Inverter

8400

E84DGxxxx...

Inverter Drives 8400 motec_ _ _ _ _ _ _ _ _ _ _ _

Reference manual EN

13572994

Lenze

Overview of technical documentation for Inverter Drives 8400

Project planning, selection & ordering

- ☐ 8400 motec hardware manual
- 🖹 Catalogue

Mounting & wiring

- 🖹 MA 8400 motec
- 🖹 MA for the accessories

Parameter setting

- 🖹 BA for diagnosis terminal
- ☐ SW 8400 motec **← This documentation**
- ☐ KHB for communication unit

Drive commissioning

- ☐ SW 8400 motec **← This documentation**
  - → chapter "Commissioning"
  - → chapter "Diagnostics & error management"

Networking

- ☐ KHB for communication unit
- 🖹 MA for the accessories

Legend:

🖹	Printed documentation
☐	Online documentation (PDF/Engineer online help)

Abbreviations used:

BA	Operating instructions
KHB	Communication manual
MA	Mounting instructions
SW	Software/reference manual

Contents

1 About this documentation

Danger!

The inverter is a source of danger which may lead to death or the severe injury of persons.

To protect yourself and others against these dangers, observe the safety instructions before switching on the inverter.

Please read the safety instructions in the mounting instructions and the hardware manual for the 8400 motec inverter. Both documents are supplied with the inverter.

This software manual contains information regarding the parameterisation of the 8400 motec inverter by means of the L-force »Engineer«.

The information in this software manual applies to the 8400 motec inverter with the following nameplate data:

Product range	Type designation	From software version
8400 motec	E84DGDVBxxxxxxx	01.00

All screenshots provided in this documentation are application examples. Depending on the software version of the inverter and the version of the »Engineer« software installed, the screenshots in this documentation may differ from the representation in the »Engineer«.

Tip!

Information and tools regarding the Lenze products can be found on the Internet:

http://www.lenze.com → Download

1.1 Document history

Version			Description
10.1	10/2019	TD06	Corrected term C00142
10.0	08/2019	TD06	Error corrections & supplements for 8400 motec (FW11.01.00)
9.0	09/2018	TD23	Extension to POWERLINK
8.1	02/2018	TD23	Error corrections & supplements
8.0	01/2018	TD23	Extended by new functions for 8400 motec V10.00.00, error corrections
7.0	06/2017	TD23	Extended by new functions for 8400 motec V09.00.00, error corrections
6.0	12/2014	TD06	Extended by new functions for 8400 motec V07.00.00
5.0	09/2014	TD05	Extended by new functions for 8400 motec V06.01.00
4.1	08/2013	TD05	Corrections
4.0	07/2013	TD05	Extended by new functions for 8400 motec V05.00.00
3.0	09/2012	TD05	• Extended by new functions for 8400 motec V03.00.00, V03.01.00, V04.00.00 and V04.01.00 • Changed to new layout
2.0	02/2011	TD05	• Extended by new functions for 8400 motec V02.00.00 • Extended by chapter "Application examples"
1.2	10/2010	TD05	Corrections
1.1	05/2010	TD05	Corrections
1.0	04/2010	TD05	First edition

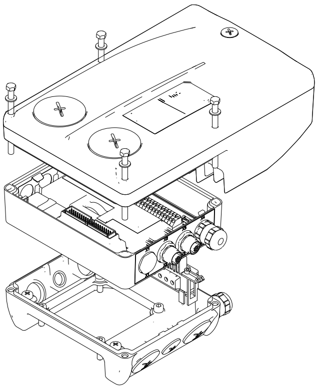
1.2 Conventions used

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

Type of information	Highlighting	Examples/notes
Numeric notation		
Decimal separator	Point	The decimal point is always used. For example: 1234.56
Text		
Version information	Blue text colour	All information that only applies to or from a certain software version of the inverter is marked accordingly in this documentation. Example: This function extension is available from software version V3.0!
Program name	» «	The Lenze »Engineer« PC software...
Window	*italics*	The *Message window*... / The dialog box *Options*...
Variable names		By setting *bEnable* to TRUE...
Control element	**Bold**	The **OK** button... / The **Copy** command... / The **Properties** tab... / The **Name** input field...
Sequence of menu commands		If several commands must be used in sequence to carry out a function, the individual commands are separated by an arrow: Select **File→Open** to...
Shortcut	**<bold>**	Use **<F1>** to open the online help.
		If a shortcut is required for a command to be executed, a "+" has been put between the key identifiers: With **<Shift>+<ESC>** ...
Hyperlink	Underlined	Optically highlighted reference to another topic. It is activated with a mouse-click in this online documentation.
Symbols		
Page reference	(🕮 14)	Optically highlighted reference to another page. It is activated with a mouse-click in this online documentation.
Step-by-step instructions	⌨	Step-by-step instructions are indicated by a pictograph.

All information that only applies to or from a certain software version of the inverter is marked accordingly in this documentation.

1.3 Terminology used

<table>
<tr><th>Term</th><th colspan="2">Meaning</th></tr>
<tr><td>Drive Unit
Communication unit
Wiring Unit
</td><td colspan="2">The 8400 motec inverter has a modular structure that includes the following modules: "Drive Unit", "Communication Unit", and "Wiring Unit".
• The drive unit is available in different power settings.
• In case of the communication unit you can select between:
  • Without fieldbus (basic I/O, standard I/O, extended I/O)
  • AS interface (without safety/with safety STO)
  • CANopen (without safety/with safety STO)
  • EtherCAT (without safety/with safety STO)
  • EtherNET/IP (without safety/with safety STO)
  • PROFIBUS (without safety/with safety STO)
  • PROFINET (without safety/with safety STO)
  • POWERLINK (without safety/with safety STO)
• The wiring unit provides flexible connection possibilities for a simple integration into the power supply of the machine.</td></tr>
<tr><td>Application</td><td colspan="2">A technology application is a drive solution equipped with Lenze's experience and know-how in which function and system blocks interconnected to a signal flow are the basis for implementing typical drive tasks.</td></tr>
<tr><td>ASM</td><td colspan="2">Async. motor</td></tr>
<tr><td>Service brake</td><td colspan="2">The service brake serves to shutdown rotary or translatory masses in motion in a controlled manner. The energy to be dissipated in this process is converted into heat in the form of friction energy. This process is a regular and recurring operating mode.</td></tr>
<tr><td>Code</td><td colspan="2">Parameter which serves to parameterise and monitor the inverter. In normal usage, the term is usually referred to as "Index".</td></tr>
<tr><td>Display code</td><td colspan="2">Parameter that displays the current status or value of an input/output of a system block.</td></tr>
<tr><td rowspan="4">Engineering tools</td><td colspan="2">Software solutions for easy engineering in all project stages</td></tr>
<tr><td></td><td>»EASY Navigator« – ensures easy operator guidance
• All convenient Lenze engineering tools at a glance
• Tools can be quickly selected
• The clear structure simplifies the engineering process from the start</td></tr>
<tr><td></td><td>»EASY Starter« – easy-to-use tool for service technicians
• Specifically designed for commissioning and maintaining Lenze devices
• Graphic user interface with very few icons
• Easy to run online diagnostics, set parameters and perform commissioning
• No risk of accidentally changing an application
• Loading off-the-shelf applications onto the device</td></tr>
<tr><td></td><td>»Engineer« – multi-device engineering
• For all products in our L-force portfolio
• Practical user interface
• Graphic interfaces make it easy to navigate
• Can be applied in every phase of a project (project planning, commissioning, production)
• Parameter setting and configuration</td></tr>
<tr><td>EPM</td><td colspan="2">Memory module on which all parametes of the drive system are saved non-volatilely. These include the parameters of the inverter and communication-relevant parameters for the communication unit used.</td></tr>
</table>

Term	Meaning
Function block	A function block can be compared with an integrated circuit that contains a certain control logic and delivers one or several values when being executed. • Each function block has a unique identifier, e.g. "L_MPot_1" (motor potentiometer function)
DC injection brake	The DC injection brake is to brake and/or hold the motor. For this purpose, the 8400 motec creates a quasi DC field at the stator of the asynchronous machine. The energy to be dissipated is converted into heat in the rotor.
Holding brake	The holding brake serves to hold the rotor by means of a mechanical unit.
Diagnosis terminal / keypad	The diagnosis terminal combines the keypad with a housing and a connecting cable. The diagnosis terminal serves to check or change individual settings. In a quick commissioning menu, the inverter can be parameterised in the basic settings by means of the diagnosis terminal. **Note:** If this documentation contains descriptions of settings with the keypad, use the diagnosis terminal instead for the 8400 motec, since the keypad cannot directly be plugged into the diagnostic interface of the 8400 motec.
LA	Abbreviation: **L**enze **A**pplication block • Example: "LA_NCtrl" – block for the "actuating drive speed" application.
Lenze setting	This setting is the default factory setting of the device.
LP	Abbreviation: **L**enze **P**ort block • Example: "LP_Network_In" – port block for fieldbus communication.
LS	Abbreviation: **L**enze **S**ystem block • Example: "LS_DigitalInput" – system block for digital input signals.
Port block	Block for implementing the process data transfer via a fieldbus
QSP	Quickstop
SLVC	Motor control: Sensorless vector control ("**S**ensor**L**ess **V**ector **C**ontrol")
Subcode	If a code contains several parameters, they are stored in "subcodes". This Manual uses a slash "/" as a separator between code and subcode (e.g. "C00039/1"). This term is also referred to as "subindex" in common parlance.
System block	In the application, system blocks provide interfaces to basic functions and to the hardware of the inverter (e.g. to the digital inputs).
USB diagnostic adapter	The USB diagnostic adapter is used for the operation, parameterisation, and diagnostics of the inverter. Data are exchanged between the PC (USB connection) and the inverter (diagnostic interface on the front) via the diagnostic adapter. • Order designation: E94AZCUS
VFCplus	Motor control: V/f characteristic control ("**V**oltage **F**requency **C**ontrol")
VFCplusEco	Motor control: V/f characteristic control - energy-saving In this motor control mode, the inverter adapts the motor voltage to the requirements of the load. Especially at speeds lower than 50 % of the rated speed and a reduced torque, losses in the motor and in the inverter can be reduced. Hence, the usually bad efficiency of the drive in the partial load operational range is significantly increased.

1.4 Definition of the notes used

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

Safety instructions

Structure of the safety instructions:

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

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

Application notes

Pictograph	Signal word	Meaning
i	**Note!**	Important note to ensure trouble-free operation
💡	**Tip!**	Useful tip for easy handling

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to present the following information more clearly.

2 Introduction: Parameterising the inverter

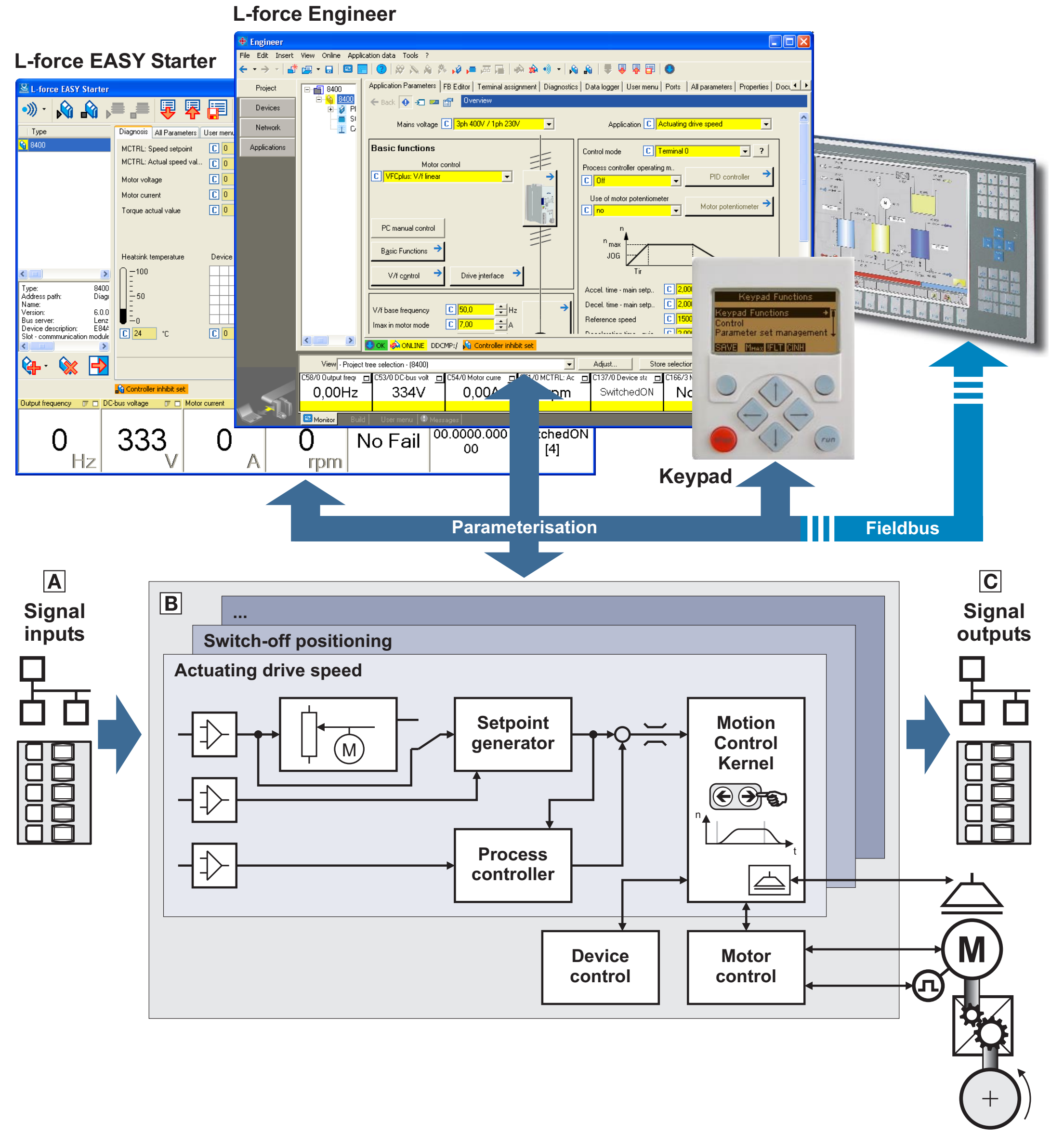
Being a component of a machine which includes a speed-variable drive system, the inverter needs to be adjusted to its drive task and the motor. The inverter is adjusted by changing parameters which are saved in the memory module. The parameters can be accessed by keypad (diagnosis terminal), by »EASY Starter« or by the »Engineer«. Access is also possible by a master control via fieldbus communication. For this purpose, various communication units are available, e.g. AS-i, CANopen, and PROFIBUS.

Danger!

In general, changing a parameter causes an immediate response in the inverter!

- This may lead to an undesirable response at the motor shaft when the inverter has been enabled!
- Setpoint sources, for instance, may switch over all of a sudden (e.g. when configuring the signal source for the main setpoint).

Certain device commands or settings which may cause critical states of drive behaviour constitute exceptions. Such parameter changes are only possible if the inverter is inhibited. Otherwise, a corresponding error message will be issued.



A Signal inputs for control and setpoint signals
B Signal flow of the integrated technology application (see the following subchapter)
C Signal outputs for status and actual value signals

[2-1] Adaptation of the drive solution via parameter setting

2.1 Integrated technology applications

The following technology applications integrated in the inverter 8400 motec provide the main signal flow for the implementation of a general or a special drive solution:

Technology application "Actuating drive speed"

This preset technology application serves to solve speed-controlled drive tasks, e.g. conveyor drives (interconnected), extruders, test benches, vibrators, travelling drives, presses, machining systems, metering units.

Technology application "actuating drive speed (AC Drive profile)"

This technology application available from version 04.01.00 provides a speed and torque control by means of "AC Drive Profile". For this purpose, the Communication Unit EtherNet/IP™ is required.

"Switch-off positioning" technology application

This technology application available from version 05.00.00 is used to solve speed-controlled drive tasks which require a pre-switch off or stopping at certain positions, e.g. roller conveyors and conveying belts. The pre-switch off is implemented by connecting switch-off sensors.

Detailed information on each technology application can be found in the main chapter entitled "Technology applications". (🕮 225)

2.2 Selection of the appropriate commissioning tool

There are several possibilities for commissioning the 8400 motec inverter:

Commissioning via keypad X400 (or diagnosis terminal X400)

The keypad is an alternative to the PC for the local operation, parameterisation, and diagnostics in a simple manner. The keypad is especially suited for test and demonstration purposes and for the case that only few parameters have to be adapted.

Note:

- Use the diagnosis terminal for the 8400 motec inverter. The diagnosis terminal combines the keypad with a housing and a connecting cable.
- The description how to make the settings with the keypad also applies to the diagnosis terminal.

Commissioning with PC and »EASY Starter«

The »EASY Starter« is a Lenze tool for easy online diagnostics, parameter setting and commissioning of the inverter.

Commissioning with PC and »Engineer«

The »Engineer« is a Lenze engineering software for parameter setting across all devices, configuring and diagnosing individual components (as for instance inverters, industrial PCs, motors, I/O systems) and machine control systems.

Tip!

The Engineering tools »EASY Starter« and »Engineer StateLevel« are provided free of charge in the internet:

http://www.Lenze.com ➞ Download ➞ Software downloads

For communication between PC and inverter, the USB diagnostic adapter can be used for instance (see the following subchapter).

2.2.1 Overview: Accessories for commissioning

Version	Features	Product key
Diagnosis terminal X400 	Keypad X400 in a robust housing, also suitable for installation into the control cabinet door. • Supports hot plugging • Graphic display with plain texts • Backlighting • Easy user guidance • 4 navigation keys, 2 context-sensitive keys • Adjustable RUN/STOP function • Incl. 2.5 m cable • Enclosure IP20; in case of front installation in control cabinet IP65 • Can be used for L-force Inverter Drives 8400 and Servo Drives 9400	EZAEBK2001
USB diagnostic adapter 	For electrical isolation of your PC and the inverter. • Supports hot plugging • Diagnostic LED for data transfer display • plug and play • Input-side voltage supply via USB connection from PC • Output-side voltage supply via the diagnostic interface of the inverter • Connecting cables can be selected in various lengths:	E94AZCUS
Connecting cable for USB diagnostic adapter	2.5 m length	EWL0070
	5 m length	EWL0071
	10 m length	EWL0072

Fast communication via diagnostic interface

From version 06.01.00, the diagnostic interface also supports the fast communication with 57,600 Baud (instead of 4,800 Baud).

- If no read or write access takes place via the diagnostic interface for 3.5 s, it is changed over to normal communication again with 4,800 Baud.
- 57,600 Baud are only possible if the 8400 motec comes with the fast diagnostic interface and an »Engineer« from version 2.19 or a keypad from firmware version 4.2 is connected.
- The current baud rate of the diagnostic interface is displayed in C01905.

2.3 General notes on parameters

All parameters for inverter parameterising or monitoring are saved as so-called "codes".

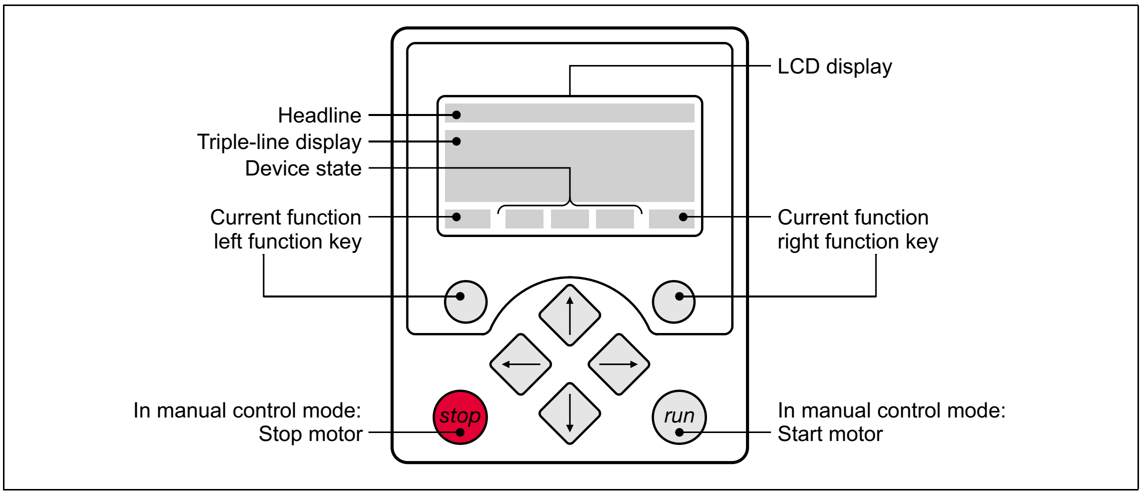
- The codes are numbered and indicated by the prefix "C" before the code, e.g. "C00002".
- Moreover, each code has a name and specific attributes, as for example access type (reading, writing), data type, limit values and default setting ("Lenze setting").
- For the sake of clarity, some codes contain "subcodes" for saving parameters. This Manual uses a slash "/" as a separator between code and subcode, e.g. C00115/1".
- According to their functionality, the parameters are divided into three groups:
  - Setting parameters: For specifying setpoints and for setting device / monitoring functions.
  - Configuration parameters: For configuring signal connections and terminal assignments.
  - Diagnostic/display parameters: For displaying device-internal process factors, current actual values and status messages. These are read-only parameters.

2.3.1 Changing the parameterisation with the keypad

Simply connect the diagnosis terminal to the diagnostic interface being located on the top of the device.

- The connecting cable can also be connected to the diagnostic interface during operation and removed again.

Keypad display and control elements



LCD display			
Headline			
In the menu level: Menu name In the parameter level: Parameter name			
Three-part display			
In the menu level: List of available menus In the parameter level: Code/subcode and setting or actual value			
Device status			
RDY	Inverter is switched on	IMP	Pulse inhibit active
RUN	Inverter is enabled	!SFLT	System fault active
CINH	Inverter is inhibited	!FLT	"Fault" device status is active
QSP	Quick stop active	!TRB	"Trouble" device status is active
Imax	Current limit exceeded	!TQSP	"TroubleQSP" device status is active
Mmax	Speed controller 1 in the limitation	WRN	A warning is indicated
Function - left function key		**Function - right function key**	
EDIT	Change parameter setting (change to editing mode)	OK	Accept change in the inverter (no saving with mains failure protection → SAVE)
☰	Back to main menu	ESC	Abort (discard change)
CINH!!	Parameter can only be changed when the inverter is inhibited		
SAVE	Save all parameter settings in the memory module safe against mains failure		

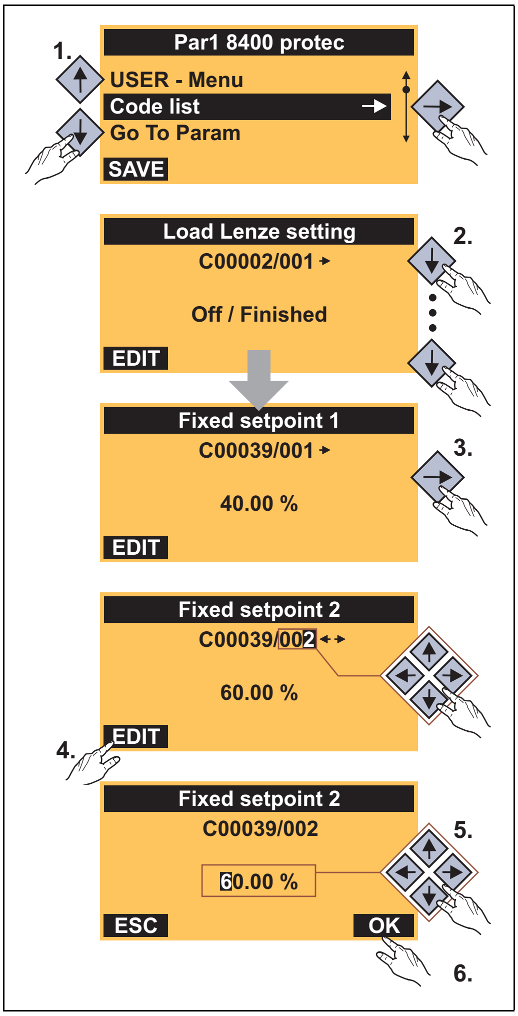
Control elements	
○	Execute the function assigned to the function key (see LCD display)
stop	Execute the stop function set in C00469 (Lenze setting: Inhibit inverter)
run	Deactivate stop function again (Lenze setting: Enable inverter again)
⇧	In the menu level: Select menu/submenu In the parameter level: Select parameter In the editing mode: Change marked digits or select list entry
⇩	
CINH	In the menu level: Select submenu/change to parameter level In the editing mode: Cursor to the right
RDY	In the menu level: One menu level higher (if available) In the parameter level: Back to the menu level In the editing mode: Cursor to the left

Menu structure

In the keypad, the parameters are classified into various menus and submenus.

- The **USER menu** includes a selection of frequently used parameters.
- The **Code list** contains all parameters.
- The **Go to param** function enables you to reach the corresponding parameter directly.
- The **Logbook** logs all errors and their chronological history.
- The **Diagnostics** menu contains diagnostic/display parameters for displaying device-internal process factors, current actual values and status messages.

General operation

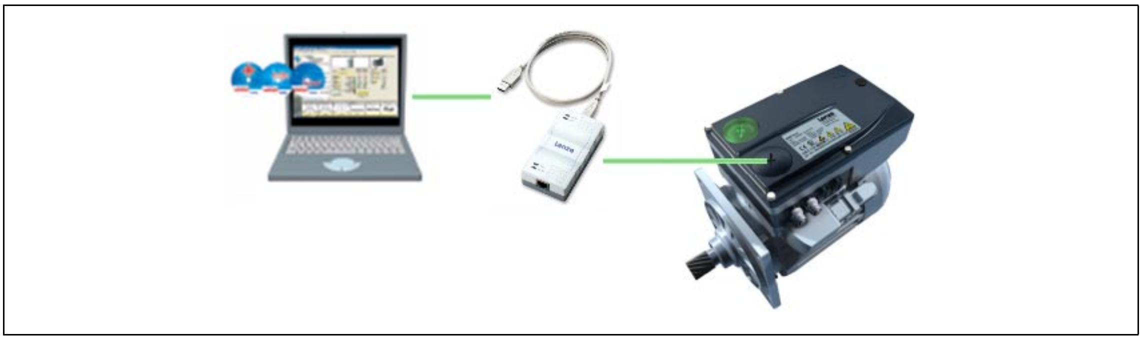


[2-2] Example: Changing parameters with the keypad

1. Use the ⇧/⇩ navigation keys to select the desired menu.
    - Use the ⇦/⇨ navigation keys to reach a higher/lower menu level.
    - Use the ☰ function key to return to the main menu.
2. Use the ⇧/⇩ navigation keys to select the parameter to be set within a submenu.
3. In order to select another subcode in case of a parameter with subcodes:
    - Press the navigation key ⇨ to change to the editing mode for the subcode.
    - Use the navigation keys to set the desired subcode.
4. Use the EDIT function key to switch over to the editing mode.
5. Use the navigation keys to set the desired value.
6. Use the OK function key to accept the change and to leave the editing mode.
    - Use the ESC function key to leave the editing mode without accepting the change.

2.3.2 Change parameter settings with PC and Lenze software

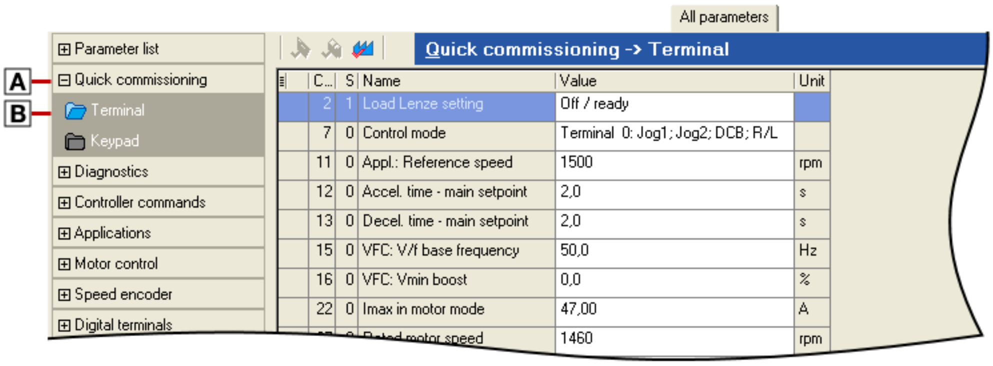
For communication between the PC (including the L-force »EASY Starter« or L-force »Engineer« software) and the inverter, the USB diagnostic adapter can for instance be used, see the following illustration. The USB diagnostic adapter is the connection between the PC (free USB port) and the inverter (diagnostic interface).



[2-3] Exemplary constellation for parameterising the inverter

The **All parameters** tab in the »EASY Starter« and the »Engineer« provides a quick access to all parameters of the inverter.

The given categories and subcategories correspond 1:1 to the menus and submenus of the keypad:



Quick commissioning -> Terminal

C...	S	Name	Value	Unit
2	1	Load Lenze setting	Off / ready	
7	0	Control mode	Terminal 0: Jog1; Jog2; DCB; R/L	
11	0	Appl.: Reference speed	1500	rpm
12	0	Accel. time - main setpoint	2,0	s
13	0	Decel. time - main setpoint	2,0	s
15	0	VFC: V/f base frequency	50,0	Hz
16	0	VFC: Vmin boost	0,0	%
22	0	Imax in motor mode	47,00	A
		Rated motor speed	1460	rpm

A Category
B Subcategories

[2-4] **All parameters** tab in the »Engineer«

Moreover, the »Engineer« provides a commissioning interface on the **Application parameters** tab where you can commission the application in a few steps.

Detailed information on how to handle the »Engineer« can be found in the integrated online help that you can call with the **[F1]** function key.

2.3.3 User menu for quick access to frequently used parameters

When a system is installed, parameters must be changed time and again until the system runs satisfactorily. The user menu of the inverter contains a selection of frequently used parameters to be able to access and change these parameters quickly:

Parameters	Name	Lenze setting
C00051	MCTRL: Actual speed value	-
C00053	DC-bus voltage	-
C00054	Motor current	-
C00061	Heatsink temperature	-
C00137	Device status	-
C00166/3	Mess. - status det. error	-
C00011	Appl.: Reference speed	1500 rpm
C00039/1	Preset setpoint 1	40.0 %
C00039/2	Preset setpoint 2	60.0 %
C00012	Acceleration time - main setpoint	2.0 s
C00013	Deceleration time - main setpoint	2.0 s
C00015	VFC: V/f base frequency	50 Hz
C00016	VFC: Vmin boost	0.0 %
C00022	Imax in motor mode	depending on the device power
C00120	Setting of motor overload (I^2xt)	100.00 %
C00087	Rated motor speed	1460 rpm
C00099	Firmware version	-
C00200	Firmware product type	-
C00105	Decel. time - quick stop	5.0 s
C00173	Mains voltage	0: "3ph 400V"
Greyed out = display parameter		

Tip!

The user menu can be freely configured in C00517.

In the »Engineer«, you can configure the user menu comfortably via the **User menu** tab (see »Engineer« online help).

2.4 Handling the memory module

Danger!

After power-off, wait at least three minutes before working on the inverter. When removing the memory module, ensure that the inverter is deenergised.

All parameters of the drive system are saved non-volatilely on the memory module. These include the parameters of the inverter and communication-relevant parameters for the communication unit used.

The plug-in version is especially suited for

- restoring an application after replacing a device.
- duplicating identical drive tasks within the frequency inverter series8400 motec, e.g. by using the optionally available EPM Programmer.

Note!

- When the device is switched on, all parameters are automatically loaded from the memory module to the main memory of the inverter.
  - When the DIP1 switch on the S1 DIP switch is in the "ON" position, the inverter works with the settings made via DIP switches S1 and S2 and displays them in the corresponding codes.
- The 8400 BaseLine and 8400 motec inverters use the same (grey) memory module. The memory module can be shifted between these inverters, but the inverter must be parameterised newly afterwards.

When handling the memory module, a distinction is drawn between the following scenarios:

Delivery status

- The memory module is plugged into the EPM slot of the drive unit.
- The Lenze setting of the parameters is stored in the memory module.
- The memory module is available as a spare part - without any data.

During operation

- Parameter sets can be saved manually.
- Parameter sets can be loaded manually.
- Parameter changes can be saved automatically.

Replacement of the inverter

- In the event of a device replacement, the entire parameter data of an axis can be copied to the replacement device by "taking along" the memory module, so that additional PC or diagnosis terminal operations are not required.
- When replacing the inverter, the versions of the old and new device are of importance. Before data are actually transferred, the versions are checked internally. As a general principle, the following applies:
  - Parameter sets of old devices with V 1.0 can be processed on new devices ≥ V 1.0 (downward compatibility).
  - Parameters of devices with higher versions are not supported on devices with lower versions. An error message will be issued if the parameter set versions of the two devices are not compatible.

Saving the parameters in the memory module safe against mains failure

Inverter parameter changes via the »Engineer«, the diagnosis terminal, or a master control via fieldbus communication will be lost after mains switching of the inverter unless the settings have been explicitly saved.

You have several options to avoid data loss by saving the parameter sets in the memory module:

- Automatic saving of parameter changes (🕮 67)
- Manual saving of parameter settings (🕮 67)

Parameter set transfer using the »Engineer«

When an online connection to the inverter has been established, the following transfer functions can directly be executed via the *Toolbar* or the **Online** menu using the L-force »Engineer«:

Symbol	Menu command	Shortcut
⬇	Download parameter set	<F5>
⬆	Upload parameter set from device	<F7>
💾	Save parameter set	

Tip!

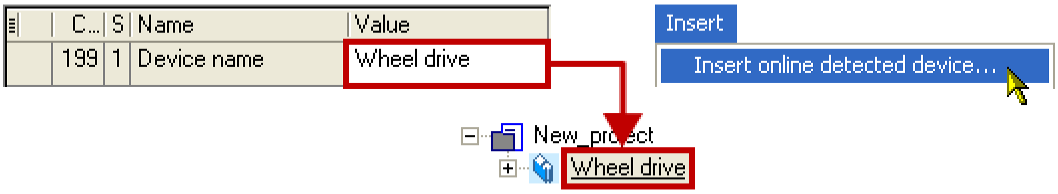
Detailed information on parameter set transfers using the »Engineer« can be found in the »Engineer« online help.

2.5 Device identification

For device identification, any device name (e.g. wheel drive) with max 32 characters can be set in C00199/1 for the inverter and saved in the memory module with mains failure protection.

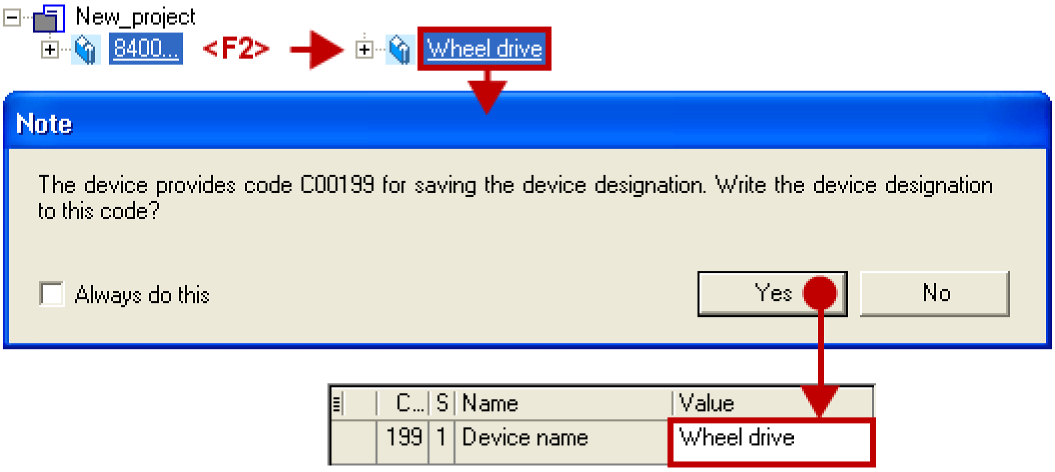
2.5.1 Automatic acceptance of the device name in the »Engineer«

If a device name is assigned in C00199/1 and the inverter in the »Engineer« is added to the project via the **Insert → Insert device detected online...** function, the device name stored in C00199/1 (here: wheel drive) is used as device designation in the *Project view* instead of the type (8400 motec):



C...	S	Name	Value
199	1	Device name	Wheel drive

This mechanism also functions in reverse direction:
If you rename the inverter in the *project view* via **<F2>**, you will be asked afterwards if you want to take over the changed name in C00199/1:



The device provides code C00199 for saving the device designation. Write the device designation to this code?

☐ Always do this

C...	S	Name	Value
199	1	Device name	Wheel drive

3 Commissioning

The 8400 motec inverter is commissioned in one of the following ways:

- Commissioning via PC / »Engineer«
  - The »Engineer« provides for convenient access to all parameters of the 8400 motec inverter and hence offers full flexibility in the commissioning process.
- Commissioning with diagnosis terminal
  (If only a few parameters have to be adapted)

  With regard to this, please observe the Note concerning the simplified commissioning process for the SLVC control mode, which is provided from version V09.00.00 onwards.
- Commissioning via the DIP switches/potentiometers at the 8400 motec
  (for simple applications)

This chapter provides information on how to commission the 8400 motec using the »Engineer«.

> Information on how to commission the 8400 motec via the DIP switches/potentiometers can be found in the mounting instructions!
>
> Information on how to commission the 8400 motec using the diagnosis terminal can be found in the hardware manual!

3.1 Safety instructions with regard to commissioning

General safety instructions

In order to prevent injury to persons or damage to material assets

- check before connecting the mains voltage
  - the wiring for completeness, short circuit, and earth fault
  - the "emergency stop" function of the entire system
  - that the motor circuit configuration (star/delta) is adapted to the output voltage of the inverter
  - the in-phase connection of the motor
  - The direction of rotation or the encoder (if available)
- check the setting of the most important drive parameters before enabling the controller:
  - the V/f rated frequency must be adapted to the motor circuit configuration!
  - the drive parameters relevant for your application must be set correctly!
  - the configuration of the I/O terminals must be adapted to the wiring!
- ensure that there are no active speed setpoints before enabling the controller.

⚠ **Danger!**

By default, the RFR control input is connected with a bridge to +24 V, meaning that the inverter is enabled!

- This input can also be used for switching on/off the drive. For this purpose, the bridge must be replaced by cabling.

Safety instructions with regard to motor operation

⚠ **Danger!**

- For thermal reasons, continuous operation of self-ventilated motors at a low field frequency and rated motor current is not permissible!
  - In the Lenze setting, the Motor temperature monitoring (PTC) is activated. (🕮 200)
- In the Lenze setting, the Brake resistor monitoring (I2xt) is activated. The activation of the monitoring function causes a switch-off of the braking operation. (🕮 201)
- With regard to the setting of the V/f base frequency (C00015), observe the following difference to the 8400 StateLine/HighLine/TopLine inverters:
  In the case of 8400 motec, the reference voltage for the V/ base frequency is the rated motor voltage (C00090) according to the motor nameplate (irrespective of the supply voltage).

3.2 Preconditions for commissioning with the »Engineer«

For commissioning, you need

- a PC that meets the following system requirements:
  - a processor with 1.4 GHz or higher
  - at least 512 MB RAM and 650 MB free hard disc space
  - Microsoft® Windows® 2000 operating system (from service pack 2 onwards) or Windows® XP
- the Lenze »Engineer« PC software
- a connection to the inverter (via the diagnostic interface or fieldbus)

Tip!

How to obtain/update the »Engineer« software:

- **Download from the internet:** The full version of the »Engineer StateLevel« is provided free of charge in the internet:
  http://www.Lenze.com ➞ Download ➞ Software downloads
- **Requesting the CD**You can also request the »Engineer« separately on CD free of charge at your Lenze representative. See the "About Lenze" area on our homepage for e.g. the corresponding German address.

3.3 Trouble-shooting during commissioning

When the »Engineer« is used, trouble during commissioning can be detected and eliminated conveniently. Proceed as follows:

- Check whether error messages appear in the »Engineer«.
  - On the **Diagnostics** tab, relevant actual states of the inverter and pending error messages are displayed in a well-arranged visualisation.
- Check whether the DIP switches on the Drive Unit are set correctly.
  - The »Engineer« serves to display the setting of the DIO switches S1 / S2 and the potentiometers P1 - P3 on the **Diagnostics** tab by clicking the **DIP switch** button.
- Check the input terminals for their corresponding setpoints.
  - The **Terminal assignment** tab displays the current input/output signals.
- Check the signal flow of the application.
  - For this purpose, click the **Signal flow** button on the **Application parameter** tab. The displayed signal flow shows active setpoints and their further processing.

Related topics:

▶ Diagnostics & error management (📖 311)

▶ Display of DIP switch positions (📖 316)

▶ LED status display (📖 312)

▶ Error messages of the operating system (📖 330)

3.4 Commissioning wizard 8400

This function extension is supported by the »Engineer« from version 2.15 onwards!

The **commissioning wizard 8400** serves to carry out a guided commissioning of the inverter based on the Lenze setting of the parameters. The set parameters can then be saved in the inverter with mains failure protection.

Note!

Take all the necessary safety precautions before you carry out the following commissioning steps and switch the device on!

▶ Safety instructions with regard to commissioning (📖 34)

How to carry out a guided commissioning using the »Engineer«:

1. Go to the *Project view* and select the 8400 motec inverter.
2. Go online.
   - After a connection to the inverter has been established, the following status is displayed in the *Status line*:

ONLINE

3. Click the icon to open the *commissioning wizard 8400* dialog box.
   - Now the commissioning wizard guides you step by step through the setting of the important parameters for a quick commissioning.
   - The **Next** button can only be activated again after all parameter settings in the device have been reset via the **Load Lenze setting** button.

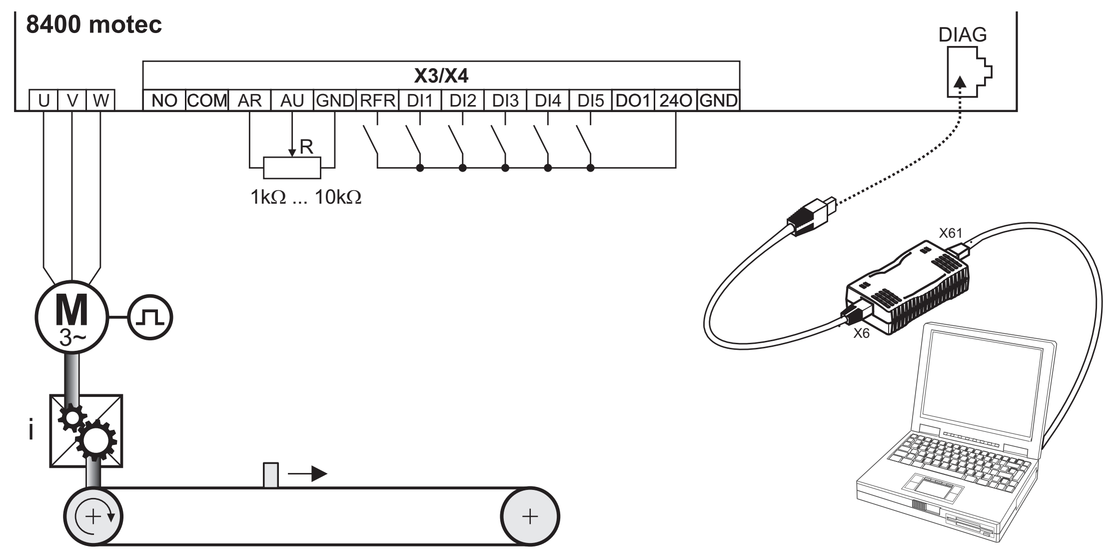
3.5 Commissioning of the "Actuating drive speed" technology application

Note!

Take all the necessary safety precautions before you carry out the following commissioning steps and switch the device on!

- Safety instructions with regard to commissioning (🕮 34)

System constellation



AR	Reference voltage (10 V) for analog signals
AU	Speed setpoint selection (slider of setpoint potentiometer R) • Scaling: 10 V ≡ 100 % ≡ 1500 rpm^{1} (for a 4-pole motor)
GND	Ground potential (GND) for analog signals
RFR	Controller enable
DIAG	Diagnostic interface for connecting the USB diagnostic adapter

[3-1] Block diagram for wiring the commissioning example for the "Actuating drive speed" application

Commissioning steps

Find a description of the commissioning steps of the "Actuating drive speed" technology application below.

Please observe the sequence of the steps in the following chapters and follow them through carefully. This will help you to commission your inverter quickly and as safely as possible:

- Prepare inverter for commissioning (🕮 38)
- Creating an »Engineer« project & going online (🕮 39)
- Parameterising the motor control (🕮 40)
- Parameterise application (🕮 42)
- Save parameter settings safe against mains failure (🕮 44)
- Enabling the inverter and selecting the speed (🕮 44)

3.5.1 Prepare inverter for commissioning

1. Wiring the power and control terminals
    - Use the mounting instructions supplied with the inverter in order to connect the power and control terminals correctly.
    - Assign the digital inputs so that your application can be displayed by one of the preconfigured control modes (C00007) for terminal control:

	Assignment of the digital terminals				
Control mode	**DI1**	**DI2**	**DI3**	**DI4**	**DI5**
Terminals 0	JOG 1/3	JOG 2/3	DCB	Cw/Ccw	BrkRelease
Terminals 2	JOG 1/3	JOG 2/3	QSP	Cw/Ccw	BrkRelease
Terminals 11	Cw/Ccw	DCB	MPotUp	MPotDown	BrkRelease
Terminal 16	JOG 1/3	JOG 2/3	Cw/QSP	Ccw/QSP	BrkRelease

Abbreviations used:

JOG	Selection of fixed setpoints 1 ... 3 parameterised in C00039/1...3
DCB	Manual DC-injection braking
Cw/Ccw	CW/CCW rotation
QSP	Quick stop
MPotUp	Motor potentiometer: Increase speed
MPotDown	Motor potentiometer: Reduce speed
Cw/QSP	Fail-safe selection of the direction of rotation in connection with quick stop
Ccw/QSP	
BrkRelease	Release holding brake manually • In the Lenze setting, the brake control is switched off (not active). ➞ Set operating mode in C02580.

2. Drive Unit: Check DIP switch S1 and DIP switch S2.
    - DIP switch S1/DIP1 must be set to "OFF" in order that no parameters of the memory module are overwritten when the device is started.
    - See display parameters C01911 and C01912 for details.
3. Communication Unit CANopen or PROFIBUS: Set DIP switch S3.
    - See display parameters C00349 (CANopen) or C13920 (PROFIBUS) for details.
4. Position the drive unit carefully onto the communication unit and fix it using the four screws.
5. Inhibit inverter: Set RFR terminal to LOW level or open the contact.
6. Switch on voltage supply of the inverter.
    - Information on some operating states can be quickly obtained via the two-colored LED display on the top of the device. ▶ LED status display (🕮 312)
7. establish a connection to the inverter, e.g. via a USB diagnostic adapter:
    - Remove the cover of the diagnostic interface on the top of the device and connect the USB diagnostic adapter to the diagnostic interface.
    - establish a connection between the USB diagnostic adapter and the PC via a free USB port.

3.5.2 Creating an »Engineer« project & going online

You can find detailed information on the general use of the »Engineer« in the online help which you can call with **[F1]**.

- The chapter "Working with projects" describes, among other things, all options of the *Start-up wizard* which are available to create a new »Engineer« project.

The following steps serve to describe a general method for creating a project with the **Select component from catalogue** option. For this purpose, individual components (inverter, motor, etc.) are selected from selection lists.

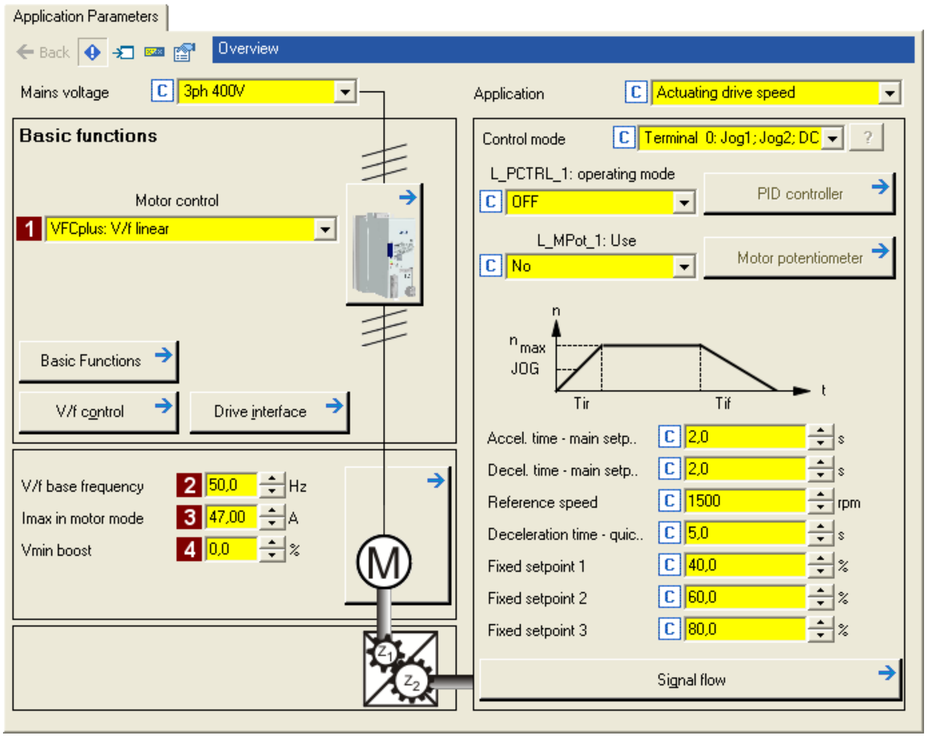
1. Start »Engineer«.
2. Create a new project with the *Start-up wizard* and the **Select component from catalogue** option:
   - In the **Component** step, select the 8400 motec inverter.
   - Select the available communication option in the **device modules** dialog step.
   - Select the "actuating drive speed" application in the **Application** dialog step.
   - Select the other components (motor/gearbox) to be added to the project in the **Other components** dialog step.
3. Go online.
   - After a connection to the inverter has been established, the following status is displayed in the *Status line*:

ONLINE

4. Download parameter set.
   - This command serves to overwrite the current parameter settings in the inverter by parameter settings of the »Engineer« project.

3.5.3 Parameterising the motor control

1. Select the **Application parameters** tab from the *Workspace*.
   - The motor control parameters, among other things, can be found on the left:


Mains voltage C 3ph 400V
Application C Actuating drive speed
Control mode C Terminal 0: Jog1; Jog2; DC
L_PCTRL_1: operating mode C OFF
L_MPot_1: Use C No
Motor control **1** VFCplus: V/f linear
V/f base frequency **2** 50,0 Hz
Imax in motor mode **3** 47,00 A
Vmin boost **4** 0,0 %
Accel. time - main setp.. C 2,0 s
Decel. time - main setp.. C 2,0 s
Reference speed C 1500 rpm
Deceleration time - quic.. C 5,0 s
Fixed setpoint 1 C 40,0 %
Fixed setpoint 2 C 60,0 %
Fixed setpoint 3 C 80,0 %

2. In the **1** **Motor control** list field (C00006), select the desired motor control.

Note!

In the Lenze setting, the V/f characteristic control (VFCplus) with linear characteristic is set in C00006 as motor control.

- V/f characteristic control (VFCplus) is a motor control mode for classic frequency inverter applications on the basis of a simple and robust control procedure for the operation of machines with a linear or quadratic load torque characteristic (e.g. fans).
- The presettings of the parameters ensure that the inverter is immediately ready for operation and the motor works adequately without further parameterisation if an inverter and a 50 Hz asynchronous machine with matching performances are assigned to each other.

3. Adapt the motor control parameters:

Parameters		Lenze setting		Information
		Value	Unit	
2	**V/f base frequency** (C00015)	50.0	Hz	▸ Adapting the V/f base frequency (🕮 108)
3	**Imax in motor mode** (C00022)	47.00	A	▸ Optimising the Imax controller (🕮 110)
4	**Vmin boost** (C00016)	0.0	%	▸ Adapting the Vmin boost (🕮 109)

Tip!

Also compare the other information on the nameplate to the motor data set in the inverter. You can find further information in the chapter entitled "Motor selection/Motor data". (📖 87)

Recommendations for the following application cases:

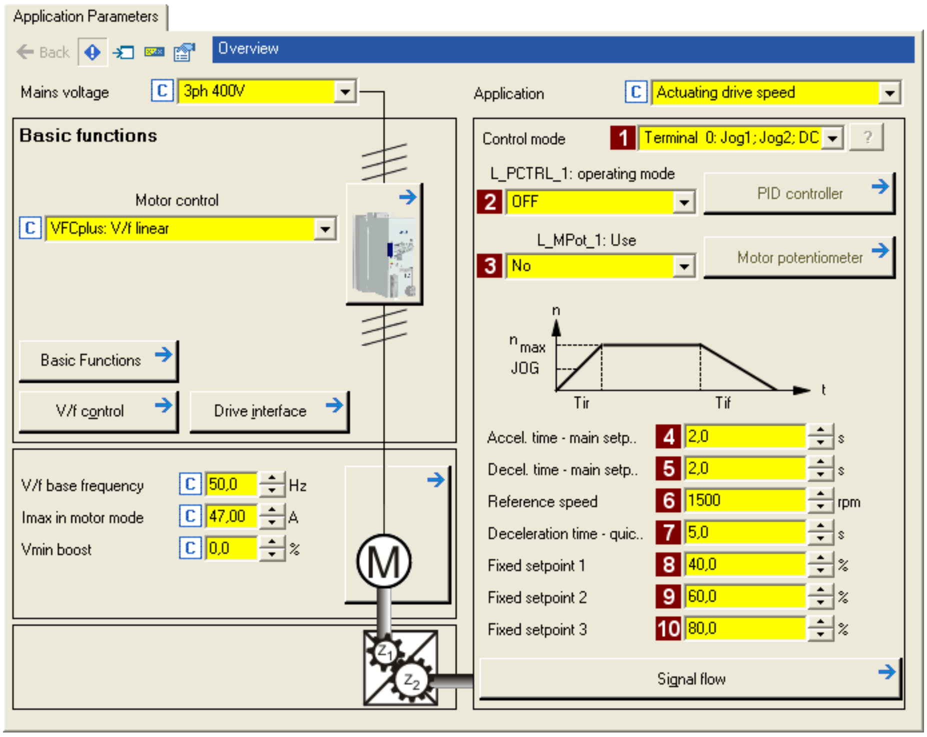
- If the inverter and motor show great differences in terms of performance: set the Imax limit (in motor mode) in C00022 to twice the rated motor current.
- If a higher starting torque is required: In idle state of the motor, set the Vmin boost in C00016 in such a way that the rated motor current flows at a field frequency of f = 3 Hz (display in C00058).
- If a high torque must be provided at small speeds without feedback: Select "Sensorless vector control (SLVC) as motor control mode in C00006.

Related topics:

- ▶ Motor control (MCTRL) (📖 85)
- ▶ Selecting the control mode (📖 97)
- ▶ V/f characteristic control (VFCplus) (📖 103)
- ▶ Sensorless vector control (SLVC) (📖 135)

3.5.4 Parameterise application

The application parameters can be found on the right side of the **Application parameter** tab:



Mains voltage: C 3ph 400V

Application: C Actuating drive speed

Motor control: C VFCplus: V/f linear

V/f base frequency: C 50,0 Hz

Imax in motor mode: C 47,00 A

Vmin boost: C 0,0 %

Control mode: 1 Terminal 0: Jog1; Jog2; DC

L_PCTRL_1: operating mode: 2 OFF

L_MPot_1: Use: 3 No

Accel. time - main setp.: 4 2,0 s

Decel. time - main setp.: 5 2,0 s

Reference speed: 6 1500 rpm

Deceleration time - quic..: 7 5,0 s

Fixed setpoint 1: 8 40,0 %

Fixed setpoint 2: 9 60,0 %

Fixed setpoint 3: 10 80,0 %

1. Select the required control mode in the 1 **Control mode** (C00007) list field.
   - The corresponding wiring diagram is displayed in a pop-up window if you click the ? button right to the list field.
   - For a detailed description, see the chapter "Terminal assignment of the control modes". (📖 240)
2. Optional: Use process controller.
   - For this purpose, select the desired operating mode in the 2 **L_PCTRL_1: Operating mode** list field (C00242).
   - For a detailed description see the L_PCTRL_1 function block. (📖 498)
   - Go to the parameterisation dialog of the process controller via the **Process controller** button.
3. Optional: Use motor potentiometer.
   - For this purpose, select "1: On" in the 3 **L_MPot_1: Use** list field (C00806).
   - For a detailed description see the L_MPot_1 function block. (📖 487)
   - Go to the parameterisation dialog of the motor potentiometer via the **Motor potentiometer** button.

4. Adapt the application parameters:

Parameters		Lenze setting		Information
		Value	Unit	
4	**Accel. time - main setpoint** (C00012)	2.0	s	The setpoint is led via a ramp function generator with linear characteristic. The ramp function generator converts setpoint step-changes at the input into a ramp. ▸ L_NSet_1 (🕮 491)
5	**Decel. time - main setpoint** (C00013)	2.0	s	
6	**Reference speed** (C00011)	1500	rpm	All speed setpoint selections are provided in % and always refer to the reference speed set in C00011. The motor reference speed is indicated on the motor nameplate.
7	**Decel. time - quick stop** (C00105)	5.0	s	If quick stop is requested, motor control is decoupled from the setpoint selection and, within the deceleration time parameterised in C00105, the motor is brought to a standstill ($n_{act} = 0$). ▸ Activate/deactivate quick stop (🕮 68)
8	**Preset setpoint 1** (C00039/1)	40.0	%	A fixed setpoint for the setpoint generator can be activated instead of the main setpoint via the selection inputs *bJogSpeed1* and *bJogSpeed2*. • Fixed setpoints are selected in [%] based on the reference speed (C00011). ▸ L_NSet_1 (🕮 491)
9	**Preset setpoint 2** (C00039/2)	60.0	%	
10	**Preset setpoint 3** (C00039/3)	80.0	%	

Tip!

- Click the **Signal flow** button to go down one dialog level to the signal flow of the application with further possible parameter settings. See chapter "Basic signal flow". (🕮 228)
- The preconfigured I/O connection in the selected control mode can be changed via configuration parameters. See chapter "User-defined terminal assignment". (🕮 217)

More detailed informaton on the technology application:

▸ TA "Actuating drive speed" (🕮 227)

▸ Interface description (🕮 232)

▸ wDriveControl control word (🕮 238)

▸ Terminal assignment of the control modes (🕮 240)

▸ Setting parameters (short overview) (🕮 245)

▸ Pre-assignment of the application (🕮 246)

3.5.5 Save parameter settings safe against mains failure

In order to prevent parameter settings carried out in the device from being lost by mains switching, you have to explicitly save the parameter set with mains failure protection in the device.

- Saving parameter set

3.5.6 Enabling the inverter and selecting the speed

Stop!

Before stipulating a speed setpoint, check whether the brake in the form of a holding brake on the motor shaft has been released!

Note!

If the controller is enabled at mains connection and C00142 has activated the "Inhibit at device on" auto-start option (Lenze setting), the inverter remains in the "ReadyToSwitchOn" state.

In order to change to the "SwitchedOn" status, controller enable must first be cancelled: Set RFR terminal to LOW level.

If the inverter is in the "SwitchedOn" state:

1. Enable inverter: Set RFR terminal to HIGH level.
2. Select speed:
   - In the "Terminals 0" by selecting a voltage at the analog input or by selecting a fixed setpoint via the digital inputs DI1/DI2.

DI1	DI2	Speed selection
LOW	**LOW**	The main speed setpoint is selected via the analog input 1 • Scaling: 10 V ≡ 100 % reference speed (C00011)
HIGH	LOW	The fixed setpoint 1 (C00039/1) is used as main speed setpoint. • Lenze setting: 40 % of the reference speed (C00011)
LOW	HIGH	The fixed setpoint 2 (C00039/2) is used as main speed setpoint. • Lenze setting: 60 % of the reference speed (C00011)
HIGH	HIGH	The fixed setpoint 3 (C00039/3) is used as main speed setpoint. • Lenze setting: 80 % of the reference speed (C00011)

Note!

Observe the actual speed value (display in C00051) and the LED status display on the inverter.

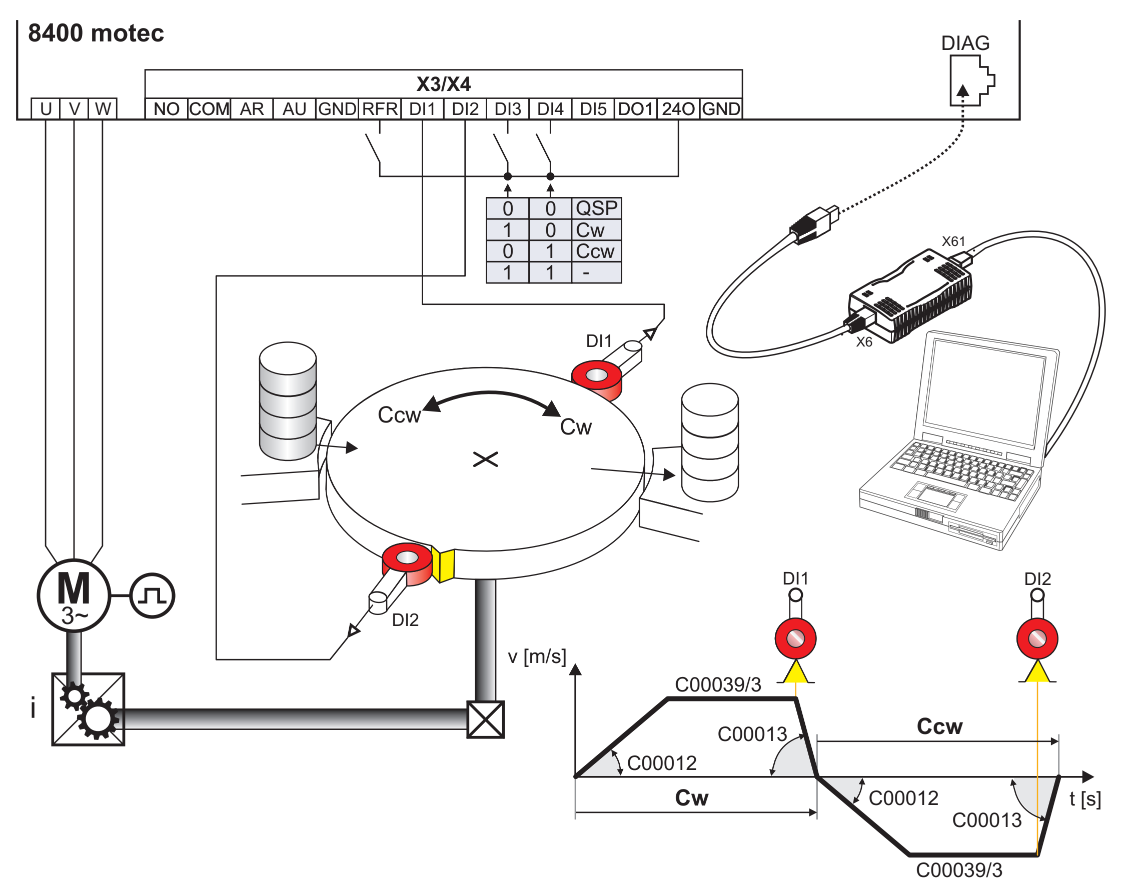
3.6 Commissioning of the "Switch-off positioning" technology application

Note!

Take all the necessary safety precautions before you carry out the following commissioning steps and switch the device on!

▶ Safety instructions with regard to commissioning (🕮 34)

System constellation



0	0	QSP
1	0	Cw
0	1	Ccw
1	1	-

RFR	Controller enable
DI1	Initiator connection for stop function 1
DI2	Initiator connection for stop function 2
DI3	Quick stop for CW rotation / selection of switch-off position 1
DI4	Quick stop for CCW rotation / selection of switch-off position 2
DIAG	Diagnostic interface for connecting the USB diagnostic adapter

[3-2] Block diagram for wiring of the commissioning example for the "Switch-off positioning" technology application

Functional principle of a switch-off positioning without pre-switch off

In case of the switch-off positioning without pre-switch off shown above, it makes sense to use the "Terminals 2" control mode:

1. Set DI3 to HIGH level to activate CW rotation.
2. The drive accelerates along the acceleration ramp (C00012) up to the traversing speed set in C00039/3.
3. After the contact DI1 is reached, the drive is led to the target position along the deceleration ramp (C00013) and comes to a standstill there.
4. Reset DI3 to LOW level and set DI4 to HIGH level to activate CCW rotation now.
5. The drive is accelerated along the acceleration ramp (C00012) up to the traversing speed set in C00039/3.
6. After the contact DI2 is reached, the drive is led to the target position along the deceleration ramp (C00013) and comes to a standstill there.

   Note: If DI3 and DI4 are reset to LOW level before the target position has been reached, the drive is led to standstill with quick stop (QSP).

Tip!

- In order to avoid positioning inaccuracy due to signal propagation delays, the initiators can be directly evaluated by the inverter. Limit switch evaluation can be configured in the inverter. In code C00488/x you can change the method of detecting position signals from level evaluation to edge evaluation.
- In order to prevent unintended movements of the load in the target position, the use of a holding brake is recommended as an alternative to DC-injection braking (limited torque).

Commissioning steps

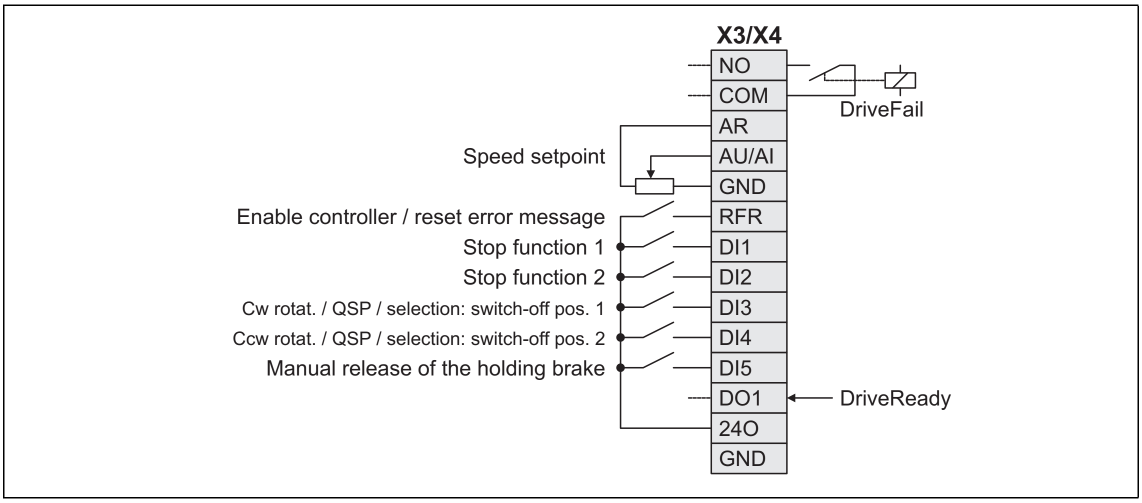
As shown in illustration [3-2], below find a description of the commissioning steps of the "Switch-off positioning" application without pre-switch off.

Please observe the sequence of the steps in the following chapters and follow them through carefully. This will help you to commission your inverter quickly and as safely as possible:

- Prepare inverter for commissioning (📖 47)
- Creating an »Engineer« project & going online (📖 48)
- Parameterising the motor control (📖 49)
- Parameterise application (📖 51)
- Save parameter settings safe against mains failure (📖 53)
- Enable inverter and test application (📖 53)

3.6.1 Prepare inverter for commissioning

1. Wiring the power and control terminals
    - Use the mounting instructions supplied with the inverter in order to connect the power and control terminals correctly.
    - In case of the application shown in illustration [3-2], switch-off positioning without pre-switch off, wiring according to the "Terminals 2" control mode makes sense:



2. Drive Unit: Check DIP switch S1 and DIP switch S2.
    - DIP switch S1/DIP1 must be set to "OFF" in order that no parameters of the memory module are overwritten when the device is started.
    - See display parameters C01911 and C01912 for details.
3. Communication Unit CANopen or PROFIBUS: Set DIP switch S3.
    - See display parameters C00349 (CANopen) or C13920 (PROFIBUS) for details.
4. Position the drive unit carefully onto the communication unit and fix it using the four screws.
5. Inhibit inverter: Set RFR terminal to LOW level or open the contact.
6. Switch on voltage supply of the inverter.
    - Information on some operating states can be quickly obtained via the two-colored LED display on the top of the device. ▶ LED status display (📖 312)
7. establish a connection to the inverter, e.g. via a USB diagnostic adapter:
    - Remove the cover of the diagnostic interface on the top of the device and connect the USB diagnostic adapter to the diagnostic interface.
    - establish a connection between the USB diagnostic adapter and the PC via a free USB port.

3.6.2 Creating an »Engineer« project & going online

You can find detailed information on the general use of the »Engineer« in the online help which you can call with **[F1]**.

- The chapter "Working with projects" describes, among other things, all options of the *Start-up wizard* which are available to create a new »Engineer« project.

The following steps serve to describe a general method for creating a project with the **Select component from catalogue** option. For this purpose, individual components (inverter, motor, etc.) are selected from selection lists.

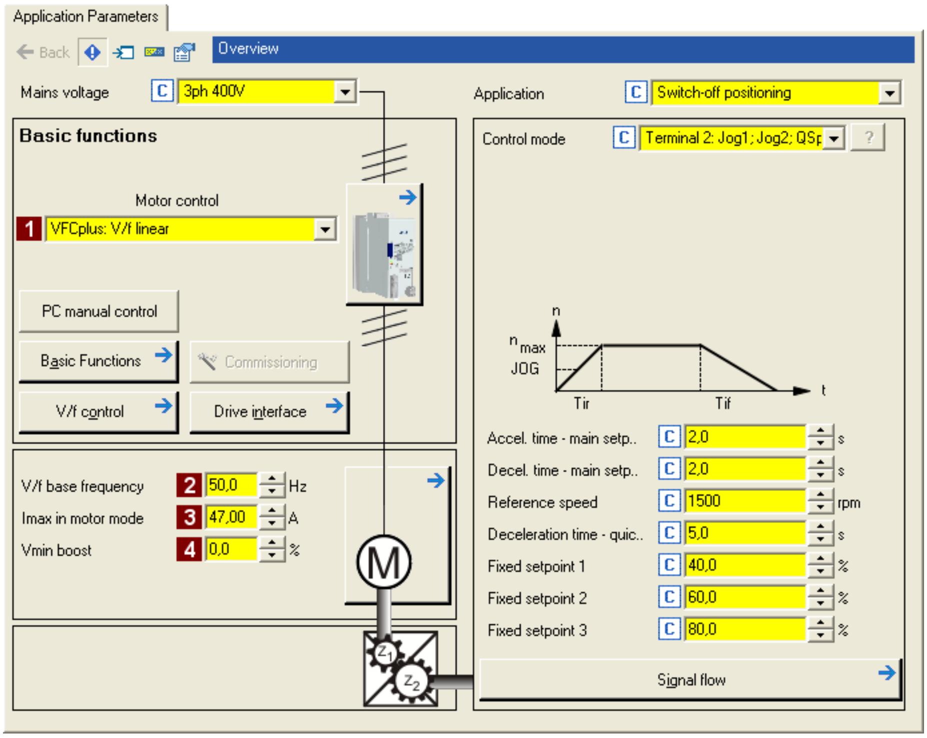
1. Start »Engineer«.
2. Create a new project with the *Start-up wizard* and the **Select component from catalogue** option:
   - In the **Component** step, select the 8400 motec inverter.
   - Select the available communication option in the **device modules** dialog step.
   - In the **Application** step, select the "Switch-off positioning" application. (The application can also be selected any time afterwards via the **Application parameter** tab or C00005.)
   - Select the other components (motor/gearbox) to be added to the project in the **Other components** dialog step.
3. Go online.
   - After a connection to the inverter has been established, the following status is displayed in the *Status line*:


ONLINE

4. Transfer parameter set to the device.
   - This command serves to overwrite the current parameter settings in the inverter by parameter settings of the »Engineer« project.

3.6.3 Parameterising the motor control

1. Select the **Application parameters** tab from the *Workspace*.
   - The motor control parameters, among other things, can be found on the left:



Mains voltage: 3ph 400V
Application: Switch-off positioning
Control mode: Terminal 2: Jog1; Jog2; QSp
Motor control: VFCplus: V/f linear
V/f base frequency: 50,0 Hz
Imax in motor mode: 47,00 A
Vmin boost: 0,0 %
Accel. time - main setp..: 2,0 s
Decel. time - main setp..: 2,0 s
Reference speed: 1500 rpm
Deceleration time - quic..: 5,0 s
Fixed setpoint 1: 40,0 %
Fixed setpoint 2: 60,0 %
Fixed setpoint 3: 80,0 %

2. In the 1 **Motor control** list field (C00006), select the desired motor control.

Note!

In the Lenze setting, the V/f characteristic control (VFCplus) with linear characteristic is set in C00006 as motor control.

- V/f characteristic control (VFCplus) is a motor control mode for classic frequency inverter applications on the basis of a simple and robust control procedure for the operation of machines with a linear or quadratic load torque characteristic (e.g. fans).
- The presettings of the parameters ensure that the inverter is immediately ready for operation and the motor works adequately without further parameterisation if an inverter and a 50 Hz asynchronous machine with matching performances are assigned to each other.

3. Adapt the motor control parameters:

Parameters		Lenze setting		Information
		Value	Unit	
2	**V/f base frequency** (C00015)	50.0	Hz	▸ Adapting the V/f base frequency (🕮 108)
3	**Imax in motor mode** (C00022)	47.00	A	▸ Optimising the Imax controller (🕮 110)
4	**Vmin boost** (C00016)	0.0	%	▸ Adapting the Vmin boost (🕮 109)

Tip!

Also compare the other information on the nameplate to the motor data set in the inverter. You can find further information in the chapter entitled "Motor selection/Motor data". (📖 87)

Recommendations for the following application cases:

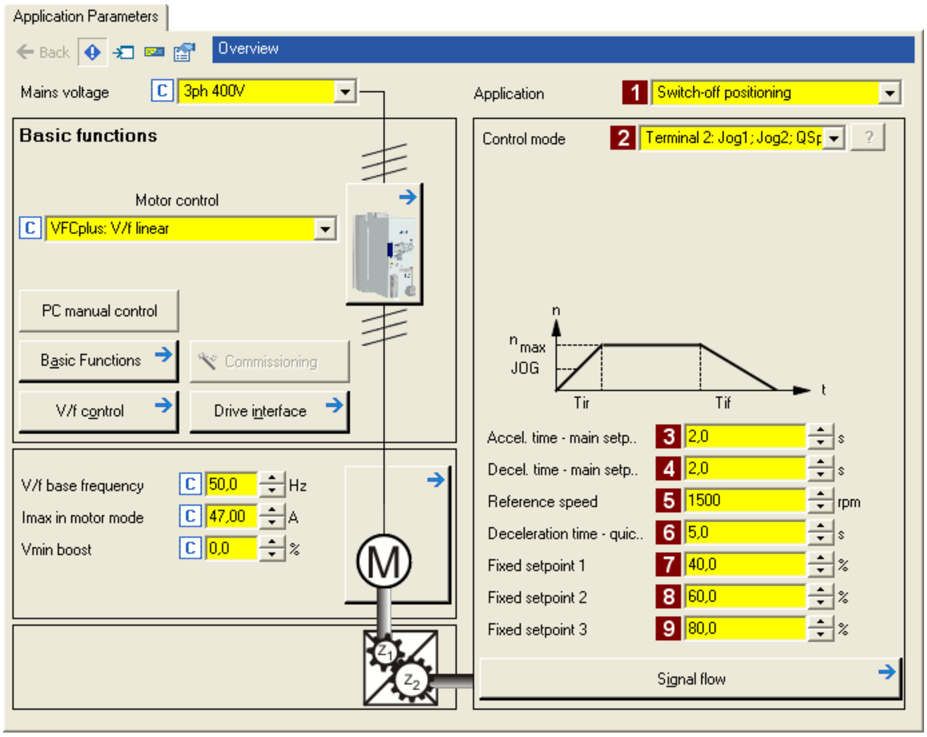
- If the inverter and motor show great differences in terms of performance:
  set the Imax limit (in motor mode) in C00022 to twice the rated motor current.
- If a higher starting torque is required:
  In idle state of the motor, set the Vmin boost in C00016 in such a way that the rated motor current flows at a field frequency of f = 3 Hz (display in C00058).
- If a high torque must be provided at small speeds without feedback:
  Select "Sensorless vector control (SLVC) as motor control mode in C00006.

Related topics:

- ▶ Motor control (MCTRL) (📖 85)
- ▶ Selecting the control mode (📖 97)
- ▶ V/f characteristic control (VFCplus) (📖 103)
- ▶ Sensorless vector control (SLVC) (📖 135)

3.6.4 Parameterise application

The application parameters can be found on the right side of the **Application parameter** tab:



Mains voltage: 3ph 400V

Application: 1 Switch-off positioning

Motor control: VFCplus: V/f linear

Control mode: 2 Terminal 2: Jog1; Jog2; QSp

V/f base frequency: 50,0 Hz

Imax in motor mode: 47,00 A

Vmin boost: 0,0 %

Accel. time - main setp.: 3 2,0 s

Decel. time - main setp.: 4 2,0 s

Reference speed: 5 1500 rpm

Deceleration time - quic..: 6 5,0 s

Fixed setpoint 1: 7 40,0 %

Fixed setpoint 2: 8 60,0 %

Fixed setpoint 3: 9 80,0 %

1. In the **1** **Application** list field (C00005), select the "switch-off positioning".
   - After the "Switch-off positioning" application is selected, the contents of the tab change, e.g. the **Process controller** and **Motor potentiometer** buttons are not shown any more.
2. In the **2** **Control mode** list field (C00007) and in case of illustration [3-2], for the shown switch-off positioning without pre-switch off the "Terminals 2" control mode must be selected.
   - The corresponding wiring diagram is displayed in a pop-up window if you click the ? button right to the list field.
   - For a detailed description, see the chapter "Terminal assignment of the control modes". (📖 272)

3. Adapt the application parameters:

Parameters		Lenze setting		Information
		Value	Unit	
3	**Accel. time - main setpoint** (C00012)	2.0	s	The setpoint is led via a ramp function generator with linear characteristic. The ramp function generator converts setpoint step-changes at the input into a ramp. Note: These settings only apply if no other ramp times have been selected at the FB L_NSet_1!
4	**Decel. time - main setpoint** (C00013)	2.0	s	
5	**Reference speed** (C00011)	1500	rpm	All speed setpoint selections are provided in % and always refer to the reference speed set in C00011. The motor reference speed is indicated on the motor nameplate.
6	**Decel. time - quick stop** (C00105)	5.0	s	If quick stop is requested, motor control is decoupled from the setpoint selection and, within the deceleration time parameterised in C00105, the motor is brought to a standstill ($n_{act} = 0$). ▸ Activate/deactivate quick stop (🕮 68)
7	**Preset setpoint 1** (C00039/1)	40.0	%	Fixed setpoints are selected in [%] based on the reference speed (C00011). **Fixed setpoint 2 must be smaller than fixed setpoint 3!** Otherwise, the drive will be started with a low speed and accelerated after the pre-switch off.
8	**Preset setpoint 2** (C00039/2)	60.0	%	
9	**Preset setpoint 3** (C00039/3)	80.0	%	

Tip!

- Click the **Signal flow** button to go down one dialog level to the signal flow of the application with further possible parameter settings. See chapter "Basic signal flow". (🕮 268)
- The preconfigured I/O connection in the selected control mode can be changed via configuration parameters. See chapter "User-defined terminal assignment". (🕮 217)
- Low-jerk traversing profiles can be implemented by means of S-shaped ramps.
- In the case of high breakaway torques combined with horizontal motion sequences, "Sensorless vector control (SLVC)" can be used as motor control (C00006).

More detailed informaton on the technology application:

▸ TA "Switch-off positioning" (🕮 264)

▸ wDriveControl control word (🕮 270)

▸ Terminal assignment of the control modes (🕮 272)

▸ Setting parameters (short overview) (🕮 279)

▸ Pre-assignment of the application (🕮 280)

3.6.5 Save parameter settings safe against mains failure

In order to prevent parameter settings carried out in the device from being lost by mains switching, you have to explicitly save the parameter set with mains failure protection in the device.

- Save parameter set.

3.6.6 Enable inverter and test application

Stop!

Before stipulating a speed setpoint, check whether the brake in the form of a holding brake on the motor shaft has been released!

Note!

If the controller is enabled at mains connection and C00142 has activated the "Inhibit at device on" auto-start option (Lenze setting), the inverter remains in the "ReadyToSwitchOn" state.

In order to change to the "SwitchedOn" status, controller enable must first be cancelled: Set RFR terminal to LOW level.

If the inverter is in the "SwitchedOn" state:

1. Enable inverter: Set RFR terminal to HIGH level.
2. Select the respective control signals via the digital inputs.

Note!

Observe the actual speed value (display in C00051) and the LED status display on the inverter.

3.7 PC manual control

This function extension is supported by the »Engineer« from version 2.13 onwards!

For the purpose of testing and demonstration and when an online connection has been established, the PC manual control enables the manual control of various drive functions from the »Engineer«.

Supported drive functions:

- Speed control (follow speed setpoint)
- Activate/deactivate quick stop

More control functions:

- Reset error message
- Set digital/analog outputs (in preparation)

Diagnostic functions:

- Display of the actual speed value and motor current (as time characteristic)
- Display of the current device status
- Display of the status determining error
- Display of the status of the digital/analog inputs (in preparation)

Activate PC manual control

Stop!

PC manual control must be explicitly activated by the user.

If PC manual control is activated, the inverter is inhibited via device command (C00002/16) first.

Note!

With active PC manual control:

The online connection between PC and controller is monitored by the inverter.

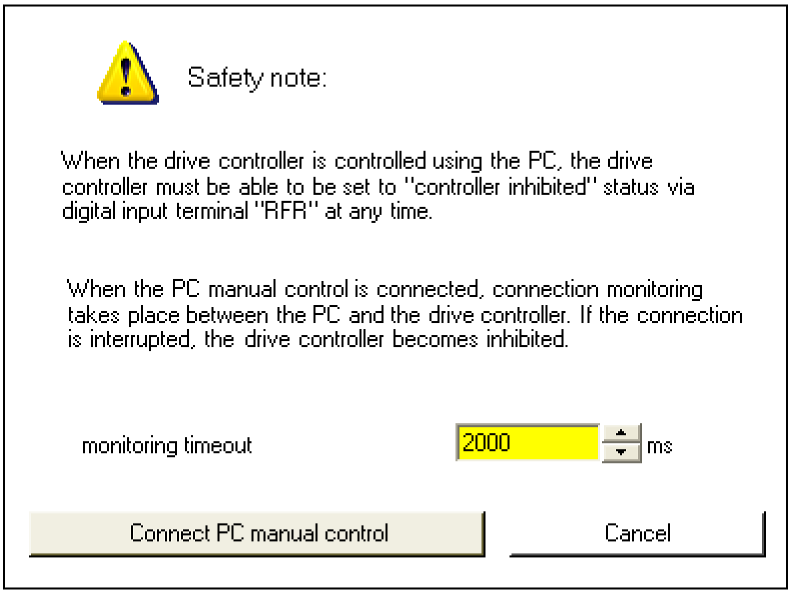
- When the online connection is interrupted for more than 2 s, the "Fault" error response is triggered, i.e. the motor becomes torqueless and is coasting unless it is already at a standstill.

PC manual control provides the **Motion Control Kernel** and the motor interface with all required control signals and setpoint signals.

- The available application (function block interconnection) is now decoupled from these interfaces, but is continued to be processed and remains unchanged.
- It does not matter what type of motor control is set in C00006.

How to activate the PC manual control:

1. If an online connection to the inverter has not been established yet:
   Go online.
2. Select the **Application parameters** tab from the *Workspace*.
3. Go to the *Overview* dialog level and click the "**PC manual control**" button.
   - First, the following safety note is displayed:



Safety note:

When the drive controller is controlled using the PC, the drive controller must be able to be set to "controller inhibited" status via digital input terminal "RFR" at any time.

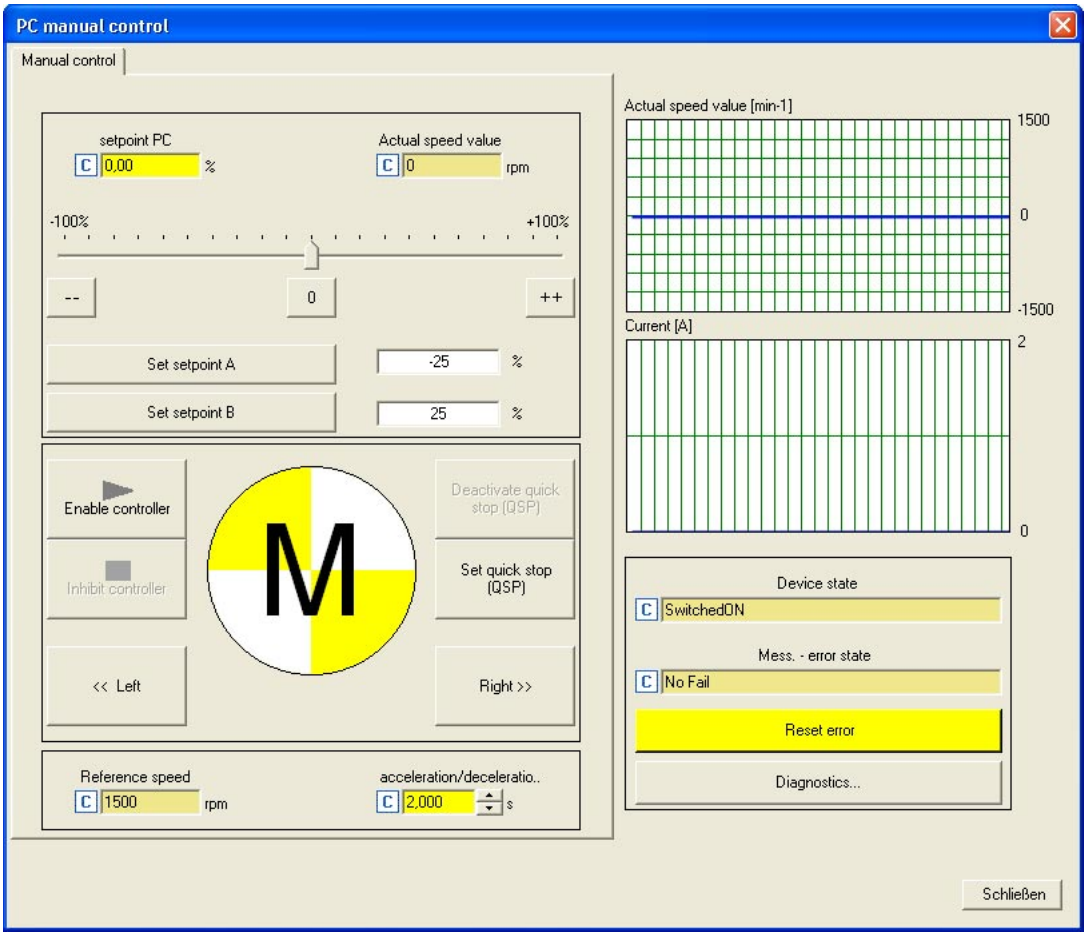
When the PC manual control is connected, connection monitoring takes place between the PC and the drive controller. If the connection is interrupted, the drive controller becomes inhibited.

monitoring timeout 2000 ms

   - Click the **Cancel** button to abort the action and close the dialog box.
4. To acknowledge the note and activate PC manual control:
   Click the **Activate PC manual control** button.
   - The inverter is inhibited via device command (C00002/16).
   - The *PC manual control* operator dialog is displayed.

PC manual control - operator dialog

The *PC manual control* operator control serves to simply make the drive rotate in the "speed follower" mode without the need to set control parameters or feedback systems.



setpoint PC: 0,00 %

Actual speed value: 0 rpm

Set setpoint A: -25 %

Set setpoint B: 25 %

Device state: SwitchedON

Mess. - error state: No Fail

Reference speed: 1500 rpm

acceleration/deceleratio..: 2,000 s

Note!

PC manual control can be exited any time by clicking the **Close** button.

If you exit the PC manual control function, the inverter is inhibited via device command (C00002/16), i.e. the motor goes to a torqueless state and coasts if it is not already at a standstill yet.

How to easily rotate the motor:

1. Set the desired speed setpoint in [%] based on the reference speed, e.g. directly in the **Setpoint PC** input field or via the slider.
    - Via the **--** / **0** / **++** buttons, the currently set speed setpoint can be reduced/increased in steps of 10 percent or set to zero.
    - Via the **Set setpoint A/B** buttons, the speed setpoint can be set to a previously set constant value A/B.
2. To start the speed follower:
   Enable the inverter via the **Enable controller** button.
    - Please observe that the inverter will not be enabled if other sources of controller inhibit (e.g. RFR terminal) are active.
    - The enabled drive now follows the defined speed setpoint.
    - In order to prevent shocks or overload at higher setpoint changes, the speed setpoint is lead via a linear ramp generator with adjustable acceleration/deceleration time.
    - Via the **Inhibit controller** button, the inverter can be inhibited again, i.e. the motor becomes torqueless and is coasting unless it already is at standstill.

Further functions:

- If the **Set quick stop (QSP)** button is clicked, the motor is braked to a standstill within the deceleration time parameterised in C00105.
    - Via the **Deactivate quick stop (QSP)** button, the quick stop can be deactivated.
- Via the **<< CCW** and **CW >>** buttons, the direction of rotation can be changed.

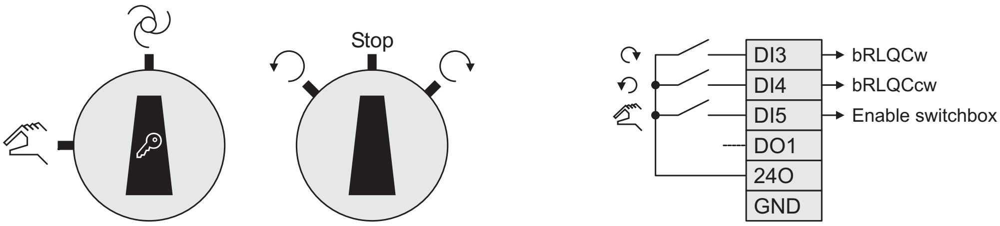
3.8 Control via Field Package ("key-operated switch operation")

This function extension is only available from version 04.00.00!

Stop!

If manual control is switched off again via key-operated switch, the control of the drive will be immediately taken over by the terminal or bus control. Available starting commands are directly accepted unless the controller is inhibited.

In the 8400 motec device version with **Field Package**, both operator buttons are connected to the digital inputs DI3, DI4 and DI5 and provide the following function:



Key-operated switch: Activate manual control
Left/right switch: Counter-clockwise rotation (Ccw) - Stop - clockwise rotation (Cw)

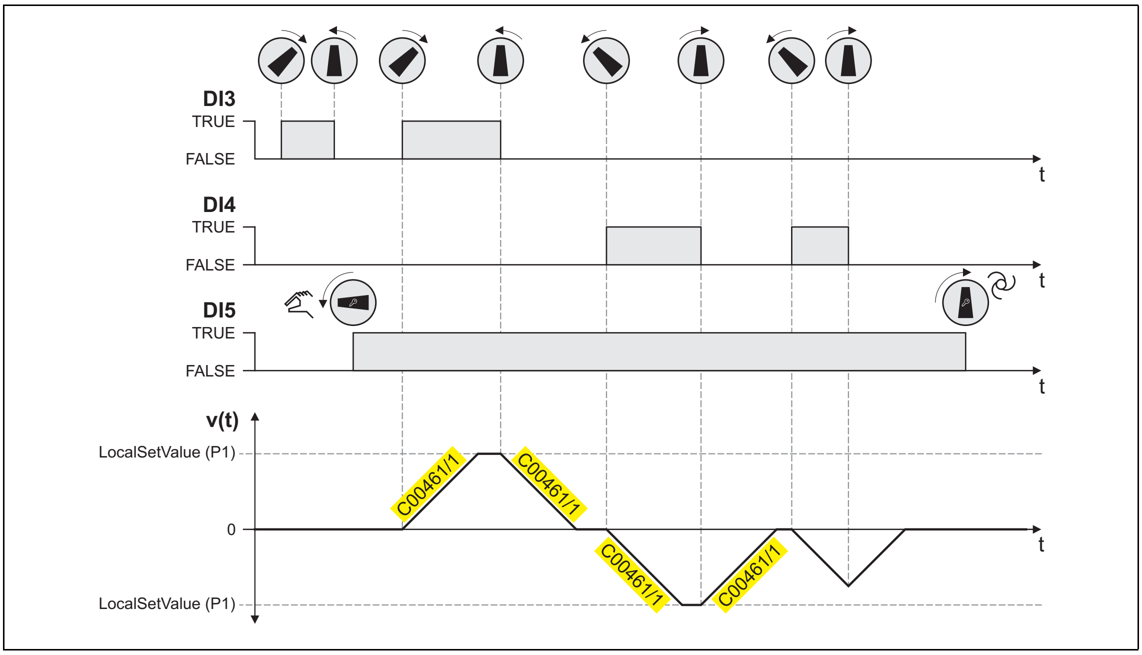
[3-3] Field Package functionality

- During operation, the potentiometer P1 serves to adjust the motor speed steplessly within the range of 0 ... 100 % of the reference speed (C00011).
  - A different setpoint source can be selected via the configuration parameter C00700/4.
- The acceleration/deceleration time can be set in C00461/1.

Note!

If the manual control is activated via key-operated switch, the *LA_NCtrl.bRemoteControlActive* output signal is set to TRUE.

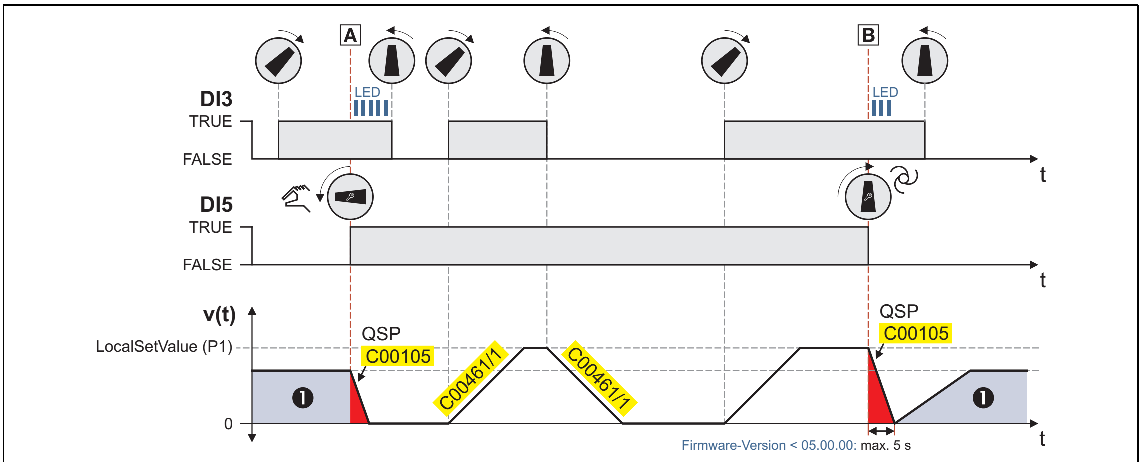
The key-operated switch operation is activated via C00460 = 1.



[3-4] Example: Manual control

Special cases

- Special case A - direction of rotation is preselected and manual control is switched on via key-operated switch: The drive is stopped via quick stop. The blue LED status display is blinking to call the user's attention to the operating error.
  - The rotation direction switch has to be first brought into "stop" position before the drive will be ramped up to setpoint speed.
- Special case B - direction of rotation of rotation is preselected and manual control is switched off via key-operated switch: The drive is stopped via quick stop. The blue LED status display is blinking during quick stop. When the drive has reached standstill, the quick stop function is stopped and the drive is again guided to the speed specified by the application.
  - Up to and including version 04.xx.xx, the QSP ramp in C00105 must be set to maximally 5 s. After 5 s, the quick stop function is aborted and the drive is again led to the speed specified by the application.
  - From version 05.00.00 onwards, longer QSP ramps are possible.



❶ Setpoint speed and ramps from the application

[3-5] Example: Special cases regarding manual control

Note!

When loading the Lenze setting to the inverter, reset the field package functionality afterwards using the »Engineer« (see the following instructions).

Starting from version 06.00.00, loading the Lenze setting does not change the C00460 service code anymore.

How to reset the Field Package functionality with the »Engineer« (e.g. after loading the Lenze setting):

1. Show service codes in the »Engineer«:
    - Execute the **Extras → Options** command to open the *Options* dialog box.
    - Go to the **Service** tab and activate the **Show invisible parameters** option.
2. Go to the **All parameters** tab and set the C00460 service code to "1: On" to activate the Field Package functionality.

    The links of the digital inputs DI3, DI4 and DI5 via the configuration parameters C00621 and C00701 are evaluated independently of the Field Package functionality. Hence, make sure to not assign more functions to these three digital inputs if the Field Package functionality is used.

4 Device control (DCTRL)

This chapter provides information on internal device control as well as the device commands which can be executed via the subcodes of C00002.

- The device control causes the inverter to take defined device statuses.
- The device control provides a multitude of status information in many ways:
  - Optically via the LED status display on the top side of the device. (🕮 312)
  - As text messages in the Logbook. (🕮 322)
  - As process signals via the outputs of the LS_DriveInterface system block. (🕮 538)
  - Via diagnostic / display parameters which are included in the »Engineer« parameter list as well as in the **Diagnostics** category in the keypad.

Note!

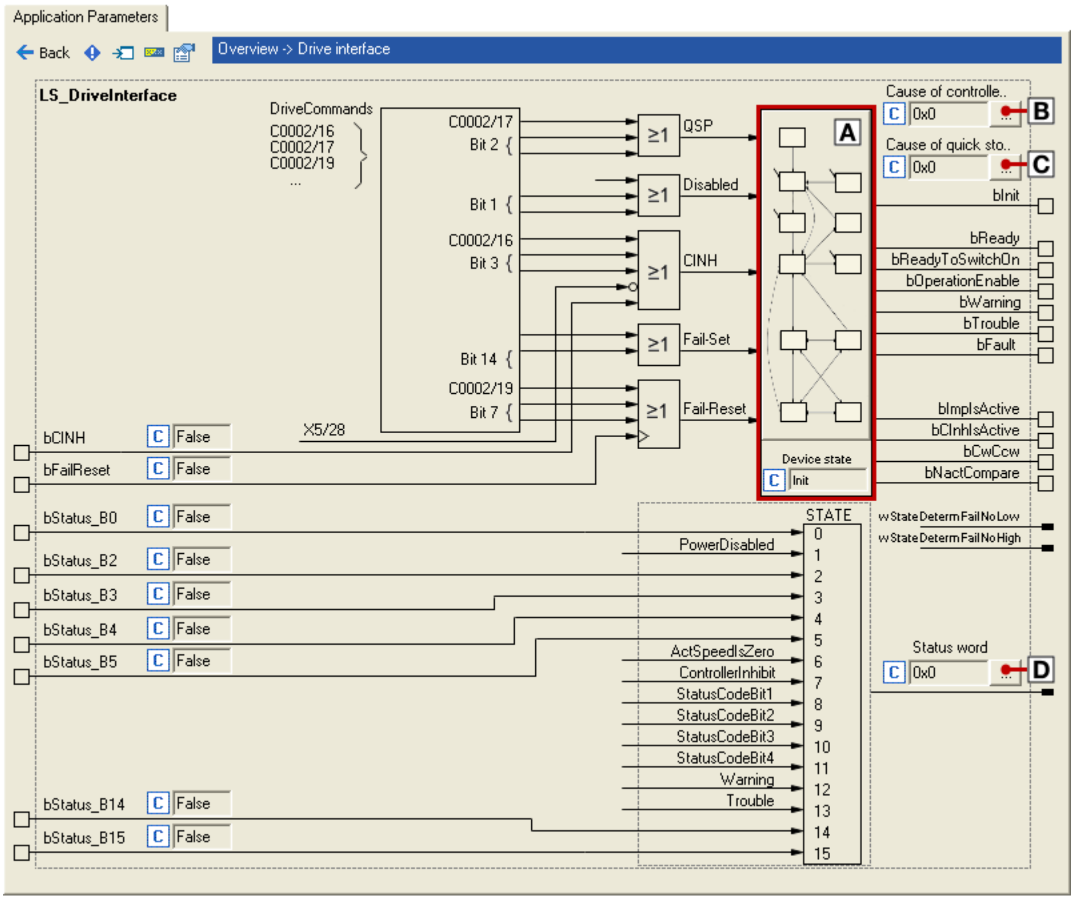
The device states of the inverter are based on the operating states of the CiA402 standard. ▶ Device state machine and device states (🕮 72)

How to get to the parameterisation dialog of the device control:

1. »Engineer« Go to the *Project view* and select the 8400 motec inverter.
2. Select the **Application parameters** tab from the *Workspace*.
3. Go to the *Overview* dialog level and click the **Drive interface** button.

Parameterisation dialog in the »Engineer«

The parameterisation dialog shows the input / output signals and the internal signal flow of the LS_DriveInterface system block which displays the device control in the application:



Cause of controlle.. C 0x0

Cause of quick sto.. C 0x0

Device state C Init

Status word C 0x0

bCINH C False

bFailReset C False

bStatus_B0 C False

bStatus_B2 C False

bStatus_B3 C False

bStatus_B4 C False

bStatus_B5 C False

bStatus_B14 C False

bStatus_B15 C False

Range / Meaning		Display parameter
A	Display of the internal state machine and the current device status	C00137
B	Display of all active sources of a controller inhibit	C00158
C	Display of all active sources of a quick stop	C00159
D	Display of the status word of the device control	C00150

4.1 Device commands (C00002/x)

In the following subchapters, the device commands of the inverter are described, which are provided in the subcodes of C00002 and which can be executed from the »Engineer« when an online connection has been established, or, as an alternative, using the keypad.

The device commands enable direct control of the inverter, the organisation of parameter sets as well as the call of diagnostic services.

Regarding the execution of the device commands, a distinction is drawn between:

- Device commands which have an immediate effect on control (e.g. "Activate quick stop")
  - After being called in C00002/x, these device commands provide static status information ("On" or "Off").
- Device commands with longer execution duration (several seconds)
  - After being called in C00002/x, these device commands provide the status information "Work in progress".
  - The execution of the device command has not finished successfully until the "Off / ready" status information is provided in C00002/x.
  - In the event of an error, the "Action cancelled" status information is provided in C00002/x . In this case, further details can be obtained from the status of the device command executed last which is displayed in C00003.

Note!

- Before activating device commands by a master control, wait for the "Ready" signal of the inverter.
- The device will reject a write process to C00002/x if the value is >1 and issue an error message.
- C00003 displays the status of the device command that was executed last.

Detailed information on the various device commands can be found in the following subchapters.

- Before you follow the instructions provided, ensure that you have selected the inverter in the *Project view*.

Short overview of device commands

C00002 Subcode:	Device command	Controller inhibit required	Status information
1	Load Lenze setting	●	dynamic
2	Load parameter set 1	●	dynamic
7	Save parameter set 1 ▸ Save parameter settings		dynamic
11	Save all parameter sets ▸ Save parameter settings		dynamic
12	Import EPM data		Static
16	Enable/inhibit inverter		Static
17	Activate/deactivate quick stop		Static
19	Reset error		Static
21	Delete logbook		Static
23	Identify motor parameters	●	dynamic
26	CAN reset node		Static
27	Device search function (from version 04.00.00)		Static
* Subcodes which are not listed are reserved for future extensions.			

Activate device command

When an online connection has been established, simply use the »Engineer« to activate a device command by selecting the corresponding option from the **Parameters** tab in C00002/x ("0: off" or "1: On / start").

- Alternatively, the device command can also be activated via e.g. keypad or through a master control by writing to C00002/x.
- Some of the frequently used device commands (such as "Save parameter set") can also be executed via the *Toolbar* icons of the »Engineer« when an online connection has been established:

Symbol	Function
	Enable inverter
	Inhibit inverter
	Save parameter set (for 8400: Save all parameter sets)
	Device search function (from version 04.00.00)

Note!

Device commands that can be executed via the *Toolbar* of the »Engineer« always affect the element currently selected in the *Project view* including all subelements!

- If no inverter but a system module is selected in the *Project view*, the corresponding device command will be activated in all lower-level inverters having an online connection with the »Engineer«.

Before the desired action is carried out, a confirmation prompt appears first, asking whether the action is really to be carried out.

4.1.1 Load Lenze setting

The C00002/1 = "1: On / start" device command resets the parameters to the Lenze setting which are saved in the inverter firmware.

- Can only be executed if the controller is inhibited; otherwise, the feedback C00002/1 = "6: No access - controller inhibit" will be returned.
- All parameter changes made since the last saving of the parameter set will get lost!
- This device command has an effect on the settings of the parameters of the operating system, application and module.

Note!

When the Lenze setting C00002/1 is loaded, all communication parameters are reset as well. After the mains is switched on, the Lenze setting is accepted and the inverter might not be accessible anymore via the communication module.

From version 10.00.00 onwards, C01004 (Load Lenze setting without C00002/1) serves to prevent all communication parameters from being reset when the Lenze setting C00002/1 is loaded.

- In order that the communication parameters are not reset while loading the Lenze setting, you must always set C01004:Bit 0 = 1 before mains switching.

How to load the Lenze setting:

1. If the inverter is enabled, it must be inhibited, e.g. by executing the "Enable/Inhibit inverter" device command "(C00002/16 = "0: Off / ready").
2. Execute the "Load Lenze setting" device command:
   C00002/1 = "1: On / start"

   The load process may take a couple of seconds. After the device command has been called in C00002/1, a dynamic status information ("Work in progress" → "Off / Ready") is returned.

4.1.2 Load parameter set 1

The C00002/2 = "1: On / start" device command reloads all parameters from the memory module to the inverter.

- The DIP switches are not used anymore to overwrite data.
- Can only be executed if the controller is inhibited; otherwise, the feedback C00002/2 = "6: No access - controller inhibit" will be returned.
- All parameter changes made since the last saving of the parameter set will get lost!
- This device command has an effect on the settings of the parameters of the operating system, application and module.

Note!

- When the device is switched on, all parameters are automatically loaded from the memory module to the main memory of the inverter.
  - When the DIP switches are active (DIP switch S1/DIP1 = "ON"), the inverter works with the settings made via the DIP switches and displays them in the corresponding codes.
- The inverter has a parameter set.
  - Up to 16 freely selectable parameters can be switched over via the basic Parameter change-over function. (📖 289)

How to load the parameter set 1 from the memory module:

1. If the inverter is enabled, it must be inhibited, e.g. by executing the "Enable/Inhibit inverter" device command "(C00002/16 = "0: Off / ready").
2. Execute the "Load parameter set 1" device command:
   C00002/2 = "1: On / start"

   The load process may take a couple of seconds. After the device command has been called in C00002/2, a dynamic status information ("Work in progress" ➜ "Off / Ready") is returned.

4.1.3 Save parameter settings

If parameter settings are changed in the inverter, those changes will be lost after mains switching of the inverter unless the settings have been saved explicitly.

Note!

How to prevent a data loss:
- Do not switch off the supply voltage during the saving process.
- Only unplug the memory module if the device is switched off.

Manual saving of parameter settings

The C00002/7 = "1: On / start" device command saves the current parameter settings safe against mains failure to the memory module of the inverter.

Automatic saving of parameter changes

Stop!

Activating this function is not permissible if parameters are changed very frequently (e.g. in case of cyclic writing of parameters via a bus system).

The maximum service life of the memory module amounts to one million writing cycles. Make sure that this value will not be reached.

When you select "1: active" in C00141/1, automatic saving is activated and every parameter change is saved automatically in the memory module. Thus, manual saving of parameter sets is not required anymore.

4.1.4 Import EPM data

The C00002/12 = "1: On / start" device command activates the automatic import of parameters from the memory module after the error message "PS04: Par.set incompatible".

- The C00002/12 = "0: Off / ready" device command deactivates this function again.

4.1.5 Enable/inhibit inverter

The C00002/16 = "1: On / start" device command enables the inverter, provided that no other source of an inverter inhibit is active.

The C00002/16 = "0: Off / ready" device command inhibits the inverter again, i.e. the power output stages in the inverter are inhibited and the speed/current controllers of the motor control are reset.

- The motor becomes torqueless and coasts down.
- When the controller is inhibited, the status output *bCInhActive* of the LS_DriveInterface system block is set to TRUE.
- When the controller inhibit request is reset, the drive synchronises to the actual speed. For this purpose,
  - If the flying restart circuit is activated in C00990, the flying restart function parameterised in C00991 is used for the synchronisation to the rotary or standing drive. ▶ Flying restart function (🕮 171)
  - In the case of an operation with feedback, the actual speed is read out by the encoder system.

Tip!

- The inverter can also be enabled or inhibited via the and *toolbar* icons.
- C00158 provides a bit coded representation of all active sources/triggers of a controller inhibit.

4.1.6 Activate/deactivate quick stop

The C00002/17 = "1: On / start" device command activates the quick stop function, i.e. the motor control is separated from the setpoint selection, and within the deceleration time parameterised inC00105 the motor is brought to a standstill ($n_{act} = 0$).

Parameters	Information	Lenze setting	
		Value	Unit
C00105	Decel. time - quick stop	2.000	s

- The motor is kept at a standstill during closed-loop operation.
- A pulse inhibit (CINH) is set if the auto-DCB function has been activated via C00019.

The C00002/17 = "0: Off / ready" device command deactivates the quick stop again, provided that no other source of a quick stop is active.

Tip!

C00159 displays a bit code of active sources/causes for the quick stop.

4.1.7 Reset error

The C00002/19 = "1: On / start" device command acknowledges an existing error message if the error cause has been eliminated and thus the error is no longer pending.

- After the reset (acknowledgement) of the current error, further errors may be pending which must also be reset.
- The status determining error is displayed in C00168.

Tip!

An error message can also be acknowledged by activating the **Reset error** button in the **Diagnostics** tab.

In the Lenze setting, switching RFR causes also causes an error acknowledgement (see configuration parameter C00701/2).

Detailed information on error messages can be found in the "Diagnostics & error management" chapter. (🕮 311)

4.1.8 Delete logbook

The C00002/21 = "1: On / start" device command deletes all logbook entries.

Tip!

To display the logbook in the »Engineer«, click the **Logbook** button on the **Diagnostics** tab.

In the *Logbook* dialog box, it is also possible to delete all logbook entries by clicking the **Delete** button.

Detailed information on the logbook can be found in the "Diagnostics & error management" chapter. (🕮 311)

4.1.9 Identify motor parameters

The C00002/23 = "1: On / start" device command performs automatic identification of the motor parameters.

- The device command is only executed if the inverter is in the "SwitchedOn" state.
- In order to identify the motor parameters, the inverter must be enabled after this device command.
  - After that it changes to the "MotorIdent" device state.
  - After successful identification, it changes back to the "SwitchedOn" device status.
- The motor model implemented in the 8400 motec cannot be used to identify a synchronous motor.
  - If the "SLPSM: Sensorless PSM" motor control has been selected in C00006, "5: No access" is automatically shown in C00002/23.

Tip!

For identifying a synchronous motor, you can use e.g. an 8400 HighLine. Afterwards, the detected data has to be transferred manually to the 8400 motec. Please contact your Lenze service partner if you need support in this matter.

Detailed information on automatic identification of motor parameters can be found in the "Automatic motor data identification" subchapter on motor control (MCTRL). (📖 95)

4.1.10 CAN reset node

The C00002/26 = "1: On / start" device command reinitialises the CAN interface of the "CAN" communication unit, which is required after e.g. changing the data transfer rate, the node address, or identifiers.

Detailed information on the "CAN" communication unit can be found in the corresponding online help and in the communication manual (KHB).

4.1.11 Device search function

This function extension is only available from version 04.00.00!

In some applications where inverters are housed in a spacious plant, it is often difficult to locate a device connected online, for instance to carry out maintenance work on this device. There is an established online connection with the inverter, but you do not know where the inverter is located physically.

The C00002/27 = "1: On / start" device command serves to carry out an "optical location":

- The LED status display at the front of the device flashes blue for the time set in C00181/1. The function then switches off automatically.
- If the device command is executed again within the set time period, the duration is extended accordingly.
- The setting C00002/27 = "0: Off / ready" serves to abort or switch off the function.
- Adjustable time period: 0 ... 6000 s (Lenze setting: 5 s)

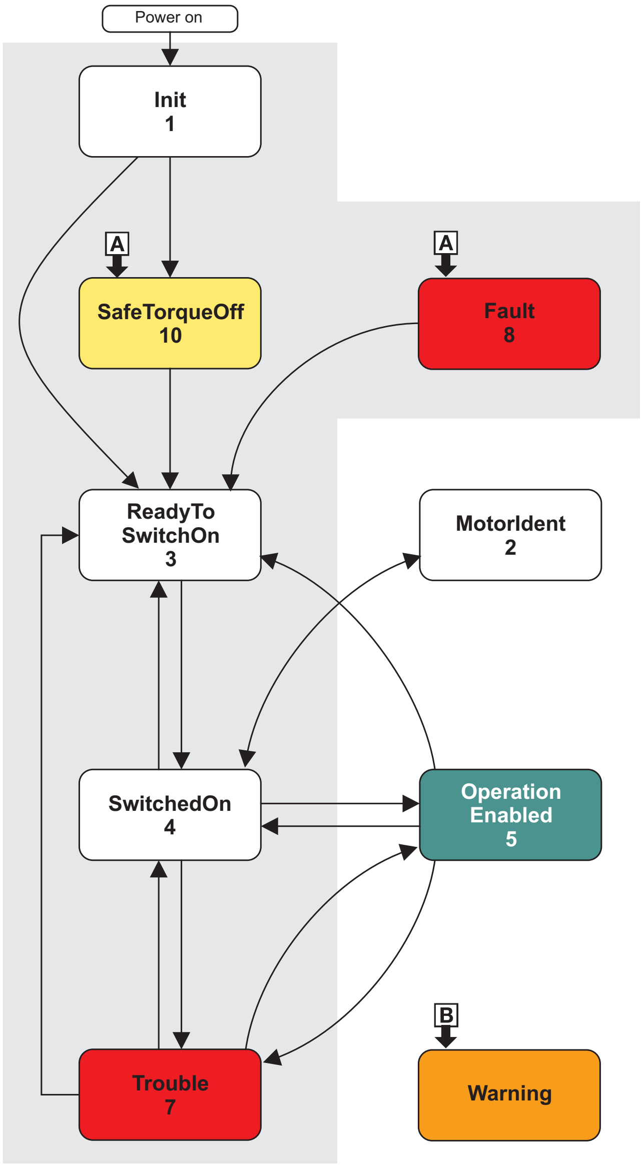
Tip!

The device search function can also be activated via the •))) *toolbar* icon.

4.2 Device state machine and device states

The behaviour of the inverter is mainly determined by the current device status within the device state machine. Which device status is active and which device status is next depends on certain control signals (e.g. for controller inhibit and quick stop) and status parameters.

Device state machine



Grey field: Pulse inhibit

A	Can be reached from all statuses.
B	"Warning" contradicts the definition of a device status. In fact, it is a message which is to call attention to the device status the warning exists for. "Warning" can occur in parallel to other device states.

- The arrows between the device states mark possible state changes.
- The digits stand for the status ID (see table below).

- The change from one state to another is done in a 1 ms cycle. If, at the same time, several state change requests exist, the state with the higher priority is processed first (see the following table).
- The C00137 displays the current device status.
- C00150 (status word) provides a bit coded representation of the current device status via bits 8 ... 11 (see table below).

ID	**Device status** (Display in C00137)	**Priority** 1=lowest 6=highest	**Status bits** (Display in C00150)				**Meaning**
			Bit 11	**Bit 10**	**Bit 9**	**Bit 8**	
0	- (Reserved)	-	0	0	0	0	-
1	Init	-	0	0	0	1	Initialisation active
2	MotorIdent	-	0	0	1	0	Motor parameter identification is active
3	ReadyToSwitchOn	4	0	0	1	1	Device is ready to start
4	SwitchedOn	3	0	1	0	0	Device is switched on
5	OperationEnabled	1	0	1	0	1	Operation
6	- (Reserved)	-	0	1	1	0	-
7	Trouble	2	0	1	1	1	Trouble active
8	Fault	6	1	0	0	0	Error active
9	- (Reserved)	-	1	0	0	1	-
10	SafeTorqueOff	5	1	0	1	0	Safe torque off is active
11	- (Reserved)	-	1	0	1	1	-
...	...	...	...				...
15	- (Reserved)	-	1	1	1	1	-

[4-1] Device statuses, priorities, and meaning of the status bits in the status word

4.2.1 Init

LED status display	Display in C00137	Display in status word 1 (C00150)			
		Bit 11	Bit 10	Bit 9	Bit 8
🟨	Init	0	0	0	1

The "Init" device status

- is the inverter's status directly after the supply voltage has been switched on.
- is the state in which the operating system is initialised.
- is the state in which all device components (power section, communication unit, etc) are identified.
- is the state in which the parameters are imported from the memory module.
- is the state in which the settings of the DIP switches are read in and parameters are overwritten.
- is the state in which it is checked whether the DC-bus voltage is within the tolerance zone and the precharge relay is closed.
- is the state in which the inverter is inhibited, i.e. there is no voltage output at the motor terminals.
- is the state in which communication via fieldbus or diagnostic interface is not working yet.
- is the state in which the application is not processed yet.
- is the state in which the monitoring mode is not active yet.
- is the state in which the inverter cannot be parameterised yet and no device commands can be carried out yet.

Note!

If the initialisation is completed, it changes automatically to the "ReadyToSwitchOn" device state.

4.2.2 MotorIdent

LED status display	Display in C00137	Display in status word 1 (C00150)			
		Bit 11	Bit 10	Bit 9	Bit 8
🟩	MotorIdent	0	0	1	0

The "MotorIdent" device state

- is the state which the inverter is in if, in the "SwitchedOn" status, the "Identify motor parameters" device command is activated and the inverter is enabled.
- the application remains active.
- all system interfaces (IO, bus systems, etc.) remain active.
- error monitoring remains active
- the inverter is controlled independently of the setpoint sources.

Stop!

During the motor parameter identification process, the inverter does not respond to setpoint changes or control processes, (e.g. speed setpoints, quick stop, torque limitations).

After the motor parameter identification is completed, the status changes back to "SwitchedOn".

Tip!

Detailed information on motor parameter identification can be found in the "Automatic motor data identification" subchapter on motor control. (📖 95)

4.2.3 SafeTorqueOff

LED status display	Display in C00137	Display in status word 1 (C00150)			
		Bit 11	Bit 10	Bit 9	Bit 8
▮ ▮ ▮	SafeTorqueOff	1	0	1	0

In the "SafeTorqueOff" device state

- the controller can only be if the used communication unit has the safety option and at least one of the two channels SIA/SIB of the safe input is set to LOW level.
- the next transaction to the "ReadyToSwitchOn" state takes place.

Detailed and important information on the integrated safety system can be found in the hardware manual!

4.2.4 ReadyToSwitchOn

LED status display	Display in C00137	Display in status word 1 (C00150)			
		Bit 11	Bit 10	Bit 9	Bit 8
	ReadyToSwitchOn	0	0	1	1

The "ReadyToSwitchOn" device state

- is the state which the inverter is in after the initialisation process has been completed successfully.
- is the state which the inverter is also in after "Trouble" "Fault", or "SafeTorqueOff" has been reset.
- is the state which the inverter is also in if bit 0 ("SwitchOn") in the MCI/CAN control word is not set.
  - Display parameter for MCI/CAN control word: C00136/1
  - Configuration parameter for MCI/CAN control word: C00700/5
- is the state in which I/O signals are evaluated.
- is the state in which the monitoring modes are active.
- is the state in which the inverter can be parameterised.
- the application is basically executable.
- prevents in the Lenze setting the auto-start option " Inhibit at device on" activated in C00142 " from changing to the "SwitchedOn" state.

Danger!

If the "Inhibit at device on" auto-start option has been deactivated in C00142, the "ReadyToSwitchOn status switches directly to the "SwitchedOn" status after mains connection.

▶ Auto-start option "Inhibit at device on" (📖 81)

4.2.5 SwitchedOn

LED status display	**Display in C00137**	**Display in status word 1 (C00150)**			
		Bit 11	Bit 10	Bit 9	Bit 8
	SwitchedON	0	1	0	0

The "SwitchedOn" device state

- is the state which the inverter is in if the user has inhibited the inverter (and no error is pending).
- is the state in which I/O signals are evaluated.
- is the state in which the monitoring modes are active.
- is the state in which the inverter can be parameterised.
- the application is basically executable.
- it can be changed to the "OperationEnabled" state by deactivating the controller inhibit.

Tip!

C00158 provides a bit coded representation of all active sources/triggers of a controller inhibit.

Depending on certain conditions, a status change takes place based on the "SwitchedOn" device status:

Change condition	Changeover to the device status
Control bit "EnableOperation" in control word *wDriveControl* = "1" **AND** terminal RFR = HIGH level (controller enable)	OperationEnabled
Control bit "SwitchOn" = "0".	ReadyToSwitchOn
Motor parameter identification requested.	MotorIdent
Undervoltage in the DC bus.	Trouble/Fault (depending on C00600/1)
Error with error response "Trouble" occurs.	Trouble

Related topics:

- ▸ wDriveControl control word (📖 238)

4.2.6 OperationEnabled

LED status display	Display in C00137	Display in status word 1 (C00150)			
		Bit 11	Bit 10	Bit 9	Bit 8
🟩	OperationEnabled	0	1	0	1

The "OperationEnabled" state

- is the state which the inverter is in if controller inhibit is deactivated and no trouble ("Trouble") or fault ("Fault") is pending.
- the operation is enabled and the motor follows the setpoint defined by the active application (with sensorless vector control only after magnetisation has been completed).

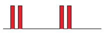
Depending on certain conditions, a status change takes place based on the "OperationEnabled" device status.

Change condition	Changeover to the device status
Control bit "EnableOperation" in control word *wDriveControl* = "0" **OR** terminal RFR = LOW level (controller inhibit).	SwitchedOn
Control bit "SwitchOn" = "0".	ReadyToSwitchOn
Undervoltage in the DC bus.	Trouble/Fault (depending on C00600/1)
Error with error response "Trouble" occurs.	Trouble

Related topics:

▶ wDriveControl control word (📖 238)

4.2.7 Trouble

LED status display	Display in C00137	Display in status word 1 (C00150)			
		Bit 11	Bit 10	Bit 9	Bit 8
	Trouble	0	1	1	1

The "Trouble" device state

- is the state which the inverter is in if a monitoring function has caused a "Trouble" error response.
- the motor has no torque (is coasting) due to the inhibit of the inverter.

Note!

The "Trouble" device status is automatically exited if the error cause has been removed.

If in C00142 the "Inhibit at trouble" is activated, explicit deactivation of the controller inhibit is required before this status can be abandoned.

Depending on certain conditions a status change takes place based on the "Trouble" device status.

Change condition	Changeover to the device status
The error cause is no longer active.	ReadyToSwitchOn
Control bit "EnableOperation" in control word *wDriveControl* = "1" **AND** terminal RFR = HIGH level (controller enable) **AND** the message has been cancelled.	OperationEnabled
Control bit "EnableOperation" in control word *wDriveControl* = "0" **OR** terminal RFR = LOW level (controller inhibit) **AND** the message has been cancelled.	SwitchedOn

Related topics:

- ▸ wDriveControl control word (🕮 238)
- ▸ Basics on error handling in the inverter (🕮 311)
- ▸ Error messages of the operating system (🕮 330)

4.2.8 Fault

LED status display	Display in C00137	Display in status word 1 (C00150)			
		Bit 11	Bit 10	Bit 9	Bit 8
🟥 🟥 🟥	Fault	1	0	0	0

The "Fault" device state

- is the state which the inverter is in if a monitoring function has caused a "Fault" error response.
- the motor has no torque (is coasting) due to the inhibit of the inverter.

The error must explicitly be reset ("acknowledged") in order to exit the device state, e.g. by the device command "Reset error" or via the control bit "ResetFault" in the control word *wDriveControl*.

Note!

If an undervoltage in the DC bus of the inverter occurs (error message "LU"), the device changes to the "Trouble" status.

An additional error of higher priority leads the device into the "Fault" status.

According to the Device state machine, the device changes to the "ReadyToSwitchOn" status after acknowledging the error although the undervoltage is still available!

If the "Inhibit at fault" auto-start option has been activated in C00142, explicit deactivation of the controller inhibit is required before the status can be abandoned.

Related topics:

- wDriveControl control word (🕮 238)
- Basics on error handling in the inverter (🕮 311)
- Error messages of the operating system (🕮 330)

4.3 Auto-start option "Inhibit at device on"

prevents in the Lenze setting the auto-start option "Inhibit at device on" activated in C00142 " from changing to the "SwitchedOn" state.

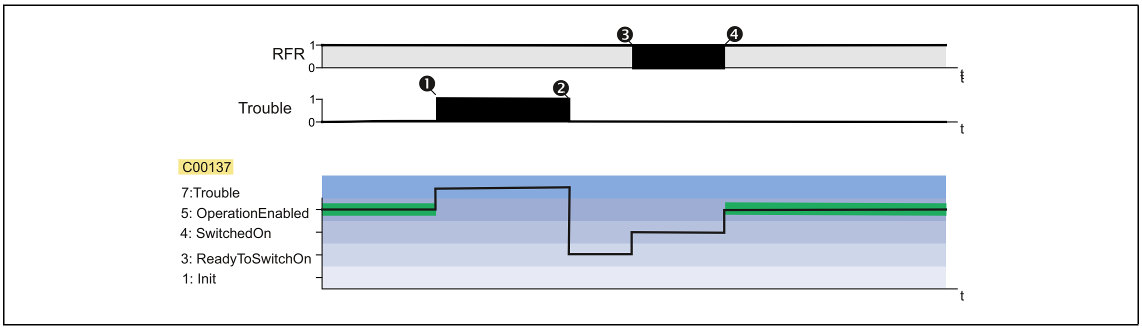
Danger!

When the auto-start option "Inhibit at device on" is deactivated, the motor can directly start after device on if the controller is enabled!

The following three cases describe the behaviour of the inverter after mains connection depending on whether the controller is enabled and the set auto-start option. Here, it is assumed that after mains connection, no errors and trouble occur in the inverter and the "EnableOperation" control bit in the *wDriveControl* is set to "1".

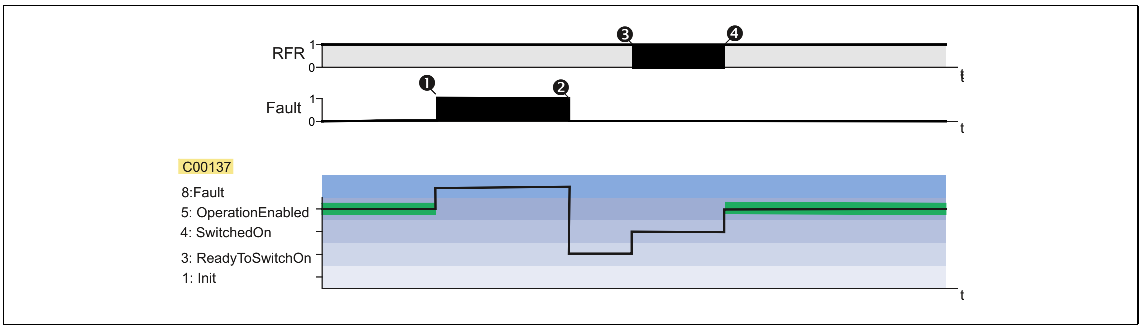
Case 1: No controller enable at mains connection

If the controller is not enabled at mains connection, the inverter remains in the "SwitchedOn" status. Only with the controller enable, the device changes to the "OperationEnabled" status, independent of the set auto-start option:



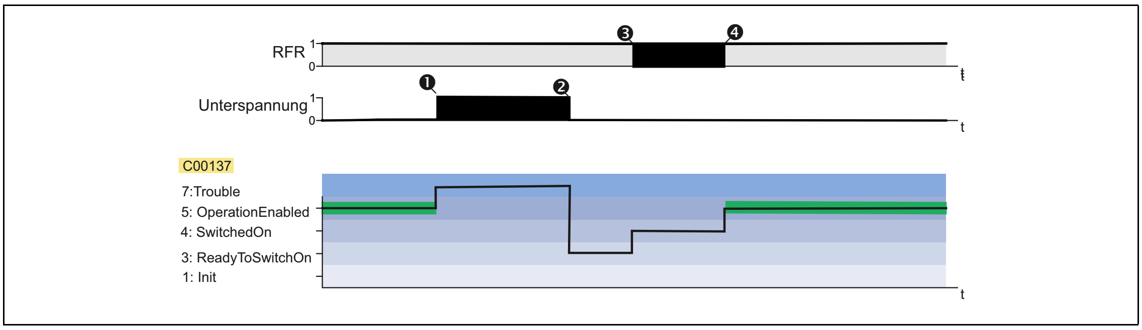
Case 2: Controller enable at mains connection and "Inhibit at device on" activated

If the controller is enabled at mains connection and the auto-start option "Inhibit at device on" is activated, the inverter remains in the "ReadyToSwitchOn" status. For changing to the "SwitchedOn" status, the controller enable must first be deactivated. Only when the controller is enabled again afterwards, the status changes to "OperationEnabled":



Case 3: Controller enable at mains connection and "Inhibit at device on" deactivated

If in C00142 the autostart option "Inhibit at device on" is deactivated (bit 0 = 0), the status first changes from "ReadyToSwitchOn" to "SwitchedOn" and then to "OperationEnabled" after mains connection with an enabled controller:



4.4 Energy saving mode

This function extension is available from version 09.00.00 and higher!

In energy saving mode, the energy demand of the inverter can be adapted to the most diverse environments and applications.

Via C01704, various functions can be utilised in a user-defined fashion so that a minimum consumption of energy results for the inverter:

- inhibiting the power output stages (controller inhibit)
- entering the energy saving mode using quick stop
- switching off the LEDs
- switching off all outputs

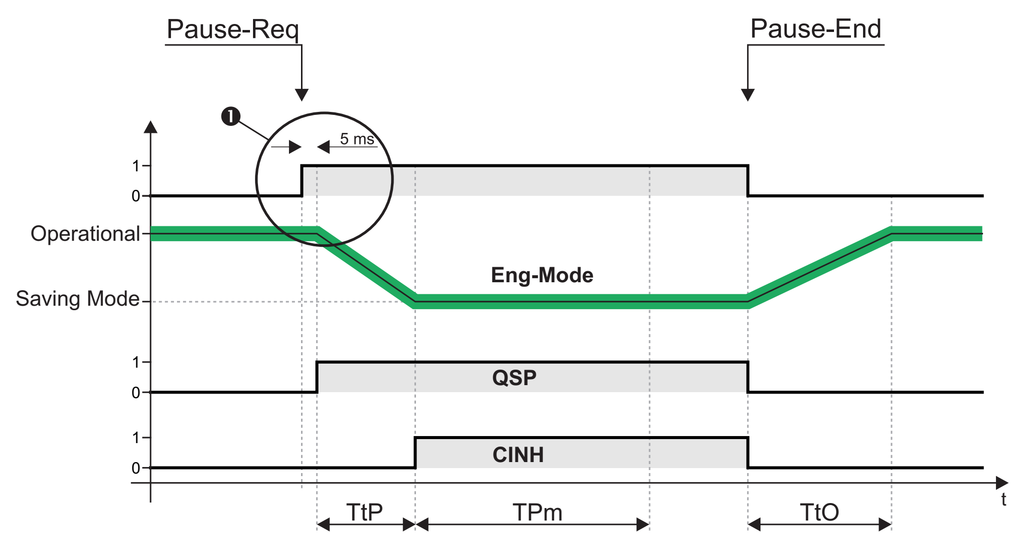
If the energy-saving mode is not desired, C01704 provides the possibility of inhibiting this operating status.

The functions for the energy saving mode provide the basis for implementing the **PROFIenergy** PROFINET profile.

Tip!

Detailed information about the **PROFIenergy** PROFINET profile can be obtained from the PROFINET specifications.

Activating / deactivating the energy saving mode



❶	To transfer the information to the FB application, the operating system requires a delay time of 5 ms.
TtP	Time to pause (C01702/1) Time required for entering the energy saving mode.
TPm	Time pause min (C01701/1) Minimum time for which the inverter is to remain in energy saving mode.
TtO	Time to operate (C01703/1) Time required for exiting the energy-saving mode.

The energy saving mode is activated via the **PROFIenergy** PROFINET profile as follows:

1. Via a "Pause-Req" command, entry to the energy-saving mode is requested.
    - At the same time, a dead time is transferred with the command.
2. If the idle time requested takes longer than the sum of the times set in C1701/1, C1702/1, and C1703/1, the inverter enters the energy-saving mode.
3. Via a "Pause-End" command, this operating status can be exited again.

5 Motor control (MCTRL)

This chapter provides information on the parameter setting of the inverter's internal motor control.

Topics:

- Special features of the 8400 motec

Basic settings:

- Motor selection/Motor data
- Selecting the control mode
- Defining current and speed limits

Description of the motor control types:

- V/f characteristic control (VFCplus)
- V/f characteristic control - energy-saving (VFCplusEco)
- V/f control (VFCplus + encoder)
- Sensorless vector control (SLVC)
- Sensorless control for synchronous motors (SLPSM)

Parameterisable additional functions:

- Selection of switching frequency
- Flying restart function
- DC-injection braking
- Slip compensation
- Oscillation damping
- Mass inertia precontrol

Further topics:

- Encoder/feedback system
- Braking operation/brake energy management
- Power and energy display
- Monitoring

5.1 Special features of the 8400 motec

In contrast to other Lenze inverters, the 8400 motec inverter has a reduced DC-bus capacity. This entails some specific characteristics that the user must take into consideration.

The closed design of the 8400 motec inverter and the heat input of the motor increase the internal temperature. However, the use of film capacitors in the DC bus provides for a very long service life.

The used capacitors have a lower capacity. This causes the following:

- Less energy can be stored in the DC bus.
- The DC-bus voltage increases faster during braking operation.
- The DC-bus voltage has a higher voltage ripple.
- The medium DC-bus voltage is slightly reduced.
- The inverter cannot be connected to the 1-phase mains.
- The oscillation damping in C00234 has to be adapted if the machine is not under load.

The voltage ripple in the DC bus must not be transmitted to the motor. Otherwise a varying torque would be caused. The compensation of the voltage ripple causes the maximum motor voltage to only reach 88 % of the mains voltage (see also display of the motor voltage in C00052).

The reduced energy absorption of the DC bus may cause special measures to be taken for braking loads. This can concern e.g. the use of an external brake resistor or the choice of a larger deceleration time.

5.2 Motor selection/Motor data

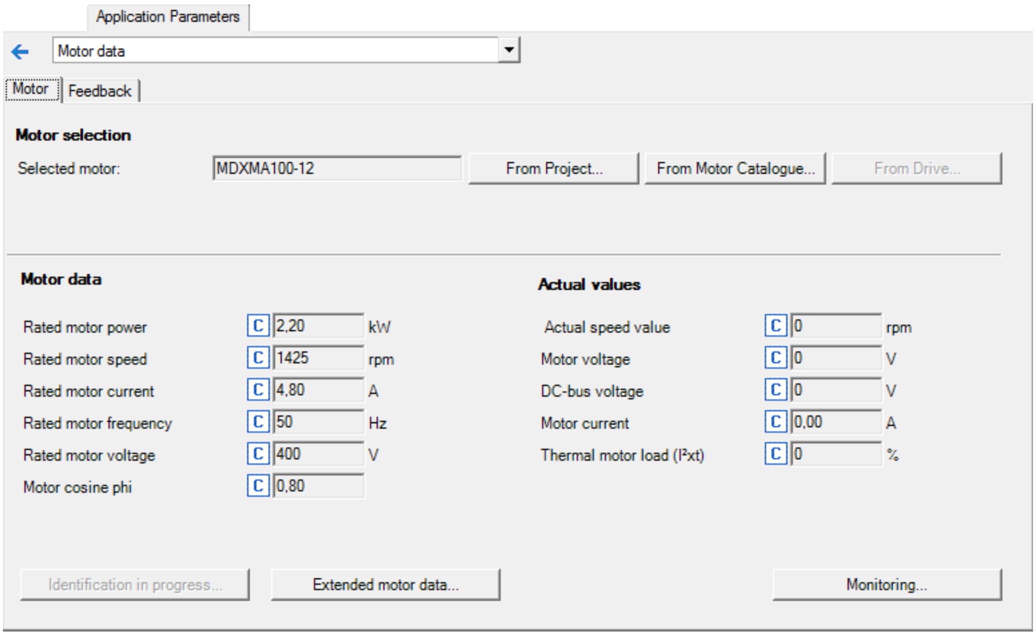
The motor data term comprises all parameters that only depend on the motor and that only characterise the electrical behaviour of the machine. The motor data are independent of the application in which the inverter and the motor are used.

Proceed as follows to open the dialog for parameterising the motor data:

1. »Engineer« Go to the *Project view* and select the 8400 motec inverter.
2. Select the **Application parameters** tab from the *Workspace*.
3. Go to the *Overview* dialog level and click the following button:

Ⓜ

Parameterisation dialog in the »Engineer«



Motor selection

Selected motor: MDXMA100-12

Motor data

Rated motor power	2,20	kW
Rated motor speed	1425	rpm
Rated motor current	4,80	A
Rated motor frequency	50	Hz
Rated motor voltage	400	V
Motor cosine phi	0,80	

Actual values

Actual speed value	0	rpm
Motor voltage	0	V
DC-bus voltage	0	V
Motor current	0,00	A
Thermal motor load (I²xt)	0	%

- Via the **From Motor Catalogue** button, the motor catalogue can be opened, especially to select a Lenze motor. ▶ Selecting a motor from the motor catalogue in the »Engineer« (📖 93)
- Via the **From inverter**... button, the motor data set in the inverter can be copied to the »Engineer« when an online connection has been established.
- Via the **Identification run...** button, various motor data can be automatically identified when an online connection to the inverter has been established. If you are not using a Lenze motor, we recommend an identification run to accept the motor data ▶ Automatic motor data identification (📖 95)
- The **Encoder** tab serves to make the settings for the encoder/feedback system if available. ▶ Encoder/feedback system (📖 181)

Note!

Saving the motor data with mains failure protection

Sensorless vector control in particular requires the motor data parameters to be set. The motor data comprise the data of the motor nameplate and the data of the motor equivalent circuit.

If the motor has been selected via the »Engineer« motor catalogue or the motor data have been adapted offline using the »Engineer«, all motor data must be copied to the inverter and saved to the memory module with mains failure protection afterwards (device commandC00002/11) when an online connection has been established.

Simplified commissioning for the SLVC control mode

From version 09.00.00:

If a Lenze motor is used, entering the "C86" motor number on the nameplate into parameter C00086 suffices.

By this action, the following parameters are set automatically:

C00006 (SLVC), C00143, and calculation of parameters C00015, C00016, C00021.

Furthermore: C00081, C00084, C00085, C00087, C00088, C00089, C00090, C00091, C00092

Motor data

In the parameterisation dialog, the data of the motor nameplate for the selected motor are displayed under "Motor data".

Parameters	Information
C00081	Rated motor power
C00087	Rated motor speed
C00088	Rated motor current
C00089	Rated motor frequency
C00090	Rated motor voltage
C00091	Motor cos φ

Actual values

When an online connection to the inverter has been established, the following actual values are displayed in the parameterisation dialog under "Actual values":

Parameters	Information
C00051	Actual speed value
C00052	Motor voltage
C00053	DC-bus voltage
C00054	Motor current
C00066	Thermal motor load (I2xt)
Greyed out = display parameter	

Adapting motor data manually

If a third party manufacturer's motor is used, the displayed motor data can exactly be adapted to the real motor by clicking the **From project**... button and selecting the "Own motor settings" entry from the **Motor selection** dialog box afterwards. For this purpose, the data of the motor nameplate and the equivalent circuit diagram must be available.

Tip!

For a better concentricity factor, we recommend to perform motor parameter identification of the third party manufacturer's motor first. The motor parameters can be manually adapted afterwards.

Improving the concentricity factor includes

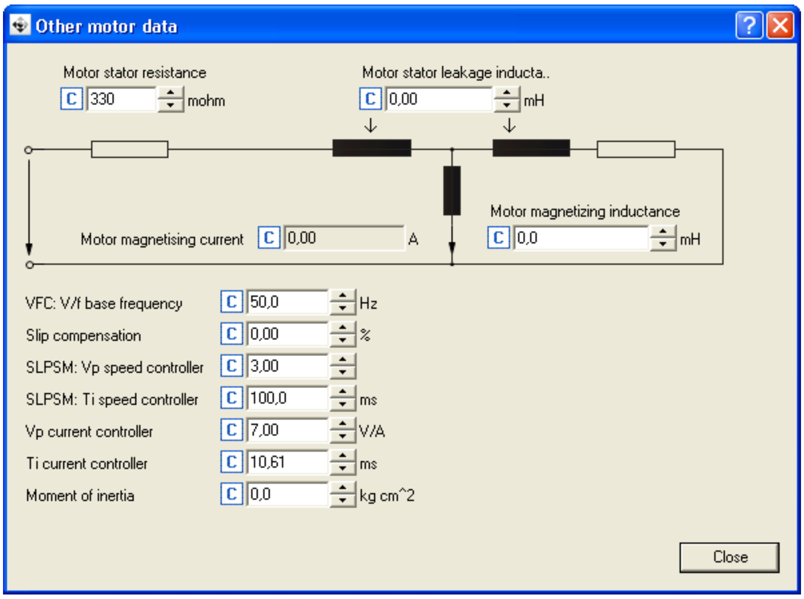
- the adjustment of the inverter error characteristic to the drive system and
- the knowledge of the motor cable resistance.

Both factors are determined in the course of motor parameter identification.

▶ Automatic motor data identification (📖 95)

Other motor data

Click the **Other motor data...** button and go to the *Other motor data* dialog box including the motor equivalent circuit:



Motor stator resistance: 330 mohm
Motor stator leakage inducta..: 0,00 mH
Motor magnetising current: 0,00 A
Motor magnetizing inductance: 0,0 mH
VFC: V/f base frequency: 50,0 Hz
Slip compensation: 0,00 %
SLPSM: Vp speed controller: 3,00
SLPSM: Ti speed controller: 100,0 ms
Vp current controller: 7,00 V/A
Ti current controller: 10,61 ms
Moment of inertia: 0,0 kg cm^2

Parameters	Information	ASM	PSM
C00084	Motor stator resistance	●	●
C00085	Motor stator leakage inductance	●	●
C00095	Motor magnetising current	●	
C00092	Motor magnetising inductance	●	
C00015	VFC: V/f base frequency	●	●
C00021	Slip compensation	●	
C00075	Vp current controller	●	●
C00076	Ti current controller	●	●
C00273	Moment of inertia	●	●
C00016	VFC: Vmin boost	●	●
C00070/3	SLPSM: Vp speed controller		●
C00071/3	SLPSM: Ti speed controller	●	●
C00011	Appl.: Reference speed	●	●
C00022	Imax in motor mode	●	●
C00982	VFC-ECO: Voltage reduction ramp	●	
C00073	Vp Imax controller	●	●

Note!

Calculation of parameter C00016 is based on the formula:

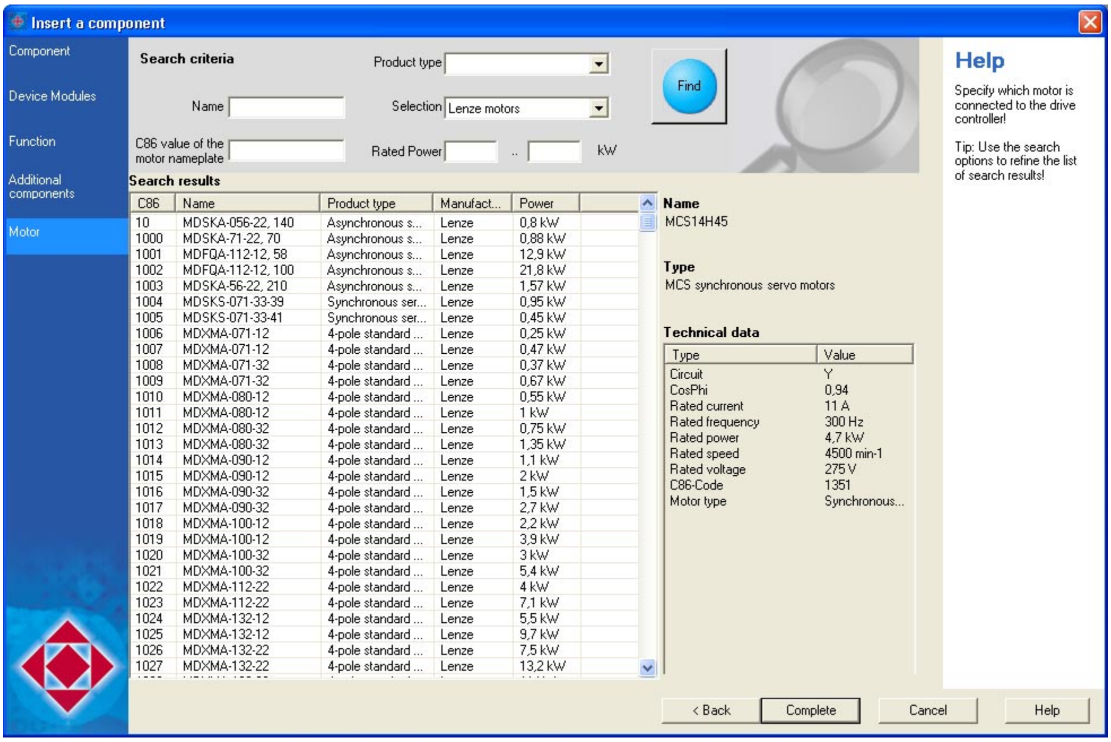
$$U_{min}[\%] = R_S[\Omega] \cdot I_{NennMot}[A] \cdot \frac{0,85 \cdot 100[\%]}{400[V]}$$

Tip!

Generally, a synchronous motor without speed feedback can also be operated with the V/f characteristic control (VFCplus) control mode. The parameters for this control mode (e.g. V/f base frequency) thus also have an according influence on synchronous motors.

5.2.1 Selecting a motor from the motor catalogue in the »Engineer«

If you tick the **Motor** control field in the "Other components" dialog when the inverter is inserted into the project, the motor for the inverter can be selected from the motor catalogue in another dialog:



Search criteria

Product type

Name

Selection Lenze motors

C86 value of the motor nameplate

Rated Power .. kW

Search results

C86	Name	Product type	Manufact...	Power
10	MDSKA-056-22, 140	Asynchronous s...	Lenze	0,8 kW
1000	MDSKA-71-22, 70	Asynchronous s...	Lenze	0,88 kW
1001	MDFQA-112-12, 58	Asynchronous s...	Lenze	12,9 kW
1002	MDFQA-112-12, 100	Asynchronous s...	Lenze	21,8 kW
1003	MDSKA-56-22, 210	Asynchronous s...	Lenze	1,57 kW
1004	MDSKS-071-33-39	Synchronous ser...	Lenze	0,95 kW
1005	MDSKS-071-33-41	Synchronous ser...	Lenze	0,45 kW
1006	MDXMA-071-12	4-pole standard ...	Lenze	0,25 kW
1007	MDXMA-071-12	4-pole standard ...	Lenze	0,47 kW
1008	MDXMA-071-32	4-pole standard ...	Lenze	0,37 kW
1009	MDXMA-071-32	4-pole standard ...	Lenze	0,67 kW
1010	MDXMA-080-12	4-pole standard ...	Lenze	0,55 kW
1011	MDXMA-080-12	4-pole standard ...	Lenze	1 kW
1012	MDXMA-080-32	4-pole standard ...	Lenze	0,75 kW
1013	MDXMA-080-32	4-pole standard ...	Lenze	1,35 kW
1014	MDXMA-090-12	4-pole standard ...	Lenze	1,1 kW
1015	MDXMA-090-12	4-pole standard ...	Lenze	2 kW
1016	MDXMA-090-32	4-pole standard ...	Lenze	1,5 kW
1017	MDXMA-090-32	4-pole standard ...	Lenze	2,7 kW
1018	MDXMA-100-12	4-pole standard ...	Lenze	2,2 kW
1019	MDXMA-100-12	4-pole standard ...	Lenze	3,9 kW
1020	MDXMA-100-32	4-pole standard ...	Lenze	3 kW
1021	MDXMA-100-32	4-pole standard ...	Lenze	5,4 kW
1022	MDXMA-112-22	4-pole standard ...	Lenze	4 kW
1023	MDXMA-112-22	4-pole standard ...	Lenze	7,1 kW
1024	MDXMA-132-12	4-pole standard ...	Lenze	5,5 kW
1025	MDXMA-132-12	4-pole standard ...	Lenze	9,7 kW
1026	MDXMA-132-22	4-pole standard ...	Lenze	7,5 kW
1027	MDXMA-132-22	4-pole standard ...	Lenze	13,2 kW

Name
MCS14H45

Type
MCS synchronous servo motors

Technical data

Type	Value
Circuit	Y
CosPhi	0,94
Rated current	11 A
Rated frequency	300 Hz
Rated power	4,7 kW
Rated speed	4500 min-1
Rated voltage	275 V
C86-Code	1351
Motor type	Synchronous...

Help

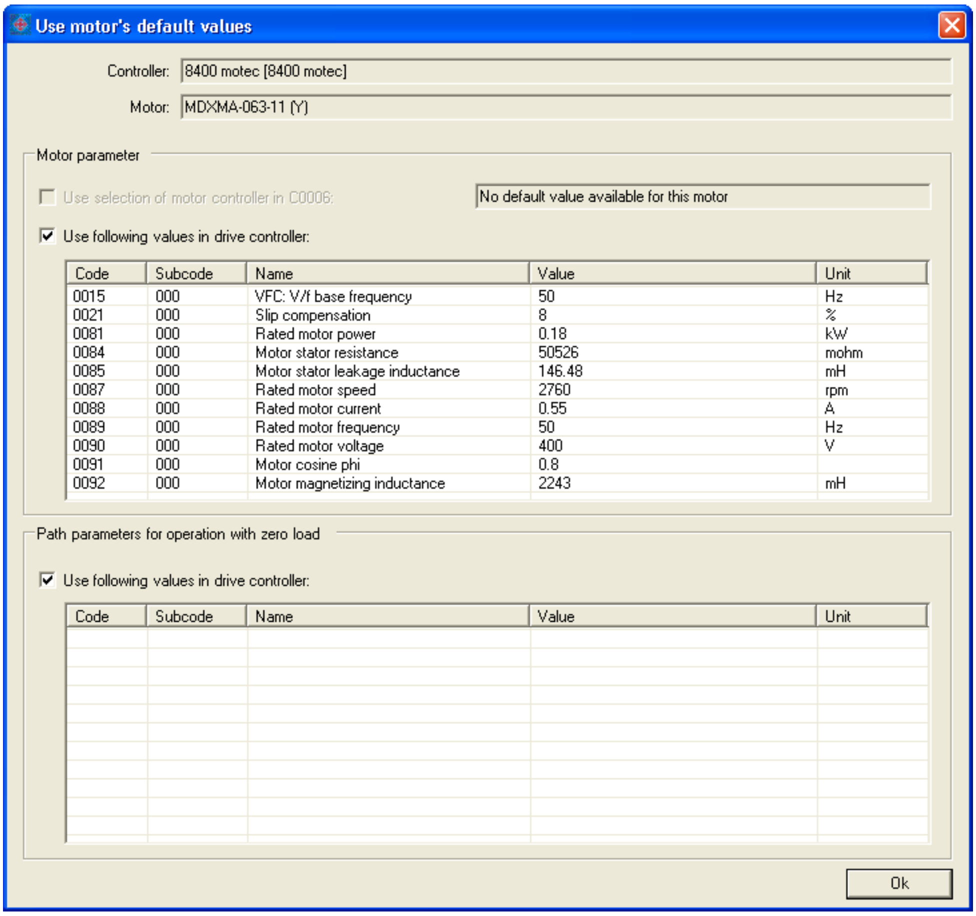
Specify which motor is connected to the drive controller!

Tip: Use the search options to refine the list of search results!

- Alternatively, the motor can be inserted into the project at a later time via the **Insert a component** command.
- Go to the **Application parameters** tab in the *Overview* ➞ *Motor data* dialog level and click the **From motor catalogue...** button to also reach the motor catalogue for the selection of another motor.

Accepting the default values of the motor

If a motor is selected from the motor catalogue at a later time, the *Use motor's default values* dialog box is displayed afterwards which includes all motor data of the selected motor. Please select here which of the default values are to be copied to the inverter:



Controller: 8400 motec [8400 motec]

Motor: MDXMA-063-11 (Y)

Motor parameter

☐ Use selection of motor controller in C0006: No default value available for this motor

☑ Use following values in drive controller:

Code	Subcode	Name	Value	Unit
0015	000	VFC: V/f base frequency	50	Hz
0021	000	Slip compensation	8	%
0081	000	Rated motor power	0.18	kW
0084	000	Motor stator resistance	50526	mohm
0085	000	Motor stator leakage inductance	146.48	mH
0087	000	Rated motor speed	2760	rpm
0088	000	Rated motor current	0.55	A
0089	000	Rated motor frequency	50	Hz
0090	000	Rated motor voltage	400	V
0091	000	Motor cosine phi	0.8	
0092	000	Motor magnetizing inductance	2243	mH

Path parameters for operation with zero load

☑ Use following values in drive controller:

Code	Subcode	Name	Value	Unit

Tip!

If a third party manufacturer's motor is used, select a Lenze motor from the motor catalogue first which is similar in terms of current, voltage and speed rating. Adapt the preselected motor data exactly to the real motor afterwards.

5.2.2 Automatic motor data identification

Via the "Identify motor parameters" device command (C00002/23), the inverter characteristic, the influences of the motor cable, and the motor parameters listed in the table below can be identified automatically:

Parameters	Information	ASM	PSM
C00015	V/f base frequency	●	●
C00016	V_{min} boost	●	●
C00021	Slip compensation	●	
C00084	Motor stator resistance	●	●
C00085	Motor stator leakage inductance	●	●
C00092	Motor magnetising inductance	●	
C00095	Motor magnetising current	●	

Danger!

During motor parameter identification, the motor is energised via the outputs U, V and W of the inverter!

Stop!

If motor parameter identification is aborted, unstable drive behaviour may be the result!

Note!

- We strongly recommend motor parameter identification before the initial commissioning of the sensorless vector control (SLVC).
- The motor parameter identification must be carried out when the motor is cold!
- The load machine may remain connected. Holding brakes, if present, may remain in the braking position.
- With an idling motor, a small angular offset may occur at the motor shaft.
- The amplitude of the rated motor current (C00088) is injected to identify the stator resistance. If the rated motor current amounts to less than 60 % of the rated inverter current, at least 60 % of the rated inverter current will be injected to ensure sufficient motor parameter identification accuracy.

How to carry out automatic motor parameter identification:

1. Inhibit the inverter if it is enabled, e.g. via the C00002/16 device command, or with a LOW signal at the RFR terminal.
2. Wait until the drive is at standstill.
3. Transfer the nameplate data to the following codes:
    - C00081: Rated motor power
    - C00087: Rated motor speed
    - C00088: Rated motor current (according to the connection method ⅄/△)
    - C00089: Rated motor frequency (according to the connection method ⅄/△)
    - C00090: Rated motor voltage (according to the connection method ⅄/△)
    - C00091: Motor cos φ
4. Start motor parameter identification via the C00002/23 device command.
5. Inverter is re-enabled.
    - Motor parameter identification starts.
    - The motor parameter identification takes approx. 30 s.
    - The identification is completed if the "0: Off / ready" message is displayed in C00002/23.
6. Inhibit inverter again.

Note!

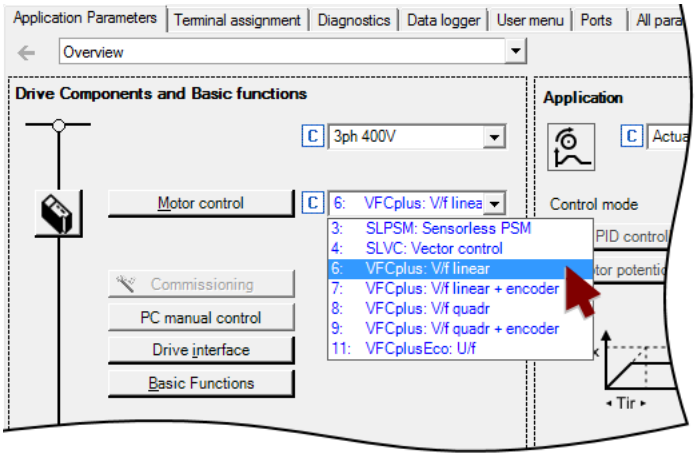
Motor parameter identification may be aborted by the inverter if a special motor (e.g. mid-frequency motor) is used or if there is a large deviation between inverter and motor power.

Another cause for the abort of the motor parameter identification could be the implausibility of the entered nameplate data, e.g. the entry P = 0 kW for the motor power.

5.3 Selecting the control mode

The 8400 motec inverter supports various modes for motor control (open loop or closed loop).

- The V/f characteristic control (VFCplus) is preset with a linear characteristic.
- The control mode can be selected in the »Engineer« on the **Application parameter** tab via the **Motor control** (C00006) list field:



- A click on the **Motor control...** button leads you to the parameterisation dialog of the selected motor control.

Tip!

In order to make the selection of the motor control easier, we provide a selection help with recommendations and alternatives for standard applications in the subchapter entitled "Selection help". (🕮 100)

The following section briefly describe the control modes. A reference to more details can be found at the end of each section.

V/f characteristic control (VFCplus)

The V/f characteristic control (VFCplus) is a motor control mode for standard frequency inverter applications based on a simple and robust control process which is suitable for the operation of machines with linear or square-law load torque characteristic (e.g. fans). Furthermore, this motor control mode is also suitable for special motors. Due to the low parameterisation effort, commissioning of such applications is fast and easy.

The V_{min}-boost (C00016) and slip compensation (C00021) required for optimising the drive behaviour are dimensioned for machines with power adaptations to the inverter in the Lenze setting.

▸ V/f characteristic control (VFCplus) (📖 103)

Energy-saving V/f characteristic control (VFCplusEco)

In contrast to the V/f characteristic control mode (VFCplus), this motor control mode uses a cosφ control in partial load operational range to automatically reduce the power loss in the machine (energy optimisation).

The motor data required for the cosφ control and the V_{min} boost (C00016) and slip compensation (C00021) required for optimising the drive behaviour are dimensioned for machines with power adaptations to the inverter in the Lenze setting.

The required motor data (motor rotor resistance, motor stator resistance, motor stator leakage inductance and mutual motor inductance) only affect the extent of energy optimisation but not the stability.

In case of applications with dynamically very high sudden load variations from the unloaded operation, this motor control mode should not be used since a motor stalling cannot be excluded.

Energy optimisation for dynamic applications is not possible with this motor control mode.

▸ V/f characteristic control - energy-saving (VFCplusEco) (📖 114)

V/f control (VFCplus + encoder)

From version 02.00.00

The V/f control can be selected for operating asynchronous motors with speed feedback. With this motor control, a slip regulator can be additionally parameterised which adjusts the actual speed value dynamically to the speed setpoint.

▸ V/f control (VFCplus + encoder) (📖 124)

Sensorless vector control (SLVC)

Sensorless (field-oriented) vector control is based on a decoupled, separate control for the torque-producing and the field-producing current component. In addition, the actual speed is reconstructed by means of a motor model so that a speed sensor is not required.

In comparison to the V/f characteristic control without feedback, the following can be achieved by means of sensorless vector control SLVC:

- A higher maximum torque throughout the entire speed range
- A higher speed accuracy
- A higher concentricity factor
- A higher level of efficiency
- The implementation of torque-actuated operation with speed limitation
- The limitation of the maximum torque in motor and generator mode for speed-actuated operation

Tip!

If a high torque without feedback is to be provided at small speeds, we recommend the "Sensorless vector control" motor control mode.

▸ Sensorless vector control (SLVC) (🕮 135)

Sensorless control for synchronous motors (SLPSM)

From version 03.01.00

This sensorless control enables an encoderless control of synchronous motors. The process is based on field-oriented control within a higher speed range (e.g. > 10 % of the rated motor speed). The actual speed value and rotor position are reconstructed via a motor model.

Standard applications for this control type are pumps and fans, horizontal materials handling and simple positioning technology.

▸ Sensorless control for synchronous motors (SLPSM) (🕮 145)

5.3.1 Selection help

To ease the selection the motor control, the following table contains recommendations and alternatives to standard applications.

Application	Motor control (C00006) blue = with speed feedback grey = alternative	
With constant load	6	VFCplus: V/f linear
	7	VFCplus: V/f linear + encoder
	4	SLVC: Vector control
	11	VFCplusEco: V/f energy-saving
With extremely alternating loads	6	VFCplus: V/f linear
	7	VFCplus: V/f linear + encoder
	4	SLVC: Vector control
With high starting duty	4	SLVC: Vector control
	7	VFCplus: V/f linear + encoder
	6	VFCplus: V/f linear
With speed control (speed feedback)	7	VFCplus: V/f linear + encoder
With high dynamic performance e.g. for positioning and infeed drives	7	VFCplus: V/f linear + encoder
Torque limitation	4	SLVC: Vector control
With torque limitation (power control)	6	VFCplus: V/f linear
	7	VFCplus: V/f linear + encoder
	4	SLVC: Vector control
Three-phase reluctance motor/sliding rotor motor/motor with permanently assigned frequency/voltage characteristic	6	VFCplus: V/f linear
Synchronous machine	3	SLPSM: Sensorless PSM
Pump and fan drives with quadratic load characteristic	11	VFCplusEco: V/f energy-saving
	8	VFCplus: V/f quadr
	4	SLVC: Vector control
horizontal materials handling technology	11	VFCplusEco: V/f energy-saving
	9	VFCplus: V/f quadr + encoder
	8	VFCplus: V/f quadr
	4	SLVC: Vector control
Simple hoists	6	VFCplus: V/f linear
	7	VFCplus: V/f linear + encoder
Winder/unwinder with dancer position control	7	VFCplus: V/f linear + encoder

5.4 Defining current and speed limits

Limitation of the speed setpoint

Parameterising the reference speed in C00011 means that the drive must rotate at the set speed if a speed setpoint of 100% is specified.

All speed setpoint selections are provided in % and always refer to the reference speed set in C00011.

Tip!

For reasons of achievable resolution and the accuracy involved, the reference speed should be geared to the speed range required for the respective application.

Lenze recommendation: Reference speed (C00011) = 1500 ... 3000 rpm

Irrespective of the selected motor control, there are more limitation options:

Parameters	Information	Lenze setting	
		Value	Unit
C00909/1	Max. positive speed	120	%
C00909/2	Max. negative speed	120	%
C00910/1	Max. positive output frequency	300	Hz
C00910/2	Max. negative output frequency	300	Hz

Current limitation in motor and generator mode

In the various motor control modes, the inverter is provided with functions which determine the dynamic behaviour under load and counteract exceedance of the maximum current in motor or generator mode.

Parameters	Information	Lenze setting	
		Value	Unit
C00022	Imax in motor mode	47.00	A
C00023	Imax in generator mode • 100 % ≡ Imax in motor mode (C00022)	100	%

The current limits must be selected depending on

- the permissible maximum current of the motor → recommendation: $I(Mot)_N$ < 1.5 ... 2.0
- the permissible maximum current of the inverter
- the torque in motor/generator mode required for the application

Note!

Highly dynamic applications
(High accelerations or short and big overloads)

The overcurrent disconnection may respond (fault message OC1) if the setting of the maximum current in motor mode in C00022 approximately corresponds to the maximum permissible value of the respective inverter.

Remedies:

- Increasing the acceleration and deceleration time (C00012 und C00013)
- Reduction of the maximum current in motor mode (C00022)
- Reduction of the maximum current in generator mode (C00023)
- Adaptation of the indirect peak current limitation (procedure depends on the selected motor control mode, see below)
- Reduction of the reset time of the current limiting controller (C00074)

Influencing the torque in motor/generator mode

The torque in motor and generator mode can be limited via the *nTorqueMotLimit_a* and *nTorqueGenLimit_a* process signal inputs.

- If sensorless vector control (SLVC) is selected, the limitation has a direct effect on the torque-producing current component.

From version 08.00.00

- If V/f characteristic control (VFCplus) is selected, limitation is indirectly performed via a so-called I_{max} controller.

From version 10.00.00

The positive and negative torque can be limited via the two process signal inputs *nTorqueMotLimit_a* and *nTorqueGenLimit_a*.

- C00143: bit 10 = 1: *nTorqueMotLimt_a* acts as *nTorqueHighLimit_a* (positive torque limitation), and *nTorqueGenLimit_a* acts as n*TorqueLowLimit_a* (negative torque limitation).

How to adapt the peak current limitation:

V/f characteristic control (VFCplus):

- Reduce the slip compensation with C00021.

Sensorless vector control (SLVC):

- Reduce the slip compensation with C00021.
- Reduce the limitation of the torque in motor mode via the *nTorqueMotLimit_a* process signal and the limitation of the torque in generator mode via the *nTorqueGenLimit_a* process signal.

5.5 V/f characteristic control (VFCplus)

In case of the V/f characteristic control (VFCplus), the motor voltage of the inverter is determined by means of a linear or quadratic characteristic depending on the field frequency or motor speed to be generated. The voltage follows a preselected characteristic.

Stop!

- The following must be observed when operating drives with quadratic V/f characteristic:
  - Please always check whether the corresponding drive is suitable for operation with a quadratic V/f characteristic!
  - If your pump drive or fan drive is not suitable for operation with a quadratic V/f characteristic, you must either use the V/f characteristic control function with a linear V/f characteristic or the sensorless vector control (SLVC).
- For adjustment, observe the thermal performance of the connected asynchronous motor at low output frequencies.
  - Usually, standard asynchronous motors with insulation class B can be operated for a short time with their rated current in the frequency range 0 Hz ≤ f ≤ 25 Hz.
  - Contact the motor manufacturer to get the exact setting values for the max. permissible motor current of self-ventilated motors in the lower speed range.
  - If you select the quadratic V/f characteristic, we recommend to set a lower V_{min}.

Note!

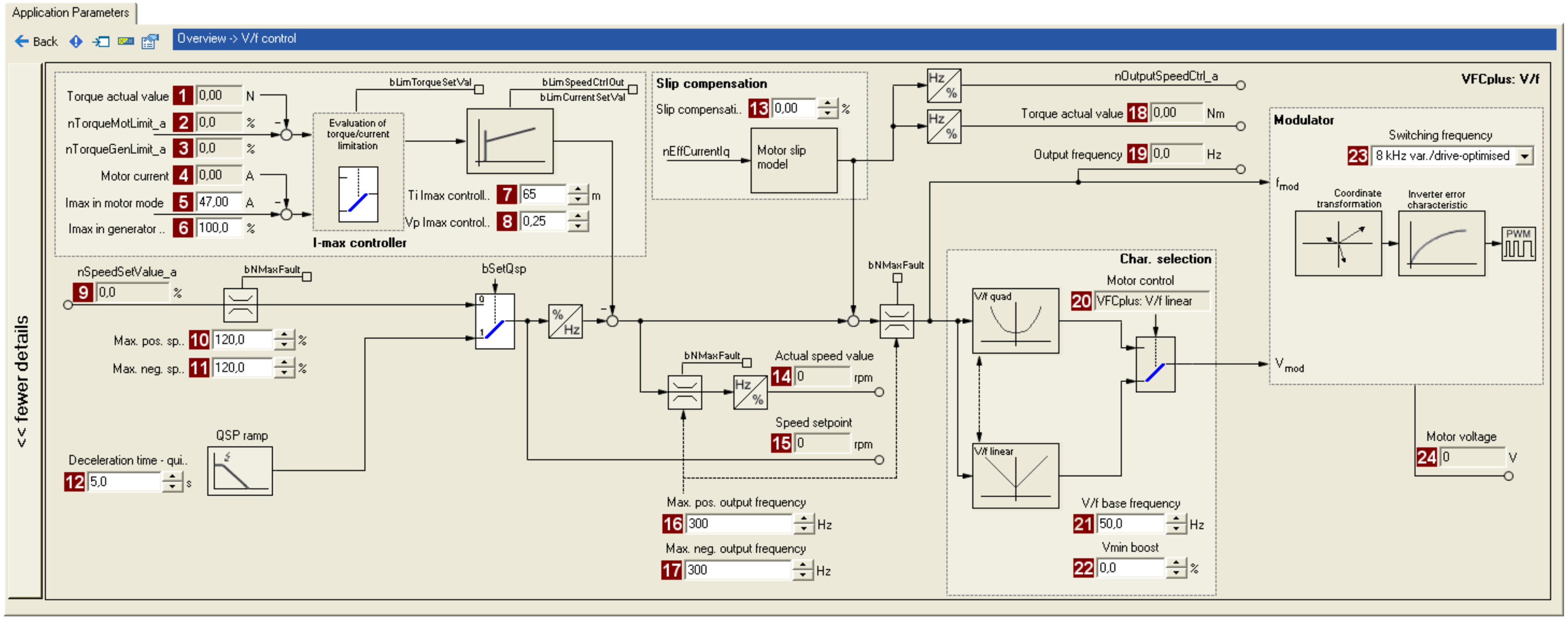
When the auto DCB threshold (C00019) is set > 0 rpm, there is no torque at the motor shaft in the lower speed range!

▶ Automatic DC-injection braking (auto DCB) (📖 174)

5.5.1 Parameterisation dialog/signal flow

Proceed as follows to open the dialog for parameterising the motor control:

1. »Engineer« Go to the *Project view* and select the 8400 motec inverter.
2. Select the **Application parameters** tab from the *Workspace*.
3. Select the motor control from the *Overview* dialog level in the **Motor control** list field:
   - "6: VFCplus: V/f linear" for linear characteristic or
   - "8: VFCplus: V/f quadr" for square-law characteristic
4. Click the **Motor control V/f** button to change to the *Overview* → *Motor control V/f* dialog box.
   - This dialog level only shows a simplified signal flow with the most important parameters.
   - When you click the **>>More details** button in the left-most position, a signal flow with more details/parameters is displayed.



Torque actual value 1 0,00 N
nTorqueMotLimit_a 2 0,0 %
nTorqueGenLimit_a 3 0,0 %
Motor current 4 0,00 A
Imax in motor mode 5 47,00 A
Imax in generator .. 6 100,0 %
Ti Imax controll.. 7 65 m
Vp Imax control.. 8 0,25
nSpeedSetValue_a 9 0,0 %
Max. pos. sp.. 10 120,0 %
Max. neg. sp.. 11 120,0 %
Deceleration time - qui.. 12 5,0 s
Slip compensati.. 13 0,00 %
Actual speed value 14 0 rpm
Speed setpoint 15 0 rpm
Max. pos. output frequency 16 300 Hz
Max. neg. output frequency 17 300 Hz
Torque actual value 18 0,00 Nm
Output frequency 19 0,0 Hz
Motor control 20 VFCplus: V/f linear
V/f base frequency 21 50,0 Hz
Vmin boost 22 0,0 %
Switching frequency 23 8 kHz var./drive-optimised
Motor voltage 24 0 V

Parameters		Information
1	C00056/2	Actual torque value
2	C00830/4	Limitation of torque in motor mode
3	C00830/5	Limitation of torque in generator mode
4	C00054	Motor current
5	C00022	Imax in motor mode
6	C00023	Imax in generator mode
7	C00074	Ti Imax controller
8	C00073	Vp Imax controller
9	C00830/3	Speed setpoint
10	C00909/1	Max. pos. speed
11	C00909/2	Max. neg. speed
12	C00105	Decel. time - quick stop
13	C00021	Slip compensation
14	C00051	Actual speed value
15	C00050	Speed setpoint
16	C00910/1	Max. pos. output frequency
17	C00910/2	Max. neg. output frequency
18	C00056/2	Actual torque value
19	C00058	Output frequency
20	C00006	Motor control
21	C00015	V/f base frequency
22	C00016	Vmin boost
23	C00018	Switching frequency
24	C00052	Motor voltage

5.5.2 Basic settings

The "Initial commissioning steps" listed in the table below are sufficient for a simple characteristic control.

- Detailed information on the individual steps can be found in the following subchapters.

Initial commissioning steps	
1	Define V/f characteristic shape.
2.	Defining current limits (Imax controller). (📖 106)

Tip!

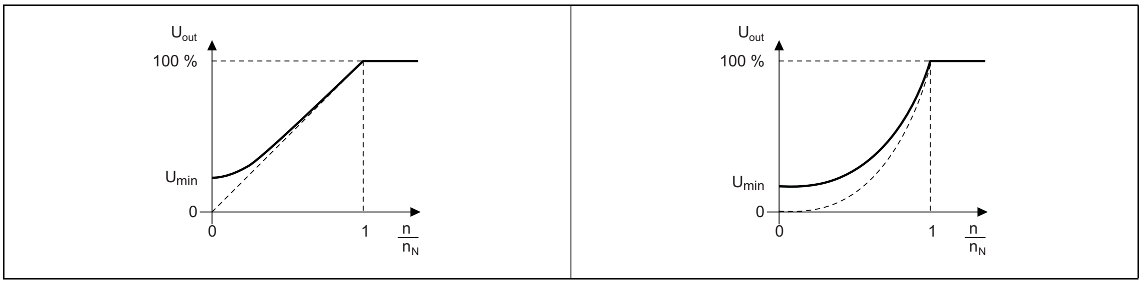
Information on the optimisation of the control mode and the adaptation to the real application is provided in chapter "Optimising the control mode". (📖 107)

Parameterisable additional functions are described correspondingly in the chapter "Parameterisable additional functions". (📖 168)

5.5.2.1 Define V/f characteristic shape

In principle, three different characteristic shapes can be stipulated:

1. **Linear V/f characteristic**:
   For drives for a constant, speed-independent load torque.
2. **Quadratic V/f characteristic**:
   For drives with a load torque curve which is quadratic or in relation to speed. Quadratic V/f characteristics are preferred in the case of centrifugal pumps and fan drives.



[5-1] Principle of a linear and quadratic V/f characteristic

The V/f characteristic shape is defined by selecting the corresponding motor control mode in C00006:

- C00006 = "6: VFCplus: V/f linear" for linear characteristic
- C00006 = "8: VFCplus: V/f quadr" for quadratic characteristic

5.5.2.2 Defining current limits (Imax controller)

The V/f characteristic control (VFCplus) and the V/f control (VFCplus + encoder) operating modes are provided with a current limitation control which is decisive for the dynamic behaviour under load and counteracts exceedance of the maximum current in motor or generator mode. This current limitation control is called I_{max} control.

- The efficiency (motor current) measured by the I_{max} control is compared with the current limit value for motor load set in C00022 and the current limit value for generator load set in C00023.
- If the current limit values are exceeded, the inverter changes its dynamic behaviour.

Motor overload during acceleration

The inverter prolongs the acceleration ramp to keep the current on or below the current limit.

Generator overload during deceleration

The inverter prolongs the acceleration ramp to keep the current on or below the current limit.

Increasing load with constant speed

- If the motor current limit value is reached:
  - The inverter reduces the effective speed setpoint until a stable working point is set or an effective speed setpoint of 0 rpm is reached.
  - If the load is reduced, the inverter increases the effective speed setpoint until the setpoint speed is reached or the load reaches the current limit value again.
- When the generator current limit value is reached:
  - The inverter increases the effective speed setpoint until a stable working point is set or the maximally permissible speed (C00909) or output frequency is reached (C000910).
  - If the load is reduced, the inverter reduces the effective speed setpoint until the setpoint speed is reached or the load reaches the current limit value again.
- If a sudden load is built up at the motor shaft (e.g. drive is blocked), the overcurrent disconnection may respond (fault message OC1 or OC11).

5.5.3 Optimising the control mode

The V/f characteristic control (VFCplus) is generally ready for operation. It can be adapted subsequently by adapting the characteristic and/or the drive behaviour.

Adapting characteristic

For the linear and quadratic characteristic, it is also possible to match its curve to different load profiles or motors by adapting the V/f base frequency (C00015) and the V_{min} boost (C00016).

▸ Adapting the V/f base frequency (🕮 108)

▸ Adapting the Vmin boost (🕮 109)

Adapting drive behaviour

- Limitation of the maximum current by a current limitation controller (e.g. to prevent the motor from stalling or to limit to the maximally permissible motor current). ▸ Optimising the Imax controller (🕮 110)
- Adaptation of the field frequency by a load-dependent slip compensation (improved speed accuracy for systems without feedback)

5.5.3.1 Adapting the V/f base frequency

The V/f base frequency (C00015) determines the slope of the V/f characteristic and has considerable influence on the current, torque, and power performance of the motor.

- The setting in C00015 applies to all permitted mains voltages.
- Mains fluctuations or fluctuations of the DC-bus voltage (operation in generator mode) do not need to be considered when the V/f base frequency is set. They are automatically compensated for by the internal mains voltage compensation of the device.
- Depending on the setting in C00015, it may be required to adapt the reference speed (C00011) to traverse the entire speed range of the motor.
- As a typical value, the V/f base frequency (C00015) is set to the value of the rated motor frequency (C00089) for standard applications and corresponds to the data on the motor nameplate.
- Reference voltage for the V/f base frequency is the rated motor voltage (C00090) according to the motor nameplate.

Note!

87-Hz operation

4-pole asynchronous motors which are designed for a rated frequency of f = 50 Hz in star connection can be operated in delta connection when being constantly excited up to f = 87 Hz.

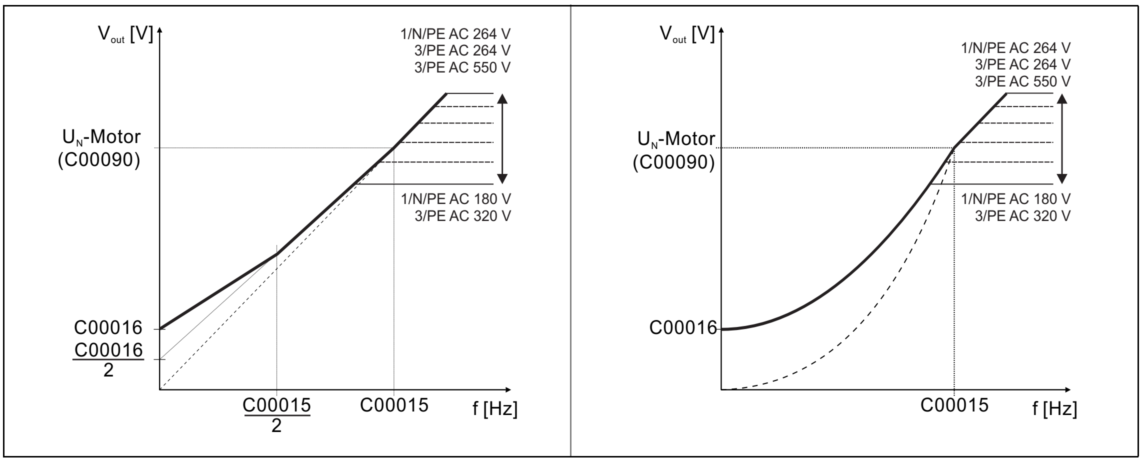
- Advantages:
  - Higher speed-setting range
  - 73% higher power output in case of standard motors
- Motor current and motor power increase by the factor $\sqrt{3}$.
- The field weakening range starts above 87 Hz.
- Generally, this process can also be used with motors which have different numbers of pole pairs. In case of 2-pole asynchronous motors, the mechanical limit speed must be maintained.

5.5.3.2 Adapting the Vmin boost

The V_{min} boost (C00016) of the motor voltage

- serves to select a load independent magnetising current which is required for asynchronous motors.
- has an effect on output frequencies below the V/f base frequency (C00015).
- optimises the torque behaviour of the motor.

The general linear and quadratic V/f characteristics are shown in the illustrations below. The illustrations show the impacts of the parameters used to adapt the characteristic shape.



[5-2] Representation of the linear V/f characteristic (on the left) and quadratic V/f characteristic (on the right)

How to set the V_{min}boost:

1. Operate motor in idle state at approx. 6 % of the rated motor speed.
2. Increase V_{min} boost (C00016) until the following motor current is reached:

   Motor in short-time operation up to 0.5 n_{rated}

   - for self-ventilated motors: $I_{motor} \approx I_{rated\ motor}$
   - for forced ventilated motors: $I_{motor} \approx I_{rated\ motor}$

   Motor in continuous operation up to 0.5 n_{rated}

   - for self-ventilated motors: $I_{motor} \approx 0.8\ I_{rated\ motor}$
   - for forced ventilated motors: $I_{motor} \approx I_{rated\ motor}$

Note!

V/f control (VFCplus + encoder)

Occurring vibrations can be decreased or eliminated by reducing the Vmin boost (C00016).

Note!

V_{min} boost is automatically calculated by the motor parameter identification using the data specified on the motor nameplate so that a no-load current of approx. 0.8 $I_{rated\ motor}$ results at the slip frequency of the machine.

V/f control (VFCplus + encoder)

If V/f control (VFCplus + encoder) is selected, we recommend a decidedly lower V_{min} boost:

- In this case, select a V_{min} boost which ensures that approx. 50 % of the rated motor current flows at slip frequency when the motor is idling.

5.5.3.3 Optimising the Imax controller

Using the Lenze setting of the current limitation controller, the drive is stable:

Parameters	Information	Lenze setting	
		Value	Unit
C00073	VFC: Vp Imax controller	0.25	
C00074	VFC: Ti Imax controller	65	ms

Most applications do not require optimisation.

The setting of the current limitation controller must be adapted if

- power control including great moments of inertia is performed.
  - Recommendation: Increase of the reset time Ti (C00074) of the I_{max} controller.
- vibrations occur in the V/f control (VFCplus + encoder) mode during the intervention of the current limitation controller.
  - Recommendation: Increase of the reset time Ti (C00074) of the I_{max} controller.
- overcurrent errors occur due to load impulses or too high acceleration ramps.
  - Recommendation: Reduction of the gain Vp (C00073) and reset time Ti (C00074) of the I_{max} controller

5.5.3.4 Torque limitation

This function extension is available from version 08.00.00 onwards!

The previous chapter, "Optimising the Imax controller", describes how the drive can be protected from overload. During commissioning, these settings are carried out once and remain unchanged afterwards. However, it is often necessary to limit the torque to a lower value for plant or process reasons.

- To avoid overload in the drive train, the torque in motor mode can be limited via the *nTorqueMotLimit_a* process input signal, and the torque in generator mode can be limited via the *nTorqueGenLimit_a* process input signal:

Designator DIS code | data type	**Information/possible settings**
nTorqueMotLimit_a C00830/4 | INT	Torque limitation in motor mode • Scaling: 16384 ≡ 100 % M_{max} (C00057) • Setting range: 0 ... +199.99 % From version 10.00.00 onwards: C00143: bit 10 = 1: positive torque limitation (nTorqueHighLimit_a)
nTorqueGenLimit_a C00830/5 | INT	Torque limitation in generator mode • Scaling: 16384 ≡ 100 % M_{max} (C00057) • Setting range: 0 ... +199.99 % From version 10.00.00 onwards: C00143: bit 10 = 1: negative torque limitation (nTorqueLowLimit_a)

Note!

- The actual torque (C00056/2) is directly calculated from the current slip speed of the machine. This requires correct entry of the motor data. (📖 87) ▸ Motor selection/ Motor data
- To avoid instabilities during operation with active slip compensation, the torque limit values are internally processed as absolute values.
- If slip compensation is deactivated (C00021 = 0), indirect torque limitation (differential signal between apparent motor current and *nTorqueMotLimit_a* or *nTorqueGenLimit_a*) occurs. Above the no-load current of the motor, the accuracy of the indirect torque limitation is limited.

V/f characteristic control (VFC)

The accuracy of the torque limitation is limited because the actual torque (C00056/2) is only calculated from the slip speed measured indirectly via the motor current.

V/f control (VFC + encoder)

The slip speed of the motor is available at the slip controller output. This leads to a high accuracy for the actual torque (C00056/2) and the torque limitation.

5.5.3.5 Optimising the starting performance after a controller enable

Note!

Up to version 06.xx.xx

All control modes

The motor is not energised if with inactive auto DC-injection braking function (C00019 = 0):

- Setpoint selection = 0 and
- output speed or output frequency = 0

The non-energised motor cannot create a torque in case of e.g. quick stop (QSB) and a missing holding brake.

Control mode SLPSM

With this control mode (C00006 = 3), the automatic DC-injection braking function is always inactive. The motor is not energised if

- Setpoint selection = 0 and
- output speed or output frequency = 0

Special feature: When the shaft has rotated before and the setpoint has been selected > 0, a jerk may occur in the machine.

From version 07.00.00

All control modes

The motor is powered if

- Automatic DC-injection braking function C00019 = 0
- Automatic DC-injection braking time C00106 = 990.0 s
- Setpoint selection = 0 and
- output speed or output frequency = 0

The motor torque remains active for all control modes, even in quick stop mode (QSP). This serves as a jerk-free start-up for the SLPSM control mode (C00006 = 3) as well.

When the inverter has been enabled, magnetisation of the motor causes a start-up delay. If this delay cannot be tolerated for specific applications, the motor must always be actuated in an energised condition.

Procedure without setting a controller inhibit

1. Deactivate the auto DCB function with C00019 = 0.
2. Do not activate the controller inhibit. Instead, stop the drive by selecting a setpoint of 0 or by activating the quick stop function.

5.5.4 Remedies for undesired drive behaviour

Drive behaviour	Remedy
Inadequate smooth running at low speeds, especially in the case of operation with a long motor cable	▸ Automatic motor data identification (🕮 95)
Problems in case of high starting duty (great mass inertia)	▸ Adapting the Vmin boost (🕮 109)
Drive does not follow the speed setpoint.	The current controller intervenes in the set field frequency to limit the controller output current to the maximum current (C0022, C0023). Therefore: • Prolong acceleration/deceleration times: C00012: Accel. time - main setpoint C00013: Decel. time - main setpoint • Consider a sufficient magnetising time of the motor. Depending on the motor power, the magnetising time amounts to 0.1 ... 0.2 s. • Increase the maximally permissible current: C00022: Imax in motor mode C00023: Imax in generator mode)
For operation without speed feedback (C00006 = 6): Insufficient speed constancy at high load (setpoint and motor speed are not proportional anymore)	• Increase slip compensation (C00021). Important: Unstable drive due to overcompensation! • With cyclic load impulses (e. g. centrifugal pump), a smooth motor characteristic is achieved by smaller values in C00021 (possibly negative values). Note: The slip compensation is only active for operation without speed feedback.
"Clamp operation active" error message (OC11): Inverter cannot follow dynamic processes, i.e. too short acceleration/deceleration times in terms of load ratios.	• Increase the gain of the I_{max} controller (C00073) • Reduce the reset time of the I_{max} controller (C00074) • Prolong the acceleration time (C00012) • Prolong the deceleration time (C00013)
Motor stalling in the field weakening range (adaptation especially required for small machines)	• If motor power < inverter power: Set C00022 to $I_{max} = 2\ I_{rated\ motor}$ • Reduce dynamic performance of setpoint generation

5.6 V/f characteristic control - energy-saving (VFCplusEco)

With the energy-saving V/f characteristic control mode (VFCplusEco), the motor voltage of the inverter is detected by means of a linear characteristic depending on the field frequency to be created or the motor speed. Moreover, a cosφ control and the resulting voltage reduction causes the motor to be always operated in the optimum efficiency range (reduction of copper losses in the asynchronous machine).

- Hence, these are the advantages of this motor control mode:
  - Good robustness
  - Easy parameter setting
  - High energy efficiency (lower heating of the motor in partial load operational range)
  - Same speed accuracy and maximum torques as with VFCplus
- Predestinated application areas of this motor control mode are materials handling technology and pump and fan systems.
- This motor control mode serves to improve efficiency of standard asynchronous machines with efficiency class IE1 (standard IEC 60034-30 2008) in the range 0 ... $M_{efficiency\_max}$ between 0 ... 20 % (Ø 5 ... 10 %).
  - Description of $M_{efficiency\_max}$: Indicates the torque [%] of M_{rated_motor}, where the motor has the max. efficiency.)
- In case of asynchronous machines with a higher energy efficiency class (IE2 and IE3), the absolute energy saving of the motor control mode is lower due to improved efficiency of the machine. However, energy saving is still achieved in a higher load range.
- $M_{efficiency\_max}$ is performance-related and listed in the following table for some power values of the energy efficiency class IE1 and IE2:

	$M_{Efficiency\_max}$ (related to M_{rated_motor})	
Performance	**IE1**	**IE2**
0.25 kW	75 %	
0.75 kW	65 %	75 %
2.2 kW	55 %	85 %
7.5 kW	30 %	45 %
22 kW	23 %	
45 kW	21 %	

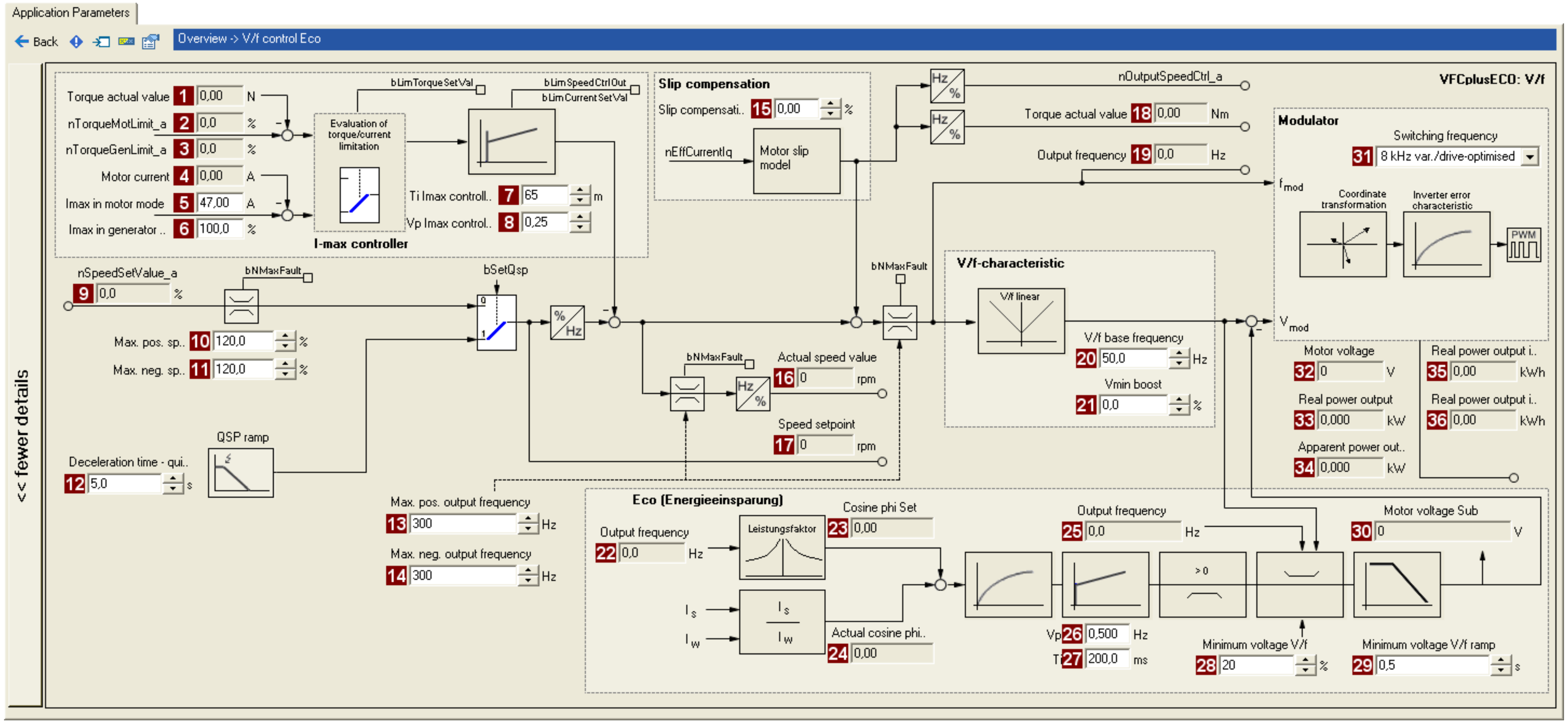
Stop!

- For adjustment, observe the thermal performance of the connected asynchronous motor at low output frequencies.
  - Usually, standard asynchronous motors with insulation class B can be operated for a short time with their rated current in the frequency range 0 Hz ... 25 Hz.
  - Contact the motor manufacturer to get the exact setting values for the max. permissible motor current of self-ventilated motors in the lower speed range.
- The nameplate data of the motor (at least rated speed and rated frequency) must be entered if, instead of a standard motor, an asynchronous motor is used with the following values:
  - rated frequency $\neq$ 50 Hz (star) or
  - rated frequency $\neq$ 87 Hz (delta) or
  - number of pole pairs $\neq$ 2

5.6.1 Parameterisation dialog/signal flow

Proceed as follows to open the dialog for parameterising the motor control:

1. »Engineer« Go to the *Project view* and select the 8400 motec inverter.
2. Select the **Application parameters** tab from the *Workspace*.
3. Select the motor control "11: VFCplusEco: V/f energy-saving" from the *Overview* dialog box in the **Motor control** list field:
4. Click the **Motor control V/f Eco** button to change to the *Overview* → *Motor control V/f* dialog box.
   - This dialog level only shows a simplified signal flow with the most important parameters.
   - When you click the **>>More details** button in the left-most position, a signal flow with more details/parameters is displayed.



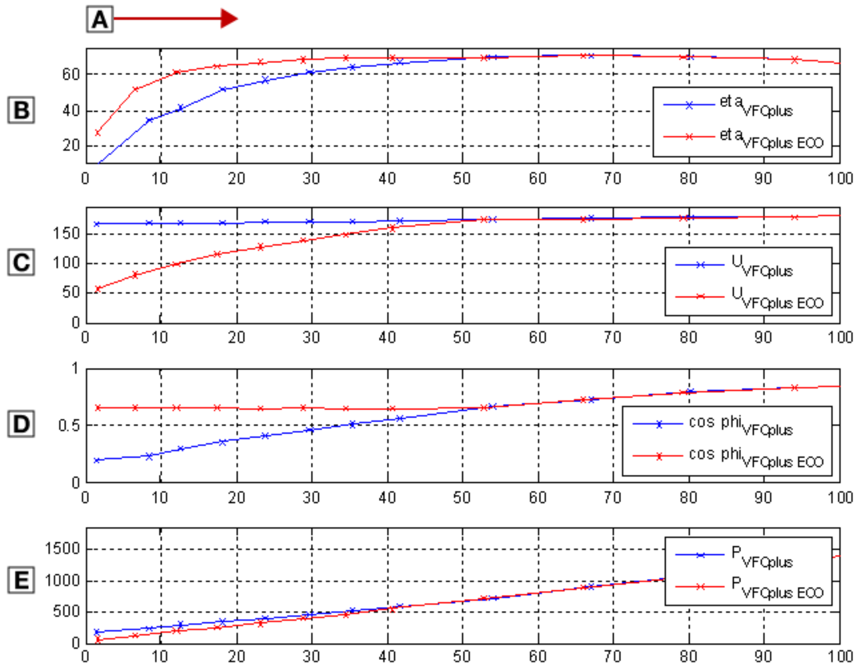
Torque actual value 1 0,00 N
nTorqueMotLimit_a 2 0,0 %
nTorqueGenLimit_a 3 0,0 %
Motor current 4 0,00 A
Imax in motor mode 5 47,00 A
Imax in generator .. 6 100,0 %
Ti Imax controll.. 7 65 ms
Vp Imax control.. 8 0,25
nSpeedSetValue_a 9 0,0 %
Max. pos. sp.. 10 120,0 %
Max. neg. sp.. 11 120,0 %
Deceleration time - qui.. 12 5,0 s
Max. pos. output frequency 13 300 Hz
Max. neg. output frequency 14 300 Hz
Slip compensati.. 15 0,00 %
Actual speed value 16 0 rpm
Speed setpoint 17 0 rpm
Torque actual value 18 0,00 Nm
Output frequency 19 0,0 Hz
V/f base frequency 20 50,0 Hz
Vmin boost 21 0,0 %
Output frequency 22 0,0 Hz
Cosine phi Set 23 0,00
Actual cosine phi.. 24 0,00
Output frequency 25 0,0 Hz
Vp 26 0,500 Hz
T 27 200,0 ms
Minimum voltage V/f 28 20 %
Minimum voltage V/f ramp 29 0,5 s
Motor voltage Sub 30 0 V
Switching frequency 31 8 kHz var./drive-optimised
Motor voltage 32 0 V
Real power output 33 0,000 kW
Apparent power out.. 34 0,000 kW
Real power output i.. 35 0,00 kWh
Real power output i.. 36 0,00 kWh

	Parameters	Information		Parameters	Information		Parameters	Information
1	C00056/2	Actual torque value	13	C00910/1	Max. pos. output frequency	25	C00058	Output frequency
2	C00830/4	Limitation of torque in motor mode	14	C00910/2	Max. neg. output frequency	26	C00975	VFC-ECO: Vp
3	C00830/5	Limitation of torque in generator mode	15	C00021	Slip compensation	27	C00976	VFC-ECO: Ti
4	C00054	Motor current	16	C00051	Actual speed value	28	C00977	VFC-ECO: Minimum voltage V/f
5	C00022	Imax in motor mode	17	C00050	Speed setpoint	29	C00982	VFC-ECO: Motor voltage Sub ramp
6	C00023	Imax in generator mode	18	C00056/2	Actual torque value	30	C00978	VFC-ECO: Motor voltage Sub
7	C00074	Ti Imax controller	19	C00058	Output frequency	31	C00018	Switching frequency
8	C00073	Vp Imax controller	20	C00015	V/f base frequency	32	C00052	Motor voltage
9	C00830/3	Speed setpoint	21	C00016	Vmin boost	33	C00980/1	Active output power
10	C00909/1	Max. pos. speed	22	C00058	Output frequency	34	C00980/2	Apparent output power
11	C00909/2	Max. neg. speed	23	C00979/2	Cosine phi set	35	C00981/1	Output energy in motor mode
12	C00105	Decel. time - quick stop	24	C00979/1	Cosine phi act	36	C00981/2	Output energy in generator mode

5.6.2 Comparison of VFCplusEco - VFCplus

The following characteristics show the impact of the energy-saving V/f characteristic control (VFCplusEco) compared to the standard V/f characteristic control (VFCplus).

- The characteristics were recorded with a standard asynchronous machine 2.2 kW with energy efficiency class IE1 at speed = 600 rpm.



A scaled torque in [%]
B efficiency in [%]
C motor voltage in [V]
D power factor
E electrical power in [W]

[5-3] Comparison of VFCplusEco - VFCplus

5.6.3 Basic settings

The "Initial commissioning steps" listed in the table below are sufficient for the V/f characteristic control - energy-saving (VFCplusECo).

- Detailed information on the individual steps can be found in the following subchapters.

Initial commissioning steps		
1	Determine the motor control: C00006 = "11: VFCplusEco: V/f energy-saving"	
2.	The required motor data are pre-initialised depending on the device and thus, they do not need to be entered directly.In order to achieve a high energy optimisation, these motor data can be entered (see the following section).	
	Set the motor selection/motor data • When selecting and parameterising the motor, the motor nameplate data and the equivalent circuit diagram data are relevant. Detailed information can be found in the "Motor selection/Motor data" chapter. (📖 87) Depending on the motor manufacturer, proceed as follows:	
	Lenze motor: Selecting a motor from the motor catalogue in the »Engineer« - or - 1. Set the motor nameplate data 2. Automatic motor data identification	**Third party manufacturer's motor:** 1. Set the motor nameplate data 2. Automatic motor data identification or set known equivalent circuit diagram manually: C00084: Motor stator resistance C00085: Motor stator leakage inductance C00092: Motor magnetising inductance
3.	Defining current limits (Imax controller). (📖 106)	

Tip!

Information on the optimisation of the control mode and the adaptation to the real application is provided in chapter "Optimising the control mode". (📖 119)

Parameterisable additional functions are described correspondingly in the chapter "Parameterisable additional functions". (📖 168)

5.6.4 Optimising the control mode

The V/f characteristic control - energy-saving (VFCplus) is generally ready for operation. It can be adapted subsequently by adapting the characteristic and/or the drive behaviour.

Adapting characteristic

For the linear characteristic as part of the V/f characteristic control - energy-saving (VFCplusEco), it is also possible (like in case of the standard V/f characteristic control) to match its curve to different load profiles or motors by adapting the V/f base frequency (C00015) and the V_{min} boost (C00016).

Note!

For an adaptation of the V_{min} boost, the V/f characteristic control - energy-saving (VFCplusEco) must not be set. For this purpose, set the V/f characteristic control (VFCplus).

▶ Adapting the V/f base frequency (📖 108)
▶ Adapting the Vmin boost (📖 109)

Adapting drive behaviour

- Limitation of the maximum current by a current limitation controller (e.g. to prevent the motor from stalling or to limit to the maximally permissible motor current). ▶ Optimising the Imax controller (📖 110)
- Adaptation of the field frequency by a load-dependent slip compensation (improved speed accuracy for systems without feedback).
- Improving the behaviour at high dynamic load changes. (📖 120)
- Adapting the slope limitation for lowering the Eco function. (📖 120)
- Optimising the cos/phi controller. (📖 121)

Torque limitation

Limit the torque to a lower value. ▶ Torque limitation (📖 111)

5.6.4.1 Improving the behaviour at high dynamic load changes

Due to the voltage reduction executed via the cosφ control, the motor may stall in the Lenze setting in case of high dynamic load changes (dynamic load impulse from 0 to more than 50 % rated motor torque).

An adaptation of the minimum voltage V/f (C00977) improves the stability in case of load impulses.

- In the Lenze setting, the minimum voltage V/f is set to 20 % for the highest energy optimisation. With this setting, a dynamic load impulse from 0 to approx. 50 % rated motor torque can be applied without the motor stalling.
- An increase of the minimum voltage V/f to 70 % permits to apply a dynamic load impulse from 0 to 100 % rated motor torque without the motor stalling. This reduces the energy optimisation to be achieved by approx. 75 %.
- A further increase of the stability at still higher dynamic load impulses can be achieved by a further increase of the minimum voltage V/f, but means a further loss in energy optimisation.

Note!

The energy optimisation can be switched off by setting the minimum voltage V/f (C00977) to 100 %. Then, the behaviour corresponds to the V/f characteristic control (VFCplus) with linear characteristic.

In case of applications with very high dynamic sudden load variations from the unloaded operation, this motor control mode should not be used or the energy optimisation should be switched off, since a motor stalling cannot be excluded.

5.6.4.2 Adapting the slope limitation for lowering the Eco function

The ramp set in C00982 for voltage reduction serves as slope limitation in order to prevent that voltage is suddenly applied to the motor when the Eco function is deactivated. Otherwise, the overvoltage limitation (Imax, Clamp) would be activated.

- This ramp is, depending on the device, pre-initialised to approx. the triple rotor time constant. An adaptation of this parameter is not required.

When the Eco function is switched off, a quick reaction (high dynamic performance) is required, but with a low current overshoot and a small torque jump. Thus, the Lenze setting of C00982 is a compromise regarding the switch-off of the Eco function (motor voltage sub=0).

- To increase the dynamics when switching off the Eco function:
  Reduce → setting in C00982.
  (Current compensation actions increase when the Eco function is switched off.)
- In order to reduce current compensation actions when switching off the Eco function:
  Increase → setting in C00982.
  (The dynamics when switching off the eco function is reduced)

5.6.4.3 Optimising the cos/phi controller

With the Lenze setting, the cosφ controller is set such that usually no adaptation is required for all power ratings and application cases.

Behaviour	**Remedy/recommendation**
The cosφ actual value (C00979/1) varies greatly.	Reduce gain Vp (C00975) and reset time Ti (C00976).
The cosφ actual value (C00979/1) is permanently lower than the cosφ setpoint (C00979/2).	Increase gain Vp (C00975) and reset time Ti (C00976).

5.6.4.4 Optimising the starting performance after a controller enable

Note!

Up to version 06.xx.xx

All control modes

The motor is not energised if with inactive auto DC-injection braking function (C00019 = 0):

- Setpoint selection = 0 and
- output speed or output frequency = 0

The non-energised motor cannot create a torque in case of e.g. quick stop (QSB) and a missing holding brake.

Control mode SLPSM

With this control mode (C00006 = 3), the automatic DC-injection braking function is always inactive. The motor is not energised if

- Setpoint selection = 0 and
- output speed or output frequency = 0

Special feature: When the shaft has rotated before and the setpoint has been selected > 0, a jerk may occur in the machine.

From version 07.00.00

All control modes

The motor is powered if

- Automatic DC-injection braking function C00019 = 0
- Automatic DC-injection braking time C00106 = 990.0 s
- Setpoint selection = 0 and
- output speed or output frequency = 0

The motor torque remains active for all control modes, even in quick stop mode (QSP). This serves as a jerk-free start-up for the SLPSM control mode (C00006 = 3) as well.

When the inverter has been enabled, magnetisation of the motor causes a start-up delay. If this delay cannot be tolerated for specific applications, the motor must always be actuated in an energised condition.

Procedure without setting a controller inhibit

1. Deactivate the auto DCB function with C00019 = 0.
2. Do not activate the controller inhibit. Instead, stop the drive by selecting a setpoint of 0 or by activating the quick stop function.

5.6.5 Remedies for undesired drive behaviour

Drive behaviour	Remedy
Inadequate smooth running at low speeds, especially in the case of operation with a long motor cable	▸ Automatic motor data identification (📖 95) Reduce the influence of the Eco function by increasing the minimum voltage V/f (C00977) if necessary.
Problems in case of high starting duty (great mass inertia)	1. Set motor control VFCplus with linear characteristic (C00006 = 6). 2. Adapting the Vmin boost. (📖 109) 3. Again set motor control VFCplusEco (C00006 = 11).

Drive does not follow the speed setpoint	The current controller intervenes in the set field frequency to limit the controller output current to the maximum current (C0022, C0023). Therefore:
	• Prolong acceleration/deceleration times:
	C00012: Accel. time - main setpoint
	C00013: Decel. time - main setpoint
	• Consider a sufficient magnetising time of the motor. Depending on the motor power, the magnetising time amounts to 0.1 ... 0.2 s.
	• Increase the maximally permissible current:
	C00022: Imax in motor mode
	C00023: Imax in generator mode
	• Make adaptations for the Eco function:
	  • Improving the behaviour at high dynamic load changes. (📖 120)
	  • Adapting the slope limitation for lowering the Eco function. (📖 120)
	  • Optimising the cos/phi controller. (📖 121)

Insufficient speed constancy at high load (setpoint and motor speed are not proportional anymore)	• Increase slip compensation (C00021). Important: Unstable drive due to overcompensation! • With cyclic load impulses (e. g. centrifugal pump), a smooth motor characteristic is achieved by smaller values in C00021 (possibly negative values). Note: The slip compensation is only active for operation without speed feedback.

"Clamp operation active" error message (OC11):
Inverter cannot follow dynamic processes, i.e. too short acceleration/deceleration times in terms of load ratios.
	• Increase the gain of the I_{max} controller (C00073)
	• Reduce the reset time of the I_{max} controller (C00074)
	• Prolong the acceleration time (C00012)
	• Prolong the deceleration time (C00013)
	• Make adaptations for the Eco function:
	  • Improving the behaviour at high dynamic load changes. (📖 120)
	  • Adapting the slope limitation for lowering the Eco function. (📖 120)

Motor stalling in the field weakening range
(adaptation especially required for small machines)
	• If motor power < inverter power:
	Set C00022 to $I_{max} = 2\ I_{\text{rated motor}}$
	• Reduce dynamic performance of setpoint generation
	• Make adaptations for the Eco function:
	  • Improving the behaviour at high dynamic load changes. (📖 120)
	  • Adapting the slope limitation for lowering the Eco function. (📖 120)

Speed variations in no-load operation for speeds > 1/3 rated speed.	Minimise speed oscillations with oscillation damping (C00234).

5.7 V/f control (VFCplus + encoder)

This function extension is available from version 02.00.00!

The V/f characteristic control (VFCplus) described above can be operated with a speed feedback. This has the following advantages:

- Steady-state accuracy of the speed
- Less parameterisation effort compared to the sensorless vector control (SLVC)
- Improved dynamics compared to V/f characteristic control without feedback or to sensorless vector control (SLVC).
- Suitability for group drives

The descriptions in chapter "V/f characteristic control (VFCplus)" also apply to the V/f control. (🕮 103)

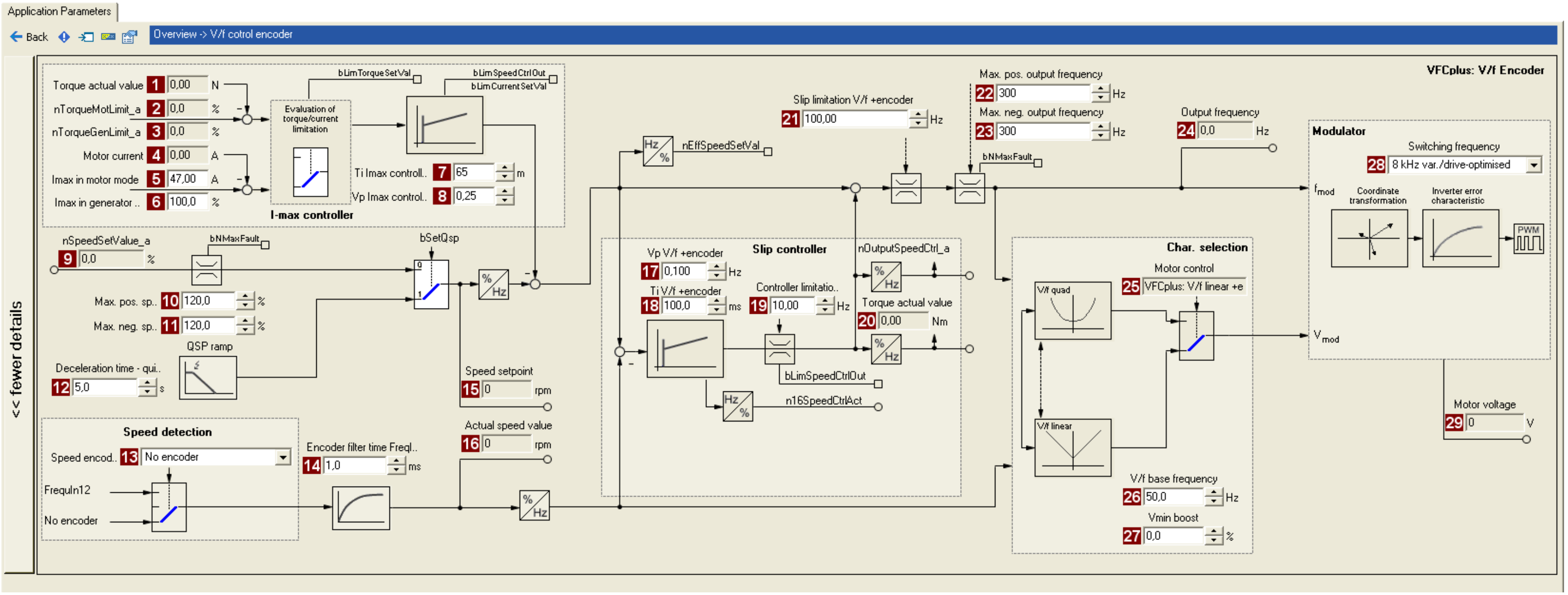
Note!

- The speed feedback mandatory for this motor control type can be fed in at the digital input terminals (DI1/DI2) via an HTL encoder.
  - In order that the HTL encoder can be evaluated correctly, the digital input terminals (DI1/DI2) must be configured as frequency inputs. ▸ Configuring DI1 and DI2 as frequency inputs (🕮 211)
- Ensure that with operation of the motor control with speed feedback the maximum input frequency of 7.5 kHz or 10 kHz for EtherNET/IP, EtherCAT, PROFINET and POWERLINK is not exceeded.
- As the slip is calculated in the feedback V/f operation and injected through the slip regulator, the slip compensation (C00021) is deactivated with V/f control.

5.7.1 Parameterisation dialog/signal flow

Proceed as follows to open the dialog for parameterising the motor control:

1. »Engineer« Go to the *Project view* and select the 8400 motec inverter.
2. Select the **Application parameters** tab from the *Workspace*.
3. Select the motor control from the *Overview* dialog level in the **Motor control** (C00006) list field:
    - "7: VFCplus: V/f linear +encoder" for linear characteristic or
    - "9: VFCplus: V/f quadr +encoder" for quadratic characteristic
4. Click the **Motor control V/f encoder** button to change to the *Overview* → *Motor control V/f* dialog box.
    - This dialog level only shows a simplified signal flow with the most important parameters.
    - When you click the **>>More details** button in the left-most position, a signal flow with more details/parameters is displayed, as shown in the following subchapter.



1 Torque actual value 0,00 N
2 nTorqueMotLimit_a 0,0 %
3 nTorqueGenLimit_a 0,0 %
4 Motor current 0,00 A
5 Imax in motor mode 47,00 A
6 Imax in generator .. 100,0 %
7 Ti Imax controll.. 65 m
8 Vp Imax control.. 0,25
9 nSpeedSetValue_a 0,0 %
10 Max. pos. sp.. 120,0 %
11 Max. neg. sp.. 120,0 %
12 Deceleration time - qui.. 5,0 s
13 Speed encod.. No encoder
14 Encoder filter time FreqI.. 1,0 ms
15 Speed setpoint 0 rpm
16 Actual speed value 0 rpm
17 Vp V/f +encoder 0,100 Hz
18 Ti V/f +encoder 100,0 ms
19 Controller limitatio.. 10,00 Hz
20 Torque actual value 0,00 Nm
21 Slip limitation V/f +encoder 100,00 Hz
22 Max. pos. output frequency 300 Hz
23 Max. neg. output frequency 300 Hz
24 Output frequency 0,0 Hz
25 Motor control VFCplus: V/f linear +e
26 V/f base frequency 50,0 Hz
27 Vmin boost 0,0 %
28 Switching frequency 8 kHz var./drive-optimised
29 Motor voltage 0 V

Parameters		Information
1	C00056/2	Actual torque value
2	C00830/29	Limitation of torque in motor mode
3	C00830/28	Limitation of torque in generator mode
4	C00054	Motor current
5	C00022	Imax in motor mode
6	C00023	Imax in generator mode
7	C00074	Ti Imax controller
8	C00073	Vp Imax controller
9	C00830/22	Speed setpoint
10	C00909/1	Max. pos. speed
11	C00909/2	Max. neg. speed
12	C00105	Decel. time - quick stop
13	C00495	Speed sensor selection
14	C00497/1	Encoder filter time FreqIn12
15	C00050	Speed setpoint
16	C00051	Actual speed value
17	C00972	Vp Vf+encoder
18	C00973	Ti Vf+encoder
19	C00971/1	Controller limitation Vf+encoder
20	C00056/2	Actual torque value
21	C00971/2	Slip limitation Vf+encoder
22	C00910/1	Max. pos. output frequency
23	C00910/2	Max. neg. output frequency
24	C00058	Output frequency
25	C00006	Motor control
26	C00015	V/f base frequency
27	C00016	Vmin boost
28	C00018	Switching frequency
29	C00052	Motor voltage
More relevant parameters for Encoder/feedback system:		
	C00115/1	Fct. DI1/2 10kHz
	C00420/1	Number of encoder increments
	C00425/1	Encoder scanning time
	C00496	Encoder evaluation method

5.7.2 Basic settings

In order to protect the drive system, carry out the commissioning of the V/f control and the slip regulator in several steps.

- Detailed information on the single steps can be found in the following subchapters or in the corresponding subchapters for V/f characteristic control.

Initial commissioning steps	
1	Define V/f characteristic shape (🕮 128)
2.	Defining current limits (Imax controller). (🕮 129)
3.	Parameterise encoder/feedback system. ▸ Encoder/feedback system (🕮 181)
4.	If special motors with a rated frequency other than 50 Hz or with a number of pole pairs ≠ 2 are used, set the motor parameters according to the motor nameplate. ▸ Motor selection/Motor data (🕮 87)
5th	Define speed setpoint (e.g. 20 % of the rated speed) and enable inverter.
6.	Check whether the actual speed value (C00051) ≈ speed setpoint (C00050) and then inhibit the inverter again. • In case of a sign reversal between actual value and setpoint, check the connection of the encoder (e.g. change track A or B of the encoder or invert the actual speed value). • In case the actual value differs considerably from the setpoint (factor 2), set the motor parameters according to motor nameplate. Then repeat step 5.
6.	To protect the drive, reduce the slip regulator limitation in C00971/1. • e.g. reduction to half the slip frequency (≈ 2 Hz)
8	Define speed setpoint (e.g. 20 % of the rated speed) and enable inverter.
9	In case of a semi-stable operational performance, reduce the reset time (C00972) or the proportional gain (C00973) of the slip regulator until a stable operation has been achieved. ▸ Parameterising the slip regulator (🕮 130)
10	In a final step, increase the slip regulator limitation again in C00971/1. • e.g. increase to twice the slip frequency

Tip!

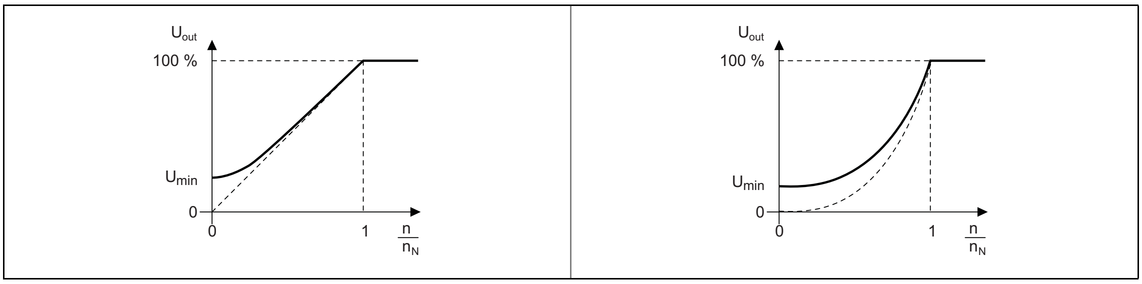
Information on the further optimisation of the control mode and the adaptation to the real application is provided in the "Optimising the control mode" chapter for the V/f characteristic control (VFCplus). (🕮 107)

Parameterisable additional functions are described correspondingly in the chapter "Parameterisable additional functions". (🕮 168)

5.7.2.1 Define V/f characteristic shape

In principle, three different characteristic shapes can be stipulated:

1. **Linear V/f characteristic**:
   For drives for a constant, speed-independent load torque.
2. **Quadratic V/f characteristic**:
   For drives with a load torque curve which is quadratic or in relation to speed. Quadratic V/f characteristics are preferred in the case of centrifugal pumps and fan drives.



[5-4] Principle of a linear and quadratic V/f characteristic

The V/f characteristic shape is defined by selecting the corresponding motor control mode in C00006:

- C00006 = "6: VFCplus: V/f linear" for linear characteristic
- C00006 = "8: VFCplus: V/f quadr" for quadratic characteristic

5.7.2.2 Defining current limits (Imax controller)

The V/f characteristic control (VFCplus) and the V/f control (VFCplus + encoder) operating modes are provided with a current limitation control which is decisive for the dynamic behaviour under load and counteracts exceedance of the maximum current in motor or generator mode. This current limitation control is called I_{max} control.

- The efficiency (motor current) measured by the I_{max} control is compared with the current limit value for motor load set in C00022 and the current limit value for generator load set in C00023.
- If the current limit values are exceeded, the inverter changes its dynamic behaviour.

Motor overload during acceleration

The inverter prolongs the acceleration ramp to keep the current on or below the current limit.

Generator overload during deceleration

The inverter prolongs the acceleration ramp to keep the current on or below the current limit.

Increasing load with constant speed

- If the motor current limit value is reached:
  - The inverter reduces the effective speed setpoint until a stable working point is set or an effective speed setpoint of 0 rpm is reached.
  - If the load is reduced, the inverter increases the effective speed setpoint until the setpoint speed is reached or the load reaches the current limit value again.
- When the generator current limit value is reached:
  - The inverter increases the effective speed setpoint until a stable working point is set or the maximally permissible speed (C00909) or output frequency is reached (C000910).
  - If the load is reduced, the inverter reduces the effective speed setpoint until the setpoint speed is reached or the load reaches the current limit value again.
- If a sudden load is built up at the motor shaft (e.g. drive is blocked), the overcurrent disconnection may respond (fault message OC1 or OC11).

5.7.2.3 Parameterising the slip regulator

The slip regulator is designed as a PI controller. In order to improve the response to setpoint changes, the setpoint speed or setpoint frequency is added to the output (correcting variable) of the slip regulator as feedforward control value.

- Unlike traditional speed controllers, the slip regulator only controls the slip.
- In the Lenze setting, the configuration of the slip regulator provides robustness and moderate dynamics.

Parameters	Information	Lenze setting	
		Value	Unit
C00971/1	VFC: Controller limitation V/f +encoder	10.00	Hz
C00971/2	VFC: Slip limitation V/f +encoder	100.00	Hz
C00972	VFC: Vp V/f +encoder	0.100	Hz/Hz
C00973	VFC: Ti V/f +encoder	100.0	ms

Note!

In particular when using low-pulse HTL encoders, vibrations may occur which can be eliminated or reduced by increasing the smoothing time of the actual speed measurement process (Nact filter time constant, C00497).

Slip regulator gain Vp

The setting range of the slip regulator gain Vp (C00972) which leads to a stable operational performance, mainly depends on the resolution of the speed sensor. There is a direct relationship between encoder resolution and gain:

- The higher the encoder resolution, the higher the gain can be set.

The following table provides maximum and recommended slip regulator gains for encoder with standard encoder increments:

Encoder increment [Increments/revolution]	**Slip regulator gain Vp**	
	maximum	recommended
8	0.09	0.06
64	0.52	0,31
100	0.79	0.47
120	0.94	0.57
128	1.00	0.60
256	1.29	0.77
386	1.63	0.98
512	1.97	1.18
640	2.31	1.38
768	2.65	1.59
896	2.99	1.79
1014	3.33	2.00
1536	4.69	2.81
2048	6.05	3.63
3072	8.77	5.26
4096	11.49	6.90

[5-1] Slip regulator gain Vp based on the encoder increment

How to adapt the slip regulator gain to the operating conditions:

1. Adapt the slip regulator gain (C00972) to the encoder increment according to table [5-1].
2. Set controller limitation (C00971/1) to half the slip frequency (≈ 2 Hz).
3. Select speed setpoint (e.g. 20 % of the rated speed).
4. Enable inverter.
5. Increase the slip regulator gain (C00972) until the drive is semi-stable.
    - This can be recognised by motor noises or "humming" of the motor or by a noise on the actual speed signal.
6. Reduce slip regulator gain (C00972) until the drive runs stable again (no motor "humming").
7. Reduce slip regulator gain (C00972) to approx. half the value.
    - With low encoder resolutions, another reduction of the slip regulator gain for low speeds may be necessary (speed setpoint ≈ 0).
    - We recommend to finally check the behaviour at setpoint speed = 0 and to further reduce the slip regulator gain if irregular running occurs.
8. Increase controller limitation (C00971/1) again (e.g. to twice the slip frequency).

Slip regulator time constant Ti

How to set the slip regulator time constant:

1. Set controller limitation (C00971/1) to half the slip frequency (≈ 2 Hz).
2. Select speed setpoint (e.g. 20 % of the rated speed).
3. Enable inverter.
4. Reduce the slip regulator time constant (C00973) until the drive is semi-stable.
    - This can be recognised by motor noise, "motor vibrations" or resonance on the actual speed value signal.
5. Increase slip regulator time constant (C00973) until the drive runs stable again (no motor "oscillation").
6. Increase the slip regulator time constant (C00973) to approx. twice the value.
7. Increase controller limitation (C00971/1) again (e.g. to twice the slip frequency).

Controller limitation

Max. intervention of the controller is limited by the controller limitation (C00971/1).

- The controller can be limited depending on the application.
- We recommend to limit the max. intervention to twice the rated slip of the motor.
- The rated slip is calculated as follows:

$$f_{\mathrm{Slip}_{\mathrm{Rated}}}[\mathrm{Hz}] = f_{\mathrm{Rated}}[\mathrm{Hz}] - \left(\frac{n_{\mathrm{Motor}_{\mathrm{Rated}}}[\mathrm{rpm}]}{60} \cdot p_{\mathrm{Number\ of\ pole\ pairs}}\right)$$

[5-5] Calculation of the rated slip

Note!

A setting of C00971/1 = 0 Hz deactivates the slip regulator. In this case, the structure of the V/f control corresponds to the structure of a V/f characteristic control without feedback.

Slip limitation

In addition to limiting the slip regulator, the field frequency to be injected can also be limited by another limiting element, the slip limitation (C00971/2).

- If the slip is e.g. limited to twice the rated slip of the motor, a stalling of the motor during very dynamic processes can be avoided.
- Motor stalling is caused by:
  - a high overcurrent at very steep speed ramps
  - very fast speed changes due to load, e.g. abrupt stopping of the drive due to an encounter with a stop or a load that is not moving.

5.7.3 Optimising the control mode

5.7.3.1 Optimising the starting performance after a controller enable

Note!

Up to version 06.xx.xx

All control modes

The motor is not energised if with inactive auto DC-injection braking function (C00019 = 0):

- Setpoint selection = 0 and
- output speed or output frequency = 0

The non-energised motor cannot create a torque in case of e.g. quick stop (QSB) and a missing holding brake.

Control mode SLPSM

With this control mode (C00006 = 3), the automatic DC-injection braking function is always inactive. The motor is not energised if

- Setpoint selection = 0 and
- output speed or output frequency = 0

Special feature: When the shaft has rotated before and the setpoint has been selected > 0, a jerk may occur in the machine.

From version 07.00.00

All control modes

The motor is powered if

- Automatic DC-injection braking function C00019 = 0
- Automatic DC-injection braking time C00106 = 990.0 s
- Setpoint selection = 0 and
- output speed or output frequency = 0

The motor torque remains active for all control modes, even in quick stop mode (QSP). This serves as a jerk-free start-up for the SLPSM control mode (C00006 = 3) as well.

When the inverter has been enabled, magnetisation of the motor causes a start-up delay. If this delay cannot be tolerated for specific applications, the motor must always be actuated in an energised condition.

Procedure without setting a controller inhibit

1. Deactivate the auto DCB function with C00019 = 0.
2. Do not activate the controller inhibit. Instead, stop the drive by selecting a setpoint of 0 or by activating the quick stop function.

5.8 Sensorless vector control (SLVC)

Sensorless vector control (SLVC) is based on a better motor current control according to a field-oriented control mode by Lenze.

Stop!

- The connected motor may be maximally two power classes lower than the motor assigned to the inverter.
- Operation of the sensorless vector control (SLVC) is only permissible for one single drive!
- Operation of the sensorless vector control (SLVC) is not permissible for hoists!
- The Lenze setting permits the operation of a power-adapted motor. Optimal operation is only possible if either:
    - the motor is selected via the Lenze motor catalogue
    - the motor nameplate data are entered and motor parameter identification is carried out afterwards
      - or -
    - the nameplate data and equivalent circuit data of the motor (motor leakage inductance and mutual motor inductance, slip compensation and motor stator resistance) are entered manually.
- When you enter the motor nameplate data, take into account the phase connection implemented for the motor (star or delta connection). Only enter the data applying to the selected connection type.
    - In this context, also observe the instructions in chapter "Adapting the V/f base frequency" relating to V/f characteristic control. (🕮 108)

Note!

Optimal operation of the sensorless vector control (SLVC) can be achieved from a minimum speed of approx. 0.5-fold slip speed. At lower speed values below the 0.5-fold slip speed, the maximum torque is reduced.

The maximum field frequency with this motor control mode is 650 Hz.

In comparison to the V/f characteristic control without feedback, the following can be achieved by means of sensorless vector control SLVC:

- A higher maximum torque throughout the entire speed range
- A higher speed accuracy
- A higher concentricity factor
- A higher level of efficiency
- The limitation of the maximum torque in motor and generator mode for speed-actuated operation

5.8.1 Parameterisation dialog

Proceed as follows to open the dialog for parameterising the motor control:

1. »Engineer« Go to the *Project view* and select the 8400 motec inverter.
2. Select the **Application parameters** tab from the *Workspace*.
3. Select the motor control "4: SLVC: Vector control" from the *Overview* dialog level in the **Motor control** list field:
4. Click the **Motor control vector** button to change to the *Overview* ➞ *Motor control vector* dialog box.
    - This dialog level lists shows all relevant parameters in a parameter list.

Short overview of the relevant parameters:

Parameters	Information
C00006	Selection of the motor control ➞ "4: SLVC: Vector control"
C00011	Reference speed
C00018	Switching frequency
C00021	Slip compensation
C00022	Imax in motor mode
C00023	Imax in generator mode
C00050	Speed setpoint
C00057	Maximum torque
C00058	Output frequency
C00081	Rated motor power
C00084	Motor stator resistance
C00085	Motor stator leakage inductance
C00087	Rated motor speed
C00088	Rated motor current
C00089	Rated motor frequency
C00090	Rated motor voltage
C00091	Motor cosine phi
C00092	Motor magnetising inductance
C00095	Motor magnetising current
C00097	Rated motor torque
C00105	Decel. time - quick stop
C00909/1	Max. pos. speed
C00909/2	Max. neg. speed
C00910/1	Max. pos. output frequency
C00910/2	Max. neg. output frequency
Greyed out = display parameter	

5.8.2 Types of control

The sensorless vector control can be operated in two different modes:

- Speed control with torque limitation (*bTorquemodeOn* = FALSE)
- Torque control with speed limitation (*bTorquemodeOn* = TRUE)

5.8.2.1 Speed control with torque limitation

When *bTorquemodeOn* = FALSE, the drive system is operated with a selected speed setpoint in a speed-controlled manner.

Note!

Starting from version 08.00.00, quick stop (QSP) is used to set the two torque limit values *nTorqueMotLimit_a* and *nTorqueGenLimit_a* to 100 %, so that the drive can be stopped quickly and safely anytime. The previous response can be set in C00143/1 via bit 13.

A speed setpoint is selected and the drive system is operated in a speed-controlled manner.

The operational performance can be adapted in the following ways:

- Overload limitation in the drive train
  - The torque is limited via the torque setpoint.
  - The torque setpoint is identical to the value at the output of the speed controller, *nOutputSpeedCtrl*.
  - To avoid overload in the drive train, the torque in motor mode can be limited via the *nTorqueMotLimit_a* process input signal, and the torque in generator mode can be limited via the *nTorqueGenLimit_a* process input signal:

Designator DIS code | data type	**Information/possible settings**
nTorqueMotLimit_a C00830/4 | INT	Torque limitation in motor mode • Scaling: 16384 ≡ 100 % M_{max} (C00057) • Setting range: 0 ... +199.99 % From version 10.00.00 onwards: C00143: bit 10 = 1: positive torque limitation (nTorqueHighLimit_a)
nTorqueGenLimit_a C00830/5 | INT	Torque limitation in generator mode • Scaling: 16384 ≡ 100 % M_{max} (C00057) • Setting range: -199.99 ... 0 % From version 10.00.00 onwards: C00143: bit 10 = 1: negative torque limitation (nTorqueLowLimit_a)

Note!

To avoid instabilities during operation, the torque limit values are internally processed as absolute values.

- Motor current limitation
  - A cross current setpoint is calculated from the torque setpoint which is limited depending on the magnetising current, the max. current in motor mode (C00022), and the max. current in generator mode (C00023).
  - Here, the total current injected into the motor does not exceed the max. currents in motor and generator mode.
- Slip compensation (🕮 177)
  - Using a slip model, the slip of the machine is reconstructed.
  - The slip compensation (C00021) acts as the influencing parameter.

5.8.2.2 Torque control with speed limitation

This function extension is available from version 08.00.00 onwards!

When *bTorquemodeOn* = TRUE, a torque-controlled operation is activated. The setpoint torque directly follows the default value *nTorqueSetValue_a*.

Due to its speed limitation, the torque-controlled drive can only rotate within a speed range whose positive speed is limited by *nSpeedHighLimit_a* and whose negative speed is limited by *nSpeedLowLimit_a*.

Note!

Quick stop (QSP) is used to switch over to Speed control with torque limitation.

- The two torque limit values *nTorqueMotLimit_a* and *nTorqueGenLimit_a* are set to 100 % inside the device in order to ensure that the drive can be stopped quickly and safely anytime from here.
- Device-internal setting of the two torque limit values *nTorqueMotLimit_a* and *nTorqueGenLimit_a* to 100 % in the case of QSP can be inhibited with C00143/1, bit 13.

- The speed is defined by the process.
- The torque setpoint is calculated directly from *nTorqueSetValue_a*.
- In order to limit the torque setpoint, in this control mode also the torque limitation function via *nTorqueMotLimit_a* and *nTorqueGenLimit_a* is active.

Designator DIS code | data type	**Information/possible settings**
nTorqueMotLimit_a C00830/4 | INT	Torque limitation in motor mode • Scaling: 16384 ≡ 100 % M_{max} (C00057) • Setting range: 0 ... +199.99 % From version 10.00.00 onwards: C00143: bit 10 = 1: positive torque limitation (nTorqueHighLimit_a)
nTorqueGenLimit_a C00830/5 | INT	Torque limitation in generator mode • Scaling: 16384 ≡ 100 % M_{max} (C00057) • Setting range: -199.99 ... 0 % From version 10.00.00 onwards: C00143: bit 10 = 1: negative torque limitation (nTorqueLowLimit_a)
nTorqueSetValue_a C00830/15 | INT	Torque setpoint / additive torque • Scaling: 16384 ≡ 100 % M_{max} (C00057)
nSpeedLowLimit_a C00830/16 | INT	Lower speed limit for speed limitation • During torque-controlled operation only (*bTorquemodeOn* = TRUE) • Scaling: 16384 ≡ 100 % rated speed (C00011)
nSpeedHighLimit_a C00830/17 | INT	Upper speed limit for the speed limitation • During torque-controlled operation only (*bTorquemodeOn* = TRUE) • Scaling: 16384 ≡ 100 % rated speed (C00011)
bTorquemodeOn C00833/53 | BOOL	Define the type of control: *bTorquemodeOn* = FALSE: Speed control with torque limitation *bTorquemodeOn* = TRUE: Torque control with speed limitation

Configuration parameters for the inputs of the application

The following parameters can be used to change the preconfigured assignment of the application inputs:

Parameters	Information
C00620/28	LA_NCtrl: nSpeedLowLimit_a • Lenze setting: 0 (not connected)
C00620/29	LA_NCtrl: nSpeedHighLimit_a • Lenze setting: 0 (not connected)
C00700/19	LA_NCtrl: nTorqueSetValue_a • Lenze setting: 0 (not connected)
C00701/36	LA_NCtrl: bTorquemodeOn • Lenze setting: 0 (not connected)
C00830/15	LA_NCtrl: nTorqueSetValue_a
C00830/16	LA_NCtrl: nSpeedLowLimit_a
C00830/17	LA_NCtrl: nSpeedHighLimit_a

5.8.3 Basic settings

The following "Initial commissioning steps" must be performed to commission the sensorless vector control:

<table>
<tr><th colspan="3">Initial commissioning steps</th></tr>
<tr><td rowspan="2">1</td><td colspan="2">Set the motor selection/motor data
• When selecting and parameterising the motor, the motor nameplate data and the equivalent circuit diagram data are relevant. Detailed information can be found in the "Motor selection/Motor data" chapter. (🕮 87)
Depending on the motor manufacturer, proceed as follows:</td></tr>
<tr><td>Lenze motor:
Selecting a motor from the motor catalogue in the »Engineer«
- or -
1. Set the motor nameplate data
2. Automatic motor data identification</td><td>Third party manufacturer's motor:
1. Set the motor nameplate data
2. Automatic motor data identification or set known equivalent circuit diagram manually:
C00084: Motor stator resistance
C00085: Motor stator leakage inductance
C00092: Motor magnetising inductance</td></tr>
<tr><td>2.</td><td colspan="2">Determine the motor control:
C00006 = "4: SLVC: Vector control"</td></tr>
<tr><td>3.</td><td colspan="2">Set the slip compensation (C00021). ▶ Slip compensation (🕮 177)</td></tr>
</table>

Tip!

We recommend to use the flying restart function for connecting/synchronising the inverter to an already rotating drive system. ▶ Flying restart function (🕮 171)

Parameterisable additional functions are described correspondingly in the chapter "Parameterisable additional functions". (🕮 168)

5.8.3.1 Reduction of the speed overshoot

During the transition from the controlled to the torque-monitored range, the I component of the speed controller is pre-loaded with the maximum possible torque in the controlled range. The value that determines this maximum torque is the controlled accelerating current (C00995/1). The Lenze setting (C00995/1 = 100%) corresponds to the maximum torque.

In the event that the motor actually requires less torque, a short speed overshoot occurs in the transition from the controlled to the torque-monitored range.

This speed overshoot is very noticeable when synchronous machines with a very low power are used (e.g. type **MCS06C41** with P_N = 250 W).

Until version < 11.01.00, the speed overshoot can be reduced by lowering the controlled accelerating current (C00995/1). The disadvantage of this measure: The maximum possible motor torque is reduced.

This function extension is available from version 11.01.00 and higher!

If necessary, there can be an adjustment for the loading of the I component of the speed controller at the transition from the controlled to the torque-monitored range to reduce this speed overshoot. Since this controlled accelerating current continues to be effective, the maximum possible torque is still available.

The adjustment can be made via

C00936/1 = 0 ... 200% (SLPSM: speed controller load value)

Recommendations

- Synchronous machines with a low power

  Setting for the speed controller load value when synchronous machines with a low power are used (e.g. type **MCS06C41** with P_N = 250 W):

  C00936/1 = 50%.
- Drive with high starting torque:

  Setting for the speed controller load value when the drive requires a very high starting torque:

  C00936/1 = 101% ... 200%

  The speed controller load value is 100%.

5.8.4 Optimising the control mode

5.8.4.1 Optimising the starting performance after a controller enable

Note!

Up to version 06.xx.xx

All control modes

The motor is not energised if with inactive auto DC-injection braking function (C00019 = 0):

- Setpoint selection = 0 and
- output speed or output frequency = 0

The non-energised motor cannot create a torque in case of e.g. quick stop (QSB) and a missing holding brake.

Control mode SLPSM

With this control mode (C00006 = 3), the automatic DC-injection braking function is always inactive. The motor is not energised if

- Setpoint selection = 0 and
- output speed or output frequency = 0

Special feature: When the shaft has rotated before and the setpoint has been selected > 0, a jerk may occur in the machine.

From version 07.00.00

All control modes

The motor is powered if

- Automatic DC-injection braking function C00019 = 0
- Automatic DC-injection braking time C00106 = 990.0 s
- Setpoint selection = 0 and
- output speed or output frequency = 0

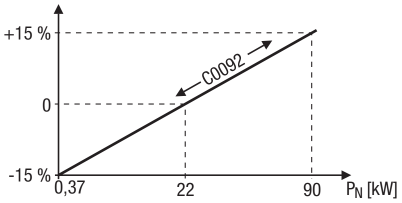
The motor torque remains active for all control modes, even in quick stop mode (QSP). This serves as a jerk-free start-up for the SLPSM control mode (C00006 = 3) as well.

When the inverter has been enabled, magnetisation of the motor causes a start-up delay. If this delay cannot be tolerated for specific applications, the motor must always be actuated in an energised condition.

Procedure without setting a controller inhibit

1. Deactivate the auto DCB function with C00019 = 0.
2. Do not activate the controller inhibit. Instead, stop the drive by selecting a setpoint of 0 or by activating the quick stop function.

5.8.5 Remedies for undesired drive behaviour

Drive behaviour	Remedy
Deviation between no-load current and magnetising current or bad speed or torque accuracy.	Adapt the motor magnetising inductance (C00092) for no-load operation. • If the no-load current is greater than the magnetising current (C00095) at 0.5-fold rated motor speed, the magnetising inductance must be reduced until the no-load current and the magnetising current have the same values. • Otherwise, the magnetising inductance must be increased. Tendency of the correction of C00092:  PN: Rated motor power
Insufficient speed constancy at high load: Setpoint and motor speed are not proportional anymore. **Caution:** Overcompensation of the settings mentioned under " Remedy" may result in unstable behaviour!	Via the slip compensation (C00021), the speed stability under high loads can be affected: • If $n_{act} > n_{slip}$, reduce the value in C00021 • If $n_{act} < n_{slip}$, increase the value in C00021
Unstable control with higher speeds.	• Check the setting of the magnetising inductance (C00092) by comparing the current consumption in no-load operation with the rated magnetising current (C00095). • Optimise oscillation damping (C00234).
"Short circuit" (OC1) error messages with a short acceleration time (C00012) in proportion to the load (inverter cannot follow the dynamic processes).	Increase the acceleration (C00012)/deceleration (C00013) time.
Mechanical resonance at certain speeds.	The L_NSet_1 function block masks out those speed ranges that include resonance.
Speed variations in no-load operation for speeds > 1/3 rated speed.	Minimise speed oscillations with oscillation damping (C00234).
Drive runs unstable.	Check set motor data (nameplate data and equivalent circuit diagram data). ▸ Motor selection/Motor data (📖 87)
Setpoint speed and actual speed differ strongly.	

5.9 Sensorless control for synchronous motors (SLPSM)

This function extension is only available from version 03.01.00!

The sensorless control for synchronous motors is based on a decoupled and separated control of the torque-creating and field-creating current share of synchronous motors. In contrast to the servo control, the actual speed value and the rotor position are reconstructed via a motor model.

Stop!

- The sensorless control for synchronous motors is only possible up to a maximum output frequency of 300 Hz!
  - Depending on the number of motor pole pairs, the reference speed (C00011) may only be selected that high that the output frequency displayed in C00059 is lower than 300 Hz.
- We recommend to select a power-adapted combination of inverter and motor.
- The Lenze setting enables operation of a power-adapted motor. Optimum operation is only possible if either
  - the motor is selected via the Lenze motor catalogue
    - or -
  - the nameplate data and equivalent circuit data of the motor (motor leakage inductance and motor stator resistance) are entered manually.
- When you enter the motor nameplate data, take into account the phase connection implemented for the motor (star or delta connection). Only enter the data applying to the selected connection type.
- In order to protect the motor (e.g. from demagnetisation) we recommend setting the ultimate motor current in C00939. This ensures motor protection even with an unstable operation. ▶ Maximum current monitoring (📖 203)
- Controller enable is only possible if the motor is at standstill.
  - Enabling the controller may cause a jerk.
  - A flying restart circuit for synchronising to rotating motors is in preparation.
- The injection of a constant current may cause an unwanted heating of the motor at controlled operation.
  - We recommend using a temperature feedback via PTC or thermal contact. ▶ Motor temperature monitoring (PTC) (📖 200)

Note!

From version 10.00.00

The stability of the sensorless control for synchronous motors can be optimised for the whole speed range. In order to achieve this, set bit 3 = 1 (optimisation of the SLPSM) C00143. In the Lenze setting (C00143, bit 3 = 0 (no optimisation of the SLPSM)), the same drive behaviour is attained as in older software versions.

Note!

Implementation of measures to prevent overvoltage

Currently, the sensorless control does not contain a flying restart function that enables a synchronisation of the inverter to a rotating machine.

- Thus, we recommend taking measures for preventing overvoltages at operation in generator mode (e.g. brake resistor).
- By any means, the delay time for the "DC-bus overvoltage" error trigger in C00601/1 must be set to 0 s.

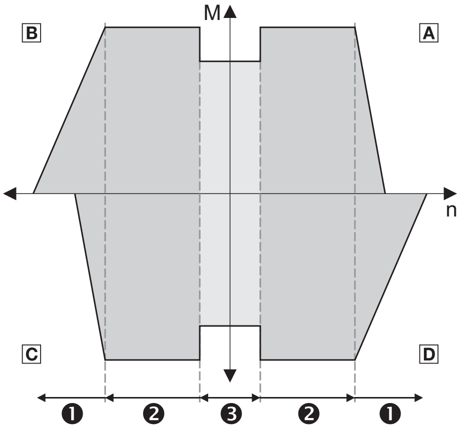
Motor parameter identification

Currently it is not possible to carry out a motor identification process in the SLPSM control mode. The use of third-party motors therefore always requires manual entry of the equivalent circuit diagram parameters of the motor.

The motor model-based speed monitoring requires a rotating machine. Thus, the operational performance of the sensorless control for synchronous motors is divided into two categories:

1. Open-loop controlled operation ($|n_{setpoint}| < n_{C00996}$)
    - In the range of low speeds, the speed of a synchronous motor is not possible. Thus, only an adjustable and constant current is injected that enables an acceleration.
2. Closed-loop controlled operation ($|n_{setpoint}| > n_{C00996}$)
    - In this range, the rotor flux position and the speed are reconstructed via an observer. The control is carried out field-oriented. Only the current is injected that is needed for the required torque.

A Operation in motor mode (CW rotation), B Operation in generator mode (CCW rotation),
C Operation in motor mode (CCW rotation), D Operation in generator mode (CW rotation)



❶ Field weakening
❷ Closed-loop controlled operation
❸ Open-loop controlled operation

[5-6] Operating ranges of the sensorless control for synchronous motors

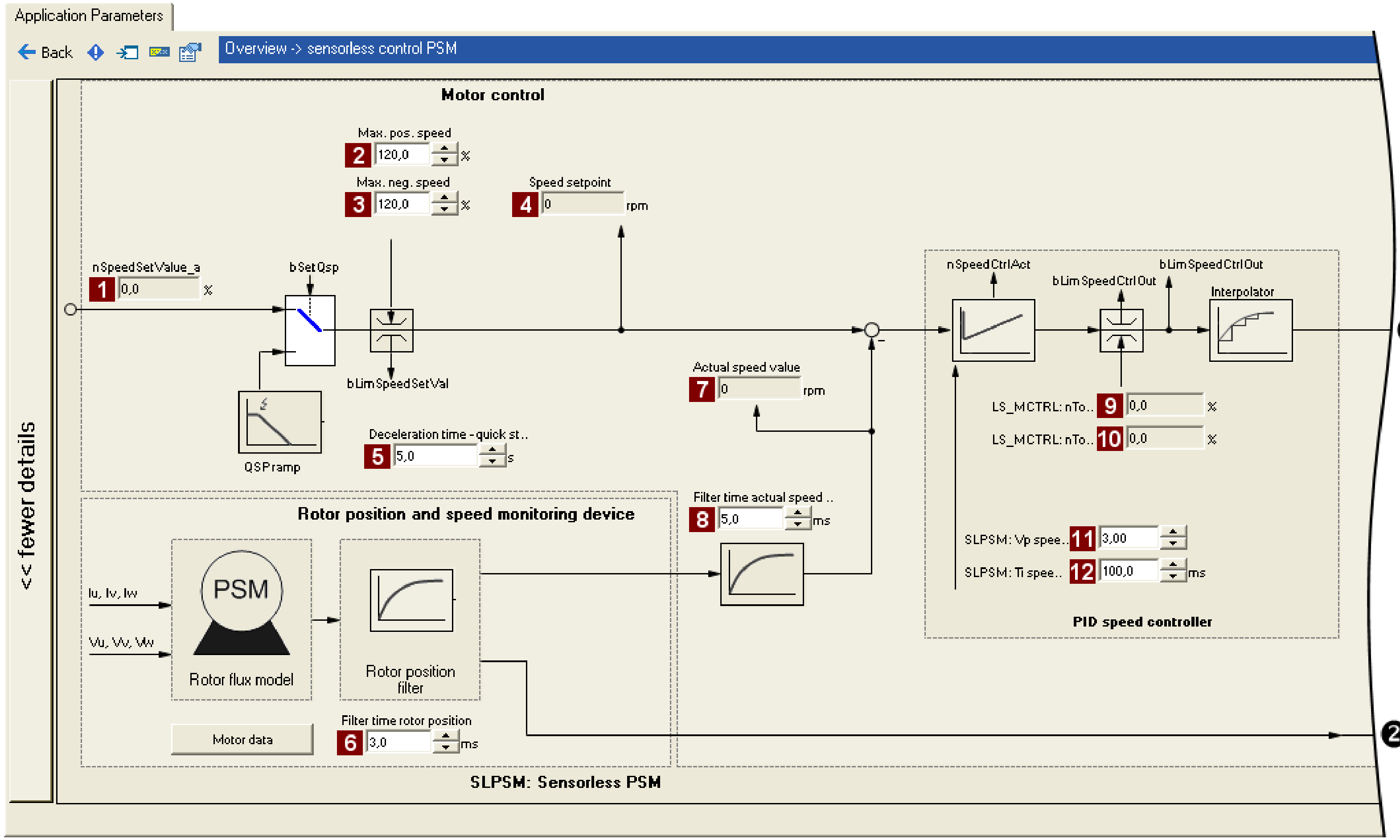
The sensorless control for synchronous motors has similar advantages for the closed-loop controlled operating range and the servo control (SC) for synchronous motors. Compared to asynchronous motors, there are the following advantages:

- Higher power density of the motor
- Higher efficiency
- Limitation of the maximum torque in motor mode and generator mode in closed-loop operating range
- Implementation of simple positioning

5.9.1 Parameterisation dialog/signal flow

Proceed as follows to open the dialog for parameterising the motor control:

1. »Engineer« Go to the *Project view* and select the 8400 motec inverter.
2. Select the **Application parameters** tab from the *Workspace*.
3. Select the motor control "3: SLPSM: Sensorless PSM" from the *Overview* dialog level in the **Motor control** list field:
4. Click the **Motor control sensorless PSM** button to change to the *Overview* → *Motor control sensorless PSM* dialog box.
   - This dialog level only shows a simplified signal flow with the most important parameters.
   - When you click the **>>More details** button in the left-most position, a signal flow with more details/parameters is displayed.



1 nSpeedSetValue_a: 0,0 %

2 Max. pos. speed: 120,0 %

3 Max. neg. speed: 120,0 %

4 Speed setpoint: 0 rpm

5 Deceleration time - quick st..: 5,0 s

6 Filter time rotor position: 3,0 ms

7 Actual speed value: 0 rpm

8 Filter time actual speed ..: 5,0 ms

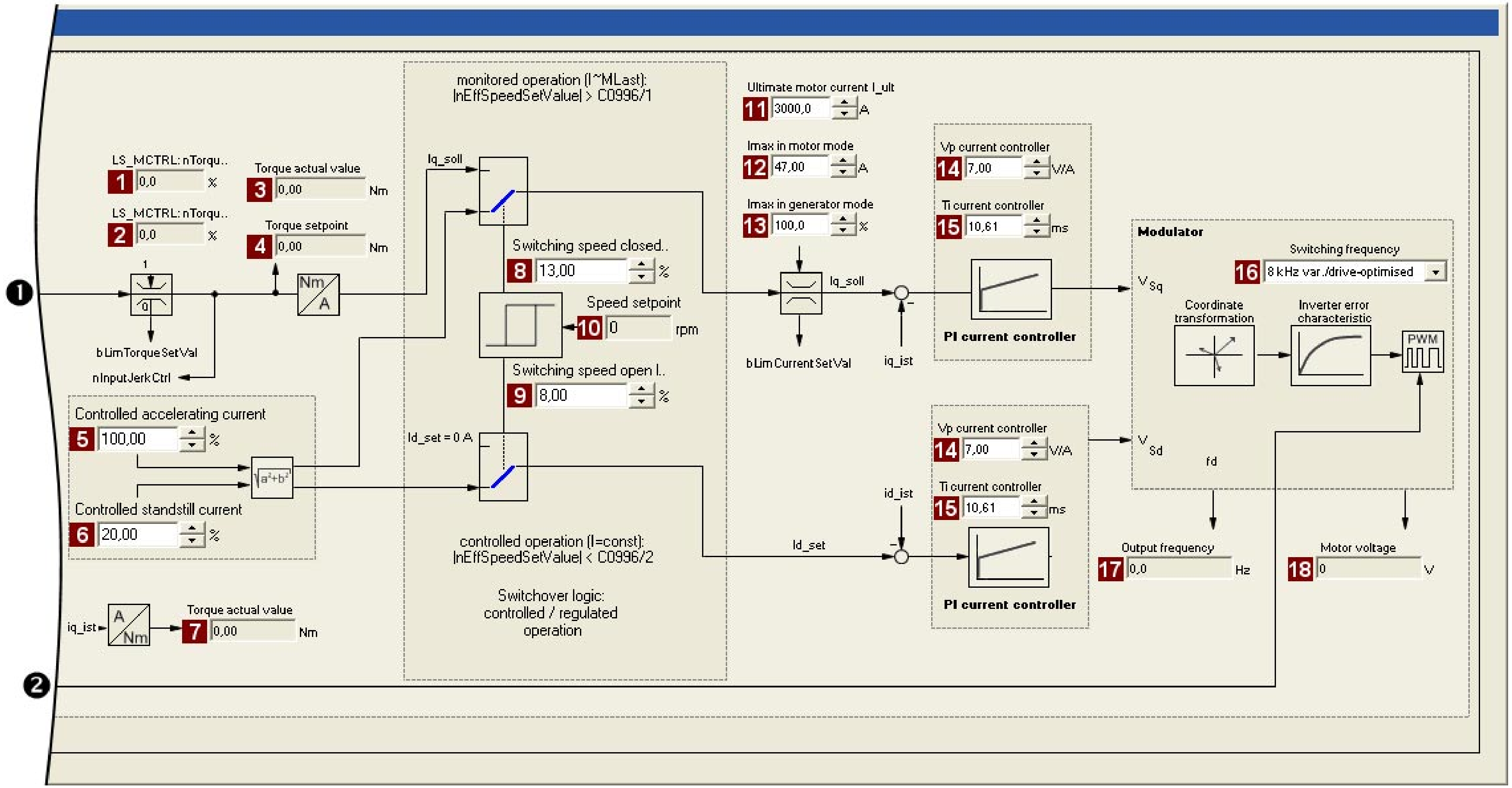
9 LS_MCTRL: nTo..: 0,0 %

10 LS_MCTRL: nTo..: 0,0 %

11 SLPSM: Vp spee..: 3,00

12 SLPSM: Ti spee..: 100,0 ms

	Parameters	Information
1	C00830/3	Speed setpoint
2	C00909/1	Max. pos. speed
3	C00909/2	Max. neg. speed
4	C00050	Speed setpoint
5	C00105	Decel. time - quick stop
6	C00998/1	Filter time of rotor position
7	C00051	Actual speed value
8	C00998/2	Filter time of actual speed value
9	C00830/4	Limitation of torque in motor mode
10	C00830/5	Limitation of torque in generator mode
11	C00070/3	Vp speed controller
12	C00071/3	Ti speed controller



LS_MCTRL: nTorqu.. 1 0,0 %
LS_MCTRL: nTorqu.. 2 0,0 %
Torque actual value 3 0,00 Nm
Torque setpoint 4 0,00 Nm
Controlled accelerating current 5 100,00 %
Controlled standstill current 6 20,00 %
Torque actual value 7 0,00 Nm
Switching speed closed.. 8 13,00 %
Switching speed open l.. 9 8,00 %
Speed setpoint 10 0 rpm
Ultimate motor current I_ult 11 3000,0 A
Imax in motor mode 12 47,00 A
Imax in generator mode 13 100,0 %
Vp current controller 14 7,00 V/A
Ti current controller 15 10,61 ms
Vp current controller 14 7,00 V/A
Ti current controller 15 10,61 ms
Switching frequency 16 8 kHz var./drive-optimised
Output frequency 17 0,0 Hz
Motor voltage 18 0 V

Parameters		Information
1	C00830/4	Limitation of torque in motor mode
2	C00830/5	Limitation of torque in generator mode
3	C00056/2	Actual torque value
4	C00056/1	Torque demand
5	C00995/1	Open-loop controlled accelerating current
6	C00995/2	Open-loop controlled standstill current
7	C00056/2	Actual torque value
8	C00996/1	Closed-loop controlled switching speed
9	C00996/2	Open-loop controlled switching speed
10	C00050	Speed setpoint
11	C00939	Ultimate motor current
12	C00022	Imax in motor mode
13	C00023	Imax in generator mode
14	C00075	Vp current controller
15	C00076	Ti current controller
16	C00018	Switching frequency
17	C00058	Output frequency
18	C00052	Motor voltage

5.9.2 Increasing the acceleration of the drive

This function extension is available from version 10.00.00!

In the open-loop controlled operation, usually less maximum torque is created than in the closed-loop controlled operation. The dynamics in this operating range is limited and a high acceleration of the drive is not possible.

Flat ramps for the acceleration and deceleration in the open-loop controlled operation and steep ramps in the closed-loop controlled operation serve to reach a considerably higher acceleration of the entire drive and less vibrations are caused.

Function extension

- Additional acceleration time T_{ir1} (C00101/1) and additional deceleration time T_{if1} (C00103/1)
  - The activation takes place via the LA_NCtrl: bTi1 application input (C00701/37).
- Process output LA_NCtrl: bSlpsmSpeedopenLoopControl
  - In the open-loop controlled operation, the output signal is set to "1".
  - Related digital signal in selection list: 90

Implementing the acceleration of the drive

- Connect the process output LA_NCtrl: bSlpsmSpeedopenLoopControl with the application input LA_NCtrl: bTi1 (C00701/37) in order that the acceleration and deceleration ramps C00101/1 and C00103/1 are activated in the open-loop controlled operation.
- Set the acceleration and deceleration ramps for the open-loop controlled operation flatter than the ramps in the closed-loop controlled operation.

5.9.3 Types of control

Sensorless control for synchronous motors can only be executed in the "Speed control with torque limitation" (*bTorquemodeOn* = FALSE) mode.

Speed control with torque limitation

A speed setpoint is selected and the drive system is operated in a speed-controlled manner. For adapting the operational performance, the overload in the drive train can be limited:

- The torque is limited via the torque setpoint.
- The torque setpoint is identical to the value at the output of the speed controller, *nOutputSpeedCtrl*.
- To avoid overload in the drive train, the torque in motor mode can be limited via the *nTorqueMotLimit_a* process input signal, and the torque in generator mode can be limited via the *nTorqueGenLimit_a* process input signal:

Designator DIS code | data type	**Information/possible settings**
nTorqueMotLimit_a C00830/4 | INT	Torque limitation in motor mode • Scaling: 16384 ≡ 100 % M_{max} (C00057) • Setting range: 0 ... +199.99 % • Can be parameterised in the Lenze setting via the free C00472/3 parameter. • Configuration parameter: C00700/2 From version 10.00.00 onwards: C00143: bit 10 = 1: positive torque limitation (nTorqueHighLimit_a)
nTorqueGenLimit_a C00830/5 | INT	Torque limitation in generator mode • Scaling: 16384 ≡ 100 % M_{max} (C00057) • Setting range: -199.99 ... 0 % • Can be parameterised in the Lenze setting via the free C00472/3 parameter. • Configuration parameter: C00700/3 From version 10.00.00 onwards: C00143: bit 10 = 1: negative torque limitation (nTorqueLowLimit_a)

STOP

Stop!

Torque limitation is only active in the closed-loop controlled operation ($|n_{Setpoint}| > n_{C00996}$)!

- It must be prevented that the actual speed value is braked into the non-observable area due to the torque limitation!

Note!

To avoid instabilities during operation, the torque limit values are internally processed as absolute values.

5.9.4 Basic settings

The following "Initial commissioning steps" must be performed to commission the sensorless control for synchronous motors:

<table>
<tr><th colspan="3">Initial commissioning steps</th></tr>
<tr><td>1</td><td colspan="2">Select motor control:
C00006 = "3: SLPSM: Sensorless PSM"</td></tr>
<tr><td rowspan="2">2.</td><td colspan="2">Set the motor selection/motor data
• When selecting and parameterising the motor, the motor nameplate data and the equivalent circuit diagram data are relevant. Detailed information can be found in the "Motor selection/Motor data" chapter. (🕮 87)
Depending on the motor manufacturer, proceed as follows:</td></tr>
<tr><td>Lenze motor:
Selecting a motor from the motor catalogue in the »Engineer«
or set motor nameplate data</td><td>Third party manufacturer's motor:
1. Set the motor nameplate data
2. Automatic motor data identification or set known equivalent circuit diagram manually:
C00084: Motor stator resistance
C00085: Motor stator leakage inductance</td></tr>
<tr><td>3.</td><td colspan="2">Set speed switching thresholds between open-loop and closed-loop controlled operation:
• Set transition speed from closed-loop to open-loop operation in C00996/1 in [%] with regard to the rated motor speed (C00087).
• Set transition speed from closed-loop to open-loop operation in C00996/2 in [%] with regard to the rated motor speed (C00087).
Note!
If the maximum speed (C00011) was set differently from the rated motor speed (C00087), C00996/1 and C00997/1 must be adjusted as follows:
$$C0996_{New} = C0996_{alt} \times (C0087)/(C0011)$$
$$C0997_{New} = C0997_{alt} \times (C0087)/(C0011)$$
Tip!
• With voltage-adjusted motors, a speed switching threshold of 10 % is recommended.
• As a rule of thumb, the speed switching threshold should be selected as follows:
$$C00996/1...2\ [\%] = \frac{U_{Rated,\ motor}[V]}{U_{Rated,\ FI}[V]} \cdot 10$$</td></tr>
<tr><td>4.</td><td colspan="2">Set open-loop accelerating current in C00995/1 in [%] with regard to the rated motor current (C00088).
• This value defines the height of the current that is injected during the acceleration process.
• The accelerating current must be dimensioned so that the required torque in the lower speed range can always be reached (acceleration torque + load torque):
$$C00995/1\ [\%] = \frac{M_{Meax}[Nm]}{M_{Rated}[Nm]} \cdot I_{Rated,\ motor}[A] \cdot 1.3$$</td></tr>
<tr><td>5th</td><td colspan="2">Set open-loop steady-state current in C00995/2 in [%] with regard to the rated motor current (C00088).
• This value defines the height of the current for processes without acceleration (e.g. standstill or constant setpoint speed).</td></tr>
<tr><td>6.</td><td colspan="2">For improving the operating characteristics:
If required, adapt the filter time for reconstructing the rotor position and the actual speed value through the motor model in C00998/1 and C00998/2.
• We recommend using the Lenze setting:
Filter time rotor position (C00998/1) = 3 ms
Filter time actual speed value (C00998/2) = 5 ms
• Deviant from this, the following value range can be used:
Filter time rotor position (C00998/1) = 2 ... 5 ms
Filter time actual speed value (C00998/2) = 3 ... 8 ms</td></tr>
<tr><td>6.</td><td colspan="2">For protecting the motor from demagnetisation:
Set the ultimate current in C00939.</td></tr>
</table>

Note!

The Lenze settings of the current controller are predefined for a power-adapted motor. For an optimal drive behaviour of a synchronous motor, we recommend to adapt the controller settings.

Tip!

Information on the optimisation of the control mode and the adaptation to the real application is provided in the "Optimising the control mode" chapter.

Parameterisable additional functions are described correspondingly in the chapter "Parameterisable additional functions". (📖 168)

5.9.5 Optimising the control mode

The measures described in the following subchapters serve to further optimise the control behaviour of the sensorless control for synchronous motors and adjust it to the concrete application.

- Optimise current controller. (📖 155)
  - The current controller should always be optimised if a motor of a third-party manufacturer with unknown motor data is used!
- Optimise speed controller. (📖 155)
  - The setting of the speed controller must be adapted depending on the mechanical path.
- Current-dependent stator leakage inductance Ppp(I) (📖 159)
  - If the motor is operated with very low and very high currents during the process (e.g. in *Pick and place*-applications), the stator leakage inductance and current controller parameters can be tracked by means of an adjustable saturation characteristic.

5.9.5.1 Optimise current controller

Note!

An optimisation of the current controller should generally be carried out unless a power-adapted standard motor is used or the motor has been selected from the motor catalogue of the »Engineer«!

An optimisation of the current controller is sensible since the two control parameters gain (C00075) and reset time (C00076) depend on the required maximum current and the set switching frequency.

Parameters	Information	Lenze setting	
		Value	Unit
C00075	Vp current controller	7.00	V/A
C00076	Ti current controller	10.61	ms

- Gain and reset time can be calculated as per the following formulae:

$$V_p = \frac{L_{ss}[H]}{T_E[s]}$$

$$T_i = \frac{L_{ss}[H]}{R_s[\Omega]}$$

V_p = Current controller gain (C00075)
T_i = Current controller reset time (C00076)
L_{ss} = Motor stator leakage inductance (C00085)
R_s = Motor stator resistance (C00084)
T_E = Equivalent time constant (= 500 µs)

5.9.5.2 Optimise speed controller

The speed controller is designed as a PID controller. For optimum behaviour, the PID speed controller has to be optimised and the overall mass inertia of the drive train has to be determined.

- In the Lenze setting, the configuration of the speed controller provides robustness and moderate dynamics.

Parameters	Information	Lenze setting	
		Value	Unit
C00070/3	SLPSM: Vp speed controller	3.00	
C00071/3	SLPSM: Ti speed controller	100.0	ms

Speed controller gain Vp

The gain Vp (C00070/3) of the speed controller is defined in a scaled representation which enables a comparable parameterisation almost independent of the power of the motor or inverter. Here, the speed input difference of the controller is scaled to the rated motor speed whereas the output torque refers to the rated motor torque. A gain of 10 means that a speed difference of 1 % is gained through the P component with 10 % torque.

If the rated data of the motor and the mass inertia of the drive system are known, we recommend the following setting:

$$V_P \approx 0.2 \ldots 0.5 \cdot \frac{T_M[s]}{0.01[s]}$$

$$T_M[s] = \frac{2 \cdot \pi \cdot n_N[rpm]}{M_N[Nm] \cdot 60} \cdot J_{Drive,\ total}[kgm^2]$$

$$M_N[Nm] = \frac{P_N[W] \cdot 60}{2 \cdot \pi \cdot n_N[rpm]}$$

V_P = Gain of the speed controller (C00070/3)
T_M = Time constant for the acceleration of the motor
M_N = Rated motor torque
n_N = Rated motor speed
$J_{drive,\ total}$ = Total moment of inertia of the drive

[5-7] Recommendation for the setting of the gain of the speed controller

If the mass inertia of the drive is unknown, the optimisation can be achieved as follows:

1. Specify speed setpoint.
   - A small speed just above the switching threshold is recommended in the closed-loop controlled operation.
2. Increase Vp (C00070/3) until the drive starts to oscillate (observe engine noise).
3. Reduce Vp (C00070/3) until the drive runs stable again.
4. Reduce Vp (C00070/3) to approx. half the value.
5. Afterwards check results of the optimisation in the entire speed range (one-time passing through of the speed range).

Tip!

Values recommended by Lenze for the setting of the (proportional) gain:

- For drive systems without feedback: Vp = 2 ... 8
- For drive systems with a good disturbance behaviour: Vp > 6

Speed controller reset time Ti

Apart from setting the P component, C00071/3 provides the possibility to take influence on the I component of the PI controller.

If the mass inertia of the drive is unknown, the optimisation can be achieved as follows:

1. Specify speed setpoint.
2. Reduce Ti (C00071/3) until the drive starts to oscillate (observe engine noise).
3. Increase Ti (C00071/3) until the drive runs stable again.
4. Increase Ti (C00071/3) to approx. twice the value.

Tip!

Value range recommended by Lenze for the setting of the reset time:

Ti = 20 ms ... 150 ms

Using the ramp response for setting the speed controller

If the mechanical components cannot be operated at the stability limit, the ramp response can also be used for setting the speed controller.

Stop!

If the controller parameters are preset unfavourably, the control can tend to heavy overshoots up to instability!

- Following and speed errors can adopt very high values.
- If the mechanics are sensitive, the corresponding monitoring functions are to be activated.

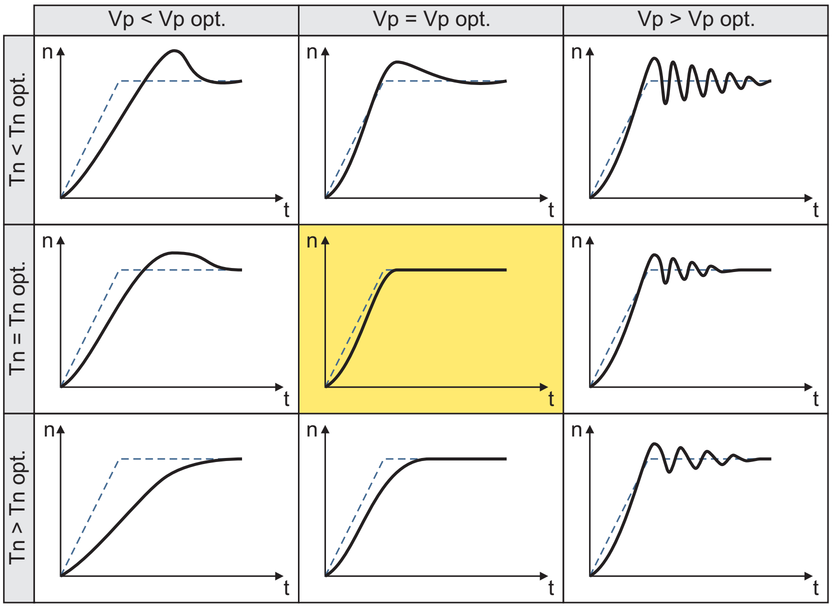
Note!

For an optimal setting, we recommend to determine the mass inertia (optimal response to setpoint changes) first.

▶ Mass inertia precontrol (📖 179)

How to optimise the speed controller setting by means of the ramp response:

1. Run a typical speed profile and record the ramp response of the speed using the data logger.
   - Motor control variables to be recorded:
     nSpeedSetValue_a (speed setpoint)
     nMotorSpeedAct_a (actual speed value)
2. Evaluate the ramp response:



   - Solid line = ramp response (actual speed value)
   - Dash line = speed setpoint
3. Change gain Vp in C00070/3 and reset time Tn in C00071/3.
4. Repeat steps 1 ... 3 until the optimum ramp response is reached.

5.9.5.3 Current-dependent stator leakage inductance Ppp(I)

This function extension is only available from version 04.00.00!

The current controller must be adjusted to the electrical characteristics of the motor stator resistance (C00084) and stator leakage inductance (C00085). In case of modern motors, the stator leakage inductance changes with the height of the current so that a new current controller setting is required for each current height.

When the motor is operated with very low and very high currents (e.g. in *Pick and place* applications), it is not always possible to achieve a satisfactory current controller setting for all operating points. For this purpose, the correction of the stator leakage inductance and current controller parameters is now possible via an adjustable saturation characteristic (17 interpolation points).

Short overview of the relevant parameters:

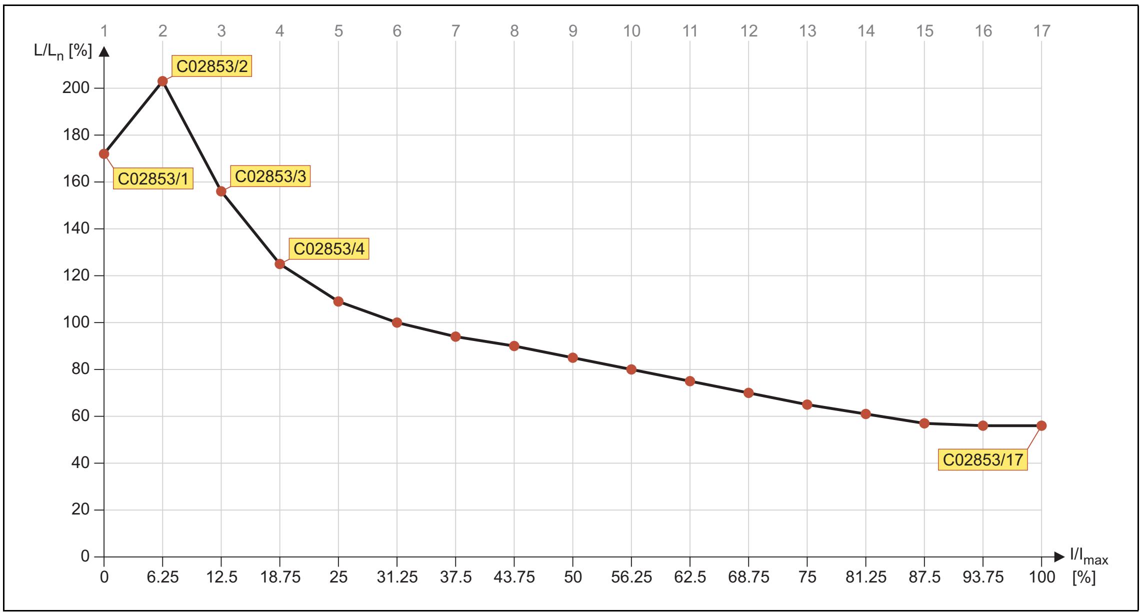
Parameters	Information	Lenze setting	
		Value	Unit
C02853/1...17	PSM: Ppp saturation characteristic (17 interpolation points)	100	%
C02855	PSM: Imax Lss saturation characteristic	3000.0	A
C02859	PSM: Activate Ppp saturation char.	0: Off	

Note!

- When a Lenze motor is selected from the »Engineer« motor catalogue, the corresponding saturation characteristic is set in C02853/1...17 and – if required – the correction via this saturation characteristic is switched on in C02859.
- For third-party motors: If the current controller becomes unstable with high currents, contact the motor manufacturer to find out whether the stator leakage inductance changes with the current level. If required, the saturation characteristic of this motor must be set in C02853/1...17 and then activated in C02859.

Distribution of the grid points

- The saturation characteristic is represented by 17 interpolation points linearly distributed on the X axis (C02853/1...17).
- Interpolation point 17 represents 100 % of the maximum motor current in the process (C02855).
- The following diagram shows the saturation characteristic stored in the »Engineer« motor catalogue for the Lenze motor "MCS12H15" as an example:



[5-8] Saturation characteristic: Inductance referring to the inductance for rated current

5.9.5.4 Optimising the starting performance after a controller enable

Note!

Up to version 06.xx.xx

All control modes

The motor is not energised if with inactive auto DC-injection braking function (C00019 = 0):

- Setpoint selection = 0 and
- output speed or output frequency = 0

The non-energised motor cannot create a torque in case of e.g. quick stop (QSB) and a missing holding brake.

Control mode SLPSM

With this control mode (C00006 = 3), the automatic DC-injection braking function is always inactive. The motor is not energised if

- Setpoint selection = 0 and
- output speed or output frequency = 0

Special feature: When the shaft has rotated before and the setpoint has been selected > 0, a jerk may occur in the machine.

From version 07.00.00

All control modes

The motor is powered if

- Automatic DC-injection braking function C00019 = 0
- Automatic DC-injection braking time C00106 = 990.0 s
- Setpoint selection = 0 and
- output speed or output frequency = 0

The motor torque remains active for all control modes, even in quick stop mode (QSP). This serves as a jerk-free start-up for the SLPSM control mode (C00006 = 3) as well.

When the inverter has been enabled, magnetisation of the motor causes a start-up delay. If this delay cannot be tolerated for specific applications, the motor must always be actuated in an energised condition.

Procedure without setting a controller inhibit

1. Deactivate the auto DCB function with C00019 = 0.
2. Do not activate the controller inhibit. Instead, stop the drive by selecting a setpoint of 0 or by activating the quick stop function.

5.9.6 Pole position identification without motion

This function extension is available from version 10.00.00!

Sensorless control for synchronous motors (SLPSM) does not necessarily require the pole position identification. With controller enable, however, the pole position must be known (angle between the motor phase U and the rotor field axis), in order to prevent a jerk at the synchronous motor.

Up to version V09.00.00: if a jerk at the synchronous motor with controller enable is to be prevented, provisions must be made within the application to ensure that the angle between the motor phase U and the rotor field axis does not diverge (e.g. always keep the motor in the excited state and only set CINH if the motor is at a standstill).

From version 10.00.00 onwards, the "pole position identification without movement" option can be selected for the sensorless control of synchronous motor.

- In the Lenze setting, the rotor displacement angle is identified for the sensorless control of synchronous motors (SLPSM) with every controller enable, which, in this way, prevents a jerk in the machine after controller enable.
- In order to obtain the same response as before, bit 0 is set to 0 in C02874, a process which deactivates the function.

Note!

- The "Pole position identification without movement" function is able to identify the electrical rotor displacement angle with an accuracy of up to 10°.
- Depending on the motor, the identification process takes 1 ... 15 ms.
- The default values of the function in the Lenze setting ensure that, in most cases, it is not necessary to make any further settings.

Short overview of the relevant parameters:

Parameters	Information	Lenze setting	
		Value	Unit
C02874	Pole position identification	1: On	
C02872	PLI: adaptation of the PLI time period during operation	0	
C02875	PLI: adaptation of the PLI ID angle during operation	0	°
C02870	PLI: degree of optimisation	-	%
C02871	PLI: duration of the identification process	-	ms
C02873	PLI: rotor displacement angle identified	-	°
Greyed out = display parameter			

Note!

For synchronous motors with a stator time constant < 1 ms, the pole position identification is not carried out because the resulting test current pulse may exceed the permissible motor current.

- This, however, concerns only few synchronous motors with a very low power (e.g Lenze motor MDSKS-020-13-300 with a rated power of 40 W).
- A pole position identification that has not been carried out is indicated by C02870 = 0 % and C02871 = 0 ms.

- The stator time constant can be calculated on the basis of the following formula:

$$T_s[\mathrm{ms}] = \frac{L_{ss}[\mathrm{mH}]}{R_s[\Omega]}$$

T_S = stator time contant
L_{SS} = Motor stator leakage inductance (C00085)
R_S = Motor stator resistance (C00084)

Optimising the pole position identification

Stop!

When the setting in C02872 is too high, an impermissible motor current may flow whilst the pole position identification is carried out. In this case, the "Fault" error response is triggered, and the "Id5: pole position identification error" error message is entered into the logbook.

With a setting in C02872 that is excessively high:

- The following other current monitoring functions may be activated:
  - OC7: motor overcurrent
  - OC11: clamp operation active
  - OC1: Power section - short circuit
- In C02870, the degree of optimisation "0 %" is shown.
- In C02871, the time period "0 ms" is shown.

How to optimise the pole position identification without movement:

1. For the optimisation, execute controller enable at different rotor displacement angle.
2. After every controller enable, check the degree of optimisation shown in C02870.

   The pole position identification is set optimally if a degree of optimisation in the range of 70 ...130 % is displayed in C02870 after every controller enable.
3. If the degree of optimisation is > 130 %:
   reduce the setting in C02872 step by step and execute controller enable at different rotor displacement angles until a degree of optimisation < 130 % is shown.
4. If the degree of optimisation is < 70 %:
   increase the setting in C02872 step by step and execute controller enable at different rotor displacement angles until a degree of optimisation > 70 % is shown.
5. Optionally: via C02875, the electrical rotor displacement angle identified can be increased or reduced. Due to the accuracy of the identification, this can for instance serve to prevent the motor from rotating backwards, if this is required by specific applications.

5.9.7 Field weakening for synchronous motors

This function extension is only available from version 04.00.00!

Note!

Function only possible with:

- Servo control (SC)
- Sensorless control for synchronous motors (SLPSM) (from version 10.00.00)

In the Lenze setting, the field weakening for synchronous motors is activated in C00079/4.

- If a high energy efficiency is required, keep the field weakening switched off or restrict the field weakening operation via C00938.

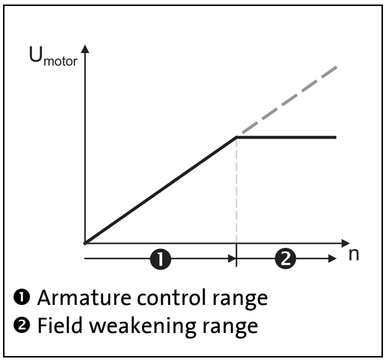
For operation in the high field weakening range, set the C00018 switching frequency so that, even dynamically, the switching frequency is not reduced to 2 kHz.
Example: with C00018 = 21 and a heavy overload, the switching frequency is reduced from 8 kHz to a minimum of 4 kHz.

Stop!

In the field weakening operation, a current is injected into the synchronous motor even in idle state which can rise to maximum current (C00022).

Ensure that this no-load current does not cause the motor to be heated impermissibly!

- We recommend using a temperature feedback via PTC or thermal contact. ▸ Motor temperature monitoring (PTC) (🕮 200)



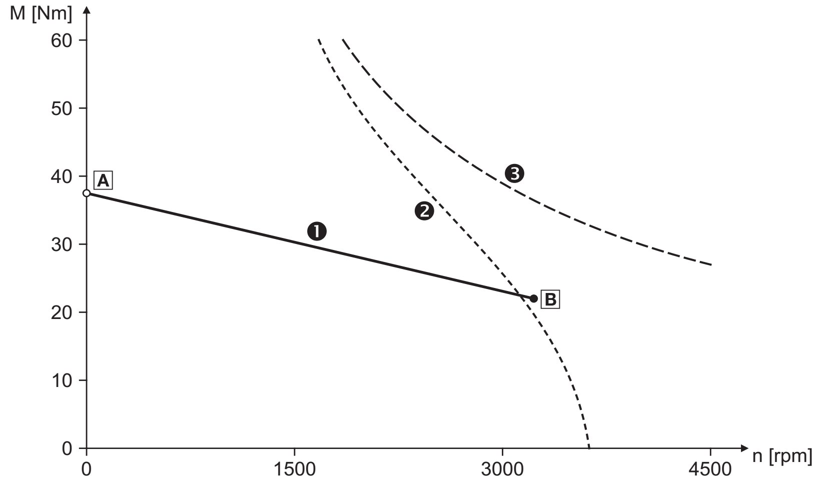
❶ Armature control range
❷ Field weakening range

[5-9] Voltage/speed characteristic with switched-on field weakening

- When field weakening is switched on, the motor magnetising current is increased from 0 A to the maximally effective magnetising current via an internal control loop when the voltage limit is reached.
- As a result, a higher speed can be reached at the same motor voltage or DC-bus voltage.

$$n_{max} = n_{nenn\_mot} \cdot \frac{800V}{\sqrt{2} \cdot U_{nenn\_mot}}$$

[5-10] Calculation of the maximally reachable speed with switched-on field weakening



A Standstill torque
B Rated torque
❶ Characteristic for continuous operation
❷ Limit characteristic at a mains voltage of 400 V without field weakening
❸ Limit characteristic with field weakening

[5-11] Speed/torque characteristics of a synchronous servo motor with field weakening

Short overview of the relevant parameters:

Parameters	Information	Lenze setting	
		Value	Unit
C00079/4	Field weakening	1: On	
C00938	Limitation of maximally effective field-producing motor current • With regard to rated motor current (C00088)	30	%
C00937/1	Maximally effective field-producing motor current	-	A
Greyed out = display parameter			

- The maximally effective field-producing motor current is calculated based on the motor data set in C00085, C00089 and C00098. Then, the value is internally limited to 98 % of the set maximum current (C00022 or maximally permissible current for the permanent switching frequency set in C00018).
- C00938 serves to limit the maximally effective field-producing motor current as well.
  - In the Lenze setting, the field weakening for synchronous motors is active (C00079/4). However, the field-producing motor current is limited via C00938 to 30 % of the rated motor current (C00088). Hence, the maximum speed is limited during field weakening operation and, at the same time, the temperature rise of the motor during field weakening operation and no-load operation is also limited.
  - If a higher speed for the field weakening operation is required or the current in the field weakening operation is to be limited (e.g. since no motor temperature detection is available and/or heating in the field weakening operation is to be limited), the value must be increased or reduced accordingly in C00938.

- In C000937/1, the actually used maximally effective field-producing motor current is displayed.
  - With switched-on and active field weakening: 0.00 A ... -x.xx A
  - With sensorless control for synchronous motors (SLPSM), the injected current is displayed in open-loop controlled operation: 0.00 A ... +x.xx A
  - If neither field weakening nor open-loop controlled operation are active,e "0.00 A" is displayed.

Note!

If a Lenze motor is used:

The inverter is automatically parameterised so that field weakening operates optimally and the maximally permissible speed is monitored.

Stop!

If an OEM motor is used:

If pulse inhibit is set in the inverter, the DC bus is loaded with the voltage that corresponds to the current speed of the machine.

Since with switched-on field weakening higher speeds can be achieved at a correspondingly higher rotor voltage of the motor, the DC bus can be loaded to a voltage higher than the set DC-bus voltage in case of pulse inhibit and a currently high motor speed and even exceed the maximally permissible voltage of 800 V!

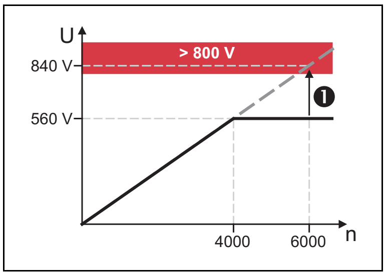
For device protection, either use a brake chopper or parameterise the motor speed monitoring via C00965 in such a way that only a maximum speed is possible which would be also reachable without field weakening with a DC-bus voltage of = 800 V.

▸ Motor speed monitoring (🕮 205)

Example: Voltage increase in the DC bus when field weakening is switched off

(For instance by an active setting of the controller inhibit or by tripping a fault or error at high motor speed.)

Field weakening	Speed n	Motor voltage peak value
Switched off	4000 rpm	560 V
	5700 rpm	800 V
	6000 rpm	840 V
Switched on	6000 rpm	560 V



- If pulse inhibit occurs at 6000 rpm and switched-on field weakening, the DC bus is loaded to more than 800 V (❶).
- A speed limitation to 5700 rpm is required since this speed causes a DC-bus voltage of 800 V if field weakening is switched off.

[5-12] Example: Possible DC-bus voltage > 800 V if field weakening gets lost

5.10 Parameterisable additional functions

5.10.1 Selection of switching frequency

The switching frequency of the inverter that can be selected in C00018 influences the smooth running performance and the noise generation in the connected motor as well as the power losses in the inverter.

The lower the switching frequency the higher the concentricity factor, the smaller the losses, and the higher the noise generation.

Stop!

If operated at a switching frequency of 16 kHz, the inverter output current must not exceed the current limit values specified in the technical data! (See "Rated data" section of the hardware manual.)

Note!

- Operate mid-frequency motors only at a switching frequency of 8 kHz or 16 kHz (var./drive-opt.).
- If operated at a switching frequency of 16 kHz, the Ixt evaluation (C00064) is considered including the required derating to 67 % of the rated device current at switching frequencies of 4 and 8 kHz.
- With a switching frequency of 4 kHz at a 400-V mains, the Ixt evaluation (C00064) is considered with 120 % of the rated device current.

Short overview of the relevant parameters:

Parameters	Information	Lenze setting	
		Value	Unit
C00018	Switching frequency	2: "8 kHz var./drive-opt."	
C00144	Switching frequency reduction (temp.)	1: On	
C00725	Current switching frequency	-	
C00910/1	Max. pos. output frequency	300	Hz
C00910/2	Max. neg. output frequency	300	Hz
Greyed out = display parameter			

Settable switching frequencies

Selection in C00018		Information
2	8 kHz var./drive-optimised	• "var.": Adaptation of the switching frequency depending on the current • "drive-opt.": drive-optimised modulation ("sine/delta modulation") • "fixed": fixed switching frequencies
3	16 kHz var./drive-optimised	
6	4 kHz constant/drive-optimised	
7	8 kHz constant/drive-optimised	
8	16 kHz constant/drive-optimised	
23	16 kHz var/8 kHz min	

Tip!

The Lenze setting C00018 = 2 (8 kHz var./drive-opt.) is the optimal value for standard applications.

Lowering the switching frequency due to high heatsink temperatures

Exceeding the maximally permissible heatsink temperature would lead to an inhibited drive due to the "Overtemperature" error and a torquelessly coasting motor. Therefore, if the Lenze setting is selected, the switching frequency is reduced to the next frequency below when the heatsink temperature has risen to 5 °C below the maximally permissible temperature. After the heatsink has cooled down, the inverter automatically switches to the next frequency above until the set switching frequency is reached.

Switching frequency reduction due to high heatsink temperature can be deactivated via C00144. If the switching frequency reduction is deactivated, the "OH1: Heatsink overtemperature" error message will be issued when the maximally permissible heatsink temperature is reached. An "Fault" response is the result and the motor is coasting.

Parameters	Information	Lenze setting
C00144	Switching frequency reduction (temp.)	1: On

Lowering of the switching frequency depending on the output current

"Variable" switching frequencies can be selected for the inverter in C00018, the inverter automatically reducing the switching frequency depending on the inverter output current. The modulation mode is not changed during this process. The changeover thresholds are included in the "Rated data" section of the hardware manual.

When a "fixed" switching frequency is selected, no switching frequency changeover takes place. In the case of fixed frequencies, the inverter output current is limited to the permissible value of the corresponding switching frequency. In the case of greater load impulses, the overcurrent interruption may be activated, to which the inverter responds with "Fault".

Limiting the maximum output frequency

The maximum output frequency (C00910) of the inverter is not limited depending on the switching frequency. Therefore, adapt the maximum output frequency according to our recommendation:

$$\text{Maximum output frequency} \leq \frac{1}{8}\text{Switching frequency}$$

- In the Lenze setting, the output frequency is limited to the maximum value of 300 Hz.

Carry out further measures:

- If required, deactivate the switching frequency changeover by the heatsink temperature via C00144.
- If required, ensure that the changeover threshold of the inverter output current to the next switching frequency below will not be exceeded. If required, select a constant switching frequency in C00018.

Operation at an ambient temperature of 45 °C

The inverter is designed so that operation at an ambient temperature of 45 °C without derating is permissible at a switching frequency of 4 kHz.

5.10.2 Flying restart function

The flying restart circuit uses a simple model of an asynchronous motor which requires knowledge of the motor stator resistance RS and the rated motor current.

Note!

- For a correct functioning of the flying restart circuit, we recommend to perform a parameter identification first. ▸ Automatic motor data identification (📖 95)
- The flying restart function works safely and reliably for drives with great centrifugal masses.
- Do not use the flying restart function if several motors with different centrifugal masses are connected to an inverter.
- After the controller is enabled, the motor can start for a short time or reverse when machines with low friction and low mass inertia are used.
- The flying restart function serves to identify max. field frequencies up to ±200 Hz.
- When power-adapted standard asynchronous motors are used (rated motor power approximately corresponds to the rated inverter power), a motor parameter identification is not required.

Tip!

If you parameterise a mechanical holding brake (C02580<>0), we recommend you to read the information regarding the flying restart function provided in this documentation on the following topic:

▸ Automatic DC-injection braking (auto DCB) (📖 174)

General information

This function serves to activate a mode which is used to "catch" a coasting motor during operation without speed feedback. This means that the synchronicity between inverter and motor is to be adjusted in such a way that a jerk-free transition to the rotating machines is achieved in the instant of connection.

The inverter determines the synchronicity by identifying the synchronous field frequency.

Duration

The "catching" process is completed after approx. 1 ... 2 seconds. The duration is influenced by the starting value. If the field frequency is not known, we recommend the preset starting value of 10 Hz.

Short overview of the relevant parameters:

Parameters	Information	Lenze setting	
		Value	Unit
C00990	Flying restart fct.: Activate	Off	
C00991	Flying restart fct.: Process	-n...+n | Last output frequency	
C00992	Flying restart: Start frequency	10	Hz
C00994	Flying restart: Current	25.00	%

How to parameterise the flying restart function:

1. Activate the flying restart circuit by selecting "1: On" in C00990.
   - Every time the controller is enabled, a synchronisation to the rotating or standing drive is carried out.

   When the Lenze setting is used, most applications do not require additional inverter settings.

   If additional settings are necessary, proceed as follows:
2. Define the process and hence the speed range/rotational frequency range in C00991 which is to be examined by the flying restart circuit.
   - We recommend the Lenze setting "5: -n...+n | Last output frequency"
3. Adjust starting frequency in C00992 if required.

   The preset starting frequency which defines the starting point of the flying restart function is optimised for standard motors.
   - We recommend to define a starting frequency of approximately 20 % of the rated motor frequency to enable a safe and fast connection to standing drive systems.
4. Set the flying restart current in C00994.

   We recommend setting a flying restart current of 10 % ... 25 % of the rated motor current.
   - During a flying restart process, a current is injected into the motor to identify the speed.
   - Reducing the current causes a reduction of the motor torque during the flying restart process. A short-time starting action or reversing of the motor is prevented with low flying restart currents.
   - An increase of the current improves the robustness of the flying restart function.

5.10.3 DC-injection braking

Danger!

Holding braking is not possible when this braking mode is used!

- For low-wear control of a holding brake, use the basic function "Holding brake control". (📖 294)

DC-injection braking allows the drive to be quickly braked to a standstill without the need to use an external brake resistor.

- The braking current is set in C00036.
- The maximum braking torque to be generated by the DC braking current is approx. 20 ... 30 % of the rated motor torque. It is lower than that for braking in generator mode with an external brake resistor.

Tip!

DC-injection braking has the advantage that it is possible to influence the braking time by changing the motor current or the braking torque..

Short overview of the relevant parameters:

Parameters	Information	Lenze setting	
		Value	Unit
C00019	Auto-DCB: Threshold • Operating threshold for activating DC-injection braking	3	rpm
C00036	DCB: Current • Braking current in [%] based on rated device current (C00098)	50	%
C00106	Auto-DCB: Hold time	0.5	s
C00107	DCB: Hold time	999.0	s
C00701/4	LA_NCtrl: bSetDCBrake • Selection of the signal source for activating DC-injection braking	Dependent on the selected control mode	

Procedure

DC-injection braking can be carried out in two ways with different types of activation:

- ▸ Manual DC-injection braking (DCB) (📖 174)
- ▸ Automatic DC-injection braking (auto DCB) (📖 174)

5.10.3.1 Manual DC-injection braking (DCB)

DC-injection braking can be manually activated via the *bSetDCBrake* process input.

- For HIGH-active inputs, DC-injection braking is active as long as the signal is at HIGH level.
- After the hold time (C00107) has expired, the controller sets the pulse inhibit (CINH).

Tip!

- In the preset "Terminals 0" control mode, DC-injection braking can be manually activated via the digital input DI3.
- In the preset "Terminals 11" control mode, DC-injection braking can be manually activated via the digital input DI2.

5.10.3.2 Automatic DC-injection braking (auto DCB)

"Automatic DC-injection braking" (referred to in the following as "auto DCB") can be used if there is a requirement that the drive be isolated from the supply at n ≈ 0.

Note!

Deactivate automatic DC-injection braking when a holding brake is used!

- For this purpose, go to C00019 and set the auto-DCB threshold to "0"

Deactivate the automatic DC-injection braking when using the FB L_PCTRL_1 (📖 498) !

- Set C00019 (Auto-DCB threshold) to the value "0".
- Set C00106 (hold time of the automatic DC-injection brake) to the value "999.0".

When both parameterisations are executed, the motor is continued to be supplied with current from version 07.00.00 despite a output frequency of "0" and a speed setpoint of "0"!

Automatic DC-injection braking is activated immediately up to and including version 03.xx.xx. From version 04.00.00 onwards, before activating DC-injection braking,

- for devices smaller than 4 kW the waiting time is always 250 ms, and
- for devices from 4 kW onwards the waiting time is always 1 s.

From version 05.00.00, the waiting time can be deactivated before activating the automatic DC-injection braking: If bit 8 is set in C00143 and the auto-DCB threshold ≤ 5 Hz, the DC-injection braking is activated immediately (without the above mentioned waiting time) if the value falls below the threshold.

C00019 [rpm] = auto DCB threshold [Hz] * 60 / number of pole pairs

Function

For understanding the auto DCB function, it is necessary to distinguish between three different types of operation:

A. The drive has been enabled and, in the course of operation, the speed setpoint falls below the auto DCB threshold.
   - In case of operation without speed feedback, a braking current (C00036) is injected. After the auto DCB hold time (C00106) has expired, the motor is deenergised via the auto DCB function, i.e. a controller inhibit (CINH) is set.

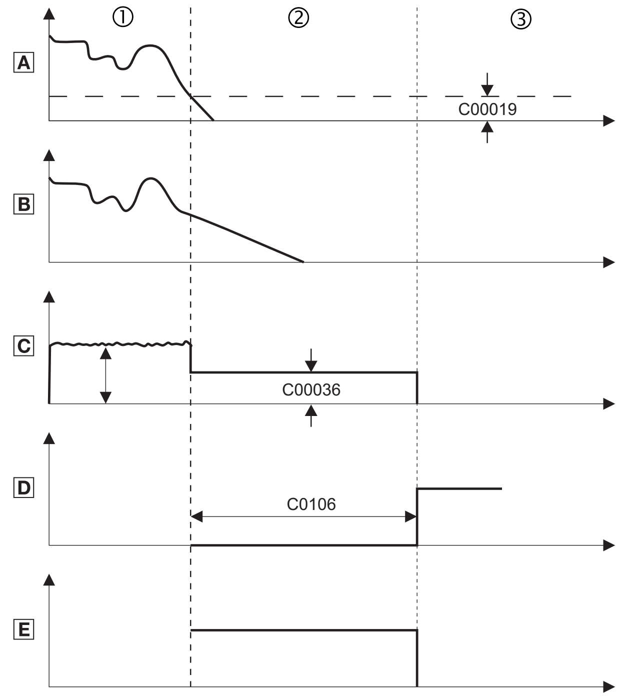
B. When the controller is enabled, the drive is at standstill (n = 0).
If the enabled drive is to start, the speed setpoint passed via the acceleration ramp must exceed the auto DCB threshold (C00019). Below this threshold, the motor will not be energised.

C. When the controller is enabled, the motor (still) rotates at a speed which is above the auto DCB threshold. If the speed setpoint reached via the acceleration ramp exceeds the auto DCB threshold (C00019), the motor will be energised and the drive will be "caught". ▶ Flying restart function (📖 171)

How to set the automatic DC-injection braking:

1. Set a hold time in C00106 > 0 s.
   - Automatic DC-injection braking is active for the time set.
   - In case of operation without speed feedback, the braking current set in C00036 is injected.
   - After the set hold time has expired, the controller sets a pulse inhibit.
2. Set the operating threshold in C00019.
   - The operating threshold can serve to set a dead band in the setpoint. If DC-injection braking is not to be active then, C00106 must be set to a value of "0".
   - In case of reversal, the DC-injection braking does not respond (exception: PID controller is active).

Explanation of the automatic DC-injection braking function by means of an example



A Speed setpoint
B Actual speed value of the motor
C Output current of the controller
D Pulse inhibit
E DC-injection braking is active

[5-13] Example 1: Signal characteristic for automatic DC-injection braking of a drive without speed feedback

① The motor rotates at a specified speed. The current adjusts itself to the load, see **C**.

② The DC braking current set in C00036 is injected.

③ After the hold time (C00106) has expired, a pulse inhibit is set.

5.10.4 Slip compensation

Under load, the speed of an asynchronous machine decreases. This load-dependent speed drop is called slip. The slip can partly be compensated for by the setting in C00021.

Parameters	Information	Lenze setting	
		Value	Unit
C00021	Slip compensation	0.00	%

- The setting of C00021 can be done automatically in the course of motor parameter identification. ▶ Automatic motor data identification (📖 95)
- The setting must be made manually if the motor parameter identification cannot be called up.

How to set the slip compensation manually:

1. Calculate the slip compensation according to motor nameplate data:

$$s = \frac{n_{rsyn} - n_r}{n_{rsyn}} \cdot 100\%$$

$$n_{rsyn} = \frac{f_r \cdot 60}{p}$$

s	Slip constant (C00021) [%]
n_{rsyn}	Synchronous motor speed [rpm]
n_r	Rated motor speed according to the motor nameplate [rpm]
f_r	Rated motor frequency according to the motor nameplate [Hz]
p	Number of motor pole pairs (1, 2, 3 ...)

2. Transfer the calculated slip constant s to C00021.
3. Correct the setting in C00021 while the drive is running until the load-dependent speed drop does not occur anymore between idling and maximum load of the motor in the desired speed range.

Tip!

The following guide value applies to a correctly set slip compensation:

- Deviation from the rated motor speed ≤ 1% for the speed range of 10 % ... 100 % of the rated motor speed and loads ≤ rated motor torque.
- Greater deviations are possible in the field weakening range.
- If C00021 is set too high, the drive may get unstable.
- Negative slip (C00021 < 0) with V/f characteristic control results in "smoother" drive behaviour at heavy load impulses or applications requiring a significant speed drop under load.

5.10.5 Oscillation damping

Mechanical oscillations are undesirable effects in every process and they may have an adverse effect on the single system components and/or the production output.

Mechanical oscillations in the form of speed oscillations are suppressed by the oscillation damping function.

Parameters	Information	Lenze setting	
		Value	Unit
C00234	Impact of oscillation damping	5	%
		(50 % from 2.2 kW device power)	
C00235	Oscillation damping filter time	50	ms

Oscillation damping is successfully used with

- unloaded motors (no-load oscillations)
- motors whose rated power deviates from the rated power of the inverter.
  - e.g. during operation at high switching frequency including the power derating involved.
- operation with higher-pole motors
- operation with special motors
- compensation of resonance in the drive
  - At an output frequency of approx. 20 ... 40 Hz, some asynchronous motors can show resonance which causes current and speed variations and thus destabilise the running operation.

How to eliminate speed oscillations:

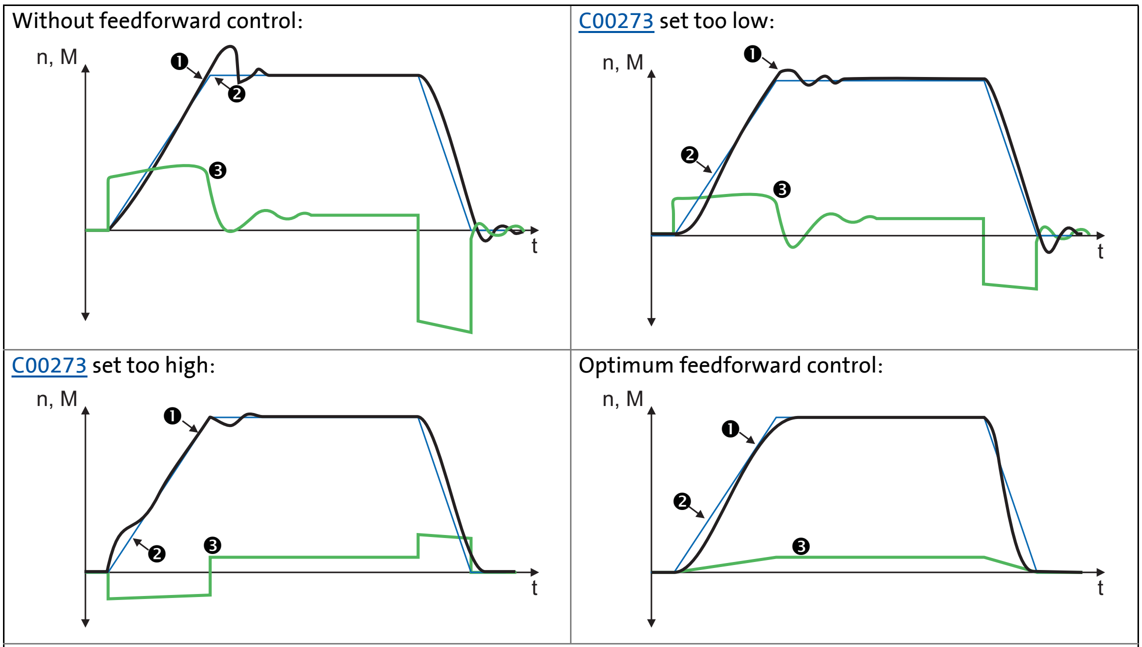
1. Approach the area where the speed oscillations occur.
2. Reduce the speed oscillations by changing C00234 step by step.
3. These can be indicators for smooth running:
   - Constant motor current characteristic
   - Reduction of the mechanical oscillations in the bearing seat

Related topics:

- L_NLim_1 FB: Blocking frequency function (📖 494)

5.10.6 Mass inertia precontrol

Setting the total moment of inertia under C00273 provides the optimum torque feedforward control. Depending on the application, an adjustment of the setting under C00273 may be necessary to optimise the response to position/speed setpoint changes by means of the torque feedforward control.


Without feedforward control:

C00273 set too low:

C00273 set too high:

Optimum feedforward control:

❶ Actual speed value (signal *nMotorSpeedAct*)
❷ Speed setpoint (signal *nMotorSpeedSet*)
❸ Speed controller output (signal *nOutputSpeedCtrl*)

[5-14] Typical signal characteristics for different settings of the load moment of inertia

How to optimise the torque feedforward control:

1. Run a typical speed profile and record the inputs and outputs of the speed controller with the data logger.
    - For this, the data rate of the 8400 motec diagnostic interface is insufficient. Thus, use the fieldbus for the communication between the 8400 motec and the »Engineer«.
    - Motor control variables to be recorded:
      nSpeedSetValue_a (speed setpoint)
      nMotorSpeedAct_a (actual speed value)
      nOutputSpeedCtrl_a (speed controller output)
2. Estimate the moment of inertia and set it in C00273 in relation to the motor end (i.e. with account being taken of the gearbox factors).
3. Repeat the data logger recording (see step 1).

   Now the data logger should show that part of the required torque is generated by the feedforward control and the speed controller output signal (*nOutputSpeedCtrl_a*) is correspondingly smaller. The resulting following error decreases.
4. Change the setting in C00273 and repeat the data logger recording until the intended response to setpoint changes is reached.
    - The optimisation could aim at the speed controller being completely relieved (see signal characteristics in Fig. [5-14]).
5. Save the parameter set (device command: C00002/11).

5.11 Encoder/feedback system

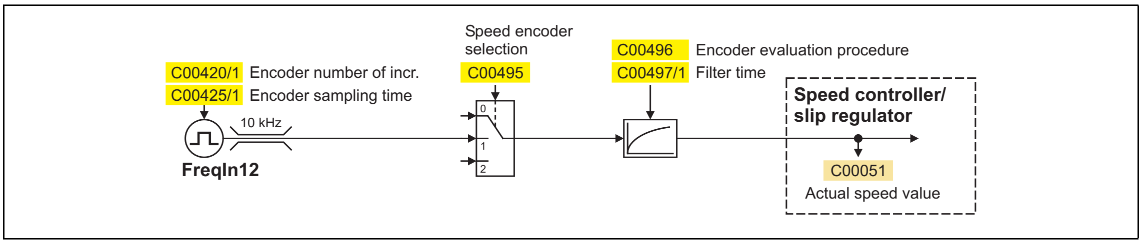
This function extension is available from version 02.00.00!

The speed feedback mandatory for the V/f control (VFCplus + encoder) can be fed in at the digital input terminals (DI1/DI2) via an HTL encoder.

- In order that the HTL encoder can be evaluated correctly, the digital input terminals (DI1/DI2) must be configured as frequency inputs. ▶ Configuring DI1 and DI2 as frequency inputs (📖 211)
- The actual speed value (C00051) is also calculated when motor control without encoder feedback has been selected if an encoder is connected and "1: Encoder signal FreqIn12" has been selected in C00495.

⚠ **Danger!**

- For (open circuit) monitoring of the encoder, it is recommended to set the "Fault" response (Lenze setting) in C00586 for safety reasons!
- To avoid interference injections when an encoder is used, only use shielded motor and encoder cables.
- Ensure that with V/f control (VFCplus + encoder) the maximum input frequency of 7.5 kHz or 10 kHz for EtherNET/IP, EtherCAT, PROFINET and POWERLINK is not exceeded at the frequency inputs.
- When evaluating a single-track encoder, make sure that the sign has been selected correctly. Otherwise, there is a risk that the motor may overspeed.



[5-15] Signal flow - encoder interface

ℹ **Note!**

When the encoder signal is used as actual speed value:
Number of encoder pulses / revolution ≤ **8192 !** (see the following example)

Example of DI1/DI2 (in accordance wit the preceding note):

- Encoder increment: 512 pulses / motor revolution
- Reference speed (C00011): 1500 rpm
- Speed setpoint: 100 %

$$\text{Input frequency} = \frac{1500\ \text{rpm}}{60\ \text{s}} \times 512\ \text{pulses} = 12800\ \text{pulses/s} = 12.8\ \text{kHz}$$

- Result: The speed or the number of increments is too high!

How to get to the parameterisation dialog of the encoder/feedback system:

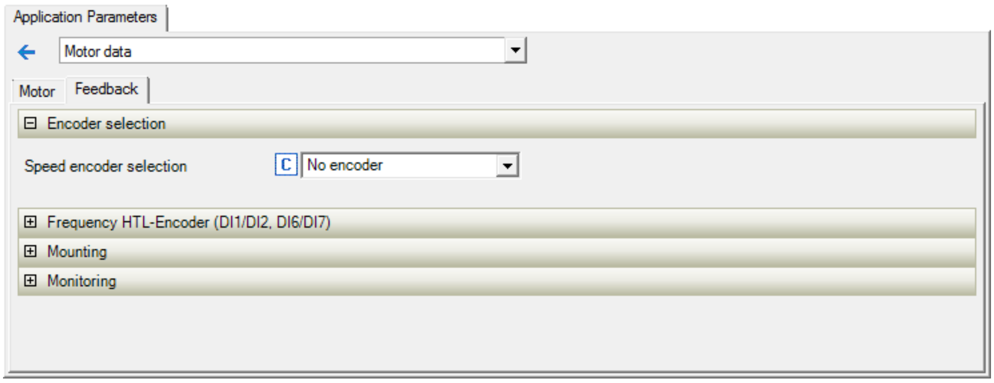
1. »Engineer« Go to the *Project view* and select the 8400 motec inverter.
2. Select the **Application parameters** tab from the *Workspace*.
3. Go to the *Overview* dialog level and click the following button:

Ⓜ

4. Change to the **Encoder** tab in the dialog level *Overview* → *Motor data*.

Parameterisation dialog in the »Engineer«

From the »Engineer« V2.20, the following parameterisation dialog is available for parameterising the encoder/feedback system. For a better overview, the parameterisation dialog contains various categories which can be opened/closed by simply clicking them. First, only the "encoder selection" category is opened:



Speed encoder selection C No encoder

Parameters	Information	Lenze setting	
		Value	Unit
C00495	Speed sensor selection • Source of feedback signal for speed control.	No sensor	

After the "encoder signal FreqIn12" feedback signal has been selected in the **Speed encoder selection** list field, the respective "frequency HTL encoder" category is automatically opened with the relevant parameters.

Short overview of the relevant parameters:

Parameters	Information	Lenze setting	
		Value	Unit
Frequency HTL encoder (DI1/DI2)			
C00115/1	Fct. DI 1/2 10kHz • Function of the digital inputs DI1 and DI2	DI1=In1 | DI2=In2	
C00420/1	Encoder increments at FreqIn12 • When the digital inputs DI1 and DI2 are used as frequency input.	128	Inc/rev.
C00497/1	Encoder filter time FreqIn12 • When the digital inputs DI1 and DI2 are used as frequency input.	1.0	ms
C00425/1	Encoder sample time FreqIn12 • When the digital inputs DI1 and DI2 are used as frequency input.	10	ms
C00496	▸ Encoder evaluation method (🕮 184)	Low-resolution encoder	
Mounting			
C01206/1	Mounting direction: Motor	Not inverted	
C01206/2	Mounting direction: Speed sensor	Not inverted	
Monitoring			
C00586	Resp. to encoder open circuit ▸ Encoder open-circuit monitoring (🕮 205)	Fault	
C00607	Resp. to max. speed reached	Fault	

General procedure

1. Configuring DI1 and DI2 as frequency inputs. (🕮 211)
2. Set the encoder increments in C00420/1.
3. Select "1: Encoder signal FreqIn12" in C00495/1.
4. Adapt the filter time of the speed measurement in C00497/1.

5.11.1 Encoder evaluation method

Depending on the encoder used, the following table specifies which evaluation method should be selected in C00496:

Selection in C00496	Encoder evaluation method
1: Low-resolution encoder (Lenze setting)	High-precision procedure for low-resolution encoders (<=128 increments) • Exact method for speed measurement with automatic scanning time setting (0.5 ... 500 ms) for low-resolution encoders in the range of 4 .... 128 increments. • Evaluation with automatic scanning time minimisation for an optimum dynamic performance. • Method is also suited for encoders with poor signal quality, e.g. for encoders with high error rate in scanning ratio and phase offset. • This method requires an equidistant period length per encoder increment. • Wiring according to EMC (e.g. motor and encoder cable shielding) is required!
3: Edge-counting procedure	Simple edge counting procedure with adjustable scanning time (C00425) • Speed measurement by means of the edges of tracks A and B measured per scanning interval. • Integrated correction algorithm for EMC interference. • Limited suitability for systems with unshielded encoder and/or motor cable. • Limited suitability for encoders with poor signal quality, i.e. high error rate in scanning ratio and phase offset.

Tip!

We recommend the use of the preset procedure for low-resolution encoders (C00496 = 1).

Low speeds during evaluation procedure for low-resolution encoders

When the evaluation procedure for low-resolution encoders (C00496 = 1) is used, the minimally measurable speed depends on the number of increments of the encoder.

The quantisation error

- is independent of the encoder increment,
- exclusively depends on the encoder quality (encoder errors).
- amounts to at least 0.5 rpm.

Internal arithmetic operations automatically maintain the minimally required value of the scanning time in order to achieve maximum dynamics.

Number of encoder increments C00420/1	Minimum speed [rpm]
8	16
16	8
32	4
64	2
128	1
256	0.5

Low speeds with edge counting

The minimum speed that can be measured and the quantisation error of speed measurement in the edge-counting procedure (C00496 = 3) depend on the scanning time that can be set in C00425/1 and the encoder resolution.

Depending on accuracy and the requirements with regard to the dynamic performance, the respective scanning time must be selected and set in C00425/1:

Encoder resolution (Number of increments)	Scanning time [ms]									
	1	**2**	**5**	**10**	**20**	**50**	**100**	**200**	**500**	**1000**
8	1875	938	375	188	93.8	37.5	18.8	9.4	3.8	1.9
16	938	469	188	94	46.9	18.8	9.4	4.7	1.9	0.9
32	469	234	94	46.9	23.4	9.4	4.7	2.3	0.9	0.5
64	234	117	46.9	23.4	11.7	4.7	2.3	1.2	0.5	0.2
128	117	58.6	23.4	11.7	5.9	2.3	1.2	0.6	0.2	0.12
256	58.6	29.3	11.7	5.9	2.9	1.2	0.6	0.3	0.12	0.06

All values in [1/min]

5.12 Braking operation/brake energy management

When electric motors are braked, the kinetic energy of the drive train is fed back into the DC circuit regeneratively. This energy leads to an increase in the DC bus voltage. In order to avoid overvoltage in the DC bus, several different strategies can be used:

- Use of a brake resistor
- Stopping of the deceleration when the brake chopper threshold is exceeded (HlgStop)
- Use of the "inverter motor brake" function (from version 02.00.00)
- Overmagnetising the motor (from version 02.00.00)
- Combination of the above named options

Stop!

If the connected brake resistor

- has a lower brake resistance value than the required brake resistor, the brake chopper may be destroyed!
- has a too low thermal power dissipation, the brake resistor may be destroyed!

C00574 serves to parameterise the error response of the brake resistor monitoring.

▶ Brake resistor monitoring (I2xt) (📖 201)

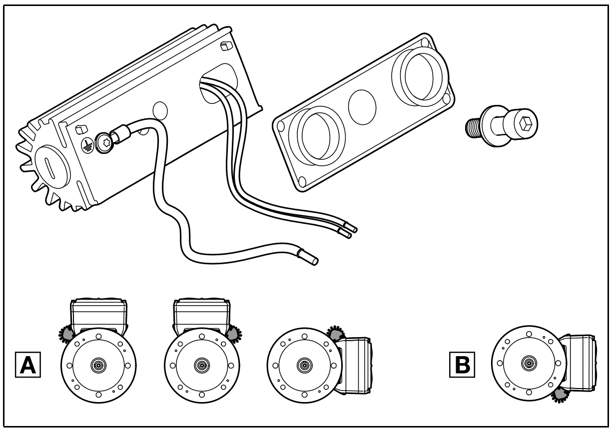
Short overview of the relevant parameters:

Parameters	Information	Lenze setting	
		Value	Unit
Basic settings			
C00173	Mains voltage	3ph 400 V	
C00175	Resp. to brake resistor control	Brake resistor	
Brake resistor			
C00129	Brake resistance value (dependent on the device power, see subchapter "Settings for internal brake resistor")	220.0	Ohm
C00130	Rated brake resistor power	15	W
C00131	Thermal capacity - brake resistor	0.6	kWs
C00133	Brake resistor utilisation	-	%
C00572	Threshold - brake resist. overload	100	%
C00574	Resp. to brake resist. overtemp.	Fault	
Inverter motor brake (variant 1)			
C00987	Inverter motor brake: nAdd	80	rpm
Inverter motor brake (variant 2)			
C00984	Inverter motor brake: Motor flux Add	20.0	%
Greyed out = display parameter			

5.12.1 Settings for mountable brake resistors

Brake resistance E84DZEWxxxx001 (motor mounting, wall mounting, 4.0 - 7.5 kW)

E84DGDVB...	**Brake resistor**	**Resistance value** R_B (C00129) [Ω]	**Rated power** P_D (C00130) A [W]	B [W]	**Thermal capacity** Q_B (C00131) [kWs]
3714 5514 7514 1124 1524	E84DZEW220R001	220.0	40	30	0.6
2224 3024	E84DZEW100R001	100.0	40	30	0.6
4024 5524 7524	E84DZEW47R0001	47.0	40	30	0.6



[5-16] Position of the brake resistor E84DZEWxxxx001

Note!

The brake resistor E84DZEW47R0001 (47 Ohm) can also be used for wall mounting (4.0 - 7.5 kW).

The rated power of the brake resistor is dependent on the mounting position.
For motor and wall mounting, see the graphic and table.

5.12.2 Settings for internal brake resistor

Brake resistor E84DGS2xxxKNP

(Frame Unit without switch)

E84DGDVB...	Brake resistor	Resistance value R_B (C00129) [Ω]	Rated power P_D (C00130) [W]	Thermal capacity Q_B (C00131) [kWs]
3714 5514 7514 1124 1524 2224 3024	E84DGS2xxxKNP	90.0	30	0.6

Brake resistor E84DGS3xxxCND

(Frame Unit with switch)

E84DGDVB...	Brake resistor	Resistance value R_B (C00129) [Ω]	Rated power P_D (C00130) [W]	Thermal capacity Q_B (C00131) [kWs]
3714 5514 7514 1124 1524 2224 3024	E84DGS3xxxCND	220.0	15	0.6

5.12.3 Voltage limits for braking operation

In the case of the 8400 motec inverter, the brake chopper is exclusively switched on via a hardware circuit.

- For the braking methods C00175 = 2 / 4, a brake chopper threshold is used as a function of the set mains voltage (C00173) in order to trigger the corresponding software response before the brake chopper threshold on the hardware side is reached:

C00173	Mains voltage	Brake chopper threshold
0	3-phase 400 V AC	677 V DC
1	3-phase 440 V AC	735 V DC
2	3-phase 480 V AC	775 V DC

- The braking method C00175 = 6 increases the motor magnetisation every time the motor is decelerated. There is no reference to the DC-bus voltage.

5.12.4 Response to an increase of the DC-bus voltage

When the brake chopper threshold in the DC bus is exceeded, the response selected in C00175 takes place (use of the brake resistor and/or stop of the deceleration).

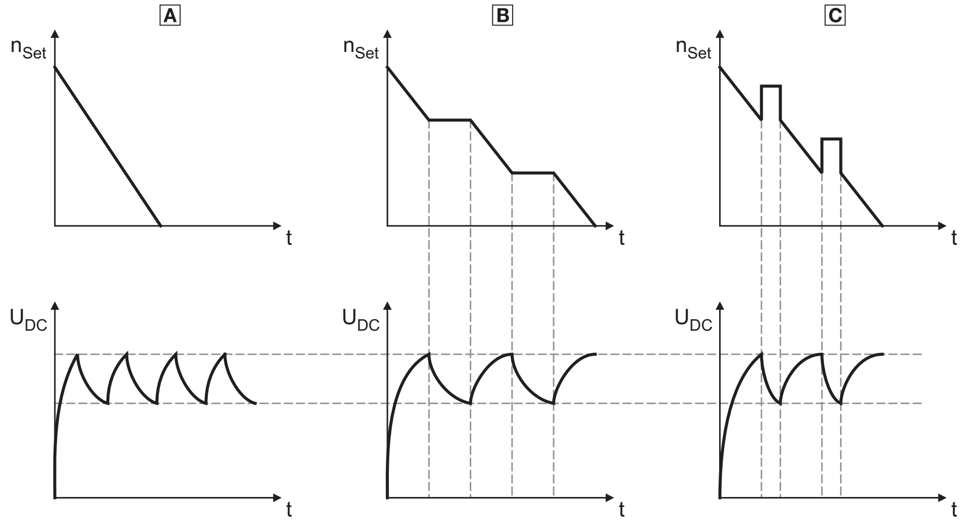
- Optimum following of the actual speed value until the speed setpoint is reached (e.g. the motor is stopped rapidly) is always achieved with the help of a brake resistor.

- Stopping the deceleration enables a smoother braking with lower dynamics and torque oscillation.
- From version 02.00.00, C00175 = 4 provides for the inverter motor brake. This function serves to prevent an overvoltage in the DC bus (oU) at higher loads. Depending on the procedure, torque oscillations may occur.

Stop!

- Both braking methods "Stop of deceleration" and "Inverter motor brake" can only be used for speed-controlled applications without the influence of a position controller!
- When the "inverter motor brake" function is used, the Motor load monitoring (I2xt) is not adapted. If it is braked too frequently, there is a risk of the motor being thermally overloaded or the motor overload monitoring does not work properly!
- The "inverter motor brake" function
  - must not be used with vertical conveyors (hoists) or with active loads!
  - is not available with sensorless vector control.

The way in which the different braking procedures work is demonstrated schematically in the following illustration:



A Use of the brake resistor (C00175 = "0: Brake resistor")
B Stopping of the deceleration (C00175 = "2: Brake resistor and stopping of the ramp function generator")
C Inverter motor brake (C00175 = "4: Motor brake and ramp stop and brake resistor")

[5-17] Graph of the effective speed setpoint and the DC bus voltage during braking

Tip!

If it is possible to dispense with exact adherence to the deceleration ramp in simple applications, selection of a braking method without an external brake resistor enables costs to be reduced due to the avoidance of having to use a brake resistor .

- For the delay time, select a value as high as possible if you are not using an external brake resistor, and use the S-shaped ramp if possible.

With the "inverter motor brake" function, an effective braking torque of 10 ... 20 % of the rated motor torque can be achieved.

5.12.4.1 Inverter motor brake

This function extension is available from version 02.00.00!

With this braking method, which can be selected as an alternative in C00175, the regenerative energy in the motor is converted as a result of dynamic acceleration/deceleration with down-ramping of the ramp function generator..

Stop!

- When the "inverter motor brake" function is used, the Motor load monitoring (I2xt) is not adapted. If it is braked too frequently, there is a risk of the motor being thermally overloaded or the motor overload monitoring does not work properly!
- The "inverter motor brake" function must not be used with vertical conveyors (hoists) or with active loads!

Tip!

If no brake resistor is used, the DC injection brake can also be used for braking in addition to the "inverter motor brake" and "stop of deceleration" function. ▶ DC-injection braking (🕮 173)

In applications with high mass inertia and long braking times (> 2 s), we recommend the use of the DC injection brake.

- The DC injection brake provides for an oscillation-minimised braking. The braking process generally takes more time than the "inverter motor brake" function with an optimised setting. Moreover, the function is only recommended for braking to a standstill.

In the following cases we recommend the "inverter motor brake" function:

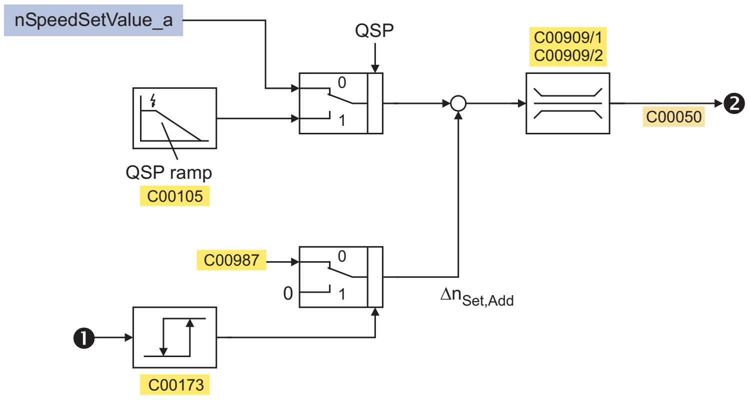
- For all applications that do not require braking to a standstill (e.g.braking to a lower speed setpoint) or the braking process can be interrupted by selecting a new speed setpoint.
- For applications with low mass inertias and a short braking time (< 1 s).
- For all applications where braking should be as quick as possible.

Operating mode of the inverter motor brake

During the deceleration, the speed encoder is stopped. The speed set in C00987 is added to the speed setpoint by means of a hysteresis-2-point DC-bus voltage controller. Here, the sign of the current actual speed is considered. Moreover, the speed controller is stopped during overvoltage.

If the DC-bus voltage falls below a defined DC-bus voltage potential of the hysteresis controller, the applied additive speed is cancelled and the speed encoder is enabled again.

The energy is converted into heat in the motor due to alternating instances of acceleration and deceleration as a result of this switching operation.



❶ DC-bus voltage
❷ Speed setpoint for motor control

[5-18] Signal flow of the "Inverter motor brake" function

- In case of an asynchronous motor, the additive speed setpoint (C00987) should be 1 ... 4 times the slip of the machine:

$$C00987\,[\mathrm{rpm}] = 1\,...\,4 \cdot (n_{Sync}[\mathrm{rpm}] - n_{Rated}[\mathrm{rpm}])$$

$$n_{Sync}[\mathrm{rpm}] = \frac{f_{Rated}[\mathrm{Hz}] \cdot 60}{p}$$

p = number of pole pairs
n_{Rat} = Rated speed of the motor
f_{Rat} = Rated frequency of the motor
n_{Sync} = Synchronous speed of the motor

[5-19] Formula for calculating the additive speed setpoint for an asynchronous motor

Note!

When the "inverter motor brake" function is used, torque oscillations occur which have may have a negative effect on the service life of the components of the mechanical drive train (e.g. gearbox).

- The extent of the occurring oscillations depends on the drive train (mass inertia, natural frequencies, etc.) and the function setting.
- We recommend optimising the "inverter motor brake" function for an oscillation-free operation as described in the following. Usually, this setting does not cause any torque oscillations which affect the service life of the gearbox.
- The settings of implementing a maximum acceleration ramp are only recommended if the inverter motor brake is used infrequently (e.g. in case of quick stop).

How to set the "inverter motor brake" function for an oscillation-reduced operation:

For V/f characteristic open-loop control/closed-loop control (VFCplus):

- Set additive speed (C00987) to rated slip speed.
- Adapt the deceleration ramp so that the deceleration time is slightly below (10 ... 30 %) the deceleration time that can be realised with the inverter motor brake.

How to set the "inverter motor brake" function for a maximum acceleration ramp:

For V/f characteristic open-loop control/closed-loop control (VFCplus):

- Set additive speed (C00987) to 1,5 ... 2,5-fold rated slip speed.
- Adapt the deceleration ramp so that the deceleration time is slightly below (10 ... 30 %) the deceleration time that can be realised with the inverter motor brake.

For sensorless vector control (SLVC):

- Set additive speed (C00987) to 2 ... 4-fold rated slip speed.
- Adapt the deceleration ramp so that the deceleration time is slightly below (10 ... 30 %) the deceleration time that can be realised with the inverter motor brake.

5.12.4.2 Degradation of braking energy by motor overmagnetisation

This function extension is available from version 02.00.00!

The "6: brake resistor and motor" braking method to be selected in C00175 causes the motor to be overmagnetised by the percentage value set in C00984 every time the speed is reduced. The overmagnetisation causes the motor current to increase which leads to further losses in the motor (and in the inverter). Hence, the braking energy that is generated can be dissipated faster via motor losses.

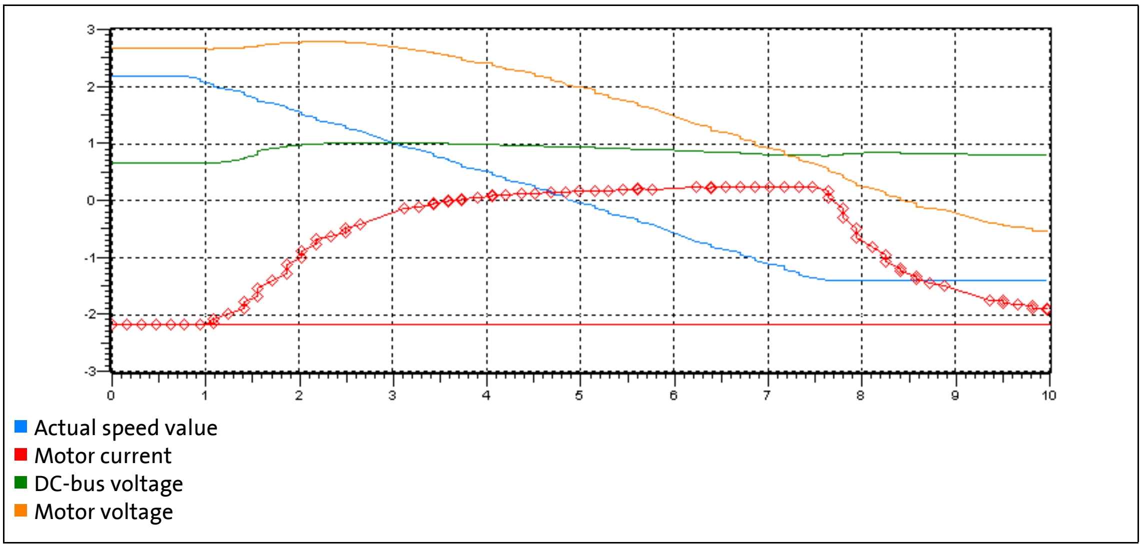
Especially with smaller motors and their lower efficiency, the braking procedure allows for a quicker braking than if no brake resistor was used and the brake ramp stopped time and again.

Note!

The overmagnetisation may be selected only that high in C00984 that the maximum inverter current will not be exceeded!

With high speeds the inverter may already output the maximum motor voltage (C00090) so that it is not possible to increase the motor voltage/motor magnetisation.

Example oscillogram



[5-20] Example oscillogram

5.13 Power and energy display

Independent of the motor control mode selected in C00006, the current output power and the output energy supplied over the total operating time can be queried via the following display parameters:

Parameters	**Information**	**Lenze setting**	
		Value	Unit
C00980/1	Active output power	-	kW
C00980/2	Apparent output power	-	kW
C00981/1	Output energy in motor mode • The value is saved in the device by switching off the mains and cannot be reset.	-	kWh
C00981/2	Output energy in generator mode • The value is saved in the device by switching off the mains and cannot be reset.	-	kWh
Greyed out = display parameter			

These display parameters serve to execute an energy analysis in the respective application. From this, decisions can be derived whether a measurement for energy optimisation is economical.

- Hence, the following questions can be answered:
  - Is it worth to use a regenerative module or should the energy be dissipated via a brake resistor?
  - Is it worth to use a DC-bus connection between the devices? (Not possible with 8400 motec.)
  - Does the application permit other parameter settings which contribute to energy saving (e.g. lower speed, other ramp times, and speed/torque profiles)?
  - What is the advantage of the V/f characteristic control - energy-saving (VFCplusEco) compared to the other control modes?

5.14 Monitoring

Many monitoring functions that are integrated in the inverter can detect errors and thus protect the device/motor from damage or overload.

- Detailed information on the individual monitoring functions can be found in the following subchapters.

Parameters	**Monitoring**	**Response** (Lenze setting)
C00565	Mains phase failure monitoring	Warning
C00574	Brake resistor monitoring (I2xt)	Fault
C00585	Motor temperature monitoring (PTC)	Fault
C00586	Encoder open-circuit monitoring	Fault
C00600/1	Undervoltage in the DC bus	Fault
C00601/1	Overvoltage in the DC bus • The response to overvoltage is always "Fault". • The response only takes place after the deceleration time set in C00601/1 has elapsed (if the overvoltage is still present then).	Fault
C00604	Device overload monitoring (Ixt)	Warning
C00606	Motor load monitoring (I2xt)	Warning

Parameterisable responses

If a monitoring function trips, the response set via the corresponding parameter is carried out. The following responses can be selected:

- "No response": Response/monitoring is deactivated.
- "Fault": Change of the operating status by a pulse inhibit of the power output stage.
- "Warning": Operating status of the inverter remains unchanged. Only a message is entered into the Logbook of the inverter.

Related topics:

- Device state machine and device states (🕮 72)
- Diagnostics & error management (🕮 311)
- Error messages of the operating system (🕮 330)

5.14.1 Device overload monitoring (Ixt)

C00064/1...3 displays the device utilisation (ixt) in [%] in different time intervals:

Parameters	Information
C00064/1	Device utilisation (Ixt) • Maximum value of pulse utilisation (C00064/2) and permanent utilisation (C00064/3).
C00064/2	Device utilisation (Ixt) 15s • Pulse utilisation over the last 15 seconds (only for loads >160 %).
C00064/3	Device utilisation (Ixt) 3 min • Permanent utilisation over the last 3 minutes.
Greyed out = display parameter	

- If the device utilisation reaches the warning threshold set in C00123 (Lenze setting: 100 %):
  - The error response set in C00604 will be carried out (Lenze setting: "Warning").
  - The "OC5: Ixt overload" error message will be entered into the Logbook.
- A setting of C00604 = "0: No Reaction" deactivates the monitoring.
- If the device utilisation reaches the permanent shutdown limit 110 %:
  - the "Fault" error response is returned.
  - The "OC9: Ixt overload shutdown limit" error message will be entered into the logbook.

5.14.2 Motor load monitoring (I2xt)

The Inverter Drives 8400 are provided with a simple, sensorless, thermal I^2xt motor monitoring of self-ventilated standard motors which is based on a mathematical model.

- C00066 displays the calculated motor load in [%].
- If the calculated motor load exceeds the value "100.00 %":
  - The error response set in C00606 will be carried out (Lenze setting: "Warning").
  - The "OC6: I2xt motor overload" error message will be entered into the Logbook.
- A setting of C00606 = "0: No Reaction" deactivates the monitoring.

Stop!

I^2xt motor monitoring does not provide full motor protection!
As the motor utilisation calculated in the thermal motor model is lost after mains switching, for instance the following operating states cannot be detected correctly:

- Restarting (after mains switching) of a motor that is already very hot.
- Change of the cooling conditions (e.g. cooling air flow interrupted or too warm).

Full motor protection requires additional measures such as the evaluation of temperature sensors that are located directly in the winding or the use of thermal contacts.

For the installation according to UL or UR, the safety instructions provided in the hardware manual must be observed! Among other things, the activation of the motor overload monitoring (I2xt) is required here.

Note!

From version 04.01.00, the thermal motor load displayed in C00066 can be pre-initialised when the device is connected to the mains, optionally using a fixed value or the value used last at the time when the device was switched off. The desired initialisation is selected in C00122. In the Lenze setting of C00122, the behaviour remains unchanged (no initialisation).

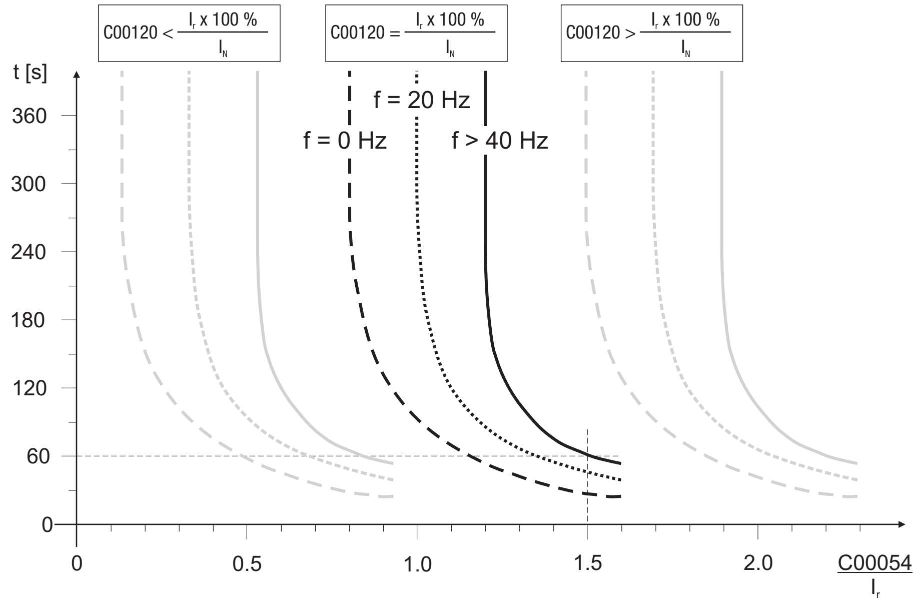
Adjustment of the motor utilisation meter

The motor utilisation meter for indicating the motor load in C00066 begins to count when the apparent motor current (C00054) is greater than the motor overload setting (C00120).

The overload threshold (C00120) is to be set as follows:

$$\text{C00120} = \frac{\text{Rated motor current (C00088)}}{\text{Rated device current (C00098)}} \cdot 100\ \%$$

- If you reduce C00120 starting from the calculated value, the motor utilisation meter will already be counted up before the rated overload threshold is reached.
- If you increase C00120 starting from the calculated value, the motor utilisation meter will not be counted up until the rated overload threshold is reached.



f: Output frequency
t: Release time
I_N: Rated device current at a switching frequency of f = 8 kHz
I_r : Rated motor current (see nameplate of motor)
C00054: Apparent motor current
C00120: Motor overload setting

[5-21] Tripping characteristic of the I^2xt monitoring

Example in Figure [5-21]:

C00120 = I_r / I_{rated} x 100 % = C00088/C00098 x 100 %

C00054 = 150 % rated motor current

- After approx. 60 seconds, C00066 has reached the final value (100 %) at output frequencies f > 40 Hz.
- The inverter outputs the "OC6: I2xt overload motor" error message and triggers the response set in C00606 (default setting: "Warning").

Note!

If the motor is operated by two drives with different rated currents, an adapted value has to be entered into C00120.

Tip!

- If forced ventilated motors are used, a premature response of the overload threshold can be avoided by deactivating this function if necessary (C00606 = "0: No Reaction").
- The current limits set in C00022 and C00023 influence the I^2xt calculation only in an indirect way. However, the operation of the motor at maximum possible load can be averted. ▶ Defining current and speed limits (📖 101)

5.14.3 Motor temperature monitoring (PTC)

For detecting and monitoring of the motor temperature, a PTC thermistor (DIN 44081/DIN 44082) or a thermal contact (NC contact) can be connected to the terminals T1 and T2.

Stop!

- The inverter can only evaluate one PTC thermistor!
  Do not connect several PTC thermistors in series or parallel.
- To achieve full motor protection, an additional temperature monitoring with separate evaluation must be installed.

Note!

- In the Lenze setting (C00585 = "1: Fault"), motor temperature monitoring is activated!
- Lenze three-phase AC motors are provided with a thermal contact on delivery.

- If 1.6 kΩ < R < 4 kΩ at the terminals T1 and T2, the monitoring will respond, see functional test below.
- If the monitoring responds:
  - The error response set in C00585 is activated (Lenze setting: "Fault").
  - The "OH3: Motor temperature (X106) triggered" error message is entered into the Logbook.
- A setting of C00585 = "0: No Reaction" deactivates the monitoring.

Tip!

We recommend to always activate the PTC input when using motors which are equipped with PTC thermistors or thermostats. This prevents the motor from being destroyed by overheating.

Functional test

Connect a fixed resistor to the PTC input:

- R > 4 kΩ : Fault message must be activated.
- R < 1 kΩ : Fault message must not be activated.

5.14.4 Brake resistor monitoring (I2xt)

Due to the converted braking power, the brake resistor is thermally stressed and can even be thermally destroyed by excessive braking power.

The monitoring of the I^2xt utilisation of the inverter serves to protect the brake resistor. It acts in proportion to the converted braking power.

Danger!

In the Lenze setting (C00574 = "1: Fault"), the response of the monitoring function stops the braking operation.

In particular for applications such as hoists, check if a stopping of the braking operation due to the setting of C00574 = "1: Fault" is permissible.

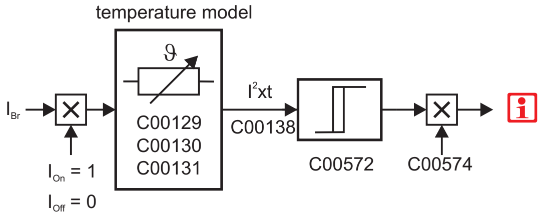
Stop!

Implement appropriate protective measures against thermal overload of the brake resistor!

Examples:
- Parameterisation of an error response in C00574 and evaluation of the parameterised error message within the application or the machine control system.
- Interruption of the mains supply by means of the temperature contact at the brake resistor and a simultaneous activation of the mechanical brake.
- Evaluating the temperature contact at the brake resistor by the motor PTC input of the inverter.

- If the I^2xt utilisation reaches the switch-off threshold set in C00572:
  - The error response set in C00574 will take place.
  - The "OC12: I2xt brake resistor overload" error message is entered into the Logbook.
- If the system is dimensioned correctly, the monitoring should not be activated. If individual pieces of rated data of the actually connected brake resistor are not known, they have to be identified.
- If the DC-bus voltage exceeds the overvoltage threshold due to a braking energy that is too high, the monitoring for overvoltage in the DC bus is activated ("OU: DC-bus overvoltage" error message).

Temperature model



ℹ Error message: "OC12: I2xt overload brake resistor"

[5-22] Signal flow for monitoring the brake resistor

The monitoring function calculates the braking current I_{Br} from the current DC-bus voltage U_{DC_act} and the brake resistance parameterised in C00129:

$$I_{Br} = \frac{U_{DC\_act}}{C00129}$$

Note!

The monitoring function can also be triggered due to a value entered in C00129 although a brake resistor is not even connected.

- The calculation considers the thermal utilisation of the brake resistor based on the following parameters:
  - Resistance value (C00129)
  - Continuous power (C00130)
  - Thermal capacity (C00131)
- In the Lenze setting these parameters are preset with the corresponding power-adapted Lenze brake resistor.
- C00133 indicates the calculated utilisation of the brake resistor in [%].
  - A utilisation of 100 % corresponds to the continuous power of the brake resistor depending on the maximally permissible temperature limit.

Related topics:

▶ Braking operation/brake energy management (🕮 186)

5.14.5 Mains phase failure monitoring

Stop!

Under load, the mains input of a three-phase inverter can be destroyed if the device is only supplied by two phases (e.g. if a mains phase fails).

The inverter has a simple mains-phase failure detection function with which a mains phase failure can be detected under load.

- In the case of power-adapted machines, approx. 50 % of the rated motor power must be exceeded so that a main-phase failure can be detected.
- If the mains phase failure monitoring is tripped:
  - The error response set in C00565 will be carried out (Lenze setting: "Warning").
  - The "Su02: Mains voltage switched-off" error message is entered into the logbook.

Note!

The failure of a mains phase can also generate an error message "LU: DC-bus undervoltage". This error cannot be parameterised by C00565.

5.14.6 Maximum current monitoring

This function extension is only available from version 03.00.00!

The ultimate motor current to be parameterised in C00939 is a limit value to protect the motor from destruction, influence of the rated data and demagnetisation.

- This limit value must not be travelled cyclically in the drive process.
- If the instantaneous value of the motor current exceeds the limit value set in C00939, the error response "Fault" occurs to protect the motor and the error message "OC7: Motor overcurrent" is entered into the logbook.
- The maximum currents to be parameterised in C00022 and C00023 should have a sufficient distance to this limit value.

Note!

If you select a Lenze motor from the catalogue and transfer its plant parameters to the inverter, the setting in C00022 and C00023 is automatically adapted to the motor selected.

5.14.7 Current monitoring for overload

This function extension is available from version 07.00.00!

If the apparent motor current exceeds a defined threshold value C00124/1) for a certain time (C00563/1) an overload has taken place.

Monitoring responds as follows:

- The *bCurrentMonitoringOverload* signal is set to TRUE
  See selection list - digital signals
- The response set in C00584/1 is activated (Lenze setting: "No Reaction")
- The **OC18** error message, current monitoring overload, is entered into the logbook.

If the overload decreases, the apparent motor current has to decrease below the value $\mathrm{C00124/1} - \dot{0}, 05 \times \mathrm{I_N}$ in order that the *bCurrentMonitoringOverload* signal can accept the FALSE state.

When *bCurrentMonitoringOverload* = FALSE, the delay time in the resolution is set to the value 0 s again.

Use of the DIP switch S2/DIP8 = "ON"

When the device is switched on, the delay time is configured with the following value:

$$\mathrm{C00563/1} = 2 \times \mathrm{C00012}$$

5.14.8 Motor speed monitoring

This function extension is only available from version 04.00.00!

If the drive reaches the maximally permissible motor speed (C00965):

- The error response "Fault" occurs, i.e. the inverter is inhibited and the motor changes to torque-free operation (coasts down).
- The error message "OS2: Max. motor speed reached" is entered into the logbook.

5.14.9 Encoder open-circuit monitoring

This function extension is available from version 02.00.00!

Note!

In the Lenze setting (C00586 = "1: Fault"), open-circuit monitoring of the encoder is activated!

When does the open-circuit monitoring system respond?

The open-circuit monitoring will trigger if

- an open circuit occurs in the encoder cable.
- an extreme overload (e.g. blocked motor shaft) occurs during the start-up phase of the motor.
- highly dynamic reversion of the motor occurs.

Which measured values lead to an actuation of the open-circuit monitoring system?

The following measured values checked for plausibility lead to an actuation of the open-circuit monitoring system:

1. If for a time > 0.2 s, the amount of deviation between the actual speed value and the speed setpoint is higher than f = 40 Hz.
2. If for a time > 0.2 s, the detected actual speed value is f = 0 Hz or n = 0 rpm and the I_{max} controller is active at the same time.
3. If for a time > 0.2 s, the injected frequency and the actual speed value have different signs and the I_{max} controller is active at the same time. This is usually the case if A/B tracks are mixed up.

Response to open circuit

- If the open-circuit monitoring is tripped:
  - The error response set in C00586 is activated (Lenze setting: "Fault").
  - The "SD3: Open circuit - feedback system" is entered into the Logbook.
- A setting of C00586 = "0: No Reaction" deactivates the monitoring.

Related topics:

▸ Encoder/feedback system (📖 181)

6 I/O terminals

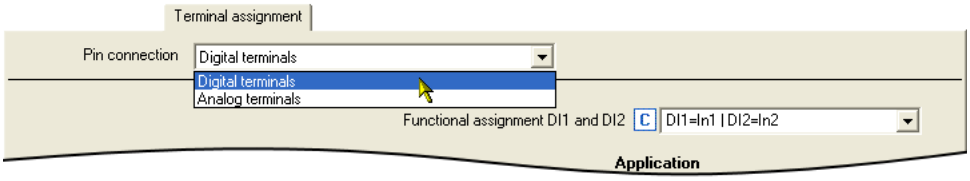
This chapter provides information on the function, possible parameter settings, and technical data of the input/output terminals of the inverter.

Which input and output terminals are available depends on the communicaton unit used:

Communication unit	**Standard I/O Enhanced I/O**	**Controller enable**	**Digital inputs**	**Digital outputs**	**Relay outputs**	**Analog inputs**	**Safety STO 2 channels (SIA, SIB)**	**External DC 24V supply**
		Number	Number	Number	Number	Number	Number	Number
I/O modules								
Basic I/O	–	1	2	–	1	–	–	–
Standard I/O	–	1	5	1	1	1	–	1
Standard I/O + M12	–	1	5	1	1	1	–	1
Extended I/O	–	1	8	1	1	2	–	–
Fieldbus modules								
CANopen	•	1	5	1	–	–	–	–
AS interface	•							
EtherCAT	•	1	5	1	–	–	–	1
EtherNet/IP™	•							
PROFIBUS	•							
PROFINET	•							
POWERLINK	•							
CANopen STO	•	1	5	1	1	1	1	1
AS-Interface STO	•							
EtherCAT STO	•							
EtherNet/IP™ STO	•							
PROFIBUS STO	•							
PROFINET STO	•							
POWERLINK STO	•							

Detailed information on the respective "CAN" communication unit can be found in the corresponding online help and in the communication manual (KHB).

In the »Engineer«, the digital and analog input and output terminals are parameterised on the **Terminal assignment** tab. To do this, go to the **Control terminals** list field and select the terminals that you wish to parameterise:



Pin connection: Digital terminals

Functional assignment DI1 and DI2 C DI1=In1 | DI2=In2

You can find further information in the respective subchapter:

- Digital terminals (🕮 207)
- Analog terminals (🕮 214)

Note!

The input and output terminals of the inverter are already functionally pre-assigned in the default setting ("Lenze setting"). The preconfigured assignment depends on the control mode selected in C00007.

▶ Terminal assignment of the control modes (📖 240)

Tip!

How you can alter the preconfigured assignment of the input and output terminals is described in the chapter entitled "User-defined terminal assignment". (📖 217)

6.1 Digital terminals

Digital input terminals

Depending on the communication unit used, the inverter is provided with

- several parameterisable input terminals (DIx) for detecting digital signals.
- one RFR control input for controller enable.

Danger!

By default, the RFR control input is connected with a bridge to +24 V, meaning that the inverter is enabled!

- This input can also be used for switching on/off the drive. For this purpose, the bridge must be replaced by cabling.

Digital output terminals

Depending on the communication unit used, the inverter is provided with

- a parameterisable output terminal (DO1) for outputting digital signals,
- a parameterisable relay switch contact (NO contact).

Note!

Initialisation behaviour:

- After mains switching up to the start of the application
  - the digital output remains set to FALSE.
  - the switch contact of the relay remains opened.

Exception handling:

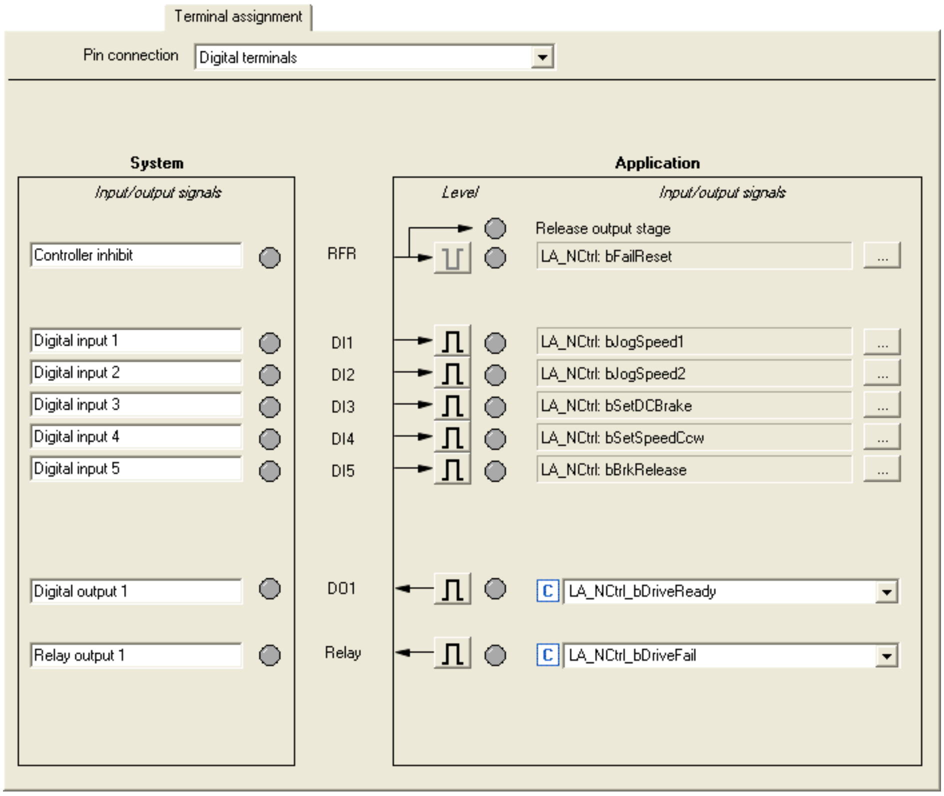
- In the event of a critical exception in the application (e.g. reset), the digital output is set to FALSE.
- While the Lenze setting is loaded
  - the relay may be energised or de-energised for a short time.
  - the digital output can be set for a short time.

Switching cycle diagnostics of the relay:

- A reference for evaluating the wear limit can be obtained via the number of switching cycles of the relay displayed in C00177/2.

Parameterisation dialog in the »Engineer«

- The representation in the »Engineer« and the possible settings depend on the communication unit used.
- The following illustration displays exemplarily all optional terminals:



Terminal assignment

Pin connection: Digital terminals

System		Application
Input/output signals		Input/output signals
		Release output stage
Controller inhibit	RFR	LA_NCtrl: bFailReset
Digital input 1	DI1	LA_NCtrl: bJogSpeed1
Digital input 2	DI2	LA_NCtrl: bJogSpeed2
Digital input 3	DI3	LA_NCtrl: bSetDCBrake
Digital input 4	DI4	LA_NCtrl: bSetSpeedCcw
Digital input 5	DI5	LA_NCtrl: bBrkRelease
Digital output 1	DO1	C LA_NCtrl_bDriveReady
Relay output 1	Relay	C LA_NCtrl_bDriveFail

Button	Function
⊓	Indicates the polarity of the input is HIGH active. The polarity can be changed from HIGH active to LOW active by clicking this button.
⊔	Indicates that the polarity of the input is LOW active. The polarity can be changed from LOW active to HIGH active by clicking this button.
...	Open the parameterising dialog for assigning application inputs to the digital input. ▸ Changing the terminal assignment with the »Engineer« (📖 219)

Short overview of the parameters for the digital terminals:

Parameters	Information	Lenze setting	
		Value	Unit
C00115/1 (from version 02.00.00)	Function assignment of DI1 and DI2 ▸ Configuring DI1 and DI2 as frequency inputs	0: DI1=In1 / DI2=In2	
Digital inputs DI1 ... DI5			
C00114	DIx: Polarity	Bit coded	
C00443/1	DIx: Terminal level	-	
C00443/2	DIx: Output level (to the application)	-	
Digital output DO1 / relay output			
C00118	DOx: Inversion	Bit coded	
C00444/1	DOx: Input level (from the application)	-	
C00444/2	DOx: Terminal level	-	
Digital outputs - terminal configuration			
C00621/1	LS_DigitalOutput:bRelay	1001: LA_nCtrl_bDriveFail	
C00621/2	LS_DigitalOutput:bOut1	1000: LA_nCtrl_bDriveReady	
Greyed out = display parameter			

Tip!

For debouncing digital inputs, two parameterisable delay elements (L_GP_DigitalDelay1 and L_GP_DigitalDelay2) are available.

▸ Application example: Debouncing a digital input (📖 516)

Related topics:

▸ User-defined terminal assignment (📖 217)

▸ Electrical data (📖 223)

6.1.1 Configuring DI1 and DI2 as frequency inputs

This function extension is available from version 02.00.00!

The internal processing function of the digital input terminals DI1 and DI2 can be reconfigured in C00115/1 if required. This serves to use these input terminals optionally as frequency inputs to implement the following functions:

- Detection of the input frequency
- Detection and processing of two unipolar input frequencies to one bipolar frequency
- Evaluation of the speed feedback for the V/f control (VFCplus + encoder)

C00115/1: Function assignment DI1 and DI2		**Function assignment**	
		DI1	**DI2**
0	**DI1=In1 / DI2=In2**	**Digital input**	**Digital input**
1	DI1=FreqIn12 / DI2=In2	Frequency input	Digital input
2	DI1&DI2=FreqIn (2-track)	Frequency input (2-track)	
3	(DI1/DI2=+-) = FreqIn12	Frequency input (speed)	Frequency input (direction)

Note!

- In the Lenze setting of C00115/1, the digital input terminals DI1 and DI2 are configured as "standard" digital inputs.
- The digital input terminals DI3 ... DI8 are basically designed as "normal" digital inputs.
- If the digital inputs are parameterised as frequency inputs, the corresponding output signals (*bIn1*/*bIn2*) at the LS_DigitalInput system block automatically takes the FALSE status.

Detailed information on how to parameterise the speed feedback for the motor control can be found in the chapter entitled "Encoder/feedback system". (🕮 181)

General information on using the input terminals as frequency inputs

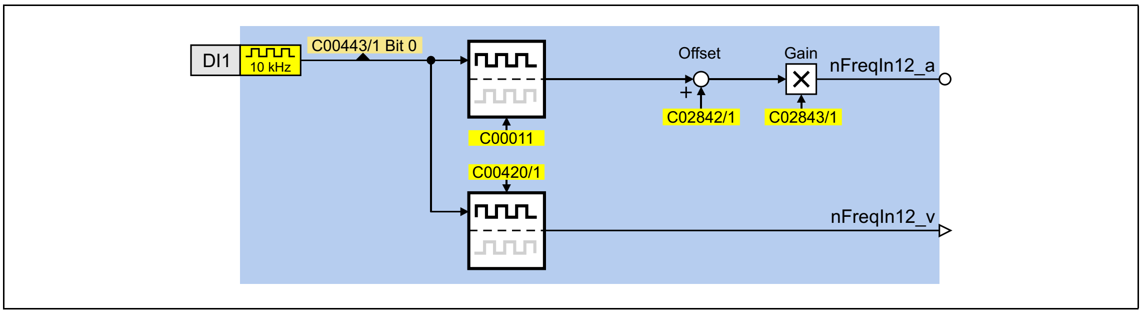
The frequency inputs serve to detect HTL encoders with any number of increments and single-track and two-track signals. Single-track signals can be evaluated with or without rotation signal.

Danger!

- For (open circuit) monitoring of the encoder, it is recommended to set the "Fault" response (Lenze setting) in C00586 for safety reasons!
- To avoid interference injections when an encoder is used, only use shielded motor and encoder cables.
- Ensure that with V/f control (VFCplus + encoder) the maximum input frequency of 7.5 kHz or 10 kHz for EtherNET/IP, EtherCAT, PROFINET and POWERLINK is not exceeded at the frequency inputs.
- When evaluating a single-track encoder, make sure that the sign has been selected correctly. Otherwise, there is a risk that the motor may overspeed.

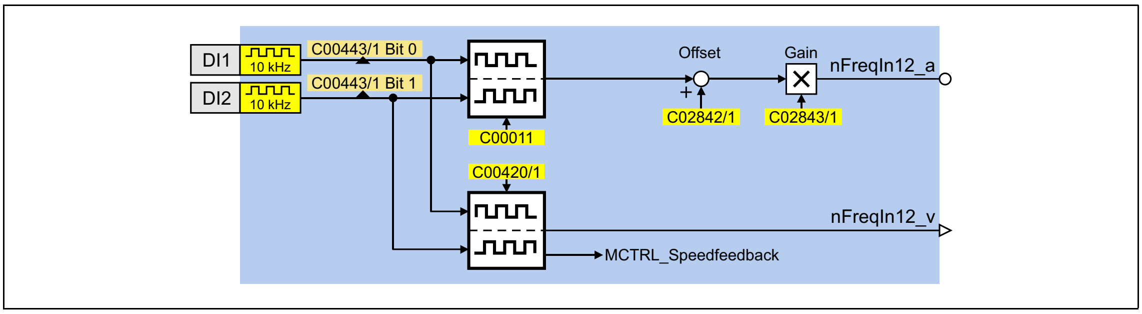
Function assignment 1: DI1=FreqIn / DI2=In

This setting in C00115/1 configures the input terminal DI1 as frequency input. The input terminal DI2 remains configured as "standard" digital input.



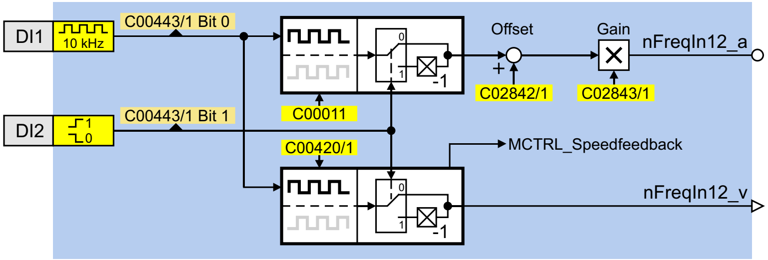
Function assignment 2: DI1&DI2=FreqIn (2-track)

This setting in C00115/1 serves to connect a two-track encoder to the terminals DI1/DI2.



Function assignment 3: DI1=FreqIn / DI2=direction

This setting in C00115/1 serves to connect a single-track encoder to the terminals DI1/DI2. Here, the rotational speed is evaluated via terminal DI1 and the direction of rotation of the encoder (LOW level ≡ CW rotation) is evaluated via terminal DI2.



Short overview of the parameters for the frequency inputs:

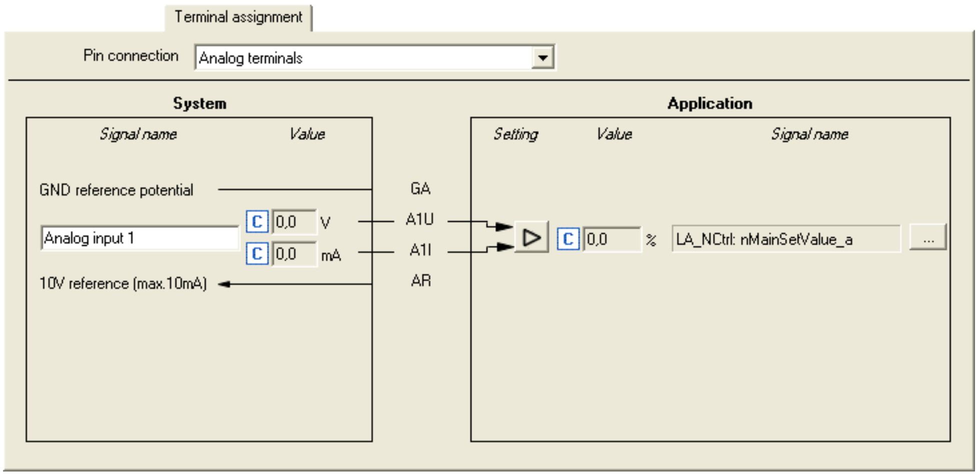
Parameters	Information	Lenze setting	
		Value	Unit
C00011	Appl.: Reference speed	1500	rpm
Frequency input DI1/DI2			
C00115/1	Fct. DI 1/2 10kHz	0: DI1=In1 / DI2=In2	
C00420/1	Encoder increments at FreqIn12	128	Incr./rev.
C02842/1	FreqIn12: Offset	0.00	%
C02843/1	FreqIn12: Gain	100.00	%
C00443/1	DIx: Terminal level	-	
C00445/1	FreqIn12_nOut_v	-	Incr/ms
C00446/1	FreqIn12_nOut_a	-	%
Greyed out = display parameter			

6.2 Analog terminals

Depending on the communication unit used, the inverter is provided with

- an analog input 1, which can be optionally configured as voltage or current input.
- an analog input 2 for voltage signals.
  (Communication Unit E84DGFCXxNx: No fieldbus, extended terminal design)

Parameterisation dialog in the »Engineer«:



Pin connection: Analog terminals

Analog input 1: C 0,0 V; C 0,0 mA

C 0,0 % LA_NCtrl: nMainSetValue_a

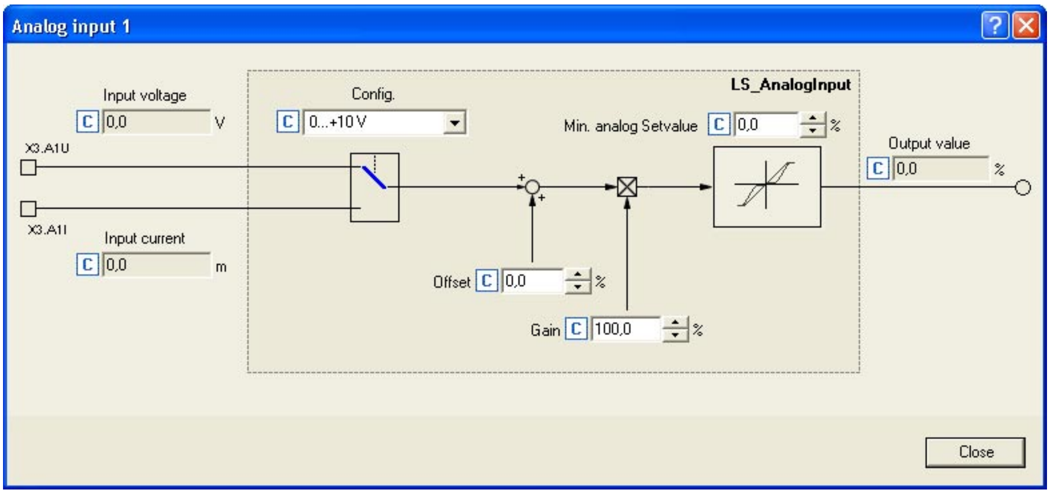
Button	Function
▷	Parameterising analog input (🕮 215)
...	Open the parameterising dialog for assigning application inputs to the analog input. ▸ Changing the terminal assignment with the »Engineer« (🕮 219)

Related topics:

- ▸ User-defined terminal assignment (🕮 217)
- ▸ Electrical data (🕮 223)

6.2.1 Parameterising analog input

By clicking on the ▷ button on the **Terminal assignment** tab, you reach the parameterising dialog for the corresponding analog input:



Input voltage 0,0 V
Input current 0,0 m
Config. 0...+10 V
Min. analog Setvalue 0,0 %
Output value 0,0 %
Offset 0,0 %
Gain 100,0 %

Short overview of parameters for the analog inputs:

Parameters	Information	Lenze setting	
		Value	Unit
Analog input 1			
C00010/1	minimum analog setpoint • Not effective with bipolar analog input (-10 V ... +10 V)	0.0	%
C00026/1	AIN1: Offset	0.0	%
C00027/1	AIN1: Gain	100.0	%
C00028/1	AIN1: Input voltage	-	V
C00029/1	AIN1: Input current	-	mA
C00033/1	AIN1: Output value (to application)	-	%
C00034/1	AIN1: Config.	0: 0 ... +10 V	
C00598/1	Resp. to open circuit AIN1	1: Fault	
Analog input 2			
C00026/2	AIN2: Offset	0.0	%
C00027/2	AIN2: Gain	100.0	%
C00028/2	AIN2: Input voltage	-	V
C00029/2	AIN2: Input current	-	mA
C00033/1	AIN2: Output value (to application)	-	%

Greyed out = display parameter

Using terminal A1U/A1I as current input

In the Lenze setting, voltage signals in the range of 0 ... +10 V are evaluated via the A1U/A1I analog input terminal. If current signals are to be detected instead, select "1: 0...20 mA" or "2: 4...20 mA in C00034/1.

Open-circuit monitoring

With a configuration as 4 ... 20 mA current loop, the error response set in C00598 takes place in the event of a wire breakage (Lenze setting: "1: Fault").

6.3 User-defined terminal assignment

In order to individually adapt the preconfigured assignment of the input/output terminals to your application, you can choose one of the following procedures:

A. In the »Engineer«:
  - Change the terminal assignment on the **Terminal assignment** tab.
  - Change the signal assignment on the **Application Parameters** tab, on the dialog level *Overview* ➞ *Signal flow*.

B. In the »Engineer« or with the keypad:
  - Change the parameters for signal configuration in the parameters list.

Note!

If you change the preconfigured assignment of the digital and analog input/output terminals, the terminal assignment will be a user-defined one. In C00007, control mode "0: Interconnection changed" will be shown.

If you select a different control mode in C00007, all configuration parameters (C00620/x, C00621/x, C00700/x and C00701/x) are reset to the Lenze default setting for the selected control mode. This also applies if the 8400 motec is parameterised via DIP switches.

▸ Pre-assignment of the application (🕮 246)

Tip!

First set a suitable Lenze configuration by selecting a corresponding control mode in C00007.

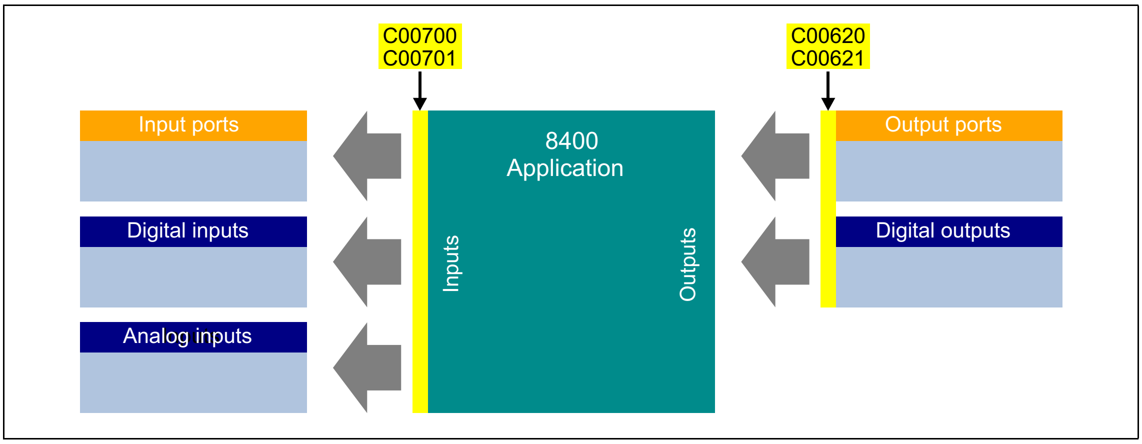
We recommend using the »Engineer« for the implementation of comprehensive user-defined drive solutions.

6.3.1 Source-destination principle

The I/O configuration of the input and output signals is carried out according to the source/destination principle:

- A connection always has a direction and therefore always has a source and a target.
- The input signals of the application are logically linked via configuration parameters to the output signals of system blocks which represent the device input terminals.
- The inputs of system blocks that represent the device output terminals are logically to output signals of the application via configuration parameters.

The following graphic illustrates the source/destination principle:



[6-1] Source-destination principle

Note the following:

- A device input terminal can be logically linked to several inputs of the application.
- Each input of the application can only be logically linked to one input signal.
- An output of the application can be logically linked to several device output terminals.

6.3.2 Changing the terminal assignment with the »Engineer«

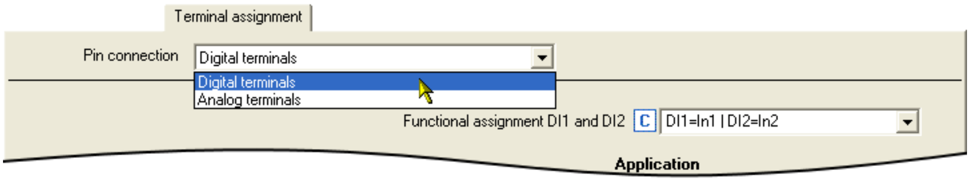
The »Engineer« serves to easily change the preconfigured terminal assignment via corresponding dialogs. The following task serves to describe the respective procedure.

Task: Based on the preset control mode "Terminals 0", the digital input DI2 is used for activating the quick stop instead of selecting the fixed setpoint 2/3. For this purpose, the digital input DI2 must not be linked to the *bJogSpeed2* input but to the *bSetQuickstop* input of the application.

Possibility 1: Change terminal assignment by means of the Terminal Assignment tab

Procedure:

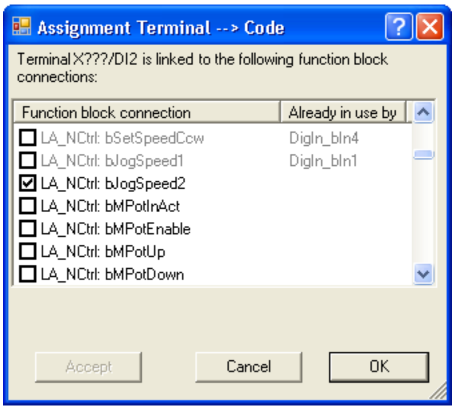
1. Go to the **Terminal Assignment** tab and select "Digital terminals" in the **Control connections** list field:



Pin connection: Digital terminals
Digital terminals
Analog terminals

Functional assignment DI1 and DI2: C DI1=In1 | DI2=In2

2. Click on the … button for the DI2 terminal in order to open the dialog box *Assignment Terminal --> Function block*.
   - In the list field, all block inputs that are currently logically linked to digital input DI2 are marked with a checkmark:



Assignment Terminal --> Code

Terminal X???/DI2 is linked to the following function block connections:

Function block connection	Already in use by
☐ LA_NCtrl: bSetSpeedCcw	DigIn_bIn4
☐ LA_NCtrl: bJogSpeed1	DigIn_bIn1
☑ LA_NCtrl: bJogSpeed2	
☐ LA_NCtrl: bMPotInAct	
☐ LA_NCtrl: bMPotEnable	
☐ LA_NCtrl: bMPotUp	
☐ LA_NCtrl: bMPotDown	

3. Remove checkmark for the connection **LA_NCtrl: bJogSpeed2** in order to cancel the existing logical link.
4. Set checkmark for connection **LA_NCtrl: bSetQuickstop** in order to logically link this application input to digital input DI2.
5. Click the **OK** button to clise the dialog box again.

Possibility 2: Change terminal assignment by means of the signal flow shown

Procedure:

1. Go to the **Application parameters** tab.
2. Go to the **Application Parameters** tab and click on the **Signal flow** button in order to change to the dialog level *Overview* ➔ *Signal flow*.
3. In the **bJogSpeed2** list field, set the selection "0: Not interconnected".
4. In the **bSetQuickstop** list field, set the "12: DigIn_bIn2" selection.

Related topics:

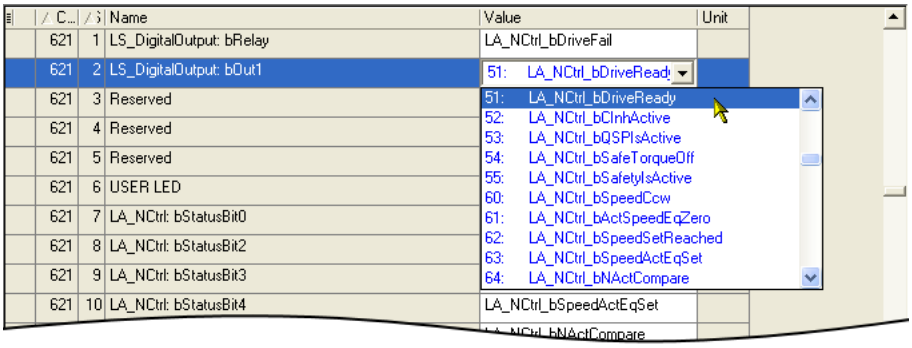
- Basic signal flow (📖 228)
- Interface description (📖 232)
- Pre-assignment of the application (📖 246)

6.3.3 Changing the terminal assignment via configuration parameters

The preconfigured terminal assignment can be reconfigured via a bus system, with the keypad or with the »Engineer« by means of configuration parameters.

- Each configuration parameter represents a signal input of a function block, a system block or an application block.
- Each configuration parameter contains a selection list with output signals of the same type of data.
- Logical linking is thus carried out by selecting the output signal for the corresponding signal input.

In the following example, digital output 1 (**LS_DigitalOutput**.*bOut1* input) is logically linked to the status signal "Drive ready" (*LA_nCtrl_bDriveReady* output signal):



C...		Name	Value	Unit
621	1	LS_DigitalOutput: bRelay	LA_NCtrl_bDriveFail	
621	2	LS_DigitalOutput: bOut1	51: LA_NCtrl_bDriveRead	
621	3	Reserved		
621	4	Reserved		
621	5	Reserved		
621	6	USER LED		
621	7	LA_NCtrl: bStatusBit0		
621	8	LA_NCtrl: bStatusBit2		
621	9	LA_NCtrl: bStatusBit3		
621	10	LA_NCtrl: bStatusBit4	LA_NCtrl_bSpeedActEqSet	

51: LA_NCtrl_bDriveReady
52: LA_NCtrl_bCInhActive
53: LA_NCtrl_bQSPIsActive
54: LA_NCtrl_bSafeTorqueOff
55: LA_NCtrl_bSafetyIsActive
60: LA_NCtrl_bSpeedCcw
61: LA_NCtrl_bActSpeedEqZero
62: LA_NCtrl_bSpeedSetReached
63: LA_NCtrl_bSpeedActEqSet
64: LA_NCtrl_bNActCompare

Configuration parameters for the digital output terminals

The subcodes of C00621 serve to change the preconfigured terminal assignment of the digital output terminals:

Parameters	Information	Lenze setting Value | Unit
C00621/1	LS_DigitalOutput:bRelay	1001: LA_nCtrl_bDriveFail
C00621/2	LS_DigitalOutput:bOut1	1000: LA_nCtrl_bDriveReady

Other subcodes (not shown here) allow the configuration of input signals of different system blocks and port blocks.

Configuration parameters for the inputs of the application

The following parameters can be used to change the preconfigured assignment of the application inputs:

Parameters	Information	Lenze setting
C00700/1	LA_NCtrl: nMainSetValue_a	10: AIn1_Out
C00700/2	LA_NCtrl: nTorqueMotLim_a	22: nPar3_a
C00700/3	LA_NCtrl: nTorqueGenLim_a	22: nPar3_a
C00700/4	Key-operated switch: Max. speed	15: Local potentiometer P1
C00700/5	LA_NCtrl: Network(MCI/CAN)_wDriveControl	6: C_wDriveCtrl
C00700/6	LA_NCtrl: nPIDVpAdapt_a	1: C_nPos100_a(100.0%)
C00700/7	LA_NCtrl: nPIDActValue_a	0: Not connected
C00700/8	LA_NCtrl: nPIDInfluence_a	1: C_nPos100_a(100.0%)
C00700/9	LA_NCtrl: nPIDSetValue_a	0: Not connected
C00700/10	Reserved	0: Not connected
C00700/11	L_Counter_1: wLdVal	0: Not connected
C00700/12	L_Counter_1: wCmpVal	0: Not connected
C00700/13	L_Compare_1: nIn1_a	0: Not connected
C00700/14	L_Compare_1: nIn2_a	0: Not connected
C00700/15	LS_ParReadWrite_1: wParIndex	0: Not connected
C00700/16	LS_ParReadWrite_1: wParSubindex	0: Not connected
C00700/17	LS_ParReadWrite_1: wInHWord	0: Not connected
C00700/18	LS_ParReadWrite_1: wInLWord	0: Not connected
C00701/1	LA_NCtrl: bCInh	0: Not connected
C00701/2	LA_NCtrl: bFailReset	10: DigIn_CInh
C00701/3	LA_NCtrl: bSetQuickstop	0: Not connected
C00701/4	LA_NCtrl: bSetDCBrake	13: DigIn_bIn3
C00701/5	LA_NCtrl: bSetSpeedCcw	14: DigIn_bIn4
C00701/6	LA_NCtrl: bJogSpeed1	11: DigIn_bIn1
C00701/7	LA_NCtrl: bJogSpeed2	12: DigIn_bIn2
C00701/8	LA_NCtrl: bMPotUp	0: Not connected
C00701/9	LA_NCtrl: bMPotDown	0: Not connected
C00701/10	LA_NCtrl: bMPotInAct	0: Not connected
C00701/11	LA_NCtrl: bMPotEnable	0: Not connected
C00701/12	LA_NCtrl: bRFG_0	0: Not connected
C00701/13	LA_NCtrl: bSetError1	0: Not connected

Parameters	Information	Lenze setting
C00701/14	LA_NCtrl: bSetError2	0: Not connected
C00701/15	LA_NCtrl: bPIDInfluenceRamp	1: C_bTrue
C00701/16	LA_NCtrl: bPIDIOff	0: Not connected
C00701/17	LA_NCtrl: bRLQCw	1: C_bTrue
C00701/18	LA_NCtrl: bRLQCcw	0: Not connected
C00701/19	LA_NCtrl: bBrkRelease	15: DigIn_bIn5
C00701/20	L_Counter_1: bClkUp	0: Not connected
C00701/21	L_Counter_1: bClkDown	0: Not connected
C00701/22	L_Counter_1: bLoad	0: Not connected
C00701/23	L_DigitalDelay_1: bIn	0: Not connected
C00701/24	L_DigitalDelay_2: bIn	0: Not connected
C00701/25	LS_WriteParamList: bExecute	0: Not connected
C00701/26	LS_WriteParamList: bSelectWriteValue_1	0: Not connected
C00701/27	Reserved	0: Not connected
C00701/28	L_DigitalLogic_1: bIn1	0: Not connected
C00701/29	L_DigitalLogic_1: bIn2	0: Not connected
C00701/30	L_DigitalLogic_2: bIn1	0: Not connected
C00701/31	L_DigitalLogic_2: bIn2	0: Not connected
C00701/32	LS_ParReadWrite_1: bExecute	0: Not connected
C00701/33	LS_ParReadWrite_1: bReadWrite	0: Not connected
C00701/34	LA_NCtrl: bPIDInAct	0: Not connected
C00701/35	LA_NCtrl: bPIDOff	0: Not connected

Example

Task: Based on the preset control mode "Terminals 0", the digital input DI2 is used for activating the quick stop instead of selecting the fixed setpoint 2/3. For this purpose, the digital input DI2 must not be linked to the *bJogSpeed2* input but to the *bSetQuickstop* input of the application.

Procedure:

1. Change the setting of the configuration parameter LA_NCtrl: bSetQuickstop (C00701/3) which represents the logical link of the *bSetQuickstop* application unit: "0: Not connected" ➜ "12: DigIn_bIn2"
2. Change the setting of the configuration parameter LA_NCtrl: bJogSpeed2 (C00701/7) which represents the logical link of the *bJogSpeed2* application unit: "12: DigIn_bIn2" ➜ "0: Not connected"

Tip!

The example shows that, for each input of a function, the associated configuration parameter (C00700/x or C00701/x) is only allowed to contain one source that you enter.

Related topics:

- Application example: Debouncing a digital input (📖 516)
- Basic signal flow (📖 228)
- Interface description (📖 232)
- Pre-assignment of the application (📖 246)

6.4 Electrical data

Digital terminals

Terminal	Application / electrical data	
24E	External 24 V voltage supply • DC 19.2 ... 28.8 V, IEC 61131-2, SELV/PELV • Current consumption ≈ 0.6 A • In case of polarity reversal: No function and no destruction	
GND	External reference potential	
RFR	Controller enable • Electrical data as in digital inputs	
DI1 ... DI5	Digital inputs	
	LOW level:	0 ... +5 V
	HIGH level:	+15 ... +30 V
	Input current:	8 mA per input (at 24 V)
	Electric strength of external voltage	max. ±30 V, permanent
	Input impedance:	3.3 kΩ (2.5 Ω ... 6 kΩ)
	Max. input frequency:	7.5 kHz or 10 kHz for EtherNET/IP, EtherCAT, PROFINET, POWERLINK (DI1/DI2)
	Processing cycle:	1 kHz (1 ms)
DO1	Digital output	
	LOW level:	0 ... +5 V
	HIGH level:	+15 ... +30 V
	Output current:	max. 50 mA per output (external resistance > 480 Ω at 24 V)
	Processing cycle:	1 kHz (1 ms)
24O	24-V voltage supply for external sensors	
	Output current:	max. 100 mA
GIO	Reference potential (digital ground)	
NO / COM	Relay output • Potential-free contact (NO contact) • AC 250 V / 3 A • DC 24 V / 2 A ... 240 V / 0.22 A • not inductive	

Analog terminals

Terminal	Application / electrical data	
AU/AI	Voltage or current input	
	General data:	
	Resolution:	10 bits (Error: 1 digit ≡ 0.1 %, in relation to the final value)
	Conversion rate:	1 kHz In order to filter short-time faults in the analog signal characteristic, the analog input value is led via a digital lag filter with a time constant of 5 ms.
	Processing cycle:	1 kHz (1 ms)
	Electric strength of external voltage	±15 V, permanent
	Temperature influence:	±0.5 % or ±1 mV/K (T_{amb} = -10 °C ... +55 °C)
	When being configured as voltage input (C00034 = "0")	
	Level/scaling:	0 ... +10 V ≡ 0 ... +2^{14} ≡ 0 ... +16384 ≡ 0 ... +100 %
	Input resistance:	> 80 kΩ
	Input voltage in case of open circuit:	Display 0 (U < 0.2 V, abs.)
	Accuracy:	±0.1 V
	Limit frequency:	315 Hz at -3 dB
	When being configured as current input (C00034 = "1" or "2")	
	Level/scaling:	When C00034 = "1": 0 ... +20 mA ≡ 0 ... +2^{14} ≡ 0 ... +16384 ≡ 0 ... +100 %
		When C00034 = "2" (life-zero): +4 ... +20 mA ≡ 0 ... +2^{14} ≡ 0 ... +16384 ≡ 0 ... +100 %
	Switching hysteresis:	1 % (at 20 mA)
	Input resistance:	approx. 250 Ω
	Input voltage in case of open circuit:	Display 0 (I < 0.1 mA)
	Accuracy:	±0.1 mA
AR	10 V reference voltage	
	Output current:	max. 10 mA
GA	Reference potential (analog ground, GND)	

7 Technology applications

This chapter describes the handling and the functional range of the technology applications available for the 8400 motec inverter.

Technology application "Actuating drive speed"

This technology application preset in C00005 serves to solve speed-controlled drive tasks, e.g. conveyor drives (interconnected), extruders, test benches, vibrators, travelling drives, presses, machine tools, dosing systems.

- ▸ TA "Actuating drive speed" (📖 227)

Technology application "actuating drive speed (AC Drive profile)"

This technology application available from version 04.01.00 provides a speed and torque control by means of "AC Drive Profile". For this purpose, the Communication Unit EtherNet/IP™ is required.

- ▸ TA "Actuating drive speed (AC Drive Profile)" (📖 255)

"Switch-off positioning" technology application

This technology application available from version 05.00.00 is used to solve speed-controlled drive tasks which require a pre-switch off or stopping at certain positions, e.g. roller conveyors and conveying belts. The pre-switch off is implemented by connecting switch-off sensors.

- ▸ TA "Switch-off positioning" (📖 264)

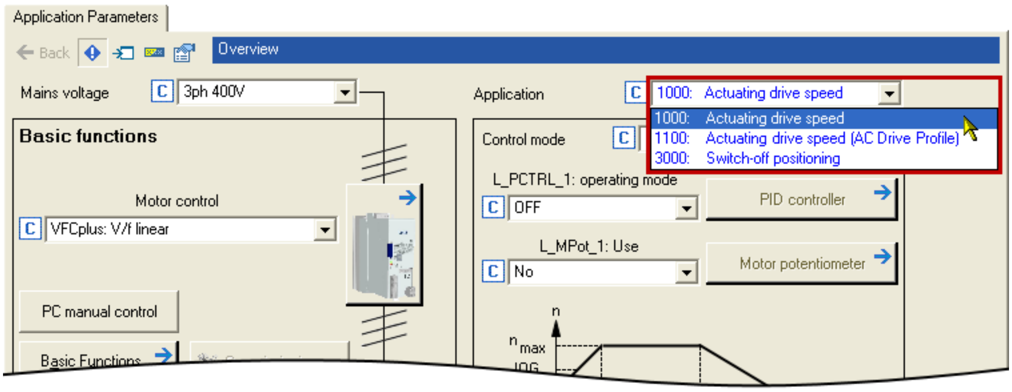
Related topics:

- ▸ Commissioning of the "Actuating drive speed" technology application (📖 37)
- ▸ Commissioning of the "Switch-off positioning" technology application (📖 45)

7.1 Selection of the technology application and the control mode

The technology application to be used is selected in C00005.

- You can select the technology application in the »Engineer« on the **Application parameter** tab via the **Application** list field:



Mains voltage: 3ph 400V

Application: 1000: Actuating drive speed

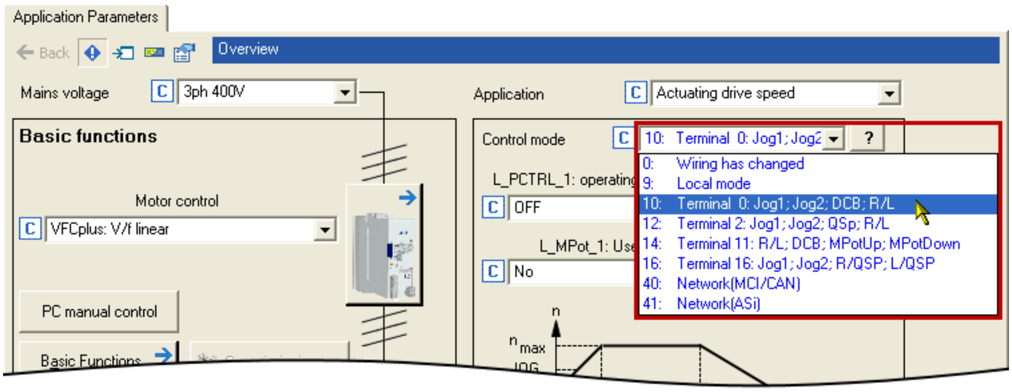
Motor control: VFCplus: V/f linear

L_PCTRL_1: operating mode: OFF

L_MPot_1: Use: No

Various control modes can be selected for each application in C00007. The selection of the control mode determines the way the technology application is controlled, e.g. via terminals or via a fieldbus.

- You can select the control mode in the »Engineer« on the **Application parameter** tab via the **Control mode** list field:



Mains voltage: 3ph 400V

Application: Actuating drive speed

Control mode: 10: Terminal 0: Jog1; Jog2

Motor control: VFCplus: V/f linear

L_PCTRL_1: operating mode: OFF

L_MPot_1: Use: No

Tip!

You can infer the pre-configured assignment of the input/output terminals and ports for each control mode from the description of the corresponding technology application:

TA "Actuating drive speed": Terminal assignment of the control modes (📖 240)

TA "Switch-off positioning": Terminal assignment of the control modes (📖 272)

Detailed information on the individual configuration of the input/output terminals can be found in the description of the I/O terminals in the subchapter"User-defined terminal assignment". (📖 217)

7.2 TA "Actuating drive speed"

Properties

- Pre-configured control modes for terminals and bus control (with predefined process data connection to the fieldbus)
- Free configuration of input and output signals
- Offset and gain of the main setpoint (if defined via analog input)
- Up to 3 fixed setpoints for speed
- Adjustable setpoint ramp times
- Linear or S-shaped ramp
- Automatic holding brake control
- Quick stop (QSP) with adjustable ramp time
- Connectable motor potentiometer function (as alternative setpoint source)
- Connectable process controller (PID controller) with various operating modes
- Load monitoring
- Implemented and freely available "GeneralPurpose" functions:
  Counter, binary delay element, binary logic, analog comparison
- Integration of encoder feedback

Input/output interface

The application features an input interface for the connection of the signal sources (e.g. main setpoint) as well as an output interface for the control of output terminals and output ports.

Parameters

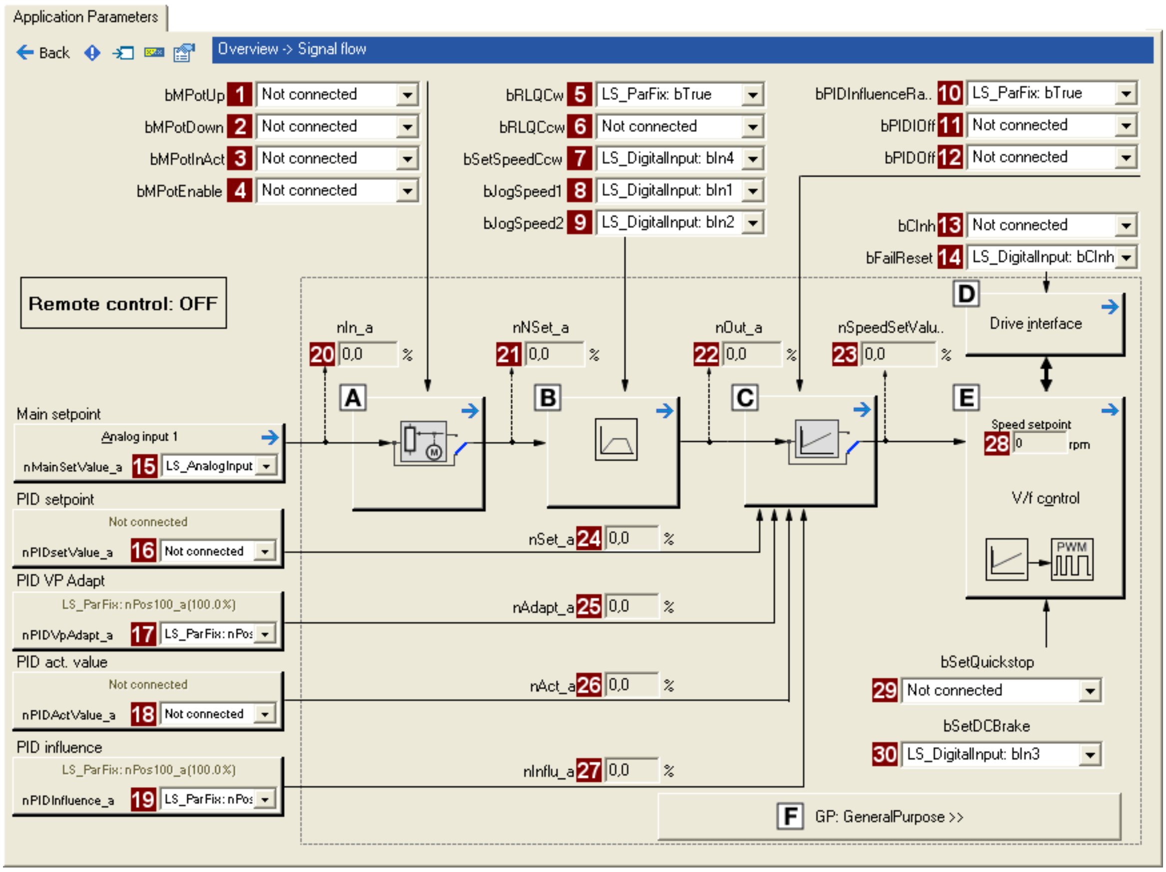
The setting/parameterisation of internal functions, the selection of setpoints and the display of actual values is executed via parameters. A re-configuration of the interfaces is also possible via the corresponding configuration parameters.

Related topics:

▶ Commissioning of the "Actuating drive speed" technology application (🕮 37)

7.2.1 Basic signal flow

When you go to the **Application parameters** tab to the top dialog level *Overview* and click the **Signal flow** button, you will get one dialog level down to the signal flow of the application (here displayed with the preset control mode "Terminals 0"):



bMPotUp 1 Not connected
bMPotDown 2 Not connected
bMPotInAct 3 Not connected
bMPotEnable 4 Not connected
bRLQCw 5 LS_ParFix: bTrue
bRLQCcw 6 Not connected
bSetSpeedCcw 7 LS_DigitalInput: bIn4
bJogSpeed1 8 LS_DigitalInput: bIn1
bJogSpeed2 9 LS_DigitalInput: bIn2
bPIDInfluenceRa.. 10 LS_ParFix: bTrue
bPIDIOff 11 Not connected
bPIDOff 12 Not connected
bCInh 13 Not connected
bFailReset 14 LS_DigitalInput: bCInh

Remote control: OFF

nIn_a 20 0,0 %
nNSet_a 21 0,0 %
nOut_a 22 0,0 %
nSpeedSetValu.. 23 0,0 %

Main setpoint
Analog input 1
nMainSetValue_a 15 LS_AnalogInput

PID setpoint
Not connected
nPIDsetValue_a 16 Not connected

PID VP Adapt
LS_ParFix: nPos100_a (100.0%)
nPIDVpAdapt_a 17 LS_ParFix: nPos

PID act. value
Not connected
nPIDActValue_a 18 Not connected

PID influence
LS_ParFix: nPos100_a (100.0%)
nPIDInfluence_a 19 LS_ParFix: nPos

nSet_a 24 0,0 %
nAdapt_a 25 0,0 %
nAct_a 26 0,0 %
nInflu_a 27 0,0 %

Speed setpoint 28 0 rpm

bSetQuickstop 29 Not connected
bSetDCBrake 30 LS_DigitalInput: bIn3

A	Motor potentiometer (L_MPot_1)	D	Device control (LS_DriveInterface)
B	Setpoint generator (L_NSet_1)	E	Motor control (MCTRL)
C	Process controller (L_PCTRL_1)	F	"GeneralPurpose" functions

All input and output interfaces of the application are described in the chapter entitled "Interface description". (📖 232)

Configuration parameters for digital control signals:

Parameters		Selection of signal source (Lenze setting)	for control signal:
1	**bMPotUp** (C00701/8)	0: Not connected	L_MPot_1: Increase speed setpoint
2	**bMPotDown** (C00701/9)	0: Not connected	L_MPot_1: Decrease speed setpoint
3	**bMPotInAct** (C00701/10)	0: Not connected	L_MPot_1: Activate inactive function
4	**bMPotEnable** (C00701/11)	0: Not connected	L_MPot_1: Activate motor potentiometer function

Parameters		Selection of signal source (Lenze setting)	for control signal:
5	**bRLQCw** (C00701/17)	1: LS_ParFix: bTrue	Activate clockwise rotation (fail-safe)
6	**bRLQCcw** (C00701/18)	0: Not connected	Activate counter-clockwise rotation (fail-safe)
7	**bSetSpeedCcw** (C00701/5)	14: LS_DigitalInput: bIn4 (DI4)	Change of direction of rotation
8	**bJogSpeed1** (C00701/6)	11: LS_DigitalInput: bIn1 (DI1)	Selection of fixed setpoints (JOG setpoints)
9	**bJogSpeed2** (C00701/7)	12: LS_DigitalInput: bIn2 (DI2)	
10	**bPIDEnableInfluenceRamp** (C00701/15)	1: LS_ParFix: bTrue	L_PCTRL_1: Activate ramp for influencing factor
11	**bPIDIOff** (C00701/16)	0: Not connected	L_PCTRL_1: Switch off I component
12	**bPIDOff** (C00701/35)	0: Not connected	L_PCTRL_1: Reset the entire PID controller • From version 04.00.00
13	**bCInh** (C00701/1)	1: LS_ParFix: bTrue	Enable/inhibit inverter
14	**bFailReset** (C00701/2)	15: LS_DigitalInput: bCInh (RFR)	Reset error message
29	**bSetQuickstop** (C00701/3)	0: Not connected	Activate quick stop (QSP)
30	**bSetDCBrake** (C00701/4)	13: LS_DigitalInput: bIn3 (DI3)	

Configuration parameters for analog setpoints:

Parameters		Selection of signal source (Lenze setting)	for setpoint selection:
15	**nMainSetValue_a** (C00700/1)	10: LS_AnalogInput: nIn1_a (Analog input 1)	Main setpoint • 100 % ≡ reference speed (C00011)
16	**nPIDSetValue_a** (C00700/9)	0: Not connected	L_PCTRL_1: Sensor setpoint or process setpoint for operating mode 2
17	**nPIDVpAdapt_a** (C00700/6)	1: LS_ParFix: nPos100_a (100%)	L_PCTRL_1: Adaptation of the gain Vp set in C00222 in percent
18	**nPIDActValue_a** (C00700/7)	0: Not connected	L_PCTRL_1: Actual speed value or actual sensor value (actual process value)
19	**nPIDInfluence_a** (C00700/8)	1: LS_ParFix: nPos100_a (100%)	L_PCTRL_1: Limitation of the influencing factor in percent

Display parameter:

Parameters		Information
20	**nIn_a** (C00830/11)	Input value of motor potentiometer
21	**nNset_a** (C00830/1)	Input value of setpoint generator
22	**nOut_a** (C00830/2)	Output value of setpoint generator
23	**nSpeedSetValue_a** (C00830/2)	Speed setpoint for motor control

	Parameters	Information
24	**nSet_a** (C00830/8)	Sensor setpoint or process setpoint for operating mode 2
25	**nAdapt_a** (C00830/7)	Adaptation of gain Vp set in C00222 in percent
26	**nAct_a** (C00830/6)	Speed or actual sensor value (actual process value)
27	**nInflu_a** (C00830/9)	Limitation of the influencing factor in percent
28	**Speed setpoint** (C00050)	Speed setpoint

Selection of the main speed setpoint

The main speed setpoint is selected in the Lenze setting via the analog input 1.

- Scaling: 10 V ≡ 100 % reference speed (C00011)
- The main setpoint is transformed to a speed setpoint in the setpoint encoder via a ramp function generator with linear or S-shaped ramps.
- For a detailed functional description see FB L_NSet_1. (🕮 491)

Motor potentiometer function

Alternatively, the main speed setpoint can be generated via a motor potentiometer function.

- In the Lenze setting, the motor potentiometer function is deactivated.
- Activation is possible via C00806 or via the *bMPotEnable* input.
- The behaviour of the motor potentiometer during switch-on of the drive system can be selected in C00805.
- For a detailed functional description see FB L_MPot_1. (🕮 487)

Process controller

A process controller (PID controller) is connected downstream of the setpoint generator.

- In the Lenze setting, the process controller is deactivated.
- The activation is executed by selecting the operating mode in C00242.
- For a detailed functional description see FB L_PCTRL_1. (🕮 498)

7.2.1.1 "GeneralPurpose" functions

The following "GeneralPurpose" functions are freely available:

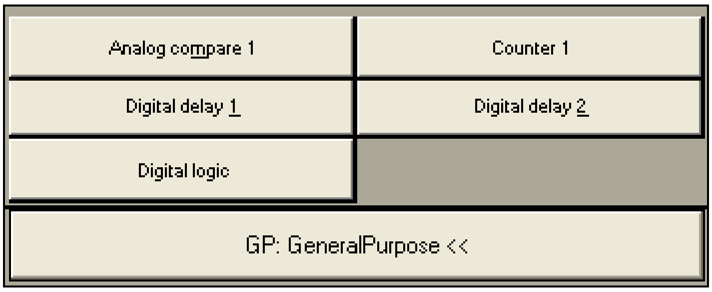
Function block	Function
L_Compare_1	Analog comparison
L_Counter_1	Digital up/down counter
L_DigitalDelay_1	Binary delay element (e.g. for debouncing a digital input)
L_DigitalDelay_2	
L_DigitalLogic_1	Binary logic (as of version 02.00.00)
L_DigitalLogic_2	Binary logic (as of version 04.00.00)
LS_ParReadWrite_1	Reading and writing of local parameters (from version 04.00.00 onwards)

- The inputs of the "GeneralPurpose" functions can be linked to other output signals via the configuration parameters of the application.
- On the other hand, the outputs of the "GeneralPurpose" functions can be selected in the configuration parameters of other inputs.

How to open the parameterisation dialog of a "GeneralPurpose" function:

Go to the *Overview* → *Signal flow* dialog level and click the **GP: GeneralPurpose >>** dialog box.

- Now, further buttons are displayed which are required for opening the parameterisation dialog of the corresponding "GeneralPurpose" function:



- Renewed clicking on the **GP: GeneralPurpose <<** button hides the additional buttons again.

Related topics:

▶ Application example: Debouncing a digital input (📖 516)

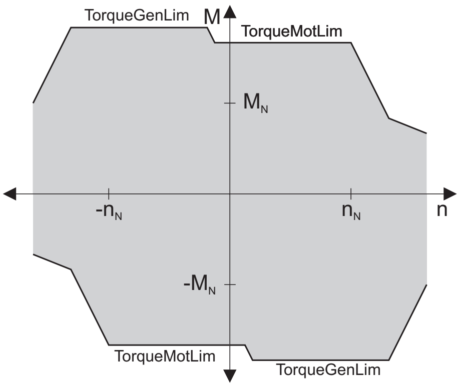
7.2.2 Interface description

Tip!

You can change the preconfigured assignment of the respective input via the configuration parameters given in the first column.

- User-defined terminal assignment (📖 217)

inputs

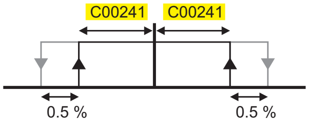
Designator Data type Configuration parameters	**Information/possible settings**
nMainSetValue_a INT C00700/1	Main speed setpoint • Scaling: 16384 ≡ 100 % reference speed (C00011) • The main setpoint is transformed to a speed setpoint in the setpoint encoder via a ramp function generator with linear or S-shaped ramps. • Upstream to the ramp function generator, a blocking speed masking function and a setpoint MinMax limitation are effective. • For a detailed functional description see FB L_NSet_1.
nTorqueMotLim_a nTorqueGenLim_a INT C00700/2...3	Torque limitation in motor mode and in generator mode • These input signals are directly transferred to the motor control to limit the inverter's maximum torque in motor and generator mode. • The drive cannot output a higher torque in motor/generator mode than set here. • The applied values (any polarity) are internally interpreted as absolute values. • If sensorless vector control (SLVC) is selected, the limitation has a direct effect on the torque-producing current component. • Scaling: 16384 ≡ 100 % M_{max} (C00057)
	Torque limits in motor and generator mode: 
Drive control	
wDriveControl WORD	Control word via communication interface • In control mode "40: Network (MCI/CAN)", the inverter that is controlled by a master control (e.g. IPC) receives its control word via the communication interface (MCI/CAN). The upstream LP_Network_In port block provides the process data word at this input. • See the "wDriveControl control word" subchapter for a detailed description of the individual control bits.
nTorqueSetValue_a INT C00700/19	
nTorqueSetValue_a INT C00700/19	Torque setpoint for torque control with speed limitation • *bTorquemodeOn* = TRUE • Scaling: 16384 ≡ 100 % M_{max} (C00057)

Designator Data type Configuration parameters	**Information/possible settings**	
bTorquemodeOn BOOL C00701/36	With *bTorquemodeOn* = TRUE, torque-controlled operation is activated. The setpoint torque directly follows the *nTorqueSetValue_a* default value. Due to its speed limitation, the torque-controlled drive can only rotate within a speed range whose positive speed is limited by *nSpeedHighLimit_a* and whose negative speed is limited by *nSpeedLowLimit_a*.	
nSpeedLowLimit_a INT C00620/28	Negative speed limitation with *bTorquemodeOn* = TRUE • Scaling: 16384 ≡ 100 % reference speed (C00011)	
nSpeedHighLimit_a INT C00620/29	Positive speed limitation with *bTorquemodeOn* = TRUE • Scaling: 16384 ≡ 100 % reference speed (C00011)	
bCInh BOOL C00701/1	Enable/inhibit inverter	
	FALSE	Enable inverter: The inverter switches to the "OperationEnabled" device status if no other source for controller inhibit is active. • C00158 provides a bit coded representation of all active sources/ triggers of a controller inhibit.
	TRUE	Inhibit inverter (controller inhibit): The inverter switches to the "SwitchedOn" device status.
bFailReset BOOL C00701/2	Reset error message In the Lenze setting this input is connected to the digital input controller enable so that a possibly existing error message is reset together with the controller enable (if the cause for the fault is eliminated).	
	TRUE	The current fault is reset, if the cause for the fault is eliminated. • If the fault still exists, the error status remains unchanged.
bSetQuickstop BOOL C00701/3	Activate quick stop (QSP) • Also see device command "Activate/deactivate quick stop".	
	TRUE	Activate quick stop • Motor control is decoupled from the setpoint selection and, within the deceleration time parameterised in C00105, the motor is brought to a standstill (n_{act} = 0). • The motor is kept at a standstill during closed-loop operation. • A pulse inhibit (CINH) is set if the auto-DCB function has been activated via C00019.
	FALSE	Deactivate quick stop • The quick stop is deactivated if no other source for the quick stop is active. • C00159 displays a bit code of active sources/causes for the quick stop.
bSetDCBrake BOOL C00701/4	Manual DC-injection braking (DCB) • Detailed information on DC-injection braking is provided in the motor control chapter, subchapter "DC-injection braking".	
	⚠ **Note!** Holding braking is not possible when this braking mode is used! Use the basic "Holding brake control" function for controlling the holding brake with a low rate of wear.	
	FALSE	Deactivate DC-injection braking.
	TRUE	Activate DC-injection braking, i.e. the drive is brought to a standstill by means of DC-injection braking. • The braking effect stops when the rotor is at standstill. • After the hold time (C00107) has expired, the controller sets the pulse inhibit (CINH).

Designator Data type Configuration parameters	**Information/possible settings**	
Fail-safe selection of the direction of rotation in connection with quick stop • In control mode "Terminals 16", both inputs are connected to the digital terminals DI3 and DI4. • For a detailed functional description see FB L_RLQ.		
bRLQCw BOOL C00701/17	Activate clockwise rotation (fail-safe)	
	FALSE	Quick stop
	TRUE	CW rotation
bRLQCcw BOOL C00701/18	Activate counter-clockwise rotation (fail-safe)	
	FALSE	Quick stop
	TRUE	CCW rotation
Setpoint generator • For a detailed functional description see FB L_NSet_1.		
bSetSpeedCcw BOOL C00701/5	Change of direction of rotation • For instance if a motor or gearbox is fixed laterally reversed to a machine part, but the setpoint selection should still be executed for the positive direction of rotation.	
	FALSE	Clockwise rotation (Cw)
	TRUE	Direction of rotation to the left (Ccw)
bJogSpeed1 bJogSpeed2 BOOL C00701/6 C00701/7	Inputs for overriding fixed setpoints (JOG setpoints) for the main setpoint • A fixed setpoint for the setpoint generator can be activated instead of the main setpoint via these selection inputs. • The two selection inputs are binary coded, therefore you can select three fixed setpoints. • In the case of binary coded selection "0" (all inputs = FALSE or not assigned), main setpoint *nMainSetValue_a* is active. • The selection of the fixed setpoints is carried out in C00039/1...3 in [%] based on the reference speed (C00011). • For a detailed functional description see FB L_NSet_1.	
bRFG_0 BOOL C00701/12	Ramp function generator: Lead the main setpoint integrator to "0" within the current Ti times • For a detailed functional description see FB L_NSet_1.	
	TRUE	The current value of the main setpoint integrator is led to "0" within the Ti time set.
Motor potentiometer Alternatively to the input signal *nMainSetValue_a*, the main setpoint can also be generated by a motor potentiometer function. • In the Lenze setting, the motor potentiometer function is deactivated. • Activation is possible via C00806 or via the *bMPotEnable* input. • The behaviour of the motor potentiometer during switch-on of the drive system can be selected in C00805. • For a detailed functional description see FB L_MPot_1.		
bMPotUp BOOL C00701/8	Increasing the speed setpoint	
	TRUE	Approach the upper speed limit value set in C00800 with the acceleration time set in C00802.
bMPotDown BOOL C00701/9	Decreasing the speed setpoint	
	TRUE	Approach the lower speed limit value set In C00801 with the deceleration time set in C00803.
bMPotInAct BOOL C00701/10	Activating the inactive function	
	TRUE	The speed setpoint behaves according to the inactive function set in C00804. • In the Lenze setting, the speed setpoint is maintained.
bMPotEnable BOOL C00701/11	Activating the motor potentiometer function • This input and C00806 are OR'd.	
	TRUE	The motor potentiometer function is active; the speed setpoint can be changed via the *bMPotUp* and *bMPotDown* control inputs.

Designator Data type Configuration parameters	**Information/possible settings**	
Process controller • In the Lenze setting, the process controller is deactivated. • The activation is executed by selecting the operating mode in C00242. • For a detailed functional description see FB L_PCTRL_1.		
bPIDEnableInfluenceRamp BOOL C00701/15	Activate ramp for influencing factor	
	FALSE	Influencing factor of the PID controller is ramped down to "0".
	TRUE	Influencing factor of the PID controller is ramped up to the value *nPIDInfluence_a*.
bPIDIOff BOOL C00701/16	Switch off the I-component of the process controller • In conjunction with the operating mode set in C00242 (Lenze setting: "Off").	
	TRUE	I-component of the process controller is switched off.
nPIDVpAdapt_a INT C00700/6	Adaptation of gain Vp set in C00222 in percent • Scaling: 16384 ≡ 100 % • Internal limitation to ± 199.99 % • Changes can be done online.	
nPIDActValue_a INT C00700/7	Speed or actual sensor value (actual process value) • Scaling: 16384 ≡ 100 % • Internal limitation to ± 199.99 %	
nPIDInfluence_a INT C00700/8	Limitation of the influencing factor in percent • The influence factor of the PID controller can be limited to a certain value (-199.99% ... + 199.99%) via *nPIDInfluence_a*. • Scaling: 16384 ≡ 100 % • Internal limitation to ± 199.99 %	
nPIDSetValue_a INT C00700/9	Sensor setpoint or process setpoint for operating mode 2 • Scaling: 16384 ≡ 100 % • Internal limitation to ± 199.99 %	
bPIDInAct BOOL C00701/34 (from version 04.00.00)	Deactivate process controller temporarily (stop) • Changes can be done online.	
	TRUE	• The current output value is frozen. • The internal control algorithm is stopped. • However, a setpoint selected via input *nNSet_a* is still provided in operating modes 0/1/4/5.
bPIDOff BOOL C00701/35 (from version 04.00.00)	Reset the entire PID controller	
	TRUE	• The I component of the controller is set to zero. • The controller output is set to zero. • The internal control algorithm is stopped.
Holding brake control • In the Lenze setting, the holding brake control is deactivated. • The activation is executed by selecting the operating mode in C02580. • For a detailed function description see chapter entitled "Holding brake control".		
bBrkRelease BOOL C00701/19	Manual release of the brake in connection with the selected operating mode. • In the Lenze setting, this input is connected to the digital input DI5.	
	FALSE	Do not release the brake manually.
	TRUE	Release brake manually (forced release). • **Note!** The brake can also be released when the controller is inhibited! • During automatic operation, the internal brake logic is deactivated and the brake is released (supervisor operation). If a controller inhibit has been set by the brake control, it will be deactivated. • In semi-automatic operation, the brake is released including feedforward control.

outputs

Designator Data type	Value/meaning	
Drive control		
wDeviceStateWord WORD	Status word of the inverter (based on DSP-402) • The status word contains information on the currents status of the inverter. • In control mode "40: Network (MCI/CAN)" the status word is transmitted to the master control as process data word via the port block LP_Network_Out. • For a detailed description of the individual status bits, see subchapter entitled "Status word.	
wDeviceAuxStateWord WORD	Extended status word of the inverter	
wDetermFailNoLow WORD	Display of the current error (Low-Word)	
wDetermFailNoHigh WORD	Display of the current error (High-Word)	
bDriveFail BOOL	TRUE	Inverter in error status • "Fault" device status is active.
bDriveReady BOOL	TRUE	Inverter is ready for operation • "SwitchedOn" device status is active. • The drive is in this device status if the DC bus voltage is applied and the inverter is still inhibited by the user (controller inhibit).
bCInhActive BOOL	TRUE	Controller inhibit is active
bQSPIsActive BOOL	TRUE	Quick stop is active
bSafeTorqueOff BOOL	TRUE	"SafeTorqueOff" device state is active
bSafetyIsActive BOOL	TRUE	In preparation
bSpeedCcw BOOL	FALSE	Clockwise rotation (Cw)
	TRUE	Direction of rotation to the left (Ccw)
bSpeedSetReached BOOL	TRUE	Speed setpoint reached • From version 04.00.00 onwards, the hysteresis window for setting this status can be set in C00241. The reset hysteresis is permanently 0.5 %: 
bSpeedActEqSet BOOL	TRUE	Actual speed value has reached setpoint within hysteresis band
bNactCompare BOOL	TRUE	During open-loop operation: Speed setpoint < Comparison value (C00024)
		During closed-loop operation: Actual speed value < Comparison value (C00024)
bImaxActive BOOL	TRUE	The current setpoint is limited internally (the inverter operates at the maximum current limit)

Designator Data type	**Value/meaning**	
Motor control		
bHeatSinkWarning BOOL	TRUE	Heatsink overtemperature detected
bOVDetected BOOL	TRUE	Overvoltage detected
bDcBrakeOn BOOL	TRUE	DC-injection braking active
bFlyingSyncActive BOOL	TRUE	Flying restart function is executed
bSlpsmSpeedopenLoopControl BOOL	From version 10.00.00 The open-loop controlled operation of the SLPSM control mode is active. • Can be used, for instance, to activate flatter acceleration and deceleration ramps for SLPSM in open-loop controlled operation. Flat ramps in open-loop controlled operation and steep ramps in closed-loop controlled operation serve to achieve a considerably higher acceleration of the entire drive.	
	FALSE	Open-loop controlled operation of the SLPSM is active
	TRUE	Closed-loop controlled operation of the SLPSM is not active
nMotorFreqAct_a C00058 | INT	Current field frequency • Scaling: 16384 ≡ 100 % V/f base frequency (C00015)	
nOutputSpeedCtrl_a INT	Speed or slip controller output • Scaling: 16384 ≡ 100 % rated motor torque (C00097)	
nMotorSpeedAct_a C00051 | INT	Actual speed value • Scaling: 16384 ≡ 100 % reference speed (C00011)	
nMotorVoltage_a INT	Current motor voltage/inverter output voltage • Scaling: 16384 ≡ 1000 V	
nMotorVoltageSmoothed_a INT	Current smoothed/inverter output voltage • Scaling: 16384 ≡ 1000 V	
nDCVoltage_a INT	Current DC-bus voltage • Scaling: 16384 ≡ 1000 V	
nMotorCurrent_a INT	Actual motor current • Scaling: 16384 ≡ 100 % I_{max_mot} (C00022)	
nMotorTorqueAct_a C00056/2 | INT	Actual torque • With "VFC (+encoder)" motor control, this value is determined from the current motor current and corresponds to the actual torque only by approximation. • Scaling: 16384 ≡ 100 % M_{max} (C00057)	
nHeatsinktemperature_a INT	Heatsink temperature • Scaling: 0 ... 16384 ≡ 0 ... 80 °C • At sub-zero temperatures, the value "0" is output.	
Holding brake control • For a detailed function description see chapter entitled "Holding brake control".		
bBrkReleaseOut BOOL	Trigger signal for the motec-internal power output (terminals BR1 and BR2) for triggering the brake. • Use bit 0 in C02582 to activate inverted triggering of the power output. ▶ Functional settings	
	FALSE	Apply brake
	TRUE	Release brake
bBrkReleased BOOL	"Brake released" status signal considering the brake release time • When the holding brake is triggered to close, *bBrkReleased* is immediately reset to FALSE even if the brake closing time has not yet elapsed!	
	TRUE	Brake released (after the brake release time has expired)

7.2.2.1 wDriveControl control word

In control mode "40: Network (MCI/CAN)", the inverter is controlled by a master control (e.g. IPC) via the *wDriveControl* control word.

- The process data word received from the master control is provided to the application via the upstream port block LP_Network_In at the *wDriveControl* input.
- Display parameter: C00136/1
- The bit assignment of the control word can be obtained from the following table:

Bit	Name	Function
Bit 0	SwitchOn	1 ≡ Change to the "SwitchedOn" device status • This bit must be set in the control word to ensure that the device changes to the "SwitchedOn" device state after mains connection without the need for a master control specifying this bit via fieldbus.
Bit 1	DisableVoltage	1 ≡ Inhibit inverter control (IMP - pulse inhibit)
Bit 2	SetQuickStop	1 ≡ Activate quick stop (QSP). ▶ Activate/deactivate quick stop (📖 68)
Bit 3	EnableOperation	1 ≡ Enable inverter (RFR) • If control via terminals is performed, this bit must be set in the control word. Otherwise the controller is inhibited. ▶ Enable/inhibit inverter (📖 68)
Bit 4	ModeSpecific_1	Reserved (currently not assigned)
Bit 5	ModeSpecific_2	
Bit 6	ModeSpecific_3	
Bit 7	ResetFault	1 ≡ Reset fault (trip reset) • Acknowledge error message (if the error cause has been eliminated). ▶ Reset error (📖 69)
Bit 8	SetHalt	1 ≡ Activate stop function • Stop drive via stopping ramp (in preparation).
Bit 9	reserved_1	Reserved (currently not assigned)
Bit 10	reserved_2	
Bit 11	SetDCBrake	1 ≡ Activate DC-injection braking ▶ Manual DC-injection braking (DCB) (📖 174)
Bit 12	JogSpeed1	Activation of fixed speed 1 ... 3
Bit 13	JogSpeed2	
Bit 14	SetFail	1 ≡ Set error (trip set)
Bit 15	SetSpeedCcw	0 ≡ Direction of rotation to the right (Cw) 1 ≡ Direction of rotation to the left (Ccw)

7.2.2.2 Status word

In control mode "40: Network (MCI/CAN)", the status information is transmitted to the master control as process data via the port block LP_Network_Out.

The *LA_NCtrl.wDeviceStateWord* status word output by the device control includes all information relevant to the master control for controlling the inverter.

- Display parameter *LA_NCtrl.wDeviceStateWord*: C00150
- The bit assignment of the *LA_NCtrl.wDeviceStateWord* status word can be obtained from the following table.

Bit	Name	Status
Bit 0	FreeStatusBit0	Free status bit 0 (configurable in C00621/7) Not assigned in Lenze setting.
Bit 1	PowerDisabled	1 ≡ Inverter control inhibited (pulse inhibit is active)
Bit 2	FreeStatusBit2	Free status bit 2 (configurable in C00621/8) In Lenze setting pre-assigned with *LA_NCtrl_bImaxActive* signal: 1 ≡ The current setpoint is limited internally (the inverter operates at the maximum current limit)
Bit 3	FreeStatusBit3	Free status bit 3 (configurable in C00621/9) In the Lenze setting pre-assigned with *LA_NCtrl_bSpeedSetReached* signal: 1 ≡ Speed setpoint reached
Bit 4	FreeStatusBit4	Free status bit 4 (configurable in C00621/10) In the Lenze setting pre-assigned with *LA_NCtrl_bSpeedActEqSet* signal: 1 ≡ Actual speed value has reached the setpoint within one hysteresis band
Bit 5	FreeStatusBit5	Free status bit 5 (configurable in C00621/11) In the Lenze setting pre-assigned with *LA_NCtrl_bNActCompare* signal: • In case of the "Open loop" operation: 1 ≡ Speed setpoint < comparison value (C00024) • For "Closed loop" operation: 1 ≡ actual speed value < comparison value (C00024)
Bit 6	ActSpeedIsZero	1 ≡ Current speed is 0
Bit 7	ControllerInhibit	1 ≡ Inverter is inhibited (controller inhibit is active)
Bit 8	StatusCodeBit0	Bit coded display of the active device status ▶ Device state machine and device states (see table [4-1])
Bit 9	StatusCodeBit1	
Bit 10	StatusCodeBit2	
Bit 11	StatusCodeBit3	
Bit 12	Warning	1 ≡ A warning exists.
Bit 13	Trouble	1 ≡ Inverter is in the "Trouble" device status • E.g. if an overvoltage has occurred.
Bit 14	FreeStatusBit14	Free status bit 14 (configurable in C00621/12) In the Lenze setting pre-assigned with *LA_NCtrl_bSpeedCcw* signal: 0 ≡ Clockwise direction of rotation (Cw), 1 ≡ Counter-clockwise direction of rotation (Ccw)
Bit 15	FreeStatusBit15	Free status bit 15 (configurable in C00621/13) In Lenze setting pre-assigned with *LA_NCtrl_bDriveReady* signal: 1 ≡ Inverter is ready for operation

7.2.3 Terminal assignment of the control modes

The following table shows which functions are assigned to the digital terminals in the different control modes.

Control mode	Assignment of the digital terminals						Relay output
	DI1	DI2	DI3	DI4	DI5	DO1	NO / COM
Local mode (see mounting instructions)	Setpoint of P2	Preset setpoint 2	Manual DC-injection braking	Change of direction of rotation [1]	Release holding brake manually [2]	Status "Drive is ready to start" [3]	Status "An error has occurred" [3]
	Preset setpoint 3						
Terminals 0	Preset setpoint 1	Preset setpoint 2	Manual DC-injection braking	Change of direction of rotation		Status "Drive is ready to start"	Status "An error has occurred"
	Preset setpoint 3						
Terminals 2	Preset setpoint 1	Preset setpoint 2	Quick stop	Change of direction of rotation			
	Preset setpoint 3						
Terminals 11	Change of direction of rotation	Manual DC-injection braking	MPotUp	MPotDown			
Terminal 16	Preset setpoint 1	Preset setpoint 2	Cw/QSP	Ccw/QSP			
	Preset setpoint 3						
Network (MCI/CAN)	Quick stop	-	-				
Network (AS-i)	-	-	-	-			

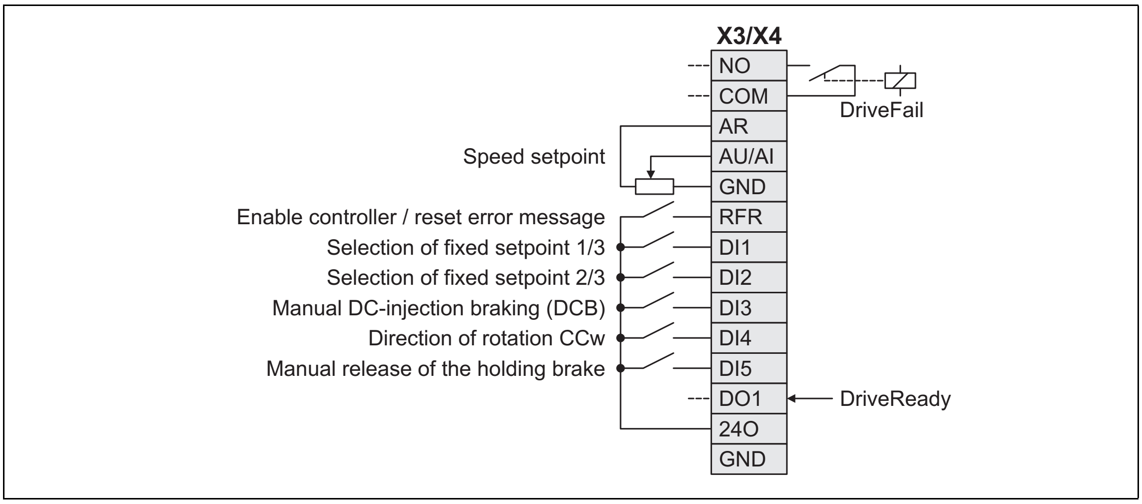
[1] If the direction of rotation is permanently set to "left" via DIP1/switch 2, DI4 has no influence in local mode.
[2] In the Lenze setting, the brake control is switched off (not active). ➞ Set operating mode in C02580.
[3] Applies to the setting DIP1/switch 8 = "OFF". If DIP1/switch 8 = "ON", both status signals have been interchanged.

Abbreviations used:	
MPotUp	Motor potentiometer: Increase speed
MPotDown	Motor potentiometer: Reduce speed
Cw/QSP	Fail-safe selection of the direction of rotation in connection with quick stop (Cw = clockwise rotation; Ccw = counter-clockwise rotation)
Ccw/QSP	

Related topics:

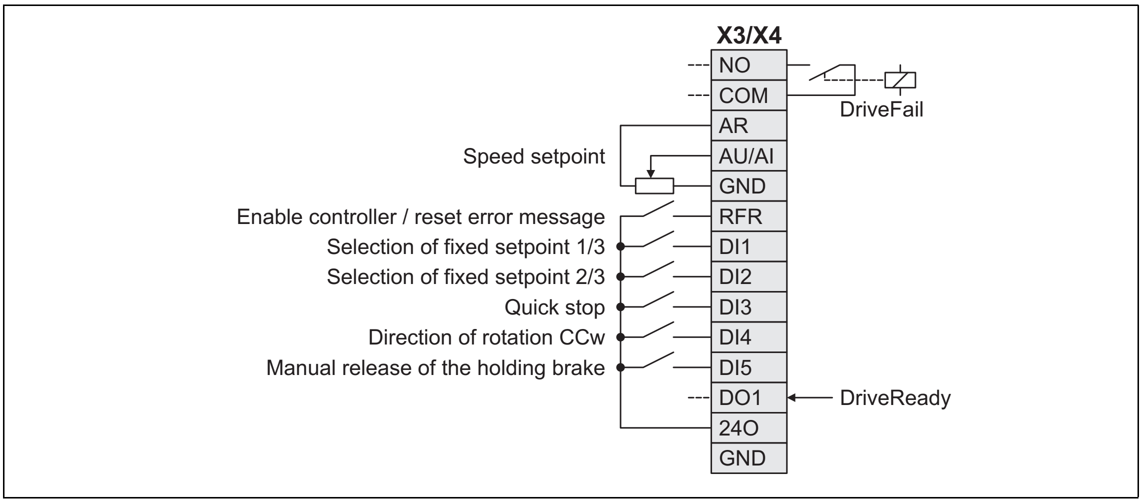
- User-defined terminal assignment (📖 217)
- Control mode "Network (MCI/CAN)" (📖 353)

7.2.3.1 Terminals 0



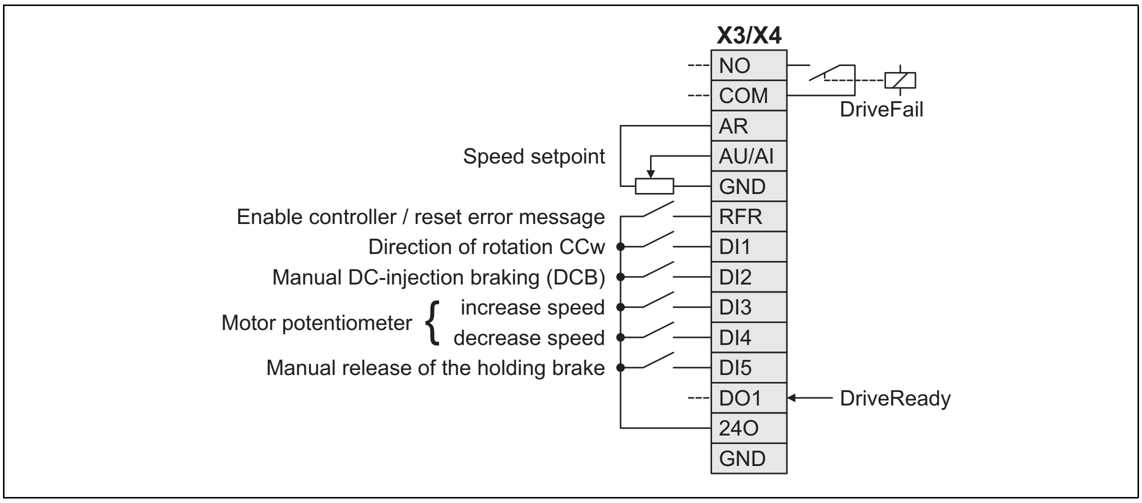
Connection	Assignment		Connection	Assignment
DI1	LA_NCtrl.bJogSpeed1		**RFR**	LA_NCtrl.bFailReset
DI2	LA_NCtrl.bJogSpeed2		**AU/AI**	LA_NCtrl.nMainSetValue_a 10 V ≡ 100 % reference speed (C00011)
DI3	LA_NCtrl.bSetDCBrake			
DI4	LA_NCtrl.bSetSpeedCcw		**NO, COM**	LA_NCtrl.bDriveFail
DI5	LA_NCtrl.bBrkRelease		**DO1**	LA_NCtrl.bDriveReady

7.2.3.2 Terminals 2



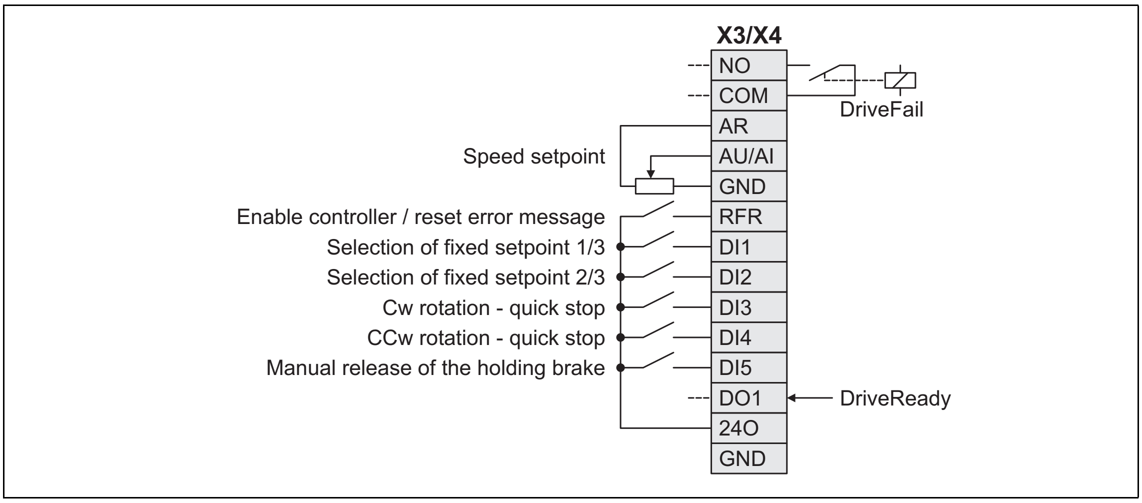
Connection	Assignment		Connection	Assignment
DI1	LA_NCtrl.bJogSpeed1		**RFR**	LA_NCtrl.bFailReset
DI2	LA_NCtrl.bJogSpeed2		**AU/AI**	LA_NCtrl.nMainSetValue_a 10 V ≡ 100 % reference speed (C00011)
DI3	LA_NCtrl.bSetQuickstop			
DI4	LA_NCtrl.bSetSpeedCcw		**NO, COM**	LA_NCtrl.bDriveFail
DI5	LA_NCtrl.bBrkRelease		**DO1**	LA_NCtrl.bDriveReady

7.2.3.3 Terminals 11



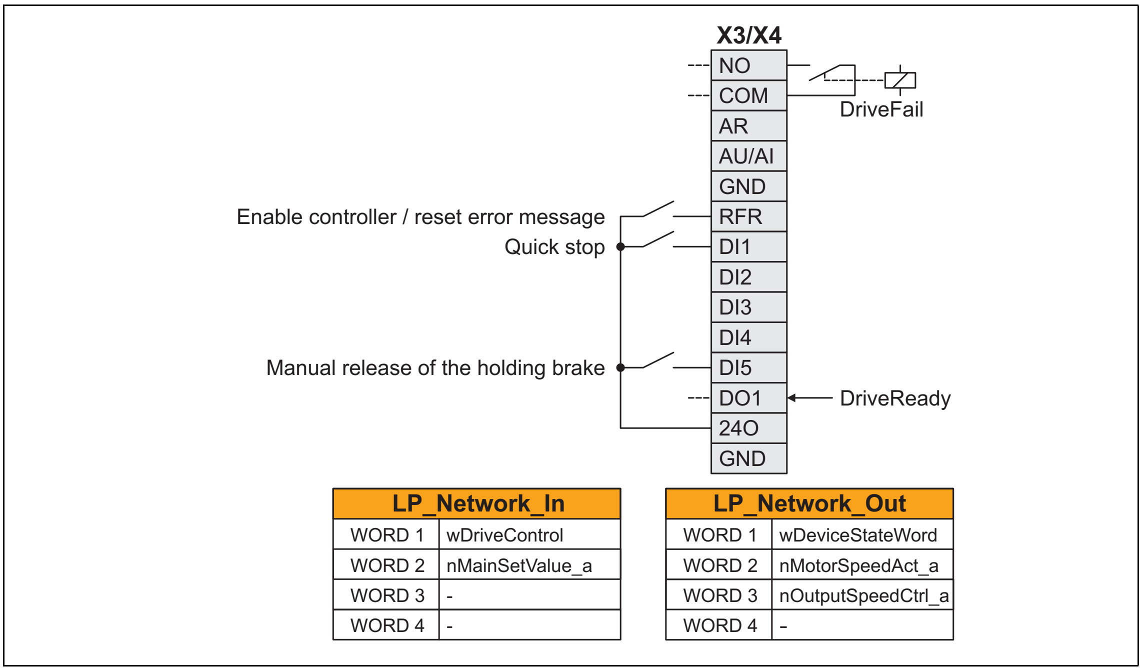
Connection	Assignment		Connection	Assignment
DI1	LA_NCtrl.bSetSpeedCcw		**RFR**	LA_NCtrl.bFailReset
DI2	LA_NCtrl.bSetDCBrake		**AU/AI**	LA_NCtrl.nMainSetValue_a 10 V ≡ 100 % reference speed (C00011)
DI3	LA_NCtrl.bMPotUp			
DI4	LA_NCtrl.bMPotDown		**NO, COM**	LA_NCtrl.bDriveFail
DI5	LA_NCtrl.bBrkRelease		**DO1**	LA_NCtrl.bDriveReady

7.2.3.4 Terminal 16



Connection	Assignment		Connection	Assignment
DI1	LA_NCtrl.bJogSpeed1		**RFR**	LA_NCtrl.bFailReset
DI2	LA_NCtrl.bJogSpeed2		**AU/AI**	LA_NCtrl.nMainSetValue_a 10 V ≡ 100 % reference speed (C00011)
DI3	LA_NCtrl.bRLQCw			
DI4	LA_NCtrl.bRLQCcw		**NO, COM**	LA_NCtrl.bDriveFail
DI5	LA_NCtrl.bBrkRelease		**DO1**	LA_NCtrl.bDriveReady

7.2.3.5 Network (MCI/CAN)



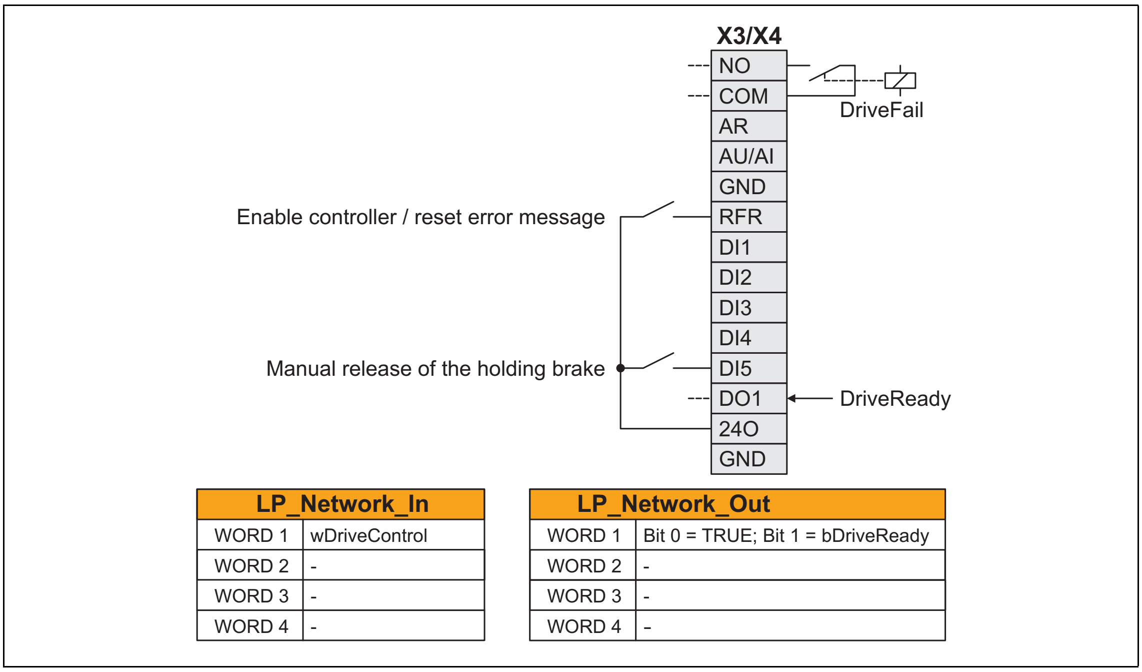
Connection	Assignment		Connection	Assignment
DI1	LA_NCtrl.SetQuickstop		**RFR**	LA_NCtrl.bFailReset
DI2	-		**AU/AI**	-
DI3	-			
DI4	-		**NO, COM**	LA_NCtrl.bDriveFail
DI5	LA_NCtrl.bBrkRelease		**DO1**	LA_NCtrl.bDriveReady

Preconfigured wiring of the internal interfaces in the control mode "Network (MCI/CAN)" is shown in chapter [7.2.5.4]. (🕮 252)

Related topics:

- wDriveControl control word (🕮 238)
- Status word (🕮 238)
- Communication (🕮 351)
- Control mode "Network (MCI/CAN)" (🕮 353)

7.2.3.6 Network (AS-i)



LP_Network_In	
WORD 1	wDriveControl
WORD 2	-
WORD 3	-
WORD 4	-

LP_Network_Out	
WORD 1	Bit 0 = TRUE; Bit 1 = bDriveReady
WORD 2	-
WORD 3	-
WORD 4	-

Connection	Assignment		Connection	Assignment
DI1	-		**RFR**	LA_NCtrl.bFailReset
DI2	-		**AU/AI**	-
DI3	-			
DI4	-		**NO, COM**	LA_NCtrl.bDriveFail
DI5	LA_NCtrl.bBrkRelease		**DO1**	LA_NCtrl.bDriveReady

Preconfigured wiring of the internal interfaces in the "Network (AS-i)" control mode is shown in chapter [7.2.5.5]. (🕮 253)

Related topics:

- wDriveControl control word (🕮 238)
- Status word (🕮 238)
- Communication (🕮 351)

7.2.4 Setting parameters (short overview)

Parameters	**Information**	**Lenze setting**	
		Value	Unit
C00012	Accel. time - main setpoint	2.0	s
C00013	Decel. time - main setpoint	2.0	s
C00182	S-ramp time PT1	20.00	s
C00134	Ramp smoothing main setpoint	0: Off	
C00019	Auto-DCB: Threshold	3	rpm
C00036	DCB: Current	50.0	%
C00039/1	Preset setpoint 1	40.0	%
C00039/2	Preset setpoint 2	60.0	%
C00039/3	Preset setpoint 3	80.0	%
C00105	Decel. time - quick stop	5.0	s
C00106	Auto-DCB: Hold time	0.5	s
C00107	DCB: Hold time	999.0	s
C00222	L_PCTRL_1: Vp	1.0	
C00223	L_PCTRL_1: Tn	400	ms
C00224	L_PCTRL_1: Kd	0.0	
C00225	L_PCTRL_1: MaxLimit	199.9	%
C00226	L_PCTRL_1: MinLimit	-199.9	%
C00227	L_PCTRL_1: Acceleration time	0.1	s
C00228	L_PCTRL_1: Deceleration time	0.1	s
C00231/1	L_PCTRL_1: Pos. maximum	199.9	%
C00231/2	L_PCTRL_1: Pos. minimum	0.0	%
C00231/3	L_PCTRL_1: Neg. minimum	0.0	%
C00231/4	L_PCTRL_1: Neg. maximum	199.9	%
C00233	L_PCTRL_1: Root function	0: Off	
C00242	L_PCTRL_1: Operating mode	0: Off	
C00243	L_PCTRL_1: Accel. time influence	5.0	s
C00244	L_PCTRL_1: Deceleration time influence	5.0	s
C00245	L_PCTRL_1: PID output value	-	%
C00246	L_PCTRL_1: nAct_a internal	-	%
C00800	L_MPot_1: Upper limit	100.0	%
C00801	L_MPot_1: Lower limit	-100.0	%
C00802	L_MPot_1: Acceleration time	10.0	s
C00803	L_MPot_1: Deceleration time	10.0	s
C00804	L_MPot_1: Inactive fct.	0: Retain value	
C00805	L_MPot_1: Init fct.	0: Load last value	
C00806	L_MPot_1: Use	0: No	

7.2.5 Pre-assignment of the application

7.2.5.1 Input connections

Control modes 10 / 12 / 14 / 16 for control via terminals

Config. parameter	Designator	Control mode			
		10: Terminals 0 see chapter [7.2.5.3]	12: Terminals 2	14: Terminals 11	16: Terminals 16
C700/1	nMainSetValue_a	AU	AU	AU	AU
C700/2	nTorqueMotLim_a	C472/3	C472/3	C472/3	C472/3
C700/3	nTorqueGenLim_a	C472/3	C472/3	C472/3	C472/3
C700/4	Key-operated switch: Max. speed	Poti P1	Poti P1	Poti P1	Poti P1
C700/5	Network(MCI/CAN)_wDriveControl	0x0009	0x0009	0x0009	0x0009
C700/6	nPIDVpAdapt_a	100 %	100 %	100 %	100 %
C700/7	nPIDActValue_a	-	-	-	-
C700/8	nPIDInfluence_a	100 %	100 %	100 %	100 %
C700/9	nPIDSetValue_a	-	-	-	-
C700/10	Reserved	-	-	-	-
C700/11	L_Counter_1: wLdVal	-	-	-	-
C700/12	L_Counter_1: wCmpVal	-	-	-	-
C700/13	L_Compare_1: nIn1_a	-	-	-	-
C700/14	L_Compare_1: nIn2_a	-	-	-	-
C700/15	LS_ParReadWrite_1: wParIndex	-	-	-	-
C700/16	LS_ParReadWrite_1: wParSubindex	-	-	-	-
C700/17	LS_ParReadWrite_1: wInHWord	-	-	-	-
C700/18	LS_ParReadWrite_1: wInLWord	-	-	-	-
C700/19	Reserved	-	-	-	-
C701/1	bCInh	-	-	-	-
C701/2	bFailReset	RFR	RFR	RFR	RFR
C701/3	bSetQuickstop	-	DI3	-	-
C701/4	bSetDCBrake	DI3	-	DI2	-
C701/5	bSetSpeedCcw	DI4	DI4	DI1	-
C701/6	bJogSpeed1	DI1	DI1	-	DI1
C701/7	bJogSpeed2	DI2	DI2	-	DI2
C701/8	bMPotUp	-	-	DI3	-
C701/9	bMPotDown	-	-	DI4	-
C701/10	bMPotInAct	-	-	-	-
C701/11	bMPotEnable	-	-	TRUE	-
C701/12	bRFG_0	-	-	-	-
C701/13	bSetError1	-	-	-	-
C701/14	bSetError2	-	-	-	-
C701/15	bPIDInfluenceRamp	TRUE	TRUE	TRUE	TRUE
C701/16	bPIDIOff	-	-	-	-
C701/17	bRLQCw	TRUE	TRUE	TRUE	DI3
C701/18	bRLQCcw	-	-	-	DI4
C701/19	bBrkRelease	DI5	DI5	DI5	DI5
C701/20	L_Counter_1: bClkUp	-	-	-	-
C701/21	L_Counter_1: bClkDown	-	-	-	-
C701/22	L_Counter_1: bLoad	-	-	-	-
C701/23	L_DigitalDelay_1: bIn	-	-	-	-
C701/24	L_DigitalDelay_2: bIn	-	-	-	-
C701/25	LS_WriteParamList: bExecute	-	-	-	-

C701/23	L_DigitalDelay_1: bIn	-	-	-	-
C701/24	L_DigitalDelay_2: bIn	-	-	-	-
C701/25	LS_WriteParamList: bExecute	-	-	-	-

Control mode 40 / 41 for control via network

Config. parameter	**Designator**	**Control mode**	
		40: Network (MCI/CAN) see chapter [7.2.5.4]	41: Network (AS-i) see chapter [7.2.5.5]
C701/13	bSetError1	-	-
C701/14	bSetError2	-	-
C701/15	bPIDInfluenceRamp	TRUE	TRUE
C701/16	bPIDIOff	-	-
C701/17	bRLQCw	TRUE	PDO1/Bit 2
C701/18	bRLQCcw	-	PDO1/Bit 3
C701/19	bBrkRelease	DI5	DI5
C701/20	L_Counter_1: bClkUp	-	-
C701/21	L_Counter_1: bClkDown	-	-
C701/22	L_Counter_1: bLoad	-	-
C701/23	L_DigitalDelay_1: bIn	-	-
C701/24	L_DigitalDelay_2: bIn	-	-
C701/25	LS_WriteParamList: bExecute	-	-
C701/26	LS_WriteParamList: bSelectWriteValue_1	-	-
C701/27	Reserved	-	-
C701/28	L_DigitalLogic_1: bIn1	-	-
C701/29	L_DigitalLogic_1: bIn2	-	-
C701/30	L_DigitalLogic_2: bIn1	-	-
C701/31	L_DigitalLogic_2: bIn2	-	-
C701/32	LS_ParReadWrite_1: bExecute	-	-
C701/33	LS_ParReadWrite_1: bReadWrite	-	-
C701/34	bPIDInAct	-	-
C701/35	bPIDOff	-	-

7.2.5.2 Output connections

Control modes 10 / 12 / 14 / 16 for control via terminals

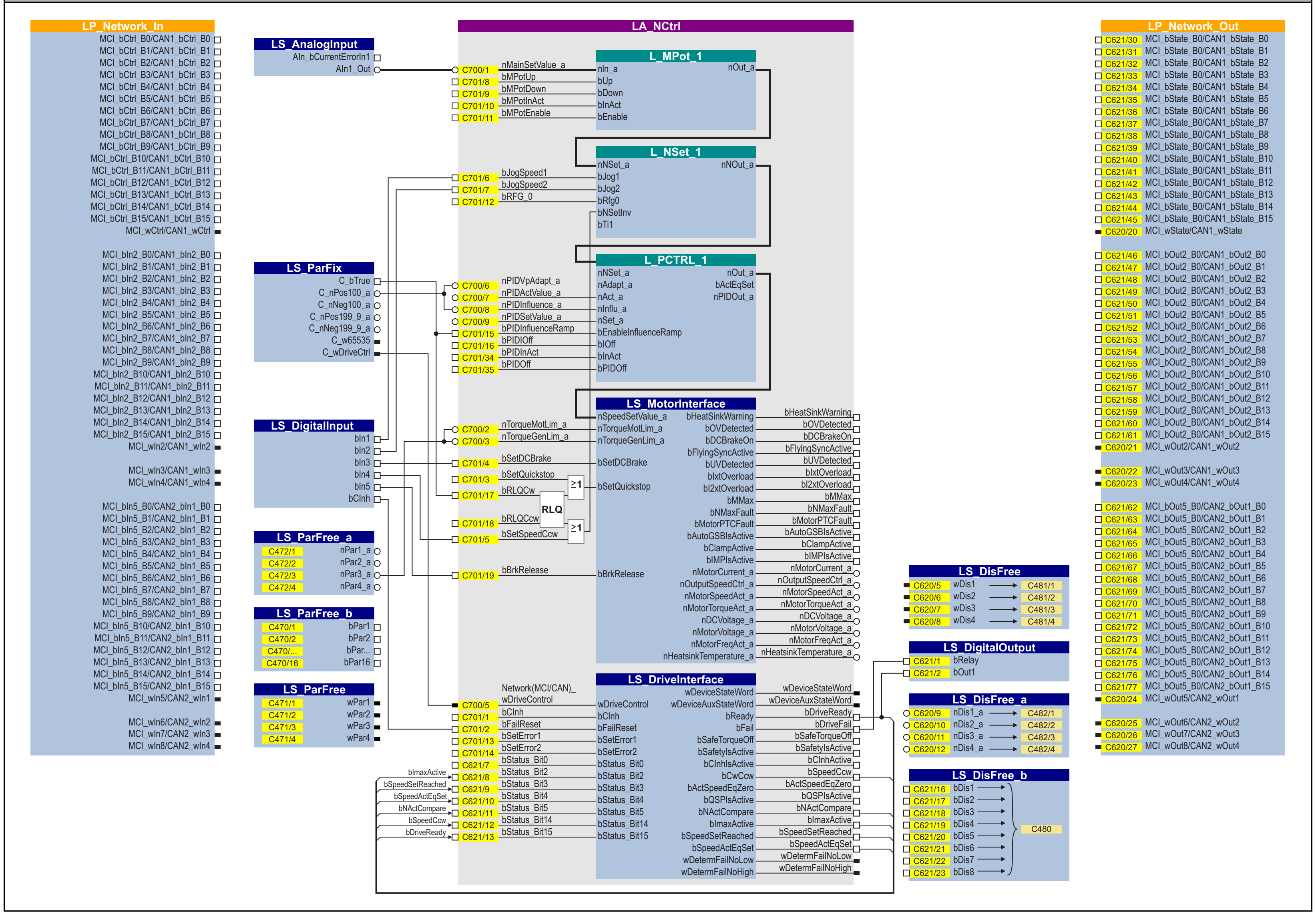
Config. parameter	Designator	Control mode	
		10: Terminals 0 see chapter [7.2.5.3]	12: Terminals 2 14: Terminals 11 16: Terminals 16
C620/5	LS_DisFree: wDis1 (➞C481/1)	-	-
C620/6	LS_DisFree: wDis2 (➞C481/2)	-	-
C620/7	LS_DisFree: wDis3 (➞C481/3)	-	-
C620/8	LS_DisFree: wDis4 (➞C481/4)	-	-
C620/9	LS_DisFree_a: nDis1_a (➞C482/1)	-	-
C620/10	LS_DisFree_a: nDis2_a (➞C482/2)	-	-
C620/11	LS_DisFree_a: nDis3_a (➞C482/3)	-	-
C620/12	LS_DisFree_a: nDis4_a (➞C482/4)	-	-
C620/20	LP_Network_Out: MCI_wState/CAN1_wState	-	-
C620/21	LP_Network_Out: MCI_wOut2/CAN1_wOut2	-	-
C620/22	LP_Network_Out: MCI_wOut3/CAN1_wOut3	-	-
C620/23	LP_Network_Out: MCI_wOut4/CAN1_wOut4	-	-
C620/24	LP_Network_Out: MCI_wOut5/CAN2_wOut1	-	-
C620/25	LP_Network_Out: MCI_wOut6/CAN2_wOut2	-	-
C620/26	LP_Network_Out: MCI_wOut7/CAN2_wOut3	-	-
C620/27	LP_Network_Out: MCI_wOut8/CAN2_wOut4	-	-
C621/1	LS_DigitalOutput: bRelay	bDriveFail	bDriveFail
C621/2	LS_DigitalOutput: bOut1 (DO1)	bDriveReady	bDriveReady
C621/7	LA_NCtrl: bStatusBit0	-	-
C621/8	LA_NCtrl: bStatusBit2	bImaxActive	bImaxActive
C621/9	LA_NCtrl: bStatusBit3	bSpeedSetReached	bSpeedSetReached
C621/10	LA_NCtrl: bStatusBit4	bSpeedActEqSet	bSpeedActEqSet
C621/11	LA_NCtrl: bStatusBit5	bNactCompare	bNactCompare
C621/12	LA_NCtrl: bStatusBit14	bSpeedCcw	bSpeedCcw
C621/13	LA_NCtrl: bStatusBit15	bDriveReady	bDriveReady
C621/16	LS_DisFree_b: bDis1 (➞C480/Bit0)	-	-
C621/17	LS_DisFree_b: bDis2 (➞C480/Bit1)	-	-
C621/18	LS_DisFree_b: bDis3 (➞C480/Bit2)	-	-
C621/19	LS_DisFree_b: bDis4 (➞C480/Bit3)	-	-
C621/20	LS_DisFree_b: bDis5 (➞C480/Bit4)	-	-
C621/21	LS_DisFree_b: bDis6 (➞C480/Bit5)	-	-
C621/22	LS_DisFree_b: bDis7 (➞C480/Bit6)	-	-
C621/23	LS_DisFree_b: bDis8 (➞C480/Bit7)	-	-
C621/30	LP_Network_Out: MCI_bState/CAN1_bState_B0	-	-
C621/31	LP_Network_Out: MCI_bState/CAN1_bState_B1	-	-
C621/32...45	LP_Network_Out: MCI_bState/CAN1_bState_B2 ... B15	-	-
C621/46...61	LP_Network_Out: MCI_bOut2/CAN1_bOut2_B0 ... B15	-	-
C621/62...77	LP_Network_Out: MCI_bOut5/CAN2_bOut1_B0 ... B15	-	-

Control mode 40 / 41 for control via network

Config. parameter	Designator	Control mode	
		40: Network (MCI/CAN) see chapter [7.2.5.4]	41: Network (AS-i) see chapter [7.2.5.5]
C620/5	LS_DisFree: wDis1 (→C481/1)	-	-
C620/6	LS_DisFree: wDis2 (→C481/2)	-	-
C620/7	LS_DisFree: wDis3 (→C481/3)	-	-
C620/8	LS_DisFree: wDis4 (→C481/4)	-	-
C620/9	LS_DisFree_a: nDis1_a (→C482/1)	-	-
C620/10	LS_DisFree_a: nDis2_a (→C482/2)	-	-
C620/11	LS_DisFree_a: nDis3_a (→C482/3)	-	-
C620/12	LS_DisFree_a: nDis4_a (→C482/4)	-	-
C620/20	LP_Network_Out: MCI_wState/CAN1_wState	wDeviceStateWord	-
C620/21	LP_Network_Out: MCI_wOut2/CAN1_wOut2	nMotorSpeedAct_a	-
C620/22	LP_Network_Out: MCI_wOut3/CAN1_wOut3	nMotorSpeedSet_a	-
C620/23	LP_Network_Out: MCI_wOut4/CAN1_wOut4	-	-
C620/24	LP_Network_Out: MCI_wOut5/CAN2_wOut1	-	-
C620/25	LP_Network_Out: MCI_wOut6/CAN2_wOut2	-	-
C620/26	LP_Network_Out: MCI_wOut7/CAN2_wOut3	-	-
C620/27	LP_Network_Out: MCI_wOut8/CAN2_wOut4	-	-
C621/1	LS_DigitalOutput: bRelay	bDriveFail	bDriveFail
C621/2	LS_DigitalOutput: bOut1 (DO1)	bDriveReady	bDriveReady
C621/7	LA_NCtrl: bStatusBit0	-	-
C621/8	LA_NCtrl: bStatusBit2	bImaxActive	bImaxActive
C621/9	LA_NCtrl: bStatusBit3	bSpeedSetReached	bSpeedSetReached
C621/10	LA_NCtrl: bStatusBit4	bSpeedActEqSet	bSpeedActEqSet
C621/11	LA_NCtrl: bStatusBit5	bNactCompare	bNactCompare
C621/12	LA_NCtrl: bStatusBit14	bSpeedCcw	bSpeedCcw
C621/13	LA_NCtrl: bStatusBit15	bDriveReady	bDriveReady
C621/16	LS_DisFree_b: bDis1 (→C480/Bit0)	-	-
C621/17	LS_DisFree_b: bDis2 (→C480/Bit1)	-	-
C621/18	LS_DisFree_b: bDis3 (→C480/Bit2)	-	-
C621/19	LS_DisFree_b: bDis4 (→C480/Bit3)	-	-
C621/20	LS_DisFree_b: bDis5 (→C480/Bit4)	-	-
C621/21	LS_DisFree_b: bDis6 (→C480/Bit5)	-	-
C621/22	LS_DisFree_b: bDis7 (→C480/Bit6)	-	-
C621/23	LS_DisFree_b: bDis8 (→C480/Bit7)	-	-
C621/30	LP_Network_Out: MCI_bState/CAN1_bState_B0	-	TRUE
C621/31	LP_Network_Out: MCI_bState/CAN1_bState_B1	-	bDriveReady
C621/32...45	LP_Network_Out: MCI_bState/CAN1_bState_B2 ... B15	-	-
C621/46...61	LP_Network_Out: MCI_bOut2/CAN1_bOut2_B0 ... B15	-	-
C621/62...77	LP_Network_Out: MCI_bOut5/CAN2_bOut1_B0 ... B15	-	-

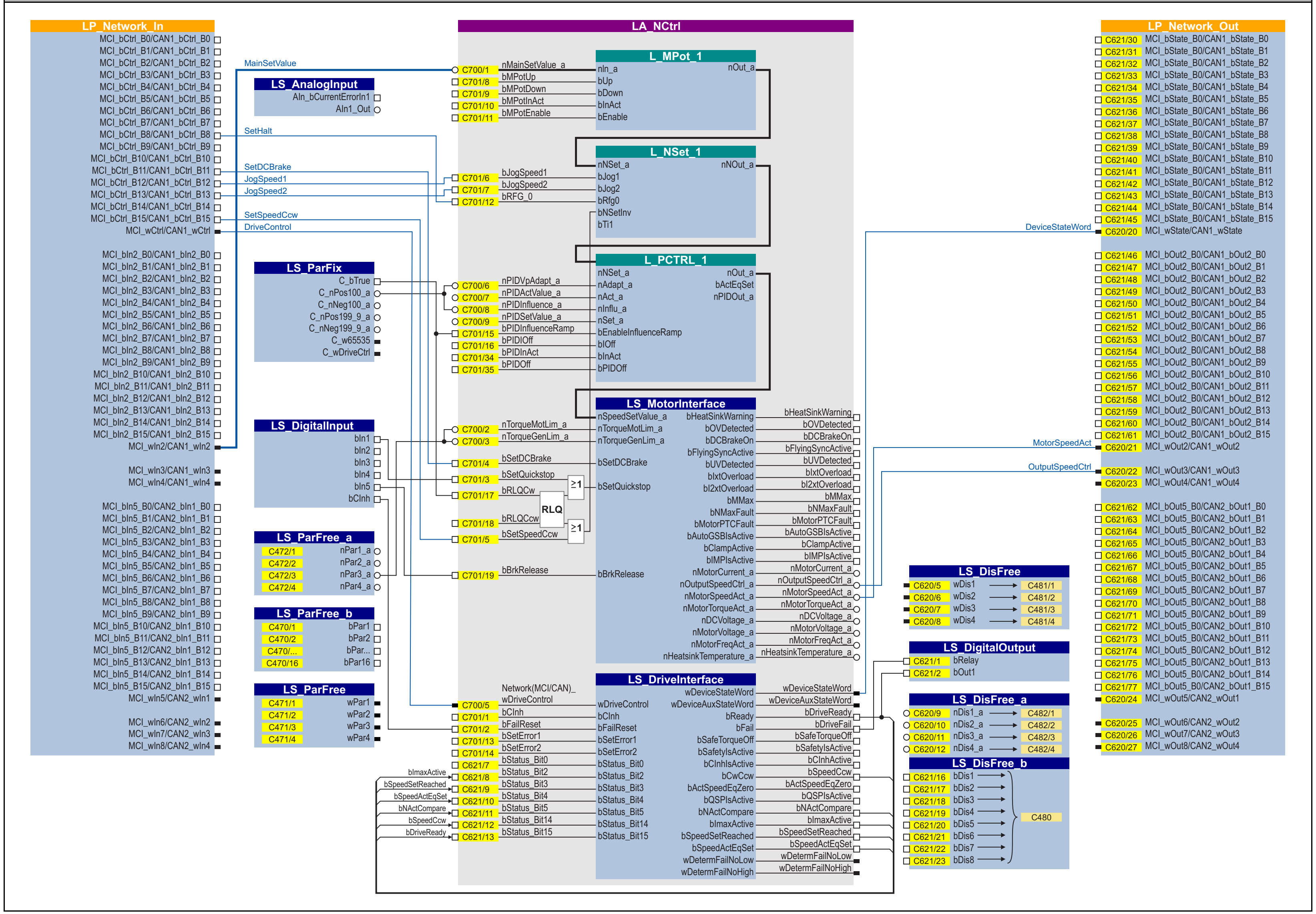
7.2.5.3 Internal signal flow for control via terminals

Wiring of the internal interfaces in the Lenze setting (control mode "10: Terminals 0")



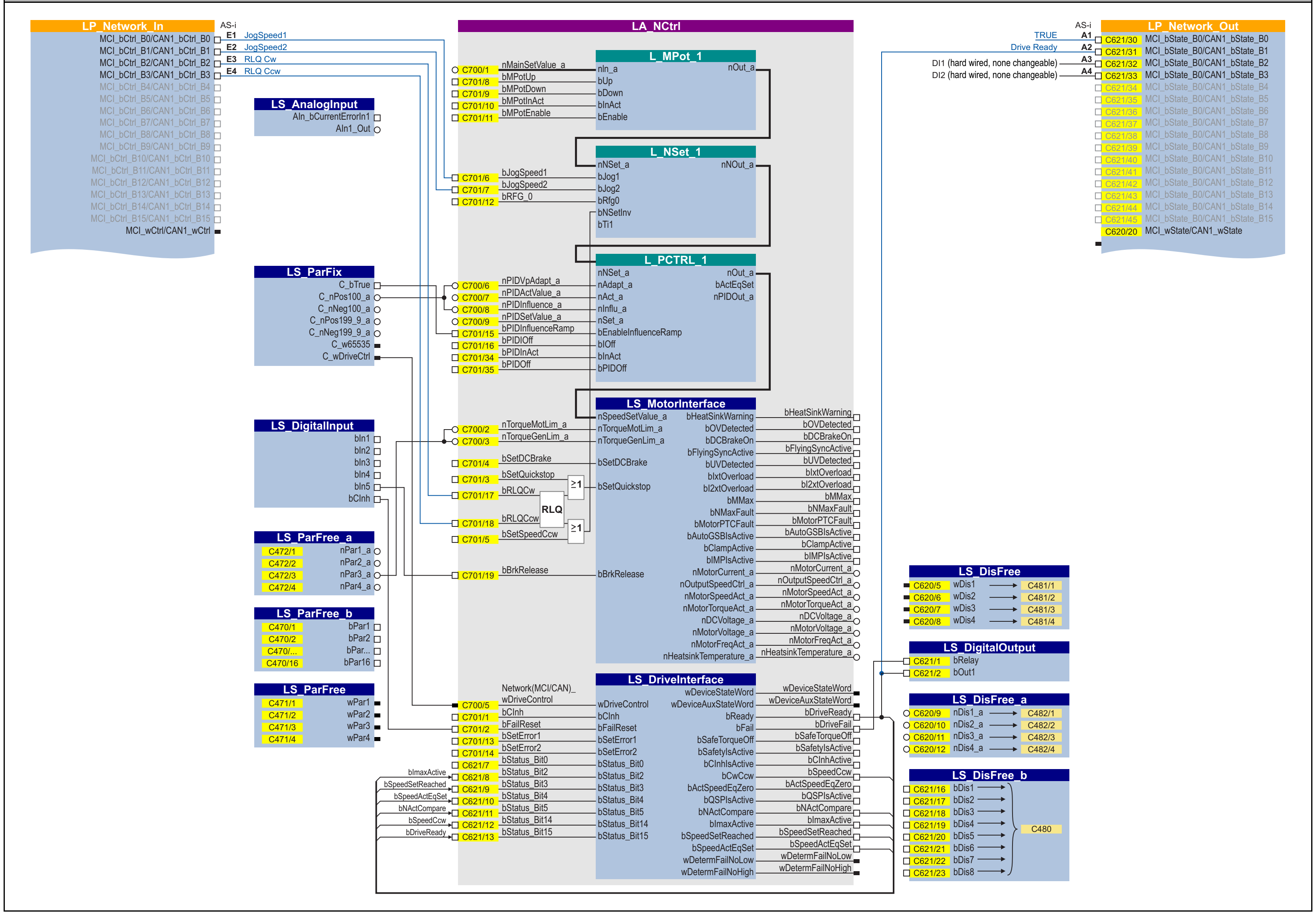
7.2.5.4 Internal signal flow for control via network (MCI/CAN)

Wiring of the internal interfaces for control via communication interface (control mode "40: Network (MCI/CAN)")



7.2.5.5 Internal signal flow for control via network (AS-i)

Wiring of the internal interfaces for control via communication interface (control mode "41: Network (AS-i)")



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to present the following information more clearly.

7.3 TA "Actuating drive speed (AC Drive Profile)"

This function extension is only available from version 04.01.00!

The EtherNet/IP™ Communication Unit supports the "AC Drive Profile".

When you use the Communication Unit EtherNet/IP™, set the "AC Drive Profile" application. The process data word received by the master control is then interpreted as "AC Drive Profile" control word.

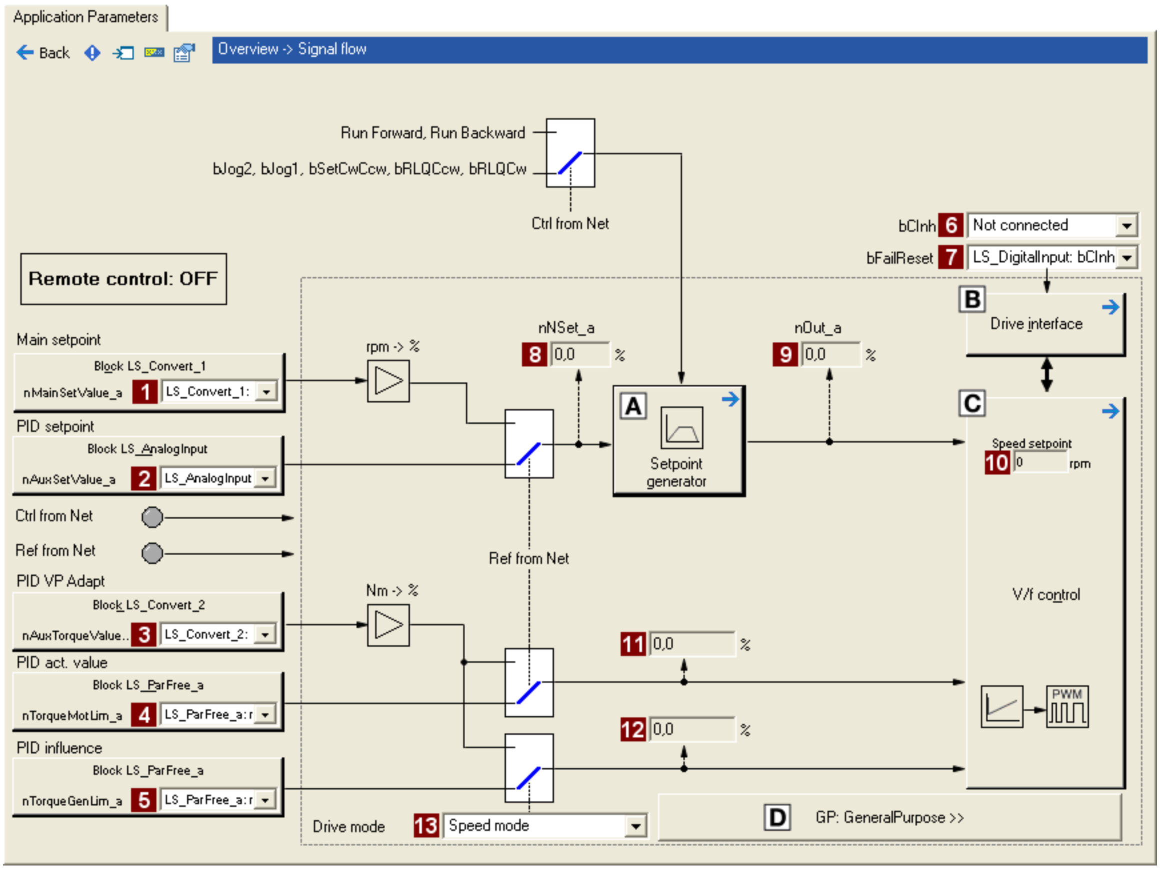
- The setting to be made for this in C00005 depends on the firmware:

8400 motec	Communication Unit EtherNet/IP™	Setting required in C00005:
Version 04.01.00	Version 01.01	"9000: AC Drive Profile"
	Version 01.02	"1100: Speed actuating drive (AC Drive Profile)" (recommendation) or "9000: AC Drive Profile"
From version 05.00.00	From version 01.01	"1100: Speed actuating drive (AC Drive Profile)" or "9000: AC Drive Profile" ("1100" is always set)

Detailed information on the "AC Drive Profile" can be found in the EtherNet/IP™ communication manual.

7.3.1 Basic signal flow

When you go to the **Application parameters** tab to the top dialog level *Overview* and click the **Signal flow** button, you will get one dialog level down to the signal flow of the application (here displayed with the preset control mode "Terminals 0"):



bCInh 6 Not connected
bFailReset 7 LS_DigitalInput: bCInh
nMainSetValue_a 1 LS_Convert_1:
nAuxSetValue_a 2 LS_AnalogInput
nAuxTorqueValue.. 3 LS_Convert_2:
nTorqueMotLim_a 4 LS_ParFree_a:r
nTorqueGenLim_a 5 LS_ParFree_a:r
8 0,0 %
9 0,0 %
10 0 rpm
11 0,0 %
12 0,0 %
Drive mode 13 Speed mode

A Setpoint generator (L_NSet_1)
B Device control (LS_DriveInterface)
C Motor control (MCTRL)
D "GeneralPurpose" functions

All input and output interfaces of the application are described in the subchapter entitled "Interface description" of the "speed actuating drive" application. (🕮 232)

Configuration parameters for digital control signals:

Parameters	Selection of signal source (Lenze setting)	for control signal:
6 **bCInh** (C00701/1)	0: Not connected	Enable/inhibit inverter
7 **bFailReset** (C00701/2)	10: LS_DigitalInput: bCinh	Reset error message

Configuration parameters for analog setpoints:

Parameters	Selection of signal source (Lenze setting)	for setpoint selection:
1 **nMainSetValue_a** (C00700/1)	80: LS_Convert_1: Out1	Main setpoint via fieldbus (Ref from Net) • 100 % ≡ reference speed (C00011)
2 **nAuxSetValue_a** (C00700/10)	10: LS_AnalogInput: nIn1_a	Local main setpoint • 100 % ≡ reference speed (C00011)
3 **nAuxTorqueValue_a** (C00700/19)	82: LS_Convert_2: Out1	Torque setpoint via fieldbus (Ref from Net)
4 **nTorqueMotLim_a** (C00700/2)	22: LS_ParFree_a: nC472_3_a	Torque limitation in motor mode
5 **nTorqueGenLim_a** (C00700/3)	23: LS_ParFree_a: nC472_4_a	Torque limitation in generator mode

Setting parameters:

Parameters	Lenze setting	for setpoint selection:
13 **Drive mode** (C01350/1)	1: Speed mode	This parameter is set by the EtherNet/IP™ Communication Unit and should not be written by the user.

Display parameter:

Parameters	Information
8 **nNset_a** (C00830/1)	Input value of setpoint generator • 100 % ≡ reference speed (C00011)
9 **nOut_a** (C00830/2)	Output value of setpoint generator • 100 % ≡ reference speed (C00011)
10 **Speed setpoint** (C00050)	Speed setpoint for motor control • 100 % ≡ reference speed (C00011)
11 **nTorqueMotLimit_a** (C00830/4)	Torque limitation in motor mode • 100 % ≡ maximum torque (C00057)
12 **nTorqueGenLimit_a** (C00830/5)	Torque limitation in generator mode • 100 % ≡ maximum torque (C00057)

7.3.2 Scaling of the speed and torque values (Ref from Net)

Scaling of the speed values

On the bus side, the speed setpoint is defined in [rpm]. In the inverter, however, all speed-related signals are processed as a percentage with regard to a reference variable (C00011). For the scaling required in this case, the LS_Convert_1 system block is used (also see Internal signal flow).

- The type of conversion can be adapted in C01354/2.
- A conversion of [rpm] to [%] is preset for the "AC Drive Profile" application according to the following formula.
- Optionally, an additional scaling can be executed via a scaling factor adjustable in C01353/1.

Note!

The scaling parameterisable via C01353/1 is carried out as "Shift Operation". Overflows are not absorbed!

Equation for scaling the speed setpoint

$$\text{Speed setpoint}_{\text{Application}} = \text{Speed setpoint}_{\text{Bus}}\,[\text{rpm}] \cdot \frac{16384}{\text{Reference speed [rpm]}} \cdot \frac{1}{2^{\text{Scaling factor}}}$$

Parameters	Name	Description
C00011	Appl.: Reference speed	Reference variable for speed-related signals
C01353/1	ACDrive: Speed scaling	Scaling factor (-128 ... 127) • In the Lenze setting "0", no scaling takes place ($2^0 = 1$)

Arithmetic example

Assumption:
- Reference speed (C00011) = 2000 rpm
- Speed setpoint selection via bus = 500 rpm (≡ 25 % of the reference speed)

$$\text{Speed setpoint}_{\text{Application}} = 500\,[\text{rpm}] \cdot \frac{16384}{2000\,[\text{rpm}]} \cdot \frac{1}{2^0} = 4096$$

Conversion of the internal scaling (16384 ≡ 100 %) in percentage:

$$4096 \cdot \frac{100\,[\%]}{16384} = 25\,[\%]\ (\text{of C00011})$$

For the output of the actual speed value to the bus, the following conversion is made:

Equation for scaling the actual speed value

$$\text{Actual speed value}_{\text{Bus}}\,[\text{rpm}] = \text{Actual speed value}_{\text{Application}} \cdot \frac{\text{Reference speed [rpm]}}{16384} \cdot 2^{\text{Scaling factor}}$$

Parameters	Name	Description
C00011	Appl.: Reference speed	Reference variable for speed-related signals
C01353/1	ACDrive: Speed scaling	Scaling factor (-128 ... 127) • In the Lenze setting "0", no scaling takes place ($2^0 = 1$)

Scaling of the torque values

On the bus side, the torque setpoint is defined in [0.01 Nm]. In the inverter, however, all torque-related signals are processed as a percentage with regard to a reference variable (C00057). For the scaling required in this case, the LS_Convert_2 system block is used (also see Internal signal flow).

- The type of conversion can be adapted in C01354/2.
- A conversion of [0.01 Nm] to [%] is preset for the "AC Drive Profile" application according to the following formula.
- Optionally, an additional scaling can be executed via a scaling factor adjustable in C01353/2.

Note!

The scaling parameterisable via C01353/2 is carried out as "Shift Operation". Overflows are not absorbed!

<table>
<tr><th colspan="3">Equation for scaling the torque setpoint</th></tr>
<tr><td colspan="3">$$\text{Torque setpoint}_{\text{Application}} = \text{Torque setpoint}_{\text{Bus}}[\text{Nm}] \cdot \frac{16384 \cdot 100}{\text{Maximum torque } [0.01\text{ Nm}]} \cdot \frac{1}{2^{\text{Scaling factor}}}$$</td></tr>
<tr><td>Parameters</td><td>Name</td><td>Description</td></tr>
<tr><td>C00057</td><td>Maximum torque</td><td>Reference variable for torque-related signals</td></tr>
<tr><td>C01353/2</td><td>ACDrive: Torque scaling</td><td>Scaling factor (-128 ... 127)
• In the Lenze setting "0", no scaling takes place ($2^0 = 1$)</td></tr>
</table>

For the output of the actual torque value to the bus, the following conversion is made:

<table>
<tr><th colspan="3">Equation for scaling the actual torque</th></tr>
<tr><td colspan="3">$$\text{Actual torque}_{\text{Bus}}[\text{Nm}] = \text{Actual torque}_{\text{Application}} \cdot \frac{\text{Maximum torque } [0.01\text{ Nm}]}{16384 \cdot 100} \cdot 2^{\text{Scaling factor}}$$</td></tr>
<tr><td>Parameters</td><td>Name</td><td>Description</td></tr>
<tr><td>C00057</td><td>Maximum torque</td><td>Reference variable for torque-related signals</td></tr>
<tr><td>C01353/2</td><td>ACDrive: Torque scaling</td><td>Scaling factor (-128 ... 127)
• In the Lenze setting "0", no scaling takes place ($2^0 = 1$)</td></tr>
</table>

7.3.3 Interface description

All input and output interfaces of the application are described in the subchapter entitled "Interface description" of the "speed actuating drive" application. (📖 232)

7.3.3.1 "AC Drive Profile" control word

- Display parameter: C01351/1
  - Will only be set and evaluated if the "AC Drive Profile" application is set in C00005.
  - If required, you can set an inversion for individual control bits in C00890/1 which is included in this display.
- The bit assignment of the control word can be obtained from the following table:

Bit	Name	Function
Bit 0	Run Forward	Connections between Run1 and Run2 and trigger events can be found in the EtherNet/IP™ communication manual.
Bit 1	Run Backward	
Bit 2	Fault Reset	0↗1 ≡ Reset error 0 ≡ No response
Bit 3	Reserved	-
Bit 4	Reserved	-
Bit 5	Ctrl from Net	Run/Stop control 0 ≡ Run/Stop control via local setting in the device or terminal 1 ≡ Run/Stop control via network (e.g. from the scanner)
Bit 6	Ref from Net	Status of the reference speed / reference torque 0 ≡ Reference via local setting in the device or terminal 1 ≡ Reference via network (e.g. from the scanner)
Bit 7 ... 15	Reserved	-

7.3.3.2 "AC Drive Profile" status word

- Display parameter: C01352/1
  - Will only be set and evaluated if the "AC Drive Profile" application is set in C00005.
- The bit assignment of the status word can be obtained from the following table:

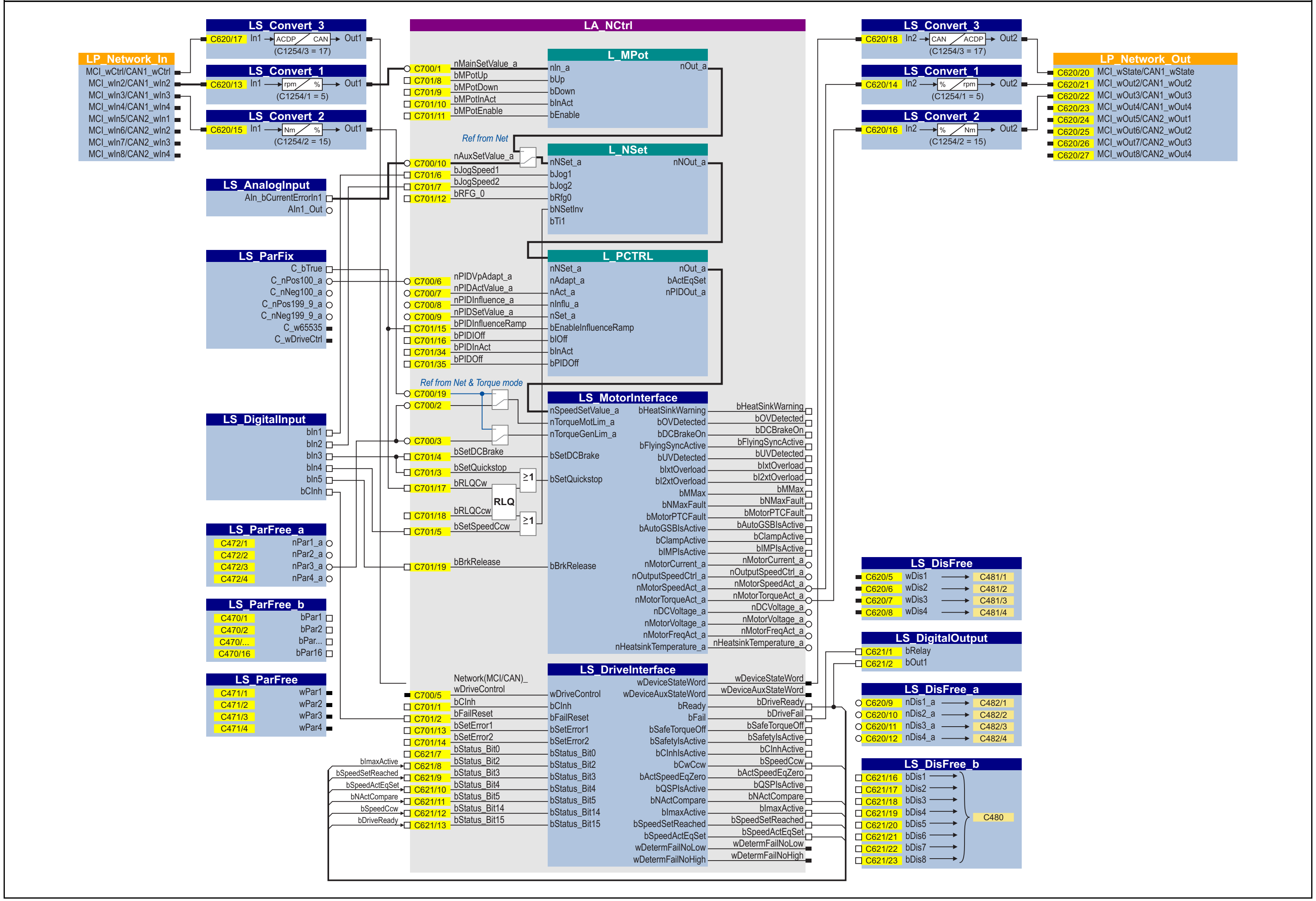
Bit	Name	Status
Bit 0	Faulted	0 ≡ No errors 1 ≡ Errors have occurred
Bit 1	Warning	0 ≡ No warnings 1 ≡ Warnings have occurred
Bit 2	Running1(Fwd)	Connections between Run1 and Run2 and trigger events can be found in the EtherNet/IP™ communication manual.
Bit 3	Running2(Rev)	
Bit 4	Ready	0 ≡ Different status than in case of "1" 1 ≡ Ready or Enabled or Stopping
Bit 5	Ctrl from Net	Run/Stop control 0 ≡ Run/Stop control via local setting in the device or terminal 1 ≡ Run/Stop control via network (e.g. from the scanner)
Bit 6	Ref from Net	Status of the reference speed / reference torque 0 ≡ Reference via local setting in the device or terminal 1 ≡ Reference via network (e.g. from the scanner)
Bit 7	At Reference	1 ≡ Currently, the inverter runs with the reference speed or reference torque (depending on the "drive mode" set in C01350/1).
Bit 8	Drive State	The "Drive State" is coded as follows: 0: Manufacturer-specific (not used with 8400 motec) 1: Start-up (drive initialisation) 2: Not_Ready (mains voltage switched off) 3: Ready (mains voltage switched-on) 4: Enabled (drive has received "Run" command) 5: Stopping (drive has received "Stop" command and is stopped) 6: Fault_Stop (drive is stopped due to an error) 7: Faulted (errors have occurred)
Bit 9	Drive State	
Bit 10	Drive State	
Bit 11	Drive State	
Bit 12	Drive State	
Bit 13	Drive State	
Bit 14	Drive State	
Bit 15	Drive State	

7.3.4 Setting parameters (short overview)

A short overview of the setting parameters can be found in the subchapter entitled "Setting parameters (short overview)" of the "speed actuating drive" application. (🕮 245)

7.3.5 Internal signal flow

Wiring of the internal interfaces in the Lenze setting (control mode "10: Terminals 0")



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to present the following information more clearly.

7.4 TA "Switch-off positioning"

This function extension is available from version 05.00.00!

The basic principle of this technology application is to travel to a switch-off sensor (e.g. a limit switch) in a speed-controlled manner and to stop as close as possible at this position. Unlike other positioning controls, the switch-off positioning neither has a position feedback nor calculates the path in advance. Thus, the accuracy that can be achieved depends on various factors such as the speed at which the switch-off sensor is advanced.

In addition, a pre-switch off can be implemented which requires a sufficient number of unassigned digital inputs on the inverter which can be used to connect other sensors for the additional stop positions. These sensors effect a reduction in speed before the last switch-off sensor is reached.

Properties

- Pre-configured control modes for terminals and bus control (with predefined process data connection to the fieldbus)
- Free configuration of input and output signals
- Offset and gain of the main setpoint (if defined via analog input)
- Up to 3 fixed setpoints for speed
- Adjustable setpoint ramp times
- Linear or S-shaped ramp
- Automatic holding brake control
- Quick stop (QSP) with adjustable ramp time
- Load monitoring
- Implemented and freely available "GeneralPurpose" functions:
  Counter, binary delay element, binary logic, analog comparison
- Integration of encoder feedback
- Switch-off sensor management for the implementation of a pre-switch off

Decision criteria

Criteria	Switch-off positioning with constant load	Switch-off positioning with variable load
Operating mode	V/f characteristic without speed sensor. Alternatively for large breakaway torques: Use of a sensorless vector control (only applicable for horizontal movements).	
Limit switch evaluation	One limit switch is required per direction of movement. When the limit switch is reached, the drive is brought to a standstill led by the deceleration ramp or the QSP ramp.	One limit switch and an initiator are required for fast/slow changeover per direction of movement. When the initiator has been reached, the speed of the drive is reduced to a creeping speed (fixed setpoint 2) in a controlled way. When the limit switch is reached, the drive is brought to a standstill led by the deceleration ramp or the QSP ramp.

Criteria	Switch-off positioning with constant load	Switch-off positioning with variable load
Positioning accuracy at the motor shaft The positioning accuracy of the load depends, among other things, on the clearance and friction of the selected mechanics and has to be determined individually.	The ideal case is 5-10° at the motor shaft. Consider the influence of the motor temperature. In the case of a constant load, you can assume a good repeat accuracy during positioning. In the case of variable loads, you must take significant deviations into account.	5-10° at the motor shaft. As the positioning is executed in a creeping speed, a good repeat accuracy is reached even for variable loads.
Speed setting range	1 : 50, based on 50Hz and M_n	1 : 50, based on 50Hz and M_n
Typical applications	Switch-off positioning with constant load, e.g. travelling drive, roll-up door.	Switch-off positioning with variable load, e.g. travelling drive, conveying belt, hoists approaching a stop position.

System limits and exclusion criteria

They result from the non-compliance with the decision criteria.

- Compared to systems with speed feedback, the positioning and repeat accuracy is reduced.
- Due to the mechanical hardware limit switches, this concept is only applicable for systems with only a few fixed positions. Changing the target position during the operation or the teaching is not possible.
- If necessary, additional functions like manual jog or homing must be realised externally, e.g. via a control.
- As the 8400 motec inverter does not meet safety-related functions except STO (Safe Torque Off), you must observe that all safety-related aspects are realised by the plant instructor.
- Especially in the case of an outdoor use or in wet areas, you must consider the corresponding discharge currents when operated with a fault current circuit breaker.

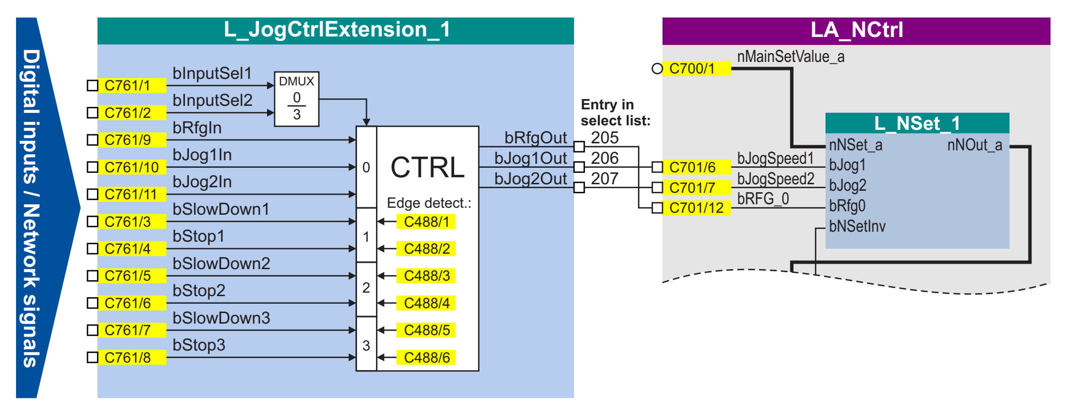
Related topics:

▶ Commissioning of the "Switch-off positioning" technology application (📖 45)

7.4.1 Functional principle

The switch-off positioning is based on the TA "Actuating drive speed" with the following functional differences:

- The motor parameter function (FB L_MPot_1) and the process controller (FB L_PCTRL_1) are not relevant for the switch-off positioning, thus these functions are switched off in the Lenze setting. The speed setpoint is passed through 1:1 by these FBs.
- The logic of the switch-off positioning is contained in the upstream FB L_JogCtrlExtension_1.
  - Depending on the selected control mode (C00007), this FB receives its control signals via digital inputs and/or via network.
  - A corresponding linking causes the FB outputs to trigger the setpoint generator (FB L_NSet_1):



[7-1] Functional principle

Truth table for activating the pre-switch off

The inputs *bInputSel1* and *bInputSel2* serve to select the pre-switch off according to the following truth table:

inputs		Function	Response in the setpoint generator (FB L_NSet_1)
bInputSel1	*bInputSel2*		
FALSE	FALSE	Pre-switch off inactive	No response • The input signals *bRfgIn*, *bJog1In* and *bJog2In* are passed through 1:1 to the upstream FB L_NSet_1.
TRUE	FALSE	The *bSlowDown1* and *bStop1* inputs are evaluated.	**Pre-switch off can be activated** • See the following Truth table - switch-off positioning.
FALSE	TRUE	The *bSlowDown2* and *bStop2* inputs are evaluated.	
TRUE	TRUE	The *bSlowDown3* and *bStop3* inputs are evaluated.	

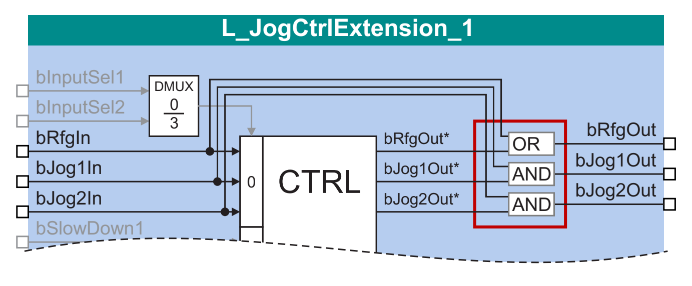
Truth table - switch-off positioning

If the pre-switch off is activated via the inputs *bInputSel1* and *bInputSel2*, the following internal logic applies to the inputs *bStopX* and *bSlowDownX*:

FB L_JogCtrlExtension_1					**Response in the setpoint generator** (FB L_NSet_1)
inputs		**Output signals (internal logic)**			
bStopX	*bSlowDownX*	*bRfgOut**	*bJog1Out**	*bJog2Out2**	
FALSE	**FALSE**	FALSE	**TRUE**	**TRUE**	If both inputs are FALSE, the fixed setpoint 3 is activated.
FALSE	**TRUE**	FALSE	FALSE	**TRUE**	If the SlowDown function is activated via the selected *bSlowDown* input, fixed setpoint 2 is activated.
TRUE	FALSE/ TRUE	**TRUE**	FALSE	FALSE	If the stop function is activated via the selected *bStop* input, setpoint "0" is activated.

Afterwards, the output signals of the internal logic are linked to the input signals *bRfgIn*, *bJog1In* and *bJog2In* as follows:

- *bRfgOut = bRfgIn* **OR** *bRfgOut**
- *bJogXOut = bJogXIn* **AND** *bJogXOut**



[7-2] Logic linkage of the output signals of the internal logic

To achieve the desired behaviour (starting at high speed, pre-switch off at low speed), both inputs *bJog1In* and *bJog2In* must be set to TRUE.

Configuration of the control inputs (level or edge sensitive)

C00488/1...6 can be used to individually set for each *bSlowDown-/bStop* input if it is to respond to level or positive edge (Lenze setting: level)

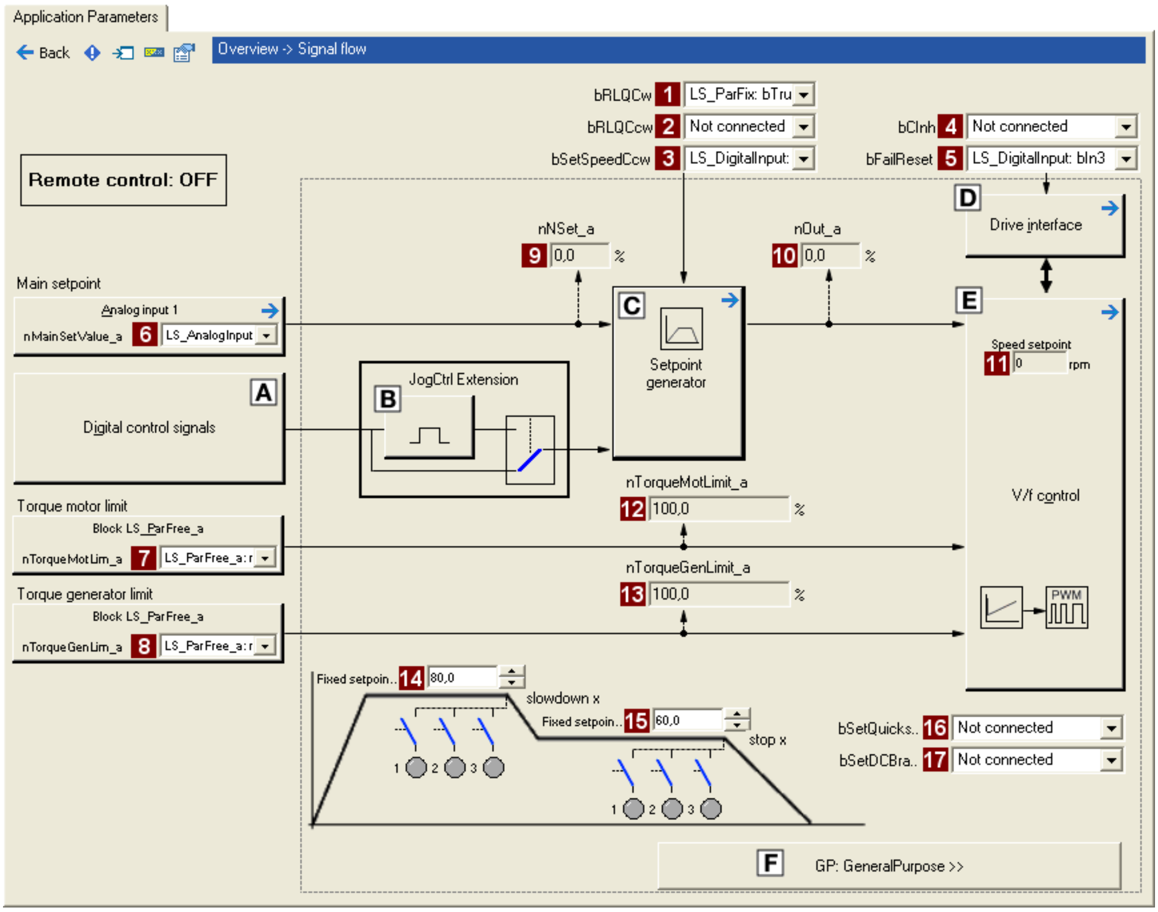
Note!

If the *bSlowDown-/bStop* inputs are configured edge-sensitively and a positioning has been carried out, at least one of the two selection inputs (*bInputSel1*, *bInputSel2*) has to change its state before a new positioning can be started!

In the control modes "Terminals 2" and "Terminals 11", this is solved by linking the travel commands (*bRLQCw*, *bRLQCcw*) and the selection inputs (*bInputSel1*, *bInputSel2*) with the same digital inputs (DI3, DI4).

7.4.2 Basic signal flow

When you go to the **Application parameters** tab to the top dialog level *Overview* and click the **Signal flow** button, you will get one dialog level down to the signal flow of the application (here displayed with the preset control mode "Terminals 0"):



bRLQCw 1 LS_ParFix: bTru
bRLQCcw 2 Not connected
bSetSpeedCcw 3 LS_DigitalInput:
bCInh 4 Not connected
bFailReset 5 LS_DigitalInput: bIn3
nMainSetValue_a 6 LS_AnalogInput
nTorqueMotLim_a 7 LS_ParFree_a:r
nTorqueGenLim_a 8 LS_ParFree_a:r
nNSet_a 9 0,0 %
nOut_a 10 0,0 %
Speed setpoint 11 0 rpm
nTorqueMotLimit_a 12 100,0 %
nTorqueGenLimit_a 13 100,0 %
Fixed setpoin.. 14 80,0
Fixed setpoin.. 15 60,0
bSetQuicks.. 16 Not connected
bSetDCBra.. 17 Not connected

A Terminal assignment & display of digital control signals

B Selection of edge/level for tripping the ramp down and stop functions (L_JogCtrlExtension_1)

C Setpoint generator (L_NSet_1)

D Device control (LS_DriveInterface)

E Motor control (MCTRL)

F "GeneralPurpose" functions

All input and output interfaces of the application are described in the subchapter entitled "Interface description" of the "speed actuating drive" application. (📖 232)

Configuration parameters for digital control signals:

Parameters		Selection of signal source (Lenze setting)	for control signal:
1	**bRLQCw** (C00701/17)	1: LS_ParFix: bTrue	Activate clockwise rotation (fail-safe)
2	**bRLQCcw** (C00701/18)	0: Not connected	Activate counter-clockwise rotation (fail-safe)
3	**bSetSpeedCcw** (C00701/5)	14: LS_DigitalInput: bIn4 (DI4)	Change of direction of rotation
4	**bCInh** (C00701/1)	0: Not connected	Enable/inhibit inverter
5	**bFailReset** (C00701/2)	13: LS_DigitalInput: bIn3 (DI3)	Reset error message
16	**bSetQuickstop** (C00701/3)	0: Not connected	Activate quick stop (QSP)
17	**bSetDCBrake** (C00701/4)	0: Not connected	Manual DC-injection braking (DCB)

Configuration parameters for analog setpoints:

Parameters		Selection of signal source (Lenze setting)	for setpoint selection:
6	**nMainSetValue_a** (C00700/1)	10: LS_AnalogInput: nIn1_a (Analog input 1)	Main setpoint • 100 % ≡ reference speed (C00011)
7	**nTorqueMotLim_a** (C00700/2)	22: LS_ParFree_a: nC472_3_a	Torque limitation in motor mode • 100 % ≡ M_{max} (C00057)
8	**nTorqueGenLim_a** (C00700/3)	23: LS_ParFree_a: nC472_4_a	Torque limitation in generator mode • 100 % ≡ M_{max} (C00057)

Setting parameters:

Parameters		Lenze setting	for setpoint selection:
14	**Preset setpoint 3** (C00039/3)	80 %	Fixed speed for positioning • 100 % ≡ reference speed (C00011)
15	**Preset setpoint 2** (C00039/2)	60 %	Fixed speed for SlowDown function (pre-switch off) • 100 % ≡ reference speed (C00011)

Display parameter:

Parameters		Information
9	**nNset_a** (C00830/1)	Input value of setpoint generator
10	**nOut_a** (C00830/2)	Output value of setpoint generator
11	**Speed setpoint** (C00050)	Speed setpoint for motor control
12	**nTorqueMotLim_a** (C00830/4)	Torque limitation in motor mode
13	**nTorqueGenLim_a** (C00830/5)	Torque limitation in generator mode

7.4.3 Interface description

All input and output interfaces of the application are described in the subchapter entitled "Interface description" of the "speed actuating drive" application. (🕮 232)

7.4.3.1 wDriveControl control word

In control mode "40: Network (MCI/CAN)", the inverter is controlled by a master control (e.g. IPC) via the *wDriveControl* control word.

- The process data word received from the master control is provided to the application via the upstream port block LP_Network_In at the *wDriveControl* input.
- Display parameter: C00136/1
- The bit assignment of the control word can be obtained from the following table:

Bit	Name	Function
Bit 0	SwitchOn	1 ≡ Change to the "SwitchedOn" device status • This bit must be set in the CAN/MCI control word to ensure that the device changes to the "SwitchedOn" device status after mains connection without the need for a master control specifying this bit via fieldbus. • If control via a bus system is not wanted (e.g. in the case of control via terminals), the *wDriveCtrl* output signal of the LS_ParFix system block can be connected to the control word inputs.
Bit 1	DisableVoltage	1 ≡ Inhibit inverter control (pulse inhibit)
Bit 2	SetQuickStop	1 ≡ Activate quick stop (QSP). ▶ Activate/deactivate quick stop (🕮 68)
Bit 3	EnableOperation	1 ≡ Enable inverter (RFR) • If control via terminals is performed, this bit must be set both in the CAN control word and in the MCI control word. Otherwise, the controller is inhibited. ▶ Enable/inhibit inverter (🕮 68)
Bit 4	ModeSpecific_1	Reserved (currently not assigned)
Bit 5	InputSel1	Binary coded selection of the switch-off position 1 ... 3 • Activation of the signal pairs *bSlowDown1/bStop1*, *bSlowDown2/bStop2* or *bSlowDown3/bStop3* according to the Truth table for activating the pre-switch off.
Bit 6	InputSel2	
Bit 7	ResetFault	1 ≡ Reset fault (trip reset) • Acknowledge error message (if the error cause has been eliminated). ▶ Reset error (🕮 69)
Bit 8	Rfg0	Ramping down the setpoint generator in the downstream FB L_NSet_1 according to the Truth table for activating the pre-switch off
Bit 9	reserved_1	Reserved (currently not assigned)
Bit 10	reserved_2	
Bit 11	LenzeSpecific_1	
Bit 12	JogSpeed1	Binary coded selection of the fixed setpoints (JOG setpoints)
Bit 13	JogSpeed2	
Bit 14	SetFail	1 ≡ Set error (trip set)
Bit 15	LenzeSpecific_4	Reserved (currently not assigned)

7.4.3.2 wDeviceStateWord status word

The *wDeviceStateWord* status word that is output by the device control includes all information relevant to the master control for controlling the inverter.

- In control mode "40: Network (MCI/CAN)" the status word is transmitted to the master control as process data word via the port block LP_Network_Out.
- Display parameter: C00150
- The bit assignment of the *wDeviceStateWord* status word can be obtained from the following table.

Bit	Name	Status
Bit 0	FreeStatusBit0	Free status bit 0 (configurable in C00621/7) Not assigned in Lenze setting.
Bit 1	PowerDisabled	1 ≡ Inverter control inhibited (pulse inhibit is active)
Bit 2	FreeStatusBit2	Free status bit 2 (configurable in C00621/8) In Lenze setting pre-assigned with *LA_NCtrl_bImaxActive* signal: 1 ≡ The current setpoint is limited internally (the inverter operates at the maximum current limit)
Bit 3	FreeStatusBit3	Free status bit 3 (configurable in C00621/9) In the Lenze setting pre-assigned with *LA_NCtrl_bSpeedSetReached* signal: 1 ≡ Speed setpoint reached
Bit 4	FreeStatusBit4	Free status bit 4 (configurable in C00621/10) In the Lenze setting pre-assigned with *LA_NCtrl_bSpeedActEqSet* signal: 1 ≡ Actual speed value has reached the setpoint within one hysteresis band
Bit 5	FreeStatusBit5	Free status bit 5 (configurable in C00621/11) In the Lenze setting pre-assigned with *LA_NCtrl_bNActCompare* signal: • In case of the "Open loop" operation: 1 ≡ Speed setpoint < comparison value (C00024) • For "Closed loop" operation: 1 ≡ actual speed value < comparison value (C00024)
Bit 6	ActSpeedIsZero	1 ≡ Current speed is 0
Bit 7	ControllerInhibit	1 ≡ Inverter is inhibited (controller inhibit is active)
Bit 8	StatusCodeBit0	Bit coded display of the active device status ▸ Device state machine and device states (see table [4-1])
Bit 9	StatusCodeBit1	
Bit 10	StatusCodeBit2	
Bit 11	StatusCodeBit3	
Bit 12	Warning	1 ≡ A warning exists.
Bit 13	Trouble	1 ≡ Inverter is in the "Trouble" device status • E.g. if an overvoltage has occurred.
Bit 14	FreeStatusBit14	Free status bit 14 (configurable in C00621/12) In the Lenze setting pre-assigned with *LA_NCtrl_bSpeedCcw* signal: 0 ≡ Clockwise direction of rotation (Cw), 1 ≡ Counter-clockwise direction of rotation (Ccw)
Bit 15	FreeStatusBit15	Free status bit 15 (configurable in C00621/13) In Lenze setting pre-assigned with *LA_NCtrl_bDriveReady* signal: 1 ≡ Inverter is ready for operation

7.4.4 Terminal assignment of the control modes

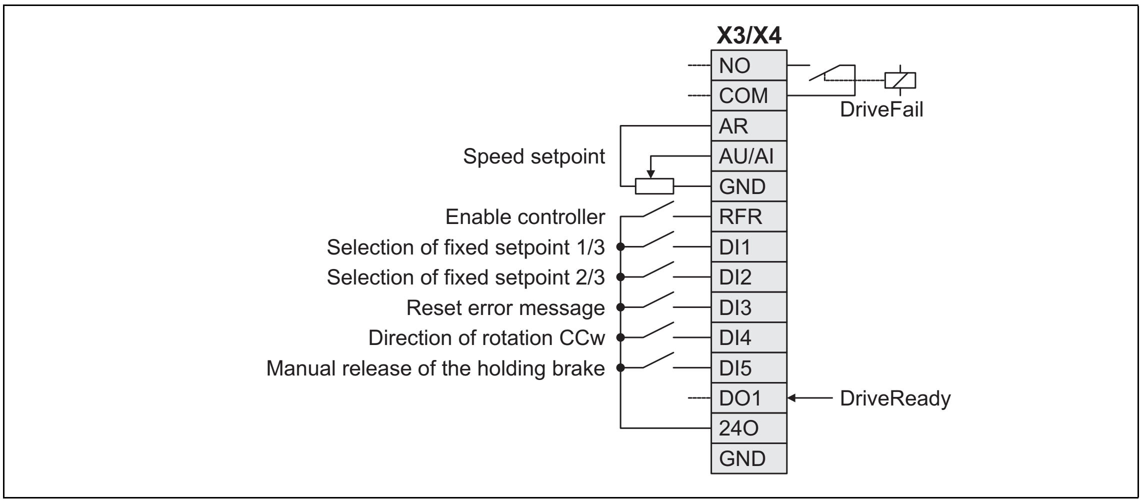
The following table shows which functions are assigned to the digital terminals in the different control modes.

	Assignment of the digital terminals						Relay output
Control mode	**DI1**	**DI2**	**DI3**	**DI4**	**DI5**	**DO1**	**NO / COM**
Local mode (see mounting instructions)	Setpoint of P2	Preset setpoint 2	Reset error message	Change of direction of rotation [1]	Release holding brake manually [2]	Status "Drive is ready to start" [3]	Status "An error has occurred" [3]
	Preset setpoint 3						
Terminals 0	Preset setpoint 1	Preset setpoint 2	Reset error message	Change of direction of rotation		Status "Drive is ready to start"	Status "An error has occurred"
	Preset setpoint 3						
Terminals 2	Stop function 1	Stop function 2	Cw/QSP Selection: Switch-off position 1	Ccw/QSP Selection: Switch-off position 2			
Terminals 11	Stop function 1	Pre-switch off 1	Cw/QSP Selection: Switch-off position 1	Ccw/QSP Selection: Switch-off position 2			
Terminal 16	Preset setpoint 1	Preset setpoint 2	Cw/QSP	Ccw/QSP			
	Preset setpoint 3						
Network (MCI/CAN)	Stop function 1	Pre-switch off 1	Stop function 2	Pre-switch off 2			
Network (AS-i)	Stop function 1	Pre-switch off 1	Stop function 2	Pre-switch off 2			
	[1] If the direction of rotation is permanently set to "left" via DIP1/switch 2, DI4 has no influence in local mode. [2] In the Lenze setting, the brake control is switched off (not active). ➜ Set operating mode in C02580. [3] Applies to the setting DIP1/switch 8 = "OFF". If DIP1/switch 8 = "ON", both status signals have been interchanged.						
Abbreviations used:							
Cw/QSP	Fail-safe selection of the direction of rotation in connection with quick stop (Cw = clockwise rotation; Ccw = counter-clockwise rotation)						
Ccw/QSP							

Related topics:

- User-defined terminal assignment (🕮 217)
- Control mode "Network (MCI/CAN)" (🕮 353)

7.4.4.1 Terminals 0

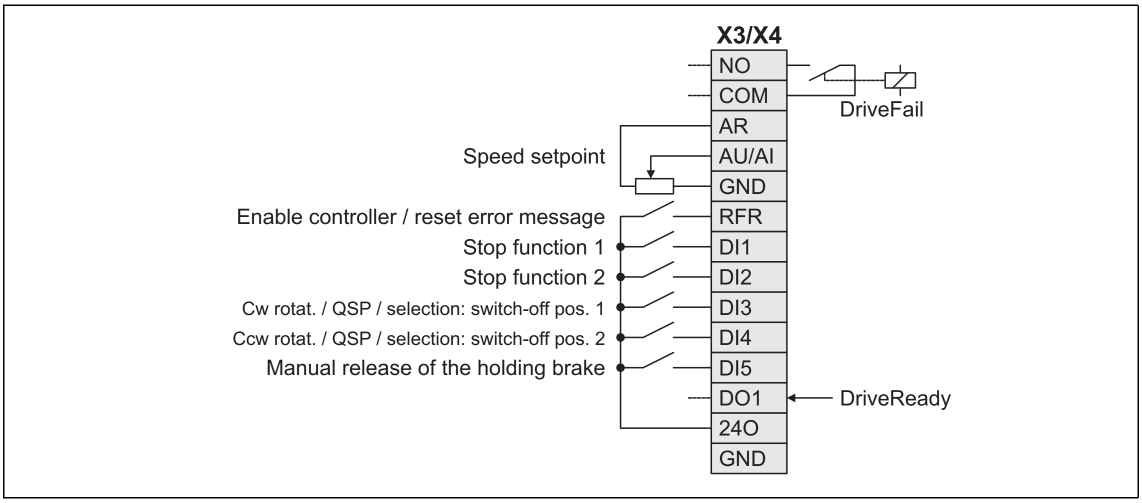


Connection	Assignment		Connection	Assignment
DI1	FB L_JogCtrlExtension_1.bJogSpeed1		**RFR**	-
DI2	FB L_JogCtrlExtension_1.bJogSpeed2		**AU/AI**	LA_NCtrl.nMainSetValue_a 10 V ≡ 100 % reference speed (C00011)
DI3	LA_NCtrl.bFailReset			
DI4	LA_NCtrl.bSetSpeedCcw		**NO, COM**	LA_NCtrl.bDriveFail
DI5	LA_NCtrl.bBrkRelease		**DO1**	LA_NCtrl.bDriveReady

Related topics:

- Truth table for activating the pre-switch off (🕮 266)

7.4.4.2 Terminals 2

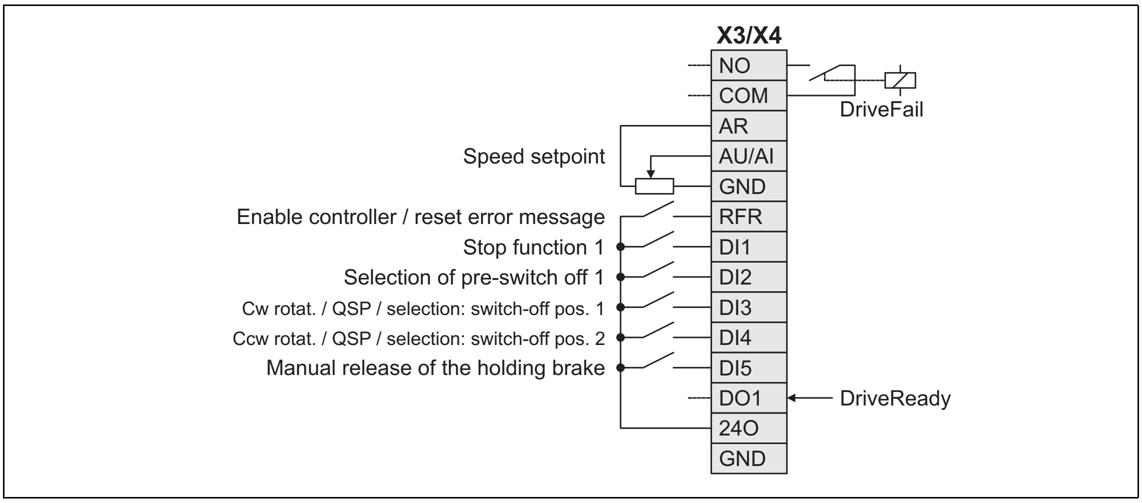


Connection	Assignment		Connection	Assignment
DI1	FB L_JogCtrlExtension_1.bStop1		**RFR**	-
DI2	FB L_JogCtrlExtension_1.bStop2		**AU/AI**	LA_NCtrl.nMainSetValue_a 10 V ≡ 100 % reference speed (C00011)
DI3	LA_NCtrl.bRLQCw FB L_JogCtrlExtension_1.bInputSel1			
DI4	LA_NCtrl.bRLQCcw FB L_JogCtrlExtension_1.bInputSel2		**NO, COM**	LA_NCtrl.bDriveFail
DI5	LA_NCtrl.bBrkRelease		**DO1**	LA_NCtrl.bDriveReady

Related topics:

- Truth table for activating the pre-switch off (📖 266)

7.4.4.3 Terminals 11

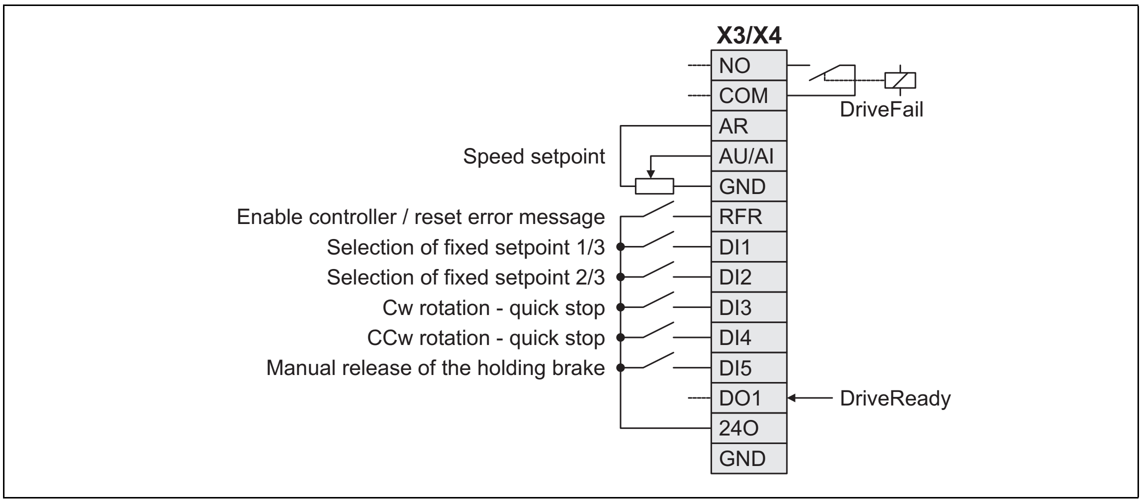


Connection	Assignment		Connection	Assignment
DI1	FB L_JogCtrlExtension_1.bStop1		**RFR**	-
DI2	FB L_JogCtrlExtension_1.bSlowDown1		**AU/AI**	LA_NCtrl.nMainSetValue_a 10 V ≡ 100 % reference speed (C00011)
DI3	LA_NCtrl.bRLQCw FB L_JogCtrlExtension_1.bInputSel1			
DI4	LA_NCtrl.bRLQCcw FB L_JogCtrlExtension_1.bInputSel2		**NO, COM**	LA_NCtrl.bDriveFail
DI5	LA_NCtrl.bBrkRelease		**DO1**	LA_NCtrl.bDriveReady

Related topics:

- Truth table for activating the pre-switch off (🕮 266)

7.4.4.4 Terminal 16

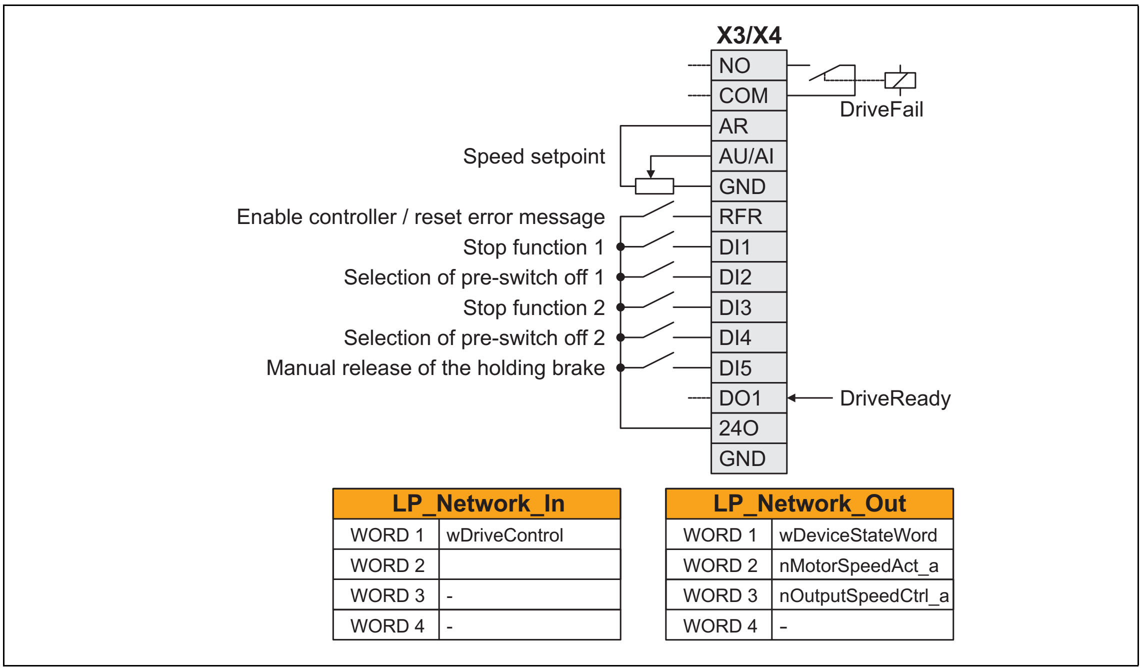


Connection	Assignment		Connection	Assignment
DI1	FB L_JogCtrlExtension_1.bJogSpeed1		**RFR**	-
DI2	FB L_JogCtrlExtension_1.bJogSpeed2		**AU/AI**	LA_NCtrl.nMainSetValue_a 10 V ≡ 100 % reference speed (C00011)
DI3	LA_NCtrl.bRLQCw			
DI4	LA_NCtrl.bRLQCcw		**NO, COM**	LA_NCtrl.bDriveFail
DI5	LA_NCtrl.bBrkRelease		**DO1**	LA_NCtrl.bDriveReady

Related topics:

- Truth table for activating the pre-switch off (🕮 266)

7.4.4.5 Network (MCI/CAN)



LP_Network_In	
WORD 1	wDriveControl
WORD 2	
WORD 3	-
WORD 4	-

LP_Network_Out	
WORD 1	wDeviceStateWord
WORD 2	nMotorSpeedAct_a
WORD 3	nOutputSpeedCtrl_a
WORD 4	-

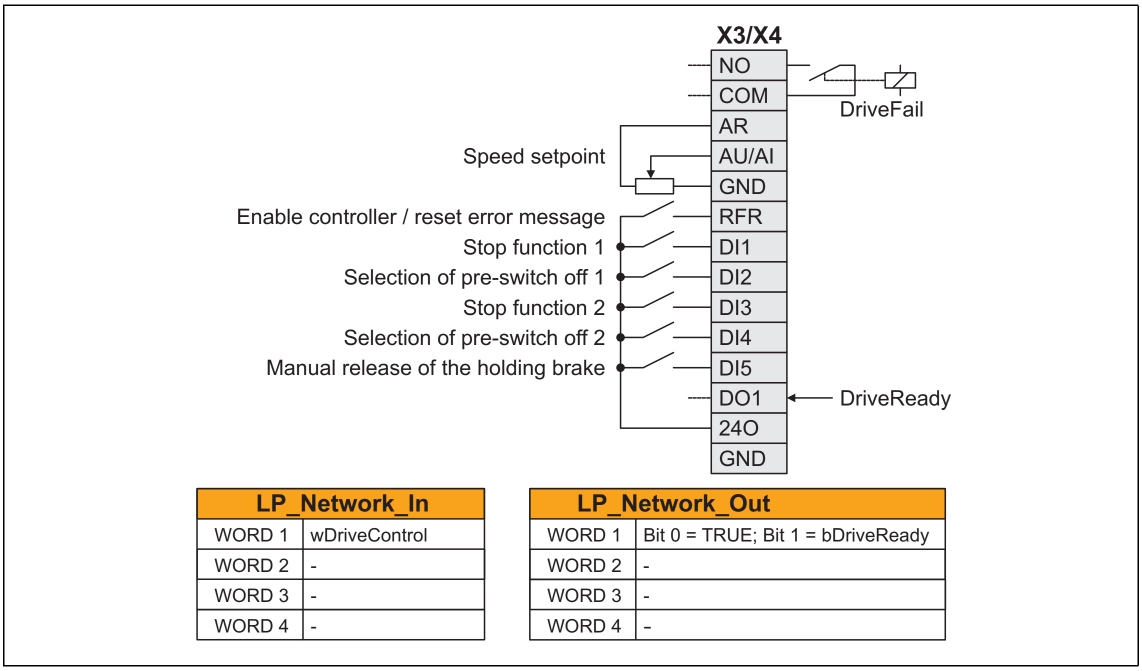
Connection	Assignment		Connection	Assignment
DI1	FB L_JogCtrlExtension_1.bStop1		**RFR**	-
DI2	FB L_JogCtrlExtension_1.bSlowDown1		**AU/AI**	LA_NCtrl.nMainSetValue_a 10 V ≡ 100 % reference speed (C00011)
DI3	FB L_JogCtrlExtension_1.bStop2			
DI4	FB L_JogCtrlExtension_1.bSlowDown2		**NO, COM**	LA_NCtrl.bDriveFail
DI5	LA_NCtrl.bBrkRelease		**DO1**	LA_NCtrl.bDriveReady

Preconfigured wiring of the internal interfaces in the control mode "Network (MCI/CAN)" is shown in chapter [7.4.6.4]. (📖 286)

Related topics:

- Truth table for activating the pre-switch off (📖 266)
- wDriveControl control word (📖 270)
- wDeviceStateWord status word (📖 271)
- Communication (📖 351)
- Control mode "Network (MCI/CAN)" (📖 353)

7.4.4.6 Network (AS-i)



LP_Network_In	
WORD 1	wDriveControl
WORD 2	-
WORD 3	-
WORD 4	-

LP_Network_Out	
WORD 1	Bit 0 = TRUE; Bit 1 = bDriveReady
WORD 2	-
WORD 3	-
WORD 4	-

Connection	Assignment		Connection	Assignment
DI1	FB L_JogCtrlExtension_1.bStop1		**RFR**	-
DI2	FB L_JogCtrlExtension_1.bSlowDown1		**AU/AI**	LA_NCtrl.nMainSetValue_a 10 V ≡ 100 % reference speed (C00011)
DI3	FB L_JogCtrlExtension_1.bStop2			
DI4	FB L_JogCtrlExtension_1.bSlowDown2		**NO, COM**	LA_NCtrl.bDriveFail
DI5	LA_NCtrl.bBrkRelease		**DO1**	LA_NCtrl.bDriveReady

Preconfigured wiring of the internal interfaces in the "Network (AS-i)" control mode is shown in chapter [7.4.6.5]. (🕮 287)

Related topics:

- wDriveControl control word (🕮 270)
- wDeviceStateWord status word (🕮 271)
- Communication (🕮 351)

7.4.5 Setting parameters (short overview)

Parameters	Information	Lenze setting	
		Value	Unit
C00011	Appl.: Reference speed	1500	rpm
C00012	Accel. time - main setpoint	2.0	s
C00013	Decel. time - main setpoint	2.0	s
C00105	Decel. time - quick stop	5.0	s
C00039/1	Preset setpoint 1	40.0	%
C00039/2	Preset setpoint 2	60.0	%
C00039/3	Preset setpoint 3	80.0	%
C00488/1	L_JogCtrlExtension_1: InputSens.SlowDown1	0: Level	
C00488/2	L_JogCtrlExtension_1: InputSens.Stop1	0: Level	
C00488/3	L_JogCtrlExtension_1: InputSens.SlowDown2	0: Level	
C00488/4	L_JogCtrlExtension_1: InputSens.Stop2	0: Level	
C00488/5	L_JogCtrlExtension_1: InputSens.SlowDown3	0: Level	
C00488/6	L_JogCtrlExtension_1: InputSens.Stop3	0: Level	
C00182	S-ramp time PT1	20.00	s
C00134	Ramp smoothing main setpoint	0: Off	
C00632/1	L_NSet_1: Blocking speed 1 max	0.00	%
C00632/2	L_NSet_1: Blocking speed 2 max	0.00	%
C00632/3	L_NSet_1: Blocking speed 3 max	0.00	%
C00633/1	L_NSet_1: Blocking speed 1 min	0.00	%
C00633/2	L_NSet_1: Blocking speed 2 min	0.00	%
C00633/3	L_NSet_1: Blocking speed 3 min	0.00	%

7.4.6 Pre-assignment of the application

7.4.6.1 Input connections

Control modes 10 / 12 / 14 / 16 for control via terminals

Config. parameter	Designator	Control mode			
		10: Terminals 0 see chapter [7.4.6.3]	12: Terminals 2	14: Terminals 11	16: Terminals 16
C700/1	nMainSetValue_a	AU	AU	AU	AU
C700/2	nTorqueMotLim_a	C472/3	C472/3	C472/3	C472/3
C700/3	nTorqueGenLim_a	C472/3	C472/3	C472/3	C472/3
C700/4	Key-operated switch: Max. speed	Poti P1	Poti P1	Poti P1	Poti P1
C700/5	Network(MCI/CAN)_wDriveControl	0x0009	0x0009	0x0009	0x0009
C700/6	nPIDVpAdapt_a	100 %	100 %	100 %	100 %
C700/7	nPIDActValue_a	-	-	-	-
C700/8	nPIDInfluence_a	100 %	100 %	100 %	100 %
C700/9	nPIDSetValue_a	-	-	-	-
C700/10	Reserved	-	-	-	-
C700/11	L_Counter_1: wLdVal	-	-	-	-
C700/12	L_Counter_1: wCmpVal	-	-	-	-
C700/13	L_Compare_1: nIn1_a	-	-	-	-
C700/14	L_Compare_1: nIn2_a	-	-	-	-
C700/15	LS_ParReadWrite_1: wParIndex	-	-	-	-
C700/16	LS_ParReadWrite_1: wParSubindex	-	-	-	-
C700/17	LS_ParReadWrite_1: wInHWord	-	-	-	-
C700/18	LS_ParReadWrite_1: wInLWord	-	-	-	-
C700/19	Reserved	-	-	-	-
C701/1	bCInh	-	-	-	-
C701/2	bFailReset	DI3	RFR	RFR	RFR
C701/3	bSetQuickstop	-	-	-	-
C701/4	bSetDCBrake	-	-	-	-
C701/5	bSetSpeedCcw	DI4	-	-	-
C701/6	bJogSpeed1	L_JogCtrlExten...: bJog1Out	L_JogCtrlExten...: bJog1Out	L_JogCtrlExten...: bJog1Out	L_JogCtrlExten...: bJog1Out
C701/7	bJogSpeed2	L_JogCtrlExten...: bJog2Out	L_JogCtrlExten...: bJog2Out	L_JogCtrlExten...: bJog2Out	L_JogCtrlExten...: bJog2Out
C701/8	bMPotUp	-	-	-	-
C701/9	bMPotDown	-	-	-	-
C701/10	bMPotInAct	-	-	-	-
C701/11	bMPotEnable	-	-	-	-
C701/12	bRFG_0	L_JogCtrlExten...: bRfgOut	L_JogCtrlExten...: bRfgOut	L_JogCtrlExten...: bRfgOut	L_JogCtrlExten...: bRfgOut
C701/13	bSetError1	-	-	-	-
C701/14	bSetError2	-	-	-	-
C701/15	bPIDInfluenceRamp	TRUE	TRUE	TRUE	TRUE
C701/16	bPIDIOff	-	-	-	-
C701/17	bRLQCw	TRUE	DI3	DI3	DI3
C701/18	bRLQCcw	-	DI4	DI4	DI4
C701/19	bBrkRelease	DI5	DI5	DI5	DI5
C701/20	L_Counter_1: bClkUp	-	-	-	-
C701/21	L_Counter_1: bClkDown	-	-	-	-
C701/22	L_Counter_1: bLoad	-	-	-	-
C701/23	L_DigitalDelay_1: bIn	-	-	-	-

Config. parameter	**Designator**	**Control mode**			
		10: Terminals 0 see chapter [7.4.6.3]	12: Terminals 2	14: Terminals 11	16: Terminals 16
C701/24	L_DigitalDelay_2: bIn	-	-	-	-
C701/25	LS_WriteParamList: bExecute	-	-	-	-
C701/26	LS_WriteParamList: bSelectWriteValue_1	-	-	-	-
C701/27	Reserved	-	-	-	-
C701/28	L_DigitalLogic_1: bIn1	-	-	-	-
C701/29	L_DigitalLogic_1: bIn2	-	-	-	-
C701/30	L_DigitalLogic_2: bIn1	-	-	-	-
C701/31	L_DigitalLogic_2: bIn2	-	-	-	-
C701/32	LS_ParReadWrite_1: bExecute	-	-	-	-
C701/33	LS_ParReadWrite_1: bReadWrite	-	-	-	-
C701/34	bPIDInAct	-	-	-	-
C701/35	bPIDOff	-	-	-	-
C761/1	L_JogCtrlExtension_1: bInputSel1	-	DI3	DI3	-
C761/2	L_JogCtrlExtension_1: bInputSel2	-	DI4	DI4	-
C761/3	L_JogCtrlExtension_1: bSlowDown1	-	-	DI2	-
C761/4	L_JogCtrlExtension_1: bStop1	-	DI1	DI1	-
C761/5	L_JogCtrlExtension_1: bSlowDown2	-	-	-	-
C761/6	L_JogCtrlExtension_1: bStop2	-	DI2	-	-
C761/7	L_JogCtrlExtension_1: bSlowDown3	-	-	-	-
C761/8	L_JogCtrlExtension_1: bStop3	-	-	-	-
C761/9	L_JogCtrlExtension_1: bRfgIn	-	-	-	-
C761/10	L_JogCtrlExtension_1: bJog1In	DI1	TRUE	TRUE	DI1
C761/11	L_JogCtrlExtension_1: bJog2In	DI2	TRUE	TRUE	DI2

Control mode 40 / 41 for control via network

Config. parameter	**Designator**	**Control mode**	
		40: Network (MCI/CAN) see chapter [7.4.6.4]	41: Network (AS-i) see chapter [7.4.6.5]
C700/1	nMainSetValue_a	AU	AU
C700/2	nTorqueMotLim_a	C472/3	C472/3
C700/3	nTorqueGenLim_a	C472/3	C472/3
C700/4	Key-operated switch: Max. speed	Poti P1	Poti P1
C700/5	Network(MCI/CAN)_wDriveControl	0x0009	0x0009
C700/6	nPIDVpAdapt_a	100 %	100 %
C700/7	nPIDActValue_a	-	-
C700/8	nPIDInfluence_a	100 %	100 %
C700/9	nPIDSetValue_a	-	-
C700/10	Reserved	-	-
C700/11	L_Counter_1: wLdVal	-	-
C700/12	L_Counter_1: wCmpVal	-	-
C700/13	L_Compare_1: nIn1_a	-	-
C700/14	L_Compare_1: nIn2_a	-	-
C700/15	LS_ParReadWrite_1: wParIndex	-	-
C700/16	LS_ParReadWrite_1: wParSubindex	-	-
C700/17	LS_ParReadWrite_1: wInHWord	-	-
C700/18	LS_ParReadWrite_1: wInLWord	-	-
C700/19	Reserved	-	-
C701/1	bCInh	-	-
C701/2	bFailReset	RFR	RFR

Config. parameter	Designator	Control mode	
		40: Network (MCI/CAN) see chapter [7.4.6.4]	41: Network (AS-i) see chapter [7.4.6.5]
C701/3	bSetQuickstop	-	-
C701/4	bSetDCBrake	-	-
C701/5	bSetSpeedCcw	-	-
C701/6	bJogSpeed1	L_JogCtrlExtension_1: bJog1Out	L_JogCtrlExtension_1: bJog1Out
C701/7	bJogSpeed2	L_JogCtrlExtension_1: bJog2Out	L_JogCtrlExtension_1: bJog2Out
C701/8	bMPotUp	-	-
C701/9	bMPotDown	-	-
C701/10	bMPotInAct	-	-
C701/11	bMPotEnable	-	-
C701/12	bRFG_0	L_JogCtrlExtension_1: bRfgOut	L_JogCtrlExtension_1: bRfgOut
C701/13	bSetError1	-	-
C701/14	bSetError2	-	-
C701/15	bPIDInfluenceRamp	TRUE	TRUE
C701/16	bPIDIOff	-	-
C701/17	bRLQCw	TRUE	PDO1/Bit 0
C701/18	bRLQCcw	-	PDO1/Bit 1
C701/19	bBrkRelease	DI5	DI5
C701/20	L_Counter_1: bClkUp	-	-
C701/21	L_Counter_1: bClkDown	-	-
C701/22	L_Counter_1: bLoad	-	-
C701/23	L_DigitalDelay_1: bIn	-	-
C701/24	L_DigitalDelay_2: bIn	-	-
C701/25	LS_WriteParamList: bExecute	-	-
C701/26	LS_WriteParamList: bSelectWriteValue_1	-	-
C701/27	Reserved	-	-
C701/28	L_DigitalLogic_1: bIn1	-	-
C701/29	L_DigitalLogic_1: bIn2	-	-
C701/30	L_DigitalLogic_2: bIn1	-	-
C701/31	L_DigitalLogic_2: bIn2	-	-
C701/32	LS_ParReadWrite_1: bExecute	-	-
C701/33	LS_ParReadWrite_1: bReadWrite	-	-
C701/34	bPIDInAct	-	-
C701/35	bPIDOff	-	-
C761/1	L_JogCtrlExtension_1: bInputSel1	PDO1/Bit 5	PDO1/Bit 0
C761/2	L_JogCtrlExtension_1: bInputSel2	PDO1/Bit 6	PDO1/Bit 1
C761/3	L_JogCtrlExtension_1: bSlowDown1	DI2	DI2
C761/4	L_JogCtrlExtension_1: bStop1	DI1	DI1
C761/5	L_JogCtrlExtension_1: bSlowDown2	DI4	DI4
C761/6	L_JogCtrlExtension_1: bStop2	DI3	DI3
C761/7	L_JogCtrlExtension_1: bSlowDown3	-	-
C761/8	L_JogCtrlExtension_1: bStop3	-	-
C761/9	L_JogCtrlExtension_1: bRfgIn	PDO1/bit 8	PDO1/bit 8
C761/10	L_JogCtrlExtension_1: bJog1In	PDO1/Bit 12	PDO1/Bit 12
C761/11	L_JogCtrlExtension_1: bJog2In	PDO1/Bit 13	PDO1/Bit 13

7.4.6.2 Output connections

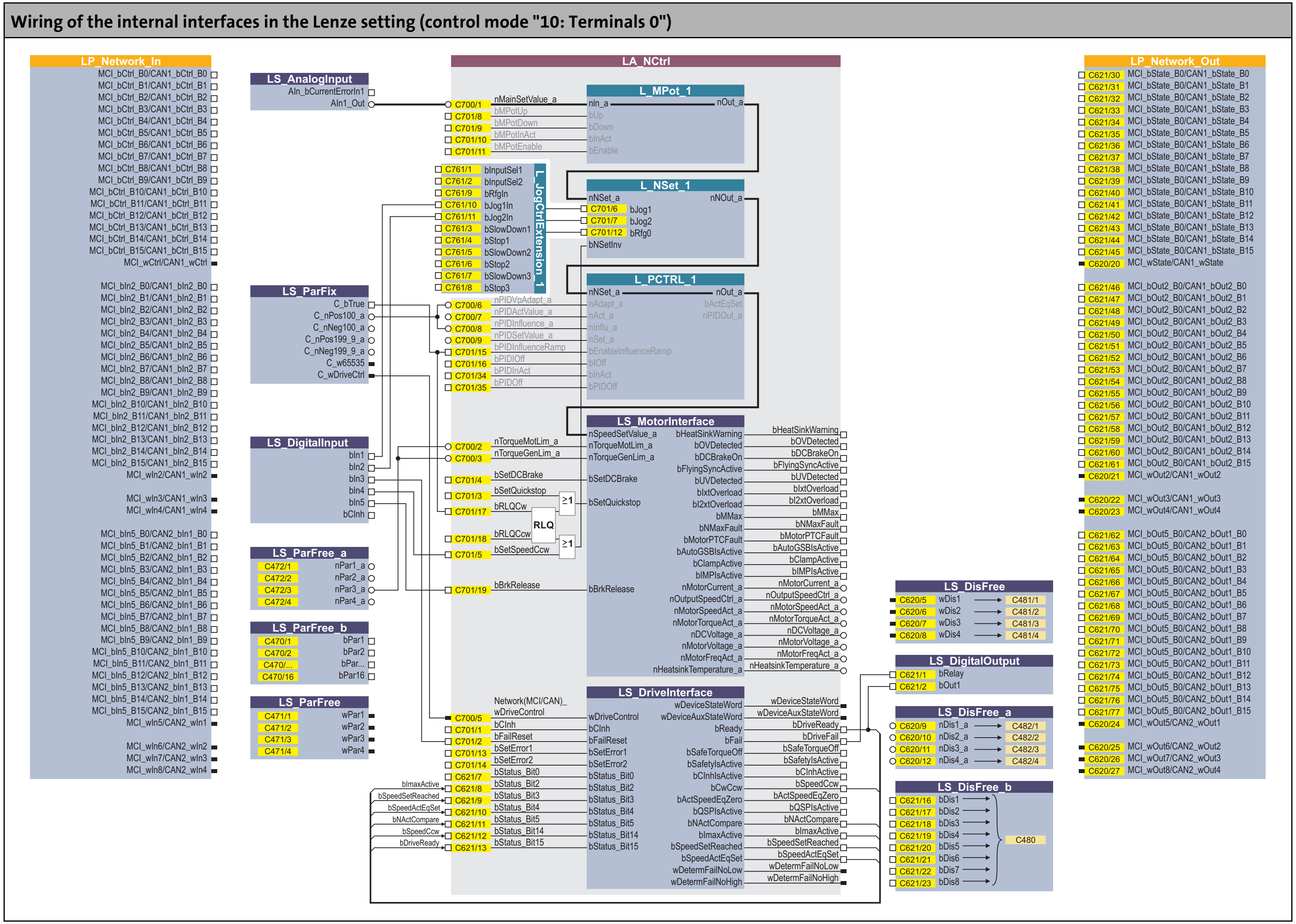
Control modes 10 / 12 / 14 / 16 for control via terminals

Config. parameter	Designator	Control mode	
		10: Terminals 0 see chapter [7.4.6.3]	12: Terminals 2 14: Terminals 11 16: Terminals 16
C620/5	LS_DisFree: wDis1 (→C481/1)	-	-
C620/6	LS_DisFree: wDis2 (→C481/2)	-	-
C620/7	LS_DisFree: wDis3 (→C481/3)	-	-
C620/8	LS_DisFree: wDis4 (→C481/4)	-	-
C620/9	LS_DisFree_a: nDis1_a (→C482/1)	-	-
C620/10	LS_DisFree_a: nDis2_a (→C482/2)	-	-
C620/11	LS_DisFree_a: nDis3_a (→C482/3)	-	-
C620/12	LS_DisFree_a: nDis4_a (→C482/4)	-	-
C620/20	LP_Network_Out: MCI_wState/CAN1_wState	-	-
C620/21	LP_Network_Out: MCI_wOut2/CAN1_wOut2	-	-
C620/22	LP_Network_Out: MCI_wOut3/CAN1_wOut3	-	-
C620/23	LP_Network_Out: MCI_wOut4/CAN1_wOut4	-	-
C620/24	LP_Network_Out: MCI_wOut5/CAN2_wOut1	-	-
C620/25	LP_Network_Out: MCI_wOut6/CAN2_wOut2	-	-
C620/26	LP_Network_Out: MCI_wOut7/CAN2_wOut3	-	-
C620/27	LP_Network_Out: MCI_wOut8/CAN2_wOut4	-	-
C621/1	LS_DigitalOutput: bRelay	bDriveFail	bDriveFail
C621/2	LS_DigitalOutput: bOut1 (DO1)	bDriveReady	bDriveReady
C621/7	LA_NCtrl: bStatusBit0	-	-
C621/8	LA_NCtrl: bStatusBit2	bImaxActive	bImaxActive
C621/9	LA_NCtrl: bStatusBit3	bSpeedSetReached	bSpeedSetReached
C621/10	LA_NCtrl: bStatusBit4	bSpeedActEqSet	bSpeedActEqSet
C621/11	LA_NCtrl: bStatusBit5	bNactCompare	bNactCompare
C621/12	LA_NCtrl: bStatusBit14	bSpeedCcw	bSpeedCcw
C621/13	LA_NCtrl: bStatusBit15	bDriveReady	bDriveReady
C621/16	LS_DisFree_b: bDis1 (→C480/Bit0)	-	-
C621/17	LS_DisFree_b: bDis2 (→C480/Bit1)	-	-
C621/18	LS_DisFree_b: bDis3 (→C480/Bit2)	-	-
C621/19	LS_DisFree_b: bDis4 (→C480/Bit3)	-	-
C621/20	LS_DisFree_b: bDis5 (→C480/Bit4)	-	-
C621/21	LS_DisFree_b: bDis6 (→C480/Bit5)	-	-
C621/22	LS_DisFree_b: bDis7 (→C480/Bit6)	-	-
C621/23	LS_DisFree_b: bDis8 (→C480/Bit7)	-	-
C621/30	LP_Network_Out: MCI_bState/CAN1_bState_B0	-	-
C621/31	LP_Network_Out: MCI_bState/CAN1_bState_B1	-	-
C621/32...45	LP_Network_Out: MCI_bState/CAN1_bState_B2 ... B15	-	-
C621/46...61	LP_Network_Out: MCI_bOut2/CAN1_bOut2_B0 ... B15	-	-
C621/62...77	LP_Network_Out: MCI_bOut5/CAN2_bOut1_B0 ... B15	-	-

Control mode 40 / 41 for control via network

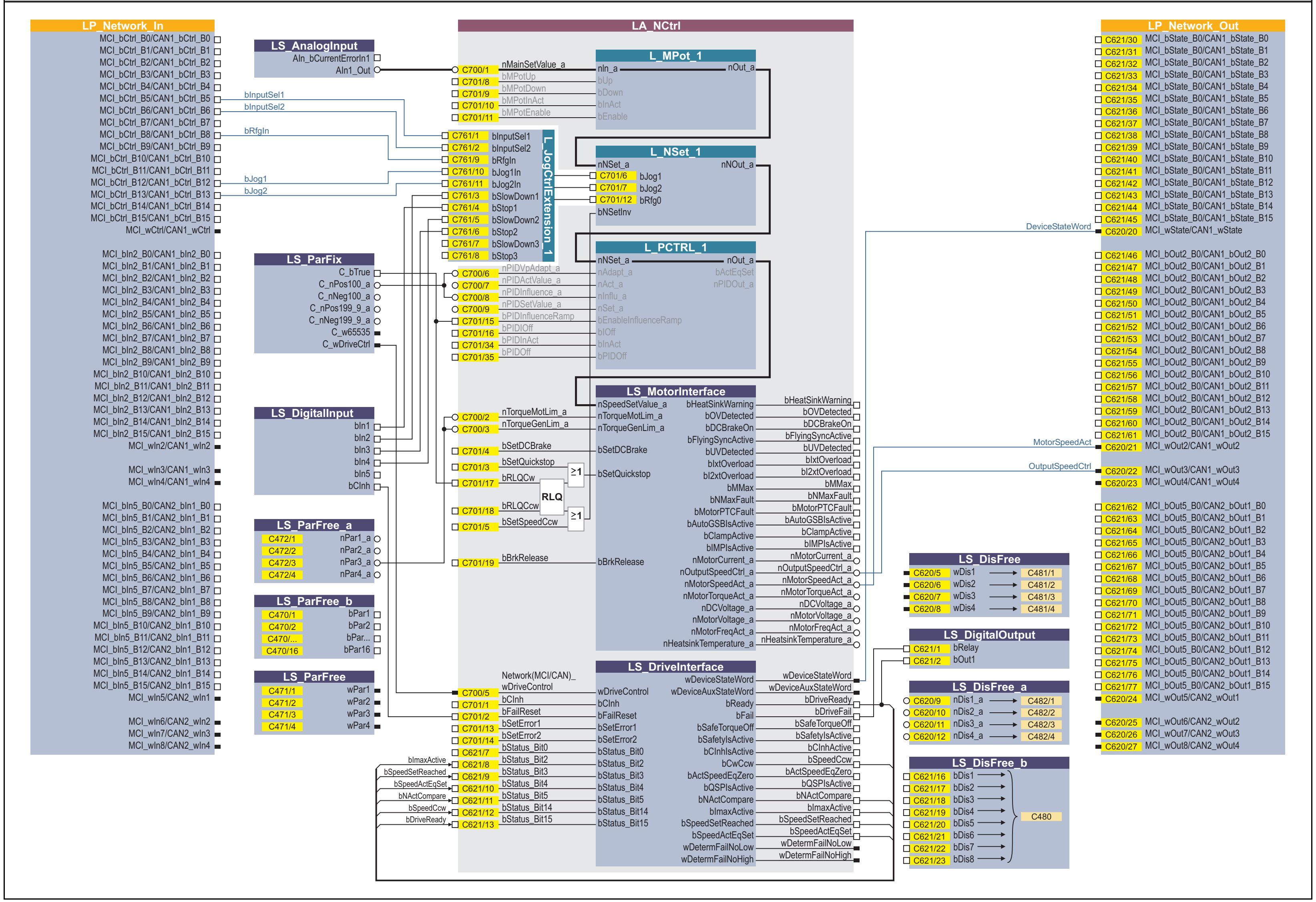
Config. parameter	Designator	Control mode	
		40: Network (MCI/CAN) see chapter [7.4.6.4]	41: Network (AS-i) see chapter [7.4.6.5]
C620/5	LS_DisFree: wDis1 (→C481/1)	-	-
C620/6	LS_DisFree: wDis2 (→C481/2)	-	-
C620/7	LS_DisFree: wDis3 (→C481/3)	-	-
C620/8	LS_DisFree: wDis4 (→C481/4)	-	-
C620/9	LS_DisFree_a: nDis1_a (→C482/1)	-	-
C620/10	LS_DisFree_a: nDis2_a (→C482/2)	-	-
C620/11	LS_DisFree_a: nDis3_a (→C482/3)	-	-
C620/12	LS_DisFree_a: nDis4_a (→C482/4)	-	-
C620/20	LP_Network_Out: MCI_wState/CAN1_wState	wDeviceStateWord	-
C620/21	LP_Network_Out: MCI_wOut2/CAN1_wOut2	nMotorSpeedAct_a	-
C620/22	LP_Network_Out: MCI_wOut3/CAN1_wOut3	nMotorSpeedSet_a	-
C620/23	LP_Network_Out: MCI_wOut4/CAN1_wOut4	-	-
C620/24	LP_Network_Out: MCI_wOut5/CAN2_wOut1	-	-
C620/25	LP_Network_Out: MCI_wOut6/CAN2_wOut2	-	-
C620/26	LP_Network_Out: MCI_wOut7/CAN2_wOut3	-	-
C620/27	LP_Network_Out: MCI_wOut8/CAN2_wOut4	-	-
C621/1	LS_DigitalOutput: bRelay	bDriveFail	bDriveFail
C621/2	LS_DigitalOutput: bOut1 (DO1)	bDriveReady	bDriveReady
C621/7	LA_NCtrl: bStatusBit0	-	-
C621/8	LA_NCtrl: bStatusBit2	bImaxActive	bImaxActive
C621/9	LA_NCtrl: bStatusBit3	bSpeedSetReached	bSpeedSetReached
C621/10	LA_NCtrl: bStatusBit4	bSpeedActEqSet	bSpeedActEqSet
C621/11	LA_NCtrl: bStatusBit5	bNactCompare	bNactCompare
C621/12	LA_NCtrl: bStatusBit14	bSpeedCcw	bSpeedCcw
C621/13	LA_NCtrl: bStatusBit15	bDriveReady	bDriveReady
C621/16	LS_DisFree_b: bDis1 (→C480/Bit0)	-	-
C621/17	LS_DisFree_b: bDis2 (→C480/Bit1)	-	-
C621/18	LS_DisFree_b: bDis3 (→C480/Bit2)	-	-
C621/19	LS_DisFree_b: bDis4 (→C480/Bit3)	-	-
C621/20	LS_DisFree_b: bDis5 (→C480/Bit4)	-	-
C621/21	LS_DisFree_b: bDis6 (→C480/Bit5)	-	-
C621/22	LS_DisFree_b: bDis7 (→C480/Bit6)	-	-
C621/23	LS_DisFree_b: bDis8 (→C480/Bit7)	-	-
C621/30	LP_Network_Out: MCI_bState/CAN1_bState_B0	-	TRUE
C621/31	LP_Network_Out: MCI_bState/CAN1_bState_B1	-	bDriveReady
C621/32...45	LP_Network_Out: MCI_bState/CAN1_bState_B2 ... B15	-	-
C621/46...61	LP_Network_Out: MCI_bOut2/CAN1_bOut2_B0 ... B15	-	-
C621/62...77	LP_Network_Out: MCI_bOut5/CAN2_bOut1_B0 ... B15	-	-

7.4.6.3 Internal signal flow for control via terminals


Wiring of the internal interfaces in the Lenze setting (control mode "10: Terminals 0")

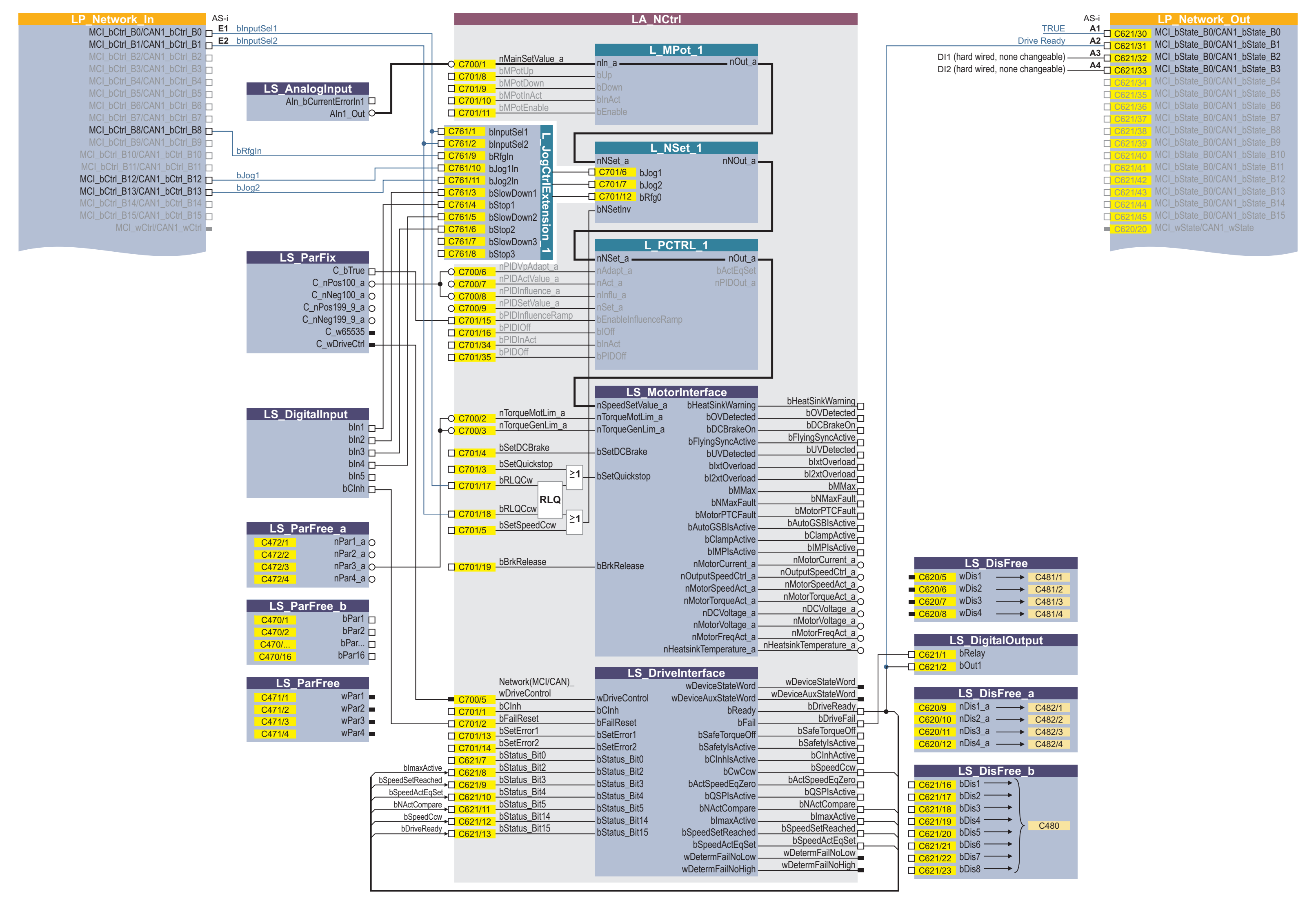
7.4.6.4 Internal signal flow for control via network (MCI/CAN)

Wiring of the internal interfaces for control via communication interface (control mode "40: Network (MCI/CAN)")



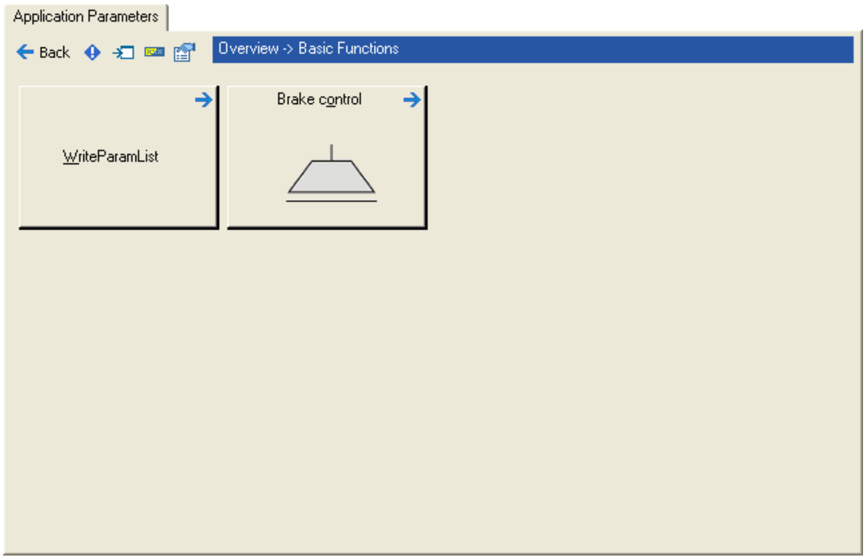
7.4.6.5 Internal signal flow for control via network (AS-i)

Wiring of the internal interfaces for control via communication interface (control mode "41: Network (AS-i)")



8 Basic functions

This chapter describes both basic functions "Parameter change-over" and "Holding brake control".



- The parameter change-over provides a change-over for up to 16 freely selectable parameters between two sets with different parameter values.
- The holding brake control serves to control the holding brake with low rate of wear as a function of the speed setpoint and various other internal digital control signals.

8.1 Parameter change-over

This basic function provides a change-over for up to 16 freely selectable parameters between two sets with different parameter values.

The parameter list is created in the same way as the user menu is composed, namely by means of parameterisation. In the »Engineer«, a user-friendly parameterisation dialog with import and export functions is available for this purpose.

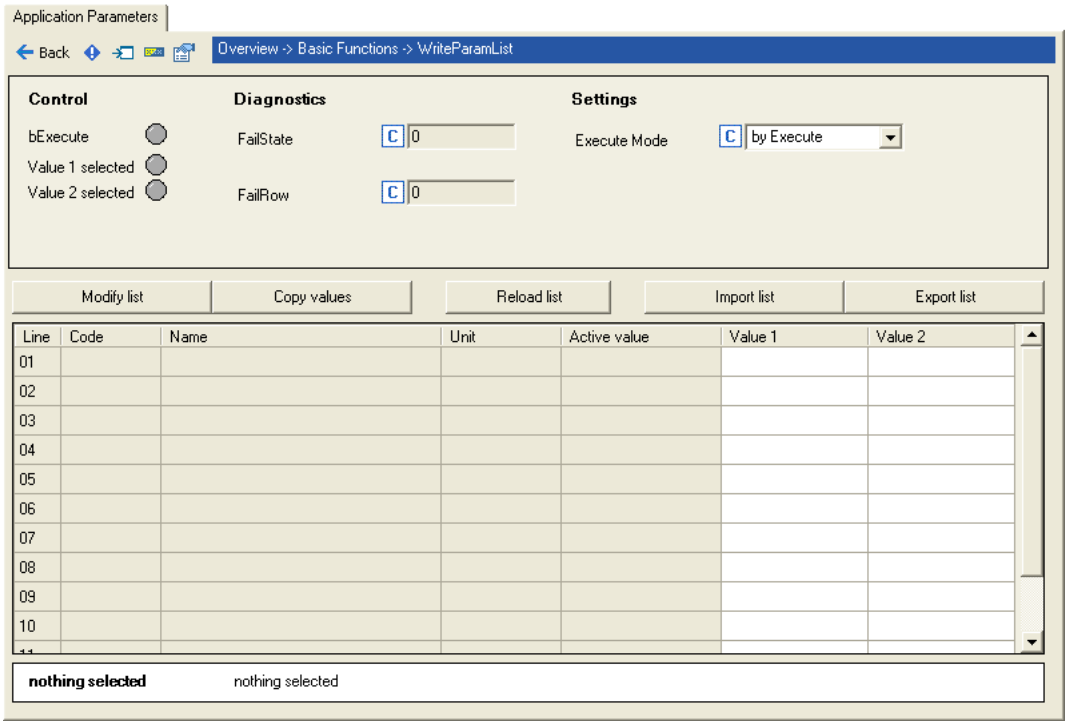
8.1.1 Configuring the list using the »Engineer« parameterisation dialog

In the »Engineer«, a parameterisation dialog is available for user-friendly creation of the parameter list and entry of the parameter values:

How to get to the parameterisation dialog:

1. »Engineer« Go to the *Project view* and select the 8400 motec inverter.
2. Select the **Application parameters** tab from the *Workspace*.
3. Go to the *Overview* dialog level and click the "**Basic functions**" button.
4. Go to the *Overview* → *Basic functions* dialog box and click the **Parameter change-over** button.

Parameterisation dialog in the »Engineer«



FailState C 0

FailRow C 0

Execute Mode C by Execute

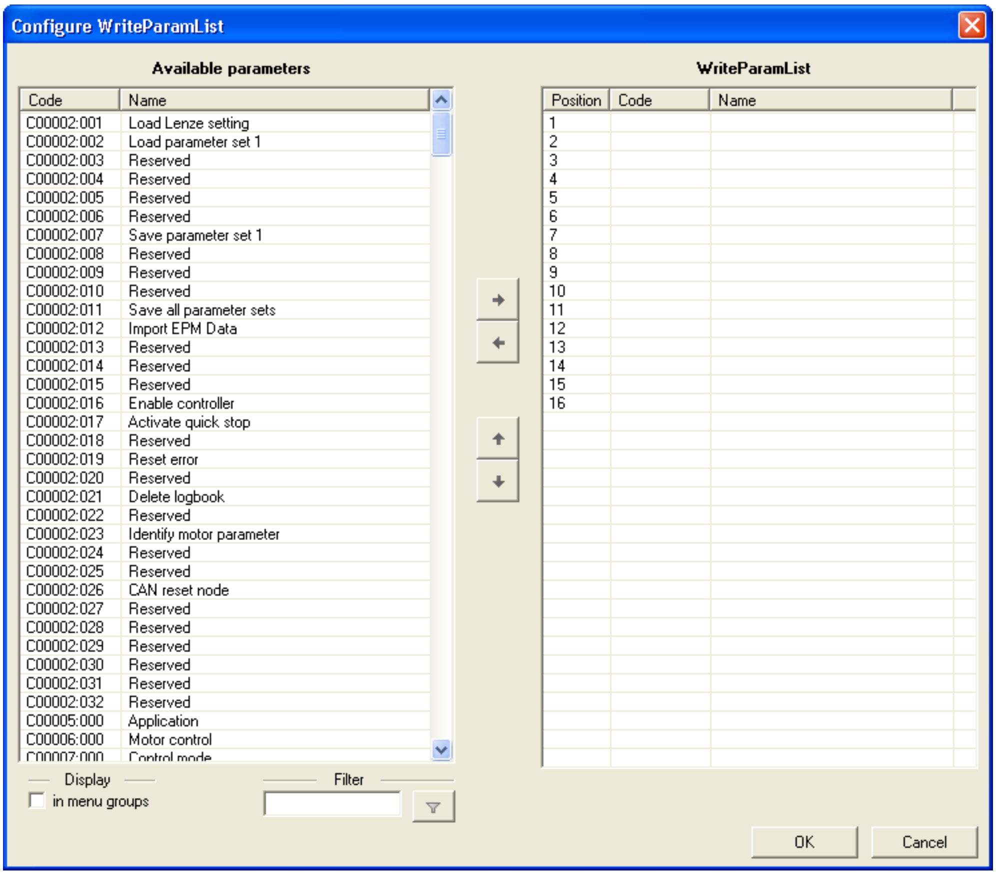
Line	Code	Name	Unit	Active value	Value 1	Value 2
01						
02						
03						
04						
05						
06						
07						
08						
09						
10						

nothing selected nothing selected

Creating/changing the list

To create or change the list, proceed as follows:

1. Click on **Change list** button.
   - The dialog box entitled *Configure WriteParamList* is shown:



Code	Name
C00002:001	Load Lenze setting
C00002:002	Load parameter set 1
C00002:003	Reserved
C00002:004	Reserved
C00002:005	Reserved
C00002:006	Reserved
C00002:007	Save parameter set 1
C00002:008	Reserved
C00002:009	Reserved
C00002:010	Reserved
C00002:011	Save all parameter sets
C00002:012	Import EPM Data
C00002:013	Reserved
C00002:014	Reserved
C00002:015	Reserved
C00002:016	Enable controller
C00002:017	Activate quick stop
C00002:018	Reserved
C00002:019	Reset error
C00002:020	Reserved
C00002:021	Delete logbook
C00002:022	Reserved
C00002:023	Identify motor parameter
C00002:024	Reserved
C00002:025	Reserved
C00002:026	CAN reset node
C00002:027	Reserved
C00002:028	Reserved
C00002:029	Reserved
C00002:030	Reserved
C00002:031	Reserved
C00002:032	Reserved
C00005:000	Application
C00006:000	Motor control
C00007:000	Control mode

Position	Code	Name
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		

   - On the left-hand side, all the parameters of the inverter with write and read access are shown in the list entitled **Available parameters**.
   - If the option **In menu groups** is activated, all parameters are shown assigned to their functions.
   - By clicking on the ▽ button in the **Filter** area, you can shorten the list of available parameters. If, for example, you enter the text "ain1" and then click on the button, only those parameters whose designation contains this text are shown for selection.
2. Highlight the parameter/parameters in the **Available parameters** list that is/are to be added to the *WriteParamList*.
   - Here, you can use the <**Ctrl**> key and the<**Shift**> key for multiple selection, as in the case of general Windows functions.

3. Click on the → button in order to add the highlighted parameters to the *WriteParamList* on the right-hand side.
   - With the ↑ and ↓ buttons, you can alter the sequence of parameters in the *WriteParamList*.

   To remove parameters from the *WriteParamList*, proceed as follows:
   - Highlight the parameter/parameters in the **WriteParamList** that is/are to be removed from the *WriteParamList*.
   - Click on the ← button to remove the highlighted parameters from the *WriteParamList*.
4. Click on the **OK** button to accept the configuration and close the dialog box.
   - You can call the configuration dialog again at any time in order to change or expand the *WriteParamList* retrospectively.

Entering values

After composing the list, you can directly enter the desired parameter values into the input fields (columns **1st value** ... **2th value**).

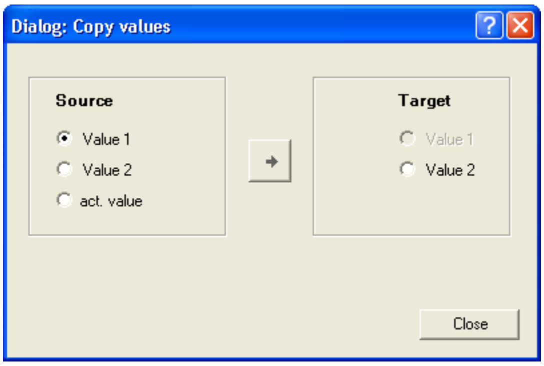
If you place the cursor in an input field, the permitted value range for the corresponding parameter is shown under the table.

Copying values

All the settings of a value set can be copied to the other value set.

To copy values, proceed as follows:

1. Click on the **Copy values** button.
   - The *Copy values* dialog box is displayed:



Dialog: Copy values

Source
● Value 1
○ Value 2
○ act. value

Target
○ Value 1
○ Value 2

2. Select **Source** and **Target**.
3. Click on → button in order to copy the values from **Source** to **target**.

Importing/exporting the list

For cross-device reuse of the *WriteParamList* configured, you can use the **Export list** and **Import list** buttons to save the parameter selection as *.epc file and then re-import the *.epc file into another 8400 inverter.

8.1.2 Configuring the list by means of parameterisation

The following application example shows the necessary procedure for configuring the list without using the »Engineer« parameterisation dialog.

Task:

The parameters C00012, C00026/1, C00027/1 and C00222 to C00224 are to be written.

Compiling the parameter list

In C01085/1 ... n, specify the above-named parameters in the <Code>,<Subcode> format:

- C01085/1 = 12.000
- C01085/2 = 26.001
- C01085/3 = 27.001
- C01085/4 = 222.000
- C01085/5 = 223.000
- C01085/6 = 224.000
- C01085/7 ... n = 0.000 (no parameter)

Note!

Gaps in the parameter list (setting = 0.000) are permissible and are skipped in the process.

Invalid parameter entries are not accepted when being entered.

Entering values for the parameters (value set 1)

In C01086/1 ... n, specify the values to be used to describe the selected parameters. The values are entered according to the scaling format/scaling factor of the respective parameter.

- C01086/1 = <value> for list entry 1 (in our example: for parameter C00012)
- C01086/2 = <value> for list entry 2 (in our example: for parameter C00026/1)
- C01086/3 = <value> for list entry 3 (in our example: for parameter C00027/1)
- etc.

These values are used for writing if the *bSelectWriteValue_1* input is not assigned or set to FALSE.

Entering further different values for the parameters (value set 2)

If required, you can set another set with values in the same manner in C01087/1 ... n which serve to write the parameters.

8.1.3 Selecting a value set

The value set to be used is selected via the *bSelectWriteValue_1* selection input. This selection input can be linked with another output signal via the configuration parameter C00701/26.

bSelectWriteValue_1	Value set used
FALSE	Value set 1 (C01086/1 ... n)
TRUE	Value set 2 (C01087/1 ... n)

8.1.4 Activating the writing of the parameters

For writing the parameter list, two modes are available in C01082:

- 0: by Execute (Lenze setting)
  The writing of the parameter list is activated by a FALSE-TRUE edge at the *bExecute* control input. This control input can be linked with another output signal via the configuration parameter C00701/25.
- 1: by Input Select
  The parameter list is written to if a change is made at the *bSelectWriteValue_1* selection input and once when the inverter is initialised.

The parameters are written one at a time every time the main program is executed until the entire parameter list is processed. In case of an error, corresponding error messages are output.

After successful completion

... the *bDone* output is set to TRUE.

- The *bDone* output is automatically reset to FALSE if writing via *bExecute* is activated again.

In the event of an error

... the *bDone* output remains set to FALSE and the *bFail* output is set to TRUE.

- C01083 displays an error status and C01084 displays the number of the list entry at which the error occurred (in connection with the selected value set).
- If several errors occur at the same time, only the first incorrect list entry will be displayed. Hence, after elimination of the displayed error and another activation, more errors may be displayed.
- The parameter list will always be processed from beginning to end, even if errors occur in the meantime.

8.2 Holding brake control

An automatic holding brake control function is integrated in the application which controls the holding brake in relation to the speed setpoint and diverse other internal control signals. Due to integrated automatic brake operation, the user is relieved of the task of managing these control signals.

Danger!

Please note that the holding brake is an important element of the safety concept of the machine as a whole.

Thus, proceed very carefully when commissioning this system part!

Stop!

Holding brakes on Lenze motors are not intended for braking during operation. The increased wear caused by braking during operation can destroy the motor holding brake!

Note!

Deactivate automatic DC-injection braking when a holding brake is used!

- Set C00019 (Auto-DCB threshold) to the value "0".
- Set C00106 (hold time of the automatic DC-injection brake) to the value "999.0".

When both parameterisations are executed, the motor is continued to be supplied with current from version 07.00.00 despite a output frequency of "0" and a speed setpoint of "0"!

If an electrically holding (self-releasing) brake is to be controlled instead of an electrically released (self-holding) brake, the trigger signal must be inverted! ▸ Functional settings (🕮 300)

Detailed information on mounting and electrical installation of the motor holding brake can be found in the documentation on the motor holding brake.

Intended use

Motor holding brakes are used to lock axes if the controller is inhibited or in case of "mains off" system status. This is not only important for vertical axes but also for e.g. horizontal axes which may cause various problems if the motion is not controlled.

Examples:

- Loss of the reference information after mains OFF and further spinning of the drive.
- Collision with other moving machine parts.

8.2.1 Parameter setting

Danger!

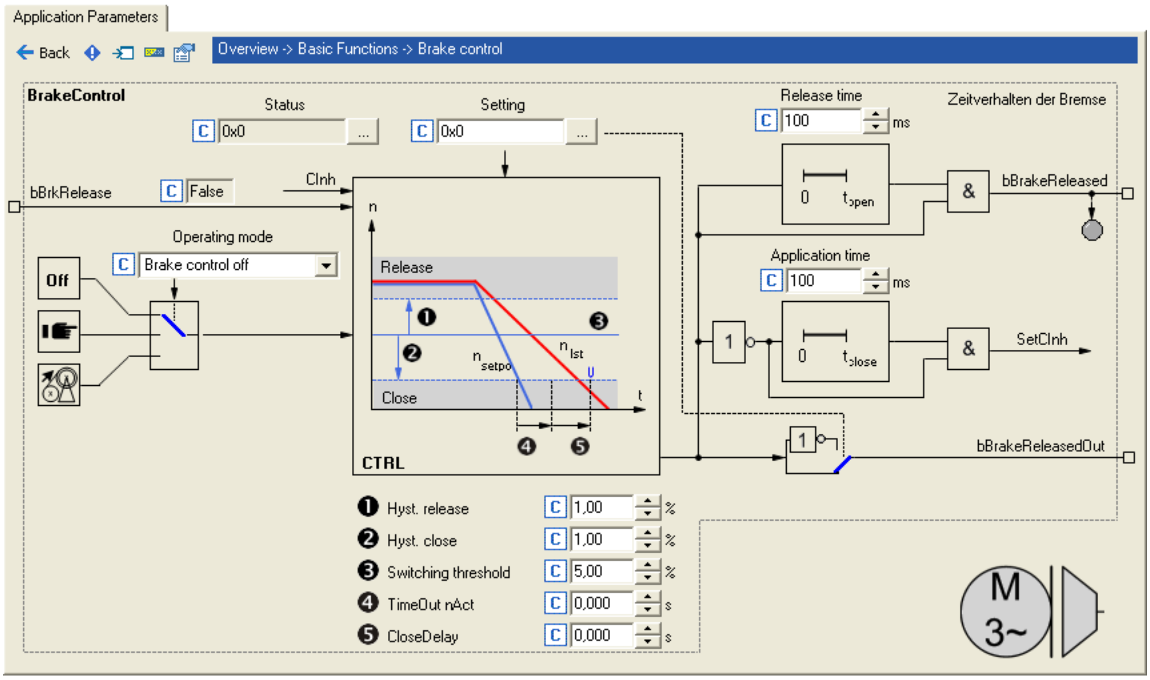
A faultless brake control function requires a correct setting of the different deceleration times in the following parameters!

A wrong setting of the delay times can cause a faulty control of the brake!

How to go to the parameterisation dialog of the holding brake control:

1. »Engineer« Go to the *Project view* and select the 8400 motec inverter.
2. Select the **Application parameters** tab from the *Workspace*.
3. Go to the *Overview* dialog level and click the "**Basic functions**" button.
4. Go to the *Overview* → *Basic functions* dialog box and click the **Holding brake control** button.

Parameterisation dialog in the »Engineer«



Status: C 0x0
Setting: C 0x0
Release time: C 100 ms
bBrkRelease: C False
Operating mode: C Brake control off
Application time: C 100 ms
❶ Hyst. release: C 1,00 %
❷ Hyst. close: C 1,00 %
❸ Switching threshold: C 5,00 %
❹ TimeOut nAct: C 0,000 s
❺ CloseDelay: C 0,000 s

Input and output signals of the holding brake control:

Input Data type Configuration parameters	Information/possible settings	
bBrkRelease BOOL C00701/19	Manual release of the brake in connection with the selected operating mode. • In the Lenze setting, this input is connected to the digital input DI5.	
	FALSE	Do not release the brake manually.
	TRUE	Release brake manually (forced release). • **Note!** The brake can also be released when the controller is inhibited! • During automatic operation, the internal brake logic is deactivated and the brake is released (supervisor operation). If a controller inhibit has been set by the brake control, it will be deactivated. • In semi-automatic operation, the brake is released including feedforward control.

Output Data type	Value/meaning	
bBrkReleaseOut BOOL	Trigger signal for the motec-internal power output (terminals BR1 and BR2) for triggering the brake. • Use bit 0 in C02582 to activate inverted triggering of the power output. ▶ Functional settings	
	FALSE	Apply brake.
	TRUE	Release brake.
bBrkReleased BOOL	"Brake released" status signal considering the brake release time • When the holding brake is triggered to close, $\beta B\rho\kappa P\epsilon\lambda\epsilon\alpha\sigma\epsilon\delta$is immediately reset to FALSE even if the brake closing time has not yet elapsed!	
	TRUE	Brake released (after the brake release time has expired).

Short overview of parameters for holding brake control:

Parameters	Information	Lenze setting	
		Value	Unit
C00701/19	Signal source for bBrkRelease	15: DigIn_bIn5	
C02580	Holding brake: Operating mode	0: Brake control off	
C02581/1	Holding brake: Switching threshold	5.00	%
C02581/2	Holding brake: Hyst. release	1.00	%
C02581/3	Holding brake: Hyst. close	1.00	%
C02582	Holding brake: Setting	0	
C02589/1	Holding brake: Closing time	100	ms
C02589/2	Holding brake: Release time	100	ms
C02593/1	Holding brake: Actual value monitoring	0.000	ms
C02593/2	Holding brake: Application delay	0.000	ms
C02610/1	MCK: Holding brake ramp time synchr.	2.0	s
C02607	Holding brake: Status	-	
C00158	Cause of controller inhibit → Bit 12: Automatic brake operation	-	
C00833/24	MCK: bBrkRelease	-	
Greyed out = display parameter			

8.2.1.1 Functional changes from firmware version 05.00.00

Note!

From version 05.00.00 onwards, the holding brake control changes as follows:

- There is no synchronisation ramp anymore. C02610/1 has no function.
- If the switching threshold (C02581/1) is set to "0", the resulting switching thresholds for opening and closing the holding brake are "0" as well.
- If the axis moves horizontally (C02582, bit 3 = "1"), the speed setpoint does not freeze while the holding brake is closed.

8.2.1.2 Functional changes from firmware version 07.00.00

Note!

Hoist applications

Up to version 06.xx.xx :

Do not use the QSP function for hoist applications since the hoist may sag when QSO is used or a setpoint of 0 rpm is directly specified.

From version 07.00.00:

An impermissible sagging of the hoist can be avoided when you make the following settings in deviation from the default setting:

- C00019 = 0 and
- C00106 = 999.0 s

Horizontal winding technology

Up to version 06.xx.xx :

In case of horizontal winding technology (C02582, Bit3 = 1), the speed setpoint (ramp function generator) is not frozen when the brake is set (closing active).

From version 07.00.00:

With QSP and a setpoint selection of 0 rpm, the brake function can be used without any restrictions.

8.2.1.3 Functional changes from firmware version 09.00.00 onwards

Note!

Automatic control / semi-automatic control (C02580 **= 12/13**)

Up to version 08.xx.xx :

When the 400 V supply is switched off, release of the holding brake is only deactivated after 500 ms. Sagging of a hoist, for instance, as a result of this response, is not desirable.

Implementation of the following measures is necessary to avoid this response:

- Ensure that the holding brake is not released before the 400 V supply is switched off, or
- implement a function block interconnection that does not release the holding brake before the 400 V supply is switched off.

From version 09.00.00:

When the 400 V supply is switched off, release of the holding brake is deactivated immediately.

Control of the brake independent of the operating mode of the holding brake (C02580)

From version 09.01.00:

Bit 7 in C02582 serves to directly release and close the holding brake via *bBrkRelease* (C00701/19). The internal control of the holding brake is deactivated.

- Possible application: Build up a torque against the closed brake via a speed setpoint and then release the brake manually. The switching status of the brake continues to be output under *bBrkReleased* and *bBrkRelasedOut* and displayed in C02607.

8.2.1.4 Operating mode

For different applications and tasks, different operating modes are available in C02580. The selected operating mode determines whether the holding brake control is used and how the holding brake will be switched.

Mode 0: Brake control off

In this mode, brake control is switched off (not active).

- The trigger signal *bBrkReleaseOut* for the holding brake control switching element is set to FALSE.
- The status signal *bBrkReleased* is set to FALSE.

Mode 11: Manual control

In this mode, brake release and brake application can be directly controlled via the input *bBrkRelease* (Configuration: C00701/19) without special logic or automatic.

- Setting pulse inhibit or controller inhibit has no influence on the trigger signal *bBrkReleaseOut* for triggering the power output (terminals BR1 and BR2).
- After the brake has been activated and the brake application time has expired, the controller is inhibited automatically by the basic "Holding brake control" function.

Tip!

You can use mode 11 to easily check if the brake switches correctly.

Mode 12: Automatic control

In this mode, the brake is controlled automatically.

- If the requested speed setpoint reaches a parameterisable upper speed threshold that allows traversing of the drive, the brake will be released and operation enabled.
- On the other hand, if speed setpoint and actual speed fall below a parameterisable lower speed threshold, the brake will be applied under consideration of different time parameters.
- The brake will also be activated automatically if quick stop is activated in the drive, e.g. by a device command or as response to an error, and in the event of controller inhibit or pulse inhibit.
- After automatic brake activation and expiration of the brake application time, the controller is inhibited automatically by the basic "Holding brake control" function.

Tip!

The 12 mode is the common mode to control the brake.

- In this mode, the *bBrkRelease* input should be permanently set to FALSE unless manual release is required.
- When *bBrkRelease* = TRUE, the brake is permanently released and the automatic control cannot apply the brake.
- Set "0: Not connected" in C00701/19 if you use this mode and do not want a forced release.

Mode 13: Semi-automatic control

From version 02.00.00

This mode is similar to mode 12 (automatic control). However, there are the following differences compared to mode 12:

- The brake has to be released manually via the *bBrkRelease* input. The parameterisable upper speed threshold is ineffective for releasing the brake.
- If the brake is released via the *bBrkRelease* input, the feedforward control gets active: Before and during the release, feedforward control takes place according to the settings in C02582 (bit 2 ... 4). ▶ Functional settings (📖 300)
- If controller inhibit is pending, the brake is not released.
- If the controller is inhibited, the brake is applied immediately.

Related topics:

▶ Behaviour in case of pulse inhibit (📖 309)

8.2.1.5 Functional settings

The following bit coded functional settings for the holding brake control can be made in C02582:

Bit	Option	Information
Bit 0	Control inverted	Activation of inverted control • "1" ≡ Inverted logic of the trigger signal *bBrkReleaseOut* for triggering the power output (terminals BR1 and BR2).
Bit 1	nAct < nMin at CInh	Brake response in case of pulse inhibit • "1" ≡ In the case of a pulse inhibit, the actual speed value is monitored which must reach the "Close" threshold value to cause the holding brake to be applied. **Note:** • Function only possible if speed feedback via the digital input terminals DI1/DI2 is available. ▸ Encoder/feedback system • This function is only active if bit 3 (horizontal/winding technology) is set as well. The function is used in order that, when the controller is inhibited, the holding brake of a drive with horizontal traverse path does not wear out during rotation. • With vertical motion (bit 3 = 0), this function is not active. Especially with hoists and activated pulse inhibit of the inverter, an immediate application of the brake is essential for safety-related reasons!
Bit 2	Inverted feedforward control	Direction of feedforward control with vertical/hoist technology: • "0" ≡ Positive direction • "1" ≡ Negative direction **Note:** • Reversal (Ccw) is then considered.
Bit 3	Horizontal/winding technology	Direction of movement of the axis • "0" ≡ The axis performs vertical movements. Gravitational acceleration causes movements. • "1" ≡ The direction of the axis is horizontal or rotary. The gravitational acceleration does not cause any movement.
Bit 4	No premagnetisation	From version 02.00.00 Deactivation of the 200 ms premagnetisation before releasing the brake. • "0" ≡ Premagnetisation in case of feedforward control. • "1" ≡ No premagnetisation.
Bit 5	Reserved	
Bit 6		
Bit 7	Direct holding brake	From version 09.01.00 onwards Releasing and closing via application input: • "0" ≡ The holding brake is released and closed via the internal control. • "1" ≡ The holding brake is directly released and closed via *bBrkRelease* (C00701/19). The internal control of the holding brake is deactivated.

Note!

In C00597, a motor phase monitoring can be set.

- When "1: Fault" is set, it is checked, before the brake is released and during motor premagnetisation, if all three motor phases are connected. If one or several motor phases are missing, the brake will not be released and the drive changes to the "Fault" status.
- If you want to use this function:
  - Ensure that the premagnetisation is not deactivated via bit 4 in C02582.
  - Do not release the brake manually via the *bBrkRelease* input since in this case, no premagnetisation and thus no check of the motor phases take place.

Related topics:

- Behaviour in case of pulse inhibit (🕮 309)
- Feedforward control of the motor before release (🕮 310)

8.2.1.6 Switching thresholds

Stop!

Do not set the lower speed threshold for closing the brake too high to prevent excessive wear of the brake!

Note!

When comparing speeds, only the absolute value of the motor speed and not the direction of rotation is considered.

Avoid a conflict between the mechanical holding brake and the "DC-injection braking" function by setting the auto-DCB threshold (C00019) to 0 rpm for DC-injection braking.

Upper speed threshold for brake release:

Switching threshold (C02581/1) + hysteresis for release (C02581/2)

Lower speed threshold for brake application:

Switching threshold (C02581/1) - hysteresis for application (C02581/3)

Tip!

The lower speed threshold for brake application should be set to approximately 5 ... 20 % of the maximum speed to minimise the wear of the brake and provide for an optimum brake reaction by a low grinding of the brake.

Related topics:

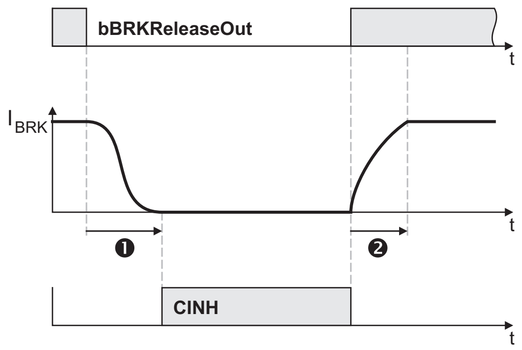
- Process when brake is released (📖 306)
- Process when brake is closed (📖 307)

8.2.1.7 Application and release time

Danger!

A wrong setting of the application and release time can cause a faulty control of the brake!

- If the application time is set too low, the controller is inhibited and the drive becomes torqueless before the brake is applied completely.



❶ C02589/1: Application time
❷ C02589/2: Release time
CINH = controller inhibit

[8-1] Chronological sequence of the brake output signal

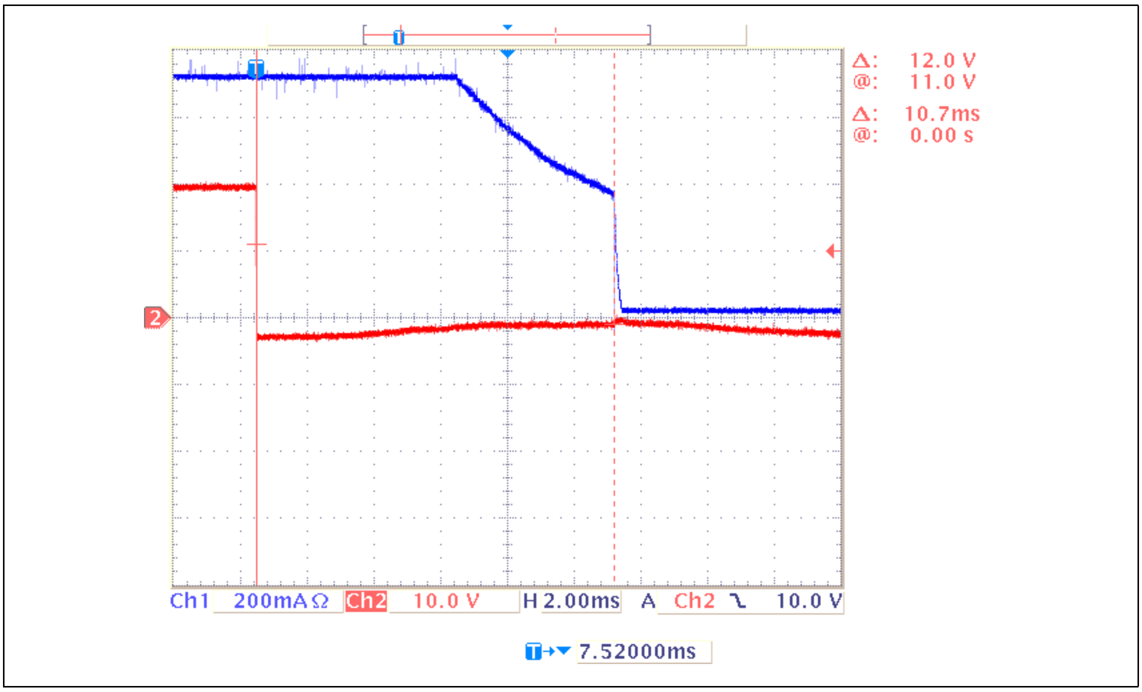
- Every mechanical holding brake comes with a construction-conditioned application and release time which must be considered by the holding brake control and is set in C02589.
- The application and release time of the Lenze holding brake is indicated in the supplied operating instructions in the "Technical data" chapter.
- If the application and release times are too long, this is uncritical in respect of safety but leads to unnecessarily long delays during cyclical braking processes.

Tip!

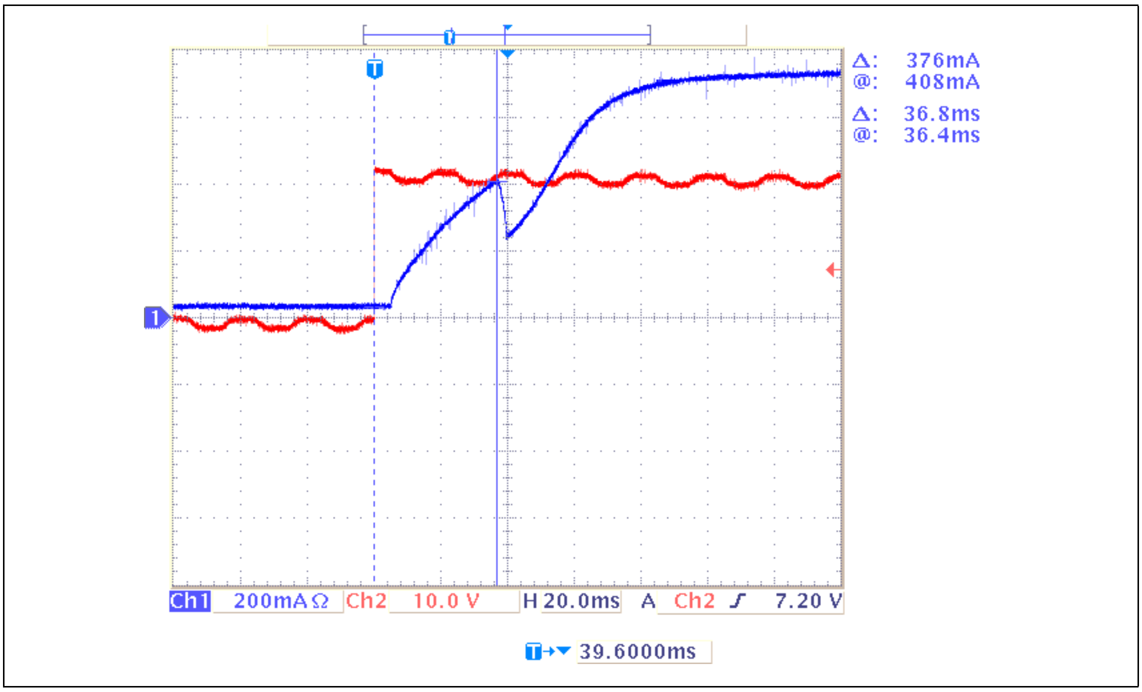
The application and release times do not only vary between the brake types but also depend on the basic conditions in the plant:

- Parameters of the hardware (cable length, temperature, level of supply voltage etc.)
- Contact elements used (contactor at the digital output)
- Type of overvoltage limitation/suppressor circuit

For optimisation purposes, detect in individual cases the response times by measurement.



[8-2] Oscillogram 1: Current characteristic for the application of a mechanical holding brake (application time: 10.7 ms)



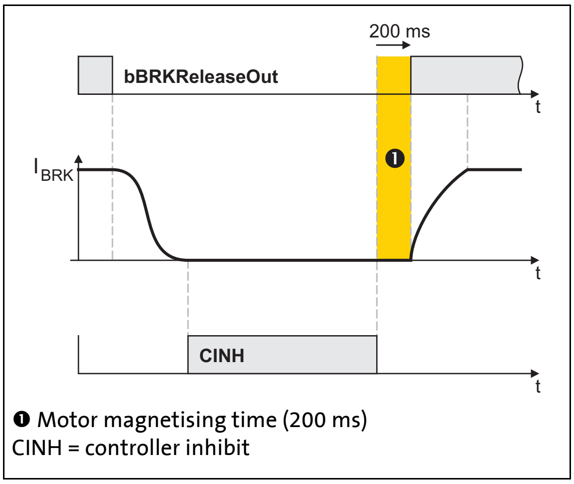
[8-3] Oscillogram 2: Current characteristic for the release of a mechanical holding brake (release time: 36.8 ms)

Related topics:

- Process when brake is released (📖 306)
- Process when brake is closed (📖 307)

8.2.1.8 Motor magnetising time (only with asynchronous motor)

When an asynchronous motor is used, first the magnetic field required for the holding torque is created (which is already available when a synchronous motor is used) after the controller inhibit is deactivated and before the brake is released:



❶ Motor magnetising time (200 ms)
CINH = controller inhibit

[8-4] Chronological sequence of the brake output signal

- The frequency related to the lower speed threshold is output for 200 ms unless the premagnetisation has not been deactivated via bit 4 in C02582.
- The same frequency is output to the motor during the release time set in C02589/2.
- The direction of rotation depends on the settings in C02582 (bit 2/3) and the setpoint speed.

8.2.1.9 Actual value monitoring

Note!

Function only possible if speed feedback via the digital input terminals DI1/DI2 is available. ▸ Encoder/feedback system (🕮 181)

If an actual value monitoring time > 0 s is selected in C02593/1, the actual speed time monitoring is active.

- The monitoring time starts when the speed setpoint has reached the lower switching threshold and the actual speed is still above this threshold. (see illustration [8-7] in chapter "Process when brake is closed".)
- If the actual speed is still above the threshold when the monitoring time has expired, the brake will be automatically applied in the automatic brake control mode (mode 12).

Note!

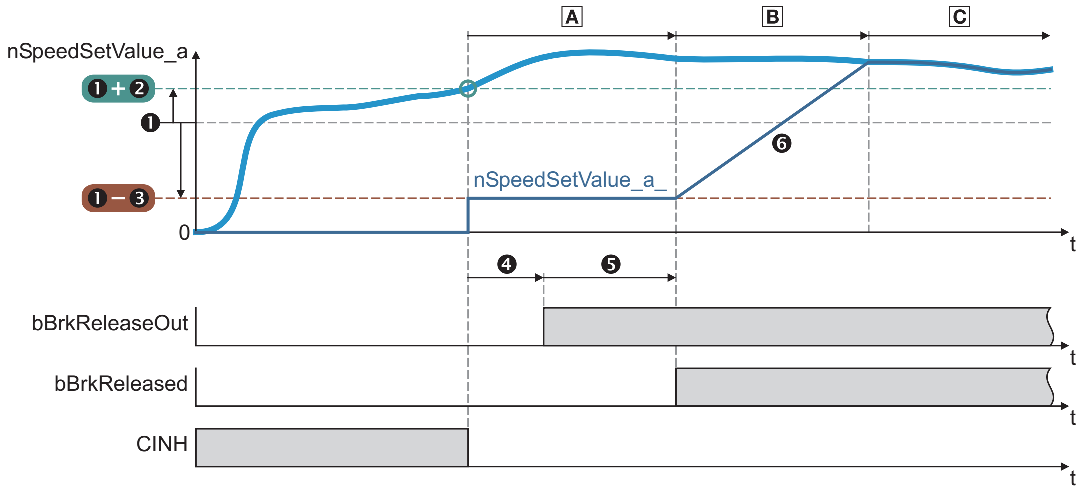
In the Lenze setting, the actual speed time monitoring is deactivated (C02593/1 = "0 s"), i.e. the brake will only be applied when the actual speed has reached the lower switching threshold if speed feedback is available.

8.2.2 Process when brake is released

1. The controller inhibit is deactivated.
2. The magnetic field required for the holding torque is created in the motor (is already available when a synchronous machine is used).
3. For brake release, the *bBrkReleaseOut* trigger signal for triggering the power output is set to TRUE.
4. After the brake opening time has elapsed:
   - The *bBrkReleased* status signal ("brake released") is set to TRUE.
   - The drive synchronises to the already accelerated speed setpoint.

Time diagram

A Feedforward control
B Setpoint synchronisation
C Follow setpoint



❶ C02581/1: Switching threshold
❷ C02581/2: Hysteresis for release
❸ C02581/3: Hysteresis for application
❹ Time slot for magnetising
❺ C02589/2: Release time
❻ Ramp time for approaching the setpoint speed

[8-5] Release holding brake in automatic mode via speed threshold

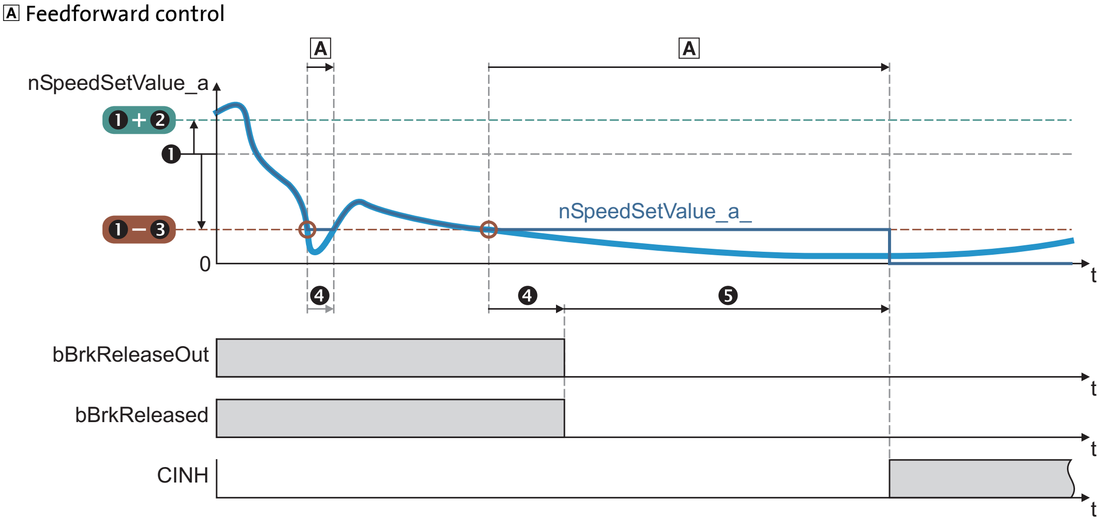
Related topics:

▶ Feedforward control of the motor before release (📖 310)

8.2.3 Process when brake is closed

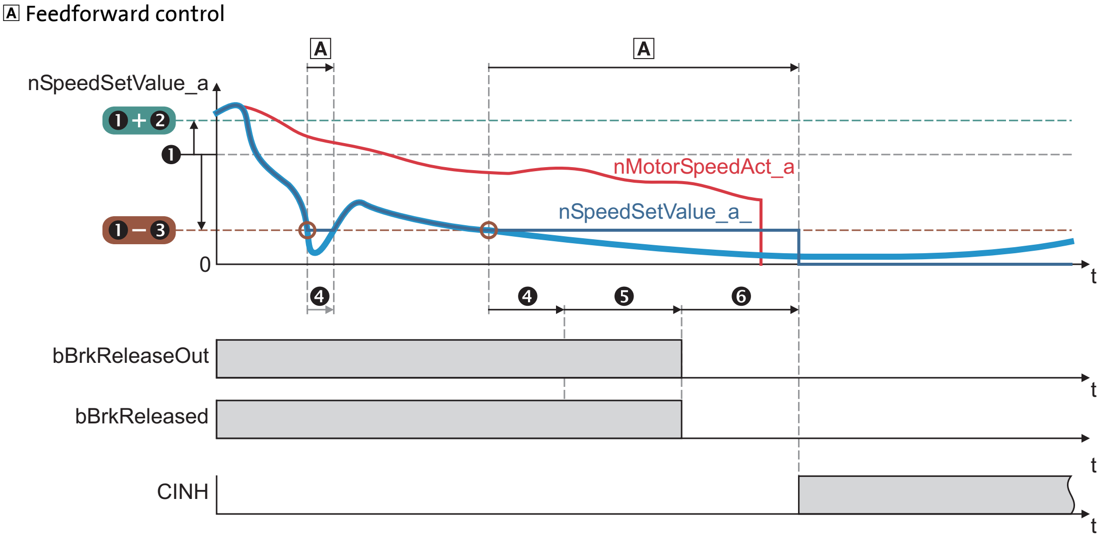
1. The motor is decelerated when the setpoint is reduced by the user (e.g. turn down the potentiometer, setpoint selection via CAN).
    - The motor can also be decelerated by the "Quick stop" function or by "DC-injection braking", either directly requested by the user or as response to an error.
2. If the speed setpoint and the actual speed have fallen below the lower speed threshold or only the speed setpoint has fallen below the lower speed threshold and the actual value monitoring time has expired:
    - For closing the brake, the *bBrkReleaseOut* trigger signal for triggering the power output is set to FALSE.
    - The *bBrkReleased* status signal is reset to FALSE.
    - The brake application time starts to expire.
3. After the brake application time has expired, the controller is inhibited.

Time diagrams



❶ C02581/1: Switching threshold
❷ C02581/2: Hysteresis for release
❸ C02581/3: Hysteresis for application
❹ C02593/2: Application delay
❺ C02589/1: Application time

[8-6] Close holding brake in automatic mode via speed threshold (actual value = setpoint)



❶ C02581/1: Switching threshold
❷ C02581/2: Hysteresis for release
❸ C02581/3: Hysteresis for application
❹ C02593/2: Application delay
❺ C02593/1: Actual value monitoring time
❻ C02589/1: Application time

[8-7] Close holding brake in automatic mode with actual value monitoring time (C02593/1 > 0 s)

8.2.4 Behaviour in case of pulse inhibit

Setting the pulse inhibit causes a load-controlled coasting of the motor until the pulse is enabled again. In the enabled inverter, the pulse can be inhibited e.g. due to a DC overvoltage, DC undervoltage or the "Safe torque off" request.

The brake response to pulse inhibit can be parameterised under C02582.

Stop!

For parameterising the response to pulse inhibit in C02582, the energy conditions of the machine should be evaluated first.

The energy stored in the machine can be considerably higher than the permissible switching energy and thus lead to the destruction of the brake if applied directly!

Activate brake immediately when pulse is inhibited

If bit 1 in C02582 is set to "0" (Lenze setting), the brake is controlled to be closed immediately when a pulse inhibit is set.

Especially in the case of hoist drives, immediate engagement of the brake is absolutely necessary for safety reasons if the pulse inhibit function of the inverter has been activated!

Only activate brake below threshold for brake activation

Note!

Function only possible if speed feedback via the digital input terminals DI1/DI2 is available. ▶ Encoder/feedback system (📖 181)

If bit 1 and bit 3 are set to "1" in C02582, the brake remains released until the lower speed threshold is reached to avoid an excessive wear of the brake.

- The braking action only takes places due to the friction in the load mechanics.
- The brake will not be applied until the motor speed has reached the threshold for brake activation. Hence, the function depends on the signal of the speed encoder.

During uncritical operation (horizontal loading condition), delayed brake application may be required to protect the brake in case of high centrifugal masses.

In case of vertical motion (bit 3 = 0), this function is not active due to safety-related reasons.

Related topics:

▶ Functional settings (📖 300)

▶ Switching thresholds (📖 301)

8.2.5 Feedforward control of the motor before release

Note!

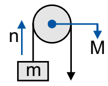
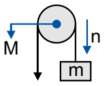
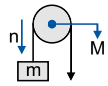
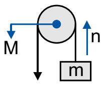
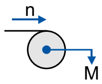
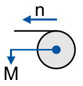
The feedforward control is only executed in mode 12 ("automatically controlled") or mode 13 ("semi-automatically controlled").

The motor is precontrolled by selecting the lower speed threshold for applying the brake. When the upper speed threshold for brake release is reached, the motor is precontrolled for 200 ms with the lower threshold value before the brake switches to the release mode.

Here, the direction of the feedforward control depends on two conditions:

1. On the settings selected under C02582:
   - Bit 2 = feedforward control inverted
   - Bit 3 = direction of the axis
2. On the sign of the setpoint.

Truth table for the direction of the feedforward control

Setpoint	Direction	Feedforward control	Scheme	Direction	
				Feedforward control value	Start value
n ≥ 0	vertical/hoist (C02582: Bit 3 = 0)	Not inverted (C02582: Bit 2 = 0)		⊕	⊕
		Inverted (C02582: Bit 2 = 1)		⊖	⊕
n < 0		Not inverted (C02582: Bit 2 = 0)		⊕	⊖
		Inverted (C02582: Bit 2 = 1)		⊖	⊖
n ≥ 0	horizontal/winding drive (C02582: Bit 3 = 1)	Inversion via bit 2 with horizontal direction not effective		⊕	⊕
n < 0				⊖	⊖

Related topics:

▶ Functional settings (📖 300)
▶ Switching thresholds (📖 301)

9 Diagnostics & error management

This chapter provides information on error handling, drive diagnostics, and fault analysis.

9.1 Basics on error handling in the inverter

Many of the functions integrated in the inverter can

- detect errors and thus protect the device from damage or overload, e.g. short-circuit detection, Ixt overload detection, overtemperature detection, etc.
- detect operating errors by the user, e.g. a missing memory module,
- output warning signals, e.g. if the speed is too high or too low, etc.

Depending on the importance, the error detection in the device responds very fast (e.g. short-circuit detection < 1 ms) or in a slower cycle (e.g. temperature monitoring approx. 100 ms).

All functions provided with an error detection (e.g. the motor control) supply information to a so-called error handler. The error handler is processed every 1 ms and evaluates all information.

In this evaluation, the current error (display in C00165) is generated and the inverter is set to the error status applicable in each case (e.g. Trouble).

The error information in C00166/1..3 is used for error diagnosis and contains the following information:

1. Error type (e.g. "Warning")
2. Error subject area (e.g. "motor management/encoder")
3. The error ID within the error subject area

Together all types of information form the real error number which is unique in the whole device system. ▶ Structure of the 32-bit error number (bit coding) (📖 330)

In addition to the control of the device status by the error handler, a logbook function records the errors and their histories. ▶ Logbook (📖 322)

Tip!

For many device errors, the error type and hence the response of the inverter to the error can be parameterised. ▶ Setting the error response (📖 326)

9.2 LED status display

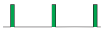
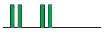
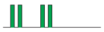
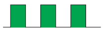
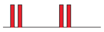
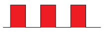
Information on some operating states can be quickly obtained via the LED status display on the top of the device. In general, the red colour symbolises a fault state ("DRIVE ERROR”) while the trouble-free state is in green ("DRIVE READY").

The meaning of various operating states can be found in the following table. The description of the operating states can be found in section

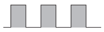
▶ Device state machine and device states

Further descriptions relating to signalling can be found here:

- Maloperation of the drive
- Device search function
- Key-operated switch operation

Green "DRIVE READY"	Red "DRIVE ERROR"	Description	Device status (Display in C00137)
Off	Off	Off	Off
	Off	Safe torque off is active	SafeTorqueOff
	Off	Device is ready to start	ReadyToSwitchOn
	Off	Device is switched on	SwitchedOn
	Off	Motor data identification/operation	OperationEnabled
  		The inverter is ready to switch on, switched on or the operation is enabled and a warning is indicated.	
Off		Trouble active	Trouble
Off		Error active	Fault

Legend
Meaning of the symbols used to describe the LED states:

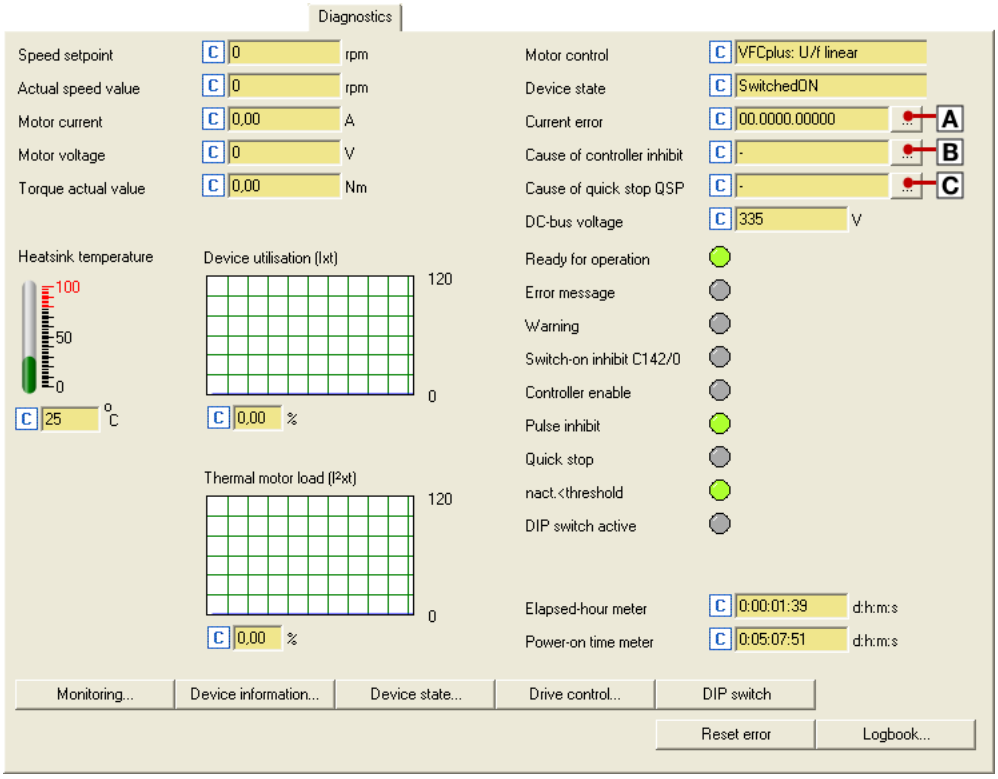
	LED is flashing once approx. every 3 seconds (*slow flash*)
	LED is flashing once approx. every 1.25 seconds (*flash*)
	LED is flashing twice approx. every 1.25 seconds (*double flash*)
	LED is blinking every second
	LED is permanently on

Tip!

- Information on failures can be transmitted e.g. to a master control via the fieldbus.
- From version 04.01.00 onwards, the brightness of the green LED can be reduced via bit 0 and bit 1 in C00143 if the green light is too bright or disturbing for your application.

9.3 Drive diagnostics with the »Engineer«

When an online connection to the inverter has been established, the connected inverter can be diagnosed and relevant actual inverter states can be displayed in a clearly arranged visualisation using the »Engineer«:



Speed setpoint 0 rpm
Actual speed value 0 rpm
Motor current 0,00 A
Motor voltage 0 V
Torque actual value 0,00 Nm
Heatsink temperature 25 °C
Device utilisation (Ixt) 0,00 %
Thermal motor load (I²xt) 0,00 %
Motor control VFCplus: U/f linear
Device state SwitchedON
Current error 00.0000.00000
Cause of controller inhibit -
Cause of quick stop QSP -
DC-bus voltage 335 V
Elapsed-hour meter 0:00:01:39 d:h:m:s
Power-on time meter 0:05:07:51 d:h:m:s

Button		Function
...	A	Display details of the current error.
	B	Display all active sources of a controller inhibit.
	C	Display all active sources of a quick stop.
Monitoring...		Configure the Monitoring. (🕮 324)
Device information...		Display identification data, e.g. information on firmware version.
Device state...		Display the internal state machine including the current device status.
Drive control...		Display the bit assignment of the following control-related words: • Network MCI/CAN control word (C00136/1) • Cause of controller inhibit (C00158) • Cause of quick stop QSP (C00159) • Status word (C00150) • Extended status word (C00155)
DIP switch		Display of DIP switch positions (🕮 316)
Error reset		Acknowledge error message (if the error cause has been eliminated).
Logbook...		Display the Logbook of the inverter. (🕮 322)

How to diagnose a drive with the »Engineer«:

1. Go to the *Project view* and select the 8400 motec inverter.
2. Click the icon or select the **Online→Go online** command to build up an online connection with the inverter.
3. Select the **Diagnostics** tab.
   - With an online connection, the **Diagnostics** tab displays current status information about the inverter.

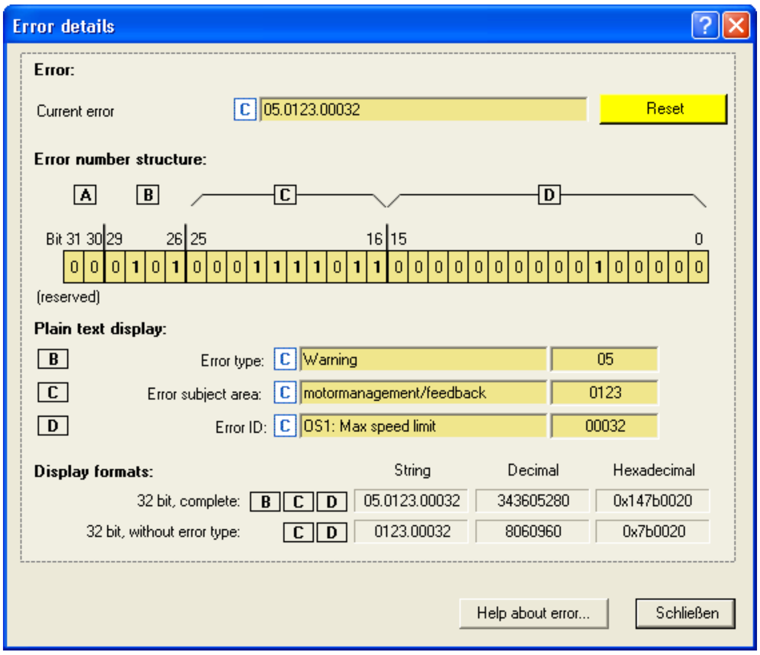
Related topics:

▶ Device control (DCTRL) (📖 61)

▶ Device state machine and device states (📖 72)

9.3.1 Display details of the current error

If you go to the **Diagnostics** tab and click the ... button for the current error, the *Error details* dialog box displays more information on the current error:



Error:

Current error: C 05.0123.00032

Error number structure:

Bits 31…0: 0 0 0 1 0 1 0 0 0 1 1 1 1 0 1 1 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0

Plain text display:

B Error type: C Warning 05
C Error subject area: C motormanagement/feedback 0123
D Error ID: C OS1: Max speed limit 00032

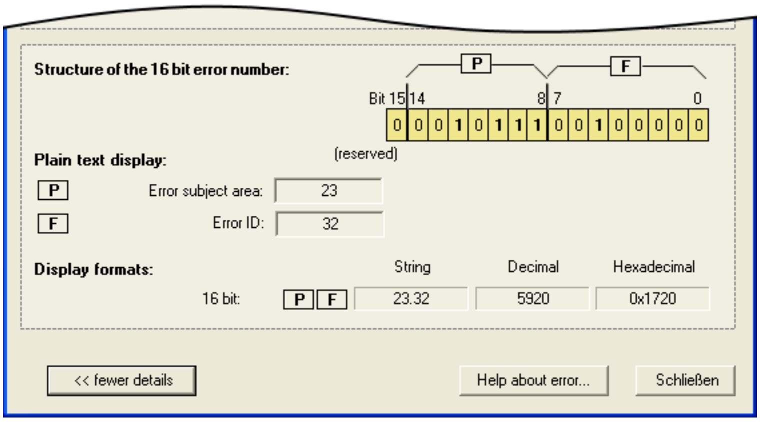
Display formats:

		String	Decimal	Hexadecimal
32 bit, complete:	B C D	05.0123.00032	343605280	0x147b0020
32 bit, without error type:	C D	0123.00032	8060960	0x7b0020

- Click the **Help about error...** button to open the online help with information on the error cause and possible remedies.

From version 04.00.00:

- The **>> more details** button serves to provide more information about the structure of the 16-bit error number:



Structure of the 16 bit error number:

Bits 15…0: 0 0 0 1 0 1 1 1 0 0 1 0 0 0 0 0

Plain text display:

P Error subject area: 23
F Error ID: 32

Display formats:

		String	Decimal	Hexadecimal
16 bit:	P F	23.32	5920	0x1720

Related topics:

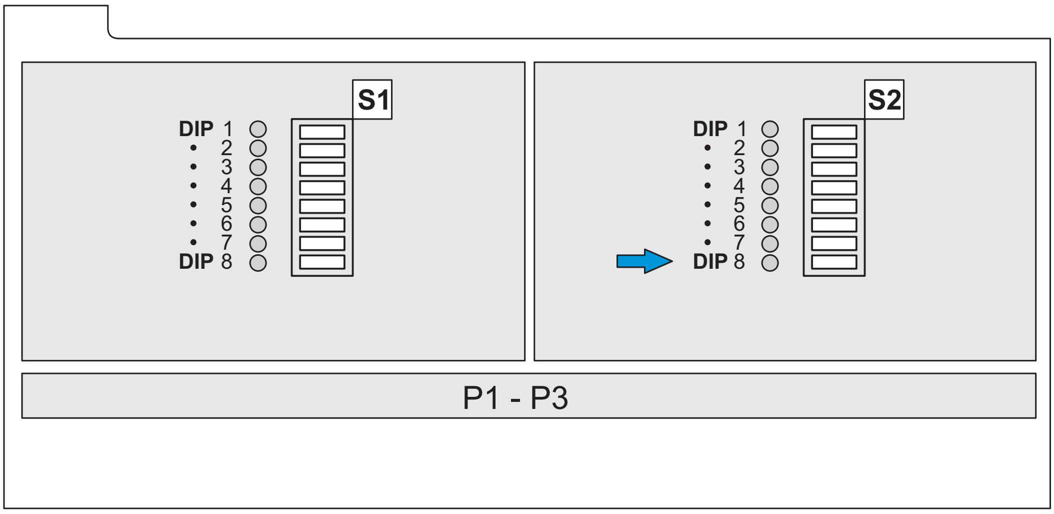
- Structure of the 32-bit error number (bit coding) (📖 330)
- Structure of the 16 bit error number (bit coding) (📖 333)

9.3.2 Display of DIP switch positions

The DIP switches S1 and S2 and the potentiometer P1 - P3 are components for easy commissioning of the inverter. When the inverter is mounted, some of them cannot be accessed. However, when an online connection has been established to the device, the »Engineer« can indicate their switching states. Go to the **Diagnostics** tab and confirm the **DIP switch** button.

In the left part of the display, the switching status of the DIP switch S1 is indicated, in the right part the switching status of the DIP switch S2 is indicated.

In the lower part, the display informs about the potentiometer settings P1 - P3. Further information on this can be found in the mounting instructions or the hardware manual for this inverter.



From version 07.00.00 onwards:

DIP8 on the DIP switch S2 (see arrow above) serves to set two different pre-assignments of the DIP switches S1 / S2 and the potentiometer P 1-P3:

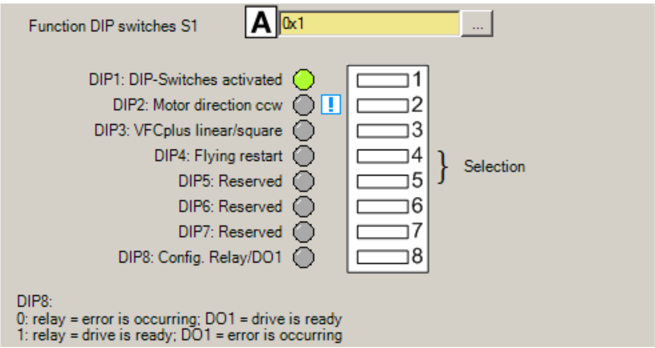
- Assignment of the DIP switches S2/DIP8 = OFF ▸ DIP switch / potentiometer assignment 0 (📖 317)
- Assignment of DIP switch S2/DIP8 = ON ▸ DIP switch / potentiometer assignment 1 (📖 319)
- For assignment of the potentiometers, see C00013 in the Parameter list (📖 365)

Related topics:

▸ Terminal assignment of the control modes (📖 240)

9.3.2.1 DIP switch / potentiometer assignment 0

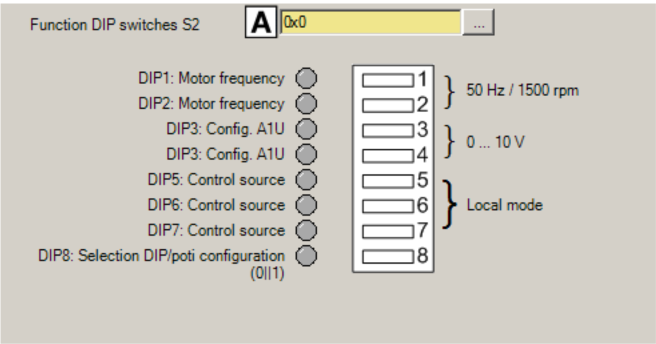
DIP switch S1



Function DIP switches S1: 0x1

DIP8:
0: relay = error is occurring; DO1 = drive is ready
1: relay = drive is ready; DO1 = error is occurring

Position	Description Affected parameters	Lenze setting
A	Hexadecimal view of the DIP switch positions DIP1 - DIP8	0x00
DIP1	Setting according to DIP switch S1/S2 and potentiometer P1 - P3 • ON: DIP switch and potentiometer "active" • OFF: DIP switch and potentiometer ineffective	OFF
DIP2	Direction of rotation • ON: left • OFF: No impact on the direction of rotation C00701/5	OFF
DIP3	Control • ON: VFCplus square-law • OFF: VFCplus linear C00006	OFF
DIP4	Flying restart circuit • ON: Flying restart circuit "ON" • OFF: Flying restart circuit "OFF" C00990	OFF
DIP5	Reserved	OFF
DIP6	Reserved	OFF
DIP7	Reserved	OFF
DIP8	Error message (only in case of Communication Unit with the "Safety STO" option) • ON: Relay = drive is ready, DO1 = error is pending • OFF: Relay = error is pending, DO1 = drive is ready C00621/1	OFF

<table>
<tr><th colspan="3">DIP switch S2</th></tr>
<tr><td colspan="3">


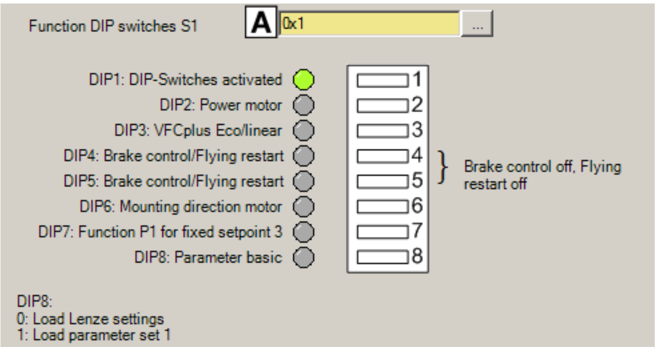
Function DIP switches S2 **A** 0x0

DIP1: Motor frequency ○
DIP2: Motor frequency ○
DIP3: Config. A1U ○
DIP3: Config. A1U ○
DIP5: Control source ○
DIP6: Control source ○
DIP7: Control source ○
DIP8: Selection DIP/poti configuration (0|1) ○

</td></tr>
<tr><th>Position</th><th>Description
Affected parameters</th><th>Lenze setting</th></tr>
<tr><td>A</td><td>Hexadecimal view of the DIP switch positions DIP1 - DIP8</td><td>0x00</td></tr>
<tr><td>DIP1, DIP2</td><td>Rated motor frequency
<table>
<tr><th></th><th>DIP1</th><th>DIP2</th></tr>
<tr><td>50 Hz (Y)</td><td>OFF</td><td>OFF</td></tr>
<tr><td>60 Hz (Y)</td><td>ON</td><td>OFF</td></tr>
<tr><td>87 Hz (Δ)</td><td>OFF</td><td>ON</td></tr>
<tr><td>120 Hz (Δ)</td><td>ON</td><td>ON</td></tr>
</table>
C00011, C00015
from version 07.00.00: C00087, C00089, C00090</td><td>DIP1 = OFF, DIP2 = OFF</td></tr>
<tr><td>DIP3, DIP4</td><td>Mode of analog input (Communication Unit with the "Safety STO" option)
<table>
<tr><th></th><th>DIP3</th><th>DIP4</th></tr>
<tr><td>0 ... 10 V</td><td>OFF</td><td>OFF</td></tr>
<tr><td>0 ... 20 mA</td><td>ON</td><td>OFF</td></tr>
<tr><td>4 ... 20 mA</td><td>OFF</td><td>ON</td></tr>
<tr><td>Not permissible</td><td>ON</td><td>ON</td></tr>
</table>
C00034</td><td>DIP3 = OFF, DIP4 = OFF</td></tr>
<tr><td>DIP5
DIP6
DIP7</td><td>Control mode - technology application
<table>
<tr><th></th><th>DIP5</th><th>DIP6</th><th>DIP7</th></tr>
<tr><td>9 (Local mode)</td><td>OFF</td><td>OFF</td><td>OFF</td></tr>
<tr><td>10 (terminals 0)</td><td>ON</td><td>OFF</td><td>OFF</td></tr>
<tr><td>12 (Terminal 2)</td><td>OFF</td><td>ON</td><td>OFF</td></tr>
<tr><td>14 (Terminal 11)</td><td>ON</td><td>ON</td><td>OFF</td></tr>
<tr><td>16 (terminals 16)</td><td>OFF</td><td>OFF</td><td>ON</td></tr>
<tr><td>Reserved</td><td>ON</td><td>OFF</td><td>ON</td></tr>
<tr><td>from version 07.00.00: 41 (AS-i)</td><td>OFF</td><td>ON</td><td>ON</td></tr>
<tr><td>40 (MCI/CAN)</td><td>ON</td><td>ON</td><td>ON</td></tr>
</table>
C00007</td><td>DIP5 = OFF, DIP6 = OFF, DIP7 = OFF</td></tr>
<tr><td>DIP8</td><td>Selection of DIP switch / potentiometer assignment
• ON: DIP switch / potentiometer assignment 1
• OFF: DIP switch / potentiometer assignment 0
C00016, C00021, C00022, C00087</td><td>OFF</td></tr>
</table>

9.3.2.2 DIP switch / potentiometer assignment 1

<table>
<tr><th colspan="3">DIP switch S1</th></tr>
<tr><td colspan="3">



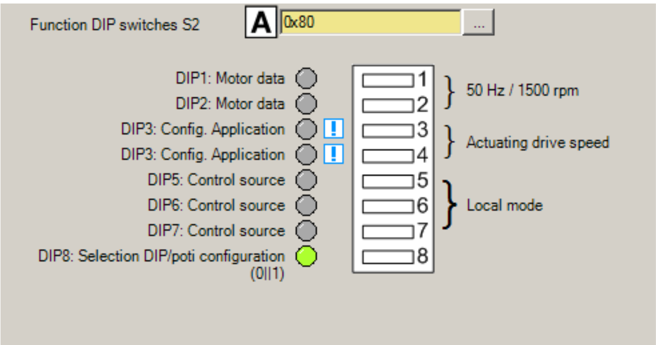
Function DIP switches S1 A 0x1

DIP1: DIP-Switches activated ●
DIP2: Power motor ○
DIP3: VFCplus Eco/linear ○
DIP4: Brake control/Flying restart ○
DIP5: Brake control/Flying restart ○
DIP6: Mounting direction motor ○
DIP7: Function P1 for fixed setpoint 3 ○
DIP8: Parameter basic ○

DIP4, DIP5: Brake control off, Flying restart off

DIP8:
0: Load Lenze settings
1: Load parameter set 1

</td></tr>
<tr><th>Position</th><th>Description
Affected parameters</th><th>Lenze setting</th></tr>
<tr><td>A</td><td>Hexadecimal view of the DIP switch positions DIP1 - DIP8</td><td>0x00</td></tr>
<tr><td>DIP1</td><td>Setting according to DIP switch S1/S2 and potentiometer P1 - P3
• ON: DIP switch and potentiometer "active"
• OFF: DIP switch and potentiometer ineffective</td><td>OFF</td></tr>
<tr><td>DIP2</td><td>Motor power
• ON: Motor power < inverter power
• OFF: Motor power = inverter power
C00120</td><td>OFF</td></tr>
<tr><td>DIP3</td><td>Control
• ON: VFCplus ECO
• OFF: VFCplus linear
C00006</td><td>OFF</td></tr>
<tr><td>DIP4, DIP5</td><td>Brake control / restart on the fly
<table>
<tr><th></th><th>DIP4</th><th>DIP5</th></tr>
<tr><td>Brake control off, restart on the fly off</td><td>OFF</td><td>OFF</td></tr>
<tr><td>Brake control off, restart on the fly on</td><td>ON</td><td>OFF</td></tr>
<tr><td>Brake control automatic horizontal, Restart on the fly off</td><td>OFF</td><td>ON</td></tr>
<tr><td>Brake control automatic, vertical, restart on the fly off</td><td>ON</td><td>ON</td></tr>
</table>
C00019, C00106, C00990, C02580 - C02582</td><td>DIP4 = OFF, DIP5 = OFF</td></tr>
<tr><td>DIP6</td><td>Motor mounting direction
• ON: Inverted
• OFF: Not inverted
C01206</td><td>OFF</td></tr>
<tr><td>DIP7</td><td>Function P1 (Top Cover)
• ON: n-fixed setpoint 3 is always specified with P1 (Top Cover)
• OFF: n-fixed setpoint 3 is specified once with P1 (Top Cover)
C00039/3</td><td>OFF</td></tr>
<tr><td>DIP8</td><td>Load parameter after switching on the mains
• ON: Load parameter from Memory Module
• OFF: Load parameter from Lenze default setting
C00002</td><td>OFF</td></tr>
</table>

<table>
<tr><th colspan="6">DIP switch S2</th></tr>
<tr><td colspan="6">
Function DIP switches S2 A 0x80
</td></tr>
<tr><th>Position</th><th colspan="4">Description
Affected parameters</th><th>Lenze setting</th></tr>
<tr><td>A</td><td colspan="4">Hexadecimal view of the DIP switch positions DIP1 - DIP8</td><td>0x00</td></tr>
<tr><td rowspan="6">DIP1, DIP2</td><td colspan="4">Rated motor frequency
C00089</td><td rowspan="6">DIP1 = OFF, DIP2 = OFF</td></tr>
<tr><td></td><td>DIP1</td><td>DIP2</td><td></td></tr>
<tr><td>50 Hz (Y)</td><td>OFF</td><td>OFF</td><td></td></tr>
<tr><td>60 Hz (Y)</td><td>ON</td><td>OFF</td><td></td></tr>
<tr><td>87 Hz (Δ)</td><td>OFF</td><td>ON</td><td></td></tr>
<tr><td>120 Hz (Δ)</td><td>ON</td><td>ON</td><td></td></tr>
<tr><td rowspan="6">DIP3, DIP4</td><td colspan="4">Configuration of application
C00005</td><td rowspan="6">DIP3 = OFF, DIP4 = OFF</td></tr>
<tr><td></td><td>DIP3</td><td>DIP4</td><td></td></tr>
<tr><td>Speed actuating drive (1000)</td><td>OFF</td><td>OFF</td><td></td></tr>
<tr><td>AC Drive Profile (1100)</td><td>ON</td><td>OFF</td><td></td></tr>
<tr><td>Switch-off positioning (3000)</td><td>OFF</td><td>ON</td><td></td></tr>
<tr><td>Reserved</td><td>ON</td><td>ON</td><td></td></tr>
<tr><td rowspan="10">DIP5
DIP6
DIP7</td><td colspan="4">Control mode - technology application
C00007</td><td rowspan="10">DIP5 = OFF, DIP6 = OFF, DIP7 = OFF</td></tr>
<tr><td></td><td>DIP5</td><td>DIP6</td><td>DIP7</td></tr>
<tr><td>9 (Local mode)</td><td>OFF</td><td>OFF</td><td>OFF</td></tr>
<tr><td>10 (terminals 0)</td><td>ON</td><td>OFF</td><td>OFF</td></tr>
<tr><td>12 (Terminal 2)</td><td>OFF</td><td>ON</td><td>OFF</td></tr>
<tr><td>14 (Terminal 11)</td><td>ON</td><td>ON</td><td>OFF</td></tr>
<tr><td>16 (terminals 16)</td><td>OFF</td><td>OFF</td><td>ON</td></tr>
<tr><td>Reserved</td><td>ON</td><td>OFF</td><td>ON</td></tr>
<tr><td>from version 07.00.00: 41 (AS-i)</td><td>OFF</td><td>ON</td><td>ON</td></tr>
<tr><td>40 (MCI/CAN)</td><td>ON</td><td>ON</td><td>ON</td></tr>
<tr><td>DIP8</td><td colspan="4">Selection of DIP switch / potentiometer assignment
• ON: DIP switch / potentiometer assignment 1
• OFF: DIP switch / potentiometer assignment 0
C00016, C00021, C00022, C00087</td><td>OFF</td></tr>
</table>

9.4 Drive diagnostics via bus system

The following display parameters contain actual values, states, and error messages.

- These parameters are listed in the »Engineer« parameter list and the keypad in the **Diagnostics** category.
- A detailed description of these parameters can be found in the chapter "Parameter reference" (📖 358).

Parameters	Display
C00051	MCTRL: Actual speed value
C00052	Motor voltage
C00053	DC-bus voltage
C00054	Motor current
C00056/1	Torque demand
C00056/2	Actual torque value
C00058	Output frequency
C00059	Appl.: Reference frequency C11
C00061	Heatsink temperature
C00064/1	Device utilisation (Ixt)
C00064/2	Device utilisation (Ixt) 15s
C00064/3	Device utilisation (Ixt) 3 min
C00133	Brake resistor utilisation
C00136/1	Communication control word
C00137	Device status
C00150	Status word
C00155	Status word 2
C00158	Cause of controller inhibit
C00159	Cause of quick stop QSP
C00165/1	Current error
C00166/1	Error type, current
C00166/2	Error subject area, current
C00166/3	Error ID, current
C00168/1...8	Error ID, history 1 ... 8
C00169/1...8	Time of error, history 1 ... 8
C00170/1...8	Error counter, history 1 ... 8
C00177/1	Switching cycles mains switching
C00177/2	Switching cycles output relay
C00178	Time the inverter was enabled (elapsed-hour meter)
C00179	Power-up time (power-on time meter)
C01911	Function DIP switch S1
C01912	Function DIP switch S2
C01913/1	Setpoint potentiometer f1 (LocalSetValue)
C01913/2	Setpoint switch f2 (fixed setpoint)
C01913/3	Ramp switch t1 (acceleration/deceleration time)

9.5 Logbook

The integrated logbook function of the inverter chronologically logs important events within the system. The logbook is intended to support you in troubleshooting and inverter diagnostics.

Events that can be logged

The following events can be logged in the logbook:

- Error messages of the operating system (📖 330)
- Error messages generated by the application (via LS_SetError_1)

Information saved

For each event, the following information is saved in the logbook:

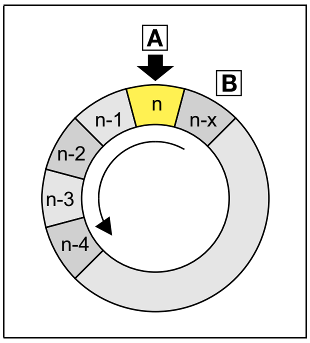
- Type of response to the event (e.g. trouble or warning)
- Subject area that activated the event (e.g. CAN or USER).
- Event
- Value of power-on time meter

Memory depth

Maximum number of logbook entries: 8

9.5.1 Functional description

The structure of the logbook corresponds to a ring buffer:



- As long as free logbook memory is available, the entry is placed in the next free position within the memory (A).
- If all memory units are assigned, the oldest entry (B) is deleted for a new entry.
- The newest entries will always remain available.

Note!

In the event of a supply voltage failure, the logbook is saved and reloaded automatically when the inverter is switched on. This ensures that the error history of the device does not get lost. For this reason it is very important to act with caution when deleting the logbook entries.

9.5.2 Reading out logbook entries

We recommend to read out logbook entries with the »Engineer«, since the »Engineer« shows the entries clearly arranged and enables them to be exported into a log file. Alternatively, the corresponding parameters can be read out using the keypad or via the fieldbus.

How to display logbook entries in the »Engineer«:

1. Go to the *Project view* and select the 8400 motec inverter.
2. Click the icon or select the **Online→Go online** command to build up an online connection with the inverter.
3. Select the **Diagnostics** tab from the *Workspace*.
4. Click **Logbook**.
    - The *Logbook* dialog box with logbook entries is displayed.
    - Click **Delete** to delete an entry from the logbook.
    - Click **Export** to export the entries from the logbook into a *.log file. ▶ Exporting logbook entries to a file (📖 323)
5. Click the **Close** button to close the *Logbook* dialog box again.

9.5.3 Exporting logbook entries to a file

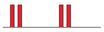
How to export the logbook entries to a file:

1. Click **Export...** in the *Logbook* dialog box.
    - The *Export logbook* dialog box is displayed.
2. Specify the folder, file name, and file type for the file.
3. Click the **Save** button to export the logbook entries into the given file.
    - Hidden logbook entries are not exported, i.e. the filter criteria specified are accounted for during the export.
    - The logbook entries are written to the file in the form of a semicolon separated list.

9.6 Monitoring

The inverter is provided with various monitoring functions which protect the drive against impermissible operating conditions.

- If a monitoring function responds,
  - an entry will be made into the Logbook of the inverter,
  - the response (Trouble, Fault, etc.) set for this monitoring function will be triggered,
  - the status of the internal device control changes according to the selected response, controller inhibit is set, and the "DRIVE ERROR" LED on the top of the controller goes on:

Response	Entry in the logbook	Display in C00168	Pulse inhibit	Disable drive function	Acknowledgement required	"DRIVE ERROR"
None						Off
Fault	☑	☑	☑	☑	☑	🟥 🟥 🟥
Trouble	☑	☑	☑	☑		
WarningLocked	☑	☑			☑	From version 11.01.00:  Until version < 11.01.00: 

This function extension is available from version 11.01.00 and higher!

C0143, Bit4 = 1 (**Warning** instead of **Warning Locked**) can be used to ensure that no manual acknowledgement is required for the **WarningLocked** response if the cause of the message has been removed. The status determining error is reset automatically. The **Drive Error** LED signals the **OFF** state, see above table.

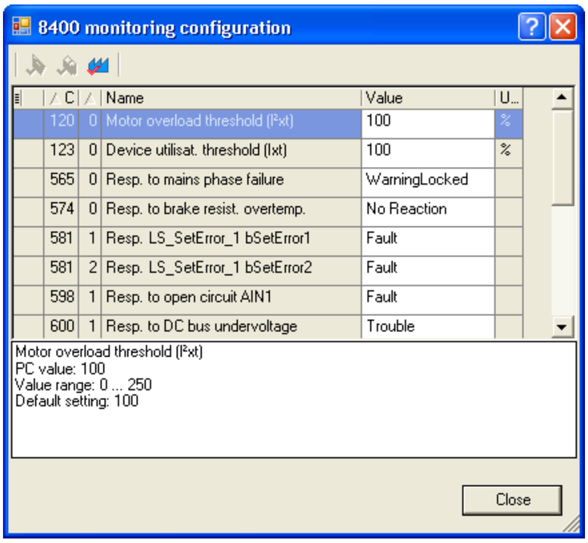
Related topics:

- LED status display (🕮 312)
- Device state machine and device states (🕮 72)
- Device overload monitoring (Ixt) (🕮 196)
- Motor load monitoring (I2xt) (🕮 197)
- Motor temperature monitoring (PTC) (🕮 200)
- Brake resistor monitoring (I2xt) (🕮 201)
- Mains phase failure monitoring (🕮 203)

9.6.1 Monitoring configuration

How to configure the monitoring functions using the »Engineer«:

1. Go to the *Project view* and select the 8400 motec inverter.
2. Select the **Diagnostics** tab from the *Workspace*.
3. Click the **Monitoring...** button.
   - The *8400 monitoring configuration* dialog box is displayed via which the desired settings can be made:



C		Name	Value	U...
120	0	Motor overload threshold (I^2xt)	100	%
123	0	Device utilisat. threshold (Ixt)	100	%
565	0	Resp. to mains phase failure	WarningLocked	
574	0	Resp. to brake resist. overtemp.	No Reaction	
581	1	Resp. LS_SetError_1 bSetError1	Fault	
581	2	Resp. LS_SetError_1 bSetError2	Fault	
598	1	Resp. to open circuit AIN1	Fault	
600	1	Resp. to DC bus undervoltage	Trouble	

Motor overload threshold (I^2xt)
PC value: 100
Value range: 0 ... 250
Default setting: 100

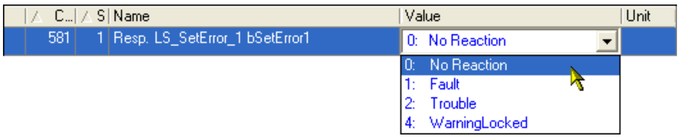
Related topics:

- Setting the error response (📖 326)

9.6.2 Setting the error response

When a monitoring function responds, the response set for this monitoring function (Trouble, Fault, etc.) will be triggered.

- For many monitoring functions the response can be individually parameterised via parameters.



C...	S	Name	Value	Unit
581	1	Resp. LS_SetError_1 bSetError1	0: No Reaction	

Tip!

The table in the chapter "Short overview (A-Z)" contains the error messages for which the response can be set. (🕮 335)

Warning thresholds

Some of the monitoring functions are activated if a defined warning threshold has been exceeded.

- The corresponding preset threshold values can be changed via the following parameters:

Parameters	Information	Lenze setting	
		Value	Unit
C00120	Motor overload threshold (I^2xt)	100	%
C00123	Device utilisat. threshold (Ixt)	100	%
C00909/1	Max. positive speed	120	%
C00909/2	Max. negative speed	120	%
C00910/1	Max. positive output frequency	300	Hz
C00910/2	Max. negative output frequency	300	Hz

9.7 Maloperation of the drive

Maloperation	Cause	Remedy
Motor does not rotate	Mains voltage at switch-on < 320 VAC • LED status display is permanently yellow	Check mains voltage Supply controller with 400 VAC
	DC-bus voltage is too low • lED status display is blinking red	Check mains voltage
	Inverter is inhibited • LED status display is blinking green	Deactivate controller inhibit • Note: Controller inhibit can be set via several sources ! • C00158 displays all active sources for controller inhibit.
	Automatic start is inhibited	LOW/HIGH edge at RFR If required, correct auto-start option in C00142. ▸ Auto-start option "Inhibit at device on"
	DC-injection braking (DCB) is active	Deactivate DC-injection braking
	Mechanical motor brake is not released	Release mechanical motor brake manually or electrically
	Quick stop (QSP) is active	Deactivate quick stop • Note: Quick stop can be set via several sources! • C00159 displays all active sources for quick stop.
	Setpoint = 0	Select setpoint
	Setpoint = 0 with activated fixed setpoint	Set fixed setpoint in C00039/1...3
	Trouble active	Clear fault
	There is no EPM slot on the drive unit or the memory module is defective • LED status display is blinking red and yellow	• If a memory module has been provided: Plug the memory module into the slot of the drive unit intended for this purpose. • If a memory module has been provided: Check if the memory module has been plugged in correctly. Replace a defective memory module.
	Switch-on command in the *wDriveControl* control word is missing	Control the status of the control word in C00136/1. Ensure that bit 0 and bit 3 are set in the control word. Control configuration of the control word input in C00700/5. ▸ wDriveControl control word
	Assignment of several mutually exclusive functions with a signal source in C00701	Correct configuration in C00701

Maloperation	Cause	Remedy
Motor rotates irregularly	Motor cable is defective	Check motor cable
	Maximum motor current in motor or generator mode is set too low	Adjust settings to the application: C00022: Imax in motor mode C00023: Imax in generator mode
	Motor is underexcited or overexcited	Check parameterisation: C00006: Motor control C00015: VFC: V/f base frequency C00016: VFC: Vmin boost
	Rated motor data (stator resistance, speed, current, frequency, voltage) and cos φ and/ or magnetising inductance is not adapted to the motor data	Execute automatic motor parameter identification with the C00002/23 device command - or - Adjust motor parameters manually: C00084: Motor stator resistance C00087: Rated motor speed C00088: Rated motor current C00089: Rated motor frequency C00090: Rated motor voltage C00091: Motor cosine phi C00092: Motor magnetising inductance
	Motor windings are wired incorrectly	Reverse from star connection to delta connection
Motor consumes too much current	V_{min} boost has been selected too high	Correct setting with C00016
	V/f base frequency has been selected too low	Correct setting with C00015
	Rated motor data (stator resistance, speed, current, frequency, voltage) and cos φ and/ or magnetising inductance is not adapted to the motor data	Execute automatic motor parameter identification with the C00002/23 device command - or - Adjust motor parameters manually: C00084: Motor stator resistance C00087: Rated motor speed C00088: Rated motor current C00089: Rated motor frequency C00090: Rated motor voltage C00091: Motor cosine phi C00092: Motor magnetising inductance
Motor parameter identification is aborted with error LP1	Motor is too small compared to the rated device power (>1 : 3)	Use device with lower rated power
	DC-injection braking (DCB) is active via terminal	Deactivate DC-injection braking
Unacceptable drive behaviour with vector control	different	Optimise or manually adapt vector control ▸ Sensorless vector control (SLVC)
		Execute automatic motor parameter identification with the C00002/23 device command ▸ Automatic motor data identification
Torque dip in field weakening range or motor stalling when being operated in the field weakening range	Motor is overloaded	Check motor load
	Motor windings are wired incorrectly	Reverse from star connection to delta connection
	V/f base frequency is set too high	Correct setting with C00015
	Mains voltage too low	Increase mains voltage
Parameter changes are not accepted	Settings according to DIP switch S1/S2, P1 - P3 are active (local mode)	Set DIP switch S1/DIP1 to "OFF" in order that no parameters of the Memory Module are overwritten when the device is started. • See display parameters C01911 and C01912 for details.

Maloperation	Cause	Remedy
Although the motor rotates, the actual motor speed "0 rpm" is displayed.	An encoder has been selected in C00495 without an encoder being connected.	Set C00495 = "0: No encoder".
	A wrong function assignment of the digital terminals DI1 and DI2 has been set in C00115.	Select the correct function assignment in C00115.

9.8 Error messages of the operating system

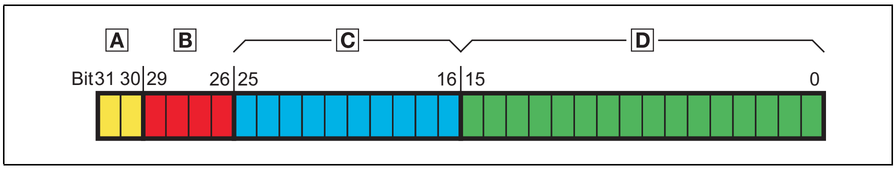
This chapter describes all error messages of the inverter operating system and possible causes & remedies.

Tip!

Each error message is also saved to the logbook in chronological order. ▶ Logbook (📖 322)

9.8.1 Structure of the 32-bit error number (bit coding)

If an error occurs in the inverter, the internal fault memory saves a 32-bit value which contains the following information:

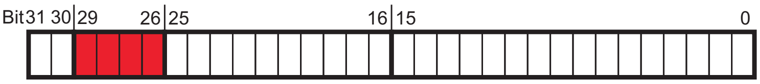


A Reserved
B Error type
C Error subject area
D Error ID

[9-1] Structure of the error number

- Display parameter: C00161/1
- The LS_DriveInterface system block shows the 32-bit error number at the outputs *wStateDetermFailNoLow* (Low Word) and *wStateDetermFailNoHigh* (High Word).
- For the sake of legibility, the error number in the logbook and in C00165/1 is displayed with the following syntax:
  [**Error type**].[**Error subject area no.**].[**Error ID**]

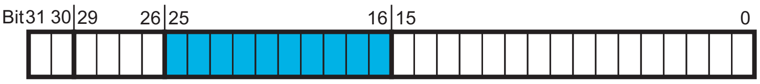
9.8.1.1 Error type



The error type gives information about the behaviour/response of the inverter to the error. The error type for some device errors can also be parameterised.

Bit 29	Bit 28	Bit 27	Bit 26	Meaning
0	0	0	0	0: No Response
0	0	0	1	1: Fault
0	0	1	0	2: Trouble
0	1	0	0	4: WarningLocked

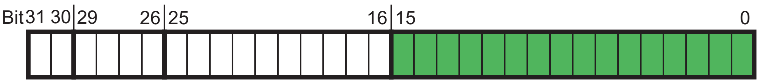
9.8.1.2 Error subject area



The error subject area indicates the internal "function unit" of the inverter in which the error has occurred:

Error subject area		Assigned errors	Remedy possible by user?
No.	**Name**		
111	Supply voltage	Errors that occur in connection with the supply voltage of the device.	Yes
119	Temperature	Errors that occur for temperature reasons.	Yes
123	Motor management / encoder	Errors that occur within the motor control or encoder evaluation.	Yes
125	Analog I/O	Errors that occur in connection with the analog inputs and outputs.	Yes
127	Communication unit	Errors reported by the communication unit and communication errors to the communication unit.	Yes if it is a fieldbus error.
131	CAN general	Errors related to general CAN functions.	Yes
135	CAN PDO	Errors that are explicitly only related to the CAN-PDO (process data objects).	Yes
140	Device configuration	Errors that occur due to incompatibilities of the plugged-in individual components (drive unit, communication unit).	Yes
144	Parameter set	Errors that occur in connection with the parameter set or the parameter set memory (memory module).	Yes if the error relates to a missing or incompatible memory module.
145	Device firmware (internal error)	Internal error of the device firmware.	No
400	Defective device hardware	Errors that occur due to defective device hardware.	No
444	Fieldbus	Errors that occur in connection with fieldbus communication.	Yes
980	US01: User error 1	Errors generated by the user (by the application) via the LS_SetError_1 system block.	Yes
981	US02: User error 2		

9.8.1.3 Error ID

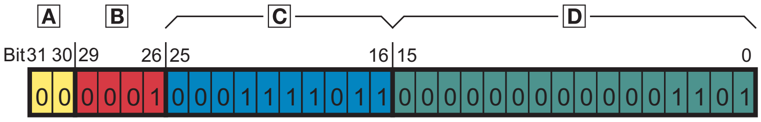


16-bit value (0 ... 65535) for error identification within the error subject area.

9.8.1.4 Example for bit coding of the error number

C00161/1 displays the internal error number "75169803".

- This decimal value corresponds to the following bit sequence:

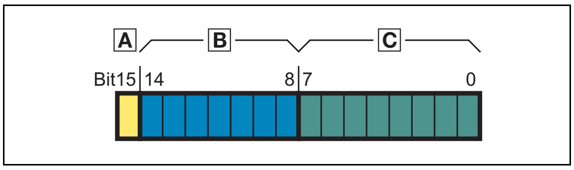


Assignment	Information	Meaning in the example
0 0	Reserved	-
0 0 0 1	Error type	1: Fault (pulse inhibit)
0 0 0 1 1 1 1 0 1 1	Error subject area	123: Motor management / encoder
0 0 0 0 0 0 0 0 0 0 0 0 1 0 1 1	Error ID	13: "LU: DC bus undervoltage"

- Thus, error number "75169803" means:
  An overcurrent has been detected in the "Motor management/encoder" subject area. A pulse inhibit is set as error response. The error message must be acknowledged after the error has been eliminated.

9.8.2 Structure of the 16 bit error number (bit coding)

In addition to the 32-bit error number, a 16-bit error number is generated if an error occurs. It consists of the following information:

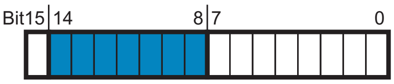


A Reserved
B Error subject area
C Error ID

[9-2] Structure of the error number

- Display parameter: C00160/1
- The LS_DriveInterface system block shows the 16-bit error number at the output *wStateDetermFailNoShort*.
- For the sake of legibility, the 16-bit error number in the logbook is displayed with the following syntax::
  [**Error subject area no.**].[**Error ID**]

Error subject area



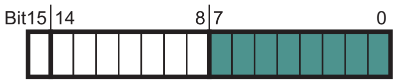
The error subject area indicates the internal "function unit" of the inverter in which the error has occurred.

Note!

Due to the smaller value range (0 ...127), the number assignment to the error subject area differs from the 32-bit error number.

Error subject area		Assigned errors	Remedy possible by user?
No.	Name		
11	Supply voltage	Errors that occur in connection with the supply voltage of the device.	Yes
19	Temperature	Errors that occur for temperature reasons.	Yes
23	Motor management / encoder	Errors that occur within the motor control or encoder evaluation.	Yes
25	Analog I/O	Errors that occur in connection with the analog inputs and outputs.	Yes
26	Defective device hardware	Errors that occur due to defective device hardware.	No
27	Communication unit	Errors reported by the communication unit and communication errors to the communication unit.	Yes if it is a fieldbus error.
31	CAN general	Errors related to general CAN functions.	Yes
35	CAN PDO	Errors that are explicitly only related to the CAN-PDO (process data objects).	Yes
40	Device configuration	Errors that occur due to incompatibilities of the plugged-in individual components (drive unit, communication unit).	Yes
44	Parameter set	Errors that occur in connection with the parameter set or the parameter set memory (memory module).	Yes if the error relates to a missing or incompatible memory module.
45	Device firmware (internal error)	Internal error of the device firmware.	No
54	Fieldbus	Errors that occur in connection with fieldbus communication.	Yes
100	US01: User error 1	Errors generated by the user (by the application) via the LS_SetError_1 system block.	Yes
101	US02: User error 2		

Error ID



8-bit value (0 ... 255) for error identification within the error subject area.

Tip!

All possible 16-bit error numbers are listed in the table entitled "Short overview (A-Z)" in the second column. (🕮 335)

9.8.3 Reset error message

An error message with the response "Fault", "Trouble", or "Warning locked" must be explicitly reset (acknowledged) after the cause of the error has been eliminated.

There are several options to reset (acknowledge) a pending error message:

- Execute the "reset error" device command: Set C00002/19 = "1"
- Set the *bFailReset* control input to TRUE
  - In the Lenze setting of C00701/2, this input is connected to the digital input RFR (controller enable) so that a possibly existing error message is reset together with the controller enable (if the cause for the fault is eliminated).
- "ResetFault" command via fieldbus: Set bit 7 = "1" in the control word
- When an online connection to the inverter has been established, change to the **Diagnostics** tab of the »Engineer« and click the **Reset error message** button.

9.8.4 Short overview (A-Z)

The table below contains all error messages of the inverter operating system in alphabetical order.

Note!

For the sake of readability, the Logbook and C00165/1 display the 32-bit error with the following syntax:
[**Error type**].[**Error subject area no.**].[**Error ID**]

In this documentation, "xx", a wildcard, stands for the error type since it is configurable for many error messages.

Tip!

If you click the cross-reference in the first column, "Error number", you will reach the detailed description of the respective error message in the following chapter "Cause & possible remedies". (📖 337)

Error number			**Error message**	**Response** (Lenze setting)	**Adjustable in**	**CAN emergency error code**
32 bits	**16 bits$_{hex}$**	**16 bits$_{dec}$**				
▸ xx.0125.00001	0x1901	6401	An01: AIN1_I < 4 mA	Fault	C00598/1	0xF000
▸ xx.0131.00002	0x1f02	7938	CA06: CAN CRC error	No Reaction	C00592/1	0x8000
▸ xx.0131.00007	0x1f07	7943	CA07: CAN Bus Warn	No Reaction	C00592/3	0x8000
▸ xx.0131.00008	0x1f08	7944	CA08: CAN Bus Stopped	No Reaction	C00592/4	0x8000
▸ xx.0131.00011	0x1f0b	7947	CA0b: CAN Bus Live Time	No Reaction	C00592/5	0x8130
▸ xx.0131.00015	0x1f0f	7951	CA0F: CAN control word	Fault	C00594/2	0xF000
▸ xx.0127.00002	0x1b02	6914	CE04: MCI communication error	Fault	C01501/1	0x7000
▸ xx.0127.00015	0x1b0f	6927	CE0F: MCI control word	Fault	C00594/2	0xF000
▸ xx.0135.00001	0x2301	8961	CE1: CAN RPDO1	No Reaction	C00593/1	0x8100
▸ xx.0135.00002	0x2302	8962	CE2: CAN RPDO2	No Reaction	C00593/2	0x8100
▸ xx.0131.00000	0x1f00	7936	CE4: CAN Bus Off	No Reaction	C00592/2	0x8000
▸ xx.0140.00013	0x280d	10253	CI01: Module missing/incompatible	Fault	-	0x7000
▸ xx.0145.00001	0x2d01	11521	dF01: Internal error 01	Fault	-	0x6108
▸ xx.0145.00002	0x2d02	11522	dF02: Internal error 02	Fault	-	0x6100
▸ xx.0145.00003	0x2d03	11523	dF03: Internal error 03	Fault	-	0x6100
▸ xx.0145.00004	0x2d04	11524	dF04: Internal error 04	Fault	-	0x6107
▸ xx.0145.00005	0x2d05	11525	dF05: Internal error 05	Fault	-	0x6100
▸ xx.0145.00006	0x2d06	11526	dF06: Internal error 06	Fault	-	0x6100
▸ xx.0145.00007	0x2d07	11527	dF07: Internal error 07	Fault	-	0x6100
▸ xx.0145.00008	0x2d08	11528	dF08: Internal error 08	Fault	-	0x6100
▸ xx.0145.00009	0x2d09	11529	dF09: Internal error 09	Fault	-	0x6100
▸ xx.0145.00010	0x2d0a	11530	dF10: time out I/O micro	Fault	-	0x5002
▸ xx.0145.00011	0x2d0b	11531	dF11: oscillator fail	Fault	-	
▸ xx.0145.00012	0x2d0c	11532	dF12: math error	Fault	-	
▸ xx.0145.00013	0x2d0d	11533	dF13: DMA error	Fault	-	
▸ xx.0400.00105	0x1a69	6761	dH69: Adjustment fault	Fault	-	0x5530
▸ xx.0123.00057	0x1739	5945	Id1: Motor data identification error	Fault	-	0xF000
▸ xx.0145.00198	0x2dc6	11718	IoC: Comm module changed	Fault	-	0x6100
▸ xx.0123.00145	0x1791	6033	LP1: Motor phase failure	No Reaction	C00597	0x3000
▸ xx.0123.00015	0x170f	5903	LU: DC bus undervoltage	Trouble	C00600/1	0x3100
▸ xx.0444.33072	0x36B1	14001	nt03: COM fault 3	Fault	-	

Error number			Error message	Response (Lenze setting)	Adjustable in	CAN emergency error code
32 bits	16 bits$_{hex}$	16 bits$_{dec}$				
▸ xx.0444.33073	0x36B2	14002	nt04: COM fault 4	Fault	-	
▸ xx.0444.33074	0x36B3	14003	nt05: COM fault 5	Fault	-	
▸ xx.0444.33077	0x36B6	14006	nt08: COM fault 8	Fault	-	
▸ xx.0444.21811	0x3688	13960	nt14: COM fault 14	Fault	C01501/2	
▸ xx.0444.24848	0x3621	13857	nt15: COM fault 15	Fault	C01501/2	
▸ xx.0444.24835	0x3664	13924	nt16: COM fault 16	Fault	C01501/2	
▸ xx.0123.00016	0x1710	5904	oC1: Power section - short circuit	Fault	-	0x2000
▸ xx.0123.00017	0x1711	5905	oC2: Power section - earth fault	Fault	-	0x2000
▸ xx.0119.00050	0x1332	4914	oC5: Ixt overload	WarningLocked	C00604	0x2000
▸ xx.0123.00105	0x1769	5993	oC6: I2xt motor overload	WarningLocked	C00606	0x2000
▸ xx.0123.00007	0x1707	5895	oC7: Motor overcurrent	Fault	-	0x2000
▸ xx.0119.00052	0x1334	4916	oC9: Ixt overload - shutdown limit	Fault	-	0x2000
▸ xx.0123.00071	0x1747	5959	oC11: Current clamp for too long (>1 sec)	Fault	-	0xF000
▸ xx.0123.00065	0x1741	5953	OC12: I2xt overload - brake resistor	Fault	-	0xF000
▸ xx.0123.00034	0x1722	5922	oC18: Current monitoring overload	No Reaction	C00584/1	0x2000
▸ xx.0119.00001	0x1301	4865	oH1: Heatsink overtemperature	Fault	-	0x4000
▸ xx.0119.00015	0x130f	4879	oH3: Motor temperature triggered	Fault	C00585	0x4000
▸ xx.0119.00000	0x1300	4864	oH4: Heatsink temp. > shutdown temp. -5°C	No Reaction	C00582	0x4000
▸ xx.0123.00032	0x1720	5920	oS1: Maximum speed limit reached	No Reaction	C00579	0x8400
▸ xx.0123.00033	0x1721	5921	oS2: Max. motor speed	Fault	-	0x8400
▸ xx.0123.00093	0x175d	5981	ot2: Speed controller limitation	No Reaction	C00567	0xF000
▸ xx.0123.00014	0x170e	5902	OU: DC bus overvoltage	Trouble	-	0x3100
▸ xx.0144.00001	0x2c01	11265	PS01: No memory module	Fault	-	0x6300
▸ xx.0144.00002	0x2c02	11266	PS02: Par. set invalid	Fault	-	0x6300
▸ xx.0144.00003	0x2c03	11267	PS03: Par. set device invalid	Fault	-	0x6300
▸ xx.0144.00004	0x2c04	11268	PS04: Par. set device incompatible	Fault	-	0x6300
▸ xx.0144.00031	0x2c1f	11295	PS31: Ident. error	Fault	-	0x6300
▸ xx.0123.00205	0x17cd	6093	Sd3: Feedback system open circuit	Fault	C00586	0x7300
▸ xx.0123.00200	0x17c8	6088	Sd10: Speed limit for feedback system 12	Fault	C00607	0x7300
▸ xx.0127.00003	0x1b03	6915	Smr1: Module internal watchdog or trap	Fault	-	0x6100
▸ xx.0127.00004	0x1b04	6916	Smr2: Module offline - no status or PDOs	Fault	-	0x6100
▸ xx.0127.00005	0x1b05	6917	Smr3: Module timeout - one or more of PDOs timeout	Fault	-	0x6100
▸ xx.0127.00006	0x1b06	6918	Smr4: SDO access failure	Fault	-	0x6100
▸ xx.0111.00002	0x0b02	2818	Su02: One mains phase is missing	WarningLocked	C00565	0x3000
▸ xx.0980.00001	0x6401	25601	US01: User error 1	Fault	C00581/1	0xF000
▸ xx.0981.00001	0x6501	25857	US02: User error 2	Fault	C00581/2	0xF000

9.8.5 Cause & possible remedies

This chapter contains all error messages of the inverter operating system in numerical order of the error numbers. The list provides detailed information on the response to the error message as well as information on the cause & possible remedies.

Note!

For the sake of readability, the Logbook and C00165/1 display the error number with the following syntax:
[**Error type**].[**Error subject area no.**].[**Error ID**]

In this documentation, "xx", a wildcard, stands for the error type since it is configurable for many error messages.

Tip!

A list of all error messages of the inverter operating system in alphabetical order can be found in the previous chapter "Short overview (A-Z)" (📖 335).

Su02: One mains phase is missing [xx.0111.00002]

Response (Lenze setting printed in bold)	**Setting:** C00565 (☑ Adjustable response)
☑ No Reaction ☑ Fault ☐ Trouble ☒ **WarningLocked**	

Cause	**Remedy**
A mains phase of a three-phase supply has failed.	Check mains connection.

oH4: Heatsink temp. > shutdown temp. -5°C [xx.0119.00000]

Response (Lenze setting printed in bold)	**Setting:** C00582 (☑ Adjustable response)
☒ **No Reaction** ☑ Fault ☐ Trouble ☑ WarningLocked	

Cause	**Remedy**
The heatsink temperature now only differs by 5 °C from the shutdown temperature of the motor.	Prevent further heating, i.e. reduce motor load or set controller inhibit so that the heatsink can cool down again.

oH1: Heatsink overtemperature [xx.0119.00001]

Response (Lenze setting printed in bold)
☐ No Reaction ☒ **Fault** ☐ Trouble ☐ WarningLocked

Cause	**Remedy**
The heatsink temperature is higher than the fixed limit temperature (90 ° C). Maybe the ambient temperature of the inverter is too high or the fan or its ventilation slots are dirty.	• Clean the inverter. • If required, clean or replace the fan. • Provide for sufficient cooling of the device.

oH3: Motor temperature triggered [xx.0119.00015]

Response (Lenze setting printed in bold)	**Setting:** C00585 (☑ Adjustable response)
☑ No Reaction ☒ **Fault** ☐ Trouble ☑ WarningLocked	

Cause	**Remedy**
The motor temperature monitoring mode at plug X?? has triggered. Possible causes: • The motor is overheated so that the thermal contact integrated into the motor has been switched. • An open circuit or a loose contact at the connections mentioned above has occurred.	• Check motor temperature monitoring. • Provide for sufficient cooling of the motor. • Check terminals for open circuit or loose contact.

oC5: Ixt overload [xx.0119.00050]

Response (Lenze setting printed in bold)	**Setting:** C00604 (☑ Adjustable response)
☑ No Reaction ☑ Fault ☐ Trouble ☒ **WarningLocked**	

Cause	**Remedy**
The Ixt overload check has tripped. • Operating threshold = 100 % Ixt (adjustable in C00123) Possible causes: • Wrong dimensioning of the device with regard to its motor load. • Load cycles are not complied with.	• Check and, if required, correct dimensioning of the device and the motor load with regard to technical data. • Reduce motor load cycles (observe load cycles according to documentation).

oC9: Ixt overload - shutdown limit [xx.0119.00052]

Response (Lenze setting printed in bold)
☐ No Reaction ☒ **Fault** ☐ Trouble ☐ WarningLocked

Cause	**Remedy**
The Ixt overload check has tripped. • Operating threshold = 110 % Ixt (fixed) Possible causes: • Wrong dimensioning of the device with regard to its motor load. • Load cycles are not complied with.	• Check and, if required, correct dimensioning of the device and the motor load with regard to technical data. • Reduce motor load cycles (observe load cycles according to documentation).

oC7: Motor overcurrent [xx.0123.00007]

Response (Lenze setting printed in bold)
☐ No Reaction ☒ **Fault** ☐ Trouble ☐ WarningLocked

Cause	**Remedy**
The maximum current monitoring function has been triggered.	Check and, if required, correct dimensioning of the load with regard to the installed device power.

oU: DC bus overvoltage [xx.0123.00014]

Response (Lenze setting printed in bold)
☐ No Reaction ☑ Fault ☒ **Trouble** ☐ WarningLocked

Cause	Remedy
The device has detected an overvoltage in the DC bus. To protect the device hardware, the inverter control is switched off. • Depending on the configuration of the auto-start lock function, set C00142 so that, when this error is tripped, the inverter only restarts after the controller inhibit has been switched. • If this error message remains active longer than the time set in C00601, a "Fault" is tripped.	• Reduce regenerative load. • Use brake resistor. • Use a regenerative power supply unit. • Establish a DC-bus connection.

LU: DC bus undervoltage [xx.0123.00015]

Response (Lenze setting printed in bold)	**Setting:** C00600/1 (☑ Adjustable response)
☐ No Reaction ☑ Fault ☒ **Trouble** ☐ WarningLocked	

Cause	Remedy
The device has detected a DC bus undervoltage. The inverter control is switched off because the drive properties of the motor control cannot be provided anymore due to the DC bus undervoltage. • Depending on the configuration of the auto-start lock function, set C00142 so that, when this error is tripped, the inverter only restarts after the controller inhibit has been switched.	• Switch on mains supply or ensure sufficient supply via DC bus. • Adjust setting in C00142 if required.

oC1: Power section - short circuit [xx.0123.00016]

Response (Lenze setting printed in bold)
☐ No Reaction ☒ **Fault** ☐ Trouble ☐ WarningLocked

Cause	Remedy
The device has recognised a short circuit of the motor phases. To protect the device electronics, the inverter control is switched off. • Mostly, incorrectly executed motor connections are the cause. • If the device is inappropriately dimensioned with regard to the motor load and the current limitation in the controller (Imax controller) is set incorrectly, this error message may also occur. ▸ Motor control: Defining current limits	• Check motor connections and the corresponding plug connector on the device. • Only use permissible combinations of device power and motor power. • Do not set the dynamics of the current limitation controller too high.

oC2: Power section - earth fault [xx.0123.00017]

Response (Lenze setting printed in bold)
☐ No Reaction ☒ **Fault** ☐ Trouble ☐ WarningLocked

Cause	**Remedy**
The device has recognised an earth fault at one of the motor phases. To protect the device electronics, the inverter control is switched off. • Mostly, incorrectly executed motor connections are the cause. • If motor filter, motor cable length, and cable type (shielding capacity) are dimensioned incorrectly, this error message may occur due to leakage currents to PE.	• Check motor connections and the corresponding plug connector on the device. • Use motor filters, cable lengths, and cable types recommended by Lenze.

oS1: Maximum speed limit reached [xx.0123.00032]

Response (Lenze setting printed in bold)	**Setting:** C00579 (☑ Adjustable response)
☒ **No Reaction** ☑ Fault ☐ Trouble ☑ WarningLocked	

Cause	**Remedy**
The device has recognised that the maximum speed has been reached.	• Limit setpoint selection to maximum values. • Adjust set speed limitation (C00909) and frequency limitation (C00910).

oS2: Max. motor speed [xx.0123.00033]

Response (Lenze setting printed in bold)
☐ No Reaction ☒ **Fault** ☐ Trouble ☐ WarningLocked

Cause	**Remedy**
The device has recognised that the maximally permissible motor speed has been reached.	• Limit setpoint selection to the maximally permissible motor speed. • If required, adapt set maximum motor speed (C00965).

oC18: Current monitoring overload [xx.0123.00034]

Response (Lenze setting printed in bold)	**Setting:** C00584/1 (☑ Adjustable response)
☒ **No Reaction** ☑ Fault ☐ Trouble ☑ WarningLocked	

Cause	**Remedy**
The current monitoring overload has tripped because the apparent motor current has exceeded the switch-off threshold set in C00124/1 for the delay time set in C00563/1C00563/1.	• Reduce overload. • Increase switch-off threshold (C00124/1).

Id1: Motor data identification error [xx.0123.00057]

Response (Lenze setting printed in bold)
☐ No Reaction ☒ **Fault** ☐ Trouble ☐ WarningLocked

Cause	**Remedy**
During the identification of motor parameters, an error has occurred. Possible causes: • Interrupted motor cable. • Switched-off power section during the identification. • Implausible start parameter settings.	• Check the motor connections and the corresponding plug connector on the device and, if necessary, the motor terminal box. • Correct start parameters for the motor parameter identification (motor nameplate data). • Stable power supply of the device.

OC12: I2xt overload - brake resistor [xx.0123.00065]

Response (Lenze setting printed in bold)
☐ No Reaction ☒ **Fault** ☐ Trouble ☐ WarningLocked

Cause	**Remedy**
Too frequent and too long braking processes.	Check drive dimensioning.

oC11: Current clamp for too long (>1 sec) [xx.0123.00071]

Response (Lenze setting printed in bold)
☐ No Reaction ☒ **Fault** ☐ Trouble ☐ WarningLocked

Cause	**Remedy**
The device indicates that the "CLAMP" overcurrent limitation has been activated. • A permanent clamp operation causes an overload disconnection.	Reduce setpoint generation dynamics or motor load.

ot2: Speed controller limitation [xx.0123.00093]

Response (Lenze setting printed in bold)	**Setting:** C00567 (☑ Adjustable response)
☒ **No Reaction** ☑ Fault ☐ Trouble ☑ WarningLocked	

Cause	**Remedy**
The output of the speed controller has reached the internal limit value. In this status, the speed controller is not able anymore to correct the system deviation. • Only during "Closed loop" operation or with vector control (SLVC).	• Observe load requirements. • Correct dimensioning or reduce setpoint generation dynamics if necessary. ▶ Motor control

oC6: I2xt overload - motor [xx.0123.00105]

Response (Lenze setting printed in bold)	**Setting:** C00606 (☑ Adjustable response)
☑ No Reaction ☑ Fault ☐ Trouble ☒ **WarningLocked**	

Cause	**Remedy**
Thermal overload of the motor.	Only self-ventilated motors can be monitored using the I2xt function. • Check whether is it a self-ventilated motor. If not, set C00606 to "0: No Reaction". • Observe load requirements. • Correct dimensioning if necessary. • For VFCplus control type: Check Vmin boost (C00016). ▶ Set Vmin boost

LP1: Motor phase failure [xx.0123.00145]

Response (Lenze setting printed in bold)	**Setting:** C00597 (☑ Adjustable response)
☒ **No Reaction** ☑ Fault ☐ Trouble ☑ WarningLocked	

Cause	**Remedy**
Motor phase failure	Motor connections/check wiring unit.

Sd10: Speed limit - feedback system 12 [xx.0123.00200]

Response (Lenze setting printed in bold)	**Setting:** C00607 (☑ Adjustable response)
☑ No Reaction ☒ **Fault** ☐ Trouble ☑ WarningLocked	

Cause	**Remedy**
Maximally permissible speed of the feedback system connected to DI1/DI2 reached.	Reduce speed of the rotation shaft/feedback system. $n_{encoder}$ <= (f_{max} x 60) / encoder increments (for f_{max} = 10 kHz)

Sd3: Open circuit - feedback system [xx.0123.00205]

Response (Lenze setting printed in bold)	**Setting:** C00586 (☑ Adjustable response)
☑ No Reaction ☒ **Fault** ☐ Trouble ☑ WarningLocked	

Cause	**Remedy**
• HTL encoder cable interrupted. • HTL encoder is defective. Note: May also be caused by a very dynamic acceleration or starting up against a blocked motor shaft (e.g. with a closed holding brake).	• Check HTL encoder cable. • Check HTL encoder. • Check related terminals. • Switch off monitoring (C00586 = "0: No reaction") when the HTL encoder is not used.

An01: AIN1_I < 4 mA [xx.0125.00001]

Response (Lenze setting printed in bold)	**Setting:** C00598/1 (☑ Adjustable response)
☑ No Reaction ☒ **Fault** ☑ Trouble ☑ WarningLocked	

Cause	**Remedy**
Open-circuit monitoring for analog input 1 has tripped. • Only if the analog input has been configured as a current loop of 4 ... 20 mA (C00034/1 = 2).	• Check wiring of the analog input terminals for open circuit. • Check minimum current values of the signal sources.

CE04: MCI communication error [xx.0127.00002]

Response (Lenze setting printed in bold)	**Setting:** C01501/1 (☑ Adjustable response)
☑ No Reaction ☒ **Fault** ☐ Trouble ☑ WarningLocked	

Cause	**Remedy**
Communication error with communication unit	• Eliminate EMC interference. • Switch the mains or restart inverter. • Exchange communication unit/drive unit. • Please contact Lenze if the problem occurs again.

Smr1: Module internal watchdog or trap [xx.0127.00003]

Response (Lenze setting printed in bold)
☐ No Reaction ☒ **Fault** ☐ Trouble ☐ WarningLocked

Cause	**Remedy**
Internal error Communication Unit	• Switch the mains or restart inverter. • Replace Communication Unit. • Please contact Lenze if the problem occurs again.

Smr2: Module offline - no status or PDOs [xx.0127.00004]

Response (Lenze setting printed in bold)
☐ No Reaction ☒ **Fault** ☐ Trouble ☐ WarningLocked

Cause	**Remedy**
Communication Unit is offline	• Increase timeout in C01503/1. • Switch the mains or restart inverter. • Check correct identification of the Communication Unit in C00203/3. • Replace Communication Unit. • Please contact Lenze if the problem occurs again.

Smr3: Module timeout - one or more of PDOs timeout [xx.0127.00005]

Response (Lenze setting printed in bold)
☐ No Reaction ☒ **Fault** ☐ Trouble ☐ WarningLocked

Cause	**Remedy**
Communication Unit: A timeout has occurred for one or several PDOs	• Increase timeout in C01503/1. • Switch the mains or restart inverter. • Check correct identification of the Communication Unit in C00203/3. • Replace Communication Unit. • Please contact Lenze if the problem occurs again.

Smr4: SDO access failure [xx.0127.00006]

Response (Lenze setting printed in bold)
☐ No Reaction ☒ **Fault** ☐ Trouble ☐ WarningLocked

Cause	**Remedy**
An error has occurred during SDO access	• Switch the mains or restart inverter. • Please contact Lenze if the problem occurs again.

CE0F: MCI control word [xx.0127.00015]

Response (Lenze setting printed in bold)	**Setting:** C00594/2 (☑ Adjustable response)
☑ No Reaction ☒ **Fault** ☑ Trouble ☑ WarningLocked	

Cause	**Remedy**
Bit 14 ("SetFail") of the wMciCtrl control word of the LS_DriveInterface system block has been set.	Trace back signal source on the bus (e.g. PROFIBUS) that sets bit 14 ("SetFail").

CE4: CAN bus off [xx.0131.00000]

Response (Lenze setting printed in bold)	**Setting:** C00592/2 (☑ Adjustable response)
☒ **No Reaction** ☑ Fault ☑ Trouble ☑ WarningLocked	

Cause	**Remedy**
CAN interface: "Bus-Off" state • Received too many faulty telegrams. • Damaged cable (e.g. loose contact). • Two nodes with the same ID.	• Check wiring and bus terminating resistor. • Set identical baud rate for each bus node. • Assign different IDs to nodes. • Eliminate electrical interference (e.g. EMC).

CA06: CAN CRC error [xx.0131.00002]

Response (Lenze setting printed in bold)	**Setting:** C00592/1 (☑ Adjustable response)
☒ **No Reaction** ☑ Fault ☑ Trouble ☑ WarningLocked	

Cause	**Remedy**
CAN interface: a faulty CAN telegram has been detected.	• Check wiring and bus terminating resistor. • Eliminate electrical interference (e.g. EMC).

CA07: CAN bus warning [xx.0131.00007]

Response (Lenze setting printed in bold)	**Setting:** C00592/3 (☑ Adjustable response)
☒ **No Reaction** ☑ Fault ☑ Trouble ☑ WarningLocked	

Cause	**Remedy**
CAN interface: Incorrect transmission or reception of more than 96 CAN telegrams. • The current number of incorrectly transmitted CAN telegrams is displayed in C00372/1. • The current number of incorrectly received CAN telegrams is displayed in C00372/2. • The current CAN error status is displayed in C00345.	• Check wiring and bus terminating resistor. • Set identical baud rate for each bus node. • Assign different IDs to nodes. • Eliminate electrical interference (e.g. EMC).

CA08: CAN bus stopped [xx.0131.00008]

Response (Lenze setting printed in bold)	**Setting:** C00592/4 (☑ Adjustable response)
☒ **No Reaction** ☑ Fault ☑ Trouble ☑ WarningLocked	

Cause	**Remedy**
CAN interface: The device has received the "Stop Remote Node" NMT telegram.	Check CAN master (NMT master).

CA0b: CAN Bus Live Time [xx.0131.00011]

Response (Lenze setting printed in bold)	**Setting:** C00592/5 (☑ Adjustable response)
☒ **No Reaction** ☑ Fault ☑ Trouble ☑ WarningLocked	

Cause	**Remedy**
CAN interface: Cyclic node monitoring • Being a Heartbeat consumer, the device has not received a Heartbeat telegram from Heartbeat producer 1 ... 7 within the defined time. • The current states of the Heartbeat producers are displayed in C00347/1.	• Reactivate Heartbeat producers by mains switching, restarting the inverter, or a CAN Reset Node. • Reparameterise CAN Heartbeat producer time or switch off consumer monitoring and reset error status if latched.

CA0F: CAN control word [xx.0131.00015]

Response (Lenze setting printed in bold)	**Setting:** C00594/2 (☑ Adjustable response)
☑ No Reaction ☒ **Fault** ☑ Trouble ☑ WarningLocked	

Cause	**Remedy**
Bit 14 ("SetFail") in the wDriveControl control word of the LS_DriveInterface system block has been set.	Trace back signal source on the CAN bus that sets bit 14 ("SetFail").

CE1: CAN RPDO1 [xx.0135.00001]

Response (Lenze setting printed in bold)	**Setting:** C00593/1 (☑ Adjustable response)
☒ **No Reaction** ☑ Fault ☑ Trouble ☑ WarningLocked	

Cause	**Remedy**
CAN interface: Time monitoring for RPDO1 has tripped. • RPDO1 has not been received within the monitoring time set in C00357/1 or was faulty.	• Set correct telegram length for CAN master (transmitter). • Eliminate electrical interference (e.g. EMC). • Adjust monitoring time C00357/1 or switch off time monitoring.

CE2: CAN RPDO2 [xx.0135.00002]

Response (Lenze setting printed in bold)	**Setting:** C00593/2 (☑ Adjustable response)
☒ **No Reaction** ☑ Fault ☑ Trouble ☑ WarningLocked	

Cause	**Remedy**
CAN interface: Time monitoring for RPDO2 has tripped. • RPDO2 has not been received within the monitoring time set in C00357/2 or was faulty.	• Set correct telegram length for CAN master (transmitter). • Eliminate electrical interference (e.g. EMC). • Adjust monitoring time C00357/2 or switch off time monitoring.

CI01: Module missing/incompatible [xx.0140.00013]

Response (Lenze setting printed in bold)
☐ No Reaction ☒ **Fault** ☐ Trouble ☐ WarningLocked

Cause	**Remedy**
There is a connection problem between the communication unit and the drive unit or an incompatibility.	• Check installation of the 8400 motec. • In case of an incompatibility, either the communication unit or the software of the drive unit is out of date. In this case, please contact Lenze.

PS01: No memory module [xx.0144.00001]

Response (Lenze setting printed in bold)
☐ No Reaction ☒ **Fault** ☐ Trouble ☐ WarningLocked

Cause	**Remedy**
Memory module is either not available or not snapped into place correctly.	• If a memory module has been provided: Plug the memory module into the slot of the drive unit intended for this purpose. • If a memory module has been provided: Check if the memory module has been plugged-in correctly.

PS02: Par. set invalid [xx.0144.00002]

Response (Lenze setting printed in bold)
☐ No Reaction ☒ **Fault** ☐ Trouble ☐ WarningLocked

Cause	Remedy
The parameter set stored in the memory module is invalid. The reason for this can be as follows: • Incomplete storage of the parameter set due to voltage failure. • The plugged-in module stems from a device with new firmware (compare C00099) or from a different device type (e.g. 8400 BaseLine).	The error can only be removed by loading the Lenze setting with the C00002/1 = "1: On / start" device command. • In order to prevent the error, do not switch off the voltage during the saving process. • If the parameter set is to be transferred from one device with a higher version to a device with a lower version, use the "copy parameter set" function of the keypad. Make sure that you do not use functions that are not available in the older device.

PS03: Par. set device invalid [xx.0144.00003]

Response (Lenze setting printed in bold)
☐ No Reaction ☒ **Fault** ☐ Trouble ☐ WarningLocked

Cause	Remedy
The parameter set in the device is invalid.	Please contact Lenze.

PS04: Par. set device incompatible [xx.0144.00004]

Response (Lenze setting printed in bold)
☐ No Reaction ☒ **Fault** ☐ Trouble ☐ WarningLocked

Cause	Remedy
The parameter set saved to the memory module is incompatible to the standard device. • Incompatibility of the parameter set is e.g. caused if the parameter set in the memory module has a higher version than the standard device.	When the memory modules are exchanged, observe the downward compatibility: • OK: motec V1.0 to motec > V1.0 • Not OK: motec V2.0 to motec < V2.0

PS31: Ident. error [xx.0144.00031]

Response (Lenze setting printed in bold)
☐ No Reaction ☒ **Fault** ☐ Trouble ☐ WarningLocked

Cause	Remedy
Incompatible or unknown HW components have been found.	• Check which HW components are faulty (C00203/x: Product type code). • Check connection between communication unit and drive unit regarding for contact problems. • Check temperature range of the device at the start. • Replace communication unit. • Check whether a software update at Lenze is possible.

dF01: Internal error 01 [xx.0145.00001]

Response (Lenze setting printed in bold)
☐ No Reaction ☒ **Fault** ☐ Trouble ☐ WarningLocked

Cause	Remedy
Device error	• Reduce switching frequency (C00018) to 4 kHz. • Please contact Lenze if the problem occurs again.

dF02: Internal error 02 [xx.0145.00002]

Response (Lenze setting printed in bold)
☐ No Reaction ☒ **Fault** ☐ Trouble ☐ WarningLocked

Cause	Remedy
Device error	• Switch the mains or restart inverter. • Please contact Lenze if the problem occurs again.

dF03: Internal error 03 [xx.0145.00003]

Response (Lenze setting printed in bold)
☐ No Reaction ☒ **Fault** ☐ Trouble ☐ WarningLocked

Cause	Remedy
Device error	• Switch the mains or restart inverter. • Please contact Lenze if the problem occurs again.

dF04: Internal error 04 [xx.0145.00004]

Response (Lenze setting printed in bold)
☐ No Reaction ☒ **Fault** ☐ Trouble ☐ WarningLocked

Cause	Remedy
Device error	• Switch the mains or restart inverter. • Please contact Lenze if the problem occurs again.

dF05: Internal error 05 [xx.0145.00005]

Response (Lenze setting printed in bold)
☐ No Reaction ☒ **Fault** ☐ Trouble ☐ WarningLocked

Cause	Remedy
Device error	• Switch the mains or restart inverter. • Please contact Lenze if the problem occurs again.

dF06: Internal error 06 [xx.0145.00006]

Response (Lenze setting printed in bold)
☐ No Reaction ☒ **Fault** ☐ Trouble ☐ WarningLocked

Cause	Remedy
Device error	• Switch the mains or restart inverter. • Please contact Lenze if the problem occurs again.

dF07: Internal error 07 [xx.0145.00007]

Response (Lenze setting printed in bold)
☐ No Reaction ☒ **Fault** ☐ Trouble ☐ WarningLocked

Cause	Remedy
Device error	• Switch the mains or restart inverter. • Please contact Lenze if the problem occurs again.

dF08: Internal error 08 [xx.0145.00008]

Response (Lenze setting printed in bold)
☐ No Reaction ☒ **Fault** ☐ Trouble ☐ WarningLocked

Cause	Remedy
Device error	• Switch the mains or restart inverter. • Please contact Lenze if the problem occurs again.

dF09: Internal error 09 [xx.0145.00009]

Response (Lenze setting printed in bold)
☐ No Reaction ☒ **Fault** ☐ Trouble ☐ WarningLocked

Cause	Remedy
Device error	• Switch the mains or restart inverter. • Please contact Lenze if the problem occurs again.

dF10: time out I/O micro [xx.0145.00010]

Response (Lenze setting printed in bold)
☐ No Reaction ☒ **Fault** ☐ Trouble ☐ WarningLocked

Cause	Remedy
Device error	• Make sure that the Drive Unit and the Communication Unit are connected correctly to each other. Check the pins of the COM plug and firmly tighten all screws of the 8400 motec cover. • Switch the mains or restart inverter. • Please contact Lenze if the problem occurs again.

dF11: oscillator fail [xx.0145.00011]

Response (Lenze setting printed in bold)
☐ No Reaction ☒ **Fault** ☐ Trouble ☐ WarningLocked

Cause	Remedy
Device error	• Switch the mains or restart inverter. • Please contact Lenze if the problem occurs again.

dF12: math error [xx.0145.00012]

Response (Lenze setting printed in bold)
☐ No Reaction ☒ **Fault** ☐ Trouble ☐ WarningLocked

Cause	Remedy
Device error	• Switch the mains or restart inverter. • Please contact Lenze if the problem occurs again.

dF13: DMA error [xx.0145.00013]

Response (Lenze setting printed in bold)
☐ No Reaction ☒ **Fault** ☐ Trouble ☐ WarningLocked

Cause	Remedy
Device error	• Switch the mains or restart inverter. • Please contact Lenze if the problem occurs again.

IoC: Comm module changed [xx.0145.00198]

Response (Lenze setting printed in bold)
☐ No Reaction ☒ **Fault** ☐ Trouble ☐ WarningLocked

Cause	**Remedy**
Since the last power-down, the Communication Unit has been replaced. The fieldbus, the safety circuit or the module type has changed. It cannot be assumed anymore that the available parameter setting matches the new Communication Unit.	Switch off the device and mount the previous Communication Unit again. Then acknowledge the error with the C00002/19 = "1: On / start" device command. All communication parameters in the device will be set to the Lenze setting of the currently used Communication Unit. Changed communication parameters must be reset and saved.

dH69: Adjustment fault [xx.0400.00105]

Response (Lenze setting printed in bold)
☐ No Reaction ☒ **Fault** ☐ Trouble ☐ WarningLocked

Cause	**Remedy**
Device error	Please contact Lenze.

nt14: COM fault 14 [xx.0444.21811]

Response (Lenze setting printed in bold)	**Setting:** C01501/2 (☑ Adjustable response)
☑ No Reaction ☒ **Fault** ☐ Trouble ☑ WarningLocked	

Cause	**Remedy**
See communication manual (KHB) for Communication Unit used.	See communication manual (KHB) for Communication Unit used.

nt16: COM fault 16 [xx.0444.24835]

Response (Lenze setting printed in bold)	**Setting:** C01501/2 (☑ Adjustable response)
☑ No Reaction ☒ **Fault** ☐ Trouble ☑ WarningLocked	

Cause	**Remedy**
See communication manual (KHB) for Communication Unit used.	See communication manual (KHB) for Communication Unit used.

nt15: COM fault 15 [xx.0444.24848]

Response (Lenze setting printed in bold)	**Setting:** C01501/2 (☑ Adjustable response)
☑ No Reaction ☒ **Fault** ☐ Trouble ☑ WarningLocked	

Cause	**Remedy**
See communication manual (KHB) for Communication Unit used.	See communication manual (KHB) for Communication Unit used.

nt03: COM fault 3 [xx.0444.33072]

Response (Lenze setting printed in bold)
☐ No Reaction ☐ Fault ☐ Trouble ☐ WarningLocked

Cause	**Remedy**
See communication manual (KHB) for Communication Unit used.	See communication manual (KHB) for Communication Unit used.

nt04: COM fault 4 [xx.0444.33073]

Response (Lenze setting printed in bold)
☐ No Reaction ☐ Fault ☐ Trouble ☐ WarningLocked

Cause	**Remedy**
See communication manual (KHB) for Communication Unit used.	See communication manual (KHB) for Communication Unit used.

nt05: COM fault 5 [xx.0444.33074]

Response (Lenze setting printed in bold)
☐ No Reaction ☐ Fault ☐ Trouble ☐ WarningLocked

Cause	**Remedy**
See communication manual (KHB) for Communication Unit used.	See communication manual (KHB) for Communication Unit used.

nt08: COM fault 8 [xx.0444.33077]

Response (Lenze setting printed in bold)
☐ No Reaction ☐ Fault ☐ Trouble ☐ WarningLocked

Cause	**Remedy**
See communication manual (KHB) for Communication Unit used.	See communication manual (KHB) for Communication Unit used.

US01: User error 1 [xx.0980.00001]

Response (Lenze setting printed in bold)	**Setting:** C00581/1 (☑ Adjustable response)
☑ No Reaction ☒ **Fault** ☑ Trouble ☑ WarningLocked	

Cause	**Remedy**
User error 1 has been tripped via the *bSetError1* input of the LS_SetError_1 system block.	User-defined.

US02: User error 2 [xx.0981.00001]

Response (Lenze setting printed in bold)	**Setting:** C00581/2 (☑ Adjustable response)
☑ No Reaction ☒ **Fault** ☑ Trouble ☑ WarningLocked	

Cause	**Remedy**
User error 2 has been tripped via the *bSetError2* input of the LS_SetError_1 system block.	User-defined.

10 Communication

The following communication units are provided for the 8400 motec inverter:

- Basic I/O
- Standard I/O
- Standard I/O + M12
- Extended I/O
- CANopen
- AS interface
- EtherCAT
- EtherNet/IP™
- PROFIBUS
- PROFINET
- POWERLINK

> Detailed information on the respective "CAN" communication unit can be found in the corresponding online help and in the communication manual (KHB).

Related topics:

▶ I/O terminals (🕮 206)

10.1 General information

The interaction of communication unit and drive unit implements fieldbus-specific functions. This comprises control words and status words, device state machines and process data mapping.

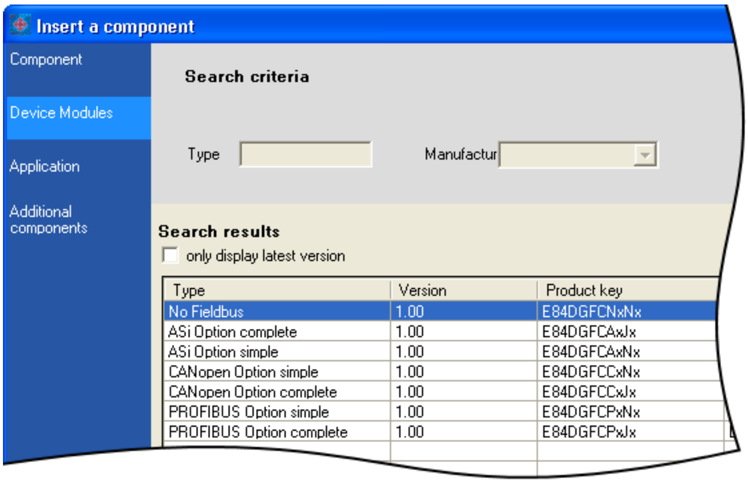
- The parameters of the fieldbus communication are saved in the memory module. The RAM copies of these data can be addressed via the fieldbus.
- The process data received are processed in the inverter in a 1ms cycle.

> The codes of the respective communication unit are described in the corresponding online help and in the communication manual (KHB).

10.2 Selection of the communication in the »Engineer«

If you insert the 8400 motec inverter into the »Engineer« *Project view* using the *Insert a component* dialog, the second dialog step, **Device modules**, implements the query for the communication option provided in the device.

Select the communication option in the list field according to the available communication unit in order that the related configuration parameters & parameterisation dialogs are available in the »Engineer«.



Search results

☐ only display latest version

Type	Version	Product key
No Fieldbus	1.00	E84DGFCNxNx
ASi Option complete	1.00	E84DGFCAxJx
ASi Option simple	1.00	E84DGFCAxNx
CANopen Option simple	1.00	E84DGFCCxNx
CANopen Option complete	1.00	E84DGFCCxJx
PROFIBUS Option simple	1.00	E84DGFCPxNx
PROFIBUS Option complete	1.00	E84DGFCPxJx

Tip!

The available communication option can also be assigned subsequently to the device in the »Engineer« any time:

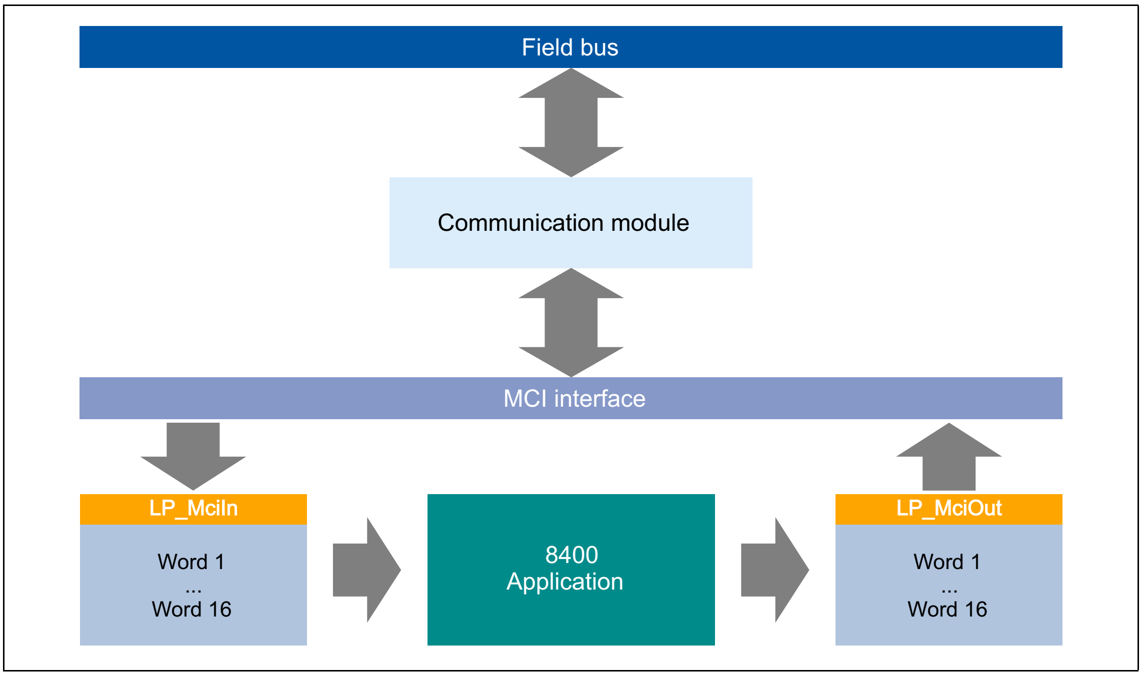
1. Go to the *Project view* and select the 8400 motec inverter.
2. Click the symbol.
3. Select the available communication option in the *Insert device modules* dialog box..
4. Press **Complete** to confirm your selection.

10.3 Control mode "Network (MCI/CAN)"

"40: Network (MCI/CAN)" can be selected as control mode in C00007 to quickly and easily implement inverter control via fieldbus communication.

In this control mode, the process data (PDOs) are transferred via the MCI or CAN interface depending on the available communication unit.

- Max. 8 process data words per direction are exchanged.
- The process data are accessed via the **LP_Network_In** and **LP_Network_Out** port blocks. These port blocks are also called process data channels.



[10-1] External and internal data transfer between the bus system, inverter, and application

Preconfigured wiring of the internal interfaces in the control mode "Network (MCI/CAN)" is shown in chapter Internal signal flow for control via network (MCI/CAN). (🕮 252)

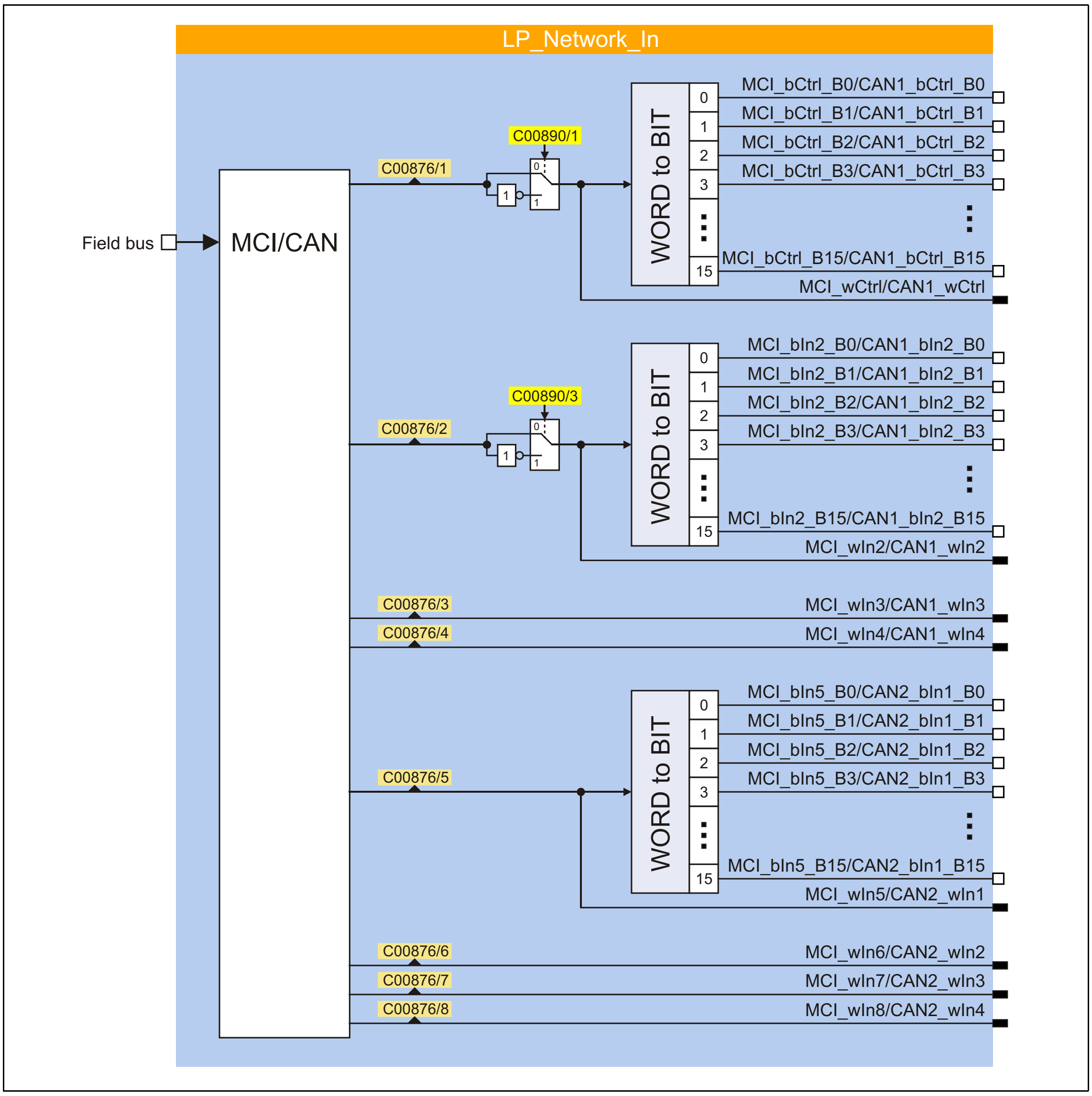
10.3.1 Pre-assignment of the data words

In the control mode "40: Network (MCI/CAN)" the process data words are already assigned sensibly:

PDO	Signal	Assignment	Information
Port block LP_Network_In			
RPDO1	wCtrl	LA_NCtrl.wDriveControl	Control word • For a detailed description of the individual control bits, see chapter "wDriveControl control word". (🕮 238)
	bCtrl1_B8	LA_NCtrl.bRFG_0	1 ≡ Activate stop function • Stop drive via stopping ramp (in preparation).
	bCtrl1_B11	LA_NCtrl.bSetDCBrake	1 ≡ Activate DC-injection braking
	bCtrl1_B12	LA_NCtrl.bJogSpeed1	Activation of fixed speed 1 ... 3
	bCtrl1_B13	LA_NCtrl.bJogSpeed2	
	bCtrl1_B15	LA_NCtrl.bSetSpeedCcw	0 ≡ Direction of rotation to the right (Cw) 1 ≡ Direction of rotation to the left (Ccw)
RPDO2	wIn2	LA_NCtrl.nMainSetValue_a	Speed setpoint • Scaling: 16384 ≡ 100 % reference speed (C00011)
RPDO3	wIn3	-	-
...	...		
RPDO8	wIn8		
Port block LP_Network_Out			
TPDO1	wState	LA_NCtrl.wDriveControlStatus	Status word of the inverter (based on DSP-402) • For bit assignment, see chapter entitled "Status word". (🕮 238)
TPDO2	wOut2	LA_NCtrl.nMotorSpeedAct_a	Actual speed value • Scaling: 16384 ≡ 100 % reference speed (C00011)
TPDO3	wOut3	LA_NCtrl.nOutputSpeedCtrl_a	Speed or slip controller output • Scaling: 16384 ≡ 100 % rated motor torque (C00097)
TPDO4	wOut4	-	-
...	...		
TPDO8	wOut8		

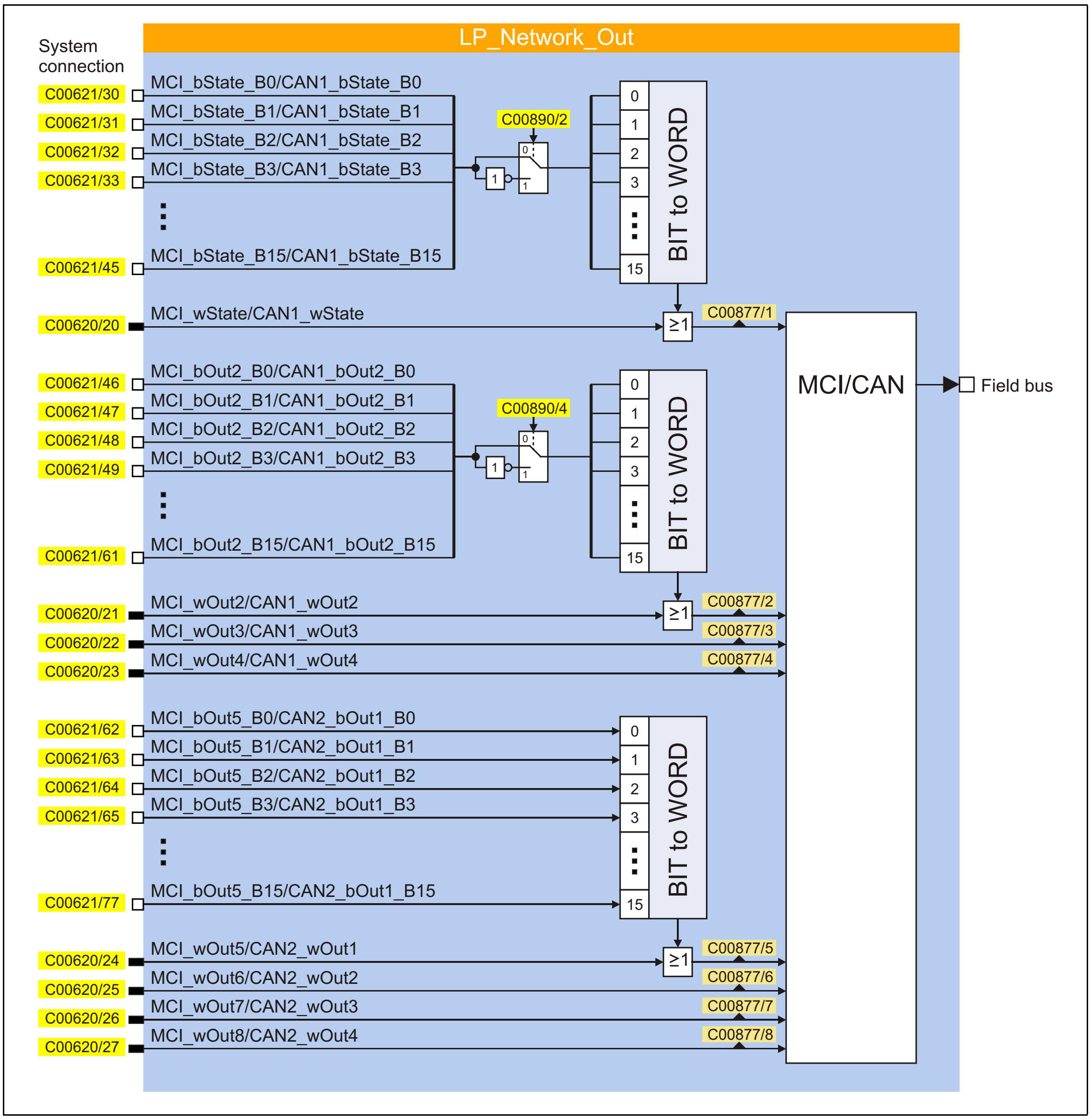
10.3.2 Port block "LP_Network_In"

When the control mode"40: Network (MCI/CAN)" has been selected, the **LP_Network_In** port block transmits the process data words (RPDOs) received by the communication unit to the application.



10.3.3 Port block "LP_Network_Out"

When the control mode "40: Network (MCI/CAN)" has been selected, the process data words (TPDOs) to be sent to the communication unit are transmitted via the **LP_Network_Out** port block..



11 Parameter reference

This chapter describes all parameters which can be used for parameterising and monitoring the inverter.

Parameters which are only available in the inverter from a certain software version onwards are marked with a corresponding note in the parameter description ("from version xx.xx.xx").

The parameter descriptions are based on the software version V11.01.00

Tip!

For quick reference of a parameter with a certain name simply use the **index** of the online documentation. The index always contains the corresponding code in parentheses behind the name.

General information on parameter setting can be found in the chapter "Introduction: Parameterising the inverter". (🕮 19)

For general information on how to read and change parameters, please see the online documentation for the »Engineer«.

11.1 Structure of the parameter descriptions

Each parameter is described in the Parameter list in the form of a table which consists of the following three areas:

Table header

The table header contains the following general information:

- Parameter number (Cxxxxx)
- Parameter name (display text in the »Engineer» and keypad)
- Data type
- Parameter index in decimal and hexadecimal notation for access via a fieldbus (e.g. CAN system bus).

Tip!

The parameter index is calculated as follows:

- Index [dec] = 24575 - code
- Index [hex] = 0x5FFF - code

Example for code C00005:

- Index [dec] = 24575 - 5 = 24570
- Index [hex] = 0x5FFF - 0x{5} = 0x5FFA

Table contents

The table contains further general explanations & notes on the parameter and the possible settings, which are represented in different ways depending on the parameter type:

- Parameters with read-only access
- Parameters with write access

Table footer

The table footer contains the Parameter attributes.

11.1.1 Data type

The following data types are available for parameters:

Data type	Meaning
INTEGER_16	16-bit value with sign
INTEGER_32	32-bit value with sign
UNSIGNED_8	8-bit value without sign
UNSIGNED_16	16-bit value without sign
UNSIGNED_32	32-bit value without sign
VISIBLE_STRING	String of characters of printable characters

11.1.2 Parameters with read-only access

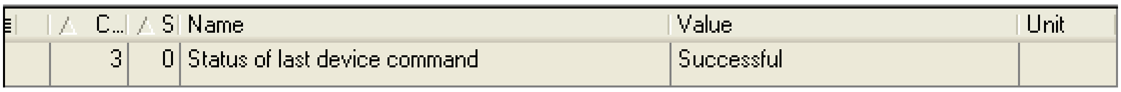
Parameters for which the "write access" attribute has not been set can only be read and not be changed by the user.

Description structure

<table>
<tr><td colspan="3">Parameter | Name:
Cxxxxx | ______________</td><td>Data type: ______
Index: ______</td></tr>
<tr><td colspan="4">Description</td></tr>
<tr><td colspan="3">Display range (min. value | unit | max. value)</td><td></td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="4">☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 1</td></tr>
</table>

Representation in the »Engineer«

The »Engineer« displays these parameters with a grey background or, with an online connection, with a pale-yellow background:



	C...	S	Name	Value	Unit
	3	0	Status of last device command	Successful	

11.1.3 Parameters with write access

Only parameters with a check mark (☑) in front of the "write access" attribute can be changed by the user. The Lenze setting for these parameters is **printed in bold**.

- The settings can either be selected from a selection list or the values can be entered directly.
- Values outside the valid setting range are represented in red in the »Engineer«.

11.1.3.1 Parameters with setting range

Description structure

<table>
<tr><td colspan="3">Parameter | Name:
Cxxxxx | ______________</td><td>Data type: ______
Index: ______</td></tr>
<tr><td colspan="4">Description</td></tr>
<tr><td colspan="3">Setting range (min. value | unit | max. value)</td><td>Lenze setting</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="4">☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 1</td></tr>
</table>

Parameter setting in the »Engineer«

In the »Engineer«, parameters are set by entering the desired value into the input field:

C...	S	Name	Value	Unit
11	0	Appl.: Reference speed	1500	rpm

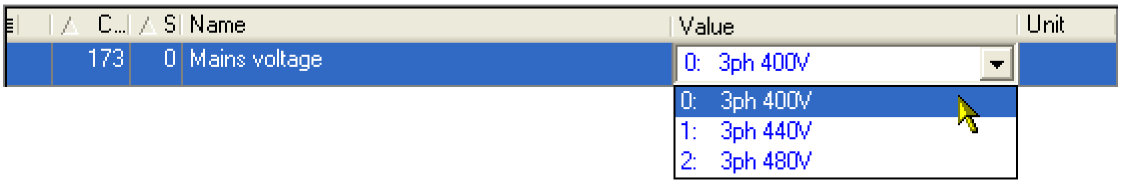
11.1.3.2 Parameters with selection list

Description structure

<table>
<tr><td colspan="2">Parameter | Name:
Cxxxxx | ______________</td><td>Data type: ______
Index: ______</td></tr>
<tr><td colspan="3">Description</td></tr>
<tr><td colspan="2">Selection list(Lenze setting printed in bold)</td><td rowspan="4"></td></tr>
<tr><td>1</td><td></td></tr>
<tr><td>2</td><td></td></tr>
<tr><td>3</td><td></td></tr>
<tr><td colspan="3">☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 1</td></tr>
</table>

Parameter setting in the »Engineer«

In the »Engineer«, a list field is used for parameter setting:



C...	S	Name	Value	Unit
173	0	Mains voltage	0: 3ph 400V	

0: 3ph 400V
1: 3ph 440V
2: 3ph 480V

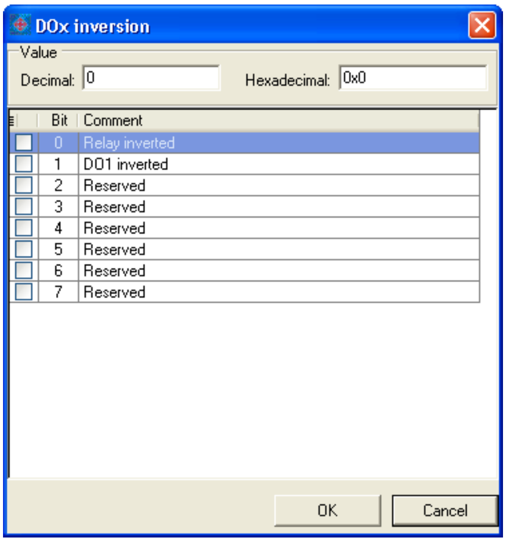
11.1.3.3 Parameters with bit-coded setting

Description structure

<table>
<tr><td colspan="3">Parameter | Name:
Cxxxxx | ______________</td><td>Data type: _______
Index: _______</td></tr>
<tr><td colspan="4">Description</td></tr>
<tr><td colspan="2">Value is bit-coded:</td><td colspan="2"></td></tr>
<tr><td>Bit 0</td><td></td><td colspan="2"></td></tr>
<tr><td>...</td><td></td><td colspan="2"></td></tr>
<tr><td>Bit 31</td><td></td><td colspan="2"></td></tr>
<tr><td colspan="4">☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 1</td></tr>
</table>

Parameter setting in the »Engineer«

The »Engineer« uses a dialog box for parameter setting in which the individual bits can be set or reset. Alternatively, the value can be entered as a decimal or hexadecimal value:



Decimal: 0 Hexadecimal: 0x0

	Bit	Comment
☐	0	Relay inverted
☐	1	DO1 inverted
☐	2	Reserved
☐	3	Reserved
☐	4	Reserved
☐	5	Reserved
☐	6	Reserved
☐	7	Reserved

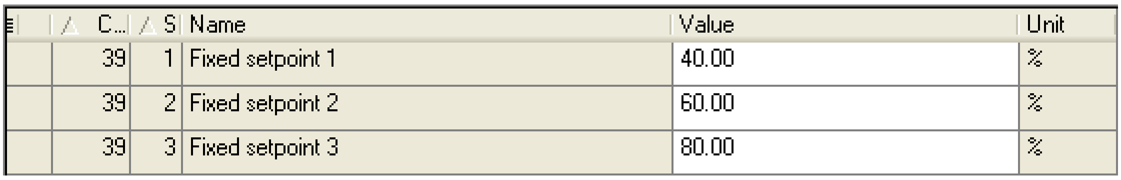
11.1.3.4 Parameters with subcodes

Description structure

Parameter | Name: **Cxxxxx | ____________**			Data type: _______ Index: _______
Description			
Setting range **(min. value | unit | max. value)**			
Subcodes	**Lenze setting**		
Cxxxxx/1			
Cxxxxx/2			
Cxxxxx/3			
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 1			

Parameter setting in the »Engineer«

The »Engineer« parameter list displays each subcode individually. The parameters are set as described in the previous chapters.



	C...	S	Name	Value	Unit
	39	1	Fixed setpoint 1	40.00	%
	39	2	Fixed setpoint 2	60.00	%
	39	3	Fixed setpoint 3	80.00	%

11.1.4 Parameter attributes

The table footers contain the parameter attributes:

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

<table>
<tr><th>Attribute</th><th colspan="2">Meaning</th></tr>
<tr><td>☑ Read access</td><td colspan="2">Read access to parameter possible.</td></tr>
<tr><td rowspan="3">☑ Write access</td><td colspan="2">Write access to parameter possible.
• Please also observe the following attributes:</td></tr>
<tr><td>☑ CINH</td><td>Parameter value can only be changed when the controller is inhibited.</td></tr>
<tr><td>☑ PLC STOP</td><td>Parameter value can only be changed when the application is stopped.</td></tr>
<tr><td>☑ No transfer</td><td colspan="2">Parameter is not transferred to inverter when the command Download parameter set is executed.</td></tr>
<tr><td>☑ COM</td><td colspan="2">Communication-relevant parameter
• This parameter is relevant for parameter data transfer via the (CAN) system bus.</td></tr>
<tr><td>☑ MOT</td><td colspan="2">Motor control parameters</td></tr>
</table>

Scaling factor

The "scaling factor" is important for parameter access via a bus system.

Signal type	Scaling factor	Resolution	Value range
Analog (scaled)	100	16 bits signed	± 199.99 %
Angular velocity	1	16 bits signed	± 32767 incr./ms
Position in [units]	10000	32 bits signed	± 214748.3647 [units]
Digital (BOOL)	1	8 bits unsigned	0 ≡ FALSE; 1 ≡ TRUE
Time	1000	16 bits unsigned	0 ... 999.000 s
Selection value	1	16 bits unsigned	0 ... 65535

Example 1: The value "654" of the parameter C00028/1 (AIN1: input voltage) read via a bus system must be divided by the corresponding scaling factor "100" to obtain the actual display value "6.54 V".

$$\frac{\text{Read value (via bus system)}}{\text{Scaling factor}} = \text{Indicated value (Engineer)}$$

[11-1] Conversion formula for read access via bus system

Example 2: In order to set the parameter C00012 (acceleration time - main setpoint) to the value "123.4 s" via a bus system, the integer value "123400" must be transferred, i.e. the value to be set must be multiplied by the corresponding scaling factor "1000".

$$\text{Value to be written (via bus system)} = \text{Value to be set} \cdot \text{Scaling factor}$$

[11-2] Conversion formula for write access via bus system

Character length

In case of parameters of "VISIBLE_STRING" data type, the character length is given in addition. This is also important for the parameter access via a bus system.

11.2 Parameter list

This chapter lists all parameters of the operating system in numerically ascending order.

Note!

The parameter descriptions are based on the software version V06.01.00.

C00002

Parameter | Name: **C00002 | Device command**	Data type: UNSIGNED_8 Index: $24573_d = 5FFD_h$

Note:

- Before switching off the supply voltage after a device command has been executed, check the successful execution of the device command via the status display in C00003!
- Before activating device commands by a master control, wait for the "Ready" signal of the inverter.
- The device will reject a write process to C00002/x if the value is >1 and issue an error message.

▸ Drive control (DCTRL): Device commands

Selection list	
0	Off / ready
1	On / start
2	Work in progress
4	Action cancelled
5	No access
6	No access controller inhibit

Subcodes	Lenze setting	Information
C00002/1	0: Off / ready	Load Lenze setting • All parameters are reset to the Lenze setting. • Only possible when the controller is inhibited. ▸ Load Lenze setting
C00002/2	0: Off / ready	Load parameter set 1 • Load parameter set 1 from the memory module. ▸ Load parameter set 1
C00002/3	0: Off / ready	Reserved
C00002/4	0: Off / ready	Reserved
C00002/5	0: Off / ready	Reserved
C00002/6	0: Off / ready	Reserved
C00002/7	0: Off / ready	Save parameter set 1 • Saving parameter set 1 in the memory module safe against mains failure. ▸ Save parameter settings
C00002/8	0: Off / ready	Reserved
C00002/9	0: Off / ready	Reserved
C00002/10	0: Off / ready	Reserved
C00002/11	0: Off / ready	Save all parameter sets • All parameter sets are saved to the memory module safe against mains failure. ▸ Save parameter settings

Parameter | Name: **C00002 | Device command**		Data type: UNSIGNED_8 Index: 24573_d = $5FFD_h$
C00002/12	0: Off / ready	Import EPM data • Setting "1: On / start" activates the automatic import of parameters of the memory module after the error message "PS04".
C00002/13	0: Off / ready	Reserved
C00002/14	0: Off / ready	Reserved
C00002/15	0: Off / ready	Reserved
C00002/16	1: On / start	Enable inverter 1 ≡ Enable inverter 0 ≡ Inhibit inverter ▶ Enable/inhibit inverter
C00002/17	0: Off / ready	Activate quick stop 1 ≡ Activate quick stop 0 ≡ Deactivate quick stop ▶ Activate/deactivate quick stop
C00002/18	0: Off / ready	Reserved
C00002/19	0: Off / ready	Reset error • After the reset (acknowledgement) of the current error, further errors may be pending which must also be reset. • Details of the currently pending error are displayed in C00166.
C00002/20	0: Off / ready	Reserved
C00002/21	0: Off / ready	Delete logbook • All entries in the logbook of the inverter are deleted. • In the logbook, information on the error history is saved. ▶ Logbook
C00002/22	0: Off / ready	Reserved
C00002/23	0: Off / ready	Identify motor parameters • This device command serves to carry out automatic motor parameter identification. • The device command is only executed when the inverter is in the "SwitchedOn" status. • In order to identify the motor parameters, the inverter must be enabled after this device command. ▶ Automatic motor parameter identification
C00002/24	0: Off / ready	Reserved
C00002/25	0: Off / ready	Reserved
C00002/26	0: Off / ready	CAN reset node • Reinitialise CAN interface of the communication unit CANopen. • Required when changing the baud rate, node address, or identifiers.
C00002/27	0: Off / ready	Device search function • From version 04.00.00 • This device command serves to optically locate an inverter connected online (e.g. for maintenance work). ▶ Device search function
C00002/28	0: Off / ready	Reserved
C00002/29	0: Off / ready	Reserved
C00002/30	0: Off / ready	Reserved
C00002/31	0: Off / ready	Reserved

Parameter | Name: **C00002 | Device command**		Data type: UNSIGNED_8 Index: 24573_d = $5FFD_h$
C00002/32	0: Off / ready	Reserved
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☑ No transfer ☐ COM ☐ MOT Scaling factor: 1		

C00003

Parameter | Name: **C00003 | Status of last device command**		Data type: UNSIGNED_8 Index: 24572_d = $5FFC_h$
Status of the device command executed last (C00002). **Note:** Before switching off the supply voltage after carrying out a device command, check whether the device command has been carried out successfully via the status display! ▶ Drive control (DCTRL): Device commands		
Selection list **(read only)**		**Information**
0	Successful	Device command has been executed successfully.
1	Command unknown	Device command implausible or unknown to the system.
2	No access	Unauthorised access for requested device command.
3	Time-out	Device command could not be processed in the defined time (timeout).
☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☑ No transfer ☐ COM ☐ MOT Scaling factor: 1		

C00005

Parameter | Name: **C00005 | Application**		Data type: UNSIGNED_16 Index: 24570_d = $5FFA_h$
Selection of the technology application		
Selection list**(Lenze setting printed in bold)**		**Information**
1000	**Actuating drive speed**	This technology application is used to solve speed-controlled drive tasks, e.g. conveying belts. ▶ Application "Speed actuating drive"
1100	Actuating drive speed (AC Drive Profile)	From version 04.01.00 Use this application if you use the EtherNet/IP™ Communication Unit. The process data word received from the master control is then interpreted as "AC Drive profile" control word. Detailed information on the "AC Drive Profile" can be found in the EtherNet/IP™ communication manual.
3000	Switch-off positioning	From version 05.00.00 This technology application is used to solve speed-controlled drive tasks which require a pre-switch off or stopping at certain positions, e.g. roller conveyors and conveying belts. This is implemented by connecting switch-off sensors. ▶ Application "Switch-off positioning"
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 1		

C00006

Parameter | Name: **C00006 | Motor control**		Data type: UNSIGNED_8 Index: 24569_d = $5FF9_h$
Selection of the motor control mode ▸ Motor control (MCTRL): Select control mode		
Selection list(Lenze setting printed in bold)		**Information**
3	SLPSM: Sensorless PSM	From version 03.00.00 This control type is used for the sensorless control of a synchronous motor. ▸ Sensorless control for synchronous motors
4	SLVC: Vector control	This control type is used for sensorless vector control of an asynchronous motor. • The control type requires motor parameters to be set as exactly as possible! ▸ Sensorless vector control
6	**VFCplus: V/f linear**	This control type is used for the speed control of an asynchronous motor via a linear V/f characteristic and is the simplest control type. • For setting the V/f characteristic, only the rated frequency (C00089) and the rated voltage (C00090) of the motor have to be entered. ▸ V/f characteristic control
7	VFCplus: V/f linear + encoder	From version 02.00.00 This control type is used for speed control of an asynchronous motor via a linear V/f characteristic. • The control type requires a speed feedback via an encoder mounted to the motor! • For setting the V/f characteristic, only the rated frequency (C00089) and the rated voltage (C00090) of the motor have to be entered. ▸ V/f control
8	VFCplus: V/f quadr	This control type is used for speed control of an asynchronous motor via a square-law V/f characteristic. • For setting the V/f characteristic, only the rated frequency (C00089) and the rated voltage (C00090) of the motor have to be entered. ▸ V/f characteristic control
9	VFCplus: V/f quadr + encoder	From version 02.00.00 This control type is used for speed control of an asynchronous motor via a square-law V/f characteristic. • The control type requires a speed feedback via an encoder mounted to the motor! • For setting the V/f characteristic, only the rated frequency (C00089) and the rated voltage (C00090) of the motor have to be entered. ▸ V/f control
11	VFCplusEco: V/f energy-saving	This control type is used for energy-saving speed control of an asynchronous motor via a linear V/f characteristic. • For setting the V/f characteristic, only the rated frequency (C00089) and the rated voltage (C00090) of the motor have to be entered. • Predestinated application areas of this control type are materials handling technology and pump and fan systems. ▸ V/f characteristic control, energy-saving
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☑ MOT Scaling factor: 1		

C00007

Parameter | Name: **C00007 | Control mode**		Data type: UNSIGNED_16 Index: 24568_d = $5FF8_h$
Selection of how the application is to be controlled.		
Selection list(Lenze setting printed in bold)		**Information**
0	Wiring has changed	This display appears when the preset configuration has been reparameterised via the connection parameters.
9	Local mode	The technology application is controlled via the control elements at the 8400 motec. Detailed information on this control mode can be found in the mounting instructions/hardware manual. The digital input terminals in local mode are assigned as follows: • DI1 = setpoint of P2/fixed setpoint 3 • DI2 = fixed setpoint 2/3 • DI3 = activate DC injection brake • DI4 = change of direction of rotation • If the reversal of rotation direction is permanently set to ccw (left) via DIP switches (DIP switch S1/ DIP2 = "ON"), DI4 has no influence. • DI5 = manual release of holding brake (set operating mode in C02580)
10	**Terminals 0: Jog1; Jog2; DCB; R/L**	The technology application is controlled via the digital input terminals of the inverter: • DI1 = fixed setpoint 1/3 • DI2 = fixed setpoint 2/3 • DI3 = activate DC injection brake • DI4 = change of direction of rotation • DI5 = manual release of holding brake (set operating mode in C02580)
12	Terminals 2: Jog1; Jog2; QSp; R/L	The technology application is controlled via the digital input terminals of the inverter: • DI1 = fixed setpoint 1/3 • DI2 = fixed setpoint 2/3 • DI3 = quick stop • DI4 = change of direction of rotation • DI5 = open/close holding brake (in conjunction with the operating mode set in C02580)
14	Terminals 11: R/L; DCB; MPotUp; MPotDown	The technology application is controlled via the digital input terminals of the inverter: • DI1 = change of direction of rotation • DI2 = active DC injection brake • DI3 = motor potentiometer: Higher speed • DI4 = motor potentiometer: Lower speed • DI5 = manual release of holding brake (set operating mode in C02580)
16	Terminals 16: Jog1; Jog2; R/QSP; L/ QSP	The technology application is controlled via the digital input terminals of the inverter: • DI1 = fixed setpoint 1/3 • DI2 = fixed setpoint 2/3 • DI3 = CW rotation/quick stop • DI4 = CCW rotation/quick stop • DI5 = manual release of holding brake (set operating mode in C02580)
40	Network (MCI/CAN)	The technology application is controlled via fieldbus communication (depending on the available communication unit). ▶ Communication

Parameter | Name: **C00007 | Control mode**		Data type: UNSIGNED_16 Index: 24568_d = $5FF8_h$
41	Network(ASi)	From version 04.00.00 The technology application is controlled via the "AS-i Option" Communication Unit
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 1		

C00010

Parameter | Name: **C00010 | Minimum analog setpoint**			Data type: INTEGER_16 Index: 24565_d = $5FF5_h$
Lower limit for analog input **Note:** • Not effective with bipolar analog input (-10 V ... +10 V). • With an offset (C00026/1) not equal to "0.0 %" or a gain (C00027/1) lower than "0.0 %", the minimum output value (for the application) can fall below the value set here. ▸ Analog terminals			
Setting range **(min. value | unit | max. value)**			
0.0	%	100.0	
Subcodes	**Lenze setting**		**Information**
C00010/1	0.0 %		Min. analog setpoint
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 100			

C00011

Parameter | Name: **C00011 | Appl.: Reference speed**			Data type: UNSIGNED_16 Index: 24564_d = $5FF4_h$
Setting the reference speed • In the inverter, all speed-related signals are processed to one reference variable in percent. • Set a reference speed here that corresponds to 100 %. • The frequency that corresponds to the set reference speed is displayed in C00059. **Note:** This is not a maximum limitation! All values in percent in the inverter may be in a range of 0 ... 199.99 %.			
Setting range **(min. value | unit | max. value)**			**Lenze setting**
50	rpm	18000	**1500 rpm**
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☑ MOT Scaling factor: 1			

C00012

Parameter | Name: **C00012 | Accel. time - main setpoint**			Data type: UNSIGNED_32 Index: 24563_d = $5FF3_h$
The L_NSet_1 FB: Acceleration time of the ramp generator for the main speed setpoint			
Setting range **(min. value | unit | max. value)**			**Lenze setting**
0.0	s	999.9	**2.0 s**
☑ Read access ☑ Write access 📚 CINH 📚 PLC STOP 📚 No transfer 📚 COM 📚 MOT Scaling factor: 1000			

C00013

Parameter | Name: **C00013 | Decel. time - main setpoint**			Data type: UNSIGNED_32 Index: 24562_d = $5FF2_h$
The L_NSet_1 FB: Deceleration time of the ramp generator for the main speed setpoint			
Setting range (min. value | unit | max. value)			**Lenze setting**
0.0	s	999.9	**2.0 s**
☑ Read access ☑ Write access 📚 CINH 📚 PLC STOP 📚 No transfer 📚 COM 📚 MOT Scaling factor: 1000			

C00015

Parameter | Name: **C00015 | VFC: V/f base frequency**			Data type: UNSIGNED_16 Index: 24560_d = $5FF0_h$
V/f base frequency for V/f characteristic control (VFCplus) and V/f control (VFCplus+encoder) • The motor voltage increases linearly with the frequency until the base frequency is reached. From this value on, the motor voltage remains constant, the speed increases and the maximum torque decreases. • After the motor to be used has been selected from the motor catalogue, the suitable value can be entered automatically. An automatic detection via the motor parameter identification is possible as well.			
Setting range (min. value | unit | max. value)			**Lenze setting**
7.5	Hz	999.9	**50.0 Hz**
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☑ MOT Scaling factor: 10			

C00016

Parameter | Name: **C00016 | VFC: Vmin boost**			Data type: UNSIGNED_16 Index: 24559_d = $5FEF_h$
Boost of the V/f voltage characteristic in the range of small speeds or frequencies with V/f characteristic control (VFCplus) and V/f control (VFCplus+encoder) • This may increase the starting torque. • After the motor to be used has been selected from the motor catalogue, the suitable value can be entered automatically. An automatic detection via the motor parameter identification is possible as well. ▸ Motor control (MCTRL): Setting the Vmin boost			
Setting range (min. value | unit | max. value)			**Lenze setting**
0.0	%	100.0	**0.0 %**
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☑ MOT Scaling factor: 100			

C00018

Parameter | Name: **C00018 | Switching frequency**		Data type: UNSIGNED_8 Index: 24557_d = $5FED_h$
Selection of the pulse width modulated switching frequency transferred from the inverter to the motor • When a variable switching frequency is selected, the switching frequency may change as a function of the load and rotational frequency. ▸ Selection of switching frequency		
Selection list(Lenze setting printed in bold)		
2	**8 kHz var./drive-optimised**	
3	16 kHz var./drive-optimised	
6	4 kHz constant/drive-optimised	
7	8 kHz constant/drive-optimised	
8	16 kHz constant/drive-optimised	
23	16 kHz var/8 kHz min	
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☑ MOT Scaling factor: 1		

C00019

Parameter | Name: **C00019 | Auto DCB: Threshold**			Data type: UNSIGNED_16 Index: 24556$_d$ = 5FEC$_h$
Setpoint speed threshold for automatic DC injection braking • For speed setpoints with values below the thresholds a DC current is injected or the motor is not supplied with current, depending on the setting. ▸ DC-injection braking ▸ Optimising the starting performance after controller enable			
Setting range **(min. value | unit | max. value)**			**Lenze setting**
0	rpm	9999	**3 rpm**
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 1			

C00021

Parameter | Name: **C00021 | Slip comp.**			Data type: INTEGER_16 Index: 24554$_d$ = 5FEA$_h$
Slip compensation for V/f characteristic control (VFCplus) and sensorless vector control (SLVC) • A higher slip compensation results in a higher increase in frequency and voltage when the machine is under load. • After the motor to be used has been selected from the motor catalogue, the suitable value can be entered automatically. An automatic detection via the motor parameter identification is possible as well. ▸ Motor control (MCTRL): Optimising the operational performance by slip compensation			
Setting range **(min. value | unit | max. value)**			**Lenze setting**
-50.00	%	50.00	**0.00 %**
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☑ MOT Scaling factor: 100			

C00022

Parameter | Name: **C00022 | Imax in motor mode**			Data type: UNSIGNED_16 Index: 24553$_d$ = 5FE9$_h$
Maximum current in motor mode for all motor control modes			
Setting range **(min. value | unit | max. value)**			**Lenze setting**
0.00	A	99.99	**47.00 A**
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☑ MOT Scaling factor: 100			

C00023

Parameter | Name: **C00023 | Imax in generator mode**			Data type: INTEGER_16 Index: 24552$_d$ = 5FE8$_h$
Maximum current in generator mode for all motor control modes • 100 % ≡ Imax in motor mode (C00022)			
Setting range **(min. value | unit | max. value)**			**Lenze setting**
0.0	%	100.0	**100.0 %**
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☑ MOT Scaling factor: 100			

C00024

Parameter | Name: **C00024 | Comparison value N_Act**			Data type: INTEGER_16 Index: 24551$_d$ = 5FE7$_h$
Threshold for the actual speed comparison • This parameter serves to set a threshold that is compared with the actual speed value. • If the value falls below this threshold, the *bNactCompare* output sets the LS_DriveInterface system block to TRUE. • Switching hysteresis = +1 %			
Setting range **(min. value | unit | max. value)**			**Lenze setting**
0.0	%	199.9	**0.0 %**
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 100			

C00026

Parameter | Name: **C00026 | AINx: Offset**			Data type: INTEGER_16 Index: 24549$_d$ = 5FE5$_h$
Offset for analog inputs ▸ Analog terminals			
Setting range **(min. value | unit | max. value)**			
-199.9	%	199.9	
Subcodes	**Lenze setting**		**Information**
C00026/1	0.0 %		AIN1: Offset
C00026/2	0.0 %		AIN2: Offset • From version 04.00.00
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 100			

C00027

Parameter | Name: **C00027 | AINx: Gain**			Data type: INTEGER_32 Index: 24548$_d$ = 5FE4$_h$
Gain for analog inputs ▸ Analog terminals			
Setting range **(min. value | unit | max. value)**			
-199.9	%	199.9	
Subcodes	**Lenze setting**		**Information**
C00027/1	100.0 %		AIN1: Gain
C00027/2	100.0 %		AIN2: Gain • From version 04.00.00
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 100			

C00028

Parameter | Name: **C00028 | AINx: Input voltage**			Data type: INTEGER_16 Index: 24547_d = $5FE3_h$
Display of the input voltage at the analog inputs ▸ Analog terminals			
Display range **(min. value | unit | max. value)**			
-10.0	V	10.0	
Subcodes			**Information**
C00028/1			AIN1: Input voltage
C00028/2			AIN2: Input voltage • From version 04.00.00
☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☑ No transfer ☐ COM ☐ MOT Scaling factor: 100			

C00029

Parameter | Name: **C00029 | AINx: Input current**			Data type: INTEGER_16 Index: 24546_d = $5FE2_h$
Display of the Input current at the analog input • When the analog input is configured for current measurement (C00034/1 = 1 or 2). • When C00034/1 is set = 2 (4 ... 20 mA), 0 ... 16 mA is displayed. ▸ Analog terminals			
Display range **(min. value | unit | max. value)**			
0.0	mA	20.0	
Subcodes			**Information**
C00029/1			AIN1: Input current
☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☑ No transfer ☐ COM ☐ MOT Scaling factor: 100			

C00033

Parameter | Name: **C00033 | AINx: Output value**			Data type: INTEGER_16 Index: 24542_d = $5FDE_h$
Display of the output value in percent of the analog input amplifier • 100 % ≡ 16384 ≡ +10 V / +20 mA ▸ Analog terminals			
Display range **(min. value | unit | max. value)**			
-199.9	%	199.9	
Subcodes			**Information**
C00033/1			AIN1: Output value
C00033/2			AIN2: Output value • From version 04.00.00
☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☑ No transfer ☐ COM ☐ MOT Scaling factor: 100			

C00034

Parameter | Name: **C00034 | AINx: Configuration**		Data type: UNSIGNED_8 Index: 24541_d = $5FDD_h$
Configuration of the analog input for current or voltage measurement ▶ Analog terminals		
Selection list		**Information**
0	0...+10 V(-10V...+10V)	Input signal is voltage signal 0 V ... +10 V • 0 V ... +10 V ≡ 0 % ... +100 %
1	0...+20mA	With external load resistor (250 Ohms): Input signal is the current signal 0 mA ... 20 mA • 0 mA ... 20 mA ≡ 0 % ... +100 %
2	4...+20mA	With external load resistor (250 Ohms): Input signal is the current signal 4 mA ... 20 mA • 4 mA ... 20 mA ≡ 0 % ... +100 % • The current loop is monitored for open circuit (I < 4 mA) by the device.
3	AIn1 - AIn2	Voltage difference (-10 V ... +10 V) between input AIn1 and input AIn2 • Selection is only sensible when using an E84DGFCXxNx Communication Unit (no fieldbus; extended terminal design).
Subcodes	**Lenze setting**	**Information**
C00034/1	0: 0...+10 V(-10V...+10V)	AIN1: Config.
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 1		

C00036

Parameter | Name: **C00036 | DCB: Current**			Data type: INTEGER_16 Index: 24539_d = $5FDB_h$
Braking current in [%] based on rated device current (C00098) • 100% ≡ C00098 ▶ DC-injection braking			
Setting range (min. value | unit | max. value)			**Lenze setting**
0.0	%	100.0	**50.0 %**
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☑ MOT Scaling factor: 100			

C00039

Parameter | Name: **C00039 | Fixed setpoint x (L_NSet_1 n-Fix)**			Data type: INTEGER_16 Index: 24536_d = $5FD8_h$
The L_NSet_1 FB: Fixed speed setpoints (JOG values) for the setpoint generator • 100% ≡ C00011			
Setting range (min. value | unit | max. value)			
-199.9	%	199.9	
Subcodes	**Lenze setting**		**Information**
C00039/1	40.0 %		Preset setpoint 1
C00039/2	60.0 %		Preset setpoint 2
C00039/3	80.0 %		Preset setpoint 3
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 100			

C00050

Parameter | Name:
C00050 | MCTRL: Speed setpoint
Data type: INTEGER_32
Index: 24525_d = $5FCD_h$

Display of the speed setpoint at the speed setpoint input of the motor control

Display range (min. value | unit | max. value)		
-18000	rpm	18000

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

C00051

Parameter | Name:
C00051 | MCTRL: Actual speed value
Data type: INTEGER_32
Index: 24524_d = $5FCC_h$

Display of the actual speed value of the motor shaft

Note:
The displayed value only corresponds to the real actual speed value of the motor shaft if an encoder is connected to the motor and the evaluation of the feedback signal has been set correctly ("Closed loop" operation).
In case of operation without speed feedback, the signal is calculated from the motor control and thus may not correspond to the real actual speed.

Display range (min. value | unit | max. value)		
-18000	rpm	18000

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

C00052

Parameter | Name:
C00052 | Motor voltage
Data type: UNSIGNED_16
Index: 24523_d = $5FCB_h$

Display of the current motor voltage/output voltage of the inverter

Display range (min. value | unit | max. value)		
0	V	1000

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

C00053

Parameter | Name:
C00053 | DC-bus voltage
Data type: UNSIGNED_16
Index: 24522_d = $5FCA_h$

Display of the current DC-bus voltage

Display range (min. value | unit | max. value)		
0	V	1000

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

C00054

Parameter | Name:
C00054 | Motor current
Data type: UNSIGNED_16
Index: 24521_d = $5FC9_h$

Display of the current motor current/output current of the inverter

Display range (min. value | unit | max. value)		
0.00	A	300.00

☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☑ No transfer ☐ COM ☐ MOT Scaling factor: 100

C00056

Parameter | Name: **C00056 | Torque**			Data type: INTEGER_32 Index: 24519_d = $5FC7_h$
Display of the current torque			
Display range **(min. value | unit | max. value)**			
-320.00	Nm	320.00	
Subcodes			**Information**
C00056/1			Torque demand • Only in case of sensorless vector control (SLVC).
C00056/2			Actual torque value • Estimated actual torque for all motor control modes.
☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☑ No transfer ☐ COM ☐ MOT Scaling factor: 100			

C00057

Parameter | Name: **C00057 | Maximum torque**			Data type: UNSIGNED_32 Index: 24518_d = $5FC6_h$
Display of the maximum torque to be generated by the motor • The maximum torque to be generated by the motor depends on various factors, e.g. on Imax in motor mode (C00022) and the motor type used.			
Display range **(min. value | unit | max. value)**			
0.00	Nm	320.00	
☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☑ No transfer ☐ COM ☐ MOT Scaling factor: 100			

C00058

Parameter | Name: **C00058 | Output frequency**			Data type: INTEGER_32 Index: 24517_d = $5FC5_h$
Display of the current output frequency			
Display range **(min. value | unit | max. value)**			
-655.0	Hz	655.0	
☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☑ No transfer ☐ COM ☐ MOT Scaling factor: 100			

C00059

Parameter | Name: **C00059 | Appl.: Reference frequency C11**			Data type: UNSIGNED_32 Index: 24516_d = $5FC4_h$
Display of the field frequency which corresponds to the reference speed set in C00011.			
Display range **(min. value | unit | max. value)**			
0.0	Hz	999.9	
☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☑ No transfer ☐ COM ☐ MOT Scaling factor: 100			

C00061

Parameter | Name: **C00061 | Heatsink temperature**			Data type: INTEGER_16 Index: 24514_d = $5FC2_h$
Display of the current heatsink temperature			
Display range **(min. value | unit | max. value)**			
-50	°C	150	
☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☑ No transfer ☐ COM ☐ MOT Scaling factor: 1			

C00064

Parameter | Name:
C00064 | Device utilisation (Ixt)

Data type: INTEGER_16
Index: $24511_d = 5FBF_h$

Display of the device utilisation Ixt in different time resolutions

- If the value displayed here exceeds the threshold set in C00123, the fault message "OC5: Device overload (Ixt)" is output and the fault response set in C00604 is executed (default setting: "Warning").

Display range (min. value | unit | max. value)			
0	%	250	

Subcodes	**Information**
C00064/1	Device utilisation (Ixt) • Maximum value of the pulse utilisation (C00064/2) and permanent utilisation (C00064/3).
C00064/2	Device utilisation (Ixt) 15s • Pulse utilisation over the last 15 seconds (only for loads >160 %).
C00064/3	Device utilisation (Ixt) 3 min • Permanent utilisation over the last 3 minutes.

☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☑ No transfer ☐ COM ☐ MOT Scaling factor: 100

C00066

Parameter | Name:
C00066 | Thermal motor load (I²xt)

Data type: INTEGER_16
Index: $24509_d = 5FBD_h$

Display of the thermal motor load, sensorlessly determined using a motor model

- If the value displayed here exceeds "100.00 %", the error message "OC6: Thermal motor overload (I2xt)" is output and the fault response set in C00606 is executed (default setting: "Warning").

▸ Motor overload monitoring (I2xt)

Display range (min. value | unit | max. value)			
0	%	200	

☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☑ No transfer ☐ COM ☐ MOT Scaling factor: 100

C00070

Parameter | Name:
C00070 | Vp speed controller

Data type: UNSIGNED_16
Index: $24505_d = 5FB9_h$

From version 03.00.00

Gain factor Vp of the speed controller for different motor control types

Setting range (min. value | unit | max. value)			
0.00		600.00	

Subcodes	**Lenze setting**	**Information**
C00070/1	10.00	SLVC: Vp speed controller • From version 06.01.00 • 0: The reset time is inactive.
C00070/2	0.00	Reserved
C00070/3	3.00	SLPSM: Vp speed controller • 0: The reset time is inactive.

☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☑ MOT Scaling factor: 100

C00071

Parameter | Name: **C00071 | Ti speed controller**			Data type: UNSIGNED_16 Index: 24504_d = $5FB8_h$
From version 03.00.00 Reset time Ti of the speed controller for different motor control types			
Setting range (min. value | unit | max. value)			
0.0	ms	6000.0	
Subcodes	**Lenze setting**		**Information**
C00071/1	218.0 ms		SLVC: Ti speed controller • From version 06.01.00
C00071/2	0.0 ms		Reserved
C00071/3	100.0 ms		SLPSM: Ti speed controller
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☑ MOT Scaling factor: 10			

C00073

Parameter | Name: **C00073 | VP Imax / torque controller**			Data type: UNSIGNED_16 Index: 24502_d = $5FB6_h$
Amplification factor Vp for Imax controller			
Setting range (min. value | unit | max. value)			**Lenze setting**
0.00		16.00	**0.25**
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☑ MOT Scaling factor: 100			

C00074

Parameter | Name: **C00074 | Ti Imax / torque controller**			Data type: UNSIGNED_16 Index: 24501_d = $5FB5_h$
Reset time Ti for Imax controller			
Setting range (min. value | unit | max. value)			**Lenze setting**
12	ms	9990	**65 ms**
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☑ MOT Scaling factor: 1			

C00075

Parameter | Name: **C00075 | Vp current controller**			Data type: UNSIGNED_16 Index: 24500_d = $5FB4_h$
From version 03.00.00 Gain factor Vp of the current controller for certain inverter functions (parameter identification, flying restart circuit) • After the motor to be used has been selected from the motor catalogue, the suitable value can be entered automatically.			
Setting range (min. value | unit | max. value)			**Lenze setting**
0.00	V/A	500.00	**7.00 V/A**
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☑ MOT Scaling factor: 100			

C00076

Parameter | Name: **C00076 | Ti current controller**			Data type: UNSIGNED_16 Index: 24499_d = $5FB3_h$
From version 03.00.00 Reset time Ti of the current controller for certain inverter functions (parameter identification, flying restart circuit) • After the motor to be used has been selected from the motor catalogue, the suitable value can be entered automatically.			
Setting range **(min. value | unit | max. value)**			**Lenze setting**
0.00	ms	500.00	**10.61 ms**
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☑ MOT Scaling factor: 100			

C00079

Parameter | Name: **C00079 | SC: Settings**		Data type: UNSIGNED_8 Index: 24496_d = $5FB0_h$
From version 04.00.00 Configuration of different options for sensorless control for synchronous motors (SLPSM)		
Selection list		
0	Off	
1	On	
Subcodes	**Lenze setting**	**Information**
C00079/1	0: Off	Reserved
C00079/2	0: Off	Reserved
C00079/3	0: Off	Reserved
C00079/4	1: On	Field weakening for synchronous motors
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☑ MOT Scaling factor: 1		

C00081

Parameter | Name: **C00081 | Rated motor power**			Data type: UNSIGNED_16 Index: 24494_d = $5FAE_h$
This value can be obtained from the motor nameplate. After the motor to be used has been selected from the motor catalogue, the suitable value can be entered automatically. **Note:** It is mandatory to give the rated motor power for the sensorless vector control (SLVC).			
Setting range **(min. value | unit | max. value)**			**Lenze setting**
0.00	kW	99.00	**11.00 kW**
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☑ MOT Scaling factor: 100			

C00084

Parameter | Name: **C00084 | Motor stator resistance**			Data type: UNSIGNED_32 Index: 24491_d = $5FAB_h$
After the motor to be used has been selected from the motor catalogue, the suitable value can be entered automatically. An automatic detection via the motor parameter identification is possible as well.			
Setting range **(min. value | unit | max. value)**			**Lenze setting**
0	mohm	200000	**330 mohm**
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☑ MOT Scaling factor: 1			

C00085

Parameter | Name: **C00085 | Motor stator leakage inductance**			Data type: UNSIGNED_16 Index: 24490_d = $5FAA_h$
After the motor to be used has been selected from the motor catalogue, the suitable value can be entered automatically. An automatic detection via the motor parameter identification is possible as well.			
Setting range **(min. value | unit | max. value)**			**Lenze setting**
0.00	mH	650.00	**0.00 mH**
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☑ MOT Scaling factor: 100			

C00086

Parameter | Name: **C00086 | Motor selection**		Data type: UNSIGNED_16 Index: 24489_d = $5FA9_h$
From version 09.00.00 onwards By entering the motor type (see motor nameplate), • the corresponding motor setting for the SLVC control mode is implemented, and • the SLVC control mode is activated. The following motors are supported by the device itself: • Motors that are provided in the device-dependent default setting (ASM in star connection) as well as these motors in delta connection. • Motors of energy efficiency class IE3 in star or delta connection. • Further Lenze motors that are frequently used The entry of a motor type has an impact on the following codes: C00006, C00015, C00016, C00021, C00087 to C00092, and C00143.		
Selection list		**Information**
0	Motor changed	
1241	MDEMA071-32 star	
1242	MDEMA071-32 delta	
1243	MDEMA071-42 star	
1244	MDEMA071-42 delta	
1245	MDEMA080-32 star	
1246	MDEMA080-32 delta	
1247	MDEMA080-42 star	
1248	MDEMA080-42 delta	
1249	MDEMA090-32 star	
1250	MDEMA090-32 delta	
1251	MDEMA100-12 star	
1252	MDEMA100-12 delta	
1253	MDEMA100-32 star	
1254	MDEMA100-32 delta	
1255	MDEMA112-22 star	

Parameter | Name: **C00086 | Motor selection**		Data type: UNSIGNED_16 Index: 24489_d = $5FA9_h$
1256	MDEMA112-22 delta	
1257	MDEMA112-32 star	
1258	MDEMA-112-32 delta	
1259	MDEMA132-22 star	
1267	MDEMA090-32 star	
1406	MDXMA080-32 star	
1525	MHEMA080-32 star	
1526	MHEMA080-32 delta	
1527	MHEMA090-12 star	
1709	MHEMA090-32 delta	
1711	M50AP132M04 star	
1712	M50AP132L04 star	
1731	M55AP090M04 star	
1732	M55AP090M04 delta	
1733	M55AP090L04 star	
1734	M55AP090L04 delta	
1735	M55AP100M04 star	
1736	M55AP100M04 delta	
1737	M55AP100L04 star	
1738	M55AP100L04 delta	
1739	M55AP112M04 star	
1740	M55AP112M04 delta	
1779	MHEMA080-32 star	
1781	MHEMA090-12 star	
1787	MDEMA080-42 star	
1788	MDEMA080-42 delta	
1825	M55AP080M04 star	
1826	M55AP080M04 delta	
1978	MDEMA080-32 star	
1979	MDEMA080-32 delta	
Subcodes	**Lenze setting**	**Information**
C00086/1	0: motor changed	When the following motor parameters are changed, this code is reset to the default setting ("0", i.e. do not load any motor data): C00081, C00084, C00085, and C00087 to C00092.
C00086/...		
C00086/1		
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☑ MOT Scaling factor: 1		

C00087

Parameter | Name:
C00087 | Rated motor speed

Data type: UNSIGNED_16
Index: 24488_{d} = $5FA8_{h}$

This value can be obtained from the motor nameplate. After the motor to be used has been selected from the motor catalogue, the suitable value can be entered automatically.

Note:
It is mandatory to give the rated motor speed for the sensorless vector control (SLVC).

Setting range (min. value	unit	max. value)	**Lenze setting**
50	rpm	18000	**1460 rpm**

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

C00088

Parameter | Name:
C00088 | Rated motor current

Data type: UNSIGNED_16
Index: 24487_{d} = $5FA7_{h}$

This value can be obtained from the motor nameplate. After the motor to be used has been selected from the motor catalogue, the suitable value can be entered automatically.

Setting range (min. value	unit	max. value)	**Lenze setting**
0.00	A	99.00	**21.00 A**

☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☑ MOT Scaling factor: 100

C00089

Parameter | Name:
C00089 | Rated motor frequency

Data type: UNSIGNED_16
Index: 24486_{d} = $5FA6_{h}$

This value can be obtained from the motor nameplate. After the motor to be used has been selected from the motor catalogue, the suitable value can be entered automatically.

Note:
It is mandatory to give the rated motor frequency for the sensorless vector control (SLVC).

Setting range (min. value	unit	max. value)	**Lenze setting**
10	Hz	1000	**50 Hz**

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

C00090

Parameter | Name:
C00090 | Rated motor voltage

Data type: UNSIGNED_16
Index: 24485_{d} = $5FA5_{h}$

This value can be obtained from the motor nameplate. After the motor to be used has been selected from the motor catalogue, the suitable value can be entered automatically.

Setting range (min. value	unit	max. value)	**Lenze setting**
0	V	1000	**400 V**

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

C00091

Parameter | Name: **C00091 | Motor cosine phi**			Data type: UNSIGNED_8 Index: 24484$_d$ = 5FA4$_h$
This value can be obtained from the motor nameplate. After the motor to be used has been selected from the motor catalogue, the suitable value can be entered automatically.			
Setting range **(min. value | unit | max. value)**			**Lenze setting**
0.20		1.00	**0.85**
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☑ MOT Scaling factor: 100			

C00092

Parameter | Name: **C00092 | Motor magnetising inductance**			Data type: UNSIGNED_16 Index: 24483$_d$ = 5FA3$_h$
After the motor to be used has been selected from the motor catalogue, the suitable value can be entered automatically. An automatic detection via the motor parameter identification is possible as well.			
Setting range **(min. value | unit | max. value)**			**Lenze setting**
0.0	mH	6500.0	**0.0 mH**
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☑ MOT Scaling factor: 10			

C00093

Parameter | Name: **C00093 | Power section identification**			Data type: UNSIGNED_16 Index: 24482$_d$ = 5FA2$_h$
Display of the identification of the detected power section of the inverter			
Display range **(min. value | unit | max. value)**			
0		65535	
☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☑ No transfer ☐ COM ☐ MOT Scaling factor: 1			

C00094

Parameter | Name: **C00094 | Password**			Data type: INTEGER_32 Index: 24481$_d$ = 5FA1$_h$
No function in case of 8400 motec			
Setting range **(min. value | unit | max. value)**			**Lenze setting**
0		9999	**0**
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 1			

C00095

Parameter | Name: **C00095 | Motor magnetising current**			Data type: UNSIGNED_16 Index: 24480$_d$ = 5FA0$_h$
After the motor to be used has been selected from the motor catalogue, the suitable value can be entered automatically. An automatic detection via the motor parameter identification is possible as well.			
Display range **(min. value | unit | max. value)**			
0.00	A	99.00	
☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☑ MOT Scaling factor: 100			

C00097

Parameter | Name: **C00097 | Rated motor torque**			Data type: UNSIGNED_32 Index: 24478_d = $5F9E_h$
Display of the rated motor torque • The value shown is calcuated from the motor parameters.			
Display range **(min. value | unit | max. value)**			
0.00	Nm	99.00	
☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☑ No transfer ☐ COM ☐ MOT Scaling factor: 100			

C00098

Parameter | Name: **C00098 | Device rated current**			Data type: UNSIGNED_16 Index: 24477_d = $5F9D_h$
Display of the rated inverter current which is defined by the integrated power section.			
Display range **(min. value | unit | max. value)**			
0.0	A	999.0	
☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☑ No transfer ☐ COM ☐ MOT Scaling factor: 10			

C00099

Parameter | Name: **C00099 | Firmware version**	Data type: VISIBLE_STRING Index: 24476_d = $5F9C_h$
Display of the firmware version of the device as string	
☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☑ No transfer ☐ COM ☐ MOT Character length: 12	

C00100

Parameter | Name: **C00100 | Firmware version**			Data type: UNSIGNED_8 Index: 24475_d = $5F9B_h$
Display of the firmware version of the device, divided into subsections.			
Display range **(min. value | unit | max. value)**			
0		99	
Subcodes			**Information**
C00100/1			Firmware version - main version
C00100/2			Firmware version - subversion
C00100/3			Firmware version - release
C00100/4			Firmware version - build
☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☑ No transfer ☐ COM ☐ MOT Scaling factor: 1			

C00101

Parameter | Name: **C00101 | Add. acceleration time x**			Data type: UNSIGNED_32 Index: 24474_d = $5F9A_h$
FB L_NSet_1: Additional acceleration time for the main setpoint • The additional acceleration time set here can be selected via the binary input *bTI1* of the L_NSet_1 FB.			
Setting range **(min. value | unit | max. value)**			
0.0	s	999.9	
Subcodes	**Lenze setting**		**Information**
C00101/1	0.0 s		From version 10.00.00 Additional acceleration time 1
C00101/...			
C00101/1			
☑ Read access ☑ Write access ☰ CINH ☰ PLC STOP ☰ No transfer ☰ COM ☰ MOT Scaling factor: 1000			

C00103

Parameter | Name: **C00103 | Add. decel. time x**			Data type: UNSIGNED_32 Index: 24472_d = $5F98_h$
FB L_NSet_1: Additional deceleration time for the main setpoint • The additional deceleration time set here can be selected via the binary input *bTI1* of the FB L_NSet_1.			
Setting range **(min. value | unit | max. value)**			
0.0	s	999.9	
Subcodes	**Lenze setting**		**Information**
C00103/1	0.0 s		From version 10.00.00 Additional deceleration time 1
C00103/...			
C00103/1			
☑ Read access ☑ Write access ☰ CINH ☰ PLC STOP ☰ No transfer ☰ COM ☰ MOT Scaling factor: 1000			

C00105

Parameter | Name: **C00105 | Decel. time - quick stop**			Data type: UNSIGNED_32 Index: 24470_d = $5F96_h$
The set deceleration time determines the ramp slope at quick stop • When the output frequency falls below the threshold set in C00019, the DC injection brake DCB is activated. **Note:** The S-ramp time set in C00182 is also active with quick stop! In order to reach the required deceleration time for quick stop, set the time accordingly lower in this parameter.			
Setting range **(min. value | unit | max. value)**			**Lenze setting**
0.0	s	999.9	**5.0 s**
☑ Read access ☑ Write access ☰ CINH ☰ PLC STOP ☰ No transfer ☰ COM ☰ MOT Scaling factor: 1000			

C00106

Parameter | Name: **C00106 | Auto DCB: Hold time**			Data type: UNSIGNED_32 Index: 24469_d = $5F95_h$
Hold time of the automatic DC injection brake • The DC injection brake is applied for the time set here if the value falls below the speed setpoint set in C00019. ▸ DC-injection braking			
Setting range **(min. value | unit | max. value)**			**Lenze setting**
0.0	s	999.0	**0.5 s**
☑ Read access ☑ Write access ☰ CINH ☰ PLC STOP ☰ No transfer ☰ COM ☰ MOT Scaling factor: 1000			

C00107

Parameter | Name: **C00107 | DCB: Hold time**			Data type: UNSIGNED_32 Index: 24468$_d$ = 5F94$_h$
Maximum hold time of the manual DC injection brake • A time can be set here after which the DC injection brake is switched off automatically to prevent the motor from thermal overload. • With the "999.0 s" setting, the hold time is infinite. ▸ DC-injection braking			
Setting range **(min. value | unit | max. value)**			**Lenze setting**
0.0	s	999.0	**999.0 s**
☑ Read access ☑ Write access 📚 CINH 📚 PLC STOP 📚 No transfer 📚 COM 📚 MOT Scaling factor: 1000			

C00114

Parameter | Name: **C00114 | DIx inversion**			Data type: UNSIGNED_16 Index: 24461$_d$ = 5F8D$_h$
The polarity of each digital input of the device can be inverted via this bit field. ▸ Digital terminals			
Setting range **(min. hex value | max. hex value)**			**Lenze setting**
0x0000		0xFFFF	**0x8000** (decimal: 32768)
Value is bit-coded: (☑ = bit set)			**Information**
Bit 0 ☐	DI1 inverted		Inversion of digital input 1
Bit 1 ☐	DI2 inverted		Inversion of digital input 2
Bit 2 ☐	DI3 inverted		Inversion of digital input 3
Bit 3 ☐	DI4 inverted		Inversion of digital input 4
Bit 4 ☐	DI5 inverted		Inversion of digital input 5
Bit 5 ☐	DI6 inverted		Inversion of digital input 6
Bit 6 ☐	DI7 inverted		Inversion of digital input 7
Bit 7 ☐	DI8 inverted		Inversion of digital input 8
Bit 8 ☐	Reserved		
Bit 9 ☐	Reserved		
Bit 10 ☐	Reserved		
Bit 11 ☐	Reserved		
Bit 12 ☐	Reserved		
Bit 13 ☐	Reserved		
Bit 14 ☐	Reserved		
Bit 15 ☑	RFR inverted		Inversion of digital input RFR (controller enable)
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT			

C00115

Parameter | Name: **C00115 | DI1| DI2: Function**		Data type: UNSIGNED_8 Index: 24460_d = $5F8C_h$
From version 02.00.00 Function assignment of the digital terminals DI1 and DI2 ▸ Digital terminals: Function assignment		
Selection list		**Information**
0	DI1=In1 | DI2=In2	DI1 = digital input DI2 = digital input
1	DI1=FreqIn12 | DI2=In2	DI1 = 1-track frequency input DI2 = digital input
2	(DI1/DI2)=FreqIn12 (2-track)	DI1 and DI2 = 2-track frequency input
3	(DI1/DI2=+-)=FreqIn12	DI1 = 1-track frequency input DI2 = specification of direction
Subcodes	**Lenze setting**	**Information**
C00115/1	0: DI1=In1 | DI2=In2	Function assignment of DI1 and DI2
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☑ MOT Scaling factor: 1		

C00118

Parameter | Name: **C00118 | DOx inversion / energy**			Data type: UNSIGNED_8 Index: 24457_d = $5F89_h$
The polarity of each digital output of the device can be inverted via this bit field.			
Setting range **(min. hex value | max. hex value)**			**Lenze setting**
0x00		0xFF	**0x00** (decimal: 0)
Value is bit-coded: (☑ = bit set)			**Information**
Bit 0 ☐	Relay inverted		Relay inversion
Bit 1 ☐	DO1 inverted		Inversion of digital output 1
Bit 2 ☐	Reserved		
Bit 3 ☐	Reserved		
Bit 4 ☐	Energy: relay decoupling value		
Bit 5 ☐	Energy: decoupling value DO1		
Bit 6 ☐	Reserved		
Bit 7 ☐	Reserved		
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT			

C00120

Parameter | Name: **C00120 | Setting of motor overload (I²xt; C0088/C0098)**			Data type: INTEGER_16 Index: 24455_d = $5F87_h$
The Inverter Drives 8400 are provided with a simple, sensorless, thermal I²xt motor monitoring of self-ventilated standard motors which is based on a mathematical model. • For setting notes, see chapter "Motor overload monitoring (I2xt)". • The response for triggering the monitoring can be selected in C00606. • The current thermal motor load is displayed in C00066.			
Setting range **(min. value | unit | max. value)**			**Lenze setting**
0	%	250	**100 %**
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☑ MOT Scaling factor: 100			

C00122

Parameter | Name: **C00122 | Initial value motor overload (I²xt)**			Data type: UNSIGNED_16 Index: 24453_d = $5F85_h$
From version 04.01.00 The thermal motor load displayed in C00066 is pre-initialised with the value set here when the device is connected to the mains. • If "100.00 %" is set, the last value at switching off the device is used for the initialisation. • Recommended setting for operation according to UL: 30.00 % ▶ Motor overload monitoring (I2xt)			
Setting range **(min. value | unit | max. value)**			
0.00	%	100.00	
Subcodes	**Lenze setting**		**Information**
C00122/1	30.00 %		Initial value motor overload (I²xt) Up to version 06.xx.xx Lenze setting: 0.00 %
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☑ MOT Scaling factor: 100			

C00123

Parameter | Name: **C00123 | Device utilisation threshold (Ixt)**			Data type: INTEGER_16 Index: 24452_d = $5F84_h$
Operating threshold for the "OC5: Device overload (Ixt)" error message • The response for reaching the threshold can be selected in C00604. • The current device utilisation is displayed in C00064.			
Setting range **(min. value | unit | max. value)**			**Lenze setting**
0	%	200	**100 %**
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☑ MOT Scaling factor: 100			

C00124

Parameter | Name: **C00124 | Current monitoring: Breaking current**			Data type: UNSIGNED_16 Index: 24451_d = $5F83_h$
From version 07.00.00 ▶ Current monitoring overload			
Setting range **(min. value | unit | max. value)**			
0	%	200	
Subcodes	**Lenze setting**		**Information**
C00124/1	200 %		Current monitoring: Breaking current overload
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☑ MOT Scaling factor: 100			

C00129

Parameter | Name: **C00129 | Brake resistance value**			Data type: UNSIGNED_16 Index: 24446_d = $5F7E_h$
Resistance value of the connected brake resistor • The value to be entered can be obtained from the nameplate of the brake resistor. • For every device type, the value is preset to the minimum adapted Lenze brake resistor. ▶ Settings for internal brake resistor E84DZEWxxxx			
Setting range **(min. value | unit | max. value)**			**Lenze setting**
0.0	Ohm	500.0	**220.0 Ohms**
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☑ MOT Scaling factor: 10			

C00130

Parameter | Name: **C00130 | Rated power - brake resistor**			Data type: UNSIGNED_16 Index: 24445_d = $5F7D_h$
Rated power of the connected brake resistor • The value to be entered can be obtained from the nameplate of the brake resistor. ▸ Settings for internal brake resistor E84DZEWxxxx			
Setting range (min. value | unit | max. value)			**Lenze setting**
0	W	65535	**15 W**
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☑ MOT Scaling factor: 1			

C00131

Parameter | Name: **C00131 | Thermal capacity - brake resistor**			Data type: UNSIGNED_16 Index: 24444_d = $5F7C_h$
Heat quantity of the brake resistor connected ▸ Settings for internal brake resistor E84DZEWxxxx			
Setting range (min. value | unit | max. value)			**Lenze setting**
0.0	kWs	6553.5	**0.6 kWs**
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☑ MOT Scaling factor: 10			

C00133

Parameter | Name: **C00133 | Brake resistor utilisation**			Data type: UNSIGNED_16 Index: 24442_d = $5F7A_h$
Display of the utilisation of the connected brake resistor			
Display range (min. value | unit | max. value)			
0	%	65535	
☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☑ MOT Scaling factor: 1			

C00134

Parameter | Name: **C00134 | Ramp rounding main setpoint**		Data type: UNSIGNED_8 Index: 24441_d = $5F79_h$
The L_NSet_1 FB: Configuration of the ramp rounding for the main setpoint		
Selection list(Lenze setting printed in bold)		**Information**
0	**Off**	Ramp rounding deactivated
1	PT1 behaviour	Ramp rounding with PT1 behaviour • The corresponding S-ramp time must be set in C00182.
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 1		

C00136

Parameter | Name: **C00136 | Communication control words**			Data type: UNSIGNED_16 Index: 24439$_d$ = 5F77$_h$
			▸ Communication
Display area (min. hex value | max. hex value)			
0x0000		0xFFFF	
Value is bit-coded:			
Bit 0	SwitchOn		
Bit 1	IMP		
Bit 2	SetQuickStop		
Bit 3	EnableOperation		
Bit 4	reserved		
Bit 5	reserved		
Bit 6	reserved		
Bit 7	ResetFault		
Bit 8	SetHalt		
Bit 9	reserved_1		
Bit 10	reserved_2		
Bit 11	LenzeSpecific_1		
Bit 12	LenzeSpecific_2		
Bit 13	LenzeSpecific_3		
Bit 14	SetFail		
Bit 15	LenzeSpecific_4		
Subcodes			**Information**
C00136/1			Network MCI/CAN control word
☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☑ No transfer ☐ COM ☐ MOT			

C00137

Parameter | Name: **C00137 | Device status**		Data type: UNSIGNED_16 Index: 24438$_d$ = 5F76$_h$
Display of the current device status		
Selection list (read only)		
0	reserved	
1	Init	
2	MotorIdent	
3	ReadyToSwitchON	
4	SwitchedON	
5	OperationEnable	
6	reserved	
7	Trouble	
8	Fault	
9	reserved	
10	SafeTorqueOff	
11	reserved	
12	reserved	
13	reserved	
14	reserved	
15	reserved	
☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☑ No transfer ☐ COM ☐ MOT Scaling factor: 1		

C00141

Parameter | Name: **C00141 | Device settings**		Data type: UNSIGNED_8 Index: 24434$_d$ = 5F72$_h$
Selection list		
0	inactive	
1	Active	
Subcodes	**Lenze setting**	**Information**
C00141/1	0: Inactive	Always save parameters • When this function is activated, every parameter change is saved in the memory module. A manual saving of parameter sets is not required anymore. **Note:** Activating this function is not permissible if parameters are changed very frequently (e.g. in case of cyclic writing of parameters via a bus system).
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 1		

C00142

Parameter | Name: **C00142 | Auto-start option**			Data type: UNSIGNED_8 Index: 24433_d = $5F71_h$
Starting performance of the inverter after mains connection and reset of "Trouble" or "Fault". ▸ Auto-start option "inhibit at device on"			
Setting range (min. hex value | max. hex value)			**Lenze setting**
0x00		0xFF	**0x01** (decimal: 1)
Value is bit-coded: (☑ = bit set)			
Bit 0 ☑	Inhibit at device on		
Bit 1 ☐	Inhibit at trouble		
Bit 2 ☐	Inhibit at fault		
Bit 3 ☐	Reserved		
Bit 4 ☐	Reserved		
Bit 5 ☐	Reserved		
Bit 6 ☐	Reserved		
Bit 7 ☐	Reserved		
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT			

C00143

Parameter | Name: **C00143 | Selection of special functions**			Data type: UNSIGNED_16 Index: 24432_d = $5F70_h$
From version 04.01.00			
Setting range (min. hex value | max. hex value)			**Lenze setting**
0x0000		0xFFFF	**0x0000** (decimal: 0)
Value is bit-coded: (☑ = bit set)			**Information**
Bit 0 ☐	Brightness of the green LED		Bit 1 | Bit 0: Brightness of the green LED • 0 | 0 ≡ Maximum brightness • 0 | 1 ≡ Reduced brightness - stage 1 • 1 | 0 ≡ Reduced brightness - stage 2 • 1 | 1 ≡ Minimum brightness Use this function if the green light is too bright or disturbing for your application. • The green LED cannot be switched off completely in order that the supply of the device with 400 V remains visibly displayed from the outside. • The setting only affects the green LED, not the red LED (fault indication).
Bit 1 ☐	Brightness of the green LED		
Bit 2 ☐	Saving of external encoder pulses		From version 09.00.00 onwards For the LS_Convert_1 FB, output signal 1 (output of encoder pulses), C01354/1 = 19 serves to also save the counted pulses of the HTL encoder non-volatilely when the mains is switched off.
Bit 3 ☐	SLPSM: optimisation		From version 10.00.00 Optimises the SLPSM stability for the whole speed range. • 0 ≡ no optimisation of the SLPSM • 1 ≡ optimisation of the SLPSM
Bit 4 ☐	Warning instead of WarningLocked		From version 11.01.00 Bit4 = 1 (Warning instead of Warning Locked) can be used to ensure that no manual acknowledgement is required for the **WarningLocked** response if the cause of the message has been removed. The status determining error is reset automatically.

Parameter | Name: **C00143 | Selection of special functions**		Data type: UNSIGNED_16 Index: 24432_d = $5F70_h$
Bit 5 ☐	Reserved	
Bit 6 ☐	Reserved	
Bit 7 ☐	Reserved	
Bit 8 ☐	No IMP before DCB	From version 05.00.00 If this bit is set and the auto DCB threshold ≤ 5 Hz, the DC-injection braking is activated immediately if the values fall below the threshold (without waiting time). ▶ Automatic DC-injection braking (auto DCB)
Bit 9 ☐	Reserved	
Bit 10 ☐	Activate nTorgueHigh und nTorgueLowLimit_a	From version 10.00.00 Limitation of the positive and negative torque. • 0 ≡ no limitation • 1 ≡ nTorqueMotLimt_a acts as nTorgueHighLimit_a (positive torque limitation) and nTorqueGenLimit_a acts as nTorgueLowLimit_a (negative torque limitation)
Bit 11 ☐	No dead band analog input	
Bit 12 ☐	bRemoteControlActive for Diag	From version 09.01.00 onwards If the bit is set, an access to the inverter is output via the diagnostic interface by means of »EASY Starter«, »Engineer« or keypad to the LA_NCtrl: bRemoteControlActive. • LA_NCtrl:bRemoteControlActive ist "1": Write access. • LA_NCtrl:bRemoteControlActive ist "0": No communication (program is offline or keypad is removed).
Bit 13 ☐	TorqueLim active at Qsp	
Bit 14 ☐	Customer variant	
Bit 15 ☐	SLVC optimisation	
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT		

C00144

Parameter | Name: **C00144 | Switching frequency reduction (temp.)**		Data type: UNSIGNED_8 Index: 24431_d = $5F6F_h$
Activation of the automatic switching frequency reduction if the temperature is too high		
Selection list(**Lenze setting printed in bold**)		**Information**
0	Off	Automatic switching frequency reduction deactivated
1	**On**	Automatic switching frequency reduction activated
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 1		

C00150

Parameter | Name: **C00150 | Status word**			Data type: UNSIGNED_16 Index: 24425_d = $5F69_h$
Bit coded device status word			
Display area **(min. hex value | max. hex value)**			
0x0000		0xFFFF	
Value is bit-coded:			**Information**
Bit 0	FreeStatusBit0		Free status bit 0
Bit 1	PowerDisabled		Power switched off
Bit 2	FreeStatusBit2		Free status bit 2
Bit 3	FreeStatusBit3		Free status bit 3
Bit 4	FreeStatusBit4		Free status bit 4
Bit 5	FreeStatusBit5		Free status bit 5
Bit 6	ActSpeedIsZero		Current speed is 0
Bit 7	ControllerInhibit		Controller is inhibited
Bit 8	StatusCodeBit0		Status code bit 0
Bit 9	StatusCodeBit1		Status code bit 1
Bit 10	StatusCodeBit2		Status code bit 2
Bit 11	StatusCodeBit3		Status code bit 3
Bit 12	Warning		Warning
Bit 13	Trouble		Interference
Bit 14	FreeStatusBit14		Free status bit 14
Bit 15	FreeStatusBit15		Free status bit 15
☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☑ No transfer ☐ COM ☐ MOT			

C00155

Parameter | Name: **C00155 | Status word 2**			Data type: UNSIGNED_16 Index: 24420_d = $5F64_h$
Bit coded device status word 2			
Display area (min. hex value | max. hex value)			
0x0000		0xFFFF	
Value is bit-coded:			**Information**
Bit 0	Fail		Fault
Bit 1	M_max		Maximum torque
Bit 2	I_max		Maximum current
Bit 3	PowerDisabled		Power switched off
Bit 4	Ready		Controller is ready for operation
Bit 5	ControllerInhibit		Controller is inhibited
Bit 6	Trouble		Interference
Bit 7	InitState		Initialisation
Bit 8	CwCcw		CW/CCW rotation
Bit 9	reserved		
Bit 10	SafeTorqueOff		Safe torque off
Bit 11	reserved		
Bit 12	reserved		
Bit 13	reserved		
Bit 14	quick stop		Quick stop active
Bit 15	MotorIdent		Motor parameter identification is active
☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☑ No transfer ☐ COM ☐ MOT			

C00158

Parameter | Name: **C00158 | Cause of controller inhibit**		Data type: UNSIGNED_16 Index: 24417_d = $5F61_h$
Bit coded display of the cause/source of the controller inhibit		
Display area **(min. hex value | max. hex value)**		
0x0000		0xFFFF
Value is bit-coded:		
Bit 0	Terminal controller enable	
Bit 1	Reserved	
Bit 2	DriveControl Network MCI/CAN	
Bit 3	SwitchOn	
Bit 4	Application	
Bit 5	Device command	
Bit 6	Error response	
Bit 7	Reserved	
Bit 8	Reserved	
Bit 9	Energy saving mode	
Bit 10	AutoStartLock	
Bit 11	Motor parameter identification	
Bit 12	Automatic brake operation	
Bit 13	DCB-IMP	
Bit 14	Reserved	
Bit 15	Reserved	
☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☑ No transfer ☐ COM ☐ MOT		

C00159

Parameter | Name: **C00159 | Cause of quick stop QSP**			Data type: UNSIGNED_16 Index: 24416_d = $5F60_h$
Bit coded display of the cause/source of the quick stop			
Display area (min. hex value | max. hex value)			
0x0000		0xFFFF	
Value is bit-coded:			
Bit 0	Terminal		
Bit 1	Reserved		
Bit 2	DriveControl Network MCI/CAN		
Bit 3	Reserved		
Bit 4	Application		
Bit 5	Device command		
Bit 6	Reserved		
Bit 7	Reserved		
Bit 8	Reserved		
Bit 9	Energy saving mode		
Bit 10	Reserved		
Bit 11	Reserved		
Bit 12	Reserved		
Bit 13	Reserved		
Bit 14	Reserved		
Bit 15	Reserved		
☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☑ No transfer ☐ COM ☐ MOT			

C00160

Parameter | Name: **C00160 | Status determining error**			Data type: UNSIGNED_16 Index: 24415_d = $5F5F_h$
Display range (min. value | unit | max. value)			
0		65535	
Subcodes			**Information**
C00160/1			Status determining error (16-bit)
☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☑ No transfer ☐ COM ☐ MOT Scaling factor: 1			

C00161

Parameter | Name: **C00161 | Status determining error**			Data type: UNSIGNED_32 Index: 24414_d = $5F5E_h$
Display range (min. value | unit | max. value)			
0		4294967295	
Subcodes			**Information**
C00161/1			Status determining error (32-bit)
☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☑ No transfer ☐ COM ☐ MOT Scaling factor: 1			

C00165

Parameter | Name: **C00165 | Error information**	Data type: VISIBLE_STRING Index: 24410_d = $5F5A_h$
Display of the error number divided into sectors in the event of an error	
Subcodes	**Information**
C00165/1	Status determining error (String)
☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☑ No transfer ☐ COM ☐ MOT Character length: 14	

C00166

Parameter | Name: **C00166 | Error information text**	Data type: VISIBLE_STRING Index: 24409_d = $5F59_h$
Display of details of the currently pending error	
Subcodes	**Information**
C00166/1	Resp. to status det. error • Response of the currently pending error
C00166/2	Subj. area status det. error • Subject area of the currently pending error
C00166/3	Message status det. error • Textual message of the currently pending error
☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☑ No transfer ☐ COM ☐ MOT Character length: 40	

C00167

Parameter | Name: **C00167 | Logbook data**	Data type: OCTET_STRING Index: 24408_d = $5F58_h$
This code is used device-internally and must not be written by the user side!	

C00168

Parameter | Name: **C00168 | Error number**			Data type: UNSIGNED_32 Index: 24407_d = $5F57_h$
Display range **(min. value | unit | max. value)**			
0		4294967295	
Subcodes			**Information**
C00168/1			Display of the internal error number for the last 8 occurred errors
C00168/...			
C00168/8			
☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☑ No transfer ☐ COM ☐ MOT Scaling factor: 1			

C00169

Parameter | Name: **C00169 | Time of error**			Data type: UNSIGNED_32 Index: 24406$_d$ = 5F56$_h$
Display range **(min. value | unit | max. value)**			
0		4294967295	
Subcodes			**Information**
C00169/1			Display of the time of error for the last 8 occurred errors
C00169/...			
C00169/8			
☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☑ No transfer ☐ COM ☐ MOT Scaling factor: 1			

C00170

Parameter | Name: **C00170 | Error counter**			Data type: UNSIGNED_8 Index: 24405$_d$ = 5F55$_h$
Display range **(min. value | unit | max. value)**			
0		255	
Subcodes			**Information**
C00170/1			Display of the error counter for the last 8 occurred errors
C00170/...			
C00170/8			
☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☑ No transfer ☐ COM ☐ MOT Scaling factor: 1			

C00171

Parameter | Name: **C00171 | Logbook access index**	Data type: UNSIGNED_8 Index: 24404$_d$ = 5F54$_h$
This code is used device-internally and must not be written by the user side!	

C00173

Parameter | Name: **C00173 | Mains voltage**		Data type: UNSIGNED_8 Index: 24402$_d$ = 5F52$_h$
Selection of the mains voltage for operating the device.		
Selection list(Lenze setting printed in bold)		
0	**3ph 400V**	
1	3ph 440V	
2	3ph 480V	
☑ Read access ☑ Write access ☑ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 1		

C00174

Parameter | Name: **C00174 | Reduc. brake chopper threshold**			Data type: UNSIGNED_8 Index: 24401$_d$ = 5F51$_h$
Note: In case of the 8400 motec, this parameter optimises the brake behaviour when C00175 = 2 or 4 (recommended setting: 50 V). In case of a different setting in C00175, this parameter has no effect.			
Setting range **(min. value | unit | max. value)**			**Lenze setting**
0	V	150	**0 V**
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 1			

C00175

Parameter | Name:
C00175 | Brake energy management: Selection of the braking procedure
Data type: UNSIGNED_8
Index: $24400_d = 5F50_h$

Selection of the braking procedure

▸ Select response if the brake resistor is controlled

Selection list(Lenze setting printed in bold)		Information
0	**Brake resistor**	• The brake resistor is used. The external brake resistor is triggered via a hardware circuit. The DC-bus voltage has no influence on the brake ramp.
2	Brake resistor and stop of the ramp function generator	The brake resistor and the "Ramp function generator stop" signal are used. When the brake chopper threshold is exceeded, the ramp function generator is stopped.
4	Brake resistor and motor brake and ramp stop	From version 02.00.00 The brake resistor as well as the "Ramp function generator stop" signal and the "Inverter motor brake" function are used.
6	Brake resistor and motor	From version 02.00.00 The brake resistor is used. The braking energy is degraded by overmagnetising the motor by the percentage value set in C00984.

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

C00177

Parameter | Name:
C00177 | Switching cycles
Data type: UNSIGNED_32
Index: $24398_d = 5F4E_h$

Counter of different switching cycles and stressful situations

Display range (min. value | unit | max. value)		
0		2147483647

Subcodes	Information
C00177/1	Number of mains switching cycles
C00177/2	Number of switching cycles of the output relay

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

C00178

Parameter | Name:
C00178 | Elapsed-hour meter
Data type: UNSIGNED_32
Index: $24397_d = 5F4D_h$

Display of operating hours in seconds

Display range (min. value | unit | max. value)		
0	s	2147483647

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

C00179

Parameter | Name:
C00179 | Power-on time meter
Data type: UNSIGNED_32
Index: $24396_d = 5F4C_h$

Display of the power-on time in seconds

Display range (min. value | unit | max. value)		
0	s	2147483647

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

C00181

Parameter | Name:
C00181 | Time settings

Data type: UNSIGNED_16
Index: 24394$_d$ = 5F4A$_h$

From version 04.00.00
Time for device search function (optical location)

▶ Device search function

Setting range **(min. value | unit | max. value)**			
0	s	6000	

Subcodes	**Lenze setting**	**Information**
C00181/1	5 s	Time - device search function

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

C00182

Parameter | Name:
C00182 | S-ramp time PT1

Data type: INTEGER_16
Index: 24393$_d$ = 5F49$_h$

FB L_NSet_1: PT1 S-ramp time for the main setpoint ramp function generator
- Only effective with activated ramp rounding (C00134 = "1").

Setting range **(min. value | unit | max. value)**			**Lenze setting**
0.01	s	50.00	**20.00 s**

☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 100

C00199

Parameter | Name:
C00199 | Device name

Data type: VISIBLE_STRING
Index: 24376$_d$ = 5F38$_h$

From version 04.00.00
Parameters for storing decription data for the inverter

▶ Device identification

Subcodes	**Lenze setting**	**Information**
C00199/1	0	

☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ COM ☐ MOT Character length: 32

C00200

Parameter | Name:
C00200 | Firmware product type

Data type: VISIBLE_STRING
Index: 24375$_d$ = 5F37$_h$

Display of the firmware product type

☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☑ No transfer ☐ COM ☐ MOT Character length: 19

C00201

Parameter | Name:
C00201 | Firmware compile date

Data type: VISIBLE_STRING
Index: 24374$_d$ = 5F36$_h$

Display of the firmware compilation date

☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☑ No transfer ☐ COM ☐ MOT Character length: 22

C00203

Parameter | Name: **C00203 | Product type code**	Data type: VISIBLE_STRING Index: 24372_d = $5F34_h$
Display of the types of the individual device components	
Subcodes	**Information**
C00203/1	Type: Control card
C00203/2	Type: Power section
C00203/3	Type: Comm. module
C00203/4	Reserved
C00203/5	Type: Memory module
C00203/6	Type: Safety module
C00203/7	Reserved
C00203/8	Type: Complete device
C00203/9	Reserved
☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☑ No transfer ☐ COM ☐ MOT Character length: 24	

C00204

Parameter | Name: **C00204 | Serial number**	Data type: VISIBLE_STRING Index: 24371_d = $5F33_h$
Display of the serial numbers of the individual device components	
Subcodes	**Information**
C00204/1	Serial no.: Control card
C00204/2	Serial no.: Power section
C00204/3	Serial no.: MCI module
C00204/4	Reserved
C00204/5	Reserved
C00204/6	Reserved
C00204/7	Serial no.: Standard device
☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ COM ☐ MOT Character length: 24	

C00210

Parameter | Name: **C00210 | HW version**	Data type: VISIBLE_STRING Index: 24365_d = $5F2D_h$
From version 06.01.00 Display of the hardware versions of the single device components	
Subcodes	**Information**
C00210/1	HW version: Control card
☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☑ No transfer ☐ COM ☐ MOT Character length: 5	

C00222

Parameter | Name: **C00222 | L_PCTRL_1: Vp**			Data type: INTEGER_16 Index: 24353_d = $5F21_h$
The L_PCTRL_1 FB: Gain factor Vp for the PID process controller			
Setting range **(min. value | unit | max. value)**			**Lenze setting**
0.1		500.0	**1.0**
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 10			

C00223

Parameter | Name: **C00223 | L_PCTRL_1: Tn**			Data type: UNSIGNED_16 Index: 24352_d = $5F20_h$
The L_PCTRL_1 FB: Reset time Tn for the PID process controller			
Setting range **(min. value | unit | max. value)**			**Lenze setting**
20	ms	6000	**400 ms**
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 1			

C00224

Parameter | Name: **C00224 | L_PCTRL_1: Kd**			Data type: UNSIGNED_16 Index: 24351_d = $5F1F_h$
The L_PCTRL_1 FB: Derivative-action coefficient Kd for the PID process controller			
Setting range **(min. value | unit | max. value)**			**Lenze setting**
0.0		5.0	**0.0**
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 10			

C00225

Parameter | Name: **C00225 | L_PCTRL_1: MaxLimit**			Data type: INTEGER_16 Index: 24350_d = $5F1E_h$
The L_PCTRL_1 FB: Maximum output value of the PID process controller			
Setting range **(min. value | unit | max. value)**			**Lenze setting**
-199.9	%	199.9	**199.9 %**
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 100			

C00226

Parameter | Name: **C00226 | L_PCTRL_1: MinLimit**			Data type: INTEGER_16 Index: 24349_d = $5F1D_h$
The L_PCTRL_1 FB: Minimum output value of the PID process controller			
Setting range **(min. value | unit | max. value)**			**Lenze setting**
-199.9	%	199.9	**-199.9 %**
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 100			

C00227

Parameter | Name: **C00227 | L_PCTRL_1: Acceleration time**			Data type: UNSIGNED_32 Index: 24348_d = $5F1C_h$
The L_PCTRL_1 FB: Acceleration time for the output value of the PID process controller			
Setting range **(min. value | unit | max. value)**			**Lenze setting**
0.0	s	999.9	**0.1 s**
☑ Read access ☑ Write access 📚 CINH 📚 PLC STOP 📚 No transfer 📚 COM 📚 MOT Scaling factor: 1000			

C00228

Parameter | Name: **C00228 | L_PCTRL_1: Deceleration time**			Data type: UNSIGNED_32 Index: 24347_d = $5F1B_h$
The L_PCTRL_1 FB: Deceleration time for the output value of the PID process controller			
Setting range **(min. value | unit | max. value)**			**Lenze setting**
0.0	s	999.9	**0.1 s**
☑ Read access ☑ Write access 📚 CINH 📚 PLC STOP 📚 No transfer 📚 COM 📚 MOT Scaling factor: 1000			

C00231

Parameter | Name: **C00231 | L_PCTRL_1: Operating range**			Data type: INTEGER_16 Index: 24344_d = $5F18_h$
The L_PCTRL_1 FB: Operating range for the PID process controller			
Setting range **(min. value | unit | max. value)**			
0.0	%	199.9	
Subcodes	**Lenze setting**		**Information**
C00231/1	199.9 %		L_PCTRL_1: Pos.Maximum
C00231/2	0.0 %		L_PCTRL_1: Pos.Minimum
C00231/3	0.0 %		L_PCTRL_1: Neg.Minimum
C00231/4	199.9 %		L_PCTRL_1: Neg.Maximum
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 100			

C00233

Parameter | Name: **C00233 | L_PCTRL_1: Root function**		Data type: UNSIGNED_8 Index: 24342_d = $5F16_h$
From version 04.00.00 The L_PCTRL_1 FB: Use of the root function at the actual value input		
Selection list(**Lenze setting printed in bold**)		**Information**
0	**Off**	Root function inactive • The actual value *nAct_a* remains unchanged for further processing
1	On	Root function active • The root is extracted of the actual value *nAct_a* for further processing
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 1		

C00234

Parameter | Name: **C00234 | Oscillation damping influence**			Data type: UNSIGNED_16 Index: 24341_d = $5F15_h$
From a device power of 2.2 kW: 50 % ▸ Oscillation damping			
Setting range **(min. value | unit | max. value)**			**Lenze setting**
0	%	250	**5 %**
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 100			

C00235

Parameter | Name:
C00235 | Oscillation damping filter time

Data type: UNSIGNED_8
Index: 24340$_d$ = 5F14$_h$

▶ Oscillation damping

Setting range (min. value | unit | max. value)			**Lenze setting**
2	ms	250	**50 ms**

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

C00239

Parameter | Name:
C00239 | Limitation of lower speed

Data type: INTEGER_16
Index: 24336$_d$ = 5F10$_h$

From version 04.01.00

Here, a minimum lower setpoint speed can be set if, for example, the setpoint for pumps and fans should not fall below a certain value. This prevents, e.g. a volume flow to be fallen below the minimum threshold.

- Compared to the setting "Min. analog setpoint" (C00010/1), this setting is scaled in [rpm] and is thus independent of the reference speed set in C00011.
- This parameter can be used if old 8200 motec projects are migrated to the 8400 motec.
- In the Lenze setting "-9999 rpm", no limitation is active.

Note:

- Stopping commands such as DC-injection braking, quick stop and RFG_0 are executed independently of this setting. Switch them off if you want to activate this setting.
- The maximum current controller can reduce the output frequency to below the minimum speed set here.

Setting range (min. value | unit | max. value)			**Lenze setting**
-18000	rpm	18000	**-9999 rpm**

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

C00241

Parameter | Name:
C00241 | L_NSet_1: Hyst. NSet reached

Data type: INTEGER_16
Index: 24334$_d$ = 5F0E$_h$

From version 04.00.00

Hysteresis window for setting the "speed setpoint reached" status

- Related digital signal in selection list: "62: LA_NCtrl_bSpeedSetReached"
- The reset hysteresis is permanently 0.5 %.

Setting range (min. value | unit | max. value)			**Lenze setting**
0.00	%	100.00	**0.50 %**

☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 100

C00242

Parameter | Name: **C00242 | L_PCTRL_1: Operating mode**		Data type: UNSIGNED_8 Index: 24333$_d$ = 5F0D$_h$
The L_PCTRL_1 FB: Selection of the operating mode - Depending on the selection, the blue switches in the displayed signal flow are set accordingly in the Engineer on the **Application parameter** tab in the *Overview* ➞ *Signal flow* ➞ *Process controller* dialog level.		
Selection list(Lenze setting printed in bold)		**Information**
0	**Off**	The input setpoint *nNSet_a* is output without any changes at the output *nOut_a*.
1	nNSet + nNSet_PID	*nNSet_a* and *nAct_a* are used as PID input values. The arriving *nNSet_a* is additively linked to the value output by the PID element.
2	nSet_PID	*nSet_a* and *nAct_a* are used as PID input values. The input *nNSet_a* is not considered.
3	nNSet_PID	*nNSet_a* and *nAct_a* are used as PID input values. The input *nSet_a* is not considered.
4	nNSet + nSet_PID	From version 04.00.00 *nSet_a* and *nAct_a* are used as PID input values. The arriving *nNSet_a* setpoint is additively linked to the value output by the PID element.
5	nNSet || nSet_PID	From version 04.00.00 *nSet_a* and *nAct_a* are used as PID input values. The setpoint *nNSet_a* is output at the output *nOut_a* . The PID output value is output at the output *nPIDOut_a*.
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 1		

C00243

Parameter | Name: **C00243 | L_PCTRL_1: Acceleration time influence**			Data type: UNSIGNED_32 Index: 24332$_d$ = 5F0C$_h$
The L_PCTRL_1 FB: Acceleration time for showing the PID output value			
Setting range (min. value | unit | max. value)			**Lenze setting**
0.0	s	999.9	**5.0 s**
☑ Read access ☑ Write access 📚 CINH 📚 PLC STOP 📚 No transfer 📚 COM 📚 MOT Scaling factor: 1000			

C00244

Parameter | Name: **C00244 | L_PCTRL_1: Deceleration time influence**			Data type: UNSIGNED_32 Index: 24331$_d$ = 5F0B$_h$
The L_PCTRL_1 FB: Deceleration time for masking out the PID output value			
Setting range (min. value | unit | max. value)			**Lenze setting**
0.0	s	999.9	**5.0 s**
☑ Read access ☑ Write access 📚 CINH 📚 PLC STOP 📚 No transfer 📚 COM 📚 MOT Scaling factor: 1000			

C00245

Parameter | Name: **C00245 | L_PCTRL_1: PID output value**			Data type: INTEGER_16 Index: 24330$_d$ = 5F0A$_h$
The L_PCTRL_1 FB: Display of the output value of the PID process controller			
Display range (min. value | unit | max. value)			
-199.9	%	199.9	
☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 100			

C00246

Parameter | Name:
C00246 | L_PCTRL_1: nAct_a internal

Data type: INTEGER_16
Index: 24329$_d$ = 5F09$_h$

From version 04.00.00
FB L_PCTRL_1: Display of the internal actual value

Display range (min. value | unit | max. value)		
-199.9	%	199.9

☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 100

C00273

Parameter | Name:
C00273 | Moment of inertia

Data type: UNSIGNED_16
Index: 24302$_d$ = 5EEE$_h$

From version 03.00.00
Moment of inertia for setpoint feedforward control with sensorless vector control (SLVC)

Setting range (min. value | unit | max. value)			**Lenze setting**
0.0	kg cm^2	6000.0	**0.0 kg cm^2**

☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☑ MOT Scaling factor: 10

C00276

Parameter | Name:
C00276 | SC: Max. output voltage

Data type: UNSIGNED_8
Index: 24299$_d$ = 5EEB$_h$

From version 04.00.00

Setting range (min. value | unit | max. value)			**Lenze setting**
80	%	99	**95 %**

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

C00290

Parameter | Name:
C00290 | Module type

Data type: UNSIGNED_16
Index: 24285$_d$ = 5EDD$_h$

This code is used device-internally and must not be written by the user side!

C00291

Parameter | Name:
C00291 | Module software compatibility value

Data type: UNSIGNED_16
Index: 24284$_d$ = 5EDC$_h$

This code is used device-internally and must not be written by the user side!

C00292

Parameter | Name:
C00292 | Drive internal communication status

Data type: UNSIGNED_8
Index: 24283$_d$ = 5EDB$_h$

This code is used device-internally and must not be written by the user side!

C00293

Parameter | Name:
C00293 | Module internal communication status

Data type: UNSIGNED_8
Index: 24282$_d$ = 5EDA$_h$

This code is used device-internally and must not be written by the user side!

C00294

Parameter | Name: **C00294 | Module reported fault**	Data type: UNSIGNED_32 Index: 24281_d = $5ED9_h$
This code is used device-internally and must not be written by the user side!	

C00295

Parameter | Name: **C00295 | Internal bus counter**	Data type: UNSIGNED_16 Index: 24280_d = $5ED8_h$
This code is used device-internally and must not be written by the user side!	

C00296

Parameter | Name: **C00296 | Module info**	Data type: UNSIGNED_16 Index: 24279_d = $5ED7_h$
This code is used device-internally and must not be written by the user side!	

C00304

Parameter | Name: **C00304 | Password1**	Data type: UNSIGNED_32 Index: 24271_d = $5ECF_h$
This code is used device-internally and must not be written by the user side!	

C00305

Parameter | Name: **C00305 | Password2**	Data type: UNSIGNED_32 Index: 24270_d = $5ECE_h$
This code is used device-internally and must not be written by the user side!	

C00306

Parameter | Name: **C00306 | Debug address**	Data type: UNSIGNED_32 Index: 24269_d = $5ECD_h$
This code is used device-internally and must not be written by the user side!	

C00307

Parameter | Name: **C00307 | Debug value**	Data type: UNSIGNED_16 Index: 24268_d = $5ECC_h$
This code is used device-internally and must not be written by the user side!	

C00371

Parameter | Name: **C00371 | CAN ErrorCode**			Data type: UNSIGNED_16 Index: 24204_d = $5E8C_h$
From version 05.00.00			
Display range **(min. value | unit | max. value)**			
0		65535	
Subcodes			**Information**
C00371/1			CAN ErrorCode
☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☑ No transfer ☑ COM ☐ MOT Scaling factor: 1			

C00420

Parameter | Name: **C00420 | Number of encoder increments**			Data type: UNSIGNED_16 Index: 24155_d = $5E5B_h$
From version 02.00.00 Indication of the encoder constant ▸ Encoder/feedback system			
Setting range **(min. value | unit | max. value)**			
1	Incr./rev.	32768	
Subcodes	**Lenze setting**	**Information**	
C00420/1	128 incr./rev.	Encoder increments at FreqIn12	
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☑ MOT Scaling factor: 1			

C00425

Parameter | Name: **C00425 | Encoder scanning time**		Data type: UNSIGNED_8 Index: 24150_d = $5E56_h$
From version 02.00.00 Encoder sample time for the digital input terminals when configured as frequency inputs ▸ Using DI1 and DI2 as frequency inputs		
Selection list		
0	1 ms	
1	2 ms	
2	5 ms	
3	10 ms	
4	20 ms	
5	50 ms	
6	100 ms	
7	200 ms	
8	500 ms	
9	1000 ms	
Subcodes	**Lenze setting**	**Information**
C00425/1	3: 10 ms	Encoder sample time FreqIn12
☑ Read access ☑ Write access ☑ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☑ MOT Scaling factor: 1		

C00443

Parameter | Name: **C00443 | DIx: Level**			Data type: UNSIGNED_16 Index: 24132_d = $5E44_h$
Bit coded display of the level of the digital inputs ▶ Digital terminals			
Display area **(min. hex value | max. hex value)**			
0x0000		0xFFFF	
Value is bit-coded:			**Information**
Bit 0	DI1		Bit set = HIGH level
Bit 1	DI2		
Bit 2	DI3		
Bit 3	DI4		
Bit 4	DI5		
Bit 5	DI6		
Bit 6	DI7		
Bit 7	DI8		
Bit 8	Reserved		
Bit 9	Reserved		
Bit 10	Reserved		
Bit 11	Reserved		
Bit 12	Reserved		
Bit 13	Reserved		
Bit 14	Reserved		
Bit 15	CINH		
Subcodes			**Information**
C00443/1			DIx: Terminal level
C00443/2			DIx: Output level
☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☑ No transfer ☐ COM ☐ MOT			

C00444

Parameter | Name: **C00444 | DOx: Level**			Data type: UNSIGNED_16 Index: 24131_d = $5E43_h$
Bit coded display of the level of the digital outputs ▶ Digital terminals			
Display area (min. hex value | max. hex value)			
0x0000		0xFFFF	
Value is bit-coded:			**Information**
Bit 0	Relay		Bit set = HIGH level
Bit 1	DO1		
Bit 2	Reserved		
Bit 3	Reserved		
Bit 4	Reserved		
Bit 5	Reserved		
Bit 6	Reserved		
Bit 7	Reserved		
Bit 8	Reserved		
Bit 9	Reserved		
Bit 10	Reserved		
Bit 11	Reserved		
Bit 12	Reserved		
Bit 13	Reserved		
Bit 14	Reserved		
Bit 15	Reserved		
Subcodes			**Information**
C00444/1			DOx: Input level
C00444/2			DOx: Terminal level
☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☑ No transfer ☐ COM ☐ MOT			

C00445

Parameter | Name: **C00445 | FreqInxx_nOut_v**			Data type: INTEGER_16 Index: 24130_d = $5E42_h$
From version 02.00.00 Display of the frequency input signals which are fed into the application. ▶ Using DI1 and DI2 as frequency inputs			
Display range (min. value | unit | max. value)			
-32767	Incr/ms	32767	
Subcodes			**Information**
C00445/1			FreqIn12_nOut_v
☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☑ No transfer ☐ COM ☐ MOT Scaling factor: 1			

C00446

Parameter | Name: **C00446 | FreqInxx_nOut_a**			Data type: INTEGER_16 Index: 24129_d = $5E41_h$
From version 02.00.00 Display of the frequency input signals which are fed into the application. ▸ Using DI1 and DI2 as frequency inputs			
Display range **(min. value | unit | max. value)**			
-199.9	%	199.9	
Subcodes			**Information**
C00446/1			FreqIn12_nOut_a
☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☑ No transfer ☐ COM ☐ MOT Scaling factor: 100			

C00450

Parameter | Name: **C00450 | HTL encoder input frequency**			Data type: UNSIGNED_32 Index: 24125_d = $5E3D_h$
Display range **(min. value | unit | max. value)**			
0.000	kHz	2147483.647	
Subcodes			**Information**
C00450/1			FreqIn12: Input frequency
☑ Read access ☐ Write access ≋ CINH ≋ PLC STOP ≋ No transfer ≋ COM ≋ MOT Scaling factor: 1000			

C00460

Parameter | Name: **C00460 | Remote: Local keyswitch**	Data type: UNSIGNED_8 Index: 24115_d = $5E33_h$
This code is used device-internally and must not be written by the user side!	

C00461

Parameter | Name: **C00461 | Remote: Acceleration/deceleration time**			Data type: UNSIGNED_32 Index: 24114_d = $5E32_h$
From version 04.00.00 Acceleration/deceleration time for PC manual control and Control via Field Package ("key-operated switch operation")			
Setting range **(min. value | unit | max. value)**			
0.0	s	999.9	
Subcodes	**Lenze setting**		**Information**
C00461/1	2.0 s		Remote: Acceleration/deceleration time
☑ Read access ☑ Write access ≋ CINH ≋ PLC STOP ≋ No transfer ≋ COM ≋ MOT Scaling factor: 1000			

C00462

Parameter | Name: **C00462 | Keypad/PC: Setpoint control**	Data type: UNSIGNED_16 Index: 24113_d = $5E31_h$
This code is used device-internally and must not be written by the user side!	

C00463

Parameter | Name:
C00463 | Keypad:
Data type: INTEGER_32
Index: 24112_d = $5E30_h$

Setting range (min. value | unit | max. value)			
0.000		16000.000	
Subcodes	**Lenze setting**		**Information**
C00463/1	729.001		Keypad: Parameter for speed setpoint
C00463/2	56.002		Keypad: Parameter for display bar

☑ Read access ☑ Write access 📚 CINH 📚 PLC STOP 📚 No transfer 📚 COM 📚 MOT Scaling factor: 1000

C00466

Parameter | Name:
C00466 | Keypad: Default parameter
Data type: INTEGER_32
Index: 24109_d = $5E2D_h$

Setting of the default parameter for the keypad

Setting range (min. value | unit | max. value)			**Lenze setting**
0		65535	**51**

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

C00467

Parameter | Name:
C00467 | Keypad: Default welcome screen
Data type: INTEGER_32
Index: 24108_d = $5E2C_h$

Selection of the welcome screen for the keypad

Selection list(Lenze setting printed in bold)		
0	Main menu	
1	**Parameter list**	

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

C00469

Parameter | Name:
C00469 | Keypad: Fct. STOP key
Data type: INTEGER_32
Index: 24106_d = $5E2A_h$

Selection of the function for the STOP key on the keypad

Selection list(Lenze setting printed in bold)		**Information**
0	No function	STOP key does not have any function
1	**Inhibit inverter**	STOP key sets controller inhibit in the drive
2	Activate quick stop	STOP key sets quick stop in the drive
4	Inhibit controller and reset errors	From version 05.00.00 STOP key sets controller inhibit in the drive. An error reset is carried out at the same time.
5	Activate quick stop and reset errors	From version 05.00.00 STOP key sets quick stop in the drive. An error reset is carried out at the same time.

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

C00470

Parameter | Name: **C00470 | LS_ParFree_b**		Data type: UNSIGNED_8 Index: 24105$_d$ = 5E29$_h$
The LS_ParFree_b SB: Setting of the signal level to be output		
Selection list		
0	False	
1	True	
Subcodes	**Lenze setting**	**Information**
C00470/1	0: FALSE	Signal level for output *bPar1* ... *bPar16*
C00470/...		
C00470/16		
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 1		

C00471

Parameter | Name: **C00471 | LS_ParFree**			Data type: UNSIGNED_16 Index: 24104$_d$ = 5E28$_h$
The LS_ParFree SB: Setting of the words to be output			
Setting range (min. hex value | max. hex value)			
0x0000		0xFFFF	
Value is bit-coded:			
Bit 0	Active		
...	...		
Bit 15	Active		
Subcodes	**Lenze setting**		**Information**
C00471/1	0x0000		Values for output *wPar1* ... *wPar4*
C00471/...			
C00471/4			
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT			

C00472

Parameter | Name: **C00472 | LS_ParFree_a**			Data type: INTEGER_16 Index: 24103$_d$ = 5E27$_h$
The LS_ParFree_a SB: Setting of the analog signals to be output			
Setting range (min. value | unit | max. value)			
-199.9	%	199.9	
Subcodes	**Lenze setting**		**Information**
C00472/1	0.0 %		Value for output *nPar1_a*
C00472/2	0.0 %		Value for output *nPar2_a*
C00472/3	100.0 %		Value for output *nPar3_a*
C00472/4	100.0 %		Value for output *nPar4_a*
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 100			

C00480

Parameter | Name: **C00480 | LS_DisFree_b**			Data type: UNSIGNED_8 Index: 24095_d = 5E1F$_h$
The LS_DisFree_b SB: Display of the input values			
Display area **(min. hex value | max. hex value)**			
0x00		0xFF	
Value is bit-coded:			**Information**
Bit 0	bDis1		Signal level input *bDis1* ... *bDis8*
...	...		
Bit 7	bDis8		
☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT			

C00481

Parameter | Name: **C00481 | LS_DisFree**			Data type: UNSIGNED_16 Index: 24094_d = 5E1E$_h$
The LS_DisFree SB: Display of the input values			
Display area **(min. hex value | max. hex value)**			
0x0000		0xFFFF	
Value is bit-coded:			
Bit 0	Bit0		
...	...		
Bit 15	Bit15		
Subcodes			**Information**
C00481/1			Input values *wDis1* ... *wDis4*
C00481/...			
C00481/4			
☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT			

C00482

Parameter | Name: **C00482 | LS_DisFree_a**			Data type: INTEGER_16 Index: 24093_d = 5E1D$_h$
The LS_DisFree_a SB: Display of the input values			
Display range **(min. value | unit | max. value)**			
-199.9	%	199.9	
Subcodes			**Information**
C00482/1			Input values *nDis1_a* ... *nDis4_a*
C00482/...			
C00482/4			
☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 100			

C00488

Parameter | Name:
C00488 | L_JogCtrlExtension_1: EdgeDetect

Data type: UNSIGNED_8
Index: 24087_d = $5E17_h$

From version 05.00.00
The L_JogCtrlExtension_1 FB: Signal methodology
- Selection whether the corresponding function is to be activated by edge or level.

Selection list		
0	Level	
1	Edge	

Subcodes	**Lenze setting**	**Information**
C00488/1	0: Level	L_JogCtrlExtension_1: InputSens.SlowDown1 • Selection of edge or level for starting slow-down function 1
C00488/2	0: Level	L_JogCtrlExtension_1: InputSens.Stop1 • Selection of edge or level for stop function 1
C00488/3	0: Level	L_JogCtrlExtension_1: InputSens.SlowDown2 • Selection of edge or level for starting slow-down function 2
C00488/4	0: Level	L_JogCtrlExtension_1: InputSens.Stop2 • Selection of edge or level for stop function 2
C00488/5	0: Level	L_JogCtrlExtension_1: InputSens.SlowDown3 • Selection of edge or level for starting slow-down function 3
C00488/6	0: Level	L_JogCtrlExtension_1: InputSens.Stop3 • Selection of edge or level for stop function 3

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

C00495

Parameter | Name:
C00495 | Speed sensor selection

Data type: UNSIGNED_8
Index: 24080_d = $5E10_h$

From version 02.00.00
Selection of the feedback system for the actual speed for motor control and display

▸ Encoder/feedback system

Selection list(Lenze setting printed in bold)		**Information**
0	**No sensor**	No sensor available for the actual speed detection
1	Sensor signal FreqIn12	Speed sensor signal is fed via the digital DI1 and DI2 inputs

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

C00496

Parameter | Name:
C00496 | Encoder evaluation method

Data type: UNSIGNED_8
Index: 24079_d = $5E0F_h$

From version 02.00.00

▸ Encoder/feedback system

Selection list(Lenze setting printed in bold)		**Information**
1	**Low-resolution encoder**	High-precision procedure for low-resolution encoders (<=128 increments)
3	Edge-counting procedure	Simple edge counting procedure with adjustable scanning time (C00425)

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

C00497

Parameter | Name: **C00497 | Nact filter time constant**			Data type: UNSIGNED_16 Index: 24078$_d$ = 5E0E$_h$
From version 02.00.00			
Setting range **(min. value | unit | max. value)**			
0.0	ms	500.0	
Subcodes	**Lenze setting**		**Information**
C00497/1	1.0 ms		Encoder filter time FreqIn12
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 10			

C00516

Parameter | Name: **C00516 | Checksums**	Data type: UNSIGNED_32 Index: 24059$_d$ = 5DFB$_h$
This code is used device-internally and must not be written by the user side!	

C00517

Parameter | Name: **C00517 | User menu**		Data type: INTEGER_32 Index: 24058_d = $5DFA_h$
When a system is installed, parameters must be changed time and again until the system runs satisfactorily. The user menu of a device serves to create a selection of frequently used parameters to be able to access and change these parameters quickly. • Format: <code number>,<subcode number> • If "0.000" is set, no entry will be displayed in the user menu.		
Setting range **(min. value | unit | max. value)**		
0.000		16000.000

Subcodes	Lenze setting	Information
C00517/1	51.000	C00051: Display of actual speed value
C00517/2	53.000	C00053: Display of DC-bus voltage
C00517/3	54.000	C00054: Display of motor current
C00517/4	61.000	C00061: Display of heatsink temperature
C00517/5	137.000	C00137: Display of device status
C00517/6	166.003	C00166/3: Display of current error message
C00517/7	0.000	User menu: Entry 7
C00517/8	11.000	C00011: Reference speed
C00517/9	39.001	C00039/1: Fixed setpoint 1
C00517/10	39.002	C00039/2: Fixed setpoint 2
C00517/11	12.000	C00012: Accel. time - main setpoint
C00517/12	13.000	C00013: Decel. time - main setpoint
C00517/13	15.000	C00015: V/f base frequency
C00517/14	16.000	C00016: Vmin boost
C00517/15	22.000	C00022: Imax in motor mode
C00517/16	120.000	C00120: Setting of motor overload (I^2xt)
C00517/17	87.000	C00087: Rated motor speed
C00517/18	99.000	C00099: Display of firmware version
C00517/19	200.000	C00200: Display of firmware product type
C00517/20	0.000	User menu: Entry 20
C00517/21	0.000	User menu: Entry 21
C00517/22	0.000	User menu: Entry 22
C00517/23	0.000	User menu: Entry 23
C00517/24	105.000	C00105: Decel. time - quick stop
C00517/25	173.000	C00173: Mains voltage
☑ Read access ☑ Write access ® CINH ® PLC STOP ® No transfer ® COM ® MOT Scaling factor: 1000		

C00563

Parameter | Name: **C00563 | Current monitoring: Delay time**		Data type: UNSIGNED_32 Index: 24012_d = $5DCC_h$
From version 07.00.00		▶ Current monitoring overload
Setting range (min. value | unit | max. value)		
0.0	s	999.9

Subcodes	**Lenze setting**	**Information**
C00563/1	3.0 s	Current monitoring: Delay time overload

☑ Read access ☑ Write access ® CINH ® PLC STOP ® No transfer ® COM ® MOT Scaling factor: 1000

C00565

Parameter | Name: **C00565 | Resp. to mains phase failure**	Data type: UNSIGNED_8 Index: 24010_d = $5DCA_h$
Response to the failure of mains phases	
Selection list(Lenze setting printed in bold)	
0	No Reaction
1	Fault
4	**WarningLocked**

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

C00567

Parameter | Name: **C00567 | Resp. to speed controller limited**	Data type: UNSIGNED_8 Index: 24008_d = $5DC8_h$
From version 02.00.00 Response if speed controller output is limited (*bLimSpeedCtrlOut* = TRUE)	
Selection list(Lenze setting printed in bold)	
0	**No Reaction**
1	Fault
4	WarningLocked

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

C00572

Parameter | Name: **C00572 | Brake resistor overload threshold**			Data type: UNSIGNED_8 Index: 24003_d = $5DC3_h$
Adjustable threshold for monitoring the brake resistor utilisation • The response for reaching the threshold can be selected in C00574.			
Setting range (min. value | unit | max. value)			**Lenze setting**
0	%	100	**100 %**

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

C00574

Parameter | Name: **C00574 | Resp. to brake resist. overtemp.**		Data type: UNSIGNED_8 Index: 24001$_d$ = 5DC1$_h$
Response which is triggered if the threshold set in C00572 for monitoring brake resistor utilisation is reached.		
Selection list(Lenze setting printed in bold)		
0	No Reaction	
1	**Fault**	
4	WarningLocked	
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☑ MOT Scaling factor: 1		

C00579

Parameter | Name: **C00579 | Resp. to speed monitoring**		Data type: UNSIGNED_8 Index: 23996$_d$ = 5DBC$_h$
Response when the max. speed limit (C00909) or output frequency limit (C00910) has been reached.		
Selection list(Lenze setting printed in bold)		
0	**No Reaction**	
1	Fault	
4	WarningLocked	
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☑ MOT Scaling factor: 1		

C00581

Parameter | Name: **C00581 | Resp. to LS_SetError_x**		Data type: UNSIGNED_8 Index: 23994$_d$ = 5DBA$_h$
Selection of the error responses for application error messages • An application error message is tripped by a FALSE-TRUE edge at the binary inputs *bSetError1...2*.		
Selection list		
0	No Reaction	
1	Fault	
2	Trouble	
4	WarningLocked	
Subcodes	**Lenze setting**	**Information**
C00581/1	1: Fault	LS_SetError_1: Resp. to bSetError1
C00581/2	1: Fault	LS_SetError_1: Resp. to bSetError2
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 1		

C00582

Parameter | Name: **C00582 | Resp. to heatsink temp. > shutdown temp. -5°C**		Data type: UNSIGNED_8 Index: 23993$_d$ = 5DB9$_h$
Response if the heatsink temperature has reached the switch-off temperature threshold.		
Selection list(Lenze setting printed in bold)		
0	**No Reaction**	
1	Fault	
4	WarningLocked	
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 1		

C00584

Parameter | Name: **C00584 | Resp. to current monitoring**		Data type: UNSIGNED_8 Index: 23991_d = $5DB7_h$
From version 07.00.00 Response in the event of current overload ▸ Current monitoring overload		
Selection list		**Information**
0	No Reaction	
1	Fault	
4	WarningLocked	
Subcodes	**Lenze setting**	**Information**
C00584/1	0: No Reaction	Resp. to current monitoring overload
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☑ MOT Scaling factor: 1		

C00585

Parameter | Name: **C00585 | Resp. to motor overtemp. PTC**		Data type: UNSIGNED_8 Index: 23990_d = $5DB6_h$
Response to motor overtemperature • The motor temperature is measured by means of a PTC thermistor detector.		
Selection list(Lenze setting printed in bold)		
0	No Reaction	
1	**Fault**	
4	WarningLocked	
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☑ MOT Scaling factor: 1		

C00586

Parameter | Name: **C00586 | Resp. to encoder open circuit**		Data type: UNSIGNED_8 Index: 23989_d = $5DB5_h$
From version 02.00.00 Response to encoder feedback system failure or encoder feedback system track failure due to open circuit **Note:** Despite the encoder error, monitoring is not activated if the setpoint is lower than or equals 40 Hz.		
Selection list(Lenze setting printed in bold)		
0	No Reaction	
1	**Fault**	
4	WarningLocked	
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☑ MOT Scaling factor: 1		

C00594

Parameter | Name: **C00594 | Resp. to control word error**		Data type: UNSIGNED_8 Index: 23981_d = $5DAD_h$
Configuration of device control monitoring		
Selection list		
0	No Reaction	
1	Fault	
2	Trouble	
4	WarningLocked	
Subcodes	**Lenze setting**	**Information**
C00594/1	0: No Reaction	Response if error bit 14 in the CAN control word is set.
C00594/2	1: Fault	Response if error bit 14 in the MCI control word is set.
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 1		

C00597

Parameter | Name: **C00597 | Resp. to LP1 motor phase fault**		Data type: UNSIGNED_8 Index: 23978_d = $5DAA_h$
Response to motor phase failure • Online testing includes the monitoring of the three motor phases during operation (motor rotates). • Static testing means testing before the holding brake is released.		
Selection list(Lenze setting printed in bold)		
0	**No Reaction**	
1	Fault	
4	WarningLocked	
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☑ MOT Scaling factor: 1		

C00598

Parameter | Name: **C00598 | Resp. to open circuit AINx**		Data type: UNSIGNED_8 Index: 23977_d = $5DA9_h$
Configuration of monitoring the analog input ▸ Analog terminals		
Selection list		
0	No Reaction	
1	Fault	
2	Trouble	
4	WarningLocked	
Subcodes	**Lenze setting**	**Information**
C00598/1	1: Fault	Response to open circuit at AIN1 if configured as 4 ... 20 mA current loop
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 1		

C00600

Parameter | Name: **C00600 | Resp. to DC bus undervoltage**		Data type: UNSIGNED_8 Index: 23975$_d$ = 5DA7$_h$
Configuration of monitoring of the motor control (group 3)		
Selection list		
1	Fault	
2	Trouble	
Subcodes	**Lenze setting**	**Information**
C00600/1	2: Trouble	Response to DC bus undervoltage
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☑ MOT Scaling factor: 1		

C00601

Parameter | Name: **C00601 | Del. resp.to fault: DC bus overvoltage**			Data type: UNSIGNED_16 Index: 23974$_d$ = 5DA6$_h$
Error response delay times			
Setting range **(min. value | unit | max. value)**			
0.00	s	65.00	
Subcodes	**Lenze setting**		**Information**
C00601/1	2.00 s		Delay time for triggering the "DC-bus overvoltage" error • If a DC-bus overvoltage occurs, an error will not be triggered until the set delay time has elapsed.
☑ Read access ☑ Write access ® CINH ® PLC STOP ® No transfer ® COM ® MOT Scaling factor: 1000			

C00604

Parameter | Name: **C00604 | Resp. to device overload (Ixt)**		Data type: UNSIGNED_8 Index: 23971$_d$ = 5DA3$_h$
Response if the adjustable device utilisation threshold (C00123) is reached. • The current device utilisation is displayed in C00064.		
Selection list **(Lenze setting printed in bold)**		
0	No Reaction	
1	Fault	
4	**WarningLocked**	
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 1		

C00606

Parameter | Name: **C00606 | Resp. to motor overload (I²xt)**		Data type: UNSIGNED_8 Index: 23969$_d$ = 5DA1$_h$
Response when the motor load displayed in C00066 reaches the value "100.00 %". ▶ Motor overload monitoring (I2xt)		
Selection list **(Lenze setting printed in bold)**		
0	No Reaction	
1	Fault	
4	**WarningLocked**	
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☑ MOT Scaling factor: 1		

C00607

Parameter | Name:
C00607 | Resp. to max freq. feedb. DIG12

Data type: UNSIGNED_8
Index: 23968_d = $5DA0_h$

From version 02.00.00
Response when the maximum input frequency has been reached via the digital inputs.

Selection list(Lenze setting printed in bold)	
0	No Reaction
1	**Fault**
4	WarningLocked

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

C00620

Parameter | Name:
C00620 | 16-bit system connection

Data type: UNSIGNED_16
Index: 23955_d = $5D93_h$

Connection parameters: 16-bit inputs

- Selection of the 16 bit output signals to be connected to the 16 bit input signals
- The selection list contains all 16 bit output signals which can be assigned to the 16 bit inputs displayed by the subcodes.

Selection list

See selection list - analog signals

Subcodes	Lenze setting	Information
C00620/1	0: Not connected	Reserved
C00620/2	0: Not connected	Reserved
C00620/3	0: Not connected	Reserved
C00620/4	0: Not connected	Reserved
C00620/5	0: Not connected	LS_DisFree: wDis1
C00620/6	0: Not connected	LS_DisFree: wDis2
C00620/7	0: Not connected	LS_DisFree: wDis3
C00620/8	0: Not connected	LS_DisFree: wDis4
C00620/9	0: Not connected	LS_DisFree_a: nDis1_a
C00620/10	0: Not connected	LS_DisFree_a: nDis2_a
C00620/11	0: Not connected	LS_DisFree_a: nDis3_a
C00620/12	0: Not connected	LS_DisFree_a: nDis4_a
C00620/13	0: Not connected	LS_Convert_1: In1
C00620/14	0: Not connected	LS_Convert_1: In2
C00620/15	0: Not connected	LS_Convert_2: In1
C00620/16	0: Not connected	LS_Convert_2: In2
C00620/17	0: Not connected	LS_Convert_3: In1
C00620/18	0: Not connected	LS_Convert_3: In2
C00620/19	0: Not connected	Reserved
C00620/20	0: Not connected	MCI_wState/CAN1_wState
C00620/21	0: Not connected	MCI_wOut2/CAN1_wOut2
C00620/22	0: Not connected	MCI_wOut3/CAN1_wOut3
C00620/23	0: Not connected	MCI_wOut4/CAN1_wOut4
C00620/24	0: Not connected	MCI_wOut5/CAN2_wOut1
C00620/25	0: Not connected	MCI_wOut6/CAN2_wOut2
C00620/26	0: Not connected	MCI_wOut7/CAN2_wOut3

Parameter | Name: **C00620 | 16-bit system connection**		Data type: UNSIGNED_16 Index: 23955$_d$ = 5D93$_h$
C00620/27	0: Not connected	MCI_wOut8/CAN2_wOut4
C00620/28	0: Not connected	LA_NCtrl: nSpeedLowLimit_a LA_NCtrl: nSpeedLowLimit_a
C00620/29	0: Not connected	LA_NCtrl: nSpeedHighLimit_a LA_NCtrl: nSpeedHighLimit_a
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 1		

C00621

Parameter | Name: **C00621 | Bool system connection**		Data type: UNSIGNED_16 Index: 23954$_d$ = 5D92$_h$
Connection parameters: Binary inputs • Selection of the binary output signals to be connected to the binary input signals • The selection list contains all binary output signals which can be assigned to the binary inputs mapped by the subcodes.		
Selection list		
See selection list - digital signals		
Subcodes	**Lenze setting**	**Information**
C00621/1	50: LA_NCtrl: bDriveFail	LS_DigitalOutput: bRelay
C00621/2	51: LA_NCtrl: bDriveReady	LS_DigitalOutput: bOut1
C00621/3	0: Not connected	Reserved
C00621/4	0: Not connected	Reserved
C00621/5	0: Not connected	Reserved
C00621/6	0: Not connected	Reserved
C00621/7	0: Not connected	LA_NCtrl: bStatusBit0
C00621/8	65: LA_NCtrl: bImaxActive	LA_NCtrl: bStatusBit2
C00621/9	62: LA_NCtrl: bSpeedSetReached	LA_NCtrl: bStatusBit3
C00621/10	63: LA_NCtrl: bSpeedActEqSet	LA_NCtrl: bStatusBit4
C00621/11	64: LA_NCtrl: bNActCompare	LA_NCtrl: bStatusBit5
C00621/12	60: LA_NCtrl: bSpeedCcw	LA_NCtrl: bStatusBit14
C00621/13	51: LA_NCtrl: bDriveReady	LA_NCtrl: bStatusBit15
C00621/14	0: Not connected	Reserved
C00621/15	0: Not connected	Reserved
C00621/16	0: Not connected	LS_DisFree_b: bDis1
C00621/17	0: Not connected	LS_DisFree_b: bDis2
C00621/18	0: Not connected	LS_DisFree_b: bDis3
C00621/19	0: Not connected	LS_DisFree_b: bDis4
C00621/20	0: Not connected	LS_DisFree_b: bDis5
C00621/21	0: Not connected	LS_DisFree_b: bDis6
C00621/22	0: Not connected	LS_DisFree_b: bDis7
C00621/23	0: Not connected	LS_DisFree_b: bDis8
C00621/24	0: Not connected	Reserved
C00621/25	0: Not connected	Reserved
C00621/26	0: Not connected	Reserved
C00621/27	0: Not connected	Reserved
C00621/28	0: Not connected	Reserved

Parameter | Name: **C00621 | Bool system connection**		Data type: UNSIGNED_16 Index: $23954_d = 5D92_h$
C00621/29	0: Not connected	Reserved
C00621/30	0: Not connected	MCI_bState_B0/CAN1_bState_B0
C00621/31	0: Not connected	MCI_bState_B1/CAN1_bState_B1
C00621/32	0: Not connected	MCI_bState_B2/CAN1_bState_B2
C00621/33	0: Not connected	MCI_bState_B3/CAN1_bState_B3
C00621/34	0: Not connected	MCI_bState_B4/CAN1_bState_B4
C00621/35	0: Not connected	MCI_bState_B5/CAN1_bState_B5
C00621/36	0: Not connected	MCI_bState_B6/CAN1_bState_B6
C00621/37	0: Not connected	MCI_bState_B7/CAN1_bState_B7
C00621/38	0: Not connected	MCI_bState_B8/CAN1_bState_B8
C00621/39	0: Not connected	MCI_bState_B9/CAN1_bState_B9
C00621/40	0: Not connected	MCI_bState_B10/CAN1_bState_B10
C00621/41	0: Not connected	MCI_bState_B11/CAN1_bState_B11
C00621/42	0: Not connected	MCI_bState_B12/CAN1_bState_B12
C00621/43	0: Not connected	MCI_bState_B13/CAN1_bState_B13
C00621/44	0: Not connected	MCI_bState_B14/CAN1_bState_B14
C00621/45	0: Not connected	MCI_bState_B15/CAN1_bState_B15
C00621/46	0: Not connected	MCI_bOut2_B0/CAN1_bOut2_B0
C00621/47	0: Not connected	MCI_bOut2_B1/CAN1_bOut2_B1
C00621/48	0: Not connected	MCI_bOut2_B2/CAN1_bOut2_B2
C00621/49	0: Not connected	MCI_bOut2_B3/CAN1_bOut2_B3
C00621/50	0: Not connected	MCI_bOut2_B4/CAN1_bOut2_B4
C00621/51	0: Not connected	MCI_bOut2_B5/CAN1_bOut2_B5
C00621/52	0: Not connected	MCI_bOut2_B6/CAN1_bOut2_B6
C00621/53	0: Not connected	MCI_bOut2_B7/CAN1_bOut2_B7
C00621/54	0: Not connected	MCI_bOut2_B8/CAN1_bOut2_B8
C00621/55	0: Not connected	MCI_bOut2_B9/CAN1_bOut2_B9
C00621/56	0: Not connected	MCI_bOut2_B10/CAN1_bOut2_B10
C00621/57	0: Not connected	MCI_bOut2_B11/CAN1_bOut2_B11
C00621/58	0: Not connected	MCI_bOut2_B12/CAN1_bOut2_B12
C00621/59	0: Not connected	MCI_bOut2_B13/CAN1_bOut2_B13
C00621/60	0: Not connected	MCI_bOut2_B14/CAN1_bOut2_B14
C00621/61	0: Not connected	MCI_bOut2_B15/CAN1_bOut2_B15
C00621/62	0: Not connected	MCI_bOut5_B0/CAN2_bOut1_B0
C00621/63	0: Not connected	MCI_bOut5_B1/CAN2_bOut1_B1
C00621/64	0: Not connected	MCI_bOut5_B2/CAN2_bOut1_B2
C00621/65	0: Not connected	MCI_bOut5_B3/CAN2_bOut1_B3
C00621/66	0: Not connected	MCI_bOut5_B4/CAN2_bOut1_B4
C00621/67	0: Not connected	MCI_bOut5_B5/CAN2_bOut1_B5
C00621/68	0: Not connected	MCI_bOut5_B6/CAN2_bOut1_B6
C00621/69	0: Not connected	MCI_bOut5_B7/CAN2_bOut1_B7
C00621/70	0: Not connected	MCI_bOut5_B8/CAN2_bOut1_B8
C00621/71	0: Not connected	MCI_bOut5_B9/CAN2_bOut1_B9
C00621/72	0: Not connected	MCI_bOut5_B10/CAN2_bOut1_B10

Parameter | Name: **C00621 | Bool system connection**			Data type: UNSIGNED_16 Index: 23954$_d$ = 5D92$_h$
C00621/73	0: Not connected	MCI_bOut5_B11/CAN2_bOut1_B11	
C00621/74	0: Not connected	MCI_bOut5_B12/CAN2_bOut1_B12	
C00621/75	0: Not connected	MCI_bOut5_B13/CAN2_bOut1_B13	
C00621/76	0: Not connected	MCI_bOut5_B14/CAN2_bOut1_B14	
C00621/77	0: Not connected	MCI_bOut5_B15/CAN2_bOut1_B15	
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 1			

C00632

Parameter | Name: **C00632 | L_NSet_1: Max.SkipFrq.**			Data type: INTEGER_16 Index: 23943$_d$ = 5D87$_h$
Maximum limit values for the speed blocking zones • Selection of the maximum limit values for the blocking zones in which the speed must not be constant.			
Setting range (min. value | unit | max. value)			
0.0	%	199.9	
Subcodes	**Lenze setting**	**Information**	
C00632/1	0.0 %	L_NSet_1: Blocking speed1 max	
C00632/2	0.0 %	L_NSet_1: Blocking speed2 max	
C00632/3	0.0 %	L_NSet_1: Blocking speed3 max	
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 100			

C00633

Parameter | Name: **C00633 | L_NSet_1: Min.SkipFrq.**			Data type: INTEGER_16 Index: 23942$_d$ = 5D86$_h$
Minimum limit values for the speed blocking zones • Selection of the minimum limit values for the blocking zones in which the speed must not be constant.			
Setting range (min. value | unit | max. value)			
0.0	%	199.9	
Subcodes	**Lenze setting**	**Information**	
C00633/1	0.0 %	L_NSet_1: Blocking speed1 min	
C00633/2	0.0 %	L_NSet_1: Blocking speed2 min	
C00633/3	0.0 %	L_NSet_1: Blocking speed3 min	
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 100			

C00634

Parameter | Name: **C00634 | L_NSet_1: wState**			Data type: UNSIGNED_16 Index: 23941_d = $5D85_h$
The L_NSet_1 FB: Bit coded status display			
Display area (min. hex value | max. hex value)			
0x0000		0xFFFF	
Value is bit-coded:			**Information**
Bit 0	No blocking zone active		1 ≡ No blocking zone set for constant speeds
Bit 1	Blocking zone 1 active		1 ≡ Suppression of constant speed characteristics within the limits of blocking zone 1
Bit 2	Blocking zone 2 active		1 ≡ Suppression of constant speed characteristics within the limits of blocking zone 2
Bit 3	Blocking zone 3 active		1 ≡ Suppression of constant speed characteristics within the limits of blocking zone 3
Bit 4	Jog in blocking zone		1 ≡ A ramp is used to keep the speed setpoint within a speed blocking zone
Bit 5	MaxLimit active		1 ≡ Speed setpoint is at the maximum speed limit
Bit 6	MinLimit active		1 ≡ Speed setpoint is at the minimum speed limit
Bit 7	Reserved		
Bit 8	Reserved		
Bit 9	Reserved		
Bit 10	Reserved		
Bit 11	Reserved		
Bit 12	Reserved		
Bit 13	Reserved		
Bit 14	Reserved		
Bit 15	Reserved		
☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☑ No transfer ☐ COM ☐ MOT			

C00680

Parameter | Name: **C00680 | L_Compare_1: Fct.**		Data type: UNSIGNED_8 Index: 23895_d = $5D57_h$
The L_Compare_1 FB: Comparison operation • If the statement of the selected comparison operation is true, the binary *bOut* output will be set to TRUE.		
Selection list(Lenze setting printed in bold)		
1	In1 = In2	
2	In1 > In2	
3	In1 < In2	
4	|In1| = |In2|	
5	|In1| > |In2|	
6	**|In1| < |In2|**	
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 1		

C00681

Parameter | Name: **C00681 | L_Compare_1: Hysteresis**			Data type: INTEGER_16 Index: 23894_d = $5D56_h$
The L_Compare_1 FB: Hysteresis for the comparison function selected in C00680			
Setting range (min. value | unit | max. value)			**Lenze setting**
0.0	%	100.0	**0.5 %**
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 100			

C00682

Parameter | Name: **C00682 | L_Compare_1: Window**			Data type: INTEGER_16 Index: 23893_d = $5D55_h$
The L_Compare_1 FB: Window for the comparison function selected in C00680			
Setting range (min. value | unit | max. value)			**Lenze setting**
0.0	%	100.0	**2.0 %**
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 100			

C00700

Parameter | Name: **C00700 | LA_NCtrl: Analog connection list**		Data type: UNSIGNED_16 Index: 23875_d = $5D43_h$
Selection list		
See selection list - analog signals		
Subcodes	**Lenze setting**	**Information**
C00700/1	10: LS_AnalogInput: nIn1_a	LA_NCtrl: nMainSetValue_a
C00700/2	22: LS_ParFree_a: nC472_3_a	LA_NCtrl: nTorqueMotLim_a
C00700/3	22: LS_ParFree_a: nC472_3_a	LA_NCtrl: nTorqueGenLim_a
C00700/4	15: LS_Local: potentiometer P1 (continuous)	Key switch: max speed
C00700/5	6: LS_ParFix: wDriveCtrl	LA_NCtrl: Network(MCI/CAN)_wDriveControl
C00700/6	1: LS_ParFix: nPos100_a(100.0%)	LA_NCtrl: nPIDVpAdapt_a
C00700/7	0: Not connected	LA_NCtrl: nPIDActValue_a
C00700/8	1: LS_ParFix: nPos100_a(100.0%)	LA_NCtrl: nPIDInfluence_a
C00700/9	0: Not connected	LA_NCtrl: nPIDSetValue_a
C00700/10	0: Not connected	LA_NCtrl: nAuxSetValue_a
C00700/11	0: Not connected	L_Counter_1: wLdVal
C00700/12	0: Not connected	L_Counter_1: wCmpVal
C00700/13	0: Not connected	L_Compare_1: nIn1_a
C00700/14	0: Not connected	L_Compare_1: nIn2_a
C00700/15	0: Not connected	LS_ParReadWrite_1: wParIndex
C00700/16	0: Not connected	LS_ParReadWrite_1: wParSubindex
C00700/17	0: Not connected	LS_ParReadWrite_1: wInHWord
C00700/18	0: Not connected	LS_ParReadWrite_1: wInLWord
C00700/19	0: Not connected	LA_NCtrl: nTorqueSetValue_a LA_NCtrl: nTorqueSetValue_a
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 1		

C00701

Parameter | Name: **C00701 | LA_NCtrl: Digital connection list**		Data type: UNSIGNED_16 Index: 23874_d = $5D42_h$
Selection list		
See selection list - digital signals		
Subcodes	**Lenze setting**	**Information**
C00701/1	0: Not connected	LA_NCtrl: bCInh
C00701/2	10: LS_DigitalInput: bCInh	LA_NCtrl: bFailReset
C00701/3	0: Not connected	LA_NCtrl: bSetQuickstop
C00701/4	13: LS_DigitalInput: bIn3	LA_NCtrl: bSetDCBrake
C00701/5	14: LS_DigitalInput: bIn4	LA_NCtrl: bSetSpeedCcw
C00701/6	11: LS_DigitalInput: bIn1	LA_NCtrl: bJogSpeed1
C00701/7	12: LS_DigitalInput: bIn2	LA_NCtrl: bJogSpeed2
C00701/8	0: Not connected	LA_NCtrl: bMPotUp
C00701/9	0: Not connected	LA_NCtrl: bMPotDown
C00701/10	0: Not connected	LA_NCtrl: bMPotInAct
C00701/11	0: Not connected	LA_NCtrl: bMPotEnable
C00701/12	0: Not connected	LA_NCtrl: bRFG_0
C00701/13	0: Not connected	LA_NCtrl: bSetError1
C00701/14	0: Not connected	LA_NCtrl: bSetError2
C00701/15	1: LS_ParFix: bTrue	LA_NCtrl: bPIDInfluenceRamp
C00701/16	0: Not connected	LA_NCtrl: bPIDIOff
C00701/17	1: LS_ParFix: bTrue	LA_NCtrl: bRLQCw
C00701/18	0: Not connected	LA_NCtrl: bRLQCcw
C00701/19	15: LS_DigitalInput: bIn5	LA_NCtrl: bBrkRelease
C00701/20	0: Not connected	L_Counter_1: bClkUp
C00701/21	0: Not connected	L_Counter_1: bClkDown
C00701/22	0: Not connected	L_Counter_1: bLoad
C00701/23	0: Not connected	L_DigitalDelay_1: bIn
C00701/24	0: Not connected	L_DigitalDelay_2: bIn
C00701/25	0: Not connected	LS_WriteParamList: bExecute
C00701/26	0: Not connected	LS_WriteParamList: bSelectWriteValue_1
C00701/27	0: Not connected	L_FreqIn12: bEncCntReset
C00701/28	0: Not connected	L_DigitalLogic_1: bIn1
C00701/29	0: Not connected	L_DigitalLogic_1: bIn2
C00701/30	0: Not connected	L_DigitalLogic_2: bIn1
C00701/31	0: Not connected	L_DigitalLogic_2: bIn2
C00701/32	0: Not connected	LS_ParReadWrite_1: bExecute
C00701/33	0: Not connected	LS_ParReadWrite_1: bReadWrite
C00701/34	0: Not connected	LA_NCtrl: bPIDInAct
C00701/35	0: Not connected	LA_NCtrl: bPIDOff
C00701/36	0: Not connected	LA_NCtrl: bTorquemodeOn LA_NCtrl: bTorquemodeOn
C00701/37	0: Not connected	LA_NCtrl: bTi1 From version 10.00.00
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 1		

C00720

Parameter | Name: **C00720 | L_DigitalDelay_1: Delay**			Data type: UNSIGNED_32 Index: 23855_d = $5D2F_h$
Switch-on/off delay time			
Setting range **(min. value | unit | max. value)**			
0.0	s	3600.0	
Subcodes	**Lenze setting**	**Information**	
C00720/1	0.0 s	L_DigitalDelay_1: ON delay	
C00720/2	0.0 s	L_DigitalDelay_1: OFF delay	
☑ Read access ☑ Write access ® CINH ® PLC STOP ® No transfer ® COM ® MOT Scaling factor: 1000			

C00721

Parameter | Name: **C00721 | L_DigitalDelay_2: Delay**			Data type: UNSIGNED_32 Index: 23854_d = $5D2E_h$
Setting range **(min. value | unit | max. value)**			
0.0	s	3600.0	
Subcodes	**Lenze setting**	**Information**	
C00721/1	0.0 s	L_DigitalDelay_2: ON delay	
C00721/2	0.0 s	L_DigitalDelay_2: OFF delay	
☑ Read access ☑ Write access ® CINH ® PLC STOP ® No transfer ® COM ® MOT Scaling factor: 1000			

C00725

Parameter | Name: **C00725 | Current switching frequency**		Data type: UNSIGNED_8 Index: 23850_d = $5D2A_h$
Display of the current switching frequency • When a variable switching frequency is selected in C00018, the switching frequency may change as a function of the load and rotational frequency.		
Selection list **(read only)**		
0	2 kHz	
1	4 kHz	
2	8 kHz	
3	16 kHz	
☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☑ No transfer ☐ COM ☐ MOT Scaling factor: 1		

C00729

Parameter | Name: **C00729 | Keypad/PC: Speed setpoint**	Data type: INTEGER_16 Index: 23846_d = $5D26_h$
This code is used device-internally and must not be written by the user side!	

C00761

Parameter | Name: **C00761 | L_JogCtrlExtension_1: Digital connection list**		Data type: UNSIGNED_16 Index: 23814$_d$ = 5D06$_h$
From version 05.00.00 Connection parameters for FB L_JogCtrlExtension_1 • Selection of the binary output signals to be connected to the binary input signals • The selection list contains all binary output signals which can be assigned to the binary inputs of the FB mapped by the subcodes.		
Selection list		
See selection list - digital signals		
Subcodes	**Lenze setting**	**Information**
C00761/1	0: Not connected	L_JogCtrlExtension_1: bInputSel1
C00761/2	0: Not connected	L_JogCtrlExtension_1: bInputSel2
C00761/3	0: Not connected	L_JogCtrlExtension_1: bSlowDown1
C00761/4	0: Not connected	L_JogCtrlExtension_1: bStop1
C00761/5	0: Not connected	L_JogCtrlExtension_1: bSlowDown2
C00761/6	0: Not connected	L_JogCtrlExtension_1: blStop2
C00761/7	0: Not connected	L_JogCtrlExtension_1: bSlowDown3
C00761/8	0: Not connected	L_JogCtrlExtension_1: bStop3
C00761/9	0: Not connected	L_JogCtrlExtension_1: bRfgIn
C00761/10	0: Not connected	L_JogCtrlExtension_1: bJog1
C00761/11	0: Not connected	L_JogCtrlExtension_1: bJog2
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 1		

C00800

Parameter | Name: **C00800 | L_MPot_1: Upper limit**			Data type: INTEGER_16 Index: 23775$_d$ = 5CDF$_h$
The L_MPot_1 FB: Upper limit of the motor potentiometer function			
Setting range **(min. value | unit | max. value)**			**Lenze setting**
-199.9	%	199.9	**100.0 %**
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 100			

C00801

Parameter | Name: **C00801 | L_MPot_1: Lower limit**			Data type: INTEGER_16 Index: 23774$_d$ = 5CDE$_h$
The L_MPot_1 FB: Lower limit of the motor potentiometer function			
Setting range **(min. value | unit | max. value)**			**Lenze setting**
-199.9	%	199.9	**-100.0 %**
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 100			

C00802

Parameter | Name: **C00802 | L_MPot_1: Acceleration time**			Data type: UNSIGNED_16 Index: 23773$_d$ = 5CDD$_h$
The L_MPot_1 FB: Acceleration time of the motor potentiometer function			
Setting range **(min. value | unit | max. value)**			**Lenze setting**
0.1	s	999.9	**10.0 s**
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 10			

C00803

Parameter | Name: **C00803 | L_MPot_1: Deceleration time**			Data type: UNSIGNED_16 Index: 23772_d = $5CDC_h$
The L_MPot_1 FB: Deceleration time of the motor potentiometer function			
Setting range (min. value | unit | max. value)			**Lenze setting**
0.1	s	999.9	**10.0 s**
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 10			

C00804

Parameter | Name: **C00804 | L_MPot_1: Inactive fct.**		Data type: UNSIGNED_8 Index: 23771_d = $5CDB_h$
The L_MPot_1 FB: Selection of the response if the motor potentiometer is deactivated via input *bInAct*		
Selection list(Lenze setting printed in bold)		**Information**
0	**Retain value**	Keep output value
1	Deceleration to 0	Deceleration via ramp to 0
2	Deceleration to lower limit	Deceleration via ramp to the lower limit (C00801)
3	Without ramp to 0	Step change to 0
4	Without ramp to lower limit	Jump to lower limit (C00800)
5	Acceleration to upper limit	Acceleration via ramp to upper limit (C00800)
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 1		

C00805

Parameter | Name: **C00805 | L_MPot_1: Init fct.**		Data type: UNSIGNED_8 Index: 23770_d = $5CDA_h$
The L_MPot_1 FB: Selection of the response at device switch-on		
Selection list(Lenze setting printed in bold)		
0	**Load last value**	
1	Load lower limit	
2	Load 0	
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 1		

C00806

Parameter | Name: **C00806 | L_MPot_1: Use**		Data type: UNSIGNED_8 Index: 23769_d = $5CD9_h$
The L_MPot_1 FB: Use of the motor potentiometer		
Selection list(Lenze setting printed in bold)		**Information**
0	**No**	The motor potentiometer is not used. • The analog value applied to the *nIn_a* input is looped through without any changes to the *nOut_a* output.
1	Yes	The motor potentiometer is used. • The analog value applied at the *nIn_a* input is led via the motor potentiometer and provided at the *nOut_a* output.
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 1		

C00820

Parameter | Name:
C00820 | L_DigitalLogic_1: Function

Data type: UNSIGNED_8
Index: $23755_d = 5CCB_h$

From version 02.00.00
The L_DigitalLogic_1 FB: Selection of the internal logic function

Selection list(Lenze setting printed in bold)		**Information**
0	**bOut = 0**	Constant value "FALSE"
1	bOut = 1	Constant value "TRUE"
2	bOut = bIn1 AND bIn2	AND operation
3	bOut = bIn1 OR bIn2	OR operation
4	bOut = f (truth table)	The truth table parameterised in C00821 is used.

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

C00821

Parameter | Name:
C00821 | L_DigitalLogic_1: Truth table

Data type: UNSIGNED_8
Index: $23754_d = 5CCA_h$

From version 02.00.00
The L_DigitalLogic_1 FB: Parameterisation of the truth table

Selection list		
0	False	
1	True	
Subcodes	**Lenze setting**	**Information**
C00821/1	0: FALSE	bIn1=0/bIn2=0
C00821/2	0: FALSE	bIn1=1/bIn2=0
C00821/3	0: FALSE	bIn1=0/bIn2=1
C00821/4	0: FALSE	bIn1=1/bIn2=1

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

C00822

Parameter | Name:
C00822 | L_DigitalLogic_2: Function

Data type: UNSIGNED_8
Index: $23753_d = 5CC9_h$

From version 04.00.00
The L_DigitalLogic_2 FB: Selection of the internal logic function

Selection list(Lenze setting printed in bold)		**Information**
0	**bOut = 0**	Constant value "FALSE"
1	bOut = 1	Constant value "TRUE"
2	bOut = bIn1 AND ... bIn3	AND operation
3	bOut = bIn1 OR ... bIn3	OR operation
4	bOut = f (truth table)	The truth table parameterised in C00823 is used.

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

C00823

Parameter | Name: **C00823 | L_DigitalLogic_2: Truth table**		Data type: UNSIGNED_8 Index: 23752_d = $5CC8_h$
From version 04.00.00 The L_DigitalLogic_2 FB: Parameterisation of the truth table		
Selection list		
0	False	
1	True	
Subcodes	**Lenze setting**	**Information**
C00823/1	0: FALSE	bIn1=0/bIn2=0
C00823/2	0: FALSE	bIn1=1/bIn2=0
C00823/3	0: FALSE	bIn1=0/bIn2=1
C00823/4	0: FALSE	bIn1=1/bIn2=1
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 1		

C00830

Parameter | Name: **C00830 | 16-bit analogue input**			Data type: INTEGER_16 Index: 23745_d = $5CC1_h$
Display in percent of 16-bit input values of different blocks			
Display range (min. value | unit | max. value)			
-199.9	%	199.9	
Subcodes			**Information**
C00830/1			L_NSet_1: nNSet_a
C00830/2			L_NSet_1: nOut_a
C00830/3			LS_MCTRL: nSpeedSetValue_a
C00830/4			LS_MCTRL: nTorqueMotLimit_a
C00830/5			LS_MCTRL: nTorqueGenLimit_a
C00830/6			L_PCTRL_1: nAct_a
C00830/7			L_PCTRL_1: nAdapt_a
C00830/8			L_PCTRL_1: nSet_a
C00830/9			L_PCTRL_1: nInflu_a
C00830/10			L_PCTRL_1: nNSet_a
C00830/11			L_MPot_1: nIn_a
C00830/12			LA_NCtrl: nAuxSpdValue_a
C00830/13			L_Compare_1: nIn1_a
C00830/14			L_Compare_1: nIn2_a
C00830/15			LA_NCtrl: nTorqueSetValue_a
C00830/16			LA_NCtrl: nSpeedLowLimit_a
C00830/17			LA_NCtrl: nSpeedHighLimit_a
☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☑ No transfer ☐ COM ☐ MOT Scaling factor: 100			

C00831

Parameter | Name: **C00831 | 16-bit common input**	Data type: UNSIGNED_16 Index: 23744_d = $5CC0_h$
Decimal/hexadecimal/bit coded display of 16 bit input values of various blocks	

<table>
<tr><td colspan="3">Parameter | Name:
C00831 | 16-bit common input</td><td>Data type: UNSIGNED_16
Index: 23744_d = 5CC0$_h$</td></tr>
<tr><td colspan="3">Display area (min. hex value | max. hex value)</td><td></td></tr>
<tr><td>0x0000</td><td></td><td>0xFFFF</td><td></td></tr>
<tr><td colspan="3">Value is bit-coded:</td><td></td></tr>
<tr><td>Bit 0</td><td colspan="2">Bit0</td><td></td></tr>
<tr><td>...</td><td colspan="2">...</td><td></td></tr>
<tr><td>Bit 15</td><td colspan="2">Bit15</td><td></td></tr>
<tr><td colspan="3">Subcodes</td><td>Information</td></tr>
<tr><td colspan="3">C00831/1</td><td>LS_DCTRL: wCANControl</td></tr>
<tr><td colspan="3">C00831/2</td><td>L_Counter_1: wLdVal</td></tr>
<tr><td colspan="3">C00831/3</td><td>L_Counter_1: wCmpVal</td></tr>
<tr><td colspan="4">☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☑ No transfer ☐ COM ☐ MOT</td></tr>
</table>

C00833

<table>
<tr><td colspan="2">Parameter | Name:
C00833 | 8-bit input</td><td>Data type: UNSIGNED_8
Index: 23742_d = 5CBE$_h$</td></tr>
<tr><td colspan="3">Display of the signal status of the binary inputs of different blocks</td></tr>
<tr><td colspan="2">Selection list</td><td></td></tr>
<tr><td>0</td><td>False</td><td></td></tr>
<tr><td>1</td><td>True</td><td></td></tr>
<tr><td colspan="2">Subcodes</td><td>Information</td></tr>
<tr><td colspan="2">C00833/1</td><td>L_NSet_1: bRfg0</td></tr>
<tr><td colspan="2">C00833/2</td><td>L_NSet_1: bNSetInv</td></tr>
<tr><td colspan="2">C00833/3</td><td>L_NSet_1: bJog1</td></tr>
<tr><td colspan="2">C00833/4</td><td>L_NSet_1: bJog2</td></tr>
<tr><td colspan="2">C00833/5</td><td>LS_SetError_1: bSetError1</td></tr>
<tr><td colspan="2">C00833/6</td><td>LS_SetError_1: bSetError2</td></tr>
<tr><td colspan="2">C00833/7</td><td>L_MPot_1: bUp</td></tr>
<tr><td colspan="2">C00833/8</td><td>L_MPot_1: bInAct</td></tr>
<tr><td colspan="2">C00833/9</td><td>L_MPot_1: bDown</td></tr>
<tr><td colspan="2">C00833/10</td><td>L_MPot_1: bEnable</td></tr>
<tr><td colspan="2">C00833/11</td><td>L_PCTRL_1: bInAct</td></tr>
<tr><td colspan="2">C00833/12</td><td>L_PCTRL_1: bIOff</td></tr>
<tr><td colspan="2">C00833/13</td><td>L_PCTRL_1: bEnableInfluenceRamp</td></tr>
<tr><td colspan="2">C00833/14</td><td>LS_DCTRL: bCINH</td></tr>
<tr><td colspan="2">C00833/15</td><td>LS_DCTRL: bFailReset</td></tr>
<tr><td colspan="2">C00833/16</td><td>LS_DCTRL: bStatus_B0</td></tr>
<tr><td colspan="2">C00833/17</td><td>LS_DCTRL: bStatus_B2</td></tr>
<tr><td colspan="2">C00833/18</td><td>LS_DCTRL: bStatus_B3</td></tr>
<tr><td colspan="2">C00833/19</td><td>LS_DCTRL: bStatus_B4</td></tr>
<tr><td colspan="2">C00833/20</td><td>LS_DCTRL: bStatus_B5</td></tr>
<tr><td colspan="2">C00833/21</td><td>LS_DCTRL: bStatus_B14</td></tr>
<tr><td colspan="2">C00833/22</td><td>LS_DCTRL: bStatus_B15</td></tr>
<tr><td colspan="2">C00833/23</td><td>L_RLQ_1: bCw</td></tr>
<tr><td colspan="2">C00833/24</td><td>L_RLQ_1: bCcw</td></tr>
</table>

Parameter | Name: **C00833 | 8-bit input**	Data type: UNSIGNED_8 Index: 23742_d = $5CBE_h$
C00833/25	MCK: bBrkRelease
C00833/26	L_Counter_1: bClkUp
C00833/27	L_Counter_1: bClkDown
C00833/28	L_Counter_1: bLoad
C00833/29	L_DigitalDelay_1: bIn
C00833/30	L_DigitalDelay_2: bIn
C00833/31	LS_WriteParamList: bExecute
C00833/32	LS_WriteParamList: bSelectWriteValue
C00833/33	L_DigitalLogic_1: bIn1
C00833/34	L_DigitalLogic_1: bIn2
C00833/35	L_NSet_1: bSetQuickStop
C00833/36	L_DigitalLogic_2: bIn1
C00833/37	L_DigitalLogic_2: bIn2
C00833/38	LS_ParReadWrite_1: bExecute
C00833/39	LS_ParReadWrite_1: bReadWrite
C00833/40	L_FreqIn12: bEncCntReset
C00833/41	L_PCTRL_1: bPIDOff
C00833/42	L_JogCtrlExtension_1: bInputSel1
C00833/43	L_JogCtrlExtension_1: bInputSel2
C00833/44	L_JogCtrlExtension_1: bSlowDown1
C00833/45	L_JogCtrlExtension_1: bStop1
C00833/46	L_JogCtrlExtension_1: bSlowDown2
C00833/47	L_JogCtrlExtension_1: bStop2
C00833/48	L_JogCtrlExtension_1: bSlowDown3
C00833/49	L_JogCtrlExtension_1: bStop3
C00833/50	L_JogCtrlExtension_1: bRfgIn
C00833/51	L_JogCtrlExtension_1: bJog1
C00833/52	L_JogCtrlExtension_1: bJog2
C00833/53	LA_NCtrl: bTorquemodeOn
C00833/54	LA_NCtrl: bTi1
☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☑ No transfer ☐ COM ☐ MOT Scaling factor: 1	

C00876

Parameter | Name:
C00876 | Network MCI/CAN input words

Data type: UNSIGNED_16
Index: $23699_d = 5C93_h$

Display of the 16-bit input values of the MCI/CAN interface

▶ Communication

Display area (min. hex value | max. hex value)		
0x0000		0xFFFF

Value is bit-coded:	
Bit 0	Bit0
...	...
Bit 15	Bit15

Subcodes	Information
C00876/1	MCI_wCtrl/CAN1_wCtrl
C00876/2	MCI_wIn2/CAN1_wIn2
C00876/3	MCI_wIn3/CAN1_wIn3
C00876/4	MCI_wIn4/CAN1_wIn4
C00876/5	MCI_wIn5/CAN2_wIn1
C00876/6	MCI_wIn6/CAN2_wIn2
C00876/7	MCI_wIn7/CAN2_wIn3
C00876/8	MCI_wIn8/CAN2_wIn4

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

C00877

Parameter | Name:
C00877 | Network MCI/AN output words

Data type: UNSIGNED_16
Index: $23698_d = 5C92_h$

Display of the 16-bit output values of the MCI/CAN interface

▶ Communication

Display area (min. hex value | max. hex value)		
0x0000		0xFFFF

Value is bit-coded:	
Bit 0	Bit0
...	...
Bit 15	Bit15

Subcodes	Information
C00877/1	MCI_wState/CAN1_wState
C00877/2	MCI_wOut2/CAN1_wOut2
C00877/3	MCI_wOut3/CAN1_wOut3
C00877/4	MCI_wOut4/CAN1_wOut4
C00877/5	MCI_wOut5/CAN2_wOut1
C00877/6	MCI_wOut6/CAN2_wOut2
C00877/7	MCI_wOut7/CAN2_wOut3
C00877/8	MCI_wOut8/CAN2_wOut4

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

C00890

Parameter | Name: **C00890 | LP_Network_InOut: Inversion**			Data type: UNSIGNED_16 Index: 23685$_d$ = 5C85$_h$
From version 04.00.00 This parameter serves to invert the control/status bits of the MCI port blocks.			
Setting range (min. hex value | max. hex value)			
0x0000		0xFFFF	
Value is bit-coded:			**Information**
Bit 0	Active		Bit set = inversion active
...	...		
Bit 15	Active		
Subcodes	**Lenze setting**		**Information**
C00890/1	0x0000		LP_Network_In: Invert.Ctrl_B0..15
C00890/2	0x0000		LP_Network_Out: Invert.State_B0..15
C00890/3	0x0000		LP_Network_In: Invert. In2_B0..15
C00890/4	0x0000		LP_Network_Out: Invert.Out2_B0..15
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT			

C00909

Parameter | Name: **C00909 | Speed limitation**			Data type: INTEGER_16 Index: 23666$_d$ = 5C72$_h$
Max. positive/negative speed for all motor control modes			
Setting range (min. value | unit | max. value)			
0.0	%	175.0	
Subcodes	**Lenze setting**		**Information**
C00909/1	120.0 %		Max. pos. speed
C00909/2	120.0 %		Max. neg. speed
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☑ MOT Scaling factor: 100			

C00910

Parameter | Name: **C00910 | Frequency limitation**			Data type: UNSIGNED_16 Index: 23665$_d$ = 5C71$_h$
Max. positive/negative output frequency for all motor control modes			
Setting range (min. value | unit | max. value)			
0	Hz	300	
Subcodes	**Lenze setting**		**Information**
C00910/1	300 Hz		Max. pos. output frequency
C00910/2	300 Hz		Max. neg. output frequency
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☑ MOT Scaling factor: 1			

C00920

Parameter | Name: **C00920 | Rated device currents**			Data type: UNSIGNED_16 Index: 23655_d = $5C67_h$
From version 09.00.00 onwards In online operation, the rated device currents for the rated power and the increased rated power with different mains voltages is shown. • The display "0A" indicates that this application case is not supported by the device.			
Display range **(min. value | unit | max. value)**			
0.0	A	6000.0	
Subcodes			**Information**
C00920/1			Rated current 3ph 400V
C00920/2			Rated current 3ph 440V
C00920/3			Rated current 3ph 480V
C00920/4			Rated current 3ph 500V
C00920/5			Increased rated current 3ph 400V
C00920/6			Increased rated current 3ph 440V
C00920/7			Increased rated curent 3ph 480V
C00920/8			Increased rated current 3ph 500V
☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☑ No transfer ☐ COM ☑ MOT Scaling factor: 10			

C00936

Parameter | Name: **C00936 | SLPSM: Speed controller load value**			Data type: UNSIGNED_16 Index: 23639_d = $5C57_h$
From version 11.01.00			
Setting range **(min. value | unit | max. value)**			
0.00	%	200.00	
Subcodes	**Lenze setting**		**Information**
C00936/1	0.00 %		SLPSM: Speed controller load value
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☑ MOT Scaling factor: 100			

C00937

Parameter | Name: **C00937 | Field-oriented motor currents**			Data type: INTEGER_16 Index: 23638_d = $5C56_h$
From version 04.00.00 ▶ Field weakening for synchronous motors			
Display range **(min. value | unit | max. value)**			
0.00	A	320.00	
Subcodes			**Information**
C00937/1			Field-producing current
☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 100			

C00938

Parameter | Name: **C00938 | PSM: Maximum motor current field weakening**			Data type: UNSIGNED_16 Index: 23637$_d$ = 5C55$_h$
From version 04.00.00 ▸ Field weakening for synchronous motors			
Setting range (min. value | unit | max. value)			**Lenze setting**
0.00	%	500.00	**30.00 %**
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☑ MOT Scaling factor: 100			

C00939

Parameter | Name: **C00939 | Ultimate motor current**			Data type: UNSIGNED_16 Index: 23636$_d$ = 5C54$_h$
From version 03.00.00			
Setting range (min. value | unit | max. value)			**Lenze setting**
0.0	A	3000.0	**3000.0 A**
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☑ MOT Scaling factor: 10			

C00965

Parameter | Name: **C00965 | Max. motor speed**			Data type: UNSIGNED_16 Index: 23610$_d$ = 5C3A$_h$
From version 04.00.00 When the drive reaches the motor speed set here: • The "Fault" error response takes place, i.e. the motor is shut down immediately. • The error message "oS2: Max. motor speed reached" is entered into the logbook.			
Setting range (min. value | unit | max. value)			**Lenze setting**
50	rpm	32500	**9999 rpm**
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☑ MOT Scaling factor: 1			

C00970

Parameter | Name: **C00970 | Rated device voltage**			Data type: UNSIGNED_16 Index: 23605$_d$ = 5C35$_h$
From version 09.00.00 onwards Display of the rated device voltage 3ph / 400 V or 1ph / 230 V			
Display range (min. value | unit | max. value)			
0	V	1000	
Subcodes			**Information**
C00970/1			Rated device voltage
☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☑ No transfer ☐ COM ☐ MOT Scaling factor: 1			

C00971

Parameter | Name: **C00971 | VFC: Limitation V/f +encoder**			Data type: UNSIGNED_16 Index: $23604_d = 5C34_h$
From version 02.00.00 Limitation of the output frequency of the slip regulator and limitation of the injected stator frequency for the V/f control (VFCplus+encoder)			
Setting range **(min. value | unit | max. value)**			
0.00	Hz	100.00	
Subcodes	**Lenze setting**		**Information**
C00971/1	10.00 Hz		Maximum output / correcting variable of the slip regulator • The slip regulator output is limited to the value set here in motor/generator mode. • We recommend defining a limit value of one or two times the motor slip frequency.
C00971/2	100.00 Hz		Maximum frequency deviation between the rotational frequency (speed) measured mechanically by the encoder and the injected stator frequency. • A limitation may e.g. avoid overcurrent interruption when traversing to a fixed limit stop.
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☑ MOT Scaling factor: 100			

C00972

Parameter | Name: **C00972 | VFC: Vp V/f +encoder**			Data type: UNSIGNED_16 Index: $23603_d = 5C33_h$
From version 02.00.00 Proportional gain of the slip regulator for V/f control (VFCplus+encoder) • The gain must be selected depending on the drive system and the sensor resolution (range: 0.005 ... 5). • A high gain requires a high number of increments.			
Setting range **(min. value | unit | max. value)**			**Lenze setting**
0.000	Hz/Hz	64.000	**0.100 Hz/Hz**
☑ Read access ☑ Write access ® CINH ® PLC STOP ® No transfer ® COM ® MOT Scaling factor: 1000			

C00973

Parameter | Name: **C00973 | VFC: Ti V/f +encoder**			Data type: UNSIGNED_16 Index: $23602_d = 5C32_h$
From version 02.00.00 Integral time constant of the slip regulator for V/f control (VFCplus+encoder) • In general, the time constant should be selected in a range of 20 ms (high dynamics) to 200 (low dynamics).			
Setting range **(min. value | unit | max. value)**			**Lenze setting**
0.0	ms	6000.0	**100.0 ms**
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☑ MOT Scaling factor: 10			

C00975

Parameter | Name: **C00975 | VFC-ECO: Vp**			Data type: UNSIGNED_16 Index: $23600_d = 5C30_h$
Proportional gain of the Cos-Phi controller for energy-saving V/f characteristic control (VFCplusEco)			
Setting range **(min. value | unit | max. value)**			**Lenze setting**
0.000	Hz/Hz	64.000	**0.500 Hz/Hz**
☑ Read access ☑ Write access ® CINH ® PLC STOP ® No transfer ® COM ® MOT Scaling factor: 1000			

C00976

Parameter | Name: **C00976 | VFC-ECO: Ti**			Data type: UNSIGNED_16 Index: 23599_d = $5C2F_h$
Reset time of the Cos-Phi controller for energy-saving V/f characteristic control (VFCplusEco)			
Setting range **(min. value | unit | max. value)**			**Lenze setting**
0.0	ms	6000.0	**200.0 ms**
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☑ MOT Scaling factor: 10			

C00977

Parameter | Name: **C00977 | VFC-ECO: Minimum voltage V/f**			Data type: UNSIGNED_8 Index: 23598_d = $5C2E_h$
Minimum voltage V/f of the Cos-Phi controller for energy-saving V/f characteristic control (VFCplusEco)			
Setting range **(min. value | unit | max. value)**			**Lenze setting**
20	%	100	**20 %**
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☑ MOT Scaling factor: 1			

C00978

Parameter | Name: **C00978 | VFC-ECO: Motor voltage sub**			Data type: INTEGER_16 Index: 23597_d = $5C2D_h$
Display of the voltage reduction with energy-saving V/f characteristic control (VFCplusEco)			
Display range **(min. value | unit | max. value)**			
-1000	V	1000	
☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 1			

C00979

Parameter | Name: **C00979 | Cosine phi**			Data type: INTEGER_16 Index: 23596_d = $5C2C_h$
Display of the cosφ setpoint and actual value with energy-saving V/f characteristic control (VFCplusEco)			
Display range **(min. value | unit | max. value)**			
-1.00		1.00	
Subcodes			**Information**
C00979/1			Cosine phi act
C00979/2			Cosine phi set
☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 100			

C00980

Parameter | Name: **C00980 | Performance indication**			Data type: INTEGER_16 Index: 23595$_d$ = 5C2B$_h$
From version 09.00.00 onwards Display parameter for an energy analysis in the prevailing application. From this, decisions can be deduced whether a measure for energy optimisation is economic.			
Display range **(min. value | unit | max. value)**			
-32.000	kW	32.000	
Subcodes			**Information**
C00980/1			Active output power
C00980/2			Apparent output power Display of the rated power at a 3ph / 400V or 1ph / 230V mains voltage
C00980/3			Rated device power
C00980/4			Input power
☑ Read access ☐ Write access ® CINH ® PLC STOP ® No transfer ® COM ® MOT Scaling factor: 1000			

C00981

Parameter | Name: **C00981 | Energy display**			Data type: INTEGER_32 Index: 23594$_d$ = 5C2A$_h$
Display parameter for an energy analysis in the prevailing application. From this, decisions can be deduced whether a measure for energy optimisation is economic. • The values are saved to the device by switching off the mains and cannot be reset.			
Display range **(min. value | unit | max. value)**			
0.00	kWh	21474836.47	
Subcodes			**Information**
C00981/1			Output energy in motor mode
C00981/2			Output energy in generator mode
☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 100			

C00982

Parameter | Name: **C00982 | VFC-ECO: Minimum voltage V/f ramp**			Data type: UNSIGNED_8 Index: 23593$_d$ = 5C29$_h$
Voltage ramp for cancelling V-Sub with energy-saving V/f characteristic control (VFCplusEco)			
Setting range **(min. value | unit | max. value)**			**Lenze setting**
0.1	s	5.0	**0.5 s**
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☑ MOT Scaling factor: 10			

C00984

Parameter | Name: **C00984 | Motor flux Add**			Data type: INTEGER_16 Index: 23591$_d$ = 5C27$_h$
From version 02.00.00			
Setting range **(min. value | unit | max. value)**			**Lenze setting**
0.0	%	199.9	**20.0 %**
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☑ MOT Scaling factor: 100			

C00985

<table>
<tr><td colspan="3">Parameter | Name:
C00985 | SLVC: Gain of field current controller</td><td>Data type: INTEGER_16
Index: 23590$_d$ = 5C26$_h$</td></tr>
<tr><td colspan="4">From version 06.01.00
Gain of the direct-axis current difference (Id) between setpoint and actual current for the voltage model of the sensorless vector control (SLVC)
• The gain should be selected within the range 0 ...1 %.</td></tr>
<tr><td colspan="3">Setting range (min. value | unit | max. value)</td><td>Lenze setting</td></tr>
<tr><td>0.00</td><td>%</td><td>20.00</td><td>0.20 %</td></tr>
<tr><td colspan="4">☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☑ MOT Scaling factor: 100</td></tr>
</table>

C00986

<table>
<tr><td colspan="3">Parameter | Name:
C00986 | SLVC: Gain of cross current controller</td><td>Data type: INTEGER_16
Index: 23589$_d$ = 5C25$_h$</td></tr>
<tr><td colspan="4">From version 06.01.00
Gain of the IQ difference for the voltage model of the sensorless vector control (SLVC)</td></tr>
<tr><td colspan="3">Setting range (min. value | unit | max. value)</td><td>Lenze setting</td></tr>
<tr><td>0.00</td><td>%</td><td>20.00</td><td>5.00 %</td></tr>
<tr><td colspan="4">☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☑ MOT Scaling factor: 100</td></tr>
</table>

C00987

<table>
<tr><td colspan="3">Parameter | Name:
C00987 | Inverter motor brake: nAdd</td><td>Data type: INTEGER_16
Index: 23588$_d$ = 5C24$_h$</td></tr>
<tr><td colspan="4">From version 02.00.00
Speed lift which is connected in pulses to the brake ramp when the motor is braked.
▸ Inverter motor brake</td></tr>
<tr><td colspan="3">Setting range (min. value | unit | max. value)</td><td>Lenze setting</td></tr>
<tr><td>0</td><td>rpm</td><td>1000</td><td>80 rpm</td></tr>
<tr><td colspan="4">☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☑ MOT Scaling factor: 1</td></tr>
</table>

C00990

<table>
<tr><td colspan="2">Parameter | Name:
C00990 | Flying restart fct.: Activation</td><td>Data type: UNSIGNED_8
Index: 23585$_d$ = 5C21$_h$</td></tr>
<tr><td colspan="3">Switch on/activate flying restart circuit for non-feedback drive systems
▸ Flying restart fct.</td></tr>
<tr><td colspan="2">Selection list(Lenze setting printed in bold)</td><td></td></tr>
<tr><td>0</td><td>Off</td><td></td></tr>
<tr><td>1</td><td>On</td><td></td></tr>
<tr><td colspan="3">☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☑ MOT Scaling factor: 1</td></tr>
</table>

C00991

Parameter | Name:
C00991 | Flying restart fct.: Process
Data type: UNSIGNED_16
Index: 23584$_d$ = 5C20$_h$

Selection of the speed search range for the flying restart function

▶ Flying restart fct.

Selection list(Lenze setting printed in bold)	
5	**-n...+n | Last output frequency**
6	-n...+n | Actual setpoint frequency

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

C00992

Parameter | Name:
C00992 | Flying restart fct.: Start frequency
Data type: INTEGER_16
Index: 23583$_d$ = 5C1F$_h$

Manual selection of the starting value for the flying restart function

- Only active if C00991 = 4 (cannot be selected yet for 8400 motec)

▶ Flying restart fct.

Setting range (min. value | unit | max. value)			**Lenze setting**
-200	Hz	200	**10 Hz**

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

C00994

Parameter | Name:
C00994 | Flying restart fct.: Current
Data type: INTEGER_16
Index: 23581$_d$ = 5C1D$_h$

Current to be injected during the flying restart process

- 100 % ≡ rated motor current (C00088).
- The flying restart current should amount to 10 ... 25 % of the rated motor current.

▶ Flying restart fct.

Setting range (min. value | unit | max. value)			**Lenze setting**
0.0	%	100.0	**25.0 %**

☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☑ MOT Scaling factor: 100

C00995

Parameter | Name:
C00995 | SLPSM: Controlled current setpoint
Data type: UNSIGNED_16
Index: 23580$_d$ = 5C1C$_h$

From version 03.00.00

▶ Sensorless control for synchronous motors (SLPSM)

Setting range (min. value | unit | max. value)		
5.00	%	400.00

Subcodes	**Lenze setting**	**Information**
C00995/1	100.00 %	SLPSM: Controlled accelerating current
C00995/2	20.00 %	SLPSM: Controlled standstill current

☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☑ MOT Scaling factor: 100

C00996

Parameter | Name: **C00996 | SLPSM: Switching speed**			Data type: INTEGER_16 Index: 23579$_d$ = 5C1B$_h$
From version 03.00.00			▸ Sensorless control for synchronous motors (SLPSM)
Setting range (min. value | unit | max. value)			
0.00	%	100.00	
Subcodes	**Lenze setting**		**Information**
C00996/1	13.00 %		SLPSM: Switching speed, closed-loop control
C00996/2	8.00 %		SLPSM: Switching speed, open-loop control
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☑ MOT Scaling factor: 100			

C00997

Parameter | Name: **C00997 | SLPSM: Filter cutoff frequency**			Data type: INTEGER_16 Index: 23578$_d$ = 5C1A$_h$
From version 03.00.00			▸ Sensorless control for synchronous motors (SLPSM)
Setting range (min. value | unit | max. value)			**Lenze setting**
0.00	%	100.00	**5.00 %**
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☑ MOT Scaling factor: 100			

C00998

Parameter | Name: **C00998 | SLPSM: Filter time rotor position**			Data type: INTEGER_16 Index: 23577$_d$ = 5C19$_h$
From version 03.00.00			▸ Sensorless control for synchronous motors (SLPSM)
Setting range (min. value | unit | max. value)			
0.5	ms	20.0	
Subcodes	**Lenze setting**		**Information**
C00998/1	3.0 ms		SLPSM: Filter time rotor position
C00998/2	5.0 ms		SLPSM: Filter time actual speed value
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☑ MOT Scaling factor: 10			

C00999

Parameter | Name: **C00999 | SLPSM: PLL gain**			Data type: INTEGER_16 Index: 23576$_d$ = 5C18$_h$
From version 03.00.00			▸ Sensorless control for synchronous motors (SLPSM)
Setting range (min. value | unit | max. value)			**Lenze setting**
0	%	1000	**50 %**
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☑ MOT Scaling factor: 1			

C01000

Parameter | Name: **C01000 | MCTRL: Status**		Data type: UNSIGNED_16 Index: 23575_d = $5C17_h$
From version 03.00.00		
Display area (min. hex value | max. hex value)		
0x0000		0xFFFF
Value is bit-coded:		
Bit 0	SL PSM: Mode	
Bit 1	Reserved	
Bit 2	Reserved	
Bit 3	Reserved	
Bit 4	Reserved	
Bit 5	Reserved	
Bit 6	Reserved	
Bit 7	Reserved	
Bit 8	Reserved	
Bit 9	Reserved	
Bit 10	Reserved	
Bit 11	Reserved	
Bit 12	C type Fire Mode	
Bit 13	C type AC3x230V	
Bit 14	C type materials handling technology	
Bit 15	C type ext. controller supply	
☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT		

C01004

Parameter | Name: **C01004 | Load Lenze setting without C002/1**		Data type: UNSIGNED_16 Index: 23571$_d$ = 5C13$_h$
From version 10.00.00		
Setting range **(min. hex value | max. hex value)**		
0x0000		0xFFFF
Value is bit-coded:		**Information**
Bit 0	Communication module	1 ≡ "Load Lenze setting without C00002/1"
Bit 1	Reserved	
Bit 2	Reserved	
Bit 3	Reserved	
Bit 4	Reserved	
Bit 5	Reserved	
Bit 6	Reserved	
Bit 7	Reserved	
Bit 8	Reserved	
Bit 9	Reserved	
Bit 10	Reserved	
Bit 11	Reserved	
Bit 12	Reserved	
Bit 13	Reserved	
Bit 14	Reserved	
Bit 15	Reserved	
Subcodes	**Lenze setting**	**Information**
C01004/1	0x0000	Load Lenze setting without C002/1
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT		

C01082

Parameter | Name: **C01082 | LS_WriteParamList: Execute Mode**		Data type: UNSIGNED_8 Index: 23493$_d$ = 5BC5$_h$
Parameter change-over: Selection of the activation method		
Selection list(**Lenze setting printed in bold**)		**Information**
0	**by Execute**	The writing of the parameter list is activated by a FALSE/TRUE edge at the *bExecute* input.
1	by Input Select	The parameter list is written to if a change is made at the *bSelectWriteValue_1* selection input and once when the inverter is initialised.
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 1		

C01083

Parameter | Name: **C01083 | LS_WriteParamList: FailState**			Data type: UNSIGNED_16 Index: 23492_d = $5BC4_h$
Parameter change-over: Error status: • 0 = no error • 33803 | 0x840B = invalid data type (e.g. STRING) • 33804 | 0x840C = limit violation • 33806 | 0x840E = invalid code • 33813 | 0x8415 = no element of the selection list • 33815 | 0x8417 = writing of the parameter not permitted • 33816 | 0x8418 = writing of the parameter only permitted if controller is inhibited • 33829 | 0x8425 = invalid subcode • 33865 | 0x8449 = no parameter with subcodes			
Display range **(min. value | unit | max. value)**			
0		34000	
☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☑ No transfer ☐ COM ☐ MOT Scaling factor: 1			

C01084

Parameter | Name: **C01084 | LS_WriteParamList: Error line**			Data type: UNSIGNED_8 Index: 23491_d = $5BC3_h$
Parameter change-over: Display of the number of list entry where the error occurred (in connection with the value set selected via *bSelectWriteValue_1* and *bSelectWriteValue_2*).			
Display range **(min. value | unit | max. value)**			
0		16	
☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☑ No transfer ☐ COM ☐ MOT Scaling factor: 1			

C01085

Parameter | Name: **C01085 | LS_WriteParamList: Index**			Data type: INTEGER_32 Index: 23490_d = $5BC2_h$
Parameter change-over: Parameter for entry 1 ... 16			
Setting range **(min. value | unit | max. value)**			
0.000		16000.000	
Subcodes	**Lenze setting**		**Information**
C01085/1	0.000		Parameter for entries 1 ... 16 • Format: <code number>.<subcode number> • Examples: "12.000" = C00012; "26.001" = C00026/1
C01085/...			
C01085/16			
☑ Read access ☑ Write access ® CINH ® PLC STOP ® No transfer ® COM ® MOT Scaling factor: 1000			

C01086

Parameter | Name: **C01086 | LS_WriteParamList: WriteValue_1**			Data type: INTEGER_32 Index: 23489_d = $5BC1_h$
Parameter change-over: Parameter values - value set 1			
Setting range **(min. value | unit | max. value)**			
-2147483647		2147483647	
Subcodes	**Lenze setting**		**Information**
C01086/1	0		Parameter values - value set 1 • Parameter values for the parameters defined in C01085/1 ... 16.
C01086/...			
C01086/16			
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 1			

C01087

Parameter | Name: **C01087 | LS_WriteParamList: WriteValue_2**			Data type: INTEGER_32 Index: 23488_d = $5BC0_h$
Parameter change-over: Parameter values - value set 2			
Setting range **(min. value | unit | max. value)**			
-2147483647		2147483647	
Subcodes	**Lenze setting**		**Information**
C01087/1	0		Parameter values - value set 2 - Parameter values for the parameters defined in C01085/1 ... 16.
C01087/...			
C01087/16			
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 1			

C01090

Parameter | Name: **C01090 | LS_ParReadWrite_1: Index**			Data type: INTEGER_32 Index: 23485_d = $5BBD_h$
From version 04.00.00 Parameter to be read or written. - Format: <code number>,<subcode number> - For a setting of "0,000", inputs *wParIndex* and *wParSubindex* are effective for addressing purposes instead.			
Setting range **(min. value | unit | max. value)**			
0.000		16000.000	
Subcodes	**Lenze setting**		**Information**
C01090/1	0.000		LS_ParReadWrite_1: Index
☑ Read access ☑ Write access ® CINH ® PLC STOP ® No transfer ® COM ® MOT Scaling factor: 1000			

C01091

Parameter | Name: **C01091 | LS_ParReadWrite_1: Cycle time**		Data type: UNSIGNED_16 Index: 23484_d = $5BBC_h$
From version 04.00.00 Time interval for cyclic reading/writing		
Selection list		
0	0 (by Execute)	
20	20 ms	
50	50 ms	
100	100 ms	
200	200 ms	
500	500 ms	
1000	1000 ms	
2000	2000 ms	
5000	5000 ms	
10000	10000 ms	
Subcodes	**Lenze setting**	**Information**
C01091/1	0: 0 (by Execute)	LS_ParReadWrite_1: Cycle time
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 1		

C01092

Parameter | Name: **C01092 | LS_ParReadWrite_1: FailState**			Data type: UNSIGNED_16 Index: 23483_d = $5BBB_h$
From version 04.00.00 Error status: • 0 = no error • 33803 | 0x840B = invalid data type (e.g. STRING) • 33804 | 0x840C = limit violation • 33806 | 0x840E = invalid code • 33813 | 0x8415 = no element of the selection list • 33815 | 0x8417 = writing of the parameter not permitted • 33816 | 0x8418 = writing of the parameter only permitted if controller is inhibited • 33829 | 0x8425 = invalid subcode • 33865 | 0x8449 = no parameter with subcodes			
Display range **(min. value | unit | max. value)**			
0		34000	
Subcodes			**Information**
C01092/1			LS_ParReadWrite_1: FailState
☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☑ No transfer ☐ COM ☐ MOT Scaling factor: 1			

C01100

Parameter | Name: **C01100 | L_Counter_1: Function**		Data type: UNSIGNED_8 Index: 23475_d = $5BB3_h$
Selection of reset function		
Selection list		
0	Normal counting	
1	Auto reset	
2	Manual reset	
Subcodes	**Lenze setting**	**Information**
C01100/1	0: Normal counting	L_Counter_1: Function
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 1		

C01101

Parameter | Name: **C01101 | L_Counter_1: Comparison**		Data type: UNSIGNED_8 Index: 23474_d = $5BB2_h$
Selection of comparison operation		
Selection list		
0	Greater than or equal to	
1	Less than or equal to	
2	equal to	
Subcodes	**Lenze setting**	**Information**
C01101/1	0: Greater than or equal to	L_Counter_1: Comparison
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 1		

C01206

Parameter | Name: **C01206 | Axis data: Mounting direction**		Data type: UNSIGNED_8 Index: 23369_d = $5B49_h$
From version 02.00.00 Inversion for mirrored motor and encoder mounting		
Selection list		
0	Not inverted	
1	Inverted	
Subcodes	**Lenze setting**	**Information**
C01206/1	0: Not inverted	Motor mounting direction • Setting for motor mounting turned by 180°.
C01206/2	0: Not inverted	Mounting direction of speed sensor • Setting of a mounted speed sensor system rotated by 180°.
☑ Read access ☑ Write access ☑ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 1		

C01350

Parameter | Name: **C01350 | ACDrive: Drive mode**		Data type: UNSIGNED_8 Index: 23225_d = $5AB9_h$
From version 04.01.00 This parameter is set by the EtherNet/IP™ Communication Unit and should not be written by the user. • Detailed information on the "AC Drive Profile" can be found in the EtherNet/IP™ communication manual.		
Selection list		
1	Speed mode	
3	Torque mode	
Subcodes	**Lenze setting**	**Information**
C01350/1	1: Speed mode	ACDrive: Drive mode
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 1		

C01351

Parameter | Name: **C01351 | ACDrive: Control word**			Data type: UNSIGNED_16 Index: 23224$_d$ = 5AB8$_h$
From version 04.01.00 Display of the "AC Drive profile" control word for the 8400 motec • If required, you can set an inversion for individual control bits in C00890/1 which is included in this display. • Detailed information on the "AC Drive Profile" can be found in the EtherNet/IP™ communication manual.			
Display area **(min. hex value | max. hex value)**			
0x0000		0xFFFF	
Value is bit-coded:			**Information**
Bit 0	Run Forward		Connections between Run1 and Run2 and trigger events can be found in the EtherNet/IP™ communication manual.
Bit 1	Run Backward		
Bit 2	Fault Reset		0->1 ≡ Reset error 0 ≡ No response
Bit 3	reserved		
Bit 4	reserved		
Bit 5	NetCtrl		Run/Stop control 0 ≡ Run/Stop control via local setting in the device or terminal 1 ≡ Run/Stop control via network (e.g. from the scanner)
Bit 6	NetRef		Status of the reference speed / reference torque 0 ≡ Reference via local setting in the device or terminal 1 ≡ Reference via network (e.g. from the scanner)
Bit 7	reserved		
Bit 8	reserved		
Bit 9	reserved		
Bit 10	reserved		
Bit 11	reserved		
Bit 12	reserved		
Bit 13	reserved		
Bit 14	reserved		
Bit 15	reserved		
Subcodes			**Information**
C01351/1			ACDrive: Control word
☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☑ No transfer ☐ COM ☐ MOT			

C01352

Parameter | Name: **C01352 | ACDrive: Status word**			Data type: UNSIGNED_16 Index: 23223_d = $5AB7_h$
From version 04.01.00 Display of the "AC Drive profile" status word from the 8400 motec • Detailed information on the "AC Drive Profile" can be found in the EtherNet/IP™ communication manual.			
Display area **(min. hex value | max. hex value)**			
0x0000		0xFFFF	
Value is bit-coded:			**Information**
Bit 0	Faulted		0 ≡ No errors 1 ≡ Errors have occurred
Bit 1	Warning		0 ≡ No warnings 1 ≡ Warnings have occurred
Bit 2	Running1 (Fwd)		Connections between Run1 and Run2 and trigger events can be found in the EtherNet/IP™ communication manual.
Bit 3	Running2 (Rev)		
Bit 4	Ready		0 ≡ Different status than in case of "1" 1 ≡ Ready or Enabled or Stopping
Bit 5	Ctrl from Net		Run/Stop control 0 ≡ Run/Stop control via local setting in the device or terminal 1 ≡ Run/Stop control via network (e.g. from the scanner)
Bit 6	Ref from Net		Status of the reference speed / reference torque 0 ≡ Reference via local setting in the device or terminal 1 ≡ Reference via network (e.g. from the scanner)
Bit 7	At Reference		1 ≡ Currently, the inverter runs with the reference speed or reference torque (depending on the "drive mode" set in C01350/1).
Bit 8	DriveState_0		The "Drive State" is coded as follows: 0: Manufacturer-specific (not used with 8400 motec) 1: Start-up (drive initialisation) 2: Not_Ready (mains voltage switched off) 3: Ready (mains voltage switched-on) 4: Enabled (drive has received "Run" command) 5: Stopping (drive has received "Stop" command and is stopped) 6: Fault_Stop (drive is stopped due to an error) 7: Faulted (errors have occurred)
Bit 9	DriveState_1		
Bit 10	DriveState_2		
Bit 11	DriveState_3		
Bit 12	DriveState_4		
Bit 13	DriveState_5		
Bit 14	DriveState_6		
Bit 15	DriveState_7		
Subcodes			**Information**
C01352/1			ACDrive: Status word
☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☑ No transfer ☐ COM ☐ MOT			

C01353

Parameter | Name: **C01353 | ACDrive: Setpoint scaling**			Data type: INTEGER_8 Index: 23222_d = $5AB6_h$
From version 05.00.00 • Detailed information on the "AC Drive Profile" can be found in the EtherNet/IP™ communication manual.			
Setting range (min. value | unit | max. value)			
-128		127	
Subcodes	**Lenze setting**		**Information**
C01353/1	0		ACDrive: Speed scaling
C01353/2	0		ACDrive: Torque scaling
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 1			

C01354

Parameter | Name: **C01354 | LS_Convert**		Data type: UNSIGNED_8 Index: 23221_d = $5AB5_h$
From version 05.00.00		
Selection list		
0	1 ==> 1 ==> 1	
1	1 Hz ==> % (C11) ==> 1 Hz	
2	0.1 Hz ==> % (C11) ==> 0.1 Hz	
3	0.01 Hz ==> % (C11) ==> 0.01 Hz	
4	0.001 Hz ==> % (C11) ==> 0.001 Hz	
5	1 Rpm ==> % (C11) ==> 1 Rpm	
6	0.1 Rpm ==> % (C11) ==> 0.1 Rpm	
7	0.01 Rpm ==> % (C11) ==> 0.01 Rpm	
8	0.001 Rpm ==> % (C11) ==> 0.001 Rpm	
9	1 A ==> % (C22) ==> 1 A	
10	0.1 A ==> % (C22) ==> 0.1 A	
11	0.01 A ==> % (C22) ==> 0.01 A	
12	0.001 A ==> % (C22) ==> 0.001 A	
13	1 Nm ==> % (C57) ==> 1 Nm	
14	0.1 Nm ==> % (C57) ==> 0.1 Nm	
15	0.01 Nm ==> % (C57) ==> 0.01 Nm	
16	0.001 Nm ==> % (C57) ==> 0.001 Nm	
17	ACDP ==> CAN ==> ACDP	
18	x C471_1 / C471_2	
19	Act position 32bit ==> 16Bit	
Subcodes	**Lenze setting**	**Information**
C01354/1	0: 1 ==> 1 ==> 1	LS_Convert_1: Function
C01354/2	0: 1 ==> 1 ==> 1	LS_Convert_2: Function
C01354/3	0: 1 ==> 1 ==> 1	LS_Convert_3: Function
☑ Read access ☑ Write access ☑ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☑ MOT Scaling factor: 1		

C01501

Parameter | Name: **C01501 | Resp. to communication error with MCI**		Data type: UNSIGNED_8 Index: 23074_d = $5A22_h$
Configuration of monitoring functions for the Communication Unit		
Selection list		
0	No Reaction	
1	Fault	
4	WarningLocked	
Subcodes	**Lenze setting**	**Information**
C01501/1	1: Fault	Resp. to MCI fault 1 • Response to a communication fault.
C01501/2	1: Fault	Resp. to MCI fault 2 • Response to an incompatible communication unit.
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 1		

C01503

Parameter | Name: **C01503 | MCI timeout**			Data type: UNSIGNED_16 Index: 23072_d = $5A20_h$
Setting range **(min. value | unit | max. value)**			
0	ms	1000	
Subcodes	**Lenze setting**		**Information**
C01503/1	200 ms		MCI timeout
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 1			

C01700

Parameter | Name: **C01700 | Energy saving mode: Mode**			Data type: UNSIGNED_8 Index: 22875_d = $595B_h$
From version 09.00.00 onwards Display of the energy saving modes maximally provided			
Display range **(min. value | unit | max. value)**			
0		1	
Subcodes			**Information**
C01700/1			Number of energy saving modes maximally provided = 1
C01700/2			Current mode • 1 ≡ Energy saving mode is active • 0 ≡ Energy saving mode is not active
☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☑ No transfer ☐ COM ☐ MOT Scaling factor: 1			

C01701

<table>
<tr><td colspan="3">Parameter | Name:
C01701 | Energy saving mode: toff min</td><td>Data type: UNSIGNED_16
Index: $22874_d = 595A_h$</td></tr>
<tr><td colspan="4">From version 09.00.00 onwards
Minimum time for which the inverter is to remain in the energy saving mode (TPm: Time Pause min).</td></tr>
<tr><td colspan="3">Setting range (min. value | unit | max. value)</td><td></td></tr>
<tr><td>0</td><td>s</td><td>65535</td><td></td></tr>
<tr><td>Subcodes</td><td colspan="2">Lenze setting</td><td>Information</td></tr>
<tr><td>C01701/1</td><td colspan="2">0 s</td><td>Energy saving mode 1: toff min</td></tr>
<tr><td colspan="4">☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 1</td></tr>
</table>

C01702

<table>
<tr><td colspan="3">Parameter | Name:
C01702 | Energy saving mode: toff</td><td>Data type: UNSIGNED_16
Index: $22873_d = 5959_h$</td></tr>
<tr><td colspan="4">From version 09.00.00 onwards
Time until the energy saving mode is entered (TtP: Time to Pause)
If the quick stop energy saving function is to be used, this time always has to be set to a greater value than the maximum time required for braking via the quickstop function.</td></tr>
<tr><td colspan="3">Setting range (min. value | unit | max. value)</td><td></td></tr>
<tr><td>0</td><td>s</td><td>65535</td><td></td></tr>
<tr><td>Subcodes</td><td colspan="2">Lenze setting</td><td>Information</td></tr>
<tr><td>C01702/1</td><td colspan="2">0 s</td><td>Energy saving mode 1: toff</td></tr>
<tr><td colspan="4">☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 1</td></tr>
</table>

C01703

<table>
<tr><td colspan="3">Parameter | Name:
C01703 | Energy saving mode: ton</td><td>Data type: UNSIGNED_16
Index: $22872_d = 5958_h$</td></tr>
<tr><td colspan="4">From version 09.00.00 onwards
Time for exiting the energy saving mode (TtO: Time to Operate).</td></tr>
<tr><td colspan="3">Setting range (min. value | unit | max. value)</td><td></td></tr>
<tr><td>0</td><td>s</td><td>65535</td><td></td></tr>
<tr><td>Subcodes</td><td colspan="2">Lenze setting</td><td>Information</td></tr>
<tr><td>C01703/1</td><td colspan="2">0 s</td><td>Energy saving mode 1: ton</td></tr>
<tr><td colspan="4">☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 1</td></tr>
</table>

C01704

<table>
<tr><td colspan="3">Parameter | Name:
C01704 | Energy saving mode: Function</td><td>Data type: UNSIGNED_16
Index: 22871_d = 5957_h</td></tr>
<tr><td colspan="4">From version 09.00.00 onwards
Response of the device in energy saving mode</td></tr>
<tr><td colspan="3">Setting range (min. hex value | max. hex value)</td><td rowspan="2"></td></tr>
<tr><td>0x0000</td><td></td><td>0xFFFF</td></tr>
<tr><td colspan="3">Value is bit-coded:</td><td>Information</td></tr>
<tr><td>Bit 0</td><td colspan="2">CINH</td><td>With entering the energy saving mode, controller inhibit is set.
Controller inhibit is reset when the "Pause-End" command is received.
• Diagnostics of active controller inhibit with C00158/0, bit 9
  • Display: "Energy saving mode"</td></tr>
<tr><td>Bit 1</td><td colspan="2">QSP</td><td>When the "Pause-Req" command is received, the inverter executes a quick stop.
• Quick stop is cancelled when the "Pause-End" command has been accepted.
• Quick stop diagnostics with C00159/0, bit 9
  • Display: "Energy saving mode"</td></tr>
<tr><td>Bit 2</td><td colspan="2">Dimming the LEDs</td><td>As far as possible, the LEDs of the inverter are switched off, or their lighting intensity is reduced.</td></tr>
<tr><td>Bit 3</td><td colspan="2">Reserved</td><td></td></tr>
<tr><td>Bit 4</td><td colspan="2">Decoupling the IOs</td><td>The digital and analog output terminals are decoupled from the application (FB Editor).
The output levels for these outputs can be defined via the decoupling values.
Parameterisation of the decoupling values for the digital outputs: C00118/0.
The brake output is always switched off and is thus deenergised.</td></tr>
<tr><td>Bit 5</td><td colspan="2">Reserved</td><td></td></tr>
<tr><td>Bit 6</td><td colspan="2">Reserved</td><td></td></tr>
<tr><td>Bit 7</td><td colspan="2">Reserved</td><td></td></tr>
<tr><td>Bit 8</td><td colspan="2">Reserved</td><td></td></tr>
<tr><td>Bit 9</td><td colspan="2">Reserved</td><td></td></tr>
<tr><td>Bit 10</td><td colspan="2">Reserved</td><td></td></tr>
<tr><td>Bit 11</td><td colspan="2">Reserved</td><td></td></tr>
<tr><td>Bit 12</td><td colspan="2">Reserved</td><td></td></tr>
<tr><td>Bit 13</td><td colspan="2">Reserved</td><td></td></tr>
<tr><td>Bit 14</td><td colspan="2">Reserved</td><td></td></tr>
<tr><td>Bit 15</td><td colspan="2">Off</td><td>Deactivate energy saving mode.</td></tr>
<tr><td>Subcodes</td><td colspan="2">Lenze setting</td><td>Information</td></tr>
<tr><td>C01704/1</td><td colspan="2">0x0000</td><td>Energy saving mode: components to be switched off.</td></tr>
<tr><td colspan="4">☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT</td></tr>
</table>

C01709

Parameter | Name: **C01709 | Energy saving mode: Status**			Data type: UNSIGNED_8 Index: $22866_d = 5952_h$
From version 09.00.00 onwards			
Display range (min. value | unit | max. value)			
0		255	
Subcodes			**Information**
C01709/1			Energy saving mode: Status
☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☑ No transfer ☐ COM ☐ MOT Scaling factor: 1			

C01905

Parameter | Name: **C01905 | Diagnostics X6: Current baud rate**			Data type: UNSIGNED_16 Index: $22670_d = 588E_h$
From version 06.01.00 Current baud rate at the diagnostic interface • From version 06.01.00, the diagnostic interface also supports the fast communication with 57,600 Baud (instead of 4,800 Baud). ▸ Fast communication via diagnostic interface			
Display range (min. value | unit | max. value)			
0	100Bd	65000	
☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☑ No transfer ☑ COM ☐ MOT Scaling factor: 1			

C01911

Parameter | Name: **C01911 | Function DIP switch S1**			Data type: UNSIGNED_8 Index: $22664_d = 5888_h$
Bit coded display of the DIP switch S1 setting **Note:** • Settings made by DIP switch S1/S2 and potentiometer P1-P3 have to be activated with the DIP switch S1/DIP1. The settings are accepted anew every time the mains is switched on. As a consequence, interim changes of parameters may be overwritten. • Information on how to commission the 8400 motec via the DIP switches/potentiometers can be found in the mounting instructions or hardware manual!			
Display area (min. hex value | max. hex value)			
0x00		0xFF	
Value is bit-coded:			**Information**
Bit 0	DIP1: DIP switch activated		"1" ≡ Settings according to DIP switch S1/S2, P1-P3 active. • C00012 and C00013 (acceleration/deceleration time) are overwritten with the setting of potentiometer P3. • C00039/1 (fixed setpoint 1) is overwritten with the setting of potentiometer P2.
Bit 1	DIP2: CCW direction of rotation|| Motor power		**DIP switch/potentiometer assignment 0 (S2/DIP8 = OFF)** C00701/5 (bSetSpeedCcw) is overwritten: "0" ≡ bSetSpeedCcw = unchanged "1" ≡ bSetSpeedCcw = TRUE (Ccw active) **DIP switch/potentiometer assignment 1 (S2/DIP8 = ON)** C00120 (setting of motor overload, I^2xt) is overwritten: "0" ≡ C00120 = 66 % "1" ≡ C00120 = 100%

Parameter | Name: **C01911 | Function DIP switch S1**		Data type: UNSIGNED_8 Index: 22664_d = 5888_h
Bit 2	DIP3: VFCplus linear/square-law || VFCplus Eco/linear	**DIP switch/potentiometer assignment 0 (S2/DIP8 = OFF)** C00006 (motor control) is overwritten: "0" ≡ VFCplus linear "1" ≡ VFCplus square-law **DIP switch/potentiometer assignment 1 (S2/DIP8 = ON)** C00006 (motor control) is overwritten: "0" ≡ VFCplus linear "1" ≡ VFCplusECO
Bit 3	DIP4: Flying restart process activated || brake control/restart on the fly	**DIP switch/potentiometer assignment 0 (S2/DIP8 = OFF)** Bit 3:C00990 is overwritten: • "0" ≡ Flying restart process deactivated • "1" ≡ Flying restart process activated Bit 4: Reserved **DIP switch/potentiometer assignment 1 (S2/DIP8 = ON)** DIP4 | DIP5: Holding brake (C02580) / restart on the fly (C00990) • 0 | 0 ≡ Holding brake off, restart on the fly off • 0 | 1 ≡ Holding brake off, restart on the fly on • 1 | 0 ≡ Holding brake on, restart on the fly off • 1 | 1 ≡ Holding brake on, restart on the fly on Further affected parameters: Auto-DCB: Threshold (C00019), Auto-DCB: Hold time (C00106), holding brake: Speed thresholds (C02581), holding brake: Setting (C02582)
Bit 4	DIP5: Reserved || Brake control/ restart on the fly	
Bit 5	DIP6: Reserved || Motor mounting direction	**DIP switch/potentiometer assignment 0 (S2/DIP8 = OFF)** Reserved **DIP switch/potentiometer assignment 1 (S2/DIP8 = ON)** C01206/1 (motor mounting direction) is overwritten: • "0" ≡ not inverted • "1" ≡ inverted
Bit 6	DIP7: Reserved || Function P1 for fixed setpoint 3	**DIP switch/potentiometer assignment 0 (S2/DIP8 = OFF)** Reserved **DIP switch/potentiometer assignment 1 (S2/DIP8 = ON)** C00039/3 (fixed setpoint 3) is overwritten: • "0" ≡ C00039/3 is written once with P1 (Top Cover) when the mains is switched on. • "1" ≡ C00039/3 is always written with P1 (Top Cover).
Bit 7	DIP8: Config. of relay/DO1 || Parameter basis	**DIP switch/potentiometer assignment 0 (S2/DIP8 = OFF)** Error message (only in case of Communication Unit with the "Safety STO" option): • "0" ≡ Relay = error is pending, DO1 = drive is ready • "1" ≡ Relay = drive is ready, DO1 = error is pending Relay: C00621/1 DO1: C00621/2 **DIP switch/potentiometer assignment 1 (S2/DIP8 = ON)** C00002/1 or C00002/2 is overwritten: • "0" ≡ C00002/1 is loaded from the Lenze default setting. • "1" ≡ C00002/2 is loaded from the Memory Module.
☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☑ No transfer ☐ COM ☐ MOT		

C01912

Parameter | Name: **C01912 | Function DIP switch S2**			Data type: UNSIGNED_8 Index: 22663_d = 5887_h
Bit coded display of the DIP switch S2 setting **Note:** • Settings made by DIP switch S1/S2 and potentiometer P1-P3 have to be activated with the DIP switch S1/DIP1. The settings are accepted anew every time the mains is switched on. As a consequence, interim changes of parameters may be overwritten. • Information on how to commission the 8400 motec via the DIP switches/potentiometers can be found in the mounting instructions or hardware manual!			
Display area **(min. hex value | max. hex value)**			
0x00		0xFF	
Value is bit-coded:			**Information**
Bit 0	DIP1: Rated motor frequency || Motor data		DIP2 | DIP1: V/f base frequency (C00015) and reference speed (C00011) From version 07.00.00: Rated motor speed (C00087), rated motor frequency (C00089) and rated motor voltage (C00090) • 0 | 0 ≡ 50 Hz, 1500 rpm • 0 | 1 ≡ 60 Hz, 1800 rpm • 1 | 0 ≡ 87 Hz, 2610 rpm • 1 | 1 ≡ 120 Hz, 3600 rpm
Bit 1	DIP2: Rated motor frequency || Motor data		
Bit 2	DIP3: Config. A1U || Config. application		**DIP switch/potentiometer assignment 0 (S2/DIP8 = OFF)** DIP4 | DIP3: Configuration of analog input (C00034) • 0 | 0 ≡ 0 ... 10 V (no load resistor) • 0 | 1 ≡ 0 ... 20 mA (load resistor is active) • 1 | 0 ≡ 4 ... 20 mA (load resistor is active) • 1 | 1 ≡ Configuration of EPM **DIP switch/potentiometer assignment 1 (S2/DIP8 = ON)** DIP4 | DIP3: Configuration of application (C00005) • 0 | 0 ≡ Speed actuating drive (1000) • 0 | 1 ≡ AC-Drive Profile (1100) • 1 | 0 ≡ Switch-off positioning (3000) • 1 | 1 ≡ Reserved
Bit 3	DIP4: Config. A1U || Config. application		

Parameter | Name: **C01912 | Function DIP switch S2**		Data type: UNSIGNED_8 Index: 22663_d = 5887_h

Bit 4	DIP5: Control source || Control source	DIP7 | DIP6 | DIP5: Control mode (C00007)
		DIP switch/potentiometer assignment 0 (S2/DIP8 = OFF)
		• 0 | 0 | 0 ≡ Local mode
		  • The technology application is controlled via the control elements at the 8400 motec.
		  • Detailed information on this control mode can be found in the mounting instructions/hardware manual.
		• 0 | 0 | 1 ≡ Terminals 0
		• 0 | 1 | 0 ≡ Terminals 2
		• 0 | 1 | 1 ≡ Terminals 11
		• 1 | 0 | 0 ≡ Terminals 16
		• 1 | 1 | 0 ≡ Network (AS-i)
		• 1 | 1 | 1 ≡ Network (MCI/CAN)
		• all other ≡ Configuration of EPM
		
		DIP switch/potentiometer assignment 1 (S2/DIP8 = ON)
		• 0 | 0 | 0 ≡ Local mode
		  • The technology application is controlled via the control elements at the 8400 motec.
		  • Detailed information on this control mode can be found in the mounting instructions/hardware manual.
		• 0 | 0 | 1 ≡ Terminals 0
		• 0 | 1 | 0 ≡ Terminals 2
		• 0 | 1 | 1 ≡ Terminals 11
		• 1 | 0 | 0 ≡ Terminals 16
		• 1 | 1 | 0 ≡ Network (AS-i)
		• 1 | 1 | 1 ≡ Network (MCI/CAN)
		• all other ≡ Configuration of EPM

Bit 5	DIP6: Control source || Control source	
Bit 6	DIP7: Control source || Control source	
Bit 7	DIP8: DIP selection/potentiometer assignment (0||1)	DIP switch selection/potentiometer assignment: • "0" ≡ DIP switch/potentiometer assignment 0 • "1" ≡ DIP switch/potentiometer assignment 1 Affected parameters: Slip compensation (C00021), I_{max} in motor mode (C00022), VFC: U_{min} boost (C00016), rated motor speed (C00087)
☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☑ No transfer ☐ COM ☐ MOT		

C01913

Parameter | Name: **C01913 | Switch position**			Data type: INTEGER_16 Index: 22662_d = 5886_h
Display of the values set via the setting elements P1 ... P3 **Note:** • Settings made by DIP switch S1/S2 and potentiometer P1-P3 have to be activated with the DIP switch S1/DIP1. The settings are accepted anew every time the mains is switched on. As a consequence, interim changes of parameters may be overwritten. • Information on how to commission the 8400 motec via the DIP switches/potentiometers can be found in the mounting instructions or hardware manual!			
Display range (min. value | unit | max. value)			
-199.99	%	199.99	
Subcodes			**Information**

Parameter | Name: **C01913 | Switch position**	Data type: INTEGER_16 Index: 22662$_d$ = 5886$_h$
C01913/1	Setting of P1 • Stepless from 0 % to 100 % **Note** (only valid for DIP switch/potentiometer assignment 1): When DIP switch S2/DIP8 = "ON": C00039/3 is always written with the value set here!
C01913/2	Setting of P2 **DIP switch/potentiometer assignment 0 (S2/DIP8 = OFF)** • Setting 0 ≡ 0 % • Setting 1 ≡ 11 % • Setting 2 ≡ 22 % • Setting 3 ≡ 33 % • Setting 4 ≡ 44 % • Setting 5 ≡ 55 % • Setting 6 ≡ 66 % • Setting 7 ≡ 77 % • Setting 8 ≡ 88 % • Setting 9 ≡ 100 % **DIP switch/potentiometer assignment 1 (S2/DIP8 = ON)** • Setting 0 ≡ C00039/1 = 5, C00039/2 = 10 • Setting 1 ≡ C00039/1 = 10, C00039/2 = 20 • Setting 2 ≡ C00039/1 = 15, C00039/2 = 30 • Setting 3 ≡ C00039/1 = 20, C00039/2 = 40 • Setting 4 ≡ C00039/1 = 25, C00039/2 = 50 • Setting 5 ≡ C00039/1 = 30, C00039/2 = 60 • Setting 6 ≡ C00039/1 = 35, C00039/2 = 70 • Setting 7 ≡ C00039/1 = 40, C00039/2 = 80 • Setting 8 ≡ C00039/1 = 45, C00039/2 = 90 • Setting 9 ≡ C00039/1 = 50, C00039/2 = 100
C01913/3	Setting of P3 **DIP switch/potentiometer assignment 0 (S2/DIP8 = OFF)** • Setting 0 ≡ 0 % • Setting 1 ≡ 11 % • Setting 2 ≡ 22 % • Setting 3 ≡ 33 % • Setting 4 ≡ 44 % • Setting 5 ≡ 55 % • Setting 6 ≡ 66 % • Setting 7 ≡ 77 % • Setting 8 ≡ 88 % • Setting 9 ≡ 100 % **DIP switch/potentiometer assignment 1 (S2/DIP8 = ON)** • Setting 0 ≡ C00012 | C00013 = 0.1 s, C00105 = 0.1 s • Setting 1 ≡ C00012 | C00013 = 0.5 s, C00105 = 0.2 s • Setting 2 ≡ C00012 | C00013 = 0.7 s, C00105 = 0.5 s • Setting 3 ≡ C00012 | C00013 = 1.0 s, C00105 = 0.7 s • Setting 4 ≡ C00012 | C00013 = 1.5 s, C00105 = 1.0 s • Setting 5 ≡ C00012 | C00013 = 2.0 s, C00105 = 1.5 s • Setting 6 ≡ C00012 | C00013 = 5.0 s, C00105 = 2.0 s • Setting 7 ≡ C00012 | C00013 = 10 s, C00105 = 5.0 s • Setting 8 ≡ C00012 | C00013 = 30 s, C00105 = 10 s0 • Setting 9 ≡ C00012 | C00013 = 60 s, C00105 = 30 s
☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☑ No transfer ☐ COM ☐ MOT Scaling factor: 100	

C02580

Parameter | Name: **C02580 | Holding brake: Operating mode**		Data type: UNSIGNED_8 Index: 21995$_d$ = 55EB$_h$
Selection of the operating mode for holding brake control ▸ Holding brake control		
Selection list(Lenze setting printed in bold)		**Information**
0	**Brake control off**	No holding brake is used. Internal control is switched off.
11	Manually controlled	The holding brake is released and applied via the *bBrkRelease* application input. • In the Lenze setting, *bBrkRelease* is linked with the digital input DI5 if control takes place via terminals.
12	Autom. controlled	The holding brake is automatically released and closed via speed setpoint comparisons.
13	Semi-automat. controlled	From version 02.00.00 The holding brake is released and applied via the *bBrkRelease* application input. • In the Lenze setting, *bBrkRelease* is linked with the digital input DI5 if control takes place via terminals.
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 1		

C02581

Parameter | Name: **C02581 | Holding brake: Speed thresholds**			Data type: INTEGER_16 Index: 21994$_d$ = 55EA$_h$
Speed setpoint threshold and hysteresis for automatic holding brake control ▸ Holding brake control			
Setting range (min. value | unit | max. value)			
0.00	%	199.99	
Subcodes	**Lenze setting**		**Information**
C02581/1	5.00 %		Holding brake: Switching threshold • Switching threshold of the speed setpoint from which on the holding brake is released/applied automatically.
C02581/2	1.00 %		Holding brake: Hyst.release • Hysteresis for holding brake release. • Release threshold = switching threshold + release hysteresis
C02581/3	1.00 %		Holding brake: Hyst. close • Hysteresis for holding brake application. • Application threshold = switching threshold - application hysteresis
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 100			

C02582

Parameter | Name: **C02582 | Holding brake: Setting**			Data type: UNSIGNED_8 Index: 21993$_d$ = 55E9$_h$
Activation of functional holding brake control options ▸ Holding brake control			
Setting range (min. hex value | max. hex value)			**Lenze setting**
0x00		0xFF	**0x08** (decimal: 8)
Value is bit-coded: (☑ = bit set)			**Information**

Parameter | Name: **C02582 | Holding brake: Setting**		Data type: UNSIGNED_8 Index: 21993_d = $55E9_h$
Bit 0 ☐	Control inverted	Activation of inverted control • 1 ≡ Inverted logic of the trigger signal *bBrkRelease* for triggering the power output (terminals BR1 and BR2).
Bit 1 ☐	nAct < nMin at CInh	Brake response in case of pulse inhibit • 1 ≡ In the case of a pulse inhibit, the actual speed value is monitored which must reach the "Close" threshold value to cause the holding brake to be applied. **Note:** • Function only possible with available speed feedback via the digital input terminals DI1/DI2. • This function is only active if bit 3 (horizontal/ winding technology) is set as well. The function is used in order that, when the controller is inhibited, the holding brake of a drive with horizontal traverse path does not wear out during rotation. • With vertical motion (bit 3 = 0), this function is not active. Especially with hoists and activated pulse inhibit of the inverter, an immediate application of the brake is essential for safety-related reasons!
Bit 2 ☐	Inverted feedforward control	Direction of feedforward control with vertical/hoist technology: • 0 ≡ Positive direction • 1 ≡ Negative direction **Note:** Reversal (Ccw) is then considered.
Bit 3 ☑	Horizontal/winding technology	Direction of movement of the axis • 0 ≡ The axis performs vertical movements. Gravitational acceleration causes movements. • 1 ≡ The direction of the axis is horizontal or rotary. The gravitational acceleration does not cause any movement.
Bit 4 ☐	No premagnetisation	From version 02.00.00 Deactivation of the 200 ms premagnetisation before releasing the brake. • 0 ≡ Premagnetisation in case of feedforward control. • 1 ≡ No premagnetisation.
Bit 5 ☐	Reserved	
Bit 6 ☐	Reserved	
Bit 7 ☐	Direct holding brake	From version 09.01.00 onwards Releasing and closing via application input: • 0 ≡ The holding brake is released and closed via the internal control. • 1 ≡ The holding brake is directly released and closed via bBrkRelease (C00701/19). The internal control of the holding brake is deactivated.
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT		

C02589

Parameter | Name: **C02589 | Holding brake: Time system**		Data type: UNSIGNED_16 Index: 21986$_d$ = 55E2$_h$
Operating times of the holding brake • The electromechanical delay times of the holding brake are specified in the data sheets or on the holding brake nameplate. ▸ Holding brake control		
Setting range **(min. value | unit | max. value)**		
0	ms	60000
Subcodes	**Lenze setting**	**Information**
C02589/1	100 ms	Holding brake: Application time • Time in which the holding brake is completely applied from the beginning of control and in which the controller is inhibited.
C02589/2	100 ms	Holding brake: Release time • Time in which the holding brake is completely released from the beginning of control.
C02589/3	0 ms	Reserved
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 1		

C02593

Parameter | Name: **C02593 | Holding brake: Activation time**		Data type: UNSIGNED_32 Index: 21982$_d$ = 55DE$_h$
Time parameter for the delay of trigger signals of the holding brake control ▸ Holding brake control		
Setting range **(min. value | unit | max. value)**		
0.0	s	3600.0
Subcodes	**Lenze setting**	**Information**
C02593/1	0.0 s	Holding brake: Actual value monitoring • Time in which the actual value is supposed to reach the threshold for closing the brake if the setpoint has already reached the threshold. • Time > 0 s: If the actual speed value has not reached the threshold within the time for brake application, the holding brake is applied by control. • Time = 0 s: The brake is only applied by control when the actual speed has reached the application threshold.
C02593/2	0.0 s	Holding brake: Application delay
☑ Read access ☑ Write access ® CINH ® PLC STOP ® No transfer ® COM ® MOT Scaling factor: 1000		

C02607

Parameter | Name: **C02607 | Holding brake: Status**			Data type: UNSIGNED_16 Index: 21968_d = $55D0_h$
Switching status of the holding brake control ▸ Holding brake control			
Display area **(min. hex value | max. hex value)**			
0x0000		0xFFFF	
Value is bit-coded:			**Information**
Bit 0	Brake applied		1 ≡ Holding brake is completely applied
Bit 1	Brake released		1 ≡ Holding brake is completely released
Bit 2	Feedforward control active		1 ≡ Feedforward control for holding of the load via the motor is active before the holding brake releases.
Bit 3	Closing active		1 ≡ The brake closing time (C02589/1) expires
Bit 4	Forced release active		1 ≡ In case of automatic operation of the holding brake control, the brake is directly released via the MCK input *bMBrakeRelease* = TRUE
Bit 5	Release active		1 ≡ The brake release time (C02589/2) expires
Bit 6	Setpoint synchronisation active		1 ≡ A speed setpoint at the MCK is approached along a defined ramp after brake release
Bit 7	Brake control fault		1 ≡ Motor phase error detected before brake is released. For configuration of monitoring see C00597.
Bit 8	Reserved		
Bit 9	Reserved		
Bit 10	Reserved		
Bit 11	Reserved		
Bit 12	Reserved		
Bit 13	Reserved		
Bit 14	Reserved		
Bit 15	Reserved		
☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☑ No transfer ☐ COM ☐ MOT			

C02610

Parameter | Name: **C02610 | MCK: Accel./decel. times**			Data type: UNSIGNED_32 Index: 21965_d = $55CD_h$
From version 02.00.00 Ramp times for speed setpoint synchronisation			
Setting range **(min. value | unit | max. value)**			
0.0	s	999.9	
Subcodes	**Lenze setting**		**Information**
C02610/1	2.0 s		Holding brake: ramp time synchr. • Ramp time for the synchronisation process to setpoint speed after the brake opening time has elapsed ▸ Holding brake control
☑ Read access ☑ Write access ® CINH ® PLC STOP ® No transfer ® COM ® MOT Scaling factor: 1000			

C02842

Parameter | Name: **C02842 | FreqInxx: Offset**			Data type: INTEGER_16 Index: 21733_d = $54E5_h$
From version 02.00.00 Offset for digital frequency input ▸ Using DI1 and DI2 as frequency inputs			
Setting range **(min. value | unit | max. value)**			
-199.99	%	199.99	
Subcodes	**Lenze setting**		**Information**
C02842/1	0.00 %		FreqIn12: Offset
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 100			

C02843

Parameter | Name: **C02843 | FreqInxx: Gain**			Data type: INTEGER_16 Index: 21732_d = $54E4_h$
From version 02.00.00 Gain for digital frequency input ▸ Using DI1 and DI2 as frequency inputs			
Setting range **(min. value | unit | max. value)**			
-199.99	%	199.99	
Subcodes	**Lenze setting**		**Information**
C02843/1	100.00 %		FreqIn12: Gain
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 100			

C02853

Parameter | Name: **C02853 | PSM: Lss saturation characteristic**			Data type: UNSIGNED_8 Index: 21722$_d$ = 54DA$_h$
From version 04.00.00			▸ Current-dependent stator leakage inductance Lss(I)
Setting range (min. value | unit | max. value)			
0	%	255	
Subcodes	**Lenze setting**		**Information**
C02853/1	100 %		PSM: Lss saturation characteristic
C02853/2	100 %		PSM: Lss saturation characteristic
C02853/3	100 %		PSM: Lss saturation characteristic
C02853/4	100 %		PSM: Lss saturation characteristic
C02853/5	100 %		PSM: Lss saturation characteristic
C02853/6	100 %		PSM: Lss saturation characteristic
C02853/7	100 %		PSM: Lss saturation characteristic
C02853/8	100 %		PSM: Lss saturation characteristic
C02853/9	100 %		PSM: Lss saturation characteristic
C02853/10	100 %		PSM: Lss saturation characteristic
C02853/11	100 %		PSM: Lss saturation characteristic
C02853/12	100 %		PSM: Lss saturation characteristic
C02853/13	100 %		PSM: Lss saturation characteristic
C02853/14	100 %		PSM: Lss saturation characteristic
C02853/15	100 %		PSM: Lss saturation characteristic
C02853/16	100 %		PSM: Lss saturation characteristic
C02853/17	100 %		PSM: Lss saturation characteristic
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☑ MOT Scaling factor: 1			

C02855

Parameter | Name: **C02855 | PSM: Imax Lss saturation characteristic**			Data type: UNSIGNED_16 Index: 21720$_d$ = 54D8$_h$
From version 04.00.00			▸ Current-dependent stator leakage inductance Lss(I)
Setting range (min. value | unit | max. value)			**Lenze setting**
0.0	A	3000.0	**3000.0 A**
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☑ MOT Scaling factor: 10			

C02859

Parameter | Name: **C02859 | PSM: Activate Lss saturation char.**		Data type: UNSIGNED_8 Index: 21716$_d$ = 54D4$_h$
From version 04.00.00		▸ Current-dependent stator leakage inductance Lss(I)
Selection list(Lenze setting printed in bold)		
0	**Off**	
1	On	
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☑ MOT Scaling factor: 1		

C02870

Parameter | Name: **C02870 | PLI without motion: Optimisation factor**			Data type: INTEGER_16 Index: 21705$_d$ = 54C9$_h$
From version 10.00.00			▸ Pole position identification without movement
Display range (min. value | unit | max. value)			
0.00	%	300.00	
Subcodes			**Information**
C02870/1			PLI without movement: degree of optimisation
☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 100			

C02871

Parameter | Name: **C02871 | PLI without motion: Running time**			Data type: INTEGER_16 Index: 21704$_d$ = 54C8$_h$
From version 10.00.00			▸ Pole position identification without movement
Display range (min. value | unit | max. value)			
0.00	ms	300.00	
Subcodes			**Information**
C02871/1			PLI without movement: runtime
☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 100			

C02872

Parameter | Name: **C02872 | PLI without motion: Adaptation of time duration**			Data type: INTEGER_8 Index: 21703$_d$ = 54C7$_h$
From version 10.00.00			▸ Pole position identification without movement
Setting range (min. value | unit | max. value)			
-10		10	
Subcodes	**Lenze setting**		**Information**
C02872/1	0		PLI without movement: adaptation of time duration
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☑ MOT Scaling factor: 1			

C02873

Parameter | Name: **C02873 | PLI without motion: Ident. el. rotor displ. angle**			Data type: INTEGER_16 Index: 21702$_d$ = 54C6$_h$
From version 10.00.00			▸ Pole position identification without movement
Display range (min. value | unit | max. value)			
0	°	360	
Subcodes			**Information**
C02873/1			PLI without movement: Ident. el. rotor displ. angle
☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 1			

C02874

Parameter | Name: **C02874 | PLI without motion**			Data type: UNSIGNED_16 Index: 21701_d = $54C5_h$
From version 10.00.00 ▸ Pole position identification without movement			
Setting range (min. hex value | max. hex value)			
0x0000		0xFFFF	
Value is bit-coded:			**Information**
Bit 0	for SLPSM with controller enable		
Bit 1	Reserved		
Bit 2	Reserved		
Bit 3	Reserved		
Bit 4	Reserved		
Bit 5	Reserved		
Bit 6	Reserved		
Bit 7	Reserved		
Bit 8	Reserved		
Bit 9	Reserved		
Bit 10	Reserved		
Bit 11	Reserved		
Bit 12	Reserved		
Bit 13	Reserved		
Bit 14	Reserved		
Bit 15	Reserved		
Subcodes	**Lenze setting**		**Information**
C02874/1	0x0001		PLI without movement
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☑ MOT			

C02875

Parameter | Name: **C02875 | PLI without motion: Adaptation of ident angle**			Data type: INTEGER_8 Index: 21700_d = $54C4_h$
From version 10.00.00 ▸ Pole position identification without movement			
Setting range (min. value | unit | max. value)			
-100	°	100	
Subcodes	**Lenze setting**		**Information**
C02875/1	0 °		PLI without movement: adaptation of ident angle
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☑ MOT Scaling factor: 1			

11.3 Selection list - analog signals

This selection list is relevant for the following configuration parameters:

Parameters	
C00620	System connection list: 16-bit
C00700	LA_NCtrl: Analog connection list

Selection list - analog signals	
0	Not connected
Frequently used constants:	
1	LS_ParFix: C_nPos100_a(100.0%)
2	LS_ParFix: C_nNeg100_a(-100.0%)
3	LS_ParFix: C_nPos199_9_a(199.9%)
4	LS_ParFix: C_nNeg199_9_a(-199.9%)
5	LS_ParFix: C_w65535
6	LS_ParFix: C_wDriveCtrl
Local DIP switch and potentiometer:	
7	LS_Local: DIP S1-S2 (Bit 15 ... bit 8 = S1; bit 0 ... bit 7 = S2)
8	LS_Local: potentiometer P2 (speed)
9	LS_Local: potentiometer P3 (ramp)
Analog terminals:	
10	LS_AnalogInput: AIn1_Out
11	LS_AnalogInput: AIn2_Out
Motor potentiometer L_MPot_1:	
12	L_MPot_1: nNSet_a
Setpoint generator L_NSet_1:	
13	LA_NCtrl: nSetSpeedValueEff_a
Digital terminals:	
14	LS_DigitalInput: nFreqIn12_a
Potentiometer P1:	
15	LS_Local: potentiometer P1 (continuous)
Free parameters (C00471/1...4):	
16	LS_ParFree: wC471_1
17	LS_ParFree: wC471_2
18	LS_ParFree: wC471_3
19	LS_ParFree: wC471_4
Free parameters (C00472/1...4):	
20	LS_ParFree_a: nC472_1_a
21	LS_ParFree_a: nC472_2_a
22	LS_ParFree_a: nC472_3_a
23	LS_ParFree_a: nC472_4_a
Data received via network (MCI/CAN):	
30	LP_Network_In: MCI_wCtrl/CAN1_wCtrl
31	LP_Network_In: MCI_wIn2/CAN1_wIn2
32	LP_Network_In: MCI_wIn3/CAN1_wIn3
33	LP_Network_In: MCI_wIn4/CAN1_wIn4
34	LP_Network_In: MCI_wIn5/CAN2_wIn1
35	LP_Network_In: MCI_wIn6/CAN2_wIn2
36	LP_Network_In: MCI_wIn7/CAN2_wIn3
37	LP_Network_In: MCI_wIn8/CAN2_wIn4

Selection list - analog signals	
Output signals of the TA "Actuating drive speed":	
50	LA_NCtrl: nMotorFreqAct_a Scaling: 16384 ≡ 100 % V/f base frequency (C00015)
51	LA_NCtrl: nMotorSpeedSet_a Scaling: 16384 ≡ 100 % reference speed (C00011)
52	LA_NCtrl: nMotorSpeedAct_a Scaling: 16384 ≡ 100 % reference speed (C00011)
53	LA_NCtrl: nMotor VoltageSmoothed_a Scaling: 16384 ≡ 1000 V
54	LA_NCtrl: nDCVoltage_a Scaling: 16384 ≡ 1000 V
55	LA_NCtrl: nMotorCurrent_a Scaling: 16384 ≡ 100 % I_{max_mot} (C00022)
56	LA_NCtrl: nMotorTorqueAct_a Scaling: 16384 ≡ 100 % M_{max} (C00057)
57	LA_NCtrl: nHeatsinktemperature_a Scaling: 0 ... 16384 ≡ 0 ... 80 °C, at sub-zero temperatures, the value "0" is output.
58	LA_NCtrl: nOutputSpeedCtrl_a Scaling: 16384 ≡ 100 % M_n (C00097)
60	LA_NCtrl: nPIDOut_a
61	LA_NCtrl: nPIDOut1_a
62	LA_NCtrl: nPIDOut2_a
63	LA_NCtrl: nPIDInfluenceOut_a
64	LA_NCtrl: nMotor Voltage_a Scaling: 16384 ≡ 1000 V
70	LA_NCtrl: wDeviceStateWord
71	LA_NCtrl: wDeviceAuxStateWord
72	LA_NCtrl: wDetermFailNoLow
73	LA_NCtrl: wDetermFailNoHigh
74	LA_NCtrl: wDetermFailNoShort
Output signals of "GeneralPurpose" functions:	
80	LS_Convert_1: Out1
81	LS_Convert_1: Out2
82	LS_Convert_2: Out1
83	LS_Convert_2: Out2
84	LS_Convert_3: Out1
85	LS_Convert_3: Out2
150	LS_ParReadWrite_1: wOutHWord
151	LS_ParReadWrite_1: wOutLWord
160	L_Counter_1: wOut

11.4 Selection list - digital signals

This selection list is relevant for the following configuration parameters:

Parameters	
C00621	System connection list: Bool
C00701	LA_NCtrl: Digital connection list

Selection list - digital signals	
0	Not connected
Frequently used constants:	
1	LS_ParFix: bTrue
Digital terminals:	
10	LS_DigitalInput: CInh
11	LS_DigitalInput: bIn1
12	LS_DigitalInput: bIn2
13	LS_DigitalInput: bIn3
14	LS_DigitalInput: bIn4
15	LS_DigitalInput: bIn5
16	LS_DigitalInput: bIn6
17	LS_DigitalInput: bIn7
18	LS_DigitalInput: bIn8
Free parameters (C00470/1...16):	
20	LS_ParFree_b: bC470_1
21	LS_ParFree_b: bC470_2
22	LS_ParFree_b: bC470_3
23	LS_ParFree_b: bC470_4
24	LS_ParFree_b: bC470_5
25	LS_ParFree_b: bC470_6
26	LS_ParFree_b: bC470_7
27	LS_ParFree_b: bC470_8
28	LS_ParFree_b: bC470_9
29	LS_ParFree_b: bC470_10
30	LS_ParFree_b: bC470_11
31	LS_ParFree_b: bC470_12
32	LS_ParFree_b: bC470_13
33	LS_ParFree_b: bC470_14
34	LS_ParFree_b: bC470_15
35	LS_ParFree_b: bC470_16
Output signals of the TA "Actuating drive speed":	
50	LA_NCtrl: bDriveFail
51	LA_NCtrl: bDriveReady
52	LA_NCtrl: bCInhActive
53	LA_NCtrl: bQSPIsActive
54	LA_NCtrl: bSafeTorqueOff
55	LA_NCtrl: bSafetyIsActive
56	LA_NCtrl: bOperationEnable
57	LA_NCtrl: bRemoteControlActive
58	LA_NCtrl: bDriveWarning
59	LA_NCtrl: bCurrentMonitoringOverload
60	LA_NCtrl: bSpeedCcw
61	LA_NCtrl: bActSpeedEqZero
62	LA_NCtrl: bSpeedSetReached
63	LA_NCtrl: bSpeedActEqSet
64	LA_NCtrl: bNActCompare
65	LA_NCtrl: bImaxActive
66	LA_NCtrl: bHeatSinkWarning
67	LA_NCtrl: bOVDetected
68	LA_NCtrl: bDCBrakeOn
69	LA_NCtrl: bFlyingSyncActive
70	LS_AnalogInput: bCurrentErrorIn1
71	LA_NCtrl: bPIDActEqSet
80	LA_NCtrl: bUVDetected
81	LA_NCtrl: bIxtOverload
82	LA_NCtrl: bI2xtOverload
83	LA_NCtrl: bMMax
84	LA_NCtrl: bNMaxFault
85	LA_NCtrl: bMotorPTCFault
87	LA_NCtrl: bAutoGSBIsActive
88	LA_NCtrl: bClampActive
89	LA_NCtrl: bIMPIsActive
90	LA_NCtrl: bSlpsmSpeedopenLoopControl
Data received via network (MCI/CAN):	
100	LP_Network_In:MCI_bCtrl_B0/CAN1_bCtrl_B0
101	LP_Network_In:MCI_bCtrl_B1/CAN1_bCtrl_B1
102	LP_Network_In:MCI_bCtrl_B2/CAN1_bCtrl_B2
103	LP_Network_In:MCI_bCtrl_B3/CAN1_bCtrl_B3
104	LP_Network_In:MCI_bCtrl_B4/CAN1_bCtrl_B4
105	LP_Network_In:MCI_bCtrl_B5/CAN1_bCtrl_B5
106	LP_Network_In:MCI_bCtrl_B6/CAN1_bCtrl_B6
107	LP_Network_In:MCI_bCtrl_B7/CAN1_bCtrl_B7
108	LP_Network_In:MCI_bCtrl_B8/CAN1_bCtrl_B8
109	LP_Network_In:MCI_bCtrl_B9/CAN1_bCtrl_B9
110	LP_Network_In:MCI_bCtrl_B10/CAN1_bCtrl_B10
111	LP_Network_In:MCI_bCtrl_B11/CAN1_bCtrl_B11
112	LP_Network_In:MCI_bCtrl_B12/CAN1_bCtrl_B12
113	LP_Network_In:MCI_bCtrl_B13/CAN1_bCtrl_B13
114	LP_Network_In:MCI_bCtrl_B14/CAN1_bCtrl_B14
115	LP_Network_In:MCI_bCtrl_B15/CAN1_bCtrl_B15
120	LP_Network_In:MCI_bIn2_B0/CAN1_bIn2_B0
121	LP_Network_In:MCI_bIn2_B1/CAN1_bIn2_B1
122	LP_Network_In:MCI_bIn2_B2/CAN1_bIn2_B2
123	LP_Network_In:MCI_bIn2_B3/CAN1_bIn2_B3
124	LP_Network_In:MCI_bIn2_B4/CAN1_bIn2_B4
125	LP_Network_In:MCI_bIn2_B5/CAN1_bIn2_B5
126	LP_Network_In:MCI_bIn2_B6/CAN1_bIn2_B6
127	LP_Network_In:MCI_bIn2_B7/CAN1_bIn2_B7
128	LP_Network_In:MCI_bIn2_B8/CAN1_bIn2_B8
129	LP_Network_In:MCI_bIn2_B9/CAN1_bIn2_B9
130	LP_Network_In:MCI_bIn2_B10/CAN1_bIn2_B10
131	LP_Network_In:MCI_bIn2_B11/CAN1_bIn2_B11
132	LP_Network_In:MCI_bIn2_B12/CAN1_bIn2_B12

Selection list - digital signals	
133	LP_Network_In:MCI_bIn2_B13/CAN1_bIn2_B13
134	LP_Network_In:MCI_bIn2_B14/CAN1_bIn2_B14
135	LP_Network_In:MCI_bIn2_B15/CAN1_bIn2_B15
140	LP_Network_In:MCI_bIn5_B0/CAN2_bIn1_B0
141	LP_Network_In:MCI_bIn5_B1/CAN2_bIn1_B1
142	LP_Network_In:MCI_bIn5_B2/CAN2_bIn1_B2
143	LP_Network_In:MCI_bIn5_B3/CAN2_bIn1_B3
144	LP_Network_In:MCI_bIn5_B4/CAN2_bIn1_B4
145	LP_Network_In:MCI_bIn5_B5/CAN2_bIn1_B5
146	LP_Network_In:MCI_bIn5_B6/CAN2_bIn1_B6
147	LP_Network_In:MCI_bIn5_B7/CAN2_bIn1_B7
148	LP_Network_In:MCI_bIn5_B8/CAN2_bIn1_B8
149	LP_Network_In:MCI_bIn5_B9/CAN2_bIn1_B9
150	LP_Network_In:MCI_bIn5_B10/CAN2_bIn1_B10
151	LP_Network_In:MCI_bIn5_B11/CAN2_bIn1_B11
152	LP_Network_In:MCI_bIn5_B12/CAN2_bIn1_B12
153	LP_Network_In:MCI_bIn5_B13/CAN2_bIn1_B13
154	LP_Network_In:MCI_bIn5_B14/CAN2_bIn1_B14
155	LP_Network_In:MCI_bIn5_B15/CAN2_bIn1_B15
Output signals of the Holding brake control:	
200	MCK: bBrkReleaseOut
201	MCK: bBrkReleased
Output signals of "GeneralPurpose" functions:	
205	L_JogCtrlExtension_1: bRfgOut
206	L_JogCtrlExtension_1: bJog1Out
207	L_JogCtrlExtension_1: bJog2Out
210	L_Counter_1: bEqual
215	L_Compare_1: bOut
220	L_DigitalDelay_1: bOut
221	L_DigitalDelay_2: bOut
Output signals of the Parameter change-over:	
230	LS_WriteParamList: bDone
231	LS_WriteParamList: bFail
Output signals of "GeneralPurpose" functions:	
238	LS_ParReadWrite_1: bDone
239	LS_ParReadWrite_1: bFail
240	L_DigitalLogic_1: bOut
241	L_DigitalLogic_2: bOut

11.5 Table of attributes

The table of attributes contains information that is required for communication with the inverter via parameters.

How to read the table of attributes:

Column		Meaning	Entry	
Code		Parameter name	Cxxxxx	
Name		Parameter short text (display text)	*Text*	
Type		Parameter type	Selection list	Value from selection list
			Bit coded	Bit coded value
			Linear value	Value with setting range
			String	String
Index	dec	Index under which the parameter is addressed. The subindex for array variables corresponds to the Lenze subcode number.	24575 - Lenze code number	Is only required for access via a bus system.
	hex		5FFF$_h$ - Lenze code number	
Data	DS	Data structure	E	Single variable (only one parameter element)
			A	Array variable (several parameter elements)
	DA	Number of array elements (subcodes)	*Number*	
	DT	Data type	INTEGER_16	2 bytes with sign
			INTEGER_32	4 bytes with sign
			UNSIGNED_8	1 byte without sign
			UNSIGNED_16	2 bytes without sign
			UNSIGNED_32	4 bytes without sign
			VISIBLE_STRING [xx]	ASCII string (with character length xx)
	Factor	Factor for data transmission via a bus system, depending on the number of decimal positions	*Factor*	1 ≡ No decimal positions 10 ≡ 1 decimal position 100 ≡ 2 decimal positions 1000 ≡ 3 decimal positions
	CINH	Writing is only possible if the controller is inhibited	CINH	

Code	Name	Parameter type	Index		Data				
			dec	hex	DS	DA	Data type	Factor	CINH
C00002	Device commands	Selection list	24573	5FFD	A	32	UNSIGNED_8	1	
C00003	Status of the last device command	Selection list	24572	5FFC	E	1	UNSIGNED_8	1	
C00005	Application	Selection list	24570	5FFA	E	1	UNSIGNED_16	1	
C00006	Motor control	Selection list	24569	5FF9	E	1	UNSIGNED_8	1	
C00007	Control mode	Selection list	24568	5FF8	E	1	UNSIGNED_16	1	
C00010	Minimum analog setpoint	Linear value	24565	5FF5	A	1	INTEGER_16	100	
C00011	Appl.: Reference speed	Linear value	24564	5FF4	E	1	UNSIGNED_16	1	
C00012	Accel. time - main setpoint	Linear value	24563	5FF3	E	1	UNSIGNED_32	1000	
C00013	Decel. time - main setpoint	Linear value	24562	5FF2	E	1	UNSIGNED_32	1000	
C00015	VFC: V/f base frequency	Linear value	24560	5FF0	E	1	UNSIGNED_16	10	
C00016	VFC: Vmin boost	Linear value	24559	5FEF	E	1	UNSIGNED_16	100	
C00018	Switching frequency	Selection list	24557	5FED	E	1	UNSIGNED_8	1	
C00019	Auto-DCB: Threshold	Linear value	24556	5FEC	E	1	UNSIGNED_16	1	
C00021	Slip comp.	Linear value	24554	5FEA	E	1	INTEGER_16	100	
C00022	Imax in motor mode	Linear value	24553	5FE9	E	1	UNSIGNED_16	100	
C00023	Imax in generator mode	Linear value	24552	5FE8	E	1	INTEGER_16	100	
C00024	Comparison value N_Act	Linear value	24551	5FE7	E	1	INTEGER_16	100	
C00026	AINx: Offset	Linear value	24549	5FE5	A	2	INTEGER_16	100	

Greyed out = display parameter (read access only)

Code	Name	Parameter type	Index		Data				
			dec	hex	DS	DA	Data type	Factor	CINH
C00027	AINx: Gain	Linear value	24548	5FE4	A	2	INTEGER_32	100	
C00028	AINx: Input voltage	Linear value	24547	5FE3	A	2	INTEGER_16	100	
C00029	AINx: Input current	Linear value	24546	5FE2	A	1	INTEGER_16	100	
C00033	AINx: Output value	Linear value	24542	5FDE	A	2	INTEGER_16	100	
C00034	AINx: Configuration	Selection list	24541	5FDD	A	1	UNSIGNED_8	1	
C00036	DCB: Current	Linear value	24539	5FDB	E	1	INTEGER_16	100	
C00039	Fixed setpoint x (L_NSet_1 n-Fix)	Linear value	24536	5FD8	A	3	INTEGER_16	100	
C00050	MCTRL: Speed setpoint	Linear value	24525	5FCD	E	1	INTEGER_32	1	
C00051	MCTRL: Actual speed value	Linear value	24524	5FCC	E	1	INTEGER_32	1	
C00052	Motor voltage	Linear value	24523	5FCB	E	1	UNSIGNED_16	1	
C00053	DC-bus voltage	Linear value	24522	5FCA	E	1	UNSIGNED_16	1	
C00054	Motor current	Linear value	24521	5FC9	E	1	UNSIGNED_16	100	
C00056	Torque	Linear value	24519	5FC7	A	2	INTEGER_32	100	
C00057	Maximum torque	Linear value	24518	5FC6	E	1	UNSIGNED_32	100	
C00058	Output frequency	Linear value	24517	5FC5	E	1	INTEGER_32	100	
C00059	Appl.: Reference frequency C11	Linear value	24516	5FC4	E	1	UNSIGNED_32	100	
C00061	Heatsink temperature	Linear value	24514	5FC2	E	1	INTEGER_16	1	
C00064	Device utilisation (Ixt)	Linear value	24511	5FBF	A	3	INTEGER_16	100	
C00066	Thermal motor load (I²xt)	Linear value	24509	5FBD	E	1	INTEGER_16	100	
C00070	Vp speed controller	Linear value	24505	5FB9	A	3	UNSIGNED_16	100	
C00071	Ti speed controller	Linear value	24504	5FB8	A	3	UNSIGNED_16	10	
C00073	VP Imax / torque controller	Linear value	24502	5FB6	E	1	UNSIGNED_16	100	
C00074	Ti Imax / torque controller	Linear value	24501	5FB5	E	1	UNSIGNED_16	1	
C00075	Vp current controller	Linear value	24500	5FB4	E	1	UNSIGNED_16	100	
C00076	Ti current controller	Linear value	24499	5FB3	E	1	UNSIGNED_16	100	
C00079	SC: Settings	Selection list	24496	5FB0	A	4	UNSIGNED_8	1	
C00081	Rated motor power	Linear value	24494	5FAE	E	1	UNSIGNED_16	100	
C00084	Motor stator resistance	Linear value	24491	5FAB	E	1	UNSIGNED_32	1	
C00085	Motor stator leakage inductance	Linear value	24490	5FAA	E	1	UNSIGNED_16	100	
C00086	Motor selection	Selection list	24489	5FA9	A	1	UNSIGNED_16	1	
C00087	Rated motor speed	Linear value	24488	5FA8	E	1	UNSIGNED_16	1	
C00088	Rated motor current	Linear value	24487	5FA7	E	1	UNSIGNED_16	100	
C00089	Rated motor frequency	Linear value	24486	5FA6	E	1	UNSIGNED_16	1	
C00090	Rated motor voltage	Linear value	24485	5FA5	E	1	UNSIGNED_16	1	
C00091	Motor cosine phi	Linear value	24484	5FA4	E	1	UNSIGNED_8	100	
C00092	Motor magnetising inductance	Linear value	24483	5FA3	E	1	UNSIGNED_16	10	
C00093	Power section ID	Linear value	24482	5FA2	E	1	UNSIGNED_16	1	
C00094	Password	Linear value	24481	5FA1	E	1	INTEGER_32	1	
C00095	Motor magnetising current	Linear value	24480	5FA0	E	1	UNSIGNED_16	100	
C00097	Rated motor torque	Linear value	24478	5F9E	E	1	UNSIGNED_32	100	
C00098	Rated device current	Linear value	24477	5F9D	E	1	UNSIGNED_16	10	
C00099	Firmware version	String	24476	5F9C	E	1	VISIBLE_STRING [12]		
C00100	Firmware version	Linear value	24475	5F9B	A	4	UNSIGNED_8	1	
C00101	Add. acceleration time x	Linear value	24474	5F9A	A	1	UNSIGNED_32	1000	
C00103	Add. acceleration time x	Linear value	24472	5F98	A	1	UNSIGNED_32	1000	
C00105	Decel. time - quick stop	Linear value	24470	5F96	E	1	UNSIGNED_32	1000	
C00106	Auto-DCB: Hold time	Linear value	24469	5F95	E	1	UNSIGNED_32	1000	
C00107	DCB: Hold time	Linear value	24468	5F94	E	1	UNSIGNED_32	1000	
C00114	DIx inversion	Bit coded	24461	5F8D	E	1	UNSIGNED_16	1	
C00115	DI1| DI2: Function	Selection list	24460	5F8C	A	1	UNSIGNED_8	1	
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Code	Name	Parameter type	Index		Data				
			dec	hex	DS	DA	Data type	Factor	CINH
C00118	DOx inversion / energy	Bit coded	24457	5F89	E	1	UNSIGNED_8	1	
C00120	Setting of motor overload (I^2xt; C0088/C0098)	Linear value	24455	5F87	E	1	INTEGER_16	100	
C00122	Initial value motor overload (I^2xt)	Linear value	24453	5F85	A	1	UNSIGNED_16	100	
C00123	Device utilisat. threshold (Ixt)	Linear value	24452	5F84	E	1	INTEGER_16	100	
C00124	Current monitoring: Breaking current	Linear value	24451	5F83	A	1	UNSIGNED_16	100	
C00129	Brake resistance value	Linear value	24446	5F7E	E	1	UNSIGNED_16	10	
C00130	Rated brake resistor power	Linear value	24445	5F7D	E	1	UNSIGNED_16	1	
C00131	Thermal capacity - brake resistor	Linear value	24444	5F7C	E	1	UNSIGNED_16	10	
C00133	Brake resistor utilisation	Linear value	24442	5F7A	E	1	UNSIGNED_16	1	
C00134	Ramp smoothing main setpoint	Selection list	24441	5F79	E	1	UNSIGNED_8	1	
C00136	Communication control words	Bit coded	24439	5F77	A	1	UNSIGNED_16	1	
C00137	Device status	Selection list	24438	5F76	E	1	UNSIGNED_16	1	
C00141	Device settings	Selection list	24434	5F72	A	1	UNSIGNED_8	1	
C00142	Auto-start option	Bit coded	24433	5F71	E	1	UNSIGNED_8	1	
C00143	Selection of special functions	Bit coded	24432	5F70	E	1	UNSIGNED_16	1	
C00144	Switching frequency reduction (temp.)	Selection list	24431	5F6F	E	1	UNSIGNED_8	1	
C00150	Status word	Bit coded	24425	5F69	E	1	UNSIGNED_16	1	
C00155	Status word 2	Bit coded	24420	5F64	E	1	UNSIGNED_16	1	
C00158	Cause of controller inhibit	Bit coded	24417	5F61	E	1	UNSIGNED_16	1	
C00159	Cause of quick stop QSP	Bit coded	24416	5F60	E	1	UNSIGNED_16	1	
C00160	Status determining error	Linear value	24415	5F5F	A	1	UNSIGNED_16	1	
C00161	Status-determining error	Linear value	24414	5F5E	A	1	UNSIGNED_32	1	
C00165	Error information	String	24410	5F5A	A	1	VISIBLE_STRING [14]		
C00166	Error information text	String	24409	5F59	A	3	VISIBLE_STRING [40]		
C00168	Error number	Linear value	24407	5F57	A	8	UNSIGNED_32	1	
C00169	Time of error	Linear value	24406	5F56	A	8	UNSIGNED_32	1	
C00170	Error counter	Linear value	24405	5F55	A	8	UNSIGNED_8	1	
C00173	Mains voltage	Selection list	24402	5F52	E	1	UNSIGNED_8	1	CINH
C00174	Reduced brake chopper threshold	Linear value	24401	5F51	E	1	UNSIGNED_8	1	
C00175	Brake energy management: Selection of the braking method	Selection list	24400	5F50	E	1	UNSIGNED_8	1	CINH
C00177	Switching cycles	Linear value	24398	5F4E	A	2	UNSIGNED_32	1	
C00178	Elapsed-hour meter	Linear value	24397	5F4D	E	1	UNSIGNED_32	1	
C00179	Power-on time meter	Linear value	24396	5F4C	E	1	UNSIGNED_32	1	
C00181	Time settings	Linear value	24394	5F4A	A	1	UNSIGNED_16	1	
C00182	S-ramp time PT1	Linear value	24393	5F49	E	1	INTEGER_16	100	
C00199	Device name	String	24376	5F38	A	1	VISIBLE_STRING [32]		
C00200	Firmware product type	String	24375	5F37	E	1	VISIBLE_STRING [19]		
C00201	Firmware compile date	String	24374	5F36	E	1	VISIBLE_STRING [22]		
C00203	Product type code	String	24372	5F34	A	9	VISIBLE_STRING [24]		
C00204	Serial number	String	24371	5F33	A	7	VISIBLE_STRING [24]		
C00210	HW version	String	24365	5F2D	A	1	VISIBLE_STRING [5]		
C00222	L_PCTRL_1: Vp	Linear value	24353	5F21	E	1	INTEGER_16	10	
C00223	L_PCTRL_1: Tn	Linear value	24352	5F20	E	1	UNSIGNED_16	1	
C00224	L_PCTRL_1: Kd	Linear value	24351	5F1F	E	1	UNSIGNED_16	10	
C00225	L_PCTRL_1: MaxLimit	Linear value	24350	5F1E	E	1	INTEGER_16	100	
C00226	L_PCTRL_1: MinLimit	Linear value	24349	5F1D	E	1	INTEGER_16	100	
C00227	L_PCTRL_1: Acceleration time	Linear value	24348	5F1C	E	1	UNSIGNED_32	1000	
C00228	L_PCTRL_1: Deceleration time	Linear value	24347	5F1B	E	1	UNSIGNED_32	1000	

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Code	Name	Parameter type	Index		Data				
			dec	hex	DS	DA	Data type	Factor	CINH
C00231	L_PCTRL_1: Operating range	Linear value	24344	5F18	A	4	INTEGER_16	100	
C00233	L_PCTRL_1: Root function	Selection list	24342	5F16	E	1	UNSIGNED_8	1	
C00234	Oscillation damping influence	Linear value	24341	5F15	E	1	UNSIGNED_16	100	
C00235	Oscillation damping filter time	Linear value	24340	5F14	E	1	UNSIGNED_8	1	
C00239	Limitation of lower speed	Linear value	24336	5F10	E	1	INTEGER_16	1	
C00241	L_NSet_1: Hyst. NSet reached	Linear value	24334	5F0E	E	1	INTEGER_16	100	
C00242	L_PCTRL_1: Operating mode	Selection list	24333	5F0D	E	1	UNSIGNED_8	1	
C00243	L_PCTRL_1: Accel. time influence	Linear value	24332	5F0C	E	1	UNSIGNED_32	1000	
C00244	L_PCTRL_1: Deceleration time influence	Linear value	24331	5F0B	E	1	UNSIGNED_32	1000	
C00245	L_PCTRL_1: PID output value	Linear value	24330	5F0A	E	1	INTEGER_16	100	
C00246	L_PCTRL_1: nAct_a internal	Linear value	24329	5F09	E	1	INTEGER_16	100	
C00273	Moment of inertia	Linear value	24302	5EEE	E	1	UNSIGNED_16	10	
C00276	SC: max. output voltage	Linear value	24299	5EEB	E	1	UNSIGNED_8	1	
C00371	CAN ErrorCode	Linear value	24204	5E8C	A	1	UNSIGNED_16	1	
C00420	Number of encoder increments	Linear value	24155	5E5B	A	1	UNSIGNED_16	1	
C00425	Encoder scanning time	Selection list	24150	5E56	A	1	UNSIGNED_8	1	CINH
C00443	DIx: Level	Bit coded	24132	5E44	A	2	UNSIGNED_16	1	
C00444	DOx: Level	Bit coded	24131	5E43	A	2	UNSIGNED_16	1	
C00445	FreqInxx_nOut_v	Linear value	24130	5E42	A	1	INTEGER_16	1	
C00446	FreqInxx_nOut_a	Linear value	24129	5E41	A	1	INTEGER_16	100	
C00461	Remote: Acceleration/deceleration time	Linear value	24114	5E32	A	1	UNSIGNED_32	1000	
C00463	Keypad: Default parameter	Linear value	24112	5E30	A	2	INTEGER_32	1000	
C00466	Keypad: Default parameter	Linear value	24109	5E2D	E	1	INTEGER_32	1	
C00467	Keypad: Default welcome screen	Selection list	24108	5E2C	E	1	INTEGER_32	1	
C00469	Keypad: Fct. STOP key	Selection list	24106	5E2A	E	1	INTEGER_32	1	
C00470	LS_ParFree_b	Selection list	24105	5E29	A	16	UNSIGNED_8	1	
C00471	LS_ParFree	Bit coded	24104	5E28	A	4	UNSIGNED_16	1	
C00472	LS_ParFree_a	Linear value	24103	5E27	A	4	INTEGER_16	100	
C00480	LS_DisFree_b	Bit coded	24095	5E1F	E	1	UNSIGNED_8	1	
C00481	LS_DisFree	Bit coded	24094	5E1E	A	4	UNSIGNED_16	1	
C00482	LS_DisFree_a	Linear value	24093	5E1D	A	4	INTEGER_16	100	
C00488	L_JogCtrlExtension_1: EdgeDetect	Selection list	24087	5E17	A	6	UNSIGNED_8	1	
C00495	Speed sensor selection	Selection list	24080	5E10	E	1	UNSIGNED_8	1	
C00496	Encoder evaluation method	Selection list	24079	5E0F	E	1	UNSIGNED_8	1	CINH
C00497	Nact filter time constant	Linear value	24078	5E0E	A	1	UNSIGNED_16	10	
C00517	User menu	Linear value	24058	5DFA	A	25	INTEGER_32	1000	
C00563	Current monitoring: Delay time	Linear value	24012	5DCC	A	1	UNSIGNED_32	1000	
C00565	Resp. to mains phase failure	Selection list	24010	5DCA	E	1	UNSIGNED_8	1	
C00567	Resp. to speed controller limited	Selection list	24008	5DC8	E	1	UNSIGNED_8	1	
C00572	Brake resistor overload threshold	Linear value	24003	5DC3	E	1	UNSIGNED_8	1	
C00574	Resp. to brake resist. overtemp.	Selection list	24001	5DC1	E	1	UNSIGNED_8	1	
C00579	Resp. to speed monitoring	Selection list	23996	5DBC	E	1	UNSIGNED_8	1	
C00581	Resp. to LS_SetError_x	Selection list	23994	5DBA	A	2	UNSIGNED_8	1	
C00582	Resp. to heatsink temp.> shutdown temp. -5°C	Selection list	23993	5DB9	E	1	UNSIGNED_8	1	
C00584	Resp. to current monitoring	Selection list	23991	5DB7	A	1	UNSIGNED_8	1	
C00585	Resp. to motor overtemp. PTC	Selection list	23990	5DB6	E	1	UNSIGNED_8	1	
C00586	Resp. to encoder open circuit	Selection list	23989	5DB5	E	1	UNSIGNED_8	1	
C00594	Resp. to control word error	Selection list	23981	5DAD	A	2	UNSIGNED_8	1	

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Code	Name	Parameter type	Index		Data				
			dec	hex	DS	DA	Data type	Factor	CINH
C00597	Resp. to LP1 motor phase fault	Selection list	23978	5DAA	E	1	UNSIGNED_8	1	
C00598	Resp. to open circuit AINx	Selection list	23977	5DA9	A	1	UNSIGNED_8	1	
C00600	Resp. to DC bus undervoltage	Selection list	23975	5DA7	A	1	UNSIGNED_8	1	
C00601	Del. resp.to fault: DC bus overvoltage	Linear value	23974	5DA6	A	1	UNSIGNED_16	1000	
C00604	Resp. to device overload (Ixt)	Selection list	23971	5DA3	E	1	UNSIGNED_8	1	
C00606	Resp. to motor overload (I²xt)	Selection list	23969	5DA1	E	1	UNSIGNED_8	1	
C00607	Resp. to max freq. feedb. DIG12	Selection list	23968	5DA0	E	1	UNSIGNED_8	1	
C00620	16-bit system connection	Selection list	23955	5D93	A	29	UNSIGNED_16	1	
C00621	Bool system connection	Selection list	23954	5D92	A	77	UNSIGNED_16	1	
C00632	L_NSet_1: Max. skip freq.	Linear value	23943	5D87	A	3	INTEGER_16	100	
C00633	L_NSet_1: Min. skip freq.	Linear value	23942	5D86	A	3	INTEGER_16	100	
C00634	L_NSet_1: wState	Bit coded	23941	5D85	E	1	UNSIGNED_16	1	
C00680	L_Compare_1: Fct.	Selection list	23895	5D57	E	1	UNSIGNED_8	1	
C00681	L_Compare_1: Hysteresis	Linear value	23894	5D56	E	1	INTEGER_16	100	
C00682	L_Compare_1: Window	Linear value	23893	5D55	E	1	INTEGER_16	100	
C00700	LA_NCtrl: Analog connection list	Selection list	23875	5D43	A	19	UNSIGNED_16	1	
C00701	LA_NCtrl: Digital connection list	Selection list	23874	5D42	A	37	UNSIGNED_16	1	
C00720	L_DigitalDelay_1: Delay	Linear value	23855	5D2F	A	2	UNSIGNED_32	1000	
C00721	L_DigitalDelay_2: Delay	Linear value	23854	5D2E	A	2	UNSIGNED_32	1000	
C00725	Current switching frequency	Selection list	23850	5D2A	E	1	UNSIGNED_8	1	
C00761	L_JogCtrlExtension_1: Digital connection list	Selection list	23814	5D06	A	11	UNSIGNED_16	1	
C00800	L_MPot_1: Upper limit	Linear value	23775	5CDF	E	1	INTEGER_16	100	
C00801	L_MPot_1: Lower limit	Linear value	23774	5CDE	E	1	INTEGER_16	100	
C00802	L_MPot_1: Acceleration time	Linear value	23773	5CDD	E	1	UNSIGNED_16	10	
C00803	L_MPot_1: Deceleration time	Linear value	23772	5CDC	E	1	UNSIGNED_16	10	
C00804	L_MPot_1: Inactive fct.	Selection list	23771	5CDB	E	1	UNSIGNED_8	1	
C00805	L_MPot_1: Init fct.	Selection list	23770	5CDA	E	1	UNSIGNED_8	1	
C00806	L_MPot_1: Use	Selection list	23769	5CD9	E	1	UNSIGNED_8	1	
C00820	L_DigitalLogic_1: Function	Selection list	23755	5CCB	E	1	UNSIGNED_8	1	
C00821	L_DigitalLogic_1: Truth table	Selection list	23754	5CCA	A	4	UNSIGNED_8	1	
C00822	L_DigitalLogic_2: Function	Selection list	23753	5CC9	E	1	UNSIGNED_8	1	
C00823	L_DigitalLogic_2: Truth table	Selection list	23752	5CC8	A	4	UNSIGNED_8	1	
C00830	16-bit analog input	Linear value	23745	5CC1	A	17	INTEGER_16	100	
C00831	16-bit common input	Bit coded	23744	5CC0	A	3	UNSIGNED_16	1	
C00833	8-bit input	Selection list	23742	5CBE	A	54	UNSIGNED_8	1	
C00876	Network MCI/CAN input words	Bit coded	23699	5C93	A	8	UNSIGNED_16	1	
C00877	Output words Network MCI/AN	Bit coded	23698	5C92	A	8	UNSIGNED_16	1	
C00890	LP_Network_InOut: Inversion	Bit coded	23685	5C85	A	4	UNSIGNED_16	1	
C00909	Speed limitation	Linear value	23666	5C72	A	2	INTEGER_16	100	
C00910	Frequency limitation	Linear value	23665	5C71	A	2	UNSIGNED_16	1	
C00920	Rated device currents	Linear value	23655	5C67	A	8	UNSIGNED_16	10	
C00937	Field-oriented motor currents	Linear value	23638	5C56	A	1	INTEGER_16	100	
C00938	PSM: Maximum motor current field weakening	Linear value	23637	5C55	E	1	UNSIGNED_16	100	
C00939	Ultimate motor current	Linear value	23636	5C54	E	1	UNSIGNED_16	10	
C00965	Max. motor speed	Linear value	23610	5C3A	E	1	UNSIGNED_16	1	
C00970	Rated device voltage	Linear value	23605	5C35	A	1	UNSIGNED_16	1	
C00971	VFC: V/f +encoder limitation	Linear value	23604	5C34	A	2	UNSIGNED_16	100	
C00972	VFC: Vp V/f +encoder	Linear value	23603	5C33	E	1	UNSIGNED_16	1000	

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			dec	hex	DS	DA	Data type	Factor	CINH
C00973	VFC: Ti V/f +encoder	Linear value	23602	5C32	E	1	UNSIGNED_16	10	
C00975	VFC-ECO: Vp	Linear value	23600	5C30	E	1	UNSIGNED_16	1000	
C00976	VFC-ECO: Ti	Linear value	23599	5C2F	E	1	UNSIGNED_16	10	
C00977	VFC-ECO: Minimum voltage V/f	Linear value	23598	5C2E	E	1	UNSIGNED_8	1	
C00978	VFC-ECO: Motor voltage Sub	Linear value	23597	5C2D	E	1	INTEGER_16	1	
C00979	Cosine phi	Linear value	23596	5C2C	A	2	INTEGER_16	100	
C00980	Performance indication	Linear value	23595	5C2B	A	4	INTEGER_16	1000	
C00981	Energy display	Linear value	23594	5C2A	A	2	INTEGER_32	100	
C00982	VFC-ECO: Motor voltage Sub ramp	Linear value	23593	5C29	E	1	UNSIGNED_8	10	
C00984	Motor flux Add	Linear value	23591	5C27	E	1	INTEGER_16	100	
C00985	SLVC: Gain of field current controller	Linear value	23590	5C26	E	1	INTEGER_16	100	
C00986	SLVC: Gain of cross current controller	Linear value	23589	5C25	E	1	INTEGER_16	100	
C00987	Inverter motor brake: nAdd	Linear value	23588	5C24	E	1	INTEGER_16	1	
C00990	Flying restart fct.: Activate	Selection list	23585	5C21	E	1	UNSIGNED_8	1	
C00991	Flying restart fct.: Process	Selection list	23584	5C20	E	1	UNSIGNED_16	1	
C00992	Flying restart: Start frequency	Linear value	23583	5C1F	E	1	INTEGER_16	1	
C00994	Flying restart: Current	Linear value	23581	5C1D	E	1	INTEGER_16	100	
C00995	SLPSM: Controlled current setpoint	Linear value	23580	5C1C	A	2	UNSIGNED_16	100	
C00996	SLPSM: Switching speed	Linear value	23579	5C1B	A	2	INTEGER_16	100	
C00997	SLPSM: Filter cutoff frequency	Linear value	23578	5C1A	E	1	INTEGER_16	100	
C00998	SLPSM: Filter time rotor position	Linear value	23577	5C19	A	2	INTEGER_16	10	
C00999	SLPSM: PLL gain	Linear value	23576	5C18	E	1	INTEGER_16	1	
C01000	MCTRL: Status	Bit coded	23575	5C17	E	1	UNSIGNED_16	1	
C01004	Load Lenze setting without C002/1	Bit coded	23571	5C13	A	1	UNSIGNED_16	1	
C01082	LS_WriteParamList: Execute Mode	Selection list	23493	5BC5	E	1	UNSIGNED_8	1	
C01083	LS_WriteParamList: FailState	Linear value	23492	5BC4	E	1	UNSIGNED_16	1	
C01084	LS_WriteParamList: Error line	Linear value	23491	5BC3	E	1	UNSIGNED_8	1	
C01085	LS_WriteParamList: Index	Linear value	23490	5BC2	A	16	INTEGER_32	1000	
C01086	LS_WriteParamList: WriteValue_1	Linear value	23489	5BC1	A	16	INTEGER_32	1	
C01087	LS_WriteParamList: WriteValue_2	Linear value	23488	5BC0	A	16	INTEGER_32	1	
C01090	LS_ParReadWrite_1: Index	Linear value	23485	5BBD	A	1	INTEGER_32	1000	
C01091	LS_ParReadWrite_1: Cycle time	Selection list	23484	5BBC	A	1	UNSIGNED_16	1	
C01092	LS_ParReadWrite_1: FailState	Linear value	23483	5BBB	A	1	UNSIGNED_16	1	
C01100	L_Counter_1: Function	Selection list	23475	5BB3	A	1	UNSIGNED_8	1	
C01101	L_Counter_1: Comparison	Selection list	23474	5BB2	A	1	UNSIGNED_8	1	
C01206	Axis data: Mounting direction	Selection list	23369	5B49	A	2	UNSIGNED_8	1	CINH
C01350	ACDrive: Drive mode	Selection list	23225	5AB9	A	1	UNSIGNED_8	1	
C01351	ACDrive: Control word	Bit coded	23224	5AB8	A	1	UNSIGNED_16	1	
C01352	ACDrive: Status word	Bit coded	23223	5AB7	A	1	UNSIGNED_16	1	
C01353	ACDrive: Setpoint scaling	Linear value	23222	5AB6	A	2	INTEGER_8	1	
C01354	LS_Convert	Selection list	23221	5AB5	A	3	UNSIGNED_8	1	CINH
C01501	Resp. to communication error with MCI	Selection list	23074	5A22	A	2	UNSIGNED_8	1	
C01503	MCI timeout	Linear value	23072	5A20	A	1	UNSIGNED_16	1	
C01700	Energy saving mode: Mode	Linear value	22875	595B	A	2	UNSIGNED_8	1	
C01701	Energy saving mode: toff min	Linear value	22874	595A	A	1	UNSIGNED_16	1	
C01702	Energy saving mode: toff	Linear value	22873	5959	A	1	UNSIGNED_16	1	
C01703	Energy saving mode: ton	Linear value	22872	5958	A	1	UNSIGNED_16	1	
C01704	Energy saving mode: Function	Bit coded	22871	5957	A	1	UNSIGNED_16	1	
C01709	Energy saving mode: Status	Linear value	22866	5952	A	1	UNSIGNED_8	1	

Greyed out = display parameter (read access only)

Code	Name	Parameter type	Index		Data				
			dec	hex	DS	DA	Data type	Factor	CINH
C01905	Diagnostics X6: Current baud rate	Linear value	22670	588E	E	1	UNSIGNED_16	1	
C01911	Function DIP switch S1	Bit coded	22664	5888	E	1	UNSIGNED_8	1	
C01912	Function DIP switch S2	Bit coded	22663	5887	E	1	UNSIGNED_8	1	
C01913	Switch position	Linear value	22662	5886	A	3	INTEGER_16	100	
C02580	Holding brake: Operating mode	Selection list	21995	55EB	E	1	UNSIGNED_8	1	
C02581	Holding brake: Speed thresholds	Linear value	21994	55EA	A	3	INTEGER_16	100	
C02582	Holding brake: Setting	Bit coded	21993	55E9	E	1	UNSIGNED_8	1	
C02589	Holding brake: Time system	Linear value	21986	55E2	A	3	UNSIGNED_16	1	
C02593	Holding brake: Activation time	Linear value	21982	55DE	A	2	UNSIGNED_32	1000	
C02607	Holding brake: Status	Bit coded	21968	55D0	E	1	UNSIGNED_16	1	
C02610	MCK: Accel./decel. times	Linear value	21965	55CD	A	1	UNSIGNED_32	1000	
C02842	FreqInxx: Offset	Linear value	21733	54E5	A	1	INTEGER_16	100	
C02843	FreqInxx: Gain	Linear value	21732	54E4	A	1	INTEGER_16	100	
C02853	PSM: Lss saturation characteristic	Linear value	21722	54DA	A	17	UNSIGNED_8	1	
C02855	PSM: Imax Lss saturation characteristic	Linear value	21720	54D8	E	1	UNSIGNED_16	10	
C02859	PSM: Activate Ppp saturation char.	Selection list	21716	54D4	E	1	UNSIGNED_8	1	
C02870	PLI without movement: degree of optimisation	Linear value	21705	54C9	A	1	INTEGER_16	100	
C02871	PLI without movement: runtime	Linear value	21704	54C8	A	1	INTEGER_16	100	
C02872	PLI without movement: adaptation of time duration	Linear value	21703	54C7	A	1	INTEGER_8	1	
C02873	PLI without movement: Ident. el. rotor displ. angle	Linear value	21702	54C6	A	1	INTEGER_16	1	
C02874	PLI without movement	Bit coded	21701	54C5	A	1	UNSIGNED_16	1	
C02875	PLI without movement: adaptation of ident angle	Linear value	21700	54C4	A	1	INTEGER_8	1	

Greyed out = display parameter (read access only)

12 Function library

This chapter describes the function and system blocks that are part of the application.

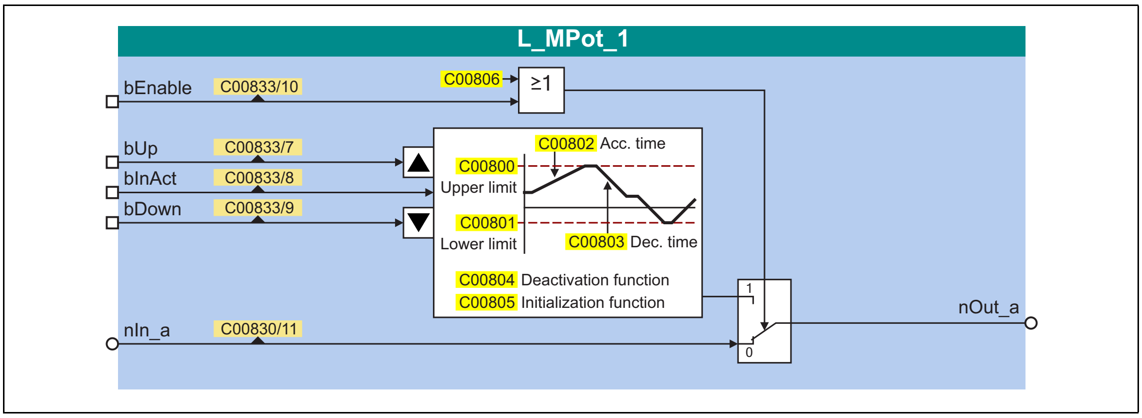
Function block	Function
L_MPot_1	Motor potentiometer (as alternative setpoint source)
L_NSet_1	Setpoint generator
L_PCTRL_1	Process controller
L_RLQ_1	Fail-safe linking of a selected direction of rotation to the quick stop function (QSP)
GP: GeneralPurpose The following "GeneralPurpose" functions are freely available:	
L_Compare_1	Analog comparison
L_Counter_1	Digital up/down counter
L_DigitalDelay_1	Binary delay element (e.g. for debouncing a digital input)
L_DigitalDelay_2	
L_DigitalLogic_1	From version 02.00.00 Configurable logic operation of two digital input signals
L_DigitalLogic_2	From version 04.00.00 Configurable logic operation of two digital input signals
L_JogCtrlExtension_1	From version 05.00.00 To implement a switch-off positioning at limit switch

System block	Function
LS_AnalogInput	Interface to the analog input terminals ▸ Analog terminals (🕮 214)
LS_Convert_1	From version 05.00.00 Conversion/scaling of setpoint values and actual values
LS_Convert_2	
LS_Convert_3	
LS_DigitalInput	Interface to the digital input terminals ▸ Digital terminals (🕮 207)
LS_DigitalOutput	Interface to the digital output terminals ▸ Digital terminals (🕮 207)
LS_DisFree	Display of 4 arbitrary 16-bit signals of the application on display codes
LS_DisFree_a	Display of 4 arbitrary analog signals of the application on display codes
LS_DisFree_b	Display of 8 arbitrary digital signals of the application on a bit coded display code
LS_DriveInterface	Interface to drive control (DCTRL) ▸ Device control (DCTRL) (🕮 61)
LS_ParFix	Output of different constant values
LS_ParFree	Output of 4 parameterisable 16-bit signals
LS_ParFree_a	Output of 4 parameterisable analog signals
LS_ParFree_b	Output of 16 parameterisable digital signals
LS_SetError_1	Parameterisable responses to user-defined events are tripped
LS_ParReadWrite_1	From version 04.00.00 Reading/Writing of local parameters
LS_WriteParamList	Interface to the basic "Parameter change-over" function ▸ Parameter change-over (🕮 289)

12.1 L_MPot_1

This FB replaces a hardware motor potentiometer and can be used as an alternative setpoint source controlled via two inputs.

- The signal is output via a ramp function generator with linear ramps.
- The acceleration and deceleration times are set via parameters.
- Constant ramping even with speed limit values changed online.
- The motor potentiometer function can be switched on/off online via parameters or a process signal.



inputs

Designator Data type	Information/possible settings	
bEnable BOOL	Switch over motor potentiometer function *bEnable* input and C00806 code are ORed.	
	TRUE	Motor potentiometer function is active, setpoint can be changed via *bUp* and *bDown*. • With switching to TRUE, the value applied to *nIn_a* is automatically transferred to the motor potentiometer.
	FALSE	The value applied to *nIn_a* is output at *nOut_a*.
nIn_a INT	When bEnable = FALSE, the analog nIn_ is input signal switched to the nOut_a output.	
bUp BOOL	Approaching of the upper speed limit value set in C00800.	
	TRUE	The *nOut_a* output signal runs to its upper limit value (*nHighLimit*). • If the *bDown* input is simultaneously set to TRUE, the *nOut_a* output signal is not changed.
bDown BOOL	Approaching of the lower speed limit value set in C00801.	
	TRUE	The *nOut_a* output signal runs to its lower limit value (*nLowLimit*). • If the *bUp* input is simultaneously set to TRUE, the *nOut_a* output signal is not changed.
bInAct BOOL	Deactivate motor potentiometer function • This input has the highest priority. • When the motor potentiometer is deactivated, the *nOut_a* output signal follows the function set with code C00804.	
	TRUE	Motor potentiometer function is deactivated.

outputs

Designator Data type	Value/meaning
nOut_a INT	Output signal

Parameters

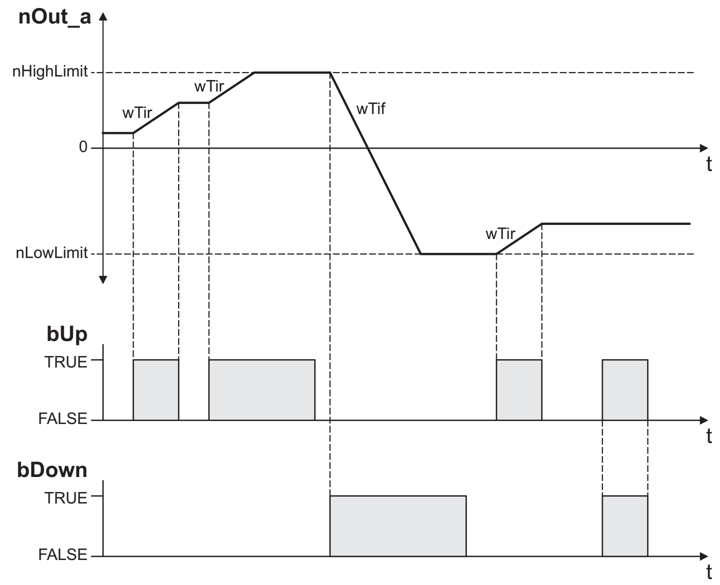
Parameters	Possible settings			Information
C00800	-199.9	%	199.9	Upper limit - Lenze setting: 100.0 %
C00801	-199.9	%	199.9	Lower limit - Lenze setting: -100.0 %
C00802	0.1	s	999.9	Acceleration time - Lenze setting: 10.0 s
C00803	0.1	s	999.9	Deceleration time - Lenze setting: 10.0 s
C00804				Inactive function - Selection of response when deactivating the motor potentiometer via the input *bInAct*.
	0	**Retain value** (Lenze setting)		No further action; *nOut_a* retains its value.
	1	Deceleration to 0		The motor potentiometer returns to 0 % within the deceleration time T_{if}.
	2	Deceleration to lower limit		The motor potentiometer runs to the lower limit value (C00801) within the deceleration time T_{if}.
	3	Without ramp to 0		**Important for the emergency stop function** The motor potentiometer output immediately changes to 0 %
	4	Without ramp to lower limit		The motor potentiometer output immediately changes to the lower limit value (C00801).
	5	Acceleration to upper limit		The motor potentiometer runs to the upper limit value (C00800) within the acceleration time T_{ir}.
C00805				Init function - Selection of response when switching on the device.
	0	**Load last value** (Lenze setting)		The output value being output during mains power-off is saved non-volatilely in the internal memory of the inverter. It will be reloaded during mains power-on.
	1	Load lower limit		The lower limit value (C00801) is loaded during mains power-on.
	2	Load 0		An output value = 0 % is loaded during mains power-on.

Parameters	Possible settings		Information
C00806			Use of the motor potentiometer
	0	**No** (Lenze setting)	The motor potentiometer is not used. • The analog value applied to the *nIn_a* input is looped through without any changes to the *nOut_a* output.
	1	Yes	The motor potentiometer is used. • The analog value applied at the *nIn_a* input is led via the motor potentiometer and provided at the *nOut_a* output.

12.1.1 Activate & control motor potentiometer

When *bInAct* is set to FALSE, the motor potentiometer is activated.

- The currently active function depends on the current output signal *nOut_a*, the limit values set and the control signals at *bUp* and *bDown*.
- When the *nOut_a* output signal is outside the limits set, the output signal runs to the next limit with the Ti times set. This process is independent of the control signals at *bUp* and *bDown*.
- When the *nOut_a* output signal is inside the limits set, the output signal changes according to the control signals at *bUp* and *bDown*.

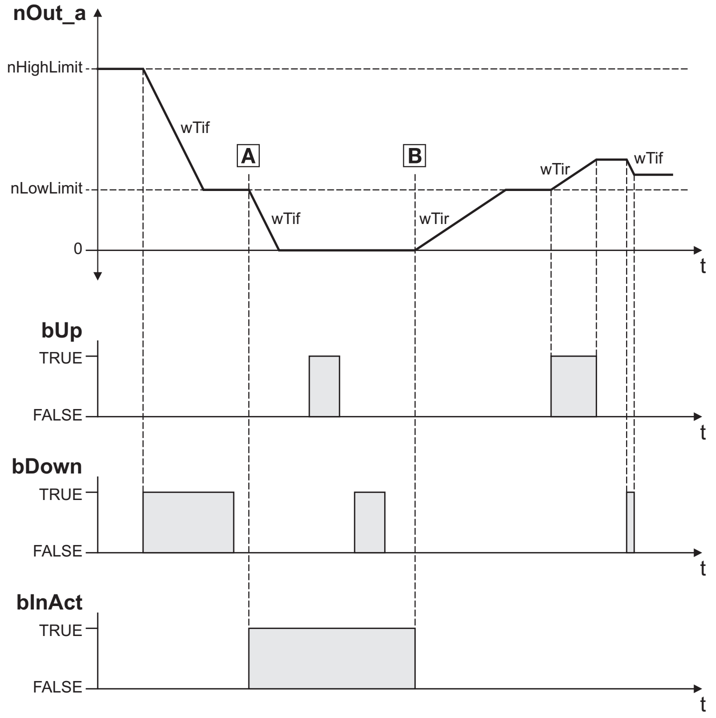


[12-1] Example: Control of the motor potentiometer

bUp	bDown	bInact	Function
FALSE	FALSE	FALSE	The *nOut_a* output signal remains unchanged.
TRUE	FALSE		The *nOut_a* output signal runs to its upper limit value (*nHighLimit*).
FALSE	TRUE		The *nOut_a* output signal runs to its lower limit value (*nLowLimit*).
TRUE	TRUE		The *nOut_a* output signal remains unchanged.
-	-	TRUE	The motor potentiometer function is deactivated. The *nOut_a* output signal responds according to the function selected via *Function*.

12.1.2 Deactivate motor potentiometer

When the motor potentiometer is deactivated by setting *bInAct* to TRUE, the *nOut_a* output signal responds according to the function selected in C00804.



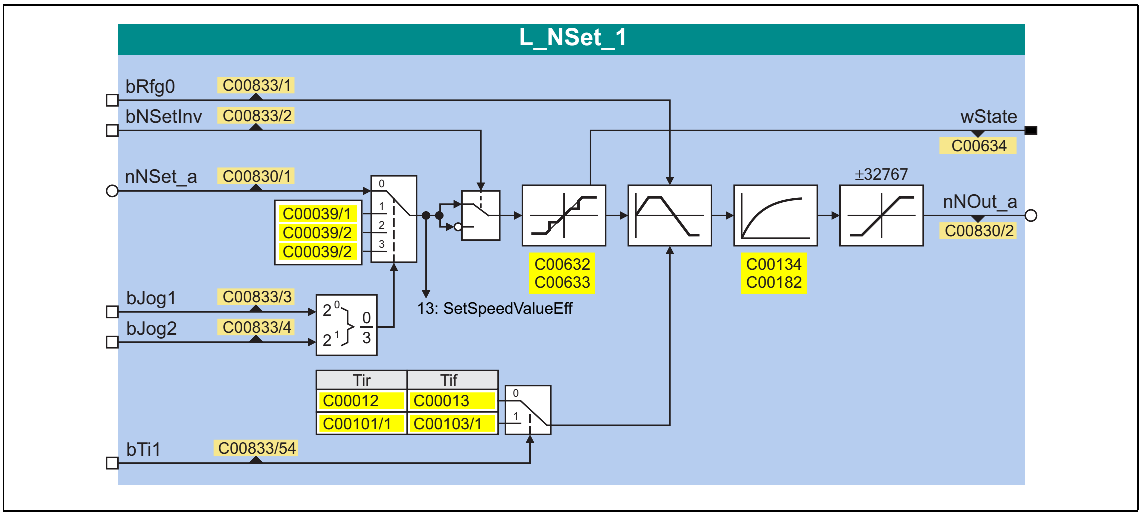
A When the motor potentiometer is deactivated, *nOut_a* is reduced to 0 % with the deceleration time *wTif*.
B If it is activated again, *nOut_a* is increased again to *nLowLimit* with the acceleration time *wTir*.

[12-2] Example: Deactivation of the motor potentiometer if C00804 = "1: Deceleration to 0"

12.2 L_NSet_1

This FB is used for general signal processing of process values and is provided with the following functions:

- Ramp function generator
  - With linear ramps for main setpoint path
  - With S-shaped ramp (PT1 rounding)
- From version 10.00.00: 2 acceleration and deceleration times
- Internal limitation of the input signal
- 3 adjustable blocking zones
- 3 fixed setpoints (JOG setpoints)



inputs

Designator Data type	Information/possible settings	
bRfg0 BOOL	Leading the main setpoint integrator to 0 within the current Ti times	
	TRUE	The current value of the main setpoint integrator is led to "0" within the Ti time set.
bNSetInv BOOL	Signal inversion for the main setpoint	
	TRUE	Main setpoint signal is inverted.
nNset_a INT	Main setpoint signal • Scaling: 16384 ≡ 100 % • Other signals are also permitted	
bJog1 / bJog2 BOOL	Inputs for overriding fixed setpoints (JOG setpoints) for the main setpoint • Selection inputs are binary coded.	
bTi1 BOOL	From version 10.00.00 Selection input for activating the additional acceleration time/deceleration time for the main setpoint.	
	TRUE	Additional acceleration time/deceleration time is activated.

outputs

Designator Data type	Value/meaning	
nNOut_a INT	Speed setpoint output signal • Scaling: 16384 ≡ 100 %	
wState WORD	Bit-coded status word • Bits that are not listed are reserved for future extensions.	
	Bit 0	No blocking zone active
	Bit 1	Blocking zone 1 active
	Bit 2	Blocking zone 2 active
	Bit 3	Blocking zone 3 active
	Bit 4	Jog in blocking zone
	Bit 5	MaxLimit active
	Bit 6	MinLimit active

Parameters

Parameters	Possible settings			Information
C00012	0.0	s	999.9	Acceleration time T_{ir} for the main setpoint • Lenze setting: 2.0 s
C00013	0.0	s	999.9	Deceleration time T_{if} for the main setpoint • Lenze setting: 2.0 s
C00039/1	-199.9	%	199.9	Fixed setpoint 1 (JOG setpoint 1) • Lenze setting: 40.0 %
C00039/2	-199.9	%	199.9	Fixed setpoint 2 (JOG setpoint 2) • Lenze setting: 60.0 %
C00039/3	-199.9	%	199.9	Fixed setpoint 3 (JOG setpoint 3) • Lenze setting: 80.0 %
C00101/1	0.0	s	999.9	From version 10.00.00 Additional acceleration time T_{ir1} for the main setpoint • Lenze setting: 0.0 s
C00103/1	0.0	s	999.9	From version 10.00.00 Additional deceleration time T_{if} for the main setpoint • Lenze setting: 0.0 s
C00134				Activates ramp rounding with PT1 behaviour for the main setpoint • The corresponding S-ramp time must be set in C00182. • Lenze setting: 0 (deactivated)
	0	Off		
	1	PT1 behaviour		
C00182	0.01	s	50.00	S-ramp time PT1 • Lenze setting: 20.00 s
C00632/1...3	0.0	%	199.9	Maximum limit values for the speed blocking zones • Selection of the maximum limit values for the blocking zones in which the speed must not be constant. • Lenze setting: 0.0 %

Parameters	Possible settings				Information
C00633/1...3	0.0		%	199.9	Minimum limit values for the speed blocking zones • Selection of the minimum limit values for the blocking zones in which the speed must not be constant. • Lenze setting: 0.0 %
C00634					Status (bit-coded) • Bits that are not listed are reserved for future extensions.
	Bit 0	No blocking zone active			
	Bit 1	Blocking zone 1 active			
	Bit 2	Blocking zone 2 active			
	Bit 3	Blocking zone 3 active			
	Bit 4	Jog in blocking zone			
	Bit 5	MaxLimit active			
	Bit 6	MinLimit active			

12.2.1 Main setpoint path

- The signals in the main setpoint path are limited to a value range of ±32767.
- The signal at *nNSet_a* is first led via the JOG selection function.
- A selected JOG value switches the *nNSet_a* input inactive. Then, the subsequent signal conditioning operates with the JOG value.

12.2.2 JOG setpoints

In addition to the direct main setpoint selection via the *nNSet_a* input, so-called JOG setpoints can be preset in C00039/1...3.

- The JOG setpoints are binary-coded and can be called using the *bJog1* and *bJog8* selection inputs:

Selection inputs		Used main setpoint
bJog2	bJog1	
FALSE	FALSE	*nNset_a*
FALSE	TRUE	C00039/1
TRUE	FALSE	C00039/2
TRUE	TRUE	C00039/3

- The number of selection inputs to be assigned depends on the number of JOG setpoints required.

12.2.3 Setpoint inversion

The output signal of the JOG function is led via an inverter.

The sign of the setpoint changes if *bNSetInv* is set to TRUE.

12.2.4 Skip frequency function

If the speed setpoints in speed-variable drives are linearly increasing, for instance, the frequency/speed range is divided into a number of equal time segments. Therefore, there may be speeds during acceleration time which must be bridged very fast (e.g. natural resonant frequencies).

The skip frequency function offers the opportunity to select a range in which the initial speed is maintained. If the speed setpoint leaves that range, the drive will be accelerated to reach the desired speed.

Note!

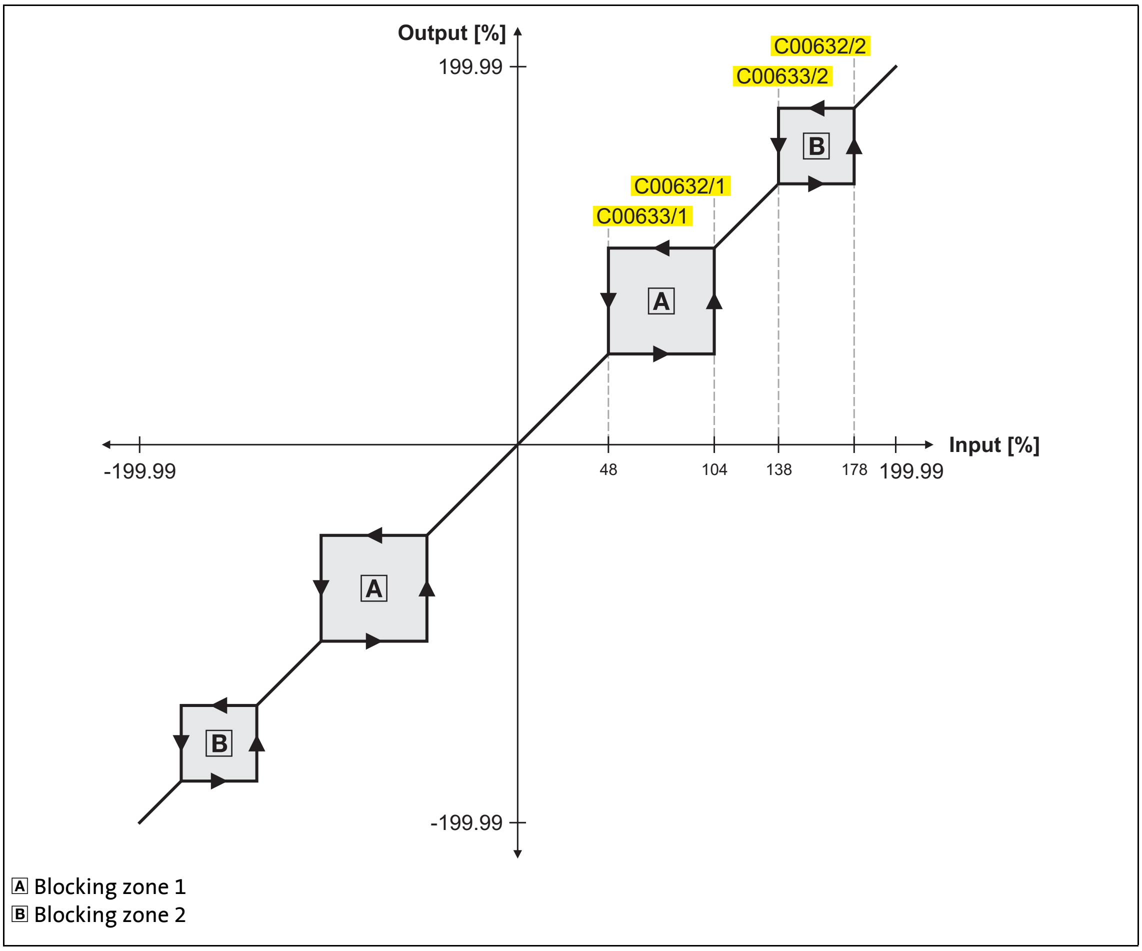
- Blocking frequencies act on the main setpoint only.
- It is not possible to exclude "0" speed if there is a sign reversal of the speed setpoint.

Definition of the blocking zones

The subcodes of codes C00632 and C00633 can be used to define three zones which are to be skipped by the output setpoint and which are to be passed as fast as possible by the ramp function generator.

The example below shows the parameter setting of two blocking zones:

Parameters	Blocking zone 1		Blocking zone 2		Blocking zone 3	
Minimum limit value	C00633/1:	48 %	C00633/2:	138 %	C00633/3:	0 %
Maximum limit value	C00632/1:	104 %	C00632/2:	178 %	C00632/3:	0 %



[12-3] Zone masking by means of parameterisable blocking zones

- The parameterised blocking zones have the same effect on negative input signals.
- A blocking zone is deactivated by entering identical limit values (in our example: blocking zone 3).

Overlapping of blocking zones

If blocking zones overlap, the lowest and highest value of the overlapping zones form a new zone.

In this case, the status display (output *wState* or display parameter C00634) only indicates one zone (the lower of the two original zones).

Abutting blocking zones

If two blocking zones abut (e.g. 20 ... 30 % and 30 ... 40 %), the limit value between the two zones (in this example 30 %) is also passed through.

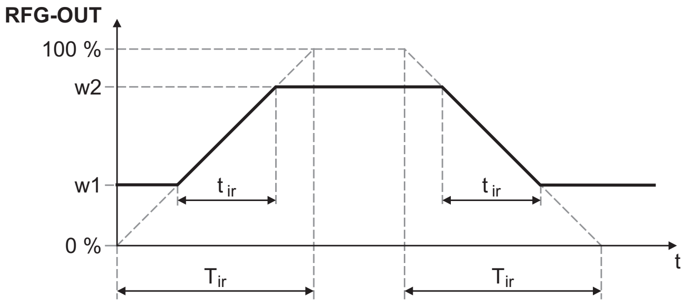
The same applies to a limit range of 0 ... xx %. During zero crossing of the speed setpoint, "0" speed is output as setpoint. It is possible to exclude "0" speed. However, in this case, the output speed will remain on the upper limit value when the input setpoint becomes "0".

Tip!

As described above, the acceleration phase starts after the blocking zones have been passed through. The ramp function generator integrated in the **L_NSet_1** function block limits the progression of the speed. For this reason, the time values set for the integrated ramp function generator should be as low as possible whereas the setpoint for the FB **L_NSet_1** should be generated by a ramp function generator with higher time values (e.g. FB L_MPot).

12.2.5 Ramp function generator for the main setpoint

The setpoint is now led via a ramp function generator with linear characteristic. The ramp function generator converts setpoint step-changes at the input into a ramp.



w1, w2 = change of the main setpoint as a function of t_{ir} and t_{if}
RFG-OUT = output of the ramp function generator

[12-4] Acceleration and deceleration times

- t_{ir} and t_{if} are the desired times for changing between w1 and w2.
- The ramps for acceleration and deceleration can be set individually.
  - C00012: Acceleration time t_{ir}
  - C00013: Deceleration time t_{if}

  From version 10.00.00 onwards:
  - C00101/1: Additional acceleration time T_{ir1}
  - C00103/1: Additional deceleration time T_{if1}
- The t_{ir}/t_{if} values are converted into the required Ti times according to the following formula:

$T_{ir} = t_{ir} \cdot \frac{100\ \%}{w2 - w1}$	$T_{if} = t_{if} \cdot \frac{100\ \%}{w2 - w1}$

- When the *bRfg0* output is set to TRUE, the ramp function generator brakes to 0 along its deceleration ramp.

12.2.6 S-ramp

A PT1 element is connected downstream of the linear ramp function generator. This arrangement implements an S-shaped ramp for a nearly jerk-free acceleration and deceleration.

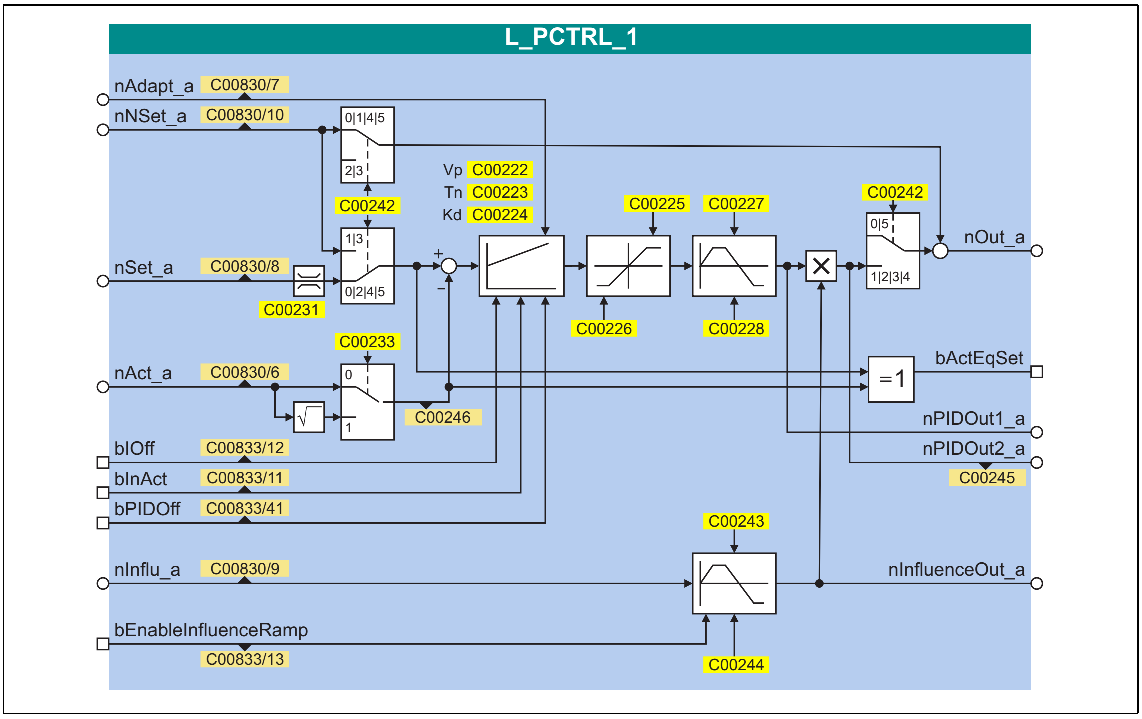
- The PT1 element can be switched on/off via C00134.
- The corresponding S-ramp time can be set under C00182.

12.3 L_PCTRL_1

This FB is a PID controller and can be used for various control tasks (e.g. as dancer position controller, tension controller, or pressure controller).

The FB is provided with the following functions:

- Adjustable control algorithm (P, PI, PID)
- Ramp function generator for preventing setpoint step-changes at the input
- Limitation of the controller output
- Factorisation of the output signal
- Vp adaptation
- Integral action component can be switched off



Note!

Before using this FB, deactivate the automatic DC-injection braking. See note in the chapter ▸ Automatic DC-injection braking (auto DCB) (🕮 174).

inputs

Designator	Data type	Information/possible settings	
nAdapt_a	INT	Adaptation of gain Vp set in C00222 in percent • Internal limitation to ± 199.9 % • Changes can be done online. • Display parameter: C00830/7	
nNset_a	INT	Speed setpoint • Scaling: 16384 ≡ 100 % • Internal limitation to ± 199.9 % • Display parameter: C00830/10	
nSet_a	INT	Sensor and process setpoint for operating modes 2, 4 and 5 • Scaling: 16384 ≡ 100 % • Internal limitation to ± 199.9 % • Display parameter: C00830/8	
nAct_a	INT	Speed or actual sensor value (actual process value) • Scaling: 16384 ≡ 100 % • Internal limitation to ± 199.9 % • Display parameter: C00830/6	
bIOff	BOOL	Switch off the I-component of the process controller • Changes can be done online. • Display parameter: C00833/12	
		TRUE	I-component of the process controller is switched off.
bInAct (from version 04.00.00)	BOOL	Deactivate process controller temporarily (stop) • Changes can be done online. • Display parameter: C00833/11	
		TRUE	• The current output value is frozen. • The internal control algorithm is stopped. • However, a setpoint selected via input *nNSet_a* is still provided in operating modes 0/1/4/5.
bPIDOff (from version 04.00.00)	BOOL	Reset the entire PID controller • Display parameter: C00833/41	
		TRUE	• The I component of the controller is set to zero. • The controller output is set to zero. • The internal control algorithm is stopped.
nInflu_a	INT	Limitation of the influencing factor in percent • *nInflu_a* serves to limit the influencing factor of the PID controller contained in the FB to a required value (- 199.9 % ... + 199.9 %). • Scaling: 16384 ≡ 100 % • Internal limitation to ± 199.9 % • Display parameter: C00830/9	
bEnableInfluenceRamp	BOOL	Activate ramp for influencing factor • Display parameter: C00833/13	
		TRUE	Influencing factor of the PID controller is ramped up to the *nInflu_a* value.
		FALSE	Influencing factor of the PID controller is ramped down to "0".

outputs

Designator Data type	Value/meaning
nOut_a INT	Output signal • Internal limitation to ±32767 (±199.9 %) • Scaling: 16384 ≡ 100 %
bActEqSet INT	Status output "Setpoint and actual value are identical" TRUE: Setpoint and actual value are identical, i.e. no system deviation available.
nPIDOut1_a INT	PID controller output without influencing factor *nInflu_a* • The inputs *bEnableInfluenceRamp* and *nInflu_a* do not have any effect here, the limited PID output value influenced by the internal ramp times is output. • There is no connection with the additive input *nNSet_a*. • Scaling: 16384 ≡ 100 %
nPIDOut2_a INT	PID controller output with influencing factor *nInflu_a* • There is no connection with the additive input *nNSet_a*. • Scaling: 16384 ≡ 100 % • Display parameter: C00245
nInfluenceOut_a INT	Current influencing factor ("ramp status") on the PID output value • Scaling: 16384 ≡ 100 %

Parameters

Parameters	Possible settings			Information
C00222	0.1		500.0	Gain Vp • Lenze setting: 1.0
C00223	20	ms	6000	Reset time Tn • Lenze setting: 400 ms
C00224	0.0		5.0	Differential component Kd • Lenze setting: 0.0
C00225	-199.9	%	+199.9	Maximum value of the PID operating range • Lenze setting: 199.9 %
C00226	-199.9	%	+199.9	Minimum value of the PID operating range • Lenze setting: -199.9 %
C00227	0.0	s	999.9	Acceleration time for the ramp at the PID output (should be set as steep as possible) • Lenze setting: 0.1 s
C00228	0.0	s	999.9	Deceleration time for the ramp at the PID output • Lenze setting: 0.1 s
C00231/1 (Pos. Maximum) C00231/2 (Pos. Minimum) C00231/3 (Neg. Minimum) C00231/4 (Neg. Maximum)	0.0	%	199.9	Operating range • Determination of the operating range for the PID process controller by limiting the input signal *nSet_a*. • Lenze setting: No limitation (-199.9 % ... +199.9 %)

Parameters	Possible settings			Information
C00233 (from version 04.00.00)				Root function • Lenze setting: "0: Off"
	0	Off		The actual value at *nAct_a* is not changed for further processing.
	1	On		The square root of the actual value at *nAct_a* is taken for further processing.
C00242				Operating mode • Lenze setting: "0: Off"
	0	Off		The input setpoint *nNSet_a* is output without any changes at the output *nOut_a*.
	1	nNSet + nNSet_PID		*nNSet_a* and *nAct_a* are used as PID input values. The arriving *nNSet_a* is additively linked to the value output by the PID element.
	2	nSet_PID		*nSet_a* and *nAct_a* are used as PID input values. The input *nNSet_a* is not considered.
	3	nNSet_PID		*nNSet_a* and *nAct_a* are used as PID input values. The input *nSet_a* is not considered.
	4	nNSet + nSet_PID (from version 04.00.00)		*nSet_a* and *nAct_a* are used as PID input values. The arriving *nNSet_a* setpoint is additively linked to the value output by the PID element.
	5	nNSet || nSet_PID (from version 04.00.00)		*nSet_a* and *nAct_a* are used as PID input values. The setpoint *nNSet_a* is output at the output *nOut_a* . The PID output value is output at the output *nPIDOut_a*.
C00243	0.0	s	999.9	Influence acceleration time • Acceleration time T_{ir} for the influencing factor. • Lenze setting: 5.0 s
C00244	0.0	s	999.9	Influence deceleration time • Deceleration time T_{if} for the influencing factor. • Lenze setting: 5.0 s
C00245	-199.9	%	+199.9	Display of PID output value *nPIDOut_a*
C00246 (from version 04.00.00)	-199.99	%	+199.99	Display of the internal PID input value *nAct_a*

12.3.1 Control characteristic

The PI algorithm is active in the Lenze setting.

Gain (P component)

The input value is controlled by a linear characteristic. The slope of the characteristic is determined by the controller gain Vp.

The controller gain Vp is set under C00222.

- The controller gain can be adapted via the input *nAdapt_a* (also possible in online mode).
- The input value *nAdapt_a* has a direct effect on the controller gain:

$$\text{P} = \text{nAdapt\_a} \cdot \text{C00222}$$

Example: With the parameterised controller gain Vp = 2.0 and *nAdapt_a* = 75 %, the resulting gain factor is as follows:

$$\text{P} = \frac{75\,[\%]}{100\,[\%]} \cdot 2.0 = 1.5$$

Integral action component (I component)

The I component of the controller can be deactivated by setting the input *bIOff* to TRUE.

- Setting the reset time Tn to the maximum value of "6000 ms" also deactivates the I component.
- The I component can be switched on and off online.

Reset time

The adjustment time Tn is set under C00223.

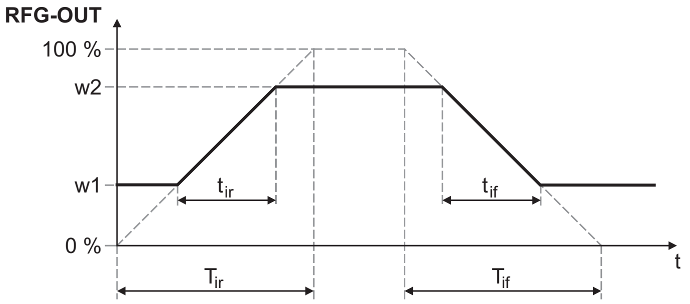
Differential component Kd (D component)

The differential component Kd is set under C00224.

- The setting "0.0 s" deactivates the D component (Lenze setting). In this way, the PID controller becomes a PI controller or P controller, if the I component has been deactivated as well.

12.3.2 Ramp function generator

The PID output is led via a ramp function generator with linear characteristic. This serves to transfer setpoint step-changes at the PID output into a ramp which should be as steep as possible.



w1, w2 = change of the main setpoint as a function of t_{ir} and t_{if}
RFG-OUT = output of the ramp function generator

[12-5] Acceleration and deceleration times

- t_{ir} and t_{if} are the desired times for changing between w1 and w2.
- The ramps for acceleration and deceleration can be set individually.
  - C00227: Acceleration time t_{ir}
  - C00228: Deceleration time t_{if}
- The t_{ir}/t_{if} values are converted into the required Ti times according to the following formula:

$T_{ir} = t_{ir} \cdot \frac{100\ \%}{w2 - w1}$	$T_{if} = t_{if} \cdot \frac{100\ \%}{w2 - w1}$

- The ramp function generator is immediately set to "0" by setting *bInAct* to TRUE.

12.3.3 Operating range of the PID process controller

The value range of the input signal *nSet_a* and thus the operating range of the PID process controller can be limited with the following parameters:

- C00231/1: Pos. maximum (default setting: 199.9 %)
- C00231/2: Pos. minimum (default setting: 0.0 %)
- C00231/3: Neg. minimum (default setting: 0.0 %)
- C00231/4: Neg. maximum (default setting: 199.9 %)

12.3.4 Evaluation of the output signal

After the limitation, the output signal is evaluated with the influencing factor *nInflu_a*. The evaluation is activated/suppressed along a ramp when the input *bEnableInfluenceRamp* is set to TRUE. The ramp times are set with the parameters "Acceleration time influence" (C00243) and "Deceleration time influence" (C00244).

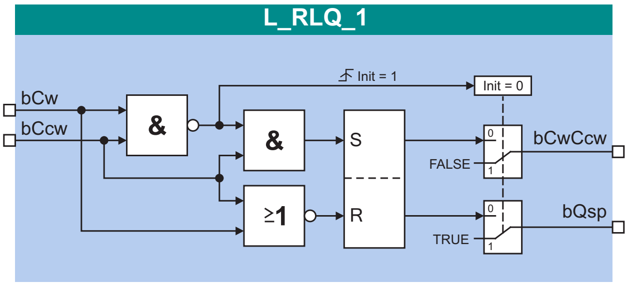
12.3.5 Control functions

The process controller has various digital inputs for controlling the FB:

Designator	Data type	**Information/possible settings**	
bIOff	BOOL	Switch off the I-component of the process controller • Changes can be done online. • Display parameter: C00833/12	
		TRUE	I-component of the process controller is switched off.
bInAct (from version 04.00.00)	BOOL	Deactivate process controller temporarily (stop) • Changes can be done online. • Display parameter: C00833/11	
		TRUE	• The current output value is frozen. • The internal control algorithm is stopped. • However, a setpoint selected via input *nNSet_a* is still provided in operating modes 0/1/4/5.
bPIDOff (from version 04.00.00)	BOOL	Reset the entire PID controller • Display parameter: C00833/41	
		TRUE	• The I component of the controller is set to zero. • The controller output is set to zero. • The internal control algorithm is stopped.

12.4 L_RLQ_1

This FB links a selected direction of rotation to the quick stop function with wire-break protection.



inputs

Designator Data type	Information/possible settings
bCw BOOL	Input • TRUE = CW rotation
bCCw BOOL	Input • TRUE = CCW rotation

outputs

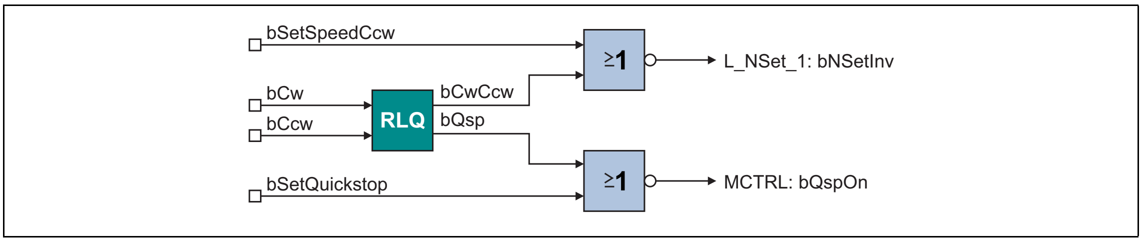
Designator Data type	Value/meaning
bQSP BOOL	Output signal for quick stop (QSP)
bCwCcw BOOL	Output signal for CW/CCW rotation • TRUE = CCW rotation

Function

inputs		outputs		Notes
bCw	**bCCw**	**bCwCcw**	**bQSP**	
TRUE	TRUE	FALSE	TRUE	The inputs have this status only if a TRUE signal is being applied to both inputs at the moment of switch-on! See also FB illustration above, "Init" = 1.
If *one* of the inputs has the TRUE status, the following truth table applies:				
FALSE	FALSE	FALSE	TRUE	See also FB illustration above, "Init" = 0.
TRUE	FALSE	FALSE	FALSE	
FALSE	TRUE	TRUE	FALSE	
TRUE	TRUE	X (save)		

[12-6] Truth table of the FB L_RLQ, 0 = FALSE, 1 = TRUE

Wiring in the application

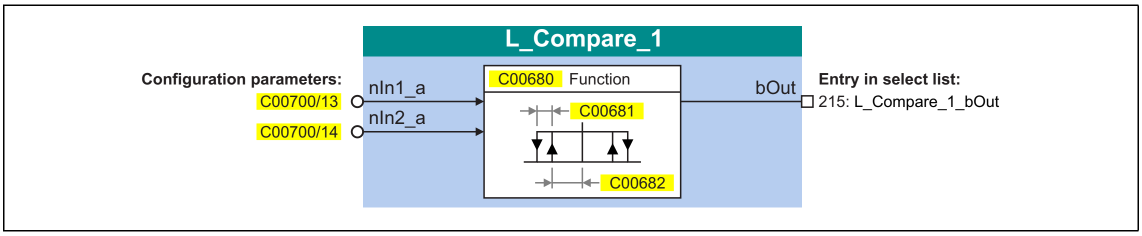


[12-7] Internal wiring

12.5 L_Compare_1

This FB compares two analog signals and can be used e.g. to implement a trigger.

- Comparison operation, hysteresis and window size can be parameterised.



Tip!

The FB is freely available as "GeneralPurpose" function.

- The inputs can be linked to other output signals via the given configuration parameters.
- The output, in turn, can be selected in the configuration parameters of other inputs.

inputs

Designator Data type	Information/possible settings
nIn1_a INT	Input signal 1
nIn2_a INT	Input signal 2

outputs

Designator Data type	Value/meaning	
bOut BOOL	Status signal "Comparison statement is true"	
	TRUE	The statement of the selected comparison mode is true.

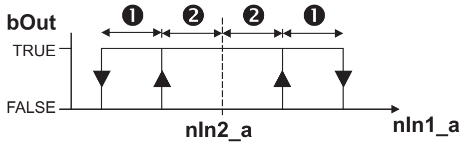
Parameters

Parameters	Possible settings			Information
C00680				Function selection
	1	nIn1 = nIn2		
	2	nIn1 > nIn2		
	3	nIn1 < nIn2		
	4	|nIn1| = |nIn2|		
	5	|nIn1| > |nIn2|		
	6	|nIn1| < |nIn2|		
C00681	0.0	%	100.0	Hysteresis • Lenze setting: 0.5 %
C00682	0.0	%	100.0	Window • Lenze setting: 2.0 %

12.5.1 Function 1: nIn1 = nIn2

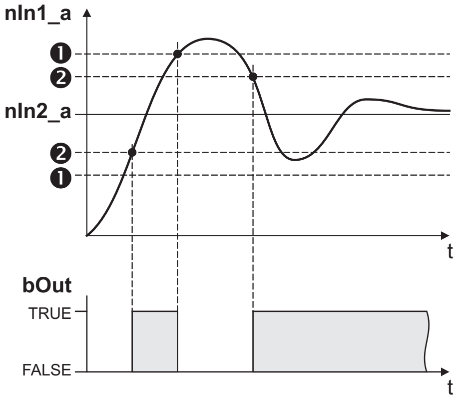
This function compares two signals with regard to equality. It can, for instance, provide the comparison "actual speed equals setpoint speed" ($n_{act} = n_{set}$).

- Use C00682 to set the window within which the equality is to apply.
- Use C00681 to set a hysteresis if the input signals are not stable and the output oscillates.



❶ C00681: Hysteresis
❷ C00682: Window

[12-8] Function 1: Switching performance

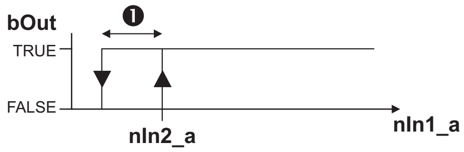


❶ C00681: Hysteresis
❷ C00682: Window

[12-9] Function 1: Example

12.5.2 Function 2: nIn1 > nIn2

This function serves, for instance, to implement the comparison "actual speed is higher than a limit value" ($n_{act} > n_x$) for one direction of rotation.

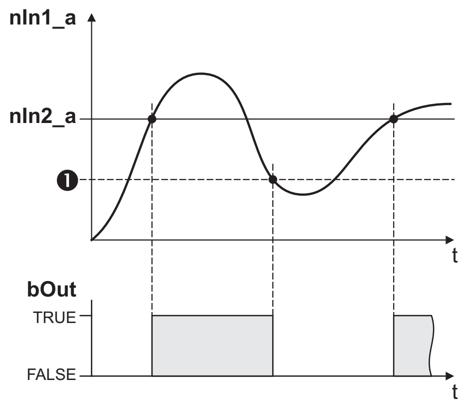


❶ C00681: Hysteresis

[12-10] Function 2: Switching performance

Functional sequence

1. If the value at *nIn1_a* exceeds the value *nIn2_a*, *bOut* changes from FALSE to TRUE.
2. Only if the signal at *nIn1_a* falls below the value of *nIn2_a - hysteresis* again, *bOut* changes back from TRUE to FALSE.

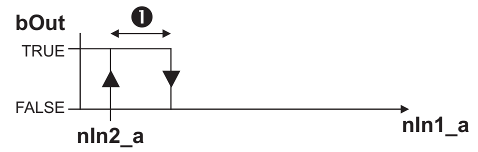


❶ C00681: Hysteresis

[12-11] Function 2: Example

12.5.3 Function 3: nIn1 < nIn2

This function serves, for instance, to implement the comparison "actual speed is lower than a limit value" ($n_{act} < n_x$) for one direction of rotation.

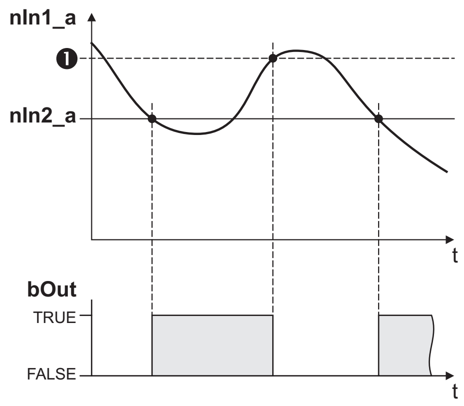


❶ C00681: Hysteresis

[12-12] Function 3: Switching performance

Functional sequence

1. If the value at *nIn1_a* falls below the value at *nIn2_a*, *bOut* changes from FALSE to TRUE.
2. Only if the signal at *nIn1_a* exceeds the value of *nIn2_a* - *hysteresis* again, *bOut* changes back from TRUE to FALSE.



❶ C00681: Hysteresis

[12-13] Function 3: Example

12.5.4 Function 4: |nIn1| = |nIn2|

This function serves to implement e.g. the comparison "$n_{act} = 0$". This function is similar to function 1. However, the amount is generated by the input signals before signal processing (without sign).

▶ Function 1: nIn1 = nIn2

12.5.5 Function 5: |nIn1| > |nIn2|

This function serves to implement e.g. the comparison "$|n_{act}| > |n_x|$" irrespective of the direction of rotation. This function is similar to function 2. However, the amount is generated by the input signals before signal processing (without sign).

▶ Function 2: nIn1 > nIn2

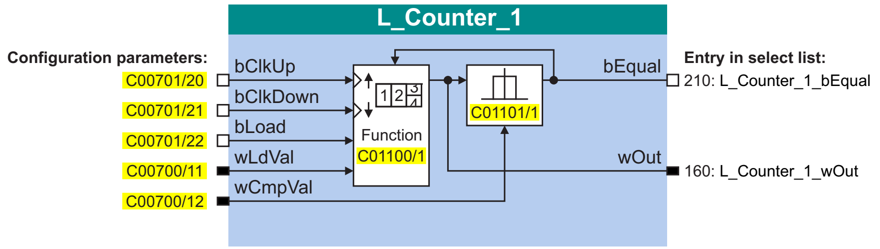
12.5.6 Function 6: |nIn1| < |nIn2|

This function serves to implement the comparison "$|n_{act}| < |n_x|$" independent of the direction of rotation. This function is similar to function 3. However, the amount is generated by the input signals before signal processing (without sign).

▶ Function 3: nIn1 < nIn2

12.6 L_Counter_1

This FB is a digital upcounter and downcounter with a parameterisable comparison operation.



Tip!

The FB is freely available as "GeneralPurpose" function.

- The inputs can be linked to other output signals via the given configuration parameters.
- The outputs, in turn, can be selected in the configuration parameters of other inputs.

inputs

Designator	Data type	Information/possible settings	
bClkUp	BOOL	Clock input • With each edge, the module counts up by "1". • Only FALSE-TRUE edges are evaluated. Note: The static state "1" is not permissible at this input.	
bClkDown	BOOL	Clock input • With each edge, the module counts down by "1". • Only FALSE-TRUE edges are evaluated. Note: The static state "1" is not permissible at this input.	
bLoad	BOOL	Load input • The input has the highest priority.	
		TRUE	Accept starting value *wLdVal*.
wLdVal	WORD	Starting value • Assigned value is internally interpreted as "INT" data type (-32767 ... +32767), i.e. the most significant bit determines the sign.	
wCmpVal	WORD	Comparison value • Assigned value is internally interpreted as "INT" data type (-32767 ... +32767), i.e. the most significant bit determines the sign.	

outputs

Designator	Data type	Value/meaning	
bEqual	BOOL	Status signal "Comparison statement is true" • The TRUE output is active in the Lenze setting if the current counter content is greater than or equal to the comparison value *wCmpVal*.	
		TRUE	The statement of the comparison mode selected in C01101/1 is true.
wOut	WORD	Counter content • Internal limitation to ± 32767 • The most significant bit determines the sign!	

Parameters

Parameters	Possible settings		Information
C01100/1			Function selection • Lenze setting: Normal counting
	0	Normal counting	
	1	Auto reset	
	2	Manual reset	
C01101/1			Selection of comparison operation • Lenze setting: Counter content ≥ comparison value
	0	Counter content ≥ comparison value	
	1	Counter content ≤ comparison value	
	2	Counter content = comparison value	

General function

- Every FALSE/TRUE edge at the *bClkUp* input causes the block to count upwards by "1".
- Every FALSE/TRUE edge at the *bClkDown* input causes the block to count downwards by "1".

Function "Normal counting"

If the statement of the comparison mode selected in C01101/1 is true, the *bCompare* output is set to TRUE.

Function "Auto reset"

If the statement of the comparison mode selected in C01101/1 is true, the *bCompare* output is set to TRUE for 1 ms and the counter is reset to the *wLdVal* starting value.

Function "Manual reset"

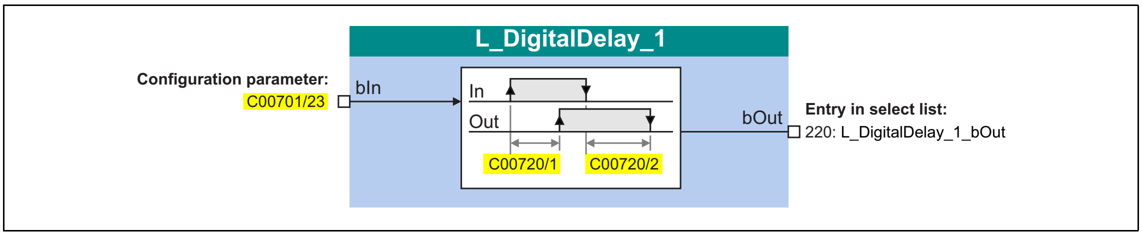
If the statement of the comparison mode selected in C01101/1 is true, the *bCompare* output is set to TRUE and the counter stops.

- Edges at *bClkUp* and *bClkDown* are ignored.
- The counter must be reset via the *bLoad* input.

12.7 L_DigitalDelay_1

This FB applies a time delay to binary signals.

- ON and OFF-deceleration can be parameterised separately.



Tip!

The FB is freely available as "GeneralPurpose" function.

- The input can be linked to another output signal via the given configuration parameter.
- The output, in turn, can be selected in the configuration parameters of other inputs.

inputs

Designator Data type	Information/possible settings
bIn BOOL	Input signal

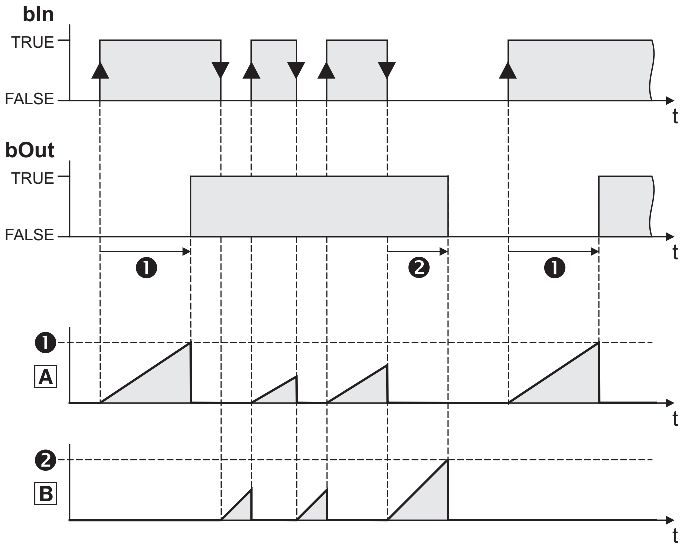
outputs

Designator Data type	Value/meaning
bOut BOOL	Output signal (time-delayed input signal)

Parameters

Parameters	Possible settings			Information
C00720/1	0.0	s	3600.0	ON-deceleration • Lenze setting: 0.0 s
C00720/2	0.0	s	3600.0	OFF-deceleration • Lenze setting: 0.0 s

Function



❶ ON delay
❷ OFF delay
A Internal timing element for ON delay (retriggerable)
B Internal timing element for OFF delay (retriggerable)

1. A FALSE-TRUE edge at b*In* starts the internal timing element for the ON delay.
2. After the defined ON delay, the input signal *bIn* is output at *bOut*.
3. A TRUE-FALSE edge at b*In* starts the internal timing element for the OFF delay.
4. After the defined OFF delay, the input signal *bIn* is output at *bOut*.

12.7.1 Application example: Debouncing a digital input

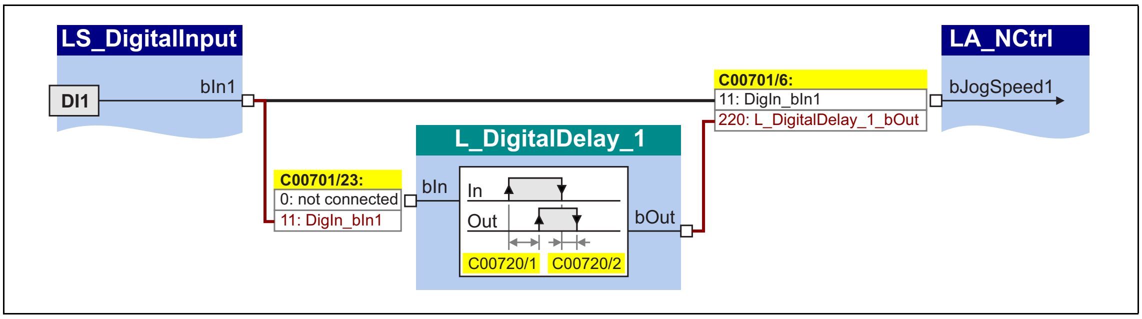
In this application example, the digital input DI1 is to be debounced.

- In the Lenze setting, the digital input DI1 is linked with the application input *bJogSpeed1*.
- By changing the following configuration parameters, the binary delay element is inserted in this signal path:

Configuration parameters		Lenze setting	Required change
C00701/6	LA_NCtrl: bJogSpeed1	11: DigIn_bIn1	220: L_DigitalDelay_1_bOut
C00701/23	L_DigitalDelay_1: bIn	0: Not connected	11: DigIn_bIn1

- The delay times can be set via the following parameters:

Setting parameters		Lenze setting	Required change
C00720/1	ON-deceleration	0.0 s	0.2 s
C00720/2	OFF-deceleration	0.0 s	0.1 s

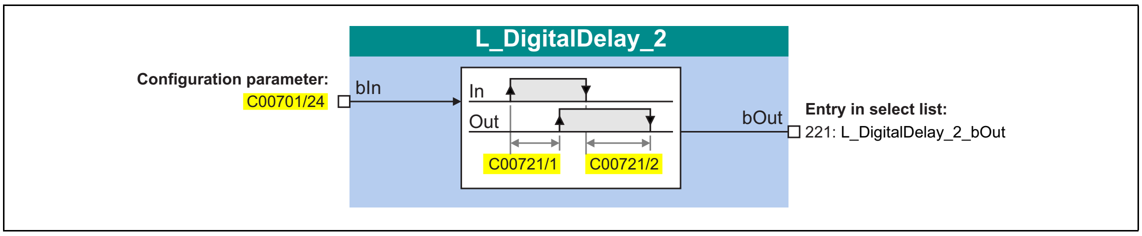


[12-14] Example: Inserting the binary delay element in the signal path

12.8 L_DigitalDelay_2

This FB applies a time delay to binary signals.

- ON and OFF-deceleration can be parameterised separately.



inputs

Designator Data type	Information/possible settings
bIn BOOL	Input signal

outputs

Designator Data type	Value/meaning
bOut BOOL	Output signal (time-delayed input signal)

Parameters

Parameters	Possible settings			Information
C00721/1	0.0	s	3600.0	ON-deceleration • Lenze setting: 0.0 s
C00721/2	0.0	s	3600.0	OFF-deceleration • Lenze setting: 0.0 s

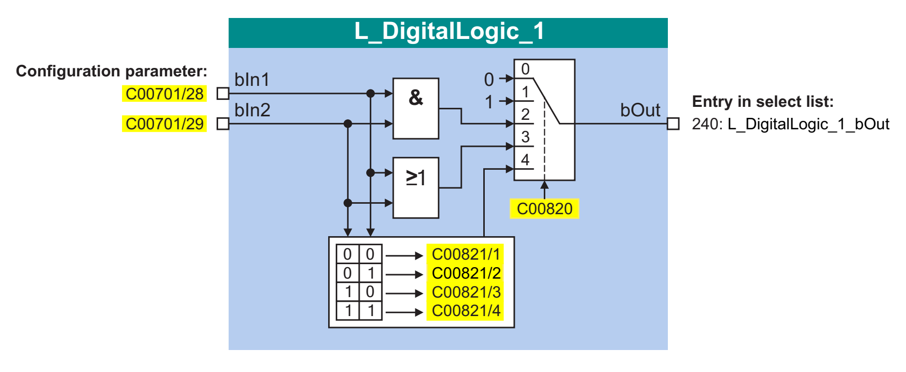
For a detailed description see L_DigitalDelay_1.

12.9 L_DigitalLogic_1

This function extension is available from version 02.00.00!

This FB provides a binary output signal created by a logic operation of the input signals. Optionally, one of the constant binary values independent from the input signals can be output.

- Output of a constant binary value
- AND operation of the inputs
- OR operation of the inputs
- Output depending on the combination of the input signals



Tip!

The FB is freely available as "GeneralPurpose" function.

- The inputs can be linked to other output signals via the given configuration parameters.
- The output, in turn, can be selected in the configuration parameters of other inputs.

inputs

Designator Data type	Information/possible settings
bIn1 BOOL	Input signal 1
bIn2 BOOL	Input signal 2

outputs

Designator Data type	Value/meaning
bOut BOOL	Output signal

Parameters

Parameters	Possible settings		Information
C00820			Function selection
	0	bOut = 0	Constant value "FALSE"
	1	bOut = 1	Constant value "TRUE"
	2	bOut = bIn1 AND bIn2	AND operation
	3	bOut = bIn1 OR bIn2	OR operation
	4	bOut = f (truth table)	The output value depends on the truth table parameterised in C00821/1...4
C00821/1...4			Truth table for function 4 • Each of the four possible input combinations can be assigned to the output value FALSE or TRUE. • For an application example see the following section.
	0	FALSE	
	1	TRUE	

Function "4: bOut = f (Truth table)"

When the function "4: bOut = f (truth table)" is selected in C00820, the output value *bOut* depends on the truth table parameterised in C00821/1...4.

The following table shows which setting may be required in C00821/1...4 to realise the logic operations NAND, NOR, XOR and XNOR:

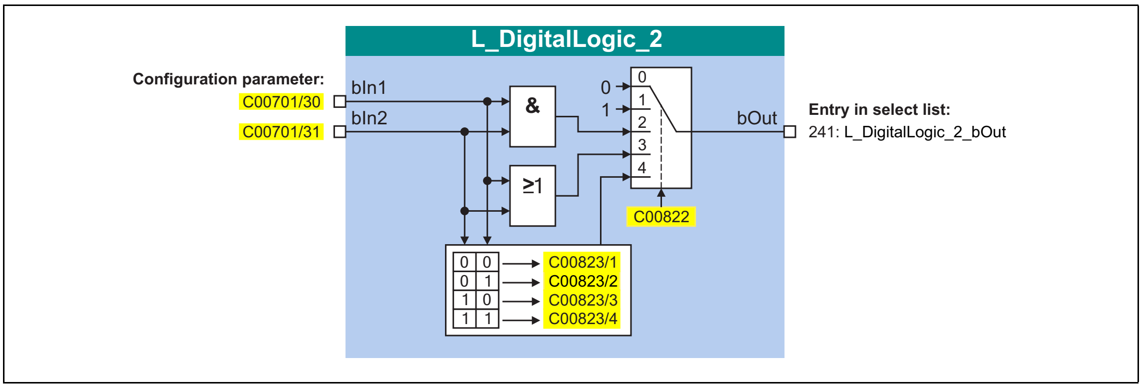
Input signals		Output	Parameter setting for logic operation:				
bIn2 C00701/29	*bIn1* C00701/28	*bOut*	NOT (bIn1)	NAND	NOR	XOR	XNOR
0	0	C00821/1 =	1	1	1	0	1
0	1	C00821/2 =	0	1	0	1	0
1	0	C00821/3 =	1	1	0	1	0
1	1	C00821/4 =	0	0	0	0	1

12.10 L_DigitalLogic_2

This function extension is only available from version 04.00.00!

This FB provides a binary output signal created by a logic operation of the input signals. Optionally, one of the constant binary values independent from the input signals can be output.

- Output of a constant binary value
- AND operation of the inputs
- OR operation of the inputs
- Output depending on the combination of the input signals



Tip!

The FB is freely available as "GeneralPurpose" function.

- The inputs can be linked to other output signals via the given configuration parameters.
- The output, in turn, can be selected in the configuration parameters of other inputs.

inputs

Designator Data type	Information/possible settings
bIn1 BOOL	Input signal 1
bIn2 BOOL	Input signal 2

outputs

Designator Data type	Value/meaning
bOut BOOL	Output signal

Parameters

Parameters	Possible settings		Information
C00822			Function selection
	0	bOut = 0	Constant value "FALSE"
	1	bOut = 1	Constant value "TRUE"
	2	bOut = bIn1 AND bIn2	AND operation
	3	bOut = bIn1 OR bIn2	OR operation
	4	bOut = f (truth table)	The output value depends on the truth table parameterised in C00823/1...4
C00823/1...4			Truth table for function 4 • Each of the four possible input combinations can be assigned to the output value FALSE or TRUE. • For an application example see the following section.
	0	FALSE	
	1	TRUE	

Function "4: bOut = f (Truth table)"

When the function "4: bOut = f (truth table)" is selected in C00822, the output value *bOut* depends on the truth table parameterised in C00823/1...4.

The following table shows which setting may be required in C00823/1...4 to realise the logic operations NAND, NOR, XOR and XNOR:

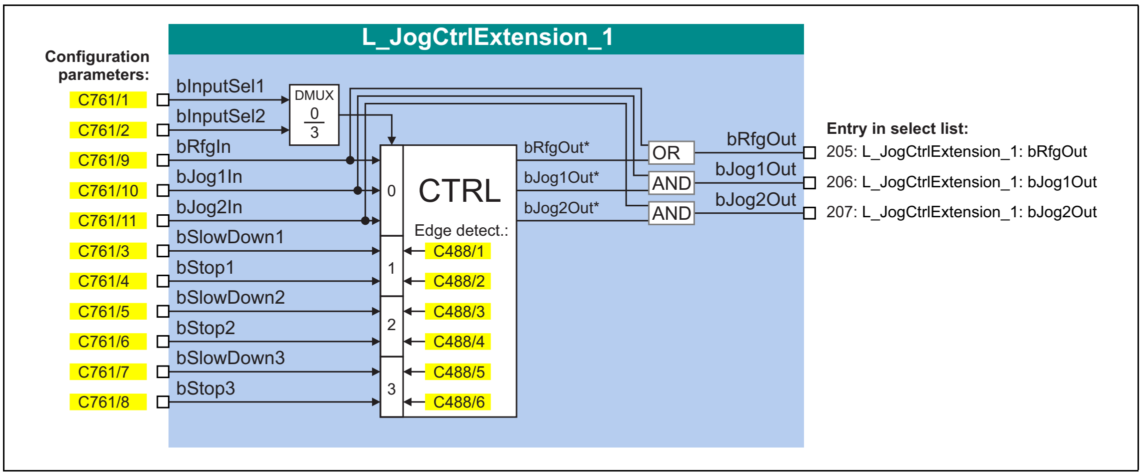
Input signals		Output	Parameter setting for logic operation:				
bIn2 C00701/31	*bIn1* C00701/30	*bOut*	NOT (bIn1)	NAND	NOR	XOR	XNOR
0	0	C00823/1 =	1	1	1	0	1
0	1	C00823/2 =	0	1	0	1	0
1	0	C00823/3 =	1	1	0	1	0
1	1	C00823/4 =	0	0	0	0	1

12.11 L_JogCtrlExtension_1

This function extension is available from version 05.00.00!

This FB is connected upstream to the L_NSet_1 ramp function generator/setpoint generator to implement a switch-off positioning at limit switch.

- Detailed information on this operating mode can be found in the description of the TA "Switch-off positioning". (📖 264)



inputs

Designator Data type	**Information/possible settings**
bInputSel1 bInputSel2 BOOL	Activation of the *bSlowDown1/bStop1*, *bSlowDown2/bStop2* and *bSlowDown3/bStop3* signal pairs according to the Truth table for activating the pre-switch off
bRfgIn BOOL	Ramping down the ramp function generator in the downstream FB L_NSet_1 according to the Truth table - switch-off positioning
bJog1In bJog2In BOOL	Selection inputs for setting fixed speeds in the setpoint generator • If the pre-switch off is inactive (*bInputSel1* and *bInputSel2* are both set to FALSE), the two control signals are output one-to-one at the *bJog1Out* and *bJog2Out* outputs. • To achieve the desired behaviour (starting at high speed, pre-switch off at low speed), both inputs must be set to TRUE. • Fixed setpoint 2 must be less than fixed setpoint 3! Otherwise, the drive will start at a low speed and accelerate after the pre-switch off.
bSlowDown1 bSlowDown2 bSlowDown3 BOOL	Activation of the fixed setpoint 2 in the downstream FB L_NSet_1 • These inputs only fulfil a function if they have been activated via *bInputSel1* and *bInputSel2* previously (see Truth table for activating the pre-switch off).
bStop1 bStop2 bStop3 BOOL	Ramping down of the ramp function generator in the downstream FB L_NSet_1 • These inputs only fulfil a function if they have been activated via *bInputSel1* and *bInputSel2* previously (see Truth table for activating the pre-switch off).

outputs

Designator Data type	Value/meaning
bRfgOut BOOL	Control signal for ramping down the ramp function generator in the FB L_NSet_1 • Required configuration: C00701/12 = "205: L_JogCtrlExtension_1: bRfgOut"
bJog1Out bJog2Out BOOL	Control signals for setting fixed speeds in the FB L_NSet_1 • Required configuration: C00701/6 = "206: L_JogCtrlExtension_1: bJog1Out" C00701/7 = "207: L_JogCtrlExtension_1: bJog2Out"

Parameters

Parameters	Possible settings		Information
C00488/1			InputSens.SlowDown1 • Selection of edge or level for starting slow-down function 1
	0	Level	
	1	Edge	
C00488/2			InputSens.Stop1 • Selection of edge or level for stop function 1
	0	Level	
	1	Edge	
C00488/3			InputSens.SlowDown2 • Selection of edge or level for starting slow-down function 2
	0	Level	
	1	Edge	
C00488/4			InputSens.Stop2 • Selection of edge or level for stop function 2
	0	Level	
	1	Edge	
C00488/5			InputSens.SlowDown3 • Selection of edge or level for starting slow-down function 3
	0	Level	
	1	Edge	
C00488/6			InputSens.Stop3 • Selection of edge or level for stop function 3
	0	Level	
	1	Edge	

Note!

If the *bSlowDown-/bStop* inputs are configured edge-sensitively and a positioning has been carried out, at least one of the two selection inputs (*bInputSel1*, *bInputSel2*) has to change its state before a new positioning can be started!

Truth table for activating the pre-switch off

The inputs *bInputSel1* and *bInputSel2* serve to select the pre-switch off according to the following truth table:

inputs		Function	Response in the setpoint generator (FB L_NSet_1)
bInputSel1	*bInputSel2*		
FALSE	FALSE	Pre-switch off inactive	No response • The input signals *bRfgIn*, and are passed through 1:1 to the upstream FB L_NSet_1.
TRUE	FALSE	The and inputs are evaluated.	**Pre-switch off can be activated** • See the following Truth table - switch-off positioning.
FALSE	TRUE	The and inputs are evaluated.	
TRUE	TRUE	The and inputs are evaluated.	

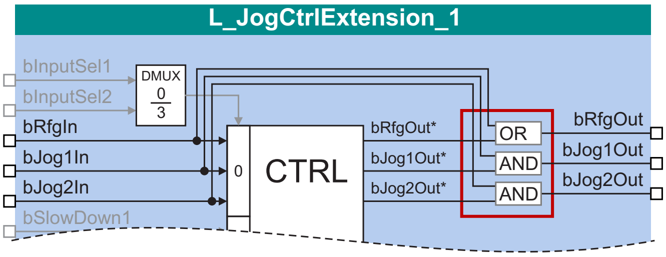
Truth table - switch-off positioning

If the pre-switch off is activated via the inputs *bInputSel1* and *bInputSel2*, the following internal logic applies to the inputs *bStopX* and *bSlowDownX*:

FB L_JogCtrlExtension_1					Response in the setpoint generator (FB L_NSet_1)
inputs		Output signals (internal logic)			
bStopX	*bSlowDownX*	*bRfgOut**	*bJog1Out**	*bJog2Out2**	
FALSE	**FALSE**	FALSE	**TRUE**	**TRUE**	If both inputs are FALSE, the fixed setpoint 3 is activated.
FALSE	**TRUE**	FALSE	FALSE	**TRUE**	If the SlowDown function is activated via the selected input, fixed setpoint 2 is activated.
TRUE	FALSE/ TRUE	**TRUE**	FALSE	FALSE	If the stop function is activated via the selected *bStop* input, setpoint "0" is activated.

Afterwards, the output signals of the internal logic are linked to the input signals *bRfgIn*, *bJog1In* and *bJog2In* as follows:

- *bRfgOut* = *bRfgIn* **OR** *bRfgOut**
- *bJogXOut* = *bJogXIn* **AND** *bJogXOut**

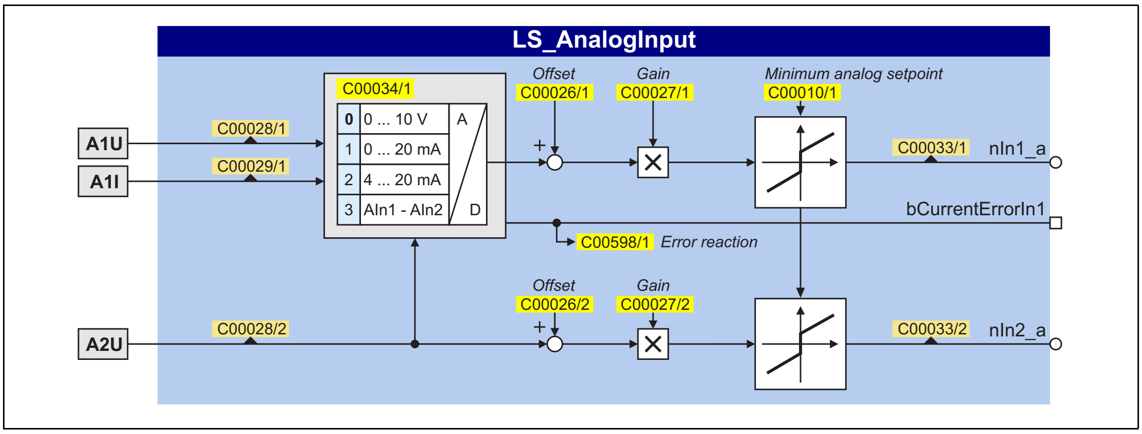


[12-15] Logic linkage of the output signals of the internal logic

To achieve the desired behaviour (starting at high speed, pre-switch off at low speed), both inputs *bJog1In* and *bJog2In* must be set to TRUE.

12.12 LS_AnalogInput

The **LS_AnalogInput** system block displays the analog inputs in the application on I/O level.



outputs

Designator Data type	**Value/meaning**
nIn1_a C00033/1 | INT	Analog input 1 • Scaling: $\pm 2^{14} \equiv \pm 10$ V for use as voltage input $+2^{14} \equiv +20$ mA for use as current input
bCurrentErrorIn1 BOOL	Status signal "Current input error" • Only when analog input 1 is used as current input. • Application: Cable-breakage monitoring of the 4 ...20 mA circuit. TRUE | $\lvert I_{AIN1} \rvert < 4$ mA
nIn2_a C00033/2 | INT	Analog input 2 • Scaling: $\pm 2^{14} \equiv \pm 10$ V • Only available with Communication Unit E84DGFCXxNx (no fieldbus, extended terminal design).

Related topics:

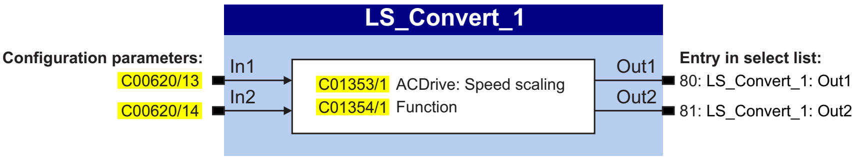
- Analog terminals (🕮 214)
- Electrical data (🕮 223)

12.13 LS_Convert_1

This function extension is available from version 05.00.00!

This FB serves to execute various conversions/scalings.

- The SB is used in the "AC Drive Profile" application for converting the speed values received and to be sent via bus (see AC Drive Profile ➜ Internal signal flow).
  - The first path (In1 ➜ Out1) is used to convert the speed setpoint for the application.
  - The second path (In2 ➜ Out2) is used to convert the actual speed value from the application for the output on the bus.
- The SB can also be used for migrating an 8200 motec project into other applications.



inputs

Designator Data type	Information/possible settings
In1	Input signal 1
In2	Input signal 2

outputs

Designator Data type	Value/meaning
Out1	Output signal 1
Out2	Output signal 2

Parameters

Parameters	Possible settings			Information
C01353/1	-128		127	ACDrive: Speed scaling
C01354/1				Function selection
	0	1 ==> 1 ==> 1		See subchapter "Conversion formulae"
	1	1 Hz ==> % (C11) ==> 1 Hz		
	...	...		
	16	0.001 Nm ==> % (C57) ==> 0.001 Nm		
	17	ACDP ==> CAN ==> ACDP		For converting the AC Drive Profile control word and status word
	18	x C471_1 / C471_2		Parameterisable conversion
	19	Act position 32bit ==> 16Bit		▶ Function 19: Counting and providing external encoder pulses

12.13.1 Conversion formulae

The following values are used as factors and divisors for the below-mentioned conversion formulae depending on the function selected in C01354/1:

Function (C01354/1)		Factor	Divisor
0	1 ==> 1 ==> 1	1	1
1	1 Hz ==> % (C11) ==> 1 Hz	1638400	2 * C00011 [min-1] * 50 / 60 * number of pole pairs (with number of pole pairs = C00089 * 60 / C00087)
2	0.1 Hz ==> % (C11) ==> 0.1 Hz	163840	
3	0.01 Hz ==> % (C11) ==> 0.01 Hz	16384	
4	0.001 Hz ==> % (C11) ==> 0.001 Hz	1638	
5	1 rpm ==> % (C11) ==> 1 rpm	16384	C00011 [rpm]
6	0.1 rpm ==> % (C11) ==> 0.1 rpm	1638	
7	0.01 rpm ==> % (C11) ==> 0.01 rpm	164	
8	0.001 rpm ==> % (C11) ==> 0.001 rpm	16	
9	1 A ==> % (C22) ==> 1 A	1638400	C00022 [A] * 100
10	0.1 A ==> % (C22) ==> 0.1 A	163840	
11	0.01 A ==> % (C22) ==> 0.01 A	16384	
12	0.001 A ==> % (C22) ==> 0.001 A	1638	
13	1 Nm ==> % (C57) ==> 1 Nm	16384	C00056 [Nm]
14	0.1 Nm ==> % (C57) ==> 0.1 Nm	16384	C00056 [Nm] * 10
15	0.01 Nm ==> % (C57) ==> 0.01 Nm	16384	C00056 [Nm] * 100
16	0.001 Nm ==> % (C57) ==> 0.001 Nm	1638	
17	ACDP ==> CAN ==> ACDP	-	-
18	x C471_1 / C471_2	C00471/1	C00471/2
19	Act position 32bit ==> 16Bit	-	-

Alternatively, a scaling can be carried out in the form 2^x.

- The value for x can be set in C01353/1.
- In the Lenze setting "0", no scaling takes place ($2^0 = 1$).

Note!

The scaling is carried out as "shift operation". Overflows are not absorbed!

Setting C01353/1	General conversion formulae	
0 (Lenze setting)	$\text{Out1 [\%]} = \text{In1} \cdot \frac{\text{Factor}}{\text{Divisor}}$	$\text{Out2} = \text{In2 [\%]} \cdot \frac{\text{Divisor}}{\text{Factor}}$
> 0	$\text{Out1 [\%]} = \frac{\text{In1}}{2^x} \cdot \frac{\text{Factor}}{\text{Divisor}}$	$\text{Out2} = \text{In2 [\%]} \cdot 2^x \cdot \frac{\text{Divisor}}{\text{Factor}}$
< 0	$\text{Out1 [\%]} = \text{In1} \cdot 2^x \cdot \frac{\text{Factor}}{\text{Divisor}}$	$\text{Out2} = \frac{\text{In2 [\%]}}{2^x} \cdot \frac{\text{Divisor}}{\text{Factor}}$

Related topics:

- Scaling of the speed and torque values (Ref from Net) (AC Drive Profile)

12.13.2 Function 19: Counting and providing external encoder pulses

The function "19: Act position 32bit ==> 16Bit" selectable in C01354/1 serves to count the pulses of an external two-track HTL encoder and process them within the application.

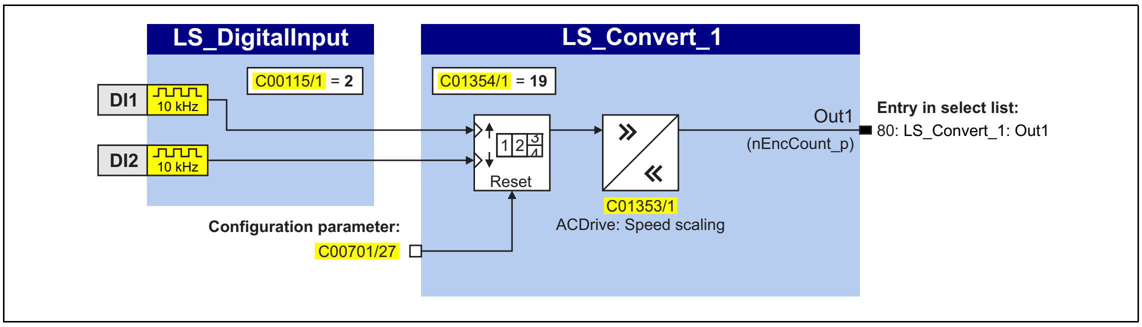
Note!

From version 09.00.00 onwards, the counted pulses of the HTL encoder can also alternatively be saved non-volatilely via code C000143, Bit2 = 1 when the mains is switched off.

Prerequisites

- The encoder is connected to the digital input terminals DI1 and DI2.
- The digital input terminals DI1 and DI2 are reconfigured as two-track frequency inputs in C00115/1 (selection "2: DI1&DI2=FreqIn (2-track)"). ▸ Configuring DI1 and DI2 as frequency inputs (📖 211)

Signal flow/functional description



[12-16] Basic signal flow

The two signals DI1 and DI2 are transmitted to a counter. The counter can be reset to "0" via a digital signal that can be configured in C00701/27.

A parameterisable multiplier/divisor is downstream to the counter. The reason for this is that the counter internally works with 32 bits, but the *Out1*output signal is a 16-bit signal.

- In case of an encoder with 128 increments (encoder increment), maximally 512 revolutions can be made until overflow (65536/128 = 512). If this limit is sufficient for the application, the default setting "0" in C01353/1 can be kept.
- Evaluations:
  - 16 bits (word) → -32768 ... 32767, 32 bits (double word) → 0 ... 65535
  - **Note:** No quadrature evaluation is provided!
    128 increments/revolution correspond to the count value 128/revolution.
- If the value "1" is set in C01353/1, the counter values are moved one position to the right which corresponds to a division by 2. The value "2" results in a division by 4 (C01353/1^2 = 2^2 = 4), etc.

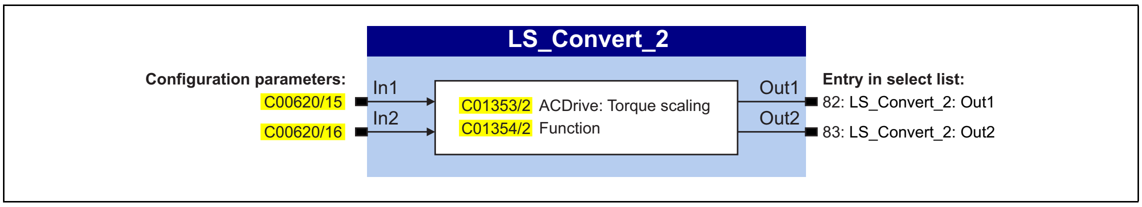
The scaled count value is provided at the *Out1* output and can be assigned via configuration parameters of other inputs to these inputs.

12.14 LS_Convert_2

This function extension is available from version 05.00.00!

This FB serves to execute various conversions/scalings.

- The SB is used in the "AC Drive Profile" application for converting the torque values received and to be sent via bus (see AC Drive Profile ➞ Internal signal flow).
  - The first path (In1 ➞ Out1) is used to convert the torque setpoint for the application.
  - The second path (In2 ➞ Out2) is used to convert the actual torque value from the application for the output on the bus.
- The SB can also be used for migrating an 8200 motec project into other applications.



inputs

Designator Data type	Information/possible settings
In1	Input signal 1
In2	Input signal 2

outputs

Designator Data type	Value/meaning
Out1	Output signal 1
Out2	Output signal 2

Parameters

Parameters	Possible settings			Information
C01353/2	-128		127	ACDrive: Torque scaling
C01354/2				Function selection
	0	1 ==> 1 ==> 1		See subchapter "Conversion formulae"
	1	1 Hz ==> % (C11) ==> 1 Hz		
	...	...		
	16	0.001 Nm ==> % (C57) ==> 0.001 Nm		
	17	ACDP ==> CAN ==> ACDP		For converting the AC Drive Profile control word and status word
	18	x C471_1 / C471_2		Parameterisable conversion
	19	Act position 32bit ==> 16Bit		See description of FB **L_Convert_1**. ▸ Function 19: Counting and providing external encoder pulses

12.14.1 Conversion formulae

The following values are used as factors and divisors for the below-mentioned conversion formulae depending on the function selected in C01354/1:

Function (C01354/1)		Factor	Divisor
0	1 ==> 1 ==> 1	1	1
1	1 Hz ==> % (C11) ==> 1 Hz	1638400	2 * (C00011 [rpm] / 60) * number of pole pairs (with number of pole pairs = C00089 * 60 / C00087)
2	0.1 Hz ==> % (C11) ==> 0.1 Hz	163840	
3	0.01 Hz ==> % (C11) ==> 0.01 Hz	16384	
4	0.001 Hz ==> % (C11) ==> 0.001 Hz	1638	
5	1 rpm ==> % (C11) ==> 1 rpm	16384	C00011 [rpm]
6	0.1 rpm ==> % (C11) ==> 0.1 rpm	1638	
7	0.01 rpm ==> % (C11) ==> 0.01 rpm	164	
8	0.001 rpm ==> % (C11) ==> 0.001 rpm	16	
9	1 A ==> % (C22) ==> 1 A	1638400	C00022 [A] * 100
10	0.1 A ==> % (C22) ==> 0.1 A	163840	
11	0.01 A ==> % (C22) ==> 0.01 A	16384	
12	0.001 A ==> % (C22) ==> 0.001 A	1638	
13	1 Nm ==> % (C57) ==> 1 Nm	16384	C00056 [Nm]
14	0.1 Nm ==> % (C57) ==> 0.1 Nm	16384	C00056 [Nm] * 10
15	0.01 Nm ==> % (C57) ==> 0.01 Nm	16384	C00056 [Nm] * 100
16	0.001 Nm ==> % (C57) ==> 0.001 Nm	1638	
17	ACDP ==> CAN ==> ACDP	-	-
18	x C471_1 / C471_2	C00471/1	C00471/2
19	Act position 32bit ==> 16Bit	-	-

Alternatively, a scaling can be carried out in the form 2^x.

- The value for x can be set in C01353/1.
- In the Lenze setting "0", no scaling takes place ($2^0 = 1$).

Note!

The scaling is carried out as "shift operation". Overflows are not absorbed!

Setting C01353/1	General conversion formulae	
0 (Lenze setting)	$\text{Out1 [\%]} = \text{In1} \cdot \frac{\text{Factor}}{\text{Divisor}}$	$\text{Out2} = \text{In2 [\%]} \cdot \frac{\text{Divisor}}{\text{Factor}}$
> 0	$\text{Out1 [\%]} = \frac{\text{In1}}{2^x} \cdot \frac{\text{Factor}}{\text{Divisor}}$	$\text{Out2} = \text{In2 [\%]} \cdot 2^x \cdot \frac{\text{Divisor}}{\text{Factor}}$
< 0	$\text{Out1 [\%]} = \text{In1} \cdot 2^x \cdot \frac{\text{Factor}}{\text{Divisor}}$	$\text{Out2} = \frac{\text{In2 [\%]}}{2^x} \cdot \frac{\text{Divisor}}{\text{Factor}}$

Related topics:

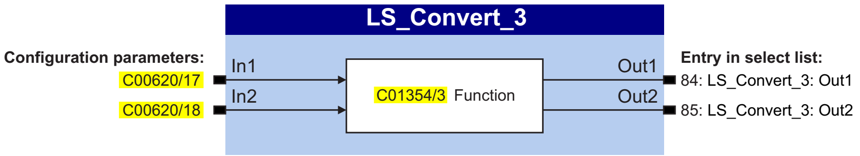
- Scaling of the speed and torque values (Ref from Net) (AC Drive Profile)

12.15 LS_Convert_3

This function extension is available from version 05.00.00!

This FB serves to execute various conversions/scalings.

- The SB is used in the "AC Drive Profile" application for converting the control word and the status word (see AC Drive Profile ➞ Internal signal flow).
  - The first path (In1 ➞ Out1) serves to convert the "AC Drive Profile" control word into the LS_DriveInterface control word *wControl*.
  - The second path (In2 ➞ Out2) serves to convert the LS_DriveInterface status word *wDeviceStateWord* into an "AC Drive Profile" conform status word for the output on the bus.
- The SB can also be used for migrating an 8200 motec project into other applications.



inputs

Designator Data type	Information/possible settings
In1	Input signal 1
In2	Input signal 2

outputs

Designator Data type	Value/meaning
Out1	Output signal 1
Out2	Output signal 2

Parameters

Parameters	Possible settings		Information
C01354/3			Function selection
	0	1 ==> 1 ==> 1	See subchapter "Conversion formulae"
	1	1 Hz ==> % (C11) ==> 1 Hz	
	...	...	
	16	0.001 Nm ==> % (C57) ==> 0.001 Nm	
	17	ACDP ==> CAN ==> ACDP	For converting the AC Drive Profile control word and status word
	18	x C471_1 / C471_2	Parameterisable conversion
	19	Act position 32bit ==> 16Bit	See description of FB **L_Convert_1**. ▸ Function 19: Counting and providing external encoder pulses

12.15.1 Conversion formulae

The following values are used as factors and divisors for the below-mentioned conversion formulae depending on the function selected in C01354/3:

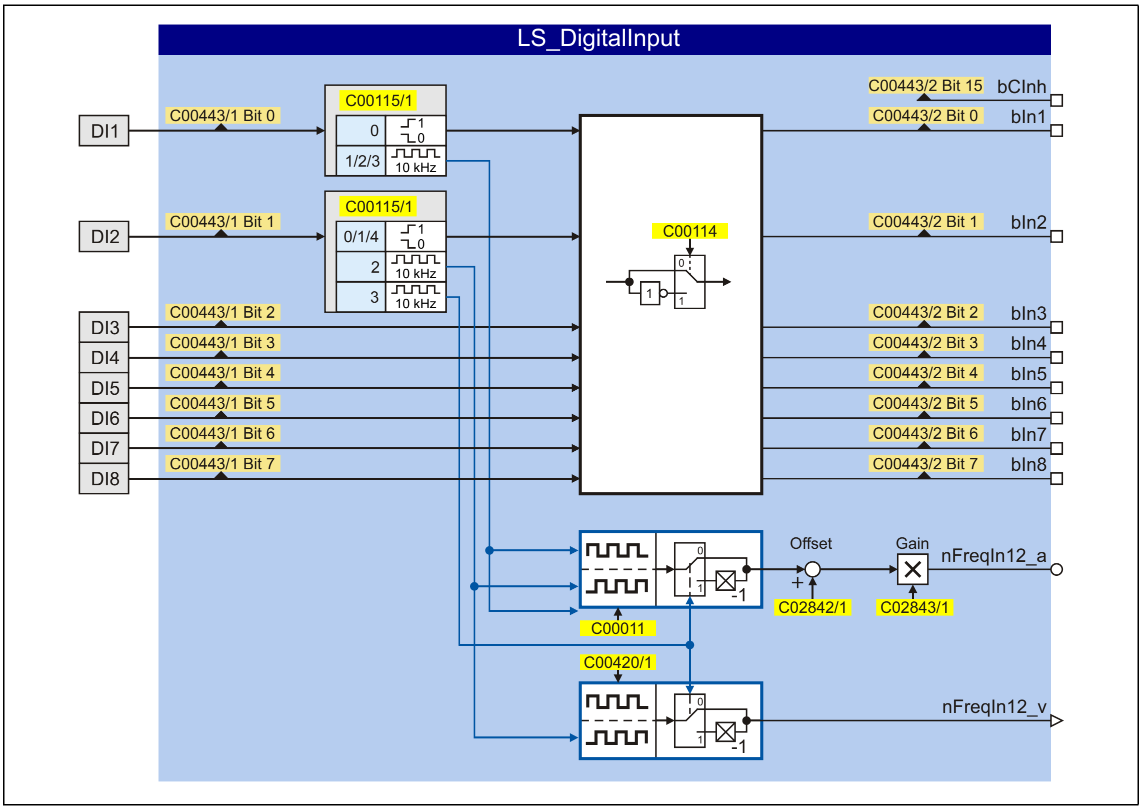
Function (C01354/3)		Factor	Divisor
0	1 ==> 1 ==> 1	1	1
1	1 Hz ==> % (C11) ==> 1 Hz	1638400	2 * (C00011 [rpm] / 60) * number of pole pairs (with number of pole pairs = C00089 * 60 / C00087)
2	0.1 Hz ==> % (C11) ==> 0.1 Hz	163840	
3	0.01 Hz ==> % (C11) ==> 0.01 Hz	16384	
4	0.001 Hz ==> % (C11) ==> 0.001 Hz	1638	
5	1 rpm ==> % (C11) ==> 1 rpm	16384	C00011 [rpm]
6	0.1 rpm ==> % (C11) ==> 0.1 rpm	1638	
7	0.01 rpm ==> % (C11) ==> 0.01 rpm	164	
8	0.001 rpm ==> % (C11) ==> 0.001 rpm	16	
9	1 A ==> % (C22) ==> 1 A	1638400	C00022 [A] * 100
10	0.1 A ==> % (C22) ==> 0.1 A	163840	
11	0.01 A ==> % (C22) ==> 0.01 A	16384	
12	0.001 A ==> % (C22) ==> 0.001 A	1638	
13	1 Nm ==> % (C57) ==> 1 Nm	16384	C00056 [Nm]
14	0.1 Nm ==> % (C57) ==> 0.1 Nm	16384	C00056 [Nm] * 10
15	0.01 Nm ==> % (C57) ==> 0.01 Nm	16384	C00056 [Nm] * 100
16	0.001 Nm ==> % (C57) ==> 0.001 Nm	1638	
17	ACDP ==> CAN ==> ACDP	-	-
18	x C471_1 / C471_2	C00471/1	C00471/2
19	Act position 32bit ==> 16Bit	-	-

General conversion formulae	
$\text{Out1 [\%]} = \text{In1} \cdot \frac{\text{Factor}}{\text{Divisor}}$	$\text{Out2} = \text{In2 [\%]} \cdot \frac{\text{Divisor}}{\text{Factor}}$

12.16 LS_DigitalInput

The **LS_DigitalInput** system block displays the digital input terminals in the application on I/O level.

- From version 02.00.00, the internal processing function of the digital input terminals DI1 and DI2 can be reconfigured in C00115/1 if required:



outputs

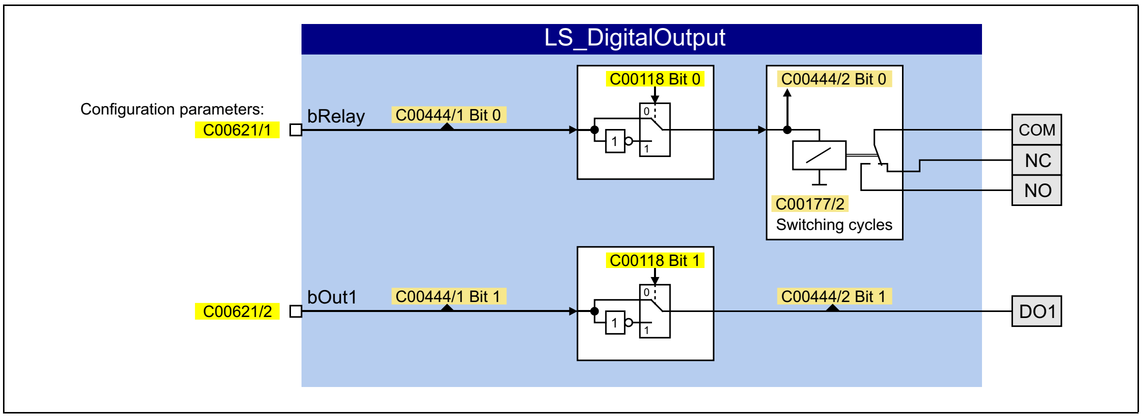
Designator DIS code | data type	Value/meaning
bCInh C00443/2 | BOOL	RFR digital input (controller enable)
bIn1 ... bIn8 C00443/2 | BOOL	Digital input DI1 ... DI8 • The number of available digital inputs depends on the Communication Unit used.
nFreqIn12_a C00446/1 | INT (from version 02.00.00)	Output frequency as scaled analog signal in [%] ▸ Configuring DI1 and DI2 as frequency inputs (🕮 211)
nFreqIn12_v C00445/1 | INT (from version 02.00.00)	Output frequency as speed signal in [inc/ms] ▸ Configuring DI1 and DI2 as frequency inputs (🕮 211)

Related topics:

- ▸ Digital terminals (🕮 207)
- ▸ Electrical data (🕮 223)

12.17 LS_DigitalOutput

The **LS_DigitalInput** system block displays the digital output terminals in the application on I/O level.



inputs

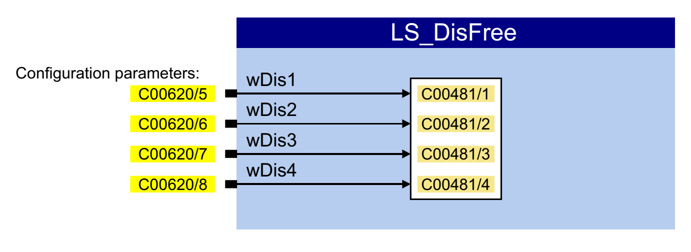
Designator DIS code | data type	**Information/possible settings**
bRelay C00444/1 | BOOL	Relay output (potential-free two-way switch)
bOut1 C00444/1 | BOOL	DO1 digital output

Related topics:

- Digital terminals (📖 207)
- Electrical data (📖 223)

12.18 LS_DisFree

This system block displays any four 16-bit signals of the application on display codes. The signals to be displayed are selected via the given configuration parameters.



inputs

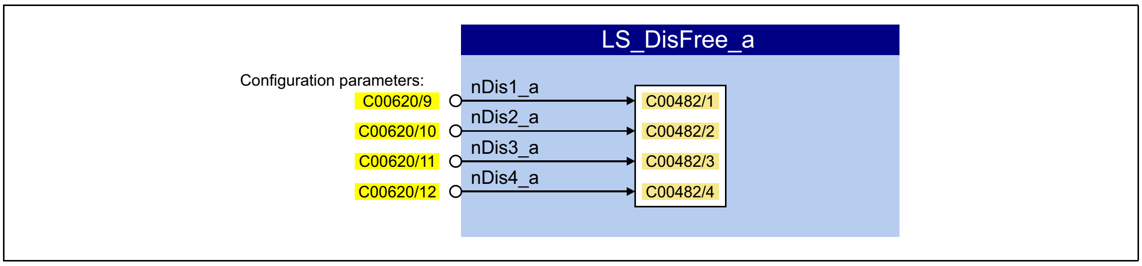
Designator Data type	Information/possible settings
wDis1 ... wDis4 WORD	Inputs for any 16-bit signals of the application

Parameters

Parameters	Possible settings			Information
C00481/1...4	0x0000		0xFFFF	Display of the 16-bit signals which are applied at the *wDis1 ... wDis4* inputs
C00620/5...8	See selection list - analog signals			Configuration parameters for the inputs *wDis1 ... wDis4*

12.19 LS_DisFree_a

This system block displays any four analog signals of the application on display codes. The signals to be displayed are selected via the given configuration parameters.



inputs

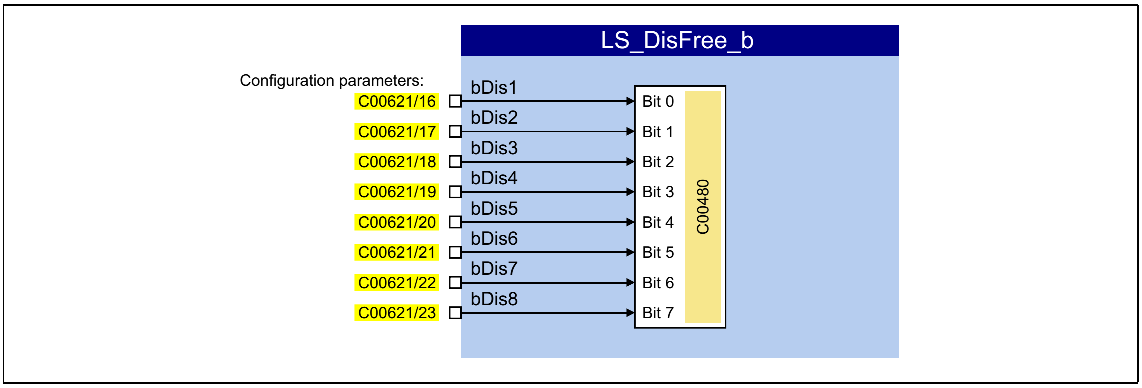
Designator Data type	Information/possible settings
nDis1_a ... nDis4_a INT	Inputs for arbitrary analog signals of the application

Parameters

Parameters	Possible settings			Information
C00482/1...4	-199.9 %		199.9 %	Display of the analog signals applied at the *nDis1_a* ... *nDis4_a* inputs
C00620/9...12	See selection list - analog signals			Configuration parameters for the inputs *nDis1_a* ... *nDis4_a*

12.20 LS_DisFree_b

This system block displays any eight digital signals of the application on a bit-coded display code. The signals to be displayed are selected via the given configuration parameters.



inputs

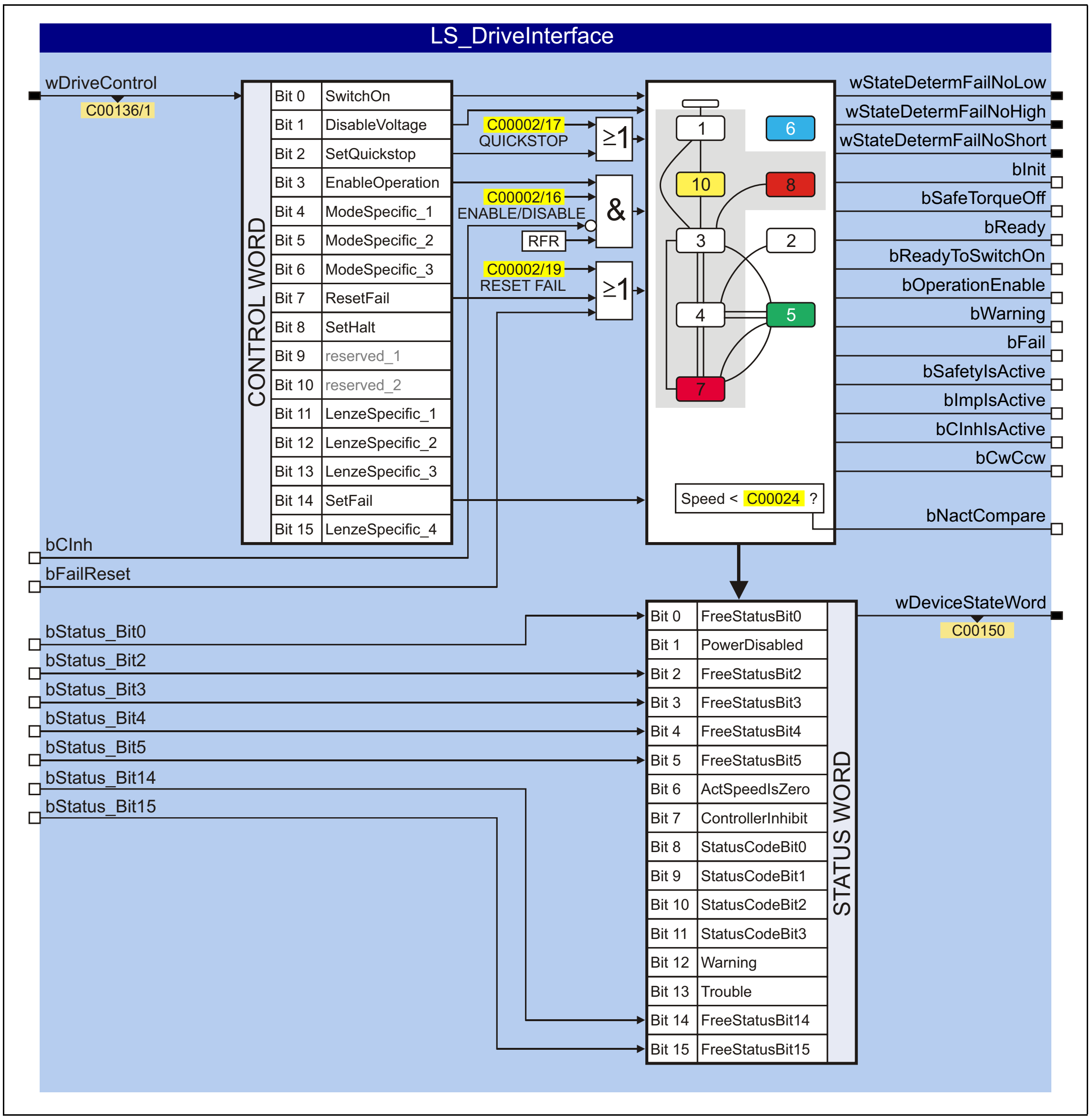
Designator Data type	Information/possible settings
bDis1 ... bDis8 BOOL	Inputs for arbitrary digital signals of the application

Parameters

Parameters	Possible settings			Information
C00480	0x0000		0xFFFF	Display of the digital signals as hexadecimal values applied at the *bDis1* ... *bDis8* inputs
	Bit 0	Signal level at the *bDis1* input		
	Bit 1	Signal level at the *bDis2* input		
	Bit 2	Signal level at the *bDis3* input		
	...	...		
	Bit 7	Signal level at the *bDis8* input		
C00621/16...23	See selection list - digital signals			Configuration parameters for the inputs *bDis1* ... *bDis8*

12.21 LS_DriveInterface

The **LS_DriveInterface** system block displays the device control in the application.



inputs

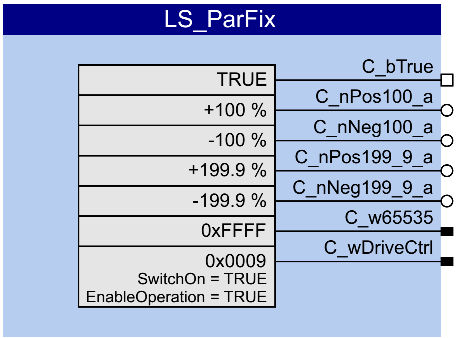
Designator DIS code | data type	**Information/possible settings**	
wDriveControl C00136/1 | WORD	Control word via communication interface • In control mode "40: Network (MCI/CAN)", the inverter that is controlled by a master control (e.g. IPC) receives its control word via the communication interface (MCI/CAN). The upstream LP_Network_In port block provides the process data word at this input. • See the "wDriveControl control word" chapter for a detailed description of the individual control bits.	
bCInh C00833/14 | BOOL	Enable/inhibit inverter	
	FALSE	Enable inverter: The inverter switches to the "OperationEnabled" device status if no other source for controller inhibit is active. • C00158 provides a bit coded representation of all active sources/ triggers of a controller inhibit.
	TRUE	Inhibit inverter (controller inhibit): The inverter switches to the "SwitchedOn" device status.
bFailReset C00833/15 | BOOL	Reset error message In the Lenze setting this input is connected to the digital input controller enable so that a possibly existing error message is reset together with the controller enable (if the cause for the fault is eliminated).	
	TRUE	The current error is reset.
bStatus_Bit0 bStatus_Bit2 bStatus_Bit3 bStatus_Bit4 bStatus_Bit5 bStatus_Bit14 bStatus_Bit15 C00833/16 ... 22 | BOOL	Freely assignable bits in the status word of the inverter. • You can use these bits for returning information to the master control (e.g. IPC).	
	Pre-assignment in the Lenze setting:	
	Bit0	- (not connected)
	Bit2	Current setpoint inside the limitation
	Bit3	Speed setpoint reached
	Bit4	Actual speed value has reached setpoint within hysteresis band
	Bit5	During open-loop operation: Speed setpoint < Comparison value (C00024)
		During closed-loop operation: Actual speed value < Comparison value (C00024)
	Bit14	Current direction of rotation: 0 ≡ Clockwise rotation (Cw) 1 ≡ Counter-clockwise rotation (Ccw)
	Bit15	Drive is ready for operation

outputs

Designator DIS code | data type	**Value/meaning**	
wDeviceStateWord C00150 | WORD	Status word of the inverter (based on DSP-402) • The status word contains information on the currents status of the inverter. • In control mode "40: Network (MCI/CAN)" the status word is transmitted to the master control as process data word via the port block LP_Network_Out. • For a detailed description of each status bit see chapter "Status word".	
wStateDetermFailNoLow WORD	Display of the status determining error (32-bit error number, Low-Word)	
wStateDetermFailNoHigh WORD	Display of the status determining error (32-bit error number, High-Word)	
wStateDetermFailNoShort WORD (from version 04.00.00)	Display of the status determining error (16-bit error number)	
bInit BOOL	TRUE	"Init" device state is active
bSafeTorqueOff BOOL	TRUE	"SafeTorqueOff" device state is active
bReady BOOL	TRUE	"SwitchedOn" device state is active
bReadyToSwitchOn BOOL	TRUE	"ReadyToSwitchOn" device state is active
bOperationEnable BOOL	TRUE	"OperationEnabled" device state is active
bWarning BOOL	TRUE	A warning is indicated
bFail BOOL	TRUE	"Fault" device state is active
bSafetyIsActive BOOL	TRUE	In preparation
bImpIsActive BOOL	TRUE	Pulse inhibit is active
bCInhIsActive BOOL	TRUE	Controller inhibit is active
bCwCcw BOOL	FALSE	Clockwise rotation (Cw)
	TRUE	Direction of rotation to the left (Ccw)
bNactCompare BOOL	TRUE	During open-loop operation: Speed setpoint < Comparison value (C00024)
		During closed-loop operation: Actual speed value < Comparison value (C00024)

12.22 LS_ParFix

This system block outputs various fixed values (constants) to be used in the interconnection. The constants can be assigned to other inputs via configuration parameters.



outputs

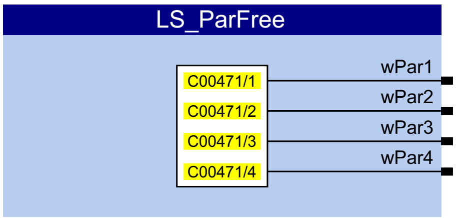
Designator Data type	Value/meaning
C_bTrue BOOL	1 ≡ TRUE
C_nPos100_a INT	16384 ≡ + 100 %
C_nNeg100_a INT	-16384 ≡ - 100 %
C_nPos199_9_a INT	32767 ≡ + 199.9 %
C_nNeg199_9_a INT	-32767 ≡ - 199.9 %
C_w65535 WORD	65535 ≡ 0xFFFF
wDriveCtrl WORD	9 ≡ 0x0009 • Bit 0, SwitchOn = TRUE • Bit 3, EnableOperation = TRUE • All others: FALSE See also: ▸ wDriveControl control word (🕮 238)

Related topics:

▸ User-defined terminal assignment (🕮 217)

12.23 LS_ParFree

This system block outputs 4 parameterisable 16-bit signals. The 16-bit signals can be assigned to other inputs via configuration parameters.



outputs

Designator Data type	Value/meaning
wPar1 ... wPar4 WORD	Output of the 16-bit signals parameterised in C00471/1...4

Parameters

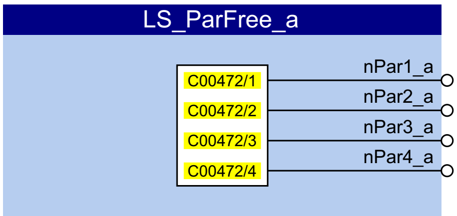
Parameters	Possible settings			Information
C00471/1...4	0x0000		0xFFFF	Setting of the 16-bit signals to be output

Related topics:

- User-defined terminal assignment (🕮 217)

12.24 LS_ParFree_a

This system block outputs 4 parameterisable analog signals. The analog signals can be assigned to other inputs via configuration parameters.



outputs

Designator Data type	Value/meaning
nPar1_a ... nPar4_a INT	Output of the analog signals parameterised in C00472/1...4

Parameters

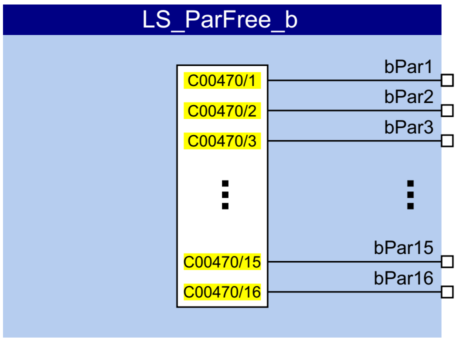
Parameters	Possible settings			Information
C00472/1...4	-199.9	%	+199.9	Selection of analog signals to be output

Related topics:

- User-defined terminal assignment (📖 217)

12.25 LS_ParFree_b

This system block outputs 16 parameterisable digital signals. The digital signals can be assigned to other inputs via configuration parameters.



outputs

Designator Data type	Value/meaning
bPar1 ... bPar16 BOOL	Output of the signal levels (FALSE/TRUE) parameterised in C00470/1...16

Parameters

Parameters	Possible settings		Information
C00470/1...16			Selection of signal levels to be output • Bit 0 ... 15 = *bPar1* ... *bPar16*
	0	"FALSE" signal is output	
	1	"TRUE" signal is output	

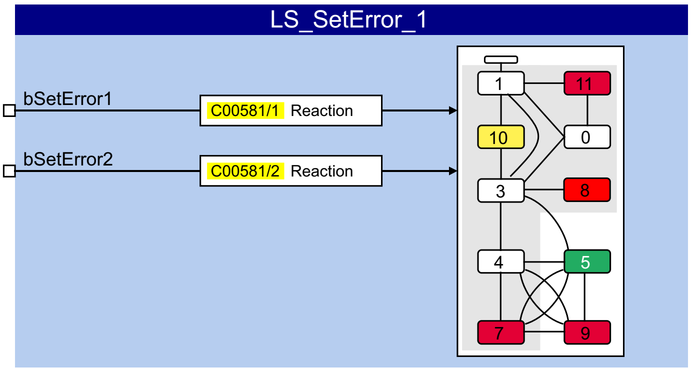
Related topics:

- User-defined terminal assignment (🕮 217)

12.26 LS_SetError_1

This system block is used to implement error handling within the application.

- The application can trip up to two different user error messages with parameterisable error response via the two boolean inputs.
- If both inputs are set to TRUE at the same time, the *bSetError1* inputs trips the error message.



inputs

Designator Data type	Information/possible settings
bSetError1 BOOL	Input for tripping "US01: User error 1" • Error subject number: 980 • Error number: (C00581/1 x 0x0400000) + (980 x 0x10000)
bSetError2 BOOL	Input for tripping "US02: User error 2" • Error subject number: 981 • Error number: (C00581/2 x 0x0400000) + (981 x 0x10000)

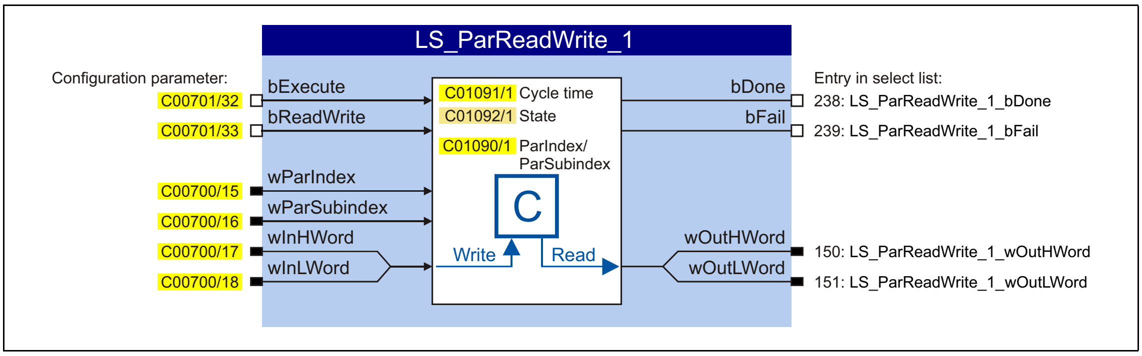
Parameters

Parameters	Possible settings		Information
C00581/1...2			Response for user error 1 ... 2 • lenze setting: "Fault"
	0	No response	
	1	Fault (pulse inhibit)	
	2	Trouble	
	4	WarningLocked	

12.27 LS_ParReadWrite_1

This function extension is only available from version 04.00.00!

This system block serves to read and write local parameters. It supports one-time and cyclic reading/writing in an adjustable time interval.



inputs

Designator Data type	**Information/possible settings**	
bExecute BOOL	Trip read/write request	
	FALSE↗TRUE	If cycle time (C01091/1) = "0 ms": One-time reading/writing of the parameter value which has been addressed via the*wParIndex* and *wParSubindex* inputs.
		If cycle time (C01091/1) > "0 ms": Cyclic reading/writing of the parameter value which has been addressed via the *wParIndex* and *wParSubindex* inputs.
	TRUE↘FALSE	Deactivate cyclic reading/writing again.
bReadWrite BOOL	Selection: Read or write request	
	FALSE	Read request
	TRUE	Write request
wParIndex WORD	Code to be read or written. • This can be alternatively selected via C01090/1.	
wParSubindex WORD	Subcode to be read or written. • This can be alternatively selected via C01090/1.	
wInHWord wInLWord WORD	Value to be written (DataHigh/DataLow portion)	

outputs

Designator Data type	**Value/meaning**	
bDone BOOL	"Read/Write request successfully completed" status signal • The output is automatically reset to FALSE if a new request is activated via *bExecute* or the cycle time (C01091/1) expires.	
	TRUE	Read/Write request successfully completed.
	FALSE	The FALSE status can have the following meanings: 1. There is no active read/write request. 2. The read/write request has not been completed yet. 3. An error has occurred (if *bFail* = TRUE).

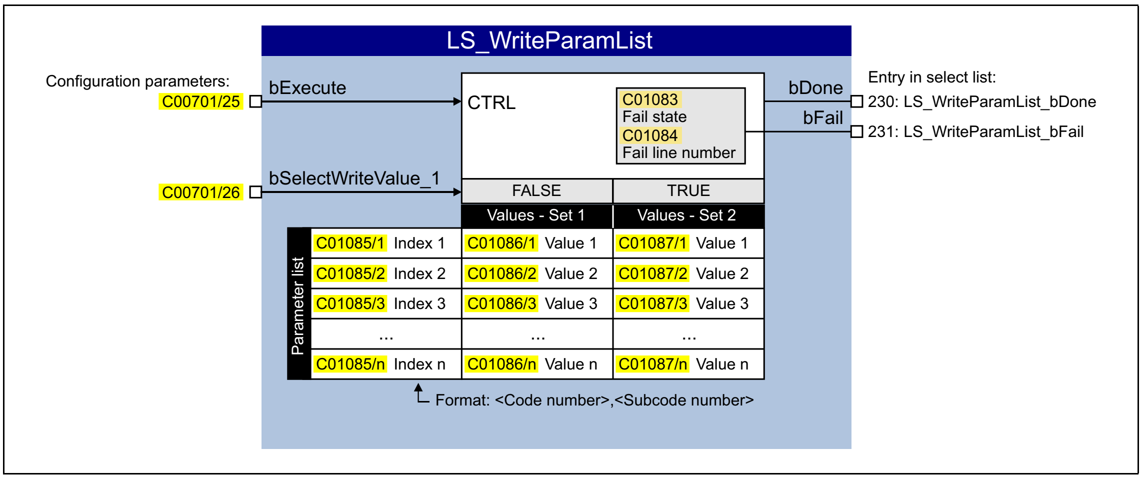
Designator Data type	Value/meaning	
bFail BOOL	"Error" status	
	TRUE	An error has occurred (group signal). • See display parameter C01092/1 for details.
wOutHWord wOutLWord WORD	Value which was read (DataHigh/DataLow portion) after read request	

Parameters

Parameters	Possible settings			Information
C01090/1	0.000		16000,000	Parameter to be read or written. • For a setting of "0,000", inputs *wParIndex* and *wParSubindex* are effective for addressing purposes instead. • Lenze setting: 0.000
	Format: <Code number>,<subcode number>			
C01091/1				Cycle time • Lenze setting: 0
	0	One-time reading/writing at *bExecute* in case of a FALSE/TRUE edge		
	Cyclic reading/writing:			
	20	20 ms		
	50	50 ms		
	100	100 ms		
	200	200 ms		
	500	500 ms		
	1000	1 s		
	2000	2 s		
	5000	5 s		
	10000	10 s		
C01092/1				Error status • If *bFail* = TRUE: Error status is displayed.
	0	No error		
	33803	Invalid data type (e.g. STRING)		
	33804	Limit violation		
	33806	Invalid code		
	33813	No element of the selection list		
	33815	Writing of the parameter not permitted		
	33816	Writing of the parameter only permitted if controller is inhibited		
	33829	Invalid subcode		
	33865	No parameter with subcodes		

12.28 LS_WriteParamList

The **LS_WriteParamList** system block provides the internal interfaces to the basic "Parameter change-over" function:



inputs

Designator Data type	Information/possible settings	
bExecute BOOL	FALSE↗TRUE	For Execute Mode (C01082) = "0: by Execute": Activate writing of the parameter list
bSelectWriteValue_1 BOOL	Parameter change-over • Binary-coded selection of the value set to be used	
	FALSE	Value set 1 (C01086/1 ... n)
	TRUE	Value set 2 (C01087/1 ... n)

outputs

Designator Data type	Value/meaning	
bDone BOOL	"Writing of the parameter list completed" status signal • The output is automatically reset to FALSE if writing via *bExecute* is activated again.	
	TRUE	Writing of the parameter list successfully completed.
	FALSE	The FALSE status can have the following meanings: 1. There is no active writing of the parameter list. 2. Writing of the parameter list has not been completed yet. 3. An error has occurred (if *bFail* = TRUE).
bFail BOOL	"Error" status	
	TRUE	An error has occurred (group signal). • See display parameter (C01083) for details.

For a detailed functional description see basic function "Parameter change-over". (🕮 289)

13 Application examples

This chapter contains different application examples for the 8400 motec.

Tip!

The required parameters can be easily set in the »Engineer« via the **All parameters**. In the "parameter list" category all parameters of the 8400 motec are listed.

13.1 Sequence control

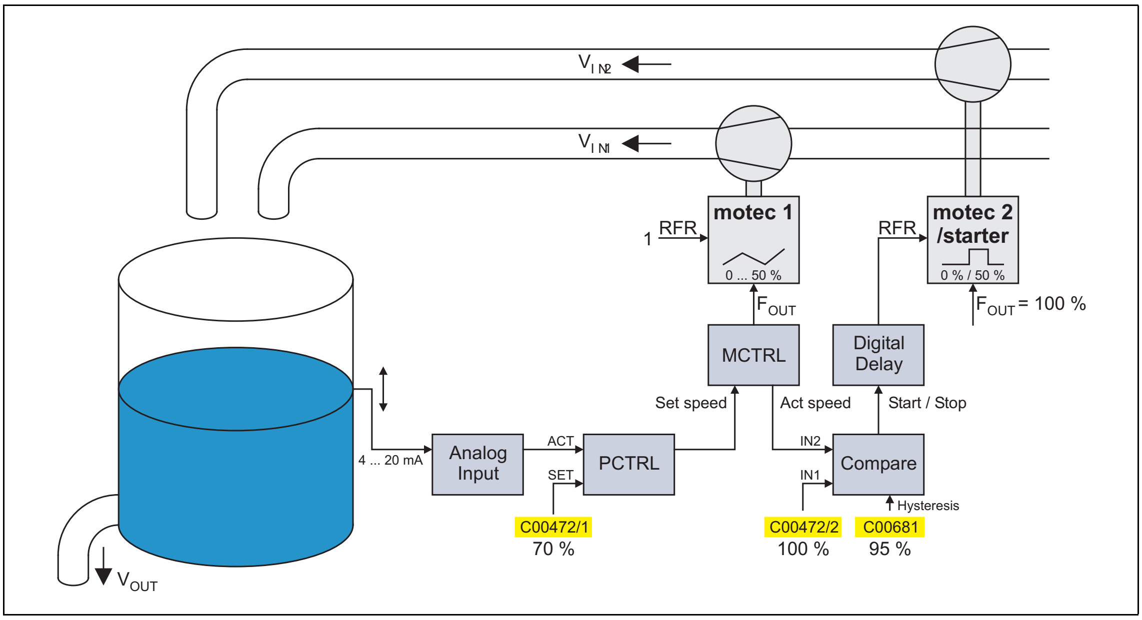
Task:

Two pumps are to keep the water level in a reservoir constant. The second pump is to be switched off if the consumption allows it.

Solution:

Pump 1 controls the water level and, if required, switches pump 2.

- For the control, the (L_PCTRL_1) process controller is used.
- For switching on pump 2, the GP function "Analog comparison" (L_Compare_1) is used. In order to prevent the permanent switching on and off of pump 2, a high hysteresis (95 %) is set for comparison.
- The GP function "Binary delay element" (L_DigitalDelay_1) prevents short runtimes and a short switch-off time of pump 2.

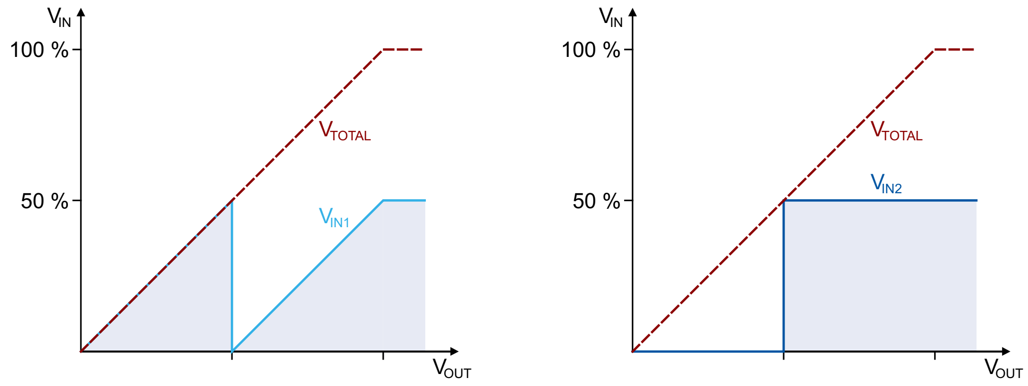


[13-1] Basic signal flow

Special features:

In partial-load operational range, (e.g. during the night), it can be operated with a small unit and thus energy can be saved.

For pump 2, both a second 8400 motec and a starter or contactor can be used.



V_{IN1} (pump 1) = 0 ... 50 %
V_{IN2} (pump 2) = 0 % / 50 %

[13-2] Level curve

Example parameter setting:

Parameters	Information	setting	Information
Settings for motor control and device control			
C00006	Motor control	8: VFCplus: V/f quadr	▸ V/f characteristic control (VFCplus)
C00141	Auto-start option	0x01	Starting performance of the inverter: Inhibit after mains connection. ▸ Auto-start option "Inhibit at device on"
C00019	Auto-DCB: Threshold	100 rpm	▸ Automatic DC-injection braking (auto DCB)
C00106	Auto-DCB: Hold time	0.0 s	DC-injection braking deactivated.
Assignment of the input/output terminals			
C00007	Control mode	10: Terminals 0	The pre-assignment is changed through the following parameter setting.
C00621/1	LS_DigitalOutput:bRelay	220: L_DigitalDelay_1_bOut	The relay is triggered by the binary delay element. The relay causes pump 2 to be released (delayed).
C00701/5	LA_NCtrl: bSetSpeedCcw	0: Not connected	Now, a reversal or rotation via digital input DI4 is not possible anymore.
Analog input			▸ Analog terminals
C00034	AINx: Configuration	2: 4...+20mA	Input signal is current signal 4 mA ... 20 mA.
C00598	Resp. to open circuit AINx	0: No Reaction	Open-circuit monitoring is deactivated.
Setpoint generator			▸ L_NSet_1
C00012	Acceleration time - main setpoint	20 s	
C00013	Deceleration time - main setpoint	20 s	

Parameters	Information	setting	Information
Process controller			▸ L_PCTRL_1
C00222	L_PCTRL_1: Vp	1.0	**Note!** Adapt control mode of the PID process controller to the concrete application!
C00223	L_PCTRL_1: Tn	1000 ms	
C00224	L_PCTRL_1: Kd	0.0	
C00225	L_PCTRL_1: MaxLimit	105.0 %	Maximum level of pump 1.
C00226	L_PCTRL_1: MinLimit	0.0 %	No reversal of direction of the pump.
C00242	L_PCTRL_1: Operating mode	2: PID as setpoint generator.	As PID input values, the process setpoint (*nSet_a*) and the actual process value (*nAct_a*) are used. The speed setpoint (*nNSet_a*) is not considered.
C00700/7	LA_NCtrl: nPIDActValue_a	10: AIn1_Out	The actual process value (*nAct_a*) is detected via the analog input 1. (Actual process value = current water level)
C00700/9	LA_NCtrl: nPIDSetValue_a	20: nPar1_a	The process setpoint (*nSet_a*) is defined via the free parameter C00472/1.
C00472/1	LS_ParFree_a: Value 1	70.0 %	Selection of the process setpoint. (Process setpoint = desired water level)
GP function "Analog comparison"			▸ L_Compare_1
C00680	L_Compare_1: Fct.	6: |In1| < |In2|	Comparison operation: |C00472/2| < |Actual speed value|
C00681	L_Compare_1: Hysteresis	95.0 %	Hysteresis for comparison
C00700/13	L_Compare_1: nIn1_a	21: nPar2_a	The comparison value 1 is selected via the free parameter C00472/2.
C00700/14	L_Compare_1: nIn2_a	52: LA_NCtrl_ nMotorSpeedAct_a	Comparison value 2 is the actual speed value. • 100 % ≡ reference speed (C00011)
C00472/2	LS_ParFree_a: Value 2	100.0 %	Selection of the comparison value 1.
GP function "Binary delay element"			▸ L_DigitalDelay_1
C00720/1	L_DigitalDelay_1: On delay	30 s	Switch-on delay for pump 2
C00720/2	L_DigitalDelay_1: Off delay	120 s	Switch-off delay for pump 2
C00701/23	L_DigitalDelay_1: bIn	215: L_Compare1_bOut	Input value of the delay element is the result of comparison.

13.2 Delayed disconnection in partial-load operation ("Sleep Mode")

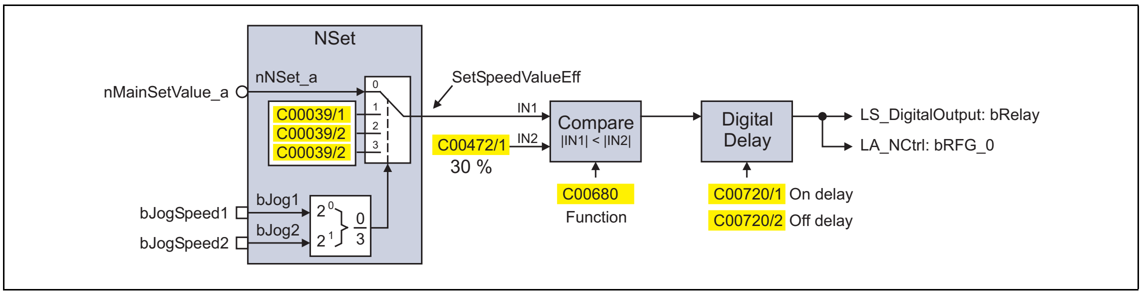
Task:

If the drive remains below a minimum load threshold for a longer period of time, the drive is to be switched off for saving energy. If the setpoint exceeds the minimum load threshold, the drive is to start again.

Solution:

The GP function "Analog comparison" (L_Compare_1) serves to monitor the setpoint speed. As soon as it falls below the set switch-off threshold, the switch-off delay starts. After the set delay time has expired, the drive switches off itself.

- The switch-off delay is implemented with the GP function "Binary delay element" (L_DigitalDelay_1).
- As soon as the setpoint exceeds the switch-off threshold again, the drive restarts.



[13-3] Basic signal flow

Example parameter setting:

Parameters	Information	setting	Information
Settings for device control			
C00141	Auto-start option	0x00	Starting performance of the inverter: No inhibit after mains connection.
Assignment of the input/output terminals			
C00621/1	LS_DigitalOutput:bRelay	220: L_DigitalDelay_1 _bOut	The relay is triggered by the binary delay element.
GP function "Analog comparison"			▸ L_Compare_1
C00680	L_Compare_1: Fct.	6: |In1| < |In2|	Comparison operation: |AIn1_Out| < |C00472/1|
C00700/13	L_Compare_1: nIn1_a	13: SetSpeedValueEff	Comparison value 1 is the input value of the setpoint generator L_NSet_1 selected via the JOG inputs.
C00700/14	L_Compare_1: nIn2_a	20: nPar1_a	The comparison value 2 is selected via the free parameter C00472/1.
C00472/1	LS_ParFree_a: Value 1	30.0 %	Selection of the comparison value 2 (switch-off threshold).
GP function "Binary delay element"			▸ L_DigitalDelay_1
C00720/1	L_DigitalDelay_1: On delay	10 s	Switch-on delay (= switch-off delay for the drive)
C00720/2	L_DigitalDelay_1: Off delay	1 s	Switch-off delay (= switch-on delay for the drive)
C00701/23	L_DigitalDelay_1: bIn	215: L_Compare_1_bOut	Input value of the delay element is the result of comparison.

Parameters	Information	setting	Information
Control signals for application			▸ TA "Actuating drive speed"
C00701/12	LA_NCtrl: bRFG_0	220: L_DigitalDelay_1_bOut	The binary delay element serves to lead the main setpoint integrator via the current Ti times to "0".

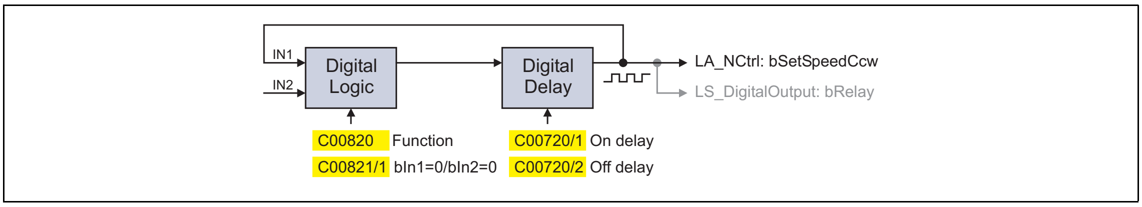
13.3 Motor load test

Task:

In order to verify a motor design, the motor is to be loaded by cyclic reversing in a long-term test.

Solution:

The GP function "Binary logic" (L_DigitalLogic_1) serves to configure the logic function "NOT". This inverts the output of the delay element (L_DigitalDelay_1) and thus generates an alternating signal. The alternating signal in turn is connected to the application input for change of direction of rotation (*bSetSpeedCcw*) and causes an alternating direction of rotation of the motor.



[13-4] Basic signal flow

Example parameter setting:

Parameters	Information	setting	Information
Assignment of the input/output terminals			
C00621/1	LS_DigitalOutput:bRelay	220: L_DigitalDelay_1 _bOut	For test purposes: The relay is also triggered with the alternating signal of the binary delay element.
GP function "Binary logic"			▸ L_DigitalLogic_1
C00820	L_DigitalLogic_1: Function	4: bOut = f(truth table)	The truth table parameterised in C00821 is used.
C00821/1	L_DigitalLogic_1: bIn1=0/bIn2=0	1: True	Truth table for logic "NOT" function.
C00701/28	L_DigitalLogic_1: bIn1	220: L_DigitalDelay_1 _bOut	Input 1 is connected to the output of the delay element.
C00701/29	L_DigitalLogic_1: bIn2	0: Not connected	Input 2 is not required.
GP function "Binary delay element"			▸ L_DigitalDelay_1
C00720/1	L_DigitalDelay_1: On delay	5 s	Switch-on delay
C00720/2	L_DigitalDelay_1: Off delay	5 s	Switch-off delay
C00701/23	L_DigitalDelay_1: bIn	240: L_DigitalLogic_1 _bOut	Input value of the delay element is the result of the binary logic.
Control signals for application			▸ TA "Actuating drive speed"
C00701/5	LA_NCtrl: bSetSpeedCcw	220: L_DigitalDelay_1 _bOut	The direction of rotation is changed with the alternating signal of the binary delay element.

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FEEDBACK

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

8400 motec · Reference manual · EDS84DMxxxx · 13572994 · DMS 10.1 EN · 10/2019 · TD06

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Accessories

AS-Interface (AS-i)

E84DGFCAxxx

Inverter Drives 8400 motec__________________

Communication Manual EN

13564903

Lenze

Contents

1 About this documentation

Contents

This documentation exclusively contains descriptions of the AS-Interface (AS-i) bus system for the Inverter Drive 8400 motec.

Note!

This documentation supplements the **mounting instructions** and the **"Inverter Drives 8400 motec" hardware manual** supplied with the Communication Unit.

The hardware manual contains safety instructions which must be observed!

The properties and functions of the AS-Interface for the Inverter Drive 8400 motec are described in detail.

Examples illustrate typical applications.

The theoretical context is only explained as far as it is required for understanding the function of the Communication Unit.

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 master computer (PLC, master) documents.

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

Tip!

Detailed information about the AS-Interface can be found on the website of the AS-Interface user organisation:

www.as-interface.net

Target group

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

Tip!

Current documentation and software updates with regard to Lenze products can be found in the download area at:

www.Lenze.com

Information regarding the validity

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

Product series	Type designation	Version
Inverter Drives 8400 motec **Communication Unit AS-Interface**	E84DGFCAxNx	AS-i V3
	E84DGFCAxJx	AS-i V3 + Safety

▸ Features and variants (🕮 13)

Screenshots/application examples

All screenshots provided in this documentation are application examples. Depending on the firmware version of the field devices and the software version of the installed Engineering tools (»Engineer«), the screenshots in this documentation may differ from the screens.

1.1 Document history

Version			Description
5.0	02/2019	TD23	• General revision • Updated to firmware version 3.0 (AS-i profile 7.A.7 for slave 2)
4.0	09/2013	TD17	• General revision • New layout
3.0	01/2012	TD17	General revision
2.0	01/2011	TD17	Update: • Low-voltage supply via the AS-i-bus cable • I/O configuration • Error messages • Parameter descriptions
1.0	12/2010	TD17	First edition

1.2 Conventions used

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

Type of information	Highlighting	Examples/notes
Spelling of numbers		
Decimal	Normal spelling	Example: 1234
Decimal separator	Point	The decimal point is always used. For example: 1234.56
Hexadecimal	0x[0 ... 9, A ... F]	Example: 0x60F4
Binary • Nibble	0b[0, 1]	Example: ’0b0110’ Example: ’0b0110.0100’
Text		
Program name	» «	PC software Example: Lenze »Engineer«
Control element	**Bold**	The **OK** button... / The **Copy** command... / The Properties tab... / The **Name** input field...
Hyperlink	underlined	Optically highlighted reference to another topic. Can be activated with a mouse-click in this documentation.
Icons		
Page reference	(🕮 7)	Optically highlighted reference to another page. Can be activated with a mouse-click in this documentation.
Step-by-step instructions	⌨🖱	Step-by-step instructions are indicated by a pictograph.

1.3 Terminology used

Term	Meaning
AS-Interface	The AS-Interface (actuator/sensor interface) ... • is an international standard for fieldbus communication. • is used in decentralised applications as fieldbus communication on the lowest control level.
AS-i	
Inverter	Lenze frequency inverter of the "Inverter Drives 8400 motec" product series
Standard device	

Drive Unit
Communication unit
Wiring Unit
	The 8400 motec inverter has a modular structure that includes the following modules: "Drive Unit", "Communication Unit", and "Wiring Unit".
	• The drive unit is available in different power settings.
	• In case of the communication unit you can select between:
	  • Without fieldbus (basic I/O, standard I/O, extended I/O)
	  • AS interface (without safety/with safety STO)
	  • CANopen (without safety/with safety STO)
	  • EtherCAT (without safety/with safety STO)
	  • EtherNET/IP (without safety/with safety STO)
	  • PROFIBUS (without safety/with safety STO)
	  • PROFINET (without safety/with safety STO)
	  • POWERLINK (without safety/with safety STO)
	• The wiring unit provides flexible connection possibilities for a simple integration into the power supply of the machine.

»Engineer«	Lenze PC software which supports you during the "Engineering" process (parameterisation, diagnostics, and configuration) throughout the whole life cycle, i. e. from planning to maintenance of the machine commissioned.
Code	Parameter which serves to parameterise and monitor the inverter. In normal usage, the term is usually referred to as "Index".
Subcode	If a code contains several parameters, they are stored in "subcodes". This manual uses a slash "/" as a separator between code and subcode (e.g. "C00118/3"). This term is also referred to as "subindex" in common parlance.
Lenze setting	This setting is the default factory setting of the device.
Basic setting	
HW	Hardware
SW	Software
CTT2 transmission (Combined Transaction Type 2)	Serial data transmission is established between master and slave (clock in/out, data in/out). This channel serves for ... • acyclic transmission of data records; • acyclic transmission of the extended process image.
Data set transmission	In the case of CTT2 transmission, data records are transmitted between the master and the slave only on request. During acyclic data record transmission, the cyclic transmission of the extended process image is interrupted.
Process image	In the case of the Inverter Drive 8400 motec, 4 bits of control data (PAA) are transmitted to the slave every time the slave is called. The slave returns a response containing 6 bits of information (PAE). The transmission is carried out at least every 10 ms (AS-i cycle (🕮 32), depending on the addressing assignment). In the case of extended process images, continuous transmission of 4 bytes per direction between the master and the slave takes place.
Parameter echo (diagnostics via parameter data channel)	The "Write Parameter" AS-i command serves to transmit 4 parameter bits to the slave. In the response message, the slave returns 4 bits (16 bit combinations) of status information.
ICs	Circuits which efficiently perform the described tasks of a slave.
MCU	Microcontroller
ASIC	Application specific integrated circuit

1.4 Notes used

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

Safety instructions

Layout of the safety instructions:

⚠ **Pictograph and signal word!**

(characterise the type and severity of danger)

Note

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

Pictograph	Signal word	Meaning
⚡	**Danger!**	**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	**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	Signal word	Meaning
ℹ	**Note!**	Important note to ensure trouble-free operation
💡	**Tip!**	Useful tip for easy handling
📖		Reference to another document

2 Safety instructions

Note!

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

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

2.1 General safety and application notes

Danger!

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

- Lenze drive and automation components ...
  - must only be used as directed.
    ▶ Application as directed (📖 12)
  - must never be commissioned if they display signs of damage.
  - must never be technically modified.
  - must never be commissioned if they are not fully mounted.
  - must never be operated without required covers.
  - during and after operation can have live, moving and rotating parts, depending on their degree of protection. Surfaces can be hot.
- The following applies to Lenze drive components ...
  - only use the accessories approved.
  - Only use original manufacturer spare parts.
- Observe all specifications contained in the enclosed documentation and related documentation.
  - This is the precondition for safe and trouble-free operation and for obtaining the product features specified.
    ▶ Features and variants (📖 13)
  - The specifications, processes, and circuitry described in this document are for guidance only and must be adapted to your own specific application. Lenze does not take responsibility for the suitability of the process and circuit proposals.
- Only qualified personnel may work with and on Lenze drive and automation components. According to IEC 60364 and CENELEC, these are persons ...
  - are familiar with installing, mounting, commissioning, and operating the product.
  - who have the corresponding qualifications for their work.
  - who know and can apply all regulations for the prevention of accidents, directives, and laws applicable at the place of use.

2.2 Device and application-specific safety instructions

- During operation, the Communication Unit must be connected to the Wiring Unit and the Drive Unit.
- Only use cables that meet the listed specifications.
  - ▶ Bus cable specification (📖 22)

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

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

2.3 Residual hazards

Device protection

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

▶ Installation (📖 20)

3 Product description

3.1 Application as directed

The AS-Interface Communication Unit ...

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

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

- is a device intended for use in industrial power systems.
- should only be used under the operating conditions prescribed in this documentation.
- can only be used in AS-i networks.
- can also be used without being connected to the AS-i network.

Any other use shall be deemed inappropriate!

3.2 Features and variants

The AS-Interface Communication Unit is available in the following versions:

Product series	**Type designation**	**Product features**				
		Enclosure	**Connection AS-Interface**	**I/O: Connection via terminal**	**I/O: Connection via M12**	**Safety**
Inverter Drives 8400 motec **Communication Unit AS-Interface**	E84DGFCAFNP	IP 65	M12	3× DI 1× DO	2× DI	
	E84DGFCAENP	IP 65	M12	2× DI	3× DI 1× DO	
	E84DGFCAFJP	IP 65	M12	3× DI 1× DO 1× AI	2× DI	●
	E84DGFCAEJP	IP 65	M12	3× DI	2× DI 1× DO 1× AI	●

- The AS-Interface Communication Unit is ...
  - mounted on top of the Wiring Unit (E84DGVNxx);
  - supplied internally by the Drive Unit (E84DGDVxxxxxxxx) and externally by the AS-i bus.
- The I/O connections can be brought into the device via M12 connectors or cable glands.
- Devices without an integrated safety system (safety option) have no analog input and no relay output.
- The integrated safety system can be used on machines for the protection of persons.
- The Communication Unit AS-Interface supports the services of the AS-i version 3.0:
  - cyclic reading and writing of single parameters
  - cyclic drive control
  - acyclic reading and writing of parameter sets
  - acyclic query of diagnostic data
- Two AS-i slaves are contained in the Communication Unit. Thus, two AS-i addresses are assigned. ▸ AS-i concept of the Communication Unit (🕮 34)
- The acyclic communication via the AS-i bus and the slave 2 are available for the read and write access to parameters.
- The AS-i slaves can be addressed ...
  - via a programming unit or from the master or
  - by means of parameters (e.g. via »Engineer«, keypad or EPM).
- The AS-i slaves must be parameterised via the Lenze »Engineer« (e.g. parameterisation of the brake or bit interconnection for control via the AS-i master).
- Up to 31 standard slaves can be connected to an AS-i network. In this case the max. cycle time is 5 ms. Up to 62 so-called A/B slaves can be connected if extended addressing is used. In this case the max. cycle time is 10 ms.

- Synchronisation (🕮 33) of input and output data is possible.
- Communication with the Lenze »Engineer« (access to all Lenze parameters) is executed via the diagnostic interface of the Drive Unit.

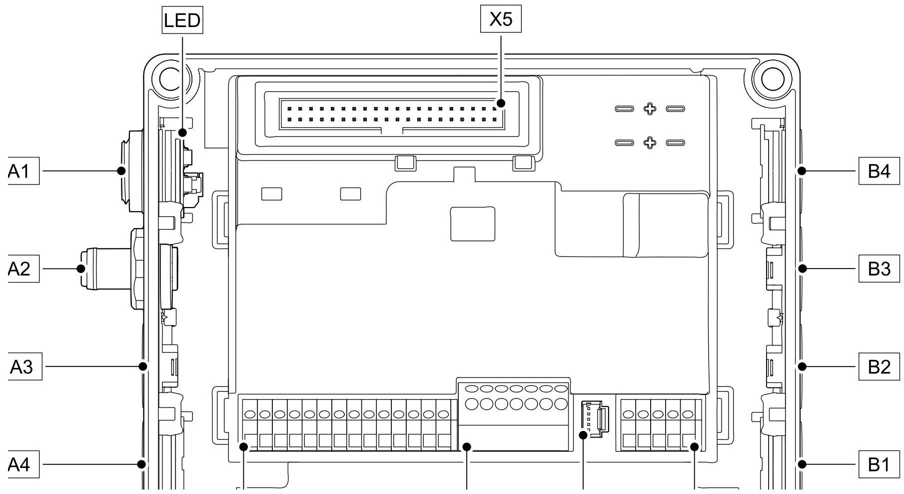
"Inverter Drives 8400 motec" hardware manual

Here you will find detailed information on the integrated safety system (safety option).

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

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

3.3 Connections and interfaces



[3-1] AS-Interface Communication Unit

Pos.	Description
A1	LEDs for AS-i status display ▶ LED status displays (📖 54)
A2	AS-i terminal (M12 pins, 5-pole) ▶ AS-i connection (📖 23)
A3 / A4 **B1 ... B4**	Positions for further freely designable inputs and outputs: • Digital inputs • Digital output • Analog input (only for E84DGFCAxJx) • Relay output (only for E84DGFCAxJx) • Connection of "Safety Option" safety system (only for E84DGFCAxJx)
X3 / X4 / X61	Terminal strips for wiring the terminals at A2 ... A4 and B1 ... B4
X5	Plug connector for connection to the Drive Unit
X55	Plug connector for the wiring of the LEDs to A1

- By default, the AS-i terminal and the LEDs for the AS-i status displays are already mounted and wired:
  - AS-i connection to terminal strip X3
  - LEDs on plug connector X55
- The positions A1 ... A4 and B1 ... B4 serve to freely connect the AS-i terminals, the LEDs for the AS-i status displays and other connections (e.g. digital inputs).
- For the connections, 5-pin M12 connectors or - alternatively - cable glands (cable cross-section max. 1.0 mm^2, AWG 18) can be used.
- The M12 connectors, cable glands and prefabricated system cables can be obtained from various manufacturers.
- Wire the M12 plugs or cable glands used with the corresponding contacts of the terminal strips X3, X4 and X61.

"Inverter Drives 8400 motec" hardware manual

Observe the notes and wiring instructions contained in this documentation.

4 Technical data

"Inverter Drives 8400 motec" hardware manual

Here you will find the **ambient conditions** and information on the **electromagnetic compatibility (EMC)** that also apply to the Communication Unit.

4.1 General data and operating conditions

Range	Values
Order designation	• E84DGFCAxNx (AS-i V3) • E84DGFCAxJx (AS-i V3, Safety)
Communication profile	AS-Interface V3.0
Standards / specifications	• EN 50295 / IEC 62026-2 • Safety engineering: EN 954-1, EN 13849-1, IEC 61508 (up to safety category 4)
Communication medium	Two-wire cable for data and auxiliary power, 2 x 1.5 mm^2 (without shielding, without terminating impedance)
Interface for communication	M12 pins, 5-pole, A-coded • Contacting of the AS-i cable with penetration technique • Cable with M12 socket, 5-pole, A-coded
Max. cable length	• Max. 100 m without repeater/extender • Max. 300 m with 2 repeaters/extenders • Max. 500 m only for star topology with repeater/extender
Bus termination	Only required for cable lengths > 100 m Bus terminating resistors are required at the first and last AS-i node (implemented in the connector of the bus cable)
Network topology	Free topology (line, ring, tree, star)
Type of node	Single slave or dual slave
Slave node number	• Max. 31 standard slaves • Max. 62 A/B slaves
Node address area	1 ... 31
Cycle time	• max. 5 ms with maximum configuration • 10 ms when A/B technique is used • profile-specific with spec 3.0 slaves
Baud rate	167 kbps (gross) 53 kbps (net; data transfer efficiency = 32 %)
Voltage supply	External supply via AS-i bus cable • U = 29.5 ... 31.6 V (according to AS-i specification) • I_{max} = 120 mA
Available digital inputs	• 5 dig. inputs with mains supply • 4 dig. inputs with supply via AS-i bus and missing mains
Conformities, approvals	• CE • UR / cUR (see also hardware manual)

4.2 Protocol data

Range	Values
AS-i device profiles	• Slave 1: 7.A.5 (CTT2) • Slave 2: 7.A.7
Process image, standard	**Slave 1:** • DI0 ... 3 = 4 bits • DO0 ... 3 = 4 bits **Slave 2:** • DI0/1 = 2 bits • DO3/4 = 2 bits **Total:** 6 input bits / 6 output bits
Process image, A/B technique	**Slave 1:** • DI0 ... 3 = 4 bits • DO0 ... 2 = 3 bits **Slave 2:** • DI0/1 = 2 bits • DO3 = 1 bits **Total:** 6 input bits / 4 output bits
Cyclic parameter data channel (AS-i spec. V2.0 and V3.0)	4 words (8 bytes)
Acyclic parameter data channel (AS-i spec. V3.0)	max. 16 double words (64 bytes)
AS-i user data length	max. 64 bytes

4.3 Communication time

The communication time is the time between the start of a request and the arrival of the corresponding response.

The communication times in an AS-i network depend on the ...

- processing time in the inverter;
- frame runtime (baud rate / frame length);
- nesting depth of the network.

Processing time in the inverter

Data	Processing time	
Process data	Approx. 2 ms	Update cycle
	+ 0 ... 1 ms	Processing time in the module
	+ 1 ... x ms	Runtime of the application task of the technology application used (tolerance)
Parameter data	Approx. 30 ms + a tolerance of 20 ms (typically) For some codes, the processing time may be longer (see software manual/ »Engineer« online help "Inverter Drives 8400 motec").	

There are no interdependencies between parameter data and process data.

5 Installation

STOP **Stop!**

Electrostatic discharge

Electronic components within the Communication Unit can be damaged or destroyed by electrostatic discharge.

Possible consequences:

- The Communication Unit is defective.
- Fieldbus communication is not possible or faulty.
- I/O signals are faulty.
- The safety function is faulty.

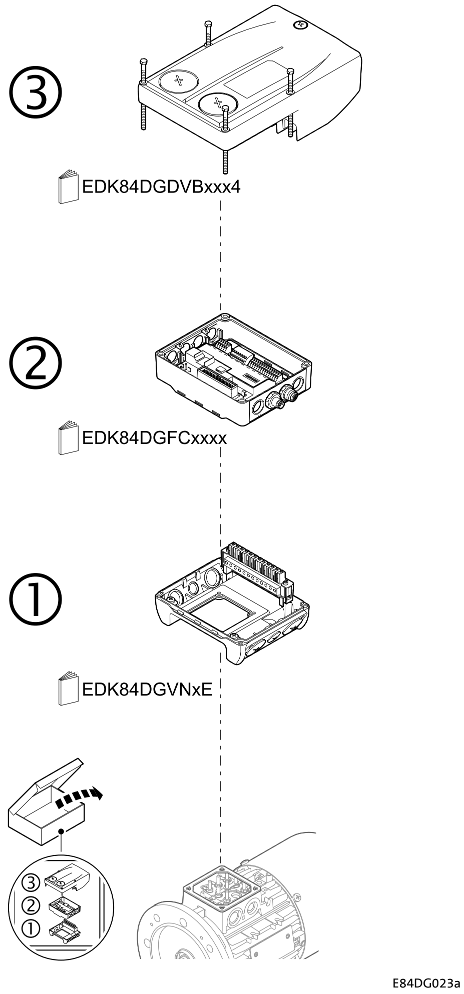
Protective measures

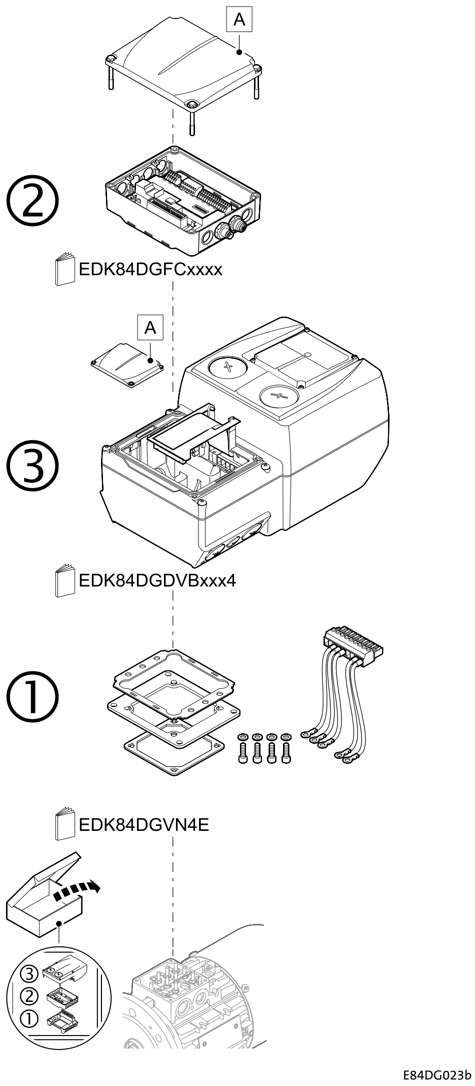
Discharge electrostatic charges before touching the Communication Unit.

5.1 Mechanical installation

Mounting instructions "Inverter Drives 8400 motec"

Here you will find detailed information on the installation.

<table>
<tr><th>0.37 ... 3.0 kW</th><th>4.0 ... 7.5 kW</th></tr>
<tr><td>


</td><td>


</td></tr>
</table>

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

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

5.2 Electrical installation

"Inverter Drives 8400 motec" hardware manual

Here you can find detailed information on ...
- the digital and analog inputs/outputs;
- the relay output;
- the integrated safety system (safety option);
- the wiring of the terminals.

Observe the notes and wiring instructions contained in this documentation.

5.2.1 Bus cable specification

The AS-i bus cable serves as ...

- external Voltage supply (🕮 24) of the Communication Unit;
- Data transmission from and to the inverter.

Note!

Only use cables that meet the listed specifications.

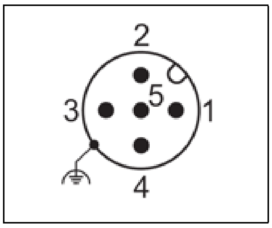
Range	Values
Cable type	Two-wire cable, insulated and shielded
Core cross-section	1.5 mm^2
Cable resistance	< 90 mΩ/m, (f = 3 ... 20 MHz)
Inductance	400 ... 1300 nH/m
Capacitance per unit length	< 80 pF/m
Electrical master value	< 5 µS/m
Surge impedance	70 ... 140 Ω
Group runtime	< 8.3 ns/m

Tip!

These data are also met by several other standardised cables. An AS-i network can also be set up with different cables. Multi-core cables (e.g. DeviceNet Thick Cable, DESINA cable/ light conductor) or busbars can be used for the setup of AS-i networks, too. In case of doubt, consult a specialist in the planning phase.

Prefabricated system cables can be obtained from diverse manufacturers.

5.2.2 AS-i connection



- M12 pins, 5-pole, A-coded
- Wiring of terminal strip X3

AS-i connection		
Pin	**Signal**	**Description**
1	ASi+	AS-i data line, positive
2	-	Not assigned
3	ASi-	AS-i data line, negative
4	-	Not assigned
5	-	Not assigned

5.2.3 Voltage supply

- The Communication Unit is supplied with voltage via the AS-i bus cable.
- Access to parameters of a device that is disconnected from the mains is not possible.
- Permissible voltage (DC) / max. current:
  - U = 29.5 ... 31.6 V (according to AS-i specification)
  - I_{max} = 120 mA

Note!

An incorrect switch-on sequence of the voltage supply causes an error in the inverter.

- First switch on the supply voltage for AS-i, then switch on the mains voltage for the inverter.

Low-voltage supply via the AS-i-bus cable

In case of low-voltage supply via the AS-i bus cable, communication with the slaves is still possible if no mains voltage is available.

- A previous mains connection (400 V) is not required.
- If the mains voltage is not connected, the digital inputs DI1 ... DI4 can be evaluated via slave 2 (FW3.0) or slave 1 and slave 2 (FW2.0).
- The AS-i input ports DI0 ... DI3 represent the digital inputs DI1 ... DI4 (see AS-i concept of the Communication Unit (📖 34)). The current status of these inputs can be called.
- All digital input and output data that can be selected by the inverter have been deleted or are invalid.
- External sensors are also supplied via the AS-i bus cable.

"Inverter Drives 8400 motec" hardware manual

Here you can find detailed information on how to wire the Communication Unit.

6 Commissioning

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

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

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

▸ Parameter reference (🕮 61)

6.1 Before initial switch-on

STOP **Stop!**

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

6.2 How to configure the host (master)

Communication with the inverter first requires configuration of the host (master).

Defining the user data length

- The AS-Interface Communication Unit supports the configuration of max. 8 process data words (max. 64 bytes).
- The user data length is defined during the initialisation phase of the master.
- The user data lengths for process input data and process output data are identical.

Note!

Observe the direction of the information flow.

- Process input data (Rx data):
  Process data from the inverter (slave) to the host (master)
- Process output data (Tx data):
  Process data from the host (master) to the inverter (slave)

6.3 Settings for AS-i communication in the »Engineer«

6.3.1 Addressing the AS-i slaves

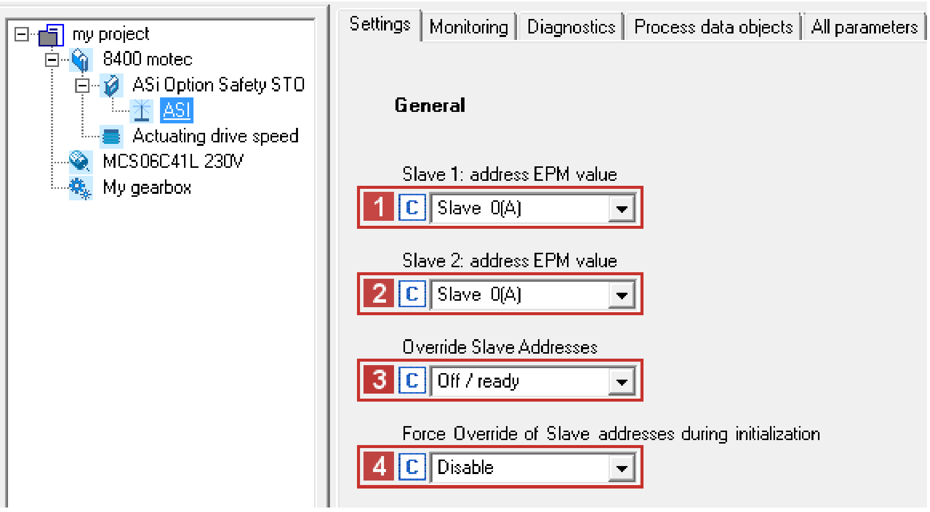
Addressing is usually carried out automatically via the master or an external addressing unit.

The AS-Interface Communication Unit uses two slaves (see AS-i concept of the Communication Unit (📖 34)) which must be initialised with **unique addresses**.

Note!

- If the same address is used for slave 1 and slave 2, the address of slave 2 is set to '0'.
- If address '0' is assigned to slave 1 and slave 2, slave 2 is switched "offline" (basic settings remain intact).
- The setting C13200/x / C13202/x = 64 serves to deactivate the slave (not active or visible in the AS-i network).

The parameters for addressing the AS-i slaves can be found in the »Engineer« on the "**Settings**" tab.



General

Slave 1: address EPM value
1 C Slave 0(A)

Slave 2: address EPM value
2 C Slave 0(A)

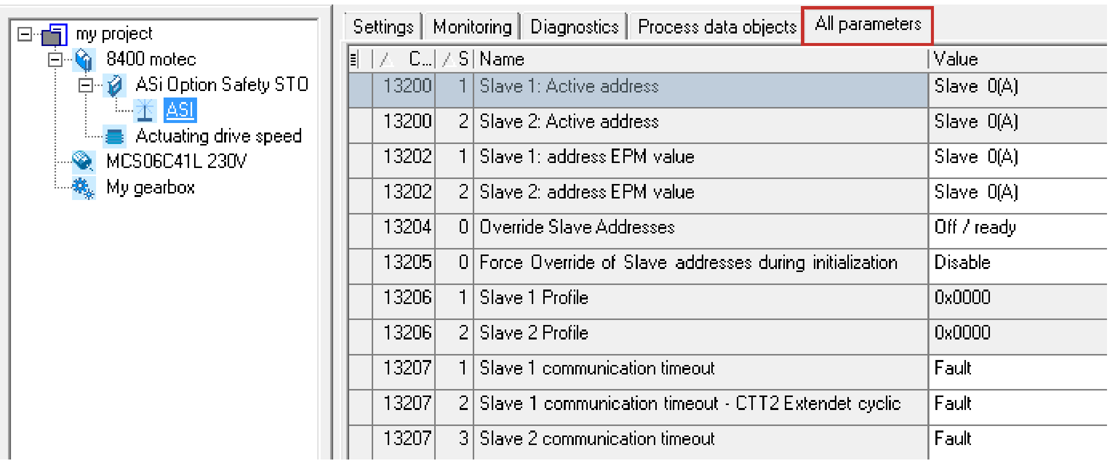
Override Slave Addresses
3 C Off / ready

Force Override of Slave addresses during initialization
4 C Disable

Setting / parameters		Code
1	**Slave 1: Address EPM value**	C13202/1
2	**Slave 1: Address EPM value**	C13202/2
3	**Override slave addresses**	C13204
4	**Override of the slave addresses during initialisation**	C13205

6.3.2 All parameters for setting the AS-i communication

All parameters for setting the AS-i communication can be found in the »Engineer« on the "**All parameters**" tab.



C...	S	Name	Value
13200	1	Slave 1: Active address	Slave 0(A)
13200	2	Slave 2: Active address	Slave 0(A)
13202	1	Slave 1: address EPM value	Slave 0(A)
13202	2	Slave 2: address EPM value	Slave 0(A)
13204	0	Override Slave Addresses	Off / ready
13205	0	Force Override of Slave addresses during initialization	Disable
13206	1	Slave 1 Profile	0x0000
13206	2	Slave 2 Profile	0x0000
13207	1	Slave 1 communication timeout	Fault
13207	2	Slave 1 communication timeout - CTT2 Extendet cyclic	Fault
13207	3	Slave 2 communication timeout	Fault

Save the changed settings with the device command **C00002/11** (save all parameter sets).

- Addressing the AS-i slaves (🕮 27)
- Parameters relevant for AS-i communication (🕮 62)

6.4 Initial switch-on

Establishing communication

- To establish communication, the inverter drive must be supplied with mains voltage.
- AS-i communication requires voltage supply of the communication unit.
  If this is requirement is not met, the "CE04: MCI communication error" error message (error No. 01.0127.00002) is output. The error must be reset in the Inverter Drive, so that AS-i communication can be established.
- The Voltage supply (📖 24) via the AS-i bus cable serves to maintain the AS-i communication in case of a main supply failure.
- During mains connection, all parameters (codes) are read.
- Addressing can be carried out automatically via the master, an external addressing unit or manually via codes in the »Engineer«.
  ▶ Addressing the AS-i slaves (📖 27)

7 Data transfer

AS-Interface transmits parameter data, configuration data, diagnostic data, alarm messages and process data between the host (master) and the inverters (slaves) that are part of the fieldbus. The data are transmitted via corresponding communication channels as a function of their time-critical response.

The bus access method of the AS-Interface is a master-slave method with cyclic polling.

- The master transmits a frame (master call) with a specific slave address.
- The slave triggered with this address responds within the allowed time (acknowledgement of the message).
- When the response has been received correctly from the master, the message is deemed to be transmitted successfully.
- If the master does not receive any response or the response cannot be decoded without errors for the master, the frame can be repeated.

7.1 AS-i messages

An AS-i message consists of ... a master call, a short pause, a slave response, and a short pause again.

Master call	Pause 1	Slave response	Pause 2
14 bits		7 bits	
84 µs	16 µs	42 µs	9 ... 12 µs
151 ... 154 µs			

- All master calls have a length of 14 bit times (1 bit time = 6 µs).
- All slave responses have a length of 7 bit times.
- The 1st pause has a typical duration of 16 µs (synchronised slave) and must not be longer than the expected slave response.
  If during this time the master does not receive the start of a slave response, no response will arrive anymore. Now the master may start with the next call.
- At the end of the slave response, there is a short pause again with a typical duration of approx. 9 ... 12 µs.
  The master needs this time to check the slave response and decide what should happen next (repeat the transmitted call or continue with the next call).

Broadcast call of the master

An exception to this message structure is a broadcast request of the master. A broadcast transmission corresponds to broadcasting to all nodes (simultaneous transmission from the master to all slaves). It can only be effected in one direction. Broadcast transmissions cannot be acknowledged. Hence, it is not ensured that all slaves have received the message correctly.

Structure of the master call

Structure in the **standard addressing mode** for up to 31 slaves:

ST	SB	Address	Information	PB	EB
1 bit	1 bit	5 bits	5 bits	1 bit	1 bit

Structure in the **advanced addressing mode** for up to 62 slaves:

ST	SB	Address	Information			PB	EB
1 bit	1 bit	5 bits	1 bit	Select bit	3 bits	1 bit	1 bit

Bit field	Description
ST	The start bit marks the start of the master call. • 0: Valid start bit • 1: Not permitted
SB	The control bit designates the call of data, parameters, addressing or commands. • 0: Data/parameter/addressing call • 1: Command call
Address	• 5 address bits contain the address of the slave to be called. • Valid address range: 1 ... 31
Information	Depending on the call type, the information bits contain the information that is transmitted to the slave. • 5 information bits in standard addressing mode • 4 information bits in advanced addressing mode
	Advanced addressing mode: • For the advanced addressing mode (for up to 62 slaves), an additional select bit has been defined. • This has been defined in order that an A slave behaves the same as a standard slave. An A slave can also be operated in networks where the master cannot distinguish between A and B slaves. A/B slaves can be recognised by the hexadecimal ID code "0xA". • Valid address range: 1A ... 31A, 1B ... 31B
PB	Parity bit: The sum of all **1** bit states in the master call must be even.
EB	The end bit marks the end of the master call. • 0: Not permitted • 1: Valid end bit

Structure of the slave response

ST	Information	PB	EB
1 bit	4 bits	1 bit	1 bit

Bit field	Description
ST	The start bit marks the start of the slave response. • 0: Valid start bit • 1: Not permitted
Information	The 4 information bits contain the information that is transmitted to the master.
PB	Parity bit: The sum of all **1** bit states in the slave response must be even.
EB	The end bit marks the end of the slave response. • 0: Not permitted • 1: Valid end bit

7.2 AS-i cycle

The complete AS-i cycle consists of:

- AS-i messages
  Max. 31 messages (sum of the standard slaves connected to the network or the maximum of A and B slaves)
- 1 management call
  Consists of a parameter exchange or a command to a slave and an optional response.
- 1 call from the recording phase
  Search for new slave addresses and optional response
- 1 reserve message (if required)

Cycle time

- The cycle time results from the following formula:

Cycle time = messages per cycle x max. message duration

- When the maximum cycle time is determined, 33 messages are maximally estimated. Hence:

Max. cycle time = 33 messages x 154 µs = 5.08 ms

  - Thus, approx. 200 cycles are passed per second.
  - Thus, a standard slave can be provided 200 times per second with new output data and can transmit its input data to the master.

Note!

Wherever A and B slaves are operated on one address, the cycle time is twice as long.

Medium response time

- The medium response time results from the following formula:

Medium response time = 0.5 x max. cycle time + max. message duration

Medium response time = 0.5 x 5.08 ms + 154 µs = 2.7 ms

- The **jitter**, which is the fluctuation around the medium response time, amounts to ...
  - ± 2.5 ms for standard slaves;
  - ± 5.0 ms for A/B slaves.

Note!

Wherever A and B slaves are operated on one address, the medium response time is twice as long (5.4 ms).

7.3 Synchronisation

The synchronisation serves to read in or output all input and output data exactly at the same time and independent of the slave address. The jitter of the outputs can be reduced from ± 2.5 ms to ± 154 µs.

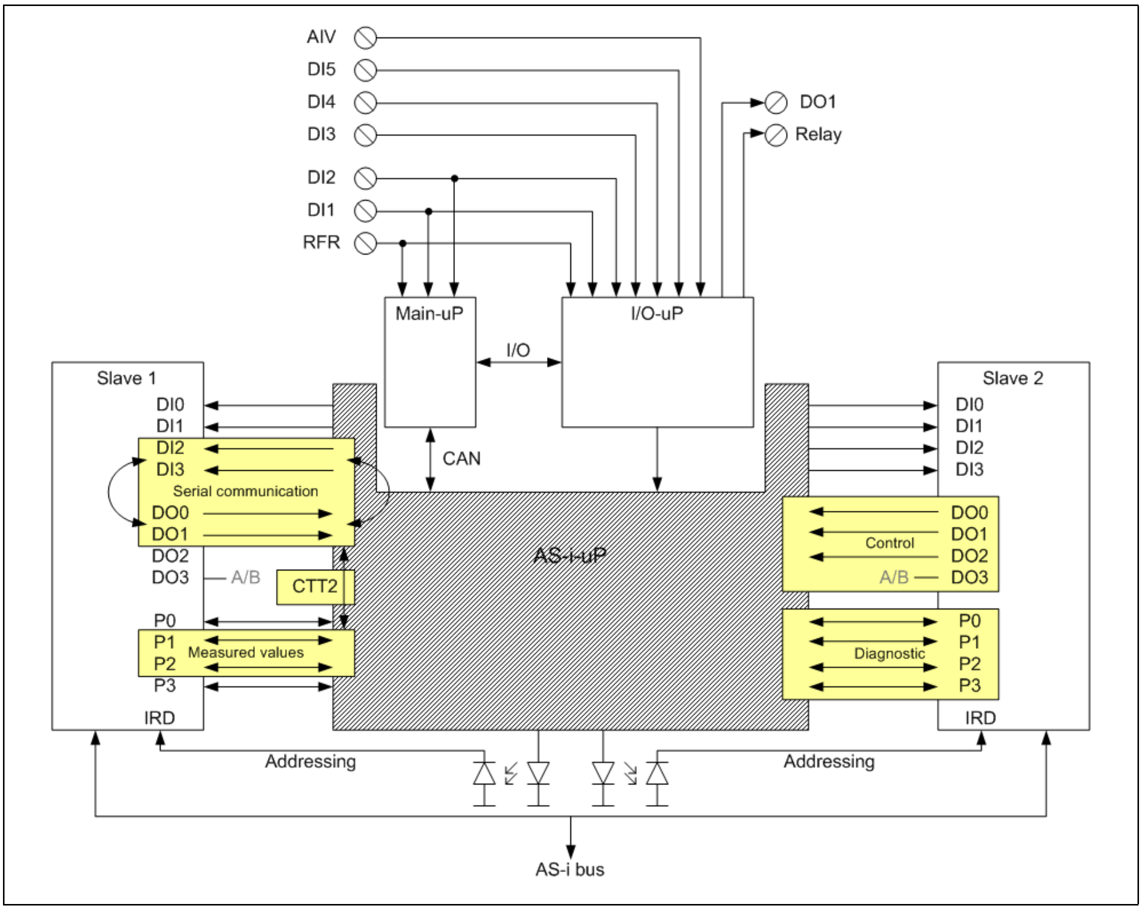
In a standard data exchange, the outputs of each slave that receives a data call from the master are updated immediately and the input information are read in. For the 1st slave, this occurs approx. 154 µs before the 2nd slave and for this slave again approx. 154 µs before the 3rd etc.

If all the slaves are in a synchronised state, the information at their inputs and outputs is only synchronised once at the beginning of the cycle. Since each slave can recognise when a new AS-i cycle starts, no special additional synchronisation command is required. Thus, the information exchange within the cycle remains the same. In order that the synchronisation works, not every slave has to be in a synchronised state.

7.4 AS-i concept of the Communication Unit

The AS-Interface Communication Unit supports the following device profiles:

AS-i profile	Slave	Data transmission	Data / parameter bits
7.A.5	1	Cyclic process image	DI0/1, DO2/3
		Serial data transmission (CTT2): Acyclic transmission of data records and cyclic transmission of the extended process image ▸ Extended process image for slave 1 (📖 36)	DI2/3, DO0/1
7.A.7	2	Cyclic process image	DI0 ... 3, DO0 ... 3
		Diagnostics via parameter data channel (parameter echo)	P0 ... P3



[7-1] AS-i concept of the Communication Unit

7.5 Data transmission slave 1 (AS-i profile 7.A.5)

Accessing the data bits

Bits	Signal / I/O mapping	Description / standard connection with ...
inputs		
DI0	DigIn_bIn2	The function of these inputs cannot be selected in the »Engineer«. Can be used to monitor the digital inputs if the Drive Unit is in the "offline" status.
DI1	DigIn_bIn4	
DI2	Serial Clock In	Intended for CTT2 transmission.
DI3	Serial Data In	
outputs		
DO0	Serial Clock Out	Intended for CTT2 transmission.
DO1	Serial Data Out	
DO2	LP_Network_In: MCI_bCtrl_B4	C00701/3: not connected
DO3	Reserved	Reserved for AS-i A/B addressing

Accessing the parameter bits

Bits	Signal / I/O mapping	Description
P0	Reserved	Selection of the process image: • 0: Data of the extended (cyclic) process image 1 • 1: Data of the extended (cyclic) process image 2 ▸ Extended process image for slave 1 (🕮 36)
P1	Reserved	
P2	Reserved	
P3	Reserved	Reserved for AS-i A/B addressing

Extended process image for slave 1

Extended process image 1 - PR0 = 0

Position	Signal / I/O mapping
Master → Slave (2 x 16 bits/word)	
Word 1	MCI_wIn2/CAN1_wIn2
Word 2	MCI_wIn5/CAN2_wIn1
Slave → Master (2 x 16 bits/word)	
Word 1	MCI_wOut2/CAN1_wOut2
Word 2	MCI_wOut5/CAN2_wOut1

Extended process image 2 - PR0 = 1

Position	Signal / I/O mapping	Description
Master → Slave (2 x 16 bits/word)		
Word 1	MCI_wIn2/CAN1_wIn2	
Word 2	MCI_wIn5/CAN2_wIn1	
Slave → Master (2 x 16 bits/word)		
Word 1	MCI_wOut2/CAN1_wOut2	
Word 2: Bits 0 ... 9	0 ... 10 V (Voltage at analog input)	10 V = 1000
Word 2: Bit 10	DI3	0: Active 1: Not active
Word 2: Bit 11	DI4	
Word 2: Bit 12	DI5	
Word 2: Bit 13	Reserved	
Word 2: Bit 14	I/O status information	0: Invalid data in word 1, word 2 1: Valid data in word 1, word 2
Word 2: Bit 15	Status of the drive (Drive Unit)	0: Drive (Drive Unit) is "offline" 1: Drive (Drive Unit) is "online"

7.6 Data transmission slave 2 (AS-i profile 7.A.7)

AS-i profile 7.A.7 for slave 2 is used for communication units from firmware version 3.0 onwards.

Accessing the data bits

Bits	Signal / I/O mapping	Description / standard connection with ...
inputs		
DI0	LP_Network_Out: MCI_bState_B0	C00621/30: not connected
DI1	LP_Network_Out: MCI_bState_B1	C00621/31: not connected
DI2	Digin_bIn1	The function of these inputs cannot be selected in the »Engineer«. Can be used to monitor the digital inputs if the Drive Unit is in the "offline" status.
DI3	Digin_bIn3	
outputs		
DO0 [1]	LP_Network_In: MCI_bCtrl_B0	C00701/6: LS_DigitalInput: bIn1
DO1 [1]	LP_Network_In: MCI_bCtrl_B1	C00701/7: LS_DigitalInput: bIn2
DO2 [1]	LP_Network_In: MCI_bCtrl_B2	C00701/17: LS_ParFix: bTrue
DO3 [2]	LP_Network_In: MCI_bCtrl_B3	C00701/18: not connected The bit is toggled, since it is also used for A/B addressing.

1) The bit is queried in cycles of 10 ms.

2) The bit is queried in cycles of 20 ms.

Accessing the parameter bits

Parameter bits P0 ... P3 provide diagnostic information to the master for slave 2. Here, P0 ... P2 define whether a status query of code **C00150** or an error/warning diagnostics is returned as slave response to the master.

The values of P0 ... P3 are transmitted to the master via the "Write_Parameter" command.

Bits	Signal / I/O mapping	Description
P0	Diagnostic information (slave ➞ master): • 4 status bits of the status word **C00150** • Error messages / warnings (see below)	Values P0 - P1 - P2: • 0 - 0 - 0: Query C00150/Bits 0 ... 3 • 0 - 0 - 1: Query C00150/Bits 4 ... 7 • 0 - 1 - 0: Query C00150/Bits 8 ... 11 • 0 - 1 - 1: Query C00150/Bits 12 ... 15 • 1 - 0 - 0: Active error • 1 - 0 - 1: Active warning
P1		
P2		
P3		

Error messages and warnings

Note!

No error message / warning is ever provided other than the one with the highest priority. As long as this error message / warning is pending, no other can be provided.

Values				Error message	Warning
P0	P1	P2	P3		
0	0	0	0	No failure	No warning
0	0	0	1	"OC1" - Short circuit	"OC5" - Device load warning
0	0	1	0	"OC2" - Ground fault	"OC6" - Overload warning
0	0	1	1	"OH" - High temperature	Heat sink temperature high warning
0	1	0	0	"US02" - User error #1	"US01" - User warning #1
0	1	0	1	"OU" - High bus voltage	Brake resistor overload
0	1	1	0	"LU" - Low bus voltage error	"LU" - Low bus voltage warning
0	1	1	1	"OC6" - Overload error	Motor identification active
1	0	0	0	"Su02" - Single phasing	"Su02" - Single phasing
1	0	0	1	"US02" - User error #2	"US02" - User warning #2
1	0	1	0	"dbF" - Dynamic brake fault	AutoStartLock
1	0	1	1	"PS0x" - EPM failure	Motor phase failure
1	1	0	0	"DF0x" - Internal failure	AIN current < 4 mA
1	1	0	1	"OH3" - PTC fault	Reserved (unused)
1	1	1	0	Drive Unit "offline"	Reserved (unused)
1	1	1	1	Other failure	Other warnings

8 Process data transfer

- Process data are transmitted via the process data channel.
- The process data serve to control the inverter.
- The transmission of process data is time-critical.
- Process data are cyclically transferred between the master and the slaves participating in the fieldbus (continuous exchange of current input and output data).
- The master can directly access the process data. In the PLC, for instance, the data are directly assigned to the I/O area.
- Process data are not saved in the inverter.
- Process data are e.g. setpoints, actual values, control words, and status words.

Note!

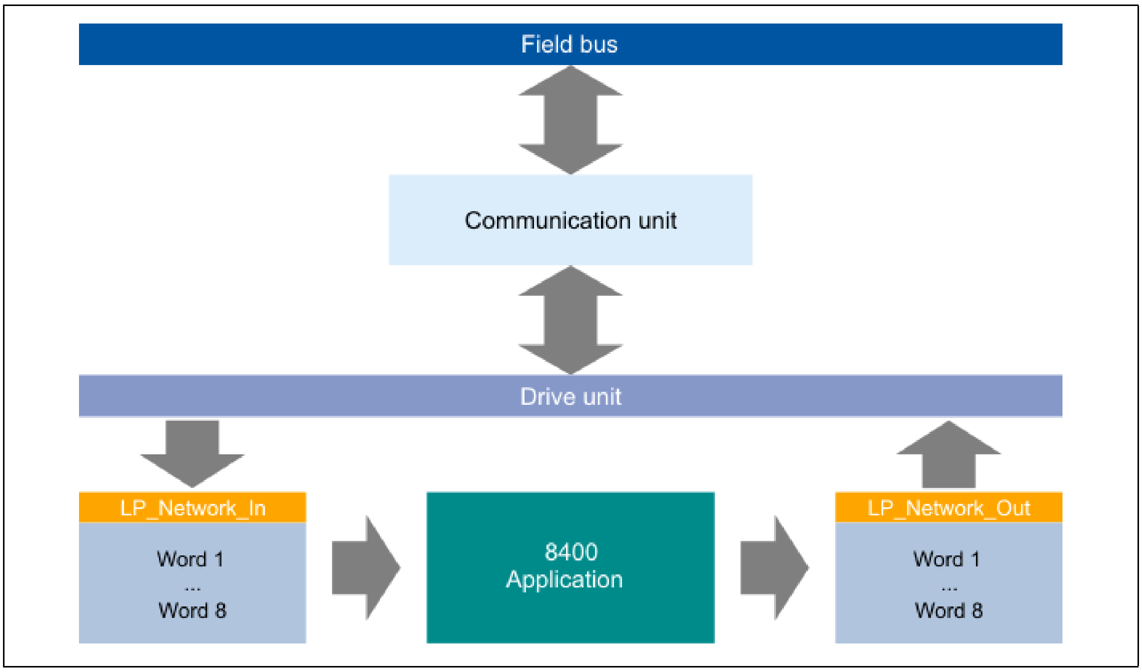
Observe the direction of the information flow.

- Process input data (Rx data):
  Process data from the inverter (slave) to the host (master)
- Process output data (Tx data):
  Process data from the host (master) to the inverter (slave)

8.1 Accessing process data / PDO mapping

Process data are transferred via the MCI/CAN interface.

- The process data is accessed via the **LP_Network_In** and **LP_Network_Out** port blocks.
- Up to 8 words (16 bits/word) per direction can be exchanged.
- The port/function blocks of the process data objects (PDO) are interconnected via the Lenze »Engineer«.



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

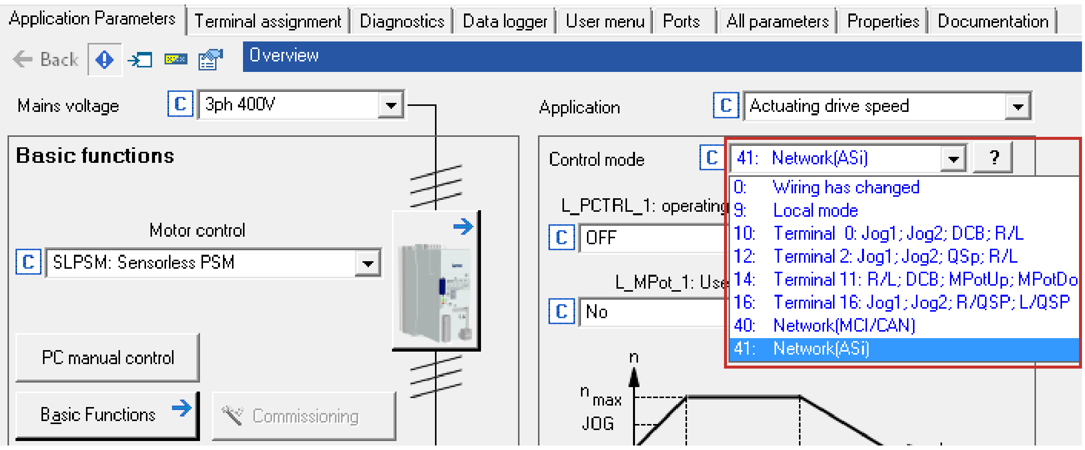
Software manual / »Engineer« online help for the Inverter Drive 8400 motec

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

8.2 Port interconnection of process data objects (PDO)

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

1. Go to the **Application parameters** tab to make the default setting of the I/O configuration. Select the **"Network (ASi)"** control mode (C00007).



Mains voltage: 3ph 400V

Application: Actuating drive speed

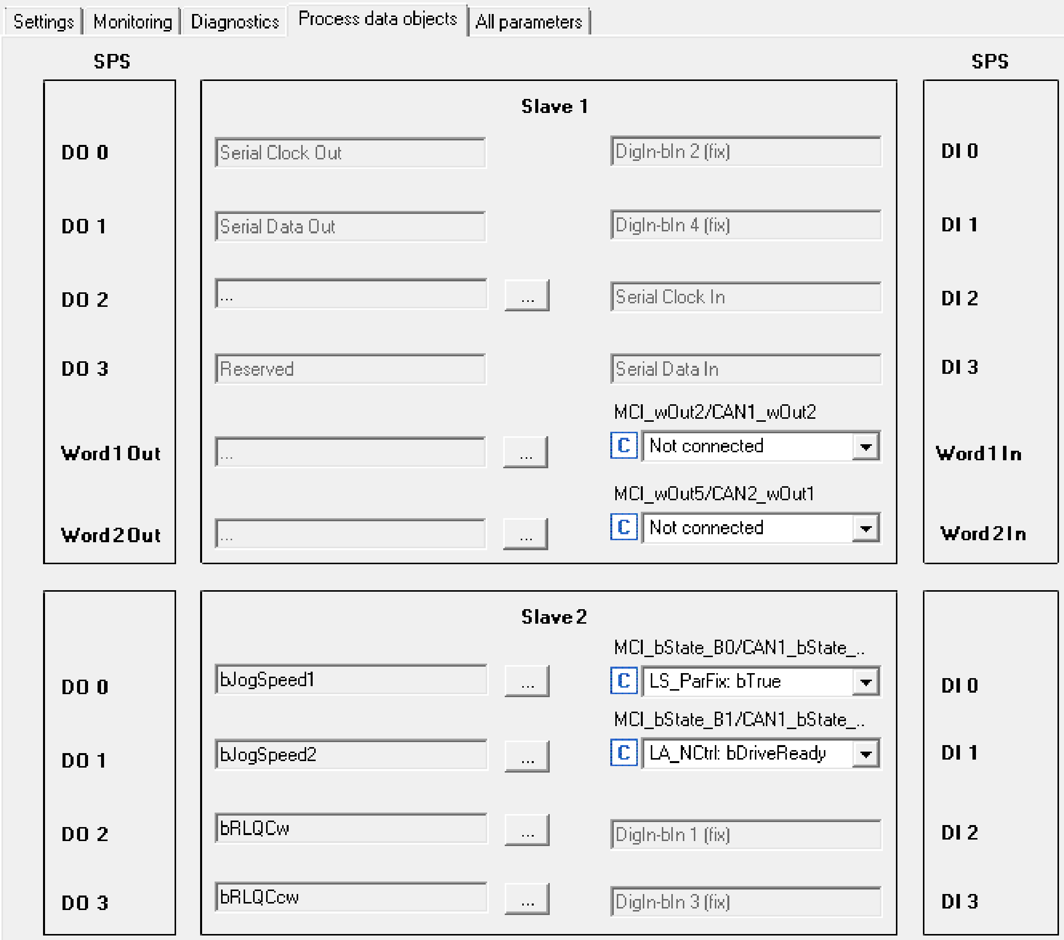
Control mode: 41: Network(ASi)

Motor control: SLPSM: Sensorless PSM

L_PCTRL_1: operating: OFF

L_MPot_1: Use: No

2. The **Process data objects** tab of the AS-i interface displays the preset I/O configuration.

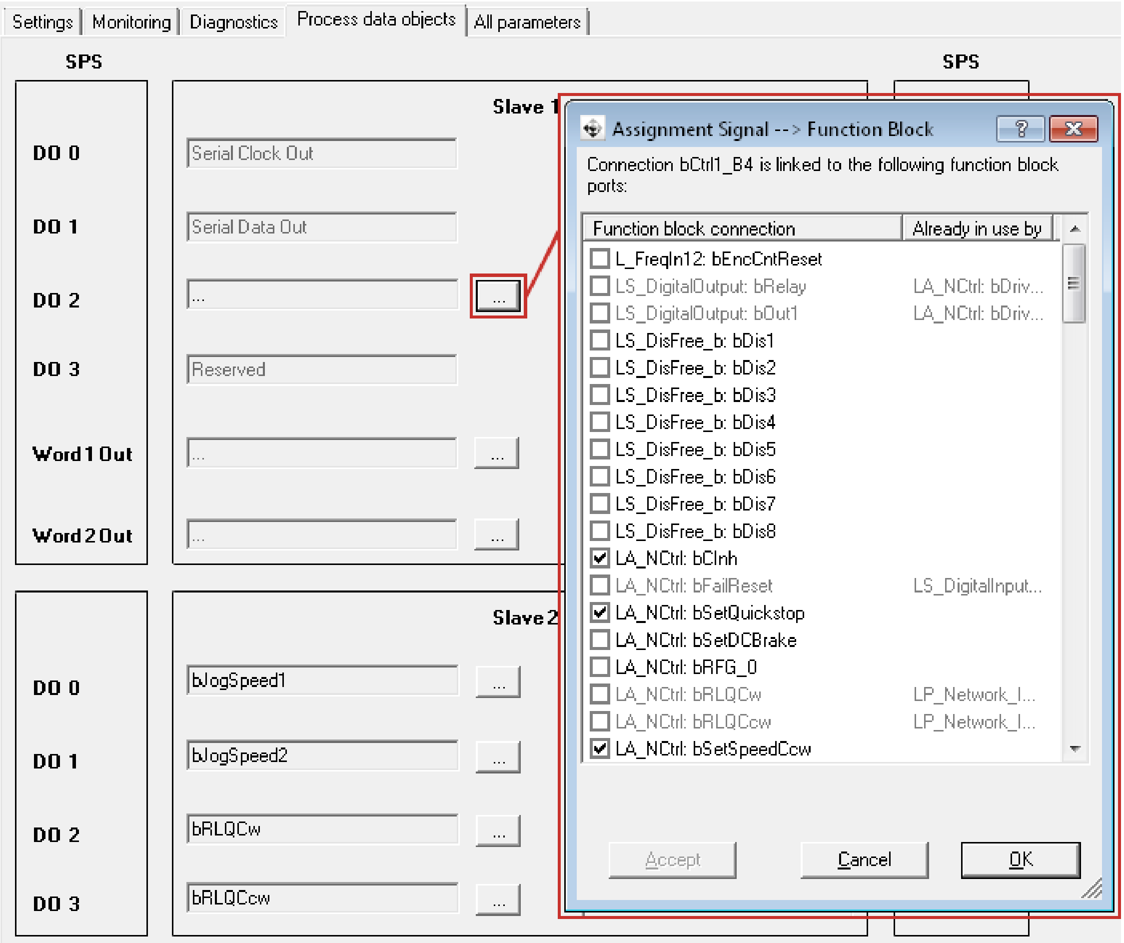


SPS	Slave 1		SPS
DO 0	Serial Clock Out	DigIn-bIn 2 (fix)	DI 0
DO 1	Serial Data Out	DigIn-bIn 4 (fix)	DI 1
DO 2	...	Serial Clock In	DI 2
DO 3	Reserved	Serial Data In	DI 3
Word1 Out	...	MCI_wOut2/CAN1_wOut2: Not connected	Word1 In
Word2 Out	...	MCI_wOut5/CAN2_wOut1: Not connected	Word2 In

	Slave 2		
DO 0	bJogSpeed1	MCI_bState_B0/CAN1_bState_..: LS_ParFix: bTrue	DI 0
DO 1	bJogSpeed2	MCI_bState_B1/CAN1_bState_..: LA_NCtrl: bDriveReady	DI 1
DO 2	bRLQCw	DigIn-bIn 1 (fix)	DI 2
DO 3	bRLQCcw	DigIn-bIn 3 (fix)	DI 3

3. Open the "Assignment Signal --> Function Block" dialog window using the ... buttons.

   By setting checkmarks (✓), select the signals here that are sent from the PLC (AS-i master) to the inverter.



Slave 1:

DO 0	Serial Clock Out
DO 1	Serial Data Out
DO 2	...
DO 3	Reserved
Word 1 Out	...
Word 2 Out	...

Slave 2:

DO 0	bJogSpeed1
DO 1	bJogSpeed2
DO 2	bRLQCw
DO 3	bRLQCcw

Assignment Signal --> Function Block

Connection bCtrl1_B4 is linked to the following function block ports:

Function block connection	Already in use by
☐ L_FreqIn12: bEncCntReset	
☐ LS_DigitalOutput: bRelay	LA_NCtrl: bDriv...
☐ LS_DigitalOutput: bOut1	LA_NCtrl: bDriv...
☐ LS_DisFree_b: bDis1	
☐ LS_DisFree_b: bDis2	
☐ LS_DisFree_b: bDis3	
☐ LS_DisFree_b: bDis4	
☐ LS_DisFree_b: bDis5	
☐ LS_DisFree_b: bDis6	
☐ LS_DisFree_b: bDis7	
☐ LS_DisFree_b: bDis8	
☑ LA_NCtrl: bCInh	
☐ LA_NCtrl: bFailReset	LS_DigitalInput...
☑ LA_NCtrl: bSetQuickstop	
☐ LA_NCtrl: bSetDCBrake	
☐ LA_NCtrl: bRFG_0	
☐ LA_NCtrl: bRLQCw	LP_Network_I...
☐ LA_NCtrl: bRLQCcw	LP_Network_I...
☑ LA_NCtrl: bSetSpeedCcw	

4. Confirm the selection by clicking **OK**.

5. Use codes 1 **C00620/21**, 2 **C00620/24**, 3 **C00621/30** and 4 **C00621/31** to select the signals that are sent from the inverter to the PLC (AS-i master).

Slave 1

SPS				SPS
DO 0	Serial Clock Out		DigIn-bIn 2 (fix)	DI 0
DO 1	Serial Data Out		DigIn-bIn 4 (fix)	DI 1
DO 2	bSetSpeedCcw; bSetQuickstop; b(	...	Serial Clock In	DI 2
DO 3	Reserved		Serial Data In	DI 3
Word 1 Out	...	...	MCI_wOut2/CAN1_wOut2 1 C Not connected	Word 1 In
Word 2 Out	...	...	MCI_wOut5/CAN2_wOut1 2 C Not connected	Word 2 In

Slave 2

SPS				SPS
DO 0	bJogSpeed1	...	MCI_bState_B0/CAN1_bState_.. 3 C LS_ParFix: bTrue	DI 0
DO 1	bJogSpeed2	...	MCI_bState_B1/CAN1_bState_.. 4 C LA_NCtrl: bDriveReady	DI 1
DO 2	bRLQCw	...	DigIn-bIn 1 (fix)	DI 2
DO 3	bRLQCcw	...	DigIn-bIn 3 (fix)	DI 3

6. Use code **C00002** to execute the command **"11: Save all parameter sets"**.

   The changed settings are activated and saved with mains failure protection.

9 Parameter data transfer

- Parameter data are acyclically transmitted via the parameter data channel.
- The parameter data channel provides access to all Lenze codes.
- The transmission of parameter data is usually not time-critical.
- Parameter data are, for instance, operating parameters, motor data and diagnostic information.
- Parameter data transfer of the AS-Interface Communication Unit is done acyclically by means of serial CTT2 transmission (combined transaction type 2).

9.1 CTT2: Read parameter value

- Acyclic read request from the master to the slave:

Byte	Contents / value
0	CTT2: Code • Index **0x12** (18): Acyclic read request
1	CTT2: Index • Index **0x10** (16): Read parameter value
2	CTT2: Number of bytes • Value depends on the master.

- Response from slave to master is OK:

Byte	Contents / value	
0	CTT2: Code • Index **0x52** (82): Acyclic read request is OK.	
1	Data type / number of bytes	
	Bit 7 = 0	Octet string (text) • Bits 0 ... 6 = Number of string characters
	Bit 7 = 1	Number (4 data bytes): • Bits 0 ... 2 = Number of valid bytes (1 = 1 byte, 2 = 2 bytes, 3 = 3 bytes, 4 = 4 bytes)
2	1st character of the character string or data byte 1 (MSB)	
3	2nd character of the string or data byte 2	
4	3rd character of the string or data byte 3	
5	4th character of the string or data byte 4 (LSB)	
6	5th character of the string	
...	...	
n	n-th character of the string	

- Response from slave to master has failed:

Byte	Contents / value
0	CTT2: Code • Index **0x92** (146): Acyclic read request is not OK.
1	CTT2: Standard error code ▸ CTT2: Standard error codes (🕮 52)
2	Error code (MSB)
3	Error code
4	Error code
5	Error code (LSB) ▸ CTT2: Acyclic device error codes (🕮 53)

9.2 CTT2: Write parameter value

- Acyclic write request from master to slave:

Byte	Contents / value	
0	CTT2: Code • Index **0x13** (19): Acyclic write request	
1	CTT2: Index • Index **0x18** (24): Write parameter value	
2	CTT2: Number of bytes • **0x8** (8)	
3	Index high byte	Index = 0x5FFF (code to be written)
4	Index low byte	
5	Subindex	
6	Data type / number of bytes	
	Bit 7 = 0	Number (4 data bytes): • Bits 0 ... 2 = Number of valid bytes (1 = 1 byte, 2 = 2 bytes, 3 = 3 bytes, 4 = 4 bytes)
	Bit 7 must be "0". Writing the string is not supported.	
7	Data byte 1 (MSB)	
8	Data byte 2	
9	Data byte 3	
10	Data byte 4 (LSB)	

- Response from slave to master is OK:

Byte	Contents / value
0	CTT2: Code • Index **0x53** (83): Acyclic write request is OK. • Parameter value was written.

- Response from slave to master has failed:

Byte	Contents / value
0	CTT2: Code • Index **0x93** (147): Acyclic write request is not OK.
1	CTT2: Standard error code ▸ CTT2: Standard error codes (🕮 52)
2	Error code (MSB)
3	Error code
4	Error code
5	Error code (LSB) ▸ CTT2: Acyclic device error codes (🕮 53)

9.3 CTT2: Read code number

- Acyclic read request from the master to the slave:

Byte	Contents / value
0	CTT2: Code • Index **0x12** (18): Acyclic read request
1	CTT2: Index • Index **0x12** (18): Read code number
2	CTT2: Number of bytes • Value depends on the master.

- Response from slave to master is OK:

Byte	Contents / value	
0	CTT2: Code • Index **0x52** (82): Acyclic read request is OK.	
3	Index high byte	Index = 0x5FFF (inverter code)
4	Index low byte	
5	Subindex	
6	Reserved	

- Response from slave to master has failed:

Byte	Contents / value
0	CTT2: Code • Index **0x92** (146): Acyclic read request is not OK.
1	CTT2: Standard error code ▸ CTT2: Standard error codes (📖 52)
2	Error code (MSB)
3	Error code
4	Error code
5	Error code (LSB) ▸ CTT2: Acyclic device error codes (📖 53)

9.4 CTT2: Write code number

- Acyclic write request from master to slave:

Byte	Contents / value	
0	CTT2: Code • Index **0x13** (19): Acyclic write request	
1	CTT2: Index • Index **0x11** (17): Write code number	
2	CTT2: Number of bytes • **0x4** (4)	
3	Index high byte	Index = 0x5FFF (inverter code)
4	Index low byte	
5	Subindex	
6	Reserved	

- Response from slave to master is OK:

Byte	Contents / value
0	CTT2: Code • Index **0x53** (83): Acyclic write request is OK. • Code number was written.

- Response from slave to master has failed:

Byte	Contents / value
0	CTT2: Code • Index **0x93** (147): Acyclic write request is not OK.
1	CTT2: Standard error code ▸ CTT2: Standard error codes (🕮 52)
2	Error code (MSB)
3	Error code
4	Error code
5	Error code (LSB) ▸ CTT2: Acyclic device error codes (🕮 53)

9.5 CTT2: Block parameter transfer

In the case of the CTT2 block parameter transfer, parameter sets with a fixed length of 64 bytes are transmitted.

Note!

In order to guarantee that a fixed data length of 64 bytes is transmitted, all the parameters are transmitted as 32-bit values (16 x 32-bit parameters).

If required, the data lengths or formats of the parameters must be adjusted accordingly. Parameter data smaller than 32 bits are not extended to 32 bits.

9.5.1 Read mode

- Acyclic read request from the master to the slave:

Byte	Contents / value
0	CTT2: Code • Index **0x12** (18): Acyclic read request
1	CTT2: Index • Index **0x20** (32): Read parameter
2	CTT2: Number of bytes • Value depends on the master.

- Response from slave to master is OK:

Byte	Contents / value
0	CTT2: Code • Index **0x52** (82): Acyclic read request is OK. • All the parameters were read.
1	Reserved
2	Reserved
3	Reserved
4 ... 7	Double word 1 • Value of the parameter in code C13214/1
...	...
64 ... 67	Double word 16 • Value of the parameter in code C13214/16

- Response from slave to master has failed:

Byte	Contents / value
0	CTT2: Code • Index **0x92** (146): Acyclic read request is not OK. • Read exception list (index **0x21** (33))
1	CTT2: Standard error code ▸ CTT2: Standard error codes (🕮 52)
2	Error code (MSB)
3	Error code
4	Error code
5	Error code (LSB) ▸ CTT2: Acyclic device error codes (🕮 53)

- After the acyclic read request (index 0x12 (18)) has failed, the master sends error codes.
- Then the read request from master to slave with the index **0x21** (33) is repeated.
- The slave sends the parameter values in code C13214/1...16 again.

9.5.2 Write mode

- Acyclic write request from master to slave:

Byte	Contents / value
0	CTT2: Code • Index **0x13** (19): Acyclic write request
1	CTT2: Index • Index **0x28** (40): Write parameter
2	CTT2: Number of bytes • **0x41** (65)
3	Reserved
4 ... 7	Double word 1 • Value of the parameter in code C13213/1
...	...
64 ... 67	Double word 16 • Value of the parameter in code C13213/16

- Response from slave to master is OK:

Byte	Contents / value
0	CTT2: Code • Index **0x53** (83): Acyclic write request is OK. • All the parameters were written.

- Response from slave to master has failed:

Byte	Contents / value
0	CTT2: Code • Index **0x93** (147): Acyclic write request is not OK. • Read exception list (index **0x29** (41))
1	CTT2: Standard error code ▸ CTT2: Standard error codes (📖 52)
2	Error code (MSB)
3	Error code
4	Error code
5	Error code (LSB) ▸ CTT2: Acyclic device error codes (📖 53)

- After the acyclic write request (index 0x13 (19)) has failed, the master sends error codes.
- Then the write request from master to slave with the index **0x29** (41) is repeated.
- The slave sends the parameter values in code C13213/1...16 again.

Note!

Faulty writing of parameter sets can change single parameters.

9.6 CTT2: Standard error codes

CTT2 error code	Description
0	No error / no CTT2 standard error
1	Invalid index
2	Invalid length
3	Request not executed
4	In process (request not fully completed / new trial)
5	Last acyclic request not confirmed
6	Invalid subindex
7	Command "Selective read request" is missing

9.7 CTT2: Acyclic device error codes

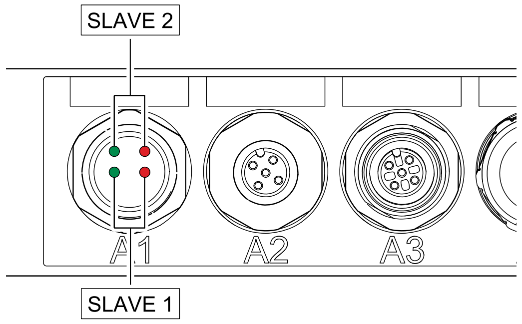
Error code [hex]				Description
Byte 0 (MSB)	Byte 1	Byte 2	Byte 3 (LSB)	
0x00	0x00	0x00	0x00	Transfer aborted
0x06	0x03	0x00	0x00	• No access rights • Invalid access • Read-only object
0x06	0x05	0x00	0x10	Invalid service
0x06	0x05	0x00	0x11	Invalid subindex
0x06	0x05	0x00	0x12	Data length too large
0x06	0x05	0x00	0x13	Data length too small
0x06	0x06	0x00	0x00	Object is no parameter
0x06	0x07	0x00	0x00	Object does not exist
0x06	0x08	0x00	0x00	Data (types) do not correspond
0x08	0x00	0x00	0x00	• Invalid function • Request cannot be executed • No operation
0x08	0x00	0x00	0x20	Request cannot be executed at the moment
0x08	0x00	0x00	0x21	No operation due to local control
0x08	0x00	0x00	0x22	Request cannot be executed due to the device state
0x08	0x00	0x00	0x30	• Value beyond the range • Parameter can only be changed when the controller is inhibited (CINH)
0x08	0x00	0x00	0x31	Parameter value too high
0x08	0x00	0x00	0x32	Parameter value too low
0x08	0x00	0x00	0x33	Value range of the (sub)parameter exceeded
0x08	0x00	0x00	0x34	Value range of the (sub)parameter too high
0x08	0x00	0x00	0x35	Value range of the (sub)parameter too low
0x08	0x00	0x00	0x36	Maximum value lower than minimum value
0x08	0x00	0x00	0x41	Communication object cannot be displayed
0x08	0x00	0x00	0x42	Process data length exceeded
0x08	0x00	0x00	0x43	General value collision
0x08	0x00	0x00	0x50	• Block access has failed • One or several parameter accesses within the block have failed • Read exception list for more details
0x08	0x00	0x00	0x80	Hardware error

10 Diagnostics

For diagnosing troubled AS-i communication, LEDs can be mounted to the Communication Unit. The LEDs, in conjunction with a transparent cover, can be procured from Lenze.

Moreover, the current bus status can be queried via code C13211 and the internal communication status can be queried via code C13950.

10.1 LED status displays

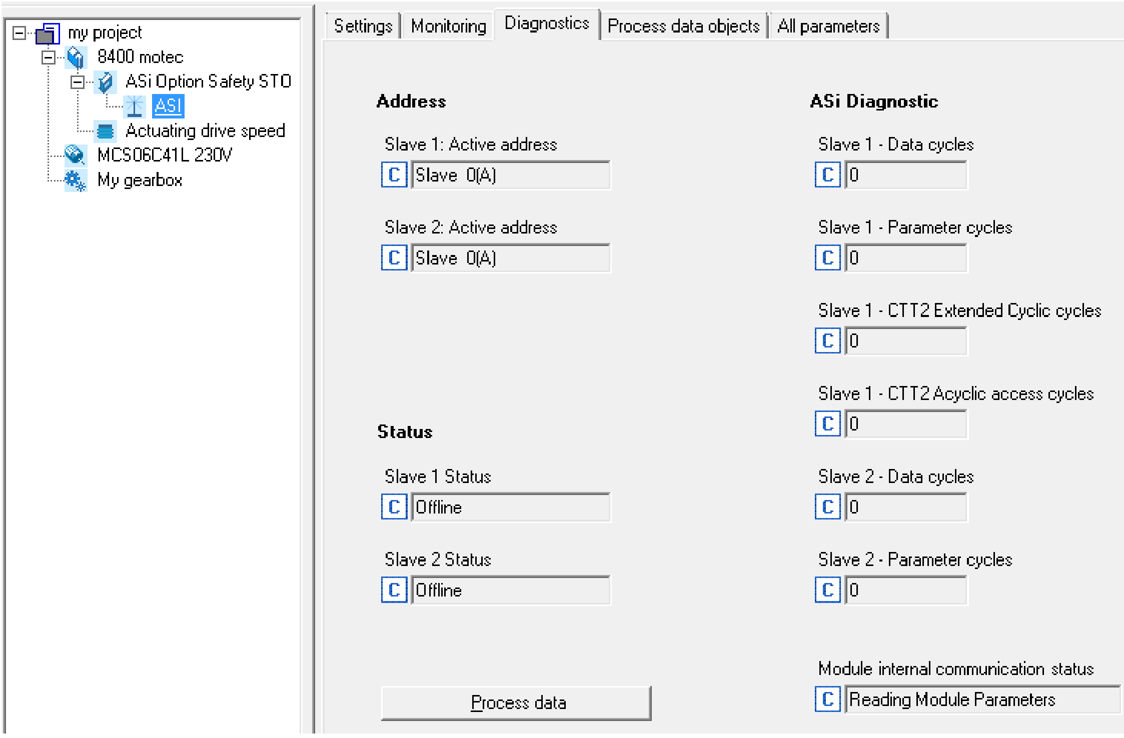


E84DG057

LED statuses for slave 1 and slave 2		Description
Green LEDs	**Red LEDs**	
Off	Off	There is no AS-i voltage.
On 🟩	Off	Everything is alright • AS-i communication is possible.
Off	On 🟥	The slave is switched off; data exchange with the master is not possible.
On 🟩	On 🟥	"No data exchange" • The Data_Exchange_Disable flag is set; data exchange with the master is not possible. • The IC is waiting for a "Write Parameter Request". • The communication monitoring reports "No data exchange" or the IC has been reset via "Watchdog IC Reset".
Blinking (2 Hz) 🟩 🟩 🟩 🟩	On 🟥	"No data exchange" • The slave is waiting for address assignment by the master. • Data exchange with the master is not possible.
Blinking (2 Hz) 🟩 🟩 🟩 🟩	Blinking (2 Hz) 🟥 🟥 🟥	Peripheral error • A signal indicating a peripheral error is pending at the FID input. • The LEDs are blinking alternately.
On 🟩	Blinking (2 Hz) 🟥 🟥 🟥 🟥	Fatal peripheral error with reset • Data sampling pulse = LOW for more than 44 µs

10.2 Diagnostics with the »Engineer«

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



Address

Slave 1: Active address: Slave 0(A)

Slave 2: Active address: Slave 0(A)

Status

Slave 1 Status: Offline

Slave 2 Status: Offline

ASi Diagnostic

Slave 1 - Data cycles: 0

Slave 1 - Parameter cycles: 0

Slave 1 - CTT2 Extended Cyclic cycles: 0

Slave 1 - CTT2 Acyclic access cycles: 0

Slave 2 - Data cycles: 0

Slave 2 - Parameter cycles: 0

Module internal communication status: Reading Module Parameters

11 Error messages

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

11.1 Short overview of the AS-i error messages

Software manual/»Engineer« online help "Inverter Drive 8400 motec"

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

The following table lists all AS-Interface error messages in the numerical order of the error numbers. Furthermore, the preset error response and - if available - the parameter for setting the error response are specified.

Tip!

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

Error no. [hex]	Subject area no. [dec]	Error no. [dec]	Error text	Error type (Error response)	Adjustable in
0x01bc3100	444	12544	Drive offline	1: No Response	C01501/2 C01503
0x01bc5531	444	21809	Drive parameter access failure - channel 1	1: No Response	
0x01bc5532	444	21810	Drive parameter access failure - channel 2	1: No Response	
0x01bc6010	444	24592	Module internal/watchdog error	1: No Response	C01501/1 C01503
0x01bc6011	444	24593	Drive PDO communication timeout	1: No Response	C01501/2 C01503
0x01bc6100	444	24832	Module offline	1: No Response	C01501/1 C01503
0x01bc6101	444	24833	Module PDO communication timeout	1: No Response	
0x01bc6102	444	24834	Module parameter access failure	1: No Response	
0x01bc813a	444	33082	Slave 1 data exchange timeout	1: No Response	C13207/1 C13208/1
0x01bc813b	444	33083	Slave 1 CTT2 extended cyclic timeout	1: No Response	C13207/2 C13208/2
0x01bc813c	444	33084	Slave 2 data exchange timeout	1: No Response	C13207/3 C13208/3
0x01bc813d	444	33085	Slave 1 AS-i ASIC Profile Failure	1: No Response	C13207/1 C13208/1
0x01bc813e	444	33086	Slave 2 AS-i ASIC Profile Failure	1: No Response	C13207/3 C13208/3

11.2 Possible causes and remedies

This chapter lists all AS-i error messages in the numerical order of the error numbers. Possible causes and remedies as well as responses to the error messages are described in detail.

Drive offline [0x01bc3100]

Response (Lenze setting printed in bold)	**Setting:** C01501/2 / C01503 (☑ adjustable response)
☑ None ☐ System fault ☒ **Fault** ☐ Trouble ☐ Quick stop by trouble ☑ Warning locked ☐ warning ☐ Information	

Cause	Remedy
• The Communication Unit is supplied with external voltage, but the Inverter Drive 8400 motec is not supplied with voltage. • The Communication Unit is not connected correctly to the Drive Unit.	• Switch off and on again the voltage supply of the Inverter Drive 8400 motec. • Check wiring and terminals. • Check internal plug connection between Communication Unit and Drive Unit. For this purpose, the Inverter Drive 8400 motec must be unscrewed. Please observe the information in the mounting instructions of the Communication Unit and the Drive Unit! • If this error continues to occur, please contact the Lenze Service. (if required, the Communication Unit must be replaced.)

Drive parameter access failure - channel 1 [0x01bc5531]

Response (Lenze setting printed in bold)	**Setting:** C01501/2 / C01503 (☑ adjustable response)
☑ None ☐ System fault ☒ **Fault** ☐ Trouble ☐ Quick stop by trouble ☑ Warning locked ☐ warning ☐ Information	

Cause	Remedy
• AS-i voltage supply interrupted. • Connection between the Communication Unit and the Drive Unit defective.	• Check wiring and terminals. • Switch off and on again the voltage supply of the Inverter Drive 8400 motec. • If this error continues to occur, please contact the Lenze Service. (if required, the Communication Unit must be replaced.)

Drive parameter access failure - channel 2 [0x01bc5532]

Response (Lenze setting printed in bold)	**Setting:** C01501/2 / C01503 (☑ adjustable response)
☑ None ☐ System fault ☒ **Fault** ☐ Trouble ☐ Quick stop by trouble ☑ Warning locked ☐ warning ☐ Information	

Cause	Remedy
• AS-i voltage supply interrupted. • Connection between the Communication Unit and the Drive Unit defective.	• Check wiring and terminals. • Switch off and on again the voltage supply of the Inverter Drive 8400 motec. • If this error continues to occur, please contact the Lenze Service. (if required, the Communication Unit must be replaced.)

Module internal/watchdog error [0x01bc6010]

Response (Lenze setting printed in bold)	**Setting:** C01501/1 / C01503 (☑ adjustable response)
☑ None ☐ System fault ☒ **Fault** ☐ Trouble ☐ Quick stop by trouble ☑ Warning locked ☐ warning ☐ Information	

Cause	Remedy
Device internal MCU error	• Switch the voltage supply of the Inverter Drive 8400 motec and the AS-i network off and on again. • If this error continues to occur, please contact the Lenze Service. (if required, the Communication Unit must be replaced.)

Drive PDO communication timeout [0x01bc6011]

Response (Lenze setting printed in bold)	**Setting:** C01501/2 / C01503 (☑ adjustable response)
☑ None ☐ System fault ☒ **Fault** ☐ Trouble ☐ Quick stop by trouble ☑ Warning locked ☐ warning ☐ Information	

Cause	Remedy
Voltage supply of the Inverter Drive 8400 motec interrupted.	• Check wiring and terminals. • Check whether the Inverter Drive 8400 motec is addressable via the diagnostics interface. • Switch off and on again the voltage supply of the Inverter Drive 8400 motec. • If this error continues to occur, please contact the Lenze Service. (if required, the Communication Unit must be replaced.)

Module offline [0x01bc6100]

Response (Lenze setting printed in bold)	**Setting:** C01501/1 / C01503 (☑ adjustable response)
☑ None ☐ System fault ☒ **Fault** ☐ Trouble ☐ Quick stop by trouble ☑ Warning locked ☐ warning ☐ Information	

Cause	Remedy
• Device internal MCU error • AS-i voltage supply interrupted. • Connection between the Communication Unit and the Drive Unit defective.	• Check wiring and terminals. • Switch the voltage supply of the AS-i network off and on again. • If this error continues to occur, please contact the Lenze Service. (if required, the Communication Unit must be replaced.)

Module PDO communication timeout [0x01bc6101]

Response (Lenze setting printed in bold)	**Setting:** C01501/1 / C01503 (☑ adjustable response)
☑ None ☐ System fault ☒ **Fault** ☐ Trouble ☐ Quick stop by trouble ☑ Warning locked ☐ warning ☐ Information	

Cause	Remedy
• AS-i voltage supply interrupted. • Connection between the Communication Unit and the Drive Unit defective.	• Check wiring and terminals. • Switch the voltage supply of the AS-i network off and on again. • If this error continues to occur, please contact the Lenze Service. (if required, the Communication Unit must be replaced.)

Module parameter access failure [0x01bc6102]

Response (Lenze setting printed in bold)	**Setting:** C01501/1 / C01503 (☑ adjustable response)
☑ None ☐ System fault ☒ **Fault** ☐ Trouble ☐ Quick stop by trouble ☑ Warning locked ☐ warning ☐ Information	

Cause	Remedy
• AS-i voltage supply interrupted. • Connection between the Communication Unit and the Drive Unit defective.	• Check wiring and terminals. • Switch the voltage supply of the AS-i network off and on again. • If this error continues to occur, please contact the Lenze Service. (if required, the Communication Unit must be replaced.)

Slave 1 data exchange timeout [0x01bc813a]

Response (Lenze setting printed in bold)	**Setting:** C13207/1 / C13208/1 (☑ adjustable response)
☑ None ☐ System fault ☒ **Fault** ☐ Trouble ☐ Quick stop by trouble ☑ Warning locked ☐ warning ☐ Information	

Cause	Remedy
• AS-i communication / voltage supply interrupted. • The monitoring time is too low.	• Check wiring and terminals. • Switch the voltage supply of the AS-i network off and on again. • Check and raise the monitoring time. • Check and adjust the AS-i settings of the master. • Check and adjust the AS-i profile settings of the master and the slaves.

Slave 1 CTT2 extended cyclic timeout [0x01bc813b]

Response (Lenze setting printed in bold)	**Setting:** C13207/2 / C13208/2 (☑ adjustable response)
☑ None ☐ System fault ☒ **Fault** ☐ Trouble ☐ Quick stop by trouble ☑ Warning locked ☐ warning ☐ Information	

Cause	Remedy
• AS-i communication / voltage supply interrupted. • The monitoring time is too low.	• Check wiring and terminals. • Switch the voltage supply of the AS-i network off and on again. • Check and raise the monitoring time. • Check and adjust the CTT2 settings of the master. • Check and adjust the AS-i profile settings of the master and the slaves.

Slave 2 data exchange timeout [0x01bc813c]

Response (Lenze setting printed in bold)	**Setting:** C13207/3 / C13208/3 (☑ adjustable response)
☑ None ☐ System fault ☒ **Fault** ☐ Trouble ☐ Quick stop by trouble ☑ Warning locked ☐ warning ☐ Information	

Cause	Remedy
• AS-i communication / voltage supply interrupted. • The monitoring time is too low.	• Check wiring and terminals. • Switch the voltage supply of the AS-i network off and on again. • Check and raise the monitoring time. • Check and adjust the AS-i settings of the master. • Check and adjust the AS-i profile settings of the master and the slaves.

Slave 1 AS-I ASIC Profile Failure [0x01bc813d]

Response (Lenze setting printed in bold)	**Setting:** C13207/1 / C13208/1 (☑ adjustable response)
☑ None ☐ System fault ☒ **Fault** ☐ Trouble ☐ Quick stop by trouble ☑ Warning locked ☐ warning ☐ Information	

Cause	Remedy
• The AS-i profile read by slave 1 (via MCU) does not correspond to the AS-i profile 7.A.5 • Module-internal switching error • AS-i ASIC error	• Check voltage supply, wiring and terminals. • Switch the voltage supply of the AS-i network off and on again. • If this error continues to occur, please contact the Lenze Service. (if required, the Communication Unit must be replaced.)

Slave 2 AS-I ASIC Profile Failure [0x01bc813e]

Response (Lenze setting printed in bold)	**Setting:** C13207/3 / C13208/3 (☑ adjustable response)
☑ None ☐ System fault ☒ **Fault** ☐ Trouble ☐ Quick stop by trouble ☑ Warning locked ☐ warning ☐ Information	

Cause	Remedy
• The AS-i profile read by slave 2 (via MCU) does not correspond to AS-i profile 7.A.7 • Module-internal switching error • AS-i ASIC error	• Check voltage supply, wiring and terminals. • Switch the voltage supply of the AS-i network off and on again. • If this error continues to occur, please contact the Lenze Service. (if required, the Communication Unit must be replaced.)

12 Parameter reference

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

12.1 Communication-relevant parameters of the operating system

Software manual/»Engineer« online help "Inverter Drive 8400 motec"
Here you will find general information on parameters.

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

C01501

Parameter | Name: **C01501 | Response in case of communication fault with MCI**		Data type: UNSIGNED_8 Index: 23074 = 0x5A22
Setting the response to a communication fault or an incompatible communication unit		
Selection list		
0	No response	
1	Error	
4	Warning Locked	
Subcodes	**Lenze setting**	**Info**
C01501/1	1: No Response	Resp. to MCI fault 1 • Response to a communication fault.
C01501/2	1: No Response	Resp. to MCI fault 2 • Response to an incompatible communication unit.
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 1		

C01503

Parameter | Name: **C01503 | MCI timeout**			Data type: UNSIGNED_16 Index: 23072 = 0x5A20
Setting range (min. value | unit | max. value)			
0	ms	1000	
Subcodes	**Lenze setting**		**Info**
C01503/1	200 ms		MCI timeout
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 1			

12.2 Parameters relevant for AS-i communication

This chapter lists the AS-i parameters of the communication unit in numerically ascending order.

C13200

Parameter | Name: **C13200 | Active address**		Data type: UNSIGNED_8 Index: 11375 = 0x2C6F
Display of the inverter's active address in the AS-i network ▸ Addressing the AS-i slaves (🕮 27)		
Selection list (read only)		**Info**
0	Slave 0(A)	
...	...	
31	Slave 31(A)	
32	Slave 0(B) - invalid	
33	Slave 1(B)	
...	...	
63	Slave 31(B)	
64	Slave not active	An error message is generated when a slave is deactivated.
Subcodes		**Info**
C13200/1		Slave 1: Active address
C13200/2		Slave 2: Active address
☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☑ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☑ COM ☐ MOT		

C13202

Parameter | Name: **C13202 | Slave address EPM value**		Data type: UNSIGNED_8 Index: 11373 = 0x2C6D
Selection of the inverter's address in the AS-i network ▸ Addressing the AS-i slaves (🕮 27)		
Selection list (Lenze setting printed in bold)		
0	**Slave 0(A)**	
...	...	
31	Slave 31(A)	
32	Slave 0(B) - invalid	
33	Slave 1(B)	
...	...	
63	Slave 31(B)	
64	Slave not active	An error message is generated when a slave is deactivated.
Subcodes	**Lenze setting**	**Info**
C13202/1	0	Slave 1: Address EPM value
C13202/2	0	Slave 2: Address EPM value
☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☑ COM ☐ MOT		

C13204

Parameter | Name: **C13204 | Override Slave Addresses**		Data type: UNSIGNED_8 Index: 11371 = 0x2C6B
Selection list (Lenze setting printed in bold)		
0	**Off / ready**	
1	On / start	
2	In progress	
3	Action failed	
4	Action cancelled	
5	No access	
☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT		

C13205

Parameter | Name: **C13205 | Override of slave addresses during initialisation**		Data type: UNSIGNED_8 Index: 11370 = 0x2C6A
Selection list (Lenze setting printed in bold)		
0	**Disable**	
1	Enable	
☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT		

C13206

Parameter | Name: **C13206 | Slave profiles**		Data type: UNSIGNED_16 Index: 11369 = 0x2C69
Value is bit-coded:		
Bit 0	ID_Code_2_Bit0	
Bit 1	ID_Code_2_Bit1	
Bit 2	ID_Code_2_Bit2	
Bit 3	ID_Code_2_Bit3	
Bit 4	ID_Code_1_Bit0	
Bit 5	ID_Code_1_Bit1	
Bit 6	ID_Code_1_Bit2	
Bit 7	ID_Code_1_Bit3	
Bit 8	ID_Code_Bit0	
Bit 9	ID_Code_Bit1	
Bit 10	ID_Code_Bit2	
Bit 11	ID_Code_Bit3	
Bit 12	IO_Configuration_Bit0	
Bit 13	IO_Configuration_Bit1	
Bit 14	IO_Configuration_Bit2	
Bit 15	IO_Configuration_Bit3	
Subcodes		**Info**
C13206/1		Slave 1 Profile
C13206/2		Slave 2 Profile
☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT		

C13207

Parameter | Name: **C13207 | Response in case of communication fault**		Data type: UNSIGNED_8 Index: 11368 = 0x2C68
The response set here is triggered if the AS-i node does not receive a message from the master within the monitoring time (C13208) or detects that it has exited the DATA_EXCHANGE status. A change in the monitoring response becomes immediately effective.		
Selection list (Lenze setting printed in bold)		
0	No response	
1	**Error**	
4	Warning Locked	
Subcodes	**Lenze setting**	**Info**
C13207/1	1	Slave 1 communication timeout
C13207/2	1	Slave 1 communication timeout - CTT2 extended cyclic
C13207/3	1	Slave 2 communication timeout
☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☑ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☑ COM ☐ MOT		

C13208

Parameter | Name: **C13208 | AS-i monitoring times**			Data type: UNSIGNED_16 Index: 11367 = 0x2C67
If the DATA_EXCHANGE status is exited, the response parameterised in C13207/1...3 is carried out when the time set here for the data exchange has elapsed. • The value "65535" is used to deactivate the monitoring. • A change of monitoring will be effective immediately.			
Setting range (min. value | unit | max. value)			
0	ms	65535	
Subcodes	**Lenze setting**		**Info**
C13208/1	3000 ms		Slave 1 monitoring time
C13208/2	3000 ms		Slave 1 monitoring time - CTT2 extended cyclic
C13208/3	3000 ms		Slave 2 monitoring time
☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT			

C13210

Parameter | Name: **C13210 | AS-i Bus transaction counter**			Data type: UNSIGNED_16 Index: 11365 = 0x2C65
Display of AS-i transactions			
Display range (min. value | unit | max. value)			
0		65535	
Subcodes			**Info**
C13210/1			Slave 1 - Data cycles
C13210/2			Slave 1 - Parameter cycles
C13210/3			Slave 1 - CTT2 extended cyclic cycles
C13210/4			Slave 1 - CTT2 acyclic access cycles
C13210/5			Slave 2 - Data cycles
C13210/6			Slave 2 - Parameter cycles
☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☑ COM ☐ MOT			

C13211

Parameter | Name: **C13211 | bus status**		Data type: UNSIGNED_8 Index: 11364 = 0x2C64
Display of the current AS-i bus status		
Selection list **(read only)**		**Info**
0	Offline	
1	Initialisation	
2	Online	
3	Initialisation failed	
4	Not accessible	
5	Disabled at 0 address	
Subcodes		**Info**
C13211/1		Slave 1 Status
C13211/2		Slave 2 Status
☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☑ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☑ COM ☐ MOT		

C13213

Parameter | Name: **C13213 | CTT2 block parameter transfer: Write parameter block configuration**			Data type: INTEGER_32 Index: 11362 = 0x2C62
▸ CTT2 block parameter transfer Write mode (📖 51)			
Setting range **(min. value | unit | max. value)**			
0.000		16000.000	
Subcodes	**Lenze setting**		**Info**
C13213/1	11.000		WriteParamBlock:Index_1
C13213/2	12.000		WriteParamBlock:Index_2
C13213/3	13.000		WriteParamBlock:Index_3
C13213/4	15.000		WriteParamBlock:Index_4
C13213/5	16.000		WriteParamBlock:Index_5
C13213/6	22.000		WriteParamBlock:Index_6
C13213/7	39.001		WriteParamBlock:Index_7
C13213/8	39.002		WriteParamBlock:Index_8
C13213/9	39.003		WriteParamBlock:Index_9
C13213/10	87.000		WriteParamBlock:Index_10
C13213/11	105.000		WriteParamBlock:Index_11
C13213/12	120.000		WriteParamBlock:Index_12
C13213/13	123.000		WriteParamBlock:Index_13
C13213/14	129.000		WriteParamBlock:Index_14
C13213/15	130.000		WriteParamBlock:Index_15
C13213/16	131.000		WriteParamBlock:Index_16
☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT Scaling factor: 1000			

C13214

Parameter | Name:
C13214 | CTT2 block parameter transfer: Read parameter block configuration

Data type: INTEGER_32
Index: 11361 = 0x2C61

▸ CTT2 block parameter transfer Read mode (📖 49)

Setting range (min. value | unit | max. value)		
0.000		16000.000

Subcodes	Lenze setting	Info
C13214/1	50.000	ReadParamBlock:Index_1
C13214/2	51.000	ReadParamBlock:Index_2
C13214/3	53.000	ReadParamBlock:Index_3
C13214/4	54.000	ReadParamBlock:Index_4
C13214/5	58.000	ReadParamBlock:Index_5
C13214/6	61.000	ReadParamBlock:Index_6
C13214/7	64.001	ReadParamBlock:Index_7
C13214/8	98.000	ReadParamBlock:Index_8
C13214/9	133.000	ReadParamBlock:Index_9
C13214/10	137.000	ReadParamBlock:Index_10
C13214/11	150.000	ReadParamBlock:Index_11
C13214/12	155.000	ReadParamBlock:Index_12
C13214/13	158.000	ReadParamBlock:Index_13
C13214/14	443.001	ReadParamBlock:Index_14
C13214/15	444.001	ReadParamBlock:Index_15
C13214/16	179.000	ReadParamBlock:Index_16

☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT
Scaling factor: 1000

C13220

Parameter | Name:
C13220 | Display: Last data to master

Data type: UNSIGNED_16
Index: 11355 = 0x2C5B

Display of the last data transmitted from the communication unit to the master.

Value is bit-coded:	
Bit 0	D0
Bit 1	D1
Bit 2	D2
Bit 3	D3
Bit 4	PR0
Bit 5	PR1
Bit 6	PR2
Bit 7	PR3
Bit 8	Reserved
...	...
Bit 15	Reserved

Subcodes	Info
C13220/1	Last data to master from slave 1
C13220/2	Last data to master from slave 2

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

C13221

Parameter | Name: **C13221 | Display: Last data from master**		Data type: UNSIGNED_16 Index: 11354 = 0x2C5A
Display of the last data transmitted from the master to the communication unit.		
Value is bit-coded:		
Bit 0	D0	
Bit 1	D1	
Bit 2	D2	
Bit 3	D3	
Bit 4	PR0	
Bit 5	PR1	
Bit 6	PR2	
Bit 7	PR3	
Bit 8	Reserved	
...	...	
Bit 15	Reserved	
Subcodes	**Info**	
C13221/1	Last data from master to slave 1	
C13221/2	Last data from master to slave 2	
☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT		

C13852

Parameter | Name: **C13852 | All words to standard device**			Data type: UNSIGNED_16 Index: 10723 = 0x29E3
Display of process data words 1 ... 8 which are transmitted from the communication unit to the drive unit. Subcodes 1 ... 8 display all the process data words from the communication unit.			
Display range **(min. value | unit | max. value)**			
0		65535	
Subcodes			**Info**
C13852/1			Word 1 of process data from module to standard device
...			...
C13852/8			Word 8 of process data from module to standard device
☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☑ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT			

C13853

Parameter | Name: **C13853 | All words from standard device**			Data type: UNSIGNED_16 Index: 10722 = 0x29E2
Display of process data words 1 ... 8 which are transmitted from the drive unit to the communication unit. Subcodes 1 ... 8 display all the process data words from the drive unit.			
Display range **(min. value | unit | max. value)**			
0		65535	
Subcodes			**Info**
C13853/1			Word 1 process data from standard device to module
...			...
C13853/8			Word 8 of process data from standard device to module
☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☑ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT			

C13900

Parameter | Name: **C13900 | Firmware product type**	Data type: VISIBLE_STRING Index: 10675 = 0x29B3
Display of the product type (string with a length of 8 bytes) • The following identification code is displayed: "E84DGFCA".	
☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT	

C13901

Parameter | Name: **C13901 | Firmware compilation date**	Data type: VISIBLE_STRING Index: 10674 = 0x29B2
Display of the compilation date of the firmware (string with a length of 20 bytes) • The date ("MMM DD YYYY") and time ("hh:mm:ss") are output, e.g. "Mar 21 2005 12:31:21".	
☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT	

C13902

Parameter | Name: **C13902 | Firmware version**	Data type: VISIBLE_STRING Index: 10673 = 0x29B1
Display of the firmware version (string with a length of 5 bytes) • An identification code is displayed, e.g. "00.80".	
☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT	

C13950

Parameter | Name: **C13950 | Internal communication status**		Data type: UNSIGNED_8 Index: 10625 = 0x2981
Display of the internal status of the communication unit		
Selection list (read only)		**Info**
0	Module not initialised	
1	Module ready for initialization	
2	Reading module parameters	
3	Module parameters have been read	
4	Initialisation of external protocol	
5	Online	
6	Module timeout	
7	'Stay Alive' condition	
☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT		

12.3 Table of attributes

The table of attributes contains information that is required for communication with the inverter via parameters.

How to read the table of attributes:

Column		Meaning	Entry	
Code		Parameter name	Cxxxxx	
Name		Parameter short text (display text)	*Text*	
Index	dec	Index under which the parameter is addressed. The subindex for array variables corresponds to the Lenze subcode number.	24575 - Lenze code number	Is only required for access via a bus system.
	hex		0x5FFF - Lenze code number	
Data	DS	Data structure	E	Single variable (only one parameter element)
			A	Array variable (several parameter elements)
	DA	Number of array elements (subcodes)	*Number*	
	DT	Data type	BITFIELD_8	1 byte, bit-coded
			BITFIELD_16	2 bytes, bit-coded
			BITFIELD_32	4 bytes, bit-coded
			INTEGER_8	1 byte, with sign
			INTEGER_16	2 bytes with sign
			INTEGER_32	4 bytes, with sign
			UNSIGNED_8	1 byte without sign
			UNSIGNED_16	2 bytes without sign
			UNSIGNED_32	4 bytes, without sign
			VISIBLE_STRING	ASCII string
			OCTET_STRING	
	Factor	Factor for data transmission via a bus system, depending on the number of decimal positions	*Factor*	1 ≡ No decimal positions 10 ≡ 1 decimal position 100 ≡ 2 decimal positions 1000 ≡ 3 decimal positions
Access	R	Read access	☑ Reading permitted	
	W	Write access	☑ Writing permitted	
	CINH	Controller inhibit required	☑ Writing is only possible if controller inhibit is set	

Table of attributes

Code	Name	Index		Data				Access		
		dec	hex	DS	DA	Data type	Factor	R	W	CINH
C13200	Active address	11375	0x2C6F	A	2	UNSIGNED_8	1	☑		
C13202	Slave address EPM value	11373	0x2C6D	A	2	UNSIGNED_8	1	☑	☑	
C13204	Override slave addresses	11371	0x2C6B	E	1	UNSIGNED_8	1	☑	☑	
C13205	Override of slave addresses during initialisation	11370	0x2C6A	E	1	UNSIGNED_8	1	☑	☑	
C13206	Slave profiles	11369	0x2C69	A	2	UNSIGNED_16		☑		
C13207	Response in case of communication fault	11368	0x2C68	A	3	UNSIGNED_8	1	☑	☑	
C13208	AS-i monitoring times	11367	0x2C67	A	3	UNSIGNED_16	1	☑	☑	
C13210	AS-i bus transaction counter	11365	0x2C65	A	6	UNSIGNED_16	1	☑		
C13211	Bus status	11364	0x2C64	A	2	UNSIGNED_8	1	☑		
C13213	CTT2 block parameter transfer: Write parameter block configuration	11362	0x2C62	A	16	INTEGER_32	1000	☑	☑	
C13214	CTT2 block parameter transfer: Read parameter block configuration	11361	0x2C61	A	16	INTEGER_32	1000	☑	☑	
C13220	Display: Last data to master	11355	0x2C5B	A	2	UNSIGNED_16		☑		
C13221	Display: Last data from master	11354	0x2C5A	A	2	UNSIGNED_16		☑		
C13852	All words to the basic device	10723	0x29E3	A	8	UNSIGNED_16	1	☑		
C13853	All words to the basic device	10722	0x29E2	A	8	UNSIGNED_16	1	☑		
C13900	Firmware Product Type	10675	0x29B3	E	1	VISIBLE_STRING		☑		
C13901	Firmware Compilation Date	10674	0x29B2	E	1	VISIBLE_STRING		☑		
C13902	Firmware Version	10673	0x29B1	E	1	VISIBLE_STRING		☑		
C13950	Module internal communication status	10625	0x2981	E	1	UNSIGNED_8	1	☑		

Index

Index

FEEDBACK

Your opinion is important to us

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

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

feedback-docu@lenze.com

Thank you very much for your support.

Your Lenze documentation team

Inverter Drive 8400 motec (AS-Interface option) · 13564903 · EDS84DMOTASI · EN 5.0 · 02/2019 · TD23

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Accessories

CANopen

E84DGFCCxxx

Inverter Drives 8400 motec__________________

Communication Manual EN

13564905

Lenze

Contents

1 About this documentation

Contents

This documentation exclusively describes the system bus (CAN) and the CANopen-specific functions of the Inverter Drive 8400 motec.

Note!

This documentation supplements the **mounting instructions** and the **"Inverter Drives 8400 motec" hardware manual** supplied with the Communication Unit.

The hardware manual contains safety instructions which must be observed!

The features of the system bus (CAN) and CANopen-specific functions for the Inverter Drive 8400 motec are described in detail.

Examples illustrate typical applications.

This documentation contains as well ...

- the most important technical data for CAN communication;
- information on the installation and commissioning of the CAN network;
- information on CAN data transfer, CAN monitoring functions, communication-relevant parameters and implemented CAN objects.

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

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 the software of other manufacturers. No responsibility is taken for corresponding information given in this documentation. Information on how to use the software can be obtained from the documents of the master computer.

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

Tip!

Detailed information about the system bus (CAN) can be found on the website of the CAN user organisation CiA (CAN in Automation):

www.can-cia.org

Target group

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

Tip!

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

www.Lenze.com

Information regarding the validity

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

Product series	Type designation	Version
Inverter Drives 8400 motec **CANopen communication unit**	E84DGFCCxNx	CANopen
	E84DGFCCxJx	CANopen + safety

▶ Features and variants (📖 13)

1.1 Document history

Version			Description
4.0	02/2019	TD23	General revision
3.0	11/2011	TD17	General revision
2.0	01/2011	TD17	Update of the ... • Parameters relevant for CANopen communication (📖 73) (version 02.00) • »Engineer« screenshots
1.0	09/2010	TD17	First edition

1.2 Conventions used

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

Type of information		Highlighting	Examples/notes
Spelling of numbers			
	Decimal	Normal spelling	Example: 1234
	Hexadecimal	0x[0 ... 9, A ... F]	Example: 0x60F4
	Binary • Nibble	In inverted commas Point	Example: ’100’ Example: ’0110.0100’
	Decimal separator	Point	The decimal point is always used. For example: 1234.56
Text			
	Program name	» «	PC software Example: Lenze »Engineer«
	Control element	**Bold**	The **OK** button... / The **Copy** command... / The Properties tab... / The **Name** input field...
	Hyperlink	Underlined	Optically highlighted reference to another topic. Can be activated with a mouse-click in this documentation.
Icons			
	Page reference	(🕮 8)	Optically highlighted reference to another page. Can be activated with a mouse-click in this documentation.
	Step-by-step instructions	⌨	Step-by-step instructions are indicated by a pictograph.

1.3 Terminology used

Term	Meaning
CAN	CAN (Controller Area Network) is an asynchronous, serial fieldbus system.
CANopen®	CANopen® is a CAN-based communication protocol and a registered trademark, licensed by the CiA® (CAN in Automation e. V.) CAN user organisation, www.can-cia.org.
Inverter	Lenze frequency inverter of the "Inverter Drives 8400 motec" product series
Standard device	

Drive Unit
Communication unit
Wiring Unit
	The 8400 motec inverter has a modular structure that includes the following modules: "Drive Unit", "Communication Unit", and "Wiring Unit".
	• The drive unit is available in different power settings.
	• In case of the communication unit you can select between:
	  • Without fieldbus (basic I/O, standard I/O, extended I/O)
	  • AS interface (without safety/with safety STO)
	  • CANopen (without safety/with safety STO)
	  • EtherCAT (without safety/with safety STO)
	  • EtherNET/IP (without safety/with safety STO)
	  • PROFIBUS (without safety/with safety STO)
	  • PROFINET (without safety/with safety STO)
	  • POWERLINK (without safety/with safety STO)
	• The wiring unit provides flexible connection possibilities for a simple integration into the power supply of the machine.

»Engineer«	Lenze PC software which supports you during the "Engineering" process (parameterisation, diagnostics, and configuration) throughout the whole life cycle, i. e. from planning to maintenance of the machine commissioned.
Code	Parameter which serves to parameterise and monitor the inverter. In normal usage, the term is usually referred to as "Index".
Subcode	If a code contains several parameters, they are stored in "subcodes". This manual uses a slash "/" as a separator between code and subcode (e.g. "C00118/3"). This term is also referred to as "subindex" in common parlance.
Lenze setting	This setting is the default factory setting of the device.
Basic setting	
HW	Hardware
SW	Software

Note!

Some of the terms used originate from the CANopen protocol.

1.4 Notes used

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

Safety instructions

Layout of the safety instructions:

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

Pictograph	Signal word	Meaning
⚡	**Danger!**	**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	**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	Signal word	Meaning
ℹ	**Note!**	Important note to ensure trouble-free operation
💡	**Tip!**	Useful tip for easy handling
📖		Reference to another document

2 Safety instructions

Note!

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

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

2.1 General safety and application notes

Danger!

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

- Lenze drive and automation components ...
  - must only be used as directed.
    ▸ Application as directed (🕮 12)
  - must never be commissioned if they display signs of damage.
  - must never be technically modified.
  - must never be commissioned if they are not fully mounted.
  - must never be operated without required covers.
  - during and after operation can have live, moving and rotating parts, depending on their degree of protection. Surfaces can be hot.
- The following applies to Lenze drive components ...
  - only use the accessories approved.
  - Only use original manufacturer spare parts.
- Observe all specifications contained in the enclosed documentation and related documentation.
  - This is the precondition for safe and trouble-free operation and for obtaining the product features specified.
    ▸ Features and variants (🕮 13)
  - The specifications, processes, and circuitry described in this document are for guidance only and must be adapted to your own specific application. Lenze does not take responsibility for the suitability of the process and circuit proposals.
- Only qualified personnel may work with and on Lenze drive and automation components. According to IEC 60364 and CENELEC, these are persons ...
  - are familiar with installing, mounting, commissioning, and operating the product.
  - who have the corresponding qualifications for their work.
  - who know and can apply all regulations for the prevention of accidents, directives, and laws applicable at the place of use.

2.2 Device and application-specific safety instructions

- During operation, the Communication Unit must be connected to the Wiring Unit and the Drive Unit.
- In case of external voltage supply, each control cabinet must be provided with a safely separated power supply unit ("SELV"/"PELV") according to EN 61800-5-1.
- Only use cables that meet the listed specifications.
  ▶ Specification of the bus cable (📖 24)

Documentation of "Inverter Drives 8400 motec", control system, plant/machine

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

2.3 Residual hazards

Device protection

- The Communication Unit contains electronic components that can be damaged or destroyed by electrostatic discharge.
  ▶ Installation (📖 20)

3 Product description

3.1 Application as directed

The CANopen communication unit ...

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

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

- is a device intended for use in industrial power systems.
- should only be used under the operating conditions prescribed in this documentation.
- may only be used in CANopen networks.
- can also be used without being connected to the CANopen network.

Any other use shall be deemed inappropriate!

3.2 Features and variants

The CANopen communication unit is available in the following versions:

Product series	Type designation	Product features				
		Enclosure	Connection CANopen	I/O: Connection via terminal	I/O: Connection via M12	Safety
Inverter Drives 8400 motec **CANopen communication unit**	E84DGFCCFNP	IP 65	M12	3× DI 1× DO	2× DI	
	E84DGFCCENP	IP 65	M12	2× DI	3× DI 1× DO	
	E84DGFCCFJP	IP 65	M12	3× DI 1× DO 1× AI	2× DI	●
	E84DGFCCEJP	IP 65	M12	3× DI	2× DI 1× DO 1× AI	●

- The CANopen communication unit ...
  - mounted on top of the Wiring Unit (E84DGVNxx);
  - is exclusively supplied internally by the drive unit (E84DGDVxxxxxxxx).
- The I/O connections can be brought into the device via M12 connectors or cable glands.
- In the E84DGFCC9xx version, a maximum of four digital inputs is conducted on M12 connectors (see "Inverter Drives 8400 motec" hardware manual).
- Devices without an integrated safety system (safety option) have no analog input and no relay output.
- In the case of the E84DGFCCxJx communication units, the integrated safety system can be used for the protection of persons on machines.
- Setting of the CAN node address and baud rate is possible via DIP switch or code.
- Communication with the Lenze »Engineer« (access to all Lenze parameters) is preferably carried out via the CAN bus. Furthermore communication can be effected via the diagnostic interface of the drive unit.

"Inverter Drives 8400 motec" hardware manual

Here you will find detailed information on the integrated safety system (safety option).

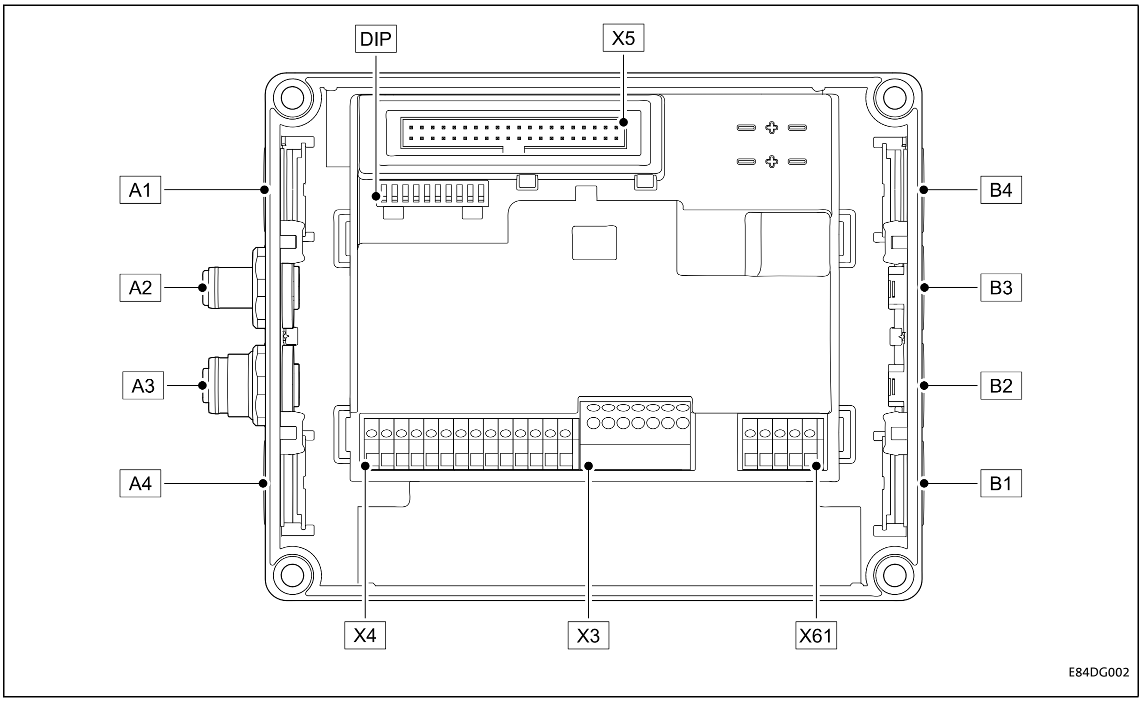
Software manual / »Engineer« online help "Inverter Drives 8400 motec"

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

The system bus (CANopen) of the Inverter Drives 8400 motec is the advanced version of the system bus (CAN) and includes the following features:

- Full compatibility according to CANopen DS301, V4.02.
- Support of the "Heartbeat" NMT slave function (DS301, V4.02).
- Number of parameterisable server SDO channels:
  - Max. 2 channels with 1 ... 8 bytes
  - Because of the 2 server SDO channels, the address range from 1 ... 63 is available.
- Number of parameterisable PDO channels:
  - Max. 2 transmit PDOs (TPDOs) with 1 ... 8 bytes (adjustable)
  - Max. 2 receive PDOs (RPDOs) with 1 ... 8 bytes (adjustable)
- All PDO channels are functionally equivalent.
- Monitoring of the RPDOs for data reception
- Adjustable error response to ...
  - physical CAN errors (frame, bit, ACK error)
  - bus-stop, bus-working
  - missing PDOs
- Telegram counters for SDOs and PDOs
- Bus status diagnostics
- Boot-up telegram generation
- Emergency telegram generation
- Reset node telegram generation (in the case of master configuration)
- Sync telegram generation and response to sync telegrams:
  - Data transmission/reception
  - Device-internal time base synchronisation
- Abort codes
- Object directory (all mandatory functions, optional functions, indexes)

3.3 Connections and interfaces



[3-1] CANopen communication unit

Pos.	Description
DIP	DIP switch ▶ Possible settings via DIP switch (🕮 30)
A2	CANopen input (M12 pins, 5-pole) ▶ CANopen connection (🕮 27)
A3	CANopen output (M12 socket, 5-pole) ▶ CANopen connection (🕮 27)
A1 / A4 **B1 ... B4**	Positions for further freely designable inputs and outputs: • Digital inputs • Digital output • Analog input (only for E84DGFCCxJx) • Relay output (only for E84DGFCCxJx) • Connection of safety system "Safety Option" (only for E84DGFCCxJx)
X3 / X4 / X61	Terminal strips for wiring the connectors at A1 ... A4 and B1 ... B4
X5	Plug connector for connection to the Drive Unit

- By default, the CANopen connectors are already pre-assembled and wired with the terminal strip X3.
- The CANopen connections and further connections (e.g. digital inputs) can be freely designed at the positions A1 ... A4 and B1 ... B4..
- For the connections, 5-pin M12 connectors or - alternatively - cable glands (cable cross-section max. 1.0 mm^2, AWG 18) can be used.
- The M12 connectors, cable glands and prefabricated system cables can be obtained from various manufacturers.
- Wire the M12 plugs or cable glands used with the corresponding contacts of the terminal strips X3, X4 and X61.

"Inverter Drives 8400 motec" hardware manual

Observe the notes and wiring instructions contained in this documentation.

4 Technical data

"Inverter Drives 8400 motec" hardware manual

Here you will find the **ambient conditions** and information on the **electromagnetic compatibility (EMC)** that also apply to the Communication Unit.

4.1 General data and operating conditions of the CANopen

Range	Values
Order designation	• E84DGFCCxNx (CANopen) • E84DGFCCxJx (CANopen + Safety)
Communication profile	CANopen, DS301 V4.02
Communication medium	DIN ISO 11898
Interface	• CANopen input: M12 pins, 5-pole, A-coded • CANopen output: M12 socket, 5-pole, A-coded
Network topology	Line terminated on both sides
Adjustable node address	1 ... 63 (can be set via DIP switch or code C00350)
Max. number of nodes	63
Baud rate [kbps]	20, 50, 125, 250, 500, 800, 1000 kbps, adjustable via DIP switches or code C00351
Process data	• Max. 2 transmit PDOs (TPDOs) with 1 ... 8 bytes (adjustable) • Max. 2 receive PDOs (RPDOs) with 1 ... 8 bytes (adjustable)
Parameter data	Max. 2 server SDO channels with 1 ... 8 bytes
Transmission mode for TPDOs	• With change of data • Time-controlled, 1 to x ms • After the reception of 1 to 240 sync telegrams
Conformities, approvals	• CE • UR / cUR (see also hardware manual)

4.2 Supported protocols

Protocols	
Standard PDO protocols	PDO write PDO read
SDO protocols	SDO download SDO download initiate SDO download segment
	SDO upload SDO upload initiate SDO upload segment
	SDO abort transfer
	SDO block download SDO block download initiate SDO block download end
	SDO block upload SDO block upload initiate SDO block upload end
NMT protocols	Start remote node (master and slave)
	Stop remote node (slave)
	Enter pre-operational (slave)
	Reset node (slave and local device)
	Reset communication protocol (slave)
Monitoring protocols	Heartbeat (heartbeat producer and heartbeat consumer) • 1 Heartbeat Producer can be monitored.
	Emergency telegram (to master)

4.3 Communication time

The communication time is the time between the start of a request and the arrival of the corresponding response.

The communication times in a CANopen network depend on ...

- processing time in the inverter;
- frame runtime (baud rate / frame length);
- nesting depth of the network.

Processing time inside the inverter

Data	Processing time	
Process data	Approx. 2 ms + 0 ... 1 ms + 1 ... x ms	Update cycle Processing time in the module Runtime of the application task of the technology application used (tolerance)
Parameter data	Approx. 30 ms + a tolerance of 20 ms (typically) • For some codes, the processing time may be longer (see software manual/»Engineer« online help "Inverter Drives 8400 motec").	

There are no interdependencies between parameter data and process data.

5 Installation

Stop!

Electrostatic discharge

Electronic components within the Communication Unit can be damaged or destroyed by electrostatic discharge.

Possible consequences:

- The Communication Unit is defective.
- Fieldbus communication is not possible or faulty.
- I/O signals are faulty.
- The safety function is faulty.

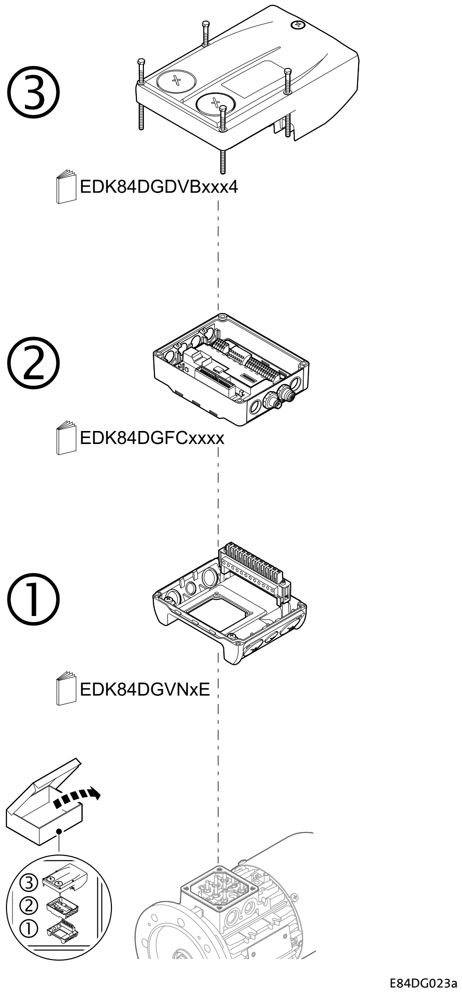
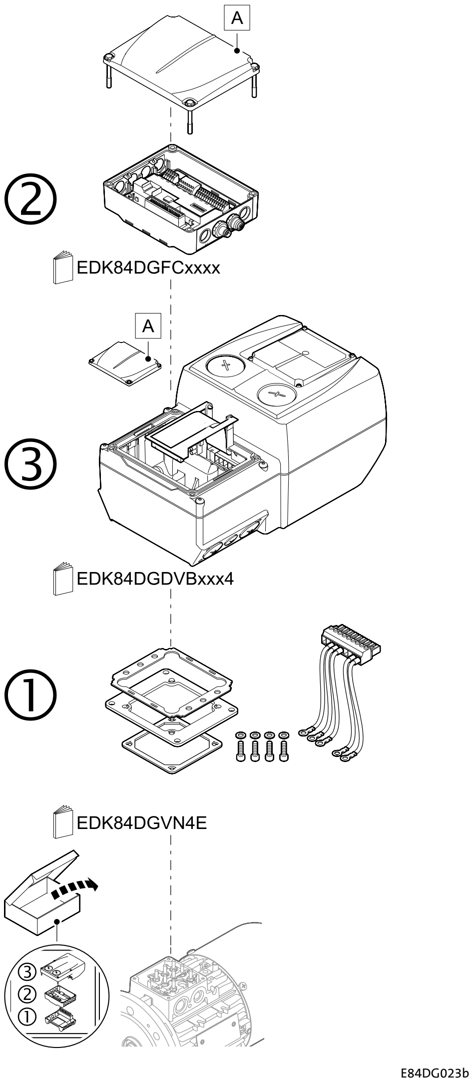
Protective measures

- Discharge electrostatic charges before touching the Communication Unit.

5.1 Mechanical installation

Mounting instructions "Inverter Drives 8400 motec"

Here you will find detailed information on the installation.

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

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

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

5.2 Electrical installation

"Inverter Drives 8400 motec" hardware manual

Here you can find detailed information on ...
- the digital and analog inputs/outputs;
- the relay output;
- the integrated safety system (safety option);
- the wiring of the terminals.

Observe the notes and wiring instructions contained in this documentation.

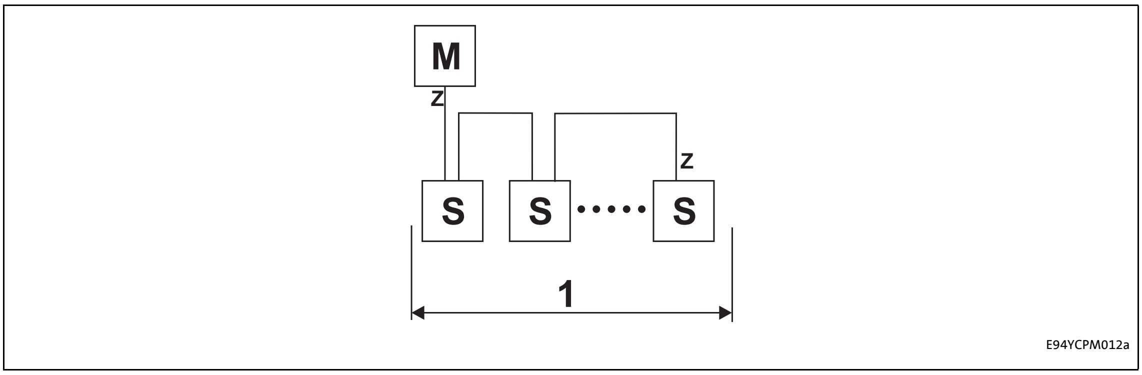
5.2.1 Network topology

The following examples show two simple CAN networks.

Each segment of the network must be terminated at both ends by resistors (120 Ω) between CAN-Low and CAN-High. The bus terminators of the system bus (CAN) are marked with a "Z" in the following examples.

A CAN network consisting of only one segment starts with the CAN master (M) with integrated bus termination, whereas the last CAN node (S) has to be terminated by a bus terminating resistor.

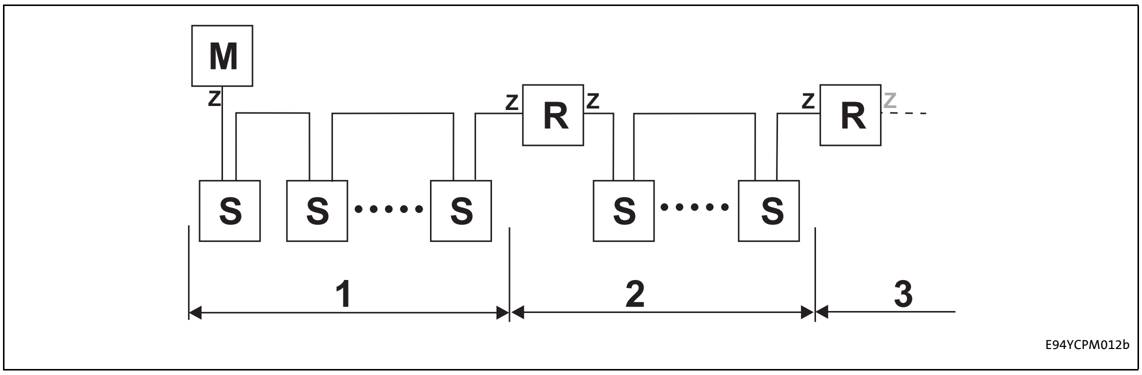
▶ Bus termination (📖 23)



[5-2] CAN network with one segment

A CAN network consisting of several segments contains repeaters (R) for connecting the segments. The repeaters are provided with integrated bus terminations.

▶ Checking the use of repeaters (📖 25)



[5-3] CAN network with repeaters

If no repeater is to be used at the end of the segment, the bus must be terminated by means of a bus terminating resistor at the last station (S). The bus termination is supplied by this station.

5.2.2 Bus termination

The system bus (CANopen) must be terminated through a bus terminating resistor at the first and last physical node (120 Ω).

In the case of the communication unit, the bus terminating resistor can only be installed externally at the M12 connector. This has the advantage that an installed resistor is visible when the device is closed.

Note!

- The CANopen terminals (input and output) must be installed so that they are closed. For this purpose either use a connecting cable, a closed terminating resistor plug (M12 pins, 5-pole, A-coded), or a cap.
- The connecting cable and terminating resistor plug can be procured freely from various cable manufacturers (e.g. Lapp or Turck).
- If you want to disconnect individual bus stations, ensure that the bus terminators at the cable ends remain active. Otherwise, the bus may become unstable.
- Observe that the bus terminator is no longer active when the terminating resistor plug has been removed.

5.2.3 Specification of the bus cable

We recommend to use CAN cables in accordance with ISO 11898-2:

CAN cables according to ISO 11898-2	
Cable type	Twisted in pairs with shield
Impedance	120 Ω (95 ... 140 Ω)
Cable resistance/cross-section Cable length ≤ 300 m Cable length 301 ... 1000 m	 ≤ 70 mΩ/m / 0.25... 0.34 mm^2 (AWG22) ≤ 40 mΩ/m / 0.5 mm^2 (AWG20)
Signal propagation delay	≤ 5 ns/m

Observe the notes provided on the Bus cable length (📖 24)!

5.2.4 Bus cable length

Note!

- It is absolutely necessary to comply with the permissible cable lengths.
- Observe the reduction of the total cable length due to the signal delay of the repeater.
  ▸ Checking the use of repeaters (📖 25)
- Mixed operation refers to different nodes being connected to the same network.
- If the total cable lengths of the nodes are different at the same baud rate, the smaller value must be used to determine the maximum cable length.

Total cable length

1. Check that the total cable length is not exceeded.

   The total cable length is defined by the baud rate.

Baud rate [kbps]	Max. bus length [m]
20	4013
50	1575
125	600
250	275
500	113
800	38
1000	13

[5-1] Total cable length

Segment cable length

2. Check that the segment cable length is not exceeded

   The segment cable length is defined by the used cable cross-section and by the number of nodes. Without repeaters the segment cable length corresponds to the total cable length.

Maximum number of nodes per segment	Cable cross-section			
	0.25 mm^2	0.5 mm^2	0.75 mm^2	1 mm^2
2	240 m	430 m	650 m	940 m
5	230 m	420 m	640 m	920 m
10	230 m	410 m	620 m	900 m
20	210 m	390 m	580 m	850 m
32	200 m	360 m	550 m	800 m
63	170 m	310 m	470 m	690 m

[5-2] Segment cable length

3. Compare both values.

   If the value determined from the Segment cable length [5-2] table is smaller than the required total cable length Total cable length [5-1], repeaters must be used. Repeaters divide the total cable length into segments.

Example: Selection help

Given	
• Cable cross-section:	0.5 mm^2, according to Specification of the bus cable (📖 24)
• Number of nodes:	63
• Repeater:	Lenze repeater, type 2176 (cable reduction: 30 m)

Based on the given specifications, the following cable lengths/number of repeaters result for a maximum of 63 nodes:

Baud rate [kbps]	20	50	125	250	500	800	1000
Max. cable length [m]	4013	1575	600	275	113	38	13
Segment cable length [m]	270	270	270	270	113	38	13
Number of repeaters	15	6	2	1	-	-	-

Checking the use of repeaters

Note!

The use of an additional repeater is recommended as:

- Service interface
  - Advantage: Trouble-free connecting during ongoing bus operation is possible.
- Calibration interface
  - Advantage: Calibration/programming units remain electrically isolated.

Given	
• Baud rate:	125 kbps
• Cable cross-section:	0.5 mm^2
• Number of nodes:	28
• Cable length:	450 m

Test step		Cable length	See
1	Total cable length at 125 kbps:	600 m	Table Total cable length [5-1] (📖 24)
2	Segment cable length for 28 nodes and a cable cross-section of 0.5 mm^2:	360 m	Table Segment cable length [5-2] (📖 25)
3	Comparison: The value determined in step 2 is smaller than the required cable length of 450 m.		

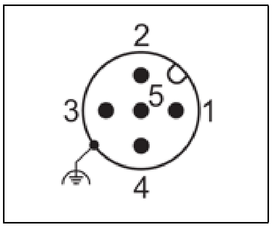
Conclusion:

- It is not possible to use a cable length of 450 m without using a repeater.
- After 360 m (test step 2) a repeater has to be used.

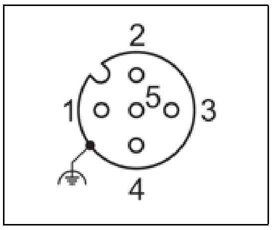
Result:

- The Lenze repeater, type 2176 (cable reduction: 30 m), is used
- Calculation of the maximum cable length:
  - First segment: 360 m
  - Second segment: 360 m (according to the table Segment cable length [5-2] (📖 25)) *minus* 30 m (cable reduction when a repeater is used)
- Max. achievable cable length with a repeater: 690 m
  - Now it is possible to use the required cable length.

5.2.5 CANopen connection



- Input: M12 pins, 5-pole, A-coded
- Wiring of terminal strip X3



- Output: M12 socket, 5-pole, A-coded
- Wiring of terminal strip X3

CANopen connection		
Pin	**Signal**	**Description**
1	-	Not assigned
2	-	Not assigned
3	CG	CAN GND potential
4	CH	CAN-High data line
5	CL	CAN-Low data line

6 Commissioning

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

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

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

▶ Parameter reference (📖 72)

6.1 Before initial switch-on

Stop!

Before switching on the inverter for the first time, check ...

- the entire wiring for completeness, short circuit, and earth fault.
- whether the bus system is terminated by means of a bus terminating resistor at the first and last physical bus station.
  ▶ Bus termination (📖 23)

6.2 How to configure the host (master)

Communication with the inverter first requires configuration of the host (master).

Defining the user data length

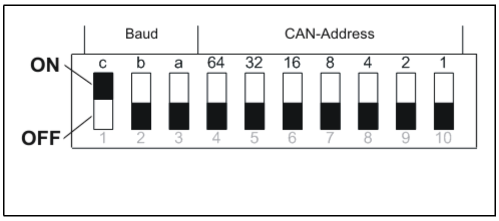
- The CANopen communication unit supports the configuration of max. 8 process data words (max. 64 bytes).
- The user data length is defined during the initialisation phase of the master.
- The user data lengths for process input data and process output data are identical.

Note!

The CANopen process data objects are designated as seen from the node's view:

- Receive PDO (RPDOx): Process data object received by a node
- Transmit PDO (TPDOx): Process data object sent by a node

6.3 Possible settings via DIP switch



[6-1] DIP switch

The DIP switches serve to ...

- Setting the baud rate (🕮 30) (switches: a ... c)
- Setting the CAN node address (🕮 31) (switches: 1 ... 64)

Lenze setting: all switches in OFF position

Note!

- The DIP switches can only be accessed when the drive unit is detached from the communication unit. Loosen the four fixing screws at the drive unit. **Observe the notes in the mounting instructions.**
- Switch off the voltage supply of the inverter and the external supply of the communication unit before you start disassembling the drive unit.
- The DIP switches are only read in when the device is switched on.

6.3.1 Setting the baud rate

The baud rate ...

- must be the same for all networked CANopen nodes;
- can be set via the DIP switches **a ... c** or via the »Engineer« (code C00351).

DIP switch position			Baud rate
c	**b**	**a**	
ON	OFF	**ON**	20 kbps
OFF	**ON**	**ON**	50 kbps
OFF	**ON**	OFF	125 kbps
OFF	OFF	**ON**	250 kbps
OFF	OFF	OFF	500 kbps
ON	**ON**	OFF	800 kbps
ON	OFF	OFF	1000 kbps

▸ Settings in the Lenze »Engineer« (🕮 32)

6.3.2 Setting the CAN node address

The node addresses must differ from each other in the case of several networked CANopen nodes.

The node address can be set via DIP switches **1 ... 64** or via the »Engineer« with code C00350.

For the setting with C00350 DIP switches **1 ... 64 must be set to OFF**.

Note!

- The valid address range is 0 ... 63.
- If DIP switch 64 = ON (node address > 63), always node address 63 is used.

DIP switch							Node address
64	**32**	**16**	**8**	**4**	**2**	**1**	
OFF	OFF	OFF	OFF	OFF	OFF	OFF	Value from C00350
OFF	OFF	OFF	OFF	OFF	OFF	**ON**	1
OFF	...	...	...	...	...	...	...
OFF	**ON**	**ON**	**ON**	**ON**	**ON**	**ON**	63
ON	...	...	...	...	...	...	

The labelling on the housing corresponds to the values of the individual DIP switches for determining the node address.

DIP switch	**64**	**32**	**16**	**8**	**4**	**2**	**1**
Switch position	OFF	OFF	**ON**	OFF	**ON**	**ON**	**ON**
Value	0	0	16	0	4	2	1
Node address	**= sum of the valencies = 16 + 4 + 2 + 1 = 23**						

The current address setting of the DIP switches is displayed in C00349.

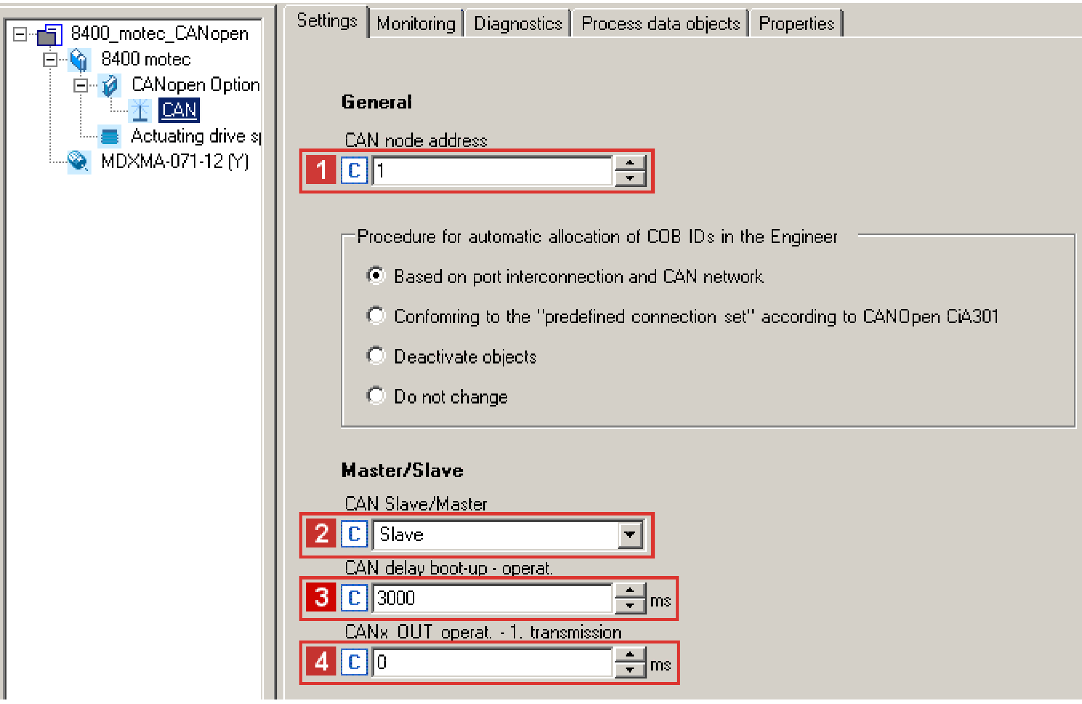
▸ DIP switch positions for setting the CAN node address (📖 101)

▸ Settings in the Lenze »Engineer« (📖 32)

6.4 Settings in the Lenze »Engineer«

The following settings can be made in the »Engineer« under the **Settings** tab:

- CAN node address 1 (C00350)
  - The node address can only be parameterised if the node address "0" is set via the DIP switches.
  - A change of the node address will only become effective after a CAN reset node.
- CAN node is slave or master 2 (C00352)
- Deceleration during status change from "Boot-up" to "Operational" 3 (C00356/1)
- Time to the first transmission of CANx_OUT in the "Operational" state 4 (C00356/4)



General

CAN node address
1 C 1

Procedure for automatic allocation of COB IDs in the Engineer
● Based on port interconnection and CAN network
○ Conforming to the "predefined connection set" according to CANOpen CiA301
○ Deactivate objects
○ Do not change

Master/Slave

CAN Slave/Master
2 C Slave

CAN delay boot-up - operat.
3 C 3000 ms

CANx_OUT operat. - 1. transmission
4 C 0 ms

Save changed settings with the device command **C00002/11** (save all parameter sets).

6.5 Initial switch-on

Establishing communication

- To establish communication, the inverter drive must be supplied with mains voltage.
- CANopen communication requires voltage supply of the communication unit.

  If this is requirement is not met, the "CE04: MCI communication error" error message (error No. 01.0127.00002) is output. The error must be reset in the Inverter Drive, so that CANopen communication can be established.
- During mains connection, all parameters (codes) and the DIP switch settings are read.
- The positions of the DIP switches define whether the CAN node address and the baud rate are selected via the DIP switches or via codes C00350 and C00351.

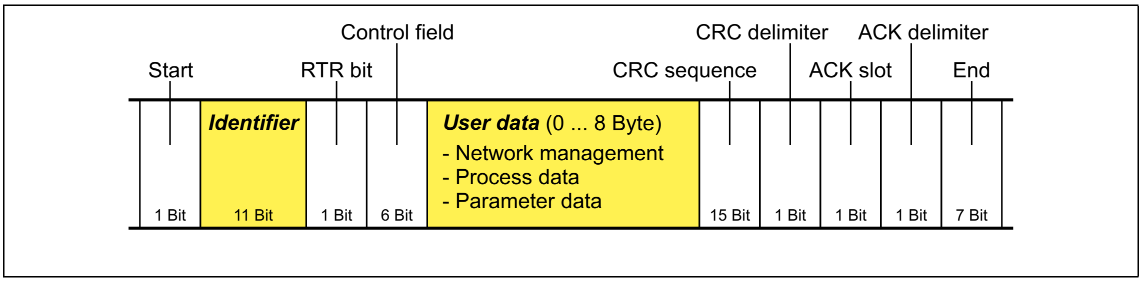
  ▸ Possible settings via DIP switch (🕮 30)

7 Data transfer

Via the system bus interface, for instance process data and parameter values can be exchanged between the nodes. In addition, the interface enables the connection of additional modules such as distributed terminals, keypads and input devices or external control systems and hosts (masters).

The system bus interface transfers CAN objects following the CANopen communication profile (CiA DS301, version 4.02) developed by the umbrella organisation of **CiA** (**C**AN **i**n **A**utomation) in conformity with the **CAL** (**C**AN **A**pplication **L**ayer).

7.1 Structure of the CAN data telegram



[7-1] Basic structure of the CAN telegram

The following subchapters provide a detailed description of the identifier and the user data. The other signals refer to the transfer characteristics of the CAN telegram the description of which is not included in the scope of this documentation.

Tip!

Please visit the homepage of the CAN user organisation CiA (CAN in automation) for further information:
http://www.can-cia.org

7.1.1 Identifier

The principle of CAN communication is based on a message-oriented data exchange between a transmitter and many receivers. All nodes can virtually transmit and receive simultaneously.

The identifier, also called COB-ID (abbr. for communication object identifier), is used to control which node is to receive a transmitted message. In addition to the addressing, the identifier contains information on the priority of the message and the type of user data.

The identifier consists of a basic identifier and the node address of the node to be addressed:

Identifier (COB-ID) = basic identifier + node address (node ID)

Exception: The identifier for process data/heartbeat/emergency objects as well as network management and sync telegrams is freely assigned by the user (either manually or automatically by the network configurator), or is permanently assigned.

Node address (node ID)

For unambiguous identification, a node address (also called node ID) within the valid address range (1 ... 63) must be assigned to every node of the system bus network.

- A node address may not be assigned more than once within a network.
- The own node address can be configured via the DIP switches or via code C00350.

▶ Setting the CAN node address (🕮 31)

Identifier assignment

The system bus is message-oriented instead of node-oriented. Every message has an unambiguous identification, the identifier. For CANopen, node-oriented transfer is achieved by the fact that every message has only one transmitter.

- The basic identifiers for network management (NMT) and sync as well as the basic SDO channel (SDO1) are defined in the CANopen protocol and cannot be changed.
- In the Lenze setting, the basic identifiers of the PDOs are preset according to the "Predefined connection set" of DS301, V4.02 and can be changed via parameters/indexes, if required.

▶ Identifiers of the process data objects (🕮 48)

Object		Direction		Lenze-Base-ID		CANopen-Base-ID	
		from device	to device	dec	Hex	dec	Hex
Network management (NMT)				0	0	0	0
Sync 1)				128	80	128	80
Emergency 1)		●		128	80	128	80
PDO1 (Process data channel 1)	TPDO1	●		384	180	384	180
	RPDO1		●	512	200	512	200
PDO2 (Process data channel 2)	TPDO2	●		640	280	640	280
	RPDO2		●	641	281	768	300
SDO1 (Parameter data channel 1)	TSDO1	●		1408	580	1408	580
	RSDO1		●	1536	600	1536	600
SDO2 (Parameter data channel 2)	TSDO2	●		1472	5C0	1472	5C0
	RSDO2		●	1600	640	1600	640
Heartbeat		●		1792	700	1792	700
Boot-up		●		1792	700	1792	700

1) If you set the sync transmit/receive identifier manually, observe the use of the emergency telegram, since it has the same COB-ID.

7.1.2 User data

All nodes communicate by exchanging data telegrams via the system bus. The user data area of the CAN telegram either contains network management data, or parameter data, or process data:

Network management data

(NMT data)

- Control information on start, stop, reset, etc. of communication to specific nodes or to all nodes of the CAN network.

Process data

(PDOs – process data objects)

- Process data are transferred via the process data channel.
- You can control the inverter by means of the process data.
- Process data are not saved in the inverter.
- Process data are transmitted between the host (master) and the inverters (slaves), providing for a continous exchange of current input and output data.
- Process data usually are unscaled/scalable raw data.
- Process data are, for instance, setpoints and actual values.
- The exact meaning of the PDO file contents is determined via the function block editor (FB Editor) in the I/O level or via the PDO mapping.

Parameter data

(SDOs – service data objects)

- Parameter data are the CANopen indexes or, in the case of Lenze devices, the codes.
- The parameters are, for instance, set for the initial system set-up during commissioning or when material is changed on the production machine.
- Parameter data are transmitted as SDOs via the parameter data channel. They are acknowledged by the receiver, i.e. the sender receives a feedback about the transmission being successful or not.
- The parameter data channel enables access to all Lenze codes and CANopen indexes.
- Parameter changes are saved automatically in the inverter until mains switching.
- Generally the parameter transfer is not time-critical.
- Parameter data are, for instance, operating parameters, motor data and diagnostic information.

7.2 Communication phases/network management

With regard to communication via the system bus, the inverter knows the following states:

Status	Explanation
"Initialisation" (Initialisation)	After switch-on, an initialisation run is carried out. • During this phase, the inverter does not participate in the data exchange on the bus. • The standard values are re-written to all CAN-relevant parameters. • After the initialisation process has been completed, the inverter is automatically in the "Pre-Operational" state.
"Pre-operational" (before being ready for operation)	Parameter data can be received, process data are ignored.
"Operational" (ready for operation)	Parameter data and process data can be received!
"Stopped" (stopped)	Only network management telegrams can be received.

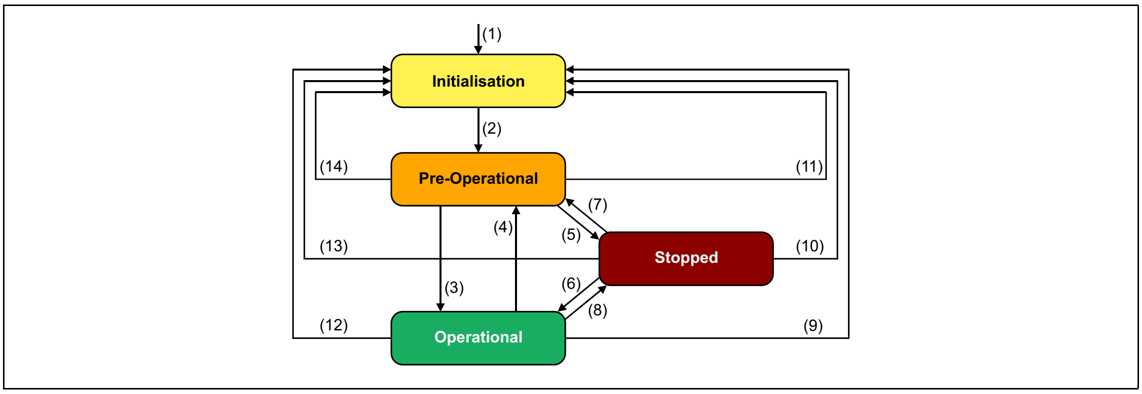
Communication object	Initialisation	Pre-Operational	Operational	Stopped
PDO			●	
SDO		●	●	
Sync		●	●	
Emergency		●	●	
Boot-up	●			
Network management (NMT)		●	●	●

Code C00359 serves to display the status of the CAN bus.

Tip!

Part of the initialisation or the entire initialisation can be carried out again in every status by transmitting the corresponding network management telegrams.

7.2.1 State transitions

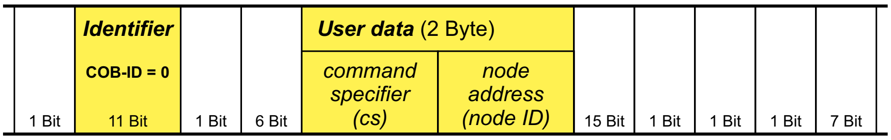


[7-2] NMT state transitions in the CAN network

Transition	NMT command	Status after change	Effects on process/parameter data after status change
(1)	-	Initialisation	Initialisation starts automatically when the mains is switched on. • During the initialisation phase, the inverter does not participate in the data exchange. • After the initialisation is completed, the node sends a boot-up message with an individual identifier and automatically changes to the "Pre-operational" status.
(2)	-	Pre-Operational	In this phase, the master determines the way in which the node(s) takes/take part in communication.
ℹ	From here, the master changes the states for the entire network. • A target address included in the NMT command defines the receiver(s). • If the inverter has been configured as CAN master, the state change to "Operational" takes place automatically after a waiting time has elapsed (C00356/1), and the NMT command 0x0100 ("Start Remote Node") is sent to all nodes. • Data can only be exchanged via process data objects if the status is "Operational"!		
(3), (6)	0x01 xx Start remote node	Operational	Network management/sync/emergency telegrams as well as process data (PDO) and parameter data (SDO) are active. Optional: When the status is changed, event- and time-controlled process data (PDOs) are transmitted once.
(4), (7)	0x80 xx Enter Pre-operational	Pre-Operational	Network management/sync/emergency telegrams and parameter data (SDO) are active.
(5), (8)	0x02 xx Stop remote node	Stopped	Only network management telegrams can be received.
(9), (10), (11)	0x81 xx Reset node	Initialisation	All CAN-relevant parameters (CiA DS 301) are initialised with the saved values.
(12), (13), (14)	0x82 xx Reset communication		All CAN-relevant parameters (CiA DS 301) are initialised with the saved values.
ℹ	Meaning of the node address in the NMT command: • xx = 0x00: With this assignment, all nodes are addressed by the telegram (broadcast telegram). The state can be changed for all nodes at the same time. • xx = Node ID: If a node address is specified, only the status of the node with the corresponding address changes.		

7.2.2 Network management telegram (NMT)

The telegram for the network management contains the identifier "0" and the command included in the user data, which consists of the command byte and the node address:



[7-3] Network management telegram for changing over the communication phases

Command specifier (cs)		NMT command
dec	hex	
1	0x01	Start remote node
2	0x02	Stop remote node
128	0x80	Enter Pre-operational
129	0x81	Reset node
130	0x82	Reset communication

One node, the CAN master, is responsible for switching over the communication phases in the entire network. The role of the CAN master can also be taken over by the inverter.

▸ Parameterising the Inverter Drives 8400 motec as CAN master (📖 40)

Example :

Data can only be exchanged via process data objects if the status is "Operational". If the CAN master is supposed to switch all nodes connected to the bus from the "Pre-operational" communication status to the "Operational" communication status, the identifier and user data in the transmission telegram must be set as follows:

- Identifier: 0x00 (network management)
- User data: 0x0100 ("Start remote node" NMT command to all nodes)

7.2.3 Parameterising the Inverter Drives 8400 motec as CAN master

If the initialisation of the system bus and the associated status change from "Pre-operational" to "Operational" is not effected by a higher-level host, the Inverter Drive 8400 motec can instead be defined to be a "quasi" master to execute this task.

Configuration of the inverter as CAN master is carried out in C00352.

- As CAN master, the inverter sets all nodes connected to the bus (broadcast telegram) to the "Operational" communication status by means of the NMT telegram "Start Remote Node". This is the only communication status allowing for data exchange via the process data objects.
- C00356/1 can be used to set a delay time, which has to pass after mains switching before the inverter applies the "Start Remote Node" NMT telegram on the bus.

Parameters	**Info**	**Lenze setting**	
		Value	Unit
C00352	CAN slave/master	Slave	
C00356/1	CAN delay boot-up - Operational	3000	ms

Note!

The changes of the master/slave operation in C00352 will only be activated

- when mains switching of the inverter takes place again

or

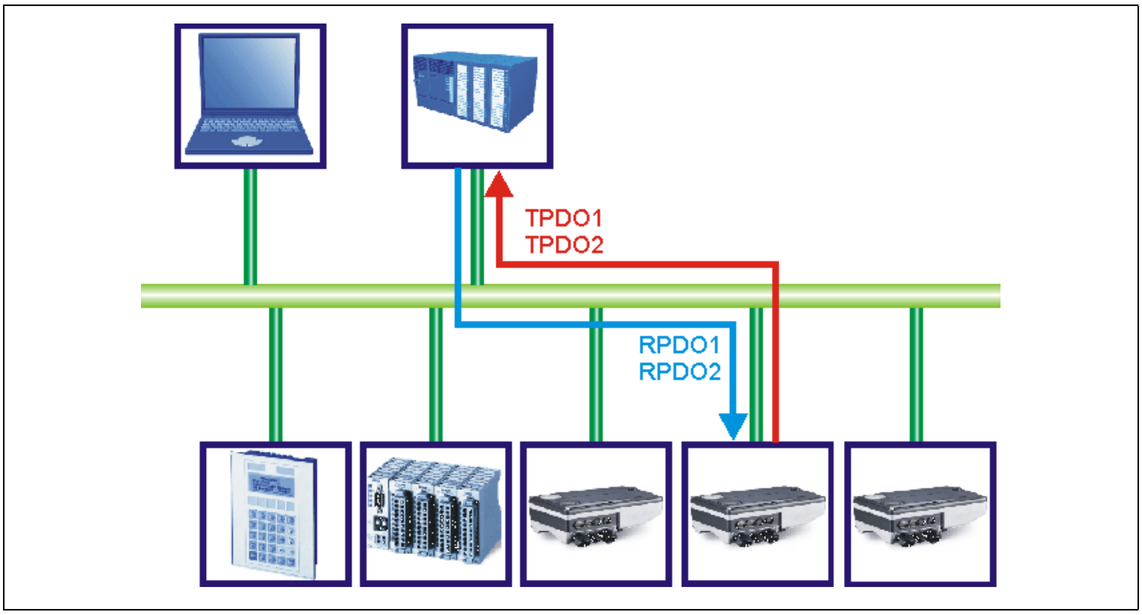
- by transmission of the "Reset Node" NMT telegram or "Reset Communication" to the inverter.

The "CAN reset node" device command (C00002/26) is provided as an alternative to the "Reset node" NMT telegram for the reinitialisation of the CAN-specific device parameters.

Tip!

Master functionality is only required during the initialisation phase of the drive system.

8 Process data transfer



[8-1] PDO data transfer from / to the higher-level host (master)

The CANopen communication unit is provided with two separate process data channels (PDO1 and PDO2) for transmitting process data. Each process data channel can transmit up to four words (8 bytes) at a maximum.

The system bus (CANopen) transmits parameter data, configuration data, diagnostic data, alarm messages and process data between the host (master) and the inverters (slaves) that are part of the fieldbus. The data are transmitted via corresponding communication channels as a function of their time-critical response.

- Process data are transmitted via the process data channel.
- The process data serve to control the inverter.
- The transmission of process data is time-critical.
- Process data are cyclically transferred between the master and the slaves participating in the fieldbus (continuous exchange of current input and output data).
- The master can directly access the process data. In the PLC, for instance, the data are directly assigned to the I/O area.
- Process data are not saved in the inverter.
- Process data are e.g. setpoints, actual values, control words, and status words.

Agreements

- The following distinction for process data telegrams between the host (master) and the invertes (slaves) is made with regard to their direction:
  - Process data telegrams to the device (RPDO)
  - Process data telegrams from the device (TPDO)
- The CANopen process data objects are designated as seen from the node's view:
  - Receive PDOs (RPDOx): Process data object received by a node
  - Transmit PDOs (TPDOx): Process data object sent by a node

Note!

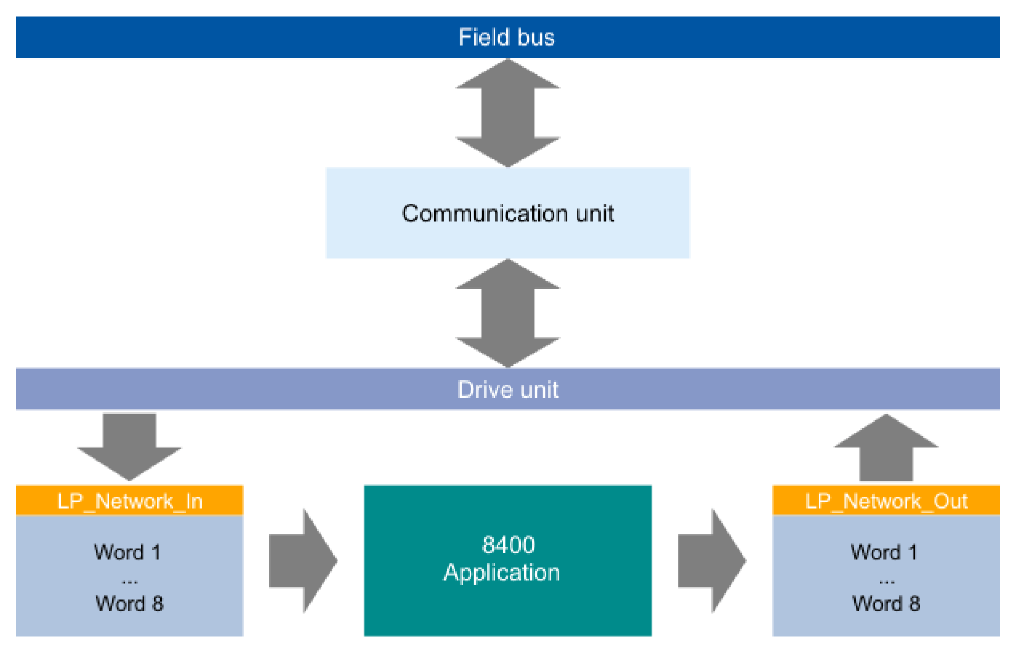
Data can only be exchanged via process data objects if the status is "Operational"!

▶ Communication phases/network management (📖 36)

8.1 Accessing process data / PDO mapping

Process data are transferred via the MCI/CAN interface.

- Max. 8 words (16 bits/word) per direction can be exchanged.
  - 2 x 4 words via the input ports CAN1_IN and CAN2_IN
  - 2 x 4 words via the output ports CAN1_OUT and CAN2_OUT
- The process data are accessed via the **LP_Network_In** and **LP_Network_Out** port blocks. These port blocks are also called process data channels.
- The port/function block interconnection of the process data objects (PDO) takes place via the Lenze »Engineer«.



[8-2] External and internal data transfer between the bus system, inverter, and application

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

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

8.2 Port interconnection of process data objects (PDO)

Note!

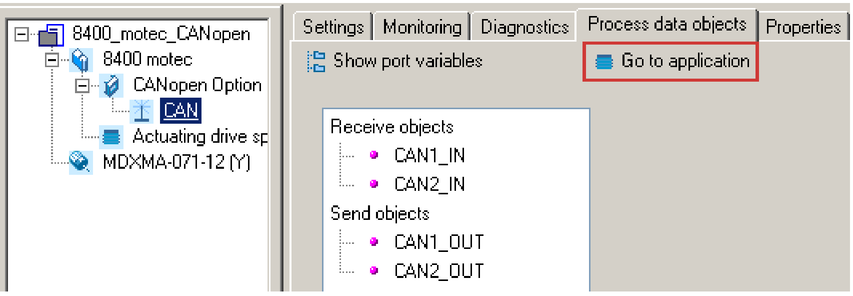
The »Engineer« screenshots shown on the following pages are only examples for the setting sequence and the resulting screens.

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

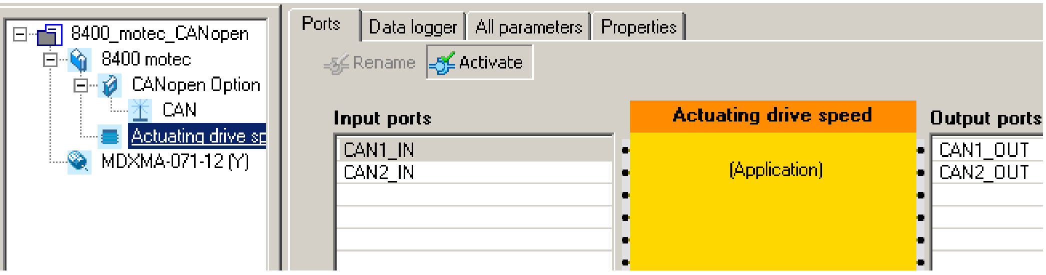
The preconfigured port interconnection of the process data objects is activated by setting code **C00007 = 40: Network (MCI/CAN)**.

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

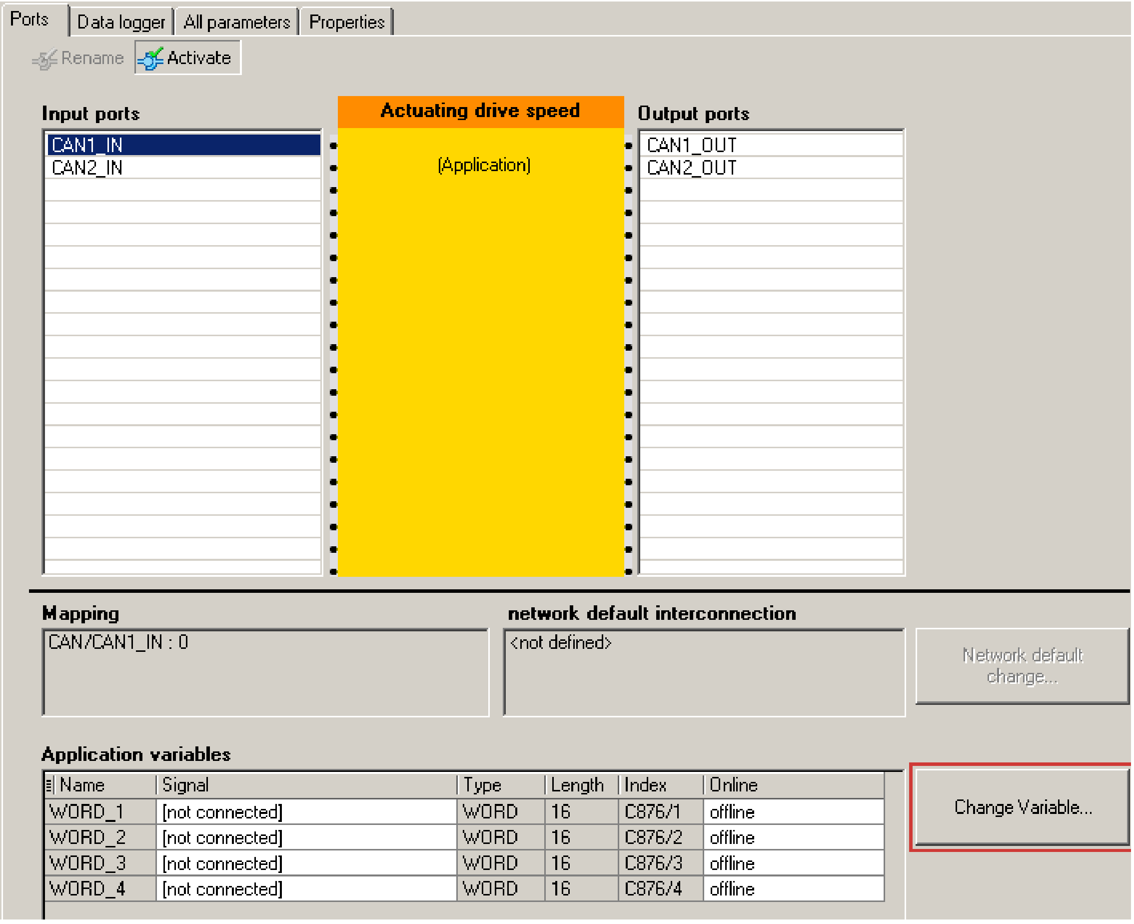
1. Go to the **Process data objects** tab and click **Go to application**.



2. The **Ports** tab displays the port blocks CAN1_IN/CAN2_IN and CAN1_OUT/CAN2_OUT.



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



Mapping

CAN/CAN1_IN : 0

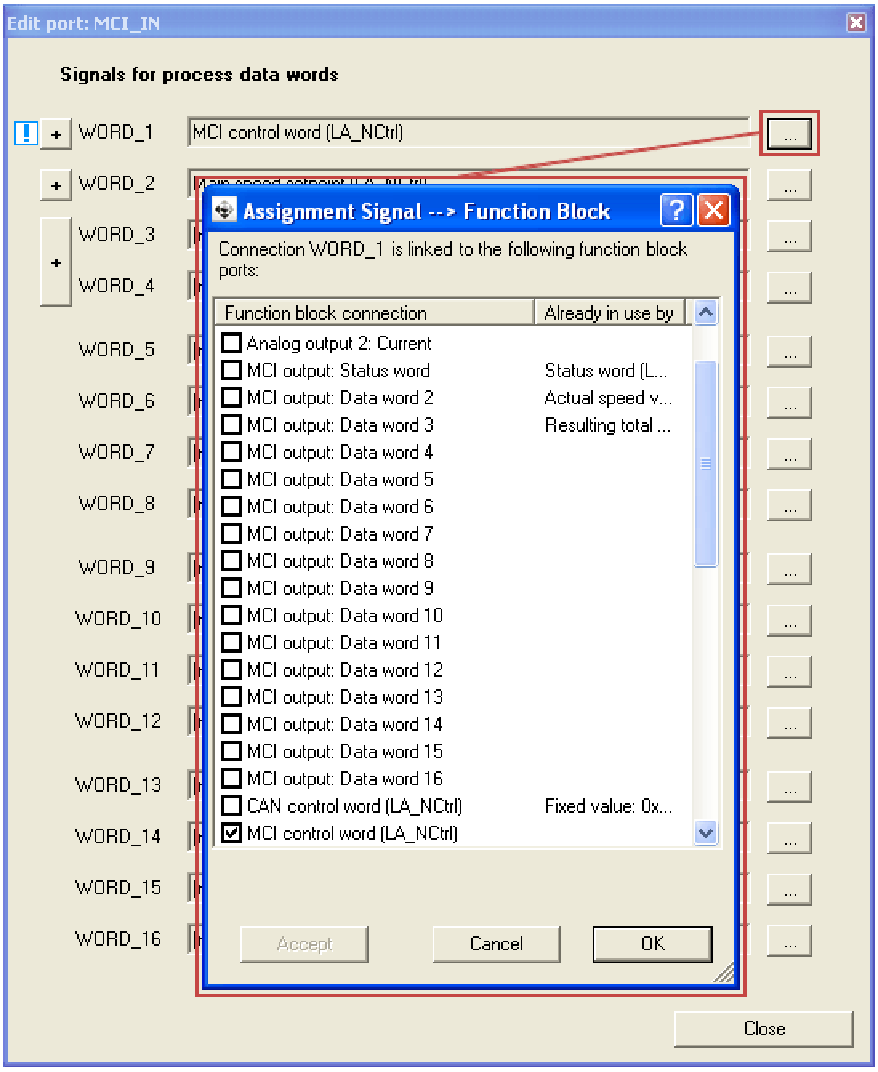
network default interconnection

<not defined>

Application variables

Name	Signal	Type	Length	Index	Online
WORD_1	[not connected]	WORD	16	C876/1	offline
WORD_2	[not connected]	WORD	16	C876/2	offline
WORD_3	[not connected]	WORD	16	C876/3	offline
WORD_4	[not connected]	WORD	16	C876/4	offline

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



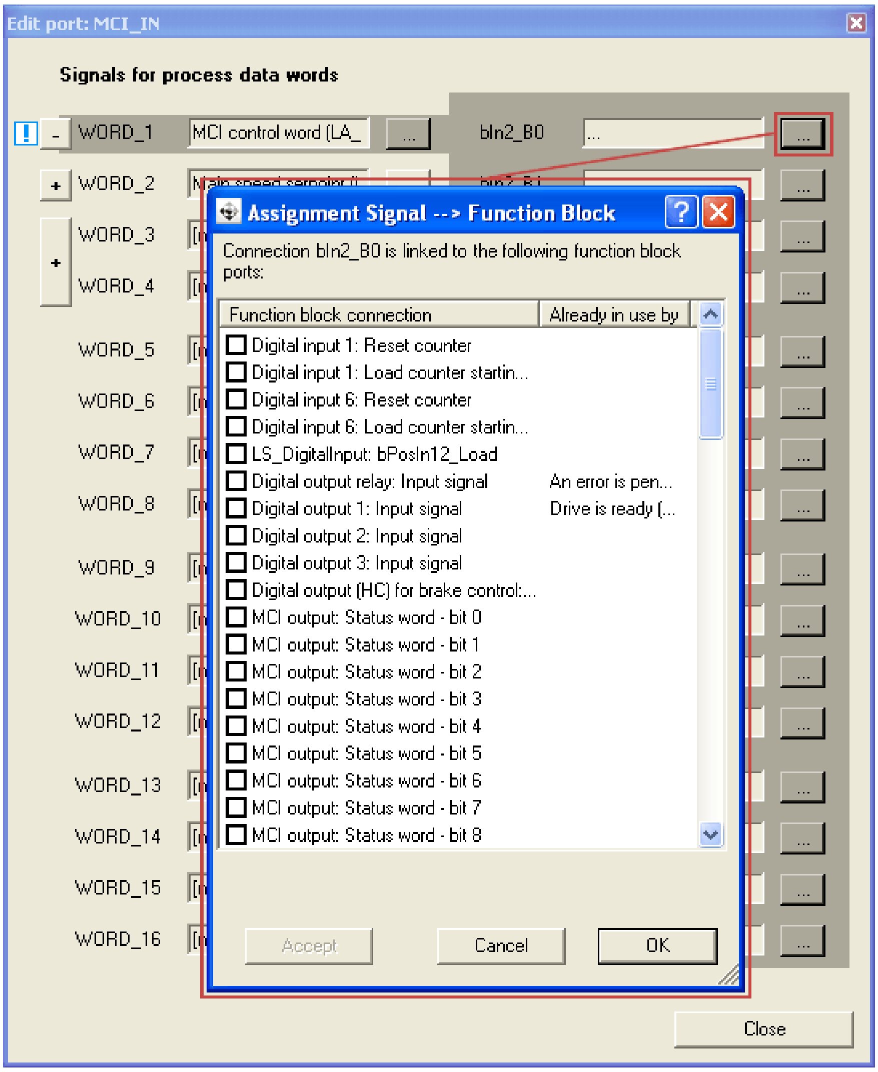
WORD_1: MCI control word (LA_NCtrl)

Connection WORD_1 is linked to the following function block ports:

Function block connection	Already in use by
☐ Analog output 2: Current	
☐ MCI output: Status word	Status word (L...
☐ MCI output: Data word 2	Actual speed v...
☐ MCI output: Data word 3	Resulting total ...
☐ MCI output: Data word 4	
☐ MCI output: Data word 5	
☐ MCI output: Data word 6	
☐ MCI output: Data word 7	
☐ MCI output: Data word 8	
☐ MCI output: Data word 9	
☐ MCI output: Data word 10	
☐ MCI output: Data word 11	
☐ MCI output: Data word 12	
☐ MCI output: Data word 13	
☐ MCI output: Data word 14	
☐ MCI output: Data word 15	
☐ MCI output: Data word 16	
☐ CAN control word (LA_NCtrl)	Fixed value: 0x...
☑ MCI control word (LA_NCtrl)	

For some process data words, you can also assign signals to the individual bits via the + and ... buttons.

→ Select the signals and then confirm the selection with **OK**.



Connection bIn2_B0 is linked to the following function block ports:

Function block connection	Already in use by
☐ Digital input 1: Reset counter	
☐ Digital input 1: Load counter startin...	
☐ Digital input 6: Reset counter	
☐ Digital input 6: Load counter startin...	
☐ LS_DigitalInput: bPosIn12_Load	
☐ Digital output relay: Input signal	An error is pen...
☐ Digital output 1: Input signal	Drive is ready (...
☐ Digital output 2: Input signal	
☐ Digital output 3: Input signal	
☐ Digital output (HC) for brake control:...	
☐ MCI output: Status word - bit 0	
☐ MCI output: Status word - bit 1	
☐ MCI output: Status word - bit 2	
☐ MCI output: Status word - bit 3	
☐ MCI output: Status word - bit 4	
☐ MCI output: Status word - bit 5	
☐ MCI output: Status word - bit 6	
☐ MCI output: Status word - bit 7	
☐ MCI output: Status word - bit 8	

The current interconnection is only displayed if the following has been set for the control mode in code **C00007 = 40: Network (MCI/CAN)**.

8.3 Identifiers of the process data objects

In the Lenze setting, the identifier for the process data objects PDO1 and PDO2 consists of a basic identifier (CANBaseID) and the node address set in C00350:

Identifier (COB-ID) = basic identifier + node address (node ID)

- The basic identifiers of the PDOs comply with the "Predefined connection set" of DS301, V4.02.
- Alternatively, define via code C00353 that the identifiers of the PDOs are to be assigned according to Lenze definition or that individual settings are to be made.
  - If C00353 = "2: COBID = C0354/x", the identifiers of the PDOs can be set individually via the Lenze codes and CANopen indexes listed in the table below. That way, identifiers independent of the node address can be set for specific PDOs.
  - If identifiers are assigned individually, all PDOs must have basic identifier values in the range of 385 ... 1407.

Process data object	Basic identifier		Individual setting	
	dec	hex	Lenze code	CANopen index
PDO1				
RPDO1	512	0x200	C00354/1	I-1400/1
TPDO1	384	0x180	C00354/2	I-1800/1
PDO2				
RPDO2	768	0x300	C00354/3	I-1401/1
TPDO2	640	0x280	C00354/4	I-1801/1

Note!

After a node address change (C00350) and a subsequent CAN reset node, the subcodes of C00354 automatically resume the values which result from the respective basic identifier and the node address set.

Short overview: Parameters for setting the identifiers

Parameters	Info	Lenze setting	
		Value	Unit
C00353/1	COBID source CAN1_IN/OUT	0: COBID = C0350 + CANBaseID	
C00353/2	COBID source CAN2_IN/OUT	0: COBID = C0350 + CANBaseID	
C00354/1	COBID CAN1_IN	0x00000201	
C00354/2	COBID CAN1_OUT	0x00000181	
C00354/3	COBID CAN2_IN	0x00000301	
C00354/4	COBID CAN2_OUT	0x00000281	

8.4 Transmission type

Process data objects can be transmitted in an event-controlled or time-controlled manner. The below table shows that it is possible to combine the different methods by means of logic operations (AND, OR):

- Event-controlled
  The PDO is sent when a certain device-internal event has occurred, e.g. when the data contents of the TPDO have changed or when a transmission cycle time has elapsed
- Synchronous transmission
  A TPDO (or RPDO) is sent (or received) after the device has received a sync telegram (COB-ID 0x80).
- Cyclic transmission
  The cyclic transmission of PDOs takes place when the transmission cycle time has elapsed.
- Polled via RTR
  A TPDO is sent when another device requests it by means of a data request telegram (RTR remote transmit request). For this purpose, the data requester (e.g. the master) sends the data request telegram with the COB-ID of the TPDO requested to be sent. The receiver recognises the RTR and transmits the corresponding PDO.

Transmission type	**PDO transmission**			**Logic combination of different transmission types**
	cyclic	**synchronous**	**event-controlled**	
0		●	●	AND
1 ... 240	●	●		AND
254	●		●	OR

Transmission type	**Description**
0	Synchronous and acyclic: The PDO is transmitted on an event-controlled basis with every sync (e.g. when a bit change occurs in the PDO).
1 ... 240	Synchronous and cyclic (sync-controlled with response): • Selection n = 1: The PDO is transmitted with every sync. • Selection 1 < n ≤ 240: The PDO is transmitted with every n-th sync.
241 ... 251	Reserved
252, 253	RTR-controlled manner is not permissible.
254	Event-controlled with cyclic transmission: If this value is entered, the PDO is transferred in an event-controlled or cyclic manner. (The values "254" and "255" are equivalent). For a cyclic transmission, a cycle time must be set for the respective PDO. In this case, cyclic transmission takes place in addition to event-controlled transmission.
255	Not permissible

The communication parameters such as the transmission mode and cycle time can be set freely for every PDO and independently of the settings of other PDOs:

Parameters	Info	Lenze setting	
		Value	Unit
C00322/1	Transmission mode CAN1 OUT	254	
C00322/2	Transmission mode CAN2 OUT	254	
C00323/1	Transmission mode CAN1 IN	254	
C00323/2	Transmission mode CAN2 IN	254	
C00324/1	Inhibit time for emergency telegrams	0	ms
C00324/2	CAN1_OUT blocking time	0	ms
C00324/3	CAN2_OUT inhibit time	0	ms
C00356/5	CAN1_OUT cycle time	0	ms
C00356/2	CAN2_OUT cycle time	0	ms

Tip!

The setting can also be carried out via the following CANopen objects:

- I-1400 / I-1401: Communication parameter for RPDO1 and RPDO2
- I-1800 / I-1801: Communication parameter for TPDO1 and TPDO2

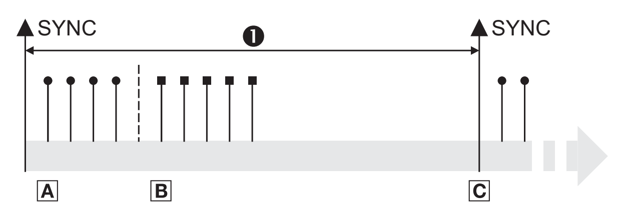
8.5 PDO synchronisation via sync telegram

In case of cyclic transmission, one or several PDOs are transmitted or received at fixed time intervals. For synchronising the cyclic process data, an additional special telegram, the sync telegram, is used.

- The sync telegram is the trigger point for the transmission of process data from the slaves to the master and for the acceptance of process data from the master in the slaves.
- For sync-controlled process data processing, the sync telegram must be generated accordingly.
- The response to a sync telegram is determined by the selected transmission type.

▸ Transmission type (🕮 49)

General procedure



❶ Sync cycle time

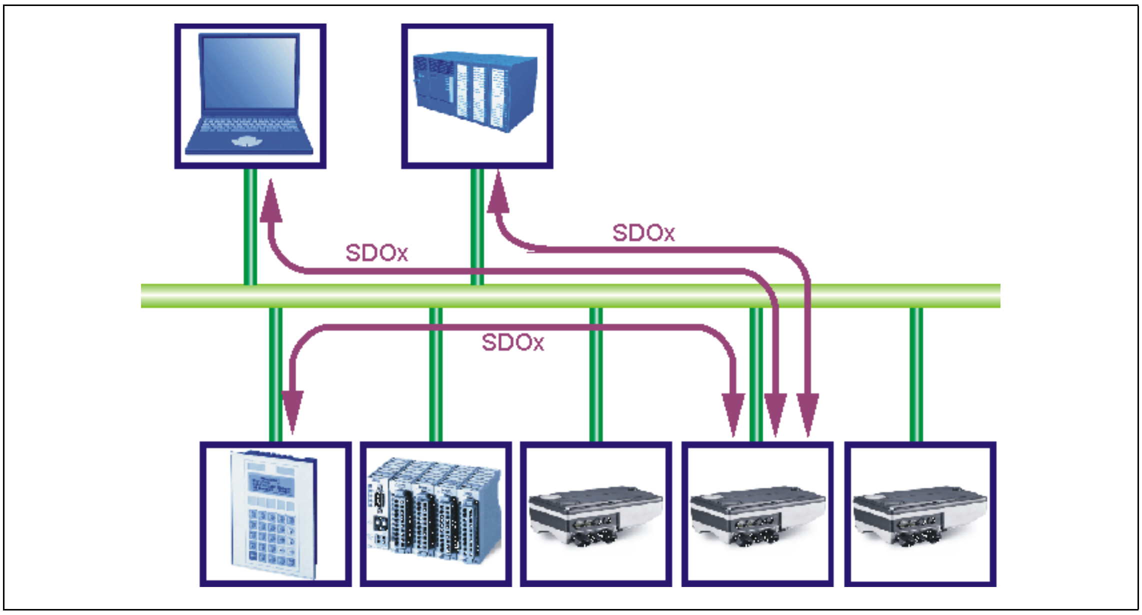
[8-3] Sync telegram

A. After the sync telegram has been received, the slaves transmit the synchronous process data to the master (TPDOs). The master reads them as process input data.
B. When the transmission process is completed, the slaves receive (RPDOs) the process output data (of the master).
    - All other telegrams (e.g. parameters or event-controlled process data) are accepted acyclically by the slaves after the transmission is completed.
    - The acyclic data are not shown in figure [8-3] They must be considered when the cycle time is dimensioned.
C. The data are accepted in the slave with the next sync telegram if the Rx mode is set to 1 ... 240. If the Rx mode is 254 or 255, the data are accepted in the next device cycle, irrespective of the sync telegram.

Short overview: Parameters for the synchronisation via sync telegram

Parameters	**Info**	**Lenze setting**		**Assignment**	
		Value	Unit	Sync master	Sync slave
C00367	CAN SYNC Rx identifier	128			●
C00368	CAN SYNC Tx identifier	128		●	
C00369	CAN SYNC transmit cycle time	0	ms	●	

9 Parameter data transfer



[9-1] Parameter data transfer via the available parameter data channels

Parameters are values stored in codes on Lenze controllers.

Two parameter data channels are available for parameter setting, enabling the simultaneous connection of different devices for configuration purposes.

Parameter data are transmitted via the system bus as SDOs (*Service Data Objects*) via the system bus (CANopen) and are acknowledged by the receiver. The SDO enables read and write access to all device parameters and to the CANopen object directory integrated in the device. Indexes (e.g. 0x1000) enable access to device parameters and functions included in the object directory. To transfer SDOs, the information contained in the user data must comply with the CAN-SDO protocol.

9.1 Identifiers of the parameter data objects

In the Lenze setting, the basic identifiers of the SDOs are preset according to the "Predefined Connection Set".

The identifiers for the parameter data objects SDO1 and SDO2 are generated from the basic identifier and the node address set in code C00350:

Identifier = basic identifier + node address

Object		Direction		Lenze-Base-ID		CANopen-Base-ID	
		from device	to device	dec	Hex	dec	Hex
SDO1 (Parameter data channel 1)	TSDO1	●		1408	580	1408	580
	RSDO1		●	1536	600	1536	600
SDO2 (Parameter data channel 2)	TSDO2	●		1472	5C0	1472	5C0
	RSDO2		●	1600	640	1600	640
Heartbeat		●		1792	700	1792	700
Boot-up		●		1792	700	1792	700

Note!

Please observe that the parameter data channels 1 and 2 are active in the factory setting.

9.2 User data

Structure of the user data of the parameter data telegram

1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
Command	**Index**		**Subindex**	**Data 1**	**Data 2**	**Data 3**	**Data 4**
	Low byte	High byte		Low word		High word	
				Low byte	High byte	Low byte	High byte

Note!

For the user data, the Motorola format is used.

▸ Parameter data telegram examples (📖 59)

The following subchapters provide detailed information on user data.

9.2.1 Command

1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
Command	**Index**		**Subindex**	**Data 1**	**Data 2**	**Data 3**	**Data 4**
	Low byte	High byte		Low word		High word	
				Low byte	High byte	Low byte	High byte

The following commands can be transmitted or received for writing and reading the parameters:

Command	**1st byte**		**Data length**	**Info**
	hex	dec		
Write request	0x23	35	4 bytes	Writing a parameter to the inverter.
	0x2B	43	2 bytes	
	0x2F	47	1 byte	
	0x21	33	Block	
Write response	0x60	96	4 bytes	Acknowledgement from the inverter to a write request.
Read request	0x40	64	4 bytes	Reading a parameter from the inverter.
Read response	0x43	67	4 bytes	Response by the inverter to a read request with the current parameter value.
	0x4B	75	2 bytes	
	0x4F	79	1 byte	
	0x41	65	Block	
Error response	0x80	128	4 bytes	Response by the inverter if the write/read request could not be executed correctly. ▸ Error messages (📖 57)

More precisely, the command byte comprises the following information:

Command	1st byte							
	Command specifier (cs)			Toggle (t)	Length*		e	s
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Write request	0	0	1	0	0/1	0/1	1	1
Write response	0	1	1	0	0	0	0	0
Read request	0	1	0	0	0	0	0	0
Read response	0	1	0	0	0/1	0/1	1	1
Error response	1	0	0	0	0	0	0	0

*Bit coding of the length: 00 = 4 bytes, 01 = 3 bytes, 10 = 2 bytes, 11 = 1 byte
e: expedited (shortened block service)
s: segmented (normal block service)

Tip!

More commands are defined in CANopen specification DS301, V4.02 (e.g. segmented transfer).

9.2.2 Addressing by means of index and subindex

1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
Command	**Index**		**Subindex**	**Data 1**	**Data 2**	**Data 3**	**Data 4**
	Low byte	High byte		Low word		High word	
				Low byte	High byte	Low byte	High byte

A parameter (Lenze code) is addressed according to the following formula:
Index = 24575 - (Lenze code number)

Example

The C00011 parameter (motor reference speed) is to be addressed.

Calculation:

- Index:
  - Decimal: 24575 - 11 = 24564
  - Hexadecimal: 0x5FFF - 0xB = 0x5FF4
- Subindex: 0x00 (subindex 0 since the parameter does not have any subcodes)

Entries:

1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
Command	**Index**		**Subindex**	**Data 1**	**Data 2**	**Data 3**	**Data 4**
	0xF4	**0x5F**	**0x00**				

9.2.3 Data 1 ... data 4

1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
Command	**Index**		**Subindex**	**Data 1**	**Data 2**	**Data 3**	**Data 4**
	Low byte	High byte		Low word		High word	
				Low byte	High byte	Low byte	High byte

Maximally 4 bytes are available for parameter value entries. Depending on the data format, they are assigned as follows:

5th byte	6th byte	7th byte	8th byte
Parameter value (1 byte)	0x00	0x00	0x00
Parameter value (2 bytes)		0x00	0x00
Low byte	High byte		
Parameter value (4 bytes)			
Low word		High word	
Low byte	High byte	Low byte	High byte

Note!

The Table of attributes (📖 84) contains a scaling factor for Lenze parameters in the "factor" column. The scaling factor is important for the transfer of parameter values which are represented with one or several decimal positions in the parameter list.

If the scaling factor is > 1, the value must be multiplied by the indicated scaling factor prior to transmission to be able to transfer the value as an integer. At the SDO client end, the integer must be divided by the scaling factor to obtain the original value including decimal positions again.

Example

A value of "123.45" is to be transmitted for a code, unit: "%" (e.g. C00039/1: "Fixed setpoint-JOG1").

Parameters with the "%" unit have two decimal positions and hence a scaling factor of "100".

Calculation:

- Value to be transmitted = scaling factor x value
- Data $_{(1\ ...\ 4)}$ = 100 x 123.45 = 12345 (0x00 00 30 39)

Entries:

1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
Command	**Index**		**Subindex**	**Data 1**	**Data 2**	**Data 3**	**Data 4**
				0x39	**0x30**	**0x00**	**0x00**

9.2.4 Error messages

1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
Command	**Index**		**Subindex**	**Error code**			
0x80 (128)	Low byte	High byte		Low word		High word	
				Low byte	High byte	Low byte	High byte

In the event of an error, the node addressed generates a telegram with the "Error response" (0x80) command.

- The telegram includes the index and subindex of the code where the error occurred.
- The error code is entered in bytes 5 ... 8.
  - The error codes are standardised according to DS301, V4.02.
  - The representation of the error codes is provided in reverse read direction (see example below).

Example

Representation of error code "0x06 04 00 41" in bytes 5 ... 8:

1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
Command	**Index**		**Subindex**	**Error code**			
				0x41	**0x00**	**0x04**	**0x06**

Meaning of the error codes

The error codes are standardised according to DS301, V4.02.

Error code	Explanation
0x0503 0000	Toggle bit not changed
0x0504 0000	SDO protocol expired
0x0504 0001	Invalid or unknown client/server command specifier
0x0504 0002	Invalid block size (only block mode)
0x0504 0003	Invalid sequence number (only block mode)
0x0504 0004	CRC error (only block mode)
0x0504 0005	Not sufficient memory
0x0601 0000	Object access not supported
0x0601 0001	Attempt to read a write-only object
0x0601 0002	Attempt to write to a read-only object
0x0602 0000	Object not listed in object directory
0x0604 0041	Object not mapped to PDO
0x0604 0042	Number and length of objects to be transferred longer than PDO length.
0x0604 0043	General parameter incompatibility
0x0604 0047	General internal device incompatibility
0x0606 0000	Access denied because of hardware error
0x0607 0010	Unsuitable data type, unsuitable service parameter length
0x0607 0012	Unsuitable data type, service parameter length exceeded
0x0607 0013	Unsuitable data type, service parameter length not long enough
0x0609 0011	Subindex does not exist
0x0609 0030	Parameter value range exceeded
0x0609 0031	Parameter values too high
0x0609 0032	Parameter values too low
0x0609 0036	Maximum value falls below minimum value
0x0800 0000	General error
0x0800 0020	Data cannot be transferred/stored for application.
0x0800 0021	Data cannot be transferred/stored for application due to local control.
0x0800 0022	Data cannot be transferred/stored for application due to current device status.
0x0800 0023	Dynamic generation of object directory not successful or no object directory available (e.g. object directory generated from file, generation not possible because of a file error).

9.3 Parameter data telegram examples

9.3.1 Read parameters

Task: The heatsink temperature of 43 °C (code C00061, data format INTEGER32, scaling factor 1) of the inverter with the node address "5" is to be read.

Telegram to the drive

Identifier	**User data**							
	1st byte	**2nd byte**	**3rd byte**	**4th byte**	**5th byte**	**6th byte**	**7th byte**	**8th byte**
	Command	**Index**		**Subindex**	**Data 1**	**Data 2**	**Data 3**	**Data 4**
0x0605	0x40	0xC2	0x5F	0x00	0x00	0x00	0x00	0x00

Explanations on the telegram to the drive	
Identifier	= 1536 + node address = 1536 + 5 = 1541 = 0x0605 (1536 = basic identifier SDO1 to the inverter)
Command	= 0x40 = "Read Request" (read request of a parameter from the inverter)
Index	= 24575 - code number = 24575 - 61 = 24514 = 0x5FC2
Subindex	= 0 (code C00061 does not have any subcodes)

Response telegram from drive (if data have been transmitted correctly)

Identifier	**User data**							
	1st byte	**2nd byte**	**3rd byte**	**4th byte**	**5th byte**	**6th byte**	**7th byte**	**8th byte**
	Command	**Index**		**Subindex**	**Data 1**	**Data 2**	**Data 3**	**Data 4**
0x0585	0x43	0xC2	0x5F	0x00	0x2B	0x00	0x00	0x00

Explanations on the telegram from the drive	
Identifier	= 1408 + node address = 1408 + 5 = 1413 = 0x0585 (1408 = basic identifier SDO1 from the inverter)
Command	= 0x43 = "Read response" (response to the read request with current value)
Index	As in telegram to the drive
Subindex	
Data 1 ... 4	= 0x0000002B = 43 [°C]

9.3.2 Write parameters

Task: The rated current of the motor connected with I_{rated} = 10.20 A (code C00088) is to be entered into the inverter with the node address "2".

Data 1 ... 4	Calculation
Value for motor current, (data type U16; display factor 1/100)	10.20 x 100 = 1020 (0x03 FC)

Telegram to the drive

Identifier	User data							
	1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
	Command	Index		Subindex	Data 1	Data 2	Data 3	Data 4
0x0602	0x2B	0xA7	0x5F	0x00	0xFC	0x03	0x00	0x00

Explanations on the telegram to the drive	
Identifier	= 1536 + node address = 1536 + 2 = 1538 = 0x0602 (1536 = basic identifier SDO1 to the inverter)
Command	= 0x23 = "Write Request" (write request of a parameter to the inverter)
Index	= 24575 - code number = 24575 - 88 = 24487 = 0x5FA7
Subindex	= 0 (code C00088 does not have any subcodes)
Data 1 ... 4	= 10.20 x 100 = 1020 = 0x000003FC (motor current value; data type U32; display factor 1/100)

Response telegram from drive (if data have been transmitted correctly)

Identifier	User data							
	1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
	Command	Index		Subindex	Data 1	Data 2	Data 3	Data 4
0x0582	0x60	0xA7	0x5F	0x00	0x00	0x00	0x00	0x00

Explanations on the telegram from the drive	
Identifier	= 1408 + node address = 1408 + 2 = 1410 = 0x0582 (1408 = basic identifier SDO1 from the inverter)
Command	= 0x60 = "Write Response" (acknowledgement of the write access from the inverter)
Index	As in telegram to the drive
Subindex	

9.3.3 Reading block parameters

Task: The firmware version (code C00099) is to be read from the parameter set of the inverter with the node address "12". The firmware version has a length of 11 ASCII characters, which is transmitted as a block parameter. Within the user data, a data width of 2nd to 8th byte is assigned to each block.

Telegram 1 to the drive: Read request

Identifier	User data							
	1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
	Command	Index		Subindex	Data 1	Data 2	Data 3	Data 4
0x060C	0x40	0x9C	0x5F	0x00	0x00	0x00	0x00	0x00

Explanations on the telegram to the drive	
Identifier	= 1536 + node address = 1536 + 12 = 1548 = 0x060C (1536 = basic identifier SDO1 to the inverter)
Command	= 0x40 = "Read Request" (read request of a parameter from the inverter)
Index	= 24575 - code number = 24575 - 99 = 24476 = 0x5F9C
Subindex	= 0 (code C00099 does not have any subcodes)

Response message 1 from the drive: Indication of the block length (11 characters)

Identifier	User data							
	1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
	Command	Index		Subindex	Data 1	Data 2	Data 3	Data 4
0x058C	0x41	0x9C	0x5F	0x00	0x0B	0x00	0x00	0x00

Explanations on the telegram from the drive	
Identifier	= 1408 + node address = 1408 + 12 = 1420 = 0x058C (1408 = basic identifier SDO1 from the inverter)
Command	= 0x41 = "Read response" (response is block telegram)
Index	As in telegram to the drive
Subindex	
Data 1 ... 4	= 0x0000000B = data length of 11 characters in the ASCII format

Telegram 2 to the drive: Request of the 1st data block

Identifier	User data							
	1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
	Command	Data 1	Data 2	Data 3	Data 4	Data 5	Data 6	Data 7
0x060C	0x60	0x00	0x00	0x00	0x00	0x00	0x00	0x00

Explanations on the telegram to the drive	
Command	= 0x60 = "Read segment request" (request: read data block) • Bit 4 = 0 (toggle bit)
	Influence of the toggle bit on the request command The individual blocks are toggled successively, i.e. first the request with command "0x60" is effected (= 011$\mathbf{0}$*0000$_{bin}$), then command "0x70" (= 011$\mathbf{1}$*0000$_{bin}$), then "0x60" again, etc. * Toggle bit

Response message 2 from the drive: Transmission of the 1st data block

Identifier	User data							
	1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
	Command	Data 1	Data 2	Data 3	Data 4	Data 5	Data 6	Data 7
0x058C	0x00	0x30	0x31	0x2E	0x30	0x30	0x2E	0x30
		0_{asc}	1_{asc}	$._{asc}$	0_{asc}	0_{asc}	$._{asc}$	0_{asc}

Explanations on the telegram to the drive	
Command	= 0x00 = 00000000$_{bin}$ • Bit 4 = 0 (toggle bit)
	Influence of the toggle bit on the transmission command • The 1st response of the inverter in the command byte is "0x000$\mathbf{0}$*0000$_{bin}$" if bytes 2 ... 8 are fully occupied with data and further telegrams are following. • The 2nd response of the inverter in the command byte is "0x000$\mathbf{1}$*0000$_{bin}$" if bytes 2 ... 8 are fully occupied with data and further telegrams are following, etc. * Toggle bit
Data 1 ... 7	= "01.00.0" (ASCII representation)

Telegram 3 to the drive: Request of the 2nd data block

Identifier	User data							
	1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
	Command	Data 1	Data 2	Data 3	Data 4	Data 5	Data 6	Data 7
0x060C	0x70	0x00	0x00	0x00	0x00	0x00	0x00	0x00

Explanations on telegram 3 to the drive	
Command	= 0x70 = "Read segment request" (request: read data block) • Bit 4 = 1 (toggle bit)

Response message 3 from the drive: Transmission of the 2nd data block including end identifier

Identifier	User data							
	1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
	Command	Data 1	Data 2	Data 3	Data 4	Data 5	Data 6	Data 7
0x058C	0x17	0x30	0x2E	0x30	0x30	0x00	0x00	0x00
		0_{asc}	$._{asc}$	0_{asc}	0_{asc}	-	-	-

Explanations on telegram 3 from the drive	
Command	= 0x17 = 00010111_{bin}: • Bit 0 = 1 (end of transmission) • Bit 1 ... bit 3 = 011_{bin} (3 bytes do not contain any data) • Bit 4 = 1 (toggle bit)
	Influence of the final bit and the residual data length on the transmission command • The end of transmission is signalled via the set final bit 0. • Bits 1 ... 3 reveal the number of bytes that do not contain data anymore. * Toggle bit
Data 1 ... 7	= "0.00" (ASCII representation) The result of the data block transmission is: "01.00.00.00"

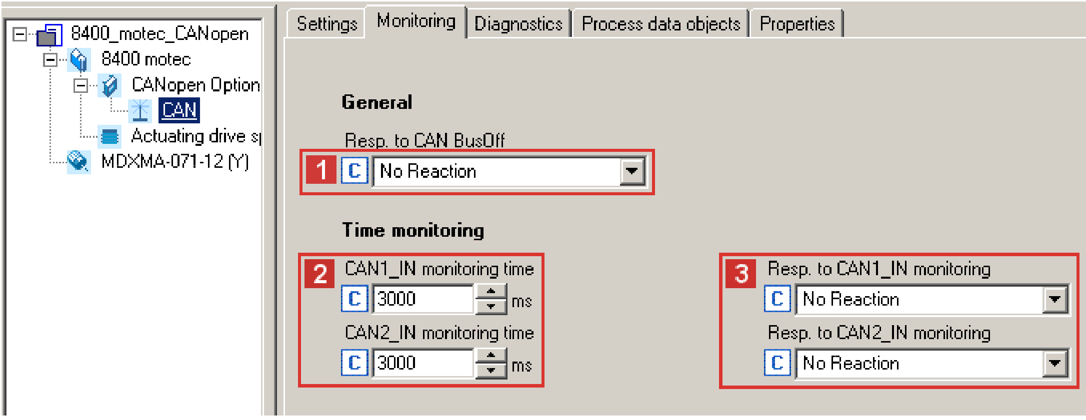
10 Monitoring

10.1 Monitoring of the RPDOs for data reception

RPDO1 and RPDO2 have a parameterisable monitoring time within which the RPDO must arrive.

The following settings can be made in the »Engineer« under the **Monitoring** tab:

- Response to "BusOff" (bus system switched off), 1 C00592/2
- CAN1_IN monitoring time, 2 C00357/1
- CAN2_IN monitoring time, 2 C00357/2
- Response to CAN1_IN monitoring, 3 C00593/1
- Response to CAN2_IN monitoring, 3 C00593/2



General

Resp. to CAN BusOff: No Reaction

Time monitoring

CAN1_IN monitoring time: 3000 ms

CAN2_IN monitoring time: 3000 ms

Resp. to CAN1_IN monitoring: No Reaction

Resp. to CAN2_IN monitoring: No Reaction

If a monitoring time > 0 ms 2 (C00357/1...2) is entered for CAN1_IN/CAN2_IN, the RPDO is expected after the set time has expired.

If the RPDO is not received within the monitoring time or with the configured sync, the response set for the respective RPDO is effected 3 (C00593/1...2).

A monitoring time = 0 ms deactivates the monitoring function.

10.2 Integrated error detection

If a node detects an error, it rejects the CAN telegram bits received so far and transmits an error flag. The error flag consists of 6 consecutive bits with the same logic value.

The following errors are detected:

Bit error

The sending node monitors the bus and interrupts the transmission if it receives a different logic value than the value transmitted. With the next bit, the sending node starts the transmission of an error flag.

In the arbitration phase, the sender only detects a bit error if a dominantly sent bit is received as a recessive bit. In the ACK slot as well, the dominant overwriting of a recessive bit is not indicated as a bit error.

Stuff-bit error

If more than 5 consecutive bits before the ACK delimiter in the CAN telegram have the same logic value, the previously transmitted telegram will be rejected and an error flag will be sent with the next bit.

CRC error

If the CRC checksum received does not correspond to the checksum calculated in the CAN chip, the CAN controller sends an error flag after the ACK delimiter, and the previously transmitted telegram is invalidated.

Acknowledgement error

If the ACK slot which is sent recessively by the transmitting node is not overwritten dominantly by a receiver, the transmitting node aborts the transmission. The transmitting node invalidates the telegram transmitted and sends an error flag with the next bit.

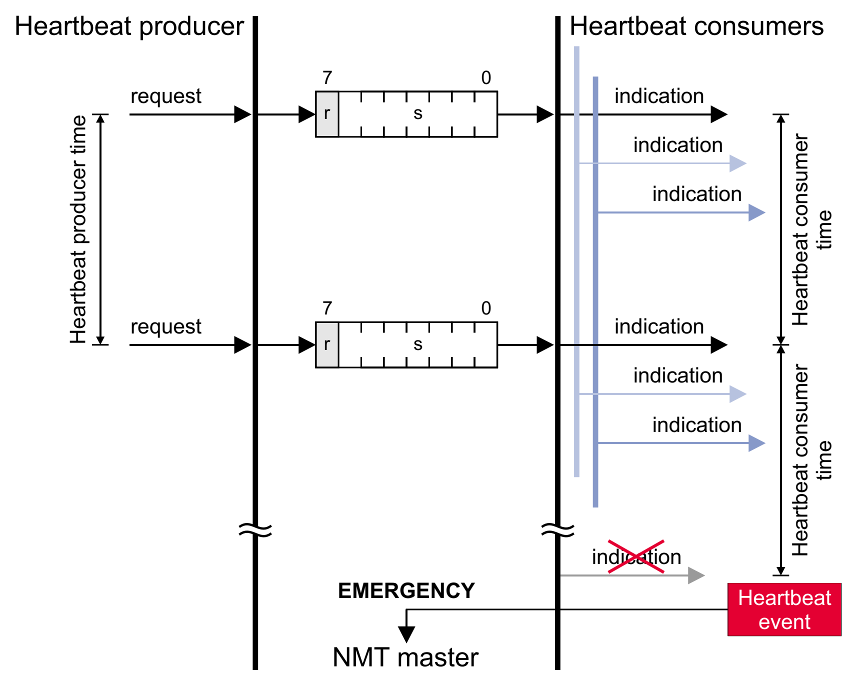
Format error

If a dominant bit is detected in the CRC delimiter, in the ACK delimiter or in the first 6 bits of the EOF field, the telegram received is rejected and an error flag is sent with the next bit.

10.3 Heartbeat protocol

The heartbeat protocol can be used for node monitoring purposes within a CAN network.

General procedure



r: Reserved (always 0)
s: status of the producer (0: Boot-up, 4: Stopped, 5: Operational, 127: Pre-Operational)

[10-1] Heartbeat protocol

1. A heartbeat producer cyclically transmits a so-called heartbeat telegram to one or more consumers.
2. The consumer(s) monitor(s) the heartbeat telegram for arrival on a regular basis.

10.3.1 Telegram structure

- The heartbeat telegram of the producer has the following identifier:
  Identifier (COB-ID) = 1792 + producer's node address
- The user data (1 byte) contain the status (s) of the producer:

Heartbeat producer status		**Data**							
Communication status	Decimal value (s)	(r)	Producer status (s)						
		Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Boot-up	0	0	0	0	0	0	0	0	0
Stopped	4	0	0	0	0	0	1	0	0
Operational	5	0	0	0	0	0	1	0	1
Pre-Operational	127	0	1	1	1	1	1	1	1

10.3.2 Parameter setting

Short overview of the parameters for the "Heartbeat" monitoring function:

Parameters	Info	Lenze setting		Assignment	
		Value	Unit	Consumer	Producer
C00347/1...n	CAN status of heartbeat producer 1	-		●	
C00381	Heartbeat producer time	0	ms		●
C00385/1...n	CAN node address of heartbeat producer 1	0		●	
C00386/1...n	Heartbeat consumer time for heartbeat producer 1	0	ms	●	
C00592/5	Resp. to heartbeat event	No response		●	
Greyed out = display parameter					

Heartbeat producer time

Time interval for the transmission of the heartbeat telegram to the consumer(s).

- Parameterisable in C00381 or via object I-1017. The parameterised time is rounded down to an integer multiple of 5 ms.
- The heartbeat telegram is sent automatically as soon as a time > 0 ms is set.

Heartbeat consumer time

Monitoring time for the nodes (producers) to be monitored.

- Parameterisable in C00386/1...n or via object I-1016.
- The parameterised time is rounded down to an integer multiple of 5 ms and must have a greater value than the heartbeat producer time of the node to be monitored.
- 1 Heartbeat Producer can be monitored.
- The node address(es) of the nodes to be monitored is/are set in C00385/1...n or via object I-1016, too.

Heartbeat event

The "heartbeat event" is triggered in the consumer if the consumer has not received a heartbeat telegram from the producer within the heartbeat consumer time:

- The consumer changes from the "Operational" communication status to the "Pre-operational" communication status.
- The NMT master receives an emergency telegram containing emergengy error code 0x8130.
- The response parameterised in C00592/5 is activated (Lenze setting: "No response").

Note!

The heartbeat monitoring will not start until the first heartbeat telegram of a monitored producer has been received successfully and the "Pre-operational" NMT status has been achieved.

The boot-up telegram counts as the first heartbeat telegram.

10.3.3 Commissioning example

Task

An inverter configured as heartbeat consumer (node 2) is to monitor another inverter (heartbeat producer; node 1).

- The heartbeat producer is to transmit a heartbeat telegram to the heartbeat consumer every 10 ms.
- The heartbeat consumer monitors the heartbeat telegram for arrival. A response is to be activated in the event of an error.

Parameterising the heartbeat producer (node 1)

1. Set the heartbeat producer time (C00381) to 10 ms.

Parameterising the heartbeat consumer (node 2)

1. Set the CAN node address of the producer in C00385/1.
2. Set the heartbeat consumer time in C00386/1.
    - Note: The heartbeat consumer time must be greater than the heartbeat producer time of the node to be monitored set in C00381.
3. Set the desired response in C00592/5 which is to be activated if a heartbeat event in the consumer occurs.

Tip!

C00347/1...n displays the heartbeat status of the nodes monitored.

Heartbeat telegram

- The heartbeat telegram from the producer has the following identifier:
  Identifier (COB-ID) = 1792 + producer node address = 1792 + 1 = 1793 = 0x701

10.4 Emergency telegram

If the error status changes because an internal device error occurs or has been eliminated, the NMT master once receives an emergency telegram with the following structure:

1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
Emergency error code		**Error register**	**Manufacturer-specific error message**				
Low byte	High byte	I-1001	0x00 Reserved	Low word		High word	
				Low byte	High byte	Low byte	High byte
See table below			• For emergency error code 0xF000: Lenze error number (value displayed in C00168) • All other emergency error codes have a value of "0" here.				

Emergency error code	Error register	Cause
0x0000	0xXX	One of several errors eliminated
	0x00	Single error eliminated (no more errors)
0x3100	0x01	Supply voltage of standard device faulty or failed
0x8100	0x11	Communication error (warning)
0x8130	0x11	Life guarding error or heartbeat error
0x8150	0x11	Collision of identifiers (COB-IDs): An identifier parameterised for reception is also used for transmission.
0x8210	0x11	PDO length shorter than expected
0x8220	0x11	PDO length greater than expected
0x8700	0x11	Sync telegram monitoring
0xF000	0x01	Generic error • An error with a "Fault", "Trouble", "TroubleQSP", "Warning", or "SystemFault" error response occurred in the standard device. • Error message is the Lenze error number (C00168).

More emergency error codes are listed in the short overview of the error messages of the operating system in the software manual/»Engineer« online help "Inverter Drives 8400 motec".

Example

1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
Emergency error code		**Error register**	**Manufacturer-specific error message**				
0x00	0xF0	0x01	0x00 Reserved	Lenze error number			
Generic error				Corresponding error-free message: Value "0x00000000"			

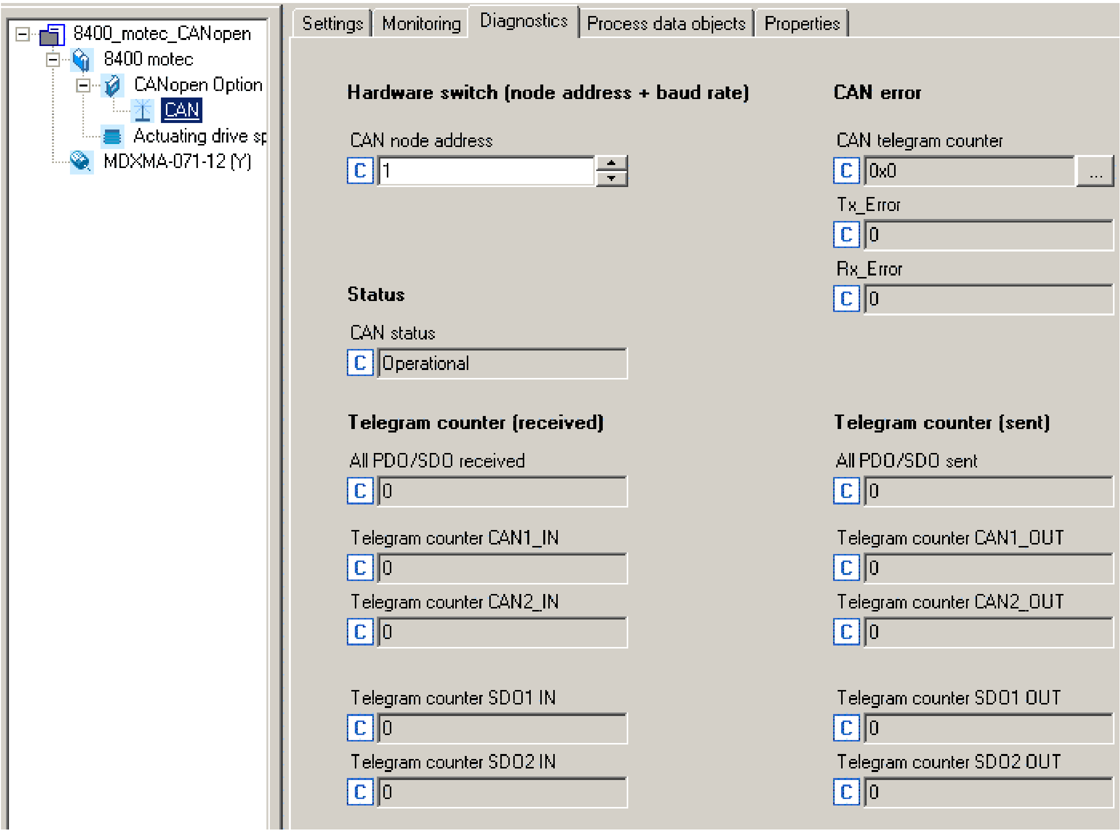
Tip!

A detalied description can be found in CAN specification DS301, V4.02.

11 Diagnostics

Diagnostics with the »Engineer«

In the »Engineer« under the **Diagnostics** tab, various system bus (CANopen) diagnostics information is displayed.



Hardware switch (node address + baud rate)

CAN node address: 1

Status

CAN status: Operational

CAN error

CAN telegram counter: 0x0

Tx_Error: 0

Rx_Error: 0

Telegram counter (received)

All PDO/SDO received: 0

Telegram counter CAN1_IN: 0

Telegram counter CAN2_IN: 0

Telegram counter SDO1 IN: 0

Telegram counter SDO2 IN: 0

Telegram counter (sent)

All PDO/SDO sent: 0

Telegram counter CAN1_OUT: 0

Telegram counter CAN2_OUT: 0

Telegram counter SDO1 OUT: 0

Telegram counter SDO2 OUT: 0

12 Parameter reference

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

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

Here you will find general information on parameters.

12.1 Communication-relevant parameters of the operating system

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

C01501

Parameter | Name: **C01501 | Resp. to communication error with MCI**		Data type: UNSIGNED_8 Index: $23074_d = 5A22_h$
Configuration of monitoring functions for the Communication Unit		
Selection list		
0	No Reaction	
1	Fault	
4	WarningLocked	
Subcodes	**Lenze setting**	**Info**
C01501/1	1: Fault	Resp. to MCI fault 1 • Response to a communication fault.
C01501/2	1: Fault	Resp. to MCI fault 2 • Response to an incompatible communication unit.
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 1		

C01503

Parameter | Name: **C01503 | MCI timeout**			Data type: UNSIGNED_16 Index: $23072_d = 5A20_h$
Setting range **(min. value | unit | max. value)**			
0	ms	1000	
Subcodes	**Lenze setting**		**Info**
C01503/1	200 ms		MCI timeout
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 1			

12.2 Parameters relevant for CANopen communication

This chapter lists the CANopen parameters of the communication unit in numerically ascending order.

C00322

Parameter | Name: **C00322 | Transmission mode CAN TxPDOs**			Data type: UNSIGNED_8 Index: 24253_d = $5EBD_h$
TPDO transmission type according to DS301 V4.02 • The following transfer modes are supported: • 0: synchronous and acyclic • 1 ... 240: synchronous and cyclic • 252: synchronous - only RTR • 253: asynchronous - only RTR • 254: send PDOs in an event-controlled fashion as long as C00324 = 0 • 255: asynchronous - device profile-specific • The basic setting for all PDOs is "Send PDOs in event-controlled fashion as long as C00324 = 0" (254). • Representation of the CANopen objects I-1800/2 and I-1801/2 (see DS301 V4.02).			
Setting range **(min. value | unit | max. value)**			
0		255	
Subcodes	**Lenze setting**		**Info**
C00322/1	254		Transmission mode CAN1 OUT
C00322/2	254		Transmission mode CAN2 OUT
☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☑ COM ☐ MOT			

C00323

Parameter | Name: **C00323 | Transmission mode CAN Rx PDOs**			Data type: UNSIGNED_8 Index: 24252_d = $5EBC_h$
RPDO transmission type according to DS301 V4.02 • For the RPDO, it serves as monitoring setting in the case of sync-controlled PDOs. • The following transfer modes are supported: • 0: synchronous and acyclic • 1 ... 240: synchronous and cyclic • 252: synchronous - only RTR • 253: asynchronous - only RTR • 254: asynchronous - manufacturer-specific • 255: asynchronous - device profile-specific • The basic setting for all PDOs is "Asynchronous - manufacturer-specific" (254). • Representation of the CANopen objects I-1400/2 and I-1401/2 (see DS301 V4.02).			
Setting range **(min. value | unit | max. value)**			
0		255	
Subcodes	**Lenze setting**		**Info**
C00323/1	254		Transmission mode CAN1 IN
C00323/2	254		Transmission mode CAN2 IN
☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☑ COM ☐ MOT			

C00324

Parameter | Name: **C00324 | CAN transmission blocking time**		Data type: UNSIGNED_16 Index: 24251_d = $5EBB_h$
Blocking time for the transmission of the emergency telegram and the process data **Note:** If the "Asynchronous - manufacturer-specific/device profile-specific" transmission type is set, the transmission cycle timer is reset to 0 if event-controlled transmission has been triggered. Example: cycle time (C00356/x) = 500 ms, blocking time = 100 ms, sporadic data change: • In the case of a sporadic data change < 500 ms, due to the blocking time set, the quickest transmission cycle is 100 ms (event-controlled transmission). • In the case of a sporadic data change > 500 ms, due to the cycle time set, the transmission cycle is 500 ms (cyclic transmission). • Representation of the CANopen objects I-1800/3 and I-1801/3 (see DS301 V4.02).		
Setting range (min. value | unit | max. value)		
0	ms	6500
Subcodes	**Lenze setting**	**Info**
C00324/1	0 ms	Inhibit time for emergency telegrams
C00324/2	0 ms	CAN1_OUT blocking time
C00324/3	0 ms	CAN2_OUT inhibit time
☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☑ COM ☐ MOT		

C00345

Parameter | Name: **C00345 | CAN error status**		Data type: UNSIGNED_8 Index: 24230_d = $5EA6_h$
Display of the CAN error status		
Selection list (read only)		
0	No Error	
1	Warning ErrActive	
2	Warning ErrPassive	
3	Bus off	
4	Reserved	
5	Reserved	
☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☑ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT		

C00347

Parameter | Name: **C00347 | CAN status HeartBeat producer**		Data type: UNSIGNED_8 Index: 24228_d = $5EA4_h$
Display of the heartbeat producer's CAN status Heartbeat protocol (📖 66)		
Selection list		
0	Boot-up	
4	Stopped	
5	Operational	
127	Pre-Operational	
250	Failed	
255	NoResponse	
Subcodes		**Info**
C00347/1		Status node 1
☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☑ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☑ COM ☐ MOT		

C00349

Parameter | Name: **C00349 | CAN setting DIP switch**			Data type: UNSIGNED_16 Index: 24226_d = $5EA2_h$
Display of the DIP switch setting at the last time the mains connection was established Possible settings via DIP switch (📖 30)			
Display area **(min. hex value | max. hex value)**			
0x0000		0xFFFF	
Value is bit-coded:			
Bit 0	Node address 1		
Bit 1	Node address 2		
Bit 2	Node address 4		
Bit 3	Node address 8		
Bit 4	Node address 16		
Bit 5	Node address 32		
Bit 6	Node address 64		
Bit 7	Baud rate 1		
Bit 8	Baud rate 2		
Bit 9	Baud rate 4		
Bit 10	Reserved		
...	...		
Bit 14	Reserved		
Bit 15	Accept DIP switch 24V ON		
☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☑ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT			

C00350

Parameter | Name: **C00350 | CAN node address**			Data type: UNSIGNED_8 Index: $24225_d = \text{5EA1}_h$
Setting of the node address via parameters • The node address can only be parameterised if the node address "0" is set via the DIP switches. • A change of the node address will only become effective after a CAN reset node. ▸ Setting the CAN node address (🕮 31)			
Setting range (min. value | unit | max. value)			**Lenze setting**
1		63	**1**
☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☑ COM ☐ MOT			

C00351

Parameter | Name: **C00351 | CAN baud rate**		Data type: UNSIGNED_8 Index: $24224_d = \text{5EA0}_h$
Setting of the baud rate via parameters • The baud rate can only be parameterised if the baud rate "0" is set via the DIP switches. • A change of the baud rate will only become effective after a CAN reset node. ▸ Setting the baud rate (🕮 30)		
Selection list (Lenze setting printed in bold)		
0	**500 kbps**	
1	250 kbps	
2	125 kbps	
3	50 kbps	
4	1000 kbps	
5	20 kbps	
14	800 kbps	
☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☑ COM ☐ MOT		

C00352

Parameter | Name: **C00352 | CAN slave/master**		Data type: UNSIGNED_8 Index: $24223_d = \text{5E9F}_h$
If "1" is entered and saved, the drive will start as a CAN master after mains switching.		
Selection list (Lenze setting printed in bold)		
0	**Slave**	
1	Master	
☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☑ COM ☐ MOT		

C00353

<table>
<tr><td colspan="2">Parameter | Name:
C00353 | CAN IN/OUT COBID source</td><td>Data type: UNSIGNED_8
Index: $24222_d = 5E9E_h$</td></tr>
<tr><td colspan="3">Identifier allocation procedure for the CANx_IN/OUT process data</td></tr>
<tr><td colspan="2">Selection list</td><td>Info</td></tr>
<tr><td>0</td><td>COBID = C0350 + LenzeBaseID</td><td>COBID = device address + LenzeBaseID</td></tr>
<tr><td>1</td><td>COBID = C0350 + CANBaseID</td><td>COBID = device address + CANBaseID (C00354/x)</td></tr>
<tr><td>2</td><td>COBID = C0354/x</td><td>COBID = direct setting from C00354/x</td></tr>
<tr><td>Subcodes</td><td>Lenze setting</td><td>Info</td></tr>
<tr><td>C00353/1</td><td>1</td><td>COBID source CAN1_IN/OUT</td></tr>
<tr><td>C00353/2</td><td>1</td><td>COBID source CAN2_IN/OUT</td></tr>
<tr><td colspan="3">☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☑ COM ☐ MOT</td></tr>
</table>

C00354

<table>
<tr><td colspan="2">Parameter | Name:
C00354 | COBID</td><td>Data type: UNSIGNED_32
Index: $24221_d = 5E9D_h$</td></tr>
<tr><td colspan="3">Setting of the default COBID according to CANopen
• A change of the COBID will only become effective after a CAN reset node.
▸ Identifiers of the process data objects (🕮 48)</td></tr>
<tr><td colspan="2">Value is bit-coded:</td><td></td></tr>
<tr><td>Bit 0</td><td>COBID Bit0</td><td></td></tr>
<tr><td>...</td><td>...</td><td></td></tr>
<tr><td>Bit 10</td><td>COBID Bit10</td><td></td></tr>
<tr><td>Bit 11</td><td>Reserved</td><td></td></tr>
<tr><td>...</td><td>...</td><td></td></tr>
<tr><td>Bit 30</td><td>Reserved</td><td></td></tr>
<tr><td>Bit 31</td><td>PDO invalid</td><td></td></tr>
<tr><td>Subcodes</td><td>Lenze setting</td><td>Info</td></tr>
<tr><td>C00354/1</td><td>513 (0x00000201)</td><td>COBID CAN1_IN</td></tr>
<tr><td>C00354/2</td><td>385 (0x00000181)</td><td>COBID CAN1_OUT</td></tr>
<tr><td>C00354/3</td><td>769 (0x00000301)</td><td>COBID CAN2_IN</td></tr>
<tr><td>C00354/4</td><td>641 (0x00000281)</td><td>COBID CAN2_OUT</td></tr>
<tr><td colspan="3">☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☑ COM ☐ MOT</td></tr>
</table>

C00355

<table>
<tr><td colspan="3">Parameter | Name:
C00355 | Active COBID</td><td>Data type: UNSIGNED_16
Index: $24220_d = 5E9C_h$</td></tr>
<tr><td colspan="4">Display of the COBID of the PDOs that is active in the CAN stack
▸ Identifiers of the process data objects (🕮 48)</td></tr>
<tr><td colspan="3">Display range (min. value | unit | max. value)</td><td></td></tr>
<tr><td>0</td><td></td><td>2047</td><td></td></tr>
<tr><td colspan="3">Subcodes</td><td>Info</td></tr>
<tr><td colspan="3">C00355/1</td><td>Active COBID CAN1_IN</td></tr>
<tr><td colspan="3">C00355/2</td><td>Active COBID CAN1_OUT</td></tr>
<tr><td colspan="3">C00355/3</td><td>Active COBID CAN2_IN</td></tr>
<tr><td colspan="3">C00355/4</td><td>Active COBID CAN2_OUT</td></tr>
<tr><td colspan="4">☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☑ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☑ COM ☐ MOT</td></tr>
</table>

C00356

Parameter | Name: **C00356 | CAN time settings**			Data type: UNSIGNED_16 Index: 24219_d = $5E9B_h$
Different time settings for the CAN interface			
Setting range (min. value | unit | max. value)			
0	ms	65000	
Subcodes	**Lenze setting**	**Info**	
C00356/1	3000 ms	CAN delay during status change from "Boot-up" to "Operational"	
C00356/2	0 ms	CAN2_OUT cycle time	
C00356/3	0 ms	Reserved	
C00356/4	0 ms	CANx_OUT time "Operational" to "First transmission"	
C00356/5	0 ms	CAN1_OUT cycle time	
☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☑ COM ☐ MOT			

C00357

Parameter | Name: **C00357 | CAN monitoring times**			Data type: UNSIGNED_16 Index: 24218_d = $5E9A_h$
Mapping of the RPDO event time (see DS301 V4.02) • If a different value than "0" is entered, the RPDO is expected after the time set has elapsed. • If the RPDO is not received within the expected time, the response set in C00593/1...2 is effected.			
Setting range (min. value | unit | max. value)			
0	ms	65000	
Subcodes	**Lenze setting**	**Info**	
C00357/1	3000 ms	CAN1_IN monitoring time	
C00357/2	3000 ms	CAN2_IN monitoring time	
☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☑ COM ☐ MOT			

C00359

Parameter | Name: **C00359 | CAN status**		Data type: UNSIGNED_8 Index: 24216_d = $5E98_h$
Display of the CAN status ▸ Communication phases/network management (📖 36)		
Selection list (read only)		
0	Operational	
1	Pre-Operational	
2	Reserved	
3	Reserved	
4	BootUp	
5	Stopped	
6	Reserved	
7	Reset	
☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☑ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☑ COM ☐ MOT		

C00360

Parameter | Name: **C00360 | CAN telegram counter**			Data type: UNSIGNED_16 Index: 24215_d = $5E97_h$
Number of received and sent CAN telegrams			
Display range (min. value | unit | max. value)			
0		65535	
Subcodes			**Info**
C00360/1			All PDOs/SDOs sent
C00360/2			All PDOs/SDOs received
C00360/3			Telegram counter CAN1_OUT
C00360/4			Telegram counter CAN2_OUT
C00360/5			Reserved
C00360/6			Telegram counter SDO1 OUT
C00360/7			Telegram counter SDO2 OUT
C00360/8			Telegram counter CAN1_IN
C00360/9			Telegram counter CAN2_IN
C00360/10			Reserved
C00360/11			Telegram counter SDO1 IN
C00360/12			Telegram counter SDO2 IN
☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☑ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☑ COM ☐ MOT			

C00364

Parameter | Name: **C00364 | CAN MessageError**		Data type: UNSIGNED_8 Index: 24211_d = $5E93_h$
Value is bit-coded:		
Bit 0	No Error	
Bit 1	StuffError	
Bit 2	FormError	
Bit 3	AckError	
Bit 4	Bit1Error	
Bit 5	Bit0Error	
Bit 6	CRCError	
Bit 7	Reserved	
☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☑ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☑ COM ☐ MOT		

C00366

<table>
<tr><td colspan="3">Parameter | Name:
C00366 | Number of CAN SDO channels</td><td>Data type: UNSIGNED_8
Index: 24209$_d$ = 5E91$_h$</td></tr>
<tr><td colspan="4">Available from firmware version 02.00 onwards.
Selection of the number of active parameter data channels
• In the Lenze setting complying with CANopen, only parameter data channel 1 is active. In order to activate both parameter data channels, set the selection "2 SDO Lenze".
• Representation of the CANopen objects I-1201 (see DS301 V4.02)</td></tr>
<tr><td colspan="2">Selection list (Lenze setting printed in bold)</td><td colspan="2">Info</td></tr>
<tr><td>0</td><td>1 SDO CANopen</td><td colspan="2">I-1201
• Subindex1.Bit31 = 1 (client -> server (rx))
• Subindex2.Bit31 = 1 (server -> client (tx))
• Bit 31 = 1 (SDO invalid/not available)</td></tr>
<tr><td>1</td><td>2 SDO Lenze</td><td colspan="2">I-1201
• Subindex1.Bit31 = 0 (client -> server (rx))
• Subindex2.Bit31 = 0 (server -> client (tx))
• Bit 31 = 1 (SDO valid/available)</td></tr>
<tr><td colspan="4">☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☑ COM ☐ MOT</td></tr>
</table>

C00367

<table>
<tr><td colspan="3">Parameter | Name:
C00367 | CAN sync Rx identifier</td><td>Data type: UNSIGNED_16
Index: 24208$_d$ = 5E90$_h$</td></tr>
<tr><td colspan="4">Identifier by means of which the sync slave is to receive sync telegrams.
• Mapping of the CANopen object I-1005 (see DS301 V4.02).
▸ PDO synchronisation via sync telegram (📖 51)</td></tr>
<tr><td colspan="3">Setting range (min. value | unit | max. value)</td><td>Lenze setting</td></tr>
<tr><td>128</td><td></td><td>255</td><td>128</td></tr>
<tr><td colspan="4">☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☑ COM ☐ MOT</td></tr>
</table>

C00368

<table>
<tr><td colspan="3">Parameter | Name:
C00368 | CAN sync-Tx identifier</td><td>Data type: UNSIGNED_16
Index: 24207$_d$ = 5E8F$_h$</td></tr>
<tr><td colspan="4">Identifier by means of which the sync master is to transmit sync telegrams.
• Mapping of the CANopen object I-1005 (see DS301 V4.02).
▸ PDO synchronisation via sync telegram (📖 51)</td></tr>
<tr><td colspan="3">Setting range (min. value | unit | max. value)</td><td>Lenze setting</td></tr>
<tr><td>128</td><td></td><td>255</td><td>128</td></tr>
<tr><td colspan="4">☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☑ COM ☐ MOT</td></tr>
</table>

C00369

<table>
<tr><td colspan="3">Parameter | Name:
C00369 | CAN sync transmission cycle time</td><td>Data type: UNSIGNED_16
Index: 24206$_d$ = 5E8E$_h$</td></tr>
<tr><td colspan="4">Cycle during which the sync master is to transmit sync telegrams.
• If "0 ms" is set (Lenze setting), no sync telegrams are generated.
• Mapping of the CANopen object I-1006 (see DS301 V4.02).
▸ PDO synchronisation via sync telegram (📖 51)</td></tr>
<tr><td colspan="3">Setting range (min. value | unit | max. value)</td><td>Lenze setting</td></tr>
<tr><td>0</td><td>ms</td><td>65000</td><td>0 ms</td></tr>
<tr><td colspan="4">☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☑ COM ☐ MOT</td></tr>
</table>

C00372

Parameter | Name: **C00372 | CAN_Tx_Rx_Error**			Data type: UNSIGNED_8 Index: 24203_d = 5E8B$_h$
Display of CAN transmission and reception errors			
Display range (min. value | unit | max. value)			
0	ms	255	
Subcodes			**Info**
C00372/1			Transmission error (Tx_Error)
C00372/2			Receipt error (Rx_Error)
☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☑ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☑ COM ☐ MOT			

C00381

Parameter | Name: **C00381 | CAN heartbeat producer time**			Data type: UNSIGNED_16 Index: 24194_d = 5E82$_h$
Time interval for the transmission of the heartbeat telegram to the consumer(s). • The heartbeat telegram is sent automatically as soon as a time > 0 ms is set. • Mapping of the CANopen object I-1017 (see DS301 V4.02). ▸ Heartbeat protocol (🕮 66)			
Setting range (min. value | unit | max. value)			**Lenze setting**
0	ms	65535	**0 ms**
☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☑ COM ☐ MOT			

C00385

Parameter | Name: **C00385 | CAN NodeID heartbeat producer**			Data type: UNSIGNED_8 Index: 24190_d = 5E7E$_h$
Subcode 1 represents the node which is to be monitored via heartbeat. ▸ Heartbeat protocol (🕮 66)			
Setting range (min. value | unit | max. value)			
0		127	
Subcodes	**Lenze setting**		**Info**
C00385/1	0		CAN NodeID heartbeat producer 1
☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☑ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☑ COM ☐ MOT			

C00386

Parameter | Name: **C00386 | ConsumerTime HeartBeat producer**			Data type: UNSIGNED_16 Index: 24189_d = 5E7D$_h$
Monitoring time for the nodes to be monitored • Mapping of the CANopen object I-1016 (see DS301 V4.02). ▸ Heartbeat protocol (🕮 66)			
Setting range (min. value | unit | max. value)			
0	ms	60000	
Subcodes	**Lenze setting**		**Info**
C00386/1	0 ms		ConsumerTime HeartBeat Producer 1
☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☑ COM ☐ MOT			

C00389

Parameter | Name: **C00389 | PDO valid / invalid**			Data type: UNSIGNED_8 Index: 24186$_d$ = 5E7A$_h$
Validity of the PDOs			
Selection list **(Lenze setting printed in bold)**			
0	**PDO available/valid**		
1	PDO not available/invalid		
Subcodes	**Lenze setting**	**Info**	
C00389/1	0	PDO valid / invalid CAN1_IN	
C00389/2	0	PDO valid / invalid CAN1_OUT	
C00389/3	0	PDO valid / invalid CAN2_IN	
C00389/4	0	PDO valid / invalid CAN2_OUT	
☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☑ COM ☐ MOT			

C00409

Parameter | Name: **C00409 | LP_CanIn mapping**				Data type: UNSIGNED_16 Index: 24166$_d$ = 5E66$_h$
Mapping for the port blocks LP_CanIn1...2 • Representation of the CANopen objects I-1600 ... I-1601 (see DS301 V4.02)				
Setting range **(min. value | unit | max. value)**				
0		65535		
Subcodes	**Lenze setting**		**Info**	
C00409/1	0		LP_CanIn1_wIn1(wCtrl)	
C00409/2	0		LP_CanIn1_wIn2	
C00409/3	0		LP_CanIn1_wIn3	
C00409/4	0		LP_CanIn1_wIn4	
C00409/5	0		LP_CanIn2_wIn1	
C00409/6	0		LP_CanIn2_wIn2	
C00409/7	0		LP_CanIn2_wIn3	
C00409/8	0		LP_CanIn2_wIn4	
☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☑ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT				

C00592

Parameter | Name: **C00592 | Resp. to CAN bus connection**		Data type: UNSIGNED_8 Index: 23983_d = $5DAF_h$
Configuration of monitoring of the CAN interface		
Selection list		
0	No Reaction	
1	Fault	
2	Trouble	
4	WarningLocked	
Subcodes	**Lenze setting**	**Info**
C00592/1	0: No Reaction	Response to an erroneous telegram in the CAN communication
C00592/2	0: No Reaction	Response to "BusOff" (bus system switched off)
C00592/3	0: No Reaction	Response to warnings of the CAN controller
C00592/4	0: No Reaction	Response to communication stop of a CAN bus node
C00592/5	0: No Reaction	Response to an event in the case of monitoring via heartbeat protocol
☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT		

C00593

Parameter | Name: **C00593 | Resp. to CANx_IN monitoring**		Data type: UNSIGNED_8 Index: 23982_d = $5DAE_h$
Configuration of monitoring for the reception of PDOs CAN1_IN and CAN2_IN		
Selection list		
0	No Reaction	
1	Fault	
2	Trouble	
4	WarningLocked	
Subcodes	**Lenze setting**	**Info**
C00593/1	0: No Reaction	Response if the monitoring time set in C00357/1 for the reception of the PDO CAN1_IN is exceeded.
C00593/2	0: No Reaction	Response if the monitoring time set in C00357/2 for the reception of the PDO CAN2_IN is exceeded.
☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT		

12.3 Table of attributes

How to read the table of attributes:

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

Table of attributes

Code	Name	Index		Data				Access		
		dec	hex	DS	DA	Data type	Factor	R	W	CINH
C00322	Transmission mode CAN TxPDOs	24253	5EBD	A	2	UNSIGNED_8	1	☑	☑	
C00323	Transmission mode CAN Rx PDOs	24252	5EBC	A	2	UNSIGNED_8	1	☑	☑	
C00324	CAN transmission blocking time	24251	5EBB	A	3	UNSIGNED_16	1	☑	☑	
C00345	CAN error status	24230	5EA6	E	1	UNSIGNED_8	1	☑		
C00347	CAN status HeartBeat producer	24228	5EA4	A	1	UNSIGNED_8	1	☑		
C00349	CAN setting of DIP switch	24226	5EA2	E	1	UNSIGNED_16		☑		
C00350	CAN node address	24225	5EA1	E	1	UNSIGNED_8	1	☑	☑	
C00351	CAN baud rate	24224	5EA0	E	1	UNSIGNED_8	1	☑	☑	
C00352	CAN slave/master	24223	5E9F	E	1	UNSIGNED_8	1	☑	☑	
C00353	CAN IN/OUT COBID source	24222	5E9E	A	2	UNSIGNED_8	1	☑	☑	
C00354	COBID	24221	5E9D	A	4	UNSIGNED_32		☑	☑	
C00355	Active COBID	24220	5E9C	A	4	UNSIGNED_16	1	☑		
C00356	CAN time settings	24219	5E9B	A	5	UNSIGNED_16	1	☑	☑	
C00357	CAN monitoring times	24218	5E9A	A	2	UNSIGNED_16	1	☑	☑	
C00359	CAN status	24216	5E98	E	1	UNSIGNED_8	1	☑		
C00360	CAN telegram counter	24215	5E97	A	12	UNSIGNED_16	1	☑		
C00364	CAN MessageError	24211	5E93	E	1	UNSIGNED_8		☑		
C00366	Number of CAN SDO channels	24209	5E91	E	1	UNSIGNED_8	1	☑	☑	
C00367	CAN SYNC Rx identifier	24208	5E90	E	1	UNSIGNED_16	1	☑	☑	
C00368	CAN sync Tx identifier	24207	5E8F	E	1	UNSIGNED_16	1	☑	☑	
C00369	CAN SYNC transmit cycle time	24206	5E8E	E	1	UNSIGNED_16	1	☑	☑	
C00372	CAN_Tx_Rx_Error	24203	5E8B	A	2	UNSIGNED_8	1	☑		
C00381	CAN heartbeat producer time	24194	5E82	E	1	UNSIGNED_16	1	☑	☑	
C00385	CAN NodeID Heartbeat producer	24190	5E7E	A	1	UNSIGNED_8	1	☑	☑	
C00386	ConsumerTime HeartBeat Producer	24189	5E7D	A	1	UNSIGNED_16	1	☑	☑	
C00389	PDO valid / invalid	24186	5E7A	A	4	UNSIGNED_8	1	☑	☑	
C00409	LP_CanIn mapping	24166	5E66	A	8	UNSIGNED_16	1	☑	☑	
C00592	Resp. to CAN bus connection	23983	5DAF	A	5	UNSIGNED_8	1	☑	☑	
C00593	Resp. to CANx_IN monitoring	23982	5DAE	A	2	UNSIGNED_8	1	☑	☑	

13 Implemented CANopen objects

Lenze devices can be parameterised with both Lenze codes and manufacturer-independent "CANopen objects". Completely CANopen-compliant communication can only be achieved by solely using CANopen objects for parameter setting. The CANopen objects described in this chapter are defined in the CAN specification DS301 V4.02.

Many CANopen objects can be mapped to Lenze codes. The "Relationship to Lenze code" column of the following table lists the Lenze codes used.

Note!

Some of the terms used here derive from the CANopen protocol.

Overview of CANopen indexes and their relationship to Lenze codes

CANopen object			Relationship to Lenze code
Index	**Subindex**	**Name**	
I-1000	0	Device type	-
I-1001	0	Error register	-
I-1003	Predefined error field		
	0	Number of errors	-
	1 ... 10	Standard error field	-
I-1005	0	COB-ID SYNC message	C00367
			C00368
I-1006	0	Communication cycle period	C00369
I-1014	0	COB-ID EMCY	-
I-1016	Consumer heartbeat time		
	0	Highest subindex supported	-
	1	Consumer heartbeat time	C00385/1...n C00386/1...n
I-1017	0	Producer heartbeat time	C00381
I-1018	Identity object		
	0	Highest subindex supported	-
	1	Vendor ID	-
	2	Product code	-
	3	Revision number	-
	4	Serial number	-
I-1200	SDO1 server parameter		
	0	Highest subindex supported	-
	1	COB-ID client –> server (rx)	-
	2	COB-ID server –> client (tx)	-
I-1201	SDO2 server parameter		C00366
	0	Highest subindex supported	
	1	COB-ID client –> server (rx)	
	2	COB-ID server –> client (tx)	

CANopen object			Relationship to Lenze code
Index	Subindex	Name	
I-1400	RPDO1 communication parameter		
	0	Highest subindex supported	-
	1	COB-ID used by RPDO	C00355/1
	2	Transmission type	C00323/1
I-1401	RPDO2 communication parameter		
	0	Highest subindex supported	-
	1	COB-ID used by RPDO	C00355/3
	2	Transmission type	C00323/2
I-1600	RPDO1 mapping parameter		
	0	Number of mapped application objects in PDO	-
	1 ... 4	Application object 1 ... 4	C00409/1...4
I-1601	RPDO2 mapping parameter		
	0	Number of mapped application objects in PDO	-
	1 ... 4	Application object 1 ... 4	C00409/5...8
I-1800	TPDO1 communication parameter		
	0	Highest subindex supported	-
	1	COB-ID used by TPDO	C00355/2
	2	Transmission type	C00322/1
	3	Inhibit time	-
	5	Event timer	C00356/5 C00369
I-1801	TPDO2 communication parameter		
	0	Highest subindex supported	-
	1	COB-ID used by TPDO	C00355/4
	2	Transmission type	C00322/2
	3	Inhibit time	-
	5	Event timer	C00356/2 C00369
I-1A00	TPDO1 mapping parameter		
	0	Number of mapped application objects in PDO	-
	1 ... 4	Application object 1 ... 4	-
I-1A01	TPDO2 mapping parameter		
	0	Number of mapped application objects in PDO	-
	1 ... 4	Application object 1 ... 4	-

I-1000 - Device type

Index **I-1000**	Name: **Device type**					
Subindex	Default setting	Display range (min. value | unit | max. value)			Access	Data type
0: Device type	0	0		4294967295	ro	U32

The CANopen index I-1000 specifies the profile for this device. Furthermore, additional information defined in the device profile itself can be stored here.

8th byte	7th byte	6th byte	5th byte
Data 4	**Data 3**	**Data 2**	**Data 1**
High word		Low word	
High byte	Low byte	High byte	Low byte
Additional information		**Device profile number**	

[13-1] Data telegram assignment

The following values are included in the 4 bytes for inverters of the 8400 series:

- 5th and 6th byte: The data contents are 0x0000, i.e. no profile definition.
- 7th byte: The data content indicates the device type: Here, the value 0x00 is included for inverters.
- 8th byte: The data contents are 0x00.

The data content for the 8400 inverter is therefore: 00 00 00 00

I-1001 - Error register

Index: **I-1001**	Name: **Error register**					
Subindex	Default setting	Display range (min. value | unit | max. value)			Access	Data type
0: Error register	-	0		255	ro	U8

Error register

The error status in the data byte (U8) is bit-coded. The following error states are coded in the data byte (U8):

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Error status
0	0	0	0	0	0	0	0	No error
0	0	0	0	0	0	0	1	Device error message
0	0	0	1	0	0	0	1	Communication error

I-1003 - Pre-defined error field

Index: **I-1003**	Name: **Predefined error field**					
Subindex	Default setting	Setting range (min. value | unit | max. value)			Access	Data type
0: Number of errors	0	0		255	rw	U8
1 ... 10: Standard error field	-	0		4294967295	ro	U32

Error history

This object indicates that an error has occurred in the module and in the standard device.

Subindex	Meaning
0	Number of saved error messages
1 ... 10	Display of the error list The error messages (U32) consist of a 16-bit error code and a manufacturer-specific information field comprising 16 bits.

Note!

The values of the "Standard error field" in subindex 1 ... 10 will be deleted if the "Number of recorded errors" subindex is overwritten with a value of "0".

Emergency error code	Cause	Entry in the Error register (I-1001)
0x0000	One of several errors eliminated	0xXX
	Elimination of one single error (afterwards no more errors)	0x00
0x1000	Standard device is in error status (error response "fault", "message", "warning", "error", "quick stop by trouble", or "system error")	0x01
0x3100	Supply voltage of standard device faulty or failed	0x01
0x8100	Communication error (warning)	0x11
0x8130	Life guard error or heartbeat error	0x11
0x8150	Collision of COB IDs: An ID parameterised for reception is also used for transmission.	0x11
0x8210	PDO length shorter than expected	0x11
0x8220	PDO length greater than expected	0x11
0x8700	Sync telegram monitoring	0x11

I-1005 - COB-ID SYNC message

Index: **I-1005**	Name: **COB-ID SYNC message**					
Subindex	Default setting	Setting range (min. value | unit | max. value)			Access	Data type
0: COB-ID SYNC message	0x0000 0080 or 0x8000 0080	0		4294967295	rw	U32

This object can be used to activate the generation of sync telegrams and to write the identifier value.

This object relates to codes C00367 and C00368.

Creating sync telegrams

To create sync telegrams, bit 30 (see below) must be set to "1". The interval of the sync telegrams can be set with the object I-1006.

Writing identifiers

For the reception of PDOs, the value 0x80 is entered in the Lenze setting (and according to CANopen specification) into the 11 bit identifier. This means that all modules are set to the same sync telegram by default.

- If sync telegrams are only to be received by specific communication modules, their identifiers can be entered with a value of up to and including 0x07FF.
- The identifier may only be changed when the communication module does not send any sync telegrams (bit 30 = "0").

- How to change the identifier:
  - Deactivate identifier (set bit 30 to "0").
  - Change identifier.
  - Activate identifier (set bit 30 to "1").

<table>
<tr><th colspan="3">8th byte</th><th>7th byte</th><th colspan="2">6th byte</th><th>5th byte</th></tr>
<tr><th colspan="3">Data 4</th><th>Data 3</th><th colspan="2">Data 2</th><th>Data 1</th></tr>
<tr><td>Bit 31</td><td>Bit 30</td><td colspan="3">Bit 29 ... bit 11</td><td colspan="2">Bit 10 ... bit 0</td></tr>
<tr><td>x</td><td>0/1</td><td colspan="3">Extended identifier*</td><td colspan="2">11-bit identifier</td></tr>
<tr><td colspan="7">* The extended identifier is not supported - bit 11 ... bit 29 must be set to "0".</td></tr>
</table>

[13-2] Data telegram assignment

I-1006 - Communication cycle period

<table>
<tr><td>Index:
I-1006</td><td colspan="6">Name:
Communication cycle period</td></tr>
<tr><td>Subindex</td><td>Default setting</td><td colspan="3">Setting range (min. value | unit | max. value)</td><td>Access</td><td>Data type</td></tr>
<tr><td>0: Communication cycle period</td><td>0 µs</td><td>0</td><td>µs</td><td>65535000</td><td>rw</td><td>U32</td></tr>
</table>

Setting the sync telegram cycle time.

- The cycle time can be selected as "1000" or as an integer multiple of it.
- With "0 µs" (Lenze setting), no sync telegrams are created.
- This object relates to code C00369.

I-1014 - COB-ID EMCY

<table>
<tr><td>Index:
I-1014</td><td colspan="6">Name:
COB-ID EMCY</td></tr>
<tr><td>Subindex</td><td>Default setting</td><td colspan="3">Setting range (min. value | unit | max. value)</td><td>Access</td><td>Data type</td></tr>
<tr><td>0: COB-ID EMCY</td><td>0x80 + node ID</td><td>0</td><td></td><td>4294967295</td><td>rw</td><td>U32</td></tr>
</table>

When a communication error or an internal error in the communication module or the inverter occurs or is acknowledged (e.g. "Fault"), an error message is sent via the system bus. The telegram is sent once in the event of each error. With bit 31, this function can be activated or deactivated.

<table>
<tr><th colspan="3">8th byte</th><th>7th byte</th><th colspan="2">6th byte</th><th>5th byte</th></tr>
<tr><th colspan="3">Data 4</th><th>Data 3</th><th colspan="2">Data 2</th><th>Data 1</th></tr>
<tr><td>Bit 31</td><td>Bit 30</td><td colspan="3">Bit 29 ... bit 11</td><td colspan="2">Bit 10 ... bit 0</td></tr>
<tr><td>0/1</td><td>0</td><td colspan="3">Extended identifier*</td><td colspan="2">11-bit identifier</td></tr>
<tr><td colspan="7">* The extended identifier is not supported - bit 11 ... bit 29 must be set to "0".</td></tr>
</table>

[13-3] Data telegram assignment

Bit	**setting**	
Bit 31	0	Emergency object is valid.
	1	Emergency object is invalid.

Note!

The identifier can only be changed in the "emergency object invalid" status (bit 31 = 1).

I-1016 - Consumer heartbeat time

Index: **I-1016**	Name: **Consumer heartbeat time**					
Subindex	Default setting	Setting range (min. value | unit | max. value)			Access	Data type
0: Highest subindex supported	1	- (read access only)			ro	U16
1 … n: Consumer heartbeat time	0	0		65535	rw	U16

Monitoring time for the nodes to be monitored via heartbeat.

▶ Heartbeat protocol (📖 66)

The parameterised time is rounded down to an integer multiple of 5 ms and must have a greater value than the heartbeat producer time of the node to be monitored.

Subindex	Meaning	Lenze code
0	Number of nodes to be monitored	
1 … n	Node ID and heartbeat time of the node to be monitored	Node ID: C00385/x Heartbeat time: C00386/x

8th byte	7th byte	6th byte	5th byte
Data 4	**Data 3**	**Data 2**	**Data 1**
Bit 31 ... bit 24	Bit 23 ... bit 16	Bit 15 ... bit 0	
0 Reserved	**Node ID**	**Heartbeat time** in [ms]	

[13-4] Data telegram assignment

I-1017 - Producer heartbeat time

Index: **I-1017**	Name: **Producer heartbeat time**					
Subindex	Default setting	Setting range (min. value | unit | max. value)			Access	Data type
0: Producer heartbeat time	0	0	ms	65535	rw	U16

Time interval for the transmission of the heartbeat telegram to the consumer(s).

▶ Heartbeat protocol (📖 66)

- The parameterised time is rounded down to an integer multiple of 5 ms.
- The heartbeat telegram is transmitted automatically as soon as a time > 0 ms is set. In this case, the node guarding monitoring function is deactivated.
- This object relates to code C00381.

I-1018 - Identity object

Index: **I-1018**	Name: **Identity object**					
Subindex	Default setting	Display range (min. value | unit | max. value)			Access	Data type
0: Highest subindex supported	See below	0		4294967295	ro	U32
1: Vendor ID						
2: Product code						
3: Revision number						
4: Serial number						

Subindex	Meaning
1	Manufacturer's identification number • The identification number allocated to Lenze by the organisation "CAN in Automation e. V." is "0x0000003B".
2	Product code
3	Main version and subversion of firmware
4	Serial number

I-1200 - SDO1 server parameter

Index: **I-1200**	Name: **SDO1 server parameter**					
Subindex	Default setting	Display range (min. value | unit | max. value)			Access	Data type
0: Highest subindex supported	2	2		2	ro	U8
1: COB-ID client -> server (rx)	Node ID + 0x600	0		4294967295	ro	U32
2: COB-ID server -> client (tx)	Node ID + 0x580	0		4294967295	ro	U32

Identifiers for SDO server channel 1 (basic SDO channel).

According to DS301 V4.02, the basic SDO channel can neither be changed nor deactivated.

Subindex	Meaning
1	Specification of the receive identifier • For SDO server channel 1: node address (C00350) + 0x600
2	Specification of the transmit identifier • For SDO server channel 1: node address (C00350) + 0x580

<table>
<tr><th colspan="3">8th byte</th><th>7th byte</th><th colspan="2">6th byte</th><th>5th byte</th></tr>
<tr><td colspan="3">Data 4</td><td>Data 3</td><td colspan="2">Data 2</td><td>Data 1</td></tr>
<tr><td>Bit 31</td><td>Bit 30</td><td colspan="3">Bit 29 ... bit 11</td><td colspan="2">Bit 10 ... bit 0</td></tr>
<tr><td>0</td><td>0</td><td colspan="3">Extended identifier*</td><td colspan="2">11-bit identifier</td></tr>
<tr><td colspan="7">* The extended identifier is not supported - bit 11 ... bit 29 must be set to "0".</td></tr>
</table>

[13-5] Data telegram assignment

I-1201 - SDO2 server parameter

Index: **I-1201**	Name: **SDO2 server parameter**					
Subindex	Default setting	Setting range (min. value | unit | max. value)			Access	Data type
0: Highest subindex supported	3	- (read access only)			ro	U8
1: COB-ID client -> server (rx)	0x80000000	0		4294967295	rw	U32
2: COB-ID server -> client (tx)	0x80000000	0		4294967295	rw	U32

Setting of the identifiers for SDO server channel 2.

- The server SDO parameter is only valid if bit 31 is set to "0" for both transmission directions (subindex 1 and 2).
- In the Lenze setting, SDO server channel 2 is deactivated (bit 31 = "1").
- The identifier may only be changed when the SDO is invalid (bit 31 = "1").

Subindex	**Meaning**
1	Specification of the receive identifier
2	Specification of the transmit identifier

8th byte		7th byte	6th byte	5th byte
Data 4		**Data 3**	**Data 2**	**Data 1**
Bit 31	Bit 30	Bit 29 ... bit 11		Bit 10 ... bit 0
0/1	**0**	**Extended identifier***		**11-bit identifier**
* The extended identifier is not supported - bit 11 ... bit 29 must be set to "0".				

[13-6] Data telegram assignment

Bit	**setting**	
Bit 31	0	SDO is valid.
	1	SDO is invalid.

How to change the identifier:

1. Deactivate identifier (set bit 31 to "1").
2. Change identifier.
3. Activate identifier (set bit 31 to "0").

Example

Parameter data channel 2 of the inverter with the node address 4 is to be activated.

- For this, bit 31 must be set to the value "0" (SDO is valid) in subindexes 1 and 2 of object I-1201.
- The master must send the two "write request" commands to the nodes via the basic SDO channel.

Identifier calculation

- Identifier (COB-ID) = basic identifier + node address (node ID)
- Basic identifier SDO2 from the master to the drive: 1600 (0x640)
  ➞ identifier = 0x640 + 0x4 = 0x644
- Basic identifier SDO2 from the drive to the master: 1472 (0x5C0)
  ➞ identifier = 0x5C0 + 0x4 = 0x5C4

Resulting data (data 1 ... data 4)

<table>
<tr><th colspan="3">8th byte</th><th>7th byte</th><th colspan="2">6th byte</th><th>5th byte</th></tr>
<tr><th colspan="3">Data 4</th><th>Data 3</th><th colspan="2">Data 2</th><th>Data 1</th></tr>
<tr><td>Bit 31</td><td>Bit 30</td><td colspan="3">Bit 29 ... bit 11</td><td colspan="2">Bit 10 ... bit 0</td></tr>
<tr><td>0</td><td>0</td><td colspan="3">Extended identifier = 0</td><td colspan="2">11-bit identifier = 0x644</td></tr>
<tr><td colspan="3">0x00</td><td>0x00</td><td colspan="2">0x06</td><td>0x44</td></tr>
</table>

[13-7] Data telegram assignment for subindex 1

<table>
<tr><th colspan="3">8th byte</th><th>7th byte</th><th colspan="2">6th byte</th><th>5th byte</th></tr>
<tr><th colspan="3">Data 4</th><th>Data 3</th><th colspan="2">Data 2</th><th>Data 1</th></tr>
<tr><td>Bit 31</td><td>Bit 30</td><td colspan="3">Bit 29 ... bit 11</td><td colspan="2">Bit 10 ... bit 0</td></tr>
<tr><td>0</td><td>0</td><td colspan="3">Extended identifier = 0</td><td colspan="2">11-bit identifier = 0x5C4</td></tr>
<tr><td colspan="3">0x00</td><td>0x00</td><td colspan="2">0x05</td><td>0xC4</td></tr>
</table>

[13-8] Data telegram assignment for subindex 2

User data assignment

1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
Command	**Index**		**Subindex**	**Data 1**	**Data 2**	**Data 3**	**Data 4**
0x23	**0x01**	**0x12**	**0x01**	**0x44**	**0x06**	**0x00**	**0x00**

[13-9] User data assignment for writing to subindex 1

1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
Command	**Index**		**Subindex**	**Data 1**	**Data 2**	**Data 3**	**Data 4**
0x23	**0x01**	**0x12**	**0x02**	**0xC4**	**0x05**	**0x00**	**0x00**

[13-10] User data assignment for writing to subindex 2

I-1400 - RPDO1 communication parameter

Index: **I-1400**	Name: **RPDO1 communication parameter**					
Subindex	Default setting	Setting range (min. value | unit | max. value)			Access	Data type
0: Highest subindex supported	5	- (read access only)			ro	U8
1: COB-ID used by RPDO	0x200 + node ID	0		4294967295	rw	U32
2: Transmission type	254	0		255	rw	U8
3: Inhibit time	-	- (not used for RPDOs)			rw	U16
4: Compatibility entry	-	- (reserved, read or write access results in error message 0x06090011)			rw	U8
5: Event timer	-	- (not used for RPDOs)			rw	U16

Communication parameters for receiving process data via RPDO1

Subindex	Meaning	Code
0	The value 5 is permanently set. • Max. 5 subindexes are supported.	-
1	RPDO1 identifier • According to the "Predefined Connection Set", the basic setting is: identifier = 0x200 + node ID	C00354/1
2	RPDO transmission type according to DS301 V4.02 ▸ Transmission type (📖 49)	C00323/1

<table>
<tr><th colspan="2">8th byte</th><th>7th byte</th><th>6th byte</th><th colspan="2">5th byte</th></tr>
<tr><th colspan="2">Data 4</th><th>Data 3</th><th>Data 2</th><th colspan="2">Data 1</th></tr>
<tr><td>Bit 31</td><td>Bit 30</td><td colspan="3">Bit 29 ... bit 11</td><td>Bit 10 ... bit 0</td></tr>
<tr><td>0/1</td><td>0/1</td><td colspan="3">Extended identifier*</td><td>11-bit identifier</td></tr>
<tr><td colspan="6">* The extended identifier is not supported - bit 11 ... bit 29 must be set to "0".</td></tr>
</table>

[13-11] Data telegram assignment

How to change the identifier:

1. Deactivate identifier (set bit 31 to "1").
2. Change identifier.
3. Activate identifier (set bit 31 to "0").

Description of subindex 1

Bit no.	Value	Explanation
0 ... 10	0/1	11-bit identifier
(11 ... 28)*	0	*) The extended identifier (29 bits) is not supported. Any of these bits must be "0".
29*	0	
30	0	RTR to this PDO permissible (cannot be set)
	1	RTR to this PDO not permissible (Lenze)
31	0	PDO active
	1	PDO not active

[13-12] I-1400 / I-1401, subindex 1

Description of subindex 2

PDO transmission			Transmission type	Explanation
cyclic	synchronous	event-controlled		
●	●		n = 1 ... 240	When a value n is entered, this PDO will be accepted with every nth sync.
		●	n = 254	PDO will be accepted immediately.

[13-13] I-1400 / I-1401, subindex 2

I-1401 - RPDO2 communication parameter

Index: **I-1401**	Name: **RPDO2 communication parameter**					
Subindex	Default setting	Setting range (min. value | unit | max. value)			Access	Data type
0: Highest subindex supported	5	- (read access only)			ro	U8
1: COB-ID used by RPDO	0x300 + node ID	0		4294967295	rw	U32
2: Transmission type	254	0		255	rw	U8
3: Inhibit time	-	- (not used for RPDOs)			rw	U16
4: Compatibility entry	-	- (reserved, read or write access results in error message 0x06090011)			rw	U8
5: Event timer	-	- (not used for RPDOs)			rw	U16

Communication parameters for receiving process data via RPDO2

Subindex	Meaning	Code
0	The value 5 is permanently set. • Max. 5 subindexes are supported.	-
1	RPDO2 identifier • According to the "Predefined Connection Set", the basic setting is: identifier = 0x300 + node ID	C00354/3
2	RPDO transmission type according to DS301 V4.02 ▸ Transmission type (📖 49)	C00323/2

For data telegram assignment and description of subindexes 1 and 2, see object I-1400.

How to change the identifier:

1. Deactivate identifier (set bit 31 to "1").
2. Change identifier.
3. Activate identifier (set bit 31 to "0").

I-1600 - RPDO1 mapping parameter

Index: **I-1600**	Name: **RPDO1 mapping parameter**					
Subindex	Default setting	Setting range (min. value | unit | max. value)			Access	Data type
0: Number of mapped application objects in PDO	0	0		8	rw	U8
1 ... 4: Application object 1 ... 4	0	0		4294967295	rw	U32

Object I-1600 serves to receive parameter data as RPDO1.

This object relates to code C00409/1...4.

Subindex	Meaning
0	Number of mapped objects
1 ... 4	Mapping entries 1 ... 4 for RPDO1 • The 4th mapping entry is used for the static mapping. For this, no value is available.

8th byte	7th byte	6th byte	5th byte
Data 4	**Data 3**	**Data 2**	**Data 1**
Bit 31 ... bit 16		Bit 15 ... bit 8	Bit 7 ... bit 0
Index		**Subindex**	**Length**

[13-14] Data telegram assignment

IEC 61131 process data words are mapped. Only whole bytes can be mapped (1 byte/mapping entry).

I-1601 - RPDO2 mapping parameter

Index: **I-1601**	Name: **RPDO2 mapping parameter**					
Subindex	Default setting	Setting range (min. value | unit | max. value)			Access	Data type
0: Number of mapped application objects in PDO	0	0		8	rw	U8
1 ... 4: Application object 1 ... 4	0	0		4294967295	rw	U32

Object I-1601 serves to receive parameter data as RPDO2.

This object relates to code C00409/5...8.

Subindex	Meaning
0	Number of mapped objects
1 ... 4	Mapping entries 1 ... 4 for RPDO2 • The 4th mapping entry is used for the static mapping. For this, no value is available.

For assignment of the data telegram see object I-1600.

I-1800 - TPDO1 communication parameter

Index: **I-1800**	Name: **TPDO1 communication parameter**					
Subindex	Default setting	Setting range (min. value | unit | max. value)			Access	Data type
0: Highest subindex supported	5	- (read access only)			ro	U8
1: COB-ID used by TPDO	0x180 + node ID	0		4294967295	rw	U32
2: Transmission type	254	0		255	rw	U8
3: Inhibit time	0 ms	0	0.1 ms	65535	rw	U16
4: Reserved	-	- (reserved, read or write access results in error message 0x06090011)			rw	U8
5: Event timer	0 ms	0	ms	65535	rw	U16

Communication parameters for sending process data via TPDO1

Subindex	Meaning	Code
0	The value 5 is permanently set. • Max. 5 subindexes are supported.	-
1	TPDO1 identifier • According to the "Predefined Connection Set", the basic setting is: identifier = 0x180 + node ID	C00354/2
2	TPDO transmission type according to DS301 V4.02 ▸ Transmission type (📖 49)	C00322/1
3	Minimum time between sending two identical TPDOs (see DS301 V4.02).	-
5	Cycle time for PDO transmission with transmission type "254".	C00356/5 C00369

<table>
<tr><th colspan="3">8th byte</th><th>7th byte</th><th colspan="2">6th byte</th><th>5th byte</th></tr>
<tr><th colspan="3">Data 4</th><th>Data 3</th><th colspan="2">Data 2</th><th>Data 1</th></tr>
<tr><td>Bit 31</td><td>Bit 30</td><td colspan="3">Bit 29 ... bit 11</td><td colspan="2">Bit 10 ... bit 0</td></tr>
<tr><td>0/1</td><td>0/1</td><td colspan="3">Extended identifier*</td><td colspan="2">11-bit identifier</td></tr>
<tr><td colspan="7">* The extended identifier is not supported - bit 11 ... bit 29 must be set to "0".</td></tr>
</table>

[13-15] Data telegram assignment

Bit	setting	
Bit 30	0	RTR to this PDO permissible (Lenze).
	1	RTR to this PDO not permissible (cannot be set).
Bit 31	0	PDO active
	1	PDO inactive

How to change the identifier:

1. Deactivate identifier (set bit 31 to "1").
2. Change identifier.
3. Activate identifier (set bit 31 to "0").

Subindex 2 - transmission type

PDO transmission			Transmission type	Explanation
cyclic	synchronous	event-controlled		
●	●		n = 1 ... 240	When a value n is entered, this PDO will be accepted with every nth sync.
●		●	n = 254	Event-controlled or cyclic

Subindex 3 - inhibit time

Note!

The delay time can only be changed when the PDO is not active (see subindex 1, bit 31 = 1).

The entered value multiplied by 0.1 gives the delay time in [ms]. Only integers will be considered, i.e. fractional numbers will be **rounded down** to integers.

Example :

- Value entered: 26
- Calculated time = 26 x 0.1 [ms] = 2.6 [ms] → delay time = 2 [ms]

Subindex 5 - event timer

For cyclic operation (transmission type 254), the cycle time for sending the process data object on the CAN bus can be set here:

The value entered corresponds to the time in [ms].

I-1801 - TPDO2 communication parameter

Index: **I-1801**	Name: **TPDO2 communication parameter**					
Subindex	Default setting	Setting range (min. value | unit | max. value)			Access	Data type
0: Highest subindex supported	5	- (read access only)			ro	U8
1: COB-ID used by TPDO	0x280 + node ID	0		4294967295	rw	U32
2: Transmission type	254	0		255	rw	U8
3: Inhibit time	0 ms	0	0.1 ms	65535	rw	U16
4: Reserved	-	- (reserved, read or write access results in error message 0x06090011)			rw	U8
5: Event timer	0 ms	0	ms	65535	rw	U16

Communication parameters for sending process data via TPDO2

Subindex	Meaning	Code
0	The value 5 is permanently set. • Max. 5 subindexesare supported.	-
1	TPDO2 identifier • According to the "Predefined Connection Set", the basic setting is: identifier = 0x280 + node ID	C00354/4
2	TPDO transmission type according to DS301 V4.02 ▸ Transmission type (📖 49)	C00322/2
3	Minimum time between sending two identical TPDOs (see DS301 V4.02).	-
5	Cycle time for PDO transmission with transmission type "254".	C00356/2 C00369

For data telegram assignment and description of subindexes, see object I-1800.

How to change the identifier:

1. Deactivate identifier (set bit 31 to "1").
2. Change identifier.
3. Activate identifier (set bit 31 to "0").

I-1A00 - TPDO1 mapping parameter

Index: **I-1A00**	Name: **TPDO1 mapping parameter**					
Subindex	Default setting	Setting range (min. value | unit | max. value)			Access	Data type
0: Number of mapped application objects in PDO	0	0		8	rw	U8
1 … 4: Application object 1 … 4	0	0		4294967295	rw	U32

Object I-1A00 serves to send parameter data as TPDO1.

Subindex	**Meaning**
0	Number of mapped objects
1 … 4	Mapping entries 1 … 4 for TPDO1 • The 4th mapping entry is used for the static mapping. For this, no value is available.

8th byte	**7th byte**	**6th byte**	**5th byte**
Data 4	**Data 3**	**Data 2**	**Data 1**
Bit 31 … bit 16		Bit 15 … bit 8	Bit 7 … bit 0
Index		**Subindex**	**Length**

[13-16] Data telegram assignment

IEC 61131 process data words are mapped. Only whole bytes can be mapped (1 byte/mapping entry).

I-1A01 - TPDO2 mapping parameter

Index: **I-1A01**	Name: **TPDO2 mapping parameter**					
Subindex	Default setting	Setting range (min. value | unit | max. value)			Access	Data type
0: Number of mapped application objects in PDO	0	0		8	rw	U8
1 … 4: Application object 1 … 4	0	0		4294967295	rw	U32

Object I-1A01 serves to send parameter data as TPDO2.

Subindex	**Meaning**
0	Number of mapped objects
1 … 4	Mapping entries 1 … 4 for TPDO2 • The 4th mapping entry is used for the static mapping. For this, no value is available.

For assignment of the data telegram see object I-1A00.

14 DIP switch positions for setting the CAN node address

The node address results from the sum of the binary values of switches 1 ... 64.

The following table shows the switch positions for the valid address range of 1 ... 63.

▶ Setting the CAN node address (📖 31)

Station address	**DIP switch**						
	64	**32**	**16**	**8**	**4**	**2**	**1**
1	OFF	OFF	OFF	OFF	OFF	OFF	**ON**
2	OFF	OFF	OFF	OFF	OFF	**ON**	OFF
3	OFF	OFF	OFF	OFF	OFF	**ON**	**ON**
4	OFF	OFF	OFF	OFF	**ON**	OFF	OFF
5	OFF	OFF	OFF	OFF	**ON**	OFF	**ON**
6	OFF	OFF	OFF	OFF	**ON**	**ON**	OFF
7	OFF	OFF	OFF	OFF	**ON**	**ON**	**ON**
8	OFF	OFF	OFF	**ON**	OFF	OFF	OFF
9	OFF	OFF	OFF	**ON**	OFF	OFF	**ON**
10	OFF	OFF	OFF	**ON**	OFF	**ON**	OFF
11	OFF	OFF	OFF	**ON**	OFF	**ON**	**ON**
12	OFF	OFF	OFF	**ON**	**ON**	OFF	OFF
13	OFF	OFF	OFF	**ON**	**ON**	OFF	**ON**
14	OFF	OFF	OFF	**ON**	**ON**	**ON**	OFF
15	OFF	OFF	OFF	**ON**	**ON**	**ON**	**ON**
16	OFF	OFF	**ON**	OFF	OFF	OFF	OFF
17	OFF	OFF	**ON**	OFF	OFF	OFF	**ON**
18	OFF	OFF	**ON**	OFF	OFF	**ON**	OFF
19	OFF	OFF	**ON**	OFF	OFF	**ON**	**ON**
20	OFF	OFF	**ON**	OFF	**ON**	OFF	OFF
21	OFF	OFF	**ON**	OFF	**ON**	OFF	**ON**
22	OFF	OFF	**ON**	OFF	**ON**	**ON**	OFF
23	OFF	OFF	**ON**	OFF	**ON**	**ON**	**ON**
24	OFF	OFF	**ON**	**ON**	OFF	OFF	OFF
25	OFF	OFF	**ON**	**ON**	OFF	OFF	**ON**
26	OFF	OFF	**ON**	**ON**	OFF	**ON**	OFF
27	OFF	OFF	**ON**	**ON**	OFF	**ON**	**ON**
28	OFF	OFF	**ON**	**ON**	**ON**	OFF	OFF
29	OFF	OFF	**ON**	**ON**	**ON**	OFF	**ON**
30	OFF	OFF	**ON**	**ON**	**ON**	**ON**	OFF
31	OFF	OFF	**ON**	**ON**	**ON**	**ON**	**ON**
32	OFF	**ON**	OFF	OFF	OFF	OFF	OFF
33	OFF	**ON**	OFF	OFF	OFF	OFF	**ON**
34	OFF	**ON**	OFF	OFF	OFF	**ON**	OFF
35	OFF	**ON**	OFF	OFF	OFF	**ON**	**ON**
36	OFF	**ON**	OFF	OFF	**ON**	OFF	OFF
37	OFF	**ON**	OFF	OFF	**ON**	OFF	**ON**
38	OFF	**ON**	OFF	OFF	**ON**	**ON**	OFF

Station address	**DIP switch**						
	64	**32**	**16**	**8**	**4**	**2**	**1**
39	OFF	**ON**	OFF	OFF	**ON**	**ON**	**ON**
40	OFF	**ON**	OFF	**ON**	OFF	OFF	OFF
41	OFF	**ON**	OFF	**ON**	OFF	OFF	**ON**
42	OFF	**ON**	OFF	**ON**	OFF	**ON**	OFF
43	OFF	**ON**	OFF	**ON**	OFF	**ON**	**ON**
44	OFF	**ON**	OFF	**ON**	**ON**	OFF	OFF
45	OFF	**ON**	OFF	**ON**	**ON**	OFF	**ON**
46	OFF	**ON**	OFF	**ON**	**ON**	**ON**	OFF
47	OFF	**ON**	OFF	**ON**	**ON**	**ON**	**ON**
48	OFF	**ON**	**ON**	OFF	OFF	OFF	OFF
49	OFF	**ON**	**ON**	OFF	OFF	OFF	**ON**
50	OFF	**ON**	**ON**	OFF	OFF	**ON**	OFF
51	OFF	**ON**	**ON**	OFF	OFF	**ON**	**ON**
52	OFF	**ON**	**ON**	OFF	**ON**	OFF	OFF
53	OFF	**ON**	**ON**	OFF	**ON**	OFF	**ON**
54	OFF	**ON**	**ON**	OFF	**ON**	**ON**	OFF
55	OFF	**ON**	**ON**	OFF	**ON**	**ON**	**ON**
56	OFF	**ON**	**ON**	**ON**	OFF	OFF	OFF
57	OFF	**ON**	**ON**	**ON**	OFF	OFF	**ON**
58	OFF	**ON**	**ON**	**ON**	OFF	**ON**	OFF
59	OFF	**ON**	**ON**	**ON**	OFF	**ON**	**ON**
60	OFF	**ON**	**ON**	**ON**	**ON**	OFF	OFF
61	OFF	**ON**	**ON**	**ON**	**ON**	OFF	**ON**
62	OFF	**ON**	**ON**	**ON**	**ON**	**ON**	OFF
63	OFF	**ON**	**ON**	**ON**	**ON**	**ON**	**ON**

15 Index

FEEDBACK

Your opinion is important to us

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

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

feedback-docu@lenze.com

Thank you very much for your support.

Your Lenze documentation team

Inverter Drive 8400 motec (CANopen option) · 13564905 · EDS84DMOTCAN · EN 4.0 · 02/2019 · TD23

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Zubehör

EtherNet/IP™

E84DGFCGxxx

Inverter Drives 8400 motec__________________

Kommunikationshandbuch DE

13564912

Lenze

Inhalt

1 Über diese Dokumentation

Inhalt

Diese Dokumentation enthält ausschließlich Beschreibungen zum Bussystem EtherNet/IP™ beim Inverter Drive 8400 motec.

Hinweis!

Diese Dokumentation ergänzt die der Communication Unit beiliegende **Montageanleitung** und das **Gerätehandbuch "Inverter Drives 8400 motec"**.

Das Gerätehandbuch enthält Sicherheitshinweise, die Sie beachten müssen!

Die Eigenschaften und Funktionen des EtherNet/IP beim Inverter Drive 8400 motec sind ausführlich beschrieben.

Typische Anwendungen sind mit Beispielen verdeutlicht.

Die theoretischen Zusammenhänge sind nur soweit erklärt, wie sie zum Verständnis der Funktion der Communication Unit notwendig sind.

Diese Dokumentation beschreibt nicht die Software eines anderen Herstellers. Für entsprechende Angaben in dieser Dokumentation kann keine Gewähr übernommen werden. Informationen zum Gebrauch der Software finden Sie in den Unterlagen zum Leitrechner (SPS, Master).

Alle in dieser Dokumentation aufgeführten Markennamen sind Warenzeichen ihrer jeweiligen Besitzer.

Tipp!

Ausführliche Informationen zu EtherNet/IP finden Sie auf der Internet-Seite der Nutzerorganisation ODVA (Open DeviceNet Vendor Association):

www.odva.org

Zielgruppe

Diese Dokumentation richtet sich an Personen, die die Vernetzung und Fernwartung einer Maschine projektieren, installieren, in Betrieb nehmen und warten.

Tipp!

Aktuelle Dokumentationen und Software-Updates zu Lenze-Produkten finden Sie im Download-Bereich unter:

www.Lenze.com

Informationen zur Gültigkeit

Die Informationen in dieser Dokumentation sind gültig für folgende Geräte:

Produktreihe	Typenbezeichnung	Gerätevariante
Inverter Drives 8400 motec **Communication Unit EtherNet/IP**	E84DGFCGxNx	EtherNet/IP
	E84DGFCGxJx	EtherNet/IP + Safety

▸ Eigenschaften und Varianten (📖 14)

Screenshots/Anwendungsbeispiele

Alle Screenshots in dieser Dokumentation sind Anwendungsbeispiele. Je nach Firmware-Version der Feldgeräte und Software-Version des installierten Engineering Tools (»Engineer«, »RSLogix 5000«) können die Screenshots in dieser Dokumentation von der Bildschirm-Darstellung abweichen.

1.1 Dokumententhistorie

Version			Beschreibung
3.0	02/2019	TD23	Allgemeine Überarbeitung
2.0	10/2013	TD17	Neues Layout Überarbeitung der Kapitel: ▸ I/O-Datentransfer (Implicit Messages) (📖 45) ▸ Parameterdaten-Transfer (Explicit Messages) (📖 74) ▸ Implementierte CIP™-Objekte (📖 109)
1.0	08/2012	TD17	Erstausgabe

1.2 Verwendete Konventionen

Diese Dokumentation verwendet folgende Konventionen zur Unterscheidung verschiedener Arten von Information:

Informationsart	Auszeichnung	Beispiele/Hinweise
Zahlenschreibweise		
Dezimal	normale Schreibweise	Beispiel: 1234
Dezimaltrennzeichen	Punkt	Es wird generell der Dezimalpunkt verwendet. Zum Beispiel: 1234.56
Hexadezimal	0x[0 ... 9, A ... F]	Beispiel: 0x60F4
Binär • Nibble	0b[0, 1]	Beispiel: ’0b0110’ Beispiel: ’0b0110.0100’
Textauszeichnung		
Programmname	» «	PC-Software Beispiel: Lenze »Engineer«
Steuerelement	**fett**	Die Schaltfläche **OK**... / Der Befehl **Kopieren**... / Die Registerkarte **Eigenschaften**... / Das Eingabefeld **Name**...
Hyperlink	unterstrichen	Optisch hervorgehobener Verweis auf ein anderes Thema. Wird in dieser Dokumentation per Mausklick aktiviert.
Symbole		
Seitenverweis	(🕮 7)	Optisch hervorgehobener Verweis auf eine andere Seite. Wird in dieser Dokumentation per Mausklick aktiviert.
Schrittweise Anleitung	⌨	Schrittweise Anleitungen sind durch ein Piktogramm gekennzeichnet.

1.3 Verwendete Begriffe

Begriff	Bedeutung
ACD	Address Conflict Detection
Adapter	EtherNet/IP-Slave
Inverter	Lenze-Frequenzumrichter der Produktreihe "Inverter Drives 8400 motec"
Grundgerät	

Drive Unit
Communication Unit
Wiring Unit
	Der Inverter 8400 motec ist modular aufgebaut. Er besteht aus den Modulen "Drive Unit", "Communication Unit" und "Wiring Unit".
	• Die Drive Unit ist in verschiedenen Leistungen verfügbar.
	• Bei der Communication Unit können Sie wählen zwischen:
	  • Ohne Feldbus (Basic I/O, Standard I/O, Extended I/O)
	  • AS-Interface (ohne Safety/mit Safety STO)
	  • CANopen (ohne Safety/mit Safety STO)
	  • EtherCAT (ohne Safety/mit Safety STO)
	  • EtherNET/IP (ohne Safety/mit Safety STO)
	  • PROFIBUS (ohne Safety/mit Safety STO)
	  • PROFINET (ohne Safety/mit Safety STO)
	  • POWERLINK (ohne Safety/mit Safety STO)
	• Die Wiring Unit bietet flexible Anschlussmöglichkeiten für einfache Integration in die Energieversorgung der Maschine.

ARP	Address Resolution Protocol
BOOTP	Bootstrap Protocol
Codestelle	Parameter, mit dem Sie den Inverter parametrieren oder überwachen können. Der Begriff wird im allgemeinen Sprachgebrauch auch als "Index" bezeichnet.
Subcodestelle	Enthält eine Codestelle mehrere Parameter, so sind diese in sogenannten "Subcodestellen" abgelegt. In der Dokumentation wird als Trennzeichen zwischen der Angabe der Codestelle und der Subcodestelle der Schrägstrich "/" verwendet (z. B. "C00118/3"). Der Begriff wird im allgemeinen Sprachgebrauch auch als "Subindex" bezeichnet.
»Engineer«	Software von Lenze, die Sie im gesamten Lebenszyklus einer Maschine - von der Planung bis zur Wartung - unterstützt.
EtherNet/IP	EtherNet/IP™ (EtherNet Industrial Protocol) ist ein auf Ethernet basierendes Feldbussystem, das zum Datenaustausch das Common Industrial Protocol™ (CIP™) verwendet. EtherNet/IP™ und Common Industrial Protocol™ (CIP™) sind Warenmarken und patentierte Technologien, lizenziert durch die Nutzerorganisation ODVA (Open DeviceNet Vendor Association), USA.
DHCP	Dynamic Host Configuration Protocol
DSCP	Differentiated Services Codepoints
EDS	Electronic Data Sheet
Explicit Messages	Mit Explicit Messages werden Parameterdaten übertragen.
HW	Hardware
IGMP	Internet Group Management Protocol
Implicit Messages	Mit Implicit Messages werden I/O-Daten übertragen.
"Klasse 1"-Verbindung	I/O-Verbindung
"Klasse 3"- Verbindung	Explicit-Verbindung
Level 2	EtherNet/IP performance level 2: I/O Message Server including Explicit Message Server
Lenze-Einstellung	Einstellungen, mit denen das Gerät ab Werk vorkonfiguriert ist.
Grundeinstellung	
PLC	Programmable Logic Controller (SPS)

Begriff	**Bedeutung**
QoS	Quality of Service
RPI	Requested Package Interval: Die geforderte Zeit zwischen 2 Telegrammen bei der zyklischen Datenübertragung
»RSLogix 5000«	Programmier- und Entwicklungssoftware von Rockwell für Leitrechner (Scanner) in EtherNet/IP-Netzwerken (z. B. Allen-Bradley Logix-Steuerungen).
Scanner	EtherNet/IP-Master oder -Client
Leitrechner	
SW	Software
TTL	Time To Live: Gültigkeitsdauer von Datenpaketen im EtherNet/IP-Netzwerk
UCMM	Unconnected Message Manager

1.4 Verwendete Hinweise

Um auf Gefahren und wichtige Informationen hinzuweisen, werden in dieser Dokumentation folgende Signalwörter und Symbole verwendet:

Sicherheitshinweise

Aufbau der Sicherheitshinweise:

> ⚠ **Piktogramm und Signalwort!**
>
> (kennzeichnen die Art und die Schwere der Gefahr)
>
> **Hinweistext**
>
> (beschreibt die Gefahr und gibt Hinweise, wie sie vermieden werden kann)

Piktogramm	Signalwort	Bedeutung
⚡	**Gefahr!**	**Gefahr von Personenschäden durch gefährliche elektrische Spannung** Hinweis auf eine unmittelbar drohende Gefahr, die den Tod oder schwere Verletzungen zur Folge haben kann, wenn nicht die entsprechenden Maßnahmen getroffen werden.
⚠	**Gefahr!**	**Gefahr von Personenschäden durch eine allgemeine Gefahrenquelle** Hinweis auf eine unmittelbar drohende Gefahr, die den Tod oder schwere Verletzungen zur Folge haben kann, wenn nicht die entsprechenden Maßnahmen getroffen werden.
STOP	**Stop!**	**Gefahr von Sachschäden** Hinweis auf eine mögliche Gefahr, die Sachschäden zur Folge haben kann, wenn nicht die entsprechenden Maßnahmen getroffen werden.

Anwendungshinweise

Piktogramm	Signalwort	Bedeutung
ℹ	**Hinweis!**	Wichtiger Hinweis für die störungsfreie Funktion
💡	**Tipp!**	Nützlicher Tipp für die einfache Handhabung
📖		Verweis auf andere Dokumentation

2 Sicherheitshinweise

Hinweis!

Halten Sie die angegebenen Sicherheitsmaßnahmen unbedingt ein, um schwere Personenschäden und Sachschäden zu vermeiden!

Bewahren Sie diese Dokumentation während des Betriebs immer in der Nähe des Produktes auf.

2.1 Allgemeine Sicherheits- und Anwendungshinweise

Gefahr!

Wenn Sie die folgenden grundlegenden Sicherheitsmaßnahmen missachten, kann dies zu schweren Personenschäden und Sachschäden führen.

- Lenze-Antriebs- und Automatisierungskomponenten ...
  - ausschließlich bestimmungsgemäß verwenden.
    ▶ Bestimmungsgemäße Verwendung (🕮 13)
  - niemals trotz erkennbarer Schäden in Betrieb nehmen.
  - niemals technisch verändern.
  - niemals unvollständig montiert in Betrieb nehmen.
  - niemals ohne erforderliche Abdeckungen betreiben.
  - können während und nach dem Betrieb – ihrer Schutzart entsprechend – spannungsführende, auch bewegliche oder rotierende Teile haben. Oberflächen können heiß sein.
- Für Lenze-Antriebskomponenten ...
  - nur das zugelassene Zubehör verwenden.
  - nur Original-Ersatzteile des Herstellers verwenden.
- Alle Vorgaben der beiliegenden und zugehörigen Dokumentation beachten.
  - Dies ist Voraussetzung für einen sicheren und störungsfreien Betrieb sowie für das Erreichen der angegebenen Produkteigenschaften.
    ▶ Eigenschaften und Varianten (🕮 14)
  - Die in diesem Dokument dargestellten verfahrenstechnischen Hinweise und Schaltungsausschnitte sind Vorschläge, deren Übertragbarkeit auf die jeweilige Anwendung überprüft werden muss. Für die Eignung der angegebenen Verfahren und Schaltungsvorschläge übernimmt der Hersteller keine Gewähr.
- Alle Arbeiten mit und an Lenze-Antriebs- und Automatisierungskomponenten darf nur qualifiziertes Fachpersonal ausführen. Nach IEC 60364 bzw. CENELEC HD 384 sind dies Personen, ...
  - die mit Aufstellung, Montage, Inbetriebsetzung und Betrieb des Produkts vertraut sind.
  - die über die entsprechenden Qualifikationen für ihre Tätigkeit verfügen.
  - die alle am Einsatzort geltenden Unfallverhütungsvorschriften, Richtlinien und Gesetze kennen und anwenden können.

2.2 Geräte- und anwendungsspezifische Sicherheitshinweise

Während des Betriebs muss die Communication Unit fest mit der Wiring Unit und der Drive Unit verbunden sein.

Dokumentation zu Inverter Drives 8400 motec, Steuerungssystem, Anlage/Maschine

Ergreifen Sie zusätzlich alle Maßnahmen, die in diesen Dokumentationen vorgeschrieben werden. Beachten Sie die enthaltenen Sicherheits- und Anwendungshinweise.

2.3 Restgefahren

Geräteschutz

Die Communication Unit enthält elektronische Bauteile, die durch elektrostatische Entladung beschädigt oder zerstört werden können.

▸ Installation (🕮 21)

3 Produktbeschreibung

3.1 Bestimmungsgemäße Verwendung

Die Communication Unit EtherNet/IP ...

- ist eine Baugruppe, die nur zusammen mit den folgenden Modulen eingesetzt werden kann:

Produktreihe	Typenbezeichnung
Inverter Drives 8400 motec **Drive Unit**	E84DGDVxxxxxxxx (ab Version V04.01)
Inverter Drives 8400 motec **Wiring Unit**	E84DGVNxx

- ist ein Betriebsmittel zum Einsatz in industriellen Starkstromanlagen.
- nur unter den in dieser Dokumentation vorgeschriebenen Einsatzbedingungen betreiben.
- nur in EtherNet/IP-Netzwerken einsetzen.
- kann auch ohne Anschluss an das EtherNet/IP-Netzwerk betrieben werden.

Jede andere Verwendung gilt als sachwidrig!

3.2 Eigenschaften und Varianten

Die Communication Unit EtherNet/IP ist in folgenden Ausführungen erhältlich:

Produktreihe	Typenbezeichnung	Eigenschaften				
		Schutzart	Anschluss EtherNet/IP	I/O: Anschluss über Klemme	I/O: Anschluss über M12	Safety
Inverter Drives 8400 motec **Communication Unit EtherNet/IP**	E84DGFCGFNP	IP 65	M12	3× DI 1× DO	2× DI	
	E84DGFCGENP	IP 65	M12	2× DI	3× DI 1× DO	
	E84DGFCGFJP	IP 65	M12	3× DI 1× DO 1× AI	2× DI	●
	E84DGFCGEJP	IP 65	M12	3× DI	2× DI 1× DO 1× AI	●

- Die Communication Unit EtherNet/IP wird ...
  - auf der Wiring Unit (E84DGVNxx) montiert;
  - intern durch die Drive Unit (E84DGDVxxxxxxxx) oder extern durch eine separate Spannungsquelle versorgt.
- Die I/O-Anschlüsse können über M12-Stecker oder durch Kabelverschraubungen ins Gerät geführt werden.
- Geräte ohne integrierte Sicherheitstechnik (Safety Option) haben keinen Analog-Eingang und keinen Relais-Ausgang.
- Die integrierte Sicherheitstechnik ist für den Personenschutz an Maschinen anwendbar.
- Das Inverter Drive 8400 motec ist stets ein Adapter-Gerät:
  EtherNet/IP-Adapter mit "Level 2"-Funktionalität
- 2-Port-Schnittstelle mt integrierter Switch-Funktionalität
- Zugriff auf alle Lenze-Parameter (konfigurierbar via TCP/IP mit dem Lenze »Engineer«)
- Bis zu 3 TCP/IP-Socket-Verbindungen für die Kommunikation mit dem Lenze »Engineer«
- Unterstützung des "IP Config Pending" (Aktivierung geänderter IP-Konfigurationen durch "Power off/on" oder "Type 0 Reset")
- Unterstützung des Redundanzprotokolls DLR (Device Level Ring) als "Beacon-based Ring Node"
- Bis zu 10 Eingangsdatenwörter zum Scanner (20 Bytes)
- Bis zu 8 Ausgangsdatenwörter vom Scanner (16 Bytes)
- Weitere CIP-Eigenschaften:
  - Max. 8 CIP-Verbindungen
  - 1 "Exclusive owner"-Verbindung
  - I/O-Verbindungstyp: zyklisch
  - Minimale I/O-Zykluszeit: 4 ms
  - Unterstützung von Multicast-Nachrichten, UCMM, ACD, BOOTP/DHCP, VLAN-Tagging/DSCP

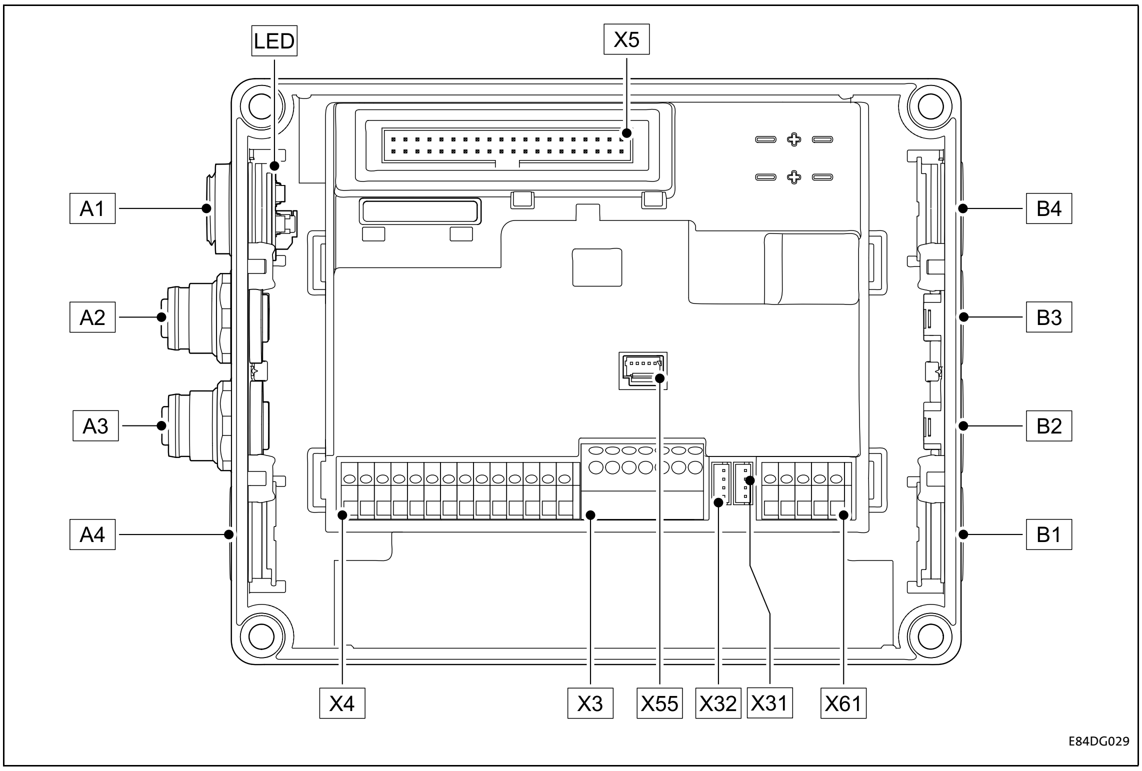
Gerätehandbuch zu Inverter Drives 8400 motec

Hier finden Sie ausführliche Informationen zur integrierten Sicherheitstechnik (Safety Option).

Referenzhandbuch / »Engineer« Online-Hilfe zum Inverter Drive 8400 motec

Hier finden Sie ausführliche Informationen zur Konfiguration der Sicherheitstechnik (Safety Option).

3.3 Anschlüsse und Schnittstellen



[3-1] Communication Unit EtherNet/IP

Pos.	Beschreibung
A1 / LED	Position für LEDs zur EtherNet/IP-Statusanzeige ▸ LED-Statusanzeigen (🕮 79)
A2	EtherNet/IP-Anschlüsse (M12 Buchsen, 5-polig, D-codiert) ▸ EtherNet/IP-Anschluss (🕮 24)
A3	
A4	Positionen für weitere frei ausführbare Eingänge und Ausgänge: • Digitale Eingänge • Digitaler Ausgang • Analoger Eingang (nur bei E84DGFCGxJx) • Relais-Ausgang (nur bei E84DGFCGxJx) • Anschluss Sicherheitstechnik "Safety Option" (nur bei E84DGFCGxJx)
B1 ... B4	
X3 / X4 / X61	Klemmenleisten zur Verdrahtung der Anschlüsse an A4 und B1 ... B4
X5	Steckerleiste zum Anschluss an die Drive Unit
X31	Steckerleiste zur Verdrahtung des EtherNet/IP-Anschlusses an A2
X32	Steckerleiste zur Verdrahtung des EtherNet/IP-Anschlusses an A3
X55	Steckerleiste zur Verdrahtung der LEDs an A1

- Im Auslieferungszustand sind die EtherNet/IP-Anschlüsse und die LEDs für die EtherNet/IP-Statusanzeigen bereits montiert und verdrahtet:
  - EtherNet/IP-Anschluss A2 an Steckerleiste X31
  - EtherNet/IP-Anschluss A3 an Steckerleiste X32
  - LEDs an Steckerleiste X55
- An den Positionen A1 ... A4 und B1 ... B4 können Sie die EtherNet/IP-Anschlüsse und weitere Anschlüsse (z. B. digitale Eingänge) auch frei ausführen.
- Die Anschlüsse können mit 5-poligen M12-Steckern, wahlweise auch mit Kabelverschraubungen (Leitungsquerschnitt max. 1.0 mm^2, AWG 18), ausgeführt werden.
- Die M12-Stecker, Kabelverschraubungen und vorkonfektionierte Systemleitungen können Sie von diversen Herstellern frei beziehen.
- Verdrahten Sie die verwendeten M12-Stecker oder Kabelverschraubungen mit den entsprechenden Kontakten der Klemmen-/Steckerleisten X3, X4 und X61.

Gerätehandbuch zu Inverter Drives 8400 motec

Beachten Sie die enthaltenen Hinweise und Verdrahtungsvorschriften.

4 Technische Daten

Gerätehandbuch zu Inverter Drives 8400 motec

Hier finden Sie die **Umgebungsbedingungen** und Daten zur **Elektromagnetischen Verträglichkeit (EMV)**, die auch für die Communication Unit gelten.

4.1 Allgemeine Daten und Einsatzbedingungen

Bereich	Werte
Bestellbezeichnung	• E84DGFCGxNx (EtherNet/IP) • E84DGFCGxJx (EtherNet/IP + Safety)
Kommunikationsprofil	EtherNet/IP
Normen / Spezifikationen	Sicherheitstechnik: EN 954-1, EN 13849-1, IEC 61508 (bis Sicherheitskategorie 4)
Schnittstelle für Kommunikation	• EtherNet/IP-Port 1: M12 Buchse, 5-polig, D-codiert • EtherNet/IP-Port 2: M12 Buchse, 5-polig, D-codiert
Netzwerktopologie	Baum, Stern und Linie
Teilnehmertyp	Adapter (Slave)
Teilnehmeranzahl	max. 254 im Subnetz
Max. Leitungslänge	100 m
Vendor-ID	587 (0x24B), Lenze ('Lenze AC Tech' in älteren Rockwell-Daten)
Gerätetyp (Device type)	2 (0x02), AC Drive
Produkt-Code	8440 (0x20F8)
Übertragungsrate	• 10 Mbit/s • 100 Mbit/s
Übertragungsmodus	Halbduplex / Vollduplex • Bei fest eingestellem Übertragungsmodus "Half/Full Duplex", muss ein Crossover-Kabel verwendet werden. • Auto-MDIX/Auto-Crossover funktioniert nur in der Einstellung "Auto-Negotiation".
Switching-Methode	Store-and-Forward / Cut-Through
Switch-Latenzzeit	ca. 125 µs bei maximaler Telegrammlänge
Externe Spannungsversorgung	• U = 24 V DC (20 V - 0 % ... 29 V + 0 %) • I_{max} = 120 mA
Konformitäten, Approbationen	• CE • UR / cUR (siehe auch Gerätehandbuch)

4.2 Protokolldaten

Bereich	Werte
I/O-Datenwörter	1 ... 10 Datenwörter zum Scanner (16 Bits/Wort, max. 20 Bytes) 1 ... 8 Datenwörter vom Scanner (16 Bits/Wort, max. 16 Bytes)
Unterstützte CIP-Dienste	• Get_Attributes_All • Get_Attribute_Single • Set_Attribute_Single • Reset (nur Typen '0' und '1') • Forward_Open • Forward_Close • Get_Member

4.3 Kommunikationszeit

Die Kommunikationszeit ist die Zeit zwischen dem Start einer Anforderung und dem Eintreffen der entsprechenden Rückantwort.

Die Kommunikationszeiten im EtherNet/IP-Netzwerk sind abhängig von der ...

- Bearbeitungszeit im Inverter;
- Telegrammlaufzeit (Übertragungsrate / Telegrammlänge);
- Verschachtelungstiefe des Netzwerks.

Bearbeitungszeit innerhalb des Inverters

Daten	Bearbeitungszeit	
Prozessdaten (I/O-Daten)	10 ms	Lenze Standard-Aktualisierungszyklus (kann im Rockwell Engineering-Tool geändert werden)
	+ 0 ... 1 ms	Verarbeitungszeit im Modul
	+ 1 ... x ms	Laufzeit der Applikationstask der verwendeten Technologieapplikation (Toleranz)
Parameterdaten	ca. 30 ms + 20 ms Toleranz (typisch) Bei einigen Codestellen kann die Bearbeitungszeit länger sein (siehe Referenzhandbuch/»Engineer« Online-Hilfe zum Inverter Drive 8400 motec).	

Es existieren keine Abhängigkeiten zwischen Parameterdaten und I/O-Daten.

4.4 Interne Switch-Latenzzeit

Durch den integrierten 2-Port-Switch entstehen Laufzeitverzögerungen. Diese Laufzeitverzögerungen können bei "Store-and-Forward" und 100 Mbit/s wie folgt berechnet werden.

Laufzeitverzögerung bei einem Ausgangsdatenpaket des Scanners inkl. 32 Bit "Run/Idle-Header" mit 16 Bit Sequenzzähler:

Laufzeitverzögerung = ((66 feste Bytes + I/O-Daten in Bytes) x 8 x 10 nsec) + 4 µsec

Laufzeitverzögerung bei einem Ausgangsdatenpaket eines Adapters ohne 32 Bit "Run/Idle-Header":

Laufzeitverzögerung = ((62 feste Bytes + I/O-Daten in Bytes) x 8 x 10 nsec) + 4 µsec

Beispiel

Verzögerung eines Ausgangsdatenpakets des Scanners mit 8 Ausgangsdatenwörtern (16 Bytes):

- ((66 feste Bytes + 16 Bytes) x 8 x 10 nsec) + 4 µsec
- (82 Bytes x 8 x 10 nsec) + 4 µsec
- 6.56 µsec + 4 µsec = **10.56 µsec**

Hinweis!

Durch den Einsatz von externen Switches können ebenfalls Laufzeitverzögerungen auftreten. Abhängig von der Anlagenkonstellation kann es sinnvoll sein eine Stern-Topologie oder eine Linien-Mischtopologie aufzubauen.

▶ Netzwerktopologie (📖 23)

5 Installation

Stop!

Elektrostatische Entladung

Durch elektrostatische Entladung können elektronische Bauteile innerhalb der Communication Unit beschädigt oder zerstört werden.

Mögliche Folgen:

- Die Communication Unit ist defekt.
- Die Feldbus-Kommunikation ist nicht möglich oder fehlerhaft.
- I/O-Signale sind fehlerhaft.
- Die Sicherheitfunktion ist fehlerhaft.

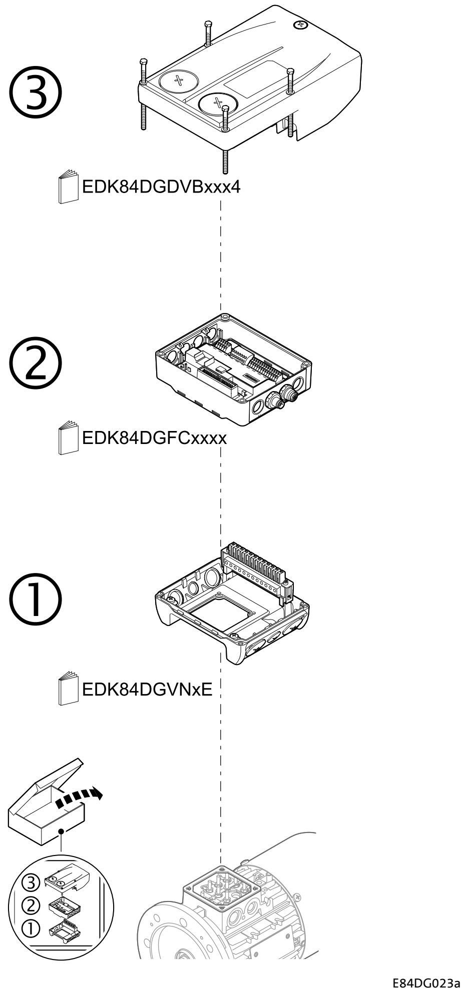
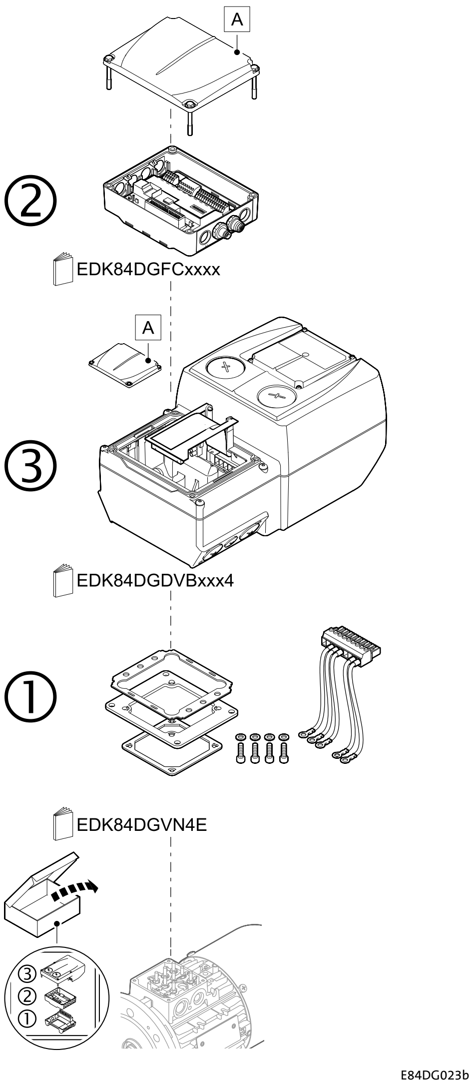
Schutzmaßnahmen

Befreien Sie sich vor dem Berühren der Communication Unit von elektrostatischen Aufladungen.

5.1 Mechanische Installation

Montageanleitungen zum Inverter Drive 8400 motec

Hier finden Sie ausführliche Informationen zur Montage.

<table>
<tr><th>0.37 ... 3.0 kW</th><th>4.0 ... 7.5 kW</th></tr>
<tr><td>
</td><td>
</td></tr>
</table>

[5-1] Mechanische Installation der 8400 motec Komponenten

Legende zur Abb. [5-1]	
1	Drive Unit
2	Communication Unit
3	Wiring Unit
A	Abdeckhaube der Drive Unit
EDK84DG...	Montageanleitungen der Drive Unit, Communication Unit, Wiring Unit

5.2 Elektrische Installation

Gerätehandbuch zu Inverter Drives 8400 motec

Hier finden Sie ausführliche Informationen zu ...
- den digitalen und analogen Ein-/Ausgängen;
- dem Relais-Ausgang;
- der integrierten Sicherheitstechnik (Safety Option);
- der Verdrahtung der Anschlüsse.

Beachten Sie die enthaltenen Hinweise und Verdrahtungsvorschriften!

5.2.1 Netzwerktopologie

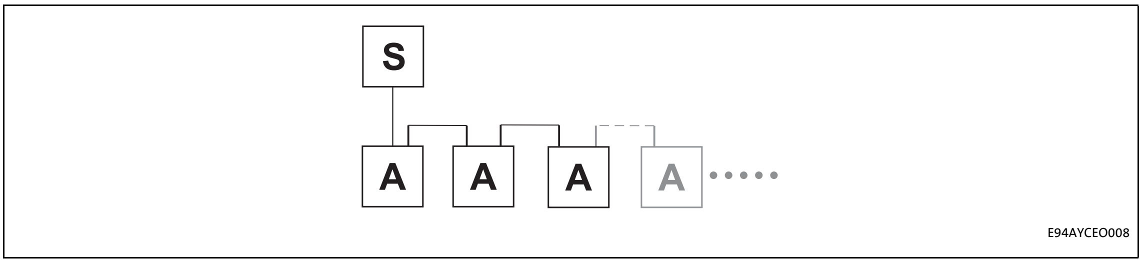
Charakteristisch für EtherNet/IP ist die Realisierung einer weitgehend freien Topologie, deren Grenze dann erreicht ist, wenn beispielsweise aufgrund der in Serie geschalteten Switches, die Latenzzeiten von Nachrichten zu groß werden.

▶ Interne Switch-Latenzzeit (🕮 20)

Praktisch für die Anlagenverdrahtung ist die Kombination aus Linie und Stichleitung.

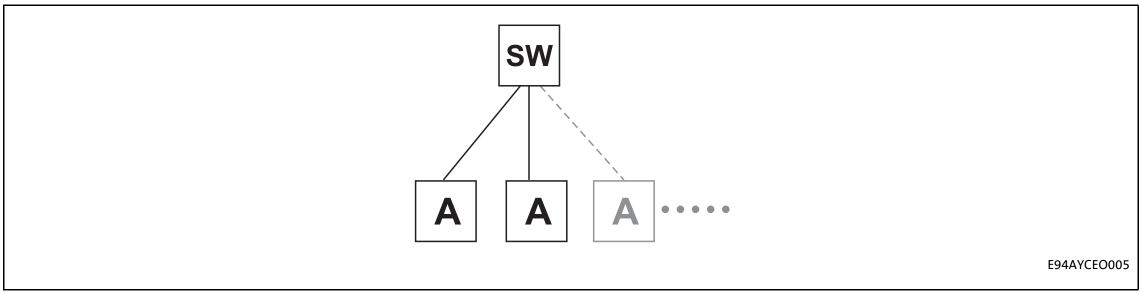
EtherNet/IP unterstützt die folgenden Topologien:

- Linie



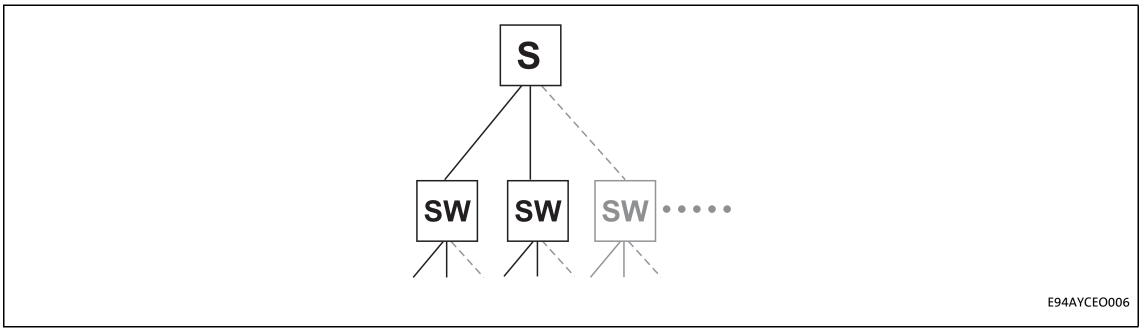
[5-2] Linientopologie (S = Scanner, A = Adapter)

- Switch / Stern



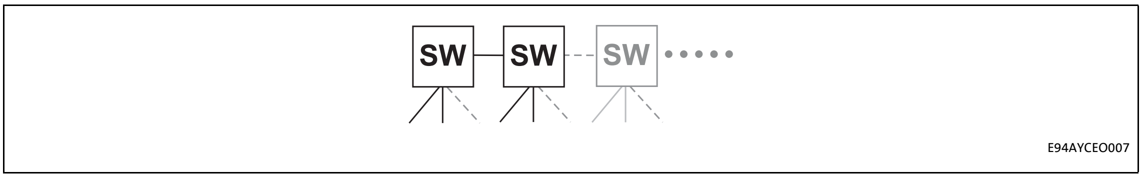
[5-3] Switch-/Sterntopologie (SW = Switch, A = Adapter)

- Baum über Switches



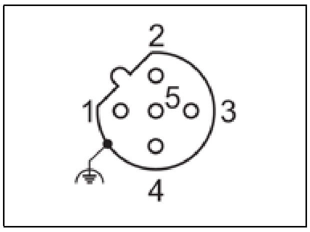
[5-4] Baumtopologie (S =Scanner, SW = Switch)

- Switch / Switch



[5-5] Switch-/Switchtopologie (SW = Switch)

5.2.2 EtherNet/IP-Anschluss



- M12 Buchse, 5-polig, D-codiert
- Verdrahtung an Klemmenleiste X31 / X32

Pin	Signal	Beschreibung
1	Tx+	Datenleitung (Sendedaten, plus)
2	Rx+	Datenleitung (Empfangsdaten, plus)
3	Tx-	Datenleitung (Sendedaten, minus)
4	Rx-	Datenleitung (Empfangsdaten, minus)
5	-	nicht belegt

5.2.3 Externe Spannungsversorgung

- Mit der externen Spannungsversorung kann für die Inbetriebnahme die EtherNet/IP-Kommunikation aufgebaut werden und die Daten der digitalen und analogen Eingänge abgefragt werden.
- Zudem kann bei einem Ausfall der Hauptversorgung mit der externen Spannungsversorgung die EtherNet/IP-Kommunikation erhalten werden.
- Die digitalen Eingänge RFR, DI1 ... DI5 und der analoge Eingang können weiterhin ausgewertet werden.
- Die externe Spannungsversorgung erfolgt über die Klemmen 24E und GND der Klemmenleiste X3.
- Zulässige Spannung (DC) / max. Strom:
  - U = 24 V DC (20 V - 0 % ... 29 V + 0 %)
  - I_{max} = 120 mA
- Der Zugriff auf Parameter eines vom Netz getrennten Gerätes ist nicht möglich.

Gerätehandbuch zu Inverter Drives 8400 motec

Hier finden Sie ausführliche Informationen zur Verdratung der externen Spannungsversorgung der Communication Unit.

6 Inbetriebnahme

Während der Inbetriebnahme werden dem Inverter anlagenspezifische Daten wie z. B. Motorparameter, Betriebsparameter, Reaktionen und Parameter zur Feldbus-Kommunikation vorgegeben. Dies geschieht bei Lenze-Geräten über die sogenannten Codestellen.

Die Codestellen des Inverters und der Kommunikation werden als ein Datensatz im Speichermodul nichtflüchtig gespeichert.

Zusätzlich gibt es Codestellen zur Diagnose und Überwachung der Busteilnehmer.

▸ Parameter-Referenz (🕮 92)

Die Daten aus dem Inverter oder Speichermodul können nur mit der Hauptspannungsversorgung (400/500 V AC) gelesen werden.

Bei der Inbetriebnahme mit 24 V DC sind nur die Daten der digitalen und analogen Eingänge in den letzten beiden Datenwörtern gültig und lesbar (siehe I/O-Daten konfigurieren (🕮 46)).

6.1 Vor dem ersten Einschalten

STOP **Stop!**

Bevor Sie das Inverter Drive 8400 motec erstmalig einschalten, überprüfen Sie die gesamte Verdrahtung auf Vollständigkeit, Kurzschluss und Erdschluss.

6.2 Leitrechner (Scanner) konfigurieren

Für die Kommunikation mit dem Inverter Drive 8400 motec muss zunächst der Leitrechner (Scanner) konfiguriert werden.

Für die Konfiguration von EtherNet/IP-Netzwerken wird für den Leitrechner (Scanner) immer eine EtherNet/IP-Konfigurationssoftware benötigt, wie z. B. »RSLogix 5000« von Rockwell.

Die Konfigurationssoftware wird zur Programmierung von Steuerungsprogrammen, EtherNet/IP-Konfiguration, Echtzeitausführung und Diagnose benötigt.

Die grundlegenden Parameter der Communication Unit sind im internen Konfigurationsspeicher abgelegt und können bei der Teilnehmererkennung vom Scanner verwendet werden.

Bei der Teilnehmersuche (Feldbus-Scan) werden die entsprechenden Gerätebeschreibungen der Lenze-Gerätefamilie herangezogen.

Tipp!

Informationen zur Projektierung mit der Programmiersoftware »RSLogix 5000« von Rockwell finden Sie hier:

- I/O-Konfiguration mit »RSLogix 5000« bis Version 19 (🕮 58)
- I/O-Konfiguration mit »RSLogix 5000« ab Version 20 (🕮 63)

6.2.1 EDS-Dateien

Je nach EtherNet/IP Scanner-Konfigurationssoftware können EDS-Dateien (Electronic Data Sheet) zur Konfiguration des Netzwerkprofils, der Kommunikation mit den teilnehmenden Geräten und zur automatischen Erstellung von Tags verwendet werden. Dazu müssen die EDS-Dateien in das Steuerungsprojekt der EtherNet/IP-Konfigurationssoftware importiert werden.

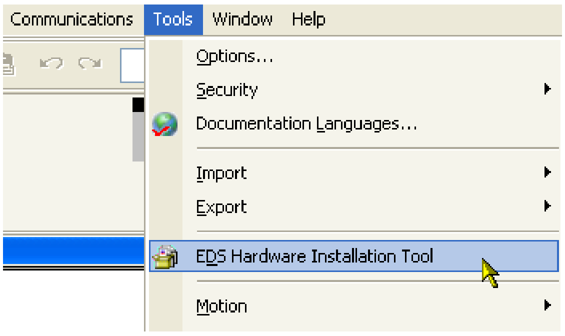
Die zur Konfiguration notwendige EDS-Datei finden Sie im Download-Bereich unter:

www.Lenze.com

Tipp!

Die Programmiersoftware »RSLogix 5000« ab Version 20 von Rockwell verfügt über ein "EDS Hardware Installation Tool" mit dem Sie ...

- EDS-Dateien installieren/importieren können;
- EDS-Dateien erzeugen können;
- EDS-Uploads ausführen können;
- EDS-Dateien aus Ihrem Steuerungsprojekt löschen können.



In »RSLogix 5000« ist der Dialog zum "EDS Hardware Installation Tool" selbsterklärend und wird hier nicht weiter beschrieben.

6.2.2 Beispiel: IP-Konfiguration der Allen-Bradley CompactLogix-Steuerung 1769-L32E

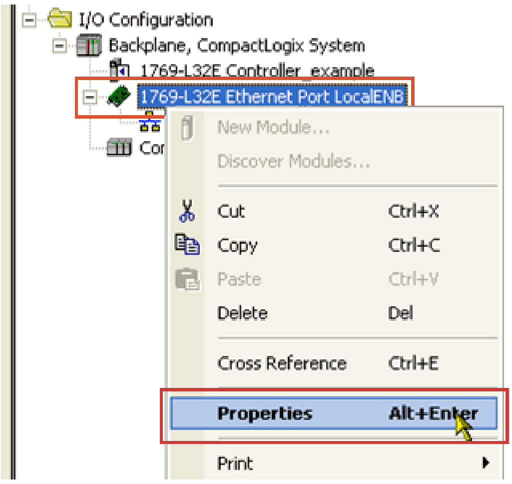
In diesem Beispiel wird die Allen-Bradley CompactLogix-Steuerung 1769-L32E mit integrierter EtherNet/IP-Schnittstelle zur Kommunikation mit Inverter Drives 8400 motec eingesetzt.

Die Konfiguration erfolgt mit der Programmiersoftware »RSLogix 5000« von Rockwell.

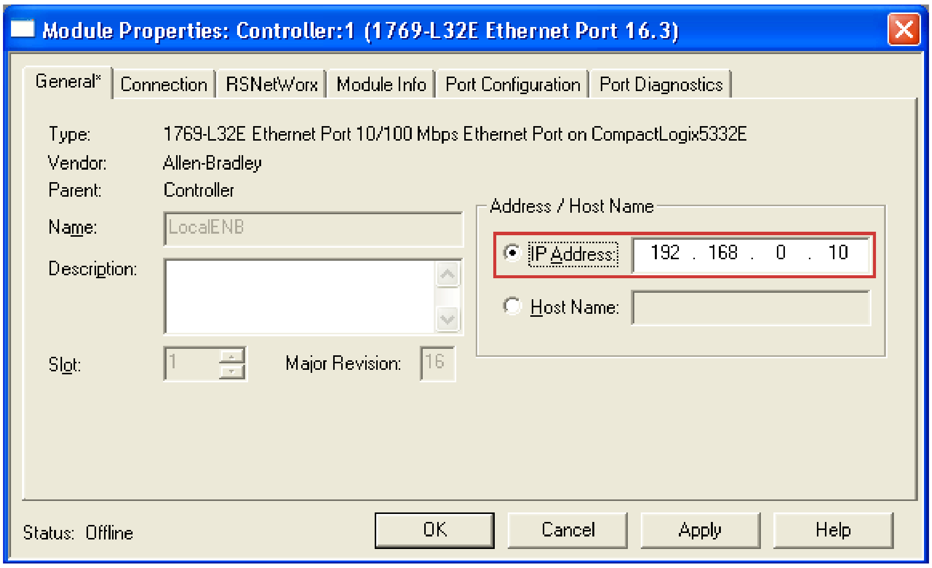
Zum Aufbau der Kommunikation über ein EtherNet/IP-Netzwerk muss die I/O-Konfiguration um die Steuerung und ihren Scanner erweitert werden.

So stellen Sie die IP-Konfiguration der CompactLogix-Steuerung 1769-L32E mit der Programmiersoftware »RSLogix 5000« ein:

1. Im Konfigurationsbaum auf den Ordner **I/O Configuration** klicken.
2. Mit der rechten Maustaste auf "1769-L32E Ethernet Port LocalENB" klicken und im Kontextmenü "Properties" auswählen.



3. Im Dialogfenster "Module Properties: ..." unter der Registerkarte **General** die IP-Adresse des Scanners einstellen.


Module Properties: Controller:1 (1769-L32E Ethernet Port 16.3)

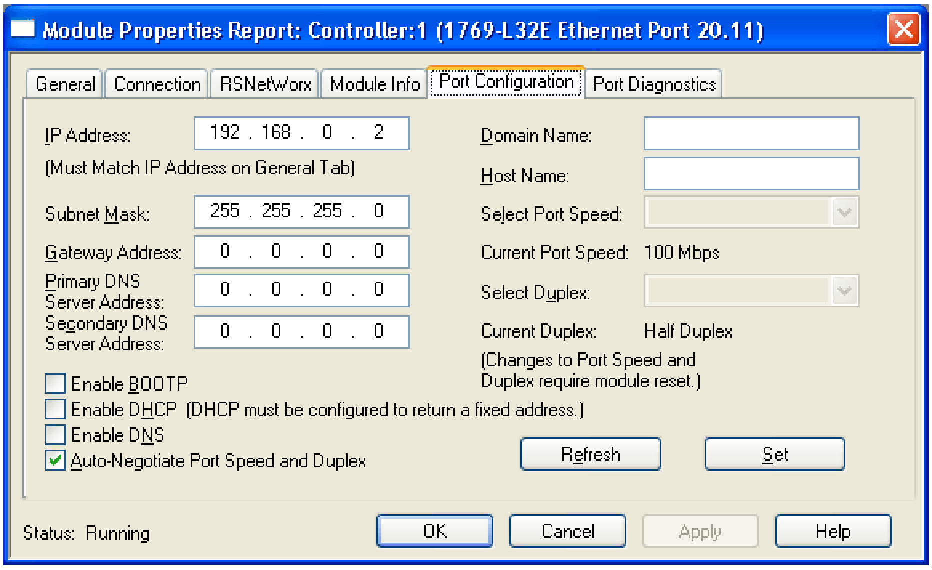
Type: 1769-L32E Ethernet Port 10/100 Mbps Ethernet Port on CompactLogix5332E
Vendor: Allen-Bradley
Parent: Controller
Name: LocalENB
Description:
Slot: 1
Major Revision: 16

Address / Host Name
● IP Address: 192 . 168 . 0 . 10
○ Host Name:

Status: Offline

4. Abschließend die Schaltfläche **OK** betätigen.

5. Unter der Registerkarte **Port Configuration** die IP-Konfiguration, die BOOTP-Einstellung, die Ethernet-Übertragungsrate und der Duplex-Mode einstellen.



Module Properties Report: Controller:1 (1769-L32E Ethernet Port 20.11)

IP Address: 192 . 168 . 0 . 2
(Must Match IP Address on General Tab)
Subnet Mask: 255 . 255 . 255 . 0
Gateway Address: 0 . 0 . 0 . 0
Primary DNS Server Address: 0 . 0 . 0 . 0
Secondary DNS Server Address: 0 . 0 . 0 . 0
Domain Name:
Host Name:
Select Port Speed:
Current Port Speed: 100 Mbps
Select Duplex:
Current Duplex: Half Duplex
(Changes to Port Speed and Duplex require module reset.)
☐ Enable BOOTP
☐ Enable DHCP (DHCP must be configured to return a fixed address.)
☐ Enable DNS
☑ Auto-Negotiate Port Speed and Duplex
Status: Running

6. Abschließend die Schaltfläche **OK** betätigen.
   - Der Scanner ist jetzt für das EtherNet/IP-Netzwerk konfiguriert.
   - Informationen zur Projektierung mit der Programmiersoftware »RSLogix 5000« von Rockwell finden Sie hier:
     - I/O-Konfiguration mit »RSLogix 5000« bis Version 19 (🕮 58)
     - I/O-Konfiguration mit »RSLogix 5000« ab Version 20 (🕮 63)

6.3 IP-Konfiguration des Inverter Drive 8400 motec einstellen

Die IP-Konfiguration wird zur Adressierung des Inverter Drive 8400 motec benötigt, damit die Kommunikation zwischen dem PC/»Engineer« oder dem Scanner und dem Inverter über EtherNet/IP erfolgen kann. Dazu müssen eine IP-Adresse, Subnetzmaske und Gateway-Adresse vergeben werden. Sie können diese IP-Parameter für das Inverter Drive 8400 motec über folgende Möglichkeiten vergeben:

- Einstellung über den EtherNet/IP-Konfigurator des »Engineer« (🕮 32)
- Einstellung über Codestellen im »Engineer« (🕮 34)
- Einstellung über einen BOOTP/DHCP-Server (🕮 36)
- Einstellung über das TCP/IP Interface Objekt (0xF5) (🕮 36)

Hinweis!

- Die Zuweisung von ungültigen Kombinationen aus IP-Adresse, Subnetzmaske und Gateway-Adresse kann dazu führen, dass keine Verbindung zum EtherNet/IP-Netzwerk hergestellt werden kann.
- Die Codestellen C13010 (IP-Adresse), C13011 (Subnetzmaske), C13012 (Gateway-Adresse) und C13016 (Multicast IP-Adresse) zeigen die aktuell verwendeten IP-Parameter.
- Bei unzulässigen Einstellungen wird die Fehlermeldung EtherNet/IP: Ungültige IP-Parameter [0x01bc6533] (🕮 85) ausgegeben.

6.3.1 Einstellung über den EtherNet/IP-Konfigurator des »Engineer«

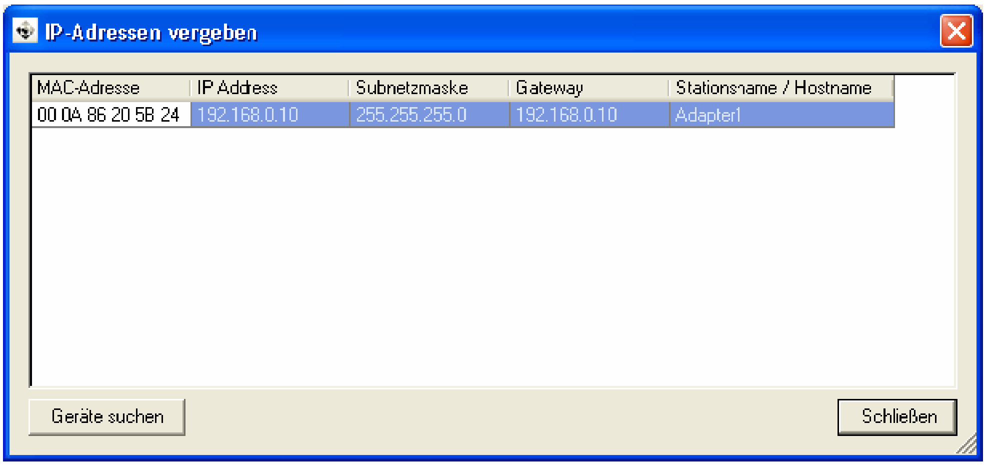
Hinweis!

- Änderungen der IP-Parameter werden sofort wirksam.
- Eine bereits bestehende IP-Verbindung zum Inverter Drive 8400 motec wird unterbrochen.

So stellen Sie die IP-Parameter über den EtherNet/IP-Konfigurator ein:

1. Den Menübefehl **Online → Konfigurator PROFINET /EtherNet/IP Adressen ...** ausführen.

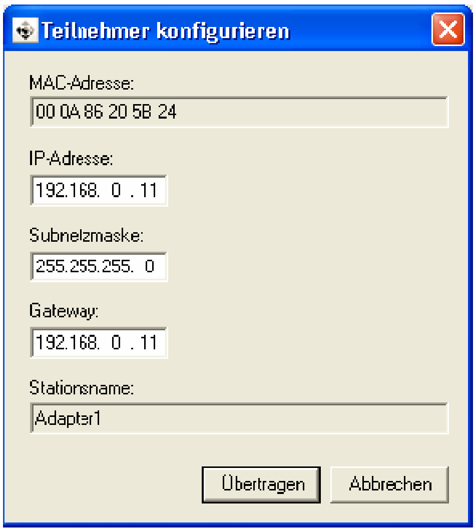
Das Dialogfenster "IP-Adressen vergeben" wird geöffnet und alle angeschlossenen Lenze EtherNet/IP-Teilnehmer werden aufgelistet.


IP-Adressen vergeben

MAC-Adresse	IP Address	Subnetzmaske	Gateway	Stationsname / Hostname
00 0A 86 20 5B 24	192.168.0.10	255.255.255.0	192.168.0.10	Adapter1

2. Mit einem Doppelklick auf einen EtherNet/IP-Teilnehmer öffnen Sie das Dialogfenster "Teilnehmer konfigurieren".

   Stellen Sie hier die IP-Parameter ein.



MAC-Adresse: 00 0A 86 20 5B 24
IP-Adresse: 192.168. 0 . 11
Subnetzmaske: 255.255.255. 0
Gateway: 192.168. 0 . 11
Stationsname: Adapter1

3. Die Schaltfläche **Übertragen** betätigen.
   - Die IP-Konfiguration wird an den entsprechenden EtherNet/IP-Teilnehmer übertragen.
   - Die Communication Unit führt einen Stack-Reset durch.
   - Die IP-Parameter werden in die Codestellen C13000 (IP-Adresse), C13001 (Subnetzmaske) und C13002 (Gateway-Adresse) geschrieben.
   - Die Codestelle C13005 (IP Konfigurations-Referenz) wird auf den Wert ’0: Gespeicherte Adresse’ gesetzt, damit die übertragene Adresse verwendet werden kann.

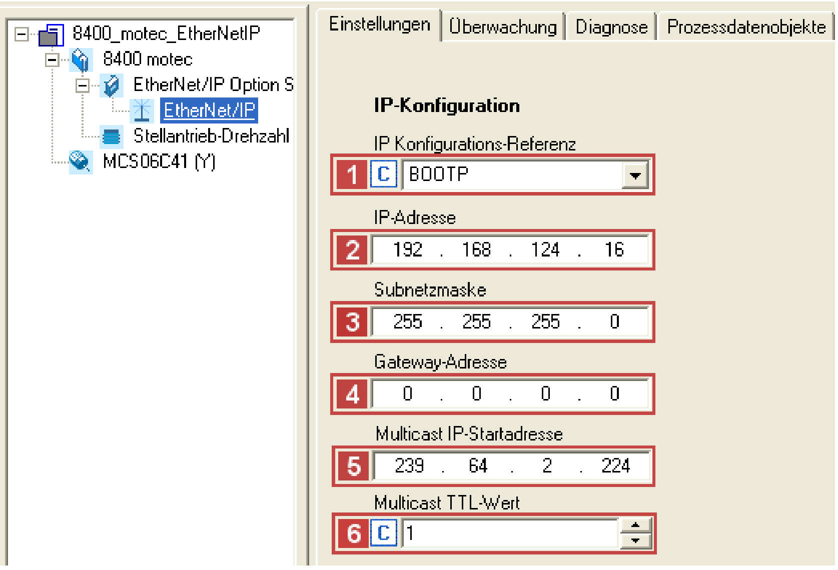
Tipp!

Überprüfen Sie, ob die Konfiguration erfolgreich übertragen wurde.

Dazu das Dialogfenster "IP-Adressen vergeben" öffnen (siehe Schritt 1) und die Schaltfläche **Geräte suchen** betätigen.

6.3.2 Einstellung über Codestellen im »Engineer«

Im »Engineer« unter der Registerkarte **Einstellungen** können Sie die IP-Parameter auch manuell einstellen. Die Werte werden in die entsprechenden Codestellen übertragen.



IP-Konfiguration

IP Konfigurations-Referenz: BOOTP

IP-Adresse: 192 . 168 . 124 . 16

Subnetzmaske: 255 . 255 . 255 . 0

Gateway-Adresse: 0 . 0 . 0 . 0

Multicast IP-Startadresse: 239 . 64 . 2 . 224

Multicast TTL-Wert: 1

Einstellungen		Beschreibung
1	**IP-Konfigurationsreferenz**	Auswahl (C13005), wie die IP-Konfiguration erfolgen soll: • **0**: Die aktuell in der Communication Unit gespeicherte IP-Konfiguration wird verwendet. • **1**: Die IP-Konfiguration wird durch einen BOOTP-Server mittels BOOTP zugewiesen. • **2**: Die IP-Konfiguration wird durch einen DHCP-Server mittels DHCP zugewiesen.
2	**IP-Addresse**	Einstellung der IP-Adresse (C13000)
3	**Subnetzmaske**	Einstellung der Subnetzmaske (C13001)
4	**Gateway-Addresse**	Einstellung der Gateway-Adresse (C13002)
5	**Multicast IP-Startadresse**	Einstellung der Multicast IP-Startadresse (C13006) ▸ Einstellung der Multicast-Konfiguration (🕮 37)
6	**Multicast TTL-Wert**	Einstellung des Multicast TTL-Wertes (C13019)

So aktivieren Sie geänderte Einstellungen im »Engineer«:

1. Den Gerätebefehl **C00002 = "11: Alle Parametersätze speichern"** ausführen.

   Die aktuelle IP-Konfiguration wird im Speichermodul des Inverters gespeichert.
2. Einen "Type 0 Reset" auf das Identity Object (1 / 0x01) (🕮 111) des Busteilnehmers durchführen oder die Spannungsversorgung der Communication Unit aus- und wieder einschalten.

IP-Adresse

Die Einstellung/Änderung der IP-Adresse erfolgt in C13000.

In C13010/1...4 wird die aktuell verwendete IP-Adresse angezeigt.

Beispiel: Anzeige der IP-Adresse 192.168.124.16				
Codestelle	C13010/1	C13010/2	C13010/3	C13010/4
Wert	192	168	124	16

Subnetzmaske

Die Subnetzmaske gibt an, welcher Teil der IP-Adresse als Net-ID und welcher Teil als Host-ID ausgewertet wird.

Gültige Subnetzmasken sind nach RFC 1878 festgelegt

Die Einstellung/Änderung der Subnetzmaske erfolgt in C13001.

In C13011/1...4 wird die aktuell verwendete Subnetzmaske angezeigt.

Beispiel: Anzeige der Subnetzmaske 255.255.255.0				
Codestelle	C13011/1	C13011/2	C13011/3	C13011/4
Wert	255	255	255	0

Gateway-Adresse

Die Gateway-Adresse ist gültig, wenn die Netzwerk-Adresse der IP-Adresse identisch mit der Gateway-Adresse ist.

Ist die Gateway-Adresse identisch mit der IP-Adresse oder ist die Adresse ’0.0.0.0’ wird keine Gateway-Funktionalität verwendet.

Die Einstellung/Änderung der Gateway-Adresse erfolgt in C13002.

In C13012/1...4 wird die aktuell verwendete Gateway-Adresse angezeigt.

Beispiel: Anzeige der Gateway-Adresse 192.168.124.16				
Codestelle	C13012/1	C13012/2	C13012/3	C13012/4
Wert	192	168	124	16

6.3.3 Einstellung über einen BOOTP/DHCP-Server

DHCP ist die Abkürzung für "Dynamic Host Configuration Protocol", d. h. dynamisches Rechnerkonfigurationsprotokoll. Dieses Protokoll wird in RFC 2131 definiert und ist eine kompatible Weiterentwicklung vom "Bootstrap Protocol" (BOOTP) nach RFC 951.

Beide Protokolle ermöglichen den Netzwerkteilnehmern über ein TCP/IP-Netz Informationen zur Netzwerkkonfiguration (z. B. die IP-Adresse) bei einem Server abzufragen. Dabei weist der BOOTP/DHCP-Server dem Client die IP-Adresse dynamisch aus einem definierten Adressbereich zu. Der Client bekommt also eine eindeutige IP-Adresse.

Mit der Codestelle C13005 legen Sie fest, wie die IP-Konfiguration erfolgen soll:

- Wert ’0’: Die aktuell in der Communication Unit gespeicherte IP-Konfiguration wird verwendet.
- Wert ’1’: BOOTP wird verwendet. (Lenze-Standardeinstellung)
- Wert ’2’: DHCP wird verwendet.

Diese Einstellung kann auch durch einen Schreibzugriff auf das Attribut 3 (Configuration Control) der Instanz 1 des TCP/IP Interface Object (245 / 0xF5) (🕮 126) erfolgen.

6.3.4 Einstellung über das TCP/IP Interface Objekt (0xF5)

Mit einem Scanner ist die IP-Konfiguration über das Attribut 5 (Interface configuration) der Instanz 1 des TCP/IP Interface Object (245 / 0xF5) (🕮 126) einstellbar.

Führen Sie nach der IP-Konfiguration einen Reset des Busteilnehmers aus ("Power off/on" oder "Type 0 Reset" auf das Identity Object (1 / 0x01) (🕮 111)).

Im »Engineer« zeigen die Codestellen C13010 (IP-Adresse), C13011 (Subnetzmaske), C13012 (Gateway-Adresse) und C13016 (Multicast IP-Adresse) die aktuell verwendeten IP-Parameter.

6.3.5 Einstellung der Multicast-Konfiguration

Auf Multicast-Telegramme, die vom Inverter gesendet werden, können mehrere Scanner zugreifen ("Listen only"- oder "Input only"-Verbindungen). Einstellungen zur Multicast-Konfiguration müssen auch in der EtherNet/IP-Konfigurationssoftware (z. B. »RSLogix 5000« von Rockwell) erfolgen.

Die Communication Unit generiert standardmäßig automatisch die für die I/O-Datenübertragung verwendete Multicast IP-Startadresse. Der TTL-Standardwert für die Multicast-Übertragung ist ’1’, so werden die Multicast I/O-Datenpakete ausschließlich über das lokale Netzwerk verbreitet.

Hinweis!

Sie können die Multicast IP-Startadresse und den Multicast TTL-Wert auch explizit einstellen. Wir empfehlen aber, die Standard-Einstellungen beizubehalten, um eine sichere Multicast-Übertragung sicherzustellen.

Folgende Codestellen für Multicast können konfiguriert werden:

Codestelle	Beschreibung
C13018	Auswahl zur Multicast IP-Adressierung über das Instanzattribut 9 (Mcast Config) im TCP/IP Interface Object (245 / 0xF5) (🕮 126) • Wert ’0’: Der Default-Algorithmus wird verwendet. • Wert ’1’: Die Adresse aus Codestelle C13006 wird als Multicast IP-Startadresse verwendet.
C13019	Einstellung des Multicast TTL-Wertes für die Gültigkeitsdauer von Datenpaketen im EtherNet/IP-Netzwerk (Instanzattribut 8 (TTL Value) im TCP/IP Interface Object (245 / 0xF5) (🕮 126))
C13020	Einstellung, wieviele Multicast IP-Adressen zugewiesen werden. (Instanzattribut 9 (Num Mcast) im TCP/IP Interface Object (245 / 0xF5) (🕮 126))

Multicast IP-Startadresse

Multicast IP-Startadressen dienen dazu, Mitgliedern einer bestimmten Gruppe (also ggf. mehreren Teilnehmern) eine Nachricht zu senden.

Die Einstellung/Änderung der Multicast IP-Startadresse erfolgt in C13006.

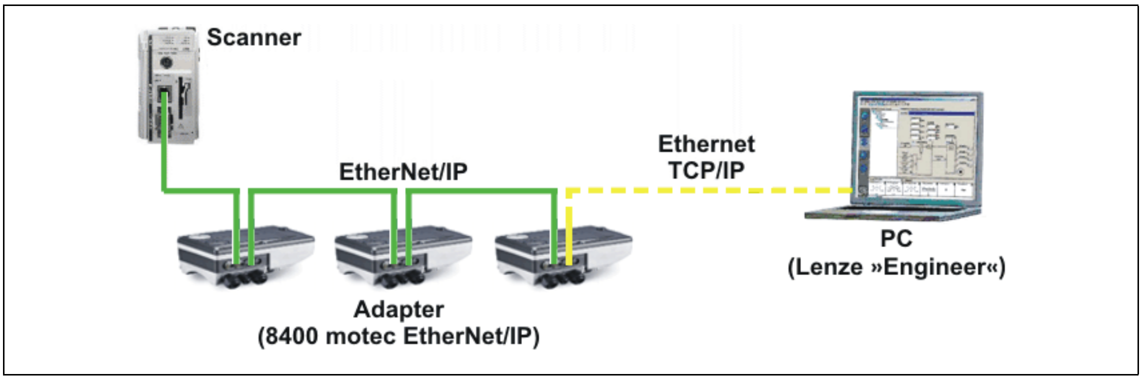
In C13016/1...4 wird die aktuell verwendete Multicast IP-Adresse des Inverters angezeigt.

Beispiel: Anzeige der Multicast IP-Adresse 239.64.2.224				
Codestelle	C13016/1	C13016/2	C13016/3	C13016/4
Wert	239	64	2	224

6.4 Online-Verbindung über EtherNet/IP mit dem Lenze »Engineer« herstellen

Hinweis!

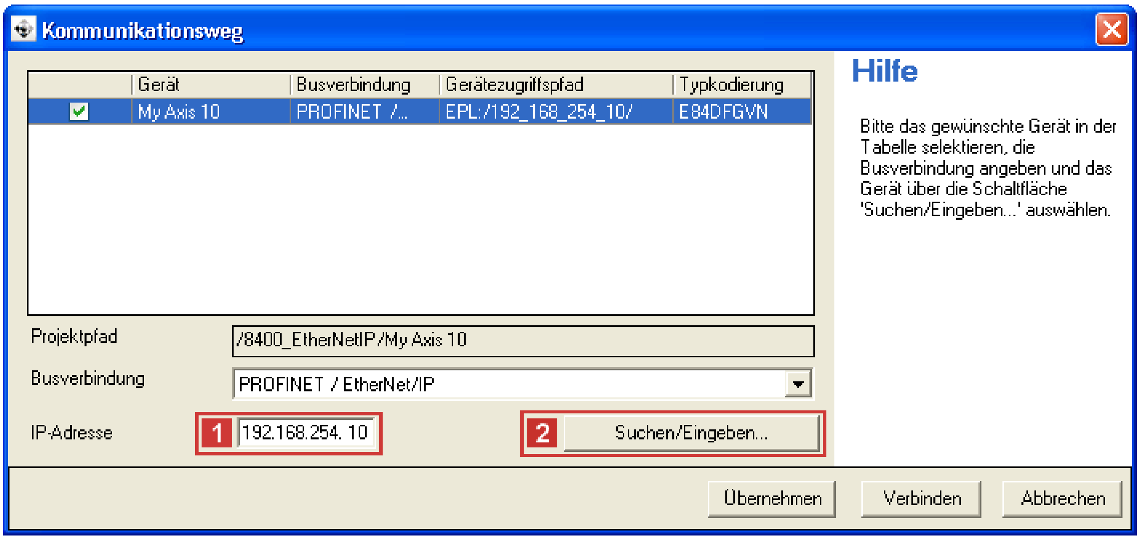
- Um einen einwandfreien Betrieb der zyklischen EtherNet/IP-Kommunikation sicherzustellen, sollte der Online-Zugriff mit dem »Engineer« über einen IEEE 802.1Q-fähigen Switch ausgeführt werden.
- Der in der Communication Unit integrierte IEEE 802.1Q-fähige Switch kann die zyklische EtherNet/IP-Kommunikation vorrangig zur normalen TCP/IP-Kommunikation verwalten. Dies geschieht bei EtherNet/IP über die VLAN-Kennung im Ethernet-Frame (einstellbar in C13021).
- Wird das Redundanzprotokoll DLR (Device Level Ring) verwendet, muss der Switch zusätzlich DLR-fähig sein.



[6-1] Beispielaufbau mit einem Allen-Bradley CompactLogix-Controller 1769-L32E (Scanner)

Für eine Online-Verbindung zwischen dem »Engineer« und dem Inverter muss der Inverter eine IP-Adresse besitzen (siehe IP-Konfiguration des Inverter Drive 8400 motec einstellen (🕮 31)).

Im »Engineer« können Sie mit dem Menübefehl **Online → Kommunikationsweg einstellen und online gehen** den EtherNet/IP-Kommunikationsweg auswählen. Die zuvor konfigurierten EtherNet/IP-Teilnehmer werden im Dialogfenster "Kommunikationsweg" angezeigt:



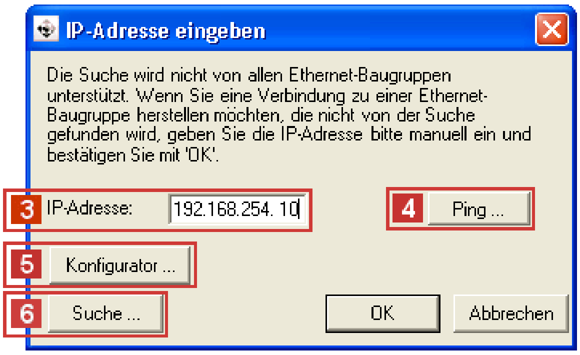
	Gerät	Busverbindung	Gerätezugriffspfad	Typkodierung
☑	My Axis 10	PROFINET /...	EPL:/192_168_254_10/	E84DFGVN

Bitte das gewünschte Gerät in der Tabelle selektieren, die Busverbindung angeben und das Gerät über die Schaltfläche 'Suchen/Eingeben...' auswählen.

Projektpfad: /8400_EtherNetIP/My Axis 10
Busverbindung: PROFINET / EtherNet/IP
IP-Adresse: 192.168.254. 10

Sollte der Gerätezugriffspfad nicht korrekt konfiguriert sein, kann hier die 1 **IP-Adresse** des im Anzeigefeld gewählten Inverters manuell eingetragen werden.

Über die Schaltfläche 2 **Suchen/Eingeben**, können Sie eine Verbindung zu Geräten herstellen, die nicht im Anzeigefeld erschienen sind. Entsprechende Einstellungen dazu erfolgen im erscheinenden Dialogfenster "IP-Adresse eingeben":



Die Suche wird nicht von allen Ethernet-Baugruppen unterstützt. Wenn Sie einer Verbindung zu einer Ethernet-Baugruppe herstellen möchten, die nicht von der Suche gefunden wird, geben Sie die IP-Adresse bitte manuell ein und bestätigen Sie mit 'OK'.

IP-Adresse: 192.168.254. 10

Hier können Sie eine 3 **IP-Adresse** manuell eingeben oder über Schaltflächen folgende Aktionen ausführen:

- Den Konsolenbefehl 4 **Ping** ausführen.
- Die IP-Adresse über den 5 **Konfigurator** zuweisen.
  - ▸ Einstellung über den EtherNet/IP-Konfigurator des »Engineer« (📖 32)
- Mit einer 6 **Suche** den Gerätezugriffspfad zum gewünschten Inverter auswählen.

Nach dem Aufbau der Online-Verbindung können Sie wie gewohnt mit dem »Engineer« weiterarbeiten.

6.5 Erstes Einschalten

Aufbau der Kommunikation

- Zum Aufbau der Kommunikation muss das Inverter Drive mit Netzspannung versorgt sein.
- Für die EtherNet/IP-Kommunikation muss die Communication Unit mit Spannung versorgt sein.

  Ist dies nicht der Fall, wird die Fehlermeldung "CE04: MCI Kommunikationsfehler" (Fehler-Nr. 01.0127.00002) ausgegeben. Der Fehler muss im Inverter Drive zurückgesetzt werden, damit die EtherNet/IP-Kommunikation aufgebaut werden kann.
- Mit der externen Spannungsversorgung kann bei einem Ausfall der Hauptversorgung die EtherNet/IP-Kommunikation erhalten werden.

  ▸ Externe Spannungsversorgung (📖 25)
- Beim Netzeinschalten werden alle Parameter (Codestellen) gelesen.
- Zur Adressierung des Inverters ist eine gültige IP-Konfiguration notwendig, wenn die Kommunikation zwischen dem PC/»Engineer« und dem Inverter über EtherNet/IP erfolgen soll.

  ▸ IP-Konfiguration des Inverter Drive 8400 motec einstellen (📖 31)

7 Datentransfer

EtherNet/IP verwendet zum Datenaustausch zwischen Geräten über ein Ethernet-Netzwerk das CIP™ (Common Industrial Protocol) – ebenso wie die eng verwandten Bussysteme DeviceNet und ControlNet.

Die Umsetzung des CIP durch Lenze basiert auf dem Standard der ODVA (Open DeviceNet Vendor Association, www.odva.org) und unterstützt die beiden wichtigsten Typen der EtherNet/IP-Kommunikation:

- Explizite Nachrichtenübertragung (für Parameterdaten)
- Implizte Nachrichtenübertragung (für I/O-Daten)

7.1 Kommunikationskanäle

Hinweis!

Bei den Begriffen "Eingang" und "Ausgang" ist der Scanner der Bezugspunkt:
- Eingangsdaten werden vom Adapter produziert und vom Scanner konsumiert.
- Ausgangsdaten werden vom Scanner produziert und vom Adapter konsumiert.

EtherNet/IP überträgt zwischen dem Leitrechner (Scanner) und den am Feldbus teilnehmenden Invertern (Adapter) Parameterdaten und I/O-Daten. Die Daten werden in Abhängigkeit ihres zeitkritischen Verhaltens über entsprechende Kommunikationskanäle übertragen.

Der I/O-Datenkanal überträgt I/O-Daten mittels "Implicit Messages".

- Mit den I/O-Daten wird der Inverter gesteuert.
- Die Übertragung von I/O-Daten ist zeitkritisch.
- I/O-Daten werden zyklisch zwischen dem Leitrechner (Scanner) und den Invertern (Adapter) übertragen (ständiger Austausch aktueller Eingangs- und Ausgangsdaten).
- Auf die I/O-Daten kann der Leitrechner (Scanner) direkt zugreifen (die Daten werden z. B. direkt in den I/O-Bereich gelegt).
- Zum Scanner können bis zu 10 Datenwörter (max. 20 Bytes) gesendet werden.
- Vom Scanner können bis zu 8 Datenwörter (max. 16 Bytes) gesendet werden.
- I/O-Daten werden nicht im Inverter gespeichert.
- I/O-Daten sind z. B. Sollwerte, Istwerte, Steuer- und Statuswörter

Der Parameterdaten-Kanal überträgt Parameterdaten mittels "Explicit Messages".

- Die Übertragung von Parameterdaten ist in der Regel nicht zeitkritisch.
- Parameterdaten sind z. B. Betriebsparameter, Motordaten sowie Diagnose-Informationen.
- Über den Parameterdaten-Kanal wird ein Zugriff auf alle Lenze-Codesstellen ermöglicht.
- Die Speicherung von Parameteränderungen muss über die Codestelle **C00002** des Inverter Drive 8400 motec erfolgen.

7.2 Telegrammtypen

Zwischen Leitrechner (Scanner) und Inverter (Adapter) werden die Telegrammtypen "Implicit Messages" und "Explicit Messages" übertragen.

Implicit Messages (I/O-Datentransfer)

"Implicit Messages" werden nach dem Producer-Consumer-Prinzip gesendet oder empfangen. Es existiert ein Sender und kein oder beliebig viele Empfänger.

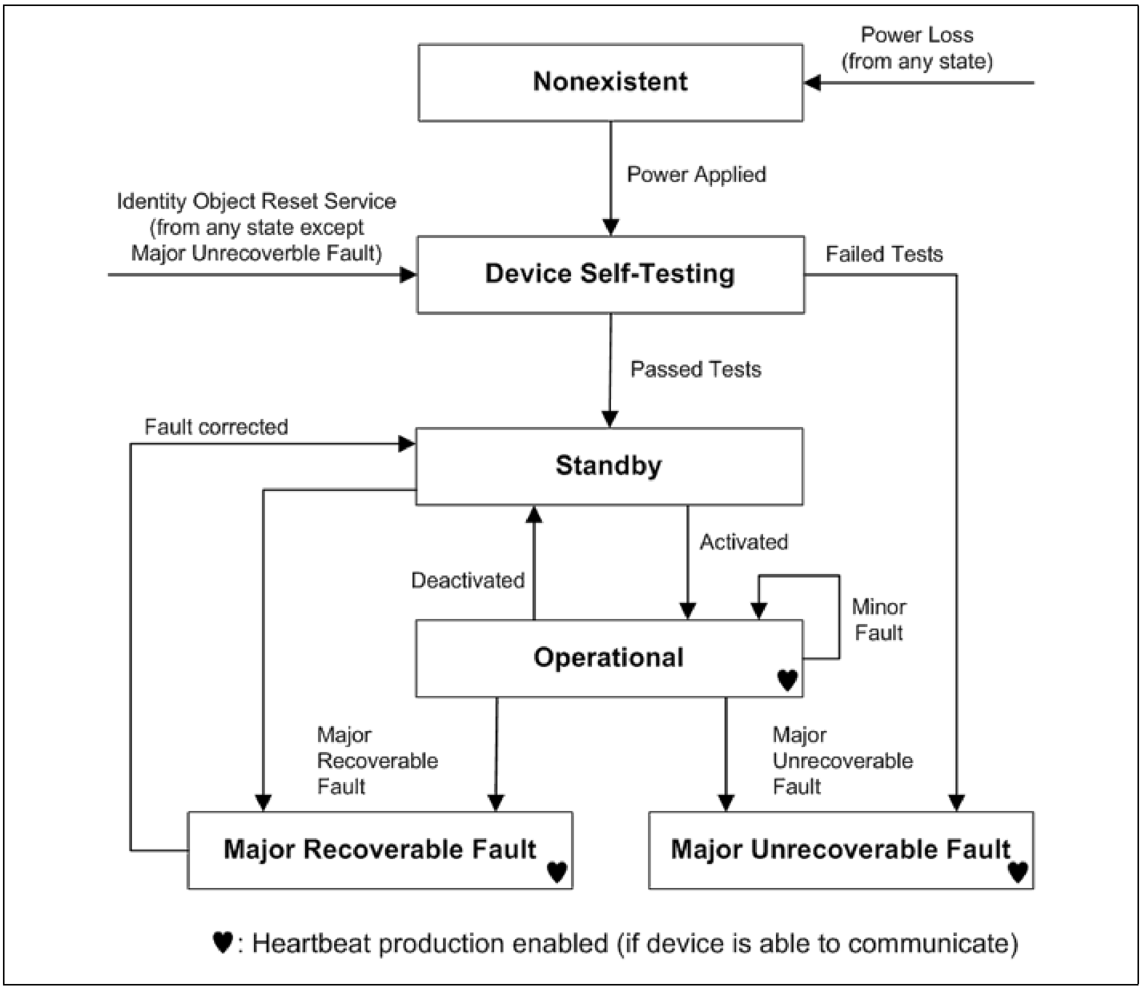
Die Übertragungsart "Cyclic I/O-Data" wird unterstützt. Mit "Cyclic I/O-Data" erzeugen der Scanner und der Adapter unabhängig voneinander ihre Daten, die in Abhängigkeit eines Timers gesendet werden. Der Wert des Timers muss vom Anwender im Scanner eingestellt werden.

Explicit Messages (Parameterdaten-Transfer)

"Explicit Messages" dienen der Konfiguration und Parametrierung der einzelnen EtherNet/IP-Teilnehmer.

Zwischen zwei Teilnehmern besteht eine Client-Server-Beziehung:
Der Client setzt einen Auftrag ab (Anforderung). Der Server nimmt diesen Auftrag entgegen und versucht ihn auszuführen. Daraufhin sendet der Server die angeforderten Daten (positive Antwort) oder eine Fehlermeldung (negative Antwort).

7.3 EtherNet/IP-Statusdiagramm



[7-1] EtherNet/IP-Statusdiagramm

Der aktuelle EtherNet/IP-Gerätestatus wird ...

- über die Codestelle C13861 ausgegeben;
- im Identity Object (1 / 0x01) (🕮 111) über die Instanzattribute 5 und 8 ausgegeben;
- über die LED **MS** angezeigt (siehe LED-Statusanzeigen (🕮 79)).

8 I/O-Datentransfer (Implicit Messages)

Um I/O-Daten (Implicit Messages) zwischen dem Leitrechner (Scanner) und dem Inverter (Adapter) austauschen zu können, müssen Sie ...

- im Inverter (Adapter) die Zuordnung der I/O-Daten zu den internen Ports (MCI) durchführen:
  - ▸ I/O-Daten-Mapping (📖 48)
  - ▸ I/O-Konfiguration im »Engineer« (📖 53)
- im Leitrechner (Scanner) den I/O-Datentransfer konfigurieren:
  - ▸ I/O-Konfiguration mit »RSLogix 5000« bis Version 19 (📖 58)
  - ▸ I/O-Konfiguration mit »RSLogix 5000« ab Version 20 (📖 63)

8.1 I/O-Daten konfigurieren

- Die I/O-Datenkonfiguration wird während der Initialisierungsphase des Scanners festgelegt (PDO-Mapping).
- Zum Scanner können bis zu 10 Datenwörter (max. 20 Bytes) gesendet werden.
- Vom Scanner können bis zu 8 Datenwörter (max. 16 Bytes) gesendet werden.
- In der Assembly-Objektinstanz **111 (0x6F, Custom Input)** werden in den letzten beiden Wörtern die I/O-Daten eingetragen:

Datenwort	Bits	Funktion	Wert / Beschreibung	
Wort 9	0 ... 9	Analoger Eingangswert (0 ... 10 V)	10 V = 1000	
	10	Digitaler Eingang 3	0 (FALSE)	offen
			1 (TRUE)	geschlossen
	11	Digitaler Eingang 4	0 (FALSE)	offen
			1 (TRUE)	geschlossen
	12	Digitaler Eingang 5	0 (FALSE)	offen
			1 (TRUE)	geschlossen
	13	Reserviert		
	14	I/O-Status	0 (FALSE)	Daten in Wort 9/10 sind nicht gültig.
			1 (TRUE)	Daten in Wort 9/10 sind gültig.
	15	Verbindungsstatus des Inverters	0 (FALSE)	Inverter ist offline ("Stay alive"-Betrieb)
			1 (TRUE)	Inverter ist online
Wort 10	0	RFR	0 (FALSE)	offen
			1 (TRUE)	geschlossen
	1	Digitaler Eingang 1	0 (FALSE)	offen
			1 (TRUE)	geschlossen
	2	Digitaler Eingang 2	0 (FALSE)	offen
			1 (TRUE)	geschlossen
	3	Digitaler Eingang 3	0 (FALSE)	offen
			1 (TRUE)	geschlossen
	4	Digitaler Eingang 4	0 (FALSE)	offen
			1 (TRUE)	geschlossen
	5	Digitaler Eingang 5	0 (FALSE)	offen
			1 (TRUE)	geschlossen
	6 ... 13	Reserviert		
	14	I/O-Status	0 (FALSE)	Daten in Wort 9/10 sind nicht gültig.
			1 (TRUE)	Daten in Wort 9/10 sind gültig.
	15	Verbindungsstatus des Inverters	0 (FALSE)	Inverter ist offline ("Stay alive"-Betrieb)
			1 (TRUE)	Inverter ist online

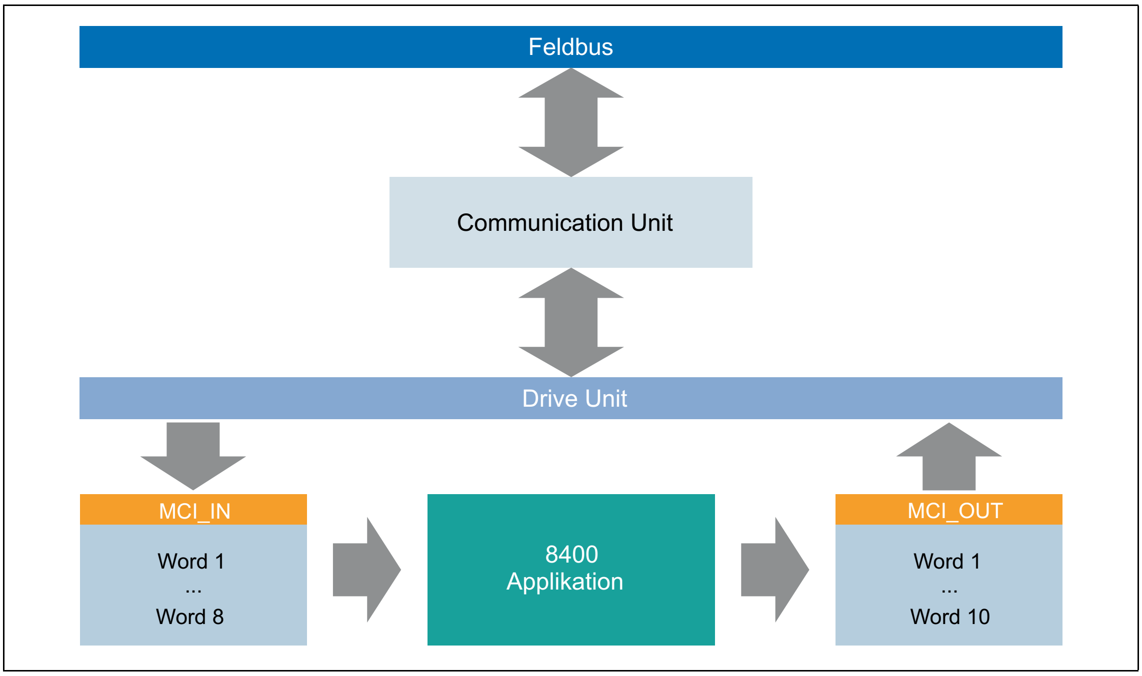
- In den Assembly-Eingangsobjektinstanzen **70 ... 73 (0x46 ... 0x49)** werden diese Daten aufgrund der Profilkonformität nicht verwendet.
- Die I/O-Datenkonfiguration ist applikationsspezifisch in den Gerätebeschreibungsdateien vordefiniert und kann bei Bedarf angepasst werden.

  ▶ I/O-Konfiguration im »Engineer« (🕮 53)

8.2 I/O-Daten-Mapping

Der I/O-Datentransfer erfolgt über die MCI-Schnittstelle.

- Der Zugriff auf die I/O-Daten erfolgt über die Portbausteine **MCI_IN** und **MCI_OUT**. Diese Portbausteine werden auch als I/O-Datenkanäle bezeichnet.
- Der Portbaustein **MCI_IN** bildet die empfangenen Datenobjekte ab.
- Der Portbaustein **MCI_OUT** bildet die zu sendenden Datenobjekte ab.
- Zum Scanner können bis zu 10 Datenwörter (max. 20 Bytes) gesendet werden.
- Vom Scanner können bis zu 8 Datenwörter (max. 16 Bytes) empfangen werden.
- Die Port-/Funktionsblockverschaltung der I/O-Datenobjekte erfolgt über den Lenze »Engineer«.



[8-1] Äußerer und innerer Datentransfer zwischen Bussystem, Inverter und Applikation

Referenzhandbuch / Online-Hilfe zum Inverter Drive 8400 motec

Hier finden Sie ausführliche Informationen zur Port-/Funktionsblockverschaltung im »Engineer« und zu Portbausteinen.

8.3 Technologieapplikationen (TA) / Antriebsprofile

Das Inverter Drive 8400 motec verfügt über verschiedene Antriebsprofile. Sie definieren eine standardisierte/individuelle Steuer- und Statuswortbelegung sowie die Standardisierung von Soll- und Istwert Normierungen.

Folgende Antriebsprofile werden vom Inverter Drive 8400 motec unterstützt:

- Lenze-Technologieapplikationen / Frei definierbare Parametersätze
- "AC Drive Profile"-Applikation

8.3.1 Lenze-Technologieapplikationen / Frei definierbare Parametersätze

Die im Inverter integrierten Technologieapplikationen liefern den Hauptsignalfluss zur Realisierung einer allgemeinen oder einer bestimmten Antriebslösung.

Für die Nutzung der Lenze-Technologieapplikationen – Auswahl im »Engineer« über Grundgeräte-Codestelle **C00005** – müssen die folgenden Assembly-Objektinstanzen im Leitrechner (Scanner) verwendet werden:

Instanz ID		Assembly-Objektinstanz
[dec]	[hex]	
110	0x6E	Custom Output (vom Scanner zum Adapter)
111	0x6F	Custom Input (vom Adapter zum Scanner)

Siehe auch Assembly Object (4 / 0x04) (📖 114).

Die Custom-Assemblies lassen auch, je nach Anwendungsfall, eine frei definierbare Parametrierung zu. So können im »Engineer« die Datenwörter mit Variablen der MCI-Portbausteine frei belegt werden.

Die frei definierbare Parametrierung kann ergänzend zur vorab eingestellten Technologieapplikation verwendet werden.

▸ Lenze-Technologieapplikation / Frei definierbare Parametersätze konfigurieren (📖 53)

Tipp!

Informationen zur Projektierung mit der Programmiersoftware »RSLogix 5000« von Rockwell finden Sie hier:

▸ I/O-Konfiguration mit »RSLogix 5000« bis Version 19 (📖 58)

▸ I/O-Konfiguration mit »RSLogix 5000« ab Version 20 (📖 63)

8.3.2 "AC Drive Profile"-Applikation

Das Inverter Drive 8400 motec unterstützt das EtherNet/IP-spezifische "AC Drive Profile".

Mit Grundgeräte-Codestelle **C00005 = "1100: AC Drive Profile"** wählen Sie die "AC Drive Profile"-Applikation aus.

Das "AC Drive Profile" enthält ...

- die Datenbasis für Motorparameter,
- Management-Funktionen der Geräte für die Motoransteuerung,
- gerätespezifische Funktionen des Inverters, z. B. Drehzahlrampen, Drehmomentregelung etc.

Für die Nutzung des "AC Drive Profile" müssen die folgenden Assembly-Objektinstanzen im Leitrechner (Scanner) verwendet werden:

Instanz ID		Assembly-Objektinstanz	
[dec]	[hex]		
20	0x14	Basic Speed Control Output	Outputs: vom Scanner zum Adapter
21	0x15	Extended Speed Control Output	
22	0x16	Speed and Torque Control Output	
23	0x17	Extended Speed and Torque Control Output	
70	0x46	Basic Speed Control Input	Inputs: vom Adapter zum Scanner
71	0x47	Extended Speed Control Input	
72	0x48	Speed and Torque Control Input	
73	0x49	Extended Speed and Torque Control Input	

Siehe auch:

- Assembly Object (4 / 0x04) (📖 114)
- "AC Drive Profile"-Objekte (📖 133)

Referenzhandbuch / »Engineer« Online-Hilfe zum Inverter Drive 8400 motec
Hier finden Sie ausführliche Informationen zur Verwendung des "AC Drive Profile".

Tipp!

Informationen zur Projektierung mit der Programmiersoftware »RSLogix 5000« von Rockwell finden Sie hier:

- ▶ I/O-Konfiguration mit »RSLogix 5000« bis Version 19 (📖 58)
- ▶ I/O-Konfiguration mit »RSLogix 5000« ab Version 20 (📖 63)

8.4 I/O-Assemblies

Hinweis!

Bei den Begriffen "Eingang" und "Ausgang" ist der Scanner der Bezugspunkt:
- Assembly-Eingangsobjekte (Input) werden vom Adapter zum Scanner gesendet.
- Assembly-Ausgangsobjekte (Output) werden vom Scanner zum Adapter gesendet.

Die Länge der I/O-Daten muss jeweils mit der resultierenden Länge der abgebildeten Ports übereinstimmen (I/O-Daten-Mapping (📖 48)).

Die Communication Unit unterstützt das Assembly Object (4 / 0x04) (📖 114) und die "AC Drive Profile"-Objekte (📖 133).

Für den Datenaustausch unterstützt die Communication Unit folgende Assembly-Objektinstanzen:

Applikation	Instanz ID		Assembly-Objektinstanz
	[dec]	[hex]	
Lenze-Technologieapplikationen / Frei definierbare Parametersätze	110	0x6E	Custom Output
	111	0x6F	Custom Input
"AC Drive Profile"-Applikation	20	0x14	Basic Speed Control Output
	21	0x15	Extended Speed Control Output
	22	0x16	Speed and Torque Control Output
	23	0x17	Extended Speed and Torque Control Output
	70	0x46	Basic Speed Control Input
	71	0x47	Extended Speed Control Input
	72	0x48	Speed and Torque Control Input
	73	0x49	Extended Speed and Torque Control Input

Assembly-Ausgangsobjekte (Outputs) werden im Allgemeinen zur Steuerung des Freigabe-/Sperrzustandes des Inverters und zur Bereitstellung der Geschwindigkeits- oder Drehmomentreferenzen eingesetzt.

Assembly-Eingangsobjekte (Inputs) werden üblicherweise zur Überwachung des Antriebszustandes und der Laufzeitgrößen wie Istgeschwindigkeit, Strom, Lage-Istwert und Lage-Fehler verwendet.

Abhängig von der durch den Scanner vorgegebenen Datenlänge kann das Speicherabbild der I/O-Daten unterschiedliche Größen besitzen.

Assembly-Ausgangsobjekte (Scanner ➜ Adapter)

Bei Assembly-Ausgangsobjekten wird ein 4-Byte-Header (32 Bit "Run/Idle-Header") vorausgesetzt. Bei der Abbildung der Assemblies wird dieser Header von den meisten Allen-Bradley PLC/SLC-Geräten automatisch in den Datenfluss eingefügt.

Unterstützt Ihre PLC – nicht wie die Rockwell-PLCs – diesen Header, ergänzen sie das Ausgangsabbild um einen führenden 32-Bit-Header.

Das **Bit 0** dieses Headers können Sie dann im Prozessabbild Ihrer PLC definieren:

- 0: Idle-Modus
- 1: Run-Modus

Für den Betrieb mit Rockwell-PLCs sind keine Anpassungen erforderlich.

Assembly-Eingangsobjekte (Adapter ➜ Scanner)

Die Assembly-Eingangsobjekte werden im Adapter-Speicher ab Byte 0 abgebildet.

Die Eingangsobjekte werden "modeless" übertragen, d. h. ein 4-Byte-Header (32 Bit "Run/Idle-Header") wird nicht mitübertragen.

Die Startadresse im Assembly-Speicherabbild ist daher der tatsächliche Beginn des ersten Assembly-Datenelements.

Beachten Sie bei der Abbildung der Eingangsobjekte auf den Steuerungsspeicher die tatsächlichen Assembly-Längen.

Der Inhalt der Eingangsdaten ist abhängig von der I/O-Datenanordnung im Inverter (I/O-Daten-Mapping (🕮 48)).

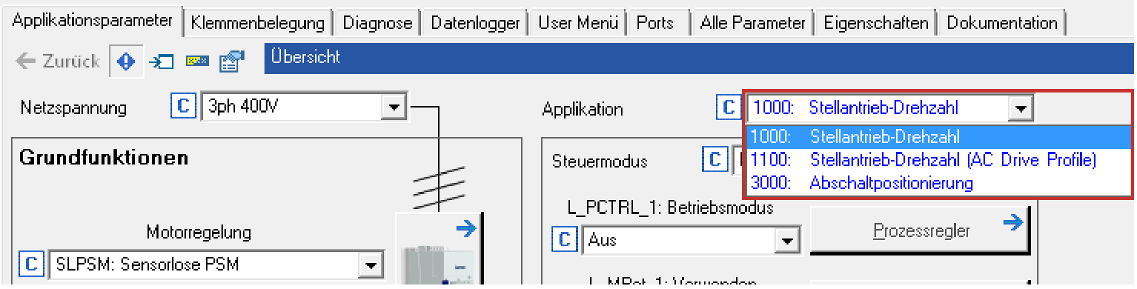
8.5 I/O-Konfiguration im »Engineer«

8.5.1 Lenze-Technologieapplikation / Frei definierbare Parametersätze konfigurieren

So konfigurieren Sie Lenze-Technologieapplikationen / frei definierbare Parametersätze im »Engineer«:

1. Unter der Registerkarte **Applikationsparameter** die Applikation auswählen (C00005 = 1000).

   Im Beispiel wird die Applikation "Stellantrieb Drehzahl" konfiguriert.



Netzspannung: 3ph 400V

Motorregelung: SLPSM: Sensorlose PSM

Applikation: 1000: Stellantrieb-Drehzahl

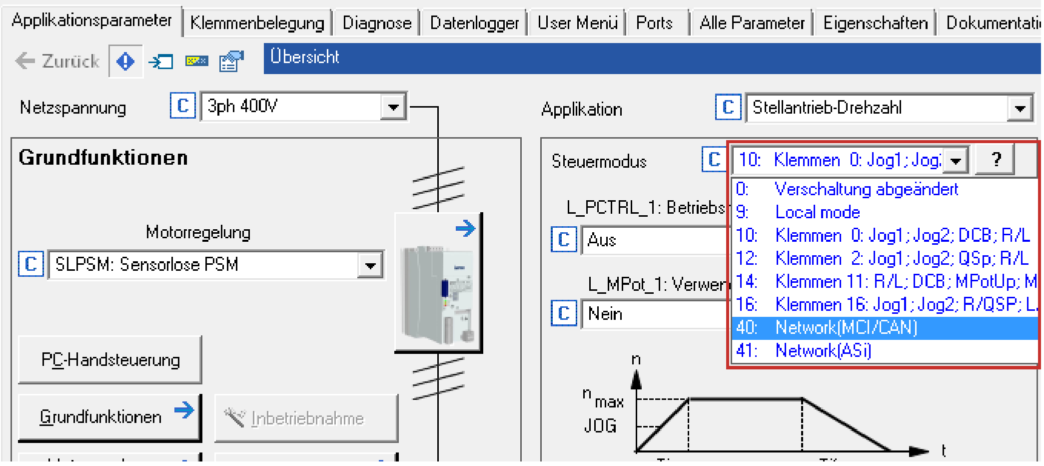
1000: Stellantrieb-Drehzahl
1100: Stellantrieb-Drehzahl (AC Drive Profile)
3000: Abschaltpositionierung

Steuermodus

L_PCTRL_1: Betriebsmodus: Aus

2. Voreinstellung der I/O-Konfiguration vornehmen.

   Steuermodus **"MCI"** auswählen (C00007 = 40).



Netzspannung: 3ph 400V

Motorregelung: SLPSM: Sensorlose PSM

Applikation: Stellantrieb-Drehzahl

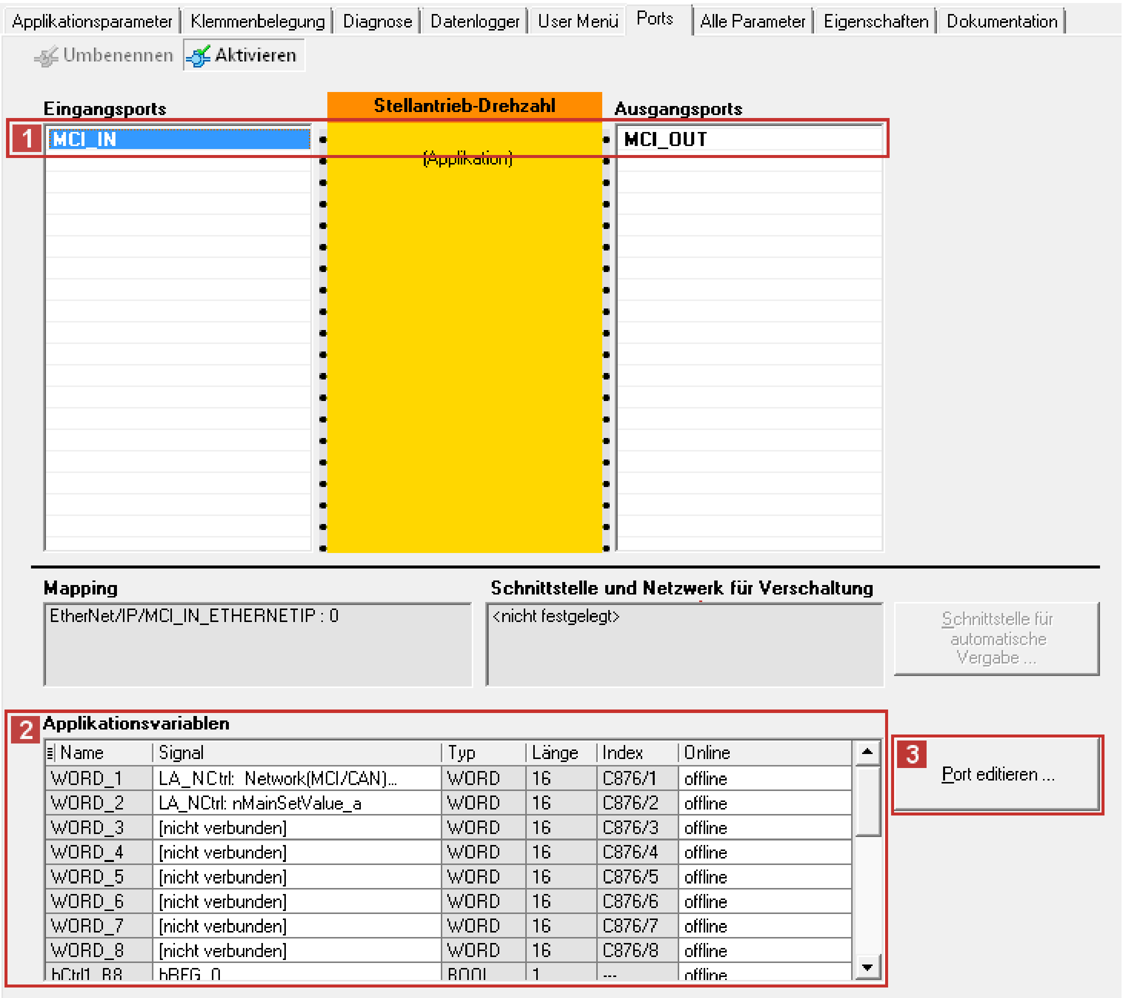
Steuermodus: 10: Klemmen 0: Jog1; Jog2

0: Verschaltung abgeändert
9: Local mode
10: Klemmen 0: Jog1; Jog2; DCB; R/L
12: Klemmen 2: Jog1; Jog2; QSp; R/L
14: Klemmen 11: R/L; DCB; MPotUp; M
16: Klemmen 16: Jog1; Jog2; R/QSP; L
40: Network(MCI/CAN)
41: Network(ASi)

L_PCTRL_1: Betriebs: Aus

L_MPot_1: Verwen: Nein

3. Unter der Registerkarte **Ports** werden die Port-Bausteine 1 **MCI_IN** und **MCI_OUT** für die I/O-Datenobjekte angezeigt.



Mapping

EtherNet/IP/MCI_IN_ETHERNETIP : 0

Schnittstelle und Netzwerk für Verschaltung

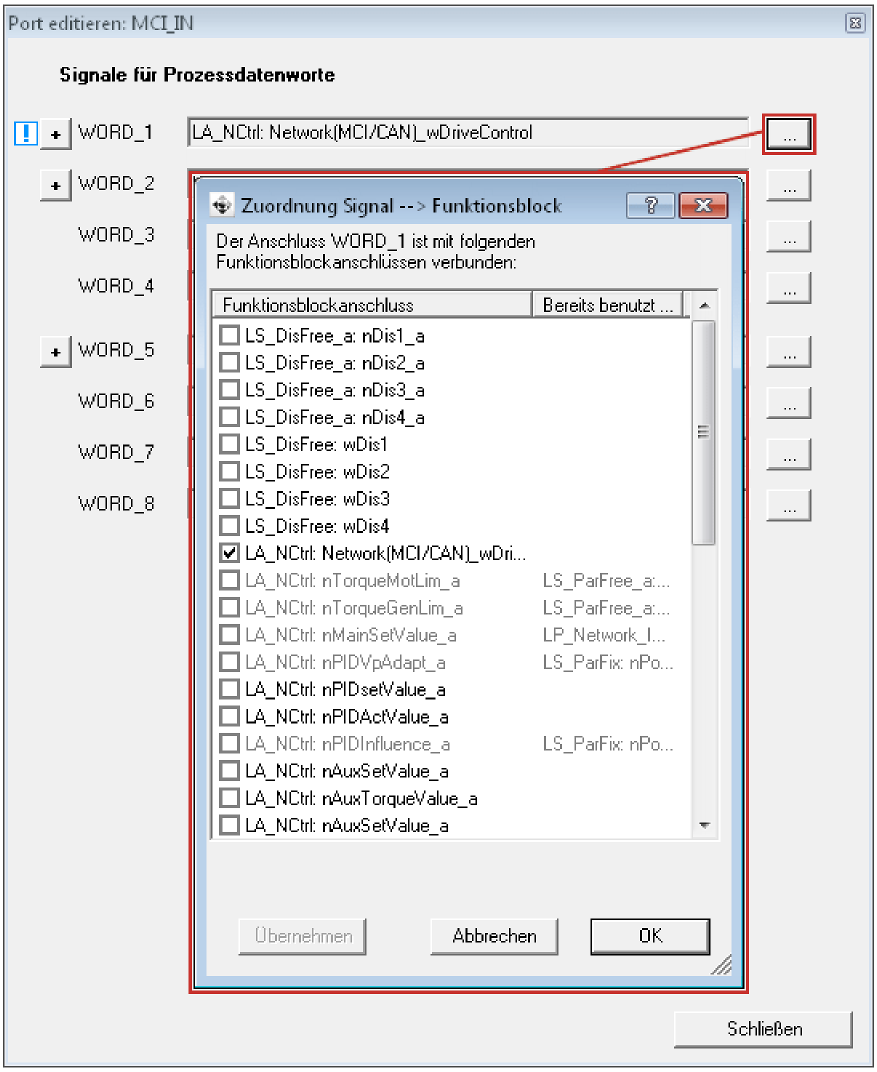
<nicht festgelegt>

2 **Applikationsvariablen**

Name	Signal	Typ	Länge	Index	Online
WORD_1	LA_NCtrl: Network(MCI/CAN)...	WORD	16	C876/1	offline
WORD_2	LA_NCtrl: nMainSetValue_a	WORD	16	C876/2	offline
WORD_3	[nicht verbunden]	WORD	16	C876/3	offline
WORD_4	[nicht verbunden]	WORD	16	C876/4	offline
WORD_5	[nicht verbunden]	WORD	16	C876/5	offline
WORD_6	[nicht verbunden]	WORD	16	C876/6	offline
WORD_7	[nicht verbunden]	WORD	16	C876/7	offline
WORD_8	[nicht verbunden]	WORD	16	C876/8	offline
bCtrl1_B8	bREG_0	BOOL	1	---	offline

- Durch Anklicken des gewünschten Ports, können Sie die vorkonfigurierte Signalverknüpfung der 2 **Applikationsvariablen** entnehmen.
- Wollen Sie die Signalverknüpfung ergänzen oder ändern, betätigen Sie die Schaltfläche 3 **Port editieren ...**.

4. Im Dialogfenster "Port editieren" können Sie über die Schaltfläche [...] den I/O-Datenwörtern Signale zuordnen.
   → Signale auswählen und anschließend die Schaltfläche **OK** betätigen.



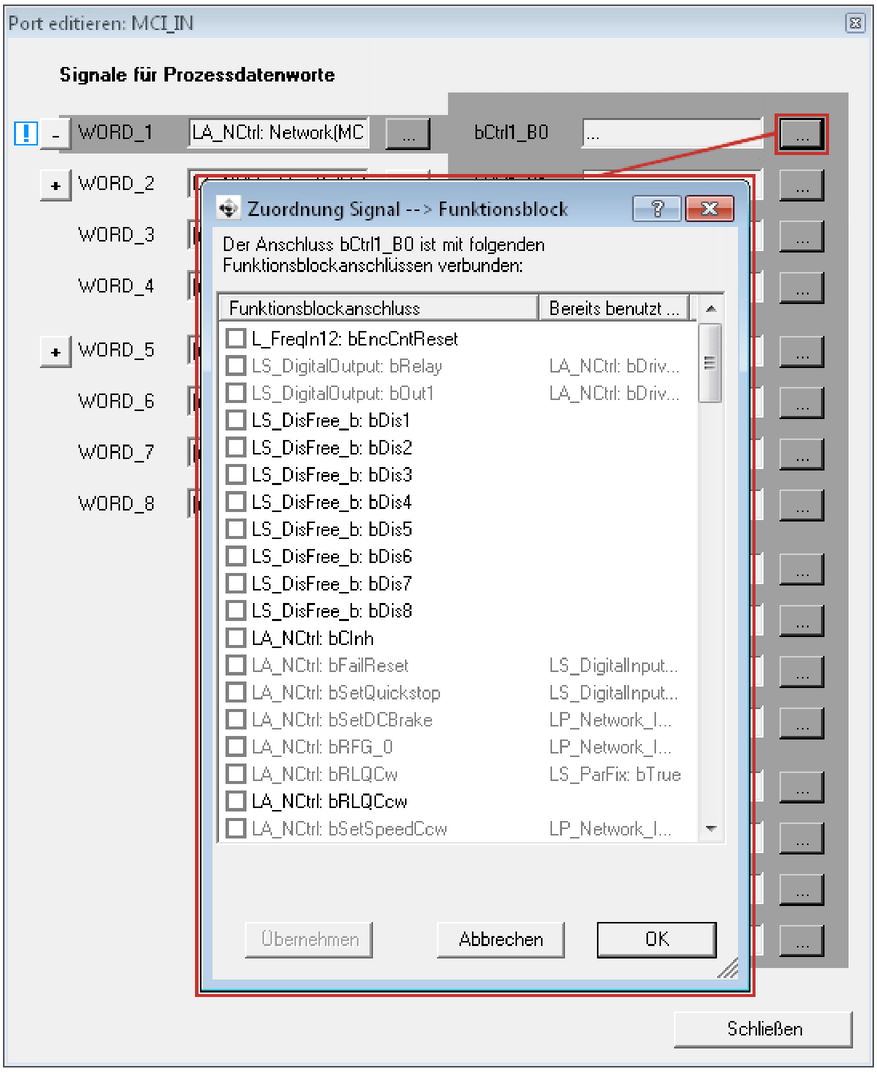
WORD_1: LA_NCtrl: Network(MCI/CAN)_wDriveControl

Der Anschluss WORD_1 ist mit folgenden Funktionsblockanschlüssen verbunden:

Funktionsblockanschluss	Bereits benutzt ...
☐ LS_DisFree_a: nDis1_a	
☐ LS_DisFree_a: nDis2_a	
☐ LS_DisFree_a: nDis3_a	
☐ LS_DisFree_a: nDis4_a	
☐ LS_DisFree: wDis1	
☐ LS_DisFree: wDis2	
☐ LS_DisFree: wDis3	
☐ LS_DisFree: wDis4	
☑ LA_NCtrl: Network(MCI/CAN)_wDri...	
☐ LA_NCtrl: nTorqueMotLim_a	LS_ParFree_a:...
☐ LA_NCtrl: nTorqueGenLim_a	LS_ParFree_a:...
☐ LA_NCtrl: nMainSetValue_a	LP_Network_I...
☐ LA_NCtrl: nPIDVpAdapt_a	LS_ParFix: nPo...
☐ LA_NCtrl: nPIDsetValue_a	
☐ LA_NCtrl: nPIDActValue_a	
☐ LA_NCtrl: nPIDInfluence_a	LS_ParFix: nPo...
☐ LA_NCtrl: nAuxSetValue_a	
☐ LA_NCtrl: nAuxTorqueValue_a	
☐ LA_NCtrl: nAuxSetValue_a	

Zudem können Sie an einigen Datenwörtern über die Schaltflächen + und ... einzelnen Bits Signale zuordnen.

➞ Signale auswählen und anschließend die Schaltfläche **OK** betätigen.



Der Anschluss bCtrl1_B0 ist mit folgenden Funktionsblockanschlüssen verbunden:

Funktionsblockanschluss	Bereits benutzt ...
☐ L_FreqIn12: bEncCntReset	
☐ LS_DigitalOutput: bRelay	LA_NCtrl: bDriv...
☐ LS_DigitalOutput: bOut1	LA_NCtrl: bDriv...
☐ LS_DisFree_b: bDis1	
☐ LS_DisFree_b: bDis2	
☐ LS_DisFree_b: bDis3	
☐ LS_DisFree_b: bDis4	
☐ LS_DisFree_b: bDis5	
☐ LS_DisFree_b: bDis6	
☐ LS_DisFree_b: bDis7	
☐ LS_DisFree_b: bDis8	
☐ LA_NCtrl: bCInh	
☐ LA_NCtrl: bFailReset	LS_DigitalInput...
☐ LA_NCtrl: bSetQuickstop	LS_DigitalInput...
☐ LA_NCtrl: bSetDCBrake	LP_Network_I...
☐ LA_NCtrl: bRFG_0	LP_Network_I...
☐ LA_NCtrl: bRLQCw	LS_ParFix: bTrue
☐ LA_NCtrl: bRLQCcw	
☐ LA_NCtrl: bSetSpeedCcw	LP_Network_I...

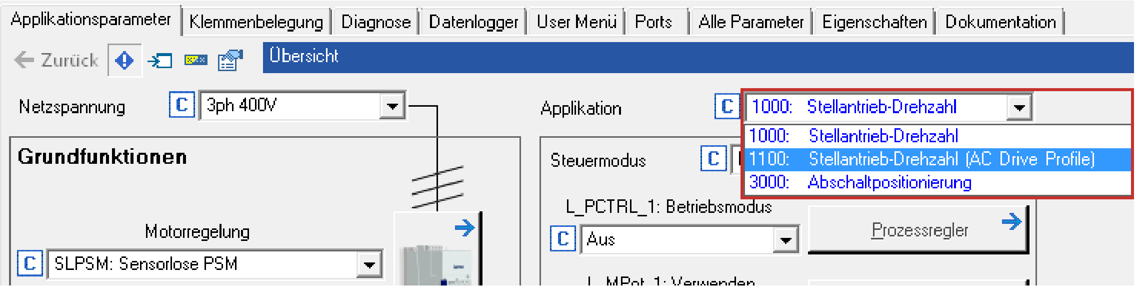
5. Mit der Grundgeräte-Codestelle **C00002** den Befehl **"11: Alle Parametersätze speichern"** ausführen.

   Die geänderten Einstellungen werden aktiviert und netzausfallsicher gespeichert.

8.5.2 "AC Drive Profile"-Applikation konfigurieren

So konfigurieren Sie die "AC Drive Profile"-Applikation im »Engineer«:

1. Unter der Registerkarte **Applikationsparameter** die "AC Drive Profile"-Applikation auswählen (C00005 = 1100).



Netzspannung C 3ph 400V

Applikation C 1000: Stellantrieb-Drehzahl

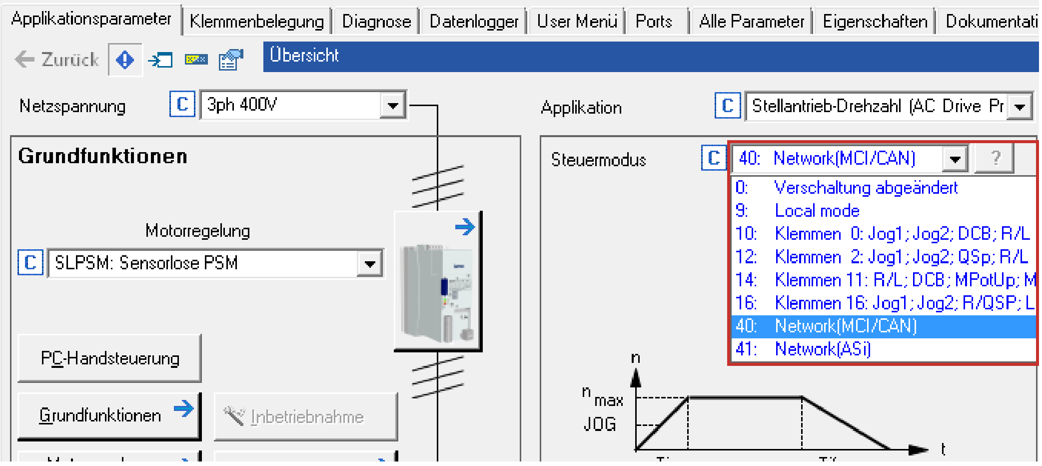
Steuermodus C

Motorregelung C SLPSM: Sensorlose PSM

L_PCTRL_1: Betriebsmodus C Aus

2. Voreinstellung der I/O-Konfiguration vornehmen.

   Steuermodus **"MCI"** auswählen (C00007 = 40).



Netzspannung C 3ph 400V

Applikation C Stellantrieb-Drehzahl (AC Drive Pr

Steuermodus C 40: Network(MCI/CAN)

Motorregelung C SLPSM: Sensorlose PSM

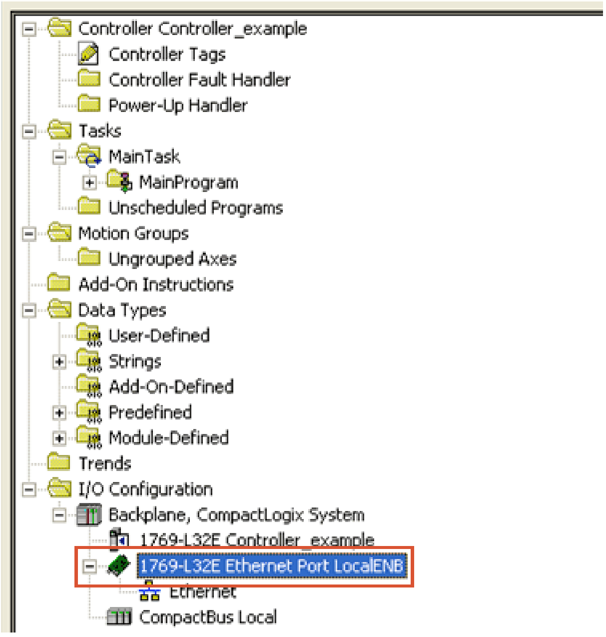
8.6 I/O-Konfiguration mit »RSLogix 5000« bis Version 19

Im Folgenden wird beispielhaft die I/O-Konfiguration der Allen-Bradley CompactLogix-Steuerung 1769-L32E mit der Rockwell-Programmiersoftware »RSLogix 5000« bis Version 19 beschrieben.

Bis einschließlich Software-Version 19 erfolgt die I/O-Konfiguration ohne EDS-Dateien.

So erfolgt die I/O-Konfiguration am Beispiel der CompactLogix-Steuerung 1769-L32E mit »RSLogix 5000«:

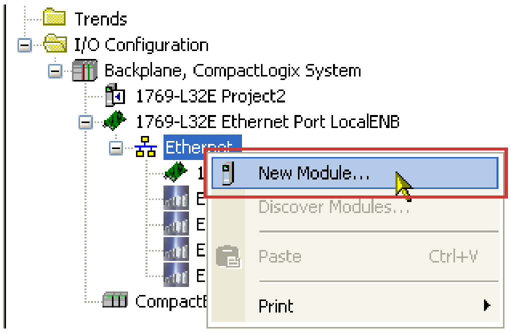
1. Im Konfigurationsbaum auf den Ordner **I/O Configuration** klicken.



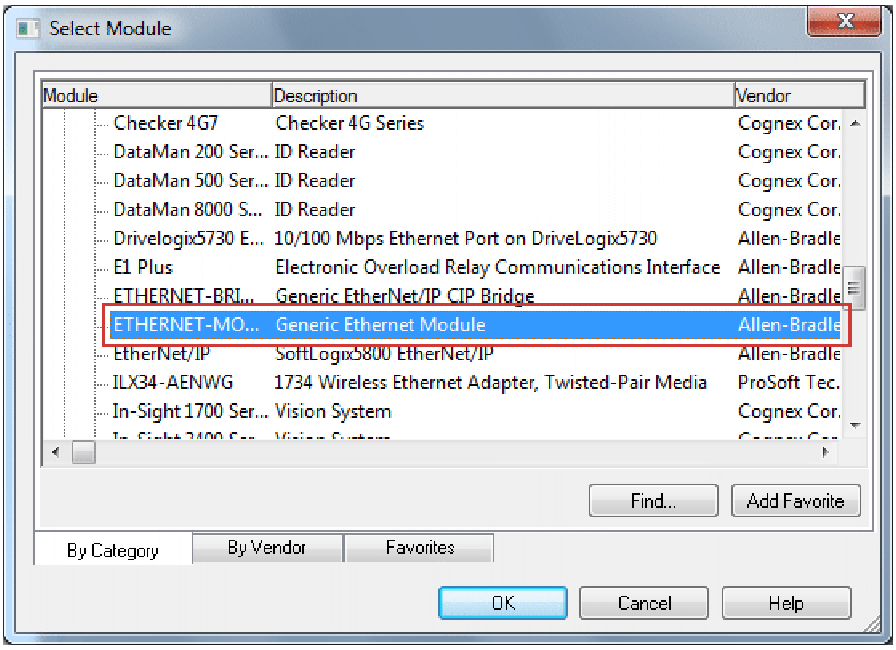
Bei der CompactLogix-Steuerung 1769-L32E enthält die I/O-Konfiguration bereits einen lokalen Ethernet-Port.

Wird eine SoftLogic- oder ControlLogix-Steuerung verwendet, so muss ein Ethernet-Port-Scanner zur Konfiguration hinzugefügt werden.

2. Mit der rechten Maustaste auf "Ethernet" klicken und im Kontextmenü den Befehl **"New Module ..."** ausführen.



3. "Communications" öffnen und "ETHERNET-MODULE | Generic Ethernet Module" auswählen.



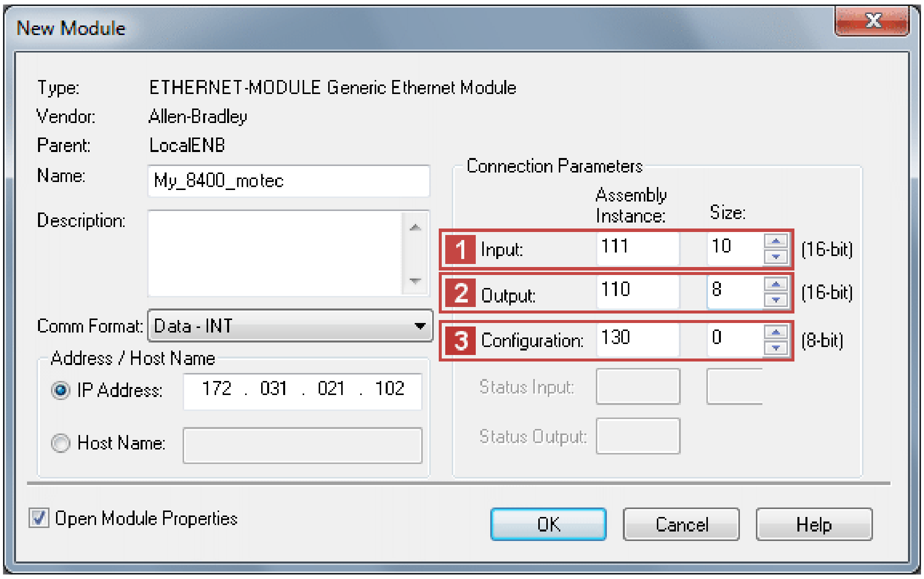
Module	Description	Vendor
Checker 4G7	Checker 4G Series	Cognex Cor.
DataMan 200 Ser...	ID Reader	Cognex Cor.
DataMan 500 Ser...	ID Reader	Cognex Cor.
DataMan 8000 S...	ID Reader	Cognex Cor.
Drivelogix5730 E...	10/100 Mbps Ethernet Port on DriveLogix5730	Allen-Bradle
E1 Plus	Electronic Overload Relay Communications Interface	Allen-Bradle
ETHERNET-BRI...	Generic EtherNet/IP CIP Bridge	Allen-Bradle
ETHERNET-MO...	Generic Ethernet Module	Allen-Bradle
EtherNet/IP	SoftLogix5800 EtherNet/IP	Allen-Bradle
ILX34-AENWG	1734 Wireless Ethernet Adapter, Twisted-Pair Media	ProSoft Tec.
In-Sight 1700 Ser...	Vision System	Cognex Cor.

4. Die Auswahl mit der Schaltfläche **OK** bestätigen.

5. Im Dialogfenster "New Module" die Eigenschaften des neu hinzugefügten Gerätes festlegen.

   Bei den Begriffen "Eingang" und "Ausgang" ist der Scanner der Bezugspunkt:
   - Assembly-Eingangsobjekte (Input) werden vom Adapter zum Scanner gesendet.
   - Assembly-Ausgangsobjekte (Output) werden vom Scanner zum Adapter gesendet.

Einstellungen für Lenze-Technologieapplikationen oder frei definierbare Parametersätze:



New Module

Type: ETHERNET-MODULE Generic Ethernet Module
Vendor: Allen-Bradley
Parent: LocalENB
Name: My_8400_motec
Description:
Comm Format: Data - INT
Address / Host Name
● IP Address: 172 . 031 . 021 . 102
○ Host Name:

Connection Parameters

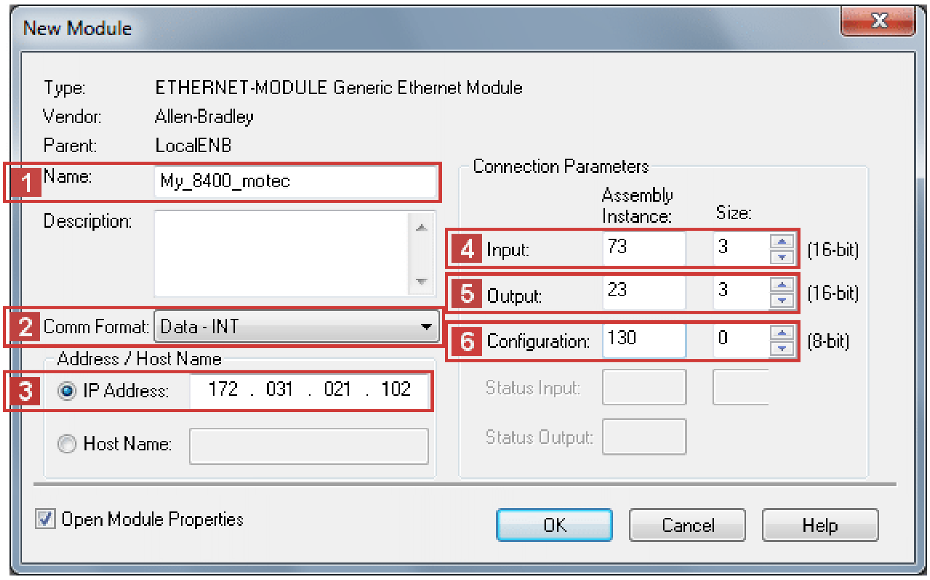
	Assembly Instance:	Size:	
1 Input:	111	10	(16-bit)
2 Output:	110	8	(16-bit)
3 Configuration:	130	0	(8-bit)
Status Input:			
Status Output:			

☑ Open Module Properties

Wenn Sie eine Lenze-Technologieapplikation oder einen individuellen Parametersatz im Inverter verwenden, können Sie mit der Assembly-Objektinstanz 1 **"Input = 111"** bis zu 10 frei definierbare Wörter (INT) über den Port MCI_OUT austauschen. Mit der Assembly-Objektinstanz 2 **"Output = 110"** können Sie bis zu 8 frei definierbare Wörter (INT) über den Port MCI_IN austauschen.

Geben Sie unter 3 "Configuration" die **Assembly-Instanz "130"** und die **Größe "0"** ein.

Einstellungen für eine "AC Drive Profile"-Applikation:



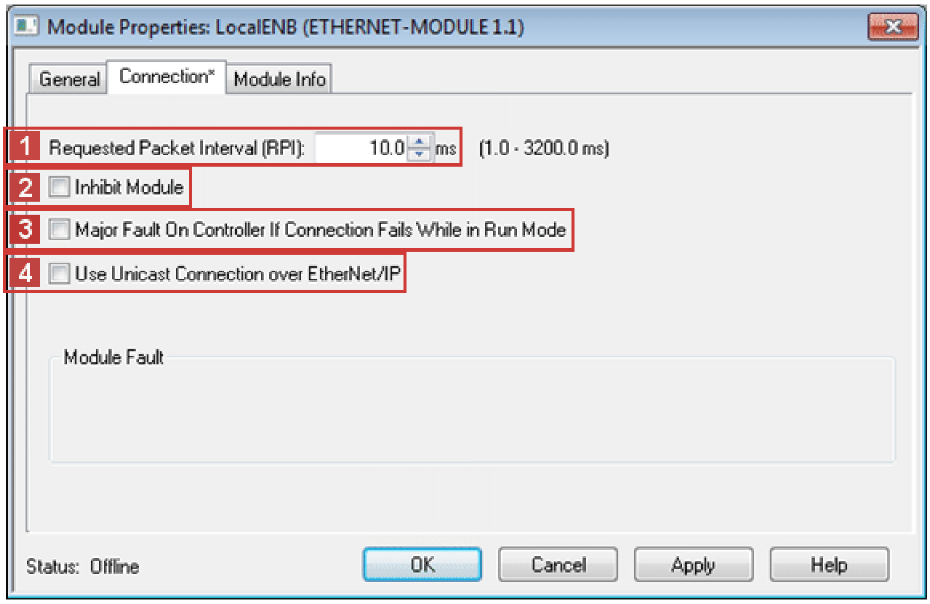
Type: ETHERNET-MODULE Generic Ethernet Module
Vendor: Allen-Bradley
Parent: LocalENB
Name: My_8400_motec
Description:
Comm Format: Data - INT
● IP Address: 172 . 031 . 021 . 102
Input: 73 3 (16-bit)
Output: 23 3 (16-bit)
Configuration: 130 0 (8-bit)
☑ Open Module Properties

Die hier gezeigten Assembly-Objektinstanzen 4 **"Input = 73"** und 5 **"Output = 23"** zeigen beispielhaft die Verwendung des AC Drive Profiles "Extended Speed and Torque".

Einstellungen		Beschreibung
1	**Name**	Gerätename oder Typ des Inverters, üblicherweise mit Bezug zum Prozess (im Beispiel "My_8400_motec")
2	**Comm Format**	Datenformat für die Assembly-Objektinstanzen (Bereich "Connection Parameters")
3	**IP-Adress**	IP-Adresse des Inverters • Die IP-Adresse muss im selben Subnetzwerk liegen wie die Steuerung. (Abhängig von der Subnetzmaske; in der Regel müssen die ersten 3 Oktette der IP-Adresse übereinstimmen.) • DNS wird nicht unterstützt; der Hostname hat lediglich gerätebeschreibenden Charakter.
4	**Input**	Assembly-Objektinstanz für Eingangsobjekte • Max. 10 Eingangsdatenwörter (20 Bytes, 16 Bits/Wort) • Die Anzahl der Eingangsdaten muss mit der resultierenden Länge der abgebildeten Ports im Sende-PDO (PDO_TX0) übereinstimmen, sonst wird die Verbindung mit der Fehlermeldung "Invalid Target to Originator Size" (0x0128) vom Adapter abgelehnt. • In der Assembly-Objektinstanz **111 (0x6F, Custom Input)** werden in den letzten beiden Wörtern die I/O-Daten eingetragen (siehe I/O-Daten konfigurieren (📖 46)) ▸ I/O-Daten-Mapping (📖 48)
5	**Output**	Assembly-Objektinstanz für Ausgangsobjekte • Max. 8 Ausgangsdatenwörter (16 Bytes, 16 Bits/Wort) • Die Anzahl der Ausgangsdaten muss mit der resultierende Länge der abgebildeten Ports im Empfangs-PDO (PDO_RX0) übereinstimmen, sonst wird die Verbindung mit der Fehlermeldung "Invalid Originator to Target Size" (0x0127) vom Adapter abgelehnt. ▸ I/O-Daten-Mapping (📖 48)
6	**Configuration**	Geben Sie für die Konfiguration die **Assembly-Instanz "130"** und die **Größe "0"** ein. Diese Werte sind erforderlich!

6. Die Einstellungen mit der Schaltfläche **OK** beenden.

7. Im Konfigurationsbaum unter **I/O Configuration** mit der rechten Maustaste auf "1769-L32E Ethernet Port LocalENB" klicken und "Properties" auswählen.
8. Unter der Registerkarte **Connection** weitere Eigenschaften einstellen.


Module Properties: LocalENB (ETHERNET-MODULE 1.1)

1 Requested Packet Interval (RPI): 10.0 ms (1.0 - 3200.0 ms)
2 ☐ Inhibit Module
3 ☐ Major Fault On Controller If Connection Fails While in Run Mode
4 ☐ Use Unicast Connection over EtherNet/IP

Module Fault

Status: Offline

Erforderliche Einstellung

Einstellung		Beschreibung
1	**Requested Packet Interval (RPI)**	**RPI ≥ 4.0 ms** einstellen. (Standard-Einstellung: 10 ms) Das RPI [ms] gibt an, in welchen Intervallen die I/O-Daten zwischen Inverter (Adapter) und Steuerung (Scanner) ausgetauscht werden.

Optionale Einstellungen

Einstellungen		Beschreibung
2	**Inhibit Module**	Mit dieser Option können Sie die Kommunikation zum Adapter unterbrechen oder sperren.
3	**Major Fault On Controller If Connection Fails While In Run Mode**	Mit dieser Option können Sie die Steuerung auch in den Fehlerzustand versetzen, wenn die EtherNet/IP-Verbindung zum Inverter ausfällt, während die Steuerung im Betrieb ist.
4	**Use Unicast Connection over EtherNet/IP**	**Option deaktiviert (Standard-Einstellung):** • Die Eingangsdaten werden mittels **Multicast-Telegrammen** vom Adapter an den Scanner gesendet. • Neben dem aktuell zu konfigurierenden Scanner können noch weitere Scanner auf die Daten zugreifen ("Listen only"- oder "Input only"-Verbindungen).
		Option aktiviert: Die Eingangsdaten werden mittels **Unicast-Telegrammen** vom Adapter an den Scanner gesendet.

9. Die Einstellungen mit der Schaltfläche **OK** beenden.
   - Die I/O-Konfiguration ist nun vollständig.
   - Die entsprechenden Tags werden anschließend in den "Controller Tags" des Steuerungsprojekts erzeugt.
10. Abschließend die I/O-Konfiguration in »RSLogix 5000« speichern (🕮 73).

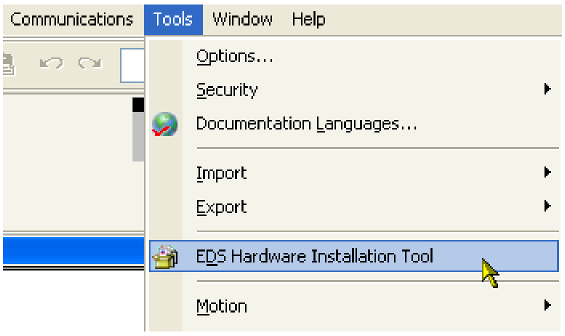
8.7 I/O-Konfiguration mit »RSLogix 5000« ab Version 20

Im Folgenden wird beispielhaft die I/O-Konfiguration der Allen-Bradley CompactLogix-Steuerung 1769-L32E mit der Rockwell-Programmiersoftware »RSLogix 5000« ab Version 20 beschrieben.

Ab Software-Version 20 erfolgt die I/O-Konfiguration mit Hilfe von EDS-Dateien (📖 28).

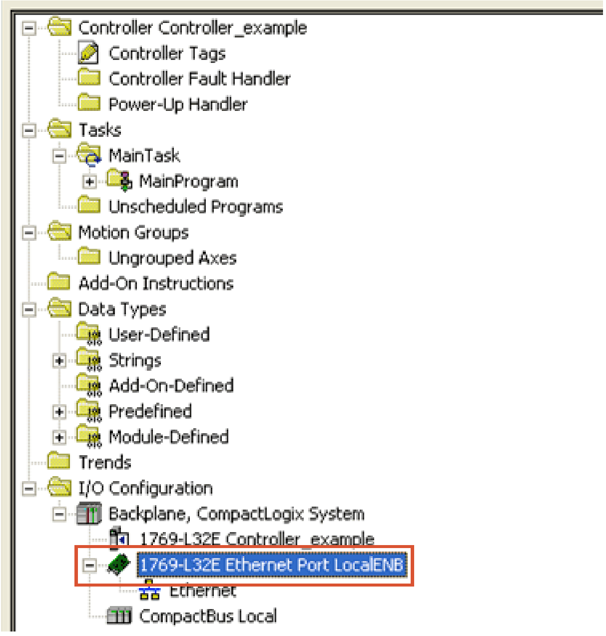
So erfolgt die I/O-Konfiguration am Beispiel der CompactLogix-Steuerung 1769-L32E mit »RSLogix 5000«:

1. Mit dem "EDS Hardware Installation Tool" die EDS-Dateien (📖 28) der EtherNet/IP-Teilnehmer importieren.



In »RSLogix 5000« ist der Dialog zum "EDS Hardware Installation Tool" selbsterklärend und wird hier nicht weiter beschrieben.

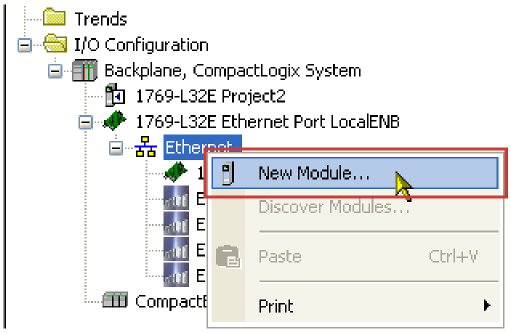
2. Im Konfigurationsbaum auf den Ordner **I/O Configuration** klicken.



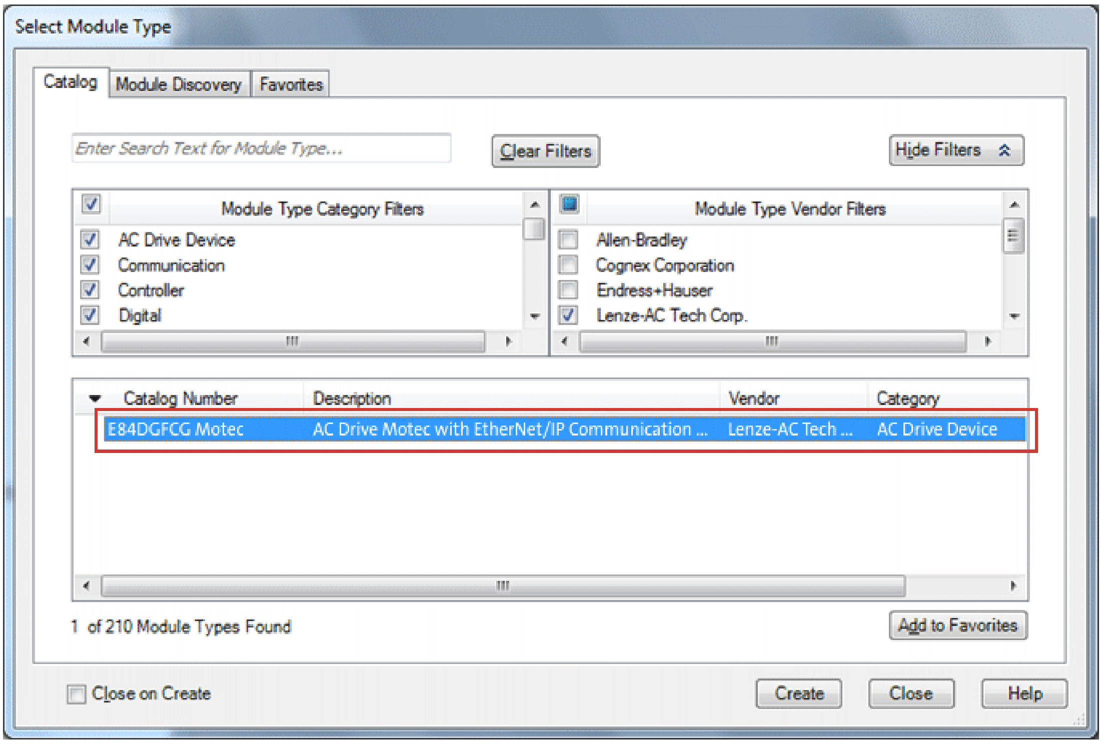
Bei der CompactLogix-Steuerung 1769-L32E enthält die I/O-Konfiguration bereits einen lokalen Ethernet-Port.

Wird eine SoftLogic- oder ControlLogix-Steuerung verwendet, so muss ein Ethernet-Port-Scanner zur Konfiguration hinzugefügt werden.

3. Mit der rechten Maustaste auf "Ethernet" klicken und im Kontextmenü den Befehl **"New Module ..."** ausführen.



4. Im Dialogfenster "Select Module Type" unter der Registerkarte **Catalog** "E84DGFCG Motec" auswählen.



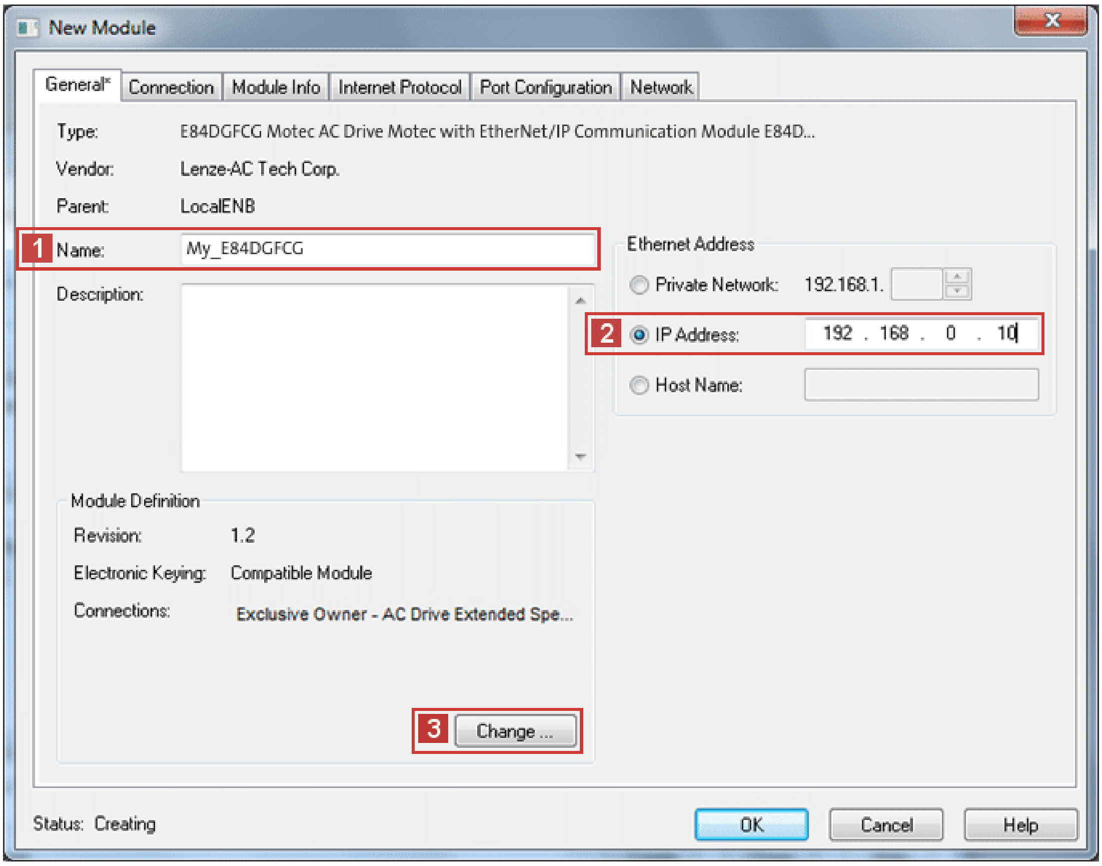
Catalog Number	Description	Vendor	Category
E84DGFCG Motec	AC Drive Motec with EtherNet/IP Communication ...	Lenze-AC Tech ...	AC Drive Device

1 of 210 Module Types Found

5. Die Auswahl mit der Schaltfläche **Create** bestätigen.

6. Im Dialogfenster "New Module" unter der Registerkarte **General** einen 1 **Namen** und eine eindeutige 2 **IP-Adresse** vergeben.

   Beispiel-Einstellungen:



Type: E84DGFCG Motec AC Drive Motec with EtherNet/IP Communication Module E84D...
Vendor: Lenze-AC Tech Corp.
Parent: LocalENB
Name: My_E84DGFCG
Description:

Ethernet Address
○ Private Network: 192.168.1.
● IP Address: 192 . 168 . 0 . 10
○ Host Name:

Module Definition
Revision: 1.2
Electronic Keying: Compatible Module
Connections: Exclusive Owner - AC Drive Extended Spe...

Status: Creating

   DNS wird nicht unterstützt; der Hostname hat lediglich gerätebeschreibenden Charakter.

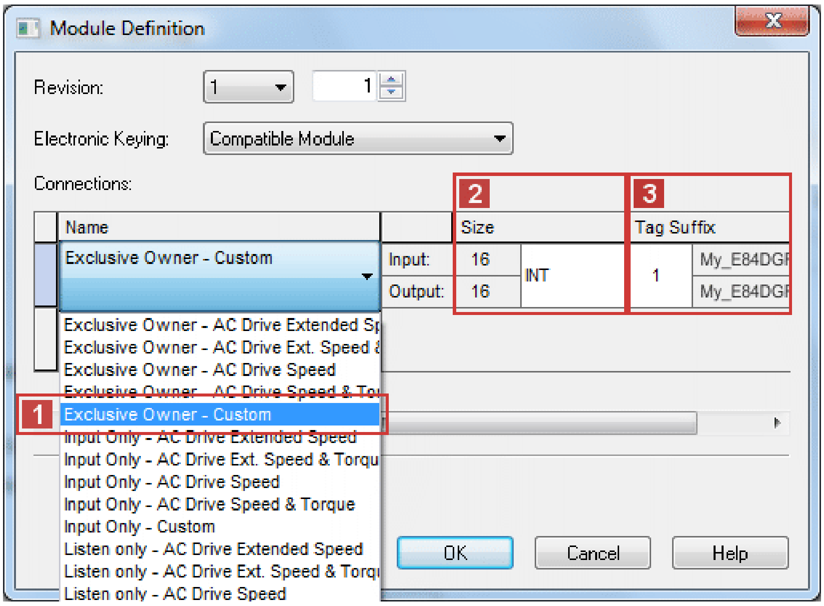
7. Die Schaltfläche 3 **Change ...** betätigen.

8. Im Dialogfenster "Module Definition" Verbindungseinstellungen vornehmen.

   Bei den Begriffen "Eingang" und "Ausgang" ist der Scanner der Bezugspunkt:
   - Assembly-Eingangsobjekte (Input) werden vom Adapter zum Scanner gesendet.
   - Assembly-Ausgangsobjekte (Output) werden vom Scanner zum Adapter gesendet.

Einstellungen für Lenze-Technologieapplikationen oder frei definierbare Parametersätze:

- **1** **"Exclusive Owner - Custom"**-Verbindung wählen.
  Wenn Sie die Lenze-Technologieapplikationen oder frei definierbare Parametersätze im Inverter verwenden, ist immer die Auswahl der Assembly-Objektinstanz "Exclusive Owner - Custom" erforderlich.
- **2** **Datentyp = INT** einstellen.
  Der Datentyp INT wird über die Ports MCI_IN und MCI_OUT des Inverter Drive 8400 motec ausgetauscht. Beim Datentyp SINT ist eine zusätzliche PLC-Logik zur Konvertierung notwendig.
  Bei "Exclusive Owner - Custom"-Verbindung: Input = 8, Output = 10 einstellen.
  Bei "Exclusive Owner - AC Drive ..."-Verbindungen: Input = 3, Output = 3 einstellen.
- **3** **Tag-Suffix = 1** einstellen.
  Ein Tag-Suffix formuliert einen modulbeschreibenden Tag-Namen.



Module Definition

Revision: 1 1

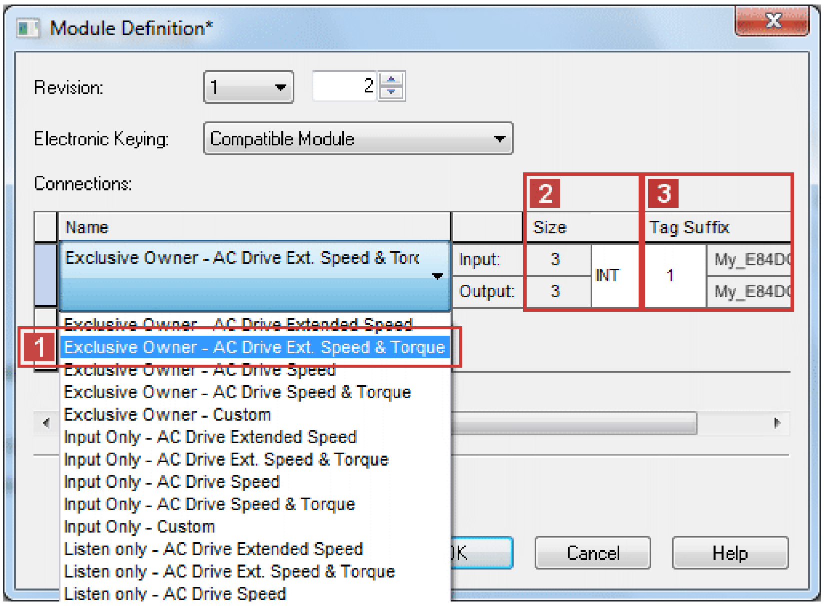
Electronic Keying: Compatible Module

Connections:

Name		Size		Tag Suffix	
Exclusive Owner - Custom	Input:	16	INT	1	My_E84DGF
	Output:	16			My_E84DGF

Einstellungen für eine "AC Drive Profile"-Applikation:

- 1 **"AC Drive"**-Verbindung wählen.
  Im Beispiel wird das AC Drive Profile "Exclusive Owner - AC Drive Ext. Speed & Torque" verwendet.
- 2 **Datentyp = INT** einstellen.
  Der Datentyp INT wird über die Ports MCI_IN und MCI_OUT des Inverter Drive 8400 motec ausgetauscht. Beim Datentyp SINT ist eine zusätzliche PLC-Logik zur Konvertierung notwendig.
- 3 **Tag-Suffix = 1** einstellen.
  Ein Tag-Suffix formuliert einen modulbeschreibenden Tag-Namen.



Module Definition*

Revision: 1 2

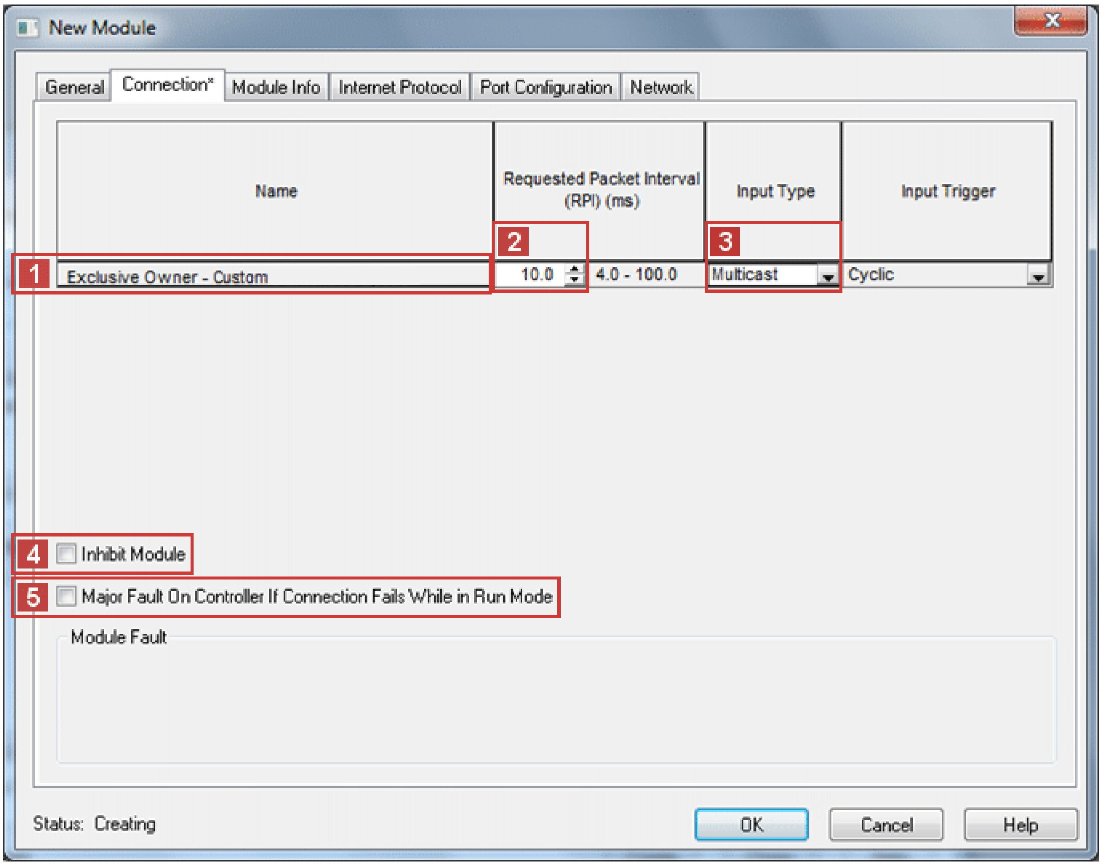
Electronic Keying: Compatible Module

Connections:

Name		Size		Tag Suffix
Exclusive Owner - AC Drive Ext. Speed & Torc	Input:	3	INT	My_E84D(
	Output:	3		My_E84D(

9. Die Einstellungen mit der Schaltfläche **OK** beenden.

10. Im Dialogfenster "New Module" unter der Registerkarte **Connection** weitere Eigenschaften einstellen.



Unter 1 **"Name"** wird die Bezeichnung der unter 8. eingestellten Verbindung angezeigt.

Im Beispiel wird eine "Exclusive Owner - Custom"-Verbindung angezeigt. Entsprechend kann hier auch die Bezeichnung einer "AC Drive Profile"-Verbindung angezeigt werden.

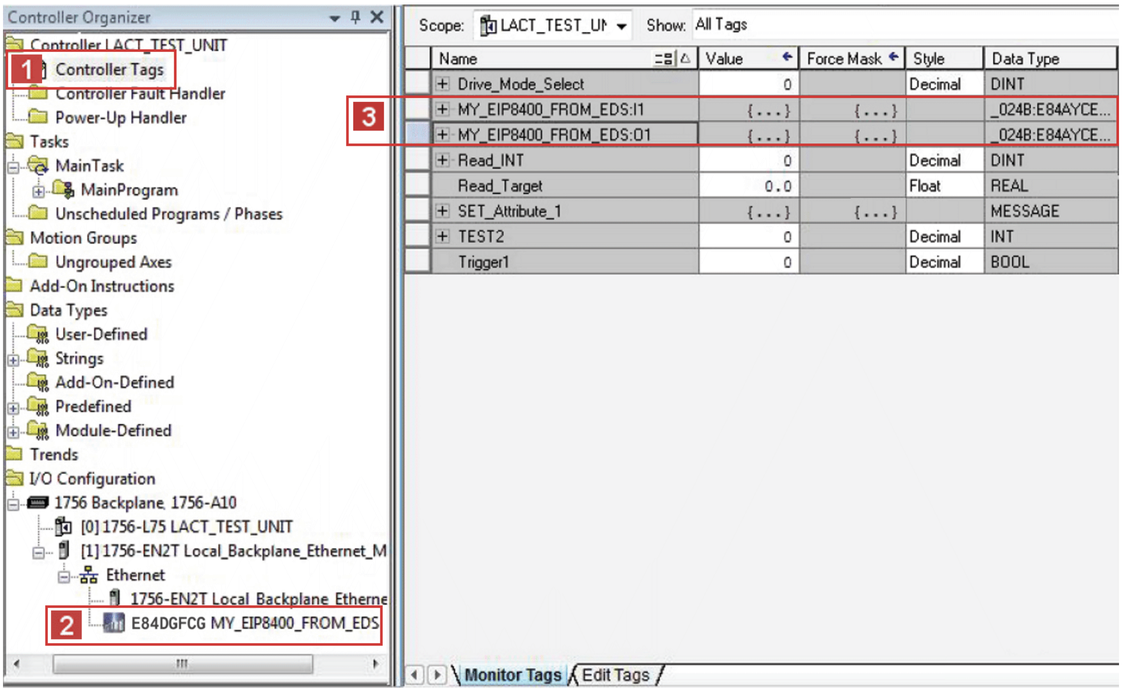
Erforderliche Einstellungen

Einstellungen		Beschreibung
2	**Requested Packet Interval (RPI)**	**RPI** ≥ **4.0 ms** einstellen. (Standard: 10 ms) Das RPI [ms] gibt an, in welchen Intervallen die I/O-Daten zwischen Inverter (Adapter) und Steuerung (Scanner) ausgetauscht werden.
3	**Input Type**	Eingangs-Typ **"Multicast"** wählen. • Die Eingangsdaten werden mittels Multicast-Telegrammen vom Adapter an den Scanner gesendet. • Neben dem aktuell zu konfigurierenden Scanner können noch weitere Scanner auf die Daten zugreifen ("Listen only"- oder "Input only"-Verbindungen).

Optionale Einstellungen

Einstellungen		Beschreibung
4	**Inhibit Module**	Mit dieser Option können Sie die Kommunikation zum Adapter unterbrechen oder sperren.
5	**Major Fault On Controller If Connection Fails While In Run Mode**	Mit dieser Option können Sie die Steuerung auch in den Fehlerzustand versetzen, wenn die EtherNet/IP-Verbindung zum Inverter ausfällt, während die Steuerung im Betrieb ist.

11. Die Einstellungen mit der Schaltfläche **OK** beenden.
    - Der Inverter wird unter der 2 **"I/O Configuration"** im Konfigurationsbaum eingefügt.
    - Die entsprechenden Tags werden in den 1 **"Controller Tags"** erzeugt.
    - Im 3 Beispiel erscheinen die ...
      Eingangs-Assembly-Tags als "MY_EIP8400_FROM_EDS:I1";
      Ausgangs-Assembly-Tags als "MY_EIP8400_FROM_EDS:O1";



Scope: LACT_TEST_UN Show: All Tags

Name	Value	Force Mask	Style	Data Type
+ Drive_Mode_Select	0		Decimal	DINT
+ MY_EIP8400_FROM_EDS:I1	{...}	{...}		_024B:E84AYCE...
+ MY_EIP8400_FROM_EDS:O1	{...}	{...}		_024B:E84AYCE...
+ Read_INT	0		Decimal	DINT
Read_Target	0.0		Float	REAL
+ SET_Attribute_1	{...}	{...}		MESSAGE
+ TEST2	0		Decimal	INT
Trigger1	0		Decimal	BOOL

Wenn Sie auf "+" vor dem Assembly-Tag-Namen klicken, werden darunter alle im Assembly-Tag enthaltenen Daten angezeigt. Sie können "Alias-Tags" erzeugen, um auf einzelne Bits des Assembly-Tags zu referenzieren.

12. Ein "Alias-Tag" erzeugen.

Beispiel mit der Assembly-Objektinstanz 23 (0x17):

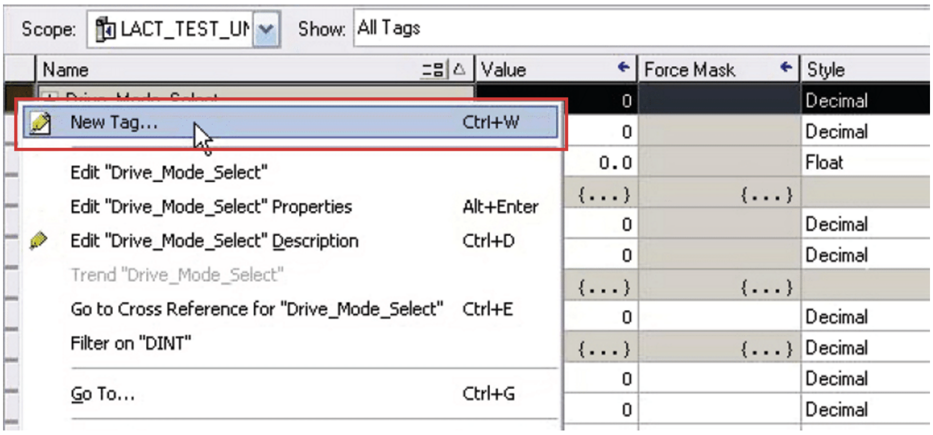
Für einen Vorwärtslauf eines Förderers soll das Bit ’0’ (Run Fwd) von Byte ’0’referenziert werden.

Instanz	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
23 (0x17)	**0**		Net Ref	NetCtrl			Fault Reset	Run Rev	**Run Fwd**
	1								
	2	Speed Reference (Low Byte)							
	3	Speed Reference (High Byte)							
	4	Torque Reference (Low Byte)							
	5	Torque Reference (High Byte)							

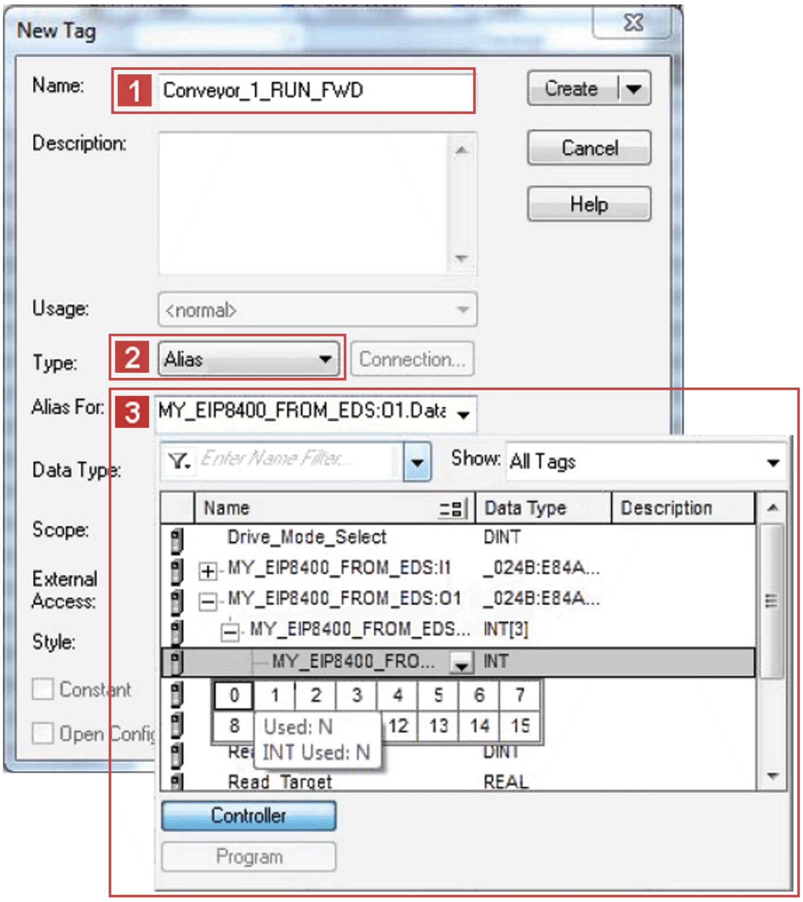
Hinweis!

- **NetCtrl (Bit 5)** und **NetRef (Bit 6)** müssen gesetzt sein, damit der Inverter Start/Stopp-Befehle und Drehzahl/Drehmoment-Befehle über das Netzwerk entgegennehmen kann.
- Um die Drehmomentregelung bei der **Assembly-Objektinstanz 23 (0x17)** nutzen zu können, muss das Attribut "DriveMode" mittels expliziter Nachrichtenübertragung geschrieben werden.
  ▶ Attribut "DriveMode" schreiben (📖 138)

Mit der rechten Maustaste auf ein Assembly-Tag klicken und im Kontextmenü den Befehl **"New Tag..."** auswählen.



13. Im Dialogfenster "New Tag" ...
    - einen 1 **Namen** für das Tag vergeben (im Beispiel "Conveyor_1_RUN_FWD");
    - 2 **Typ = "Alias"** einstellen;
    - die 3 **Alias-Adresse** auswählen, die für das Alias-Tag referenziert werden soll. (im Beispiel "MY_EIP8400_FROM_EDS:O1.Data(0).0" (Bit ’0’ von Byte ’0’)



Name: Conveyor_1_RUN_FWD

Description:

Usage: <normal>

Type: Alias

Alias For: MY_EIP8400_FROM_EDS:O1.Data

Data Type:

Scope:

External Access:

Style:

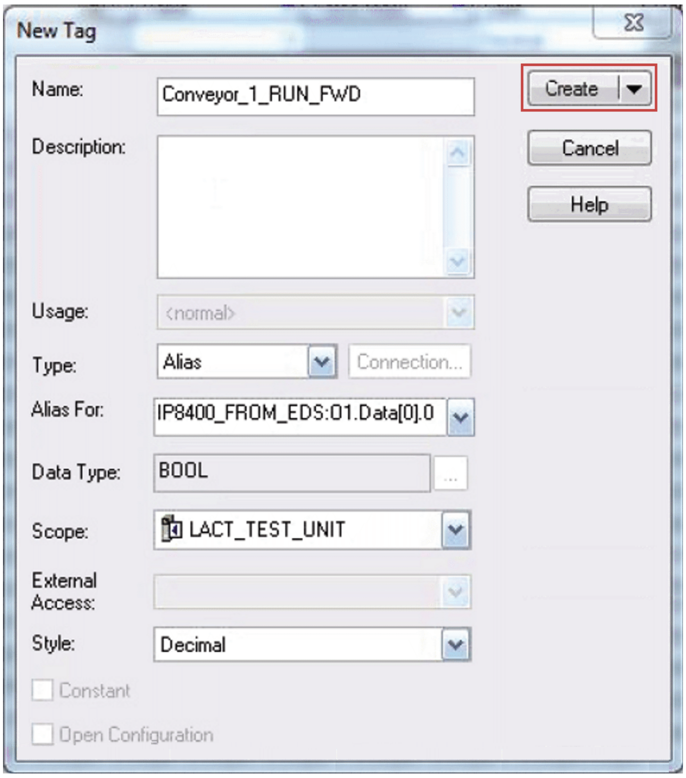
Show: All Tags

Name	Data Type	Description
Drive_Mode_Select	DINT	
+ MY_EIP8400_FROM_EDS:I1	_024B:E84A...	
− MY_EIP8400_FROM_EDS:O1	_024B:E84A...	
− MY_EIP8400_FROM_EDS...	INT[3]	
MY_EIP8400_FRO...	INT	
Re	DINT	
Read_Target	REAL	

0	1	2	3	4	5	6	7
8				12	13	14	15

Used: N
INT Used: N

14. Die Einstellungen mit der Schaltfläche **Create** bestätigen.



Name: Conveyor_1_RUN_FWD
Description:
Usage: <normal>
Type: Alias
Alias For: IP8400_FROM_EDS:O1.Data[0].0
Data Type: BOOL
Scope: LACT_TEST_UNIT
External Access:
Style: Decimal
☐ Constant
☐ Open Configuration

Das Alias-Tag "Conveyor_1_RUN_FWD" wird unter den **"Controller Tags"** erzeugt:

Name	Value	Force Mask	Style	Data Type
...	...	...	...	...
[–] MY_EIP8400_FROM_EDS:O1	{...}	{...}		_024B:E84AYCE...
[+] MY_EIP8400_FROM_EDS:O1.Data[1]	0		Decimal	SINT
[+] MY_EIP8400_FROM_EDS:O1.Data[2]	0		Decimal	SINT
[+] MY_EIP8400_FROM_EDS:O1.Data[3]	0		Decimal	SINT
[+] MY_EIP8400_FROM_EDS:O1.Data[4]	0		Decimal	SINT
[+] MY_EIP8400_FROM_EDS:O1.Data[5]	0		Decimal	SINT
Conveyor_1_RUN_FWD	**0**		**Decimal**	**BOOL**

15. Abschließend die I/O-Konfiguration in »RSLogix 5000« speichern (🕮 73).

8.8 I/O-Konfiguration in »RSLogix 5000« speichern

Nachdem der Scanner und der Adapter zur I/O-Konfiguration hinzugefügt wurden, muss die Konfiguration in die Steuerung geladen werden. Zudem sollten Sie die Konfigurationsdatei auf ihrem Rechner speichern.

So speichern Sie die I/O-Konfiguration:

1. Den Menübefehl **Communications → Download** auswählen.
   - Das Dialogfenster "Download" öffnet sich.
   - Erscheint die Meldung, dass »RSLogix 5000« nicht in den Online-Modus wechseln kann, wählen Sie den Menübefehl **Communications → Communications Who Active** aus und suchen Sie Ihre Steuerung im Dialogfeld "Who Active". Erscheint die Steuerung dort nicht, so muss der EtherNet/IP-Treiber zu »RSLinx« hinzugefügt oder in »RSLinx« konfiguriert werden. Weitere Informationen dazu finden Sie in der »RSLinx«-Online-Hilfe.
2. Auf die Schaltfläche **Download** klicken.
   - Die I/O-Konfiguration wird in die Steuerung geladen.
   - Nach erfolgreicher Beendigung des Downloads wechselt »RSLogix 5000« in den Online-Modus und das I/O-OK-Feld links oben auf dem Bildschirm ist grün.
3. Den Menübefehl **File → Save** aufrufen.
   - Wird die I/O-Konfiguration zum ersten Mal gespeichert, öffnet sich das Dialogfenster "Save As".
   - Zum Speichern der Konfiguration in einer Datei auf dem Rechner müssen Sie einen Ordner auswählen und einen Dateinamen eingeben.
   - Abschließend auf die Schaltfläche **Save** klicken.

9 Parameterdaten-Transfer (Explicit Messages)

Eine "Explicit Message" ist ein logischer Befehl im PLC-Programm, der zur Nachrichtenübertragung verwendet wird. Er kann eingesetzt werden, um eine Parametereinstellung oder die Daten eines Assembly-Objekts zu lesen oder zu beschreiben.

Bei den Allen-Bradley-Geräten der Reihen CompactLogix, ControlLogix und SoftLogix bietet der MSG-Befehl die in diesem Kapitel beschriebenen Einsatzmöglichkeiten. Beschreibungen zu anderen PLC-Typen finden Sie in der entsprechenden Programmierungs-Dokumentation der jeweiligen PLC.

Hinweis!

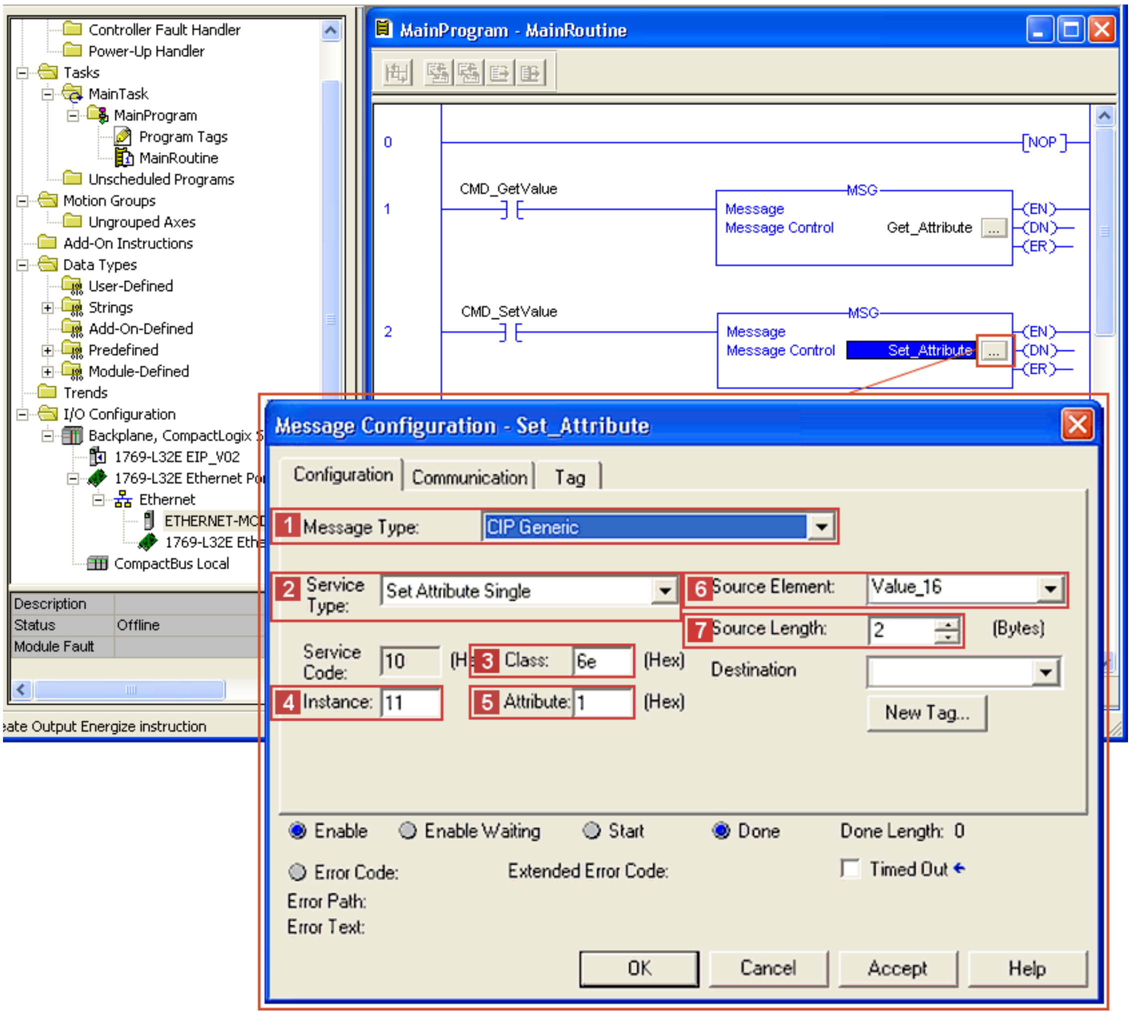
Wenn Sie mehrere MSG BLOCKs pro Adapter verwenden, können Sie durch sequentielles Triggern ressourcenschonend arbeiten und für weitere mögliche Clients genug Kommunikations-Reserven im EtherNet/IP-Modul vorhalten.

Applikationshinweis

Ein Beispiel zum Parameterdaten-Transfer (Parameter lesen/schreiben) bei einer "AC Drive Profile"-Applikation finden Sie im Download-Bereich (Application Knowledge Base) unter www.Lenze.com.

9.1 Parameter schreiben

Um beispielsweise mittels expliziter Nachrichtenübertragung in die Codestelle **C00011** (Bezugsdrehzahl) des Inverter Drive 8400 motec zu schreiben, sind folgende Einstellungen erforderlich:



Message Type: CIP Generic

Service Type: Set Attribute Single

Service Code: 10 (Hex)

Class: 6e (Hex)

Instance: 11

Attribute: 1 (Hex)

Source Element: Value_16

Source Length: 2 (Bytes)

Destination:

● Enable ○ Enable Waiting ○ Start ● Done Done Length: 0

○ Error Code: Extended Error Code: ☐ Timed Out

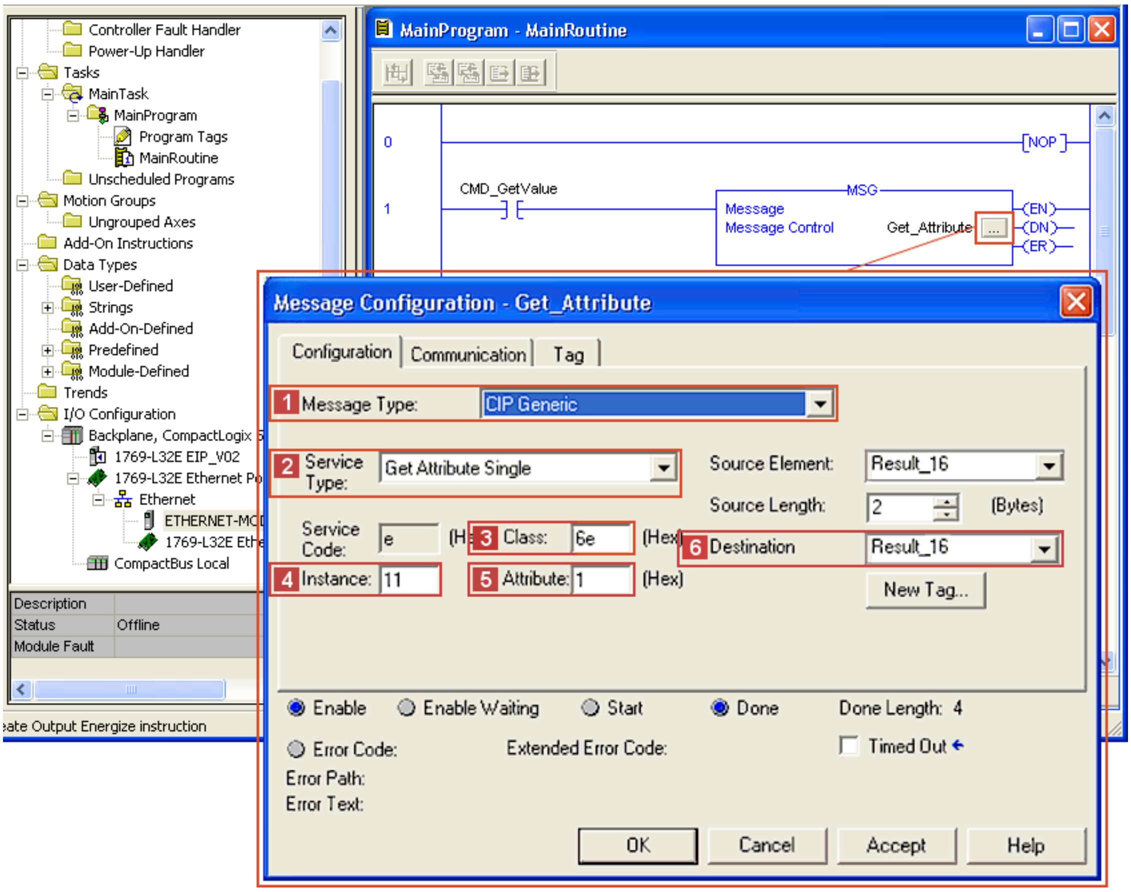
Error Path:

Error Text:

Einstellungen		Wert / Beschreibung
1	**Nachrichtentyp**	"CIP Generic"
2	**Servicetyp**	"Set Attribute Single" (Service-Code "0x10")
3	**Klasse**	"6E" (Zugriff auf Lenze-Codestelle)
4	**Instanz**	"11" = Lenze-Codestelle C00011 des Inverter Drive 8400 motec
5	**Attribut**	"1" = Subcodestelle der Lenze-Codestelle • Wenn die Lenze-Codestelle keinen Subcode hat, muss hier der Wert '1' eingetragen werden. • Die Konfiguration einer Anzeige-Codestelle durch den Dienst "SET" ist nicht möglich.
6	**Quellen-Element**	Variable im PLC-Programm, die als Datenquelle für das Schreiben verwendet wird.
7	**Quellen-Länge**	Die Quellen-Länge muss auf die Länge (Datentyp) des aktuellen Parameters eingestellt werden (siehe Parameter-Referenz im Referenzhandbuch/Online-Hilfe des Inverters). Für das Schreiben auf die Codestelle C00011 muss die Quellen-Länge auf "2 Bytes" gesetzt werden.

9.2 Parameter lesen

Um beispielsweise mittels expliziter Nachrichtenübertragung die Lenze-Codestelle **C00011** (Bezugsdrehzahl) des Inverter Drive 8400 motec auszulesen, sind folgende Einstellungen erforderlich:



Message Configuration - Get_Attribute

1 Message Type: CIP Generic

2 Service Type: Get Attribute Single

Service Code: e (Hex)

3 Class: 6e (Hex)

4 Instance: 11

5 Attribute: 1 (Hex)

Source Element: Result_16

Source Length: 2 (Bytes)

6 Destination: Result_16

● Enable ○ Enable Waiting ○ Start ● Done Done Length: 4

○ Error Code: Extended Error Code: ☐ Timed Out

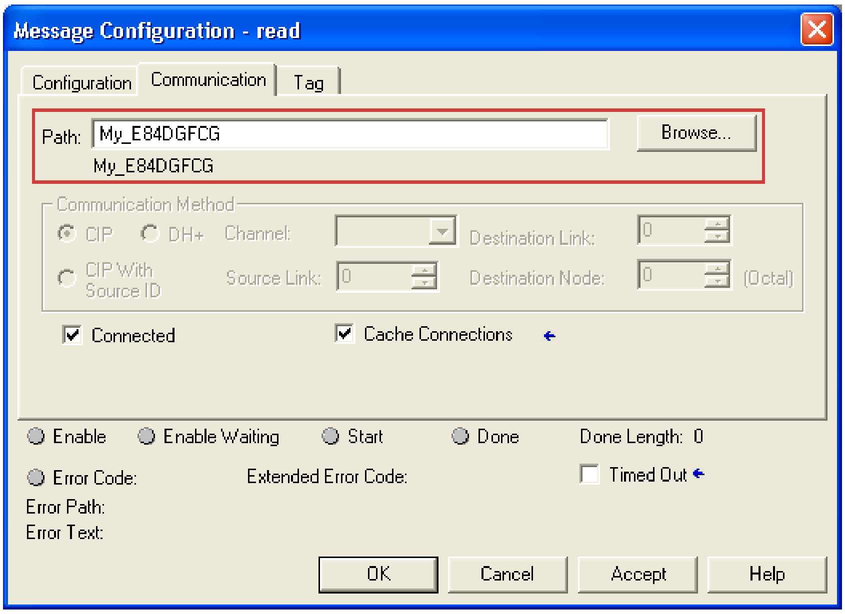
Error Path:

Error Text:

	Einstellungen	Wert / Beschreibung
1	**Nachrichtentyp**	"CIP Generic"
2	**Servicetyp**	"Get Attribute Single" (Service-Code "0x0E")
3	**Klasse**	"6E" (Zugriff auf Lenze-Codestelle)
4	**Instanz**	"11" = Lenze-Codestelle C00011 des Inverter Drive 8400 motec
5	**Attribut**	"1" = Subcodestelle der Lenze-Codestelle Wenn die Lenze-Codestelle keinen Subcode hat, muss hier der Wert ’1’ eingetragen werden.
6	**Ziel**	Variable im PLC-Programm, auf die die Antriebsdaten kopiert werden. Beim Lesen der Codestelle C00011 muss das als Ziel verwendete Tag ein Einzelwort im UINT16-Format sein.

Für jede "Explicit Message" muss unter der Registerkarte **Communication** der Pfad zum Senden der Nachricht über den Ethernet-Port der Steuerung an die IP-Adresse des Inverters eingestellt werden. Dieser Pfad ist abhängig von der verwendeten PLC.

Sollten Sie Unterstützung bei der Einstellung dieses Pfads benötigen, wenden Sie sich bitte an den Hersteller der PLC.


Message Configuration - read

Path: My_E84DGFCG
My_E84DGFCG

Communication Method
● CIP ○ DH+ Channel:
Destination Link: 0
○ CIP With Source ID
Source Link: 0
Destination Node: 0 (Octal)

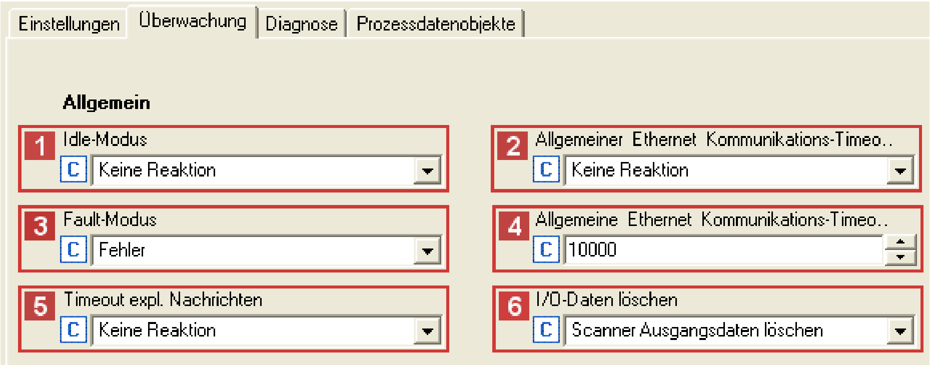
☑ Connected
☑ Cache Connections

○ Enable ○ Enable Waiting ○ Start ○ Done Done Length: 0
○ Error Code: Extended Error Code: ☐ Timed Out
Error Path:
Error Text:

10 Überwachungen

Störung der EtherNet/IP-Kommunikation

Reaktionen des Inverter Drive 8400 motec auf eine Störung der EtherNet/IP-Kommunikation können Sie im »Engineer« unter der Registerkarte **Überwachung** einstellen.



Allgemein

1 Idle-Modus: C Keine Reaktion

2 Allgemeiner Ethernet Kommunikations-Timeo..: C Keine Reaktion

3 Fault-Modus: C Fehler

4 Allgemeine Ethernet Kommunikations-Timeo..: C 10000

5 Timeout expl. Nachrichten: C Keine Reaktion

6 I/O-Daten löschen: C Scanner Ausgangsdaten löschen

Einstellungen		Beschreibung

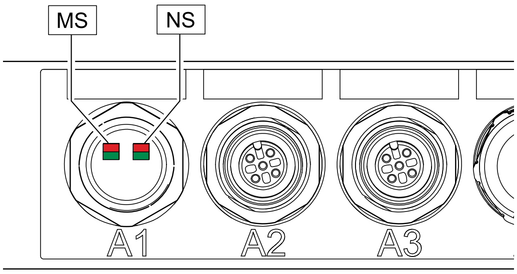
1	**Idle-Modus**	Der vom Scanner gesendete 32 Bit Real-Time-Header wird ausgewertet.
		• Run/Idle Flag (Bit 0) = 1:
		  • Der Scanner signalisiert die Gültigkeit der I/O-Daten.
		• Run/Idle Flag (Bit 0) = 0:
		  • Die I/O-Daten sind ungültig und im Inverter erfolgt die hier parametrierte Reaktion (C13880/1).
		  • Die I/O-Daten werden gemäß der Einstellung in 6 (C13885) behandelt.

2	**Allgemeiner Ethernet Kommunikations-Timeout**	Findet nach Ablauf der in 4 (C13881) eingestellten Zeit kein Zugriff mehr über den »Engineer« statt, erfolgt im Inverter die hier parametrierte Reaktion (C13880/4).
3	**Fault-Modus**	Der Adapter (Communication Unit) überwacht die I/O-Verbindung zum Scanner. Bleibt innerhalb der vom Scanner parametrierten Timeout-Zeit für implizite Nachrichten eine "Implicit Message" aus, erfolgt im Inverter die hier parametrierte Reaktion (C13880/2).
4	**Allgemeine Ethernet Kommunikations-Timeout-Zeit**	Hier wird die allgemeine Nachrichten-Überwachungszeit (C13881) eingestellt. Wird innerhalb dieser Zeit keine Nachricht empfangen, erfolgt die in 2 (C13880/4) parametrierte Reaktion. Diese Nachrichten werden überwacht: • Implicit Messages • Explicit Messages • Zugriff des »Engineer« über EtherNet/IP
5	**Timeout expliziter Nachrichten**	Bleibt innerhalb der vom Scanner parametrierten Timeout-Zeit für explizite Nachrichten eine "Explicit Message" aus, erfolgt im Inverter die hier parametrierte Reaktion (C13880/3).
6	**I/O-Daten löschen**	Einstellung (C13885), welche I/O-Daten der Adapter zur Aufrechterhaltung der internen Kommunikation weiter verarbeiten soll, wenn ... • der CIP-Netzwerkstatus (C13862) der steuernden I/O-Verbindung nicht "Connected" ist oder • ein Idle-Ereignis eingetreten ist.

11 Diagnose

Zur Diagnose der EtherNet/IP-Kommunikation sind in der Communication Unit LEDs montiert. Zudem können Sie sich im »Engineer« Diagnose-Informationen anzeigen lassen.

11.1 LED-Statusanzeigen



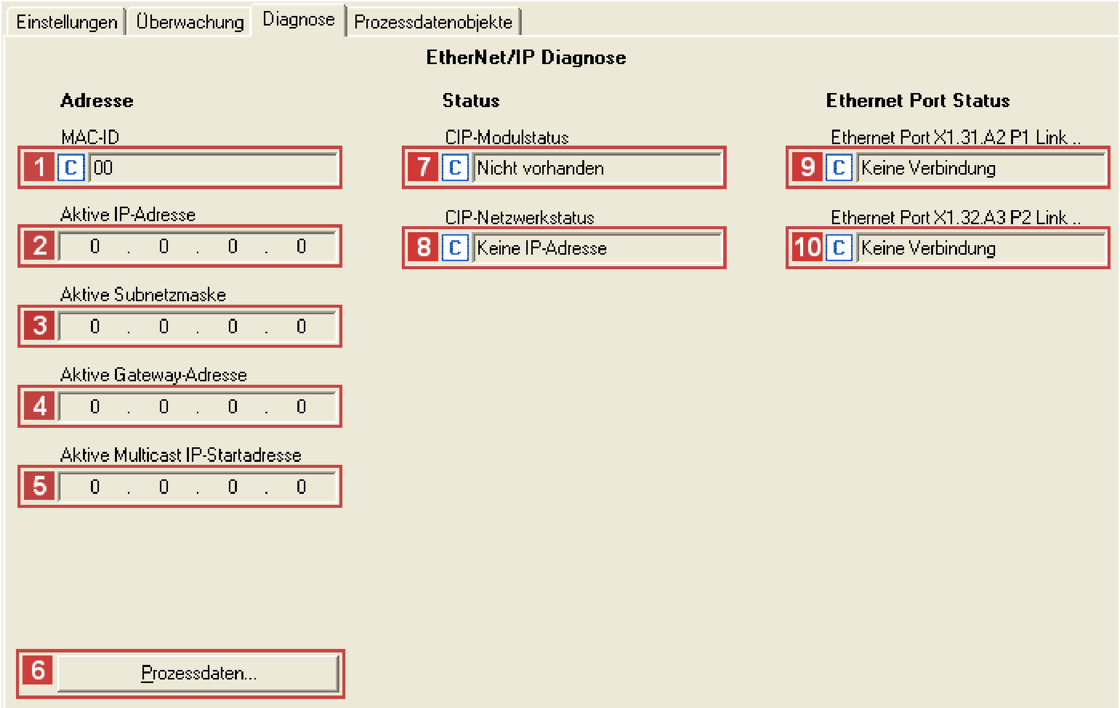
E84DG056

LED	Farbe / Zustand		Beschreibung
MS	**grün**	**rot**	
	aus	aus	CIP-Modulstatus: "Nonexistent" Die Communication Unit wird nicht mit Spannung versorgt.
	aus	an	 CIP-Modulstatus: "Major Unrecoverable Fault" Die Communication Unit weist einen nicht behebbaren Fehler auf.
	aus	blinkt	 CIP-Modulstatus: "Major Recoverable Fault" Die Communication Unit weist einen behebbaren Fehler auf.
	an	aus	 CIP-Modulstatus: "Operational" Die Communication Unit arbeitet einwandfrei.
	blinkt	aus	 CIP-Modulstatus: "Standby" Die Communication Unit ist noch nicht vollständig konfiguriert oder die Konfiguration ist fehlerhaft (z. B. ungültige IP-Adresse).
	blinkt	blinkt	 CIP-Modulstatus: "Device Self Testing" Die Communication Unit befindet sich im Selbsttest.

LED	Farbe / Zustand		Beschreibung
NS	**grün**	**rot**	
	aus	aus	CIP-Netzwerkstatus: "No IP Adress" Die Communication Unit wird nicht mit Spannung versorgt oder hat noch keine IP-Adresse erhalten.
	aus	an	 CIP-Netzwerkstatus: "Duplicate IP" Die Communication Unit kann nicht auf den Feldbus zugreifen (IP-Adressenkonflikt).
	aus	blinkt	 CIP-Netzwerkstatus: "Connection Timeout" Eine Zeitüberschreitung (Timeout) liegt vor.
	an	aus	 CIP-Netzwerkstatus: "Connected" Die Communication Unit arbeitet einwandfrei und hat eine Verbindung zum Scanner aufgebaut.
	blinkt	aus	 CIP-Netzwerkstatus: "No Connections" Die Communication Unit ... • arbeitet einwandfrei; • hat eine IP-Adresse zugewiesen bekommen; • wurde noch nicht vom Scanner ins Netzwerk eingebunden.
	blinkt	blinkt	 CIP-Netzwerkstatus: "Self-Test" Die Communication Unit befindet sich im Selbsttest.

11.2 Diagnose mit dem »Engineer«

Im »Engineer« können Sie sich unter der Registerkarte **Diagnose** diverse EtherNet/IP Diagnose-Informationen anzeigen lassen.



Anzeige		Codestelle
1	**MAC-ID**	C13003
2	**Aktive IP-Addresse**	C13010
3	**Aktive Subnetzmaske**	C13011
4	**Aktive Gateway-Addresse**	C13012
5	**Aktive Multicast IP-Adresse**	C13016
6	**Prozessdaten**	C13850, C13851
7	**CIP-Modulstatus**	C13861
8	**CIP-Netzwerkstatus**	C13862
9	**Ethernet Port X31 Verbindungsstatus**	C13863/1
10	**Ethernet Port X32 Verbindungsstatus**	C13863/2

12 Fehlermeldungen

Dieses Kapitel ergänzt die Fehlerliste im Referenzhandbuch und in der »Engineer« Online-Hilfe zum Inverter Drive 8400 motec um die EtherNet/IP-Fehlermeldungen.

12.1 Kurzübersicht der EtherNet/IP-Fehlermeldungen

Referenzhandbuch/»Engineer« Online-Hilfe zum Inverter Drive 8400 motec

Hier finden Sie allgemeine Informationen zur Diagnose & Störungsanalyse und zu Fehlermeldungen.

In der folgenden Tabelle sind alle EtherNet/IP-Fehlermeldungen in numerischer Reihenfolge der Fehlernummer aufgeführt. Zudem wird die voreingestellte Fehlerreaktion und – sofern vorhanden – der Parameter zur Einstellung der Fehlerreaktion angegeben.

Tipp!

Wenn Sie auf den Querverweis in der ersten Spalte klicken, gelangen Sie zur ausführlichen Beschreibung (Ursachen und Abhilfen) der entsprechenden Fehlermeldung.

Fehler-Nr. [hex]	Sachgebiet-Nr. [dec]	Fehler-Nr. [dec]	Fehlertext	Fehlertyp (Fehlerreaktion)	einstellbar in
0x01bc3100	444	12544	EtherNet/IP: Verbindung zum Inverter Drive 8400 verloren	1: Fehler	C01501/2
0x01bc5531	444	21809	EtherNet/IP: Kein Zugriff auf Speicher	1: Fehler	C01501/2
0x01bc5532	444	21810	EtherNet/IP: Fehler beim Lesen vom Speicher	1: Fehler	C01501/2
0x01bc5533	444	21811	EtherNet/IP: Fehler beim Schreiben in Speicher (nt14: COM fault 14)	1: Fehler	C01501/2
0x01bc6010	444	24592	EtherNet/IP: Neustart durch Watchdog-Reset	1: Fehler	C01501/2
0x01bc6011	444	24593	EtherNet/IP: Interner Fehler	1: Fehler	C01501/2
0x01bc6100	444	24832	EtherNet/IP: Interner Fehler	1: Fehler	C01501/2
0x01bc6101	444	24833	EtherNet/IP: Interner Fehler	1: Fehler	C01501/2
0x01bc641f	444	25631	EtherNet/IP: Parametersatz ungültig	1: Fehler	C01501/2
0x01bc6420	444	25632	EtherNet/IP: Lenze-Einstellung geladen	1: Fehler	-
0x01bc6430	444	25648	EtherNet/IP: Ungültige Konfiguration	1: Fehler	-
0x01bc6533	444	25907	EtherNet/IP: Ungültige IP-Parameter	1: Fehler	-
0x01bc8111	444	33041	EtherNet/IP: Fault-Modus	1: Fehler	C13880/2
0x01bc8112	444	33042	EtherNet/IP: Expliziter Nachrichten Timeout	0: Keine Reaktion	C13880/3
0x01bc8114	444	33044	EtherNet/IP: Allgemeiner Ethernet Timeout	0: Keine Reaktion	C13880/4
0x01bc8132	444	33074	EtherNet/IP: Idle-Modus (nt05: COM fault 5)	0: Keine Reaktion	C13880/1
0x01bc8273	444	33395	EtherNet/IP: Doppelte IP-Adresse	1: Fehler	-

12.2 Mögliche Ursachen und Abhilfen

In diesem Kapitel sind alle EtherNet/IP-Fehlermeldungen in numerischer Reihenfolge der Fehlernummer aufgeführt. Mögliche Ursachen und Abhilfen sowie Reaktionen auf die Fehlermeldungen werden ausführlich beschrieben.

EtherNet/IP: Verbindung zum Inverter Drive 8400 verloren [0x01bc3100]

Reaktion (Lenze-Einstellung fettgedruckt)	**Einstellung:** C01501/2 (☑ Einstellbare Reaktion)
☑ Keine ☐ Systemfehler ☒ **Fehler** ☐ Störung ☐ Schnellhalt durch Störung ☑ Arretierte Warnung ☐ Warnung ☐ Information	

Ursache	Abhilfe
• Die Communication Unit ist mit externer Spannung versorgt, aber das Inverter Drive 8400 motec ist nicht mit Spannung versorgt. • Die Communication Unit ist nicht korrekt mit der Drive Unit verbunden.	• Spannungsversorgung des Inverter Drive 8400 motec aus- und wieder einschalten. • Verdrahtung und Anschlüsse überprüfen. • Interne Steckverbindung zwischen Communication Unit und Drive Unit prüfen. Das Inverter Drive 8400 motec muss dazu aufgeschraubt werden. Beachten Sie dazu die Informationen in den Montageanleitungen der Communication Unit und Drive Unit! • Tritt dieser Fehler weiterhin auf, wenden Sie sich an den Lenze-Service. (Ggf. muss die Communication Unit ausgetauscht werden.)

EtherNet/IP: Kein Zugriff auf Speicher [0x01bc5531]

Reaktion (Lenze-Einstellung fettgedruckt)	**Einstellung:** C01501/2 (☑ Einstellbare Reaktion)
☑ Keine ☐ Systemfehler ☒ **Fehler** ☐ Störung ☐ Schnellhalt durch Störung ☑ Arretierte Warnung ☐ Warnung ☐ Information	

Ursache	Abhilfe
Zugriff auf Speicher war nicht möglich.	Gerät mit Fehlerbeschreibung an Lenze senden.

EtherNet/IP: Fehler beim Lesen vom Speicher [0x01bc5532]

Reaktion (Lenze-Einstellung fettgedruckt)	**Einstellung:** C01501/2 (☑ Einstellbare Reaktion)
☑ Keine ☐ Systemfehler ☒ **Fehler** ☐ Störung ☐ Schnellhalt durch Störung ☑ Arretierte Warnung ☐ Warnung ☐ Information	

Ursache	Abhilfe
Parameter konnte nicht gelesen werden.	• Erneuter Download der Applikation (einschließlich Modul). • Gerät mit Fehlerbeschreibung an Lenze senden.

EtherNet/IP: Fehler beim Schreiben in Speicher [0x01bc5533] (nt14: COM fault 14)

Reaktion (Lenze-Einstellung fettgedruckt)	**Einstellung:** C01501/2 (☑ Einstellbare Reaktion)
☑ Keine ☐ Systemfehler ☒ **Fehler** ☐ Störung ☐ Schnellhalt durch Störung ☑ Arretierte Warnung ☐ Warnung ☐ Information	

Ursache	Abhilfe
Parameter konnte nicht geschrieben werden.	• Erneuter Download der Applikation (einschließlich Modul). • Gerät mit Fehlerbeschreibung an Lenze senden.

EtherNet/IP: Neustart durch Watchdog-Reset [0x01bc6010]

Reaktion (Lenze-Einstellung fettgedruckt)	**Einstellung:** C01501/2 (☑ Einstellbare Reaktion)
☑ Keine ☐ Systemfehler ☒ **Fehler** ☐ Störung ☐ Schnellhalt durch Störung ☑ Arretierte Warnung ☐ Warnung ☐ Information	

Ursache	Abhilfe
Gerät ist defekt.	Gerät mit Fehlerbeschreibung an Lenze senden.

EtherNet/IP: Interner Fehler [0x01bc6011]

Reaktion (Lenze-Einstellung fettgedruckt)	**Einstellung:** C01501/2 (☑ Einstellbare Reaktion)
☑ Keine ☐ Systemfehler ☒ **Fehler** ☐ Störung ☐ Schnellhalt durch Störung ☑ Arretierte Warnung ☐ Warnung ☐ Information	

Ursache	Abhilfe
Gerät ist defekt.	Gerät mit Fehlerbeschreibung an Lenze senden.

EtherNet/IP: Interner Fehler [0x01bc6100]

Reaktion (Lenze-Einstellung fettgedruckt)	**Einstellung:** C01501/2 (☑ Einstellbare Reaktion)
☑ Keine ☐ Systemfehler ☒ **Fehler** ☐ Störung ☐ Schnellhalt durch Störung ☑ Arretierte Warnung ☐ Warnung ☐ Information	

Ursache	Abhilfe
Gerät ist defekt.	Gerät mit Fehlerbeschreibung an Lenze senden.

EtherNet/IP: Interner Fehler [0x01bc6101]

Reaktion (Lenze-Einstellung fettgedruckt)	**Einstellung:** C01501/2 (☑ Einstellbare Reaktion)
☑ Keine ☐ Systemfehler ☒ **Fehler** ☐ Störung ☐ Schnellhalt durch Störung ☑ Arretierte Warnung ☐ Warnung ☐ Information	

Ursache	Abhilfe
Gerät ist defekt.	Gerät mit Fehlerbeschreibung an Lenze senden.

EtherNet/IP: Parametersatz ungültig [0x01bc641f]

Reaktion (Lenze-Einstellung fettgedruckt)	**Einstellung:** C01501/2 (☑ Einstellbare Reaktion)
☑ Keine ☐ Systemfehler ☒ **Fehler** ☐ Störung ☐ Schnellhalt durch Störung ☑ Arretierte Warnung ☐ Warnung ☐ Information	

Ursache	Abhilfe
Es konnte kein aktiver Parametersatz geladen werden.	• Erneuter Download der Applikation (einschließlich Modul). • Gerät mit Fehlerbeschreibung an Lenze senden.

EtherNet/IP: Lenze-Einstellung geladen [0x01bc6420]

Reaktion (Lenze-Einstellung fettgedruckt)	**Einstellung:** nicht möglich
☐ Keine ☐ Systemfehler ☒ **Fehler** ☐ Störung ☐ Schnellhalt durch Störung ☐ Arretierte Warnung ☐ Warnung ☐ Information	

Ursache	Abhilfe
Zugriff auf Parametersatz war nicht möglich.	• Erneuter Download der Applikation (einschließlich Modul). • Gerät mit Fehlerbeschreibung an Lenze senden.

EtherNet/IP: Ungültige Konfiguration [0x01bc6430]

Reaktion (Lenze-Einstellung fettgedruckt)	**Einstellung:** nicht möglich
☐ Keine ☐ Systemfehler ☒ **Fehler** ☐ Störung ☐ Schnellhalt durch Störung ☐ Arretierte Warnung ☐ Warnung ☐ Information	

Ursache	Abhilfe
Modulkonfiguration ist fehlerhaft.	Modulkonfiguration prüfen und korrigieren.

EtherNet/IP: Ungültige IP-Parameter [0x01bc6533]

Reaktion (Lenze-Einstellung fettgedruckt)	**Einstellung:** nicht möglich
☐ Keine ☐ Systemfehler ☒ **Fehler** ☐ Störung ☐ Schnellhalt durch Störung ☐ Arretierte Warnung ☐ Warnung ☐ Information	

Ursache	Abhilfe
Ein oder mehrere IP-Parameter sind fehlerhaft.	IP-Konfiguration prüfen und korrigieren. ▶ IP-Konfiguration des Inverter Drive 8400 motec einstellen (🕮 31)

EtherNet/IP: Fault-Modus [0x01bc8111]

Reaktion (Lenze-Einstellung fettgedruckt)	**Einstellung:** C13880/2
☑ Keine ☐ Systemfehler ☒ **Fehler** ☐ Störung ☐ Schnellhalt durch Störung ☑ Arretierte Warnung ☐ Warnung ☐ Information	

Ursache	Abhilfe
• Verbindung zum Scanner wurde unterbrochen. • Ausfall der steuernden I/O-Verbindung durch Timeout. • Innerhalb der vom Scanner parametrierten Timeout-Zeit für implizite Nachrichten bleibt eine "Implicit Message" aus.	• Leitungen und Anschlüsse überprüfen. • Netzwerkkabel an EtherNet/IP-Anschluss einstecken. • Requested Package Interval (RPI) der I/O-Verbindung überprüfen. • Timeout-Zeit für implizite Nachrichten erhöhen.

EtherNet/IP: Expliziter Nachrichten Timeout [0x01bc8112]

Reaktion (Lenze-Einstellung fettgedruckt)	**Einstellung:** C13880/3
☒ **Keine** ☐ Systemfehler ☑ **Fehler** ☐ Störung ☐ Schnellhalt durch Störung ☑ Arretierte Warnung ☐ Warnung ☐ Information	

Ursache	Abhilfe
• Verbindung zum Scanner wurde unterbrochen. • Ausfall einer explitziten Verbindung • Innerhalb der vom Scanner parametrierten Timeout-Zeit für explizite Nachrichten bleibt eine "Explicit Message" aus.	• Leitungen und Anschlüsse überprüfen. • Netzwerkkabel an EtherNet/IP-Anschluss einstecken. • Requested Package Interval (RPI) der expliziten Verbindung überprüfen. • Timeout-Zeit für explizite Nachrichten erhöhen.

EtherNet/IP: Allgemeiner Ethernet Timeout [0x01bc8114]

Reaktion (Lenze-Einstellung fettgedruckt)	**Einstellung:** C13880/4
☒ **Keine** ☐ Systemfehler ☑ **Fehler** ☐ Störung ☐ Schnellhalt durch Störung ☑ Arretierte Warnung ☐ Warnung ☐ Information	

Ursache	Abhilfe
• Ausfall der »Engineer«-Kommunikation über Ethernet • Nach Ablauf der in C13881 eingestellten Zeit findet kein Zugriff mehr über den »Engineer« statt.	• Leitungen und Anschlüsse überprüfen. • Netzwerkkabel einstecken. • Die allgemeine Nachrichten-Überwachungszeit in C13881 erhöhen. ▶ Störung der EtherNet/IP-Kommunikation (🕮 78)

EtherNet/IP: Idle-Modus [0x01bc8132] (nt05: COM fault 5)

Reaktion (Lenze-Einstellung fettgedruckt)	**Einstellung:** C13880/1
☒ **Keine** ☐ Systemfehler ☑ **Fehler** ☐ Störung ☐ Schnellhalt durch Störung ☑ Arretierte Warnung ☐ Warnung ☐ Information	

Ursache	Abhilfe
• Ein Idle-Ereignis wurde vom Scanner empfangen. • Der Scanner befindet sich im "PROG"-Modus. • Im "Scanner Command Register" ist das Run/Idle Flag (Bit 0) = 0.	Den Scanner in den Run-Modus setzen. Run/Idle Flag (Bit 0) = 1

EtherNet/IP: Doppelte IP-Adresse [0x01bc8273]

Reaktion (Lenze-Einstellung fettgedruckt)	**Einstellung:** nicht möglich
☐ Keine ☐ Systemfehler ☒ **Fehler** ☐ Störung ☐ Schnellhalt durch Störung ☐ Arretierte Warnung ☐ Warnung ☐ Information	

Ursache	Abhilfe
Eine IP-Adresse wurde im Netzwerk doppelt vergeben. Die Adressen der Netzwerkteilnehmer müssen sich voneinander unterscheiden.	IP-Adresse (C13000) korrigieren. ▸ IP-Konfiguration des Inverter Drive 8400 motec einstellen (🕮 31)

12.3 CIP™-Fehlermeldungen

Fehlercode [hex]	Fehlerbezeichnung	Beschreibung
0x000	SUCCESS	Kein Fehler
0x001	. . .	Instanz-Fehlermeldungen (📖 121) des Connection Manager Object (6 / 0x06) (📖 120)
0x002	RESOURCE_UNAVAILABLE	Notwendige Resource zur Dienstausführung nicht verfügbar.
0x003	INVALID_PARAM_VALUE	Ungültiger Parameterwert
0x008	SERVICE_NOT_SUPP	Dienst wird nicht unterstützt.
0x009	INVALID_ATTRIB_VALUE	Das Attribut ist ungültig.
0x00B	ALREADY_IN_STATE	Das Objekt ist bereits im angeforderten Status.
0x00C	OBJ_STATE_CONFLICT	Das Objekt kann den Dienst nicht ausführen.
0x00E	ATTR_NOT_SETTABLE	Das Attribut ist schreibgeschützt.
0x00F	PRIVILEGE_VIOLATION	Zugriff verweigert.
0x010	DEVICE_STATE_CONFLICT	Der aktuelle Zustand des Gerätes verbietet die Ausführung des angeforderten Dienstes.
0x011	REPLY_DATA_TOO_LARGE	Die Antwortdaten sind länger als der Antwort-Buffer.
0x013	NOT_ENOUGH_DATA	Die Länge der Daten ist zu kurz.
0x014	ATTRIBUTE_NOT_SUPP	Das Attribut wird nicht unterstützt.
0x015	TOO_MUCH_DATA	Die Länge der Daten ist zu lang.
0x016	OBJECT_DOES_NOT_EXIST	Das Objekt wird vom Adapter nicht unterstützt.
0x017	FRAGMENTATION	Die Fragmentierung für den angeforderten Dienst ist momentan nicht aktiviert.
0x020	INVALID_PARAMETER	Ungültiger Parameter

12.4 Abbildung von Lenze-Gerätefehlern auf DRIVECOM-Fehler

Über das Instanzattribut "FaultCode" des Control Supervisor Object (41 / 0x29) (📖 135) werden Lenze-Gerätefehler mit DRIVECOM-Fehlernummern ausgegeben.

Die folgenden Tabellen zeigen die Zuordnung der Lenze-Gerätefehler und "CAN Emergency Error Codes" zu den DRIVECOM-Fehler.

Referenzhandbuch / »Engineer« Online-Hilfe zum Inverter Drive 8400 motec

Hier finden Sie ausführliche Informationen zu den in der folgenden Tabelle aufgeführten Lenze-Fehlermeldungen.

Lenze-Fehler		CAN	DRIVECOM-Fehler	
Fehlernummer [32 Bit]	**Fehlermeldung**	**Emergency Error Code**	**Fehlernummer [hex]**	**Fehlermeldung**
xx.0111.00002	Su02: Eine Netzphase fehlt	0x3000	0x3000	Voltage
xx.0111.00003	Su03: Zu häufiges Netzschalten	0x3000	0x3000	Voltage
xx.0111.00004	Su04: CU unzureichend versorgt	0x3000	0x3000	Voltage
xx.0111.00006	Su06: Netzeingang Überlast	0x3000	0x3000	Voltage
xx.0119.00000	OH4: Kühlkörpertemp. > Abschalttemp. -5°C	0x4000	0x4000	Temperature
xx.0119.00001	OH1: Übertemperatur Kühlkörper	0x4000	0x4000	Temperature
xx.0119.00002	OH7: Motortemperatur Resolver > C121	0x4000	0x4000	Temperature
xx.0119.00003	OH9: Motorübertemperatur Resolver	0x4000	0x4000	Temperature
xx.0119.00012	Sd6: Fehler Temperaturfühler Resolver	0x7300	0x7300	Sensor
xx.0119.00015	OH3: Motortemperatur (X106) ausgelöst	0x4000	0x4000	Temperature
xx.0119.00020	OH6: Motortemperatur MultiEncoder > C121	0x4000	0x4000	Temperature
xx.0119.00021	OH12: Motorübertemperatur MultiEncoder	0x4000	0x4000	Temperature
xx.0119.00022	Sd12: Fehler Temperaturfühler MultiEncoder	0x7300	0x7300	Sensor
xx.0119.00050	OC5: Ixt Überlast	0x2000	0x2000	Current
xx.0123.00001	OT1: Maximalmoment erreicht	0x8300	0x8302	Torque Limiting
xx.0123.00007	OC7: Überstrom Motor	0x2000	0x2000	Current
xx.0123.00014	OU: Überspannung Zwischenkreis	0x3100	0x3110	Mains overvoltage
xx.0123.00015	LU: Unterspannung Zwischenkreis	0x3100	0x3120	Mains undervoltage
xx.0123.00016	OC1: Leistungsteil Kurzschluss	0x2000	0x2130	Short Circuit
xx.0123.00017	OC2: Leistungsteil Erdschluss	0x2000	0x2120	Short to Earth
xx.0123.00024	Sd2: Drahtbruch Resolver	0x7300	0x7303	Resolver 1 defectiv
xx.0123.00026	Sd7: Fehler Encoder Kommunikation	0x7300	0x7305	Incremental Encoder 1 Defective
xx.0123.00027	Sd4: Drahtbruch MultiEncoder	0x7300	0x7300	Sensor
xx.0123.00030	OC10: Maximalstrom erreicht	0x2000	0x2000	Current
xx.0123.00031	OC17: Clamp setzt Impulssperre	0xF000	0xF000	Additional Functions
xx.0123.00032	OS1: Maximales Drehzahllimit erreicht	0x8400	0x8402	Velocity Limiting
xx.0123.00033	OS2: Max. Motordrehzahl	0x8400	0x8400	Speed Controller
xx.0123.00056	ID2: Fehler Motordatenidentifizierung	0xF000	0xF000	Additional Functions
xx.0123.00057	ID1: Fehler Motordatenidentifizierung	0xF000	0xF000	Additional Functions
xx.0123.00058	ID3: CINH Motordatenidentifizierung	0xF000	0xF000	Additional Functions
xx.0123.00059	ID4: Fehler Widerstandsidentifikation	0xF000	0xF000	Additional Functions
xx.0123.00060	ID7: Motorregelung ungleich Motordaten	0xF000	0xF000	Additional Functions
xx.0123.00062	Sd8: Encoder Winkeldriftüberw.	0x7300	0x7300	Sensor
xx.0123.00065	OC12: I2xt Überlast Bremswiderstand	0xF000	0x7110	Brake Chopper
xx.0123.00071	OC11: Current clamp for too long (>1 sec)	0xF000	0xF000	Additional Functions
xx.0123.00074	ID5: Fehler Pollageidentifikation	0xF000	0xF000	Additional Functions
xx.0123.00075	ID6: Fehler Resolverident.	0xF000	0xF000	Additional Functions

Lenze-Fehler		CAN	DRIVECOM-Fehler	
Fehlernummer [32 Bit]	**Fehlermeldung**	**Emergency Error Code**	**Fehlernummer [hex]**	**Fehlermeldung**
xx.0123.00090	OC13: Überschreitung Maximalstrom für Fch	0x2000	0x2000	Current
xx.0123.00093	OT2: Ausgang Drehzahlregler begrenzt	0xF000	0x7310	Speed
xx.0123.00094	FC01: Schaltfrequenzabsenkung	0x2000	0xF000	Additional Functions
xx.0123.00095	FC02: Maximaldrehzahl für Fchop	0xF000	0xF000	Additional Functions
xx.0123.00096	OC14: Begrenzung Längsstromregler	0xF000	0xF000	Additional Functions
xx.0123.00097	OC15: Begrenzung Querstromregler	0xF000	0xF000	Additional Functions
xx.0123.00098	OC16: Begrenzung Drehmomentregler	0xF000	0xF000	Additional Functions
xx.0123.00099	FC03: Begrenzung Feldregler	0xF000	0xF000	Additional Functions
xx.0123.00105	OC6: I2xt Überlast Motor	0x2000	0x7120	Motor
xx.0123.00145	LP1: Ausfall Motorphase	0x3000	0x3130	Phase Failure
xx.0123.00200	SD10: Drehzahllimit Rückführsystem 12	0x7300	0x7300	Sensor
xx.0123.00201	SD11: Drehzahllimit Rückführsystem 67	0x7300	0x7300	Sensor
xx.0123.00205	SD3: Drahtbruch Rückführsystem	0x7300	0x7301	Tacho defective
xx.0125.00001	An01: AIN1_I < 4 mA	0xF000	0xF000	Additional Functions
xx.0125.00002	An02: AIN2_I < 4 mA	0xF000	0xF000	Additional Functions
xx.0126.00001	Ab01: AchsbusTimeOut	0x8000	0x8000	Monitoring
xx.0126.00002	Ab02: Achsbus-IO-Fehler	0x8100	0x8100	Communication
xx.0127.00002	CE04: MCI Kommunikationsfehler	0x7000	0x7500	Communication
xx.0127.00015	CE0F: MCI Steuerwort	0xF000	0xF000	Additional Functions
xx.0131.00000	CE4: CAN Bus Off	0x8000	0x8000	Monitoring
xx.0131.00006	CA06: CAN CRC Fehler	0x8000	0x8000	Monitoring
xx.0131.00007	CA07: CAN Bus Warn	0x8000	0x8000	Monitoring
xx.0131.00008	CA08: CAN Bus Stopped	0x8000	0x8000	Monitoring
xx.0131.00011	CA0b: CAN HeartBeatEvent	0x8130	0x8000	Monitoring
xx.0131.00015	CA0F: CAN Steuerwort	0xF000	0x8000	Monitoring
xx.0135.00001	CE1: CAN RPDO1	0x8100	0x8100	Communication
xx.0135.00002	CE2: CAN RPDO2	0x8100	0x8100	Communication
xx.0135.00003	CE3: CAN RPDO3	0x8100	0x8100	Communication
xx.0135.00004	CP04: CAN RPDO4	0x8100	0x8100	Communication
xx.0140.00013	CI01: Modul fehlt/inkompatibel	0x7000	0x7000	Additional Modules
xx.0144.00001	PS01: Kein Memmodul	0x6300	0x6300	Date Set
xx.0144.00002	PS02: Par.satz ungültig	0x6300	0x6300	Date Set
xx.0144.00003	PS03: Par.satz Gerät ungültig	0x6300	0x6300	Date Set
xx.0144.00004	PS04: Par.satz Gerät inkompatibel	0x6300	0x6300	Date Set
xx.0144.00007	PS07: Par. Memmodul ungültig	0x6300	0x6300	Date Set
xx.0144.00008	PS08: Par. Gerät ungültig	0x6300	0x6300	Date Set
xx.0144.00009	PS09: Par.format ungültig	0x6300	0x6300	Date Set
xx.0144.00010	PS10: Memorymodul Bindung ungültig	0x5000	0x5000	Device Hardware
xx.0144.00031	PS31: Ident. Fehler	0x6300	0x6300	Date Set
xx.0145.00014	dF14: SW-HW ungültig	0x5530	0x6000	Device Software
xx.0145.00015	dF15: DCCOM CU2 Fehler	0x6100	0x6100	Internal Software
xx.0145.00024	dF18: BU RCOM Fehler	0x6100	0x6100	Internal Software
xx.0145.00025	dF25: CU RCOM Fehler	0x6100	0x6100	Internal Software
xx.0145.00026	dF26: Apl. Watchdog	0x6200	0x6010	Software Reset (Watchdog)
xx.0145.00033	dF21: BU Watchdog	0x6100	0x6010	Software Reset (Watchdog)
xx.0145.00034	dF22: CU Watchdog	0x6100	0x6010	Software Reset (Watchdog)
xx.0145.00035	dF10: AutoTrip Reset	0xF000	0xF000	Additional Functions
xx.0145.00050	dF50: Retain Fehler	0x6100	0x6100	Internal Software
xx.0145.00051	dF51: CuCcr Fehler	0x6100	0x6100	Internal Software
xx.0145.00052	dF52: BuCcr Fehler	0x6100	0x6100	Internal Software

Lenze-Fehler		CAN	DRIVECOM-Fehler	
Fehlernummer [32 Bit]	**Fehlermeldung**	**Emergency Error Code**	**Fehlernummer [hex]**	**Fehlermeldung**
xx.0184.00001	Ck01: Pos. HW-Endschalter	0x8600	0x8600	Positioning Controller
xx.0184.00002	Ck02: Neg. HW-Endschalter	0x8600	0x8600	Positioning Controller
xx.0184.00005	Ck15: Fehler Meldesig. Bremse	0x8600	0x8600	Positioning Controller
xx.0184.00007	Ck03: Pos. SW-Endlage	0x8600	0x8600	Positioning Controller
xx.0184.00008	Ck04: Neg. SW-Endlage	0x8600	0x8600	Positioning Controller
xx.0184.00015	Ck14: Zielposition außerhalb SW-Enlage	0x8600	0x8600	Positioning Controller
xx.0184.00064	Ck16: Zeitüberlauf Handbedienung	0x8600	0x8600	Positioning Controller
xx.0184.00153	Ck05: Fehler Schleppabstand 1	0x8611	0x8611	Following Error
xx.0184.00154	Ck06: Fehler Schleppabstand 2	0x8611	0x8611	Following Error
xx.0184.00155	Ck07: Fahrbereichgrenze überschritten	0x8612	0x8612	Reference Limit
xx.0184.00156	Ck08: Referenzposition unbekannt	0x8612	0x8612	Reference Limit
xx.0184.08005	Ck09: Positioniermodus ungültig	0x8600	0x8600	Positioning Controller
xx.0184.08007	Ck10: Profildaten unplausibel	0x8600	0x8600	Positioning Controller
xx.0184.08009	Ck11: Betriebsart ungültig	0x8600	0x8600	Positioning Controller
xx.0184.08014	Ck12: Profilnummer ungültig	0x8600	0x8600	Positioning Controller
xx.0184.08015	Ck13: Fehler FB MCKCtrlInterface	0x8600	0x8600	Positioning Controller
xx.0400.00009	dH09: EEPROM Leistungsteil	0x5530	0x7600	Data Memory
xx.0400.00016	dH10: Lüfterausfall	0x5000	0x5000	Device Hardware
xx.0400.00104	dH68: Abgleichdatenfehler CU	0x5530	0x6000	Device Software
xx.0400.00105	dH69: Abgleichdatenfehler BU	0x5530	0x6000	Device Software
xx.0980.00001	Anwenderfehler 1	0x6200	0x6200	User Software
xx.0981.00002	Anwenderfehler 2	0x6200	0x6200	User Software
xx.0982.00003	Anwenderfehler 3	0x6200	0x6200	User Software
xx.0983.00004	Anwenderfehler 4	0x6200	0x6200	User Software
xx.0984.00001	Anwenderfehler 5	0x6200	0x6200	User Software
xx.0985.00002	Anwenderfehler 6	0x6200	0x6200	User Software
xx.0986.00003	Anwenderfehler 7	0x6200	0x6200	User Software
xx.0987.00004	Anwenderfehler 8	0x6200	0x6200	User Software

EtherNet/IP-Fehlermeldungen

Lenze-Fehler		DRIVECOM-Fehler	
Fehlernummer [32 Bit]	**Fehlermeldung**	**Fehlernummer [hex]**	**Fehlermeldung**
xx.0444.12544	EtherNet/IP: Verbindung zum Inverter Drive verloren	0x7510	Serial Interface No 1
xx.0444.21809	EtherNet/IP: Kein Zugriff auf Speicher	0x7600	Data Memory
xx.0444.21810	EtherNet/IP: Fehler beim Lesen vom Speicher	0x7600	Data Memory
xx.0444.21811	EtherNet/IP: Fehler beim Schreiben in Speicher	0x7600	Data Memory
xx.0444.24592	EtherNet/IP: Neustart durch Watchdogreset	0x6010	Software Reset (Watchdog)
xx.0444.24593	EtherNet/IP: Interner Fehler	0x6100	Internal Software
xx.0444.24832	EtherNet/IP: Interner Fehler	0x6100	Internal Software
xx.0444.24833	EtherNet/IP: Interner Fehler	0x6100	Internal Software
xx.0444.25631	EtherNet/IP: Parametersatz ungültig	0x7421	Invalid Parameters
xx.0444.25632	EtherNet/IP: Lenze-Einstellung geladen	0x7421	Invalid Parameters
xx.0444.25648	EtherNet/IP: Ungültige Konfiguration	0x7421	Invalid Parameters
xx.0444.25907	EtherNet/IP: Ungültige IP-Parameter	0x7421	Invalid Parameters
xx.0444.33041	EtherNet/IP: Fault-Modus	0x7000	Additional Modules
xx.0444.33042	EtherNet/IP: Expliziter Nachrichten Timeout	0x7500	Communication
xx.0444.33044	EtherNet/IP: Allgemeiner Ethernet Timeout	0x7500	Communication
xx.0444.33074	EtherNet/IP: Idle-Modus	0x7000	Additional Modules
xx.0444.33395	EtherNet/IP: Doppelte IP-Adresse	0x7421	Invalid Parameters

13 Parameter-Referenz

Dieses Kapitel ergänzt die Parameterliste und die Attributtabelle im Referenzhandbuch und in der »Engineer« Online-Hilfe zum Inverter Drive 8400 motec um die Parameter der Communication Unit E84DGFCGxxx (EtherNet/IP).

13.1 Parameter der Communication Unit

> **Referenzhandbuch / »Engineer« Online-Hilfe zum Inverter Drive 8400 motec**
> Hier finden Sie allgemeine Informationen zu Parametern.

In diesem Kapitel sind die Parameter der Communication Unit E84DGFCGxxx (EtherNet/IP) in numerisch aufsteigender Reihenfolge aufgeführt.

C13000

Parameter | Name: **C13000 | IP-Adresse**		Datentyp: UNSIGNED_8 Index: 11575 = 0x2D37
Einstellung der IP-Adresse ▸ IP-Konfiguration des Inverter Drive 8400 motec einstellen (🕮 31)		
Einstellbereich (min. Wert | Einheit | max. Wert)		
0		255
Subcodes	**Lenze-Einstellung**	**Info**
C13000/1	192	IP-Adresse (höchstwertiges Byte)
C13000/2	168	IP-Adresse
C13000/3	124	IP-Adresse
C13000/4	16	IP-Adresse (niederstwertiges Byte)
☑ Lesezugriff ☑ Schreibzugriff ☐ RSP ☐ PLC-STOP ☐ Kein Transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT		

C13001

Parameter | Name: **C13001 | Subnetzmaske**		Datentyp: UNSIGNED_8 Index: 11574 = 0x2D36
Einstellung der Subnetzmaske ▸ IP-Konfiguration des Inverter Drive 8400 motec einstellen (🕮 31)		
Einstellbereich (min. Wert | Einheit | max. Wert)		
0		255
Subcodes	**Lenze-Einstellung**	**Info**
C13001/1	255	Subnetzmaske (höchstwertiges Byte)
C13001/2	255	Subnetzmaske
C13001/3	255	Subnetzmaske
C13001/4	0	Subnetzmaske (niederstwertiges Byte)
☑ Lesezugriff ☑ Schreibzugriff ☐ RSP ☐ PLC-STOP ☐ Kein Transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT		

C13002

Parameter | Name: **C13002 | Gateway-Adresse**		Datentyp: UNSIGNED_8 Index: 11573 = 0x2D35
Einstellung der Gateway-Adresse ▸ IP-Konfiguration des Inverter Drive 8400 motec einstellen (🕮 31)		
Einstellbereich **(min. Wert | Einheit | max. Wert)**		
0		255
Subcodes	**Lenze-Einstellung**	**Info**
C13002/1	0	Gateway-Adresse (höchstwertiges Byte)
C13002/2	0	Gateway-Adresse
C13002/3	0	Gateway-Adresse
C13002/4	0	Gateway-Adresse (niederstwertiges Byte)
☑ Lesezugriff ☑ Schreibzugriff ☐ RSP ☐ PLC-STOP ☐ Kein Transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT		

C13003

Parameter | Name: **C13003 | MAC-ID**	Datentyp: OCTET_STRING Index: 11572 = 0x2D34
Anzeige der MAC-ID	
☑ Lesezugriff ☐ Schreibzugriff ☐ RSP ☐ PLC-STOP ☐ Kein Transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT	

C13005

Parameter | Name: **C13005 | IP Konfigurations-Referenz**		Datentyp: UNSIGNED_8 Index: 11570 = 0x2D32
Auswahl, wie die IP-Konfiguration erfolgen soll. (Instanzattribut 3 (Configuration Control) im TCP/IP Interface Object (245 / 0xF5) (🕮 126)) ▸ IP-Konfiguration des Inverter Drive 8400 motec einstellen (🕮 31)		
Auswahlliste **(Lenze-Einstellung fettgedruckt)**		**Info**
0	Gespeicherte Adresse	Die aktuell in der Communication Unit gespeicherte IP-Konfiguration wird verwendet.
1	**BOOTP**	Die IP-Konfiguration wird durch den Scanner mittels BOOTP zugewiesen.
2	DHCP	Die IP-Konfiguration wird durch den Scanner mittels DHCP zugewiesen. Die Zuweisung einer Gateway-Adresse, die nicht im selben Subnetz wie die IP-Adresse liegt, wird abgelehnt.
☑ Lesezugriff ☑ Schreibzugriff ☐ RSP ☐ PLC-STOP ☐ Kein Transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT		

C13006

Parameter | Name: **C13006 | Multicast IP-Startadresse**			Datentyp: UNSIGNED_8 Index: 11569 = 0x2D31
Einstellung der Multicast IP-Adresse ▸ IP-Konfiguration des Inverter Drive 8400 motec einstellen (🕮 31)			
Einstellbereich **(min. Wert | Einheit | max. Wert)**			
0		255	
Subcodes	**Lenze-Einstellung**		**Info**
C13006/1	239		Multicast IP-Startaddresse (höchstwertiges Byte)
C13006/2	64		Multicast IP-Startaddresse
C13006/3	2		Multicast IP-Startaddresse
C13006/4	224		Multicast Startaddresse (niederstwertiges Byte)
☑ Lesezugriff ☑ Schreibzugriff ☐ RSP ☐ PLC-STOP ☐ Kein Transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT			

C13010

Parameter | Name: **C13010 | Aktive IP-Adresse**			Datentyp: UNSIGNED_8 Index: 11565 = 0x2D2D
Anzeige der aktiven IP-Adresse (Instanzattribut 5 (IP Address) im TCP/IP Interface Object (245 / 0xF5) (🕮 126))			
Anzeigebereich **(min. Wert | Einheit | max. Wert)**			
0		255	
Subcodes			**Info**
C13010/1			Aktive IP-Adresse (höchstwertiges Byte)
C13010/2			Aktive IP-Adresse
C13010/3			Aktive IP-Adresse
C13010/4			Aktive IP-Adresse (niederstwertiges Byte)
☑ Lesezugriff ☐ Schreibzugriff ☐ RSP ☐ PLC-STOP ☐ Kein Transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT			

C13011

Parameter | Name: **C13011 | Aktive Subnetzmaske**			Datentyp: UNSIGNED_8 Index: 11564 = 0x2D2C
Anzeige der aktiven Subnetzmaske (Instanzattribut 5 (IP Network Mask) im TCP/IP Interface Object (245 / 0xF5) (🕮 126))			
Anzeigebereich **(min. Wert | Einheit | max. Wert)**			
0		255	
Subcodes			**Info**
C13011/1			Aktive Subnetzmaske (höchstwertiges Byte)
C13011/2			Aktive Subnetzmaske
C13011/3			Aktive Subnetzmaske
C13011/4			Aktive Subnetzmaske (niederstwertiges Byte)
☑ Lesezugriff ☐ Schreibzugriff ☐ RSP ☐ PLC-STOP ☐ Kein Transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT			

C13012

<table>
<tr><td colspan="3">Parameter | Name:
C13012 | Aktive Gateway-Adresse</td><td>Datentyp: UNSIGNED_8
Index: 11563 = 0x2D2B</td></tr>
<tr><td colspan="4">Anzeige der aktiven Gateway-Adresse
(Instanzattribut 5 (Gateway Address) im TCP/IP Interface Object (245 / 0xF5) (🕮 126))</td></tr>
<tr><td colspan="3">Anzeigebereich (min. Wert | Einheit | max. Wert)</td><td></td></tr>
<tr><td>0</td><td></td><td>255</td><td></td></tr>
<tr><td colspan="3">Subcodes</td><td>Info</td></tr>
<tr><td colspan="3">C13012/1</td><td>Aktive Gateway-Adresse (höchstwertiges Byte)</td></tr>
<tr><td colspan="3">C13012/2</td><td>Aktive Gateway-Adresse</td></tr>
<tr><td colspan="3">C13012/3</td><td>Aktive Gateway-Adresse</td></tr>
<tr><td colspan="3">C13012/4</td><td>Aktive Gateway-Adresse (niederstwertiges Byte)</td></tr>
<tr><td colspan="4">☑ Lesezugriff ☐ Schreibzugriff ☐ RSP ☐ PLC-STOP ☐ Kein Transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT</td></tr>
</table>

C13016

<table>
<tr><td colspan="3">Parameter | Name:
C13016 | Multicast IP-Adresse</td><td>Datentyp: UNSIGNED_8
Index: 11559 = 0x2D27</td></tr>
<tr><td colspan="4">Anzeige der aktiven Multicast IP-Adresse</td></tr>
<tr><td colspan="3">Anzeigebereich (min. Wert | Einheit | max. Wert)</td><td></td></tr>
<tr><td>0</td><td></td><td>255</td><td></td></tr>
<tr><td colspan="3">Subcodes</td><td>Info</td></tr>
<tr><td colspan="3">C13016/1</td><td>Multicast IP-Addresse (höchstwertiges Byte)</td></tr>
<tr><td colspan="3">C13016/2</td><td>Multicast IP-Addresse</td></tr>
<tr><td colspan="3">C13016/3</td><td>Multicast IP-Addresse</td></tr>
<tr><td colspan="3">C13016/4</td><td>Multicast IP-Addresse (niederstwertiges Byte)</td></tr>
<tr><td colspan="4">☑ Lesezugriff ☐ Schreibzugriff ☐ RSP ☐ PLC-STOP ☐ Kein Transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT</td></tr>
</table>

C13017

Parameter | Name: **C13017 | Ethernet Einstellung**		Datentyp: UNSIGNED_16 Index: 11558 = 0x2D26
Einstellung der Übertragungsrate für die Ethernet-Anschlüsse		
Auswahlliste		
0	Autonegotiation	
1	10 Mbps	
2	100 Mbps	
3	Reserviert	
4	Reserviert	
5	10 Mbps/Halbduplex	
6	10 Mbps/Vollduplex	
7	100 Mbps/Halbduplex	
8	100 Mbps/Vollduplex	
9	Reserviert	
10	Reserviert	
11	Reserviert	
12	Reserviert	
Subcodes	**Lenze-Einstellung**	**Info**
C13017/1	0: Autonegotiation	Ethernet Einstellung Port X31
C13017/2	0: Autonegotiation	Ethernet Einstellung Port X32
☑ Lesezugriff ☑ Schreibzugriff ☐ RSP ☐ PLC-STOP ☐ Kein Transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT		

C13018

Parameter | Name: **C13018 | Multicast Einstellung**		Datentyp: UNSIGNED_8 Index: 11557 = 0x2D25
Auswahl zur Multicast IP-Adressierung über das Instanzattribut 9 (Mcast Config) im TCP/IP Interface Object (245 / 0xF5) (📖 126)		
Auswahlliste (Lenze-Einstellung fettgedruckt)		
0	**Default Algorithmus**	
1	Multicast IP-Startadresse	
☑ Lesezugriff ☑ Schreibzugriff ☐ RSP ☐ PLC-STOP ☐ Kein Transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT		

C13019

Parameter | Name: **C13019 | Multicast TTL-Wert**			Datentyp: UNSIGNED_8 Index: 11556 = 0x2D24
Einstellung des Multicast TTL-Wertes für die Gültigkeitsdauer von Datenpaketen im EtherNet/IP-Netzwerk (Instanzattribut 8 (TTL Value) im TCP/IP Interface Object (245 / 0xF5) (📖 126))			
Einstellbereich (min. Wert | Einheit | max. Wert)			**Lenze-Einstellung**
1		255	**1**
☑ Lesezugriff ☑ Schreibzugriff ☐ RSP ☐ PLC-STOP ☐ Kein Transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT			

C13020

<table>
<tr><td colspan="3">Parameter | Name:
C13020 | Anzahl zugewiesener IP-Adressen</td><td>Datentyp: UNSIGNED_8
Index: 11555 = 0x2D23</td></tr>
<tr><td colspan="4">Einstellung, wieviele Multicast IP-Adressen zugewiesen werden.
(Instanzattribut 9 (Num Mcast) im TCP/IP Interface Object (245 / 0xF5) (🕮 126))</td></tr>
<tr><td colspan="3">Einstellbereich (min. Wert | Einheit | max. Wert)</td><td>Lenze-Einstellung</td></tr>
<tr><td>1</td><td></td><td>8</td><td>1</td></tr>
<tr><td colspan="4">☑ Lesezugriff ☑ Schreibzugriff ☐ RSP ☐ PLC-STOP ☐ Kein Transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT</td></tr>
</table>

C13021

<table>
<tr><td colspan="2">Parameter | Name:
C13021 | Quality of Service (VLAN-Tagging)</td><td>Datentyp: UNSIGNED_8
Index: 11554 = 0x2D22</td></tr>
<tr><td colspan="3">Einstellung, ob QoS-Tags zur Priorisierung der zu übertragenden Datenpakete verwendet werden.
(Instanzattribut 1 (802.1Q Tag Enable) im Quality of Service (QoS) Object (72 / 0x48) (🕮 124))</td></tr>
<tr><td colspan="2">Auswahlliste (Lenze-Einstellung fettgedruckt)</td><td></td></tr>
<tr><td>0</td><td>Keine Verwendung 802.1Q Tag</td><td></td></tr>
<tr><td>1</td><td>Verwendung 802.1Q Tag</td><td></td></tr>
<tr><td colspan="3">☑ Lesezugriff ☑ Schreibzugriff ☐ RSP ☐ PLC-STOP ☐ Kein Transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT</td></tr>
</table>

C13022

<table>
<tr><td colspan="3">Parameter | Name:
C13022 | Quality of Service (DSCP)</td><td>Datentyp: UNSIGNED_8
Index: 11553 = 0x2D21</td></tr>
<tr><td colspan="4">Einstellung zur Priorisierung der zu übertragenden Datenpakete mit Differentiated Services Codepoints (DSCP)</td></tr>
<tr><td colspan="3">Einstellbereich (min. Wert | Einheit | max. Wert)</td><td></td></tr>
<tr><td>0</td><td></td><td>63</td><td></td></tr>
<tr><td>Subcodes</td><td colspan="2">Lenze-Einstellung</td><td>Info</td></tr>
<tr><td>C13022/1</td><td colspan="2">59</td><td>Reserviert</td></tr>
<tr><td>C13022/2</td><td colspan="2">47</td><td>Reserviert</td></tr>
<tr><td>C13022/3</td><td colspan="2">55</td><td>Reserviert</td></tr>
<tr><td>C13022/4</td><td colspan="2">47</td><td>QoS DSCP Scheduled
(Instanzattribut 5 (DSCP Scheduled) im Quality of Service (QoS) Object (72 / 0x48) (🕮 124))</td></tr>
<tr><td>C13022/5</td><td colspan="2">43</td><td>QoS DSCP High Prio
(Instanzattribut 6 (DSCP High Prio) im Quality of Service (QoS) Object (72 / 0x48) (🕮 124))</td></tr>
<tr><td>C13022/6</td><td colspan="2">31</td><td>Reserviert</td></tr>
<tr><td>C13022/7</td><td colspan="2">27</td><td>QoS DSCP Explicit Msg
(Instanzattribut 8 (DSCP Explicit Msg.) im Quality of Service (QoS) Object (72 / 0x48) (🕮 124))</td></tr>
<tr><td colspan="4">☑ Lesezugriff ☑ Schreibzugriff ☐ RSP ☐ PLC-STOP ☐ Kein Transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT</td></tr>
</table>

C13840

Parameter | Name: **C13840 | DLR Netzwerktopologie**		Datentyp: UNSIGNED_8 Index: 10735 = 0x29EF
Anzeige der verwendeten DLR-Netzwerktopologie (Device Level Ring) (Instanzattribut 1 (Network Topology) im Device Level Ring (DLR) Object (71 / 0x47) (📖 122))		
Auswahlliste (nur Anzeige)		
0	Linear	
1	Ring	
☑ Lesezugriff ☐ Schreibzugriff ☐ RSP ☐ PLC-STOP ☐ Kein Transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT		

C13841

Parameter | Name: **C13841 | DLR Netzwerkstatus**		Datentyp: UNSIGNED_8 Index: 10734 = 0x29EE
Anzeige des DLR-Netzwerktstatus (Device Level Ring) (Instanzattribut 2 (Network Status) im Device Level Ring (DLR) Object (71 / 0x47) (📖 122))		
Auswahlliste (nur Anzeige)		
0	Normal	
1	Ring Fault	
2	Unexpected Loop detected	
☑ Lesezugriff ☐ Schreibzugriff ☐ RSP ☐ PLC-STOP ☐ Kein Transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT		

C13842

Parameter | Name: **C13842 | Supervisor IP-Adresse**			Datentyp: UNSIGNED_8 Index: 10733 = 0x29ED
Anzeige der Supervisor IP-Adresse (Instanzattribut 10 (Supervisor IP Address) im Device Level Ring (DLR) Object (71 / 0x47) (📖 122))			
Anzeigebereich (min. Wert | Einheit | max. Wert)			
0		255	
Subcodes			**Info**
C13842/1			Supervisor IP-Adresse (höchstwertiges Byte)
C13842/2			Supervisor IP-Adresse
C13842/3			Supervisor IP-Adresse
C13842/4			Supervisor IP-Adresse (niederstwertiges Byte)
☑ Lesezugriff ☐ Schreibzugriff ☐ RSP ☐ PLC-STOP ☐ Kein Transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT			

C13843

Parameter | Name: **C13843 | Supervisor MAC-ID**	Datentyp: OCTET_STRING Index: 10732 = 0x29EC
Anzeige der Supervisor MAC-ID (Instanzattribut 10 (Supervisor MAC Address) im Device Level Ring (DLR) Object (71 / 0x47) (📖 122))	
☑ Lesezugriff ☐ Schreibzugriff ☐ RSP ☐ PLC-STOP ☐ Kein Transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT	

C13844

<table>
<tr><td colspan="2">Parameter | Name:
C13844 | Beacon Überwachung</td><td>Datentyp: UNSIGNED_32
Index: 10731 = 0x29EB</td></tr>
<tr><td colspan="3">Anzeige der Beacon-Zeiten (µs)</td></tr>
<tr><td>Subcodes</td><td colspan="2">Info</td></tr>
<tr><td>C13844/1</td><td colspan="2">Beacon Intervall</td></tr>
<tr><td>C13844/2</td><td colspan="2">Beacon Timeout</td></tr>
<tr><td colspan="3">☑ Lesezugriff ☐ Schreibzugriff ☐ RSP ☐ PLC-STOP ☐ Kein Transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT</td></tr>
</table>

C13845

<table>
<tr><td colspan="2">Parameter | Name:
C13845 | Beacon Telegramme</td><td>Datentyp: UNSIGNED_32
Index: 10730 = 0x29EA</td></tr>
<tr><td colspan="3">Anzeige von Beacon-Telegramminformationen</td></tr>
<tr><td>Subcodes</td><td colspan="2">Info</td></tr>
<tr><td>C13845/1</td><td colspan="2">Beacon Telegramme Port X31</td></tr>
<tr><td>C13845/2</td><td colspan="2">Beacon Telegramm-Fehler Port X31</td></tr>
<tr><td>C13845/3</td><td colspan="2">Beacon Telegramme Port X32</td></tr>
<tr><td>C13845/4</td><td colspan="2">Beacon Telegramm-Fehler Port X32</td></tr>
<tr><td colspan="3">☑ Lesezugriff ☐ Schreibzugriff ☐ RSP ☐ PLC-STOP ☐ Kein Transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT</td></tr>
</table>

C13846

<table>
<tr><td colspan="2">Parameter | Name:
C13846 | Erkennung Adresskonflikt (ACD)</td><td>Datentyp: UNSIGNED_8
Index: 10729 = 0x29E9</td></tr>
<tr><td colspan="3">Aktivierung der Adresskonflikterkennung (ACD)
(Instanzattribut 10 (SelectAcd) im TCP/IP Interface Object (245 / 0xF5) (📖 126))
Bei Änderung dieses Wertes ist ein Reset des Gerätes ("Power off/on" oder "Type 0 Reset") erforderlich.</td></tr>
<tr><td colspan="2">Auswahlliste (Lenze-Einstellung fettgedruckt)</td><td></td></tr>
<tr><td>0</td><td>Deaktiviert</td><td></td></tr>
<tr><td>1</td><td>Aktiviert</td><td></td></tr>
<tr><td colspan="3">☑ Lesezugriff ☑ Schreibzugriff ☐ RSP ☐ PLC-STOP ☐ Kein Transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT</td></tr>
</table>

C13847

<table>
<tr><td colspan="2">Parameter | Name:
C13847 | Status Konflikterkennung (ACD)</td><td>Datentyp: UNSIGNED_8
Index: 10728 = 0x29E8</td></tr>
<tr><td colspan="3">Anzeige des Status der Adresskonflikterkennung (ACD)</td></tr>
<tr><td colspan="2">Auswahlliste (nur Anzeige)</td><td></td></tr>
<tr><td>0</td><td>Kein Konflikt</td><td></td></tr>
<tr><td>1</td><td>Konflikt erkannt</td><td></td></tr>
<tr><td colspan="3">☑ Lesezugriff ☐ Schreibzugriff ☐ RSP ☐ PLC-STOP ☐ Kein Transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT</td></tr>
</table>

C13848

Parameter | Name: **C13848 | Letzte Konflikt-MAC-ID**	Datentyp: OCTET_STRING Index: 10727 = 0x29E7
Anzeige der MAC-Adresse des EtherNet/IP-Teilnehmers, an dem zuletzt ein Adresskonflikt (ACD) auftrat. Die Daten des letzten Konflikts werden nur in diese Codestelle übernommen, wenn zu dem Zeitpunkt ACD aktiv ist (C13846 = 1). (Instanzattribut 11 (RemoteMAC) im TCP/IP Interface Object (245 / 0xF5) (🕮 126))	
☑ Lesezugriff ☐ Schreibzugriff ☐ RSP ☐ PLC-STOP ☐ Kein Transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT	

C13849

Parameter | Name: **C13849 | Letzte Konflikt-IP-Adresse**			Datentyp: UNSIGNED_8 Index: 10726 = 0x29E6
Anzeige der IP-Adresse des EtherNet/IP-Teilnehmers, an dem zuletzt ein Adresskonflikt (ACD) auftrat. Die Daten des letzten Konflikts werden nur in diese Codestelle übernommen, wenn zu dem Zeitpunkt ACD aktiv ist (C13846 = 1).			
Anzeigebereich **(min. Wert | Einheit | max. Wert)**			
0		255	
Subcodes			**Info**
C13849/1			Letzte Konflikt IP-Adresse (höchstwertiges Byte)
C13849/2			Letzte Konflikt IP-Adresse
C13849/3			Letzte Konflikt IP-Adresse
C13849/4			Letzte Konflikt IP-Adresse (niederstwertiges Byte)
☑ Lesezugriff ☐ Schreibzugriff ☐ RSP ☐ PLC-STOP ☐ Kein Transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT			

C13850

Parameter | Name: **C13850 | Alle Wörter zum Scanner**			Datentyp: INTEGER_16 Index: 10725 = 0x29E5
Anzeige der I/O-Datenwörter, die von der Communication Unit (Adapter) zum Scanner übertragen werden. In den Subcodestellen werden alle I/O-Datenwörter zum Scanner angezeigt. Es sind nur diejenigen gültig, die konfiguriert sind.			
Anzeigebereich **(min. Wert | Einheit | max. Wert)**			
-32768		32767	
Subcodes			**Info**
C13850/1			
...			
C13850/10			
☑ Lesezugriff ☐ Schreibzugriff ☐ RSP ☐ PLC-STOP ☐ Kein Transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT			

C13851

Parameter | Name: **C13851 | Alle Wörter vom Scanner**		Datentyp: INTEGER_16 Index: 10724 = 0x29E4
Anzeige der I/O-Datenwörter, die vom Scanner zur Communication Unit (Adapter) übertragen werden. In den Subcodestellen werden alle I/O-Datenwörter vom Scanner angezeigt. Es sind nur diejenigen gültig, die konfiguriert sind.		
Anzeigebereich **(min. Wert | Einheit | max. Wert)**		
-32768		32767

Subcodes	**Info**
C13851/1	
...	
C13851/8	

☑ Lesezugriff ☐ Schreibzugriff ☐ RSP ☐ PLC-STOP ☐ Kein Transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT

C13858

Parameter | Name: **C13858 | Ethernet Port Statistiken**	Datentyp: UNSIGNED_32 Index: 10717 = 0x29DD
Anzeige von Statistikwerten zum Datentransfer über die Ethernet-Anschlüsse	
Subcodes	**Info**
C13858/1	Ethernet Port X31: RX
C13858/2	Ethernet Port X31: RX CRC Fehler
C13858/3	Ethernet Port X31: RX verworfen
C13858/4	Ethernet Port X31: TX
C13858/5	Ethernet Port X31: TX verworfen
C13858/6	Ethernet Port X32: RX
C13858/7	Ethernet Port X32: RX CRC Fehler
C13858/8	Ethernet Port X32: RX verworfen
C13858/9	Ethernet Port X32: TX
C13858/10	Ethernet Port X32: TX verworfen

☑ Lesezugriff ☐ Schreibzugriff ☐ RSP ☐ PLC-STOP ☐ Kein Transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT

C13861

Parameter | Name: **C13861 | CIP-Modulstatus**	Datentyp: UNSIGNED_16 Index: 10714 = 0x29DA
Anzeige des aktuellen CIP-Modulstatus (Instanzattribut 8 (State) im Identity Object (1 / 0x01) (🕮 111)) • Der Status wird auch über die LED **MS** signalisert. ▸ LED-Statusanzeigen (🕮 79)	

Auswahlliste **(nur Anzeige)**	
0	Nicht vorhanden
1	Device Self Testing
2	Standby
3	Operational
4	Major Recoverable Fault
5	Major Unrecoverable Fault

☑ Lesezugriff ☐ Schreibzugriff ☐ RSP ☐ PLC-STOP ☐ Kein Transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT

C13862

Parameter | Name: **C13862 | CIP-Netzwerkstatus**		Datentyp: UNSIGNED_16 Index: 10713 = 0x29D9
Anzeige des aktuellen CIP-Netzwerkstatus • Der Status wird auch über die LED **NS** signalisert. ▶ LED-Statusanzeigen (🕮 79)		
Auswahlliste (nur Anzeige)		
0	Keine IP-Adresse	
1	Keine Verbindung	
2	Verbindung aufgebaut	
3	Verbindungs-Timeout	
4	Duplicate IP	
5	Selbsttest	
☑ Lesezugriff ☐ Schreibzugriff ☐ RSP ☐ PLC-STOP ☐ Kein Transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT		

C13863

Parameter | Name: **C13863 | Ethernet Port**		Datentyp: UNSIGNED_16 Index: 10712 = 0x29D8
Anzeige der aktuellen Übertragungsrate an den Ethernet-Anschlüssen		
Auswahlliste (nur Anzeige)		
0	Keine Verbindung	
1	10 Mbps/Halbduplex	
2	10 Mbps/Vollduplex	
3	100 Mbps/Halbduplex	
4	100 Mbps/Volluplex	
5	Reserviert	
6	Reserviert	
Subcodes		**Info**
C13863/1		Ethernet Port X31 Link Status
C13863/2		Ethernet Port X32 Link Status
☑ Lesezugriff ☐ Schreibzugriff ☐ RSP ☐ PLC-STOP ☐ Kein Transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT		

C13870

Parameter | Name: **C13870 | Status CIP-Verbindungen**		Datentyp: UNSIGNED_16 Index: 10705 = 0x29D1
Anzeige des aktuellen CIP-Verbindungsstatus		
Auswahlliste (nur Anzeige)		
0	Keine Verbindung	
3	Verbindung aufgebaut	
4	Verbindungs-Timeout	
Subcodes		**Info**
C13870/1		Status CIP-Verbindung 1
...		...
C13870/8		Status CIP-Verbindung 8
☑ Lesezugriff ☐ Schreibzugriff ☐ RSP ☐ PLC-STOP ☐ Kein Transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT		

C13871

Parameter | Name: **C13871 | Typ CIP-Verbindungen**		Datentyp: UNSIGNED_16 Index: 10704 = 0x29D0
Anzeige der aktuellen CIP-Verbindungstypen • "Listen Only"-Verbindungen werden nicht angezeigt.		
Auswahlliste **(nur Anzeige)**		
0	Nicht vorhanden	
1	Exclusive Owner	
2	Input Only	
3	Listen Only	
4	Explizite Verbindung	
Subcodes		**Info**
C13871/1		Typ CIP-Verbindung 1
...		...
C13871/8		Typ CIP-Verbindung 8
☑ Lesezugriff ☐ Schreibzugriff ☐ RSP ☐ PLC-STOP ☐ Kein Transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT		

C13872

Parameter | Name: **C13872 | Trigger CIP-Verbindungen**		Datentyp: UNSIGNED_16 Index: 10703 = 0x29CF
Anzeige der aktuellen CIP-Verbindungsklasse		
Auswahlliste **(nur Anzeige)**		
0	Nicht vorhanden	
1	Klasse 1, zyklisch, Client	
163	Klasse 3, App. Obj., Server	
Subcodes		**Info**
C13872/1		Trigger CIP-Verbindung 1
...		...
C13872/8		Trigger CIP-Verbindung 8
☑ Lesezugriff ☐ Schreibzugriff ☐ RSP ☐ PLC-STOP ☐ Kein Transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT		

C13873

Parameter | Name: **C13873 | RPI CIP-Verbindungen**			Datentyp: UNSIGNED_32 Index: 10702 = 0x29CE
Anzeige der aktuellen RPI-Zeiten (Requested Package Interval) der CIP-Verbindungen ("Originator to Target"-Zeit)			
Anzeigebereich **(min. Wert | Einheit | max. Wert)**			
0	ms	4294967295	
Subcodes			**Info**
C13873/1			RPI CIP-Verbindung 1
...			...
C13873/8			RPI CIP-Verbindung 8
☑ Lesezugriff ☐ Schreibzugriff ☐ RSP ☐ PLC-STOP ☐ Kein Transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT			

C13874

Parameter | Name: **C13874 | Timeout-Zeit CIP-Verbindungen**			Datentyp: UNSIGNED_32 Index: 10701 = 0x29CD
Anzeige der Zeitüberschreitungen (ms) der CIP-Verbindungen			
Anzeigebereich **(min. Wert | Einheit | max. Wert)**			
0	ms	4294967295	
Subcodes			**Info**
C13874/1			Timeout-Zeit CIP-Verbindung 1
...			...
C13874/8			Timeout-Zeit CIP-Verbindung 8
☑ Lesezugriff ☐ Schreibzugriff ☐ RSP ☐ PLC-STOP ☐ Kein Transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT			

C13875

Parameter | Name: **C13875 | RUN/IDLE-Flag CIP-Verbindungen**		Datentyp: UNSIGNED_16 Index: 10700 = 0x29CC
Anzeige der Run- und Idle-Flags der CIP-Verbindungen		
Auswahlliste **(nur Anzeige)**		
0	Nicht vorhanden	
1	IDLE	
2	RUN	
Subcodes		**Info**
C13875/1		RUN/IDLE-Flag CIP-Verbindung 1
...		...
C13875/8		RUN/IDLE-Flag CIP-Verbindung 8
☑ Lesezugriff ☐ Schreibzugriff ☐ RSP ☐ PLC-STOP ☐ Kein Transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT		

C13880

Parameter | Name: **C13880 | Reaktion bei Störung der Kommunikation**		Datentyp: UNSIGNED_8 Index: 10695 = 0x29C7
Einstellung der Überwachungsreaktion bei einer Störung der EtherNet/IP-Kommunikation (🕮 78) (Abbildung des Lenze-Objektes Lenze Class (101 / 0x65) (🕮 139)) Eine Änderung der Überwachungsreaktion wird sofort wirksam.		
Auswahlliste		
0	Keine Reaktion	
1	Fehler	
4	Arretierte Warnung	
Subcodes	**Lenze-Einstellung**	**Info**
C13880/1	0: Keine Reaktion	Idle-Modus
C13880/2	1: Fehler	Fault-Modus (nur bei "Exclusive owner" Verbindungen)
C13880/3	0: Keine Reaktion	Timeout expl. Nachrichten
C13880/4	0: Keine Reaktion	Allgemeiner Ethernet Kommunikations-Timeout
☑ Lesezugriff ☑ Schreibzugriff ☐ RSP ☐ PLC-STOP ☐ Kein Transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT		

C13881

Parameter | Name: **C13881 | Allgemeine Ethernet Kommunikations-Timeoutzeit**			Datentyp: UNSIGNED_16 Index: 10694 = 0x29C6
Einstellung der allgemeinen Überwachungszeit (siehe Störung der EtherNet/IP-Kommunikation (🕮 78)) Eine Änderung der Überwachungszeit wird sofort wirksam.			
Einstellbereich **(min. Wert | Einheit | max. Wert)**			**Lenze-Einstellung**
500	ms	65535	**10000 ms**
☑ Lesezugriff ☑ Schreibzugriff ☐ RSP ☐ PLC-STOP ☐ Kein Transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT			

C13885

Parameter | Name: **C13885 | I/O-Daten löschen**		Datentyp: UNSIGNED_8 Index: 10690 = 0x29C2
Einstellung, welche I/O-Daten der Adapter zur Aufrechterhaltung der internen Kommunikation weiter verarbeiten soll, wenn ... • der Netzwerkstatus der steuernden I/O-Verbindung "Not connected" ist (siehe C13862) oder • ein Idle-Ereignis eingetreten ist. Eine Änderung der Einstellung wird sofort wirksam. (Siehe Störung der EtherNet/IP-Kommunikation (🕮 78).)		
Auswahlliste **(Lenze-Einstellung fettgedruckt)**		
0	Verwendung letzter Scanner Ausgangsdaten	
1	**Scanner Ausgangsdaten löschen**	
☑ Lesezugriff ☑ Schreibzugriff ☐ RSP ☐ PLC-STOP ☐ Kein Transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT		

C13899

Parameter | Name: **C13899 | Host-Name**		Datentyp: VISIBLE_STRING Index: 10676 = 0x29B4
Die Subcodestellen beinhalten jeweils einen String mit einer Länge von 32 Bytes. Hier wird die Bezeichnung des EtherNet/IP-Teilnehmers ausgegeben. (Instanzattribut 6 (Host Name) im TCP/IP Interface Object (245 / 0xF5) (🕮 126))		
Subcodes	**Lenze-Einstellung**	**Info**
C13899/1		Hostname
C13899/2		Hostname
☑ Lesezugriff ☑ Schreibzugriff ☐ RSP ☐ PLC-STOP ☐ Kein Transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT		

C13900

Parameter | Name: **C13900 | Firmware Produkttyp**	Datentyp: VISIBLE_STRING Index: 10675 = 0x29B3
Die Codestelle beinhaltet einen String mit einer Länge von 8 Bytes. Die Erkennungsziffer "E84DGFCG" wird ausgegeben.	
☑ Lesezugriff ☐ Schreibzugriff ☐ RSP ☐ PLC-STOP ☐ Kein Transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT	

C13901

Parameter | Name: **C13901 | Firmware Kompilierdatum**	Datentyp: VISIBLE_STRING Index: 10674 = 0x29B2
Die Codestelle beinhaltet einen String mit einer Länge von 20 Bytes. Das Erstellungsdatum ("MMM TT JJJJ") und die Uhrzeit ("hh:mm:ss") der Software werden ausgegeben (z. B. "Mar 21 2005 12:31:21").	
☑ Lesezugriff ☐ Schreibzugriff ☐ RSP ☐ PLC-STOP ☐ Kein Transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT	

C13902

Parameter | Name: **C13902 | Firmware Version**	Datentyp: VISIBLE_STRING Index: 10673 = 0x29B1
Die Codestelle beinhaltet einen String mit einer Länge von 11 Bytes. Die Firmware-Version wird ausgegeben (z. B. "00.01.00.00").	
☑ Lesezugriff ☐ Schreibzugriff ☐ RSP ☐ PLC-STOP ☐ Kein Transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT	

13.2 Attributtabelle

Die Attributtabelle enthält Informationen, die für eine Kommunikation zum Inverter über Parameter erforderlich sind.

So lesen Sie die Attributtabelle:

Spalte		Bedeutung	Eintrag	
Code		Parameter-Bezeichnung	Cxxxxx	
Name		Parameter-Kurztext (Display-Text)	*Text*	
Index	dec	Index, unter dem der Parameter adressiert wird. Der Subindex bei Array-Variablen entspricht der Lenze-Subcodenummer.	24575 - Lenze-Codenummer	Wird nur bei Zugriff über ein Bussystem benötigt.
	hex		0x5FFF - Lenze-Codenummer	
Daten	DS	Datenstruktur	E	Einfach-Variable (nur ein Parameterelement)
			A	Array-Variable (mehrere Parameterelemente)
	DA	Anzahl der Array-Elemente (Subcodes)	*Anzahl*	
	DT	Datentyp	BITFIELD_8	1 Byte bit-codiert
			BITFIELD_16	2 Bytes bit-codiert
			BITFIELD_32	4 Bytes bit-codiert
			INTEGER_8	1 Byte mit Vorzeichen
			INTEGER_16	2 Bytes mit Vorzeichen
			INTEGER_32	4 Bytes mit Vorzeichen
			UNSIGNED_8	1 Byte ohne Vorzeichen
			UNSIGNED_16	2 Bytes ohne Vorzeichen
			UNSIGNED_32	4 Bytes ohne Vorzeichen
			VISIBLE_STRING	ASCII-String
			OCTET_STRING	
	Faktor	Faktor für Datenübertragung über ein Bussystem, abhängig von der Anzahl der Nachkommastellen	*Faktor*	1 ≡ keine Nachkommastellen 10 ≡ 1 Nachkommastelle 100 ≡ 2 Nachkommastellen 1000 ≡ 3 Nachkommastellen
Zugriff	R	Lesezugriff	☑ Lesen erlaubt	
	W	Schreibzugriff	☑ Schreiben erlaubt	
	RSP	Reglersperre (CINH) erforderlich	☑ Schreiben ist nur bei Reglersperre (CINH) möglich	

Attributtabelle

Code	Name	Index		Daten				Zugriff		
		dec	hex	DS	DA	DT	Faktor	R	W	RSP
C13000	IP-Adresse	11575	0x2D37	A	4	UNSIGNED_8		☑	☑	
C13001	Subnetzmaske	11574	0x2D36	A	4	UNSIGNED_8		☑	☑	
C13002	Gateway-Adresse	11573	0x2D35	A	4	UNSIGNED_8		☑	☑	
C13003	MAC-ID	11572	0x2D34	E	1	OCTET_STRING		☑		
C13005	IP Konfigurations-Referenz	11570	0x2D32	E	1	UNSIGNED_8	1	☑	☑	
C13006	Multicast IP-Startadresse	11569	0x2D31	A	4	UNSIGNED_8		☑	☑	
C13010	Aktive IP-Adresse	11565	0x2D2D	A	4	UNSIGNED_8	1	☑		
C13011	Aktive Subnetzmaske	11564	0x2D2C	A	4	UNSIGNED_8	1	☑		
C13012	Aktive Gateway-Adresse	11563	0x2D2B	A	4	UNSIGNED_8	1	☑		
C13016	Multicast IP-Adresse	11559	0x2D27	A	4	UNSIGNED_8	1	☑		
C13017	Ethernet Einstellung	11558	0x2D26	A	2	UNSIGNED_16	1	☑	☑	
C13018	Multicast Einstellung	11557	0x2D25	E	1	UNSIGNED_8	1	☑	☑	
C13019	Multicast TTL-Wert	11556	0x2D24	E	1	UNSIGNED_8	1	☑	☑	
C13020	Anzahl zugewiesener IP-Adressen	11555	0x2D23	E	1	UNSIGNED_8	1	☑	☑	
C13021	Quality of Service (VLAN-Tagging)	11554	0x2D22	E	1	UNSIGNED_8	1	☑	☑	
C13022	Quality of Service (DSCP)	11553	0x2D21	A	7	UNSIGNED_8		☑	☑	
C13840	DLR Netzwerktopologie	10735	0x29EF	E	1	UNSIGNED_8	1	☑		
C13841	DLR Netzwerkstatus	10734	0x29EE	E	1	UNSIGNED_8	1	☑		
C13842	Supervisor IP-Adresse	10733	0x29ED	A	4	UNSIGNED_8	1	☑		
C13843	Supervisor MAC-ID	10732	0x29EC	E	1	OCTET_STRING		☑		
C13844	Beacon Überwachung	10731	0x29EB	A	2	UNSIGNED_32	1	☑		
C13845	Beacon Telegramme	10730	0x29EA	A	4	UNSIGNED_32	1	☑		
C13846	Erkennung Adresskonflikt (ACD)	10729	0x29E9	E	1	UNSIGNED_8	1	☑	☑	
C13847	Status Konflikterkennung (ACD)	10728	0x29E8	E	1	UNSIGNED_8	1	☑		
C13848	Letzte Konflikt-MAC-ID	10727	0x29E7	E	1	OCTET_STRING		☑		
C13849	Letzte Konflikt-IP-Adresse	10726	0x29E6	A	4	UNSIGNED_8	1	☑		
C13850	Alle Wörter zum Scanner	10725	0x29E5	A	10	INTEGER_16	1	☑		
C13851	Alle Wörter vom Scanner	10724	0x29E4	A	8	INTEGER_16	1	☑		
C13858	Ethernet Port Statistiken	10717	0x29DD	A	10	UNSIGNED_32	1	☑		
C13861	CIP-Modulstatus	10714	0x29DA	E	1	UNSIGNED_16	1	☑		
C13862	CIP-Netzwerkstatus	10713	0x29D9	E	1	UNSIGNED_16	1	☑		
C13863	Ethernet Port	10712	0x29D8	A	2	UNSIGNED_16	1	☑		
C13870	Status CIP-Verbindungen	10705	0x29D1	A	8	UNSIGNED_16	1	☑		
C13871	Typ CIP-Verbindungen	10704	0x29D0	A	8	UNSIGNED_16	1	☑		
C13872	Trigger CIP-Verbindungen	10703	0x29CF	A	8	UNSIGNED_16	1	☑		
C13873	RPI CIP-Verbindungen	10702	0x29CE	A	8	UNSIGNED_32	1	☑		
C13874	Timeout-Zeit CIP-Verbindungen	10701	0x29CD	A	8	UNSIGNED_32	1	☑		
C13875	RUN/IDLE-Flag CIP-Verbindungen	10700	0x29CC	A	8	UNSIGNED_16	1	☑		
C13880	Reaktion bei Störung der Kommunikation	10695	0x29C7	A	4	UNSIGNED_8	1	☑	☑	
C13881	Allgemeine Ethernet Kommunikations-Timeoutzeit	10694	0x29C6	E	1	UNSIGNED_16	1	☑	☑	
C13885	I/O-Daten löschen	10690	0x29C2	E	1	UNSIGNED_8	1	☑	☑	
C13899	Host-Name	10676	0x29B4	A	2	VISIBLE_STRING		☑	☑	
C13900	Firmware Produkttyp	10675	0x29B3	E	1	VISIBLE_STRING		☑		
C13901	Firmware Kompilierdatum	10674	0x29B2	E	1	VISIBLE_STRING		☑		
C13902	Firmware Version	10673	0x29B1	E	1	VISIBLE_STRING		☑		

14 Implementierte CIP™-Objekte

Ein EtherNet/IP-Teilnehmer ist als eine Ansammlung von Objekten zu sehen. Ein einzelnes Objekt wird durch seine Klasse, deren Instanzen und Attribute beschrieben. Auf diese Objekte sind verschiedene Dienste, wie z. B. Lesedienste oder Schreibdienste, anwendbar.

Hinweis!

In diesem Kapitel werden nur die von Lenze implementierten CIP-Objekte und deren unterstützte Eigenschaften (Attribute, Service-Codes etc.) beschrieben.

Es werden nicht alle Objekteigenschaften, wie sie in der "Common Industrial Protocol Specification" der ODVA beschrieben sind, unterstützt.

"Common Industrial Protocol Specification" der ODVA

Hier finden Sie weitere ausführliche Informationen zu CIP-Objekten.

Übersicht der implementierten CIP-Objekte

CIP-Objekte	Beschreibung
Allgemeine Objekte	
Identity Object (1 / 0x01) (📖 111)	Identifikation und allgemeine Informationen zum Gerät
Message Router Object (2 / 0x02) (📖 113)	Adressierung eines Dienstes für den Datentransfer zu einer beliebigen Objektklasse oder Instanz
Assembly Object (4 / 0x04) (📖 114)	Eingangs-/Ausgangsdaten des Scanners
Connection Manager Object (6 / 0x06) (📖 120)	Verwaltung der internen Ressourcen für den Datentransfer (Implicit/Explicit Messaging)
EtherNet/IP-Objekte	
Device Level Ring (DLR) Object (71 / 0x47) (📖 122)	Statusinformationen für das DLR-Protokoll
Quality of Service (QoS) Object (72 / 0x48) (📖 124)	Klassifizierungen und Priorisierungen der Datenpakete für die EtherNet/IP-Kommunikation
TCP/IP Interface Object (245 / 0xF5) (📖 126)	Konfiguration der TCP/IP-Netzwerkschnittstelle des Gerätes
Ethernet Link Object (246 / 0xF6) (📖 130)	Allgemeine Informationen und Statusinformationen zu den Ethernet-Schnittstellen des Gerätes
AC Drive Profile Objekte	
Motor Data Object (40 / 0x28) (📖 134)	Datenbasis für Motorparameter
Control Supervisor Object (41 / 0x29) (📖 135)	Management-Funktionen der Geräte für die Motoransteuerung.
AC Drive Object (42 / 0x2A) (📖 137)	Gerätespezifische Funktionen des Inverters, z. B. Drehzahlrampen, Drehmomentregelung etc.
Lenze-Objekte	
Lenze Class (101 / 0x65) (📖 139)	Lenze-Fehlerreaktionen auf EtherNet/IP-Fehler
Lenze Class (103 / 0x67) (📖 141)	Abbild der Eingangsdaten des Scanners
Lenze Class (104 / 0x68) (📖 142)	Abbild der Ausgangsdaten des Scanners
Lenze Class (110 / 0x6E) (📖 143)	Zugriff auf Lenze-Codestellen

Allgemeine Klassenattribute

Attribut-ID	Service	Bezeichnung	Datentyp	Beschreibung
1	Get	Revision	UINT	Revisions-Nr. des Objektes
2	Get	Max. Instance	UINT	Max. Anzahl von Instanzen des Objektes
3	Get	Number of Instances	UINT	Anzahl von Instanzen des Objektes
4	Get	Optional Attribute List:	STRUCT of:	Liste der optionalen Instanzattribute:
		Number Attributes	UINT	Anzal der optionalen Attribute
		Optional Attributes	ARRAY of UINT	Auflistung der optionalen Attribute
5	Get	Optional Service List:	STRUCT of:	Liste der optionalen Dienste:
		Number Services	UINT	Anzal der optionalen Dienste
		Optional Services	ARRAY of UINT	Auflistung der optionalen Dienste
6	Get	Max. ID Number Class Attributes	UINT	Die Attribut-ID des letzten Klassenattributs der im Gerät implementierten Klassenbeschreibung
7	Get	Max. ID Number Instance Attributes	UINT	Die Attribut-ID des letzten Instanzattributs der im Gerät implementierten Klassenbeschreibung

14.1 Allgemeine CIP-Objekte

14.1.1 Identity Object (1 / 0x01)

Das "Identity Object" liefert die Identifikation und allgemeine Informationen zum Gerät.

Klassenattribute

Attribut-ID	Service	Bezeichnung	Datentyp	Wert
1	Get	Revision	UINT	1 (0x0001)
2	Get	Max. Instance	UINT	1 (0x0001)
3	Get	Number of Instances	UINT	1 (0x0001)
6	Get	Max. ID Number Class Attributes	UINT	7 (0x0007)
7	Get	Max. ID Number Instance Attributes	UINT	8 (0x0008)

Instanzattribute

Attribut-ID	Service	Bezeichnung	Datentyp	Wert
1	Get	Vendor ID	UINT	587 (0x024B)
2	Get	Device Type	UINT	2 (0x0002): AC Drive
3	Get	Product Code	UINT	8440 (0x20F8)
4	Get	Revision:	STRUCT of:	Firmware-Stand des Gerätes
		Major Revision	USINT	
		Minor Revision	USINT	
5	Get	Status	WORD	Aktueller Gerätestatus (Status-Bits) • Instanzattribut "Status" (Attribut 5) (🕮 112) • EtherNet/IP-Statusdiagramm (🕮 44)
6	Get	Serial Number	UDINT	Seriennummer des Gerätes
7	Get	Product Name	SHORT_STRING	E84DGFCG
8	Get	State	USINT	Aktueller Gerätestatus: • 0: Nonexistent • 1: Device Self-Testing • 2: Standby • 3: Operational • 4: Major Recoverable Fault • 5: Major Unrecoverable Fault • 6 ... 254: Reserviert • 255: Standard für "Get_Attributes_All"-Service (Siehe auch C13861, LED-Statusanzeigen (🕮 79))

Instanzattribut "Status" (Attribut 5)

Bits	Bezeichnung	Beschreibung
0	Owned	Der Zustand ’1’ gibt an, dass das Gerät (oder ein Objekt innerhalb des Gerätes) einen Besitzer hat. Innerhalb eines Master/Slave-Musters gibt der Zustand ’1’ an, dass das "Predefined Master/Slave Connection Set" einem Master zugeteilt ist. Außerhalb des Master/Slave-Musters ist die Bedeutung "TBD".
1	-	Reserviert (0)
2	Configured	Der Zustand ’1’ gibt an, dass die Geräteapplikation etwas anderes ausführt als die "Out-of-box"-Standardkonfiguration. Diese sollte nicht die Konfiguration der Kommunikation beinhalten.
3	-	Reserviert (0)
4 ... 7	Extended Device Status	• 0000: Status ist "Self-Testing" oder unbekannt • 0001: Firmware Update wird durchgeführt • 0010: Mindestens eine fehlerhafte I/O-Verbindung • 0011: Keine I/O-Verbindungen vorhanden • 0100: Nichtflüchtige Konfiguration ist mangelhaft • 0101: "Major Fault" (Bit 10 oder 11 ist ’1’) • 0110: Mindestens eine I/O-Verbindung ist im "Run Mode" • 0111: Mindestens eine I/O-Verbindung ist vorhanden, alle im "Idle Mode" • 1000: Reserviert • 1001: Reserviert • 1010 ... 1111: Reserviert / Hersteller-spezifisch
8	Minor Recoverable Fault	Der Zustand ’1’ gibt an, dass ein "Minor Recoverable Fault" aufgetreten ist.
9	Minor Unrecoverable Fault	Der Zustand ’1’ gibt an, dass ein "Minor Unrecoverable Fault" aufgetreten ist.
10	Major Recoverable Fault	Der Zustand ’1’ gibt an, dass ein "Major Recoverable Fault" aufgetreten ist.
11	Major Unrecoverable Fault	Der Zustand ’1’ gibt an, dass ein "Major Unrecoverable Fault" aufgetreten ist.
12 ... 15	Extended Device Status 2	Reserviert (0) / Hersteller-spezifisch

Unterstützte Service-Codes

Service-Code [hex]	Bezeichnung	Beschreibung
0x01	Get_Attributes_All	Gibt eine Liste der Attribute und deren Werte eines bestimmten Objektes aus.
0x05	Reset	Diese Reset-Service-Typen werden unterstützt: • 0: Ein Netzschalten (Power off/on) wird nachgebildet. • 1: Die Parameter des Gerätes werden in die Lenze-Einstellung zurückgesetzt und ein Netzschalten (Power off/on) wird nachgebildet.
0x0E	Get_Attribute_Single	Gibt den Wert eines bestimmten Attributes aus.

14.1.2 Message Router Object (2 / 0x02)

Mit dem "Message Router Object" kann ein Client einen Dienst für den Datentransfer zu einer beliebigen Objektklasse oder Instanz adressieren.

Klassenattribute

Attribut-ID	Service	Bezeichnung	Datentyp	Wert
1	Get	Revision	UINT	1 (0x0001)
2	Get	Max. Instance	UINT	1 (0x0001)
3	Get	Number of Instances	UINT	1 (0x0001)
4	Get	Optional Attribute List:	STRUCT of:	
		Number Attributes	UINT	2 (0x0002)
		Optional Attributes	ARRAY of UINT	1 , 2 (0x0001.0002)
5	Get	Optional Service List:	STRUCT of:	
		Number Services	UINT	1 (0x0001)
		Optional Services	ARRAY of UINT	10 (0x000A)
6	Get	Max. ID Number Class Attributes	UINT	7 (0x0007)
7	Get	Max. ID Number Instance Attributes	UINT	6 (0x0006)

Instanzattribute

Attribut-ID	Service	Bezeichnung	Datentyp	Wert
1	Get	Object list:	STRUCT of:	Objektliste:
		Number	UINT	Anzahl der unterstützten Objektklassen-Codes
		Classes	ARRAY of UINT	Auflistung der unterstützten Objektklassen-Codes
2	Get	Number Available	UINT	Max. Anzahl der unterstützten Verbindungen

Unterstützte Service-Codes

Service-Code [hex]	Bezeichnung	Beschreibung
0x01	Get_Attributes_All	Gibt eine Liste der Attribute und deren Werte eines bestimmten Objektes aus.
0x0E	Get_Attribute_Single	Gibt den Wert eines bestimmten Attributes aus.

14.1.3 Assembly Object (4 / 0x04)

Für den Datenaustausch unterstützt die Communication Unit folgende Assembly-Objektinstanzen:

Applikation	**Instanz ID**		**Assembly-Objektinstanz**
	[dec]	**[hex]**	
Lenze-Technologieapplikationen / Frei definierbare Parametersätze	110	0x6E	Custom Output
	111	0x6F	Custom Input
"AC Drive Profile"-Applikation	20	0x14	Basic Speed Control Output
	21	0x15	Extended Speed Control Output
	22	0x16	Speed and Torque Control Output
	23	0x17	Extended Speed and Torque Control Output
	70	0x46	Basic Speed Control Input
	71	0x47	Extended Speed Control Input
	72	0x48	Speed and Torque Control Input
	73	0x49	Extended Speed and Torque Control Input

Der Inhalt der Eingangs- und Ausgangsdaten ist abhängig von der I/O-Datenanordnung im Inverter (I/O-Daten-Mapping (🕮 48)).

Applikationshinweis

Ein Beispiel zum Parameterdaten-Transfer (Parameter lesen/schreiben) bei einer "AC Drive Profile"-Applikation finden Sie im Download-Bereich (Application Knowledge Base) unter www.Lenze.com.

Klassenattribute

Attribut-ID	**Service**	**Bezeichnung**	**Datentyp**	**Wert**
1	Get	Revision	UINT	2 (0x0002)
2	Get	Max. Instance	UINT	130 (0x0082)
3	Get	Number of Instances	UINT	11 (0x000B)
4	Get	Optional Attribute List:	STRUCT of:	
		Number Attributes	UINT	1 (0x0001)
		Optional Attributes	ARRAY of UINT	4 (0x0004)
6	Get	Max. ID Number Class Attributes	UINT	7 (0x0007)
7	Get	Max. ID Number Instance Attributes	UINT	4 (0x0004)

Instanzattribute für Ausgangsdaten des Scanners

Attribut-ID	Service	Bezeichnung	Datentyp	Wert
3	Get / Set	Data	ARRAY of SINT / INT / DINT	Max. 16 Bytes vom Scanner zum Adapter: • 20 (0x14): Basic Speed Control Output • 21 (0x15): Extended Speed Control Output • 22 (0x16): Speed and Torque Control Output • 23 (0x17): Extended Speed and Torque Control Output • 110 (0x6E): Custom Output ▸ Instanzattribut "Data" (Attribut 3) (📖 116)
4	Get	Size	UINT	Anzahl der Bytes in Attribut 3 (Data)

Bei Assembly-Ausgangsobjekten (Scanner an Adapter) wird ein 4-Byte-Header (32 Bit "Run/Idle-Header") vorausgesetzt. Bei der Abbildung der Assemblies wird dieser Header von den meisten Allen-Bradley PLC/SLC-Geräten automatisch in den Datenfluss eingefügt.

Unterstützt Ihre PLC – nicht wie die Rockwell-PLCs – diesen Header, ergänzen sie das Ausgangsabbild um einen führenden 32-Bit-Header.

Das **Bit 0** dieses Headers können Sie dann im Prozessabbild Ihrer PLC definieren:

- Zustand ’0’: Idle-Modus
- Zustand ’1’: Run-Modus

Für den Betrieb mit Rockwell-PLCs sind keine Anpassungen erforderlich.

Die Lenze Class (104 / 0x68) (📖 142) liefert das Abbild der Ausgangsdaten des Scanners.

Instanzattribute für Eingangsdaten des Scanners

Attribut-ID	Service	Bezeichnung	Datentyp	Wert
3	Get / Set	Data	ARRAY of SINT / INT / DINT	Max. 20 Bytes vom Adapter zum Scanner: • 70 (0x46): Basic Speed Control Input • 71 (0x47): Extended Speed Control Input • 72 (0x48): Speed and Torque Control Input • 73 (0x49): Extended Speed and Torque Control Input • 111 (0x6F): Custom Input ▶ Instanzattribut "Data" (Attribut 3) (🕮 116) In der Assembly-Objektinstanz **111 (0x6F, Custom Input)** werden in den letzten beiden Wörtern die I/O-Daten eingetragen. ▶ I/O-Daten konfigurieren (🕮 46)
4	Get	Size	UINT	Anzahl der Bytes in Attribut 3 (Data)

Die Assembly-Eingangsobjekte (Adapter an Scanner) werden im Adapter-Speicher ab Byte 0 abgebildet.

Die Eingangsobjekte werden "modeless" übertragen, d. h. ein 4-Byte-Header wird nicht mitübertragen.

Die Startadresse im Assembly-Speicherabbild ist daher der tatsächliche Beginn des ersten Assembly-Datenelements.

Beachten Sie bei der Abbildung der Eingangsobjekte auf den Steuerungsspeicher die tatsächlichen Assembly-Längen.

Die Lenze Class (103 / 0x67) (🕮 141) liefert das Abbild der Eingangsdaten des Scanners.

Instanzattribut "Data" (Attribut 3)

Instanz	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
20 (0x14)	**0**						Fault Reset		Run Fwd
	1								
	2	Speed Reference (Low Byte)							
	3	Speed Reference (High Byte)							
21 (0x15)	**0**		Net Ref	NetCtrl			Fault Reset	Run Rev	Run Fwd
	1								
	2	Speed Reference (Low Byte)							
	3	Speed Reference (High Byte)							
22 (0x16)	**0**						Fault Reset		Run Fwd
	1								
	2	Speed Reference (Low Byte)							
	3	Speed Reference (High Byte)							
	4	Torque Reference (Low Byte)							
	5	Torque Reference (High Byte)							

Instanz	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
23 (0x17)	0		Net Ref	NetCtrl			Fault Reset	Run Rev	Run Fwd
	1								
	2	Speed Reference (Low Byte)							
	3	Speed Reference (High Byte)							
	4	Torque Reference (Low Byte)							
	5	Torque Reference (High Byte)							
110 (0x6E)	0	Custom Output							
	...	...							
	31	Custom Output							
70 (0x46)	0						Running1 (Fwd)		Faulted
	1								
	2	Speed Actual (Low Byte)							
	3	Speed Actual (High Byte)							
71 (0x47)	0	At Reference	RefFrom Net	CtrlFrom Net	Ready	Running2 (Rev)	Running1 (Fwd)	Warning	Faulted
	1	Drive State							
	2	Speed Actual (Low Byte)							
	3	Speed Actual (High Byte)							
72 (0x48)	0						Running1 (Fwd)		Faulted
	1								
	2	Speed Actual (Low Byte)							
	3	Speed Actual (High Byte)							
	4	Torque Actual (Low Byte)							
	5	Torque Actual (High Byte)							
73 (0x49)	0	At Reference	RefFrom Net	CtrlFrom Net	Ready	Running2 (Rev)	Running1 (Fwd)	Warning	Faulted
	1	Drive State							
	2	Speed Actual (Low Byte)							
	3	Speed Actual (High Byte)							
	4	Torque Actual (Low Byte)							
	5	Torque Actual (High Byte)							
111 (0x6F)	0	Custom Input							
	...	...							
	31	Custom Input							

Hinweis!

Um die Drehmomentregelung bei den **Assembly-Objektinstanzen 22 (0x16), 23 (0x17), 72 (0x48), 73 (0x49)** nutzen zu können, muss das Attribut "DriveMode" mittels expliziter Nachrichtenübertragung geschrieben werden.

▸ Attribut "DriveMode" schreiben (📖 138)

Daten-Mapping der Ausgangs-Assemblies

Datenkomponente [Bits 0 ... 7]	Klasse		Instanz Nummer	Attribut	
	Name	Nummer		Name	Nummer
RunFwd [Bit 0]	Control Supervisor	0x29	1	Run1	3
RunRev [Bit 1]	Control Supervisor	0x29	1	Run2	4
FaultReset [Bit 2]	Control Supervisor	0x29	1	FaultRst	12
NetCtrl [Bit 5]	Control Supervisor	0x29	1	NetCtrl	5
NetRef [Bit 6]	AC Drive	0x2A	1	NetRef	4
Drive Mode [Bits 0 ... 7]	AC Drive	0x2A	1	DriveMode	6
Speed Reference [Bits 0 ... 7]	AC Drive	0x2A	1	SpeedRef	8
Torque Reference [Bits 0 ... 7]	AC Drive	0x2A	1	TorqueRef	12
Custom Output [Bits 0 ... 7]					

Hinweis!

Bei den **Assembly-Objektinstanzen 21 (0x15) und 23 (0x17)** müssen **NetCtrl (Bit 5)** und **NetRef (Bit 6)** gesetzt sein, damit der Inverter Start/Stopp-Befehle und Drehzahl/Drehmoment-Befehle über das Netzwerk entgegennehmen kann.

Daten-Mapping der Eingangs-Assemblies

Datenkomponente [Bits 0 ... 7]	Klasse		Instanz Nummer	Attribut	
	Name	Nummer		Name	Nummer
Faulted [Bit 0]	Control Supervisor	0x29	1	Faulted	10
Warning [Bit 1]	Control Supervisor	0x29	1	Warning	11
Running1 (Fwd) [Bit 2]	Control Supervisor	0x29	1	Running1	7
Running2 (Rev) [Bit 3]	Control Supervisor	0x29	1	Running2	8
Ready [Bit 4]	Control Supervisor	0x29	1	Ready	9
CtrlFromNet [Bit 5]	Control Supervisor	0x29	1	CtrlFromNet	15
RefFromNet [Bit 6]	AC Drive	0x2A	1	RefFromNet	29
At Reference [Bit 7]	AC Drive	0x2A	1	AtReference	3
Drive State [Bits 0 ... 7]	Control Supervisor	0x29	1	State	6
Speed Actual [Bits 0 ... 7]	AC Drive	0x2A	1	SpeedActual	7
Torque Actual [Bits 0 ... 7]	AC Drive	0x2A	1	TorqueActual	11
Custom Input [Bits 0 ... 7]					

Unterstützte Service-Codes

Service-Code [hex]	Bezeichnung	Beschreibung
0x0E	Get_Attribute_Single	Gibt den Wert eines bestimmten Attributes aus.
0x10	Set_Attribute_Single	Ändert den Wert eines bestimmten Attributes.

14.1.4 Connection Manager Object (6 / 0x06)

Das "Connection Manager Object" verwaltet die internen Ressourcen für den I/O-Datentransfer (Implicit Messaging) und den Parameterdatentransfer (Explicit Messaging). Die durch die "Connection Manager"-Klasse spezifizierte Instanz bezieht sich auf eine "Connection Instance" oder ein "Connection Object".

Klassenattribute

Attribut-ID	Service	Bezeichnung	Datentyp	Wert
1	Get	Revision	UINT	1 (0x0001)
2	Get	Max. Instance	UINT	1 (0x0001)
3	Get	Number of Instances	UINT	1 (0x0001)
4	Get	Optional Attribute List:	STRUCT of:	
		Number Attributes	UINT	8 (0x0008)
		Optional Attributes	ARRAY of UINT	1 ... 8 0x0001.0002.0003.0004.0005.0006.0007.0008
6	Get	Max. ID Number Class Attributes	UINT	7 (0x0007)
7	Get	Max. ID Number Instance Attributes	UINT	8 (0x0008)

Instanzattribute

Attribut-ID	Service	Bezeichnung	Datentyp	Wert
1	Set ¹⁾	Open Requests	UINT	Anzahl der empfangenen "Forward Open Service Requests"
2	Set ¹⁾	Open Format Rejects	UINT	Anzahl der "Forward Open Service Requests", die wegen eines mangelhaften Formates abgewiesen wurden.
3	Set ¹⁾	Open Resource Rejects	UINT	Anzahl der "Forward Open Service Requests", die wegen mangelnder Ressourcen abgewiesen wurden.
4	Set ¹⁾	Open Other Rejects	UINT	Anzahl der "Forward Open Service Requests", die wegen anderer Gründe als eines mangelhaften Formates oder mangelnder Ressourcen abgewiesen wurden.
5	Set ¹⁾	Close Requests	UINT	Anzahl der empfangenen "Forward Close Service Requests"
6	Set ¹⁾	Close Format Requests	UINT	Anzahl der "Forward Close Service Requests", die wegen eines mangelhaften Formates abgewiesen wurden.
7	Set ¹⁾	Close Other Requests	UINT	Anzahl der "Forward Close Service Requests", die wegen anderer Gründe als eines mangelhaften Formates abgewiesen wurden.
8	Set ¹⁾	Connection Timeouts	UINT	Gesamte Anzahl von "Connection Timeouts", die in von diesem Objekt überwachten Verbindungen aufgetreten sind.

1) Ein Gerät kann mit dem allgemeinen Statuscode "0x09" (Ungültiger Attributwert) einen "Request" des Attributes abweisen, wenn der gesendete Attributwert nicht Null ist.

Instanz-Fehlermeldungen

Fehler-code [hex]	Erweiter-ter Code [hex]	Fehlerbezeichnung	Beschreibung
0x000	-	SUCCESS	Kein Fehler
0x001	0x106	OWNERSHIP_CONFLICT	Die Verbindung konnte nicht aufgebaut werden, da eine andere Verbindung bereits die notwendigen Ressourcen belegt hat. Es ist nur eine "Exclusive owner"-Verbindung zum Adapter möglich.
0x001	0x119	NON- LISTEN ONLY CONNECTION NOT OPENED	Die Verbindung konnte nicht aufgebaut werden, da keine "Non-listen only"-Verbindung exisitiert (Input only, Exclusive owner). Die "Non-listen only"-Verbindung muss vom Verbindungstyp "multicast" sein.
0x001	0x127	INVALID_ORIGINATOR_TO_ TARGET_SIZE	Die resultierende Länge der im Empfangsobjekt PDO_RX0 abgebildeten Ports stimmt nicht mit der im Scanner vorgegebenden Anzahl der Datenbytes der Assembly-Objektinstanz 110 (0x6E, Custom Output) überein.
0x001	0x128	INVALID_TARGET_TO_ ORIGINATOR_SIZE	Die resultierende Länge der im Sendeobjekt PDO_TX0 abgebildeten Ports stimmt nicht mit der im Scanner vorgegebenden Anzahl der Datenbytes der Assembly-Objektinstanz 111 (0x6F, Custom Input) überein.
0x001	0x204	UNCONNECTED_REQUEST_ TIMED_OUT	Der Adapter beantwortet den Verbindungsaufbau nicht. • Möglicherweise besteht keine physikalische Verbindung. • Der Adapter ist ausgeschaltet. • Der Adapter hat eine ungültige IP-Konfiguration.
0x001	0x320	ACCESS_CONTENTION	Herstellerspezifischer Fehler: • Die Konfigurationen der Assembly-Eingangsobjekte und Ausgangsobjekte sind vertauscht. • Die Verbindung konnte nicht aufgebaut werden, da bereits eine andere Verbindung die notwendigen Ressourcen belegt hat. Nur eine "Exclusive owner"-Verbindung zum Adapter ist möglich.
0x001	0x111	ROUTER_EXT_ERR_RPI_ NOT_SUPPORTED	Das eingestellte RPI für eine Verbindung wird nicht unterstützt. • Min. Klasse-1-RPI = 4 ms • Min. Klasse-3-RPI = 10 ms
0x001	0x112	RROUTER_EXT_ERR_RPI_ VALUE_NOT_ACCEPTABLE	Das eingestellte RPI für eine Verbindung wird nicht unterstützt. • Min. Klasse-1-RPI = 4 ms • Min. Klasse-3-RPI = 10 ms
0x001	0x123	ROUTER_EXT_ERR_INVALID_ TO_CONNECTION_TYPE	Der Ausgangsabbild-Verbindungstyp ist ungültig oder wird nicht unterstützt.
0x001	0x124	ROUTER_EXT_ERR_INVALID_ TO_CONNECTION_TYPE	Der Eingangsabbild-Verbindungstyp ist ungültig oder wird nicht unterstützt.
0x001	0x12A	ROUTER_EXT_ERR_INVALID_ CONSUMING_PATH	Die Pfadangabe für die Ausgangsdaten vom Scanner ist ungültig.
0x001	0x12B	ROUTER_EXT_ERR_INVALID_ PRODUCING_PATH	Die Pfadangabe für die Eingangsdaten zum Scanner ist ungültig.

Unterstützte Service-Codes

Service-Code [hex]	Bezeichnung	Beschreibung
0x54	Forward_Open	Öffnet eine CIP-Verbindung von der PLC zum Zielantrieb.
0x4E	Forward_Close	Schließt eine CIP-Verbindung von der PLC zum Zielantrieb.
0x0E	Get_Attribute_Single	Gibt den Wert eines bestimmten Attributes aus.

14.2 EtherNet/IP-Objekte

14.2.1 Device Level Ring (DLR) Object (71 / 0x47)

Das "Device Level Ring (DLR) Object" liefert Statusinformationen für das DLR-Protokoll. Das DLR-Protokoll ist ein "Layer 2"-Protokoll, das die Verwendung einer Ethernet-Ring-Topologie ermöglicht.

Hinweis!

Unterstützt wird nur der "Beacon-based Ring Node"-Modus.

Klassenattribute

Attribut-ID	Service	Bezeichnung	Datentyp	Wert
1	Get	Revision	UINT	2 (0x0002)
2	Get	Max. Instance	UINT	1 (0x0001)
3	Get	Number of Instances	UINT	1 (0x0001)
6	Get	Max. ID Number Class Attributes	UINT	7 (0x0007)
7	Get	Max. ID Number Instance Attributes	UINT	2 (0x0002)

Instanzattribute

Attribut-ID	Service	Bezeichnung	Datentyp	Wert
1	Get	Network Topology	USINT	Aktuelle Netzwerk-Topologie • 0: Linien-Topologie • 1: Ring-Topologie (Anzeige über C13840)
2	Get	Network Status	USINT	Aktueller Netzwerkstatus • 0: Normal • 1: Ring Fault (nur bei Ring-Topologie) • 2: Unexpected Loop Detected (nur bei Linien-Topologie) (Anzeige über C13841)
10	Get	Active Supervisor Address	STRUCT of:	IP- und MAC-Adresse des aktiven Ring-Supervisor
		Supervisor IP Address	UDINT	Ethernet MAC-Adresse Der Wert ’0’ besagt, dass keine IP-Adresse für das Gerät konfiguriert ist. (Anzeige über C13842)
		Supervisor MAC Address	ARRAY of USINT[6]	Ethernet MAC-Adresse (Anzeige über C13843)
12	Get	Capability Flags	DWORD	Verarbeitungsweise der Telegramme für die Ring-Node-Implementierung • 2: Beacon-based Ring Node ▸ Instanzattribut "Capability Flags" (Attribut 12) (🕮 123)

Instanzattribut "Capability Flags" (Attribut 12)

Bits	Bezeichnung	Beschreibung
0	Announce-based Ring Node	Wird nicht unterstützt (Zustand ’0’).
1	Beacon-based Ring Node	Der Zustand ’1’ wird gesetzt, wenn die Ring-Node-Implementierung auf der Verarbeitung von "Beacon frames" basiert. Siehe hierzu auch: • C13844 (Beacon Überwachung) • C13845 (Beacon Telegramme)
2 ... 31	-	Reserviert (0)

Unterstützte Service-Codes

Service-Code [hex]	Bezeichnung	Beschreibung
0x01	Get_Attributes_All	Gibt eine Liste der Attribute und deren Werte eines bestimmten Objektes aus.
0x0E	Get_Attribute_Single	Gibt den Wert eines bestimmten Attributes aus.
0x10	Set_Attribute_Single	Ändert den Wert eines bestimmten Attributes.
0x18	Get_Member	Gibt Glieder eines bestimmten Attributes aus.

14.2.2 Quality of Service (QoS) Object (72 / 0x48)

Das "Quality of Service (QoS) Object" ermöglicht unterschiedliche Klassifizierungen und Priorisierungen der Datenpakete für die EtherNet/IP-Kommunikation. Dazu werden die EtherNet/IP-Nachrichten mit "802.1Q-Tags" und "Differentiated Services Codepoints" (DSCP) markiert.

Klassenattribute

Attribut-ID	Service	Bezeichnung	Datentyp	Wert
1	Get	Revision	UINT	1 (0x0001)
2	Get	Max. Instance	UINT	1 (0x0001)
3	Get	Number of Instances	UINT	1 (0x0001)
6	Get	Max. ID Number Class Attributes	UINT	7 (0x0007)
7	Get	Max. ID Number Instance Attributes	UINT	8 (0x0008)

Instanzattribute

Die Instanzattribute wirken unabhängig voneinander.

Die DSCP-Werte werden für die IP-Header verwendet.

Unabhängig davon kann zusätzlich das VLAN-Tagging aktiviert werden (C13021 = 1).

Die VLAN-ID von Lenze-Geräten ist ’0’.

Die VLAN-Priorität ergibt sich aus den konfigurierten DSCP-Werten.

Änderungen der Attributwerte werden erst nach einem Reset des Gerätes ("Power off/on" oder "Type 0 Reset") wirksam.

Hinweis!

Wenn Sie VLAN-Tagging aktivieren, stellen sie sicher, dass alle beteiligten komponenten VLAN-Tagging unterstützen. Möglicherweise sind Geräte, die das nicht tun, nicht mehr erreichbar.

Attribut-ID	Service	Bezeichnung	Datentyp	Wert
1	Set	802.1Q Tag Enable	USINT	Ermöglicht das Senden von Datenpaketen mit 802.1Q-Tags (C13021) • 0: Keine Verwendung von 802.1Q-Tags (Lenze-Einstellung) • 1: Verwendung von 802.1Q-Tags
4	Set	DSCP Urgent	USINT	55: Dringende/zwingend erforderliche Nachrichten **Wird zur Zeit nicht unterstützt.**
5	Set	DSCP Scheduled	USINT	47: Vorgesehene Nachrichten (Nur bei "Exclusive owner"-Verbindungen verwendbar.) (C13022/4)
6	Set	DSCP High	USINT	43: Nachrichten hoher Priorität (Nur bei "Input only"- und "Listen only"-Verbindungen verwendbar.) (C13022/5)

Attribut-ID	Service	Bezeichnung	Datentyp	Wert
7	Set	DSCP Low	USINT	31: Nachrichten niederer Priorität **Wird zur Zeit nicht unterstützt.**
8	Set	DSCP Explicit	USINT	27: "Explicit Messages" (Parameterdaten) (C13022/7)

Unterstützte Service-Codes

Service-Code [hex]	Bezeichnung	Beschreibung
0x0E	Get_Attribute_Single	Gibt den Wert eines bestimmten Attributes aus.
0x10	Set_Attribute_Single	Ändert den Wert eines bestimmten Attributes.

14.2.3 TCP/IP Interface Object (245 / 0xF5)

Das "TCP/IP Interface Object" dient zur Konfiguration der TCP/IP-Netzwerkschnittstelle des Gerätes.

Klassenattribute

Attribut-ID	Service	Bezeichnung	Datentyp	Wert
1	Get	Revision	UINT	2 (0x0002)
2	Get	Max. Instance	UINT	1 (0x0001)
3	Get	Number of Instances	UINT	1 (0x0001)
4	Get	Optional Attribute List:	STRUCT of:	
		Number Attributes	UINT	4 (0x0004)
		Optional Attributes	ARRAY of UINT	8 ... 11 (0x0008.0009.000A.000B)
6	Get	Max. ID Number Class Attributes	UINT	0x0007
7	Get	Max. ID Number Instance Attributes	UINT	0x000B

Instanzattribute

Hinweis!

Ein Schreibzugriff auf das Attribut 3 (Configuration Control) führt dazu, dass die in Attribut 5 definierte TCP/IP-Konfiguration permanent gespeichert wird.

Soll mit der in Attribut 5 definierten TCP/IP-Konfiguration als "statische IP" gestartet werden, muss im Attribut 3 "0 = Statische TCP/IP-Konfiguration verwenden" gesetzt sein.

Attribut-ID	Service	Bezeichnung	Datentyp	Wert
1	Get	Status	DWORD	Aktueller Status der TCP/IP-Netzwerkschnittstelle ▶ Instanzattribut "Status" (Attribut 1) (🕮 128)
2	Get	Configuration Capability	DWORD	Optionale Möglichkeiten zur TCP/IP-Konfiguration ▶ Instanzattribut "Configuration Capability" (Attribut 2) (🕮 128)
3	Get / Set	Configuration Control	DWORD	Auswahl, wie die TCP/IP-Konfiguration erfolgen soll (C13005): Mögliche Werte für Bits 0 ... 3: • 0000: Statische TCP/IP-Konfig. verwenden. • 0001: TCP/IP-Konfig. über BOOTP • 0010: TCP/IP-Konfig. über DHCP Bits 4 ... 31 sind reserviert (0).

Attribut-ID	Service	Bezeichnung	Datentyp	Wert
4	Get	Physical Link Object:	STRUCT of:	Pfad zum "Physical Link Object"
		Path Size	UINT	2 (0x0002)
		Path	padded EPATH	• 32 (0x0020) • 246 (0x00F6) • 36 (0x0024) • 1 (0x0001)
5	Get	Interface Configuration:	STRUCT of:	Aktuelle TCP/IP-Konfiguration
		IP Address	UDINT	C13010 (Aktive IP-Adresse)
		Network Mask	UDINT	C13011 (Aktive Subnetzmaske)
		Gateway Address	UDINT	C13012 (Aktive Gateway-Addresse)
		Name Server	UDINT	
		Name Server 2	UDINT	
		Domain Name 1	STRING	
6	Get / Set	Host Name	STRING	Host-Name des Gerätes (C13899, max. 64 ASCII-Zeichen)
8	Get / Set	TTL Value	USINT	TTL-Wert (C13019) für EtherNet/IP Multicast-Datenpakete (Wertebereich: 1 ... 255)
9	Get / Set	Mcast Config:	STRUCT of:	Konfiguration der Multicast IP-Adressierung
		Alloc Control	USINT	Steuerwort (C13018) zur Adressierung: • 0: Die Multicast IP-Adressen werden mit dem Standard-Zuordnungsalgorithmus generiert. • 1: Die Zuordnung der Multicast IP-Adressen erfolgt über die Werte in "Num Mcast" und "Mcast Start Addr" (C13006) • 2: Reserviert
		Reserved	USINT	0 (0x0000)
		Num Mcast	UINT	Gesamte Anzahl der vergebenen Multicast IP-Adressen (C13020)
		Mcast Start Addr	UDINT	Aktive Multicast IP-Startadresse (C13006)
10	Set	SelectAcd	BOOL	Aktivierung der Adresskonflikterkennung (ACD, C13846) • 0: ACD deaktivieren • 1: ACD aktivieren Bei Änderung dieses Wertes ist ein Reset des Gerätes ("Power off/on" oder "Type 0 Reset") erforderlich.
11	Get / Set	LastConflictDetected:	STRUCT of:	ACD Diagnose-Informationen zum zu Letzt aufgetretenen Adresskonflikt
		AcdActivity	USINT	Status des ACD-Algorithmus, als der letzte Adresskonflikt auftrat: • 0: NoConflictDetected (Default) • 1: ProbeIpv4Address • 2: OngoingDetection • 3: SemiActiveProbe
		RemoteMAC	ARRAY of USINT[6]	MAC-Adresse des Gerätes, an dem der letzte Adresskonflikt auftrat
		ArpPdu	ARRAY of USINT[28]	Wiedergabe der ARP-Nachricht mit Informationen zum Adresskonflikt ▸ Aufbau der ARP-Nachricht (Attribut 11, "ArpPdu") (🕮 129)

Instanzattribut "Status" (Attribut 1)

Bits	Bezeichnung	Beschreibung
0 ... 3	Interface Configuration Status	• 0000: Keine TCP/IP-Konfiguration vorhanden (Attribut 5) • 0001: Gültige TCP/IP-Konfiguration (Attribut 5) über BOOTP, DHCP oder statische/permanente Speicherung • 0010 ... 1111: Reserviert
4	Mcast Pending	Dieses Bit zeigt eine anstehende Änderung der Multicast-Konfiguration im Attribut 9 (Mcast Config) und/oder des TTL-Wertes (C13019) an. Es wird auf '1' gesetzt, wenn entweder ein Multicast-Attribut oder der TTL-Wert gesetzt wird. Die anstehende Änderung wird erst nach einem Reset des Gerätes ("Power off/on" oder "Type 0 Reset") wirksam. Dieses Bit wird dann wieder auf '0' zurückgesetzt.
5	Interface Configuration Pending	Dieses Bit zeigt eine anstehende Änderung der TCP/IP-Konfiguration im Attribut 5 (Interface Configuration) an. Es wird auf '1' gesetzt, wenn ein Attribut gesetzt wird. Die anstehende Änderung wird erst nach einem Reset des Gerätes ("Power off/on" oder "Type 0 Reset") wirksam.
6	AcdStatus	Anzeige des Status der Adresskonflikterkennung (ACD, C13847): • 0: Kein Adresskonflikt erkannt • 1: Adresskonflikt erkannt
7 ... 31	-	Reserviert (0)

Instanzattribut "Configuration Capability" (Attribut 2)

Bits	Bezeichnung	Beschreibung
0	BOOTP CLient	Der Zustand '1' gibt an, dass das Gerät seine TCP/IP-Konfiguration über BOOTP erhält.
1	DNS Client	Wird nicht unterstützt (Zustand '0').
2	DHCP Client	Der Zustand '1' gibt an, dass das Gerät seine TCP/IP-Konfiguration über DHCP erhält.
3	DHCP-DNS Update	Wird nicht unterstützt (Zustand '0').
4	Configuration Setable	Der Zustand '1' gibt an, dass die TCP/IP-Konfiguration in Attribut 5 (Interface Configuration) einstellbar ist.
5	Hardware Configurable	Wird nicht unterstützt (Zustand '0').
6	Interface Configuration Change Requires Reset	Der Zustand '1' gibt an, dass Änderungen der TCP/IP-Konfiguration im Attribut 5 (Interface Configuration) erst nach einem Reset des Gerätes ("Power off/on" oder "Type 0 Reset") wirksam werden. Der Zustand '0' wird nicht unterstützt (sofortige Wirksamkeit der Änderungen).
7	AcdCapable	Der Zustand '1' gibt an, dass das Gerät über die Adresskonflikterkennung (ACD) verfügt.
8 ... 31	-	Reserviert (0)

Aufbau der ARP-Nachricht (Attribut 11, "ArpPdu")

Feldgröße [Bytes]	Feldname	Wert
2	Hardware Address Type	1: Ethernet H/W
2	Protocol Address Type	0x0800: IP
1	HADDR LEN	6: Ethernet H/W
1	PADDR LEN	4: IP
2	OPERATION	1: Request 2: Response
6	SENDER HADDR	H/W-Adresse des Senders
4	SENDER PADDR	Protokolladresse des Senders
6	TARGET HADDR	H/W-Adresse des Ziels
4	TARGET PADDR	Protokolladresse des Ziels

Unterstützte Service-Codes

Service-Code [hex]	Bezeichnung	Beschreibung
0x01	Get_Attributes_All	Gibt eine Liste der Attribute und deren Werte eines bestimmten Objektes aus.
0x0E	Get_Attribute_Single	Gibt den Wert eines bestimmten Attributes aus.
0x10	Set_Attribute_Single	Ändert den Wert eines bestimmten Attributes.

14.2.4 Ethernet Link Object (246 / 0xF6)

Das "Ethernet Link Object" liefert allgemeine Informationen und Statusinformationen der Ethernet-Schnittstellen (IEEE 802.3).

Hinweis!

Schreibzugriffe auf schreibbare Attribute werden hier sofort wirksam.

Klassenattribute

Attribut-ID	Service	Bezeichnung	Datentyp	Wert
1	Get	Revision	UINT	3 (0x0003)
2	Get	Max. Instance	UINT	2 (0x0002)
3	Get	Number of Instances	UINT	2 (0x0002)
4	Get	Optional Attribute List:	STRUCT of:	
		Number Attributes	UINT	4 (0x0004)
		Optional Attributes	ARRAY of UINT	7 ... 10 (0x0007.0008.0009.000A)
6	Get	Max. ID Number Class Attributes	UINT	0x0007
7	Get	Max. ID Number Instance Attributes	UINT	0x000A

Instanzattribute

Attribut-ID	Service	Bezeichnung	Datentyp	Wert
1	Get	Interface Speed	UDINT	Aktuelle Übertragungsrate • 10 Mbit/s • 100 Mbit/s
2	Get	Interface Flags	DWORD	Status-Bits der Ethernet-Schnittstelle ▶ Instanzattribut "Interface Flags" (Attribut 2) (📖 131)
3	Get	Physical Adress	ARRAY of USINT[6]	MAC-Adresse der Ethernet-Schnittstelle
6	Set	Interface Control	STRUCT of:	
		Control Bits	WORD	Steuer-Bits für die Ethernet-Schnittstelle ▶ Instanzattribut "Control Bits" (Attribut 6, Interface Control) (📖 132)
		Forced Interface Speed	UINT	Übertragungsrate [in Mbit/s], mit der die Ethernet-Schnittstelle betrieben werden soll (C13017). Beispielwerte: • 10 = 10 Mbit/s • 100 = 100 Mbit/s

Attribut-ID	Service	Bezeichnung	Datentyp	Wert
7	Get	Interface Type	USINT	Schnittstellentyp (Übertragungsmedium) • 0: Unbekannter Schnittstellentyp • 1: Geräteinterne Schnittstelle (z. B. Embedded switch) • 2: Twisted-pair (z. B. 100Base-TX), Lenze-Einstellung • 3: Optical fiber (z. B. 100Base-FX) • 4 ... 255: Reserviert
8	Get	Interface State	USINT	Aktueller Betriebsstatus der Ethernet-Schnittstelle • 0: Unbekannter Status • 1: Enable (Die Schnittstelle kann Daten senden und empfangen.) • 2: Disable • 3: Testing • 4 ... 255: Reserviert
9	Set	Admin State	USINT	Administrativer Status • 0: Reserviert • 1: Enable • 2: Disable • 3 ... 255: Reserviert
10	Get	Interface Label	SHORT_ STRING	Text zur Identifakation/Bezeichnung der Ethernet-Schnittstelle

Instanzattribut "Interface Flags" (Attribut 2)

Bits	Bezeichnung	Beschreibung
0	Link Status	Dieses Bit zeigt an, ob die Ethernet-Schnittstelle mit einem aktiven Netzwerk verbunden ist. • 0: Keine Ethernet-Verbindung vorhanden • 1: Ethernet-Verbindung vorhanden
1	Half/Full Duplex	Dieses Bit zeigt den aktuellen Übertragungsmodus der Ethernet-Schnittstelle an. • 0: Halbduplex • 1: Vollduplex **Hinweis:** Ist das "Link Status"-Bit = 0, so ist der Wert für das "Half/Full Duplex"-Bit nicht ermittelbar.

2 ... 4	Negotiation Status	Diese Bits zeigen den Status der "Link Auto-Negotiation".
		• 000: Die "Link Auto-Negotiation" ist in Bearbeitung.
		• 001: Die "Link Auto-Negotiation" und die Geschwindigkeitserkennung ist fehlgeschlagen.
		  • Die Standardwerte für die Übertragungsrate und den Übertragungsmodus verwenden.
		  • Die Standardwerte sind produktabhängig; empfohlene Werte sind ’10 Mbit/s’ und ’Halbduplex’.
		• 010: Die "Link Auto-Negotiation" ist fehlgeschlagen, eine Übertragungsrate wurde aber erkannt.
		  • Den empfohlenen Wert für den Übertragungsmodus ’Halbduplex’ verwenden.
		• 011: Die "Link Auto-Negotiation" und die Geschwindigkeitserkennung war erfolgreich.
		• 100: Keine "Link Auto-Negotiation" aktiv.

Bits	Bezeichnung	Beschreibung
5	Manual Setting Requires Reset	Reset nach Änderungen der Link-Parameter • 0: Die Ethernet-Schnittstelle kann automatisch Änderungen der Link-Parameter (Auto-Negotiation, Übertragungsmodus, Übertragungsrate) aktivieren. • 1: Bei Änderungen der Link-Parameter (Auto-Negotiation, Übertragungsmodus, Übertragungsrate) muss ein Reset des Gerätes ("Power off/on" oder "Type 0 Reset") erfolgen.
6	Local Hardware Fault	Harware-Fehlererkennung • 0: Kein Hardware-Fehler wurde an der Ethernet-Schnittstelle erkannt. • 1: Ein Hardware-Fehler wurde an der Ethernet-Schnittstelle erkannt.
7 ... 31	-	Reserviert (0)

Instanzattribut "Control Bits" (Attribut 6, Interface Control)

Bits	Bezeichnung	Beschreibung
0	Auto-negotiate	Aktivierung der "Link Auto-Negotiation" • 0: "Link Auto-Negotiation" ist inaktiv. Das Gerät verwendet die Einstellungen der Bits "Forced Duplex Mode" (Bit 1) und "Forced Interface Speed" (siehe Attribut 6, Interface Control). • 1: "Link Auto-Negotiation" ist aktiv.
1	Forced Duplex Mode	Ist das "Auto-negotiate"-Bit = 0, zeigt dieses Bit den zuverwendenden Übertragungsmodus an. • 0: Halbduplex • 1: Vollduplex
2 ... 15	-	Reserviert (0)

Unterstützte Service-Codes

Service-Code [hex]	Bezeichnung	Beschreibung
0x01	Get_Attributes_All	Gibt eine Liste der Attribute und deren Werte eines bestimmten Objektes aus.
0x0E	Get_Attribute_Single	Gibt den Wert eines bestimmten Attributes aus.
0x10	Set_Attribute_Single	Ändert den Wert eines bestimmten Attributes.

14.3 "AC Drive Profile"-Objekte

Mit Grundgeräte-Codestelle **C00005 = "1100: AC Drive Profile"** wählen Sie die "AC Drive Profile"-Applikation aus.

Das "AC Drive Profile" enthält ...

- die Datenbasis für Motorparameter,
- Management-Funktionen der Geräte für die Motoransteuerung,
- gerätespezifische Funktionen des Inverters, z. B. Drehzahlrampen, Drehmomentregelung etc.

Für die Nutzung des "AC Drive Profile" müssen die folgenden Assembly-Objektinstanzen im Leitrechner (Scanner) verwendet werden:

Instanz ID		**Assembly-Objektinstanz**	
[dec]	**[hex]**		
20	0x14	Basic Speed Control Output	Outputs: vom Scanner zum Adapter
21	0x15	Extended Speed Control Output	
22	0x16	Speed and Torque Control Output	
23	0x17	Extended Speed and Torque Control Output	
70	0x46	Basic Speed Control Input	Inputs: vom Adapter zum Scanner
71	0x47	Extended Speed Control Input	
72	0x48	Speed and Torque Control Input	
73	0x49	Extended Speed and Torque Control Input	

Siehe auch Assembly Object (4 / 0x04) (📖 114)

Referenzhandbuch / »Engineer« Online-Hilfe zum Inverter Drive 8400 motec
Hier finden Sie ausführliche Informationen zur Verwendung des "AC Drive Profile".

14.3.1 Motor Data Object (40 / 0x28)

Das "Motor Data Object" liefert eine Datenbasis für Motorparameter.

Klassenattribute

Attribut-ID	Service	Bezeichnung	Datentyp	Wert
1	Get	Revision	UINT	1 (0x0001)
2	Get	Max. Instance	UINT	1 (0x0001)
3	Get	Number of Instances	UINT	1 (0x0001)

Instanzattribute

Attribut-ID	Service	Bezeichnung	Datentyp	Wert
1	Get	NumAttr	USINT	Anzahl der unterstützten Attribute
2	Get	Attributes	ARRAY of USINT	Auflistung der unterstützten Attribute
3	Get / Set	MotorType	USINT	AC-Motortyp • 6: Induktionsmotor mit gewickeltem Läufer • 7: Käfigläufer-Induktionsmotor

Instanzattribute für AC-Motortypen

Attribut-ID	Service	Bezeichnung	Datentyp	Wert
6	Get / Set	RatedCurrent	UINT	Nenn-Statorstrom [100mA]
7	Get / Set	RatedVoltage	UINT	Nenn-Basisspannung [V]

Für einen Schreibzugriff auf die Attribute "RatedCurrent" und "RatedVoltage" ist eine Deaktivierung der Reglerfreigabe (RFR = 0) erforderlich.

Unterstützte Service-Codes

Service-Code [hex]	Bezeichnung	Beschreibung
0x01	Get_Attributes_All	Gibt eine Liste der Attribute und deren Werte eines bestimmten Objektes aus.
0x0E	Get_Attribute_Single	Gibt den Wert eines bestimmten Attributes aus.
0x10	Set_Attribute_Single	Ändert den Wert eines bestimmten Attributes.

14.3.2 Control Supervisor Object (41 / 0x29)

Das "Control Supervisor Object" beschreibt alle Management-Funktionen der Geräte für die Motoransteuerung.

Klassenattribute

Attribut-ID	Service	Bezeichnung	Datentyp	Wert
1	Get	Revision	UINT	1 (0x0001)
2	Get	Max. Instance	UINT	1 (0x0001)
3	Get	Number of Instances	UINT	1 (0x0001)

Instanzattribute

Attribut-ID	Service	Bezeichnung	Datentyp	Wert
1	Get	NumAttr	USINT	Anzahl der unterstützten Attribute
2	Get	Attributes	ARRAY of USINT	Auflistung der unterstützten Attribute
3	Set	Run1	BOOL	Die Run/Stop-Ansteuerung kann über eine lokale Einstellung im Gerät oder Klemme oder über das Netzwerk erfolgen (siehe Attribut "NetCtrl"). Zusammenhänge zwischen Run1 und Run2 und Auslöseereignisse finden Sie im Abschnitt Run/Stop Event (🕮 136).
4	Set	Run2	BOOL	
5	Set	NetCtrl	BOOL	Run/Stop-Ansteuerung • 0: Run/Stop-Ansteuerung über lokale Einstellung im Gerät oder Klemme • 1: Run/Stop-Ansteuerung über Netzwerk (z. B. vom Scanner)
6	Get	State	USINT	• 0: Herstellerspezifisch • 1: Startup • 2: Not_Ready • 3: Ready • 4: Enabled • 5: Stopping • 6: Fault_Stop • 7: Faulted
7	Get	Running1	BOOL	• 0: Anderer Status als bei '1' • 1: [Enabled und Run1] oder [Stopping und Running1] oder [Fault_Stop und Running1]
8	Get	Running2	BOOL	• 0: Anderer Status als bei '1' • 1: [Enabled und Run2] oder [Stopping und Running2] oder [Fault_Stop und Running2]
9	Get	Ready	BOOL	• 0: Anderer Status als bei '1' • 1: Ready oder Enabled oder Stopping
10	Get	Faulted	BOOL	• 0: Keine Fehler • 1: Fehler sind aufgetreten
11	Get	Warning	BOOL	• 0: Keine Warnungen • 1: Warnungen sind aufgetreten
12	Set	FaultRst	BOOL	• 0 → **1: Fehler zurücksetzen** • 0: Keine Reaktion

Attribut-ID	Service	Bezeichnung	Datentyp	Wert
13	Get	FaultCode	UINT	DRIVECOM-Fehlercode des Fehlers, der zum Status Faulted führte. ▶ Abbildung von Lenze-Gerätefehlern auf DRIVECOM-Fehler (📖 88)
15	Get	CtrlFromNet	BOOL	Status der Run/Stop-Ansteuerung • 0: Run/Stop-Ansteuerung über lokale Einstellung im Gerät oder Klemme • 1: Run/Stop-Ansteuerung über Netzwerk (z. B. vom Scanner)

Run/Stop Event

Zusammenhänge zwischen Run1 und Run2:

Run1 / Run2	Starter					Drive
	Einschalter	Starter	Umkehrschalter	Drehzahl	Softstart	
Run1	Close	Run	RunFwd	RunLow	RunRamp1	RunFwd
Run2	No Action	No Action	RunRev	RunHigh	RunRamp2	RunRev

Run1- und Run2-Auslöser:

Run1	Run2	Auslösungsereignis	Run-Typ
0	0	Stop	No Action
0 → **1**	0	Run	Run1
0	0 → **1**	Run	Run2
0 → **1**	0 → **1**	No Action	No Action
1	1	No Action	No Action
1 → **0**	1	Run	Run2
1	1 → **0**	Run	Run1

Unterstützte Service-Codes

Service-Code [hex]	Bezeichnung	Beschreibung
0x01	Get_Attributes_All	Gibt eine Liste der Attribute und deren Werte eines bestimmten Objektes aus.
0x0E	Get_Attribute_Single	Gibt den Wert eines bestimmten Attributes aus.
0x10	Set_Attribute_Single	Ändert den Wert eines bestimmten Attributes.

14.3.3 AC Drive Object (42 / 0x2A)

Das "AC Drive Object" beschreibt die gerätespezifischen Funktionen des Inverters, z. B. Drehzahlrampen, Drehmomentregelung etc.

Klassenattribute

Attribut-ID	Service	Bezeichnung	Datentyp	Wert
1	Get	Revision	UINT	1 (0x0001)
2	Get	Max. Instance	UINT	1 (0x0001)
3	Get	Number of Instances	UINT	1 (0x0001)

Instanzattribute

Attribut-ID	Service	Bezeichnung	Datentyp	Wert
1	Get	NumAttr	USINT	Anzahl der unterstützten Attribute
2	Get	Attributes	ARRAY of USINT	Auflistung der unterstützten Attribute
3	Get	AtReference	BOOL	1: Der Inverter läuft aktuell mit der Referenzdrehzahl oder dem Referenzdrehmoment (abhängig vom Attribut 6, DriveMode).
4	Get / Set	NetRef	BOOL	• 0: Referenz über lokale Einstellung im Gerät oder Klemme • 1: Referenz über Netzwerk (z. B. vom Scanner)
6	Get / Set	DriveMode	USINT	Antriebsmodus: • 1: Leerlauf Drehzahl (Frequenz) • 3: Drehmomentregelung Um die Drehmomentregelung bei den **Assembly-Objektinstanzen 22 (0x16), 23 (0x17), 72 (0x48), 73 (0x49)** nutzen zu können, muss dieses Attribut geschrieben werden. ▶ Attribut "DriveMode" schreiben (📖 138)
7	Get	SpeedActual	INT	Aktuelle Drehzahl [rpm/$2^{SpeedScale}$]
8	Get / Set	SpeedRef	INT	Referenzdrehzahl [rpm/$2^{SpeedScale}$]
11	Get	TorqueActual	INT	Aktuelles Drehmoment [Nm/$2^{TorqueScale}$]
12	Get / Set	TorqueRef	INT	Referenzdrehmoment [Nm/$2^{TorqueScale}$]
22	Get / Set	SpeedScale	SINT	Drehzahl-Skalierungsfaktor [Nm/$2^{SpeedScale}$] Wertebereich: -128 ... 127
24	Get / Set	TorqueScale	SINT	Drehmoment-Skalierungsfaktor [Nm/$2^{TorqueScale}$] Wertebereich: -128 ... 127
29	Get / Set	RefFromNet	BOOL	Status der Referenzdrehzahl / des Referenzdrehmoments • 0: Referenz über lokale Einstellung im Gerät oder Klemme • 1: Referenz über Netzwerk (z. B. vom Scanner)

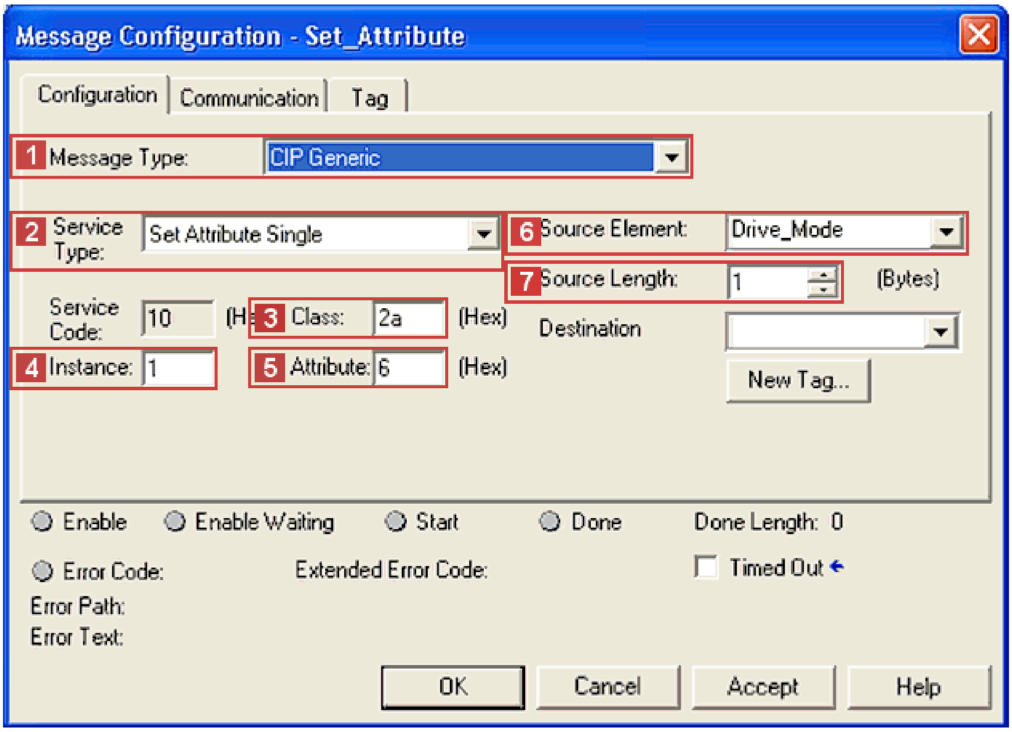
Unterstützte Service-Codes

Service-Code [hex]	Bezeichnung	Beschreibung
0x01	Get_Attributes_All	Gibt eine Liste der Attribute und deren Werte eines bestimmten Objektes aus.
0x0E	Get_Attribute_Single	Gibt den Wert eines bestimmten Attributes aus.
0x10	Set_Attribute_Single	Ändert den Wert eines bestimmten Attributes.

14.3.4 Attribut "DriveMode" schreiben

Um die Drehmomentregelung bei den **Assembly-Objektinstanzen 22 (0x16), 23 (0x17), 72 (0x48), 73 (0x49)** nutzen zu können, muss das Attribut "DriveMode" mittels expliziter Nachrichtenübertragung geschrieben werden.

Um das Attribut "DriveMode" mittels expliziter Nachrichtenübertragung zu schreiben, sind folgende Einstellungen erforderlich:


Message Configuration - Set_Attribute

1 Message Type: CIP Generic

2 Service Type: Set Attribute Single

Service Code: 10 (Hex)

3 Class: 2a (Hex)

4 Instance: 1

5 Attribute: 6 (Hex)

6 Source Element: Drive_Mode

7 Source Length: 1 (Bytes)

Destination:

○ Enable ○ Enable Waiting ○ Start ○ Done Done Length: 0

○ Error Code: Extended Error Code: ☐ Timed Out

Error Path:

Error Text:

Einstellungen		Wert / Beschreibung
1	**Nachrichtentyp**	"CIP Generic"
2	**Servicetyp**	"Set Attribute Single" (Service-Code "0x10")
3	**Klasse**	"2A" (AC Drive Object)
4	**Instanz**	"1"
5	**Attribut**	"6" (Attribut "DriveMode")
6	**Quellen-Element**	"Drive_Mode" (Variable im PLC-Programm, die als Datenquelle für das Schreiben verwendet wird.)
7	**Quellen-Länge**	"1 Byte" (Der Datentyp der Variable ist SINT.)

14.4 Lenze-Objekte

14.4.1 Lenze Class (101 / 0x65)

Die "Lenze Class (101 / 0x65)"ermöglicht den Zugriff auf die in der Codestelle C13880 einstellbaren Fehlerreaktionen auf EtherNet/IP-Fehler.

Hinweis

Die Attribute dieser Klasse sind in der EDS-Datei beschrieben. Somit können die Attribute über die Rockwell-Software »RSNetWorx« direkt im Eigenschaftendialog der EtherNet/IP-Teilnehmer unter "Parameters" eingestellt werden.

Klassenattribute

Attribut-ID	Service	Bezeichnung	Datentyp	Wert
1	Get	Revision	UINT	2 (0x0002)
2	Get	Max. Instance	UINT	1 (0x0001)

Instanzattribute

Attribut-ID	Service	Bezeichnung	Datentyp	Wert
1	Get	No. of supported Attributes	USINT	6 (0x0006)
2	Get	Attribute List	USINT	1 (0x0001) ... 6 (0x0006)
3	Get / Set	Reaction on Idle Mode	USINT	Entspricht Wert in C13880/1: • 0 = keine Reaktion • 1 = Fehler • 4 = Arretierte Warnung
4	Get / Set	Reaction on Fault Mode	USINT	Entspricht Wert in C13880/2: • 0 = keine Reaktion • 1 = Fehler • 4 = Arretierte Warnung
5	Get / Set	Reaction on Expl. Msg. TO	USINT	Entspricht Wert in C13880/3: • 0 = keine Reaktion • 1 = Fehler • 4 = Arretierte Warnung
6	Get / Set	Reaction on I/O Timeout	USINT	Entspricht Wert in C13880/4: • 0 = keine Reaktion • 1 = Fehler • 4 = Arretierte Warnung

Unterstützte Service-Codes

Service-Code [hex]	Bezeichnung	Beschreibung
0x01	Get_Attributes_All	Gibt eine Liste der Attribute und deren Werte eines bestimmten Objektes aus.
0x0E	Get_Attribute_Single	Gibt den Wert eines bestimmten Attributes aus.
0x10	Set_Attribute_Single	Ändert den Wert eines bestimmten Attributes.

14.4.2 Lenze Class (103 / 0x67)

Die "Lenze Class (103 / 0x67)" liefert das Abbild der Eingangsdaten des Scanners.

Die Eingangsdaten für den Scanner werden an die **MCI_OUT**-Schnittstelle der Communication Unit gelegt und über die Assembly-Objektinstanz **111 (0xE6)** an den Scanner gesendet.

Klassenattribute

Attribut-ID	Service	Bezeichnung	Datentyp	Wert
1	Get	Revision	UINT	2 (0x0002)
2	Get	Max. Instance	UINT	1 (0x0001)

Instanzattribute

Attribut-ID	Service	Bezeichnung	Datentyp	Wert
1	Get	No. of supported Attributes	USINT	3 (0x0003)
2	Get	Attribute List	USINT	1 (0x0001) ... 3 (0x0003)
3	Get	I/O image of produced data	USINT	Abbild der Eingangsdaten des Scanners

Unterstützte Service-Codes

Service-Code [hex]	Bezeichnung	Beschreibung
0x01	Get_Attributes_All	Gibt eine Liste der Attribute und deren Werte eines bestimmten Objektes aus.
0x0E	Get_Attribute_Single	Gibt den Wert eines bestimmten Attributes aus.

14.4.3 Lenze Class (104 / 0x68)

Die "Lenze Class (104 / 0x68)" liefert das Abbild der Ausgangsdaten des Scanners.

Die Ausgangsdaten des Scanners werden über die Assembly-Objektinstanz **110 (0xE5, Custom Output)** gesendet und an die **MCI_IN**-Schnittstelle der Communication Unit gelegt.

Klassenattribute

Attribut-ID	Service	Bezeichnung	Datentyp	Wert
1	Get	Revision	UINT	2 (0x0002)
2	Get	Max. Instance	UINT	1 (0x0001)

Instanzattribute

Attribut-ID	Service	Bezeichnung	Datentyp	Wert
1	Get	No. of supported Attributes	USINT	3 (0x0003)
2	Get	Attribute List	USINT	1 (0x0001) ... 3 (0x0003)
3	Get	I/O image of consumed data	USINT	Abbild der Ausgangsdaten des Scanners

Unterstützte Service-Codes

Service-Code [hex]	Bezeichnung	Beschreibung
0x01	Get_Attributes_All	Gibt eine Liste der Attribute und deren Werte eines bestimmten Objektes aus.
0x0E	Get_Attribute_Single	Gibt den Wert eines bestimmten Attributes aus.

14.4.4 Lenze Class (110 / 0x6E)

Die "Lenze Class (110 / 0x6E)" ermöglicht den lesenden oder schreibenden Zugriff auf Lenze-Codestellen.

Eine Lenze-Codestelle ist dabei als "Instanz" (entsprechende Codestellen-Nr. 1 ... 65535) und deren Subcodestellen als "Attribute" anzugeben.

Hinweis!

- Wenn die betreffende Lenze-Codestelle keinen Subcode hat, muss im Attribut der Wert '0' eingetragen werden. Wird '0' als Attributwert vom verwendeten Engineering-Tool nicht unterstützt, muss der Wert '1' eingetragen werden.
- Die Konfiguration einer Anzeige-Codestelle durch "Set_Attribute_Single" ist nicht möglich.

Klassenattribute

Attribut-ID	Service	Bezeichnung	Datentyp	Wert
1	Get	Revision	UINT	2 (0x0002)
2	Get	Max. Instance	UINT	1 (0x0001)

Instanzattribute

Attribut-ID	Service	Bezeichnung	Datentyp	Wert
0 ... 255	Get / Set	Lenze Subcode number	Datentyp der Subcode-stelle	Wert der Subcodestelle

Unterstützte Service-Codes

Service-Code	Bezeichnung	Beschreibung
0x0E	Get_Attribute_Single	Gibt den Wert eines bestimmten Attributes aus.
0x10	Set_Attribute_Single	Ändert den Wert eines bestimmten Attributes.

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FEEDBACK

Ihre Meinung ist uns wichtig

Wir erstellten diese Anleitung nach bestem Wissen mit dem Ziel, Sie bestmöglich beim Umgang mit unserem Produkt zu unterstützen.

Vielleicht ist uns das nicht überall gelungen. Wenn Sie das feststellen sollten, senden Sie uns Ihre Anregungen und Ihre Kritik in einer kurzen E-Mail an:

feedback-docu@lenze.com

Vielen Dank für Ihre Unterstützung.

Ihr Lenze-Dokumentationsteam

Inverter Drive 8400 motec (EtherNet/IP™ Option) · 13564912 · EDS84DMOTEIP · DE 3.0 · 02/2019 · TD23

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Accessories

POWERLINK

E84DGFCLxxx

Inverter Drives 8400 motec__________________

Communication manual EN

13560868

Lenze

Contents

1 About this documentation

Contents

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

Note!

This documentation supplements the **mounting instructions** and the **Inverter Drive 8400 motec hardware manual** supplied with the Communication Unit.

The hardware manual contains safety instructions which must be observed!

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

Examples illustrate typical applications.

The theoretical context is only explained as far as it is required for understanding the function of the Communication Unit.

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 master computer (PLC, master) documents.

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

Tip!

Detailed information about POWERLINK can be found on the website of the Ethernet POWERLINK Standardization Group:

www.ethernet-powerlink.org

Target group

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

Tip!

Current documentation and software updates with regard to Lenze products can be found in the download area at:

www.Lenze.com

Information regarding the validity

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

Product series	Type designation	Variant
Inverter Drives 8400 motec **POWERLINK Communication Unit**	E84DGFCLxNx	POWERLINK
	E84DGFCLxJx	POWERLINK + Safety

▶ Features and variants (🕮 13)

Screenshots/application examples

All screenshots in this documentation are application examples. Depending on the firmware version of the field devices and the software version of the Engineering tools installed (e.g. »Engineer«), the screenshots in this documentation may deviate from the actual screen representation.

1.1 Document history

Version			Description
1.0	10/2018	TD23	First edition

1.2 Conventions used

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

Type of information	Highlighting	Examples/notes
Spelling of numbers		
Decimal	Normal spelling	Example: 1234
Decimal separator	Point	The decimal point is always used. For example: 1234.56
Hexadecimal	0x[0 ... 9, A ... F]	Example: 0x60F4
Binary • Nibble	0b[0, 1]	Example: ’0b0110’ Example: ’0b0110.0100’
Text		
Program name	» «	PC software Example: Lenze »Engineer«
Window	*italics*	The *message window*... / The *Options* dialog box...
Control element	**Bold**	The **OK** button... / The **Copy** command... / The Properties tab... / The **Name** input field...
Hyperlink	Underlined	Optically highlighted reference to another topic. Can be activated with a mouse-click in this documentation.
Icons		
Page reference	(🕮 7)	Optically highlighted reference to another page. Can be activated with a mouse-click in this documentation.
Step-by-step instructions	⌨🖱	Step-by-step instructions are indicated by a pictograph.

1.3 Terminology used

Term	Meaning
ETHERNET POWERLINK	POWERLINK is a real-time capable fieldbus system based on Ethernet. For user data exchange, POWERLINK specifies a communication protocol based on CANopen. POWERLINK is a patented technology licensed by the Ethernet POWERLINK Standardization Group (EPSG), Germany.
Inverter	Lenze inverters of the "Inverter Drives 8400 motec" product series
Standard device	

Drive Unit
Communication unit
Wiring Unit
	The 8400 motec inverter has a modular structure that includes the following modules: "Drive Unit", "Communication Unit", and "Wiring Unit".
	• The drive unit is available in different power settings.
	• In case of the communication unit you can select between:
	  • Without fieldbus (basic I/O, standard I/O, extended I/O)
	  • AS interface (without safety/with safety STO)
	  • CANopen (without safety/with safety STO)
	  • EtherCAT (without safety/with safety STO)
	  • EtherNET/IP (without safety/with safety STO)
	  • PROFIBUS (without safety/with safety STO)
	  • PROFINET (without safety/with safety STO)
	  • POWERLINK (without safety/with safety STO)
	• The wiring unit provides flexible connection possibilities for a simple integration into the power supply of the machine.

»Engineer«	Lenze PC software which supports you during the "Engineering" process (parameterisation, diagnostics, and configuration) throughout the whole life cycle, i. e. from planning to maintenance of the machine commissioned.
»PLC Designer«	
Code	Parameter which serves to parameterise and monitor the inverter. In normal usage, the term is usually referred to as "Index".
Subcode	If a code contains several parameters, they are stored in "subcodes". This manual uses a slash "/" as a separator between code and subcode (e.g. "C00118/3"). This term is also referred to as "subindex" in common parlance.
Lenze setting	This setting is the default factory setting of the device.
Basic setting	
HW	Hardware
SW	Software
EPL	Abbreviation for "Ethernet POWERLINK"
(EPL) nodes	Ethernet POWERLINK nodes (*managing node*, *controlled nodes*)
CN	Controlled node (EPL slave)
MN	Managing node (EPL master) The *Managing Node* accepts the control function for the data communication of the decentralised field devices. Typically, the *Managing Node* is the communication interface of a PLC.
Node ID	EPL node address

1.4 Notes used

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

Safety instructions

Layout of the safety instructions:

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

Pictograph	Signal word	Meaning
⚡	**Danger!**	**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	**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	Signal word	Meaning
ℹ	**Note!**	Important note to ensure trouble-free operation
💡	**Tip!**	Useful tip for easy handling
📖		Reference to another document

2 Safety instructions

Note!

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

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

2.1 General safety and application notes

Danger!

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

- Lenze drive and automation components ...
  - must only be used as directed.
    ▶ Application as directed (🕮 12)
  - must never be commissioned if they display signs of damage.
  - must never be technically modified.
  - must never be commissioned if they are not fully mounted.
  - must never be operated without required covers.
  - during and after operation can have live, moving and rotating parts, depending on their degree of protection. Surfaces can be hot.
- The following applies to Lenze drive components ...
  - only use the accessories approved.
  - Only use original manufacturer spare parts.
- Observe all specifications contained in the enclosed documentation and related documentation.
  - This is the precondition for safe and trouble-free operation and for obtaining the product features specified.
    ▶ Features and variants (🕮 13)
  - The specifications, processes, and circuitry described in this document are for guidance only and must be adapted to your own specific application. Lenze does not take responsibility for the suitability of the process and circuit proposals.
- Only qualified personnel may work with and on Lenze drive and automation components. In accordance with IEC 60364 and CENELEC HD 384, these are persons ...
  - are familiar with installing, mounting, commissioning, and operating the product.
  - who have the corresponding qualifications for their work.
  - who know and can apply all regulations for the prevention of accidents, directives, and laws applicable at the place of use.

2.2 Device and application-specific safety instructions

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

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

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

2.3 Residual hazards

Device protection

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

▸ Installation (🕮 18)

3 Product description

3.1 Application as directed

The POWERLINK communication unit ...

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

Product series	Type designation
Inverter Drives 8400 motec **Drive Unit**	E84DGDVxxxxxxxx (from version 8.00)
Inverter Drives 8400 motec **Wiring Unit**	E84DGVNxx

- is a device intended for use in industrial power systems.
- should only be used under the operating conditions prescribed in this documentation.
- can only be used in POWERLINK networks.
- can also be used without being connected to the POWERLINK network.

Any other use shall be deemed inappropriate!

3.2 Features and variants

The POWERLINK Communication Unit is available in the following versions:

Product series	**Type designation**	**Product features**				
		Enclosure	**Connection POWERLINK**	**I/O: Connection via terminal**	**I/O: Connection via M12**	**Safety**
Inverter Drives 8400 motec **POWERLINK Communication Unit**	E84DGFCLFNP	IP 65	M12	3× DI 1× DO	2× DI	
	E84DGFCLENP	IP 65	M12	2× DI	3× DI 1× DO	
	E84DGFCLFJP	IP 65	M12	3× DI 1× DO 1× AI	2× DI	●
	E84DGFCLEJP	IP 65	M12	3× DI	2× DI 1× DO 1× AI	●

- The POWERLINK Communication Unit is ...
  - mounted to the Wiring Unit (E84DGVNxx);
  - supplied internally via the Drive Unit (E84DGDVxxxxxxxx) or externally via a separate voltage source.
- The I/O connections can be brought into the device via M12 connectors or cable glands.
- Devices without an integrated safety system (safety option) have no analog input and no relay output.
- The integrated safety system is applicable on machines for the protection of persons.
- Real-time Ethernet with the Ethernet POWERLINK V2 communication profile for motion and general applications
- Supported functions:
  - POWERLINK CN (Controlled Node)
- Up to 6 data words (max. 12 bytes) can be sent or received.
- Very short CN response times for optimal network performance
- Communication with the Lenze »EASY Starter« (access to all Lenze parameters) is executed via the diagnostic interface of the Drive Unit.

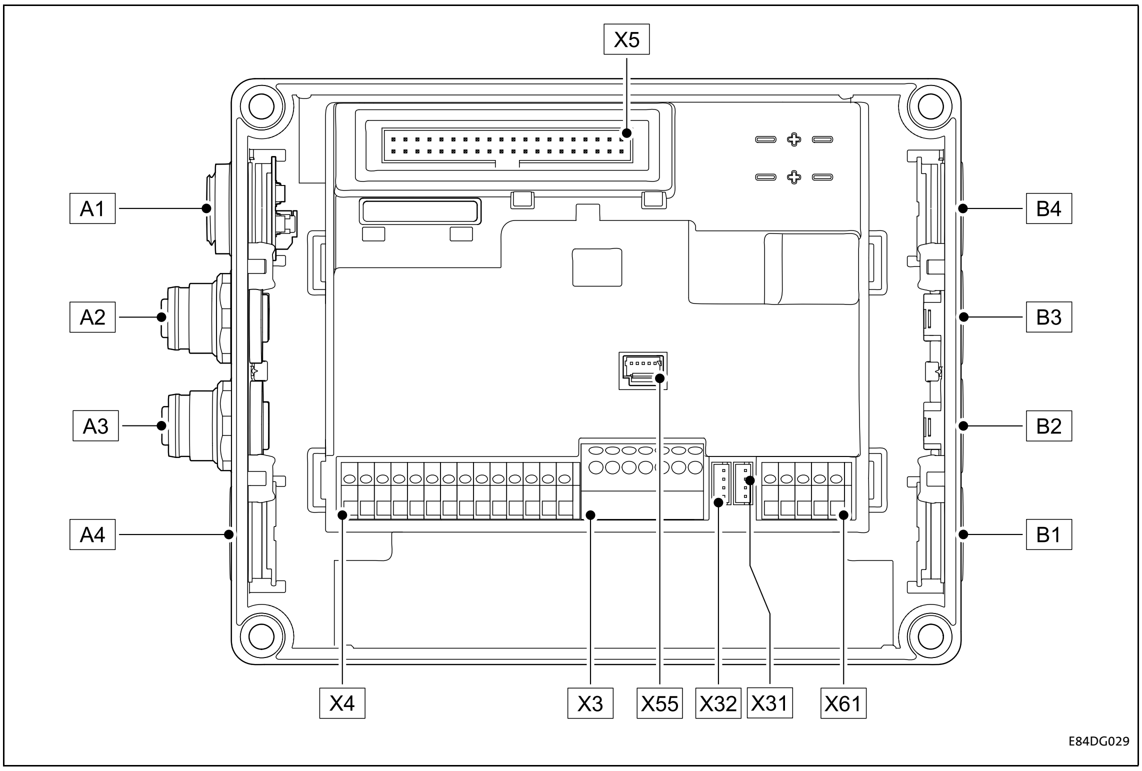
Hardware manual for the Inverter Drive 8400 motec

Here you will find detailed information on the integrated safety system (safety option).

Reference manual/online help for the Inverter Drive 8400 motec

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

3.3 Connections and interfaces



[3-1] POWERLINK Communication Unit

Pos.	Description
A1	LEDs for POWERLINK status display ▶ LED status displays (🕮 38)
A2	POWERLINK IN (M12 socket, 4-pole, D-coded) ▶ POWERLINK connection (🕮 23)
A3	POWERLINK OUT (M12 socket, 4-pole, D-coded) ▶ POWERLINK connection (🕮 23)
A4 **B1 ... B4**	Positions for further freely designable inputs and outputs: • Digital inputs • Digital output • Analog input (only for E84DGFCLxJx) • Relay output (only for E84DGFCLxJx) • Connection of "Safety Option" safety system (only for E84DGFCLxJx)
X3, X4, X61	Terminal strips for wiring the connections at A4 and B1 ... B4
X5	Plug connector for connection to the Drive Unit
X31	Plug connector for wiring the POWERLINK IN to A2
X32	Plug connector for wiring the POWERLINK OUT to A3
X55	Plug connector for wiring the LEDs at A1

- By default, the POWERLINK connections and the LEDs for the POWERLINK status displays are already mounted and wired:
  - POWERLINK IN to plug connector X31
  - POWERLINK OUT to plug connector X32
  - LEDs to plug connector X55
- It is also possible to connect the POWERLINK and other inputs and outputs (e.g. digital inputs) via the positions A1 ... A4 and B1 ... B4.
- For the connections, 5-pin M12 connectors or - alternatively - cable glands (cable cross-section max. 1.0 mm^2, AWG 18) can be used.
- The M12 connectors, cable glands and prefabricated system cables can be obtained from various manufacturers.
- Wire the M12 connectors or cable glands used to the corresponding contacts of the terminal strips/plug connectors X3, X4 and X61.

Hardware manual for the Inverter Drive 8400 motec

Observe the notes and wiring instructions contained in this documentation.

4 Technical data

Hardware manual for the Inverter Drive 8400 motec

Here you will find the **ambient conditions** and information on the **electromagnetic compatibility (EMC)** that also apply to the Communication Unit.

4.1 General data and operating conditions

Range	Values
Order designation	• E84DGFCLxNx (POWERLINK) • E84DGFCLxJx (POWERLINK + Safety)
Communication profile	Ethernet POWERLINK V2
Interface for communication	• POWERLINK IN: M12 socket, 4-pole, D-coded • POWERLINK OUT: M12 socket, 4-pole, D-coded
Network topology	Tree, star, and line
Type of node	Controlled node
Node addresses (node IDs)	1 ... 239
Transmission mode	Half duplex
Baud rate	100 Mbps
External voltage supply	• U = 24 V DC (20 V - 0 % ... 29 V + 0 %) • I_{max} = 120 mA
Conformities, approvals	• CE • UR / cUR • EAC (see also hardware manual)

4.2 POWERLINK communication data

Range	Values
Min. cycle time	400 µs
Total cycle times	0.4 / 0.5 / 1.0 / 1.2 / 2.0 / 3.0 ... 20.0 ms
Buffer size	• Tx-iso: max. 1490 bytes • Rx-iso: max. 1490 bytes
Delay time	• Controlled node (T_{Preq} - T_{Res}): approx. 2.6 µs • Controlled node (T_{SoA} - T_{ASnd}): approx. 2.6 µs
Frame size	Max. asynchronous frame size (MTU): 1518 bytes
SDO communication method	UDP/IP or ASND
Number of RPDOs	1 channel
RPDO user data per application	Max. 6 objects (max. 10 bytes)
Number of TPDOs	1 channel (data access of all nodes by broadcasting)
TPDO user data per application	Max. 6 objects (12 bytes)
CN operating modes	Support of ... • Multiplex CNs • Optional CNs

Communication time

The communication time is the time between the start of a request and the arrival of the corresponding response.

The communication times in an POWERLINK network depend on the ...

- processing time in the inverter;
- frame runtime (baud rate / frame length);
- nesting depth of the network.

Processing time inside the inverter

Data	Processing time	
Process data	Approx. 2 ms + 0 ... 1 ms + 1 ... x ms	Update cycle Processing time in the module Runtime of the application task of the technology application used (tolerance)
Parameter data	Approx. 30 ms + a tolerance of 20 ms (typically) Some codes may require a longer processing time (see reference manual/ online help for Inverter Drive 8400 motec).	

There are no interdependencies between parameter data and process data.

5 Installation

STOP **Stop!**

Electrostatic discharge

Electronic components within the Communication Unit can be damaged or destroyed by electrostatic discharge.

Possible consequences:

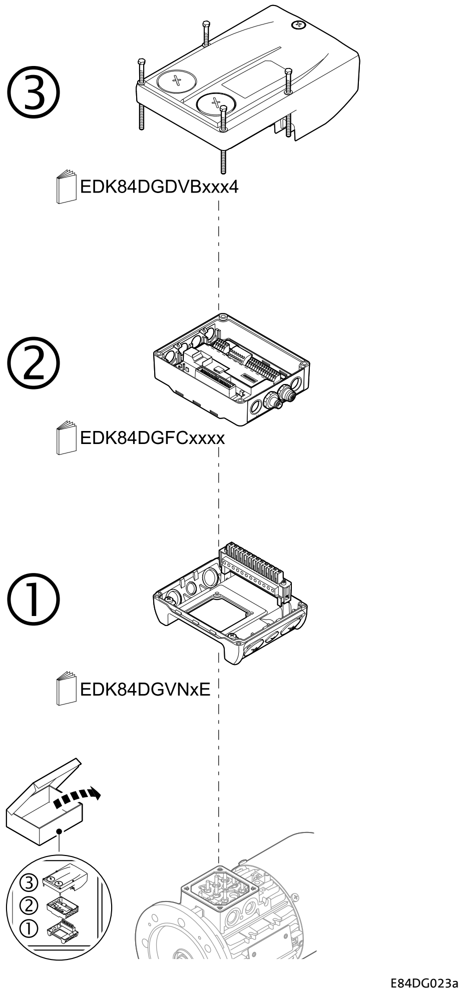
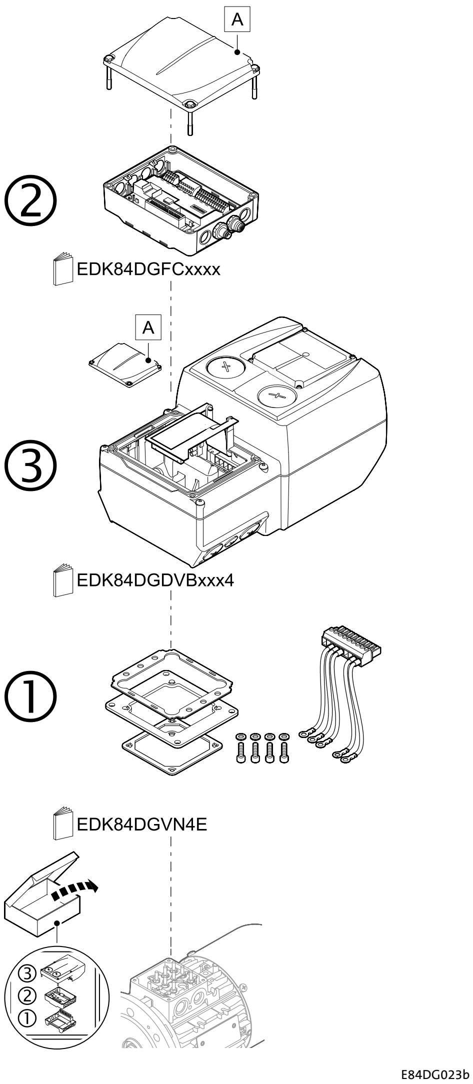
- The Communication Unit is defective.
- Fieldbus communication is not possible or faulty.
- I/O signals are faulty.
- The safety function is faulty.

Protective measures

Discharge electrostatic charges before touching the Communication Unit.

5.1 Mechanical installation

Mounting instructions for the Inverter Drive 8400 motec
Here you will find detailed information on the installation.

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

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

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

5.2 Electrical installation

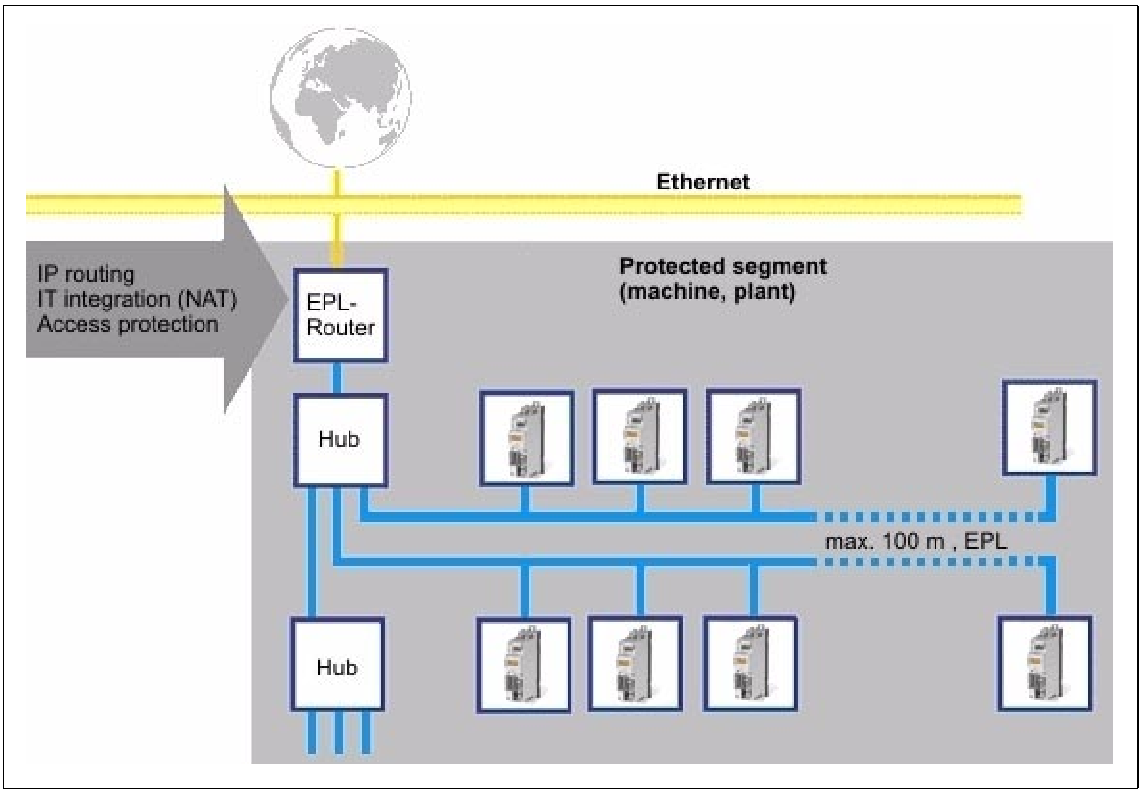
Hardware manual for the Inverter Drive 8400 motec

Here you will find detailed information about ...

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

Observe the notes and wiring instructions provided therein!

5.2.1 Network topology



[5-2] Network topology for POWERLINK

Note!

The use of class-1 hubs and switches inside the EPL network segment is not permitted.

Inside the segment only Ethernet hubs may be used as infrastructure elements. The hubs must meet the requirements on class II repeaters acc. to IEEE 802.3u.

Class I hubs and switches are not permissible since they have considerably longer delay times for the frame forwarding and a bigger jitter. Both sizes reduce the real-time capability and dynamics.

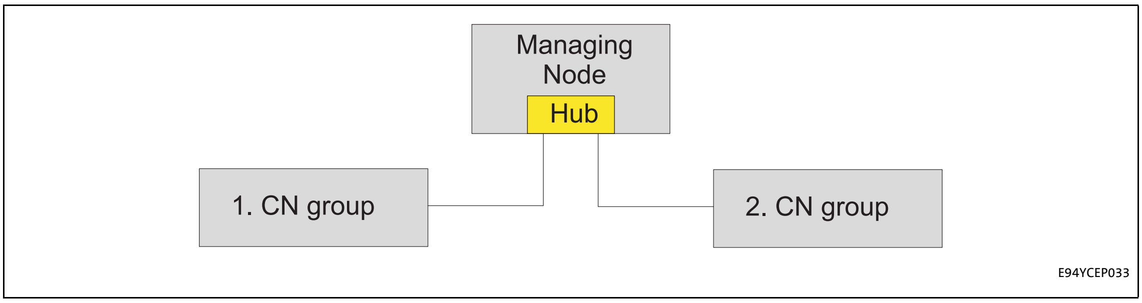
The cable length between both nodes is limited to 100 m.

The topology rules (IEEE 802.3u) required for controlling the collisions may be violated in the EPL network segment since according to the EPL access order frame collisions are prevented. This enables a structure of lines and any hybrid forms between star and line topology.

Recommended topology

For an easy configuration and due to many possible topology variants we recommend to create networks according to the following rules:

1. Create CN groups with up to 10 nodes.
2. Connect CN groups in star shape to the managing node.
3. Connect CN groups to the managing node via one external hub each.
   - For more than 2 CN groups, use an external hub.
   - For max. 7 CN groups one hub is sufficient.
   - For more than 7 CN groups, use further hubs.
   - The groups can be distributed on the hubs just as you like.
   - Observe the restrictions of the used managing node.



[5-3] Star topology for 1 to 2 CN groups

5.2.2 POWERLINK

Note!

Standard Ethernet nodes are not permitted in the POWERLINK network segment.

In order to use the real-time capability of the POWERLINK technology, POWERLINK nodes must be interconnected in a separate network segment.

In accordance with the EPL rules, only the managing node controls the network access of EPL nodes. The managing node is the only node that transmits autonomously. The slave nodes (i.e. all controlled nodes) only transmit when they are entitled to transmit by the managing node.

Non-EPL nodes (e.g. PCs) typically violate these rules by sending frames independently of the managing node. These frames interfere with the cyclic frame exchange of the EPL nodes and impede the real-time capability of POWERLINK.

Connection to the standard Ethernet network

The connection to an external standard Ethernet network is carried out via an POWERLINK router or an POWERLINK gateway.

These infrastructure components separate the network traffic in the POWERLINK network segment from the one in the standard Ethernet. The handling of the frames depend on their direction:

- Standard Ethernet ---> EPL network segment:
  Only frames that are addressed to nodes in the EPL network segment are forwarded. The forwarding takes place in the asynchronous area of the EPL cycle.
- EPL network segment ---> standard Ethernet:
  Only asynchronous frames that are not addressed to nodes in the EPL network segment are forwarded.

Tip!

Detailed information on the function and setting of the router or gateway can be found in the documentation of the component manufacturer.

5.2.3 Basic Ethernet Mode

Note!

Operation in the "Basic Ethernet Mode" does not permit any real-time communication.

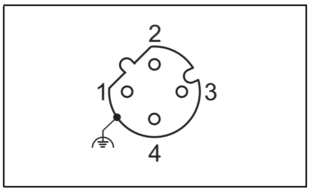
The Communication Unit can be operated in the "Basic Ethernet Mode" for a basic parameter setting provided that the following applies:

1. Operation of the module with network address (node ID) ≤ 239.
   - IP address: 192.168.100.[*Node ID*], see Node address (node ID) setting (📖 26)
2. No operation with real-time EPL must be carried out.

No integration of a managing node (EPL address = 240) into the standard Ethernet network.

5.2.4 POWERLINK connection

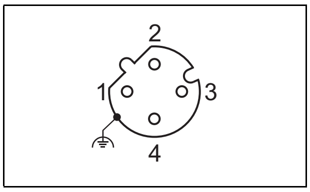
POWERLINK IN



- M12 socket, 4-pole, D-coded
- Wiring at terminal strip X31

Pin	Signal	Description
1	Tx +	Data line (transmitted data, plus)
2	Rx +	Data line (received data, plus)
3	Tx -	Data line (transmitted data, minus)
4	Rx-	Data line (received data, minus)

POWERLINK OUT



- M12 socket, 4-pole, D-coded
- Wiring at terminal strip X32

Pin	Signal	Description
1	Tx +	Data line (transmitted data, plus)
2	Rx +	Data line (received data, plus)
3	Tx -	Data line (transmitted data, minus)
4	Rx-	Data line (received data, minus)

5.2.5 External voltage supply

- The external voltage supply can be used to establish POWERLINK communication for commissioning and to query the data of the digital and analog inputs.
- Furthermore the external voltage supply serves to maintain POWERLINK communication if the main supply fails.
- The digital inputs RFR, DI1 ... DI5 and the analog input can continue to be evaluated.
- The external voltage supply is done via the terminals 24E and GND of the terminal strip X3.
- Permissible voltage (DC) / max. current:
  - U = 24 V DC (20 V - 0 % ... 29 V + 0 %)
  - I_{max} = 120 mA
- Access to parameters of a device that is disconnected from the mains is not possible.

Hardware manual for the Inverter Drive 8400 motec

Here you can find detailed information on how to wire the Communication Unit.

6 Commissioning

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

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

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

▸ Parameter reference (📖 45)

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

6.1 Before initial switch-on

Stop!

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

6.2 Node address (node ID) setting

The POWERLINK node address (node ID) can either be defined via the DIP switches of the Drive Unit or set in the »EASY Starter«/»Engineer« in code C13899.

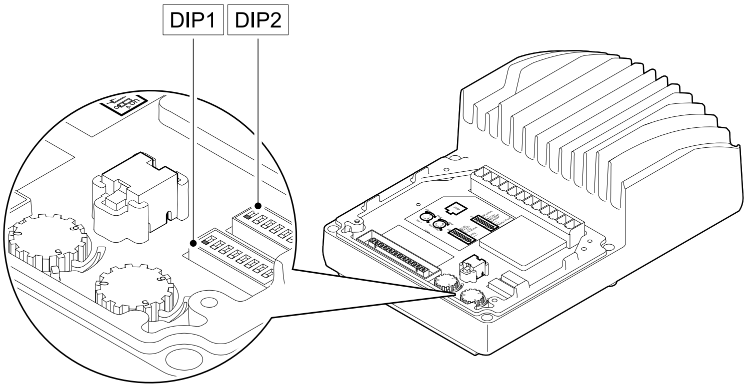
- If you set the node via DIP switches, the Drive Unit cannot be configured anymore via the DIP switches DIP1, DIP2 and the potentiometers P1, P2, P3.
- In case of the following DIP switch settings, the node ID is obtained from C13899:
  - DIP1, switch 1 is "ON"
  - DIP1, switch 1 is "OFF" and DIP2, switch 1 ... 8 are "OFF" (Lenze setting).
- The node IDs must differ from each other in case of several networked POWERLINK nodes.
- Save the changed parameter settings with the device command **C00002/11** (save all parameter sets).

DIP switches of the Drive Unit

Note!

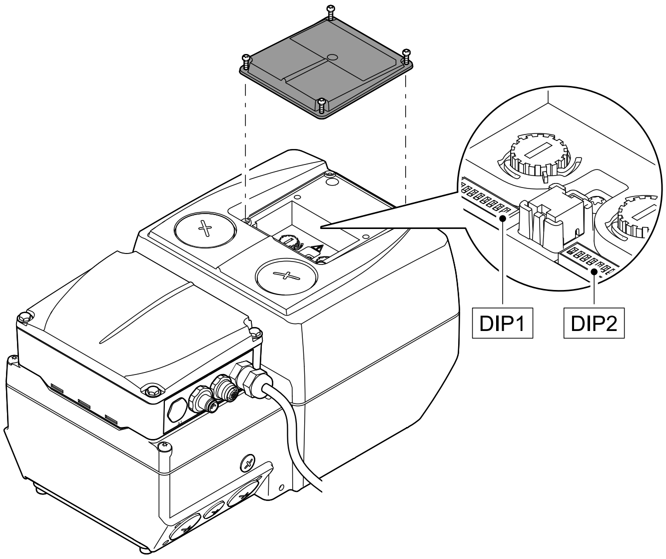
- The DIP switches can only be accessed when the drive unit is detached from the communication unit. Loosen the four fixing screws at the drive unit. **Observe the notes in the mounting instructions.**
- Switch off the voltage supply of the controller and the external supply of the communication unit before starting with the disassembly of the drive unit.
- The DIP switches are only read in when the device is switched on.

DIP switches of the Drive Unit 0.37 ... 3 kW



DIP1	DIP switches for configuring the Drive Unit or for setting the POWERLINK node address
DIP2	

DIP switches of the Drive Unit 4 ... 7.5 kW



DIP1	DIP switches for configuring the Drive Unit or for setting the POWERLINK node address
DIP2	

Setting of the DIP switches DIP1 and DIP2

DIP1	1	2	3	4	5	6	7	8	Description
	OFF	...	...	...	...	...	...	...	The node ID 1 ...239 can be set via DIP2. (Lenze setting)
	ON	...	...	...	...	...	...	...	Obtain node ID from C13899.

DIP2	1	2	3	4	5	6	7	8	Description
Value	128	64	32	16	8	4	2	1	
	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	Obtain node ID from C13899. (Lenze setting)
	OFF	OFF	OFF	OFF	OFF	OFF	OFF	**ON**	Node ID = 1
	...	...	...	...	...	...	...	...	...
	ON	**ON**	**ON**	OFF	**ON**	**ON**	**ON**	**ON**	Node ID = 239
	ON	**ON**	**ON**	**ON**	**ON**	**ON**	**ON**	**ON**	If the set value is higher than 239, the node ID is set to 239.

- The valid address range is 0 ... 239. If the value set via DIP switch DIP2 is higher than 239, the node ID is set to 239.
- The node ID is used in the last byte of the IP address: 192.168.100.[*Node ID*]
- In C13920, the DIP switch position of DIP2 (node ID) of the last mains switching is displayed.
- In C13864, the active node ID is displayed.
- C13865 displays whether the node ID has been set via DIP switches or via C13899.

6.3 Initial switch-on

Establishing communication

- To establish communication, the inverter drive must be supplied with voltage.
- POWERLINK communication requires voltage supply of the communication unit.

  If this is requirement is not met, the "CE04: MCI communication error" error message (error No. 01.0127.00002) is output. The error must be reset in the Inverter Drive, so that POWERLINK communication can be established.
- The external voltage supply serves to keep up POWERLINK communication in the event of a main supply failure.

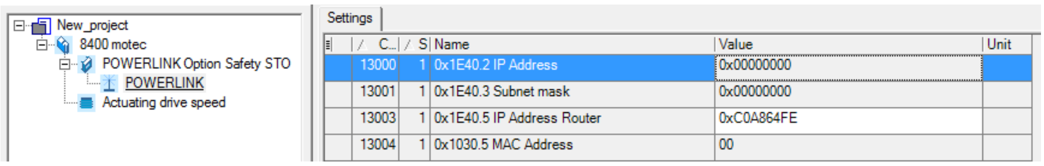
  ▶ External voltage supply (📖 24)
- Addressing can be carried out manually via DIP switches or codes in the »EASY Starter«/ »Engineer«.

  ▶ Node address (node ID) setting (📖 26)

6.4 Settings in the »Engineer«

Select the *project element* POWERLINK in the *project tree*.

- The workspace now displays the codes you can use to make the POWERLINK settings.



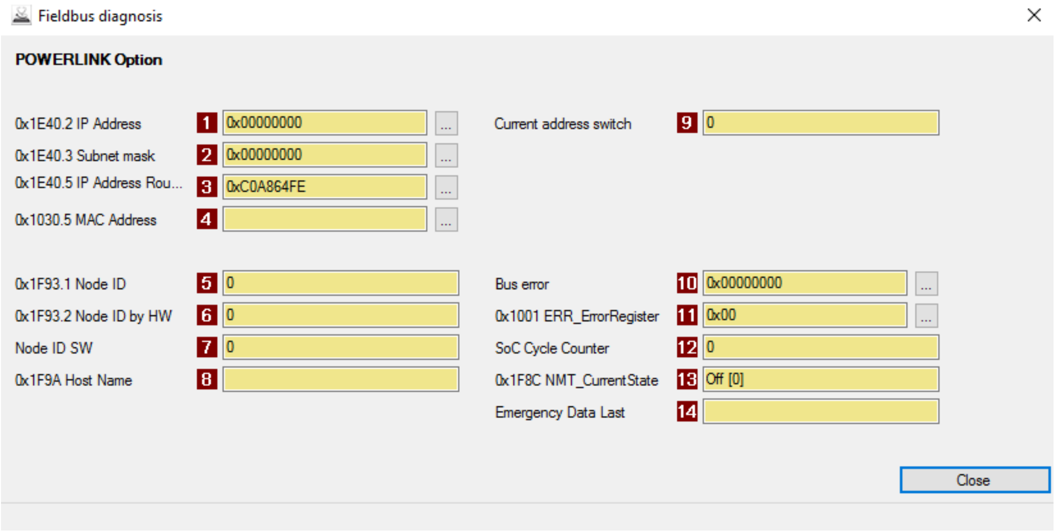
C...	S	Name	Value	Unit
13000	1	0x1E40.2 IP Address	0x00000000	
13001	1	0x1E40.3 Subnet mask	0x00000000	
13003	1	0x1E40.5 IP Address Router	0xC0A864FE	
13004	1	0x1030.5 MAC Address	00	

Parameters		Lenze setting	Info
C13000	0x1E40.2 IP Address	0xC0A86401	Read only • The IP address is derived from the node address (node ID): **192.168.100.[Node ID]**. • The Lenze setting corresponds to the IP address 192.168.100.1 (0xC0.A8.64.01).
C13001	0x1E40.3 Subnet Mask		Read only
C13003	0x1E40.5 IP Address Router	3232261374	Lenze setting (hex): 0xC0A864FE = 192.168.100.254
C13004	0x1030.5 MAC Address		Read only
C13136	SoC Cycle Counter		Read only
C13861	0x1F8C NMT Communication Status		Read only
C13864	0x1F93.1 Node ID		Read only
C13865	0x1F93.2 Node ID by HW		Read only
C13867	Emergency data load		Read only
C13879	Bus error		Read only
C13898	0x1F9A Host Name		DNS-compatible device name. The length is limited to 20 characters. The device name must be non-ambiguous within the network domain.
C13899	Node ID SW	0	Setting of the node ID, unless a node ID is set via DIP switches.
C13920	Current address switch		Read only

6.5 Settings in the »EASY Starter«

How to open the parameter list for the POWERLINK settings:

1. Go to the online devices in the *device list* and select the diagnostic adapter (8400 motec).
2. Select the **diagnostics** tab in the workspace.
3. Open the fieldbus diagnostics dialog window via the Feldbus button.
   - The dialog box displays the codes you can use to make the POWERLINK settings.



Fieldbus diagnosis

POWERLINK Option

0x1E40.2 IP Address	1	0x00000000	Current address switch	9	0
0x1E40.3 Subnet mask	2	0x00000000			
0x1E40.5 IP Address Rou...	3	0xC0A864FE			
0x1030.5 MAC Address	4				
0x1F93.1 Node ID	5	0	Bus error	10	0x00000000
0x1F93.2 Node ID by HW	6	0	0x1001 ERR_ErrorRegister	11	0x00
Node ID SW	7	0	SoC Cycle Counter	12	0
0x1F9A Host Name	8		0x1F8C NMT_CurrentState	13	Off [0]
			Emergency Data Last	14	

	Parameters	Lenze setting	Info
1	0x1E40.2 IP Address C13000	0xC0A86401	Read only • The IP address is derived from the node address (node ID): **192.168.100.[Node ID]**. • The Lenze setting corresponds to the IP address 192.168.100.1 (0xC0.A8.64.01).
2	0x1E40.3 Subnet Mask C13001		Read only
3	0x1E40.5 IP Address Router C13003	3232261374	Lenze setting (hex): 0xC0A864FE = 192.168.100.254
4	0x1030.5 MAC Address C13004		Read only
5	0x1F93.1 Node ID C13864		Read only
6	0x1F93.2 Node ID by HW C13865		Read only
7	Node ID SW C13899	0	Setting of the node ID, unless a node ID is set via DIP switches.
8	0x1F9A Host Name C13898		DNS-compatible device name. The length is limited to 20 characters. The device name must be non-ambiguous within the network domain.
9	Current address switch C13920		Read only
10	Bus error C13879		Read only
11	0x1001 error memory C13110		Read only
12	SoC Cycle Counter C13136		Read only
13	0x1F8C NMT Communication Status C13861		Read only
14	Emergency data load C13867		Read only

6.6 Optimisation of networks

SDO bandwidth

Note!

The channel bandwidth should only be increased if the network is below capacity limit.

The SDO channel width (C13075) is the size of the asynchronous channel used for parameter setting and diagnostics. A higher value improves the transmission of large amounts of data (e.g. parameter downloads) and at the same time reduces the number of possible nodes.

Maximum time for device search

During the device search, the managing node has to wait until all controlled nodes have been found.

- Unless all controlled nodes are available in the defined EPL cycle time, the "EPL_BOOTUP_1" error message is generated. The managing node remains in this status.
- If the managing node has found all controlled nodes, it starts the network.

Due to machine or system-specific switch-on sequences, it may be required to adapt the following EPL objects:

- CN object **0x1F99**: NMT_CNBasicEthernetTimeout_U32 (C13078)
- MN object **0x1F89**: NMT_BootTime_REC

Note!

In order to avoid a too quick change to the "Basic Ethernet Mode" (📖 22), the value of the **0x1F99** object (NMT_CNBasicEthernetTimeout_U32) must be higher than the value of the **0x1F89** object (NMT_BootTime_REC) which is the case by default.

▸ Index table (📖 62)

7 Process data transfer

POWERLINK transmits process data, parameter data, configuration data and diagnostic data between the managing node and the controlled nodes. Depending on their time-critical behaviour, the data are transmitted via different communication channels.

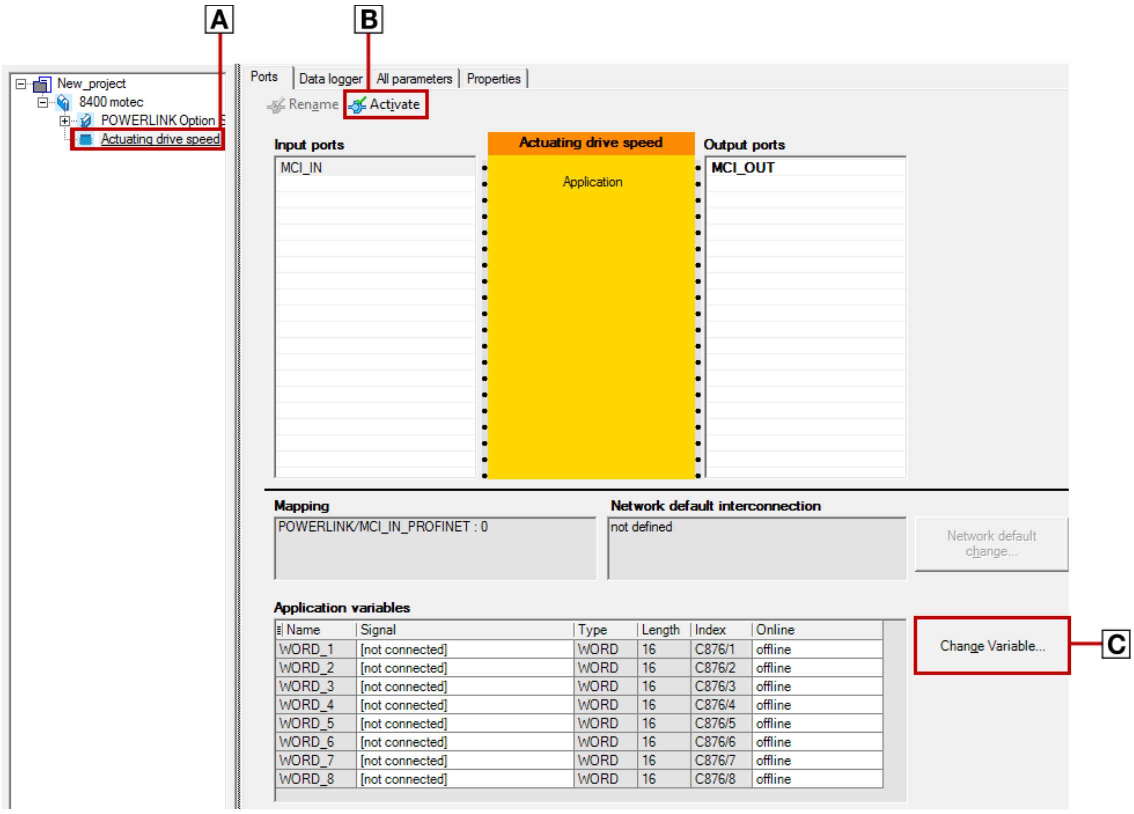
- Process data are transmitted via the process data channel.
- Process data serve to control the Inverter Drive 8400 motec.
- The transmission of process data is time-critical.
- Process data are cyclically transferred between the managing node and the controlled nodes (permanent exchange of current input and output data).
- The managing node can directly access the process data. In the PLC, for instance, the data are directly assigned to the I/O area.
- Up to 6 process data words (max. 12 bytes) can be sent or received.
- Process data are not saved in the Inverter Drive 8400 motec.
- Process data are e.g. setpoints, actual values, control words, and status words.

7.1 Freely configuring the port interconnection of the process data objects (PDO)

The port interconnection of the process data objects is only possible in the »Engineer«.

How to freely configure the port interconnection:

1. Go to the project view of the »Engineer« and select the application (A).
2. Select the port blocks **MCI_IN** or **MCI_OUT** on the **Ports** tab with a mouse-click and activate them with the **Activate** (B) button.
3. Click the **Edit port ...** (C) button.



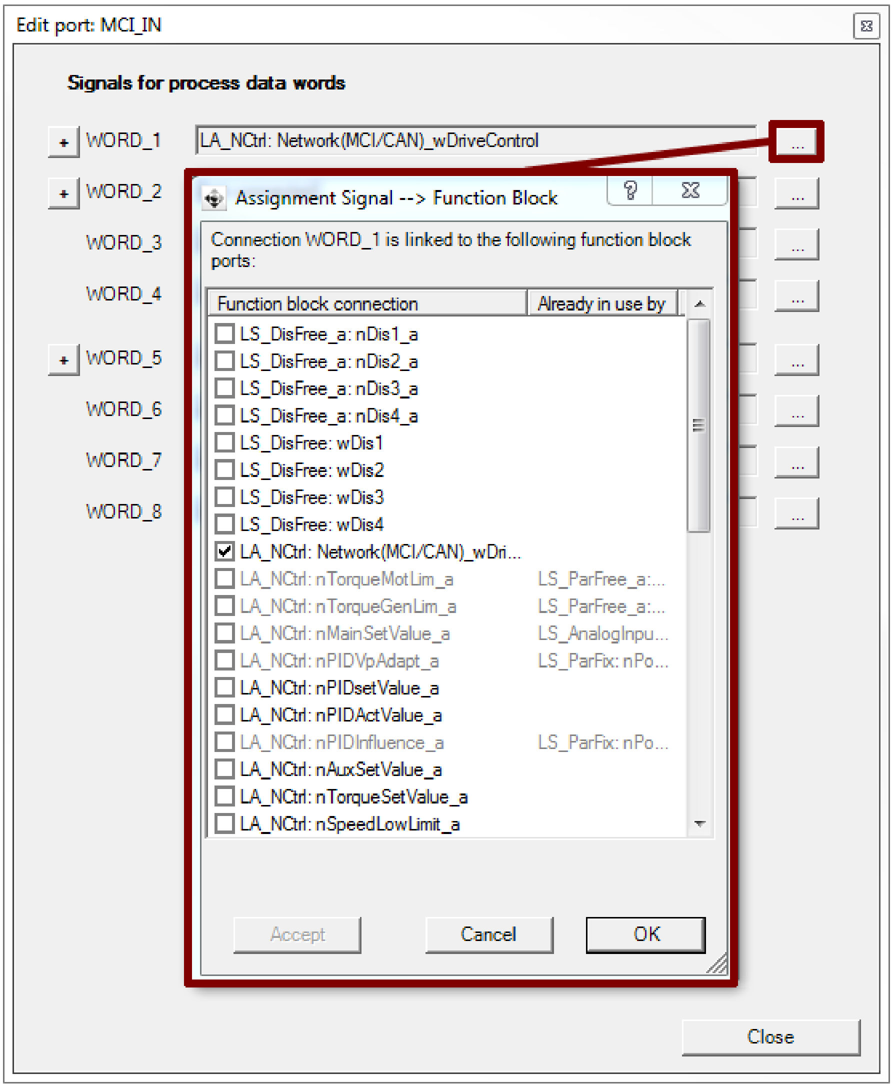
Mapping
POWERLINK/MCI_IN_PROFINET : 0

Network default interconnection
not defined

Application variables

Name	Signal	Type	Length	Index	Online
WORD_1	[not connected]	WORD	16	C876/1	offline
WORD_2	[not connected]	WORD	16	C876/2	offline
WORD_3	[not connected]	WORD	16	C876/3	offline
WORD_4	[not connected]	WORD	16	C876/4	offline
WORD_5	[not connected]	WORD	16	C876/5	offline
WORD_6	[not connected]	WORD	16	C876/6	offline
WORD_7	[not connected]	WORD	16	C876/7	offline
WORD_8	[not connected]	WORD	16	C876/8	offline

4. Via the ... button, you assign signals to the process data words in the *Signal assignment --> Function block* dialog box.
   - Select the desired signals.
   - Confirm the selection with **OK**.

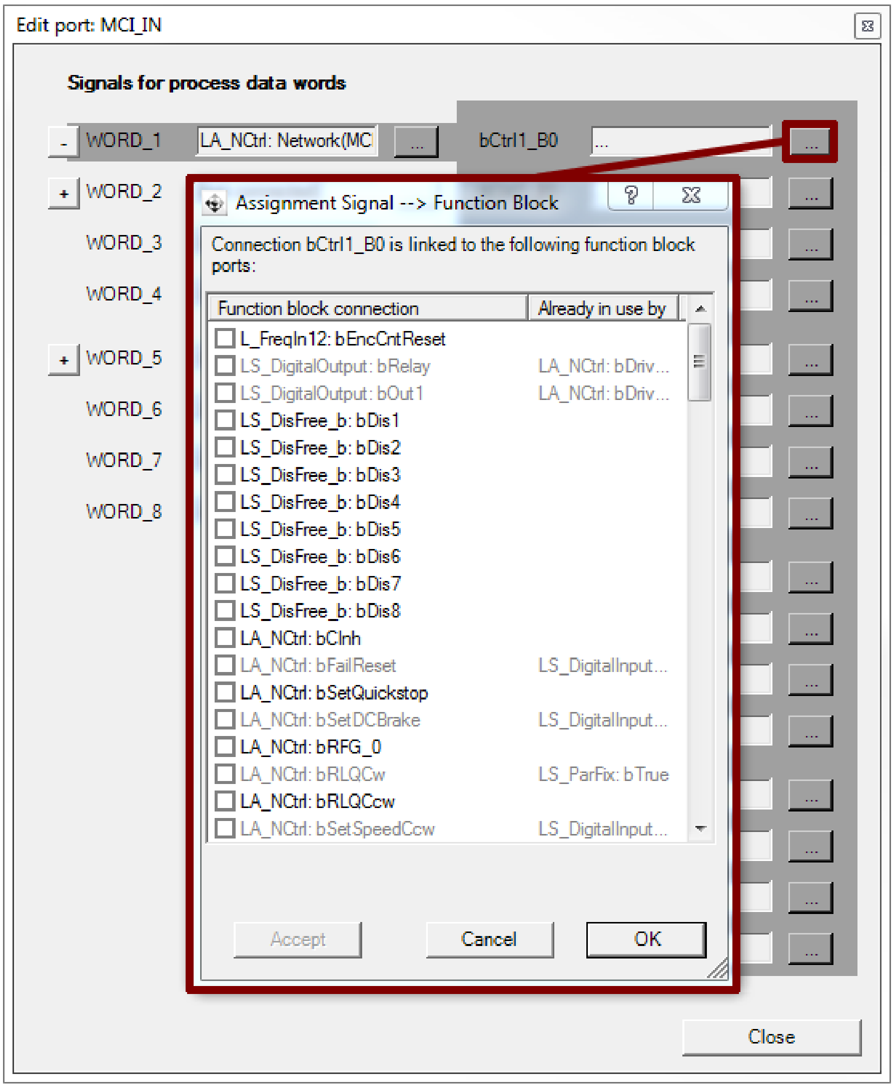


WORD_1 LA_NCtrl: Network(MCI/CAN)_wDriveControl

Connection WORD_1 is linked to the following function block ports:

Function block connection	Already in use by
☐ LS_DisFree_a: nDis1_a	
☐ LS_DisFree_a: nDis2_a	
☐ LS_DisFree_a: nDis3_a	
☐ LS_DisFree_a: nDis4_a	
☐ LS_DisFree: wDis1	
☐ LS_DisFree: wDis2	
☐ LS_DisFree: wDis3	
☐ LS_DisFree: wDis4	
☑ LA_NCtrl: Network(MCI/CAN)_wDri...	
☐ LA_NCtrl: nTorqueMotLim_a	LS_ParFree_a:...
☐ LA_NCtrl: nTorqueGenLim_a	LS_ParFree_a:...
☐ LA_NCtrl: nMainSetValue_a	LS_AnalogInpu...
☐ LA_NCtrl: nPIDVpAdapt_a	LS_ParFix: nPo...
☐ LA_NCtrl: nPIDsetValue_a	
☐ LA_NCtrl: nPIDActValue_a	
☐ LA_NCtrl: nPIDInfluence_a	LS_ParFix: nPo...
☐ LA_NCtrl: nAuxSetValue_a	
☐ LA_NCtrl: nTorqueSetValue_a	
☐ LA_NCtrl: nSpeedLowLimit_a	

5. Via the + button, you can expand the view for the process data words WORD_1, WORD_2 und WORD_5 to assign them to additional control and status bit signals.
   - Via the ... button, you can select the desired signals in the *Signal assignment --> Function block* dialog box.
   - Confirm the selection with **OK**.



WORD_1: LA_NCtrl: Network(MC

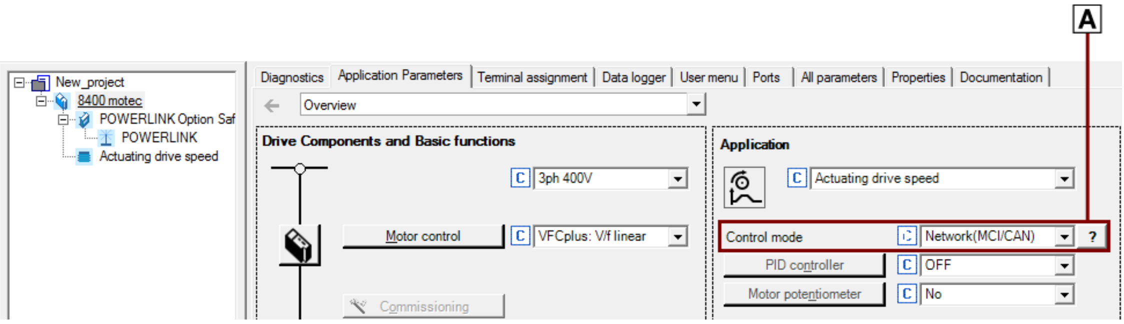
bCtrl1_B0: ...

Assignment Signal --> Function Block

Connection bCtrl1_B0 is linked to the following function block ports:

Function block connection	Already in use by
☐ L_FreqIn12: bEncCntReset	
☐ LS_DigitalOutput: bRelay	LA_NCtrl: bDriv...
☐ LS_DigitalOutput: bOut1	LA_NCtrl: bDriv...
☐ LS_DisFree_b: bDis1	
☐ LS_DisFree_b: bDis2	
☐ LS_DisFree_b: bDis3	
☐ LS_DisFree_b: bDis4	
☐ LS_DisFree_b: bDis5	
☐ LS_DisFree_b: bDis6	
☐ LS_DisFree_b: bDis7	
☐ LS_DisFree_b: bDis8	
☐ LA_NCtrl: bCInh	
☐ LA_NCtrl: bFailReset	LS_DigitalInput...
☐ LA_NCtrl: bSetQuickstop	
☐ LA_NCtrl: bSetDCBrake	LS_DigitalInput...
☐ LA_NCtrl: bRFG_0	
☐ LA_NCtrl: bRLQCw	LS_ParFix: bTrue
☐ LA_NCtrl: bRLQCcw	
☐ LA_NCtrl: bSetSpeedCcw	LS_DigitalInput...

6. Set the control mode A to "Network (MCI/CAN)" (C00007 = 40) on the **Application parameter** tab.



3ph 400V

Motor control: VFCplus: V/f linear

Application: Actuating drive speed

Control mode: Network(MCI/CAN)

PID controller: OFF

Motor potentiometer: No

8 Monitoring

8.1 Interruption of POWERLINK communication

An interruption of POWERLINK communication in the OPERATIONAL state, e.g. by cable break or failure of the managing node, is detected by the controlled node. The response to this interruption of communication depends on the following settings:

1. The watchdog monitoring time defined in the managing node is transferred to the controlled node when the POWERLINK communication is initialised.

   If the controlled node being in the OPERATIONAL state does not receive valid process data, the process data are handled according to the setting in C13885. (The last data sent by the managing node can either be used or set to zero.)

   If communication fails, the controlled node state changes to PRE-OPERATIONAL (see C13861) and the red LED "ERR" is activated (see LED status displays (🕮 38)).

   By default, there is no response in the controlled node.
2. In order to trigger a response in the controlled node, additionally set a response of the controlled node (C13880/1).

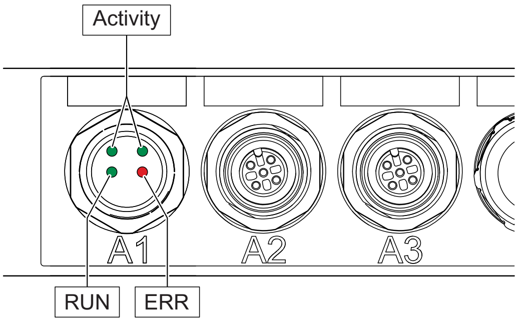
8.2 Interruption of internal communication

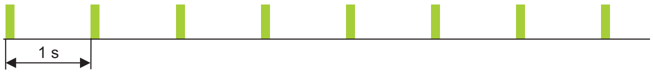
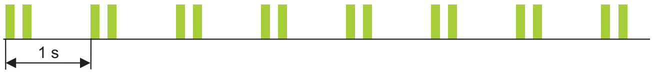
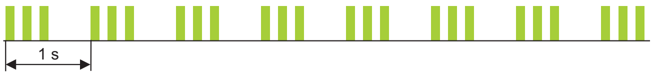
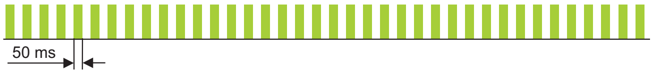
- The response in the case of a communication error between the Communication Unit and the Drive Unit can be set via code C01501.
- The Communication Unit reports interrupted communication via an emergency telegram to the master and changes to the "Safe-Operational" state.
- The error message "EPL: Lost connection to 8400 target [0x01bc3100]" (🕮 42) is output.

9 Diagnostics

POWERLINK communication faults can be diagnosed via the LEDs of the Communication Unit.

9.1 LED status displays



LED	Colour	Status	Description
Activity	green	Off	The Communication Unit is not active on the fieldbus or is in the "INIT" state.
		blinking	 EPL network is in the initialisation phase. EPL status: NMT_CS_PREOPERATIONAL_1
		blinking	 EPL network is in the initialisation phase with cyclic traffic. EPL status: NMT_CS_PREOPERATIONAL_2
		blinking	 EPL node is waiting for the start signal. EPL status: NMT_CS_READY_TO_OPERATE
		blinking	 The EPL node has not found a managing node and is in Basic Ethernet Mode (📖 22). EPL status: NMT_CS_BASIC_ETHERNET
		blinking	 EPL node is in the "Stopped" status (waiting for disconnection). EPL status: NMT_CS_STOPPED
		On	 EPL node is in the operating phase. EPL status: NMT_CS_OPERATIONAL

LED	Colour	Status	Description
RUN	green	Off	The Communication Unit is not active on the fieldbus or is in the "Init" state.
		On	 The Communication Unit is supplied with voltage and is connected to the standard device.
		blinking	 The Communication Unit is supplied with voltage, but has not yet established a connection to the standard device. (Standard device is switched off, initialising or not present.)
ERR	red	Off	No error
		On	 A fieldbus error has occurred (POWERLINK collision).

9.2 Diagnostic data

- Pending diagnostic data are signalled from the controlled node to the managing node by means of an emergency message.
- Code C13887 serves to suppress sending emergency messages to the managing node. You can select which type of error is to be suppressed.
- Errors and warnings are sent to the managing node as extended diagnostic messages.
- The diagnostic data are visible via the PLC Engineering software.

Bytes	Meaning	Value [hex]
1 ... 6	Diagnostic block header	0x0010 001C 0100
7 ... 8	Alarm type	0x0001 (diagnosis)
9 ... 12	API (Application Programming Interface)	0x0000 0000
13, 14	Slot number	0x0001 / 0x0002
15, 16	Subslot number	0x0001
17 ... 20	Module ID	ID according to module
21 ... 24	Submodule number	ID according to module
25, 26	Alarm specification	0xB000
27, 28	User structure ID	0x0001
29 ... 32	Error code	

Reference manual/online help for the Inverter Drive 8400 motec

Detailed information on the error codes is provided here.

10 Error messages

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

10.1 Short overview of the POWERLINK error messages

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

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

The following table contains all error messages of the Communication Unit in numerical order of the error number. Furthermore the preset error response and - if applicable – the parameter for setting the error response is specified.

Tip!

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

Error no. [hex]	Subject area no. [dec]	Error no. [dec]	Error text	Error type (Error response)	Adjustable in
0x01bc3100	444	12544	EPL: Lost connection to 8400 target	1: No Response	-
0x01bc5531	444	21809	EPL: NV memory: No access	1: No Response	-
0x01bc5532	444	21810	EPL: NV memory: Read error	1: No Response	-
0x01bc5533	444	21811	EPL: NV memory: Write error	1: No Response	-
0x01bc6010	444	24592	EPL: Restart after watchdog reset	1: No Response	-
0x01bc6011	444	24593	EPL: Watchdog reset	1: No Response	-
0x01bc6100	444	24832	EPL: Software error	1: No Response	-
0x01bc6101	444	24833	EPL: Fatal software error	1: No Response	-
0x01bc6110	444	24848	EPL: Invalid PDO mapping	1: No Response	-
0x01bc641f	444	25631	EPL: Invalid parameter set	1: No Response	-
0x01bc6420	444	25632	EPL: Default setting loaded	1: No Response	-
0x01bc6430	444	25648	EPL: Invalid module configuration	1: No Response	-
0x01bc8131	444	33073	EPL: OPERATIONAL status left	1: No Response	C13880/1
0x01bc8261	444	33377	EPL: Invalid address selected	1: No Response	-
0x01bc8265	444	33381	EPL: Synchronisation of MN lost	0: None	C13880/2
0x01bc8266	444	33382	EPL: Frame error (CRC)	0: None	C13880/3

10.2 Possible causes and remedies

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

▸ Short overview of the POWERLINK error messages (📖 41)

EPL: Lost connection to 8400 target [0x01bc3100]

Response (Lenze setting printed in bold)	**Setting:** not possible
☐ No reaction ☐ System fault ☒ **Fault** ☐ Trouble ☐ Quick stop by trouble ☐ WarningLocked ☐ Warning ☐ Information	

Cause	Remedy
Communication to the Inverter Drive 8400 motec is interrupted. • The Inverter Drive 8400 motec is switched off. • The Communication Unit is not connected correctly to the Drive Unit.	• Switch on Inverter Drive 8400 motec. • Check connection of the Communication Unit to the Drive Unit. • Sent Inverter Drive 8400 motec with error description to Lenze.

EPL: NV Memory: No access [0x01bc5531]

Response (Lenze setting printed in bold)	**Setting:** not possible
☐ No reaction ☐ System fault ☒ **Fault** ☐ Trouble ☐ Quick stop by trouble ☐ WarningLocked ☐ Warning ☐ Information	

Cause	Remedy
Access to parameter set in memory module via standard device was not successful.	Download application again (including module).

EPL: NV Memory: Read error [0x01bc5532]

Response (Lenze setting printed in bold)	**Setting:** not possible
☐ No reaction ☐ System fault ☒ **Fault** ☐ Trouble ☐ Quick stop by trouble ☐ WarningLocked ☐ Warning ☐ Information	

Cause	Remedy
Parameter in the memory module could not be read.	Download application again (including module).

EPL: NV Memory: Write error [0x01bc5533]

Response (Lenze setting printed in bold)	**Setting:** not possible
☐ No reaction ☐ System fault ☒ **Fault** ☐ Trouble ☐ Quick stop by trouble ☐ WarningLocked ☐ Warning ☐ Information	

Cause	Remedy
Parameter in the memory module could not be written.	Download application again (including module).

EPL: Restart after watchdog reset [0x01bc6010]

Response (Lenze setting printed in bold)	**Setting:** not possible
☐ No reaction ☐ System fault ☒ **Fault** ☐ Trouble ☐ Quick stop by trouble ☐ WarningLocked ☐ Warning ☐ Information	

Cause	Remedy
Communication unit is defective.	Send Communication Unit with error description to Lenze.

EPL: Watchdog reset [0x01bc6011]

Response (Lenze setting printed in bold)	**Setting:** not possible
☐ No reaction ☐ System fault ☒ **Fault** ☐ Trouble ☐ Quick stop by trouble ☐ WarningLocked ☐ Warning ☐ Information	

Cause	Remedy
Communication unit is defective.	Send Communication Unit with error description to Lenze.

EPL: Software error [0x01bc6100]

Response (Lenze setting printed in bold)	**Setting:** not possible
☐ No reaction ☐ System fault ☒ **Fault** ☐ Trouble ☐ Quick stop by trouble ☐ WarningLocked ☐ Warning ☐ Information	

Cause	Remedy
Communication unit is defective.	Send Communication Unit with error description to Lenze.

EPL: Fatal software error [0x01bc6101]

Response (Lenze setting printed in bold)	**Setting:** not possible
☐ No reaction ☐ System fault ☒ **Fault** ☐ Trouble ☐ Quick stop by trouble ☐ WarningLocked ☐ Warning ☐ Information	

Cause	Remedy
Communication unit is defective.	Send Communication Unit with error description to Lenze.

EPL: PDO Mapping invalid [0x01bc6110]

Response (Lenze setting printed in bold)	**Setting:** not possible
☐ No reaction ☐ System fault ☒ **Fault** ☐ Trouble ☐ Quick stop by trouble ☐ WarningLocked ☐ Warning ☐ Information	

Cause	Remedy
Invalid mapping configuration.	Correct the mapping configuration.

EPL: Invalid parameter set [0x01bc641f]

Response (Lenze setting printed in bold)	**Setting:** not possible
☐ No reaction ☐ System fault ☒ **Fault** ☐ Trouble ☐ Quick stop by trouble ☐ WarningLocked ☐ Warning ☐ Information	

Cause	Remedy
No active parameter set could be loaded.	Download application again (including module).

EPL: Factory settings loaded [0x01bc6420]

Response (Lenze setting printed in bold)	**Setting:** not possible
☐ No reaction ☐ System fault ☒ **Fault** ☐ Trouble ☐ Quick stop by trouble ☐ WarningLocked ☐ Warning ☐ Information	

Cause	Remedy
Access to parameter set in memory module via standard device was not successful.	Download application again (including module).

EPL: Invalid module configuration [0x01bc6430]

Response (Lenze setting printed in bold)	**Setting:** not possible
☐ No reaction ☐ System fault ☒ **Fault** ☐ Trouble ☐ Quick stop by trouble ☐ WarningLocked ☐ Warning ☐ Information	

Cause	Remedy
Module configuration is faulty.	Check and correct module configuration.

EPL: State OPERATIONAL lost [0x01bc8131]

Response (Lenze setting printed in bold)	**Setting:** C13880/1
☒ No reaction ☐ System fault ☒ **Fault** ☒ Trouble ☒ Quick stop by trouble ☒ WarningLocked ☐ Warning ☒ Information	

Cause	Remedy
Data exchange via POWERLINK has been terminated. • Also see the chapter "Interruption of POWERLINK communication" (📖 37).	• Check the network cable (plug) and replace it if necessary. • Plug the network cable into the POWERLINK terminal X251 or X252 and continue to check the status of the managing node.

EPL: Invalid address selected [0x01bc8261]

Response (Lenze setting printed in bold)	**Setting:** not possible
☐ No reaction ☐ System fault ☒ **Fault** ☐ Trouble ☐ Quick stop by trouble ☐ WarningLocked ☐ Warning ☐ Information	

Cause	Remedy
An invalid IP address has been assigned by the managing node via POWERLINK or set as node ID.	• Ensure that a valid IP address is assigned by the managing node via POWERLINK. • Set valid node ID. ▶ Node address (node ID) setting (📖 26)

EPL: Synchronisation lost from MN [0x01bc8265]

Response (Lenze setting printed in bold)	**Setting:** C13880/2
☒ None ☐ System fault ☐ Fault ☒ **Trouble** ☒ Quick stop by trouble ☒ Warning locked ☐ Warning ☒ Information	

Cause	Remedy
In the controlled node, the synchronisation cycle of the managing node has failed. The controlled node changes automatically to the NMT_CS_PREOPERATIONAL_1 state and waits for a new run-up by the managing node.	• Check network cable and components (failure of managing node, router). • Restart managing node if required.

EPL: Telegram error detected (CRC) [0x01bc8266]

Response (Lenze setting printed in bold)	**Setting:** C13880/3
☒ None ☐ System fault ☐ Fault ☒ **Trouble** ☒ Quick stop by trouble ☒ Warning locked ☐ Warning ☒ Information	

Cause	Remedy
Faulty telegrams (CRC error) have been detected. Possible causes: • A device in the network is not EPL-compliant. • EMC interference is too strong.	• Check if a non-EPL-compliant device is in the network (e.g. diagnostics PC). • Reduce EMC interference on the network or use an additional shield connection.

11 Parameter reference

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

11.1 Communication-relevant parameters of the operating system

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

Here you will find general information on parameters.

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

C01501

Parameter | Name: **C01501 | Resp. to communication error with MCI**		Data type: UNSIGNED_8 Index: 23074_d = $5A22_h$
Configuration of monitoring functions for the Communication Unit		
Selection list		
0	No response	
1	Error	
4	Warning Locked	
Subcodes	**Lenze setting**	**Info**
C01501/1	1: No Response	Resp. to MCI fault 1 • Response to a communication fault.
C01501/2	1: No Response	Resp. to MCI fault 2 • Response to a fault in the Communication Unit.
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 1		

C01503

Parameter | Name: **C01503 | MCI timeout**			Data type: UNSIGNED_16 Index: 23072_d = $5A20_h$
Setting range **(min. value | unit | max. value)**			
0	ms	1000	
Subcodes	**Lenze setting**		**Info**
C01503/1	200 ms		MCI timeout
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 1			

11.2 Parameters relevant for POWERLINK communication

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

C13000

Parameter | Name: **C13000 | 0x1E40.2 IP address**			Data type: UNSIGNED_32 Index: $11575_d = 2D37_h$
The code displays the IP address of the communication module. • The IP address is derived from the node address (Node ID): **192.168.100.[Node ID]** • The node ID is derived from the DIP switch setting of the Drive Unit or from C13899. ▸ Node address (node ID) setting (📖 26)			
Display range (min. value | unit | max. value)			
Subcodes			**Info**
C13000/1			IP address • Example: 0xC0A86401 = 192.168.100.1
☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☑ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☑ COM ☐ MOT			

C13001

Parameter | Name: **C13001 | 0x1E40.3 Subnet Mask**			Data type: UNSIGNED_32 Index: $11574_d = 2D36_h$
The code declares the IP subnet mask which restricts the directly addressable IP address range (i.e. without a gateway in the EPL segment of the routers). The value 255.255.255.0 (0xFFFFFF00) is always assigned to the subnet mask in one segment.			
Display range (min. value | unit | max. value)			
Subcodes			**Info**
C13001/1			EPL IP Subnet Mask • Lenze setting (hex): 0xFFFFFF00 = 255.255.255.0
☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☑ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☑ COM ☐ MOT			

C13003

Parameter | Name: **C13003 | 0x1E40.5 IP address router**			Data type: UNSIGNED_32 Index: $11572_d = 2D34_h$
The code declares the IP address of the router which connects the EPL segment to the higher-level network. The standard entry corresponds to the standard router address of the EPL specification: → **192.168.100.254** Permissible entries replace the lowest-order byte of the standard entry with the EPL address of the node which has the function of a router.			
Setting range (min. value | unit | max. value)			
Subcodes	**Lenze setting**		**Info**
C13003/1	3232261374		IP address router • Lenze setting (hex): 0xC0A864FE = 192.168.100.254
☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☑ COM ☐ MOT			

C13004

Parameter | Name: **C13004 | 0x1030.5 MAC address**			Data type: OCTET_STRING Index: 11571$_d$ = 2D33$_h$
The code indicates the physical address (MAC address) of the POWERLINK interface of the Communication Unit. When the Communication Unit is produced, the MAC address is assigned unequivocally worldwide and provides addressing on the lowest level.			
Display range **(min. value | unit | max. value)**			
Subcodes			**Info**
C13004/1			MAC Address (octet string[6]) 00-0A-86-xx-yy-zz • 00-0A-86 = Lenze • xx-yy-zz = consecutive number
☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☑ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☑ COM ☐ MOT			

C13028

Parameter | Name: **C13028 | 0x1F81 Node Assignment CN**		Data type: UNSIGNED_32 Index: 11547_d = $2D1B_h$
The code declares the controlled nodes 1 ... 100 and their properties.		
Value is bit-coded:		
Bit 0 ... 31	see below	
Subcodes	**Lenze setting**	**Info**
C13028/1	0	
...	..	
C13028/100	0	
☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☑ COM ☐ MOT		

The describing bit field has the following structure:

Bit	Value	Description
0 (LSB)	0	EPL node with this ID does not exist.
	1	EPL node with this ID exists.
1	0	EPL node with this ID is not a controlled node.
	1	EPL node with this ID is a controlled node.
2	0	On detection of a booting controlled node, the application will not be informed.
	1	On detection of a booting controlled node, the application will be informed and the controlled node will be started.
3	0	Optional controlled node
	1	Obligatory controlled node
4	0	The managing node is allowed to send reset commands.
	1	The managing node must not send any reset command.
5	0	Software version verification of the controlled node is not required.
	1	Software version verification of the controlled node is required.
6	0	Automatic application software update is not allowed.
	1	Automatic application software update is allowed.
7	-	Reserved / No function
8	0	Isochronously accessed controlled node
	1	Asynchronously accessed controlled node (bit 9 is irrelevant)
9	0	Continuously accessed controlled node
	1	Multiplex EPL nodes are supported.
10	0	No "POWERLINK to standard Ethernet" router function.
	1	The device can be used as an "POWERLINK to standard Ethernet" router (router type 1).
11	0	No "POWERLINK to fieldbus" router function.
	1	The device can be used as an "POWERLINK to fieldbus" router (router type 1).
12	0	The managing node does not send any PRes frames
	1	The managing node sends PRes frames
13 ... 30	-	Reserved / No function
31 (MSB)	0	Bits 0 ... 30 inhibited
	1	Bits 0 ... 30 enabled

C13029

Parameter | Name: **C13029 | 0x1F81 Node Assignment**		Data type: UNSIGNED_32 Index: 11546_d = $2D1A_h$
The code declares managing node, diagnostic device, and router, and describes their properties.		
Value is bit-coded:		
Bit 0 ... 31	see below	
Subcodes	**Lenze setting**	**Info**
C13029/1	2147483661	EPL node assignment managing node Lenze setting (hex): 0x8000000D
C13029/2	0	EPL node assignment diagnostic device Lenze setting (hex): 0x00000000
C13029/3	2147483655	EPL node assignment router Lenze setting (hex): 0x80000007
☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☑ COM ☐ MOT		

The describing bit field has the following structure:

Bit	Value	Description
0 (LSB)	0	EPL node with this ID does not exist.
	1	EPL node with this ID exists.
1	0	EPL node with this ID is not a controlled node.
	1	EPL node with this ID is a controlled node.
2	0	On detection of a booting controlled node, the application will not be informed.
	1	On detection of a booting controlled node, the application will be informed and the controlled node will be started.
3	0	Optional controlled node
	1	Obligatory controlled node
4	0	The managing node is allowed to send reset commands.
	1	The managing node must not send any reset command.
5	0	Software version verification of the controlled node is not required.
	1	Software version verification of the controlled node is required.
6	0	Automatic application software update is not allowed.
	1	Automatic application software update is allowed.
7	-	Reserved / No function
8	0	Isochronously accessed controlled node
	1	Asynchronously accessed controlled node (bit 9 is irrelevant)
9	0	Continuously accessed controlled node
	1	Multiplex EPL nodes are supported.
10	0	No "POWERLINK to standard Ethernet" router function.
	1	The device can be used as an "POWERLINK to standard Ethernet" router (router type 1).
11	0	No "POWERLINK to fieldbus" router function.
	1	The device can be used as an "POWERLINK to fieldbus" router (router type 1).
12	0	The managing node does not send any PRes frames
	1	The managing node sends PRes frames
13 ... 30	-	Reserved / No function
31 (MSB)	0	Bits 0 ... 30 inhibited
	1	Bits 0 ... 30 enabled

C13040

Parameter | Name: **C13040 | 0x1F82 Feature Flags**	Data type: UNSIGNED_32 Index: 11535_d = $2D0F_h$
The code displays the POWERLINK functions implemented by the EPL node. Lenze standard value: 0x00000207	
Value is bit-coded:	
Bit 0 ... 31	see below
☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☑ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☑ COM ☐ MOT	

The describing bit field has the following structure:

Bit	Value	Description
0 (LSB)	0	Asynchronous access
	1	Isochronous access
1	0	No SDO by UDP/IP
	1	SDO by UDP/IP
2	0	No SDO by EPL "ASnd"
	1	SDO by EPL "ASnd"
3	0	No SDO integrated in PDO
	1	SDO integrated in PDO
4	0	No "NMT Info Services"
	1	"NMT Info Services" supported
5	0	No extended "NMT State Commands"
	1	Extended "NMT State Commands" supported
6	0	No dynamic PDO mapping
	1	Dynamic PDO mapping supported
7	-	Reserved / No function
8	0	No configuration manager function
	1	Configuration manager function
9	0	Only isochronous cyclic access permitted.
	1	Isochronous multiplexed access possible.
10	0	No address assignment via software
	1	Address assignment via software
11	-	Reserved / No function
12	0	No "POWERLINK to standard Ethernet" router function.
	1	The device can be used as an "POWERLINK to standard Ethernet" router (router type 1).
13	0	No "POWERLINK to fieldbus" router function.
	1	The device can be used as an "POWERLINK to fieldbus" router (router type 1).
14 ... 31 (MSB)	-	Reserved / No function

C13060

Parameter | Name: **C13060 | 0x1006 Cycle Time**	Data type: UNSIGNED_32 Index: 11515_d = $2CFB_h$
The code declares the length of the EPL cycle in µs. • In the configured state, this code must have an identical value in all EPL nodes. • The selected value must correspond to the actual bus cycle time so that the internal monitoring functions work correctly.	

Selection list **(Lenze setting printed in bold)**	
400	400
500	500
600	600
800	800
1000	**1000**
2000	2000
3000	3000
4000	4000
5000	5000
6000	6000
7000	7000
8000	8000
9000	9000
10000	10000
11000	11000
12000	12000
13000	13000
14000	14000
15000	15000
16000	16000
17000	17000
18000	18000
19000	19000
20000	20000

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

C13066

Parameter | Name: **C13066 | 0x1F8D PResPayloadLimit RPDO CN**			Data type: UNSIGNED_16 Index: 11509_d = $2CF5_h$
The code defines the reserved user data length of the PRes telegrams for controlled nodes 1 ... 100. Each subcode number corresponds to one EPL node with the same node ID. The EPL node must be enabled via code C13028. The subcodes describe the PRes telegrams received. The value must be within the range of 36 ... 1490 bytes. The values are upper limit values for the entire size of the PDO mappings for received PRes telegrams. **In the configured state, the values stored for the EPL nodes must be identical to the corresponding C13072 entries. C13066 must have an identical value in all EPL nodes of the network.**			
Setting range **(min. value | unit | max. value)**			
0	Byte	1490	
Subcodes	**Lenze setting**		**Info**
C13066/1	0 byte		
...	...		
C13066/100	0 byte		
☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☑ COM ☐ MOT			

C13067

Parameter | Name: **C13067 | 0x1F8D PResPayloadLimit**			Data type: UNSIGNED_16 Index: 11508_d = $2CF4_h$
The code defines the reserved user data length of the PRes frames for managing node, diagnostic device or router. Each subcode number corresponds to one EPL node with the same node ID. The EPL node must be enabled via code C13028. The subcode describes the PRes telegrams received. The value must be within the limits of 36 ... 1490 bytes. The values are upper limit values for the entire size of the PDO mappings for received PRes telegrams. **In the configured state, the values stored for the nodes must be identical to the corresponding C13072 entries. C13066 must have an identical value in all EPL nodes of the network.**			
Setting range **(min. value | unit | max. value)**			
0	Byte	1490	
Subcodes	**Lenze setting**		**Info**
C13067/1	0 byte		Managing node
C13067/2	0 byte		Diagnostics device
C13067/3	0 byte		router
☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☑ COM ☐ MOT			

C13071

Parameter | Name: **C13071 | 0x1F98.4 PReqPayloadLimit RPDO**			Data type: UNSIGNED_16 Index: 11504_d = $2CF0_h$
The code defines the maximum data size to be received by the controlled node via PReq for the current network configuration. C13071 is an upper limit value for the entire size of the PDO mapping for the PReq telegram. In the configured state, the value must be identical to the entry for a response valid for the EPL node.			
Setting range **(min. value | unit | max. value)**			**Lenze setting**
36	Byte	1490	**36 bytes**
☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☑ COM ☐ MOT			

C13072

Parameter | Name: **C13072 | 0x1F98.5 PResPayloadLimit TPDO**			Data type: UNSIGNED_16 Index: $11503_d = 2CEF_h$
The code defines the maximum data size to be sent by the EPL node for the current network configuration. The PDO mapping is allowed to assign data with a total size greater than or equal to C13072. **In the configured state, C13072 must be identical to the entry in C13066 valid for the EPL node.**			
Setting range (min. value | unit | max. value)			**Lenze setting**
36	Byte	1490	**36 bytes**
☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☑ COM ☐ MOT			

C13074

Parameter | Name: **C13074 | 0x1F98.7 Multiplex Cycle Counter**			Data type: UNSIGNED_8 Index: $11501_d = 2CED_h$
This code serves to define the maximum number of the multiplexed cycles. If, for instance, the value "3" is entered, the multiplexed cycle is repeated every three cycles. Within one multiplexed cycle, the nodes are queried according to the value in code C13079. If, for instance, the value "2" is entered for a node in C13079/x, it is always queried only in the second cycle of the three multiplexed cycles.			
Setting range (min. value | unit | max. value)			**Lenze setting**
0	Cycles	255	**0 cycles**
☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☑ COM ☐ MOT			

C13075

Parameter | Name: **C13075 | 0x1F98.8 SDO Channel Width (AsyncMTU)**			Data type: UNSIGNED_16 Index: $11500_d = 2CEC_h$
The code defines the maximum user data size of asynchronous frames. Protocol-specific headers for EPL, UDP/IP and others as well as service-specific headers are to be interpreted as part of the user data. **In the configured state, the C13075 values of all EPL nodes must be identical.**			
Setting range (min. value | unit | max. value)			**Lenze setting**
300	Byte	1500	**300 bytes**
☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☑ COM ☐ MOT			

C13076

Parameter | Name: **C13076 | 0x1F98.9 Prescaler_U16**			Data type: UNSIGNED_16 Index: $11499_d = 2CEB_h$
This code configures the change rate of the SoC PS flag.			
Setting range (min. value | unit | max. value)			**Lenze setting**
0	Cycles	1000	**2 Cycles**
☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☑ COM ☐ MOT			

C13078

Parameter | Name: **C13078 | 0x1F99 BasicEthTimeout**			Data type: UNSIGNED_32 Index: $11497_d = 2CE9_h$
The code defines the time interval needed for the booting controlled node to wait for the managing node. If the controlled node detects a managing node within the interval, the controlled node changes to NMT_CS_PREOPERATIONAL_1, if not it changes to "Basic Ethernet Mode".			
Setting range (min. value | unit | max. value)			**Lenze setting**
0	µs	4294967295	**5000000 µs**
☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☑ COM ☐ MOT			

C13079

Parameter | Name: **C13079 | 0x1F9B Multiplex Cycle CN**			Data type: UNSIGNED_8 Index: 11496_d = $2CE8_h$
This code indicates in which multiplexed cycle the node is queried. The value entered must not exceed the value in code C13074. If, for instance, the value "3" is entered in code C13074, the multiplexed cycle is repeated every three cycles. If now the value "3" is entered for one node in C13079/x, it is always queried only in the second cycle of the three multiplexed cycles.			
Setting range **(min. value | unit | max. value)**			
0	Cycles	255	
Subcodes	**Lenze setting**		**Info**
C13079/1	0 cycles		
...	...		
C13079/100	0 cycles		
☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☑ COM ☐ MOT			

C13102

Parameter | Name: **C13102 | 0x1F9E NMT Reset Command**		Data type: UNSIGNED_8 Index: 11473_d = $2CD1_h$
A reset command to a single EPL node in the network can result in cycle and monitoring errors. The code initiates a reset of the EPL node. When the reset has been executed, the code is automatically set to "NoCommand / NMTInvalidService".		
Selection list **(Lenze setting printed in bold)**		
40	ResetNode	
41	ResetCommunication	
42	ResetConfiguration	
255	**NoCommand**	
☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☑ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☑ COM ☐ MOT		

C13136

Parameter | Name: **C13136 | SoC Cycle Counter**			Data type: UNSIGNED_32 Index: 11439_d = $2CAF_h$
The subcodes of the code display a counter for EPL cycles. • The SoC cycle counter can be used for activity monitoring. • The counter is started at "0" each time the EPL node is switched on. The overflow is at "4294967295".			
Display range **(min. value | unit | max. value)**			
0		4294967295	
☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☑ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☑ COM ☐ MOT			

C13859

Parameter | Name: **C13859 | 0x1A00.0 Number of mapped Tx PDO-1**			Data type: UNSIGNED_8 Index: 10716_d = $29DC_h$
Number of sent PDOs via the PDO channel 1 (Tx)			
Display range **(min. value | unit | max. value)**			
0		10	
Subcodes			**Info**
C13859/1			0x1A00.0 Number of mapped Tx PDO-1
☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☑ COM ☐ MOT			

C13860

Parameter | Name: **C13860 | 0x160x.0 Number of mapped Rx PDO**			Data type: UNSIGNED_8 Index: $10715_d = 29DB_h$
Number of received PDOs via the PDO channel 1 (Rx)			
Display range **(min. value | unit | max. value)**			
0		8	
Subcodes			**Info**
C13860/1			0x1600.0 Number of mapped Rx PDO-1
☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☑ COM ☐ MOT			

C13861

Parameter | Name: **C13861 | 0x1F8C NMT Communication Status**		Data type: UNSIGNED_8 Index: $10714_d = 29DA_h$
The code displays the current NMT state (according to the Ethernet POWERLINK specification) of the EPL node.		
0	Off	NMT_GS_OFF
25	Initialising	NMT_GS_INITIALISING
41	ResetAppl	NMT_GS_RESET_APPLICATION
57	ResetComm	NMT_GS_RESET_CONFIGURATION
121	ResetConfig	NMT_GS_RESET_CONFIGURATION
28	NotActive	NMT_CS_NOT_ACTIVE
29	PreOp1	NMT_CS_PRE_OPERATIONAL_2
93	PreOp2	NMT_CS_PRE_OPERATIONAL_2
109	ReadyToOp	NMT_CS_READY_TO_OPERATE
253	Operational	NMT_CS_OPERATIONAL
77	Stopped	NMT_CS_STOPPED
30	BasicEthernet	NMT_CS_BASIC_ETHERNET
0	Off	NMT_GS_OFF
☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☑ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☑ COM ☐ MOT		

C13864

Parameter | Name: **C13864 | 0x1F93.1 Node ID**			Data type: UNSIGNED_8 Index: $10711_d = 29D7_h$
The code displays the currently valid EPL device address. • The EPL device address must be unequivocal in the EPL network segment. • See also C13899.			
Display range **(min. value | unit | max. value)**			
1		239	
☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☑ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☑ COM ☐ MOT			

C13865

Parameter | Name: **C13865 | 0x1F93.2 Node ID by HW**			Data type: UNSIGNED_8 Index: 10710_d = $29D6_h$
The code displays whether the EPL node address (node ID) has been set via the DIP switch of the Drive Unit or via C13899. • 0 (FALSE): Node ID has been set via C13899. • 1 (TRUE): Node ID has been set via DIP switches. ▸ Node address (node ID) setting (📖 26)			
Display range **(min. value | unit | max. value)**			
0		1	
☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☑ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☑ COM ☐ MOT			

C13879

Parameter | Name: **C13879 | Bus error**		Data type: UNSIGNED_32 Index: 10696_d = $29C8_h$
The code displays the bus error status which is signalled in the "ERR" LED. • Bit 0 = 0 (0x00000000) no bus error • Bit 0 = 1 (0x00000001) bus error active		
Value is bit-coded:		
Bit 0	Bus Error if TRUE	
☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☑ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☑ COM ☐ MOT		

C13880

Parameter | Name: **C13880 | error response**		Data type: UNSIGNED_8 Index: 10695_d = $29C7_h$
The subcodes determine the reaction when the OPERATIONAL state is left, when SoC is lost and when a CRC error occurs.		
Selection list		
0	No response	
1	Error	
3	Quick stop by trouble	
4	Warning Locked	
6	Information	
Subcodes	**Lenze setting**	**Info**
C13880/1	0: No Response	Error reaction at OPERATIONAL loss
C13880/2	0: No Response	Error reaction at SoC loss
C13880/3	0: No Response	Error reaction at CRC error
☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☑ COM ☐ MOT		

C13884

Parameter | Name: **C13884 | Response to RPDO monitoring**		Data type: BITFIELD_8 Index: 10691_d = $29C3_h$
The code displays if the EPL node is synchronised. • Bit 0 = 0 (0x00000000) The EPL node is not synchronised. • Bit 0 = 1 (0x00000001) The EPL node is synchronised.		
Value is bit-coded:		
Bit 0	CU Synchronisation is locked if TRUE	
☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☑ COM ☐ MOT		

C13885

Parameter | Name: **C13885 | Suppress emergency message upon**	Data type: UNSIGNED_8 Index: 10690_d = $29C2_h$
The code controls the error response to failing PDO communication with a node. The failure is detected because expected PDO data are missing.	

Selection list **(Lenze setting printed in bold)**	
0	Maintain PDO
1	**Delete PDO**

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

C13887

Parameter | Name: **C13887 | Suppress emergency message upon**	Data type: BITFIELD_8 Index: 10688_d = $29C0_h$

This code serves to suppress sending alarm messages to the managing node. You can explicitly suppress a certain type of error. Furthermore, all errors are entered into the logbook.

- A change can only be effective immediately if no error number with the error type selected here is active in **C00165**.

Value is bit-coded:	
Bit 0	Error
Bit 1	Fault
Bit 2	Quick stop by trouble
Bit 3	Warning Locked
Bit 4	Warning
Bit 5	Reserved
Bit 6	Reserved
Bit 7	Reserved

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

C13898

Parameter | Name: **C13898 | 0x1F9A Host Name**	Data type: VISIBLE_STRING Index: 10677_d = $29B5_h$

The code defines a DNS-compatible device name. The length is limited to 20 characters. **The device name must be non-ambiguous within the network domain.**
Naming convention:
The device name ...

- starts with a letter;
- ends with a letter or a digit.

The device name consists of ...

- letters (A ... Z, a ... z);
- digits (0 ... 9);
- hyphen (-).

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

C13899

Parameter | Name: **C13899 | Node ID SW**			Data type: UNSIGNED_8 Index: 10676_d = $29B4_h$
Setting of the node ID, unless a node ID is set via DIP switches. ▸ Node address (node ID) setting (🕮 26)			
Setting range **(min. value | unit | max. value)**			**Lenze setting**
0		239	**0**
☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☑ COM ☐ MOT			

C13900

Parameter | Name: **C13900 | Firmware Type**	Data type: VISIBLE_STRING Index: 10675_d = $29B3_h$
Display of the Lenze firmware type of the Communication Unit (product designation).	
☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☑ COM ☐ MOT	

C13901

Parameter | Name: **C13901 | Firmware Date**	Data type: VISIBLE_STRING Index: 10674_d = $29B2_h$
Display of the creation date of the Communication Unit firmware.	
☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☑ COM ☐ MOT	

C13902

Parameter | Name: **C13902 | Firmware Version**	Data type: VISIBLE_STRING Index: 10673_d = $29B1_h$
Display of the version number of the Communication Unit firmware.	
☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☑ COM ☐ MOT	

C13910

Parameter | Name:
C13910 | Last Module Error

Data type: UNSIGNED_32
Index: 10665_d = $29A9_h$

Display of the error code of the error last occurred in the Communication Unit

Selection list (Lenze setting printed in bold)	
0	**No error**
297566817	Warning locked INVALID_ADDR
29122816	Software error
96239921	Fault OPER_LOST
230457649	Quick stop OPER_LOST
297566513	Warning locked OPER_LOST
431784241	Information OPER_LOST
96240229	Fault CN_SoC_LOSS
230457957	Quick stop CN_SoC_LOSS
297566821	Warning locked CN_SoC_LOSS
431784549	Information CN_SoC_LOSS
96240230	Fault COM_CRC
230457958	Quick stop COM_CRC
297566822	Warning locked COM_CRC
431784550	Information COM_CRC

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

C13915

Parameter | Name:
C13915 | CustomerObject[16]

Data type: OCTET_STRING
Index: 10660_d = $29A4_h$

The code contains an octet string[16] for customised use.

Setting range (min. value | unit | max. value)		

Subcodes	**Lenze setting**	**Info**
C13915/1	00000000000000000000000000000000	

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

C13920

Parameter | Name:
C13920 | Current address switch

Data type: UNSIGNED_8
Index: 10655_d = $299F_h$

The code displays the current DIP switch position (node ID).
Not all switch positions are useful. The values for node IDs assigned by means of switches are between 1 and 239.
▸ Node address (node ID) setting (🕮 26)

Display range (min. value | unit | max. value)		
0		255

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

11.3 Table of attributes

The table of attributes contains information required for a communication with the Inverter Drives 8400 motec via parameters.

How to read the table of attributes:

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

Table of attributes

Code	Name	Index		Data				Access		
		dec	hex	DS	DA	Data type	Factor	R	W	CINH
C13000	0x1E40.2 IP address	11575	2D37	A	1	UNSIGNED_32		☑		
C13001	0x1E40.3 Subnet mask	11574	2D36	A	1	UNSIGNED_32		☑		
C13003	0x1E40.5 IP Address Router	11572	2D34	A	1	UNSIGNED_32		☑	☑	
C13004	0x1030.5 MAC address	11571	2D33	A	1	OCTET_STRING		☑		
C13028	0x1F81 NMT_NodeAssignment CN	11547	2D1B	A	100	UNSIGNED_32		☑	☑	
C13029	NMT_NodeAssignment	11546	2D1A	A	3	UNSIGNED_32		☑	☑	
C13040	0x1F82 Feature Flags	11535	2D0F	E	1	UNSIGNED_32		☑		
C13060	0x1006 Cycle Time	11515	2CFB	E	1	UNSIGNED_32	1	☑	☑	
C13066	0x1F8D PResPayloadLimit RPDO CN	11509	2CF5	A	100	UNSIGNED_16	1	☑	☑	
C13067	0x1F8D PResPayloadLimit	11508	2CF4	A	3	UNSIGNED_16	1	☑	☑	
C13071	0x1F98.4 PReqPayloadLimit RPDO	11504	2CF0	E	1	UNSIGNED_16	1	☑	☑	
C13072	0x1F98.5 PResPayloadLimit TPDO	11503	2CEF	E	1	UNSIGNED_16	1	☑	☑	
C13074	0x1F98.7 MultiplCycleCnt	11501	2CED	E	1	UNSIGNED_8	1	☑	☑	
C13075	0x1F98.8 AsyncMTU	11500	2CEC	E	1	UNSIGNED_16	1	☑	☑	
C13076	0x1F98.9 Prescaler_U16	11499	2CEB	E	1	UNSIGNED_16	1	☑	☑	
C13078	0x1F99 BasicEthTimeout	11497	2CE9	E	1	UNSIGNED_32	1	☑	☑	
C13079	0x1F9B NMT_MultiplCycleAsgn CN	11496	2CE8	A	100	UNSIGNED_8	1	☑	☑	
C13102	0x1F9E NMT_ResetCmd	11473	2CD1	E	1	UNSIGNED_8	1	☑	☑	
C13136	SoC Cycle Counter	11439	2CAF	E	1	UNSIGNED_32	1	☑		
C13859	0x1A00.0 Number of mapped Tx PDO-1	10716	29DC	A	1	UNSIGNED_8	1	☑		
C13860	0x160x.0 Number of mapped Rx PDO-1	10715	29DB	A	1	UNSIGNED_8	1	☑		
C13861	0x1F8C NMT_CurrentState	10714	29DA	E	1	UNSIGNED_8	1	☑		
C13864	0x1F93.1 Node ID	10711	29D7	E	1	UNSIGNED_8	1	☑		
C13865	0x1F93.2 Node ID by HW	10710	29D6	E	1	UNSIGNED_8	1	☑		
C13879	Bus error	10696	29C8	E	1	UNSIGNED_32		☑		
C13880	Module error reactions	10695	29C7	A	3	UNSIGNED_8	1	☑	☑	
C13884	CU Synchronisation lock status	10691	29C3	E	1	BITFIELD_8		☑		
C13885	Error reaction on RPDO check	10690	29C2	E	1	UNSIGNED_8	1	☑	☑	
C13887	Suppress emergency message upon	10688	29C0	E	1	BITFIELD_8		☑	☑	
C13898	0x1F9A Host Name	10677	29B5	E	1	VISIBLE_STRING		☑	☑	
C13899	Node ID SW	10676	29B4	E	1	UNSIGNED_8	1	☑	☑	
C13900	Firmware Type	10675	29B3	E	1	VISIBLE_STRING		☑		
C13901	Firmware Date	10674	29B2	E	1	VISIBLE_STRING		☑		
C13902	Firmware Version	10673	29B1	E	1	VISIBLE_STRING		☑		
C13910	Last Module Error	10665	29A9	E	1	UNSIGNED_32	1	☑	☑	
C13915	CustomerObject[16]	10660	29A4	A	1	OCTET_STRING		☑	☑	
C13920	Current address switch	10655	299F	E	1	UNSIGNED_8	1	☑		

12 Index table

The following objects specified by the POWERLINK communication profile (DS 301) are supported:

EPL index	Index name	Subindex name	Type	Attr.	Reference / description	Value
0x1000	NMT_DeviceType_U32	-	U32	R	-	0
0x1001	ERR_ErrorRegister_U8	-	I8	R	-	
0x1003.0	ERR_History_ADOM	NumberOfEntries	U8	RW	-	
0x1003.1 ...254	ERR_History_ADOM	ErrorEntry_DOM	DOMAIN	R	-	
0x1006	NMT_CycleLen_U32	-	U32	RW	C13060	1000
0x1008	NMT_ManufactDevName_VS	-	VS5	R	-	Lenze motec inverter
0x1018.0	NMT_IdentityObject_REC	NumberOfEntries	U8	R	-	4
0x1018.1	NMT_IdentityObject_REC	VendorId_U32	U32	R	-	59
0x1018.2	NMT_IdentityObject_REC	ProductCode_U32	U32	R	-	840110
0x1018.3	NMT_IdentityObject_REC	RevisionNo_U32	U32	R	-	
0x1018.4	NMT_IdentityObject_REC	SerialNo_U32	U32	R	-	
0x1020.0	CFM_VerifyConfiguration_REC	NumberOfEntries	U8	R	-	2
0x1020.1	CFM_VerifyConfiguration_REC	ConfDate_U32	U32	RW	-	
0x1020.2	CFM_VerifyConfiguration_REC	ConfTime_U32	U32	RW	-	
0x1030.0	NMT_InterfaceGroup_0h_REC	NumberOfEntries	U8	R	-	9
0x1030.1	NMT_InterfaceGroup_0h_REC	InterfaceIndex_U16	U16	R	Interface no. of the POWERLINK interface	1
0x1030.2	NMT_InterfaceGroup_0h_REC	InterfaceDescription_ VSTR	VS3	R	Description of the POWERLINK interface	Lenze E84DGFEC
0x1030.3	NMT_InterfaceGroup_0h_REC	InterfaceType_U8	U8	R	Interface type	6
0x1030.4	NMT_InterfaceGroup_0h_REC	InterfaceMtu_U32	U32	R	Maximum frame size [byte]	1490
0x1030.5	NMT_InterfaceGroup_0h_REC	InterfacePhysAddress_ OSTR	OS6	R	C13004/1	
0x1030.6	NMT_InterfaceGroup_0h_REC	InterfaceName_VSTR	VS16	RW	Symb. name of the POWERLINK interface	ETH0
0x1030.7	NMT_InterfaceGroup_0h_REC	InterfaceOperState_U8	U8	R	Operation status of the POWERLINK interface	1
0x1030.8	NMT_InterfaceGroup_0h_REC	InterfaceAdminState_U8	U8	RW	Administration status of the POWERLINK interface	1
0x1030.9	NMT_InterfaceGroup_0h_REC	Valid_BOOL	BOOL	RW	Release of the interface description	1: TRUE
0x1300	SDO_SequLayerTimeout_U32	-	U32	RW	Value in [ms]	15000
0x1301	SDO_CmdLayerTimeout_U32	-	U32	RW	Value in [ms]	30000
0x1400.0	PDO_RxCommParam_00h_REC	NumberOfEntries	U8	R	-	2
0x1400.1	PDO_RxCommParam_00h_REC	NodeID_U8	U8	RW	-	0
0x1400.2	PDO_RxCommParam_00h_REC	MappingVersion_U8	U8	R	Version of PDO mapping	0
0x1600.0	PDO_RxMappParam_00h_REC	NumberOfEntries	U8	R	C13860/1	
0x1600.1 ...8	PDO_RxMappParam_00h_REC	ObjectMapping_U64	U64	RW	-	
0x1800.0	PDO_TxCommParam_00h_REC	NumberOfEntries	U8	R	-	2
0x1800.1	PDO_TxCommParam_00h_REC	NodeID_U8	U8	R	Node ID of the receiver	0 (pseudo node ID for PRes-Tx)
0x1800.2	PDO_TxCommParam_00h_REC	MappingVersion_U8	U8	R	Version of PDO mapping	0
0x1A00.0	PDO_TxMappParam_00h_AU64	NumberOfEntries	U8	R	C13859/1	
0x1A00.1 ...10	PDO_TxMappParam_00h_AU64	ObjectMapping	U64	R	-	
0x1C0A.0	DLL_CNCollision_REC	NumberOfEntries	U8	R	-	3
0x1C0A.1	DLL_CNCollision_REC	CumulativeCnt_U32	U32	RW	-	
0x1C0A.1	DLL_CNCollision_REC	ThresholdCnt_U32	U32	R	-	
0x1C0A.1	DLL_CNCollision_REC	Threshold_U32	U32	RW	-	15

EPL index	Index name	Subindex name	Type	Attr.	Reference / description	Value
0x1C0B.0	DLL_CNLossSoC_REC	NumberOfEntries	U8	R	-	3
0x1C0B.1	DLL_CNLossSoC_REC	CumulativeCnt_U32	U32	RW	-	
0x1C0B.1	DLL_CNLossSoC_REC	ThresholdCnt_U32	U32	R	-	
0x1C0B.1	DLL_CNLossSoC_REC	Threshold_U32	U32	RW	-	15
0x1C0C.0	DLL_CNLossSoA_REC	NumberOfEntries	U8	R	-	3
0x1C0C.1	DLL_CNLossSoA_REC	CumulativeCnt_U32	U32	RW	-	
0x1C0C.1	DLL_CNLossSoA_REC	ThresholdCnt_U32	U32	R	-	
0x1C0C.1	DLL_CNLossSoA_REC	Threshold_U32	U32	RW	-	15
0x1C0D.0	DLL_CNLossPReq_REC	NumberOfEntries	U8	R	-	3
0x1C0D.1	DLL_CNLossPReq_REC	CumulativeCnt_U32	U32	RW	-	
0x1C0D.1	DLL_CNLossPReq_REC	ThresholdCnt_U32	U32	R	-	
0x1C0D.1	DLL_CNLossPReq_REC	Threshold_U32	U32	RW	-	15
0x1C0F.0	DLL_CNCRCError_REC	NumberOfEntries	U8	R	-	3
0x1C0F.1	DLL_CNCRCError_REC	CumulativeCnt_U32	U32	RW	-	
0x1C0F.1	DLL_CNCRCError_REC	ThresholdCnt_U32	U32	R	-	
0x1C0F.1	DLL_CNCRCError_REC	Threshold_U32	U32	RW	-	15
0x1C10	DLL_CNLossOfLinkCum_U32	-	U32	RW	-	
0x1C13	DLL_CNSoCJitterRange_U32	-	U32	RW	-	2000
0x1C14	DLL_CNLossOfSocTolerance_U32	-	U32	RW	-	100000
0x1E40.0	NWL_IpAddrTable_0h_REC	NumberOfEntries	U8	R	-	5
0x1E40.1	NWL_IpAddrTable_0h_REC	IfIndex_U16	U16	R	-	0
0x1E40.2	NWL_IpAddrTable_0h_REC	Addr_IPAD	U32	R	C13000/1	
0x1E40.3	NWL_IpAddrTable_0h_REC	NetMask_IPAD	U32	R	C13001/1	
0x1E40.4	NWL_IpAddrTable_0h_REC	ReasmMaxSize_U16	U16	R	Maximum frame size which can be reconstructed from frames arriving in fragments [byte].	1518
0x1E40.5	NWL_IpAddrTable_0h_REC	DefaultGateway_IPAD	U32	RW	C13003/1	
0x1E4A.0	NWL_IpGroup_REC	NumberOfEntries	U8	R	-	3
0x1E4A.1	NWL_IpGroup_REC	Forwarding_BOOL	BOOL	R	Release for IP router function	0: FALSE
0x1E4A.2	NWL_IpGroup_REC	DefaultTTL_U16	U16	RW	TimeToLive value for transmitted IP frames Limits the range with regard to router stations passed.	64
0x1E4A.3	NWL_IpGroup_REC	ForwardingDatagrams_ U32	U32	R	Counter for routed frames	
0x1F81.0	NMT_NodeAssignment_AU32	NumberOfEntries	U8	RW	-	254
0x1F81.1 ...100	NMT_NodeAssignment_AU32	NodeAssignment	U32	RW	C13028/1...100	
0x1F81.240	NMT_NodeAssignment_AU32	NodeAssignment	U32	RW	C13029/1	
0x1F81.253	NMT_NodeAssignment_AU32	NodeAssignment	U32	RW	C13029/2	
0x1F81.254	NMT_NodeAssignment_AU32	NodeAssignment	U32	RW	C13029/3	
0x1F82	NMT_FeatureFlags_U32	-	U32	R	C13040	0x20
0x1F83	NMT_EPLVersion_U8	-	U8	R	EPL version	
0x1F8C	NMT_CurrNMTState_U8	-	U8	R	C13861	
0x1F8D.0	NMT_PResPayloadLimitList_AU16	NumberOfEntries	U8	R	-	254
0x1F8D.1 ...100	NMT_PResPayloadLimitList_AU16	PResPayloadLimit	U16	RW	C13066/1...100	36
0x1F8D.240	NMT_PResPayloadLimitList_AU16	PResPayloadLimit	U16	RW	C13067/1	36
0x1F8D.253	NMT_PResPayloadLimitList_AU16	PResPayloadLimit	U16	RW	C13067/2	36
0x1F8D.254	NMT_PResPayloadLimitList_AU16	PResPayloadLimit	U16	RW	C13067/3	36
0x1F93.0	NMT_EPLNodeID_REC	NumberOfEntries	U8	R		2
0x1F93.1	NMT_EPLNodeID_REC	NodeID_U8	U8	R	C13864	
0x1F93.2	NMT_EPLNodeID_REC	NodeIDByHW_BOOL	BOOL	R	-	
0x1F98.0	NMT_CycleTiming_REC	NumberOfEntries	U8	R	-	9

EPL index	Index name	Subindex name	Type	Attr.	Reference / description	Value
0x1F98.1	NMT_CycleTiming_REC	IsochrTxMaxPayload_U16	U16	R	Size of the isochronous transmit memory	1490
0x1F98.2	NMT_CycleTiming_REC	IsochrRxMaxPayload_U16	U16	R	Size of the isochronous receive memory	1490
0x1F98.3	NMT_CycleTiming_REC	PResMaxLatency_U32	U32	R	Isochronous response delay [ns]	3000
0x1F98.4	NMT_CycleTiming_REC	PReqActPayloadLimit_U16	U16	RW	C13071	36
0x1F98.5	NMT_CycleTiming_REC	PResActPayloadLimit_U16	U16	RW	C13072	36
0x1F98.6	NMT_CycleTiming_REC	ASndMaxLatency_U32	U32	R	Asynchronous response delay [ns]	3000
0x1F98.7	NMT_CycleTiming_REC	MultiplCycleCnt_U8	U8	RW	C13074	0
0x1F98.8	NMT_CycleTiming_REC	AsyncMTU_U16	U16	RW	C13075	300
0x1F98.9	NMT_CycleTiming_REC	Prescaler_U16	U16	RW	C13076	2
0x1F99	NMT_CNBasicEthernetTimeout_U32	-	U32	RW	C13078	5000000
0x1F9A	NMT_HostName_VSTR	-	VS32	RW	C13898	
0x1F9B.0	NMT_MultiplCycleAssign_AU8	NumberOfEntries	U8	RW	C13079	254
0x1F9B.1 ...254	NMT_MultiplCycleAssign_AU8	CycleNo	U8	RW	C13079	0 ... value of 0x1F98.7
0x1F9E	NMT_ResetCmd_U8	-	U8	RW	C13102	

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Index

FEEDBACK

Your opinion is important to us

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

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

feedback-docu@lenze.com

Thank you very much for your support.

Your Lenze documentation team

Decentralised frequency inverter 8400 motec (POWERLINK Option) · 13560868 · EDS84DMOTPL EN 1.0 - 11/2018

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Accessories

PROFIBUS

E84DGFCpxxx

Inverter Drives 8400 motec__________________

Communication Manual EN

13564909

Contents

1 About this documentation

Contents

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

Note!

This documentation supplements the **mounting instructions** and the **"Inverter Drives 8400 motec" hardware manual** supplied with the Communication Unit.

The hardware manual contains safety instructions which must be observed!

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

Examples illustrate typical applications.

This documentation also contains the following:

- Safety instructions that must be observed
- The basic technical data of the communication module
- Information on versions of the Lenze standard devices to be used
- Notes on troubleshooting and fault elimination

The theoretical context is only explained as far as it is required for understanding the function of the communication module.

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 master computer (PLC, master) documents.

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

Tip!

Detailed information about PROFIBUS can be found on the website of the PROFIBUS user organisation:

www.profibus.com

Screenshots/application examples

All screenshots in this documentation are application examples. Depending on the firmware version of the field devices and the software version of the Engineering tools installed (»Engineer«), screenshots in this documentation may differ from the representation on the screen.

Target group

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

Tip!

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

www.Lenze.com

Information regarding the validity

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

Product series	Type designation	Version
Inverter Drives 8400 motec **PROFIBUS Communication Unit**	E84DGFCPxNx	PROFIBUS
	E84DGFCPxJx	PROFIBUS + Safety

▶ Features and variants (📖 14)

1.1 Document history

Version			Description
4.0	02/2019	TD23	• General revision
3.0	11/2011	TD17	• General revision • Digital and analog input information (📖 38) supplemented. • Description of code C13887 (from version 02.00) supplemented.
2.0	01/2011	TD17	• DIP switch settings (📖 30) corrected. • »Engineer« screenshots updated.
1.0	09/2010	TD17	First edition

1.2 Conventions used

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

Type of information		Highlighting	Examples/notes
Spelling of numbers			
	Decimal	Normal spelling	Example: 1234
	Hexadecimal	0x[0 ... 9, A ... F]	Example: 0x60F4
	Binary • Nibble	In inverted commas Point	Example: ’100’ Example: ’0110.0100’
	Decimal separator	Point	The decimal point is always used. For example: 1234.56
Text			
	Program name	» «	PC software Example: Lenze »Engineer«
	Control element	**Bold**	The **OK** button... / The **Copy** command... / The **Properties** tab... / The **Name** input field...
	Hyperlink	underlined	Optically highlighted reference to another topic. Can be activated with a mouse-click in this documentation.
Icons			
	Page reference	(🕮 8)	Optically highlighted reference to another page. Can be activated with a mouse-click in this documentation.
	Step-by-step instructions	⌨🖱	Step-by-step instructions are indicated by a pictograph.

1.3 Terminology used

Term	Meaning
Inverter	Lenze frequency inverter of the "Inverter Drives 8400 motec" product series
Standard device	
Drive Unit Communication unit Wiring Unit	The 8400 motec inverter has a modular structure that includes the following modules: "Drive Unit", "Communication Unit", and "Wiring Unit". • The drive unit is available in different power settings. • In case of the communication unit you can select between: • Without fieldbus (basic I/O, standard I/O, extended I/O) • AS interface (without safety/with safety STO) • CANopen (without safety/with safety STO) • EtherCAT (without safety/with safety STO) • EtherNET/IP (without safety/with safety STO) • PROFIBUS (without safety/with safety STO) • PROFINET (without safety/with safety STO) • POWERLINK (without safety/with safety STO) • The wiring unit provides flexible connection possibilities for a simple integration into the power supply of the machine.
»Engineer«	Lenze PC software which supports you during the "Engineering" process (parameterisation, diagnostics, and configuration) throughout the whole life cycle, i. e. from planning to maintenance of the machine commissioned.
Code	Parameter which serves to parameterise and monitor the inverter. In normal usage, the term is usually referred to as "Index".
Subcode	If a code contains several parameters, they are stored in "subcodes". This manual uses a slash "/" as a separator between code and subcode (e.g. "C00118/3"). This term is also referred to as "subindex" in common parlance.
Lenze setting	This setting is the default factory setting of the device.
Basic setting	
HW	Hardware
SW	Software

1.4 Notes used

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

Safety instructions

Layout of the safety instructions:

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

Pictograph	Signal word	Meaning
⚡	**Danger!**	**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	**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	Signal word	Meaning
ℹ	**Note!**	Important note to ensure trouble-free operation
💡	**Tip!**	Useful tip for easy handling
📖		Reference to another document

2 Safety instructions

Note!

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

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

2.1 General safety and application notes

Danger!

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

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

2.2 Device and application-specific safety instructions

- During operation, the Communication Unit must be connected to the Wiring Unit and the Drive Unit.
- In case of external voltage supply, each control cabinet must be provided with a safely separated power supply unit ("SELV"/"PELV") according to EN 61800-5-1.
- Only use cables that meet the listed specifications.
  ▶ Bus cable specification (📖 24)

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

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

2.3 Residual hazards

Device protection

- The Communication Unit contains electronic components that can be damaged or destroyed by electrostatic discharge.
  ▶ Installation (📖 19)

3 Product description

3.1 Application as directed

The communication unit PROFIBUS ...

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

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

- is a device intended for use in industrial power systems.
- may only be operated under the operating conditions specified in this documentation.
- may only be used in PROFIBUS networks.
- can also be used without being connected to the PROFIBUS network.

Any other use shall be deemed inappropriate!

3.2 Features and variants

The communication unit PROFIBUS is available in the following versions:

Product series	Type designation	Product features				
		Enclosure	Connection PROFIBUS	I/O: Connection via terminal	I/O: Connection via M12	Safety
Inverter Drives 8400 motec **Communication unit PROFIBUS**	E84DGFCPFNP	IP 65	M12	3× DI 1× DO	2× DI	
	E84DGFCPENP	IP 65	M12	2× DI	3× DI 1× DO	
	E84DGFCPFJP	IP 65	M12	3× DI 1× DO 1× AI	2× DI	●
	E84DGFCPEJP	IP 65	M12	3× DI	2× DI 1× DO 1× AI	●

- The PROFIBUS communication unit is ...
  - mounted on top of the Wiring Unit (E84DGVNxx);
  - supplied internally via the Drive Unit (E84DGDVxxxxxxxx) or externally via a separate voltage source.
- The I/O connections can be brought into the device via M12 connectors or cable glands.
- Devices without an integrated safety system (safety option) have no analog input and no relay output.
- The integrated safety system can be used on machines for the protection of persons.
- Support of the parameter data channel DRIVECOM (DP-V0), PROFIDrive (DP-V1) in preparation
- Exchange of up to 8 process data words per direction
- Bus coupling via remote bus according to the RS485 standard
- Automatic detection of the baud rate (9.6 kbps to 12 Mbps)
- Setting of the station address is possible via DIP switch or code.
- Communication with the Lenze »Engineer« (access to all Lenze parameters) is executed via the diagnostic interface of the Drive Unit.

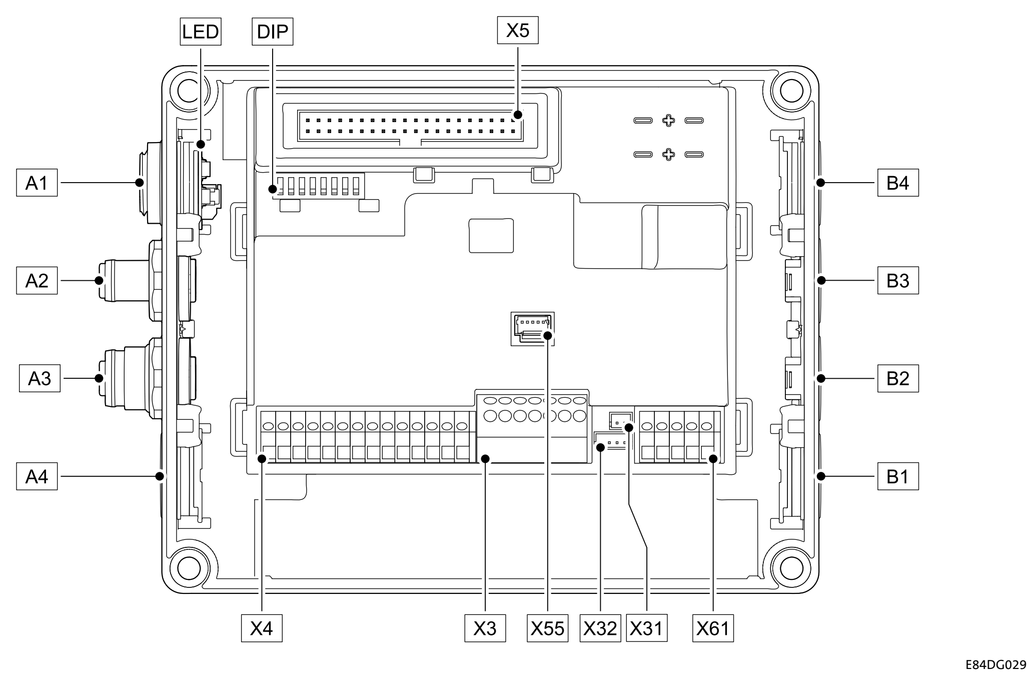
"Inverter Drives 8400 motec" hardware manual

Here you will find detailed information on the integrated safety system (safety option).

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

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

3.3 Connections and interfaces



[3-1] PROFIBUS Communication Unit

Pos.	Description
DIP	DIP switch ▸ Possible settings via DIP switch (📖 29)
A1 / LED	Position of LEDs for PROFIBUS status display ▸ LED status displays (📖 70)
A2	PROFIBUS input (M12 male, 5-pin) ▸ PROFIBUS connection (📖 25)
A3	PROFIBUS output (M12 female, 5-pin) ▸ PROFIBUS connection (📖 25)
A4	Positions for further freely designable inputs and outputs: • Digital inputs • Digital output • Analog input (only for E84DGFCPxJx) • Relay output (only for E84DGFCPxJx) • Connection of "Safety Option" safety system (only for E84DGFCPxJx)
B1 ... B4	
X3 / X4 / X61	Terminal strips for wiring the connections at A4 and B1 ... B4
X5	Plug connector for connection to the Drive Unit
X31	Plug connector for wiring the PROFIBUS input at A2
X32	Plug connector for wiring the PROFIBUS output at A3
X55	Plug connector for the wiring of the LEDs to A1

- By default, the PROFIBUS connections and the LEDs for the PROFIBUS status displays are already mounted and wired:
  - PROFIBUS input to plug connector X31
  - PROFIBUS output to plug connector X32
  - LEDs on plug connector X55
- At positions A1 ... A4 and B1 ... B4, it is also possible to design the PROFIBUS connections and other connections (e.g. digital inputs) freely.
- For the connections, 5-pin M12 connectors or - alternatively - cable glands (cable cross-section max. 1.0 mm^2, AWG 18) can be used.
- The M12 connectors, cable glands and prefabricated system cables can be obtained from various manufacturers.
- Wire the M12 connectors or cable glands used to the corresponding contacts of the terminal strips/plug connectors X3, X4 and X61.

"Inverter Drives 8400 motec" hardware manual

Observe the notes and wiring instructions contained in this documentation.

4 Technical data

"Inverter Drives 8400 motec" hardware manual

Here you will find the **ambient conditions** and information on the **electromagnetic compatibility (EMC)** that also apply to the Communication Unit.

4.1 General data and operating conditions

Range	Values
Order designation	• E84DGFCPxNx (PROFIBUS) • E84DGFCPxJx (PROFIBUS + Safety)
Communication profile	• PROFIBUS DP-V0 (DRIVECOM) • PROFIBUS DP-V1 (PROFIdrive), from SW version 2.0
Standards / specifications	• IEC 61158 / EN 50170 • IEC 61784
Communication medium	RS485
Interface for communication	• PROFIBUS input: M12 pins, 5-pole, B-coded • PROFIBUS output: M12 socket, 5-pole, B-coded
Max. cable length	1200 m (depending on the selected baud rate, the used cable type and hardware (repeaters))
Bus termination	Bus terminating resistors are required at the first and last PROFIBUS node (implemented in the connector of the bus cable)
Network topology	• Line (without repeater) • Tree/line (with repeater)
Type of node	PROFIBUS slave
Slave node number	• Max. 31 (without repeater) • Max. 125 (with repeater)
PNO identification number	0x0A89
Baud rate for cable type A (EN 50170)	9.6 kbps ... 12 Mbps (automatic detection)
External voltage supply	• U = 24 V DC (20 V - 0 % ... 29 V + 0 %) • I_{max} = 120 mA
Conformities, approvals	• CE • UR / cUR

4.2 Protocol data

Range	Values
Process data words (PCD)	1 ... 8 words (16 bits/word)
Cyclic parameter data channel (DP-V0)	4 words
Acyclic parameter data channel (DP-V1)	Max. 240 bytes
PROFIBUS user data length	1 ... 8 words process data channel + 4 words parameter data channel

4.3 Communication time

The communication time is the time between the start of a request and the arrival of the corresponding response.

The communication times in a PROFIBUS network depend on ...

- processing time in the inverter;
- frame runtime (baud rate / frame length);
- nesting depth of the network.

Processing time inside the inverter

Data	Processing time	
Process data	Approx. 2 ms	Update cycle
	+ 0 ... 1 ms	Processing time in the module
	+ 1 ... x ms	Runtime of the application task of the technology application used (tolerance)
Parameter data	Approx. 30 ms + a tolerance of 20 ms (typically) • For some codes, the processing time may be longer (see software manual/»Engineer« online help "Inverter Drives 8400 motec").	

There are no interdependencies between parameter data and process data.

5 Installation

Stop!

Electrostatic discharge

Electronic components within the Communication Unit can be damaged or destroyed by electrostatic discharge.

Possible consequences:

- The Communication Unit is defective.
- Fieldbus communication is not possible or faulty.
- I/O signals are faulty.
- The safety function is faulty.

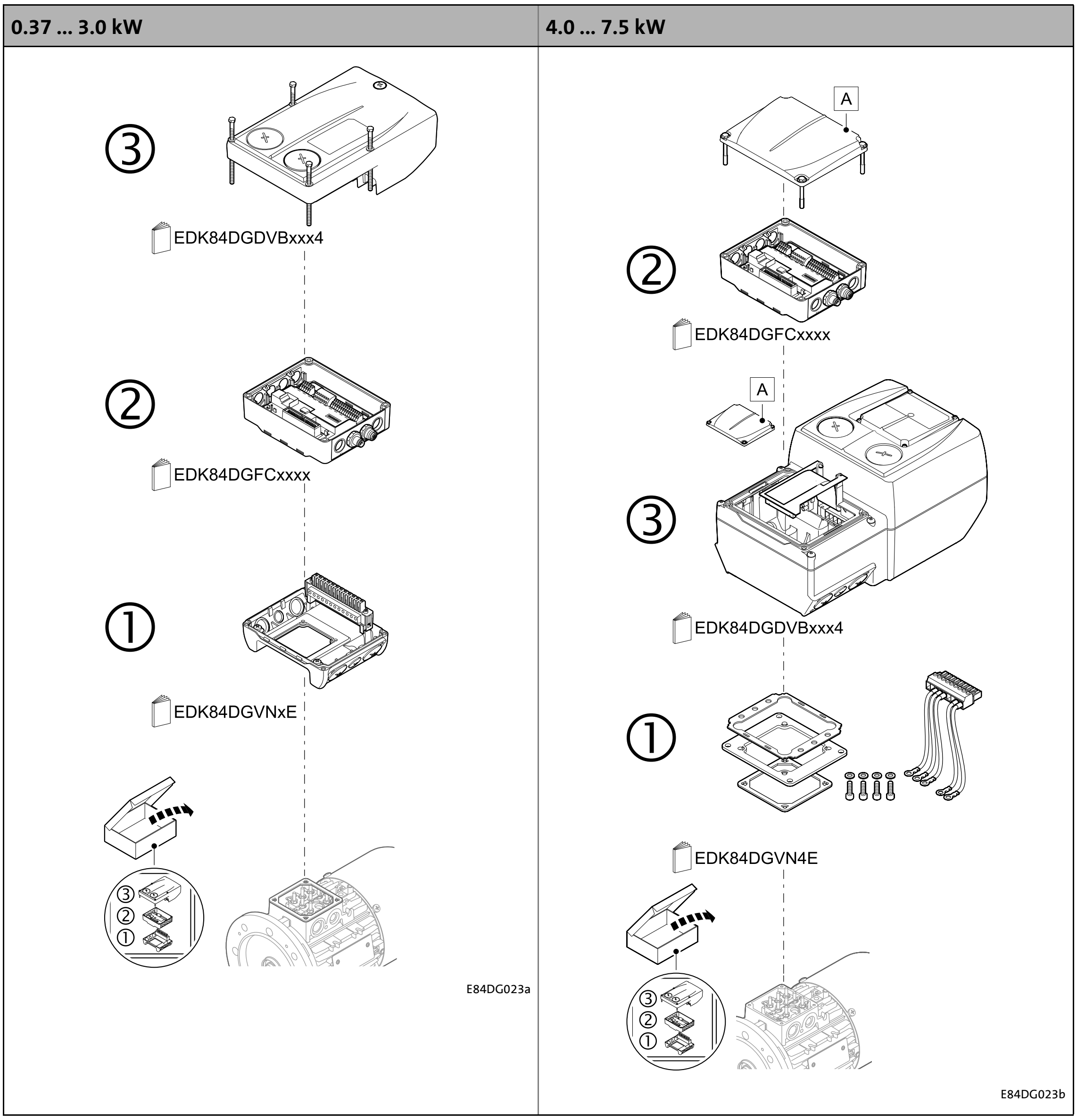
Protective measures

Discharge electrostatic charges before touching the Communication Unit.

5.1 Mechanical installation

Mounting instructions "Inverter Drives 8400 motec"

Here you will find detailed information on the installation.



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

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

5.2 Electrical installation

"Inverter Drives 8400 motec" hardware manual

Here you can find detailed information on ...

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

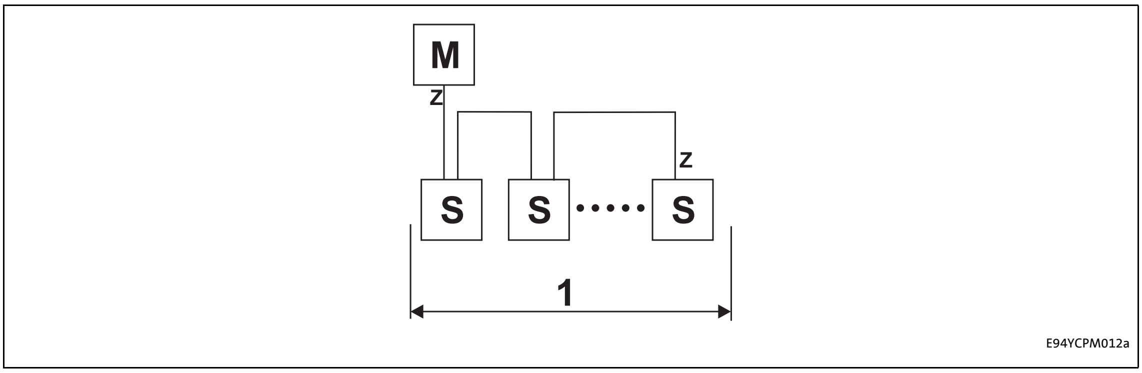
Observe the notes and wiring instructions contained in this documentation.

5.2.1 Network topology

Two simple RS485 networks are described in the following examples.

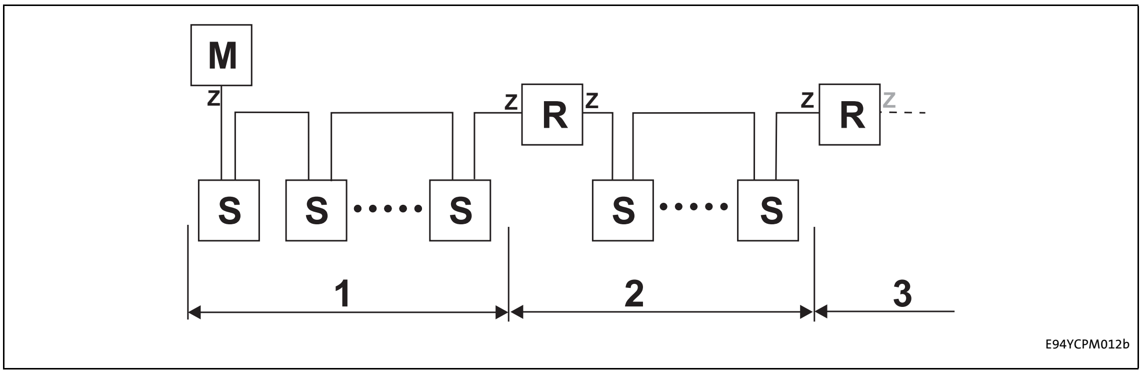
Every segment of the network must be terminated at both ends. The bus terminators of the PROFIBUS are marked with a "Z" in the below examples.

With an RS485 network of only one segment, the PROFIBUS master (M) with the integrated bus terminating resistor starts the segment and the bus of the last PROFIBUS node (S) must be terminated with a bus terminating resistor.



[5-2] RS485 network with one segment

An RS485 network consisting of several segments contains repeaters (R) for connecting the segments. The repeaters are provided with integrated bus terminating resistors.



[5-3] RS485 network with a repeater

If no repeater is to be used at the end of the segment, the bus must be terminated by means of a bus terminating resistor at the last station (S). The bus termination is supplied by this station.

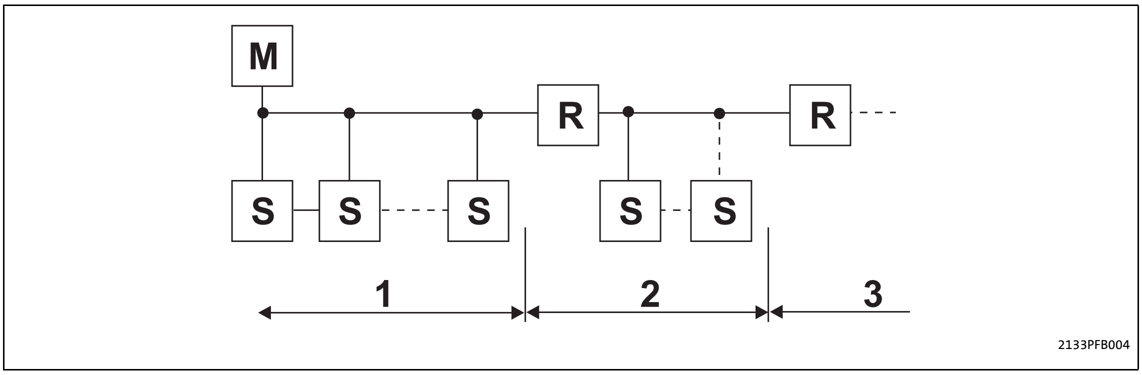
External supply of the communication unit allows for the separation of the bus termination supply from the inverter supply.

Note!

The bus terminator must always be supplied. Otherwise, the bus can get unstable.

- Bus termination (📖 23)
- External voltage supply (📖 26)

Number of nodes



[5-4] Number of nodes

Segment	Master (M)	Slave (S)	Repeater (R)
1	1	31	-
	2	30	-
2	-	30	1
3	-	30	1

Tip!

Repeaters do not have a station address. When calculating the maximum number of stations, they reduce the number of stations by 1 on each side of the segment.

By means of repeaters, you can establish line or tree topologies. The maximum total dimension of the bus system depends on ...

- the used baud rate;
- the number of repeaters.

5.2.2 Bus termination

The PROFIBUS must be terminated by means of a bus terminating resistor at the first and last physical station.

In the case of the communication unit, the bus terminating resistor can only be installed externally at the M12 connector. This has the advantage that an installed resistor is visible when the device is closed.

Note!

- The PROFIBUS connections (input and output) must be installed in an enclosed manner. Please use either a connection cable, an enclosed bus terminator connector (M12 male, 4-pin, B-coded) or a cap.
- The connecting cable and terminating resistor plug can be procured freely from various cable manufacturers (e.g. Lapp or Turck).
- If you want to disconnect individual bus stations, ensure that the bus terminators at the cable ends remain active. Otherwise, the bus may become unstable.
- Please observe that the bus termination is not active any longer if ...
  - the bus terminator connector has been disconnected;
  - the mains supply of the drive unit and the external 24V supply of the communication unit have been switched off at the same time.

5.2.3 Bus cable specification

Note!

Only use cables that correspond to the given specifications of the PROFIBUS user organisation.

Range	Values
Cable resistance	135 ... 165 Ω/km, (f = 3 ... 20 MHz)
Capacitance per unit length	≤ 30 nF/km
Loop resistance	< 110 Ω/km
Core diameter	> 0.64 mm
Core cross-section	> 0.34 mm^2
Cores	Twisted in pairs, insulated and shielded

Bus cable length

The length of the bus cable depends on the baud rate and cable type used. The data in the following table applies to PROFIBUS cables of "FC-Standard Cable" cable type .

Baud rate	Length
9.6 ... 93.75 kbps	1200 m
187.5 kbps	1000 m
500 kbps	400 m
1500 kbps	200 m
3000 ... 12000 kbps	100 m

Note!

The baud rate depending on the data volume, cycle time and number of stations should only be selected as high as required for the application.

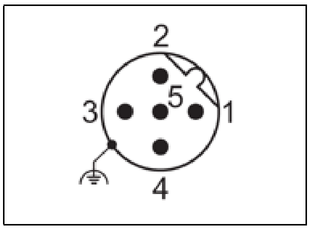
Tip!

We recommend taking the use of optical fibres into consideration for high baud rates.

Advantages of optical fibres:

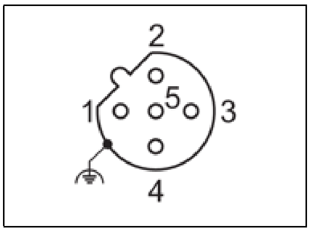
- External electromagnetic interferences have no effect on the transmission path.
- Bus lengths of several kilometres are also possible with higher baud rates.
- The bus length is ...
  - independent of the baud rate;
  - dependent on the optical fibre used.

5.2.4 PROFIBUS connection



- PROFIBUS input: M12 pins, 5-pole, B-coded
- Wiring at terminal strip X31
- Shield connection via housing

PROFIBUS input		
Pin	**Signal**	**Description**
1	-	Not assigned
2	RxD/TxD-N (A)	Data line A (received/transmitted data, minus)
3	-	Not assigned
4	RxD/TxD-P (B)	Data line B (received/transmitted data, plus)
5	-	Not assigned



- PROFIBUS output: M12 socket, 5-pole, B-coded
- Wiring at terminal strip X32
- Shield connection via housing

PROFIBUS output		
Pin	**Signal**	**Description**
1	P5V2	5 V DC / 30 mA (bus termination)
2	RxD/TxD-N (A)	Data line A (received/transmitted data, minus)
3	M5V2	Data ground (ground to 5 V)
4	RxD/TxD-P (B)	Data line B (received/transmitted data, plus)
5	-	Not assigned

5.2.5 External voltage supply

- By means of the external voltage supply, PROFIBUS communication for commissioning can be established, and the data of the digital and analog inputs can be queried.
- Furthermore the external voltage supply serves to maintain PROFIBUS communication if the main supply fails.
- The digital inputs RFR, DI1 ... DI5 and the analog input can continue to be evaluated.
- The external voltage supply is done via the terminals 24E and GND of the terminal strip X3.
- Permissible voltage (DC) / max. current:
  - U = 24 V DC (20 V - 0 % ... 29 V + 0 %)
  - I_{max} = 120 mA
- Access to parameters of a device that is disconnected from the mains is not possible.

"Inverter Drives 8400 motec" hardware manual

Here you can find detailed information on how to wire the Communication Unit.

6 Commissioning

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

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

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

▸ Parameter reference (🕮 79)

6.1 Before initial switch-on

Stop!

Before switching on the inverter for the first time, check ...

- the entire wiring for completeness, short circuit, and earth fault.
- whether the bus system is terminated by means of a bus terminating resistor at the first and last physical bus station.
  ▸ Bus termination (🕮 23)

6.2 How to configure the host (master)

Communication with the inverter requires configuration of the host (master) first.

Configuration for the host (master) and the DP-V0 parameter data channel

For the configuration of the PROFIBUS, the PROFIBUS device description file of the Inverter Drive 8400 motec must be read into the master.

The device description file is available on Lenze's website in the "Services & Downloads" area at:

www.Lenze.com

The following language variants of the device description file can be used:

- LENZE84D.GSD (source file, English)
- LENZE84D.GSG (German)
- LENZE84D.GSE (English)

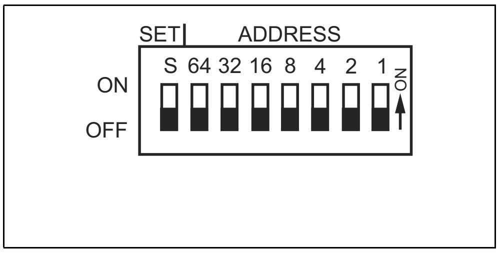
Defining the user data length

The user data length is defined during the initialisation phase of the master.

The communication unit PROFIBUS supports the configuration of max. 8 process data words (max. 16 bytes).

The user data lengths for process input data and process output data are identical.

6.3 Possible settings via DIP switch



[6-1] DIP switch

The DIP switches serve to ...

- Setting the station address (📖 30) (switches: 1 ... 64)
- Receiving the station address via the master (📖 29) (switch: S)

Lenze setting: all switches in OFF position

Note!

- The DIP switches can only be accessed when the drive unit is detached from the communication unit. Loosen the four fixing screws at the drive unit. **Observe the notes in the mounting instructions.**
- Switch off the voltage supply of the inverter and the external supply of the communication unit before you start disassembling the drive unit.
- The DIP switches are only read in when the device is switched on.

6.3.1 Receiving the station address via the master

Set the DIP switch **S = OFF**, in order to receive the station address automatically via the master.

- The station address active at the PROFIBUS is displayed in C13864.
- The settings of the DIP switches **1 ... 64** have no effect.
- When the mains connection is established, first the station address (DIP switch or C13899) set on the device is applied. Then the station address is obtained via the master.

6.3.2 Setting the station address

The station addresses must differ from each other if several networked PROFIBUS stations are used.

The station address can be set via the DIP switches **1 ... 64** or via the »Engineer« with code C13899.

The setting with C13899 requires DIP switches **1 ... 64** to be either **OFF** or **ON**.

Note!

The valid address range is 0 ... 126 (max. 125 slaves).

DIP switch settings

DIP switch								Station address
S	**64**	**32**	**16**	**8**	**4**	**2**	**1**	
OFF	...	...	...	...	...	...	...	Autom. via master
ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	Value from C13899
ON	OFF	OFF	OFF	OFF	OFF	OFF	**ON**	1
ON	...	...	...	...	...	...	...	...
ON	**ON**	**ON**	**ON**	**ON**	**ON**	**ON**	OFF	126
ON	**ON**	**ON**	**ON**	**ON**	**ON**	**ON**	**ON**	Value from C13899

The labelling on the package corresponds to the values of the individual DIP switches for determining the node address.

Example :

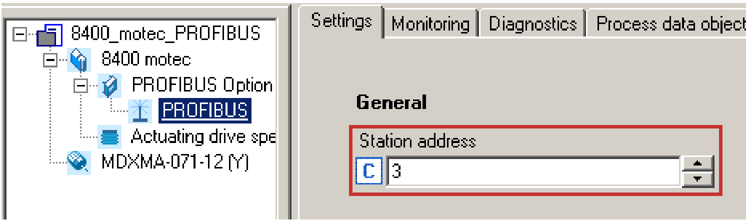
DIP switch	**64**	**32**	**16**	**8**	**4**	**2**	**1**
Switch position	OFF	OFF	**ON**	OFF	**ON**	**ON**	**ON**
Value	0	0	16	0	4	2	1
Station address	**= sum of the valencies = 16 + 4 + 2 + 1 = 23**						

- The current address set with the switches is displayed in C13920.
- The station address active at the PROFIBUS is displayed in C13864.

▸ DIP switch positions for setting the station address (🕮 91)

Setting the station address via the »Engineer«

In the »Engineer«, the station address can be set via the **Settings** tab.



General

Station address: 3

- Impermissible addresses are displayed in red in the **Station address** (code C13899).
- Save changed settings with the device command **C00002/11** (save all parameter sets).

6.4 Initial switch-on

Establishing communication

- To establish communication, the inverter drive must be supplied with mains voltage.
- PROFIBUS communication requires voltage supply of the communication unit.

  If this is requirement is not met, the "CE04: MCI communication error" error message (error No. 01.0127.00002) is output. The error must be reset in the Inverter Drive, so that PROFIBUS communication can be established.
- The external voltage supply serves to maintain PROFIBUS communication if the main supply fails.

  ▶ External voltage supply (📖 26)
- When the mains connection is established, all parameters (codes) and the DIP switch settings are read.
- The settings of the DIP switches determine whether the station address is selected automatically by the PROFIBUS master or via code C13899.

  ▶ Possible settings via DIP switch (📖 29)

7 Data transfer

PROFIBUS master and inverter communicate with each other by exchanging data telegrams via PROFIBUS. The user data area of the data telegram contains parameter data or process data. In the inverter, different communication channels are assigned to the parameter data and process data.

Communication channels

- The process data channel transmits process data.
  - The process data serve to control the inverter.
  - The host (master) can directly access the process data. In the PLC, for instance, the data are directly saved to the I/O area.
  - Process data are not saved in the inverter.
  - Process data are transferred cyclically between the host (master) and the inverters (slaves) (continuous exchange of current input and output data).
  - Process data are e.g. setpoints, actual values, control words, and status words.
  - The Inverter Drive 8400 motec can exchange a maximum of 8 process data words (16 bits/ word) per direction.
  - In addition to the process data, digital and analog input information can also be queried. These signals are set permanently to 2 additional data words which must be parameterised correspondingly in the HW manager.
  - ▶ Digital and analog input information (🕮 38)

Note!

Please observe the direction of the flow of information!

- Process input data (Rx data):
  - Process data from the inverter (slave) to the master
- Process output data (Tx data):
  - Process data from the master to the inverter (slave)

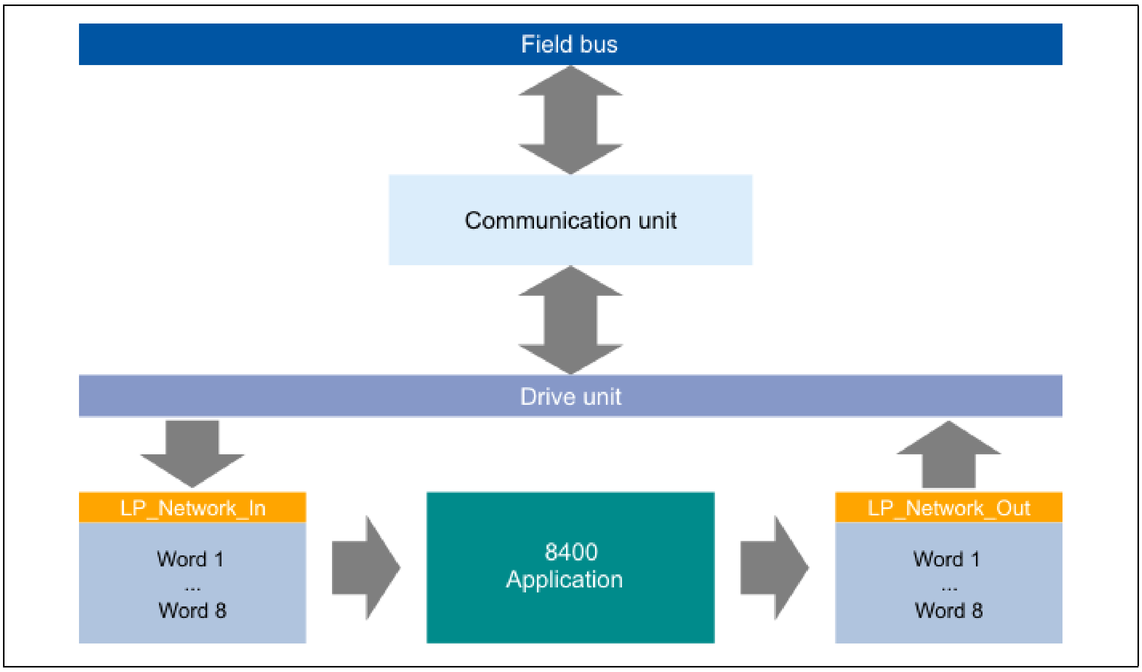
- The parameter data channel serves to transfer parameter data.
  - The parameter data channel provides access to all Lenze codes.
  - The transmission of parameter data is usually not time-critical.
  - Parameter data are, for instance, operating parameters, motor data and diagnostic information.
  - Parameter changes must be stored via code **C00002** of the Inverter Drive 8400 motec.

8 Process data transfer

8.1 Access to process data / PDO mapping

Process data are transferred via the MCI/CAN interface.

- Max. 8 words (16 bits/word) per direction can be exchanged.
- The process data are accessed via the **LP_Network_In** and **LP_Network_Out** port blocks. These port blocks are also called process data channels.
- The port/function blocks of the process data objects (PDO) are interconnected via the Lenze »Engineer«.



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

Software manual / »Engineer« online help for the Inverter Drive 8400 motec

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

8.2 Port interconnection of process data objects (PDO)

Note!

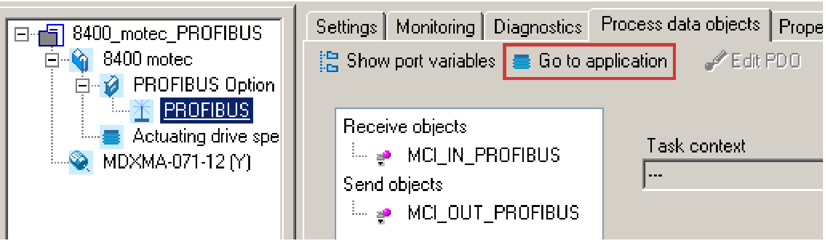
The »Engineer« screenshots shown on the following pages are only examples for the setting sequence and the resulting screens.

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

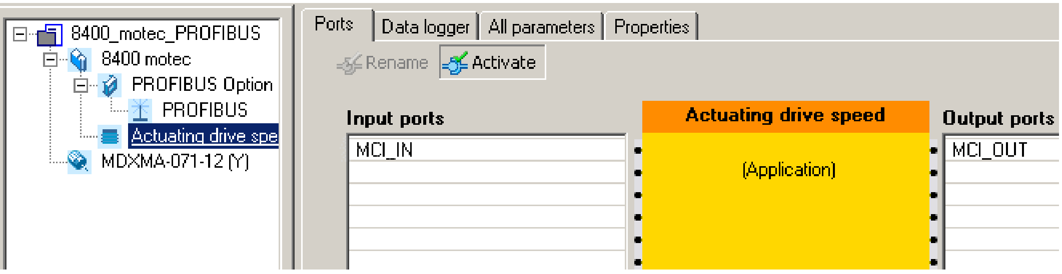
The preconfigured port interconnection of the process data objects is activated by setting code **C00007 = 40: Network (MCI/CAN)**.

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

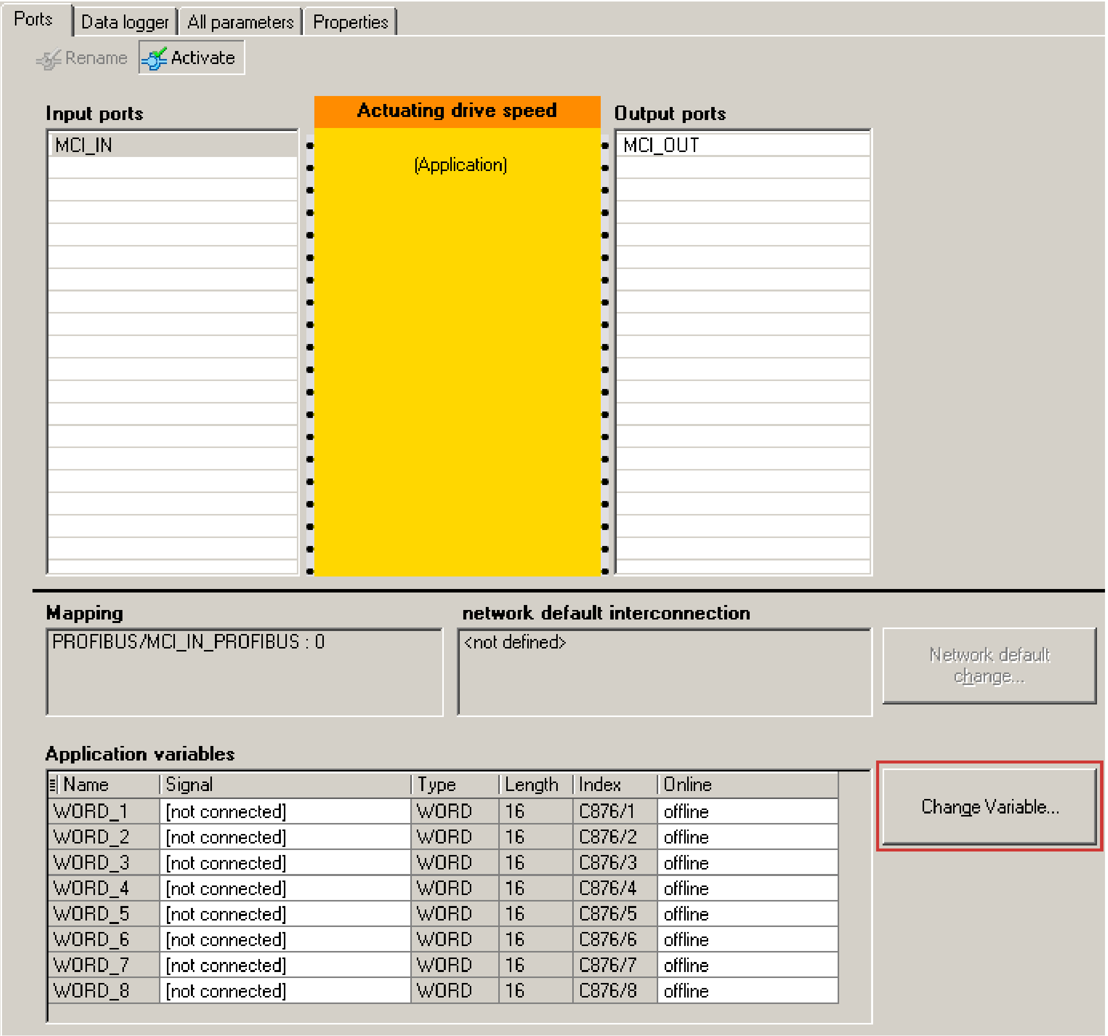
1. Go to the **Process data objects** tab and click **Go to application**.



2. The **Ports** tab displays the port blocks MCI_IN and MCI_OUT.



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



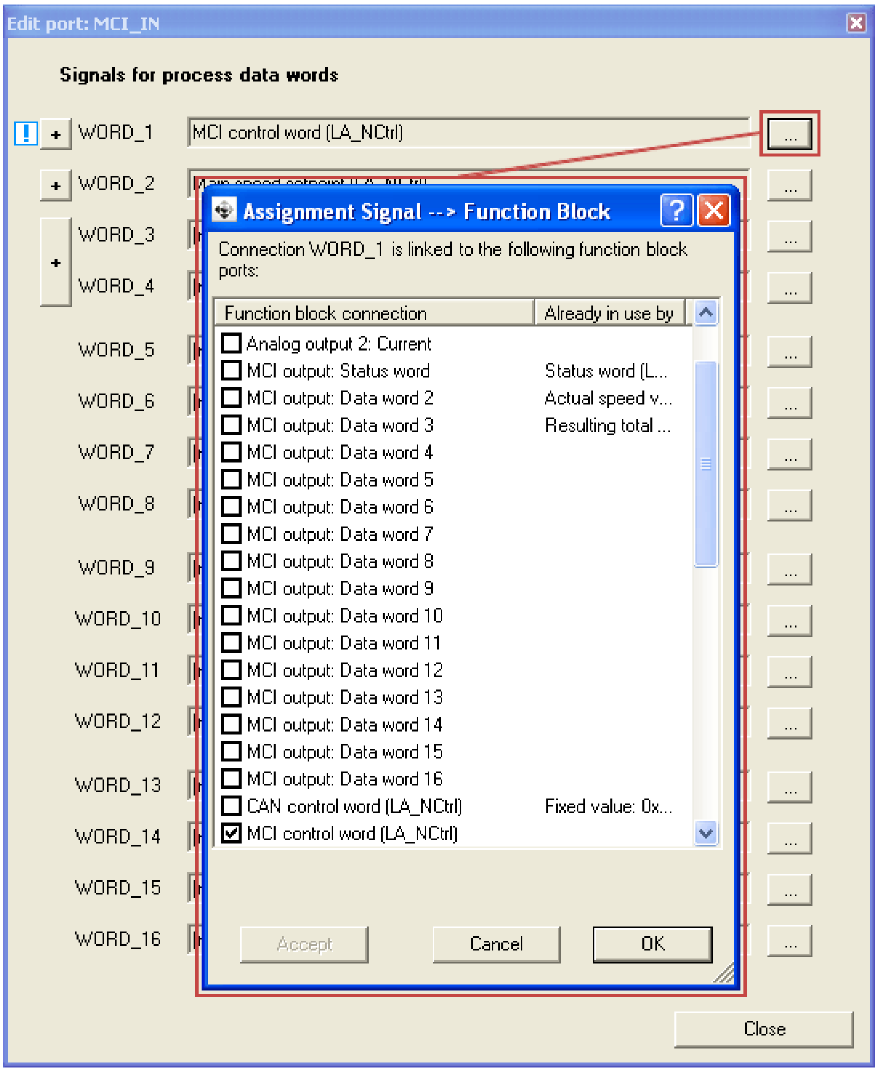
Mapping
PROFIBUS/MCI_IN_PROFIBUS : 0

network default interconnection
<not defined>

Application variables

Name	Signal	Type	Length	Index	Online
WORD_1	[not connected]	WORD	16	C876/1	offline
WORD_2	[not connected]	WORD	16	C876/2	offline
WORD_3	[not connected]	WORD	16	C876/3	offline
WORD_4	[not connected]	WORD	16	C876/4	offline
WORD_5	[not connected]	WORD	16	C876/5	offline
WORD_6	[not connected]	WORD	16	C876/6	offline
WORD_7	[not connected]	WORD	16	C876/7	offline
WORD_8	[not connected]	WORD	16	C876/8	offline

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



Edit port: MCI_IN

Signals for process data words

WORD_1: MCI control word (LA_NCtrl)

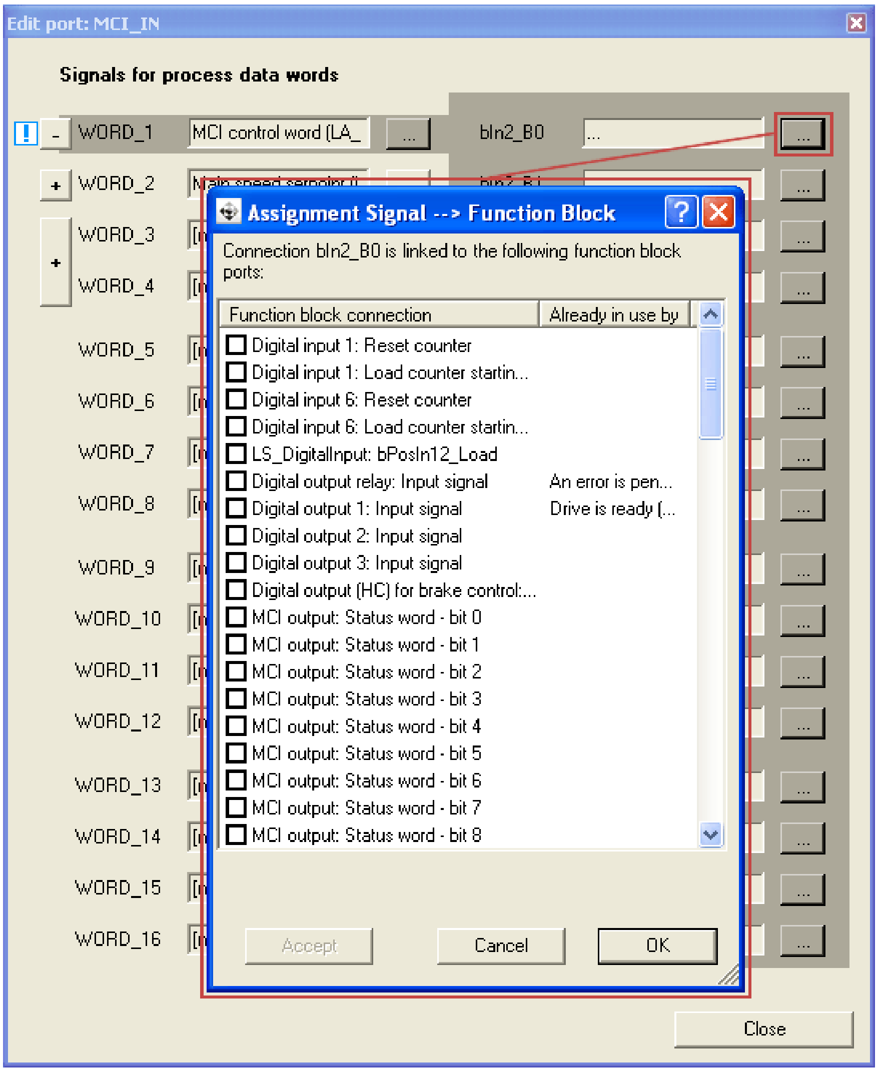
Assignment Signal --> Function Block

Connection WORD_1 is linked to the following function block ports:

Function block connection	Already in use by
☐ Analog output 2: Current	
☐ MCI output: Status word	Status word (L...
☐ MCI output: Data word 2	Actual speed v...
☐ MCI output: Data word 3	Resulting total ...
☐ MCI output: Data word 4	
☐ MCI output: Data word 5	
☐ MCI output: Data word 6	
☐ MCI output: Data word 7	
☐ MCI output: Data word 8	
☐ MCI output: Data word 9	
☐ MCI output: Data word 10	
☐ MCI output: Data word 11	
☐ MCI output: Data word 12	
☐ MCI output: Data word 13	
☐ MCI output: Data word 14	
☐ MCI output: Data word 15	
☐ MCI output: Data word 16	
☐ CAN control word (LA_NCtrl)	Fixed value: 0x...
☑ MCI control word (LA_NCtrl)	

For some process data words, you can also assign signals to the individual bits via the + and ... buttons.

→ Select the signals and then confirm the selection with **OK**.



Connection bIn2_B0 is linked to the following function block ports:

Function block connection	Already in use by
☐ Digital input 1: Reset counter	
☐ Digital input 1: Load counter startin...	
☐ Digital input 6: Reset counter	
☐ Digital input 6: Load counter startin...	
☐ LS_DigitalInput: bPosIn12_Load	
☐ Digital output relay: Input signal	An error is pen...
☐ Digital output 1: Input signal	Drive is ready (...
☐ Digital output 2: Input signal	
☐ Digital output 3: Input signal	
☐ Digital output (HC) for brake control:...	
☐ MCI output: Status word - bit 0	
☐ MCI output: Status word - bit 1	
☐ MCI output: Status word - bit 2	
☐ MCI output: Status word - bit 3	
☐ MCI output: Status word - bit 4	
☐ MCI output: Status word - bit 5	
☐ MCI output: Status word - bit 6	
☐ MCI output: Status word - bit 7	
☐ MCI output: Status word - bit 8	

The current interconnection is only displayed if the following has been set for the control mode in code **C00007 = 40: Network (MCI/CAN)**.

8.3 Digital and analog input information

In addition to the process data, also digital and analog input information can be queried. The signals are stored permanently on 2 additional data words which have to be parameterised correspondingly in the HW manager. These two data words can even be accessed if the mains voltage of the inverter is switched off and only the communication unit is supplied externally with DC 24 V. For all other data words, the mains voltage of the inverter must be switched on.

Word	Bit	Function	Values / states
1	0	Analog input value (0 ... 10 V)	10 V = 1000_{dec} (1111101000_{bin})
	...		
	9		
	10	Digital input 3	0: Closed / not active 1: Open / active
	11	Digital input 4	0: Closed / not active 1: Open / active
	12	Digital input 5	0: Closed / not active 1: Open / active
	13	Reserved	
	14	I/O status	0: I/O data are invalid. 1: I/O data are valid. • For determining the I/O status, the checksums are generated from the I/O data in the master and in the slave (inverter), respectively, and are then compared to each other.
	15	Drive status	0: Inverter is 'offline'. 1: Inverter is 'online'.
2	0	RFR (controller enable)	0: Inverter is enabled. 1: Inverter is not enabled (inhibited).
	1	Digital input 1	0: Closed / not active 1: Open / active
	2	Digital input 2	0: Closed / not active 1: Open / active
	3	Digital input 3	0: Closed / not active 1: Open / active
	4	Digital input 4	0: Closed / not active 1: Open / active
	5	Digital input 5	0: Closed / not active 1: Open / active
	6	Reserved	
	...		
	13		
	14	I/O status	0: I/O data are invalid. 1: I/O data are valid.
	15	Drive status	0: Inverter is 'offline'. 1: Inverter is 'online'.

9 Parameter data transfer

The PROFIBUS communication unit supports the cyclic and acyclic transmission of parameter data:

- Cyclic DP-V0 parameter data are based on the DRIVECOM profile.
  If the DP-V0 parameter data channel is active, it additionally occupies 4 words of the input and output data.
- The acyclic DP-V1 parameter data are based on the PROFIdrive profile (PROFIDrive (DP-V1) in preparation)

9.1 Addressing of the parameter data

The parameter data are addressed via codes which you'll find in a code table in this documentation and in the corresponding documentation of your inverter.

▸ Parameter reference (🕮 79)

Addressing of Lenze parameters

In the case of the DP-V0 parameter data channel, the parameters of a device are not addressed directly via Lenze code numbers, but via indices (bytes 3 + 4) and subindices (byte 2).

- The conversion is made via an offset (24575 / 0x5FFF):
  - PROFIBUS-Index$_{dec}$ = 24575 - Lenze code numbers
  - PROFIBUS-DP index$_{hex}$ = 0x5FFF - Lenze code number$_{hex}$
- Example of C00105 (quick stop deceleration time):
  - PROFIBUS-Index$_{dec}$ = 24575 - 105 = 24470
  - PROFIBUS-DP index$_{hex}$ = 0x5FFF - 0x69 = 0x5F96
- The parameter values are entered into the user data (bytes 5 to 8) of the telegram.

9.2 DRIVECOM parameter data channel (DP-V0)

The DRIVECOM parameter data channel (DP-V0) ...

- enables the parameterisation and diagnostics of the inverter.
- provides access to all Lenze parameters (codes).
- additionally occupies 4 words (16 bits/word) of the input and output data words in the master.
- is identical for both transmission directions.

9.2.1 Telegram structure (overview)

The telegram of the parameter data channel consists of a total of 8 bytes:

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Service	Subindex	Index High byte	Index Low byte	Data 4 / Error 4	Data 3 / Error 3	Data 2 / Error 2	Data 1 / Error 1

The individual bytes are described in detail in the following subchapters.

9.2.2 Byte 1: Service

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Service	Subindex	Index High byte	Index Low byte	Data 4 / Error 4	Data 3 / Error 3	Data 2 / Error 2	Data 1 / Error 1

Request and response control for the parameter data channel

7	6	5	4	3	2	1	0

[9-1] Method of counting for bits 0 ... 7

Bit 0 ... 2: Request	
Read/write request from the master to the inverter	
000	No request
001	Read request ▶ Reading parameter data from the inverter (📖 42)
010	Write request (write data to the inverter) ▶ Reading parameter data from the inverter (📖 42)
100	Data transfer abort by the master ▶ Data transfer abort by the master (📖 43)

Bit 3
Reserved

Bit 4/5: Data length	
Data length ≤ 4 bytes in the telegram bytes 5 ... 8 (data 1 ... 4 / error 1 ... 4)	
00	1 byte
01	2 bytes
10	3 bytes
11	4 bytes

Bit 6: Handshake
Indicates a new request. • The state of this (toggle) bit is changed by the master for every new request. • The inverter copies the bit into its response message.

Bit 7: Status	
Status information from the inverter to the master with the order confirmation. • This status bit informs the master whether the request has been carried out without errors.	
0	Request completed without errors.
1	Request not completed because of an error. • The status bit set indicates that the telegram is an "error telegram". The data of bytes 5 ... 8 (data/error) must be interpreted as an error message. ▶ Error codes (📖 46)

9.2.2.1 Reading parameter data from the inverter

General procedure:

1. Determine the user data area of the inverter, i. e. where is the storage location of the DP user data in the master computer (observe manufacturer-specific details).
2. Enter the address of the required parameter in the "Index" and "Subindex" fields (DP output data).
3. Request in the service byte = read request.
    - The handshake bit in the service byte must be changed (DP output data).
4. Check whether the handshake bit in the service byte is the same for the DP input data and the DP output data.
    - If the handshake bit is the same, the response has been received.
    - It is useful to implement a time monitoring tool.
5. Check whether the status bit in the service byte is set:
    - Status bit is not set: The "Data/Error" field contains the required Parameter value (data) (📖 45).
    - Status bit is set: The read request has not been executed correctly. The "Data/Error" field contains the Error codes (📖 46).

9.2.2.2 Writing parameter data to the inverter

General procedure:

1. Determine the user data area of the inverter, i. e. where is the storage location of the DP user data in the master computer (observe manufacturer-specific details).
2. Enter the address of the required parameter in the "Index" and "Subindex" fields (DP output data).
3. Enter the parameter value in the "Data/Error" field.
4. Request in the service byte = write request.
    - The handshake bit in the service byte must be changed (DP output data).
5. Check whether the handshake bit in the service byte is the same for the DP input data and the DP output data.
    - If the handshake bit is the same, the response has been received.
    - It is useful to implement a time monitoring tool.
6. Check whether the status bit in the service byte is set:
    - Status bit is not set: The write request has been executed correctly.
    - Status bit is set: The write request has not been executed correctly. The "Data/Error" field contains the Error codes (📖 46).

9.2.2.3 Data transfer abort by the inverter

To abort the transfer, the error telegram is used.

- The error telegram is marked by a set status bit in the service byte.
- The telegram can either be the response to an "Initiate Read/Write Service" or to a "Read/Write Segment Service".

Response of the inverter in the event of an error:

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Service	Subindex	Index High byte	Index Low byte	Data 4 / Error 4	Data 3 / Error 3	Data 2 / Error 2	Data 1 / Error 1
1t110000	SIDX	IDXH	IDXL	Error Class	Error code	Additional Code High	Additional Code Low

9.2.2.4 Data transfer abort by the master

The master can use this error telegram to abort a running segment transmission.

- The error telegram is marked by a set status bit in the service byte.
- The service byte also contains the request code "4" (100_{bin}).
- Bit 4 and bit 5 in the service byte (data length) are without meaning.
- Additional information (subindex, index, error information) is not transmitted.

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Service	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved
1txx0100	0	0	0	0	0	0	0

Response of the inverter if no errors occur:

The inverter also acknowledges the error telegram of the master with an error telegram.

- The error telegram is marked by a set status bit in the service byte.
- In the case of correct execution, the telegram contains the error information "0x00000000" in bytes 5 ... 8.
- Additional information (subindex, index) is not transmitted.

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Service	SIDX	IDXH	IDXL	Error Class	Error code	Additional Code High	Additional Code Low
1t110000	0	0	0	0	0	0	0

9.2.3 Byte 2: Subindex

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Service	**Subindex**	Index High byte	Index Low byte	Data 4 / Error 4	Data 3 / Error 3	Data 2 / Error 2	Data 1 / Error 1

Additional addressing via the subindex is required for those codes of the Inverter Drives 8400 motec that contain subcodes (see code table).

9.2.4 Bytes 3 + 4: Index

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Service	Subindex	**Index High byte**	**Index Low byte**	Data 4 / Error 4	Data 3 / Error 3	Data 2 / Error 2	Data 1 / Error 1

The parameter (Lenze code) is selected via these two bytes according to the formula:

- **Index = 24575 - Lenze code number**

(Also see "Addressing of Lenze parameters" (🕮 39))

Example :

The parameter C00105 (quick stop (QSP) deceleration time) is to be addressed:

- Index = 24575 - 105 = 24470 = 0x5F96
- The entries in bytes 3 + 4 for this example would be:

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Service	Subindex	**0x5F**	**0x96**	Data 4 / Error 4	Data 3 / Error 3	Data 2 / Error 2	Data 1 / Error 1

9.2.5 Bytes 5 ... 8: Parameter value / error information

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Service	Subindex	Index High byte	Index Low byte	**Data 4 / Error 4**	**Data 3 / Error 3**	**Data 2 / Error 2**	**Data 1 / Error 1**

The state of status bit 7 in the service byte determines the meaning of this data field:

Status bit	Meaning of bytes 5 ... 8
0	Bytes 5 ... 8 contain the parameter value (data 1 ... 4). ▸ Parameter value (data) (📖 45)
1	Bytes 5 ... 8 contain an error message (error 1 ... 4) due to an invalid access. ▸ Error codes (📖 46)

Parameter value (data)

Note!

Strings or data blocks cannot be transmitted.

Depending on the data format, the length of the parameter value is between 1 and 4 bytes.

- Data are saved in the Motorola format, i.e. first the high byte (high word), then the low byte (low word):

Byte 5	Byte 6	Byte 7	Byte 8
High byte	Low byte	High byte	Low byte
High word		Low word	
Double word			

- Principle for the assignment of bytes 5 ... 8 with parameter values of different lengths:

Byte 5	Byte 6	Byte 7	Byte 8
Parameter value (length 1)	00	00	00
Parameter value (length 2)		00	00
Parameter value (length 4)			

9.2.6 Error codes

The following error messages may appear:

Byte 8	Byte 7	Byte 6	Byte 5	Meaning
Error 1	Error 2	Error 3	Error 4	
0x06	0x03	0x00	0x00	No right to access
0x06	0x05		0x11	Invalid subindex
0x06	0x05		0x12	Data length too large
0x06	0x05		0x13	Data length too small
0x06	0x07		0x00	Object does not exist
0x06	0x08		0x00	Data types do not comply with each other
0x08	0x00		0x00	Request cannot be executed
0x08	0x00		0x20	Request cannot be executed at the moment
0x08	0x00		0x22	Request cannot be executed due to the device status / The parameter can only be changed in the case of a controller inhibit
0x08	0x00		0x30	Out of value range
0x08	0x00		0x31	Parameter value too high
0x08	0x00		0x32	Parameter value too low
0x08	0x00		0x80	Hardware error

9.2.7 Telegram examples

9.2.7.1 Read request: Querying the heatsink temperature

The heatsink temperature of the inverter is to be read.

- Code to be read: C00061
- Heatsink temperature: 43 °C

Byte 1: Service (request)

- Request = 0t110001$_{bin}$
  - Bit 0 ... 2 = 001$_{bin}$ for read request
  - Bit 3 = 0 (reserved)
  - Bit 4/5 = 01$_{bin}$ for 2-byte data length (only relevant for the response telegram)
  - Bit 6 = handshake bit (t ≡ status is changed in the response telegram)
  - Bit 7 = status bit (only relevant for the response telegram)

Byte 2: Subindex

- Subindex = 0 because code C00061 does not contain any subindices.

Bytes 3 + 4: Index

- Index = 24575 - code number = 24575 - 61 = 24514 = 0x5FC2
  - Byte 3 (high byte) = 0x5F
  - Byte 4 (low byte) = 0xC2

Bytes 5 ... 8: Data

- The response telegram contains the value of code C00061:
  - Data 3 + 4 = 43 [°C] x 1 (internal factor) = 43 = 0x002B

Result:

- Request telegram from master to drive:

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Service	Subindex	Index high byte	Index low byte	Data 4	Data 3	Data 2	Data 1
0x01	0x00	0x5F	0xC2	0x00	0x00	0x00	0x00
0t000001$_{bin}$	00000000$_{bin}$	01011111$_{bin}$	11000010$_{bin}$	00000000$_{bin}$	00000000$_{bin}$	00000000$_{bin}$	00000000$_{bin}$
Waiting for change of handshake bit 6 in service byte 1 of the response.							

- Response telegram from drive to master (for correct execution):

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Service	Subindex	Index high byte	Index low byte	Data 4	Data 3	Data 2	Data 1
0x11	0x00	0x5F	0xC2	0x00	0x2B	0x00	0x00
0t010001$_{bin}$	00000000$_{bin}$	01011111$_{bin}$	11000010$_{bin}$	00000000$_{bin}$	00101011$_{bin}$	00000000$_{bin}$	00000000$_{bin}$

9.2.7.2 Write request: Setting the deceleration time for quick stop (QSP)

In the inverter, the deceleration time for quick stop (QSP) is to be set to 50 ms.

- Code to be written: C00105

Byte 1: Service (request)

- Request = $0t110010_{bin}$
  - Bit 0 ... 2 = 010_{bin} for write request
  - Bit 3 = 0 (reserved)
  - Bit 4/5 = 11_{bin} for 4-byte data length
  - Bit 6 = handshake bit (t ≡ status is changed in the response telegram)
  - Bit 7 = status bit (only relevant for the response telegram)

Byte 2: Subindex

- Subindex = 0 because code C00105 does not contain any subindices.

Bytes 3 + 4: Index

- Index = 24575 - code number = 24575 - 105 = 24470 = 0x5F96
  - Byte 3 (high byte) = 0x5F
  - Byte 4 (low byte) = 0x96

Bytes 5 ... 8: Data

- The parameter value of 0.05 s to be set is multiplied by the code-specific factor of "1000" and entered in the user data:
  - Data 1 ... 4 = 0.05 [s] x 1000 (internal factor) = 50 = 0x00000032

Result:

- Request telegram from master to drive:

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Service	Subindex	Index high byte	Index low byte	Data 4	Data 3	Data 2	Data 1
0x72	0x00	0x5F	0x96	0x00	0x00	0x00	0x32
$0t110010_{bin}$	00000000_{bin}	01011111_{bin}	10010110_{bin}	00000000_{bin}	00000000_{bin}	00000000_{bin}	00110010_{bin}
Waiting for change of handshake bit 6 in service byte 1 of the response							

- Response telegram from drive to master (for correct execution):

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Service	Subindex	Index high byte	Index low byte	Data 4	Data 3	Data 2	Data 1
0x40	0x00	0x5F	0x96	0x00	0x00	0x00	0x32
$0t000000_{bin}$	00000000_{bin}	01011111_{bin}	10010110_{bin}	00000000_{bin}	00000000_{bin}	00000000_{bin}	00110010_{bin}

9.3 PROFIdrive parameter data channel (DP-V1)

Data communication with PROFIBUS DP-V0 is characterised by cyclic diagnostics and cyclic process data and parameter data transfer.

An optional service extension is the acyclic parameter data transfer of PROFIBUS DP-V1 (in preparation). This service does not impair the functionality of the standard services under PROFIBUS DP-V0.

PROFIBUS DP-V0 and PROFIBUS DP-V1 can be operated simultaneously in the same network. This enables the step-by-step expansion or modification of a system.

The services of PROFIBUS DP-V1 can be used by the class 1 master (PLC) and the class 2 master (diagnostics master, etc.).

The integration of the acyclic service into the fixed bus cycle depends on the corresponding configuration of the class 1 master:

- With configuration, a time slot is reserved.
- Without configuration the acyclic service is *appended* when a class 2 master acyclically accesses a DP-V1 slave.

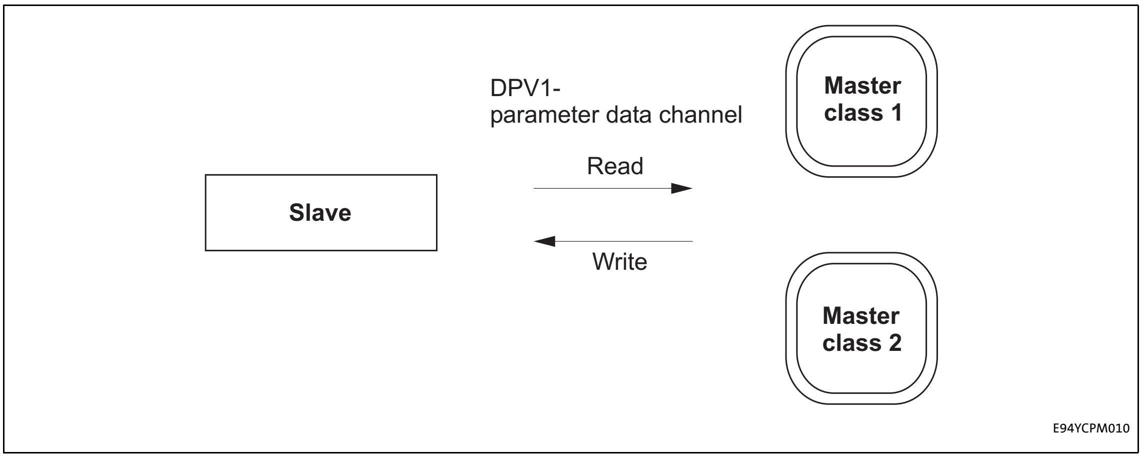
Product features

- Parameter number and subindex addresses with a width of 16 bits each.
- Several parameter requests can be combined to one request (multi-parameter request).
- There is always only one parameter request in process (no pipelining).
- A parameter request/response must fit into a data block (max. 240 bytes). Requests/responses cannot be split into several data blocks.
- No spontaneous messages are transferred.
- There are only acyclic parameter requests.
- Profile-specific parameters can be read independently of the slave state.

9.3.1 Connection establishment between master and slave

A class 1 master can always be used to request parameters from a slave if the slave is in the "Data_Exchange" state.

In addition to the class 1 master, a class 2 master can establish a communication connection to the slave:

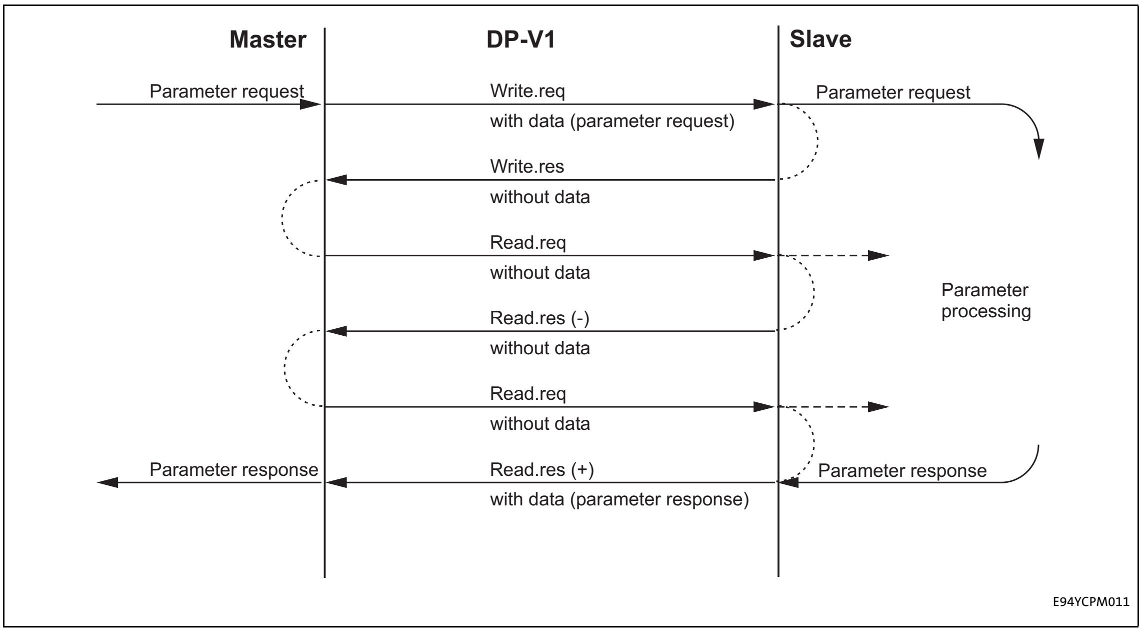


[9-2] Data communication via the DP-V1 parameter data channel

9.3.2 Acyclic data transfer

Note!

A parameter request refers to one or several parameter(s) (multi-parameter request).

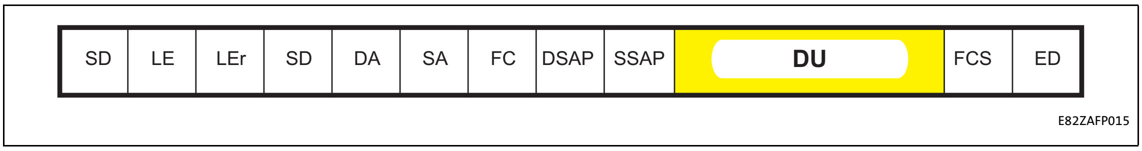


[9-3] Transmission directions

Explanation

- A "Write.req" is used to pass the data set (DB47) to the slave in the form of a parameter request.
- With "Write.res" the master receives the confirmation for the receipt of the message.
- The master requests the response of the slave with "Read.req".
- The slave responds with "Read.res (-)" if processing has not yet been completed.
- After parameter processing, the parameter request is completed by transmitting the parameter response to the master with "Read.res (+)".

9.3.3 Telegram structure



[9-4] PROFIBUS data telegram

The data unit (DU) contains the DP-V1 header and the parameter request or the parameter response.

The following subchapters describe the parameter request and the parameter response in detail.

Note!

The DP-V1 header consists of:

- Function identification
- Slot number
- Data set
- Length of the user data

Please refer to the corresponding PROFIBUS specification for further information on the DP-V1 header.

Assignment of the user data depending on the data type

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

Data type	Length	User data assignment				
		Byte 1	**Byte 2**	**Byte 3**	**Byte 4**	**Byte ...**
String	x bytes	🟨	🟨	🟨	🟨	🟨
U8	1 byte	🟨	00			
U16	2 bytes	High byte	Low byte			
		🟨	🟨			
U32	4 bytes	High word		Low word		
		High byte	Low byte	High byte	Low byte	
		🟨	🟨	🟨	🟨	

9.3.3.1 Reading parameter data from the inverter

Note!

- When a read request is processed, no parameter value is written to the slave.
- In the case of a multi-parameter read request, the parameter attribute, index, and subindex are repeated with the number "n" of the parameters requested.
- A read request must not exceed the maximum data length of 240 bytes.

Request header

Byte 1	Byte 2	Byte 3	Byte 4
Request reference	Request identification	Axis	Number of indices

Field	Data type	Values
Request reference	U8	This value is specified by the master
Request identification	U8	0x01: Request parameters for reading
Axis	U8	0x00 or 0x01
Number of indices	U8	0x"n" (n = number of parameters requested)

Parameter attribute

Byte 5	Byte 6
Attribute	Number of subindices

Field	Data type	Values
Attribute	U8	0x10: Value
Number of subindices	U8	0x00 (For array elements: Enter the number of array elements required.)

Index and subindex

Byte 7	Byte 8	Byte 9	Byte 10
Index		Subindex	
High byte	Low byte	High byte	Low byte

Field	Data type	Values
Index	U16	0x0001 ... 0xFFFF (1 ... 65535)
Subindex	U16	0x0001 ... 0xFFFF (1 ... 65535)

9.3.3.2 Response to a correctly executed read request

Note!

Responses to a read request do not contain parameter attributes, indices and subindices.

Response header

Byte 1	Byte 2	Byte 3	Byte 4
Request reference (mirrored)	Response identification	Axis (mirrored)	Number of indices

Field	Data type	Values
Request reference	U8	Mirrored value of the parameter request
Response identification	U8	0x01: Parameter has been read
Axis	U8	0x00 or 0x01
Number of indices	U8	0x"n" (n = number of parameters requested)

Parameter format

Byte 5	Byte 6
Format	Number of values

Field	Data type	Values
Format	U8	0x02: Integer8 0x03: Integer16 0x04: Integer32 0x05: Unsigned8 0x06: Unsigned16 0x07: Unsigned32 0x09: Visible string 0x0A: Octet string 0x40: Zero 0x41: Byte 0x42: Word 0x43: Double word
Number of values	U8	0x01 or number of requested subindices/parameters (with several subindices/parameters only the parameter value is repeated). In the case of string codes, the number of characters is entered here.

Parameter value

Byte 7	Byte 8	Byte 9	Byte 10
Value			

Field	Data type	Values
Value	String	Any (length > 4 bytes possible)
	U8	0x00 .... 0xFF
	U16	0x0000 .... 0xFFFF
	U32	0x0000 0000 .... 0xFFFF FFFF

9.3.3.3 Response to a read error

Note!

In the case of a multi-parameter request, correct and possible faulty messages are summarised in one telegram. They have the following data contents:

- Correct message:
  - Format: data type of the value requested
  - Number of values: as described in the chapter "Reading parameter data from the inverter" (📖 42).
  - Parameter value: value requested
- Faulty message
  - Format: 0x44
  - Number of values: 0x01 or 0x02
  - Error code without additional information (for number of values = 0x01) or
  - Error code with additional information (for number of values = 0x02)

A faulty access to a parameter "n" is indicated at the nth position in the response telegram of a multi-parameter request.

Response header

Byte 1	Byte 2	Byte 3	Byte 4
Request reference (mirrored)	Response identification	Axis (mirrored)	Number of indices

Field	Data type	Values
Request reference	U8	Mirrored value of the parameter request
Response identification	U8	0x81: Parameter has not been read • The data in the bytes 7 + 8 must be interpreted as an error code.
Axis	U8	0x00 or 0x01
Number of indices	U8	0x"n" (n = number of parameters requested)

Parameter format

Byte 5	Byte 6
Format	Number of values

Field	Data type	Values
Format	U8	0x44: Error
Number of values	U8	0x01: Error code without additional information 0x02: Error code with additional information

Error code

Byte 7	Byte 8	Byte 9	Byte 10
Error code		Additional information (if available)	
High byte	Low byte	High byte	Low byte

Field	Data type	Values
Error code	U16	0x0000 .... 0xFFFF ▸ Error codes (🕮 61)
Additional information (if available)	U16	

9.3.3.4 Writing parameter data to the inverter

Note!

When a multi-parameter write request is transferred, the ...

- Parameter attribute
- Index and subindex

and then the ...

- Parameter format
- Parameter value

... are repeated with the number "n" of the parameters addressed.

A write request must not exceed the maximum data length of 240 bytes.

Request header

Byte 1	Byte 2	Byte 3	Byte 4
Request reference	Request identification	Axis	Number of indices

Field	Data type	Values
Request reference	U8	This value is defined by the master.
Request identification	U8	0x02: Write parameter
Axis	U8	0x00 or 0x01
Number of indices	U8	0x"n" (n = number of parameters addressed)

Parameter attribute

Byte 5	Byte 6
Attribute	Number of subindices

Field	Data type	Values
Attribute	U8	0x10: Value
Number of subindices	U8	0x00 (For array elements: Enter the number of array elements required.)

Index and subindex

Byte 7	Byte 8	Byte 9	Byte 10
Index		Subindex	
High byte	Low byte	High byte	Low byte

Field	Data type	Values
Index	U16	0x0001 ... 0xFFFF (1 ... 65535)
Subindex	U16	0x0001 ... 0xFFFF (1 ... 65535)

Parameter format

Byte 11	Byte 12
Format	Number of values

Field	Data type	Values
Format	U8	0x02: Integer8 0x03: Integer16 0x04: Integer32 0x05: Unsigned8 0x06: Unsigned16 0x07: Unsigned32 0x09: Visible string 0x0A: Octet string 0x40: Zero 0x41: Byte 0x42: Word 0x43: Double word
Number of values	U8	0x01 or number of written subindices/parameters (with several subindices/parameters only the parameter value is repeated). In the case of string codes, the number of characters is entered here.

Parameter value

Byte 13	Byte 14	Byte 15	Byte 16
Value			

Field	Data type	Values
Value	String	Any (length > 4 bytes possible)
	U8	0x00 .... 0xFF
	U16	0x0000 .... 0xFFFF
	U32	0x0000 0000 .... 0xFFFF FFFF

9.3.3.5 Response to a correctly executed write request

Note!

In the case of a multi-parameter request, correct and possible faulty messages are summarised in one frame. They have the following data contents:

- Correct message
  - Format: 0x40
  - Number of values: 0x00
- Faulty message
  - Format: 0x44
  - Number of values: 0x01 or 0x02
  - Error code without additional information (for number of values = 0x01) or with additional information (for number of values = 0x02)

A faulty access to a parameter "n" is indicated at the nth position in the response frame of a multi-parameter request.

Response header

Byte 1	Byte 2	Byte 3	Byte 4
Request reference (mirrored)	Response identification	Axis (mirrored)	Number of indices

Field	Data type	Values
Request reference	U8	Mirrored value of the parameter request
Response identification	U8	0x02: Parameter has been written
Axis	U8	0x00 or 0x01
Number of indices	U8	0xn (n = number of parameters addressed)

9.3.3.6 Response to a write error

Response header

Byte 1	Byte 2	Byte 3	Byte 4
Request reference (mirrored)	Response identification	Axis (mirrored)	Number of indices

Field	Data type	Values
Request reference	U8	Mirrored value of the parameter request
Response identification	U8	0x82: Parameter has not been written • The data in the bytes 7 + 8 must be interpreted as an error code.
Axis	U8	0x00 or 0x01
Number of indices	U8	0x"n" (n = number of parameters addressed)

Parameter format

Byte 5	Byte 6
Format	Number of values

Field	Data type	Values
Format	U8	0x44: Error
Number of values	U8	0x01: Error code without additional information 0x02: Error code with additional information

Error code

Byte 7	Byte 8	Byte 9	Byte 10
Error code		Additional information (if available)	
High byte	Low byte	High byte	Low byte

Field	Data type	Values
Error code	U16	0x0000 .... 0xFFFF ▸ Error codes (🕮 61)
Additional information (if available)	U16	

9.3.4 Error codes

Error code	Description	Explanation	Additional information
0x0000	Impermissible parameter number	Access to unavailable parameter	-
0x0001	Parameter value cannot be changed	Change access to a parameter value that cannot be changed	Subindex
0x0002	Lower or upper value limit exceeded	Change access with value beyond the value limits	Subindex
0x0003	Faulty subindex	Access to unavailable subindex	Subindex
0x0004	No array	Access with subindex to non-indicated parameter	-
0x0005	Wrong data type	Change access with value that does not match the data type of the parameter	-
0x0006	No setting permitted (only resettable)	Change access with value unequal to 0 where this is not permitted	Subindex
0x0007	Description element cannot be changed	Change access to a description element that cannot be changed	Subindex
0x0008	Reserved	(PROFIdrive profile V2: PPO-Write requested in the IR is not available)	-
0x0009	Description data not available	Access to unavailable description (parameter value is available)	-
0x000A	Reserved	(PROFIdrive profile V2: Wrong access group)	-
0x000B	No parameter change rights	Change access without parameter change rights	-
0x000C	Reserved	(PROFIdrive profile V2: Wrong password)	-
0x000D	Reserved	(PROFIdrive profile V2: Text in the cyclic traffic cannot be read)	-
0x000E	Reserved	(PROFIdrive profile V2: Name in the cyclic traffic cannot be read)	-
0x000F	No text array available	Access to unavailable text array (parameter value is available)	-
0x0010	Reserved	(PROFIdrive profile V2: Missing PPO-Write)	-
0x0011	Request cannot be executed due to the operating state	Access is not possible due to temporary reasons not specified here	-
0x0012	Reserved	(PROFIdrive profile V2: Other error)	-
0x0013	Reserved	(PROFIdrive profile V2: date in the cyclic traffic cannot be read)	-
0x0014	Value impermissible	Change access with the value that is inside the value limits but not permissible for other permanent reasons (parameters with defined individual values)	Subindex
0x0015	Response too long	The length of the current response exceeds the maximum transmittable length	-
0x0016	Parameter address impermissible	Impermissible or non-supported value for attribute, number of subindices, parameter number, or subindex, or a combination	-
0x0017	Format impermissible	Write request: Impermissible or non-supported format of parameter data	-
0x0018	Number of values not consistent	Write request: Number of values of the parameter data do not match the number of subindices in the parameter address	-
0x0019	Reserved	-	-
...			
0x0064			

Error code	Description	Explanation	Additional information
0x0065	Manufacturer-specific	-	-
...			
0x00FF			

9.3.5 Telegram examples

9.3.5.1 Read request: Querying the heatsink temperature

The heatsink temperature of the inverter is to be read.

- Code to be read: C00061
- Heatsink temperature: 43 °C

Parameter request

Byte 1	Byte 2	Byte 3	Byte 4
Request reference	Request identification	Axis	Number of indices
0xXX	0x01	0x00	0x01
	Request parameters for reading		

Byte 5	Byte 6
Attribute	Number of subindices
0x10	0x00
Value	No subindex

Byte 7	Byte 8	Byte 9	Byte 10
Index		Subindex	
High byte	Low byte	High byte	Low byte
0x5F	0xC2	0x00	0x00
Index = 24575 - code no. = 24575 - 61 = 24514 = 0x5F C2		No subindex	

Parameter response to a correctly executed read request

Byte 1	Byte 2	Byte 3	Byte 4
Request reference	Response identification	Axis	Number of indices
0xXX	0x01	0x00	0x01
(mirrored)	Parameter has been read	(mirrored)	

Byte 5	Byte 6
Format	Number of values
0x03	0x01
Integer16	1 value

Byte 7	Byte 8
Value	
High byte	Low byte
0x00	0x2B
Value read = 0x 00 2B = 43 x 1 (internal factor) = 43 [°C]	

Parameter response to a read error

Byte 1	Byte 2	Byte 3	Byte 4
Request reference	Response identification	Axis	Number of indices
0xXX	0x81	0x00	0x01
(mirrored)	Parameter has not been read	(mirrored)	

Byte 5	Byte 6
Format	Number of values
0x44	0x01
Error	Error code without additional information

Byte 7	Byte 8
Error code	
High byte	Low byte
For the meaning, see the "Error codes" (🕮 61) chapter	

9.3.5.2 Write request: Setting the deceleration time for quick stop (QSP)

In the inverter, the deceleration time for quick stop (QSP) is to be set to 50 ms.

- Code to be written: C00105

Parameter request

Byte 1	Byte 2	Byte 3	Byte 4
Request reference	Request identification	Axis	Number of indices
0xXX	0x02	0x00	0x01
	Write parameters	Axis 0	1 index

Byte 5	Byte 6
Attribute	Number of subindices
0x10	0x00
Value	No subindex

Byte 7	Byte 8	Byte 9	Byte 10
Index		Subindex	
High byte	Low byte	High byte	Low byte
0x5F	0x96	0x00	0x00
Index = 24575 - code no. = 24575 - 105 = 24470 = 0x5F 96		No subindex	

Byte 11	Byte 12
Format	Number of values
0x43	0x01
Double word	1 value

Byte 13	Byte 14	Byte 15	Byte 16
Value			
High word: high byte	High word: low byte	Low- word: high byte	Low word: low byte
0x00	0x00	0x00	0x32
Value to be written = 0.05 [s] x 1000 (internal factor) = 50 = 0x00 00 00 32			

Parameter response to a correctly executed write request

Byte 1	Byte 2	Byte 3	Byte 4
Request reference	Response identification	Axis	Number of indices
0xXX	0x02	0x00	0x01
(mirrored)	Parameter has been written	(mirrored)	1 index

Parameter response to a read error

Byte 1	Byte 2	Byte 3	Byte 4
Request reference	Response identification	Axis	Number of indices
0xXX	0x82	0x00	0x01
(mirrored)	Parameter has not been written	(mirrored)	1 index

Byte 5	Byte 6
Format	Number of values
0x44	0x01
Error	Error code without additional information

Byte 7	Byte 8
Error code	
High byte	Low byte
For the meaning, see the "Error codes" (📖 61) chapter	

10 Monitoring

10.1 Permanent interruption of PROFIBUS communication

If the PROFIBUS communication is interrupted permanently, e.g. by cable breakage or failure of the PROFIBUS master, no process data are transmitted to the slave being in the "Data_Exchange" state.

After the watchdog monitoring time determined by the PROFIBUS master has expired, the response parameterised in C13880/1 is executed.

The process data are treated according to the setting in C13885. (The data sent last by the master can be used or can be set to zero.)

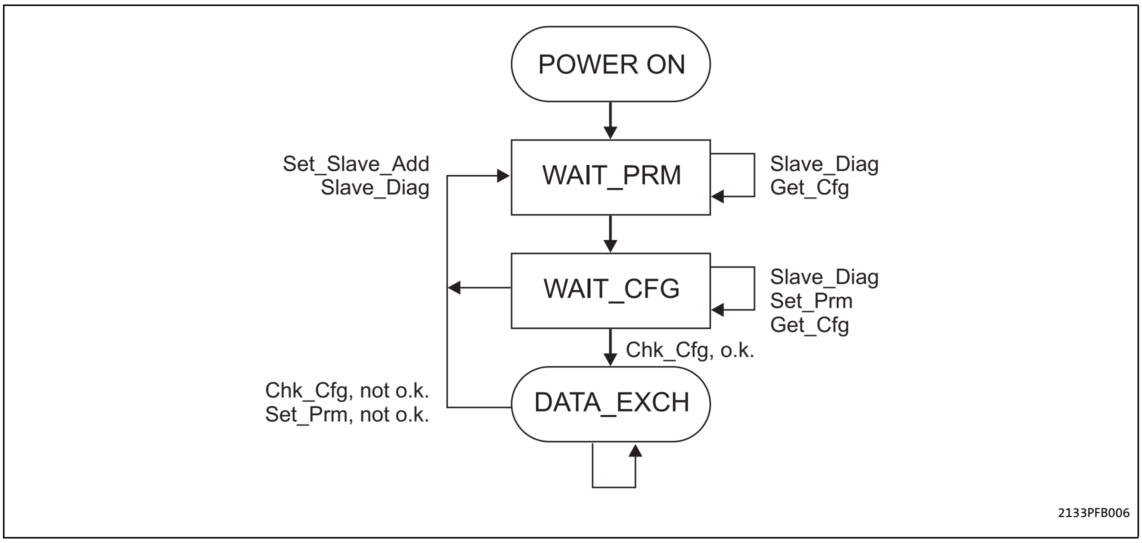
Preconditions for a response of the inverter (slave)

- A monitoring time of 1 ... 65534 ms for the "Data_Exchange" status (C13881) is set.
  A value of "65535 ms" (Lenze setting) deactivates the monitoring.
- A response for the slave is set in C13880/1 (Lenze setting "No response").
- The slave is in the "Data_Exchange" state.
- The watchdog monitoring time is configured correctly in the master.

If one of these preconditions is not met, the response to the absence of cyclic process data telegrams from the master is not executed.

▶ Settings and displays in the »Engineer« (📖 69)

10.2 Short-time interruption of PROFIBUS communication



[10-1] Sequence for short-time interruption of communication

The master detects the communication fault and only after a few microseconds it transfers the slave to the WAIT_PRM state of the DP state machine (see fig. [10-1]).

Only after the state chain of the DP state machine ending in the "Data_Exchange" state (DATA_EXCH) has been passed through, the watchdog monitoring time calculated for the slave (in milliseconds) continues to run.

Note!

The watchdog monitoring time does not continue running if the slave does not reach the "Data_Exchange" state due to repeated communication errors (e.g. caused by loose contact).

Additional monitoring for the data exchange

An additional monitoring function for data exchange is available under code C13881. This monitoring function already becomes active when the "Data_Exchange" state is exited and the parameterised time (0 ... 65535 ms) has expired. The monitoring function then triggers the response parameterised under C13880/1.

Note!

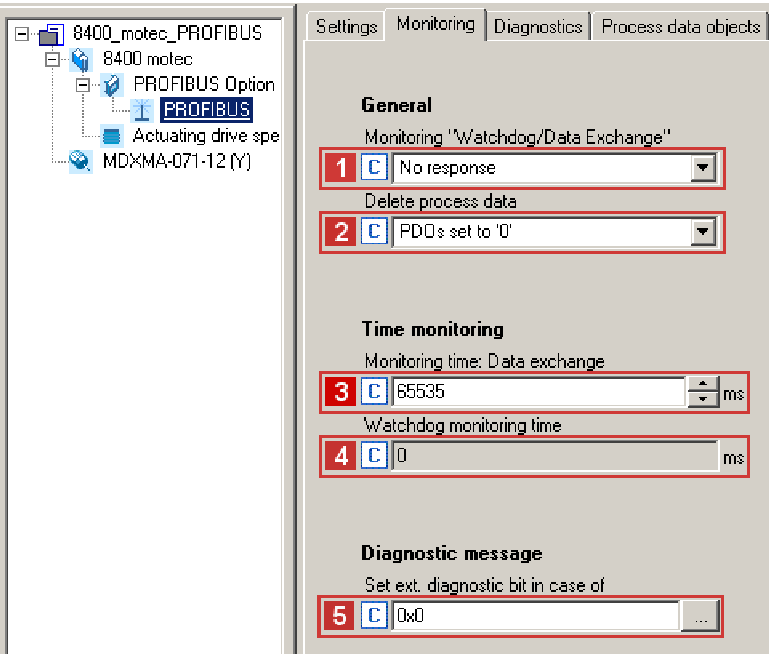
Observe the following condition for the time setting:

Monitoring time for the data exchange (C13881) ≥ watchdog monitoring time of the PROFIBUS (C13882/1).

10.3 Settings and displays in the »Engineer«

For monitoring the PROFIBUS communication, you can set a Lenze-internal monitoring time in the »Engineer« via the **Monitoring** tab 3 (C13881) and a response of the inverter 1 (C13880).

The watchdog monitoring time 4 defined in the PROFIBUS master is displayed in code C13882.



General

Monitoring "Watchdog/Data Exchange"
1 C No response

Delete process data
2 C PDOs set to '0'

Time monitoring

Monitoring time: Data exchange
3 C 65535 ms

Watchdog monitoring time
4 C 0 ms

Diagnostic message

Set ext. diagnostic bit in case of
5 C 0x0 ...

If the inverter does not receive any valid process data in the "Data_Exchange" state, the process data are treated according to the setting in 2 C13885. (In this way, the data sent last by the master can be used or set to zero.)

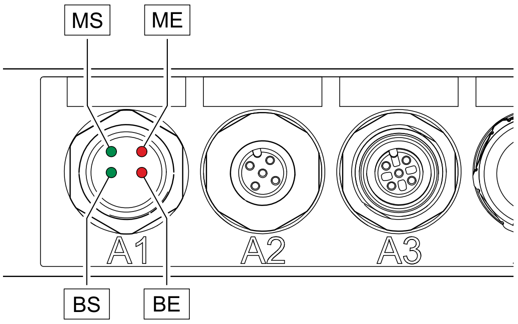
Furthermore you can set the error responses causing the external diagnostic bit ("Diag-Bit") to be set in the inverter 5 (C13886).

11 Diagnostics

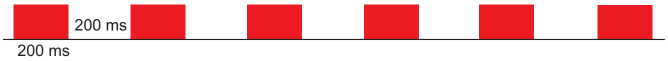
PROFIBUS communication faults can be diagnosed via the LEDs of the communication unit.

Furthermore, the »Engineer« provides some diagnostic information on PROFIBUS.

11.1 LED status displays

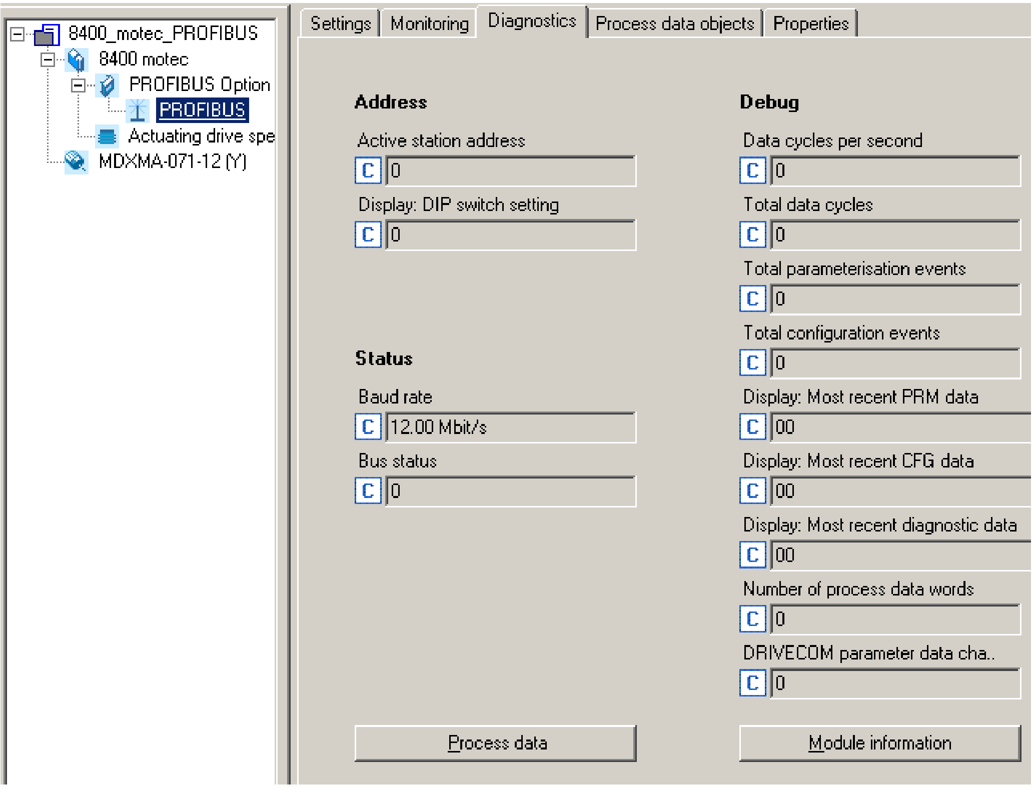


E84DG056

LED	Colour	Status	Description
MS	green	On	🟩 The communication module is supplied with voltage and is connected to the standard device.
		blinking	 The communication module is supplied with voltage, but is not connected to the standard device. (Standard device is switched off, in the initialisation phase, or not available.)
ME	red	On	🟥 An error has occurred in the communication module.
BS	green	Off	The communication module is not active on the fieldbus or is in the "Init" state.
		blinking	 The communication module is in the "Data_Exchange" status.
BE	red	blinking	 Incorrect setting for the station address. The communication module has been initialised and continues to work internally with the respective standard values.
		On	🟥 Bus error/fault is active (e.g. bus cable unplugged).

11.2 Diagnostics with the »Engineer«

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



Address

Active station address: C 0

Display: DIP switch setting: C 0

Status

Baud rate: C 12.00 Mbit/s

Bus status: C 0

Debug

Data cycles per second: C 0

Total data cycles: C 0

Total parameterisation events: C 0

Total configuration events: C 0

Display: Most recent PRM data: C 00

Display: Most recent CFG data: C 00

Display: Most recent diagnostic data: C 00

Number of process data words: C 0

DRIVECOM parameter data cha..: C 0

11.3 Querying the current bus status

Code C13861 displays the current PROFIBUS status in a bit-coded form:

Bit assignment				**Description**	
Bit 3	**Bit 2**	**Bit 1**	**Bit 0**	Reserved	
		Bit 5	**Bit 4**	**State of the DP state machine (DP-STATE)**	
		0	0	WAIT_PRM	The slave waits for a parameter data telegram after acceleration. Other types of telegrams will not be processed. Data exchange is not yet possible.
		0	1	WAIT_CFG	The slave waits for the configuration telegram that specifies the number of input and output bytes. The master informs the slave about the number of I/O bytes that will be transferred.
		1	0	DATA_EX	If the parameter settings and the configuration have been accepted by the firmware and by the application, the slave state changes to "Data_Exchange" (exchange of user data with the master).
		1	1	Not possible	
		Bit 7	**Bit 6**	**State of the Watchdog-State-Machine (WD-STATE)**	
		0	0	BAUD_SEARCH	The slave is able to recognise the baud rate automatically.
		0	1	BAUD_CONTROL	After recognising the correct baud rate, the slave status changes to BAUD_CONTROL, and the baud rate is monitored.
		1	0	DP_CONTROL	The DP_CONTROL state serves for response monitoring of the master.
		1	1	Not possible	
Bit 11	**Bit 10**	**Bit 9**	**Bit 8**	**Recognised PROFIBUS baud rate**	
0	0	0	0	12 Mbps	
0	0	0	1	6 Mbps	
0	0	1	0	3 Mbps	
0	0	1	1	1.5 Mbps	
0	1	0	0	500 kbps	
0	1	0	1	187.5 kbps	
0	1	1	0	93.75 kbps	
0	1	1	1	45.45 kbps	
1	0	0	0	19.2 kbps	
1	0	0	1	9.6 kbps	
Bit 15	**Bit 14**	**Bit 13**	**Bit 12**	Reserved	

11.4 Diagnostic data

- Present diagnostic data are signalled to the master by the PROFIBUS slave via an alarm message.
- Errors and warnings of the inverter are sent to the master as extended diagnostic messages.

General structure of diagnostic messages

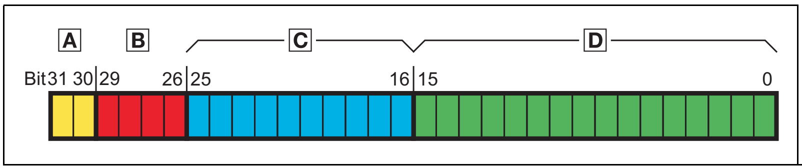
Byte	Description
1	Bit 0: Station does not exist (set by the master). Bit 1: Slave is not ready for data exchange. Bit 2: Configuration data do not correspond. Bit 3: Slave has extended diagnostic data. Bit 4: Requested function is not supported by the slave. Bit 5: Slave response is invalid (set by the master) Bit 6: Incorrect parameter setting Bit 7: Slave has been parameterised by another master (set by the master).
2	Bit 0: Slave must be parameterised again. Bit 1: Static diagnostics Bit 2: Permanently set to "1". Bit 3: Watchdog active Bit 4: Freeze command received. Bit 5: Sync command received. Bit 6: Reserved Bit 7: Slave is deactivated (set by the master).
3	Bit 7: Diagnostics overflow - amount of diagnostic information present in the slave is too large to fit into one telegram.
4	Bits 0 ... 7: Master address after parameterisation ("0xFF" without parameterisation)
5	Bits 0 ... 7: ID number (high byte)
6	Bits 0 ... 7: ID number (low byte)
7	header • The header contains the block length of the advanced diagnostics including the header byte. • In this case, the value of the entry is "0x0A" (bytes 7 ... 16 = 10 bytes).

8	Status_Type
	• The value of this entry is fixed. For the following bit assignment it is "0x81":
	  • Bit 7 = 1: "status"
	  • Bit 0 = 1: "status message"
	  • Value of all other bits = 0

9	Slot_Number • The value of the slot number is "0x00".
10	Specifier • An indicated error is entered in the specifier with the identification "0x1" (status coming). • An eliminated error is entered in the specifier with the identification "0x02" (status going). • If no errors are indicated, the entry in the specifier has the value "0x00" (no further differentiation).
11	Reserved
12	
13 ... 16	Error code of the inverter

Error code of the Inverter Drive 8400 motec

If an error occurs in the inverter, a 32-bit value is stored in the error format in the logbook, composed of the following information:



A Reserved
B Error type
C Error subject area
D Error ID

[11-1] Structure of the error number

- Bytes 13 ... 16 of the diagnostic message contain the error code of the inverter.
- In the logbook and in code **C00165**, the error number is shown in the following syntax in order to facilitate the readability:
  [error type].[error subject area no.].[error ID]

Software manual/»Engineer« online help for Inverter Drives 8400 motec
Here you'll find detailed information on the structure and contents of the error codes.

Example: Error "Short circuit (OC1)"

Byte	Value [hex]	Description
1	x	Standard data (PRM_Fault)
...		
6		
7	0A	Block length of the advanced diagnostics = 10 bytes
8	81	Status message
9	00	Slot 0
10	01	Status coming
11	00	
12	00	
13	0B	Error message 0x11C4000B ("Short circuit (OC1)") • Error type: "Warning locked" • Subject area: 0x11C4 (current) • Error ID: 0x000B Thus, the error number "0x11C4000B" means: An overcurrent has been detected in the "current" subject area causing a "Warning locked" error response which must be unlocked after the error has been removed.
14	00	
15	C4	
16	11	

12 Error messages

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

Software manual/»Engineer« online help for the Inverter Drive 8400 motec

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

12.1 Short overview of the PROFIBUS error messages

The following table lists all PROFIBUS error messages in the numerical order of the error numbers. Furthermore, the preset error response and - if available - the parameter for setting the error response are specified.

Tip!

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

Error number			Error text	Error type	Adjustable in
hex	dec (Subject area no.)	dec (Error no.)			
0x01bc3100	444	12544	Connection to 8400 standard device lost	1: No Response	C01501/2
0x01bc5531	444	21809	Memory: No access	1: No Response	C01501/2
0x01bc5532	444	21810	Memory. Read error	1: No Response	C01501/2
0x01bc5533	444	21811	Memory. Write error (nt14: COM fault 14)	1: No Response	C01501/2
0x01bc6010	444	24592	Restart after watchdog reset	1: No Response	C01501/2
0x01bc6011	444	24593	Internal error	1: No Response	C01501/2
0x01bc6100	444	24832	Internal error	1: No Response	C01501/2
0x01bc6101	444	24833	Internal error	1: No Response	C01501/2
0x01bc6110	444	24848	Internal error (nt15: COM fault 15)	1: No Response	
0x01bc641f	444	25631	Invalid parameter set	1: No Response	C01501/2
0x01bc6420	444	25632	Error: Lenze settings loaded	1: No Response	
0x01bc8130	444	33072	Profibus Watchdog: Monitoring time elapsed (nt03: COM fault 3)	0: No Response	C13880/1
0x01bc8131	444	33073	Profibus: State Data_Exchange left (nt04: COM fault 4)	0: No Response	C13880/1
0x01bc8132	444	33074	Profibus Watchdog: DP-V1 MSC2 monitoring time exceeded (nt05: COM fault 5)	0: No Response	C13880/1

12.2 Possible causes and remedies

This chapter lists all PROFIBUS error messages in the numerical order of the error numbers. Possible causes and remedies as well as responses to the error messages are described in detail.

Connection to 8400 standard device lost [0x01bc3100]

Response (Lenze setting printed in bold)	**Setting:** C01501/2 (☑ Adjustable response)
☑ None ☐ System fault ☒ **Fault** ☐ Trouble ☐ Quick stop by trouble ☑ Warning locked ☐ warning ☐ Information	

Cause	Remedy
• The Communication Unit is supplied with external voltage, but the Inverter Drive 8400 motec is not supplied with voltage. • The Communication Unit is not connected correctly to the Drive Unit.	• Switch off and on again the voltage supply of the Inverter Drive 8400 motec. • Check wiring and terminals. • Check internal plug connection between Communication Unit and Drive Unit. For this purpose, the Inverter Drive 8400 motec must be unscrewed. Please observe the information in the mounting instructions of the Communication Unit and the Drive Unit! • If this error continues to occur, please contact the Lenze Service. (if required, the Communication Unit must be replaced.)

Memory: No access [0x01bc5531]

Response (Lenze setting printed in bold)	**Setting:** C01501/2 (☑ Adjustable response)
☑ None ☐ System fault ☒ **Fault** ☐ Trouble ☐ Quick stop by trouble ☑ Warning locked ☐ warning ☐ Information	

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

Memory. Read error [0x01bc5532]

Response (Lenze setting printed in bold)	**Setting:** C01501/2 (☑ Adjustable response)
☑ None ☐ System fault ☒ **Fault** ☐ Trouble ☐ Quick stop by trouble ☑ Warning locked ☐ warning ☐ Information	

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

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

Response (Lenze setting printed in bold)	**Setting:** C01501/2 (☑ Adjustable response)
☑ None ☐ System fault ☒ **Fault** ☐ Trouble ☐ Quick stop by trouble ☑ Warning locked ☐ warning ☐ Information	

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

Restart by watchdog reset [0x01bc6010]

Response (Lenze setting printed in bold)	**Setting:** C01501/2 (☑ Adjustable response)
☑ None ☐ System fault ☒ **Fault** ☐ Trouble ☐ Quick stop by trouble ☑ Warning locked ☐ warning ☐ Information	

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

Internal error [0x01bc6011]

Response (Lenze setting printed in bold)	**Setting:** C01501/2 (☑ Adjustable response)
☑ None ☐ System fault ☒ **Fault** ☐ Trouble ☐ Quick stop by trouble ☑ Warning locked ☐ warning ☐ Information	

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

Internal error [0x01bc6100]

Response (Lenze setting printed in bold)	**Setting:** C01501/2 (☑ Adjustable response)
☑ None ☐ System fault ☒ **Fault** ☐ Trouble ☐ Quick stop by trouble ☑ Warning locked ☐ warning ☐ Information	

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

Internal error [0x01bc6101]

Response (Lenze setting printed in bold)	**Setting:** C01501/2 (☑ Adjustable response)
☑ None ☐ System fault ☒ **Fault** ☐ Trouble ☐ Quick stop by trouble ☑ Warning locked ☐ warning ☐ Information	

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

Internal error [0x01bc6110] (nt15: COM fault 15)

Response (Lenze setting printed in bold)	**Setting:** not possible
☐ None ☐ System fault ☒ **Fault** ☐ Trouble ☐ Quick stop by trouble ☐ Warning locked ☐ warning ☐ Information	

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

Invalid parameter record [0x01bc641f]

Response (Lenze setting printed in bold)	**Setting:** C01501/2 (☑ Adjustable response)
☑ None ☐ System fault ☒ **Fault** ☐ Trouble ☐ Quick stop by trouble ☑ Warning locked ☐ warning ☐ Information	

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

Error: Lenze settings loaded [0x01bc6420]

Response (Lenze setting printed in bold)	**Setting:** not possible
☐ None ☐ System fault ☒ **Fault** ☐ Trouble ☐ Quick stop by trouble ☐ Warning locked ☐ warning ☐ Information	

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

Profibus watchdog: monitoring time exceeded [0x01bc8130] (nt03: COM fault 3)

Response (Lenze setting printed in bold)	**Setting:** C13880/1 (☑ adjustable response)
☒ **None** ☐ System fault ☑ Fault ☐ Trouble ☑ Quick stop by trouble ☑ Warning locked ☐ Warning ☑ Information	

Cause	Remedy
Permanent interruption of communication to PROFIBUS master. • Also see the chapter "Permanent interruption of PROFIBUS communication" (🕮 67).	Check cables and terminals. **Note:** We recommend to set "Warning locked" for the response (no drive-relevant response).

Profibus: Data_Exchange status exited [0x01bc8131] (nt04: COM fault 4)

Response (Lenze setting printed in bold)	**Setting:** C13880/1 (☑ adjustable response)
☒ **None** ☐ System fault ☑ Fault ☐ Trouble ☑ Quick stop by trouble ☑ Warning locked ☐ Warning ☑ Information	

Cause	Remedy
Data exchange via PROFIBUS has been stopped. • Also see the chapter "Permanent interruption of PROFIBUS communication" (🕮 67).	Check cables and terminals. The slave must receive new parameterisation and configuration files from the master in order to be able to exchange data again.

Profibus Watchdog: DP-V1 MSC2 monitoring time exceeded [0x01bc8132] (nt05: COM fault 5)

Response (Lenze setting printed in bold)	**Setting:** C13880/1 (☑ adjustable response)
☒ **None** ☐ System fault ☑ Fault ☐ Trouble ☑ Quick stop by trouble ☑ Warning locked ☐ Warning ☑ Information	

Cause	Remedy
Permanent interruption of communication to PROFIBUS master. • Also see the chapter "Permanent interruption of PROFIBUS communication" (🕮 67).	Check cables and terminals. **Note:** We recommend to set "Warning locked" for the response (no drive-relevant response).

13 Parameter reference

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

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

13.1 Communication-relevant parameters of the operating system

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

C01501

Parameter | Name: **C01501 | Response in case of communication fault with MCI**		Data type: UNSIGNED_8 Index: $23074_d = 5A22_h$
Configuration of monitoring functions for the Communication Unit		
Selection list		
0	No response	
1	Error	
4	Warning Locked	
Subcodes	**Lenze setting**	**Info**
C01501/1	1: Fault	Resp. to MCI fault 1 • Response to a communication fault.
C01501/2	1: Fault	Resp. to MCI fault 2 • Response to an incompatible communication unit.
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 1		

C01503

Parameter | Name: **C01503 | MCI timeout**			Data type: UNSIGNED_16 Index: $23072_d = 5A20_h$
Setting range **(min. value | unit | max. value)**			
0	ms	1000	
Subcodes	**Lenze setting**		**Info**
C01503/1	200 ms		MCI timeout
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 1			

13.2 Parameters relevant for PROFIBUS communication

This chapter lists the PROFIBUS parameters of the communication unit in numerically ascending order.

C13850

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

Display of the process data words transferred from the communication unit to the PROFIBUS master.
In the subcodes 1 ... 8, all process data words to the master are displayed. However, only the configured process data words are valid.

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

Subcodes	**Info**
C13850/1	Word 1 to master
...	...
C13850/8	Word 8 to master

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

C13851

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

Display of the process data words transferred from the PROFIBUS master to the communication unit.
In the subcodes 1 ... 8, all process data words from the master are displayed. However, only the configured process data words are valid.

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

Subcodes	**Info**
C13851/1	Word 1 from master
...	...
C13851/8	Word 8 from master

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

C13852

Parameter | Name: **C13852 | All words to standard device**	Data type: UNSIGNED_16 Index: $10723_d = 29E3_h$

Display of process data words 1 ... 8 which are transmitted from the communication unit to the drive unit.
Subcodes 1 ... 8 display all the process data words from the communication unit.

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

Subcodes	**Info**
C13852/1	Word 1 to drive unit
...	...
C13852/8	Word 8 to drive unit

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

C13853

Parameter | Name: **C13853 | All words from standard device**			Data type: UNSIGNED_16 Index: 10722_d = $29E2_h$
Display of process data words 1 ... 8 which are transmitted from the drive unit to the communication unit. Subcodes 1 ... 8 display all the process data words from the drive unit.			
Display range **(min. value | unit | max. value)**			
0		65535	
Subcodes			**Info**
C13853/1			Word 1 from drive unit
...			...
C13853/8			Word 8 from drive unit
☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT			

C13860

Parameter | Name: **C13860 | Settings**			Data type: UNSIGNED_8 Index: 10715_d = $29DB_h$
Display of the current configuration data.			
Display range **(min. value | unit | max. value)**			
0		255	
Subcodes			**Info**
C13860/1			Reserved
C13860/2			Number of process data words • 1 ... 8 words
C13860/3			DRIVECOM parameter data channel • 0: Not active • 1: Active
C13860/4			Reserved
☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT			

C13861

Parameter | Name: **C13861 | Bus status**			Data type: UNSIGNED_16 Index: 10714_d = $29DA_h$
Bit-coded display of the current bus state. ▸ Querying the current bus status (🕮 72)			
Display range **(min. value | unit | max. value)**			
0		65535	
☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT			

C13862

Parameter | Name: **C13862 | Bus counter**			Data type: UNSIGNED_16 Index: 10713_d = $29D9_h$
When the maximum count value of 65535 is reached, the counter starts again with 0.			
Display range (min. value | unit | max. value)			
0		65535	
Subcodes			**Info**
C13862/1			Data cycles per second
C13862/2			Total data cycles
C13862/3			Total parameterisation events
C13862/4			Total configuration events
☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT			

C13863

Parameter | Name: **C13863 | Baud rate**		Data type: UNSIGNED_8 Index: 10712_d = $29D8_h$
Display of the baud rate		
Selection list (read only)		
0	12.00 Mbps	
1	6.00 Mbps	
2	3.00 Mbps	
3	1.50 Mbps	
4	500.00 kbps	
5	187.50 kbps	
6	93.75 kbps	
7	45.45 kbps	
8	19.20 kbps	
9	9.60 kbps	
☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT		

C13864

Parameter | Name: **C13864 | Active station address**			Data type: UNSIGNED_8 Index: 10711_d = $29D7_h$
Display of the active station address ▸ Setting the station address (🕮 30)			
Display range (min. value | unit | max. value)			
0		255	
☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT			

C13865

Parameter | Name: **C13865 | Display: Most recent PRM data**	Data type: OCTET_STRING Index: 10710_d = $29D6_h$
Display of the last parameter data sent by the PROFIBUS master with the "Set-Prm" telegram (ASCII string with 24 characters)	
☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT	

C13866

<table>
<tr><td colspan="3">Parameter | Name:
C13866 | Display: Most recent CFG data</td><td>Data type: OCTET_STRING
Index: $10709_d = 29D5_h$</td></tr>
<tr><td colspan="4">Display of the last configuration data sent by the PROFIBUS master with the "Chk-Cfg" telegram (ASCII string with 22 characters)</td></tr>
<tr><td colspan="4">☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT</td></tr>
</table>

C13867

<table>
<tr><td colspan="3">Parameter | Name:
C13867 | Display: Most recent diagnostic data</td><td>Data type: OCTET_STRING
Index: $10708_d = 29D4_h$</td></tr>
<tr><td colspan="4">Display of the last diagnostic data sent to the PROFIBUS master (ASCII string with 16 characters)</td></tr>
<tr><td colspan="4">☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT</td></tr>
</table>

C13880

<table>
<tr><td colspan="3">Parameter | Name:
C13880 | Reaction on communication failure</td><td>Data type: UNSIGNED_8
Index: $10695_d = 29C7_h$</td></tr>
<tr><td colspan="4">Monitoring response to a communication fault on the PROFIBUS
• A change in the monitoring response becomes immediately effective.
▸ Permanent interruption of PROFIBUS communication (📖 67)</td></tr>
<tr><td colspan="2">**Selection list**</td><td colspan="2" rowspan="4"></td></tr>
<tr><td>0</td><td>No response</td></tr>
<tr><td>1</td><td>Error</td></tr>
<tr><td>4</td><td>Warning Locked</td></tr>
<tr><td>**Subcodes**</td><td>**Lenze setting**</td><td colspan="2">**Info**</td></tr>
<tr><td>C13880/1</td><td>0: No Response</td><td colspan="2">The response set here for the "watchdog/data exchange" monitoring is executed if the bus station ...
• does not receive any message from the master within the watchdog monitoring time (with an active connection, it is displayed in C13882/1 / C13882/2).
• detects that it is no longer in the "Data_Exchange" status. Please see also the notes given under C13881.</td></tr>
<tr><td colspan="4">☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT</td></tr>
</table>

C13881

<table>
<tr><td colspan="3">Parameter | Name:
C13881 | Monitoring time: Data exchange</td><td>Data type: UNSIGNED_16
Index: $10694_d = 29C6_h$</td></tr>
<tr><td colspan="4">If the "Data_Exchange" state has been exited, the response parameterised with C13880/1 is carried out when the monitoring time set here for the data exchange has expired.
• A value of "65535" in this code deactivates the monitoring function.
• A change of monitoring will be effective immediately.
• Recommendation: The monitoring time set here should be longer than the watchdog monitoring time (displayed in C13882/1 / C13882/2).
▸ Permanent interruption of PROFIBUS communication (📖 67)</td></tr>
<tr><td colspan="3">**Setting range** **(min. value | unit | max. value)**</td><td>**Lenze setting**</td></tr>
<tr><td>0</td><td>ms</td><td>65535</td><td>**65535 ms**</td></tr>
<tr><td colspan="4">☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT</td></tr>
</table>

C13882

Parameter | Name: **C13882 | Monitoring time: Watchdog**			Data type: UNSIGNED_32 Index: 10693_d = $29C5_h$
Display of the watchdog monitoring time determined by the PROFIBUS master • Monitoring starts with the receipt of the first telegram. • When a value of "0" is displayed, the monitoring function is deactivated. • A change in the watchdog monitoring time in the master will become effective immediately. ▸ Permanent interruption of PROFIBUS communication (📖 67)			
Display range **(min. value | unit | max. value)**			
0	ms	4294967295	
Subcodes			**Info**
C13882/1			Watchdog monitoring time
C13882/2			DP-V1 MSAC2
☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT			

C13885

Parameter | Name: **C13885 | Delete process data**		Data type: UNSIGNED_8 Index: 10690_d = $29C2_h$
Setting of the process data which are to be further processed by the inverter for maintaining internal communication if the PROFIBUS has failed.		
Selection list **(Lenze setting printed in bold)**		
0	Use of most recent master PDOs	
1	**PDOs are set to the value 0'**	
☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT		

C13886

Parameter | Name: **C13886 | Set ext. diagnostic bit in case of**		Data type: BITFIELD_8 Index: 10689_d = $29C1_h$
Bit-coded selection of the error responses in the drive unit causing the external diagnostic bit ("diag bit") to be set (see PROFIBUS specification; bit 3 of byte 1 of the DP diagnostic messages). • The diagnostic bit is sent to the PROFIBUS master by the communication unit and is evaluated separately there. • The diagnostic bit is always set when a system error or an error message by the safety module occurs. • The Lenze setting "0" means that the diagnostic bit is not set for the following error responses.		
Value is bit-coded:		
Bit 0	Error	
Bit 1	Reserved	
Bit 2	Reserved	
Bit 3	Warning Locked	
Bit 4	Reserved	
...	...	
Bit 7	Reserved	
☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT		

C13887

Parameter | Name: **C13887 | Suppress signalling diag. mess.**		Data type: BITFIELD_8 Index: 10688_d = $29C0_h$
From version 02.00 Bit coded selection of the error responses in the drive unit, at which diagnostic signalling is suppressed.		
Value is bit-coded:		**Info**
Bit 0	Error	
Bit 1	Fault	
Bit 2	Reserved	
Bit 3	Warning Locked	
Bit 4	Reserved	
...	...	
Bit 7	Reserved	
☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT		

C13899

Parameter | Name: **C13899 | Station address**			Data type: UNSIGNED_8 Index: 10676_d = $29B4_h$
Optional setting of the station address (instead of setting via DIP switches 1 ... 64) • The station address set here only becomes effective if the DIP switch **S has been set to ON** and the DIP switches **1 ... 64 have been set to OFF** prior to power-on. • The active station address is displayed under C13864. • A change in the station address will only be effective after the parameter set has been stored and if the mains of the communication unit or the inverter has been switched again subsequently. ▶ Setting the station address (📖 30)			
Setting range **(min. value | unit | max. value)**			**Lenze setting**
3		126	**3**
☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☑ COM ☐ MOT			

C13900

Parameter | Name: **C13900 | Firmware product type**	Data type: VISIBLE_STRING Index: 10675_d = $29B3_h$
Display of the product type (string with a length of 8 bytes) • The following identification code is displayed: "E84DGFCP".	
☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT	

C13901

Parameter | Name: **C13901 | Firmware compilation date**	Data type: VISIBLE_STRING Index: 10674_d = $29B2_h$
Display of the compilation date of the firmware (string with a length of 20 bytes) • The date ("MMM DD YYYY") and time ("hh:mm:ss") are output, e.g. "Mar 21 2005 12:31:21".	
☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT	

C13902

Parameter | Name: **C13902 | Firmware version**	Data type: VISIBLE_STRING Index: 10673_d = $29B1_h$
Display of the firmware version (string with a length of 5 bytes) • An identification code is displayed, e.g. "00.80".	
☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT	

C13920

Parameter | Name: **C13920 | Display: DIP switch setting**			Data type: UNSIGNED_8 Index: 10655$_d$ = 299F$_h$
Display of the current DIP switch setting • The displayed value corresponds to the sum of the individual DIP switch values 1 ... 64. • The active station address is displayed under C13864. ▸ Setting the station address (📖 30)			
Display range **(min. value | unit | max. value)**			
0		255	
☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☑ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT			

C13950

Parameter | Name: **C13950 | Module internal communication status**		Data type: UNSIGNED_8 Index: 10625$_d$ = 2981$_h$
Display of the internal status of the communication unit		
Selection list **(read only)**		**Info**
0	Module not initialised	
1	Module ready for initialization	
2	Reading module parameters	
3	Module parameters have been read	
4	Initialisation of external protocol	
5	Online	
6	Module timeout	
☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT		

13.3 Table of attributes

The table of attributes contains information required for a communication with the Inverter Drives 8400 motec via parameters.

How to read the table of attributes:

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

Table of attributes

Code	Name	Index		Data				Access		
		dec	hex	DS	DA	Data type	Factor	R	W	CINH
C13850	All words from drive to master	10725	29E5	A	8	UNSIGNED_16	1	☑		
C13851	All words from master to drive	10724	29E4	A	8	UNSIGNED_16	1	☑		
C13852	All words to the basic device	10723	29E3	A	8	UNSIGNED_16	1	☑		
C13853	All words to the basic device	10722	29E2	A	8	UNSIGNED_16	1	☑		
C13860	Settings	10715	29DB	A	4	UNSIGNED_8	1	☑		
C13861	Bus status	10714	29DA	E	1	UNSIGNED_16	1	☑		
C13862	Bus counter	10713	29D9	A	4	UNSIGNED_16	1	☑		
C13863	Baud rate	10712	29D8	E	1	UNSIGNED_8	1	☑		
C13864	Active station address	10711	29D7	E	1	UNSIGNED_8	1	☑		
C13865	Display: Most recent PRM data	10710	29D6	E	1	OCTET_STRING		☑		
C13866	Display: Most recent CFG data	10709	29D5	E	1	OCTET_STRING		☑		
C13867	Display: Most recent diagnostic data	10708	29D4	E	1	OCTET_STRING		☑		
C13880	Monitoring Reaction	10695	29C7	A	1	UNSIGNED_8	1	☑	☑	
C13881	Monitoring time: Data exchange	10694	29C6	E	1	UNSIGNED_16	1	☑	☑	
C13882	Monitoring time: Watchdog	10693	29C5	A	2	UNSIGNED_32	1	☑		
C13885	Delete process data	10690	29C2	E	1	UNSIGNED_8	1	☑	☑	
C13886	Set ext. diagnostic bit in case of	10689	29C1	E	1	BITFIELD_8		☑	☑	
C13887	Suppress signalling diag. mess. upon	10688	29C0	E	1	BITFIELD_8		☑	☑	
C13899	Station address	10676	29B4	E	1	UNSIGNED_8	1	☑	☑	
C13900	Firmware Product Type	10675	29B3	E	1	VISIBLE_STRING		☑		
C13901	Firmware Compilation Date	10674	29B2	E	1	VISIBLE_STRING		☑		
C13902	Firmware Version	10673	29B1	E	1	VISIBLE_STRING		☑		
C13920	Display: DIP switch setting	10655	299F	E	1	UNSIGNED_8	1	☑		
C13950	Module internal communication status	10625	2981	E	1	UNSIGNED_8	1	☑		

13.4 Implemented PROFIdrive objects (DP-V1)

I-918

Index | Name: **0x918 | Display of station address**			Data type: U16
Display of the set station address (see also C13864)			
Display range **(min. value | unit | max. value)**			
1		126	
☑ Read access ☐ Write access			

I-963

Index | Name: **0x963 | Baud rate**		Data type: U16
Display of the PROFIBUS baud rate (see also C13863)		
Selection list **(read only)**		
0	9.6 kbps	
1	19.2 kbps	
2	93.75 kbps	
3	187.5 kbps	
4	500 kbps	
6	1.5 Mbps	
7	3 Mbps	
8	6 Mbps	
9	12 Mbps	
☑ Read access ☐ Write access		

I-964

Index | Name: **0x964 | Device identification**		Data type: U16
Display of identification data		
Subindex	Display	**Info**
0x964/0	262	Manufacturer: Lenze
0x964/1	8400	Device type
0x964/2	xxyy	Software version, e.g. 0100 (V 01.00)
0x964/3	yyyy	Firmware date (year), e.g. 2007
0x964/4	ddmm	Firmware date (day/month), e.g. 0506 (5th June)
☑ Read access ☐ Write access		

I-974

Index | Name: **0x974 | Maximum time per DPV1 parameter access**		Data type: U16
Display of access statistics		
Subindex	Display	**Info**
0x974/0	240 bytes	Maximum block length
0x974/1	40	Maximum number of parameter accesses
0x974/2	0	Maximum time per access
☑ Read access ☐ Write access		

14 DIP switch positions for setting the station address

The station address results from the sum of the binary valencies of switches 1 ... 64.

The following table shows the switch positions for the valid address range 0 ... 126.

▶ Setting the station address (📖 30)

Station address	**DIP switch**						
	64	**32**	**16**	**8**	**4**	**2**	**1**
0	OFF	OFF	OFF	OFF	OFF	OFF	OFF
1	OFF	OFF	OFF	OFF	OFF	OFF	**ON**
2	OFF	OFF	OFF	OFF	OFF	**ON**	OFF
3	OFF	OFF	OFF	OFF	OFF	**ON**	**ON**
4	OFF	OFF	OFF	OFF	**ON**	OFF	OFF
5	OFF	OFF	OFF	OFF	**ON**	OFF	**ON**
6	OFF	OFF	OFF	OFF	**ON**	**ON**	OFF
7	OFF	OFF	OFF	OFF	**ON**	**ON**	**ON**
8	OFF	OFF	OFF	**ON**	OFF	OFF	OFF
9	OFF	OFF	OFF	**ON**	OFF	OFF	**ON**
10	OFF	OFF	OFF	**ON**	OFF	**ON**	OFF
11	OFF	OFF	OFF	**ON**	OFF	**ON**	**ON**
12	OFF	OFF	OFF	**ON**	**ON**	OFF	OFF
13	OFF	OFF	OFF	**ON**	**ON**	OFF	**ON**
14	OFF	OFF	OFF	**ON**	**ON**	**ON**	OFF
15	OFF	OFF	OFF	**ON**	**ON**	**ON**	**ON**
16	OFF	OFF	**ON**	OFF	OFF	OFF	OFF
17	OFF	OFF	**ON**	OFF	OFF	OFF	**ON**
18	OFF	OFF	**ON**	OFF	OFF	**ON**	OFF
19	OFF	OFF	**ON**	OFF	OFF	**ON**	**ON**
20	OFF	OFF	**ON**	OFF	**ON**	OFF	OFF
21	OFF	OFF	**ON**	OFF	**ON**	OFF	**ON**
22	OFF	OFF	**ON**	OFF	**ON**	**ON**	OFF
23	OFF	OFF	**ON**	OFF	**ON**	**ON**	**ON**
24	OFF	OFF	**ON**	**ON**	OFF	OFF	OFF
25	OFF	OFF	**ON**	**ON**	OFF	OFF	**ON**
26	OFF	OFF	**ON**	**ON**	OFF	**ON**	OFF
27	OFF	OFF	**ON**	**ON**	OFF	**ON**	**ON**
28	OFF	OFF	**ON**	**ON**	**ON**	OFF	OFF
29	OFF	OFF	**ON**	**ON**	**ON**	OFF	**ON**
30	OFF	OFF	**ON**	**ON**	**ON**	**ON**	OFF
31	OFF	OFF	**ON**	**ON**	**ON**	**ON**	**ON**
32	OFF	**ON**	OFF	OFF	OFF	OFF	OFF
33	OFF	**ON**	OFF	OFF	OFF	OFF	**ON**
34	OFF	**ON**	OFF	OFF	OFF	**ON**	OFF
35	OFF	**ON**	OFF	OFF	OFF	**ON**	**ON**
36	OFF	**ON**	OFF	OFF	**ON**	OFF	OFF
37	OFF	**ON**	OFF	OFF	**ON**	OFF	**ON**

Station address	**DIP switch**						
	64	**32**	**16**	**8**	**4**	**2**	**1**
38	OFF	**ON**	OFF	OFF	**ON**	**ON**	OFF
39	OFF	**ON**	OFF	OFF	**ON**	**ON**	**ON**
40	OFF	**ON**	OFF	**ON**	OFF	OFF	OFF
41	OFF	**ON**	OFF	**ON**	OFF	OFF	**ON**
42	OFF	**ON**	OFF	**ON**	OFF	**ON**	OFF
43	OFF	**ON**	OFF	**ON**	OFF	**ON**	**ON**
44	OFF	**ON**	OFF	**ON**	**ON**	OFF	OFF
45	OFF	**ON**	OFF	**ON**	**ON**	OFF	**ON**
46	OFF	**ON**	OFF	**ON**	**ON**	**ON**	OFF
47	OFF	**ON**	OFF	**ON**	**ON**	**ON**	**ON**
48	OFF	**ON**	**ON**	OFF	OFF	OFF	OFF
49	OFF	**ON**	**ON**	OFF	OFF	OFF	**ON**
50	OFF	**ON**	**ON**	OFF	OFF	**ON**	OFF
51	OFF	**ON**	**ON**	OFF	OFF	**ON**	**ON**
52	OFF	**ON**	**ON**	OFF	**ON**	OFF	OFF
53	OFF	**ON**	**ON**	OFF	**ON**	OFF	**ON**
54	OFF	**ON**	**ON**	OFF	**ON**	**ON**	OFF
55	OFF	**ON**	**ON**	OFF	**ON**	**ON**	**ON**
56	OFF	**ON**	**ON**	**ON**	OFF	OFF	OFF
57	OFF	**ON**	**ON**	**ON**	OFF	OFF	**ON**
58	OFF	**ON**	**ON**	**ON**	OFF	**ON**	OFF
59	OFF	**ON**	**ON**	**ON**	OFF	**ON**	**ON**
60	OFF	**ON**	**ON**	**ON**	**ON**	OFF	OFF
61	OFF	**ON**	**ON**	**ON**	**ON**	OFF	**ON**
62	OFF	**ON**	**ON**	**ON**	**ON**	**ON**	OFF
63	OFF	**ON**	**ON**	**ON**	**ON**	**ON**	**ON**
64	**ON**	OFF	OFF	OFF	OFF	OFF	OFF
65	**ON**	OFF	OFF	OFF	OFF	OFF	**ON**
66	**ON**	OFF	OFF	OFF	OFF	**ON**	OFF
67	**ON**	OFF	OFF	OFF	OFF	**ON**	**ON**
68	**ON**	OFF	OFF	OFF	**ON**	OFF	OFF
69	**ON**	OFF	OFF	OFF	**ON**	OFF	**ON**
70	**ON**	OFF	OFF	OFF	**ON**	**ON**	OFF
71	**ON**	OFF	OFF	OFF	**ON**	**ON**	**ON**
72	**ON**	OFF	OFF	**ON**	OFF	OFF	OFF
73	**ON**	OFF	OFF	**ON**	OFF	OFF	**ON**
74	**ON**	OFF	OFF	**ON**	OFF	**ON**	OFF
75	**ON**	OFF	OFF	**ON**	OFF	**ON**	**ON**
76	**ON**	OFF	OFF	**ON**	**ON**	OFF	OFF
77	**ON**	OFF	OFF	**ON**	**ON**	OFF	**ON**
78	**ON**	OFF	OFF	**ON**	**ON**	**ON**	OFF
79	**ON**	OFF	OFF	**ON**	**ON**	**ON**	**ON**
80	**ON**	OFF	**ON**	OFF	OFF	OFF	OFF

Station address	DIP switch						
	64	32	16	8	4	2	1
81	**ON**	OFF	**ON**	OFF	OFF	OFF	**ON**
82	**ON**	OFF	**ON**	OFF	OFF	**ON**	OFF
83	**ON**	OFF	**ON**	OFF	OFF	**ON**	**ON**
84	**ON**	OFF	**ON**	OFF	**ON**	OFF	OFF
85	**ON**	OFF	**ON**	OFF	**ON**	OFF	**ON**
86	**ON**	OFF	**ON**	OFF	**ON**	**ON**	OFF
87	**ON**	OFF	**ON**	OFF	**ON**	**ON**	**ON**
88	**ON**	OFF	**ON**	**ON**	OFF	OFF	OFF
89	**ON**	OFF	**ON**	**ON**	OFF	OFF	**ON**
90	**ON**	OFF	**ON**	**ON**	OFF	**ON**	OFF
91	**ON**	OFF	**ON**	**ON**	OFF	**ON**	**ON**
92	**ON**	OFF	**ON**	**ON**	**ON**	OFF	OFF
93	**ON**	OFF	**ON**	**ON**	**ON**	OFF	**ON**
94	**ON**	OFF	**ON**	**ON**	**ON**	**ON**	OFF
95	**ON**	OFF	**ON**	**ON**	**ON**	**ON**	**ON**
96	**ON**	**ON**	OFF	OFF	OFF	OFF	OFF
97	**ON**	**ON**	OFF	OFF	OFF	OFF	**ON**
98	**ON**	**ON**	OFF	OFF	OFF	**ON**	OFF
99	**ON**	**ON**	OFF	OFF	OFF	**ON**	**ON**
100	**ON**	**ON**	OFF	OFF	**ON**	OFF	OFF
101	**ON**	**ON**	OFF	OFF	**ON**	OFF	**ON**
102	**ON**	**ON**	OFF	OFF	**ON**	**ON**	OFF
103	**ON**	**ON**	OFF	OFF	**ON**	**ON**	**ON**
104	**ON**	**ON**	OFF	**ON**	OFF	OFF	OFF
105	**ON**	**ON**	OFF	**ON**	OFF	OFF	**ON**
106	**ON**	**ON**	OFF	**ON**	OFF	**ON**	OFF
107	**ON**	**ON**	OFF	**ON**	OFF	**ON**	**ON**
108	**ON**	**ON**	OFF	**ON**	**ON**	OFF	OFF
109	**ON**	**ON**	OFF	**ON**	**ON**	OFF	**ON**
110	**ON**	**ON**	OFF	**ON**	**ON**	**ON**	OFF
111	**ON**	**ON**	OFF	**ON**	**ON**	**ON**	**ON**
112	**ON**	**ON**	**ON**	OFF	OFF	OFF	OFF
113	**ON**	**ON**	**ON**	OFF	OFF	OFF	**ON**
114	**ON**	**ON**	**ON**	OFF	OFF	**ON**	OFF
115	**ON**	**ON**	**ON**	OFF	OFF	**ON**	**ON**
116	**ON**	**ON**	**ON**	OFF	**ON**	OFF	OFF
117	**ON**	**ON**	**ON**	OFF	**ON**	OFF	**ON**
118	**ON**	**ON**	**ON**	OFF	**ON**	**ON**	OFF
119	**ON**	**ON**	**ON**	OFF	**ON**	**ON**	**ON**
120	**ON**	**ON**	**ON**	**ON**	OFF	OFF	OFF
121	**ON**	**ON**	**ON**	**ON**	OFF	OFF	**ON**
122	**ON**	**ON**	**ON**	**ON**	OFF	**ON**	OFF
123	**ON**	**ON**	**ON**	**ON**	OFF	**ON**	**ON**

Station address	**DIP switch**						
	64	**32**	**16**	**8**	**4**	**2**	**1**
124	**ON**	**ON**	**ON**	**ON**	**ON**	OFF	OFF
125	**ON**	**ON**	**ON**	**ON**	**ON**	OFF	**ON**
126	**ON**	**ON**	**ON**	**ON**	**ON**	**ON**	OFF

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Inverter Drive 8400 motec (PROFIBUS option) · 13564909 · EDS84DMOTPBUS · EN 4.0 · 02/2019 · TD23

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Accessories

PROFINET®

E84DGFCRxxx

Inverter Drives 8400 motec__________________

Communication Manual EN

13564911

Lenze

Contents

1 About this documentation

Contents

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

Note!

This documentation supplements the **mounting instructions** and the **"Inverter Drives 8400 motec" hardware manual** supplied with the Communication Unit.

The hardware manual contains safety instructions which must be observed!

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

Examples illustrate typical applications.

This documentation also contains the following:

- Safety instructions that must be observed
- The basic technical data of the communication module
- Information on versions of the Lenze standard devices to be used
- Notes on troubleshooting and fault elimination

The theoretical context is only explained as far as it is required for understanding the function of the communication module.

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

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

Tip!

Detailed information on PROFINET can be found on the homepage of the PROFIBUS user organisation which also develops the PROFINET communication technology:

www.profibus.com

Screenshots/application examples

All screenshots in this documentation are application examples. Depending on the firmware version of the field devices and the software version of the Engineering tools installed (»Engineer«), screenshots in this documentation may differ from the representation on the screen.

Target group

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

Tip!

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

www.Lenze.com

Information regarding the validity

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

Product series	Type designation	Version
Inverter Drives 8400 motec **PROFINET Communication Unit**	E84DGFCRxNx	PROFINET
	E84DGFCRxJx	PROFINET + Safety

▸ Features and variants (🕮 12)

1.1 Document history

Version			Description
5.0	02/2019	TD23	• General corrections
4.0	03/2017	TD17	• General corrections • Description for C13887 (🕮 84) updated.
3.0	02/2017	TD17	• New layout • New: Response of the outputs in compliance with PROFINET standard V2.3 (🕮 38) • Updated: LED status displays (🕮 66)
2.0	11/2011	TD17	General revision
1.0	06/2011	TD17	First edition

1.2 Conventions used

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

Type of information	**Highlighting**	**Examples/notes**
Spelling of numbers		
Decimal	Normal spelling	Example: 1234
Decimal separator	Point	The decimal point is always used. For example: 1234.56
Hexadecimal	0x[0 ... 9, A ... F]	Example: 0x60F4
Binary • Nibble	In inverted commas Point	Example: ’100’ Example: ’0110.0100’
Text		
Version information	Blue text colour	All information that only applies to or from a certain software version of the inverter is marked accordingly in this documentation. Example: This function extension is available from software version V3.0!
Program name	» «	The Lenze »Engineer« PC software...
Control element	**Bold**	The **OK** button... / The **Copy** command... / The Properties tab... / The **Name** input field...
Sequence of menu commands		If several commands are required in succession for executing a function, the single commands are separated by an arrow: Select the **File** ➞ **Open** command to...
Hyperlink	Underlined	Optically highlighted reference to another topic. It is activated with a mouse-click in this online documentation.
Icons		
Page reference	(📖 5)	Optically highlighted reference to another page. It is activated with a mouse-click in this online documentation.
Step-by-step instructions	⌨🖱	Step-by-step instructions are indicated by a pictograph.

1.3 Terminology used

Term	Meaning
Inverter	Lenze frequency inverter of the "Inverter Drives 8400 motec" product series
Standard device	

Drive Unit
Communication unit
Wiring Unit
	The 8400 motec inverter has a modular structure that includes the following modules: "Drive Unit", "Communication Unit", and "Wiring Unit".
	• The drive unit is available in different power settings.
	• In case of the communication unit you can select between:
	  • Without fieldbus (basic I/O, standard I/O, extended I/O)
	  • AS interface (without safety/with safety STO)
	  • CANopen (without safety/with safety STO)
	  • EtherCAT (without safety/with safety STO)
	  • EtherNET/IP (without safety/with safety STO)
	  • PROFIBUS (without safety/with safety STO)
	  • PROFINET (without safety/with safety STO)
	  • POWERLINK (without safety/with safety STO)
	• The wiring unit provides flexible connection possibilities for a simple integration into the power supply of the machine.

Code	Parameter which serves to parameterise and monitor the inverter. In normal usage, the term is usually referred to as "Index".
Subcode	If a code contains several parameters, they are stored in "subcodes". This manual uses a slash "/" as a separator between code and subcode (e.g. "C00118/3"). This term is also referred to as "subindex" in common parlance.
Lenze setting	This setting is the default factory setting of the device.
Basic setting	
»Engineer«	Lenze PC software which supports you during the "Engineering" process (parameterisation, diagnostics, and configuration) throughout the whole life cycle, i. e. from planning to maintenance of the machine commissioned.
HW	Hardware
SW	Software
I/O controller	PROFINET master The I/O controller takes over the master function for data communication of the decentralised field devices. The I/O controller usually is the communication interface of a PLC.
I/O device	PROFINET slave
IO supervisor	Engineering and diagnostics tools The IO supervisor can access process data, diagnostic data, and alarm data.
PROFI® INDUSTRIAL ETHERNET NET	PROFINET® (Process Field Network) is a real-time capable fieldbus system based on Ethernet. PROFINET® is a registered trademark and patented technology licensed by the PROFIBUS & PROFINET International (PI) user organisation.

1.4 Notes used

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

Safety instructions

Layout of the safety instructions:

⚠ **Pictograph and signal word!**

(characterise the type and severity of danger)

Note

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

Pictograph	Signal word	Meaning
⚡	**Danger!**	**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	**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	Signal word	Meaning
ℹ	**Note!**	Important note to ensure trouble-free operation
💡	**Tip!**	Useful tip for easy handling
📖		Reference to another document

2 Safety instructions

Note!

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

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

2.1 General safety and application notes

Danger!

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

- Lenze drive and automation components ...
  - must only be used as directed.
    ▶ Application as directed (📖 12)
  - must never be commissioned if they display signs of damage.
  - must never be technically modified.
  - must never be commissioned if they are not fully mounted.
  - must never be operated without required covers.
  - during and after operation can have live, moving and rotating parts, depending on their degree of protection. Surfaces can be hot.
- The following applies to Lenze drive components ...
  - only use the accessories approved.
  - Only use original manufacturer spare parts.
- Observe all specifications contained in the enclosed documentation and related documentation.
  - This is the precondition for safe and trouble-free operation and for obtaining the product features specified.
    ▶ Features and variants (📖 12)
  - The specifications, processes, and circuitry described in this document are for guidance only and must be adapted to your own specific application. Lenze does not take responsibility for the suitability of the process and circuit proposals.
- Only qualified personnel may work with and on Lenze drive and automation components. According to IEC 60364 and CENELEC, these are persons ...
  - are familiar with installing, mounting, commissioning, and operating the product.
  - who have the corresponding qualifications for their work.
  - who know and can apply all regulations for the prevention of accidents, directives, and laws applicable at the place of use.

2.2 Device and application-specific safety instructions

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

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

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

2.3 Residual hazards

Device protection

- The Communication Unit contains electronic components that can be damaged or destroyed by electrostatic discharge.
  ▸ Installation (🕮 19)

3 Product description

3.1 Application as directed

The PROFINET communication unit can only be used in conjunction with the following modules:

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

The Communication Unit ...

- is a device intended for use in industrial power systems.
- may only be operated under the operating conditions specified in this documentation.
- may only be used in PROFINET networks.
- can also be used without being connected to the PROFINET network.

Any other use shall be deemed inappropriate!

3.2 Features and variants

The PROFINET Communication Unit is available in the following versions:

Product series	Type designation	Product features				
		Enclosure	Connection PROFINET	I/O: Connection via terminal	I/O: Connection via M12	Safety
Inverter Drives 8400 motec **PROFINET Communication Unit**	E84DGFCRFNP	IP 65	M12	3× DI 1× DO	2× DI	
	E84DGFCRENP	IP 65	M12	2× DI	3× DI 1× DO	
	E84DGFCRFJP	IP 65	M12	3× DI 1× DO 1× AI	2× DI	●
	E84DGFCREJP	IP 65	M12	3× DI	2× DI 1× DO 1× AI	●

- The PROFINET Communication Unit is ...
  - mounted on top of the Wiring Unit (E84DGVNxx);
  - supplied internally via the Drive Unit (E84DGDVxxxxxxxx) or externally via a separate voltage source.
- The I/O connections can be brought into the device via M12 connectors or cable glands.
- Devices without an integrated safety system (safety option) have no analog input and no relay output.
- The integrated safety system can be used on machines for the protection of persons.
- Support of the I&M0...4 functionality for the identification of the standard device
- Automatic detection of the baud rate 100 Mbps
- A line topology is enabled by the integrated 2-port switch.
- Protocols supported:
  - LLDP (Link Layer Discovery Protocol) for topology recognition
  - SNMP (Simple Network Management Protocol) for diagnostics
  - MRP (Media Redundancy Protocol) for the implementation of the inverter into a ring topology as client node
- Exchange of up to 8 process data words per direction
- Communication with the Lenze »Engineer« (access to all Lenze parameters) is executed via the diagnostic interface of the Drive Unit.
- An online connection via PROFINET can be established using the Lenze »Engineer«.

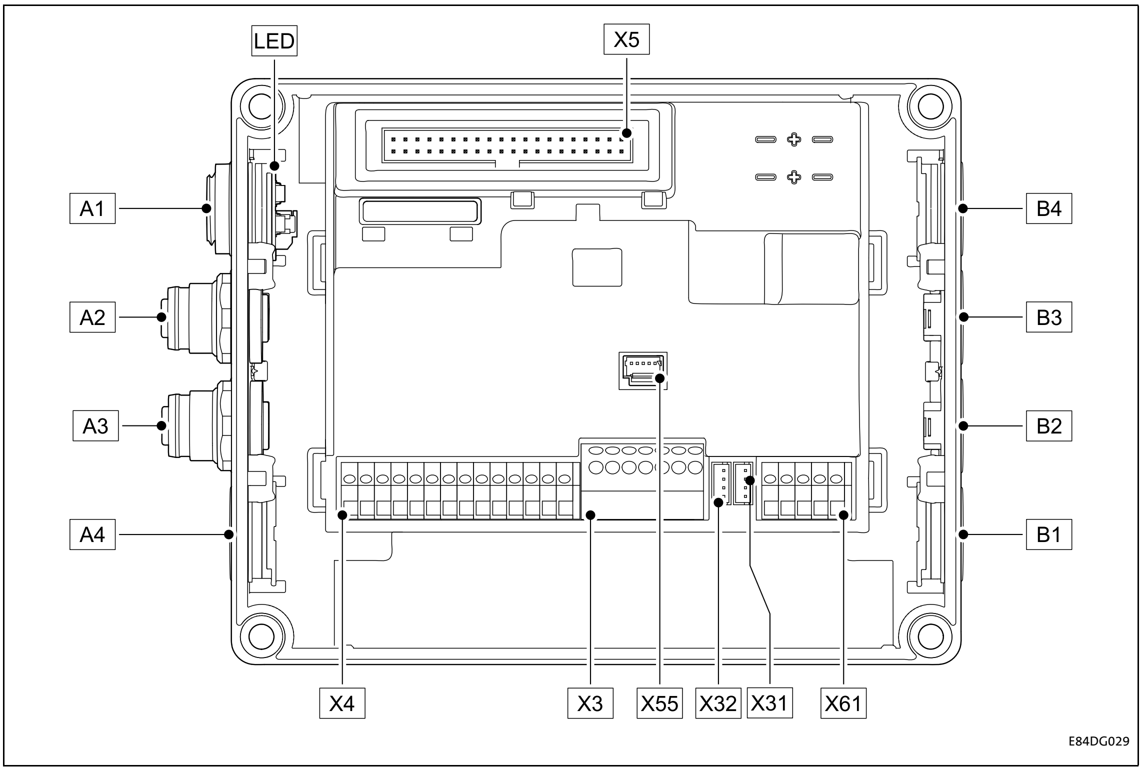
"Inverter Drives 8400 motec" hardware manual

Here you will find detailed information on the integrated safety system (safety option).

Reference manual/online help for the Inverter Drive 8400 motec

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

3.3 Connections and interfaces



[3-1] PROFINET Communication Unit

Pos.	Description
A1 / LED	Position for LEDs for PROFINET status display ▸ LED status displays (🕮 66)
A2	PROFINET port 1 (M12 socket, 5-pole, D-coded) ▸ PROFINET connection (🕮 23)
A3	PROFINET port 2 (M12 socket, 5-pole, D-coded) ▸ PROFINET connection (🕮 23)
A4	Positions for further freely designable inputs and outputs: • Digital inputs • Digital output • Analog input (only for E84DGFCRxJx) • Relay output (only for E84DGFCRxJx) • Connection of "Safety Option" safety system (only for E84DGFCRxJx)
B1 ... B4	
X3 / X4 / X61	Terminal strips for wiring the connections at A4 and B1 ... B4
X5	Plug connector for connection to the Drive Unit
X31	Plug connector for wiring PROFINET port 1 at A2
X32	Plug connector for wiring PROFINET port 2 at A3
X55	Plug connector for the wiring of the LEDs to A1

- By default, the PROFINET connections and the LEDs for the PROFINET status displays are already mounted and wired:
  - PROFINET port 1 at plug connector X31
  - PROFINET port 2 at plug connector X32
  - LEDs on plug connector X55
- It is also possible to connect the PROFINET and other inputs and outputs (e.g. digital inputs) via the positions A1 ... A4 and B1 ... B4.
- For the connections, 5-pin M12 connectors or - alternatively - cable glands (cable cross-section max. 1.0 mm^2, AWG 18) can be used.
- The M12 connectors, cable glands and prefabricated system cables can be obtained from various manufacturers.
- Wire the M12 connectors or cable glands used to the corresponding contacts of the terminal strips/plug connectors X3, X4 and X61.

"Inverter Drives 8400 motec" hardware manual

Observe the notes and wiring instructions contained in this documentation.

4 Technical data

"Inverter Drives 8400 motec" hardware manual

Here you will find the **ambient conditions** and information on the **electromagnetic compatibility (EMC)** that also apply to the Communication Unit.

4.1 General data and operating conditions

Range	Values
Order designation	• E84DGFCRxNx (PROFINET) • E84DGFCRxJx (PROFINET + Safety)
Communication profile	PROFINET
Communication medium	S/FTP (Screened Foiled Twisted Pair, ISO/IEC 11801 or EN 50173), CAT 5e
Interface for communication	• PROFINET port 1: M12 socket, 5-pole, D-coded • PROFINET port 2: M12 socket, 5-pole, D-coded
Network topology	Tree, star, and line
Type of node	I/O device with real time (RT) communication properties
Number of device nodes	Max. 255 in the subnetwork
Max. cable length between two nodes	100 m
PNO identification number	0x0106
Device identification (Device ID)	0x8440
Baud rate	100 Mbps
Switching method	"Store and forward"
Switch latency	Approx. 125 µs at max. frame length
External voltage supply	• U = 24 V DC (20 V - 0 % ... 29 V + 0 %) • I_{max} = 120 mA
Conformities, approvals	• CE • UR / cUR (see also hardware manual)

4.2 Protocol data

Range	Values
Process data words slot 1	1 ... 8 process data words (max. 16 bytes)
Process data words slot 2 (for digital/analog inputs)	Optionally 0, 1, or 2 process data words (max. 4 bytes) ▸ Process input data AI/DI (Slot2) (📖 44)
Acyclic parameter channel	Limited by the PROFINET frame size

4.3 Communication time

The communication time is the time between the start of a request and the arrival of the corresponding response.

The communication times in an PROFINET network depend on the ...

- processing time in the inverter;
- frame runtime (baud rate / frame length);
- nesting depth of the network.

Processing time inside the inverter

Data	Processing time	
Process data	Approx. 2 ms	Update cycle
	+ 0 ... 1 ms	Processing time in the module
	+ 1 ... x ms	Runtime of the application task of the technology application used (tolerance)
Parameter data	Approx. 30 ms + a tolerance of 20 ms (typically) • Some codes may require a longer processing time (see reference manual/ online help for Inverter Drive 8400 motec).	

There are no interdependencies between parameter data and process data.

4.4 Internal switch latency

The integrated 2-port switch causes runtime delays which can be calculated as follows:

Runtime delay = ((36 permanent bytes + process data in bytes) x 8 x 10 nsec) + 4 µsec

Example :

20 process data words => 40 bytes

- ((36 permanent bytes + 40 bytes) x 8 x 10 nsec) + 4 µsec
- (76 bytes x 8 x 10 nsec) + 4 µsec
- 6.08 µsec + 4 µsec = **10.08 µsec**

In accordance with the PROFINET specification, the shortest PROFINET I/O frame must have a data length of 72 bytes. If the 36 permanent bytes are subtracted from the 72 bytes, 36 bytes are available for process data. If now less than 36 bytes of process data are used, the PROFINET I/O frame is filled with "zero bytes" until it can be transmitted. As a consequence for the calculation formula, the shortest PROFINET I/O frame with 18 process data words (36 bytes) has always the same length and thus the runtime delay is the same, too.

Note!

The use of external switches can also lead to runtime delays. Depending on the system constellation, it may be useful to create a star topology or a line/mix topology.

▶ Network topology (📖 21)

5 Installation

Stop!

Electrostatic discharge

Electronic components within the Communication Unit can be damaged or destroyed by electrostatic discharge.

Possible consequences:

- The Communication Unit is defective.
- Fieldbus communication is not possible or faulty.
- I/O signals are faulty.
- The safety function is faulty.

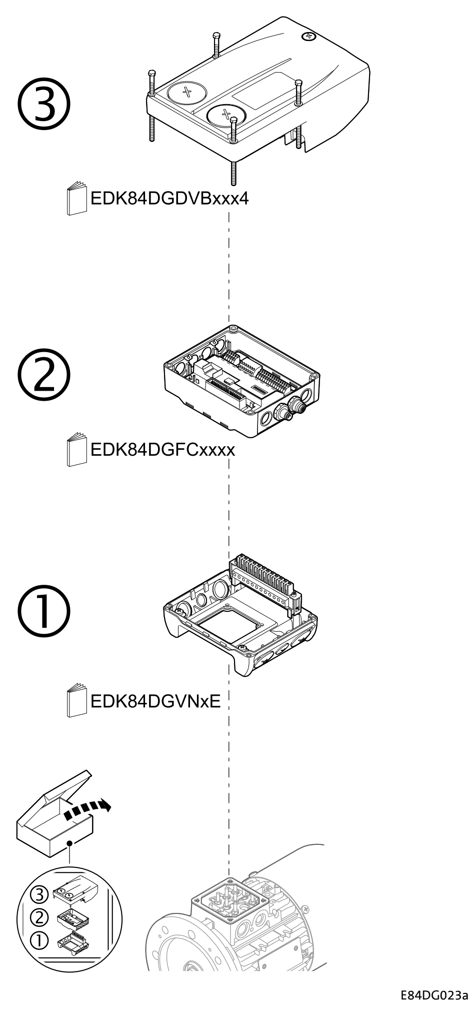
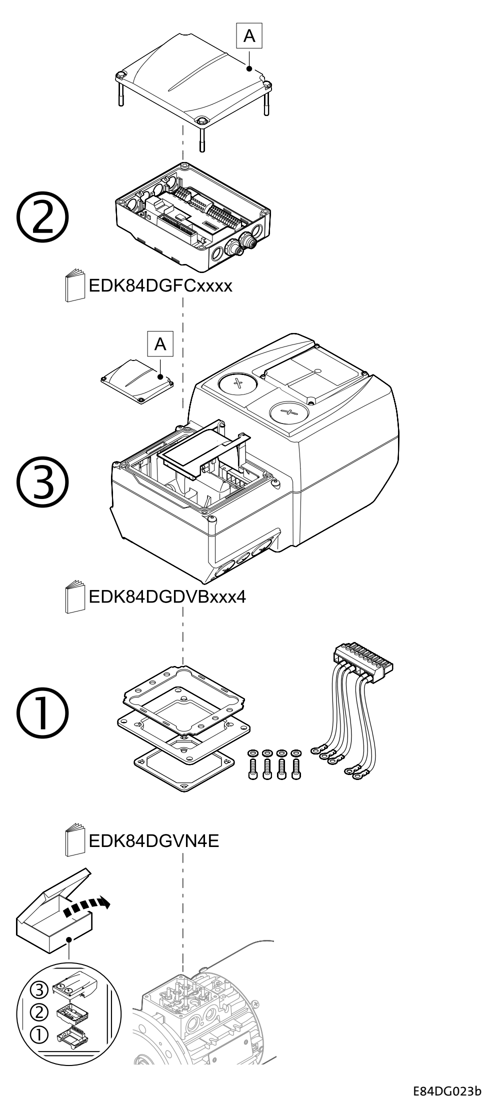
Protective measures

- Discharge electrostatic charges before touching the Communication Unit.

5.1 Mechanical installation

Mounting instructions "Inverter Drives 8400 motec"

Here you will find detailed information on the installation.

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

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

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

5.2 Electrical installation

"Inverter Drives 8400 motec" hardware manual

Here you can find detailed information on ...
- the digital and analog inputs/outputs;
- the relay output;
- the integrated safety system (safety option);
- the wiring of the terminals.

Observe the notes and wiring instructions contained in this documentation.

5.2.1 Network topology

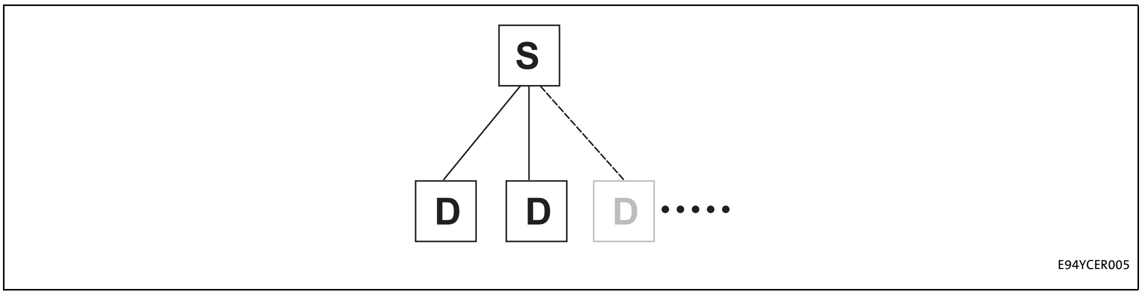
It is typical of PROFINET to have a rather free topology the limiting factor of which is large message latencies due to e.g. switches connected in series.

▶ Internal switch latency (📖 18)

The combination of a line and a stub is useful for system wiring.

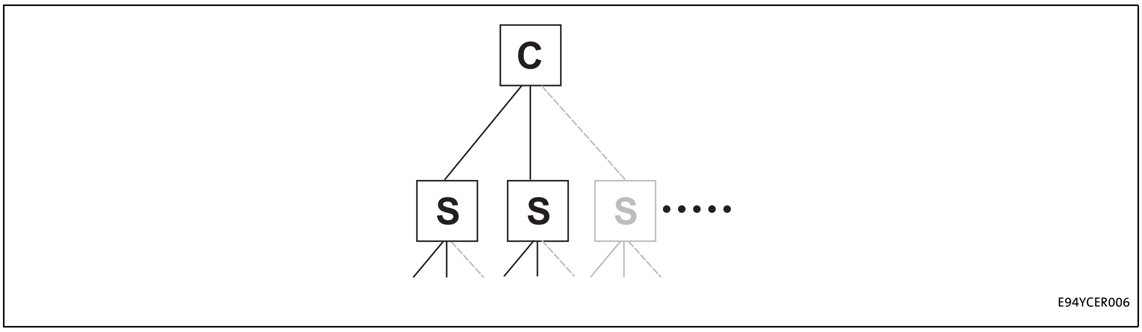
PROFINET supports the following topologies:

- Switch / star



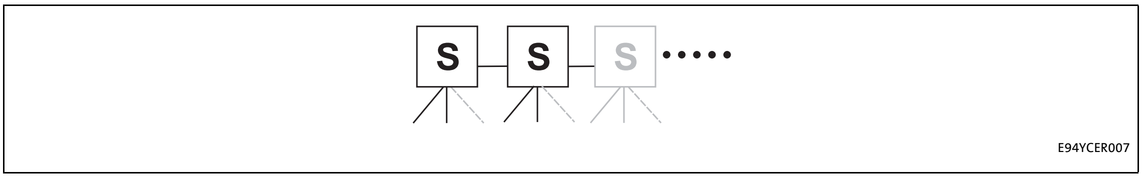
[5-2] Switch / star topology (S = switch, D = I/O device)

- Tree via switches



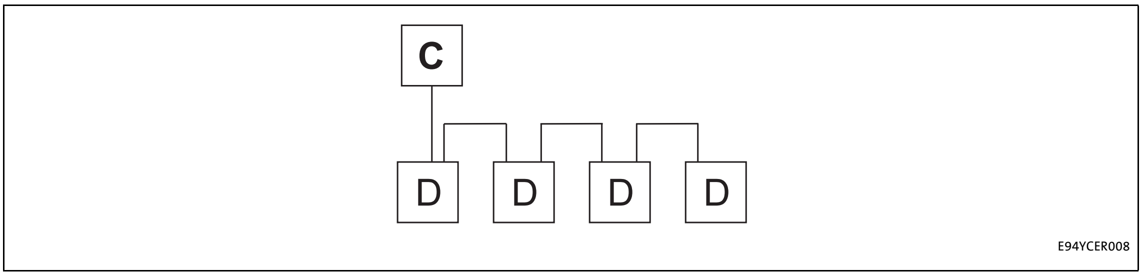
[5-3] Tree topology (C =I/O controller, S = switch)

- Switch / switch



[5-4] Switch/switch topology (S = switch)

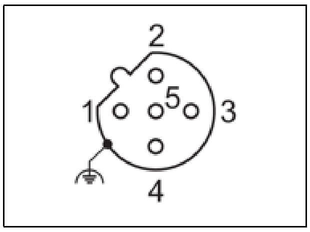
- I/O controller / I/O device



[5-5] Line topology (C = I/O controller, D = I/O device)

5.2.2 PROFINET connection

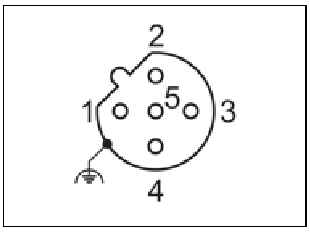
PROFINET port 1



- M12 socket, 5-pole, D-coded
- Wiring at terminal strip X31

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

PROFINET port 2



- M12 socket, 5-pole, D-coded
- Wiring at terminal strip X32

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

5.2.3 External voltage supply

- The external voltage supply can be used to establish PROFINET communication for commissioning and to query the data of the digital and analog inputs.
- Furthermore the external voltage supply serves to maintain PROFINET communication if the main supply fails.
- The digital inputs RFR, DI1 ... DI5 and the analog input can continue to be evaluated.
- The external voltage supply is done via the terminals 24E and GND of the terminal strip X3.
- Permissible voltage (DC) / max. current:
  - U = 24 V DC (20 V - 0 % ... 29 V + 0 %)
  - I_{max} = 120 mA
- Access to parameters of a device that is disconnected from the mains is not possible.

"Inverter Drives 8400 motec" hardware manual

Here you can find detailed information on how to wire the Communication Unit.

6 Commissioning

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

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

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

▸ Parameter reference (🕮 75)

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

For commissioning with 24 V DC, only the data of the digital and analog inputs in the last two data words are valid and readable (see Process input data AI/DI (Slot2) (🕮 44)).

6.1 Before initial switch-on

STOP **Stop!**

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

6.2 Configuring the PROFINET IO controller

For communication with the PROFINET Communication Unit, the IO controller must be configured first.

Configuration for device control

For the configuration of PROFINET, the current PROFINET device description file (XML) of the Communication Unit has to be imported in the IO controller.

The device description file **GSDML-Vx.z-Lenze-8440PNabb-yyyymmdd.xml** can be found in the download area at:

www.Lenze.com

Wildcards in the file name "GSDML-Vx.z-Lenze-8440PN100-yyyymmdd.xml"	
x	Main version of the GSDML scheme used
z	Subversion of the GSDML scheme used
a	Major version of the software version
bb	Minor version of the software version
yyyy	Year
mm	Month
dd	Day

Defining the user data length

The user data length is defined during the initialisation phase of the I/O controller.

The PROFINET Communication Unit supports the configuration of max. 8 process data words (max. 16 bytes).

Description of the device data base file

Selection text	Process data	Assigned I/O memory
Slot 1: PCD (nW)	1 ... 8 words	0 ... 16 bytes
Slot 2: AI/DI (nW)	0 ... 2 words	0 ... 4 bytes

Example of selecting the device data base file

- "PCD (8W)" = 8 process data words in slot 1 of the PROFINET telegram

6.3 Setting the station name

Note!

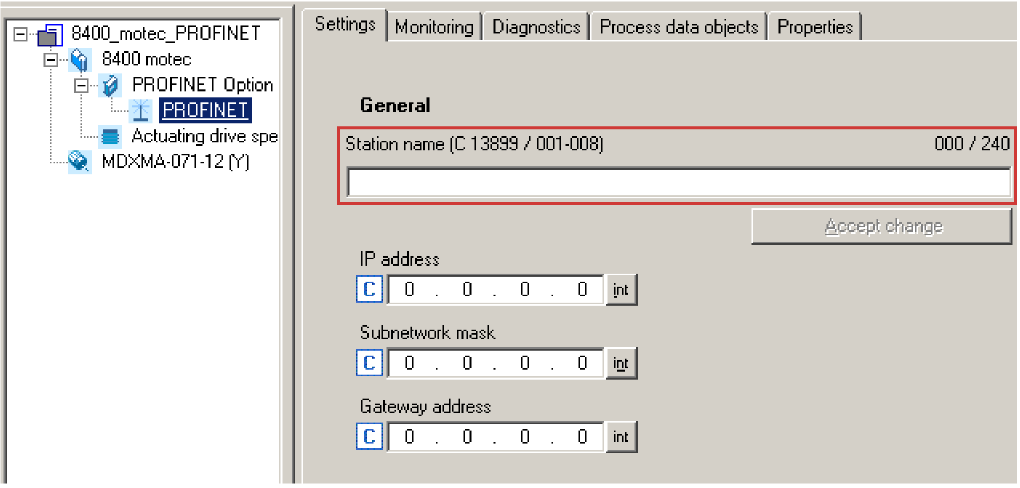
- The "Node blinking test" PROFINET function which serves to identify an accessible device is supported. The red LED **BE** (LED status displays (📖 66)) flickers during execution.
- Operation of PROFINET requires a valid station name.
- In the case of impermissible settings, the red LED **BE** blinks (LED status displays (📖 66)), and the error message PROFINET: Stack init error [0x01bc6534] (📖 74) is output. The Communication Unit then internally continues to work with the deleted name.
- If the station name is assigned by the IO controller via PROFINET or via the PROFINET configurator of the »Engineer«, changes will become effective immediately.

The station name currently used is shown in code C13864.

The station name ...

- is required for unambiguous addressing of the Inverter Drive 8400 motec by the I/O controller.
- can either be assigned by the I/O controller via PROFINET or set manually in the »Engineer«.
- has to be allocated in accordance with the PROFINET specification:
  - 1 or several labels separated by ".".
  - Max. length per label: 63 characters
  - Max. total length: 240 characters
  - Permissible characters: [a ... z], [0 ... 9], [.], [-]
  - Labels must not begin or end with [-].
- Prohibited syntax:
  - "n.n.n.n" (n = 0 ... 999)
  - "port-xyz" (x, y, z = 0 ... 9)
  - "port-xyz-abcde" (a, b, c, d, e, x, y, z = 0 ... 9)

In the »Engineer« the station name is set under the **Settings** tab.



Station name (C 13899 / 001-008) 000 / 240

IP address 0 . 0 . 0 . 0

Subnetwork mask 0 . 0 . 0 . 0

Gateway address 0 . 0 . 0 . 0

- Then click **Accept change**. The station name is saved and written to code C13899.
- In the Lenze setting a deleted name is displayed. The name is also deleted if the "Reset to factory defaults" command is executed by an IO supervisor or an I/O controller.

6.4 Setting the IP configuration

The IP configuration is required for addressing the Inverter Drive 8400 motec if communication between the PC/»Engineer« or the IO controller and the inverter is to be established via PROFINET. This requires allocation of an IP address, subnet mask, and gateway address.

If no PROFINET network or no IO controller is available yet, you have the following options to allocate the IP address, subnet mask, and gateway address for the Communication Unit:

- Setting via the PROFINET configurator of the »Engineer« (🕮 30)
- Setting via codes in the »Engineer« (🕮 32)

Note!

- If the IP parameters are assigned by the IO controller via PROFINET or the PROFINET configurator of the »Engineer«, changes will become effective immediately and are saved with mains failure protection.
- 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 the case of impermissible settings, the red LED **BE** blinks (LED status displays (🕮 66)), and the error message PROFINET: Stack init error [0x01bc6534] (🕮 74) is output.

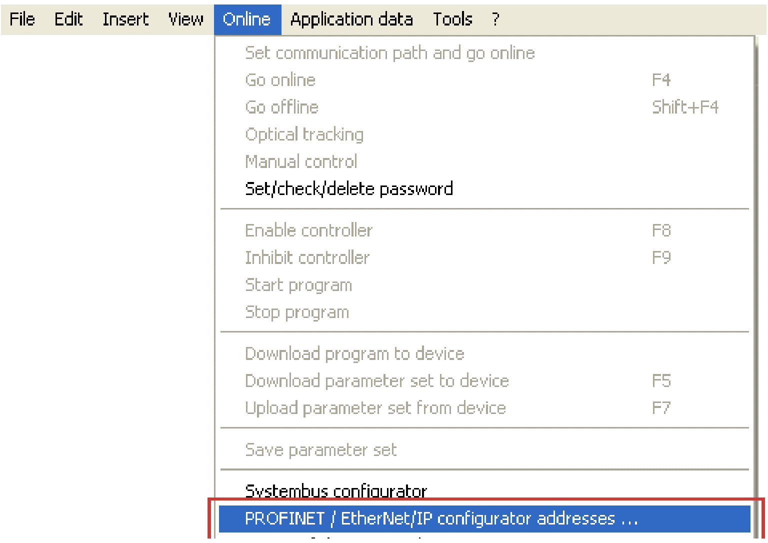
6.4.1 Setting via the PROFINET configurator of the »Engineer«

Note!

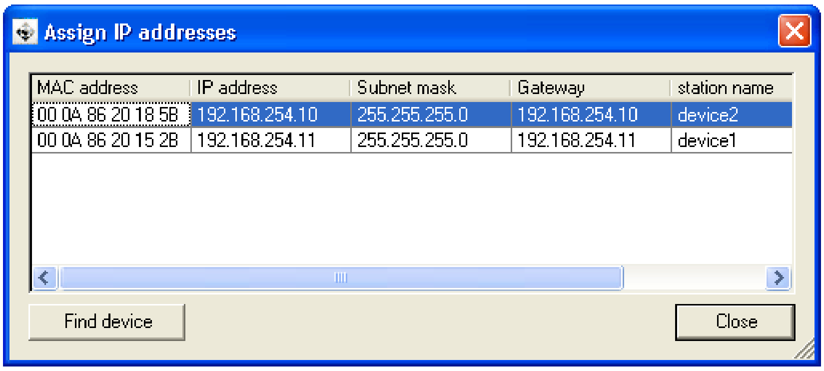
- The IP address must only be allocated manually in the »Engineer« if the PROFINET network is not operated on the IO controller yet (IP address has not been allocated by the IO controller yet).
- While setting the IP parameters in the »Engineer«, PROFINET communication with the IO controller must not take place at the same time.
- Changes will be effective immediately and are saved with mains failure protection.

How to set the IP parameters via the PROFINET configurator:

1. Execute the menu command **Online → Profinet configurator addresses....**

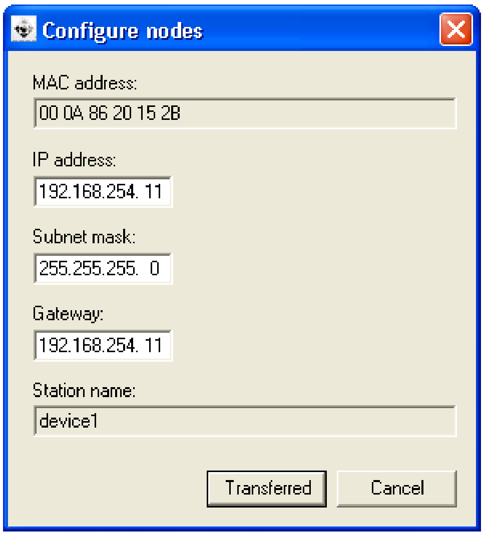


The **Assign IP addresses** dialog window is opened, and all Lenze PROFINET devices connected are listed.



MAC address	IP address	Subnet mask	Gateway	station name
00 0A 86 20 18 5B	192.168.254.10	255.255.255.0	192.168.254.10	device2
00 0A 86 20 15 2B	192.168.254.11	255.255.255.0	192.168.254.11	device1

2. By double-clicking on the individual IP parameters, you can set the IP configuration for each PROFINET node in the **Configure nodes** dialog window.



MAC address: 00 0A 86 20 15 2B
IP address: 192.168.254. 11
Subnet mask: 255.255.255. 0
Gateway: 192.168.254. 11
Station name: device1

3. Click **Transferred**.
   - The IP configuration is transferred to the corresponding PROFINET node.
   - Changes in the IP parameters will become effective immediately.
   - The IP parameters are written to codes C13000 (IP address), C13001 (subnet mask), and C13002 (gateway address) of the Communication Unit.

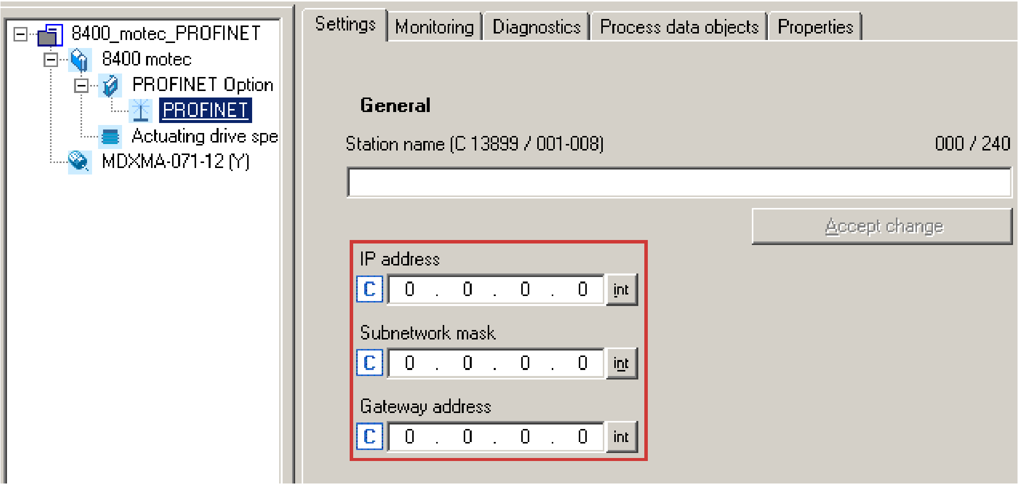
   By clicking the **Find device** button in the **Assign IP addresses** dialog window (see step 1), you can check whether the configuration was transferred successfully.
4. With the **C00002 = "11: Save all parameter sets"** device command, the current IP configuration is saved non-volatilely.

6.4.2 Setting via codes in the »Engineer«

Note!

- The IP address must only be allocated manually in the »Engineer« if the PROFINET network is not operated on the IO controller yet (IP address has not been allocated by the IO controller yet).
- While setting the IP parameters in the »Engineer«, PROFINET communication with the IO controller must not take place at the same time.

You can also set the IP parameters manually via code in the »Engineer« under the **Settings** tab.



General

Station name (C 13899 / 001-008) 000 / 240

IP address: 0 . 0 . 0 . 0

Subnetwork mask: 0 . 0 . 0 . 0

Gateway address: 0 . 0 . 0 . 0

The IP parameters are written to codes C13000 (IP address), C13001 (subnet mask), and C13002 (gateway address).

With the **C00002 = "11: Save all parameter sets"** device command, the current IP configuration is saved non-volatilely.

Decimal representation of the IP parameters

By clicking the **[int]** buttons on the right next to the input fields, the IP parameters are represented as decimal values.

In the case of the decimal representation, the byte sequence is inverted.

Example: IP address 192.168.0.1

- C13000 = 16820416 [00000001.00000000.10101000.11000000$_{\text{bin}}$]

Byte 3								Byte 2								Byte 1								Byte 0							
1								0								168								192							
0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	1	0	1	0	0	0	1	1	0	0	0	0	0	0

IP address

- The IP address is set/changed in C13000.

Subnet Mask

- The subnet mask indicates which part of the IP address is evaluated as net ID or host ID.
- Valid subnet masks are defined in accordance with RFC 1878
- The subnet mask is set/changed in C13001.

Gateway address

- The gateway address is valid if the network address of the IP address and the gateway address are identical.
- If the gateway address and the IP address are identical, gateway functionality is not used.
- DHCP is not supported.
- The gateway address is set/changed in C13002.

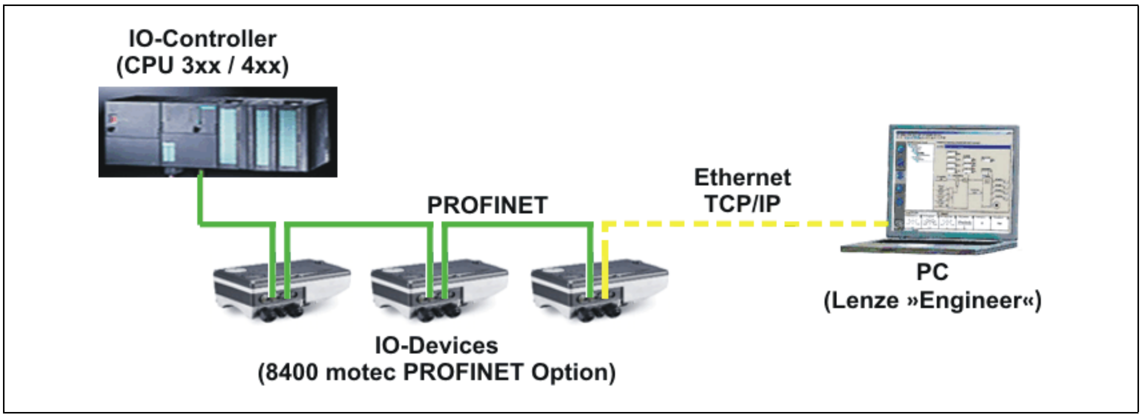
6.5 Establishing an online connection via PROFINET with the Lenze »Engineer«

This functionality is only supported **from software version V01.30.05**.

Note!

To ensure perfect operation of cyclic PROFINET communication, online access with the »Engineer« must be effected via a PROFINET switch.

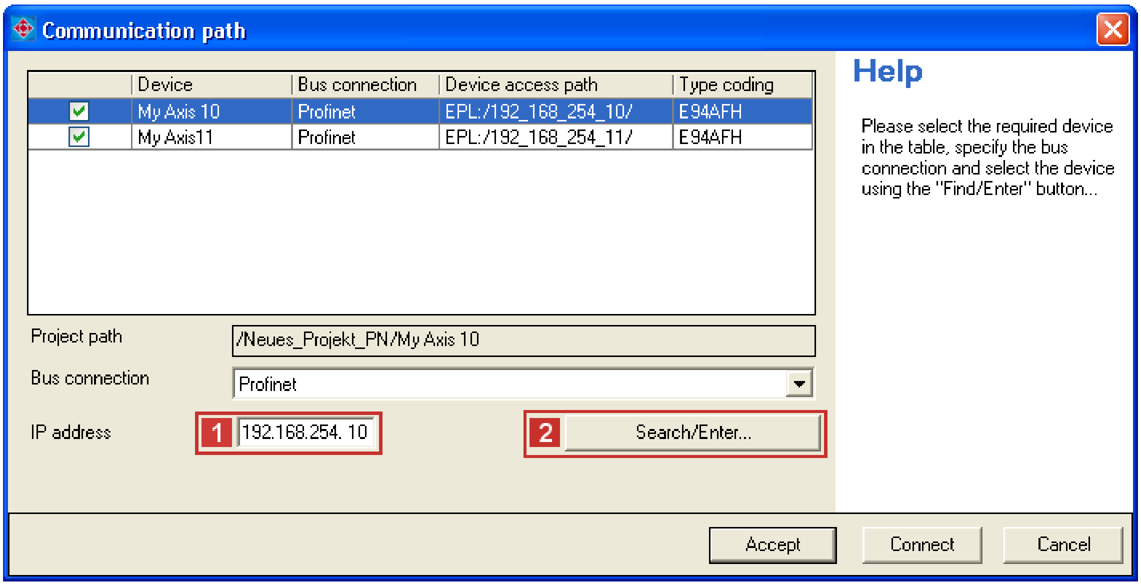
The PROFINET switch integrated in the communication module can execute cyclic PROFINET communication prior to normal TCP/IP communication. In the case of PROFINET this is effected via the VLAN identification in the Ethernet frame.



[6-1] Example: PROFINET network

For an online connection between the »Engineer« and the inverter, the inverter must have an IP address (see Setting the IP configuration (📖 29)).

In the »Engineer« via the menu command **Online → Set communication path and go online**, you can select the PROFINET communication path. The PROFINET nodes previously configured are shown in the *Communication path* dialog window:



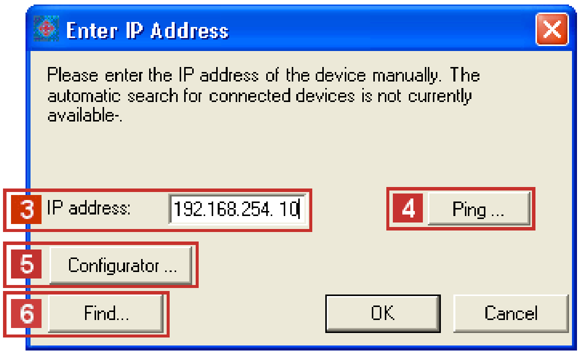
	Device	Bus connection	Device access path	Type coding
☑	My Axis 10	Profinet	EPL:/192_168_254_10/	E94AFH
☑	My Axis11	Profinet	EPL:/192_168_254_11/	E94AFH

Project path: /Neues_Projekt_PN/My Axis 10
Bus connection: Profinet
IP address: 192.168.254. 10

Please select the required device in the table, specify the bus connection and select the device using the "Find/Enter" button...

If the device access path is not configured correctly, the 1 IP address of the inverter selected in the display field can be entered manually here.

Via 2 **Search/Enter** you can establish a connection to devices which have not appeared in the display field. Corresponding settings for this can be made in the dialog window *Enter IP address*, which is shown:



Please enter the IP address of the device manually. The automatic search for connected devices is not currently available-.

IP address: 192.168.254. 10

Here you can enter an 3 **IP address** manually or execute the following actions using the buttons:

- Execute the console command 4 **Ping**.
- Assign the IP address via the 5 **Configurator**.
  ▸ Setting via the PROFINET configurator of the »Engineer« (📖 30)
- Select the device access path to the desired inverter by clicking 6 **Find**.

After having established the online connection, you can continue work with the »Engineer« as usual.

6.6 Initial switch-on

Establishing communication

- To establish communication, the inverter drive must be supplied with mains voltage.
- PROFINET communication requires voltage supply of the communication unit.
- If this is requirement is not met, the "CE04: MCI communication error" error message (error No. 01.0127.00002) is output. The error must be reset in the Inverter Drive, so that AS-i communication can be established.
- The external voltage supply serves to maintain PROFINET communication if the main supply fails.

  ▸ External voltage supply (🕮 24)
- With mains connection (power ON), ...
  - all parameters (codes) are read;
  - the output data are set to '0'.
- Addressing can be effected automatically via the IO controller or manually via codes in the »Engineer«.

  ▸ Setting the station name (🕮 27)
- Addressing the inverter requires a valid IP configuration if communication between the PC/ »Engineer« and the inverter via PROFINET is to be established.

  ▸ Setting the IP configuration (🕮 29)

7 Data transfer

PROFINET transmits parameter data, configuration data, diagnostic data, alarm messages, and process data between the host (I/O controller) and the inverters that are part of the fieldbus (I/O devices). Depending on their time-critical behaviour, the data are transmitted via corresponding communication channels.

7.1 Communication channels

- The process data channel transmits process data.
  - The process data serve to control the inverter.
  - The transmission of process data is time-critical.
  - Process data are transmitted cyclically between the I/O controller and the I/O devices that are part of the fieldbus according to the Provider/Consumer model (continuous exchange of current input and output data).
  - The I/O controller can directly access the process data. In the PLC, for instance, the data are directly assigned to the I/O area.
  - The Inverter Drive 8400 motec can exchange a maximum of 8 process data words (16 bits/word) per direction.
  - Process data are not saved in the inverter.
  - Process data are e.g. setpoints, actual values, control words, and status words.

Note!

Please observe the direction of the flow of information!

- Process input data (Rx data):
  - Process data from the inverter (IO device) to the IO controller
- Process output data (Tx data):
  - Process data from the IO controller to the inverter (IO device)

- Parameter data are transmitted via the acyclic channel.
  - The transmission of parameter data is usually not time-critical.
  - The access to the parameter data depends on the PROFIdrive profile.
  - Examples of parameter data are operating parameters, motor data, and diagnostic information.
  - The acyclic channel provides access to all Lenze codes.
  - Parameter changes must be stored via code **C00002** of the Inverter Drive 8400 motec.

7.2 Response of the outputs in compliance with PROFINET standard V2.3

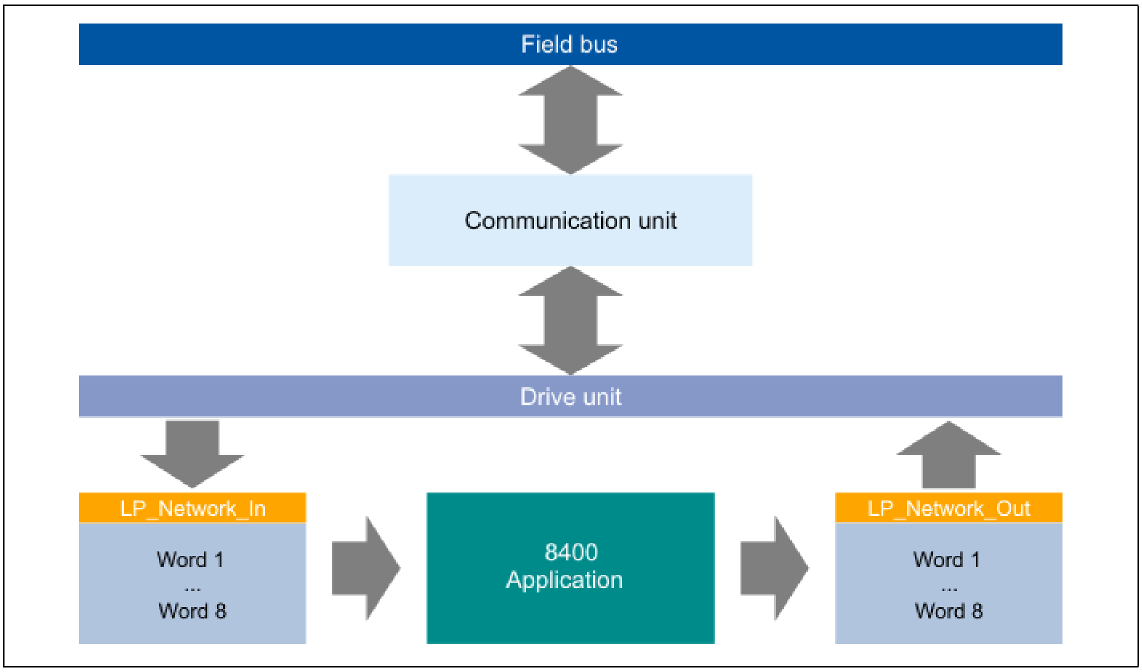
Event	Response of the outputs
Switch on mains (power ON)	The output data are set to '0'.
Abort of the process data transfer	The output data are treated according to the parameter setting of codes C13880/1, C13881/0, and C13885/0.
Invalid IO controller output values	The output data are set to '0'.

8 Process data transfer

8.1 Access to process data / PDO mapping

Process data are transferred via the MCI/CAN interface.

- Max. 8 words (16 bits/word) per direction can be exchanged.
- The process data are accessed via the **LP_Network_In** and **LP_Network_Out** port blocks. These port blocks are also called process data channels.
- Port block **LP_Network_In** maps the MCI PDOs received.
- Port block **LP_Network_Out** maps the MCI PDOs to be transmitted.
- The port/function blocks of the process data objects (PDO) are interconnected via the Lenze »Engineer«.



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

Reference manual/online help for the Inverter Drive 8400 motec

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

8.2 Port interconnection of process data objects (PDO)

Note!

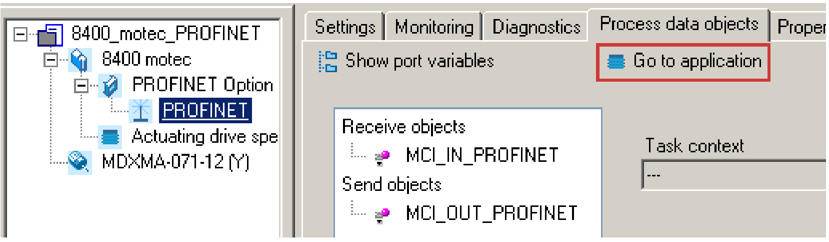
The »Engineer« screenshots shown on the following pages are only examples of the setting sequence and the resulting screens.

Depending on the software version of the and the version of the »Engineer« installed, the screenshots may vary from your »Engineer« depiction.

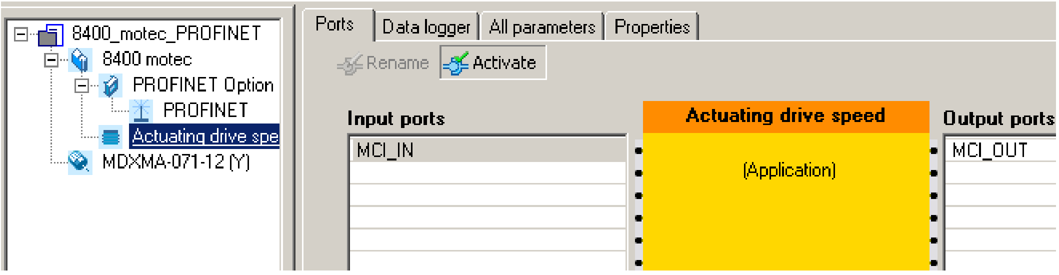
The preconfigured port interconnection of the process data objects is activated by setting code **C00007 = 40: Network (MCI/CAN)**.

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

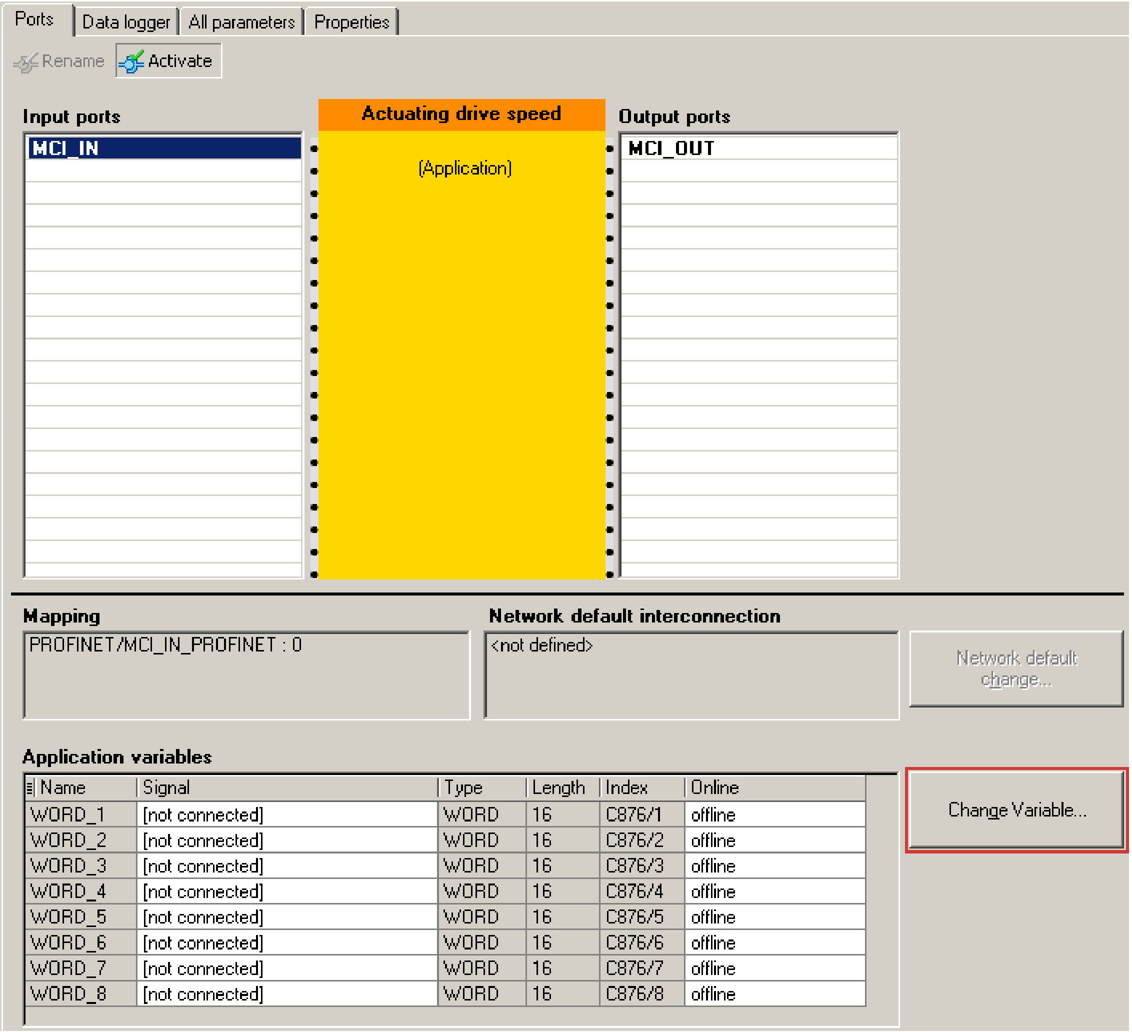
1. Go to the **Process data objects** tab and click **Go to application**.



2. The **Ports** tab displays the port blocks MCI_IN and MCI_OUT.



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



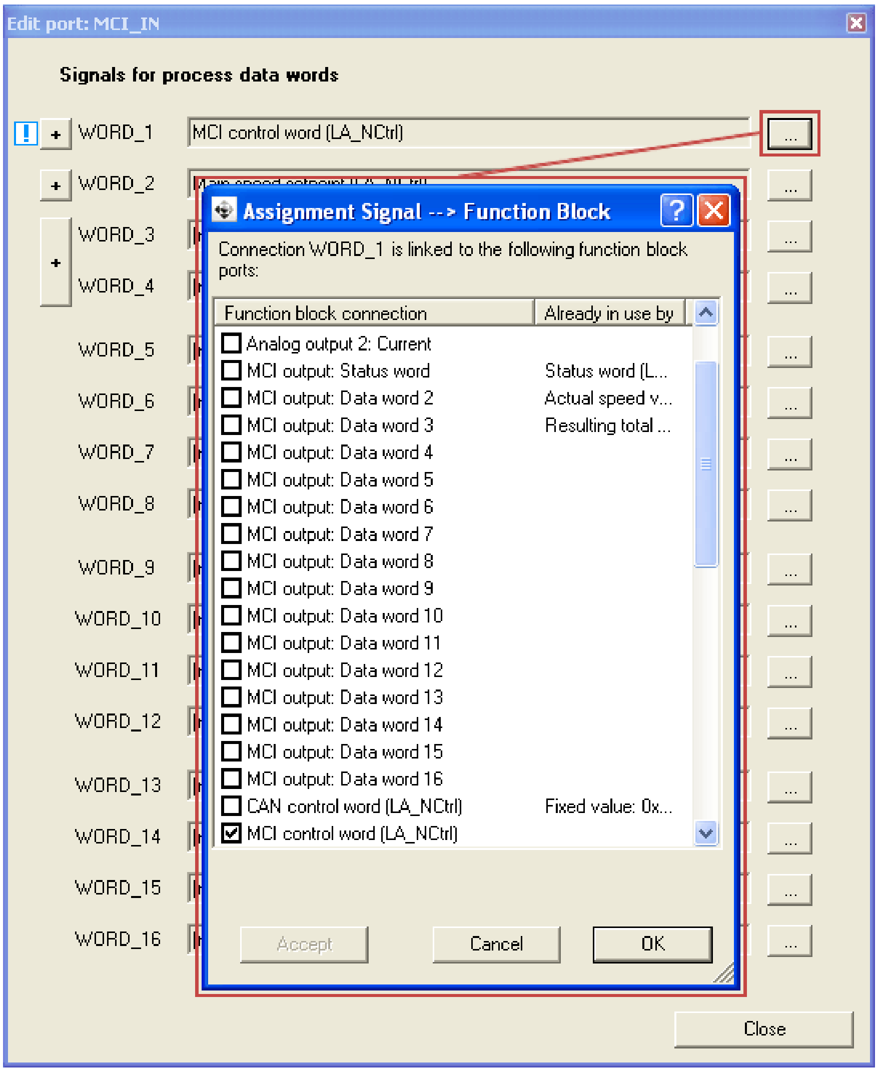
Mapping
PROFINET/MCI_IN_PROFINET : 0

Network default interconnection
<not defined>

Application variables

Name	Signal	Type	Length	Index	Online
WORD_1	[not connected]	WORD	16	C876/1	offline
WORD_2	[not connected]	WORD	16	C876/2	offline
WORD_3	[not connected]	WORD	16	C876/3	offline
WORD_4	[not connected]	WORD	16	C876/4	offline
WORD_5	[not connected]	WORD	16	C876/5	offline
WORD_6	[not connected]	WORD	16	C876/6	offline
WORD_7	[not connected]	WORD	16	C876/7	offline
WORD_8	[not connected]	WORD	16	C876/8	offline

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



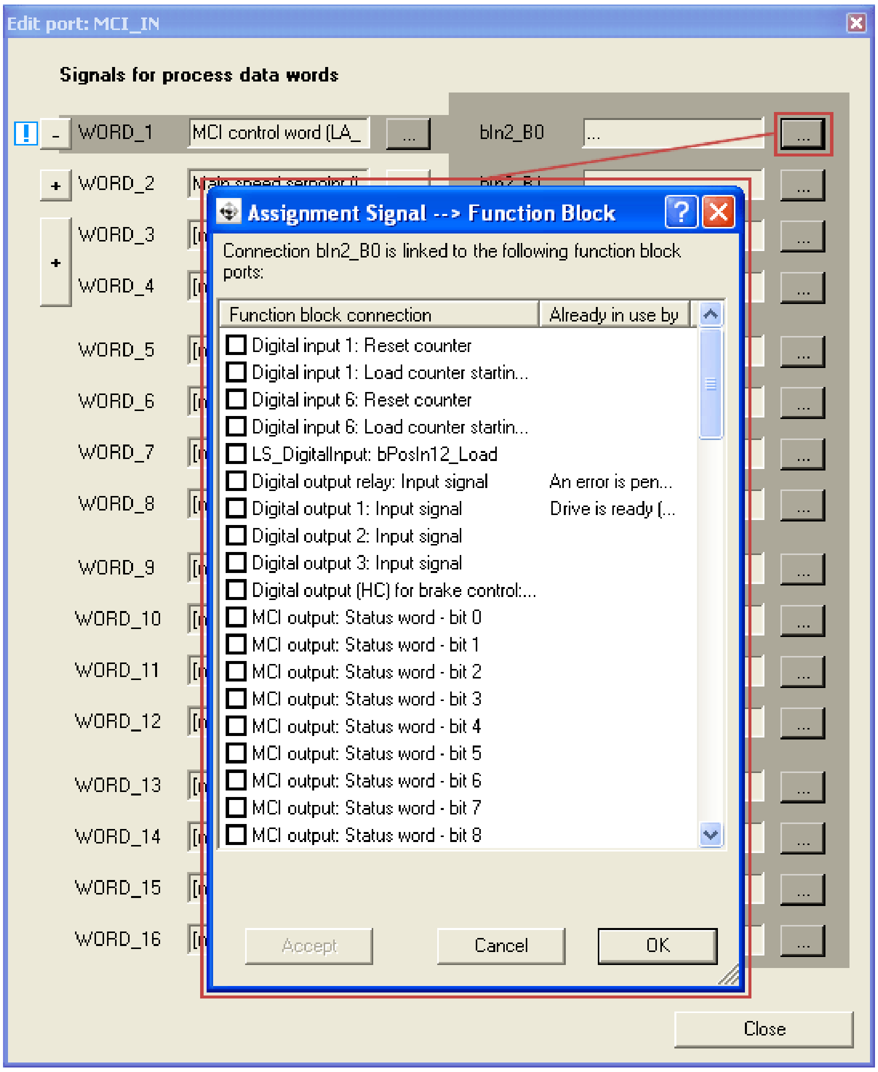
WORD_1: MCI control word (LA_NCtrl)

Connection WORD_1 is linked to the following function block ports:

Function block connection	Already in use by
☐ Analog output 2: Current	
☐ MCI output: Status word	Status word (L...
☐ MCI output: Data word 2	Actual speed v...
☐ MCI output: Data word 3	Resulting total ...
☐ MCI output: Data word 4	
☐ MCI output: Data word 5	
☐ MCI output: Data word 6	
☐ MCI output: Data word 7	
☐ MCI output: Data word 8	
☐ MCI output: Data word 9	
☐ MCI output: Data word 10	
☐ MCI output: Data word 11	
☐ MCI output: Data word 12	
☐ MCI output: Data word 13	
☐ MCI output: Data word 14	
☐ MCI output: Data word 15	
☐ MCI output: Data word 16	
☐ CAN control word (LA_NCtrl)	Fixed value: 0x...
☑ MCI control word (LA_NCtrl)	

For some process data words, you can also assign signals to the individual bits via the + and ... buttons.

→ Select the signals and then confirm the selection with **OK**.



Connection bIn2_B0 is linked to the following function block ports:

Function block connection	Already in use by
☐ Digital input 1: Reset counter	
☐ Digital input 1: Load counter startin...	
☐ Digital input 6: Reset counter	
☐ Digital input 6: Load counter startin...	
☐ LS_DigitalInput: bPosIn12_Load	
☐ Digital output relay: Input signal	An error is pen...
☐ Digital output 1: Input signal	Drive is ready (...
☐ Digital output 2: Input signal	
☐ Digital output 3: Input signal	
☐ Digital output (HC) for brake control:...	
☐ MCI output: Status word - bit 0	
☐ MCI output: Status word - bit 1	
☐ MCI output: Status word - bit 2	
☐ MCI output: Status word - bit 3	
☐ MCI output: Status word - bit 4	
☐ MCI output: Status word - bit 5	
☐ MCI output: Status word - bit 6	
☐ MCI output: Status word - bit 7	
☐ MCI output: Status word - bit 8	

The current interconnection is only displayed if the following has been set for the control mode in code **C00007 = 40: Network (MCI/CAN)**.

8.3 Process input data AI/DI (Slot2)

- 0, 1, or 2 input words can be optionally assigned to slot 2.
- The data represent the states of the digital inputs (RFR, DI1 ... DI5) and the analog input of the device.
- Via the fieldbus these data can even be read when no mains voltage is applied to the Communication Unit and only the fieldbus interface connection is supplied with 24 V DC.

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

9 Parameter data transfer

9.1 The acyclic channel (PROFIdrive profile)

An optional service extension is the acyclic parameter data transfer.

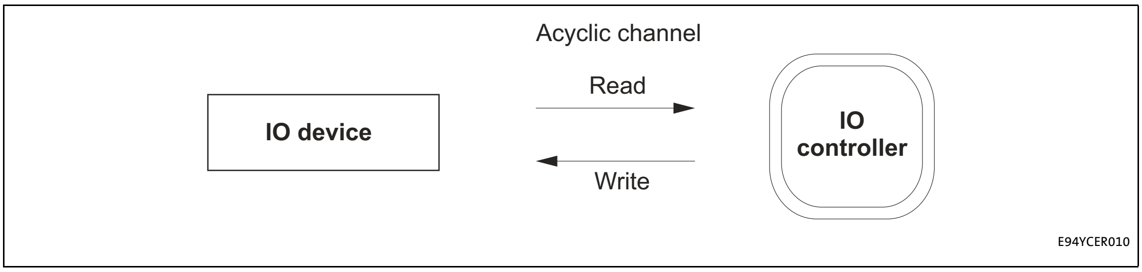
Cyclic and acyclic PROFINET services can be operated simultaneously in the network.

Product features

- There is always only one parameter request in process (no pipelining).
- No spontaneous messages are transferred.
- There are only acyclic parameter requests.
- Profile-specific parameters can be read independently of the I/O device state.

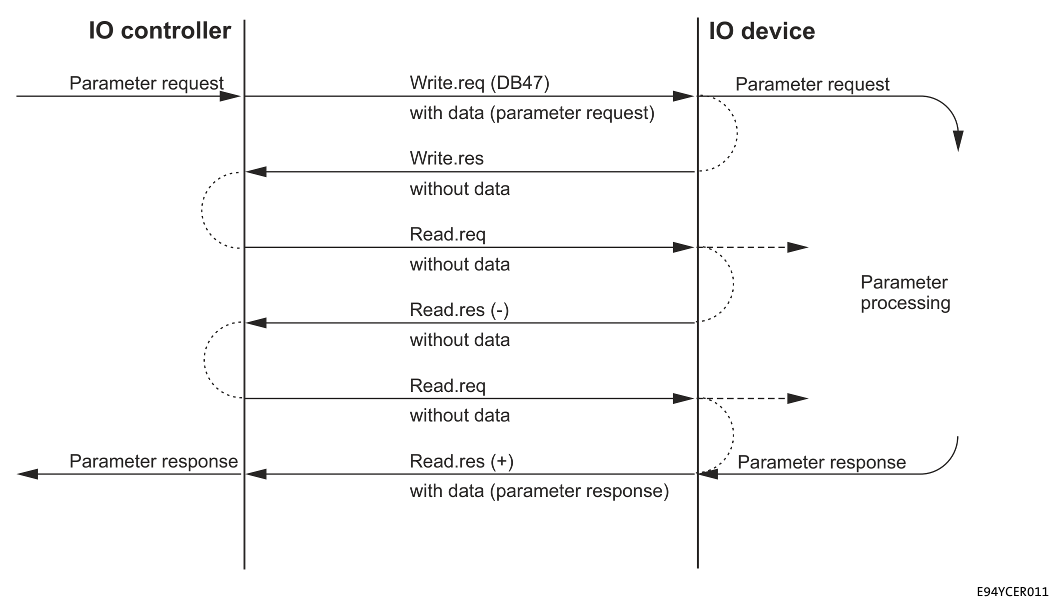
9.1.1 Connection establishment of an I/O controller to an I/O device

An I/O controller can always be used to request parameters from an I/O device if the I/O device is in the "Data_Exchange" state.



[9-1] Data communication via the acyclic channel

9.1.2 Acyclic data transmission process



[9-2] Data communication via the acyclic channel

- A "Write.req" is used for transmitting the data set (DB47) to the I/O device in the form of a parameter request.
- "Write.res" confirms the receipt of the message by the I/O controller.
- The I/O controller requests the response of the I/O device with "Read.req".
- The I/O device responds with a "Read.res (-)" if processing is not yet completed.
- After parameter processing, the parameter request is completed by transmitting the parameter response in the form of a "Read.res (+)" to the I/O controller.

9.1.3 Structure of the PROFINET data frame

Dest Addr	Scr Addr	VLAN Day	Type 0800H	RPC	NDR	Read/Write Block	Data	FSC
6 bytes	6 bytes	4 bytes	4 bytes	80 bytes	64 bytes	64 bytes	0 ... 240 bytes	4 bytes

In the "Read/Write Block", the initiator specifies the access to data set "DB47". The data which are written to this index or read by it contain a header and the parameter request or the parameter response. The read data or the data to be written are contained in the "Data" field.

The following subchapters describe the parameter request and the parameter response in detail.

PROFINET specification

Here you will find detailed information on the PROFINET data telegram.

Assignment of the user data depending on the data type

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

Data type	Length	User data assignment				
		Byte 1	Byte 2	Byte 3	Byte 4	Byte ...
String	x bytes	🟨	🟨	🟨	🟨	🟨
U8	1 byte	🟨	00			
U16	2 bytes	High byte	Low byte			
		🟨	🟨			
U32	4 bytes	High word		Low word		
		High byte	Low byte	High byte	Low byte	
		🟨	🟨	🟨	🟨	

9.2 Reading parameters from the inverter

Note!

- When a read request is processed, no parameter value is written to the I/O device.
- In the case of a multi-parameter read request, parameter attribute, index, and subindex are repeated "n" times, "n" being the number of parameters requested.

Request header

Byte 1	Byte 2	Byte 3	Byte 4
Request reference	Request identification	Axis	Number of indices

Field	Data type	Values
Request reference	U8	This value is specified by the I/O controller.
Request identification	U8	0x01: Request parameters for reading
Axis	U8	0x00 or 0x01
Number of indices	U8	0x"n" (n = number of parameters requested)

Parameter attribute

Byte 5	Byte 6
Attribute	Number of subindices

Field	Data type	Values
Attribute	U8	0x10: Value
Number of subindices	U8	0x00 or 0x01

Index and subindex

Byte 7	Byte 8	Byte 9	Byte 10
Index		Subindex	
High byte	Low byte	High byte	Low byte

Field	Data type	Values
Index	U16	0x0001 ... 0xFFFF (1 ... 65535)
Subindex	U16	0x0001 ... 0xFFFF (1 ... 65535)

9.2.1 Response to a correctly executed read request

Note!

- Responses to read requests do not contain parameter attributes and indices/ subindices.
- When a multi-parameter read request is transmitted, the parameter format and the parameter value are repeated "n" times, "n" being the number of parameters requested.

Response header

Byte 1	Byte 2	Byte 3	Byte 4
Request reference (mirrored)	Response identification	Axis (mirrored)	Number of indices

Field	Data type	Values
Request reference	U8	Mirrored value of the parameter request
Response identification	U8	0x01: Parameter has been read
Axis	U8	0x00 or 0x01
Number of indices	U8	0x"n" (n = number of parameters requested)

Parameter format

Byte 5	Byte 6
Format	Number of values

Field	Data type	Values
Format	U8	0x02: Integer8 0x03: Integer16 0x04: Integer32 0x05: Unsigned8 0x06: Unsigned16 0x07: Unsigned32 0x09: Visible string 0x0A: Octet string 0x40: Zero 0x41: Byte 0x42: Word 0x43: Double word
Number of values	U8	• 0x01 • Number of requested subindices. (If there is more than one subindex, only the parameter value is repeated.) • In the case of string codes, the number of characters is entered here.

Parameter value

Byte 7	Byte 8	Byte 9	Byte 10
Value			

Field	Data type	Values
Value	String	Any
	U8	0x00 .... 0xFF
	U16	0x0000 .... 0xFFFF
	U32	0x0000 0000 .... 0xFFFFFFFF

9.2.2 Response to a read error

Response header

Byte 1	Byte 2	Byte 3	Byte 4
Request reference (mirrored)	Response identification	Axis (mirrored)	Number of indices

Field	Data type	Values
Request reference	U8	Mirrored value of the parameter request
Response identification	U8	0x81: Parameter has not been read • The data in the bytes 7 + 8 must be interpreted as an error code.
Axis	U8	0x00 or 0x01
Number of indices	U8	0x"n" (n = number of parameters requested)

Parameter format

Byte 5	Byte 6
Format	Number of values

Field	Data type	Values
Format	U8	0x44: Error
Number of values	U8	0x01: Error code without additional information 0x02: Error code with additional information

Error code

Byte 7	Byte 8	Byte 9	Byte 10
Error code		Additional information (if available)	
High byte	Low byte	High byte	Low byte

Field	Data type	Values
Error code	U16	0x0000 .... 0xFFFF ▸ Error information (error) (🕮 61)
Additional information (if available)	U16	

9.2.3 Frame example: Read request

The heatsink temperature of the inverter is to be read.

- Code to be read: C00061
- Heatsink temperature: 43 °C

Parameter request

Byte 1	Byte 2	Byte 3	Byte 4
Request reference	Request identification	Axis	Number of indices
0xXX	0x01	0x00	0x01
	Request parameters for reading		

Byte 5	Byte 6
Attribute	Number of subindices
0x10	0x00
Value	No subindex

Byte 7	Byte 8	Byte 9	Byte 10
Index		Subindex	
High byte	Low byte	High byte	Low byte
0x5F	0xC2	0x00	0x00
Index = 24575 - code no. = 24575 - 61 = 24514 = 0x5F C2		No subindex	

Parameter response to a correctly executed read request

Byte 1	Byte 2	Byte 3	Byte 4
Request reference	Response identification	Axis	Number of indices
0xXX	0x01	0x00	0x01
(mirrored)	Parameter has been read	(mirrored)	

Byte 5	Byte 6
Format	Number of values
0x43	0x01
Double word	1 value

Byte 7	Byte 8	Byte 9	Byte 10
Value			
High word: high byte	High word: low byte	Low- word: high byte	Low word: low byte
0x00	0x00	0x00	0x2B
Read value = 0x00 00 00 2B = 43 x 1 (internal factor) = 43 [°C]			

Parameter response to a read error

Byte 1	Byte 2	Byte 3	Byte 4
Request reference	Response identification	Axis	Number of indices
0xXX	0x81	0x00	0x01
(mirrored)	Parameter has not been read	(mirrored)	

Byte 5	Byte 6
Format	Number of values
0x44	0x01
Error	Error code without additional information

Byte 7	Byte 8
Error code	
High byte	Low byte
For the meaning see the chapter "Error information (error)" (🕮 61)	

9.3 Writing parameters to the inverter

Note!

- When a multi-parameter write request is processed, the parameter attribute, index, subindex, and then the parameter format and parameter value are repeated "n" times, "n" being the number of parameters requested.
- A parameter request must not exceed the maximum data length of 240 bytes.

Request header

Byte 1	Byte 2	Byte 3	Byte 4
Request reference	Request identification	Axis	Number of indices

Field	Data type	Values
Request reference	U8	This value is specified by the I/O controller.
Request identification	U8	0x02: Write parameter
Axis	U8	0x00 or 0x01
Number of indices	U8	0x"n" (n = number of parameters requested)

Parameter attribute

Byte 5	Byte 6
Attribute	Number of subindices

Field	Data type	Values
Attribute	U8	0x10: Value
Number of subindices	U8	0x00 or 0x01

Index and subindex

Byte 7	Byte 8	Byte 9	Byte 10
Index		Subindex	
High byte	Low byte	High byte	Low byte

Field	Data type	Values
Index	U16	0x0001 ... 0xFFFF (1 ... 65535)
Subindex	U16	0x0001 ... 0xFFFF (1 ... 65535)

Parameter format

Byte 11	Byte 12
Format	Number of values

Field	Data type	Values
Format	U8	0x02: Integer8 0x03: Integer16 0x04: Integer32 0x05: Unsigned8 0x06: Unsigned16 0x07: Unsigned32 0x09: Visible string 0x0A: Octet string 0x40: Zero 0x41: Byte 0x42: Word 0x43: Double word
Number of values	U8	• 0x01 • Number of requested subindices. (If there is more than one subindex, only the parameter value is repeated.) • In the case of string codes, the number of characters is entered here.

Parameter value

Byte 13	Byte 14	Byte 15	Byte 16
Value			

Field	Data type	Values
Value	String	Any
	U8	0x00 .... 0xFF
	U16	0x0000 .... 0xFFFF
	U32	0x0000 0000 .... 0xFFFFFFFF

9.3.1 Response to a correctly executed write request

Response header

Byte 1	Byte 2	Byte 3	Byte 4
Request reference (mirrored)	Response identification	Axis (mirrored)	Number of indices

Field	Data type	Values
Request reference	U8	Mirrored value of the parameter request
Response identification	U8	0x01: Parameter written
Axis	U8	0x00 or 0x01
Number of indices	U8	0x"n" (n = number of parameters requested)

9.3.2 Response to a write error

Note!

In the case of a multi-parameter request, correct and possible faulty messages are summarised in one frame. They have the following data contents:

- Correct message
  - Format: 0x40
  - Number of values: 0x00
- Faulty message
  - Format: 0x44
  - Number of values: 0x01 or 0x02
  - Error code without additional information (number of values = 0x01) *or*
  - Error code with additional information (number of values = 0x02)

A faulty access to a parameter "n" is indicated at the nth position in the response frame of a multi-parameter request.

Response header

Byte 1	Byte 2	Byte 3	Byte 4
Request reference (mirrored)	Response identification	Axis (mirrored)	Number of indices

Field	Data type	Values
Request reference	U8	Mirrored value of the parameter request
Response identification	U8	0x82: Parameter has not been written • The data in the bytes 7 + 8 must be interpreted as an error code.
Axis	U8	0x00 or 0x01
Number of indices	U8	0x"n" (n = number of parameters requested)

Parameter format

Byte 5	Byte 6
Format	Number of values

Field	Data type	Values
Format	U8	0x44: Error
Number of values	U8	0x01: Error code without additional information 0x02: Error code with additional information

Error code

Byte 7	Byte 8	Byte 9	Byte 10
Error code		Additional information (if available)	
High byte	Low byte	High byte	Low byte

Field	Data type	Values
Error code	U16	0x0000 .... 0xFFFF ▸ Error information (error) (🕮 61)
Additional information (if available)	U16	

9.3.3 Frame example: Write request

In the inverter, the deceleration time for quick stop is to be set to 50 ms.

- Code to be written: C00105

Parameter request

Byte 1	Byte 2	Byte 3	Byte 4
Request reference	Request identification	Axis	Number of indices
0xXX	0x02	0x00	0x01
	Write parameters	Axis 0	1 index

Byte 5	Byte 6
Attribute	Number of subindices
0x10	0x00
Value	No subindex

Byte 7	Byte 8	Byte 9	Byte 10
Index		Subindex	
High byte	Low byte	High byte	Low byte
0x5F	0x96	0x00	0x00
Index = 24575 - code no. = 24575 - 105 = 24470 = 0x5F 96		No subindex	

Byte 11	Byte 12
Format	Number of values
0x43	0x01
Double word	1 value

Byte 13	Byte 14	Byte 15	Byte 16
Value			
High word: high byte	High word: low byte	Low- word: high byte	Low word: low byte
0x00	0x00	0x00	0x32
Value to be written = 0.05 [s] x 1000 (internal factor) = 50 = 0x00 00 00 32			

Parameter response to a correctly executed write request

Byte 1	Byte 2	Byte 3	Byte 4
Request reference	Response identification	Axis	Number of indices
0xXX	0x02	0x00	0x01
(mirrored)	Parameter has been written	(mirrored)	1 index

Parameter response after write error

Byte 1	Byte 2	Byte 3	Byte 4
Request reference	Response identification	Axis	Number of indices
0xXX	0x82	0x00	0x01
(mirrored)	Parameter has not been written	(mirrored)	1 index

Byte 5	Byte 6
Format	Number of values
0x44	0x01
Error	Error code without additional information

Byte 7	Byte 8
Error code	
High byte	Low byte
For the meaning see the chapter "Error information (error)" (🕮 61)	

9.4 Error information (error)

Error code	Meaning	Description	Additional information
0x0000	Impermissible parameter number	Access to unavailable parameter	-
0x0001	Parameter value cannot be changed	Change access to a parameter value that cannot be changed	Subindex
0x0002	Lower or upper value limit exceeded	Change access with value beyond the value limits	Subindex
0x0003	Faulty subindex	Access to unavailable subindex	Subindex
0x0004	No array	Access with subindex to non-indicated parameter	-
0x0005	Wrong data type	Change access with value that does not match the data type of the parameter	-
0x0006	No setting permitted (only resettable)	Change access with value unequal to 0 where this is not permitted	Subindex
0x0007	Description element cannot be changed	Change access to a description element that cannot be changed	Subindex
0x0008	Reserved	(PROFIdrive profile V2: PPO-Write requested in the IR is not available)	-
0x0009	Description data not available	Access to unavailable description (parameter value is available)	-
0x000A	Reserved	(PROFIdrive profile V2: Wrong access group)	-
0x000B	No parameter change rights	Change access without parameter change rights	-
0x000C	Reserved	(PROFIdrive profile V2: Wrong password)	-
0x000D	Reserved	(PROFIdrive profile V2: Text in the cyclic traffic cannot be read)	-
0x000E	Reserved	(PROFIdrive profile V2: Name in the cyclic traffic cannot be read)	-
0x000F	No text array available	Access to unavailable text array (parameter value is available)	-
0x0010	Reserved	(PROFIdrive profile V2: Missing PPO-Write)	-
0x0011	Request cannot be executed due to the operating state	Access is not possible due to temporary reasons not specified here	-
0x0012	Reserved	(PROFIdrive profile V2: Other error)	-
0x0013	Reserved	(PROFIdrive profile V2: date in the cyclic traffic cannot be read)	-
0x0014	Value impermissible	Change access with the value that is inside the value limits but not permissible for other permanent reasons (parameters with defined individual values)	Subindex
0x0015	Response too long	The length of the current response exceeds the maximum transmittable length	-
0x0016	Parameter address impermissible	Impermissible or non-supported value for attribute, number of subindices, parameter number, or subindex, or a combination	-
0x0017	Format impermissible	Write request: Impermissible or non-supported format of parameter data	-
0x0018	Number of values not consistent	Write request: Number of values of the parameter data do not match the number of subindices in the parameter address	-
0x0019	Reserved	-	-
...			
0x0064			

Error code	Meaning	Description	Additional information
0x0065	Manufacturer-specific	-	-
...			
0x00FF			

9.5 Consistent parameter data

In the PROFINET communication system, data are permanently exchanged between the host (CPU + I/O controller) and the standard device via the plugged-on I/O device interface module. The I/O controller and the CPU (central processing unit) of the host access a joint memory: the dual port memory (DPM).

- The DPM permits a data exchange in both directions (write/read):

It could happen that a slower I/O controller writing would be overtaken by a faster CPU reading within a cycle time without any further data organisation.

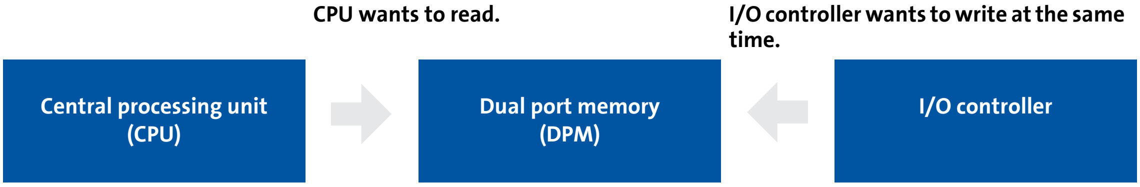
In order to avoid such an impermissible state, the parameter data to be transmitted must be marked as "consistent".

Data communication with consistent data

With consistency, either "reading" or "writing" is possible when the I/O controller and the CPU simultaneously access the memory:

- The I/O controller transfers data only as a complete data set.
- The CPU can only access completely updated data sets.
- The I/O controller cannot read or write data as long as the CPU accesses consistent data.

The result becomes clear from the example below:



1. As the I/O controller can only write when the CPU does not read, the I/O controller has to wait until the data are completely read by the CPU.
2. The I/O controller only writes a complete data set into the DPM.

Configuring consistent data

Note!

Consistency is achieved by an appropriate I/O controller configuration (see documentation for the configuring software).

10 Monitoring

10.1 Interruption of PROFINET communication

An interruption of PROFINET communication in the "Data_Exchange" state, e.g. by cable break or failure of the I/O controller is recognised by the I/O device.

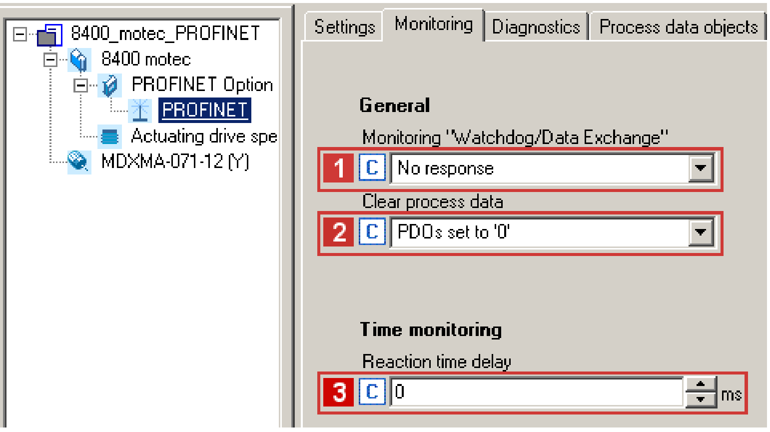
The response to the interruption of communication is controlled via the following settings:

1. During the initialisation of PROFINET communication the watchdog monitoring time specified in the I/O controller (C13882) is transferred to the I/O device.

   If the I/O device does not receive any valid process data in the "Data_Exchange" state, the process data are treated according to the setting in 2 C13885. (Like this the data that were sent last by the I/O controller can be used or set to zero.)

   After the watchdog monitoring time has elapsed, the I/O device changes to the "No_Data_Exchange" status (see C13861), and the red LED **BE** is activated (LED status displays (🕮 66)).

   There is no response in the I/O device.
2. To trigger a response in the IO device, you have to set a **Reaction of the Inverter Drive 8400 motec** 1 (C13880) additionally in the »»Engineer«« under the **Monitoring** tab.



General

Monitoring "Watchdog/Data Exchange"

1 C No response

Clear process data

2 C PDOs set to '0'

Time monitoring

Reaction time delay

3 C 0 ms

By setting a **Reaction time delay** 3 (C13881) you can decelerate this response.
- In the Lenze setting "0 ms", this monitoring is activated.
- With the setting "65535 ms", this monitoring is deactivated.
- A change of monitoring will be effective immediately.
- The monitoring time elapses when the "Data_Exchange" status is exited.

After this response delay has elapsed, the response set is executed with the error message "PROFINET: Data_Exchange status quit [0x01bc6531]" (🕮 73).

10.2 Interruption of internal communication

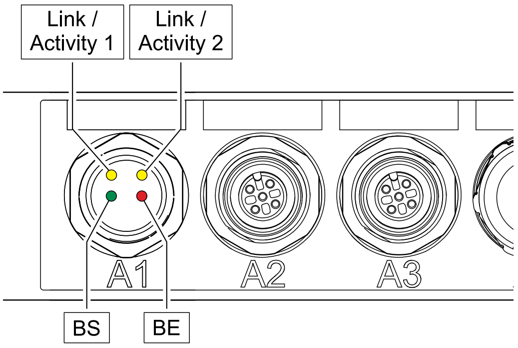
- The response in the case of a communication error between the Communication Unit and the Drive Unit can be set via code C01501.
- The Communication Unit reports a connection interruption to the IO controller and changes to the "No_Data_Exchange" state.
- The error message "PROFINET: Exist. conn. to 8400 lost [0x01bc3100]" (📖 71) is output.

11 Diagnostics

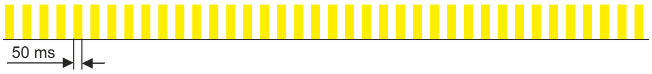
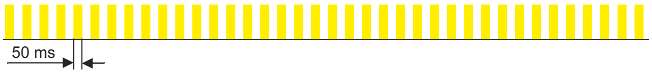
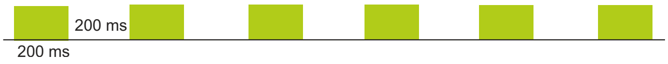
PROFINET communication faults can be diagnosed via the LEDs of the Communication Unit.

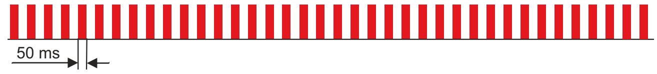
Moreover, the »Engineer« provides diagnostic PROFINET information.

11.1 LED status displays



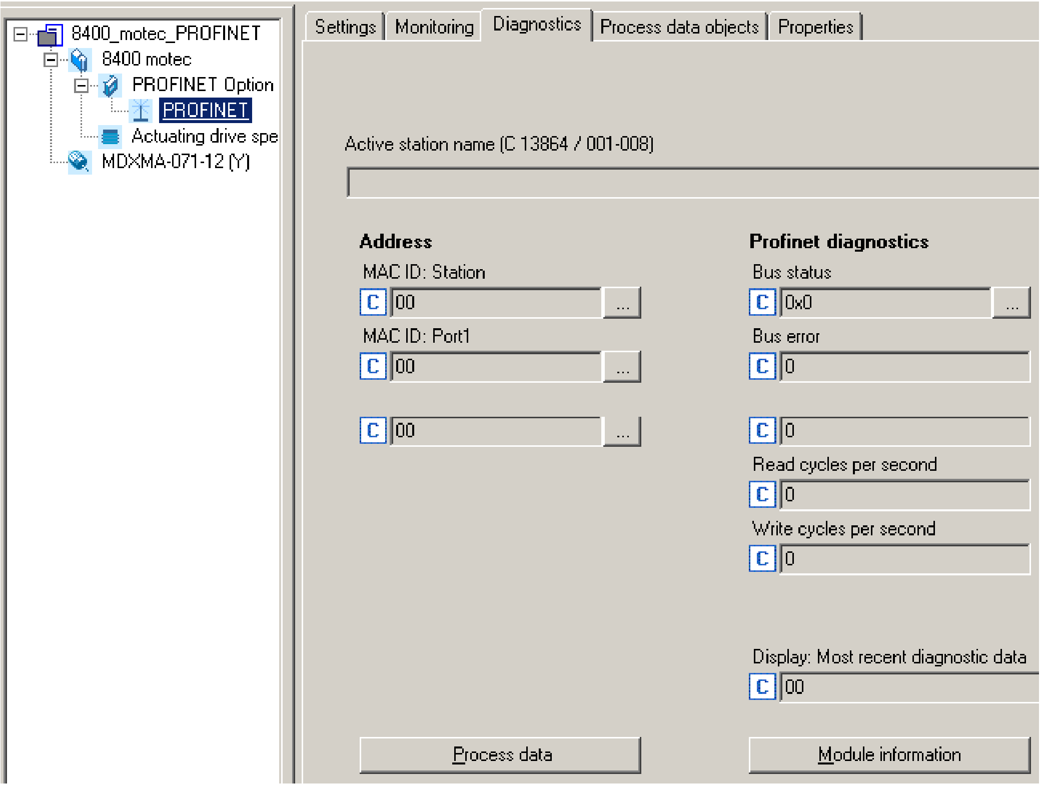
E84DG056

LED	Colour	Status	Description
Link / Activity 1	Yellow	Off	• No cable is connected to PROFINET port 1. • No communication
		On	 A cable is connected to PROFINET port 1.
		Flickers	 Communication at PROFINET port 1 is active.
Link / Activity 2	Yellow	Off	• No cable is connected to PROFINET port 2. • No communication
		On	 A cable is connected to PROFINET port 2.
		Flickers	 Communication at PROFINET port 2 is active.
BS (bus status)	green	Off	No communication (the Communication Unit is not active on the fieldbus or is in the "Init" status).
		blinking	 Communication active (the Communication Unit is in the "Data_Exchange" status.)

LED	Colour	Status	Description
BE (bus error)	red	On	 Bus error/fault is active (e.g. PROFINET cable not connected). The Communication Unit is in the "No_Data_Exchange" status.
		blinking	 Impermissible settings: • Invalid station name • Invalid IP parameters The Communication Unit has been initialised and continues to work internally with the corresponding standard values.
		Flickering/ blinking	From SW version 02.00 onwards with a 50 ms blinking pattern:  From SW version 03.00 onwards with a 500 ms blinking pattern:  The "Node blinking test" PROFINET function is activated by the I/O controller. The jittering LED serves to identify/localise accessible I/O devices.

11.2 Diagnosing with the »Engineer«

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



Active station name (C 13864 / 001-008)

Address

MAC ID: Station: C 00

MAC ID: Port1: C 00

C 00

Profinet diagnostics

Bus status: C 0x0

Bus error: C 0

C 0

Read cycles per second: C 0

Write cycles per second: C 0

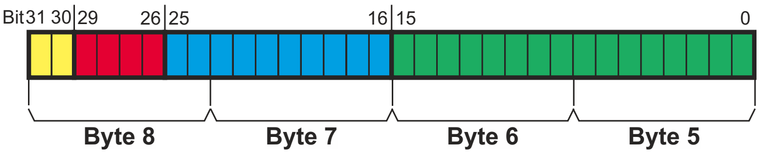
Display: Most recent diagnostic data: C 00

11.3 Diagnostic data

- The I/O device sends an alarm message to the I/O controller to signalise the diagnostic data below.
- Errors and warnings in the Inverter Drive 8400 motec are sent to the IO controller as extended diagnostic messages.
- The diagnostic data can be displayed using the hexadecimal representation of the Siemens S7 engineering tool.

Bytes	Meaning	Value [hex]
1 ... 6	Diag. block header	0x0010 001C 0100
7 ... 8	Alarm type	0x0001 (diagnosis)
9 ... 12	API	0x0000 0000
13, 14	Slot number	0x0001 / 0x0002
15, 16	Subslot number	0x0001
17 ... 20	Module ID	ID according to module
21 ... 24	Submodule ID	ID according to module
25, 26	Alarm specifier	0xB000
27, 28	User structure identifier	0x0001
29 ... 32	Error code of the Inverter Drive 8400 motec	

Error code of the Inverter Drive 8400 motec



- The error code can be found in bytes 29 ... 32 of the diagnostic message.
- In the logbook and in code **C00165**, the error number is shown in the following syntax in order to facilitate the readability:
  [error type].[error subject area no.].[error ID]

Example: error message "PROFINET: Data_Exchange status quit [0x01bc6531]"

Byte 32								Byte 31								Byte 30								Byte 29							
0x01								0xbc								0x65								0x31							
0	0	0	0	0	0	0	1	1	0	1	1	1	1	0	0	0	1	1	0	0	1	0	1	0	0	1	1	0	0	0	1
Response		Instance ID				Module ID										Error ID															

Reference manual/online help for the Inverter Drive 8400 motec

Detailed information on the error codes is provided here.

12 Error messages

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

12.1 Short overview of the PROFINET error messages

Reference manual/online help for the Inverter Drive 8400 motec

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

The following table contains all PROFINET error messages in numerical order of the error number. Furthermore the preset error response and - if applicable – the parameter for setting the error response is specified.

Tip!

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

Error no. [hex]	Subject area no. [dec]	Error no. [dec]	Error text	Error type (Error response)	Adjustable in
0x01bc3100	444	12544	PROFINET: Exist. connect. to 8400 lost	1: No Response	C01501/2
0x01bc5531	444	21809	PROFINET: Memory: No access	1: No Response	C01501/2
0x01bc5532	444	21810	PROFINET: Memory: Read error	1: No Response	C01501/2
0x01bc5533	444	21811	PROFINET: Memory: Write error (nt14: COM fault 14)	1: No Response	C01501/2
0x01bc6010	444	24592	PROFINET: Restart by watchdog reset	1: No Response	C01501/2
0x01bc6011	444	24593	PROFINET: Internal error	1: No Response	C01501/2
0x01bc6100	444	24832	PROFINET: Internal error	1: No Response	C01501/2
0x01bc6101	444	24833	PROFINET: Internal error	1: No Response	C01501/2
0x01bc641f	444	25631	PROFINET: Invalid parameter set	1: No Response	C01501/2
0x01bc6420	444	25632	PROFINET: Error: Lenze setting loaded	1: No Response	-
0x01bc6430	444	25648	PROFINET: Invalid module configuration	1: No Response	C01501/2
0x01bc6501	444	25857	PROFINET: Record parameter: Invalid read	4: Warning locked	-
0x01bc6502	444	25858	PROFINET: Record parameter: Invalid write	4: Warning locked	-
0x01bc6503	444	25859	PROFINET: Data output status bad	4: Warning locked	-
0x01bc6531	444	25905	PROFINET: Data_Exchange status quit	0: None	C13880/1
0x01bc6532	444	25906	PROFINET: Station name error	1: No Response	-
0x01bc6533	444	25907	PROFINET: IIP address error	1: No Response	-
0x01bc6534	444	25908	PROFINET: Stack init error	1: No Response	-
0x01bc6650	444	26192	PROFINET: Internal error	1: No Response	-

12.2 Possible causes and remedies

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

PROFINET: Exist. conn. to 8400 lost [0x01bc3100]

Response (Lenze setting printed in bold)	**Setting:** C01501/2 (☑ Adjustable response)
☑ None ☐ System fault ☒ **Fault** ☐ Trouble ☐ Quick stop by trouble ☑ Warning locked ☐ warning ☐ Information	

Cause	Remedy
• The Communication Unit is supplied with external voltage, but the Inverter Drive 8400 motec is not supplied with voltage. • The Communication Unit is not connected correctly to the Drive Unit.	• Switch off and on again the voltage supply of the Inverter Drive 8400 motec. • Check wiring and terminals. • Check internal plug connection between Communication Unit and Drive Unit. For this purpose, the Inverter Drive 8400 motec must be unscrewed. Please observe the information in the mounting instructions of the Communication Unit and the Drive Unit! • If this error continues to occur, please contact the Lenze Service. (if required, the Communication Unit must be replaced.)

PROFINET: Memory: No access [0x01bc5531]

Response (Lenze setting printed in bold)	**Setting:** C01501/2 (☑ Adjustable response)
☑ None ☐ System fault ☒ **Fault** ☐ Trouble ☐ Quick stop by trouble ☑ Warning locked ☐ warning ☐ Information	

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

PROFINET: Memory: Read error [0x01bc5532]

Response (Lenze setting printed in bold)	**Setting:** C01501/2 (☑ Adjustable response)
☑ None ☐ System fault ☒ **Fault** ☐ Trouble ☐ Quick stop by trouble ☑ Warning locked ☐ warning ☐ Information	

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

PROFINET: Memory: Error when writing [0x01bc5533] (nt14: COM fault 14)

Response (Lenze setting printed in bold)	**Setting:** C01501/2 (☑ Adjustable response)
☑ None ☐ System fault ☒ **Fault** ☐ Trouble ☐ Quick stop by trouble ☑ Warning locked ☐ warning ☐ Information	

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

PROFINET: Restart through watchdog reset [0x01bc6010]

Response (Lenze setting printed in bold)	**Setting:** C01501/2 (☑ Adjustable response)
☑ None ☐ System fault ☒ **Fault** ☐ Trouble ☐ Quick stop by trouble ☑ Warning locked ☐ warning ☐ Information	

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

PROFINET: Internal error [0x01bc6011]

Response (Lenze setting printed in bold)	**Setting:** C01501/2 (☑ Adjustable response)
☑ None ☐ System fault ☒ **Fault** ☐ Trouble ☐ Quick stop by trouble ☑ Warning locked ☐ warning ☐ Information	

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

PROFINET: Internal error [0x01bc6100]

Response (Lenze setting printed in bold)	**Setting:** C01501/2 (☑ Adjustable response)
☑ None ☐ System fault ☒ **Fault** ☐ Trouble ☐ Quick stop by trouble ☑ Warning locked ☐ warning ☐ Information	

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

PROFINET: Internal error [0x01bc6101]

Response (Lenze setting printed in bold)	**Setting:** C01501/2 (☑ Adjustable response)
☑ None ☐ System fault ☒ **Fault** ☐ Trouble ☐ Quick stop by trouble ☑ Warning locked ☐ warning ☐ Information	

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

PROFINET: Invalid parameter set [0x01bc641f]

Response (Lenze setting printed in bold)	**Setting:** C01501/2 (☑ Adjustable response)
☑ None ☐ System fault ☒ **Fault** ☐ Trouble ☐ Quick stop by trouble ☑ Warning locked ☐ warning ☐ Information	

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

PROFINET: Error: Lenze setting loaded [0x01bc6420]

Response (Lenze setting printed in bold)	**Setting:** not possible
☐ No reaction ☐ System fault ☒ **Fault** ☐ Trouble ☐ Quick stop by trouble ☐ WarningLocked ☐ Warning ☐ Information	

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

PROFINET: Invalid module configuration [0x01bc6430]

Response (Lenze setting printed in bold)	**Setting:** C01501/2 (☑ Adjustable response)
☑ None ☐ System fault ☒ **Fault** ☐ Trouble ☐ Quick stop by trouble ☑ Warning locked ☐ warning ☐ Information	

Cause	Remedy
A module or submodule does not comply with the configuration of the Siemens STEP7 engineering tool.	Check module configuration.

PROFINET: Record parameter: Invalid read [0x01bc6501]

Response (Lenze setting printed in bold)	**Setting:** not possible
☐ None ☐ System fault ☐ Fault ☐ Trouble ☐ Quick stop by trouble ☒ **Warning locked** ☐ Warning ☐ Information	

Cause	Remedy
Invalid parameter read access	Check configuration.

PROFINET: Record parameter: Invalid write [0x01bc6502]

Response (Lenze setting printed in bold)	**Setting:** not possible
☐ None ☐ System fault ☐ Fault ☐ Trouble ☐ Quick stop by trouble ☒ **Warning locked** ☐ Warning ☐ Information	

Cause	Remedy
Invalid parameter write access When reading back the data, the IO Controller has requested a data length (number of data bytes) that is to small.	Check configuration.

PROFINET: Data output status bad [0x01bc6503]

Response (Lenze setting printed in bold)	**Setting:** not possible
☐ None ☐ System fault ☐ Fault ☐ Trouble ☐ Quick stop by trouble ☒ **Warning locked** ☐ Warning ☐ Information	

Cause	Remedy
• Output data invalid. • Connection to the Siemens STEP7 engineering tool has been interrupted.	• Check configuration. • Check cables and terminals.

PROFINET: Data_Exchange status quit [0x01bc6531]

Response (Lenze setting printed in bold)	**Setting:** C13880/1 (☑ Adjustable response)
☒ **None** ☐ System fault ☑ Fault ☐ Trouble ☑ Quick stop by trouble ☑ Warning locked ☐ Warning ☑ Information	

Cause	Remedy
The data exchange via PROFINET has been terminated. • Also see the chapter "Interruption of PROFINET communication" (🕮 64).	Check cables and terminals.

PROFINET: Station name error [0x01bc6532]

Response (Lenze setting printed in bold)	**Setting:** not possible
☐ None ☐ System fault ☒ **Fault** ☐ Trouble ☐ Quick stop by trouble ☐ Warning locked ☐ warning ☐ Information	

Cause	Remedy
Station name is not DNS-conform.	Use a DNS-compliant station name. ▶ Setting the station name (🕮 27)

PROFINET: IP address error [0x01bc6533]

Response (Lenze setting printed in bold)	**Setting:** not possible
☐ None ☐ System fault ☒ **Fault** ☐ Trouble ☐ Quick stop by trouble ☐ Warning locked ☐ warning ☐ Information	

Cause	Remedy
An invalid IP address has been assigned by the I/O controller via PROFINET or has been set in code C13000.	• Make sure that the I/O controller has assigned a valid IP address via PROFINET. • Set a valid IP address. ▸ Setting the IP configuration (📖 29)

PROFINET: Stack init error [0x01bc6534]

Response (Lenze setting printed in bold)	**Setting:** not possible
☐ None ☐ System fault ☒ **Fault** ☐ Trouble ☐ Quick stop by trouble ☐ Warning locked ☐ warning ☐ Information	

Cause	Remedy
The stack cannot be initialised with the parameters selected by the user. This may be due to a station name which does not comply with the PROFINET specification.	Check and, if necessary, adapt PROFINET parameters: ▸ Setting the IP configuration (📖 29) ▸ Setting the station name (📖 27)

PROFINET: Internal error [0x01bc6650]

Response (Lenze setting printed in bold)	**Setting:** not possible
☐ None ☐ System fault ☒ **Fault** ☐ Trouble ☐ Quick stop by trouble ☐ Warning locked ☐ warning ☐ Information	

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

13 Parameter reference

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

Reference manual/online help for the Inverter Drive 8400 motec

Here you will find general information on parameters.

13.1 Communication-relevant parameters of the operating system

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

C01501

<table>
<tr><td colspan="2">Parameter | Name:
C01501 | Response in case of communication fault with MCI</td><td>Data type: UNSIGNED_8
Index: 23074_d = $5A22_h$</td></tr>
<tr><td colspan="3">Configuration of monitoring functions for the Communication Unit</td></tr>
<tr><td colspan="2">Selection list</td><td></td></tr>
<tr><td>0</td><td>No response</td><td></td></tr>
<tr><td>1</td><td>Error</td><td></td></tr>
<tr><td>4</td><td>Warning Locked</td><td></td></tr>
<tr><td>Subcodes</td><td>Lenze setting</td><td>Info</td></tr>
<tr><td>C01501/1</td><td>1: No Response</td><td>Resp. to MCI fault 1
• Response to a communication fault.</td></tr>
<tr><td>C01501/2</td><td>1: No Response</td><td>Resp. to MCI fault 2
• Response to a fault in the Communication Unit.</td></tr>
<tr><td colspan="3">☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 1</td></tr>
</table>

C01503

<table>
<tr><td colspan="3">Parameter | Name:
C01503 | MCI timeout</td><td>Data type: UNSIGNED_16
Index: 23072_d = $5A20_h$</td></tr>
<tr><td colspan="3">Setting range (min. value | unit | max. value)</td><td></td></tr>
<tr><td>0</td><td>ms</td><td>1000</td><td></td></tr>
<tr><td>Subcodes</td><td colspan="2">Lenze setting</td><td>Info</td></tr>
<tr><td>C01503/1</td><td colspan="2">200 ms</td><td>MCI timeout</td></tr>
<tr><td colspan="4">☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 1</td></tr>
</table>

13.2 Parameters relevant for PROFINET communication

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

Note!

PROFINET command "Reset to Factory Defaults"

If the "Reset to factory defaults" PROFINET command is executed by an IO supervisor or an I/O controller, the PROFINET-specific parameters will be reset to their standard values:

- C13000 | IP address
- C13001 | Subnetwork mask
- C13002 | Gateway address
- C13010 | Active IP address
- C13011 | Active subnetwork mask
- C13012 | Active gateway address
- C13864 | Active station name
- C13887 | Suppress signalling diag. mess. upon
- C13899 | Station name
- C13910 | I&M1 system designation
- C13911 | I&M1 installation site
- C13912 | I&M2 installation date
- C13913 | I&M3 additional information
- C13914 | I&M4 signature code

C13000

Parameter | Name: **C13000 | IP address**			Data type: UNSIGNED_32 Index: 11575_d = $2D37_h$
Setting of the IP address ▸ Setting the IP configuration (📖 29)			
Setting range **(min. value | unit | max. value)**			**Lenze setting**
0		4294967295	**0**
☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT			

C13001

Parameter | Name: **C13001 | Subnetwork mask**			Data type: UNSIGNED_32 Index: 11574_d = $2D36_h$
Setting of the subnet mask ▸ Setting the IP configuration (📖 29)			
Setting range **(min. value | unit | max. value)**			**Lenze setting**
0		4294967295	**0**
☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT			

C13002

Parameter | Name: **C13002 | Gateway address**			Data type: UNSIGNED_32 Index: 11573_d = $2D35_h$
Setting of the gateway address ▸ Setting the IP configuration (🕮 29)			
Setting range (min. value | unit | max. value)			**Lenze setting**
0		4294967295	**0**
☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT			

C13003

Parameter | Name: **C13003 | Physical address**	Data type: OCTET_STRING Index: 11572_d = $2D34_h$
Display of the MAC-ID	
Subcodes	**Info**
C13003/1	MAC ID: Station
C13003/2	MAC ID: Port1
C13003/3	MAC ID: Port2
☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT	

C13010

Parameter | Name: **C13010 | Active IP address**			Data type: UNSIGNED_8 Index: 11565_d = $2D2D_h$
Display of the active IP address • The active IP address may differ from the contents of code C13000, depending on whether the station name was changed via the fieldbus or the parameter.			
Display range (min. value | unit | max. value)			
0		255	
Subcodes			**Info**
C13010/1			Active IP address.1
C13010/2			Active IP address.2
C13010/3			Active IP address.3
C13010/4			Active IP address.4
☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT			

C13011

Parameter | Name: **C13011 | Active subnetwork mask**			Data type: UNSIGNED_8 Index: 11564$_d$ = 2D2C$_h$
Display of the active subnetwork mask • The active subnetwork mask may differ from the contents of code C13001, depending on whether the station name was changed via the fieldbus or the parameter.			
Display range **(min. value | unit | max. value)**			
0		255	
Subcodes			**Info**
C13011/1			Active subnetwork mask.1
C13011/2			Active subnetwork mask.2
C13011/3			Active subnetwork mask.3
C13011/4			Active subnetwork mask.4
☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT			

C13012

Parameter | Name: **C13012 | Active gateway address**			Data type: UNSIGNED_8 Index: 11563$_d$ = 2D2B$_h$
Display of the active gateway address • The active gateway address may differ from the contents of code C13002, depending on whether the station name was changed via the fieldbus or the parameter.			
Display range **(min. value | unit | max. value)**			
0		255	
Subcodes			**Info**
C13012/1			Active gateway address.1
C13012/2			Active gateway address.2
C13012/3			Active gateway address.3
C13012/4			Active gateway address.4
☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT			

C13850

Parameter | Name: **C13850 | All words to master**			Data type: UNSIGNED_16 Index: 10725$_d$ = 29E5$_h$
Display of the process data words which are transmitted from the inverter to the IO controller. In the subcodes 1 to 8, all process data words to the I/O controller are displayed. However, only the configured process data words are valid.			
Display range **(min. value | unit | max. value)**			
0		65535	
Subcodes			**Info**
C13850/1			
...			
C13850/8			
☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT			

C13851

Parameter | Name: **C13851 | All words from master**				Data type: UNSIGNED_16 Index: 10724_d = $29E4_h$
Display of the process data words which are transmitted from the IO controller to the inverter. In the subcodes 1 to 8, all process data words from the I/O controller are displayed. However, only the configured process data words are valid.				
Display range **(min. value | unit | max. value)**				
0		65535		
Subcodes			**Info**	
C13851/1				
...				
C13851/8				
☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT				

C13860

Parameter | Name: **C13860 | Settings**				Data type: UNSIGNED_8 Index: 10715_d = $29DB_h$
Display range **(min. value | unit | max. value)**				
0		255		
Subcodes			**Info**	
C13860/1			Reserved	
C13860/2			Number of process data words	
C13860/3			Reserved	
C13860/4			Reserved	
☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT				

C13861

Parameter | Name: **C13861 | Bus status**		Data type: BITFIELD_16 Index: $10714_d = 29DA_h$
Bit-coded display of current bus status		
Value is bit-coded:		**Info**
Bit 0	Initialised	
Bit 1	Online	
Bit 2	Connected	
Bit 3	Address conflict	
Bit 4	Hardware error	
Bit 5	EEPROM error	
Bit 6	Watchdog error	
Bit 7	Protocol error	
Bit 8	Profinet stack ok	
Bit 9	Profinet stack not configured	
Bit 10	Ethernet controller error	
Bit 11	UDP stack error	
Bit 12	Reserved	
...	...	
Bit 15	Reserved	
☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT		

C13862

Parameter | Name: **C13862 | Bus counter**			Data type: UNSIGNED_32 Index: $10713_d = 29D9_h$
Display of the data cycles per second (independent of data changes)			
Display range **(min. value | unit | max. value)**			
0		4294967295	
Subcodes			**Info**
C13862/1			Data cycles per second
C13862/2			Read cycles per second
C13862/3			Write cycles per second
☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT			

C13864

Parameter | Name: **C13864 | Active station name**	Data type: VISIBLE_STRING Index: 10711_d = $29D7_h$
Displays the active station name used by the inverter. It may differ from the contents of code C13899, depending on whether the station name has been changed via the fieldbus or via C13899. ▸ Setting the station name (🕮 27)	
Subcodes	**Info**
C13864/1	1st ... 30th character
C13864/2	31th ... 60th character
C13864/3	61th ... 90th character
C13864/4	91th ... 120th character
C13864/5	121th ... 150th character
C13864/6	151th ... 180th character
C13864/7	181th ... 210th character
C13864/8	211th ... 240th character
☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT	

C13867

Parameter | Name: **C13867 | Display: Most recent diagnostic data**	Data type: OCTET_STRING Index: 10708_d = $29D4_h$
Display of the diagnostic data sent by the inverter most recently.	
☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT	

Bytes	Information
0	Slot
1	
2	Subslot
3	
4	Error code
...	
7	
8	Slot
9	
10	Subslot
11	
12	Error code
...	
15	

C13877

Parameter | Name: **C13877 | Bus error(1)**		Data type: UNSIGNED_16 Index: 10698_d = $29CA_h$
The code contains the error currently detected on the fieldbus. • The error values can occur in combination with the error values from code C13878.		
Selection list (read only)		**Info**
0	No error	
1	Internal error	
2	Unit ID unknown	
3	Max. units exceeded	
4	Invalid size	
5	Unit type unknown	
6	Runtime plug	
7	Invalid argument	
8	Service pending	
9	Stack not ready	
10	Command unknown	
11	Invalid address descriptor	
12	Watchdog expired	
13	Protocol not supported	
☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT		

C13878

Parameter | Name: **C13878 | Bus error(2)**		Data type: BITFIELD_16 Index: 10697_d = $29C9_h$
The code contains the error currently detected on the fieldbus. • The error values can occur in combination with the error values from code C13877.		
Value is bit-coded:		**Info**
Bit 0	Reserved	
...	...	
Bit 6	Reserved	
Bit 7	IP address error	
Bit 8	Station name error	
Bit 9	DataExch left	
Bit 10	Stack boot error	
Bit 11	Stack online error	
Bit 12	Stack state error	
Bit 13	Stack revision error	
Bit 14	Stack init error	
Bit 15	Stack CPU boot error	
☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT		

C13880

Parameter | Name: **C13880 | Monitoring Reaction**			Data type: UNSIGNED_8 Index: 10695_d = $29C7_h$
The action set in subcode 1 of the code is carried out when the node recognises that it is no longer in the "Data_Exchange" status. • Please also observe the notes provided in code C13881. • A change in the monitoring response becomes immediately effective.			
Selection list			
0	No response		
1	Error		
3	Quick stop by trouble		
4	Warning Locked		
6	Information		
Subcodes	**Lenze setting**	**Info**	
C13880/1	0: No Response	"Watchdog/Data Exchange" monitoring	
☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT			

C13881

Parameter | Name: **C13881 | Reaction time delay**				Data type: UNSIGNED_16 Index: 10694_d = $29C6_h$
If the "Data_Exchange" status is exited, the response parameterised in C13880 is activated after the time set here has expired. • A value of "65535" in this code deactivates the monitoring function. • A change of monitoring will be effective immediately.				
Setting range **(min. value | unit | max. value)**			**Lenze setting**	
0	ms	65535	**0 ms**	
☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT				

C13885

Parameter | Name: **C13885 | Clear process data**		Data type: UNSIGNED_8 Index: 10690_d = $29C2_h$
This code is used to set the process data which the I/O device is to process in order to maintain the internal communication when the PROFINET has exited the "Data_Exchange" status.		
Selection list **(Lenze setting printed in bold)**		
0	Use of most recent master PDOs	
1	**PDOs are set to the value'0'**	
☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT		

C13887

Parameter | Name: **C13887 | Suppress signalling diag. mess. upon**		Data type: BITFIELD_8 Index: 10688_d = $29C0_h$
With this code, the transmission of alarm messages to the IO controller can be suppressed. By setting the corresponding bit to TRUE, errors of a specific type can be suppressed systematically. In addition, all errors are entered in the logbook. • A change can only be effective immediately if no error number with the error type selected here is active in **C00165**.		
Value is bit-coded:		**Info**
Bit 0	Error	
Bit 1	Fault	
Bit 2	Quick stop by trouble	
Bit 3	Warning Locked	
Bit 4	Warning	
Bit 5	Information	Starting from SW version 3.00.
Bit 6	Reserved	
Bit 7	Connection to 8400 lost	Starting from SW version 3.00. Error message: PROFINET: Exist. conn. to 8400 lost [0x01bc3100] (🕮 71)
☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT		

C13899

Parameter | Name: **C13899 | Station name**		Data type: VISIBLE_STRING Index: 10676_d = $29B4_h$
The name with a max. length of 240 characters is distributed to the subindices. The name can be entered starting with subindex 1. The following unused subindices are not relevant. • The station name must be assigned in accordance with the PROFINET specification. In the standard setting a deleted name is displayed. The name is also deleted if the "Reset to factory defaults" command is executed by an IO supervisor or an I/O controller. • A change of the station name will only become effective by switching the mains of the inverter. ▸ Setting the station name (🕮 27)		
Subcodes	**Lenze setting**	**Info**
C13899/1		1st ... 30th character
C13899/2		31th ... 60th character
C13899/3		61th ... 90th character
C13899/4		91th ... 120th character
C13899/5		121th ... 150th character
C13899/6		151th ... 180th character
C13899/7		181th ... 210th character
C13899/8		211th ... 240th character
☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT		

C13900

Parameter | Name: **C13900 | Firmware Product Type**	Data type: VISIBLE_STRING Index: 10675_d = $29B3_h$
The code contains a string with a length of 8 characters. The identification code "E84DGFCR" is output.	
☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT	

C13901

Parameter | Name:
C13901 | Firmware Compilation Date

Data type: VISIBLE_STRING
Index: 10674$_d$ = 29B2$_h$

The code contains a string with a length of 20 characters. The software creation date ("MMM DD YYYY") and time ("hh:mm:ss") are displayed (e.g. "Mar 21 2005 12:31:21").

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

C13902

Parameter | Name:
C13902 | Firmware Version

Data type: VISIBLE_STRING
Index: 10673$_d$ = 29B1$_h$

The code contains a string with a length of 11 characters. The identification code is displayed (e.g. "01.00.00.00").

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

C13910

Parameter | Name:
C13910 | I&M1 system designation

Data type: VISIBLE_STRING
Index: 10665$_d$ = 29A9$_h$

Input/output of the I&M1 plant identification code
- The Lenze setting shows an empty string.

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

C13911

Parameter | Name:
C13911 | I&M1 installation site

Data type: VISIBLE_STRING
Index: 10664$_d$ = 29A8$_h$

Input/output of the I&M1 location identification code
- The Lenze setting shows an empty string.

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

C13912

Parameter | Name:
C13912 | I&M2 installation date

Data type: VISIBLE_STRING
Index: 10663$_d$ = 29A7$_h$

Input/output of the I&M2 date of installation
- The Lenze setting shows an empty string.

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

C13913

Parameter | Name:
C13913 | I&M3 additional information

Data type: VISIBLE_STRING
Index: 10662$_d$ = 29A6$_h$

Input/output if the I&M3 additional information
- The Lenze setting shows an empty string.

Subcodes	Lenze setting	Info
C13913/1		I&M3 additional information
C13913/2		I&M3 additional information

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

C13914

Parameter | Name: **C13914 | I&M4 signature code**		Data type: OCTET_STRING Index: 10661_d = $29A5_h$
Input/output of the I&M4 signature		
Subcodes	**Lenze setting**	**Info**
C13914/1	00000000000000000000000000000 0000000000000000000000000	I&M4 signature code
C13914/2	00000000000000000000000000000 0000000000000000000000000	I&M4 signature code
☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT		

13.3 Table of attributes

The table of attributes contains information that is required for communication with the inverter via parameters.

How to read the table of attributes:

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

Table of attributes

Code	Name	Index		Data				Access		
		dec	hex	DS	DA	Data type	Factor	R	W	CINH
C13000	IP address	11575	2D37	E	1	UNSIGNED_32	1	☑	☑	
C13001	Subnet Mask	11574	2D36	E	1	UNSIGNED_32	1	☑	☑	
C13002	Gateway address	11573	2D35	E	1	UNSIGNED_32	1	☑	☑	
C13003	Physical address	11572	2D34	A	3	OCTET_STRING		☑		
C13010	Active IP Address	11565	2D2D	A	4	UNSIGNED_8	1	☑		
C13011	Active Subnetwork Mask	11564	2D2C	A	4	UNSIGNED_8	1	☑		
C13012	Active gateway address	11563	2D2B	A	4	UNSIGNED_8	1	☑		
C13850	All words from drive to master	10725	29E5	A	8	UNSIGNED_16	1	☑		
C13851	All words from master to drive	10724	29E4	A	8	UNSIGNED_16	1	☑		
C13860	Settings	10715	29DB	A	4	UNSIGNED_8	1	☑		
C13861	Bus status	10714	29DA	E	1	BITFIELD_16		☑		
C13862	Bus counter	10713	29D9	A	3	UNSIGNED_32	1	☑		
C13864	Active station name	10711	29D7	A	8	VISIBLE_STRING		☑		
C13867	Display: Most recent diagnostic data	10708	29D4	E	1	OCTET_STRING		☑		
C13877	Bus error(1)	10698	29CA	E	1	UNSIGNED_16	1	☑		
C13878	- Bus error(2)	10697	29C9	E	1	BITFIELD_16		☑		
C13880	Monitoring Reaction	10695	29C7	A	1	UNSIGNED_8	1	☑	☑	
C13881	Reaction time delay	10694	29C6	E	1	UNSIGNED_16	1	☑	☑	
C13885	Delete process data	10690	29C2	E	1	UNSIGNED_8	1	☑	☑	
C13887	Suppress signalling diag. mess. upon	10688	29C0	E	1	BITFIELD_8		☑	☑	
C13899	Station name	10676	29B4	A	8	VISIBLE_STRING		☑	☑	
C13900	Firmware Product Type	10675	29B3	E	1	VISIBLE_STRING		☑		
C13901	Firmware Compilation Date	10674	29B2	E	1	VISIBLE_STRING		☑		
C13902	Firmware Version	10673	29B1	E	1	VISIBLE_STRING		☑		
C13910	I&M1 system designation	10665	29A9	E	1	VISIBLE_STRING		☑	☑	
C13911	I&M1 installation site	10664	29A8	E	1	VISIBLE_STRING		☑	☑	
C13912	I&M2 installation date	10663	29A7	E	1	VISIBLE_STRING		☑	☑	
C13913	I&M3 additional information	10662	29A6	A	2	VISIBLE_STRING		☑	☑	
C13914	I&M4 signature code	10661	29A5	A	2	OCTET_STRING		☑	☑	

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FEEDBACK

Your opinion is important to us

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

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

feedback-docu@lenze.com

Thank you very much for your support.

Your Lenze documentation team

Inverter Drive 8400 motec (PROFINET® option) · 13564911 · EDS84DMOTPNET · EN 5.0 · 02/2019 · TD23

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Accessories

EtherCAT®

E84DGFCTxxx

Inverter Drives 8400 motec_________________

Communication Manual EN

13564907

Lenze

Contents

1 About this documentation

Contents

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

Note!

This documentation supplements the **mounting instructions** and the **"Inverter Drives 8400 motec" hardware manual** supplied with the Communication Unit.

The hardware manual contains safety instructions which must be observed!

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

Examples illustrate typical applications.

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

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

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

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

Tip!

Detailed information on EtherCAT can be found on the website of the EtherCAT Technology Group:

www.EtherCAT.org

Target group

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

Tip!

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

www.Lenze.com

Information regarding the validity

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

Product series	Type designation	Version
Inverter Drives 8400 motec **EtherCAT communication unit**	E84DGFCTxNx	EtherCAT
	E84DGFCTxJx	EtherCAT + Safety

▶ Features and variants (🕮 14)

1.1 Document history

Version			Description
4.0	01/2019	TD23	General revision
3.0	05/2017	TD17	• From Communication Unit SW version V01.02: ▸ State change after "Operational" in the stay-alive operation (📖 27) • New layout
2.1	11/2012	TD17	EtherCAT® is a registered trademark of the Beckhoff Automation GmbH, Germany.
2.0	11/2011	TD17	Information about the EtherCAT register "AL Status Code" (📖 37) supplemented.
1.0	04/2011	TD17	First edition

1.2 Conventions used

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

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

1.3 Terminology used

Term	Meaning
EtherCAT	EtherCAT® (**Ether**net for **C**ontroller and **A**utomation **T**echnology) is an Ethernet-based fieldbus system which fulfils the application profile for industrial real-time systems. EtherCAT® is a registered trademark and patented technology, licenced by Beckhoff Automation GmbH, Germany.
Inverter	Lenze inverters of the "Inverter Drives 8400 motec" product series
Standard device	

Drive Unit
Communication unit
Wiring Unit
	The 8400 motec inverter has a modular structure that includes the following modules: "Drive Unit", "Communication Unit", and "Wiring Unit".
	• The drive unit is available in different power settings.
	• In case of the communication unit you can select between:
	  • Without fieldbus (basic I/O, standard I/O, extended I/O)
	  • AS interface (without safety/with safety STO)
	  • CANopen (without safety/with safety STO)
	  • EtherCAT (without safety/with safety STO)
	  • EtherNET/IP (without safety/with safety STO)
	  • PROFIBUS (without safety/with safety STO)
	  • PROFINET (without safety/with safety STO)
	  • POWERLINK (without safety/with safety STO)
	• The wiring unit provides flexible connection possibilities for a simple integration into the power supply of the machine.

»Engineer«	Lenze PC software which supports you during the "Engineering" process (parameterisation, diagnostics, and configuration) throughout the whole life cycle, i. e. from planning to maintenance of the machine commissioned.
»PLC Designer«	
»TwinCAT«	Beckhoff PC software for EtherCAT configuration
Code	Parameter which serves to parameterise and monitor the inverter. In normal usage, the term is usually referred to as "Index".
Subcode	If a code contains several parameters, they are stored in "subcodes". This manual uses a slash "/" as a separator between code and subcode (e.g. "C00118/3"). This term is also referred to as "subindex" in common parlance.
Lenze setting	This setting is the default factory setting of the device.
Basic setting	
HW	Hardware
SW	Software
ESI	"EtherCAT Slave Information" (device description file in XML format)
CoE	CANopen over EtherCAT
I-1600.8	CoE index (hexadecimal representation) • In the example: index 0x1600, subindex 8
TA	Technology application
PDO	Process data object
SDO	Service data object
"Hot connect"	This feature provides for removing and connecting slave nodes during operation.

1.4 Notes used

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

Safety instructions

Layout of the safety instructions:

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

Pictograph	Signal word	Meaning
⚡	**Danger!**	**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	**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	Signal word	Meaning
ℹ	**Note!**	Important note to ensure trouble-free operation
💡	**Tip!**	Useful tip for easy handling
📖		Reference to another document

2 Safety instructions

Note!

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

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

2.1 General safety and application notes

Danger!

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

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

2.2 Device and application-specific safety instructions

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

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

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

2.3 Residual hazards

Device protection

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

▸ Installation (📖 19)

3 Product description

3.1 Application as directed

The EtherCAT communication unit ...

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

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

- is a device intended for use in industrial power systems.
- should only be used under the operating conditions prescribed in this documentation.
- may only be used in EtherCAT networks.
- can also be used without being connected to the EtherCAT network.

Any other use shall be deemed inappropriate!

3.2 Features and variants

The EtherCAT communication unit is available in the following versions:

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

- The EtherCAT communication unit is ...
  - mounted on top of the Wiring Unit (E84DGVNxx);
  - supplied internally via the Drive Unit (E84DGDVxxxxxxxx) or externally via a separate voltage source.
- The I/O connections can be brought into the device via M12 connectors or cable glands.
- Devices without an integrated safety system (safety option) have no analog input and no relay output.
- The integrated safety system can be used on machines for the protection of persons.
- SDO transfer with CoE (CANopen over EtherCAT)
- Up to 10 process data words (max 20 bytes) can be sent to the master.
- Up to 8 process data words (max. 16 bytes) can be sent from the master.
- Communication with the Lenze »Engineer« (access to all Lenze parameters) is executed via the diagnostic interface of the Drive Unit.
- Access to all Lenze parameters with CoE (CANopen over EtherCAT)
- Cycle times: 1 ms or an integer multiple of 1 ms

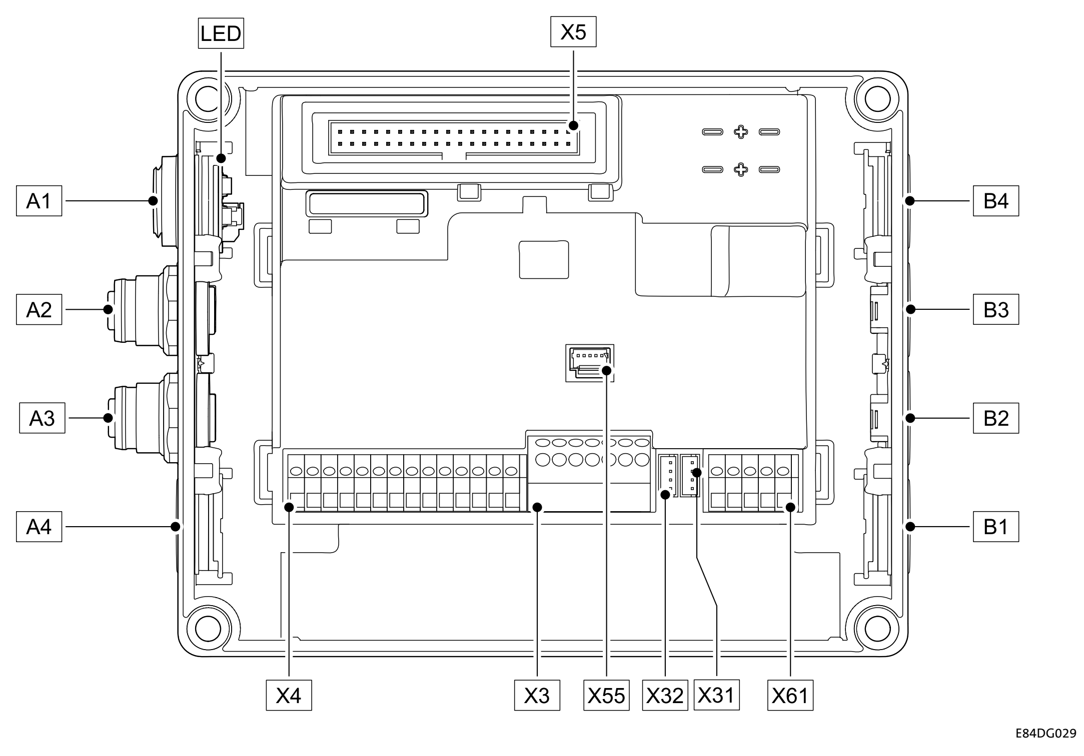
"Inverter Drives 8400 motec" hardware manual

Here you will find detailed information on the integrated safety system (safety option).

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

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

3.3 Connections and interfaces



[3-1] EtherCAT communication unit

Pos.	Description
A1 / LED	Position for LEDs for EtherCAT status display ▸ LED status displays (🕮 59)
A2	IN: EtherCAT input (M12 socket, 5-pole, D-coded) ▸ EtherCAT connection (🕮 23)
A3	OUT: EtherCAT output (M12 socket, 5-pole, D-coded) ▸ EtherCAT connection (🕮 23)
A4	Positions for further freely designable inputs and outputs: • Digital inputs • Digital output • Analog input (only for E84DGFCTxJx) • Relay output (only for E84DGFCTxJx) • Connection of "Safety Option" safety system (only for E84DGFCTxJx)
B1 ... B4	
X3 / X4 / X61	Terminal strips for wiring the connections at A4 and B1 ... B4
X5	Plug connector for connection to the Drive Unit
X31	Plug connector for wiring the EtherCAT input (IN) to A2
X32	Plug connector for wiring the EtherCAT output (OUT) to A3
X55	Plug connector for the wiring of the LEDs to A1

- By default, the EtherCAT connections and the LEDs for the EtherCAT status displays are already mounted and wired:
  - EtherCAT input to plug connector X31
  - EtherCAT output to plug connector X32
  - LEDs on plug connector X55
- At positions A1 ... A4 and B1 ... B4 it is also possible to connect the EtherCAT terminals and other connections (e.g. digital inputs) freely.
- For the connections, 5-pin M12 connectors or - alternatively - cable glands (cable cross-section max. 1.0 mm^2, AWG 18) can be used.
- The M12 connectors, cable glands and prefabricated system cables can be obtained from various manufacturers.
- Wire the M12 connectors or cable glands used to the corresponding contacts of the terminal strips/plug connectors X3, X4 and X61.

"Inverter Drives 8400 motec" hardware manual

Observe the notes and wiring instructions contained in this documentation.

4 Technical data

"Inverter Drives 8400 motec" hardware manual

Here you will find the **ambient conditions** and information on the **electromagnetic compatibility (EMC)** that also apply to the Communication Unit.

4.1 General data and operating conditions

Range	Values
Order designation	• E84DGFCTxNx (EtherCAT) • E84DGFCTxJx (EtherCAT + Safety)
Communication profile	EtherCAT
Supported device profile and mailbox protocol	CANopen over EtherCAT (CoE)
Communication medium	S/FTP (Screened Foiled Twisted Pair, ISO/IEC 11801 or EN 50173), CAT 5e
Interface for communication	• EtherCAT input (IN): M12 socket, 5-pole, D-coded • EtherCAT output (OUT): M12 socket, 5-pole, D-coded
Network topology	Line, switch
Type of node	EtherCAT slave
Number of nodes	Max. 65535 (in the entire network)
Max. cable length between two EtherCAT nodes	100 m (typical)
Vendor ID [hex]	0x3B
Product ID	841020
Revision ID	Dependent on the software version of the Communication Unit
Baud rate	100 Mbps, full duplex
Cycle times	1 ms or an integer multiple of 1 ms
External voltage supply	• U = 24 V DC (20 V - 0 % ... 29 V + 0 %) • I_{max} = 120 mA
Conformities, approvals	• CE • UR / cUR (see also hardware manual)

4.2 Protocol data

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

4.3 Communication time

Parameter data (SDO)

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

- The processing time in the inverter is approx. 10 ms + a tolerance of 20 ms (typically)
- Some codes may require a longer processing time (see reference manual / »Engineer« online help "Inverter Drive 8400 motec").

Process data (PDO)

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

The communication times for process data depend on ...

- processing time in the inverter (interval time of the application task, process data mode)
- Runtime on the bus (telegram length, number of nodes, PDO update time, instant of transmission of the EtherCAT-frame)

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

The following processing time arises:

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

5 Installation

Stop!

Electrostatic discharge

Electronic components within the Communication Unit can be damaged or destroyed by electrostatic discharge.

Possible consequences:

- The Communication Unit is defective.
- Fieldbus communication is not possible or faulty.
- I/O signals are faulty.
- The safety function is faulty.

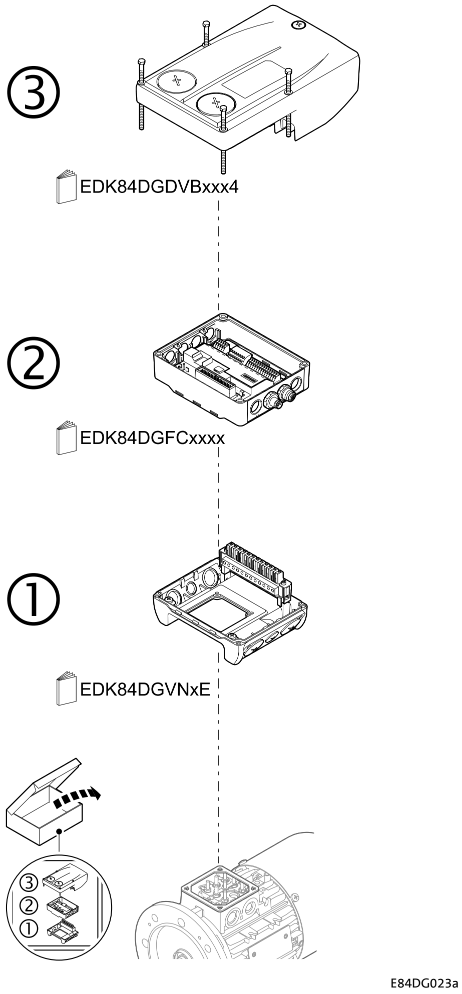
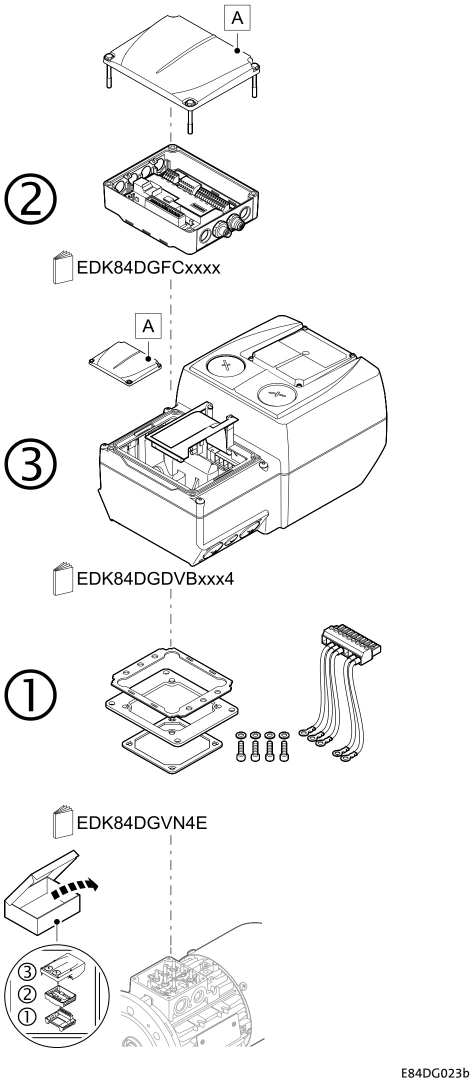
Protective measures

Discharge electrostatic charges before touching the Communication Unit.

5.1 Mechanical installation

Mounting instructions "Inverter Drives 8400 motec"

Here you will find detailed information on the installation.

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

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

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

5.2 Electrical installation

"Inverter Drives 8400 motec" hardware manual

Here you can find detailed information on ...

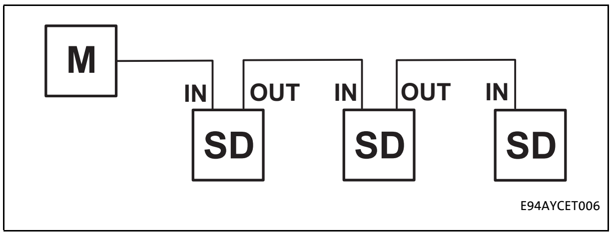
- the digital and analog inputs/outputs;
- the relay output;
- the integrated safety system (safety option);
- the wiring of the terminals.

Observe the notes and wiring instructions contained in this documentation.

5.2.1 Network topology

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

Line topology



M = master

SD = slave device

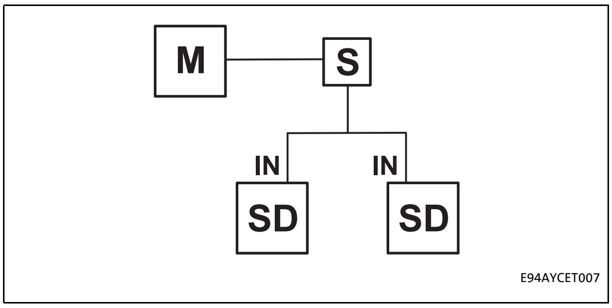
[5-2] Line topology

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

Tip!

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

Switch topology



M = master

S = switch

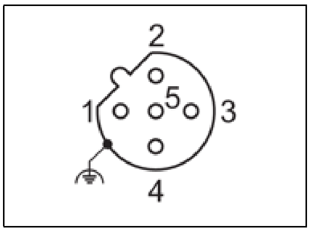
SD = slave device

[5-3] Switch topology

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

5.2.2 EtherCAT connection

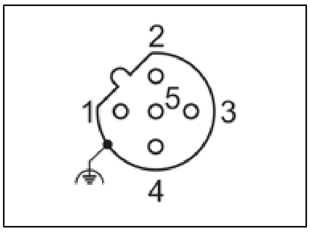
EtherCAT input (IN)



- M12 socket, 5-pole, D-coded
- Wiring at terminal strip X31

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

EtherCAT output (OUT)



- M12 socket, 5-pole, D-coded
- Wiring at terminal strip X32

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

5.2.3 External voltage supply

- The external voltage supply can be used to establish EtherCAT communication for commissioning and to query the data of the digital and analog inputs.
- Furthermore the external voltage supply serves to maintain EtherCAT communication if the main supply fails.
- The digital inputs RFR, DI1 ... DI5 and the analog input can continue to be evaluated.
- The external voltage supply is done via the terminals 24E and GND of the terminal strip X3.
- Permissible voltage (DC) / max. current:
  - U = 24 V DC (20 V - 0 % ... 29 V + 0 %)
  - I_{max} = 120 mA
- Access to parameters of a device that is disconnected from the mains is not possible.

"Inverter Drives 8400 motec" hardware manual

Here you can find detailed information on how to wire the Communication Unit.

6 Commissioning

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

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

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

▶ Parameter reference (📖 67)

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

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

6.1 Before initial switch-on

STOP **Stop!**

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

6.2 Configuring the Controller (master)

For communication with the Communication Unit, the Controller (master) must be configured first.

In order to configure EtherCAT networks, you always need a configuration software for the Controller, e.g.:

- Lenze »PLC Designer«
- Beckhoff »TwinCAT«

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

- The basic parameters of the Communication Unit are stored in the internal configuration memory and can be used by the master for the node identification.
- For node detection (fieldbus scan), the corresponding device descriptions of the Lenze device family are used.

6.2.1 Installing device description files

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

www.Lenze.com

The device description file **Lenze_Inverter_8400_IO_yyyymmdd.xml** must be installed via the EtherCAT configuration software.

Wildcards in the file name	
yyyy	Year
mm	Month
dd	Day

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

6.2.2 Automatic device identification

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

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

To be used from Communication Unit SW version V01.02!

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

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

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

Error messages

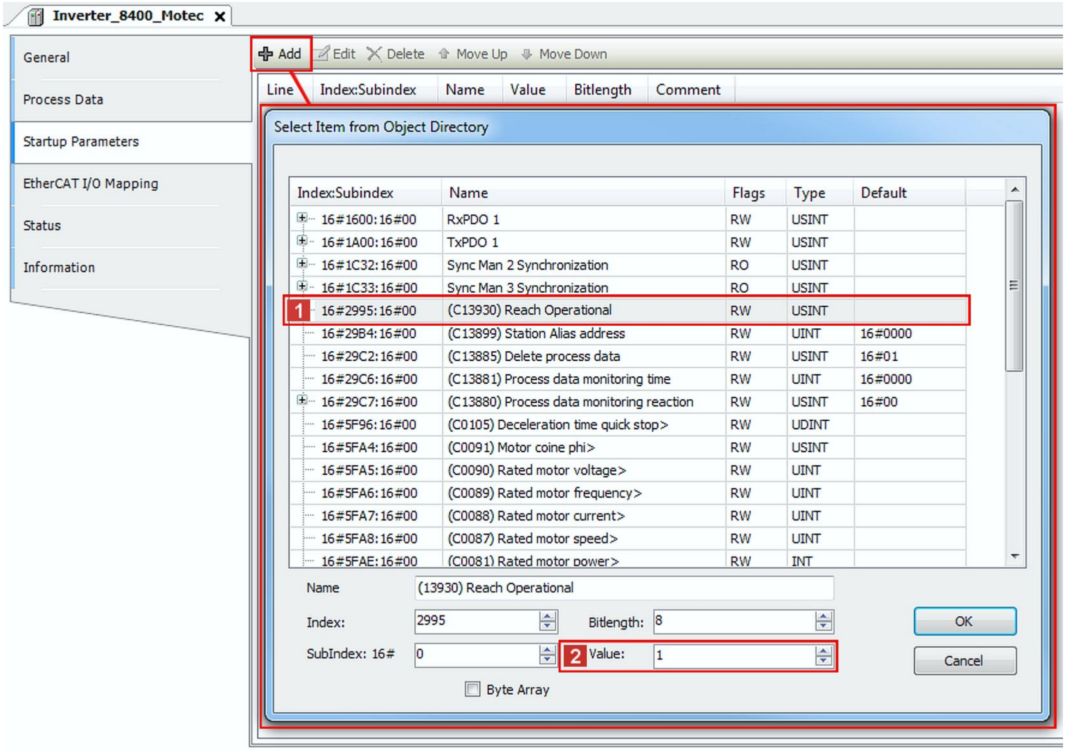
- Logbook message: "Inverter_8400_Motec: CoE - Emergency request. id=0x0, len=8, errCode=0x1000, ErrReg=0x1, data: 0x0 0x0 0x31 0xbc 0x1."
- Message of the communication unit: Quit "Operational" status [0x01bc8131] (nt04: COM fault 4) (🕮 66)

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

Preconditions:

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

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



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

Name: (13930) Reach Operational
Index: 2995
Bitlength: 8
SubIndex: 16# 0
Value: 1

6.2.4 Configuring process data

- The process data configuration is determined during the initialisation phase of the master (PDO mapping).
- Up to 10 process data words (max 20 bytes) can be sent to the master.
- Up to 8 process data words (max. 16 bytes) can be sent from the master.
- Independent of the configured length of the process data from the Inverter Drive 8400 motec to the master, the I/O data are always entered into the last two words:

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

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

6.2.5 Determining the cycle time

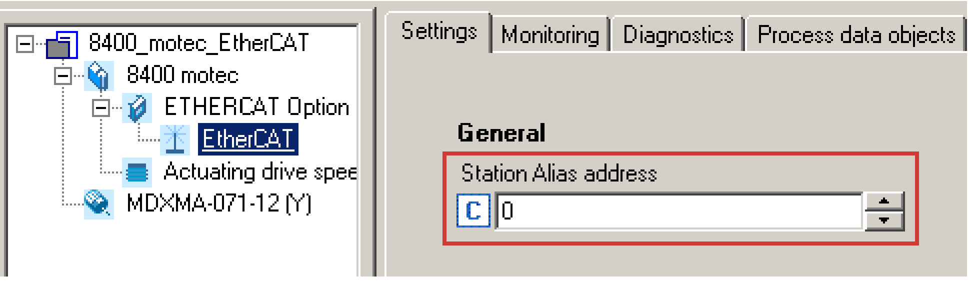
The process data objects (PDO) are transmitted cyclically between the master and the slaves.

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

6.3 Address allocation

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

Via the **Station alias address** input field you can assign a fixed address to the EtherCAT slave.



Station Alias address: 0

Note!

- The station alias address must only be set if the node is part of a "hot connect" group.
- The station alias address must be unambiguous and may only be assigned once within the EtherCAT network.
- Use the same station alias address in the EtherCAT master and in the slave.

- Valid address range: 0 ... 32767
  - Address 0 means that no station alias address is assigned.
  - Impermissible addresses are marked in red in the input field.
  - The address is written to code C13899.
- In addition, specify the use of the fixed addressing on the master.
- The address assigned by the master is displayed under code C13864.
- Via standard device code **C00002**, execute the **"11: Save all parameter sets"** device command to activate the changed station alias address and to save it to the memory module.

6.4 Initial switch-on

Establishing communication

- To establish communication, the inverter must be supplied with mains voltage.
- EtherCAT communication requires voltage supply of the communication unit.

  If this is requirement is not met, the "CE04: MCI communication error" error message (error No. 01.0127.00002) is output. The error must be reset in the inverter so that EtherCAT communication can be established.
- The external voltage supply serves to keep up EtherCAT communication in the event of a main supply failure.

  ▶ External voltage supply (📖 24)
- During mains connection, all parameters (codes) are read.
- Addressing can be carried out automatically via the EtherCAT master or manually via codes in the »Engineer«.

  ▶ Address allocation (📖 31)

7 Data transfer

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

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

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

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

7.1 EtherCAT frames

EtherCAT frames have the following structure:

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

Ethernet header

The Ethernet header contains the following information:

- Target address of the EtherCAT frame (destination)
- Source address of the EtherCAT frame (source)
- Type of the EtherCAT frame (EtherType = 0x88A4)

Ethernet data

The Ethernet data contain the following information:

- Length of the datagrams within the EtherCAT frame (Length)
- One reserved bit (Reserved)
- Type of the datagrams within the EtherCAT frame (Type)
- EtherCAT datagrams (Datagrams)

FCS

Checksum of the EtherCAT frame

7.2 EtherCAT datagrams

EtherCAT datagrams have the following structure:

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

EtherCAT command header

The EtherCAT command header contains the following information:

- Command to be executed
- Addressing information
- Length of the data area (Data)
- Interrupt field

Data

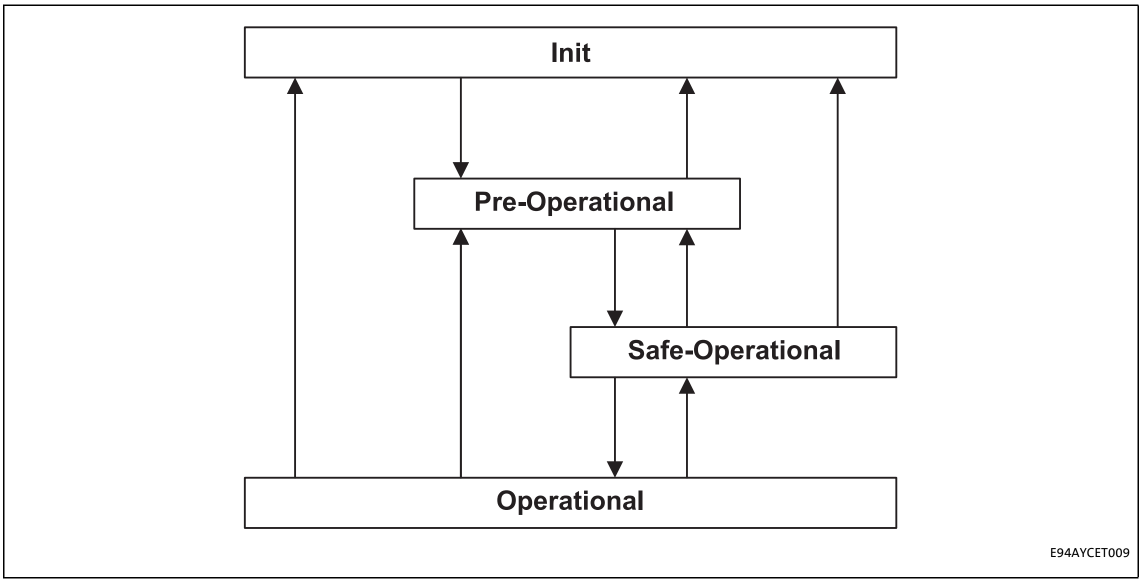
The data area contains the data of the command to be executed.

WKC

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

7.3 EtherCAT state machine

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



[7-1] EtherCAT state machine

Status	Description
Init	• Initialisation phase • No SDO/PDO communication with the slaves • Device can be detected by fieldbus scan
Pre-Operational	• The fieldbus is active. • SDO communication (mailbox communication) is possible. • No PDO communication

Safe-operational	• SDO communication (mailbox communication) is possible.
	• PDO communication:
	  • The input data in the process image are updated.
	  • The output data from the process image are not transferred to the slaves.

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

Note!

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

The current EtherCAT state is displayed in C13861 and signalled via the "RUN" LED.

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

▸ Diagnosing with the »Engineer« (🕮 61)
▸ LED status displays (🕮 59)

7.4 AL Status Code

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

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

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

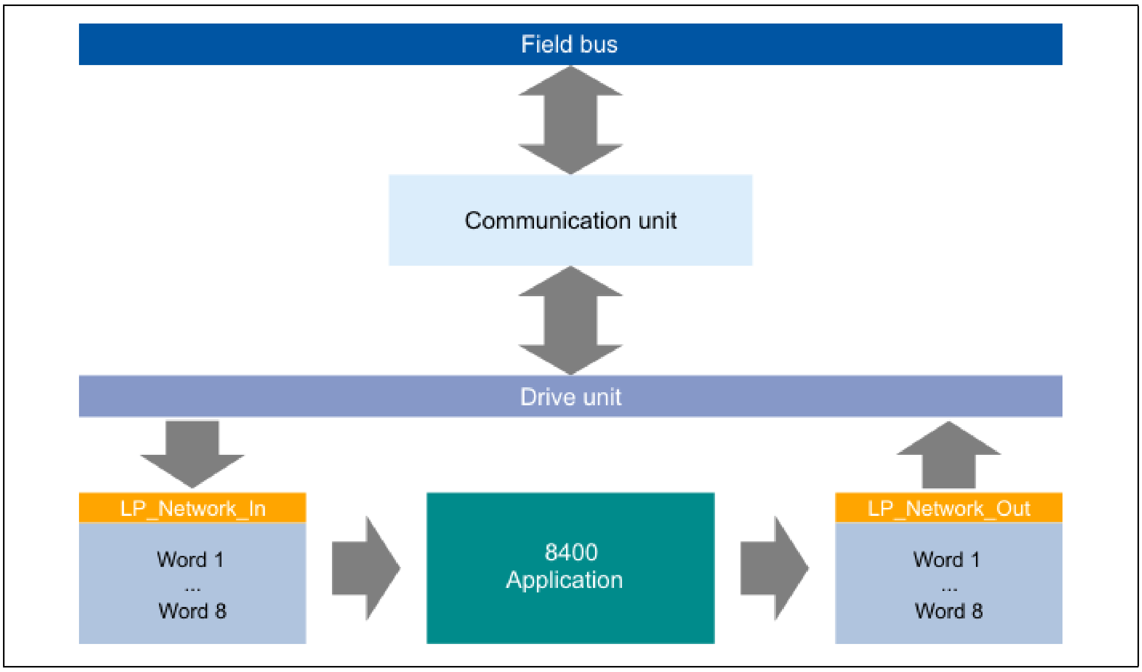
8 Process data transfer

- Process data are transmitted by means of EtherCAT datagrams (📖 35) via the process data channel.
- Process data serve to control the Inverter Drive 8400 motec.
- The transmission of process data is time-critical.
- Process data are cyclically transferred between the Controller (master) and the inverters (slaves) (continuous exchange of current input and output data).
- The master can directly access the process data. In the PLC for instance, the data are directly stored in the I/O area.
- Up to 10 process data words (max 20 bytes) can be sent to the master.
- Up to 8 process data words (max. 16 bytes) can be sent from the master.
- Process data are not saved in the Inverter Drive 8400 motec.
- Process data are e.g. setpoints, actual values, control words, and status words.

8.1 Accessing process data / PDO mapping

Process data are transferred via the MCI/CAN interface.

- Max. 8 words (16 bits/word) per direction can be exchanged.
- The process data are accessed via the **LP_Network_In** and **LP_Network_Out** port blocks. These port blocks are also called process data channels.
- Port block **LP_Network_In** maps the MCI PDOs received.
- Port block **LP_Network_Out** maps the MCI PDOs to be transmitted.
- The port/function blocks of the process data objects (PDO) are interconnected via the Lenze »Engineer«.



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

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

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

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

Note!

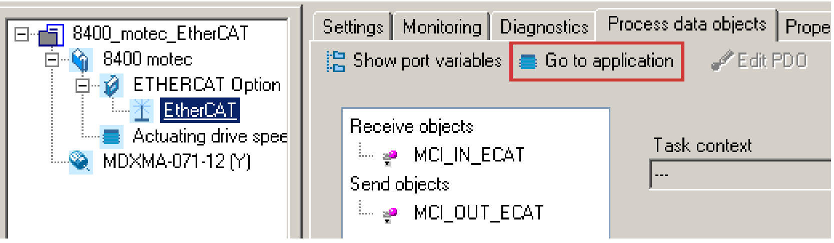
The »Engineer« screenshots shown on the following pages are only examples of the setting sequence and the resulting screens.

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

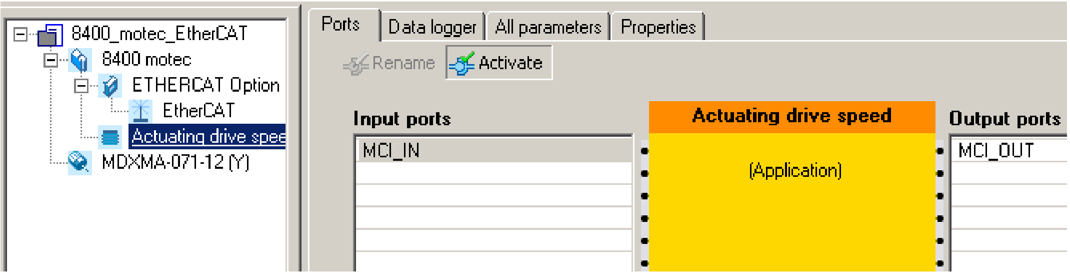
The preconfigured port interconnection of the process data objects is activated by setting code **C00007 = 40: Network (MCI/CAN)**.

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

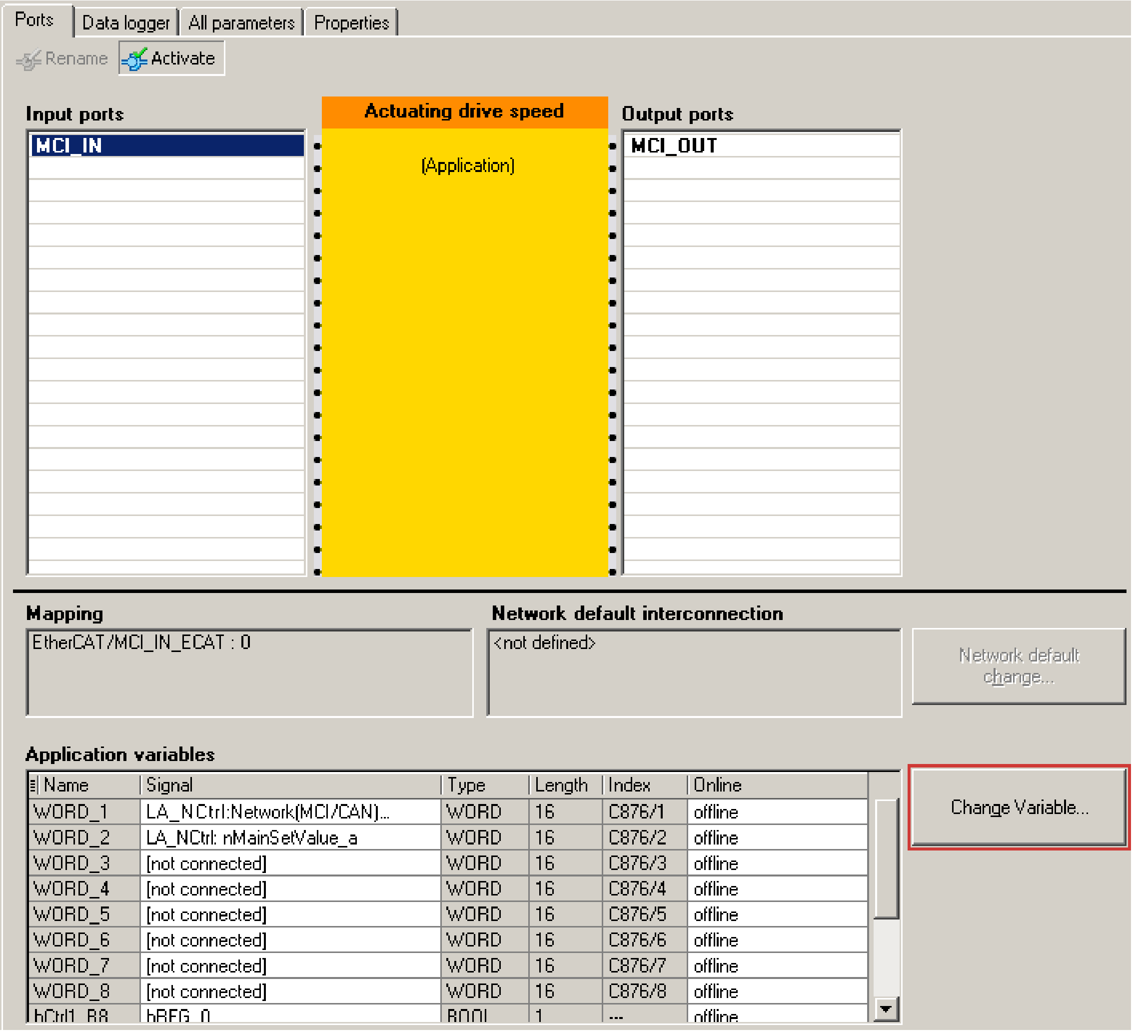
1. Go to the **Process data objects** tab and click **Go to application**.



2. The **Ports** tab displays the port blocks MCI_IN and MCI_OUT.



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



Mapping

EtherCAT/MCI_IN_ECAT : 0

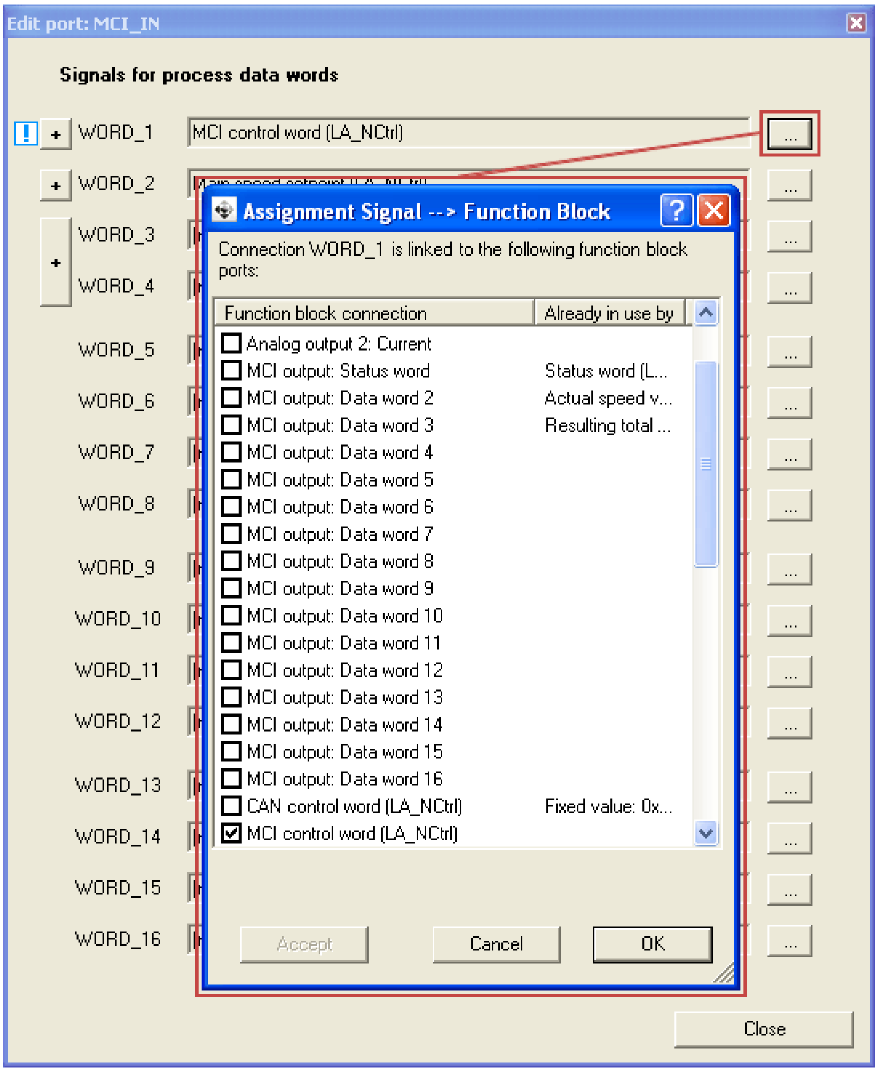
Network default interconnection

<not defined>

Application variables

Name	Signal	Type	Length	Index	Online
WORD_1	LA_NCtrl:Network(MCI/CAN)...	WORD	16	C876/1	offline
WORD_2	LA_NCtrl: nMainSetValue_a	WORD	16	C876/2	offline
WORD_3	[not connected]	WORD	16	C876/3	offline
WORD_4	[not connected]	WORD	16	C876/4	offline
WORD_5	[not connected]	WORD	16	C876/5	offline
WORD_6	[not connected]	WORD	16	C876/6	offline
WORD_7	[not connected]	WORD	16	C876/7	offline
WORD_8	[not connected]	WORD	16	C876/8	offline
bCtrl1_B8	bREG_0	BOOL	1	---	offline

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



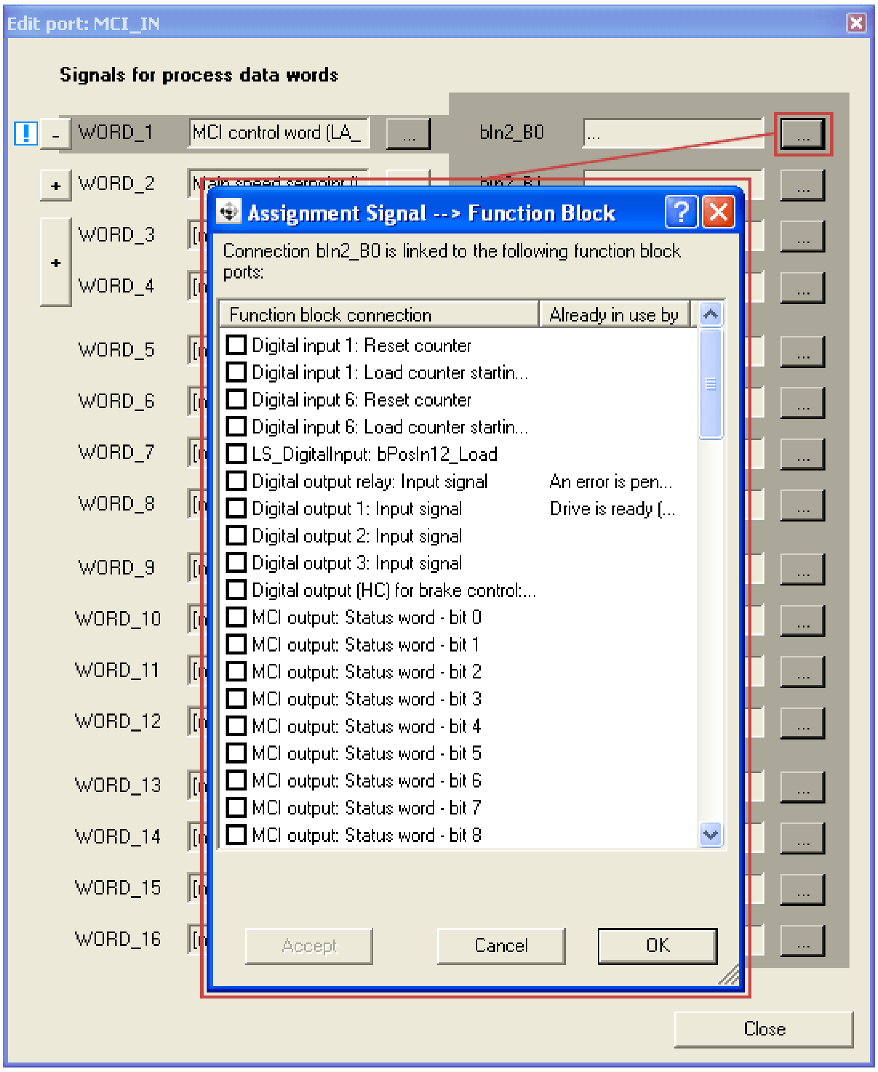
WORD_1: MCI control word (LA_NCtrl)

Connection WORD_1 is linked to the following function block ports:

Function block connection	Already in use by
☐ Analog output 2: Current	
☐ MCI output: Status word	Status word (L...
☐ MCI output: Data word 2	Actual speed v...
☐ MCI output: Data word 3	Resulting total ...
☐ MCI output: Data word 4	
☐ MCI output: Data word 5	
☐ MCI output: Data word 6	
☐ MCI output: Data word 7	
☐ MCI output: Data word 8	
☐ MCI output: Data word 9	
☐ MCI output: Data word 10	
☐ MCI output: Data word 11	
☐ MCI output: Data word 12	
☐ MCI output: Data word 13	
☐ MCI output: Data word 14	
☐ MCI output: Data word 15	
☐ MCI output: Data word 16	
☐ CAN control word (LA_NCtrl)	Fixed value: 0x...
☑ MCI control word (LA_NCtrl)	

For some process data words, you can also assign signals to the individual bits via the + and ... buttons.

→ Select the signals and then confirm the selection with **OK**.



Assignment Signal --> Function Block

Connection bIn2_B0 is linked to the following function block ports:

Function block connection	Already in use by
☐ Digital input 1: Reset counter	
☐ Digital input 1: Load counter startin...	
☐ Digital input 6: Reset counter	
☐ Digital input 6: Load counter startin...	
☐ LS_DigitalInput: bPosIn12_Load	
☐ Digital output relay: Input signal	An error is pen...
☐ Digital output 1: Input signal	Drive is ready (...
☐ Digital output 2: Input signal	
☐ Digital output 3: Input signal	
☐ Digital output (HC) for brake control:...	
☐ MCI output: Status word - bit 0	
☐ MCI output: Status word - bit 1	
☐ MCI output: Status word - bit 2	
☐ MCI output: Status word - bit 3	
☐ MCI output: Status word - bit 4	
☐ MCI output: Status word - bit 5	
☐ MCI output: Status word - bit 6	
☐ MCI output: Status word - bit 7	
☐ MCI output: Status word - bit 8	

The current interconnection is only displayed if the following has been set for the control mode in code **C00007 = 40: Network (MCI/CAN)**.

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

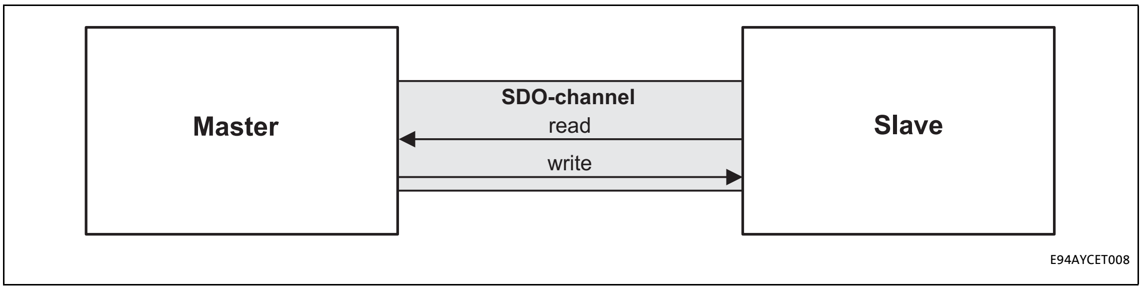
9 Parameter data transfer

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

- The SDO channel provides for access to Implemented CoE objects (📖 54) and Lenze codes by means of the CoE protocol.
- The transmission of parameter data is usually not time-critical.
- Parameter data are, for instance, operating parameters, motor data, diagnostic information.

9.1 Establishing a connection between master and slave

Basically a master can always request parameter jobs from a slave if the slave is at least in the "Pre-operational" state.



[9-1] Data communication via the SDO channel

9.2 Reading and writing parameters

Parameters ...

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

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

Indexing of the Lenze codes

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

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

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

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

Structure of a mailbox datagram

In a datagram, mailbox data are transferred within an EtherCAT frame. The data area of the mailbox datagram has the following structure:

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

9.2.1 Reading parameters (SDO upload)

1. The master sends "Initiate Domain Upload Request".
2. The slave acknowledges the request with a positive response ("Initiate Domain Upload Response").
   In the event of an error the slave responds with "Abort Domain Transfer".

Note!

In the case of jobs for the inverter, please make sure that you convert the code into an index.

▸ Indexing of the Lenze codes (🕮 45)

SDO Upload Request

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

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

SDO Upload Expedited Response

An "SDO Upload Expedited Response" is effected if the data length of the parameter data to be read is up to 4 bytes.

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

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

SDO Upload Expedited Response

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

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

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

Example

In the case of an **upload** to the index 0x5FD8 (standard value of C00039/1, preset setpoint_1 = 0x0FA0), the transmitted response structure contains the following data:

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

9.2.2 Writing parameters (SDO download)

1. The master sends "Initiate Domain Download Request".
2. The slave acknowledges the request with a positive response ("Initiate Domain Download Response").
   In the event of an error the slave responds with "Abort Domain Transfer".

Note!

In the case of jobs for the inverter, please make sure that you convert the code into an index.

▸ Indexing of the Lenze codes (🕮 45)

SDO Download Expedited Request

An "SDO Download Expedited Request" is effected if the data length of the parameter data to be written is up to 4 bytes.

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

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

SDO Download Expedited Request

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

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

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

SDO Download Response

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

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

Example

In case of a **download**, the request structure transmitted to the index 0x1600 contains the following data:

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

9.3 Implemented CoE objects

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

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

R: Read access only
RW: Read and write access

9.4 EtherCAT objects of the Communication Unit

The object directory displays the Parameters of the Communication Unit (📖 68) as objects:

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

R: Read access only

RW: Read and write access

9.5 SDO abort codes (Abort codes)

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

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

10 Monitoring

10.1 Interruption of EtherCAT communication

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

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

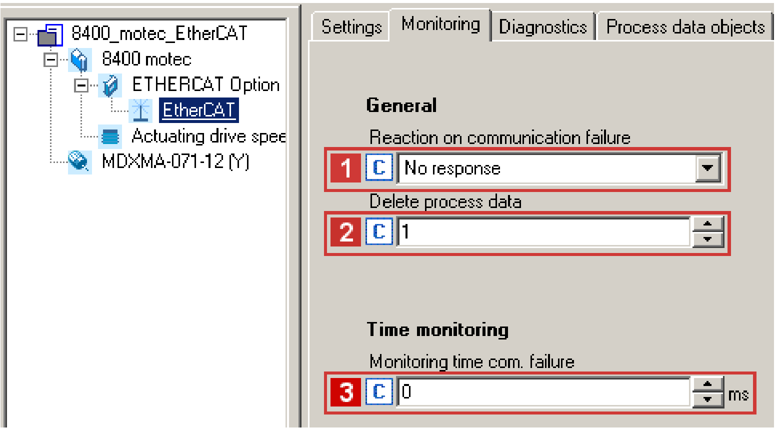
1. During the initialisation of the EtherCAT communication, the sync manager watchdog monitoring time determined in the master is transferred to the slave.

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

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

   There is no response by the slave.

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



General

Reaction on communication failure
1 C No response

Delete process data
2 C 1

Time monitoring

Monitoring time com. failure
3 C 0 ms

Set a **response delay** 3 (C13881) to delay execution of the response.

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

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

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

10.2 Interruption of internal communication

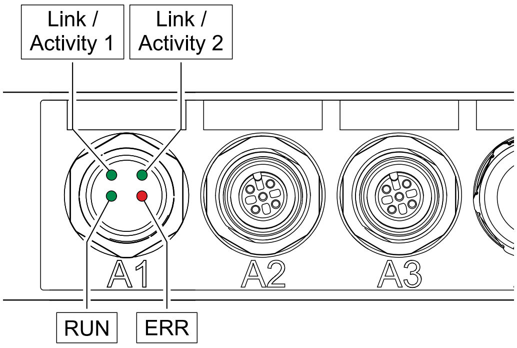
- The response in the case of a communication error between the Communication Unit and the Drive Unit can be set via code C01501.
- The Communication Unit reports interrupted communication via an emergency telegram to the master and changes to the "Safe-Operational" state.
- The error message "Connection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

11 Diagnostics

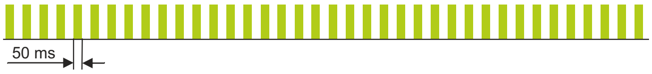
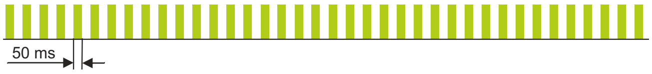
EtherCAT communication faults can be diagnosed via the LEDs of the communication unit.

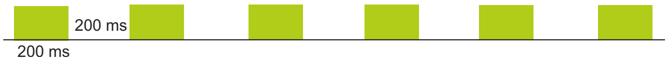
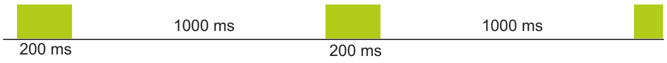
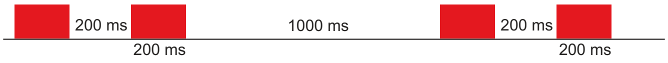
Moreover, the »Engineer« provides diagnostic EtherCAT information.

11.1 LED status displays



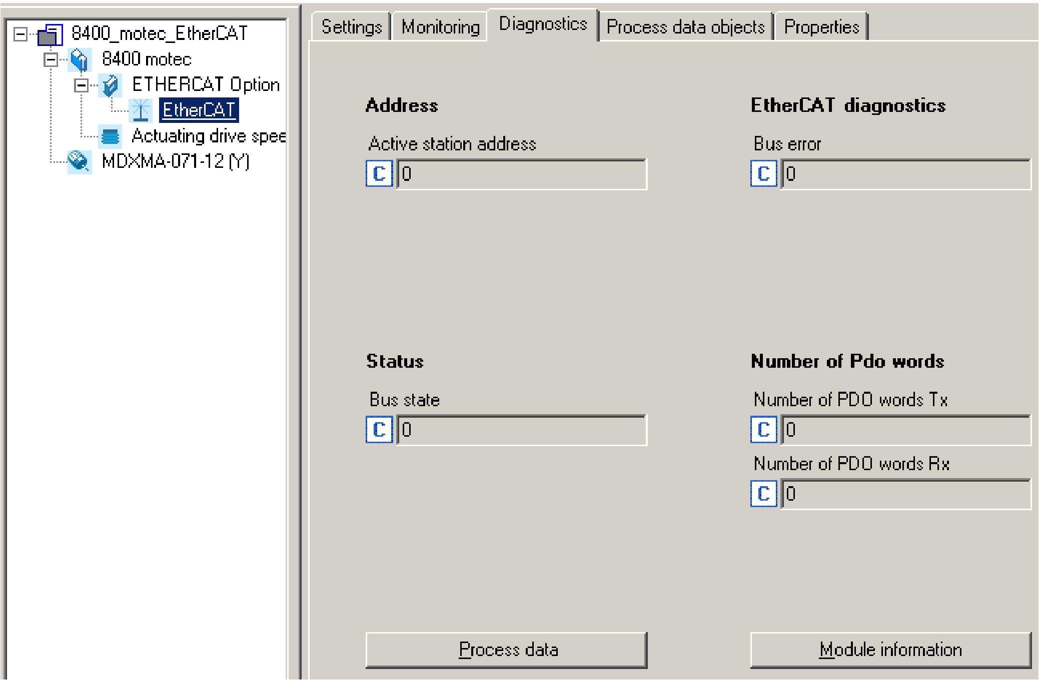
E84DG056

LED	Colour	Status	Description
Link / Activity 1 (A2)	green	Off	• No cable is connected to the EtherCAT input (IN). • No communication
		On	 A cable is connected to the EtherCAT input (IN).
		Flickers	 Communication at the EtherCAT input (IN) is active.
Link / Activity 2 (A3)	green	Off	• No cable is connected to the EtherCAT output (OUT). • No communication
		On	 A cable is connected to the EtherCAT output (OUT).
		Flickers	 Communication at the EtherCAT output (OUT) is active.

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

11.2 Diagnosing with the »Engineer«

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



Address

Active station address: C 0

EtherCAT diagnostics

Bus error: C 0

Status

Bus state: C 0

Number of Pdo words

Number of PDO words Tx: C 0

Number of PDO words Rx: C 0

11.3 Emergency requests / Emergency messages

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

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

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

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

Structure of the Emergency message

Example: Emergency message of the error "Quit "Operational" status [0x01bc8131] (nt04: COM fault 4)"

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

- Bytes 1 and 2 display that there is an error.
- Byte 3 display the contents of the error register (I-1001).
- The error code is entered in bytes 5 ... 8.

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

Detailed information on the error codes is provided here.

12 Error messages

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

12.1 Short overview of the EtherCAT error messages

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

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

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

Tip!

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

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

12.2 Possible causes and remedies

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

Connection to 8400 lost [0x01bc3100]

Response (Lenze setting printed in bold)	**Setting:** C01501/2 (☑ adjustable response)
☑ None ☐ System fault ☒ **Fault** ☐ Trouble ☐ Quick stop by trouble ☑ Warning locked ☐ warning ☐ Information	

Cause	Remedy
• The Communication Unit is supplied with external voltage, but the Inverter Drive 8400 motec is not supplied with voltage. • The Communication Unit is not connected correctly to the Drive Unit.	• Switch off and on again the voltage supply of the Inverter Drive 8400 motec. • Check wiring and terminals. • Check internal plug connection between Communication Unit and Drive Unit. For this purpose, the Inverter Drive 8400 motec must be unscrewed. Please observe the information in the mounting instructions of the Communication Unit and the Drive Unit! • If this error continues to occur, please contact the Lenze Service. (if required, the Communication Unit must be replaced.)

Memory: No access [0x01bc5531]

Response (Lenze setting printed in bold)	**Setting:** C01501/2 (☑ adjustable response)
☑ None ☐ System fault ☒ **Fault** ☐ Trouble ☐ Quick stop by trouble ☑ Warning locked ☐ warning ☐ Information	

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

Memory: Read error [0x01bc5532]

Response (Lenze setting printed in bold)	**Setting:** C01501/2 (☑ adjustable response)
☑ None ☐ System fault ☒ **Fault** ☐ Trouble ☐ Quick stop by trouble ☑ Warning locked ☐ warning ☐ Information	

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

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

Response (Lenze setting printed in bold)	**Setting:** C01501/2 (☑ adjustable response)
☑ None ☐ System fault ☒ **Fault** ☐ Trouble ☐ Quick stop by trouble ☑ Warning locked ☐ warning ☐ Information	

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

Restart by watchdog reset [0x01bc6010]

Response (Lenze setting printed in bold)	**Setting:** C01501/2 (☑ adjustable response)
☑ None ☐ System fault ☒ **Fault** ☐ Trouble ☐ Quick stop by trouble ☑ Warning locked ☐ warning ☐ Information	

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

Internal error [0x01bc6011]

Response (Lenze setting printed in bold)	**Setting:** C01501/2 (☑ adjustable response)
☑ None ☐ System fault ☒ **Fault** ☐ Trouble ☐ Quick stop by trouble ☑ Warning locked ☐ warning ☐ Information	

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

Internal error [0x01bc6100]

Response (Lenze setting printed in bold)	**Setting:** C01501/2 (☑ adjustable response)
☑ None ☐ System fault ☒ **Fault** ☐ Trouble ☐ Quick stop by trouble ☑ Warning locked ☐ warning ☐ Information	

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

Internal error [0x01bc6101]

Response (Lenze setting printed in bold)	**Setting:** C01501/2 (☑ adjustable response)
☑ None ☐ System fault ☒ **Fault** ☐ Trouble ☐ Quick stop by trouble ☑ Warning locked ☐ warning ☐ Information	

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

Invalid parameter set [0x01bc641f]

Response (Lenze setting printed in bold)	**Setting:** C01501/2 (☑ adjustable response)
☑ None ☐ System fault ☒ **Fault** ☐ Trouble ☐ Quick stop by trouble ☑ Warning locked ☐ warning ☐ Information	

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

Error: Lenze setting loaded [0x01bc6420]

Response (Lenze setting printed in bold)	**Setting:** not possible
☐ None ☐ System fault ☒ **Fault** ☐ Trouble ☐ Quick stop by trouble ☐ Warning locked ☐ warning ☐ Information	

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

Invalid module configuration [0x01bc6430]

Response (Lenze setting printed in bold)	**Setting:** C01501/2 (☑ adjustable response)
☑ None ☐ System fault ☒ **Fault** ☐ Trouble ☐ Quick stop by trouble ☑ Warning locked ☐ warning ☐ Information	

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

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

Response (Lenze setting printed in bold)	**Setting:** C13880 (☑ Adjustable response)
☒ **None** ☐ System fault ☑ Fault ☐ Trouble ☑ Quick stop by trouble ☑ Warning locked ☐ Warning ☑ Information	

Cause	Remedy
The EtherCAT data exchange was stopped in the "Operational" state. • Also see the chapter "Interruption of EtherCAT communication" (🕮 57).	• Check cables and terminals. • The master must reset the inverter to the "Operational" status (C13930 = 1). If required, check a pending emergency message first. ▸ State change after "Operational" in the stay-alive operation (🕮 27)

13 Parameter reference

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

Reference manual/online help for the Inverter Drive 8400 motec

Here you will find general information on parameters.

13.1 Communication-relevant parameters of the operating system

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

C01501

Parameter | Name: **C01501 | Response in case of communication fault with MCI**		Data type: UNSIGNED_8 Index: 23074_d = $5A22_h$
Configuration of monitoring functions for the Communication Unit		
Selection list **(Lenze setting printed in bold)**		
0	No response	
1	Error	
4	Warning Locked	
Subcodes	**Lenze setting**	**Info**
C01501/1	1: No Response	Resp. to MCI fault 1 • Response to a communication fault.
C01501/2	1: No Response	Resp. to MCI fault 2 • Response to a fault in the Communication Unit.
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 1		

C01503

Parameter | Name: **C01503 | MCI timeout**			Data type: UNSIGNED_16 Index: 23072_d = $5A20_h$
Setting range **(min. value | unit | max. value)**			
0	ms	1000	
Subcodes	**Lenze setting**		**Info**
C01503/1	200 ms		MCI timeout
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 1			

13.2 Parameters of the Communication Unit

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

C13850

Parameter | Name: **C13850 | All words to master**			Data type: UNSIGNED_16 Index: 10725_d = $29E5_h$
Display of the process data words (subcodes 1 ... 10) which are transferred from the inverter to the master. Only those which are configured are valid.			
Display range **(min. value | unit | max. value)**			
0		65535	
Subcodes			**Info**
C13850/1			1st word
...			...
C13850/8			8th word
C13850/9			I/O data 1
C13850/10			I/O data 2
☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT			

C13851

Parameter | Name: **C13851 | All words from master**			Data type: UNSIGNED_16 Index: 10724_d = $29E4_h$
Display of the process data words (subcodes 1 ... 8) which are transferred from the inverter to the master. Only those which are configured are valid.			
Display range **(min. value | unit | max. value)**			
0		65535	
Subcodes			**Info**
C13851/1			1st word
...			...
C13851/8			8th word
☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT			

C13859

Parameter | Name: **C13859 | All words to standard device**			Data type: UNSIGNED_16 Index: 10716_d = $29DC_h$
Number of process data words to be sent			
Display range **(min. value | unit | max. value)**			
0		10	
☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT			

C13860

Parameter | Name: **C13860 | All words from standard device**			Data type: UNSIGNED_16 Index: 10715_d = $29DB_h$
Number of process data words to be received			
Display range (min. value | unit | max. value)			
0		8	
☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT			

C13861

Parameter | Name: **C13861 | Bus status**			Data type: UNSIGNED_16 Index: 10714_d = $29DA_h$
Display of the current bus status ▶ EtherCAT state machine (📖 36)			
Display range (min. value | unit | max. value)			
0		65535	
☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT			

C13864

Parameter | Name: **C13864 | Active station address**			Data type: UNSIGNED_16 Index: 10711_d = $29D7_h$
Display of the station address allocated by the master			
Display range (min. value | unit | max. value)			
0		32767	
☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT			

C13867

Parameter | Name: **C13867 | Display of emergency data**	Data type: OCTET_STRING Index: 10708_d = $29D4_h$
Display of the emergency data sent by the inverter (string with a length of 8 bytes). ▶ Emergency requests / Emergency messages (📖 62)	
☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT	

C13879

Parameter | Name: **C13879 | Bus error**			Data type: UNSIGNED_16 Index: 10696_d = $29C8_h$
Bit coded display of the bus error Additionally, an error message is entered in the EtherCAT register "AL Status Code" (📖 37).			
Value is bit-coded:		**Info**	
Bit 0	General bus error		
Bit 1	Reserved		
...	...		
Bit 31	Reserved		
☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT			

C13880

Parameter | Name:
C13880 | Monitoring reaction

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

The set response will be executed if the node detects that it is no longer in the "Operational" state and the monitoring time (C13881) has elapsed.
The **notes in code** C13881 **must be observed!**
▸ Interruption of EtherCAT communication (🕮 57)

Selection list (Lenze setting printed in bold)	
0	No response
1	Error
4	Warning Locked

Subcodes	**Lenze setting**	**Info**
C13880/1	0: No Response	

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

C13881

Parameter | Name:
C13881 | Response time when exiting "Operational"

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

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

▸ Interruption of EtherCAT communication (🕮 57)

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

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

C13885

Parameter | Name:
C13885 | Clear process data

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

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

▸ Interruption of EtherCAT communication (🕮 57)

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

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

C13899

Parameter | Name:
C13899 | Station Alias address

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

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

▸ Address allocation (🕮 31)

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

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

C13900

<table>
<tr><td colspan="4">Parameter | Name:
C13900 | Firmware product type</td><td>Data type: VISIBLE_STRING
Index: $10675_d = 29B3_h$</td></tr>
<tr><td colspan="5">The code contains a string with a length of 8 bytes.
The following identification code is displayed: "E84DFFET".</td></tr>
<tr><td colspan="5">☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT</td></tr>
</table>

C13901

<table>
<tr><td colspan="4">Parameter | Name:
C13901 | Firmware compilation date</td><td>Data type: VISIBLE_STRING
Index: $10674_d = 29B2_h$</td></tr>
<tr><td colspan="5">The code contains a string with a length of 20 bytes.
Here, the compilation date ("MM DD YYYY") and time ("hh:mm:ss") of the software are provided.
Example: "Mar 21 2005 12:31:21"</td></tr>
<tr><td colspan="5">☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT</td></tr>
</table>

C13902

<table>
<tr><td colspan="4">Parameter | Name:
C13902 | Firmware version</td><td>Data type: VISIBLE_STRING
Index: $10673_d = 29B1_h$</td></tr>
<tr><td colspan="5">The code contains a string with a length of 11 bytes.
Here, the firmware version is provided.
Example: "01.00.00.00"</td></tr>
<tr><td colspan="5">☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT</td></tr>
</table>

C13930

<table>
<tr><td colspan="4">Parameter | Name:
C13930 | Reach Operational</td><td>Data type: UNSIGNED_8
Index: $10645_d = 2995_h$</td></tr>
<tr><td colspan="5">▸ State change after "Operational" in the stay-alive operation (🕮 27)
The parameter is a volatile parameter that is not saved and must therefore be reset to '1' each time the controller (master) is restarted.
• Setting ’1’: State change after "Operational"
• Setting ’0’: No state change</td></tr>
<tr><td colspan="3">Setting range (min. value | unit | max. value)</td><td colspan="2">Lenze setting</td></tr>
<tr><td>0</td><td></td><td>1</td><td colspan="2">0</td></tr>
<tr><td colspan="5">☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☑ COM ☐ MOT</td></tr>
</table>

13.3 Table of attributes

The table of attributes contains information that is required for communication with the inverter via parameters.

How to read the table of attributes:

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

Table of attributes

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

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FEEDBACK

Your opinion is important to us

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

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

feedback-docu@lenze.com

Thank you very much for your support.

Your Lenze documentation team

Inverter Drive 8400 motec (EtherCAT® option) · 13564907 · EDS84DMOTECAT · EN 4.0 · 02/2019 · TD23

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