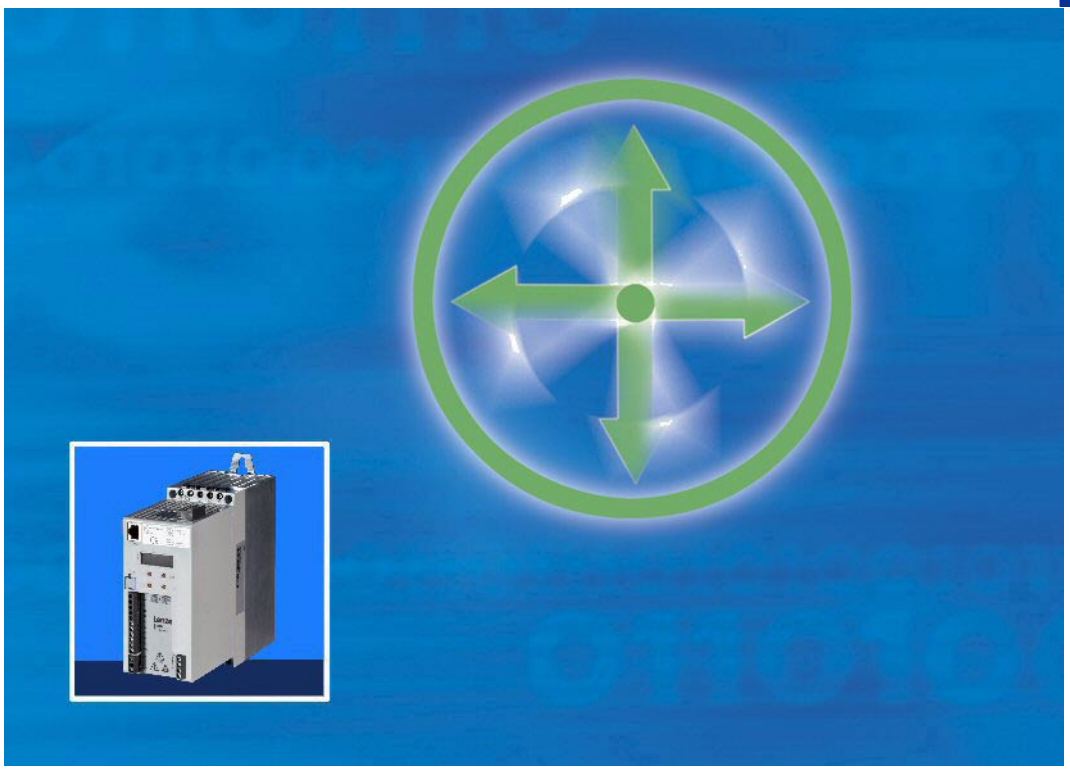
EDS84AVBDxx
13292140

L-force *Drives*

Software Manual

8400



E84AVBDExxxxxx0

8400 BaseLine D Inverter Drives

Lenze

Overview of the technical documentation for Inverter Drives 8400

Project planning, selecting & ordering

- ☐ 8400 Hardware Manual
- Catalogue

Mounting & wiring

- MA 8400 BaseLine/8400StateLine/HighLine
- MA for communication module
- MA for extension module
- MA for safety module
- MA for accessories

Parameter setting

- BA keypad
- ☐ SW 8400 BaseLine C
- ☐ SW 8400 BaseLine D ← **This documentation**
- ☐ SW 8400 StateLine
- ☐ SW 8400 HighLine
- ☐ KHB for communication module

Commissioning of the drive

- Commissioning guide
- ☐ SW 8400 StateLine/HighLine
  - → Chapter "Commissioning"
  - → Chapter "Oscilloscope"
  - → Chapter "Diagnostics & fault analysis"

Networking

- ☐ KHB for communication medium used

Legend:

- Printed documentation
- ☐ Online documentation (PDF/»Engineer« online help)

Abbreviations used

BA	Operating Instructions
KHB	Communication Manual
MA	Mounting Instructions
SW	Software Manual

Contents

1 About this documentation

Danger!

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

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

Please read the safety instructions provided in the 8400 Mounting Instructions and in the 8400 Hardware Manual. Both documents are supplied with the controller.

This Software Manual contains information about the parameterisation of the 8400 BaseLine D controller using the L-force »Engineer« and the keypad.

The information given in this Software Manual applies to the 8400 BaseLine D frequency inverter with the following nameplate data:

Type	Type designation	From software version	Important
8400 BaseLine D	E84AVBDExxxxSX0	2.1	Variant without digital output X4/DO1
8400 BaseLine D	E84AVBDExxxxSX1	2.1	Variant with digital output X4/DO1 ▸ Digital outputs (📖 118)
8400 BaseLine D	E84AVBDExxxxxx0	3.0	New function block L_PCTRL

Tip!

Current documentation and software updates for Lenze products can be found on the Internet in the "Services & Downloads" area under

http://www.Lenze.com

1.1 Document history

Version			Description
1.0	06/2008	TD06	First edition
2.0	07/2008	TD 06	Second edition
3.0	02/2009	TD 06	New: The chapters "Commissioning" and "Parameter reference" have been revised, new block L_RLQ (CW/CCW rotation)
4.0	04/2009	TD 06	New: Subcode c012 in C002 for adaption of parameter sets from controllers with firmware version ≤ V2.1 in the event of service.
5.0	04/2009	TD 06	New: • Function block L_PCTRL • Quick saving at the push of a button (📖 59) • Parameter list with info texts

1.2 Conventions used

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

Type of information	Writing	Examples/notes
Variable identifier	*Italics*	By setting *bEnable* to TRUE...
Window		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, then the individual commands are separated by an arrow: Select **File→Open** to...
Shortcut	**<Bold>**	Press **<F1>** to open the Online Help.
		If a command requires a combination of keys, a "+" is placed between the key symbols: Use **<Shift>+<ESC>** to...
Hyperlink	Underlined	A hyperlink is an optically highlighted reference which is activated by a mouse click.
Step-by-step instructions		Step-by-step instructions are indicated by a pictograph.

1.3 Terminology used

Term	Meaning
»Engineer«	Lenze PC software which supports you in "engineering" (parameterisation, diagnostics and configuration) throughout the whole life cycle, i.e. from planning to maintenance of the commissioned machine.
Application block	Block for a drive application (e.g. actuating drive - speed) A drive application is a drive solution provided with the experiences and know-how of Lenze in which function blocks interconnected to a signal flow form the basis for implementing typical drive tasks.
Code	Parameter used for controller parameter setting or monitoring. The term is usually called "index".
Display codes	Parameter that displays the current status or value of a system block input/ output.
FB Editor	Function block editor Graphical interconnection tool which is provided for signal interconnections in the »Engineer« on the **FB editor** tab and by means of which the applications integrated in the drive can also be reconfigured and extended by individual functions.
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 (the instance name) and a processing number which defines the position at which the function block is calculated during the task cycle.
Lenze setting	This setting is the default factory setting of the device.
Port block	Block for implementing the process data transfer via a fieldbus
QSP	Quick stop
SC	Operating mode: **S**ervo **C**ontrol
SLVC	Operating mode: **S**ensor**L**ess **V**ector **C**ontrol

Term	Meaning
Subcode	If a code contains several parameters, the individual parameters are stored under "subcodes". This manual uses a slash "/" as a separator between code and subcode (e.g. "C118/3"). The term is usually called "subindex".
System block	System blocks provide interfaces to basic functions and to the hardware of the controller in the FB editor of the »Engineer« (e.g. to the digital inputs).
VFCplus	Operating mode: V/f characteristic control ("**V**oltage **F**requency **C**ontrol")

1.4 Definition of notes used

The following signal words and symbols are used in this Software Manual 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 informs how to prevent dangerous situations)

Pictograph	Signal word	Meaning
	**Danger!**	**Danger of personal injury through dangerous electrical voltage** Reference to an imminent danger that may result in death or serious personal injury if the corresponding measures are not taken.
	**Danger!**	**Danger of personal injury through a general source of danger** Reference to an imminent danger that may result in death or serious personal injury if the corresponding measures are not taken.
	**Stop!**	**Danger of 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
	**Note!**	Important note to ensure trouble-free operation
	**Tip!**	Useful tip for easy handling

2 Product description

2.1 Functions of the frequency inverter

- Memory module for parameter transfer and quick and easy device replacement
- Approved for use in balanced supply systems (TN systems)
- Wide input voltage range up to 500V (+10%) for a worldwide application without using additional transformers
- Approvals CE, UL
- High overload capacity up to 200% for generating high breakaway torques and for a fault-tolerant operation
- Integrated brake transistor (brake chopper) only available with devices operating at 400 V / 500 V.
- Integrated interface for diagnostics via PC with extensive diagnostic options
- Integrated protective functions
- Adjustable warning levels for a simplified and safe machine maintenance (e.g. motor operating time)
- Adjustable password to protect your parameter setting
- Saving of all parameters at the push of a button
- Relay output
- DC connection
- Integrated EMC shield connections for control cables

2.2 Memory module

Danger!

After switching off the mains, wait three minutes before working on the controller. If you want to remove the memory module, make sure that the controller is deenergised.

The memory module is a memory location for the drive parameters of the 8400 BaseLine. The pluggable design especially serves to

- restore an application after a device has been exchanged.
- duplicate identical drive tasks within the 8400 BaseLine frequency inverter series.

Tip!

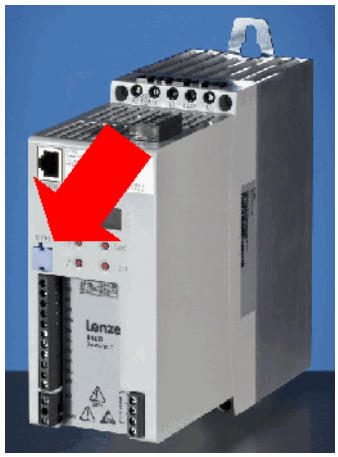
For duplication, we recommend to use the optionally available EPM Programmer.

Exchange of the memory module

By default, the memory module is positioned in the EPM slot at the front of the controller (see arrow).

To avoid confusion with other Lenze products, the memory modules of the 8400 BaseLine frequency inverter series are grey. The exchange of these memory modules among each other is possible without any problems.

More details on the handling can be found in the 8400 hardware manual which is part of the data medium included in the scope of supply.



[2-1] Positioning of the grey memory module at the front of the 8400 BaseLine

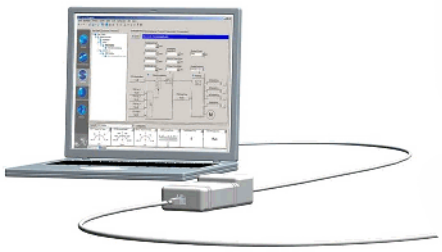
2.3 Communicating with the controller

The following interface can be used to build up communication between PC and controller:

- Diagnostic interface X6/Going online via diagnostic adapter

2.3.1 Going online via diagnostic adapter

For the initial commissioning of the controller, you can use, for instance, the diagnostic adapter offered by Lenze:



Note!

Please observe the documentation for the diagnostic adapter!

Preconditions:

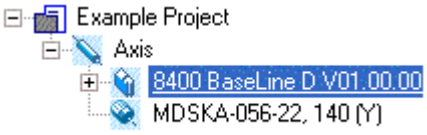
- The diagnostic adapter is connected to diagnostic interface X6 on the controller and to a free USB port on the PC.
- The driver required for the diagnostic adapter is installed.
- The controller is supplied with mains power via X100.

Stop!

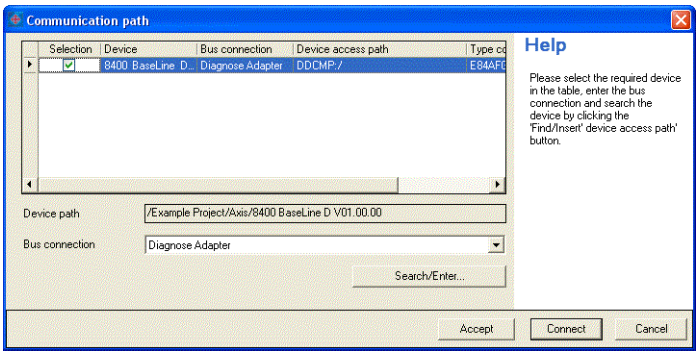
If you change parameters in the »Engineer« while the controller is connected online, the changes will be directly accepted by the controller!

How to build up an online connection via the diagnostic adapter:

1. Select the 8400 BaseLine controller to which you want to build up an online connection in the *Project view* of the »Engineer«:

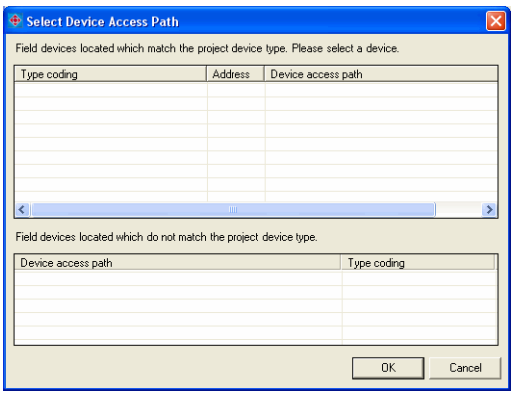


2. Click the icon or select the command **Online→Go online**.
   - If no online connection has been configured for the selected controller so far, the *Device assignment offline devices* dialog box will be displayed:

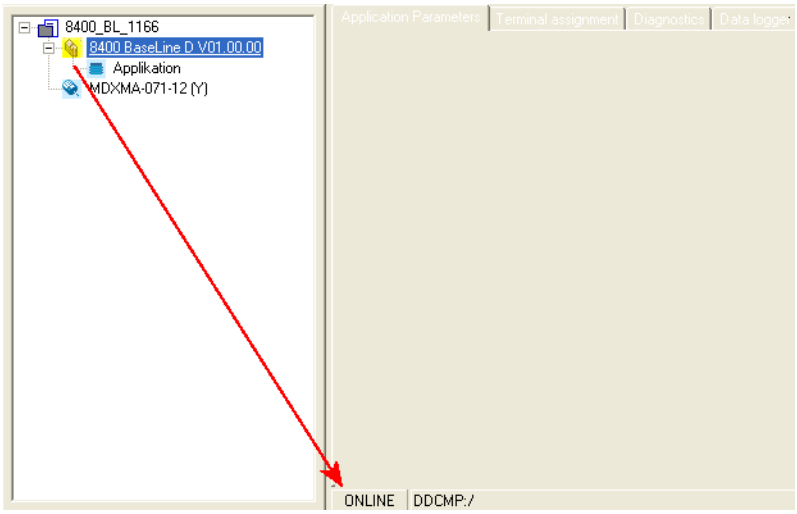


   - The dialog box also appears if the online connection is built up via the command **Online→Go online** instead of using the *toolbar* icon.
3. Select the "Diagnostic adapter" entry from the **Bus connection** list field.

4. Click **Find device access path** to find the controller in the selected bus system.
   - The *Address assignment* dialog box appears:



5. Select the corresponding controller from the **Field devices located** list field.
6. Click **OK**.
   - The *Address assignment* dialog box is closed and the selected **Device access path** (e.g. "DDCMP:/") is indicated in the *Device assignment offline devices* dialog box.
7. Click **Connect**.
   - The dialog box is closed and the online connection with the controller is built up.
   - When an online connection with the controller exists, this is indicated in the *Project view* - by a yellow icon and
     - by the word "ONLINE" in the status bar:



Now you can use the icons and to easily build up and end a connection with the controller. The communication settings are only required when communication with a controller is built up for the first time.

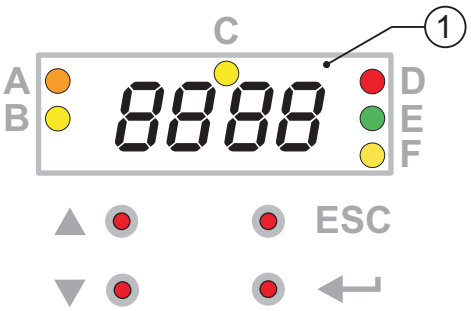
▶ If you want to change the existing configuration, select the command **Online→Go online** to open the *Device assignment offline devices* dialog box and change the settings.

▶ With an online connection, the »Engineer« displays the current parameter settings of the controller with a yellow background colour.

- When the background colour changes from yellow to red, the connection with the controller has been interrupted.

2.4 Internal Keypad

Display elements and control panel



Symbol	Information	Meaning
①	4-character display with LEDs (A ... F)	
A	orange	Set current/torque limit is reached
B	yellow	Minus sign for identifying the negative numbers with more than 3 digits.
C	yellow	User-LED, can be configured via C621/42
D	red	See Signalling of the LEDs "D" and "E" (📖 24)
E	green	
F	yellow	Direction of rotation, CCW rotation
	Off	Rotational direction CW
	blinking	Commanded direction does not (yet) equal the actual direction - for example during reversing
ESC	Escape key	back
↵	Enter key	Short: Next / confirmation 3 seconds: Save all parameters
▲	Navigation key, upwards	Short: Navigation in the menu level and parameter level and parameter editing Long (> 2 seconds): Fast scrolling function
▼	Navigation key, downwards	

3 Commissioning

3.1 Before switching on

Danger!

- Continuous operation at low field frequency with rated motor current may lead to thermal overload when self-ventilated machines are used. If required, motor temperature monitoring should be activated with C120 ▸ Motor temperature monitoring with I²xt (📖 108).
- If an asynchronous motor with the nameplate data 400 V ⅄ /230 V △ is delta-connected to a frequency inverter for 400 V mains supply voltage, set code C015 (V/f base frequency) to 87 Hz.

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

▶ before connecting the mains voltage:
- Wiring for completeness, short circuit, and earth fault
- The "emergency stop" function of the entire system
- The motor circuit configuration (star/delta) must be adapted to the output voltage of the controller
- The in-phase connection of the motor

▶ the setting of the most important drive parameters before enabling the controller:
- Is the V/f rated frequency adapted to the motor circuit configuration?
- Are the drive parameters relevant for your application set correctly?
- Is the configuration of the analog and digital inputs and outputs adapted to the wiring?

Tip!

In the Lenze setting, the "linear V/f characteristic" mode is set as motor control. The parameter settings are preset so that, if the frequency inverter and the 50 Hz asynchronous machine match in terms of power, the controller is immediately ready for operation without any further parameter setting expense and the motor operates satisfactorily.

Recommendations for the following application cases:

- If the frequency inverter and the motor differ widely in terms of power, → set I_{max} (C022) to 2.0 $I_{N(motor)}$.
- If a high starting torque is required
  → set V_{min} boost (C016) in motor idle state so that the rated motor current (C058) flows at a field frequency of f = 3Hz.
- For noise optimisation
  → set the switching frequency (C018) to "3" (16 $kHz_{sin\ var}$).
- If you need a high torque at low speed we recommend the control mode “vector control".

3.2 Parameter setting and diagnosing directly at the controller

Parameter setting

The front of the controller is provided with control elements which serve to access the parameters (also called codes) stored in the controller.

- An overview with a corresponding description of the codes can be found in chapter
  - Parameter reference (📖 167).
- An overview of the menu structure of the internal keypad can be found in chapter
  - Menu structure (📖 22).

Diagnosing

The optical display of the internal keypad shows important status information of the controller by LEDs. The positions of the coloured LEDs are marked on the housing by letters.

- More information on diagnostics options and messages can be found in the chapters
  - Diagnostics (📖 23)
  - Messages (📖 25)
- The different controller states are described in chapter
  - Device states (📖 46)

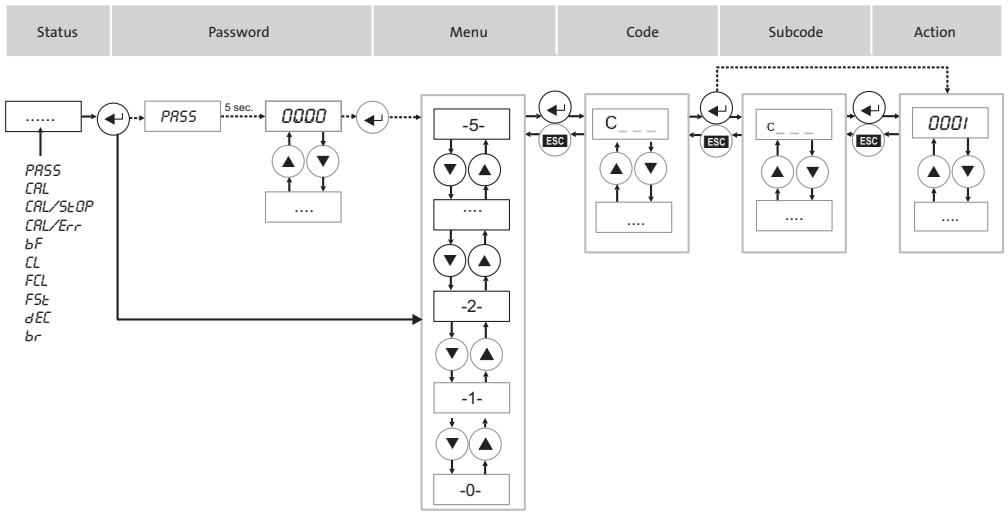
Tip!

Extensive parameter settings and configurations should be carried out with the L-force »Engineer«. If you want to use the L-force »Engineer«, the online help and the software documentation for the controller will support you.

3.2.1 Menu structure

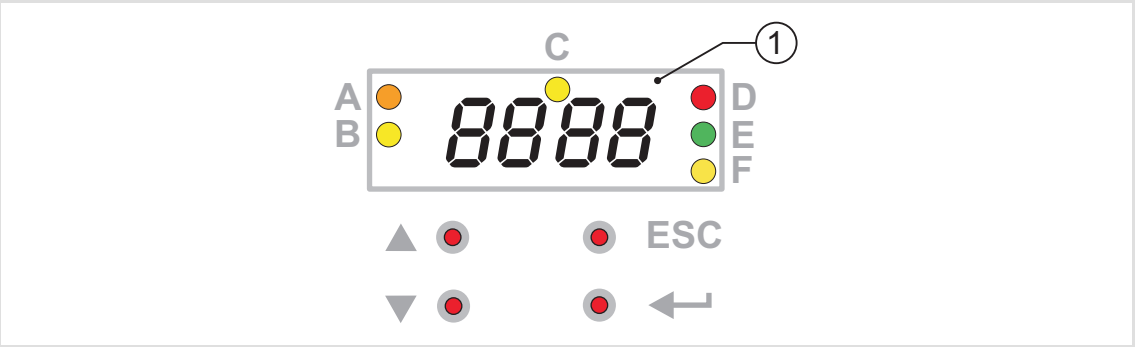
Note!

- After switching on the controller, the internal keypad performs a quick self-test. All segments of the display flash for approx. 3 seconds. After that the display switches to the display which indicates the setpoint speed of the motor. The internal keypad is now operational.
- When the password protection is activated and no password is input, only the user menu is freely accessible. All other functions require the correct password.

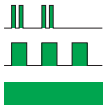
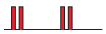


Menu
-0- , Access to all parameters selected by the user under C517.
-1- , Access to all drive parameters.
-2- , Access to parameters for fast commissioning with terminals.
-3- , Access to parameters for fast commissioning with internal keypad.
-4- , Access to motor control parameters.
-5- , Access to diagnostic parameters.

3.2.2 Diagnostics



Symbol	Information	Meaning
①	4-character display with LEDs (A ... F)	
A	orange	Set current/torque limit is reached
B	yellow	Minus sign for identifying the negative numbers bigger than 4 characters when the rotational direction has been reversed
C	yellow	User LED, configurable via C621/42, user-defined LED status
D	red	DRIVE ERROR, see the following table
E	green	Drive ready (no error occurred), see the following table
F	yellow	Direction of rotation, CCW rotation
	Off	Rotational direction CW
	blinking	Commanded direction is not equal to actual direction- for example during reversing
ESC	Escape key	Abort
↵	Enter key	Confirmation / save parameter
▲	upwards	Short pressing: Navigation on menu and parameter level, parameter processing, long pressing (> 2 seconds): Quick scroll function
▼	downwards	

LED E = DRV-RDY	LED D = DRV-ERR	Status
OFF	OFF	"Init" state
	OFF	"ReadyToSwitchON" state
	OFF	"SwitchedON" state
	OFF	"OperationEnabled" state
		Status display "Warning" The controller is ready to switch on, switched on or the operation is enabled and a warning is indicated.
OFF		"Trouble" state
OFF		"Fault" state
The symbols used to represent the LED states have the following meanings:		
	LED flashes once approx. every three seconds (*slow flash*)	
	LED flashes once approx. every 1.25 seconds (*flash*)	
	LED flashes twice approx. every 1.25 seconds (*double flash*)	
	LED blinks every second	
	LED is permanently on	

[3-1] Signalling of the LEDs "D" and "E"

3.2.3 Messages

The current status of the controller is constituted via

► six coloured LEDs, see Signalling of the LEDs "D" and "E" (📖 24)

► messages:

Message		Meaning
PASS		Password input
CAL	blinking	Identification is in progress. Operation is not enabled yet.
CAL / StOP	alternatively blinking	Identification is ready to start
CAL / Err	alternatively blinking	Identification is not ready to start. Either C088, or C089, or C090 is 0.
bF	blinking	Identification error. Drive ID stored in EMP does not match the drive ID stored in the controller.
CL	constant	CL: Clamp Current limit set in C022 is reached.
FCL	constant	Fast current limit value (higher than value set in C022) is reached
FSt	constant	Flying start is in progress
dEc	constant	Deceleration is temporarily suspended because of higher bus voltage
br	flashes during the hold time of the DC brake	DC brake is in progress

3.3 Test commissioning

Danger!

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

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

Please read the safety instructions provided in the 8400 Mounting Instructions and in the 8400 Hardware Manual. Both documents are supplied with the controller.

Only a few parameters need to be adapted for the drive. Afterwards, the drive application can be immediately controlled via the digital and analog inputs of the controller.

Tip!

For initial commissioning of the frequency inverter, the drive application is preconfigured with the terminal control in the Lenze setting.

Commissioning step	Action
Connect I/Os	Enter the I/O connection • C007: Selection from table (-->terminals, 10)
Parameterise application	Set speed setpoint • C011: Define reference speed in [rpm] • C012: Set acceleration time in [s] • C013: Set deceleration time in [s] • C105: Set QSP deceleration time in [s] • Further codes, e.g. jog values, TI times, brake management, etc.
Saving and testing	Save parameter set (📖 58) • Save parameter set 1 (-->C002/7 = 1) • Save all parameter sets (-->C002/11 = 1) • Save all parameter sets at the push of a button • Save all parameter changes automatically with mains failure protection (---> C141/1)

Further parameters can be used to assign the settings of the actual values to other interfaces.

Target of the "test commissioning"

For test and demonstration purposes, the motor is to start to rotate with as few wiring and settings as possible in best time.

Keypad control or terminal control

First decide how the controller is to be controlled during test commissioning:

- Test commissioning with keypad control (📖 28)
- Test commissioning with terminal control (📖 30)

Tip!

The operation and commissioning of the internal keypad is described in the Hardware Manual of the 8400 frequency inverter. The index of the CD attached to the device as scope of supply contains the Hardware Manual saved as PDF.

A detailed description of how to use the integrated keypad can be found in this manual in the chapter

- Parameter setting and diagnosing directly at the controller (📖 21)

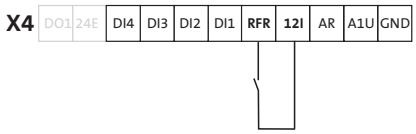
3.3.1 Test commissioning with keypad control

Commissioning steps

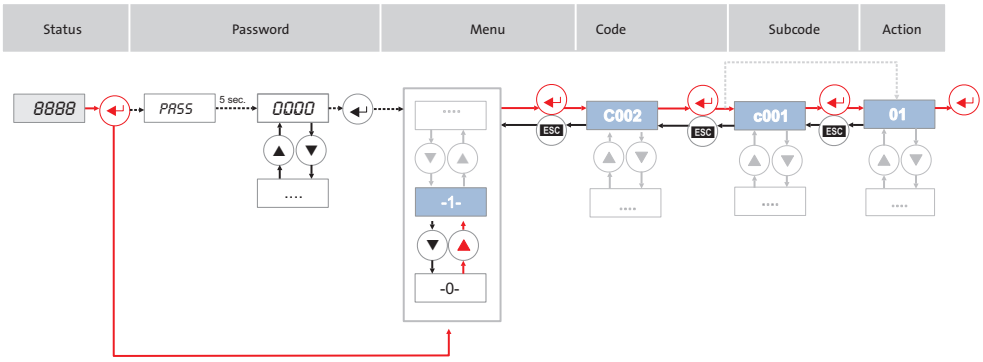
1. Wire the power connections

   Make use of the Mounting Instructions supplied with the frequency inverter to wire the power terminals according to the requirements of your device.

2. Wire the control connections

Digital inputs at terminal X4	Assignment	Info
	**RFR**	• Controller enable RFR = high • Error reset High → low (edge-controlled)

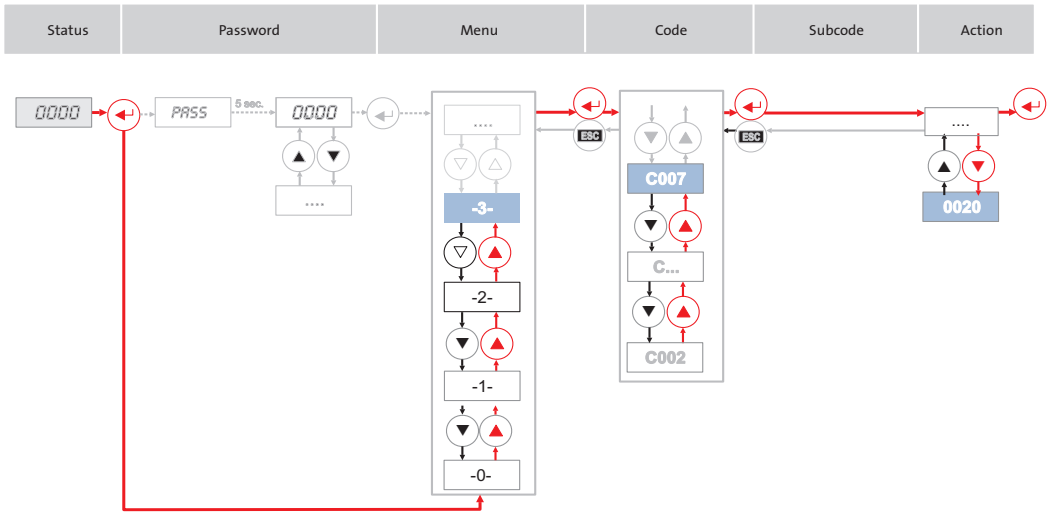
3. If you are sure that the state of the frequency inverter is as delivered from the manufacturer (Lenze setting), you can skip this commissioning step.
   If not, restore the Lenze setting on the frequency inverter:



- Select menu -1- (all parameters)
- Press "Enter" key
- Set code C002
- Press "Enter" key
- Set subcode C001
- Press "Enter" key
- Set value "01"
- Press "Enter" key

[3-2] Setting / resetting the Lenze setting

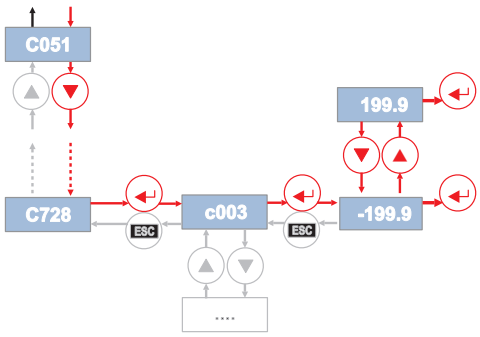
4. Set keypad control



- Select menu -3- (quick commissioning with integrated keypad)
- Press "Enter" key
- Set code C007
- Press "Enter" key
- Set value "20"
- Press "Enter" key

5. Enable the controller:
   Set terminal X4/RFR to HIGH potential (X4/12I).

6. Use the keypad to change the motor velocity or
   the motor speed by selecting different fixed setpoints:

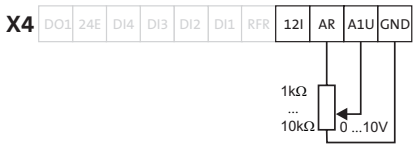
Internal Keypad	Code	Subcode	Motor speed
	C728	3	CCW rotation: -199.9 % ..... 0 (from C011) CW rotation: 0 ... +199.9 % (from C011)
	C051	-	Observe • the actual speed value: C051 • appearing messages ▸ Diagnostics (📖 23)

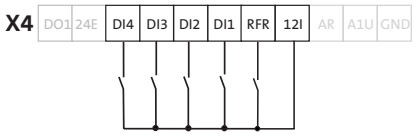
7. Save the settings with mains failure protection by entering the value "1" in code C002, subcode 7.

3.3.2 Test commissioning with terminal control

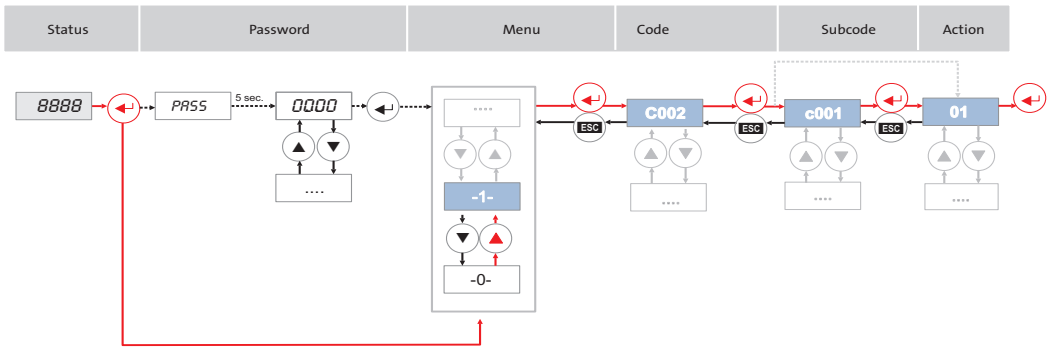
Commissioning steps

1. Wire the power connections
   Make use of the Mounting Instructions supplied with the frequency inverter to carry out the power connections correctly and in accordance with the requirements of your device.
2. Wire the control connections

Wiring of the analog input at X4	Assignment	Terminal control
	**A1U**	Setpoint selection 10 V (= 100 %): 1500 rpm (for 4-pole motor)

Interconnection of the digital inputs at X4	Assignment	Terminal control
 DI1 ... DI4: All active = high	**RFR**	• Controller enable: RFR = high • Error reset: High → low (edge-controlled)
	DI1	DI1: Fixed frequency 1 ... fixed frequency 3, DI2: Fixed frequency 2 ... fixed frequency 3 see table [3-1] (📖 31)
	DI2	
	DI3	DCB
	DI4	Direction of rotation counter-clockwise/clockwise (CCW/CW)

3. If you are sure that the state of the frequency inverter is as delivered from the manufacturer (Lenze setting), you can skip the following step.
   If not, restore the Lenze setting on the frequency inverter:



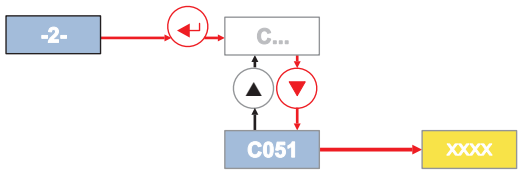
- Select menu -1- (all parameters)
- Press "Enter" key
- Set code C002
- Press "Enter" key
- Set subcode C001
- Press "Enter" key
- Set value "01"
- Press "Enter" key

[3-3] Setting / resetting the Lenze setting

4. Enable the controller:
   Set terminal X4/RFR to HIGH potential (X4/12I).
5. Use the potentiometer to change the motor velocity or the motor speed by selecting different fixed setpoints:

DI2	DI1	Motor speed
0	0	Setpoint from potentiometer
0	1	40 % of C011 (reference speed)
1	0	60 % of C011 (reference speed)
1	1	80 % of C011 (reference speed)

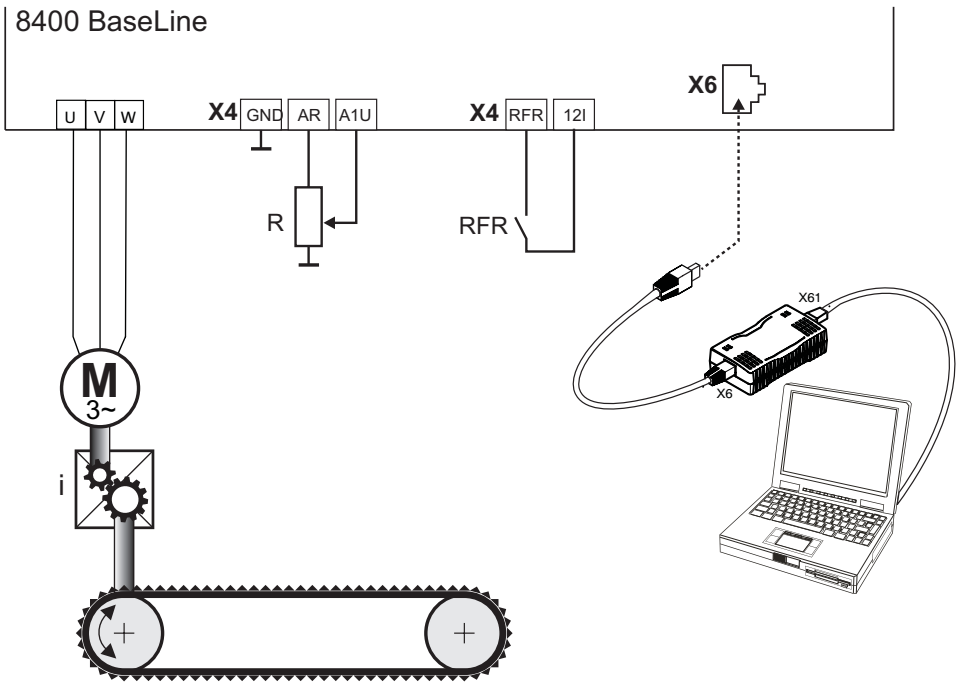
[3-1] Selection of fixed motor speeds via digital input terminals

Internal Keypad	Code	Subcode	Motor speed
	C051	-	Observe • the actual speed value: C051 • appearing messages ▸ Diagnostics (📖 23)

6. Save the settings with mains failure protection by entering the value "1" in code C002, subcode 7.

3.4 Commissioning of the drive application with the »Engineer«

The focus here is to commission a simple system constellation with a few components (see the illustration below). During the step-by-step instructions, you will get more information which is suitable for commissioning higher requirements.



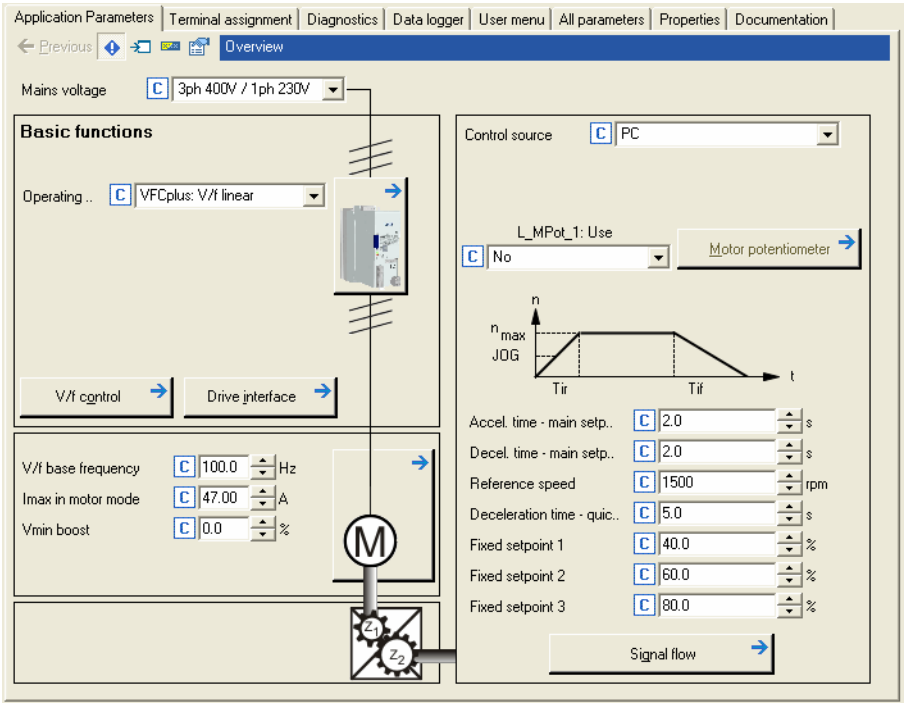
- Control terminals at plug connector X4:
  - GND, ground potential for analog and digital signals
  - AR, reference voltage (10 V) for analog signals
  - A1U, input 1 for analog signals (slider of the setpoint potentiometer R)
  - RFR, controller enable (CINH)
- Parameter setting and diagnostic terminal X6:
  - Communication between PC and controller

[3-4] Block diagram for wiring the commissioning example for the drive application

Tip!

Execute the following subchapters step by step.

When the device is commissioned using the »Engineer«, commissioning is carried out by means of dialogs and graphic user interfaces.



[3-5] The "Application parameter" tab as an example of a graphic user interface

3.4.1 Observe the safety measures

Observe all required safety measures before switching on the device. See also Before switching on (📖 19) .

3.4.2 Open the »Engineer«

When the »Engineer« is open, press the function key F1 to access the online help.

Note!

In the general part of the menu structure of the online help basic operations are described in detail. Please refer to the following chapters and make implementations as required:

- Chapter "Working with projects", e. g. "Creating a new project (select a component from the catalogue)", or "Creating a new project (Start search for connected devices)""
- Chapter "Project structure", e. g. select a motor, if possible, carry out motor identification run
- Chapter "Device functions in the online mode", e. g. "Setting a communication path and going online", establish connection between PC - device

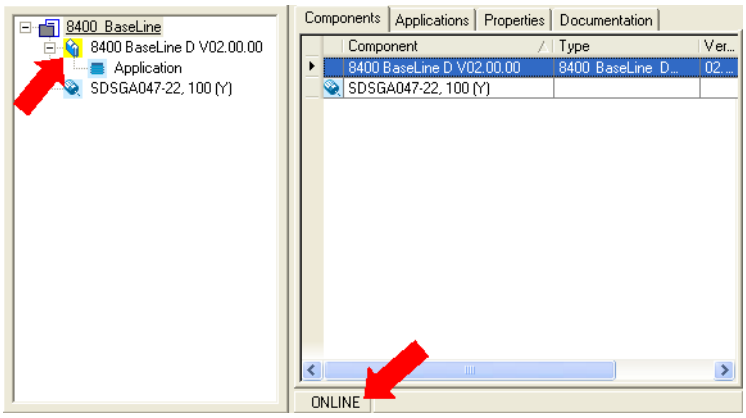
1. Execute start-up wizard

   Using the start-up wizard and the information contained in the online help you first create a project in the »Engineer«

2. Establish an online connection

   You establish a connection to the controller and its connected components, for instance via a diagnostic adapter.

   When an online connection has been established between PC and device, the colour of the symbol in the project tree changes (right arrow) and "ONLINE" appears in the lower part of the workspace (right arrow). Click the highlighted symbol on the left:



[3-6] Reference to the online connection in the project tree and the working area

3.4.3 Load the Lenze setting

In order to be able to take a defined state as a basis for this commissioning, you have to load the Lenze setting.

Start the action with C002/1 = 1.

Note!

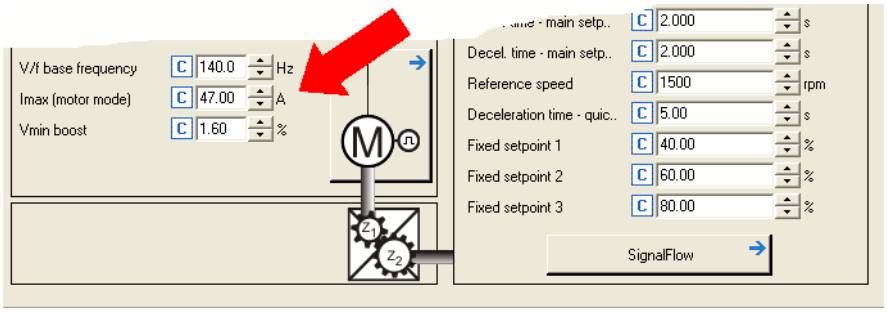
After the Lenze setting has been loaded, the "action ready" status is reported with C002/1 = 0.

Tip!

How to load the Lenze setting using the »Engineer« is described in chapter Load Lenze setting (📖 58).

3.4.4 Make motor settings

Enter the data of your motor into the field marked with the arrow if it is not a power-adapted standard motor:



3.4.5 Select control source

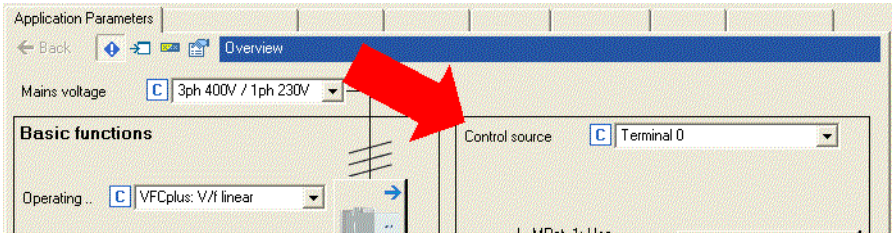
In this section, the origin of the signal source of the main setpoint is set. The selection of the signal source defines how the set technology application is to be controlled. On the "Application parameter" tab, for instance, (or with code C007) the main setpoint can be defined as constant value via a digital input (terminal control).

The following options are available:

▶ Terminal control

Selection	Name	DI1	DI2	DI3	DI4
10	Terminal 0	JOG 1/3	JOG 2/3	DCB	CCW
12	Terminal 2	JOG 1/3	JOG 2/3	QSP	CCW
14	Terminal 11	CCW	DCB	MPotUp	MPotDown
16	Terminal 16	JOG 1/3	JOG 2/3	CwQSP	CcwQSP

▶ Control via keypad / PC
  – Selection 20, keypad
  – Selection 21, PC



▶ In the commissioning example, the control source "Terminals 0" (Lenze setting) is selected (see arrow above).

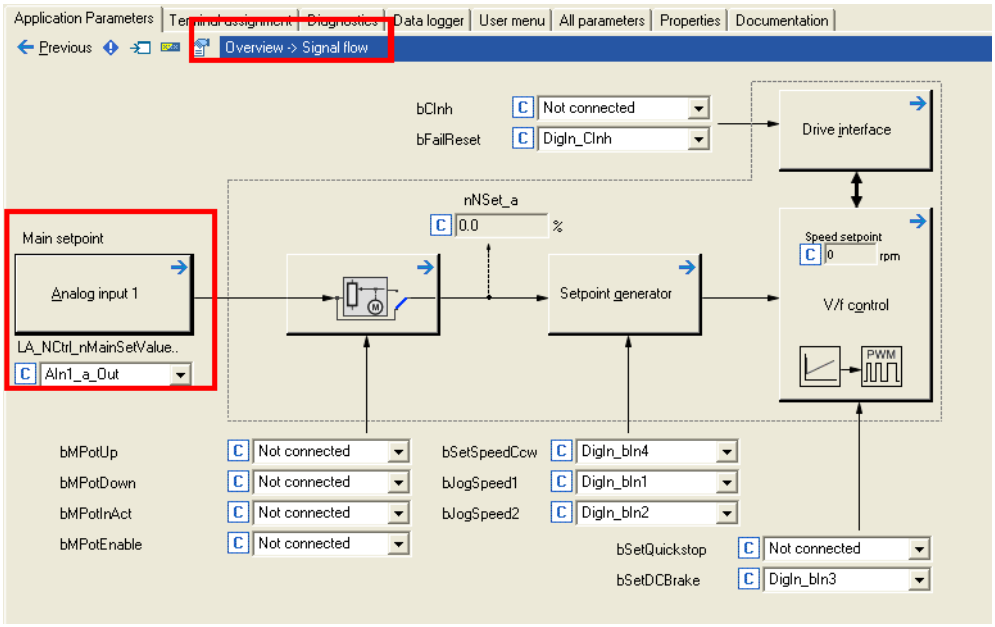
Important parameters

Parameter	INFO
C007	Select control mode
C242	Operating mode, selection for PID controller
C806	Use motor potentiometer yes / no

The device inputs and outputs called system blocks at Lenze are the interface of the application towards the peripherals of the controller, e.g. the digital and analog I/Os ("LS_DigitalInput, LS_DigitalOutput, LS_AnalogInput").

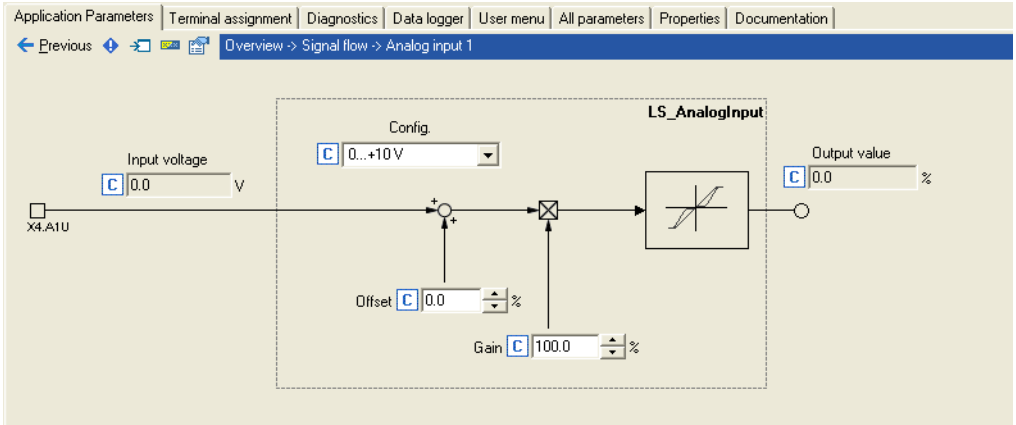
This is how you can follow, for instance, the origin of the main setpoint in the »Engineer«. Based on the "Application parameter" tab shown before, select the following path:

▶ Click the "Signal flow" button.
The dialog box "Overview --> Signal flow" appears (see below).
Here you find the "Analog input 1" button (see marking).
By the selection of the signal source (terminal control 0) this input is entered as source of the main setpoint:



[3-7] Signal sources of the TA "Speed closed-loop control", path: "Application parameters" tab --> "Signal flow" button

▶ Click the "Main setpoint" button. A dialog window opens which contains further details on the origin
(terminal X4/A1U) and parameter setting (offset, C026 / gain, C027):



An overview of the inputs and outputs assigned as a function of the control source can be found in a configuration table in the chapter Pre-assignment of the drive application (📖 140).

The configuration table contains a selection for the most frequently used signals so that a quick commissioning with only a few operator control action is possible. If the described pre-assignment of the application block is not suitable for the drive task, select code C007 = "0" to implement an individual configuration by means of the FB editor.

This allows for easy commissioning of the application, e.g. together with the setpoint box available in the Lenze accessories program.

3.4.6 Start program

- RFR = TRUE: Enable controller
- The setpoint potentiometer ("R", see graphics [3-4]) serves to vary the speed.

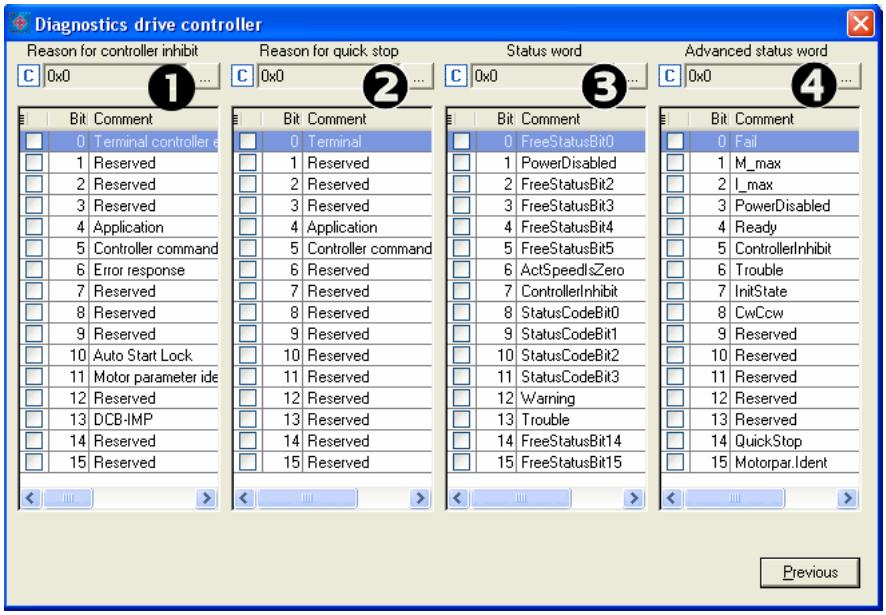
3.4.7 Diagnostics

Why does the motor not rotate?

If the motor does not move contrary to expectations after the last commissioning step, we recommend the following systematic way to find out the reason for it.

1. Check the signal flow for plausible setpoints
2. Check setpoint sources
   - Click the "Drive control" button (see illustration) of the "Diagnostics" tab

The appearing view is a complete summary of all control sources having an impact on the controller:



❶ Control sources which set the drive to controller inhibit
❷ Control sources which set the drive to quick stop
❸ / ❹ Diverse status information

[3-8] Diagnostics options for drive control

Tip!

This information can also be displayed by the internal keypad. For this call the codes specified in the header of the table.

3.5 Password protection

The controller offers the option to protect the unauthorised access to the menu level by assigning a password. The following sections describe how to create, change, or delete the password protection and how to access the menu level via the password:

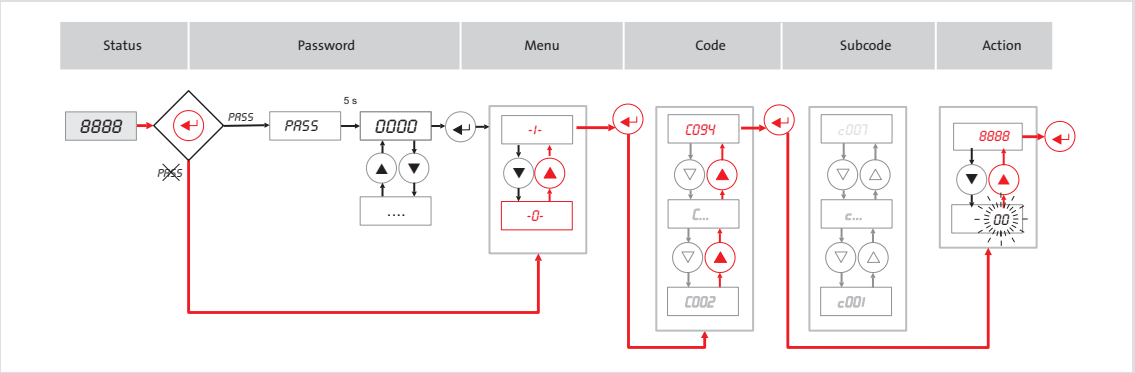
- Entry of a password not available yet (delivery status) (📖 41)
- Delete or change available password (📖 42)
- Access password-protected controller without knowing the password (📖 43)
- Reach password-protected menu level with knowing the password (📖 44)

For this proceed step by step. The graphics shown above contain a program overview and the required steps.

The meaning of the menus and the related menu levels are described in the chapter
- Menu structure (📖 22).

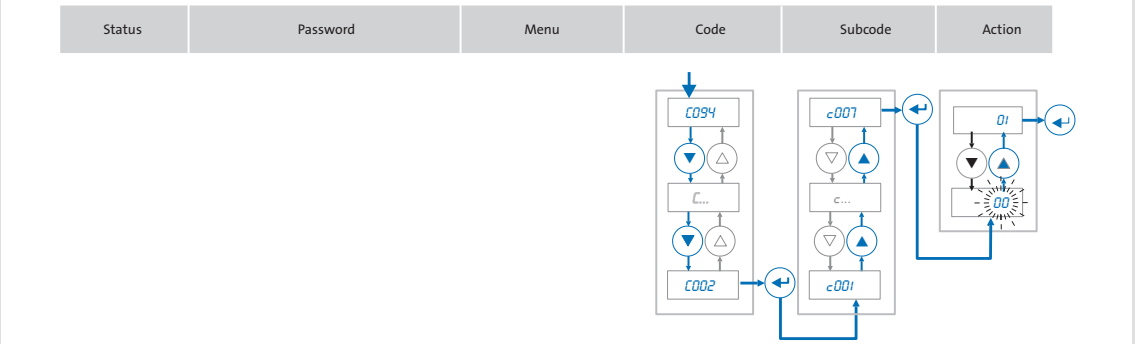
3.5.1 Entry of a password not available yet

This information is required if you want to create the password protection for e.g. a controller in default status.



[3-9] Enter password and confirm it

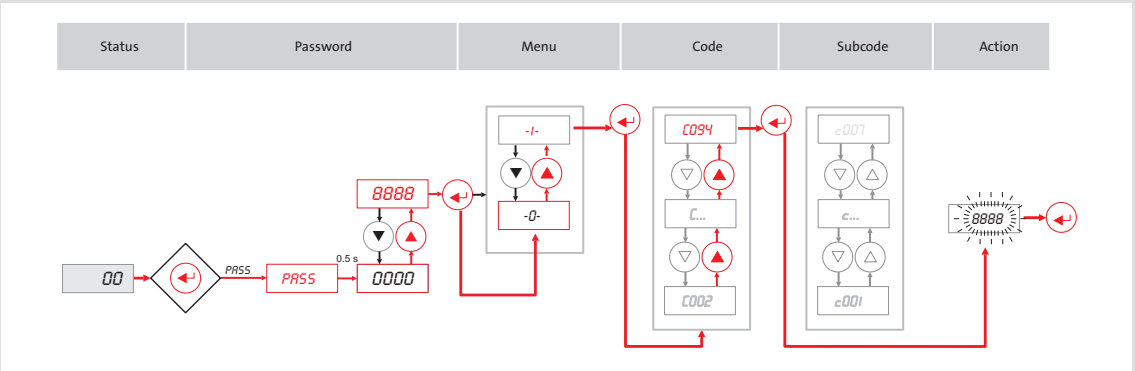
Action	Display	INFO	Graphics
Mains on	00	After the mains has been switched on, "00" is displayed	[3-9]
↲	-0-	Without password protection you have free access from here to all parameters and menu levels	
▲	-/-		
↲	C002		
▲	C094	Press ▲ until C094 appears	
↲	00	00 is blinking, i.e. entry is possible	
▲	<8888>	Entry of a password from 01 9999	
↲	C094	Password confirmed	



[3-10] Save password with mains failure protection

Action	Display	INFO	Graphics
▼	C002	Scroll down until C002 has been reached	[3-10]
↲	c001	Subcode level reached	
▲	C007		
↲	00	00 is blinking	
"01"	01	Enter "1", confirm with ↲, i.e. password is saved with failure protection	

3.5.2 Delete or change available password

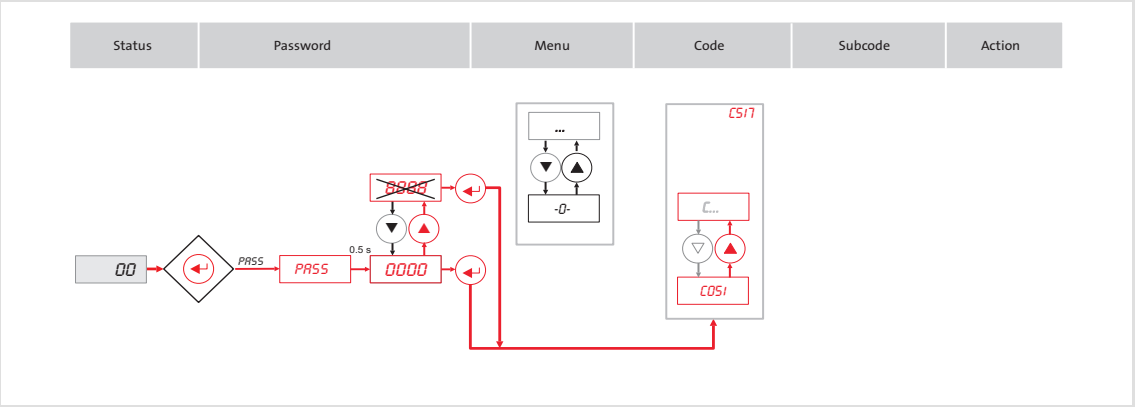


[3-11] Call available password

Action	Display	Info	Graphics
Mains on	00		[3-11]
↲	... PASS 0000	First PASS appears, then 0000	
▲	<8888>	Enter password	
↲	-0-	Ready to delete or change the password	
▲	-/-		
↲	C002		
▲	C094	Press ▲ until C094 appears	
↲	<8888>	Available password is blinking	
▲ ▼	<8888> 0000	New password: Set with ▲ ▼ or Delete password: Set with ▼ to "0000"	
↲	C094	Password confirmed	
Save		▸ Save password with mains failure protection (📖 41)	[3-10]

3.5.3 Access password-protected controller without knowing the password

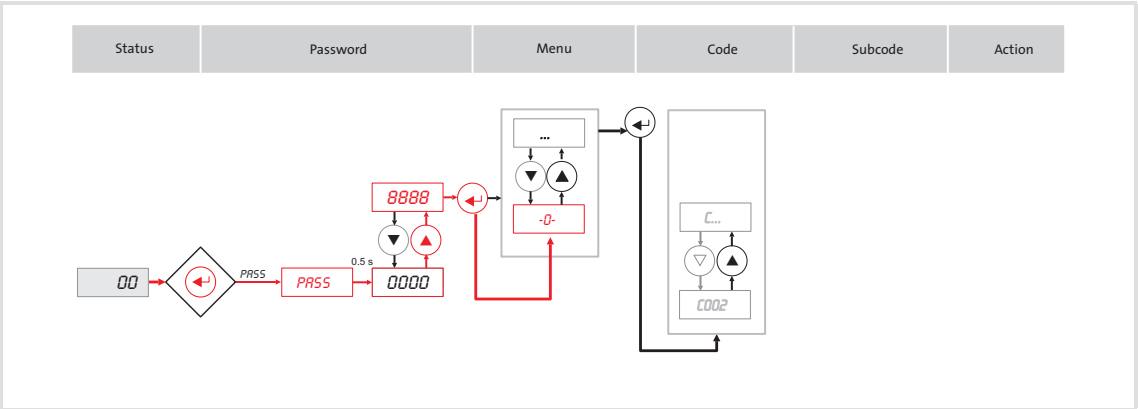
The codes of the password-protected controller can only be accessed in a restricted way. The accessible codes can be defined with C517.



[3-12] Limited parameter range without knowing the password

Action	Display	INFO
Mains on	00	
↲	... PASS 0000	First PASS appears, then 0000
↲	<8888>	The password cannot be entered correctly since the password is not known or has been entered wrongly. Only those codes appear which have been enabled for the "unauthorised" access. The range of these codes can be defined in the 20 subcodes of C517. The Lenze setting of C517 contains the following codes: C051, C053, C054, C061, C137, C011, C039, C012, C013, C015, C016, C022, C120, C087, C099.

3.5.4 Reach password-protected menu level with knowing the password



[3-13] Reaching the menu level with knowing the password

Action	Display	INFO
Mains on	00	
↲	... PASS 0000	First PASS appears, then 0000
▲	<8888>	Enter password
↲	-0-	All menu levels can be accessed without any restrictions.

4 Drive control (DCTRL)

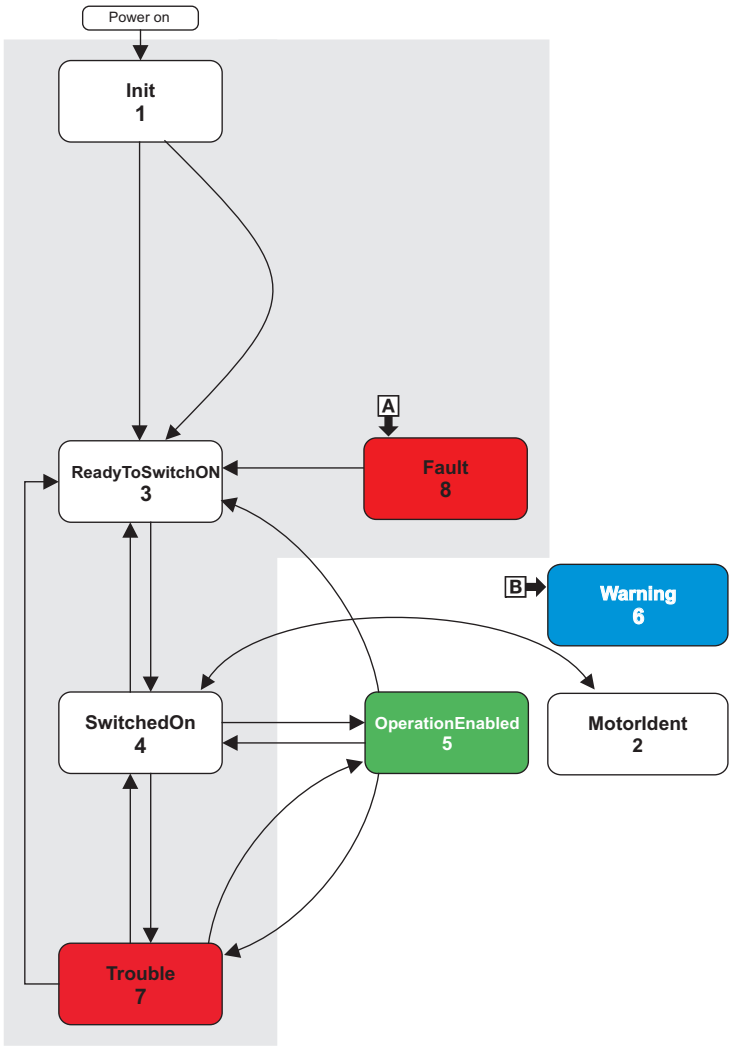
This chapter gives information about the device function "Drive control DCTRL". This device function serves to control the controller into defined states and retrieve status information via the system block LS_DriveInterface:

- The device displays status information in different ways
  - as optical display via front LEDs to signalise the operating status, see chapter ▸ Diagnostics (📖 23).
  - as text message in the Engineer.
  - as process signal at the output of the system block LS_DriveInterface
  - as diagnostic parameter
- The operating states of the controller are based on the DS402 standard. ▸ Device states (📖 46)

4.1 Device states

The state machine controls the controller into certain states (see diagram below). The arrows between the device states indicate the starting and end points of the possible state changes.

The current device state can be indicated via code C137.



Pulse inhibit (grey field)

A Can be reached from all states.

B "Warning" contradicts the definition of a device state. In fact, it is a message which is to call attention to the device state the warning exists for.
"Warning" can occur in parallel to other states.

[4-1] Device state machine

4.1.1 "Init" state

LED DRIVE READY	LED DRIVE ERROR	Display in C137
OFF	OFF	1: Initialisation active

In this state

- the controller is immediately after switching on mains power.
- the operating system is initialised.
- all device components (memory module, power section, etc.) are identified.

▶ The inverter is inhibited, i.e. the motor terminals (U, V, W) of the inverter are deenergised.

▶ The digital and analog inputs are not yet evaluated at this time.

▶ The communication interfaces (e.g. diagnostic interface) are not yet working.

▶ The application is not yet processed.

▶ The monitoring functions are not yet active.

▶ The controller cannot be parameterised yet and no device commands can be executed.

When the power section is identified, it is checked first if it is switched on or if the required voltage is within the tolerance zone. In case of undervoltage in the DC bus, the controller changes to the "Trouble" or "Fault" state depending on the configuration.

4.1.2 "MotorIdent" status

LED DRIVE READY	LED DRIVE ERROR	Display in C00137
	OFF	MotorIdent

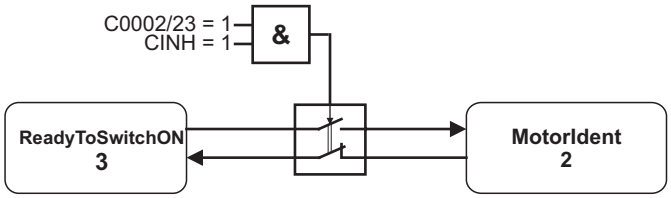
8400 frequency inverters are provided with a function that automatically identifies the motor parameters, see the functional description Motor data identification .

Stop!

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

The "MotorIdent" device state can only be reached by the "SwitchON" device state and jumps back to it after the action is completed.

The following illustration shows under which conditions the state change is possible or completed:



[4-2] Conditions for the state change of the motor identification

While the motor parameters are being identified,

- the application remains active
- all system interfaces (IOs, bus systems, etc.) remain active
- error monitoring remains active
- the inverter is controlled independent of the setpoint sources.

Detailed description: ▸ Automatic motor parameter identification (📖 90)

4.1.3 "SafeTorqueOff" state

Danger!

This state is only possible together with a connected safety module and an existing power section supply.

4.1.4 "ReadyToSwitchON" state

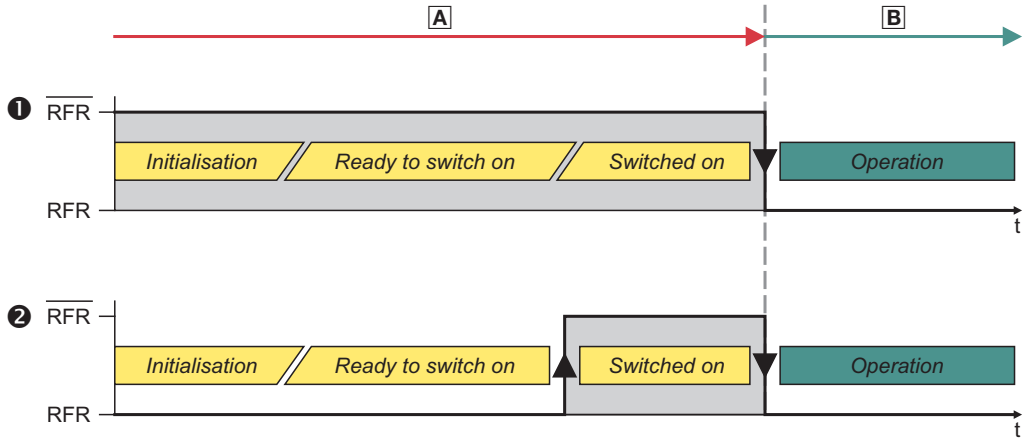
LED DRIVE READY	LED DRIVE ERROR	Display in C00137
	OFF	ReadyToSwitchON

This is the device state of the controller after the initialisation is completed!

- The bus systems are running and the terminals and encoders are evaluated.
- The monitoring modes are active.
- The controller can be parameterised.
- The application is executable.

Auto-start option C00142 = 1: Auto restart inhibited after power-up

- When the auto-start option C00142 = 1 (inhibit when "Mains on", Lenze setting) has been selected, the controller inhibit must always be cancelled after power-up so that the controller can change from the "Device is ready to switch on" to the "Device is switched on":



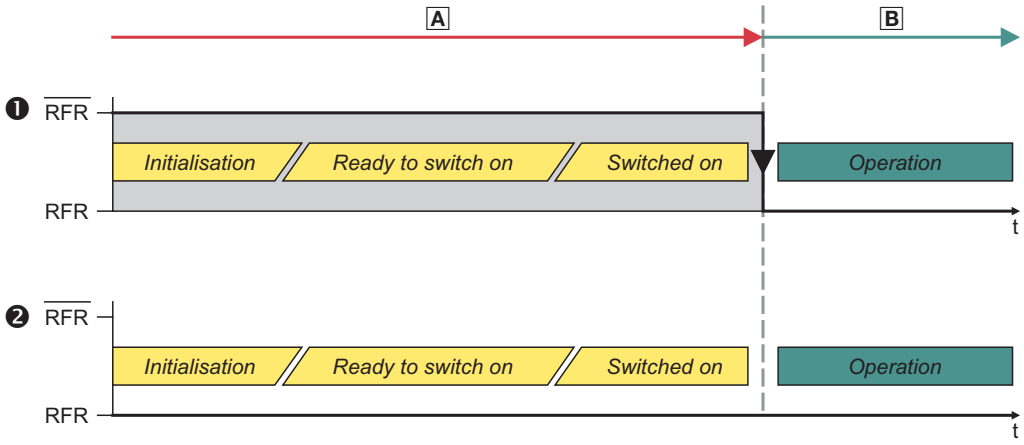
A Controller pulses are inhibited
B Controller pulses are enabled

❶ With controller inhibit at power-up
❷ Without controller inhibit at power-up

[4-3] State change when auto restart is inhibited (C00142 = "1")

Auto-start option C00142 = 0: Auto restart is enabled after power-up

▶ The following illustration shows the state changes for the auto-start option C00142 = 0 as a function of the controller inhibit:



A Controller pulses are inhibited
B Controller pulses are enabled

❶ With controller inhibit at power-up
❷ Without controller inhibit during power-up

[4-4] State change when auto restart is enabled (C00142 = "0")

Tip!

Code C00142 can also be used to configure that the controller inhibits the auto-start function if

- there is a "Trouble" error status or
- a "Fault" error status or
- an undervoltage has been detected

4.1.5 "SwitchedON" state

LED DRIVE READY	LED DRIVE ERROR	Display in C00137
	OFF	SwitchedON

This is the drive's device state if the DC-bus voltage is applied and the controller is still inhibited by the user (controller inhibit). The reason for the controller inhibit (CINH) is displayed in C00158.

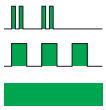
- The bus systems are running and the terminals and encoders are evaluated.
- The monitoring modes are active.
- The application is executable.
- When the controller is enabled, the motor generates a torque.

4.1.6 "OperationEnabled" state

LED DRIVE READY	LED DRIVE ERROR	Display in C00137
	OFF	OperationEnable

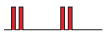
In this device state, the motor follows the setpoint defined in the application.

4.1.7 Status display "Warning"

LED DRIVE READY	LED DRIVE ERROR	Display in C00137
		Warning

This display may appear in parallel with all device states if a monitoring mode responds for which the "Warning" or "Warning locked" error responses have been parameterised.

4.1.8 "Trouble" state

LED DRIVE READY	LED DRIVE ERROR	Display in C00137
OFF		Trouble

This device state becomes active as soon as a monitoring mode responds for which the "Trouble" error response has been parameterised.

- The motor has no torque (is coasting) due to the inhibit of the inverter.
- The "Trouble" device state is left automatically as soon as the error cause is eliminated.

Depending on certain conditions, the "Trouble" device state changes to another state:

State no.	State name	Condition(s) for the state change
11	ReadyToSwitchON	This state is accepted automatically without evaluating a control bit
12	OperationEnabled	Control bit "ControllerInhibit" of all control channels = FALSE **&** the message has been cancelled again
13	SwitchedON	Control bit "ControllerInhibit" of a control channel = TRUE **&** the message has been cancelled again
14	TroubleQSP	There is an error in the system configured to "TroubleQSP" **&** the message has been cancelled again

4.1.9 "Fault" state

LED DRIVE READY	LED DRIVE ERROR	Display in C00137
OFF		Fault

This device state becomes active as soon as a monitoring mode responds for which the error response "Fault" has been parameterised.

- The motor has no torque (is coasting) due to the inhibit of the inverter.
- To exit the device state, "Fail reset" must be set.

After "Fail Reset" has been executed, the state changes to "ReadyToSwitchON".

Note!

If there is an undervoltage in the DC bus (error message "LU") of the frequency inverter, the device changes to the "Trouble" state.

An additionally occurring error with higher priority causes the drive to change to the "Fault" state.

According to the Device state machine (📖 46) the device changes to the "ReadyToSwitchOn" state after the error has been acknowledged, although the undervoltage is still available!

Tip!

For more information on the error messages, see

- Error messages of the operating system (📖 129) or
- Cause & possible remedies (📖 133).

4.2 Controller commands

4.2.1 General information

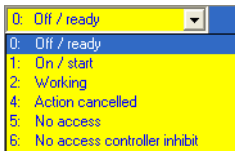
The commands in the subcodes of code C002 enable

- the direct control of the controller. This comprises e.g. the following subcodes:
  - 16, enable controller (CINH)
    "0" = controller is inhibited by software, "1" = enable via external switch
  - 17, quick stop (QSP)
    "0" = activate QSP via external switch, "1" = activate QSP via software
- the management of parameter sets and diagnosis services:
  - Parameter set management, e.g. subcode 7, load parameter set 1
  - Logbook management
  - Error management
  - Identification, e.g. motor parameters, inverter characteristic

Regarding the execution of the commands, there are two different groups:

1. Commands with immediate control effect (e.g. quick stop). These commands contain the static status information ON or OFF.
2. Commands with a pure command nature

The subcodes of the second group do not execute the action immediately. However, after the command is written, they deliver dynamic status information and thus demonstrate the command progress:



After the activation value (1: On / start) is written, it can be read until the following state is reported:

- "2": Busy and then > (0: Off / ready)

If a problem occurs during the execution of a device command, the returned information is

- "4": Action cancelled
  or
- "5": No access

Certain commands can only be executed if the controller is inhibited, e.g.

- Load Lenze setting C002/1
- Load parameter set 1, C002/7
- Identify motor parameters C002/23

If these commands are executed without the controller being inhibited, the returned information is:

▶ "6": No access controller inhibit

Note!

C003 always displays the last error occurred in the form of an error number, if e.g. a command should fail.

▸ Status display for device command (📖 57)

The following subchapters describe the device commands in the controller in detail.

With an online connection, the controller commands can be activated from the »Engineer« by selecting the corresponding command on the **Parameters** tab under C002. As an alternative, the controller commands can be activated via the internal keypad.

Stop!

Before switching off the supply voltage after transmitting a device command via C002, use this code to check that the device command has been completed successfully, see C002/7 (save parameter set 1) or chapter Save parameter set (📖 58). This particularly applies to device commands used for saving data in the memory module of the device. If the saving process cannot be completed successfully, data inconsistency can occur in the memory module.

Tip!

Many frequently required device commands (e.g. "Save parameters") can be executed via the *toolbar* icons of the »Engineer«.

Note!

Controller 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 controller, but e.g. a system module is selected in the *Project view*, the corresponding device command (e.g. load parameter set ) will be activated in all lower-level controllers having an online connection with the »Engineer«.

For the commands described in the following subsections, the controller must be selected in the *Project view*.

4.2.2 Overview of device commands

Code C002 Subcode	Controller command	INFO	Static/ command
1	Load Lenze setting	▸ Load Lenze setting (📖 58)	CINH
2	Load parameter set 1	"Load" means: The data is transferred from the memory module to the device	-
3...6	Reserved		-
7	Save parameter set 1	"Save" means: The data is transferred from the device to the memory module	-
8...10	Reserved		-
11	Save all parameter sets	All data is transferred from the device to the memory module	-
12...15	Reserved		-
16	Enable controller	▸ Set/remove controller inhibit (📖 68)	-
17	Activate quick stop	▸ Activate/deactivate quick stop function (QSP) (📖 69)	-
18	Reserved		-
19	Reset error	▸ Reset of error message (📖 131)	-
20	Reserved		-
21	Delete logbook	▸ Logbook (📖 124)	CINH
22	Reserved		-
23	Identify motor parameters		CINH
24	Reserved		-
25	Reserved		-
26	CAN ResetNode		CINH
27...32	Reserved		-

[4-1] Overview of device commands, "CINH": controller must be inhibited

4.2.3 Status display for device command

For almost all device commands, the status is displayed via C002, e.g. whether the device command has been executed successfully or an error has occurred during the execution. If an error has occurred (i.e. C002 provides the value "4": Failed on readback), you can read out the parameter 3 for detailed error diagnosis. C003 displays the status of the last executed device command.

- The device commands which support the status display via C002 can be obtained from the table in the previous chapter "Overview of device commands" (see column "Static / command").
- The display under C003 remains unchanged if a device command does not support the status display.

4.2.4 Load Lenze setting

This controller command resets the parameter settings to the Lenze setting. All parameter changes get lost.

- Only possible when controller is inhibited.
- This controller command has an effect on the settings of the parameters of the operating system and application.

How to load the Lenze setting:

1. Click the icon to set the controller inhibit.
   - A confirmation prompt is displayed asking you if the controller should really be inhibited.
2. Confirm confirmation prompt with **Yes** to continue the action.
3. Execute device command C002/1 = 1: "On / Activate".

4.2.5 Save parameter set

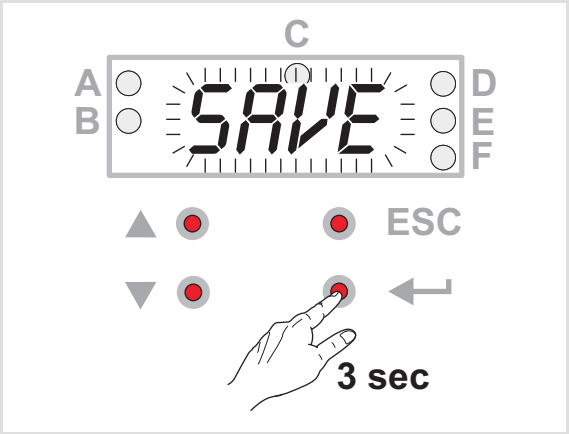
Controller parameter changes made via the »Engineer« or internal keypad will get lost after mains switching of the controller unless the settings have been explicitly saved with the corresponding controller command in the memory module of the controller.

You have various opportunities to prevent a data loss by saving the parameter sets in the memory module:

- Quick saving at the push of a button
- Automatic saving of parameter changes
- Manual saving of parameter sets

Quick saving at the push of a button

This function serves to save all available parameter sets at any time by pushing a button.



How to proceed:

1. Keep the entry button pressed for 3 seconds.
2. When "SAVE" is blinking, your parameter sets are saved with mains failure protection.
3. You can continue your work. "SAVE" will disappear from the display after approximately 2 seconds.

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 activate the automatic saving function with code C141/1, every parameter change is saved in the memory module. Thus, manual saving of parameter sets is not required anymore.

Manual saving of parameter sets

This procedure serves to save either the parameter set 1 or all parameter sets via the subcodes of code C002.

- When C002/7 = "1", the parameter set 1 is saved in the controller.
- When C002/11 = "1", all parameter sets are saved in the controller.

4.2.6 Load parameter set

Activation of this device command reloads all parameters from the memory module into the controller. All parameter changes made since the parameter set has been saved last will get lost.

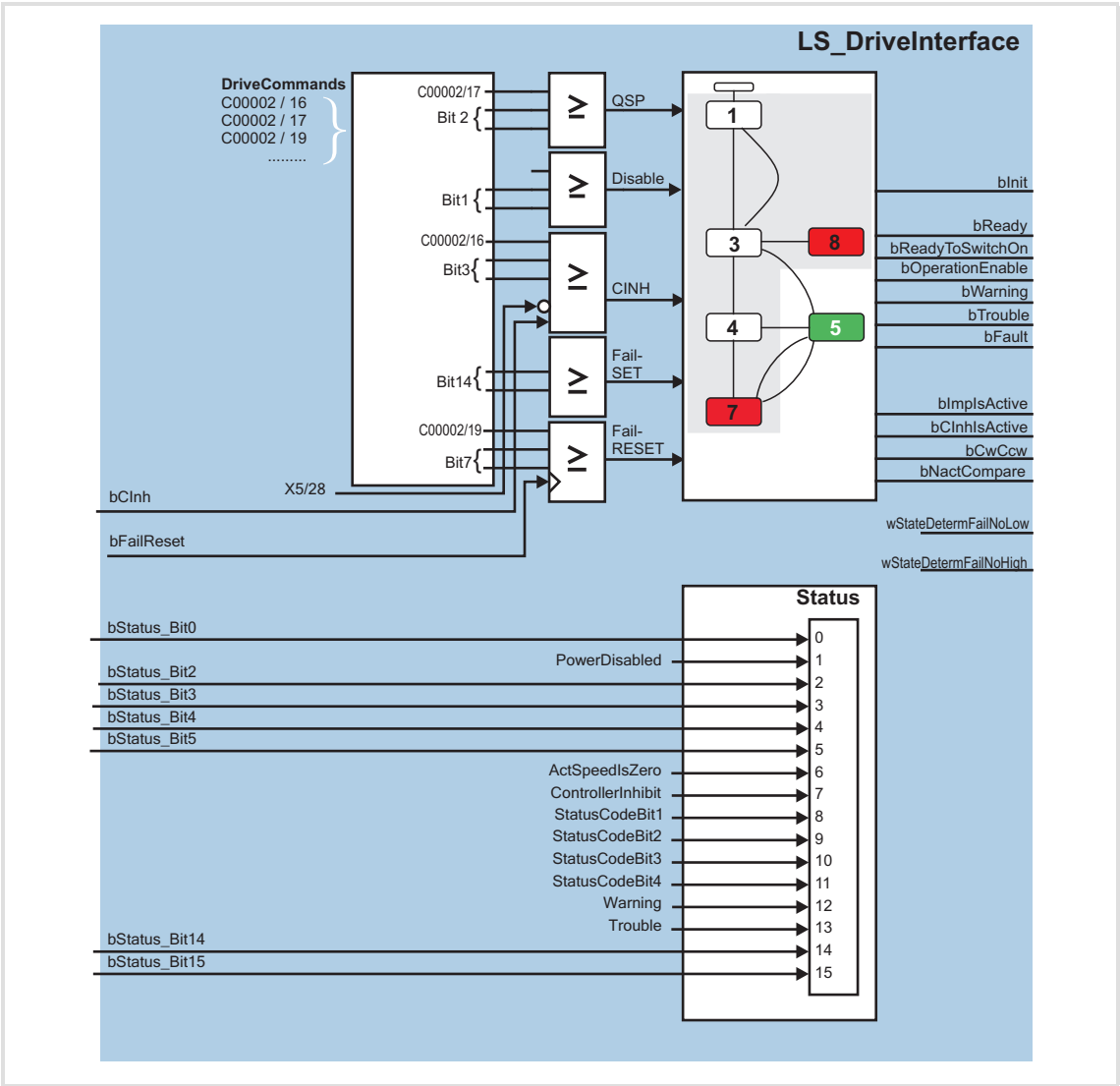
- Only possible when the controller is inhibited
- This device command has an effect on the settings of the parameters of the operating system, application, and module.

How to reload the starting parameters from the memory module:

1. Click the  symbol to inhibit the controller and stop the application currently running.
   - A confirmation prompt is displayed asking you if the controller should really be inhibited and the application currently running should be stopped.
2. Confirm confirmation prompt with **Yes** to continue the action.
3. Execute device command C002 / 2 = "1", *Load parameter set 1*.

4.3 System block "LS_DriveInterface"

The following graphic displays the functions of the **LS_DriveInterface** system block:



Inputs

Identifier DIS code | data type	Value/meaning	
bCInh BOOL	▸ Set/remove controller inhibit (📖 68)	
	True	The controller is set to the **SwitchedON** state.
	FALSE	The controller is set to the **OperationEnabled** state.
bFailReset BOOL	▸ Reset of error message (📖 131)	
	True	The current error is reset.
	FALSE	The current error is not reset.
bStatus_Bit0 bStatus_Bit2 bStatus_Bit3 bStatus_Bit4 bStatus_Bit5 bStatus_Bit14 bStatus_Bit15 BOOL	Freely assignable bit positions of the controller's status word. You can use these bit positions for returning information to the higher-level control (e.g. IPC).	

Outputs

Identifier DIS code | data type	Value/meaning	
wDeviceStatusWord WORD	Status word of the controller. The status word contains all information required for controlling the controller. The process data word is sent to the higher-level control via a port block.	
wStateDetermNoLow WORD	Display of the state-determining error (low)	
wStateDetermNoHigh WORD	Display of the state-determining error (high)	
*) all BOOL	True	State control of the controller is in state:
bInit *)		State control of the controller is in state: • Init
bSafeTorqueOff *)		State control of the controller is in state: • SafeTorqueOff
bReady *)		State control of the controller is in state: • Ready
bReadyToSwitchOn *)		State control of the controller is in state: • ReadyToSwitchON
bOperationEnable *)		State control of the controller is in state: • OperationEnable
bWarning *)		State control of the controller is in state: • Warning
bTrouble *)		State control of the controller is in state: • OperationEnable
bFail *)		State control of the controller is in state: • Fault
bSystemFail *)		State control of the controller is in state: • SystemFail
bImpIsActive		Pulse inhibit is active
bCInhIsActive	True	Controller inhibit is active

Identifier DIS code | data type	Value/meaning	
bCwCcw	True	Motor rotates in CCW direction
bNactCompare		For open-loop operation: Speed setpoint = comparison value C024 For closed-loop operation: Actual speed value = comparison value C024

Status word output

Bit	Function	INFO
0	FreeStatusBit0	
1	PowerDisabled	Inverter control is inhibited (IMP)
2	FreeStatusBit2	Function depends on the application selected
3	FreeStatusBit3	
4	FreeStatusBit4	
5	FreeStatusBit5	
6	ActSpeedIsZero	Actual speed = 0
7	ControllerInhibit	Controller inhibit is active
8	StatusCodeBit0	Status ID (bit-coded)
9	StatusCodeBit1	
10	StatusCodeBit2	
11	StatusCodeBit3	
12	Warning	
13	Trouble	
14	FreeStatusBit14	Function depends on the application selected
15	FreeStatusBit15	

[4-2] Status word of the controller

Bit	Function	INFO
0	Fail	
1	M_max	
2	I_max	

[4-3] Extended status word of the controller

4.4 Parameter setting

4.4.1 General information

The controller can be adapted to a specific task by means of parameters. There are different ways to parameterise the controller:

- Internal Keypad
- Diagnostic interface

Parameter identification

Each parameter has

- a parameter number which is unique within a drive system
- a parameter text (»Engineer«)
- specific attributes
  - access type (read, write)
  - data type
  - limit values
  - Lenze setting (factory-set scaling)

Division of the parameters into groups

The parameters are divided into the following function groups:

A. Setting parameters
   Parameters for setting a device function, e.g. acceleration ramp, reference speed, max. motor current

B. Configuration parameters
   Parameters for setting signal flows (signal interconnections) in the device, e.g. connection of the main setpoint to the analog input of the controller

C. Diagnostic parameters
   Parameters for displaying device-internal process variables, e.g. the actual motor voltage or the control word. The diagnostic parameters have the attribute: *read only*.

Changing of parameters

Danger!

If you change configuration parameters, please observe that this causes the device-internal signal flow to change immediately which could result in a sudden change of setpoint sources (if, for instance, the signal source for the main setpoint is configured).

This can lead to an undesired behaviour at the motor shaft.

Changing a parameter usually causes an immediate response of the controller.

The exceptions are certain device commands, e.g. C002/1 ("Load default setting") or settings which might cause a critical state of the drive behaviour, e.g. a change of the actual speed value feedback configuration for closed-loop operation of the motor control. Such parameter changes are only accepted if the controller is inhibited, otherwise an error message is generated.

4.4.2 Saving of the parameters in the memory module

All parameters of the drive system are saved in the integrated memory module of the controller. This includes the parameters of the controller.

When the device is switched on, all parameters are automatically loaded from the memory module into the main memory of the controller.

In the event of a device replacement, the entire parameter data of an axis can be retained by "taking along" the memory module, so that additional PC or internal keypad operations are not required.

The controller is provided with *one* data set for all parameters, i.e. every setting and configuration parameter has a value.

4.4.3 Handling of the memory module

Danger!

If the memory module has been removed and the device is switched on, the connector pins are live and thus dangerous since the protection against contact is missing.

Stop!

The memory module must not be plugged in or unplugged during operation.

Note!

- Automatic saving is explicitly not supported because this significantly reduces the service life of the memory module.
- The 8400 BaseLine memory module is not compatible with the 8400 StateLine and 8400 HighLine memory modules.
- If the memory module has been removed, the "PS01" error message appears, see Monitoring (📖 127)

In the delivery state, the Lenze setting of the parameters is stored in the memory module.

The following cases are distinguished regarding the handling:

- Delivery
  - All devices are delivered with a plugged-on memory module.
  - The memory module is available as a spare part - without any data.
- During operation
  - The memory module (EPM) is required for operation.
  - Parameter sets can be saved manually.
  - Parameter sets can be loaded manually
- Replacement of the controller
  If the controller has to be replaced, observe the versions of the devices. Generally, the following applies:
  - Before the data is transferred, the version is checked.
  - Parameter sets of devices with V 1.0 can be processed on devices ≥ V 1.0 (downward compatibility).
  - If the parameter set versions of the two devices are not compatible, an error message (PS02/PS03, see Monitoring (📖 127)) is generated.
  - Parameters of a higher device version are not supported on devices with a lower version.

4.4.4 Non-volatile saving of parameters

Note!

During the saving process

- Do not switch off the supply voltage.
- Do not pull off the memory module from the device.

To save changed parameters permanently (i.e. safe against mains failure), the device command C002/7 must be called separately. This command copies all parameters from the RAM of the device to the memory module.

This process may take some seconds.

The state of this saving process is indicated by the state of the corresponding device command C002/7.

The device command C002/1 can be used to reset the controller to the Lenze setting of the parameters (delivery state).

4.4.5 Parameter set transfer

The »Engineer« PC program can be used to

- save the parameter set to the memory module of the controller,
- read the parameter set from the controller
- transfer the parameter set to the controller .

4.4.6 Parameters for status display

Parameter	INFO
C002	Device command transmission and execution status
C003	Status of last device command
C137	Device state
C150	Status word
C155	Status word 2
C158	Cause of controller inhibit (CINH)
C159	Cause of QSP
C165/1	Status-determining error as numeric text / actual error
C166/1	Error type, status-determining / actual error
C166/2	Subject area, status-determining / actual error
C166/3	Error ID, status-determining / actual error
C168	Status-determining error (display of 32-bit number)
Highlighted in grey = display parameter	

4.4.7 Set/remove controller inhibit

Setting the controller inhibit inhibits the power stages in the controller and resets the speed/current controllers of the motor control.

- When the controller is inhibited, the status output *bCInhActive* of the system block LS_DriveInterface is set to TRUE.
- The controller can be inhibited by different sources, e.g. via the digital input RFR, the *bCInh* input of the LS_DriveInterface system block or the "Inhibit controller" device command (C002/16 = "0").
- The bit code under C158 shows the source that inhibited the controller.

4.5 Activate/deactivate quick stop function (QSP)

When the quick stop function is activated, it

- disconnects the motor control from the selected setpoint and brakes the motor to standstill (n_{act} = 0) along the quick stop ramp (C105).
- sets the pulse inhibit (CINH) if the function auto DCB has been activated via C019.

Activation of the quick stop function

The quick stop function can be activated by different signal sources:

- Device command C002/17, activate quick stop
- Input signal at the LS_MotorInterface system block (motor control) set to TRUE.

Tip!

The cause of a quick stop can be displayed via the parameter C159.

5 Motor control (MCTRL)

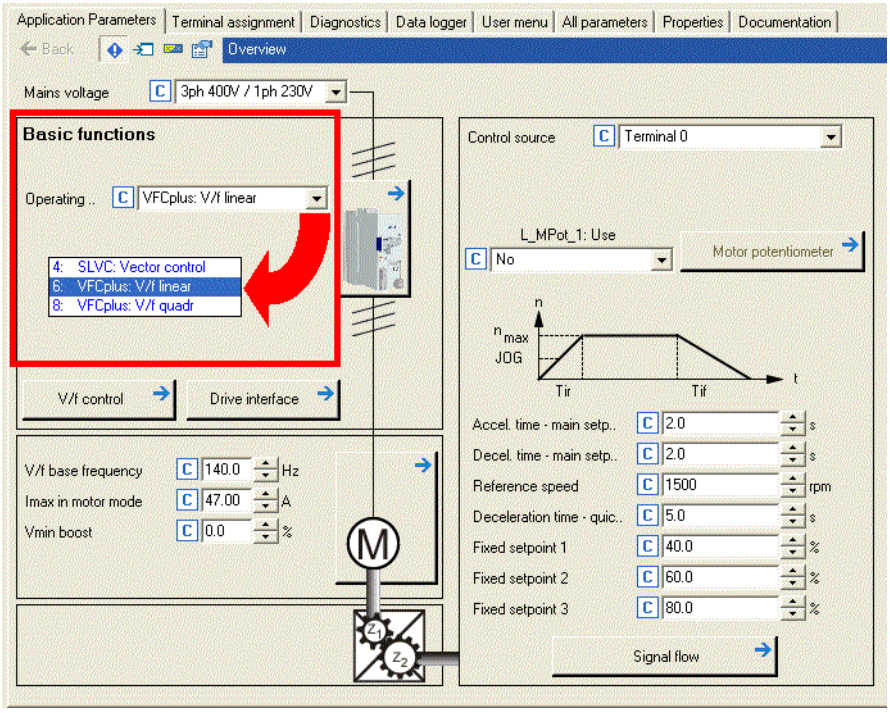
This chapter contains information on parameter setting of the internal motor control of the controller, i.e. this chapter describes

- Control types and related signal flow diagrams
- Motor selection
- Parameter setting of the motor
- Optimisation of the internal control loops of the motor control.

See also:
- Parameter setting of the V/f characteristic control (📖 76)
- Sensorless vector control (SLVC) (📖 84)

5.1 Selection of the operating mode

The motor control mode is defined with the selection of the operating mode, see C6:



Two different processes are available, which can be operated as follows regarding the speed feedback:

- V/f characteristic control (📖 74)
  - Without speed feedback, VFCplus: linear V/f characteristic (C6, value: 6)
  - Without speed feedback, VFCplus: square-law V/f characteristic (C6, value: 8)
- Sensorless vector control (SLVC) (📖 84)
  - without speed feedback, sensorless vector control (C006, value: 4)

V/f characteristic control

The V/f characteristic control is an operating mode for standard frequency inverter applications based on a simple and robust control process. In addition to the operation of machines with linear or square-law load torque characteristic (e.g. fan), the control process is also suited for high-inertia systems thanks to the use of the autoboost function. Due to the low parameterisation effort, easy and fast commissioning can be implemented for such applications.

Field-oriented vector control

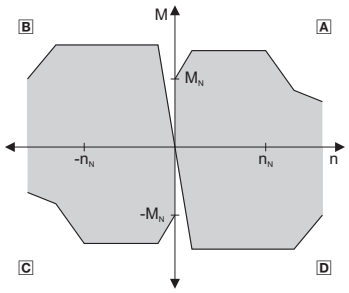
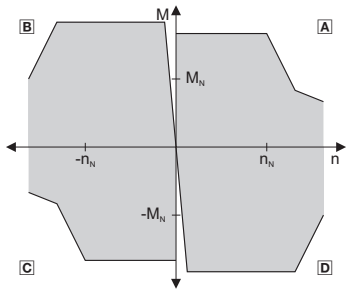
The field-oriented vector control provides better drive properties than the V/f characteristic control. These are in particular:

- A higher maximum torque over the whole speed range,
- a higher speed accuracy,
- a higher concentricity factor,
- a higher efficiency.
- The limitation of the maximum torque in motor and generator mode for speed-actuated operation

Tip!

If you need a high torque without feedback at low speed, we recommend the “vector control" mode.

As shown in the following graphics, the drive systems with vector control have more advantages than a system using V/f control.

V/f characteristic control without feedback	Vector control without feedback
 9300vec092	 9300vec095

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)

To ease the selection of the operating mode (C006), the following table contains recommendations and alternatives for standard applications.

Application	Recommended	Alternatively
Single drives		
With constant load	Linear V/f characteristic	Vector control
With extremely alternating loads	Vector control	Linear V/f characteristic
With high starting duty	Vector control	Linear V/f characteristic
With speed control	Linear V/f characteristic	Linear V/f characteristic
Torque limitation	Vector control	-
With torque limitation (power control)	Linear V/f characteristic	Vector control
Three-phase reluctance motor	Linear V/f characteristic	-
Three-phase sliding rotor motor	Linear V/f characteristic	-
Three-phase AC motors with permanently assigned frequency/voltage characteristic	Linear V/f characteristic	-
Pump and fan drives with quadratic load characteristic	Square-law V/f characteristic	Linear V/f characteristic or vector control
Group drives *(several motors connected to controller)*		
Identical motors and loads	Linear V/f characteristic	-
Different motors and/or alternating loads	Linear V/f characteristic	-
Simple hoists	Linear V/f characteristic	-

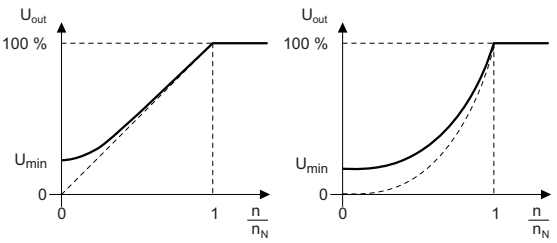
5.1.1 V/f characteristic control

Stop!

- The following must be observed when operating drives with square-law V/f characteristic:
  - Please always check whether the corresponding drive is suitable for operation with a quadratic V/f characteristic!
  - If your pump or fan drive is not suitable for operation with a quadratic V/f characteristic, either use the V/f characteristic control with linear V/f characteristic or the vector control mode.
- 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}.

The control structure is shown, in simplified form, in the following illustration. For the complete representation, see
▸ Signal flow (📖 105).

In case of the V/f characteristic control, the motor voltage of the inverter is detected by means of a linear or square-law characteristic depending on the field frequency or motor speed to be generated. The voltage follows a preselected characteristic.



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

Generally, two different characteristic shapes can be defined:

- Linear V/f characteristic for drives with a constantly running and speed-independent load torque
- Quadratic characteristic for drives with a load torque increasing quadratically with the speed. Quadratic V/f characteristics are mainly used in centrifugal pumps and fan drives.

5.1.1.1 Parameter setting of the V/f characteristic control

Overview of the relevant parameters

Parameter	INFO
C006	Selection of the operating mode for V/f characteristic control without feedback with • value "6" for linear characteristic or • value "8" for quadratic characteristic
C011	Reference speed
C015	Base frequency
C016	V_{min} boost
C018	Switching frequency
C021	Slip compensation
C022	Current limit (in motor mode)
C023	Current limit (in generator mode)
C073	I_{max} current controller gain
C074	Reset time I_{max} current controller
C909/1 /2	Maximum positive / negative speed
C910/1 /2	Maximum positive / negative output frequency

How to parameterise the V/f characteristic:

1. Select the operating mode " V/f characteristic control" with appropriate characteristic shape C006.
2. When using an asynchronous motor which deviates from the standard motor, having a different rated frequency than 50 Hz (star) / 87 Hz (delta) and a different number of pole pairs than 2:
   - Enter nameplate data of the motor (at least rated speed, rated frequency and rated voltage)
3. If required, adapt the base frequency of the V/f characteristic C015
4. If required, rise the V/f characteristic by V_{min} C016

See also:
- Setting the V/f base frequency (📖 77)
- Setting V_{min} boost (📖 78)

Setting the V/f base frequency

The V/f base frequency 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 code C015 applies to all permissible mains voltages.
- Mains fluctuations or fluctuations of the DC-bus voltage (operation in generator mode) do not need to be considered when the code is set. They are automatically compensated by the internal mains voltage compensation of the device.
- Depending on the setting of C015 it may be necessary to adapt the reference speed C011 to be able to run through the whole motor speed range.
- The V/f base frequency is automatically calculated from the data stored in the motor nameplate by the motor parameter identification:

$$C00015[Hz] = \frac{U_{freq.inv}[V]}{U_{ratedmot}[V]} \cdot f_{rated}[Hz]$$

- $V_{frequency\ inverter}$:
  - Frequency inverter 400 V
  - Frequency inverter 230 V
- $V_{ratedmot}$: Rated motor voltage depending on the connection method
- f_{rated}: Rated motor frequency

Typical values for the V/f base frequency C015:

Frequency inverter 400 V				**Frequency inverter 230 V**			
Motor voltage [V]	Motor frequency [Hz]	Motor connection	**C015**	Motor voltage [V]	Motor frequency [Hz]	Motor connection	**C015**
230 / 400	50	⅄	50 Hz	230	50	△	50 Hz
220 / 380	50	⅄	52.6 Hz	220 / 380	50	△	52.3 Hz
280 / 480	60	⅄	50 Hz				
400 / 690 400	50 50	△	50 Hz				
230 / 400 280 / 480 400	50 60 87	△	87 Hz				
220 / 380	50	△	90.9 Hz				

Note!

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.

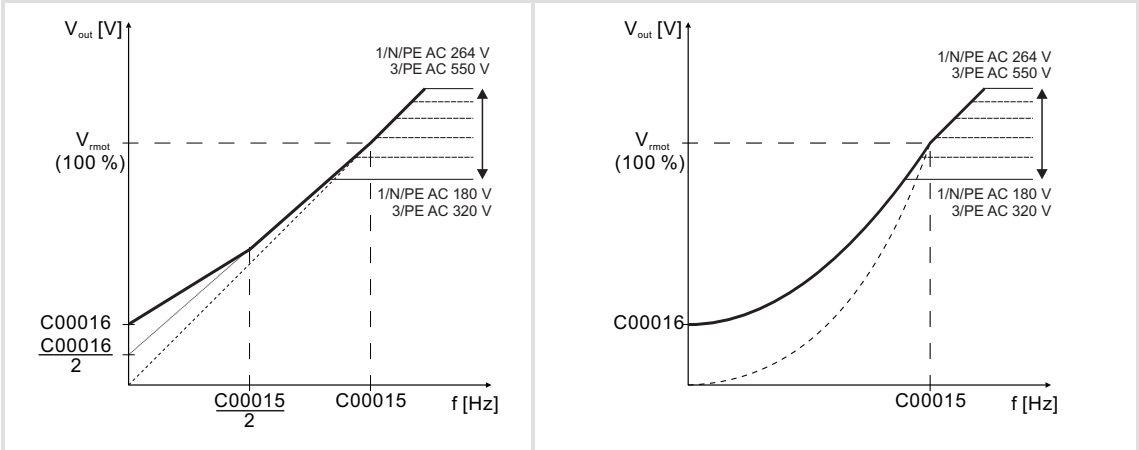
Setting V_{min} boost

The V_{min} boost C016 of the motor voltage

- serves to select a magnetising current required for asynchronous motors independent of the load.
- is effective for output frequencies below the V/f base frequency
- optimises the torque behaviour of the motor.

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

The maximum motor voltage to be reached depends on the current mains voltage height.



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

How to adjust the Vmin boost:

1. Operate motor in idle state at approx. 6 % of the rated motor speed.
2. Increase V_{min} until the following motor current is reached:
   - Motor in short-time operation up to 0.5 n_{rated}
     with self-ventilated motors: $I_{motor} \approx I_{rated\ motor}$
     with forced-ventilated motors: $I_{motor} \approx I_{rated\ motor}$
   - Motor in continuous operation up to 0.5 n_{rated}
     with self-ventilated motors: $I_{motor} \approx 0.8\ I_{rated\ motor}$
     with forced ventilated motors: $I_{motor} \approx I_{rated\ motor}$

Subsequent optimisation of the V/f characteristic control

The V/f characteristic control is generally ready for service. The options to subsequently adapt the V/f characteristic control is to adapt the drive behaviour.

- Adaptation of the characteristic
  - Each of the three characteristic shapes can be adapted to different load profiles or motors via several parameters, see e.g. C015, base frequency or C016, V_{min} boost.
- Adaptation of the drive behaviour
  - Limitation of the maximum current C022 by a current controller (e.g. to prevent the motor from stalling or to limit to the maximum permissible motor current)
  - Adaptation of the field frequency by a load-dependent slip compensation C021 (improved speed accuracy for systems without feedback)

Only the following drive behaviour requires an optimisation of the V/f characteristic control:

Drive behaviour	Remedy
Bad smooth running with low speeds, especially in case of operation with long motor cable	Carry out motor identification
Problems in case of high starting duty (great mass inertia)	Adapt V_{min} boost C016 • Set the code so that a 0.8 ... 1-fold rated motor current flows with a controller enabled and 5 ... 10% of the rated speed.
The 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 • increase acceleration time / deceleration time C012, C013 • Consider a sufficient magnetising time of the motor. Depending on the motor power the magnetising time amounts to 0.1 ... 2 s • increase permissible maximum current (in motor mode, in generator mode) C022, C023
For operation with C006 = 6: Insufficient speed constancy at high load (setpoint and motor speed are not proportional any more)	• Increase slip compensation C021. Important: unstable drive due to overcompensation! • If cyclic load impulses (e.g. centrifugal pump) occur, a smooth motor characteristic is achieved by smaller values in C021 (possibly negative values)
Error messages "Peak current limitation clamp" (FCL), controller cannot follow dynamic processes, i.e. acceleration or deceleration times are too short regarding the load conditions	• Increase the gain of the I_{max} controller C073 • Reduce the integral-action time of the I_{max} controller C074 • Increase the acceleration time C012 • Increase the deceleration time C013

5.1.1.2 Optimisation of the operational performance by means of slip compensation

Note!

The slip compensation C021 is active in the V/f characteristic control mode and in the vector control mode (C6 = 4, 6, 8).

Under load, the speed of an asynchronous machine decreases. This load-dependent speed drop is called slip.

The slip can be compensated by setting C021 accordingly.

- The slip compensation can be set automatically by entering the value calculated during the motor parameter identification into code C021.
- The setting must be made manually when the motor parameter identification cannot be called up.

How to enter the slip compensation automatically:

1. Prepare the motor parameter identification by setting the following data taken from the motor nameplate:
   - Rated motor power C081
   - Rated motor speed C087
   - Rated motor current C088
   - Rated motor frequency C089
   - Rated motor voltage C090
   - Motor cos φ C091
2. Carry out the motor parameter identification
   ▸ Automatic motor parameter identification (📖 90)

How to set the slip compensation manually:

1. Calculate the slip compensation from the data of the motor nameplate:

$$s = \frac{n_{rsyn} - n_r}{n_{rsyn}} \cdot 100\%$$

$$n_{rsyn} = \frac{f_r \cdot 60}{p}$$

s	Slip constant C021 [%]
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 ..)

[5-1] Calculation of the slip compensation from the motor data

2. Enter the result in code C021
3. When the drive is running, correct the code C021 until no load-dependent speed drop occurs anymore in the speed range between idle state and maximum load of the motor. The guide value for a correctly set slip compensation is as follows:
   - 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

Tip!

- If C021 is set too high, the drive may become unstable.
- Negative slip (C021 < 0) in conjunction with V/f characteristic control results in "smoother" drive behaviour at heavy load impulses or applications requiring a significant speed drop under load.

5.1.1.3 Optimisation of the I_{max} controller setting

5.1.2 Vector control

Stop!

- The connected motor may be maximum one power class lower than the motor assigned to the controller.
- The operation with vector control is only permissible for a single drive.
- The operation with sensorless vector control (SLVC) is not permissible for hoists.
- A stable operation is only possible if one of the following three entries are made:
  - Enter the nameplate data and equivalent circuit data of the motor (motor leakage inductance and mutual motor inductance, slip compensation and stator and rotor resistance) manually or
  - enter the selected motor via the Lenze motor catalogue or
  - enter the motor nameplate data and carry out the motor parameter identification.
- 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.

Tip!

The complete structure of the vector control is shown in the ▸ Signal flow (📖 105) .

5.1.2.1 Sensorless vector control (SLVC)

The operating mode is based on the improved motor current control according to the Lenze FTC method.

Compared to the V/f characteristic control without feedback you will obtain

- a higher maximum torque over the whole speed range,
- a higher speed accuracy,
- a higher concentricity factor,
- a higher efficiency,
- the implementation of torque-controlled operation with speed limitation,
- the limitation of the maximum torque in motor and generator mode for speed-controlled operation.

Speed control with torque limitation

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 setpoints. Thus, for avoiding an overload in the drive train, *nLimMotTorque* C728/1 can be used to limit the torque in motor mode and *nLimGenTorque* C728/2 to limit the torque in generator mode.

Note!

The codes for determining the torque limit values C728/1 for *nLimMotTorque* and C728/2 for *nLimGenTorque* have a setting range of -199.9 % ... 0 ... +199.9 %. To prevent sign problems or an unstable operation, the entered limit values are processed as absolute values.

- Slip compensation:
  The slip of the machine is derived by means of the slip model. The influencing parameter is the slip compensation C021.

Overview of the relevant parameters

Parameter	INFO
C6	Selection of the operating mode for V/f characteristic control without feedback with • value "6" for linear characteristic or • value "8" for quadratic characteristic
C011	Reference speed
C018	Switching frequency
C021	Slip compensation
C022	Current limit (in motor mode)
C023	Current limit (in generator mode)
C057	Maximum torque
C081	Rated motor power
C084	Motor stator resistance
C085	Motor stator leakage inductance
C087	Rated motor speed
C088	Rated motor current
C089	Rated motor frequency
C090	Rated motor voltage
C091	Motor cosine phi
C092	Mutual motor inductance
C097	Rated motor torque
C909/1 /2	Maximum positive / negative speed
C910/1 /2	Maximum positive / negative output frequency

How to set the sensorless vector control:

1. Set code C6 to the value "4" for selecting the "sensorless vector control (SLVC)" mode.
2. For the motor selection and parameterisation, the equivalent circuit data and the nameplate data are required. Depending on the manufacturer of the motor used, proceed as follows:
   - **Lenze motor**
     Select the motor from the »Engineer« catalogue [A]
     Carry out the motor parameter identification [C]
   - **External motor**
     Enter the nameplate data of the motor [B] and carry out the motor parameter identification [C]oder
     directly enter nameplate data [D] and known equivalent circuit data C084, C085, C092.

Selection and parameter setting of the motor

A. Select the motor from the »Engineer« motor catalogue.
Continue with step [C].
   - If the Lenze motor is not listed there, continue with step [B].
   - If you use an external motor, continue with [B] and
   - then [C] or [D]

B. Prepare the motor parameter identification by setting the following data taken from the motor nameplate:
   - Rated motor power C081
   - Rated motor speed C087
   - Rated motor current C088
   - Rated motor frequency C089
   - Rated motor voltage C090
   - Motor cos φ C091

C. Carry out motor parameter identification C002/23

   The following parameters are identified and automatically transmitted to the corresponding codes:
   - Motor leakage inductance C085
   - Mutual motor inductance C092
   - Stator resistance (total resistance from motor cable resistance and stator resistance) C084

D. Enter the nameplate data and the equivalent circuit data of the external motor:
   - Rated motor power C081
   - Rated motor speed C087
   - Rated motor current C088
   - Rated motor frequency C089
   - Rated motor voltage C090
   - Motor cos φ C091
   - Stator resistance C084
   - Stator inductance C092
   - Leakage inductance C085

The field-oriented sensorless vector control is now ready for operation.

Optimisation of the sensorless vector control in case of undesired drive behaviour

Drive behaviour	Remedy
Insufficient speed constancy at high load (setpoint and motor speed are not proportional any more) CAUTION: An overcompensation of the settings mentioned under " Remedy" can result in unstable behaviour!	Via C021 (slip compensation) you can affect the speed stability under high loads: • If $n_{act} > n_{slip}$, reduce the value in C021 • If $n_{act} < n_{slip}$, increase the value in C021
Error messages "Short circuit" (OC1) or "Peak current limitation clamp" (FLC) at short acceleration times C012 in proportion to the load (controller cannot follow the dynamic processes).	• Increase the gain of the torque controller C073 • Reduce the integral-action time of the torque controller C074 • Increase the acceleration time / deceleration time C012 / C013
Speed variations in no-load operation for speeds > 1/3 rated speed	The oscillation damping minimises speed variations C234
• Drive runs unstable • Setpoint speed and actual speed deviate strongly	Check the equivalent circuit data of the motor and the nameplate data.

5.1.3 Automatic motor parameter identification

Danger!

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

Observe the corresponding safety instructions!

The motor parameter identification serves to determine the motor data, the inverter characteristic and the effects of the motor cable.

Note!

We strongly recommend to execute the motor parameter identification prior to the initial commissioning of the sensorless vector control.

Overview of the relevant parameters

Parameter	Name	INFO
C015	V/f base frequency	Value measured during the parameter identification or calculated value
C021	Slip compensation	Value measured during the parameter identification or calculated value
C081	Nameplate data	
C084	Stator resistance	Value measured during the parameter identification or calculated value
C085	Leakage inductance	Value measured during the parameter identification or calculated value
C087	Rated motor speed	Nameplate data
C088	Rated motor current	Nameplate data
C089	Rated motor current	Nameplate data
C090	Rated motor current	Nameplate data
C091	Motor cos φ	Nameplate data
C092	Stator inductance	Value measured during the parameter identification or calculated value

[5-2] Codes for automatic motor parameter identification

Note!

- The motor parameter identification must be carried out when the motor is cold!
- The load machine may remain connected. Holding brake, if present; may remain in the braking position.
- With an idling motor, a small angular offset may occur at the motor shaft.
- The motor parameter identification may be aborted by unstable drive behaviour (e.g. through a special motor or a great deviation between inverter and motor power).

How to carry out the automatic motor parameter identification:

1. Inhibit the controller (e.g. LOW signal at terminal X4/RFR).
   Wait until the drive is at standstill.
2. Transfer the nameplate data to the following codes:
   - C081, rated motor power
   - C087, rated motor speed
   - C088 , enter value according to the connection method (⅄ / △)
   - C089 , enter value according to the connection method (⅄ / △)
   - C090, enter value according to the connection method (⅄ / △)
   - C091, motor cos φ
3. Start the motor parameter identification with the device command C002/23.
4. Enable the controller (e.g. HIGH signal at terminal X4/RFR).
   The identification process starts. The progress of the identification can be read out under C2/23.
   The identification process takes about 30 s.
   During this time the following steps are executed:
   - The motor stator resistance C084 is measured.
   - The inverter error characteristic is measured.
   - The motor magnetising inductance C092 and the motor stator leakage inductance C085 are calculated from the data entered.
   - The V/f base frequency C015 is calculated.
   - The slip compensation C021 is calculated.
5. The identification is completed when the value in C002/23 is back to "0".
6. Inhibit the controller (e.g. LOW signal at terminal X4/RFR).

5.2 Motor selection

The motor data must be especially parameterised for the field-oriented control. The motor data comprises the parameters of the motor nameplate and the data of the equivalent circuit diagram of the motor.

Overview of the relevant parameters

Parameter	INFO
C081	Rated motor power
C087	Rated motor speed
C088	Rated motor current
C089	Rated motor frequency
C090	Rated motor voltage
C091	Motor cos φ

[5-3] Codes of the motor nameplate

Parameter	INFO
C084	Data of the equivalent circuit diagram of the motor
C085	Data of the equivalent circuit diagram of the motor
C092	Mutual motor inductance

[5-4] Codes of the equivalent circuit diagram of the motor

5.2.1 Manual parameter setting of external motors

External motor data can be entered manually if you have the equivalent circuit diagram and nameplate data available.

Tip!

For the improvement of the concentricity factor, we recommend to carry out the motor parameter identification of the external motor first, and then enter the data for the manual parameterisation.

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 during the motor parameter identification.

Overview of the relevant parameters

Parameter	INFO
C015	V/f base frequency
C021	Slip compensation
C081	Nameplate data, rated motor power
C084	Data of the equivalent circuit diagram of the motor
C085	Data of the equivalent circuit diagram of the motor
C087	Nameplate data, rated motor speed
C088	Nameplate data, rated motor current
C089	Nameplate data, rated motor frequency
C090	Nameplate data, rated motor voltage
C091	Nameplate data, motor cos φ
C092	Data of the equivalent circuit diagram of the motor

[5-5] Codes for the manual parameterisation of the motor data

5.3 Selection of the switching frequency

Note!

Operate the mid-frequency motors exclusively with the switching frequency $f = 8\ kHz_{sin}$ or $f = 16\ kHz_{sin}$.

The switching frequency of the inverter has an effect on the smooth running performance and the noise generation in the motor connected, as well as on the power loss in the controller.

The lower the switching frequency, the

- better the concentricity factor
- lower the power loss
- higher the noise generation.

Adjustable switching frequencies:

Parameter	Values
C018	1: 4 kHz var./drive-optimised
	2: 8 kHz var./drive-optimised
	3: 16 kHz var./drive-optimised
	4: Reserved
	5: 2 kHz constant/drive-optimised
	6: 4 kHz constant/drive-optimised
	7: 8 kHz constant/drive-optimised
	8: 16 kHz constant/drive-optimised

Lowering the switching frequency due to high heatsink temperatures

If the maximally permissible heatsink temperature was exceeded, the drive would be inhibited due to the "Overtemperature" error and the motor would coast without any torque.

Therefore, the switching frequency in the Lenze setting is lowered to the next smaller value when the heatsink temperature has increased to 5 ° C below the maximum permissible temperature.

After the heatsink has cooled down, the controller automatically switches to the next higher switching frequency up to the switching frequency set.

Lowering the switching frequency can be prevented using code C144. When the maximum permissible heatsink temperature is reached, "Fault" is set for the respective switching frequency and the motor coasts, see code C165.

Note!

For operation with a switching frequency of 16 kHz,

- the controller output current must not exceed the current limit values given in the technical data. Reduce the output current using the codes C022, C023.
- the Ixt evaluation C064 is considered with the required derating to 0.67 I_{rated} (I_{rated} - rated device current) at switching frequencies of 2, 4 and 8 kHz.

Lowering of the switching frequency depending on the output current

"Variable" switching frequencies can be selected for the controller in C018, where the controller automatically lowers the switching frequency depending on the controller output current. The changeover threshold is included in the rated data of the Hardware Manual. (The Hardware Manual can be found on the CD supplied with the device.)

When a "fixed" switching frequency is selected, no switching frequency changeover takes place. In case of fixed frequencies, the controller output current is limited to the permissible value of the corresponding switching frequency. In case of larger load impulses, the overcurrent interruption may be activated, to which the controller responds with "Fault", see code C165.

Tip!

The Lenze setting "8 kHz_{var}" (C018, value "2") is the optimum value for standard applications.

Limiting the maximum output frequency

The maximum output frequency of the controller is not limited depending on the switching frequency.

For this reason, adapt the maximum output frequency according to our recommendation:

Maximum output frequency $\leq \frac{1}{32}$ Switching frequency	At a switching frequency of 4 kHz, for instance, 125 Hz for the maximum output frequency should not be exceeded.

Carry out further measures:

- ▶ If required, deactivate the switching frequency changeover by the heatsink temperature C144.
- ▶ If required, ensure that the changeover threshold of the controller output current to the next smaller switching frequency will not be exceeded. If required, select a fixed switching frequency using code C018.

Operation at an ambient temperature of 45°C

The controller is designed so that operation at an ambient temperature of 45° C without derating is permissible at a switching frequency of 4 kHz.

5.4 Definition of current and speed limits

5.4.1 Definition of speed limits

Limitation of the speed setpoint

The parameter setting of code C00011 means with a speed setpoint of 100 % the drive must rotate with the given value of the code. The speed setpoint information is given in percent and refers to the *reference speed* set in C00011. For the sake of the resolution to be achieved and the connected accuracy, the reference speed should be based on the speed range required in the prevailing application.
Lenze recommendation: Reference speed = 1500 ... 3000 rpm.

Irrespective of the operating mode, there are more limitation options:

- Limitation of the max. positive or negative speed C909/1 or /2
- Limitation of the max. positive or negative output field frequency C910/1 or /2

Note!

In the torque-controlled operation (bTorqueModeOn = TRUE), the limitation of the speed setpoint has no function! In this case, a permissible speed range can be defined via the speed limitation (nSpeedHighLimit and nSpeedLowLimit).

5.4.2 Definition of current limits

The 8400 controllers are provided in the various operating modes with functions which determine the dynamic behaviour under load and counteract the exceedance of the maximum current in motor or generator mode.

The max. motor or generator current is limited with the codes C022 or C023.

The current limits must be selected depending on

- the permissible maximum motor current
  - Recommendation: I_{max} < 1.5 ... 2.0 I(mot)$_N$
- the permissible maximum inverter current
- the required motor or generator torque for the application

Note!

Highly dynamic applications
(e.g. low acceleration and deceleration ramp times or greatly fluctuating loads)

The overcurrent disconnection may respond (fault message OC1 or OC11) when the parameterisation of the maximum current in motor mode C022 approximately corresponds to the maximum permissible value of the respective inverter.

Remedy by

- Increase of the acceleration and deceleration ramp time,
- Reduction of the maximum current C022 / C023 in motor/generator mode
- Adaptation of the indirect peak current limitation which is implemented depending on the type of operation (for procedure see below)
- Reduction of the reset time of the current limitation controller with C074/1.

How to adapt the peak current limitation:

SLVC:

- Reduce slip compensation with C021.
- Reduce nTorqueMotLim C728/1 and nTorqueGenLim C728/2.

5.5 Flying restart function

The flying restart function works with a simple asynchronous motor model which requires the knowledge of the stator resistance RS and the rated motor current. In order that the flying restart function works properly, we recommend to carry out a parameter identification before using the function. ▸ Automatic motor parameter identification (📖 90)

The flying restart function works safely and reliably for drives with great centrifugal masses.

Note!

- Do not use the flying restart function if several motors with different centrifugal masses are connected to a controller.
- 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.

Tip!

- 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.
- In connection with the flying restart function, we recommend to read the information given in this manual in the chapter
  ▸ Automatic DC-injection braking (Auto-DCB) (📖 102)

5.5.1 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 controller and motor must be adjusted to achieve a jerk-free transition to the rotating machines in the instant of connection.

The frequency inverter detects the synchronicity by identifying the synchronous field frequency.

Duration

The "catching" process is completed after approx. 1 ... 2 seconds.

Overview of the relevant parameters

Parameter	INFO
C990	Activation of flying restart function
C991	Selection of the flying restart function
C992	Selection of the starting frequency
C994	Current injection for the flying restart process

How to parameterise the flying restart function:

1. Activate flying restart circuit in C990 through "ON".
   - 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 controller settings.

   If additional settings are necessary, proceed as follows:
2. Define the search mode for the flying restart circuit in C991:
   - we recommend Lenze default setting "5": Last output frequency

   We recommend to set 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.

5.6 DC-injection braking

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 can be defined with code C036.
- 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.
- Automatic DC-injection braking (Auto-DCB) improves the starting performance of the motor during operation without speed feedback.

Overview of the relevant parameters

Parameter	INFO
C019	Auto-DCB: threshold Response threshold for activating the DC-injection braking
C036	DCB: Current Enter the current in [%]
C106	Auto-DCB: hold time
C107	DCB: hold time
C701/4	See explanations for function block LA_NCtrl

DC-injection braking can be carried out in two ways with different types of activation:

- Manual DC-injection braking (DCB) (101)
- Automatic DC-injection braking (Auto-DCB) (102)

5.6.1 Manual DC-injection braking (DCB)

The DC-injection braking can be activated manually by assigning a digital input (E1 ... E4) to the DCB function.

For HIGH-active inputs, DC-injection braking is active as long as the signal is at HIGH level.

When the hold time C107 (999.0 s = hold time has no time limit) has expired, the controller sets the pulse inhibit (CINH).

5.6.2 Automatic DC-injection braking (Auto-DCB)

"Automatic DC-injection braking" (in the following called "Auto-DCB") can be used when the drive has to be deenergised at n ≈ 0.

Function

For understanding the "Auto-DCB" function, it is necessary to distinguish between three different types of operation:

1. When the drive is enabled and the speed setpoint falls below the Auto-DCB threshold during operation, a braking current C036 is injected. When the Auto-DCB hold time C106 has expired, the motor is deenergised via the Auto-DCB function, i.e. the controller inhibit (CINH) is set.
2. At the moment of controller enable, the drive is at standstill (n = 0).
   If the enabled drive is to start up, the speed setpoint passed via the acceleration ramp must exceed the Auto-DCB threshold C019. Below this threshold, the motor will not be energised.
3. At the moment of controller enable, the motor (still) rotates with a speed above the Auto-DCB threshold and the drive is "caught".
   For more detailed information on the topic see
   ▸ Flying restart function (📖 98).

Stop!

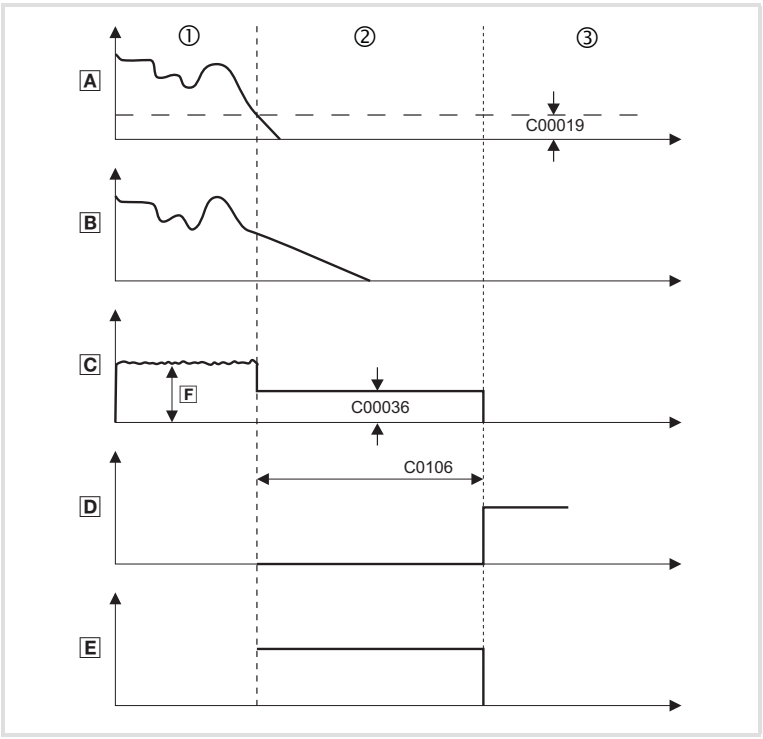
If the DC-injection braking operation is too long and the braking current or braking voltage is too high, the connected motor may overheat.

How to set the automatic DC-injection braking

1. Set the hold time in code C106 to t > 0.0 s
   - Automatic DC-injection braking is active for the time set.
   - A braking current is injected (code C036).
   - When the hold time C106 has expired, the controller sets the pulse inhibit.
2. Set the response threshold with C019. This code can be used to set a dead band in the setpoint. If DC-injection braking is not to be active here, C106 must be set to the value "0.0".

Explanation of the automatic DC-injection braking function by means of two examples

Example 1



A :
Speed setpoint
B :
Actual speed value of the motor
C :
Controller output current
D :
Pulse inhibit
E :
DC-injection braking is active

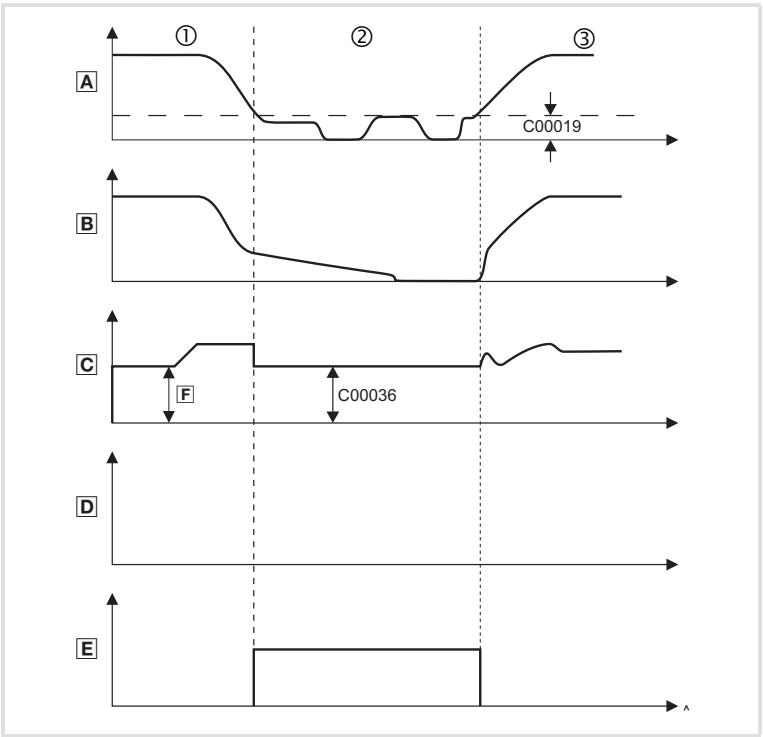
① :
The motor rotates with the selected speed. The resulting current depends on the load F.

② :
The DC braking current set in C036 is injected.

③ :
When the hold time C106 has expired, the pulse inhibit is set.

[5-3] Example 1: Signal characteristic for automatic DC-injection braking

Example 2



A :
Speed setpoint
B :
Actual speed value of the motor
C :
Controller output current
D :
Pulse inhibit
E :
DC-injection braking is active

① :
The motor rotates with the selected speed. The resulting current depends on the load F.

② :
The DC braking current set in C036 is injected.

③ :
The actual speed value of the motor follows the speed setpoint. The resulting current depends on the load.

[5-4] Example 2: Signal characteristic for automatic DC-injection braking

5.6.3 Oscillation damping

Undesirable effects in every process are mechanical oscillations which 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.

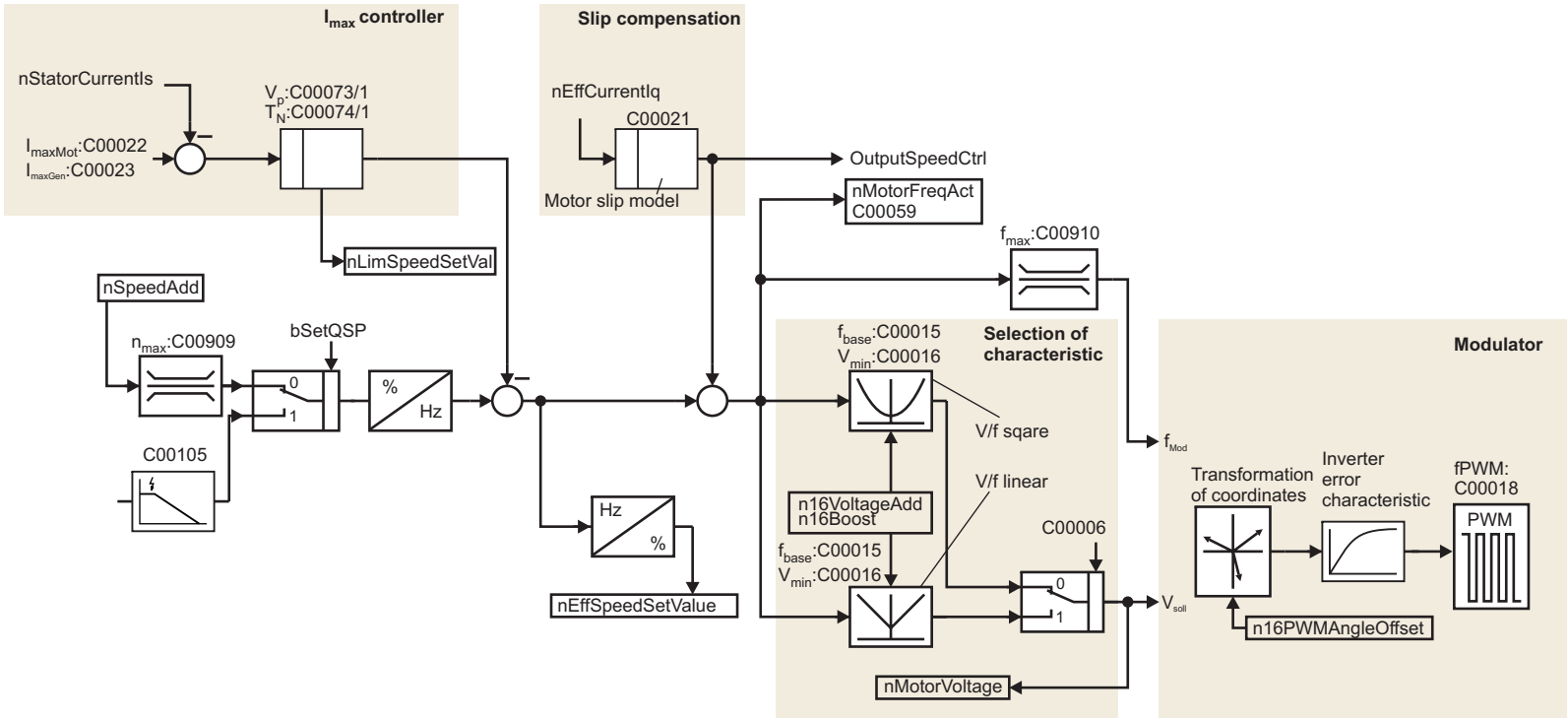
Oscillation damping is successfully used with

- unloaded motors (no-load oscillations)
- motors with a different rated power than that of the controller, e.g. at operation with high switching frequency and the related power derating.
- operation with higher-pole motors
- operation with special motors
- compensation of resonances in the drive
  - Some asynchronous motors can show resonances at an output frequency of approx. 20 ... 40 Hz which cause current and speed variations and thus destabilise the running operation.

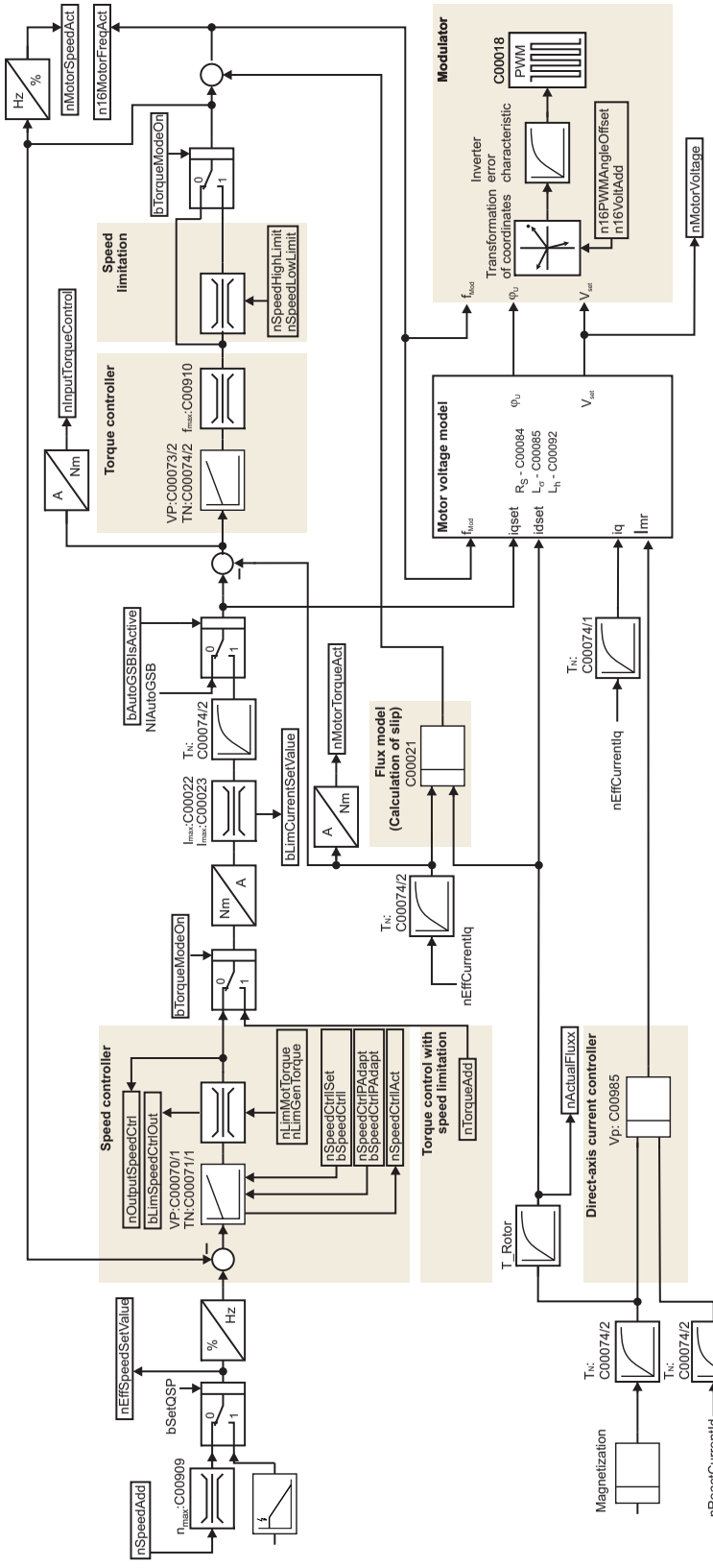
How to eliminate speed oscillations:

1. Approach the area where the speed oscillations occur.
2. Reduce the speed oscillations by changing C234 and C235 step by step.
3. These can be indicators for smooth running:
   - Constant motor current characteristic
   - Reduction of the mechanical oscillations in the bearing seat

5.7 Signal flow



[5-5] Signal flow - V/f characteristic control without feedback



[5-6] Sensorless vector control (speed control)

5.8 System block "LS_MotorInterface"

5.9 Monitoring functions

5.9.1 Motor temperature monitoring with I²xt

The 8400 frequency inverter is provided with a simple, sensorless monitoring for thermal "I^2xt" motor overload of self-ventilated standard motors.

C066 displays the motor utilisation meter I^2xt, which shows whether the motor is overloaded or not.

The permissible overload time of the motor is reached with an overload of C066 = 100 %, the message "Thermal motor overload, I^2xt" (OC6) is output and the response set in C606 is initiated (default setting: "warning").

C120 serves to enter the overload threshold for I^2xt motor monitoring

Stop!

The I^2xt motor monitoring does not provide a full motor protection! Since the motor utilisation calculated in the thermal motor model gets lost after switching the mains, the following operating states cannot be determined 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).

A full motor protection requires additional measures as e.g. the evaluation of temperature sensors that are located directly in the winding or the use of thermal contacts.

Adjustment

Calculate the overload threshold I^2xt:

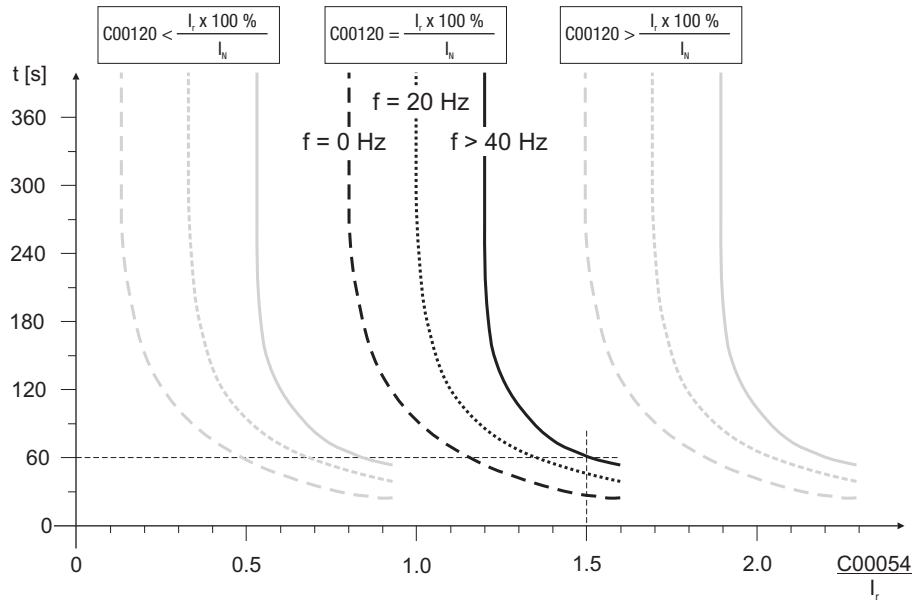
$$C00120 = \frac{I_r}{I_N} \cdot 100\%$$

- I_r Rated motor current (C088)
- I_N Rated current of the controller at a switching frequency of f = 8 kHz

▶ If you reduce C120 starting from the calculated value, the motor utilisation meter I^2xt (C066) will already be counted up before the rated overload threshold has been reached.

▶ If you increase C120 starting from the calculated value, the motor utilisation meter I^2xt (C066) will be counted up after the rated overload threshold has been reached.

The motor utilisation meter starts to count up when the apparent motor current (C054) is higher than the rated motor current (C088).



f: output frequency
t: release time
I_N: Rated controller current at a switching frequency of f = 8 kHz
I_r : rated motor current (C088)
C054: Apparent motor current

[5-7] Tripping characteristic of I^2xt monitoring

▶ Example: C120 = I_r /I_N x 100 %
  – C054 = 1.5 x rated motor current
  – After approx. 60 seconds, C066 has reached the final value 100 % at output frequencies f > 40 Hz. The controller switches off with the error "Thermal motor overload, I^2xt" (OC6) if C606 is set to "0" (trip).

Tip!

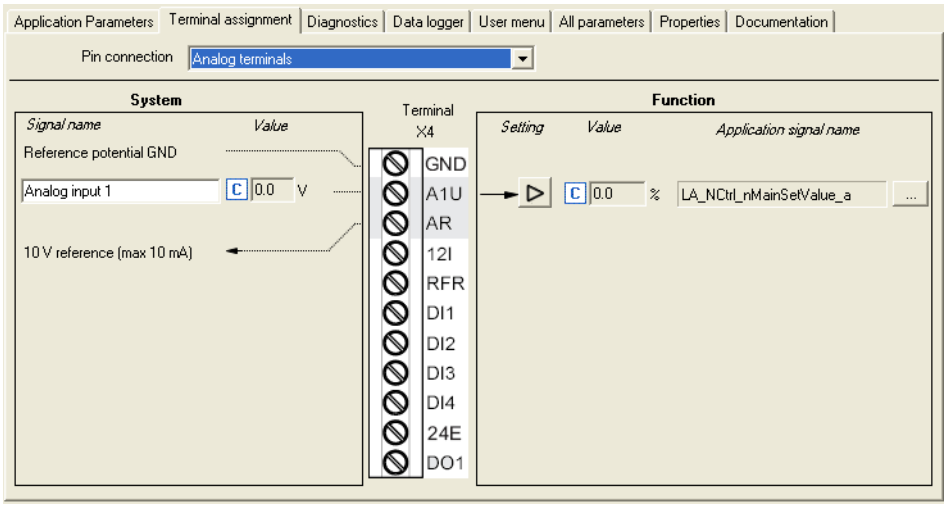
- To prevent the overload threshold of motors with forced ventilation from being triggered too early, deactivate this function.
- The current limits C022 and C023 only have an indirect influence on the I^2xt calculation. The settings of C022 and C023, however, serve to prevent the motor from being operated with maximum possible utilisation.

6 I/O terminals

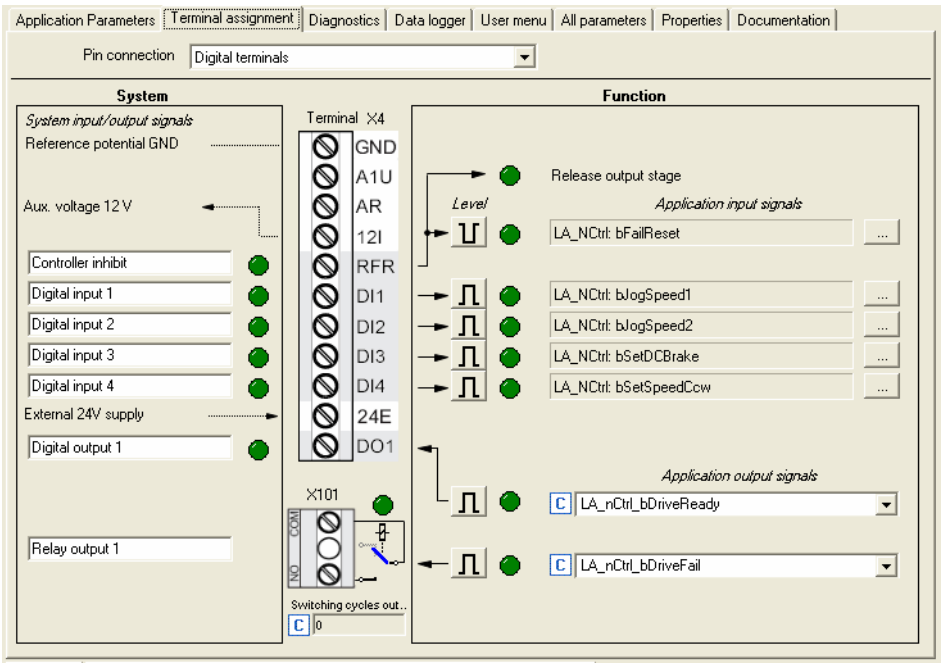
This chapter informs about the function and the possible parameter settings of the controller's input and output terminals.

The parameters are set in the »Engineer« on the **Terminal assignment** tab. Here, "analog terminals" and "digital terminals" are distinguished in the **Control connections** list field:

- Analog input (📖 112)



- Digital inputs (📖 116)
- Digital outputs (📖 118)



6.1 Analog input

The controller has an analog input which serves to detect voltage signals as e.g. an analog speed setpoint selection or the signal of an external sensor (temperature, pressure, etc.).

The following areas can be parameterised:

- 0 ... 10 V, C034/1 = 0
- 0 ... + 5 V, C034/1 = 1, with external load resistor (250 Ω): 0 ... 20 mA
- + 1 ... + 5 V C034/1 = 2, with external load resistor (250 Ω): 4 ... 20 mA

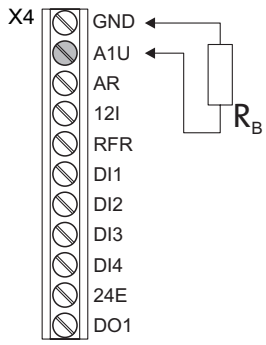
Moreover, current signals in the 0/+4 ... +20 mA range, ("Life Zero" including open-circuit monitoring) can be detected via a load resistor (250 Ω) connected to the terminals.

- Further possible parameter settings of the input signals of
  - offset and
  - gain
- Diagnostics options:
  - The monitored input can be queried with a status signal.
  - Input and output values of the system block are displayed in the »Engineer« / internal keypad.

Note!

To prevent undefined states, free input terminals of the controller must be assigned as well, e.g. by applying 0 V (GND) to the terminal "X4/A1U".

6.1.1 Terminal assignment/electrical data



Terminal	Use	Electrical data	
X4/A1U	Voltage input / Current input	Level:	• 0 ... + 10 V DC • 0 ... + 5 V DC (0 ... + 20 mA)*) • 1 ... + 5 V DC (+ 4 ... + 20 mA)*)
		Load resistor*):	R_B = 250 Ω According to the above graphics, a load resistor must be connected to current signals 0/+4 ... 20 mA.
		Resolution:	10 Bit (Error: 1 digit ≡ 0.1 %, related to the actual value)
		Scaling:	When C034 = "0": ± 10 V ≡ ± 2^{14} ≡ 16384 ≡ ±100 %
		Conversion rate:	1 kHz In order to filter out short-term interferences from the analog signal characteristic, the analog input value is filtered with a digital lag filter with a time constant equal to 5 ms.
		Input resistance	> 80 kΩ for VDC 250 Ω for mADC
		Input voltage in case of open circuit	Display 0 (U < 0.05 V, absolute)
		Sampling frequency (processing cycle)	1 kHz (1 ms)
		Accuracy	± 0.1 V
		Electric strength of external voltage	± 15 V, permanent
X4/GND	GND, reference potential of analog signals		

6.1.2 Parameter setting

Short overview of the parameters for the analog input:

Parameter	INFO
C010/1	Minimum analog setpoint ▸ Minimum and maximum output speed (📖 114)
C011	Maximum output speed (reference speed) ▸ Minimum and maximum output speed (📖 114)
C034	Configuration of analog input 1, evaluation of current (with external load resistor) or voltage
C598/1	Resp. to open circuit AIN1
C026/1	Analog input 1: Offset
C027/1	Analog input 1: Gain
C028/1	Analog input 1: Voltage input signal
C029/1	Analog input 1: Current input signal
C033/1	Analog input 1: AIN1_nIn_a
Highlighted in grey = display parameter	

6.1.3 Using the analog input as current input

- The current source must be connected to the X4/GND and X4/A1U plug connector.
- Code C034, selection "1" and "2", serves to reconfigure the analog input 1 to a current input if a load resistor of 250 Ω is connected externally in parallel.

Tip!

The selection "2" serves to implement a 4 ...20 mA current loop, e.g. for fault-resistant speed setpoint selection.

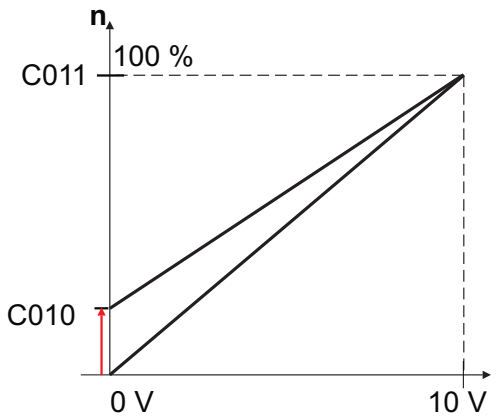
Open-circuit monitoring

Use C598/1 to set an open circuit error response for the 4 ...20 mA current loop. This error response is already activated in the Lenze setting!

Minimum and maximum output speed

The speed range required for the application is set via the selection of the output speeds:

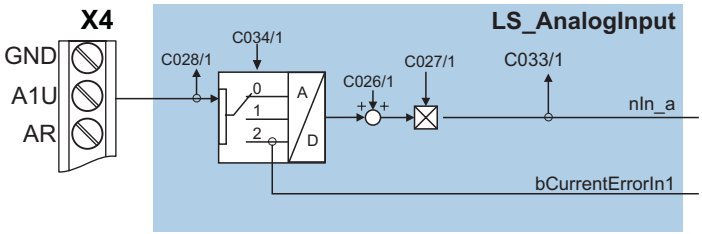
- The maximum output speed which can be parameterised in code C011 is reached with a speed setpoint selection of 100 %.
  This value depends on the setpoint source and is considered as the reference speed for all other settings.
- The value which can be parameterised in code C010 corresponds to the minimum speed if
  - the input of the LS_AnalogInput block is connected to the X4/A1U input terminal (Lenze setting)
    and
  - a voltage of 0 V applies to the X4/A1U input terminal.



[6-1] Relation between setpoint and minimum and maximum output speed

6.1.4 System block "LS_AnalogInput"

The system block **LS_AnalogInput** displays the analog input in the function block editor.



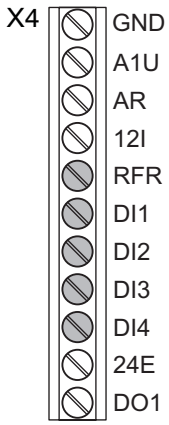
Output Data type	Value/meaning
nIn_a C033/1 | INT	Analog input 1 • Scaling: ± 2^{14} ≡ ± 10 V for use as voltage input + 2^{14} ≡ + 20 mA (+ 5 V) for use as current input (with external load resistor)
bCurrentErrorIn1 BOOL	Status signal "Current input error" • Only when analog input 1 is used as current input (with external load resistor). • Application: Cable-breakage monitoring of the 4 ...20 mA circuit.
	True $\lvert I_{AIN1} \rvert$ < 4 mA

6.2 Digital inputs

The four terminals DI1 ... DI4 of the plug connector X4 serve to detect digital signals.

Control input RFR serves to enable the controller and is firmly connected to the device control.

6.2.1 Terminal assignment/electrical data



Terminal	Use	Electrical data	
X4/DI1 .. X4/DI4	Digital input 1 ... 4	LOW level:	0 ... 2.5 VDC
		HIGH level:	+ 10 V ... + 30 V DC
		Input current:	4 mA per input at 12 V DC (X4 / 12I)
		Electric strength of external voltage:	Max. ± 30 V, permanent
		Input impedance:	3.3 kΩ
		Processing cycle:	1 ms
X4/RFR	Controller enable	See digital inputs	
X4/GND	Reference potential (digital ground)		

6.2.2 Parameter setting

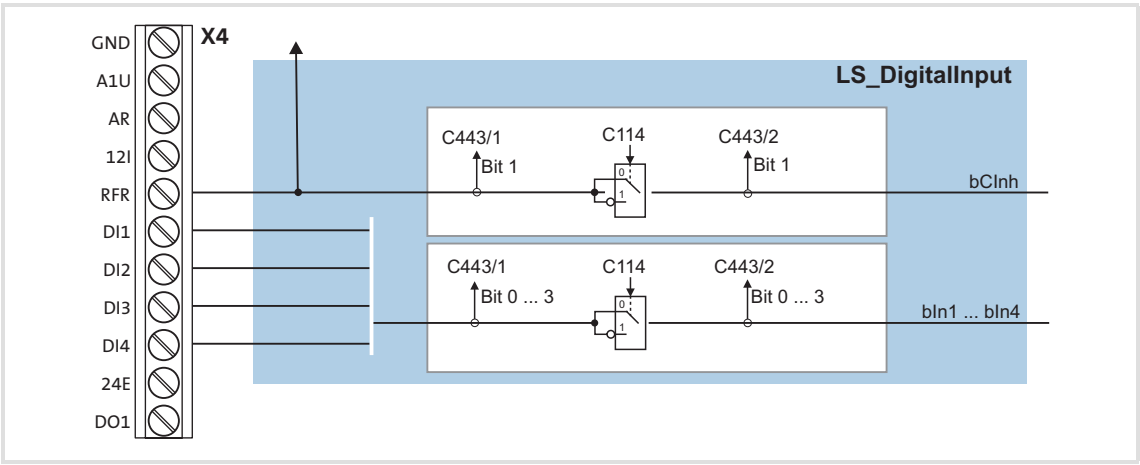
Short overview of parameters for the digital inputs:

Parameter	INFO
C011	Reference speed of the drive
C114	Inversion of the digital input
C701	Linking of the digital inputs with different functions of the drive application is possible.
C443/1	Status: Terminal level • DI1 ... DI4: Bit 0 ... 3 • CINH: Bit 15
C443/2	Status: Output level • DI1 ... DI4: Bit 0 ... 3 • CINH: Bit 15
Highlighted in grey = display parameter	

6.2.3 System block "LS_DigitalInput"

The system block **LS_DigitalInput** displays the digital inputs in the function block editor.

A total of four digital inputs DigIn1 ... DigIn4 can be parameterised. For each of the processing functions, the terminal function can be inverted with C114 The status can be queried via code C443 at the input and output of the processing function.



Output DIS code | data type	Value/meaning
bCInh C443/1 /2 | BOOL	Controller enable Note: In addition, there is a direct and non-configurable connection to the output stages of the frequency inverter.
bIn1 C443/1 /2 | BOOL	Digital input DI1
...	
bIn4 C443/1 /2 | BOOL	Digital input DI4

6.3 Digital outputs

The controller is provided with a parameterisable digital output and a relay output.

Note!

Initialisation behaviour:

- After mains switching up to the start of the application, the digital output remains set to FALSE.

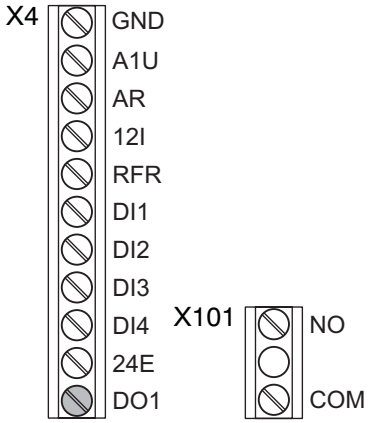
Exception handling:

- In case of a critical exception in the application (e.g. reset), the digital output is set to FALSE considering the functional direction parameterised in C118.

Switching cycle diagnostics:

- Code C177/2 serves to evaluate the load of the relay by querying the switching cycles.

6.3.1 Terminal assignment/electrical data



Terminal	Use	Electrical data	
X4/DO1	Digital output 1	LOW level:	0 V
		HIGH level:	+12 ... +30 V (independent of the voltage at X4/24E)
		Output current:	max. 50 mA (external resistance > 480 Ω at 24 V)
		Processing cycle:	1 ms
X4/24E	External voltage (24 V DC) to supply the digital output		
X4/GND	Reference potential (digital ground)		
X101/COM	Relay output, common contact	Potential-free two-way switch AC 250 V / 3 A DC 24 V / 2 A ... 240 V / 0.16 A (with suppressor circuit) Important: The minimum load must not fall below 12 V and 5 mA.	
X101/NO	Relay output, NC contact		

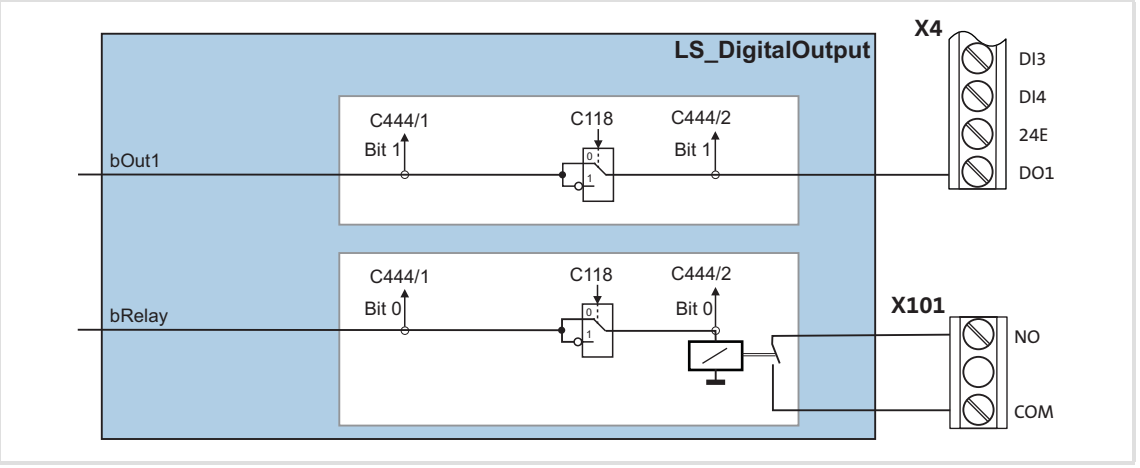
6.3.2 Parameter setting

Short overview of parameters for the digital outputs:

Parameter	Info
C118	Inversion of the output logic
C621/1	Linking the **bRelay** signal with the drive application Lenze setting: LA_nCtrl_bDriveFail (50)
C621/2	Linking the **bOut1** signal with the drive application Lenze setting: LA_nCtrl_bDriveReady (51)
C177/2	Status: Switching cycles, output relay
C444/1	Status: Input level • Bit 0: bRelay • Bit 1: bOut1
C444/2	Status: Terminal level • Bit 0: bRelay • Bit 1: bOut1
Highlighted in grey = display parameter	

6.3.3 Function block "LS_DigitalOutput"

In the FB editor, the function block **LS_DigitalOutput** is the interface to the digital output at the front of the controller.



Input DIS code | data type	Information/possible settings
bOut1 C444/1 | BOOL	Digital output 1
bRelay C444/1 | BOOL	Relay output, potential-free make contact

7 Error management

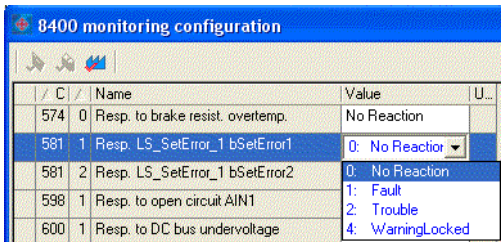
7.1 Basics on error handling in the controller

In the controller many functions are integrated which detect errors and thus

- protect the device against damage or overload, e.g. short circuit detection, Ixt overload detection, overtemperature detection, etc.
- detect a maloperation by the user, e.g. memory module missing.
- output a warning signal if desired, e.g. if the speed is too high or too low, etc.

Depending on the importance, this 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).

Furthermore, depending on their importance, some device errors can be configured with respect to their effect on the behaviour of the controller (e.g. for user errors which may occur):



All functions provided with an error detection (e.g. the motor control) supply information to an error handler which is processed every 1 ms and which evaluates all the information.

During this evaluation

- the current error is generated
- the controller is set to the respective error status (e.g. "fault").

These error data serve to diagnose errors systematically and contain the following information:

1. the error type, e.g. warning
2. the subject area
3. the error identification number within the subject area

Together all types of information form the real error number which is unique in the whole device system.

In addition to the control of the device state by the error handler, a logbook function records the errors and their history. ▸ Logbook (📖 124)

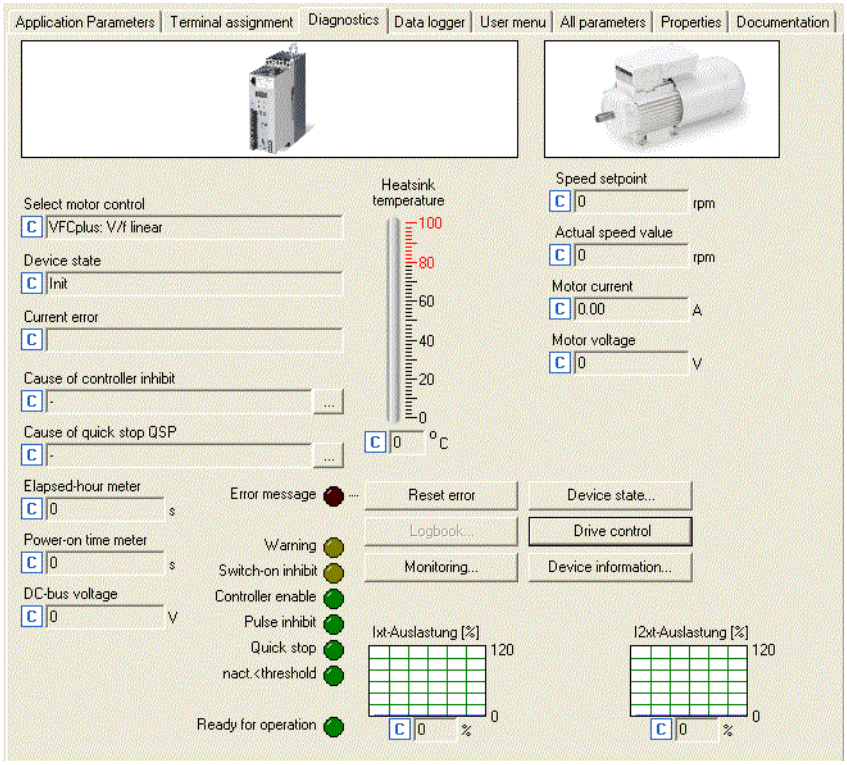
7.2 Drive diagnostics with the »Engineer«

Tip!

The drive diagnostics with the integrated keypad is described in chapter Diagnostics (📖 23) beschrieben..

With an online connection to the controller, you can use the »Engineer« to carry out a diagnostics for the connected controller and get a clear visualisation of important controller states:

The online connection to the »Engineer« can be made via the diagnostic interface X6.



[7-1] "Diagnostics" tab, screenshot for online connection to the frequency inverter

- Use the **Reset error** button to acknowledge an existing error message if the cause of the error has been eliminated.
- Use the **Logbook** button to display the logbook of the controller. For detailed information about the logbook, please see the chapter "Logbook (📖 124)" .
- The ▸ Device state button serves to display the state machine. The current device status is indicated by a field highlighted in blue.
- The "Monitoring" button serves to set the monitoring functions (configuration of the error type).

- If you click the ▸ Drive control button, a table appears providing information on the bit assignment of the following control-relevant words:
  - Cause of controller inhibit C158
  - Cause of quick stop C159
  - Status word C150
  - Extended status word C155

Display parameters

The parameters listed in the following tables serve to query current states and actual values of the controller for diagnostic purposes, e.g. by using the internal keypad, a bus system or the »Engineer« (with an online connection to the controller).

- These parameters are listed in the »Engineer« parameter list and the internal keypad.
- A detailed description of these parameters can be found in chapter "Parameter reference" (📖 167).

Parameter	Display
C051	Actual speed value
C052	Motor voltage
C054	Motor current
C057	Maximum torque
C059	Appl. Nominal frequency C11
C061	Heatsink temperature
C064	Device utilisation (I x t)
C066	Thermal motor load (I^2xt)
C168	Status-determining error
C178	Elapsed-hour meter
C179	Power-on time meter

Identification data

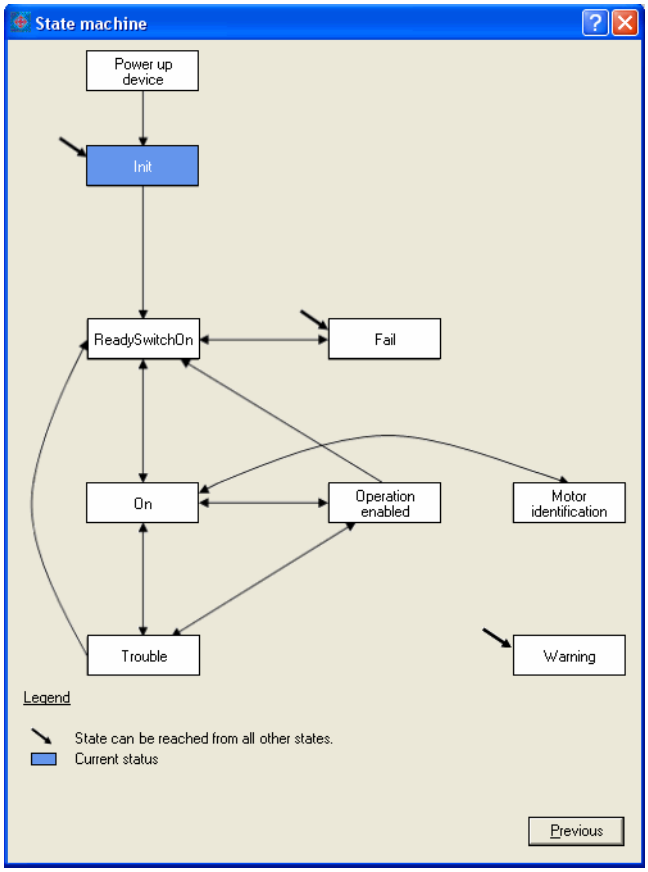
The parameters listed in the following table which are entered in the »Engineer« parameter list and in the internal keypad in the **Identification → Controller** category, serve to display the identification data of the controller:

Parameter	Display
C093	Power section ID
C099, C100	Firmware version
C200	Firmware product type
C201	Firmware compile date

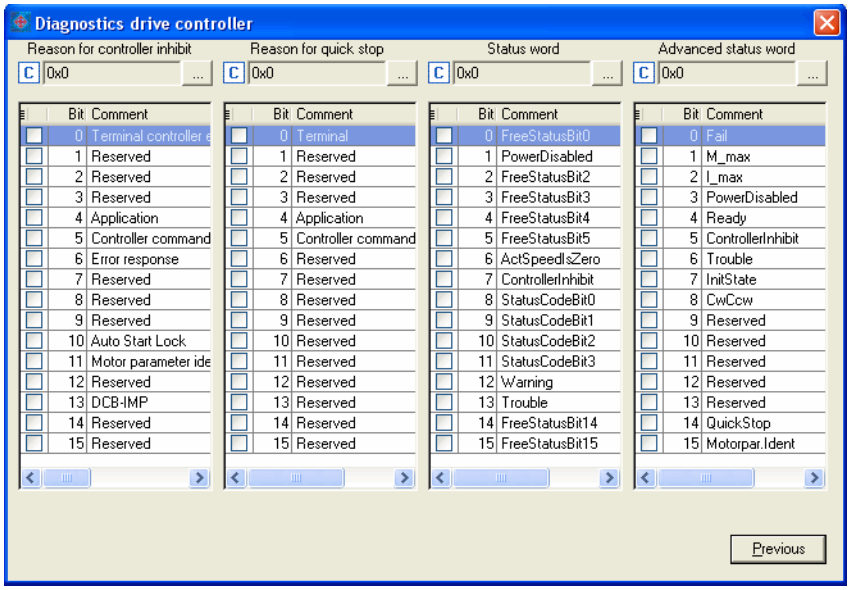
How to diagnose a drive with the »Engineer«:

1. Select the 8400 BaseLine controller to be diagnosed in the *Project view*.
2. Click the icon or select the command **Online→Go online** to build up an online connection with the controller.

3. Select the **Diagnostics** tab.
   - With an online connection, the **Diagnostics** tab displays current status information about the controller.



[7-2] Device state



[7-3] Drive control

7.3 Logbook

The integrated logbook function of the controller chronologically logs important events within the system and plays an important role for troubleshooting and controller diagnostics.

Events that can be logged

The following events can be logged in the logbook:

- Error messages generated by the application

Information saved

For each event, the following information is saved in the logbook:

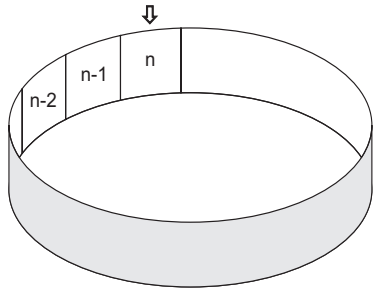
- Type of response (e.g. fault, warning) to the event
- Subject area that activated the event (e. g. user).
- Event
- Value of power-on time meter

Memory depth

Maximum number of logbook entries: 8

7.3.1 Functional description

The structure of the logbook corresponds to a ring buffer:



Ⓐ Current event

- As long as free logbook memory capacity is available, the entries will be saved at the next free memory location.
- If all memory locations are occupied, the oldest entry will be deleted to save a new entry.

[7-4] Ring buffer structure

In the event of a supply voltage failure, the logbook is saved and reloaded automatically when the controller 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.

Note!

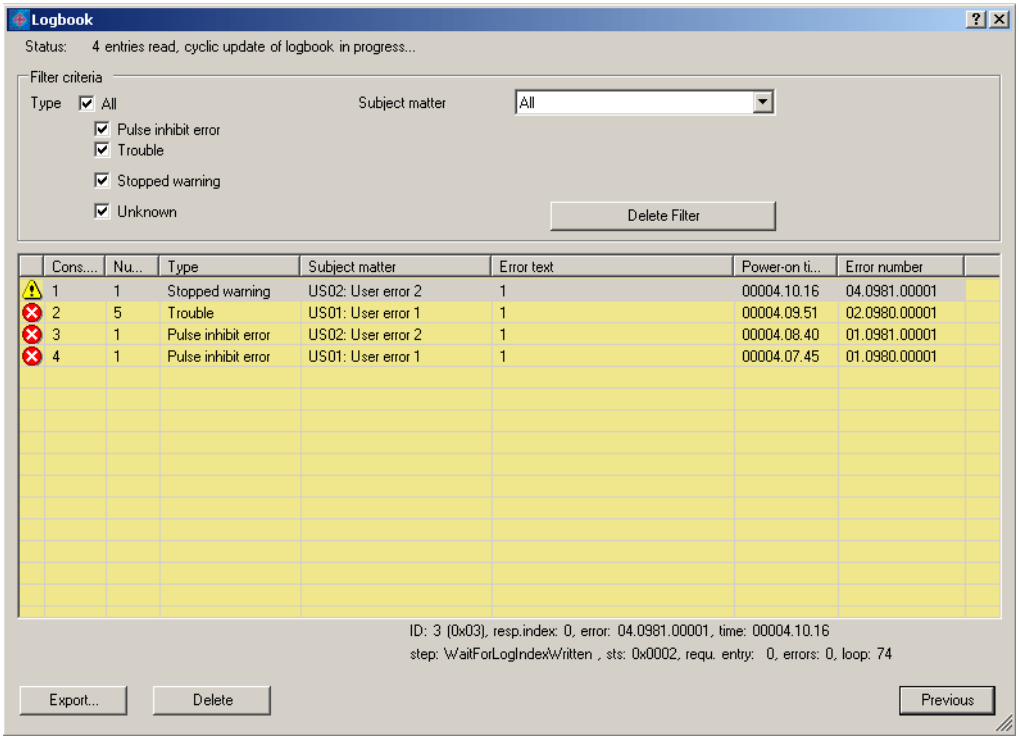
Events for which the response is set to "None" are not entered into the logbook.

7.3.2 Reading out logbook entries

With an online connection, the existing logbook entries can simply be displayed in the »Engineer«. Alternatively, the logbook entries can also be read via the corresponding parameters (e.g. using the internal keypad).

How to display logbook entries in the »Engineer«:

1. Go to the *Project view* and select the 8400 BaseLine controller whose logbook entries are to be read.
2. Click the icon or select the command **Online→Go online** to build up an online connection with the controller.
3. Select the **Diagnostics** tab from the *Workspace*.
4. Click **Logbook**.
   - The *Logbook* dialog box appears
   - Click **Delete** to delete an entry from the logbook.
   - Click **Export** to export the entries from the logbook into a *.log file.
5. Click **Previous** to close the *Logbook* dialog box.



[7-5] Dialog area of the logbook

7.4 Monitoring

The controller includes different monitoring functions that protect the drive against impermissible operating conditions.

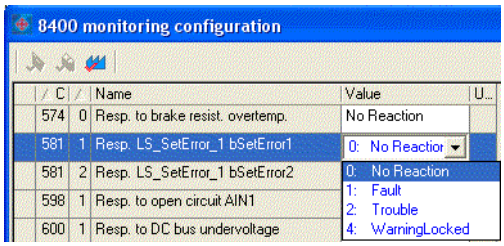
▶ If a monitoring function responds,
- an entry will be made into the Logbook of the controller,
- the response (troubleQSP, warning, fault, etc.) selected for the monitoring function will be activated,
- the status of the internal device control changes according to the selected response, controller inhibit is set, and the "DRIVE ERROR" LED on the front of the controller goes on:

Response	Logbook entry	Display in C168	Pulse inhibit	Controller inhibit	Acknowledgement required	LED "DRV-ERR"
None						OFF
Fault	☑	☑	☑	☑	☑	
Trouble	☑	☑	☑	☑ (after 0.5 s)		
Warning locked	☑	☑			☑	

7.4.1 Setting the error response

When a monitoring function responds, the response set for this monitoring function (troubleQSP, warning, fault, etc.) will be activated.

▶ For many monitoring functions the response can be individually parameterised via parameters.



Tip!

The table in chapter "▸ Short overview (A-Z)" contains the error messages for which the response can be set (📖 132).

Warning thresholds

Some of the monitoring functions are activated if a defined warning threshold (e.g. temperature) has been exceeded.

▶ The corresponding preset threshold values can be changed via the following parameters:

Parameter	INFO
C120	Motor overload protection (I²xt)
C123	Device util. warning threshold
C174	Undervoltage (LU) threshold

7.4.2 Monitoring of the device utilisation

In C064, the device utilisation (i x t) over the last 180 seconds is displayed in [%].

▶ If the value displayed in C064 exceeds the warning threshold set in C123, the error message "Device utilisation Ixt > C123" is output and the error response set in C604 occurs (default setting: "Warning").

▶ If the value displayed in C064 exceeds 100 %, the error message "device utilisation Ixt > 100 %" is output and the error response "fault" occurs.

– The error can only be reset if the value displayed in C064 is < 95 % again.

7.5 Error messages of the operating system

This chapter describes all error messages of the controller operating system and possible causes & remedies.

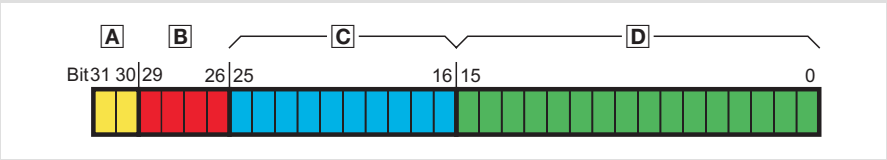
Tip!

The error messages are also saved in the logbook in chronological order. ▸ Logbook (📖 124)

7.5.1 Error number

7.5.1.1 Structure of the error number (bit coding)

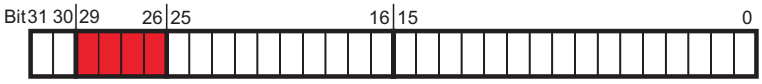
If an error occurs in the controller, the logbook saves a 32-bit value in the error format which contains the following information:



A Reserved
B Error type
C Error subject area
D Error ID

[7-6] Structure of the error number

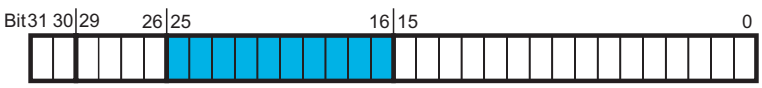
7.5.1.2 Error type



The error type is dynamically assigned by the operating system.

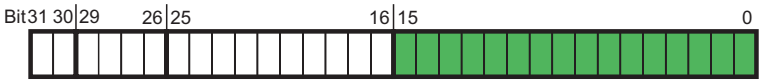
Bit 29	Bit 28	Bit 27	Bit 26	Meaning
0	0	0	0	0: No response
0	0	0	1	1: Pulse inhibit fault
0	0	1	0	2: Trouble
0	1	0	0	4: Warning locked

7.5.1.3 Error subject area



The subject area indicates the internal "function unit" of the controller in which the error occurred.

7.5.1.4 Error ID

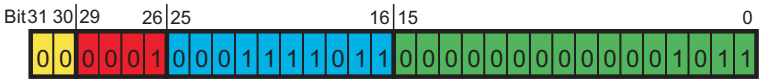


16-bit value (0 ... 65535) for error identification.

7.5.1.5 Example for bit coding of the error number

C168 displays the error number "75169803".

▶ This decimal value corresponds to the following bit sequence:



Assignment	Information	Meaning in the example
0 0	Reserved	Assigned with 0b00
0 0 0 1	Error type	1: Pulse inhibit fault
0 0 0 1 1 1 1 0 1 1	Subject area	123: Motor management
0 0 0 0 0 0 0 0 0 0 0 0 1 0 1 1	Error ID	16: "Short circuit" (OC1)

▶ The bit-by-bit representation of the error number (divided into nibbles)
0000 | 0100 | 0111 | 1011 | 0000 | 0000 | 0000 | 1011
corresponds to the hexadecimal value of "0x47B000B"

▶ The error number "75169803" thus means:
In the "Motor management" subject area, an overcurrent has been detected. An "error pulse inhibit" occurred as a response to the error which has to be acknowledged after the error has been eliminated.

7.5.2 Reset of 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.

Error messages can be reset via

- the code C002/19 = "1"
- the »Engineer«
- the DCTRL input with C701/2 = "1" (terminal "X4/RFR": Low ---> High)
- Mains switching (switching off the mains and then on again)

Tip!

With an online connection to the controller, use the **Diagnostics** tab of the »Engineer« and click **Error message reset** to reset a pending error message.

7.5.3 Short overview (A-Z)

The following table contains all error messages of the controller operating system in alphabetical order with the preset error response and - if available – the parameter for setting the error response.

Tip!

If you click the cross-reference in the last column "Detailed information", you get to the detailed description of the corresponding error message in the following chapter "Cause & possible remedies" (📖 133) .

Error message	Cross-reference / INFO
An01: AIN1_I < 4 mA	An01
df01 ... df10: Internal error	Please contact Lenze
dH69: Adjustment data error	dH69
ID1: Motor data identification error	ID1
LU: DC-bus undervoltage	LU
OC1: Power section - short circuit	OC1
OC2: Power section - earth fault	OC2
OC5: Ixt overload	OC5
OC6: I2xt motor overload	OC6
OH: Heatsink overtemperature	OH
OU: DC-bus overvoltage	OU
PS01: No memory module	PS01
PS02: Invalid parameter set	PS02
PS03: Parameter set of device invalid	PS03
PS04: Invalid parameter set	PS04
PS31: Parameter set of different power class	PS031
US01: User error 1	US01
US02: User error 2	US02

[7-1] Monitoring

7.5.4 Cause & possible remedies

This chapter contains all error messages of the controller operating system in numerical order of the error number with detailed information on the response to the error message as well as information on the cause & possible remedies.

Tip!

A list of all error messages of the controller operating system in alphabetical order can be found in the previous chapter
▸ Short overview (A-Z) (📖 132).

Table of the individual errors

Subject area		Error no.	Error cause	Error response	Remedy by the user
No.	Name				
119	Temperature	7798785	**OH: Heatsink overtemperature** The heatsink temperature is higher than the fixed limit temperature (90 ° C). The ambient temperature of the controller may be too high or the fan or its ventilation slots may be dirty.	1: Error - pulse inhibit ("Fault")	Check control cabinet temperature. Clean air filter of control cabinet Clean controller. If required, clean or replace the fan Provide for sufficient cooling of the device.
119	Temperature	7798834	**OC5: Ixt overload** The Ixt overload check has tripped due to 1.) wrong dimensioning of the device with regard to its motor load or 2.) non-compliance with the load cycles	C00604	Regarding 1.) Check and, if required, correct the dimensioning between the device and motor load with regard to technical data Regarding 2.) Reduce load cycles of the motor. Observe load cycles according to the documentation.
123	Motor management / encoder	8060942	**OU: DC-bus overvoltage** The device has detected an overvoltage in the DC bus and an earth fault on the motor side. In order to protect the device hardware, the inverter control is switched off. Depending on the configuration of the auto-start lock function, C00142 serves to set that, if the this error has been tripped, the controller only starts after the controller inhibit is switched. If this error message remains active longer than the time set in C00601, a "Fault" is tripped.	2: Trouble	Reduction of the load in generator mode. Use of a brake resistor Use of a regenerative power supply module. Layout of a DC-bus connection. Remove earth fault on the motor side.
123	Motor management / encoder	8060943	**LU: DC-bus undervoltage** The device has detected an undervoltage in the DC bus. The inverter control is switched off since the drive characteristics of the motor control cannot be ensured anymore due to the DC-bus undervoltage. The configuration of the auto-start lock function C00142 serves to set that, after this error has tripped, the controller only starts after the controller inhibit is switched.	2: Trouble	Switch on the mains supply or ensure sufficient supply via DC bus. Adapt C00142, if required
123	Motor management / encoder	8060944	**OC1: Power section - short circuit** The device has detected a short circuit of the motor phases. In order to protect the device electronics, the inverter control is switched off. Mostly, faulty motor connections are the reason. If the device is dimensioned inappropriately with regard to the motor load and if the current limitation in the current controller is misadjusted (I_{max} controller), this error message may occur as well. See also the chapter Motor control - defining current limits	1: Error - pulse inhibit ("Fault")	Check of the motor connections and the corresponding plug connector at the device. Compliance with the permissible combinations of device and motor power. Do not set the dynamics of the current limitation controller too high.

Subject area		Error no.	Error cause	Error response	Remedy by the user
No.	Name				
123	Motor management / encoder	8060945	**OC2: Power section - earth fault** The device has detected an earth fault of the motor phases. In order to protect the device electronics, the inverter control is switched off. Mostly, faulty motor connections are the reason. If the sinusoidal filters, motor cable lengths and cable types (capacity of shielding) are misdimensioned, discharge currents to PE may lead to this error message.	1: Error - pulse inhibit ("Fault")	Check of the motor connections and the corresponding plug connector at the device. Use of sinusoidal filters, cable lengths and cable types recommended by Lenze.
123	Motor management / encoder	8061033	**OC6: I2xt motor overload** Thermal overload of the motor	C00606	Check whether the motor overload threshold I²xt in code C120 is dimensioned correctly. Compliance with load requirements and, if required, correction of dimensioning. With control mode VFCplus: Check of the Vmin boost, see C00016 For details see Setting Vmin boost
125	Analog I/O integrated	8192001	**An01: AIN1 I < 4 mA**	C00598/1	Check wiring of the analog input terminal for open circuit. Check minimum current values of the signal sources.
144	Parameter set	9437185	**PS01: No memory module** Memory module is not plugged in. Either the memory module is not available or not correctly engaged in the slot.	5: Warning	Plug in the memory module or make sure that it is engaged correctly.
144	Parameter set	9437186	**PS02: Invalid parameter set** Parameter set filing invalid due to a previously incomplete saving of the parameter set (e.g. by voltage failure or pulling out the memory module during the saving process).	1: Error - pulse inhibit ("Fault")	Please make sure during the saving process that the voltage supply is kept up and the module remains plugged into the slot.
144	Parameter set	9437187	**PS03: Parameter set of device invalid** Incompatibility of the parameter set is e.g. caused if the parameter set in the memory module has a higher version than the basic device expects.	1: Error - pulse inhibit ("Fault")	When exchanging the memory modules, observe the downward compatibility.
144	Parameter set	9437188	**PS04: Invalid parameter set** A memory module incompatible for this device has been detected.	1: Error - pulse inhibit ("Fault")	If devices are exchanged, the parameter sets of the memory module for the device can be accepted by means of C002/c012 = "1".
144	Parameter set	9437215	**PS31: Parameter set of different power class** A parameter set of a memory module has been detected with a different power class and motor control SLVC (C006 = 4).	1: Error - pulse inhibit ("Fault")	Execute the motor parameter identification (C002/c023 = "1").
400	Device hardware defective	26214505	**dH69: Adjustment data error** Adjustment data error - power section	1: Error - pulse inhibit ("Fault")	The device must be returned to Lenze.
980	US01: User error 1	64225281	**US01: User error 1** User error 1 of LS_SetError_1	C00581/1	Defined by the user
981	US02: User error 2	64290817	**US02: User error 2** User error 1 of LS_SetError_1	C00581/2	Defined by the user

8 Drive Application

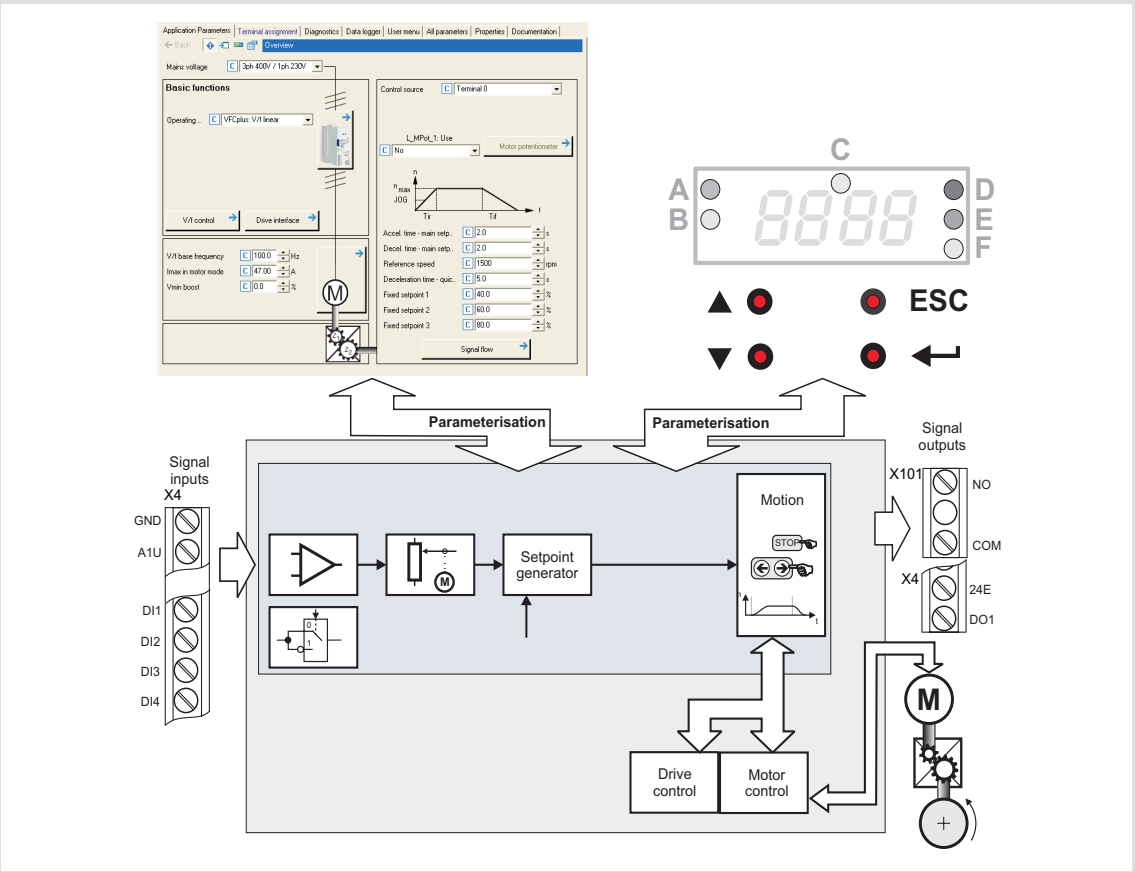
The drive application is a drive solution provided with the experiences and know-how of Lenze in which function blocks interconnected to a signal flow form the basis for implementing typical drive tasks.

Brief description of the drive application features

- Configurable input signals for terminal or manual control
- Free configuration of output signals
- Offset and gain of the main setpoint
- Up to 3 fixed setpoints for speed
- Adjustable setpoint ramp times
- Linear or S-shaped ramp
- Manual jog (function depends on the device type)
- Quick stop with adjustable ramp time
- Motor potentiometer (can be switched on/off)
- Load monitoring

This chapter describes the management and details of the drive application of the 8400 BaseLine frequency inverter.

8.1 Overview of the software structure of the drive application function



[8-1] Software structure of the application function

The device comes integrated with the drive application ("actuating drive - speed"). This drive application provides the main signal flow for implementing a general or particular drive task in the form of a signal interconnection of diverse function blocks (application level).

The drive application is provided with an input interface for connecting the control signal sources (e.g. main setpoint) and an interface for controlling the device outputs.

The control signals and device outputs are connected to the drive application in the I/O level.

Within the drive application, the main setpoint path affects the signals for the motor control and the state control of the controller.

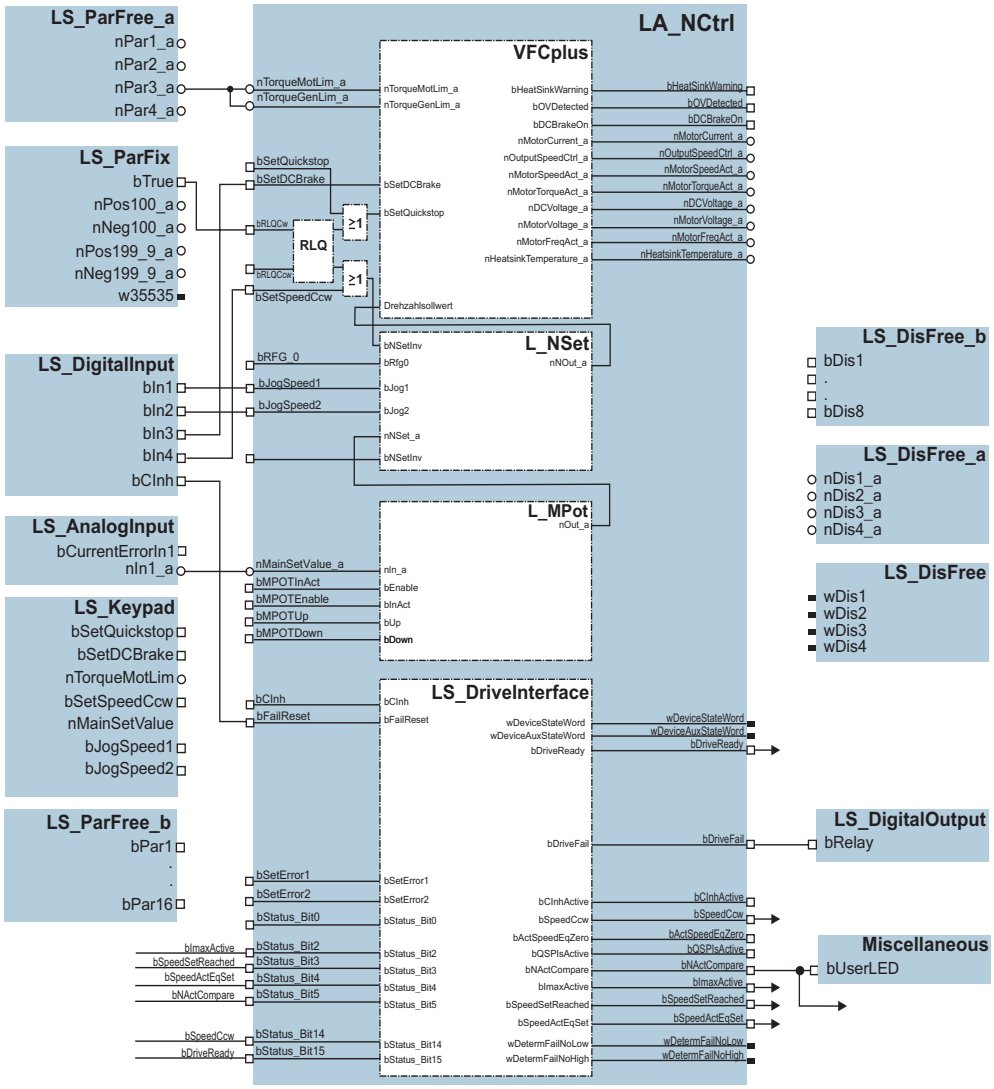
Both the control inputs and the control outputs and the entire drive application are provided with parameters for

- Setting / parameter setting of internal functions
- Display of actual values
- Connection of the FBs in the I/O level

All these parameters can be addressed via the diagnostic interface. The parameters are set e.g. via the internal keypad or diagnostics / user interfaces in the »Engineer«.

8.1.1 Input and output interconnection of the drive application

The input and output interconnection, the individual control signals are shown which act on the drive application:



[8-2] Interconnection of the signal sources, marking: analog input 1 as main setpoint

8.1.2 Functions of the drive application "Actuating drive - speed"

Function	BaseLine D	BaseLine C	StateLine C	HighLine C
Connection of device I/Os	Adjustable via parameter tables Additionally configurable via parameters or FB Editor			
Signal flow generation	Predefined in the device Some functions can be switched on and off via parameters			Freely configurable via FB Editor
FB Editor, I/O level	-		Yes, editable	
FB Editor, application level			Diagnostics only	Yes, editable
Open-loop operation Closed-loop operation	Yes No	Yes No	Yes Yes	Yes Yes
Speed setpoint selection via ramp function generator with S-shaped (jerk-free) ramp characteristic	Yes	Yes	Yes	Yes
Number of fixed setpoints	3	3	15	15
Number of ramp times	1	1	15	15
Function for comparing the actual speed with the digital feedback	Yes	Yes	Yes	Yes
Reversal of CW/CCW rotation via digital signal	Yes	Yes	Yes	Yes
Set/reset error	Yes	Yes	Yes	Yes
Diagnostics of the digital and analog inputs and outputs	Yes	Yes	Yes	Yes
Configurable connection of control and status signals	Yes	Yes	Yes	Yes
Adjustable load monitoring	Yes	Yes	No	Yes
Integrated automatic brake operation	Yes, simple speed threshold	Yes, simple speed threshold	Yes, simple speed threshold	Yes, with additional functions
Expandable by signal interconnection	Only in the I/O level	Only in the I/O level	Only in the I/O level	Yes
Blocking speeds	Yes	Yes	Yes	Yes
Motor potentiometer function	Yes	Yes	Yes	Yes
PID process controller	Yes	Yes	Yes	Yes
Manual jog	No	No	Yes	Yes, two speeds
Automatic load identification and control parameter setting	No	No	No	No

Selection of the control type

The selection of the control type determines how the drive application of the BaseLine is to be controlled. The following types are available:

1. Terminal control (Lenze setting)
2. Control via internal keypad / PC

The device inputs and outputs called system blocks at Lenze are the interfaces between the (internal) drive application and the peripheral inputs and outputs of the controller. The terminals, for instance, are important inputs and outputs for the user. The frequency inverter has one analog input and several digital inputs and outputs.

The interconnections between system blocks and the drive application are assigned with code C007. An overview of the signals affecting the inputs and outputs of the drive application is provided by the table in chapter Pre-assignment of the drive application (📖 140). Die Tabelle gibt die Verknüpfungen in der Lenze-Einstellung wieder..

8.1.3 Pre-assignment of the drive application

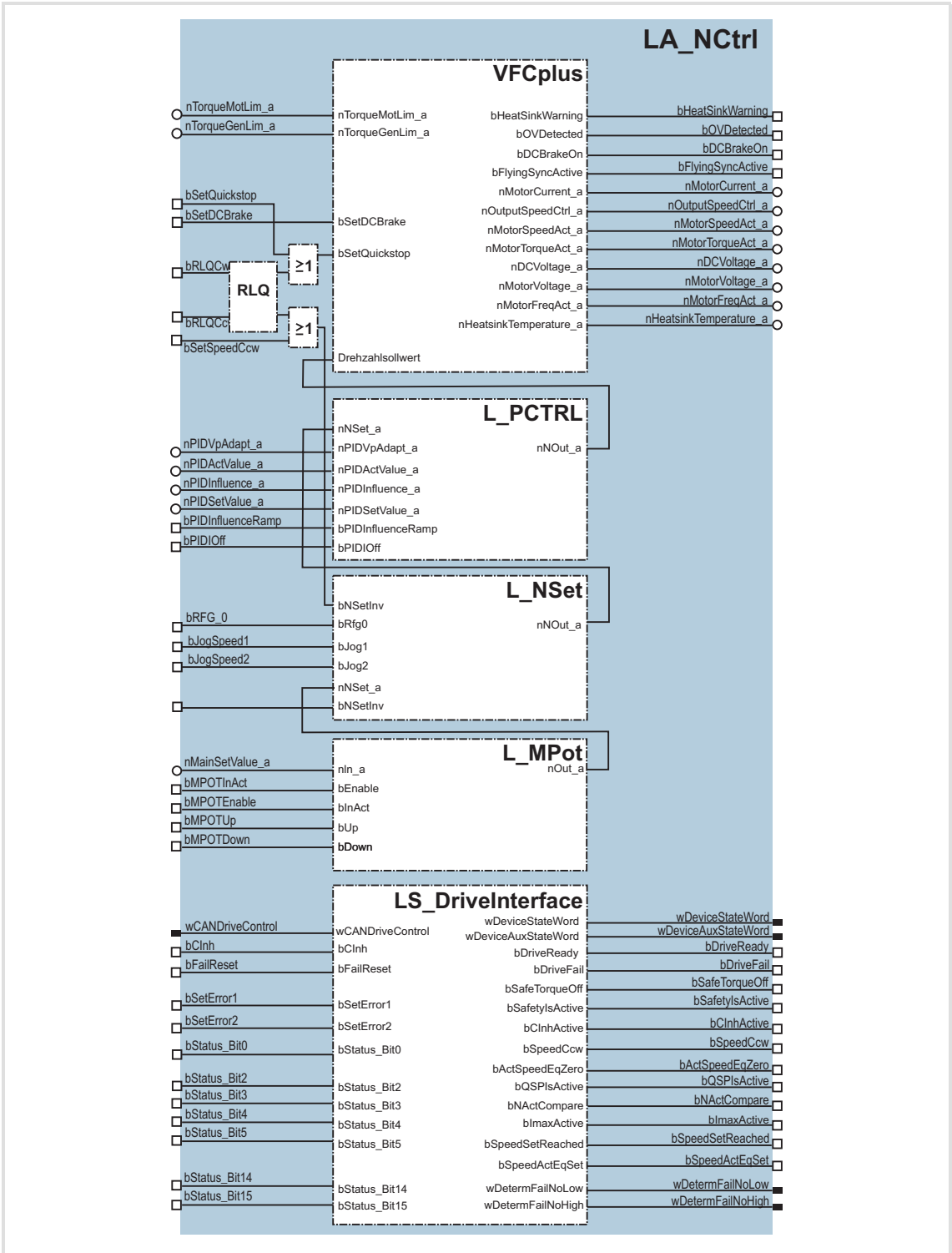
Input connections

Code	Input LA_NCtrl:	Code C007, value:					
		10 *(Terminal 0)*	**12** *(Terminal 2)*	**14** *(Terminal 11)*	**16** *(Terminal 16)*	**20** *(Keypad)*	**21** *(PC)*
C700/1	nMainSetValue_a	LS_AnalogInput:nIn1_a (X4/A1U)				LS_Keypad: nMainSetValue_a	LS_ParFree_a:nPar1_a
C700/2	nTorqueMotLm_a	LS_ParFree_a:nPar3_a				LS_Keypad: nTorqueMotLim_a	LS_ParFree_a:nPar3_a
C700/3	nTorqueGenLm_a	LS_ParFree_a:nPar3_a				LS_Keypad: nTorqueGenLim_a	LS_ParFree_a:nPar3_a
C700/6	nPIDVpAdapt_a	LS_ParFix:nPos100_a					
C700/8	nPIDInfluence_a	LS_ParFix:nPos100_a					
C701/2	bFailReset	LS_DigitalInput:bCInh (X4/RFR)					
C701/3	bSetQuickstop	-	LS_DigitalInput:bIn3 (X4/DI3)	-	-	LS_Keypad:bSetQuickstop	-
C701/4	bSetDCBrake	LS_DigitalInput:bIn3 (X4/DI3)	-	LS_DigitalInput:bIn2 (X4/DI2)	-	LS_Keypad:bSetDCBrake	LS_ParFree_b:bPar3_a
C701/5	bSetSpeedCcw	LS_DigitalInput:bIn4 (X4/DI4)		LS_DigitalInput:bIn1 (X4/DI1)	-	LS_Keypad:bSetSpeedCcw	LS_ParFree_b:bPar4_a
C701/6	bJogSpeed1	LS_DigitalInput:bIn1, (X4/DI1)		-	LS_DigitalInput:bIn1, (X4/DI1)	LS_Keypad:bJogSpeed1	LS_ParFree_b:bPar1_a
C701/7	bJogSpeed2	LS_DigitalInput:bIn2, (X4/DI2)		-	LS_DigitalInput:bIn2, (X4/DI2)	LS_Keypad:bJogSpeed2	LS_ParFree_b:bPar2_a
C701/8	bMPotUp	-	-	LS_DigitalInput:bIn3 (X4/DI3)	-	-	-
C701/9	bMPotDown	-	-	LS_DigitalInput:bIn4 (X4/DI4)	-	-	-
C701/11	bMPotEnable	-	-	LS_ParFix:bTrue	-	-	-
C701/12	bRFG_0	-	-	-	-	-	-
C701/15	bPIDInfluenceRamp	LS_ParFix:bTrue					
C701/17	bRLQCw	LS_ParFix:bTrue			LS_ParFix:bTrue LS_DigitalInput: bIn3 (X4/DI3)	LS_ParFix:bTrue	
C701/18	bRLQCcw	-			LS_DigitalInput: bIn4 (X4/DI4)	-	

Output connections

Code	Name	Code C007, output LA_NCtrl, value:					
		10 *(Terminal 0)*	**12** *(Terminal 2)*	**14** *(Terminal 11)*	**16** *(Terminal 16)*	**20** *(Keypad)*	**21** *(PC)*
C620/5	LS_DisFree: wDis1	-	-	-	-	LA_NCtrl:wDeviceStateWord	
C620/9	LS_DisFree: nDis1_a	-	-	-	-	LA_NCtrl:nMotorSpeedAct_a	
C620/10	LS_DisFree: nDis2_a	-	-	-	-	LA_NCtrl:nOutputSpeedCtrl_a	
C620/20	LP_CAN-OUT1: wState	-	-	-	-	-	-
C620/21	LP_CAN-OUT1: wOut2	-	-	-	-	-	-
C620/22	LP_CAN-OUT1: wOut3	-	-	-	-	-	-
C621/1	LS_DigitalOutput: bRelay (X101)	LA_NCtrl:bDriveFail					
C621/2	LS_DigitalOutput: bOut1 (X4/DO1)	LA_NCtrl:bDriveReady					
C621/6	USER-LED	LA_NCtrl:bNActCompare					
C621/8	LA_NCtrl: bStatusBit2	LA_NCtrl:bImaxActive					
C621/9	LA_NCtrl: bStatusBit3	LA_NCtrl:bSpeedSetReached					
C621/10	LA_NCtrl: bStatusBit4	LA_NCtrl:bSpeedActEqSet					
C621/11	LA_NCtrl: bStatusBit5	LA_NCtrl:bNActCompare					
C621/12	LA_NCtrl: bStatusBit14	LA_NCtrl:bSpeedCcw					
C621/13	LA_NCtrl: bStatusBit15	LA_NCtrl:bDriveReady					
C621/16	LS_DisFree: bDis1	-				LA_NCtrl:bDriveReady	
C621/17	LS_DisFree: bDis2	-				LA_NCtrl:bDriveFail	

8.2 Interface description of the drive application



[8-3] Drive application LA_NCtrl

Inputs

Identifier/data type	Information/possible settings
bSetQuickstop C701/3 BOOL	The quick stop function is activated via this control signal. TRUE = quick stop is active. Here, the drive ramps down the QSP ramp C0105 to speed = 0 and • keeps the motor at n = 0 if closed loop is active • sets pulse inhibit if Auto-DCB is activated
bRFG_0 C701/12 BOOL	When bRFG_0 = TRUE, the setpoint generator leads its currently generated speed value to zero via the ramps parameterised.
nTorqueMotLim_a C700/2 INT	These input signals are directly transferred to the motor control to limit the controller's maximum torque in motor and generator mode. Negative values at these inputs are interpreted as "0" and have the following effects: • Internal limitation of the torque at 199.9% (upper limit) • The drive cannot supply a higher torque in motor mode than set herewith 100% = M_{max} from C057
nTorqueGenLim_a C700/3 INT	These input signals are directly transferred to the motor control to limit the controller's maximum torque in motor and generator mode. Negative values at these inputs are interpreted as "0" and have the following effects: • Internal limitation of the torque 199.9% (lower limit) • The drive cannot supply a higher torque in generator mode than set herewith 100% = M_{max} from C057
bSetDCBrake C701/4 BOOL	The bSetDCBrake control signal brakes the drive to standstill. TRUE = SetDCBrake is active. • Braking current (C036) and hold time (C106 / C107) are adjustable • Braking process: DC-injection braking. Advantage of the DC-injection braking: The DC-injection braking provides the opportunity to influence the braking time by changing the motor current or braking torque. The braking effect stops when the rotor is at standstill.
bSetSpeedCcw C701/5 BOOL	This control signal serves to change over the direction of rotation of the drive to CCW rotation. When the signal is TRUE and the main setpoint is positive, the motor shaft rotates CCW
nMainSetValue_a C700/1 INT	Main setpoint
bJogSpeed1 C701/6 bJogSpeed2 C701/7 BOOL	---> Fixed speeds These control inputs serve to select fixed setpoints. The JOG setpoints are set relatively in percent [%] of the reference speed C011. The digital control signals bJogSpeed1 and JogSpeed2 serve to switch off the main setpoint and activate the JOG setpoint at the same time. A total of 3 JOG setpoints can be selected. The coding for the enabling of the JOG values is carried out according to the following table: • Main setpoint: bJogSpeed1 = 0, bJogSpeed2 =0 • JOG 1 (C039/1): bJogSpeed1 = 1, bJogSpeed2 =0 • JOG 2 (C039/2): bJogSpeed1 = 0, bJogSpeed2 =1 • JOG 3 (C039/3): bJogSpeed1 = 1, bJogSpeed2 =1 **Acceleration and deceleration times for the main setpoint path** The main setpoint is led via a ramp function generator. This serves to convert input steps into a ramp. The acceleration and deceleration times refer to a change of the speed from 0 to nmax (0% to 100%). The calculation of the Tir (C012) and Tif (C013) times to be set is described in the NSET function block description.

Identifier/data type	Information/possible settings
bMPOTUp C701/8 bMPOTDown C701/9 bMPOTInAct C701/10 bMPOTEnable C701/11 BOOL	---> Motor potentiometer function The application is provided with an integrated motor potentiometer. This function can be switched on/off via the parameters C701/11 or C806 = 1. When the function is switched on, the motor potentiometer is connected to the main setpoint path and thus acts as signal source for the main speed setpoint. This setpoint can be ramped up and down by means of the digital control inputs bMPOTUp and bMPOTDown via a parameterisable ramp time (C802, C803).
bCInh C701/1 BOOL	There are several options to inhibit the controller: • Terminal 28 (RFG) This signal acts fail-safe and always inhibits the controller. FALSE : controller inhibit is active • Control parameter C2/16. 0: controller inhibit is active • bCinh at the control input of the application TRUE: controller inhibit is active As long as one of these controller inhibit sources is set, the drive remains in the controller inhibited status. The reason for the "controller is inhibited" status can be detected via the C0158 parameter. When controller inhibit is set, the drive loses its torque, the machine is coasting. When the controller inhibit request is reset, the drive synchronises to the actual speed. For this purpose, • an automatic flying restart function of the device is activated, if required (see parameter C990) • the actual speed from the motor model of the motor control is used for synchronisation for vector control without feedback.
bFailReset C701/2 BOOL	C701/2 A pending error can be reset by a LOW-HIGH edge (Lenze setting, linkage with terminal X4/RFR) of this digital control signal if the cause of the fault has been eliminated. If the fault still exists, the error status remains unchanged.
bSetError1 C701/13 bSetError2 C701/14 BOOL	
bStatus_Bit0 C621/7 bStatus_Bit2 C621/8 .. bStatus_Bit5 C621/11 bStatus_Bit14 C621/12 bStatus_Bit15 C621/13 BOOL	

Outputs

Identifier/data type	Information/possible settings
wDriveControlStatus WORD	For detailed description see ▸ Status word output (📖 63) Application control via a bus system is possible with the 8400 BaseLine C controller.
wCurrentFailNumber WORD	Shows the current error numbers. For a detailed description of the structure of error numbers see ▸ Error number (📖 129) .
bDriveReady WORD	Display: Drive is ready to process setpoints. No error occurred.
bDriveFail BOOL	An error occurred. The error type is as follows: • Fault • Trouble • WarningLocked
bCInhActive WORD	Display: Controller inhibit is activated
bQSPIsActive WORD	Display: Quick stop is activated
bSpeedCcw WORD	Display: Direction of motor rotation with respect to actual speed value. TRUE: Motor rotates anti-clockwise (as viewed looking onto the motor shaft)
bSpeedActCompare WORD	TRUE: The actual speed value is lower than the value set in C024.
bImaxActive WORD	TRUE: The controller operates at the maximum current limit
bSpeedSetReached, bSpeedActEqSet WORD	• bSpeedSetReached TRUE: Speed setpoint reached. • bSpeedSetReached TRUE: Actual speed value has reached setpoint within one hysteresis band
nMotorCurrent_a WORD	Output of the current motor current
nMotorSpeedSet_a, nMotorSpeedAct_a WORD	• nMotorSpeedSet_a: resulting total speed setpoint. • nMotorSpeedAct_a: actual speed value
nMotorTorqueAct_a WORD	Current actual torque value
nDCVoltage_a WORD	Actual DC-bus voltage
nMotorVoltage_a WORD	Currently applied motor voltage

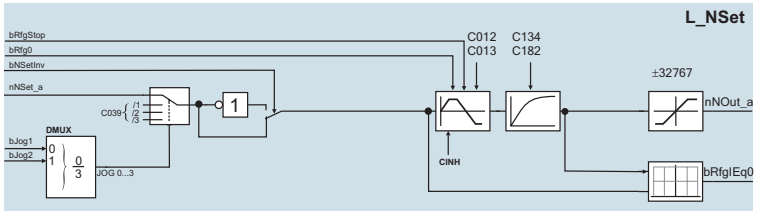
9 Function library

9.1 Function blocks

9.1.1 L_NSet

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
- Setting and holding the ramp function generator
- S-shaped ramp (PT1 rounding) of the ramp function generator
- Internal limitation of the input signal
- 3 fixed setpoints (JOG setpoints)



Inputs

Identifier/data type	Information/possible settings	
bRfg0 C701/12 BOOL	Leading the main setpoint integrator to 0 within the current Ti times	
	True	The current value of the mains setpoint integrator is led to "0" via the Ti time set.
bNSetInv C701/5 BOOL	Signal inversion for the main setpoint	
	True	Main setpoint signal is inverted.
nNSet_a C039/12 INT	Main setpoint signal • Other signals are also permitted	
bJog1 ... bJog2 C701/6 ... C701/7 BOOL	Selection inputs for fixed change-over setpoints (JOG setpoints) for the main setpoint • Selection inputs are binary coded.	

Outputs

Identifier/data type	Value/meaning	
nNOut_a INT	Speed setpoint output signal • 16384 ≡ 100 %	
bRfgIEqO BOOL	Status signal "ramp function generator has reached setpoint"	
	True	The ramp function generator has reached the speed setpoint.

Parameter

Identifier/data type Index	Possible settings			INFO
dnTir DINT **C012**	0.0	s	999.9	Acceleration time - main setpoint Initialisation: 0.0 s
dnTif DINT **C013**	0.0	s	999.9	Deceleration time Tif for the main setpoint • Initialisation: 0.0 s
C39/[1...3] Array of INT **C039/1..3**	-199.9	%	199.9	Fixed setpoints (JOG setpoints) • Initialisation: 0.0 %
bSShapeActive BOOL **C134**				Activates S-shaped ramp function generator characteristic for the main setpoint • The time constant is set using *nTiSShaped*. • Initialisation: 0 (deactivated)
	0	S-shaped ramp function generator characteristic deactivated		
	1	S-shaped ramp function generator characteristic activated		
nTiSShaped INT **C182**	0.0	s	50.0	Ti time of the S-shaped ramp function generator • Initialisation: 20.0 s

9.1.1.1 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.

9.1.1.2 JOG setpoints

JOG setpoints are constant values which are stored in the memory under *C39/1 ... C39/3*.

- The JOG setpoints can be called binary-coded using the *bJog1 ... bJog2* selection inputs so that 3 options are available.
- The main setpoint *nNSet_a* must be freely defined for *bJog1 ... bJog2 = FALSE*.

bJog2	bJog1	Used Main setpoint
FALSE	FALSE	nNSet_a
FALSE	True	C39/1
True	FALSE	C39/2
True	True	C39/3

- The number of selection inputs to be assigned depends on the number of JOG setpoints required.

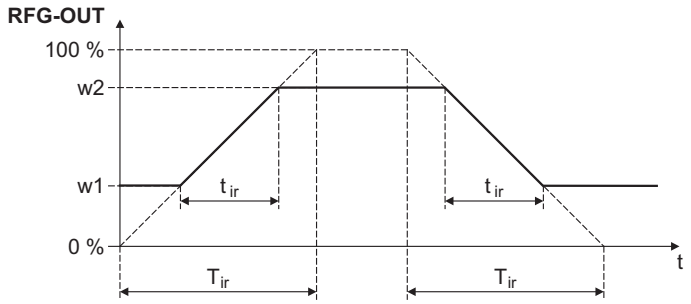
9.1.1.3 Setpoint inversion

The output signal of the JOG function is led via an inverter.

The sign of the setpoint changes if *bNSetInv* is set to TRUE.

9.1.1.4 Ramp function generator for the main setpoint

Afterwards, the setpoint is led via a ramp function generator with linear characteristic. The ramp function generator transfers setpoint step-changes at the input to a ramp.



w1, w2 = change of the main setpoint as a function of t_{ir} or t_{if}
RFG-OUT = output of the ramp function generator

[9.1] Acceleration and deceleration times

$$T_{ir} = t_{ir} \cdot \frac{100\,\%}{w2 - w1} \qquad T_{if} = t_{if} \cdot \frac{100\,\%}{w2 - w1}$$

9.1.1.5 S-shaped ramp

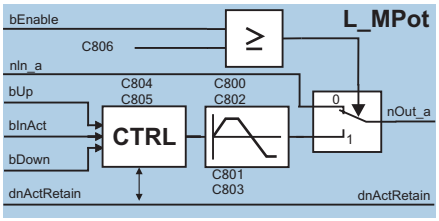
A PT1 element is connected downstream of the linear ramp function generator. This arrangement implements an S-shaped ramp for a nearly jerk-free acceleration and deceleration.

- The PT1 element is switched off/on using *bSShapeActive*.
- The time constant is set using *nTiSShaped*.

9.1.2 L_MPot

This FB replaces a hardware motor potentiometer and can be used as an alternative setpoint source which is 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.
- The potentiometer function is selected via the *Function* parameter.



Inputs

Identifier/data type		Information/possible settings	
bEnable C701/11	BOOL	Change-over of motor potentiometer function Input *bEnable* and code C806 *bEnableInternal* are ORed.	
		True	The motor potentiometer function is active, setpoint can be changed via *bUp* and *bDown*. • With a change-over 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 C700/1	INT	When bEnable = FALSE, the analog input signal nIn_ is switched to the nOut_a output.	
bUp C701/8	BOOL	Increase output signal	
		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 C701/9	BOOL	Reduce output signal	
		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 C701/10	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 *Function*.	
		True	Motor potentiometer function is deactivated.

Outputs

Identifier/data type		Value/meaning
nOut_a	INT	Output signal

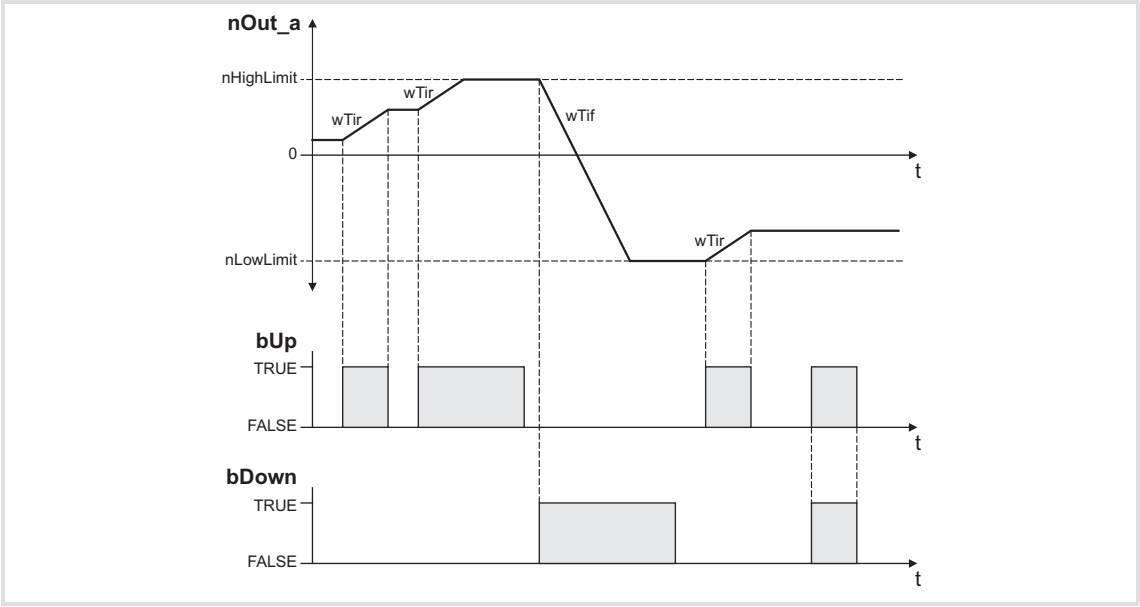
Parameter

Identifier/data type Index	Possible settings			INFO
dnActRetain DINT				Saves the current setpoint
nHighLimit C800 INT	-199.9	%	199.9	Upper limit • Initialisation: 100.0 %
nLowLimit C801 INT	-199.9	%	199.9	Lower limit • Initialisation: -100.0 %
wTir C802 WORD	1	0.1 s	6000	Acceleration time - main setpoint (Tir) • 10 ≡ 1 s • Initialisation: 10 s
wTif C803 WORD	1	0.1 s	6000	Deceleration time Tif • 10 ≡ 1 s • Initialisation: 10 s
Function C804 BYTE				Function selection • Initialisation: 0
	0	No further action; *nOut_a* retains its value.		
	1	The motor potentiometer returns to 0 % with the deceleration time Tif.		
	2	The motor potentiometer runs to the lower limit value with the deceleration time Tif (*nLowLimit*)		
	3	The motor potentiometer output immediately changes to 0 %		**Important for the emergency stop function**
	4	The motor potentiometer output immediately changes to the lower limit value (*nLowLimit*)		
	5	The motor potentiometer runs to the upper limit value with the acceleration time Tir (*nHighLimit*)		
byInitFunction C805 BYTE				Behaviour after mains power-up • Initialisation: 0
	0	The output value being output during mains power-up, is saved non-volatilely in the internal memory of the controller. It will be reloaded during mains power-up.		
	1	The lower limit (*nLowLimit*) is loaded during mains power-up.		
	2	An output value = 0 % is loaded during mains power-up.		

9.1.2.1 Activation & control of 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*.

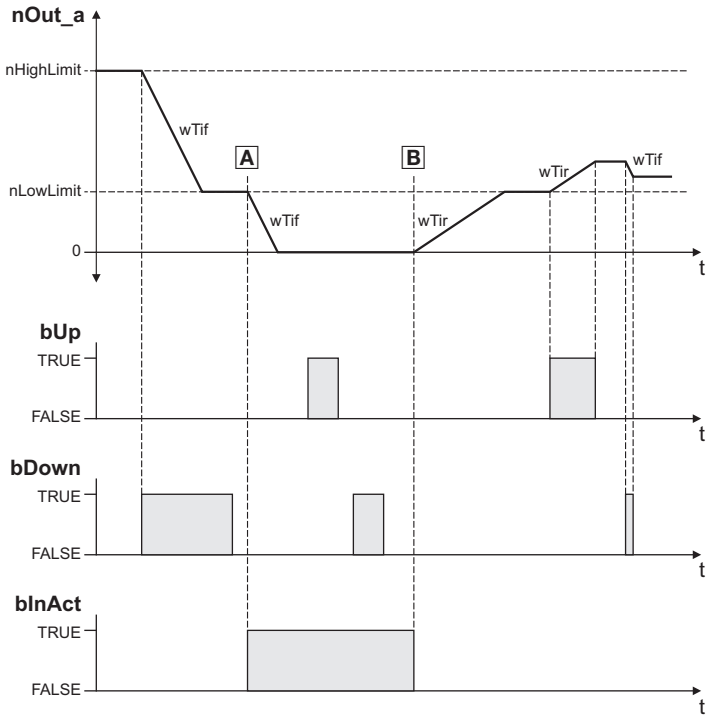


[9.2] Example: Control of the motor potentiometer

bUp	bDown	bInact	Function
FALSE	FALSE	FALSE	The *nOut_a* output signal remains unchanged.
FALSE	True		The *nOut_a* output signal runs to its upper limit value (*nHighLimit*).
True	FALSE		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*.

9.1.2.2 Deactivation of motor potentiometer

When the motor potentiometer is deactivated by setting *bInAct* to TRUE, the *nOut_a* output signal responds according to the function selected via *Function*.

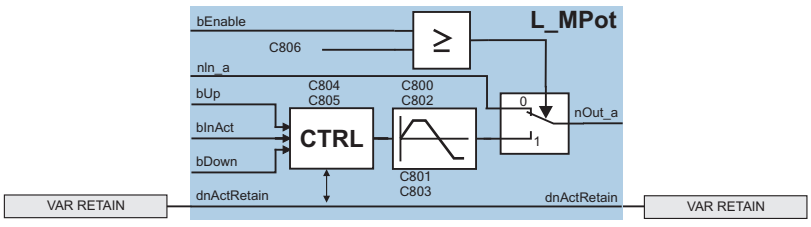


A When the motor potentiometer is deactivated, *nOut_a* is reduced to 0 % with the deceleration time *wTif*.
B If it is activated again, *nOut_a* is increased again to *nLowLimit* with the acceleration time *wTir*.

[9.3] Example: Deactivation of the motor potentiometer when the *function* 1, C804 = 1, has been selected

9.1.2.3 Save current output value after mains failure

To save the last actual value at *nOut_a* after a mains failure, declare a RETAIN variable and combine this with the FB instance as shown in the following illustration:



- This variable always saves the current value at *nOut_a*. Even in case of mains failure the variable keeps the value.
- When the mains is switched on again, the value saved in the variable is read into the FB **L_MPOT** and processed as starting value.

9.1.3 L_PCTRL

This function extension is available from software version 3.0!

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).

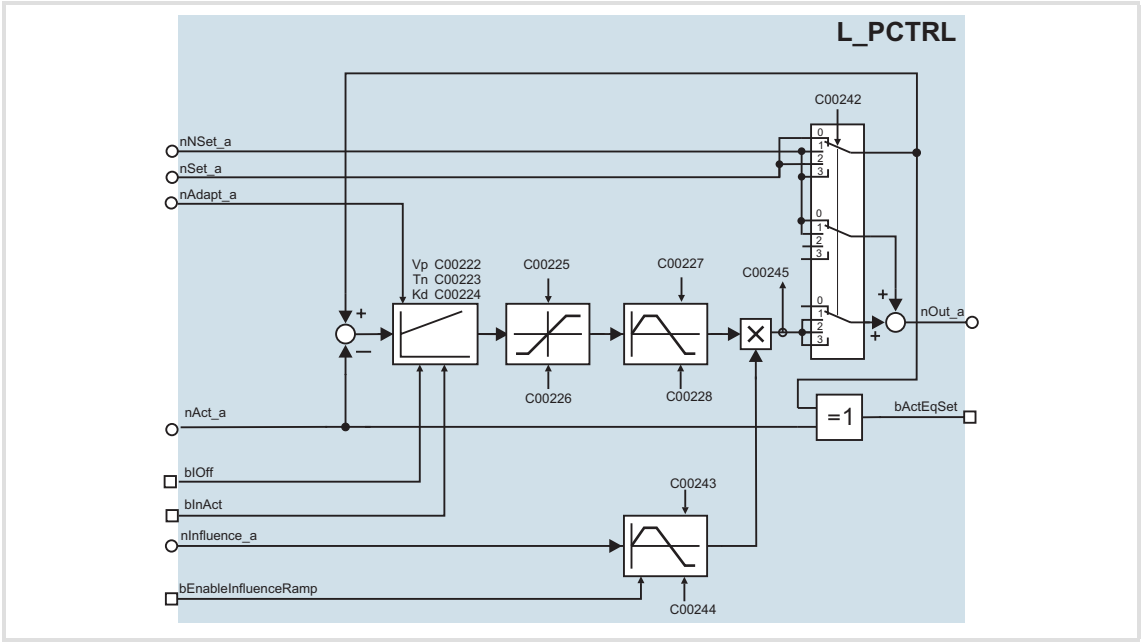
- Available function blocks: 1

The FB is provides 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



Inputs

Identifier/data type	Information/possible settings	
nNSet_a INT	Speed setpoint	
nAdapt_a INT	Reduction of the gain (nVp) by the value applied (in %) • Internal limitation to ±32767 • Changes can be done online. Example: When nVp = 2.0 and nVpadapt = 75 % ((75/100) x 16384 = 12288), the gain factor results in: 2.0 x 12288 = 24576	
nSet_a INT	Sensor setpoint (process setpoint) in the operating mode nMode = 1 and 3 • Internal limitation to ± 199.9 % Process setpoint in operating mode nMode = 2 • Internal limitation to ± 199.9 %	
nAct_a INT	Speed or actual sensor value (actual process value) • Internal limitation to ± 199.9 %	
bInAct BOOL	Deactivate process controller temporarily • Changes can be done online. Note: This input is not connected with the application NCTRL.	
	True	Process controller is deactivated, the internal PID-component is switched off.
bIOff BOOL	Switch off the I-component of the process controller • Changes can be done online.	
	True	I-component of the process controller is switched off
nInfluence_a INT	• Internal limitation to ±32767 • *nInfluence_a* serves to limit the influencing factor of the PID controller contained in the FB to a required value (- 199.9 % ... + 199.9 %).	
nEnableInfluenceRamp INT	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

Identifier/data type	Value/meaning
nOut_a INT	Output signal • 16384 ≡ 100 %
bActEqSet INT	Active: Setpoint and actual value are identical, no system deviation available

Parameter

Identifier/data type Index	Possible settings			Info
Vp INT **C00222**	0.1	0.1	500	Gain Vp • Initialisation: 1.0
Tn INT	20	ms	6000	Reset time Tn • Initialisation: 400 ms
Kd INT **C00224**	0	0.1	5	Differential component Kd • Initialisation: 0.0

Identifier/data type Index	Possible settings			Info
MaxLimit DINT **C00225**	-199.99	%	+199.99	Maximum value of the PID operating range • Initialisation: 199.99 %
MinLimit DINT **C00226**	-199.99	%	+199.99	Minimum value of the PID operating range • Initialisation: -199.99 %
Acceleration time DINT **C00227**	0.000	s	999.999	Acceleration time for the ramp at the PID output (should be set as steep as possible) • Initialisation: 0.010 s
Deceleration time DINT **C00228**	0.000	s	999.999	Deceleration time for the ramp at the PID output • Initialisation: 0.010 s
Operating mode **C00242**				Value range of the output signal • Initialisation: 0
	0	Off		The setpoint applied to the input nNSet_a is output without any changes at the output nOut_a.
	1	Additive + feedforward control		The setpoint is picked off at the input nNSet_a. Simultaneously, the setpoint is added to the output value of the PID-component and then output at nOut_a.
	2	PID as a setpoint generator		The setpoint is picked off at the input nSet_a. The input nNSet_a is not used. There is no additive linking at the output.
	3	PID setpoint from L_NSet_1		The setpoint is picked off at the input nNSet_a. The input nSet_a is not used. There is no additive linking at the output.
Influence acceleration time **C00243**	0.000	s	999.999	Acceleration time T_{ir} for the influence value • Initialisation: 5 s
Influence deceleration time **C00244**	0.000	s	999.999	Deceleration time T_{if} for the influence value • Initialisation: 5 s

9.1.3.1 Control characteristic

The PID algorithm is active in the Lenze setting.

Differential component Kd

The Kd component can be deactivated by setting *nKd* = 0.0. This makes the controller a PI controller (or P controller if the integral action component is switched off as well).

Integral action component

You can switch off the I-component by

- setting *bIOff* to TRUE or
- entering Tn = 6000 s (max. value).

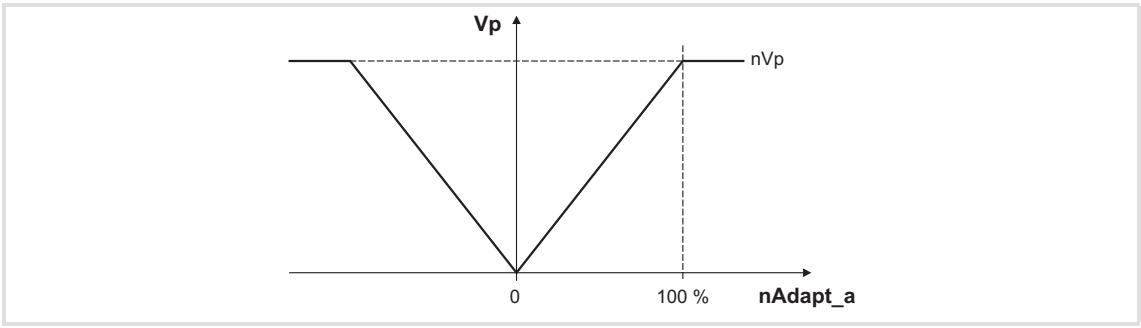
The I-component can be switched on and off online.

Reset time Tn

nTn serves to parameterise the reset time.

Gain Vp

- The Vp gain is defined via *nAdapt_a*:

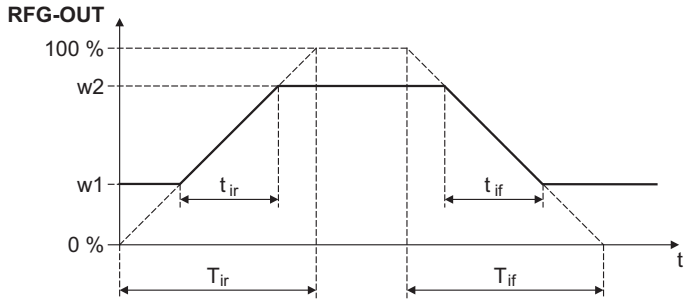


[9.4] Definition of Vp gain via *nAdapt_a*

- The input value is led via a linear characteristic. The slope of the characteristic is defined with *nVp* (upper limit) and the value "0" (lower limit). The value in *nVp* applies if the input value is +100 % (100 % = 16384)

9.1.3.2 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

[9.5] 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.
  - Acceleration time t_{ir} with C00227
  - Deceleration time t_{if} with C00228
- The t_{ir}/t_{if} values are converted into the required Ti times according to the following formula:

$$T_{ir} = t_{ir} \cdot \frac{100\,\%}{w2 - w1} \qquad T_{if} = t_{if} \cdot \frac{100\,\%}{w2 - w1}$$

- The ramp function generator is immediately set to "0" by setting *bInAct* to TRUE.

9.1.3.3 Value range of the output signal

- The output signal and thus the operating range of the PID-component can be limited with the parameters nMaxLimit and nMinLmit (- 199.9%...+ 199.9%)

9.1.3.4 Evaluation of the output signal

- The limitation is followed by an evaluation of the output signal via *nInfluence_a*.
- This evaluation is activated or suppressed along a ramp via the input *bEnableInfluenceRamp*. The ramp times are set with the parameters "Influence acceleration time" and "Influence deceleration time" (C00243 / C00244).

9.1.3.5 Deactivation of the process controller

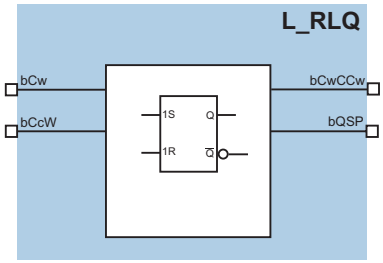
- *bInAct* = TRUE deactivates the process controller. This serves to
  - set the PID output = 0,
  - set the integral action component = 0,
  - set the ramp function generator = 0.

A setpoint executed in mode 1 of the input *nNSet_a*, however, will still be output.

9.1.4 L_RLQ

This FB combines the selection of a direction of rotation with the QSP function with wire break protection.

▶ Available function blocks: 1



Inputs

Identifier/data type		Information/possible settings
bCw	BOOL	Input • TRUE = CW rotation
bCCw	BOOL	Input • TRUE = CCW rotation

Outputs

Identifier/data type		Value/meaning
bQSP	BOOL	Output signal for QSP (quick stop)
bCwCcw	BOOL	Output signal for CW/CCW rotation • TRUE = CCW rotation

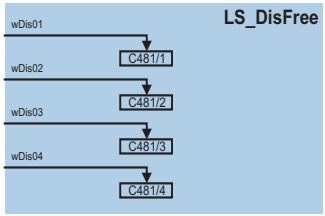
Function

Inputs		Outputs		Info
bCw	**bCcw**	**bCwCcw**	**bQSP**	
True	True	FALSE	True	**Only if both inputs are applied with a TRUE signal at the moment of switch-on, the outputs have these state!**
FALSE	FALSE	FALSE	True	If only *one* of the inputs has the TRUE status, this part of the truth table applies
True	FALSE	FALSE	FALSE	
FALSE	True	True	FALSE	
True	True	*)		*) no change of the original status.

[9.6] Truth table of the FB L_RLQ, 0 = FALSE, 1 = TRUE

9.1.5 LS_DisFree

This FB serves to display any 16-bit process signal on display codes.



Inputs

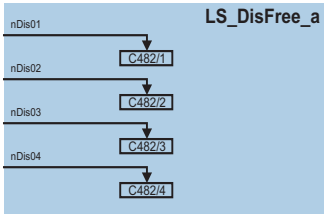
Identifier/data type	Information/possible settings
wDis01 ... wDis04 C620/5 ... 8 WORD	Input

Parameter

Identifier/data type Index	Possible settings			INFO
C481/1 ... 4	0x0000		0xFFFF	General 16-bit signal • Read only

9.1.6 LS_DisFree_a

This FB serves to display four percentage analog process signals on display codes.



Inputs

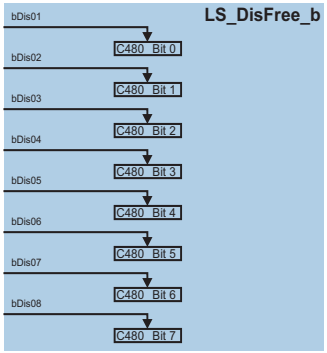
Identifier/data type	Information/possible settings
nDis01_a ... nDis04_a C620/9 ... 12 INT	Input

Parameter

Identifier/data type Index	Possible settings			INFO
C482/1 ... 4	- 199.9 %		+ 199.9 %	Process signal • Read only

9.1.7 LS_DisFree_b

This FB serves to display eight boolean process signals on a bit-standardised display code.



Inputs

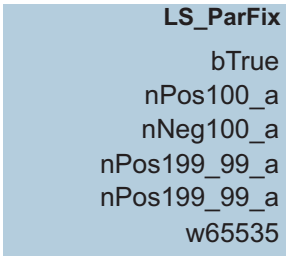
Identifier/data type	Information/possible settings
bDis01 ... nDis08 C621/16 ... 23 BOOL	Input

Parameter

Identifier/data type Index	Possible settings			INFO
C480/1 ... 8	0		1	Process signal • Read only

9.1.8 LS_ParFix

This system block provides the user with fixed values which can be used in the interconnection for parameterisation purposes.

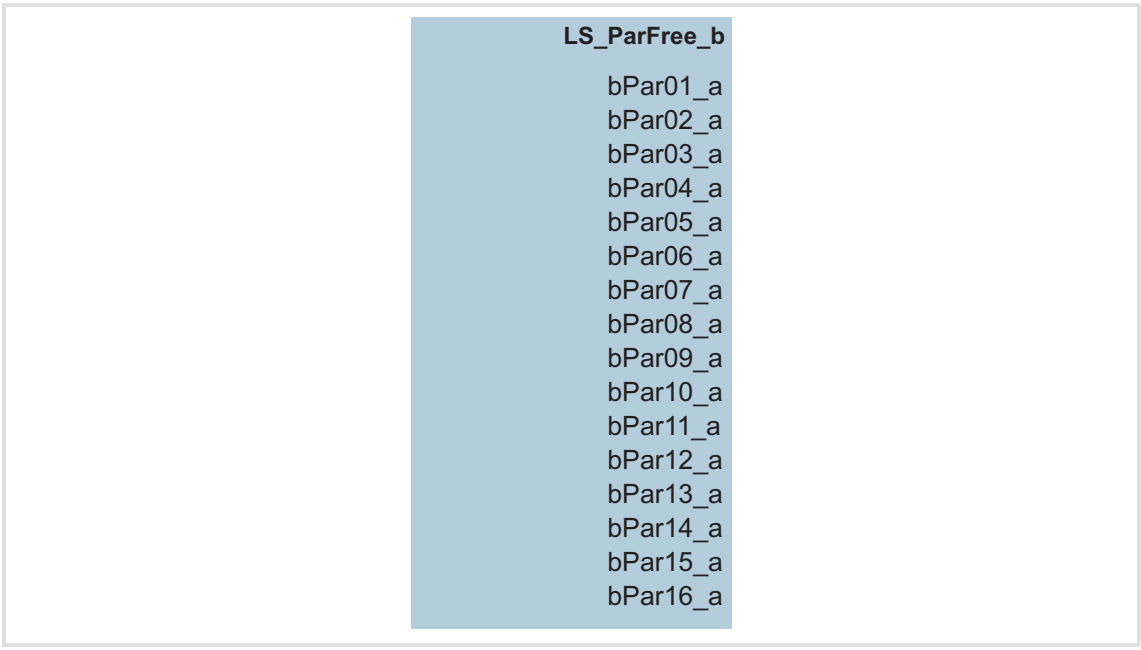


Outputs

The output values are fixed and can therefore not be parameterised.

9.1.9 LS_ParFree_b

This system block provides 16 digital signals which can be parameterised separately by the user.



Outputs

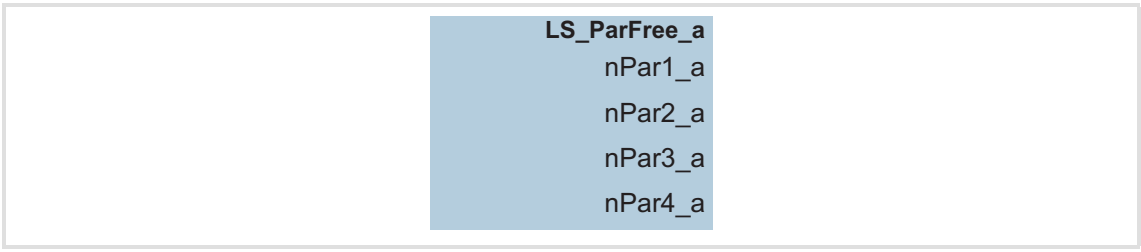
Identifier/data type	Information/possible settings
bPar01 ... bPar16 BOOL	Output

Parameter

Identifier/data type Index	Possible settings	INFO
C470/1 ... 16	0	"FALSE" signal is output
	1	"TRUE" signal is output

9.1.10 LS_ParFree_a

This system block provides 4 analog signal which can be parameterised separately by the user.



Outputs

Identifier/data type	Information/possible settings
nPar1_a ... nPar4_a INT	Output

Parameter

Identifier/data type Index	Possible settings			INFO
C472/1 ... 4	-199.9	%	+199.9	

10 Parameter reference

All parameters for controller parameter setting and monitoring are called "codes".

- The codes are numbered and indicated by the prefix "C" before the code, e.g. "C00002".
- 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. C00118/3".
- The terms "code" and "subcode" generally correspond to the terms "index" and "subindex" and "parameter" and "subparameter".
- In case of the 8400 frequency inverter, the following functions can be carried out via codes:
  - Setting of setpoints, e.g. acceleration time.
  - Display of actual values, e.g. actual motor current.
  - Configuration of signal links, e.g. assignment of the digital input terminals to control inputs of the technology application.
  - Configuration of monitoring functions, e.g. selection of the error response and setting of trigger thresholds.

Parameters which are only available in the controller 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 V03.00.00

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 after the name.

For general information on how to read and change parameters, please see the online documentation for the »Engineer«.

10.1 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 »Engineer» and keypad)
- Data type
- Parameter index in decimal and hexadecimal notation for access via a fieldbus, e.g. system bus (CAN).

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 the representation of which depends on the parameter type:

- Parameters with read-only access
- Parameters with write access

Table footer

The table footer contains the Parameter attributes.

10.1.1 Data type

The following data types are available for parameters:

Data type	Meaning
INTEGER_8	8-bit value with sign
INTEGER_16	16-bit value with sign
INTEGER_32	32-bit value with sign
INTEGER_64	64-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
UNSIGNED_64	64-bit value without sign
FLOATING_POINT	32-bit floating point number
VISIBLE_STRING	String of digits from printable digits
OCTET_STRING	String of digits from any digits
BITFIELD_8	8-bit value, bit-coded
BITFIELD_16	16-bit value, bit-coded
BITFIELD_32	32-bit value, bit-coded

10.1.2 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

Parameter | Name: **Cxxxxx | _____** Data type: _____ Index: _____

Description

Display range (min. value | unit | max. value)

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

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	

10.1.3 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 are either selected by means of a selection list or through direct value entry.
- Values outside the valid setting range are represented in red in the »Engineer«.

10.1.3.1 Parameters with setting range

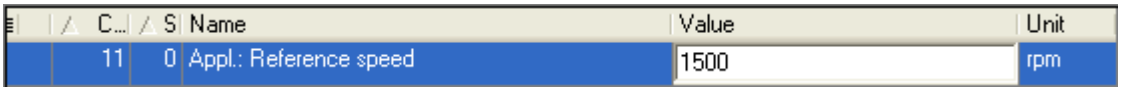
Description structure

Parameter | Name: **Cxxxxx | _____**			Data type: _____ Index: _____
Description			
Setting range (min. value | unit | max. value)			**Lenze setting**

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

Parameter setting in the »Engineer«

In the »Engineer«, parameters are set by entering the desired value into the input field:



10.1.3.2 Parameters with selection list

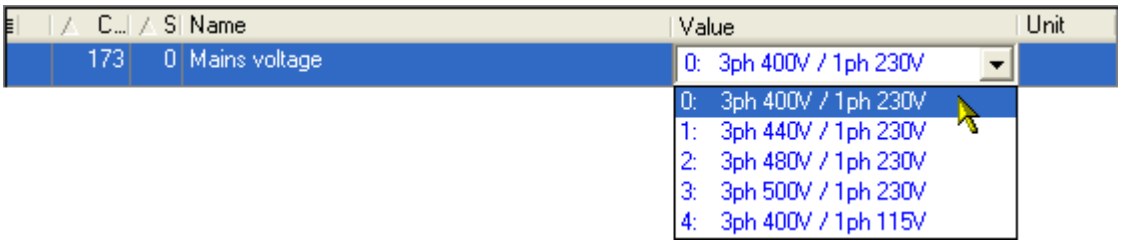
Description structure

Parameter | Name: **Cxxxxx | _____**		Data type: _____ Index: _____
Description		
Selection list (Lenze setting printed in bold)		
1		
2		
3		

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

Parameter setting in the »Engineer«

In the »Engineer«, a list field is used for parameter setting:



10.1.3.3 Parameters with bit-coded setting

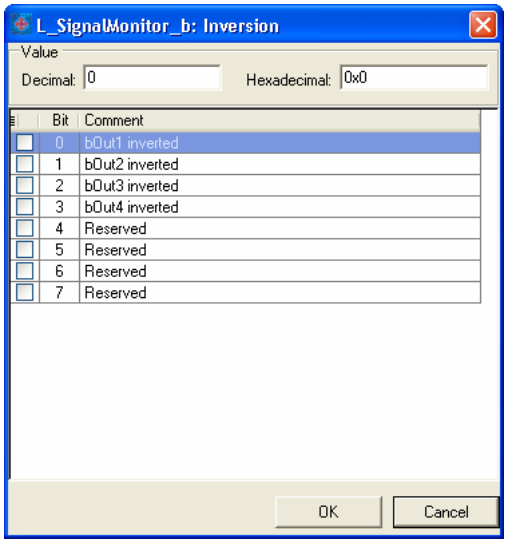
Description structure

Parameter | Name: **Cxxxxx | _____**		Data type: _____ Index: _____
Description		
Value is bit-coded:		
Bit 0		
...		
Bit 31		

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

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:



. 10.1.3.4 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			
Cxxxxx/4			
☑ 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. They are parameterised 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	%
	39	4	Fixed setpoint 4	0.00	%

10.1.4 Parameter attributes

The table footers contain the parameter attributes:

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

Attribute	Meaning	
☑ Read access	Read access to parameter possible.	
☑ Write access	Write access to parameter possible. • Please also observe the following attributes:	
	☑ CINH	Parameter value can only be changed when the controller is inhibited.
	☑ PLC STOP	Parameter value can only be changed when the application is stopped.
☑ No transfer	Parameter is **not** transferred to controller when the command Download parameter set is executed.	
☑ COM	Communication-relevant parameter • this parameter is relevant for parameter data transfer via the system bus (CAN)	
☑ MOT	Parameter of the motor control	

. 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 increments/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" read via a bus system of the parameter C00028/1 (AIN1: input voltage) must be divided by the corresponding scaling factor "100" to obtain the real display value "6.54 V".

$$\frac{\text{Read value (via bus system)}}{\text{Scaling factor}} = \text{Indicated value (Engineer)}$$

[10-1] Conversion formula for read access via bus system

Example 2: In order to set the parameter C00012 (acceleration time - main setpoint) to the value "123.45 %" via a bus system, the integer value "12345" must be transferred, i.e. the value to be set must be multiplied by the corresponding scaling factor "100".

$$\text{Value to be written (via bus system)} = \text{Value to be set} \cdot \text{Scaling factor}$$

[10-2] Conversion formula for write access via bus system

10.2 Parameter list

This chapter describes all parameters of the operating system in numerically ascending order.

Note!

The parameter descriptions are based on the software version V03.00.00.

C00002

Parameter | Name:
C00002 | Controller commands

Data type: UNSIGNED_8
Index: $24573_d = 5FFD_h$

Note:
Before switching off the supply voltage after executing a device command, check the successful execution of the device command by means of the status display in C00003!

▸ Drive control (DCTRL): Device commands

Selection list	
0	Off / ready
1	On / start
2	Working
4	Action cancelled
5	No access
6	No access controller inhibit

Subcodes	Lenze setting	Info
C00002/1	0: Off / ready	Load Lenze setting • All parameters are reset to the Lenze setting. • Only possible when controller is inhibited.
C00002/2	0: Off / ready	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
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 in the memory module with mains failure protection.
C00002/12	0: Off / ready	Reserved
C00002/13	0: Off / ready	Reserved
C00002/14	0: Off / ready	Reserved
C00002/15	0: Off / ready	Reserved
C00002/16	1: On / start	Enable controller "1" ≡ Enable controller "0" ≡ Inhibit controller

Parameter | Name: **C00002 | Controller commands**		Data type: UNSIGNED_8 Index: $24573_d = 5FFD_h$
C00002/17	0: Off / ready	Activate quick stop "1" ≡ Activate quick stop "0" ≡ Deactivate quick stop
C00002/18	0: Off / ready	Reserved
C00002/19	0: Off / ready	Reset error • After the reset of the current error, other errors may be pending which must be reset as well. • Details on 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 controller will be deleted. • Information about the error history is saved in the logbook.
C00002/22	0: Off / ready	Reserved
C00002/23	0: Off / ready	Identify motor parameters • This device command serves to carry out an automatic identification of the motor parameters. • The device command is only carried out if the controller is in the Switched On status • In order to identify the motor parameters, the controller must be enabled after this device command.
C00002/24	0: Off / ready	Reserved
C00002/25	0: Off / ready	Reserved
C00002/26	0: Off / ready	Reserved
C00002/27	0: Off / ready	Reserved
C00002/28	0: Off / ready	Reserved
C00002/29	0: Off / ready	Reserved
C00002/30	0: Off / ready	Reserved
C00002/31	0: Off / ready	Reserved
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 executing a device command, check the successful execution of the device command by means of this status display!

▸ Drive control (DCTRL): Device commands

Selection list (read only)		Info
0	Successful	Device command has been executed successfully.
1	Command unknown	Device command is implausible or not known in the system.
2	No access	Access for required device command is not approved.
3	Time-out	Processing of the device command could not be executed within the defined time (time-out).

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

C00006

Parameter | Name:
C00006 | Select motor control

Data type: UNSIGNED_8
Index: $24569_d = 5FF9_h$

Selection of motor control type (operating mode)

▸ Motor control (MCTRL): Selection of operating mode

Selection list (Lenze setting printed in bold)		Info
4	SLVC: Vector control	This control type is used for sensorless vector control of an asynchronous motor. • This control mode needs the motor parameters to be set as exactly as possible!
6	**VFCplus: V/f linear**	This control type is used for open-loop speed control of an asynchronous motor via a linear V/f characteristic and represents the most simple control type. • In order to set the V/f characteristic, the rated frequency (C00089) and rated voltage (C00090) of the motor must be entered only.
8	VFCplus: V/f quadr	This control type is used for open-loop speed control of an asynchronous motor via a square-law V/f characteristic. • In order to set the V/f characteristic, the rated frequency (C00089) and rated voltage (C00090) of the motor must be entered only.

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

C00007

Parameter | Name:
C00007 | Select control mode

Data type: UNSIGNED_16
Index: $24568_d = 5FF8_h$

Configuration of the digital inputs

Selection list (Lenze setting printed in bold)		Info
0	Wiring has changed	This display appears if the defined configuration has been reparameterised via the connection parameters.
10	**Terminal 0**	The technology application is controlled using the digital input terminals of the controller. • DI1 = JOG 1/3 • DI2 = JOG 2/3 • DI3 = DCB • DI4 = R/L
12	Terminal 2	The technology application is controlled using the digital input terminals of the controller. • DI1 = JOG 1/3 • DI2 = JOG 2/3 • DI3 = QSP • DI4 = R/L
14	Terminal 11	The technology application is controlled using the digital input terminals of the controller. • DI1 = R/L • DI2 = DCB • DI3 = MPotUp • DI4 = MPotDown
16	Terminal 16	The technology application is controlled using the digital input terminals of the controller. • DI1 = JOG 1/3 • DI2 = JOG 2/3 • DI3 = R/QSP • DI4 = L/QSP
20	Keypad	The technology application is controlled via the keypad: → C00728: Setpoint selections → C00002: Device commands → C00003: Status of last device command ▲ Increase speed ▼ Reduce speed
21	PC	The technology application is controlled using the "Free parameters" of the controller (PC control).

☑ 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: $24565_d = 5FF5_h$

From version 03.00.00

Setting range (min. value | unit | max. value)		
0.0	%	100.0

Subcodes	Lenze setting	Info
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 of the reference speed
- In the controller, all speed-related signals are processed to one reference variable in percent.
- Set a reference speed here that corresponds to 100 %.

Note:
This is not a maximum limitation!
All values in percent in the controller may be in the range of 0 ... 199.99 %.

Setting range (min. value | unit | max. value)			Lenze setting
50	rpm	9999	**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: $24563_d = 5FF3_h$

FB L_NSet_1: 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: $24562_d = 5FF2_h$

FB L_NSet_1: 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 VFCplus operating mode
- 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 within a small speed or frequency range for the VFCplus operating mode
- 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 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 list (Lenze setting printed in bold)	
1	4 kHz var./drive-optimised
2	**8 kHz var./drive-optimised**
3	16 kHz var./drive-optimised
5	2 kHz constant/drive-optimised
6	4 kHz constant/drive-optimised
7	8 kHz constant/drive-optimised
8	16 kHz constant/drive-optimised

☑ 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 the automatic DC injection brake
- 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.

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 VFCplus and SLVC operating modes
- An increase of the slip compensation causes a greater frequency and voltage increase when the machine is loaded.
- 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 operating 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 operating 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.
- When the value falls below this threshold, the *bNactCompare* output of the SB LS_DriveInterface switches 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 input

▸ I/O terminals

Setting range (min. value | unit | max. value)		
-199.9	%	199.9

Subcodes	Lenze setting	Info
C00026/1	0.0 %	AIN1: Offset

☑ 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 input

▸ I/O terminals

Setting range (min. value | unit | max. value)		
-199.9	%	199.9

Subcodes	Lenze setting	Info
C00027/1	100.0 %	AIN1: Gain

☑ 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 input

▸ I/O terminals

Display range (min. value | unit | max. value)		
-10.0	V	10.0

Subcodes	Info
C00028/1	AIN1: Input voltage

☑ 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.

▸ I/O terminals

Display range (min. value | unit | max. value)		
0.0	mA	20.0

Subcodes	Info
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

▸ I/O terminals

Display range (min. value | unit | max. value)		
-199.9	%	199.9

Subcodes	Info
C00033/1	AIN1: Output value

☑ 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

▸ I/O terminals

Selection list		Info
0	0...+10 V	Input signal is the voltage signal 0 V ... +10 V • 0 V ... +10 V ≡ 0 % ... +100 %
1	0...+5V	With external load resistor (250 Ohms): Input signal is the current signal 0 mA ... 20 mA • 0 mA ... 20 mA ≡ 0 % ... +100 %
2	1...+5V (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 .

Subcodes	Lenze setting	Info
C00034/1	0: 0...+10 V	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: $24539_d = 5FDB_h$

Current value in [%] for DC-injection braking
- 100 % ≡ Imax in motor mode (C00022)

Setting range (min. value | unit | max. value)			Lenze setting
0.0	%	150.0	**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: $24536_d = 5FD8_h$

FB L_NSet_1: Fixed speed setpoints (Jog values) for the setpoint generator

Setting range (min. value | unit | max. value)		
-199.9	%	199.9

Subcodes	Lenze setting	Info
C00039/1	40.0 %	Fixed setpoint 1
C00039/2	60.0 %	Fixed setpoint 2
C00039/3	80.0 %	Fixed 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)		
-9999	rpm	9999

☑ 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 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)		
-9999	rpm	9999

☑ 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 motor torque

Display range (min. value | unit | max. value)		
-99.00	Nm	99.00

Subcodes	Info
C00056/1	Torque setpoint • Only for SLVC operating mode.
C00056/2	Torque actual value • Estimated actual torque for all operating 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)		
0.0	Nm	999.9

☑ 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	Info
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 via the last 15 seconds (only for loads >160 %).
C00064/3	Device utilisation (Ixt) 3min • Permanent utilisation via 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 being detected sensorless via a motor model
- If the value displayed here exceeds the threshold set in C00120, the fault message "OC6: Device overload (Ixt)" is output and the fault response set in C00606 is executed (default setting: "Warning").

Display range (min. value | unit | max. value)		
0	%	200

☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☑ No transfer ☐ COM ☐ MOT Scaling factor: 100

C00073

Parameter | Name:
C00073 | Vp Imax controller

Data type: UNSIGNED_16
Index: $24502_d = 5FB6_h$

Gain 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 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

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 field-oriented operating mode (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

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 field-oriented operating mode (SLVC).

Setting range (min. value | unit | max. value)			Lenze setting
50	rpm	9999	**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 field-oriented operating mode (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
0.40		1.00	**0.85**

☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☑ MOT Scaling factor: 100

C00092

Parameter | Name:
C00092 | Motor magnetizing 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 ID

Data type: UNSIGNED_16
Index: $24482_d = 5FA2_h$

Display of the identification of the detected power section of the frequency 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: $24481_d = 5FA1_h$

The controller provides the opportunity to protect the menu level from unauthorised access by assigning a password.

▸ Password protection

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: $24480_d = 5FA0_h$

From version 03.00.00

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 displayed here is calculated from different parameters, e.g. the maximum current set in C00022.

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 | Rated device 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

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	Info
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

C00105

Parameter | Name:
C00105 | Deceleration time - quick stop

Data type: UNSIGNED_32
Index: $24470_d = 5F96_h$

The set deceleration time determines the ramp slope at quick stop
- If the output frequency falls below the threshold set in C00019, the DCB DC injection brake is activated.

Note:
The S-ramp time set in C00182 is also effective at quick stop!
In order to reach the required deceleration time for quick stop, set accordingly less time 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.

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
- In order to not overload the motor thermally, a time for automatic switch-off of the DC injection brake can be set here.

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: $24461_d = 5F8D_h$

Polarity of the digital inputs
- Every digital input of the device can be inverted with regard to polarity via this bit field.

▸ I/O terminals

Setting range (min. hex value | max. hex value)			Lenze setting
0x0000		0xFFFF	**0x8000** (decimal: 32768)

Value is bit-coded: (☑ = bit set)		Info
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 ☐	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 ☑	RFR inverted	Inversion of digital input CInh (controller inhibit)

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

C00118

Parameter | Name:
C00118 | DOx inversion

Data type: UNSIGNED_8
Index: $24457_d = 5F89_h$

Polarity of the digital outputs
- Every digital output of the device can be inverted with regard to polarity via this bit field.

I/O terminals

Setting range (min. hex value | max. hex value)			Lenze setting
0x00		0xFF	**0x00** (decimal: 0)

Value is bit-coded: (☑ = bit set)		Info
Bit 0 ☐	Relay inverted	Relay inversion
Bit 1 ☐	DO1 inverted	Inversion of digital output 1
Bit 2 ☐	Reserved	
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

C00120

Parameter | Name:
C00120 | Motor overload threshold (I²xt)

Data type: INTEGER_16
Index: $24455_d = 5F87_h$

Operating threshold for the error message "OC6: Motor overload (I²xt)"
- The response for reaching the threshold 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

C00123

Parameter | Name:
C00123 | Device utilisat. threshold (Ixt)

Data type: INTEGER_16
Index: $24452_d = 5F84_h$

Operating threshold for the error message "OC5: Device overload (Ixt)"
- 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	%	100	**100 %**

☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 100

C00134

Parameter | Name:
C00134 | Ramp smoothing main setpoint

Data type: UNSIGNED_8
Index: $24441_d = 5F79_h$

Configuration of the ramp rounding for the main setpoint

Selection list (Lenze setting printed in bold)		Info
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

C00137

Parameter | Name:
C00137 | Device state

Data type: UNSIGNED_16
Index: $24438_d = 5F76_h$

Display of the current device state

Selection list (read only)	
0	reserved
1	Init
2	MotorIdent
3	ReadySwitchON
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: $24434_d = 5F72_h$

From version 03.00.00

Selection list	
0	inactive
1	active

Subcodes	Lenze setting	Info
C00141/1	0: inactive	always save parameter

☑ 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: $24433_d = 5F71_h$

Setting of the "Auto-start" function
- When inhibit is activated, the motor can only start after the device state has changed.

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 power-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

C00144

Parameter | Name:
C00144 | Switching freq. reduct. (temp.)

Data type: UNSIGNED_8
Index: $24431_d = 5F6F_h$

Activation of the automatic switching frequency reduction at too high temperature

Selection list (Lenze setting printed in bold)		Info
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 range (min. hex value | max. hex value)			
0x0000		0xFFFF	
Value is bit-coded:			**Info**
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		Fault
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 range (min. hex value | max. hex value)			
0x0000		0xFFFF	
Value is bit-coded:			**Info**
Bit 0	Fail		Fail
Bit 1	M_max		Maximum torque
Bit 2	I_max		Maximum current
Bit 3	PowerDisabled		Power switched off
Bit 4	Ready		Ready
Bit 5	ControllerInhibit		Controller is inhibited
Bit 6	Trouble		Fault
Bit 7	InitState		InitState
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 is active
Bit 15	MotorIdent		Motor parameter identification 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 controller inhibit		
Display range (min. hex value | max. hex value)		
0x0000		0xFFFF
Value is bit-coded:		
Bit 0	Terminal controller enable	
Bit 1	Reserved	
Bit 2	Reserved	
Bit 3	Reserved	
Bit 4	Application	
Bit 5	Controller command	
Bit 6	Error response	
Bit 7	Reserved	
Bit 8	Reserved	
Bit 9	Reserved	
Bit 10	AutoStartLock	
Bit 11	Motor parameter identification	
Bit 12	Reserved	
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 quick stop

Display range (min. hex value | max. hex value)		
0x0000		0xFFFF

Value is bit-coded:	
Bit 0	Terminal
Bit 1	Reserved
Bit 2	Reserved
Bit 3	Reserved
Bit 4	Application
Bit 5	Controller command
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

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

C00165

Parameter | Name:
C00165 | Error information

Data type: VISIBLE_STRING
Index: $24410_d = 5F5A_h$

Display of the error numbers divided into sectors in the case of an error

Subcodes	Info
C00165/1	Current error

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

C00166

Parameter | Name:
C00166 | Error information text

Data type: VISIBLE_STRING
Index: $24409_d = 5F59_h$

Display of details on the currently pending error

Subcodes	Info
C00166/1	Resp. - current error • Response of the currently pending error
C00166/2	Subj. - current error • Subject area of the currently pending error
C00166/3	Mess. - current error • Textual message of the currently pending error

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

C00167

Parameter | Name:
C00167 | Logbook data

Data type: OCTET_STRING
Index: $24408_d = 5F58_h$

This code is used internally by the controller and must not be overwritten by the user!

C00168

Parameter | Name: **C00168 | Error number**			Data type: UNSIGNED_32 Index: $24407_d = 5F57_h$
Display of the internal error number for the 8 errors occurred last			
Display range (min. value | unit | max. value)			
0		4294967295	

Subcodes	Info
C00168/1	Error number - history 1
C00168/2	Error number - history 2
C00168/3	Error number - history 3
C00168/4	Error number - history 4
C00168/5	Error number - history 5
C00168/6	Error number - history 6
C00168/7	Error number - history 7
C00168/8	Error number - history 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 of the time of error for the 8 errors occurred last			
Display range (min. value | unit | max. value)			
0		4294967295	

Subcodes	Info
C00169/1	Error time- history 1
C00169/2	Error time- history 2
C00169/3	Error time- history 3
C00169/4	Error time- history 4
C00169/5	Error time- history 5
C00169/6	Error time- history 6
C00169/7	Error time- history 7
C00169/8	Error time- history 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 of the error counter for the 8 errors occurred last

Display range (min. value | unit | max. value)		
0		255

Subcodes	Info
C00170/1	Error counter - history 1
C00170/2	Error counter - history 2
C00170/3	Error counter - history 3
C00170/4	Error counter - history 4
C00170/5	Error counter - history 5
C00170/6	Error counter - history 6
C00170/7	Error counter - history 7
C00170/8	Error counter - history 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 internally by the controller and must not be overwritten by the user!

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)		Info
0	**3ph 400V / 1ph 230V**	3-phase 400 V or 1-phase 230 V
1	3ph 440V / 1ph 230V	3-phase 440 V or 1-phase 230 V
2	3ph 480V / 1ph 230V	3-phase 480 V or 1-phase 230 V
3	3ph 500V / 1ph 230V	3-phase 500 V or 1-phase 230 V

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

C00174

Parameter | Name:
C00174 | Reduced brake chopper threshold

Data type: UNSIGNED_8
Index: $24401_d = 5F51_h$

The threshold from which on the brake chopper is controlled is reduced by the voltage value set here.

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

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	Info
C00177 /1	Number of mains switching cycles
C00177 /2	Number of the 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 the operating hours in "seconds" unit

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" unit

Display range (min. value | unit | max. value)		
0	s	2147483647

☑ 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: $24393_d = 5F49_h$

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

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

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

C00203

Parameter | Name:
C00203 | Product type code

Data type: VISIBLE_STRING
Index: $24372_d = 5F34_h$

From version 03.00.00
Display of the single device component types

Subcodes	Info
C00203/1	Reserved
C00203/2	Reserved
C00203/3	Reserved
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

C00222

Parameter | Name:
C00222 | L_PCTRL_1: Vp

Data type: INTEGER_16
Index: $24353_d = 5F21_h$

From version 03.00.00
FB L_PCTRL_1: 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: $24352_d = 5F20_h$

From version 03.00.00
FB L_PCTRL_1: Reset time Tr 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: $24351_d = 5F1F_h$

From version 03.00.00
FB L_PCTRL_1: 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: $24350_d = 5F1E_h$

From version 03.00.00
FB L_PCTRL_1: 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: $24349_d = 5F1D_h$

From version 03.00.00
FB L_PCTRL_1: 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: $24348_d = 5F1C_h$

From version 03.00.00
FB L_PCTRL_1: 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: $24347_d = 5F1B_h$

From version 03.00.00
FB L_PCTRL_1: 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: $24344_d = 5F18_h$

From version 03.00.00
FB L_PCTRL_1: Operating range for the PID process controller

Setting range (min. value | unit | max. value)		
0.0	%	199.9

Subcodes	Lenze setting	Info
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

C00234

Parameter | Name:
C00234 | Oscillation damping influence

Data type: UNSIGNED_16
Index: $24341_d = 5F15_h$

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 | Filter time - oscill. damping

Data type: UNSIGNED_8
Index: $24340_d = 5F14_h$

This code is used internally by the controller and must not be overwritten by the user!

C00236

Parameter | Name:
C00236 | Oscill. damping - field weakening

Data type: UNSIGNED_8
Index: $24339_d = 5F13_h$

This code is used internally by the controller and must not be overwritten by the user!

C00242

Parameter | Name:
C00242 | L_PCTRL_1: operating mode

Data type: UNSIGNED_8
Index: $24333_d = 5F0D_h$

From version 03.00.00

FB L_PCTRL_1: 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)		Info
0	**Off**	The input setpoint *nNSet_a* is output without any changes at the *nOut_a* output.
1	Additive + feedforward control	*nNSet_a* and *nAct_a* are used as PID input values. The input setpoint *nNSet_a* is added to the value output by the PID element.
2	PID as setpoint generator	*nSet_a* and *nAct_a* are used as PID input values. The *nNSet_a* input is not considered.
3	PID setpoint from L_NSet_1	*nNSet_a* and *nAct_a* are used as PID input values. The *nSet_a* is not considered.

☑ 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: $24332_d = 5F0C_h$

From version 03.00.00

FB L_PCTRL_1: 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: $24331_d = 5F0B_h$

From version 03.00.00

FB L_PCTRL_1: 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: $24330_d = 5F0A_h$

From version 03.00.00

FB L_PCTRL_1: 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

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

▸ I/O terminals

Display range (min. hex value | max. hex value)			
0x0000		0xFFFF	
Value is bit-coded:			**Info**
Bit 0	DI1		Bit set = HIGH level
Bit 1	DI2		
Bit 2	DI3		
Bit 3	DI4		
Bit 4	Reserve		
Bit 5	Reserve		
Bit 6	Reserve		
Bit 7	Reserve		
Bit 8	Reserve		
Bit 9	Reserve		
Bit 10	Reserve		
Bit 11	Reserve		
Bit 12	Reserve		
Bit 13	Reserve		
Bit 14	Reserve		
Bit 15	CINH		

Subcodes	**Info**
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

▸ I/O terminals

Display range (min. hex value | max. hex value)		
0x0000		0xFFFF

Value is bit-coded:		Info
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	Info
C00444/1	DOx: Input level
C00444/2	DOx: Terminal level

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

C00470

Parameter | Name:
C00470 | LS_ParFree_b

Data type: UNSIGNED_8
Index: $24105_d = 5E29_h$

SB LS_ParFree_b: Setting of the signal level to be output

Selection list	
0	False
1	True

Subcodes	Lenze setting	Info
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

C00472

Parameter | Name: **C00472 | LS_ParFree_a**			Data type: INTEGER_16 Index: $24103_d = 5E27_h$
SB LS_ParFree_a: Setting of the analog signals to be output			
Setting range (min. value | unit | max. value)			
-199.9	%	199.9	
Subcodes	**Lenze setting**		**Info**
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: $24095_d = 5E1F_h$
SB LS_DisFree_b: Display of the input values			
Display range (min. hex value | max. hex value)			
0x00		0xFF	
Value is bit-coded:			**Info**
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: $24094_d = 5E1E_h$
SB LS_DisFree: Display of the input values			
Display range (min. hex value | max. hex value)			
0x0000		0xFFFF	
Value is bit-coded:			
Bit 0	Bit0		
...	...		
Bit 15	Bit15		
Subcodes			**Info**
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: $24093_d = 5E1D_h$
SB LS_DisFree_a: Display of the input values		
Display range (min. value | unit | max. value)		
-199.9	%	199.9

Subcodes	Info
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

C00516

Parameter | Name: **C00516 | Checksums**		Data type: UNSIGNED_32 Index: $24059_d = 5DFB_h$
Display range (min. value | unit | max. value)		
0		255

Subcodes	Info
C00516/1	Checksum of the interconnection

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

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.

Setting range (min. value | unit | max. value)		
0		994

Subcodes	Lenze setting	Info
C00517/1	51	C00051: Display of actual speed value
C00517/2	53	C00053: Display of DC-bus voltage
C00517/3	54	C00054: Display of motor current
C00517/4	61	C00061: Display of heatsink temperature
C00517/5	137	C00137: Display of device state
C00517/6	0	
C00517/7	0	
C00517/8	11	C00011: Reference speed
C00517/9	39	C00039: Fixed setpoints 1 ... 3
C00517/10	0	
C00517/11	12	C00012: Accel. time - main setpoint
C00517/12	13	C00013: Decel. time - main setpoint
C00517/13	15	C00015: V/f base frequency
C00517/14	16	C00016: Vmin boost
C00517/15	22	C00022: Imax in motor mode
C00517/16	120	C00120: Motor overload threshold (I^2xt)
C00517/17	87	C00087: Rated motor speed
C00517/18	99	C00099: Display of firmware version
C00517/19	0	
C00517/20	0	

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

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

C00574

Parameter | Name:
C00574 | Resp. to brake resist. overtemp.

Data type: UNSIGNED_8
Index: $24001_d = 5DC1_h$

Response to overtemperature of the brake resistor

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. LS_SetError_x

Data type: UNSIGNED_8
Index: $23994_d = 5DBA_h$

SB LS_SetError_1: 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	Info
C00581/1	1: Fault	Resp. LS_SetError_1 bSetError1
C00581/2	1: Fault	Resp. LS_SetError_1 bSetError2

☑ 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 of the analog input

Selection list	
0	No Reaction
1	Fault
2	Trouble
4	WarningLocked

Subcodes	Lenze setting	Info
C00598/1	1: Fault	Response to open circuit at AIN1 when being 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 overvoltage

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	Info
C00600/1	2: Trouble	Resp. to undervoltage in the DC bus

☑ 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: $23974_d = 5DA6_h$

Delay times for error responses

Setting range (min. value | unit | max. value)		
0.00	s	65.00

Subcodes	Lenze setting	Info
C00601/1	2.00 s	Delay time for error activation "DC-bus overvoltage" • In case of DC-bus overvoltage, an error is only transmitted after this 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 if the adjustable motor overload threshold (C00120) is reached.
- The current thermal motor load is displayed in C00066.

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 for connection with the 16-bit input signals.
- The selection list contains all 16-bit output signals which can be assigned to the 16-bit inputs mapped by the subcodes.

Selection list		Info
0	Not connected	
1	C_nPos100_a(100.0%)	
2	C_nNeg100_a(-100.0%)	
3	C_nPos199_9_a(199.9%)	
4	C_nNeg199_9_a(-199.9%)	
5	C_w65535	
6	C_wDriveCtrl	
10	AIn1_Out	
20	nPar1_a	
21	nPar2_a	
22	nPar3_a	
23	nPar4_a	
24	LS_Keypad_nTorqueMotLim_a	
25	LS_Keypad_nTorqueGenLim_a	
26	LS_Keypad_nMainSetValue_a	
50	LA_NCTRL_nMotorFreqAct_a	
51	LA_NCTRL_nOutputSpeedCtrl_a	
52	LA_NCtrl_nMotorSpeedAct_a	
53	LA_NCtrl_nMotor Voltage_a	
54	LA_NCtrl_nDCVoltage_a	
55	LA_NCtrl_nMotorCurrent_a	

Parameter | Name: C00620 | 16-bit system connection		Data type: UNSIGNED_16 Index: $23955_d = 5D93_h$
56	LA_NCtrl_nMotorTorqueAct_a	
57	LA_NCTRL_nHeatsinkTemperature_a	
70	LA_NCTRL_wDeviceStateWord	
71	LA_NCTRL_wDeviceAuxStateWord	
72	LA_NCTRL_wDetermFailNoLow	
73	LA_NCTRL_wDetermFailNoHigh	

Subcodes	Lenze setting	Info
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

☑ 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 for connection with 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		Info
0	Not connected	
1	C_bTrue	
11	DigIn_bIn1	
12	DigIn_bIn2	
13	DigIn_bIn3	
14	DigIn_bIn4	
15	DigIn_CInh	
20	bPar1	
21	bPar2	
22	bPar3	
23	bPar4	
24	bPar5	
25	bPar6	
26	bPar7	
27	bPar8	
28	bPar9	

Parameter | Name: **C00621 | Bool system connection**		Data type: UNSIGNED_16 Index: $23954_d = 5D92_h$
29	bPar10	
30	bPar11	
31	bPar12	
32	bPar13	
33	bPar14	
34	bPar15	
35	bPar16	
36	LS_Keypad_bSetQuickstop	
37	LS_Keypad_bSetDCBrake	
38	LS_Keypad_bSetSpeedCcw	
39	LS_Keypad_bJogSpeed1	
40	LS_Keypad_bJogSpeed2	
50	LA_nCtrl_bDriveFail	
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	
65	LA_nCtrl_bImaxActive	
66	LA_nCtrl_bHeatSinkWarning	
67	LA_nCtrl_bOVDetected	
68	LA_nCtrl_bDCBrakeOn	
69	LA_NCtrl_bFlyingSyncActive	
70	Ain_bCurrentErrorIn1	

Subcodes	Lenze setting	Info
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	64: LA_nCtrl_bNActCompare	USER LED
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

Parameter | Name: **C00621 | Bool system connection**		Data type: UNSIGNED_16 Index: $23954_d = 5D92_h$
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

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

C00700

Parameter | Name: **C00700 | LA_NCtrl: analog connection list**	Data type: UNSIGNED_16 Index: $23875_d = 5D43_h$

Connection parameters for "Actuating drive - speed" application: 16-bit inputs
- Selection of the 16-bit output signals for connection with the 16-bit input signals
- The selection list contains all 16-bit output signals which can be assigned to the 16-bit inputs mapped by the subcodes.

Selection list		Info
0	Not connected	
1	C_nPos100_a(100.0%)	
2	C_nNeg100_a(-100.0%)	
3	C_nPos199_9_a(199.9%)	
4	C_nNeg199_9_a(-199.9%)	
5	C_w65535	
6	C_wDriveCtrl	
10	AIn1_Out	
20	nPar1_a	
21	nPar2_a	
22	nPar3_a	
23	nPar4_a	
24	LS_Keypad_nTorqueMotLim_a	
25	LS_Keypad_nTorqueGenLim_a	
26	LS_Keypad_nMainSetValue_a	
50	LA_NCTRL_nMotorFreqAct_a	
51	LA_NCTRL_nOutputSpeedCtrl_a	
52	LA_NCtrl_nMotorSpeedAct_a	
53	LA_NCtrl_nMotor Voltage_a	
54	LA_NCtrl_nDCVoltage_a	
55	LA_NCtrl_nMotorCurrent_a	
56	LA_NCtrl_nMotorTorqueAct_a	
57	LA_NCTRL_nHeatsinkTemperature_a	
70	LA_NCTRL_wDeviceStateWord	
71	LA_NCTRL_wDeviceAuxStateWord	
72	LA_NCTRL_wDetermFailNoLow	

Parameter | Name:
C00700 | LA_NCtrl: analog connection list

Data type: UNSIGNED_16
Index: $23875_d = 5D43_h$

73	LA_NCTRL_wDetermFailNoHigh	

Subcodes	Lenze setting	Info
C00700/1	10: AIn1_Out	LA_NCtrl: nMainSetValue_a
C00700/2	22: nPar3_a	LA_NCtrl: nTorqueMotLim_a
C00700/3	22: nPar3_a	LA_NCtrl: nTorqueGenLim_a
C00700/4	0: Not connected	Reserved
C00700/5	0: Not connected	Reserved
C00700/6	1: C_nPos100_a(100.0%)	LA_NCtrl: nPIDVpAdapt_a
C00700/7	0: Not connected	LA_NCtrl: nPIDActValue_a
C00700/8	1: C_nPos100_a(100.0%)	LA_NCtrl: nPIDInfluence_a
C00700/9	0: Not connected	LA_NCtrl: nPIDsetValue_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: $23874_d = 5D42_h$

Connection parameters for "Actuating drive - speed" application: Binary inputs
- Selection of the binary output signals for connection with 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		Info
0	Not connected	
1	C_bTrue	
11	DigIn_bIn1	
12	DigIn_bIn2	
13	DigIn_bIn3	
14	DigIn_bIn4	
15	DigIn_CInh	
20	bPar1	
21	bPar2	
22	bPar3	
23	bPar4	
24	bPar5	
25	bPar6	
26	bPar7	
27	bPar8	
28	bPar9	
29	bPar10	
30	bPar11	
31	bPar12	
32	bPar13	
33	bPar14	
34	bPar15	
35	bPar16	
36	LS_Keypad_bSetQuickstop	
37	LS_Keypad_bSetDCBrake	

Parameter | Name: **C00701 | LA_NCtrl: digital connection list**		Data type: UNSIGNED_16 Index: $23874_d = 5D42_h$
38	LS_Keypad_bSetSpeedCcw	
39	LS_Keypad_bJogSpeed1	
40	LS_Keypad_bJogSpeed2	
50	LA_nCtrl_bDriveFail	
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	
65	LA_nCtrl_bImaxActive	
66	LA_nCtrl_bHeatSinkWarning	
67	LA_nCtrl_bOVDetected	
68	LA_nCtrl_bDCBrakeOn	
69	LA_NCtrl_bFlyingSyncActive	
70	Ain_bCurrentErrorIn1	

Subcodes	Lenze setting	Info
C00701/1	0: Not connected	LA_NCtrl: bCInh
C00701/2	15: DigIn_CInh	LA_NCtrl: bFailReset
C00701/3	0: Not connected	LA_NCtrl: bSetQuickstop
C00701/4	13: DigIn_bIn3	LA_NCtrl: bSetDCBrake
C00701/5	14: DigIn_bIn4	LA_NCtrl: bSetSpeedCcw
C00701/6	11: DigIn_bIn1	LA_NCtrl: bJogSpeed1
C00701/7	12: DigIn_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: C_bTrue	LA_NCtrl: bPIDInfluenceRamp
C00701/16	0: Not connected	LA_NCtrl: bPIDIOff
C00701/17	1: C_bTrue	LA_NCtrl: bRLQCw
C00701/18	0: Not connected	LA_NCtrl: bRLQCcw

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

C00725

Parameter | Name:
C00725 | Current switching frequency

Data type: UNSIGNED_8
Index: $23850_d = 5D2A_h$

From version 03.00.00

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)	
1	4 kHz var./drive-optimised
2	8 kHz var./drive-optimised
3	16 kHz var./drive-optimised
5	2 kHz constant/drive-optimised
6	4 kHz constant/drive-optimised
7	8 kHz constant/drive-optimised
8	16 kHz constant/drive-optimised

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

C00727

Parameter | Name:
C00727 | LS_Keypad: Digital values

Data type: UNSIGNED_8
Index: $23848_d = 5D28_h$

Executing control commands when operating via keypad

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

Subcodes	Lenze setting	Info
C00727/1	0	"1" ≡ request quick stop
C00727/2	0	"1" ≡ request DC-injection braking
C00727/3	0	"1" ≡ request reversal
C00727/4	0	"1" ≡ request fixed speed setpoint 1
C00727/5	0	"1" ≡ request fixed speed setpoint 2

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

C00728

Parameter | Name:
C00728 | LS_Keypad: Keypad analog values

Data type: INTEGER_16
Index: $23847_d = 5D27_h$

Selection of different setpoints when operating via keypad

Setting range (min. value | unit | max. value)		
-199.9	%	199.9

Subcodes	Lenze setting	Info
C00728/1	100.0 %	Torque limit in motor mode
C00728/2	100.0 %	Torque limit in generator mode
C00728/3	0.0 %	Setpoint speed

☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer ☐ COM ☐ MOT Scaling factor: 100

C00800

Parameter | Name:
C00800 | L_MPot_1: Upper limit

Data type: INTEGER_16
Index: $23775_d = 5CDF_h$

FB L_MPot_1: 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: $23774_d = 5CDE_h$

FB L_MPot_1: 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: $23773_d = 5CDD_h$

FB L_MPot_1: 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: $23772_d = 5CDC_h$

FB L_MPot_1: 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 function

Data type: UNSIGNED_8
Index: $23771_d = 5CDB_h$

FB L_MPot_1: Selection of the response when deactivating the motor potentiometer via the *bInAct* input

Selection list (Lenze setting printed in bold)		Info
0	**Keep value**	Keep output value
1	Deceleration to 0	Deceleration via ramp to 0
2	Deceleration to lower limit	Deceleration via ramp via the lower limit (C00801)
3	Without ramp to 0	Jump 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: $23770_d = 5CDA_h$

FB L_MPot_1: Selection of the response when switching on the device

Selection list (Lenze setting printed in bold)	
0	**Load last value**
1	U. Load 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: $23769_d = 5CD9_h$

FB L_MPot_1: Application of motor potentiometer

Selection list (Lenze setting printed in bold)		Info
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 to 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

C00830

Parameter | Name: **C00830 | 16Bit-Input analog**	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	Info
C00830/1	L_NSet_1: nNSet_a
C00830/2	L_NSet: 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

☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☑ No transfer ☐ COM ☐ MOT Scaling factor: 100

C00831

Parameter | Name: **C00831 | 16Bit-Input common**	Data type: UNSIGNED_16 Index: $23744_d = 5CC0_h$

From version 03.00.00

Decimal/hexadecimal/bit-coded display of 16-bit input values of different blocks

Display range (min. hex value | max. hex value)		
0x0000		0xFFFF
Value is bit-coded:		
Bit 0	Bit0	
...	...	
Bit 15	Bit15	

Subcodes	Info
C00831/1	LS_DCTRL: wCANControl

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

C00833

Parameter | Name:
C00833 | 8Bit-Input

Data type: UNSIGNED_8
Index: $23742_d = 5CBE_h$

From version 03.00.00

Display of the signal status of the binary inputs of different blocks

Selection list	
0	False
1	True

Subcodes	Info
C00833/1	L_NSet_1: bRfg0
C00833/2	L_NSet_1: bNSetInv
C00833/3	L_NSet_1: bJog1
C00833/4	L_NSet_1: bJog2
C00833/5	LS_SetError_1: bSetError1
C00833/6	LS_SetError_1: bSetError2
C00833/7	L_MPot_1: bUp
C00833/8	L_MPot_1: bInAct
C00833/9	L_MPot_1: bDown
C00833/10	L_MPot_1: bEnable
C00833/11	Reserved
C00833/12	L_PCTRL_1: bIOff
C00833/13	L_PCTRL_1: bEnableInfluenceRamp
C00833/14	LS_DCTRL: bCINH
C00833/15	LS_DCTRL: bFailReset
C00833/16	LS_DCTRL: bStatus_B0
C00833/17	LS_DCTRL: bStatus_B2
C00833/18	LS_DCTRL: bStatus_B3
C00833/19	LS_DCTRL: bStatus_B4
C00833/20	LS_DCTRL: bStatus_B5
C00833/21	LS_DCTRL: bStatus_B14
C00833/22	LS_DCTRL: bStatus_B15
C00833/23	L_RLQ_1: bCw
C00833/24	L_RLQ_1: bCcw

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

C00909

Parameter | Name:
C00909 | Speed limitation

Data type: INTEGER_16
Index: $23666_d = 5C72_h$

Maximum positive/negative speed for all operating modes

Setting range (min. value | unit | max. value)		
0.0	%	175.0

Subcodes	Lenze setting	Info
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: $23665_d = 5C71_h$

Maximum positive/negative output frequency for all operating modes

Setting range (min. value | unit | max. value)		
0	Hz	300

Subcodes	Lenze setting	Info
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

C00990

Parameter | Name:
C00990 | Flying restart fct.: Activation

Data type: UNSIGNED_8
Index: $23585_d = 5C21_h$

Switch on/activate flying restart circuit for non-feedback drive systems

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

C00991

Parameter | Name:
C00991 | Flying restart fct.: Process

Data type: UNSIGNED_16
Index: $23584_d = 5C20_h$

Selection of the starting value and the speed search range for the flying restart function

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: start frequency

Data type: INTEGER_16
Index: $23583_d = 5C1F_h$

Selection of the starting value for the flying restart function

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 (C00081).
- The flying restart current is to amount to 10 ... 25 % of the rated motor current.

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

10.3 Table of attributes

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

How to read the table of attributes:

Column		Meaning	Entry	
Code		Parameter designation	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	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 byte bit-coded
			BITFIELD_32	4 byte bit-coded
			INTEGER_8	1 byte with sign
			INTEGER_16	2 byte with sign
			INTEGER_32	4 byte with sign
			UNSIGNED_8	1 byte without sign
			UNSIGNED_16	2 byte without sign
			UNSIGNED_32	4 byte without sign
			VISIBLE_STRING	ASCII 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	

Code	Name	Index		Data				Access		
		dec	hex	DS	DA	DT	Factor	R	W	CINH
C00002	Controller commands	24573	5FFD	A	32	UNSIGNED_8	1	☑	☑	
C00003	Status of last device command	24572	5FFC	E	1	UNSIGNED_8	1	☑		
C00006	Select motor control	24569	5FF9	E	1	UNSIGNED_8	1	☑	☑	
C00007	Select control mode	24568	5FF8	E	1	UNSIGNED_16	1	☑	☑	
C00010	Minimum analog setpoint	24565	5FF5	A	1	INTEGER_16	100	☑	☑	
C00011	Appl.: Reference speed	24564	5FF4	E	1	UNSIGNED_16	1	☑	☑	
C00012	Accel. time - main setpoint	24563	5FF3	E	1	UNSIGNED_32	1000	☑	☑	
C00013	Decel. time - main setpoint	24562	5FF2	E	1	UNSIGNED_32	1000	☑	☑	
C00015	VFC: V/f base frequency	24560	5FF0	E	1	UNSIGNED_16	10	☑	☑	
C00016	VFC: Vmin boost	24559	5FEF	E	1	UNSIGNED_16	100	☑	☑	
C00018	Switching frequency	24557	5FED	E	1	UNSIGNED_8	1	☑	☑	
C00019	Auto-DCB: Threshold	24556	5FEC	E	1	UNSIGNED_16	1	☑	☑	
C00021	Slip comp.	24554	5FEA	E	1	INTEGER_16	100	☑	☑	
C00022	Imax in motor mode	24553	5FE9	E	1	UNSIGNED_16	100	☑	☑	
C00023	Imax in generator mode	24552	5FE8	E	1	INTEGER_16	100	☑	☑	
C00024	Comparison value N_Act	24551	5FE7	E	1	INTEGER_16	100	☑	☑	
C00026	AINx: Offset	24549	5FE5	A	1	INTEGER_16	100	☑	☑	

Code	Name	Index		Data				Access		
		dec	hex	DS	DA	DT	Factor	R	W	CINH
C00027	AINx: Gain	24548	5FE4	A	1	INTEGER_32	100	☑	☑	
C00028	AINx: Input voltage	24547	5FE3	A	1	INTEGER_16	100	☑		
C00029	AINx: Input current	24546	5FE2	A	1	INTEGER_16	100	☑		
C00033	AINx: Output value	24542	5FDE	A	1	INTEGER_16	100	☑		
C00034	AINx: Configuration	24541	5FDD	A	1	UNSIGNED_8	1	☑	☑	
C00036	DCB: Current	24539	5FDB	E	1	INTEGER_16	100	☑	☑	
C00039	Fixed setpoint x (L_NSet_1 n-Fix)	24536	5FD8	A	3	INTEGER_16	100	☑	☑	
C00050	MCTRL: Speed setpoint	24525	5FCD	E	1	INTEGER_32	1	☑		
C00051	MCTRL: Actual speed value	24524	5FCC	E	1	INTEGER_32	1	☑		
C00052	Motor voltage	24523	5FCB	E	1	UNSIGNED_16	1	☑		
C00053	DC-bus voltage	24522	5FCA	E	1	UNSIGNED_16	1	☑		
C00054	Motor current	24521	5FC9	E	1	UNSIGNED_16	100	☑		
C00056	Torque	24519	5FC7	A	2	INTEGER_32	100	☑		
C00057	Maximum torque	24518	5FC6	E	1	UNSIGNED_32	100	☑		
C00058	Output frequency	24517	5FC5	E	1	INTEGER_32	100	☑		
C00059	Appl.: Reference frequency C11	24516	5FC4	E	1	UNSIGNED_32	100	☑		
C00061	Heatsink temperature	24514	5FC2	E	1	INTEGER_16	1	☑		
C00064	Device utilisation (Ixt)	24511	5FBF	A	3	INTEGER_16	100	☑		
C00066	Thermal motor load (I²xt)	24509	5FBD	E	1	INTEGER_16	100	☑		
C00073	Vp Imax controller	24502	5FB6	E	1	UNSIGNED_16	100	☑	☑	
C00074	Ti Imax controller	24501	5FB5	E	1	UNSIGNED_16	1	☑	☑	
C00081	Rated motor power	24494	5FAE	E	1	UNSIGNED_16	100	☑	☑	
C00084	Motor stator resistance	24491	5FAB	E	1	UNSIGNED_32	1	☑	☑	
C00085	Motor stator leakage inductance	24490	5FAA	E	1	UNSIGNED_16	100	☑	☑	
C00087	Rated motor speed	24488	5FA8	E	1	UNSIGNED_16	1	☑	☑	
C00088	Rated motor current	24487	5FA7	E	1	UNSIGNED_16	100	☑	☑	
C00089	Rated motor frequency	24486	5FA6	E	1	UNSIGNED_16	1	☑	☑	
C00090	Rated motor voltage	24485	5FA5	E	1	UNSIGNED_16	1	☑	☑	
C00091	Motor cosine phi	24484	5FA4	E	1	UNSIGNED_8	100	☑	☑	
C00092	Motor magnetizing inductance	24483	5FA3	E	1	UNSIGNED_16	10	☑	☑	
C00093	Power section ID	24482	5FA2	E	1	UNSIGNED_16	1	☑		
C00094	Password	24481	5FA1	E	1	INTEGER_32	1	☑	☑	
C00095	Motor magnetising current	24480	5FA0	E	1	UNSIGNED_16	100	☑		
C00097	Rated motor torque	24478	5F9E	E	1	UNSIGNED_32	100	☑		
C00098	Rated device current	24477	5F9D	E	1	UNSIGNED_16	10	☑		
C00099	Firmware version	24476	5F9C	E	1	VISIBLE_STRING		☑		
C00100	Firmware version	24475	5F9B	A	4	UNSIGNED_8	1	☑		
C00105	Deceleration time - quick stop	24470	5F96	E	1	UNSIGNED_32	1000	☑	☑	
C00106	Auto-DCB: hold time	24469	5F95	E	1	UNSIGNED_32	1000	☑	☑	
C00107	DCB: hold time	24468	5F94	E	1	UNSIGNED_32	1000	☑	☑	
C00114	DIx inversion	24461	5F8D	E	1	UNSIGNED_16		☑	☑	
C00118	DOx inversion	24457	5F89	E	1	UNSIGNED_8		☑	☑	
C00120	Motor overload threshold (I²xt)	24455	5F87	E	1	INTEGER_16	100	☑	☑	
C00123	Device utilisat. threshold (Ixt)	24452	5F84	E	1	INTEGER_16	100	☑	☑	
C00134	Ramp rounding - main setpoint	24441	5F79	E	1	UNSIGNED_8	1	☑	☑	
C00137	Device state	24438	5F76	E	1	UNSIGNED_16	1	☑		
C00141	Device settings	24434	5F72	A	1	UNSIGNED_8	1	☑	☑	
C00142	Auto-start option	24433	5F71	E	1	UNSIGNED_8		☑	☑	
C00144	Switching freq. reduct. (temp.)	24431	5F6F	E	1	UNSIGNED_8	1	☑	☑	
C00150	Status word	24425	5F69	E	1	UNSIGNED_16		☑		
C00155	Status word 2	24420	5F64	E	1	UNSIGNED_16		☑		

Code	Name	Index		Data				Access		
		dec	hex	DS	DA	DT	Factor	R	W	CINH
C00158	Cause of controller inhibit	24417	5F61	E	1	UNSIGNED_16		☑		
C00159	Cause of quick stop QSP	24416	5F60	E	1	UNSIGNED_16		☑		
C00165	Error information	24410	5F5A	A	1	VISIBLE_STRING		☑		
C00166	Error information text	24409	5F59	A	3	VISIBLE_STRING		☑		
C00168	Error number	24407	5F57	A	8	UNSIGNED_32	1	☑		
C00169	Time of error	24406	5F56	A	8	UNSIGNED_32	1	☑		
C00170	Error counter	24405	5F55	A	8	UNSIGNED_8	1	☑		
C00173	Mains voltage	24402	5F52	E	1	UNSIGNED_8	1	☑	☑	☑
C00174	Reduced brake chopper threshold	24401	5F51	E	1	UNSIGNED_8	1	☑	☑	
C00177	Switching cycles	24398	5F4E	A	2	UNSIGNED_32	1	☑		
C00178	Elapsed-hour meter	24397	5F4D	E	1	UNSIGNED_32	1	☑		
C00179	Power-on time meter	24396	5F4C	E	1	UNSIGNED_32	1	☑		
C00182	S-ramp time PT1	24393	5F49	E	1	INTEGER_16	100	☑	☑	
C00200	Firmware product type	24375	5F37	E	1	VISIBLE_STRING		☑		
C00201	Firmware compile date	24374	5F36	E	1	VISIBLE_STRING		☑		
C00203	Product type code	24372	5F34	A	9	VISIBLE_STRING		☑		
C00222	L_PCTRL_1: Vp	24353	5F21	E	1	INTEGER_16	10	☑	☑	
C00223	L_PCTRL_1: Tn	24352	5F20	E	1	UNSIGNED_16	1	☑	☑	
C00224	L_PCTRL_1: Kd	24351	5F1F	E	1	UNSIGNED_16	10	☑	☑	
C00225	L_PCTRL_1: MaxLimit	24350	5F1E	E	1	INTEGER_16	100	☑	☑	
C00226	L_PCTRL_1: MinLimit	24349	5F1D	E	1	INTEGER_16	100	☑	☑	
C00227	L_PCTRL_1: acceleration time	24348	5F1C	E	1	UNSIGNED_32	1000	☑	☑	
C00228	L_PCTRL_1: deceleration time	24347	5F1B	E	1	UNSIGNED_32	1000	☑	☑	
C00231	L_PCTRL_1: Operating range	24344	5F18	A	4	INTEGER_16	100	☑	☑	
C00234	Oscillation damping influence	24341	5F15	E	1	UNSIGNED_16	100	☑	☑	
C00242	L_PCTRL_1: operating mode	24333	5F0D	E	1	UNSIGNED_8	1	☑	☑	
C00243	L_PCTRL_1: Acceleration time influence	24332	5F0C	E	1	UNSIGNED_32	1000	☑	☑	
C00244	L_PCTRL_1: Deceleration time influence	24331	5F0B	E	1	UNSIGNED_32	1000	☑	☑	
C00245	L_PCTRL_1: PID output value	24330	5F0A	E	1	INTEGER_16	100	☑		
C00443	DIx: Level	24132	5E44	A	2	UNSIGNED_16		☑		
C00444	DOx: Level	24131	5E43	A	2	UNSIGNED_16		☑		
C00470	LS_ParFree_b	24105	5E29	A	16	UNSIGNED_8	1	☑	☑	
C00472	LS_ParFree_a	24103	5E27	A	4	INTEGER_16	100	☑	☑	
C00480	LS_DisFree_b	24095	5E1F	E	1	UNSIGNED_8		☑		
C00481	LS_DisFree	24094	5E1E	A	4	UNSIGNED_16		☑		
C00482	LS_DisFree_a	24093	5E1D	A	4	INTEGER_16	100	☑		
C00516	Checksums	24059	5DFB	A	1	UNSIGNED_32	1	☑		
C00517	User menu	24058	5DFA	A	20	INTEGER_32	1	☑	☑	
C00565	Resp. to mains phase failure	24010	5DCA	E	1	UNSIGNED_8	1	☑	☑	
C00574	Resp. to brake resist. overtemp.	24001	5DC1	E	1	UNSIGNED_8	1	☑	☑	
C00581	Resp. LS_SetError_x	23994	5DBA	A	2	UNSIGNED_8	1	☑	☑	
C00598	Resp. to open circuit AINx	23977	5DA9	A	1	UNSIGNED_8	1	☑	☑	
C00600	Resp. to DC bus undervoltage	23975	5DA7	A	1	UNSIGNED_8	1	☑	☑	
C00601	Del.resp. to fault: DC bus overvoltage	23974	5DA6	A	1	UNSIGNED_16	1000	☑	☑	
C00604	Resp. to device overload (Ixt)	23971	5DA3	E	1	UNSIGNED_8	1	☑	☑	
C00606	Resp. to motor overload (I²xt)	23969	5DA1	E	1	UNSIGNED_8	1	☑	☑	
C00620	16-bit system connection	23955	5D93	A	12	UNSIGNED_16	1	☑	☑	
C00621	Bool system connection	23954	5D92	A	23	UNSIGNED_16	1	☑	☑	
C00700	LA_NCtrl: analog connection list	23875	5D43	A	9	UNSIGNED_16	1	☑	☑	
C00701	LA_NCtrl: digital connection list	23874	5D42	A	18	UNSIGNED_16	1	☑	☑	

Code	Name	Index		Data				Access		
		dec	hex	DS	DA	DT	Factor	R	W	CINH
C00725	Current switching frequency	23850	5D2A	E	1	UNSIGNED_8	1	☑		
C00727	LS_Keypad: Digital values	23848	5D28	A	5	UNSIGNED_8	1	☑	☑	
C00728	LS_Keypad: Keypad analog values	23847	5D27	A	3	INTEGER_16	100	☑	☑	
C00800	L_MPot_1: Upper limit	23775	5CDF	E	1	INTEGER_16	100	☑	☑	
C00801	L_MPot_1: Lower limit	23774	5CDE	E	1	INTEGER_16	100	☑	☑	
C00802	L_MPot_1: Acceleration time	23773	5CDD	E	1	UNSIGNED_16	10	☑	☑	
C00803	L_MPot_1: Deceleration time	23772	5CDC	E	1	UNSIGNED_16	10	☑	☑	
C00804	L_MPot_1: Inactive function	23771	5CDB	E	1	UNSIGNED_8	1	☑	☑	
C00805	L_MPot_1: Init fct.	23770	5CDA	E	1	UNSIGNED_8	1	☑	☑	
C00806	L_MPot_1: Use	23769	5CD9	E	1	UNSIGNED_8	1	☑	☑	
C00830	16Bit input analog	23745	5CC1	A	11	INTEGER_16	100	☑		
C00831	16Bit-Input common	23744	5CC0	A	1	UNSIGNED_16		☑		
C00833	8Bit-Input	23742	5CBE	A	24	UNSIGNED_8	1	☑		
C00909	Speed limitation	23666	5C72	A	2	INTEGER_16	100	☑	☑	
C00910	Frequency limitation	23665	5C71	A	2	UNSIGNED_16	1	☑	☑	
C00990	Flying restart fct: Activation	23585	5C21	E	1	UNSIGNED_8	1	☑	☑	
C00991	Flying restart fct: Process	23584	5C20	E	1	UNSIGNED_16	1	☑	☑	
C00992	Flying restart: start frequency	23583	5C1F	E	1	INTEGER_16	1	☑	☑	
C00994	Flying restart fct: Current	23581	5C1D	E	1	INTEGER_16	100	☑	☑	

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Your opinion is important to us

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

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

feedback-docu@Lenze.de

Thank you for your support.

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