Lenze

Manual

Global Drive

9300 Servo PLC

This documentation applies to the following Lenze PLC devices:

	Type designation	As from hardware version	As from software version
9300 Servo PLC	EVS93XX-xI	7A	7.0
9300 Servo PLC	EVS93XX-xT	7A	7.0

What's new?

Version		Changes
1.4	07/2000	Revised edition for the 9300 Servo PLC as of software version V1.0
2.0	07/2001	Revised edition for the 9300 Servo PLC as of software version V2.0
3.0	01/2003	Revised edition for the 9300 Servo PLC as of software version V6.0
4.0/4.1	08/2006	Revised edition for the 9300 Servo PLC as of software version V7.0

Important note:

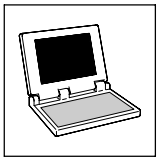
The software is supplied to the user as described in this document. Any risks resulting from its quality or use remain the responsibility of the user. The user must provide all safety measures protecting against possible maloperation.

We do not take any liability for direct or indirect damage, e.g. profit loss, order loss or any loss regarding business.

All information given in this documentation has been carefully selected and tested for compliance with the hardware and software described. Nevertheless, discrepancies cannot be ruled out. We do not accept any responsibility or liability for any damage that may occur. Required corrections will be included in updates of this documentation.

All product names mentioned in this documentation are trademarks of the corresponding owners.

Version 4.1 08/2006



1 Preface and general information 1-1

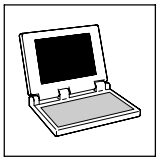
1.1 About this Manual 1-1
1.1.1 Conventions used in this Manual 1-1
1.1.2 System block descriptions 1-1
1.1.3 Pictographs in this Manual 1-2
1.1.4 Terminology used 1-2
1.2 System block introduction 1-3
1.2.1 System block principle 1-3
1.2.2 Node numbers 1-4
1.2.3 Access via system variables 1-5
1.2.4 Access via absolute addresses 1-5
1.2.5 Definition of inputs/outputs 1-6
1.2.6 Linking of system blocks with DDS 1-7
1.2.7 Signal types and scalings 1-8

2 System blocks 2-1

2.1 AIF1_IO_AutomationInterface (node number 41) 2-2
2.1.1 Inputs_AIF1 2-2
2.1.2 Outputs_AIF1 2-5
2.2 AIF2_IO_AutomationInterface (node number 42) 2-7
2.2.1 Inputs_AIF2 2-7
2.2.2 Outputs_AIF2 2-9
2.3 AIF3_IO_AutomationInterface (node number 43) 2-11
2.3.1 Inputs_AIF3 2-11
2.3.2 Outputs_AIF3 2-13
2.4 AIF_IO_Management (node number 161) 2-15
2.4.1 Inputs_AIF_Management 2-15
2.4.2 Outputs_AIF_Management 2-17
2.5 ANALOG1_IO (node number 11) 2-18
2.5.1 Inputs_ANALOG1 (analog input) 2-18
2.5.2 Outputs_ANALOG1 (analog output) 2-19
2.6 ANALOG2_IO (node number 12) 2-20
2.6.1 Inputs_ANALOG2 (analog input) 2-20
2.6.2 Outputs_ANALOG2 (analog output) 2-20
☒ CAN1_IO (node number 31) . . . . . 🕮
☒ CAN2_IO (node number 32) . . . . . 🕮
☒ CAN3_IO (node number 33) . . . . . 🕮
☒ CAN_Management (node number 101) . . . . . 🕮
☒ CAN_Synchronization (node number 102) . . . . . 🕮

🕮 See also Manual "System bus (CAN) for Lenze PLC devices".

2.7 DCTRL_DriveControl (node number 121) 2-21
2.7.1 Inputs_DCTRL 2-22
2.7.2 Outputs_DCTRL 2-22
2.7.3 Quick stop (QSP) 2-23
2.7.4 Operation disabled (DISABLE) 2-23
2.7.5 Controller inhibit (CINH) 2-24
2.7.6 Setting TRIP (TRIP-SET) 2-24
2.7.7 Resetting TRIP (TRIP-RESET) 2-25
2.7.8 Output of digital status signals 2-25
2.7.9 Transfer of status/control word via AIF 2-27
2.8 DFIN_IO_DigitalFrequency (node number 21) 2-28
2.8.1 Inputs_DFIN 2-28
2.9 DFOUT_IO_DigitalFrequency (node number 22) 2-35
2.9.1 Inputs_DFOUT / Outputs_DFOUT 2-35
2.10 DIGITAL_IO (node number 1) 2-39
2.10.1 Inputs_DIGITAL (digital inputs) 2-39
2.10.2 Outputs_DIGITAL (digital outputs) 2-40
2.11 FCODE_FreeCode (node number 141) 2-41
2.12 MCTRL_MotorControl (node number 131) 2-44
2.12.1 Inputs_MCTRL 2-45
2.12.2 Outputs_MCTRL 2-46
2.12.3 Current controller 2-47
2.12.4 Torque setpoint / additional torque setpoint 2-48
2.12.5 Torque limitation 2-49
2.12.6 Maximum speed 2-50
2.12.7 Speed controller 2-51
2.12.8 Torque control with speed limitation 2-52
2.12.9 Speed setpoint limitation 2-52
2.12.10 Phase controller 2-53
2.12.11 Quick stop (QSP) 2-54
2.12.12 Field weakening 2-55
2.12.13 Switching frequency changeover 2-55
2.12.14 Feedback systems 2-56
2.12.15 Touch probe (TP) 2-57
2.12.16 Manual adaptation of motor data 2-59
2.12.17 Monitoring 2-61
2.12.17.6 LP1 - monitoring of the motor phases 2-70
2.12.17.16 PL - monitoring of the rotor position adjustment 2-79
2.13 MCTRL_AUX_HighResFeedback (node number 181) 2-82
2.13.1 Inputs_MCTRL_AUX_HighResFeedback 2-82
2.13.2 Outputs_MCTRL_AUX_HighResFeedback 2-82
2.14 STATEBUS_IO (node number 51) 2-83
2.15 SYSTEM_FLAGS (system flags, node number 151) 2-84



3 Appendix 3-1

3.1 PLC functionality 3-1

3.2 Extendability/networking 3-2

3.3 Memories 3-3

3.3.1 Retain memory 3-4

3.3.2 Persistent memory 3-5

3.3.3 Downloading data 3-7

3.4 System POUs 3-8

3.5 System error messages 3-9

3.5.1 Overview of system error messages, error sources and responses 3-10

3.5.2 Responses and their effects on the drive 3-13

3.5.3 System error message reset 3-13

3.5.4 Causes and remedies 3-14

3.5.5 Fault analysis via the fault memory 3-19

3.5.6 Fault analysis via the LED display of the PLC 3-21

3.5.7 Fault analysis via the 9371BB keypad 3-21

3.5.8 Fault analysis via the LECOM status word C0150 3-21

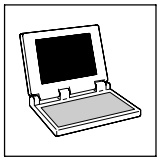
3.6 Code table 3-22

3.6.1 Temporary codes 3-52

3.6.2 RAM access via codes 3-52

3.7 Attribute table 3-55

4 Index 4-1



1 Preface and general information

1.1 About this Manual

This Manual describes the system block functions which can be selected and parameterised in the control configuration of the **Drive PLC Developer Studio** (DDS) for **9300 Servo PLC**.

1.1.1 Conventions used in this Manual

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

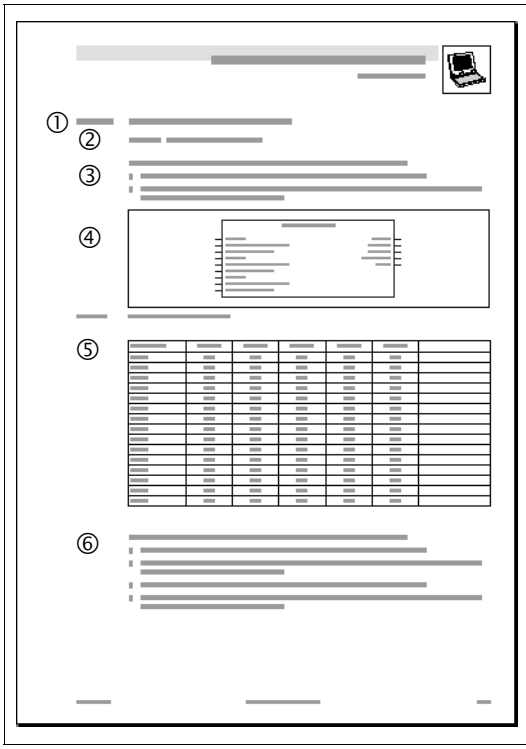
Information type	Distinction (in text)	Example
System block name	**bold**	The SB **DIGITAL_IO**...
System (block) variable identifier	*italics*	The input *DIGIN_bIn1_b*...

Tip!

Information about the conventions used for variable names of Lenze system blocks, function blocks and functions can be obtained from the appendix of the DDS online documentation "Introduction into IEC 61131-3 programming". The conventions ensure universal and uniform naming and support the readability of PLC programs.

1.1.2 System block descriptions

All system block descriptions given in this Manual have the same structure:



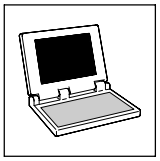
①	Headline with SB identifier
②	SB function and node number
③	Short description of the SB and its most important features
④	System block chart including all corresponding variables • Input variables • Output variables
⑤	Table giving information about input and output variables: • Identifier • Data type • Signal type • Address • Display code • Display format • Info
⑥	Detailed SB description

1.1.3 Pictographs in this Manual

	Pictographs used	Signal words	
Warning of material damage		**Stop!**	Warns of **potential damage to material**. Possible consequences if disregarded: Damage of the PLC or its environment.
More notes		**Tip!** **Note!**	Indicates a tip or note.

1.1.4 Terminology used

Term	In this Manual used for
AIF	Automation interface
DDS	Drive PLC Developer Studio
FIF	Function interface
GDC	Global Drive Control (parameter setting program from Lenze)
SB	System block
System bus	System bus (CAN): Lenze standard bus system similar to *CANopen*



1.2 System block introduction

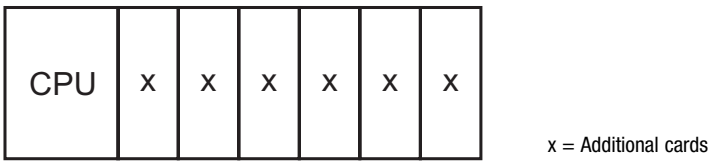
For a long time, Lenze has followed the principle of describing controller functions with the aid of function blocks (FBs). This principle can also be found in the IEC 61131-3 standard.

- Functions which can be used as software functions in projects are stored in function libraries as **function blocks** or **functions**.
- In addition, quasi-hardware functions are available as **system blocks** (SBs).

1.2.1 System block principle

The system-block principle can be explained by means of a PLC system in a rack:

- The rack contains the CPU, digital I/Os, analog I/Os, counter card, positioning card, etc. as additional cards:



- The CPU can directly access the additional cards and process the resulting information.
- Additional cards have fixed addresses for access.

With Lenze PLC controllers, system blocks can be compared with these additional cards!

System blocks are special (hardware) function blocks permanently integrated into the run-time system of the PLC.

- SBs can address real hardware.
- SBs are assigned/identified through so-called node numbers. (📖 1-4)
- SB inputs and outputs are accessed via system variables or absolute memory addresses. (📖 1-5)
- Inputs/outputs are always classified from the program's point of view. (📖 1-6)
- Required SBs must be explicitly linked to the project via the control configuration of DDS. (📖 1-7)

1.2.2 Node numbers

The system blocks of the **9300 Servo PLC** carry the following node numbers:

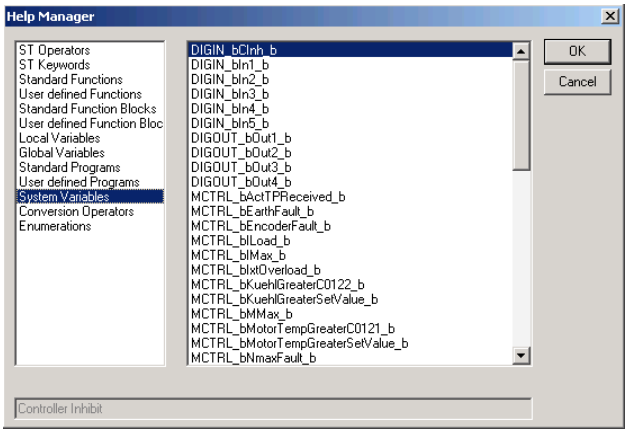
Node number	System block	Notes
1	DIGITAL_IO	Digital inputs/outputs
11	ANALOG1_IO	Analog inputs/outputs 1
12	ANALOG2_IO	Analog inputs/outputs 2
21	DFIN_IO_DigitalFrequency	Digital frequency input
22	DFOUT_IO_DigitalFrequency	Digital frequency output
31	CAN1_IO	System bus (CAN)[1]
32	CAN2_IO	
33	CAN3_IO	
41	AIF1_IO_AutomationInterface	Automation interface
42	AIF2_IO_AutomationInterface	
43	AIF3_IO_AutomationInterface	
51	STATEBUS_IO	State bus
60	OSC_Oscilloscope	Oscilloscope function
101	CAN_Management	System bus (CAN) management[1]
102	CAN_Syncronization	System bus (CAN) synchronisation[1]
111	FIF_CAN_Management	System bus (CAN), FIF module **CAN-I/O** management[1]
121	DCTRL_DriveControl	Device control
131	MCTRL_MotorControl	Motor control
141	FCODE_FreeCodes	Free codes
151	SYSTEM_FLAGS	System flags
161	AIF_IO_Management	Automation interface management
171	VAR_PERSISTENT	Persistent variables
181	MCTRL_AUX_HighResFeedback	High-resolution encoder signal
[1] SBs for system bus (CAN) are described in the "System bus (CAN) for Lenze PLC devices" Manual.		

The node number is part of the absolute SB address (see chapter 2). (📖 1-5)

1.2.3 Access via system variables

You can use the system variables of a system block in your project after the system block has been integrated into the control configuration of the DDS.

- Open the input assistance in the DDS editors via **<F2>** to get a listing of all available system variables:



- This Manual lists the system variables in the table for the corresponding system block:

Variable	Data type	Signal type	Address	Display code	Display format	Note
DIGIN_bIn1_b ... DIGIN_bIn8_b	Bool	Binary	%IX1.0.0 ... %IX1.0.7	C0443/1 ... C0443/8	bin	

Example: Table with SB DIGITAL_IO inputs of the Drive PLC

1.2.4 Access via absolute addresses

System block inputs and outputs can also be accessed via absolute addresses according to the IEC61131-3 standard:

For inputs use:	For outputs use:	
%IXa.b.c	%QXa.b.c	a = node number b = word address c = bit address

- This Manual lists the absolute addresses in the table for the corresponding system block:

Variable	Data type	Signal type	Address	Display code	Display format	Note
DIGIN_bIn1_b ... DIGIN_bIn8_b	Bool	Binary	%IX1.0.0 ... %IX1.0.7	C0443/1 ... C0443/8	bin	

Example: Table with SB DIGITAL_IO inputs of the Drive PLC

1.2.5 Definition of inputs/outputs

The application program is connected with the hardware by linking system blocks with program organisation units (POUs):

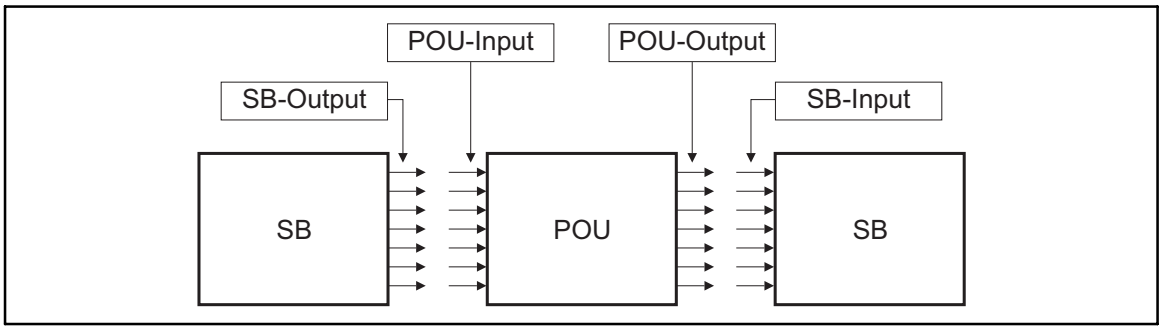


Fig. 1-1 Principle: Linking of system blocks with a program organisation unit (POU)

Tip!

Inputs and outputs are always classified from the program's point of view.

- Logic SB inputs are hardware outputs of the PLC.
- Logic SB outputs are hardware inputs of the PLC.

Example: System block DIGITAL_IO of the 9300 Servo PLC

If you want to use the digital input 1 and the digital output 1 of the **9300 Servo PLC**, proceed as follows:

1. Link the SB **DIGITAL_IO** explicitly with the DDS control configuration. (📖 1-7)
2. Access to digital input 1:
   Assign the system variable *DIGIN_bIn1_b* to a POU input.
3. Access to digital output 1:
   Assign the system variable *DIGOUT_bOut1_b* to a POU output.

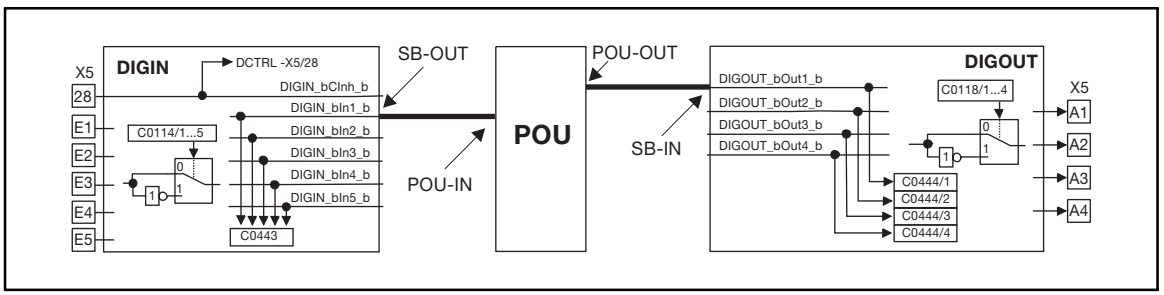


Fig. 1-2 Principle: Linking of the 9300 Servo PLC system block DIGITAL_IO with a POU

Tip!

According to the IEC61131-3 standard, only one copy of the digital input 1 and the digital output 1 may be transferred.

1.2.6 Linking of system blocks with DDS

The system blocks required must be explicitly linked to the project via the control configuration of the DDS.

- The control configuration is placed as an object in the **Resources** tab in the *Object organiser*.
- The control configuration lists all inputs and outputs including the identifiers of the corresponding I/O variable, the absolute address and the data type of the I/O variable for every linked SB.

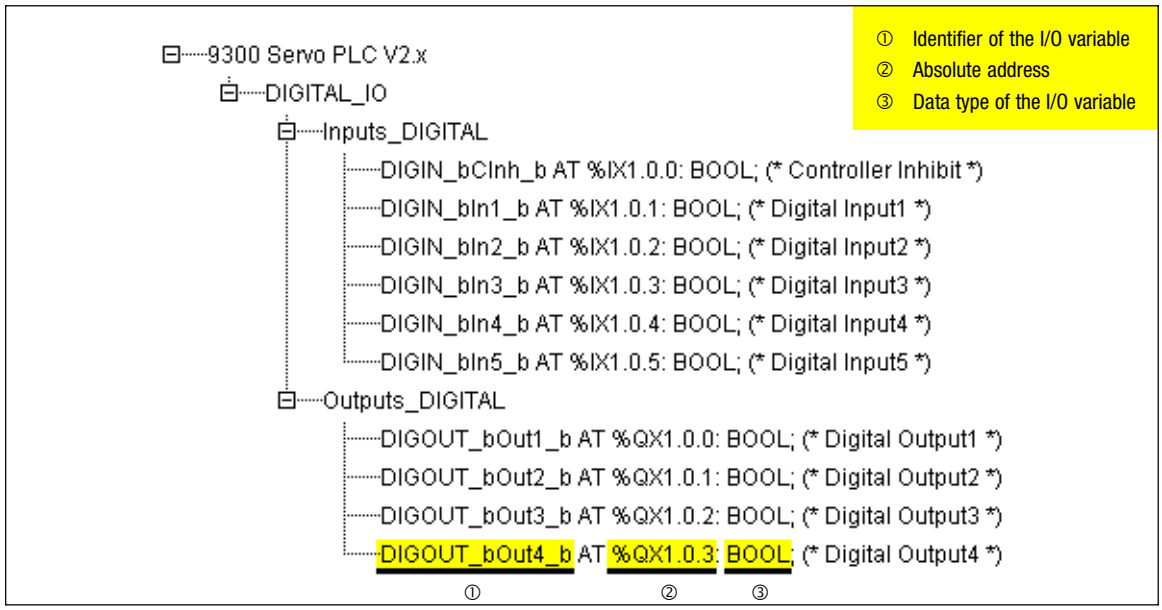


Fig. 1-3 Example: Control configuration for 9300 Servo PLC with linked SB DIGITAL_IO

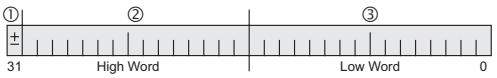
Tip!

The control configuration provides a context menu for adding and deleting SBs which can be activated via the right mouse key.

1.2.7 Signal types and scalings

Most inputs and outputs of Lenze function blocks/system blocks can be assigned to a certain signal type. We distinguish between digital, analog, position and speed signals.

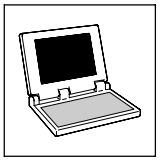
The identifier of the corresponding input/output variable has an ending (starting with an underscore). It indicates the signal type.

Signal type	Ending	Memory space	Scaling (external value ≡ internal value)	Previous identification
Analog	_a (analog)	16 bits	100 % ≡ 16384	○
Digital	_b (binary)	8 bits	0 ≡ FALSE; 1 ≡ TRUE	□
Phase difference or speed	_v (velocity)	16 bits	15000 rpm ≡ 16384	△
	• Phase difference/speed ref. to 1 ms • Scaling example: $Speed\ (on\ motor\ side) = 15000\ [rpm] = \frac{15000}{60\ [s]}$ $1\ motor\ revolution = 65536\ [inc]$ $Variable\ value\ (..._v) = \frac{15000}{60\ [s]} \cdot 65536\ [inc] = \frac{15000}{60000\ [ms]} \cdot 65536\ [inc] = 16384 \left[\frac{inc}{ms}\right]$			
Phase-angle or position	_p (position)	32 bits	1 motor revolution ≡ 65536	▲
	 ① Direction (0 ≡ clockwise rotation; 1 ≡ counter-clockwise rotation) ②No. of motor revolutions (0 ... 32767) ③ Phase angle or position (0 ... 65535)			

Note!

Due to their scaling, analog signals have an asymmetrical resolution range (-200 % ... +199.99 %):

External value:	-200 %	-100 %	0	+100 %	+199.99 %
Internal value:	-32768	-16384	0	+16384	+32767



2 System blocks

The following sections inform about the system blocks of the basic unit.

2.1 AIF1_IO_AutomationInterface (node number 41)

2.1.1 Inputs_AIF1

This SB is used as an interface for input signals (e.g. setpoints/actual values) from attached fieldbus modules (e.g. INTERBUS, PROFIBUS-DP).

- The process image is
  - created in the cyclic task in a fixed time interval of 10 ms.
  - created in an interval task within the time set for this task.
  - read at the beginning of the task and written at its end.

Tip!

Please observe the Operating Instructions for the attached fieldbus module.

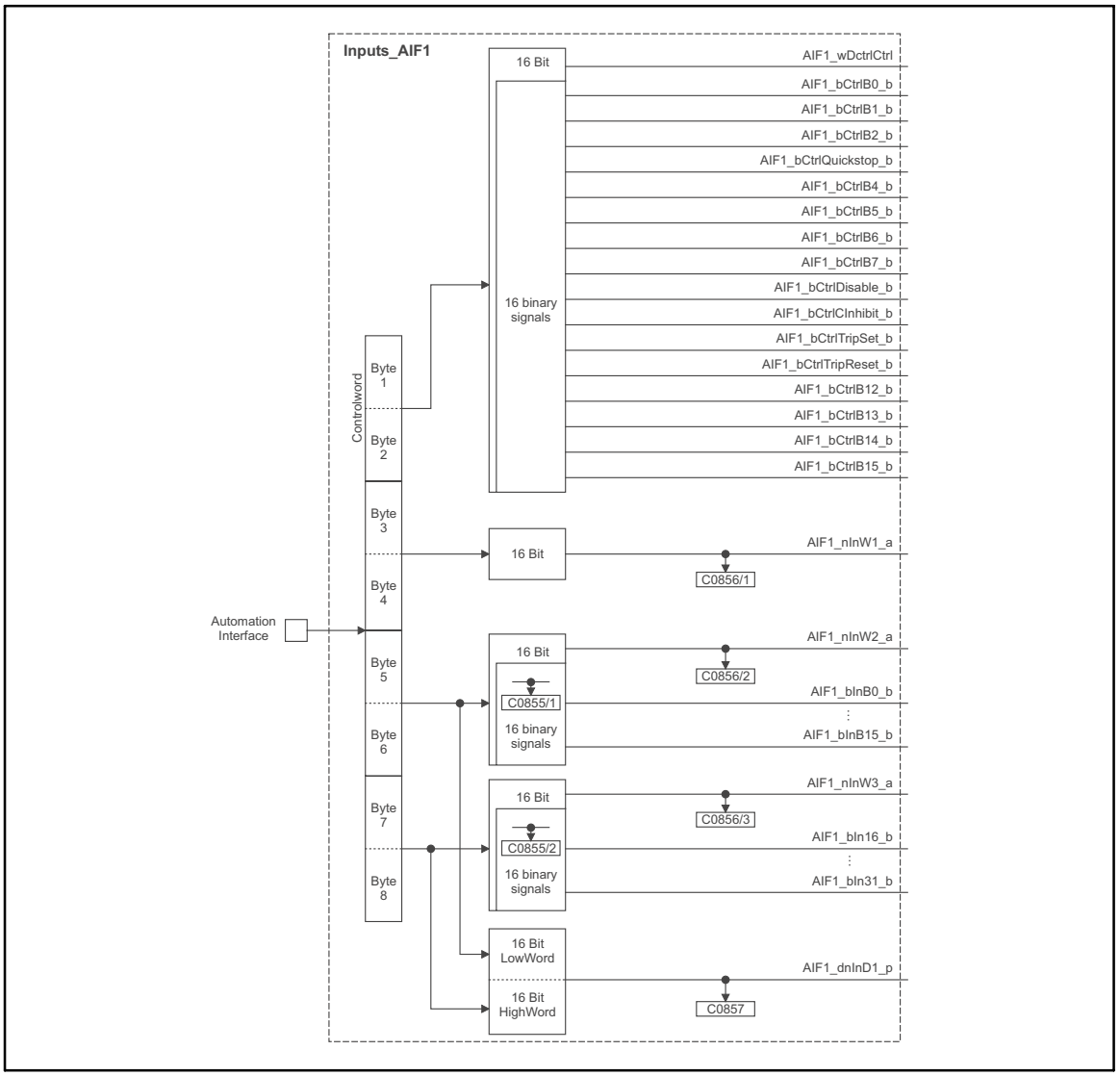
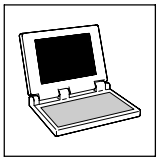


Fig. 2-1 Inputs_AIF1



System variables

Variable	Data type	Signal type	Address	Display code	Display format	Note
AIF1_wDctrlCtrl	Word	-	%IX41.0	C0136/3	hex	
AIF1_bCtrlB0_b	Bool	Binary	%IX41.0.0	C0136/3	bin	
AIF1_bCtrlB1_b			%IX41.0.1			
AIF1_bCtrlB2_b			%IX41.0.2			
AIF1_bCtrlQuickstop_b			%IX41.0.3			
AIF1_bCtrlB4_b			%IX41.0.4			
AIF1_bCtrlB5_b			%IX41.0.5			
AIF1_bCtrlB6_b			%IX41.0.6			
AIF1_bCtrlB7_b			%IX41.0.7			
AIF1_bCtrlDisable_b			%IX41.0.8			
AIF1_bCtrlCInhibit_b			%IX41.0.9			
AIF1_bCtrlTripSet_b			%IX41.0.10			
AIF1_bCtrlTripReset_b			%IX41.0.11			
AIF1_bCtrlB12_b			%IX41.0.12			
AIF1_bCtrlB13_b			%IX41.0.13			
AIF1_bCtrlB14_b			%IX41.0.14			
AIF1_bCtrlB15_b			%IX41.0.15			
AIF1_nInW1_a	Integer	Analog	%IW41.1	C0856/1	dec [%]	
AIF1_nInW2_a			%IW41.2	C0856/2		
AIF1_nInW3_a			%IW41.3	C0856/3		
AIF1_bInB0_b ... AIF1_bInB15_b	Bool	Binary	%IX41.2.0 ... %IX41.2.15	C0855/1	hex	
AIF1_bInB16_b ... AIF1_bInB31_b			%IX41.3.0 ... %IX41.3.15	C0855/2		
AIF1_dnInD1_p	Double integer	Position	%ID41.1	C0857	dec [inc]	

User data

The received 8 bytes of user data are assigned to several variables of different data types simultaneously. Thus the data can be evaluated in the PLC program as

- binary information (1 bit)
- control word/quasi-analog value (16 bits)
- phase information (32 bits)

according to the requirements.

<table>
<tr><th>Byte</th><th>Variable (1 bit)</th><th>Variable (16 bits)</th><th>Variable (32 bits)</th></tr>
<tr><td>1, 2</td><td>AIF1_bInB0_b
AIF1_bInB1_b
AIF1_bInB2_b
AIF1_bCtrlQuickstop_b
AIF1_bInB4_b
...
AIF1_bInB7_b
AIF1_bCtrlDisable_b
AIF1_bCtrlCInhibit_b
AIF1_bCtrlTripSet_b
AIF1_bCtrlTripReset_b
AIF1_bInB12_b
...
AIF1_bInB15_b</td><td>AIF1_wDctrlCtrl</td><td></td></tr>
<tr><td></td><td>Notes:</td><td colspan="2">Drive PLC:
All variables assigned to byte 1/2 can be freely used in the PLC program.</td></tr>
<tr><td></td><td></td><td colspan="2">9300 Servo PLC:
The assignment of the controller-internal control word to byte 1/2 is not a fixed assignment.
• Byte 1/2 can, however, be used to write the signals for the quick stop (QSP), DISABLE, CINH, TRIP-SET and TRIP-RESET functions to the SB DCTRL_DriveControl.
– To do this, connect the variable AIF1_wDctrlCtrl with the variable DCTRL_wAIF1Ctrl of the SB DCTRL_DriveControl.
• The signals can also be read and processed via the following variables:
– AIF1_bCtrlQuickstop_b
– AIF1_bCtrlDisable_b
– AIF1_bCtrlCInhibit_b
– AIF1_bCtrlTripSet_b
– AIF1_bCtrlTripReset_b</td></tr>
<tr><td>3, 4</td><td></td><td>AIF1_nInW1_a</td><td></td></tr>
<tr><td>5, 6</td><td>AIF1_bInB0_b
...
AIF1_bInB15_b</td><td>AIF1_nInW2_a</td><td rowspan="2">AIF1_dnInD1_p</td></tr>
<tr><td>7, 8</td><td>AIF1_bInB16_b
...
AIF1_bInB31_b</td><td>AIF1_nInW3_a</td></tr>
</table>

2.1.2 Outputs_AIF1

This SB is used as an interface for output signals (e.g. setpoints/actual values) to attached fieldbus modules (e.g. INTERBUS, PROFIBUS-DP).

- The process image is
  - created in the cyclic task in a fixed time interval of 10 ms.
  - created in an interval task within the time set for this task.
  - read at the beginning of the task and written at its end.

Tip!

Please observe the Operating Instructions for the attached fieldbus module.

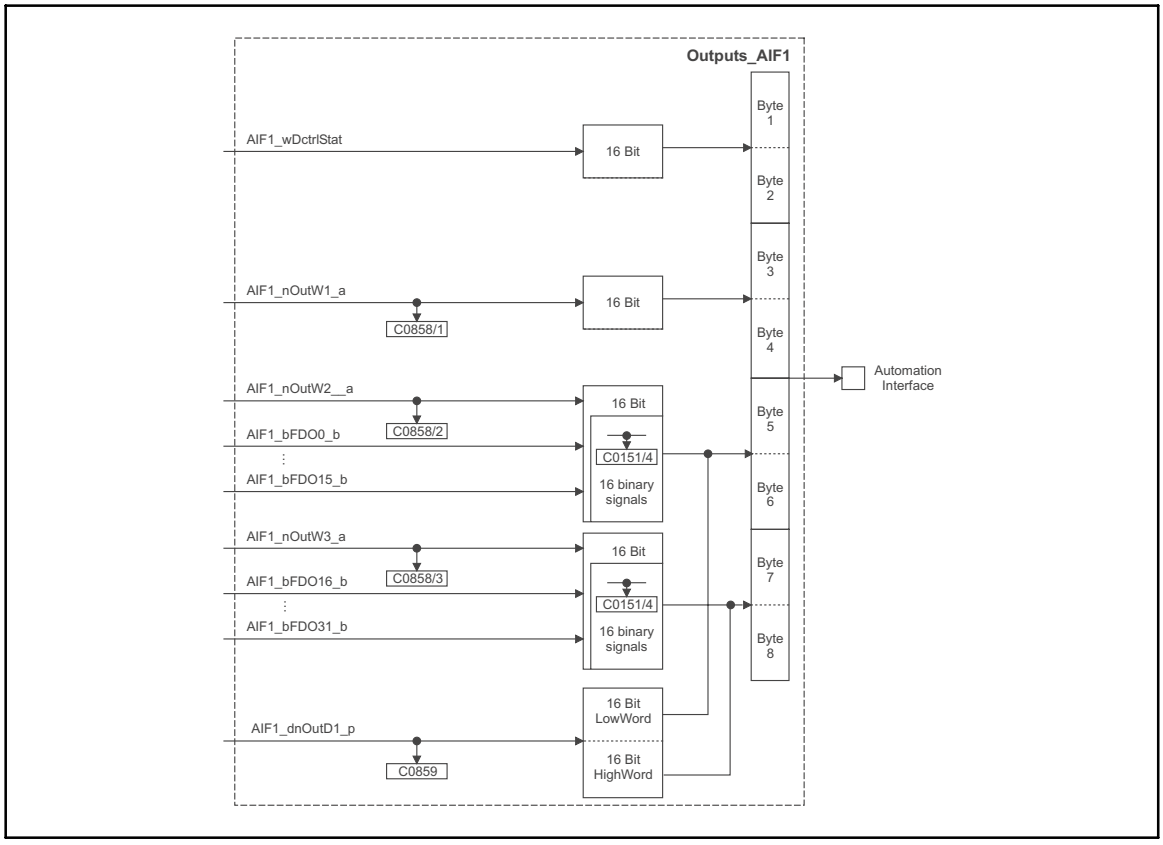


Fig. 2-2 Outputs_AIF1

System variables

Variable	Data type	Signal type	Address	Display code	Display format	Note
AIF1_wDctrlStat	Word	-	%QW41.0	-	-	
AIF1_nOutW1_a	Integer	Analog	%QW41.1	C0858/1	dec [%]	
AIF1_nOutW2_a			%QW41.2	C0858/2		
AIF1_nOutW3_a			%QW41.3	C0858/3		
AIF1_bFDO0_b .. AIF1_bFDO15_b	Bool	Binary	%QX41.2.0 ... %QX41.2.15	C0151/4	hex	Display code in hex as double word
AIF1_bFDO16_b .. AIF1_bFDO31_b			%QX41.3.0 ... %QX41.3.15			
AIF1_dnOutD1_p	Double integer	Position	%QD41.1	C0859	dec [inc]	

User data

The 8 bytes of user data to be sent can be written to via several variables of different data types simultaneously. Thus the data can be transferred by the PLC program as

- binary information (1 bit)
- status word/quasi-analog value (16 bits)
- phase information (32 bits)

according to the requirements.

Byte	Variable (1 bit)	Variable (16 bits)	Variable (32 bits)
1, 2		AIF1_wDctrlStat	
	Notes:	**Drive PLC:** All variables assigned to byte 1/2 can be written to by the PLC program.	
		9300 Servo PLC: Bytes 1 and 2 can be used to transfer the status word from the SB **DCTRL_DriveControl**. • To do this, connect the variable *DCTRL_wStat* of the SB **DCTRL_DriveControl** with the variable *AIF1_wDctrlStat*. • In addition to signals such as IMP and CINH, the SB **DCTRL_DriveControl** status word contains some freely assignable signals which can be written to via the variables *DCTRL_bStateB.._b* of the SB **DCTRL_DriveControl**.	
3, 4		AIF1_nOutW1_a	
5, 6	AIF1_bFDO0_b ... AIF1_bFDO15_b	AIF1_nOutW2_a	AIF1_dnOutD1_p
7, 8	AIF1_bFDO16_b ... AIF1_bFDO31_b	AIF1_nOutW3_a	

Tip!

Avoid simultaneous overwriting via different variable types to ensure data consistency.

- Thus bytes 5 and 6 should only be written to
  - by the variable *AIF1_dnOutD1_p*,
  - by the variable *AIF1_nOutW2_a* or
  - by the variables *AIF1_bFDO0_b* ... *AIF1_bFDO15_b*.

2.2 AIF2_IO_AutomationInterface (node number 42)

2.2.1 Inputs_AIF2

Automation interface (node number 42)

This SB is used as an interface for input signals (e.g. setpoints/actual values) from attached fieldbus modules (e.g. INTERBUS, PROFIBUS-DP).

- The process image is
  - created in the cyclic task in a fixed time interval of 10 ms.
  - created in an interval task within the time set for this task.
  - read at the beginning of the task and written at its end.

Tip!

Please observe the Operating Instructions for the attached fieldbus module.

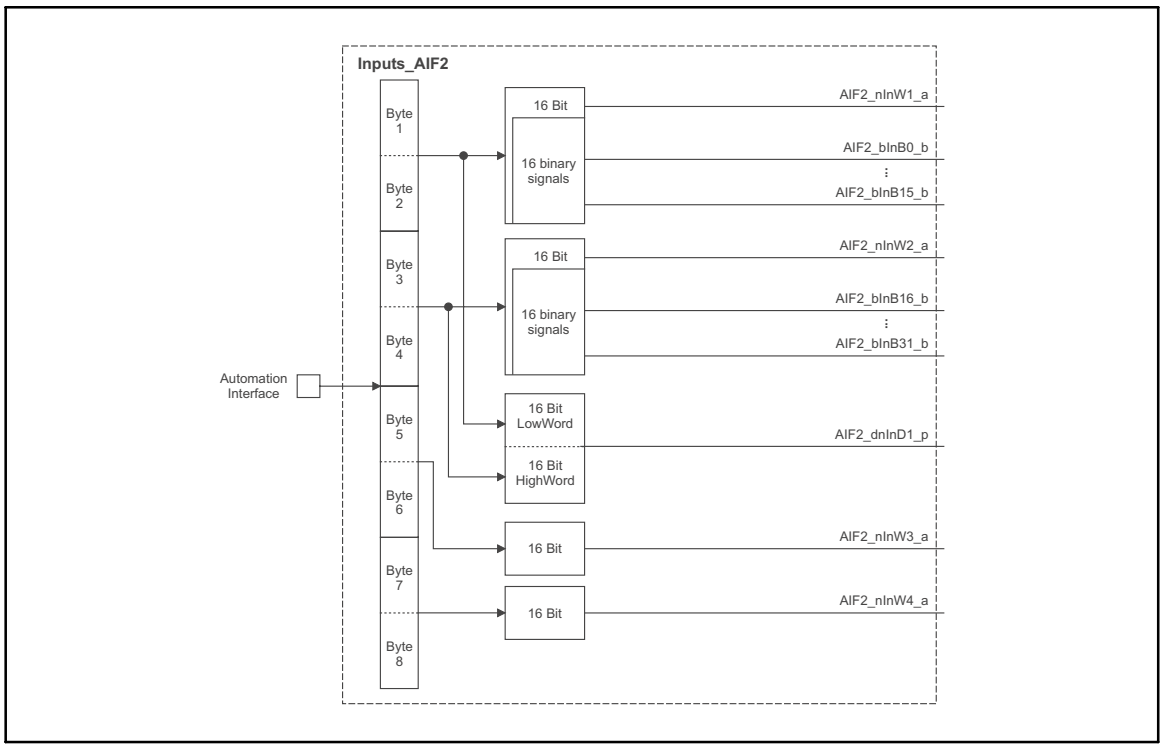


Fig. 2-3 Inputs_AIF2

System variables

Variable	Data type	Signal type	Address	Display code	Display format	Note
AIF2_nInW1_a	Integer	Analog	%IW42.0			
AIF2_nInW2_a			%IW42.1			
AIF2_nInW3_a			%IW42.2			
AIF2_nInW4_a			%IW42.3			
AIF2_bInB0_b ... AIF2_bInB15_b	Bool	Binary	%IX42.0.0 ... %IX42.0.15			
AIF2_bInB16_b ... AIF2_bInB31_b			%IX42.1.0 ... %IX42.1.15			
AIF2_dnInD1_p	Double integer	Position	%ID42.0			

User data

The 4 first bytes of the received 8 bytes of user data are assigned to several variables of different data types simultaneously. Thus the data can be evaluated in the PLC program as

- binary information (1 bit)
- quasi-analog value (16 bits)
- angle information (32 bits)

according to the requirements.

Byte	Variable (1 bit)	Variable (16 bits)	Variable (32 bits)
1, 2	AIF2_bInB0_b ... AIF2_bInB15_b	AIF2_nInW1_a	AIF2_dnInD1_p
3, 4	AIF2_bInB16_b ... AIF2_bInB31_b	AIF2_nInW2_a	
5, 6		AIF2_nInW3_a	
7, 8		AIF2_nInW4_a	

2.2.2 Outputs_AIF2

This SB is used as an interface for output signals (e.g. setpoints/actual values) to attached fieldbus modules (e.g. INTERBUS, PROFIBUS-DP).

- The process image is
  - created in the cyclic task in a fixed time interval of 10 ms.
  - created in an interval task within the time set for this task.
  - read at the beginning of the task and written at its end.

Tip!

Please observe the Operating Instructions for the attached fieldbus module.

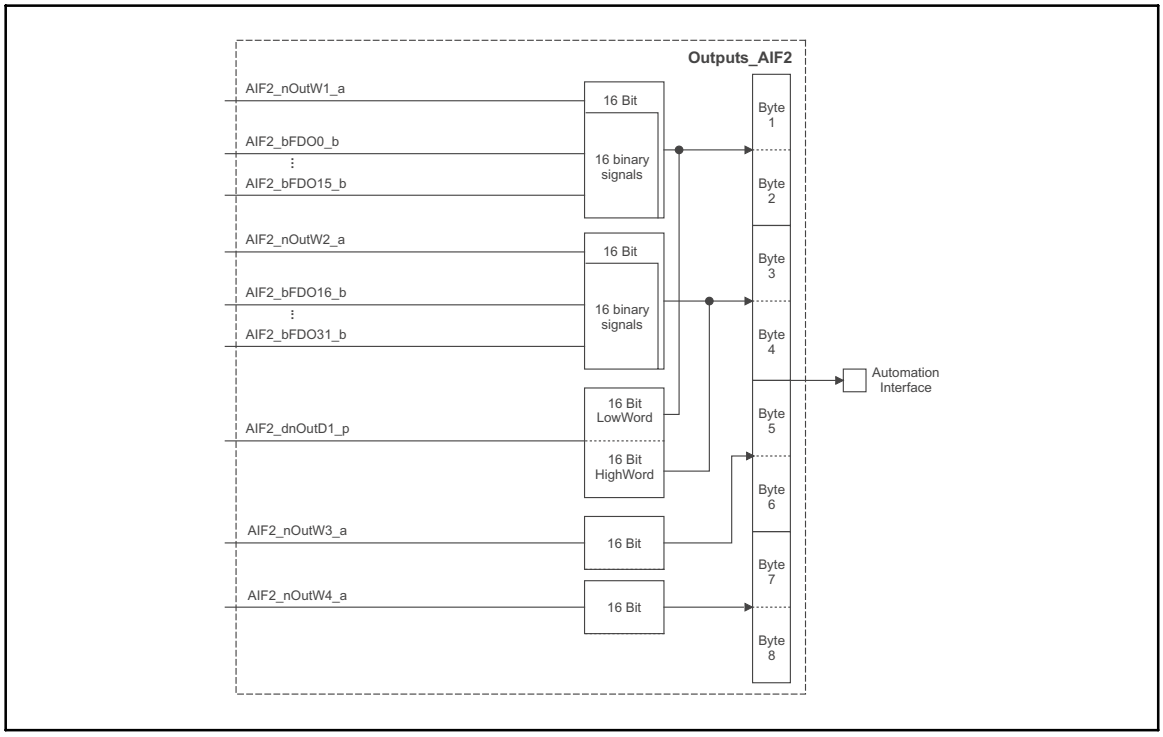


Fig. 2-4 Outputs_AIF2

System variables

Variable	Data type	Signal type	Address	Display code	Display format	Note
AIF2_nOutW1_a	Integer	Analog	%QW42.0			
AIF2_nOutW2_a			%QW42.1			
AIF2_nOutW3_a			%QW42.2			
AIF2_nOutW4_a			%QW42.3			
AIF2_bFDO0_b ... AIF2_bFDO15_b	Bool	Binary	%QX42.0.0 ... %QX42.0.15			
AIF2_bFDO16_b ... AIF2_bFDO31_b			%QX42.1.0 ... %QX42.1.15			
AIF2_dnOutD1_p	Double integer	Position	%QD42.0			

User data

The first 4 bytes of the 8 bytes of user data to be sent can be written to via several variables of different data types at the same time. Data can therefore be transferred by the PLC program as

- binary information (1 bit)
- quasi-analog value (16 bits)
- angle information (32 bits)

according to the requirements.

Byte	Variable (1 bit)	Variable (16 bits)	Variable (32 bits)
1, 2	AIF2_bFDO0_b ... AIF2_bFDO15_b	AIF2_nOutW1_a	AIF2_dnOutD1_p
3, 4	AIF2_bFDO16_b ... AIF2_bFDO31_b	AIF2_nOutW2_a	
5, 6		AIF2_nOutW3_a	
7, 8		AIF2_nOutW4_a	

Tip!

Avoid simultaneous overwriting via different variable types to ensure data consistency.

- Thus bytes 1 and 2 should only be written to
  - by the variable *AIF2_dnOutD1_p*,
  - by the variable *AIF2_nOutW1_a* or
  - by the variables *AIF2_bFDO0_b ... AIF2_bFDO15_b*.

2.3 AIF3_IO_AutomationInterface (node number 43)

2.3.1 Inputs_AIF3

This SB is used as an interface for input signals (e.g. setpoints/actual values) from attached fieldbus modules (e.g. INTERBUS, PROFIBUS-DP).

- The process image is
  - created in the cyclic task in a fixed time interval of 10 ms.
  - created in an interval task within the time set for this task.
  - read at the beginning of the task and written at its end.

Tip!

Please observe the Operating Instructions for the attached fieldbus module.

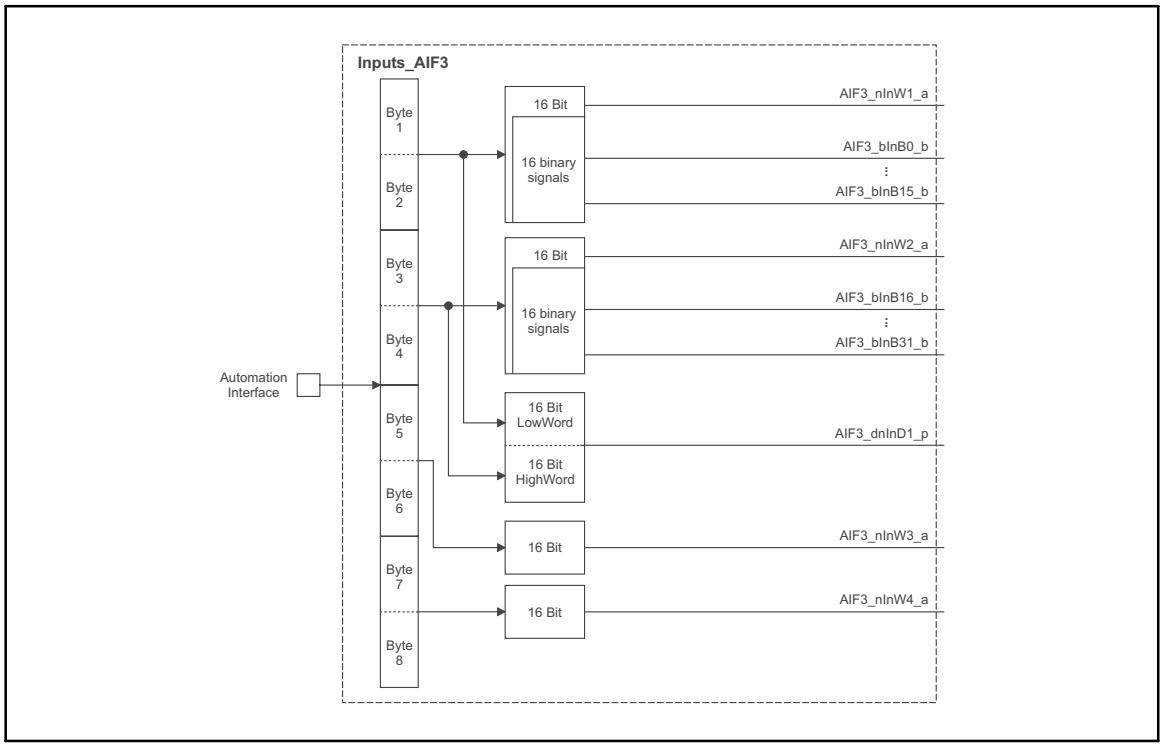


Fig. 2-5 Inputs_AIF3

System variables

Variable	Data type	Signal type	Address	Display code	Display format	Note
AIF3_nInW1_a	Integer	Analog	%IW43.0			
AIF3_nInW2_a			%IW43.1			
AIF3_nInW3_a			%IW43.2			
AIF3_nInW4_a			%IW43.3			
AIF3_bInB0_b ... AIF3_bInB15_b	Bool	Binary	%IX43.0.0 ... %IX43.0.15			
AIF3_bInB16_b ... AIF3_bInB31_b			%IX43.1.0 ... %IX43.1.15			
AIF3_dnInD1_p	Double integer	Position	%ID43.0			

User data

The 4 first bytes of the received 8 bytes of user data are assigned to several variables of different data types simultaneously. Thus the data can be evaluated in the PLC program as

- binary information (1 bit)
- quasi-analog value (16 bits)
- angle information (32 bits)

according to the requirements.

Byte	Variable (1 bit)	Variable (16 bits)	Variable (32 bits)
1, 2	AIF3_bInB0_b ... AIF3_bInB15_b	AIF3_nInW1_a	AIF3_dnInD1_p
3, 4	AIF3_bInB16_b ... AIF3_bInB31_b	AIF3_nInW2_a	
5, 6		AIF3_nInW3_a	
7, 8		AIF3_nInW4_a	

2.3.2 Outputs_AIF3

This SB is used as an interface for output signals (e.g. setpoints/actual values) to attached fieldbus modules (e.g. INTERBUS, PROFIBUS-DP).

- The process image is
  - created in the cyclic task in a fixed time interval of 10 ms.
  - created in an interval task within the time set for this task.
  - read at the beginning of the task and written at its end.

Tip!

Please observe the Operating Instructions for the attached fieldbus module.

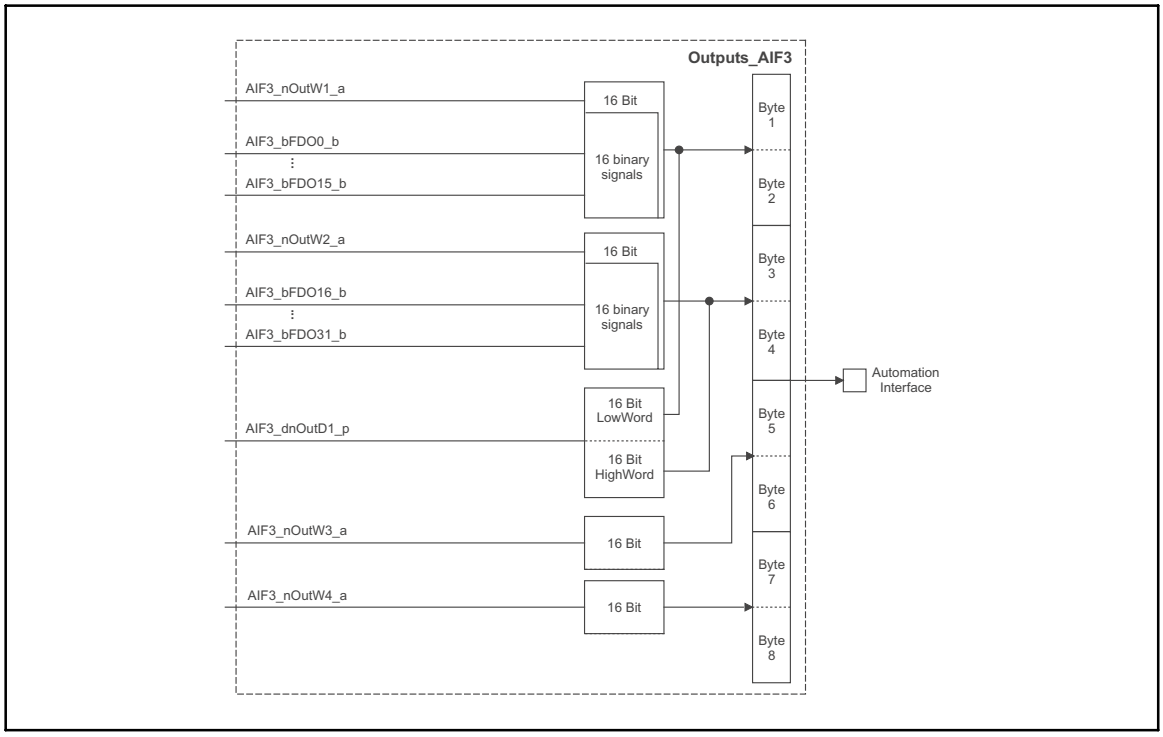


Fig. 2-6 Outputs_AIF3

System variables

Variable	Data type	Signal type	Address	Display code	Display format	Note
AIF3_nOutW1_a	Integer	Analog	%QW43.0			
AIF3_nOutW2_a			%QW43.1			
AIF3_nOutW3_a			%QW43.2			
AIF3_nOutW4_a			%QW43.3			
AIF3_bFDO0_b ... AIF3_bFDO15_b	Bool	Binary	%QX43.0.0 ... %QX43.0.15			
AIF3_bFDO16_b ... AIF3_bFDO31_b			%QX43.1.0 ... %QX43.1.15			
AIF3_dnOutD1_p	Double integer	Position	%QD43.0			

User data

The first 4 bytes of the 8 bytes of user data to be sent can be written to via several variables of different data types at the same time. Data can therefore be transferred by the PLC program as

- binary information (1 bit)
- quasi-analog value (16 bits)
- angle information (32 bits)

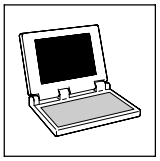
according to the requirements.

Byte	Variable (1 bit)	Variable (16 bits)	Variable (32 bits)
1, 2	AIF3_bFDO0_b ... AIF3_bFDO15_b	AIF3_nOutW1_a	AIF3_dnOutD1_p
3, 4	AIF3_bFDO16_b ... AIF3_bFDO31_b	AIF3_nOutW2_a	
5, 6		AIF3_nOutW3_a	
7, 8		AIF3_nOutW4_a	

Tip!

Avoid simultaneous overwriting via different variable types to ensure data consistency.

- Thus bytes 1 and 2 should only be written to
  - by the variable *AIF3_dnOutD1_p*,
  - by the variable *AIF3_nOutW1_a* or
  - by the variables *AIF3_bFDO0_b ... AIF3_bFDO15_b*.



2.4 AIF_IO_Management (node number 161)

2.4.1 Inputs_AIF_Management

This SB monitors the communication of a fieldbus module connected to an automation interface (AIF).

- In the event of an error, *AIF_bCe0CommErr_b* is set to **TRUE** and the communication error ”CE0” (LECOM no. 61) is initiated. The response to this error can be configured under C0126 (Lenze setting: off).
- New AIF fieldbus modules (e.g. 2133 and 2175) also use *AIF_bFieldBusStateBit0_b* ... *AIF_bFieldBusStateBit15_b* to transfer an error number from the fieldbus module.
- C2121 displays the status.

Tip!

Read the documentation for the attached fieldbus module.

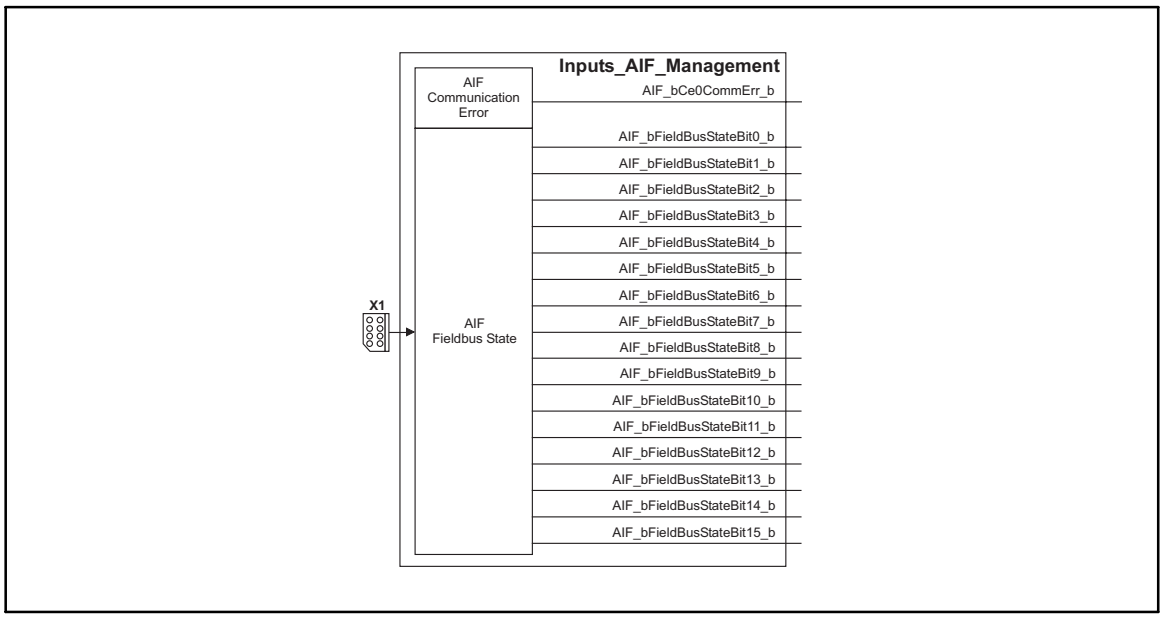


Fig. 2-7 System block ”Inputs_AIF_Management”

System variables

Variable	Data type	Signal type	Address	Display code	Display format	Note
AIF_bCe0CommErr_b	Bool	Binary	%IX161.0.0			Communication error “CE0”
AIF_bFieldBusStateBit0_b			%IX161.1.0			Error number - bit 0
AIF_bFieldBusStateBit1_b			%IX161.1.1			Error number - bit 1
AIF_bFieldBusStateBit2_b			%IX161.1.2			Error number - bit 2
AIF_bFieldBusStateBit3_b			%IX161.1.3			Error number - bit 3
AIF_bFieldBusStateBit4_b			%IX161.1.4			Error number - bit 4
AIF_bFieldBusStateBit5_b			%IX161.1.5			Error number - bit 5
AIF_bFieldBusStateBit6_b			%IX161.1.6			Error number - bit 6
AIF_bFieldBusStateBit7_b			%IX161.1.7			Error number - bit 7
AIF_bFieldBusStateBit8_b			%IX161.1.8			Error number - bit 8
AIF_bFieldBusStateBit9_b			%IX161.1.9			Error number - bit 9
AIF_bFieldBusStateBit10_b			%IX161.1.10			Error number - bit 10
AIF_bFieldBusStateBit11_b			%IX161.1.11			Error number - bit 11
AIF_bFieldBusStateBit12_b			%IX161.1.12			Error number - bit 12
AIF_bFieldBusStateBit13_b			%IX161.1.13			Error number - bit 13
AIF_bFieldBusStateBit14_b			%IX161.1.14			Error number - bit 14
AIF_bFieldBusStateBit15_b			%IX161.1.15			Error number - bit 15

Codes

Code	LCD	Possible settings		Info
		Lenze	Selection	
C0126	MONIT CE0	3		Configuration for communication error ”CE0” with automation interface
			0 TRIP 2 Warning 3 Off	
C2121	AIF: state	Disp		AIF-CAN: Status • Detailed information can be found in the documentation for the corresponding fieldbus module.
			0 {dec} 255 Decimal value is bit-coded: Bit 0 XCAN1_IN monitoring time Bit 1 XCAN2_IN monitoring time Bit 2 XCAN3_IN monitoring time Bit 3 XCAN bus-off Bit 4 XCAN operational Bit 5 XCAN pre-operational Bit 6 XCAN warning Bit 7 Internally assigned	

2.4.2 Outputs_AIF_Management

This SB transfers commands and messages to a fieldbus module connected to an automation interface (AIF).

For this purpose C2120 provides a control word. The commands are specified as numbers. Some command numbers are universally applicable for all fieldbus modules, others apply only for special modules. The total number of commands available can amount to up to 16.

Tip!

Read the documentation for the attached fieldbus module.

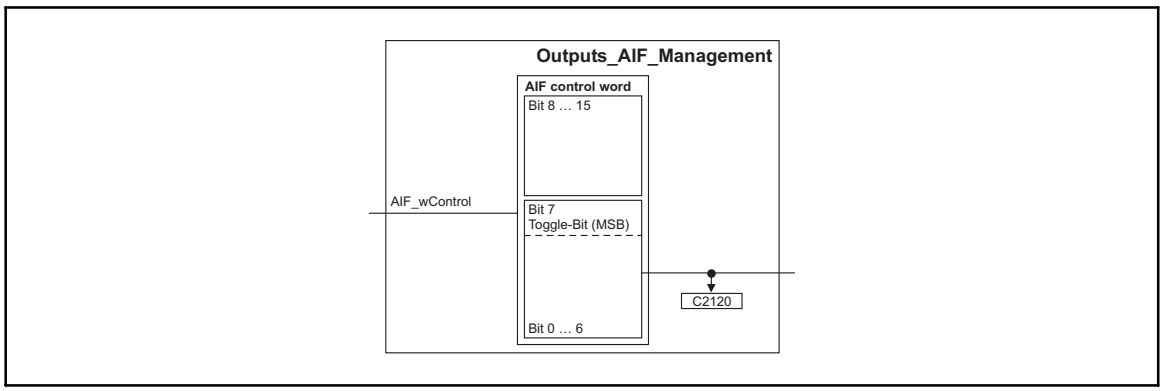


Fig. 2-8 System block "Outputs_AIF_Management"

System variables

Variable	Data type	Signal type	Address	Display code	Display format	Note
AIF_wControl	Word		%QX161.0	C2120		

Codes

Code	LCD	Possible settings		Info
		Lenze	Selection	
C2120	AIF: Control			AIF command
			0 No command	
			1 Read CAN codes + reinitialisation	
			2 Read XCAN codes	
			10 Read XCAN C2356/1 ... 4	
			11 Read XCAN C2357	
			12 Read XCAN C2375	
			13 Read XCAN C2376 ... C2378	
			14 Read XCAN C2382	
			255 Not assigned	

2.5 ANALOG1_IO (node number 11)

2.5.1 Inputs_ANALOG1 (analog input)

The input is the interface for differential analog signals between terminals X6/1, 2. It can be used as a setpoint input or as an actual value input.

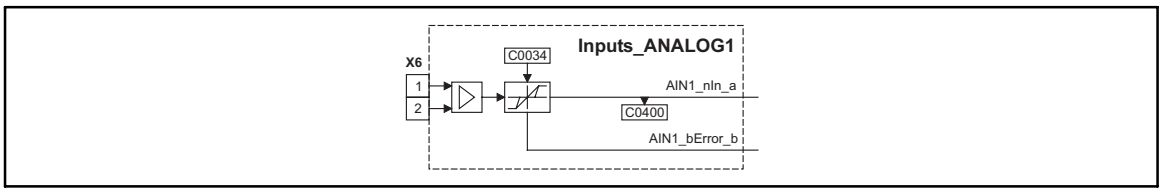


Fig. 2-9 Inputs_ANALOG1

System variables

Variable	Data type	Signal type	Address	Display code	Display format	Note
AIN1_nIn_a	Integer	Analog	%IW11.0	C0400	dec [%]	Analog input 1
AIN1_bError_b	Bool	Binary	%IX11.1.0	-	-	Only when C0034 = 1: TRUE if $\|I\| < 2$ mA

Selection of master voltage/master current

- C0034 can be used to set whether the input is to be used for a master voltage or a master current:

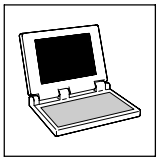
Code	LCD	Possible settings			Info
		Lenze	Selection		
C0034	Mst current	0			Selection: Master voltage/master current
			0	-10 V ... + 10 V (master voltage)	
			1	+4 mA ... +20 mA (master current)	
			2	-20 mA ... +20 mA	

- Please also observe the jumper position X3 at the front of the 9300 Servo PLC in this connection (see terminal assignment).

Use as a 4 ... 20 mA master current input

- If the input is used as a master current input (C0034 =1), then *AIN1_bError_b* = TRUE as long as the absolute value of the master current is < 2 mA, otherwise it is FALSE.
- C0598 can be used to set the response for the case that the absolute value of the master current is < 2 mA:

Code	LCD	Possible settings			Info
		Lenze	Selection		
C0598	MONIT SD5	3			Monitoring configuration: Absolute master current value across X6/1, 2 < 2 mA
			0	TRIP	
			2	Warning	
			3	Off	

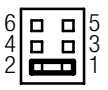
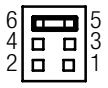


Terminal assignment

- Set via C0034 whether the input is to be used for a master voltage or a master current.
- Set jumper bar X3 according to setting in C0034:

Stop!

Do not plug the jumper on 3-4! The PLC cannot be initialised in this case.

Terminal	Use	Jumper X3	Measuring range	
X6/1, 2	Differential input for master voltage		**C0034 = 0** Level: Resolution: Scaling:	 -10 V ... +10 V 5 mV (11 bits + sign) ±10 V ≡ ±16384 ≡ ±100 %
	Differential input for master current		**C0034 = 1** Level: Resolution: Scaling:	 +4 mA ... +20 mA 20 µA (10 bits without sign) +4 mA ≡ 0 ≡ 0 % +20 mA ≡ +16384 ≡ +100 %
			C0034 = 2 Level: Resolution: Scaling:	 -20 mA ... +20 mA 20 µA (10 bits + sign) ±20 mA ≡ ±16384 ≡ ±100 %

2.5.2 Outputs_ANALOG1 (analog output)

The output can be used as a monitor output. Internal analog signals can be output as voltage signals via terminal X6/62 and used, for instance, as display values or setpoints for slave drives.

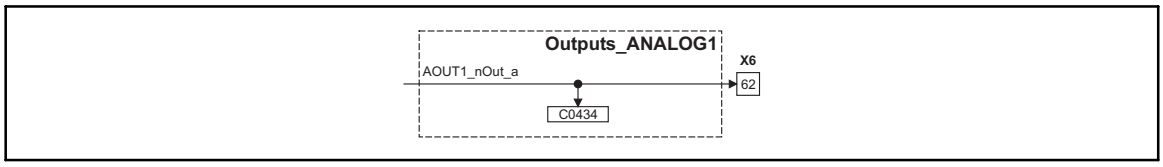


Fig. 2-10 Outputs_ANALOG1

System variables

Variable	Data type	Signal type	Address	Display code	Display format	Note
AOUT1_nOut_a	Integer	Analog	%QW11.0	C0434	dec [%]	Analog output 1

Terminal assignment

Terminal	Use	Measuring range	
X6/62	Analog output 1 (monitor 1)	Level: Resolution: Scaling:	-10 V ... +10 V (max. 2 mA) 20 mV (9 bits + sign) ±10 V ≡ ±16384 ≡ ±100 %
X6/7	Internal ground, GND	-	

2.6 ANALOG2_IO (node number 12)

2.6.1 Inputs_ANALOG2 (analog input)

The input is the interface for differential analog signals between terminals X6/3, 4.

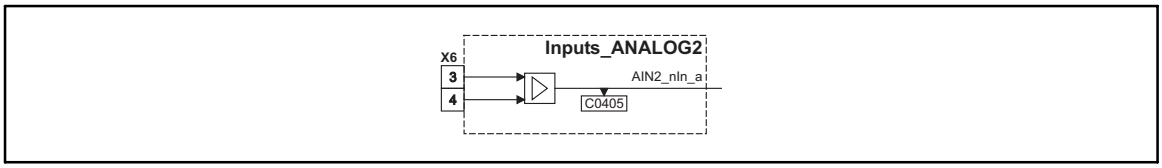


Fig. 2-11 Inputs_ANALOG2

System variables

Variable	Data type	Signal type	Address	Display code	Display format	Note
AIN2_nIn_a	Integer	Analog	%IW12.0	C0405	dec [%]	Analog input 2

Terminal assignment

Terminal	Use	Measuring range
X6/3, 4	Differential input for master voltage (no effect of jumper X3)	Level: -10 V ... +10 V Resolution: 5 mV (11 bits + sign) Scaling: ±10 V ≡ ±16384 ≡ ±100 %

2.6.2 Outputs_ANALOG2 (analog output)

The output can be used as a monitor output. Internal analog signals can be output as voltage signals via terminal X6/63 and used, for instance, as display values or setpoints for slave drives.

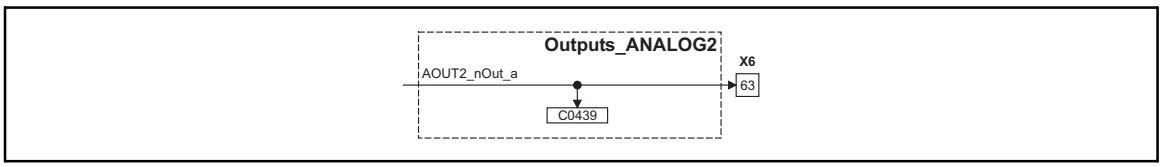


Fig. 2-12 Outputs_ANALOG2

System variables

Variable	Data type	Signal type	Address	Display code	Display format	Note
AOUT2_nOut_a	Integer	Analog	%QW12.0	C0439	dec [%]	Analog output 2

Terminal assignment

Terminal	Use	Measuring range
X6/63	Analog output 2 (monitor 2)	Level: -10 V ... +10 V (max. 2 mA) Resolution: 20 mV (9 bits + sign) Scaling: ±10 V ≡ ±16384 ≡ ±100 %
X6/7	Internal ground, GND	-

2.7 DCTRL_DriveControl (node number 121)

This SB controls the transition of the 9300 Servo PLC to certain states (e.g. TRIP, TRIP-RESET, quick stop (QSP) or controller inhibit (CINH)).

- The process image is created in the course of a fixed system task (interval: 2 ms).

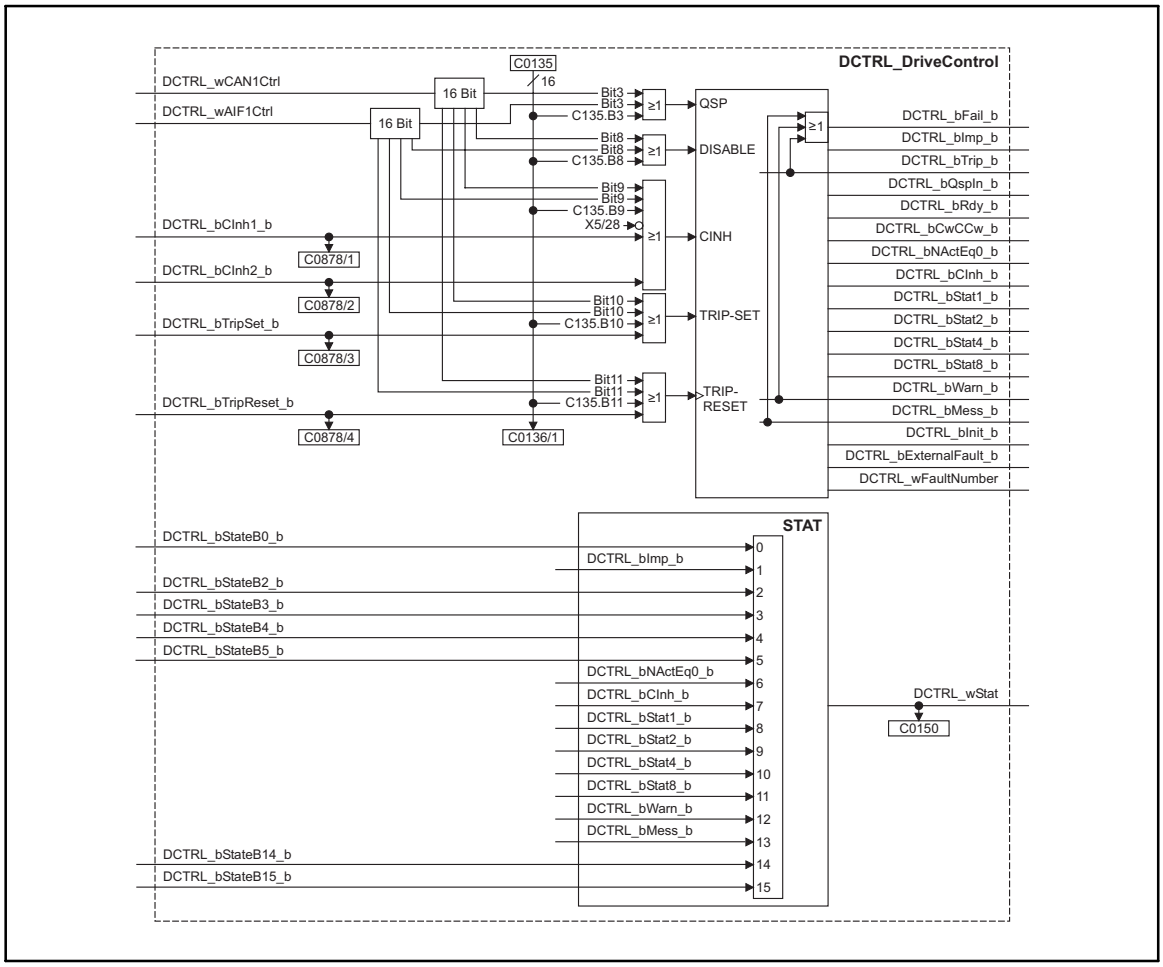


Fig. 2-13 DCTRL_DriveControl

Tip!

The SB **DCTRL_DriveControl** only affects the motor control and drive control of the 9300 Servo PLC, i.e. motor control/drive control and application program of the PLC are completely independent of each other as long as the signals are not queried in the application program.

- If, for instance, the motor control initiates a TRIP, the application program will not be stopped!
- If, however, a TRIP is caused by a task overflow, the application program of the PLC will be stopped as well!

2.7.1 Inputs_DCTRL

System variables

Variables	Data type	Signal type	Address	Display code	Display format	Note	
DCTRL_bFail_b	Bool	Binary	%IX121.0.0			TRUE = active error	
DCTRL_bImp_b			%IX121.0.1			TRUE = power output stages with high resistance	
DCTRL_bTrip_b			%IX121.0.2			TRUE = active fault	
DCTRL_bQspIn_b			%IX121.0.3			TRUE = quick stop (QSP)	📖 2-23
DCTRL_bRdy_b			%IX121.0.4			TRUE = ready for operation	
DCTRL_bCwCcw_b			%IX121.0.5			FALSE = CW, TRUE = CCW	
DCTRL_bNActEq0_b			%IX121.0.6			TRUE = motor speed < C0019	
DCTRL_bCInh_b			%IX121.0.7			TRUE = RSP	📖 2-24
DCTRL_bStat1_b	Bool	Binary	%IX121.0.8			Status signals	📖 2-25
DCTRL_bStat2_b			%IX121.0.9				
DCTRL_bStat4_b			%IX121.0.10				
DCTRL_bStat8_b			%IX121.0.11				
DCTRL_bWarn_b	Bool	Binary	%IX121.0.12			TRUE = active warning	
DCTRL_bMess_b			%IX121.0.13			TRUE = active message	
DCTRL_bInit_b			%IX121.0.14			TRUE = initialisation phase	
DCTRL_bExternalFault_b			%IX121.0.15			TRUE = external error	📖 2-26
DCTRL_wStat	Word	-	%IW121.1	C0150	hex	Status word	📖 2-25
DCTRL_wFaultNumber			%IW121.2	C0168		Current error number	📖 3-9

2.7.2 Outputs_DCTRL

System variables

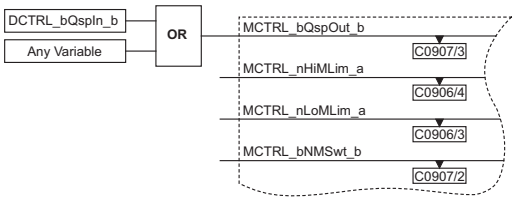
Variable	Data type	Signal type	Address	Display code	Display format	Note	
DCTRL_wCAN1Ctrl	Word		%QW121.3			CAN control word	
DCTRL_wAIF1Ctrl			%QW121.2			AIF control word	
DCTRL_bCInh1_b	Bool	Binary	%QX121.0.1	C0878/1	bin	Controller inhibit (CINH)	📖 2-23
DCTRL_bCInh2_b			%QX121.0.2	C0878/2			
DCTRL_bTripSet_b			%QX121.0.3	C0878/3		TRIP-SET	📖 2-24
DCTRL_bTripReset_b			%QX121.0.4	C0878/4		TRIP-RESET	📖 2-25
DCTRL_bStatB0_b	Bool	Binary	%QX121.1.0			Status signals	📖 2-25
DCTRL_bStatB2_b			%QX121.1.2				
DCTRL_bStatB3_b			%QX121.1.3				
DCTRL_bStatB4_b			%QX121.1.4				
DCTRL_bStatB5_b			%QX121.1.5				
DCTRL_bStatB14_b			%QX121.1.14				
DCTRL_bStatB15_b			%QX121.1.15				

2.7.3 Quick stop (QSP)

The QSP function is used to stop the drive independently of the selected setpoint within an adjustable time interval.

Note!

Quick stop (QSP) will only be set if *DCTRL_bQspIn_b* is connected to *MCTRL_bQspOut_b* of SB **MCTRL_MotorControl**:



- The function can be controlled via the following 3 inputs (OR-linked):
  - Control word *CAN1_wDctrlCtrl* of SB **CAN1_IN**
  - Control word *AIF_wDctrlCtrl* of SB **AIF1_IN**
  - Control word C0135, bit 3
- C0136/1 indicates the control word C0135:

Code	LCD	Possible settings				Info
		Lenze	Selection			
C0136	CTRLWORD	Disp				Control word • Hexadecimal value is bit-coded.
			0	{hex}	FFFF	
1						DCTRL_DriveControl

- Speed is reduced to 0 within the deceleration time set under C0105:

Code	LCD	Possible settings				Info
		Lenze	Selection			
C0105	QSP Tif	0.000				Deceleration time for quick stop (QSP) • Referred to speed change n_{max} ... 0.
			0.000	{0.001 s}	999.900	

2.7.4 Operation disabled (DISABLE)

This function sets ”Operation disabled (DISABLE)” in the drive, i.e. the power output stages are inhibited and all speed/current/position controllers are reset. With ”Operation disabled”, the drive cannot be started with the ”Controller enable” command.

- The function can be controlled via the following 3 inputs (OR-linked):
  - Control word *CAN1_wDctrlCtr* of SB **CAN1_IN**
  - Control word *AIF_wDctrlCtrl* of SB **AIF1_IN**
  - Control word C0135, bit 8
- C0136/1 indicates the control word C0135. (📖 2-23)

2.7.5 Controller inhibit (CINH)

This function sets ”Controller inhibit (CINH)” in the drive, i.e. the power output stages are inhibited and all speed/current/position controllers are reset.

- The function can be controlled via the following 6 inputs (OR-linked):
  - Terminal X5/28 (FALSE = controller inhibit active)
  - Control word *CAN1_wDctrlCtr* of SB **CAN1_IN**
  - Control word *AIF_wDctrlCtrl* of SB **AIF1_IN**
  - Control word C0135, bit 9
  - System variable *DCTRL_bCInh1_b* (TRUE = set controller inhibit)
  - System variable *DCTRL_bCInh2_b* (TRUE = set controller inhibit)
- C0136/1 indicates the control word C0135. (📖 2-23)

2.7.6 Setting TRIP (TRIP-SET)

This function sets ”TRIP” in the drive and signals an ”external error” (error message ”EEr”).

- The function can be controlled via the following 4 inputs (OR-linked):
  - Control word *CAN1_wDctrlCtr* of SB **CAN1_IN**
  - Control word *AIF_wDctrlCtrl* of SB **AIF1_IN**
  - Control word C0135, bit 10
  - System variable *DCTRL_bTripSet_b* (TRUE = set TRIP)
- C0136/1 indicates the control word C0135. (📖 2-23)
- The response to TRIP can be set under C0581:

Code	LCD	Possible settings		Info
		Lenze	Selection	
C0581	MONIT Eer	0		Monitoring configuration: External error
			0 TRIP	
			1 Message	
			2 Warning	
			3 Off	

2.7.7 Resetting TRIP (TRIP-RESET)

This function resets an active TRIP provided that the cause of malfunction is eliminated. If the cause of malfunction is still active, there is no response.

- The function can be controlled via the following 4 inputs (OR-linked):
  - Control word *CAN1_wDctrlCtr* of SB **CAN1_IN**
  - Control word *AIF_wDctrlCtrl* of SB **AIF1_IN**
  - Control word C0135, bit 11
  - System variable *DCTRL_bTripReset_b*

Note!

The function can only be performed by the FALSE-TRUE edge of the signal resulting from the OR operation!

- A FALSE-TRUE edge cannot occur if one of the inputs is TRUE!

- C0136/1 indicates the control word C0135. (📖 2-23)

2.7.8 Output of digital status signals

Via *DCTRL_wStat* a status word is output which consists of the signals generated from the SB **DCTRL_DriveControl** and of signals from freely configurable SB inputs:

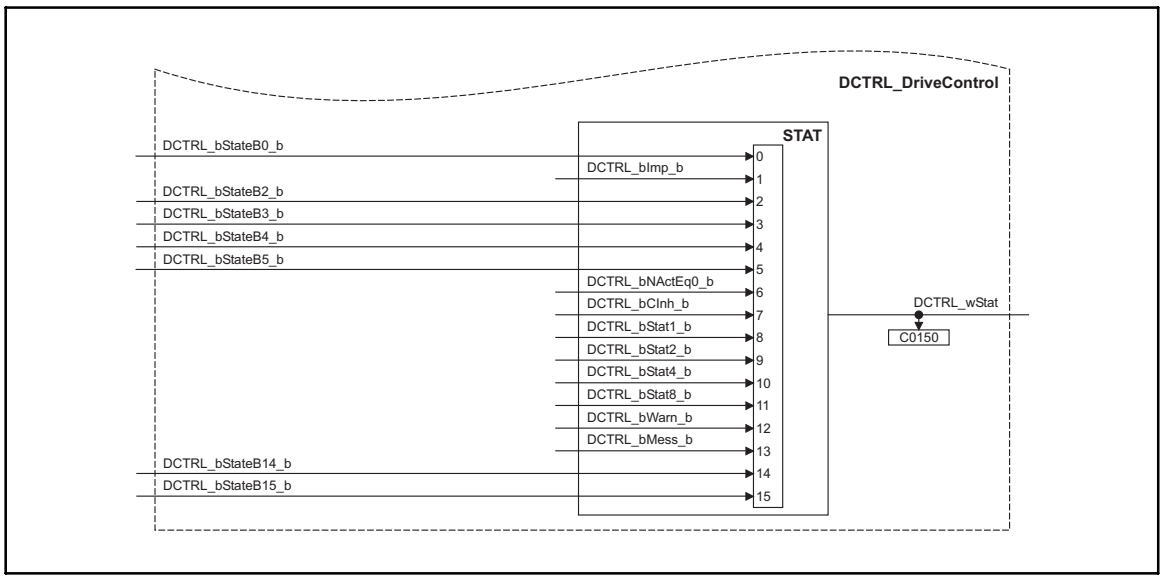


Fig. 2-14 Output of the status word DCTRL_wStat

- With C0150 you can display the status word:

Code	LCD	Possible settings			Info
		Lenze	Selection		
C0150	Status word	Disp			Status word DCTRL_wStat • FCODE_bC150Bit0_b ... FCODE_bC150Bit15_b
			0 {1} 65535		
			Decimal value is bit-coded:		
			Bit 00	Freely configurable 0	DCTRL_bStateB0_b
			Bit 01	IMP (DCTRL_bImp_b)	
			Bit 02	Freely configurable 2	DCTRL_bStateB2_b
			Bit 03	Freely configurable 3	DCTRL_bStateB3_b
			Bit 04	Freely configurable 4	DCTRL_bStateB4_b
			Bit 05	Freely configurable 5	DCTRL_bStateB5_b
			Bit 06	n = 0 (DCTRL_bNActEq0_b)	
			Bit 07	RSP (DCTRL_bClnh_b)	
			Bit 08	Status (DCTRL_bStat1_b)	
			Bit 09	Status (DCTRL_bStat2_b)	
			Bit 10	Status (DCTRL_bStat4_b)	
			Bit 11	Status (DCTRL_bStat5_b)	
			Bit 12	Warning (DCTRL_bWarn_b)	
			Bit 13	Message (DCTRL_bMess_b)	
			Bit 14	Freely configurable 14	DCTRL_bStateB14_b
			Bit 15	Freely configurable 15	DCTRL_bStateB15_b

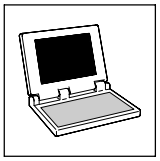
- The system variables *DCTRL_bStat1_b* ... *DCTRL_bStat8_b* display the status of the drive in binary-coded form:

DCTRL_bStat8_b	DCTRL_bStat4_b	DCTRL_bStat2_b	DCTRL_bStat1_b	Status
0	0	0	0	Initialisation after connection of the supply voltage
0	0	0	1	Protection against unexpected start-up active (C0142 = 0)
0	0	1	1	Drive inhibited (controller inhibit)
0	1	1	0	Drive enabled
0	1	1	1	The triggering of a monitoring function resulted in a ”message”
1	0	0	0	The triggering of a monitoring function resulted in a TRIP
0 = FALSE	1 = TRUE			

2.7.8.1 TRIP status (DCTRL_bExternalFault_b)

If a ”TRIP” is initiated in the drive (e.g. via the system variable *DCTRL_bTripSet_b*, C0135/bit 10 or keypad), the system variable *DCTRL_bExternalFault_b* is set to TRUE.

- *DCTRL_bExternalFault_b* is reset to FALSE by confirming the TRIP.



2.7.9 Transfer of status/control word via AIF

If the control and/or status word of SB **DCTRL_DriveControl** is to be assigned to SB **AIF1_IO**, the following program in the IEC1131-3 programming language IL can, for instance, be used:

```
LD DCTRL_wStat
ST AIF1_wDctrlStat    /* writing the status word */

LD AIF1_wDctrlCtrl
ST DCTRL_wAIF1Ctrl    /* writing the control word */
```

Tip!

The assignment of the status/control word depends on the communication module used and on the transmission profile set (e.g. DRIVECOM).

2.8 DFIN_IO_DigitalFrequency (node number 21)

2.8.1 Inputs_DFIN

This SB can convert a pulse current at the digital frequency input X9 into a speed value and scale it.

- The transmission is very precise without offset and gain errors.
- In addition, this SB provides the phase correction value *DFIN_dnIncLastScan_p* which is required within the calling task for phase processing of touch probe processes. (📖 2-33)

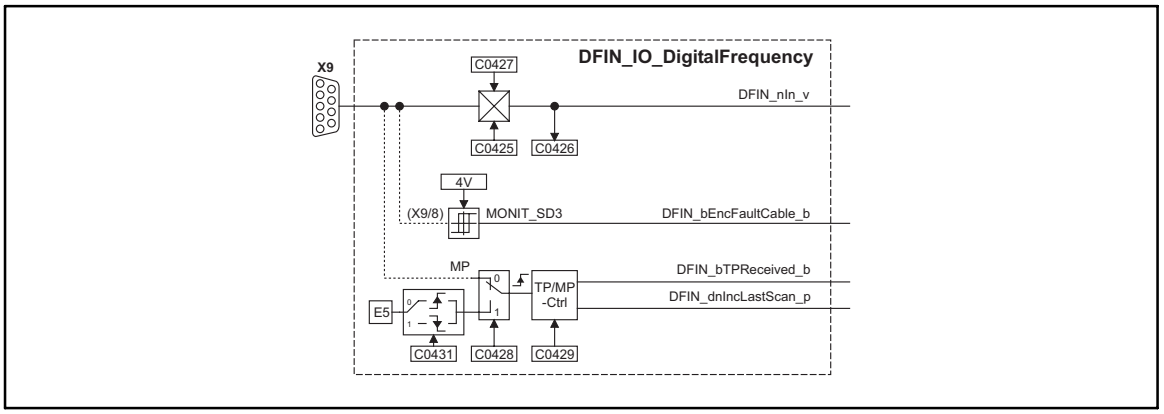


Fig. 2-15 DFIN_IO_DigitalFrequency

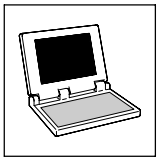
System variables

Variable	Data type	Signal type	Address	Display code	Display format	Note
DFIN_nIn_v	Integer	Velocity	%IW21.0	C0426	dec [rpm]	Value in inc/ms
DFIN_bEncFaultCable_b	Bool	Binary	%IX21.1.0	-	-	TRUE = Monitoring "FaultEncCable" has been triggered because X9/8 is not supplied with voltage and the digital frequency coupling is thus interrupted.
DFIN_bTPReceived_b	Bool	Binary	%IX21.1.2	-	-	Receive touch probe (TP)
DFIN_dnIncLastScan_p	Double integer	Position	%ID21.1	-	-	Δinc between TP and start of the task

Stop!

The digital frequency input X9 cannot be used if

- you use the digital frequency output X10 (C0540 = 0, 1, 2) **and**
- an incremental encoder/sin-cos encoder!



Tip!

The process image is newly created for every task the SB is used in.

- If *DFIN_nIn_v*, *DFIN_dnIncLastScan_p* and *DFIN_bTPReceived_b* are used in several tasks, each task creates its own SB process image.
- This process is different from the previous process image creation principle!

- The digital frequency input X9 is dimensioned for TTL-level signals.
- The input of a zero track is optional.

Configuration of the number of increments

- The drive can be adapted to the connected encoder or upstream controller with digital frequency cascade or digital frequency bus under C0425.

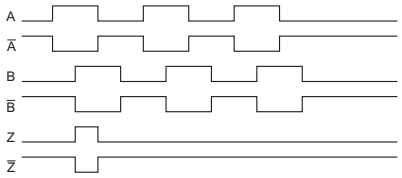
Code	LCD	Possible settings		Info
		Lenze	Selection	
C0425	DFIN const	3		Number of increments of the encoder input
			0 256 increments per revolution	
			1 512 increments per revolution	
			2 1024 increments per revolution	
			3 2048 increments per revolution	
			4 4096 increments per revolution	
			5 8192 increments per revolution	
			6 16384 increments per revolution	

Configuration of the digital frequency input signal

- The type of the digital frequency input signal is configured under C0427:

Code	LCD	Possible settings		Info
		Lenze	Selection	
C0427	DFIN function	0		Type of the digital frequency signal
			0 2 phases	
			1 A = Speed / B = Direction	
			2 A or B = Speed or direction	

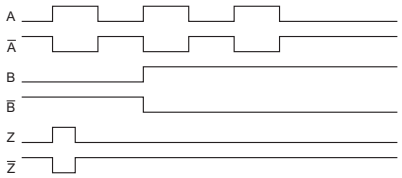
C0427 = 0 (2 phases)



Signal sequence with phase shift (CW rotation)

Track	CW rotation	CCW rotation
A	leads track B by 90° (*DFIN_nIn_v* = positive value)	lags behind track B by 90° (*DFIN_nIn_v* = negative value)
B	-	-

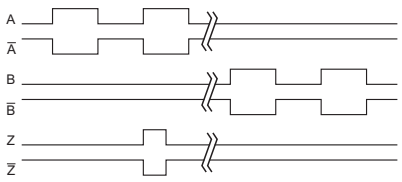
C0427 = 1 (A = Speed / B = Direction)



Control of the direction of rotation via track B

Track	CW rotation	CCW rotation
A	transmits the speed	transmits the speed
B	= FALSE (*DFIN_nIn_v* = positive value)	= TRUE (*DFIN_nIn_v* = negative value)

C0427 = 2 (A or B = speed or direction)



Control of the speed and the direction of rotation via track A or track B

Track	CW rotation	CCW rotation
A	transmits the speed and the direction of rotation (*DFIN_nIn_v* = positive value)	= FALSE
B	= FALSE	transmits the speed and the direction of rotation (*DFIN_nIn_v* = negative value)

Transmission function

$$\text{DFIN\_nIn\_v} = \text{f [Hz]} \cdot \frac{60}{\text{number of increments from C0425}} \cdot \frac{2^{14}}{15000}$$

Example:

- Input frequency = 200 kHz
- C0425 = 3, this corresponds to 2048 increments/rev.

$$\text{DFIN\_nIn\_v [rpm]} = 200000\ \text{Hz} \cdot \frac{60}{2048} = 5859\ \text{rpm}$$

Signal adaptation

Finer resolutions can be achieved by adding a downstream FB (e.g. L_CONV from the LenzeDrive.lib):

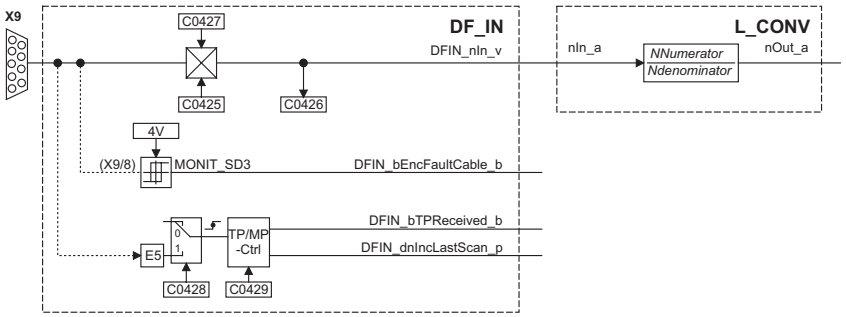
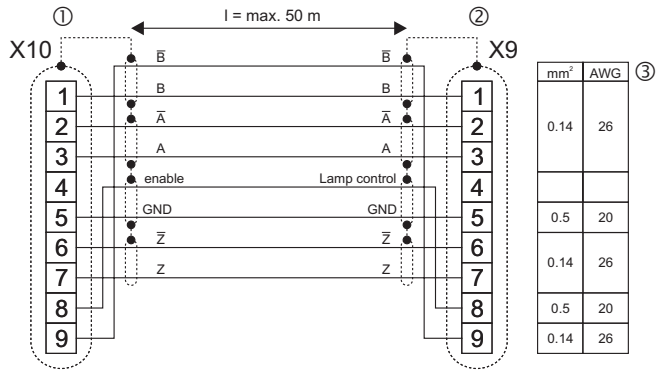


Fig. 2-16 Digital frequency input (DFIN_IO_DigitalFrequency) with downstream FB L_CONV for scaling

$$\text{nOut\_a} = \text{f [Hz]} \cdot \frac{60}{\text{number of increments from C0425}} \cdot \frac{\text{nNumerator}}{\text{nDenominator}} \cdot \frac{2^{14}}{15000}$$

2.8.1.1 Technical data for the connection of X9



The connection is to be carried out as shown in the wiring diagram:
- Use cables which are twisted and shielded in pairs.
- Connect the shield at both ends.
- Observe specified cable cross-sections.

Fig. 2-17 Connection of digital frequency output X10 with digital frequency input X9

① Master drive
② Slave drive
③ Cable cross-sections to be used

Note!

Digital frequency input (X8/X9) and digital frequency output (X10) cannot be used independently of each other, i.e. either X8 or X9 is output to X10 (C0540 = 4, 5).

- If the configuration under C0540 selects another output for X10 (C0540 = 0, 1, 2), the digital frequency inputs X8/X9 are deactivated.

Digital frequency input X9

Technical data	
Connection:	Sub-D male connector, 9-pole
Output frequency:	0 - 500 kHz
Current consumption:	Max. 6 mA per channel
Possible input signals:	• Incremental encoder with two 5 V complementary signals (TTL encoders), shifted by 90° • Encoder simulation of the master drive
Properties	
• Two-track with inverse 5 V signals and zero track • PIN 8 (LC) monitors the cable / the upstream drive controller: – When PIN 8 is LOW, the "FaultEncCable" ("SD3") monitoring is triggered. – If the monitoring is not required, this input can be connected to +5 V. • The digital frequency input is switched off with C0540 = 0, 1 or 2.	

Assignment of the Sub-D male connector (X9)									
PIN	1	2	3	4	5	6	7	8	9
Signal	B	$\overline{A}$	A	+5 V	GND	$\overline{Z}$	Z	LC	$\overline{B}$

Digital frequency output X10

- See SB **DFOUT_IO_DigitalFrequency**. (📖 2-35)

2.8.1.2 Touch probe (TP)

Process: The current phase value (digital frequency input value) is saved by a quick interrupt in the operating system when a signal change occurs at the TP activating input (e.g. X5/E5).

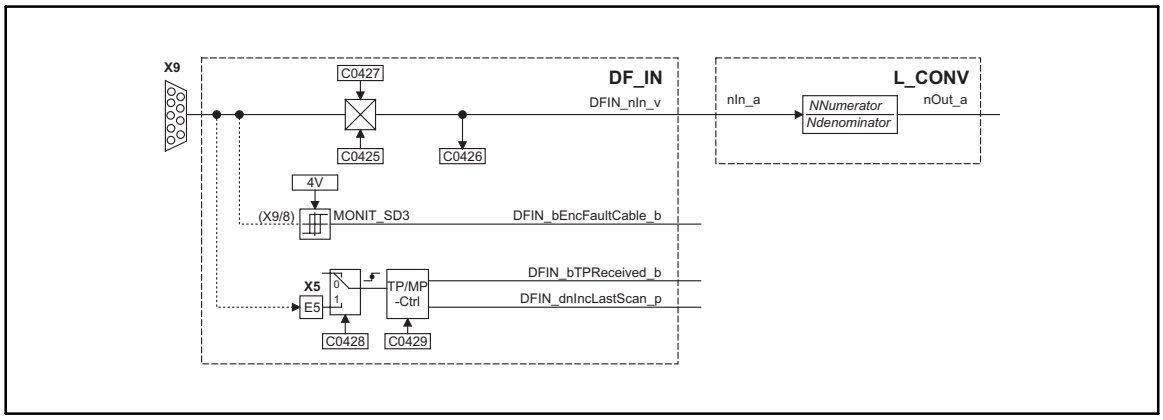


Fig. 2-18 Function chart of a TP

① Time-equidistant start of an interval task
φ Phase signal

Touch probe configuration

Code	LCD	Possible settings			Info
		Lenze	Selection		
C0428	DFIN TP sel.	0			Touch probe selection
			0	Touch probe via zero pulse	
			1	Touch probe through digital input X5/E5	
C0429	TP delay	0			Touch probe delay • Compensation of delay times of the TP signal source at X5/E5
			-32767 {1 inc} 32767		
C0431	DFIN TP EDGE	0			Touch probe activation • For touch probe via digital input X5/E5 (C0428 = 1)
			0	Activation with positive signal	
			1	Activation with negative signal	

Functional sequence

1. The TP is activated via a signal change at the digital input X5/E5 or via a zero pulse (only if an encoder is connected).
2. If a TP has occurred, *DFIN_bTPReceived_b* is set = TRUE.
3. After the start of the task, *DFIN_dnIncLastScan_p* indicates the number of increments [inc] counted since the TP.
4. Then *DFIN_bTPReceived_b* is set = FALSE.

Note!

- It is necessary that all three outputs (*DFIN_nIn_v*, *DFIN_bTPReceived_b* and *DFIN_dnIncLastScan_p*) are processed in the task even if just one signal is required.
- The polarity of the digital input X5/E5 configured under C0114/5 does not affect the edge evaluation.

DFIN_nIn_v

- The value *DFIN_nIn_v* is scaled in increments per millisecond.
  (INT) 16384 corresponds to 15000 rpm. See chapter 1.2.7, ”Signal types and scalings”. (📖 1-8)
- For every task in which *DFIN_nIn_v* is used the operating system creates an individual integrator that is reset after every start of the task (task-internal process image).

Example (*DFIN_nIn_v* in a 10 ms task):

- When the 10 ms task starts, the value of the integrator is stored in a local area of the task and the integrator is reset. The value in the local area gives an average value in increments per 1 ms.
- If a position value is to be derived from this value, then it must be multiplied by *SYSTEM_nTaskInterval* / 4 to get the result in increments per 10 ms, as in the example.
  Example: In a 1-ms task, *SYSTEM_nTaskInterval* has the value 4 (4 x 250 µs = 1 ms).
- In the Lenze FBs this process is already implemented.

2.8.1.3 Encoder cable monitoring (”FaultEncCable”)

PIN 8 (LC) of the digital frequency input X9 monitors the cable / the upstream drive controller:

- When PIN 8 is LOW, the ”FaultEncCable” (”SD3”) monitoring is triggered and the system variable *DFIN_bEncFaultCable_b* is set to TRUE.
- If the monitoring is not required, this input can be connected to +5 V.

2.9 DFOUT_IO_DigitalFrequency (node number 22)

2.9.1 Inputs_DFOUT / Outputs_DFOUT

This SB converts internal speed signals into frequency signals and outputs them to X10.

- The transmission is very precise with the remainder being considered (no offset and gain errors).

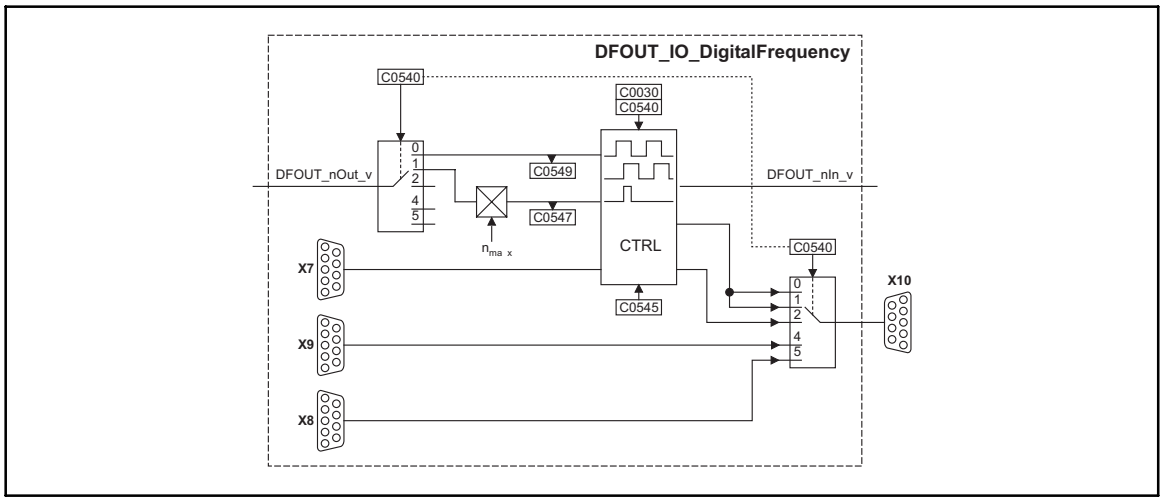


Fig. 2-19 Digital frequency output (DF_OUT)

System variables

Variable	Data type	Signal type	Address	Display code	Display format	Note
DFOUT_nOut_v	Integer	Velocity	%QW22.0	C0547 C0549	dec [%] dec [rpm]	
DFOUT_nIn_v	Integer	Velocity	%IW22.0	-	-	

Tip!

The process image is newly created for every task the SB is used in.

- If *DFOUT_nIn_v* and *DFOUT_nOut_v* are used in several tasks, an own process image of the SB is created for each of these tasks.
- This process is different from the previous process image creation principle!

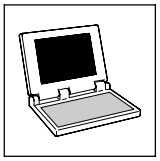
- The signals of the digital frequency output X10 are TTL-compatible.
- The output signal corresponds to the simulation of an incremental encoder:
  – Track A, track B and the zero track (if necessary) as well as the corresponding inverted tracks are output with tracks shifted by 90°.

Configuration of the digital frequency output signal

- The type of the digital frequency output signal is configured under C0540:

Code	LCD	Possible settings		Info
		Lenze	Selection	
C0540	Function	2		Digital frequency output: Function • X9 is inhibited if 0, 1, or 2 have been selected. • DFOUT_nIn_v = 0 if 4 or 5 have been selected. • The input signals are buffered electrically.
			0 DFOUT_nOut_v as % 1 DFOUT_nOut_v as rpm 2 Incremental encoder simulation + zero pulse 4 X9 is output on X10 5 X8 is output on X10	

C0540 = 0	**Output of an analog signal**
Function	The input signal *DFOUT_nOut_v* is interpreted as an analog signal [%] and is output as a frequency signal on the digital frequency output X10.
Scaling	100 % ≡ (INT)16384 ≡ C0011 (n_{max})
Transmission function	$f\,[Hz] = DFOUT\_nOut\_v\,[\%] \cdot \frac{\text{number of increments from C0030}}{100} \cdot \frac{C0011\ (n_{max})}{60}$ $DFOUT\_nIn\_v = f\,[Hz] \cdot \frac{60}{\text{number of increments from C0030}} \cdot \frac{2^{14}}{15000}$
Example	• *DFOUT_nOut_v* = 50 % • C0030 = 3, this corresponds to a number of increments of 2048 increments/revolution • C0011 = 3000 rpm $f\,[Hz] = 50\ \% \cdot \frac{2048}{100} \cdot \frac{3000}{60} = 51200\ Hz$
C0540 = 1	**Output of a speed signal**
Function	The input signal *DFOUT_nOut_v* is interpreted as a speed signal [rpm] and is output as a frequency signal on the digital frequency output X10.
Scaling	15000 rpm ≡ (INT)16384
Transmission function	$f\,[Hz] = DFOUT\_nOut\_v\,[rpm] \cdot \frac{\text{number of increments from C0030}}{60}$
Example	• *DFOUT_nOut_v* = 3000 rpm • C0030 = 3, this corresponds to a number of increments of 2048 increments/revolution $f\,[Hz] = 3000\ rpm \cdot \frac{2048}{60} = 102400\ Hz$
C0540 = 2	**Encoder simulation of the resolver with zero track in resolver position**
Function	• The function is used if a resolver is connected to X7. • The encoder constant for the output X10 is set under C0030. • The output of the zero pulse referring to the rotor depends on how the resolver is attached to the motor. • The zero pulse can be shifted by +360 ° under C0545 (65536 inc = 360 °).
C0540 = 4	**Direct output of X9**
Function	Use of X9 as a digital frequency input. • The input signal at X9 is electrically amplified and is directly output to X10. • The signals depend on the assignment of input X9. • C0030 and C0545 have no function. • The zero track is only output if it is also connected to X9.
C0540 = 5	**Direct output of X8**
Function	Use of X8 as an input for incremental encoders or sin/cos encoders. • The input signal at X8 is electrically amplified and is directly output to X10. • The signals depend on the assignment of input X8. • C0030 and C0545 have no function. • The zero track is only output if it is also connected to X8.

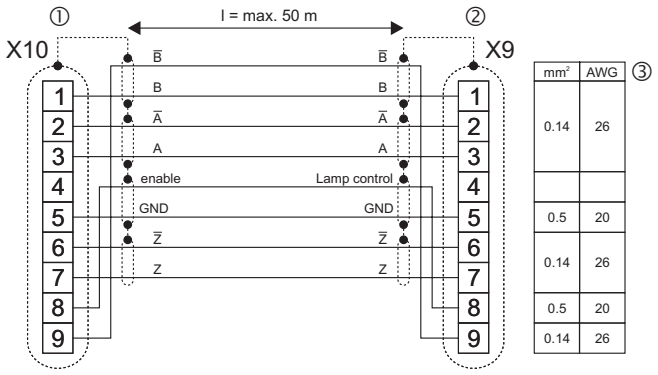


Configuration of the encoder constant

- The encoder constant of the encoder simulation can be set under C0030:

Code	LCD	Possible settings		Info
		Lenze	Selection	
C0030	DFOUT const	3		Encoder constant
			0 256 increments per revolution	
			1 512 increments per revolution	
			2 1024 increments per revolution	
			3 2048 increments per revolution	
			4 4096 increments per revolution	
			5 8192 increments per revolution	
			6 16384 increments per revolution	

2.9.1.1 Technical data for the connection of X10



The connection is to be carried out as shown in the wiring diagram:
- Use cables which are twisted and shielded in pairs.
- Connect the shield at both ends.
- Observe specified cable cross-sections.

Fig. 2-20 Connection of digital frequency output X10 with digital frequency input X9

① Master drive
② Slave drive
③ Cable cross-sections to be used

Note!

Digital frequency input (X8/X9) and digital frequency output (X10) cannot be used independently of each other, i.e. either X8 or X9 is output to X10 (C0540 = 4, 5).

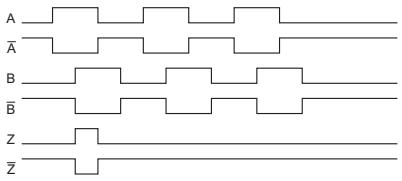
- If the configuration under C0540 selects another output for X10 (C0540 = 0, 1, 2), the digital frequency inputs X8/X9 are deactivated.

Digital frequency output X10

Technical data	
Connection:	Sub-D female connector, 9-pole
Output frequency:	0 - 500 kHz
Ampacity:	Max. 20 mA per channel
Load capacity:	• With a parallel connection, a maximum of 3 slave drives can be connected. • With a series connection, any number of slave drives can be connected.
Properties	
• Two-track with inverse 5 V signals and zero track • When PIN 8 (EN) is LOW, the master drive is being initialised (e.g. if the mains was disconnected in the meantime). The slave drive can thus monitor the master.	

Assignment of the Sub-D connector (X10)

PIN	1	2	3	4	5	6	7	8	9
Signal	B	$\overline{A}$	A	+5 V	GND	$\overline{Z}$	Z	EN	$\overline{B}$



Signal sequence with phase shift (CW rotation)

Track	CW rotation	CCW rotation
A	leads track B by 90° (*DFIN_nIn_v* = positive value)	lags behind track B by 90° (*DFIN_nIn_v* = negative value)
B	-	-

Note!

The digital frequency output X10 has a system-dependent delay time T_d which can be calculated using the following formula:

T_d = Task cycle time (process image cycle) - 1 ms

Example: If *DFOUT_nOut_v* is written to in a "10-ms task", the signal at X10 has a delay time T_d of 9 ms (10 ms - 1 ms).

Digital frequency input X9

- See SB **DFIN_IO_DigitalFrequency**. (📖 2-28)

2.10 DIGITAL_IO (node number 1)

2.10.1 Inputs_DIGITAL (digital inputs)

This SB reads in the signals at the terminals X5/E1 ... E5 and X5/28 and conditions them.

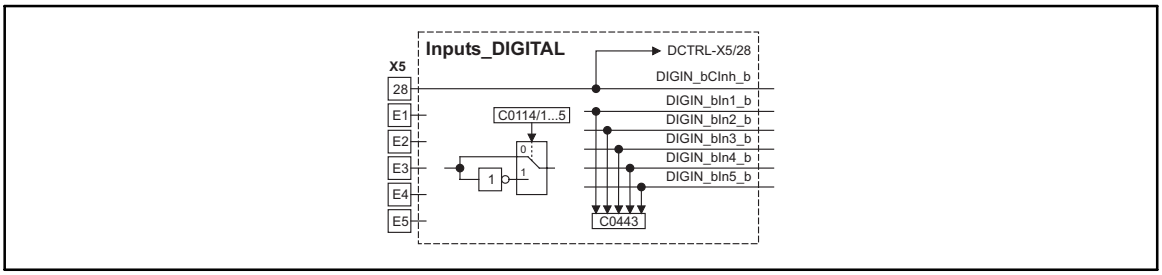


Fig. 2-21 Inputs_DIGITAL

System variables

Variable	Data type	Signal type	Address	Display code	Display format	Note
DIGIN_bCInh_b	Bool	Binary	%IX1.0.0	-	-	Controller inhibit (CINH) acts directly on the DCTRL control.
DIGIN_bIn1_b			%IX1.0.1	C0443	bin	
DIGIN_bIn2_b			%IX1.0.2			
DIGIN_bIn3_b			%IX1.0.3			
DIGIN_bIn4_b			%IX1.0.4			
DIGIN_bIn5_b			%IX1.0.5			

Electrical data of the input terminals

Terminal	Use		Measuring range
X5/28	Controller enable (RFR)	Freely assignable	LOW level: 0 ... +4 V HIGH level: +13 ... +30 V Input current: 8 mA per input (at 24 V) [1] Response time of the interrupt task: < 250 µs [2] Use of X5/E1 ... E3 as a touch probe input: See "Function library LenzeTpDrv.lib" manual
X5/E1	Interrupt-capable[1] Touch-probe-capable[2]		
X5/E2			
X5/E3			
X5/E4	TP signal, actual motor speed X7 (resolver), X8 (encoder)		
X5/E5	TP signal X9 (digital frequency input)		
X5/39	Ground (GND) of digital inputs and outputs		

- The terminal polarity of the inputs X5/E1 ... E5 can be configured under C0114:

Code	LCD	Possible settings		Info
		Lenze	Selection	
C0114	DIGIN pol		0 HIGH active 1 LOW active	Terminal polarity
1		1		X5/E1
2		1		X5/E2
3		0		X5/E3
4		0		X5/E4
5		0		X5/E5

2.10.2 Outputs_DIGITAL (digital outputs)

This SB conditions the digital signals and outputs them at terminals X5/A1 ... A4.

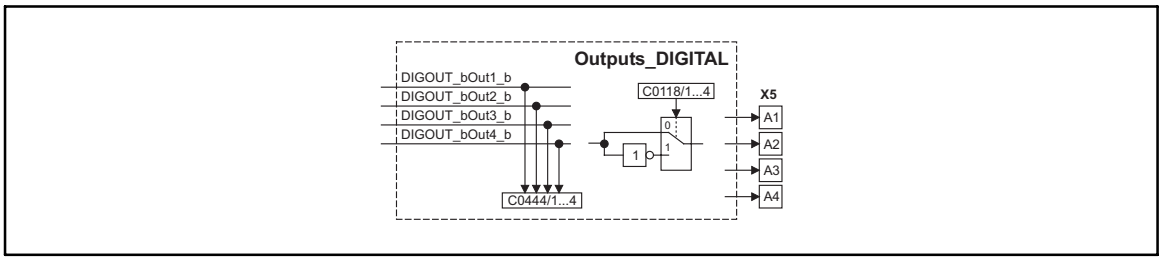


Fig. 2-22 Outputs_DIGITAL

System variables

Variable	Data type	Signal type	Address	Display code	Display format	Note
DIGOUT_bOut1_b	Bool	Binary	%QX1.0.0	C0444/1	bin	
DIGOUT_bOut2_b			%QX1.0.1	C0444/2		
DIGOUT_bOut3_b			%QX1.0.2	C0444/3		
DIGOUT_bOut4_b			%QX1.0.3	C0444/4		

Electrical data of the output terminals

Terminal	Use	Measuring range	
X5/A1	Freely assignable	LOW level:	0 ... +4 V
X5/A2		HIGH level:	+13 ... +30 V
X5/A3		Output current:	Max. 50 mA per output (external resistance ≥480 Ω at 24 V)
X5/A4		Delay times:	300 µs with rising edge 100 µs with falling edge
X5/39	Ground (GND) of digital inputs and outputs		

- The terminal polarity of the outputs X5/A1 ... A4 can be configured under C0118:

Code	LCD	Possible settings		Info
		Lenze	Selection	
C0118	DIGOUT pol			Terminal polarity
			0 HIGH active 1 LOW active	
1		0		X5/A1
2		0		X5/A2
3		0		X5/A3
4		0		X5/A4

2.11 FCODE_FreeCode (node number 141)

At Lenze, controller parameters are called codes. The PLC can be adapted to your application without additional programming by changing codes.

This SB provides several variables for directly reading out the assigned ”free” codes of the PLC and for processing them in the PLC program.

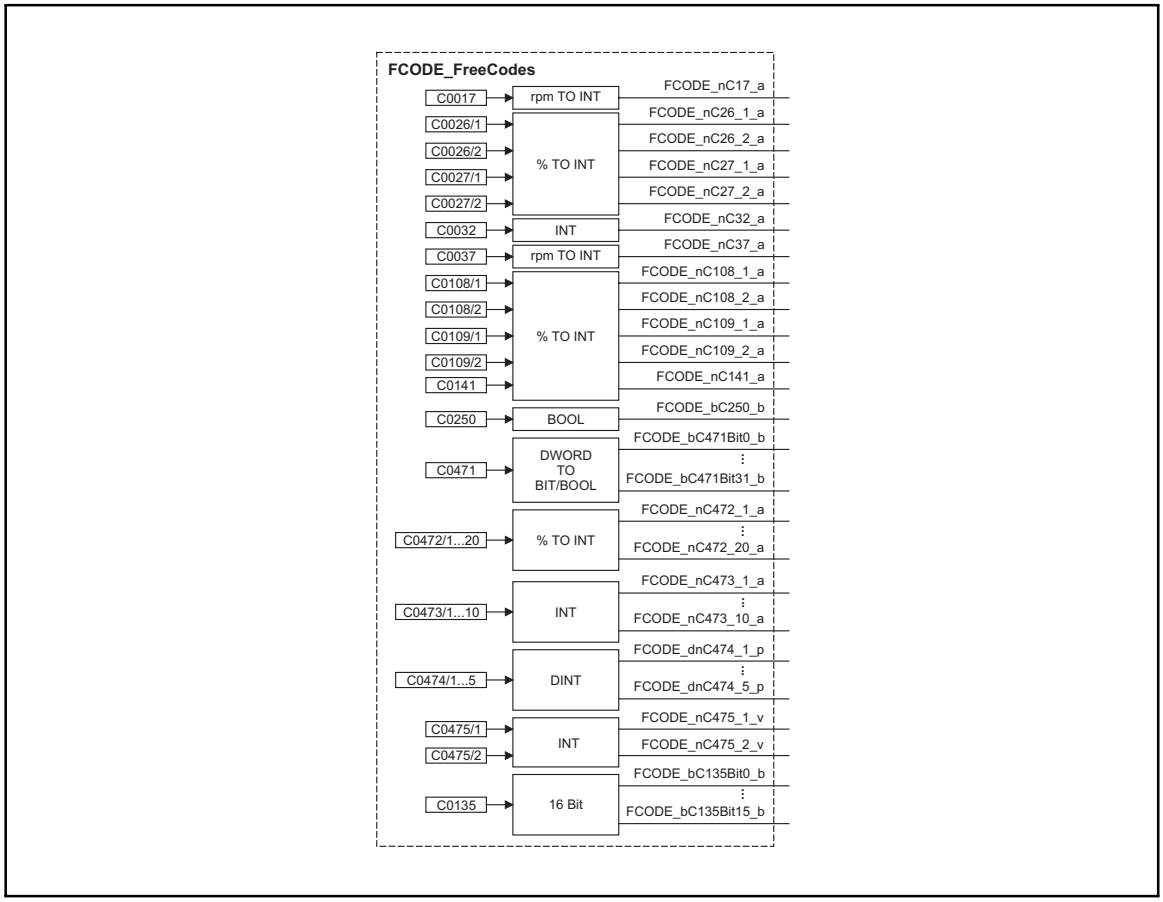


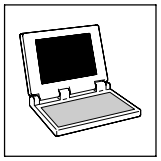
Fig. 2-23 FCODE_FreeCodes

The PLC codes listed in the boxes ( ) on the left-hand side are assigned to the variables listed on the right-hand side.

- Code values are converted into variable values according to a fixed scaling routine.
- In the code table, you can find the options that can be set and the Lenze settings. (3-22)

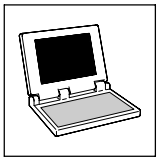
Example

You can enter a percentage value [%] in PLC code C0472/1 (e.g. via the keypad). This value is directly assigned to the variable *FCODE_nC472_1_a* (data type ”integer”) via a fixed scaling routine and can be processed in the PLC program.



System variables

Variable	Data type	Signal type	Address	Display code	Display format	Note
FCODE_nC17_a	Integer	Analog	%IW141.0	-	-	Default = 50 rpm
FCODE_nC26_1_a			%IW141.2			Default = 0.00 %
FCODE_nC26_2_a			%IW141.3			Default = 0.00 %
FCODE_nC27_1_a			%IW141.4			Default = 100.00 %
FCODE_nC27_2_a			%IW141.5			Default = 100.00 %
FCODE_nC32_a			%IW141.6			Default = 1
FCODE_nC37_a			%IW141.7			Default = 0 rpm
FCODE_nC108_1_a			%IW141.8			Default = 100.00 %
FCODE_nC108_2_a			%IW141.9			Default = 100.00 %
FCODE_nC109_1_a			%IW141.10			Default = 0.00 %
FCODE_nC109_2_a			%IW141.11			Default = 0.00 %
FCODE_nC141_a			%IW141.12			Default = 0.00 %
FCODE_bC250_b	Bool	Binary	%IX141.13.0	-	-	Default = 0
FCODE_bC471Bit**0**_b ... FCODE_bC471Bit**15**_b	Bool	Binary	%IX141.14.**0** ... %IX141.14.**15**	-	-	Default = 0
FCODE_bC471Bit**16**_b ... FCODE_bC471Bit**31**_b			%IX141.15.**0** ... %IX141.15.**15**			
FCODE_nC472_**1**_a ... FCODE_nC472_**20**_a	Integer	Analog	%IW141.**16** ... %IW141.**35**	-	-	Default = 0.00 % C0472/3 = 100.00 %
FCODE_nC473_**1**_a ... FCODE_nC473_**10**_a	Integer	Analog	%IW141.**36** ... %IW141.**45**	-	-	Default = 0 C0473/1, 2 = 1
FCODE_dnC474_**1**_p ... FCODE_dnC474_**5**_p	Double integer	Position	%ID141.**23** ... %ID141.**27**	-	-	Default = 0
FCODE_nC475_1_v	Integer	Velocity	%IW141.56	-	-	Default = 0
FCODE_nC475_2_v			%IW141.57			
FCODE_bC135Bit**0**_b ... FCODE_bC135Bit**15**_b	Bool	Binary	%IX141.58.**0** ... %IX141.58.**15**	-	-	Default = 0



Note!

The free code C0470 is stored under the same memory address as C0471 and can thus be read out via the variables *FCODE_bC471Bit0_b* ... *FCODE_bC471Bit31_b* assigned to code C0471.

Unlike code C0471, which can contain a 32-bit value, code C0470 is divided into 4 subcodes with 8 bits each:

Code	LCD	Possible settings				Info
		Lenze	Selection			
C0470	FCODE 8bit					Freely configurable code (digital signals) • C0470 has the same memory address as C0471. • Hexadecimal value is bit-coded.
			0	{hex}	FFFF	
1		0				C0470/1 = C0471, bit 0 ... 7
2		0				C0470/2 = C0471, bit 8 ... 15
3		0				C0470/3 = C0471, bit 16 ... 23
4		0				C0470/4 = C0471, bit 24 ... 31
C0471	FCODE 32bit	0				Freely configurable code (digital signals) • Variables assigned via FCODE_FreeCodes: FCODE_bC471Bit0_b ... FCODE_bC471Bit31_b • C0471 has the same memory address as C0470.
			0	{1}	4294967296	

2.12 MCTRL_MotorControl (node number 131)

This SB contains the control function for the driving machine. It consists of phase control, speed control and motor control.

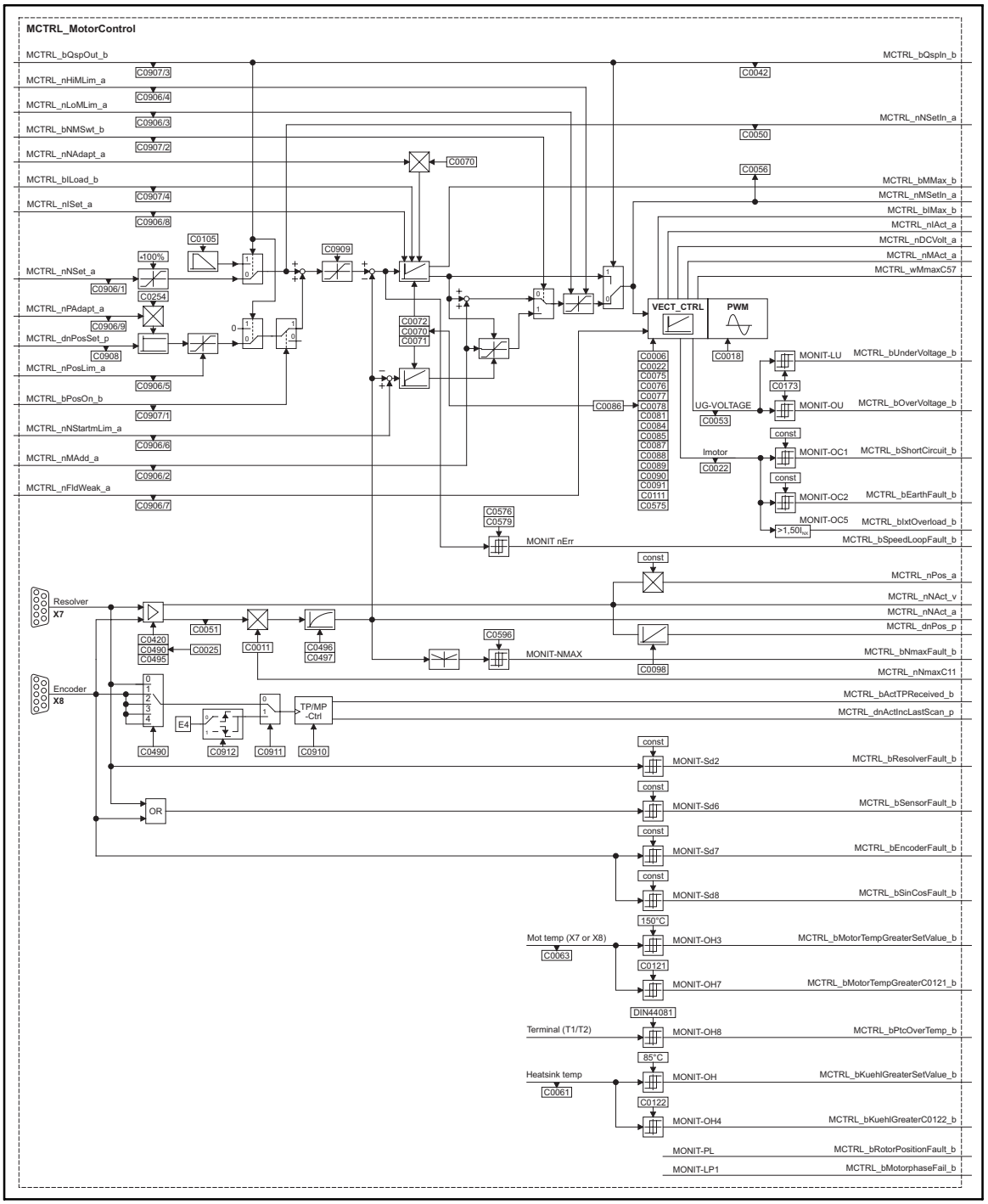
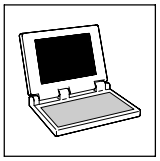


Fig. 2-24 MCTRL_MotorControl

The process image is created in the course of a fixed system task (interval: 1 ms).

- Exception: *MCTRL_bActTPReceived_b*, *MCTRL_dnActIncLastScan_p* and *MCTRL_nNAct_v* are read into the process input image of the task in which they are actually used.



2.12.1 Inputs_MCTRL

System variables

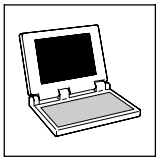
Variable	Data type	Signal type	Address	Display code	Display format	Note
MCTRL_bQspIn_b	Bool	Binary	%IX131.0.0.0	C0042	bin	TRUE = Drive carries out quick stop (QSP)
MCTRL_nNSetIn_a	Integer	Analog	%IW131.1	C0050	dec [%]	Speed setpoint • 16384 ≡ 100 % n_{max} (C0011)
MCTRL_bMMax_b	Bool	Binary	%IX131.0.2	-	-	TRUE = Speed controller operates within the limits.
MCTRL_nMSetIn_a	Integer	Analog	%IW131.3	C0056	dec [%]	Torque setpoint • 16384 ≡ 100 % M_{max} (C0057)
MCTRL_bIMax_b	Bool	Binary	%IX131.0.1	-	-	TRUE = Drive operates at current limit C0022
MCTRL_nIAct_a	Integer	Analog	%IW131.5	-	-	Actual motor current • 16384 ≡ 100 % I_{max} (C0022)
MCTRL_nDCVolt_a			%IW131.6			DC voltage • 16384 ≡ 1000 V
MCTRL_nMAct_a			%IW131.4			Actual torque • 16384 ≡ 100 % M_{max} (C0057)
MCTRL_wMmaxC57	Word	-	%IW131.16	-	-	Display of maximum torque (C0057) x 10
MCTRL_bUndervoltage_b	Bool	Binary	%IX131.0.3	-	-	Monitoring: Undervoltage
MCTRL_bOvervoltage_b			%IX131.0.4			Monitoring: Overvoltage
MCTRL_bShortCiruit_b			%IX131.0.5			Monitoring: Short circuit
MCTRL_bEarthFault_b			%IX131.0.6			Monitoring: Earth fault
MCTRL_bIxtOverload_b			%IX131.9.2			Monitoring: I x t overload
MCTRL_bSpeedLoop Fault_b			%IX131.9.4			Monitoring: Speed out of tolerance margin
MCTRL_nPos_a	Integer	Analog	%IW131.7	-	-	Actual phase value as an analog signal • 90° ≡ 100%
MCTRL_nNAct_v	Integer	Velocity	%IW131.8	-	-	Actual speed value [inc/ms]
MCTRL_nNAct_a	Integer	Analog	%IW131.2	-	-	Actual speed value • 16384 ≡ 100 % n_{max} (C0011)
MCTRL_dnPos_p	Double integer	Position	%ID131.5	-	-	Rotor position of the motor
MCTRL_bNmaxFault_b	Bool	Binary	%IX131.0.7	-	-	Monitoring: Max. system speed exceeded
MCTRL_nNmaxC11	Integer	-	%IW131.15	-	-	Display of max. speed (C0011)
MCTRL_bActTP Received_b	Bool	Binary	%IX131.0.10	-	-	Receive touch probe (TP)
MCTRL_dnActIncLast Scan_p	Double integer	Position	%ID131.6	-	-	Δinc during TP and task start

Variable	Data type	Signal type	Address	Display code	Display format	Note
MCTRL_bResolverFault_b	Bool	Binary	%IX131.0.8	-	-	Monitoring: Resolver error
MCTRL_bEncoderFault_b			%IX131.9.1			Monitoring: Encoder error
MCTRL_bSensorFault_b			%IX131.9.0			Monitoring: Thermal sensor error
MCTRL_bSinCosFault_b			%IX131.9.3			Monitoring: Absolute value encoder error
MCTRL_bMotorTemp GreaterSetValue_b			%IX131.0.11			Monitoring: Motor temperature > 150 °C
MCTRL_bMotorTemp GreaterC0121_b			%IX131.0.12			Monitoring: Motor temperature > C0121
MCTRL_bPtcOverTemp_b			%IX131.0.13			Monitoring: Motor overtemperature (PTC)
MCTRL_bKuehl GreaterSetValue_b			%IX131.0.14			Monitoring: Heatsink temperature > 85 °C
MCTRL_bKueh GreaterC0122_b			%IX131.0.15			Monitoring: Heatsink temperature > C0122
MCTRL_bRotorPosition Fault_b			%IX131.9.5			Monitoring: Error during last rotor position adjustment
MCTRL_bMotorphase Fail_b			%IX131.9.6			Monitoring: Motor phase failure detection

2.12.2 Outputs_MCTRL

System variables

Variable	Data type	Signal type	Address	Display code	Display format	Note
MCTRL_bQspOut_b	Bool	Binary	%QX131.0.0	C0907/3	bin	TRUE = Drive carries out quick stop (QSP)
MCTRL_nHiMLim_a	Integer	Analog	%QW131.4	C0906/4	dec [%]	Upper torque limitation • in % of C0057
MCTRL_nLoMLim_a			%QW131.3	C0906/3		Lower torque limitation • in % of C0057
MCTRL_bNMSwt_b	Bool	Binary	%QX131.0.1	C0907/2	bin	FALSE = Speed control TRUE = Torque control
MCTRL_nNAdapt_a	Integer	Analog	%QW131.12	-	-	Adaptive proportional gain (Vp) of the speed controller
MCTRL_bILoad_b	Bool	Binary	%QX131.0.3	C0907/4	bin	TRUE = Integral action component of the speed controller is accepted by *MCTRL_nISet_a*
MCTRL_nISet_a	Integer	Analog	%QW131.7	C0906/8	dec [%]	Integral action component of the speed controller
MCTRL_nNSet_a			%QW131.1	C0906/1		Speed setpoint
MCTRL_nPAdapt_a			%QW131.8	C0906/9		Effect of C0254 on proportional gain (Vp) in %, • The absolute value (without sign) is processed.
MCTRL_dnPosSet_p	Double integer	Position	%QD131.5	C0908	dec [inc]	Deviation of set phase to actual phase for phase controller
MCTRL_nPosLim_a	Integer	Analog	%QW131.9	C0906/5	dec [%]	Effect of the phase controller • In % of n_{max} (C0011)
MCTRL_bPosOn_b	Bool	Binary	%QX131.0.2	C0907/1	-	TRUE = Activate phase controller
MCTRL_nNStartMLim_a	Integer	Analog	%QW131.5	C0906/6	dec [%]	Lower speed limit for speed limitation
MCTRL_nMAdd_a			%QW131.2	C0906/2		Additional torque setpoint or torque setpoint
MCTRL_nFldWeak_a			%QW131.6	C0906/7		Motor control



2.12.3 Current controller

Tip!

Select a matching motor from the ”Motor selection list” under C0086. This automatically sets the correct parameters for the current controller.

- The ”Motor selection list” can be found in the Mounting Instructions for the 9300 Servo PLC.

- To adapt the current controller to the connected machine, set the controller’s proportional gain under C0075 and the controller’s reset time under C0076:

Code	LCD	Possible settings			Info
		Lenze	Selection		
C0075	Vp curr CTRL	→	0.00	{0.01} 15.99	Proportional gain of current controller (V_{pi}) → Dependent on C0086 • If C0086 is changed, the value is reset to the assigned Lenze setting.
C0076	Tn curr CTRL	→	0.5 2000 ms = switched off	{0.1 ms} 2000.0	Reset time of current controller (T_{ni}) → Dependent on C0086 • If C0086 is changed, the value is reset to the assigned Lenze setting.

2.12.4 Torque setpoint / additional torque setpoint

MCTRL_nMAdd_a is - depending on the setting of *(MCTRL_bNMSwt_b)* - used as a torque setpoint or as an additional torque setpoint.

Torque setpoint

With *MCTRL_bNMSwt_b* = TRUE, the torque control is active.

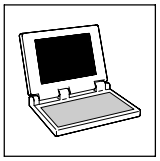
- *MCTRL_nMAdd_a* acts as a torque setpoint.
- The speed controllers have a monitoring function.
- The torque setpoint is selected in [%] of the max. possible torque.
  - Negative values mean a torque with CCW rotation of the motor.
  - Positive values mean a torque with CW rotation of the motor.
- The max. possible torque is set under C0057:

Code	LCD	Possible settings				Info
		Lenze	Selection			
C0057	Max torque	Disp				Maximum possible torque of the drive configuration • Dependent on C0022, C0086
			0.0	{0.1 Nm}	500.0	

Additional torque setpoint

With *MCTRL_bNMSwt_b* = FALSE, the speed control is active.

- *MCTRL_nMAdd_a* is added to the output of the speed controller.
- The limits given by the torque limitation *MCTRL_nLoMLim_a* and *MCTRL_nHiMLim_a* cannot be exceeded.
- The additional torque setpoint can, for instance, be used for friction compensation or to add acceleration (dv/dt).



2.12.5 Torque limitation

Via *MCTRL_nLoMLim_a* and *MCTRL_nHiMLim_a* you can set an external torque limitation. This means that different torques can be selected for the quadrants ”driving” and ”braking”.

- *MCTRL_nHiMLim_a* is the upper torque limit in [%] of the max. possible torque.
- *MCTRL_nLoMLim_a* is the lower torque limit in [%] of the max. possible torque.
- The max. possible torque is set under C0057. (📖 2-48)

Stop!

Only set positive values in *MCTRL_nHiMLim_a* and negative values in *MCTRL_nLoMLim_a*, otherwise the speed controller may be unable to perform its intended control function. This can result in an uncontrolled acceleration of the drive.

Tip!

- If *MCTRL_nHiMLim_a* is not assigned (free), the upper torque limit automatically is 100 % of the max. possible torque.
- If *MCTRL_nLoMLim_a* is not assigned (free), the lower torque limit automatically is -100 % of the max. possible torque.
- At quick stop (QSP) the torque limitation is deactivated, i.e. the drive is operated with ±100 %.

2.12.6 Maximum speed

The maximum speed (n_{max}) is set under C0011. This value is used as a reference for the absolute and relative setpoints selected for the acceleration and deceleration times and for the upper and lower speed limits.

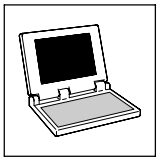
- n_{max} = 100 % ≡ (INT) 16384

Code	LCD	Possible settings			Info
		Lenze	Selection		
C0011	Nmax	3000			Maximum speed Reference value for the absolute and relative setpoint selection for the acceleration and deceleration times. • For parameterisation via interface: Large changes in one step should only be made when the controller is inhibited.
			500	{1 rpm} 16000	

Tip!

MCTRL_nNmaxC11 displays the maximum speed set under C0011.

- Use this system variable for programming your own speed scalings.
- Example: C0011 = 3000 rpm ⇨ *MCTRL_nNmaxC11* = 3000



2.12.7 Speed controller

The speed controller is designed as an ideal PID controller.

Parameter setting

By selecting a motor under C0086 the parameters are preset, making most adaptations to the application unnecessary.

- The proportional gain V_p can be set under C0070:
  - Enter approx. 50 % of the speed setpoint (100 % = 16384 = n_{max}).
  - Increase C0070 until the drive becomes unstable (pay attention to motor noise)
  - Reduce C0070 until the drive runs stable again.
  - Reduce C0070 to approx. half the value.

Code	LCD	Possible settings				Info
		Lenze	Selection			
C0070	Vp speed CTRL	→				Proportional gain of speed controller (V_{pn}) → Dependent on C0086 • If C0086 is changed, the value is reset to the assigned Lenze setting.
			0.0	{0.5}	255.0	

- The reset time T_n can be set under C0071:
  - Reduce C0071 until the drive becomes unstable (pay attention to motor noise).
  - Increase C0071, until the drive runs stable again.
  - Increase C0071 to approx. twice the value.

Code	LCD	Possible settings				Info
		Lenze	Selection			
C0071	Tn speed CTRL	→				Reset time of speed controller (T_{nn}) → Dependent on C0086 • If C0086 is changed, the value is reset to the assigned Lenze setting.
			1.0 >512 ms = switched off	{0.5 ms}	600.0	

- The derivative gain T_d can be set under C0072:
  - Increase C0072 during operation until the drive reaches an optimum control performance.

Code	LCD	Possible settings				Info
		Lenze	Selection			
C0072	Td speed CTRL	0.0				Derivative gain of speed controller (T_{dn})
			0.0	{0.1 ms}	32.0	

- Via *MCTRL_nNAdapt_a* the proportional gain V_p can be changed using the PLC program:

V_p = *MCTRL_nNAdapt_a* [%] ·C0070

Default: *MCTRL_nNAdapt_a*= 100 % ⇨V_p = 100 % ·C0070 = C0070

Signal limitation

If the drive outputs the maximum torque, the speed controller operates within the limitation.

- The drive cannot follow the speed setpoint.
- *MCTRL_bMMax_b* is set to TRUE.

Set integral action component

To select defined starting values for the torque, the integral action component of the speed controller can be set externally (e.g. when using the brake control).

- *MCTRL_bILoad_b* = TRUE
  - The speed controller accepts the value at *MCTRL_nISet_a* for its integral action component.
  - The value at *MCTRL_nISet_a* acts as a torque setpoint for the motor control.
- *MCTRL_bILoad_b* = FALSE
  - Function is switched off.

2.12.8 Torque control with speed limitation

Set *MCTRL_bNMSwt_b* = TRUE to activate this function.

- For limiting the speed, a second speed controller (auxiliary speed controller) is connected.
- *MCTRL_nMAdd_a* acts as a bipolar torque setpoint.
- The speed controller 1 generates the upper speed limit.
  - The upper speed limit is passed to *MCTRL_nNSet_a* in [%] of n_{max} (positive sign for CW direction of rotation).
- The speed controller 2 (auxiliary speed controller) generates the lower speed limit.
  - The lower speed limit is passed to *MCTRL_nNStartLim_a* in [%] of n_{max} (negative sign for CCW direction of rotation).
- n_{max} is selected under C0011. (📖 2-50)

Stop!

Use

- the upper speed limit only for CW rotation (positive values) and
- the lower speed limit only for CCW rotation (negative values),

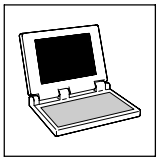
otherwise the drive can accelerate in an uncontrolled way!

2.12.9 Speed setpoint limitation

The speed setpoint limitation can be set under C0909:

Code	LCD	Possible settings		Info
		Lenze	Selection	
C0909	speed limit	1		Speed setpoint limitation
			1 -175 % ... +175 %	
			2 0 % ... +175 %	
			3 -175 % ... 0 %	

- Select the speed setpoint via *MCTRL_nNSet_a* in [%] of n_{max}.
- n_{max} is selected under C0011. (📖 2-50)



2.12.10 Phase controller

The phase controller is needed, i.a., to ensure phase-synchronous operation and drift-free standstill.

Parameter setting

1. Assign *MCTRL_nPosSet_a* to a signal source which provides the phase difference between set phase and actual phase.
2. Define a value > 0 for *MCTRL_nPosLim_a*.
3. Set *MCTRL_bPosOn_b* = TRUE.
4. Set the gain of the phase controller > 0 via C0254.
   – Before setting C0254, select a proportional gain for the speed controller as high as possible under C0070. (📖 2-51)
   – Increase C0254 during operation until the drive shows the required control performance.

Code	LCD	Possible settings				Info
		Lenze	Selection			
C0254	Vp angle CTRL	0.4000				Gain of phase controller (V_p)
			0.0000	{0.0001}	3.9999	

Effect of the phase controller

The output of the phase controller is added to the speed setpoint.

- If the actual phase is lagging, the drive is accelerated.
- If the actual phase is leading, the drive is decelerated until the desired phase synchronisation is achieved.

The influence of the phase controller consists of:

- Phase difference multiplied by the gain V_p (C0254).
- Additional influence via an analog signal at *MCTRL_nPAdapt_a*.
  (V_p = C0254 · *MCTRL_nPAdapt_a* / 16384)
- Limitation of the phase controller output to ±*MCTRL_nPosLim_a*.

Limitation of the phase controller output

This value limits the maximum compensation speed of the drive in the event of large phase differences.

2.12.11 Quick stop (QSP)

The QSP function is used to stop the drive independently of the selected setpoint within an adjustable time interval.

- The QSP function is active if *MCTRL_bQsp_b* is set = TRUE.
- If the SB **DCTRL_DriveControl** is to trigger QSP, the QSP function must be programmed as follows:

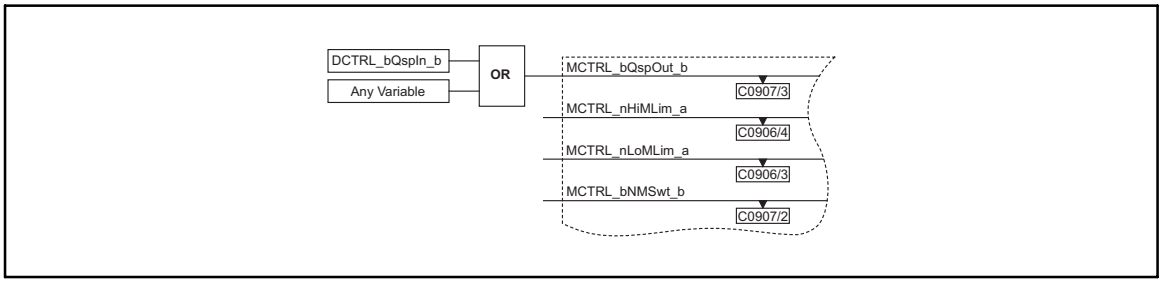


Fig. 2-25 Programming of the QSP function if SB DCTRL_DriveControl is to trigger QSP

Function:

- If torque control is selected, it will be deactivated. The drive is controlled by the speed controller.
- Speed is reduced to 0 within the deceleration time set under C0105:

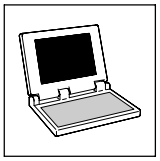
Code	LCD	Possible settings			Info
		Lenze	Selection		
C0105	QSP Tif	0.000			Deceleration time for quick stop (QSP) • Referred to speed change n_{max} ... 0.
			0.000	{0.001 s} 999.900	

- The torque limits *MCTRL_nLoMLim_a* and *MCTRL_nHiMLim_a* are deactivated, i.e. the drive is operated with ±100 %. (📖 2-49)
- The phase controller is activated. If the rotor position is shifted actively, the drive generates a torque against this displacement if
  - – C0254 is set non-zero,
  - – *MCTRL_nPosLim_a* is triggered with a value > 0 %.

STOP

Stop!

If the field is weakened manually (*MCTRL_nFldWeak_a* < 100 %), the drive cannot supply the maximum torque.



2.12.12 Field weakening

Adjusting the field weakening range is not required if the motor type has been set under C0086. In this case all necessary parameters are set automatically.

The motor is operated in the field weakening range if

- the output voltage of the controller exceeds the rated motor voltage set under C0090.
- the controller cannot increase the output voltage with increasing speed because of the mains voltage / DC-bus voltage.

Under C0575 you can set a factor between 1 ... 8 to limit the maximum field weakening. ”8” means that the maximum field weakening is 8-fold.

Manual field weakening

The field can be weakened manually via *MCTRL_nFldWeak_a*.

- For maximum excitation *MCTRL_nFldWeak_a* must be actuated with +100 % (= 16384).
- If *MCTRL_nFldWeak_a* is not assigned (free), the field weakening is automatically +100 %.

Stop!

The available torque is reduced by the field weakening.

2.12.13 Switching frequency changeover

The following switching frequencies can be set for the inverter under C0018:

- 8 kHz for power-optimised operation ⇨ maximum power output of the controller, but with audible pulse operation.
- 16 kHz for noise-optimised operation ⇨ inaudible pulse operation of the controller, but with reduced power output (torque).
- Automatic changeover between power-optimised and noise-optimised operation.

Code	LCD	Possible settings		Info
		Lenze	Selection	
C0018	fchop	1		Switching frequency
			0 16/8 kHz automatic changeover	Optimum noise reduction with automatic changeover to 8 kHz
			1 8 kHz sine	Power-optimised operation
			2 16 kHz sine	Noise-optimised operation

Automatic switching frequency changeover

You can use the automatic switching frequency changeover if you want to operate the drive in the noise-optimised range but the torque available in this mode is not high enough for acceleration processes.

Condition M = f(I)	Function
$M < M_{r16}$ (I_{r16})	Controller operates with 16 kHz (noise-optimised)
M_{r16} (I_{r16}) < M < M_{r8} (I_{r8})	Controller switches to 8 kHz (power-optimised)
$M > M_{max8}$ (I_{max8})	Controller operates with 8 kHz at its current limit

2.12.14 Feedback systems

The following codes can be used to configure the feedback systems for position and speed controllers:

Code	LCD	Possible settings		IMPORTANT
		Lenze	Selection	
[C0420]	Encoder const	512		Encoder: Constant for encoder input X8
			1 {1 inc/rev} 8192	
[C0490]	Feedback pos	0		Feedback system for the position controller • C0490 = 0, 1, 2 can be mixed with C0495 = 0, 1, 2. • C0490 = 3, 4 also sets C0495 to the same value.
			0 Resolver at X7 1 Encoder TTL at X8 2 Sin/cos encoder at X8 3 Absolute value encoder ST at X8 4 Absolute value encoder MT at X8	
[C0495]	Feedback n	0		Feedback system for the speed controller • C0495 = 0, 1, 2 can be mixed with C0490 = 0, 1, 2. • C0495 = 3, 4 also sets C0490 to the same value.
			0 Resolver at X7 1 Encoder TTL at X8 2 Sin/cos encoder at X8 3 Absolute value encoder ST (single turn) at X8 4 Absolute value encoder MT (multi turn) at X8	
C0497	Nact filter	2.0		Actual speed value filter time constant PT1
			0.0 {0.1 ms} 50.0 0 ms = switched off	

2.12.15 Touch probe (TP)

Process: The current phase value (digital frequency input value) is saved by a quick interrupt in the operating system when a signal change occurs at the TP activating input (e.g. X5/E4).

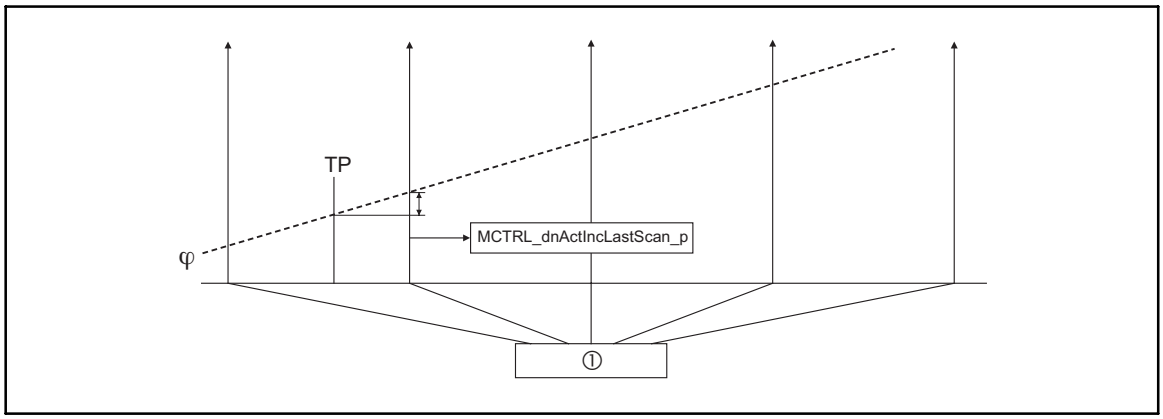


Fig. 2-26 Function chart of a TP

① Time-equidistant start of an interval task
φ Phase signal

Touch probe configuration

Code	LCD	Possible settings		IMPORTANT
		Lenze	Selection	
C0910	TP Delay	0	-32767 {1 inc} 32767	Touch probe delay • Compensation of delay times of the TP signal source at X5/E4
C0911	MCTRL TP sel	0	0 Touch probe via zero pulse 1 Touch probe through digital input X5/E4	Touch probe selection
C0912	MCTRL TP EDGE	0	0 Activation with positive signal 1 Activation with negative signal	Touch probe activation • For touch probe via digital input X5/E4 (C0911 = 1)

- The feedback system generating the zero pulse is set under C0490. (📖 2-56)

Function sequence

1. The TP is activated via a signal change at a digital input (X5/E1 ... E4) or via a zero pulse at the incremental encoder input X8 or the resolver input X7.
2. If a TP has occurred, *MCTRL_bActTPReceived_b* is set = TRUE.
3. After the start of the task *MCTRL_dnActIncLastScan_p* indicates the number of increments [inc/ms] counted since the TP.
4. Then *MCTRL_bActTPReceived_b* is set = FALSE.

Note!

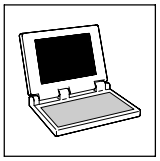
- It is necessary that all three outputs (*MCTRL_nNAct_v*, *MCTRL_bActTPReceived_b* and *MCTRL_dnActIncLastScan_p*) are processed in the task even if just one signal is required.
- For more detailed information about the use of the digital inputs X5/E1 ... E3 for touch probe, please refer to the ”Function library LenzeTpDrv.lib” Manual.

MCTRL_nNAct_v

- The value *MCTRL_nNAct_v* is scaled in increments per millisecond.
  (INT) 16384 corresponds to 15000 rpm. See chapter 1.2.7, ”Signal types and scalings”. (📖 1-8)
- For every task in which *MCTRL_nNAct_v* is used the operating system creates an individual integrator that is reset after every start of the task (task-internal process image).

Example (*MCTRL_nNAct_v* in a 10-ms task):

- When the 10-ms task starts, the value of the integrator is saved in a local area of the task and the integrator is reset. The value in the local area gives an average value in increments per 1 ms.
- If a position value is to be derived from this value, then it must be multiplied by *SYSTEM_nTaskInterval* / 4 to get the result in increments per 10 ms, as in the example.
  Example: In a 1-ms task *SYSTEM_nTaskInterval* has the value 4 (4 x 0.250 s = 1 ms)
- In the Lenze FBs this process is already implemented.



2.12.16 Manual adaptation of motor data

If you use a motor not listed in the selection under C0086, select a motor with similar data under C0086 and adapt the motor data manually.

Tip!

For more detailed information about commissioning, please refer to the Mounting Instructions for the 9300 Servo PLC!

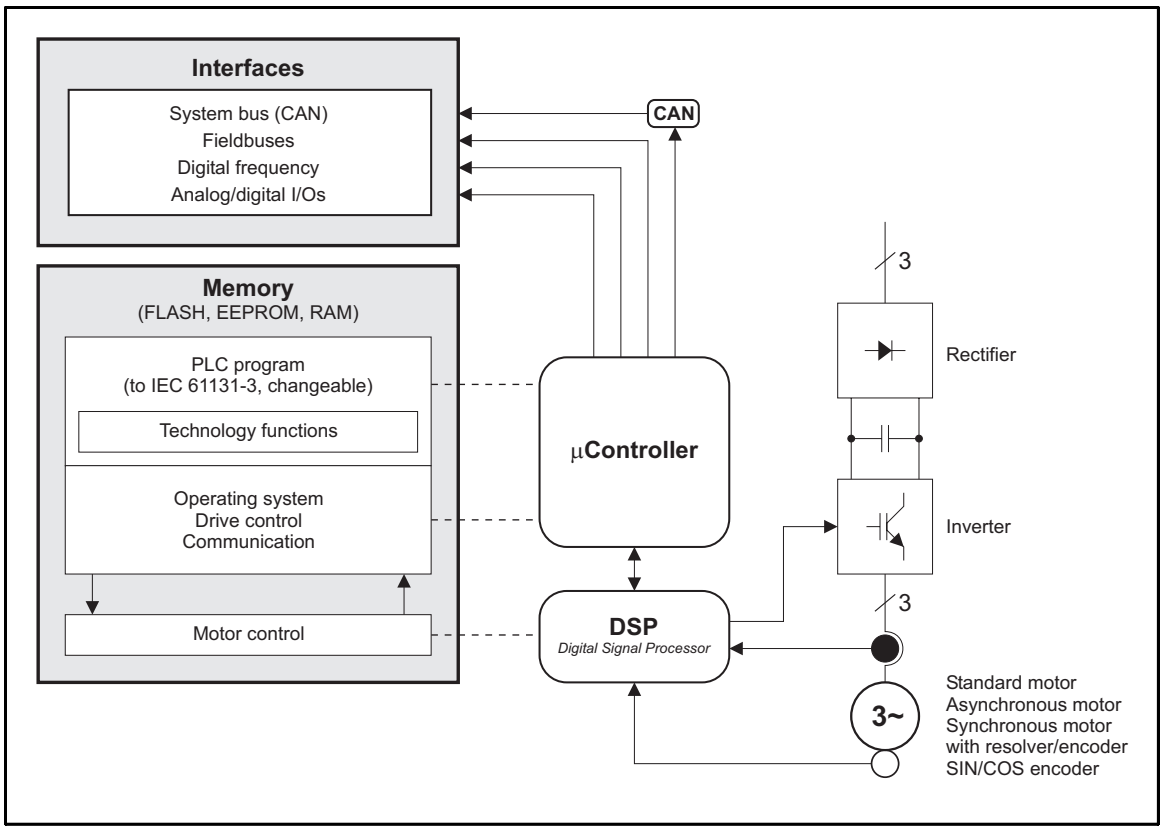
- The following codes help you to manually adapt the motor data:

Code	LCD	Possible settings				IMPORTANT
		Lenze	Selection			
[C0006]	Op mode	→				Operating mode of the motor control → Dependent on C0086 • If C0086 is changed, the value is reset to the assigned Lenze setting • Change of C0006 sets C0086 = 0! • ESC (*Extended Speed Control*): Speed control with increased speed control steadiness for operation with incremental encoder only (not resolver!).
			2	Servo async Y		Servo control for asynchronous motors in star connection
			3	Servo PM-SM Y		Servo control for synchronous motors in star connection
			22	Servo async		Servo control for asynchronous motors in delta connection
			31	ASM Y - ESC		Servo control for asynchronous motors in star connection, ESC
			32	PM-SM Y - ESC		Servo control for synchronous motors in star connection, ESC
			33	ASM - ESC		Servo control for asynchronous motors in delta connection, ESC
C0022	Imax current	→				I_{max} limit → Dependent on C0086 • If C0086 is changed, the value is reset to the assigned Lenze setting (1.5 * Imotor)
			0	{0.01 A}	1.50 I_r	
C0077	Vp field CTRL	0.25				Proportional gain of field controller (V_{pF})
			0.00	{0.01}	15.99	
C0078	Tn field CTRL	15.0				Reset time of field controller (T_{nF})
			1.0 8000 ms = switched off	{0.5 ms}	8000.0	
[C0081]	Mot power	→				Rated motor power according to nameplate → Dependent on C0086 • If C0086 is changed, the value is reset to the assigned Lenze setting • Change sets C0086 = 0
			0.01	{0.01 kW}	500.00	
[C0084]	Mot Rs	→				Stator resistance of the motor → Dependent on C0086 • If C0086 is changed, the value is reset to the assigned Lenze setting • Change sets C0086 = 0
			0.00	{0.01 Ω}	100.00	

Code	LCD	Possible settings			IMPORTANT
		Lenze	Selection		
[C0085]	Mot Ls	→	0.00	{0.01 mH} 200.00	Leakage inductance of the motor → Dependent on C0086 • If C0086 is changed, the value is reset to the assigned Lenze setting • Change sets C0086 = 0
[C0087]	Mot speed	→	300	{1 rpm} 16000	Rated motor speed → Dependent on C0086 • If C0086 is changed, the value is reset to the assigned Lenze setting • Change sets C0086 = 0
[C0088]	Mot current	→	0.5	{0.1 A} 500.0	Rated motor current → Dependent on C0086 • If C0086 is changed, the value is reset to the assigned Lenze setting • Change sets C0086 = 0
[C0089]	Mot frequency	→	10	{1 Hz} 1000	Rated motor frequency → Dependent on C0086 • If C0086 is changed, the value is reset to the assigned Lenze setting • Change sets C0086 = 0
[C0090]	Mot voltage	→	50	{1 V} 500	Rated motor voltage → Dependent on C0086 • If C0086 is changed, the value is reset to the assigned Lenze setting • Change sets C0086 = 0
[C0091]	Mot cos phi	→	0.50	{0.01} 1.00	Motor cos φ → Dependent on C0086 • If C0086 is changed, the value is reset to the assigned Lenze setting • Change sets C0086 = 0
C0111	Rr tune	100 %	50.00	{0.01 %} 199.99	Adjustment of the rotor resistance (particularly recommended for non-Lenze motors and high field weakening.) • Adjustment in % of the rated rotor resistance of the motor.

2.12.17 Monitoring

The 9300 Servo PLC comprises two independent sectors, the motor control and the PLC.



The motor control is provided with several monitoring functions which protect the drive from impermissible operating conditions.

If a monitoring function is activated,

- the response set for this monitoring function is triggered.
- a corresponding system variable is set to TRUE as long as the trigger condition for the monitoring function is fulfilled.

  The system variables of the monitoring functions can be processed in the application program of the PLC.

The current error number is also indicated in the variable *DCTRL_wFaultNumber* of the PLC program.

The fault memory (C0168/x) stores the error messages with an offset which indicates the type of the response:

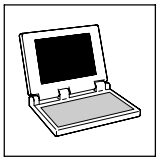
No. of the error message	Type of response
0xxx	TRIP
1xxx	Message
2xxx	Warning
3xxx	FAIL-QSP

Example: C0168/1 = 2061

- x061:
  The current error (subcode 1 of C0168) is a communication error (error message ”CE0”/No. ”x061”) between the AIF module and the PLC.
- 2xxx:
  The response is a warning.

Tip!

- Occurring faults generally do not affect the operating ability of the PLC!
- For more detailed information about the error sources detected by the PLC as well as causes & remedies, please refer to the appendix (chapter 3.5). (📖 3-9)



Overview of system error messages of the motor control

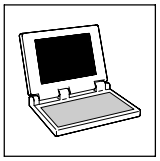
Error		Monitoring function	System variable	Possible responses • Lenze setting ✓ Setting possible					
No.	Display			Code	TRIP	Message	Warning	FAIL-QSP	Off
x011	OC1	Short circuit	MCTRL_bShortCircuit_b		•				
x012	OC2	Earth fault	MCTRL_bEarthFault_b		•				
x015	OC5	I x t overload	MCTRL_bIxtOverload_b		•				
x020	OU	Overvoltage	MCTRL_bOvervoltage_b			•			
x030	LU	Undervoltage	MCTRL_bUndervoltage_b			•			
x032	LP1	Motor phase failure	MCTRL_bMotorphaseFail_b	C0597	✓		✓		•
x050	OH	Heatsink temperature (fixed)	MCTRL_bKuehlGreaterSet-Value_b		•				
x053	OH3	Motor temperature (fixed)	MCTRL_bMotorTempGreater-SetValue_b	C0583	•				✓
x054	OH4	Heatsink temperature (adjustable)	MCTRL_bKuehlGreaterC0122_b	C0582			•		✓
x057	OH7	Motor temperature (adjustable)	MCTRL_bMotorTemp-GreaterC0121_b	C0584			•		✓
x058	OH8	Motor temperature (PTC)	MCTRL_bPtcOverTemp_b	C0585	✓		✓		•
x082	Sd2	Resolver error	MCTRL_bResolverFault_b	C0586	•		✓		✓
x086	Sd6	Thermal sensor error	MCTRL_bSensorFault	C0594	•		✓		✓
x087	Sd7	Absolute value encoder error [1]	MCTRL_bEncoderFault_b		•				
x088	Sd8	Absolute value encoder error [1]	MCTRL_bSinCosFault_b	C0580	✓				•
x089	PL	Error during rotor position adjustment	MCTRL_bRotorPositionFault_b		•				
x190	nErr	Speed out of tolerance margin	MCTRL_bSpeedLoopFault_b	C0579	✓	✓	✓	✓	•
x200	NMAX	Maximum speed exceeded	MCTRL_bNmaxFault_b		•				

x: 0 = TRIP, 1 = Message, 2 = Warning, 3 = FAIL-QSP

[1] When the error has been eliminated: Deenergise the controller completely!

Responses and their effects on the drive

Response	⇨ Effect	Keypad display		
		RDY	IMP	Fail
TRIP		☐	■	■
TRIP active:	⇨ The power outputs U, V, W are switched to high resistance. ⇨ The drive is coasting (no control!).			
TRIP reset:	⇨ The drive runs to its setpoint along the set ramps.			
Message		☐	■	■
	 The drive restarts automatically when the message is no longer present!			
Message active:	⇨ The power outputs U, V, W are switched to high resistance.			
≤ 0.5 s	⇨ The drive is coasting (no control!).			
> 0.5 s	⇨ The drive is coasting (due to internal controller inhibit!). If required, restart program.			
Message reset:	⇨ The drive runs to its setpoint with the maximum torque.			
Warning		■	☐	■
	 The drive can be destroyed as a result of deactivated monitoring functions!			
	⇨ The failure merely is displayed, the drive runs on in a controlled manner.			
FAIL-QSP		-	-	-
	⇨ The drive decelerates to standstill along the QSP ramp (C0105).			
Off		-	-	-
	 The drive can be destroyed as a result of deactivated monitoring functions!			
	⇨ There is no response to the failure!			
		☐ = off	■ = on	



2.12.17.1 OC1 - short-circuit monitoring

This monitoring function protects the drive controller.

Error		Monitoring function	System variable	Possible responses				
No.	Display			TRIP	Message	Warning	FAIL-QSP	Off
x011	OC1	Short circuit	MCTRL_bShortCircuit_b	•				
				• Lenze setting ✓ Setting possible				

Monitoring is actuated in the event of a short circuit in the motor phases. This can also be caused by an interturn fault in the machine.

- Monitoring can also respond during power-up if an **earth fault** occurs.
- If monitoring responds, the drive controller has to be disconnected from the mains and the short circuit has to be eliminated.

2.12.17.2 OC2 - earth-fault monitoring

This monitoring function protects the drive controller.

Error		Monitoring function	System variable	Possible responses				
No.	Display			TRIP	Message	Warning	FAIL-QSP	Off
x012	OC2	Earth fault	MCTRL_bEarthFault_b	•				
				• Lenze setting ✓ Setting possible				

The 9300 Servo PLC is equipped with earth-fault detection as standard.

- If monitoring is actuated, the drive controller has to be disconnected from the mains and the earth fault has to be eliminated.

Possible causes of an earth fault:

- Short circuit to frame of the machine
- Short circuit of a phase to the shield
- Short circuit of a phase to PE

2.12.17.3 OC5 - I x t overload monitoring

Error		Monitoring function	System variable	Possible responses				
No.	Display			TRIP	Message	Warning	FAIL-QSP	Off
x015	OC5	I x t overload	MCTRL_blxtOverload_b	•				
				• Lenze setting ✓ Setting possible				

Overcurrent diagram for OC5 fault message

The following diagram shows the maximum permissible overcurrent as a function of time:

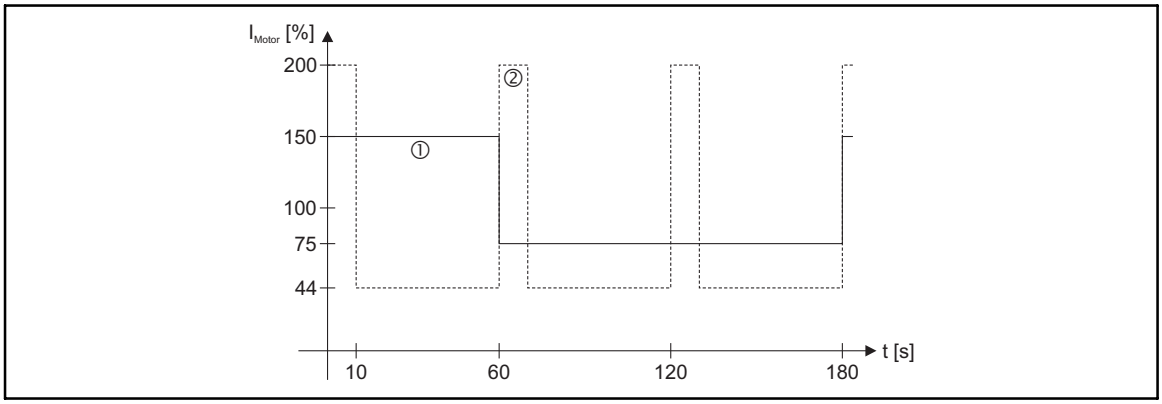


Fig. 2-27 Overcurrent diagram

The maximum permissible overcurrent is dependent on the I_{max} limit set under C0022. (📖 2-59)

① I_{max} limit set under C0022 ≤ 150 % I_r:

- Within a period of **180 s**, the arithmetic mean value of the motor current may not exceed **100 %** of the rated device current.
- Example: Arithmetic mean value to curve ①:

$$\frac{60\ s \cdot 150\ \% + 120\ s \cdot 75\ \%}{180\ s} = 100\ \%$$

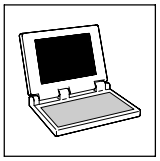
② I_{max} limit set under C0022 > 150 % I_r:

- Within a period of **60 s**, the arithmetic mean value of the motor current may not exceed **70 %** of the rated device current.
- Example: Arithmetic mean value to curve ②:

$$\frac{10\ s \cdot 200\ \% + 50\ s \cdot 44\ \%}{60\ s} = 70\ \%$$

The current controller load is displayed in C0064:

Code	LCD	Possible settings		IMPORTANT
		Lenze	Selection	
C0064	Utilization	Disp	0 {1 %} 150	Controller load I x t during the last 180 seconds • C0064 >100 % trips OC5. • TRIP-RESET is only possible if C0064 < 95 %.



2.12.17.4 OU - overvoltage monitoring

This function monitors the DC bus and protects the controller.

Error		Monitoring function	System variable	Possible responses				
No.	Display			TRIP	Message	Warning	FAIL-QSP	Off
x020	OU	Overvoltage	MCTRL_bOvervoltage_b		•			
				• Lenze setting ✓ Setting possible				

Monitoring is actuated if the DC bus voltage at the terminals $+U_G$ and $-U_G$ exceeds a switch-off threshold dependent on C0173, and it remains active until the value falls below the respective switch-on threshold again.

- The DC-bus voltage is set under C0173:

Code	LCD	Possible settings		IMPORTANT
		Lenze	Selection	
[C0173]	UG limit	1		Adaptation of DC-bus voltage thresholds • Check during commissioning and adapt if necessary • All drive components in interconnected drives must have the same thresholds
			0 Mains < 400 V; with or without brake unit 1 Mains = 400 V; with or without brake unit 2 Mains = 460 V; with or without brake unit 3 Mains = 480 V; without brake unit 4 Mains = 480 V; with brake unit	

- The switch-off and switch-on thresholds dependent on C0173 can be gathered from the following table:

Setting of C0173		Switch-off threshold	Switch-on threshold
0	Mains < 400 V; with or without brake unit	770 V	755 V
1	Mains = 400 V; with or without brake unit	770 V	755 V
2	Mains = 460 V; with or without brake unit	770 V	755 V
3	Mains = 480 V; without brake unit	770 V	755 V
4	Mains = 480 V; with brake unit	800 V	785 V

- The switch-off threshold defines the voltage level of the DC-bus voltage, at which the pulse inhibit is activated.

Braking torque derating

Without a braking system being connected (934X power supply module or 935X braking unit), the braking torque is automatically derated when the DC-bus voltage reaches the following value:

Threshold for braking torque derating = Switch-off threshold − OV reduce

- The ”OV reduce” value is set under C0172:

Code	LCD	Possible settings		IMPORTANT
		Lenze	Selection	
[C0172]	0V reduce	10		Threshold for activating the braking torque derating before OU trip
			0 {10 V} 100	

Example:

- C0173 = 3 ⇨ Switch-off threshold = 770 V
- C0172 = 10 ⇨ ”OV reduce” = 10 V

Threshold for braking torque derating = 770 V − 10 V = 760 V

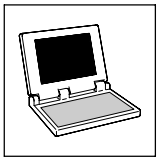
⇨ The braking torque is derated as soon as the DC-bus voltage reaches or exceeds 760 V.

- Braking with active braking torque derating generates clearly audible motor noise.

Tip!

If the monitoring system responds frequently, the drive dimensioning may be inappropriate (too much braking energy being generated).

- Remedy: Use 934X power supply module or (additional) 935X braking units.
- When several controllers are operated simultaneously, a DC-bus connection may be useful. In this way the braking energy generated by one drive can be used to drive another drive. Only the energy difference is taken from the mains.



2.12.17.5 LU - undervoltage monitoring

This function monitors the DC bus and protects the controller.

Error		Monitoring function	System variable	Possible responses				
No.	Display			TRIP	Message	Warning	FAIL-QSP	Off
x030	LU	Undervoltage	MCTRL_bUndervoltage_b		•			
				• Lenze setting ✓ Setting possible				

The monitoring responds if the DC-bus voltage at the terminals $+U_G$ and $-U_G$ falls below a switch-off threshold dependent on C0173 and it remains active until the corresponding switch-on threshold has again been exceeded.

- The DC-bus voltage is set under C0173 (📖 2-67).
- The switch-off and switch-on thresholds dependent on C0173 can be gathered from the following table:

Setting of C0173		Switch-off threshold	Switch-on threshold
0	Mains < 400 V; with or without brake unit	285 V	430 V
1	Mains = 400 V; with or without brake unit	285 V	430 V
2	Mains = 460 V; with or without brake unit	328 V	473 V
3	Mains = 480 V; without brake unit	342 V	487 V
4	Mains = 480 V; with brake unit	342 V	487 V

- The switch-off threshold defines the voltage level of the DC-bus voltage, at which the pulse inhibit is activated.

Tip!

If the undervoltage lasts longer than 3 s or if the drive is powered up, this is entered into the fault memory.

- This can be the case if the control module is supplied externally via the terminals X5/39 and X5/59 and the mains is switched off.
- If the undervoltage has been eliminated (reconnection to the mains), the entry is not updated in the fault memory but deleted because this is not an error but a controller status.

Undervoltages which last for less than 3 s are interpreted as a fault (e.g. power system fault) and entered into the fault memory. In this case the fault memory is updated.

2.12.17.6 LP1 - monitoring of the motor phases

This monitoring function checks if a motor phase has failed.

Note!

- This monitoring function can only be used for asynchronous motors.
- When this monitoring function is activated, the calculating time available for the user is reduced.

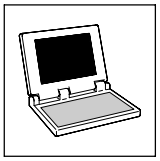
Error		Monitoring function	System variable	Possible responses				
No.	Display			TRIP	Message	Warning	FAIL-QSP	Off
x032	LP1	Motor phase failure	MCTRL_bMotorphaseFail_b	✓		✓		•
				• Lenze setting ✓ Setting possible				

- The monitoring limit is set under C0599.
- The response is set under C0597.

Code	LCD	Possible settings			IMPORTANT
		Lenze	Selection		
C0597	MONIT LP1	3			Configuration of motor phase monitoring (LP1)
			0	TRIP	
			2	Warning	
			3	Off	
C0599	Limit LP1	5			Monitoring limit for LP1 fault
			0.01	{0.01 %} 10.00	

Error acknowledgement

1. Check motor cables.
2. Execute TRIP-RESET.



2.12.17.7 OH - heatsink temperature monitoring (fixed)

This monitoring function protects the drive controller.

Error		Monitoring function	System variable	Possible responses				
No.	Display			TRIP	Message	Warning	FAIL-QSP	Off
x050	OH	Heatsink temperature (fixed)	MCTRL_bKuehlGreaterSet-Value_b	•				
				• Lenze setting ✓ Setting possible				

MCTRL_bKuehlGreaterSetValue_b is derived from a comparator with hysteresis. The switch-off threshold and the hysteresis are fixed:

- The switch-off threshold is 85 °C
- The hysteresis is 5 K, i.e. the value for switching on again is 80 °C.

The following causes can bring about an actuation of the monitoring process:

Cause	Remedy
The ambient temperature is too high.	Mount a blower in the control cabinet.
The drive controller is overloaded in the arithmetic mean, i. e. overload and recovery phase exceed 100%.	• Mount a blower in the control cabinet. • Shorten overload phase. • Use a more powerful drive controller.

2.12.17.8 OH3 - motor temperature monitoring (fixed)

This monitoring function protects the motor against overheating.

Error		Monitoring function	System variable	Possible responses				
No.	Display			TRIP	Message	Warning	FAIL-QSP	Off
x053	OH3	Motor temperature (fixed)	MCTRL_bMotorTempGreater-SetValue_b	•				✓
				• Lenze setting ✓ Setting possible				

MCTRL_bMotorTempGreaterSetValue_b is derived from a comparator with hysteresis. The switch-off threshold and the hysteresis are fixed:

- The switch-off threshold is 150 °C
- The hysteresis is 15 K, i.e. the value for switching on again is 135 °C.

This monitoring only applies to the temperature sensor specified by Lenze as it is, for instance, included in the Lenze standard servo motor.

- The Sub-D connectors X7 or X8 are available as inputs.

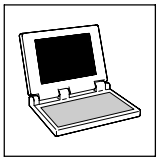
Stop!

The temperature sensor may either be connected to X7 **or** to X8; the respective other input for the temperature sensor must be free!

This monitoring is active in the Lenze setting and is thus triggered when you use a non-Lenze servo motor!

- The response is set under C0583:

Code	LCD	Possible settings		IMPORTANT
		Lenze	Selection	
C0583	MONIT OH3	→		Monitoring configuration: Motor temperature (Motor temperature > fixed limit temperature) → Dependent on C0086
			0 TRIP 3 Off	



2.12.17.9 OH4 - heatsink temperature monitoring (adjustable)

This monitoring function protects the drive controller.

Error		Monitoring function	System variable	Possible responses				
No.	Display			TRIP	Message	Warning	FAIL-QSP	Off
x054	OH4	Heatsink temperature (adjustable)	MCTRL_bKuehlGreaterC0122_b			•		✓
				• Lenze setting ✓ Setting possible				

This monitoring function is designed as an early warning stage before final disconnection of the drive controller by means of TRIP (OH) via the monitoring function "heatsink temperature (fixed)". (📖 2-71)

- With this function the process can be influenced to avoid a switch-off of the controller at an unfavourable moment.
- Furthermore, for instance, additional fans, which would cause an unacceptable noise in continuous operation, can also be switched on and off.

MCTRL_bKuehlGreaterC0122_b is derived from a comparator with hysteresis.

- The operating threshold is set under C0122.
- Hysteresis is 5 K (fixed), i. e. monitoring is reset at 5 K below the operation threshold that has been set.
- The response is set under C0582.

Code	LCD	Possible settings		IMPORTANT
		Lenze	Selection	
C0122	OH4 limit	85	45 {1 °C} 85	Temperature threshold for heatsink temperature prewarning "Tht > C0122" (fault OH4)
C0582	MONIT OH4	2	2 Warning 3 Off	Configuration of monitoring

2.12.17.10 OH7 - motor temperature monitoring (adjustable)

This monitoring function monitors the process.

Error		Monitoring function	System variable	Possible responses				
No.	Display			TRIP	Message	Warning	FAIL-QSP	Off
x057	OH7	Motor temperature (adjustable)	MCTRL_bMotorTemp-GreaterC0121_b			•		✓
				• Lenze setting ✓ Setting possible				

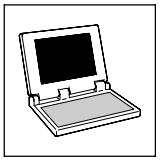
This monitoring function is designed as an early warning stage before final disconnection of the drive controller by means of TRIP (OH3) via the monitoring function "motor temperature (fixed)". (📖 2-72)

- With this function the process can be influenced to avoid a switch-off of the motor at an unfavourable moment.
- Furthermore, for instance, additional fans, which would cause an unacceptable noise in continuous operation, can be switched on and off.

*MCTRL_bMotorTempGreaterC0121_b*is derived from a comparator with hysteresis.

- The operating threshold is set under C0121.
- Hysteresis is 15 K (fixed), i. e. monitoring is reset at 15 K below the operation threshold that has been set.
- The response is set under C0584.

Code	LCD	Possible settings			IMPORTANT
		Lenze	Selection		
C0121	OH7 limit	150			Temperature threshold for motor temperature prewarning "TMot > C0121" (fault OH7)
			45	{1 °C} 150	
C0584	MONIT OH7	→			Monitoring configuration: Motor temperature (Motor temperature > variable limit temperature C0121) → Dependent on C0086 • Temperature monitoring via resolver input
			2	Warning	
			3	Off	



2.12.17.11 OH8 - motor temperature monitoring via T1, T2

This monitoring function protects the motor.

Error		Monitoring function	System variable	Possible responses				
No.	Display			TRIP	Message	Warning	FAIL-QSP	Off
x058	OH8	Motor temperature (PTC)	MCTRL_bPtcOverTemp_b	✓		✓		•
				• Lenze setting ✓ Setting possible				

MCTRL_bPTCOverTemp_b is derived from the digital signal across the terminals T1, T2 next to the power terminals UVW.

- The switch-off threshold and the hysteresis depend on the encoder system (DIN 44081).
- The response is set under C0585:

Code	LCD	Possible settings		IMPORTANT
		Lenze	Selection	
C0585	MONIT OH8	3		Monitoring configuration: Motor temperature (Motor temperature across T1/T2 too high) • Temperature monitoring via PTC input
			0 TRIP 2 Warning 3 Off	

Stop!

If you use the inputs T1, T2 to protect the motor, the monitoring response should not be ”Warning” or ”Off” since the motor could be damaged or destroyed in the event of more overload!

2.12.17.12 Sd2 - resolver monitoring for open circuit

This monitoring function monitors the resolver feed cable and the resolver for open circuits and protects the motor.

Error		Monitoring function	System variable	Possible responses				
No.	Display			TRIP	Message	Warning	FAIL-QSP	Off
x082	Sd2	Resolver error	MCTRL_bResolverFault_b	•		✓		✓
				• Lenze setting ✓ Setting possible				

Stop!

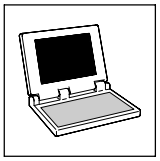
If the monitoring is switched off, the machine can reach very high speeds in the event of faults (e. g. system cable is disconnected or not correctly screwed), which can result in the damage of the motor and of the driven machine! The same applies if ”warning” is set as a response.

- For commissioning always use the Lenze setting (TRIP) for C0856.
- The possibility of switching off via C0856 should only be used if the monitoring is triggered without any obvious reason (e.g. due to long cables or intense interference injection caused by other drives).

If a fault has occurred in the actual speed detection, it is possible that the overspeed monitoring (NMAX) does not respond as expected.

- This monitoring
  - is automatically activated if the resolver is selected as an actual speed value encoder under C0025 (C0025 = 10).
  - is automatically deactivated if another actual speed value encoder is selected.
- The response is set under C0586:

Code	LCD	Possible settings		IMPORTANT
		Lenze	Selection	
C0586	MONIT SD2	0	0 TRIP 2 Warning 3 Off	Monitoring configuration: Resolver error



2.12.17.13 Sd6 - motor temperature sensor monitoring

This monitoring function checks whether the motor temperature sensor supplies values within the measuring range of -50 ... +250 °C.

If the values are out of this measuring range, monitoring is triggered.

Error		Monitoring function	System variable	Possible responses				
No.	Display			TRIP	Message	Warning	FAIL-QSP	Off
x086	Sd6	Temperature sensor error	MCTRL_bSensorFault	•		✓		✓
				• Lenze setting ✓ Setting possible				

- The response is set under C0586:

Code	LCD	Possible settings		IMPORTANT
		Lenze	Selection	
C0594	MONIT SD6	→		Monitoring configuration: Motor temperature sensor error (X7 or X8) → Dependent on C0086
			0 TRIP 2 Warning 3 Off	

2.12.17.14 Sd7 - absolute value encoder monitoring

This monitoring function repeatedly reads in the absolute value of the encoder when the PLC is switched on to find out if the same value is transmitted to the drive.

If a deviation > 5 % is detected at the motor shaft, the monitoring (TRIP) is actuated.

Error		Monitoring function	System variable	Possible responses				
No.	Display			TRIP	Message	Warning	FAIL-QSP	Off
x087	Sd7	Absolute value encoder error	MCTRL_bEncoderFault_b	•				
				• Lenze setting ✓ Setting possible				

2.12.17.15 Sd8 - sin/cos encoder monitoring during operation

This monitoring function performs a plausibility check to find out whether the encoder is available and the sin/cos tracks supply plausible values with regard to each other.

Error		Monitoring function	System variable	Possible responses				
No.	Display			TRIP	Message	Warning	FAIL-QSP	Off
x088	Sd8	Absolute value encoder error	MCTRL_bSinCosFault_b	✓				•
				• Lenze setting ✓ Setting possible				

- The following sin/cos encoder types are supported:
  - Stegmann SCS 60/70 ST 512 single-turn absolute value encoder (512 inc/rev)
  - Stegmann SCM 60/70 ST 512 multi-turn absolute value encoder (512 inc/rev)
- The error ”Sd8” can only be reset by mains switching.
- It may be necessary that the encoder has to move a few angular degrees for triggering an error.
- The response is set under C0580:

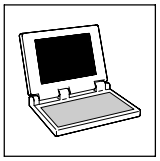
Code	LCD	Possible settings		IMPORTANT
		Lenze	Selection	
C0580	MONIT SD8	3		Monitoring configuration: Sin/cos encoder
			0 TRIP 3 Off	

Note!

If the encoder is to be monitored and, especially, if synchronous machines are used, the error response should be set to ”TRIP”.

For further encoder reliability, the monitoring of following errors can, for example, additionally be activated for positioning systems. This error response should also be set to ”TRIP”.

Apparent errors	Hidden errors
• Unplugged connectors, all encoder signals open. • Single open circuit, one of the following signals is missing: – COS A – RefCOS A – SIN B – RefSIN B – GND – VCC • Double open circuit with the following signal pairs: – COS A and RefCOS A – SIN B and RefSIN B – COS A and SIN B – RefCOS A and RefSIN B – or all four signals (COS A, RefCOS A, SIN B, RefSIN B) open.	• Short circuits, especially between the sine and cosine signals. • Cable/encoder interferences with intermediate values • ”Semi”-short circuits (> 0 Ohm) • ”Semi”-interruptions (< infinite)



2.12.17.16 PL - monitoring of the rotor position adjustment

This monitoring function monitors the correct execution of the rotor position adjustment.

Error		Monitoring function	System variable	Possible responses				
No.	Display			TRIP	Message	Warning	FAIL-QSP	Off
x089	PL	Error during rotor position adjustment	MCTRL_bRotorPositionFault_b	•				
				• Lenze setting ✓ Setting possible				

Error triggering

- If an Sd7 error occurs during the rotor position adjustment with an absolute value encoder, a TRIP will occur after the subsequent mains switching.
- If a rotor position adjustment with any encoder is aborted (e.g. by C0095 = 0 or switch-off), a TRIP will occur.

Error acknowledgement

1. Activate rotor position adjustment with C0095 = 1.
2. Execute TRIP-RESET.
3. Re-execute rotor position adjustment.

2.12.17.17 nErr - speed monitoring (speed out of tolerance margin)

This monitoring function compares the actual speed value supplied by the speed encoder to the speed setpoint on the speed controller. If the difference between the two speed values exceeds the tolerance margin set in C0576, the monitoring function is actuated.

Error		Monitoring function	System variable	Possible responses				
No.	Display			TRIP	Message	Warning	FAIL-QSP	Off
x190	nErr	Speed out of tolerance margin	MCTRL_bSpeedLoopFault_b	✓	✓	✓	✓	•
				• Lenze setting ✓ Setting possible				

This monitoring function can be used to evaluate the speed following behaviour of the controller.

- If the system deviation exceeds a certain value, this may indicate a drive problem. In this case, the drive cannot follow the set speed setpoint for some reason. With operational controllers, this may be caused by mechanical blockades on the load side, or by an insufficient motor torque.

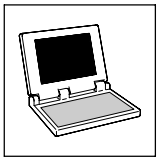
Furthermore, this monitoring function can be used for additional speed encoder protection in speed-controlled operation. This monitoring function thus supplements the individual encoder monitoring functions.

- Errors on the encoder system bring about an incorrect actual speed value. This usually results in a system deviation on the speed controller that is greater than that during normal operation.
- The tolerance margin is set via C0576:
- The response is set via C0579:

Code	LCD	Possible settings		IMPORTANT
		Lenze	Selection	
C0576	nErr Window	100	0 {1 %} 100	Tolerance margin for speed monitoring • Referred to n_{max}. • 100 % = lowest monitoring sensitivity.
C0579	MONIT nErr	3	0 TRIP 1 Message 2 Warning 3 Off 4 Fail-QSP	Speed monitoring configuration

Note!

- If the encoder is to be monitored, set the error response to ”TRIP”.
- To ensure that there are no false alarms, it might be necessary to adapt the setpoint/quick stop ramps (by means of longer time intervals) to the application.
- The selected tolerance margin (C0576) should be at least twice as high as the system deviation occurring during operation. The deviation can be determined by means of appropriate tests during commissioning.



2.12.17.18 NMAX - speed monitoring (maximum speed exceeded)

This monitoring function monitors the process.

Error		Monitoring function	System variable	Possible responses				
No.	Display			TRIP	Message	Warning	FAIL-QSP	Off
x200	NMAX	Maximum speed exceeded	MCTRL_bNmaxFault_b	•				
				• Lenze setting ✓ Setting possible				

The monitoring responds when the current speed exceeds the upper speed limit of the system or the double value of C0011 (n_{max}).

Stop!

- For active loads (e.g. hoists) ensure torque-free operation of the drive. Special system-specific measures are required!
- If the actual speed value encoder fails, the monitoring may fail to respond.

- The upper system speed is set under C0596:

Code	LCD	Possible settings			IMPORTANT
		Lenze	Selection		
C0596	NMAX limit	5500			Monitoring configuration: Max. speed of the machine
			0	{1 rpm} 16000	

2.13 MCTRL_AUX_HighResFeedback (node number 181)

High-resolution encoder

Use this SB only after consulting with Lenze!

2.13.1 Inputs_MCTRL_AUX_HighResFeedback

Variable	Data type	Data type	Address	Display code	Display format	Note
MCTRL_AUX_ dnEncoderAngle	Double integer	Position	%ID181.0			High-resolution encoder position

2.13.2 Outputs_MCTRL_AUX_HighResFeedback

Variable	Data type	Data type	Address	Display code	Display format	Note
MCTRL_AUX_ wEncoderMask	Word	-	%QW181.0			Mask for high-resolution encoder position

2.14 STATEBUS_IO (node number 51)

The state bus is a bus system specifically designed for Lenze controllers/PLCs.

This SB can set the state bus to LOW level and thus set all nodes connected to the state bus to a previously selected status (e.g. TRIP, quick stop (QSP) or controller inhibit (CINH)).

The SB immediately detects when a node sets the state bus to LOW level and the corresponding control signal can be processed in the PLC program.

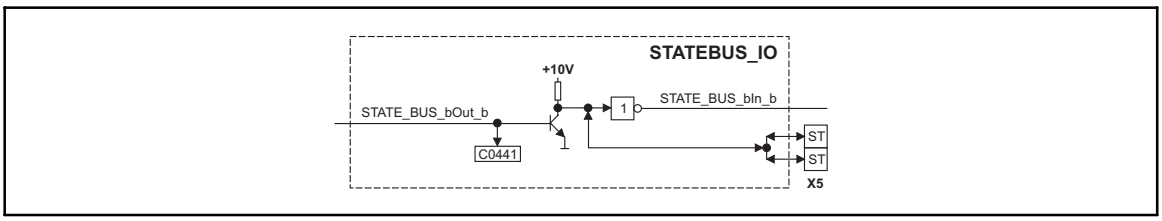


Fig. 2-28 STATEBUS_IO

Variable	Data type	Signal type	Address	Display code	Display format	Note
STATEBUS_bOut_b	Bool	Binary	%QX51.0.4	C0441	bin	LOW signal output
STATEBUS_bIn_b	Bool	Binary	%IX51.0.6	-	-	LOW signal detection

- Every device connected to the state bus can set the state bus to LOW level (multi-master operation).
- A maximum of 20 devices (controllers/PLCs) can be networked via the state bus.

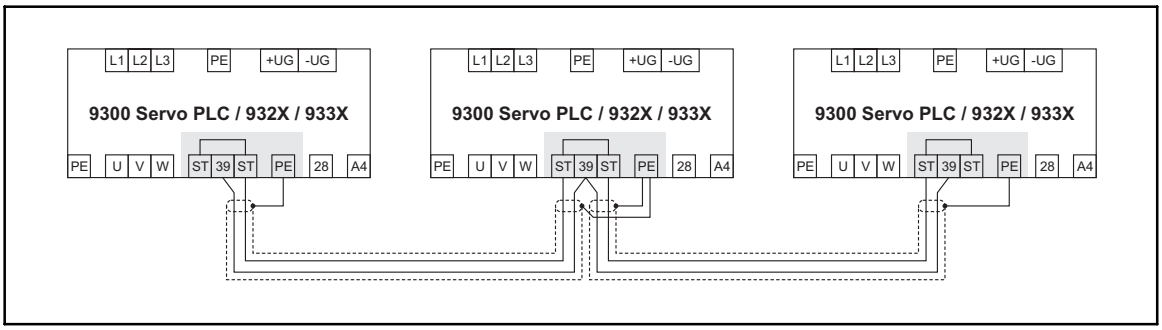


Fig. 2-29 Networking via the state bus

Stop!

Do not connect an external voltage to terminals X5/ST!

2.15 SYSTEM_FLAGS (system flags, node number 151)

System flags are global variables which are permanently integrated into the run-time system. They include functions that facilitate programming.

The following system flags are included in the PLC:

Variable	Data type	Address	Note
SYSTEM_bClock01Hz	Bool	%IX151.0.0	0.1 Hz system clock
SYSTEM_bClock1Hz		%IX151.0.8	1.0 Hz system clock
SYSTEM_bClock10Hz		%IX151.1.0	10 Hz system clock
SYSTEM_bClock0100Hz		%IX151.1.8	100 Hz system clock
SYSTEM_bTogCycleTask		%IX151.2.0	Toggle flag - cyclic task
SYSTEM_b1LoopCyclicTask		%IX151.2.8	First loop - cyclic task
SYSTEM_b1LoopTask2		%IX151.3.0	First loop - task ID2
SYSTEM_b1LoopTask3		%IX151.3.8	First loop - task ID3
SYSTEM_b1LoopTask4		%IX151.4.0	First loop - task ID4
SYSTEM_b1LoopTask5		%IX151.4.8	First loop - task ID5
SYSTEM_b1LoopTask6		%IX151.5.0	First loop - task ID6
SYSTEM_b1LoopTask7		%IX151.5.8	First loop - task ID7
SYSTEM_b1LoopTask8		%IX151.6.0	First loop - task ID8
SYSTEM_b1LoopTask9		%IX151.6.8	First loop - task ID9
SYSTEM_nTaskInterval	Integer	%IW151.7	Interval of current task
SYSTEM_nTaskID		%IW151.8	Identification of current task

Tip!

The system variables are not generated in simulation mode.

SYSTEM_bClockxHz

These system flags output a fixed clock pulse with an equal pulse/pause ratio.

- The flag is toggled in real time.
- When you use this system flag, take care with the sampling frequency used for polling this flag (aliasing effect). You should use at least twice the toggle frequency.

Example:

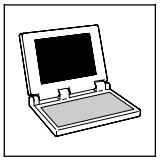
You would like to use the system flag *SYSTEM_bClock100Hz* as a clock for a counter.

- The pulse/pause ratio is 5 ms/5 ms.
- To avoid an aliasing effect, the counter must always be polled with an interval task < 5 ms.

SYSTEM_bTogCycleTask

This system flag alters the state with the cyclic task:

1. cycle: FALSE
2. cycle: TRUE
3. cycle: FALSE
4. cycle: TRUE
   etc.



SYSTEM_nTaskInterval

This system flag indicates the interval of the running task with a resolution of 0.25 ms.

- If, for instance, a 10-ms task is processed, the system flag indicates ”40” (40 x 0.25 ms = 10 ms).
- If a task different from an interval task is processed, the system flag indicates ”0”.

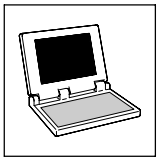
SYSTEM_nTaskID

This system flag indicates the task ID of the running task.

SYSTEM_b1LoopCyclicTask/SYSTEM_b1Loop Task X

These system flags are TRUE only once during the first cycle of a task.

- After the first cycle, the flags will be set to FALSE.
- The only way to reset the status to TRUE is to reset the program in the PLC.

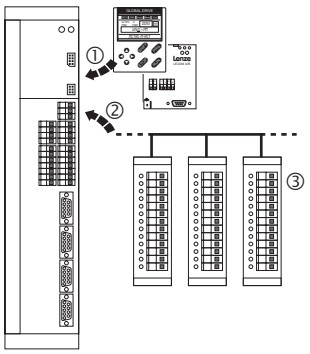


3 Appendix

3.1 PLC functionality

Field		Number	Description	
Inputs	Digital	1	Input for controller enable	24 V DC / 8 mA per input
		5	Free inputs (3 of them interrupt-capable[1])	[1] Response time 0.25 ms
	Analog	1	Free input (11 bits + sign)	±10 V or ±20 mA
		1	Free input (11 bits + sign)	±10 V
	Digital frequency	1	Input	0 ... 500 kHz
Outputs	Digital	4	Free outputs	24 V DC / max. 50 mA per output
	Analog	2	Free outputs (9 bits + sign)	±10 V / max. 20 mA
	Digital frequency	1	Output	0 ... 500 kHz
Feedback system			Resolver, incremental or sin/cos encoder	
Operation set			According to IEC61131-3	
Counter/times			According to IEC61131-3, depending on the data memory available	
Fast counter		1	0 ... 500 kHz	
Flags		512	Flag words	
Memory			See chapter 3.3 (📖 3-3)	
Processing time (1-bit operation)			0.7 µs	
Task types		8	Time or event-controlled tasks (1 ms ... 16 s)	
		1	Cyclic task	
Functions			• PID control functions • Electrical shaft • Positioning function • Mains failure control • Brake control • Flow point arithmetic	
Programming software			Drive PLC Developer Studio • Programming languages according to IEC61131-3 standard (IL, LD, FBD, ST, SFC) as well as CFC editor • Monitoring, visualisation, simulation and debugging	
Technology functions (only for ET variant)			Software packages (cam, positioner, winder)	

3.2 Extendability/networking



① **Automation interface (AIF)**
for EMZ9371BB keypad or the following AIF modules:
- 2102 LECOM-A/B/LI
- 2103 FP interface (RS-232C)
- 2111 INTERBUS
- 2112 INTERBUS-Loop
- 2133 PROFIBUS-DP
- 2174 CAN addressing module
- 2175 DeviceNet/CANopen

Others in preparation

② **Integrated system bus interface**

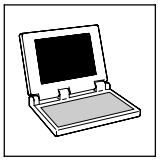
③ **9374IB terminal extension**
For the extension of the digital input and output terminals via the system bus.
- 8 terminals programmable as inputs or outputs.
- 9300 Servo PLC extendable with up to eight 9374 modules.
- Response time to a signal change at the terminal extension < 2 ms.

System bus (CAN)

Interface	Available CAN objects	
Integrated system bus interface ②	PDOs	CAN1_IN/CAN1_OUT CAN2_IN/CAN2_OUT CAN3_IN/CAN3_OUT
	SDOs	SDO1 (parameter data channel 1) SDO2 (parameter data channel 2)
		L_ParRead/L_ParWrite functionality
	Sync telegram	
	Synchronisation of the internal time basis by receiving the sync telegram	
	Free CAN objects	
	CanDSx driver for mapping indexes to codes and for the bus monitoring functions "Heartbeat" and "Node Guarding" (see "Function library LenzeCanDSxDrv.lib" Manual).	
Automation interface (AIF) ① with appropriate fieldbus module (e.g. 2175)	PDOs	XCAN1_IN/XCAN1_OUT XCAN2_IN/XCAN2_OUT XCAN3_IN/XCAN3_OUT
	SDOs	XSDO1 (parameter data channel 1) XSDO2 (parameter data channel 2)
	XSync telegram	
	AifParMap driver for mapping code accesses via AIF to other codes (see "Function library LenzeAifParMapDrv.lib" Manual).	

Tip!

For more detailed information about the system bus (CAN), please refer to the "System bus (CAN) for Lenze PLC devices" Manual.



3.3 Memories

The below table gives you an overview of the memories available:

Memory		Size	Info
ROM			
	Program memory	384 kbytes	Re-written whenever the program is downloaded
	Application data memory (FLASH)	15 segments à 64 kbytes	For data and motion profiles (cam data). • Data are preserved even after repeated program downloads or firmware updates. • Use the command **Online →Reset (original)** in the DDS online mode to delete data.
RAM			
	PLC data memory	10 kbytes	Can be symbolically used for FB instances and PLC variables.
	Application data memory	2 blocks à 64 kbytes	Data gets lost after mains disconnection.
E2PROM-buffered memory			
	Retain memory	160 bytes	See subsection 3.3.1
	Persistent memory	32 bytes	See subsection 3.3.2

Tip!

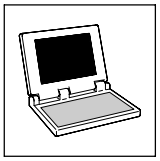
The **LenzeMemDrv.lib** function library includes functions for read/write access to the additional backup memory (application data memory, FLASH) of the PLC.

- Additional information can be found in the Manual for the **LenzeMemDrv.lib** function library.

3.3.1 Retain memory

In the retain memory the values of the retain variables are stored safe from power failure and are thus available to the program even after mains switching. (Saving with C0003 = 1 is not required.)

- Retain variables are declared by means of the variable class **`VAR RETAIN`**.
- Retain variables are created as a symbolically addressable memory.
- With each program download the retain variables are reset to their initialisation value. If an initialisation value has not been defined, the corresponding retain variable will be initialised with the value ”0”.
- In the DDS online mode you can use the commands **Online→Reset (cold)** and **Online→Reset (original)** to reset the retain variables in the PLC to their initialisation values.



3.3.2 Persistent memory

In the persistent memory 32 bytes of data can be stored safe from power failure and are thus available to the program even after mains switching. Unlike in the retain memory, data remains unchanged in the persistent memory even after a new program download. (Saving with C0003 = 1 is not required.)

- The persistent memory can only be deleted in the DDS online mode using the command **Online→Reset (original)**.

Access to the persistent memory

The persistent memory is accessed via the system variables of the control configuration. The 32 bytes available can be assigned to several variables of different data types at the same time. In this way they can be used as required by the application in the PLC program:

	System variable (8 bits)		System variable (16 bits)		System variable (32 bits)	
Byte	Identifier	Address	Identifier	Address	Identifier	Address
0	VAR_Persistent_byByte0	%QB171.0	VAR_Persistent_wWord0	%QW171.0	VAR_Persistent_dwDWord0	%QD171.0
1	VAR_Persistent_byByte1	%QB171.1				
2	VAR_Persistent_byByte2	%QB171.2	VAR_Persistent_wWord1	%QW171.1		
3	VAR_Persistent_byByte3	%QB171.3				
4	VAR_Persistent_byByte4	%QB171.4	VAR_Persistent_wWord2	%QW171.2	VAR_Persistent_dwDWord1	%QD171.1
5	VAR_Persistent_byByte5	%QB171.5				
6	VAR_Persistent_byByte6	%QB171.6	VAR_Persistent_wWord3	%QW171.3		
7	VAR_Persistent_byByte7	%QB171.7				
8	VAR_Persistent_byByte8	%QB171.8	VAR_Persistent_wWord4	%QW171.4	VAR_Persistent_dwDWord2	%QD171.2
9	VAR_Persistent_byByte9	%QB171.9				
10	VAR_Persistent_byByte10	%QB171.10	VAR_Persistent_wWord5	%QW171.5		
11	VAR_Persistent_byByte11	%QB171.11				
12	VAR_Persistent_byByte12	%QB171.12	VAR_Persistent_wWord6	%QW171.6	VAR_Persistent_dwDWord3	%QD171.3
13	VAR_Persistent_byByte13	%QB171.13				
14	VAR_Persistent_byByte14	%QB171.14	VAR_Persistent_wWord7	%QW171.7		
15	VAR_Persistent_byByte15	%QB171.15				
16	VAR_Persistent_byByte16	%QB171.16	VAR_Persistent_wWord8	%QW171.8	VAR_Persistent_dwDWord4	%QD171.4
17	VAR_Persistent_byByte17	%QB171.17				
18	VAR_Persistent_byByte18	%QB171.18	VAR_Persistent_wWord9	%QW171.9		
19	VAR_Persistent_byByte19	%QB171.19				
20	VAR_Persistent_byByte20	%QB171.20	VAR_Persistent_wWord10	%QW171.10	VAR_Persistent_dwDWord5	%QD171.5
21	VAR_Persistent_byByte21	%QB171.21				
22	VAR_Persistent_byByte22	%QB171.22	VAR_Persistent_wWord11	%QW171.11		
23	VAR_Persistent_byByte23	%QB171.23				
24	VAR_Persistent_byByte24	%QB171.24	VAR_Persistent_wWord12	%QW171.12	VAR_Persistent_dwDWord6	%QD171.6
25	VAR_Persistent_byByte25	%QB171.25				
26	VAR_Persistent_byByte26	%QB171.26	VAR_Persistent_wWord13	%QW171.13		
27	VAR_Persistent_byByte27	%QB171.27				
28	VAR_Persistent_byByte28	%QB171.28	VAR_Persistent_wWord14	%QW171.14	VAR_Persistent_dwDWord7	%QD171.7
29	VAR_Persistent_byByte29	%QB171.29				
30	VAR_Persistent_byByte30	%QB171.30	VAR_Persistent_wWord15	%QW171.15		
31	VAR_Persistent_byByte31	%QB171.31				

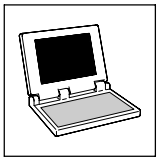
Note!

Some Lenze projects, programming examples and templates use parts of the persistent memory. They are marked with ”LenzeInternalUse” and must not be changed by the user.

Example: Power-failure-safe storage of the current position

You can, for instance, use an AT declaration to connect the variable with the current position directly to the address of a persistent variable and thus store the position safe from power failure:

```
g_dnActualPosition_p AT%QD171.6:DINT;
```



3.3.3 Downloading data

In DDS (as of version 2.0) it is possible to attach a file to your project whose data is automatically downloaded to the PLC when the program is downloaded.

- This mechanism is, for instance, used in the **Software Package - Cam** to download motion profiles.

Note!

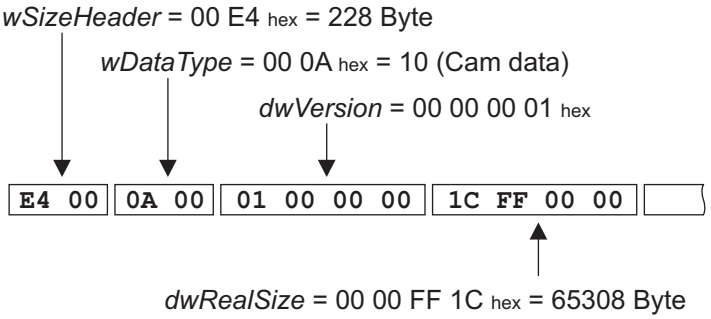
- With the 9300 Servo PLC the additional data is loaded into the application FLASH.
- With the Drive PLC the additional data is directly attached to the PLC program because the Drive PLC does not have an application FLASH.

For the download being executed by the DDS, the following two conditions must be met:

1. The PLC program must have been stopped.
2. The header of the file attached to the project must have the following structure:

Name	Data type	Data length in bytes	Contents
wSizeHeader	WORD	2	Header length in bytes
wDataType	WORD	2	Data specification identifier • This information can be found under C2131 after data has been downloaded.
			0 ... 10000: Lenze-spezific data
			> 10000: User data
dwVersion	DWORD	4	Data version • This information can be found under C2132 after data has been downloaded.
dwRealSize	DWORD	4	User data length in bytes (without header)
dwTimeStamp	DWORD	4	Time stamp of the last data change • This information can be found under C2133 after data has been downloaded.
wLicenseInfo	WORD	2	*Reserved for future extensions*
wSizeSymbolicName	WORD	2	Length of the symbolic file name
achSymbolicName	ACH	wSizeSymbolicName	Character array including the symbolic file name • This information can be found under C2130 after data has been downloaded.
wCopyToRam	WORD	2	Selection whether data will be automatically copied into the application RAM of the PLC after downloading. • Maximum data length = 128 kbytes (RAM block 1 and 2)
			0: Data is not copied into the application RAM.
			1: Data is copied into the application RAM.
			2 ... 65535: Reserved
dwReserved	DWORD	4	*Reserved for future extensions*
awSizeAddInfo	DWORD	190	

Interpretation of the header information: least significant byte first:



3.4 System POUs

System POUs are POUs of the ”program” type which are designated with a special name and thus acquire the feature of being started by an event occurring in the PLC.

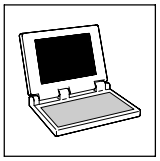
- The program includes a total maximum of 1000 instructions for system POUs.
- Unlike tasks or PLC_PRG, system POUs are not run-time monitored by a ”watchdog”.
- The special POU names and the corresponding event for starting the POU are listed in the following table:

POU name	Event for starting POU	The POU starts if
PLC_TaskOverrun	Task overflow	... the task monitoring time is exceeded.
PLC_RealError	Floating-point error	... a floating-point error occurs.
PLC_FailTripping	TRIP	... a trip is set.
PLC_WarningTripping	Warning	... a warning is activated.
PLC_MessageTripping	Message	... a message is activated. [1]
PLC_FailQspTripping	FAIL-QSP	... a FAIL-QSP is activated. [1] [2]
PLC_CANError	CAN-BUS error	... a CAN bus error occurs (e.g. BUS-OFF).
PLC_AIFError	AIF-BUS error	... an AIF bus error occurs.
PLC_Restart	Start	... the START command is activated after a STOP.
PLC_ColdStart	Cold start	... a RESET, RESET (cold), RESET (original) or a program download has been triggered. [3] **Note:** System variables must not be used in PLC_ColdStart. Otherwise, unexpected errors may occur in the control (e.g. start-up of the motor).
PLC_Stop	PLC stop	... the STOP command is activated.

[1] Not available for Drive PLC.
[2] Is only called if the pulse inhibit is not active.
[3] The CAN/AIF bus is ready after this POU has been executed.

Tip!

If you need a system POU for an event-controlled start, simply create a ”program”-type POU and name this POU with the PUO name which is listed in the table for the corresponding event.



3.5 System error messages

The fault memory (C0168/x) stores the error messages with an offset which indicates the type of the response:

No. of the error message	Type of response
0xxx	TRIP
1xxx	Message
2xxx	Warning
3xxx	FAIL-QSP

Example: C0168/1 = 2061

- x061:
  The current error (subcode 1 of C0168) is a communication error (error message ”CE0”/No. ”x061”) between the AIF module and the PLC.
- 2xxx:
  The response is a warning.

The current error number is also indicated in the variable *DCTRL_wFaultNumber* of the PLC program.

Tip!

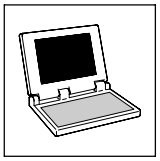
Occurring faults generally do not affect the operating ability of the PLC!

3.5.1 Overview of system error messages, error sources and responses

System error message				Possible settings/response • Lenze setting ✓ Setting possible						Available in		
No.	Display	Source	Meaning	Code	TRIP	Message	Warning	FAIL-QSP	Off	Drive PLC	Servo PLC	ECSxA
x011	OC1	MCTRL	Motor cable short circuit		•						✓	✓
x012	OC2	MCTRL	Motor cable earth fault		•						✓	✓
x015	OC5	MCTRL	I x t overload		•						✓	✓
x016	OC6	MCTRL	I^2 x t overload (C0120)		•							✓
x017	OC7	MCTRL	I x t warning (C0123)	C0604	✓		•		✓			✓
x018	OC8	MCTRL	I^2 x t warning (C0127)	C0605	✓		•		✓			✓
x020	OU	MCTRL	Overvoltage in the DC bus			•					✓	✓
x030	LU	MCTRL	Undervoltage in the DC bus			•					✓	✓
x032	LP1	MCTRL	Motor phase failure	C0597	✓		✓		•		✓	✓
x050	OH	MCTRL	Heatsink temperature higher than fixed limit temperature		•						✓	✓
x051	OH1	MCTRL	Temperature inside the controller > 90° C		•							✓
x053	OH3	MCTRL	Motor temperature higher than fixed limit temperature	C0583	•				✓		✓	✓
x054	OH4	MCTRL	Heatsink temperature higher than variable limit temperature (C0122)	C0582			•		✓		✓	✓
x055	OH5	MCTRL	Temperature inside the controller > C0124	C0605	✓		•		✓			✓
x057	OH7	MCTRL	Motor temperature higher than variable limit temperature (C0121)	C0584			•		✓		✓	✓
x058	OH8	MCTRL	Motor temperature via inputs T1/T2 too high	C0585	✓		✓		•		✓	✓
x061	CE0	AIF	Communication error in AIF module⇔PLC	C0126	✓		✓		•	✓	✓	✓
			CAN communication error:									
x062	CE1	CAN1	CAN1_IN (monitoring time can be set under C0357/1)	C0591	✓		✓		•	✓	✓	✓
x063	CE2	CAN2	CAN2_IN (monitoring time can be set under C0357/2)	C0592								
x064	CE3	CAN3	CAN3_IN (monitoring time can be set under C0357/3)	C0593								
x065	CE4	CAN	CAN BUS-OFF status (too many faulty telegrams have been received)	C0595	✓		✓		•	✓	✓	✓
x066	CE5	CAN	CAN time-out (gateway function C0370)	C0603	✓		✓		•	✓	✓	✓
x070	U15	Internal	Undervoltage of internal 15 V voltage supply		•					✓	✓	✓
x071	CCr	Internal	Internal fault [1]		•					✓	✓	✓
x072	PR1	Internal	Check sum error in parameter set 1		•					✓	✓	✓
x074	PEr	Internal	Program error [1]		•					✓	✓	✓
x075	PR0	Internal	General error in parameter sets [1]		•					✓	✓	✓
x079	PI	Internal	Error during parameter initialisation [1]		•					✓	✓	✓
x080	PR6	Internal	Too many user codes		•					✓	✓	✓
x082	Sd2	MCTRL	Resolver error	C0586	•		✓		✓		✓	✓
x083	Sd3	MCTRL	Encoder error at X9 PIN 8	C0587	✓		✓		•		✓	
x085	Sd5	MCTRL	Encoder error at analog input (X6) (C0034 = 1)	C0598	✓		✓		•		✓	✓
x086	Sd6	MCTRL	Sensor error: motor temperature (X7 or X8)	C0594	•		✓		✓		✓	✓
x087	Sd7	MCTRL	Absolute value encoder error at X8 [1]	C0025	•						✓	✓
x088	Sd8	MCTRL	Absolute value encoder error at X8 [1]	C0580	✓				•		✓	✓

x: 0 = TRIP, 1 = Message, 2 = Warning, 3 = FAIL-QSP

[1] When the error has been eliminated: Deenergise the controller completely!



System error message				Possible settings/response • Lenze setting ✓ Setting possible						Available in		
No.	**Display**	**Source**	**Meaning**	Code	TRIP	Message	Warning	FAIL-QSP	Off	Drive PLC	Servo PLC	ECSxA
x089	PL	MCTRL	Error during rotor position adjustment		•						✓	✓
x091	EEr	FWM	External monitoring activated via DCTRL	C0581	•	✓	✓	✓	✓		✓	✓
x105	H05	Internal	Internal error (memory)		•					✓	✓	✓
x107	H07	Internal	Internal error (power section)		•						✓	✓
x108	H08	Internal	Extension board not connected properly or not supported by program		•					✓		✓
x110	H10	FWM	Temperature sensor error: heatsink temperature	C0588	•				✓		✓	✓
x111	H11	FWM	Temperature sensor error: Temperature inside the controller		•				✓		✓	✓
			FIF-CAN / CAN-AUX communication error:									
x122	CE11	FIF-CAN1	FIF-CAN1_IN (monitoring time can be set under C2457/1)	C0591	✓		✓		•	✓		
		CANaux1	CANaux1_IN (monitoring time can be set under C2457/1)	C2481	✓		✓		•			✓
x123	CE12	FIF-CAN2	FIF-CAN2_IN (monitoring time can be set under C2457/2)	C0592	✓		✓		•	✓		
		CANaux2	CANaux2_IN (monitoring time can be set under C2457/2)	C2482	✓		✓		•			✓
x124	CE13	FIF-CAN3	FIF-CAN3_IN (monitoring time can be set under C2457/3)	C0593	✓		✓		•	✓		
		CANaux3	CANaux3_IN (monitoring time can be set under C2457/3)	C2483	✓		✓		•			✓
x125	CE14	FIF-CAN	BUS-OFF status of FIF-CAN (too many faulty telegrams have been received)	C0595	✓		✓		•	✓		
		CANaux	BUS-OFF status of CAN-AUX (too many faulty telegrams have been received)	C2484	✓		✓		•			✓
x126	CE15	CANaux	Communication error in gateway function (C0370, C0371) via CAN-AUX	C2485	✓		✓		•			✓
x190	nErr	MCTRL	Speed out of tolerance margin (C0576)	C0579	✓	✓	✓	✓	•		✓	✓
x200	NMAX	MCTRL	Maximum speed exceeded (C0596)		•						✓	✓
			Time-out (see task configuration):									
x201	overrun Task1	Internal	Task with ID 2	[2]	•		✓	✓		✓	✓	✓
x202	overrun Task2		Task with ID 3									
x203	overrun Task3		Task with ID 4									
x204	overrun Task4		Task with ID 5									
x205	overrun Task5		Task with ID 6									
x206	overrun Task6		Task with ID 7									
x207	overrun Task7		Task with ID 8									
x208	overrun Task8		Task with ID 9									
x219	overrun Cycl.-T	Internal	Time-out in cyclic task (PLC_PRG, ID 1)	[2]	•		✓	✓		✓	✓	✓

x: 0 = TRIP, 1 = Message, 2 = Warning, 3 = FAIL-QSP

[2] In DDS adjustable under **Project → Exceptional response**

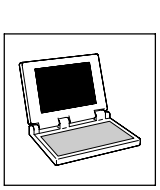
System error message				Possible settings/response • Lenze setting ✓ Setting possible						Available in		
No.	**Display**	**Source**	**Meaning**	Code	TRIP	Message	Warning	FAIL-QSP	Off	Drive PLC	Servo PLC	ECSxA
			Floating-point error (REAL) in:									
x209	float Sys-T	Internal	System task	2)	•		✓	✓		✓	✓	✓
x210	float Cycl.-T		Cyclic task (PLC_PRG, ID 1)									
x211	float T Id2		Task with ID 2									
x212	float T Id3		Task with ID 3									
x213	float T Id4		Task with ID 4									
x214	float T Id5		Task with ID 5									
x215	float T Id6		Task with ID 6									
x216	float T Id7		Task with ID 7									
x217	float T Id8		Task with ID 8									
x218	float T Id9		Task with ID 9									
x220	NoT-FktCredit	Internal	Not enough technology units available in the PLC		•					✓	✓	✓
x230	No Program	Internal	No PLC program loaded in PLC		•					✓	✓	✓
x231	Unallowed Lib	Internal	A library function has been called in the PLC program which is not supported		•					✓	✓	✓
x232	NoCamData	Internal	Motion profiles (cam data) are not available		•					✓	✓	✓
			Free CAN objects:									
x240	ovrTransQueue	Free CAN obj.	Overflow of the transmit request memory	C0608	•	✓	✓	✓3)	✓	✓	✓	✓
x241	ovr Receive		Too many receive telegrams	C0609	•			✓			✓	✓
			Application memory (FLASH):									
x250	2.Flash Err	Internal	Access not possible 1) (FLASH memory defective or not available)		•						✓	
x251	AddData CsErr	Internal	Check sum error occurred when loading data into the FLASH memory									
x252	AddData DlErr	Internal	Error occurred when downloading data into the FLASH memory (e.g. time-out)									
x260	Err NodeGuard	Node guarding	"Life guarding event": The PLC as a CAN slave has not received any "node guarding" telegram within the node lifetime of the CAN master.	C0384	•	✓	✓	✓3)	✓	✓	✓	✓

x: 0 = TRIP, 1 = Message, 2 = Warning, 3 = FAIL-QSP

1) When the error has been eliminated: Deenergise the controller completely!

2) In DDS adjustable under **Project → Exceptional response**

3) Only with 9300 Servo PLC!



3.5.2 Responses and their effects on the drive

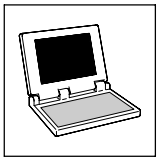
Response	⇨ Effect	Keypad display		
		RDY	IMP	Fail
TRIP		☐	■	■
TRIP active:	⇨ The power outputs U, V, W are switched to high resistance. ⇨ The drive is coasting (no control!).			
TRIP reset:	⇨ The drive runs to its setpoint along the set ramps.			
Message		☐	■	■
	The drive restarts automatically when the message is no longer present!			
Message active:	⇨ The power outputs U, V, W are switched to high resistance.			
≤ 0.5 s	⇨ The drive is coasting (no control!).			
> 0.5 s	⇨ The drive is coasting (due to internal controller inhibit!). If required, restart program.			
Message reset:	⇨ The drive runs to its setpoint with the maximum torque.			
Warning		■	☐	■
	The drive can be destroyed as a result of deactivated monitoring functions!			
	⇨ The failure merely is displayed, the drive runs on in a controlled manner.			
FAIL-QSP		-	-	-
	⇨ The drive is decelerated to standstill along the QSP ramp (C0105).			
Off		-	-	-
	The drive can be destroyed as a result of deactivated monitoring functions!			
	⇨ There is no response to the failure!			
		☐ = off	■ = on	

3.5.3 System error message reset

Response	Measures to reset system error messages
TRIP/FAIL-QSP	A reset of TRIP/FAIL-QSP requires an acknowledgement. • If the TRIP source is still active, the current TRIP cannot be reset. A TRIP/FAIL-QSP can be acknowledged by: • Dialog box "9300 diagnostics" in GDC ⇨ Click on button "History buffer reset". • 9371 BB keypad⇨ Press STOP key. Then press RUN key to reenable the PLC. • Code C0043 ⇨Set C0043 = 0 • Control word C0135, bit 11 • Control word *AIF1_wDctrlCtrl* of SB **AIF1_IN** • Control word *CAN1_wDctrlCtrl* of SB **CAN1_IN** • System variable *DCTRL_vTripReset_b* of SB **DCTRL_DriveControl**
Message	After eliminating the fault, the message self-resets and the drive restarts automatically!
Warning	After eliminating the fault, the message is reset automatically.

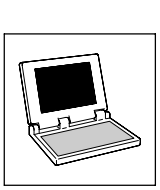
3.5.4 Causes and remedies

Error message		Description	Cause	Remedy
No.	Display			
---	---	No fault	-	-
x011	OC1	Motor cable short circuit	Short circuit	• Search for the cause of short circuit. • Check motor cable.
			Capacitive charging current of the motor cable is too high.	Use motor cable which is shorter or of lower capacitance.
x012	OC2	Motor cable earth fault	One of the motor phases has earth contact.	• Search for the cause of the short circuit. • Check motor cable.
x015	OC5	I x t overload	• Frequent and too long acceleration with overcurrent • Continuous overload with $I_{motor} > 1.05 \times I_{rx}$	Check drive dimensioning.
x020	OU	Overvoltage in the DC bus	Braking energy is too high. (DC-bus voltage is higher than set in C0173.)	• Use braking unit or regenerative module. • Check dimensioning of the brake resistor.
x030	LU	Undervoltage in the DC bus	DC-bus voltage is lower than the value specified under C0173.	• Check mains voltage. • Check power supply module.
x032	LP1	Motor phase failure	A current-carrying motor phase has failed.	• Check motor. • Check motor cable. • Switch off monitoring (C0597 = 3).
			The current limit value is set too low.	• Set higher current limit value via C0599.
x050	OH	Heatsink temperature > +90 °C	Ambient temperature T_u > +40 °C or > +50 °C	• Allow module to cool and ensure better ventilation. • Check ambient temperature in the control cabinet.
			Heatsink is very dirty.	Clean heatsink
			Wrong mounting position	Change mounting position.
x053	OH3	Motor temperature > +150 °C threshold (temperature detection via resolver or incremental value encoder)	Motor is thermally overloaded due to: • Impermissible continuous current • Frequent or too long acceleration processes	• Check drive dimensioning. • Switch off monitoring (C0583 = 3).
			No PTC/temperature contact connected.	Correct wiring.
x054	OH4	Heatsink temperature > C0122	Ambient temperature T_u > +40 °C or > +50 °C	• Allow module to cool and ensure better ventilation. • Check ambient temperature in the control cabinet. • Switch off monitoring (C0582 = 3).
			Heatsink is very dirty.	Clean heatsink
			Wrong mounting position	Change mounting position.
			The value specified under C0122 is set too low.	Enter a higher value under C0122.
x057	OH7	Motor temperature > C0121 (temperature detection via resolver or incremental value encoder)	Motor is thermally overloaded due to: • Impermissible continuous current • Frequent or too long acceleration processes	• Check drive dimensioning. • Switch off monitoring (C0584 = 3).
			No PTC/temperature contact connected.	Correct wiring.
			The value specified under C0121 is set too low.	Enter a higher value in C0121.
x058	OH8	Motor temperature via inputs T1 and T2 is too high.	Motor is thermally overloaded due to: • Impermissible continuous current • Frequent or too long acceleration processes	• Check drive dimensioning. • Switch off monitoring (C0585 = 3).
			Terminals T1 and T2 are not connected	Connect PTC/temperature contact.
x061	CE0	Automation interface (AIF) communication error	Faulty transfer of control commands via AIF.	• Plug on the communication module/keypad XT firmly, screw down, if necessary. • Switch off monitoring (C0126 = 3).
x: 0 = TRIP, 1 = Message, 2 = Warning, 3 = FAIL-QSP				



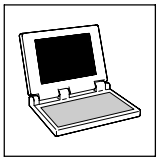
Error message		Description	Cause	Remedy
No.	Display			
x062	CE1	Communication error at the process data input object CAN1_IN	CAN1_IN object receives faulty data or communication is interrupted.	• Check wiring at X4. • Check transmitter. • Increase monitoring time under C0357/1, if necessary. • Switch off monitoring (C0591 = 3).
x063	CE2	Communication error at the process data input object CAN2_IN	CAN2_IN object receives faulty data or communication is interrupted.	• Check wiring at X4. • Check transmitter. • Increase monitoring time under C0357/2, if necessary. • Switch off monitoring (C0592 = 3).
x064	CE3	Communication error at the process data input object CAN3_IN	CAN3_IN object receives faulty data or communication is interrupted.	• Check wiring at X4. • Check transmitter. • Increase monitoring time under C0357/3, if necessary. • Switch off monitoring (C0593 = 3).
x065	CE4	BUS-OFF status of system bus (CAN)	The controller has received too many faulty telegrams via the system bus (CAN) and has disconnected from the bus.	• Check wiring at X4: Is the bus correctly terminated? • Check shield connection of the cables. • Check PE connection. • Check bus load, reduce the baud rate if necessary. (Observe the cable length!) • Switch off the monitoring (C0595 = 3).
x066	CE5	Time-out of system bus (CAN) (communication error of gateway function)	For remote parameterisation (C0370, C0371) via system bus (CAN): • Slave does not respond. • Communication monitoring time has been exceeded.	• Check wiring of system bus (CAN). • Check CAN bus configuration.
x070	U15	Undervoltage of internal 15 V voltage supply		Check voltage supply.
x071	CCR	System fault	Interference injection on control cables too high	Shield the control cables.
			Ground or earth loops in the wiring	• Check wiring. • Check PE connection.
				When the error has been eliminated: Deenergise the controller completely!
0072	PR1	Check sum error in parameter set 1 **CAUTION: Factory adjustment is loaded automatically!**	• Fault when loading a parameter set. • Interruption during transmission of the parameter set via operating unit/keypad.	• Set the required parameters and save them with C0003 = 1. • For "PR0", additionally switch off the supply voltage. • Check use of pointers.
			The saved parameters do not match the loaded software version.	Before the error can be acknowledged, the parameter set must be saved with C0003 = 1.
0074	PEr	Program error	Error detected in program sequence	Send parameter set (on floppy disk/CD-ROM) and a detailed description of the problem to Lenze. **When the error has been eliminated: Deenergise the controller completely!**
0075	PR0	Parameter set error **CAUTION: Factory adjustment is loaded automatically!**	• Error while loading a parameter set. • Interruption during transmission of the parameter set via keypad.	• Set the required parameters and save them under C0003 = 1. • Switch off the supply voltage. • When PLC devices are concerned, check the use of pointers.
			The saved parameters do not match the loaded software version.	Before the error can be acknowledged, the parameter set must be saved under C0003 = 1.
				When the error has been eliminated: Deenergise the controller completely!
x: 0 = TRIP, 1 = Message, 2 = Warning, 3 = FAIL-QSP				

Error message		Description	Cause	Remedy
No.	Display			
0079	PI	Error during parameter initialisation	• An error has been detected during parameter set transfer between two controllers. • The parameter set does not match the controller, for instance, if data is transferred from a higher-performance controller to a lower-performance controller.	• Correct the parameter set. • Check code initialisation values. **When the error has been eliminated: Deenergise the controller completely!**
0080	PR6	Too many user codes		Reduce the number of user codes.
x082	Sd2	Resolver error at X7	Resolver cable interrupted.	• Check cable for open circuit. • Check resolver. • Switch off the monitoring (C0586 = 3).
x083	Sd3	Encoder error at X9	Cable interrupted.	Check cable for open circuit.
			Pin X9/8 not connected.	Apply 5 V to pin X9/8 or switch off monitoring (C0587 = 3).
x085	Sd5	Encoder error at X6 PIN 1 and 2 (C0034 = 1)	Master current value at X6 PIN 1 and 2 < 2mA	• Check cable for open circuit. • Check master current value encoder. • Switch off the monitoring (C0598 = 3).
x086	Sd6	Motor temperature sensor error (X7 or X8)	Encoder for detecting the motor temperature at X7 or X8 indicates undefined values.	• Check cable for firm connection. • Switch off the monitoring (C0594 = 3).
x087	Sd7	Absolute-value encoder error at X8	Absolute value encoder at X8 does not transmit any data.	• Check cable for open circuit. • Check absolute value encoder. • Check supply voltage (C0421). • No Stegmann encoder connected. **When the error has been eliminated: Deenergise the controller completely!**
x088	Sd8	Sin/cos encoder at X8 transmits inconsistent data.	The tracks in the sin/cos encoder are defective.	Replace the sin/cos encoder.
			The interference level on the encoder cable is too high.	• Check correct shield connection of the encoder cable. • If necessary, delay the triggering of the error message via the filter time constants. Setting: – For ECSxS/P/M/A under C0559. – For 9300 servo cam profiler under C0575.
		Sin/cos encoder at X8 does not transmit any data.	Open circuit.	Check cable for open circuit.
			Wrong encoder connected.	Connect sin/cos encoder from Stegmann.
			Sin/cos encoder defective.	Replace the sin/cos encoder.
			Incorrect setting for the supply voltage.	Set voltage supply under C0421.
				When the error has been eliminated: Deenergise the controller completely!
x089	PL	Error during rotor position adjustment	• Sd7 error during a rotor position adjustment with absolute value encoder after subsequent mains switching • Abort of the rotor position adjustment (e.g. with C0095 = 0 or disconnection)	1. Activate rotor position adjustment with C0095 = 1. 2. Execute TRIP-RESET. 3. Re-execute rotor position adjustment.
x091	EEr	External monitoring has been actuated via **DCTRL**.	A digital signal assigned to the TRIP-SET function has been activated.	• Check external encoder. • Switch off the monitoring (C0581 = 3).
0105	H05	Internal fault (memory)		Contact Lenze.
0107	H07	Internal fault (power stage)	During initialisation of the controller, an incorrect power stage was detected.	Contact Lenze.
x108	H08	"Extension board" error	"Extension board" not connected correctly.	• Connect "extension board" correctly. • Check connector.
			"Extension board" is not supported by PLC program.	• Adapt PLC program to "extension board". • Use "extension board" which is supported by PLC program.
x: 0 = TRIP, 1 = Message, 2 = Warning, 3 = FAIL-QSP				



Error message		Description	Cause	Remedy
No.	Display			
X110	H10	Heatsink temperature sensor error	Sensor for detecting the heatsink temperature indicates undefined values.	• Contact Lenze. • Switch off the monitoring (C0588 = 3).
x111	H11	Temperature sensor error: Temperature inside the controller	Sensor for detecting the internal temperature indicates undefined values.	• Contact Lenze. • Switch off the monitoring (C0588 = 3).
x122	CE11	Communication error at process data input object FIF-CAN1_IN	FIF-CAN1_IN object receives faulty data or communication is interrupted.	• Check wiring. • Check transmitter. • Increase monitoring time under C2457/1 if necessary. • Switch off the monitoring (C0591 = 3).
x123	CE12	Communication error at process data input object FIF-CAN2_IN	FIF-CAN2_IN object receives faulty data or communication is interrupted.	• Check wiring. • Check transmitter. • Increase monitoring time under C2457/2 if necessary. • Switch off the monitoring (C2482 = 3).
x124	CE13	Communication error at process data input object FIF-CAN3_IN	FIF-CAN3_IN object receives faulty data or communication is interrupted.	• Check wiring. • Check transmitter. • Increase monitoring time under C2457/3 if necessary. • Switch off the monitoring (C2483 = 3).
x125	CE14	BUS-OFF status of FIF-CAN (too many faulty telegrams have been received)	The module has received too many faulty telegrams via the system bus (CAN) and has disconnected from the bus.	• Check wiring: Is the bus correctly terminated? • Check shield connection of the cables. • Check PE connection. • Check bus load, reduce the baud rate if necessary. (Observe the cable length!) • Switch off the monitoring (C0595 = 3).
x190	nErr	Speed control error (speed out of tolerance margin (C0576))	• Active load (e.g. for hoists) is too high. • Mechanical blockades on the load side	Check drive dimensioning.
x200	Nmax	Maximum speed (C0596) has been exceeded.	• Active load (e.g. for hoists) is too high. • Drive is not speed-controlled, torque is excessively limited.	• Check drive dimensioning. • Increase torque limit, if necessary.
x201	overrun Task1	Time-out in task 1 (ID 2)	Processing of the task takes longer than the monitoring time set.	• Adapt length of the task runtime. • Adapt monitoring time. • Determine the cause of the time-out by checking the task runtime on the task monitor. • Swap out time-critical program parts to a slower task.
x202	overrun Task2	Time-out in task 2 (ID 3)		
x203	overrun Task3	Time-out in task 3 (ID 4)		
x204	overrun Task4	Time-out in task 4 (ID 5)		
x205	overrun Task5	Time-out in task 5 (ID 6)		
x206	overrun Task6	Time-out in task 6 (ID 7)		
x207	overrun Task7	Time-out in task 7 (ID 8)		
x208	overrun Task8	Time-out in task 8 (ID 9)		
x: 0 = TRIP, 1 = Message, 2 = Warning, 3 = FAIL-QSP				

Error message		Description	Cause	Remedy
No.	**Display**			
x209	float Sys-T	Float error in system task (ID 0)	Error in real calculation (e.g. division by 0)	Check calculations (program code).
x210	float Cycl.-T	Float error in cyclic task (PLC_PRG, ID 1)		
x211	float Task1	Float error in task 1 (ID 2)		
x212	float Task2	Float error in task 2 (ID 3)		
x213	float Task3	Float error in task 3 (ID 4)		
x214	float Task4	Float error in task 4 (ID 5)		
x215	float Task5	Float error in task 5 (ID 6)		
x216	float Task6	Float error in task 6 (ID 7)		
x217	float Task7	Float error in task 7 (ID 8)		
x218	float Task8	Float error in task 8 (ID 9)		
x219	overrun Cyc.-t	Time-out in cyclic task (PLC_PRG, ID 1)	Processing of the task takes longer than the monitoring time set.	• Adapt length of the task runtime. • Adapt monitoring time. • Determine the cause of the time-out by checking the task runtime on the task monitor. • Swap out time-critical program parts to a slower task.
0220	noT-Fkt Credit	Not enough technology units available.	A program with technology functions has been tried to be loaded to a controller not providing the corresponding units.	• Use technology variant of the controller. • Contact Lenze, if necessary.
0230	No Program	Missing PLC program	No PLC program loaded.	Load PLC program.
0231	Unallowed Lib	PLC program calls invalid library function.	In the PLC program a library function has been called which is not supported by the controller (e.g. because the corresponding hardware is missing).	• Remove library function or ensure that the corresponding hardware is available. • Contact Lenze, if necessary.
0232	NoCam Data	Motion profiles (cam data) are not available.	When calling functions of the function library **LenzeCamControl.lib** it was detected that there are no motion profiles (CAM data) loaded in the memory of the controller.	• Ensure that the valid cam data has been attached to the project via the DDS CAM support. • Reload the PLC program into the controller. (Possibly the command **Online→Reset (origin)** has been executed in DDS.)
x240	ovrTrans Queue	”Free CAN objects” error	Overflow of the transmit request memory	• Reduce the number of transmit requests. • Prolong the cycle time.
x241	ovr Receive		Too many receive telegrams	Reduce the number of telegrams on the system bus (CAN).
x250	2.Flash Err	Error during FLASH memory access	The PLC program tries to access a faulty FLASH memory or a FLASH memory that does not exist	Ensure that the PLC is provided with the corresponding FLASH memory. If the FLASH memory is OK, contact Lenze. **When the error has been eliminated: Deenergise the controller completely!**
x251	AddData CsErr	Error during FLASH memory access	Check sum error occurred when loading data into the FLASH memory	Check the checksum of the file to be loaded and repeat the data transfer.
x252	AddData DIErr	Error during FLASH memory access	An error occurred when downloading the data into the FLASH memory (e.g. time-out, transmission error, mains failure during transmission)	Check/repeat data transfer.
x260	Err Node Guard	”Life guarding event”	The controller configured as a CAN slave does not receive a ”Node Guarding” telegram from the CAN master within the ”Node Life Time”.	• Check wiring at X4. • Check CAN configuration. • Ensure that ”node guarding” has been activated in the CAN master • Adapt the ”node life time” (C0383) to CAN master setting.
x: 0 = TRIP, 1 = Message, 2 = Warning, 3 = FAIL-QSP				



3.5.5 Fault analysis via the fault memory

The fault memory of the PLC consists of 8 memory locations which store the following information about the active fault and the 7 previous faults in their chronological order of occurrence:

- No. of system error message (📖 3-9)
- Response to the fault (warning, message, TRIP, etc.) (📖 3-9)
- Time of occurrence (referred to power-on time of the PLC, e.g. ”1234567 s”)
- Frequency of successive occurrence

The fault memory information is stored under codes C0168/x ... C0170/x:

C0168	C0169	C0170	Subcode	Contains information about
No. of the system error message and **response**	**Time** of occurrence	**Frequency** of successive occurrence	1	Active fault
			2	Last fault
			3	Last but one fault
			4	Last but two fault
			5	Last but three fault
			6	Last but four fault
			7	Last but five fault
			8	Last but six fault

Tip!

The fault memory works according to the principle of a shift register:

If the current fault is no longer active or has been acknowledged by a TRIP-RESET, all information is automatically shifted up one subcode in the fault memory.

- The information concerning the previously active fault is now stored under subcode 2.
- The information concerning the previous last but six fault is deleted from the fault memory and cannot be retrieved any longer.

Note!

- If several faults causing different responses occur simultaneously:
  - Only the fault causing the highest-priority response is entered into the fault memory (priority = TRIP → message → FAIL-QSP → warning).
- If several faults causing the same response occur simultaneously (e.g. 2 messages):
  - Only the fault occurring first is entered into the fault memory.
- If a fault occurs several times in succession:
  - Only the time of the last occurrence is entered into the fault memory.

Fault reset

The current fault can be reset by a TRIP-RESET e.g. via C0043:

Code	LCD	Possible settings		Info
		Lenze	Selection	
C0043	Trip reset	0		TRIP reset
			0 TRIP-RESET (current TRIP reset)	
			1 Error occurred (TRIP is active)	

Deleting entries in the fault memory

The entries in the fault memory can be deleted via C0167.

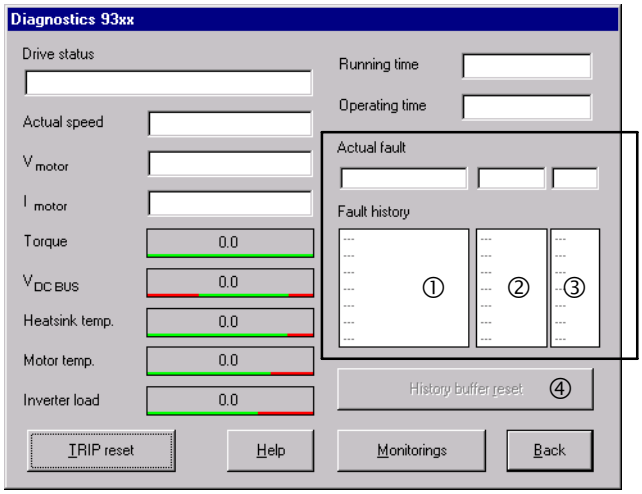
- This function can only be used if there is no active fault.

Code	LCD	Possible settings		Info
		Lenze	Selection	
C0167	Reset failmem	0		Reset fault memory
			0 No function	
			1 Delete all entries in history buffer	

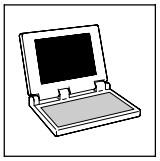
Access to fault memory via Global Drive Control (GDC)

The fault memory of the PLC can also be displayed in the GDC.

- Double-click on "Dialog diagnostics" in the GDC parameter menu to open the *9300 diagnostics* dialog box:



① No. of system error message and response (C0168/x)
② Time of occurrence (C0169/x)
③ Frequency of successive occurrence (C0170/x)
④ Reset of the fault (TRIP-RESET); only possible if there is no active fault.



3.5.6 Fault analysis via the LED display of the PLC

Two LEDs at the front of the PLC indicate the controller status:

LED green	LED red	Controller status	Check
■	□	Controller enabled; no fault	
★	□	Controller inhibit, switch-on inhibit	C0183; or C0168/1
□	★	FAIL	C0168/1
■	★	Warning, FAIL-QSP	C0168/1
■ on □ off ★blinking			

3.5.7 Fault analysis via the 9371BB keypad

Displayed status messages indicate the controller status:

Display	Controller status	Check
RDY	PLC ready for operation; controllers can be inhibited	C0183, C0168/1
IMP	Pulses at the power stage inhibited	C0183, C0168/1
I_{max}	Max. current reached	
M_{max}	Max. torque reached	
Fail	Fault through TRIP, message, FAIL-QSP or warning	C0183, C0168/1

3.5.8 Fault analysis via the LECOM status word C0150

The status word C0150 is bit-coded as follows:

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Free		Message 1 ≡ active	Warning	Controller status				RSP 1 ≡ active	Speed 1 ≡actual value =0	Free				IMP 1 ≡ active	Free

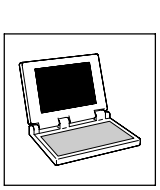
Controller status				
0	0	0	0	Controller initialisation
0	0	0	1	Switch-on inhibit
0	0	1	1	Controller inhibited (RSP)
0	1	1	0	Controller enabled
0	1	1	1	Message active
1	0	0	0	Fault active
1	0	0	1	Power off
1	0	1	0	FAIL-QSP

3.6 Code table

How to read the code table:

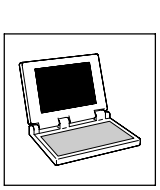
Column	Abbreviation	Meaning
Code	C0168	Code C0168
	1	Subcode 1 of code C0168
	2	Subcode 2 of code C0168
	…	…
	8	Subcode 8 of code C0168
	[C0156]	Parameter value of code can only be changed when controller is inhibited.
LCD		Keypad LCD
Lenze		Lenze setting of the code
	Disp	Display code (can only be displayed)
	→	The "Info" column contains more information.
Selection	1 {1 %} 99	Minimum value {Smallest step/unit} Maximum value
Info		Additional information on code

Code	LCD	Possible settings		Info
		Lenze	Selection	
[C0002]	Par load	0		Load parameter set • Only possible when PLC has been stopped. • Parameter set 1 is automatically loaded after power-on.
			0 Load Lenze setting into RAM	
			1 Load parameter set 1 into RAM	
C0003	Par save	0		Save parameter set • Also possible when PLC is in operation.
			0 Saving completed	
			1 Non-volatile saving of parameter set 1	
C0004	Op display	56		Keypad operating display • Keypad indicates selected code in the operating level if no other status indications of C0183 are active.
			All available codes	
[C0006]	Op mode	→		Operating mode of the motor control → Dependent on C0086 • If C0086 is changed, the value is reset to the assigned Lenze setting • Change of C0006 sets C0086 = 0! • ESC (*Extended Speed Control*): Speed control with increased speed control steadiness for operation with incremental encoder only (not resolver!).
			2 Servo async Y	Servo control for asynchronous motors in star connection
			3 Servo PM-SM Y	Servo control for synchronous motors in star connection
			22 Servo async	Servo control for asynchronous motors in delta connection
			31 ASM Y - ESC	Servo control for asynchronous motors in star connection, ESC
			32 PM-SM Y - ESC	Servo control for synchronous motors in star connection, ESC
			33 ASM - ESC	Servo control for asynchronous motors in delta connection, ESC
C0009	LECOM address	1		LECOM controller address (bus node number for operation via interface) • 10, 20, ..., 90 reserved for broadcast to node groups with RS232, RS485, fibre optics.
			1 {1} 99	



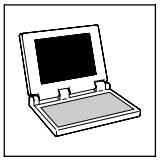
Code	LCD	Possible settings				Info
		Lenze	Selection			
C0011	Nmax	3000				Maximum speed Reference value for the absolute and relative setpoint selection for the acceleration and deceleration times. • For parameterisation via interface: Large changes in one step should only be made when the controller is inhibited.
			500	{1 rpm}	16000	
C0017	FCODE (Qmin)	50				Freely configurable code FCODE_nC17_a (switching threshold $n_{act.} < n_x$)
			-16000	{1 rpm}	16000	
C0018	fchop	1				Switching frequency
			0	16/8 kHz automatic changeover		Optimum noise reduction with automatic changeover to 8 kHz
			1	8 kHz sine		Power-optimised operation
			2	16 kHz sine		Noise-optimised operation
C0019	Thresh nact=0	0				Threshold for $n_{act.} = 0$ being detected. (signal for DCTRL_bNActEq0_b)
			0	{1 rpm}	16000	
C0022	Imax current	→				I_{max} limit → Dependent on C0086 • If C0086 is changed, the value is reset to the assigned Lenze setting (1.5 * Imotor)
			0	{0.01 A}	1.50 I_r	
[C0025]	Feedback type	10				Selection of the feedback system • Input of the encoder specified on the nameplate of the Lenze motor: • C0025 automatically changes C0420, C0490, C0495
			0	COMMON		C0420, C0490 or C0495 has been changed subsequently
			10	RSx (resolver)		The resolver is designated with RSxxxxxxxx.
			110 111 112 113	IT-512-5V IT-1024-5V IT-2048-5V IT-4096-5V		Incremental encoder with TTL level
			210 211 212 213	IS-512-5V IS-1024-5V IS-2048-5V IS-4096-5V		Sin/cos encoder
			310	AS-8V		Single turn • Sin/cos encoder with RS485 interface, from Stegmann • For the number of encoder increments see C0420
			410	AM-8V		Multi turn • Sin/cos encoder with RS485 interface, from Stegmann • For the number of encoder increments see C0420
C0026	FCODE (offset)					Freely configurable code (relative analog signals)
			-199.99	{0.01 %}	199.99	
1		0.00				FCODE_nC26_1_a (offset for terminal X6/1,2)
2		0.00				FCODE_nC26_2_a (offset for terminal X6/3,4)
C0027	FCODE (gain)					Freely configurable code (relative analog signals)
			-199.99	{0.01 %}	199.99	
1		100.00				FCODE_nC27_1_a (gain X6/1,2)
2		100.00				FCODE_nC27_2_a (gain X6/3,4)

Code	LCD	Possible settings			Info
		Lenze	Selection		
C0030	DFOUT const	3			Constant for the digital frequency output
			0	256 increments per revolution	
			1	512 increments per revolution	
			2	1024 increments per revolution	
			3	2048 increments per revolution	
			4	4096 increments per revolution	
			5	8192 increments per revolution	
			6	16384 increments per revolution	
C0032	FCODE Gearbox	1			Freely configurable code (absolute analog signals) • FCODE_nC32_a (gearbox factor numerator)
			-32767	{1} 32767	
C0034	Mst current	0			Analog input *AIN1_nIn_a*: Selection: Master voltage/master current for setpoint selection
			0	-10 V ... + 10 V	
			1	+4 mA ... +20 mA	
			2	-20 mA ... +20 mA	
C0037	Set-value rpm	0			Freely configurable code (absolute speed signals) • FCODE_nC37_a (setpoint selection in rpm)
			-16000	{1 rpm} 16000	
C0040	Ctrl enable	1			Controller inhibit (CINH) • Write to code: Enable/inhibit controller • Read code: Read controller status
			0	Controller inhibited	
			1	Controller enabled	
C0042	DIS: QSP	Disp			Quick stop status (QSP)
			0	QSP not active	
			1	QSP active	
C0043	Trip reset	0			TRIP reset
			0	TRIP-RESET (current TRIP reset)	
			1	Error occurred (TRIP is active)	
C0050	MCTRL-NSET2	Disp			Speed setpoint at speed controller input (*nNsetIn_a*)
			-100.00	{0.01 %} 100.00	
C0051	MCTRL-NACT	Disp			Actual speed value
			-30000	{1 rpm} 30000	
C0052	MCTRL Umot	Disp			Motor voltage
			0	{1 V} 800	
C0053	UG-VOLTAGE	Disp			DC-bus voltage
			0	{1 V} 900	
C0054	Imot	Disp			Motor current
			0.0	{0.1 A} 500.0	
C0056	MCTRL-MSET2	Disp			Torque setpoint (nMSetIn_a)
			-100.00	{0.01 %} 100.00	
C0057	Max Torque	Disp			Maximum possible torque of the drive configuration • Dependent on C0022, C0086
			0.0	{0.1 Nm} 500.0	
C0058	Rotor diff	0.0			Zero phase of the rotor for synchronous motors (C0095)
			-180.0	{0.1 °} 179.9	
C0059	Mot pole no.	Disp			Pole pair number of the motor
			1	{1} 50	
C0060	Rotor pos	Disp			Current rotor position • 1 rev. = 2048 inc.
			0	{1} 2047	



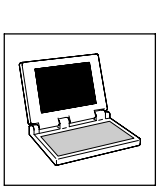
Code	LCD	Possible settings				Info
		Lenze	Selection			
C0061	Heatsink temp	Disp				Heatsink temperature
			0	{1 °C}	100	
C0063	Mot temp	Disp				Motor temperature
			0	{1 °C}	200	
C0064	Utilization	Disp				Controller load I x t during the last 180 seconds • C0064 >100 % trips OC5. • TRIP-RESET is only possible if C0064 < 95 %.
			0	{1 %}	150	
C0067	Act trip	Disp				Current TRIP ("0" is displayed for FAIL-QSP, warning and message.)
C0070	Vp speed CTRL	→				Proportional gain of speed controller (V_{pn}) → Dependent on C0086 • If C0086 is changed, the value is reset to the assigned Lenze setting.
			0.0	{0.5}	255.0	
C0071	Tn speed CTRL	→				Reset time of speed controller (T_{nn}) → Dependent on C0086 • If C0086 is changed, the value is reset to the assigned Lenze setting.
			1.0 >512 ms = switched off	{0.5 ms}	600.0	
C0072	Td speed CTRL	0.0				Derivative gain of speed controller (T_{dn})
			0.0	{0.1 ms}	32.0	
C0075	Vp curr CTRL	→				Proportional gain of current controller (V_{pi}) → Dependent on C0086 • If C0086 is changed, the value is reset to the assigned Lenze setting.
			0.00	{0.01}	15.99	
C0076	Tn curr CTRL	→				Reset time of current controller (T_{ni}) → Dependent on C0086 • If C0086 is changed, the value is reset to the assigned Lenze setting.
			0.5 2000 ms = switched off	{0.1 ms}	2000.0	
C0077	Vp field CTRL	0.25				Proportional gain of field controller (V_{pF})
			0.00	{0.01}	15.99	
C0078	Tn field CTRL	15.0				Reset time of field controller (T_{nF})
			1.0 8000 ms = switched off	{0.5 ms}	8000.0	
[C0081]	Mot power	→				Rated motor power according to nameplate → Dependent on C0086 • If C0086 is changed, the value is reset to the assigned Lenze setting • Change sets C0086 = 0
			0.01	{0.01 kW}	500.00	
[C0084]	Mot Rs	→				Stator resistance of the motor → Dependent on C0086 • If C0086 is changed, the value is reset to the assigned Lenze setting • Change sets C0086 = 0
			0.00	{0.01 Ω}	100.00	
[C0085]	Mot Ls	→				Leakage inductance of the motor → Dependent on C0086 • If C0086 is changed, the value is reset to the assigned Lenze setting • Change sets C0086 = 0
			0.00	{0.01 mH}	200.00	

Code	LCD	Possible settings		Info
		Lenze	Selection	
[C0086]	Mot type	→		Selection of the motor type → Dependent on the controller • If C0086 is changed, C0006, C0022, C0070, C0071, C0081, C0084, C0085, C0087, C0088, C0089, C0090, C0091 are reset to the assigned Lenze setting
			0 COMMON	Non-Lenze motor
			New generation of Lenze asynchronous servo motors	• Integrated temperature monitoring via resolver or encoder cable • Temperature monitoring via resolver or encoder cable is automatically activated, i.e.: C0583 = 0 C0584 = 2 C0594 = 0
			10 DSKA56-140	MDSKAXX056-22, f_r: 140Hz
			11 DFKA71-120	MDFKAXX071-22, f_r: 120Hz
			12 DSKA71-140	MDSKAXX071-22, f_r: 140Hz
			13 DFKA80-60	MDFKAXX080-22, f_r: 60Hz
			14 DSKA80-70	MDSKAXX080-22, f_r: 70Hz
			15 DFKA80-120	MDFKAXX080-22, f_r: 120Hz
			16 DSKA80-140	MDSKAXX080-22, f_r: 140Hz
			17 DFKA90-60	MDFKAXX090-22, f_r: 60Hz
			18 DSKA90-80	MDSKAXX090-22, f_r: 80Hz
			19 DFKA90-120	MDFKAXX090-22, f_r: 120Hz
			20 DSKA90-140	MDSKAXX090-22, f_r: 140Hz
			21 DFKA100-60	MDFKAXX100-22, f_r: 60Hz
			22 DSKA100-80	MDSKAXX100-22, f_r: 80Hz
			23 DFKA100-120	MDFKAXX100-22, f_r: 120Hz
			24 DSKA100-140	MDSKAXX100-22, f_r: 140Hz
			25 DFKA112-60	MDFKAXX112-22, f_r: 60Hz
			26 DSKA112-85	MDSKAXX112-22, f_r: 85Hz
			27 DFKA112-120	MDFKAXX112-22, f_r: 120Hz
			28 DSKA112-140	MDSKAXX112-22, f_r: 140Hz
			30 DFQA100-50	MDFQAXX100-50, f_r: 50Hz
			31 DFQA100-100	MDFQAXX100-100, f_r: 100Hz
			32 DFQA112-28	MDFQAXX112-28, f_r: 28Hz
			33 DFQA112-58	MDFQAXX112-58, f_r: 58Hz
			34 DFQA132-20	MDFQAXX132-20, f_r: 20Hz
			35 DFQA132-42	MDFQAXX132-42, f_r: 42Hz
			40 DFQA112-50	MDFQAXX112-50, f_r: 50Hz
			41 DFQA112-100	MDFQAXX112-100, f_r: 100Hz
			42 DFQA132-36	MDFQAXX132-36, f_r: 36Hz
			43 DFQA132-76	MDFQAXX132-76, f_r: 76Hz



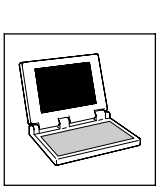
Code	LCD	Possible settings		Info
		Lenze	Selection	
[C0086]	Mot type		Lenze asynchronous servo motors	• Without integrated temperature monitoring • Temperature monitoring via resolver or encoder cable is automatically deactivated, i.e.: C0583 = 3 C0584 = 3 C0594 = 3
			50 DSVA56-140	DSVAXX056-22, f_r: 140Hz
			51 DFVA71-120	DFVAXX071-22, f_r: 120Hz
			52 DSVA71-140	DSVAXX071-22, f_r: 140Hz
			53 DFVA80-60	DFVAXX080-22, f_r: 60Hz
			54 DSVA80-70	DSVAXX080-22, f_r: 70Hz
			55 DFVA80-120	DFVAXX080-22, f_r: 120Hz
			56 DSVA80-140	DSVAXX080-22, f_r: 140Hz
			57 DFVA90-60	DFVAXX090-22, f_r: 60Hz
			58 DSVA90-80	DSVAXX090-22, f_r: 80Hz
			59 DFVA90-120	DFVAXX090-22, f_r: 120Hz
			60 DSVA90-140	DSVAXX090-22, f_r: 140Hz
			61 DFVA100-60	DFVAXX100-22, f_r: 60Hz
			62 DSVA100-80	DSVAXX100-22, f_r: 80Hz
			63 DFVA100-120	DFVAXX100-22, f_r: 120Hz
			64 DSVA100-140	DSVAXX100-22, f_r: 140Hz
			65 DFVA112-60	DFVAXX112-22, f_r: 60Hz
			66 DSVA112-85	DSVAXX112-22, f_r: 85Hz
			67 DFVA112-120	DFVAXX112-22, f_r: 120Hz
			68 DSVA112-140	DSVAXX112-22, f_r: 140Hz
			New generation of Lenze synchronous servo motors	• Integrated temperature monitoring via resolver or encoder cable • Temperature monitoring via resolver or encoder cable is automatically activated, i.e.: C0583 = 0 C0584 = 2 C0594 = 0
			108 DSKS36-13-200	MDSKSXX036-13, f_r: 200Hz
			109 DSKS36-23-200	MDSKSXX036-23, f_r: 200Hz
			110 DSKS56-23-150	MDSKSXX056-23, f_r: 150Hz
			111 DSKS56-33-150	MDSKSXX056-33, f_r: 150Hz
			112 DSKS71-13-150	MDSKSXX071-13, f_r: 150Hz
			113 DFKS71-13-150	MDFKSXX071-13, f_r: 150Hz
			114 DSKS71-23-150	MDSKSXX071-23, f_r: 150Hz
			115 DFKS71-23-150	MDFKSXX071-23, f_r: 150Hz
			116 DSKS71-33-150	MDSKSXX071-33, f_r: 150Hz
			117 DFKS71-33-150	MDFKSXX071-33, f_r: 150Hz
			160 DSKS56-23-190	MDSKSXX56-23-190, f_r:190Hz
			161 DSKS56-33-200	MDSKSXX56-33-200, f_r:200Hz
			162 DFKS71-03-170	MDFKSXX71-03-170, f_r:170Hz
			163 DSKS71-03-165	MDSKSXX71-03-165, f_r:165Hz
			164 DSKS71-13-185	MDSKSXX71-13-185, f_r:185Hz
			165 DFKS71-13-180	MDFKSXX71-13-180, f_r:180Hz
			166 DSKS71-33-180	MDSKSXX71-33-180, f_r:180Hz
			167 DFKS71-33-175	MDFKSXX71-33-175, f_r:175Hz

Code	LCD	Possible settings			Info
		Lenze	Selection		
[C0086]	Mot type		Lenze inverter motor in star connection		• Temperature monitoring via resolver or encoder cable is automatically deactivated, i.e.: C0583 = 3 C0584 = 3 C0594 = 3
			210 DXRA071-12-50		DXRAXX071-12, f_d: 50Hz
			211 DXRA071-22-50		DXRAXX071-22, f_d: 50Hz
			212 DXRA080-12-50		DXRAXX080-12, f_d: 50Hz
			214 DXRA090-12-50		DXRAXX090-12, f_d: 50Hz
			215 DXRA090-32-50		DXRAXX090-32, f_d: 50Hz
			216 DXRA100-22-50		DXRAXX100-22, f_d: 50Hz
			217 DXRA100-32-50		DXRAXX100-32, f_d: 50Hz
			218 DXRA112-12-50		DXRAXX112-12, f_d: 50Hz
			219 DXRA132-12-50		DXRAXX132-12, f_d: 50Hz
			220 DXRA132-22-50		DXRAXX132-22, f_d: 50Hz
			221 DXRA160-12-50		DXRAXX160-12, f_d: 50Hz
			222 DXRA160-22-50		DXRAXX160-22, f_d: 50Hz
			223 DXRA180-12-50		DXRAXX180-12, f_d: 50Hz
			224 DXRA180-22-50		DXRAXX180-22, f_d: 50Hz
			225 30kW-ASM-50		
			226 37kW-ASM-50		
			227 45kW-ASM-50		
			228 55kW-ASM-50		
			229 75kW-ASM-50		
			Lenze inverter motor in delta connection		• Temperature monitoring via resolver or encoder cable is automatically deactivated, i.e.: C0583 = 3 C0584 = 3 C0594 = 3
			250 DXRA071-12-87		DXRAXX071-12, f_d: 87Hz
			251 DXRA071-22-87		DXRAXX071-22, f_d: 87Hz
			252 DXRA080-12-87		DXRAXX080-12, f_d: 87Hz
			254 DXRA090-12-87		DXRAXX090-12, f_d: 87Hz
			255 DXRA090-32-87		DXRAXX090-32, f_d: 87Hz
			256 DXRA100-22-87		DXRAXX100-22, f_d: 87Hz
			257 DXRA100-32-87		DXRAXX100-32, f_d: 87Hz
			258 DXRA112-12-87		DXRAXX112-12, f_d: 87Hz
			259 DXRA132-12-87		DXRAXX132-12, f_d: 87Hz
			260 DXRA132-22-87		DXRAXX132-22, f_d: 87Hz
			261 DXRA160-12-87		DXRAXX160-12, f_d: 87Hz
			262 DXRA160-22-87		DXRAXX160-22, f_d: 87Hz
			263 DXRA180-12-87		DXRAXX180-12, f_d: 87Hz
			264 DXRA180-22-87		DXRAXX180-22, f_d: 87Hz
			265 30kW-ASM-87		
			266 37kW-ASM-87		
			267 45kW-ASM-87		
			268 55kW-ASM-87		
			269 75kW-ASM-87		
[C0087]	Mot speed	→			Rated motor speed → Dependent on C0086 • If C0086 is changed, the value is reset to the assigned Lenze setting • Change sets C0086 = 0
			300	{1 rpm} 16000	
[C0088]	Mot current	→			Rated motor current → Dependent on C0086 • If C0086 is changed, the value is reset to the assigned Lenze setting • Change sets C0086 = 0
			0.5	{0.1 A} 500.0	



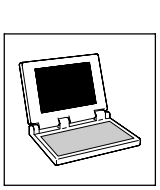
Code	LCD	Possible settings				Info
		Lenze	Selection			
[C0089]	Mot frequency	→				Rated motor frequency → Dependent on C0086 • If C0086 is changed, the value is reset to the assigned Lenze setting • Change sets C0086 = 0
			10	{1 Hz}	1000	
[C0090]	Mot voltage	→				Rated motor voltage → Dependent on C0086 • If C0086 is changed, the value is reset to the assigned Lenze setting • Change sets C0086 = 0
			50	{1 V}	500	
[C0091]	Mot cos phi	→				Motor cos φ → Dependent on C0086 • If C0086 is changed, the value is reset to the assigned Lenze setting • Change sets C0086 = 0
			0.50	{0.01}	1.00	
C0093	DRIVE ident	Disp				Controller identification
			0	Def. power stage		
			1	No power stage		
			93xx	93xx		
C0094	Password	0				Keypad password protection • Parameter password protection for the keypad. • When the password is activated, only user-menu codes can be accessed. • For extended password protection, please see C0096.
			0	{1}	9999	
			0 = No password protection			
[C0095]	Rotor pos adj	0				Rotor position adjustment of a synchronous motor • C0058 displays the zero phase of the rotor • C0095 = 1 starts position adjustment
			0	Not active		
			1	Active		
C0096	AIF/CAN prot.					AIF/CAN password protection • Extended password protection for bus systems when password is activated (C0094). • All codes in the user menu can be accessed.
			0	No password protection		
			1	Read protection		
			2	Write protection		
			3	Read/write protection		
1		0				AIF password protection
2		0				CAN password protection
C0098	Zero pos offs	0				Setting the reference position of the feedback system • For position feedback (integrator output *MCTRL_dnPos_p* of the motor control) • Only possible when the controller is inhibited. • Caution: This code returns an invalid value when it is read.
			-2147483647	{1 inc}	2147483647	
C0099	S/W version	Disp				Software version of operating system
C0105	QSP Tif	0.000				Deceleration time for quick stop (QSP) • Referred to speed change n_{max} (C0011) ... 0
			0.000	{0.001 s}	999.900	

Code	LCD	Possible settings		Info
		Lenze	Selection	
C0108	FCODE (gain)			Freely configurable code (relative analog signals)
			-199.99 {0.01 %} 199.99	
1		100.00		FCODE_nC108_1_a
2		100.00		FCODE_nC108_2_a
C0109	FCODE (offset)			Freely configurable code (relative analog signals)
			-199.99 {0.01 %} 199.99	
1		0.00		FCODE_nC109_1_a
2		0.00		FCODE_nC109_2_a
C0111	Rr tune	100 %		Adjustment of the rotor resistance (Particularly recommended for non-Lenze motors and high field weakening.) • Adjustment in % of the rated rotor resistance of the motor.
			50.00 {0.01 %} 199.99	
C0114	DIGIN pol			Terminal polarity
			0 HIGH active 1 LOW active	
1		1		X5/E1
2		1		X5/E2
3		0		X5/E3
4		0		X5/E4
5		0		X5/E5
C0118	DIGOUT pol			Terminal polarity
			0 HIGH active 1 LOW active	
1		0		X5/A1
2		0		X5/A2
3		0		X5/A3
4		0		X5/A4
C0121	OH7 limit	150		Temperature threshold for motor temperature prewarning "TMot > C0121" (fault OH7)
			45 {1 °C} 150	
C0122	OH4 limit	85		Temperature threshold for heatsink temperature prewarning "Tht > C0122" (fault OH4)
			45 {1 °C} 85	
C0125	Baud rate	0		LECOM baud rate for accessory module 2102
			0 9600 bps 1 4800 bps 2 2400 bps 3 1200 bps 4 19200 bps	
C0126	MONIT CE0	3		Configuration for communication error "CE0" with automation interface
			0 TRIP 2 Warning 3 Off	



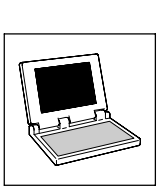
Code	LCD	Possible settings			Info
		Lenze	Selection		
C0135	System Var	0			Internal code • Control word for networking via automation interface (AIF) • FCODE_bC135Bit0_b ... FCODE_bC135Bit15_b
			0	{1} 65535	
			Decimal value is bit-coded:		
			Bit 00	Freely configurable 0	
			Bit 01	Freely configurable 1	
			Bit 02	Freely configurable 2	
			Bit 03	QSP	
			Bit 04	Freely configurable 4	
			Bit 05	Freely configurable 5	
			Bit 06	Freely configurable 6	
			Bit 07	Freely configurable 7	
			Bit 08	Operation inhibited	
			Bit 09	RSP	
			Bit 10	TRIP set	
			Bit 11	TRIP reset	
			Bit 12	Freely configurable 12	
			Bit 13	Freely configurable 13	
			Bit 14	Freely configurable 14	
			Bit 15	Freely configurable 15	
C0136	CTRLWORD	Disp			Control word • Hexadecimal value is bit-coded.
			0	{hex} FFFF	
1					DCTRL_DriveControl
2					CAN1_IN
3					AIF1_IN
C0141	FCODE (setval)	0.00			Freely configurable code (relative analog signals) • FCODE_nC141_a
			-199.99	{0.01 %} 199.99	
C0142	Start options	1			Starting performance of the Servo PLC • After power-on • After message (t > 0.5 s) • After TRIP
			0	Start protection	
			1	Automatic start	
C0150	Status word	Disp			Status word DCTRL_wStat • FCODE_bC150Bit0_b ... FCODE_bC150Bit15_b
			0	{1} 65535	
			Decimal value is bit-coded:		
			Bit 00	Freely configurable 0	DCTRL_bStateB0_b
			Bit 01	IMP	
			Bit 02	Freely configurable 2	DCTRL_bStateB2_b
			Bit 03	Freely configurable 3	DCTRL_bStateB3_b
			Bit 04	Freely configurable 4	DCTRL_bStateB4_b
			Bit 05	Freely configurable 5	DCTRL_bStateB5_b
			Bit 06	n = 0	
			Bit 07	RSP	
			Bit 08	Status	
			Bit 09	Status	
			Bit 10	Status	
			Bit 11	Status	
			Bit 12	Warning	
			Bit 13	Message	
			Bit 14	Freely configurable 14	DCTRL_bStateB14_b
			Bit 15	Freely configurable 15	DCTRL_bStateB15_b

Code	LCD	Possible settings		Info
		Lenze	Selection	
[C0151]	CAN/AIF FDO	Disp		Free digital CAN/AIF outputs
			0 {hex} FFFF Hexadecimal value is bit-coded:	
1			Bit 00 CAN1_bFDO0_b ... ... Bit 15 CAN1_bFDO31_b	CAN1_OUT
2			Bit 00 CAN2_bFDO0_b ... ... Bit 15 CAN2_bFDO31_b	CAN1_OUT
3			Bit 00 CAN3_bFDO0_b ... ... Bit 15 CAN3_bFDO31_b	CAN1_OUT
4			Bit 00 AIF1_bFDO0_b ... ... Bit 15 AIF3_bFDO31_b	AIF1_OUT
C0155				Status word 2 (extended status word)
			0 {1} 65535 Decimal value is bit-coded: Bit 00 Fail Bit 01 Mmax Bit 02 Imax Bit 03 IMP Bit 04 RDY Bit 05 RSP Bit 06 TRIP Bit 07 Init Bit 08 CW/CCW Bit 09 Not assigned ... ... Bit 15 Not assigned	
C0157	Stat. FreeBit	Disp		Status word DCTRL: Status of freely definable bits
			0 1	
1				DCTRL_bStateB0_b
2				DCTRL_bStateB2_b
3				DCTRL_bStateB3_b
4				DCTRL_bStateB4_b
5				DCTRL_bStateB5_b
6				DCTRL_bStateB14_b
7				DCTRL_bStateB15_b
C0161	Act trip	Disp		Current TRIP • Same as C0168/1 • "0" is displayed for FAIL-QSP, warning and message.
C0167	Reset failmem	0		Reset fault memory
			0 No function 1 Delete all entries in history buffer	
C0168	Fail number	Disp		Fault memory: Error messages • List with error messages in their chronological order of occurrence.
			All error messages	
1				Current error message
2				Last error message
3				Last but one error message
4				Last but two error message
5				Last but three error message
6				Last but four error message
7				Last but five error message
8				Last but six error message



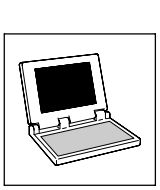
Code	LCD	Possible settings				Info
		Lenze	Selection			
C0169	Failtime	Disp				Fault memory: Power-on time • Listing of the power-on times until an error message has occurred under C0168/x. • Refers to the power-on time meter (C0179)
			0	{1 s}	65535	
1						Current error message
2						Last error message
3						Last but one error message
4						Last but two error message
5						Last but three error message
6						Last but four error message
7						Last but five error message
8						Last but six error message
C0170	Counter	Disp				Fault memory: Frequency of error messages • List with the frequency of successive occurrence of an error message under C0168/x.
			0	{1}	65535	
1						Current error message
2						Last error message
3						Last but one error message
4						Last but two error message
5						Last but three error message
6						Last but four error message
7						Last but five error message
8						Last but six error message
[C0172]	0V reduce	10				Threshold for activating the braking torque derating before OU trip
			0	{10 V}	100	
[C0173]	UG limit	1				Adaptation of DC-bus voltage thresholds • Check during commissioning and adapt if necessary • All drive components in interconnected drives must have the same thresholds
			0	Mains < 400 V; with or without brake unit		
			1	Mains = 400 V; with or without brake unit		
			2	Mains = 460 V; with or without brake unit		
			3	Mains = 480 V; without brake unit		
			4	Mains = 480 V; with brake unit		
C0178	Op timer	Disp				Elapsed-hour meter • Time the controller was enabled.
			0	{1 s}	4294967295	
C0179	Mains timer	Disp				Power-on time meter • Power-on time
			0	{1 s}	4294967295	

Code	LCD	Possible settings			Info
		Lenze	Selection		
C0183	Diagnostics	Disp			Drive diagnostics • Indicates fault and status information. • If several items of fault or status information are present simultaneously, the item with the lowest number is displayed
			0	OK	No fault
			101	Initializing	Initialisation phase
			102	TRIP/error	TRIP active
			103	Emergency stop	Emergency stop executed
			104	IMP message	Message active
			105	Power off	
			111	BSP C135	Operation inhibit C135
			112	BSP AIF	Operation inhibit AIF
			113	BSP CAN	Operation inhibit CAN
			121	RSP terminal 28	Controller inhibited via: X5/28
			122	RSP internal 1	DCTRL-CINH1
			123	RSP internal 2	DCTRL-CINH2
			124	RSP C135/STOP	STOP key of 9371BB
			125	RSP AIF	Controller inhibited via AIF
			126	RSP CAN	Controller inhibited via CAN
			131	FAIL-QSP	
			141	Power-up inhibit	Restart protection active
			142	IMP inhibit	Power outputs at high resistance
			151	QSP external terminal	QSP via MCTRL-QSP
			152	QSP C135/STOP	QSP via STOP key
			153	QSP AIF	QSP via AIF
			154	QSP CAN	QSP via CAN
			160	PLC stop	PLC stopped
			250	Warning	Warning active (C0168)
C0199	BuildNumber	Disp			Operating system software creation number
C0200	S/W Id	Disp			Operating system software product code
C0201	S/W date	Disp			Operating system software creation date
C0202	Internal ID	Disp			Internal identification
1					MPC1
2					MPC2
3					MPC3
4					MPC4
C0203	Komm.-No.	Disp			Commission number
C0204	Serial-No.	Disp			Serial number
C0205	Target-Id	Disp			Identification number of the PLC
C0206	Produkt date	Disp			Production date
C0207	DL info 1	Disp			Download info 1
C0208	DL info 2	Disp			Download info 2
C0209	DL info 3	Disp			Download info 3
C0250	FCODE 1Bit	0			Freely configurable code (digital signals) • FCODE_bC250_b
			0	1	
C0254	Vp angle CTRL	0.4000			Gain of phase controller (V_p)
			0.0000	{0.0001} 3.9999	
C0300					Internal error diagnostics
C0301					Internal error diagnostics
C0302					Internal error diagnostics
C0350	CAN address	1			System bus: Node address
			1	{1} 63	



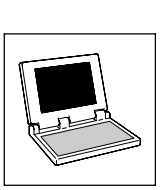
Code	LCD	Possible settings				Info
		Lenze	Selection			
C0351	CAN baudrate	0				System bus: Baud rate
			0	500 kbit/s		
			1	250 kbit/s		
			2	125 kbit/s		
			3	50 kbit/s		
			4	1000 kbit/s		
			5	20 kbit/s		
C0352	CAN mst	0				System bus: Master/slave configuration of the PLC • With selection 1 or 2, the PLC sends a system bus boot-up and is thus “quasi” master. • Additional information about the ”heartbeat” and ”node guarding” function can be found in the Manual for the function library **LenzeCanDSxDrv.lib**.
			0	Slave (boot-up not active)		
			1	Master (boot-up active)		
			2	Master with ”node guarding” (SyncReceived no longer possible)		
			3	Slave and ”heartbeat” producer		
			4	Slave with ”node guarding”		
C0353	CAN addr sel					System bus: Source for PDO identifiers
			0	Identifier assignment under C0350 + basic identifier		
			1	Identifier assignment under C0354/x		
1		0				CAN1_IN/OUT
2		0				CAN2_IN/OUT
3		0				CAN3_IN/OUT
C0354	CAN addr					System bus: Definition of individual PDO identifiers • Value to be entered = Identifier - 384
			1	{1}	512	
1		129				CAN1_IN
2		1				CAN1_OUT
3		257				CAN2_IN
4		258				CAN2_OUT
5		385				CAN3_IN
6		386				CAN3_OUT
C0355	CAN Id	Disp				System bus: PDO identifiers
			385	{1}	896	
1						CAN1_IN
2						CAN1_OUT
3						CAN2_IN
4						CAN2_OUT
5						CAN3_IN
6						CAN3_OUT
C0356	CAN boot up					System bus: Time settings
1		3000	0	{1 ms}	65000	Delay time after power-on for initialisation through the “quasi” master.
2		0	0 = Event-controlled transmission	{1}	65000	Task time factor for sending the CAN2_OUT process data object.
3		0				Task time factor for sending the CAN3_OUT process data object.
4		20	0	{1 ms}	65000	Delay time for sending the process data object.
C0357	CE monit time					System bus: Monitoring time for process data input objects
			0	{1 ms}	65000	
1		3000				CE1 monitoring time
2		3000				CE2 monitoring time
3		3000				CE3 monioring time

Code	LCD	Possible settings				Info
		Lenze	Selection			
C0358	Reset node	0				System bus: Reset node
			0	No function		
			1	CAN reset node		
C0359	CAN state	Disp				System bus: Status
			0	Operational		
			1	Pre-operational		
			2	Warning		
			3	Bus off		
			4	Stopped		
C0360	CAN message	Disp				System bus: Telegram counter (number of telegrams) • For values > 65535 counting restarts with 0
			0	{1 ms}	65535	
1						All sent (without free CAN objects)
2						All received (without free CAN objects)
3						Sent on CAN1_OUT
4						Sent on CAN2_OUT
5						Sent on CAN3_OUT
6						Sent on parameter data channel1
7						Sent on parameter data channel2
8						Received from CAN1_IN
9						Received from CAN2_IN
10						Received from CAN3_IN
11						Received from parameter data channel1
12						Received from parameter data channel2
C0361	Load IN/OUT	Disp				System bus: Bus load • Trouble-free operation demands that the total bus load (all connected devices) does not exceed 80 %.
			0	{1 %}	100	
1						All sent (without free CAN objects)
2						All received (without free CAN objects)
3						Sent on CAN1_OUT
4						Sent on CAN2_OUT
5						Sent on CAN3_OUT
6						Sent on parameter data channel1
7						Sent on parameter data channel2
8						Received from CAN1_IN
9						Received from CAN2_IN
10						Received from CAN3_IN
11						Received from parameter data channel1
12						Received from parameter data channel2
C0362	Sync cycle	Disp				System bus: Time interval between 2 sync telegrams (in preparation)
			1	{1 ms}	30	
C0363	Sync corr	1				System bus: Sync correction increments
			1	0.2 µs/ms		
			2	0.4 µs/ms		
			3	0.6 µs/ms		
			4	0.8 µs/ms		
			5	1.0 µs/ms		
C0365	DIS:CAN active	Disp				Input signal CAN active
			0	CAN not active		
			1	CAN active		



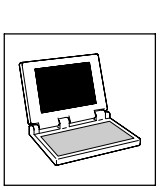
Code	LCD	Possible settings				Info
		Lenze	Selection			
C0366	Sync response	1				System bus: Sync response
			0	No response		No response PLC responds to a sync telegram by sending the CAN1_OUT object.
			1	Response to sync		
C0367	Sync Rx Id	128				System bus: Sync Rx identifier Receive identifier of the sync telegram.
			1	{1}	256	
C0368	Sync Tx Id	128				System bus: Sync Tx identifier Transmit identifier of the sync telegram.
			1	{1}	256	
C0369	Sync Tx Time	0				System bus: CAN sync send telegram cycle • A sync telegram with the identifier of C0368 is sent with the set cycle time.
			0 0 = Off	{1}	65000	
C0370	Gateway addr.	0				System bus: Activate remote parameterisation • With a setting ≠ 0 all code write/read accesses are redirected to the system bus node with the node address set here. • The corresponding code is accessed via parameter data channel SDO1 of the target device.
			0 0 = Remote parameterisation deactivated	{1}	63	
C0381	HeartProTime	0				System bus: Heartbeat (slave): HeartbeatProducerTime Time interval for sending the "heartbeat" message. • Only relevant for setting C0352 = 3. • Additional information about the "heartbeat" function can be found in the Manual for the function library **LenzeCanDSxDrv.lib**.
			0	{1 ms}	65535	
C0382	GuardTime	0				System bus: Node guarding (slave): NodeGuardTime Time interval for the status request from the master. • Only relevant for setting C0352 = 4. • Additional information about the "node guarding" function can be found in the Manual for the function library **LenzeCanDSxDrv.lib**.
			0	{1 ms}	65535	
C0383	LifeTimeFact.	0				System bus: Node guarding (slave): NodeLifeTime factor Factor for the NodeLifeTime monitoring time: NodeLifeTime = C0383 x C0382 (NodeGuardTime) • Only relevant for setting C0352 = 4. • Additional information about the "node guarding" function can be found in the Manual for the function library **LenzeCanDSxDrv.lib**.
			0	{1}	255	
C0384	Err NodeGuard	3				System bus: Node guarding (slave): Response to a "node guarding" event. • Only relevant for setting C0352 = 4. • Additional information about the "node guarding" function can be found in the Manual for the function library **LenzeCanDSxDrv.lib**.
			0	TRIP		
			1	Message		
			2	Warning		
			3	Off		
			4	FAIL-QSP		
C0400	DIS: OUT	Disp				Analog input terminal 1/2 (AIN1_nIn_a)
			-199.99	{0.01 %}	199.99	
C0405	DIS: OUT	Disp				Analog input terminal 3/4 (AIN2_nIn_a)
			-199.99	{0.01 %}	199.99	

Code	LCD	Possible settings				Info
		Lenze	Selection			
[C0416]	Resolver adj	0				Correction of the resolver error • For Lenze motors: Read resolver error from the nameplate
			0	{1}	99999999	
[C0420]	Encoder const	512				Encoder: Constant for encoder input X8
			1	{1 inc/rev}	8192	
[C0421]	Enc voltage	5.00				Encoder: Supply voltage for the encoder • CAUTION: Incorrect input may destroy the encoder
			5.00	{0.1 V}	8.00	
C0425	DFIN const	3				Digital frequency input DFIN_IO_DigitalFrequency: Number of increments of the encoder input
			0	256 increments per revolution		
			1	512 increments per revolution		
			2	1024 increments per revolution		
			3	2048 increments per revolution		
			4	4096 increments per revolution		
			5	8192 increments per revolution		
			6	16384 increments per revolution		
C0426	DIS: OUT	Disp				Digital frequency input DFIN_IO_DigitalFrequency: DFIN_nIn_v
			-32767	{1 rpm}	32767	
C0427	DFIN function	0				Digital frequency input DFIN_IO_DigitalFrequency: Type of the digital frequency signal
			0	2 phases		
			1	A = Speed / B = Direction		
			2	A or B = Speed or direction		
C0428	DFIN TP sel.	0				Digital frequency input DFIN_IO_DigitalFrequency: Touch probe selection
			0	Touch probe via zero pulse		
			1	Touch probe through digital input X5/E5		
C0429	TP delay	0				Digital frequency input DFIN_IO_DigitalFrequency: Touch probe delay • Compensation of delay times of the TP signal source at X5/E5
			-32767	{1 inc}	32767	
C0431	DFIN TP EDGE	0				Digital frequency input DFIN_IO_DigitalFrequency: Touch probe activation • For touch probe via digital input X5/E5 (C0428 = 1)
			0	Activation with positive signal		
			1	Activation with negative signal		
C0434	DIS: IN	Disp				Analog output terminal 62 (AOUT1_nOut_a)
			-199.99	{0.01 %}	199.99	
C0439	DIS: AOUT2	Disp				Analog output terminal 63 (AOUT2_nOut_a)
			-199.99	{0.01 %}	199.99	
C0441	DIS: IN	Disp				State bus monitoring signal (STATE_BUS_bOut_b)
			0		1	



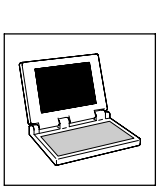
Code	LCD	Possible settings				Info
		Lenze	Selection			
C0443	DIS: DIGIT-OUT	Disp				Digital inputs
			0	{dec}	255	
			Decimal value is bit-coded:			
			Bit 0	DIGIN_bIn1_b		X5/E1
			Bit 1	DIGIN_bIn2_b		X5/E2
			Bit 2	DIGIN_bIn3_b		X5/E3
			Bit 3	DIGIN_bIn4_b		X5/E4
			Bit 4	DIGIN_bIn5_b		X5/E5
			Bit 5	STATE-BUS_bIn_b		
			Bit 6	DIGIN_bCInh_b		
			Bit 7	Not assigned		
C0444	DIS: DIGOUT	Disp				Digital outputs
			0		1	
1				DIGOUT_bOut1_b		X5/A1
2				DIGOUT_bOut2_b		X5/A2
3				DIGOUT_bOut3_b		X5/A3
4				DIGOUT_bOut4_b		X5/A4
[C0469]	Fct STP key	2				Function of the STOP key of the operating module • Selected function is executed when the STOP key is pressed. • Caution: Trouble-free functioning demands that the SB **DCTRL** is integrated into the control configuration.
			0	Deactivated		
			1	Controller inhibit		
			2	QSP		
C0470	FCODE 8bit					Freely configurable code (digital signals) • C0470 has the same memory address as C0471. • Hexadecimal value is bit-coded.
			0	{hex}	FFFF	
1		0				C0470/1 = C0471, bit 0 ... 7
2		0				C0470/2 = C0471, bit 8 ... 15
3		0				C0470/3 = C0471, bit 16 ... 23
4		0				C0470/4 = C0471, bit 24 ... 31
C0471	FCODE 32bit	0				Freely configurable code (digital signals) • Variables assigned via FCODE_FreeCodes: FCODE_bC471Bit0_b ... FCODE_bC471Bit31_b • C0471 has the same memory address as C0470.
			0	{1}	4294967296	
C0472	FCODE analog					Freely configurable code (relative analog signals)
			-199.99	{0.01 %}	199.99	
1		0				FCODE_bC472_1_a
2		0				FCODE_bC472_2_a
3		100				FCODE_bC472_3_a
4		0				FCODE_bC472_4_a
...		...				...
20		0				FCODE_bC472_20_a
C0473	FCODE abs					Freely configurable code (absolute analog signals)
			-32767	{1}	32767	
1		1				FCODE_bC473_1_a
2		1				FCODE_bC473_2_a
3		0				FCODE_bC473_3_a
...		...				...
10		0				FCODE_bC473_10_a

Code	LCD	Possible settings		Info
		Lenze	Selection	
C0474	FCODE PH			Freely configurable code (phase signals)
			-2147483648 {1} 2147483647	
1		0		FCODE_dnC474_1_p
...		...		...
5		0		FCODE_dnC474_5_p
C0475	FCODE DF			Freely configurable code (phase difference signals)
			-16000 {1 rpm} 16000	
1		0		FCODE_nC475_1_v
2		0		FCODE_nC475_2_v
[C0490]	Feedback pos	0		Feedback system for the position controller • C0490 = 0, 1, 2 can be mixed with C0495 = 0, 1, 2. • C0490 = 3, 4 also sets C0495 to the same value.
			0 Resolver at X7 1 Encoder TTL at X8 2 Sin/cos encoder at X8 3 Absolute value encoder ST at X8 4 Absolute value encoder MT at X8	
[C0495]	Feedback n			Feedback system for the speed controller • C0495 = 0, 1, 2 can be mixed with C0490 = 0, 1, 2. • C0495 = 3, 4 also sets C0490 to the same value.
			0 Resolver at X7 1 Encoder TTL at X8 2 Sin/cos encoder at X8 3 Absolute value encoder ST (single turn) at X8 4 Absolute value encoder MT (multi turn) at X8	
C0496	NactFilter on	0		Activation: Actual speed value filter time constant PT1 (C0497) on *MCTRL_nNAct_a*
			0 Not active 1 Active	
C0497	Nact filter	2.0		Actual speed value filter time constant PT1
			0.0 {0.1 ms} 50.0 0 ms = switched off	
C0504				PLC memory: RAM access via codes • More detailed information can be found in chapter 3.6.2, "RAM access via codes". 📖 3-52
C0505				
C0506				
C0507				
C0508				
C0509				
C0510	ProtAppFlash	0		PLC memory: Write protection of the application FLASH
			0 No write protection 1 Write protection	



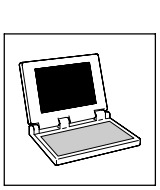
Code	LCD	Possible settings				Info
		Lenze	Selection			
C0517	User menu					User menu with up to 32 entries • The numbers of desired codes are entered under the subcodes. • The data is input in xxx.yy format – xxx: Code number – yy: Subcode for code • There is no check whether the entered code exists.
			0.00	{0.01}	7999.00	
1		51.00	C0051/0	MCTRL-NACT		
2		54.00	C0054/0	Imot		
3		56.00	C0056/0	MCTRL-MSET2		
4		0.00		Not assigned		
5		0.00		Not assigned		
6		183.00	C0183/0	Diagnostics		
7		168.01	C0168/1	Fail number		
8		86.00	C0086/0	Mot type		
9		22.00	C0022/0	Imax current		
10		0.00		Not assigned		
11		11.00	C0011/0	Nmax		
12		0.00		Not assigned		
13		0.00		Not assigned		
14		105.00	C0105/0	QSP Tif		
15		0.00		Not assigned		
16		70.00	C0070/0	Vp speed CTRL		
17		71.00	C0071/0	Tn speed CTRL		
18		1500.00	C1500/0			
19		2100.00	C2100/0	Time slice		
20		2102.00	C2102/0	Task switch		
21		2104.00	C2104/0	PLC Autorun		
22		0.00				
23		2108.00	C2108/0	PLC run/stop		
24		0.00		Not assigned		
...		...		...		
30		0.00		Not assigned		
31		94.00	C0094/0	Password		
32		3.00	C0003/0	Par save		
C0540	Function	2				Digital frequency output DFOUT_IO_DigitalFrequency: Function • X9 is inhibited if 0, 1, or 2 have been selected. • DFOUT_nIn_v = 0 if 4 or 5 have been selected. • The input signals are buffered electrically.
			0	DFOUT_nOut_v as %		
			1	DFOUT_nOut_v as rpm		
			2	Incremental encoder simulation + zero pulse		
			4	X9 is output on X10		
			5	X8 is output on X10		
C0545	PH offset	0				Digital frequency output DFOUT_IO_DigitalFrequency: Phase offset of the zero pulse for incremental encoder simulation (1 rev. = 65535 inc.)
			0	{1 inc}	65535	
C0547	DFOUT_nOut_v	Disp				Digital frequency output DFOUT_IO_DigitalFrequency: DFOUT_nOut_v as analog value (if C0540 = 0)
			-199.99	{0.01 %}	199.99	

Code	LCD	Possible settings				Info
		Lenze	Selection			
C0549	DFOUT_nOut_v	Disp				Digital frequency output DFOUT_IO_DigitalFrequency: DFOUT_nOut_v as speed value (if C0540 = 1)
			-32767	{1 rpm}	32767	
C0559	SD8 Filter t	1.00				Filter time constant (SD8)
			1	{1 ms}	200	Example: When the setting is "10 ms", an SD8 TRIP is initiated after 10 ms.
C0575	max fld weak	4.00				Factor for limiting the max. possible field weakening • Setting "4.00" means, for example, max. 400 % field weakening possible.
			1.00	{0.01}	8.00	
C0576	nErr Window	100				Tolerance margin for speed monitoring • Referred to n_{max}. • 100 % = lowest monitoring sensitivity.
			0	{1 %}	100	
C0577	Vp fld weak	3.00				Field weakening controller gain V_p
			0.00	{0.01 ms}	15.99	
C0578	Tn fld weak	10.0				Field weakening controller reset time Tn
			2.0 8000 ms = switched off	{0.5 ms}	8192.0	
C0579	MONIT nErr	3				Speed monitoring configuration
			0 TRIP 1 Message 2 Warning 3 Off 4 FAIL-QSP			
C0580	MONIT SD8	3				Monitoring configuration: Sin/cos encoder • Dependent on C0559
			0 TRIP 3 Off			
C0581	MONIT Eer	0				Monitoring configuration: External error
			0 TRIP 1 Message 2 Warning 3 Off			
C0582	MONIT OH4	2				Monitoring configuration: Heatsink temperature (Heatsink temperature > limit temperature C0122)
			2 Warning 3 Off			
C0583	MONIT OH3	→				Monitoring configuration: Motor temperature (Motor temperature > fixed limit temperature) → Dependent on C0086
			0 TRIP 3 Off			
C0584	MONIT OH7	→				Monitoring configuration: Motor temperature (Motor temperature > variable limit temperature C0121) → Dependent on C0086 • Temperature monitoring via resolver input
			2 Warning 3 Off			
C0585	MONIT OH8	3				Monitoring configuration: Motor temperature (Motor temperature across T1/T2 too high) • Temperature monitoring via PTC input
			0 TRIP 2 Warning 3 Off			



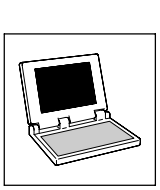
Code	LCD	Possible settings				Info
		Lenze	Selection			
C0586	MONIT SD2	0				Monitoring configuration: Resolver error
			0	TRIP		
			2	Warning		
			3	Off		
C0587	MONIT SD3	3				Monitoring configuration: Encoder error at X9/pin 8
			0	TRIP		
			2	Warning		
			3	Off		
C0588	MONIT H10/H11	3				Monitoring configuration: Temperature sensors (Heatsink temperature/temperature inside the controller)
			0	TRIP		
			2	Warning		
			3	Off		
C0591	MONIT CE1	3				System bus: Monitoring configuration CAN1_IN communication error (CE1)
			0	TRIP		
			2	Warning		
			3	Off		
C0592	MONIT CE2	3				System bus: Monitoring configuration CAN2_IN communication error (CE2)
			0	TRIP		
			2	Warning		
			3	Off		
C0593	MONIT CE3	3				System bus: Monitoring configuration CAN3_IN communication error (CE3)
			0	TRIP		
			2	Warning		
			3	Off		
C0594	MONIT SD6	→				Monitoring configuration: Motor temperature sensor error (X7 or X8) → Dependent on C0086
			0	TRIP		
			2	Warning		
			3	Off		
C0595	MONIT CE4	3				System bus: Monitoring configuration "BusOffState" (CE4)
			0	TRIP		
			2	Warning		
			3	Off		
C0596	NMAX limit	5500				Monitoring configuration: Max. speed of the machine
			0	{1 rpm}	16000	
C0597	MONIT LP1	3				Configuration of motor phase monitoring (LP1) • Setting of the monitoring limit via C0599
			0	TRIP		
			2	Warning		
			3	Off		
C0598	MONIT SD5	3				Monitoring configuration: Master current at X6/1, 2 (Master current < 2 mA)
			0	TRIP		
			2	Warning		
			3	Off		
C0599	Limit LP1	5				LP1 fault monitoring limit
			0.01	{0.01 %}	10.00	

Code	LCD	Possible settings				Info
		Lenze	Selection			
C0608	ovr Tx-Queue	0				System bus: Monitoring configuration Free CAN objects: Tx buffer (transmission memory overflow)
			0	TRIP		
			1	Message		
			2	Warning		
			3	Off		
			4	FAIL-QSP		
C0603	MONIT CE5	3				System bus: Monitoring configuration Time-out with remote parameter setting activated (C0370)
			0	TRIP		
			2	Warning		
			3	Off		
C0609	over Rx-Isr	0				System bus: Monitoring configuration Free CAN objects: Too many telegrams received
			0	TRIP		
			4	FAIL-QSP		
C0855	DIS: IN (0-15)	Disp				Automation interface (AIF): Process data input words
			0000	{hex}	FFFF	
			Hexadecimal value is bit-coded:			
1			Bit 00	AIF1_bInB0_b		AIF1_IN: Process data input word 3
			Bit 01	AIF1_bInB1_b		
			...			
			Bit 15	AIF1_bInB15_b		
2			Bit 00	AIF1_bInB16_b		AIF1_IN: Process data input word 4
			Bit 01	AIF1_bInB17_b		
			...			
			Bit 15	AIF1_bInB31_b		
C0856	DIS: IN.Wx	Disp				Automation interface (AIF): Process data input words
			-32768	{1 %}	32767	
1						AIF1_IN: Process data input word 2 (AIF1_nInW1_a)
2						AIF1_IN: Process data input word 3 (AIF1_nInW2_a)
3						AIF1_IN: Process data input word 4 (AIF1_nInW3_a)
C0857	DIS: IN.D1	Disp				Automation interface (AIF): Process data input word • AIF1_dnInD1_p (32-bit phase information)
			-2147483648	{1}	2147483647	
C0858	DIS: OUT.Wx	Disp				Automation interface (AIF): Process data output words
			-32768	{1 %}	32767	
1						AIF1_OUT: Process data output word 2 (AIF1_nOutW1_a)
2						AIF1_OUT: Process data output word 3 (AIF1_nOutW2_a)
3						AIF1_OUT: Process data output word 4 (AIF1_nOutW3_a)
C0859	DIS: OUT.D1	Disp				Automation interface (AIF): Process data output word • AIF1_dnOutD1_p (32-bit phase information)
			-2147483648	{1}	2147483647	



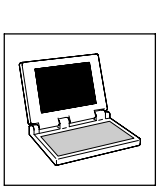
Code	LCD	Possible settings		Info
		Lenze	Selection	
C0863	DIS: INx dig x	Disp		System bus: Process data input words
			0000 {hex} FFFF Hexadecimal value is bit-coded:	
1			Bit 00 CAN1_bInB0_b Bit 01 CAN1_bInB1_b ... Bit 15 CAN1_bInB15_b	CAN1_IN: Process data input word 1
2			Bit 00 CAN1_bInB16_b Bit 01 CAN1_bInB17_b ... Bit 15 CAN1_bInB31_b	CAN1_IN: Process data input word 2
3			Bit 00 CAN2_bInB0_b Bit 01 CAN2_bInB1_b ... Bit 15 CAN2_bInB15_b	CAN2_IN: Process data input word 1
4			Bit 00 CAN2_bInB16_b Bit 01 CAN2_bInB17_b ... Bit 15 CAN2_bInB31_b	CAN2_IN: Process data input word 2
5			Bit 00 CAN3_bInB0_b Bit 01 CAN3_bInB1_b ... Bit 15 CAN3_bInB15_b	CAN3_IN: Process data input word 1
6			Bit 00 CAN3_bInB16_b Bit 01 CAN3_bInB17_b ... Bit 15 CAN3_bInB31_b	CAN3_IN: Process data input word 2
C0866	DIS: INx.Wx	Disp		System bus: Process data input words
			-32768 {1 %} 32767	
1				CAN1_nInW1_a
2				CAN1_nInW2_a
3				CAN1_nInW3_a
4				CAN2_nInW1_a
5				CAN2_nInW2_a
6				CAN2_nInW3_a
7				CAN2_nInW4_a
8				CAN3_nInW1_a
9				CAN3_nInW2_a
10				CAN3_nInW3_a
11				CAN3_nInW4_a
C0867	DIS: Inx.D1	Disp		System bus: Process data input double words
			-2147483648 {1} 2147483647	
1				CAN1_IN: Process data input double word 1 (CAN1_dnInD1_p)
2				CAN2_IN: Process data input double word 1 (CAN2_dnInD1_p)
3				CAN3_IN: Process data input double word 1 (CAN3_dnInD1_p)

Code	LCD	Possible settings				Info
		Lenze	Selection			
C0868	DIS: OUTx.Wx	Disp				System bus: Process data output words
			-32768	{1 %}	32767	
1						CAN1_nOutW1_a
2						CAN1_nOutW2_a
3						CAN1_nOutW3_a
4						CAN2_nOutW1_a
5						CAN2_nOutW2_a
6						CAN2_nOutW3_a
7						CAN2_nOutW4_a
8						CAN3_nOutW1_a
9						CAN3_nOutW2_a
10						CAN3_nOutW3_a
11						CAN3_nOutW4_a
C0869	DIS: Out1/2.Dx	Disp				System bus: Process data output double words
			-2147483648	{1}	2147483647	
1						CAN1_OUT: Process data output double word 1 (CAN1_dnOutD1_p)
2						CAN2_OUT: Process data output double word 1 (CAN2_dnOutD1_p)
3						CAN3_OUT: Process data input double word 1 (CAN3_dnOutD1_p)
C0878	DigInOfDctrl	Disp				DCTRL_DriveControl: Digital inputs
			0		1	
1						DCTRL_bCInh1_b
2						DCTRL_bCInh1_b
3						DCTRL_bTripSet_b
4						DCTRL_bTripReset_b
C0879	Reset ctrl					Reset of control words • C0879/x = 1 performs 1 reset.
			0	Do not reset		
			1	Reset		
1						C0135
2						AIF
3						CAN
C0906	DIS: analog	Disp				MCTRL_MotorControl: Analog input signals
			-199.99	{0.01 %}	199.99	
1						Speed setpoint (MCTRL_nNSet_a)
2						Torque setpoint (MCTRL_nMAdd_a)
3						Lower torque limit (MCTRL_nLoMLim_a)
4						Upper torque limit (MCTRL_nHiMLim_a)
5						Position controller limit (MCTRL_nPosLim_a)
6						Lower speed limit (MCTRL_nNStartMLim_a)
7						Field weakening (MCTRL_nFldWeak_a)
8						Integral action component of speed controller (MCTRL_nISet_a)
9						Position controller adaptation (MCTRL_nPAdapt_a)



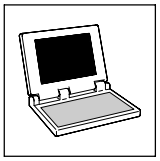
Code	LCD	Possible settings			Info
		Lenze	Selection		
C0907	DIS: digital	Disp			MCTRL_MotorControl: Digital input signals
			0	1	
1					Position control on/off (MCTRL_bPosOn_b)
2					Speed/torque control (MCTRL_bNMSwt_b)
3					Quick stop (MCTRL_bQspOut_b)
4					Load integral action component of speed controller (MCTRL_bILoad_b)
C0908	DIS: PHI-SET	Disp			MCTRL_MotorControl: Position controller input (MCTRL_dnPosSet_p) • 1 rev. = 65536 inc.
			-2147483648 {1 inc}	2147483647	
C0909	speed limit	1			Speed setpoint limitation
			1 -175 % ... +175 % 2 0 % ... +175 % 3 -175 % ... 0 %		
C0910	TP delay	0			MCTRL_MotorControl: Touch probe delay • Compensation of delay times of the TP signal source at X5/E4
			-32767 {1 inc}	32767	
C0911	MCTRL TP sel	0			MCTRL_MotorControl: Touch probe selection
			0 Touch probe via zero pulse 1 Touch probe through digital input X5/E4		
C0912	MCTRL TP EDGE	0			MCTRL_MotorControl: Touch probe activation • For touch probe via digital input X5/E4 (C0911 = 1)
			0 Activation with positive signal 1 Activation with negative signal		
C1120	Sync mode	0			System bus: Sync source
			0 Off 1 Synchronization via system bus (CAN) 2 Synchronization via terminal X3/I1		
C1121	Sync cycle	2			System bus: Synchronisation cycle • Definition of the cycle time of the sync telegram/signal. • Parameterisation is only required for the slave!
			1 {1 ms}	13	
C1122	Sync phase	0.460			System bus: Synchronisation phase • Phase shift between the sync telegram/signal and the start of the internal control program.
			0 {0.001 ms}	6.5	
C1123	Sync-window	0			System bus: Synchronisation window • If the sync telegram/signal sent from the master is within the "time window", CAN_bSyncInsideWindow_b = TRUE.
			0 {0.001 ms}	6.5	
C1190	Char.: temp 1	0			PTC: Type selection for motor
			0 Lenze standard 1 User-specific		

Code	LCD	Possible settings		Info
		Lenze	Selection	
C1191	Char.: temp			PTC: Temperature characteristic selection
			0 {1 °C} 255	
1		100		Characteristic for temperature 1
2		150		Characteristic for temperature 2
C1192	Char.: OHM			PTC: Resistance characteristic selection
			0 {1 Ω} 30000	
1		1670		Characteristic for R1 at temperature 1
2		2225		Characteristic for R2 at temperature 2
C1799	DFOUT fmax	1250		DF_OUT_DigitalFrequency: Maximum output frequency at X10
			20 {1 kHz} 1250	
C1810	S/W Id keypad	Disp		Keypad identification
C1811	S/W date keypad	Disp		Keypad creation date
C2100	Time slice	13		Time slice for task switch between system task and cyclic task (PLC_PRG)
			6 {1 ms} 26	
C2102	Task switch	0		Configuration of task switch process
			Activation after: 0 Time slice 1 Time slice + end PLC_PRG 2 Time slice + end PLC_PRG + end system task	
C2104	PLC Autorun	0		Automatic start of the PLC Program after power-on
			0 No auto start 1 Auto start after power-on	
C2106	Downl.protect	0		Write protection for the PLC program
			0 New download possible 1 No new download possible	
C2107	PwDownlProt.	0		Password for download write protection (C2106)
			0 {1} 4294967295	
C2108	PLC run/stop	0		PLC program
			0 No function 1 PLC run 2 PLC stop 3 PLC reset	 Start Stop Reset
C2111	GDC Id	Disp	27012006132510 = • Date (day.month.year): 27.01.2006 • Time (hour:min.:sec.): 13:25:10	Compilation time/date of PLC program
C2113	PLC Prog Name	Disp		Name of the PLC program
C2115	T-Fct credit	Disp		Number of technology units
C2116	CreditPinCode	0		Pin code for technology unit activation in the event of servicing (contact Lenze)
			0 {1} 4294967295	
C2117	Full credit	Disp		Service code
C2118	ParWriteChan.	0		CAN object for L_ParRead and L_ParWrite
			0 PDO channel (CAN1_IO ... CAN3_IO) 1 SDO2 channel	



Code	LCD	Possible settings		Info
		Lenze	Selection	
C2120	AIF: Control	0		AIF-CAN: Control word
			0 [1] 255 Decimal value is bit-coded: 0 No command 1 Read XCAN code + new initialization 2 Read XCAN code 10 Read XCAN C2356/1 ... 4 11 Read XCAN C2357 12 Read XCAN C2375 13 Read XCAN C2376 ... C2378 14 Read XCAN C2382 255 Not assigned	**Note:** The state of the MSB (bit 7) of the control word automatically changes with each access to the code. Please take this into account when interpreting the data!
C2121	AIF: state	Disp		AIF-CAN: Status • Detailed information can be found in the documentation for the corresponding fieldbus module.
			0 {dec} 255 Decimal value is bit-coded: Bit 0 XCAN1_IN monitoring time Bit 1 XCAN2_IN monitoring time Bit 2 XCAN3_IN monitoring time Bit 3 XCAN bus off Bit 4 XCAN operational Bit 5 XCAN pre-operational Bit 6 XCAN warning Bit 7 Internally assigned	
C2130	FileNameAddDa	Disp	Symbolic name of data	Information about the additional data that was transferred to the PLC together with the PLC program. • More detailed information can be found in chapter 3.3.3, "Downloading data". 📖 3-7
C2131	Type AddData	Disp	Data specification identifier	
C2132	VersionAddData	Disp	Data version	
C2133	TimeStamp	Disp	Time stamp of data	
C2350	XCAN Address	1		AIF-CAN: Node address
			1 {1} 63	
C2351	XCAN baudrate	0		AIF-CAN: Baud rate
			0 500 kbit/s 1 250 kbit/s 2 125 kbit/s 3 50 kbit/s 4 1000 kbit/s 5 20 kbit/s 6 10 kbit/s	
C2352	CAN mst	0		AIF-CAN: Set-up quasi master • Controller sends system bus boot-up and is thus the "quasi" master
			0 Boot-up not active 1 Boot-up active	
C2353	CAN addr sel1			AIF-CAN: Source for PDO identifiers
			0 Identifier assignment via C2350 + basic identifier 1 Identifier assignment via C2354/x	
1		0		XCAN1_IN/OUT
2		0		XCAN2_IN/OUT
3		0		XCAN3_IN/OUT

Code	LCD	Possible settings				Info
		Lenze	Selection			
C2354	XCAN sel.addr					AIF-CAN: Definition of individual PDO identifiers • Value to be entered = Identifier - 384
			0	{1}	1663	
1		129				XCAN1_IN
2		1				XCAN1_OUT
3		257				XCAN2_IN
4		258				XCAN2_OUT
5		385				XCAN3_IN
6		386				XCAN3_OUT
C2355	XCAN Id	Disp				AIF-CAN: System bus identifiers for the PDOs
			384	{1}	2047	
1						XCAN1_IN
2						XCAN1_OUT
3						XCAN2_IN
4						XCAN2_OUT
5						XCAN3_IN
6						XCAN3_OUT
C2356	CAN boot up					AIF-CAN: Time settings
			0	{1 ms}	65000	Delay time after power-on for initialisation through the “quasi” master
1		3000				
			0 0 = Event-controlled transmission	{1 ms}	65000	Cycle time for transmitting the process data object
2		0				XCAN1_OUT
3		0				XCAN2_OUT
4		0				XCAN3_OUT
5		0				XCAN Sync Tx cycle time
C2357	CExmonit time					AIF-CAN: Monitoring time for process data input objects
			0	{1 ms}	65000	
1		3000				XCAN1_IN
2		3000				XCAN2_IN
3		3000				XCAN3_IN
4		1				Bus off
C2359	AIF HW Set.	Disp				AIF module DIP switch settings
			0	{1}	65535	
C2367	Sync Rx Id	128				AIF-CAN: Sync Rx identifier • Receive identifier for the sync telegram
			1	{1}	256	
C2368	Sync Tx Id	128				AIF-CAN: Sync Tx identifier • Transmit identifier for the sync telegram
			1	{1}	256	
C2373	Sync Rate IN					AIF-CAN: Sync counter
			1	{1}	240	
1		1				XCAN1_IN
2		1				XCAN2_IN
3		1				XCAN3_IN
C2374	Sync RATE OUT					AIF-CAN: Sync counter
			1	{1}	240	
1		1				XCAN1_OUT
2		1				XCAN2_OUT
3		1				XCAN3_OUT



Code	LCD	Possible settings				Info
		Lenze	Selection			
C2375	XCAN Tx-Mode					AIF-CAN: TX mode for XCANx_OUT • Selection of cycle time under C2356
			0	Sync with response		
			1	Sync without response		
			2	Event-controlled (with mask)/cyclically		
			3	Event-controlled (with mask) with cyclic overlay		
1		0				XCAN1_OUT
2		0				XCAN2_OUT
3		0				XCAN3_OUT
C2376	XCAN1 Mask					AIF-CAN: XCAN1_OUT mask
			0	{hex}	FFFF	
1		FFFF				Mask for process data output word 1
2		FFFF				Mask for process data output word 2
3		FFFF				Mask for process data output word 3
4		FFFF				Mask for process data output word 4
C2377	XCAN2 Mask					AIF-CAN: XCAN2_OUT mask
			0	{hex}	FFFF	
1		FFFF				Mask for process data output word 1
2		FFFF				Mask for process data output word 2
3		FFFF				Mask for process data output word 3
4		FFFF				Mask for process data output word 4
C2378	XCAN3 Mask					AIF-CAN: XCAN3_OUT mask
			0	{hex}	FFFF	
1		FFFF				Mask for process data output word 1
2		FFFF				Mask for process data output word 2
3		FFFF				Mask for process data output word 3
4		FFFF				Mask for process data output word 4
C2382	XCAN Conf. CE					AIF-CAN: Monitoring configuration
			0	Off		
			1	Controller inhibit		
			2	QSP		
1		0				XCAN1_IN (no telegrams received)
2		0				XCAN2_IN (no telegrams received)
3		0				XCAN3_IN (no telegrams received)
4		0				Bus off
5		0				Life guarding event
C2500						Temporary codes (see chapter 3.6.1)
			0	{1}	65535	
1		0				%MW 0
...		...				...
255		0				%MW 254
C2501						Temporary codes (see chapter 3.6.1)
			0	{1}	65535	
1		0				%MW 255
...		...				...
255		0				%MW 509

3.6.1 Temporary codes

Codes C2500 and C2501 are temporary codes, i.e. the data

- does not occupy any EEPROM memory space.
- cannot be saved in the parameter set of the unit using C0003 = 1.
- will be lost after mains disconnection or power failure.
- is fixedly linked with the PLC flag area.

- Temporary codes should be used for parameters which are only accessed during a switch-on cycle of the PLC.
- The temporary codes can also be used to directly access the flag area of the PLC (e.g via HMI) without having to create a variable.

3.6.2 RAM access via codes

If you want to access the RAM of the PLC from external controls or PC tools, for instance, for manipulating motion profile data online, you can use the following codes:

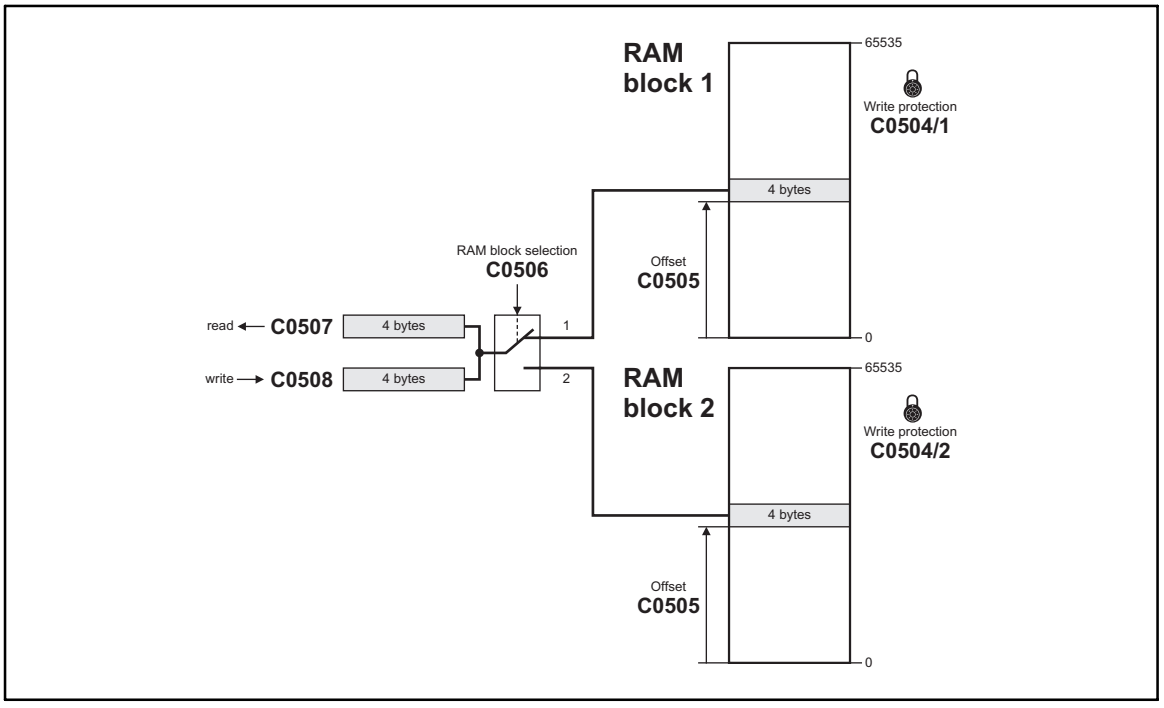
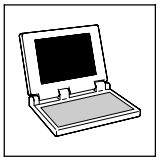


Fig. 3-1 Codes for RAM access



Parameters					
Code / **Subcode**	**Data type**	**Access**	**Info**		
				Possible settings	**Presetting**
C0504	-	R / W	Activate/deactivate write protection for RAM • When the write protection is activated, the RAM cannot be written to via LenzeMemDrv.lib codes or functions.		
1			0	Deactivate write protection for RAM block 1	0
			1	Activate write protection for RAM block 1	
2			0	Deactivate write protection for RAM block 2	0
			1	Activate write protection for RAM block 2	
C0505	-	W	Offset address within the RAM block selected under C0506		
			0 {1} 65532		0
C0506	-	W	Selection of the RAM block for access via C0508/C0509		
			1	RAM block 1	
			2	RAM block 2	
C0507	Double integer	R	Value read from the RAM block • After the RAM block has been read, the pointer to the memory address is automatically incremented by 4 bytes.		
C0508	Double integer	W	Value to be written in the RAM block • After the RAM block has been written to, the pointer to the memory address is automatically incremented by 4 bytes.		
C0509	-	R / W	Check sum test		
			0	Deactivated	0
			1	Activated	

Note!

- The RAM access is processed in parallel with the PLC program in the system task. The processing time therefore depends on the workload of the system.
- You can use the functions of the **LenzeMemDrv.lib** function library to access the RAM from your IEC 61131 program.

Auto-increment access

The four data bytes are always read/written through ”auto-increment access”, i.e. the pointer to the address in the selected RAM block is automatically incremented by four bytes after reading code C0507 or writing to code C0508:

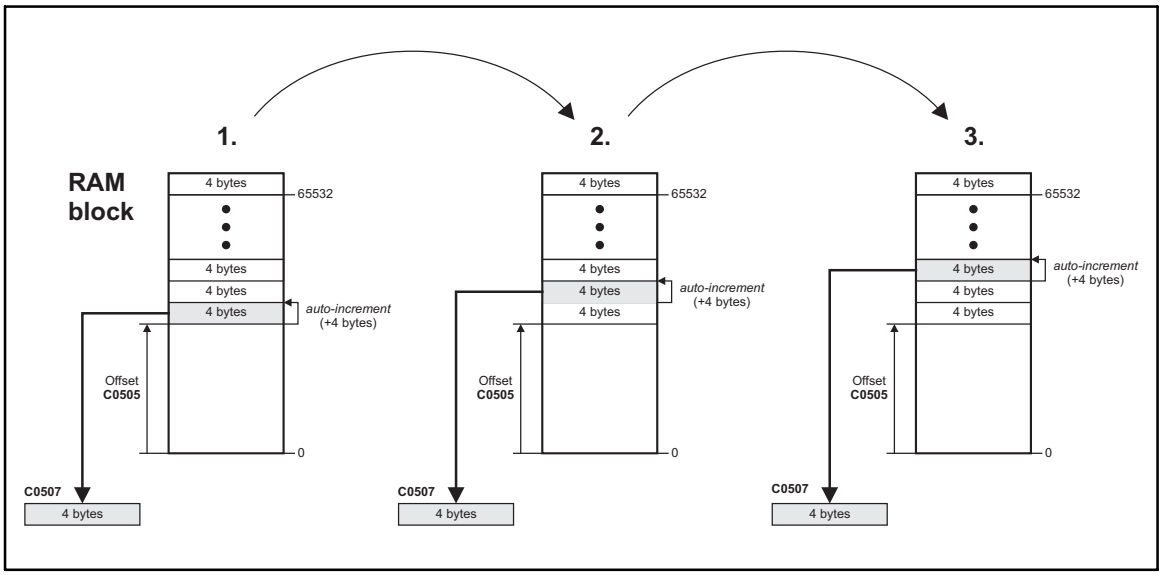
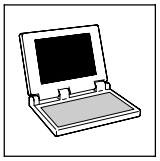


Fig. 3-2 Example: Reading successive double integer values from the RAM block through auto-increment access



3.7 Attribute table

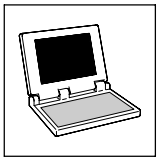
If you want to create your own programs, you will need the information given in the attribute table. This table contains all the information required for communicating to the PLC via parameters.

How to read the attribute table:

Column		Meaning	Entry	
Code		Designation of the Lenze code	Cxxxx	
Index	dec	Index used to address the parameter. The subindex of an array variable corresponds to the Lenze subcode number	24575 - Lenze code number	Only required for control via INTERBUS-S, PROFIBUS-DP or system bus (CAN).
	hex		5FFFh - 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)		
	DT	Data type	B8	1 byte, bit-coded
			B16	2 bytes, bit-coded
			B32	4 bytes, bit-coded
			FIX32	32-bit value with sign; decimal with 4 decimal positions
			I32	4 bytes with sign
			U16	2 bytes without sign
			U32	4 bytes without sign
			VS	ASCII string
	Format	LECOM format (see also Operating Instructions for fieldbus module 2102)	VD	ASCII decimal format
			VH	ASCII hexadecimal format
			VS	String format
			VO	Octet string format for data blocks
	DL	Data length in bytes		
	Decimal position	Number of decimal positions		
Access	LCM-R/W	Access authorisation for LECOM	Ra	Reading is always permitted.
			Wa	Writing is always permitted.
			W	Writing is attached to a condition.
	Condition	Condition for writing	CINH	Writing is only permitted if the controller is inhibited (CINH). [1]
			PLC Stop	Writing is only permitted if the PLC program is stopped.
				[1] Only with 9300 Servo PLC

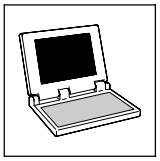
Code	Index		Data						Access	
	dec	hex	DS	DA	DT	Format	DL	Decimal position	LCM-R/W	Condition
C0002	24573	5FFDh	E	1	FIX32	VD	4	0	Ra/W	CINH + PLC stop
C0003	24572	5FFCh	E	1	FIX32	VD	4	0	Ra/Wa	
C0004	24571	5FFBh	E	1	FIX32	VD	4	0	Ra/Wa	
C0006	24569	5FF9h	E	1	FIX32	VD	4	0	Ra/W	CINH
C0009	24566	5FF6h	E	1	FIX32	VD	4	0	Ra/Wa	
C0011	24564	5FF4h	E	1	FIX32	VD	4	0	Ra/Wa	
C0017	24558	5FEEh	E	1	FIX32	VD	4	0	Ra/Wa	
C0018	24557	5FEDh	E	1	FIX32	VD	4	0	Ra/Wa	
C0019	24556	5FECh	E	1	FIX32	VD	4	0	Ra/Wa	
C0022	24553	5FE9h	E	1	FIX32	VD	4	2	Ra/Wa	
C0025	24550	5FE6h	E	1	FIX32	VD	4	0	Ra/W	CINH
C0026	24549	5FE5h	A	2	FIX32	VD	4	2	Ra/Wa	
C0027	24548	5FE4h	A	2	FIX32	VD	4	2	Ra/Wa	

Code	Index		Data						Access	
	dec	hex	DS	DA	DT	Format	DL	Decimal position	LCM-R/W	Condition
C0030	24545	5FE1h	E	1	FIX32	VD	4	0	Ra/Wa	
C0032	24543	5FDFh	E	1	FIX32	VD	4	0	Ra/Wa	
C0034	24541	5FDDh	E	1	FIX32	VD	4	0	Ra/Wa	
C0037	24538	5FDAh	E	1	FIX32	VD	4	0	Ra/Wa	
C0040	24535	5FD7h	E	1	FIX32	VD	4	0	Ra/Wa	
C0042	24533	5FD5h	E	1	FIX32	VD	4	0	Ra	
C0043	24532	5FD4h	E	1	FIX32	VD	4	0	Ra/Wa	
C0050	24525	5FCDh	E	1	FIX32	VD	4	2	Ra	
C0051	24524	5FCCh	E	1	FIX32	VD	4	0	Ra	
C0052	24523	5FCBh	E	1	FIX32	VD	4	0	Ra	
C0053	24522	5FCAh	E	1	FIX32	VD	4	0	Ra	
C0054	24521	5FC9h	E	1	FIX32	VD	4	1	Ra	
C0056	24519	5FC7h	E	1	FIX32	VD	4	0	Ra	
C0057	24518	5FC6h	E	1	FIX32	VD	4	1	Ra	
C0058	24517	5FC5h	E	1	FIX32	VD	4	1	Ra/Wa	
C0059	24516	5FC4h	E	1	FIX32	VD	4	0	Ra	
C0060	24515	5FC3h	E	1	FIX32	VD	4	0	Ra	
C0061	24514	5FC2h	E	1	FIX32	VD	4	0	Ra	
C0063	24512	5FC0h	E	1	FIX32	VD	4	0	Ra	
C0064	24511	5FBFh	E	1	FIX32	VD	4	0	Ra	
C0067	24508	5FBCh	E	1	FIX32	VD	4	0	Ra	
C0070	24505	5FB9h	E	1	FIX32	VD	4	1	Ra/Wa	
C0071	24504	5FB8h	E	1	FIX32	VD	4	1	Ra/Wa	
C0072	24503	5FB7h	E	1	FIX32	VD	4	1	Ra/Wa	
C0075	24500	5FB4h	E	1	FIX32	VD	4	2	Ra/Wa	
C0076	24499	5FB3h	E	1	FIX32	VD	4	1	Ra/Wa	
C0077	24498	5FB2h	E	1	FIX32	VD	4	2	Ra/Wa	
C0078	24497	5FB1h	E	1	FIX32	VD	4	1	Ra/Wa	
C0081	24494	5FAEh	E	1	FIX32	VD	4	2	Ra/W	CINH
C0084	24491	5FABh	E	1	FIX32	VD	4	2	Ra/W	CINH
C0085	24490	5FAAh	E	1	FIX32	VD	4	2	Ra/W	CINH
C0086	24489	5FA9h	E	1	FIX32	VD	4	0	Ra/W	CINH
C0087	24488	5FA8h	E	1	FIX32	VD	4	0	Ra/W	CINH
C0088	24487	5FA7h	E	1	FIX32	VD	4	1	Ra/W	CINH
C0089	24486	5FA6h	E	1	FIX32	VD	4	0	Ra/W	CINH
C0090	24485	5FA5h	E	1	FIX32	VD	4	0	Ra/W	CINH
C0091	24484	5FA4h	E	1	FIX32	VD	4	2	Ra/W	CINH
C0093	24482	5FA2h	E	1	FIX32	VD	4	0	Ra	
C0094	24481	5FA1h	E	1	FIX32	VD	4	0	Ra/Wa	
C0095	24480	5FA0h	E	1	FIX32	VD	4	0	Ra/W	CINH
C0096	24479	5F9Fh	A	2	FIX32	VD	4	0	Ra/Wa	
C0099	24476	5F9Ch	E	1	FIX32	VD	4	1	Ra	
C0105	24470	5F96h	E	1	FIX32	VD	4	3	Ra/Wa	
C0108	24467	5F93h	A	2	FIX32	VD	4	2	Ra/Wa	
C0109	24466	5F92h	A	2	FIX32	VD	4	2	Ra/Wa	
C0114	24461	5F8Dh	A	5	FIX32	VD	4	0	Ra/Wa	
C0118	24457	5F89h	A	4	FIX32	VD	4	0	Ra/Wa	
C0121	24454	5F86h	E	1	FIX32	VD	4	0	Ra/Wa	
C0122	24453	5F85h	E	1	FIX32	VD	4	0	Ra/Wa	
C0125	24450	5F82h	E	1	FIX32	VD	4	0	Ra/Wa	
C0126	24449	5F81h	E	1	FIX32	VD	4	0	Ra/Wa	



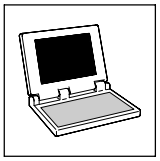
Code	Index		Data						Access	
	dec	hex	DS	DA	DT	Format	DL	Decimal position	LCM-R/W	Condition
C0135	24440	5F78h	E	1	B16	VH	2	0	Ra/Wa	
C0136	24439	5F77h	A	3	B16	VH	2	0	Ra	
C0141	24434	5F72h	E	1	FIX32	VD	4	2	Ra/Wa	
C0142	24433	5F71h	E	1	FIX32	VD	4	0	Ra/Wa	
C0150	24425	5F69h	E	1	B16	VH	2	0	Ra	
C0151	24424	5F68h	E	1	B32	VH	4	0	Ra	
C0155	24420	5F64h	E	1	B16	VH	2	0	Ra	
C0157	24418	5F62h	A	7	FIX32	VD	4	0	Ra	
C0161	24414	5F5Eh	E	1	FIX32	VD	4	0	Ra	
C0167	24408	5F58h	E	1	FIX32	VD	4	0	Ra/Wa	
C0168	24407	5F57h	A	8	FIX32	VD	4	0	Ra	
C0169	24406	5F56h	A	8	U32	VH	4	0	Ra	
C0170	24405	5F55h	A	8	FIX32	VD	4	0	Ra	
C0172	24403	5F53h	E	1	FIX32	VD	4	0	Ra/Wa	
C0173	24402	5F52h	E	1	FIX32	VD	4	0	Ra/Wa	
C0178	24397	5F4Dh	E	1	U32	VH	4	0	Ra	
C0179	24396	5F4Ch	E	1	U32	VH	4	0	Ra	
C0183	24392	5F48h	E	1	FIX32	VD	4	0	Ra	
C0199	24376	5F38h	E	1	FIX32	VD	4	0	Ra	
C0200	24375	5F37h	E	1	VS	VS	14	0	Ra	
C0201	24374	5F36h	E	1	VS	VS	20	0	Ra	
C0202	24373	5F35h	E	1	FIX32	VD	4	0	Ra	
C0203	24372	5F34h	E	1	VS	VS	12	0	Ra	
C0204	24371	5F33h	E	1	FIX32	VD	4	0	Ra	
C0206	24369	5F31h	E	1	VS	VS	13	0	Ra	
C0207	24368	5F30h	E	1	VS	VS	14	0	Ra	
C0208	24367	5F2Fh	E	1	VS	VS	14	0	Ra	
C0209	24366	5F2Eh	E	1	VS	VS	14	0	Ra	
C0250	24325	5F05h	E	1	FIX32	VD	4	0	Ra/Wa	
C0254	24321	5F01h	E	1	FIX32	VD	4	4	Ra/Wa	
C0300	24275	5ED3h	E	1	FIX32	VD	4	0	Ra	
C0301	24274	5ED2h	E	1	FIX32	VD	4	0	Ra	
C0302	24273	5ED1h	E	1	U32	VH	4	0	Ra	
C0350	24225	5EA1h	E	1	FIX32	VD	4	0	Ra/Wa	
C0351	24224	5EA0h	E	1	FIX32	VD	4	0	Ra/Wa	
C0352	24223	5E9Fh	E	1	FIX32	VD	4	0	Ra/Wa	
C0353	24222	5E9Eh	A	3	FIX32	VD	4	0	Ra/Wa	
C0354	24221	5E9Dh	A	6	FIX32	VD	4	0	Ra/Wa	
C0355	24220	5E9Ch	A	6	FIX32	VD	4	0	Ra	
C0356	24219	5E9Bh	A	4	FIX32	VD	4	0	Ra/Wa	
C0357	24218	5E9Ah	A	3	FIX32	VD	4	0	Ra/Wa	
C0358	24217	5E99h	E	1	FIX32	VD	4	0	Ra/Wa	
C0359	24216	5E98h	E	1	FIX32	VD	4	0	Ra	
C0360	24215	5E97h	A	12	FIX32	VD	4	0	Ra	
C0361	24214	5E96h	A	12	FIX32	VD	4	2	Ra	
C0362	24213	5E95h	E	1	FIX32	VD	4	3	Ra	
C0363	24212	5E94h	E	1	FIX32	VD	4	0	Ra/Wa	
C0365	24210	5E92h	E	1	FIX32	VD	4	0	Ra	
C0366	24209	5E91h	E	1	FIX32	VD	4	0	Ra/Wa	
C0367	24208	5E90h	E	1	FIX32	VD	4	0	Ra/Wa	
C0368	24207	5E8Fh	E	1	FIX32	VD	4	0	Ra/Wa	

Code	Index		Data						Access	
	dec	hex	DS	DA	DT	Format	DL	Decimal position	LCM-R/W	Condition
C0369	24206	5E8Eh	E	1	FIX32	VD	4	0	Ra/Wa	
C0400	24175	5E6Fh	E	1	FIX32	VD	4	2	Ra	
C0405	24170	5E6Ah	E	1	FIX32	VD	4	2	Ra	
C0416	24159	5E5Fh	E	1	U32	VH	4	0	Ra/W	CINH
C0420	24155	5E5Bh	E	1	FIX32	VD	4	0	Ra/W	CINH
C0421	24154	5E5Ah	E	1	FIX32	VD	4	1	Ra/W	CINH
C0425	24150	5E56h	E	1	FIX32	VD	4	0	Ra/Wa	
C0426	24149	5E55h	E	1	FIX32	VD	4	0	Ra	
C0427	24148	5E54h	E	1	FIX32	VD	4	0	Ra/Wa	
C0428	24147	5E53h	E	1	FIX32	VD	4	0	Ra/Wa	
C0429	24146	5E52h	E	1	FIX32	VD	4	0	Ra/Wa	
C0431	24144	5E50h	E	1	FIX32	VD	4	0	Ra/Wa	
C0434	24141	5E4Dh	A	3	FIX32	VD	4	2	Ra	
C0439	24136	5E48h	A	3	FIX32	VD	4	2	Ra	
C0441	24134	5E46h	E	1	FIX32	VD	4	0	Ra	
C0443	24132	5E44h	E	1	B8	VH	1	0	Ra	
C0444	24131	5E43h	A	4	FIX32	VD	4	0	Ra	
C0469	24106	5E2Ah	E	1	FIX32	VD	4	0	Ra/W	CINH
C0470	24105	5E29h	A	4	B8	VH	1	0	Ra/Wa	
C0471	24104	5E28h	E	1	B32	VH	4	0	Ra/Wa	
C0472	24103	5E27h	A	20	FIX32	VD	4	2	Ra/Wa	
C0473	24102	5E26h	A	10	FIX32	VD	4	0	Ra/Wa	
C0474	24101	5E25h	A	5	I32	VH	4	0	Ra/Wa	
C0475	24100	5E24h	A	2	FIX32	VD	4	0	Ra/Wa	
C0490	24085	5E15h	E	1	FIX32	VD	4	0	Ra/W	CINH
C0495	24080	5E10h	E	1	FIX32	VD	4	0	Ra/W	CINH
C0497	24078	5E0Eh	E	1	FIX32	VD	4	1	Ra/Wa	
C0504	24071	5E07h	A	2	FIX32	VD	4	0	Ra/Wa	
C0505	24070	5E06h	E	1	FIX32	VD	4	0	Ra/Wa	
C0506	24069	5E05h	E	1	FIX32	VD	4	0	Ra/Wa	
C0507	24068	5E04h	E	1	FIX32	VD	4	0	Ra	
C0508	24067	5E03h	E	1	FIX32	VD	4	0	Ra/Wa	
C0509	24066	5E02h	E	1	FIX32	VD	4	0	Ra/Wa	
C0510	24065	5E01h	E	1	FIX32	VD	4	0	Ra/Wa	
C0517	24058	5DFAh	A	32	FIX32	VD	4	2	Ra/Wa	
C0540	24035	5DE3h	E	1	FIX32	VD	4	0	Ra/Wa	
C0545	24030	5DDEh	E	1	FIX32	VD	4	0	Ra/Wa	
C0547	24028	5DDCh	E	1	FIX32	VD	4	2	Ra	
C0549	24026	5DDAh	E	1	FIX32	VD	4	0	Ra	
C0559	24016	5DD0h	E	1	FIX32	VD	4	0	Ra/Wa	
C0577	23998	5DBEh	E	1	FIX32	VD	4	2	Ra/Wa	
C0578	23997	5DBDh	E	1	FIX32	VD	4	1	Ra/Wa	
C0580	23995	5DBBh	E	1	FIX32	VD	4	0	Ra/Wa	
C0581	23994	5DBAh	E	1	FIX32	VD	4	0	Ra/Wa	
C0582	23993	5DB9h	E	1	FIX32	VD	4	0	Ra/Wa	
C0583	23992	5DB8h	E	1	FIX32	VD	4	0	Ra/Wa	
C0584	23991	5DB7h	E	1	FIX32	VD	4	0	Ra/Wa	
C0585	23990	5DB6h	E	1	FIX32	VD	4	0	Ra/Wa	
C0586	23989	5DB5h	E	1	FIX32	VD	4	0	Ra/Wa	
C0587	23988	5DB4h	E	1	FIX32	VD	4	0	Ra/Wa	
C0588	23987	5DB3h	E	1	FIX32	VD	4	0	Ra/Wa	



Code	Index		Data						Access	
	dec	hex	DS	DA	DT	Format	DL	Decimal position	LCM-R/W	Condition
C0591	23984	5DB0h	E	1	FIX32	VD	4	0	Ra/Wa	
C0592	23983	5DAFh	E	1	FIX32	VD	4	0	Ra/Wa	
C0593	23982	5DAEh	E	1	FIX32	VD	4	0	Ra/Wa	
C0594	23981	5DADh	E	1	FIX32	VD	4	0	Ra/Wa	
C0595	23980	5DACh	E	1	FIX32	VD	4	0	Ra/Wa	
C0596	23979	5DABh	E	1	FIX32	VD	4	0	Ra/Wa	
C0597	23978	5DAAh	E	1	FIX32	VD	4	0	Ra/Wa	
C0598	23977	5DA9h	E	1	FIX32	VD	4	0	Ra/Wa	
C0599	23976	5DA8h	E	1	FIX32	VD	4	1	Ra/Wa	
C0608	23963	5D9Bh	E	1	FIX32	VD	4	0	Ra/Wa	
C0609	23962	5D9Ah	E	1	FIX32	VD	4	0	Ra/Wa	
C0855	23720	5CA8h	A	2	B16	VH	2	0	Ra	
C0856	23719	5CA7h	A	3	I32	VH	4	2	Ra	
C0857	23718	5CA6h	E	1	I32	VH	4	0	Ra	
C0858	23717	5CA5h	A	3	I32	VH	4	2	Ra	
C0859	23716	5CA4h	E	1	I32	VH	4	0	Ra	
C0863	23712	5CA0h	A	6	B16	VH	2	0	Ra	
C0866	23709	5C9Dh	A	11	FIX32	VD	4	2	Ra	
C0867	23708	5C9Ch	A	3	I32	VH	4	0	Ra	
C0868	23707	5C9Bh	A	11	FIX32	VD	4	2	Ra	
C0869	23706	5C9Ah	A	3	I32	VH	4	0	Ra	
C0878	23697	5C91h	A	4	FIX32	VD	4	0	Ra	
C0879	23696	5C90h	A	3	FIX32	VD	4	0	Ra/Wa	
C0906	23669	5C75h	A	9	FIX32	VD	4	2	Ra	
C0907	23668	5C74h	A	4	FIX32	VD	4	0	Ra	
C0908	23667	5C73h	E	1	I32	VH	4	0	Ra	
C0909	23666	5C72h	E	1	FIX32	VD	4	0	Ra/Wa	
C0910	23665	5C71h	E	1	FIX32	VD	4	0	Ra/Wa	
C0911	23664	5C71h	E	1	FIX32	VD	4	0	Ra/Wa	
C0912	23663	5C70h	E	1	FIX32	VD	4	0	Ra/Wa	
C1120	23455	5B9Fh	E	1	FIX32	VD	4	0	Ra/Wa	
C1121	23454	5B9Eh	A	2	FIX32	VD	4	0	Ra/Wa	
C1122	23453	5B9Dh	E	1	FIX32	VD	4	3	Ra/Wa	
C1123	23452	5B9Ch	A	2	FIX32	VD	4	3	Ra/Wa	
C1190	23385	5B59h	E	1	FIX32	VD	4	0	Ra/Wa	
C1191	23384	5B58h	A	2	FIX32	VD	4	0	Ra/Wa	
C1192	23383	5B57h	A	2	FIX32	VD	4	0	Ra/Wa	
C1799	22776	58F8h	E	1	FIX32	VD	4	0	Ra/Wa	
C1810	22765	58EDh	E	1	VS	VS	14	0	Ra	
C1811	22764	58ECh	E	1	VS	VS	14	0	Ra	
C2100	22475	57CBh	E	1	FIX32	VD	4	0	Ra/Wa	
C2102	22473	57C9h	E	1	FIX32	VD	4	0	Ra/Wa	
C2104	22471	57C7h	E	1	FIX32	VD	4	0	Ra/Wa	
C2108	22467	57C3h	E	1	FIX32	VD	4	0	Ra/Wa	
C2111	22464	57C0h	E	1	VS	VS	14	0	Ra	
C2113	22462	57BDh	E	1	VS	VS	14	0	Ra	
C2114	22461	57BCh	A	13	U32	VH	4	0	Ra	
C2115	22460	57BBh	E	1	U16	VH	2	0	Ra/Wa	
C2117	22458	57B9h	E	1	FIX32	VD	4	0	Ra	
C2118	22457	57B8h	E	1	FIX32	VD	4	0	Ra/Wa	
C2120	22455	57B7h	E	1	FIX32	VD	4	0	Ra/Wa	

Code	Index		Data						Access	
	dec	hex	DS	DA	DT	Format	DL	Decimal position	LCM-R/W	Condition
C2121	22454	57B6h	E	1	B8	VH	1	0	Ra	
C2350	22225	56D1h	E	1	FIX32	VD	4	0	Ra/Wa	
C2351	22224	56D0h	E	1	FIX32	VD	4	0	Ra/Wa	
C2352	22223	56CFh	E	1	FIX32	VD	4	0	Ra/Wa	
C2353	22222	56CEh	A	3	FIX32	VD	4	0	Ra/Wa	
C2354	22221	56CDh	A	6	FIX32	VD	4	0	Ra/Wa	
C2355	22220	56CCh	A	6	FIX32	VD	4	0	Ra/Wa	
C2356	22219	56CBh	A	5	FIX32	VD	4	0	Ra/Wa	
C2357	22218	56CAh	A	4	FIX32	VD	4	0	Ra/Wa	
C2359	22216	56C8h	E	1	FIX32	VD	4	0	Ra/Wa	
C2367	22208	56C0h	E	1	FIX32	VD	4	0	Ra/Wa	
C2368	22207	56BFh	E	1	FIX32	VD	4	0	Ra/Wa	
C2373	22202	56BAh	A	3	FIX32	VD	4	0	Ra/Wa	
C2374	22201	56B9h	A	3	FIX32	VD	4	0	Ra/Wa	
C2375	22200	56B8h	A	3	FIX32	VD	4	0	Ra/Wa	
C2376	22199	56B7h	A	4	FIX32	VD	4	0	Ra/Wa	
C2377	22198	56B6h	A	4	FIX32	VD	4	0	Ra/Wa	
C2378	22197	56B5h	A	4	FIX32	VD	4	0	Ra/Wa	
C2382	22193	56B1h	A	5	FIX32	VD	4	0	Ra/Wa	
C2500	22075	563Bh	A	255	FIX32	VD	4	0	Ra/Wa	
C2501	22074	563Ah	A	255	FIX32	VD	4	0	Ra/Wa	



4 Index

A

Absolute value encoder, Monitoring, 2-77

Additional torque setpoint, 2-48

Addresses, absolute, 1-5

AIF_IO_Management, 2-15
- Inputs_AIF_Management, 2-15
- Outputs_AIF_Management, 2-17

AIF1_IO_AutomationInterface, 2-2
- Inputs_AIF1, 2-2
- Outputs_AIF1, 2-5

AIF2_IO_AutomationInterface, 2-7
- Inputs_AIF2, 2-7
- Outputs_AIF2, 2-9
- Outputs_AIF3, 2-13

AIF3_IO_AutomationInterface, 2-11
- Inputs_AIF3, 2-11

Analog input, 2-18 , 2-20

Analog output, 2-19 , 2-20

ANALOG1_IO
- Inputs_ANALOG1, 2-18
- Outputs_ANALOG1, 2-19

Analog1_IO, 2-18

ANALOG2_IO
- Inputs_ANALOG2, 2-20
- Outputs_ANALOG2, 2-20

Analog2_IO, 2-20

Attribute table, 3-55

Automatic switching frequency changeover, 2-55

Automation interface
- AIF_IO_Management, 2-15
  - Inputs_AIF_Management, 2-15
  - Outputs_AIF_Management, 2-17
- AIF1_IO_AutomationInterface, 2-2
  - Inputs_AIF1, 2-2
  - Outputs_AIF1, 2-5
- AIF2_IO_AutomationInterface, 2-7
  - Inputs_AIF2, 2-7
  - Outputs_AIF2, 2-9
- AIF3_IO_AutomationInterface, 2-11
  - Inputs_AIF3, 2-11
  - Outputs_AIF3, 2-13
- Control word, 2-17
- Transfer of status/control word, 2-27

B

Braking torque derating, 2-68

C

Code table, 3-22

Controller inhibit (CINH), 2-24

Conventions, 1-1
- Pictographs used, 1-2
- System block descriptions, 1-1

Current controller, 2-47

D

DCTRL_DriveControl (device control), 2-21
- Controller inhibit (CINH), 2-24
- Inputs_DCTRL, 2-22
- Operation disabled (DISABLE), 2-23
- Output of digital status signals, 2-25
- Outputs_DCTRL, 2-22
- Quick stop (QSP), 2-23
- Resetting TRIP (TRIP-RESET), 2-25
- Transfer of status/control word via AIF, 2-27
- TRIP status (DCTRL_bExternalFault_b), 2-26

DFIN_IO_DigitalFrequency, 2-28
- Encoder cable monitoring, 2-34
- Inputs_DFIN, 2-28
- Technical data, 2-32
- Touch probe (TP), 2-33

DFOUT_IO_DigitalFrequency, 2-35
- Inputs_DFOUT, 2-35
- Outputs_DFOUT, 2-35
- Technical data, 2-37

Digital frequency input (DFIN)
- Encoder cable monitoring, 2-34
- Technical data, 2-32
- Touch probe (TP), 2-33

Digital frequency output (DFOUT), technical data, 2-37

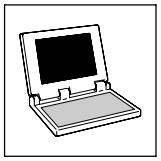
Digital inputs, 2-39

Digital outputs, 2-40

DIGITAL_IO, 2-39
- Inputs_DIGITAL, 2-39
- Outputs_DIGITAL, 2-40

Downloading data, 3-7

DRIVECOM, 2-27



E

E2PROM-buffered memory, 3-3

Earth fault, monitoring, 2-65

Encoder cable monitoring, 2-34

Error messages, 3-9
- Causes and remedies, 3-14
- Overview, 3-10
- Responses, 3-13

Error sources, overview, 3-10

Extendability, 3-2

F

FAIL-QSP, 2-64 , 3-13

Fault analysis, 3-19

Fault memory, 3-19
- Display in Global Drive Control, 3-20

Fault reset, 3-20

FCODE_FreeCode, 2-41

Feedback systems, 2-56

Field weakening, 2-55

File header, 3-7

FLASH memory, 3-3

Free codes, 2-41

G

Global Drive Control, Fault memory, 3-20

H

Heatsink temperature, Monitoring
- Adjustable, 2-73
- Fixed, 2-71

I

I x t overload
- Monitoring, 2-66
- Overcurrent diagram, 2-66

Inputs
- Analog. *See* Analog inputs
- Definition, 1-6
- Digital. *See* Digital inputs

Inputs_AIF_Management, 2-15

Inputs_AIF1, 2-2

Inputs_AIF2, 2-7

Inputs_AIF3, 2-11

Inputs_ANALOG1, 2-18

Inputs_ANALOG2, 2-20

Inputs_DCTRL, 2-22

Inputs_DFIN, 2-28

Inputs_DFOUT, 2-35

Inputs_DIGITAL, 2-39

Inputs_MCTRL, 2-45

Inputs_MCTRL_AUX_HighResFeedback, 2-82

K

Keypad, status messages, 3-21

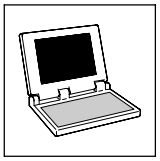
L

LECOM, status word C0150, 3-21

LED display, 3-21

LP1 - monitoring of the motor phases, 2-70

LU - undervoltage monitoring, 2-69



M

Master frequency input, 2-28

Master frequency output, 2-35

Maximum speed, 2-50

MCTRL_AUX_HighResFeedback (high-resolution encoder), 2-82

MCTRL_MotorControl (motor control), 2-44
- Additional torque setpoint, 2-48
- Current controller, 2-47
- Feedback systems, 2-56
- Field weakening, 2-55
- Inputs_MCTRL, 2-45
- Manual adaptation of motor data, 2-59
- Maximum speed, 2-50
- Monitoring, 2-61
  - LP1 - monitoring of the motor phases, 2-70
  - LU - undervoltage monitoring, 2-69
  - nErr - speed monitoring (speed out of tolerance margin), 2-80
  - NMAX - speed monitoring (maximum speed exceeded), 2-81
  - OC1 - earth-fault monitoring, 2-65
  - OC1 - short-circuit monitoring, 2-65
  - OC5 - I x t overload monitoring, 2-66
  - OH - heatsink temperature monitoring (fixed), 2-71
  - OH3 - motor temperature monitoring (fixed), 2-72
  - OH4 - heatsink temperature monitoring (adjustable), 2-73
  - OH7 - motor temperature monitoring (adjustable), 2-74
  - OH8 - motor temperature monitoring via T1, T2, 2-75
  - OU - overvoltage monitoring, 2-67
  - PL - monitoring of the rotor position adjustment, 2-79
  - Responses and their effects on the drive, 2-64
  - Sd2 - resolver monitoring for open circuit, 2-76
  - Sd6 - motor temperature sensor monitoring, 2-77
  - Sd7 - absolute value encoder monitoring, 2-77
  - Sd8 - sin/cos encoder monitoring during operation, 2-78
- Outputs_MCTRL, 2-46
- Phase controller, 2-53
- Quick stop (QSP), 2-54
- Speed controller, 2-51
- Speed setpoint limitation, 2-52
- Switching frequency changeover, 2-55
- System error messages of the motor control, 2-63
- Torque control with speed limitation, 2-52
- Torque limitation, 2-49
- Torque setpoint, 2-48
- Touch probe (TP), 2-57
  - Configuration, 2-57
  - Function sequence, 2-58
  - MCTRL_nNAct_v, 2-58

MCTRL_nNmaxC11, 2-50

Memory types, 3-3

Message, 2-64 , 3-13

Monitoring, 2-61
- FAIL-QSP, 2-64 , 3-13
- LP1 - monitoring of the motor phases, 2-70
- LP1 - motor phase monitoring, 2-71
- LU - undervoltage monitoring, 2-69
- Message, 2-64 , 3-13
- nErr - speed monitoring (speed out of tolerance margin), 2-80
- NMAX - speed monitoring (maximum speed exceeded), 2-81
- OC1 - short-circuit monitoring, 2-65
- OC2 - earth-fault monitoring, 2-65
- OC5 - I x t overload monitoring, 2-66
- OH3 - motor temperature monitoring (fixed), 2-72
- OH4 - heatsink temperature monitoring (adjustable), 2-73
- OH7 - motor temperature monitoring (adjustable), 2-74
- OH8 - motor temperature monitoring via T1, T2, 2-75
- OU - overvoltage monitoring, 2-67
- PL - monitoring of the rotor position adjustment, 2-79
- Responses and their effects on the drive, 2-64
- Sd2 - resolver monitoring for open circuit, 2-76
- Sd6 - motor temperature sensor monitoring, 2-77
- Sd7 - absolute value encoder monitoring, 2-77
- Sd8 - sin/cos encoder monitoring during operation, 2-78
- Warning, 2-64 , 3-13

Motor data, manual adaptation, 2-59

Motor phases, monitoring, 2-70

Motor temperature, monitoring
- Adjustable, 2-74
- Fixed, 2-72
- Via terminals T1, T2, 2-75

Motor temperature sensor, Monitoring, 2-77

N

nErr - speed monitoring (speed out of tolerance margin), 2-80

Networking, 3-2

NMAX - speed monitoring (maximum speed exceeded), 2-81

Node numbers, 1-4

O

OC1 - short-circuit monitoring, 2-65

OC2 - earth-fault monitoring, 2-65

OC5 - I x t overload monitoring, 2-66

OH - heatsink temperature monitoring (fixed), 2-71

OH3 - motor temperature monitoring (fixed), 2-72

OH4 - heatsink temperature monitoring (adjustable), 2-73

OH7 - motor temperature monitoring (adjustable), 2-74

OH8 - motor temperature monitoring via T1, T2, 2-75

Open-circuit monitoring, Resolver, 2-76

Operation disabled (DISABLE), 2-23

OU - overvoltage monitoring, 2-67

Output of digital status signals, 2-25

Outputs
- Analog. *See* Analog outputs
- Definition, 1-6
- Digital. *See* Digital outputs

Outputs_AIF_Management, 2-17

Outputs_AIF1, 2-5

Outputs_AIF2, 2-9

Outputs_AIF3, 2-13

Outputs_ANALOG1, 2-19

Outputs_ANALOG2, 2-20

Outputs_DCTRL, 2-22

Outputs_DFOUT, 2-35

Outputs_DIGITAL, 2-40

Outputs_MCTRL, 2-46

Outputs_MCTRL_AUX_HighResFeedback, 2-82

Overcurrent diagram, 2-66

Overvoltage, monitoring, 2-67

P

Persistent memory, 3-5

Phase controller, 2-53

PL - monitoring of the rotor position adjustment, 2-79

PLC functionality, 3-1

POUs, 3-8

Program organisation unit (POU), 1-6

Q

Quick stop (QSP), 2-23 , 2-54

R

RAM, 3-3

RAM access, 3-52

Resetting TRIP (TRIP-RESET), 2-25

Resolver, open-circuit monitoring, 2-76

Responses, 2-64 , 3-13
- Overview, 3-10

Retain memory, 3-4

ROM, 3-3

Rotor position adjustment, monitoring, 2-79

S

Safety instructions, layout
- More notes, 1-2
- Warning of material damage, 1-2

Scalings, 1-8

Sd2 - resolver monitoring for open circuit, 2-76

Sd6 - motor temperature sensor monitoring, 2-77

Sd7 - absolute value encoder monitoring, 2-77

Sd8 - sin/cos encoder monitoring during operation, 2-78

Setting TRIP (TRIP-SET), 2-24

Short circuit, monitoring, 2-65

Signal types, 1-8

Sin/cos encoder, Monitoring, 2-78

Speed, Monitoring
- (maximum speed exceeded), 2-81
- (speed out of tolerance margin), 2-80

Speed controller, 2-51
- Set integral action component, 2-52

Speed setpoint limitation, 2-52

STATEBUS_IO, 2-83

Status messages, 3-21

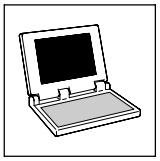
Status signals, output, 2-25

Status word C0150, 3-21

Status/control word, transfer via AIF, 2-27

Switching frequency changeover, 2-55

System blocks, 2-1
- Absolute addresses, 1-5
- AIF_IO_Management, 2-15
  - Inputs_AIF_Management, 2-15
  - Outputs_AIF_Management, 2-17
- AIF1_IO_AutomationInterface, 2-2
  - Inputs_AIF1, 2-2
  - Outputs_AIF1, 2-5
- AIF2_IO_AutomationInterface, 2-7
  - Inputs_AIF2, 2-7
  - Outputs_AIF2, 2-9
  - Outputs_AIF3, 2-13
- AIF3_IO_AutomationInterface, 2-11
  - Inputs_AIF3, 2-11
- ANALOG1_IO
  - Inputs_ANALOG1, 2-18
  - Outputs_ANALOG1, 2-19
- Analog1_IO, 2-18
- ANALOG2_IO
  - Inputs_ANALOG2, 2-20
  - Outputs_ANALOG2, 2-20
- Analog2_IO, 2-20
- DCTRL_DriveControl (device control), 2-21
  - Controller inhibit (CINH), 2-24
  - Inputs_DCTRL, 2-22
  - Operation disabled (DISABLE), 2-23
  - Outputs_DCTRL, 2-22
  - Quick stop (QSP), 2-23
  - Resetting TRIP (TRIP-RESET), 2-25
  - TRIP status (DCTRL_bExternalFault_b), 2-26 , 2-27



Definition of inputs/outputs, 1-6

DFIN_IO_DigitalFrequency, 2-28
Encoder cable monitoring, 2-34
Inputs_DFIN, 2-28
Technical data, 2-32
Touch probe (TP), 2-33

DFOUT_IO_DigitalFrequency, 2-35
Inputs_DFOUT, 2-35
Outputs_DFOUT, 2-35
Technical data, 2-37

DIGITAL_IO, 2-39
Inputs_DIGITAL, 2-39
Outputs_DIGITAL, 2-40

Introduction, 1-3

Linking, 1-7

MCTRL_AUX_HighResFeedback (high-resolution encoder), 2-82

MCTRL_MotorControl, Inputs_MCTRL, 2-45

MCTRL_MotorControl (motor control), 2-44
Additional torque setpoint, 2-48
Current controller, 2-47
Feedback systems, 2-56
Field weakening, 2-55
Manual adaptation of motor data, 2-59
Maximum speed, 2-50
Monitoring, 2-61
Outputs_MCTRL, 2-46
Phase controller, 2-53
Quick stop (QSP), 2-54
Speed controller, 2-51
Speed setpoint limitation, 2-52
Switching frequency changeover, 2-55
System error messages of the motor control, 2-63
Torque control with speed limitation, 2-52
Torque limitation, 2-49
Torque setpoint, 2-48
Touch probe (TP), 2-57

Node numbers, 1-4

STATEBUS_IO, 2-83

System variables, 1-5

SYSTEM_FLAGS, 2-84

System bus (CAN), 3-2

See also Manual "System bus (CAN) for Lenze PLC devices"

System error messages, 3-9
Causes and remedies, 3-14
Overview, 3-10
Reset, 3-13
Responses, 3-13

System error messages of the motor control, 2-63

System POUs, 3-8

System variables, 1-5

SYSTEM_FLAGS, 2-84

T

Temperature monitoring
Heatsink, 2-71 , 2-73
Motor, 2-72 , 2-74 , 2-75

Temporary codes, 3-52

Term definitions, 1-2

Terminal extension 9374IB, 3-2

Torque control, with speed limitation, 2-52

Torque limitation, 2-49

Torque setpoint, 2-48

Touch probe (TP), 2-57
Configuration, 2-57
Digital frequency input (DFIN), 2-33
Function sequence, 2-58
MCTRL_nNAct_v, 2-58

TRIP, 2-64 , 3-13

TRIP status (DCTRL_bExternalFault_b), 2-26

TRIP-RESET, 3-20

U

Undervoltage, Monitoring, 2-69

W

Warning, 2-64 , 3-13