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EDS9300U
00408847

Lenze

Manual

Global Drive
9300 servo inverters

Contents of the Manual 9300

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Explanation of symbols: ● part of the corresponding Manual

All documentation listed here contains a type designation and a material number at the top left edge.

The features and data specified in your Manual correspond to the controller version at the time of printing (print date: see inside cover of the parts). Lenze strives to keep all information up to the state of the latest controller version. If you should still find differences to your Manual, we kindly ask you to refer to the Operating Instructions included in the scope of supply or to contact your Lenze representative directly.

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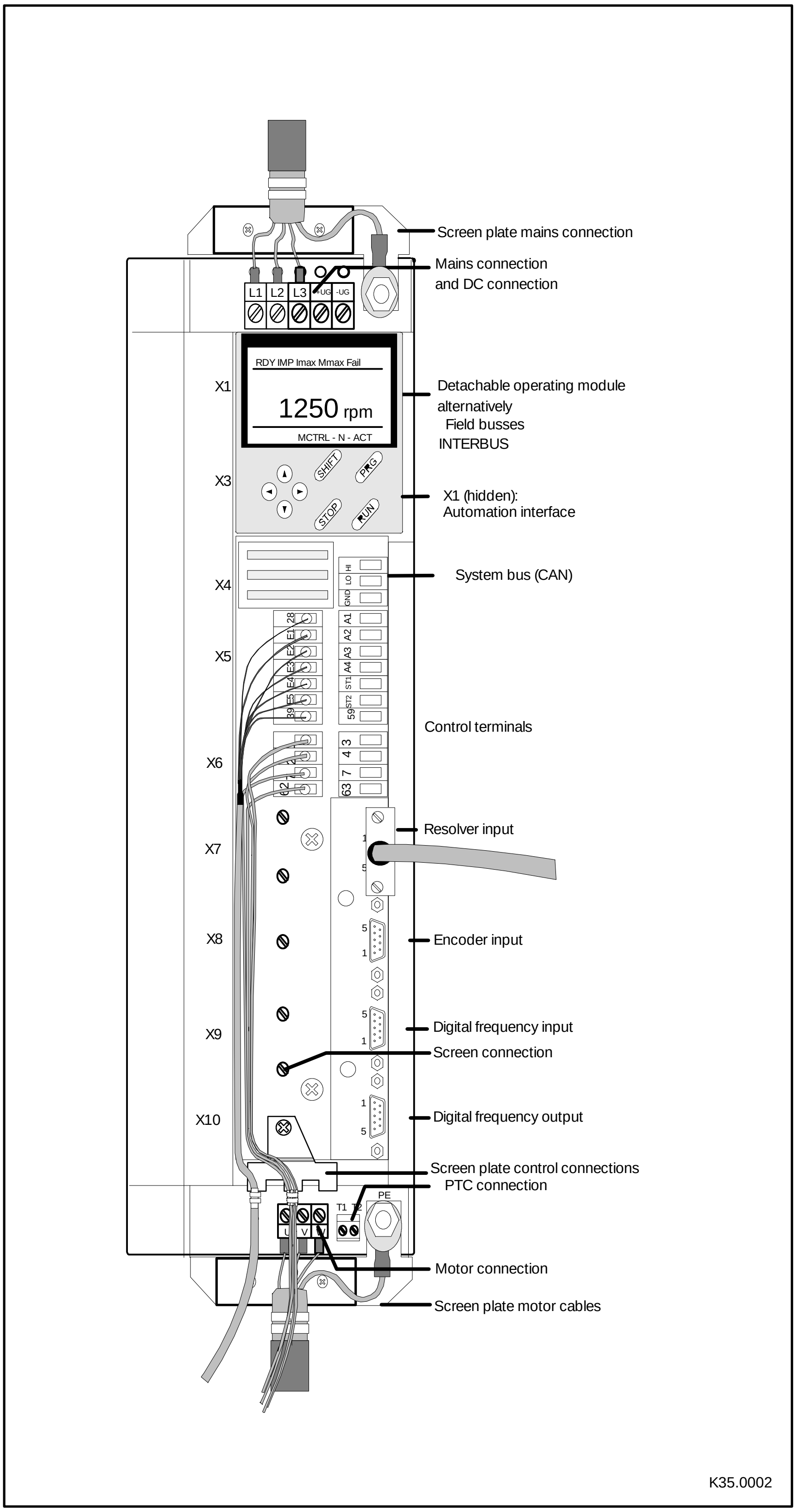

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EDS9300U--SA
00408837

Lenze

Manual
Part A

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Preface and general information

Global Drive
9300 servo inverter

This manual is valid for the 93XX controllers of the versions

33.932X-	ES	2x.	2x		(9321 - 9329)
33.933X-	ES	2x.	2x		(9330 - 9332)
33.932X-	CS	2x.	2x	-V003	Cold Plate (9321 - 9328)

Controller type

Design:
Ex = Enclosure IP20
Cx = Cold Plate
xK = Cam profiler
xP = Servo position controller
xR = Register controller
xS = Servo inverter

Hardware version and index

Software version and index

Variant

Explanation

Version 1.0 07/99

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1 Preface and general information

1.1 How to use this Manual

- This Manual supplements the Operating Instructions of the 93XX servo inverters.
- It contains the Operating Instructions which were valid when the systems Manual was printed and additional information on systems engineering, functionality and accessories.
  – In case of doubt, the Operating Instructions attached to the 93XX servo inverter is valid.
- The Manual assists you in selecting and dimensioning the 93XX servo inverters and the accessories to ensure a safe and trouble-free operation. It contains safety information which must be observed.
- The Manual must always be in a complete and perfectly readable state.

1.1.1 Terminology used

Term	In the following text used for
93XX	Any type of servo inverter (types 9321 ... 9332)
Controller	93XX servo inverter
Drive system	Drive systems with 93XX servo inverters and other Lenze drive components

1.1.2 What is new?

Edition	Id No.	Important	Änderungen
11/97	00398827		First edition
1.0 07/99	00408847	supersedes 395638	Update to software version 2.x

1.2 Scope of supply

Scope of supply	Important
• 1 servo inverter type 93XX • 1 book of operating instructions • 1 accessory kit (bits and pieces for mechanical and electrical installation)	After reception of the delivery, check immediately whether the scope of supply matches the accompanying papers. Lenze does not accept any liability for deficiencies claimed subsequently. Claim • visible transport damage immediately to the forwarder. • visible deficiencies/incompleteness immediately to your Lenze representative.

1.3 Legal regulations

<table>
<tr><td rowspan="2">Identification</td><td>Nameplate</td><td>CE-identification</td><td>Manufacturer</td></tr>
<tr><td>Lenze controllers are unambiguously designated by the contents of the nameplate.</td><td>Conforms to the EC Low Voltage Directive</td><td>Lenze GmbH & Co KG
Postfach 101352
D-31763 Hameln</td></tr>
<tr><td>Application as directed</td><td colspan="3">93XX servo inverter
● Operate the controller only under the conditions prescribed in these operating instructions.
● are components
– for open- and closed-loop control of variable speed drives with PM synchronous motors, asynchronous servo motors or asynchronous standard motors.
– for installation in a machine
– used for assembly together with other components to form a machine.
● are electric units for the installation into control cabinets or similar enclosed operating housing.
● comply with the requirements of the Low-Voltage Directive.
● are not machines for the purpose of the Machinery Directive.
● are not to be used as domestic appliances, but only for industrial purposes.
Drive systems with 93XX servo inverters
● comply with the EMC Directive if they are installed according to the guidelines of CE-typical drive systems.
● can be used
– for operation at public and non-public mains
– for operation in industrial premises and residential areas.
● The user is responsible for the compliance of his application with the EC directives.
Any other use shall be deemed as inappropriate!</td></tr>
<tr><td>Liability</td><td colspan="3">● The information, data, and notes in these instructions met the state of the art at the time of printing. Claims on modifications referring to controllers which have already been supplied cannot be derived from the information, illustrations, and descriptions.
● The specifications, processes, and circuitry described in these instructions are for guidance only and must be adapted to your own specific application. Lenze does not take responsibility for the suitability of the process and circuit proposals.
● The specifications in these instructions describe the product features without guaranteeing them.
● Lenze does not accept any liability for damage and operating interference caused by:
– Disregarding the operating instructions
– unauthorized modifications to the controller
– operating errors
– improper working on and with the controller</td></tr>
<tr><td>Warranty</td><td colspan="3">● Warranty conditions: see Sales and Delivery Conditions of Lenze GmbH & Co KG.
● Warranty claims must be made to Lenze immediately after detecting the deficiency or fault.
● The warranty is void in all cases where liability claims cannot be made.</td></tr>
<tr><td rowspan="4">Waste disposal</td><td>Material</td><td>recycle</td><td>dispose</td></tr>
<tr><td>Metal</td><td>●</td><td>-</td></tr>
<tr><td>Plastic</td><td>●</td><td>-</td></tr>
<tr><td>Assembled PCBs</td><td>-</td><td>●</td></tr>
</table>

1.4 EC directives/ Declaration of conformity

1.4.1 What is the purpose of EC directives?

EC directives are issued by the European Council and are intended for the determination of common technical requirements (harmonization) and certification procedures within the European Community. At the moment, there are 21 EC directives of product ranges. The directives are or will be converted to national laws of the member states. A certification issued by one member state is valid automatically without any further approval in all other member states.

The texts of the directive are restricted to the essential requirements. Technical details are or will be determined by European harmonized standards.

1.4.2 What does the CE mark imply?

After a verification, the conformity according to the EC directives is certified by affixing a CE mark. Within the EC there are no commercial barriers for a product with the CE mark.

The attachment of a declaration of conformity is not necessary for most of the directives. Users or customers are therefore not aware which of the 21 EC Directives comply with a certain product and which harmonized standards were considered in the evaluation procedure of conformity.

Controllers with the CE mark exclusively correspond to the Low Voltage Directive. So far, only recommendations were given for the compliance with the EMC regulation. In this case, the user himself has to prove the compliance with the CE directives for the installation of a machine. Lenze has already given proof of the compliance with the CE directives and confirmed this by the declaration of conformity to the EMC CE directive.

1.4.3 EC Low Voltage Directive

(73/23/EEC)

amended by: CE Mark Directive (93/68/EEC)

General

- The Low Voltage Directive is effective for all electrical equipment for use with a rated voltage between 50 V and 1000V V AC and between 75 V and 1500 V DC and with normal ambient conditions. The use of e.g. electrical equipment in explosive atmospheres and electrical parts in passenger and goods lifts are excepted.
- The objective of the Low Voltage Directive is to ensure that only electrical equipment which does not endanger the safety of persons or animals is placed on the market. It should also be designed to conserve material assets.

1.4.3.1 EC Declaration of Conformity ’95

for the purpose of the EC Low Voltage Directive (73/23/EEC)

amended by: CE Mark Directive (93/68/EEC)

The 93XX controllers are developed, designed, and manufactured in compliance with the above mentioned EC directive under the sole responsibility of

Lenze GmbH & Co KG, Postfach 10 13 52, D-31763 Hameln

Considered standards:

Standard	
DIN VDE 0160 5.88 + A1 / 4.89 + A2 / 10.88 EN 50178 Classification VDE 0160 / 11.94	Electronic equipment for use in electrical power installations
DIN VDE 0100	Standards for the erection of power installations
EN 60529	IP Degrees of protection
IEC 249 / 1 10/86, IEC 249 / 2-15 / 12/89	Base material for printed circuits
IEC 326 / 1 10/90, EN 60097 / 9.93	Printed circuits, printed boards
DIN VDE 0110 /1-2 /1/89 /20/ 8/90	Creepage distances and clearances

Hameln, 01 January,1997

(i. V. Langner)
Product Manager

(i. V. Lackhove)
Project Manager

1.4.4 EC Directive Electromagnetic Compatibility

(89/336/EEC)

amended by: First Amendment Directive (92/31/EEC)
CE Mark Directive (93/68/EEC)

General

- The EC Electromagnetic Compatibility Directive is effective for ”devices” which may cause electromagnetic interference or the operation of which may be impaired by such interference.
- The aim is to limit the generation of electromagnetic interference such that an operation without interferences of radio and telecommunication systems and other equipment is possible. The devices must also show an appropriate resistance against electromagnetic interference to ensure the application as directed.
- Controllers cannot be operated on their own. Controllers cannot be evaluated on their own in terms of EMC. Only after the integration of the controllers into a drive system, can this system be tested concerning the objectives of the EC EMC Directive and the compliance with the ”Law about the Electromagnetic Compatibility of Devices”.
- Lenze has evaluated the conformity of controllers on defined drive systems. These evaluated drive systems are called ”CE-typical drive system” in the following.

  Therefore, the user of the controllers can
  - either determine the system components and their implementation into a drive system himself and declare the conformity under his own responsibility,
  - or install the drive system according to the CE-typical drive system evaluated by the inverter manufacturer who has already proved the conformity.

Components of the CE typical drive system

System component	Specification
Controller	Controller types 93XX series For the type designation refer to the first cover page
Mains filter A/B	For data and filter assignment see chapter ”Ratings”
Motor cable	Screened power cable with tinned E-CU braid with a minimum of 85% optical coverage.
Mains cable between mains filter and controller	As from cable length 300 mm: Screened power cable with tinned E-CU braid with a minimum of 85% optical coverage.
Control cables	Screened signal cable type LIYCY
Motor	Standard three-phase asynchronous motor, servo synchronous motor, servo asynchronous motor Lenze types DXRA, MDXKX or similar

- Controller, RFI filter and mains choke are located on a common mounting plate.
- The system components were wired according to chapter 4 ”Electrical Installation”.

1.4.4.1 EC Declaration of Conformity ’95

in the sense of Electromagnetic Compatibility (89/336/EEC)

amended by: First Amendment Directive (92/31/EEC)
CE Mark Directive (93/68/EEC)

The 93XX controllers are no independent devices in the sense of the law about electromagnetic compatibility (EMVG of 9 Nov., 92 and 1st EMVGÄndG of 30 Aug, 95). The controller can only be evaluated in terms of EMC after it has been implemented into a drive system.

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declares the conformity of the described ”CE-typical drive system” with the 93XX controllers to the above mentioned EC Directive.

The conformity evaluation is based on the working paper of the product standard for drive systems:

IEC 22G-WG4 5/94	EMC product standard including specific test methods for power drive systems

Considered generic standards:

Generic standard	
EN 50081-1 /92	Generic standard for the emission of noise Part 1: Residential area, commercial premises, and small businesses
EN 50081-2 /93 (used in addition to the requirements of IEC 22G)	Generic standard for the emission of noise Part 2: Industrial premises The emission of noise in industrial premises is not limited in IEC 22G.
prEN 50082-2 3/94	Generic standard for noise immunity Part 2: Industrial premises The requirements of noise immunity for residential areas were not considered, since these are less strict.

Considered basic standards for the test of the noise emission:

Basic standard	Test	Limit value
EN 55022 7/92	Radio interference housing and mains Frequency range 0.15 - 1000 MHz	Class B for use in residential areas and commercial premises
EN 55011 7/92 (used in addition to the requirements of IEC 22G)	Radio interference housing and mains Frequency range 0.15 - 1000 MHz The emission of noise in industrial premises is not limited in IEC 22G.	Class A for use in industrial premises
IEC 801-2 /91	Electrostatic discharge on housing and heatsink	Severity 3 6 kV for contact, 8 kV clearance
IEC 1000-4-3	Electromagnetic fields Frequency range 26 - 1000 MHz	Severity 3 10 V/m
ENV 50140 /93	High-frequency field Frequency range 80 - 1000 MHz, 80% amplitude-modulated	Severity 3 10 V/m
	Fixed frequency 900 MHz with 200 Hz, 100 % modulated	10 V/m
IEC 801-4 /88	Fast transients, burst on power terminals	Severity 3 2 kV / 5 kHz
	Burst on bus and control cables	Severity 4 2 kV / 5 kHz
IEC 801-5	Surge test mains cables	Installation class 3

Hameln, 01 January,1997

(i. V. Langner)
Product Manager

(i. V. Lackhove)
Project Manager

1.4.5 EC Machinery Directive

(89/392/EEC)

amended by: First Amendment Directive (91/368/EEC)
Second Amendment Directive (93/44/EEC)
CE Mark Directive (93/68/EEC)

General

For the purpose of the Machinery Directive, "machinery" means an assembly of linked parts or components, at least one of which moves, with the appropriate actuators, control and power circuits, etc., joined together for a specific application, in particular for the processing, treatment, moving or packaging of a material.

1.4.5.1 EC Manufacturer's Declaration

in the sense of the EC Machinery Directive (89/392/EEC)

amended by: First Amendment Directive (91/368/EEC)
Second Amendment Directive (93/44/EEC)
CE Mark Directive (93/68/EEC)

The 93XX controllers are developed, designed, and manufactured under the sole responsibility of

Lenze GmbH & Co KG, Postfach 10 13 52, D-31763 Hameln

Commissioning of the controllers is prohibited until it is proven that the machine where they are to be installed, corresponds to the EC Machinery Directive.

Hameln, 01 January,1997

(i. V. Langner)	(i. V. Lackhove)
Product Manager	Project Manager

2 Safety information

2.1 See Operating Instructions

Safety information

EDS9300U--SB
00408838

Lenze

Manual
Part B

Technical Data

Installation

Global Drive
9300 servo inverter

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This manual is valid for the 93XX controllers of the versions

33.932X- ES 2x. 2x (9321 - 9329)
33.933X- ES 2x. 2x (9330 - 9332)
33.932X- CS 2x. 2x -V003 Cold Plate (9321 - 9328)

Controller type

Design:
Ex = Enclosure IP20
Cx = Cold Plate
xK = Cam profiler
xP = Servo position controller
xR = Register controller
xS = Servo inverter

Hardware version and index

Software version and index

Variant

Explanation

Version 1.0 07/99

Part B

Contents

3 Technical data

3.1 Features

- Single axis in narrow design
  – thus space-saving installation
- Power range: 370 W to 75 kW
  – uniform control module and thus uniform connection for the control cables over the complete power range
- Heat sink can be separated
  – the cooling can be achieved outside the control cabinet (punching or ”Cold Plate”)
- Power connections from the top (supply) or from the bottom (motor)
  – simple connection for multi-axis applications
- Direct connection of resolver and encoder feedback
  – simple connection via prefabricated cables (accessories)
  – connecting cables can be plugged
- Integrated phase controller for driftfree standstill
- Field-oriented control for asynchronous and synchronous motors
- Vector modulation
- Digital synchronization system via digital frequency
  – setpoint transmission without offset - und gain errors
  – Synchronization in speed and rotor position
  – Homing function
- Application configuration for control functions and input/output signals
  – comprehensive function block library
  – high flexibility in the adaptation of the internal control structure to the application
- Integrated automation interface
  – simple extensions of the controller functions
- System bus for the connection of servo inverters and for the extension of input and output terminals
- Approval of standard devices UL 508, File No. 132659 (listed)
- Approval 9371 BB (BAE) UL 508, File No. 132659 (listed)

3.2 General data/application conditions

Field	Values
Vibration resistance	Germanischer Lloyd, general conditions
Permissible moisture	Humidity class F without condensation (average relative humidity 85 %)
Permissible temperature ranges	during transport of the controller: -25 °C ... +70 °C during storage of the controller: -25 °C ... +55 °C during operation of the controller: 0 °C ... +40 °C without power derating +40 °C ... +55 °C with power derating (units 9321-9326) +40 °C ... +50 °C with power derating (units 9327-9332)
Permissible installation height h	$h \leq 1000$ m amsl without power derating 1000 m amsl $< h \leq 4000$ m amsl with power derating
Permissible pollution	VDE 0110 part 2 pollution degree 2
Noise emission	Requirements to EN 50081-2, EN 50082-1, IEC 22G-WG4 (Cv) 21 Limit value class A to EN 55011 (industrial premises) with mains filter A Limit value class B to EN 55022 (residential area) with mains filter B and installation in control cabinet
Noise immunity	Limit values maintained using mains filter. Requirements to EN 50082-2, IEC 22G-WG4 (Cv) 21 . **Requirements** **Standard** **Severity** Running time EN61000-4-2 3, i.e. 8 kV with air discharge and 6 kV with contact discharge RF interference (enclosure) EN61000-4-3 3, i.e. 10 V/m; 27 to 1000 MHz Burst EN61000-4-4 3/4, i.e. 2 kV/5 kHz Surge (on mains cable) IEC 1000-4-5 3, i.e. 1,2/50 µs, 1 kV phase-phase, 2 kV phase-PE
Insulation strength	Overvoltage category III to VDE 0110
Packaging	to DIN 4180 9321 to 9332: Delivery packaging
Type of protection	IP20 IP41 on the heat-sink side for thermal separation (punching) NEMA 1: Protection against contact
Approvals	CE: Low-Voltage Directive UL508: Industrial Control Equipment UL508C: Power Conversion Equipment

3.3 Rated data

3.3.1 Types 9321 to 9325

	Type	**EVS9321-ES**	**EVS9322-ES**	**EVS9323-ES**	**EVS9324-ES**	**EVS9325-ES**
	Order No.	EVS9321-ES	EVS9322-ES	EVS9323-ES	EVS9324-ES	EVS9325-ES
	Type	**EVS9321-CS**	**EVS9322-CS**	**EVS9323-CS**	**EVS9324-CS**	**EVS9325-CS**
	Order No.	EVS9321-CS	EVS9322-CS	EVS9323-CS	EVS9324-CS	EVS9325-CS
Mains voltage	V_r [V]	320 V ±0% ≤ V_r ≤ 528 V ±0%; 45 Hz … 65 Hz ±0%				
Alternative DC supply	V_G [V]	460 V ±0% ≤ V_{DC} ≤ 740 V ±0%				
Mains current with mains filter Mains current without mains filter	I_r [A]	1.5 2.1	2.5 3.5	3.9 5.5	7.0 -	12.0 16.8
Ratings for operation at a mains: 3 AC / 400V / 50Hz/60Hz						
Motor power (4 pole ASM)	P_r [kW]	0.37	0.75	1.5	3.0	5.5
	P_r [hp]	0.5	1.0	2.0	4.0	7.5
Output power U, V, W (8kHz*)	S_{r8} [kVA]	1.0	1.7	2.7	4.8	9.0
Output power +U_G, -U_G 2)	P_{DC} [kW]	2.0	0.75	2.2	0.75	0
Output current (8 kHz*)	I_{r8} [A]	1.5	2.5	3.9	7.0	13.0
Output current (16 kHz*)	I_{r16} [A]	1.1	1.8	2.9	5.2	9.7
Max. output current (8 kHz*)1)	I_{max8} [A]	2.3	3.8	5.9	10.5	19.5
Max. output current (16 kHz*)1)	I_{max16} [A]	1.7	2.7	4.4	7.8	14.6
Max. standstill current (8 kHz*)	I_{08} [A]	2.3	3.8	5.9	10.5	19.5
Max. standstill current (16 kHz*)	I_{016} [A]	1.7	2.7	4.4	7.8	14.6
Ratings for operation at a mains: 3 AC / 480V / 50Hz/60Hz						
Motor power (4 pole ASM)	P_r [kW]	0.37	0.75	1.5	3.0	5.5
	P_r [hp]	0.5	1.0	2.0	4.0	7.5
Output power U, V, W (8kHz*)	S_{r8} [kVA]	1.2	2.1	3.2	5.8	10.8
Output power +U_G, -U_G 2)	P_{DC} [kW]	2.0	0.75	2.2	0.75	0
Output current (8 kHz*)	I_{r8} [A]	1.5	2.5	3.9	7.0	13.0
Output current (16 kHz*)	I_{r16} [A]	1.1	1.8	2.9	5.2	9.7
Max. output current (8 kHz*)1)	I_{max8} [A]	2.3	3.8	5.9	10.5	19.5
Max. output current (16 kHz*)1)	I_{max16} [A]	1.7	2.7	4.4	7.8	14.6
Max. standstill current (8 kHz*)	I_{08} [A]	2.3	3.8	5.9	10.5	19.5
Max. standstill current (16 kHz*)	I_{016} [A]	1.7	2.7	4.4	7.8	14.6
Motor voltage	V_M [V]	0 - 3 V_{mains}				
Power loss (operation with I_{rx})	P_{loss} [W]	100	110	140	200	260
Power derating	[%/K] [%/m]	40°C < T_{amb} < 55 °C: 2 %/K (not UL approved) 1000 m amsl < h ≤ 4000 m amsl: 5%/1000m				
Weight	m [kg]	3.5	3.5	5.0	5.0	7.5

1) The currents apply to a periodical load cycle with 1 minute overcurrent with the current mentioned here and 2 minutes base load with 75% I_{rx}

2) When operated under rated load, the controller can supply this power additionally.

* Chopper frequency of the inverter (C0018)

3.3.2 Types 9321 to 9324 with 200 % overcurrent

	Type	EVS9321-ES	EVS9322-ES	EVS9323-ES	EVS9324-ES
Ratings for operation at a mains: 3 AC / 400V / 50Hz/60Hz					
Motor power (4 pole ASM)	P_r [kW]	0.37	0.75	1.5	3.0
	P_r [hp]	0.5	1.0	2.0	4.0
Output power U, V, W (8 kHz)	S_{r8} [kVA]	1.0	1.7	2.7	4.8
Output current (8 kHz) 2)	I_{r8} [A]	1.5	2.5	3.9	7.0
Output current (16 kHz) 2)	I_{r16} [A]	1.1	1.8	2.9	5.2
Max. output current (8 kHz)1)	I_{max8}[A]	3.0	5.0	7.8	14.0
Max. output current (16 kHz)1)	I_{max16} [A]	2.2	3.6	5.8	10.4
Max. standstill current (8 kHz)	I_{08} [A]	3.0	5.0	7.8	14.0
Max. standstill current (16 kHz)	I_{016} [A]	2.2	3.6	5.8	10.4
Ratings for operation at a mains: 3 AC / 480V / 50Hz/60Hz					
Motor power (4 pole ASM)	P_r [kW]	0.37	0.75	1.5	3.0
	P_r [hp]	0.5	1.0	2.0	4.0
Output power U, V, W (8 kHz)	S_{r8} [kVA]	1.2	2.1	3.2	5.8
Output current (8 kHz) 2)	I_{r8} [A]	1.5	2.5	3.9	7.0
Output current (16 kHz) 2)	I_{r16} [A]	1.1	1.8	2.9	5.2
Max. output current (8 kHz)1)	I_{max8} [A]	3.0	5.0	7.8	14.0
Max. output current (16 kHz)1)	I_{max16} [A]	2.2	3.6	5.8	10.4
Max. standstill current (8 kHz)	I_{08} [A]	3.0	5.0	7.8	14.0
Max. standstill current (16 kHz)	I_{016} [A]	2.2	3.6	5.8	10.4

1) The currents apply to a periodical load cycle with 10 seconds overcurrent with the current mentioned here and 50 seconds base load with 44 % I_{rx}

Main point for individual situations	Settings under code C0022	Thermal continuous current	Max. current phase	Recovery phase
Continuous power	$I_{max} \leqq$ 150 % I_{rX}	100 % I_{rX}	150 % I_{rX} for 60 s	75 % I_{rX} for 120 s
Peak power	$I_{max} >$ 150 % I_{rX}	70 % I_{rX}	200 % I_{rX} for 10 s	44 % I_{rX} for 50 s

2) The output current INx is only valid for a motor current adjustable under C022 which has not exceeded 150% rated current (nameplate).
If the maximum current is increased to a value higher than this, the continuous current is automatically reduced to 70 % of its original value.

Overcurrent diagram: 🕮 7-207

All other data: 🕮 3-3

Note!

The change to I_{max} > 150 % I_{rX} is only possible when the controller is inhibited.

3.3.3 Types 9326 to 9332

	Type	**EVS9326-ES**	**EVS9327-ES**	**EVS9328-ES**	**EVS9329-ES**	**EVS9330-ES**	**EVS9331-ES**	**EVS9332-ES**
	Order No.	EVS9326-ES	EVS9327-ES	EVS9328-ES	EVS9329-ES	EVS9330-ES	EVS9331-ES	EVS9332-ES
	Type	**EVS9326-CS**	**EVS9327-CS**	**EVS9328-CS**				
	Order No.	EVS9326-CS	EVS9327-CS	EVS9328-CS				
Mains voltage	V_r [V]	320 V ±0% ≤ V_r ≤ 528 V ±0% ; 45 Hz … 65 Hz ±0%						
Alternative DC supply	V_G [V]	460 V ±0% ≤ V_G ≤ 740 V ±0%						
Mains current with mains filter Mains current without mains filter	I_r [A]	20.5 -	27.0 43.5	44.0 -	53.0 -	78.0 -	100 -	135 -
Ratings for operation at a mains: 3 AC / 400V / 50Hz/60Hz								
Motor power (4 pole ASM)	P_r [kW]	11.0	15.0	22.0	30.0	45.0	55.0	75.0
	P_r [hp]	15.0	20.5	30.0	40.0	60.0	73.5	100.0
Output power UVW (8 kHz*)	S_{r8} [kVA]	16.3	22.2	32.6	40.9	61.6	76.2	100.5
Output power +U_G, -U_{DC} 2)	P_{DC} [kW]	0	10	4	0	5	0	0
Output current (8 kHz*) 1)	I_{r8} [A]	23.5	32.0	47.0	59.0	89.0	110.0	145.0
Output current (16 kHz*) 1)	I_{r16} [A]	15.3	20.8	30.6	38.0	58.0	70.0	90.0
Max. output current (8 kHz*)	I_{max8} [A]	35.3	48.0	70.5	88.5	133.5	165.0	217.5
Max. output current (16 kHz*)	I_{max16} [A]	23.0	31.2	45.9	57.0	87.0	105.0	135.0
Max. standstill current (8 kHz*)	I_{08} [A]	23.5	32.0	47.0	52.0	80.0	110.0	126.0
Max. standstill current (16kHz*)	I_{016} [A]	15.3	20.8	30.6	33.0	45.0	70.0	72.0
Ratings for operation at a mains: 3 AC / 480V / 50Hz/60Hz								
Motor power (4 pole ASM)	P_r [kW]	11.0	18.5	30.0	37.0	45.0	55.0	90.0
	P_r [hp]	15.0	25.0	40.0	49.5	60.0	73.5	120.0
Output power UVW (8 kHz*)	S_{r8} [kVA]	18.5	25.0	37.0	46.6	69.8	87.3	104.0
Output power +U_{DC}, -U_{DC} 2)	P_{DC} [kW]	0	12	4.8	0	6	0	6
Output current (8 kHz*)	I_{r8} [A]	22.3	30.4	44.7	56.0	84.0	105.0	125.0
Output current (16 kHz*)	I_{r16} [A]	14.5	19.2	28.2	35.0	55.0	65.0	80.0
Max. output current (8 kHz*)1)	I_{max8} [A]	33.5	45.6	67.1	84.0	126.0	157.5	187.5
Max. output current (16 kHz*)1)	I_{max16} [A]	21.8	28.8	42.3	52.5	82.5	97.5	120.0
Max. standstill current (8 kHz*)	I_{08} [A]	22.3	30.4	44.7	49.0	72.0	105.0	111.0
Max. standstill current (16kHz*)	I_{016} [A]	14.5	19.2	28.2	25.0	36.0	58.0	58.0
Motor voltage	V_M [V]	0 - 3 V_{mains}						
Power loss	P_{loss} [W]	360	430	640	810	1100	1470	1960
Power derating	[%/K] [%/K] [%/m]	*9326: at 40 °C < T_{amb} < 55 °C: 2%/K (not UL approved)* *9327 - 9332: at 40 °C < T_{amb} < 50 °C: 2.5%/K (not UL approved)* 1000 m amsl < h ≤ 4000 m amsl: 5%/1000m						
Weight	m [kg]	7.5	12.5	12.5	12.5	36.5	59	59

1) The currents apply to a periodical load cycle with 1 minute overcurrent with the current mentioned here and 2 minutes base load with 75% I_{rx}

2) When operated under rated load, the controller can supply this power additionally.

* Chopper frequency of the inverter (C0018)

3.3.4 Fuses and cable cross-sections

Type	Mains input L1, L2, L3, PE/motor connection U, V, W										Input +UG, -UG		
	Operation without mains filter					Operation with mains filter							
	Fuse		E.l.c.b.	Cable cross-section 2)		Fuse		E.l.c.b.	Cable cross-section 2)		Fuse	Cable cross-section 2)	
	VDE	UL	VDE	mm^2	AWG	VDE	UL	VDE	mm^2	AWG		mm^2	AWG
9321	M 6A	5A	B 6A	1	17	M 6A	5A	B 6A	1	17	6.3A	1	17
9322	M 6A	5A	B 6A	1	17	M 6A	5A	B 6A	1	17	6.3A	1	17
9323	M 10A	10A	B 10A	1.5	15	M 10A	10A	B 10A	1.5	15	8A	1.5	15
9324	-	-	-	-	-	M 10A	10A	B 10A	1.5	15	12A	1.5	15
9325	M 32A	25A	B 32A	6	9	M 20A	20A	B 20A	4	11	20A	4	11
9326	-	-	-	-	-	M 32A	25A	B 32A	6	9	40A	6	9
9327	M 63A	63A	-	16	6	35A	35A	-	10	7	50A	10	7
9328	-	-	-	-	-	50A	50A	-	16	5	80A	16	5
9329	-	-	-	-	-	80A	80A	-	25	3	100A	25	3
9330	-	-	-	-	-	100A	100A	-	50	0	2 * 80A 1)	2 * 16	2 * 5
9331	-	-	-	-	-	125A	125 A	-	70	2/0	2 * 100A 1)	2 * 25	2 * 3
9332	-	-	-	-	-	160A	175 A	-	95	3/0	3 * 80A 1)	3 * 16	3 * 5

1) The DC bus fuses are connected in parallel

2) The valid local regulations must be observed

For operation of the controllers in a UL-approved plant:

- Use only UL-approved fuses and fuse holders:
  – 500 V to 600 V in the mains input (AC)
  – 700 V in DC-bus voltage (DC)
  – The activation characteristic is defined by ”H” or ”K5”.
- Use only UL-approved cables.

Tip!

UL-approved fuses and fuse holders can be obtained from, e.g. Bussmann or Ferraz.

Connection of the motor cables

- The protection of the motor cables is not necessary for functional reasons.
- Refer to the data listed in the table ”Operation with mains filter”.

3.3.5 Mains filter

Type	Rated data (uk ≈ 6%)		Lenze order number	
	Mains current	**Inductance**	**for RFI degree A**	**for RFI degree B**
9321	1.5 A	24 mH	EZN3A2400H002	EZN3B2400H002
9322	2.5 A	15 mH	EZN3A1500H003	EZN3B1500H003
9323	4 A	9 mH	EZN3A0900H004	EZN3B0900H004
9324	7 A	5 mH	EZN3A0500H007	EZN3B0500H007
9325	13 A	3 mH	EZN3A0300H013	EZN3B0300H013
9326	24 A	1.5 mH	EZN3A0150H024	EZN3B0150H024
9327	30 A	1.1 mH	EZN3A0110H030	EZN3B0110H030
9328	42 A	0.8 mH	EZN3A0080H042	EZN3B0080H042
9329	60 A	0.54 mH	EZN3A0055H060	EZN3B0055H060
9330	90 A	0.37 mH	EZN3A0037H090	EZN3B0037H090
9331	150 A	0.22 mH	EZN3A0022H150	EZN3B0022H150
9332	150 A	0.22 mH	EZN3A0022H150	EZN3B0022H150

The mains filters for RFI degree B contain additional RFI suppression components.

3.4 Dimensions

The dimensions of the controllers depend on the mechanical installation. (📖 4-1)

Technical data

4 Installation

4.1 Mechanical installation

4.1.1 Important notes

- Use the controllers as built-in devices only!
- If the cooling air contains pollutants (dust, fluff, grease, aggressive gases):
  - Take suitable preventive measures, e.g. separate air duct, installation of filters, regular cleaning, etc.
- Ensure free space!
  - You can install several controllers next to each other without free space in a control cabinet.
  - Ensure unimpeded ventilation of cooling air and outlet of exhaust air!
  - Allow a free space of 100 mm at the top and at the bottom.
- Do not exceed the permissible ambient temperature during operation. (🕮 3-2)
- With continuous oscillations or vibrations:
  - Check whether shock absorbers are necessary.

Possible mounting positions

Vertically on the control cabinet back panel with mains connections at the top:

- with enclosed fixing rails or fixing brackets. (🕮 4-2)
- thermally separated with external heat sink
  - Push-through technique(🕮 4-3)
  - ”Cold plate technique” (🕮 4-6)

4.1.2 Standard assembly with fixing rails or fixing brackets

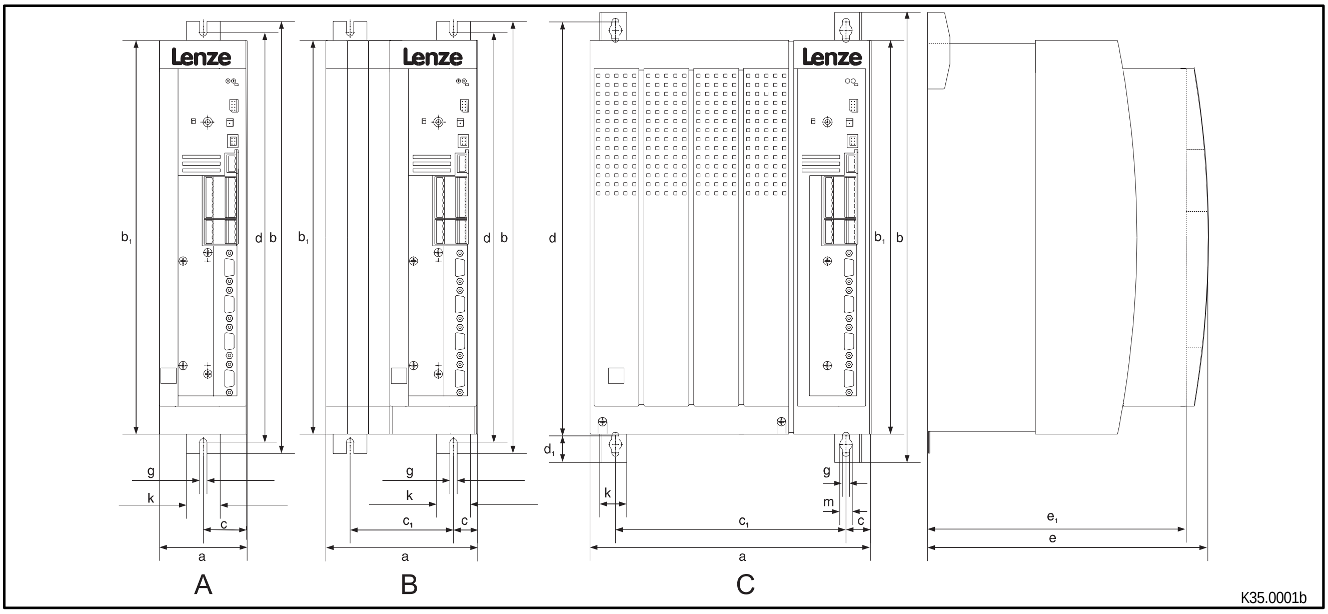


Abb. 4-1 Dimensions for assembly with fixing rails/fixing brackets

Type	Fig.	a	b	b1	c	c1	d	d1	e*	e1	g	k	m
9321, 9322	A	78	384	350	39	-	365	-	250	230	6.5	30	-
9323, 9324	A	97	384	350	48.5	-	365	-	250	230	6.5	30	-
9325, 9326	B	135	384	350	21.5	92	365	-	250	230	6.5	30	-
9327, 9328, 9329	C	250	402	350	22	206	370	24	250	230	6.5	24	11
9330	C	340	672	591	28,5	283	624	38	285	265	11	28	18
9331, 9332	C	450	748.5	680	30.5	389	702	38	285	265	11	28	18

* When using a plug-on fieldbus module:
Observe the free space required for the connection cables

All dimensions in mm

Controllers 9321 to 9326

- Assembly preparation:
  - – Take out fixing rail(s) (accessory kit in the box) and mount them on the controller housing

Controllers 9327 to 9332

- Remove cover:
  - – Loosen screws (X)
  - – Swing cover to the top and detach
  - – Take accessory kit out of the interior of the controller
- Assembly preparation:
  - – Take out fixing bracket and screws (accessory kit) and mount them on the controller housing

4.1.3 Assembly with thermally separated power stage ("push-through technique")

The heat sink of the controllers 9321 ... 9329 can be mounted outside the control cabinet to reduce the heat generated in the control cabinet. For this, you need an assembly frame with seal (can be ordered from Lenze).

- Distribution of the power loss:
  - Approx. 65% via the separated heat sink (heat sink + blower)
  - Approx. 35 % inside the controller.
- The enclosure of the separated heat sink (heat sink + blower) is IP41.
- The rated data of the controller is still valid.

Preparation for assembly:

1. Lay the halves of the assembly frame into the slot provided on the controller.
2. Push the frame halves together until the ends catch.
3. Slip the seal ring over the heat sink and insert it into the slot provided.

Dimensions for the types 9321 to 9326

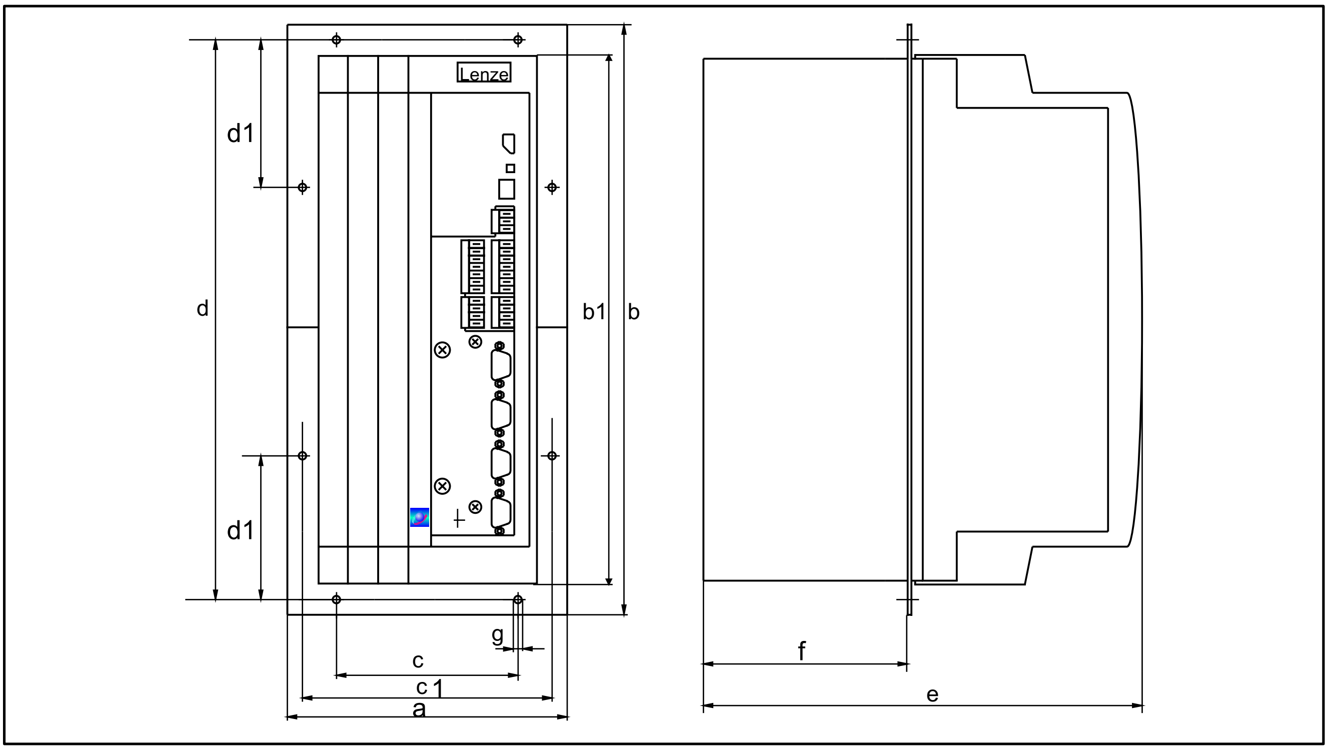


Abb. 4-2 Dimensions for the assembly with thermally separated power stage

Type	a	b	b1	c	c1	d	d1	e*	f	g
9321, 9322	112.5	385.5	350	60	95.5	365.5	105.5	250	92	6.5
9323, 9324	131.5	385.5	350	79	114.5	365.5	105.5	250	92	6.5
9325, 9226	135	385.5	350	117	137.5	365.5	105.5	250	92	6.5

* When using an attachable fieldbus module:
Observe the free space required for the connection cables

All dimensions in mm

Assembly cut-out

Type	Height	Width
9321, 9322	350 ±3	82 ±3
9323, 9324		101 ±3
9325, 9326		139 ±3

Dimensions for the types 9327 to 9329

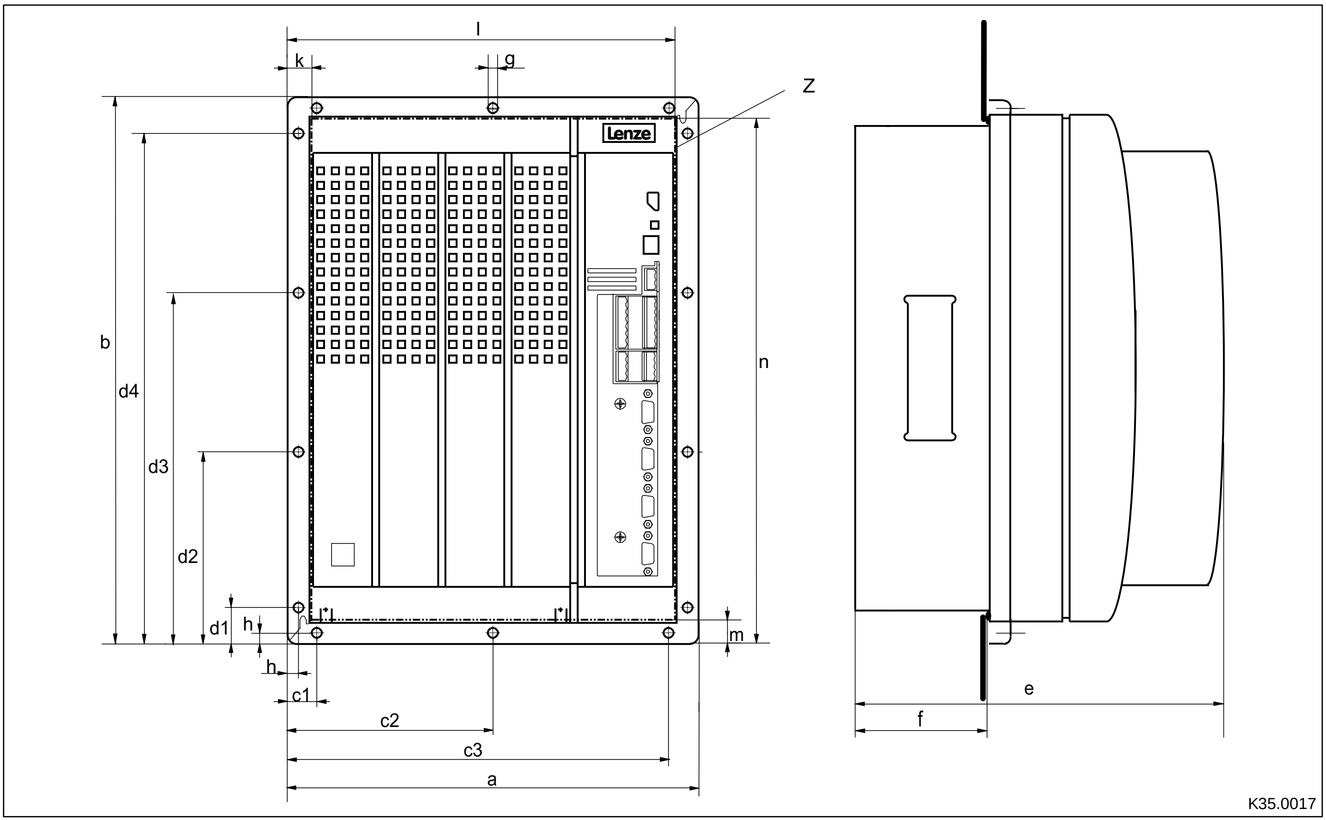


Abb. 4-3 Dimensions for the assembly with thermally separated power stage

Type	**a**	**b**	**c1**	**c2**	**c3**	**d1**	**d2**	**d3**	**d4**	**e *)**	**f**	**g**	**h**
9327, 9328, 9329	280	379	28	140	252	41	141	238	338	250	90	6	9

Assembly cut-out Z

Type	**Height**	**Width**	**k**	**l**	**m**	**n**
9327, 9328, 9329	338 ±1	238 ±1	20 ±2	259 ±2	20 ±2	359 ±2

* When using an attachable fieldbus module:
Observe the free space required for the connection cables

All dimensions in mm

4.1.4 Assembly of variants

Variant EVS932X-Cx (”Cold plate”)

For installation in a control cabinet with other heat sinks in ”cold plate technique” (x = order designation; more information on the inner cover page).

Dimensions for the types 9321-Cx to 9326-Cx

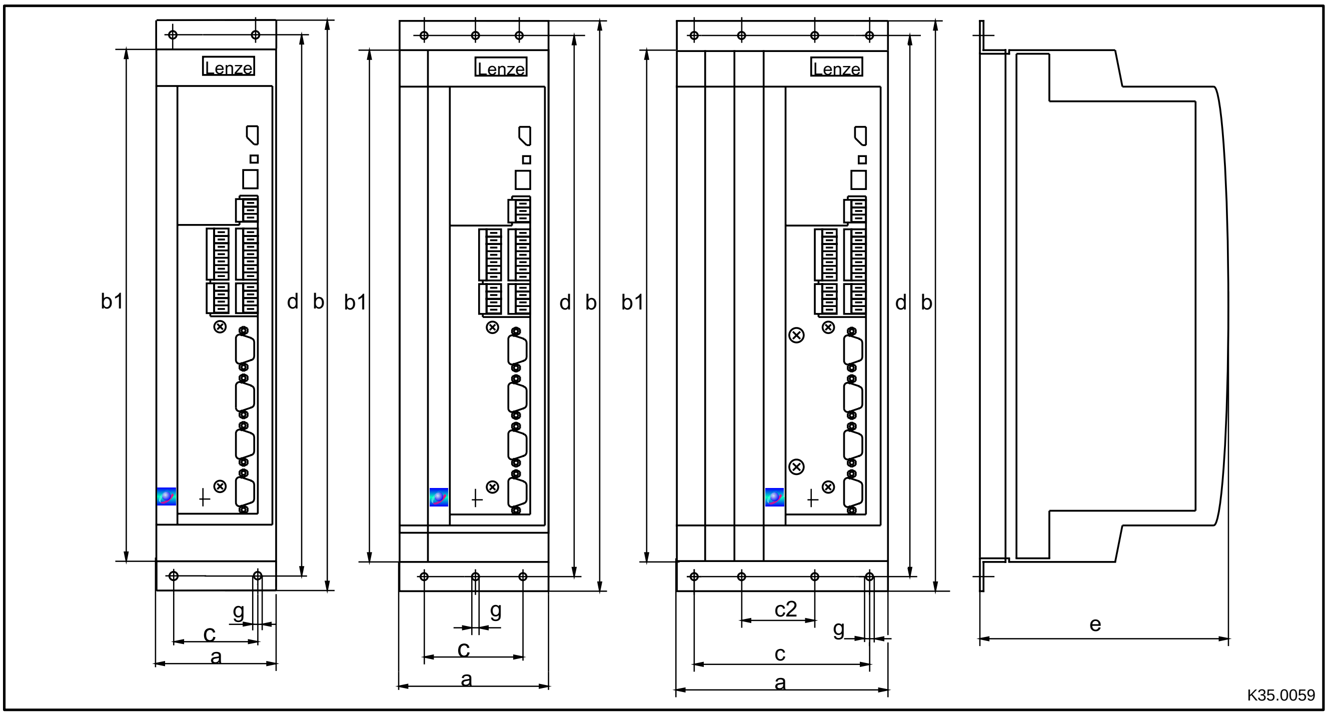


Abb. 4-4 Dimensions for the assembly in ”cold plate technique”

Type	a	b	b1	c	c2	d	e*	g
9321-Cx 9322-Cx	78	381	350	48	-	367	168	6.5
9323-Cx 9324-Cx	97	381	350	67	-	367	168	6.5
9325-Cx 9326-Cx	135	381	350	105	38	367	168	6.5

* When using an attachable fieldbus module:
Observe the free space required for the connection cables

All dimensions in mm

Dimensions for the types 9327-Cx and 9328-Cx

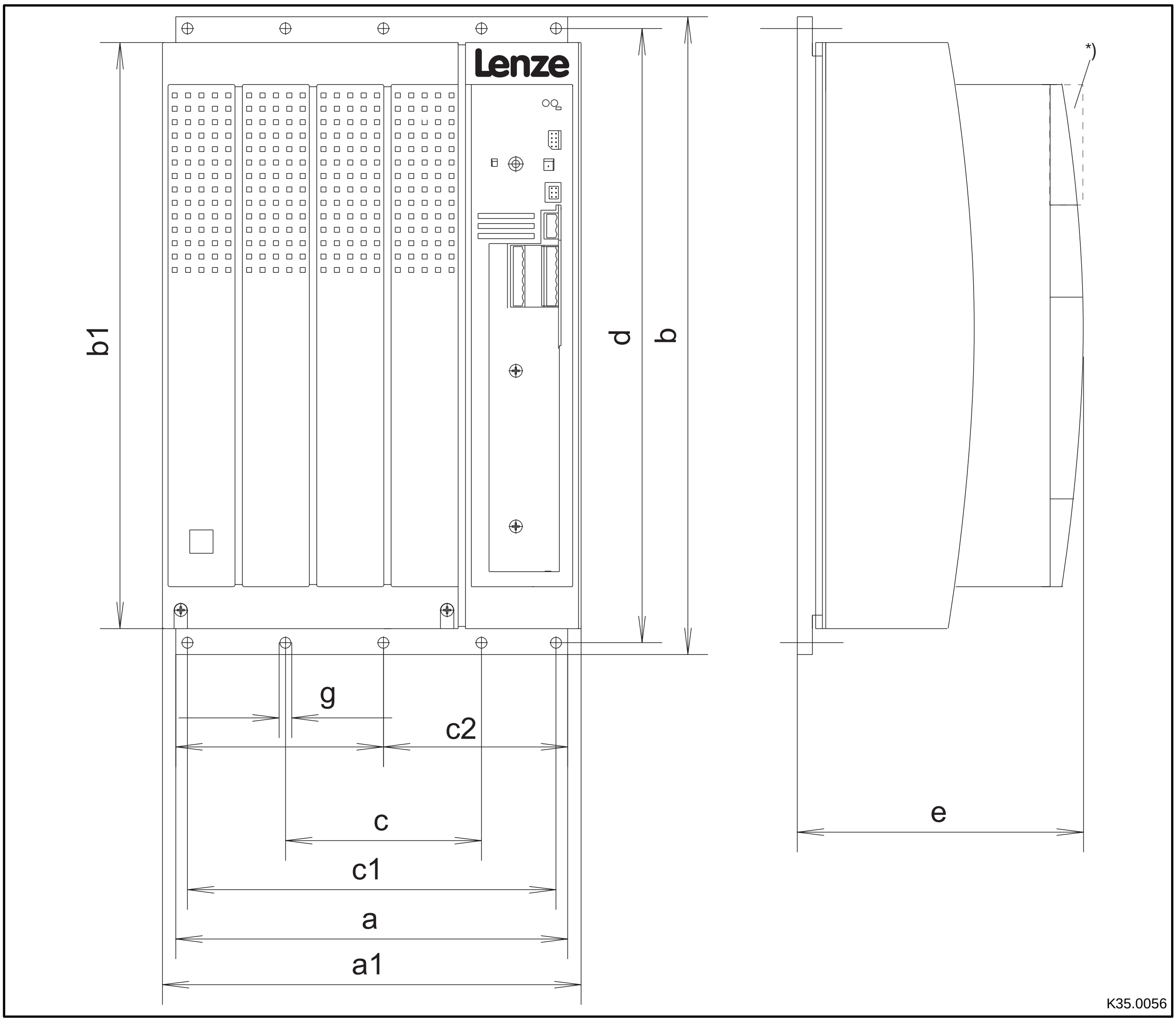


Abb. 4-5 Dimensions for the assembly in "cold plate technique"

Type	a	a1	b	b1	c	c1	c2	d	e*	g
9327-Cx 9328-Cx	234	250	381	350	110	220	117	367	171	6.5

* When using an attachable fieldbus module:
Observe the free space required for the connection cables

All dimensions in mm

- Observe the following points to comply with the technical data:
  – Ensure sufficient ventilation of the heat sink.
  – The free space behind the control cabinet back panel must be at least 500 mm.
- If several controllers are installed in the control cabinet:
  – Do not install the controllers on top of each other.
- The cooling path must not exceed the thermal resistances stated in the table:

Controller	**Cooling path**	
Type	**Power to be dissipated P_{loss} [W]**	**$R_{thmax\ heat\ sink}$ [K/W]**
9321-Cx	80	0.50
9322-Cx	80	0.50
9323-Cx	100	0.40
9324-Cx	155	0.25
9325-Cx	210	0.19
9326-Cx	360	0.10
9327-Cx	410	0.09
9328-Cx	610	0.06

- The temperature of the cold plate must not exceed +85° C.
- Insertion depth t of the screws into the base plate of the controller:

$$8\ \text{mm} \leq t \leq 10\ \text{mm}$$

- For the bore pattern and surface quality of the heat sink please consult the factory.
- Apply the heat-conductive compound (accessory kit) to the cold plate of the controller.

4.2 Electrical installation

For information about the installation according to EMC, see chapter 4.3. (📖 4-34)

4.2.1 Protection of persons

Danger!

All power terminals carry voltage up to 3 minutes after mains disconnection.

4.2.1.1 Residual-current circuit breakers

Labelling of RCCBs	Meaning
∿	AC-sensitive residual-current circuit breaker (RCCB, type AC)
∿ ⎍	Pulse-current sensitive residual-current circuit breaker (RCCB, type A)
⎓ ∿ ⎍	All-current sensitive residual-current circuit breaker (RCCB, type B)

Definition

In the following text “RCCB” is used for “residual-current circuit breaker”.

Protection of persons and animals

DIN VDE 0100 with residual-current operated protective devices (RCCB):
- The controllers are equipped with a mains rectifier. If a short-circuit to frame occurs, a smooth DC residual current can block the activation of the DC sensitive or pulse-current sensitive RCCBs and thus destroy the protective function for all units connected. We therefore recommend:
  - ”pulse-current sensitive RCCB” or ”all-current RCCB” in systems equipped with controllers with single-phase mains connection (L1/N).
  - ”all-current sensitive RCCB” in systems equipped with controllers with three-phase mains connection (L1/L2/L3).

Rated residual current

Please observe the rated residual current for the selection of the RCCB:
- Controller with single-phase mains connection: 30 mA rated residual current
- Controller with three-phase mains connection: 300 mA rated residual current

The RCCB can be activated unintentionally under the following conditions:
- In the event of capacitive leakage currents between the cable screens (especially with wall mounting).
- Simultaneous connection of several inverters to the mains
- If RFI filters are used.

Installation

The RCCB must only be installed between the supplying mains and the controller.

Standards
(All-current sentitive RCCB)

All-current sensitive RCCBs are described in the European Standard EN EN 50178 and in the IEC 755.
The EN 50178 has been harmonized and has been effective since October 1997. It replaces the national standard VDE 0160.

4.2.1.2 Insulation

The controllers have an electrical isolation (insulating distance) between the power terminals and the control terminals as well as to the housing:

- Terminals X1 and X5 have a double basic insulation (double insulating distance, safe mains isolation to VDE0160, EN50178). The protection against contact is ensured without any further measures.
- The control inputs and outputs of all controllers are electrically isolated.

Danger!

- Terminals X3, X4, X6, X7, X8, X9, X10 have a single basic insulation (single insulating distance).
- Protection against contact in the event of fault is ensured only by additional measures.
- If an external voltage supply (24V DC) is used, the insulation level of the controller depends on the insulation level of the voltage source.

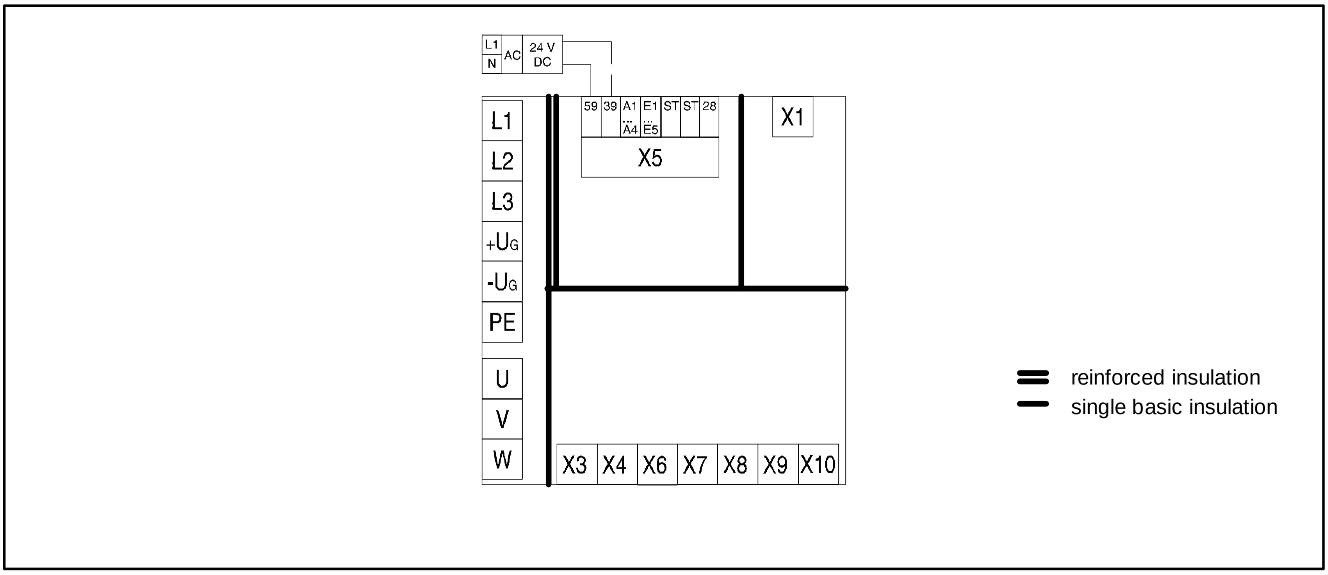


Abb. 4-6 Basic insulation in the controller

4.2.1.3 Replacement of defective fuses

Replace defective fuses with the prescribed type only when no voltage is applied. (🕮 3-6)

- For single drives, the controller carries a hazardous voltage up to three minutes after mains disconnection.
- In a DC-bus connection, all controllers must be inhibited and separated from the mains.

4.2.1.4 Mains disconnection

Make a safety disconnection between the controller and the mains only via a contactor at the input side.

- Please observe that all drives connected to the DC bus must be inhibited.

4.2.2 Protection of the controller

Stop!

The controllers contain electrostatically sensitive components.

- Prior to assembly and service operations, the personnel must be free of electrostatic charge:
  - Discharge by touching the PE fixing screw or another grounded metal part in the control cabinet.

- Length of the screws for the connection to the screen cable/screen plate for the types 9327 to 9332: < 12 mm
- Controller protection by means of external fuses. (🕮 3-6)
- Protect unused control inputs and outputs with plugs or covers (included in the contents of delivery) for the Sub-D inputs.
- Frequent mains switching can overload the internal switch-on current limitation. For cyclic mains switching, the controller can be switched on every three minutes as a maximum.
- The controllers 9324, 9326, 9328 and 9329 must only be operated with the appropriate mains filters. (🕮 3-7)
- In case of condensation, connect the controller to the mains voltage only after the visible humidity has evaporated.

4.2.3 Motor protection

- Complete motor protection according to VDE:
  - By overcurrent relays or temperature monitoring.
  - Required for group drives (motors connected in parallel to a controller)
  - We recommend the use of PTC thermistors or thermostats with PTC characteristic to monitor the motor temperature.

Stop!

As standard Lenze three-phase AC motors are equipped with PTC thermistors. If motors from other manufacturers are used, carry out all steps required for the adaptation to the controller. (🕮 4-28)

- When using motors with insulation which is not suitable for inverter operation:
  - Please contact your motor supplier.
    Lenze AC motors are designed for inverter operation.
- With the corresponding parameter setting, the controllers generate field frequencies up to 600 Hz:
  - With motors not suited for the application, dangerous overspeeds may occur and destroy the drive.

4.2.4 Mains types/conditions

Please observe the restrictions for each mains type!

Mains	Operation of the controllers	Notes
With grounded neutral (TT/TN mains)	No restrictions	Observe controller ratings ● Mains r.m.s. current: 📖 3-3
With isolated neutral (IT mains)	Possible, if the controller is protected in the event of an earth fault in the supplying mains. ● Possible, if appropriate earth fault detections are available and ● the controller is separated from the mains immediately.	Safe operation in the event of an earth fault at the inverter output cannot be guaranteed.
With grounded phase	Operation is only possible with one variant	Contact Lenze
DC-supply via $+U_G/-U_G$	The DC voltage must be symmetrical to PE.	The controller will be destroyed when grounding $+U_G$ or $-U_G$.

4.2.5 Interaction with compensation equipment

- The controllers take up a very low fundamental reactive power from the supplying AC mains. Therefore compensation is not necessary.
- If the controllers are operated at mains with compensation, this equipment must be used with chokes.
  – For this, contact the supplier of the compensation equipment.

4.2.6 Specification of all cables used

- The cables used must comply with the required approvals of the application site (e. g. UL).
- The prescribed minimum cross-sections of PE conductors must be maintained in all cases. The cross-section of the PE conductor must be at least as large as the cross-section of the power connections.
- The screening quality of a cable is determined by
  – a good screen connection
  – a low screen resistance
  Only use screens with tin-plated or nickel-plated copper braids!
  Screens of steel braid are not suitable.
  – For the overlapping degree of the screen braid:
  A min. of 70 % to 80 % with an overlapping angle of 90°

4.2.7 Power connections

Controller	**Preparations for the power connection**
9321 ... 9326	● Remove the covers of the power connections: – Unlatch to the front by gentle pressure. – Pull upwards (mains connection) or downwards (motor connection).
9327 ... 9332	● Remove cover: – Loosen screws (X) (see Abb. 4-1). – Swing cover to the top and detach. – Take the accessory kit out of the interior of the controller.

4.2.7.1 Mains connection

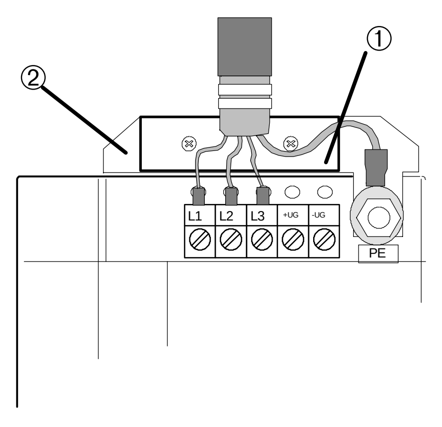
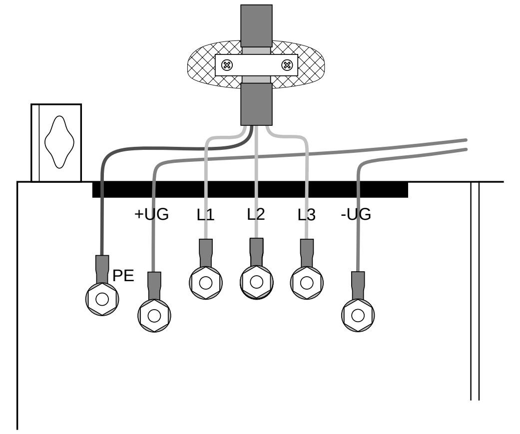
Types 9321 to 9326	**Types 9327 to 9332**
	
Correct screen connection with screened cables (required parts in the accessory kit): ● Screw sreen plate ① on fixing bracket ②. ● Fix screen using cable lugs. Do not use as a strain relief! ● To improve the screen connection: Connect screen additionally to the stud next to the power connections.	Correct screen connection with screened cables: ● Connect the screen with suitable clamp on the conducting control cabinet mounting plate. ● To improve the screen connection: Connect screen additionally to the stud next to the power connections.

Abb. 4-7 Proposal for mains connection

- Connect the mains cables to the screw terminals L1, L2, L3.
- Connect cables for brake unit (935X), supply module (934X) or further controllers in the DC bus connection to the screw terminals +UG, -UG at the top of the controller.
- Max. permissible cable cross-sections and tightening torques:

Type	**Terminals**		
	Max. permissible cable cross-sections	**L1, L2, L3, +UG, -UG**	**PE connection**
9321 - 9326	4 mm^{2} 1)	0.5 ... 0.6 Nm (4.4 ... 5.3 lbin)	3.4 Nm (30 lbin)
9327 - 9329	25 mm^{2} 2)	4 Nm (35 lbin)	
9330 - 9331	95 mm^{2} 2)	7 Nm (62 lbin)	
9332	120 mm^{2} 2)	12 Nm (106.2 lbin)	

1) with pin-end connector: 6 mm^{2}
with wire crimp cap 4 mm^{2}
2) with ring cable lug The cross-section is only limited by the cable cut-out in the housing.

Fuses

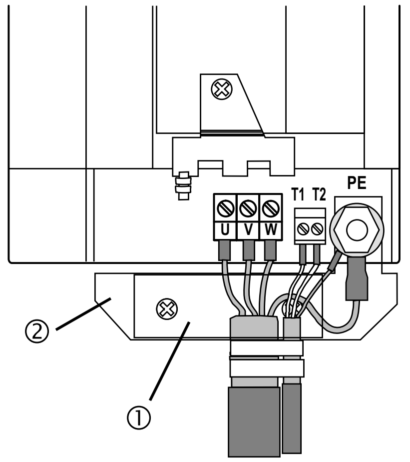
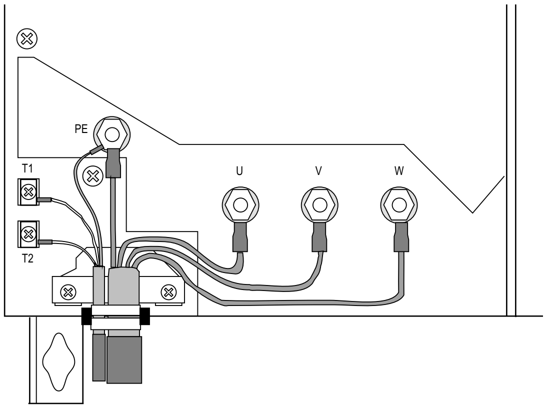
Fuses and cable cross-sections	The specifications in chapter 3.3.4 are recommendations and refer to the application ● in control cabinets and machines ● installation in the cable duct ● max. ambient temperature +40 °C.	🕮 3-6
Selection of the cable cross-section	For selection take into account the voltage drop in the event of load application (to DIN 18015 part 1: ≤ 3 %).	
Cable and controller protection on the AC side (L1, L2, L3)	● By means of standard commercial fuses. ● Fuses in UL-conform plants must have UL-approval. ● The rated voltages of the fuses must be dimensioned according to the mains voltage at the site. The activation characteristic is defined with ”H” or ”K5”.	
Cable and controller protection on the DC side (+UG, -UG)	● By means of recommended DC fuses. ● The fuses/fuse holders recommended by Lenze are UL approved.	
For DC group drives or supply using a DC source:	Observe the information given in Part F of the Manual.	
Connection of a brake unit	If the unit is connected to the terminals +UG / -UG, the fuses and cross-sections indicated in chapter 3.3.4 are not valid. These unit-specific data can be obtained from the technical documentation for the brake unit.	
Further information	For cable and controller protection see the chapter ”Accessories” in “Planning”.	
Further standards	The compliance with other standards (e.g.: VDE 0113, VDE 0289, etc.) remains the responsibility of the user.	

4.2.7.2 Motor connection

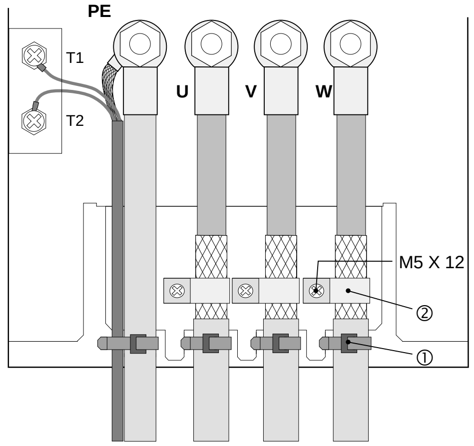
For EMC safety reasons, we recommend the use of screened motor cables.

Note!

The screening of the motor cables is only required to comply with existing standards (e. g. VDE 0160, EN 50178).

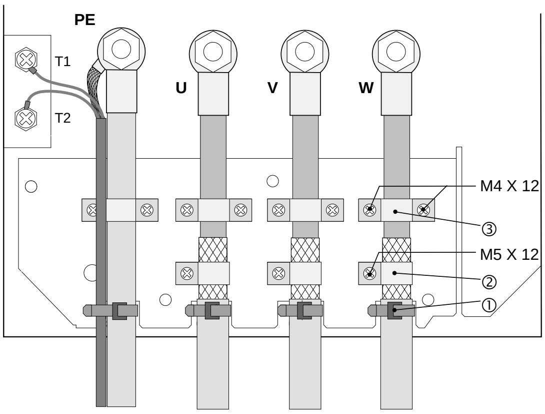
Types 9321 to 9326	
	Correct screen connection with screened cables (required parts in the accessory kit): ● Screw sreen plate ① on fixing bracket ②. ● Fix the screen of the motor cable and thermal contact, if necessary. Do not use as a strain relief! ● To improve the screen connection: Connect screen additionally to the stud PE next to the motor connections.
Types 9327 to 9329	
	Correct screen connection with screened cables: ● Fix the screen of the motor cable and thermal contact, if necessary. Do not use as a strain relief! ● To improve the screen connection: Connect screen additionally to the stud PE next to the motor connections.

Types 9330 and 9331



- Strain relief by using cable binders ①.
- Correct screen connection with screened cables:
  - – Apply motor cable screen to the screening plate using clamp and screws M5x12 ②.
  - – Connect thermal contact screen to the stud PE next to the motor connections over a large surface.

Type 9332



- Strain relief by using cable clamps and screws M4x12 ③.
  - – Additional strain relief/fixing can be achieved by using cable binders ①.
- Correct screen connection with screened cables:
  - – Apply motor cable screen to the screening plate using clamp and screws M5x12 ②.
  - – Connect thermal contact screen to the stud PE next to the motor connections over a large surface.

Abb. 4-8 Proposal for motor connection

- Observe the max. permissible motor cable length:

	V_r = 400 V (+10%)		V_r = 480 V (+10%)	
Type	f_{chop} = 8 kHz	f_{chop} = 16 kHz	f_{chop} = 8 kHz	f_{chop} = 16 kHz
9321/9322	up to 50 m	up to 45 m	up to 50 m	up to 25 m
9323 - 9332	up to 50 m	up to 50 m	up to 50 m	up to 50 m

- Connect the motor cables to the screw terminals U, V, W.
  – Observe correct pole connection.
  – Max. motor cable length: 50 m.
  – Max. permissible cable cross-sections and tightening torques:

	Max. permissible cable cross-sections		Terminal screw tightening torques			
Type	Power connections	T1, T2	U, V, W	PE connection	Screen/ strain relief	T1, T2
9321 - 9326	4 mm^{2} 1)	1.5 mm^2	0.5 ... 0.6 Nm (4.4 ... 5.3 lbin)	3.4 Nm (30 lbin)	-	0.5 ... 0.6 Nm (4.4 ... 5.3 lbin)
9327 - 9329	25 mm^{2} 2)		4 Nm (35 lbin)		-	0.5 ... 0.6 Nm (4.4 ... 5.3 lbin)
9330 - 9331	95 mm^{2} 2)		7 Nm (62 lbin)		3.4 Nm (30 lbin)	
9332	120 mm^{2} 2)		12 Nm (106.2 lbin)		M4: 1.7 Nm (15 lbin) M5: 3.4 Nm (30 lbin)	

1) with pin-end connector: 6 mm ^{2}
with wire crimp cap 4 mm^2
2) with ring cable lug The cross-section is only limited by the cable cut-out

Note!

Switching on the motor side of the controller is permitted for safety switch-off only (emergency switch-off).

4.2.7.3 Connection of a brake unit

- When connecting a brake unit (brake module with internal brake resistor or brake chopper with external brake resistor) observe the corresponding Operating Instructions in all cases.

STOP

Stop!

- Design the circuit so that, if the temperature monitoring of the brake unit is activated,
  – the controllers are inhibited (X5/28 = LOW).
  – the mains is disconnected.
- Examples:
  – Chapter 4.3, “Installation of a CE-typical drive system”. (🕮 4-34)
  – Abb. 4-9, “Decentralized supply for DC-bus connection of several drives”. (🕮 4-18)

4.2.7.4 DC-bus connection of several drives

Decentralized supply with brake module

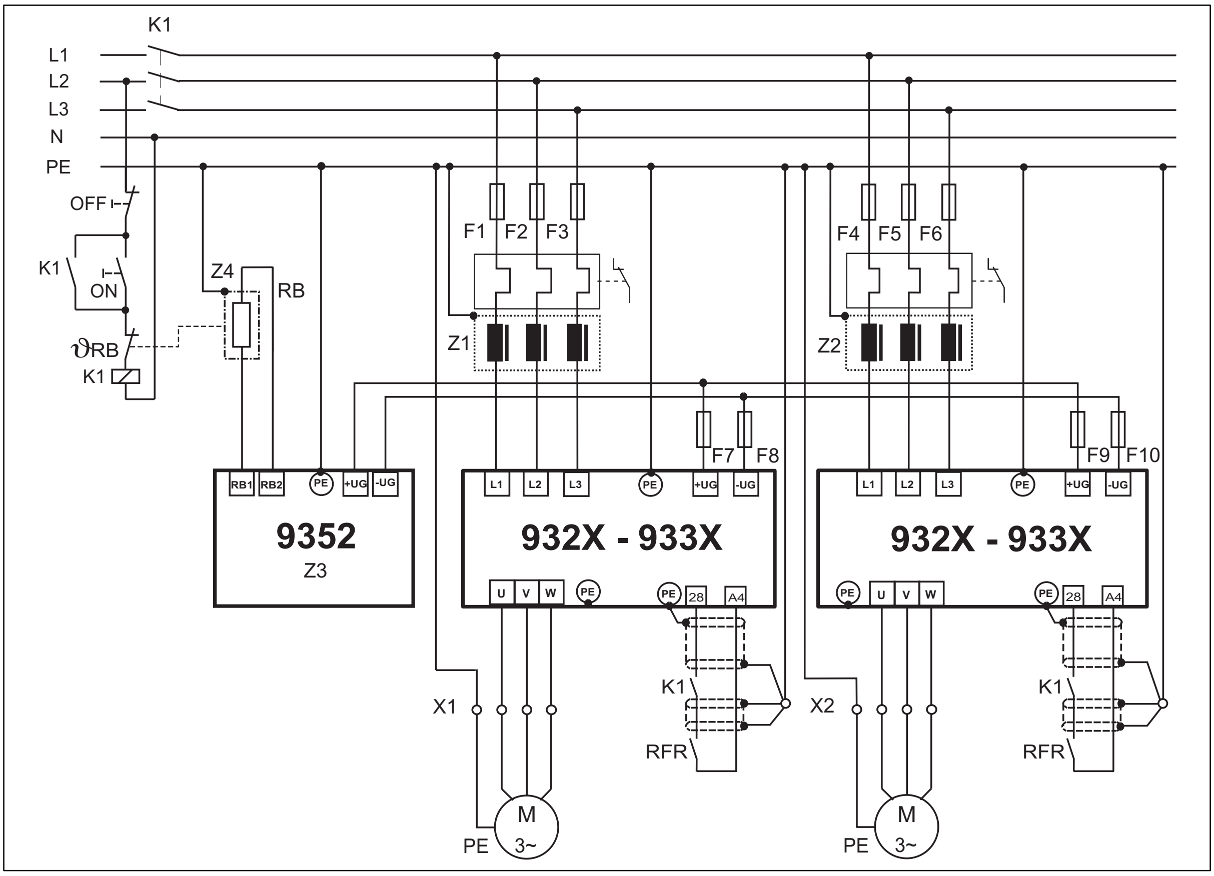


Abb. 4-9 Decentralized supply with DC-bus connection of several drives

Z1, Z2	Mains filter (for selection see Manual, Part F)
Z3	Brake chopper
Z4	Brake resistor (for r.m.s. current monitoring see the Manual, Part F)
F1...F6	Fuses (see chapter 3.3.4 and chapter 4.2.7.1)
F7...F10	DC-bus fuse (see chapter 3.3.4 / 4.2.7.1); fuse holder with/without alarm contact
K1	Main contactor

Stop!

- Set the DC bus voltage thresholds of controller and brake unit to the same values.
  - – Controller using C0173
  - – Brake unit with switches S1 and S2
- Use a bimetal relay to monitor the mains supply.

Note!

Observe the information given in Part F of the Manual and the application report “DC-bus connection” for selection of the components.

Central supply with supply module

- Observe the corresponding Operating Instructions for installation of a supply module.

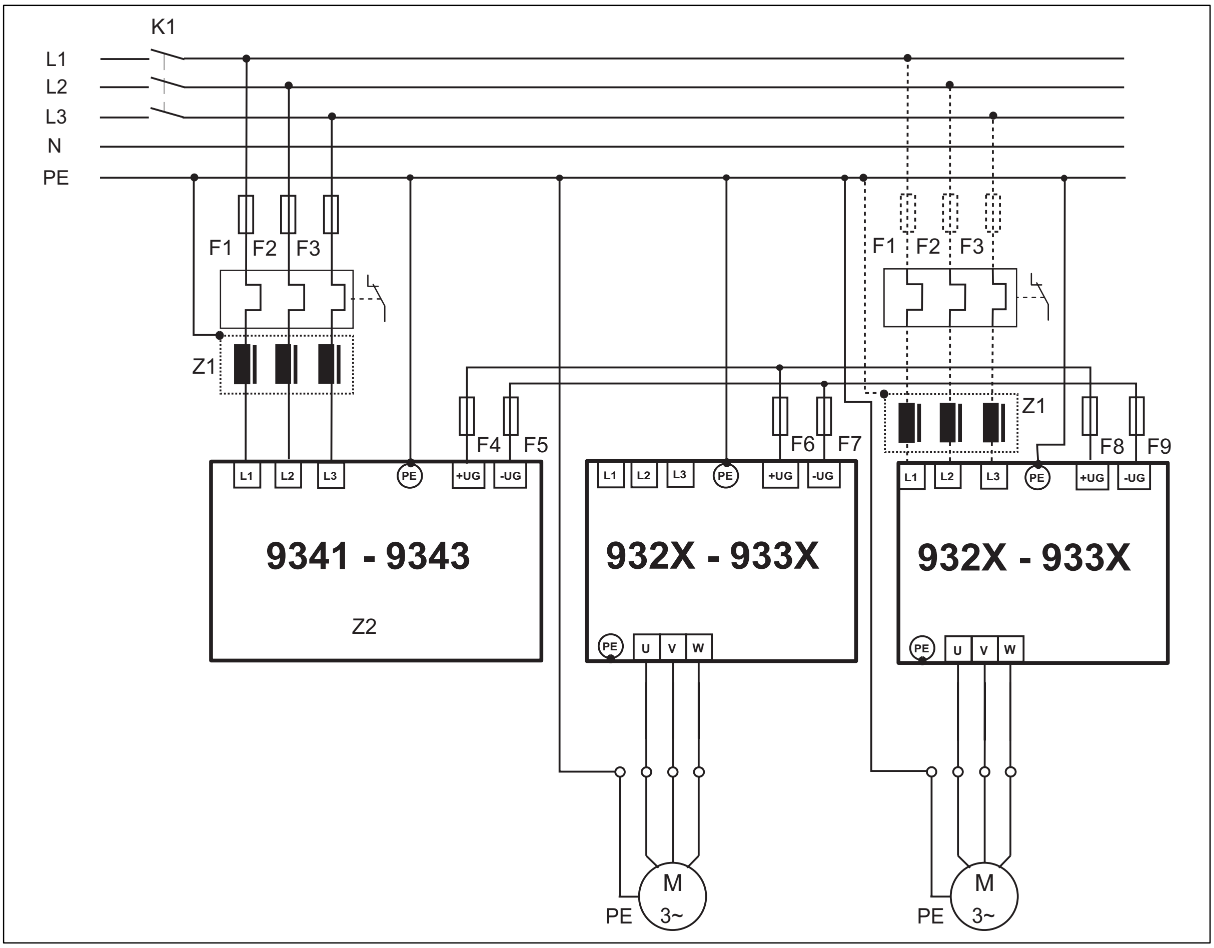


Abb. 4-10 Central supply for DC bus connection of several drives

Z1	Mains filter
Z2	Supply module
F1...F6	Protection, see “Cable protection” (📖 3-6) / “mains connection” (📖 4-13)
F4...F9	DC-bus fuse (see chapter 3.3.4 / 4.2.7.1); fuse holder with/without alarm contact
K1	Main contactor

Note!

If the power supply of the supply module is not high enough, a parallel supply can be installed via the mains input of other controllers (see Manual, Part F). In this event, the controller can only be operated with the assigned mains filters (min. limit value class A).

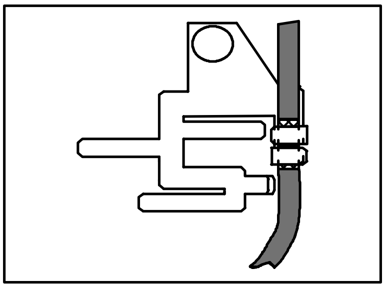
4.2.8 Control connections

4.2.8.1 Control cables

- Connect the control cables to the screw terminals:

Max. permissible cable cross-section	Tightening torques
1.5 mm^2	0.5 ... 0.6 Nm (4.4 ... 5.3 lbin)

- We recommend the unilateral screening of all cables for analog signals to avoid signal distortion.
- Connect the screens of the control cables
  - with the screen sheet to the front metal surface (screw length max. 12 mm).



4.2.8.2 Control terminal assignment

Protection against polarity reversal

- The protection against polarity reversal prevents from wrong connection of the internal control inputs. It is however possible to overcome the protection against polarity reversal by applying high force. The controller cannot be enabled.

Overview

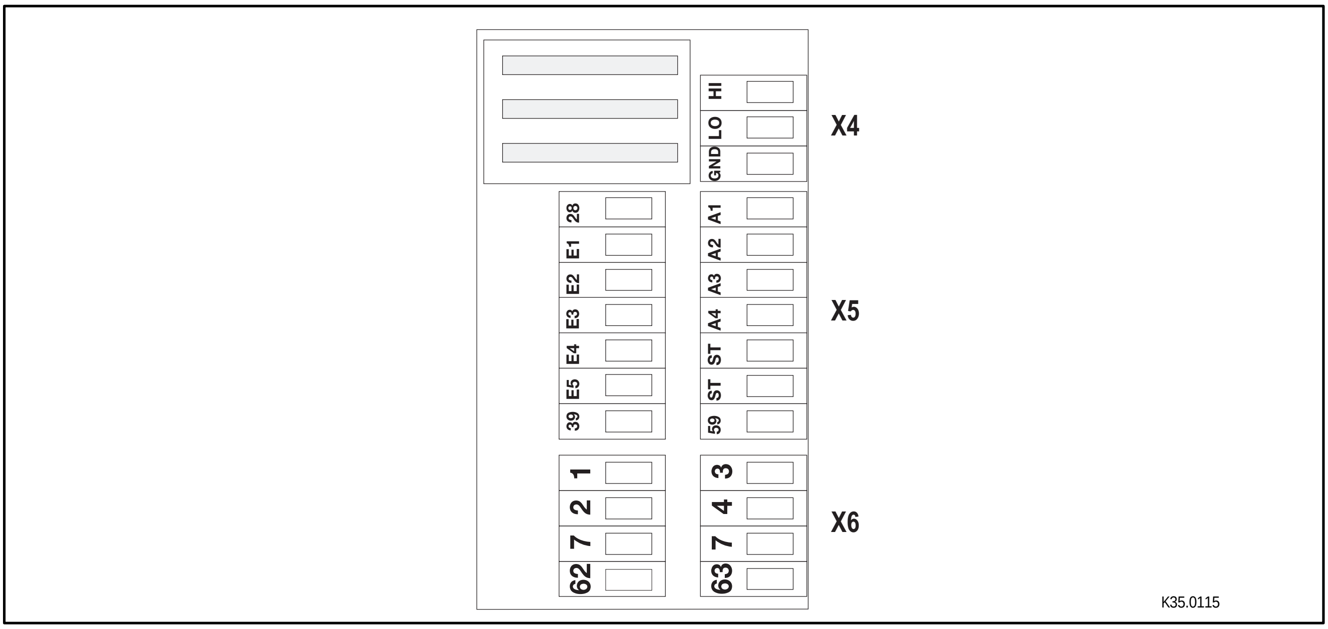
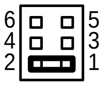
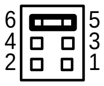


Abb. 4-11 View of the control connections of the controller front

	Terminal	Use (Factory setting is printed in bold)		Level	Data
Analog inputs	1, 2	Difference input master voltage **(speed main setpoint)**	 Jumper X3	-10 V to +10 V	Resolution: 5 mV (11 bit + sign)
		Difference input master current	 Jumper X3	-20 mA to +20 mA	Resolution: 20 μA (10 bit + sign)
	3, 4	Difference input master voltage **(additional speed setpoint)**	Jumper X3 has no influence	-10 V to +10 V	Resolution: 5 mV (11 bit + sign)
Analog outputs	62	Monitor 1 **(Actual speed)**		-10 V to +10 V; max. 2 mA	Resolution: 20 mV (9 bit + sign)
	63	Monitor 2 **(torque setpoint)**		-10 V to +10 V; max. 2 mA	Resolution: 20 mV (9 bit + sign)
	7	Internal ground, GND		-	-
Digital inputs	28	Controller enable (RFR)		HIGH	LOW: 0 … +4 V HIGH: +13 … +30 V Input current for 24V: 8 mA per input Reading and writing of the inputs: once per ms (average value)
	E1	freely assignable **(remove CW rotation / QSP)**		HIGH	
	E2	freely assignable **(remove CCW rotation / QSP)**		HIGH	
	E3	freely assignable **(enable JOG-setpoint 1)**		HIGH	
	E4	freely assignable **(TRIP set)**		HIGH	
	E5	freely assignable **(reset fault - TRIP-reset)**		Signal LOW→HIGH	
Digital outputs	A1	freely assignable **(TRIP)**		LOW	LOW: 0 … +4 V HIGH: +13 … +30 V Output current: max. 50 mA per output (external resistance at least 480 Ω at 24 V) Updating of the outputs: once per ms
	A2	freely assignable **($n_{act.} < n_x$)**		LOW	
	A3	freely assignable **(RDY)**		HIGH	
	A4	freely assignable **(M_{max})**		HIGH	
	39	Ground of the digital inputs and outputs		-	
	59	Supply input of the control module: 24 V external (I > 1A)		-	

Note!

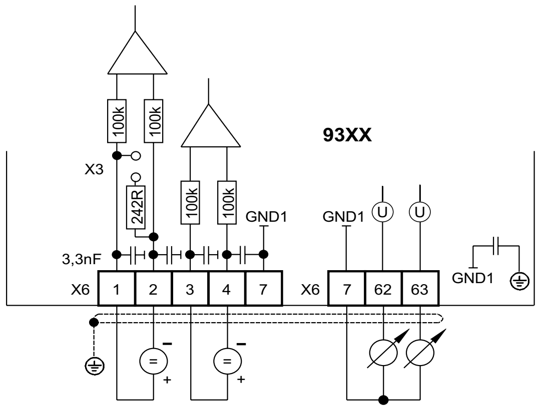
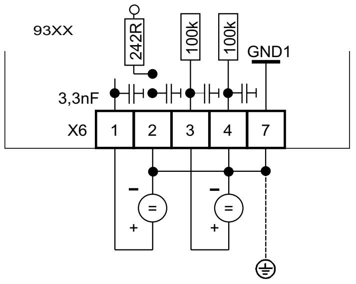
If necessary, remove the plug-on module to change the jumper.

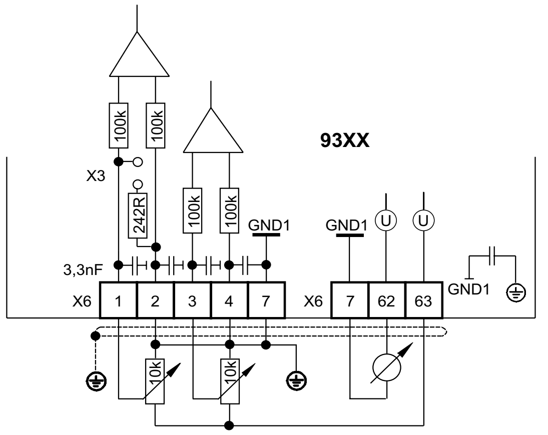
4.2.8.3 Connection diagrams

Connection of analog signals

Analog signals are connected via the 2 x 4-pole terminal block X6.

Depending on the use of the analog input, the jumper of X3 must be set accordingly.

<table>
<tr><th colspan="2">Connection for external voltage supply</th></tr>
<tr><td> </td><td>STOP!
● The maximum permitted voltage difference between an external voltage source and theGND1 (terminal X6/7) of the controller is 10V (common mode).
● The maximum permitted voltage difference between GND1 (terminal X6/7) and the PE of the controller is 50V.</td></tr>
<tr><td> </td><td>Limit the voltage difference
● by overvoltage clamping components or
● by direct connection of terminal(s) X6/2, X6/4 and X6/7 to GND1 and PE (see figure).</td></tr>
</table>

<table>
<tr><th colspan="2">Connection for internal voltage supply</th></tr>
<tr><td> </td><td>Configuration of the internal voltage supply:
● Set a freely assignable analog output (AOUTx) to HIGH level.
● For instance terminal X6/63: Assign FIXED100% to C0436 (📖 LEERER MERKER),
10V are thus applied across terminal X6/63.

Note!
Use one of the predefined configurations in C0005 for this application. With C0005 = XX1X (e. g. 1010 for speed control with control via terminals) FIXED 100% is automatically assigned to the output X6/63 (corresponds to 10 V at the output X6/63).</td></tr>
</table>

Connection of digital signals

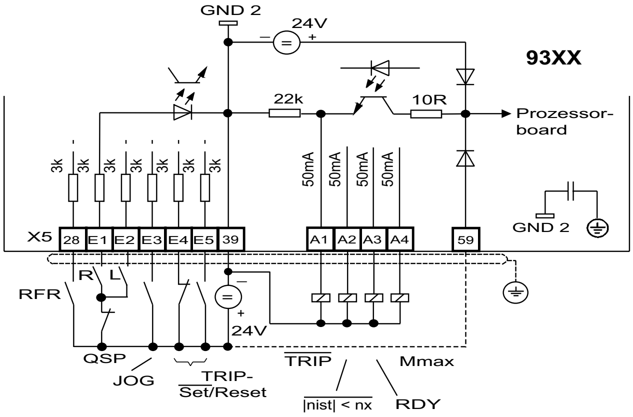
Analog signals are connected via the 2 x 7-pole terminal block X5.

The levels of the digital inputs and outputs are PLC compatible.

Show/Hide Bookmarks

Only use relays with low-current contacts for the switching of the signal cables (recommendation: relays with gold-plated contacts).

Connection for external power supply



The external voltage source supplies the digital inputs and outputs.

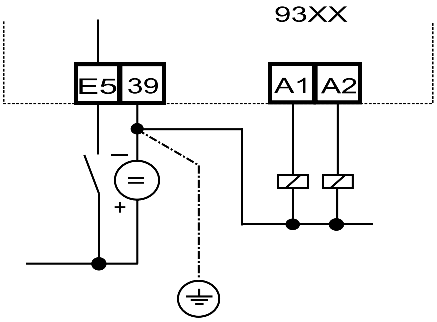
- If the external supply voltage is also to be used as an alternative supply of the control electronics (backup operation in case of mains failure):
  - – For this, make the connection illustrated as a broken line.
  - – The external voltage source must be able to drive a current > 1A.

This ensures that all actual values, even after mains disconnection, are still detected and processed.

- Connection of the external voltage source:
  - – supply voltage at X5/59
  - – external ground at X5/39

STOP!

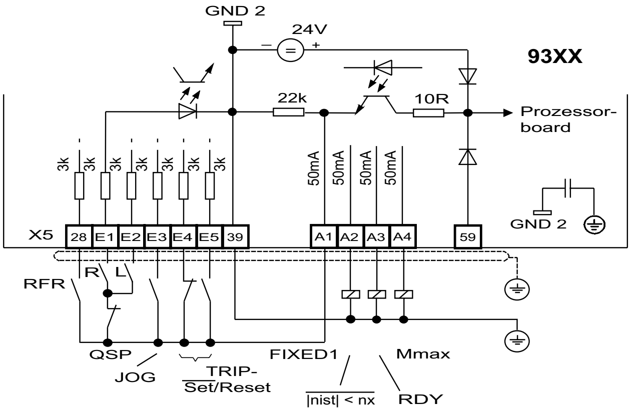
The maximum permitted voltage difference between GND2 (terminal X5/39) and the PE of the controller is 50 V.



Limit the voltage difference

- by overvoltage clamping components or
- by a direct PE connection of terminal 39 (see figure).

Connection for internal power supply



Configuration of the internal voltage supply

- Set a freely assignable digital output (DIGOUTx) to HIGH level.
- For example terminal X5/A1: Assign C0117/1 with FIXED1. 24V are thus applied across terminal X5/A1.

Tip!

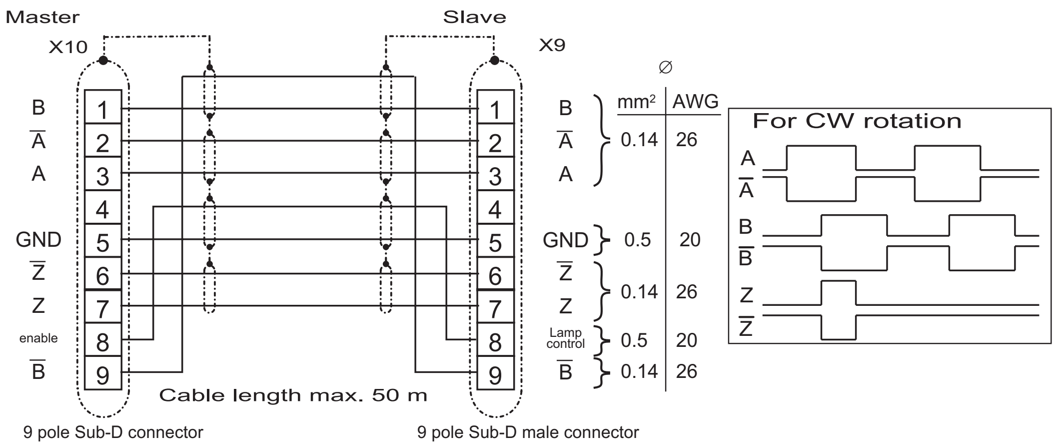
For this application, you may use one of the predefined configurations in C0005. The output is assigned automatically with FIXED1 (corresponds to 24 V at terminal X5/A1) by C0005 = XX1X (e. g. 1010 for speed control via terminals).

Digital frequency input (X9) / digital frequency output (X10)

Note!

Use prefabricated Lenze cables for the connection to the digital frequency input (X9) or digital frequency output (X10). Otherwise, use cables with twisted pairs and screened wires (A, $\overline{A}$ / B, $\overline{B}$ / Z, $\overline{Z}$) (see diagram).

Digital frequency output X10	**Digital frequency input X9**
Features: - Sub-D female connector, 9-pole - Output frequency: 0 - 500 kHz - Current load capacity per channel: max. 20 mA - Two-track with inverse 5 V signals and zero track - X10 has a different basic setting depending on the selected configuration (C0005) – Factory setting: Encoder simulation of the resolver signal - Load capacity: – With parallel connection do not connect more than 3 slaves. - When PIN 8 (EN) shows a LOW level, the master is initialized (e.g. if the mains was disconnected). The slave can thus monitor the master.	Features: - Sub-D male connector, 9-pole - Input frequency: 0 - 500 kHz - Current consumption per channel: max. 6 mA - Two-track with inverse 5 V signals and zero track - Possible input signals: – Incremental encoder with two 5 V complementary signals shifted by 90° (TTL encoder). – Encoder simulation of the master - PIN 8 serves to monitor the cable or the connected controller: – When this PIN shows a LOW level, the SD3 monitoring responds. – If the monitoring is not required, this input can be connected to +5V. - The input is disconnected if C0540 = 0, 1, 2 or 3.



Pin assignment X10									Pin assignment X9								
1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9
B	A	A	+5 V	GND	Z	Z	EN	B	B	A	A	+5 V	GND	Z	Z	LC	B

STATE-BUS (X5/ST)

The STATE-BUS is a controller-specific bus system for monitoring a DC-bus network:

- Controls all networked drives in a preselected way.
- Up to 20 controllers can be connected.
- Connection of the STATE-BUS cables to terminals X5/ST.

STOP

Stop!

Do not apply an external voltage across terminals X5/ST.

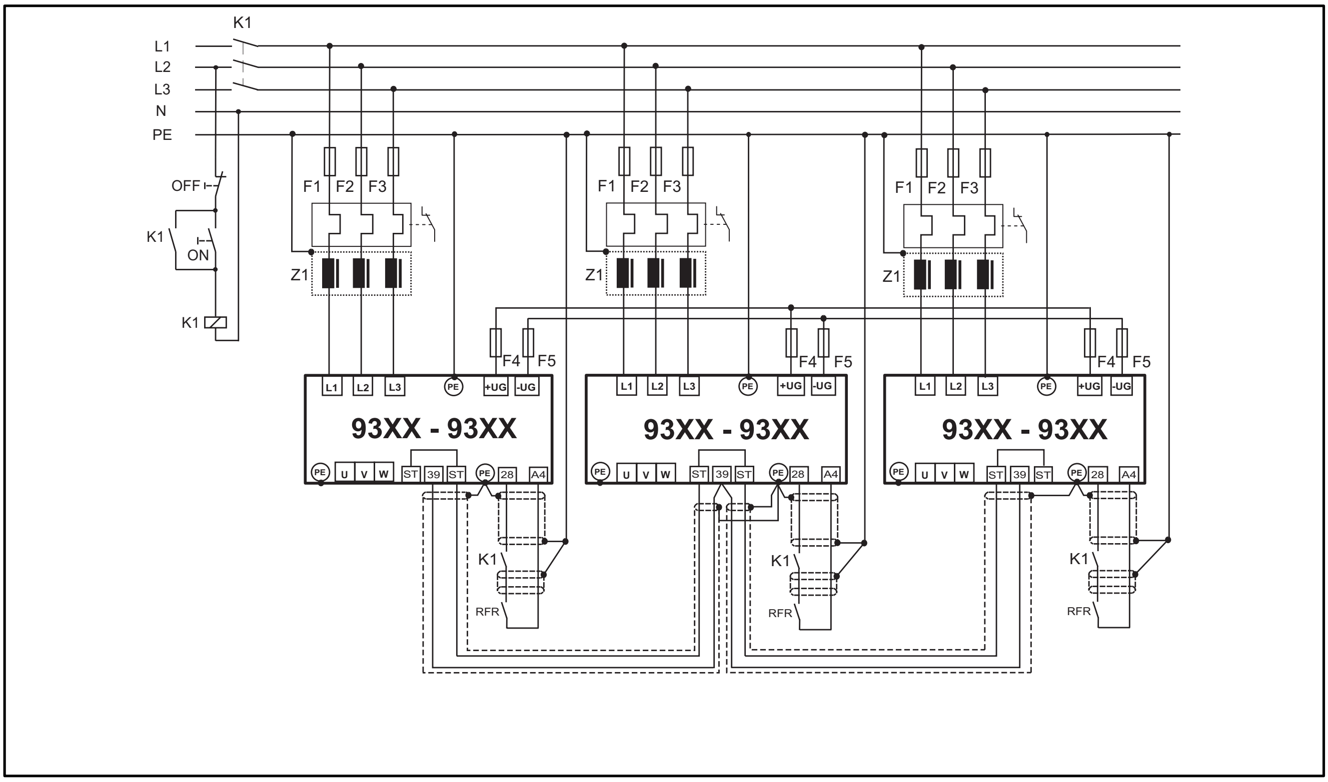


Abb. 4-12 Monitoring of a DC-bus drive network with the STATE-BUS

Z1	Mains filter
F1...F5	Protection, see “Cable protection” (📖 3-6) / “Mains connection” (📖 4-13)
K1	Main contactor

System bus connection (X4)

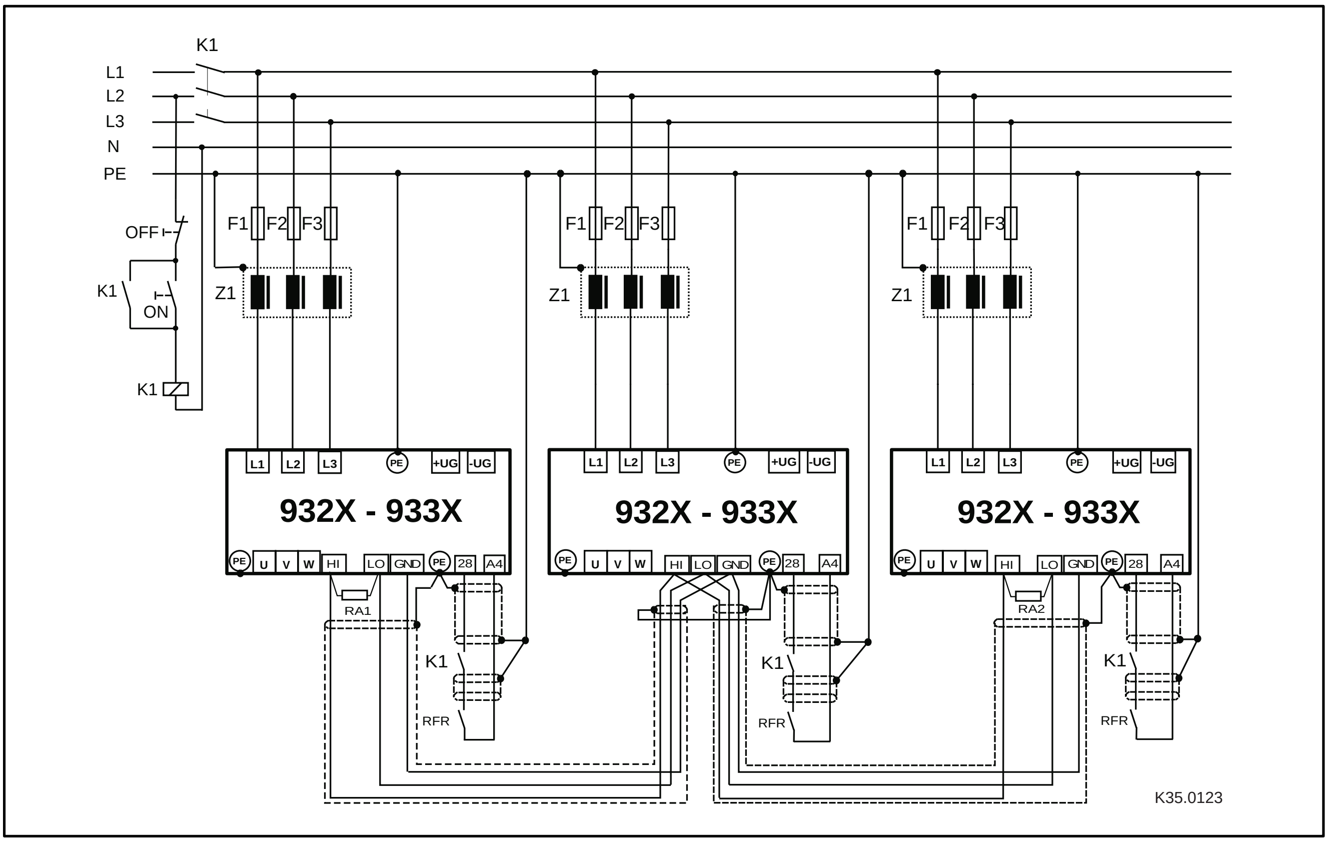


Abb. 4-13 Wiring of the system bus

RA1, RA2 Bus terminating resistors 120 Ω (included in the accessory kit)

- Connection via pluggable screw terminals (double terminals can be used).
- Only connect terminals of the same designation.
- Features of the signal cable:

Total cable length	**up to 300 m**	**300 m to 1000 m**
Cable type	LIYCY 2 x 2 x 0.5 mm^2 twisted pair with screening Pair 1: CAN-LOW (LO) and CAN-HIGH (HI) Pair 2: 2*GND	CYPIMF 2 x 2 x 0.5 mm^2 twisted pair with screening Pair 1: CAN-LOW (LO) and CAN-HIGH (HI) Pair 2: 2*GND
Cable resistance	≤ 40 Ω/km	≤ 40 Ω/km
Capacitance per unit length	≤ 130 nF/km	≤ 60 nF/km

- Connection of the bus termination resistors:
  – Connect one resistor 120 Ω to the first and one to the last bus participant.
  – On the 93XX controller the resistor can be screwed directly under the terminals X4/HI and X4/LO.

Features:

- CAN based with bus protocol according to CANopen (CAL-based Communication Profile DS301)
- Bus expansion:
  - 25 m at max. 1 Mbit/s baud rate
  - up to 1 km with reduced baud rate
- Extremely reliable data transmission (hamming distance = 6)
- Signal level to ISO 11898
- Up to 63 bus devices are possible
- Access to all Lenze parameters
- Master functions integrated into the controller
  - Data exchange possible between controllers without participation of a master system (current ratio control, speed synchronization, etc.)

The following connections of the system bus connection are possible:

- Connection to a decentral terminal extension for digital and analog inputs and outputs
- Connection to a superimposed control (PLC, decentral digital inputs and outputs, keypad)
- Interconnection of several controllers

Automation interface (X1)

The automation interface (X1) is used for the connection of different plug-on modules

- Operating module
- Fieldbus modules
  - RS232, RS485, optical fibre, type 2102 (LECOM-A/B/LI),
  - INTERBUS, type 2111
  - PROFIBUS, type 2131

4.2.9 Motor temperature monitoring

Selection of the feedback system	• Temperature sensor KTY – “Linear” temperature sensor in the motor winding (standard for Lenze motors MDXKX and MDXQX) • Temperature sensor PTC – PTC temperature sensor with defined tripping temperature (see DIN 44081 and DIN 44082) • Thermal contact TKO – Thermostat/normally closed contact
Other monitorings	KTY, PTC and TKO do not offer full protection. To improve the monitoring, Lenze recommends a bimetal relay.
Alternative monitoring	Comparators (CMP1 ... CMP3) monitor and a time element (TRANS1 ... TRANS4) limits the motor current (blocking current) at low speed or if the motor is in standstill. This function can be implemented by interconnecting the corresponding function blocks.
Reactions	Different, depending on the temperature monitoring. 🕮 7-205

Stop!

Do not connect an external voltage to the inputs.

	Lenze motors			**Motors of other manufacturers**		
	MDXKX and MDXQX		**with thermal contact**	**with sensor for continuous temperature detection**		**with thermal contact or PTC to DIN 44081/44082**
Connection	• Resolver input X7: – Pin X7/8 = PTC+ Pin X7/9 = PTC- • Encoder input X8: – Pin X8/8 = PTC+ Pin X8/5 = PTC-		Terminals T1/T2 next to the terminals U, V, W	• Resolver input X7: – Pin X7/8 = PTC+ Pin X7/9 = PTC- • Encoder input X8: – Pin X8/8 = PTC+ Pin X8/5 = PTC-		Terminals T1/T2 next to the terminals U, V, W
Fault message	(MONIT-)OH3	(MONIT-)OH7	(MONIT-)OH8	(MONIT-)OH3	(MONIT-)OH7	(MONIT-)OH8
Possible reactions	The corresponding monitoring and thus the following codes are preset under C0086					
	• Trip (C0583 = 0) • OFF (C0583 = 3)	• Warning (C0584 = 2) • OFF (C0584 = 3)	• Trip (C0585 = 0) • Warning (C0585 = 2) • OFF (C0585 = 3)	• Trip (C0583 = 0) • OFF (C0583 = 3)	• Warning (C0584 = 2) • OFF (C0584 = 3)	• Trip (C0585 = 0) • Warning (C0585 = 2) • OFF (C0585 = 3)
Point of release	fixed at 150 ° C	adjustable 45°C ... 150°C (C0121)	fixed, (depending on PTC/thermal contact): PTC: at R_{ϑ} > 1600 Ω	fixed at 150 °C	adjustable 45°C ... 150°C (C0121)	fixed, (depending on PTC/thermal contact): PTC: at R_{ϑ} > 1600 Ω
Notes	• Monitoring is active in the factory setting. • If resolver (X7) and encoder (X8) are operated together: – Connect PTC only to one connector (X7 or X8) – The PTC connection of the other connector remains unconnected • Further information on the connection of the temperature sensor can be obtained from the description of the feedback system.		• Deactivate monitoring via X7 or X8 under C0583=3 and C0584=3 • Connection to DIN 44081 (see also Abb. 4-14).	• We recommend a Ziehl PTC (up to 150 °C): K15301075 or a thermostat. • Input characteristic. 🕮 4-29 • Deactivate monitoring via X7 or X8 under C0583=3 and C0584=3		• Deactivate monitoring via X7 or X8 under C0583=3 and C0584=3 • Connection to DIN 44081 (see also Abb. 4-14).

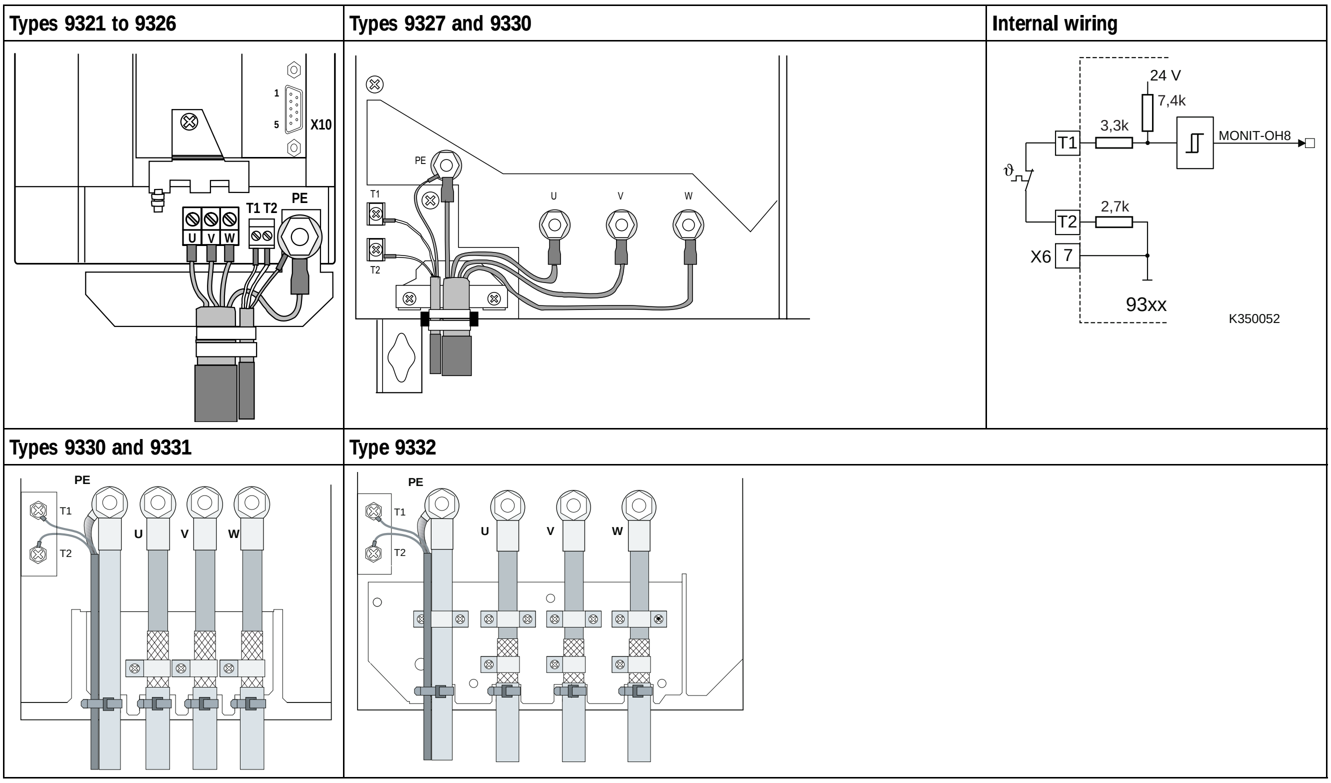
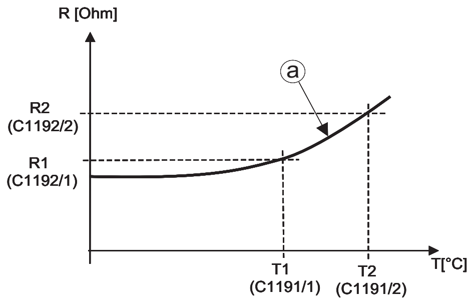


Abb. 4-14 Connection of a thermal sensor to the terminals T1 and T2 and interconnection

Note!

- The prefabricated Lenze system cables for **Lenze servo motors** provide the cable for the temperature feedback. The cables are designed for wiring according to EMC.
- If you use cables of your own:
  – Always lay cables separately from motor cables.

4.2.9.1 User-specific characteristic for a PTC resistor



Code	Subcode	Description
C1190	0 (Control mode 1)	Evaluation of the Lenze standard motor-temperature sensor
	1 (Control mode 2)	Evaluation of a user-specific temperature sensor. The operating level is almost in the linear section (a) of the sensor characteristic. The working area is determined by two vertex. Interpolation takes place between these two points.
C1191	1 (100 °C)	Definition of the temperature vertex assigned to the resistances of the sensor.
	2 (150 °C)	
C1192	1 (1670 Ω)	Definition of sensor resistances
	2 (2225 Ω)	

Example of a sensor characteristic for continuous temperature detection

4.2.10 Feedback systems

Different feedback systems can be connected to the controller:

- Resolver feedback (factory setting)
- Encoder feedback
  - – Incremental encoder TTL
  - – Sin/cos encoder
  - – Sin/cos encoder with serial communication (single turn)
  - – Sin/cos encoder with serial communication (multi turn)

Resolver signal or encoder signal can be output for slaves at the digital frequency output X10.

- Connection as shown in the figures:
  - – Use twisted pair cables and screened pair cables.
  - – Connect the screen at both ends.
  - – Use indicated cable cross-sections.
- The feedback system is activated under C0025.

Sensorless control SSC

The sensorless controller (SSC) should not be used for new drive solutions (C0025 = 1).

Instead, use a vector control EVF 9300 or contact Lenze.

Resolver connection (X7)

- In all configurations predefined under C0005, a resolver can be used as feedback system. An adjustment is not necessary.

Note!

Use prefabricated Lenze system cables for resolver connection.

Features:

- 2-pole resolver (V = 10 V, f = 4 kHz)
- Resolver and resolver cable are monitored for open circuit (fault indication Sd2)

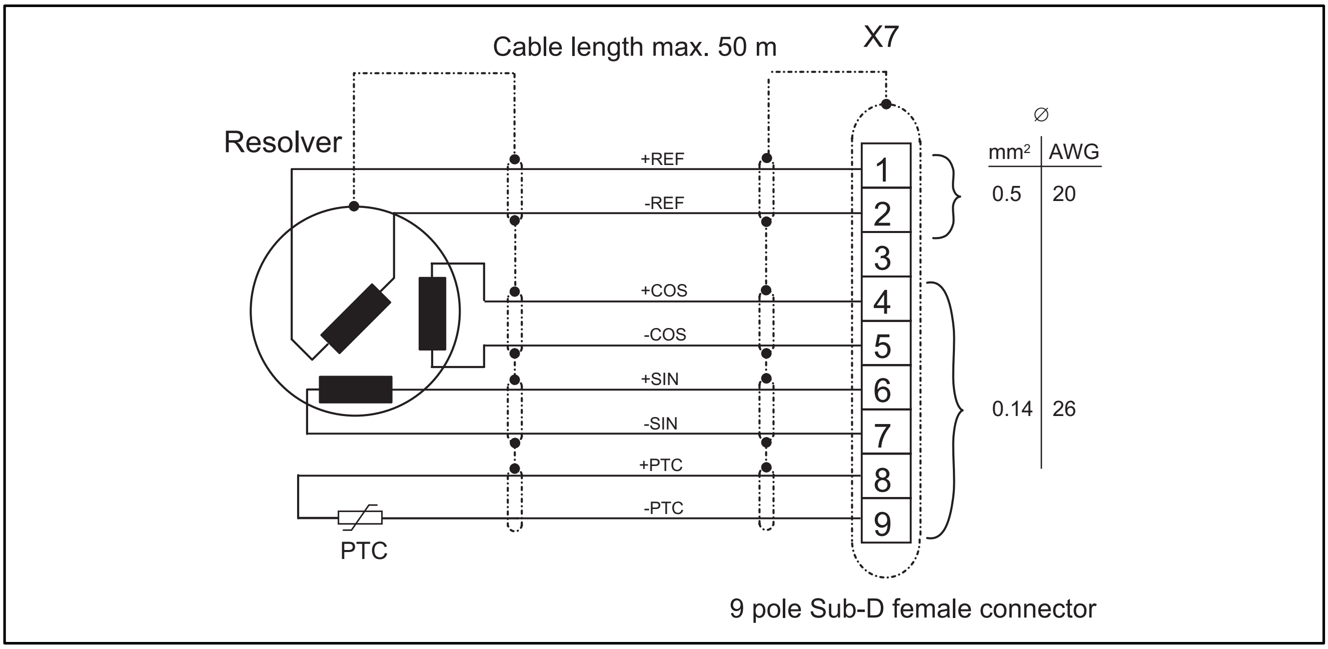


Abb. 4-15 Resolver connection

Assignment of the female connector (X7)									
Pin	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Signal	+Ref	-Ref	GND	+COS	-COS	+SIN	-SIN	+PTC (🕮 4-28)	-PTC (🕮 4-28)

Encoder connection (X8)

An incremental encoder or a sin/cos encoder can be connected to this input.

Note!

Use prefabricated Lenze system cables for encoder connection.

- The encoder supply voltage V_{CC5_E} can be adjusted in the range from 5 V to 8 V under C0421
  - to set the encoder supply
  - to compensate the voltage drop on the encoder cable, if necessary
    $\Delta V \approx 2$ * cable length * resistance/m * $I_{encoder}$

Stop!

Observe the connection voltage of the encoder system used. If C0421 is set too high, the encoder might be destroyed.

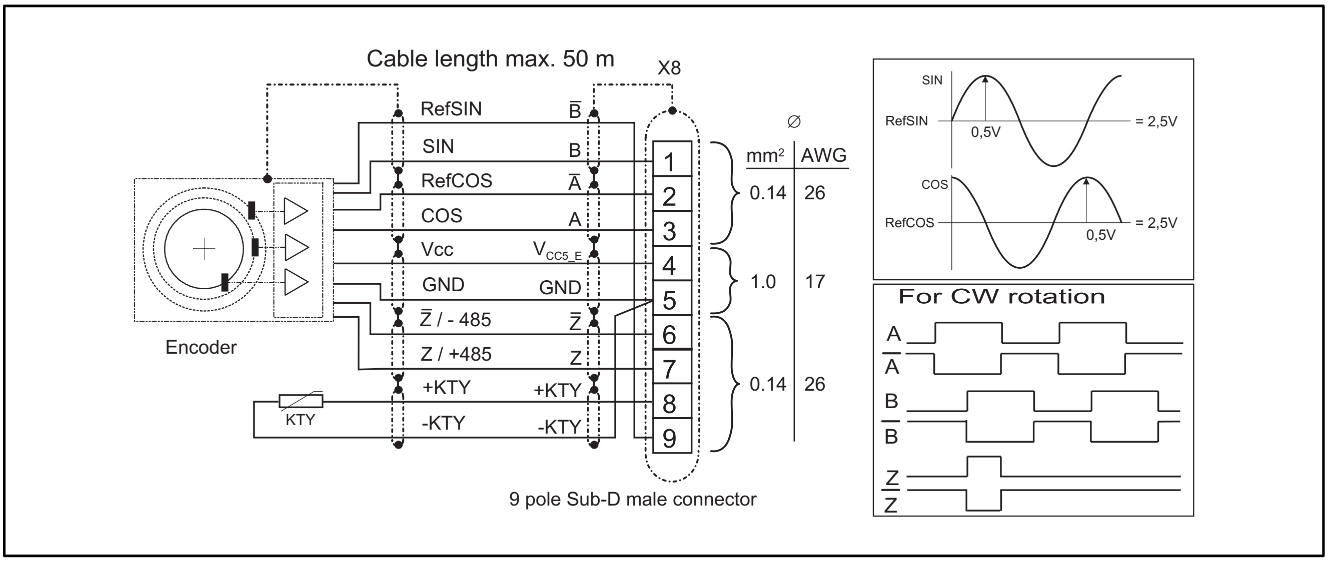


Abb. 4-16 Encoder connection

Incremental encoder

Features:

- Incremental encoders with two 5 V complementary signals shifted by 90 ° (TTL encoder) can be connected.
  – The zero track can be connected (as option).
- 9-pole Sub-D female connector
- Input frequency: 0 - 500 kHz
- Current consumption per channel: 6 mA

Assignment of the male connector (X8)									
Pin	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Signal	B	$\overline{A}$	A	V_{CC5_E}	GND (-PTC)	$\overline{Z}$	Z	+PTC (📖 4-28)	$\overline{B}$

Sin/cos encoder

Features:

- The following encoders can be connected
  – sin/cos encoders with a rated voltage from 5 V to 8 V.
  – sin/cos encoders with a communication interface, type Stegmann SCS/M70xxx (The initialization time of the controller is increased to approx. 2 seconds).
- 9-pole Sub-D female connector
- Internal resistance Ri = 221 Ω
- Voltage sine and cosine track: 1 Vss ±0.2 V
- Voltage RefSIN and RefCOS: +2,5 V

Note!

For drives with track indications assign: sine, $\overline{\text{sine}}$ and cosine, $\overline{\text{cosine}}$:
Assign RefSIN with $\overline{\text{sine}}$ and RefCOS with $\overline{\text{cosine}}$.

Assignment of the male connector (X8)									
Pin	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Signal	SIN	RefCOS	COS	V_{CC5_E}	GND (-PTC)	$\overline{Z}$ or -RS485	Z or +RS485	+PTC (📖 4-28)	RefSIN

4.3 Installation of a CE-typical drive system

General notes	● The electromagnetic compatibility of a machine depends on the type of installation and care taken. Please observe: – Assembly – Filters – Screening – Grounding ● For diverging installations, the conformity to the CE EMC Directive requires a check of the machine or system regarding the EMC limit values. This is for instance valid for – using unscreened cables – the use of group RFI filters instead of assigned RFI filters – operation without mains filter ● **The compliance of the machine application with the EMC Directive is in the responsibility of the user.** – If you observe the following measures, you can assume that the machine will operate without any EMC problems caused by the drive system, and that compliance with the EMC Directive and the EMC law is achieved. – If devices which do not comply with the CE requirement concerning noise immunity EN 50082-2 are operated close to the controller, these devices may be disturbed electromagnetically by the controllers.
Structure	● Connect controller, mains choke, and mains filter to the grounded mounting plate with a wire of as large a cross-section as possible: – Mounting plates with conductive surfaces (zinc-coated, stainless steel) allow permanent contact. – Painted plates are not suitable for the installation in accordance with the EMC. ● If you use several mounting plates: – Connect as much surface as possible of the mounting plates (e.g. with copper bands). ● Ensure the separation of motor cable and signal or mains cable. ● Do not use the same terminal strip for mains input and motor output. ● Cable guides as close as possible to the reference potential. Unguided cables have the same effect as aerials.
Filters	● Use mains filters or RFI filters and mains chokes which are assigned to the controller: – RFI filters reduce impermissible high-frequency interference to a permissible value. – Mains chokes reduce low-frequency interferences which depend on the motor cable and its length. – Mains filters combine the functions of mains choke and RFI filter.
Screening	● Connect the screen of the motor cable to the controller – to the screen connection of the controller. – additionally to the mounting plate with a surface as large as possible. – Recommendation: For the connection, use ground clamps on bare metal mounting surfaces. ● If contactors, motor-protecting switches or terminals are located in the motor cable: – Connect the screens of the connected cables also to the mounting plate, with a surface as large as possible. ● Connect the screen in the motor terminal box or on the motor housing to PE: – Metal glands at the motor terminal box ensure a connection of the screen and the motor housing. ● If the mains cable between mains filter and controller is longer than 300mm: – Screen mains cables. – Connect the screen of the mains cable directly to the inverter and to the mains filter and connect it to the mounting plate with as large a surface as possible. ● Use of a brake chopper: – Connect the screen of the brake resistor cable directly to the mounting plate, at the brake chopper and the brake resistor with as large a surface as possible. – Connect the screen of the cable between controller and brake chopper directly to the mounting plate, at the inverter and the brake chopper with a surface as large as possible. ● Screen the control cables: – Connect both screen ends of the digital control cables. – Connect one screen end of the analog control cables. – Always connect the screens to the screen connection at the controller over the shortest possible distance. ● Application of controllers in residential areas: – To limit the radio interference, use an additional screen damping ≥ 10 dB. This is usually achieved by installation in enclosed and grounded control cabinets made of metal.
Grounding	● Ground all metallically conductive components (controller, mains filter, motor filter, mains choke) using suitable cables connected to a central point (PE bar). ● Maintain the minimum cross-sections prescribed in the safety regulations: – For EMC, not the cable cross-section is important, but the surface and the contact with a cross-section as large as possible, i.e. large surface.

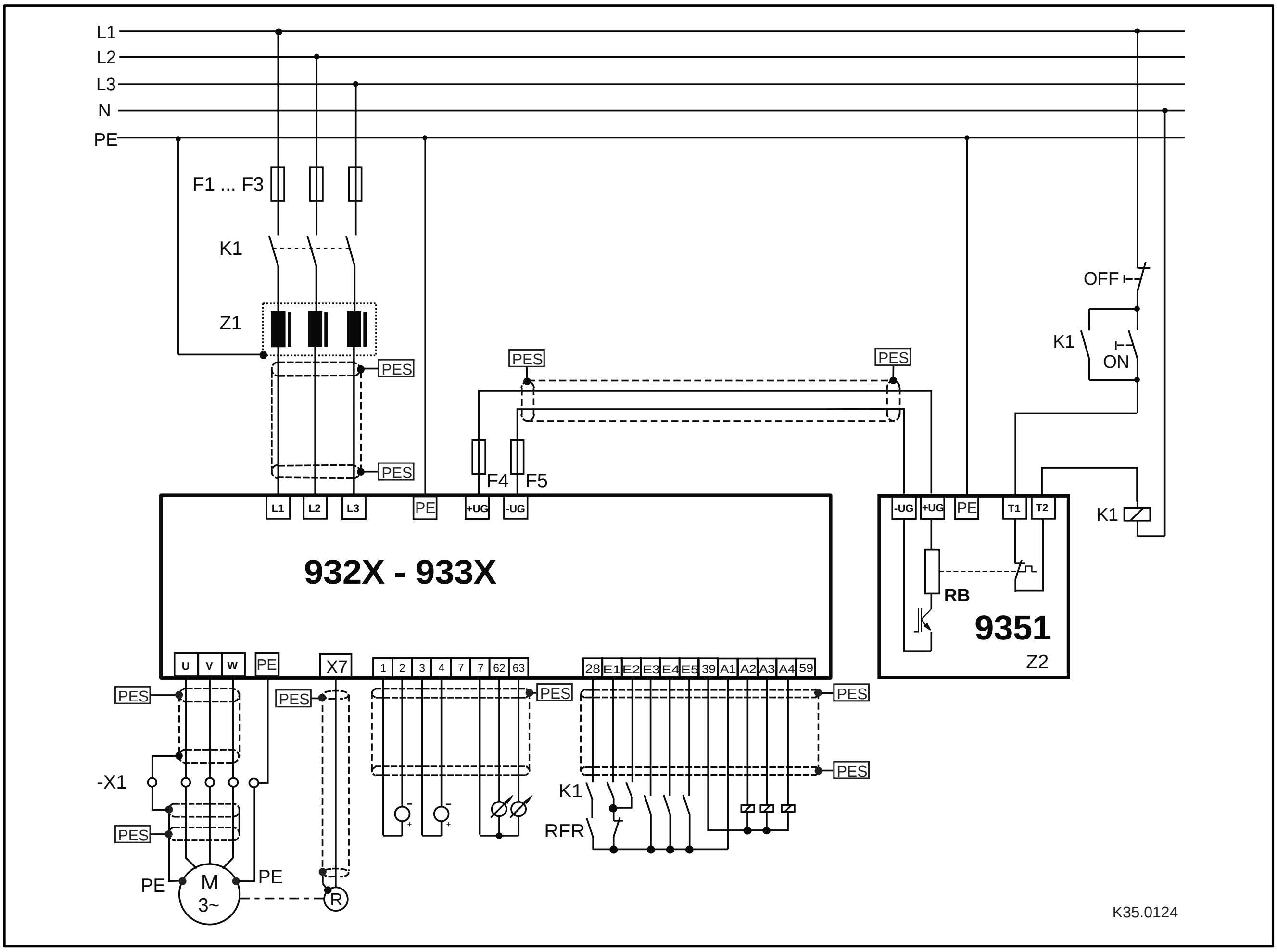


Abb. 4-17 Example for wiring in accordance with the EMC regulations

F1...F5	Protection, see “Cable protection” (🕮 3-6) / “mains connection” (🕮 4-13)
K1	Mains contactor
Z1	Mains filter “A” or “B” see Accessories.
Z2	Brake module, see Accessories.
-X1	Terminal strip in control cabinet
PES	RF scree termination by a PE connection with a surface as large as possible (see ”Screening” in this chapter).

EDS9300U--SC
00408839

Lenze

Manual
Part C

Commissioning

During operation

Global Drive
9300 servo inverter

Show/Hide Bookmarks

This manual is valid for the 93XX controllers of the versions

33.932X-	ES	2x.	2x		(9321 - 9329)
33.933X-	ES	2x.	2x		(9330 - 9332)
33.932X-	CS	2x.	2x	-V003	Cold Plate (9321 - 9328)

Controller type

Design:
Ex = Enclosure IP20
Cx = Cold Plate
xK = Cam profiler
xP = Servo position controller
xR = Register controller
xS = Servo inverter

Hardware version and index

Software version and index

Variant

Explanation

All indications given in these Operating instructions have been selected carefully and comply with the hardware and software described. Nevertheless, deviations cannot be ruled out. We do not take any responsibility or liability for damages which might possibly occur. Required corrections will be made in the following editions.

Version 1.0 07/99

Part C

Show/Hide Bookmarks

Contents

5 Commissioning

5.1 Initial switch-on

Stop!

Prior to initial switch-on of the controller, check the wiring for completeness, short-circuit, and earth fault:

- Power connection:
  – Supply via terminals L1, L2 and L3 (direct mains connection) or alternatively via terminals +UG, -UG (DC bus connection, network of drives)
- Motor connection:
  – In-phase connection to the motor (direction of rotation)
- Feedback system (resolver, incremental encoder, …)
- Control terminals:
  – Controller enable: terminal X5/28 (reference potential: X5/39)
  – Direction of rotation terminal X5/E1 or X5/E2 (reference potential: X5/39)
  – with external setpoint selection: terminals X6/1, X6/2 (reference potential: X6/7)
- Cover of the power terminals:
  – Put on cover(s) and fix.
- **Keep to the switch-on sequence!**

Tip!

- All specifications of the parameterization refer to the application example ”Speed control” in chapter LEERER MERKER.
- Use the convenient short set-up menus for the commissioning with the operating module 9371 BB or the PC and the Global Drive Control or LEMOC2 in which the codes for the most important settings are summarized (see also chapter LEERER MERKER).

5.1.1 Switch-on sequence

1. X5/28 (controller enable) must be open (LOW).
2. X5/E4 to HIGH signal (+13 V ... +30 V)
3. Switch on mains:
   – The controller is ready for operation after approx.0.5 s (2 s for drives with sine-cosine encoder with serial interface).
4. Adapt controller to the operating conditions under C0173:
   – If the controllers are not adapted, their lives are reduced.

C0173	Mains voltage	upper switch-off threshold	Operation
0	< 400 V	770 V	with or without brake unit
1 (default setting)	400 V		
2	400 V < $U_{Mains} \leq$ 460 V		
3	480 V		**without** brake unit
4	480 V	800 V	**with** brake unit

5. Enter motor data:
   - – For drives with Lenze motor: select motor under C0086.
   - – For drives with other motors: see chapter LEERER MERKER.
6. Select feedback system:
   - – Drives with resolver: no changes required.
   - – Drives with other feedback systems:
     Select feedback system under C0025.
     Set encoders voltage under C0421.
     (Menu: "Motor / Feedb.", submenu: "Feedback" or
     menu: "Motor/Feedback system", submenu: "Feedback systems")
   - – For sensorless speed control (SSC): C0025 = 1. Do not use this control for new applications (see chapter LEERER MERKER).
7. When the digital terminals X5 are supplied with internal voltage:
   - – Assign output X5/A1 with "FIXED1". Terminal X5/A1 supplies approx. 24 V (see also chapter 4.2.8.2 and LEERER MERKER)
8. When the analog terminals X6 are supplied with internal voltage:
   - – Assign output X6/63 (see also chapter 7.4.8) with "FIXED100%". The output on terminal X6/63 is 10V.

Tip!

For this application, you may use one of the predefined configurations in C0005.C0005 = XX1X (e.g. 1010 = speed control via terminals) automatically assigns the output X5/A1 to FIXED1.

---

9. Set the maximum speed under C0011.
10. Enter a direction of rotation (see chapter LEERER MERKER):
    - CW rotation: HIGH signal at X5/E1 (+13 V … +30 V)
    - CCW rotation: HIGH signal at X5/E2 (+13 V … +30 V)
11. Apply setpoint:
    - – Apply a voltage > 0 V (max. 10 V) at X6/1, X6/2.
    - – Do not activate a JOG setpoint (X5/E3 LOW).
12. Check whether the drive is ready for operation:
    - – When the green LED is flashing:
      Controller is ready for operation, go on with LEERER MERKER
    - – When green LED is dark and red LED is flashing:
      Interference occurred. Before proceeding with the commissioning, elininate the fault (see chapter LEERER MERKER "Troubleshooting and fault elimination").
13. Enable controller (see chapter LEERER MERKER):
    - – The green LED is illuminated if a HIGH signal is applied at X5/28 (+13 V … +30 V) and no other source of controller inhibit is active.
14. For operation with a fieldbus module, additional settings are necessary
    (see operating instructions of the corresponding fieldbus module).

The motor will now rotate with the setpoint speed and the selected direction of rotation.

Troubleshooting:

	Fault	**Cause / remedy**
Feedback system	- Motor rotates CCW when viewed to the motor shaft - C0060 counts down after controller enable	Feedback system is not connected in-phase - Connect feedback system in-phase
Asynchronous motor	Motor - rotates with I_{max} and 50% slip frequency - does not react on setpoint changes	Motor is not connected in-phase - Connect motor in-phase at the terminals U, V, W
Synchronous motor	- Motor does not follow the setpoint change - Imax follows the setpoint in idle running	
	- Motor rotates CCW when viewed to the motor shaft.	The rotor angle (offset of electrical and mechanical rotor angle) is not correct - Make a rotor position adjustment (C0095 = 1). For this, operate the motor without load.

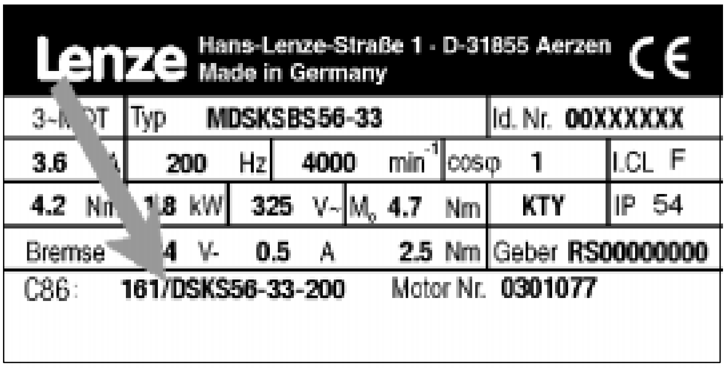
5.2 Input of the motor data

To achieve an optimum speed-torque behaviour of the drive, it is necessary to enter the nameplate data of the connected motor.

- If a LENZE motor is used:
  - – Select the motor type under C0086 (see code table).The controller sets all other motor data automatically.
  - – To achieve outstanding accuracy you can enter the eight-digit designation of the motor nameplate ”Geber” (encoder”) under C0416 when using motors with resolvers (optional).

Tip!

Obtain the motor type from the nameplate.Example: “161”. The motor designation behind this number is shown in the display (”DSKS56-33-200”).



- If the motor type is not listed under C0086, select a Lenze motor with similar data under C0086 (see table). You have to change the following motor data manually:
  - – C0006: Operating mode of the motor control
  - – C0022: Adapt I_{max} to the maximum motor current
  - – C0081: Rated motor power
  - – C0087: Rated motor speed
  - – C0088: Rated motor current
  - – C0089: Rated motor frequency

- C0090: Rated motor voltage
- C0091: Motor-cos φ
- User-specific detection of the motor temperature (see chapter LEERER MERKER)

Only for very high requirements to the control features:

- C0084: Stator resistance of the motor
- C0085: Leakage inductance of the motor

Tip!

- All required inputs are contained in the menu ”motor/feedb.” (”motor/feedback system”).
- If you select a motor type under C0086 and change one of the above listed motor data subsequently, C0086 = o (COMMON) is set (i.e. no Lenze motor is used).
- Do not operate reluctance motors.

C0086		**Lenze motor type**	**C0081**	**C0087**	**C0088**	**C0089**	**C0090**	**Motor type**	**Thermal sensor**
No.	**Display**		P_r [kW]	n_r [rpm]	I_r [A]	f_r [Hz]	U_r [V]		
10	DSKA56-140	MDSKAXX056-22	0.80	3950	2.4	140	390	Asynchronous servo motor	KTY
11	DFKA71-120	MDFKAXX071-22	2.20	3410	6.0	120			
12	DSKA71-140	MDSKAXX071-22	1.70	4050	4.4	140			
13	DFKA80-60	MDFKAXX080-22	2.10	1635	4.8	60			
14	DSKA80-70	MDSKAXX080-22	1.40	2000	3.3	70			
15	DFKA80-120	MDFKAXX080-22	3.90	3455	9.1	120			
16	DSKA80-140	MDSKAXX080-22	2.30	4100	5.8	140			
17	DFKA90-60	MDFKAXX090-22	3.80	1680	8.5	60			
18	DSKA90-80	MDSKAXX090-22	2.60	2300	5.5	80			
19	DFKA90-120	MDFKAXX090-22	6.90	3480	15.8	120			
20	DSKA90-140	MDSKAXX090-22	4.10	4110	10.2	140	350		
21	DFKA100-60	MDFKAXX100-22	6.40	1700	13.9	60	390		
22	DSKA100-80	MDSKAXX100-22	4.00	2340	8.2	80			
23	DFKA100-120	MDFKAXX100-22	13.20	3510	28.7	120			
24	DSKA100-140	MDSKAXX100-22	5.20	4150	14.0	140	330		
25	DFKA112-60	MDFKAXX112-22	11.00	1710	22.5	60	390		
26	DSKA112-85	MDSKAXX112-22	6.40	2490	13.5	85			
27	DFKA112-120	MDFKAXX112-22	20.30	3520	42.5	120			
28	DSKA112-140	MDSKAXX112-22	7.40	4160	19.8	140	320		
30	DFQA100-50	MDFQAXX100-22	10.60	1420	26.5	50	360		
31	DFQA100-100	MDFQAXX100-22	20.30	2930	46.9	100			
32	DFQA112-28	MDFQAXX112-22	11.50	760	27.2	28			
33	DFQA112-58	MDFQAXX112-22	22.70	1670	49.1	58			
34	DFQA132-20	MDFQAXX132-32	17.00	550	45.2	20			
35	DFQA132-42	MDFQAXX132-32	40.30	1200	88.8	42			
40	DFQA112-50	MDFQAXX112-22	20.10	1425	43.7	50			
41	DFQA112-100	MDFQAXX112-22	38.40	2935	81.9	100			
42	DFQA132-36	MDFQAXX132-32	36.40	1030	77.4	39			
43	DFQA132-76	MDFQAXX132-32	60.10	2235	144.8	76	340		

C0086		Lenze motor type	C0081	C0087	C0088	C0089	C0090	Motor type	Thermal sensor
No.	Display		P_r [kW]	n_r [rpm]	I_r [A]	f_r [Hz]	U_r [V]		
50	DSVA56-140	DSVAXX056-22	0.80	3950	2.4	140	390	Asynchronous servo motor	TKO (Thermal contact)
51	DFVA71-120	DFVAXX071-22	2.20	3410	6.0	120			
52	DSVA71-140	DSVAXX071-22	1.70	4050	4.4	140			
53	DFVA80-60	DFVAXX080-22	2.10	1635	4.8	60			
54	DSVA80-70	DSVAXX080-22	1.40	2000	3.3	70			
55	DFVA80-120	DFVAXX080-22	3.90	3455	9.1	120			
56	DSVA80-140	DSVAXX080-22	2.30	4100	5.8	140			
57	DFVA90-60	DFVAXX090-22	3.80	1680	8.5	60			
58	DSVA90-80	DSVAXX090-22	2.60	2300	5.5	80			
59	DFVA90-120	DFVAXX090-22	6.90	3480	15.8	120			
60	DSVA90-140	DSVAXX090-22	4.10	4110	10.2	140	350		
61	DFVA100-60	DFVAXX100-22	6.40	1700	13.9	60	390		
62	DSVA100-80	DSVAXX100-22	4.00	2340	8.2	80			
63	DFVA100-120	DFVAXX100-22	13.20	3510	28.7	120			
64	DSVA100-140	DSVAXX100-22	5.20	4150	14.0	140	330		
65	DFVA112-60	DFVAXX112-22	11.00	1710	22.5	60	390		
66	DSVA112-85	DSVAXX112-22	6.40	2490	13.5	85			
67	DFVA112-120	DFVAXX112-22	20.30	3520	42.5	120			
68	DSVA112-140	DSVAXX112-22	7.40	4160	19.8	140	320		
108	DSKS36-13-200	MDSKSXX036-13	0.25	4000	0.9	200	245	Synchronous servo motor	KTY
109	DSKS36-23-200	MDSKSXX036-23	0.54	4000	1.1	200	345		
110	DSKS56-23-150	MDSKSXX056-23	0.60	3000	1.25	150	350		
111	DSKS56-33-150	MDSKSXX056-33	0.91	3000	2.0	150	340		
112	DSKS71-13-150	MDSKSXX071-13	1.57	3000	3.1	150	360		
113	DFKS71-13-150	MDFKSXX071-13	2.29	3000	4.35	150	385		
114	DSKS71-23-150	MDSKSXX071-23	2.33	3000	4.85	150	360		
115	DFKS71-23-150	MDFKSXX071-23	3.14	3000	6.25	150	375		
116	DSKS71-33-150	MDSKSXX071-33	3.11	3000	6.7	150	330		
117	DFKS71-33-150	MDFKSXX071-33	4.24	3000	9.1	150	345		
160	DSKS56-23-190	MDSKSXX056-23	1.1	3800	2.3	190	330		
161	DSKS56-33-200	MDSKSXX056-33	1.8	4000	3.6	200	325		
162	DSKS71-03-170	MDSKSXX071-03	2.0	3400	4.2	170	330		
163	DFKS71-03-165	MDFKSXX071-03	2.6	3300	5.6	165	330		
164	DSKS71-13-185	MDSKSXX071-13	3.2	3700	7.0	185	325		
165	DFKS71-13-180	MDFKSXX071-13	4.1	3600	9.2	180	325		
166	DSKS71-33-180	MDSKSXX071-33	4.6	3600	10.0	180	325		
167	DFKS71-33-175	MDFKSXX071-33	5.9	3500	13.1	175	325		

C0086		Lenze motor type	C0081	C0087	C0088	C0089	C0090	Motor type	Thermal sensor
No.	Display		P_r [kW]	n_r [rpm]	I_r [A]	f_r [Hz]	U_r [V]		
210	DXRA071-12-50	DXRAXX071-12	0.25	1410	0.9	50	400	Asynchronous inverter motor (in star connection)	TKO (Thermal contact)
211	DXRA071-22-50	DXRAXX071-22	0.37	1398	1.2				
212	DXRA080-12-50	DXRAXX080-12	0.55	1400	1.7				
213	DXRA080-22-50	DXRAXX080-22	0.75	1410	2.3				
214	DXRA090-12-50	DXRAXX090-12	1.10	1420	2.7				
215	DXRA090-32-50	DXRAXX090-32	1.50	1415	3.6				
216	DXRA100-22-50	DXRAXX100-22	2.20	1425	4.8				
217	DXRA100-32-50	DXRAXX100-32	3.00	1415	6.6				
218	DXRA112-12-50	DXRAXX112-12	4.00	1435	8.3				
219	DXRA132-12-50	DXRAXX132-12	5.50	1450	11.0				
220	DXRA132-22-50	DXRAXX132-22	7.50	1450	14.6				
221	DXRA160-12-50	DXRAXX160-12	11.00	1460	21.0				
222	DXRA160-22-50	DXRAXX160-22	15.00	1460	27.8				
223	DXRA180-12-50	DXRAXX180-12	18.50	1470	32.8				
224	DXRA180-22-50	DXRAXX180-22	22.00	1456	38.8				
225	30kW-ASM-50		30.00	1470	52.0				
226	37kW-ASM-50		37.00	1470	66.0				
227	45kW-ASM-50		45.00	1480	82.0				
228	55kW-ASM-50		55.00	1480	93.0				
229	75kW-ASM-50		75.00	1480	132.0				
250	DXRA071-12-87	DXRAXX071-12	0.43	2525	1.5	87	400	Asynchronous inverter motor (in delta connection)	TKO (Thermal contact)
251	DXRA071-22-87	DXRAXX071-22	0.64	2515	2.0				
252	DXRA080-12-87	DXRAXX080-12	0.95	2515	2.9				
253	DXRA080-22-87	DXRAXX080-22	1.3	2525	4.0				
254	DXRA090-12-87	DXRAXX090-12	1.95	2535	4.7				
255	DXRA090-32-87	DXRAXX090-32	2.7	2530	6.2				
256	DXRA100-22-87	DXRAXX100-22	3.9	2535	8.3				
257	DXRA100-32-87	DXRAXX100-32	5.35	2530	11.4				
258	DXRA112-12-87	DXRAXX112-12	7.10	2545	14.3				
259	DXRA132-12-87	DXRAXX132-12	9.7	2555	19.1				
260	DXRA132-22-87	DXRAXX132-22	13.2	2555	25.4				
261	DXRA160-12-87	DXRAXX160-12	19.3	2565	36.5				
262	DXRA160-22-87	DXRAXX160-22	26.4	2565	48.4				
263	DXRA180-12-87	DXRAXX180-12	32.4	2575	57.8				
264	DXRA180-22-87	DXRAXX180-22	38.7	2560	67.4				
265	30kW-ASM-87		52.00	2546	90.0				
266	37kW-ASM-87		64.00	2546	114.0				
267	45kW-ASM-87		78.00	2563	142.0				
268	55kW-ASM-87		95.00	2563	161.0				
269	75kW-ASM-87		130.00	2563	228.0				

5.3 Controller enable

- The controller is enabled only after all sources of controller inhibit have been reset (series connection of all sources).
  – When the controller is enabled, the green LED on the controller is illuminated.
- The active sources of the controller inhibit are displayed under C0183 (see also menu: Diagnostic; Actual info.

The following table shows the conditions for the controller enable:

Source controller inhibit	Controller inhibited	Controller enabled	Note
Terminal X5/28	0 V ... +4 V	+13 V ... +30 V	-

Operating unit	STOP key	RUN key	Inhibit with the STOP key is possible only if the STOP key is assigned with "CINH" under C0469.
Fault	In case of TRIP In case of Message	TRIP reset	For check see chapter LEERER MERKER
System bus	Transmission of the control information INHIBIT via C0135	Transmission of the control information ENABLE via C0135	see systems manual
Field bus module	See operating instructions of the corresponding fieldbus module		-

Tip!

All sources act like a series connection of switches which are independent of each other.

5.4 Input of the direction of rotation

Based on the factory setting, the motor direction of rotation depends on

- the sign of the speed setpoint (link of main and additional setpoint).
- the triggering of the digital inputs X5/E1 and X5/E2.

5.5 Quick stop

Using the quick stop function (QSP), you can stop the drive for a time to be set, independently of the setpoint input.

In the factory setting, the quick stop function is active:

- If, during mains connection
  – X5/E1 = HIGH and X5/E2 = HIGH or
  – X5/E1 = LOW and X5/E2 = LOW
- If, during operation
  – X5/E1 = LOW and X5/E2 = LOW
  QSP is recognized by the controller if a LOW signal is applied at X5/E1 and X5/E2 for more than approx. 2 ms.

Function:

- The speed decelerates to zero according to the set deceleration time under C0105 (factory setting = 0 s).The drive stop driftfree.
- The drive accelerates to its setpoint along the set ramps if one of the inputs is triggered with a HIGH level.
  – If the speed was not zero, the controller synchronizes to the actual speed.

5.6 Change of the internal control structure

The internal control structure is adapted to the application (e.g. speed control, torque control, phase control, ...) via code C0005 (see chapter LEERER MERKER). For this, the controller must first be inhibited.

Stop!

When the internal control structure is changed, another terminal assignment may result.

5.7 Changing the terminal assignment

(see also chapter 7.3 ”Working with function blocks”)

If you change the configuration under C0005, the assignment of all inputs and outputs with their corresponding default assignment is overwritten.If necessary, you have to adapt the function assignment to your wiring.

Tip!

Use the menu ”Terminal I/O” when the 9371BB operating module is used or the menu ”Terminal I/O” with Global Drive Control or LEMOC2.

Stop!

If you reassign an input, the previously assigned signal source is **not** overwritten! Remove unwanted active links (see chapter 7.3.3).

5.7.1 Freely assignable digital inputs

Five freely assignable digital inputs are available (X5/E1 … X5/E5). You can determine a polarity for every input and thus define whether the input is HIGH active or LOW active.

Change assignment:

Tip!

Use the submenu ”DIGIN” with the 9371BB operating module or the submenu ”Digital inputs” with Global Drive Control or LEMOC2.

Example:
Menu ”Terminal I/O; DIGIN” (Terminals I/O;digital inputs)

The most important targets for digital inputs are listed below

Valid for the basic configuration C0005 = 1000.

Code			controlled by		Note
CFG	Subcode	Signal name	Signal (interface)	Selection list 2	
C0885	000	R/L/Q-R	DIGIN1 (Terminal X5/E1)	0051	HIGH = Main setpoint not inverted (CW rotation)
C0886	000	R/L/Q-L	DIGIN2 (Terminal X5/E2)	0052	HIGH = Main setpoint inverted (CCW rotation)
C0787	001	NSET-JOG*1	DIGIN3 (Terminal X5/E3)	0053	HIGH = Fixed speed of C0039/x has priority over main setpoint The signals are binary coded.
	002	NSET-JOG*2	FIXED0 -	1000	
	003	NSET-JOG*4	FIXED0 -	1000	
	004	NSET-JOG*8	FIXED0 -	1000	

Code			controlled by			Note
CFG	Subcode	Signal name	Signal (interface)		Selection list 2	
C0788	001	NSET-TI*1	FIXED0	-	1000	Additional acceleration and deceleration times of C0101/x and C0103/x The signals are binary coded.
	002	NSET-TI*2	FIXED0	-	1000	
	003	NSET-TI*4	FIXED0	-	1000	
	004	NSET-TI*8	FIXED0	-	1000	
C0880	001	DCTRL-PAR*1	FIXED0	-	1000	Parameter set selection: The signals are binary coded (see chapter 7.7.3.4)
	002	DCTRL-PAR*2	FIXED0	-	1000	
C0881	000	DCTRL-PAR-LOAD	FIXED0	-	1000	LOW-HIGH edge loads the parameter set selected with DCTRL-PAR*x
C0871	000	DCTRL-TRIP-SET	DIGIN4	(Terminal X5/E4)	0054	LOW = controller sets TRIP (EEr)
C0876	-	DCTRL-TRIP-RES	DIGIN5	(Terminal X5/E5)	0055	LOW-HIGH edge = resets active trip
C0920	000	REF-ON	FIXED0	-	1000	HIGH = start homing
C0921	000	REF-MARK	FIXED0	-	1000	LOW-HIGH edge = stop homing

1. Select the input of the function block for which you want to assign another source, via the configuration code CFG in the code level.
   - – Example:
     C0787/2 (CFG/subcode) determines the source for the input ”NSET-JOG*2” (signal name) in the function block ”Speed setpoint conditioning” (NSET).
2. Change to the parameter level using PRG. Select the source (signal) from the displayed list.Determine the origin of the signal for the control of this input.
   - – Example:
     ”NSET-JOG*2” is to be controlled by terminal X5/E5 (interface).
   - – Select DIGIN5 (signal) and confirm with SHIFT + PRG.
3. Change to the code level by pressing PRG twice.
4. Determine the polarity or the input terminals X5/E1 to X5/E5 (HIGH active or LOW active) under C0114 and subcode.
   - – Select the terminal in the code level via subcode.
   - – Change to the parameter level using PRG and select the polarity.
   - – Change to the code level by presing PRG twice.
5. Repeat step 1 to 4 until all desired inputs are assigned.
6. Remove unwanted connections (see chapter 7.3.3). The previous connection of terminal X5/5 is not removed automatically.If you want to remove the connection:
   - – Select C0876 in the code level (previous target of terminal X5/E5)
   - – Change to the parameter level using PRG.
   - – Select FIXED0 (signal) and confirm with SHIFT+PRG.

5.7.2 Freely assignable digital outputs

Four freely assignable digital outputs are available (X5/A1 … X5/A4). You can determine a polarity for every input and thus define whether the input is HIGH active or LOW active.

The most important codes are listed in the submenu: DIGOUT (digital outputs)

Change assignment:

1. Select the output which is to be assigned to another function under C0117 via the subcode.
2. Change to the parameter level using PRG.Select the signal which is to be output by the selected output terminal, from the displayed list.Change to the code level using PRG.
3. Determine the polarity (HIGH active or LOW active) under C0118 via the subcode of the output.

4. Repeat step 1 to 3 until all desired outputs are assigned.

5.7.3 Freely assignable analog inputs

The most important codes are listed in the submenu: AIN1 X6.1/2 or AIN2 X6.3/4 (analog input 1 (X6.1/2) or analog input 2 (X6.3/4))

Change assignment:

1. Select the input of the function block to which you want to assign another source, in the code level.
   - – Example
     Determine the source for the input ”main setpoint” (NSET-N) in the function block ”speed setpoint conditioning” (NSET) under C0780.
2. Change to the parameter level using PRG.Select the signal which is to be used as a source for the selected input, from the displayed list.
3. Repeat step 1 and 2 until all desired inputs are assigned.
4. Remove unwanted links (see chapter 7.3.3).

5.7.4 Freely assignable monitor outputs

You can output internal signals as voltage signals via the monitor outputs X6/62 and X6/63.

You can adapt the outputs to a measuring instrument or a slave under C0108 and C0109.

The most important codes are listed in the submenu: AOUT1 X6.62 or AIN2 X6.63 (analog output 1 (X6.62) or analog output 1 (X6.63))

Change assignment:

1. Select the output to which you want to assign another signal (source) in the code level (e.g. C0431 for output X6/62).
2. Change to the parameter level using PRG.Select the signal which is to be output by the monitor output, from the displayed list.
3. Adjust an offset in the connected hardware under C0109, if necessary.
4. Adapt the signal gain of the connected hardware under C0108, if necessary.
5. Repeat step 1 to 4 to assign the second ouput.

6 During operation

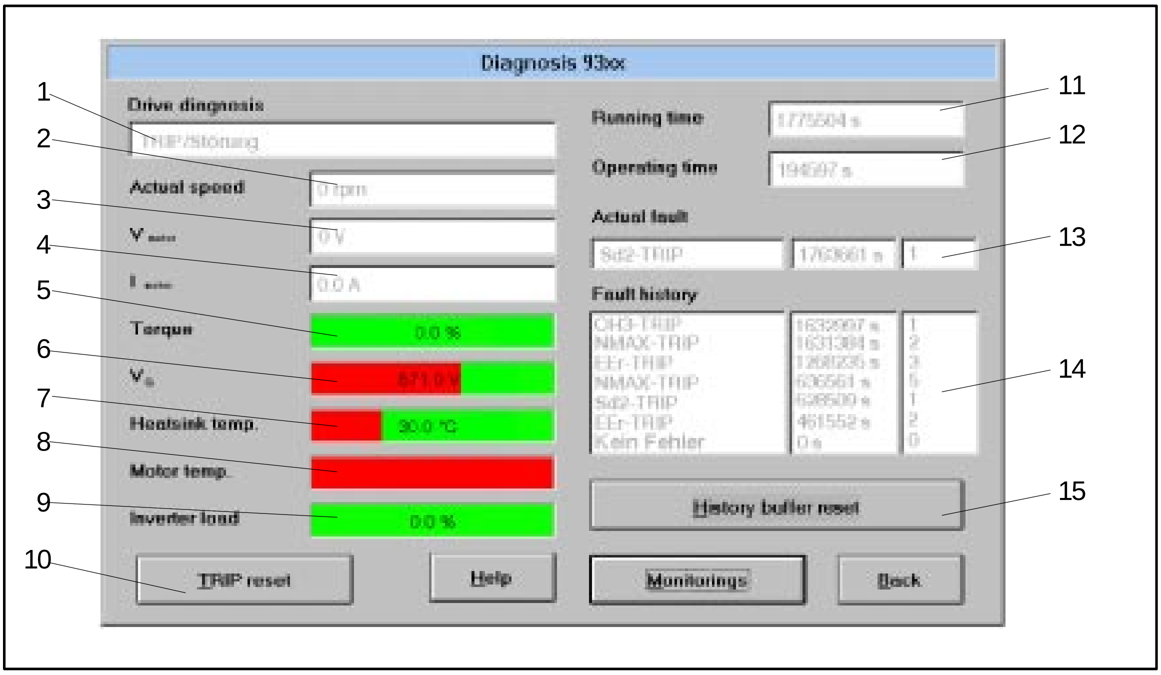
6.1 Status indications

6.1.1 On the 9371 BB keypad

Status messages on the keypad		
Display	**on**	**off**
RDY	Ready for operation	Initializing or fault
IMP	Power outputs inhibited	Power outputs enabled
FAIL	Active fault (TRIP, fail-QSP, message or warning)	No fault
I_{MAX}	Motor current setpoint ≥ C0022	Motor current setpoint < C0022
M_{MAX}	Speed controller within its limitation. Drive is torque controlled.	Speed-controlled drive

6.1.2 In Global Drive Control

1. Click the ”Control” button in the ”Basic settings” dialog box.
2. Click the ”Diagnostic” button in the ”Control” dialog box.



Drive diagnosis
TRIP/Störung

Actual speed 0 rpm
V_{motor} 0 V
I_{motor} 0.0 A
Torque 0.0 %
V_G 571.0 V
Heatsink temp. 30.0 °C
Motor temp.
Inverter load 0.0 %

Running time 1775504 s
Operating time 194697 s

Actual fault

Sd2-TRIP	1763661 s	1

Fault history

OH3-TRIP	1632997 s	1
NMAX-TRIP	1631384 s	2
EEr-TRIP	1268235 s	3
NMAX-TRIP	636561 s	5
Sd2-TRIP	628509 s	1
EEr-TRIP	461552 s	2
Kein Fehler	0 s	0

Abb. 6-1 Dialog box ”Diagnostics 9300”

1	Type of fault
2	Actual speed
3	Actual motor voltage
4	Actual motor current
5	Motor torque
6	DC-bus voltage
7	Heat sink temperature
8	Motor temperature
9	Controller load
10	Reset fault
11	Time when the supply voltage was applied
12	Time when the controller was enabled
13	Actual fault with time and frequency of the fault. 🕮 8-3
14	Fault history with time and frequency of the fault. 🕮 8-3
15	Reset history buffer. 🕮 8-4

6.2 Information on operation

Please observe the following notes for controller operation:

Stop!

- Cyclic connection and disconnection of the supply voltage at L1, L2, L3 or $+U_{DC}$, $-U_G$ mgiht overload the internal input current limit:
  – Allow at least 3 minutes between disconnection and reconnection.

- During mains switching (L1,L2,L3) it is not important whether further controllers are supplied via the DC bus.

6.2.1 Switching on the motor side

- Switching on the motor side of the inverter is permissible for emergency switch-off.
- Please note:
  – Switching while a controller is enabled may cause the fault indication ”0Cx” (short-circuit/earth fault in operating case x).
  – For long motor cables and operation of controllers with smaller output power, leakage currents through interfering cable capacitances may cause the fault indication ”OCx”.
  – Switching equipment on the motor side must be dimensioned for DC voltages (V_{DC} max = 800 V).

6.2.2 Controller protection by current derating

Valid for the types 9326 to 9332.

For field frequencies < 5 Hz the controller automatically derates the maximum permissible output current.

- For operation with chopping frequency = 8 KHz (C0018=1, optimum power):
  - – The current limit is derated according to the heat sink temperature (see Abb. 6-2).
- For operation with chopping frequency = 16 KHz (C0018=2, optimum noise):
  - – The current limit is always derated to $I_{r16} = I_{016}$.
- For operation with automatic changeover of the chopping frequency (C0018=0):
  - – Below the threshold, the controller operates with 16 kHz (optimum noise). The function of the current limitation follows the characteristic ”Imax 16 KHz” (see Abb. 6-2).
  - – If the machine requires a higher torque, for example for acceleration, the controller automatically switches to 8 kHz (optimum power). The function of the current limitation follows the characteristic ”Imax 8 KHz” (see Abb. 6-2).

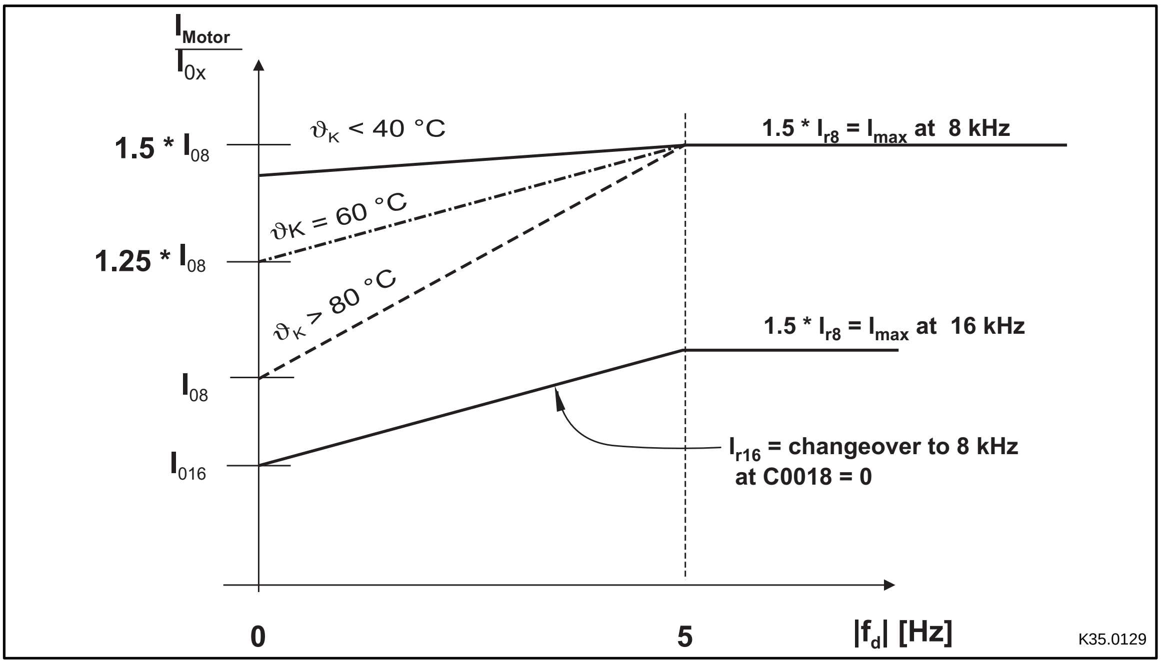


Abb. 6-2 Current derating function for types 9326 to 9332

ϑ_K	Heat sink temperature
I_{rx}	Rated current at U, V, W depends on the chopper frequency
f_d	Field frequency at output U, V, W
I_{0x}	Max. standstill current at field frequency = 0 Hz

See also chapter “Rated data”. 🕮 3-3

Show/Hide Bookmarks

EDS9300U--SD1.1
00408840

Lenze

Manual
Part D1.1

Configuration servo inverter

Global Drive

9300 servo inverter

Show/Hide Bookmarks

This manual is valid for the 93XX controllers of the versions

33.932X- ES 2x. 2x (9321 - 9329)

33.933X- ES 2x. 2x (9330 - 9332)

33.932X- CS 2x. 2x -V003 Cold Plate (9321 - 9328)

Controller type

Design:
Ex = Enclosure IP20
Cx = Cold Plate
xK = Cam profiler
xP = Servo position controller
xR = Register controller
xS = Servo inverter

Hardware version and index

Software version and index

Variant

Explanation

Version 1.0 07/99

Part D1.1

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7 Configuration

Every practical application demands certain application-specific configurations (programs).

For this, function blocks are available which can be connected for the corresponding application. The function blocks are linked via codes. (📖 7-31)

7.1 Predefined configurations

Basic configurations are already defined for standard applications of the controller. These basic configurations can be selected via code C0005. The signal flow charts for the most important basic configurations are listed in the appendix.

7.1.1 Working with predefined configurations

To adapt predefined configurations to your application, proceed as follows:

1. Select basic configuration under C0005.
2. Select operating mode under C0005. (📖 7-1)
3. Configure different signal flow charts, if necessary:
   - – Integrate or remove function blocks. (📖 7-31)
   - – Set parameters for function blocks. (📖 7-32)
   - – Change terminal configuration.

Note!

If the signal flow for the basic configuration is changed, e.g. by adding function blocks, C0005 is set to ”0”. The message ”COMMON” is displayed.

If only the assignment of the control inputs and outputs is changed, C0005 remains the same. Under code C0464 an identification is displayed.

7.1.2 Speed control C0005 = 1XXX (1000)

For standard applications,you can immediately commission the drive with the default settings. To adapt it to special requirements, please observe the notes in the following sections.

7.1.2.1 Setpoint input

Main setpoint

The speed is determined via the setpoint n_{set}(display in C0046), related to the adjustable value n_{max} (C0011). The setpoint is provided bipolar via the input X6/1,2. When a master voltage of 10 V is applied, the drive rotates with the speed set under C0011. If you want to operate the controller with a lower master voltage, you can adapt the system via the codes C0026/1 (offset) and C0027/1 (gain). Alternatively, you can also enter the setpoints via

- keypad,
- integrated system bus (CAN),
- automation interface (LECOM, InterBus, Profibus DP, RS 232, RS 485, fiber optics).

Which of these inputs is active as setpoint source, depends on the selected configuration C0005. The setpoint source can also be set under the configuration code C0780 in the NSET function block.

Master current

If the analog main setpoint is to be entered as master current via X6/1,2, you can select the current range under code C0034:

- For -20 mA … +20 mA: C0034 = 2
- For 4 … 20 mA: C0034 = 1 (can only be used unipolar)

If the range 4…20 mA is selected, the error code Sd5 is indicated when the value falls below 2 mA.

For this, the signal is conditioned in function block AIN1.

The change from master voltage to master current (load resistor 242R) must be carried out via the jumper setting at X3:

- Master voltage/potentiometer:
  – Jumper X3 in the bottom position (default setting)
- Master curent:
  – Jumper X3 in the top position

JOG setpoints

If you need fixed settings as a main setpoint, you can retrieve setpoints which you have parameterized via the JOG inputs, from the memory. JOG setpoints replace the main setpoint. Enter the JOG setpoints as relative values in % of n_{max}. If you apply a HIGH signal to input E3, the main setpoint is switched off and the first JOG setpoint is activated at the same time. A maximum of 15 JOG setpoints can be selected.

Invert main setpoint

The main setpoint can be inverted via terminals E1 and E2 (i.e. the sign of the input value is changed. Mandatory:

E1	E2	Main setpoint
0	0	Drive performs QSP (quick stop)
1	0	Main setpoint not inverted
0	1	Main setpoint inverted
1	1	Drive maintains its previous state

Acceleration and deceleration times for the main setpoint channel

The main setpoint is led via a ramp generator. Thus, jumps can be converted into a ramp. The acceleration time and deceleration time refer to a speed change from 0 to n_{max} (0% to 100%). The calculation of the times T_{ir} (C0012) and T_{if} (C0013) to be set is described in the NSET function block description.

Additional acceleration and deceleration times

For the ramp generator of the main setpoint (NSET-N/JOG setpoint), you can call additional acceleration and deceleration times from the memory via the inputs NSET-TI*x, for instance, to change the acceleration time of the drive as from a defined speed. For this, these inputs must be assigned to a signal source. A maximum of 15 additional acceleration and deceleration times can be programmed.

S-shaped acceleration characteristic

Under C0134, you can select two different characteristics for the ramp generator of the main setpoint:

- linear characteristic for all accelerations requiring a constant acceleration
- S-shaped characteristic for all accelerations requiring a jerk-free acceleration

Code	Parameter	Meaning
C0134	0 1	linear characteristic S-shaped characteristic
C0182	0.01 … 50.0 s	T_{i}-time for the s-shaped ramp generator
C0012	0.00 … 999.9 s	T_{ir}-time for the acceleration
C0013	0.00 … 999.9 s	T_{if}-time for the deceleration

Additional setpoint

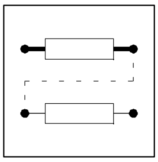
An analog additional setpoint (bipolar) can be added via the input X6/3,4 (or another signal source). The additional setpoint (display in C0049) is led to the NSET function block via an analog switch. The additional setpoint is led via an inversion. This inversion is deactivated. The additional setpoint is then passed to a ramp generator (acceleration and deceleration times via C0220/C0221), and finally added to the main setpoint in the arithmetic block. The additional setpoint can be used e.g. as a correction signal for grinding machines (for the control of a constant circumferential speed when the diameter of the grinding wheel is reduced.

If you want to use the additional setpoint, set code C0190 to the desired arithmetic operation. In the default setting, code C0190 is set to 0. This means that the additional setpoint is switched off.

Input of the direction of rotation

The direction of rotation results from the sign of the speed setpoint at the input MCTRL-N-SET of the function block MCTRL.
The sign of this speed setpoint results from

- the sign of main and additional setpoint,
- the level position at terminals E1 and E2,
- the selected logic operation of main and additional setpoint via the arithmetic block in the NSET function block



Configuration

Limitation of the speed setpoint

The speed setpoint is always limited to 100% n_{max}(C0011) in the MCTRL function block. This means that the maximum speed in C0011 is always defined as the highest-possible speed.

Example:

A speed of 4500 rpm is to be used in this configuration. The speed is to be corrected in the range from 0 to +10 % via the additional setpoint. A master voltage of 0 to +10 V is available at the inputs X6/1,2 and X6/3,4.

The following parameterization results:

- C0011 = 5000 rpm, C0190 = 1 (addition)
- C0027/1 = 90%
- C0027/2 = 10%

The speed limit can also be influenced by code C0909. Here, you can determine the direction of rotation:

- C0909 = 0 → CW and CCW rotation allowed
- C0909 = 1 → only CW rotation allowed
- C0909 = 2 → only CCW rotation allowed

In plants where only one direction of rotation is permitted, a reversing of the drive caused by the setpoint can be avoided.

Additional torque setpoint

In some applications, it may be necessary to add another torque setpoint. Example: adding acceleration in winding and positioning applications
For this, the input MCTRL-M-ADD is available. In the default setting, this input is not active (FIXED0%). To use this input, an analog signal source must be assigned.

Torque limitation

The torque can be limited via code C0472/3 from 0 to +100%.
Every other signal source can also be assigned.

Feedback of actual speed

In this configuration, all specified actual value encoders can be used. The corresponding actual value encoder can be selected under code C0025. An adjustment is not necessary.

Quick stop (QSP)

When the quick stop function is activated, the drive decelerates along the ramp set under C0105 to zero speed and carries out a holding torque with driftfree standstill. The torque limitation and the additional torque setpoint have no effect. This means that the drive provides the maximum possible torque (observe settings of the motor data). When quick stop is reset, the drive synchronizes to the momentary speed.

Controller inhibit (CINH)

When the controller is inhibited, the drive does not supply a torque and is coasting. When controller inhibit is reset, the drive synchronizes to the momentary speed.

Stop the controller via trip (TRIP-SET)

The controller can be stopped via the monitoring function when the LOW signal is applied at terminal X5/E4. This input is mainly used to evalulate external binary encoders.
The reaction on this input signal can be programmed.
(see chapter LEERER MERKER)

Fault reset (TRIP-RESET)

After the cause of fault has been eliminated, a trip can be reset with a LOW-HIGH flank at terminal X5/E5.

7.1.3 Torque control with speed limitation 4000

The drive is set to torque control with the configuration C0005 = 4XXX ”Torque control with speed limitation”. The torque can be provided in both directions.

The speed in the different operating cases,is monitored using the n-controllers via a speed limitation.

7.1.3.1 Function

If the actual speed is within its limitation, the drive is torque-controlled. If one of the speed limits (CCW or CW rotation) is reached, the drive becomes speed-controlled.

7.1.3.2 Setpoint input

Torque setpoint

The torque setpoint is entered via the analog terminal X6/3,4. When all motor data are entered correctly, the drive provides 100 % of the possible torque (C0057) in the positive direction (CW) with an input voltage of +10 V (corresponding to 100 % in negative direction (CCW) with -10 V).

If you want to operate the controller with a lower master voltage, you can adapt the system via the codes C0026/2 (offset) and C0027/2 (gain).

Alternatively, you can also enter the setpoints via

- keypad,
- integrated system bus (CAN),
- Automation interface (LECOM, InterBus, Profibus DP, RS 232, RS 485, fiber optics).

Which of these inputs is active as a setpoint source, depends on the selected configuration C0005. The signal source can also be set under the configuration C0891 (MCTRL-M-ADD) in the MCTRL function block.

Speed setpoint (speed limits)

The speed limitation is carried out via the n-controllers in the MCTRL function block. The first speed controller (main speed controller) is the upper speed limit and the second speed controller is the lower speed limit.

Example:

The speed can be within a range of ±5000 rpm.

+5000rpm (CW rotation) is the upper limit and -5000 rpm (CCW rotation) is the lower limit. The parameterization is explained below.

The upper speed limit is provided via the analog terminal X6/1,2. This input can be used as a speed setpoint e.g. in the threading in winding systems, wire-drawing machines, etc.

Please observe:

- The torque cannot exceed the input at terminal X6/3,4.
  The input voltage must be set to 10 V, if necessary.
- The value cannot fall below the lower speed limit (code C0472/4).
- The setpoint speed is conditioned in the same way as for speed control (C0005=1000).

Reference values:

- When a master voltage of +10 V is entered, the setting under C0011 is the upper speed limit (CW rotation).
- If -10 V are provided, C0011 is the upper speed limit in CCW rotation.

The lower speed limit is entered under code C0472/4.

Reference values:

- If -100% are entered, the setting under C0011 is the lower speed limit is CCW rotation.

Quick stop (QSP) and controller inhibit (CINH)

See quick stop (QSP) and controller inhibit (CINH).

TRIP-SET and TRIP-RESET

See TRIP-SET and TRIP-RESET.

7.1.4 Digital frequency coupling

7.1.4.1 General description of the system

The digital frequency coupling described here enables a digital setpoint transmission and evaluation between a setpoint source and one or more controllers. The transmission channel can either be used as a bus or a cascade (see explanation below) for:

- phase synchronizing
- speed-synchronous running
- speed ratio synchronizing
- position controls with driftfree standstill

The setpoint can be evaluated with a factor in every controller and can be output again with a gain at the corresponding digital frequency output.

The digital frequency coupling is a pure digital setpoint transmission with all its advantages:

- driftfree
- very precise

- increased safety

A network of drives generally consists of a master and several slaves: Therefore, three configurations are offered to achieve a digital frequency coupling:

- Master, C0005 = 5XXX (master integrator)
- Slave for digital frequency slave, C0005 = 6XXX (parallel connection)
- Slave for digital frequency cascade, C0005 = 7XXX (series connection)

Setpoint conditioning

Speed and phase setpoints are processed as absolute values in the setpoint part.

Gearbox factors (C0032 and C0033)

The evaluation factors C0032 and C0033 are in the setpiont channel of the corresponding drive (slave). They are used to set a gearbox factor.

Setting range of the factors:

- C0032 from -32767 to +32767
- C0033 from +1 to +32767

The quotient is limited to ± 32767.

7.1.4.2 Master configuration

Purpose

The master configuration

- activates the phase control, which is connected to the speed controller

and

- the drive is configured as a master for the digital frequency coupling for the generation of the digital master frequency for the slaves.

The phase control improves the control features of the drive so that a driftfree standstill is achieved, e.g. for positioning, hoists, etc.

Features

The features refer to the general features of this configuration. Some of them, however, can only used by reprogramming.

- Master with the possibility of signal conditioning as in the configurations C0005 = 1XXX, 4XXX except for the setpoint inversion via terminal X5/E1,E2
- Digital frequency output signal is the setpoint for slave 0 (master) and other slaves
- Evaluation of the setpoint for slave 0 with a factor (numerator/denominator) and gearbox adaptation (numerator/denominator). It can be set via
  - automation interface or system bus
  - motor potentiometer
  - other signal source
- external torque limitation possible by reconfiguration
- Emergency stop function for the complete network of drives possible by reconfiguration (C0005 = 5900)
- RFR function causes a reloading of the setpoint integrator with the actual value of slave 0 (setpoint = actual value)
- The phase trimming or speed correction can be carried out via
  - automation interface or system bus
  - analog terminal
  - one of the signal sources (function blocks)
- Message ”contouring error limit reached” can be adjusted via code
- TRIP when reaching the phase controller limit
- Speed limit of slave 0 = C0011
- Phase controller influence can be adjusted and switched off via digital input
- Homing function possible via zero track or touch probe
- Synchronization Flying is possible via zero track or touch probe
- Characteristic of the synchronization can be adjusted via ramp generator

Master integrator (setpoint generation)

The selection of the setpoint channel corresponds to the configurations 1XXX and 4XXX, but without inversion of the main setpoint via terminals X5/E1,E2. This means:

- Main setpoint analog via terminal X6/1,2
- Additional setpoint analog via terminal X6/3,4 (the additional setpoint must be enabled when C0190 is used)

In this configuration ,the setpoint input refers to the frequency at the digital frequency input X10.

Tip!

The resulting speed setpoint is output at the digital frequency ouput X10. It is the setpoint as an absolute value and direction of rotation for the following slaves. It is also a setpoint for slave 0 (included in the master drive), i.e. for the complete network of drives.

The master drive consists of the master integrator and slave 0. Slave 0 is the first drive at the master frequency.

Digital frequency output X10

The digital frequency output simulates an incremental encoder with two 5-V-complementary signals shifted by 90°. The encoder constant (inc/rev.) can be set and scaled under code C0030. The encoder type 2048 inc/rev. is set as a default.
The output frequency is determined by the set speed in C0011 (n_{max}) and the encoder constant.

Example:

C0011 = 5000 rpm, C0030 = 4 → 4096 inc/rev. Setpoint = 100%
The output frequency is 341.3 kHz (5000/60s * 4096).

In case of higher speeds e.g. 8000 rpm, an output frequency of 564.1 kHz results from this setting. This means that the maximum possible output frequency of 500 kHz would be exceeded. Therefore, select here an encoder constant with less increments.

Tip!

Basically, the frequencies (encoder constant) should be selected as high as possible since the best resolution is given in the range of 400 kHz.

Setpoint conditioning

All following settings only refer to this drive and not to the complete network of drives.

The setpoint is led via the DFSET function block. Here, you can adapt your settings to the application.

The setpoint is evaluated with a factor (numerator/denominator). This is used to set the ratio between the drive and the setpoint. To change the direction of rotation, you can set negative values.

The denominator is entered via code C0533. In this configuration, the numerator is entered via the free control code C0473/1, but it can be supplied from any other source by reprogramming (configuring).

The adaptation can also be carried out via the gearbox factor (numerator/denominator). The gearbox factor can be used to set the gearbox ratio of the drive. The denominator is entered via code C0033.In this configuration, the numerator is entered via the free control code C0032, but it can be supplied from any other source by reprogramming (configuring).

Speed trimming (additional speed setpoint)

An additional setpoint can be added to the speed setpoint via the control code C0472/5. It is thus possible to accelerate or decelerate the drive. The value is entered in % of n_{max}. Here, however, every analog source can be used as a signal source.

Purpose:

e.g. input for correction values

Phase trimming

An additional setpoint can be added to the phase setpoint via the control code C0473/3.In doing so, the rotor position is lagging or leading the setpoint. The value is entered in increments; a revolution is resolved in 65535 increments. The phase trimming can be carried out in the range of ±32767 (i.e. ±1/2 revolution). A multiplier can be set under C0529 to extend the setting range.

Example: phase trimming = DFSET_A_TRIM * C0529

Here, however, every analog source can be used as a signal source.

100% = one 1/4 revolution = 16383 increments.

Purpose:

e.g. input for correction values

Phase offset

Under code C0252, a fixed phase offset can be added to the setpoint of the drive. The setting can be within ±245760000 increments.

Reference:

see phase trimming

Phase adjustment

In some applications it is necessary that the phase leads or lags with increasing speed. For this, an adjustment of ±1/2 revolution can be entered under code C0253. The set phase adjustment is reached at 15000 rpm (linear relationship).

QSP at the master

If QSP is set at the master, the setpoint (C0050) for all drives is decelerated along the QSP ramp. The complete network of drives can thus be stopped, led by the QSP integrator. If QSP is canceled before the drives come to a standstill, the drive network starts to decelerate or accelerate with the value under C0050 to the speed setpoint at the setpoint integrator.

Unlike configuration 5900, the phase synchronizing between master and slave is lost in configuration 5000.

QSP at the slave 0 (master drive)

If the deceleration ramp is very short and can only be obtained with I_{max} , the phase synchronizing is lost. A driftfree standstill is obtained. The switching of QSP is a continuous operation for the connected slaves so that a reversal is possible if the deceleration ramp set at the master is too short for one of the slaves (e.g. too high inertia for the set deceleration ramp).

CINH at the master

If the master is inhibited, the actual value of slave 0 is used as a setpoint for the other slaves. The complete network of drives can thus be stopped, led by the coasting slave 0. If the master is enabled again before reaching standstill, the drive network starts to accelerate with the actual speed at the setpoint integrator.

The phase difference is set to zero when switching CINH.

7.1.4.3 Slave for digital frequency bus

Purpose

With the configuration C0005 = 6XXX for the setpoint bus,

- the phase control is activated, which is connected to the speed controller
- the setpoint signal channel is changed to digital frequency coupling for a phase or speed synchronous running.

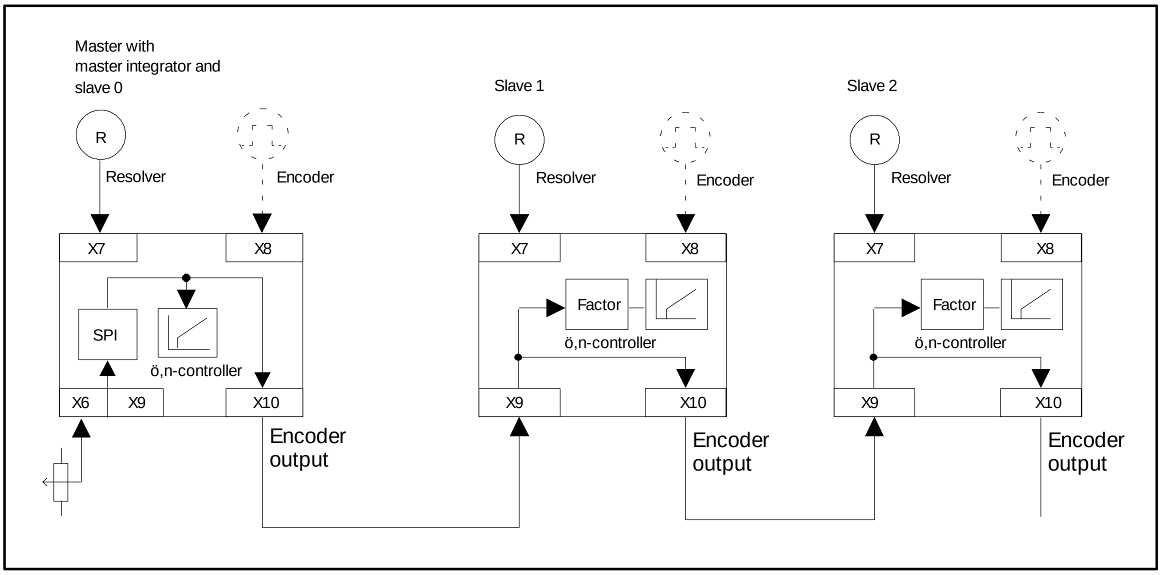


Abb. 7-1 Slave for digital frequency bus

Features

The features refer to the general features of this configuration. Some of them, however, can only used by reprogramming.

- Hardware connection of the digital frequency input with the digital frequency output (so that any number of drives can be connected one after another)
- Evaluation of the setpoint with a factor (numerator/denominator) for the corresponding slave is possible (gearbox adaptation).
  The setting is possible via an analog signal source:
  – terminal,
  – code or
  – function block.
- external torque limitation is possible
- QSP function for the individual drive. The setpoint is still output.
- CIHN function for the individual drive. The setpoint is still output to the digital frequency output.
- The phase trimming or speed correction can be carried out via
  – LECOM
  – analog terminal
  – one of the signal sources (function blocks)
- Message ”contouring error limit reached” can be adjusted via code
- TRIP when reaching the phase controller limit
- Speed limit of slave 0 = C0011
- Phase controller influence can be adjusted and switched off via digital input
- Homing function possible via zero track or touch probe
- Synchronization during operation is possible via zero track or touch probe
- Characteristic of the synchronization can be adjusted via ramp generator

Cascading factor (C0473/1 and C0533)

This function is valid only if the configuration is not changed.

The following constants for the digital frequency input (X9) can be set under C0425:

- 16384 inc/rev.
- 8192 inc/rev.
- 4096 inc/rev.
- 2048 inc/rev.
- 1024 inc/rev.
- 512 inc/rev.
- 256 inc/rev.

Cascading factors which cannot be raised to the power of two, can be assigned via C0473/1 and C0533. The following relationship is valid:

The quotient is limited to ±32767.

Setting range of the factors:

- C0473/1: -32767 … +32767
- C0533: +1 … +32767

Setpoint conditioning of the slave

The value read from input Dig.-Set (X9) is the setpoint (speed and phase) for the internal control.

Differences compared to the speed control:

- no setpoint integrator in the setpoint channel
- no change to JOG value
- the additional setpoint is not active
- the CW/CCW changeover must be carried out via the sign of the gearbox factor.

QSP at the slave

If you switch QSP at the slave drive, the setpoint (C0050) is decelerated at the QSP ramp. Homing points are lost. A driftfree standstill is obtained since the set phase is led by the QSP integrator when switching QSP.

CINH at the slave

If a slave is inhibited, the motor is coasting at the friction torque. The digital frequency output, however, still provides the setpoint for the following slave. If the slave is enabled again, the drive accelerates to its setpoint (possibly at the current limit). When CINH is set, the phase integrators are set to zero. Homing points are lost.

Exception:

If pulse inhibit (IMP) is released because of a short-term mains undervoltage (< 500 ms), the phase integrators are not reset. After mains recovery, the drive can follow again its set phase. A phase difference is balanced.

7.1.4.4 Slave for digital frequency cascade

Purpose

With the configuration C0005 = 7XXX for the setpoint cascade,

- the phase control is activated, which is connected to the speed controller
- the setpoint signal channel is changed to digital frequency coupling for speed ratio synchronizing

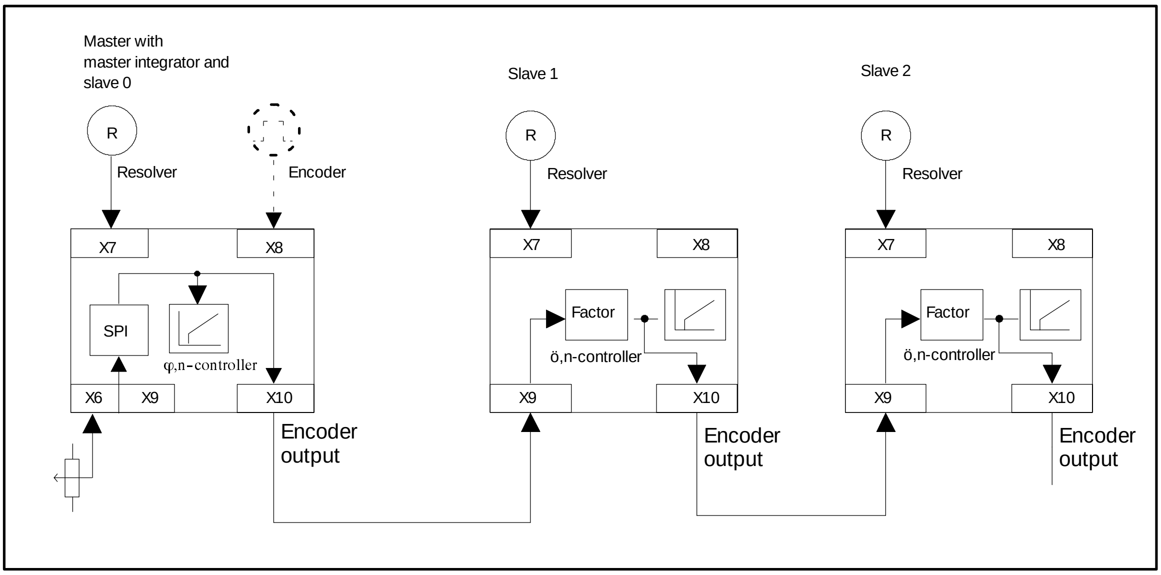


Abb. 7-2 Slave for digital frequency cascade

Features

The features refer to the general features of this configuration. Some of them, however, can only used by reprogramming.

- **Resolver feedback is possible only**
- Evaluation for the setpoint (cascading factor) with a factor (numerator/denominator) for the digital frequency output (and thus for all following drives)
- Evaluation of the setpoint with a factor (numerator/denominator) for the corresponding slave is possible (gearbox adaptation). It can be set via an analog signal source (standard: code C0032, C0033)
- External torque limitation is possible
- The setpoint for the cascade is not affected by the QSP or CINH function in the individual drive
- The phase trimming or speed correction can be carried out via
  - – LECOM,
  - – analog terminal or
  - – one of the signal sources (function blocks).
- Message ”contouring error limit reached” can be adjusted via code
- TRIP when reaching the phase controller limit
- Speed limit of slave 0 = C0011
- Phase controller influence can be adjusted and switched off via digital input
- Homing function possible via zero track or touch probe

- Flying synchronization during operation is possible via zero track or touch probe
- Characteristic of the synchronization can be adjusted via ramp generator

Cascading factor (C0473/1 and C0533)

This function is valid only if the configuration is not changed.

The following constants for the digital frequency input (X9) can be set under C0425:

- 16384 inc/rev.
- 8192 inc/rev.
- 4096 inc/rev.
- 2048 inc/rev.
- 1024 inc/rev.
- 512 inc/rev.
- 256 inc/rev.

Cascading factors which cannot be raised to the power of two, can be assigned via C0473/1 and C0533. The following relationship is valid:

$$\frac{\text{C0425}}{\text{encoder constant}} = \frac{\text{C0473/1}}{\text{C0533}}$$

The quotient is limited to ±32767.

Setting range of the factors:

- C0473/1: -32767 … +32767
- C0533: +1 … +32767

Setpoint conditioning of the slaves

The value read from X9, evaluated with C0425, C0473/1 and C0533, is the setpoint (speed and phase) for the internal control and is also the output value at the digital frequency output X10.

The setpoint for the corresponding drive can be evaluated via the gearbox factor C0032 and C0033.

The direction of rotation for the corresponding slave can be set via the evaluation factors.

Differences compared to the speed control:

- no setpoint integrator in the setpoint channel in the default setting
- no change to a JOG value
- the additional setpoint is not active

Feedback system (X7)

The resolver only can be selected as a feedback system.

QSP at the slave

If QSP is switched at the slave, the setpoint (C0050) is decelerated along the QSP ramp. Homing points are lost. A driftfree standstill is obtained since the set phase is led by the QSP integrator when switching QSP.

If the deceleration ramp is very short and can only be obtained with I_{max} , the phase synchronizing is lost(e.g. too high inertia for the set ramp).

The digital frequency output still supplies the setpoint for the following slave(s).

CINH at the slave

If a slave is inhibited, the motor is coasting at the friction torque.The digital frequency output, however, still provides the setpoint for the following slave.If the slave is enabled again, the drive accelerates to its setpoint (possibly at the current limit).

The phase difference is set to zero when switching CINH. Homing points are lost.

Exception:

If control inhibit is released because of a short-term mains undervoltage (< 500 ms), the phase difference is not reset.After mains recovery, the drive can follow again its set phase.A phase difference is balanced. The digital frequency output still supplies the setpoint for the slave(s).

7.1.5 Speed synchronizing

7.1.5.1 How to select the correct configuration

The following slave configurations can be selected for the speed synchronizing with the master configuration C0005 = 5XXX:

- Slave for setpoint bus C0005 = 6XXX;
  for only two drives or fixed speed relationships which must be set only once (commissioning)
- Slave for setpoint cascade C0005 = 7XXX;
  for more than two drives or simple change of the speed relationship with stretching factors in the running process

A correction value for the speed synchronizing can be changed and displayed via the input DFSET-N-TRIM in the DFSET function block.

The input can be changed by reconfiguration via:

- analog terminal
- motor potentiometer
- keypad
- automation interface or system bus

The correction value is provided in % of C0011 (n_{max}).

Deactivate the phase controller for the speed synchronizing. This means that the phase-synchronous running becomes a speed-synchronous running, which results in adding phase errors between the drives. The phase controller can be deactivated by setting code C0254 to zero.

7.1.5.2 Speed-synchronous running

Purpose

For material transports with very low stretching coefficients, such as paper, metal, etc., the tension can be set via the gearbox factor C0032/C0033 by oversynchonizing in the ‰ range. A specified tension thus results from the stretching coefficient of the material. For a better operation and higher accuracy in the digital frequency coupling, we recommend the digital frequency cascade C0005 = 7XXX.

7.1.5.3 Speed ratio synchronizing

Purpose

- Stretching systems
- Wire-drawing plants

Example

Extruder system with stretching of plastic threads by a speed ratio synchronizing. The stretching is performed online during the process via a motor potentiometer function.

7.1.6 Phase synchronizing

Purpose

- Drive concept for positive movements (e.g. packing of bottles on conveyor belts)
- Synchro system (e.g. line shaft, printing machines with embossing or printing rolls depending on the format)

Conditions

Configuration C0005 = 6XXX or 7XXX.

In the configurations C0005 = 5XXX, the specifications are effective only for slave 0.

Phase-synchronous running

When the phase controller is active, every controller can perform a phase-synchronous, driftfree phase synchronizing to its setpoint. Since in a digital frequency cascade the setpoint of the second slave was conditioned in the first slave and there is no synchronization between the two systems, a fixed phase offset results, which, however, does not add up.

7.1.6.1 Phase controller

Adapt phase controller

A value at MCTRL-P-ADAPT acts on the gain set under C0254.

Special features

The difference between setpoint and actual phase is led to the phase controller. It is a p-controller, referred to the phase. Its influence can be set under C0254. C0254 = 0 means the complete disconnection of the phase controller from the control system.

Setting range of C0254 = 0.0001 … 3.9999; C0254=1.00 and 16384 incr. control difference (1/4 revolution) corresponds to a speed change of n_{max}.

The output of the phase controller can be limited by C0472/6. The limitation can also be connected to another analog signal source.

Phase controller limit

The phase controller limit is fixed to a phase difference of 65531 revolutions. If this phase difference is exceeded, the phase controller can no longer correct the setpoint phase. When the phase controller limit is reached, a trip P13 is generated. The priority of the fault indication can be evaluated.

Tip!

When the phase controller limit is reached and the monitoring is switched off, the sign at the phase controller output may change. The phase difference is set to zero when switching CINH.

7.1.6.2 Phase trimming

The phase trimming can be changed under C0473/3 and displayed under C0536/3. The phase trimming can also be carried out by another analog signal source:

- Analog output of a function block
- Motor potentiometer
- Analog terminal
- Keypad
- Automation interface or system bus

The input of the phase trimming can be multiplied under C0529.

The rotor position can thus be offset by up to 20000 revolutions.

- Negative values = CCW offset
- Positive values = CW offset

Resolution: 65536 inc/rev. = 1 rev. * C0529

7.1.6.3 Contouring error limit

The contouring error limit can be in absolute values in increments under C0255. The setting range is: 0 … 1.8*10^9 increments.

When the contouring error limit is reached, a signal is generated which is evaluated by the ”monitoring”. This signal can be evaluated with the priority (Trip, Message or Warning) desired by the user.

The phase difference is set to zero when switching CINH. The signal ”contouring error limit” is thus no longer generated.

7.1.6.4 Processing of the zero pulse (flying synchronizing)

If the zero pulses are not used for the digit frequency processing, a phase synchronzing is achieved with a constant phase offset.

Initial situation

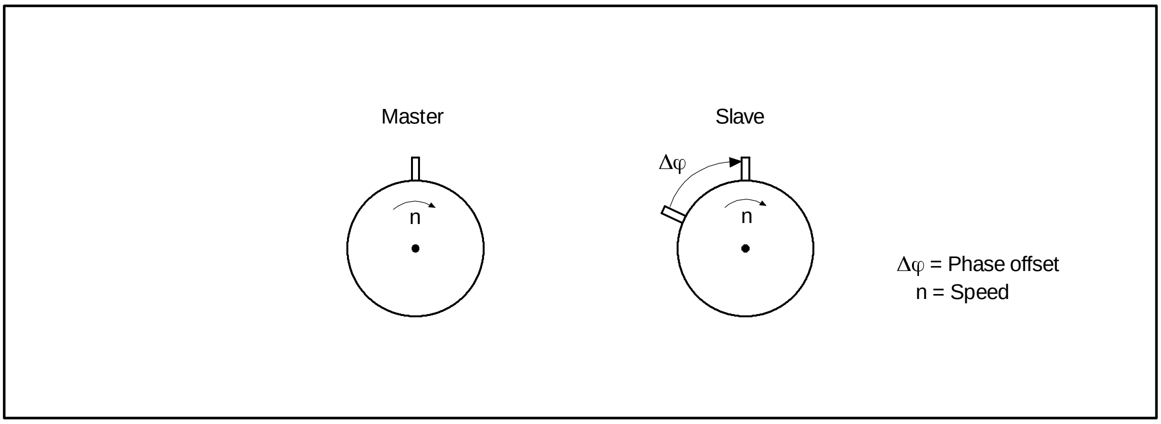


Abb. 7-3 Initial situation when processing the zero pulse ($\Delta\varphi \neq 0$)

If this phase offset is to be corrected to zero, either

- homing is necessary

or

- the processing of the zero pulse of the digital frequency input and the feedback system.

Final situation

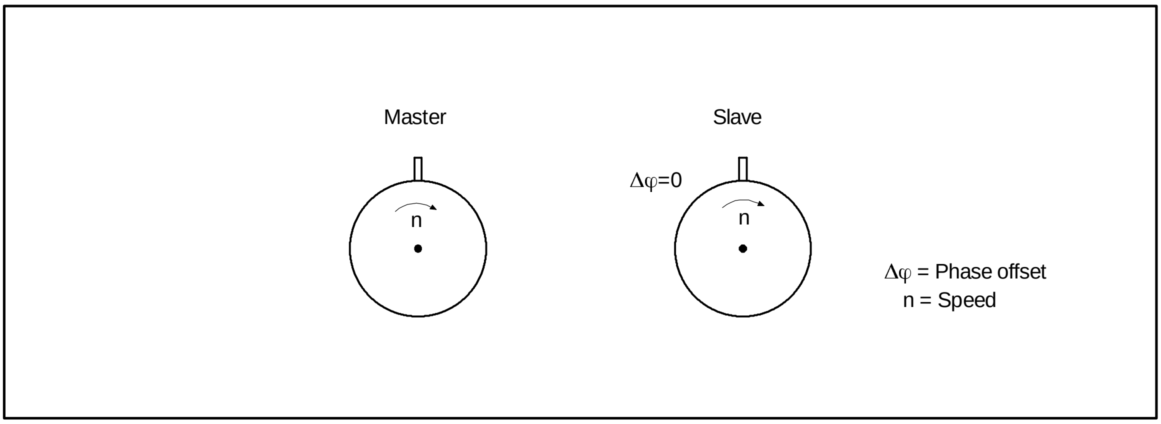


Abb. 7-4 Final situation when processing the zero pulse ($\Delta\varphi = 0$)

How to achieve the final situation:

- the function must be activated under code C0534 (DFSET function block)
- the input DFSET-0-PULSE must be triggered with a HIGH signal when the zero pulse is evaluated only once (DFSET function block)
- the phase control must be activated (MCTRL function block)
- the zero pulses must be connected to the SubD connectors X9 (X8 when using an encoder)

Zero pulse at the setpoint

The rotor position setpoint is entered via the setpoint zero pulse (during operation of the drive network). The synchronization is performed only after a setpoint and an actual zero pulse, that means not before the second zero pulse.

Control behaviour:

The phase offset is corrected by an acceleration or deceleration. The direction (acceleration or deceleration) depends on the determined phase offset. If the rotor leads within a range between 0° and 180° the drive is synchronized by deceleration. If the rotor lags within a range between 0° and 180° the drive is synchronized by acceleration.

Different modes of the zero pulse synchronization

The different modes of the zero pulse synchronization can be selected via the subcodes of C0534.

The following table assigns the subcodes to the corresponding modes of the zero pulse synchronization:

Selection of C0534	**Mode of the zero pulse synchronization**
1	continuous zero pulse synchronization as described under ”Zero pulse at the setpoint” (see page 7-21)
2	as selection 1, but DFSET-0-PULSE must be triggered with a HIGH signal
10	single zero pulse synchronization; control behaviour as described under ”Zero pulse at the setpoint” (see page 7-21)
11	single zero pulse synchronization; the drive is always synchronized by CW rotation
12	single zero pulse synchronization; the drive is always synchronized by CCW rotation
13	single evaluation of the setpoint and actual zero pulse; the direction of the synchronization is not defined

Use of TOUCH-PROBE

The zero pulse evaluation can also be derived from the digital inputs X5/E4 (actual value) and X5/E5 (setpoint) instead of the zero tracks of the inputs X9 and the corresponding feedback system. The function is changed over from evaluation of the encoder (or resolver) zero tracks to evaluation of the inptus X5/E4 and X5/E5 with C0532 = 2.

IMPORTANT:

The inputs X5/E4 and X5/E5 are assigned to trip set or trip reset in the default setting. In this case, the connection of the input terminals to the DCTRL function block (controller control) must be removed.

Use of zero pulse at the setpoint and TOUCH PROBE at the actual value

The zero pulse can also be evaluated by a zero pulse at the setpoint input X9 and a TOUCH PROBE input X5/E4 (actual value). The function is switched on with C0532 = 3.

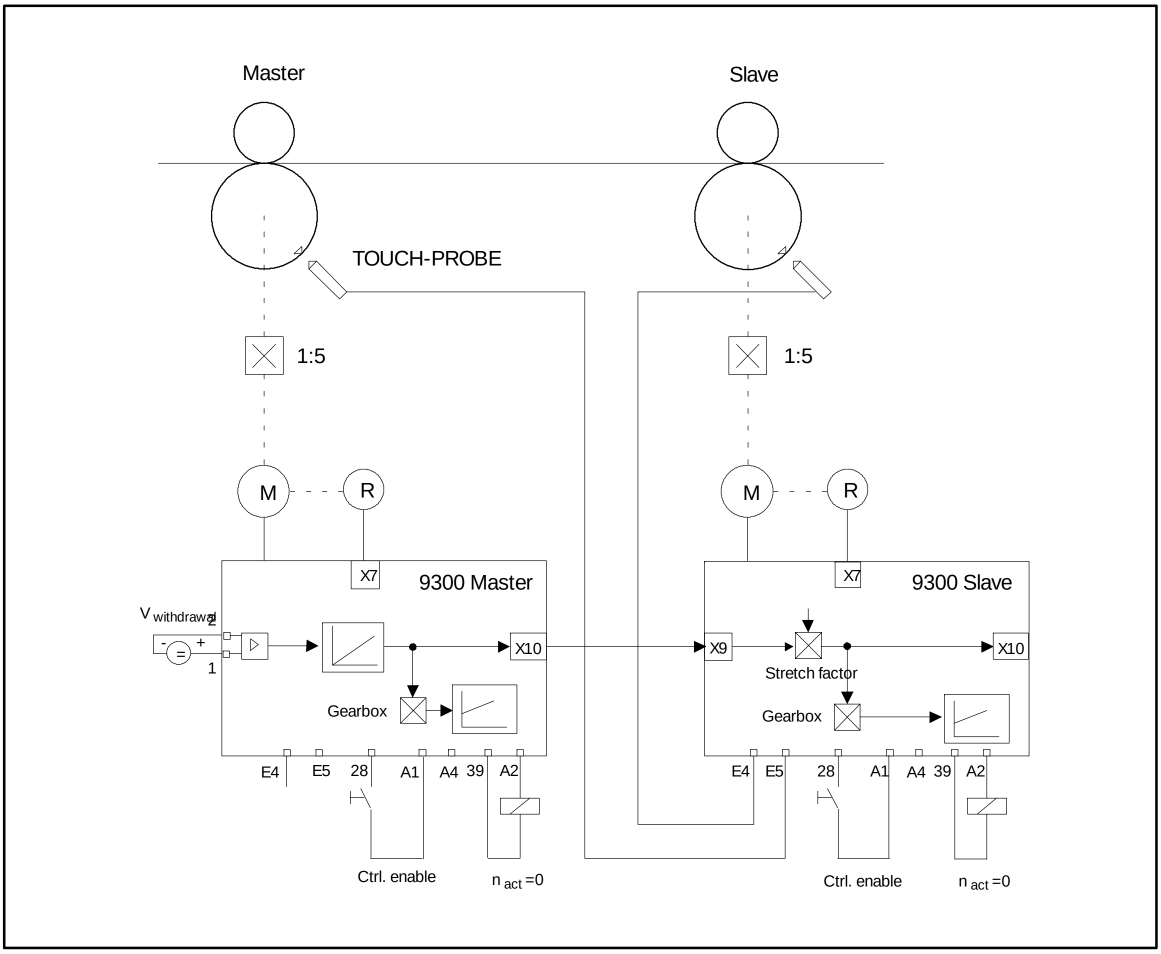


Abb. 7-5 Example for the use of TOUCH PROBE

7.1.6.5 Homing

The homing function is available in the configurations 5XXX, 6XXX und 7XXX. The homing function is used to bring the drive shaft to a specified position. For this, the drive is disconnected from the setpoint channel and follows the profile generator.

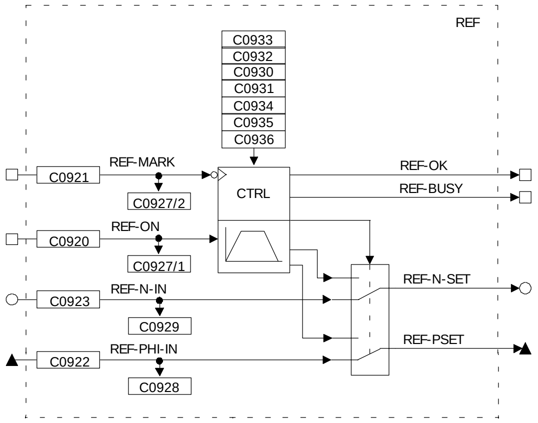


Abb. 7-6 Homing function block (REF)

Homing is started by a rising edge at the digital input ”REF-ON” (with default setting on terminal X5/E3); this input must remain until homing is completed.

After the negative edge at the input REF-MARK (assigned to terminal X5/E2 in the default setting) the drive positions to the home position. This input is provided for a homing switch. The speed profile is generated by profile generated which is integrated into the REF function block. Here, you can set acceleration and deceleration time and the homing speed.

The home position is defined as follows:

Next zero pulse after the negative edge of the homing switch plus the home position offset (C0934).

The zero position (depending on the rotor attached to the motor) instead of the zero pulse is effective for position feedback via resolver, and the touch probe phase for homing via touch probe.

The output signal ”REF-BUSY” displays with the HIGH signal whether the homing function is active.

The output signal ”REF-OK” displays with the HIGH signal that homing was completed successfully. This signal can be requested via the output terminal X5/A4.

The setpoint outputs for position and speed from the REF function block are connected to the corresponding setpoint inputs of the MCTRL function block (see signal flow chart to the configurations 5XXX, 6XXX and 7XXX). When the homing function is active (input REF-ON = HIGH), the drive is disconnected from the setpoint channel. The drive then follows the profile generator.

During homing, the DFSET-SET input of the digital frequency processing is activated. This is done by the REF-BUSY output of the REF function block. After completion of homing REF-BUSY=LOW, the drive is connected again jerk-free to digital frequency.

To perform another homing, an edge at the REF-ON input is required.

7.1.6.6 Homing modes

Mode 0

Homing with zero pulse/zero position.

Move to the home position in CW rotation. The home position is at the next zero pulse/zero positon after the negative edge of the homing switch REF-MARK plus the home position offset.

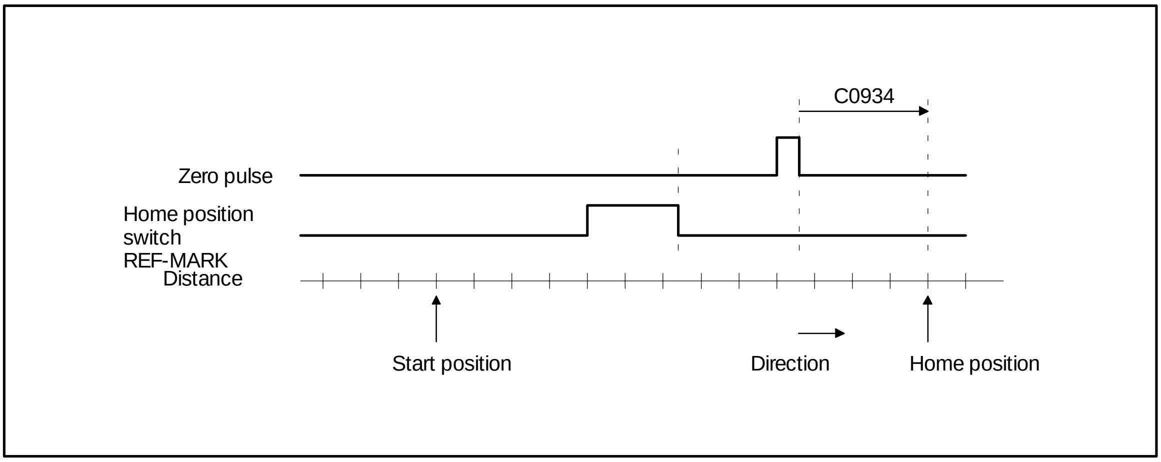


Abb. 7-7 Homing with zero pulse/zero position; move to the home position in CW rotation

Mode 1

Homing with zero pulse/zero position.

Move to the home position in CCW rotation. The home position is at the next zero pulse/zero positon after the negative edge of the homing switch REF-MARK plus the home position offset (C0934).

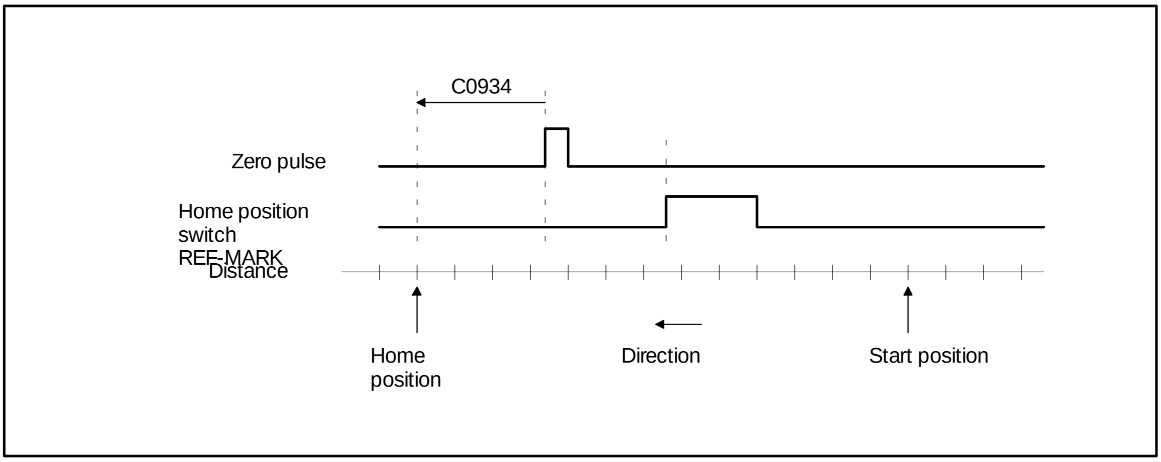


Abb. 7-8 Homing with zero pulse/zero position: Move to the home position in CCW rotation.

Mode 2...5

Mode 2 to mode 5 are reserved

Mode 6

Homing with touch probe.

Move to the home position in CW rotation. The home position is at the touch probe signal after the negative edge of the homing switch REF-MARK plus the home position offset (C0934).

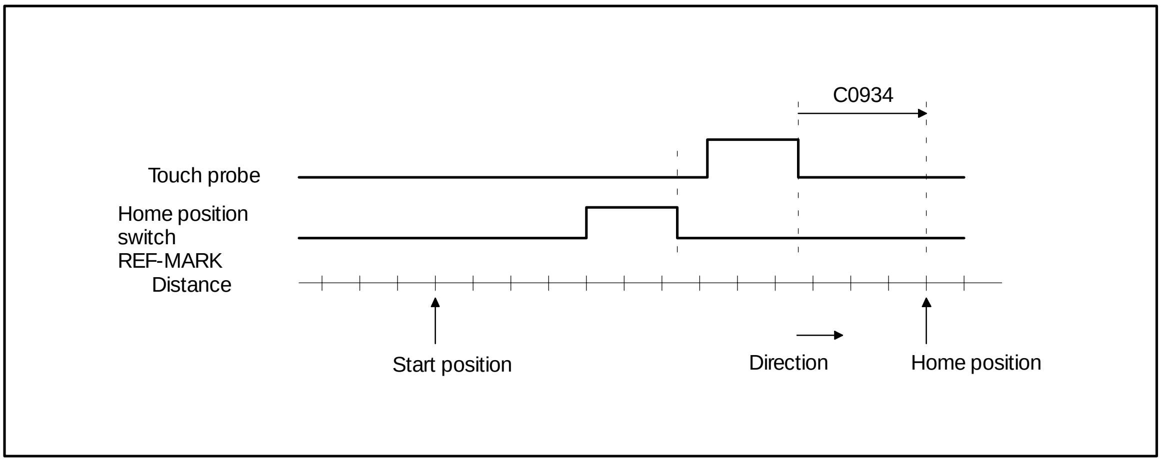


Abb. 7-9 Homing with touch probe; move to the home position in CW rotation

Mode 7

Homing with touch probe.

Move to the home position in CCW rotation. The home position is at the touch probe signal after the negative edge of the home position switch plus the home position offset.

Mode 8

Homing with touch probe.

Move to the home position in CW rotation.The home position is at the next touch probe signal plus the home position offset.

Mode 9

Homing with touch probe.

Move to the home position in CCW rotation. The home position is at the next touch probe signal plus the home position offset.

Notes for mode 6 to mode 9

The edge of the zero pulse or the touch probe signal (LOW → HIGH or HIGH → LOW) for the determination of the home position can be selected under code C0933.

7.1.6.7 Profile generator

The speed profile for homing is generated via a profile generator. The target can be changed during the homing procedure.

The profile generator generates a speed profile with linear ramps.

Enter the following parameters:

Code	Meaning	Input
C0930	Gearbox ratio numerator	1 … 65535 Numerator of the gearbox ratio between motor and position encoder (motor side)
C0931	Gearbox ratio denominator	1 … 65535 Denminator of the gearbox ratio between motor and position encoder (encoder side)
C0934	Home position offset	-2.140.000.000 … +2.140.000.000 (incr.) Distance between zero track or touch probe and the home position during homing
C0935	Homing speed	0.0001 … 100.0000 (% n_{max}) motor speed during homing
C0936	Homing T_i time	0.01 … 990.00 (sec) Acceleration and deceleration time during homing. Reference: 0 to n_{max} or n_{max} to 0

The speed profile for homing is determined by entering a speed in per cent and an integration time (T_i) for the ramps. The homing offset is directly entered in increments of the encoder system. (Complicated calculations and the input of e.g. the feed constant are thus not necessary.)

Three cases are possible when the home position is approached:

- Case 1:
  - – Large home position offset
- Case 2:
  - – Home position offset = 0; the zero pulse has not yet occurred during homing
- Case 3:
  - – Home position offset = 0; the zero pulse has already occurred once during homing

Large home position offset (case 1)

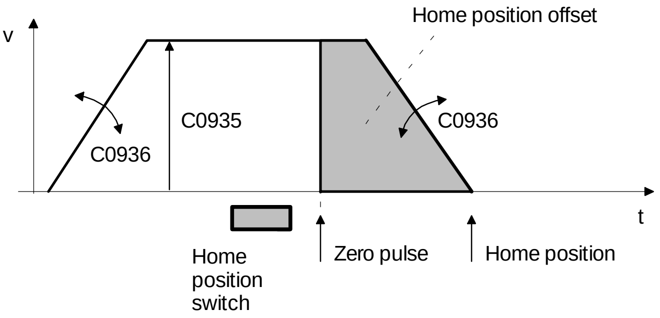


Abb. 7-10 Approach of home position (case 1)

Home positon offset = 0 (case 2)

The zero pulse has not yet occurred during homing (the absolute position is detected only after one revolution when using incremental encoders):

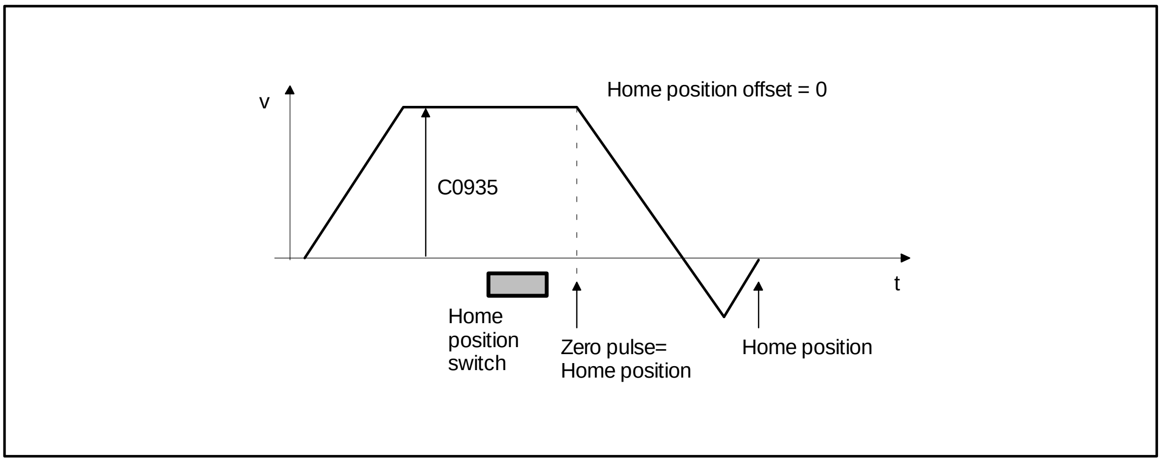


Abb. 7-11 Approach of home position (case 2)

With an unfavourable parameterization or position of the home position switch, the drive cannot approach the home position directly because of an excessive inertia. This means that the drive overrides the home position and returns.

A return during homing can be avoided by setting the home position offset such that the distance is long enough to brake down to standstill. The home position switches and subsequent zero pulse must be displaced correspondingly.

Home position offset = 0 (case 3)

The zero pulse has already occurred once during homing.

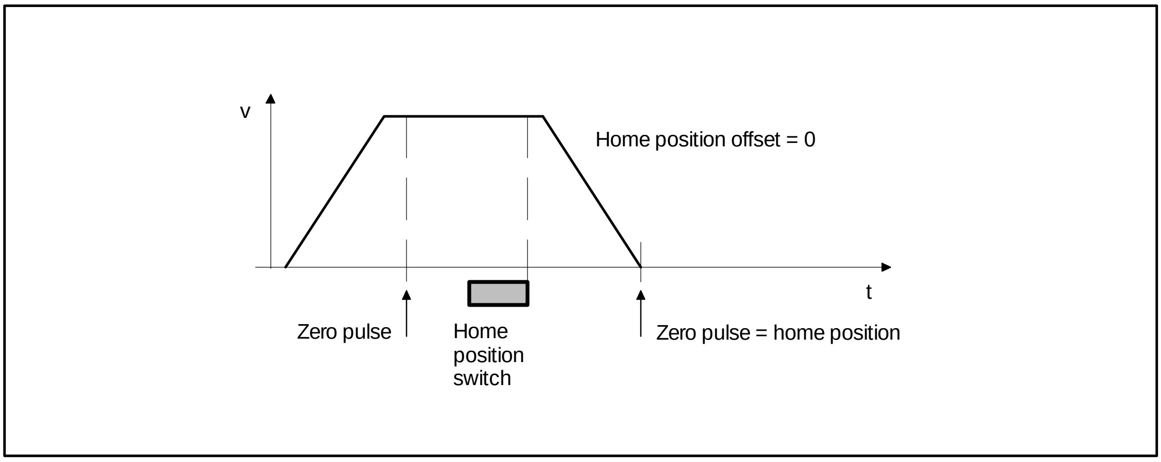
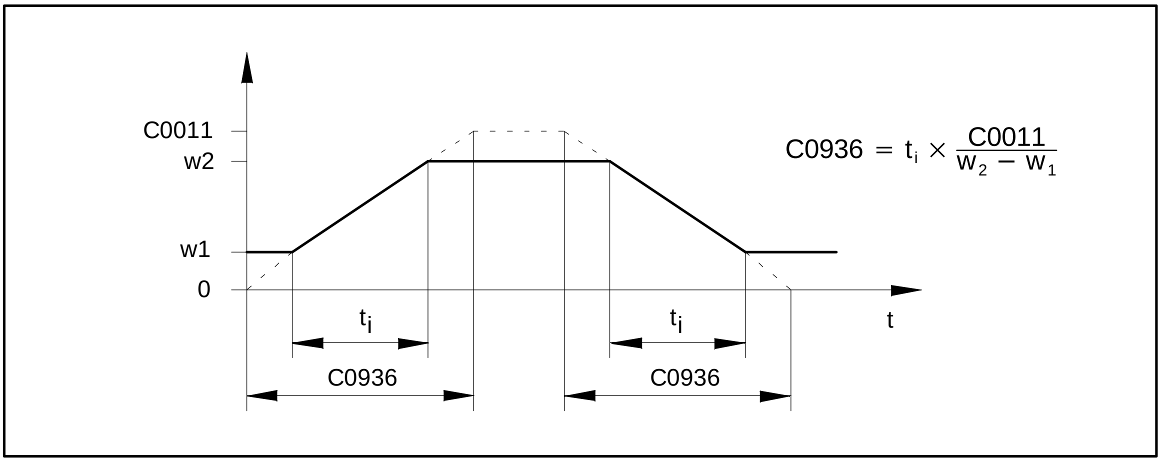


Abb. 7-12 Approach of the home position (case 3)

If the zero pulse has already occurred or if an absolute value encoder (e.g. resolver) is used as an actual-value encoder, the drive moves as described in Abb. 7-12 Approach… via the set ramp to its home position.

Acceleration and deceleration time

The acceleration and deceleration time refer to a change of the output value from 0 to 100 % (C0011). The time set under C0936 can be calculated as follows:



$$C0936 = t_i \times \frac{C0011}{w_2 - w_1}$$

Abb. 7-13 Calculation of the acceleration and deceleration time

The desired time is the change between w_1 and w_2.

Enter the calculated time under C0936.

7.2 Operating modes

Determine which interface you want to use for parameter setting or control of the controller by choosing an operating module.

7.2.1 Parameter setting

Parameter setting via

- Communication module (connected to X1)
  – 2102 (LECOM A/B/LI)
  – 2111 (INTERBUS)
  – 2131 (PROFIBUS)
- System bus module (connected to X4)
  – 2173
- Parameters can be changed by both interfaces.

7.2.2 Control

Control is possible via terminals (X5 and X6), via the fieldbus module at X1 or via the system bus (X4). Mixed modes are also possible.

Note!

C0005 contains predefined configurations which allow a very easy change of the operating mode.

7.2.3 Configuration with Global Drive Control

With the PC program Global Drive Control (GDC) LENZE offers

- an easy to understand,
- well structured,
- convenient

tool for the configuration of your specific drive task.

Function block library

- GDC provides an easy-to-read library of available function blocks (FB).
- GDC also displays the complete assignment of a FB.

Signal configuration

The signal configuration is done with only one dialog box. It is a convenient way

- to display every FB as a block diagram.
- to see the assignment of all signal inputs at a glance.
- to enter the FB in the processing table.
- to print your signal configuration.

Terminal assignment

Freely assignable terminals can be configured using two dialog boxes:

Configuration

- Dialog box - to link digital inputs and outputs.
- Dialog box - to link analog inputs and outputs.

7.3 Working with function blocks

You can configure the signal flow in the controller yourself by connecting function blocks. The controller can thus be easily adapted to diverse applications.

7.3.1 Signal types

Every function block has a number of inputs and outputs for connection. Corresponding to their functions, there are only certain types of signals at the inputs and outputs:

- Quasi analog signals
  – Symbol: ○
  – Unit: %
  – Abbreviation: a
  – Value range: ± 16384 = ± 100%
  – Resolution: 16 bit
- Digital signals
  – Symbol: □
  – Unit: binary, with HIGH or LOW level
  – Abbreviation: d
  – Resolution: 1 bit
- Speed signals
  – Symbol: △
  – Unit: rpm
  – Abbreviation: phd
  – Resolution: 16 bit
- Phase signals
  – Symbol: ▲
  – Unit: inc
  – Abbreviation: ph
  – Resolution: 16 bit

Only the same types of signals can be connected. Thus, the analog output signal of one function block can only be connected to the analog input of the other function block. If you try to connect two different signal types, the connection is rejected.

7.3.2 Elements of a function block

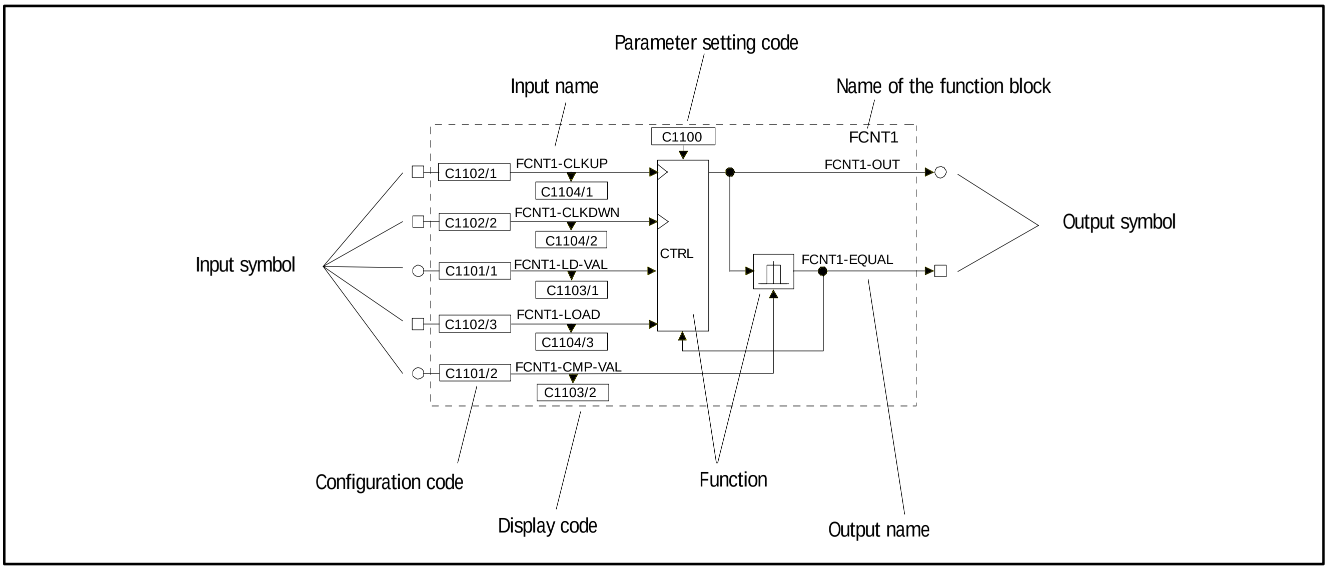


Abb. 7-14 Structure of a FB using the example of FCNT1

Name of the FB

Identifies the FB unambigeously. FBs with the same function are distinguished by a number behind their names.

Every FB is defined by a selection number. The input of the selection number into the processing table is always required for the calculation of the FB. (🕮 7-37) . The selection numbers are listed in selection list 5. (🕮7-41) .

Example:

(FCNT1, see Abb. 7-14)

- FCNT1 ≙ selection number 6400 (selection list 5).

Input symbol

Designates the signal type which is allowed as signal source for this input. (🕮 7-31)

Note!

You cannot configure inputs which are not linked.

Input name

Consists of the FB name and a designation. Inputs with the same function are distinguished by a number behind their designations.

Configuration code

Configures the input with a signal source (e.g. terminal signal, control code, output of a FB, ...). Inputs with identical codes are distinguished by the subcode. The subcode is attached to the code (Cxxxx/1). These codes are configured by their subcodes.

It is not possible to connect an input with several signal sources.

Display code

Displays the current input value. Inputs with identical codes are distinguished by the subcode. The subcode is attached to the code (Cxxxx/1). These codes are displayed via their subcodes.

Display codes cannot be processed.

Function

Represents the mathematical function as a block diagram. Abb. 7-14

Parameter setting code

Adaptation of the function or the behaviour to the application. The possible settings are explained and shown in the text and/or the line diagram.

Output symbol

Designates the signal type. Connections with inputs of the same signal type are possible. (🕮 7-31)

Every output is defined by a selection number. The selection numbers are divided into selection lists (1 ... 4) according to the different signal types. (🕮7-41)

An output is linked to an input by the selection numbers.

Example:

(FCNT1, see Abb. 7-14)

- FCNT1-OUT ≙ selection number 6400 (analog signal, selection list 1).
- FCNT1-EQUAL ≙ selection number 6400 (dgitial signal, selection list 2).

Note!

Outputs, which are not linked, cannot be configured.

Output name

Consists of the FB name and a designation. Outputs with the same function are distinguished by a number behind their designation.

7.3.3 Connection of function blocks

General rules

- Assign a signal source to an input.
- One input can have only one signal source.
- Inputs of different function blocks can have the same signal source.
- Only the same types of signals can be connected. Thus, the analog output signal of one function block can only be connected to the analog input of the other function block.

Stop!

Existing connections, which are not desired, must be removed by reconfiguration. Otherwise, the drive cannot perform the desired function.

Note!

Lenze offers a net-list generator for the visualization of existing connections (see accessories: PC program GDC). (🕮 13-3)

Configuration

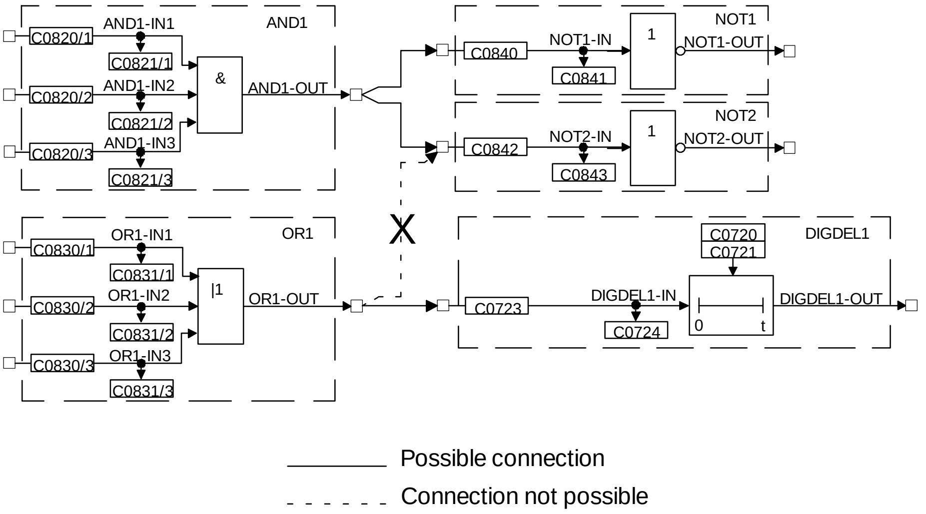


Abb. 7-15 Correct connection of function blocks

Basic procedure

1. Select the configuration code of the function block input which is to be changed.
2. Determine the source of the input signal for the selected input (e.g. from the output of another function block).
3. The function block input is assigned via a menu which contains only those signal sources which are of the same type as the function block input to be assigned.
4. Select and confirm the signal source.
5. Remove undesired connections, if any.
   - For this, select the corresponding signal assignment of the input via the configuration code (e.g. FIXED 0, FIXED 1, FIXED 0%, ...).
6. Repeat 1. to 5. until the desired configuration is set.
7. Save modified configuration in the desired parameter set.

Example

- Condition:
  - Factory setting
- Task:
  - Square the analog signal of X6/3, X6/4 and output to X6/62.
- Solution:
  - You need the function blocks AIN2, ARIT2 and AOUT2.

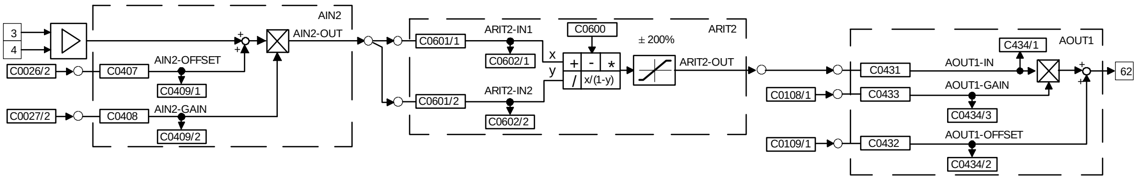


Abb. 7-16 Example of a simple configuration

Create connections

1. Determine the signal source for ARIT2-IN1:
   - – Change to the code level using the arrow keys
   - – Select C0601/1 using ▲ or ▼.
   - – Change to the parameter level using PRG.
   - – Select output AIN2/OUT (selection number 55) using ▲ or ▼.
   - – Confirm using SH + PRG
   - – Change to the code level again using PRG.
2. Determine signal source for ARIT2-IN2:
   - – Select C0601/2 using ▲.
   - – Change to the parameter level using PRG.
   - – Select output AIN2/OUT (selection number 55) using ▲ or ▼.
   - – Confirm using SH + PRG
   - – Change to the code level again using PRG.
3. Parameterise ARIT2:
   - – Select C0600 using ▼.
   - – Change to the parameter level using PRG.
   - – Select multiplication (selection number 3).
   - – Confirm using SH + PRG
   - – Change to the code level again using PRG.
4. Determine signal source for AOUT1:
   - – Select C0431 using ▼.
   - – Change to the parameter level using PRG.
   - – Select output ARIT2-OUT (selection number 5505).
   - – Confirm using SH + PRG
   - – Change to the code level again using PRG.
5. Enter function block ARIT2 in the processing table:
   - – Select C0465 and subcode 8 using ▲
   - – Change to the parameter level using PRG.
   - – Enter function block ARIT2 (selection number 5505).
   - – Confirm using SH + PRG
   - – Change to the code level again using PRG.
   - – The sequence of the FB processing is thus determined.

Remove connections

- Since a source can have several targets, there may be further signal connections, which may not be wanted.
- Example:
  - – In the factory setting of the basic configuration C0005 = 1000 (speed control), ASW1-IN1 and AIN2-OUT are connected.
  - – This connection is not automatically removed by the settings described above! If you do not want this connection, it must be removed.

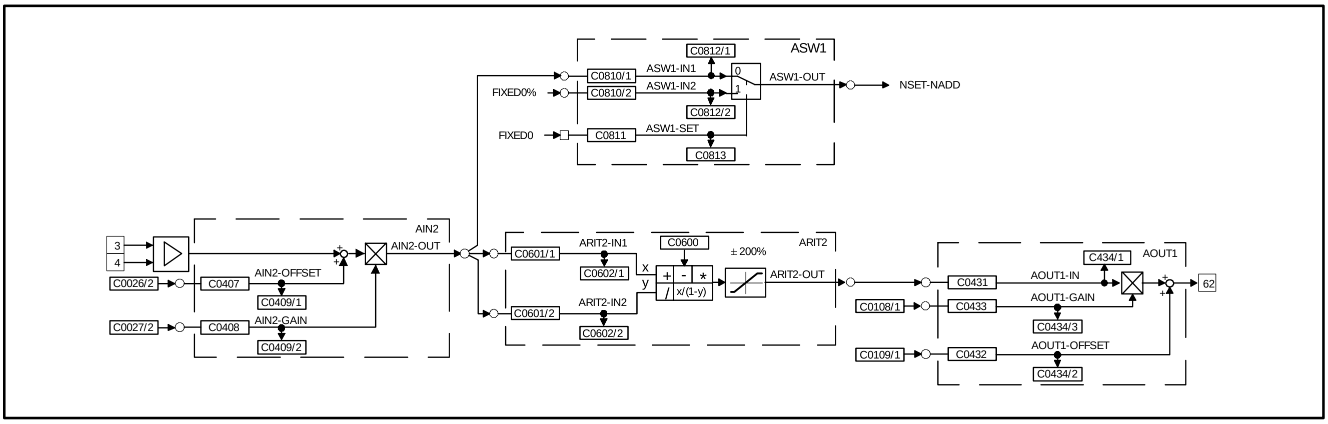


Abb. 7-17 Remove connections in a configuration

6. Remove connection between ASW1-IN1 and AIN2-OUT:
   - – Select C0810/1 using ▲ or ▼.
   - – Change to the parameter level using PRG.
   - – Select the constant FIXED0% (selection number 1000) using ▲ or ▼.
   - – Confirm using SH + PRG
   - – Change to the code level again using PRG.

Now, the connection is removed.

7. Save new configuration, if desired:
   - – If you do not want to lose the modifications after mains disconnection, save the new signal configuration under C0003 in one of the parameter sets.

7.3.4 Entries into the processing table

The 93XX controller provides a certain time for calculating the processing time of FBs. Since the type and number of FBs to be used depends on the application and can vary considerably, not all available FBs are permanently calculated. A processing table is therefore provided under code C0465, where only the FBs used are listed. This means that the drive system is perfectly matched to the task. If further function blocks are integrated into an existing configuration, they must be listed in the processing table.

Several aspects must be observed:

The number of FBs to be processed is limited

A maximum of 50 FBs can be integrated into a configuration. Every FB requires a certain processing time.Code C0466 displays the residual time for the processing of FBs. If this time has elapsed no further FBs can be integrated.

Entry sequence into the FBs

Normally, the entry sequence under C0465 is arbitrary, but it may be important for applications with high response. In general, the most favourable sequence is adapted to the signal flow.

Example:

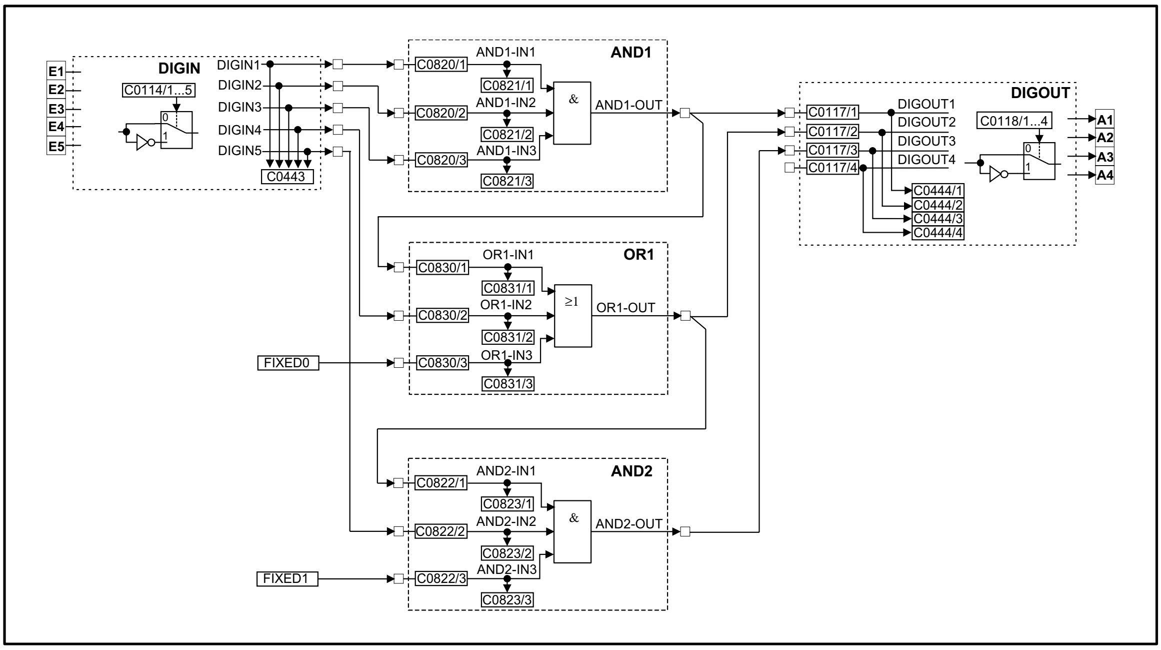


Abb. 7-18 Example of a configuration

Structure of the processing table for the configuration example in Abb. 7-18:

1. DIGIN does not have to be entered into the processing table.
2. The first FB is AND1, since it receives its input signals from DIGIN and is only connected to successors.
3. The second FB is OR1, since its signal source is the output of AND1 (predecessor). The output signal in AND1 must be generated before being processed in OR1. At the same time, OR1 has a successor. OR1 must therefore be entered in the processing table before the successor.
4. The third FB is AND2, since it has a predecessor (see 3.)

5. The entries under C0465 are:
   - Pos. 10: AND1 10500
   - Pos. 11: OR1 10550
   - Pos. 12: AND2 10505

This example was started with position 10 because these positions are not assigned in the default setting.

FBs do not have to be entered consecutively in the processing table. Empty positions in the processing table are permissible.

Note!

Other FBs can also be entered between the FBs listed in the example.

FBs which do not have to be entered into the processing table

The following signal sources are always executed and do not have to be entered into the processing table:

- AIF-IN
- CANx-IN
- DIGIN
- DIGOUT
- FCODE (all free codes)
- MCTRL
- Fixed signal sources (FIXED0, FIXED0%, etc.)

Frequent configuration faults

Malfunction	**Cause**	**Remedy**
FB does not supply an output signal	FB was not entered into the processing table C0465	Enter FB
FB only supplies constant signals	FB has been overwritten or deleted from the processing table C0465	Enter FB again, if necessary using a different subcode (list position)
The output signal is not sent to the next FB	No connection between the FBs	Make connection (following FBs) via the configuration code (CFG)
FB cannot be entered in the table C0465	Residual process time is too short (see C0466)	If necessary, delete all FBs not used (e.g. inputs and outputs not used) With DC-bus operation it might be possible to execute some functions via other controllers
The controller outputs internally calculated signals with a delay.	The processing sequence for the FBs is wrong.	Adapt the processing table to the signal flow (C0465).

7.4 Description of function blocks

Table of exisiting function blocks

Function block	Description	CPU time [μs]	used in base configuration C0005						
			1000	4000	5000	6000	7000	20	21
AND1	Logic AND, block1	7						●	●
AND2	Logic AND, block2							●	●
AND3	Logic AND, block3							●	●
AND4	Logic AND, block4								●
AND5	Logic AND, block5								
AND6	Logic AND, block6								
AND7	Logic AND, block7								
OR1	Logic OR, block1	7			●	●	●	●	●
OR2	Logic OR, block2							●	●
OR3	Logic OR, block3							●	●
OR4	Logic OR, block4								●
OR5	Logic OR, block5								●
NOT1	Logic NOT, block1	4						●	●
NOT2	Logic NOT, block2							●	●
NOT3	Logic NOT, block3							●	●
NOT4	Logic NOT, block4								●
NOT5	Logic NOT, block5								●
R/L/Q	QSP / set-value inversion	9	●	●				●	●
FLIP1	D-Flipflop 1	7						●	●
FLIP2	D-Flipflop 2								
DIGDEL1	Binary delay element 1	10							
DIGDEL2	Binary delay element 2								
DIGIN	Input terminals X5/E1…X5/E5	-	●	●	●	●	●	●	●
DIGOUT	Output terminals X5/A1…X5/A4	-	●	●	●	●	●	●	●
AIN1	Analog input X6/1, X6/2	11	●	●	●	●	●	●	●
AIN2	Analog input X6/3, X6/4	29	●	●	●	●	●	●	●
AOUT1	Analog output X6/62	13	●	●	●	●	●	●	●
AOUT2	Analog output X6/63		●	●	●	●	●	●	●
FCNT1	Counter	11							
FEVAN1	Free analog input variable	4							
FEVAN2	Free analog input variable								
CMP1	Comparator 1	15	●	●	●	●	●	●	●
CMP2	Comparator 2							●	●
CMP3	Comparator 3								●
ASW1	Analog changeover 1	4	●		●			●	●
ASW2	Analog changeover 2							●	●
ASW3	Analog changeover 3							●	●
ASW4	Analog change-over 4							●	●
ANEG1	Analog inverter 1		●	●	●	●	●	●	●
ANEG2	Analog inverter 2								●
PT1-1	First order time-delay element	9							
ARIT1	Arithmetic block 1	12						●	●
ARIT2	Arithmetic block 2								
ARITPH1	32-bBit arithmetic block	15							
LIM1	Limiter	6						●	●
ADD1	Addition block	9							●
ABS1	Absolute value generator	5						●	●
FIXSET1	Fixed set-values	10							
DFIN	Digital frequency input	6	●	●	●	●	●		●
DFOUT	Digital frequency output	38	●	●	●	●	●	●	●

Function block library

Function block	Description	CPU time [µs]	used in base configuration C0005						
			1000	4000	5000	6000	7000	20	21
DFSET	Digital frequency processing	93			●	●	●		●
DCTRL	Device control	-	●	●	●	●	●	●	●
MCTRL	Servo control	-	●	●	●	●	●	●	●
NSET	Speed set-value conditioning	77	●	●	●			●	●
MPOT1	Motor potentiometer	22							
PCTRL1	Process controller	63							
REF	Homing function	110			●	●	●	●	●
RFG1	Ramp generator	18							●
SRFG1	S-shaped ramp generator	15							
SYNC1	Multi-axis positioning	55							
GEARCOMP	Gearbox torsion	1							
DT1-1	Differential element	13							
DFRFG1	Digital frequency ramp generator	44							
MFAIL	Mains failure detection							●	●
BRK	Trigger holding brake	17							
TRANS1	Binary flank evaluation	8							
TRANS2	Binary flank evaluation								
TRANS3	Binary flank evaluation								
TRANS4	Binary flank evaluation								
MONIT	Monitoring	-	●	●	●	●	●	●	●
MLP1	Motor phase failure detection	30							
S&H	Sample and Hold	5							
STORE1	Memory 1	35							
STORE2	Memory 2	20							
DB1	Dead band	8						●	
CONV1	Conversion	9							
CONV2	Conversion								
CONV3	Conversion								●
CONV4	Conversion								
CONV5	Conversion								●
CONV6	Conversion								●
CONVPHA1	32-bit conversion	6							
CONVPHPH1	32-bit conversion	80							
CONVPP1	32-bit / 16-bit conversion	55							

Function block	Description	CPU time [µs]	used in base configuration C0005						
			1000	4000	5000	6000	7000	20	21
PHADD1	32-bit addition block	10							
PHCMP1	Comparator	9							●
PHCMP2	Comparator								●
PHCMP3	Comparator								●
PHINT1	Phase integrator	8							
PHINT2	Phase integrator								
PHINT2	Phase integrator								
PHDIFF	32-bit comparison between setpoint and actual value	10							
PHDIV1	Conversion	9							
AIF-OUT	Fieldbus	60	●	●	●	●	●		
CAN-OUT	System bus		●	●	●	●	●		
FCODE 17	Free control codes	-	●	●	●	●	●	●	●
FCODE 26/1			●	●	●	●	●	●	●
FCODE 26/2			●	●	●	●	●	●	●
FCODE 27/1			●	●	●	●	●	●	●
FCODE 27/2			●	●	●	●	●	●	●
FCODE 32					●	●	●		●
FCODE 37									●
FCODE 108/1			●	●	●	●	●	●	●
FCODE 108/2			●	●	●	●	●	●	●
FCODE 109/1			●	●	●	●	●	●	●
FCODE 109/2			●	●	●	●	●	●	●
FCODE 141									●
FCODE 175									●
FCODE 250									●
FCODE 471								●	●
FCODE 472/1									
FCODE 472/2									
FCODE 472/3			●	●	●	●	●	●	
FCODE 472/4									
FCODE 472/5					●	●	●	●	●
FCODE 472/6					●	●	●	●	●
FCODE 472/7									
FCODE 472/8									
FCODE 472/9								●	●
FCODE 472/10								●	●
FCODE 472/11								●	
FCODE 472/12									
FCODE 472/13									
FCODE 472/14									
FCODE 472/15									
FCODE 472/16									
FCODE 472/17									
FCODE 472/18									
FCODE 472/19									
FCODE 472/20									

Function block	Description	CPU time [μs]	used in base configuration C0005						
			1000	4000	5000	6000	7000	20	21
FCODE 473/1					●	●	●		●
FCODE 473/2					●	●	●		
FCODE 473/3					●	●	●		
FCODE 473/4									
FCODE 473/5									
FCODE 473/6									
FCODE 473/7									
FCODE 473/8									
FCODE 473/9									
FCODE 473/10									
FCODE 474/1									
FCODE 474/2									
FCODE 474/3									
FCODE 474/4									
FCODE 474/5									
FCODE 475/2									

7.4.1 Absolute value generator (ABS)

Purpose

This FB is used to convert bipolar signals into unipolar signals.

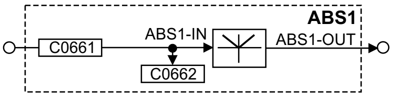


Abb. 7-19 Absolute value generator (ABS1)

Signal				Source			Note
Name	**Type**	**DIS**	**DIS format**	**CFG**	**List**	**Lenze**	
ABS1-IN1	a	C0662	dec [%]	C0661	1	1000	-
ABS1-OUT	a	-	-	-	-	-	-

Function

The absolute value of the input signal is generated.

7.4.2 Addition block (ADD)

Purpose

Adds or subtracts ”analog” signals depending on the input used.

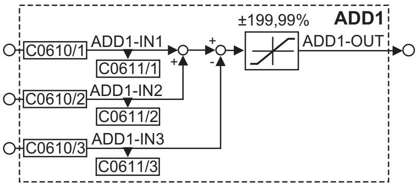


Abb. 7-20 Addition block (ADD1)

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
ADD1-IN1	a	C0611/1	dec [%]	C0610/1	1	1000	Addition input
ADD1-IN2	a	C0611/2	dec [%]	C0610/2	1	1000	Addition input
ADD1-IN3	a	C0611/3	dec [%]	C0610/3	1	1000	Subtraction input
ADD1-OUT	a	-	-	-	-	-	limited to ±199.99%

Function

- Input ADD1-IN1 is added to input ADD1-IN2.
- The input ADD-IN3 is subtracted from the calculated result.
- The result of the subtraction is then limited to ±199.99 %.

7.4.3 Automation interface (AIF-IN)

Purpose

Interface for input signals from the connected field bus module (e.g. INTERBUS-S, PROFIBUS-DP) for setpoints and actual values as binary, analog or phase information. Please observe the corresponding Operating Instructions of the connected fieldbus module.

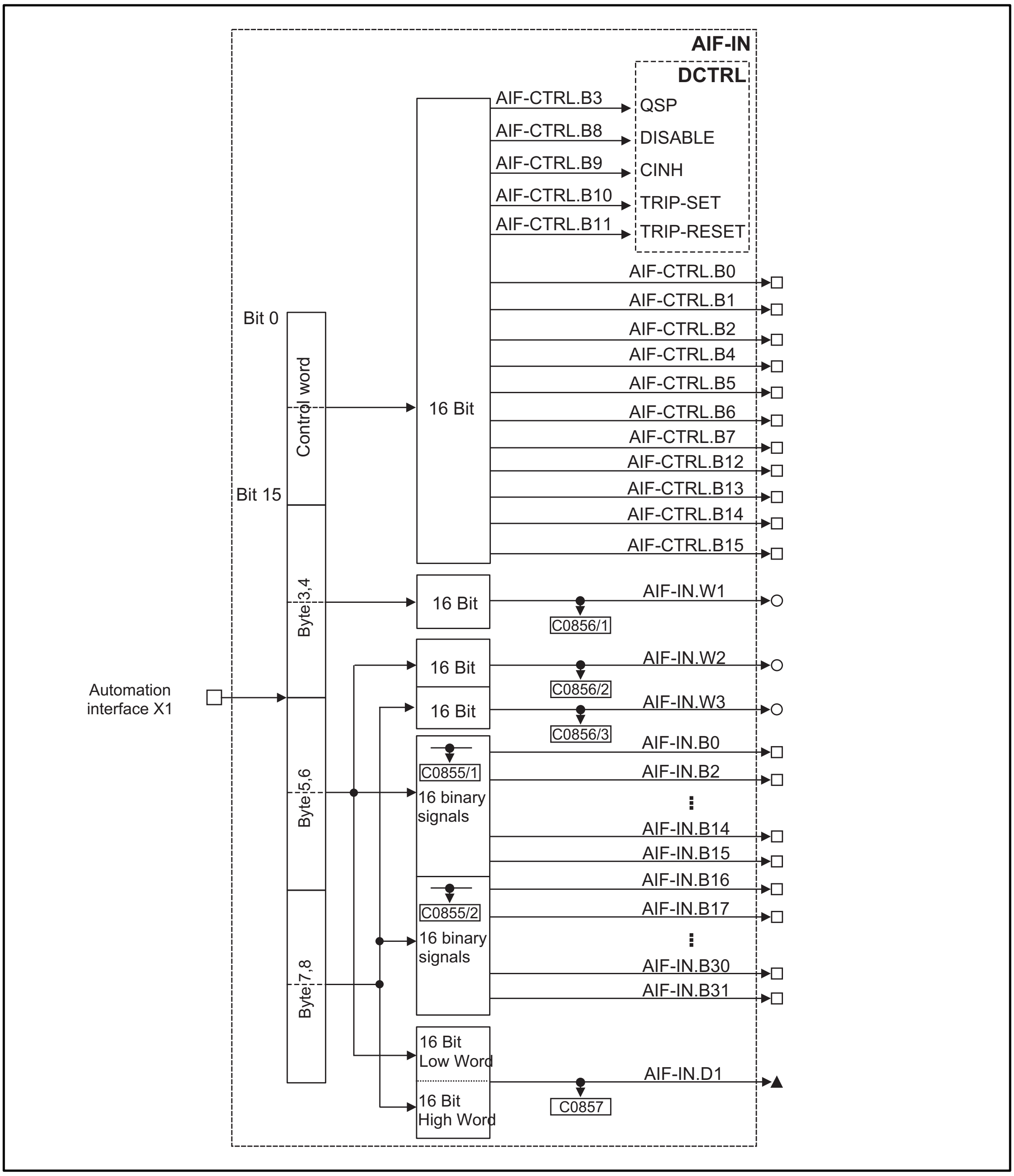


Abb. 7-21 Automation interface (AIF-IN)

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
AIF-CTRL.B0	d	C0136/3	bin	-	-	-	
AIF-CTRL.B1	d	C0136/3	bin	-	-	-	
AIF-CTRL.B2	d	C0136/3	bin	-	-	-	
AIF-CTRL.B4	d	C0136/3	bin	-	-	-	
AIF-CTRL.B5	d	C0136/3	bin	-	-	-	
AIF-CTRL.B6	d	C0136/3	bin	-	-	-	
AIF-CTRL.B7	d	C0136/3	bin	-	-	-	
AIF-CTRL.B12	d	C0136/3	bin	-	-	-	
AIF-CTRL.B13	d	C0136/3	bin	-	-	-	
AIF-CTRL.B14	d	C0136/3	bin	-	-	-	
AIF-CTRL.B15	d	C0136/3	bin	-	-	-	
AIF-IN.W1	a	C0856/1	dec [%]	-	-	-	+16384 = +100 %
AIF-IN.W2	a	C0856/2	dec [%]	-	-	-	+16384 = +100 %
AIF-IN.W3	a	C0856/3	dec [%]	-	-	-	+16384 = +100 %
AIF-IN.D1	ph	C0857	dec [inc]	-	-	-	65536 = 1 revolution
AIF-IN.D2	ph	C1197	dec [inc]	-	-	-	65536 = 1 revolution
AIF-IN.B0	d	C0855/1	hex	-	-	-	
AIF-IN.B1	d	C0855/1	hex	-	-	-	
AIF-IN.B2	d	C0855/1	hex	-	-	-	
AIF-IN.B3	d	C0855/1	hex	-	-	-	
AIF-IN.B4	d	C0855/1	hex	-	-	-	
AIF-IN.B5	d	C0855/1	hex	-	-	-	
AIF-IN.B6	d	C0855/1	hex	-	-	-	
AIF-IN.B7	d	C0855/1	hex	-	-	-	
AIF-IN.B8	d	C0855/1	hex	-	-	-	
AIF-IN.B9	d	C0855/1	hex	-	-	-	
AIF-IN.B10	d	C0855/1	hex	-	-	-	
AIF-IN.B11	d	C0855/1	hex	-	-	-	
AIF-IN.B12	d	C0855/1	hex	-	-	-	
AIF-IN.B13	d	C0855/1	hex	-	-	-	
AIF-IN.B14	d	C0855/1	hex	-	-	-	
AIF-IN.B15	d	C0855/1	hex	-	-	-	
AIF-IN.B16	d	C0855/2	hex	-	-	-	
AIF-IN.B17	d	C0855/2	hex	-	-	-	
AIF-IN.B18	d	C0855/2	hex	-	-	-	
AIF-IN.B19	d	C0855/2	hex	-	-	-	
AIF-IN.B20	d	C0855/2	hex	-	-	-	
AIF-IN.B21	d	C0855/2	hex	-	-	-	
AIF-IN.B22	d	C0855/2	hex	-	-	-	
AIF-IN.B23	d	C0855/2	hex	-	-	-	
AIF-IN.B24	d	C0855/2	hex	-	-	-	
AIF-IN.B25	d	C0855/2	hex	-	-	-	
AIF-IN.B26	d	C0855/2	hex	-	-	-	
AIF-IN.B27	d	C0855/2	hex	-	-	-	
AIF-IN.B28	d	C0855/2	hex	-	-	-	
AIF-IN.B29	d	C0855/2	hex	-	-	-	
AIF-IN.B30	d	C0855/2	hex	-	-	-	
AIF-IN.B31	d	C0855/2	hex	-	-	-	

Function

The input signals of the 8 byte user data of the AIF object are converted into corresponding signal types. The signals can be used via further function blocks.

Byte 1 and 2

Byte 1 and 2 form the control word for the controller. The bits 3, 8, 9, 10, and 11 of these bytes are directly transferred to the function block DCTRL where they are linked to other signals. The other 11 bits can be used to control further function blocks.

Byte 3 and 4

form the signal to AIF-IN.W1.

Byte 5, 6, 7 and 8

The meaning of these user data can be selected among different signal types. Depending on the requirement, these data can be evaluated as up to 2 analog signals, 32 digital signals or one phase signal.Mixed forms are also possible.

7.4.4 Automation interface (AIF-OUT)

Purpose

Interface for output signals from the connected field bus module (e.g. INTERBUS-S, PROFIBUS-DP) for setpoints and actual values as binary, analog or phase information.Please observe the corresponding Operating Instructions of the connected fieldbus module.

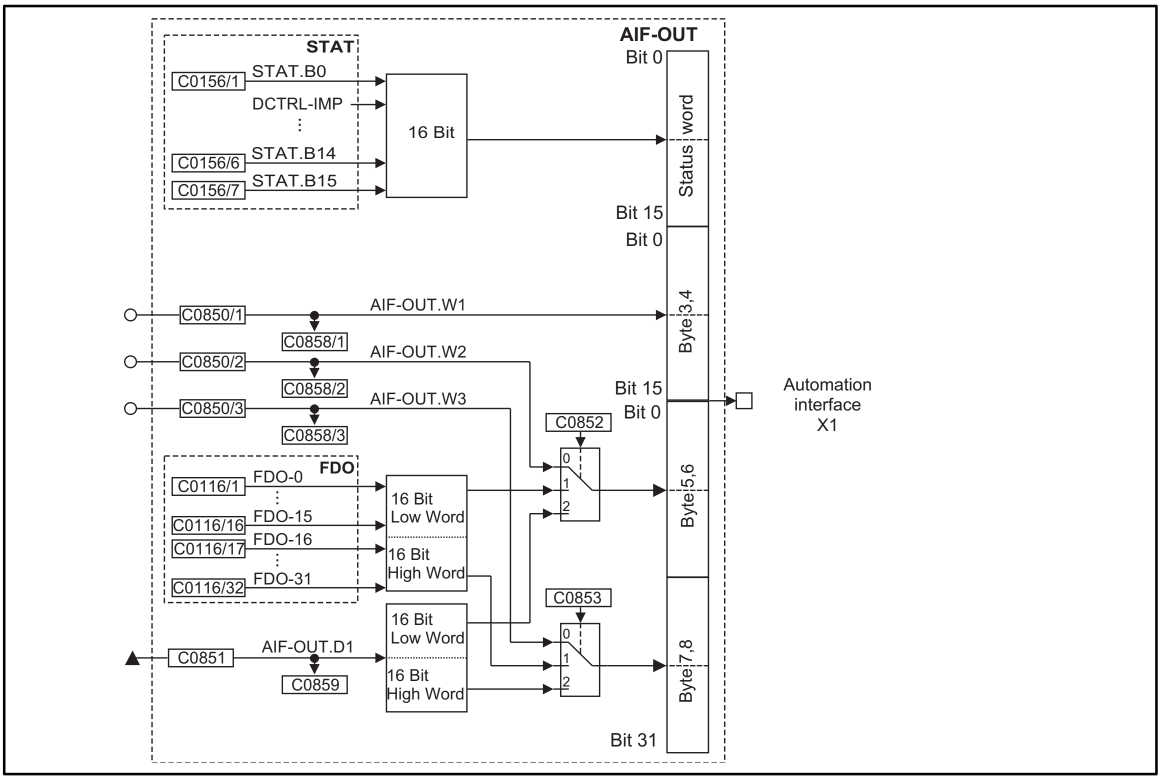


Abb. 7-22 Automation interface (AIF-OUT)

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
AIF-OUT.W1	a	C0858/1	dec [%]	C0850/1	1	1000	+100 % = +16384
AIF-OUT.W2	a	C0858/2	dec [%]	C0850/2	1	1000	+100 % = +16384
AIF-OUT.W3	a	C0858/3	dec [%]	C0850/3	1	1000	+100 % = +16384
AIF-OUT.D1	ph	C0859	abs [inc]	C0851	4	1000	1 revolution = 65536
AIF-OUT.D2	ph	C1196	abs [inc]	C1195	4	1000	1 revolution = 65536

Function

The input signals of this function block are copied to the 8 byte user data of the AIF object and laid on the connected fieldbus module. The meaning of the user data can be determined very easily with C0852 and C0853 and the corresponding configuration code (CFG).

Byte 1 and 2

Here, the status word of the function block STAT is mapped. Some of the bits are freely assignable (see description function block STAT in chapter 7.4.57)

Byte 3 and 4

- C0854 = 0
  – The analog signal at AIF-OUT.W1 is output.
- C0854 = 3
  – The LOW WORD from AIF-OUT.D2 is output.

Byte 5 and 6

- C0852 = 0
  – The analog signal at AIF-OUT.W2 is output on byte 5 and 6.
- C0852 = 1
  – Bits 0 ... 15 of FDO are output.
- C0852 = 2
  – The LOW WORD from AIF-OUT.D1 is output.
- C0852 = 3
  – The HIGH WORD of AIF-OUT.D2 is output.

Byte 7 and 8

- C0853 = 0
  – The analog signal at AIF-OUT.W3 is output.
- C0853 = 1
  – Bits 16 ... 31 of FDO are output.
- C0853 = 2
  – The HIGH WORD of AIF-OUT.D1 is output.

Example

You want to output 16 digital signals of FDO and the LOW WORD of AIF-OUT.D1:

- The LOW-WORD of AIF-OUT.D1 can only be output on byte 5 and 6.
  – For this, C0852 is set to 2. The phase signal at C0851 is output on byte 5 and 6.
- For the digital signals, only the bits 16 ... 31 (byte 7 and 8) are available (byte 5 and 6 are assigned):
  – For this, C0853 is set to 1. Bit 16 ... 31 (FDO) are output on byte 7 and 8.

7.4.5 Analog input via terminal 1,2/3,4 (AIN)

Purpose

This FB is the interface for analog signals as

- setpoint input,
- actual value input and
- parameter control.

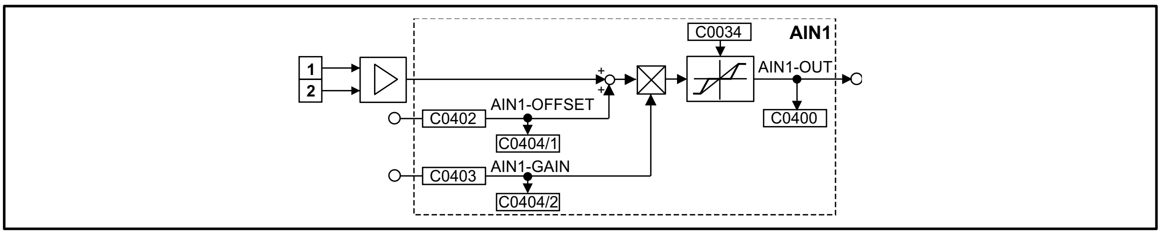


Abb. 7-23 Analog input via terminal 1,2 (AIN1)

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
AIN1-OFFSET	a	C0404/1	dec [%]	C0402	1	19502	-
AIN1-GAIN	a	C0404/2	dec [%]	C0403	1	19504	-
AIN1-OUT	a	-	-	-	-	-	-

Special feature of input terminals 1,2

- A dead band element can be integrated into the output signal at AIN1 via code C0034. The function 4 ... 20 mA as a current master value can be achieved together with the jumper setting X2 (controller front).
- The signal is read cyclically (1 ms).

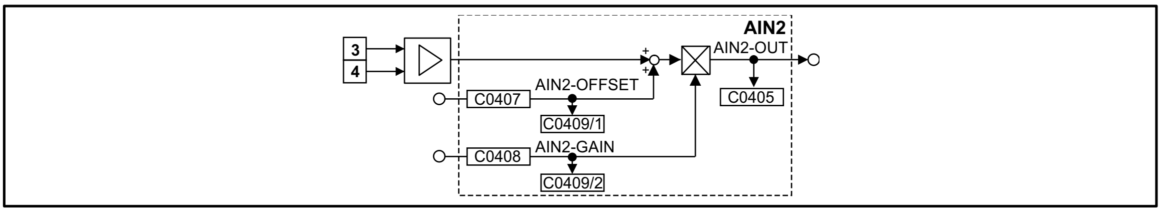


Abb. 7-24 Analog input via terminal 3, 4 (AIN2)

Special feature of AIN2

- The signal is read cyclically every 250 μs .

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
AIN2-OFFSET	a	C0409/1	dec [%]	C0407	1	19503	-
AIN2-GAIN	a	C0409/2	dec [%]	C0408	1	19505	-
AIN2-OUT	a	-	-	-	-	-	-

Function

- The analog input value is added to the value at input AINx-OFFSET.
- The result of the addition is limited to ±200%.
- The limited value is multiplied with the value which is applied at input AINx-GAIN.
- The signal is then limited to ±200%.
- The signal is output at AINx-OUT.

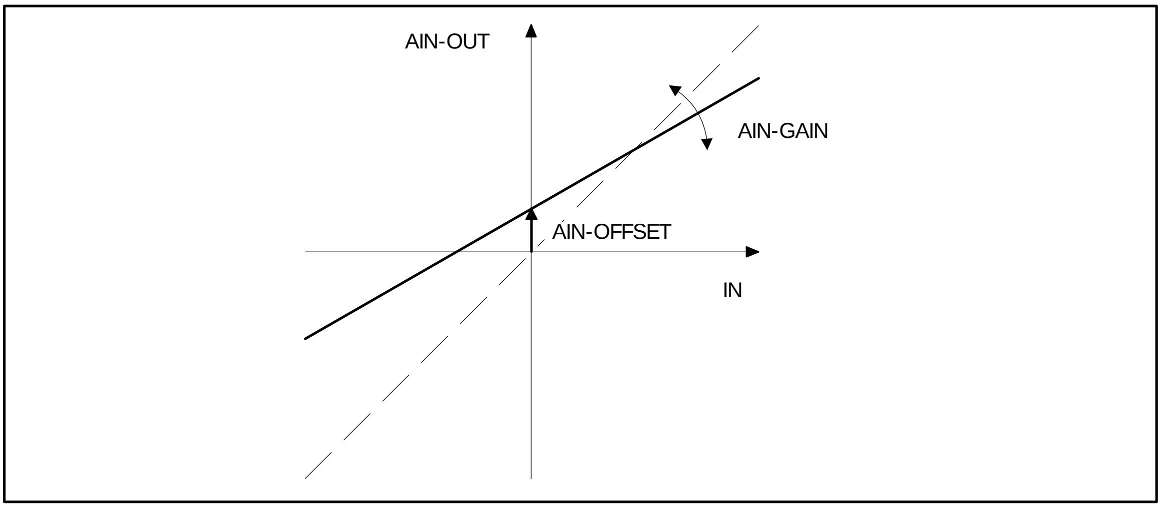


Abb. 7-25 Offset and gain of the analog input

7.4.6 AND link (AND)

Purpose

This function is used to link digital signals as an AND function. These operations can be used for the control of functions or the generation of status information.

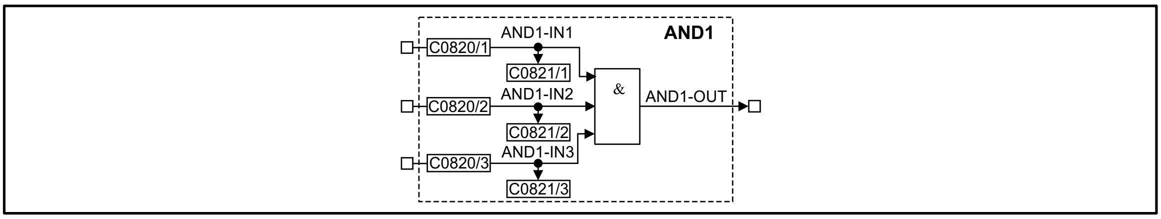


Abb. 7-26 AND function (AND1)

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
AND1-IN1	d	C0821/1	bin	C0820/1	2	1000	-
AND1-IN2	d	C0821/2	bin	C0820/2	2	1000	-
AND1-IN3	d	C0821/3	bin	C0820/3	2	1000	-
AND1-OUT	d	-	-	-	-	-	-

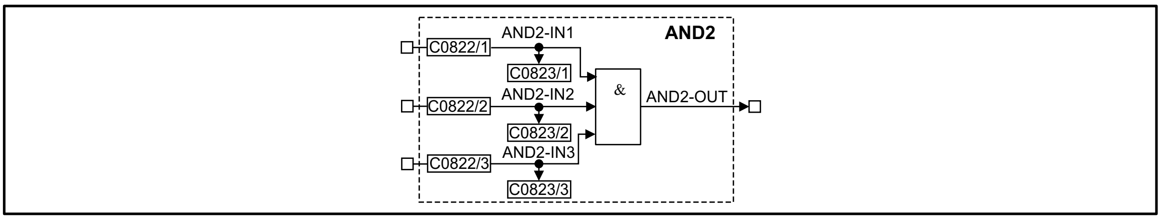


Abb. 7-27 AND function (AND2)

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
AND2-IN1	d	C0823/1	bin	C0822/1	2	1000	-
AND2-IN2	d	C0823/2	bin	C0822/2	2	1000	-
AND2-IN3	d	C0823/3	bin	C0822/3	2	1000	-
AND2-OUT	d	-	-	-	-	-	-

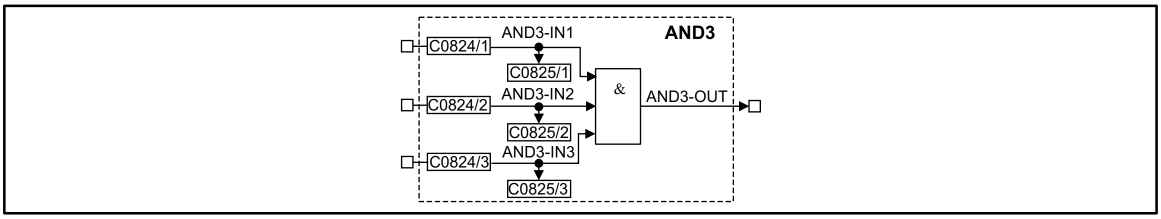


Abb. 7-28 AND function (AND3)

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
AND3-IN1	d	C0825/1	bin	C0824/1	2	1000	-
AND3-IN2	d	C0825/2	bin	C0824/2	2	1000	-
AND3-IN3	d	C0825/3	bin	C0824/3	2	1000	-
AND3-OUT	d	-	-	-	-	-	-

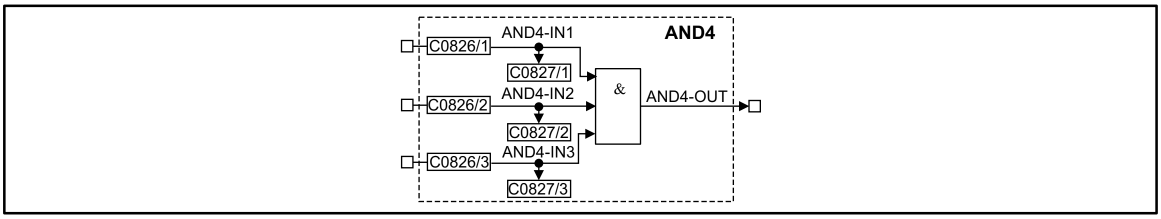


Abb. 7-29 AND function (AND4)

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
AND4-IN1	d	C0827/1	bin	C0826/1	2	1000	-
AND4-IN2	d	C0827/2	bin	C0826/2	2	1000	-
AND4-IN3	d	C0827/3	bin	C0826/3	2	1000	-
AND4-OUT	d	-	-	-	-	-	-

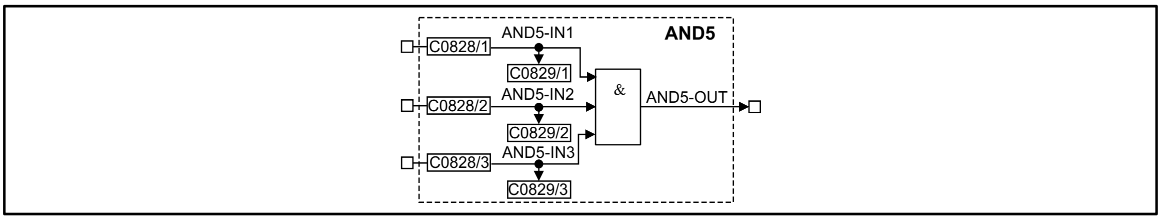


Abb. 7-30 AND function (AND5)

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
AND5-IN1	d	C0829/1	bin	C0828/1	2	1000	-
AND5-IN2	d	C0829/2	bin	C0828/2	2	1000	-
AND5-IN3	d	C0829/3	bin	C0828/3	2	1000	-
AND5-OUT	d	-	-	-	-	-	-

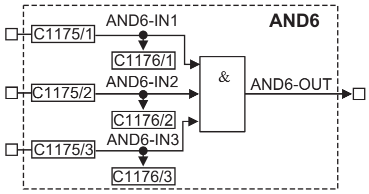


Abb. 7-31 AND function (AND6)

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
AND6-IN1	d	C1176/1	bin	C1175/1	2	1000	-
AND6-IN2	d	C1176/2	bin	C1175/2	2	1000	-
AND6-IN3	d	C1176/3	bin	C1175/3	2	1000	-
AND6-OUT	d	-	-	-	-	-	-

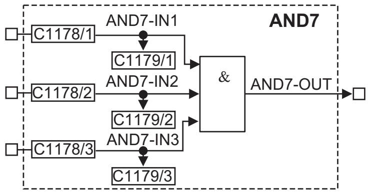


Abb. 7-32 AND function (AND7)

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
AND7-IN1	d	C1179/1	bin	C1178/1	2	1000	-
AND7-IN2	d	C1179/2	bin	C1178/2	2	1000	-
AND7-IN3	d	C1179/3	bin	C1178/3	2	1000	-
AND7-OUT	d	-	-	-	-	-	-

Function

ANDx-IN1	ANDx-IN2	ANDx-IN3	ANDx-OUT
0	0	0	0
1	0	0	0
0	1	0	0
1	1	0	0
0	0	1	0
1	0	1	0
0	1	1	0
1	1	1	1

The function corresponds to a series connection of normally-open contacts in a contactor control.

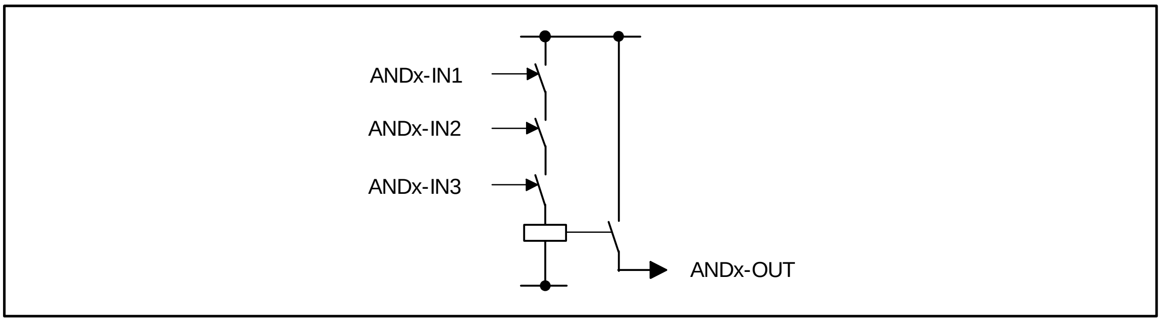


Abb. 7-33 AND function as a series connection of normally-open contacts

Tip!

If only two inputs are required, use the inputs ANDx-IN1 and ANDx-IN2. Assign the input ANDx-IN3 to the signal source FIXED1 via the configuration code.

7.4.7 Inverter (ANEG)

Purpose

This FB inverts the sign of an analog signal.

Two inverters are available:

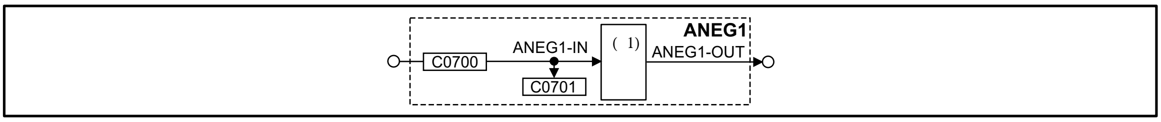


Abb. 7-34 Inverter (ANEG1)

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
ANEG1-IN	a	C0701	dec [%]	C0700	1	19523	-
ANEG1-OUT	a	-	-	-	-	-	-

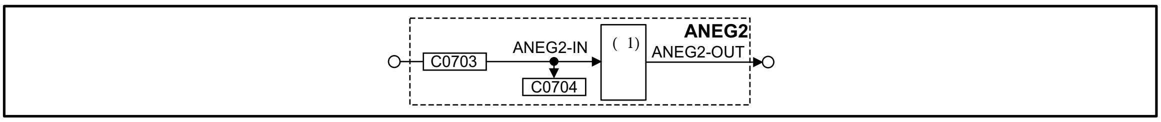


Abb. 7-35 Inverter (ANEG2)

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
ANEG2-IN	a	C0704	dec [%]	C0703	1	1000	-
ANEG2-OUT	a	-	-	-	-	-	-

Function

The input value is multiplied with -1 and then output again.

7.4.8 Analog output via terminal 62/63 (AOUT)

Purpose

AOUT1 and AOUT2 can be used as monitor outputs.

Internal analog signals can be output as voltage signals and be used e.g. as display values or setpoints for slaves.

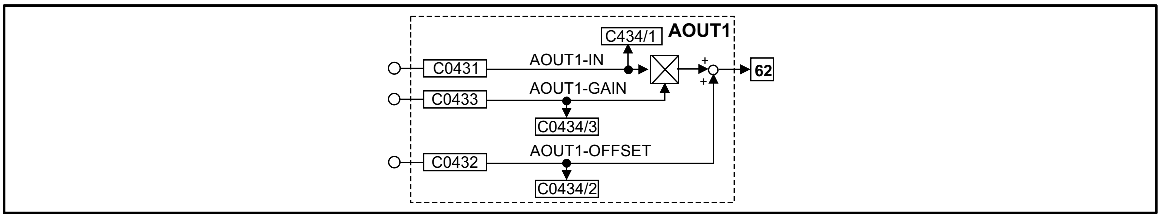


Abb. 7-36 Analog output via terminal X6/62 (AOUT1)

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
AOUT1-IN	a	C0434/1	dec [%]	C0431	1	5001	-
AOUT1-GAIN	a	C0434/3	dec [%]	C0433	1	19510	-
AOUT1-OFFSET	a	C0434/2	dec [%]	C0432	1	19512	-

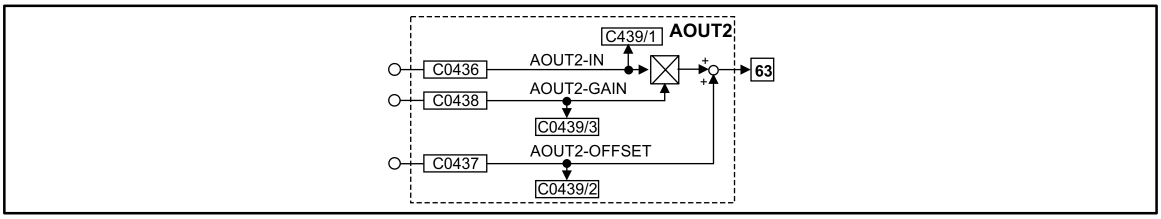


Abb. 7-37 Analog output via terminal X6/63 (AOUT2)

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
AOUT2-IN	a	C0439/1	dec [%]	C0436	1	5002	-
AOUT2-GAIN	a	C0439/3	dec [%]	C0438	1	19511	-
AOUT2-OFFSET	a	C0439/2	dec [%]	C0437	1	19513	-

Function

- The value at input AOUTx-IN is multiplied with the value at input AOUTx-GAIN.
  - The formula for the multiplication is: 100% * 100% = 100%.
- The result of the multiplication is limited to ±200%.
- The limited value is added to the value which is applied at input AOUTx-OFFSET.
  - The formula for the addition is 50% + 10% = 60%. The result of the calculation is mapped in such a way that 100% = 10 V.
- The result of the addition is limited again to ±200%.
- The result of the calculation is mapped in such a way that 100% = 10 V and is output as a signal at terminal 62 or 63.

Example for an output value

AOUT1-IN = 50%, AOUT1-GAIN = 100%, AOUT1-OFFSET = 10%

Output terminal 62 = ((50% * 100% = 50%) + 10% = 60%) = 6 V

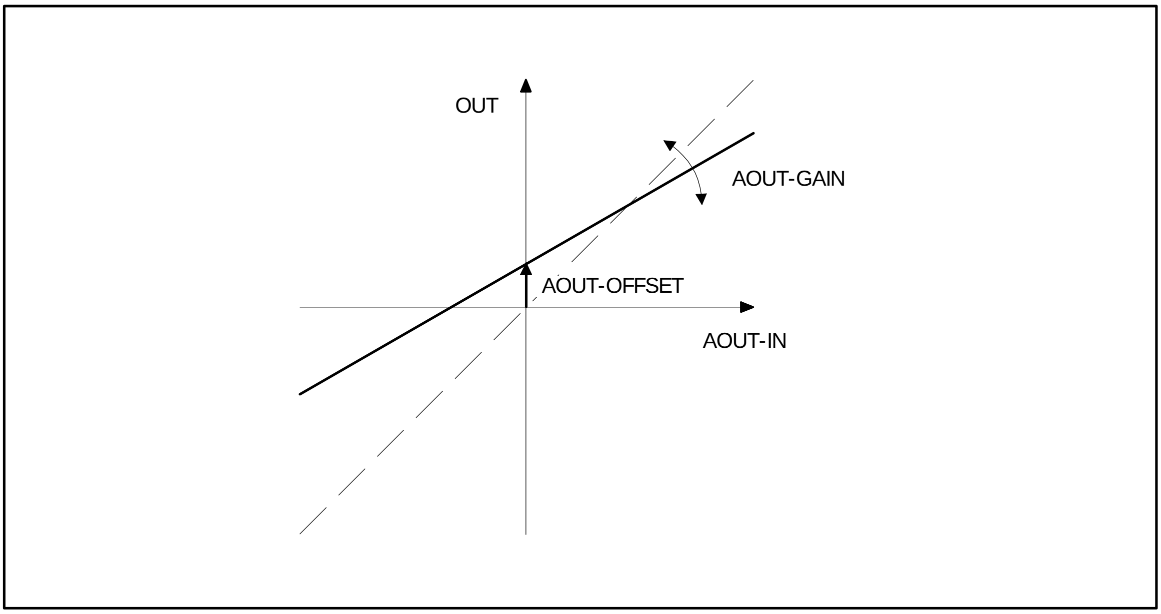


Abb. 7-38 Offset and gain of the analog output

7.4.9 Arithmetic block (ARIT)

Purpose

Logic operation of two ”analog” signals.

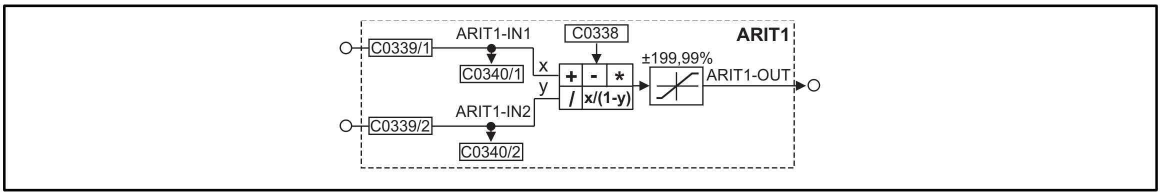


Abb. 7-39 Arithmetic block (ARIT1)

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
ARIT1-IN1	a	C0340/1	dec [%]	C0339/1	1	1000	-
ARIT1-IN2	a	C0340/2	dec [%]	C0339/2	1	1000	-
ARIT1-OUT	a	-	-	-	-	-	limited to ±199.99 %

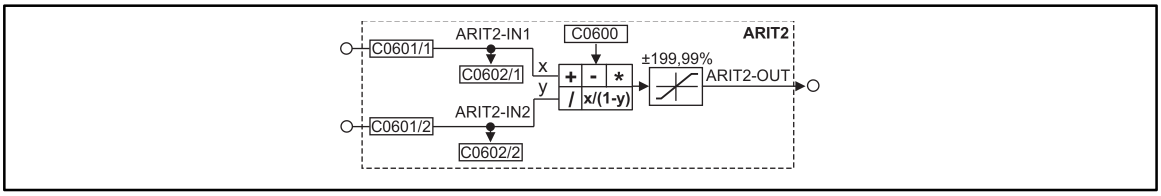


Abb. 7-40 Arithmetic block (ARIT2)

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
ARIT2-IN1	a	C0602/1	dec [%]	C0601/1	1	1000	-
ARIT2-IN2	a	C0602/2	dec [%]	C0601/2	1	1000	-
ARIT2-OUT	a	-	-	-	-	-	limited to ±199.99 %

Function

For both arithmetic blocks the following functions can be selected (example for ARIT1):

- C0338 = 0
  - Output = ARIT1-IN1
  - ARIT1-IN2 is not processed
- C0338 = 1
  - Output = ARIT1-IN1 + ARIT1-IN2
  - Example: 100% = 50% + 50%
- C0338 = 2
  - Output = ARIT1-IN1 - ARIT1-IN2
  - Example: 50% = 100% - 50%
- C0338 = 3
  - Output = ARIT1-IN1 * ARIT1-IN2
  - Example: 100% = 100% * 100%

- C0338 = 4
  - Output = ARIT1-IN1 / |ARIT1-IN2|
  - Example: 1% = 100% / 100%
- C0338 = 5
  - Output = ARIT1-IN1 / (100% - ARIT1-IN2)
  - Example: 200% = 100% /(100% - 50%)

7.4.10 Arithmetic block (ARITPH)

Purpose

The FB ARITPH calculates a phase output signal from two phase input signals.

ARITPH1

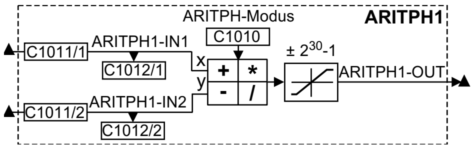


Abb. 7-41 Function block ARITPH1

Signal				Source		Note
Name	Type	DIS	DIS format	CFG	List	
ARITPH1-IN1	ph	C1012/1	dec [inc]	C1011/1	3	-
ARITPH1-IN2	ph	C1012/2	dec [inc]	C1011/2	3	-
ARITPH1-OUT	ph	-	-	-	-	

Function

- Selection of the arithmetic function with the code ARITPH mode.
- The function block limits the result (see table)

ARITPH mode	Arithmetic function	Limitation	
C1010=0	OUT = IN1	2^{30} -1	
C1010=1	OUT = IN1 + IN2	2^{30} -1	
C1010=2	OUT = IN1 - IN2	2^{30} -1	
C1010=3	OUT = (IN1 * IN2) / 2^{31}	2^{30} -1	(remainder not considered)
C1010=11	OUT = IN1 + IN2	without	with overflow
C1010=12	OUT = IN1 - IN2	without	with overflow
C1010=13	OUT = IN1 * IN2	2^{31}	
C1010=14	OUT = IN1 / IN2	2^{30} -1	(remainder not considered)

- The calculation is performed cyclically in the control program.

7.4.11 Changeover switch for analog signals (ASW)

Purpose

This FB changes between two analog signals.

Therefore, it is possible to change e.g. during winding between an initial diameter and a calculated diameter.

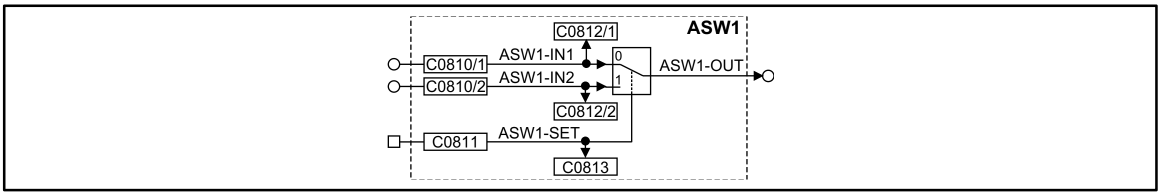


Abb. 7-42 Changeover switch for analog signals (ASW1)

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
ASW1-IN1	a	C0812/1	dec [%]	C0810/1	1	55	-
ASW1-IN2	a	C0812/2	dec [%]	C0810/2	1	1000	-
ASW1-SET	d	C0813	bin	C0811	2	1000	-
ASW1-OUT	a	-	-	-	-	-	-

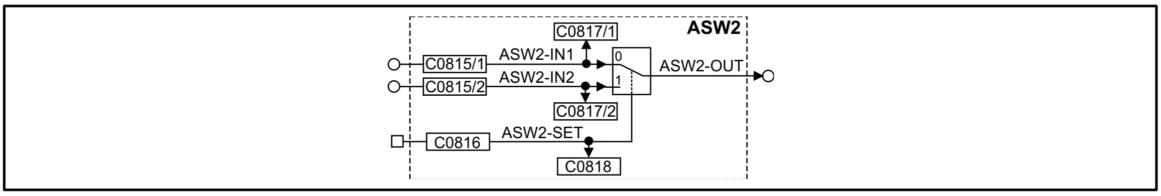


Abb. 7-43 Changeover switch for analog signals (ASW2)

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
ASW2-IN2	a	C0817/1	dec [%]	C0815/1	1	1000	-
ASW2-IN1	a	C0817/2	dec [%]	C0815/2	1	1000	-
ASW2-SET	d	C0818	bin	C0816	2	1000	-
ASW2-OUT	a	-	-	-	-	-	-

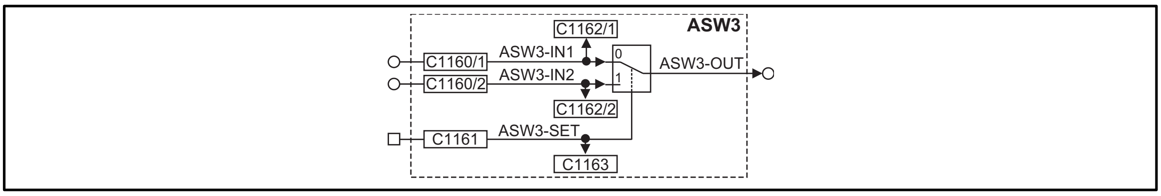


Abb. 7-44 Changeover switch for analog signals (ASW3)

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
ASW3-IN2	a	C1162/1	dec [%]	C1160/1	1	1000	-
ASW3-IN1	a	C1162/2	dec [%]	C1160/2	1	1000	-
ASW3-SET	d	C1163	bin	C1161	2	1000	-
ASW3-OUT	a	-	-	-	-	-	-

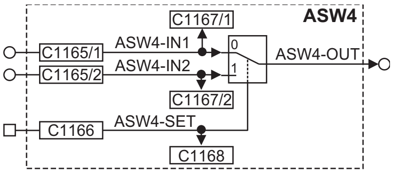


Abb. 7-45 Changeover switch for analog signals (ASW4)

Signal				Source			Note
Name	**Type**	**DIS**	**DIS format**	**CFG**	**List**	**Lenze**	
ASW4-IN2	a	C1167/1	dec [%]	C1165/1	1	1000	-
ASW4-IN1	a	C1167/2	dec [%]	C1165/2	1	1000	-
ASW4-SET	d	C1168	bin	C1166	2	1000	-
ASW4-OUT	a	-	-	-	-	-	-

Function

This FB is controlled via a binary input. Depending on the input signal, different signals are sent to the output:

- If a HIGH signal is applied at the binary input, the signal which is applied at the ASWx-IN2 input is sent to the output.
- If a LOW signal is applied, the signal which is applied at the ASW-IN2 input is sent to the output.

7.4.12 Holding brake (BRK)

Purpose

The FB is used to trigger a holding brake.

Possible applications:

- Hoists
- Traversing drives
- Active loads

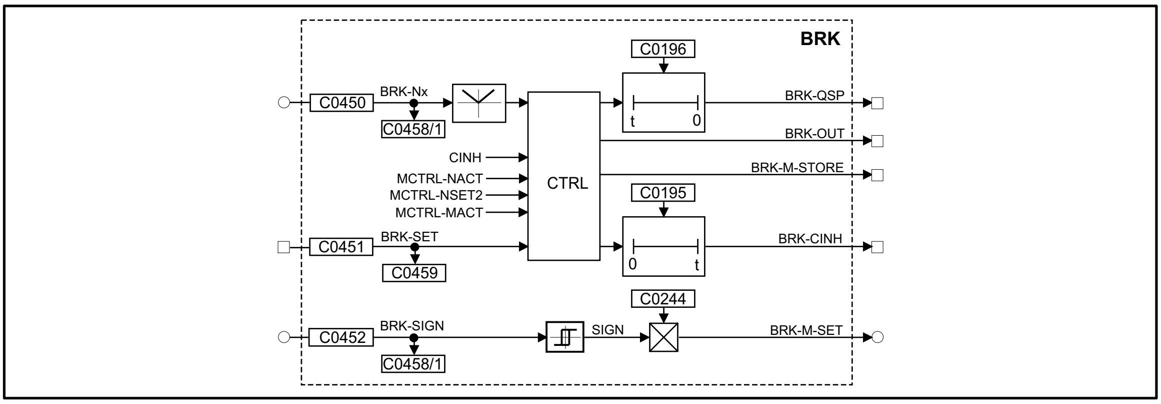


Abb. 7-46 Holding brake (BRK)

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
BRK-SET	d	C0459	bin	C0451	2	1000	-
BRK-NX	a	C0458/1	dec [%]	C0450	1	1000	Speed threshold from which the drive can output the signal "close brake". The signal source for this input can be a control code, a fixed value or any other analog output of a FB.
BRK-SIGN	a	C0458/2	dec [%]	C0452	1	1000	Direction of the torque, with which the drive has to build a torque against the brake.The signal source for this input can be a control code, a fixed value or any other analog ouptput of a FB.
BRK-M-SET	a	-	dec [%]	C0244	-	0.00	Holding torque of the DC injection brake 100% = value of C0057
BRK-T-ACT	a	-	dec	C0195	-	99.9	Brake-close time
BRK-T-RELEASE	a	-	dec	C0196	-	0.0	Brake-open time

Function

The signals N-ACT, M-ACT, N-SET and BRK-Nx are processed as absolute values within the function block.

7.4.12.1 Close brake

Purpose

A HIGH signal at the BRK-SET input activates the function. The BRK-QSP output changes to HIGH at the same time. This signal can be used to decelerate the drive to zero speed via a deceleration ramp.

Function

If the setpoint speed falls below the speed set at the BRK-Nx input, the BRK-OUT output is set to HIGH. To obtain protection against open circuit, this signal must be inverted at the output (e.g. under C0118).

When the BRK-OUT is set, a time element is triggered. After the time set under C0195 has elapsed, the BRK-RSP output is set. Using this output, for instance, the controller inhibit (inside the controller) can be set. In general, the brake-close time is set here. This is necessary because the brake does not close immediately after the activation of the BRK-OUT signal and thus the drive does not provide a holding torque for the time set.

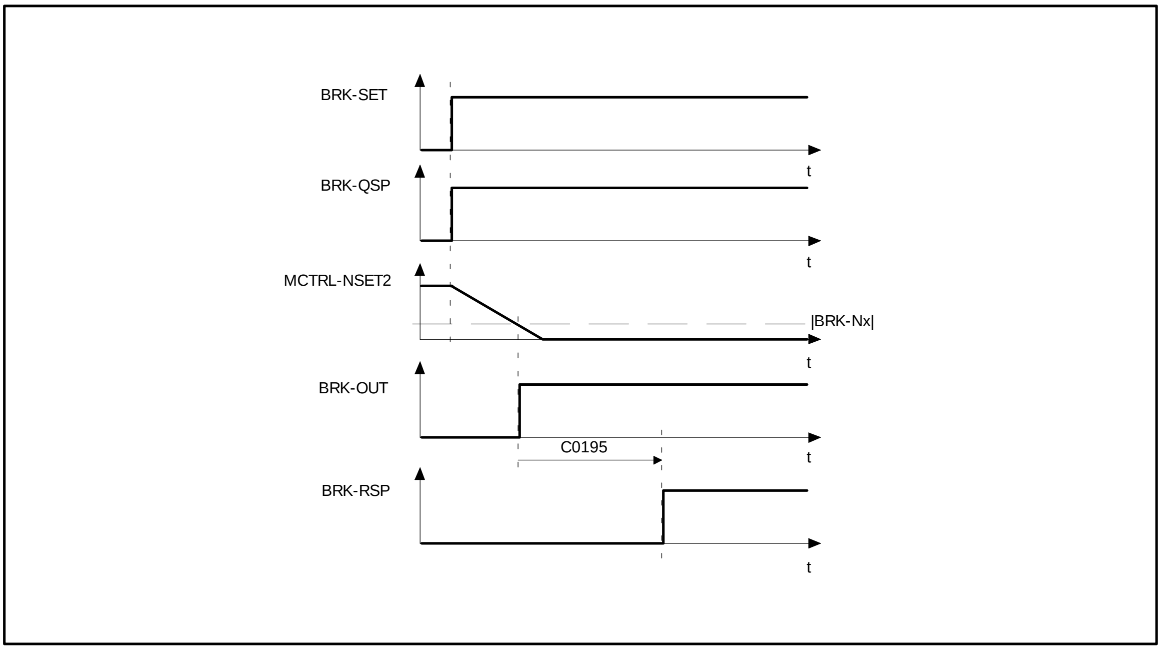


Abb. 7-47 Signal sequence when the brake is closed

7.4.12.2 Open brake

Purpose

The LOW signal at the BRK-SET input sets the BRK-CINH immediately to LOW. The BRK-M-STORE output is set to HIGH at the same time. This signal initiates the generation of a defined brake torque against the brake. The drive thus takes up the torque while the brake opens. The signal is reset only after the time set under C0196 has elapsed.

Function

The BRK-OUT output signal is set to LOW as soon as the torque reaches the value set under C0244 (holding torque).

When the input is reset, a time element is triggered. After the time set under C0196 has elapsed, the BRK-QSP output is reset. With this signal, the setpoint integrator can be enabled after the brake-open time has elapsed, for instance.

Note

If an actual speed larger than the value at BRK-Nx is detected before the brake-open time (C0196) has elapsed, the BRK-QSP and BRK-M-STORE signals are immediately reset. The drive can immediately operate speed- or phase controlled. If the BRK-QSP output acts on the QSP control word, the drive synchronizes to the actual speed and follows its setpoint.

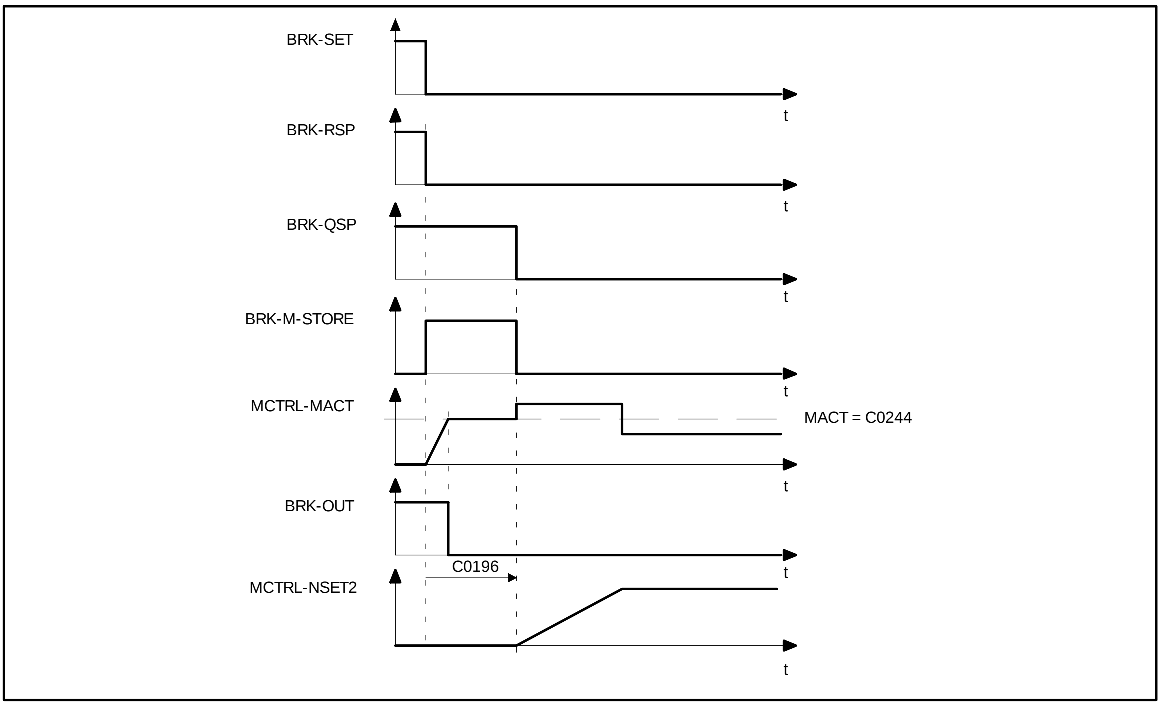


Abb. 7-48 Signal sequence when the brake is opened (released)

7.4.12.3 Setting controller inhibit

Purpose

Controller inhhibit can be set e.g. in case of an interference (LU, OU, ...).

Function

When controller inhibit (CINH) is set, the BRK-OUT signal is immediately set to HIGH. The drive is then braked by its mechanical brake.

If the fault is eliminated quickly, i.e. if the controller inhibit (CINH) is reset before the actual speed falls below the threshold BRK-Nx, the BRK-OUT signal is immediately set to LOW. The drive synchronizes itself to the momentary speed and follows its setpoint.

If the value falls below the threshold, the drive starts as described under ”Open brake”.

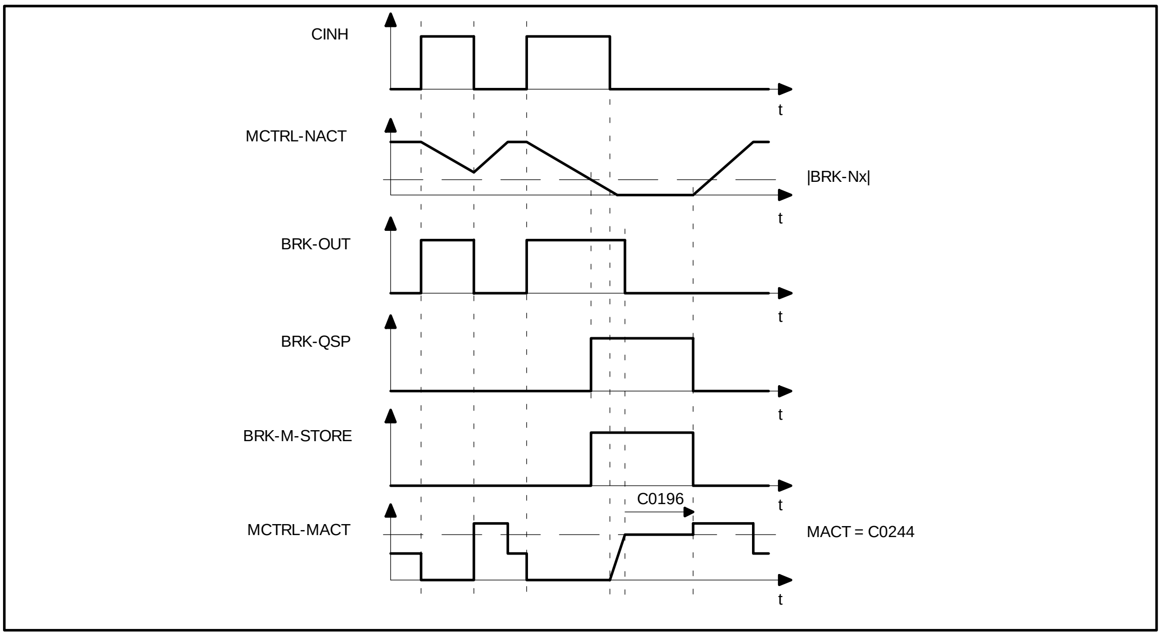


Abb. 7-49 Control brake by CINH

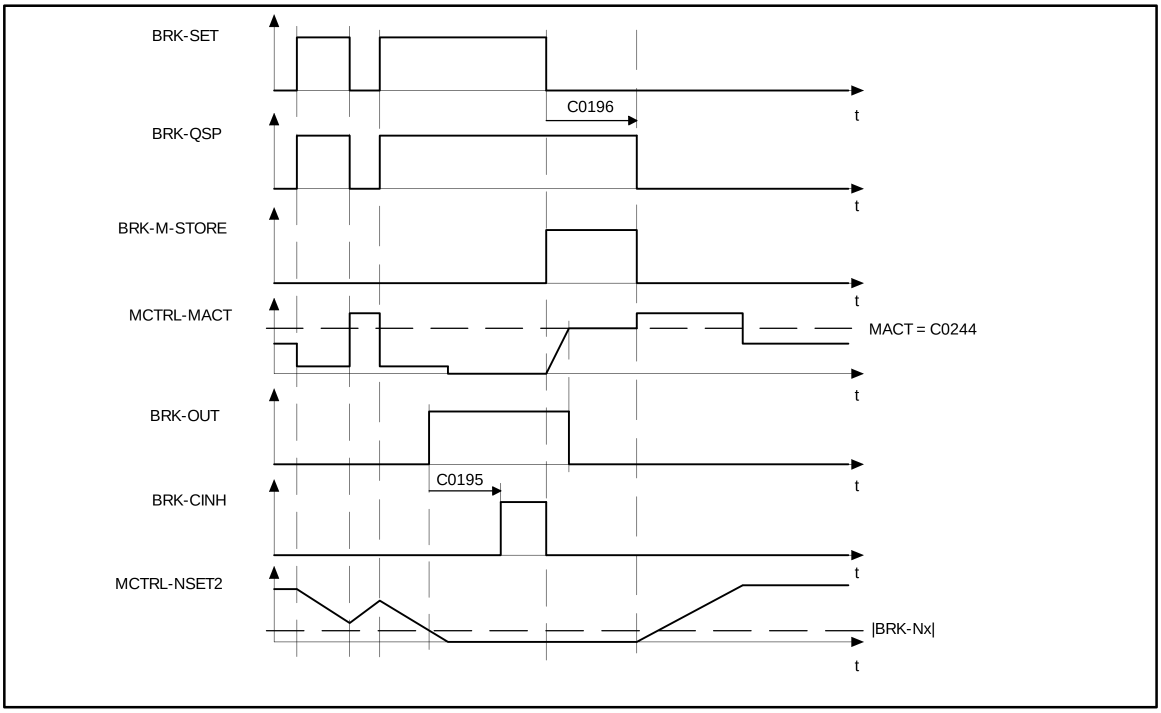


Abb. 7-50 Switching cycle when braking

7.4.13 System bus (CAN-IN)

Purpose

Interface for input signals from the system bus for setpoints and actual values as binary, analog, or phase information.

CAN-IN1

The process data object CAN-IN1 is provided for the cyclic transmission of process data and the communication with higher-level master.

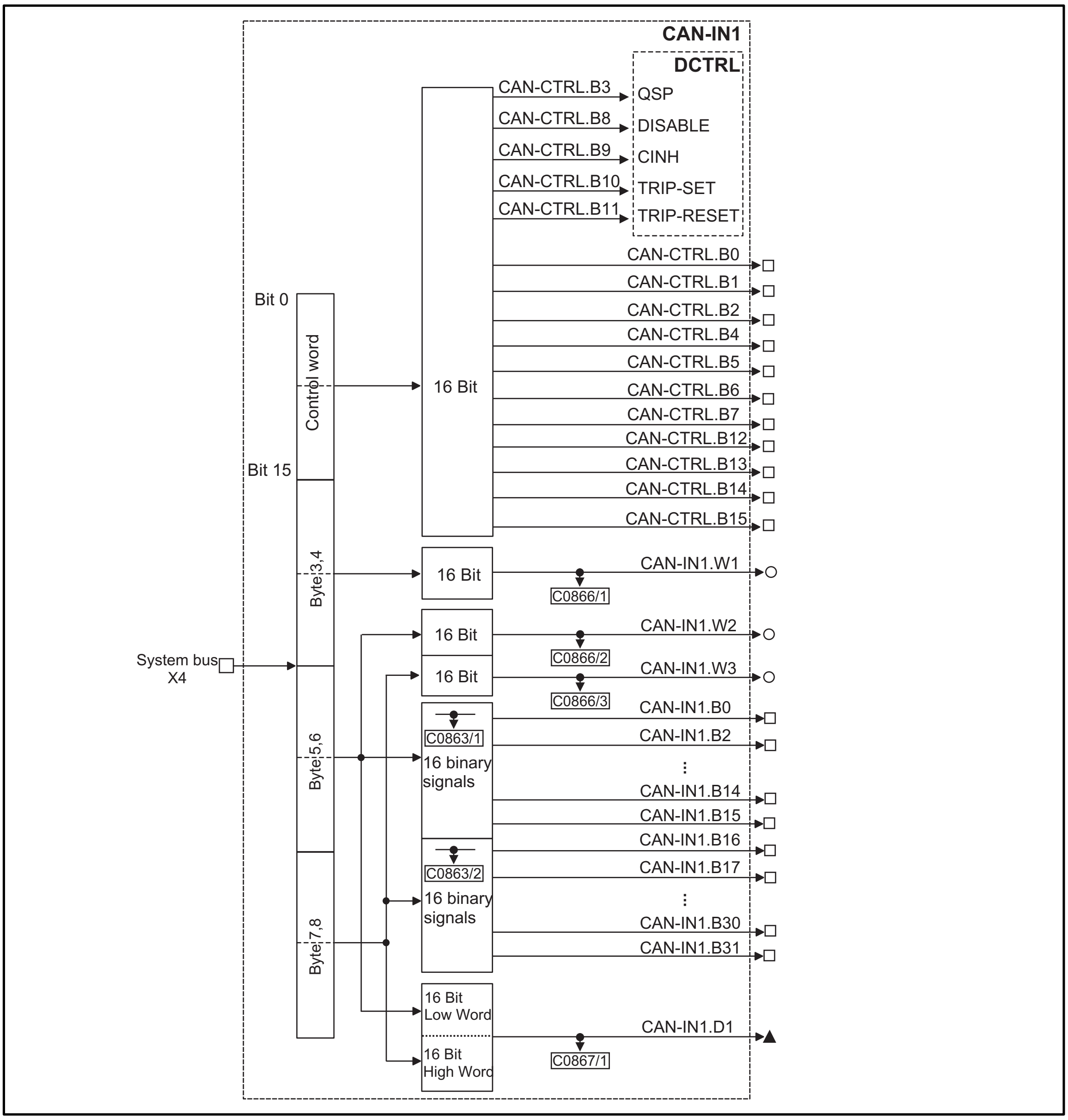


Abb. 7-51 System bus (CAN-IN1)

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
CAN-CTRL.B0	d	C0136/2	bin	-	-	-	
CAN-CTRL.B1	d	C0136/2	bin	-	-	-	
CAN-CTRL.B2	d	C0136/2	bin	-	-	-	
CAN-CTRL.B4	d	C0136/2	bin	-	-	-	
CAN-CTRL.B5	d	C0136/2	bin	-	-	-	
CAN-CTRL.B6	d	C0136/2	bin	-	-	-	
CAN-CTRL.B7	d	C0136/2	bin	-	-	-	
CAN-CTRL.B12	d	C0136/2	bin	-	-	-	
CAN-CTRL.B13	d	C0136/2	bin	-	-	-	
CAN-CTRL.B14	d	C0136/2	bin	-	-	-	
CAN-CTRL.B15	d	C0136/2	bin	-	-	-	
CAN-IN1.W1	a	C0866/1	dec [%]	-	-	-	+16384 = +100 %
CAN-IN1.W2	a	C0866/2	dec [%]	-	-	-	+16384 = +100 %
CAN-IN1.W3	a	C0866/3	dec [%]	-	-	-	+16384 = +100 %
CAN-IN1.D1	ph	C0867/1	dec [inc]	-	-	-	65536 = 1 revolution
CAN-IN1.B0	d	C0863/1	hex	-	-	-	
CAN-IN1.B1	d	C0863/1	hex	-	-	-	
CAN-IN1.B2	d	C0863/1	hex	-	-	-	
CAN-IN1.B3	d	C0863/1	hex	-	-	-	
CAN-IN1.B4	d	C0863/1	hex	-	-	-	
CAN-IN1.B5	d	C0863/1	hex	-	-	-	
CAN-IN1.B6	d	C0863/1	hex	-	-	-	
CAN-IN1.B7	d	C0863/1	hex	-	-	-	
CAN-IN1.B8	d	C0863/1	hex	-	-	-	
CAN-IN1.B9	d	C0863/1	hex	-	-	-	
CAN-IN1.B10	d	C0863/1	hex	-	-	-	
CAN-IN1.B11	d	C0863/1	hex	-	-	-	
CAN-IN1.B12	d	C0863/1	hex	-	-	-	
CAN-IN1.B13	d	C0863/1	hex	-	-	-	
CAN-IN1.B14	d	C0863/1	hex	-	-	-	
CAN-IN1.B15	d	C0863/1	hex	-	-	-	
CAN-IN1.B16	d	C0863/2	hex	-	-	-	
CAN-IN1.B17	d	C0863/2	hex	-	-	-	
CAN-IN1.B18	d	C0863/2	hex	-	-	-	
CAN-IN1.B19	d	C0863/2	hex	-	-	-	
CAN-IN1.B20	d	C0863/2	hex	-	-	-	
CAN-IN1.B21	d	C0863/2	hex	-	-	-	
CAN-IN1.B22	d	C0863/2	hex	-	-	-	
CAN-IN1.B23	d	C0863/2	hex	-	-	-	
CAN-IN1.B24	d	C0863/2	hex	-	-	-	
CAN-IN1.B25	d	C0863/2	hex	-	-	-	
CAN-IN1.B26	d	C0863/2	hex	-	-	-	
CAN-IN1.B27	d	C0863/2	hex	-	-	-	
CAN-IN1.B28	d	C0863/2	hex	-	-	-	
CAN-IN1.B29	d	C0863/2	hex	-	-	-	
CAN-IN1.B30	d	C0863/2	hex	-	-	-	
CAN-IN1.B31	d	C0863/2	hex	-	-	-	

Function

The input signals of the 8 byte user data of this CAN object are converted into corresponding signal types. The signals can be used via further function blocks.

Byte 1 and 2

Byte 1 and 2 form the control word for the controller. The bits 3, 8, 9, 10, and 11 of these bytes are directly transferred to the function block DCTRL, where they are linked to other signals. The other 11 bits can be used to control further function blocks.

Byte 3 and 4

form the signal to CAN-IN1.W1.

Byte 5, 6, 7 and 8

The meaning of these user data can be selected among different signal types. Depending on the requirement, these data can be evaluated as up to 2 analog signals, 32 digital signals or one phase signal.Mixed forms are also possible.

CAN-IN2

The process data object CAN-IN2 is provided for the event-driven transmission of process data and for communication among the controllers. However, decentralized inputs can also be evaluated.

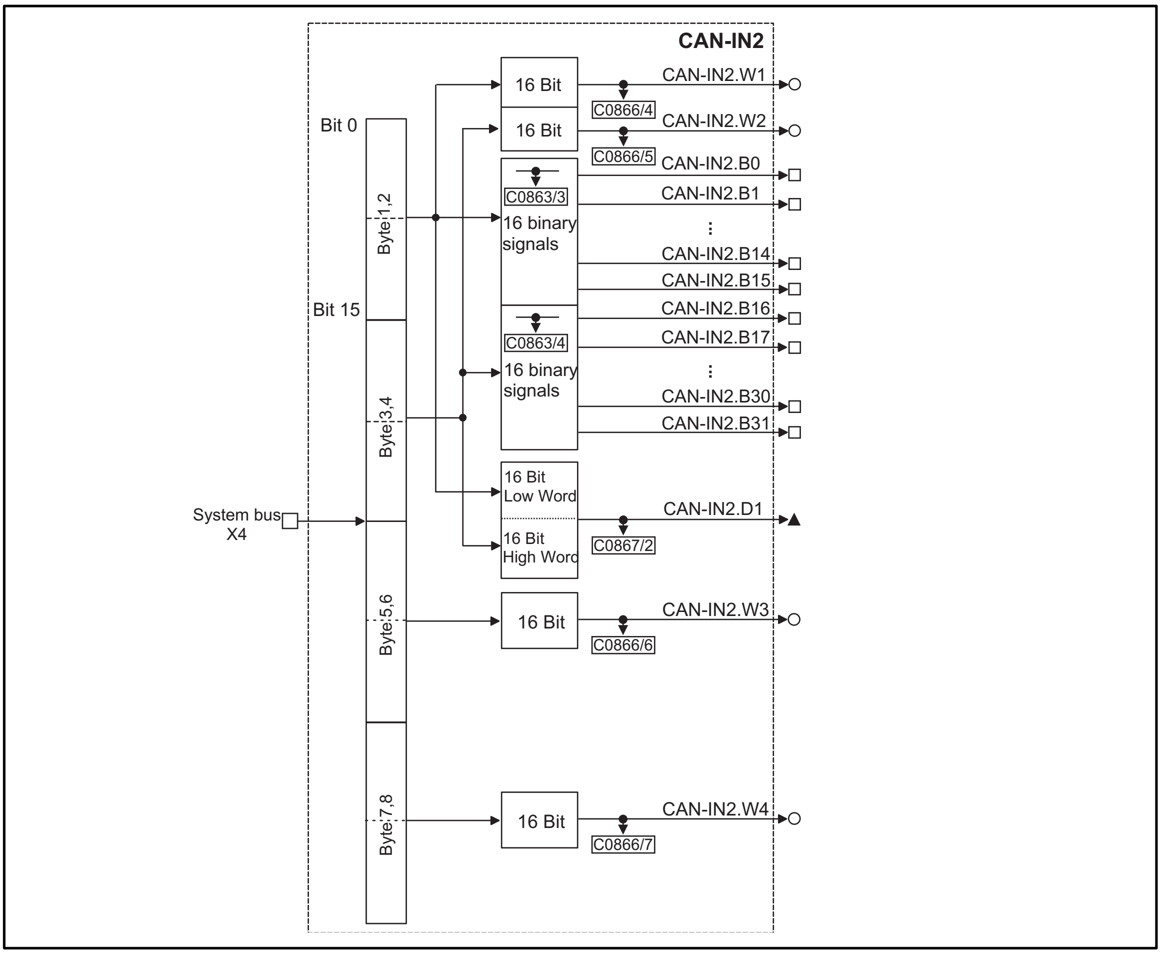


Abb. 7-52 System bus (CAN-IN2)

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
CAN-IN2.W1	a	C0866/4	dec [%]	-	-	-	+16384 = +100 %
CAN-IN2.W2	a	C0866/5	dec [%]	-	-	-	+16384 = +100 %
CAN-IN2.W3	a	C0866/6	dec [%]	-	-	-	+16384 = +100 %
CAN-IN2.W4	a	C0866/7	dec [%]	-	-	-	+16384 = +100 %
CAN-IN2.D1	ph	C0867/2	dec [inc]	-	-	-	65536 = 1 revolution
CAN-IN2.B0	d	C0863/3	hex	-	-	-	
CAN-IN2.B1	d	C0863/3	hex	-	-	-	
CAN-IN2.B2	d	C0863/3	hex	-	-	-	
CAN-IN2.B3	d	C0863/3	hex	-	-	-	
CAN-IN2.B4	d	C0863/3	hex	-	-	-	
CAN-IN2.B5	d	C0863/3	hex	-	-	-	
CAN-IN2.B6	d	C0863/3	hex	-	-	-	
CAN-IN2.B7	d	C0863/3	hex	-	-	-	
CAN-IN2.B8	d	C0863/3	hex	-	-	-	
CAN-IN2.B9	d	C0863/3	hex	-	-	-	
CAN-IN2.B10	d	C0863/3	hex	-	-	-	
CAN-IN2.B11	d	C0863/3	hex	-	-	-	
CAN-IN2.B12	d	C0863/3	hex	-	-	-	
CAN-IN2.B13	d	C0863/3	hex	-	-	-	
CAN-IN2.B14	d	C0863/3	hex	-	-	-	
CAN-IN2.B15	d	C0863/3	hex	-	-	-	
CAN-IN2.B16	d	C0863/4	hex	-	-	-	
CAN-IN2.B17	d	C0863/4	hex	-	-	-	
CAN-IN2.B18	d	C0863/4	hex	-	-	-	
CAN-IN2.B19	d	C0863/4	hex	-	-	-	
CAN-IN2.B20	d	C0863/4	hex	-	-	-	
CAN-IN2.B21	d	C0863/4	hex	-	-	-	
CAN-IN2.B22	d	C0863/4	hex	-	-	-	
CAN-IN2.B23	d	C0863/4	hex	-	-	-	
CAN-IN2.B24	d	C0863/4	hex	-	-	-	
CAN-IN2.B25	d	C0863/4	hex	-	-	-	
CAN-IN2.B26	d	C0863/4	hex	-	-	-	
CAN-IN2.B27	d	C0863/4	hex	-	-	-	
CAN-IN2.B28	d	C0863/4	hex	-	-	-	
CAN-IN2.B29	d	C0863/4	hex	-	-	-	
CAN-IN2.B30	d	C0863/4	hex	-	-	-	
CAN-IN2.B31	d	C0863/4	hex	-	-	-	

Function

The input signals of the 8 byte user data of this CAN object are converted into corresponding signal types. The signals can be used via further function blocks.

Byte 1, 2, 3 and 4

The meaning of these user data can be selected among different signal types. Depending on the requirement, these data can be evaluated as up to 2 analog signals, 32 digital signals or one phase signal.Mixed forms are also possible.

Byte 5 and 6

form the signal to CAN-IN2.W3.

Byte 7 and 8

form the signal to CAN-IN2.W4.

CAN-IN3

The process data object CAN-IN3 is provided for the event-driven transmission of process data and for communication among the controllers. However, decentralized inputs can also be evaluated.

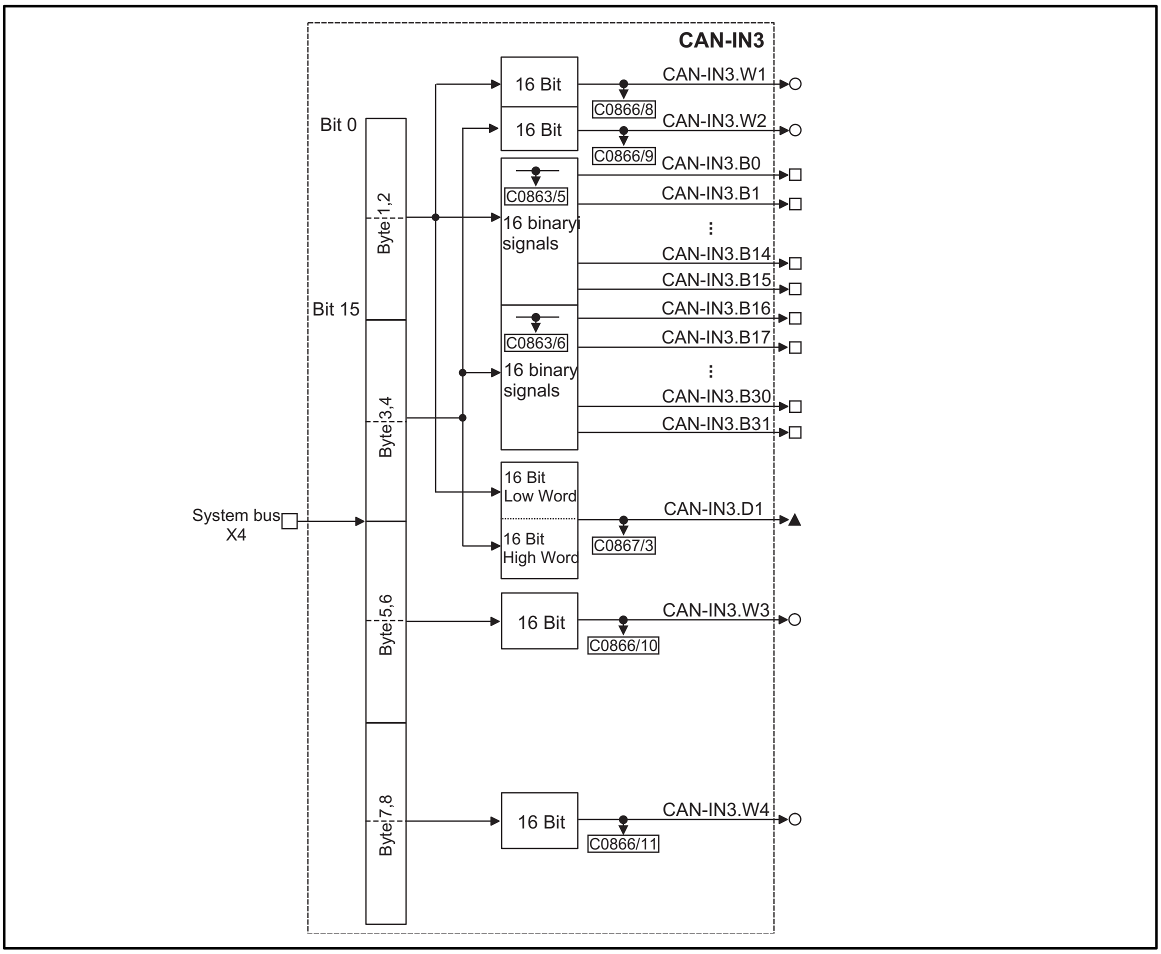


Abb. 7-53 System bus (CAN-IN3)

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
CAN-IN3.W1	a	C0866/8	dec [%]	-	-	-	+16384 = +100 %
CAN-IN3.W2	a	C0866/9	dec [%]	-	-	-	+16384 = +100 %
CAN-IN3.W3	a	C0866/10	dec [%]	-	-	-	+16384 = +100 %
CAN-IN3.W4	a	C0866/11	dec [%]	-	-	-	+16384 = +100 %
CAN-IN3.D1	ph	C0867/3	dec [inc]	-	-	-	65536 = 1 revolution
CAN-IN3.B0	d	C0863/5	hex	-	-	-	
CAN-IN3.B1	d	C0863/5	hex	-	-	-	
CAN-IN3.B2	d	C0863/5	hex	-	-	-	
CAN-IN3.B3	d	C0863/5	hex	-	-	-	
CAN-IN3.B4	d	C0863/5	hex	-	-	-	
CAN-IN3.B5	d	C0863/5	hex	-	-	-	
CAN-IN3.B6	d	C0863/5	hex	-	-	-	
CAN-IN3.B7	d	C0863/5	hex	-	-	-	
CAN-IN3.B8	d	C0863/5	hex	-	-	-	
CAN-IN3.B9	d	C0863/5	hex	-	-	-	
CAN-IN3.B10	d	C0863/5	hex	-	-	-	
CAN-IN3.B11	d	C0863/5	hex	-	-	-	
CAN-IN3.B12	d	C0863/5	hex	-	-	-	
CAN-IN3.B13	d	C0863/5	hex	-	-	-	
CAN-IN3.B14	d	C0863/5	hex	-	-	-	
CAN-IN3.B15	d	C0863/5	hex	-	-	-	
CAN-IN3.B16	d	C0863/6	hex	-	-	-	
CAN-IN3.B17	d	C0863/6	hex	-	-	-	
CAN-IN3.B18	d	C0863/6	hex	-	-	-	
CAN-IN3.B19	d	C0863/6	hex	-	-	-	
CAN-IN3.B20	d	C0863/6	hex	-	-	-	
CAN-IN3.B21	d	C0863/6	hex	-	-	-	
CAN-IN3.B22	d	C0863/6	hex	-	-	-	
CAN-IN3.B23	d	C0863/6	hex	-	-	-	
CAN-IN3.B24	d	C0863/6	hex	-	-	-	
CAN-IN3.B25	d	C0863/6	hex	-	-	-	
CAN-IN3.B26	d	C0863/6	hex	-	-	-	
CAN-IN3.B27	d	C0863/6	hex	-	-	-	
CAN-IN3.B28	d	C0863/6	hex	-	-	-	
CAN-IN3.B29	d	C0863/6	hex	-	-	-	
CAN-IN3.B30	d	C0863/6	hex	-	-	-	
CAN-IN3.B31	d	C0863/6	hex	-	-	-	

Function

The input signals of the 8 byte user data of this CAN object are converted into corresponding signal types. The signals can be used via further function blocks.

Byte 1, 2, 3 and 4

The meaning of these user data can be selected among different signal types. Depending on the requirement, these data can be evaluated as up to 2 analog signals, 32 digital signals or one phase signal.Mixed forms are also possible.

Byte 5 and 6

form the signal to CAN-IN3.W3.

Byte 7 and 8

form the signal to CAN-IN3.W4.

7.4.14 System bus (CAN-OUT)

Purpose

Interface for output signals from the system bus for setpoints and actual values as binary, analog, or phase information. (🕮 7-68)

CAN-OUT1

The process data object CAN-OUT1 is provided for the cyclic transmission of process data and the communication with a superimposed master.

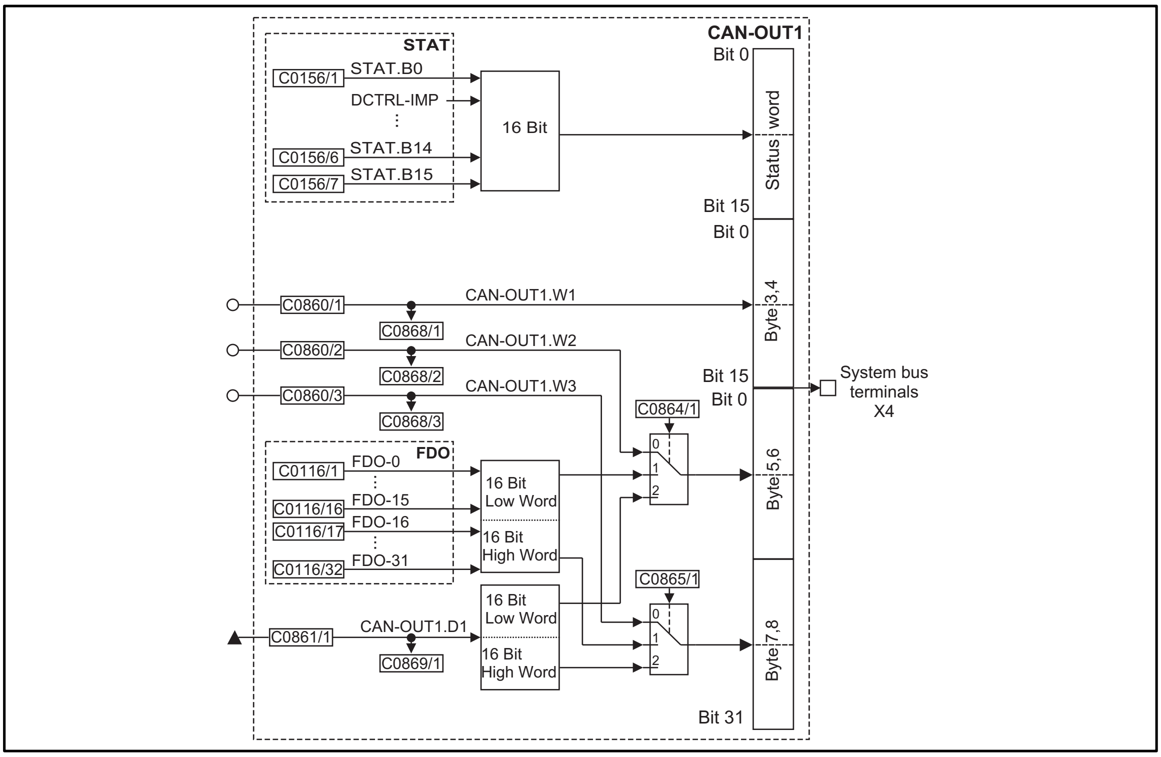


Abb. 7-54 System bus (CAN-OUT1)

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
CAN-OUT1.W1	a	C0868/1	dec [%]	C0860/1	1	1000	+100 % = +16384
CAN-OUT1.W2	a	C0868/2	dec [%]	C0860/2	1	1000	+100 % = +16384
CAN-OUT1.W3	a	C0868/3	dec [%]	C0860/3	1	1000	+100 % = +16384
CAN-OUT1.D1	ph	C0869/1	dec [inc]	C0861/1	4	1000	1 revolution = 65536

Function

The input signals of this function block are copied to the 8 byte user data of CAN object 1 and laid on the system bus. The meaning of the user data can be determined very easily with C0864/1 and C0865/1 and the corresponding configuration code (CFG).

Byte 1 and 2

Here, the status word of the function block STAT is mapped. (🕮 7-190)
Some of the bits are freely assignable.

Byte 3 and 4

Here, the analog signal configured at the input CAN-OUT1.W1 is mapped.

Byte 5, 6, 7 and 8

The meaning of these user data can be selected among different signal types. Depending on the requirement, up to two analog signals, 32 digital signals of the function block FDO or a phase signal can be selected.Mixed forms are also possible.

Example:

16 digital signals and one analog signal are to be output.

The digital signals are output by the function block FDO. The bits 16 to 31 are to be output. For this, set C0865/1 = 1. These bits are output on byte 7 and 8.

This means that the analog signal is lead via CAN-OUT1.W2. For this, set C0864/1 = 0. These bits are output on byte 5 and 6. An analog signal source is assigned to the input under configuration code C0860/2.

CAN-OUT2

The process data object CAN-OUT2 is provided for the event-driven transmission of process data and for communication among the controllers. Decentralized outputs can also be accessed.

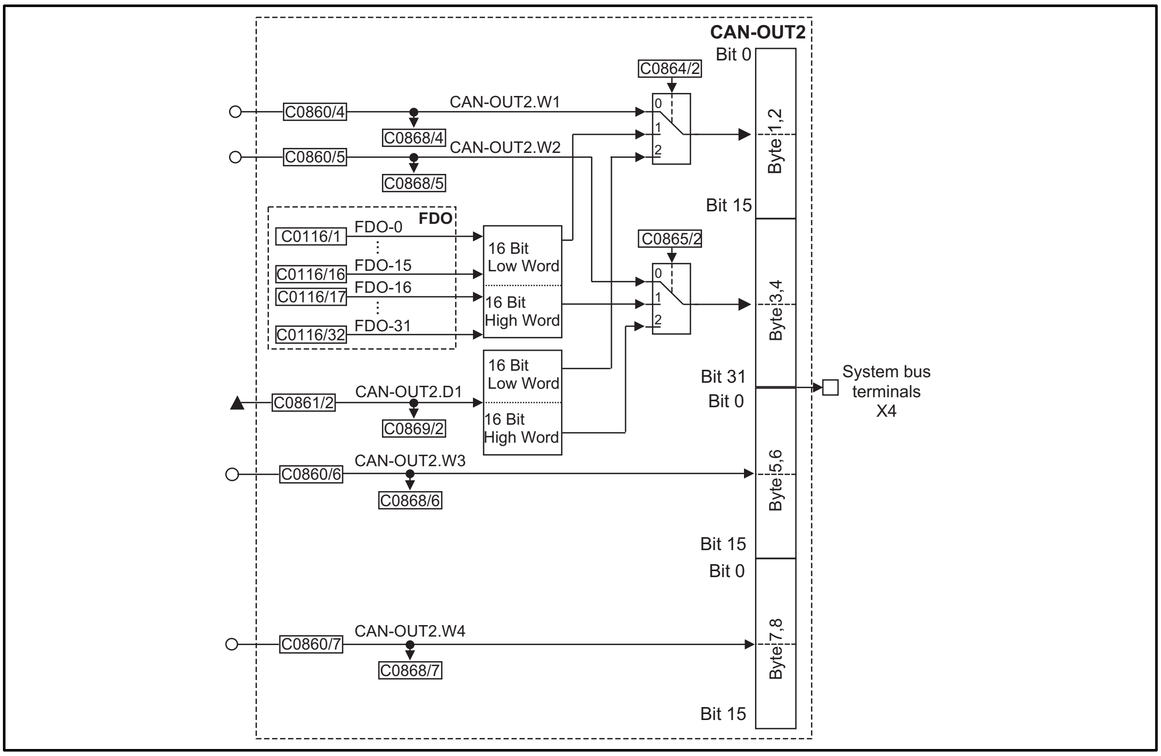


Abb. 7-55 System bus (CAN-OUT2)

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
CAN-OUT2.W1	a	C0868/4	dec [%]	C0860/4	1	1000	+100 % = +16384
CAN-OUT2.W2	a	C0868/5	dec [%]	C0860/5	1	1000	+100 % = +16384
CAN-OUT2.W3	a	C0868/6	dec [%]	C0860/6	1	1000	+100 % = +16384
CAN-OUT2.W4	a	C0868/7	dec [%]	C0860/7	1	1000	+100 % = +16384
CAN-OUT2.D1	ph	C0869/2	dec [inc]	C0861/2	4	1000	1 revolution = 65536

Function

The input signals of this function block are copied to the 8 byte user data of CAN object 2 and laid on the system bus. The meaning of the user data can be determined very easily with C0864/2 and C0865/2 and the corresponding configuration code (CFG).

Byte 1, 2, 3 and 4

The meaning of these user data can be selected among different signal types. Depending on the requirement, up to two analog signals, 32 digital signals of the function block FDO or a phase signal can be selected.Mixed forms are also possible.

Byte 5 and 6

Here, the analog signal configured at the input CAN-OUT2.W3 is mapped.

Byte 7 and 8

Here, the analog signal configured at the input CAN-OUT2.W4 is mapped.

CAN-OUT3

The process data object CAN-OUT3 is provided for the event-driven transmission of process data and for communication among the controllers. Decentralized outputs can also be accessed.

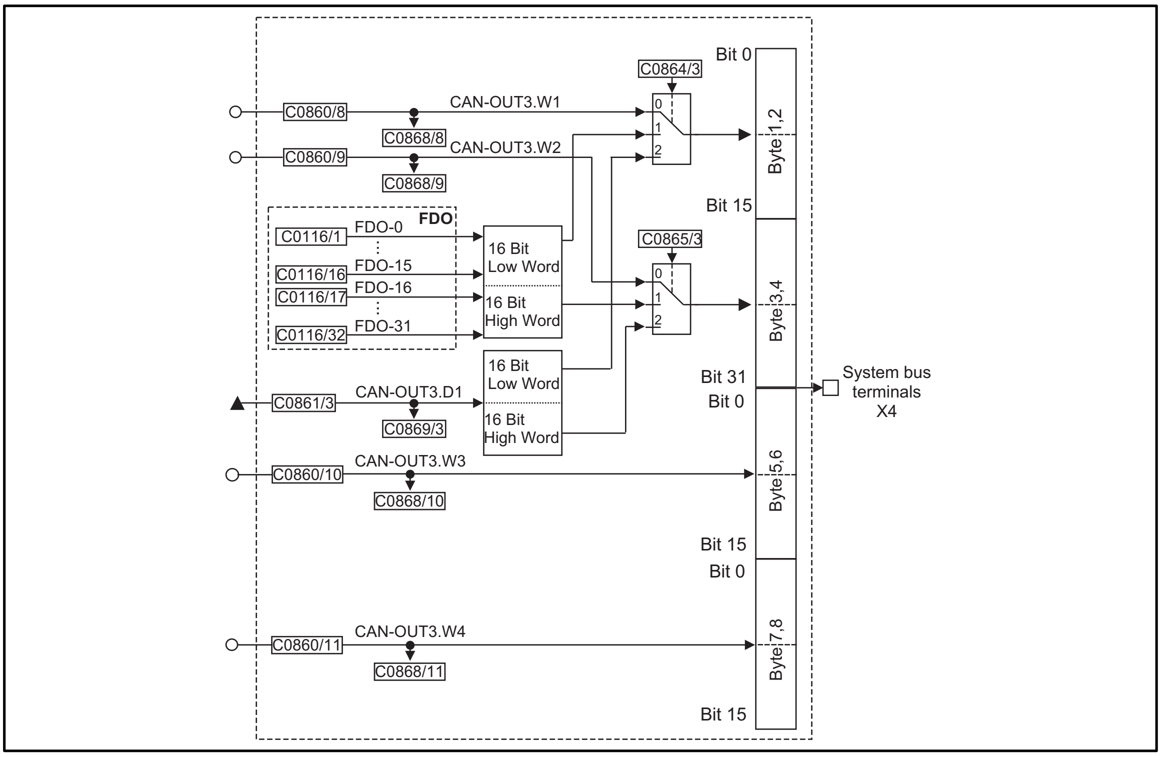


Abb. 7-56 System bus (CAN-OUT3)

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
CAN-OUT3.W1	a	C0868/8	dec [%]	C0860/8	1	1000	+100 % = +16384
CAN-OUT3.W2	a	C0868/9	dec [%]	C0860/9	1	1000	+100 % = +16384
CAN-OUT3.W3	a	C0868/10	dec [%]	C0860/10	1	1000	+100 % = +16384
CAN-OUT3.W4	a	C0868/11	dec [%]	C0860/11	1	1000	+100 % = +16384
CAN-OUT3.D1	ph	C0869/3	dec [inc]	C0861/3	4	1000	1 revolution = 65536

Function

The input signals of this function block are copied to the 8 byte user data of CAN object 3 and laid on the system bus. The meaning of the user data can be determined very easily with C0864/3 and C0865/3 and the corresponding configuration code (CFG).

Byte 1, 2, 3 and 4

The meaning of these user data can be selected among different signal types. Depending on the requirement, up to two analog signals, 32 digital signals of the function block FDO or a phase signal can be selected.Mixed forms are also possible.

Byte 5 and 6

Here, the analog signal configured at the input CAN-OUT3.W3 is mapped.

Byte 7 and 8

Here, the analog signal configured at the input CAN-OUT3.W4 is mapped.

7.4.15 Comparator (CMP)

Purpose

These function blocks are used to compare two analog signals with each other.

Two comparators are available. They can be used to implement threshold switches:

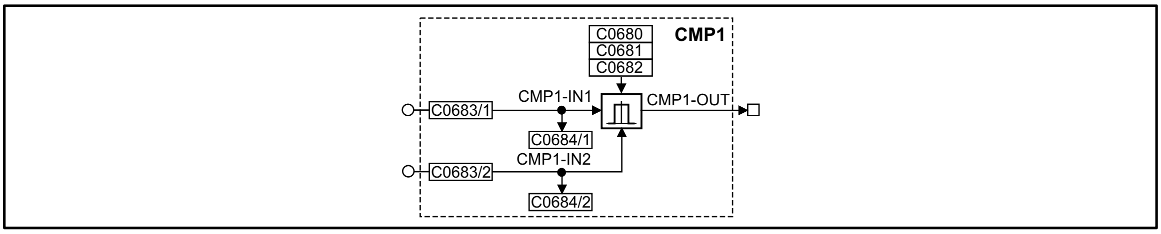


Abb. 7-57 Comparator (CMP1)

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
CMP1-IN1	a	C0684/1	dec [%]	C0683/1	1	5001	-
CMP1-IN2	a	C0684/2	dec [%]	C0683/2	1	19500	-
CMP1-OUT	a	-	-	-	-	-	-

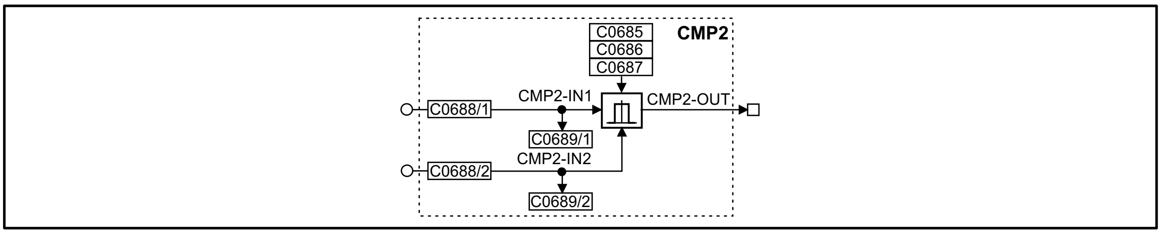


Abb. 7-58 Comparator (CMP2)

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
CMP2-IN1	a	C0689/1	dec [%]	C0688/1	1	1000	-
CMP2-IN2	a	C0689/2	dec [%]	C0688/2	1	1000	-
CMP2-OUT	a	-	-	-	-	-	-

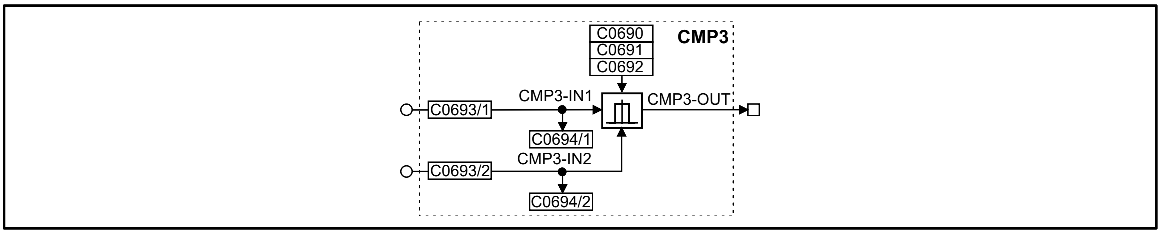


Abb. 7-59 Comparator (CMP3)

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
CMP3-IN1	a	C0694/1	dec [%]	C0693/1	1	1000	-
CMP3-IN2	a	C0694/2	dec [%]	C0693/2	1	1000	-
CMP3-OUT	a	-		-	-	-	-

Function

The description is an example for CMP1 and is also suitable for CMP2 and CMP3.

The function of these function blocks can be set under code C0680 (CMP1). The following comparator functions are available:

- CMP1-IN1 = CMP1-IN2
- CMP1-IN1 > CMP1-IN2
- CMP1-IN1 < CMP1-IN2
- |CMP1-IN1| = |CMP1-IN2|
- |CMP1-IN1| > |CMP1-IN2|
- |CMP1-IN1| < |CMP1-IN2|

7.4.15.1 Function 1: CMP1-IN1 = CMP1-IN2

This function is used to find out whether two signals are identical.

- Under code C0682 you can set the window of equality.
- Under code C0681 a hysteresis can be set if the input signals are not stable and therefore the output oscillates.

The exact function can be obtained from the line diagram.

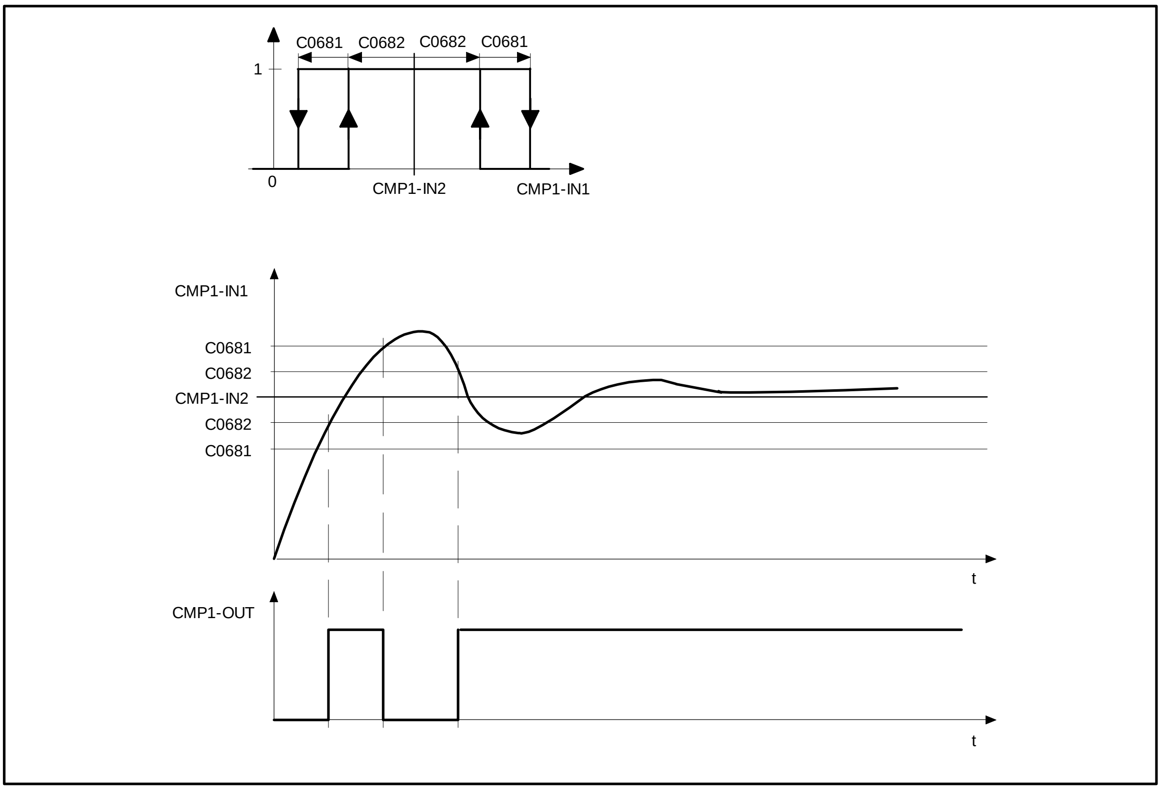


Abb. 7-60 Equality of signals (CMP1-IN1 = CMP1-IN2)

Example:

This function is used to obtain the comparison "Actual speed is equal to setpoint speed ($n_{act} = n_{set}$)".

7.4.15.2 Function 2: CMP1-IN1 > CMP1-IN2

- If the value at the input CMP1-IN1 exceeds the value at the input CMP1-IN2, the output CMP1-OUT changes from LOW to HIGH.
- If the signal at input CMP1-IN1 falls below the value of CMP1-IN2 - C0681 again, the output changes from HIGH to LOW.

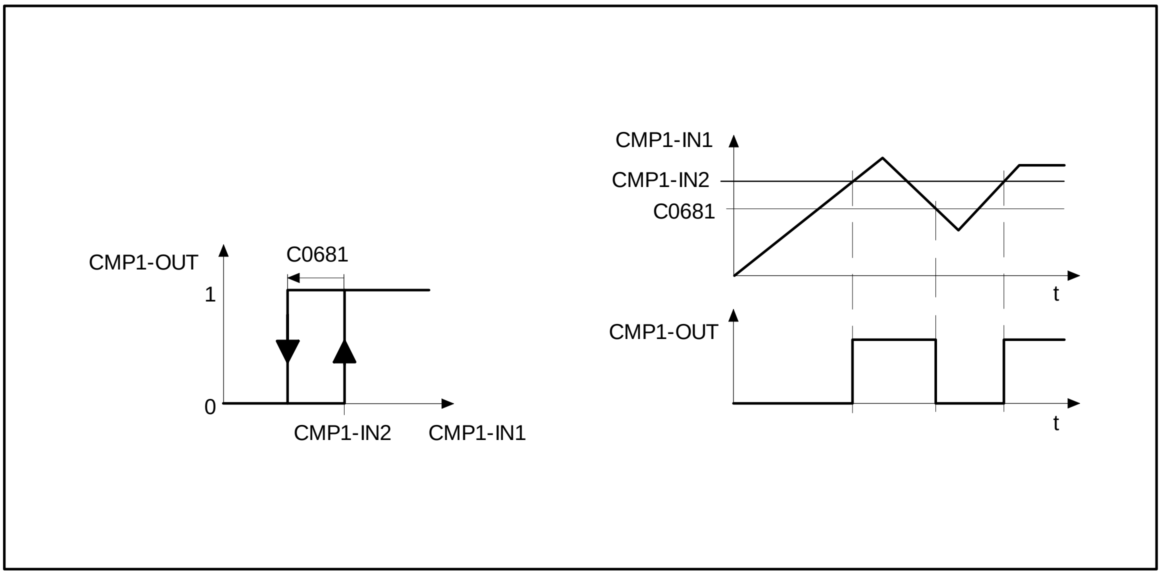


Abb. 7-61 Exceeding signal values (CMP1-IN1 > CMP1-IN2)

Example:

This function is used to obtain the comparison ”Actual speed is higher than a limit value ($n_{act} > n_x$)” for one direction of rotation.

7.4.15.3 Function 3: CMP1-IN1 < CMP1-IN2

- If the value at the input CMP1-IN1 falls below the value at the input CMP1-IN2, the output CMP1-OUT changes from LOW to HIGH.
- If the signal at input CMP1-IN1 exceeds the value of CMP1-IN2 + C0681 again, the output changes from HIGH to LOW.

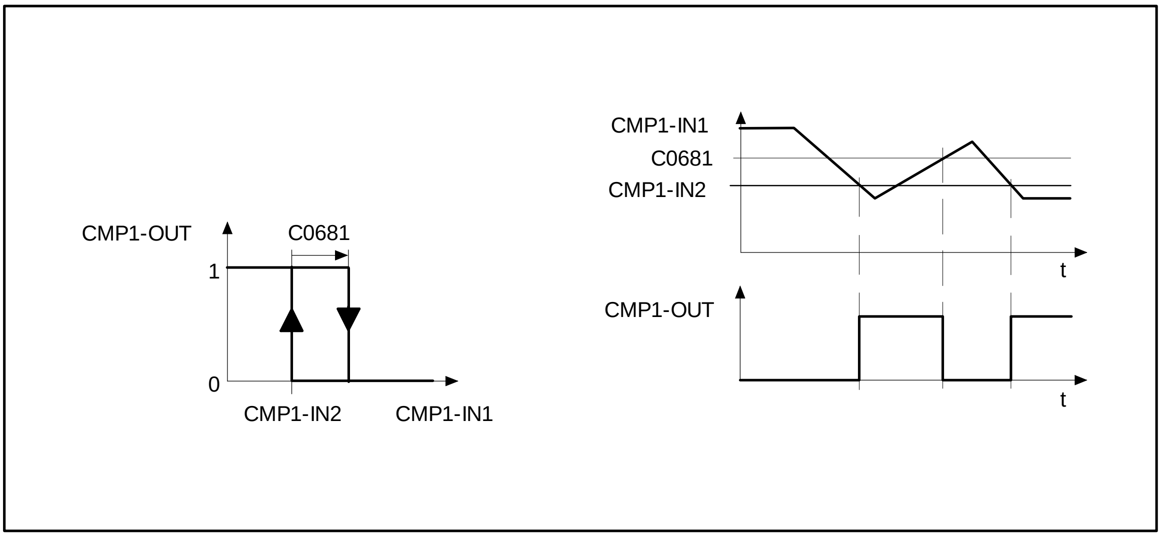


Abb. 7-62 A value falls below signal values (CMP1-IN1 < CMP1-IN2)

Example:

This function is used to obtain the comparison ”Actual speed is lower than a limit value ($n_{act} > n_x$)” for one direction of rotation.

7.4.15.4 Function 4: |CMP1-IN1| = |CMP1-IN2|

This function is the same as function 1. The absolute value of the input signals (without sign) is generated here before the signal processing.

Example:

This function is used to obtain the comparison ”$n_{act} = 0$”.

7.4.15.5 Function 5: |CMP1-IN1| > |CMP1-IN2|

This function is the same as function 3. The absolute value of the input signals (without sign) is generated here before the signal processing.

Example:

This function is used to obtain the comparison ”$|n_{act}| > |n_x|$” independently of the direction of rotation.

7.4.15.6 Function 6: |CMP1-IN1| < |CMP1-IN2|

This function is the same as function 2. The absolute value of the input signals (without sign) is generated here before the signal processing.

Example:

This function is used to obtain the comparison ”$|n_{act}| < |n_x|$” independently of the direction of rotation.

7.4.16 Signal conversion (CONV)

Purpose

These function blocks can be used to standardize signals or signal types or to convert signal types into different signal types. The conversion is very precise by providing the conversion factor as numerator and denominator.

CONV1

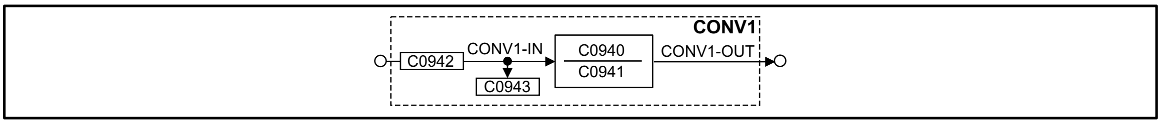


Abb. 7-63 Function block CONV1

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
CONV1-IN	a	C0943	dec [%]	C0942	1	1000	
CONV1-OUT	a	-	-	-	-	-	Limited to ±199.99 %

This function block is used to multiply or divide analog signals.

The conversion is done according to the formula:

$$\text{CONV1–OUT} = \text{CONV1–IN} \cdot \frac{\text{C0940}}{\text{C0941}}$$

Example:

An analog signal is to be multiplied with 1.12.
For this, enter C0940 = 112 and C0941 = 100.

CONV2

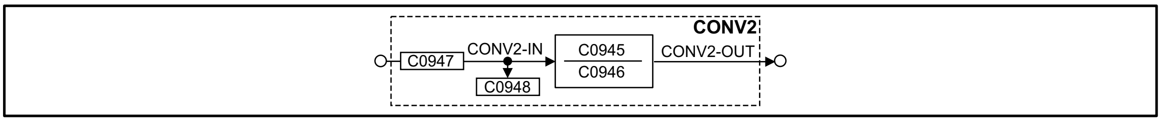


Abb. 7-64 Function block CONV2

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
CONV2-IN	a	C0948	dec [%]	C0947	1	1000	
CONV2-OUT	a	-	-	-	-	-	Limited to ±199.99 %

This function block is used to multiply or divide analog signals.

The conversion is done according to the formula:

$$\text{CONV2–OUT} = \text{CONV2–IN} \cdot \frac{\text{C0945}}{\text{C0946}}$$

CONV3

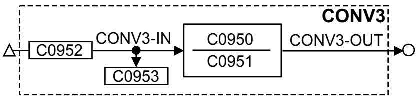


Abb. 7-65 Function block CONV3

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
CONV3-IN	phd	C0953	dec [rpm]	C0952	4	1000	
CONV3-OUT	a	-	-	-	-	-	Limited to ±199.99 %

This function block is used to convert speed signals into analog signals.

The conversion is done according to the formula:

$$\text{CONV3-OUT} = \text{CONV3-IN} \cdot \frac{100\%}{15000\text{rpm}} \cdot \frac{\text{C0950}}{\text{C0951}}$$

CONV4

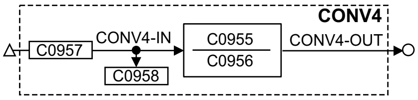


Abb. 7-66 Function block CONV4

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
CONV4-IN	phd	C0958	dec [rpm]	C0957	4	1000	
CONV4-OUT	a	-	-	-	-	-	Limited to ±199.99 %

This function block is used to convert speed signals into analog signals.

The conversion is done according to the formula:

$$\text{CONV4-OUT} = \text{CONV4-IN} \cdot \frac{100\%}{15000\text{rpm}} \cdot \frac{\text{C0955}}{\text{C0956}}$$

CONV5

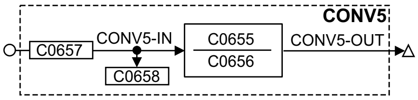


Abb. 7-67 Function block CONV5

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
CONV5-IN	a	C0658	dec [%]	C0657	1	1000	
CONV5-OUT	phd	-	-	-	-	-	Limited to ±29999 rpm

This function block is used to convert analog signals into speed signals.

The conversion is done according to the formula:

$$\text{CONV5-OUT} = \text{CONV5-IN} \cdot \frac{15000\text{rpm}}{100\%} \cdot \frac{\text{C0655}}{\text{C0656}}$$

CONV6

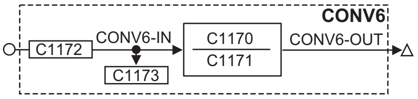


Abb. 7-68 Function block CONV6

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
CONV6-IN	a	C1173	dec [%]	C1172	1	1000	
CONV6-OUT	phd	-	-	-	-	-	Limited to ±29999 rpm

This function block is used to convert analog signals into speed signals.

The conversion is done according to the formula:

$$\text{CONV6-OUT} = \text{CONV6-IN} \cdot \frac{15000\text{rpm}}{100\%} \cdot \frac{\text{C1170}}{\text{C1171}}$$

7.4.17 Phase conversion (CONVPHA)

Purpose

Converts a phase signal into an analog signal and into a speed signal.

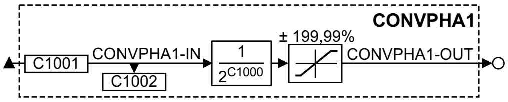


Abb. 7-69 Phase conversion (CONVPHA1)

Signal				Source		Note
Name	Type	DIS	DIS format	CFG	List	
CONVPHA1-IN	ph	C1002	dec [inc]	C1001	3	-
CONVPHA1-OUT	a	-	-	-	-	Limited to ±199.99 %, remainder considered
CONVPHA1-OUT2	phd	-	-	-	-	Limited to ±32767 rpm, remainder considered

Function

- Conversion with adaptation using divisor.
- The conversion is done according to the formulae:

$$\text{CONVPHA1-OUT [\%]} = \text{CONVPHA1-IN [inc]} \cdot \frac{100}{2^{14} \cdot 2^{C1000}}$$

$$\text{CONVPHA1-OUT2 [rpm]} = \text{CONVPHA1-IN [inc]} \cdot \frac{1875}{2^{14} \cdot 2^{C1000}}$$

$$\text{CONVPHA1-OUT2 [inc]} = \text{CONVPHA1-IN [inc]} \cdot \frac{1}{2^{C1000}}$$

7.4.18 Phase conversion (CONVPHPH)

Purpose

Conversion of a phase signal with dynamic fracture.

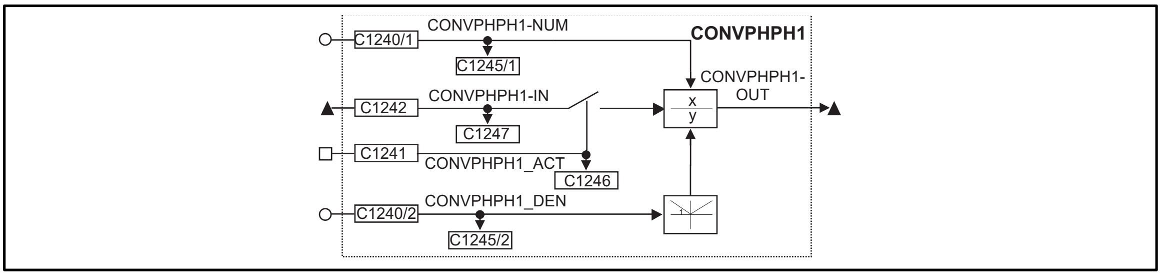


Abb. 7-70 Phase conversion (CONVPHPH1)

Signal				Source		Note
Name	Type	DIS	DIS format	CFG	List	
CONVPHPH1-IN	ph	C1247	dec [inc]	C1242	3	-
CONVPHPH1-NUM	a	C1245/1	dec	C1240/1	1	Numerator
CONVPHPH1-DEN	a	C1245/2	dec	C1240/2	1	Denominator (with absolute value generation)
CONVPHPH1-ACT	d	C1246	bin	C1241	2	-
CONVPHPH1-OUT	ph	-	-	-	-	without limitation, remainder considered

Function

Caution!

The conversion result is not limited. The result must therefore not exceed the range of ±2147483647.

- C1241 = HIGH
  – The phase signal at CONVPHPH1-IN is evaluated using the factor from C1245/1 / C1245/2.
- C1241 = LOW
  – The value 0 is evaluated using the factor from C1245/1 / C1245/2.

7.4.19 Speed conversion (CONVPP)

Purpose

Conversion of a speed signal with dynamic fracture

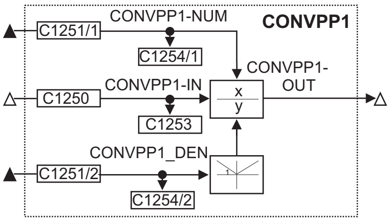


Abb. 7-71 Speed conversion (CONVPP1)

Signal				Source		Note
Name	Type	DIS	DIS format	CFG	List	
CONVPP1-IN	phd	C1253	dec [rpm]	C1250	4	-
CONVPP1-NUM	ph	C1254/1	dec [inc]	C1251/1	3	Numerator
CONVPP1-DEN	ph	C1254/2	dec [inc]	C1251/2	3	Denominator (with absolute value generation)
CONVPP1-OUT	phd	-	-	-	-	without limitation, remainder considered

Function

Caution!

The conversion result is not limited.The result must therefore not exceed the range of ±32767.

- The speed signal at CONVPP1-IN is evaluated using the factor from C1251/1 / C1251/2.

7.4.20 Characteristic function (CURVE)

Purpose

Conversion of an analog signal into a characteristic.

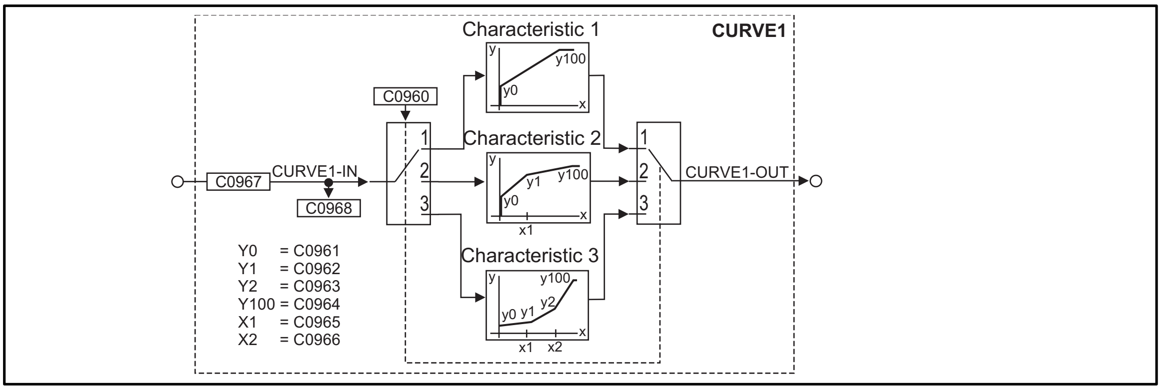


Abb. 7-72 Characteristic function (CURVE1)

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
CURVE1-IN	a	C0968	dec [%]	C0967	1	5001	-
CURVE1-OUT	a	-	-	-	-	-	-

Scope of functions

Under C0960, you can select the function:

- Characteristic with two co-ordinates
- Characteristic with three co-ordinates
- Characteristic with four co-ordinates

The codes for entering the co-ordinates can be obtained from the line diagrams.

A linear interpolation is carried out between the co-ordinates.

For negative input values at CURVEx-IN, the settings of the co-ordinates are processed inversely (see line diagrams).If this is not required:

- Connect absolute value generator (ABS) before or after the CURVE function block

or

- Connect limiter (LIM) before or after the CURVE function block

7.4.20.1 Characteristic with two co-ordinates

Set C0960 = 1.

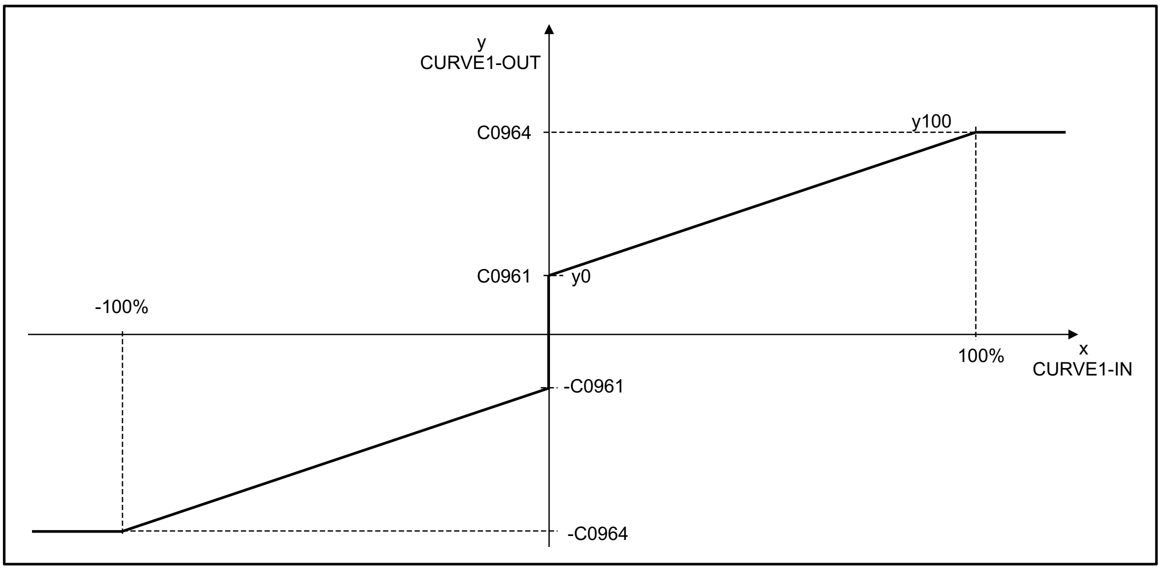


Abb. 7-73 Line diagram with 2 co-ordinates

7.4.20.2 Characteristic with three co-ordinates

Set C0960 = 2.

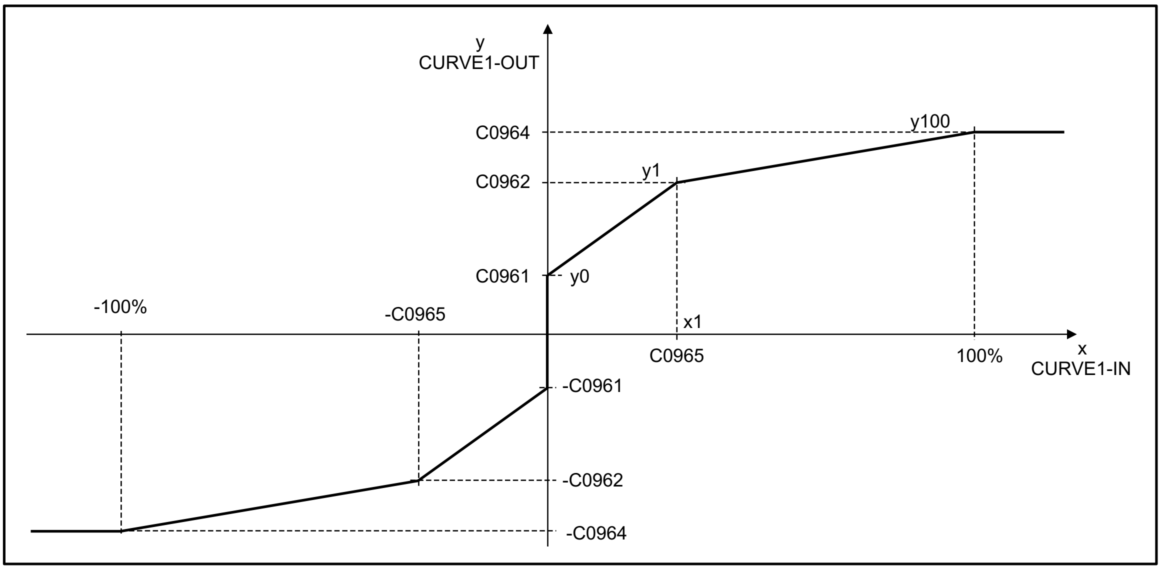


Abb. 7-74 Line diagram with three co-ordinates

7.4.20.3 Characteristic with four co-ordinates

Set C0960 = 3.

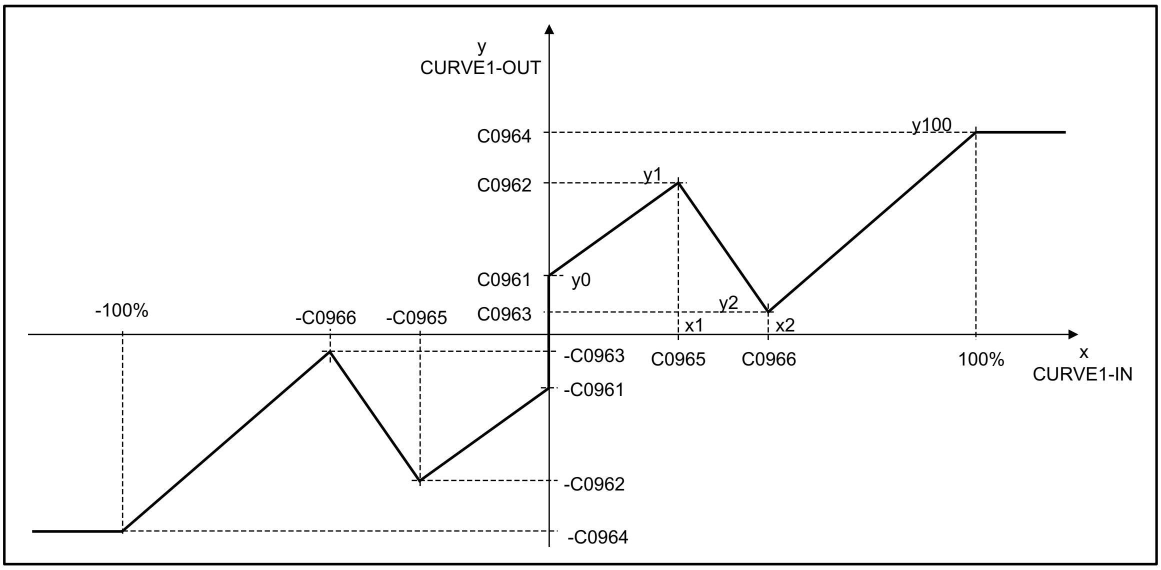


Abb. 7-75 Line diagram characteristic with four co-ordinates

7.4.21 Dead band (DB)

Purpose

The dead band element is used to set interfering influences around zero, e.g. interferences on analog input voltages, to digital zero.

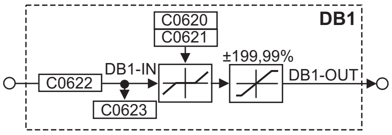


Abb. 7-76 Dead band element (DB1)

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
DB1-IN	a	C0623	dec [%]	C0622	1	1000	-
DB1-OUT	a	-	-	-	-	-	limited to ±199.99 %

Function

- The dead band is parameterized under C0621.
- The gain is set under C0620.

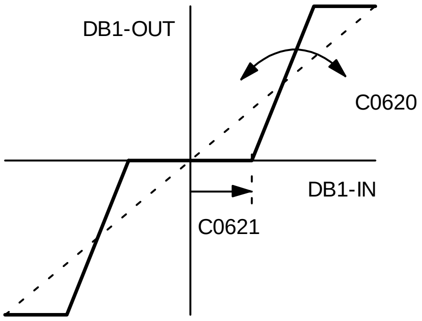


Abb. 7-77 Dead band and gain

7.4.22 Control of the controller (DCTRL)

Purpose

This function block is used to control the controller into different states (e.g. Trip, Trip-Reset, quick stop or controller inhibit).

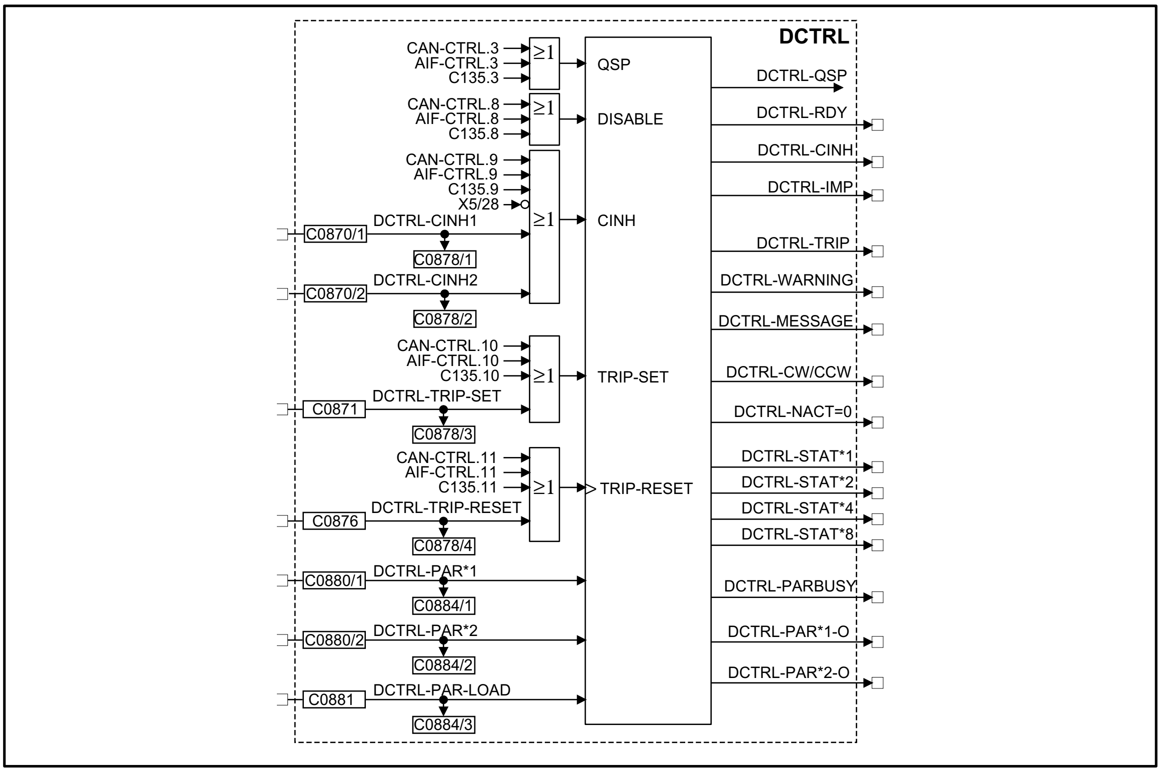


Abb. 7-78 Function block DCTRL

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
DCTRL-CINH1	d	C0878/1	bin	C0870/1	2	1000	HIGH = inhibit controller
DCTRL-CINH2	d	C0878/2	bin	C0870/2	2	1000	HIGH = inhibit controller
DCTRL-TRIP-SET	d	C0878/3	bin	C0871	2	54	HIGH = fault indication EEr
DCTRL-TRIPRESET	d	C0878/4	bin	C0876	2	55	LOW-HIGH signal = Trip reset
DCTRL-PAR*1	d	C0884/1	bin	C0880/1	2	1000	Select parameter set
DCTRL-PAR*2	d	C0884/2	bin	C0880/2	2	1000	Select parameter set
DCTRL-PAR-LOAD	d	C0884/3	bin	C0881	2	1000	LOW-HIGH signal = Load parameter set
DCTRL-RDY	d	-	bin	-	-	-	HIGH = Ready for operation
DCTRL-CINH	d	-	bin	-	-	-	HIGH = Controller inhibited
DCTRL-IMP	d	-	bin	-	-	-	HIGH = High-resistance power output stages
DCTRL-TRIP	d	-	bin	-	-	-	HIGH = Active fault
DCTRL-WARNING	d	-	bin	-	-	-	HIGH = Active warning
DCTRL-MESSAGE	d	-	bin	-	-	-	HIGH = Active message
DCTRL-CW/CCW	d	-	bin	-	-	-	LOW = CW rotation, HIGH = CCW rotation
DCTRL-NACT=0	d	-	bin	-	-	-	HIGH = Motor speed < C0019
DCTRL-STAT*1	d	-	bin	-	-	-	general status (binary coded)
DCTRL-STAT*2	d	-	bin	-	-	-	general status (binary coded)
DCTRL-STAT*4	d	-	bin	-	-	-	general status (binary coded)
DCTRL-STAT*8	d	-	bin	-	-	-	general status (binary coded)
DCTRL-PARBUSY	d	-	bin	-	-	-	HIGH = Change of parameter set active
DCTRL-PAR*1-O	d	-	bin	-	-	-	Parameter set X active (binary coded)
DCTRL-PAR*2-0	d	-	bin	-	-	-	Parameter set X active (binary coded)

Function

- Quick stop (QSP)
- Operation inhibited (DISABLE)
- Controller inhibit (CINH)
- TRIP-SET
- TRIP-RESET
- Change of parameter set (PAR)
- Status of the controller

7.4.22.1 Quick stop (QSP)

The drive is braked to standstil via the deceleration ramp C105 and generates a holding toque.

- The function can be controlled by three inputs
  – Control word CAN-CTRL bit 3 of CAN-IN1
  – Control word AIF-CTRL bit 3 of AIF-IN
  – Control word C0135 bit 3
- All inputs are linked by an OR-operation.

7.4.22.2 Operation inhibited (DISABLE)

In this state, the drive cannot be started by the command: controller enable. The power output stages are inhibited. All controllers are reset.

- The function can be controlled by three inputs
  – Control word CAN-CTRL bit 8 of CAN-IN1
  – Control word AIF-CTRL bit 8 of AIF-IN
  – Control word C0135 bit 8
- All inputs are linked by an OR-operation.

7.4.22.3 Controller inhibit (CINH)

The power output stages are inhibited.All controllers are reset.

- The function can be controlled by six inputs
  – Terminal X5/28 (LOW = controller inhibit)
  – Control word CAN-CTRL bit 9 of CAN-IN1
  – Control word AIF-CTRL bit 9 of AIF-IN
  – Control word C0135 bit 9
  – Free inputs DCTRL-CINH1 and DCTRL-CINH2
- All inputs are linked by an OR-operation.

7.4.22.4 TRIP-SET

The drive is controlled into the state under code C0581 and indicates EEr (external monitoring).

- The function can be controlled by four inputs
  - – Control word CAN-CTRL bit 10 of CAN-IN1
  - – Control word AIF-CTRL bit 10 of AIF-IN
  - – Control word C0135 bit 10
  - – Free input DCTRL-TRIP-SET
- All inputs are linked by an OR-operation.

7.4.22.5 TRIP-RESET

Resets an active trip, after the cause of fault is reset. If the cause of fault is still active, there is no reaction.

- The function can be controlled by four inputs
  - – Control word CAN-CTRL bit 11 of CAN-IN1
  - – Control word AIF-CTRL bit 11 of AIF-IN
  - – Control word C0135 bit 11
  - – Free input DCTRL-TRIP-RESET
- All inputs are linked by an OR-operation.
- The function can only be performed by a LOW-HIGH signal.

Tip!

If one of the output is HIGH, no LOW-HIGH edge is possible at the resulting signals.

7.4.22.6 Change of parameter set (PAR)

The controller loads and uses the selected parameter set.

- The parameter set to be loaded is selected via the inputs DCTRL-PAR*1 and DCTRL-PAR*2. The inputs are binary coded (1 of 4).

PAR*2	PAR*1	Selected parameter set
0	0	Parameter set 1
0	1	Parameter set 2
1	0	Parameter set 3
1	1	Parameter set 4

- With a LOW-HIGH - signal at the input DCTRL-PAR-LOAD the controller changes to the selected parameter set.

Tip!

If the parameter set to be loaded via terminal X5/Ex is selected before connecting the supply voltage, the LOW-HIGH signal at the input DCTRL-PAR-LOAD is not necessary. In this case, the controller loads automatically the selected parameter set.

- The controller is not ready for operation for approx. 1 second. DCTRL- RDY shows LOW during this time.

7.4.22.7 Controller state

The state is binary coded in the outputs DCTRL-STAT*x.

STAT*8	STAT*4	STAT*2	STAT*1	Action of the controller
0	0	0	0	Initializing after supply voltage connection
0	0	0	1	Lock mode, Protection against restart active C0142
0	0	1	1	Drive is in controller inhibit mode
0	1	1	0	Controller enabled
0	1	1	1	The release of a monitoring function resulted in a ”message”
1	0	0	0	The release of a monitoring function resulted in a ”trip”

7.4.23 Digital frequency input (DFIN)

Purpose

Conversion and standardization of a power pulse current at the digital frequency input X9 into a speed and phase setpoint. The transmission of a digital frequency is very precise (without offset and gain errors).

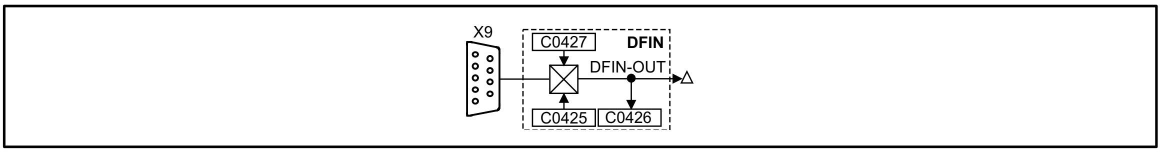


Abb. 7-79 Digital frequency input (DFIN)

Signal				Source		Note
Name	Type	DIS	DIS format	CFG	List	
DFIN-OUT	phd	C0426	dec [rpm]	-	-	

Function

- The input X9 is dimensioned for signals with TTL level (see chapter 4.2.8 digital frequency input X9).
- Adapt the controller to the connected encoder or controller, in the event of pulse train cascade or pulse train bus under C0425.
- The input of a zero track is optional.
- The evaluation of the following input signals is possible under C0427:

C0427 = 0

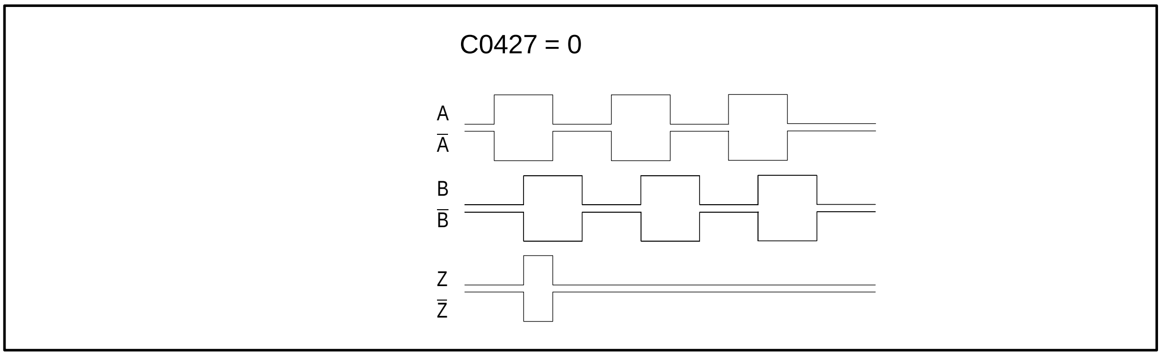


Abb. 7-80 Signal sequence with phase shift (CW rotation)

- CW rotation
  – Track A is leading track B by 90° (positive value at DFIN-OUT).
- CCW rotation
  – Track A is lagging behind track B by 90° (negative value at DFIN-OUT).

C0427 = 1

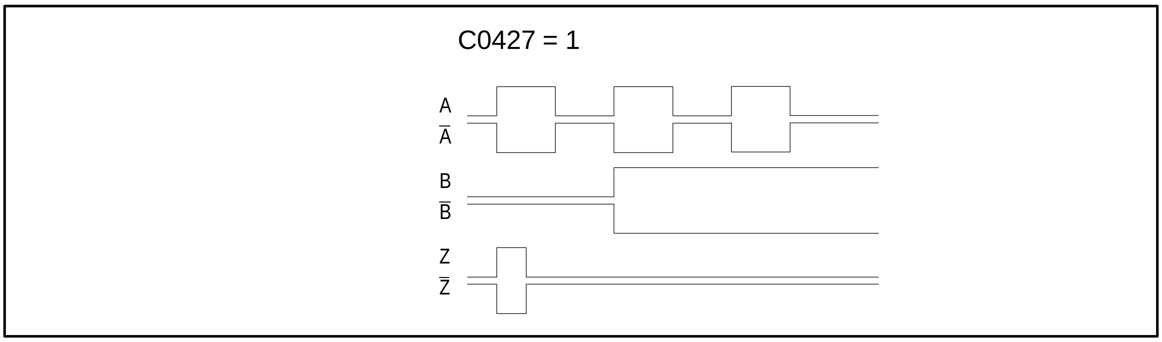


Abb. 7-81 Control of the direction of rotation by track B

- CW rotation
  - Track A transmits the speed.
  - Track B=LOW (positive value at DFIN-OUT).
- CCW rotation
  - Track A transmits the speed.
  - Track B=HIGH (negative value at DFIN-OUT).

C0427 = 2

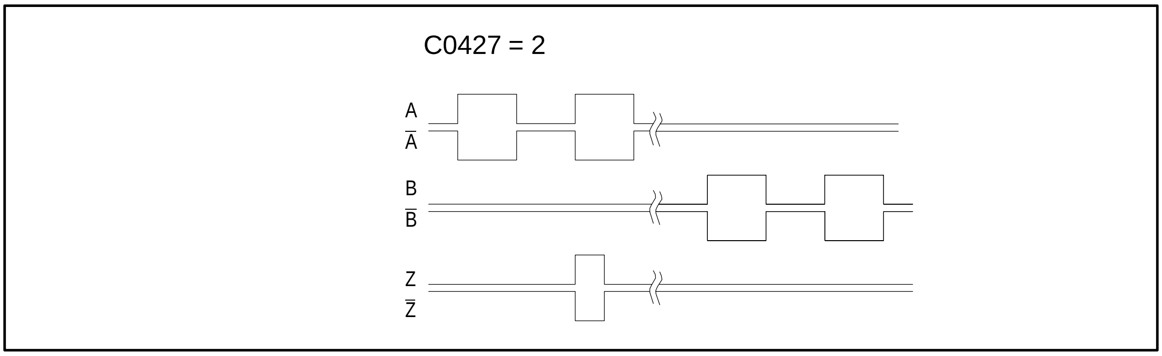


Abb. 7-82 Control of speed and direction of rotation via track A or track B

- CW rotation
  - Track A transmits the speed and the direction of rotation (positive value at DFIN-OUT).
  - Track B=LOW
- CCW rotation
  - Track B transmits the speed and the direction of rotation (negative value at DFIN-OUT).
  - Track A=LOW

Transmission function

$$\text{DFIN-OUT [rpm]} = \text{f [Hz]} \cdot \frac{60}{\text{Increments\_from\_C0425}}$$

Example:

Input frequency = 200 kHz

C0425 = 3 (≙ of an increment of 2048 inc/rev)

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

Signal adaptation

Finer resolutions than the squaring can be achieved by connecting an FB (e.g. CONV3 or CONV4).

Example:

The FB CONV3 converts the speed signal into a quasi-analog signal.

The conversion is done according to the formula:

$$\mathrm{CONV3-OUT}\,[\%] = \mathrm{f}\,[\mathrm{Hz}] \cdot \frac{0,4}{\mathrm{Increments\_from\_C0425}} \cdot \frac{\mathrm{C0950}}{\mathrm{C0951}}$$

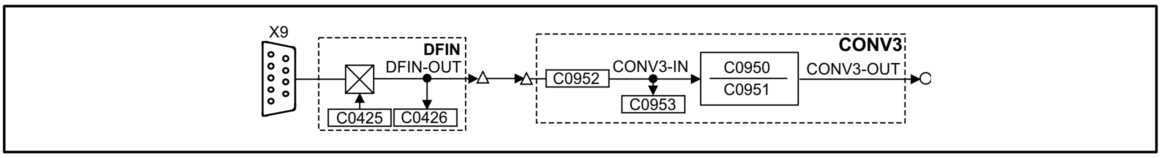


Abb. 7-83 Digital frequency input (DFIN) with connected converter

---

Stop!

When C0540 = 0, 1, 2, 3 and feedback system C0025 > 10, you must no longer use the digital frequency input X9.

7.4.24 Digital frequency output (DFOUT)

Purpose

Converts internal speed signals into frequency signals and outputs them to subsequent drives.The transmission is very precise (without offset and gain errors).

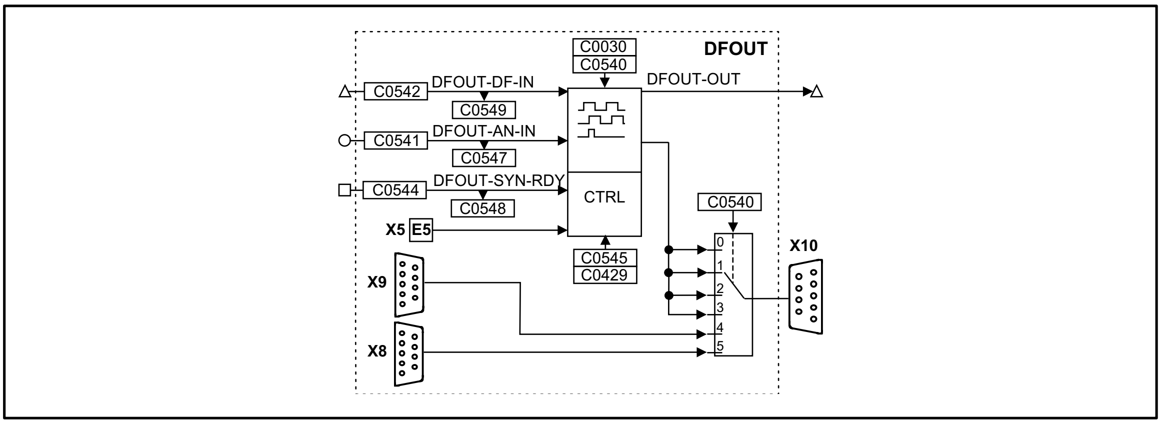


Abb. 7-84 Digital frequency output (DFOUT)

Signal				Source		Note
Name	Type	DIS	DIS format	CFG	List	
DFOUT-DF-IN	phd	C0549	dec [rpm]	C0542	4	-
DFOUT-AN-IN	a	C0547	dec [%]	C0541	1	Input in [%] of nmax (C0011)
DFOUT-SYN-RDY	d	C0548	bin	C0544	2	-
DFOUT-OUT	phd	-	-	-	-	-

Function

- Output signals on X10
- Output of an analog signal
- Output of a speed signal
- Encoder simulation of the resolver with internal zero track
- Encoder simulation of the resolver with external zero track
- Direct output of X8
- Direct output of X9

7.4.24.1 Output signals on X10

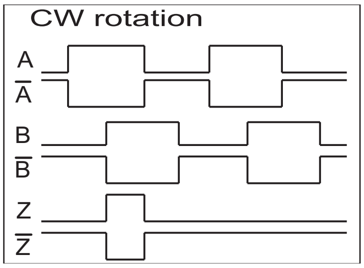


Abb. 7-85 Signal sequence for CW rotation (definition)

- 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 degree.
  - The levels are TTL compatible.
- The signal sequence in the diagram occurs if the input values are positive (CW rotation).
- If the input values are negative (CCW rotation), track B leads track A by 90° 5 .
- The zero pulse is output according to the function set under C0540.
- C0030 is used to set the encoder constant of the encoder simulation.
- The function of the digital frequency output X10 is determined via C0540.

STOP

Stop!

C0540 = 0 to C0540 = 3 cannot be set if the connection to the digital frequency input DFIN X9 is made and C0025 > 10 was selected.

[C0540]	Signal at X10
0	DFOUT-AN-IN is output at X10; external input of the zero track is possible
1	DFOUT-DF-IN is output at X10; external input of the zero track is possible
2	Encoder simulation of the resolver with zero track in resolver zero track (mechanical assembly to the motor)
3	Encoder simulation of the resolver with external input of the zero track (terminal X5/E5)
4	The signal at input X9 is amplified electrically and is output directly (C0030 is without function)
5	The signal at input X8 is amplified electrically and is output directly (C0030 is without function)

7.4.24.2 Output of an analog signal

For this, code C0540 must be set to 0. The value applied at input DFOUT-AN-IN is converted into a frequency.

Transmission function

$$f\ [\mathrm{Hz}] = \mathrm{DFOUT} - \mathrm{AN} - \mathrm{IN}\ [\%] \cdot \frac{\text{Increments from C0030}}{100} \cdot \frac{\mathrm{C0011}}{60}$$

Example:

DFOUT-AN-IN = 50 %

C0030 = 3, this corresponds to 2048 inc/rev.

C0011 = 3000 rpm

$$f\ [\mathrm{Hz}] = 50\ \% \cdot \frac{2048}{100} \cdot \frac{3000}{60} = 51200\ \mathrm{Hz}$$

Generate zero pulse

An artificail zero pulse can be generated for the output frequency.

- Set input DFOUT-SYN-RDY = HIGH.
- A LOW-HIGH edge at terminal X5/E5 generates the zero pulse 360° later.
  – Then, a zero pulse is generated every 360° according to C0030.
- The zero pulse can be shifted by +360° under C0545 (65536 inc = 360°).

7.4.24.3 Output of a speed signal

- Set C0540 = 1.
  – This setting converts the value applied at input DFOUT-DF-IN into a frequency only.

Transmission function

$$f\ [\mathrm{Hz}] = \mathrm{DFOUT} - \mathrm{DF} - \mathrm{IN}\ [\mathrm{rpm}] \cdot \frac{\text{Increments from C0030}}{60}$$

Example:

DFOUT-DF-IN = 3000 rpm

C0030 = 3, this corresponds to 2048 inc/rev.

$$f\ [\mathrm{Hz}] = 3000\ \mathrm{rpm} \cdot \frac{2048}{60} = 102400\ \mathrm{Hz}$$

Generate zero pulse

An artificail zero pulse can be generated for the output frequency.

- Set input DFOUT-SYN-RDY = HIGH.
- A LOW-HIGH edge at terminal X5/E5 generates the zero pulse 360° later.
  – Then, a zero pulse is generated every 360° according to C0030.
- The zero pulse can be shifted by +360° under C0545 (65536 inc = 360°).

7.4.24.4 Encoder simulation of the resolver

Set C0540 = 2 or C0540 = 3 (depending on the desired generation of the zero track).

- The function is used if a resolver is connected to X7.
- The encoder constant for output X10 is set under C0030.

Generate zero pulse in resolver zero position (C0540 = 2)

The output of the zero pulse referring to the motor depends on how the resolver is attached to the motor.

- The zero pulse can be shifted by +360° under C0545 (65536 inc = 360°).

Generate zero pulse externally (C0540 = 3)

An artificail zero pulse can be generated for the output frequency.

- Set input DFOUT-SYN-RDY to HIGH.
- A LOW-HIGH edge at terminal X5/E5 generates the zero pulse 360° later.
  – Then, a zero pulse is generated every 360° according to C0030.
- The zero pulse can be shifted by +360° under C0545 (65536 inc = 360°).

7.4.24.5 Direct output of X8 (C0540 = 4)

- The input signal at X8 is amplified electrically and output directly.
- The signals depend on the assignment of input X8.
- C0030 and C0545 have no function.
- The zero track is output only if it is connected to X8.

7.4.24.6 Direct output of X9 (C0540 = 5)

- The input signal at X9 is amplified electrically and output directly.
- The signals depend on the assignment of input X9.
- C0030 and C0545 have no function.
- The zero track is output only if it is connected to X9.

7.4.25 Digital frequency ramp generator (DFRFG)

Purpose

Synchronization of the drive (motor shaft) on a digital frequency (phase input). Then, the drive performs a phase-synchronous run to the digital frequency.

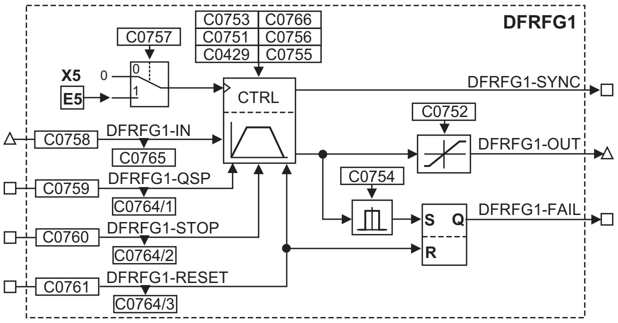


Abb. 7-86 Digital frequency ramp generator (DFRFG1)

Signal				Source		Note
Name	Type	DIS	DIS format	CFG	List	
DFRFG1-IN	phd	C0765	dec [rpm]	C0758	4	Speed/Phase setpoint
DFRFG1-QSP	d	C0764/1	bin	C0759	2	HIGH = quick stop
DFRFG1-STOP	d	C0764/2	bin	C0760	2	HIGH = save setpoint
DFRFG1-RESET	d	C0764/3	bin	C0761	2	HIGH = reset
DFRFG1-OUT	phd	-	-	-	-	Speed/Phase setpoint
DFRFG1-SYNC	d	-	-	-	-	HIGH = drive runs synchronously
DFRFG1-FAIL	d	-	-	-	-	HIGH = phase difference exceeded

Function

- Profile generator
- Quick stop
- Ramp generator stop
- RESET
- Detect phase difference
- Start via touch probe initiator (terminal X5/E5)
- Correction of the touch probe initiator (terminal X5/E5)

7.4.25.1 Profile generator

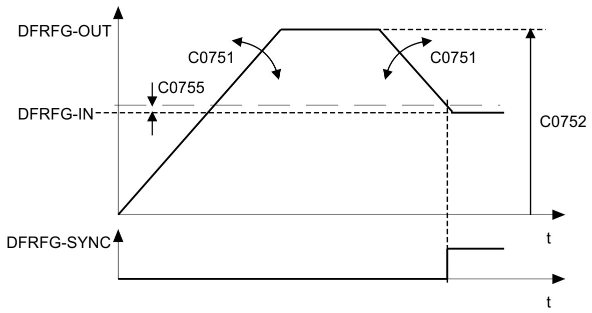


Abb. 7-87 Synchronize on DFRFG

The profile generator generates ramps which lead the setpoint phase to its target.

- Set acceleration and deceleration under C0751.
- Set max. speed under C0752.
- If the distance and the speed reach their setpoints, the output switches DFRFG1-SYNC=HIGH. At the same time, the FB switches the profile generator inactive.
- Set changeover point under C0755.

Stop!

Do not operate the drive at the torque limit M_{max}, I_{max}.

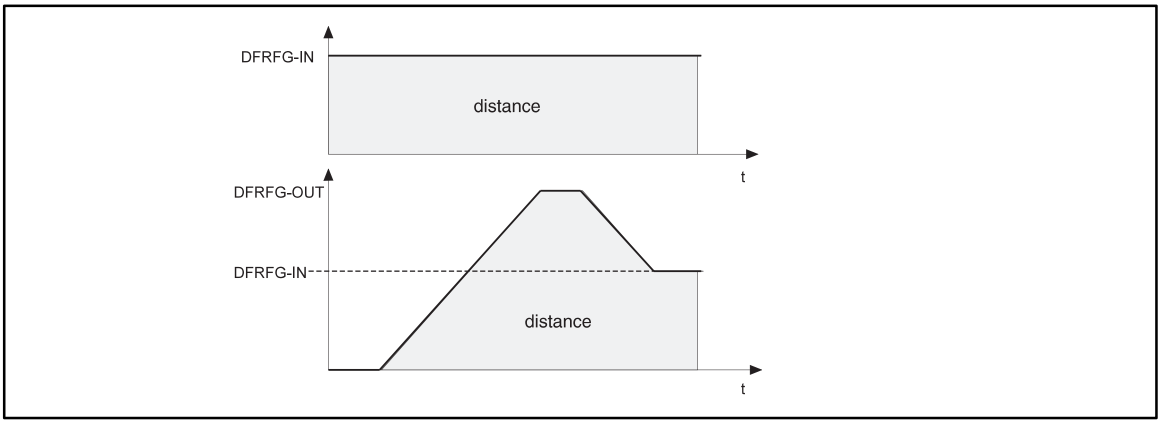


Abb. 7-88 Speed-time diagram DFRFG

The number of increments at DFRFG-IN (master drive) provide the target. The target can be represented as a distance. In the speed-time diagram, the distance covered (phase) is shown as the area under the speed profile. When synchronization is reached, master and slave have covered the same distance (phase).

7.4.25.2 Quick stop

Removes the drive from the network and brakes it to standstill.

- Activate with DFRFG-QSP=HIGH.
- Set deceleration time under C0753.
- Store the setpoint phase detected at DFRFG-IN.
- Approach of the setpoint phase via the profile generator after reset of the quick stop request.

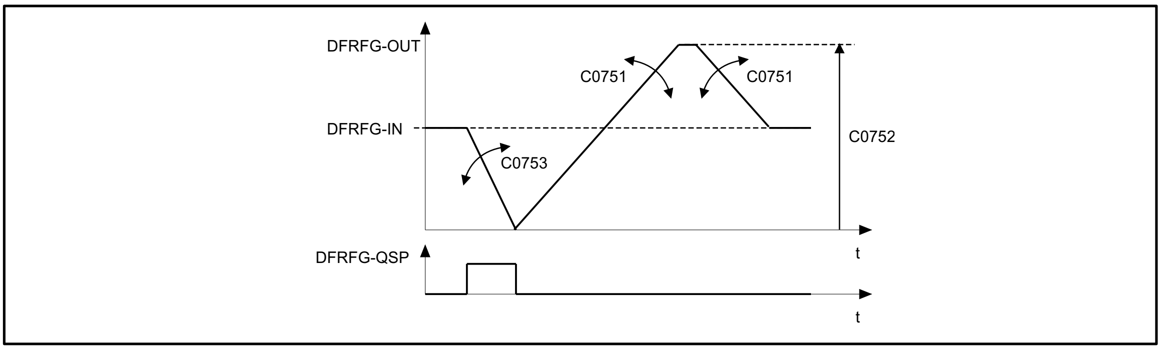


Abb. 7-89 Quick stop DFRFG

7.4.25.3 Ramp generator stop

Maintains the state of the profile generator during operation.

- Activate with DFRFG-STOP=HIGH
- Output of the last state at DFRFG-OUT.
- Store the setpoint phase detected at DFRFG-IN.
- Approach of the setpoint phase via the profile generator after reset of the stop request.

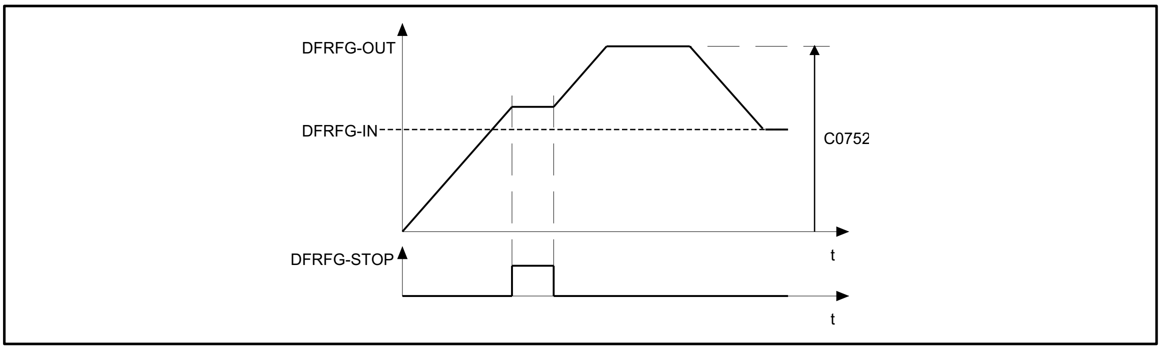


Abb. 7-90 Ramp generator stop

7.4.25.4 RESET

DFRFG-RESET = HIGH:

- Resets the setpoint phase which is internally added
- Activates the profile generator
- HIGH-LOW edge at DFRFG-RESET: Detection of the setpoint phase

7.4.25.5 Detect phase difference

Monitoring of the phase difference between input DFRFG-IN and output DFRFG-OUT.

- Set limit value of the monitoring under C0754
- Activates the monitoring: DFRFG-FAIL = HIGH
- Storing the signal until DFRFG-RESET=HIGH
- The profile generator can accept a phase difference of up to ±2140000000 inc (= 32000 revolutions).

7.4.25.6 Start via touch probe initiator (terminal X5/E5)

Function

- Set C0757 = 1.
- The function is activated by **simultaneously** setting the inputs
  – DFRFG-QSP and DFRFG-RESET = HIGH.
- Starting procedure:
  – Signals at DFRFG-QSP and DFRFG-RESET=LOW.
  – Touch probe signals are otherwise ignored .
- A LOW-HIGH edge at terminal X5/E5 starts the procedure:

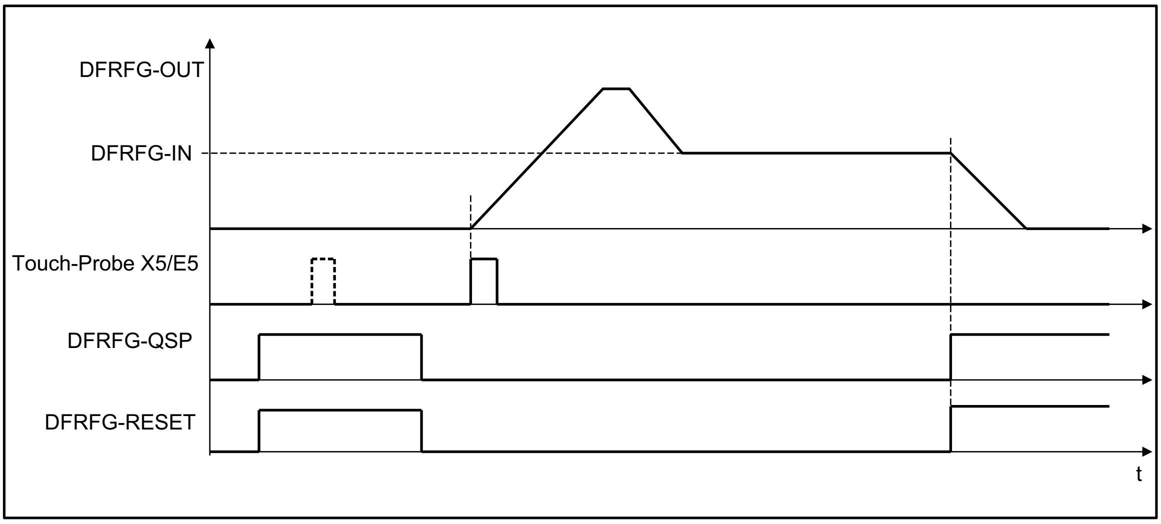


Abb. 7-91 Starting via touch probe initiator (terminal X5/E5)

Stop!

In the default setting, terminal X5/E5 has another function.

7.4.25.7 Correction of the touch probe initiator (terminal X5/E5)

Delays during activation of the initiator cause a speed-dependent phase offset (e.g. during positioning, synchronizing).

- Set correction value for the phase offset under C0429.
- Formula for the correction value at C0429

$$\text{Correction value at C0429} = 16384 \cdot \text{correction value}$$

- Please obtain the correction value from the data sheet of the initiator, or contact the manufacturer.

7.4.25.8 Set offset

The offset can be set under code C0756 (see chapter; Code list). The offset refers to the digital frequency input and is scaled to 1 revolution (≙65536 increments).

The TOUCH-PROBE (TP) initiates the start of the ramp generator. The lead of the master from the moment of starting or the resulting distance/phase difference is taken up during the acceleration.

- Setting: positive offset values
  - Causes a time shift of the TP
  - This means that less time is necessary compared to the setting e.g. offset = 0, to obtain a synchronism with the master.

Tip!

When the offset is large and the input speeds are low, the drive may reverse. To avoid this, you can select a direction of rotation for the output under C0766.

7.4.26 Digital frequency processing (DFSET)

Purpose

Conditions the digital frequency for the controller. Input of the stretch factor, gearbox factor and the speed or phase trimming.

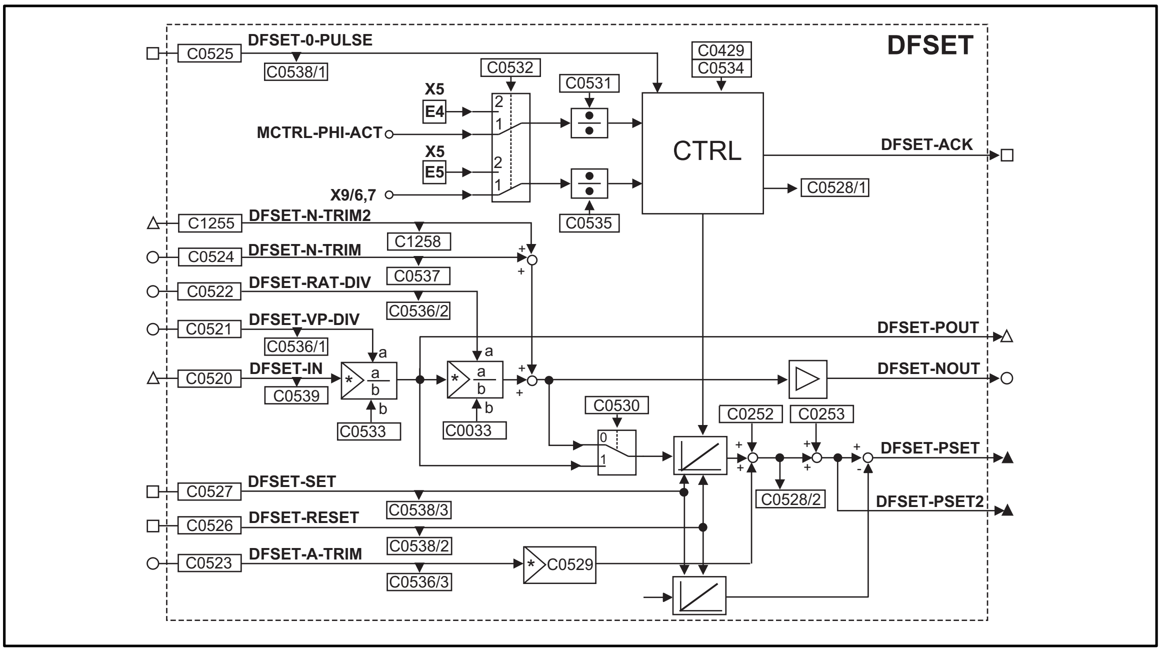


Abb. 7-92 Digital frequency processing (DFSET)

Signal				Source		Note
Name	Type	DIS	DIS format	CFG	List	
DFSET-IN	phd	C0539	dec [rpm]	C0520	4	Speed/Phase setpoint
DFSET-N-TRIM	a	C0537	dec [%]	C0524	1	Speed trimming in [%] of C0011
DFSET-N-TRIM2	phd	C1258	dec [rpm]	C1255	4	Speed trimming in [rpm] of C0011
DFSET-A-TRIM	a	C0536/3	dec [inc]	C0523	1	Phase trimming 100% = 16384 inc
DFSET-VP-DIV	a	C0536/1	dec	C0521	1	Numerator stretch factor 100 % = 16384 inc
DFSET-RAT-DIV	a	C0536//2	dec	C0522	1	Numerator gearbox factor 100 % = 16384 inc
DFSET-0-PULSE	d	C0538/1	bin	C0525	2	HIGH = Enabling of zero pulse synchronizing
DFSET-SET	d	C0538/3	bin	C0527	2	• HIGH = Set phase integrators to equal values • LOW-HIGH edge sets DFSET-PSET = 0 • HIGH-LOW edge sets DFSET-PSET = momentary value of MCTRL-PHI-SET • DFSET-SET has a higher priority than DFSET-RESET
DFSET-RESET	d	C0538/2	bin	C0526	2	• HIGH = sets position difference = 0 • HIGH = sets DFSET-PSET and DFSET-PSET2 = 0
DFSET-NOUT	a	-	-	-	-	in [%] of nmax (C0011)
DFSET-POUT	phd	-	-	-	-	Speed/Phase setpoint
DFSET-PSET	ph	-	-	-	-	Contouring error for phase controller
DFSET-PSET2	ph	-	-	-	-	Phase setpoint 65536 inc = 1 revolution
DFSET-ACK	d	-	-	-	-	HIGH = Synchronizing is performed

Function

- Setpoint conditioning with stretch and gearbox factor
- Processing of correction values
- Synchronizing on zero track or touch probe (for resolver feedback touch probe only)

7.4.26.1 Setpoint conditioning with stretch and gearbox factor

Stretch factor

Defines the ratio between the drive and the setpoint.

- The stretch factor evaluates the setpoints at DFSET-IN. DFSET-POUT outputs the result.
- The stretch factor results from numerator and denominator.
  - – Numerator is variable from analog signal source or fixed value by the code.
  - – Input of the denominator under C0533.
- Relationship:

$$\text{DFSET–POUT} = \text{DFSET–IN} \cdot \frac{\text{DFSET–VP–DIV}}{\text{C0533}}$$

Gearbox factor

Defines the gearbox ratio of the drive. Enter the ratio of the drive.

- The stretch factor evaluates the setpoint at DFSET-IN multiplied by the stretch factor. DFSET-NOUT outputs the result.
- The gearbox factor results from numerator and denominator.
  - – Numerator is variable from analog signal source or fixed value by the code.
  - – Input of the denominator under C0033.
- Relationship:

$$\text{DFSET} - \text{NOUT} = \text{stretch factor} \cdot \frac{\text{DFSET} - \text{RAT} - \text{DIV}}{\text{C0033}}$$

$$\text{DFSET–NOUT} = \text{DFSET–IN} \cdot \frac{\text{DFSET–VP–DIV}}{\text{C0533}} \cdot \frac{\text{DFSET–RAT–DIV}}{\text{C0033}}$$

7.4.26.2 Processing of correction values

Speed trimming

This is used to add correction values, e.g. by a superimposed closed-loop control. This allows acceleration or deceleration of the drive.

- Adds an analog value at DFSET-N-TRIM to the setpoint speed.
- Adds a speed value at DFSET-N-TRIM2 to the setpoint speed.
  - – The speed trimming via this input is more precise.

Phase trimming

Adds a setpoint at DFSET-A-TRIM to the setpoint phase. This changes the rotor position to the setpoint with the number of increments provided (drive leading or lagging). The phase trimming is performed within a range of ±32767 increments (≙ ±1/2 revolution). The source can be any analog signal.

- The input is done in increments (one revolution ≙ 65536 increments).
- When analog values are entered, 100% correspond to 1/4 revolution = 16384 increments.
- Extension of the setting range with a multiplier under C0529.

Phase offset

Addition of a fixed phase offset under C0252 to the setpoint of the drive.

Speed-proportional phase setting

Leading or lagging of the phase with rising speed.

- Enter a suitable setting in increments under code C0253.
- The set phase offset is reached at 15000 rpm of the drive (linear relationship).

7.4.26.3 Synchronizing on zero track or touch probe

The synchronization is selected under C0532.

- C0532 = 1, zero pulse
  - – zero track of digital frequency input X9 and zero track by the feedback system set under C0490 (not for resolver evaluation).
- C0532 = 2, Touch probe
  - – via terminals X5/E4 (actual pulse) and X5/E5 (set pulse).
- C0532 = 3, zero pulse (setpoint) and TOUCH-PROBE (actual value)
  - – Zero track from the digital frequency input X9 for the setpoint and touch probe initiator via terminal X5/E4 for the actual value.

Touch probe initators can have delay times which cause a speed-dependent phase offset.

- Set correction value for the phase offset under C0429.
- Formula for correction value at C0429:

$$\text{Correction value at C0429} = 16384 \cdot \text{correction value}$$

- Please obtain the values from the data sheet of the initiator or contact the manufacturer.

Stop!

When the synchronization via terminals X5/E4 and X5/E5 (C0532 = 2) is activated, ensure that no other control signals are taken from these terminals. If the configuration is changed under C0005, the terminals are assigned to a basic setting.

Synchronization mode

For the synchronization, different modes are available which can be set under C0534.

C0534	Synchronization mode	Note
0	inactive	function inactive
1	continuous synchronization with correction in the shortest possible way	
2	continuous synchronization with correction in the shortest possible way	after a LOW-HIGH signal to DFSET-0-pulse, the zero track is synchronized once
10	single synchronization, a phase deviation is corrected in the shortest possible way	after a LOW-HIGH signal to DFSET-0-pulse, the zero track is synchronized once
11	single synchronization, a phase deviation is corrected in CW direction	after a LOW-HIGH signal to DFSET-0-pulse, the zero track is synchronized once
12	single synchronization, a phase deviation is corrected in CCW direction	after a LOW-HIGH signal to DFSET-0-pulse, the zero track is synchronized once
13	single synchronization, a phase difference is determined between setpoint pulse and actual pulse and is corrected to the corresponding direction of rotation according to the sign	after LOW-HIGH signal at DFSET-0-Pulse the zero track is synchronized once

7.4.27 Delay elements (DIGDEL)

Purpose

This function is used to delay digital signals. These operations can be used for the control of functions or the generation of status information.

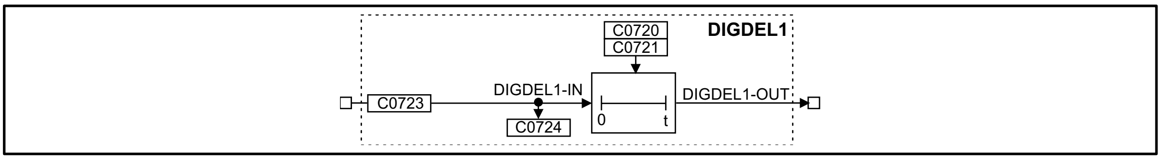


Abb. 7-93 Delay element (DIGDEL1)

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
DIGDEL1-IN	d	C0724	bin	C0723	2	1000	-
DIGDEL1-OUT	d	-	-	-	-	-	-

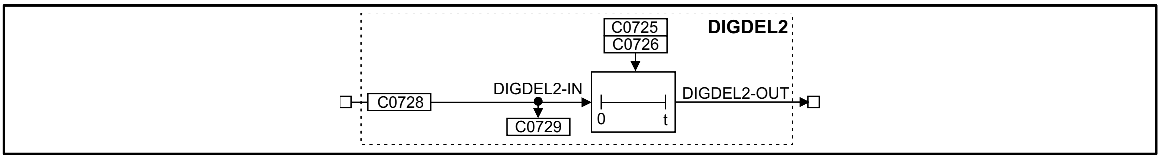


Abb. 7-94 Delay element (DIGDEL2)

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
DIGDEL2-IN	d	C0729	bin	C0728	2	1000	-
DIGDEL-OUT	d	-	-	-	-	-	-

Function

You can select the following functions under C0720 (DIGDEL1) and C0725 (DIGDEL2):

- on-delay
- dropout delay
- general delay

7.4.27.1 On-delay

If the on-delay is set, a signal change at the input DIGDELx-IN from LOW to HIGH is passed on to the DIGDELx-OUT output after the delay time set under C0721 or C0726 has elapsed.

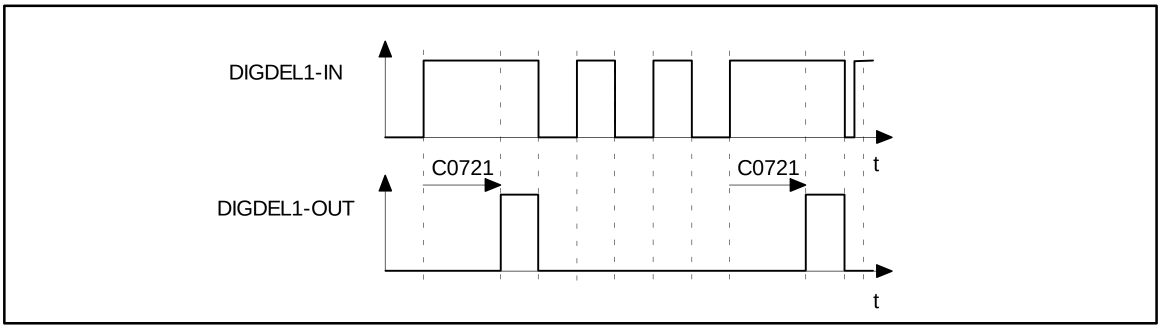


Abb. 7-95 On-delay (DIGDEL1)

In this function, the time-element operates like a retriggerable monoflop:

- A LOW-HIGH edge at the input DIGDELx-IN starts the time element.
- If the delay time set under C0721 or C0726 has elapsed, the output DIGDELx-OUT is set to HIGH.
- The time element is reset and the output DIGDELx-OUT is set to LOW with a HIGH-LOW edge at the input DIGDELx-IN.

7.4.27.2 Dropout delay

A dropout delay causes a signal change at the input DIGDELx-IN from HIGH to LOW to be passed on to the output DIGDELx-OUT if the delay time set under C0721 or C0726 has elapsed.

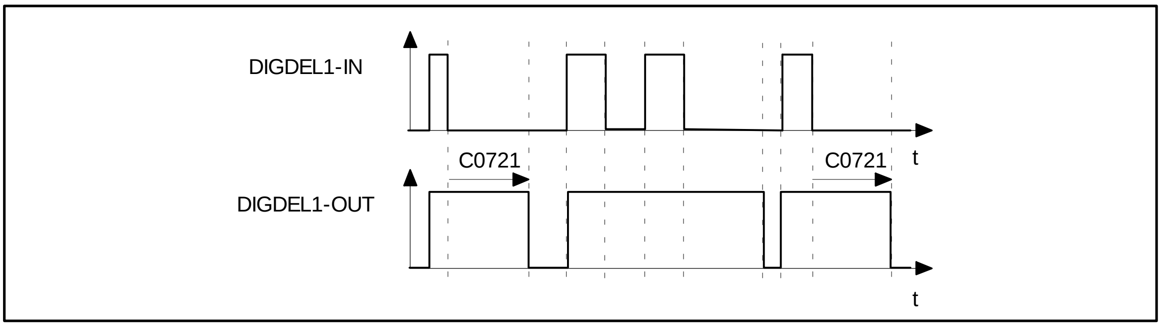


Abb. 7-96 Dropout delay (DIGDEL1)

- A LOW-HIGH edge at the input DIGDELx-IN causes the output DIGDELx-OUT to be set to HIGH and the time element to be reset.
- The time element is started with a HIGH-LOW edge at the input DIGDELx-IN.
- After the delay time set under C0721 or C0726 has elapsed, the output DIGDELx-OUT is set to LOW.

7.4.27.3 General delay

A general delay causes any signal change at the input DIGDELx-IN to be passed to the output DIGDELx-OUT only after the time set under C0721 or C0726 has elapsed.

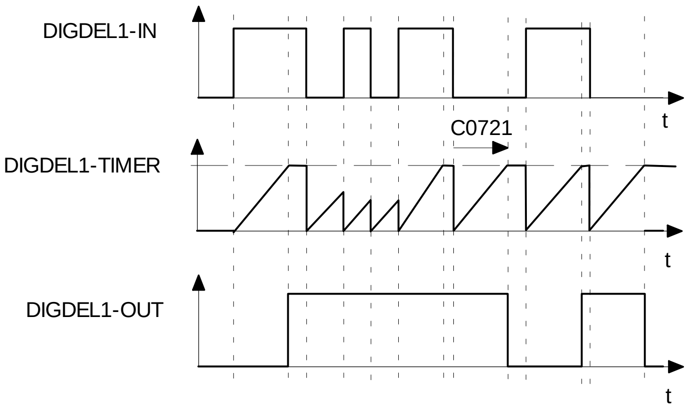


Abb. 7-97 General delay

- The time element is started with any edge at the input DIGDELx-IN.
- When the timer (can be set under C0721 or C0726) has reached the upper limit, the output DIGDELx-OUT is set to the same value as the input DIGDEL1-IN.

7.4.28 Freely assignable digital inputs (DIGIN)

Purpose

Reading and conditioning of the signals at the terminals X5/E1 to X5/E5.

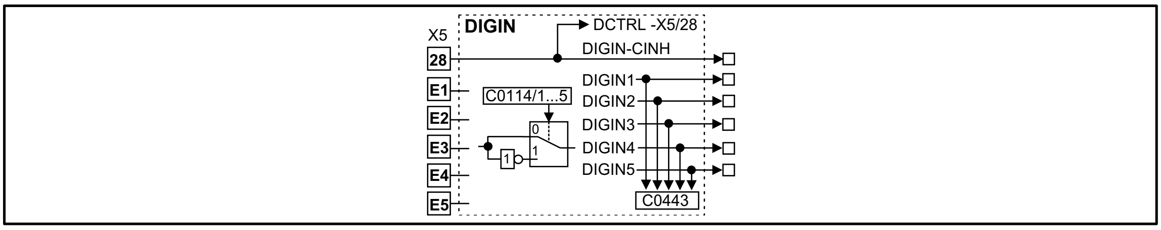


Abb. 7-98 Freely assignable digital inputs (DIGIN)

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
DIGIN-CINH	d	-	dec	-	-	-	Controller inhibit acts directly on the DCTRL control
DIGIN1	d	C0443	dec	-	-	-	-
DIGIN2	d	C0443	dec	-	-	-	-
DIGIN3	d	C0443	dec	-	-	-	-
DIGIN4	d	C0443	dec	-	-	-	-
DIGIN5	d	C0443	dec	-	-	-	-

Function

The terminals X5/E1 to X5/E5 are scanned every millisecond. The level for every input can be inverted. For this, proceed as follows:

- Select code C0114 with corresponding subcode (e.g. subcode 3 for input X5/E3)
- Enter the desired level as a parameter:
  – 0 = Level not inverted (HIGH active)
  – 1 = Level inverted (LOW active)

7.4.29 Freely assignable digital outputs (DIGOUT)

Purpose

Conditioning of the digital signals and output to the terminals X5/A1 to X5/A4.

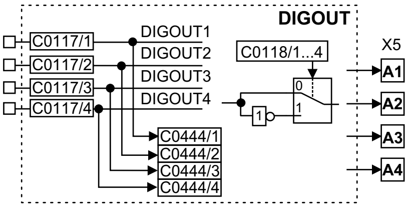


Abb. 7-99 Freely assignable digital outputs (DIGOUT)

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
DIGOUT1	d	C0444/1	bin	C0117/1	2	15000	-
DIGOUT2	d	C0444/2	bin	C0117/2	2	10650	-
DIGOUT3	d	C0444/3	bin	C0117/3	2	500	-
DIGOUT4	d	C0444/4	bin	C0117/4	2	5003	-

Function

The terminals X5/A1 to X5/A4 are updated every millisecond. The level for every output can be inverted. For this, proceed as follows:

- Select code C0118 with corresponding subcode (e.g. subcode 3 for output X5/A3)
- Enter the desired level as a parameter:
  – 0 = Level not inverted (HIGH active)
  – 1 = Level inverted (LOW active)

7.4.30 First order derivative-action element (DT1)

Purpose

Derivative action of signals

For instance, used for the speed injection (dv/dt).

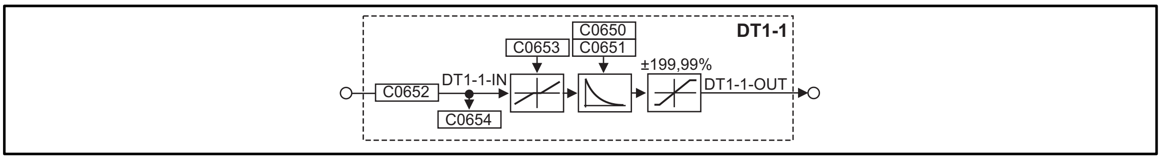


Abb. 7-100 First order derivative-action element (DT1-1)

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
DT1-1-IN	a	C0654	dec [%]	C0652	1	1000	-
DT1-1-OUT	a	-	-	-	-	-	limited to ±199.99 %

Function

- The gain is set under C0650.
- The delay $T_v$is set under C0651.
- The input sensitivity of the DT1-1 element can be reduced under C0653.
- The FB only evaluates the specified most significant bits, according to the setting.

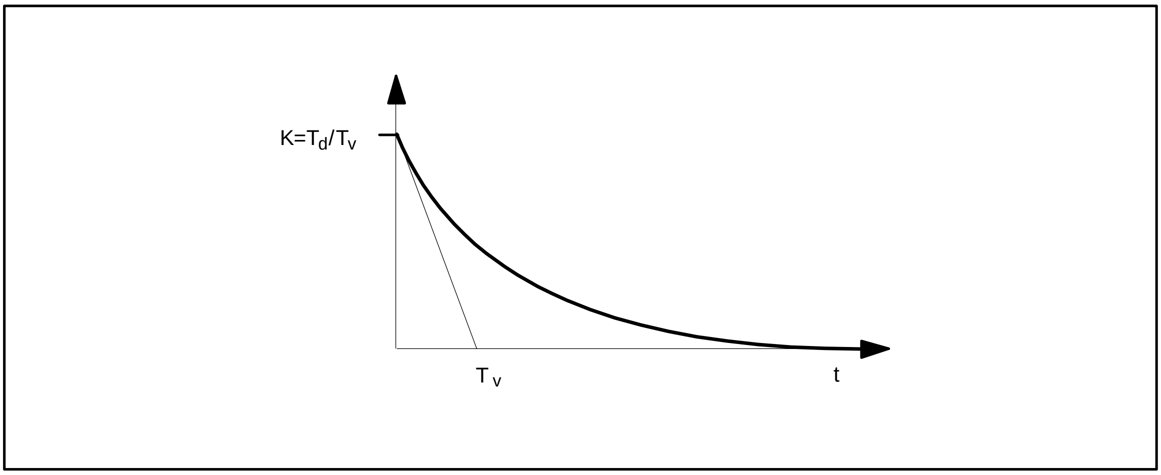


Abb. 7-101 Delay time T_v of the first order derivative-action element

7.4.31 Free piece counter (FCNT)

Purpose

Digital up/down counter.

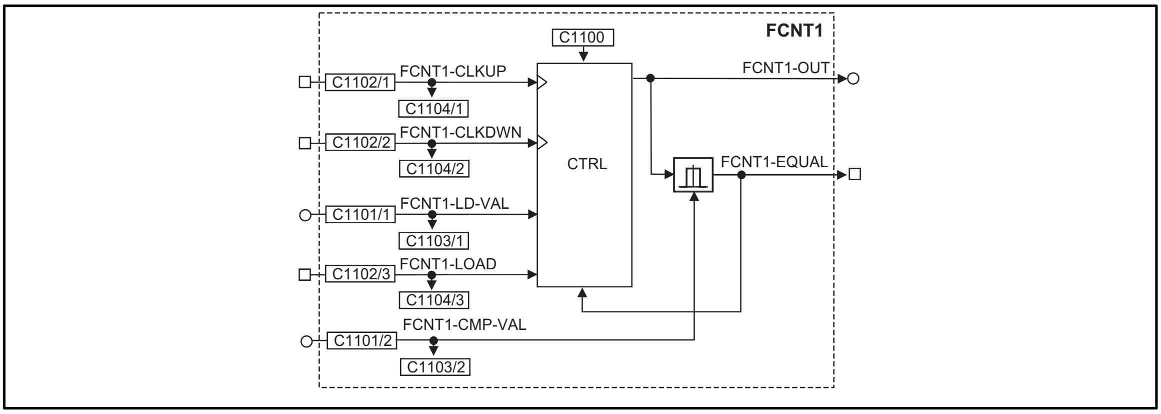


Abb. 7-102 Free piece counter (FCNT1)

Signal				Source		Note
Name	Type	DIS	DIS format	CFG	List	
FCNT1-CLKUP	d	C1104/1	bin	C1102/1	2	LOW-HIGH edge = counts up by 1
FCNT1-CLKDWN	d	C1104/2	bin	C1102/2	2	LOW-HIGH edge = counts down by 1
FCNT1-LD-VAL	a	C1103/1	dec	C1101/1	1	Start value
FCNT1-LOAD	d	C1104/3	bin	C1102/3	2	● HIGH = Accept start value ● The input has the highest priority
FCNT1-CMP-VAL	a	C1103/2	dec	C1101/2	1	Comparison value
FCNT1-OUT	a	-	-	-	-	Counter limited to ±199.99 % (≙ ±32767)
FCNT1-EQUAL	d	-	-	-	-	HIGH = comparison value reached

Function

C1100 = 1

- For | counter | ≥ | FCNT1-CMP-VAL | (comparison value):
  - – For 1 ms FCNT1-EQUAL = HIGH
  - – Resets the counter to the start value (FCNT1-LD-VAL)

Tip!

If the signal is to be set for a longer time, e.g. when the output is requested by a PLC, you can extend the signal with the TRANS function block.

C1100 = 2

- For | counter | = | FCNT1-CMP-VAL | (comparison value):
  - – The counter stops
- FCNT1-LOAD = HIGH resets the counter to the start value (FCNT1-LD-VAL)

7.4.32 Free digital outputs (FDO)

Purpose

This function block is used to switch digital signals via C0151, via the function block AIF-OUT and via the function block CAN-OUT, to the connected fieldbus systems.

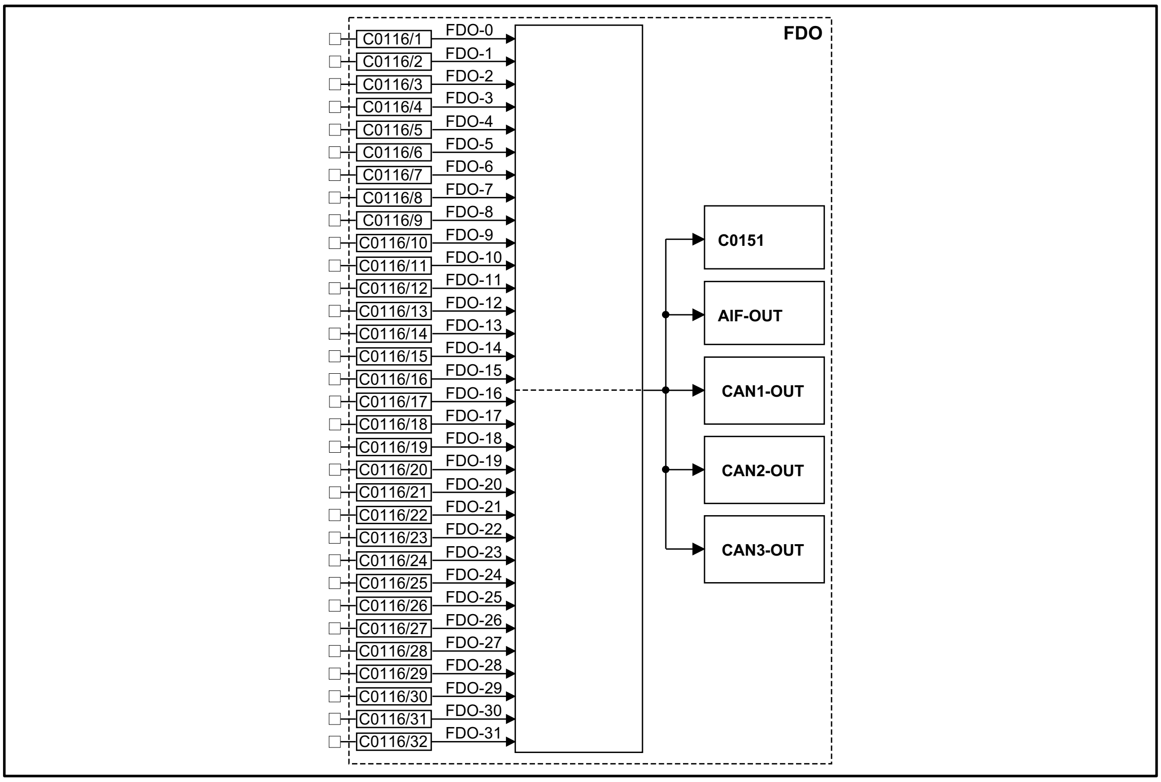


Abb. 7-103 Free digital outputs (FDO)

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
FDO-0	d	C0151	hex	C0116/1	2	1000	
FDO-1	d	C0151	hex	C0116/2	2	1000	
FDO-2	d	C0151	hex	C0116/3	2	1000	
FDO-3	d	C0151	hex	C0116/4	2	1000	
FDO-4	d	C0151	hex	C0116/5	2	1000	
FDO-5	d	C0151	hex	C0116/6	2	1000	
FDO-6	d	C0151	hex	C0116/7	2	1000	
FDO-7	d	C0151	hex	C0116/8	2	1000	
FDO-8	d	C0151	hex	C0116/9	2	1000	
FDO-9	d	C0151	hex	C0116/10	2	1000	
FDO-10	d	C0151	hex	C0116/11	2	1000	
FDO-11	d	C0151	hex	C0116/12	2	1000	
FDO-12	d	C0151	hex	C0116/13	2	1000	
FDO-13	d	C0151	hex	C0116/14	2	1000	
FDO-14	d	C0151	hex	C0116/15	2	1000	
FDO-15	d	C0151	hex	C0116/16	2	1000	
FDO-16	d	C0151	hex	C0116/17	2	1000	
FDO-17	d	C0151	hex	C0116/18	2	1000	
FDO-18	d	C0151	hex	C0116/19	2	1000	
FDO-19	d	C0151	hex	C0116/20	2	1000	
FDO-20	d	C0151	hex	C0116/21	2	1000	
FDO-21	d	C0151	hex	C0116/22	2	1000	
FDO-22	d	C0151	hex	C0116/23	2	1000	
FDO-23	d	C0151	hex	C0116/24	2	1000	
FDO-24	d	C0151	hex	C0116/25	2	1000	
FDO-25	d	C0151	hex	C0116/26	2	1000	
FDO-26	d	C0151	hex	C0116/27	2	1000	
FDO-27	d	C0151	hex	C0116/28	2	1000	
FDO-28	d	C0151	hex	C0116/29	2	1000	
FDO-29	d	C0151	hex	C0116/30	2	1000	
FDO-30	d	C0151	hex	C0116/31	2	1000	
FDO-31	d	C0151	hex	C0116/32	2	1000	

Function

You can freely select a digital signal source for every signal input.

- The corresponding bit in the data word (DWORD) is marked with FDO-x (e.g. FDO-0 for the LSB and FDO-31 for the MSB).
- The DWORD is transferred to code C0151 and to the function blocks AIF-OUT, CAN-OUT1, CAN-OUT2, and CAN-OUT3.

7.4.33 Freely assignable input variables (FEVAN)

Purpose

Transfer of analog signals to any code.At the same time, the FB converts the signal to the data format of the target code.

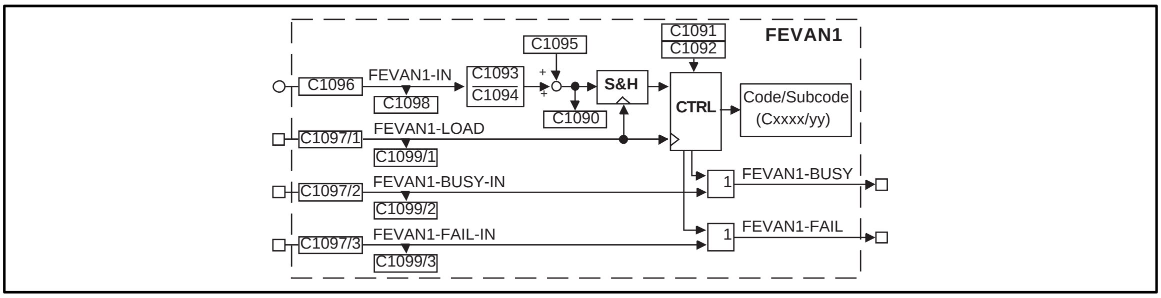


Abb. 7-104 Freely assignable input variables (FEVAN1)

Signal				Source		Note
Name	Type	DIS	DIS format	CFG	List	
FEVAN1-IN	a	C1098	dec	C1096	1	Input value
FEVAN1-LOAD	d	C1099	bin	C1097	2	A LOW-HIGH edge transmits the converted signal to the target code.
FEVAN1-BUSY	d	-	-	-	-	HIGH = transmitting
FEVAN1-FAIL	d	-	-	-	-	● HIGH = transmission failed – A LOW-HIGH edge at FEFAN1-LOAD switches FEFAN1-FAIL = LOW.
-	-	C1090	-	-	-	Display of the converted signal

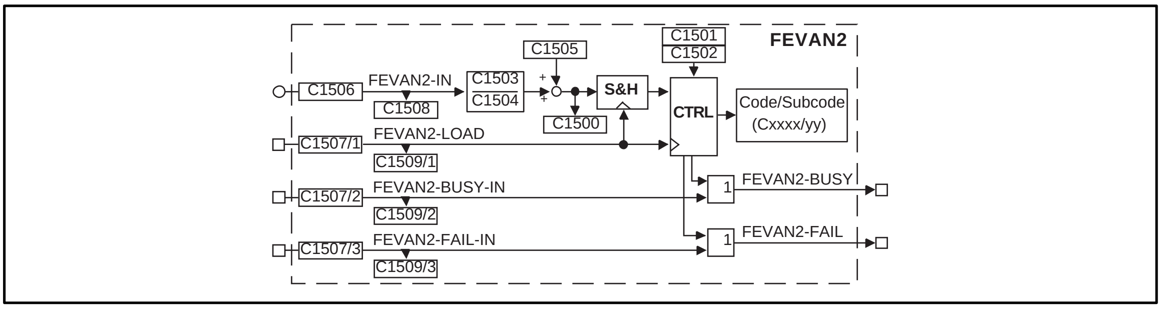


Abb. 7-105 Freely assignable input variables (FEVAN2)

Signal				Source		Note
Name	Type	DIS	DIS format	CFG	List	
FEVAN2-IN	a	C1508	dec	C1506	1	Input value
FEVAN2-LOAD	d	C1509	bin	C1507	2	A LOW-HIGH edge transmits the converted signal to the target code.
FEVAN2-BUSY	d	-	-	-	-	HIGH = transmitting
FEVAN2-FAIL	d	-	-	-	-	● HIGH = transmission failed – A LOW-HIGH edge at FEFAN2-LOAD switches FEFAN2-FAIL = LOW.
-	-	C1500	-	-	-	Display of the converted signal

Function

- Conversion of the read data via:
  - – Numerator, denominator
  - – Offset
- Selection of a target code for the data read.

Codes for the conversion of the data read and for the selection of the target code:

				Selection of the target code		
Function block	**Numerator**	**Denominator**	**Offset**	**Code**	**Subcode**	**Examples**
FEVAN1	C1093	C1094	C1095	C1091	C1092	
FEVAN2	C1503	C1504	C1505	C1501	C1502	

Data transmission

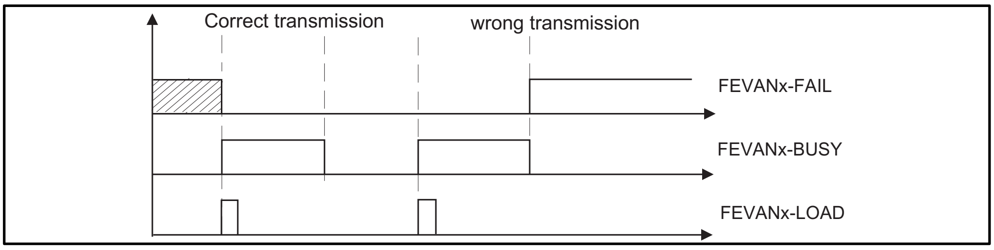


Abb. 7-106 Signal flow

Transmission errors can occur, if:

- the target code is not available
- the target subcode is not available
- the transmitted data are out of the target code limits
- the target code is inhibited since it can only be written if the controller is inhibited.Set controller inhibit (see code table).

Cyclic data transmission

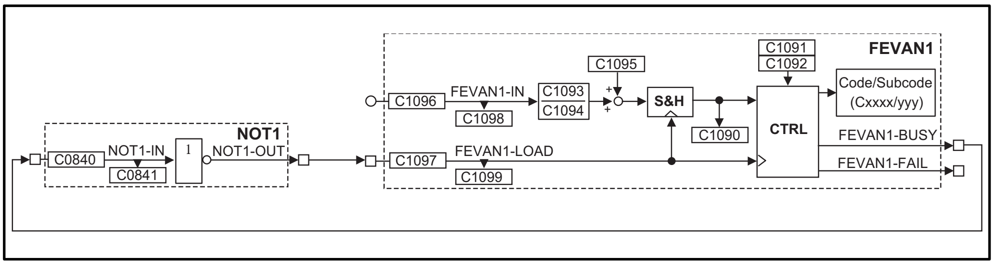


Abb. 7-107 Example for a cycle data transmission to a target code

Conversion

In the example, the conversion is performed at FB FEVAN1.

- The data format of the target code is important for the conversion (see attribute table, chapter 7.10).
- Adapt input signal to the data format of the target code:
  - C1093 (numerator)
  - C1094 (denominator).
- C1094 also fixes the decimal code of the target code:
  - Set C1094 corresponding to the existing decimal codes of the target code. The number of decimal codes can be obtained from the code table.
  - 0.0001 ≙ no decimal codes
  - 0.001 ≙ one decimal code
  - 0.01 ≙ decimal codes
  - 0.1 ≙ three decimal codes
  - 1 ≙ four decimal codes
- For target codes with percentage standardization, the formula for the conversion must include a scaling factor (see example 1).

Example 1 (only for FIX32 format with percentage scaling):

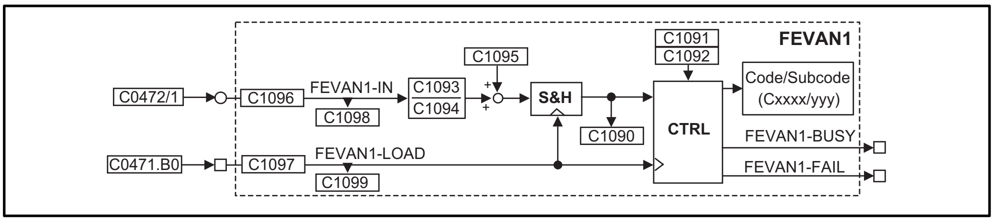


Abb. 7-108 Example of a circuit for FIX32 format with percentage scaling

Task:

- C0472/1 = 1.05 %. Write this value to C0141.

Configuration:

- Connect FEVAN1-IN (C1096) to FCODE-472/1 (19521).
- Connect FEVAN1-LOAD (C1097/1) to FCODE-471.B0 (19521).

Parameterization:

- Set C1091 = 141 (≙ C0141)
- Set C1092=0 (no subcode)
- C1093 = calculate numerator
- Set C1094 = 0.01 (two decimal places)
- Set C1095 = 0 (no offset)

Calculation:

$$\text{FEVAN1–IN [\%]} \cdot \underbrace{\frac{1}{10000}}_{\text{Scaling factor}} \cdot \underbrace{\frac{16384}{100}}_{\text{Scaling factor}} \cdot \frac{C1093}{C1094} + C1095 = C0141\ [\%]$$

Control:

- Set C0471.B0 = 1 (≙ 00000001h) so that the data are transmitted to the target code.

Example with target C1093:

$$\underbrace{1,05\,\%}_{\text{Setpoint in C0141}} \cdot 10000 \cdot \frac{100}{16384} \cdot C1094 \cdot \underbrace{\frac{1}{1,05\,\%}}_{\text{FEVAN1-IN}} = C1093 = 0.6103$$

Display:

- C0141 = 1.00 %

Example 2 (only for FIX32 format scaling):

Task:

- C0473/1 = 1000. Write this value to C0011.

Configuration:

- Connect FEVAN1-IN (C1096) to FCODE-473/1 (19551).
- Connect FEVAN1-LOAD (C1097/1) to FCODE-471.B0 (19521).

Parameterization:

- Set C1091 = 11 (≙ C0011)
- Set C1092=0 (no subcode)
- Set C1093 = 1.0
- Set C1094 = 0.0001 (no decimal place)
- Set C1095 = 0 (no offset)

The source code has no unit. The standardization factor is omitted.

Calculation:

$$\text{FEVAN1–IN} \cdot \frac{1}{10000} \cdot \underbrace{\frac{\text{C1093}}{\text{C1094}}}_{\text{Scaling factor}} + \text{C1095} = \text{C0011 [rpm]}$$

$$1000 \cdot \frac{1}{10000} \cdot \frac{1,0}{0.0001} + 0 = 1000\ \text{rpm}$$

Control:

- Set C0471.B0 = 1 (≙ 00000001h) so that the data are transmitted to the target code.

Display:

- C0011 displays the value 1000 rpm.

The other formats are calculated according to the following formula:

$$\text{FEVAN1–IN} \cdot \frac{\text{C1093}}{\text{C1094}} + \text{C1095} = \text{x}$$

7.4.34 Fixed setpoints (FIXSET)

Purpose

This function block is used to program a maximum of 15 fixed setpoints and to call them via digital terminals or control codes.

The fixed setpoints can be used e.g. for:

- Different dancer set positions when a dancer position control is used or
- Different stretch ratios (gearbox factor) when a speed ratio control with digital frequency coupling is used

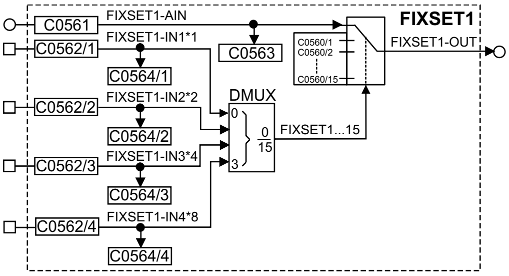


Abb. 7-109 Fixed setpoint (FIXSET1)

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
FIXSET1-AIN	a	C0563	dec [%]	C0561	1	1000	The input is switched to the output, if a LOW level is applied at all selection inputs FIXSET-INx.
FIXSET1-IN1*1	d	C0564/1	bin	C0562/1	2	1000	The number of inputs to be assigned depends on the number of required FIXSET setpoints.
FIXSET1-IN2*2	d	C0564/2	bin	C0562/2	2	1000	
FIXSET1-IN3*4	d	C0564/3	bin	C0562/3	2	1000	
FIXSET1-IN4*8	d	C0564/4	bin	C0562/4	2	1000	
FIXSET1-OUT	a	-	-	-	-	-	

Function

The output of the FB can be used as a setpoint source (signal source) for another FB (e.g. process controller, arithmetic block, etc.). The parameterization and handling is the same as for JOG, but it is independent of JOG (see function block NSET).

- Parameterization of the fixed setpoints
  – The individual fixed setpoints are parameterized by the subcodes of C0560.
- Output of the selected fixed setpoint:
  – If the binary inputs are triggered with a HIGH signal, a fixed setpoint from the table is switched to the output.
- Range:
  – The values for the fixed setpoints range from -200% to +200%.

7.4.34.1 Enable of the FIXSET1 setpoints

Number of required fixed setpoints	**Number of the inputs to be assigned**
1	at least 1
1 ... 3	at least 2
4 ... 7	at least 3
8 ... 15	4

Decoding table of the binary input signals:

Output signal FIXSET1-OUT =	**1st input FIXSET1-IN1**	**Input FIXSET1-IN2**	**3rd input FIXSET1-IN3**	**4th input FIXSET1-IN4**
FIXSET1-AIN	0	0	0	0
C0560/1	1	0	0	0
C0560/2	0	1	0	0
C0560/3	1	1	0	0
C0560/4	0	0	1	0
C0560/5	1	0	1	0
C0560/6	0	1	1	0
C0560/7	1	1	1	0
C0560/8	0	0	0	1
C0560/9	1	0	0	1
C0560/10	0	1	0	1
C0560/11	1	1	0	1
C0560/12	0	0	1	1
C0560/13	1	0	1	1
C0560/14	0	1	1	1
C0560/15	1	1	1	1

7.4.35 Flipflop (FLIP)

Purpose

This FB is a D flipflop. This function is used to evaluate and save digital signal transitions.

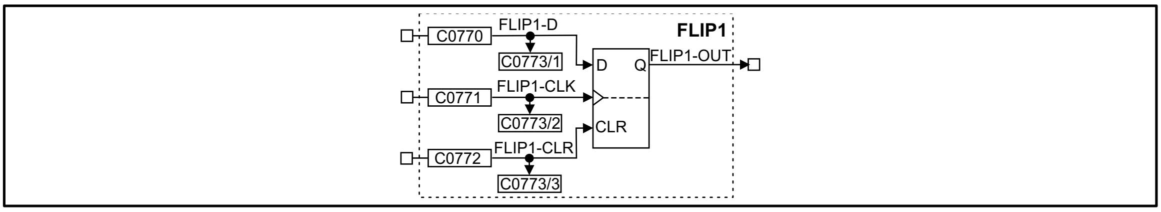


Abb. 7-110 Flipflop (FLIP1)

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
FLIP1-D	d	C0773/1	bin	C0770	2	1000	-
FLIP1-CLK	d	C0773/2	bin	C0771	2	1000	evaluates LOW-HIGH edges only
FLIP1-CLR	d	C0773/3	bin	C0772	2	1000	evaluates the input level only: input has highest priority
FLIP1-OUT	d	-	-	-	-	-	-

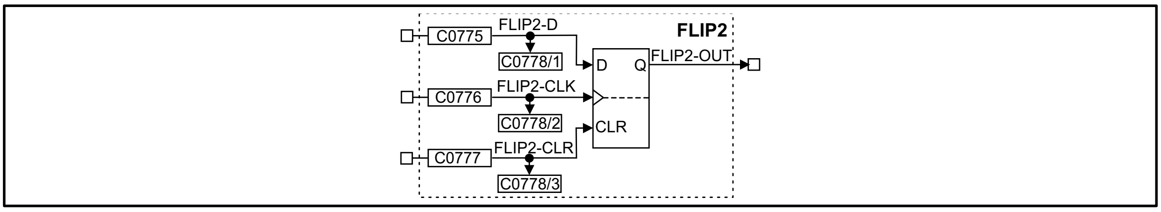


Abb. 7-111 Flipflop (FLIP2)

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
FLIP2-D	d	C0778/1	bin	C0775	2	1000	-
FLIP2-CLK	d	C0778/2	bin	C0776	2	1000	evaluates LOW-HIGH edges only
FLIP2-CLR	d	C0778/3	bin	C0777	2	1000	evaluates the input level only: input has highest priority
FLIP2-OUT	d	-	-	-	-	-	-

Function

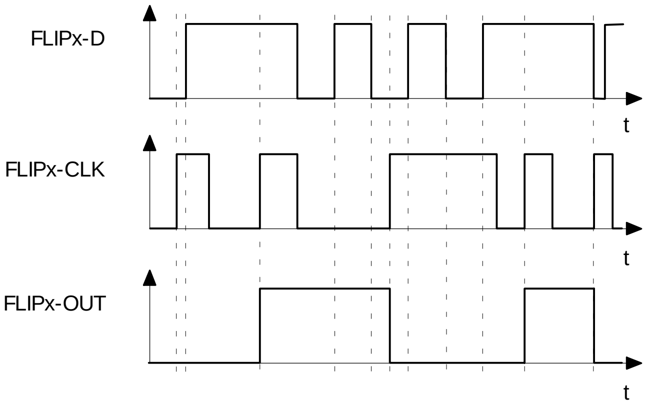


Abb. 7-112 Sequence of a flipflop

- The input FLIPx-CLR always has priority.
- If a HIGH level is applied at the input FLIPx-CLR, the output FLIPx-OUT is set to a LOW level and maintained until this input is applied to a HIGH level.
- With a LOW-HIGH edge at the input FLIPx-CLK, the level at the input FLIPx-D is switched to the output and saved until
  – another LOW-HIGH edge is applied at the input FLIPx-CLK or
  – the input FLIPx-CLR is applied to a HIGH level.

7.4.36 Gearbox compensation (GEARCOMP)

Purpose

Compensates elasticity in the control circuit

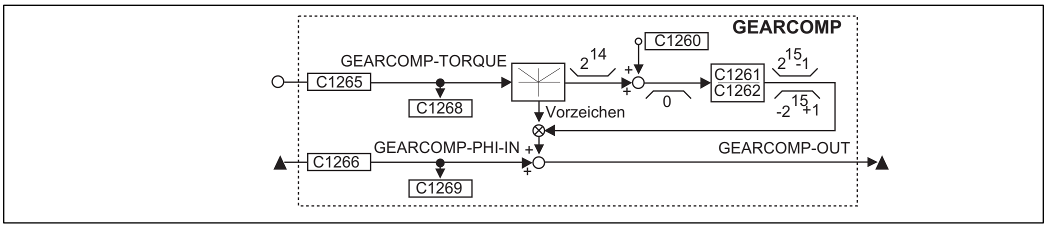


Abb. 7-113 Gearbox compensation (GEARCOMP)

Signal				Source		Note
Name	Type	DIS	DIS format	CFG	List	
GEARCOMP-TORQUE	a	C1268	dec [%]	C1265	2	Input value
GEARCOMP-PHI-IN	ph	C1269	dec [inc]	C1266	3	A LOW-HIGH edge transmits the converted signal to the target code.
GEARCOMP-OUT	ph	-	-	-	-	HIGH = transmitting

Function

- The signal at GEARCOMP-TORQUE is divided into the absolute value and the sign.
- The absolute value is converted (via C1260, C1261, C1262).
- The result is evaluated with the sign and added to the signal at GEARCOMP-PHI-IN.

Codes for the conversion of the absolute value:

Code	Function	Selection			Note
C1260	Offset	-16383	{1}	16383	
C1261	Numerator	-32767	{1}	32767	dynamic switch-off at C1261 = 0
C1262	Denominator	1	{1}	32767	

7.4.37 Limiter (LIM)

Purpose

This FB is used to limit signals to ranges which can be set.

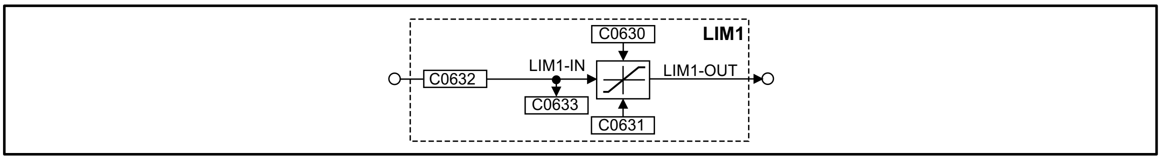


Abb. 7-114 Limiter (LIM1)

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
LIM1-IN1	a	C0633	dec [%]	C0632	1	1000	-
LIM1-OUT	a	-	-	-	-	-	-

Function

- If the input signal exceeds the upper limit (C0630), the upper limit is effective.
- If the input signal falls below the lower limit (C0631), the lower limit is effective.

Tip!

The lower limit (C0631) must be smaller than the upper limit (C0630).

7.4.38 Internal motor control (MCTRL)

Purpose

This function block consists of the control of the driving machine, including phase controller, speed controller and motor control.

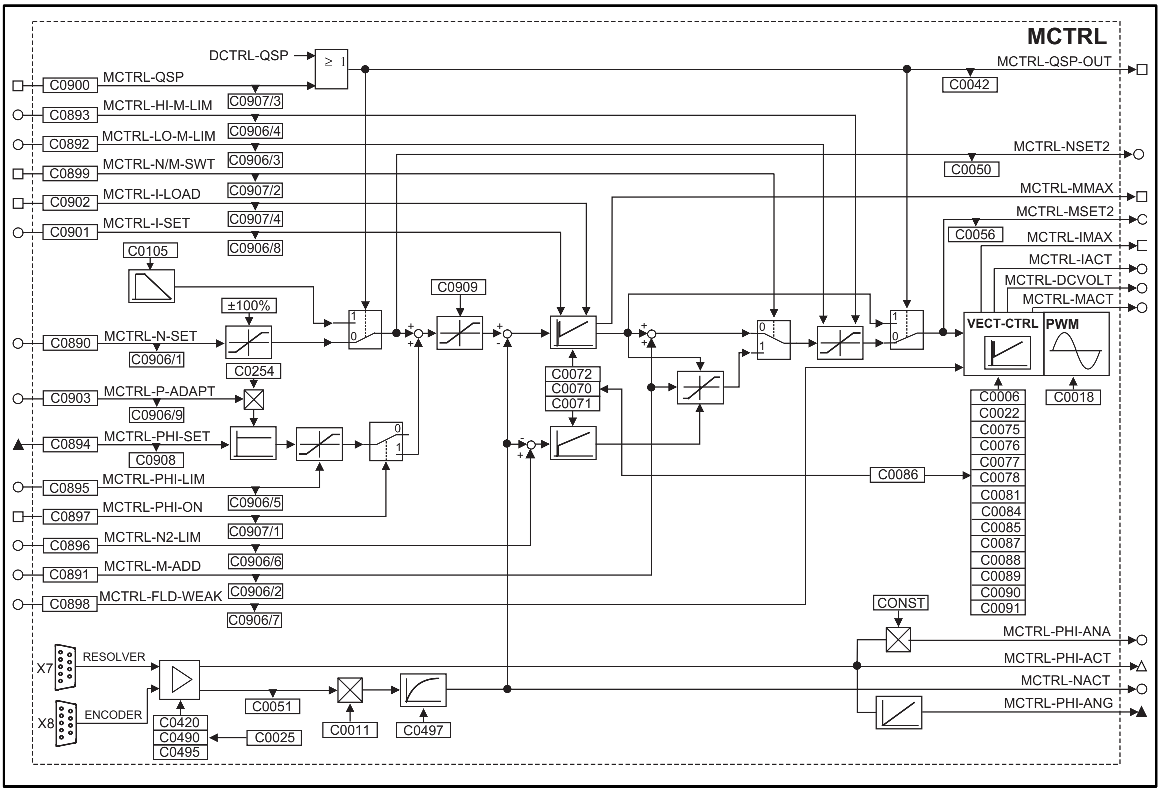


Abb. 7-115	Internal motor control (MCTRL)

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
MCTRL-PHI-SET	ph	C0908	dec [inc]	C0894	3	1000	Input phase controller for difference between set and actual phase
MCTRL-N-SET	a	C0906/1	dec [%]	C0890	1	5050	Input speed setpoint
MCTRL-M-ADD	a	C0906/2	dec [%]	C0891	1	1000	Additional torque setpoint or torque setpoint
MCTRL-LO-MLIM	a	C0906/3	dec [%]	C0892	1	5700	Lower torque limit in % of C0057
MCTRL-HI-MLIM	a	C0906/4	dec [%]	C0893	1	19523	Upper torque limit in % of C0057
MCTRL-PHI-LIM	a	C0906/5	dec [%]	C0895	1	1006	Influence of the phase controller in % of nmax C0011
MCTRL-N2-LIM	a	C0906/6	dec [%]	C0896	1	1000	Lower speed limit for speed limit
MCTRL-FLDWEAK	a	C0906/7	dec [%]	C0898	1	1006	Motor excitation
MCTRL-I-SET	a	C0906/8	dec [%]	C0901	1	1006	Input to set the I-component of the speed controller
MCTRL-P-ADAPT	a	C0906/9	dec [%]	C0903	1	1006	Influence in % on VP of C0254; the absolute value (without sign) is processed
MCTRL-PHI-ON	d	C0907/1	bin	C0897	2	1000	HIGH = Activate phase controller
MCTRL-N/M-SWT	d	C0907/2	bin	C0899	2	1000	LOW = speed control active HIGH = torque control active
MCTRL-QSP	d	C0907/3	bin	C0900	2	10250	HIGH = Drive performs QSP
MCTRL-I-LOAD	d	C0907/4	bin	C0902	2	1000	HIGH = I component of the n-controller is accepted by MCTRL-I-SET
MCTRL-PHI-ACT	phd	-	-	-	-	-	
MCTRL-PHI-ANG	ph	-	-	-	-	-	65536 inc = one revolution
MCTRL-NACT	a	-	-	-	-	-	in % of nmax (C0011)
MCTRL-PHI-ANA	a	-	-	-	-	-	Actual phase as analog signal 90 degree = 100%
MCTRL-MACT	a	-	-	-	-	-	in % of Mmax (C0057)
MCTRL-MSET2	a	-	-	-	-	-	in % of Mmax (C0057)
MCTRL-NSET2	a	-	-	-	-	-	in % of nmax (C0011)
MCTRL-DCVOLT	a	-	-	-	-	-	100% = 1000V
MCTRL-QSP-OUT	d	-	-	-	-	-	HIGH = Drive performs QSP
MCTRL-MMAX	d	-	-	-	-	-	HIGH = Speed controller operates within its limit
MCTRL-IMAX	d	-	-	-	-	-	HIGH = Drive operates at its current limit C0022
MCTRL-IACT	a	-	-	-	-	-	-

Function

- Current controller
- Torque limit
- Additional torque setpoint
- Speed controller
- Torque control with speed limit
- Limit for speed setpoint
- Phase controller
- Quick stop QSP
- Field weakening
- Chopping frequency change-over

7.4.38.1 Current controller

Adapt current controller under C0075 (proportional gain) and C0076 (adjustment time) to the connected machine.

Tip!

Set a suitable motor from the motor selection list under C0086. (🕮 7-60)
This automatically sets the parameters of the current controller correctly.

7.4.38.2 Additional torque setpoint

Depending on the triggering of the input MCTRL-IN/M-SWT, the input MCTRL-M-ADD serves as a torque setpoint or an additional torque setpoint. The additional torque setpoint can be used, for example for friction compensation or for speed injection (dv/dt).

- With MCTRL-N/M-SWT = LOW the speed control is active.
  - – MCTRL-M-ADD is added to the output of the n-controller.
  - – the limits set by the torque limit MCTRL-LO-M-LIM and MCTRL-HI-M-LIM cannot be exceeded.
- With MCTRL-N/M-SWT = HIGH the torque control is active.
  - – MCTRL-M-ADD acts as a torque setpoint.
  - – The n-controllers have a monitoring function.
- The torque setpoint is provided in [%] of the maximum torque (see code C0057).
  - – negative values mean a torque with CCW rotation of the motor.
  - – positive values mean a torque with CW rotation of the motor

7.4.38.3 Torque limiting

An external torque limit can be set by the inputs MCTRL-LO-M-LIM and MCTRL-HI-M-LIM. This means that different torques can be set for the quadrants ”driving” and ”braking”.

- MCTRL-HI-M-LIM is the upper torque limit in [%] of the max. possible torque (C0057).
- MCTRL-LO-M-LIM is the lower torque limit in [%] of the max. possible torque (C0057).
- In case of quick stop (QSP) the torque limiting is deactivated.

Stop!

Only set positive values in MCTRL-HI-M-LIM and negative values in MCTRL-LO-M-LIM, otherwise the speed controller may lose control.The drive may accelerate accidentally.

7.4.38.4 Speed controller

The speed controller is designed as an ideal PID - controller.

Parameter setting

When a motor from the table in chapter 5.2 is selected under C0086, the parameters are set so that only very few adjustments to the application are necessary, if any.

- For parameter setting of the proportional gain Vp under C0070
  – Enter approx. 50 % setpoint speed
  – Increase C0070, until the drive becomes instable (observe motor noises).
  – Reduce C0070, until the drive becomes stable again.
  – Reduce C0070 to approx. 50 %
- For parameter setting of the adjustment time Tn under C0071.
  – Reduce C0071, until the drive becomes instable (observe motor noises).
  – Increase C0071, until the drive becomes stable again.
  – Set C0071 to approx. twice the value.
- For parameter setting of the difference gain Td under C0072.
  – Increase C0072 during operation until an optimum control behaviour is achieved.

Signal limiting

When the drive outputs the maximum torque, the speed controller is at its limit.

- The drive cannot follow the speed setpoint.
- This state is shown by MCTRL-MMAX = HIGH.

Set integral component

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

- MCTRL-I-LOAD = HIGH
  - The n-controller accepts the value at the input MCTRL-I-SET as its integral component.
  - The value at the input MCTRL-I-SET acts as a torque setpoint for the motor control.
- MCTRL-I-LOAD = LOW
  - Function switched off.

7.4.38.5 Torque control with speed limiting

This function is activated by MCTRL-N/M-SWT = HIGH. For the speed limit, a second speed controller (auxiliary speed controller) is connected.

- MCTRL-M-ADD acts as a bipolar torque setpoint.
- n-controller 1 generates the upper speed limit.
  - The upper speed limit is provided in [%] at the input MCTRL-N-SET by nmax C0011 (positive sign for CW rotation).
  - The upper speed limit should only be used for CW rotation.
- n-controller 2 (auxiliary controller) generates the lower speed limit.
  - The lower speed limit is provided in [%] at the input MCTRL-N2-LIM by nmax C0011 (negative sign for CCW rotation).
  - The lower speed limit should only be used for CCW rotation.

7.4.38.6 Limiting of setpoint speed

The speed setpoint in the input MCTRL-N-SET is limited to ± 100% of nmax (C0011).

A limit of the direction of rotation for the speed setpoint can be set under C0909.

7.4.38.7 Phase controller

The phase controller is required to achieve phase synchronization and driftfree standstill.

Tip!

Select a configuration with digital frequency coupling under C0005. This allows an automatic connection of all important signals. On this basis, you can optimize the system.

Activate phase controller

1. Configure a signal source under C0894, which provides the phase difference between set and actual phase (see ”digital frequency - configurations under C0005”).
2. Enter a value > 0 at the input MCTRL-PHI-LIM.
3. Trigger the input MCTRL-PHI-ON with HIGH (e.g. FIXED1).
4. Set the gain of the phase controller C0254 > 0 (see chapter 7.4.38.4)
   - Before setting C0254, select a P-gain C0070 for the n-controller as high as possible.
   - During operation, increase C0254, until the drive shows the desired control behaviour.

Phase controller influence

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 synchronization is achieved.

The influence of the phase controller consists of:

- Phase difference multiplied by the P-gain C0254
- Additional influence via analog signal at MCTRL-P-ADAPT
- limit of the phase controller output to ± MCTRL-PHI-LIM

Limitation of the phase controller output

This limits the maximum speed-up of the drive in the event of large phase differences.

7.4.38.8 Quickstop QSP

The quick stop function is used to stop the drive independently of the setpoint input, within a time to be set.

The quick stop function is active,

- if the input MCTRL-QSP is triggered with HIGH.
- if the controller is triggered through the control words (DCTRL).

Function:

- If torque control is selected, this will be deactivated. The drive is controlled by the speed controller.
- The speed decelerates with the deceleration rate set under C0105 to zero speed.
- The torque limits MCTRL-LO-M-LIM and MCTRL-HI-M-LIM are deactivated.
- The phase controller is activated. If the rotor position is shifted actively, the drive generates a torque against this displacement, if:
  – C0254 is not zero
  – the input MCTRL-PHI-LIM is triggered with a value > 0 %.

STOP

Stop!

If the field is weakened manually (MCTRL-FLD-WEAK < 100%), the drive cannot supply the maximum torque.

7.4.38.9 Field weakening

The field weakening does not have to be set if the motor type was set under under C0086. All necessary settings are done automatically. The motor is operated in the field weakening, if:

- the output voltage of the controller exceeds the rated motor voltage set under C0090.
- the controller can no longer increase the output voltage with increasing speed, due to the mains voltage or DC bus voltage.

Manual field weakening

A manual field weakening is possible via the input MCTRL-FLD-WEAK. For a maximum excitation, this input must be triggered with +100% (e.g.FIXED100%).

Stop!

The available torque is reduced by the field weakening.

7.4.38.10 Chopping frequency change-over

The chopping frequency of the inverter can be selected:

- 8 kHz fixed, for operation with optimum power (C0018 = 1)
  – maximum power output of the controller, but with audible pulse operation
- 16 kHz fixed, for operation with optimum noise (C0018 = 2)
  – inaudible pulse operation of the controller,but with reduced power (torque)
- automatic change-over between operation with optimum power and optimum noise (C0018 = 0)

Automatic chopping frequency change-over

The automatic chopping frequency change-over can be used if the drive is to be operated with optimum noise, but the torque available in this mode is not sufficient for accelerations.

Condition M = f(I)	**Function**
$M < M_{r16}$ (I_{r16})	Controller operates with 16 kHz (optimum noise)
M_{r16} (I_{r16}) $< M < M_{r8}$ (I_{r8})	Controller changes to 8 kHz (optimum power)
$M > M_{max8}$ (I_{max8})	Controller operates with 8 kHz in its current limit

7.4.39 Mains failure control (MFAIL)

Purpose

If the supply voltage via L1, L2, L3 or +UG, -UG fails, the drive (drive network) can be decelerated (braked) in a controlled way. Without this function, the drive (network) would coast.

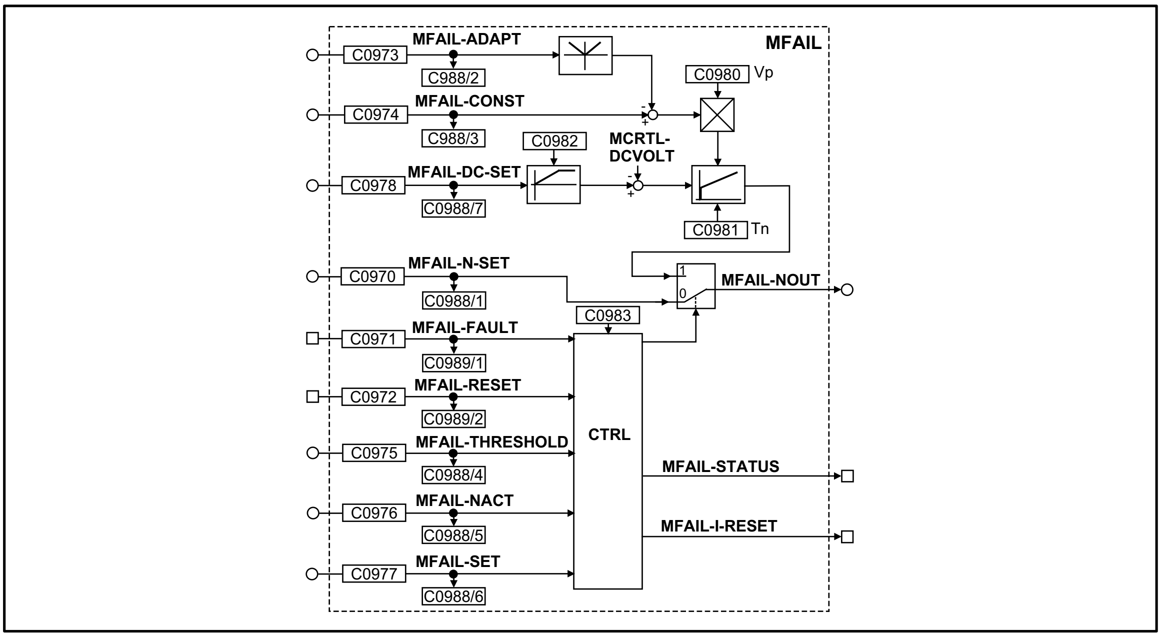


Abb. 7-116 Mains failure control (MFAIL)

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
MFAIL-N-SET	a	C0988/1	dec [%]	C0970	1	1000	Speed setpoint in [%] of C0011
MFAIL-ADAPT	a	C0988/2	dec [%]	C0973	1	1000	Dynamic adaptation of the proportional gain of the U_{Gset} controller in [%] of C0980
MFAIL-KONST	a	C0988/3	dec [%]	C0974	1	1000	Proportional gain of the U_{Gset} controller in [%] of C0980
MFAIL-THRESHOLD	a	C0988/4	dec [%]	C0975	1	1000	Restart threshold in [%] of C0011
MFAIL-NACT	a	C0988/5	dec [%]	C0976	1	1000	Comparison value for the restart threshold in [%] of C0011
MFAIL-SET	a	C0988/6	dec [%]	C0977	1	1000	Speed start point for the deceleration in [%] of C0011
MFAIL-DC-SET	a	C0988/7	dec [%]	C0978	1	1000	Voltage setpoint on which the DC bus voltage is to be maintained, 100% = 1000V
MFAIL-FAULT	d	C0989/1	bin	C0971	2	1000	HIGH = activates the mains failure control
MFAIL-RESET	d	C0989/2	bin	C0972	2	1000	HIGH = reset
MFAIL-N-OUT	a	-	-	-	-	-	Speed setpoint in [%] of C0011
MFAIL-STATUS	d	-	-	-	-	-	HIGH = mains failure control active
MFAIL-I-RESET	d	-	-	-	-	-	HIGH = mains failure control active, the drive is braking

Range of functions

- Mains failure detection
- Mains failure control
- Restart protection
- Reset of the mains failure control
- Dynamic adaptation of the control parameters
- Fast mains recovery (KU)
- Application examples

7.4.39.1 Mains failure detection

The type of the mains failure detection to be used depends on the drive system used.

A failure of the voltage supply of the power stage is detected:

- by the level of the DC bus voltage or
- by an external system (e.g. supply module 934X or voltage measuring relay).
- Different systems can be combined.

Mains failure detected by the level of the DC bus voltage

Use with single drives or multi-axis drives, which do not use external monitoring systems.

- For this, you can use a comparator (e.g. CMP2). Set the signal links:
  – C0688/1 = 5005 (MCTRL-DCVOLT to CMP2-IN1)
  – C0688/2 = 19540 (free code C0472/20 to CMP2-IN2)
  – C0971 = 10655 (CMP2-OUT to MFAIL-FAULT)
  – Set function of the comparator CMP2 with C0685 = 3

Enter the function blocks CMP2 and MFAIL in free positions of the processing table in C0465.

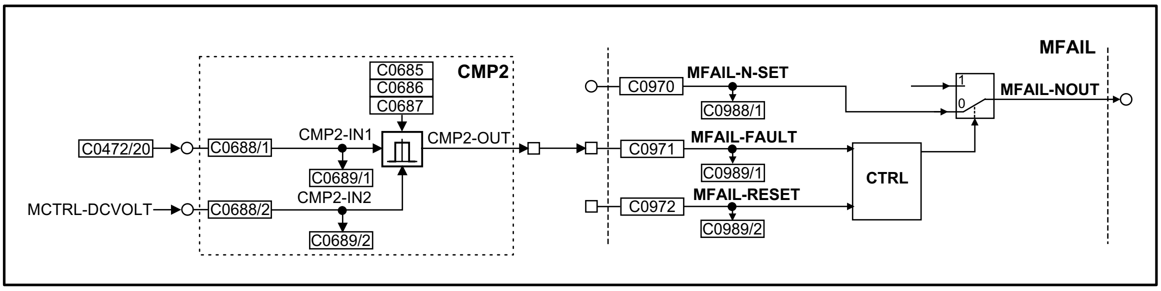


Abb. 7-117 Example of a mains failure detection with internal function blocks (section)

Main failure detection of the supply module

- A digital output of the supply module 934x is switched to the function block MFAIL via the digital inputs DIGIN of the 93XX controller. In the example, input X5/E4 is used. Set the signal link:
  – C0971 = 54 (DIGIN4 to MFAIL-FAULT)
  – C0871 = 1000 (remove DCTRL-TRIP-SET from terminal X5/E4)
  – Select level (HIGH or LOW active) with C0114/4

Enter the function block MFAIL in a free position of the processing table in C0465.

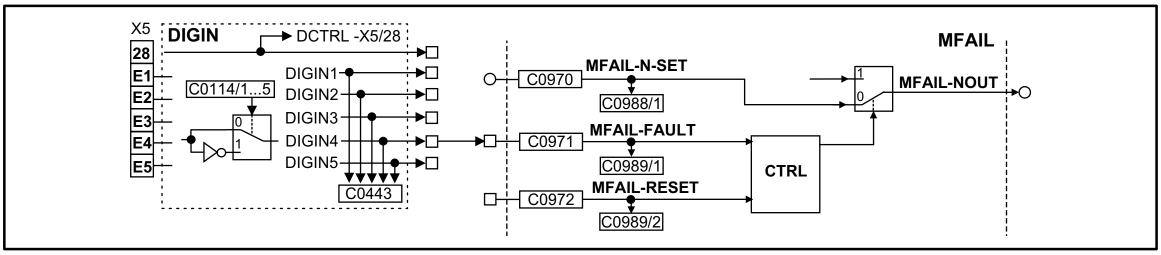


Abb. 7-118 Example of a mains failure detection by an external monitoring system

Combination of these methods

- These methods are combined via an OR link with an internal function block. OR5 is used in the example. Set the signal links:
  - – C0688/1 = 5005 (MCTRL-DCVOLT to CMP2-IN1)
  - – C0688/2 = 19540 (free code C0472/20 to CMP2-IN2)
  - – Set function of the comparator CMP2 with C0685 = 3
  - – C0838/1 = 10655 (CMP2-OUT to OR5-IN1)
  - – C0838/2 = 54 (DIGIN5 to OR5-IN2)
  - – C0971 = 10570 (OR5-OUT to MFAIL-FAULT)

Enter the function blocks CMP2, OR5 and MFAIL in free positions of the processing table in C0465.

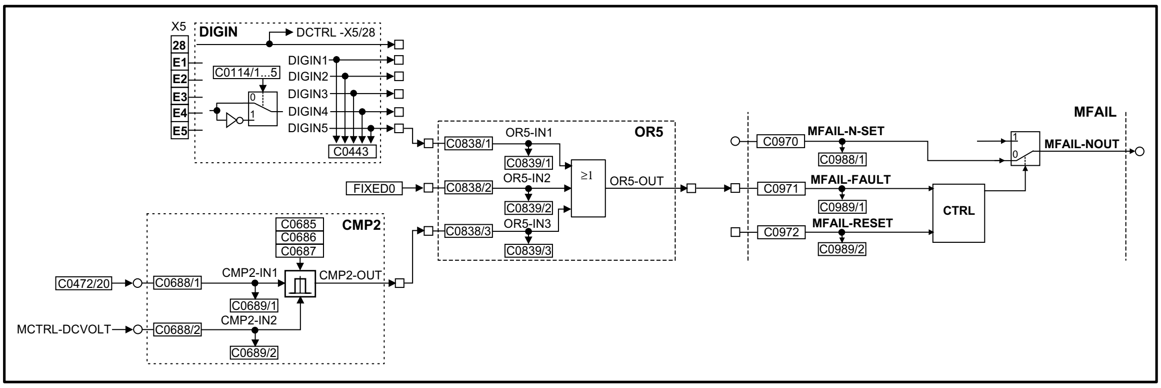


Abb. 7-119 Example of a mains failure detected by different sources

7.4.39.2 Mains failure control

Integration of the function block into the signal flow of the controller

As an example, the function block is integrated into the basic configuration C0005 = 1000 (speed control):

1. Generate speed setpoint channel:
   - – C0970 = 5050 (NSET-NOUT to MFAIL-N-SET)
   - – C0890 = 6100 (MFAIL-NOUT to MCTRL-N-SET)
2. Determine start value for the sequence (here actual speed):
   - – C0977 = 6100 (MFAIL-NOUT to MFAIL-SET)
3. Determine source for the setpoint of the DC bus voltage (here by a freely connectable code FCODE C0472/19):
   - – C0978 = 19539 (C0472/19 to MFAIL-DC-SET)

4. Determine source for the activation of the mains failure control:
   – see chapter 7.4.39.1
5. Generate proportional gain and adaptation of the DC bus voltage controller:
   – C0974 = 1006 (FIXED100% to MFAIL-CONST)
   – C0973 = 1000 (FIXED0% to MFAIL-ADAPT)
6. Achieve restart protection
   – C0976 = 6100 (MFAIL-NOUT to MCTRL-NACT)
   – C0975 = 19538 (C0472/18 to MFAIL-THRESHLD)
   – First enter approx. 2 % under C0472/18 (reference: nmax C0011)
7. Connect reset input (here with terminal X5/E5 TRIP-RESET):
   – C0972 = 55 (DIGIN5 to MFAIL-RESET)
8. Enter all function blocks used (except for codes and digital inputs DIGIN) in free positions of the processing table in C0465.

Tip!

All settings must be saved non-volatile in a parameter set under C0003.

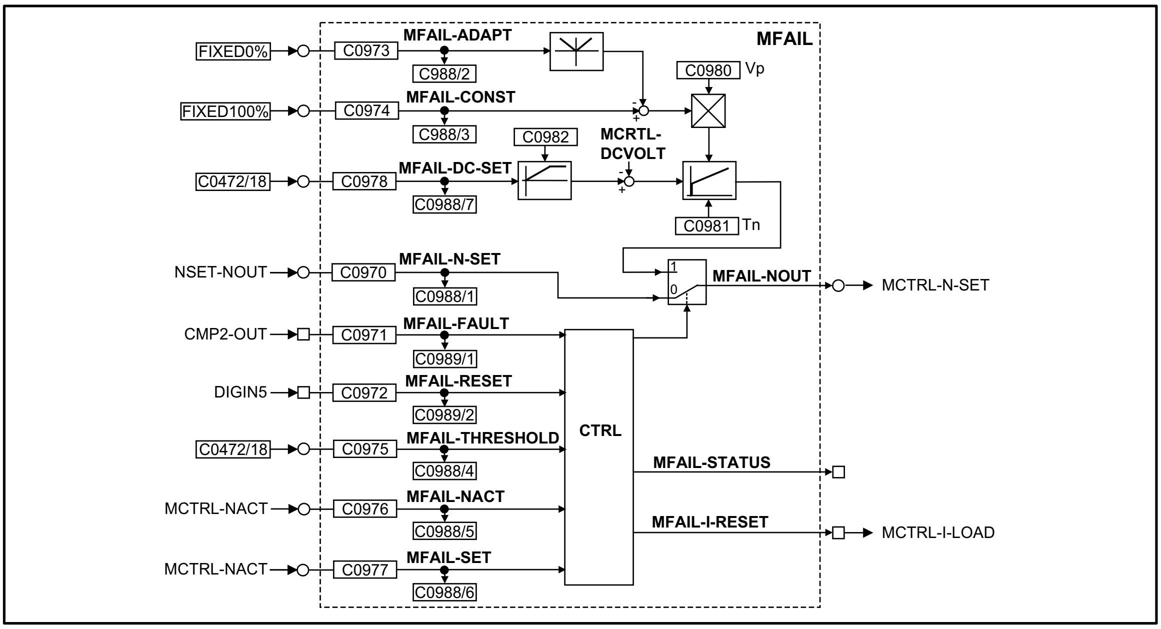


Abb. 7-120 Link for the basic configuration C0005 = 1000

Activation

- MFAIL-FAULT = HIGH activates the mains failure control.
- MFAIL-FAULT = LOW triggers a timing element. After the time set under C0983 has elapsed, the mains failure control is completed/canceled (see description of mains recovery, chapter 7.4.39.6).
  – The drive is accelerated to the speed setpoint if the restart protection is not active.
  – The drive is still braked to zero speed, if the restart protection is active (see description about the restart protection, Chapter 7.4.39.3).
  – If the restart protection is active, the drive can only be reset by a HIGH level signal at the MFAIL-RESET input.

Function

The controller gains the required energy from the rotational energy of the driven machine.The driven machine is braked via the power loss of the controller and the motor.The speed deceleration ramp is shorter than for an uncontrolled system (coasting drive).

With the activation,

- the DC bus voltage is controlled to the value at the MFAIL-DC-SET input.
- an internally generated speed setpoint is output at the MFAIL-N-OUT output. The drive can thus be braked to zero speed (via the speed setpoint).
  - The value at input MFAIL-SET is the start value for the controlled deceleration.This input is generally connected to the output MCTRL-NACT (actual speed) or MCTRL-NSET2, MFAIL-NOUT (speed setpoint).
  - The speed deceleration ramp (and thus the brake torque) results from the moment of inertia of the driven machine(s), the power loss, and the parameterization.

Stop!

- If a connected brake unit is activated, the drive is braked with the maximum possible torque (Imax).In this case, it may be necessary to adapt the parameterization (see description of the parameterization).
- If the power stage is not supplied, the drive cannot generate a standstill torque (important for active loads such as hoists).

Parameter setting

The parameters to be set, depend strongly on the motor used, the inertia of the driven machine and the drive configuration (single drive, drive network, master - slave operation, etc.). This function must therefore be adapted to the individual application in every case.

The following specifications refer to Chapter 7.4.39.1

Important settings prior to the initial set-up:

1. Save the previous setting in a parameter set (e.g. parameter set 4)

Stop!

For internal voltage supply of the terminals (C0005 = xx1x) terminal X6/63 is used as a voltage source for external potentiometers.In this case, measure across terminals +UG, -UG.

---

2. Measure the DC bus voltage with an oscilloscope (channel 1)
   - with a suitable voltage divider across terminals +UG, -UG. or
   - by providing the DC bus voltage e.g. at terminal X6/62. For this ,set C0436 = 5005 (MCTRL-DCVOLT). 1 V at terminal X6/63 = 100 V at +UG, -UG.
3. Measure the speed with an oscilloscope (channel 2)
   - by supplying the speed on terminal X6/62 for instance (standard setting). For this, set C0431 = 5001 (MCTRL-NACT). 10 V at terminal X6/62 = nmax (C0011).
4. Provide the threshold for the mains failure detection in C0472/20.The provision depends on the setting in C0173.
   - Set the threshold approx. 50 V above the threshold LU (example for C0173 = 0,1; C0472/20 = 48 % ≙ 480 V).

Mains voltage range	C0173 =	Switch-off threshold LU	Switch-on threshold LU	Switch-off threshold OU	Switch-on threshold OU
< 400 V	0	285 V	430 V	770 V	755 V
400 V	1	285 V	430 V	770 V	755 V

Mains voltage range	**C0173 =**	**Switch-off threshold LU**	**Switch-on threshold LU**	**Switch-off threshold OU**	**Switch-on threshold OU**
400 V ... 460 V	2	328 V	473 V	770 V	755 V
480 V without brake chopper	3	342 V	487 V	770 V	755 V
Operation with brake chopper (up to 480 V)	4	342 V	487 V	800 V	785 V

Stop!

This setpoint must be below the threshold of any brake unit which may be connected.If a connected brake unit is activated, the drive is braked with the maximum possible torque (Imax). The desired operating behaviour is lost.

5. Set the setpoint on which the DC bus voltage is to be controlled:
   – Set the setpoint to approx. 700 V (C0472/18 = 70 %).

Commissioning

The commissioning should be carried out with motors without load.

1. The drive can be started with a LOW-HIGH edge at X5/E5.
2. Set the acceleration time Tir:
   – Set speed setpoint to 100%, operate controller with maximum speed.
   – Inhibit controller via terminal X5/28 (you can also use any other controller inhibit source, CINH) and measure deceleration time until standstill.
   – Set approx. 1/10 of the deceleration time in C0982.
3. Setting the retrigger time

- In case of mains failure detection by detecting the DC bus voltage level:
  – Set measured deceleration time from item 2. under C0983.
- In case of mains failure detection via an external system (e.g. supply module 934X):
  – Under C0983, set the time in which the drive is to be continued to be braked in a controlled way for short-term mains recovery.

4. Switch off supply voltage (mains or DC bus).

The oscilloscope should display thje following characteristic:

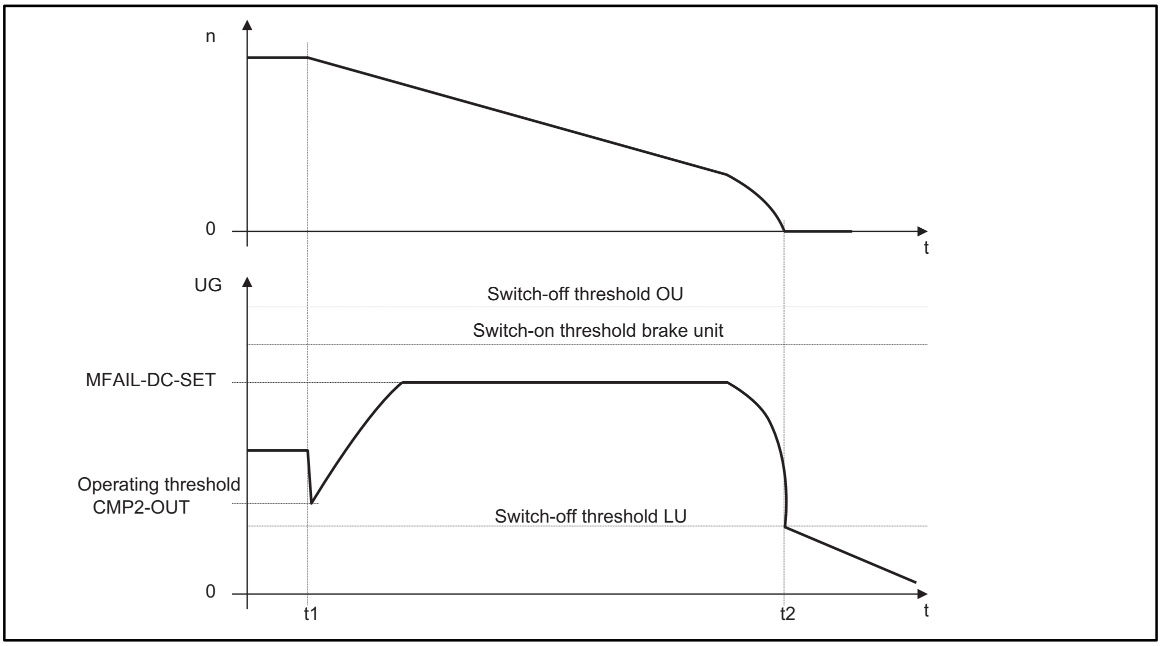


Abb. 7-121 Schematic representation with activated mains failure control (ideal characteristic)

t1 Mains failure

t2 Zero speed reached

Fine setting

Repeat the following steps several times.

1. Obtain a very low final speed before the controller reaches the undervoltage threshold LU:
   - Increase the proportional gain MFAIL V_p (C0980).
   - Reduce the adjustment time MFAIL T_n (C0981).
2. Avoid activation of the brake unit or the overvoltage threshold:
   - Increase the adjustment time MFAIL T_n (C0981) until the characteristic in Abb. 7-121 is almost reached.
   - Reduce additionally the setpoint of the DC bus voltage at the input MFAIL-DC-SET (in the example C0472/19), if necessary.
3. Increase of the deceleration time or reduction of the brake torque (see Abb. 7-122) is only possible with restrictions:
   - An increase of the acceleration time MFAIL T_{ir} (C0982) reduces the initial brake torque and increases the deceleration time.
   - An increase of the adjustment time MFAIL T_n (C0981) reduces the brake torque and increases the deceleration time. If the adjustment times under C0981 are too long, the controller reaches the LU threshold before zero speed is reached. The drive is therefore no longer controlled.
4. Re-establish signal connections which may be used, to the outputs of the controller (terminals X6).

Tip!

All settings must be saved non-volatile in a parameter set under C003.

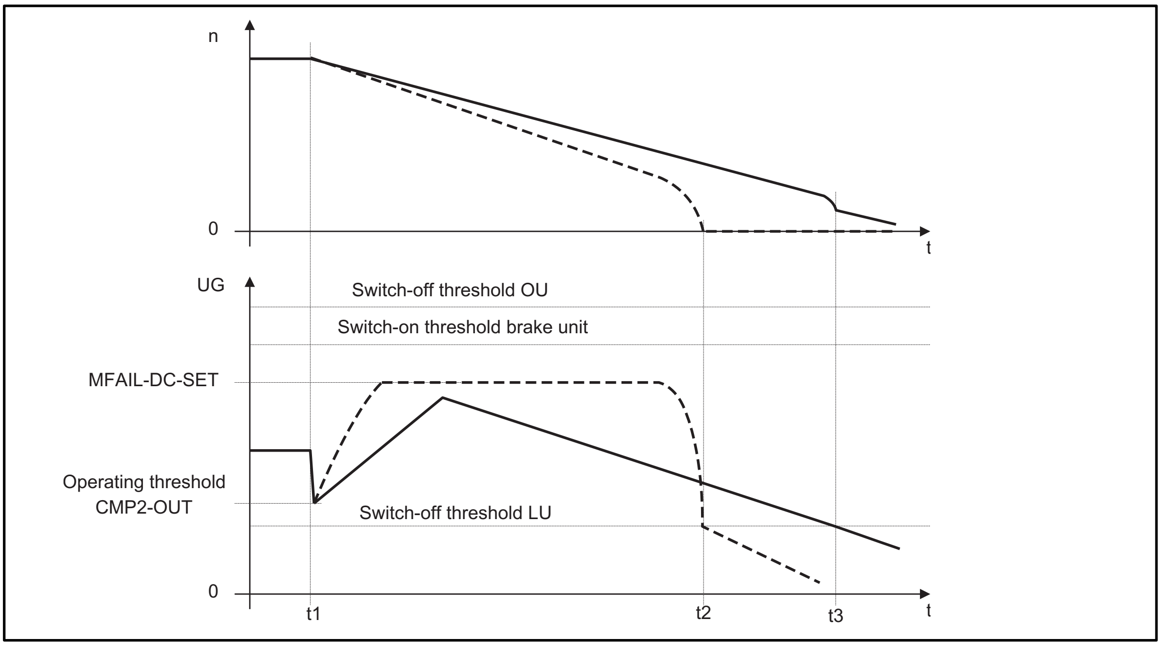


Abb. 7-122 Schematic with different brake torques

t = t1 Mains failure
t = t2 Zero speed with higher brake torque (short adjustment time)
t = t3 Drive reaches the LU switch-off threshold with lower brake torque (high adjustment time), without reaching zero speed
t > t3 Drive is no longer controlled (is braked by friction)

7.4.39.3 Restart protection

The integrated restart protection is to avoid a restart in the lower speed range, after the supply voltage was interrupted for a short time only (mains recovery before the drive has come to standstill).

- For establishing the restart protection see item 6. in chapter 7.4.39.2.
- Under C0472/18, enter the threshold in [%] if nmax (C0011) below which no automatic start is wished after mains recovery.
  - Speed after mains recovery < threshold in C0472/18: Drive is still braked in a controlled way.This function can only be completed by MFAIL-RESET = HIGH.
  - Speed after mains recovery > threshold in C0472/18 Drive accelerates to its setpoint along the set ramps.
- The function is deactivated by:
  - C0472/18 = 0 % or
  - C0975 = 1000 (FIXED0% to MFAIL-THRESHLD)
- Reset with MFAIL-RESET = HIGH
  - is required after every mains connection
  - is displayed by MFAIL-STATUS = HIGH, if MFAIL-FAULT = LOW

7.4.39.4 Reset of the mains failure control

- The mains failure control is reset with MFAIL-RESET = HIGH (in the example with terminal X5/E5).
- The reset pulse is always required if:
  - the restart protection is active.
  - the restart protection is used and the supply (mains or DC supply) was switched on.

7.4.39.5 Dynamic adaptation of the control parameters

In special cases, a dynamic modification of the proportional gain may be useful.For this, two inputs (MFAIL-CONST and MFAIL-ADAPT) are available at the function block MFAIL. The resulting proportional gain results from:

$$V_p = C0980 \cdot \frac{\text{MFAIL-CONST} - |\text{MFAIL-ADAPT}|}{100\ \%}$$

7.4.39.6 Fast mains recovery (KU)

The fast mains recovery causes a restart of the controller unless the restart protection is active.The drive accelerates to its setpoint.If this is not wanted, the restart can be delayed via the retrigger time C0983, or avoided together with the restart protection.

A fast mains recovery occurs:

- due to the system, the mains recovery is indicated by the mains failure detection via the level of the DC bus voltage (see Chapter 7.4.39.1).
- because of a ”short interrupt” (KU) of the utility company (e.g. in case of thunderstorms).
- because of faulty components in the supply cables (e.g. slip rings)

Set the retrigger time C0983 higher than the measured deceleration time during braking.

7.4.39.7 Application example

Drive network with digital frequency coupling

Stop!

In drive networks which are connected via pulse trains (a master and one or more slaves):

- the mains failure detection may only be activated for the master.
  – the mains failure control must be integrated correspondingly into the signal flow.
- All controllers must be operated in the DC bus connection via the terminals +UG, -UG.Observe the specifications in the chapter “Dimensioning”.

Tip!

Further information and predefined configurations can be obtained from Lenze.

7.4.40 Motor potentiometer (MPOT)

Purpose

The FB replaces a hardware motor potentiometer.

The motor potentiometer is used as an alternative setpoint source which is triggered by two terminals.

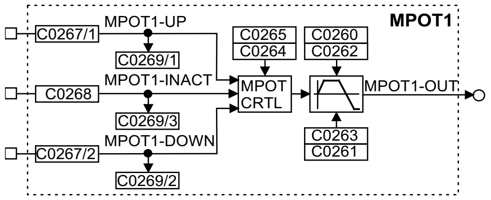


Abb. 7-123 Motor potentiometer (MPOT1)

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
MPOT1-UP	d	C0269/1	bin	C0267/1	2	1000	-
MPOT1-INACT	d	C0269/3	bin	C0268	2	1000	-
MPOT1-DOWN	d	C0269/2	bin	C0267/2	2	1000	-
MPOT1-OUT	a	-	-	-	-		-

Function

Control of the motor potentiometer:

- MPOT1-UP = HIGH
  – The motor potentiometer approaches its upper limit.
- MPOT1-DOWN = HIGH
  – The motor potentiometer approaches its lower limit.
- MPOT1-UP = LOW and MPOT1-DOWN = LOW or
  MPOT1-UP = HIGH and MPOT1-DOWN = HIGH:
  – The motor potentiometer does not change its output signal.

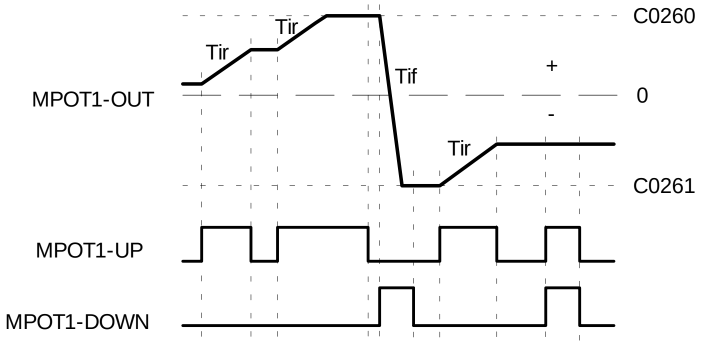


Abb. 7-124 Control signals of the motor potentiometer

Another digital input (MPOT1-INACT) exists apart from the two digital inputs MPOT1-UP and MPOT1-DOWN. The motor potentiometer function can be activated or deactivated with the input MPOT1-INACT. Logic 1 at this input activates the motor potentiometer function. The input MPOT1-INACT has priority over the inputs MPOT1-UP and MPOT1-DOWN.

When the motor potentiometer is deactivated, the motor potentiometer output (MPOT1-OUT) follows the function set under C0264. Under C0264, you can set the following functions:

C0264 =	**Meaning**
0	No further action; the output MPOT1-OUT keeps its value
1	The motor potentiometer returns to 0 % with the corresponding deceleration time
2	The motor potentiometer approaches its lower limit (C0261) with the corresponding deceleration time
3	The motor potentiometer immediately changes its output to 0%. **(important for emergency stop function)**
4	The motor potentiometer immediately changes its output to the lower limit (C02619
5	The motor potentiometer approaches its upper limit (C0260) with the corresponding acceleration time

If the motor potentiometer is activated (input MPOT1-INACT = 0), the subsequent function depends on

- the momentary output signal,
- the set limits of the MPOT
- the control signals UP and DOWN.

If the output value is out of the limits, the MPOT approaches the next limt with the set T_i times. This function is independent of the control inputs MPOT1-UP and MPOT1-DOWN

If the output value is within the limits, the output follows the selected control function UP, DOWN or no action.

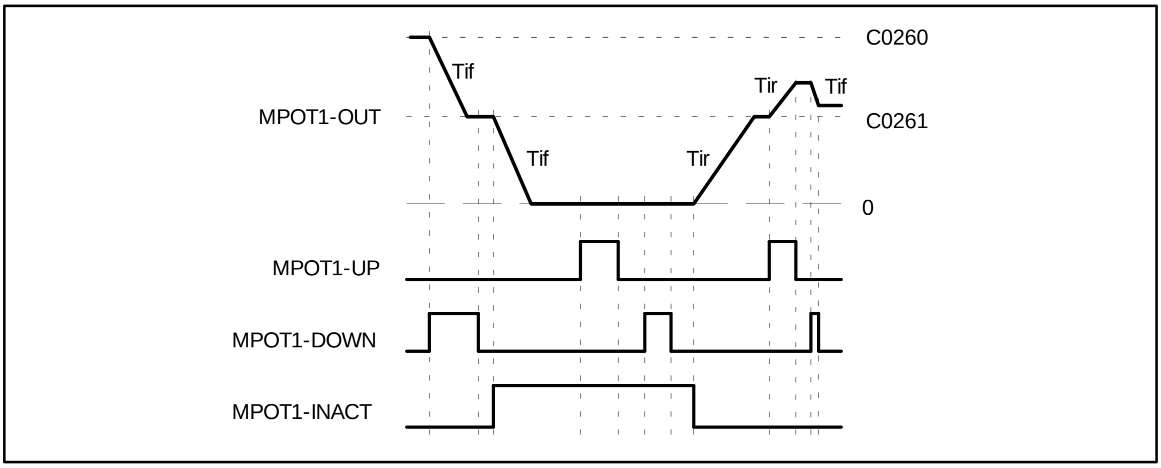


Abb. 7-125 Deactivation of the motor pot via the input MPOT1-INACT

Initialization

With this function, the output value MPOT can be saved non-volatile in the internal memory of the device. The values is saved automatically if this function was selected under the code. The values is then restored to the MPOT after mains connection.

You can activate other initialization functions under C0265 (see code table).

If the initialization is completed, the MPOT follows the applied control function.

7.4.41 Logic NOT (NOT)

Purpose

Logic inversion of digital signals. The inversion can be used for the control of functions or the generation of status information.

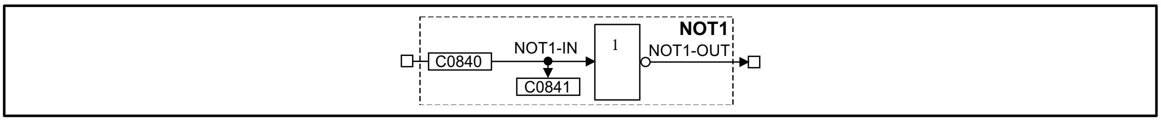


Abb. 7-126 Logic NOT

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
NOT1-IN	d	C0841	bin	C0840	2	1000	-
NOT1-OUT	d	-	-	-	-	-	-

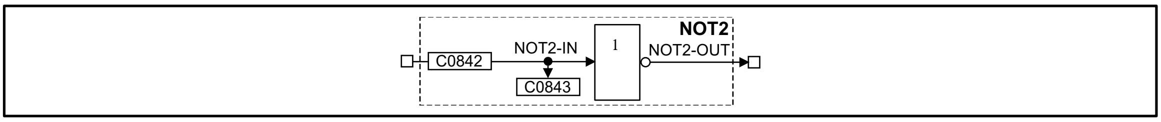


Abb. 7-127 Logic NOT (NOT2)

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
NOT2-IN	d	C0843	bin	C0842	2	1000	-
NOT2-OUT	d	-	-	-	-	-	-

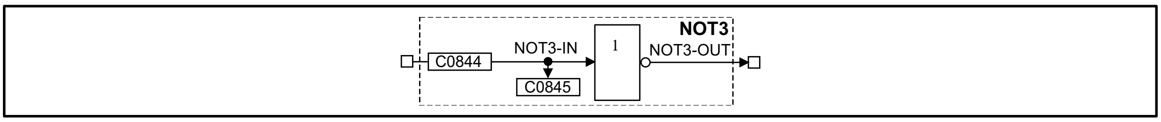


Abb. 7-128 Logic NOT (NOT3)

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
NOT3-IN	d	C0845	bin	C0844	2	1000	-
NOT3-OUT	d	-	-	-	-	-	-

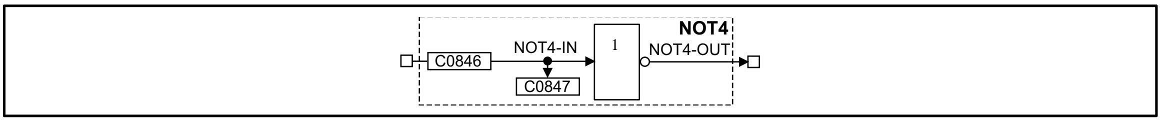


Abb. 7-129 Logic NOT (NOT4)

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
NOT4-IN	d	C0847	bin	C0846	2	1000	-
NOT4-OUT	d	-	-	-	-	-	-

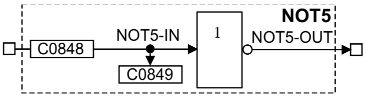


Abb. 7-130 Logic NOT (NOT5)

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
NOT5-IN	d	C0849	bin	C0848	2	1000	-
NOT5-OUT	d	-	-	-	-	-	-

Function

NOTx-IN1	NOTx-OUT
0	1
1	0

The function corresponds to a change from a normally-open contact to a normally-closed contact in a control with contactors.

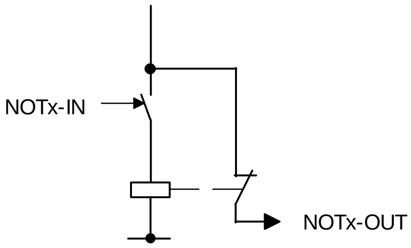


Abb. 7-131 Function of NOT as a change from a normally-open to a normally-closed contact

7.4.42 Conditioning of the setpoint speed (NSET)

Purpose

This FB conditions the

- main setpoint speed and
- and additional setpoint (or other signals)

for the subsequent control structure via ramp generator or fixed speeds.

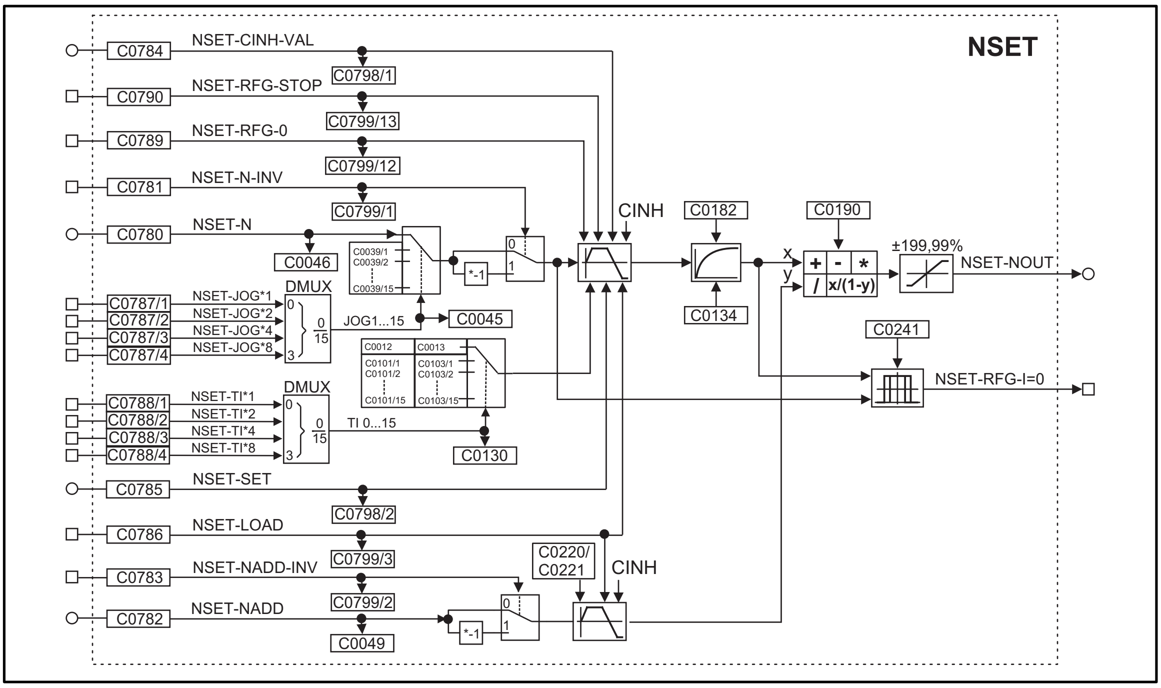


Abb. 7-132 Conditioning of the setpoint speed (NSET)

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
NSET-N	a	C0046	dec [%]	C0780	1	50	Provided for main setpoint; other signals are permissible
NSET-NADD	a	C0047	dec [%]	C0782	1	5650	Provided for additional setpoint; other signals are permissible
NSET-JOG*1	d	C0799/4	bin	C0787/1	2	53	Selection and control of overriding "fixed setpoints" for the main setpoint
NSET-JOG*2	d	C0799/5	bin	C0787/2	2	1000	
NSET-JOG*4	d	C0799/6	bin	C0787/3	2	1000	
NSET-JOG*8	d	C0799/7	bin	C0787/4	2	1000	
NSET-TI*1	d	C0799/8	bin	C0788/1	2	1000	Selection and control of alternative "fixed setpoints" for the main setpoint
NSET-TI*2	d	C0799/9	bin	C0788/2	2	1000	
NSET-TI*4	d	C0799/10	bin	C0788/3	2	1000	
NSET-TI*8	d	C0799/11	bin	C0788/4	2	1000	
NSET-N-INV	d	C0799/1	bin	C0781	2	10251	Control of the signal inversion for the main setpoint
NSET-NADD-INV	d	C0799/2	bin	C0783	2	1000	Control of the signal inversion for the additional setpoint
NSET-RFG-0	d	C0799/12	bin	C0789	2	1000	The main setpoint integrator is led to zero via the momentary T_i times
NSET-RFG-STOP	d	C0799/13	bin	C0790	2	1000	Holding (freezing) of the main setpoint integrator to its momentary value
NSET-CINH-VAL	a	C0798/1	dec [%]	C0784	1	5001	The signal is generated which the main setpoint integrator is to be accepted when the controller is inhibited
NSET-SET	a	C0798/2	dec [%]	C0785	1	5000	The signal is generated which the main setpoint integrator is to be accepted when the NSET-LOAD input is set
NSET-LOAD	d	C0799/3	bin	C0786	2	5001	Control of the two ramp generators in special situations e.g. QSP
NSET-OUT	a	-	-	-	-	-	-
NSET-RFG-I=0	d	-	-	-	-	-	-

Function

- Main setpoint channel
- JOG setpoints
- Setpoint inversion
- S ramp

7.4.42.1 Main setpoint channel

- The signals in the main setpoint channel are limited to the range of ±199.99 %.
- The signal at input NSET-N is led via the function JOG selection.
- The JOG function has priority over the setpoint input NSET-N. This means a selected JOG value switches the input to inactive. The following signal conditioning uses the JOG value instead.

7.4.42.2 JOG setpoints

- These are fixed values which are saved in the memory.
- JOG values can be called from the memory via the inputs NSET-JOG*x.
- The inputs NSET-JOG*x are binary coded so that 15 JOG values can be called.
- The decoding for the enabling of the JOG values (calling from the memory) is carried out according to the following table:

Output signal	**1st input NSET-JOG*1**	**Input NSET-JOG*2**	**3rd input NSET-JOG*4**	**4th input NSET-JOG*8**
NSET-N	0	0	0	0
JOG 1	1	0	0	0
JOG 2	0	1	0	0
JOG 3	1	1	0	0
JOG 4	0	0	1	0
JOG 5	1	0	1	0
JOG 6	0	1	1	0
JOG 7	1	1	1	0
JOG 8	0	0	0	1
JOG 9	1	0	0	1
JOG 10	0	1	0	1
JOG 11	1	1	0	1
JOG 12	0	0	1	1
JOG 13	1	0	1	1
JOG 14	0	1	1	1
JOG 15	1	1	1	1

- If all inputs are assigned with 0, the input NSET-N is active.
- The number of inputs which you must assign, depends on the number of the required JOG setpoints. A maximum of four inputs and thus 15 possibilities can be selected. The digital signal source is assigned under C0787 and the corresponding subcode.

Number of the required JOG setpoints	**Number of the inputs to be assigned**
1	at least 1
1 ... 3	at least 2
4 ... 7	at least 3
8 ... 15	4

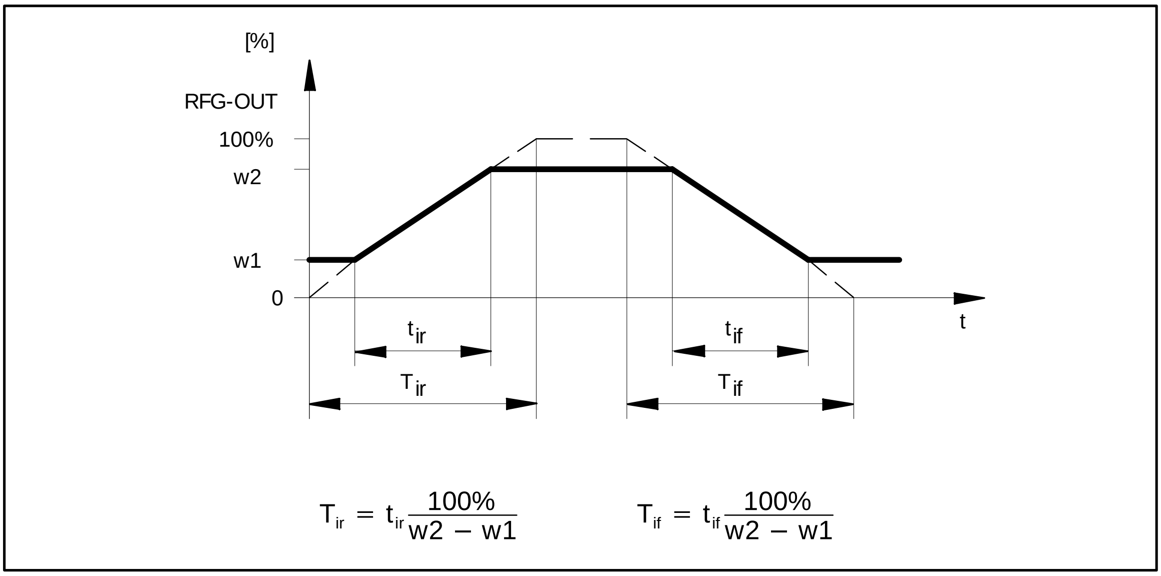
7.4.42.3 Setpoint inversion

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

The sign of the setpoint is inverted if the input NSET-N-INV is triggered with a HIGH signal.

Ramp generator for the main setpoint

The setpoint is then led via a ramp generator with linear characterisitc. Setpoint step-changes are thus transformed into a ramp.



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

Abb. 7-133 Acceleration and deceleration times of the ramp generator

- The ramps can be adjusted separately for acceleration and deceleration.
  - – 16 acceleration and deceleration times can be switched active via the inputs NSET-TI*x (for table and function see JOG setpoints; they are decoded according to the signal graphic).
  - – The T_i times can only be activated in pairs.
- The controller inhibit (CINH) is set, the ramp generator accepts the value which was applied at the input NSET-CINH-VAL and transmits it to the next function. This function has priority over all other functions.
- NSET-RFG-STOP = HIGH
  - – The ramp generator is stopped. Changes at the input of the ramp generator have no effect on the output.
- NSET-RFG-0 = HIGH
  - – The ramp generator decelerates to zero along its deceleration ramp.
- It is also possible to load the ramp generator online with a defined value. For this, the input NSET-LOAD must be set to HIGH. As long as this input is set, the value at the input NSET-SET is accepted by the ramp generator and provided at the output.

Priorities:

CINH	NSET-LOAD	NSET-RFG-0	NSET-RFG-STOP	Function
0	0	0	0	RFG follows the input value via the set ramps
0	0	0	1	The value at the ouput of RFG is frozen
0	0	1	0	RFG decelerates to zero along the set deceleration ramp
0	0	1	1	
0	1	0	0	RFG accepts the value applied at the input NSET-SET and provides it to its output
0	1	0	1	
0	1	1	0	
0	1	1	1	
1	0	0	0	RFG accepts the value applied at the input NSET-CINH-VAL and provides it to its output
1	0	0	1	
1	0	1	0	
1	0	1	1	
1	1	0	0	
1	1	0	1	
1	1	1	0	
1	1	1	1	

7.4.42.4 S ramp

A PT1 element is connected to the linear ramp generator. This arrangement implements an S ramp for an almost jerk-free acceleration and deceleration.

- The PT1 element is connected and disconnected by C0134.
- The time constant is set under C0182.

7.4.42.5 Arithmetic operation

The output value is led to an arithmetic module. This module links the main setpoint and the additional setpoint arithmetically. The arithmetic operation is selected under C0190 (see table below).

C0190	Function	Example
0	Output = X (Y is not processed)	-
1	Output = X + Y	100 % = 50 % + 50 %
2	Output = X - Y	50 % = 100 % - 50%
3	Output = X * Y	100 % = 100 % * 100%
4	Output = X/|Y|	1 % = 100 % / 100%
5	Output = X/(100% - Y)	200 % = 100 % / (100 % - 50 %)

7.4.42.6 Additional setpoint

- An additional setpoint (e.g. a correction signal) can be linked to the main setpoint via the input NSET-NADD.
- The input signal can be inverted via the input NSET-NADD-INV, before it has an effect on the ramp generator. The ramp generator has a linear characteristic with one acceleration and one deceleration time.
- When NSET-LOAD = HIGH the ramp generator is set to zero and held there without considering the T_i times. The same applies when controller inhibit is set.

7.4.43 OR operation (OR)

Purpose

Logic OR operation of digital signals. The operations can be used for the control of functions or the generation of status information.

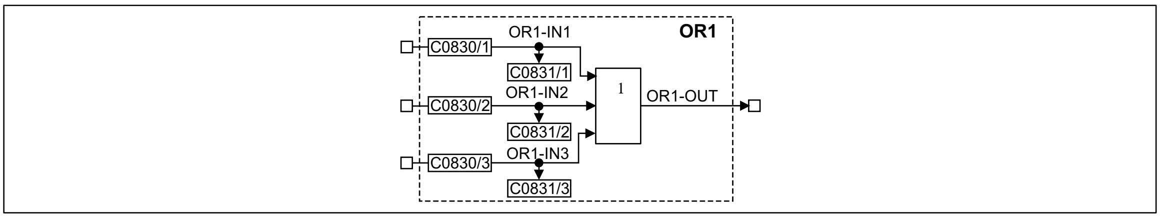


Abb. 7-134 OR operation

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
OR1-IN1	d	C0831/1	bin	C0830/1	2	1000	-
OR1-IN2	d	C0831/2	bin	C0830/2	2	1000	-
OR1-IN3	d	C0831/3	bin	C0830/3	2	1000	-
OR1-OUT	d	-	-	-	-	-	-

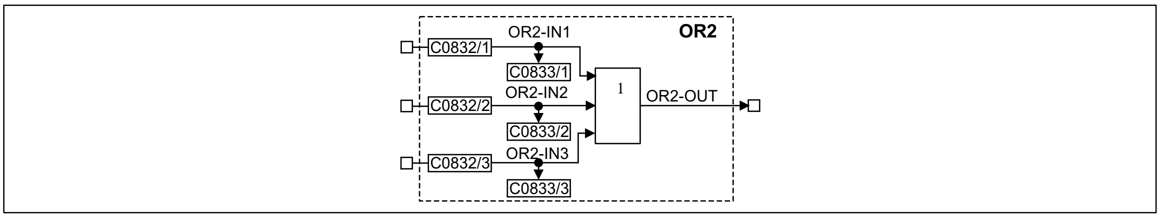


Abb. 7-135 OR operation (OR2)

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
OR2-IN1	d	C0833/1	bin	C0832/1	2	1000	-
OR2-IN2	d	C0833/2	bin	C0832/2	2	1000	-
OR2-IN	d	C0833/3	bin	C0832/3	2	1000	-
OR2-OUT	d	-	-	-	-	-	-

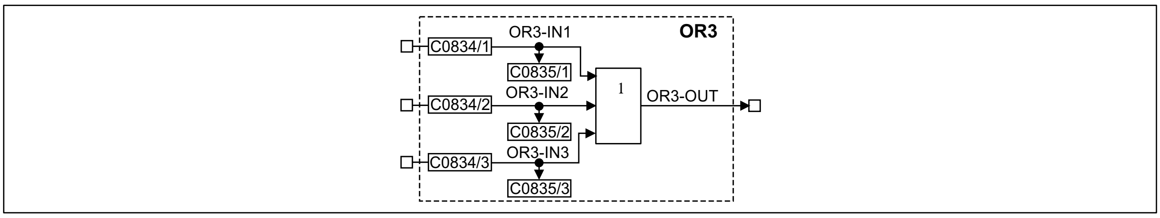


Abb. 7-136 OR operation (OR3)

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
OR3-IN1	d	C0835/1	bin	C0834/1	2	1000	-
OR3-IN2	d	C0835/2	bin	C0834/2	2	1000	-
OR3-IN3	d	C0835/3	bin	C0834/3	2	1000	-
OR3-OUT	d	-	-	-	-	-	-

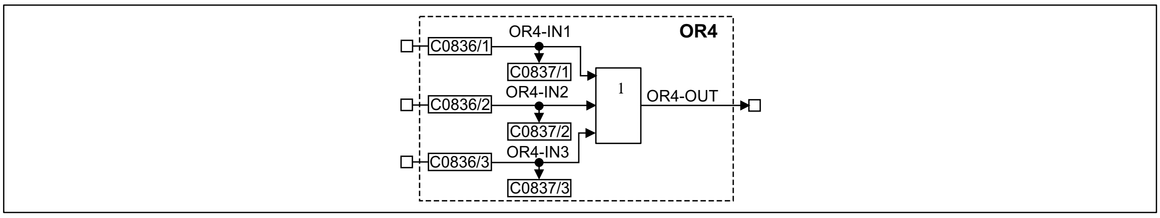


Abb. 7-137 OR operation (OR4)

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
OR4-IN1	d	C0837/1	bin	C0826/1	2	1000	-
OR4-IN2	d	C0837/2	bin	C0826/2	2	1000	-
OR4-IN3	d	C0837/3	bin	C0826/3	2	1000	-
OR4-OUT	d	-	-	-	-	-	-

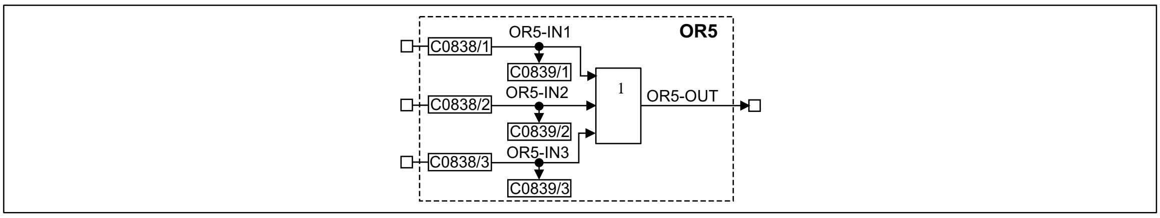


Abb. 7-138 OR operation (OR5)

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
OR5-IN1	d	C0839/1	bin	C0828/1	2	1000	-
OR5-IN2	d	C0839/2	bin	C0828/2	2	1000	-
OR5-IN3	d	C0839/3	bin	C0828/3	2	1000	-
OR5-OUT	d	-	-	-	-	-	-

Function

ORx-IN1	ORx-IN2	ORx-IN3	ORx-OUT
0	0	0	0
1	0	0	0
0	1	0	0
1	1	0	0
0	0	1	0
1	0	1	0
0	1	1	0
1	1	1	1

The function corresponds to a parallel connection of normally-open contacts in a contactor control.

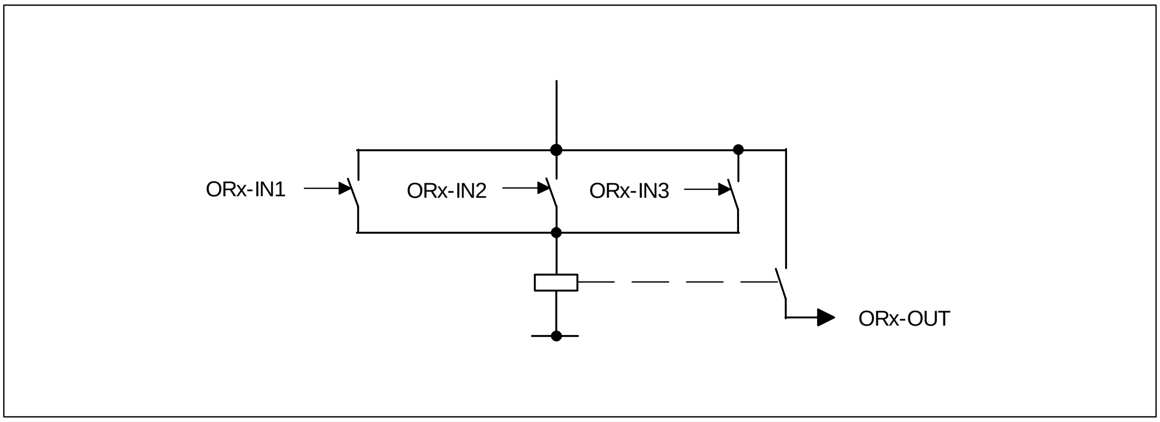


Abb. 7-139 Function of the OR operation as a parallel connection of normally-open contacts

Tip!

If only two inputs are required, use the inputs ORx-IN1 and ORx-IN2. Assign the input ORx-IN3 with the signal source FIXED0.

7.4.44 Oscilloscope function (OSZ)

Purpose

Detection of any measurement variables (e.g. setpoint speed, actual speed, torque, etc.) . They are visualized in Global Drive Control.

Supports the controller commissioning and trouble-shooting.

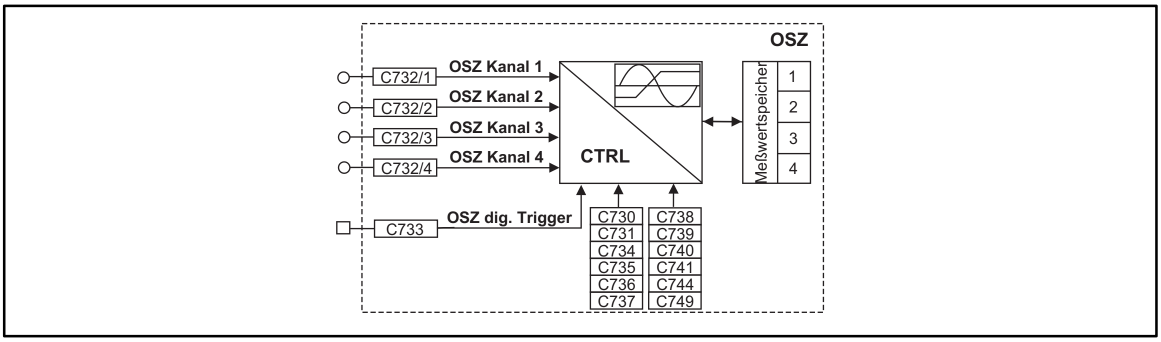


Abb. 7-140 Oscilloscope function (OSZ)

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
OSZ CHANNEL 1	a	-	-	C0732/1	1	-	-
OSZ CHANNEL 2	a	-	-	C0732/2	1	-	-
OSZ CHANNEL 3	a	-	-	C0732/3	1	-	-
OSZ CHANNEL 4	a	-	-	C0732/4	1	-	-
OSZ-DIG-TRIGGER	d	-	-	C0733/1	2	-	-

Function

The FB consists of three units:

- Trigger check
  – Monitoring of the digital trigger source for a valid trigger result
- Processing of the measured signal
  – Linking the measurement inputs
  – Calculation of the time
  – Monitoring of the analog trigger source for a valid trigger result
- Memory of the measured values
  – Scaling of the ring buffer memory
  – Filing of the measured data in the ring buffer memory
  – Saving of measured points for the reconstruction of the graphic

Description of the functions

Function	Code	Choice	Description
OSZ mode			Controls the measurement in the controller
	C0730	1	● Starts the recording of the measured values
		0	● Cancels a current measurement
OSZ status			Displays five different operating states
	C0731	1	● Measurement completed – The memory of the measured values is completely filled with data. The measured values can be called by the PC.
		2	● Measurement active – A measurement was started with C0730 = 1. The FB waits for a valid trigger result.
		3	● Trigger recognized – The FB has recognized a valid trigger result. Depending on the trigger delay, the saving of the measured data is not yet completed. It is completed automatically with the entry of the last memory unit.
		4	● Measurement cancelled – Cancelling of the current recording of the measured values (C0730 = 0). The memory of the measured values has been filled with data. The data can be called by the PC.
		5	● Read memory – A memory of the measured data is currently read. No setting is possible in this operating state.
Configuration OSZ channel 1 ... 4	C0732/1 to C0732/4		● Links the measurement channels of the FB with the signals of the process environment – Assignment of four measurement channels with any analog signals is possible. Enter the corresponding signal number in C0732/1 ... C0732/4. – Always start linking with channel 1, then channel 2 and so on. Unused channels are automatically assigned with the signal FIXED 0%.
Configuration OSZ trigger	C0733/1		Links the digital trigger input with a digital signal of the process environment – The trigger input can be assigned with any digital signal. Enter the corresponding signal number in C0733/1.
Trigger source			Determines the trigger source
	C0734	1	The source is one of the four measurement channels C0734/1 ... C0734/4
		0	The source is the digital trigger input (C0733/1)
Trigger level	C0735	-32767 ... 32767	● Determines the trigger level which the triggering releases when the threshold is exceeded. – The trigger level is monitored only when the triggering is done on one of the four channels. – The trigger level is not effective with digital triggering.
Trigger edge			Determines the trigger edge which causes the release of the triggering. ● Triggering on analog input channel – With a LOW-HIGH trigger edge, the analog trigger signal must exceed a defined trigger level to release the triggering. – With a HIGH-LOW trigger edge, the analog trigger signal must fall below a defined trigger level to release the triggering. ● Triggering on digital trigger input – With a LOW-HIGH trigger edge the digital trigger signal must change from LOW to HIGH to release the triggering. – With a HIGH-LOW trigger edge the digital trigger signal must change from HIGH to LOW to release the triggering. Abb. 7-141displays the triggering of an analog signal with positive edge.
	C0736	1	– HIGH-LOW trigger edge
		0	LOW-HIGH trigger edge

Function	Code	Choice	Description
Trigger delay			The trigger delay determines when the saving of the measured values is started, referring to the trigger time.
	C0737	-100.0 % ... 0 %	● Negative trigger delay (pre-triggering) – Defines a percentage of the complete memory content. This part of the memory content is filled with measured values **before** the triggering (see Abb. 7-142).
		0 % ... 999.9 %	● Positive trigger delay (post triggering) – Defines a percentage of the complete memory content. The measured values are saved **after** the triggering. The delay is defined by the part of this memory content (Abb. 7-141).
Scanning period	C0738	1 ms ... 10 min	● Setting the scanning period – The scanning period is the time between two measurements – The measurements are carried at the same time for all channels (e.g. a value is measured at the channel 1 at the same time as a value at channel 2, 3, or 4. – The scanning period can be set in steps of 1, 2 and 5.
Number of channels	C0739		Number of channels used for measurements
Read memory			The code is necessary if the GDC is not used for visualization.
	C0740/1	0 ... 16383	● Determines the start for the reading of the memory and thus enables the deliberate access to a memory block. – To read the memory part by part (e.g. read only the measured values of a channel or reading with reduced memory size), the start can be shifted.
	C0740/2	1	● Enable ”read memory” – Enables the access to the memory to read the data
		0	● Inhibit ”read memory” – Inhibits the access to the memory. The access must be inhibited after every reading the data
Information on the function block			Provides information on the function block
	C0741/1		Version of the function block (e.g.120: version 1.20)
	C0741/2		Data memory size (1024 ... 16384 byte)
	C0741/3		Data size of the measured values (1 byte / 2 bytes)
	C0741/4		Number of the available measurement channels (1 ... 4)
Memory size	C0744	0 ... 6	Set memory size of the data memory – Max. size of the data memory: 8192 measured values ≙ 16384 bytes (C0744 = 6) – Min. size of the data memory: 512 measured values ≙ 1024 bytes (C0744 = 0) – Change of the memory size from 512 ... 8192 measured values / step – An optimum adaptation of the memory size to the corresponding task reduces the data transmission time.
Information on saving			Information on saving the measured values in the memory The FB saves the data in a ring format. For the reconstruction of the signal sequence, the following three ”graphic points” are marked.
	C0749/1		Measured value no. of the time of cancelling
	C0749/2		Measured value no. of the time of triggering
	C0749/3		Measured values no. of the time of completion

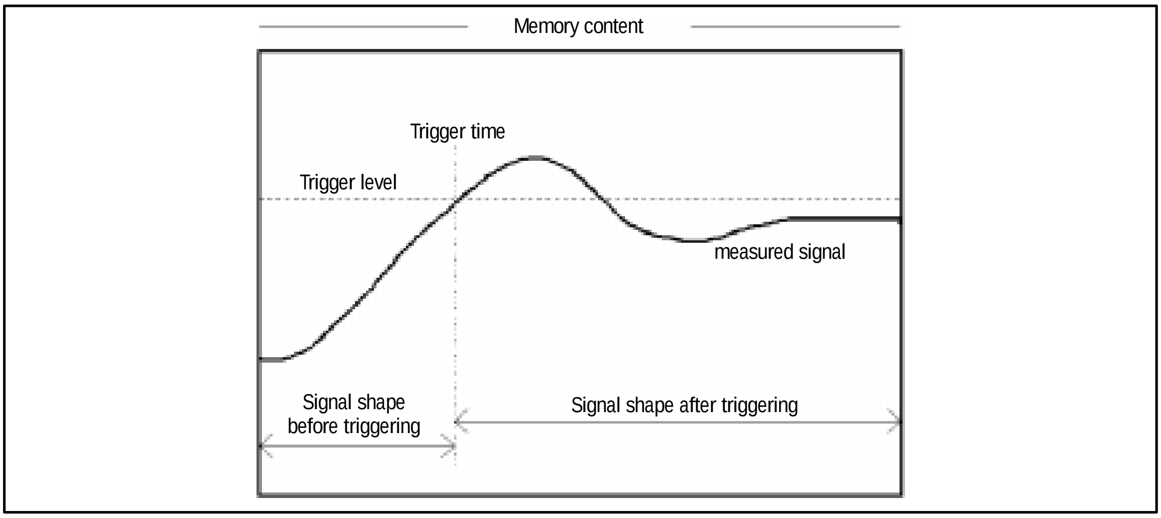


Abb. 7-141 Example: Trigger level and trigger delay with approx. -30 % post triggering

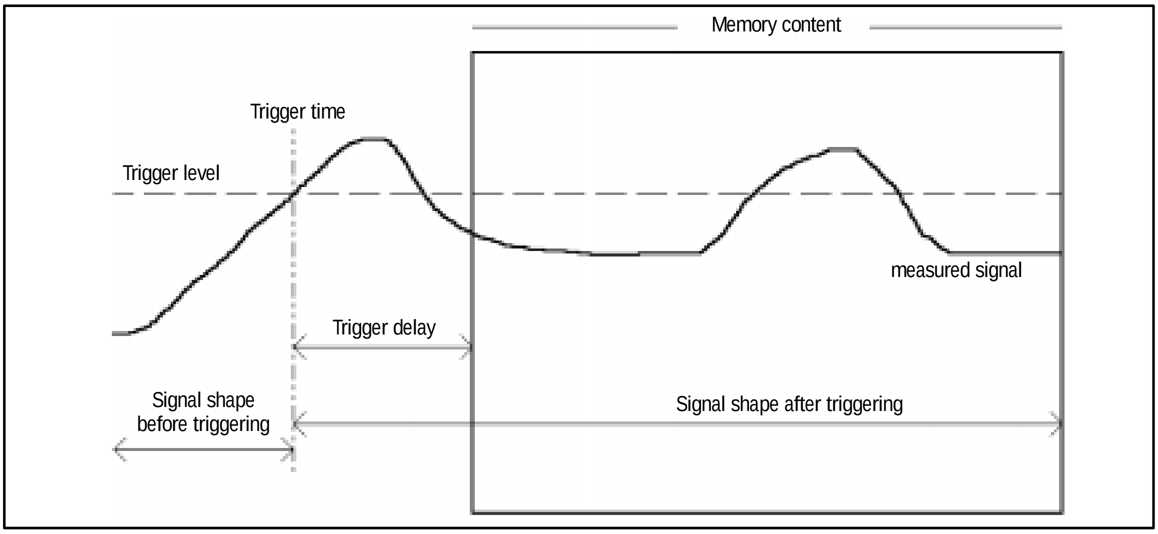


Abb. 7-142 Example: Trigger level and trigger delay with approx. -30% pre-triggering

7.4.45 Process controller (PCTRL1)

Purpose

The FB is used, for instance, as a higher-level controller (dancer position controller, tension controller, pressure controller etc.).

The control characteristic is according to the ideal PID algorithm, but it can also be changed over to a PI or P characteristic.

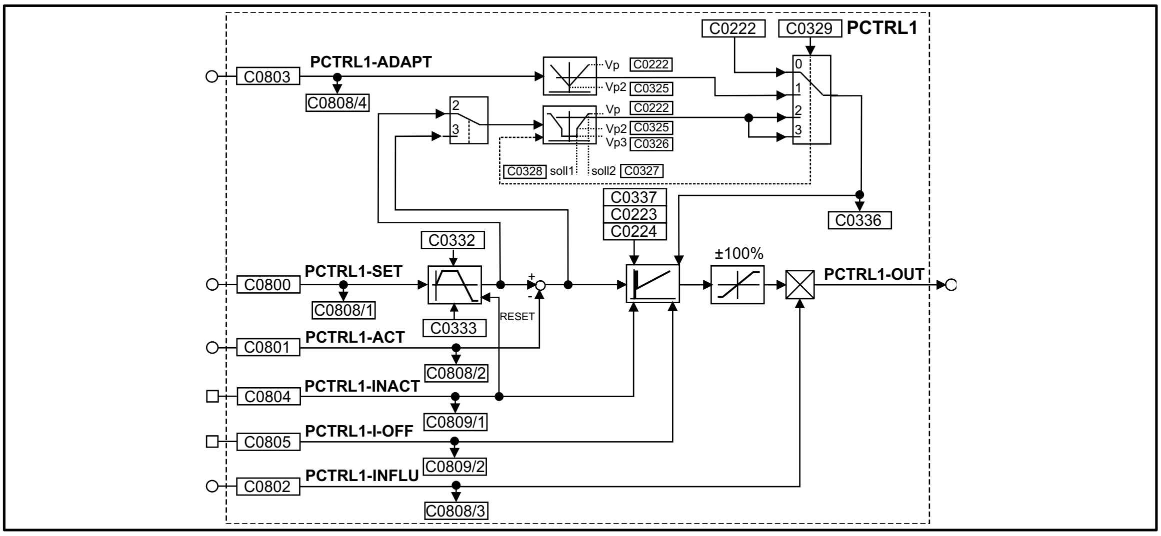


Abb. 7-143 Process controller (PCTRL1)

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
PCTRL1-SET	a	C0808/1	dec [%]	C0800	1	1000	Input of the process setpoint. Possible value range: ±200%. The time of step-change signals can be decelerated via the ramp generator (C0332 for the acceleration time; C0333 for the deceleration time).
PCTRL1-ACT	a	C0808/2	dec [%]	C0801	1	1000	Actual value input; value range ±200%
PCTRL1-INFLU	a	C0808/3	dec [%]	C0802	1	1000	Evaluation or suppression of the output signal; value range ±200%
PCTRL1-ADAPT	a	C0808/4	dec [%]	C0803	1	1000	Online change of the P gain; value range ±200%
PCTRL1-INACT	d	C0809/1	bin	C0804	2	1000	Online deactivation of the process controller
PCTRL1-I-OFF	d	C0809/2	bin	C0805	2	1000	Online setting of the I component to zero
PCTRL1-OUT	a	-	-	-	-	-	-

Function

Setpoint and actual value are sent to the process controller via the corresponding inputs and processed according to the selected control algorithm (control chararacteristic).

7.4.45.1 Control characteristic

- In the default setting, the PID algorithm is active.
- The D-component can be deactivated by setting code C0224 to zero. Thus, the controller becomes a PI-controller (or P-controller if the I-component is also switched off).
- The I-component can be switched on or off online via the PCTRL-I-OFF input. For this, the input is assigned a digital signal source (e.g. one of the freely assignable digital input terminals). If the I-component is to be switched off permanently, the input is assigned the signal source ”FIXED1”.
  - – PCTRL-I-OFF = HIGH switched off the I-component
  - – PCTRL-I-OFF = LOW switches on the I-component
- The adjustment time is parameterized via C0223.
- The P-gain can be set in different ways. The function for the provision of the P-gain is selected under C0329:
  - – C0329 = 0
    The P-gain is entered under C0222.
  - – C0329 = 1
    The P-gain is entered via the PCTRL-ADAPT input. The input value is led via a linear characteristic. The shape of the characteristic is set under C0222 (upper limit) and C0325 (lower limit). The value under C0222 is valid if the input value = +100 % or -100 %. The value under C0325 is valid if the input value = 0 %.

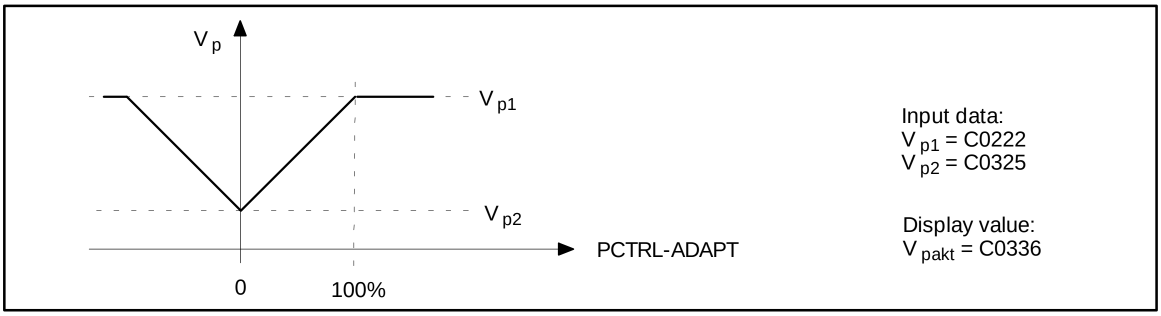


Abb. 7-144 Input of the P-gain via PCTRL-ADAPT input

  - – C0329 = 2
    The P-gain is derived from the process setpoint PCTRL-SET. The setpoint is obtained after the ramp generator and calculated via the characteristic with three coordinates.

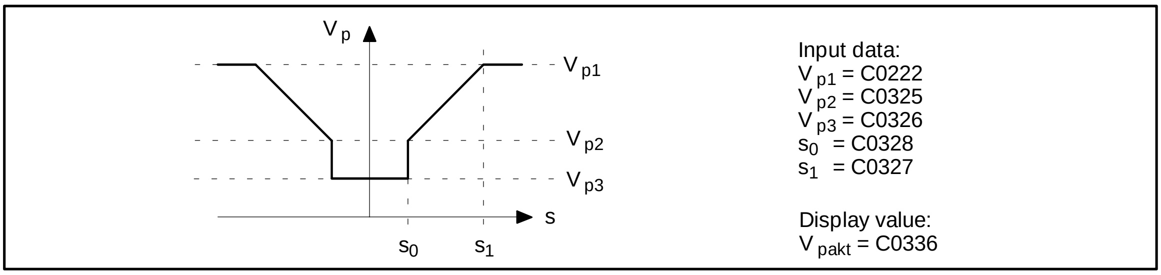
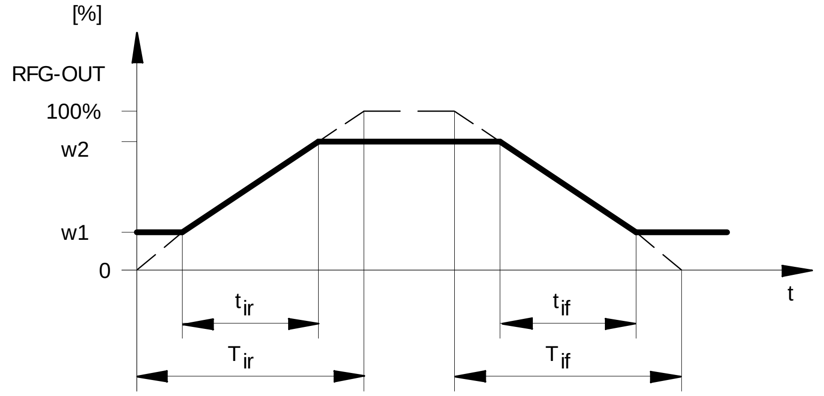


Abb. 7-145 Input of the P-gain derived from the PCTRL-SET process setpoint

  - – C0329 = 3
    The input of the P-gain is derived from the control difference and led by the characteristic generation as C0329 = 2.

7.4.45.2 Ramp generator

The setpoint PCTRL-SET is led by a ramp generator with linear characteristic.Thus, setpoint step-changes at the input can be transformed into a ramp.



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

Abb. 7-146 Acceleration and deceleration times of the ramp generator

- The ramps can be adjusted separately for acceleration and deceleration.
  - – Acceleration time t_{ir} with C0332.
  - – Deceleration time t_{if} with C0333.
- PCTRL-INACT = HIGH
  - – The ramp generator is immediately set to zero.

7.4.45.3 Value range of the output signal

- The process controller operates bipolar in the default setting.
  - – The output value is limited to ±100 %.
- The function can be set unipolar under C0337.
  - – The output value is limited to 0 ... +100 %.

7.4.45.4 Evaluation of the output signal

- The output signal can be evaluated after the limitation block via PCTRL-INFLU.
  - – The process controller can be used or suppressed with this evaluation.
  - – The calcuation is done according to the following formula:
    100 % (PCTRL-OUT) = 100 % * 100 % (PCTRL-INFLU).

7.4.45.5 Deactivation of the process controller

- PCTRL-INACT = HIGH deactivates the process controller
  - – PCTRL-OUT is set to zero.
  - – The I-component is set to zero.
  - – The ramp generator is set to zero.

7.4.46 Phase addition block (PHADD)

Purpose

Adds or subtracts phase signals, depending on the input used.

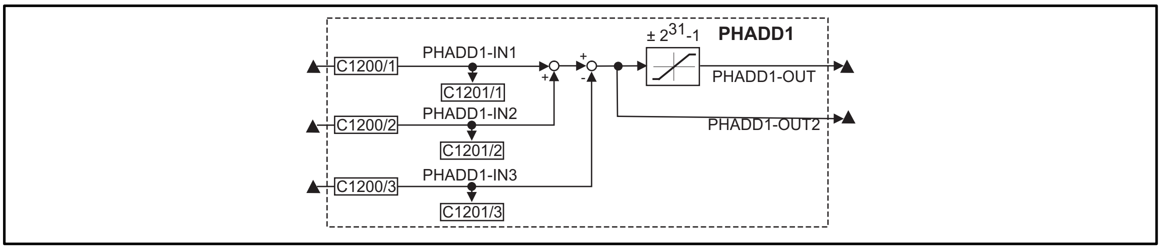


Abb. 7-147 Phase addition block (PHADD1)

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
PHADD1-IN1	ph	C1200/1	dec [inc]	C1201/1	3	1000	Adding input
PHADD1-IN2	ph	C1200/2	dec [inc]	C1201/2	3	1000	Adding input
PHADD1-IN3	ph	C1200/3	dec [inc]	C1201/3	3	1000	Subtracting input
PHADD1-OUT	ph	-	-	-	-	-	limited to ±2147483647
PHADD1-OUT2	ph	-	-	-	-	-	-

Function

- Input PHADD1-IN1 is added to the input PHADD1-IN2.
- The input PHADD-IN3 is subtracted from the calculated result.
- The result of the subtraction is then
  – limited to ±2147483647 and output to PHADD1-OUT.
  – output to PHADD1-OUT2 unlimited.

7.4.47 Phase comparator (PHCMP)

Purpose

Compares two phase signals (distances) with each other.

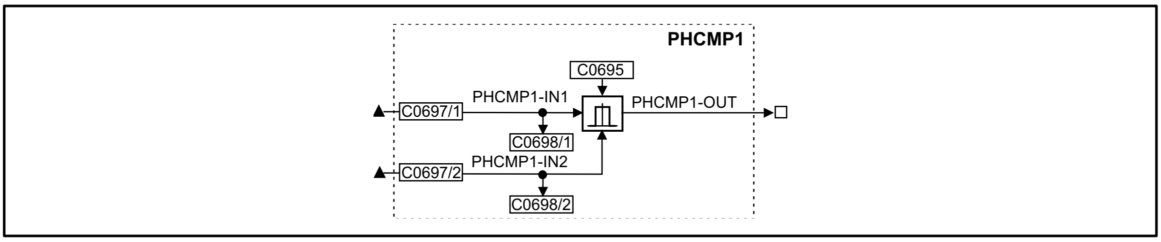


Abb. 7-148 Phase comparator (PHCMP1)

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
PHCOMP1-IN1	ph	C0698/1	dec [inc]	C0697/1	3	1000	Signal to be compared
PHCOMP1-IN2	ph	C0698/2	dec [inc]	C0697/2	3	1000	Comparison value
PHCOMP1-OUT	d	-	-	-	-	-	

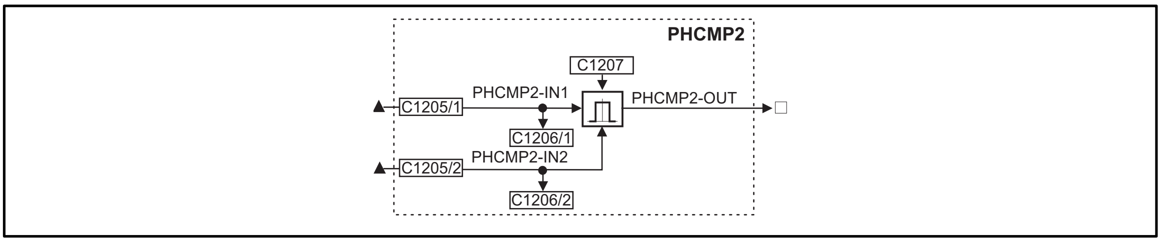


Abb. 7-149 Phase comparator (PHCMP2)

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
PHCOMP2-IN1	ph	C1206/1	dec [inc]	C1205/1	3	1000	Signal to be compared
PHCOMP2-IN2	ph	C1206/2	dec [inc]	C1205/2	3	1000	Comparison value
PHCOMP2-OUT	d	-	-	-	-	-	

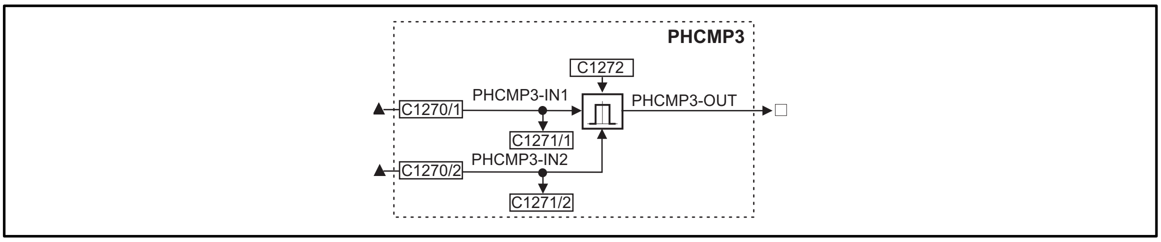


Abb. 7-150 Phase comparator (PHCMP3)

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
PHCOMP3-IN1	ph	C1271/1	dec [inc]	C1270/1	3	1000	Signal to be compared
PHCOMP3-IN2	ph	C1271/2	dec [inc]	C1270/2	3	1000	Comparison value
PHCOMP3-OUT	d	-	-	-	-	-	

Function

Function block	Code	Function	Note
PHCMP1	C0695 = 0	• When PHCMPx-IN1 > PHCMPx-IN2 – PHCMPx-OUT = HIGH • When PHCMPx-IN1 ≤ PHCMPx-IN2 – PHCMPx-OUT = LOW	
PHCMP2	C1207 = 0		
PHCMP3	C1272 = 0		
PHCMP1	C0695 = 1	• When | PHCMPx-IN1 | > | PHCMPx-IN2 | – PHCMPx-OUT = HIGH • When | PHCMPx-IN1 | ≤ | PHCMPx-IN2 | – PHCMPx-OUT = LOW	Compares the absolute value of the inputs
PHCMP2	C1207 = 1		
PHCMP3	C1272 = 1		

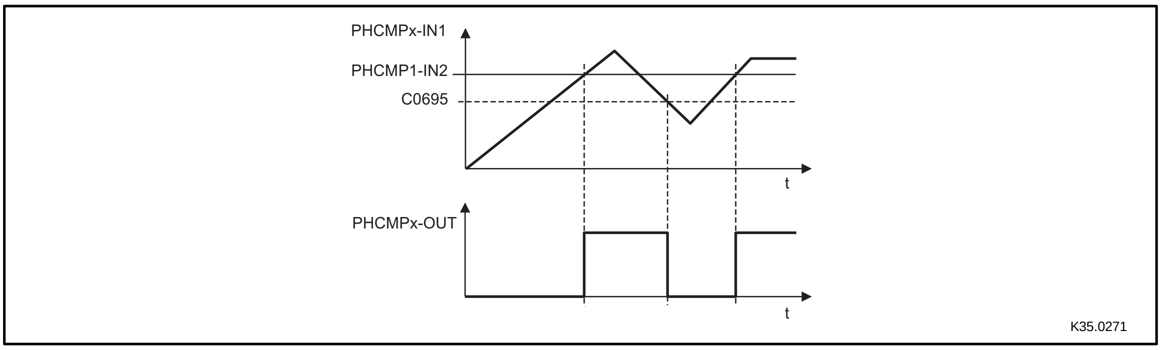


Abb. 7-151 Representation of the function using the example of PHCMP1

7.4.48 Actual phase integrator (PHDIFF)

Purpose

Deliberate addition of a phase signal to the setpoint phase.

A comparison between setpoint and actual phase signals is also possible.

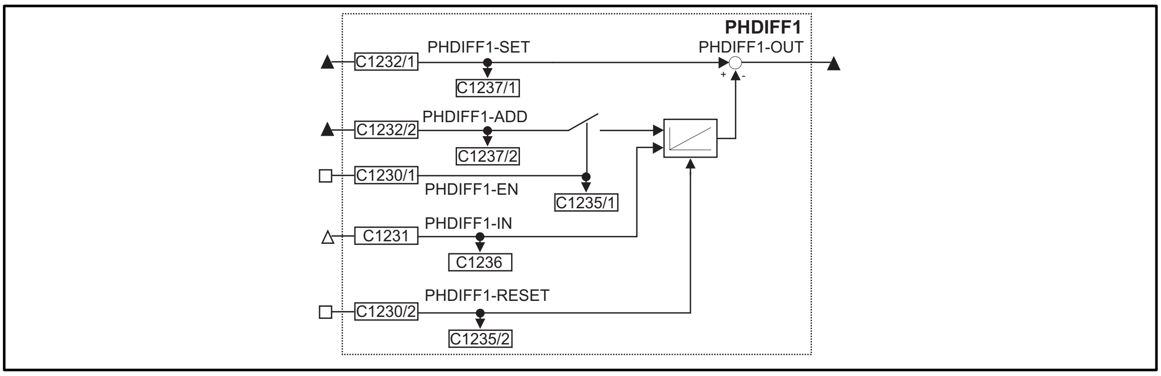


Abb. 7-152 Actual phase integrator (PHDIFF1)

Signal				Source		Note
Name	Type	DIS	DIS format	CFG	List	
PHDIFF1-IN	phd	C1236	dec [rpm]	C1231	4	-
PHDIFF1-SET	ph	C1237/1	dec [inc]	C1232/1	3	-
PHDIFF1-ADD	ph	C1237/2	dec [inc]	C1232/2	3	-
PHDIFF1-EN	d	C1235/1	bin	C1230/1	2	-
PHDIFF1-RESET	d	C1235/2	bin	C1230/2	2	HIGH = sets the actual phase integrator = 0
PHDIFF1-OUT	ph	-	-	-	-	without limitation

Function

C1230/1 = HIGH

- The speed signal at PHDIFF1-IN is integrated by the actual phase integrator.
- The phase signal at PHDIFF1-ADD is integrated to the integrated speed signal.
- The result of the actual phase integrator is subtracted from the phase signal at PHDIFF1-SET.

C1230/1 = LOW

- The speed signal at PHDIFF1-IN is integrated by the actual phase integrator.
- The result of the actual phase integrator is subtracted from the phase signal at PHDIFF1-SET.

7.4.49 Signal adaptation for phase signals (PHDIV)

Purpose

Division or multiplication of phase signals as a power of two.

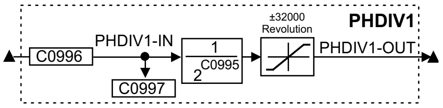


Abb. 7-153 Signal adaptation for phase signals (PHDIV1)

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
PHDIV1-IN	ph	C0997	dec [inc]	C0996	3	1000	
PHDIV1-OUT	ph	-	-	-	-	-	65536 inc = one encoder revolution

Function

- Arithmetic function:

$$\text{PHDIV1-OUT} = \frac{\text{PHDIV1-IN}}{2^{\text{C0995}}}$$

  – positive values in C0995 result in a division
  – negative values in C0995 result in a multiplication
- The output value is limited to ±32000 encoder revolutions.
  – If the limit is exceeded, the output is kept at the limit value.

7.4.50 Phase integrator (PHINT)

Purpose

Integrates a speed or a velocity to a phase (distance). The integrator can accept max. ±32000 encoder revolutions.

PHINT3 can recognize a relative distance.

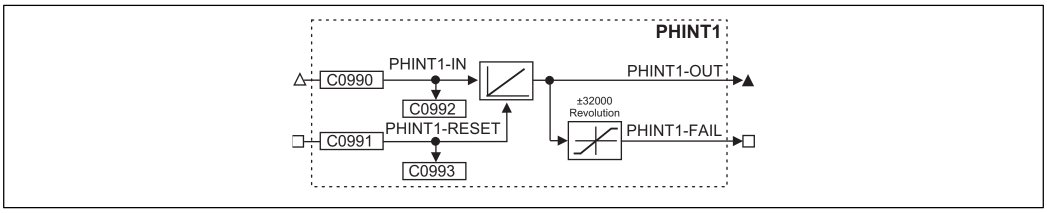


Abb. 7-154 Phase integrator (PHINT1)

Signal				Source		Note
Name	Type	DIS	DIS format	CFG	List	
PHINT1-IN	phd	C0992	dec [rpm]	C0990	4	1 revolution = 65536 increments
PHINT1-RESET	d	C0993	bin	C0091	2	HIGH = sets the phase integrator to 0 and PHINT1-FAIL = LOW
PHINT1-OUT	ph	-	-	-	-	65536 inc = 1 encoder revolution, overflow is possible
PHINT1-FAIL	d	-	-	-	-	HIGH = overflow

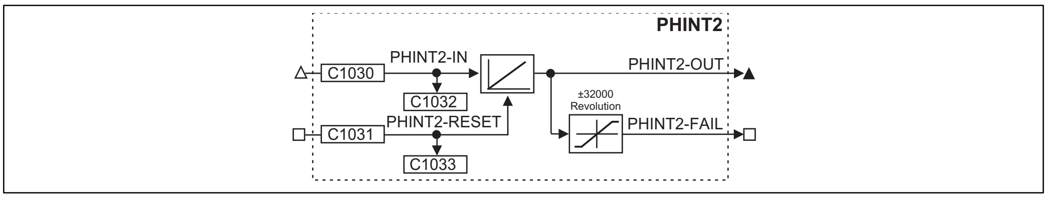


Abb. 7-155 Phase integrator (PHINT2)

Signal				Source		Note
Name	Type	DIS	DIS format	CFG	List	
PHINT2-IN	phd	C1032	dec [rpm]	C1030	4	1 revolution = 65536 increments
PHINT2-RESET	d	C1033	bin	C1031	2	HIGH = sets the phase integrator to zero and PHINT2-FAIL = LOW
PHINT2-OUT	ph	-	-	-	-	65536 inc = 1 encoder revolution, overflow is possible
PHINT2-FAIL	d	-	-	-	-	HIGH = overflow

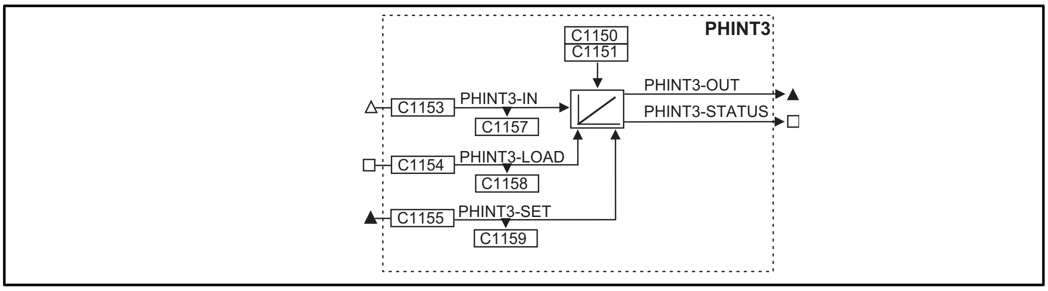


Abb. 7-156 Phase integrator (PHINT3)

Signal				Source		Note
Name	Type	DIS	DIS format	CFG	List	
PHINT3-IN	phd	C1157	dec [rpm]	C1153	4	1 revolution = 65536 increments
PHINT3-LOAD	d	C1158	bin	C1154	2	HIGH = sets the phase integrator to the input signal of PHINT3-IN and PHINT3-STATUS = LOW
PHINT3-SET	ph	C1159	dec [inc]	C1155	3	
PHINT3-OUT	ph	-	-	-	-	65536 inc = 1 encoder revolution, overflow is possible
PHINT3-STATUS	d	-	-	-	-	HIGH = overflow completed or distance covered

Function

- Constant input value (PHINT1 and PHINT2)
- Constant input value (PHINT3)
- Input value with change of the sign (PHINT3)
- Scaling of PHINTx-OUT

7.4.50.1 Constant input value (PHINT1 and PHINT2)

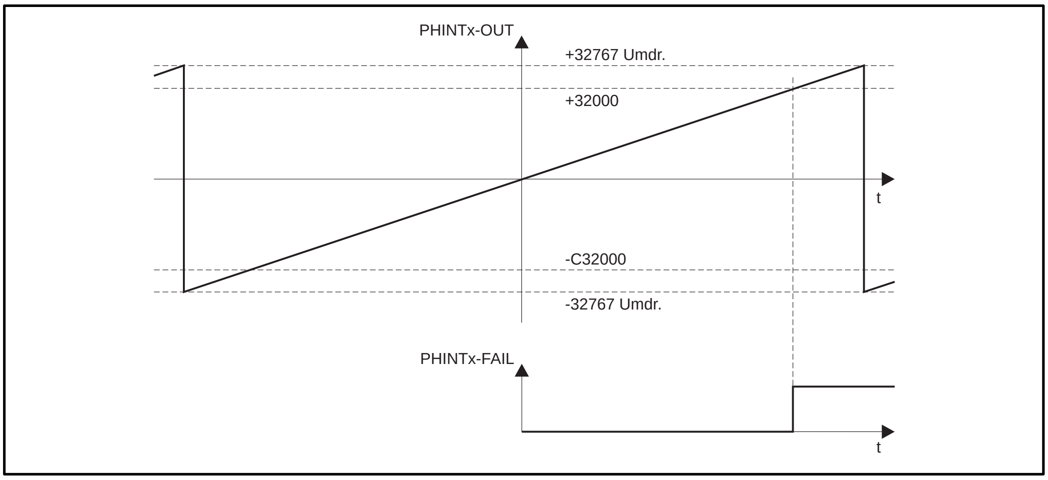


Abb. 7-157 Function of PHINTx with constant input value

- The FB integrates speed or velocity values at PHINTx-IN to a phase (distance).
- PHINTx-OUT outputs the count of the bipolar integrator.
  – A positive value at PHINTx-IN increments the integrator (count is increased).
  – A negative value at PHINTx-IN decrements the integrator (count is reduced).
- If the count exceeds the value of +32767 encoder revolutions (≙ +2147483647 inc)
  – an overflow results. The counting is continued at the value -32768.

  – PHINTx-FAIL switches to HIGH when the value ≥ +32000 is reached

- If the count falls below the value of -32768 encoder revolutions (≙ -2147483648)
  – an overflow results. The counting starts at the value +32767.
  – PHINTx-FAIL switches to HIGH when the value ≤ -32000 is reached.

- PHINTX -RESET = HIGH
  - – sets the integrator to 0
  - – Sets PHINTx-OUT = 0, as long as a HIGH level is applied to PHINTx-IN.
  - – Sets PHINTx-FAIL = LOW.

7.4.50.2 Constant input value (PHINT3)

The FB PHINT3 has three modes which can be set under C1150.

Mode C1150 = 2 is described in Chapter 7.4.50.3.

C1150 = 0

The input PHINT3-LOAD is state-triggered (HIGH level).

- PHINT3-LOAD = HIGH
  - – The integrator is loaded with the input value at PHINT3-SET.
  - – Sets the output PHINT3-STATUS = LOW

C1150 = 1

The input PHINT3-LOAD is edge-triggered (LOW-HIGH edge).

- PHINT3-LOAD = LOW-HIGH edge
  - – The integrator is loaded with the input value at PHINT3-SET and starts adding from this point
  - – Sets the output PHINT3-STATUS = LOW

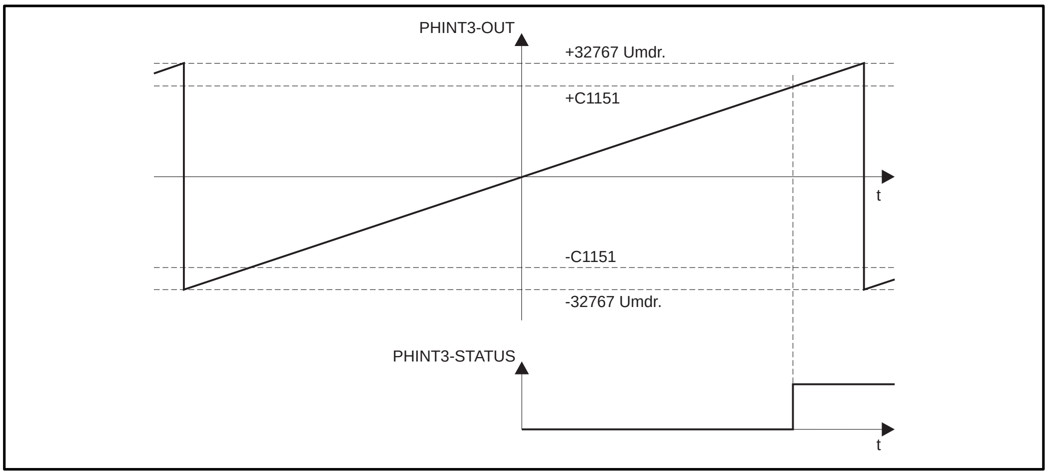


Abb. 7-158 Function of PHINT3 with constant input value when C1150 = 0 and C1150 = 1

- The FB integrates speed or velocity values at PHINT3-IN to a phase (distance).
- PHINT3-OUT outputs the count of the bipolar integrator.
  - – A positive value at PHINT3-IN increments the integrator (count is increased).
  - – A negative value at PHINT3-IN decrements the integrator (count is reduced).
- If the count exceeds the value of +32767 encoder revolutions (≙ +2147483647 inc)
  - – an overflow results. The counting is continued at the value -32768,
  - – PHINT3-STATUS switches to HIGH when the value (+) C1151 is reached
- If the count falls below the value of -32768 encoder revolutions (≙ -2147483648)
  - – an overflow results. The counting starts at the value +32767,
  - – PHINT3-STATUS switches to HIGH when the value (-) C1151 is reached

7.4.50.3 Input value with change of the sign (PHINT3)

C1150 = 2

The input PHINT3-LOAD is state-triggered (HIGH level).

- PHINT3-LOAD = HIGH
  - – The integrator is loaded with the input value at PHINT3-SET.

– Sets the output PHINT3-STATUS = LOW.

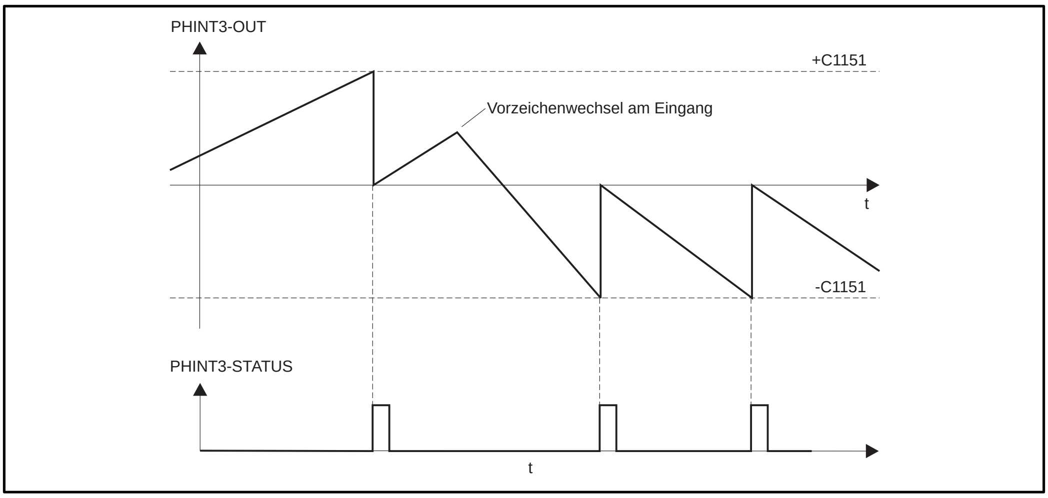


Abb. 7-159 Function of PHINT3 with change of sign when C1150 = 2

- The FB integrates speed or velocity values at PHINT3-IN to a phase (distance).
- PHINT3-OUT outputs the count of the bipolar integrator.
  - – A positive value at PHINT3-IN increments the integrator (count is increased).
  - – A negative value at PHINT3-IN decrements the integrator (count is reduced).
- If the count exceeds the value of (+) C1151
  - – the value of C1151 is subtracted from the count
  - – switches PHINT3-STATUS to for the time of 1 ms.
- If the count falls below the value of (-) C1151
  - – the value of C1151 is added to the count,
  - – switches PHINT3-STATUS to for the time of 1 ms.

7.4.50.4 Scaling of PHINTx-OUT

Mathematic description of PHINTx-OUT:

$$\text{PHINTx} - \text{OUT[inc]} = \text{PHINTx} - \text{IN[rpm]} \cdot \text{t[s]} \cdot 65536\text{[inc/rev.]}$$

t = integration time

Example:

You want to determine the count of the integrator with a certain speed at the input and a certain integration time.

- Given values:
  - – PHINTx-IN = 1000 rpm
  - – t = 10 s
  - – Start value of the integrator = 0
- Solution:
  - – Conversion of PHINTx-IN:

$$1000\text{ rpm} = \frac{1000\text{ rev.}}{60\text{ s}}$$

  - – Calculation of PHINTx-OUT:

$$\text{PHINTx} - \text{OUT} = \frac{1000\text{ rev.}}{60\text{ s}} \cdot 10\text{ s} \cdot \frac{65536\text{ inc}}{\text{rev.}} = 10922666\text{ inc}$$

7.4.51 First order delay element (PT1)

Purpose

Filter and delay analog signals.

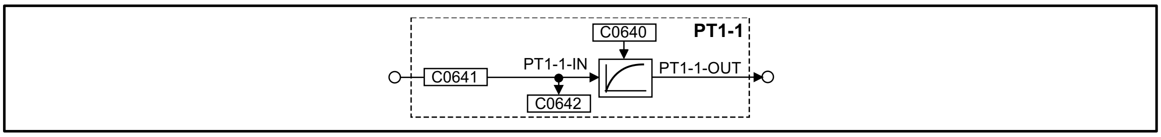


Abb. 7-160 First order delay element (PT1-1)

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
PT1-1-IN	a	C0642	dec [%]	C0641	1	1000	-
PT1-1-OUT	a	-	-	-	-	-	-

Function

- The delay T is set under C0640.
- The proportional value is fixed at K = 1.

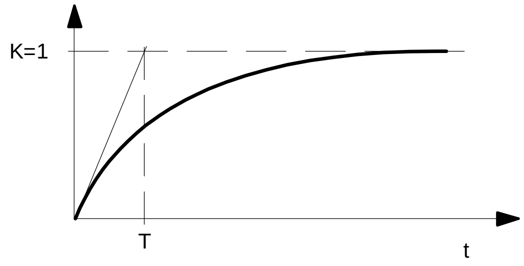


Abb. 7-161 Delay T of the first-order delay element

7.4.52 CW-CCW-QSP link (R/L/Q)

Purpose

The FB links the input of the direction of rotation and the QSP function with a protection against open circuit.

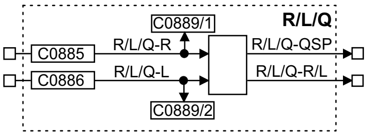


Abb. 7-162 CW-CCW-QSP link (R/L/Q)

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
R/L/Q-R	d	C0889/1	bin	C0885	2	51	-
R/L/Q-L	d	C0889/2	bin	C0886	2	52	-
R/L/Q-QSP	d	-	-	-	-	-	-
R/L/Q-R/L	d	-	-	-	-	-	-

Function

- After mains connection and simultaneous HIGH level at both inputs, the outputs are connected as follows:

Inputs		Outputs	
R/L/Q-R	R/L/Q-L	R/L/Q-R/L	R/L/Q-QSP
1	1	0	1

- The following table results, only if one of the inputs was set to LOW once:

Inputs		Outputs	
R/L/Q-R	R/L/Q-L	R/L/Q-R/L	R/L/Q-QSP
0	0	0	1
1	0	1	0
0	1	1	0
1	1	unchanged	unchanged

- If both inputs are set to HIGH during operation, both outputs still have their previously output value.

7.4.53 Homing function (REF)

Purpose

The homing function is used to bring the drive shaft to a specific position.

Tip!

First, select a predefined configuration under C0005, which already includes the REF function block. Thus you make sure that all important signal links are established automatically. Then adapt the configuration to your application.

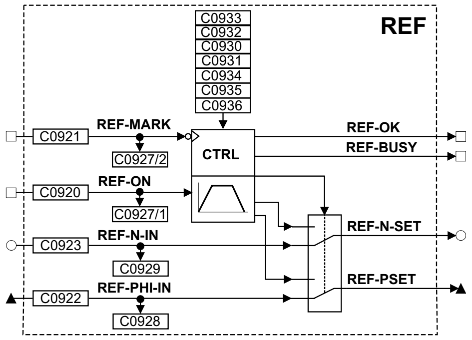


Abb. 7-163 Function block REF

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
REF-N-IN	a	C0929	dec [%]	C0923	1	1000	Speed setpoint in % of nmax C0011
REF-PHI-IN	ph	C0928 C0926/2	dec [inc]	C0922	3	1000	Phase setpoint (contouring error for phase controller in FB MCTRL)
REF-ACTPOS-IN	ph	C0926/1	dec [inc]	C0925	3	1000	Loading value for current position (REF-ACTPOS)
REF-ON	d	C0927/1	bin	C0920	2	1000	HIGH = start homing
REF-MARK	d	C0927/2	bin	C0921	2	1000	Home position switch
REF-POS-LOAD	d	C0927/3	bin	C0924	2	1000	LOW-HIGH edge = phase at the input REF-ACTPOS-IN is loaded in REF-ACTPOS (start value)
REF-OK	d	-	bin	-	-	-	HIGH = homing completed/homing known
REF-BUSY	d	-	bin	-	-	-	HIGH = homing function active
REF-N-SET	a	-	dec [%]	-	-	-	Setpoint speed for n-controller
REF-PSET	ph	-	dec [rpm]	-	-	-	Phase setpoint (contouring error for phase controller in FB MCTRL)

Scope of the function

- Profile generator
- Homing modes
- Control via input signals
- Output of status signals

7.4.53.1 Profile generator

The homing speed profile can be adapted to the application.

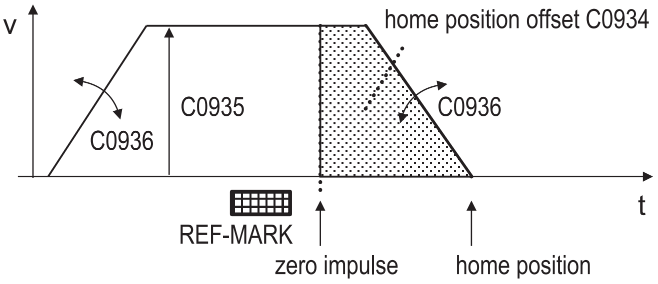


Abb. 7-164 Homing speed profile

Code	Meaning	Note
C0930	Gearbox factor numerator, pinion circumference on the motor side	Setting is required only if the feedback encoder is not attached to the motor
C0931	Gearbox factor denominator, pinion circumference on the encoder side	
C0933	Calculate position on the rising or falling edge of the zero track or touch probe	according to the selected mode
C0934	Homing point offset = number of increments after the zero pulse	The reference is: 65536 inc = 1 revolution. An input of up to 2140000000 inc is possible
C0935	Maximum traversing speed	Input % of nmax C0011
C0936	Acceleration / deceleration time	linear ramp
C0926/3	REF-ACTPOS, actual position	display only
C0926/4	REF-TARGET, actual target position	display only

The profile generator calculates the speed profile from the set profile parameters.

- Parameter changes are possible during homing.
  – C0935 and C0936 become effective if REF-ON = LOW.
- The drive should not be operated at the torque limit (MCTRL-MMAX = HIGH), otherwise the drive cannot follow the speed profile.
  – Increase acceleration / deceleration time C0936 until MCTRL-MMAX is no longer activated.
- The phase controller in the MCTRL function block must be switched active.

7.4.53.2 Homing modes

The home position is defined by:

- the homing mode C0932
- the signal edge of the zero pulse or touch probe signal C0933
- the home position offset C0934

Note!

The zero position (depending on the rotor attached to the motor) instead of the zero pulse is effective for position feedback via resolver, and the touch probe phase for homing via touch probe.

Homing with homing switch on zero pulse/zero position

After the negative edge of the homing switch REF-MARK, the home position is at the next zero pulse/ zero position plus the home position offset:

- Mode 0 (C0932 = 0):
  - – Move to the home position in CW rotation.
  - – Enter positive home position offset C0934.

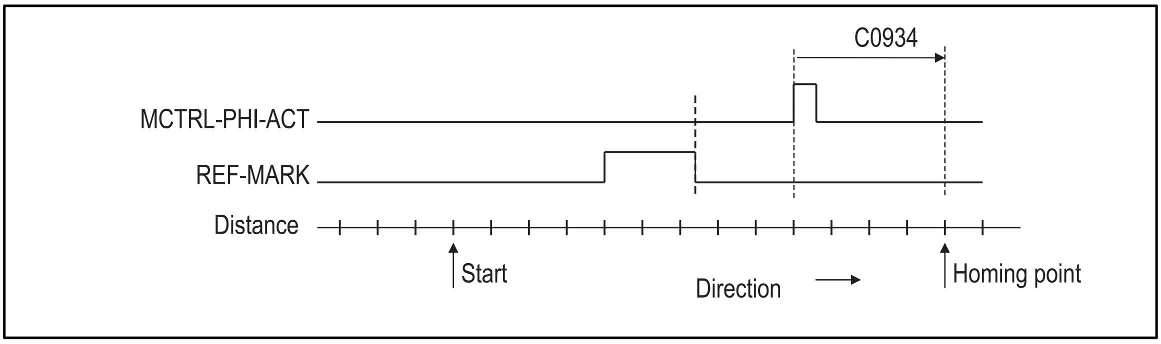


Abb. 7-165 Homing with zero pulse/zero position: Move to the home position in CW rotation.

- Mode 1 (C0932 = 1):
  - – Move to the home position in CCW rotation.
  - – Enter negative home position offset C0934.

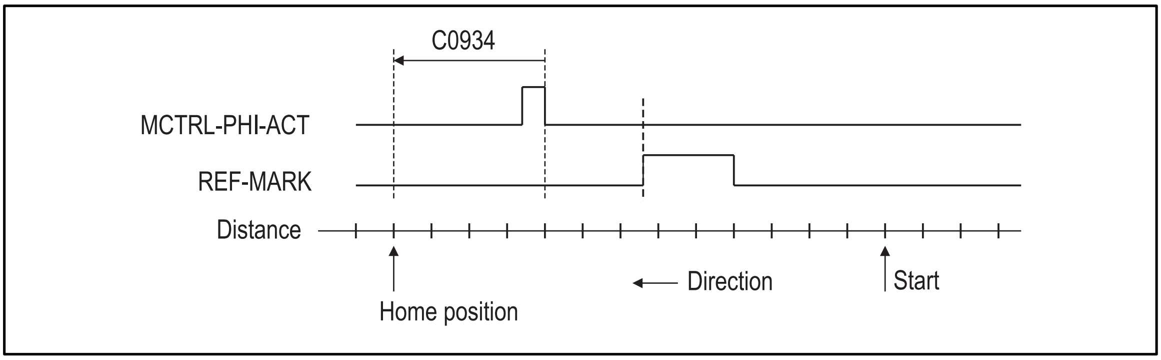


Abb. 7-166 Homing with zero pulse/zero position: Move to the home position in CCW rotation.

Homing with home switch and touch probe (TP)

After the negative edge of the homing switch RER-MARK, the home position is at the touch probe signal (terminal X5/E4) plus the home position offset:

- Mode 6 (C0932 = 6):
  - – Move to the home position in CW rotation.
  - – Enter positive home position offset C0934.

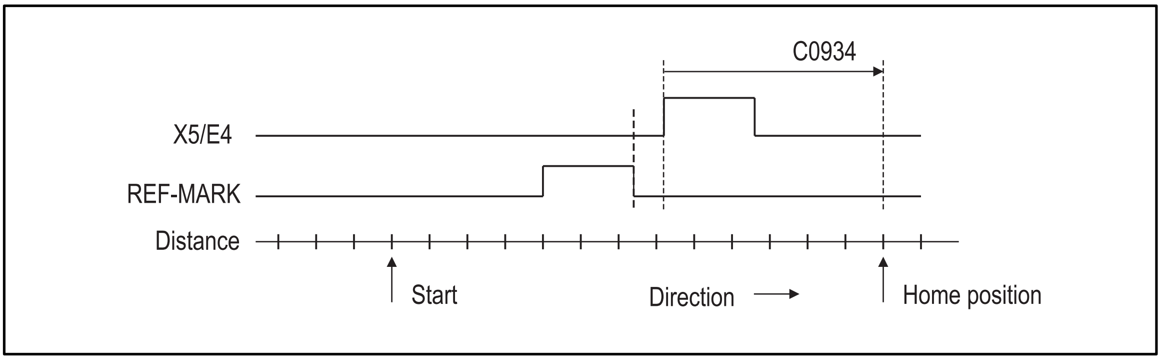


Abb. 7-167 Homing with touch probe: Move to the home position in CW rotation.

- Mode 7 (C0932 = 7):
  - – Move to the home position in CCW rotation.
  - – Enter negative home position offset C0934.

Homing with touch probe (TP)

The home position is at the next touch probe signal (terminal X5/E4) plus the home position offset.

- Mode 8 (C0932 = 8):
  - – Move to the home position in CW rotation.
  - – Enter positive home position offset C0934.
- Mode 9 (C0932 = 9):
  - – Move to the home position in CCW rotation.
  - – Enter negaitive home position offset C0934.

Direct homing

The home position is on the home position offset.

- Mode 20 (C0932 = 20):
  - The drive moves from the actual position (REF-ACTPOS) to the home position immediately after the activation (REF-ON = HIGH).
  - The actual position (REF-ACTPOS) can previously be loaded with the input value REF-ACTPOS-IN (see Chapter LEERER MERKER).
  - The distance and direction results from the actual position (REF-ACTPOS) and the set home position offset (C0934).

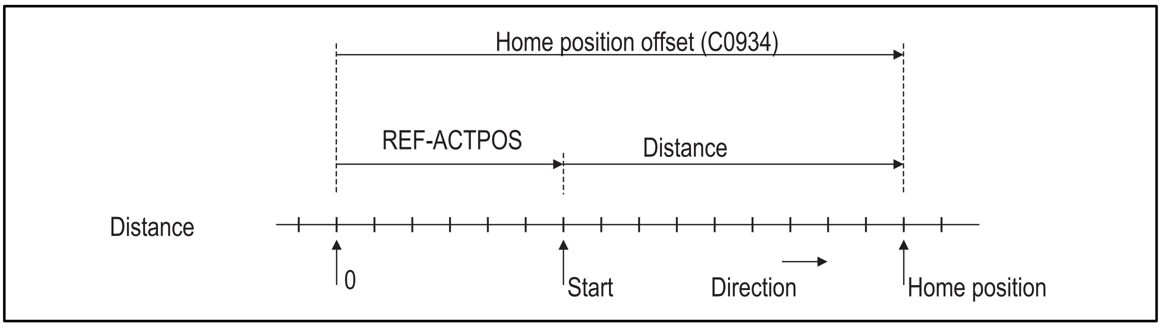


Abb. 7-168 Direct homing; move to the home position in CW rotation

- Mode 21 (C0932 = 21) as mode 20, but in addition:
  - The actual position (REF-ACTPOS) is loaded during mains disconnection and is loaded again with mains connection.

7.4.53.3 Control via input signals

- REF-ON = HIGH (edge) starts homing:
  - The input must remain HIGH until homing is completed. Homing is canceled when the input is set to LOW before the home position is reached.
- REF-ON = LOW interrupts homing:
  - The drive is decelerated to zero speed along the ramp set under C0936.
  - The inputs REF-N-IN and REF-PHI-IN are connected to the outputs REF-N-SET and REF-PSET.
  - Has no effect when homing is already completed (REF-BUSY = LOW).
- REF-POS-LOAD = LOW-HIGH edge
  - The profile generator accepts the phase applied at input REF-ACTPOS-IN as a start value for the actual position REF-ACTPOS.
  - The function is effective only if REF-ON = LOW.
  - The function is effective only in modes 20 and 21.

7.4.53.4 Output of status signals

- REF-BUSY = HIGH: homing is active:
  - The profile generator is connected to the outputs REF-PSET and REF-N-SET.
- REF-BUSY = LOW: homing is not active or completed:
  - The inputs REF-PHI-IN and REF-N-IN are connected to the outputs REF-PSET and REF-N-SET.
- REF-OK = HIGH: homing was completed successfully:
  - Homing is completed if the setpoint of the profile generator has reached the home position.
  - A possible contouring error is transmitted to the function block DFSET and compensated (see Chapter LEERER MERKER) unless the drive is operated in its torque limitation.
- REF-OK = LOW:
  - homing is currently executed
OR
  - the home position is no longer known, e.g. due to an interference OR
  - homing was interrupted.

7.4.53.5 Connection of the function block

- REF-PSET supplies the phase setpoint belonging to REF-N-SET (contouring error) for the phase controller in the MCTRL function block.
  - Both signals (REF-PSET and REF-N-SET) must be processed for a correct homing.
- The homing function must be connected to the function block DFSET (see signal flow chart for the configurations 5000, 6000 or 7000).
  - Otherwise, phase errors may occur which add up.

7.4.54 Ramp generator (RFG)

Purpose

The ramp generator limits the rise of signals.

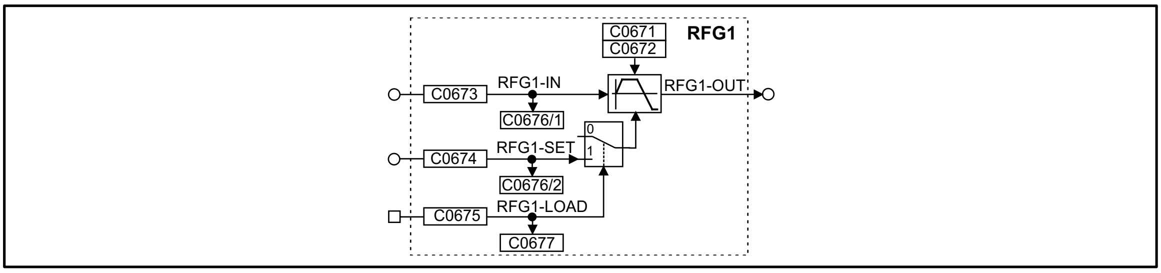


Abb. 7-169 Ramp generator (RFG1)

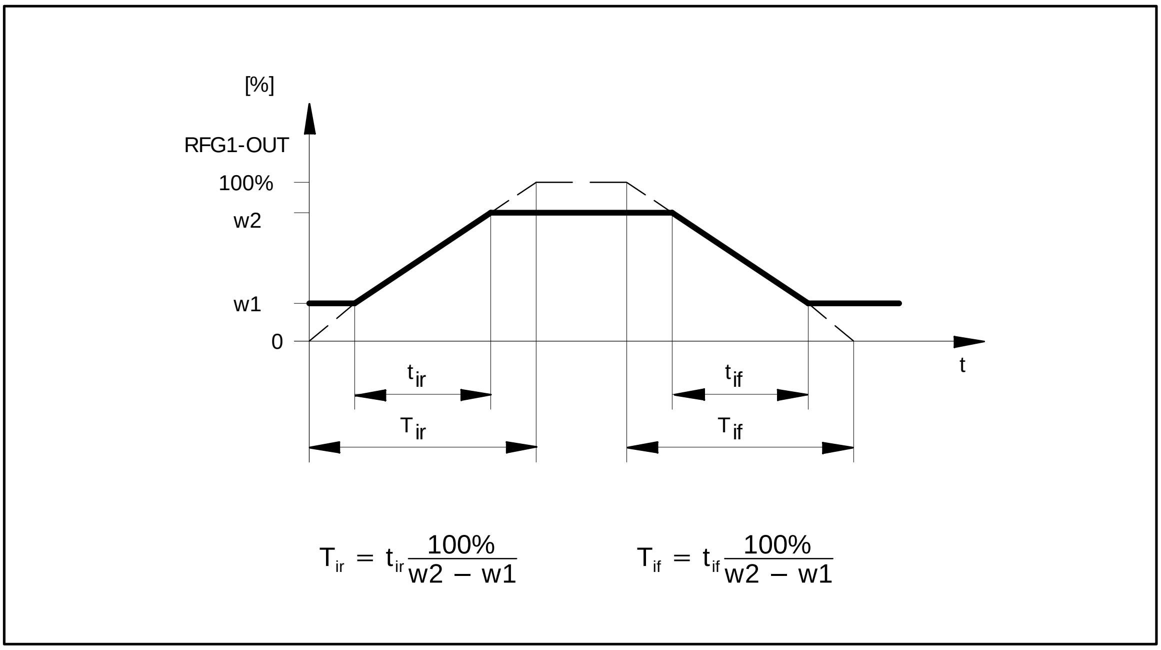
Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
RFG1-IN	a	C0676/1	dec [%]	C0673	1	1000	-
RFG1-SET	a	C0676/2	dec [%]	C0674	1	1000	-
RFG1-LOAD	d	C0677	-	C0675	2	1000	-
RFG1-OUT	a	-	-	-	-	-	-

Function

- Calculation and setting of the times T_{ir} and T_{if}
- Loading of the ramp generator

7.4.54.1 Calculation and setting of the times T_{ir} and T_{if}

The acceleration time and deceleration time refer to a change of the output value from 0 to 100 %. The times T_{ir} and T_{if} to be set can be calculated as follows:



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

Abb. 7-170 Acceleration and deceleration times of the ramp generator

Here, t_{ir} and t_{if} are the desired times for the change between w_1 and w2. The calculated times $T_{ir}$and T_{if} can be set under C0671 and C0672.

7.4.54.2 Loading of the ramp generator

The ramp generator can be initialized with defined values via the inputs RFG1-SET and RFG1-LOAD.

- As long as the input RFG1-LOAD = HIGH, the input RFG1-SET is switched to the output.
- If the input RFG1-LOAD = LOW, the ramp generator accelerates from this value to its input value via the set $T_i$times.

7.4.55 Sample and hold function (S&H)

Purpose

The FB can save analog signals. The saved value is also available after mains disconnection.

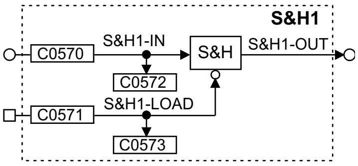


Abb. 7-171 Sample and hold function (S&H1)

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
S&H1-IN	a	C0572	dec [%]	C0570	1	1000	
S&H1-LOAD	d	C0573	bin	C0571	2	1000	LOW = save
S&H1-OUT	a	-	-	-	-	-	

Function

- With S&H1-LOAD = HIGH the signal at the input S&H1-IN is switched to the output S&H1-OUT.
- With S&H1-LOAD = LOW the output S&H1-OUT is disconnected from the input S&H1-IN and outputs the value which was last valid.

Saving in the case of mains disconnection:

- Keep S&H1-LOAD to LOW level when disconnecting the supply voltage (mains, DC bus or terminal 59).
- Keep S&H1-LOAD to LOW level when connecting the supply voltage (mains, DC bus or terminal 59).

7.4.56 S-shaped ramp generator (SRFG)

Purpose

The function block is used to evaluate a setpoint via an S-shape (sin^2 shape).

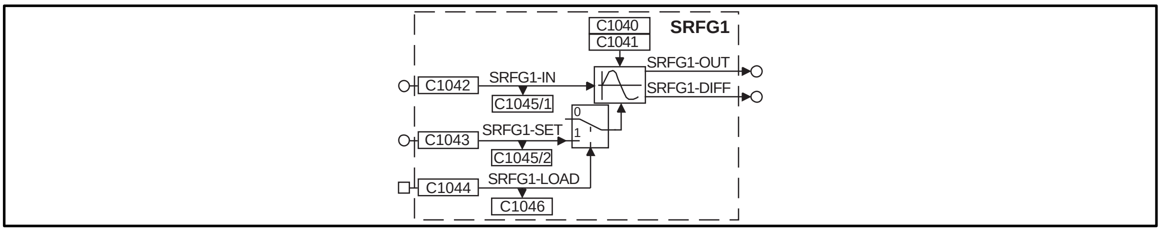


Abb. 7-172 S-shaped ramp generator (SRFG1)

Signal				Source		Note
Name	Type	DIS	DIS format	CFG	List	
SRFG1-IN	a	C1045/1	dec [%]	C1042	1	Input
SRFG1-SET	a	C1045/2	dec [%]	C1043	1	Start value for the ramp generator, acceptance when SRFG1-LOAD = High
SRFG1-LOAD	d	C1046	bin	C0144	2	HIGH = accepts the value at SRFG1-SET and supplies it to SRFG1-OUT; SRFG1-DIFF remains at 0 %
SRFG1-OUT	a	-	-	-	-	Output limited to ±100 %
SRFG1-DIFF	a	-	-	-	-	Output limited to ±100 %, supplies the acceleration of the ramp generator

SRFG1-LOAD

- The ramp generator is loaded (set) with the signal of SRFG1-SET via the digital input SRFG1-LOAD.
- This value is immediately accepted, i.e. there is no S-shaped acceleration or deceleration (the output jumps to this value).
- As long as SRFG-LOAD = HIGH, the ramp generator remains inhibited.

Function

The maximum acceleration and the jolt can be adjusted separately.

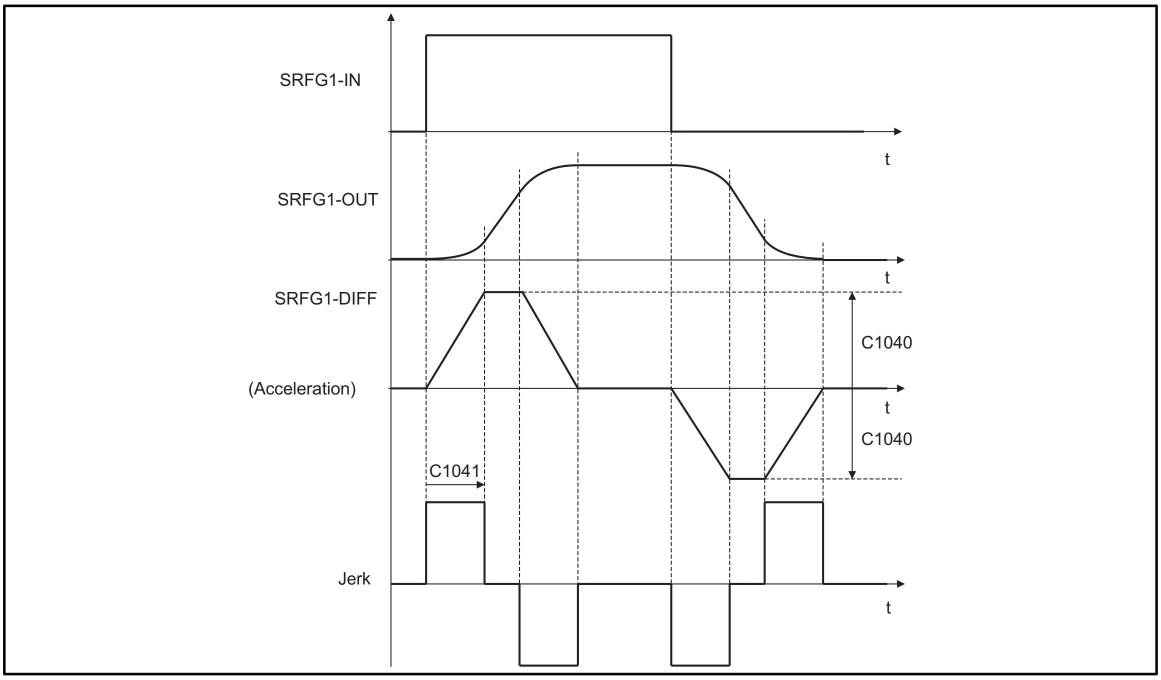
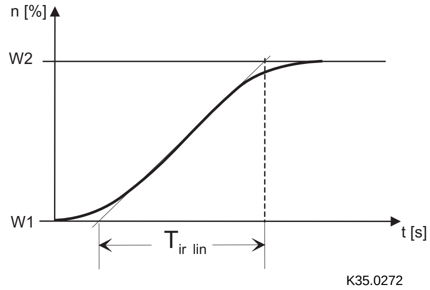


Abb. 7-173 Line diagram

- Max. acceleration:
  - – For the positive as well as for the negative acceleration, C1040 applies.
  - – The setting is calculated according to the formula:

$$T_{\text{ir lin}} = 1\text{s} \cdot \frac{W_2\,[\%] - W_1\,[\%]}{\text{C1040}\,[\%]}$$



- Jolt (C1041):
  - – The jolt is entered in [s] until the ramp generator operates with maximum acceleration (see Abb. 7-173).

7.4.57 Output of digital status signals (STAT)

Purpose

The FB evaluates digital signals of the function blocks and the status of the controller and passes them on to C0150 and to the FB AIF-OUT and CAN-OUT1.

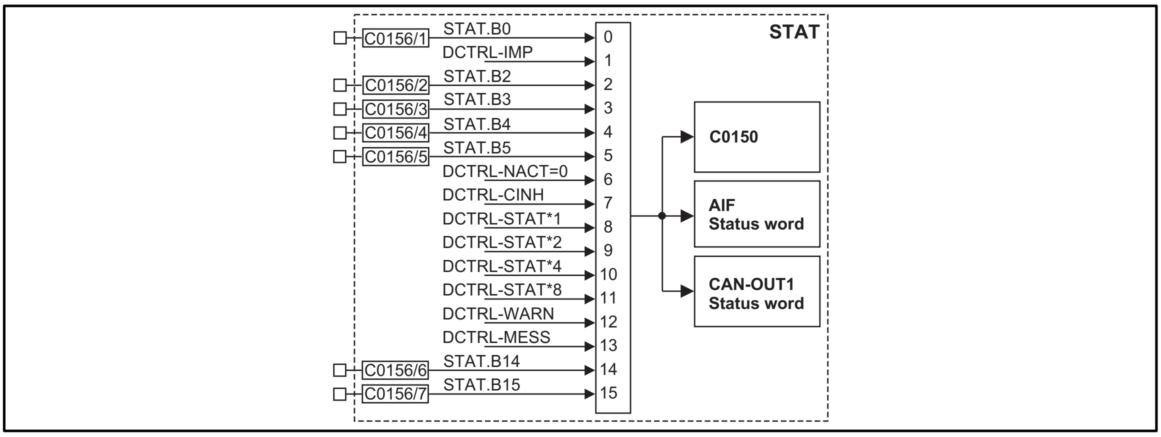


Abb. 7-174 Output of digital status signals (STAT)

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
STAT.B0	d	-	bin	C0156/1	2	2000	
STAT.B2	d	-	bin	C0156/2	2	5002	
STAT.B3	d	-	bin	C0156/3	2	5003	
STAT.B4	d	-	bin	C0156/4	2	5050	
STAT.B5	d	-	bin	C0156/5	2	10650	
STAT.B14	d	-	bin	C0156/6	2	505	
STAT.B15	d	-	bin	C0156/7	2	500	

Function

The status word consists of some linked (DCTRL-xxxx-) and some freely linkable signal inputs (STAT.Bx).

- Digital signal sources can be freely assigned to the inputs STAT.Bx.
- The corresponding bit in the data word is marked with STAT.Bx (e.g. STAT.B0 for the LSB)
- The Statuswort is transferred to code C0150 and to the function blocks AIF-OUT, CAN-OUT1, CAN-OUT2, and CAN-OUT1.
- The inputs with the name DCTRL-xxxx are directly accepted from the function block DCTRL. (🕮LEERER MERKER)

7.4.58 Control of a drive network (STATE-BUS)

Purpose

The FB controls the controllers to specified states (e.g. trip, trip reset, quick stop or controller inhibit).

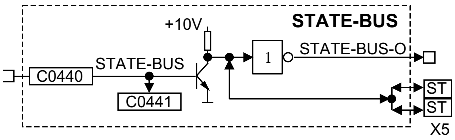


Abb. 7-175 Control of a function block STATE-BUS

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
STATE-BUS	d	C0441	bin	C0440	2	1000	
STATE-BUS-O	d	-	-	-	-	-	
TERMINA X5/ST	d	-	-	-	-	-	

Function

The STATE-BUS is a device-specific bus system which is designed for Lenze controllers only. The function block STATE-BUS acts on the terminals X5/ST or reacts on a LOW signal at these terminals (multimaster ability).

- Every connected controller can set these terminals to LOW signal.
- All connected controllers evaluate the signal level at these terminals and control the function blocks which are internally configured.
- Up to 20 controllers can be connected.

Stop!

Do not apply an external voltage at terminal X5/ST.

7.4.59 Memory block (STORE)

Purpose

Saves a setpoint phase signal which is created from a speed signal. The saving is activated via the TP input Ex.

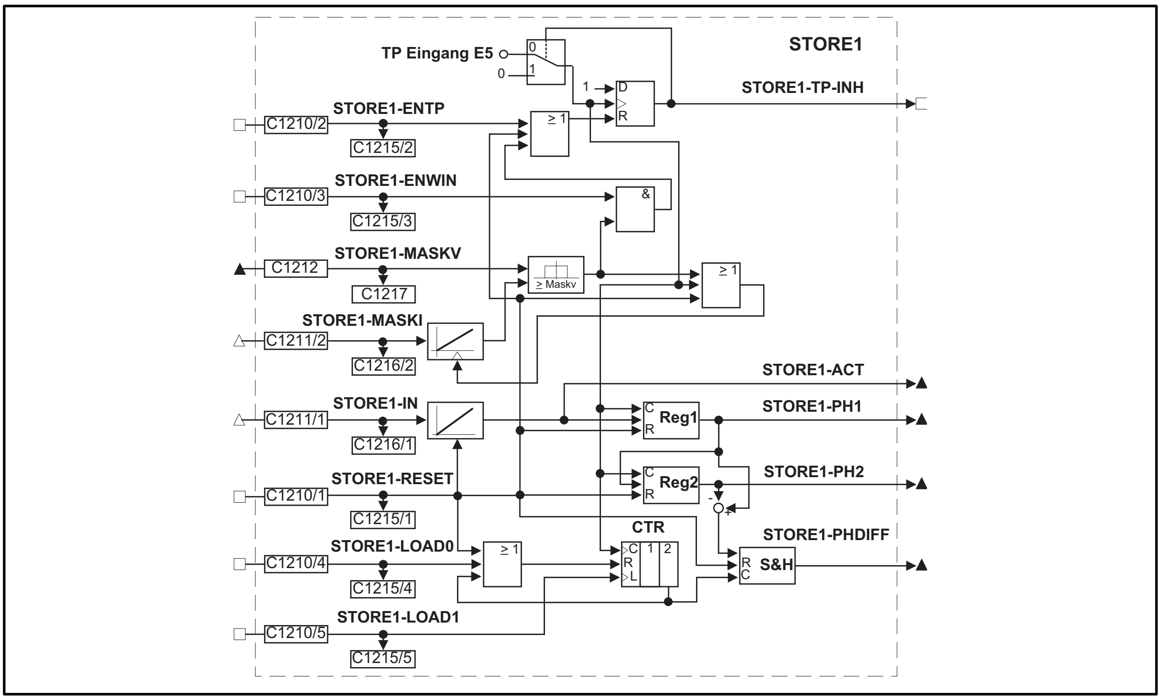


Abb. 7-176 Memory block (STORE1)

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
STORE1-IN	phd	C1216/1	dec [rpm]	C1211/1	4	1000	-
STORE1-RESET	d	C1215/1	bin	C1210/1	2	1000	HIGH = resets all functions
STORE1-ENTP	d	C1215/2	bin	C1210/2	2	1000	HIGH = enables the triggering via the TP input E5
STORE1-MASKI	phd	C1216/2	dec [rpm]	C1211/2	4	1000	-
STORE1-MASKV	ph	C1217	dec [inc]	C1212	3	1000	-
STORE1-ENWIN	d	C1215/3	bin	C1210/3	2	1000	HIGH = signal is enabled when | STORE1-MASKI | ≥ STORE1-MASKV
STORE1-LOAD0	d	C1215/4	bin	C1210/4	2	1000	HIGH = resets the counter which controls the output STORE1-PHDIFF
STORE1-LOAD1	d	C1215/5	bin	C1012/5	2	1000	LOW-HIGH edge = sets the counter = 1, which controls the output STORE1-PHDIFF
STORE1-ACT	ph	-	-	-	-	-	Outputs the current, integrated value
STORE1-PH1	ph	-	-	-	-	-	Outputs the last value stored by X5/E5
STORE1-PH2	ph	-	-	-	-	-	Outputs the last but one value stored by X5/E5
STORE1-PHDIFF	ph	-	-	-	-	-	Outputs the difference between STORE1-PH1 and STORE1-PH2
STORE1-TP-INH	d	-	-	-	-	-	HIGH = Triggering via TP input E5 was carried out. For another triggering, a positive edge must occur at the input STORE1-ENTP.

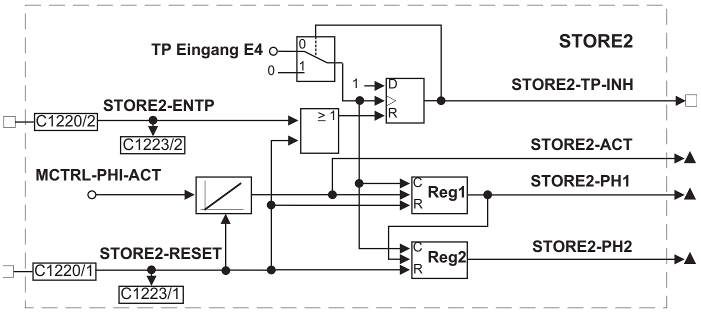


Abb. 7-177 Memory block (STORE2)

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
STORE2-RESET	d	C1223/1	bin	C1220/1	2	1000	HIGH = resets all functions
STORE2-ENTP	d	C1223/2	bin	C1220/2	2	1000	HIGH = enables the triggering via the TP input E4
STORE2-ACT	ph	-	-	-	-	-	Outputs the current, integrated value
STORE2-PH1	ph	-	-	-	-	-	Outputs the last value stored by X5/E5
STORE2-PH2	ph	-	-	-	-	-	Outputs the last but one value stored by X5/E5
STORE2-TP-INH	d	-	-	-	-	-	HIGH = Triggering via TP input E4 was carried out. For another triggering, a positive edge must occur at the input STORE-ENTP.

Function

- STORE1 control via TP input E5
- Save STORE1 phase signal
- Save STORE2 phase signal

7.4.59.1 STORE1 control via TP input E5

The trigger signal STORE1-TP-INH indicates a triggering with a HIGH signal via the TP input E5 (LOW-HIGH edge at X5/E5). The STORE1-TP-INH signalizes at the time that the triggering is deactivated and must be reset to the active state. This can be done by

- STORE1-RESET = HIGH
- STORE1-ENTP = LOW-HIGH edge
- STORE1-ENWIN = HIGH **and** the comparison of phase signals

Comparison of phase signals

The speed signal at STORE1-MASKI is integrated to a phase signal and compared with the phase signal at STORE1-MASKV.

If the condition | STORE1-MASKI | ≥ STORE1-MASKV

is fulfilled,

- the TP input E5 for the next triggering is enabled with STORE1-ENWIN = HIGH,
- the integrator for the speed signal at STORE1-MASKI is reset.

7.4.59.2 Save STORE1 phase signal

A speed signal at input STORE1-IN is added to a phase signal. The following sequence indicates the ways of signal output and storage.

- The current phase signal is output to STORE1-ACT.

1. A LOW-HIGH edge at the TP input E5 saves the last phase signal and supplies it to STORE1-PH1.
2. STORE1-ENTP = LOW-HIGH edge enables the TP input E5 for the next triggering.
3. Another LOW-HIGH edge at the TP input E5 saves the last phase signal.
   – STORE1-PH1 outputs this last phase signal.
   – STORE1-PH2 outptus the last but one phase signal.
   – STORE1-PHDIFF outputs the difference between STORE1-PH1 and STORE1-PH2.

- STORE1-RESET = HIGH resets memory, counter, integrators and enables the TP input E5 for the triggering.

Output of the difference of the two saved phase signals

- A two-step counter controls the output at STORE1-PHDIFF.
- Every second triggering via the PT input E5 results in another output to STORE1-PHDIFF.
- STORE1-LOAD0 = HIGH resets the counter.

Additional control

1. STORE1-LOAD1 = LOW-HIGH edge, sets the counter to the first step (preparation of the output to STORE1-PHDIFF)
2. A triggering via TP input E5 sets the counter to the second step (output to STORE1-PHDIFF).

Tip!

If STORE1-LOAD1 is set cyclically, STORE1-PHDIFF supplies a new difference signal after every triggering.

7.4.59.3 Save STORE2 phase signal

A phase signal at MCTRL-PHI-ACT is added to a phase signal. The following sequence indicates the ways of signal output and storage.

- The current phase signal is output to STORE2-ACT.

1. A LOW-HIGH edge at the TP input E4 saves the last phase signal and supplies it to STORE2-PH1.
2. STORE2-ENTP = LOW-HIGH edge enables the TP input E4 for the next triggering.
3. Another LOW-HIGH edge at the TP input E4 saves the last phase signal.
   – STORE2-PH1 outputs this last phase signal.
   – STORE2-PH2 outputs the last but one phase signal.

- STORE2-RESET = HIGH resets memory and integrator and enables the TP input E4 for the triggering.

7.4.60 Multi-axis synchronization (SYNC)

Purpose

Synchronizes the control program cycle of the drives with the cycle of a higher-level control.

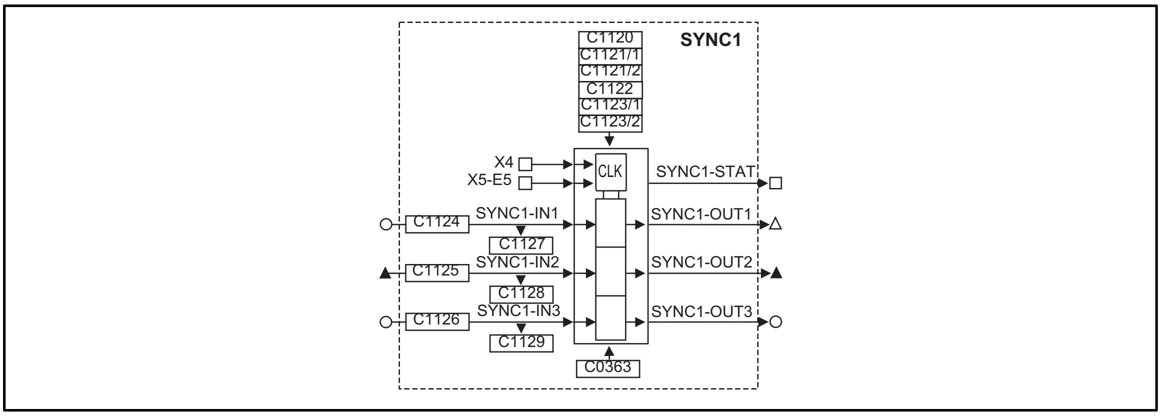


Abb. 7-178 Multi-axis synchronization (SYNC1)

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
SYNC1-IN1	a	C1127	dec [inc]	C1124	1	1000	-
SYNC1-IN2	ph	C1128	dec [inc]	C1125	3	1000	-
SYNC1-IN3	a	1129	dec	C1126	1	1000	
SYNC1-STAT	d	-	-	-	-	-	After completion of the synchronization SYNC1-STAT switches to HIGH. If the synchronization is quit, SYNC1-STAT switches to LOW.
SYNC1-OUT1	phd	-	-	-	-	-	-
SYNC1-OUT2	ph	-	-	-	-	-	-
SYNC1-OUT3	a	-	-	-	-	-	-

Function

- Possible axis synchronizations
- Cycle times
- Phase shift
- Synchronization window for synchronization via terminal (SYNC WINDOW)
- Correction value of phase controller (SYNC CORRECT)
- Fault indications
- Configuration examples
- Standardization

7.4.60.1 Possible axis synchronizations

Operating mode

Code	Value	Function
C1120	0	FB without function. Switches the data at the inputs directly to the outputs.
	1	CAN Sync active Synchronizes the controllers to the sync telegram of the system bus.
	2	Terminal Sync active Synchronizes the controllers to the sync signal of terminal X5/E5.

Synchronization time

After the mains connection and the initialization time of the controller, the FB SYNC1 also requires a synchronization time.

The synchronization time depends on

- the baud rate of the system bus (CAN-SYNC),
- the start time (input of the first SYNC telegram/signal),
- the time between the SYNC telegrams,
- the SYNC correction factor (C0363),
- the operating mode of the FB SYNC1

Axis synchronization via system bus (CAN)

The system bus (CAN) transmits the sync telegram as well as the process signals.

Application examples:

- Input of cyclic, synchronized position setpoint information, e.g. multi-axis control via the system bus (CAN).

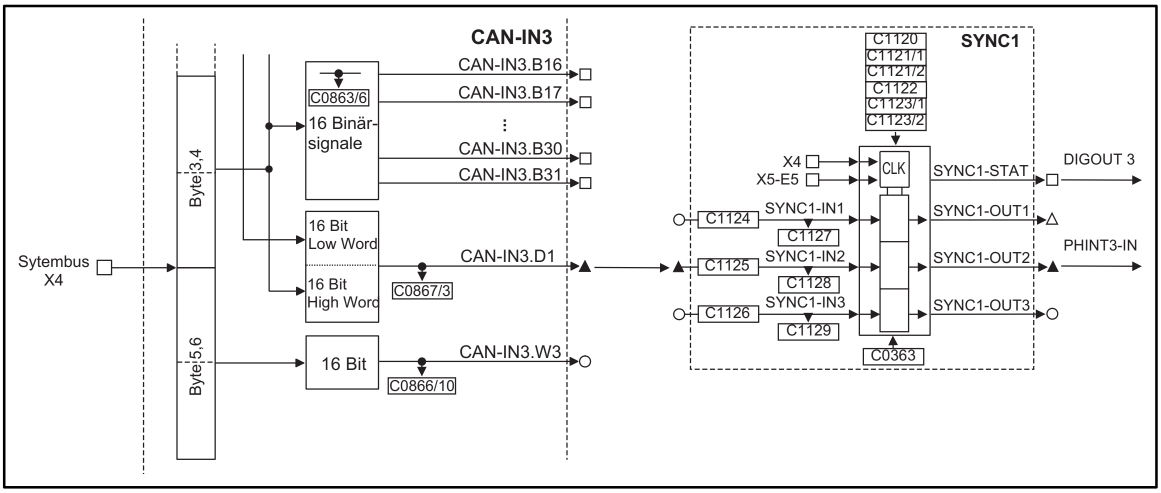


Abb. 7-179 Example for a link of the FB SYNC1

Axis synchronization via terminal control (X5/E5)

There are two different transmission channels for the sync signal and the process signal.

- The process signals are connected via a freely selectable input channel (e.g. AIF interface, DF input).
- The sync signal is sent via terminal X5/E5.

Application examples:

- Input of cyclic, synchronized position setpoint information for multi-axis positioning via different bus systems (e.g. Interbus).
- Synchronization of internal processing cycles of the FB to higher-level process controls.

7.4.60.2 Cycle times

Sync cycle time (SYNC CYCLE)

The master (e.g. PLC) sends ther periodic sync telegram[1)] (sync signal[2)]).

The controllers (slaves) receive the sync telegram and compare the time between two LOW-HIGH edges of the signal with the provided cycle time (1121/1).

The cycle time is entered in integer numbers (1 ms, 2 ms, 3 ms, ...).

1) Designation for the synchronization via system bus (CAN)

2) Designation for the synchronization via terminal

Code	Value	Function
C1121/1	1 ... 13 ms	Definition of the cycle time of the sync telegram (sync signal). A parameterization is required only for the slave. ● C1120 = 1 (CAN sync) – Time between two sync telegrams of the master. Adapt the time to the master SYNC. C0362 displays the time (CAN sync cycle) for the slave. Set the value in C1121/1 smaller than the value in C0362. ● C1120 = 2 (terminal SYNC) – Time between two sync signals of the master to X5/E5. Adapt the time to the master SYNC.Set the value in C1121/1 ≥ cycle time of the master.

Interpolation cycle time (INTPOL. CYCLE)

The FB interpolates the input signals (C1124, C1125, C1126) between the sync telegrams and sync signals and transmits them to the corresponding output. This means that an optimized signal shape with regard to the internal processing cycle is achieved (e.g. reduction of signal step changes in the output variables when using long sync cycles).

The interpolation is restarted with every sync signal (LOW-HIGH edge).

Code	Value	Function
C1121/2	1 ... 13 ms	Definition of the interpolation cycles / steps ● C1120 = 1 – C1121/2 has no effect – The interpolation cycles are derived from the sync cycle (C1121/1). ● C1120 = 2 – The interpolation cycle can be selected independently of the sync cycle. – Select the parameterization of C1121/2 according to the cycle of the process value input.

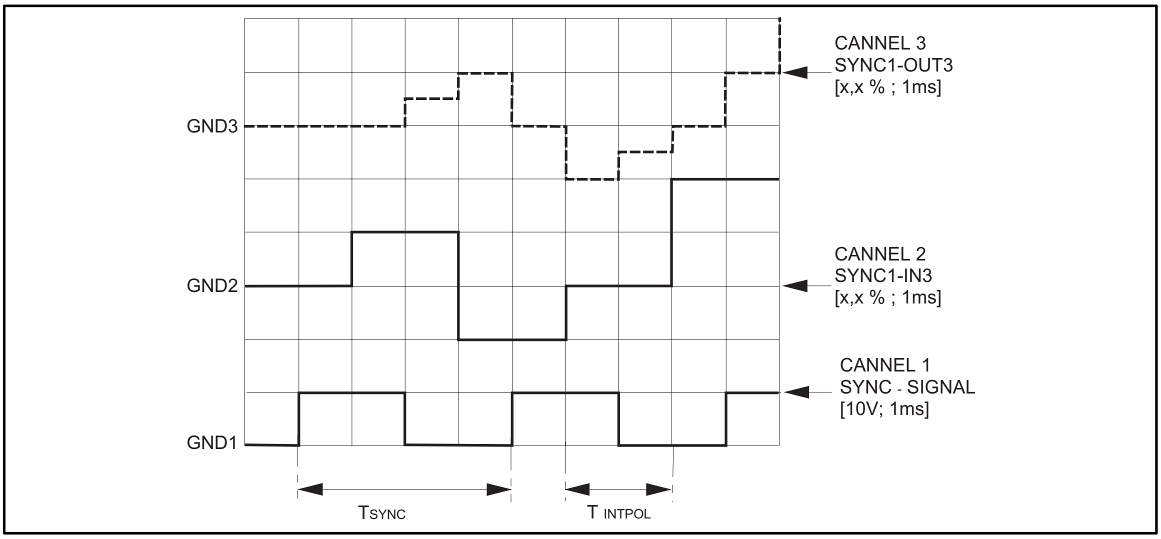


Abb. 7-180 Example of an interpolation

See Abb. 7-180:

An analog value at SYNC1-IN3 is output as an interpolated value SYNC1-OUT3.

- Sync cycle (C1121/1) = 4 ms
- Interpolation cycle (C1121/2) = process cycle = 2 ms
- Phase shift (C1123/1) = 0 ms

7.4.60.3 Phase shift

Phase shift for the synchronization via system bus (SYNC TIME)

Code	Value	Function
C1122	0 ...10.000 µs	• C1120 = 1 – Phase shift between the sync telegram and the start of the internal control program. – The parameters are set automatically depending on the parameterization of the system bus (CAN). • C1120 = 2 – C1122 has no effect

Phase shift for the synchronization via terminal (PHASE SHIFT)

Code	Value	Function
C1123/1	-1.000 ms bis +1.000 ms	• C1120 = 1 – C1123/1 has no effect • C1120 = 2 – Phase shift between the sync signal and the start of the internal control program (e.g. to compensate the effects of signal run times / dead times for the sync signal of the individual slaves).

7.4.60.4 Time window for the synchronization via terminal

Code	Value	Function
C1123/2	0 ... 1.000 ms	• C1120 = 1 – C1123/2 has no effect • C1120 = 2 – Definition of a ”time window” for the LOW-HIGH edges of the sync signal at the slave (defined under C1121/1). – If the sync signal sent by the master is within this ”time window”, SYNC1-STAT switches to HIGH.

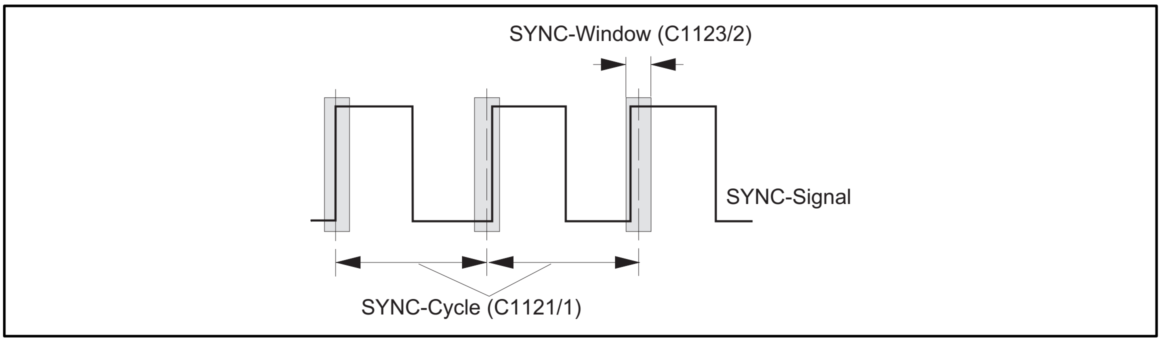


Abb. 7-181 ”Time window” for the LOW-HIGH edges of the sync signal

Tip!

A jitter up to ±200 µs on the LOW-HIGH edges of the sync signal is permissible. The size of the jitter affects the parameterization of the ”time window”.

7.4.60.5 Correction value phase controller

Code	Value	Function
C0363	1 ... 5	• Correction values for C0363 = 1 → 0.8 µs 2 → 1.6 µs 3 → 2.4 µs 4 → 3.2 µs 5 → 4.0 µs • C1120 = 1 – The value is derived automatically from internal parameters of the system bus (CAN). • C1120 = 2 – Optimizing the rise time of the phase controller depending on the frequency of the sync signal. – Increase the value when the frequency of the sync signal is reduced. – A stable signal at SYNC1-STAT is an indicator for an optimal parameterization.

7.4.60.6 Fault indications

Fault indications for the synchronization via system bus

Fault	Cause	Remedy
P16	Controller was enabled in an unsynchronized state (SYNC1-STAT = LOW)	Enable controller only after SYNC1-STAT = HIGH
	The time between two sync telegrams is faulty	C0362 displays the period between two sync telegrams. ● Set the time in C1121/1 to the time in C0362. ● Adapt the time of the sync telegram from the master

Fault indications for the synchronization via terminal

Fault	Cause	Remedy
P16	Controller was enabled in an unsynchronized state (SYNC1-STAT = LOW)	Enable controller only after SYNC1-STAT = HIGH
	No sync signal	Connect sync signal to terminal X5/E5
	The period of the sync signal is not a multiple of 1 ms	Adapt period
	Sync window too small	Adapt C1123/2 to the ratios

7.4.60.7 Configuration examples

Configuration example CAN-SYNC

Maintain the following sequence during the commissioning:

Step	Where	Operation
1.	-	Commission controller and system bus without FB SYNC1
2.	-	Inhibit controller
3.	CAN master	Define telegram sequence 1. Send new setpoint to all slaves 2. Send SYNC telegram 3. All slaves must respond
4.	CAN slaves	Enter FB SYNC1 in the first position of the processing table
5.		Parameterize the signal assignment of the inputs at FB SYNC1
6.		Select C1120 = 1 (sync mode for FB SYNC1)
7.	CAN master	Start communication, send sync telegrams
8.	CAN slaves	FB SYNC1 (CAN SYNC-CYCLE) ● Request cycle time of the SYNC telegram from the master under C0362
9.		FB SYNC1 (SYNC CYCLE) ● Set C1121 according to the time of the sync telegrams from the control ● Set C1121 ≥ C0362
10.		Parameterize the monitoring function P16 under C1290
11.		Connect output signals of SYNC1 to the desired inputs of the corresponding FB
12.		Via FB DIGOUT ● detect signal from SYNC1-STAT
13.		When SYNC1-STAT = HIGH, enable controller

Configuration example TERMINAL-SYNC

Maintain the following sequence during the commissioning:

Step	Where	Operation
1.	-	Commission controller without FB SYNC1
2.	-	Inhibit controller
3.	Slaves	Enter FB SYNC1 in the first position of the processing table
4.		Apply sync signal at terminal X5/E5
5.		Parameterize the signal assignment of the inputs at FB SYNC1
6.		Select C1120 = 2 (sync mode for FB SYNC1)
7.	Sync master	Start communication, send sync signals
8.	Slaves	FB SYNC1 (SYNC CYCLE) ● Parameterize the sync cycle time of the sending source under C1121
9.		Parameterize the monitoring function P16 under C1290
10.		Connect output signals of SYNC1 to the desired inputs of the corresponding FB
11.		Via FB DIGOUT ● provide signal from SYNC1-STAT
12.		FB SYNC1 (SYNC WINDOW) ● Enter the optimum size of the ”time window” under C1123/2 ● If the sync signal jitters strongly, increase the ”time window”
13.		When SYNC1-STAT = HIGH, enable controller

7.4.60.8 Scaling

The signal at input SYNC1-IN1 is transmitted in a scaled form to SYNC1-OUT1

Formula for the scaling:

$$\text{SYNC1-OUT1 [rpm]} = \text{SYNC1-IN1 [inc]} \cdot \frac{1875\ \text{rpm}}{2048\ \text{inc}}$$

The inputs SYNC1-IN2 and SYNC1-IN3 are not scaled. The FB transmits the data unevaluated to SYNC1-OUT2 or SYNC1-OUT3.

7.4.61 Edge evaluation (TRANS)

Purpose

This function is used to evaluate digital signal edges and convert them into pulses with a defined time.

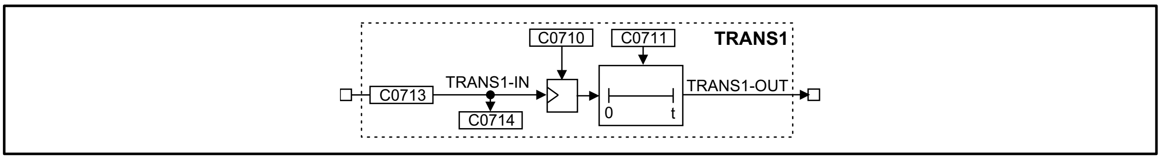


Abb. 7-182 Edge evaluation (TRANS1)

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
TRANS1-IN	d	C0714	bin	C0713	2	1000	-
TRANS1-OUT	d	-	-	-	-	-	-

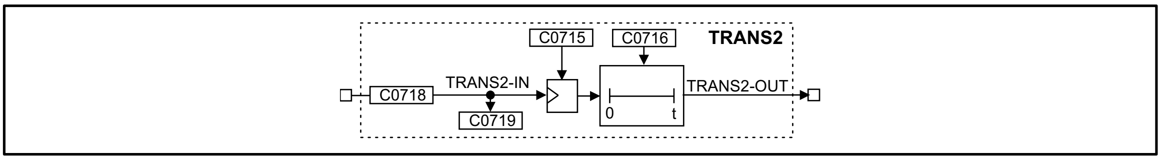


Abb. 7-183 Edge evaluation (TRANS2)

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
TRANS2-IN	d	C0719	bin	C0718	2	1000	-
TRANS2-OUT	d	-	-	-	-	-	-

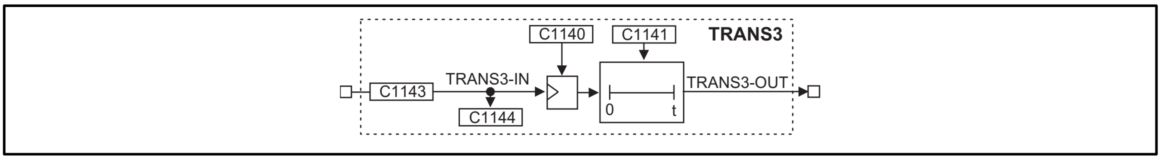


Abb. 7-184 Edge evaluation (TRANS3)

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
TRANS3-IN	d	C1144	bin	C1143	2	1000	-
TRANS3-OUT	d	-	-	-	-	-	-

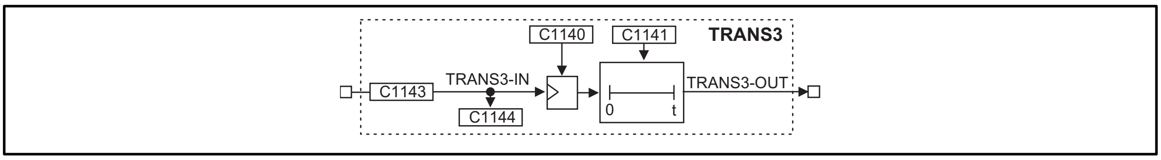


Abb. 7-185 Edge evaluation (TRANS4)

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
TRANS4-IN	d	C1149	bin	C1148	2	1000	-
TRANS4-OUT	d	-	-	-	-	-	-

Function

This FB is an edge evaluator which can be retriggered. This FB can react on different events. The following functions can be selected under code C0710 or C0716:

- Positive edge
- Negative edge
- Positive or negative edge

7.4.61.1 Evaluate positive edge

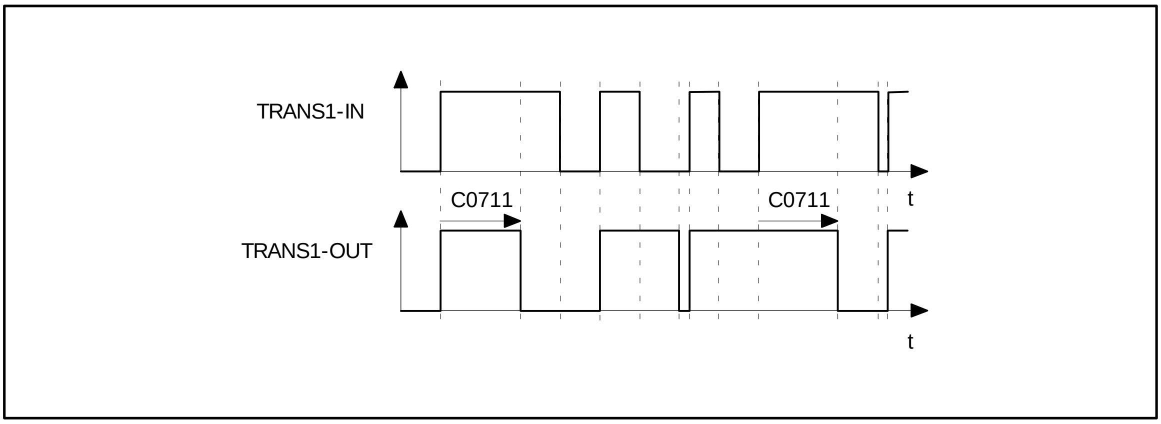


Abb. 7-186 Evaluation of positive edges (TRANS1)

- The output TRANSx-OUT is set to HIGH as soon as a LOW-HIGH edge is sent to the input.
- After the time set under C0711 or C0716 has elapsed, the output changes again to LOW unless there is another LOW-HIGH edge at the input.

7.4.61.2 Evalute negative edge

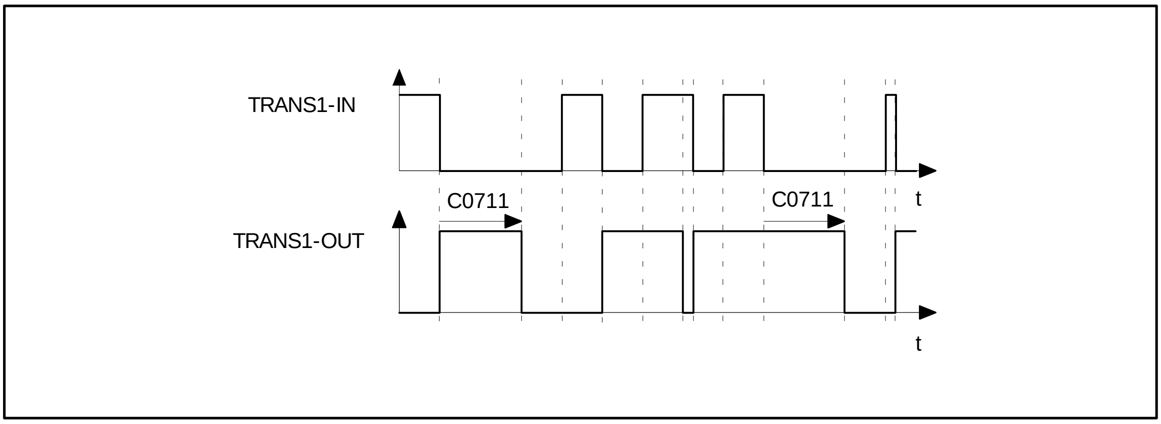


Abb. 7-187 Evaluation of negative edges (TRANS1)

- The output TRANSx-OUT is set to HIGH as soon as a HIGH-LOW edge is sent to the input.
- After the time set under C0711 or C0716 has elapsed, the output changes again to LOW, unless there is another HIGH-LOW edge at the input.

7.4.61.3 Evaluate positive or negative edge

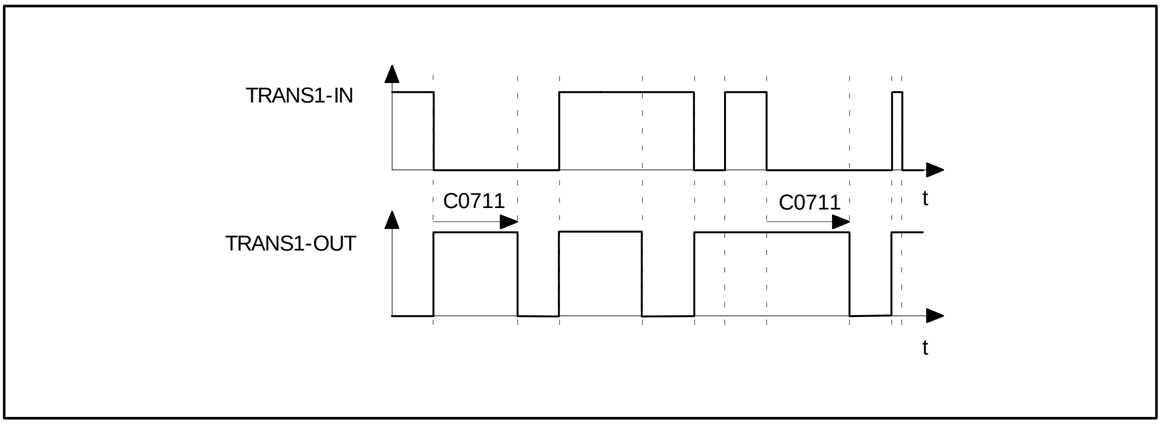


Abb. 7-188 Evaluation of positive and negative edges (TRANS1)

- The output TRANSx-OUT is set to HIGH as soon as a HIGH-LOW edge or a LOW-HIGH edge is sent to the input.
- After the time set under C0711 or C0716 has elapsed, the output changes again to LOW unless there is another HIGH-LOW edge or LOW-HIGH edge at the input.

7.5 Monitoring

Various monitoring functions protect the drive from impermissible operating conditions.

If a monitoring function is activated,

- the corresponding preset reaction is triggered. (📖 Chapter "Reactions")
- a digital output is set, if it is assigned to the corresponding reaction.
- the fault indication is entered in position 1 in the history buffer. (📖 8-3)

7.5.1 Reactions

The controller can react to interference in four different ways:

- TRIP (highest priority)
- Message
- FAIL-QSP
- Warning
- Off=no reaction (lowest priority)

For some operating faults, you can determine the controller reactions.
(📖 7-206, chapter "Set reactions")

TRIP

- Switches the power outputs U, V, W to a high resistance until TRIP is reset
- The drive is idling (no control!).
- After TRIP reset the drive moves to its setpoint along the set ramps. (📖 8-10)

Message

- Switches the power outputs U, V, W to a high resistance as long as the fault is active.
- Short-term fault $\leq$ 0.5 s
  - – The drive is idling (no control!), as long as the fault is active.
  - – If the fault is eliminated, the drive moves to its setpoint with maximum torque.
- Long-term fault $>$ 0.5 s
  - – The drive is idling (no control!), as long as the fault is active.
  - – Controllers are reset.
  - – Position setpoint = act. position

Danger!

The drive restarts automatically after the fault has been eliminated.

Warning

- The drive operates under control.

Off

- No reaction to operating faults! Monitoring is deactivated.

Stop!

Switched-off monitoring functions can destroy the drive.

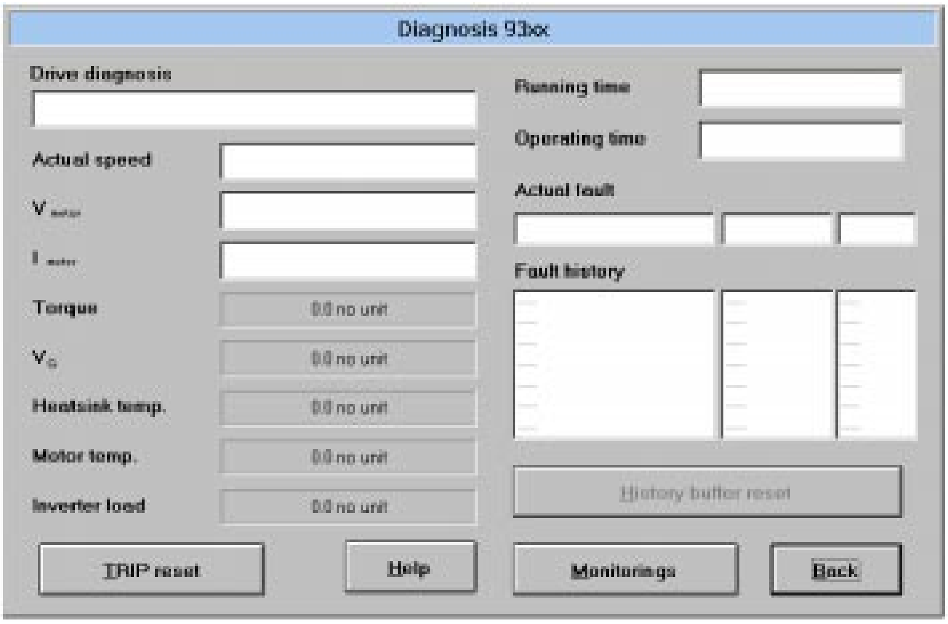
FAIL-QSP

Decelerates the drive to standstill within a defined time. Setpoint selections for delays in program sets are not considered.

- Brakes the drive to standstill along the QSP ramp.
- The time for the QSP ramp is set via the dialog box "Basic settings".
- Factory setting of FAIL-QSP: (🕮 8-6)

7.5.2 Setting of reactions

1. Click "Parameter menu" in the "Basic settings" dialog box.
2. Select the menu "Dialog Diagnostics" by a double click.



Torque 0.0 no unit

V_G 0.0 no unit

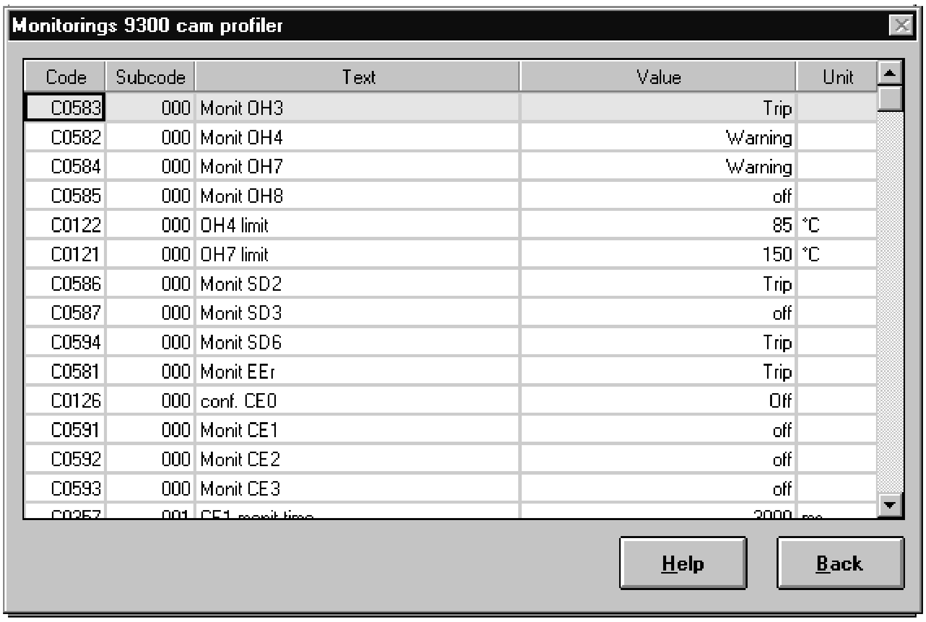
Heatsink temp. 0.0 no unit

Motor temp. 0.0 no unit

Inverter load 0.0 no unit

Abb. 7-189 Dialog box "Diagnostics 9300"

3. Click the button ”Monitorings...”.



Code	Subcode	Text	Value	Unit
C0583	000	Monit OH3	Trip	
C0582	000	Monit OH4	Warning	
C0584	000	Monit OH7	Warning	
C0585	000	Monit OH8	off	
C0122	000	OH4 limit	85	°C
C0121	000	OH7 limit	150	°C
C0586	000	Monit SD2	Trip	
C0587	000	Monit SD3	off	
C0594	000	Monit SD6	Trip	
C0581	000	Monit EEr	Trip	
C0126	000	conf. CE0	Off	
C0591	000	Monit CE1	off	
C0592	000	Monit CE2	off	
C0593	000	Monit CE3	off	

Abb. 7-190 Dialog box ”Monitoring configuration 93xx”

4. Click the desired monitoring function.
5. Confirm possible and allowed reactions with ”OK”.

The following chapter gives an overview of all monitoring functions and their settings.

7.5.3 Monitoring functions

Overview of the fault sources detected by the controller and the corresponding reactions

Fault message		Possible reactions					
Display	**Meaning**	**T**	**M**	**W**	**Q**	**off**	**Code**
CCr	System fault	●	-	-	-	-	-
CE0	Communication error (AIF)	✓	-	✓	-	●	C0126
CE1	Communication error at the process data input object CAN-IN1 (time monitoring can be set under C0357/1)	✓	-	✓	-	●	C0591
CE2	Communication error at the process data input object CAN-IN2 (time monitoring can be set under C0357/2)	✓	-	✓	-	●	C0592
CE3	Communication error at the process data input object CAN-IN3 (time monitoring can be set under C0357/3)	✓	-	✓	-	●	C0593
CE4	BUS-OFF state (many communication errors occurred)	✓	-	✓	-	●	C0595
EEr	External monitoring	●	✓	✓	✓	✓	C0581
H05	Internal fault	●	-	-	-	-	-
H07	Internal fault	●	-	-	-	-	-
H10	Sensor fault heat sink temperature	●	-	-	-	✓	C0588
H11	Sensor fault: indoor temperature	●	-	-	-	✓	
LP1	Motor phase failure detection (function block must be entered in C0465)	✓	-	✓	-	●	C0597
LU	Undervoltage	-	●	-	-	-	-
NMAX	Maximum speed exceeded (C0596)	●	-	-	-	-	-
OC1	Short circuit	●	-	-	-	-	-
OC2	Earth fault	●	-	-	-	-	-
OC5	I x t overload	●	-	-	-	-	-

Fault message		Possible reactions					
Display	**Meaning**	**T**	**M**	**W**	**Q**	**off**	**Code**
OH	Heat sink temperature 1 (max. permissible, fixed)	●	-	-	-	-	-
OH3	Motor temperature 1 (max. permissible, fixed)	●	-	-	-	✓	C0583
OH4	Heat sink temperature 2 (adjustable; C0122)	-	-	●	-	✓	C0582
OH7	Motor temperature 2 (can be set; code: C0121)	-	-	●	-	✓	C0584
OH8	Motor temperature (fixed) via inputs T1/T2	✓	-	✓*	-	●	C0585
OU	Overvoltage on the DC bus	-	●	-	-	-	-
P01	Limit switch negative = LOW	✓	-	-	●	-	C1285/1
P02	Limit switch positive = LOW	✓	-	-	●	-	C1285/2
P03	Contouring error - digital frequency > C0255	✓	-	●	-	✓	C0589
P04	Position limit negative exceeded	✓	-	-	●	-	C1285/3
P05	Position limit positive exceeded	✓	-	-	●	-	C1285/4
P06	No reference	✓	-	-	●	-	C1287/1
P07	Parameter set mode absolute	✓	-	-	●	-	C1291/1
P08	Actual offset out of range	✓	-	-	●	-	C1291/2
P09	Impermissible programming	✓	-	-	●	-	C1291/3
P12	Encoder range exceeded	✓	-	-	●	-	C1288/1
P13	Phase overflow	●	-	✓	-	✓	C0590
P14	1st contouring error POS > C1218/1	✓	-	✓	●	✓	C1286/1
P15	2nd contouring error POS > C1218/2	✓	-	✓	✓	●	C1286/2
P16	Sync error	✓	-	✓	●	✓	C1290/1
P17	TP control error	✓	-	✓	●	✓	C1289/1
P18	Internal limitation	✓	-	●	✓	✓	C1289/2
PEr	Program error	●	-	-	-	-	-
PI	Fault during initialization	●	-	-	-	-	-
PR0	General fault in parameter sets	●	-	-	-	-	-
PR1	Fault in parameter set 1	●	-	-	-	-	-
Sd2	Resolver fault	●	-	✓*	-	✓	C0586
Sd3	Encoder fault at X9 PIN 8	✓	-	✓*	-	●	C0587
Sd5	Encoder fault at X6/1 X6/2 (C0034 = 1)	✓	-	✓	-	●	C0598
Sd6	Sensor fault: motor temperature (X7 or X8)	●	-	✓	-	✓	C0594
Sd7	Fault in the absolute value encoder at X8	✓	-	-	-	●	C0025

T	TRIP	●	Lenze
M	Message	✓	possible
W	Warning	-	not possible
Q	Fault/QSP	✓*	possible, the drive may be destroyed if the fault is not removed immediately

Overcurrent diagram for fault message ”OC5”

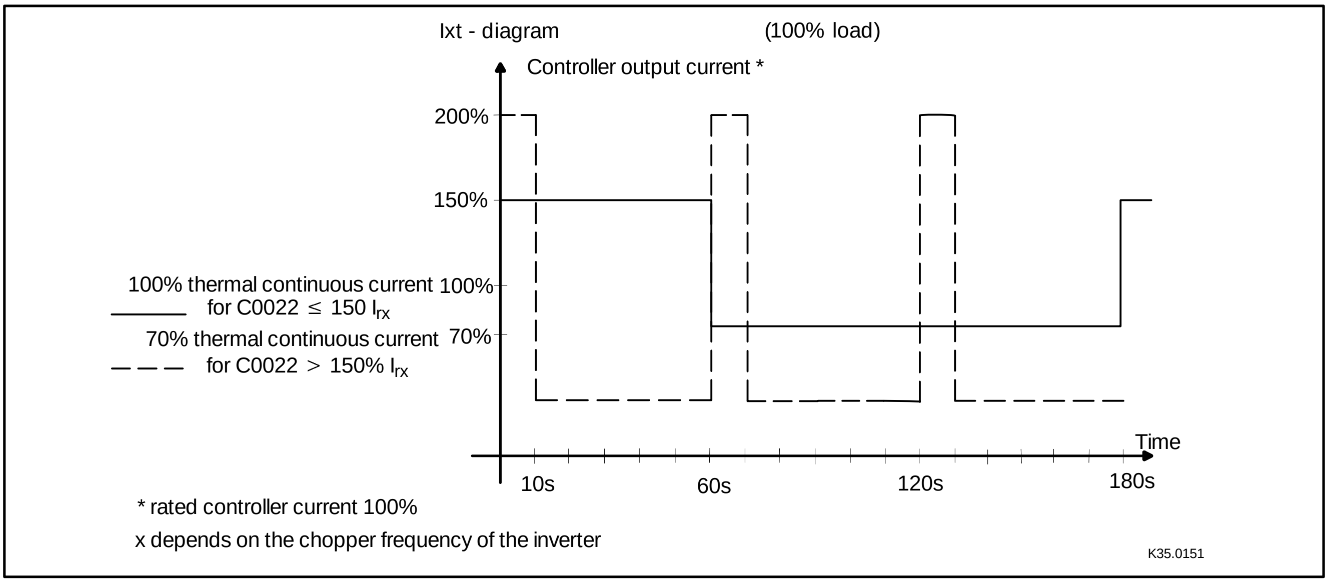


Abb. 7-191 Max. permissible overcurrent depending on the time

7.5.3.1 Undervoltage LU

Purpose

Monitores the DC-bus, protects the controller.

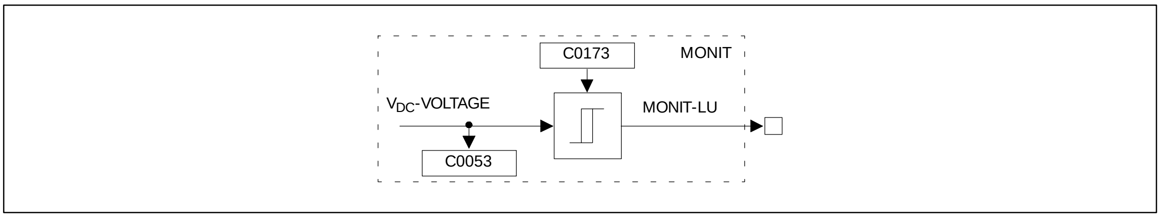


Abb. 7-192 Undervoltage LU

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
V_{DC}-VOLTAGE	-	C0053	dec	-	-	-	assignment cannot be changed
MONIT-LU	d	-	-	-	-	-	-

Mains voltage range	Selection number (C0173)	Switch-off threshold LU	Switch-on threshold LU
< 400 V	0	285 V	430 V
400 V	1	285 V	430 V
400 … 460 V	2	328 V	473 V
480 V without brake chopper	3	342 V	487 V
Operation with brake chopper (up to 480 V)	4	342 V	487 V

Function

The monitoring will be activated if the DC-bus voltage (terminals $+U_{DC}$ and $-U_{DC}$) falls below the threshold (switch-off threshold LU) which has been set under code C0173.

The message will be reset as soon as the value is higher than the switch-on threshold LU set.

The switch-off threshold LU determines the voltage level of the DC-bus voltage at which the pulse will be inhibited.

The selection number also applies to the overvoltage monitoring (OU).

The code setting is to be adapted to the existing mains voltage (also for $+U_{DC}$/$-U_{DC}$ terminals). If several controllers are connected via a DC-bus, all controllers must have the same settings.

If the LU message is indicated for more than 3 seconds or if the mains is switched on, the event will be entered into the history buffer. This might happen when the control module is supplied from an external supply via terminals X5/39 and X5/59 and the mains is switched off.

If the signal is reset (mains is switched on again) the entry in the history buffer will not be continued, but deleted (since it is not a fault but a controller status).

If the undervoltage message is not indicated for 3 seconds but for a shorter period of time, the event will be interpreted as fault (e.g. mains fault) and entered into the history buffer. In such a case the history buffer entry will be continued.

Features:

- LECOM No.: 1030
- Reaction: MESSAGE (unchangeable)

7.5.3.2 Overvoltage OU

Purpose

Monitores the DC bus. Protects the controller.

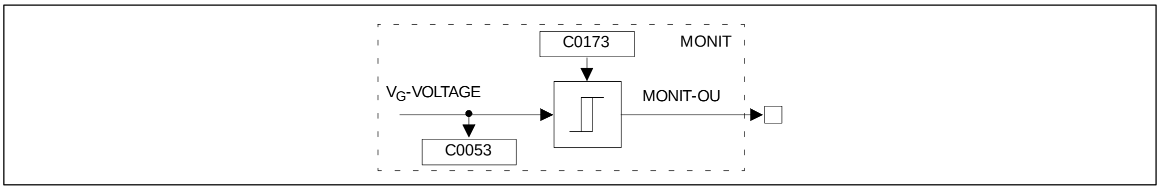


Abb. 7-193 Overvoltage OU

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
V_G-VOLTAGE	-	C0053	dec	-	-	-	-
MONIT-OU	d	-	-	-	-	-	-

Mains voltage range	**Selection number** (C0173)	**Switch-off threshold OU**	**Switch-on threshold OU**
< 400 V	0	770 V	755 V
400 V	1	770 V	755 V
400 … 460 V	2	770 V	755 V
480 V without brake chopper	3	770 V	755 V
Operation with brake chopper (up to 480 V)	4	800 V	785 V

Function

The monitoring will be activated if the DC-bus voltage (terminals $+U_G$ and $-U_G$) falls below the threshold (switch-off threshold OU) which has been set under code C0173.

The message will be reset when the value falls below the switch-on threshold OU.

The table above shows the settings for the switching thresholds according to the selection numbers.

The switch-off threshold OU determines the voltage level of the DC-bus voltage at which the pulse will be inhibited.

The selection number also applies to the undervoltage monitoring (LU).

Features:

- LECOM No.: 1020
- Reaction: MESSAGE (unchangeable)

Frequent activation of the monitoring indicates wrong drive selection, i.e. the occuring braking energy is too high.

Remedy:

- Use a 934X supply module or
- (additional) 935X brake units

If several controllers are operated at the same time, operation in a DC-bus might be reasonable.

The generated braking energy of the drive could then be used to drive another controller.

The mains connections would then only take up the energy difference.

7.5.3.3 Heat sink monitoring OH (fixed)

Purpose

Protects the controller.

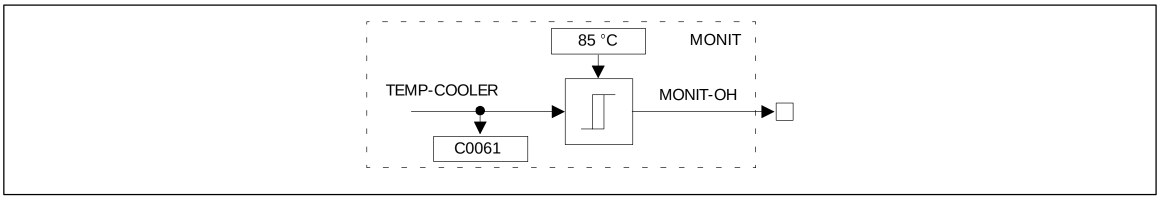


Abb. 7-194 Heat sink monitoring OH

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
TEMP-COOLER	-	C0061	dec	-	-	-	assignment cannot be changed
MONIT-OH	d	-	-	-	-	-	-

Function

The signal OH is derived from a comparator with hysteresis. The switch-off threshold is 85°C and cannot be changed. The hysteresis is also unchangeable and is 5 K, i.e. restart at 80°C.

Features:

- LECOM no.: 50
- Reaction: TRIP (unchangeable)

The activation of the monitoring can be caused by the following:

- The ambient temperature is too high.
  Remedy:
  – Integrate fan into the control cabinet.
- The controller is overloaded in the arithmetic mean, i.e. overload and recovery phase are above 100%.
  Remedy:
  – Shorten overload phase
  – Use controller with more power

7.5.3.4 Heat sink monitoring OH4 (adjustable)

Purpose

Controller protection

This monitoring is designed as a warning before the disconnection of the controller via the OH-TRIP.

Thus, the process can be influenced to avoid a switch-off of the controller at an inconvenient time.

For example, blowers which would cause an inacceptable noise in continuous operation, can also be triggered.

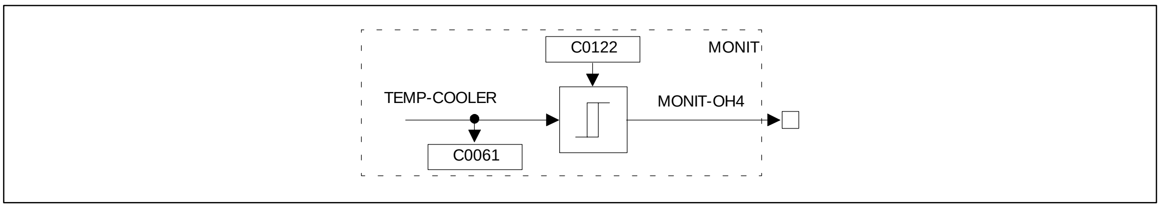


Abb. 7-195 Heat sink monitoring OH4 with adjustable threshold

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
TEMP-COOLER	-	C0061	dec	-	-	-	cannot be reassigned
MONIT-OH4	d	-	-	-	-	-	-

Function

The signal OH4 is derived from a comparator with hysteresis. The threshold can be set under code C0122. The hysteresis is fixed and amounts to 5 K. The signal is thus reset below a threshold of 5 K.

Features:

- LECOM no.: 2054
- Reaction: WARNING or OFF

7.5.3.5 Motor temperature monitoring OH8

Purpose

Motor protection

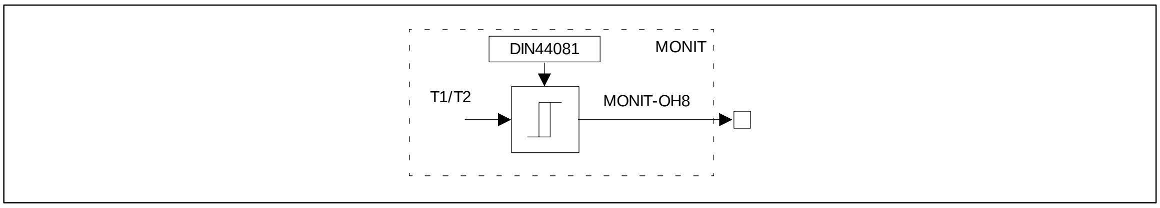


Abb. 7-196 Motor temperature monitoring OH8

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
T1/T2	-	-	-	-	-	-	-
MONIT-OH8	d	-	-	-	-	-	-

Function

The signal OH8 is derived from the digital signal via the terminals T1, T2 next to the power terminals UVW. The threshold and the hysteresis depend on the encoder system (DIN 44081) (see Chapter 4.2.9).

STOP

Stop!

When using this input as a motor protection: If the monitoring is set to warning or OFF, the motor can be destroyed in case of further overload.

Features:

- LECOM no.: 58, 2058
- Reaction: TRIP, WARNING or OFF

7.5.3.6 Motor temperature monitoring OH7 (adjustable)

Purpose

Process monitoring

This monitoring is designed as a warning before the disconnection via the OH3-TRIP.

Thus, the process can be influenced to avoid a switch-off of the motor at an inconvenient time.

For example, blowers which would cause an inacceptable noise in continuous operation, can also be triggered.

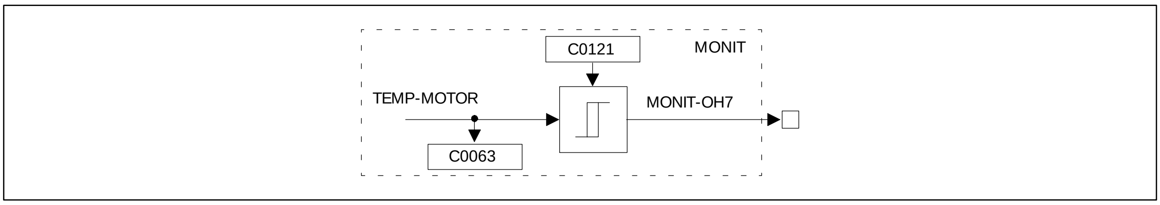


Abb. 7-197 Motor temperature monitoring OH7 with adjustable threshold

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
TEMP-MOTOR	-	C0063	dec	-	-	-	-
MONIT-OH7	d	-	-	-	-	-	-

Function

The signal OH7 is derived from a comparator with hysteresis.

Here, the same conditions apply as for the OH3 monitoring, since here the same inputs are used.

The threshold is set under code C0121. The hysteresis is fixed and amounts to 15 K. The signal is thus reset below a threshold of 15 K.

Features:

- LECOM no.: 2057
- Reaction: WARNING or OFF

7.5.3.7 Motor temperature monitoring OH3 (fixed)

Purpose

Protects the motor from overheat.

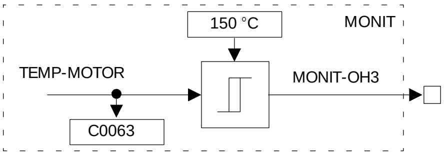


Abb. 7-198 Motor temperature monitoring OH3 with fixed threshold

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
TEMP-MOTOR	-	C0063	dec	-	-	-	-
MONIT-OH3	d	-	-	-	-	-	-

Function

The signal OH3 is derived from a comparator with hysteresis. The switch-off threshold is 150°C and is fixed. The hysteresis is also fixed and amounts to 15 K (i.e. the reclosing temperature is 135°C). This monitoring is only effective for the thermal sensor specified by Lenze as it is included in the standard Lenze servo motor. The Sub-D connectors X7 or X8 serve as inputs.

Stop!

Only one of the inputs can be used. The other input must not be assigned (must remain open). This monitoring is activated by default setting. This means that the monitoring reacts if no Lenze servo motor is used.

Features:

- LECOM no.: 53
- Reaction: TRIP or OFF

7.5.3.8 External fault EEr

Purpose

Monitors the process.

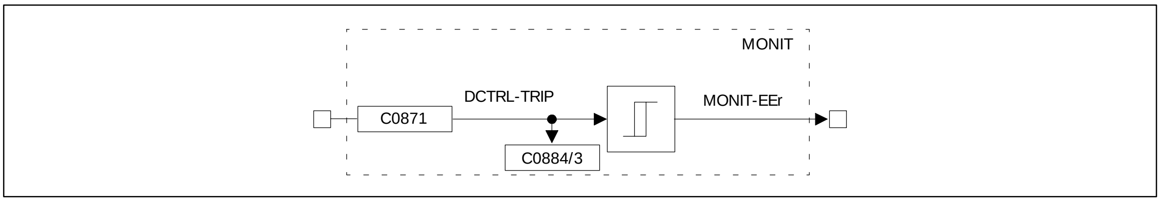


Abb. 7-199 External fault EEr

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
DCTRL-TRIP	d	C0884/3	bin	C0871	2	54	-
MONIT-EEr	d	-	-	-	-	-	-

Function

The signal EEr is generated from the signal DCTRL-TRIP-SET at the input (level evaluation). With factory setting, this signal is generated from the terminal X5/E4. Here you can connect an external encoder which can control the reaction required of the controller.

It is however also possible to use any other binary signal source.

Features:

- LECOM No.: 91, 1091, 2091
- Reaction: TRIP, MESSAGE, WARNING or OFF

7.5.3.9 Earth fault monitoring OC2

Purpose

Protects the controller.

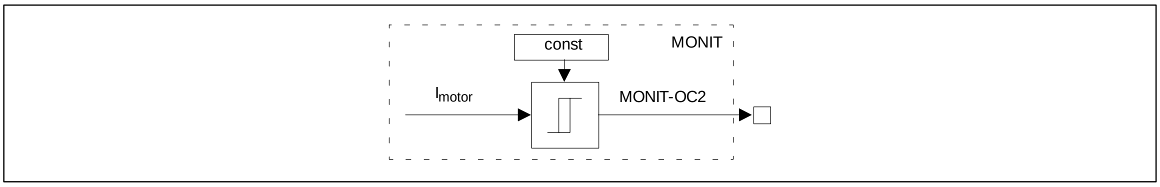


Abb. 7-200 Earth fault monitoring OC2

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
I_{MOTOR}	-	-	-	-	-	-	-
MONIT-OC2	d	-	-	-	-	-	-

Function

All controllers of the 93XX are equipped with an earth fault detection as standard.

In the event of a fault detection, the controller must be separated from the mains and the earth fault must be eliminated.

Features

- LECOM No.: 12
- Reaction: TRIP (unchangeable)

Possible reasons for an earth fault:

- Short-circuit to frame
- Short-circuit of a phase to screen
- Short-circuit of a phase to PE

7.5.3.10 Monitoring for short-circuit OC1

Purpose

Protects the controller.

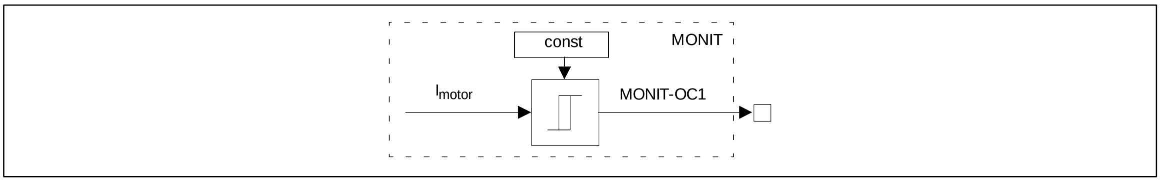


Abb. 7-201 Monitoring for short-circuit OC1

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
I_{MOTOR}	-	-	-	-	-	-	-
MONIT-OC1	d	-	-	-	-	-	-

Function

This monitoring is activated in the event of a short-circuit of the motor phases. It is also possible that it is an interturn fault in the machine.

Furthermore, this monitoring can also be activated if an earth fault occurs.

If the monitoring is activated, the controller must be separated from the mains and the short circuit must be eliminated.

Features:

- LECOM no.: 11
- Reaction: TRIP (unchangeable)

7.5.3.11 Motor phase failure monitoring LP1

Purpose

Protects the motor.

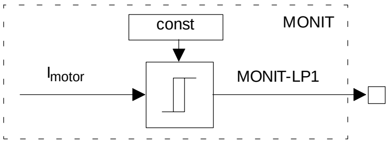


Abb. 7-202 Motor phase failure monitoring LP1

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
I_{MOTOR}	-	-	-	-	-	-	-
MONIT-LP1	d	-	-	-	-	-	-

Function

This monitoring will be activated when a cable in one of the motor phases is interrupted.

Note!

It is also activated if the motor winding is interrupted.

Features:

- LECOM No.: 32
- Reaction: TRIP (unchangeable)

7.5.3.12 Resolver monitoring for open circuit Sd2

Purpose

Protects the motor.

Monitors the resolver cables for open circuit.

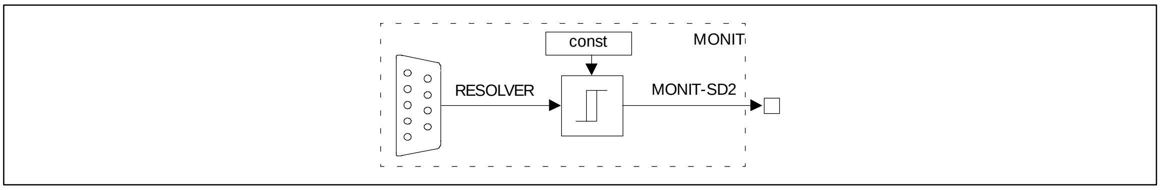


Abb. 7-203 Resolver monitoring for open circuit Sd2

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
RESOLVER	-	-	-	-	-	-	-
MONIT-SD2	d	-	-	-	-	-	-

Function

Warning!

The monitoring should not be switched-off for commissioning because the machine can run at very high speeds in the event of a fault (e.g. system cable not connected correctly or not connected at all) and the motor and the connected machine can be destroyed. The same applies if the monitoring is set to WARNING: The switch-off possibility should only be used if the monitoring is activated without obvious reason (very long cable, strong interferences caused by other devices).

The monitoring will be automatically activated if the resolver is selected as act. speed encoder (C0025).

The monitoring will be automatically deactivated if another act. speed encoder is selected.

Stop!

With a fault in the act. speed detection it is not guaranteed that the monitoring is activated when an overspeed NMAX occurs.

Features:

- LECOM no.: 82, 2082
- Reaction: TRIP, WARNING or OFF

7.5.3.13 Dig-Set monitoring Sd3

Purpose

Monitors the process.

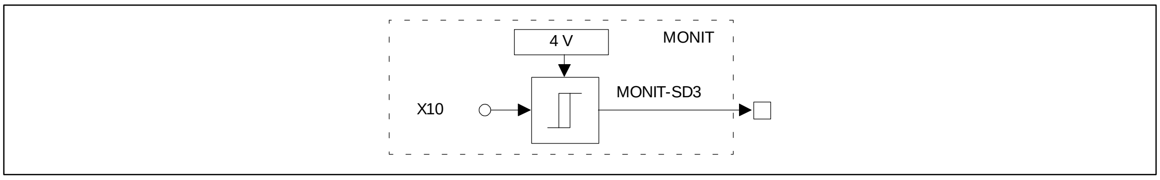


Abb. 7-204 Dig-Set monitoring Sd3

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Possibilities	
X10	-	-	-	-	-	-	-
MONIT-SD3	d	-	-	-	-	-	-

Function

The monitoring Sd3 will be activated if the dig. frequency input X9 of pin 8 is not voltage supplied. It indicates an interruption of the dig. frequency connection.

Features:

- LECOM No.: 83, 2083
- Reaction: TRIP, WARNING or OFF

7.5.3.14 System fault CCr

Purpose

Controller protection

Function

The processor was disturbed in its program sequence. For safety reasons the operation is interrupted.

Remedy:

- Check PE connections
- Screen control cables and motor cables, if necessary

Features:

- LECOM no.: 71
- Reaction: TRIP (cannot be modified)

7.5.3.15 Parameter set error PR1, PR2, PR3, PR4

Purpose

Controller protection

Function

During loading, each of the parameter sets is checked for completeness and correctness. If a difference should be recognized, the controller changes to the TRIP state. The incorrect parameter set is displayed (C0168; PR1 = parameter set1 etc.).

At the same time, the default setting is loaded, but not saved (after TRIP-RESET the controller operates with the default settings, until the setting is changed).

The cause can be a transmission error during the transmission of parameter sets to the controller.

Remedy:

The corresponding parameter set must be reset or transmitted to the controller again.

This interference can also be caused by an interrupt of the transmission of parameter sets by the operating unit (e.g. by an early disconnection of the operating unit).

Features:

- LECOM
  - No.: 72 (PR1)
  - No.: 73 (PR2)
  - No.: 77 (PR3)
  - No.: 78 (PR4)
- Reaction: TRIP (cannot be modified)

7.5.3.16 Parameter error PRO

Purpose

Protects the controller.

Function

Function of LECOM No. 79 (PI)

Some parameters are used for the internal calculation of servo data. The monitoring will be activated if this calculation detects faulty values.

Reasons:

Data from a high-power controller were transferred to a low-power controller, e. g. the values set for the motor do not match the controller.

Please contact Lenze, and give them the value indicated under the codes C0300 and C0301.

Function of LECOM No. 75 (PR0)

This fault message is activated if the saved parameter does not correspond to the loaded software version. Factory setting will then be loaded automatically. All parameter sets must be saved again manually to acknowledge PR0 (C0003). A fault message can only be acknowledged after saving.

STOP

Stop!

It is not enough to save one parameter set.

Features:

- LECOM
  - – No.: 79 (PI)
  - – No.: 75 (PR0)
- Reaction: TRIP (unchangeable)

7.5.3.17 Communication error CE0

Purpose

Process monitoring

Function

The communication between an automation interface X1 and a fieldbus module is interfered.

Remedy:

Plug in fieldbus module correctly and bolt.

Features:

- LECOM no.: 61
- Reaction: TRIP (cannot be modified)

7.5.3.18 Contouring error P03

Purpose

Process monitoring

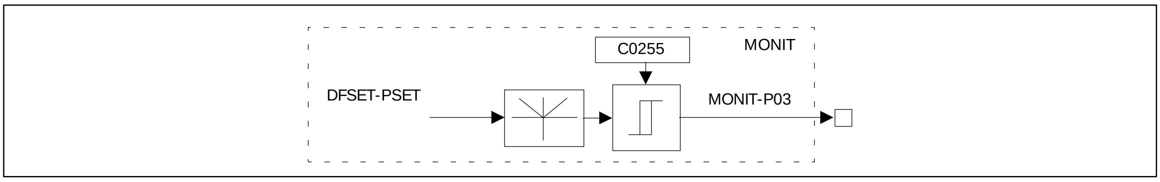


Abb. 7-205 Contouring error P03

Signal				Source			Note
Name	**Type**	**DIS**	**DIS format**	**CFG**	**List**	**Lenze**	
DFSET-PSET	-	-	-	-	-	-	-
MONIT-P03	d	-	-	-	-	-	-

Function

The monitoring reacts if the drive is not able to follow its set phase, because, e.g.

- the centrifugal mass is too large for the set acceleration or deceleration time

or

- the torque limit is reached (load torque > drive torque)

Remedy:

- Unload drive

or

- increase torque limit at the servo controller (if the power limits of the controller are not yet achieved).

The monitoring is derived from the phase difference of setpoint integrator minus actual phase integrator. The comparison value (contouring error limit C0255) can be set by a code. Homing points are only lost if a TRIP reaction is set.

Features:

- For process monitoring
- LECOM no.: 153, 2153
- Reaction: TRIP, WARNING or OFF

7.5.3.19 Phase controller overflow P13

Purpose

Process monitoring

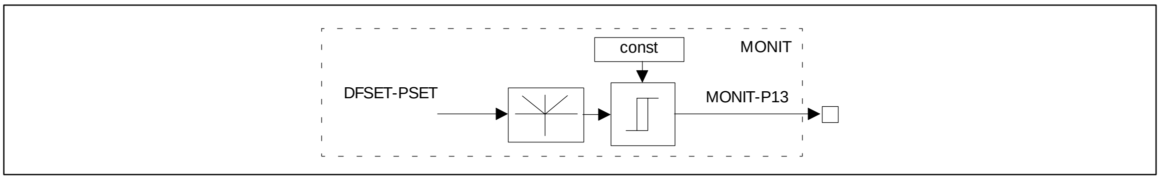


Abb. 7-206 Phase controller overflow P13

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
DFSET-PSET	-	-	-	-	-	-	-
MONIT-P13	d	-	-	-	-	-	-

Function

If this monitoring reacts, the phase deviation which can be represented internally, is exceeded. Homing points are lost.

When the monitoring is switched off, the homing points are also lost.

Features:

- LECOM no.: 163
- Reaction: TRIP or OFF

7.5.3.20 Power stage identification H07

Purpose

Controller protection

Function

This monitoring is only effective if a control type with history buffer is used. It does not provide an additional binary output.

If this monitoring reacts, the controller has detected an incorrect power stage. This indication can only be reset by mains switching.

If this indication should occur again, please contact Lenze.

Features:

- LECOM no.: 107
- Reaction: TRIP (cannot be modified)

7.5.3.21 Fault after automatic adjustment H30

Purpose

Controller protection

Function

This monitoring is only effective if a control type with history buffer is used. It does not provide an additional binary output.

This indication is generated if an internal automatic adjustment has failed during mains switching.

Please contact Lenze.

The controller can only be reset by mains switching.

Features:

- LECOM no.: 130
- Reaction: TRIP (cannot be modified)

7.5.3.22 Fault in the resolver driver H06

Purpose

Protects the controller.

Function

This monitoring is effective if a control type with history buffer is used. It does not provide an additional binary output.

This message will be generated if a fault occurs in the resolver driver during mains connection. Please contact Lenze.

Resetting is only possible by mains switching.

Features:

- LECOM no.: 106
- Reaction: TRIP (unchangeable)

7.5.3.23 System speed monitoring N_{Max}

Purpose

Monitors the process.

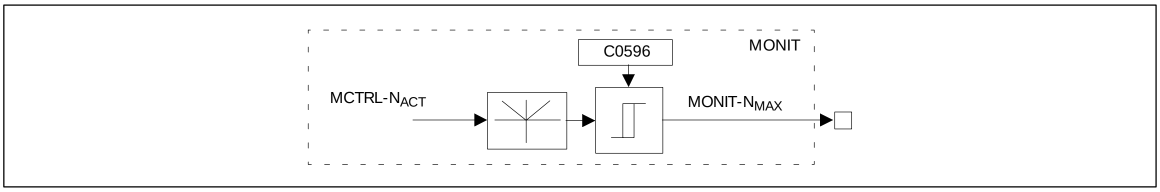


Abb. 7-207 System speed monitoring N_{Max}

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
MCTRL-N_{ACT}	-	-	-	-	-	-	assignment cannot be changed
MONIT-N_{MAX}	d	-	-	-	-	-	-

Function

Independently of the direction of rotation, the max. system speed can be selected under code C0596. The monitoring is activated if:

- the actual speed exceeds the limit set under C0596.
- the actual speed exceeds the value set under C0011 (n_{max}) by 200%.

Stop!

- With active loads (e.g. hoists) ensure that no torque is generated. Special, system-specific measures are required.
- In the event of a failure of the actual speed encoder it cannot be guaranteed that the monitoring will be activated.

Features:

- LECOM-No.: 200
- Reaction: TRIP (unchangeable)

7.5.4 Fault indication via digital output

In the function block DIGOUT the fault messages TRIP, message and warning can be assigned to the digital outputs (e. g. terminals X5/A1… X5/A4).

Display TRIP or Message or Warning individually (individual indication):

1. Select digital output in the code level under C0117 and subcode.
2. Assign TRIP or Message or Warning in the parameter level.

Display TRIP, Message, Warning collectively (collective indication):

1. Assign TRIP, message and warning to an OR-element.
2. Select digital output in the code level under C0117 and subcode.
3. Assign output of the OR-element in the parameter level.

Display monitoring functions individually:

1. Select digital output in the code level under C0117 and subcode.
2. Assign monitoring function (e.g. MONIT-OH7).

7.6 Parameterization

- The parameter setting of the controller is used to adapt the drive to your applications.
- The complete parameter set is organized in codes which are consecutively numbered and always begin with ”C” (see code table, chapter 7.8).
- You can save the parameter set of an application.
  - Four parameter sets are available so that the controller can be adjusted rapidly from one application to another.
  - When delivered, the parameter sets are factory-set.

7.7 Ways of parameterization

There are two ways to change parameters:

- Using the operating module
- Using a superimposed host (PC or PLC) via fieldbus modules and operating programs (see accessories chapter 13).

In these operating instructions, only the change of parameters using the operating module is described.

7.7.1 Structure of the parameter set

To simplify operation, the operating module 9371BB and the PC programs GLOBAL DRIVE CONTROL and LEMOC2 consist of menu levels which will guide you rapidly to the desired codes:

- Main menu
  - contains submenus
  - contains the complete code list
- Submenus
  - contain the codes which are assigned to them

Codes consist of:

- Code level
  - Codes without subcodes contain one parameter
  - Codes with subcodes contain several parameters
- Parameter level/operating level
  There are four different parameter types:
  - Absolute values of a physical variable
    (e.g. 400 V, 10 s)
  - Relative values of controller variables
    (e.g. 50 % setpoint)
  - Codes for specific states
    (e.g. 0 = controller inhibited, 1 = controller enabled)
  - Display values
    These values can only be displayed and not changed.
    (e.g. actual motor current under C0054)

You can change absolute and relative values in discrete steps.

7.7.2 List of the selection menus

Operating module 9371 BB		**Global Drive Control or LEMOC2**	
Main menu	**Submenu**	**Main menu**	**Submenu**
USER menu		USER menu	
Code list		Code list	
Load / Store		Parameter set management	
Diagnostic		Diagnostics	
	Actual info		Momentary operation
	History		History
Short setup		Short setup	
	Speed mode		Speed mode
	Torque mode		Torque mode
	DF master		Digital frequency master
	DF slave bus		Digital frequency slave bus
	DF slave cas		Digital frequency slave cascade
	UserMenue CFG		Configuration User Menu
Main FB		Main function blocks	
	NSET		NSET: Speed preparation
	NSET-JOG		NSET-JOG: JOG values
	NSET-RAMP1		NSET-RAMP1: Standard ramp generator
	MCTRL		MCTRL: Motor control
	DFSET		DFSET: Digital frequency processing
	DCTRL		DCTRL: Device control
Terminal I/O		Terminal I/O	
	AIN1 X6.1/2		Analog input 1 X6.1/2
	AIN2 X6.3/4		Analog input 2 X6.3/4
	AOUT1 X6 62		Analog output 1 X6/62
	AOUT2 X6 63		Analog output 2 X6/63
	DIGIN		Digital inputs
	DIGOUT		Digital outputs
	DFIN		Digital frequency input
	DFOUT		Digital frequency output
	State bus		Statebus
Controller		Controller setting	
	Speed		speed
	Current		Current/Torque
	Phase		Phase
Motor/Feedb.		Motor/Feedback system	
	Motor adj		Motor adjustment
	Feedback		Feedback systems
Monitoring		Monitoring	

Operating module 9371 BB		**Global Drive Control or LEMOC2**	
Main menu	**Submenu**	**Main menu**	**Submenu**
LECOM/AIF		LECOM/AIF interface	
	LECOM-A/B		LECOM-A/B
	AIF interface		AIF data interface
	Status word		Status word
System bus		System bus	
	Management		CAN management
	CAN-IN1		CAN-IN1 Input block 1
	CAN-OUT1		CAN-OUT1 Output block 1
	CAN-IN2		CAN-IN2 Input block 2
	CAN-OUT2		CAN-OUT2 Output block 2
	CAN-IN3		CAN-IN3 Input block 3
	CAN-OUT3		CAN-OUT3 Output block 3
	Status word		Status word
	FDO		FDO: Free digital outputs
	Diagnostic		Diagnostics
FB config		FB configuration	
Func. blocks		Function blocks	
	ABS		ABS: Absolute value
	ADD		ADD Addition
	AIF-OUT		AIF-OUT Data interface
	AIN1		AIN1 Analog input1 (term. 1/2
	AIN2		AIN2 Analog input2 (term. 3/4
	AND1		AND1 Logic AND
	AND2		AND2 Logic AND
	AND3		AND3 Logic AND
	AND4		AND4 Logic AND
	AND5		AND5 Logic AND
	AND6		AND6 Logic AND
	AND7		AND6 Logic AND
	ANEG1		ANEG1 Analog NOT
	ANEG2		ANEG2 Analog NOT
	AOUT1		AOUT1 Analog output term. 62
	AOUT2		AOUT2 Analog output term. 63
	ARIT1		ARIT1 Arithmetics
	ARIT2		ARIT2 Arithmetics
	ARITPH1		ARITPH1 32 Bit Arithmetics
	ASW1		ASW1 Analog switch
	ASW2		ASW2 Analog switch
	ASW3		ASW3 Analog switch
	ASW4		ASW4 Analog switch
	BRK		BRK Brake logic
	CAN-OUT1		CAN-OUT1 Output block 1
	CAN-OUT2		CAN-OUT2 Output block 2
	CAN-OUT3		CAN-OUT3 Output block 3
	CONV2		CONV2 Converter

Configuration

Operating module 9371 BB		Global Drive Control or LEMOC2	
Main menu	**Submenu**	**Main menu**	**Submenu**
	CFG-FB		CFG FB configuration
	CMP1		CMP1 Analog comparator
	CMP2		CMP2 Analog comparator
	CMP3		CMP3 Analog comparator
	CONV1		CONV1 Converter
	CONV3		CONV3 Converter
	CONV4		CONV4 Converter
	CONV5		CONV5 Converter
	CONV6		CONV6 Converter
	CONVPHA1		CONVPHA1 32-bit converter
	CONVPHPH1		CONVPHPH1 32-bit converter
	CONVPP1		CONVPP1 32-bit / 16-bit converter
	DB		DB Analog dead band
	DCTRL		DCTRL Device control
	DFIN		DFIN Digital frequency input
	DFOUT		DFOUT Digital frequency output
	DFRFG		DFRFG Digital frequency ramp generator
	DFSET		DFSET Digital frequency processing
	DIGDEL1		DIGDEL1 Digital delay
	DIGDEL2		DIGDEL2 Digital delay
	DIGIN		DIGIN Digital input E1 - E5
	DIGOUT		DIGOUT Digital output A1 - A4
	DT1		DT1 Differential element
	FCNT1		FCNT1 Counter
	FDO		FDO Free digital outputs
	FEVAN1		FEVAN1 Free analog input variable
	FEVAN2		FEVAN2 Free analog input variable
	FIXSET		FIXSET Fixed setpoints
	FLIP1		FLIP1 Flip-Flop
	FLIP2		FLIP2 Flip-Flop
	LIM		LIM Limiter
	GEARCOMP		GEARCOMP Gearbox torsion
	MCTRL		MCTRL Motor control
	MFAIL		MFAIL Mains failure detection
	MPOT		MPOT Motor potentiometer
	NOT1		NOT1 Logic NOT
	NOT2		NOT2 Logic NOT
	NOT3		NOT3 Logic NOT
	NOT4		NOT4 Logic NOT
	NOT5		NOT5 Logic NOT
	NSET		NSET Speed preparation
	NSET-JOG		NSET-JOG JOG values
	NSET-RAMP1		NSET-RAMP1 Standard ramp generator
	OR1		OR1 Logic OR
	OR2		OR2 Logic OR
	OR3		OR3 Logic OR
	OR4		OR4 Logic OR
	OR5		OR5 Logic OR

Operating module 9371 BB		**Global Drive Control or LEMOC2**		
Main menu	**Submenu**	**Main menu**	**Submenu**	
	PCTRL		PCTRL	Process controller
	PHADD1		PHADD1	32-bit adding element
	PHCMP1		PHCMP1	Phase comparator
	PHCMP2		PHCMP2	Phase comparator
	PHCMP3		PHCMP3	Phase comparator
	PHDIFF1		PHDIFF1	32-bit comparison between setpoint and actual value
	PHDIV1		PHDIV1	Phase division
	PHINT1		PHINT1	Phase integrator
	PHINT2		PHINT2	Phase integrator
	PHINT3		PHINT3	Phase integrator
	PT1		PT1	Delay element
	R/L/Q		R/L/Q	CW-CCW-QSP
	REF		REF	Homing
	RFG		RFG	Ramp generator
	SRFG1		SRFG1	S-shaped ramp generator
	STORE1		STORE1	Saving phase, E5
	STORE2		STORE2	Saving phase, E4
	SYNC1		SYNC1	Control program synchronization
	TRANS1		TRANS1	Signal evaluation
	TRANS2		TRANS2	Signal evaluation
	TRANS3		TRANS3	Signal evaluation
	TRANS4		TRANS4	Signal evaluation
FCODE		Free codes		
Identify		Identification		
	Drive		Controller	
	Op Keypad		LECOM	

7.7.3 Parameter change using the keypad

7.7.3.1 Keypad

(Order number: EMZ9371BB)

The keypad can be connected or disconnected from X1 during operation.

After the keypad has been connected to the controller it is initialized. The keypad is ready for operation when ”GLOBAL DRIVE READY” is indicated.

Front view

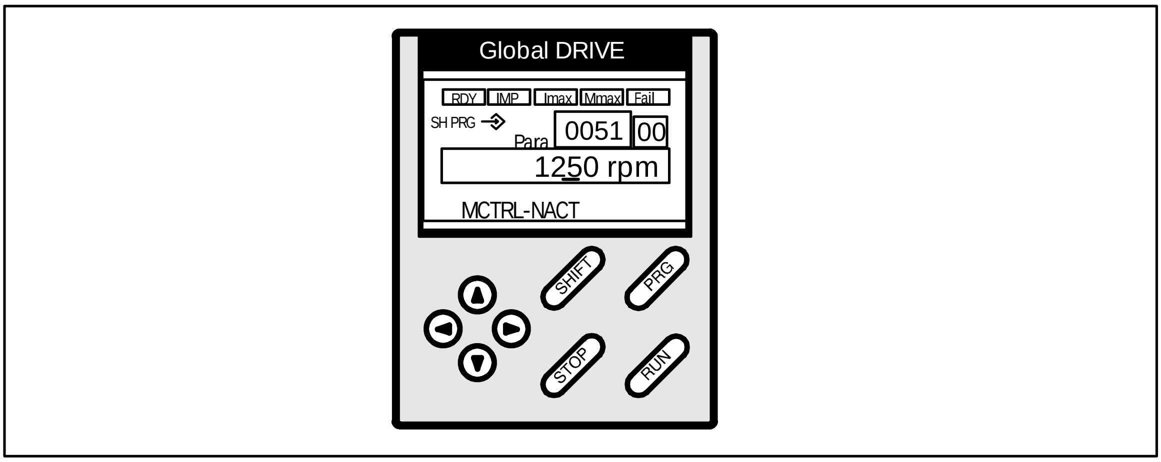


Abb. 7-208 The keypad

LCD

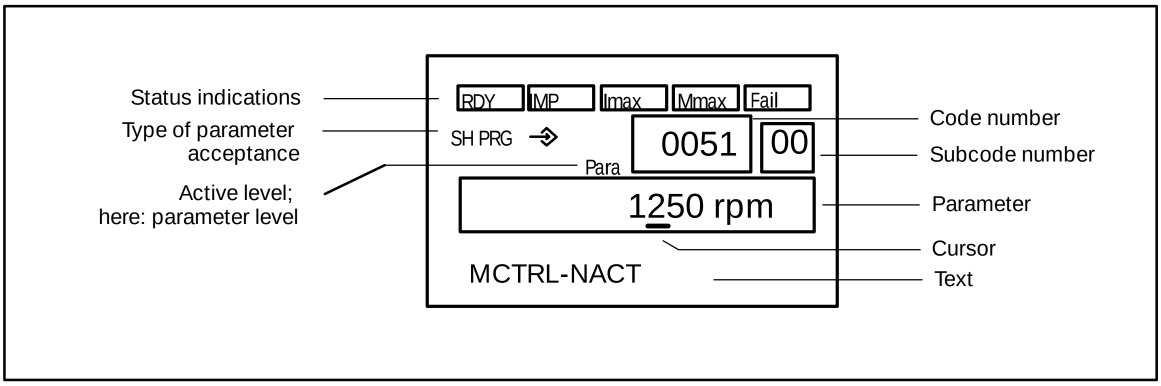


Abb. 7-209 LCD display on the keypad

Segments and status messages of the LCD display:

Segment	Explanation
Code number	Four-digit code number
Subcode number	Two-digit subcode number
Parameter	Parameter value with up to twelve digits
Text	Text with max. 13 characters; Operating level: Status information from C0183 or content of C0004
SH PRG ➾	SH PRG ➾ : Parameter acceptance by pressing SHIFT + PRG (OFFLINE)
	SH PRG: Parameter acceptance with SHIFT + PRG when the controller is inhibited (OFFLINE)
	➾ : Parameter is directly accepted by the controller (ONLINE)
	Empty: Parameter cannot be changed
Active level	Menu = Menu level, Code = Code level, Para = Parameter level, Nothing displayed = Operating level

Status messages of the keypad		
Display	**on**	**off**
RDY	Ready for operation	Initialization or fault
IMP	Power outputs inhibited	Power outputs enabled
FAIL	Active fault	No fault
I_{MAX}	Motor current setpoint ≥ C0022	Motor current setpoint < C0022
M_{MAX}	Speed controller 1 within limitation. Drive is torque controlled.	Drive is speed controlled.

Key functions

”SHIFT + ” means:

1. Press SHIFT and remain pressing it.
2. Press another key indicated.

Keys	Function		
	Menu level	**Code level**	**Parameter level/operating level**
PRG	-	Change between code, parameter and operating level	
SHIFT + PRG	-	-	Parameter acceptance (depends on parameter and menu)
▲	Next higher menu point	Next higher code number	Increase indicated number
SHIFT + ▲	Quickly to next higher menu point	Quickly increase code number	Quickly increase displayed number
▼	Next lower menu point	Next lower code number	Decrease displayed number
SHIFT + ▼	Quickly to next lower menu point	Quickly decrease code number	Quickly decrease displayed number
◀	Next higher menu level	Jump to menu level	Cursor left
▶	Next lower menu level (submenus) or code level	-	Cursor right
RUN	Void STOP-key function		
STOP	Inhibit controller: Quick stop, ctrl. inhibit or switched off C0469 Trip reset: If a TRIP occurs and the STOP key is pressed (independently of C0469) Press RUN afterwards. The LED in the STOP-key indicates its status. ● LED on: STOP-key pressed ● LED off: RUN-key pressed		

Operating level

Change from the prameter level to the operating level by pressing PRG.

- The operating level indicates additional status information or displays the additional display value determined under C0004 (presetting: act. speed C0051).
  – In the USER menu the first line indicates the first code of the USER menu.
- The additional information is indicated according to the following priority list:

Priority	Display	Meaning
1	GLOBAL DRIVE INIT	Initialization or communication fault between keypad and controller
2	XXX - TRIP	Active TRIP (contents of C0168/1)
3	XXX - MESSAGE	Active message (contents of C0168/1)
4	Special controller status:	
		Switch-on inhibit
5	Source for controller inhibit (at the same time value of C0004 is displayed):	
	STP1	Terminal X5/28
	STP3	Keypad or LECOM A/B/LI
	STP4	InterBus-S or Profibus
	STP5	System bus (CAN)
	STP6	C0040
6	Source for quick stop:	
	QSP-term-Ext	Input MCTRL-QSP at function block MCTRL is at HIGH signal (factory setting: assigned to terminals X5/E1 and X5/E2)
	QSP-C0135	Keypad or LECOM A/B/LI
	QSP-AIF	InterBus-S or Profibus
	QSP-CAN	System bus (CAN)
7	XXX - WARNING	Active warning (contents of C0168/1)
8	xxxx	Value of C0004

User menu

In practical use it might be necessary to change certain codes more than once.

Under C0517 it is therefore possible to install a user menu with max. 32 codes which are to be changed most frequently.

- The number before the comma is the code number.
- The number after the comma stands for the subcode.
- Code-subcode combinations must only occur once.

7.7.3.2 Change parameters

Note!

The changed parameter set must be saved if the changes are to remain valid after mains switch-off (see chapter 7.7.3.3).

Basic procedure

1. Use the arrow keys to change from the menus ▲, ▼, ◀ or ▶ to the code level. ”Code” is displayed.
2. With ▲ or ▼ code or subcode can be selected.
3. Change to the parameter level using PRG. ”Para” is displayed.
4. With ◀ or ▶ the cursor (small, black bar) can be moved under the digit to be changed.
5. With ▲ or ▼ change digit.
6. If necessary, repeat 4. and 5. to change other digits.
7. Accept parameters. The LCD next to the parameter indicates how the controller accepts the changed parameter:

Display next to the parameter	Controller has accepted the new value
⇨	immediately, during the change
SH+ PRG ⇨	after having pressed SH+ PRG. Acknowledgement: ok is displayed
SH+ PRG	Press STOP to inhibit the controller. Press SHIFT + PRG. Acknowledgement: ok is displayed Press RUN to enable the controller.

8. Change to the code level by 2 * PRG. ”Code” is displayed.

7.7.3.3 Save parameter set

Save the parameters to ensure that the settings will not be lost after mains switch-off.

- Up to 4 different parameter sets can be created, if this is required by, for instance, a machine, which processes different materials or works in different operating states (set-up operation, ”stand by”, etc.).
- If you need only one parameter set, save the changes permanently under parameter set 1, since the controller loads this parameter set automatically after every switch on.

Procedure

1. Use the arrow keys to change from the menus to the code level.
   ”Code” is displayed.
2. With ▲ or ▼ select C0003.
3. Change to the parameter level using PRG.
   ”Para” is displayed.
4. With ▲ or ▼ set parameter to 1 (also during operation).
   Note: If the parameter set is to be saved in a different location, select 2, 3 or 4 instead of 1.
5. Press SHIFT + PRG.
   ”OK” is displayed for approx. 1 s.
   Your settings are now saved permanently under parameter set 1 (or 2, 3 or 4).

7.7.3.4 Load parameter set

(only possible with controller inhibit)

Warning!

- After loading of a new parameter set the controller will be initialized again and behaves as if the mains was switched on:
  - – System configurations and terminal assignment can be changed. Ensure, that your wiring and drive configuration correspond to the settings of the parameter set.
- Only use terminal X5/28 as source for the controller inhibit! Otherwise, the drive can start in an uncontrolled way when changing to another parameter set.

Note!

The RDY message is not displayed while the parameter set is loaded, since the controller cannot be operated then.

Mains connection

The controller loads parameter set 1 automatically.

Keypad

1. X5/28 = LOW
2. With ▲ or ▼ select C0002.
3. Change to the parameter level using PRG.
4. With ▲ or ▼ select required parameter set.
5. Press SHIFT + PRG.
   ”OK” is displayed. Loading is over as soon as ”OK” is off.
6. Enable the controller with X5/28 = HIGH.

Terminal control

It is possible to change to other parameter sets using, for instance, the digital inputs X5/E1 … X5/E5.

After mains switch-on the controller reads parameter set 1. After that the terminals are evaluated and the selected parameter set is loaded. A LOW-HIGH signal at input DCTRL-PAR-LOAD (”Load parameter set”) is not required.

- In each parameter set one or two digital inputs must be assigned to ”Select parameter set”:
  - – Determine the source(s) for ”Select parameter set” under C0880. The signal names are: DCTRL-PAR*1 and DCTRL-PAR*2.
- In each parameter set one digital input must be assigned to ”Load parameter set”:
  - – Determine the source for ”Load parameter set” under C0881. The signal name is: DCTRL-PAR-LOAD.
- These inputs must be assigned identically for all parameter sets to be used.

- The controller reads the terminals assigned to ”Select parameter” as binary code. The input DCTRL-PAR*1 is the first input, the input DCTRL-PAR*2 is the second input. Input (e.g. E1 = 1st input, E2 = 2nd input).
  - – The signal must be constantly assigned to the terminals for at least 10 ms to ensure that the parameter set to be loaded is correct.
  - – Terminal signals for the selection of parameter sets:

	1st input (DCTRL-PAR*1)	**2nd input (DCTRL-PAR*2)**
Parameter set 1	LOW	LOW
Parameter set 2	HIGH	LOW
Parameter set 3	LOW	HIGH
Parameter set 4	HIGH	HIGH

- A LOW-HIGH signal at the input ”Load parameter set” DCTRL-PAR-LOAD switches to the new parameter set.

Procedure:

1. Control digital inputs which are assigned to the function ”Select parameter set”.
2. Inhibit the controller with X5/28 = LOW.
3. Activate a LOW-HIGH signal at the input ”Load parameter set”.
4. After loading:
   - – C0002 indicates the number of the loaded parameter set.
   - – RDY is on.
5. Enable the controller with X5/28 = HIGH.

7.7.3.5 Parameter set transfer

(only possible with controller inhibit)

Warning!

- After loading of a new parameter set the controller will be initialized again and behaves as if the mains was switched on:
  - – System configurations and terminal assignment can be changed. Ensure, that your wiring and drive configuration correspond to the settings of the parameter set.
- Only use terminal X5/28 as source for the controller inhibit! Otherwise, the drive can start in an uncontrolled way when changing to another parameter set.

Use the keypad to transfer complete parameter sets from one controller (e.g. controller 1) to another controller (e.g. controller 2).

When copying from the controller to the keypad all parameter sets are copied and saved in the keypad.

Procedure:

1. Plug the keypad in controller 1.
2. Inhibit the controller with X5/28 = LOW.
3. Save the last changes in the corresponding parameter set under C0003.
4. Use the arrow keys to change from the menus to the code level.
   ”Code” is displayed.
5. With ▲ or ▼ select C0003.

6. Change to the parameter level using PRG.
   ”Para” is displayed.
7. Select parameter 11.
8. Press SHIFT + PRG.
   RDY is off. BUSY is displayed.
   All parameter sets are copied to the keypad. Copying is completed when BUSY is off (after approx. one minute).

Stop!

Do not plug out the keypad before BUSY is off. Otherwise, TRIP ”PRX” will be indicated.

---

9. Enable the controller with X5/28 = HIGH.
10. Plug the keypad in controller 2.
11. Inhibit the controller 2 with X5/28 = LOW.
12. Use the arrow keys to change from the menus to the code level.
    ”Code” is displayed.
13. With ▲ or ▼ select C0002.
14. Change to the parameter level using PRG.
    ”Para” is displayed.
15. Select parameter 20 to copy all parameter sets from the keypad to the controller 2 **and** to save them.
16. Press SHIFT + PRG.
    RDY is off. BUSY is displayed.
    All parameter sets are copied to controller 2 and saved. Copying and saving is completed when BUSY is off.
17. Enable the controller with X5/28 = HIGH.

Note!

It is also possible to copy single parameter sets from the keypad to the controller 2:

- For this, use parameters 11, 12, 13, or 14 instead of parameter 20 to copy the parameter sets 1, 2, 3, or 4 to the the controller 2.15.
- The copied parameter sets must be saved if the changes are to remain valid after mains switch-off (see chapter 7.7.3.3).

7.7.3.6 Password protection

Code	LCD	Possible settings		IMPORTANT
		Lenze	Selection	
C0094	Password	0	0 ... 9999	Password • Parameter access protection for the keypad. If the password is activated, only codes of the USER menu are made available. For further selection possibilities see C0096.
[C0096] 1 2	 AIF protect. CAN protect.	 0 0	 0 No password protection 1 Read protection 2 Write protection 3 Read/write protection	Extended password protection for bus systems with activated password (C0094). • Full access to codes in the user menu.

With password protection under C0094m the access to codes via keypad can be limited.

- Reading of C0094 with the keypad:
  - – C0094 = 0: Password protection is not activated.
  - – C0094 = 9999: Password protection is activated.
- Activate password protection:
  - – Enter a four digit number under C0094.
  - – Confirm input with SH + PRG.
- Deactivate password protection:
  - – Enter four digit number again.
  - – All other entries will be rejected.

Effect

- Working with the keypad:
  - – The codes of the USER menu can be read and changed.
  - – All other codes are no longer displayed.
- Working with the fieldbus:
  - – With C0096/1 (AIF) and C0096/2 (CAN) it is possible to extend the access protection for fieldbus operation.

7.7.4 Display functions

Act. value display

The actual values can be read under the following codes:

Code	Meaning
C0051	Absolute act. speed value [rpm]
C0052	Absolute motor voltage [V]
C0053	Absolute DC-bus voltage [V]
C0054	Absolute motor current [A]
C0060	Rotor position [inc/rev]
C0061	Heat sink temperature [°C]
C0063	Absolute motor temperature [°C] Display only if the KTY (PTC) is connected via X7 or X8.
C0064	Controller load capacity [%]

Identification

- Read under C0099 which software version is used by the controller.
- C0093 indicates the controller type.

EDS9300U--SD1.2
00408841

Lenze

Manual
Part D1.2

Code table servo inverter

Global Drive
9300 servo inverter

This manual is valid for the 93XX controllers of the versions

33.932X-	ES	2x.	2x		(9321 - 9329)
33.933X-	ES	2x.	2x		(9330 - 9332)
33.932X-	CS	2x.	2x	-V003	Cold Plate (9321 - 9328)

Controller type

Design:
Ex = Enclosure IP20
Cx = Cold Plate
xK = Cam profiler
xP = Servo position controller
xR = Register controller
xS = Servo inverter

Hardware version and index

Software version and index

Variant

Explanation

Version 1.0 07/99

Part D1.2

Contents

7.8 Code table

How to read the code table:

Column	Abbreviation	Meaning
Code	C0039 1 2 ... 14 15	Code C0039 Subcode 1 of code C0039 Subcode 2 of code C0039 ... Subcode 14 of code C0039 Subcode 15 of code C0039
	[C0005]	Parameter value of the code can only be modified when controller is inhibited
LCD		Keypad LCD • DIS: ... Only display • CFG: ... Configured value is indicated on the LCD of the keypad • All other are parameter values
Lenze		Factory setting of the code
	*	The column "Important" contains further information
Selection	1 {1 %} 99	Minimum value {smallest step/unit} maximum value
IMPORTANT	-	Additional, important explanation of the code
	🕮 7-1	Reference on page with further information on the code

Code	LCD	Possible settings			IMPORTANT
		Lenze	Choice	Info	
C0002	Par load	0	0 Load default	Load factory setting into RAM	Load parameter set • Parameter set1 is loaded automatically after every mains connection.
			1 Load PS1 2 Load PS2 3 Load PS3 4 Load PS4	Load parameter set x into the RAM and activate	
			11 Load ext PS1 12 Load ext PS2 13 Load ext PS3 14 Load ext PS4	Load parameter set x from the operating module into the RAM and activate	
			20 ext -> EEPROM	Transmit all parameter sets from the operating module to the controller and store non-volatile	
C0003	Par save	0	0 Ready	Saving completed	Save parameter set
			1 Save PS1 2 Save PS2 3 Save PS3 4 Save PS4	Save current parameter set x non-volatile	
			11 Save extern	Save all parameter sets to the operating module	
C0004	Op-display	56	All available codes	Operating display	Operating module shows selected code in the operating level if no other status indications of C0183 are active.

Configuration

Code	LCD	Possible settings				IMPORTANT
		Lenze	Choice		Info	
[C0005]	Signal CFG	1000			Signal configuration (predefined basic configurations)	
			0000	Common	Modified basic configuration	
			1	CFG:86xx -1-	Compatible to frequency inverter 86xx: C005 = -1-/-2-/-11-	
			2	CFG:86xx -2-		
			2	CFG:86xx -11-		
			20	CFG:922x -20-	compatible to servo controller 922x: C005 = -20-/-21-	
			21	CFG:922x -21-		
			100	CFG:empty	All internal connections are removed	
			1000	Speed mode	Speed control	The digit indicates the predefined controller control ● xxx1: RS232, RS485 or fiber-optics ● xxx3: InterBus-S or Profibus ● xxx5: Systembus (CAN) The last digit but one indicates the predefined voltage source for the control terminals ● xx0x: external supply voltage ● xx1x: internal voltage supply via X5/A1 The last digit but two indicates additional functions ● x1xx: Brake control ● x9xx: in case of quick stop the complete connection of drives is phase-controlled to zero speed
			1001	Speed 1		
			1003	Speed 3		
			1005	Speed 5		
			1010	Speed 10		
			1011	Speed 11		
			1013	Speed 13		
			1015	Speed 15		
			1100	Speed 100		
			1101	Speed 101		
			1103	Speed 103		
			1105	Speed 105		
			1110	Speed 110		
			1111	Speed 111		
			1113	Speed 113		
			1115	Speed 115		
			4000	Torque mode	Torque control with speed limitation	
			4001	Torque 1		
			4003	Torque 3		
			4005	Torque 5		
			4010	Torque 10		
			4011	Torque 11		
			4013	Torque 13		
			4015	Torque 15		
			5000	DF mst	Master for digital frequency coupling	
			5001	DF mst 1		
			5003	DF mst 3		
			5005	DF mst 5		
			5010	DF mst 10		
			5011	DF mst 11		
			5013	DF mst 13		
			5015	DF mst 15		
			5900	DF mst 900		
			5901	DF mst 901		
			5903	DF mst 903		
			5905	DF mst 905		
			5910	DF mst 910		
			5911	DF mst 911		
			5913	DF mst 913		
			5915	DF mst 915		
			6000	DF slv bus	Slave to digital frequency bus	
			6001	DF slv bus 1		
			6003	DF slv bus 3		
			6005	DF slv bus 5		
			6010	DF slv bus 10		
			6011	DF slv bus 11		
			6013	DF slv bus 13		
			6015	DF slv bus 15		

Code	LCD	Possible settings			IMPORTANT
		Lenze	Choice	Info	
			7000 DF slv cas 7001 DF slv cas 1 7003 DF slv cas 3 7005 DF slv cas 5 7010 DF slv cas 10 7011 DF slv cas 11 7013 DF slv cas 13 7015 DF slv cas 15	Slave to digital frequency cascade	
[C0006]	Op mode	*		Operating mode of the motor control	→ depending on C0086 • Change of C0086 resets value to the assigned default setting • Change of C0006 sets C0086 = 0!
			1 SSC norm Y	sensorless control for motors in star connection	
			2 Servo async Y	Servo control asynchronous motors in star connection	
			3 Servo PM-SM Y	Servo control synchronous motors in star connection	
			11 SSC norm	sensorless control for motors in delta connection	
			22 Servo async	Servo control asynchronous motors in delta connection	
C0009	LECOM address	1	1 {1} 99	Device address	Bus device number when operated via interface • 10, 20, ..., 90 reserved for broadbast to device groups for RS232, RS485, fibre optics.
C0011	Nmax	3000	500 {1 rpm} 16000	Maximum speed	Reference value for the absolute and relative setpoint selection for the acceleration and deceleration times. • For parameterization via interface: Large changes in one step should only be made when the controller is inhibited.
C0012	Tir (acc)	0,000	0,000 {0,001 s} 999.900	Acceleration time T_{ir} for the main setpoint of NSET	Related to the speed change 0…n_{max}.
C0013	Tif (dec)	0.000	0.000 {0.001 s} 999.900	Deceleration time T_{if} for the main setpoint of NSET	Related to the speed change 0…n_{max}.
C0017	FCODE (Qmin)	50	-16000 {1 rpm} 16000	Switching threshold $n_{act} < n_x$	n_{act} < C0017 activates the comparator output CMP1-OUT
C0018	fchop	1	0 16/8 kHz sin	Optimum noise reduction with automatic change-over to 8 kHz	Chopping frequency
			1 8 kHz sin	Operation with optimum power	
			2 16 kHz sin	Operation with optimum noise reduction	
C0019	Thresh nact=0	0	0 {1 rpm} 16000	Threshold when $n_{act} = 0$ is recognized.	
C0021	Slipcomp	0.00	0.00 {0.01 %} 20.00	Slip compensation	active only in sensorless control below the value of C0291
C0022	Imax current	→	0 {0.01 A} 1.50 I_r	I_{max}limit	→ depending on C0086 • Change of C0086 resets value to the assigned factory setting (1.5*Imotor) • for RSP change-over to $I_{max} > 1.5\ I_r$ possible for types 9321 to 9324
			0 {0.01 A} 2.00 I_r	I_{max}limit for 9321 to 9324	

Configuration

Code	LCD	Possible settings			IMPORTANT
		Lenze	Choice	Info	
[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 was changed subsequently	
			1 no feedback	Control without feedback system (sensorless control, SSC)	
			10 RSx (Resolver)	The resolver is designated with RSxxxxxxxx.	
			110 IT-512-5V 111 IT-1024-5V 112 IT-2048-5V 113 IT-4096-5V	Incremental encoder with TTL level	
			210 IS-512-5V 211 IS-1024-5V 212 IS-2048-5V 213 IS-4096-5V	Sine-cosine encoder	
			310 AS-512-8V	Single turn Sine-cosine encoder with RS485 interface Type Stegmann	
			410 AM-512-8V	Multi turn Sine-cosine encoder with RS485 interface Type Stegmann	
C0026				Freely assignable code for relative analog signals	Used for:
1	FCODE (offset)	0.00	-199.99 {0.01 %} 199.99		Offset for terminal X6/1,2
2	FCODE (offset)	0.00			Offset for terminal X6/3,4
C0027				Freely assignable code for relative analog signals	Used for:
1	FCODE (gain)	100.00	-199.99 {0.01 %} 199.99		Gain X6/1,2
2	FCODE (gain)	100.00			Gain X6/3,4
C0030	DFOUT const	3	0 256 inc/rev 1 512 inc/rev 2 1024 inc/rev 3 2048 inc/rev 4 4096 inc/rev 5 8192 inc/rev 6 16384 inc/rev	Constant for the digital frequency output in increments per revolution	
C0032	FCODE Gearbox	1	-32767 {1} 32767	Freely assignable code	Used for: Gearbox factor numerator
C0033	Gearbox denom	1	1 {1} 32767	Gearbox factor (denominator) for DFSET	
C0034	Mst current	0	0 -10 V ... + 10 V 1 +4 mA ... +20 mA 2 -20 mA ... +20 mA	Selection: Master voltage/master current for setpoint input	
C0037	Set-value rpm	0	-16000 {1 rpm} 16000	Setpoint input in rpm	
C0039				Fixed speeds (JOG setpoints) can be selected for NSET using digital inputs.	
1	JOG set-value	100.0	-199.99 {0.01 } 199.99		
2	JOG set-value	75.00			
3	JOG set-value	50.00			
4	JOG set-value	25.00			
5	JOG set-value	0.00			
...	...	...			
14	JOG set-value	0.00			
15	JOG set-value	0.00			
C0040	Ctrl enable	1	0 Ctrl inhibit 1 Ctrl enable	Controller inhibit	• Write: – controls the code • Read: – reads the controller status
C0042	DIS: QSP		0 QSP inactive 1 QSP active	Quick stop status	display only

Code	LCD	Possible settings			IMPORTANT
		Lenze	Choice	Info	
C0043	Trip reset		0 no/trip reset 1 trip active	reset current trip Active trip	Reset of an active trip: • Set C0043 = 0
C0045	DIS: act JOG		0 Nset active 1 JOG 1 2 JOG 2 ... 15 JOG 15	Active JOG setpoint	display only
C0046	DIS: N		-199.99 {0.01 %} 199.99	Main setpoint	display only
C0049	DIS: NADD		-199.99 {0.01 %} 199.99	Additional setpoint	display only
C0050	MCTRL-NSET2		-100.00 {0.01 %} 100.00	n_{set} at the speed controller input	display only
C0051	MCTRL-NACT		-30000 {1 rpm} 30000	Actual speed	display only
C0052	MCTRL-Umot		0 {1 V} 800	Actual motor voltage	display only
C0053	UG-VOLTAGE		0 {1 V} 900	DC bus voltage	display only
C0054	IMot		0.0 {0.1 A} 500.0	Actual motor current	display only
C0056	MCTRL-MSET2		-100.00 {0.01 %} 100.00	Torque setpoint (output of the speed controller)	display only
C0057	Max Torque		0.0 {0.1 Nm} 500.0	Maximum possible torque of the drive configuration	display only • depending on C0022, C0086
C0058	Rotor diff		-180.0 {0.1 °} 179.9	Zero phase of the rotor for synchronous motors (C0095)	display only
C0059	Mot pole no.		1 {1} 50	Pole pair number of the motor	display only
C0060	Rotor pos		0 {1} 2047	current rotor position	display only • 1 rev. = 2048 inc
C0061	Heatsink temp		0 {1 °C} 100	Heatsink temperature	display only
C0063	Mot temp		0 {1 °C} 200	Motor temperature	display only
C0064	Utilization		0 {1 %} 150	Controller load I x t during the last 180 s	display only • C0064 >100 % releases Trip OC5 • Trip reset is possible only if C0064 < 95 %
C0067	Act trip		see selection list 10 All fault indications	Momentary fault indication	display only
C0070	Vp speed-CTRL	→	0.0 {0.5} 255.0	V_{pn} speed controller	→ depending on C0086 • Change of C0086 resets value to the assigned default setting
C0071	Tn speed-CTRL	→	1.0 {0.5 ms} 600.0 >512 ms switched off	T_{nn} speed controller	→ depending on C0086 • Change of C0086 resets value to the assigned default setting
C0072	Td speed-CTRL	0.0	0.0 {0.1 ms} 32.0	T_{dn} speed controller	
C0075	Vp curr-CTRL	→	0.00 {0.01} 15.99	V_{pi} current controller	→ depending on C0086 • Change of C0086 resets value to the assigned default setting
C0076	Tn curr-CTRL	→	0.5 {0.1 ms} 1999.0 2000 ms switched off	T_{ni} current controller	→ depending on C0086 • Change of C0086 resets value to the assigned default setting
C0077	Vp field-CTRL	0.25	0.00 {0.01} 15.99	V_{pF} field controller	
C0078	Tn field-CTRL	15.0	1.0 {0.5 ms} 7999.0 8000 ms switched off	T_{nF} field controller	
[C0081]	Mot power	→	0.01 {0.01 kW} 500.00	Rated motor power acc. to nameplate	→ depending on C0086 • Change of C0086 resets value to the assigned default setting • Change of C0081 sets C0086 = 0

Code	LCD	Possible settings			IMPORTANT
		Lenze	Choice	Info	
[C0084]	Mot Rs	→	0.00 {0.01 Ω} 100.00	Stator resistance of the motor required for C0006 = 1	→ depending on C0086 • Change of C0086 resets value to the assigned default setting • Change of C0084 sets C0086 = 0
[C0085]	Mot Ls	→	0.00 {0.01} 200.00	Stray inductance of the motor required for C0006 = 1	→ depending on C0086 • Change of C0086 resets value to the assigned default setting • Change of C0085 sets C0086 = 0
[C0086]	Mot type	→		Selection motor type	→ depending on the controller • Change of C0086 resets C0006, C0022, C0070, C0071, C0081, C0084, C0085, C0087, C0088, C0089, C0090, C0091 to the assigned default setting
			0 COMMON	no Lenze motor	
			10 DSKA56-140	MDSKAXX056-22, f_r: 140Hz	New generation of Lenze asynchronous servo motors integrated temperature monitoring via resolver or encoder cable • The temperature monitoring via resolver or encoder cable is activated automatically, i.e.: C0583 = 0 C0584 = 2 C0594 = 0
			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				IMPORTANT
		Lenze	Choice		Info	
			50	DSVA56-140	DSVAXX056-22, f_r: 140Hz	Lenze asynchronous servo motors without integrated temperature monitoring ● The temperature monitoring via resolver or encoder cable is deactivated automatically, i.e.: C0583 = 3 C0584 = 3 C0594 = 3
			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	
			108	DSKS36-13-200	MDSKSXX036-13, f_r: 200Hz	New generation of Lenze synchronous servo motors integrated temperature monitoring via resolver or encoder cable ● The temperature monitoring via resolver or encoder cable is activated automatically, i.e.: C0583 = 0 C0584 = 2 C0594 = 0
			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	

Configuration

Code	LCD	Possible settings			IMPORTANT
		Lenze	Choice	Info	
			210 DXRA071-12-50 211 DXRA071-22-50 212 DXRA080-12-50 214 DXRA090-12-50 215 DXRA090-32-50 216 DXRA100-22-50 217 DXRA100-32-50 218 DXRA112-12-50 219 DXRA132-12-50 220 DXRA132-22-50 221 DXRA160-12-50 222 DXRA160-22-50 223 DXRA180-12-50 224 DXRA180-22-50 225 30kW-ASM-50 226 37kW-ASM-50 227 45kW-ASM-50 228 55kW-ASM-50 229 75kW-ASM-50	DXRAXX071-12, f_d : 50Hz DXRAXX071-22, f_d : 50Hz DXRAXX080-12, f_d : 50Hz DXRAXX090-12, f_d : 50Hz DXRAXX090-32, f_d : 50Hz DXRAXX100-22, f_d : 50Hz DXRAXX100-32, f_d : 50Hz DXRAXX112-12, f_d : 50Hz DXRAXX132-12, f_d : 50Hz DXRAXX132-22, f_d : 50Hz DXRAXX160-12, f_d : 50Hz DXRAXX160-22, f_d : 50Hz DXRAXX180-12, f_d : 50Hz DXRAXX180-22, f_d : 50Hz	Lenze inverter motor in star connection • The temperature monitoring via resolver or encoder cable is deactivated automatically, i.e.: C0583 = 3 C0584 = 3 C0594 = 3
			250 DXRA071-12-87 251 DXRA071-22-87 252 DXRA080-12-87 254 DXRA090-12-87 255 DXRA090-32-87 256 DXRA100-22-87 257 DXRA100-32-87 258 DXRA112-12-87 259 DXRA132-12-87 260 DXRA132-22-87 261 DXRA160-12-87 262 DXRA160-22-87 263 DXRA180-12-87 264 DXRA180-22-87 265 30kW-ASM-87 266 37kW-ASM-87 267 45kW-ASM-87 268 55kW-ASM-87 269 75kW-ASM-87	DXRAXX071-12, f_d : 87Hz DXRAXX071-22, f_d : 87Hz DXRAXX080-12, f_d : 87Hz DXRAXX090-12, f_d : 87Hz DXRAXX090-32, f_d : 87Hz DXRAXX100-22, f_d : 87Hz DXRAXX100-32, f_d : 87Hz DXRAXX112-12, f_d : 87Hz DXRAXX132-12, f_d : 87Hz DXRAXX132-22, f_d : 87Hz DXRAXX160-12, f_d : 87Hz DXRAXX160-22, f_d : 87Hz DXRAXX180-12, f_d : 87Hz DXRAXX180-22, f_d : 87Hz	Lenze inverter motor in delta connection • The temperature monitoring via resolver or encoder cable is deactivated automatically, i.e.: C0583 = 3 C0584 = 3 C0594 = 3
[C0087]	Mot speed	→	300 {1 rpm} 16000	Rated motor speed	→ depending on C0086 • Change of C0086 resets value to the assigned default setting • Change of C0087 sets C0086 = 0
[C0088]	Mot current	→	0.5 {0.1 A} 500.0	Rated motor current	→ depending on C0086 • Change of C0086 resets value to the assigned default setting • Change of C0088 sets C0086 = 0
[C0089]	Mot frequency	→	10 {1 Hz} 1000	Rated motor frequency	→ depending on C0086 • Change of C0086 resets value to the assigned default setting • Change of C0089 sets C0086 = 0
[C0090]	Mot voltage	→	50 {1 V} 500	Rated motor voltage	→ depending on C0086 • Change of C0086 resets value to the assigned default setting • Change of C0090 sets C0086 = 0

Code	LCD	Possible settings			IMPORTANT
		Lenze	Choice	Info	
[C0091]	Mot cos phi	→	0.50 {0.01} 1.00	Motor cos φ	→ depending on C0086 • Change of C0086 resets value to the assigned default setting • Change of C0091 sets C0086 = 0
C0093	Drive ident			Controller identification	display only
			0 invalid		
			1 none		
			93xx 93xx	Type of Lenze servo inverter	
C0094	Password	0	0 9999	Password	
[C0095]	Rotor pos adj	0	0 inactive	Rotor position adjustment of a synchronous motor	C0095 = 1 starts position adjustment
			1 active	C0058 displays the zero angle of the rotor	
C0099	S/W version		x.xx	Software version	display only
C0101				Additional acceleration times T_{ir} for the main setpoint of NSET	Related to the speed change 0…n_{max}.
1	add Tir	0.000	0.000 {0.001 s} 999.900		
2	add Tir	0.000			
...	...	...			
15	add Tir	0.000			
C0103				Additional deceleration times T_{if} for the main setpoint of NSET	Related to the speed change 0…n_{max}.
1	add Tif	0.000	0.000 {0.001 s} 999.900		
2	add Tif	0.000			
...	...	...			
15	add Tif	0.000			
C0105	QSP Tif	0.000	0.000 {0.001 s} 999.900	Deceleration time for quick stop (QSP)	Related to the speed change 0…n_{max}.
C0108				Freely assignable code for relative analog signals	
1	FCODE (gain)	100.00	-199.99 {0.01 %} 199.99		
2	FCODE (gain)	100.00			
C0109				Freely assignable code for relative analog signals	
1	FCODE (offset)	0.00	-199.99 {0.01 %} 199.99		
2	FCODE (offset)	0.00			
C0114				Terminal polarity	
1	DIGIN pol	0	0 HIGH active	X5/E1	
2	DIGIN pol	0	1 LOW active	X5/E2	
3	DIGIN pol	0		X5/E3	
4	DIGIN pol	1		X5/E4	
5	DIGIN pol	0		X5/E5	
[C0116]			see selection list 2	Signal configuration FDO	Free digital outputs can only be evaluated when networked with automation interfaces.
1	CFG: FDO	1000	FIXED 0	FDO 0	
2	CFG: FDO	1000	FIXED 0	FDO 1	
...	...	...	...	...	
31	CFG: FDO	1000	FIXED 0	FDO 30	
32	CFG: FDO	1000	FIXED 0	FDO 31	
[C0117]		→	see selection list 2	Signal configuration DIGOUT	→ depending on C0005
1	CFG: DIGOUT	15000	DCTRL-TRIP	X5/A1	
2	CFG: DIGOUT	10650	CMP1-OUT	X5/A2	
3	CFG: DIGOUT	500	DCTRL-RDY	X5/A3	
4	CFG: DIGOUT	5003	MCTRL-MMAX	X5/A4	
C0118				Terminal polarity DIGOUT	
1	DIGOUT pol	1	0 High active	X5/A1	
2	DIGOUT pol	1	1 Low active	X5/A2	
3	DIGOUT pol	0		X5/A3	
4	DIGOUT pol	0		X5/A4	
C0121	OH7 limit	150	45 {1 °C} 150	Temperature threshold for early warning motor temperature (OH7 fault)	
C0122	OH4 limit	85	45 {1 °C} 85	Temperature threshold for warning heat sink temperature (fault OH4)	

Code	LCD	Possible settings			IMPORTANT
		Lenze	Choice	Info	
C0125	Baud rate	0	0 9600 baud 1 4800 baud 2 2400 baud 3 1200 baud 4 19200 baud	LECOM baud rate for 2102 module	
C0126	MONIT CE0	3	0 Trip 2 Warning 3 Off	Configuration communication error monitoring with automation interface CE0	
C0130	DIS: act Ti		 0 C12/C13 1 Ti 1 2 Ti 2 ... 14 Ti 14 15 Ti 15	active $T_i$times of NSET C0012/C0013 active T_{ir1}/T_{if1} active T_{ir2}/T_{if2} active ... T_{ir14}/T_{if14} active T_{ir15}/T_{if15} active	• display only
C0134	RFG charac	0	0 linear 1 S-shaped	linear S-shaped	Ramp characteristic for main setpoint
C0135	Control word		0 {1} 65535	Control word when networked with automation interfaces	Decimal control word • Device interpretes information 16 bit, binary coded
C0136 1 2 3	 DIS: CTRLWORD DIS: CTRLWORD DIS: CTRLWORD			 Control word in DCTRL Control word in CAN-IN1 Control word in AIF-IN	display only
C0141	FCODE (setval)	0.00	-199.99 {0.01 %} 199.99	Freely assignable code for relative analog signals	used as main setpoint in the configurations C0005 = xxx1
C0142	Start options	1	 0 Start lock 1 Auto start	Start options 0 = Start protection 1 = automatic start	is executed: • after mains connection • after message (t > 0.5s) • after trip
C0150	Status word		0 {1} 65535	Status word when networked with automation interfaces	Decimal status word • display only • binary interpretation indicates the bit states
C0151	DIS: FDO (DW)		output signals configured with C0116	Hexadecimal signal assignment of the free digital outputs.	• display only • binary interpretation indicates the bit states
C0155	Status word 2		0 {1} 65535	Status word 2	Extended decimal status word • display only • binary interpretation indicates the bit states
[C0156] 1 2 3 4 5 6 7	 CFG: STAT.B0 CFG: STAT.B2 CFG: STAT.B3 CFG: STAT.B4 CFG: STAT.B5 CFG: STAT.B14 CFG: STAT.B15	 2000 5002 5003 5050 10650 505 500	see selection list 2 PAR*1 MCTRL-IMAX MCTRL-MMAX NSET-RFG I=O CMP1-OUT DCTRL-CW/CCW DCTRL-RDY	Configuration of the free bits of the status word	
C0157 1 2 3 4 5 6 7	 DIS: STAT.B0 DIS: STAT.B2 DIS: STAT.B3 DIS: STAT.B4 DIS: STAT.B5 DIS: STAT.B14 DIS: STAT.B15		 0 1	Status of the free bits of the status word	display only

Code	LCD	Possible settings			IMPORTANT
		Lenze	Choice	Info	
C0161	Act trip		All fault indications (see chapter LEERER MERKER)	momentary fault indiations (as under C0168/1)	display only
C0167	Reset failmem	0	0 No reset		
			1 Reset	Clears the history buffer	
C0168			All fault indications (ihe chapter LEERER MERKER)	Faults occurred	History buffer • List of fault occurred • display only
1	Fail no. act			now active	
2	Fail no. old1			last	
3	Fail no. old2			last but one	
4	Fail no. old3			last but two	
5	Fail no. old4			last but three	
6	Fail no. old5			last but four	
7	Fail no. old6			last but five	
8	Fail no. old7			last but six	
C0169			corresponding mains switch-on time	Occurrence of the faults	History buffer • List of times when the faults have occurred under C0168 • related to C0179 • display only
1	Failtime act			now active	
2	Failtime old1			last	
3	Failtime old2			last but one	
4	Failtime old3			last but two	
5	Failtime old4			last but three	
6	Failtime old5			last but four	
7	Failtime old6			last but five	
8	Failtime old7			last but six	
C0170				Fault frequency	History buffer • List of how often the faults have occurred consecutively under C0168 • display only
1	Counter act			now active	
2	Counter old1			last	
3	Counter old2			last but one	
4	Counter old3			last but two	
5	Counter old4			last but three	
6	Counter old5			last but four	
7	Counter old6			last but five	
8	Counter old7			last but six	
[C0172]	OV reduce	10	0 {10 V} 100	Threshold to activate the brake torque reduction before OU fault	
[C0173]	UG limit	1		Adaptation of DC bus voltage thresholds	• check during commissioning and adapt, if necessary • all drive components in DC bus connections must have the same thresholds
			0 Mains< 400V+ -B	Operation on mains < 400 V with or without brake unit	
			1 Mains= 400V+ -B	Operation on 400 V mains with or without brake unit	
			2 Mains= 460V+ -B	Operation on 460 V mains with or without brake unit	
			3 Mains= 480V-B	Operation on 480 V mains without brake unit	
			4 Mains= 480V+ B	Operation on 480 V mains with brake unit	
C0178	Op timer		0 {1 s} 4294967295	Elapsed operating time meter	Time when the controller was enabled
C0179	Mains timer		0 {1 s} 4294967295	Mains switch-on time meter	Time when the mains was switched on
C0182	Ti S-shaped	20.00	0.01 s {0.01 s} 50.00 s	T_i time of the S-shaped ramp generator for NSET	Determines the S-shape • small values⇒ small S rounding • high values⇒ large s rounding

Configuration

Code	LCD	Possible settings					IMPORTANT
		Lenze	Choice			Info	
C0183	Diagnostics					Drive diagnostics	● display only ● indicates fault or status information ● if several items or fault or status information are to be shown, the information with the smallest number is displayed
			0	OK		No fault	
			101	Init		Initialization phase	
			102	Trip		TRIP active	
			103	RFG P-OFF		Emergency stop was released	
			104	IMP Message		Message active	
			105	Power off			
			111	BSP C135		Operation inhibited	
			112	BSP AIF			
			113	BSP CAN			
			121	CINH term 28		Controller inhibited via X5/28	
			122	CINH int 1		DCTRL-CINH1	
			123	CINH int 2		DCTRL-CINH2	
			124	CINH C135/STP		STOP key of 9371BB	
			125	CINH AIF		Controller inhibited via AIF	
			126	CINH CAN		Controller inhibited via CAN	
			141	Lock mode		Restart protection active	
			142	IMP		Power outputs with high resistance	
			151	QSP ext term		QSP via MCTRL-QSP	
			152	QSP C135/STP		QSP via STOP key	
			153	QSP AIF		QSP via AIF	
			154	QSP CAN		QSP via CAN	
			250	Warning		Warning active	
C0190	NSET arit	0	0	OUT = C46		Arithmetics block in the function block NSET	Connects main setpoint C0046 and additional setpoint C0049
			1	C46 + C49			
			2	C46 - C49			
			3	C46 * C49			
			4	C46 / C49			
			5	C46/(100 - C49)			
C0195	BRK1 T act	99.9	0.0	{0.1 s}	99.9	Brake engaging time	Engaging time of the mechanical holding brake (see technical data of the brake). ● after the time elapsed under C0195, the status ”mechanical brake closed” is reached
			99.9 s	infinite			
C0196	BRK T release	0.0	0.0	{0.1 s}	60.0	Brake disengaging time	Disengaging time of the mechanical holding brake (see technical data of the brake). ● After time has elapsed under C0195, the status ”mechanical brake closed” is reached
C0200	S/W Id					Software identification	display only
C0201	S/W date					Software release date	display only
C0203	Comm. no.		x / xxxx / xxxxx			Commission number	display only
C0204	Serial-No.		0	{1}	65535	Serial number	display only
C0206	Produkt date					Production date	display only
C0207	DL info 1					Download-Info 1	display only
C0208	DL info 2					Download-Info 2	display only
C0209	DL info 3					Download-Info 3	display only
C0220	NSET Tir add	0.000	0.000	{0.001 s}	999.900	Acceleration time T_{ir} of the additional setpoint for NSET	Related to the speed change 0…$n_{max.}$
C0221	NSET Tif add	0.000	0.000	{0.001 s}	999.900	Deceleration time T_{if} of the additional setpoint for NSET	Related to the speed change 0…$n_{max.}$
C0222	PCTRL Vp	1.0	0.1	{0.1}	500.0	Process controller gain V_p	
C0223	PCTRL Tn	400	20	{1 ms}	99999	Process controller integral component T_n	
			99999 ms	switched off			

Code	LCD	Possible settings			IMPORTANT
		Lenze	Choice	Info	
C0224	PCTRL Kd	0.0	0.0 {0.1} 5.0	Process controller differential compconent K_d	
C0241	NSET RFG I = O	1.00	0.00 {0.01 %} 100.00 100 % = n_{max}	Threshold ramp generator for main setpoint Input = output	
C0244	BRK M set	0.00	-100.00 {0.01 %} 100.00 100 % = value of C0057	Holding torque of the DC injection brake	
C0250	FCODE 1Bit				
C0252	phase offset	0	-245760000 {1 inc} 245760000	Phase offset for DFSET	Fixed phase offset for digital frequency configuration • 1 rev. = 65536 inc
C0253	Angle n-trim	→	-32767 {1 inc} 32767	Phase trimming for DFSET	speed-dependent phase trimming → depending on C0005, C0025, C0490 • Change of C0005, C0025, or C0490 resets C0253 to the default setting • 1 rev. = 65536 inc • C0253 is reached at 15000 rpm
C0254	Vp angle-CTRL	0.40	0.0000 {0.0001} 3.9999	V_p phase controller in MCTRL	
C0255	Threshold P03	327680	10 {1 inc} 1800000000	Contouring error limit	Contouring error limit for fault P03 • 1 rev. = 65536 inc • Contouring error > C0255 releases fault "P03"
C0260	MPOT1 high	100.00	-199.99 {0.01 %} 199.99	Upper limit of motor potentiometer	mandatory • C0260 > C0261
C0261	MPOT1 low	-100.0	-199.99 {0.01 %} 199.99	Lower limit of motor potentiometer	mandatory • C0261 < C0260
C0262	MPOT1 Tir	10.0	0.1 {0.1 s} 6000.0	Motor pot acceleration time T_{ir}	Related to change 0…100 %
C0263	MPOT1 Tif	10.0	0.1 {0.1 s} 6000.0	Motor pot deceleration time T_{if}	Related to change 0…100 %
C0264	MPOT1 on/off	0	 0 No function 1 Down to 0% 2 Down to C261 3 Jump 0% 4 Jump to C261 5 Up to C260	Deactivation function of motor pot no change Deceleration with T_{if} to 0% Deceleration with T_{if} to C0261 Inhibit with T_{if} = 0 to 0% Inhibit with T_{if} = 0 to C0261 Acceleration with T_{ir} to C0260	• Function which is executed when motor pot is deactivated via the input MPOT1-INACTIVE.
C0265	MPOT1 init	0	 0 Power off 1 C261 2 0%	Initialization function of motor pot Value during mains failure lower limit of C0261 0 %	• Value which is accepted during mains switching and activated motor pot.
[C0267]			see selection list 2	Configuration of the digital inputs of motor pot MPOT1	
1	CFG: UP	1000	FIXED 0	Digital input acceleration	
2	CFG: DOWN	1000	FIXED 0	Digital input deceleration	
[C0268]	CFG: INACT	1000	see selection list 2 FIXED 0	Configuration of the motor pot input MPOT1-INACTIVE	
C0269				Input signals motor potentiometer	display only
1	DIS: UP				
2	DIS: DOWN				
3	DIS: INACTIVE				
C0291	SSC override	0	0 {1 rpm} 16000	Override frequency for the transition from sensorless control to controlled operation	

Code	LCD	Possible settings			IMPORTANT
		Lenze	Choice	Info	
C0292	SSC Im set	0.00	0.00 {0.01 A} 500.00	Motor current setpoint	Set approx. 1.0 to 1.1 rated motor current for sensorless control.
C0293	SSC dynamic	0.00	0.00 {0.01 %} 199.00	Dynamic constant	dynamic motor current boost
C0294	Vp frq ctrl	→	0.0 {0.1} 99.9	Prpportional gain frequency controller	* depending on C0086
C0295	Tn frq ctrl	→	2 {1 ms} 20000	Adjustment time frequency controller	→ depending on C0086
C0296	Dynamic Const	100	0 {0.1} 32767	Dynamic constant	
C0325	Vp2 adapt	1.0	0.1 {0.1} 500.0	Process controller adaptation gain (V_{p2})	
C0326	Vp3 adapt	1.0	0.1 {0.1} 500.0	Process controller adaptation gain (V_{p3})	
C0327	Set2 adapt	100.00	0.00 {0.01 %} 100.00	Process controller adaptation n_{set2}	Set speed threshold of the process controller adaptation mandatory • C0327 > C0328
C0328	Set1 adapt	0.00	0.00 {0.01 %} 100.00	Process controller adaptation n_{set1}	Set speed threshold of the process controller adaptation mandatory • C0328 < C0327
C0329	Adapt on/off	0	 0 no 1 Extern Vp 2 Set-value 3 Ctrl diff	Activate process controller adaptation no process controller adaptation external via input Adaptation via setpoint Adaptation via control difference	
C0332	PCTRL Tir	0.000	0.000 {0.001 s} 999.900	Process controller acceleration time T_{ir}	related to setpoint change 0…100 %
C0333	PCTRL Tif	0.000	0.000 {0.001 s} 999.900	Process controller deceleration time T_{ir}	related to setpoint change 0…100 %
C0336	DIS: act Vp		0.0 {0.1} 500.0	Process controller momentary V_p	display only
C0337	Bi/unipolar	0	0 bipolar 1 unipolar	Process controller range bipolar/unipolar	
C0338	ARIT1 funct	1	0 OUT = IN1 1 IN1 + IN2 2 IN1 - IN2 3 IN1 * IN2 4 IN1 / IN2 5 IN1/(100 - IN2)	Function arithmetic block ARIT1	links inputs IN1 and IN2
[C0339] 1 2	 CFG: IN CFG: IN	 1000 1000	See selection list 1 FIXED 0 % FIXED 0 %	Configuration arithmetic blockARIT1	
C0340 1 2	 DIS: IN DIS: IN			Input signals arithmetic block ARIT1	display only
[C0350]	CAN address	1	1 {1} 63	CAN bus node address	
[C0351]	CAN baudrate	0	0 500 kbit/s 1 250 kbit/s 2 125 kbit/s 3 50 kbit/s 4 1000 kbit/s	CAN bus baud rate	
[C0352]	CAN mst	0	0 Slave 1 Master	Install CAN bus master operation	
C0353 1 2 3	 CAN addr sel1 CAN addr sel2 CAN addr sel3	 0 0 0	 0 C350 1 C354	Source for CAN bus IN/OUT addresses	

Code	LCD	Possible settings			IMPORTANT
		Lenze	Choice	Info	
C0354				CAN bus IN/OUT node addresses	
1	IN1 addr2	129	1 {1} 512		
2	OUT1 addr2	1			
3	IN2 addr2	257			
4	OUT2 addr2	258			
5	IN3 addr2	385			
6	OUT3 addr2	386			
C0355				CAN bus identifier	display only
1	CAN-IN1 Id		0 {1} 2047		
2	CAN-OUT1 Id				
3	CAN-IN2 Id				
4	CAN-OUT2 Id				
5	CAN-IN3 Id				
6	CAN-OUT3 Id				
C0356				CAN bus time settings	
1	CAN boot up	3000	0 {1 ms} 65000		
2	CAN-OUT2 T	0			
3	CAN-OUT3 T	0			
4	CAN delay	20			
[C0357]				CAN bus monitoring time for I_{rx}	
1	CE1monit time	3000	0 {1 ms} 65000		
2	CE2monit time	3000			
3	CE3monit time	3000			
C0358	Reset node	0	0 no function 1 CAN reset	Install CAN bus reset node	
C0359	CAN state	0	0 Operational 1 Pre-Operat 2 Warning 3 Bus off	CAN bus status:	display only
C0360			0 {1} 65535	Telegram counter (number of telegrams)	display only ● for counter values > 65535 the counting starts at zero
1	Message OUT			all sent	
2	Message IN			all received	
3	Message OUT1			sent to CAN-OUT1	
4	Message OUT2			sent to CAN-OUT2	
5	Message OUT3			sent to CAN-OUT3	
6	Message POUT1			sent to parameter channel1	
7	Message POUT2			sent to parameter channel1	
8	Message IN1			received from CAN-IN1	
9	Message IN2			received from CAN-IN2	
10	Message IN3			received from CAN-IN3	
11	Message PIN1			received from parameter channel1	
12	Message PIN2			received from parameter channel2	
C0361			0 {1 %} 100	CAN bus load	● display only ● To ensure a perfect operation, the total bus load (all connected devices) should be less than 80%
1	Load OUT			all sent	
2	Load IN			all received	
3	Load OUT1			sent to CAN-OUT1	
4	Load OUT2			sent to CAN-OUT2	
5	Load OUT3			sent to CAN-OUT3	
6	Load POUT1			sent to parameter channel1	
7	Load POUT2			sent to parameter channel1	
8	Load IN1			received from CAN-IN1	
9	Load IN2			received from CAN-IN2	
10	Load IN3			received from CAN-IN3	
11	Load PIN1			received from parameter channel1	
12	Load PIN2			received from parameter channel2	
C0362	Sync cycle		0 {1 ms} 30	Time between two sync telegrams on the system bus	display only

Configuration

Code	LCD	Possible settings			IMPORTANT
		Lenze	Choice	Info	
C0363	Sync corr	1	1 0.8 µs 2 1.6 µs 3 2.4 µs 4 3.2 µs 5 4.0 µs	Correction value for C0362	
[C0364]	CFG:CAN activ	1000	see selection list 2 FIXED 0	Activate process data externally	Change over from pre-operation to operation
C0365	DIS:CAN activ		0 1	Input signal CAN active	display only
C0366	Sync Response	1	0 no sync response 1 sync response		
C0367	Sync Rx ID	128	1 {1} 256		
C0368	Sync Tx ID	128	1 {1} 256		
C0369	Sync Tx Time	0	0 {1} 65000		
C0400	DIS: OUT		-199.99 {0,01 %} 199.99	Output of AIN1	display only
[C0402]	CFG: OFFSET	19502	See selection list 1 FCODE-26/1	Configuration offset of AIN1	
[C0403]	CFG: GAIN	19504	See selection list 1 FCODE-27/1	Configuration gain of AIN1	
C0404 1 2	 DIS: OFFSET DIS: GAIN		-199.99 {0.01 %} 199.99	Input signals of AIN1	display only
C0405	DIS: OUT		-199.99 {1 %} 199.99	Output of AIN2	display only
[C0407]	CFG: OFFSET	19503	See selection list 1 FCODE-26/2	Configuration offset of AIN2	
[C0408]	CFG: GAIN	19505	See selection list 1 FCODE-27/2	Configuration gain of AIN2	
C0409 1 2	 DIS: OFFSET DIS: GAIN		-199.99 {0.01 %} 199.99	Input signals of AIN2	display only
[C0416]	Resolver adj	0	0 {1} 99999999	Correction of the resolver error	for Lenze motors • Read resolver error from the nameplate
[C0420]	Encoder const	512	256 {1 inc/rev} 8192	Encoder constant for encoder input X8 in increments per revolution	
[C0421]	Encoder volt	5.00	5.00 {0.1V} 8.00	Set supply voltage for the encoder used	CAUTION: incorrect input may destroy the encoder
C0425	DFIN const	3	0 256 inc/rev 1 512 inc/rev 2 1024 inc/rev 3 2048 inc/rev 4 4096 inc/rev 5 8192 inc/rev 6 16384 inc/rev	Constant for digital frequency input in increments per revolution	
C0426	DIS: OUT		-32767 {1 rpm} 32767	Output signal of DFIN	display only
C0427	DFIN funktion	0	0 2-phase 1 A puls / B dir 2 Puls A or B	Type of the digital frequency signal 0 = Quadrature 1 = Pulse / Direction 2 = Pulse A / Pulse B	
C0429	TP5 delay	0	-32767 {1 inc} 32767	Dead time compensation for the TP function of DFSET and DFRFG	
[C0431]	CFG: IN	5001	See selection list 1 MCTRL-NACT	Configuration input of AOUT1	
[C0432]	CFG: OFFSET	19512	See selection list 1 FCODE-109/1	Configuration offset of AOUT1	
[C0433]	CFG: GAIN	19510	See selection list 1 FCODE-108/1	Configuration gain of AOUT1	

Code	LCD	Possible settings			IMPORTANT
		Lenze	Choice	Info	
C0434				Input signals of AOUT1	display only
1	DIS: IN		-199.99 {0.01 %} 199.99		
2	DIS: OFFSET				
3	DIS: GAIN				
[C0436]	CFG: IN	5002	See selection list 1 MCTRL-MSET2	Configuration input of AOUT2	
[C0437]	CFG: OFFSET	19513	See selection list 1 FCODE-109/2	Configuration offset of AOUT2	
[C0438]	CFG: GAIN	19511	See selection list 1 FCODE-108/2	Configuration gain of AOUT2	
C0439				Input signals of AOUT2	display only
1	DIS: IN		-199.99 {0.01 %} 199.99		
2	DIS: OFFSET				
3	DIS: GAIN				
[C0440]	CFG: STATE-BUS	1000	see selection list 2	Configuration state bus X5/ST	
C0441	DIS: STATE-BUS			Monitoring signal State bus	display only
C0443	DIS: DIGIN-OUT		0 {1} 255	Signals at X5/E1 to X5/E5 decimal value	display only ● Binary interpretation indicates terminal signals
C0444				Signals at X5/A1 to X5/A4	display only
1	DIS: DIGOUT1		0 1		
2	DIS: DIGOUT2				
3	DIS: DIGOUT3				
4	DIS: DIGOUT4				
[C0450]	CFG: NX	1000	See selection list 1 FIXED 0 %	Configuration analog input of BRK1	
[C0451]	CFG: ON	1000	see selection list 2 FIXED 0	Configuration digital input of BRK1	
[C0452]	CFG: SIGN	1000	See selection list 1 FIXED 0 %	Configuration analog input of BRK1	
C0458				Analog input signals of BRK1	display only
1	DIS: NX		-199.99 {0.01 %} 199.99		
2	DIS: SIGN				
C0459	DIS: ON			Digital input signal of BRK1	display only
C0464	Customer I/F		0 original 1 changed	Status of selected basic configuration	display only ● Reassignment of terminals in a base configuration from C0005 does not change C0005 and sets C0464 = 1 ● Adding or removing of function blocks or changing the signal flow among the function blocks in a base configuration of C0005 sets C0005 = 0 and C0464 = 1

Configuration

Code	LCD	Possible settings			IMPORTANT
		Lenze	Choice	Info	
[C0465]		*	See selection list 5	Processing sequence list of function blocks Contained in the program of signal processing (sequence in which the function blocks are processed)	→ depending on C0005 Change of C0005 loads assigned processing list → Valid for C0005 = 1000 ● After changing the signal flow adapt the processing list in every case.Otherwise, the device may use wrong signals! ● The function blocks DIGIN, DIGOUT, AIF-IN, CAN-IN, and MCTRL are always processed and do not have to be entered in the list.
1	FB list	200			
2	FB list	0			
3	FB list	50			
4	FB list	0			
5	FB list	0			
6	FB list	55			
7	FB list	0			
8	FB list	0			
9	FB list	10250			
10	FB list	0			
11	FB list	0			
12	FB list	0			
13	FB list	5650			
14	FB list	0			
15	FB list	0			
16	FB list	5050			
...	...	0			
19	FB list	5700			
...	...	0			
22	FB list	10650			
...	...	0			
25	FB list	70			
...	...	0			
28	FB list	75			
...	...	0			
31	FB list	250			
...	...	0			
41	FB list	25000			
42	FB list	20000			
...	...	0			
49	FB list	0			
50	FB list	0			
C0466	CPU T remain			Residual process time for the processing of function blocks	display only
[C0469]	Fct STP key	2		Function of the STOP key of the operating module	Function is activated when pressing the STOP key.
			0 inactive	Deactivated	
			1 CINH	Controller inhibit	
			2 QSP	Quick stop	
C0470				Freely assignable code for digital signals	The data words C0470 and C0471 are in parallel and are identical
1	FCODE bit 0-7	0	0 {1} 255		
2	FCODE bit8-15	0			
3	FCODE bit 16-23	0			
4	FCODE bit 24-31	0			
C0471	FCODE 32 bit	0	0 {1} 4294967296	Freely assignable code for digital signals	The data words C0470 and C0471 are in parallel and are identical
C0472				Freely assignable code for relative analog signals	
1	FCODE analog	0.00	-199.99 {0.01 %} 199.99		
2	FCODE analog	0.00			
3	FCODE analog	100.00			
...	...	...			
19	FCODE analog	0.00			
20	FCODE analog	0.00			
C0473				Freely assignable code for absolute analog signals	
1	FCODE abs	1	-32767 {1} 32767		
2	FCODE abs	1			
3	FCODE abs	0			
...	...	...			
9	FCODE abs	0			
10	FCODE abs	0			

Code	LCD	Possible settings			IMPORTANT
		Lenze	Choice	Info	
C0474				Freely assignable code for phase signals	1 rev. = 65536 inc
1	FCODE PH	0	-2147483648 {1} 2147483648		
2	FCODE PH	0			
3	FCODE PH	0			
4	FCODE PH	0			
5	FCODE PH	0			
C0475				Freely assignable code for phase difference signals	1 rev. = 65536 inc
1	FCODE DF	0	-16000 {1 rpm} 16000		
2	FCODE DF	0			
[C0490]	Feedback pos	0		Feedback system for the speed 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	Resolver at X7	
			1 Encoder TTL	Encoder TTL at X8	
			2 Encoder sin	sin/cos encoder at X8	
			3 Absolut ST	Absolute value encoder ST at X8	
			4 Absolut MT	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	Resolver at X7	
			1 Encoder TTL	Encoder TTL at X8	
			2 Encoder sin	sin/cos encoder at X8	
			3 Absolut ST	Absolute value encoder ST at X8	
			4 Absolut MT	Absolute value encoder MT at X8	
C0497	Nact-filter	2.0	0.0 {0.1 ms} 50.0 0 ms switched off	Time constant actual speed	
C0517			0 {1} 199900	User menu with up to 32 entries	• Under the subcodes the numbers of the desired codes are entered. • The input is done in the format xxx.yy – xxx: Code number – yy: Subcode for code • It is not checked whether the entered code exists.
1	User menu	51.00	C0051/0 MCTRL-NACT		
2	User menu	54.00	C0054/0 Imot		
3	User menu	56.00	C0056/0 MCTRL-MSET2		
4	User menu	46.00	C0046/0 DIS: N		
5	User menu	49.00	C0049/0 DIS: NADD		
6	User menu	183.00	C0183/0 Diagnostics		
7	User menu	168.01	C0168/1 Fail no. act		
8	User menu	86.00	C0086/0 Mot type		
9	User menu	22.00	C0022/0 Imax current		
10	User menu	5.00	C0005/0 Signal cfg		
11	User menu	11.00	C0011/0 Nmax		
12	User menu	12.00	C0012/0 Tir		
13	User menu	13.00	C0013/0 Tif		
14	User menu	105.00	C0105/0 QSP Tif		
15	User menu	39.01	C0039/1 JOG setpoint		
16	User menu	70.00	C0070/0 Vp speed CTRL		
17	User menu	71.00	C0071/0 Tn speed CTRL		
18	User menu	0	not assigned		
...	...	0	not assigned		
31	User menu	94.00	C0094/0 Password		
32	User menu	3.00	C0003/0 Par save		
[C0520]	CFG: IN	1000	See selection list 4 FIXEDPHI-0	Configuration input of DFSET	
[C0521]	CFG: VP-DIV	1000	See selection list 1 FIXED 0 %	Configuration gain factor numerator of DFSET	
[C0522]	CFG: RAT-DIV	1000	See selection list 1 FIXED 0 %	Configuration gearbox factor numerator of DFSET	
[C0523]	CFG: A-TRIM	1000	See selection list 1 FIXED 0 %	Configuration phase trimming of DFSET	
[C0524]	CFG: N-TRIM	1000	See selection list 1 FIXED 0 %	Configuration speed trimming of DFSET	
[C0525]	CFG: 0-PULSE	1000	see selection list 2 FIXED 0	Configuration one-time zero pulse is activation of DFSET	
[C0526]	CFG: RESET	1000	see selection list 2 FIXED 0	Configuration reset integrators of DFSET	

Configuration

Code	LCD	Possible settings			IMPORTANT
		Lenze	Choice	Info	
[C0527]	CFG: SET	1000	see selection list 2 FIXED 0	Configuration set integrators of DFSET	
C0528					display only
1	DIS: 0-pulse A		-2000000000 {1 inc} 2000000000	Phase difference betweent 2 zero pulses	
2	DIS: Offset			Offset of C0523*C0529 + C0252	
C0529	Multip offset	1	-20000 {1} 20000	Offset multiplier	
C0530	DF evaluation	1	0 with g factor 1 without g factor	Evaluation of the setpoint integrator of DFSET (with/without gearbox factor)	Evaluation of the setpoint integrator of DFSET
C0531	Act 0 div	1	1 {1} 16384	Actual zero pulse divider of DFSET	
C0532	0-pulse/TP	1	1 0-pulse 2 Touch probe	Selection zero pulse of the feedback system or touch probe for DFSET	
C0533	Vp denom	1	1 {1} 32767	Gain factor denominator of DFSET	
C0534	0-pulse fct	0	0 Inactive 1 Continuous 2 Cont. switch 10 Once, fast way 11 Once, cw 12 Once, ccw 13 Once, 2*0-puls	Actual zero pulse divider of DFSET	
C0535	Set 0 div	1	1 {1} 16384	Set zero pulse divider of DFSET	
C0536				Absolute analog input signals of DFSET	display only
1	DIS: VP-DIV		-32767 {1} 32767		
2	DIS: RAT-DIV				
3	DIS: A-TRIM				
C0537	DIS: N-TRIM		-199.99 {0.01 %} 199.99	Relative analog input signal of DFSET	display only
C0538				Digital input signals of DFSET	display only
1	DIS: 0-PULSE				
2	DIS: RESET				
3	DIS: SET				
C0539	DIS: IN		-32767 {1 rpm} 32767	Input signal of DFSET	display only
[C0540]	Function	2	0 Analog input	analog input	
			1 PH diff input 2 Res + int 0 3 Res + ext 0	Phase difference input Resolver simulation + zero pulse Resolver simulation without zero pulse	X9 is inhibited if 0, 1, 2 or 3 was selected
			4 OUT = DFIN 5 OUT = encoder	X9 is output on X10 X8 is output on X10	The input signals get a gain
[C0541]	CFG: AN-IN	5001	See selection list 1 MCTRL-NACT	Configuration analog input of DFOUT	
[C0542]	CFG: DF-IN	1000	See selection list 4 FIXEDPHI 0	Configuration digital frequency input of DFOUT	
[C0544]	CFG: SYN-RDY	1000	see selection list 2 FIXED 0	Configuration synchronization signal for the zero pulse of DFOUT	
C0545	PH offset	0	0 {1 inc} 65535	Phase offset of DFOUT	1 rev. = 65535 inc
C0546	Min inc/rev	1000	1 {1 inc} 2147483647		1 rev. = 65535 inc
C0547	DIS: AN-IN		-199.99 {0.01 %} 199.99	Relative analog input signal of DFOUT	display only
C0548	DIS: SYN-RDY		0 1	Digital input signal of DFOUT	display only
C0549	DIS: DF-IN		-32767 {1 rpm} 32767	Absolute analog input signal of DFOUT	display only

Code	LCD	Possible settings			IMPORTANT
		Lenze	Choice	Info	
C0560				Fixed setpoints of FIXSET1	
1	Fix set-value	100.00	-199.99 {0.01 %} 199.99		
2	Fix set-value	75.00			
3	Fix set-value	50.00			
4	Fix set-value	25.00			
5	Fix set-value	0.00			
...	...	...			
14	Fix set-value	0.00			
15	Fix set-value	0.00			
[C0561]	CFG: AIN		See selection list 1	Configuration analog input of FIXSET1	
		1000	FIXED 0 %		
[C0562]			see selection list 2	Configuration digital inputs of FIXSET1	
1	CFG: IN	1000	FIXED 0		
2	CFG: IN	1000	FIXED 0		
3	CFG: IN	1000	FIXED 0		
4	CFG: IN	1000	FIXED 0		
C0563	DIS: AIN		-199.99 {0.01 %} 199.99	Analog input signal of FIXSET1	display only
C0564				Digital input signals of FIXSET1	display only
1	DIS: IN				
2	DIS: IN				
3	DIS: IN				
4	DIS: IN				
[C0570]	CFG: IN		See selection list 1	Configuration analog input of S&H1	
		1000	FIXED 0 %		
[C0571]	CFG: LOAD		see selection list 2	Configuration digital input of S&H1	
		1000	FIXED 0		
C0572	DIS: IN		-199.99 {0.01 %} 199.99	Analog input signal of S&H1	display only
C0573	DIS: LOAD			Digital input signal of S&H1	display only
C0577	Vp fld weak	3.0	0.00 {0.01 ms} 15.99	Field weakening controller gain V_p	
C0578	Tn fld weak	10	2.0 {0.5 ms} 8192.0	Field weakening controller adjustment time Tn	
			8000 ms switched off		
C0581	MONIT EEr	0	0 Trip	Configuration monitoring EEr (external fault)	
			1 Message		
			2 Warning		
			3 Off		
C0582	MONIT OH4	2	2 Warning	Configuration monitoring OH4 (heat sink temperature)	
			3 Off		
C0583	MONIT OH3	*	0 Trip	Configuration monitoring OH3 (motor temperature fixed)	→ depending on C0086
			3 Off		
C0584	MONIT OH7	*	2 Warning	Configuration monitoring OH7 (motor temperature adjustable)	→ depending on C0086 Temperature monitoring via resolver input
			3 Off		
C0585	MONIT OH8	3	0 Trip	Configuration monitoring OH8 (motor temperature adjustable)	Temperature monitoring via PTC input
			2 Warning		
			3 Off		
C0586	MONIT SD2	0	0 Trip	Configuration monitoring SD2 (resolver)	
			2 Warning		
			3 Off		
C0587	MONIT SD3	3	0 Trip	Configuration monitoring SD3 (encoder at X9)	
			2 Warning		
			3 Off		
C0588	MONIT H10/H11	3	0 Trip	Configuration monitoring H10 and H11 (thermal sensors in the controller)	
			3 Off		
C0589	MONIT P03	2	0 Trip	Configuration monitoring P03 (contouring error)	
			2 Warning		
			3 Off		
C0590	MONIT P13	0	0 Trip	Configuration monitoring P13 (phase error)	
			2 Warning		
			3 Off		

Configuration

Code	LCD	Possible settings			IMPORTANT
		Lenze	Choice	Info	
C0591	MONIT CE1	3	0 Trip 2 Warning 3 Off	Configuration monitoring CE1 (CAN-IN1 fault)	
C0592	MONIT CE2	3	0 Trip 2 Warning 3 Off	Configuration monitoring CE2 (CAN-IN2 fault)	
C0593	MONIT CE3	3	0 Trip 2 Warning 3 Off	Configuration monitoring CE3 (CAN-IN3 fault)	
C0594	MONIT SD6	*	0 Trip 2 Warning 3 Off	Configuration monitoring SD6 (motor temperature sensor)	→ depending on C0086
C0595	MONIT CE4	3	0 Trip 2 Warning 3 Off	Configuration monitoring CE4 (CAN bus off)	
C0596	Nmax limit	5500	0 {1 rpm} 16000	Monitoring: Speed of the machine	
C0597	MONIT LP1	3	0 Trip 2 Warning 3 Off	Configuration monitoring motor phase failure	
C0598	MONIT SD5	3	0 Trip 2 Warning 3 Off	Configuration monitoring master current at X5/1.2 < 2mA	
C0599	Limit LP 1	5.0	1.0 {0.1} 10.0	Current limit for motor phase failure monitoring	
C0600	Function	1	0 OUT = IN1 1 IN1 + IN2 2 IN1 - IN2 3 IN1 * IN2 4 IN1 / IN2 5 IN1/(100 - IN2)	Function arithmetic block ARIT2	links inputs IN1 and IN2
[C0601] 1 2	 CFG: IN CFG: IN	 1000 1000	See selection list 1 FIXED 0 % FIXED 0 %	Configuration analog inputs of ARIT2	
C0602 1 2	 DIS: IN DIS: IN		-199.99 {0.01 %} 199.99	analog input signals of ARIT2	display only
[C0610] 1 2 3	 CFG: IN CFG: IN CFG: IN	 1000 1000 1000	See selection list 1 FIXED 0 % FIXED 0 % FIXED 0 %	Configuration analog inputs of addition block ADD1	Adds inputs IN1, IN2 and IN3
C0611 1 2 3	 DIS: IN DIS: IN DIS: IN		-199.99 {0.01 %} 199.99	analog input signals of ADD1	display only
C0620	DB1 gain	1.00	-10.00 {0.01} 10.00	Gain dead band component DB1	
C0621	DB1 value	1.00	0.00 {0.01 %} 100.00	Dead band of DB1	
[C0622]	CFG: IN	 1000	See selection list 1 FIXED 0 %	Configuration analog input of DB1	
C0623	DIS: IN		-199.99 {0.01 %} 199.99	Analog input signal of DB1	display only
C0630	Max limit	100.00	-199.99 {0.01 %} 199.99	Upper limit of limiter LIM1	
C0631	Min limit	-100.0	-199.99 {0.01 %} 199.99	Lower limit of limiter LIM1	
[C0632]	CFG: IN	 1000	See selection list 1 FIXED 0 %	Configuration analog input of LIM1	
C0633	DIS: IN		-199.99 {0.01 %} 199.99	Analog input signal of LIM1	display only
C0640	Delay T	20.00	0.01 {0.01 s} 50.00	Time constant of the PT1-1 component	
[C0641]	CFG: IN	 1000	See selection list 1 FIXED 0 %	Configuration analog input of PT1-1	
C0642	DIS: IN		-199.99 {0.01 %} 199.99	Analog input signal of PT1-1	display only

Code	LCD	Possible settings			IMPORTANT
		Lenze	Choice	Info	
C0650	DT1-1 gain	1.00	-320.00 {0.01} 320.00	Gain of DT1-1 component	
C0651	Delay T	1.00	0.005 {0.01 s} 5.000	Time constant of DT1-1	
[C0652]	CFG: IN	1000	See selection list 1 FIXED 0 %	Configuration analog input of DT1-1	
C0653	Sensibility	1	1 15-bit 2 14-bit 3 13-bit 4 12-bit 5 11-bit 6 10-bit 7 9-bit	Input sensitivity of DT1-1	
C0654	DIS: IN		-199.99 {0.01 %} 199.99	Analog input signal of DT1-1	display only
C0655	Numerator	1	-32767 {1} 32767	Numerator for CONV5	
C0656	Denominator	1	1 {1} 32767	Denominator for CONV5	
[C0657]	CFG: IN	1000	See selection list 1 FIXED 0 %	Configuration analog input of CONV5	
C0658	DIS: IN		-199.99 {0.01 %} 199.99	Analog input signal of CONV5	display only
[C0661]	CFG: IN	1000	See selection list 1 FIXED 0 %	Configuration analog input absolute-value generator ABS1	
C0662	DIS: IN		-199.99 {0.01 %} 199.99	Analog input signal of ABS1	display only
C0671	RFG1 Tir	0.000	0.000 {0.01 s} 999.900	Acceleration time T_{ir} of ramp generator RFG1	
C0672	RFG1 Tif	0.000	0.000 {0.01 s} 999.900	Deceleration time T_{if} of RFG1	
[C0673]	CFG: IN	1000	See selection list 1 FIXED 0 %	Configuration analog input of RFG1	
[C0674]	CFG: SET	1000	See selection list 1 FIXED 0 %	Configuration set input of RFG1	
[C0675]	CFG: LOAD	1000	see selection list 2 FIXED 0	Configuration digital input of RFG1	
C0676				Analog input signals of RFG1	display only
1	DIS: IN		-199.99 {0.01 %} 199.99		
2	DIS: SET				
C0677	DIS: LOAD			Digital input signal of RFG1	display only
C0680	Function	6	1 IN1 = IN 2 2 IN 1 > IN2 3 IN 1 < IN2 4 |IN1| = |IN2| 5 |IN1| > |IN2| 6 |IN1| < |IN2|	Function comparator CMP1	Compares the inputs IN1 and IN2
C0681	Hysteresis	1.00	0.00 {0.01 %} 100.00 %	Hysteresis of CMP1	
C0682	Window	1.00	0.00 {0.01 %} 100.00 %	Window of CMP1	
[C0683]			See selection list 1	Configuration analog inputs of CMP1	
1	CFG: IN	5001	MCTRL-NACT		
2	CFG: IN	19500	FCODE-17		
C0684				Analog input signals of CMP1	display only
1	DIS: IN		-199.99 {0.01 %} 199.99		
2	DIS: IN				
C0685	Function	1	1 IN1 = IN 2 2 IN 1 > IN2 3 IN 1 < IN2 4 |IN1| = |IN2| 5 |IN1| > |IN2| 6 |IN1| < |IN2|	Function comparator CMP2	Compares the inputs IN1 and IN2
C0686	Hysteresis	1.00	0.00 {0.01 %} 100.00 %	Hysteresis of CMP2	
C0687	Window	1.00	0.00 {0.01 %} 100.00 %	Window of CMP2	
[C0688]			See selection list 1	Configuration analog inputs of CMP2	
1	CFG: IN	1000	FIXED 0%		
2	CFG: IN	1000	FIXED 0%		

Configuration

Code	LCD	Possible settings			IMPORTANT
		Lenze	Choice	Info	
C0689 1 2	 DIS: IN DIS: IN		 -199.99 {0.01 %} 199.99	Analog input signals of CMP2	display only
C0690	Function	1	1 IN1 = IN 2 2 IN 1 > IN2 3 IN 1 < IN2 4 |IN1| = |IN2| 5 |IN1| > |IN2| 6 |IN1| < |IN2|	Function comparator CMP3	Compares the inputs IN1 and IN2
C0691	Hysteresis	1.00	0.00 {0.01 %} 100.00 %	Hysteresis of CMP3	
C0692	Window	1.00	0.00 {0.01 %} 100.00 %	Window of CMP3	
[C0693] 1 2	 CFG: IN CFG: IN	 1000 1000	See selection list 1 FIXED 0% FIXED 0%	Configuration analog inputs of CMP3	
C0694 1 2	 DIS: IN DIS: IN		 -199.99 {0.01 %} 199.99	Analog input signals of CMP3	display only
C0695	Function	2	1 IN 1 < IN2 2 |IN1| < |IN2|	Function comparator for phase signals PHCMP1	Compares the inputs IN1 and IN2
[C0697] 1 2	 CFG: IN CFG: IN	 1000 1000	See selection list 3 FIXED 0INC FIXED 0INC	Configuration phase inputs of PHCMP1	
C0698 1 2	 DIS: IN DIS: IN		 -2147483647 {1} 2147483647	Phase input signals of PHCMP1	display only
[C0700]	CFG: IN	 19523	See selection list 1 FCODE-472/3	Configuration input of von ANEG1	
C0701	DIS: IN		-199.99 {0.01 %} 199.99	Input signal of ANEG1	display only
[C0703]	CFG: IN	 1000	See selection list 1 FIXED 0 %	Configuration input of ANEG2	
C0704	DIS: IN		-199.99 {0.01 %} 199.99	Input signal ANEG2	display only
C0710	Function	0	0 Rising trans 1 Falling trans 2 Both trans	Function edge evaluation TRANS1	
C0711	Pulse T	0.001	0.001 {0.001 s} 60.000	Pulse time of TRANS1	
[C0713]	CFG: IN	 1000	see selection list 2 FIXED 0	Configuration digital input of TRANS1	
C0714	DIS: IN			Digital input signal of TRANS1	display only
C0715	Function	0	0 Rising trans 1 Falling trans 2 Both trans	Function edge evaluation TRANS2	
C0716	Pulse T	0.001	0.001 {0.001 s} 60.000	Pulse time of TRANS2	
[C0718]	CFG: IN	 1000	see selection list 2 FIXED 0	Configuration digital input of TRANS2	
C0719	DIS: IN			Digital input signal of TRANS2	display only
C0720	Function	2	0 On delay 1 Off delay 2 On/Off delay	Function digital delay component DIGDEL1	
C0721	Delay T	1.000	0.001 {0.001 s} 60.000	Delay time of DIGDEL1	
[C0723]	CFG: IN	 1000	see selection list 2 FIXED 0	Configuration digital input of DIGDEL1	
C0724	DIS: IN			Digital input signal of DIGDEL1	display only
C0725	Function	0	0 On delay 1 Off delay 2 On/Off delay	Function digital delay component DIGDEL2	
C0726	Delay T	1.0	0.001 {0.001 s} 60.000	Delay time of DIGDEL2	
[C0728]	CFG: IN	 1000	see selection list 2 FIXED0	Configuration digital input of DIGDEL2	

Code	LCD	Possible settings			IMPORTANT
		Lenze	Choice	Info	
C0729	DIS: IN			Digital input signal of DIGDEL2	display only
C0730	Mode	0	0 Start measurement 1 Stop measurement	Start / Stop of the measurement recording of OSZ	
C0731	Status		0 Measurement completed 1 Measurement active 2 Trigger recognized 3 Cancel 4 Cancel after trigger 5 Read memory	current operating state of OSZ	display only
[C0732]			See selection list 1	Configuration analog inputs of OSZ	
1	CFG: channel1	1000	FIXED0%		
2	CFG: channel2	1000	FIXED0%		
3	CFG: channel3	1000	FIXED0%		
4	CFG: channel4	1000	FIXED0%		
[C0733]			see selection list 2	Configuration trigger input of OSZ	
1	CFG: Dig. trigger	1000	FIXED0		
C0734	Trigger source	0	0 dig. trigger input 1 Channel 1 2 Channel 2 3 Channel 3 4 Channel 4	Selection of the trigger source of OSZ	
C0735	Trigger level	0	-32767 {1} 32767	Set trigger level for channel 1 ... 4 of OSZ	
C0736	Trigger edge	0	0 LOW/HIGH edge 1 HIGH/LOW edge	Selection of the trigger edge of OSZ	
C0737	Trigger delay	0.0	-100.0 {0.1 %} 999.99	Setting pre and post triggering of OSZ	
C0738	Scanning period	3	3 1 ms 4 2 ms 5 5 ms 6 10 ms 7 20 ms 8 50 ms 9 100 ms 10 200 ms 11 500 ms 12 1 s 13 2 s 14 5 s 15 10 s 16 20 s 17 50 s 18 1 min 19 2 min 20 5 min 21 10 min	Selection of the scanning period of OSZ	
C0739	Number of channels	4	1 {1} 4	Number of channels to be measured of OSZ	
C0740				Determine start point when reading the data memory of OSZ	
1	during start	0	0 {1} 16383	Deliberate selection of a memory block	
2	Free/Inhibit	0	0 Data reading inhibited 1 Data reading enabled	The data memory of OSZ must be enabled for reading	
C0741				OSZ	display only
1	DIS: Version			Sub1 Version	
2	DIS: Memory size			Sub2 Memory size	
3	DIS: Data width			Sub3 Data width	
4	DIS: Number of channels			Sub4 Number of channels	
C0742	DIS: Data block length			Data block length of OSZ	display only

Code	LCD	Possible settings			IMPORTANT
		Lenze	Choice	Info	
C0743	DIS: Read data block			Reading an 8 byte data block	display only
C0744	Memory size	2048	512 0 1024 1 1536 2 2048 3 3072 4 4096 5 8192 6	Adapt memory depth of the measurement task	
C0749 1 2 3	 DIS: Cancel index DIS: Index trigger DIS: Index end			Information on saving the measured values	display only
C0750	Vp denom	16	1 Gain = 1 2 Gain = 1/2 4 Gain = 1/4 8 Gain = 1/8 16 Gain = 1/16 32 Gain = 1/32 64 Gain = 1/64 128 Gain = 1/128 256 Gain = 1/256 512 Gain = 1/512 1024 Gain = 1/1024 2048 Gain = 1/2048 4096 Gain = 1/4096 8192 Gain = 1/8192 16384 Gain = 1/16384	Denominator gain of position controller of DFRFG1	
C0751	DFRFG1 Tir	1.000	0.001 {0.001 s} 999.900	Acceleration time T_{ir} of DFRFG1	
C0752	Max speed	3000	1 {1 rpm} 16000	Maximum make up speed of DFRFG1	
C0753	DFRFG1 QSP	0.000	0.000 {0.001 s} 999.900	Deceleration time T_{if} for QSP of DFRFG1	
C0754	PH error	*	10 {1 inc} 2000000000	contouring error of DFRFG1	→ 2000000000 1 rev. = 65535 inc
C0755	Syn window	100	0 {1 inc} 65535	Synchronization window of DFRFG1	
C0756	Offset	0	$-1*10^9$ {1 inc} $1*10^9$	Offset of DFRFG1	
C0757	Function	0	0 no TP start 1 with TP start	Function of DFRFG1	
[C0758]	CFG: IN	1000	See selection list 4 FIXEDPHI-0	Configuration phase input of DFRFG1	
[C0759]	CFG: QSP	1000	see selection list 2 FIXED0	Configuration digital input (triggering QSP) of DFRFG1	
[C0760]	CFG: STOP	1000	see selection list 2 FIXED0	Configuration digital input (ramp generator stop) of DFRFG1	
[C0761]	CFG: RESET	1000	see selection list 2 FIXED0	Configuration digital input (reset integrators) of DFRFG1	
C0764 1 2 3	 DIS: QSP DIS: STOP DIS: RESET			Digital input signals of DFRFG1	display only
C0765	DIS: IN		-32767 {1 rpm} 32767	Absolute analog input signal of DFRFG1	display only
C0766	Speed dir.	1	1 cw / ccw 2 cw 3 ccw	Preselection of the direction of speed via DFRFG1	
[C0770]	CFG: D	1000	see selection list 2 FIXED0	Configuration data input of FLIP1	
[C0771]	CFG: CLK	1000	see selection list 2 FIXED0	Configuration clock input of FLIP1	

Code	LCD	Possible settings			IMPORTANT
		Lenze	Choice	Info	
[C0772]	CFG: CLR	1000	see selection list 2 FIXED0	Configuration reset input of FLIP1	
C0773				Digital input signals of FLIP1	display only
1	DIS: D				
2	DIS: CLK				
3	DIS: CLR				
[C0775]	CFG: D	1000	see selection list 2 FIXED0	Configuration data input of FLIP2	
[C0776]	CFG: CLK	1000	see selection list 2 FIXED0	Configuration clock input of FLIP2	
[C0777]	CFG: CLR	1000	see selection list 2 FIXED0	Configuration reset input of FLIP2	
C0778				Digital input signals of FLIP2	display only
1	DIS: D				
2	DIS: CLK				
3	DIS: CLR				
[C0780]	CFG: N	50	See selection list 1 AIN1-OUT	Configuration main setpoint input of NSET	
[C0781]	CFG: N-INV	10251	see selection list 2 R/L/Q-R/L	Configuration main setpoint inversion of NSET	
[C0782]	CFG: NADD	5650	See selection list 1 ASW1-OUT	Configuration additional setpoint input of NSET	
[C0783]	CFG: NADD-INV	1000	see selection list 2 FIXED0	Configuration additional setpoint inversion of NSET	
[C0784]	CFG: CINH-VAL	5001	See selection list 1 MCTRL-NACT	Configuration output signal with controller inhibit of NSET	
[C0785]	CFG: SET	5000	See selection list 1 MCTRL-NSET2	Configuration ramp generator of NSET	
[C0786]	CFG: LOAD	5001	see selection list 2 MCTRL-QSP-OUT	Configuration digital input (load ramp generator) of NSET	
[C0787]			see selection list 2	Configuration JOG selection and JOG activation of NSET	Binary interpretation
1	CFG: JOG*1	53	DIGIN3		
2	CFG: JOG*2	1000	FIXED0		
3	CFG: JOG*4	1000	FIXED0		
4	CFG: JOG*8	1000	FIXED0		
[C0788]			see selection list 2	Configuration Ti selection and Ti activation of NSET	• Binary interpretation • Tir and Tif pairs are identical
1	CFG: TI*1	1000	FIXED0		
2	CFG: TI*2	1000	FIXED0		
3	CFG: TI*4	1000	FIXED0		
4	CFG: TI*8	1000	FIXED0		
[C0789]	CFG: RFG-0	1000	see selection list 2 FIXED0	Configuration digital input (ramp generator 0) of NSET	
[C0790]	CFG: RFG-STOP	1000	see selection list 2 FIXED0	Configuration digital input (ramp generator stop) of NSET	
C0798				Analog input signals of NSET	display only
1	DIS: CINH-VAL		-199.99 {0.01 %} 199.99		
2	DIS: SET				

Code	LCD	Possible settings			IMPORTANT
		Lenze	Choice	Info	
C0799				Digital input signals of NSET	display only
1	DIS: N-INV				
2	DIS: NADD-INV				
3	DIS: LOAD				
4	DIS: JOG*1				
5	DIS: JOG*2				
6	DIS: JOG*4				
7	DIS: JOG*8				
8	DIS: TI*1				
9	DIS: TI*2				
10	DIS: TI*4				
11	DIS: TI*8				
12	DIS RFG-0				
13	DIS: RFG-STOP				
[C0800]	CFG: SET	1000	See selection list 1 FIXED0%	Configuration setpoint input of process controller PCTRL1	
[C0801]	CFG: ACT	1000	See selection list 1 FIXED0%	Configuration actual value input of PCTRL1	
[C0802]	CFG: INFLU	1000	See selection list 1 FIXED0%	Configuration evaluation input of PCTRL1	
[C0803]	CFG: ADAPT	1000	See selection list 1 FIXED0%	Configuration adaptation input of PCTRL1	
[C0804]	CFG: INACT	1000	see selection list 2 FIXED0	Configuration deactivation input of PCTRL1	
[C0805]	CFG: I-OFF	1000	see selection list 2 FIXED0	Configuration digital input (switch off I-component) of PCTRL1	
C0808				Analog input signals of PCTRL1	display only
1	DIS: SET		-199.99 {0.01 %} 199.99		
2	DIS: ACT				
3	DIS: INFLU				
4	DIS: ADAPT				
C809				Digital input signals of PCTRL1	display only
1	DIS: INACT				
2	DIS: I-OFF				
[C0810]			See selection list 1	Configuration analog inputs of analog switch ASW1	
1	CFG: IN	55	AIN2-OUT		
2	CFG: IN	1000	FIXED0%		
[C0811]	CFG: SET	1000	see selection list 2 FIXED0	Configuration digital input of ASW1	
C0812				Analog input signals of ASW1	display only
1	DIS: IN		-199.99 {0.01 %} 199.99		
2	DIS: IN				
C0813	DIS: SET			Digital input signal of ASW1	display only
[C0815]			See selection list 1	Configuration analog inputs of analog switch ASW2	
1	CFG: IN	1000	FIXED0%		
2	CFG: IN	1000	FIXED0%		
[C0816]	CFG: SET	1000	see selection list 2 FIXED0	Configuration digital input of ASW2	
C0817				Analog input signals of ASW2	display only
1	DIS: IN		-199.99 {0.01 %} 199.99		
2	DIS: IN				
C0818	DIS: SET			Digital input signal of ASW2	display only
[C0820]			see selection list 2	Configuration digital inputs of the AND element AND1	
1	CFG: IN	1000	FIXED0		
2	CFG: IN	1000	FIXED0		
3	CFG: IN	1000	FIXED0		

Code	LCD	Possible settings			IMPORTANT
		Lenze	Choice	Info	
C0821				Digital input signals of AND1	display only
1	DIS: IN				
2	DIS: IN				
3	DIS: IN				
[C0822]			see selection list 2	Configuration digital inputs of the AND element AND2	
1	CFG: IN	1000	FIXED0		
2	CFG: IN	1000	FIXED0		
3	CFG: IN	1000	FIXED0		
C0823				Digital input signals of AND2	display only
1	DIS: IN				
2	DIS: IN				
3	DIS: IN				
[C0824]			see selection list 2	Configuration digital inputs of the AND element AND3	
1	CFG: IN	1000	FIXED0		
2	CFG: IN	1000	FIXED0		
3	CFG: IN	1000	FIXED0		
C0825				Digital input signals of AND3	display only
1	DIS: IN				
2	DIS: IN				
3	DIS: IN				
[C0826]			see selection list 2	Configuration digital inputs of the AND element AND4	
1	CFG: IN	1000	FIXED0		
2	CFG: IN	1000	FIXED0		
3	CFG: IN	1000	FIXED0		
C0827				Digital input signals of AND4	display only
1	DIS: IN				
2	DIS: IN				
3	DIS: IN				
[C0828]			see selection list 2	Configuration digital inputs of the AND element AND5	
1	CFG: IN	1000	FIXED0		
2	CFG: IN	1000	FIXED0		
3	CFG: IN	1000	FIXED0		
C0829				Digital input signals of AND5	display only
1	DIS: IN				
2	DIS: IN				
3	DIS: IN				
[C0830]			see selection list 2	Configuration digital inputs of the OR element OR1	
1	CFG: IN	1000	FIXED0		
2	CFG: IN	1000	FIXED0		
3	CFG: IN	1000	FIXED0		
C0831				Digital input signals of OR1	display only
1	DIS: IN				
2	DIS: IN				
3	DIS: IN				
[C0832]			see selection list 2	Configuration digital inputs of the OR element OR2	
1	CFG: IN	1000	FIXED0		
2	CFG: IN	1000	FIXED0		
3	CFG: IN	1000	FIXED0		
C0833				Digital input signals of OR2	display only
1	DIS: IN				
2	DIS: IN				
3	DIS: IN				
[C0834]			see selection list 2	Configuration digital inputs of the OR element OR3	
1	CFG: IN	1000	FIXED0		
2	CFG: IN	1000	FIXED0		
3	CFG: IN	1000	FIXED0		

Code	LCD	Possible settings			IMPORTANT
		Lenze	Choice	Info	
C0835				Digital input signals of OR3	display only
1	DIS: IN				
2	DIS: IN				
3	DIS: IN				
[C0836]			see selection list 2	Configuration digital inputs of the OR element OR4	
1	CFG: IN	1000	FIXED0		
2	CFG: IN	1000	FIXED0		
3	CFG: IN	1000	FIXED0		
C0837				Digital input signals of OR4	display only
1	DIS: IN				
2	DIS: IN				
3	DIS: IN				
[C0838]			see selection list 2	Configuration digital inputs of the OR element OR5	
1	CFG: IN	1000	FIXED0		
2	CFG: IN	1000	FIXED0		
3	CFG: IN	1000	FIXED0		
C0839				Digital input signals of OR5	display only
1	DIS: IN				
2	DIS: IN				
3	DIS: IN				
[C0840]	CFG: IN	1000	see selection list 2 FIXED0	Configuration digital input of the digital NOT element NOT1	
C0841	DIS: IN			Digital input signal of NOT1	display only
[C0842]	CFG: IN	1000	see selection list 2 FIXED0	Configuration digital input of the digital NOT element NOT2	
C0843	DIS: IN			Digital input signal of NOT2	display only
[C0844]	CFG: IN	1000	see selection list 2 FIXED0	Configuration digital input of the digital NOT element NOT3	
C0845	DIS: IN			Digital input signal of NOT3	display only
[C0846]	CFG: IN	1000	see selection list 2 FIXED0	Configuration digital input of the digital NOT element NOT4	
C0847	DIS: IN			Digital input signal of NOT4	display only
[C0848]	CFG: IN	1000	see selection list 2 FIXED0	Configuration digital input of the digital NOT element NOT5	
C0849	DIS: IN			Digital input signal of NOT5	display only
[C0850]			See selection list 1	Configuration process output words for automation interface AIF (X1)	
1	CFG: OUT.W1	1000	FIXED0%		
2	CFG: OUT.W2	1000	FIXED0%		
3	CFG: OUT.W3	1000	FIXED0%		
[C0851]			See selection list 3	Configuration 32-bit phase information	
1	CFG: OUT.D1	1000	FIXED0INC		
C0852	Type OUT.W2	0	0 analog 1 digital 0-15 2 D1: low phase 3 D2: high phase	Configuration process output word 2 for automation interface AIF (X1)	
C0853	Type OUT.W3	0	0 analog 1 digital 16-31 2 high phase	Configuration process output word 3 for automation interface AIF (X1)	
C0854	Type OUT.W1	0	0 analog 3 D2: low phase	Configuration process output word 1 for automation interface AIF (X1)	
C0855	DIS: IN (0-15) DIS: IN (16-31)		0 FFFF	Process input words hexadecimal for automation interface X1	display only
C0856				Process input words decimal	display only
1	DIS: IN.W1		-199.99 {0.01%} 199.99		100% = 16384
2	DIS: IN.W2				
3	DIS: IN.W3				
C0857	DIS: IN.D1		-2147483648 {1} 2147483647	32-bit phase information	display only

Code	LCD	Possible settings			IMPORTANT
		Lenze	Choice	Info	
C0858				Process output words	display only
1	DIS: OUT.W1		-199.99 {0.01 %} 199.99		100% = 16384
2	DIS: OUT.W2				
3	DIS: OUT.W3				
C0859	DIS: OUT.D1		-2147483648 {1} 2147483647	32-bit phase information	display only
[C0860]			See selection list 1	Configuration process output words for system bus output blocks (CAN)	
1	CFG: OUT1.W1	1000	FIXED0%		
2	CFG: OUT1.W2	1000	FIXED0%		
3	CFG: OUT1.W3	1000	FIXED0%		
4	CFG: OUT2.W1	1000	FIXED0%		
5	CFG: OUT2.W2	1000	FIXED0%		
6	CFG: OUT2.W3	1000	FIXED0%		
7	CFG: OUT2.W4	1000	FIXED0%		
8	CFG: OUT3.W1	1000	FIXED0%		
9	CFG: OUT3.W2	1000	FIXED0%		
10	CFG: OUT3.W3	1000	FIXED0%		
11	CFG: OUT3.W4	1000	FIXED0%		
[C0861]			See selection list 3	Configuration 32-bit phase information for system bus output blocks (CAN)	
1	CFG: OUT1.D1	1000	FIXED0INC		
2	CFG: OUT2.D1	1000	FIXED0INC		
3	CFG: OUT3.D1	1000	FIXED0INC		
C0863				Process input words hexadecimal for system bus (CAN)	display only
1	DIS: IN3 dig0		0 FFFF		
2	DIS: IN2 dig16				
3	DIS: IN2 dig0				
4	DIS: IN3 dig16				
5	DIS: IN3 dig0				
6	DIS: IN3 dig16				
C0864				Configuration process output words for system bus (CAN)	
1	Type OUT1.W2	0	0 analog sign		
2	Type OUT2.W1	0	1 digital 0-15		
3	Type OUT3.W1	0	2 low phase		
C0865				Configuration process output words for system bus (CAN)	
1	Type OUT1.W3	0	0 analog sign		
2	Type OUT2.W2	0	1 digital 16-31		
3	Type OUT3.W2	0	2 high phase		
C0866				Process input words for system bus (CAN)	display only
1	DIS: IN1.W1		-199.99 {0.01 %} 199.99		100% = 16384
2	DIS: IN1.W3				
3	DIS: IN2.W1				
4	DIS: IN2.W2				
5	DIS: IN2.W3				
6	DIS: IN2.W4				
7	DIS: IN2.W4				
8	DIS: IN3.W1				
9	DIS: IN3.W2				
10	DIS: IN3.W3				
11	DIS: IN3.W4				
C0867				32-bit phase information for system bus (CAN)	display only
1	DIS: IN1.D1		-2147483648 {1} 2147483647		
2	DIS: IN2.D1				
3	DIS: IN3.D1				

Code	LCD	Possible settings			IMPORTANT
		Lenze	Choice	Info	
C0868 1 2 3 4 5 6 7 8 9 10 11	 DIS: OUT1.W1 DIS: OUT1.W2 DIS: OUT1.W3 DIS: OUT2.W1 DIS: OUT2.W2 DIS: OUT2.W3 DIS: OUT2.W4 DIS: OUT3.W1 DIS: OUT3.W2 DIS: OUT3.W3 DIS: OUT3.W4		 -199.99 {0.01 %} 199.99	Process output words system bus (CAN)	display only 100% = 16384
C0869 1 2 3	 DIS: OUT1.D1 DIS: OUT2.D1 DIS: OUT3.D1		 -2147483648 {1} 2147483647	32-bit phase information for system bus (CAN)	display only
[C0870] 1 2	 CFG: CINH CFG: CINH	 1000 1000	see selection list 2 FIXED0 FIXED0	Configuration digital inputs (inhibit controller) of DCTRL	
[C0871]	 CFG: TRIP-SET	 54	see selection list 2 DIGIN 4	Configuration digital input (TRIP-Set) of DCTRL	
[C0876]	 CFG: TRIP-RES	 55	see selection list 2 DIGIN 5	Configuration digital input (TRIP-Reset) of DCTRL	
C0878 1 2 3 4	 DIS: CINH1 DIS: CINH2 DIS: TRIP-SET DIS: TRIP-RES			Digital input signals of DCTRL	display only
C0879 1 2 3	 Reset C135 Reset AIF Reset CAN		 0 no reset 1 reset	Reset of control words	• C0879 = 1 performs one reset
[C0880] 1 2	 CFG: PAR*1 CFG: PAR*2	 1000 1000	see selection list 2 FIXED0 FIXED0	Configuration Select parameter set of DCTRL	
[C0881]	 CFG:PAR-LOAD	 1000	see selection list 2 FIXED0	Configuration Load parameter set of DCTRL	
C0884 1 2 3	 DIS: PAR*1 DIS: PAR*2 DIS: PAR-LOAD			Signals for parameter set selection of DCTRL	display only
[C0885]	 CFG: R	 51	see selection list 2 DIGIN 1	Configuration digital input (CW rotation) of CW/CCW/Q	
[C0886]	 CFG: L	 52	see selection list 2 DIGIN 2	Configuration digital input (CCW rotation) of CW/CCW/Q	
C0889 1 2	 DIS: R DIS: L			Digital input signals of R/L/Q	display only
[C0890]	CFG: N-SET	 5050	See selection list 1 NSET-NOUT	Configuration speed setpoint input motor control MCTRL	
[C0891]	CFG: M-ADD	 1000	See selection list 1 FIXED0%	Configuration torque setpoint input of MCTRL	
[C0892]	CFG: LO-M-LIM	 5700	See selection list 1 ANEG1-OUT	Configuration lower torque limit of MCTRL	
[C0893]	CFG: HI-M-LIM	 19523	See selection list 1 FCODE-472/3	Configuration upper torque limit of MCTRL	
[C0894]	CFG: PHI-SET	 1000	See selection list 3 FIXED0INC	Configuration rotor position setpoint of MCTRL	

Code	LCD	Possible settings			IMPORTANT
		Lenze	Choice	Info	
[C0895]	CFG: PHI-LIM	1006	See selection list 1 FIXED100%	Configuration phase controller limit of MCTRL	
[C0896]	CFG: N2-LIM	1000	See selection list 1 FIXED0%	Configuration second speed limitation of MCTRL	
[C0897]	CFG: PHI-ON	1000	see selection list 2 FIXED0	Configuration switch-on signal phase controller of MCTRL	
[C0898]	CFG: FLD-WEAK	1006	See selection list 1 FIXED100%	Configuration signal for field weakening of MCTRL	
[C0899]	CFG: N/M-SWT	1000	see selection list 2 FIXED0	Configuration changeover between speed control and torque control MCTRL	
[C0900]	CFG: QSP	10250	see selection list 2 R/L/Q-QSP	Configuration control signal to activate QSP of MCTRL	
[C0901]	CFG: I-SET	1000	See selection list 1 FIXED0%	Configuration Load I-component of the MCTRL speed controller	
[C0902]	CFG: I-LOAD	1000	see selection list 2 FIXED0	Configuration release signal to load the I-component of the MCTRL speed controller	
[C0903]	CFG: P-ADAPT	1006	See selection list 1 FIXED0%	[CINH] CFG: MCTRL-P-ADAPT	Adaptation phase controller
C0906 1 2 3 4 5 6 7 8 9	 DIS: N-SET DIS: M-ADD DIS: LO-M-LIM DIS: HI-M-LIM DIS: PHI-LIM DIS: N2-LIM DIS: FLD-WEAK DIS: I-SET DIS: P-ADAPT		-199.99 {0.01 %} 199.99	Analog input signals of MCTRL	display only
C0907 1 2 3 4	 DIS: PHI-ON DIS: N/M-SWT DIS: QSP DIS: I-LOAD			Digital input signals of MCTRL	display only
C0908	DIS: PHI-SET		-2147483647 {1 inc} 2147483647	Set phase signal of MCTRL	display only • 1 rev. = 65536 inc
C0909	speed limit	1	1 +/- 175 % 2 0 .. +175 % 3 -175 .. 0 %	Speed limitation for the MCTRL speed setpoint	
[C0920]	CFG: ON	1000	see selection list 2 FIXED0	Configuration activating input homing of REF	
[C0921]	CFG: MARK	1000	see selection list 2 FIXED0	Configuration digital homing switch of REF	
[C0922]	CFG: PHI-IN	1000	See selection list 3 FIXED0INC	Configuration phase input of REF	
[C0923]	CFG: N-IN	1000	See selection list 1 FIXED0%	Configuration speed input of REF	
[C0924]	CFG: POS-LOAD	1000	see selection list 2 FIXED0	Configuration of the control "Set position" of REF	
[C0925]	CFG: ACTPOS-I	1000	See selection list 3 FIXED0INC	Configuration of the position "Set position" of REF	
C0926 1 2 3 4	 DIS: ACTPOS-I DIS: PHI-IN DIS: ACTPOS DIS: TARGET		-2147483647 {1 inc} 2147483647	Phase input signals of REF	display only

Configuration

Code	LCD	Possible settings			IMPORTANT
		Lenze	Choice	Info	
C0927 1 2 3	 DIS: ON DIS: MARK DIS: LOAD			digital input signals of REF	display only
C0928	DIS: PHI-IN		-2147483647 {1 inc} 2147483647	Phase signal (contouring error) of REF	display only • 1 rev. = 65536 inc
C0929	DIS: N-IN		-199.99 {0.01 %} 199.99	Analog input signal of REF	display only
[C0930]	Gearbox mot	1	1 {1} 65535	Gearbox factor (numerator) for REF	
[C0931]	Gearbox enc	1	1 {1} 65535	Gearbox factor (denominator) for REF	
C0932	REF mode	0	 0 Mode 0 1 Mode 1 6 Mode 6 7 Mode 7 8 Mode 8 9 Mode 9 20 Mode 20 21 Mode 21	Homing mode for REF	
C0933	REF trans	0	 0 Rising trans 1 Falling trans	Referfence signal edge for REF Rising edge falling edge	
C0934	REF offset	0	-2140000000 {1 inc} 2140000000	Reference offset for REF	
C0935	REF speed	2.0000	0.0001 {0.0001 % N_{max}} 100.0000	Homing speed for REF	
C0936	REF Ti	1.00	0.01 {0.01 s} 990.00	T $_i$ time homing of REF	• Tir and Tif are identical
C0940	Numerator	1	-32767 {1} 32767	Numerator for CONV1	
C0941	Denominator	1	1 {1} 32767	Denominator for CONV1	
[C0942]	CFG: IN	 1000	See selection list 1 FIXED0%	Configuration analog input CONV1	
C0943	DIS: IN		-199.99 {0.01 %} 199.99	Relative analog input signal of CONV1	display only
C0945	Numerator	1	-32767 {1} 32767	Numerator for CONV2	
C0946	Denominator	1	1 {1} 32767	Denominator for CONV2	
[C0947]	CFG: IN	 1000	See selection list 1 FIXED0%	Configuration analog input CONV2	
C0948	DIS: IN		-199.99 {0.01 %} 199.99	Relative analog input signal of CONV2	display only
C0950	Numerator	1	-32767 {1} 32767	Numerator for CONV3	
C0951	Denominator	1	1 {1} 32767	Denominator for CONV3	
[C0952]	CFG: IN	 1000	See selection list 4 FIXEDPHI0	Configuration analog input CONV3	
C0953	DIS: IN		-32767 {1 rpm} 32767	Absolute analog input signal of CONV3	display only
C0955	Numerator	1	-32767 {1} 32767	Numerator for CONV4	
C0956	Denominator	1	1 {1} 32767	Denominator for CONV4	
[C0957]	CFG: IN	 1000	See selection list 4 FIXEDPHI0	Configuration analog input CONV4	
C0958	DIS: IN		-32767 {1 rpm} 32767	absolute analog input signal of CONV4	display only
C0960	Function	1	 1 Function1 2 Function2 3 Function3	Characteristic CURVE1-IN	
C0961	y0	0.00	0.00 {0.01 %} 199.99	Ordinate of the pair (x=0%/y0) of CURVE1	
C0962	y1	50.00	0.00 {0.01 %} 199.99	Ordinate of the pair (x1/y1) of CURVE1	
C0963	y2	75.00	0.00 {0.01 %} 199.99	Ordinate of the pair (x2/y2) of CURVE1	
C0964	y100	100.00	0.00 {0.01 %} 199.99	Ordinate of the pair (x=100%/y100) of CURVE1	
C0965	x1	50.00	0.01 {0.01 %} 100.00	Abscissa of the pair (x1/y1) of CURVE1	
C0966	x2	75.00	0.01 {0.01 %} 99.00	Abscissa of the pair (x2/y2) of CURVE1	

Code	LCD	Possible settings					IMPORTANT
		Lenze	Choice			Info	
[C0967]	CFG: IN	1000	See selection list 1 FIXED0%			Configuration characteristic CURVE1-IN	
C0968	DIS: IN		-199.99	{0.01 %}	199.99	Relative analog input signal of CONV1	display only
[C0970]	CFG: N-SET	1000	See selection list 1 FIXED0%			Configuration speed input of mains failure control MFAIL	Setpoint path
[C0971]	CFG: FAULT	1000	see selection list 2 FIXED0			Configuration input mains failure detected of MFAIL	Input fora activation
[C0972]	CFG: RESET	1000	see selection list 2 FIXED0			Configuration reset mains failure control of MFAIL	
[C0973]	CFG: ADAPT	1000	See selection list 1 FIXED0%			Configuration of MFAIL Adaptation of the P-gain of the voltage controller	
[C0974]	CFG: CONST	1000	See selection list 1 FIXED0%			Configuration of MFAIL Adaptation of the P-gain of the voltage controller	
[C0975]	CFG: THRESHLD	1000	See selection list 1 FIXED0%			Configuration of MFAIL Restart protection when the value falls below the speed threshold	
[C0976]	CFG: NACT	1000	See selection list 1 FIXED0%			Configuration of MFAIL ● Comparison value for threshold function ● Start for U_2 controller	
[C0977]	CFG: SET	1000	See selection list 1 FIXED0%			Configuration speed start value for MFAIL	
[C0978]	CFG: DC-SET	1000	See selection list 1 FIXED0%			Configuration setpoint DC bus voltage for MFAIL	
C0980	MFAIL Vp	0.500	0.001	{0.001}	31.000	Gain Vp of MFAIL	
C0981	MFAIL Tn	100	20	{1 ms}	2000	Time constant of MFAIL	
C0982	MFAIL Tir	2.000	0.001	{0.001 s}	16.000	Acceleration time Tir of MFAIL	
C0983	Retrigger T	1.000	0.001	{0.001 s}	60.000		
C0988 1 2 3 4 5 6 7	 DIS: N-SET DIS: ADAPT DIS: CONST DIS: THRESHLD DIS: NACT DIS: SET DIS: DC-SET		-199.99	{0.01 %}	199.99	Analog input signals of MFAIL	display only
C0989 1 2	 DIS: FAULT DIS: RESET					Digital input signals of MFAIL	display only
[C0990]	CFG: IN	1000	See selection list 4 FIXEDPHI0			Configuration input phase integrator PHINT1	
[C0991]	CFG: RESET	1000	see selection list 2 FIXED0			Configuration reset input of PHINT1	
C0992	DIS: IN		-32767	{1}	32767	Input signal of PHINT1	display only
C0993	DIS: RESET					Digital input signal of PHINT1	display only
C0995	Division	1	-31	{1}	31	Division factor of phase division PHDIV1	
[C0996]	CFG: IN	1000	See selection list 3 FIXED0INC			Configuration input phase division PHDIV1	
C0997	DIS: IN		-2147483647	{1}	2147483647	Input signal of PHDIV1	display only
C1000	Division	1	0	{1}	31	Division factor	
[C1001]	CFG: IN	1000	See selection list 3 FIXED0INC			Configuration input of CONVPHA1	
C1002	DIS: IN		-2147483647	{1}	2147483647	Input signal of CONVPHA1	display only

Configuration

Code	LCD	Possible settings			IMPORTANT
		Lenze	Choice	Info	
C1010	Function	1	0 OUT = IN1 1 IN1 + IN2 2 IN1 - IN2 3 IN1 * IN2 14 IN1 / IN2 21 IN1 + IN2 (no limit) 22 IN1 - IN2 (no limit)	Function of ARITPH1	
[C1011]			See selection list 3	Configuration inputs ARITPH1	
1	CFG: IN	1000	FIXED0INC		
2	CFG: IN	1000	FIXED0INC		
C1012			-2147483647 {1} 2147483647	Input signals ARITPH1	display only
1	DIS: IN				
2	DIS: IN				
[C1030]	CFG: IN	1000	See selection list 4 FIXEDPHI0	Configuration input PHINT2	
[C1031]	CFG: RESET	1000	see selection list 2 FIXED0	Configuration reset input of PHINT2	
C1032	DIS: IN		-32767 {1} 32767	Input signal of PHINT2	display only
C1033	DIS: RESET			Digital input signal of PHINT2	display only
C1040	Accelaration	100.000	0.001 {0.001} 5000.000	Acceleration of SRFG1	
C1041	Jerk	0.200	0.001 {0.001 s} 999.999	Set jerk of SRFG1	
[C1042]	CFG: IN	1000	See selection list 1 FIXED0%	Configuration input of SRFG1	
[C1043]	CFG: SET	1000	See selection list 1 FIXED0%	Configuration input of SRFG1	
[C1044]	CFG: LOAD	1000	see selection list 2 FIXED0	Configuration digital input of SRFG1	
C1045				Input signals of SRFG1	display only
1	DIS: IN		-199.99 {0.01 %} 199.99		
2	DIS: SET				
C1046	DIS: LOAD			Digital input signal of SRFG1	display only
C1090	Output signal		-2147483648 {1} 2147483647	Output signal of FEVAN1	display only
C1091	Code	141	2 {1} 2000	Target code of FEVAN1	
C1092	Subcode	0	0 {1} 255	Target code of FEVAN1	
C1093	Numerator	1.0000	0.0001 {0.0001} 100000.0000	FEVAN1 numerator	
C1094	Denomiator	0.0001	0.0001 {1} 100000.0000	FEVAN1 denominator	
C1095	Offset	0	0 {1} 1000000000	FEVAN1 offset	
[C1096]	CFG: IN	1000	See selection list 1 FIXED0%	Configuration analog input of FEVAN1	
[C1097]	CFG: LOAD	1000	see selection list 2 FIXED0	Configuration digital inputs of FEVAN1	
C1098	DIS: IN		-32768 {1} 32767	Analog input signal of FEVAN1	display only
C1099	DIS: LOAD			Digital input signal of FEVAN1	display only
C1100	Function	1	1 Return 2 Hold	Function of FCNT1	
[C1101]			See selection list 1	Configuration analog inputs of FCNT1	
1	CFG: LD-VAL	1000	FIXED0%		
2	CFG: CMP-VAL	1000	FIXED0%		
[C1102]			see selection list 2	Configuration digital inputs of FCNT1	
1	CFG: CLKUP	1000	FIXED0		
2	CFG: CLKDWN	1000	FIXED0		
3	CFG: LOAD	1000	FIXED0		
C1103				Analog input signals of FCNT1	display only
1	DIS: LD-VAL		-32768 {1} 32768		
2	DIS: CMP-VAL				

Code	LCD	Possible settings			IMPORTANT
		Lenze	Choice	Info	
C1104				Digital input signals of FCNT1	display only
1	DIS: CLKUP				
2	DIS: CLKDWN				
3	DIS: LOAD				
C1120	Sync mode	2	0 off 1 CAN sync 2 Terminal sync	Function of SYNC1	
[C1121]			0 {1 ms} 13	SYNC1	
1	Sync cycle	2		Definition of the cycle time of the sync signals (in the slave)	for SYSTEMBUS only
2	Interpol. cycl	2		Definition of the interpolation time between the sync signals (in the slave)	• only for terminal • the interpolation is restarted with every sync signal
C1122	Sync time	0.460	0.000 {0.001 ms} 10.000	Phase shift between the CAN sync and internal control program cycle	• for SYSTEMBUS only • depending on the baud rate and bus load
C1123			-1.000 {0.001 ms} 1.000	• Phase shift between terminal sync and internal control program cycle	only for terminal sync
1	Phaseshift	0			
2	Sync Window	0	0.000 {0.001 ms} 1.000	Window for the synchronization edge of the terminal sync (LOW/HIGH edge)	• only for terminal sync • activates when the sync start window is quit
[C1124]	CFG: IN1	1000	See selection list 3 FIXED0INC	Configuration input of SYNC1	
[C1125]	CFG: IN2	1000	See selection list 3 FIXED0INC	Configuration input of SYNC1	
[C1126]	CFG: IN3	1000	See selection list 3 FIXED0INC	Configuration input of SYNC1	
C1127	DIS: IN1		-2147483647 {1} 2147483647	Input signal of SYNC1	display only
C1128	DIS: IN2		-2147483647 {1} 2147483647	Input signal of SYNC1	display only
C1129	DIS: IN3		-2147483647 {1} 2147483647	Input signal of SYNC1	display only
C1140	Function	0	0 Rising trans 1 Falling trans 2 Both trans	Function edge evaluation TRANS3	
C1141	Pulse T	0.001	0.001 {0.001 s} 60.000	TRANS3 pulse duration	
[C1143]	CFG: IN	1000	see selection list 2 FIXED 0	Configuration digital input of TRANS3	
C1144	DIS: IN			Digital input signal of TRANS3	display only
C1145	Function	0	0 Rising trans 1 Falling trans 2 Both trans	Function edge evaluation TRANS4	
C1146	Pulse T	0.001	0.001 {0.001 s} 60.000	TRANS4 pulse duration	
[C1148]	CFG: IN	1000	see selection list 2 FIXED 0	Configuration digital input of TRANS4	
C1149	DIS: IN			Digital input signal of TRANS4	display only
C1150	Function	0	0 Load perm 1 Load edge 2 Cmp & sub	Function of PHINT3	
C1151	Cmp. value	$2 \cdot 10^9$	0 {1} 2000000000	Comparison value of PHINT3	
[C1153]	CFG: IN	1000	See selection list 4 FIXEDPHI0	Configuration input phase integrator PHINT3	
[C1154]	CFG: LOAD	1000	see selection list 2 FIXED0	Configuration input of PHINT3	
[C1155]	CFG: SET	1000	See selection list 3 FIXED0INC	Configuration input of PHINT3	

Code	LCD	Possible settings			IMPORTANT
		Lenze	Choice	Info	
C1157	DIS: IN		-32767 {1} 32767	Input signal of PHINT3	display only
C1158	DIS: LOAD			Input signal of PHINT3	display only
C1159	DIS: SET		-2147483647 {1} 2147483647	Input signal of PHINT3	display only
[C1160]			See selection list 1	Configuration analog inputs of ASW3	
1	CFG: IN	1000	FIXED0%		
2	CFG: IN	1000	FIXED0%		
[C1161]			see selection list 2	Configuration digital input of ASW3	
	CFG: SET	1000	FIXED0		
C1162				Analog input signals of ASW3	display only
1	DIS: IN		-199.99 {0.01 %} 199.99		
2	DIS: IN				
C1163	DIS: SET			Digital input signal of ASW3	display only
[C1165]			See selection list 1	Configuration analog inputs of ASW4	
1	CFG: IN	1000	FIXED0%		
2	CFG: IN	1000	FIXED0%		
[C1166]			see selection list 2	Configuration digital input of ASW4	
	CFG: SET	1000	FIXED0		
C1167				Analog input signals of ASW4	display only
1	DIS: IN		-199.99 {0.01 %} 199.99		
2	DIS: IN				
C1168	DIS: SET			Digital input signal of ASW4	display only
C1170	Numerator	1	-32767 {1} 32767	Numerator for CONV6	
C1171	Denominator	1	1 {1} 32767	CONV6 denominator	
[C1172]	CFG: IN		See selection list 1	Configuration analog input of CONV6	
		1000	FIXED 0 %		
C1173	DIS: IN		-199.99 {0.01 %} 199.99	Analog input signal of CONV6	display only
[C1175]			see selection list 2	Configuration digital inputs of AND6	
1	CFG: IN	1000	FIXED0		
2	CFG: IN	1000	FIXED0		
3	CFG: IN	1000	FIXED0		
C1176				Digital input signals of AND6	display only
1	DIS: IN				
2	DIS: IN				
3	DIS: IN				
[C1178]			see selection list 2	Configuration digital inputs of AND7	
1	CFG: IN	1000	FIXED0		
2	CFG: IN	1000	FIXED0		
3	CFG: IN	1000	FIXED0		
C1179				Digital input signals of AND7	display only
1	DIS: IN				
2	DIS: IN				
3	DIS: IN				
C1190	Mot. PTC-Sel.	0	0 standard 1 Characterist.	PTC selection for motor	
C1191				Selection of PTC temperature characteristic	
1	Char.: temp 1	100	0 {1 °C} 255		
2	Char.: temp 2	150			
C1192				Selection of PTC resistance characteristic	
1	Char.: OHM 1	1670	0 {1 Ω} 30000		
2	Char.: OHM 2	2225			
[C1195]	CFG: OUT.D2		See selection list 3	Configuration input phase signal of AIF-OUT	
		1000	FIXED0INC		
C1196	DIS: OUT.D2		-2147483647 {1} 2147483647	Input signal of AIF-OUT	display only
C1197	DIS: IN.D2			Output signal of AIF-IN	
[C1200]			See selection list 3	Configuration inputs of PHADD1	
1	CFG: IN	1000	FIXED0INC		
2	CFG: IN	1000	FIXED0INC		
3	CFG: IN	1000	FIXED0INC		

Code	LCD	Possible settings			IMPORTANT
		Lenze	Choice	Info	
C1201				Input signals of PHADD1	
1	DIS: IN		-2147483647 {1} 2147483647		
2	DIS: IN				
3	DIS: IN				
[C1205]			See selection list 3	Configuration inputs of PHCMP2	
1	CFG: IN	1000	FIXED0INC		
2	CFG: IN	1000	FIXED0INC		
C1206				Input signals of PHCMP2	
1	DIS: IN		-2147483647 {1} 2147483647		
2	DIS: IN				
C1207	Function	2	1 IN1 < IN2	Function of PHCMP2	
			2 |IN1| < |IN2|		
[C1210]			see selection list 2	Configuration digital inputs of STORE1	
1	CFG: RESET	1000	FIXED0		
2	CFG: ENTP	1000	FIXED0		
3	CFG: ENWIN	1000	FIXED0		
4	CFG: LOAD0	1000	FIXED0		
5	CFG: LOAD1	1000	FIXED0		
[C1211]			See selection list 4	Configuration inputs of STORE1	
1	CFG: IN	1000	FIXEDPHI-0		
2	CFG: MASKI	1000	FIXEDPHI-0		
[C1212]	CFG: MASKV	1000	See selection list 3	Configuration input of STORE1	
			FIXED0INC		
C1215				Input signals of STORE1	display only
1	DIS: RESET				
2	DIS: ENTP				
3	DIS: ENWIN				
4	DIS: LOAD0				
5	DIS: LOAD1				
C1216			-32767 {1} 32767	Input signals of STORE1	display only
1	DIS: IN				
2	DIS: MASKI				
C1217	DIS: MASKV		-2147483647 {1} 2147483647	Input signal of STORE1	display only
[C1220]			see selection list 2	Configuration digital inputs of STORE2	
1	CFG: RESET	1000	FIXED0		
2	CFG: ENTP	1000			
C1223				Digital input signals of STORE2	display only
1	DIS: RESET				
2	DIS: ENTP				
[C1230]			see selection list 2	Configuration digital inputs of PHDIFF1	
1	CFG: EN	1000	FIXED0		
2	CFG: RESET	1000	FIXED0		
[C1231]	CFG: IN		See selection list 4	Configuration input of PHDIFF1	
		1000	FIXEDPHI-0		
[C1232]			See selection list 3	Configuration inputs of PHDIFF1	
1	CFG: SET	1000	FIXED0INC		
2	CFG: ADD	1000	FIXED0INC		
C1235				Digital input signals of PHDIFF1	display only
1	DIS: EN				
2	DIS: RESET				
C1236	DIS: IN		-32767 {1} 32767	Input signal of PHDIFF1	display only
C1237			-2147483647 {1} 2147483647	Input signals of PHDIFF1	
1	DIS: SET				
2	DIS: ADD				
[C1240]			See selection list 1	Configuration inputs of CONVPHPH1	
1	CFG: NUM	1000	FIXED0%		
2	CFG: DEN	1000	FIXED0%		
[C1241]	CFG: ACT		see selection list 2	Configuration input of CONVPHPH1	
		1000	FIXED0		

Configuration

Code	LCD	Possible settings			IMPORTANT
		Lenze	Choice	Info	
[C1242]	CFG: IN	1000	See selection list 3 FIXED0INC	Configuration input of CONVPHPH1	
C1245				Input signals of CONVPHPH1	display only
1	DIS: NUM		-199.99 {0.01 %} 1999.99		
2	DIS: DEN				
C1246	DIS: ACT			Digital input signal of CONVPHPH1	display only
C1247	DIS: IN		-2147483647 {1} 2147483647	Input signal of CONVPHPH1	display only
[C1250]	CFG: IN	1000	See selection list 4 FIXEDPHI-0	Configuration input of CONVPP1	
[C1251]			See selection list 3	Configuration inputs of CONVPP1	
1	CFG: NUM	1000	FIXED0INC		
2	CFG: DEN	1000	FIXED0INC		
C1253	DIS: IN		-32767 {1 rpm } 32767	Input signal of CONVPP1	display only
C1254				Input signals of CONVPP1	display only
1	DIS: NUM		-2147483647 {1} 2147483647		
2	DIS: DEN				
[C1255]	CFG: N-TRIM2	1000	See selection list 4 FIXEDPHI-0	Input signal of DFSET	
C1258	DIS: N-TRIM2		-32767 {1 rpm} 32767	Input signal of DFSET	display only
C1260	Offset	0	-16383 {1} 16383	Offset of GEARCOMP	
C1261	Num	1	-32767 {1} 32767	Numerator of GEARCOMP	
C1262	Denom	1	1 {1} 32767	Denominator of GEARCOMP	
[C1265]	CFG: TORQUE	1000	See selection list 1 FIXED0%	Configuration correction input of GEARCOMP	
[C1266]	CFG: Phi In	1000	See selection list 3 FIXED0INC	Configuration input of GEARCOMP	
C1268	DIS: TORQUE		-199.99 {0.01 %} 199.99	Input signal of GEARCOMP	display only
C1269	DIS: Phi In		-2147483647 {1} 2147483647	Input signal of GEARCOMP	display only
[C1270]			See selection list 3	Configuration inputs of PHCMP3	
1	CFG: IN	1000	FIXED0INC		
2	CFG: IN	1000	FIXED0INC		
C1271				Input signals of PHCMP3	display only
1	DIS: IN		-2147483647 {1} 2147483647		
2	DIS: IN				
C1272	Function	2	1 IN1 < IN2 2 |IN1| < |IN2|	Function of PHCMP3	
C1290	MONIT P16	03	0 Trip 2 Warning 3 Off	Configuration of the monitoring mode of the synchronization test of SYNC1	
C1500	Output signal		-2147483648 {1} 2147483647	Output signal of FEVAN2	display only
C1501	Code	141	2 {1} 2000	Target code of FEVAN2	
C1502	Subcode	0	0 {1} 255	Target subcode of FEVAN2	
C1503	Numerator	1.0000	0.0001 {0.0001} 100000.0000	Numerator of FEVAN2	
C1504	Denomiator	0.0001	0.0001 {1} 100000.0000	FEVAN2 denominator	
C1505	Offset	0	0 {1} 1000000000	FEVAN2 offset	
[C1506]	CFG: IN	1000	See selection list 1 FIXED0%	Configuration analog input of FEVAN2	
[C1507]	CFG: LOAD	1000	see selection list 2 FIXED0	Configuration digital inputs of FEVAN2	
C1508	DIS: IN		-32768 {1} 32767	Analog input signal of FEVAN2	display only
C1509	DIS: LOAD			Digital input signal of FEVAN2	display only
C1799	DFOUT f max		20 {1} 1250 1250 ≙ 500 kHz	Limitation f_{max} at the digital frequency output	
C1810	S/W Id keypad				
C1811	S/W date keypad				

7.9 Selection lists of signal links

Selection list 1, analog output signals (○)					
000050	AIN1-OUT	010000	BRK-M-SET	020101	CAN-IN1.W1
000055	AIN2-OUT	015028	UTILIZATION	020102	CAN-IN1.W2
000100	DFSET-NOUT	019500	FCODE-17	020103	CAN-IN1.W3
001000	FIXED0%	019502	FCODE-26/1	020201	CAN-IN2.W1
001006	FIXED100%	019503	FCODE-26/2	020202	CAN-IN2.W2
001007	FIXED-100%	019504	FCODE-27/1	020203	CAN-IN2.W3
005000	MCTRL-NSET2	019505	FCODE-27/2	020204	CAN-IN2.W4
005001	MCTRL-NACT	019506	FCODE-32	020301	CAN-IN3.W1
005002	MCTRL-MSET2	019507	FCODE-37	020302	CAN-IN3.W2
005003	MCTRL-MACT	019510	FCODE-108/1	020303	CAN-IN3.W3
005004	MCTRL-IACT	019511	FCODE-108/2	020304	CAN-IN3.W4
005005	MCTRL-DCVOLT	019512	FCODE-109/1	025101	AIF-IN.W1
005009	MCTRL-PHI-ACT	019513	FCODE-109/2	025102	AIF-IN.W2
005050	NSET-NOUT	019515	FCODE-141	025103	AIF-IN.W3
005051	NSET-RFG-I	019521	FCODE-472/1		
005100	MPOT1-OUT	019522	FCODE-472/2		
005150	PCTRL1-OUT	019523	FCODE-472/3		
005200	REF-N-SET	019524	FCODE-472/4		
005500	ARIT1-OUT	019525	FCODE-472/5		
005505	ARIT2-OUT	019526	FCODE-472/6		
005550	ADD1-OUT	019527	FCODE-472/7		
005600	RFG1-OUT	019528	FCODE-472/8		
005610	SRFG1-OUT	019529	FCODE-472/9		
005611	SRFG1-DIFF	019530	FCODE-472/10		
005650	ASW1-OUT	019531	FCODE-472/11		
005655	ASW2-OUT	019532	FCODE-472/12		
005660	ASW3-OUT	019533	FCODE-472/13		
005665	ASW4-OUT	019534	FCODE-472/14		
005700	ANEG1-OUT	019535	FCODE-472/15		
005705	ANEG2-OUT	019536	FCODE-472/16		
005750	FIXSET1-OUT	019537	FCODE-472/17		
005800	LIM1-OUT	019538	FCODE-472/18		
005850	ABS1-OUT	019539	FCODE-472/19		
005900	PT1-1-OUT	019540	FCODE-472/20		
005950	DT1-1-OUT	019551	FCODE-473/1		
006100	MFAIL-NOUT	019552	FCODE-473/2		
006150	DB1-OUT	019553	FCODE-473/3		
006200	CONV1-OUT	019554	FCODE-473/4		
006205	CONV2-OUT	019555	FCODE-473/5		
006210	CONV3-OUT	019556	FCODE-473/6		
006215	CONV4-OUT	019557	FCODE-473/7		
006230	CONVPHA1-OUT	019558	FCODE-473/8		
006300	S&H1-OUT	019559	FCODE-473/9		
006350	CURVE1-OUT	019560	FCODE-473/10		
006400	FCNT1-OUT				
006600	SYNC1-OUT3				

Selection list 2, digital output signals (☐)

000051	DIGIN1	010000	BRK1-OUT	015000	DCTRL-TRIP	019500	FCODE-250
000052	DIGIN2	010001	BRK1-CINH	015001	DCTRL-MESS	019521	FCODE-471.B0
000053	DIGIN3	010002	BRK1-QSP	015002	DCTRL-WARN	019522	FCODE-471.B1
000054	DIGIN4	010003	BRK1-M-STORE	015003	DCTRL-FAIL	019523	FCODE-471.B2
000055	DIGIN5	010250	R/L/Q-QSP	015010	MONIT-LU	019524	FCODE-471.B3
000060	STATE-BUS-O	010251	R/L/Q-R/L	015011	MONIT-OU	019525	FCODE-471.B4
000065	DIGIN-CINH	010500	AND1-OUT	015012	MONIT-EEr	019526	FCODE-471.B5
000100	DFSET-ACK	010505	AND2-OUT	015013	MONIT-OC1	019527	FCODE-471.B6
000500	DCTRL-RDY	010510	AND3-OUT	015014	MONIT-OC2	019528	FCODE-471.B7
000501	DCTRL-CINH	010515	AND4-OUT	015015	MONIT-LP1	019529	FCODE-471.B8
000502	DCTRL-INIT	010520	AND5-OUT	015016	MONIT-OH	019530	FCODE-471.B9
000503	DCTRL-IMP	010525	AND6-OUT	015017	MONIT-OH3	019531	FCODE-471.B10
000504	DCTRL-NACT=0	010530	AND7-OUT	015018	MONIT-OH4	019532	FCODE-471.B11
000505	DCTRL-CW/CCW	010550	OR1-OUT	015019	MONIT-OH7	019533	FCODE-471.B12
001000	FIXED0	010555	OR2-OUT	015020	MONIT-OH8	019534	FCODE-471.B13
001001	FIXED1	010560	OR3-OUT	015021	MONIT-Sd2	019535	FCODE-471.B14
002000	DCTRL-PAR*1-O	010565	OR4-OUT	015022	MONIT-Sd3	019536	FCODE-471.B15
002001	DCTRL-PAR*2-O	010570	OR5-OUT	015023	MONIT-P03	019537	FCODE-471.B16
002002	DCTRL-PARBUSY	010600	NOT1-OUT	015024	MONIT-P13	019538	FCODE-471.B17
005001	MCTRL-QSP-OUT	010605	NOT2-OUT	015026	MONIT-CE0	019539	FCODE-471.B18
005002	MCTRL-IMAX	010610	NOT3-OUT	015027	MONIT-NMAX	019540	FCODE-471.B19
005003	MCTRL-MMAX	010615	NOT4-OUT	015028	MONIT-OC5	019541	FCODE-471.B20
005050	NSET-RFG-I=0	010620	NOT5-OUT	015029	MONIT-SD5	019542	FCODE-471.B21
005200	REF-OK	010650	CMP1-OUT	015030	MONIT-SD6	019543	FCODE-471.B22
005201	REF-BUSY	010655	CMP2-OUT	015031	MONIT-SD7	019544	FCODE-471.B23
006000	DFRFG1-FAIL	010660	CMP3-OUT	015032	MONIT-H07	019545	FCODE-471.B24
006001	DFRFG1-SYNC	010680	PHCMP1-OUT	015033	MONIT-H10	019546	FCODE-471.B25
006100	MFAIL-STATUS	010685	PHCMP2-OUT	015034	MONIT-H11	019547	FCODE-471.B26
006101	MFAIL-I-RESET	010690	PHCMP3-OUT	015040	MONIT-CE1	019548	FCODE-471.B27
006400	FCNT1-EQUAL	010700	DIGDEL1-OUT	015041	MONIT-CE2	019549	FCODE-471.B28
006600	SYNC1-STAT	010705	DIGDEL2-OUT	015042	MONIT-CE3	019550	FCODE-471.B29
		010750	TRANS1-OUT	015043	MONIT-CE4	019551	FCODE-471.B30
		010755	TRANS2-OUT			019552	FCODE-471.B31
		010760	TRANS3-OUT			019751	FCODE-135.B0
		010765	TRANS4-OUT			019752	FCODE-135.B1
		010900	FLIP1-OUT			019753	FCODE-135.B2
		010905	FLIP2-OUT			019755	FCODE-135.B4
		012000	PHINT1-FAIL			019756	FCODE-135.B5
		012005	PHINT2-FAIL			019757	FCODE-135.B6
		012010	PHINT3-STAT			019758	FCODE-135.B7
		013000	FEVAN1-BUSY			019763	FCODE-135.B12
		013001	FEVAN1-FAIL			019764	FCODE-135.B13
		013005	FEVAN2-BUSY			019765	FCODE-135.B14
		013006	FEVAN2-FAIL			019766	FCODE-135.B15
		014050	STORE1-TP-INH				
		014055	STORE2-TP-INH				

Selection list 2, digital output signals (☐), continued

020001	CAN-CTRL.B0	020201	CAN-IN2.B0	020301	CAN-IN3.B0	025001	AIF-CTRL.B0
020002	CAN-CTRL.B1	020202	CAN-IN2.B1	020302	CAN-IN3.B1	025002	AIF-CTRL.B1
020003	CAN-CTRL.B2	020203	CAN-IN2.B2	020303	CAN-IN3.B2	025003	AIF-CTRL.B2
020005	CAN-CTRL.B4	020204	CAN-IN2.B3	020304	CAN-IN3.B3	025005	AIF-CTRL.B4
020006	CAN-CTRL.B5	020205	CAN-IN2.B4	020305	CAN-IN3.B4	025006	AIF-CTRL.B5
020007	CAN-CTRL.B6	020206	CAN-IN2.B5	020306	CAN-IN3.B5	025007	AIF-CTRL.B6
020008	CAN-CTRL.B7	020207	CAN-IN2.B6	020307	CAN-IN3.B6	025008	AIF-CTRL.B7
020013	CAN-CTRL.B12	020208	CAN-IN2.B7	020308	CAN-IN3.B7	025013	AIF-CTRL.B12
020014	CAN-CTRL.B13	020209	CAN-IN2.B8	020309	CAN-IN3.B8	025014	AIF-CTRL.B13
020015	CAN-CTRL.B14	020210	CAN-IN2.B9	020310	CAN-IN3.B9	025015	AIF-CTRL.B14
020016	CAN-CTRL.B15	020211	CAN-IN2.B10	020311	CAN-IN3.B10	025016	AIF-CTRL.B15
020101	CAN-IN1.B0	020212	CAN.IN2.B11	020312	CAN-IN3.B11	025101	AIF-IN.B0
020102	CAN-IN1.B1	020213	CAN-IN2.B12	020313	CAN-IN3.B12	025102	AIF-IN.B1
020103	CAN-IN1.B2	020214	CAN-IN2.B13	020314	CAN-IN3.B13	025103	AIF-IN.B2
020104	CAN-IN1.B3	020215	CAN-IN2.B14	020315	CAN-IN3.B14	025104	AIF-IN.B3
020105	CAN-IN1.B4	020216	CAN-IN2.B15	020316	CAN-IN3.B15	025105	AIF-IN.B4
020106	CAN-IN1.B5	020217	CAN-IN2.B16	020317	CAN-IN3.B16	025106	AIF-IN.B5
020107	CAN-IN1.B6	020218	CAN-IN2.B17	020318	CAN-IN3.B17	025107	AIF-IN.B6
020108	CAN-IN1.B7	020219	CAN-IN2.B18	020319	CAN-IN3.B18	025108	AIF-IN.B7
020109	CAN-IN1.B8	020220	CAN-IN2.B19	020320	CAN-IN3.B19	025109	AIF-IN.B8
020110	CAN-IN1.B9	020221	CAN-IN2.B20	020321	CAN-IN3.B20	025110	AIF-IN.B9
020111	CAN-IN1.B10	020222	CAN-IN2.B21	020322	CAN-IN3.B21	025111	AIF-IN.B10
020112	CAN-IN1.B11	020223	CAN-IN2.B22	020323	CAN-IN3.B22	025112	AIF-IN.B11
020113	CAN-IN1.B12	020224	CAN-IN2.B23	020324	CAN-IN3.B23	025113	AIF-IN.B12
020114	CAN-IN1.B13	020225	CAN-IN2.B24	020325	CAN-IN3.B24	025114	AIF-IN.B13
020115	CAN-IN1.B14	020226	CAN-IN2.B25	020326	CAN-IN3.B25	025115	AIF-IN.B14
020116	CAN-IN1.B15	020227	CAN-IN2.B26	020327	CAN-IN3.B26	025116	AIF-IN.B15
020117	CAN-IN1.B16	020228	CAN-IN2.B27	020328	CAN-IN3.B27	025117	AIF-IN.B16
020118	CAN-IN1.B17	020229	CAN-IN2.B28	020329	CAN-IN3.B28	025118	AIF-IN.B17
020119	CAN-IN1.B18	020230	CAN-IN2.B29	020330	CAN-IN3.B29	025119	AIF-IN.B18
020120	CAN-IN1.B19	020231	CAN-IN2.B30	020331	CAN-IN3.B30	025120	AIF-IN.B19
020121	CAN-IN1.B20	020232	CAN-IN2.B31	020332	CAN-IN3.B31	025121	AIF-IN.B20
020122	CAN-IN1.B21					025122	AIF-IN.B21
020123	CAN-IN1.B22					025123	AIF-IN.B22
020124	CAN-IN1.B23					025124	AIF-IN.B23
020125	CAN-IN1.B24					025125	AIF-IN.B24
020126	CAN-IN1.B25					025126	AIF-IN.B25
020127	CAN-IN1.B26					025127	AIF-IN.B26
020128	CAN-IN1.B27					025128	AIF-IN.B27
020129	CAN-IN1.B28					025129	AIF-IN.B28
020130	CAN-IN1.B29					025130	AIF-IN.B29
020131	CAN-IN1.B30					025131	AIF-IN.B30
020132	CAN-IN1.B31					025132	AIF-IN.B31

Selection list 3, Phase signals (▲)		**Selection list 4, Phase difference signals (∆)**		**Selection list 5, Function blocks**			
000100	DFSET-PSET	000050	DFIN-OUT	000000	empty	010000	BRK1
000101	DFSET-PSET2	000100	DFSET-POUT	000050	AIN1	010250	R/L/Q
001000	FIXED0INC	000250	DFOUT-OUT	000055	AIN2	010500	AND1
005000	MCTRL-PHI-ANG	001000	FIXEDPHI-0	000070	AOUT1	010505	AND2
005200	REF-PSET	005000	MCTRL-PHI-ACT	000075	AOUT2	010510	AND3
005520	ARITPH1-OUT	006000	DFRFG-OUT	000100	DFSET	010515	AND4
005580	PHADD1-OUT	006220	CONV5-OUT	000200	DFIN	010520	AND5
005581	PHADD1-OUT2	006225	CONV6-OUT	000250	DFOUT	010525	AND6
006235	CONVPHPH1-OUT	006230	CONVPHA1-OUT2	005050	NSET	010530	AND7
006600	SYNC1-OUT2	006240	CONVPP1-OUT	005100	MPOT1	010550	OR1
012000	PHINT1-OUT	006600	SYNC1-OUT1	005150	PCTRL1	010555	OR2
012005	PHINT2-OUT	019521	FCODE-475/1	005200	REF	010560	OR3
012010	PHINT3-OUT	019522	FCODE-475/2	005500	ARIT1	010565	OR4
012050	PHDIV1-OUT			005505	ARIT2	010570	OR5
014000	PHDIFF1-OUT			005520	ARITPH1	010600	NOT1
014050	STORE1-PHACT			005550	ADD1	010605	NOT2
014051	STORE1-PH1			005580	PHADD1	010610	NOT3
014052	STORE1-PH2			005600	RFG1	010615	NOT4
014053	STORE1-PHDIFF			005610	SRFG1	010620	NOT5
014055	STORE2-PHACT			005650	ASW1	010650	CMP1
014056	STORE2-PH1			005655	ASW2	010655	CMP2
014057	STORE1-PH2			005660	ASW3	010660	CMP3
014100	GEARCOMP-OUT			005665	ASW4	010680	PHCMP1
019521	FCODE-474/1			005700	ANEG1	010685	PHCMP2
019522	FCODE-474/2			005705	ANEG2	010690	PHCMP3
019523	FCODE-474/3			005750	FIXSET1	010700	DIGDEL1
019524	FCODE-474/4			005800	LIM1	010705	DIGDEL2
019525	FCODE-474/5			005850	ABS1	010750	TRANS1
020103	CAN-IN1.D1			005900	PT1-1	010755	TRANS2
020201	CAN-IN2.D1			005950	DT1-1	010760	TRANS3
020301	CAN-IN3.D1			006000	DFRFG1	010765	TRANS4
025103	AIF-IN.D1			006100	MFAIL	010900	FLIP1
				006150	DB1	010905	FLIP2
				006200	CONV1	012000	PHINT1
				006205	CONV2	012005	PHINT2
				006210	CONV3	012010	PHINT3
				006215	CONV4	012050	PHDIV1
				006220	CONV5	013000	FEVAN1
				006225	CONV6	013005	FEVAN2
				006230	CONVPHA1	013100	TR
				006235	CONVPHPH1	014000	PHDIFF1
				006240	CONVPP1	014050	STORE1
				006300	S&H1	014055	STORE2
				006350	CURVE1	014100	GEARCOMP
				006420	FCNT1	015100	MLP1
				006600	SYNC1	020000	CAN-OUT
						025000	AIF-OUT

Selection list 10, error list			
000000	No fail	000105	H05 trip
000011	OC1 trip	000107	H07 trip
000012	OC2 trip	000110	H10 trip
000015	OC5 trip	000111	H11 trip
000022	LUQ trip	000153	P03 trip
000032	LP1 trip	000163	P13 trip
000050	OH trip	000166	P16 trip
000053	OH3 trip	000200	NMAX trip
000057	OH7 trip	001020	OU message
000058	OH8 trip	001030	LU message
000061	CE0 trip	001091	EEr message
000062	CE1 trip	002032	LP1 warning
000063	CE2 trip	002054	OH4 warning
000064	CE3 trip	002057	OH7 warning
000065	CE4 trip	002058	OH8 warning
000070	U15 trip	002061	CE0 warning
000071	CCr trip	002062	CE1 warning
000072	Pr1 trip	002063	CE2 warning
000073	Pr2 trip	002064	CE3 warning
000074	PEr trip	002065	CE4 warning
000075	Pr0 trip	002082	Sd2 warning
000077	Pr3 trip	002083	Sd3 warning
000078	Pr4 trip	002085	Sd5 warning
000079	PI trip	002086	Sd6 warning
000082	Sd2 trip	002091	EER warning
000083	Sd3 trip	002153	P03 warning
000085	Sd5 trip	002163	P13 warning
000086	Sd6 trip	002166	P16 warning
000087	Sd7 trip		
000091	EEr trip		

7.10 Table of attributes

If you want to write programs on your own, you need the specifications given in the table of attributes. It includes all information for the communication with the controller using parameters.

How to read the table of attributes:

Column		**Meaning**	**Entry**	
Code		Meaning of the Lenze code	Cxxxx	
Index	dec	Index, under which the parameter is addressed. The subindex of array variables corresponds to the Lenze subcode number	24575 - Lenze code	Is only required for control via InterBus-S, Profibus DP or system bus (CAN).
	hex		5FFFh - Lenze code	
Data	DS	Data structure	E	Single variable (only one parameter element)
			A	Array variable (several parameter elements)
	DA	Number of array elements (subcodes)	xx	
	DT	Data type	B8	1 byte bit-coded
			B16	2 byte bit-coded
			B32	4 byte bit-coded
			FIX32	32 bit value with sign; decimal with four decimal codes
			I32	4 byte with sign
			U32	4 byte without sign
			VS	ASCII string
	Format	LECOM format (see also Operating Instructions of the fieldbus module 2102)	VD	ASCII decimal format
			VH	ASCII hexadecimal format
			VS	String format
			VO	Octett string format for data blocks
	DL	Data length in byte		The column "Important" contains further information
Access	LCM-R/W	Access authorization for LECOM	Ra	Reading is always permitted
			Wa	Writing is always permitted
			W	Writing is restricted
	Condition	Condition for writing	CINH	Writing permitted only with controller inhibit

Code	**Index**		**Data**					**Access**	
	dec	**hex**	**DS**	**DA**	**DT**	**Format**	**DL**	**LCM-R/W**	**Condition**
C0002	24573	5FFDh	E	1	FIX32	VD	4	Ra/W	CINH
C0003	24572	5FFCh	E	1	FIX32	VD	4	Ra/Wa	
C0004	24571	5FFBh	E	1	FIX32	VD	4	Ra/Wa	
C0005	24570	5FFAh	E	1	FIX32	VD	4	Ra/W	CINH
C0006	24569	5FF9h	E	1	FIX32	VD	4	Ra/W	CINH
C0009	24566	5FF6h	E	1	FIX32	VD	4	Ra/Wa	
C0011	24564	5FF4h	E	1	FIX32	VD	4	Ra/Wa	
C0012	24563	5FF3h	E	1	FIX32	VD	4	Ra/Wa	
C0013	24562	5FF2h	E	1	FIX32	VD	4	Ra/Wa	
C0017	24558	5FEEh	E	1	FIX32	VD	4	Ra/Wa	
C0018	24557	5FEDh	E	1	FIX32	VD	4	Ra/Wa	
C0019	24556	5FECh	E	1	FIX32	VD	4	Ra/Wa	
C0021	24554	5FEAh	E	1	FIX32	VD	4	Ra/Wa	
C0022	24553	5FE9h	E	1	FIX32	VD	4	Ra/Wa	
C0025	24550	5FE6h	E	1	FIX32	VD	4	Ra/W	CINH
C0026	24549	5FE5h	A	2	FIX32	VD	4	Ra/Wa	
C0027	24548	5FE4h	A	2	FIX32	VD	4	Ra/Wa	
C0030	24545	5FE1h	E	1	FIX32	VD	4	Ra/Wa	

Code	Index		Data					Access	
	dec	hex	DS	DA	DT	Format	DL	LCM-R/W	Condition
C0032	24543	5FDFh	E	1	FIX32	VD	4	Ra/Wa	
C0033	24542	5FDEh	E	1	FIX32	VD	4	Ra/Wa	
C0034	24541	5FDDh	E	1	FIX32	VD	4	Ra/Wa	
C0037	24538	5FDAh	E	1	FIX32	VD	4	Ra/Wa	
C0039	24536	5FD8h	A	15	FIX32	VD	4	Ra/Wa	
C0040	24535	5FD7h	E	1	FIX32	VD	4	Ra/Wa	
C0042	24533	5FD5h	E	1	FIX32	VD	4	Ra	
C0043	24532	5FD4h	E	1	FIX32	VD	4	Ra/Wa	
C0045	24530	5FD2h	E	1	FIX32	VD	4	Ra	
C0046	24529	5FD1h	E	1	FIX32	VD	4	Ra	
C0049	24526	5FCEh	E	1	FIX32	VD	4	Ra	
C0050	24525	5FCDh	E	1	FIX32	VD	4	Ra	
C0051	24524	5FCCh	E	1	FIX32	VD	4	Ra	
C0052	24523	5FCBh	E	1	FIX32	VD	4	Ra	
C0053	24522	5FCAh	E	1	FIX32	VD	4	Ra	
C0054	24521	5FC9h	E	1	FIX32	VD	4	Ra	
C0056	24519	5FC7h	E	1	FIX32	VD	4	Ra	
C0057	24518	5FC6h	E	1	FIX32	VD	4	Ra	
C0058	24517	5FC5h	E	1	FIX32	VD	4	Ra/Wa	
C0059	24516	5FC4h	E	1	FIX32	VD	4	Ra	
C0060	24515	5FC3h	E	1	FIX32	VD	4	Ra	
C0061	24514	5FC2h	E	1	FIX32	VD	4	Ra	
C0063	24512	5FC0h	E	1	FIX32	VD	4	Ra	
C0064	24511	5FBFh	E	1	FIX32	VD	4	Ra	
C0067	24508	5FBCh	E	1	FIX32	VD	4	Ra	
C0070	24505	5FB9h	E	1	FIX32	VD	4	Ra/Wa	
C0071	24504	5FB8h	E	1	FIX32	VD	4	Ra/Wa	
C0072	24503	5FB7h	E	1	FIX32	VD	4	Ra/Wa	
C0075	24500	5FB4h	E	1	FIX32	VD	4	Ra/Wa	
C0076	24499	5FB3h	E	1	FIX32	VD	4	Ra/Wa	
C0077	24498	5FB2h	E	1	FIX32	VD	4	Ra/Wa	
C0078	24497	5FB1h	E	1	FIX32	VD	4	Ra/Wa	
C0081	24494	5FAEh	E	1	FIX32	VD	4	Ra/W	CINH
C0084	24491	5FABh	E	1	FIX32	VD	4	Ra/W	CINH
C0085	24490	5FAAh	E	1	FIX32	VD	4	Ra/W	CINH
C0086	24489	5FA9h	E	1	FIX32	VD	4	Ra/W	CINH
C0087	24488	5FA8h	E	1	FIX32	VD	4	Ra/W	CINH
C0088	24487	5FA7h	E	1	FIX32	VD	4	Ra/W	CINH
C0089	24486	5FA6h	E	1	FIX32	VD	4	Ra/W	CINH
C0090	24485	5FA5h	E	1	FIX32	VD	4	Ra/W	CINH
C0091	24484	5FA4h	E	1	FIX32	VD	4	Ra/W	CINH
C0093	24482	5FA2h	E	1	FIX32	VD	4	Ra	
C0094	24481	5FA1h	E	1	FIX32	VD	4	Ra/Wa	
C0095	24480	5FA0h	E	1	FIX32	VD	4	Ra/W	CINH
C0096	24479	5F9Fh	A	2	FIX32	VD	4	Ra/Wa	
C0099	24476	5F9Ch	E	1	FIX32	VD	4	Ra	
C0101	24474	5F9Ah	A	15	FIX32	VD	4	Ra/Wa	
C0103	24472	5F98h	A	15	FIX32	VD	4	Ra/Wa	
C0105	24470	5F96h	E	1	FIX32	VD	4	Ra/Wa	
C0108	24467	5F93h	A	2	FIX32	VD	4	Ra/Wa	
C0109	24466	5F92h	A	2	FIX32	VD	4	Ra/Wa	
C0114	24461	5F8Dh	A	5	FIX32	VD	4	Ra/Wa	

Code	Index		Data					Access	
	dec	hex	DS	DA	DT	Format	DL	LCM-R/W	Condition
C0116	24459	5F8Bh	A	32	FIX32	VD	4	Ra/W	CINH
C0117	24458	5F8Ah	A	4	FIX32	VD	4	Ra/W	CINH
C0118	24457	5F89h	A	4	FIX32	VD	4	Ra/Wa	
C0121	24454	5F86h	E	1	FIX32	VD	4	Ra/Wa	
C0122	24453	5F85h	E	1	FIX32	VD	4	Ra/Wa	
C0125	24450	5F82h	E	1	FIX32	VD	4	Ra/Wa	
C0126	24449	5F81h	E	1	FIX32	VD	4	Ra/Wa	
C0130	24445	5F7Dh	E	1	FIX32	VD	4	Ra	
C0134	24441	5F79h	E	1	FIX32	VD	4	Ra/Wa	
C0135	24440	5F78h	E	1	B16	VH	2		
C0136	24439	5F77h	A	3	B16	VH	2	Ra	
C0141	24434	5F72h	E	1	FIX32	VD	4	Ra/Wa	
C0142	24433	5F71h	E	1	FIX32	VD	4	Ra/Wa	
C0150	24425	5F69h	E	1	B16	VH	2	Ra	
C0151	24424	5F68h	E	1	B32	VH	4	Ra	
C0155	24420	5F64h	E	1	B16	VH	2	Ra	
C0156	24419	5F63h	A	7	FIX32	VD	4	Ra/W	CINH
C0157	24418	5F62h	A	7	FIX32	VD	4	Ra	
C0161	24414	5F5Eh	E	1	FIX32	VD	4	Ra	
C0167	24408	5F58h	E	1	FIX32	VD	4	Ra/Wa	
C0168	24407	5F57h	A	8	FIX32	VD	4	Ra	
C0169	24406	5F56h	A	8	U32	VH	4	Ra	
C0170	24405	5F55h	A	8	FIX32	VD	4	Ra	
C0172	24403	5F53h	E	1	FIX32	VD	4	Ra/Wa	
C0173	24402	5F52h	E	1	FIX32	VD	4	Ra/Wa	
C0178	24397	5F4Dh	E	1	U32	VH	4	Ra	
C0179	24396	5F4Ch	E	1	U32	VH	4	Ra	
C0182	24393	5F49h	E	1	FIX32	VD	4	Ra/Wa	
C0183	24392	5F48h	E	1	FIX32	VD	4	Ra	
C0190	24385	5F41h	E	1	FIX32	VD	4	Ra/Wa	
C0195	24380	5F3Ch	E	1	FIX32	VD	4	Ra/Wa	
C0196	24379	5F3Bh	E	1	FIX32	VD	4	Ra/Wa	
C0200	24375	5F37h	E	1	VS	VS	14	Ra	
C0201	24374	5F36h	E	1	VS	VS	20	Ra	
C0202	24373	5F35h	E	1	FIX32	VD	4	Ra	
C0203	24372	5F34h	E	1	VS	VS	12	Ra	
C0204	24371	5F33h	E	1	FIX32	VD	4	Ra	
C0206	24369	5F31h	E	1	VS	VS	13	Ra	
C0207	24368	5F30h	E	1	VS	VS	14	Ra	
C0208	24367	5F2Fh	E	1	VS	VS	14	Ra	
C0209	24366	5F2Eh	E	1	VS	VS	14	Ra	
C0220	24355	5F23h	E	1	FIX32	VD	4	Ra/Wa	
C0221	24354	5F22h	E	1	FIX32	VD	4	Ra/Wa	
C0222	24353	5F21h	E	1	FIX32	VD	4	Ra/Wa	
C0223	24352	5F20h	E	1	FIX32	VD	4	Ra/Wa	
C0224	24351	5F1Fh	E	1	FIX32	VD	4	Ra/Wa	
C0241	24334	5F0Eh	E	1	FIX32	VD	4	Ra/Wa	
C0244	24331	5F0Bh	E	1	FIX32	VD	4	Ra/Wa	
C0250	24325	5F05h	E	1	FIX32	VD	4	Ra/Wa	
C0252	24323	5F03h	E	1	I32	VH	4	Ra/Wa	
C0253	24322	5F02h	E	1	FIX32	VD	4	Ra/Wa	
C0254	24321	5F01h	E	1	FIX32	VD	4	Ra/Wa	

Code	Index		Data					Access	
	dec	hex	DS	DA	DT	Format	DL	LCM-R/W	Condition
C0255	24320	5F00h	E	1	U32	VH	4	Ra/Wa	
C0260	24315	5EFBh	E	1	FIX32	VD	4	Ra/Wa	
C0261	24314	5EFAh	E	1	FIX32	VD	4	Ra/Wa	
C0262	24313	5EF9h	E	1	FIX32	VD	4	Ra/Wa	
C0263	24312	5EF8h	E	1	FIX32	VD	4	Ra/Wa	
C0264	24311	5EF7h	E	1	FIX32	VD	4	Ra/Wa	
C0265	24310	5EF6h	E	1	FIX32	VD	4	Ra/Wa	
C0267	24308	5EF4h	A	2	FIX32	VD	4	Ra/W	CINH
C0268	24307	5EF3h	E	1	FIX32	VD	4	Ra/W	CINH
C0269	24306	5EF2h	A	3	FIX32	VD	4	Ra	
C0291	24284	5EDCh	E	1	FIX32	VD	4	Ra/Wa	
C0292	24283	5EDBh	E	1	FIX32	VD	4	Ra/Wa	
C0293	24282	5EDAh	E	1	FIX32	VD	4	Ra/Wa	
C0294	24281	5ED9h	E	1	FIX32	VD	4	Ra/Wa	
C0295	24280	5ED8h	E	1	FIX32	VD	4	Ra/Wa	
C0296	24279	5ED7h	E	1	FIX32	VD	4	Ra/Wa	
C0325	24250	5EBAh	E	1	FIX32	VD	4	Ra/Wa	
C0326	24249	5EB9h	E	1	FIX32	VD	4	Ra/Wa	
C0327	24248	5EB8h	E	1	FIX32	VD	4	Ra/Wa	
C0328	24247	5EB7h	E	1	FIX32	VD	4	Ra/Wa	
C0329	24246	5EB6h	E	1	FIX32	VD	4	Ra/Wa	
C0332	24243	5EB3h	E	1	FIX32	VD	4	Ra/Wa	
C0333	24242	5EB2h	E	1	FIX32	VD	4	Ra/Wa	
C0336	24239	5EAFh	E	1	FIX32	VD	4	Ra	
C0337	24238	5EAEh	E	1	FIX32	VD	4	Ra/Wa	
C0338	24237	5EADh	E	1	FIX32	VD	4	Ra/Wa	
C0339	24236	5EACh	A	2	FIX32	VD	4	Ra/W	CINH
C0340	24235	5EABh	A	2	FIX32	VD	4	Ra	
C0350	24225	5EA1h	E	1	FIX32	VD	4	Ra/Wa	
C0351	24224	5EA0h	E	1	FIX32	VD	4	Ra/Wa	
C0352	24223	5E9Fh	E	1	FIX32	VD	4	Ra/Wa	
C0353	24222	5E9Eh	A	3	FIX32	VD	4	Ra/Wa	
C0354	24221	5E9Dh	A	6	FIX32	VD	4	Ra/Wa	
C0355	24220	5E9Ch	A	6	FIX32	VD	4	Ra	
C0356	24219	5E9Bh	A	4	FIX32	VD	4	Ra/Wa	
C0357	24218	5E9Ah	A	3	FIX32	VD	4	Ra/Wa	
C0358	24217	5E99h	E	1	FIX32	VD	4	Ra/Wa	
C0359	24216	5E98h	E	1	FIX32	VD	4	Ra	
C0360	24215	5E97h	A	12	FIX32	VD	4	Ra	
C0361	24214	5E96h	A	12	FIX32	VD	4	Ra	
C0362	24213	5E95h	E	1	FIX32	VD	4	Ra	
C0363	24212	5E94h	E	1	FIX32	VD	4	Ra/Wa	
C0364	24211	5E93h	E	1	FIX32	VD	4	Ra/W	CINH
C0365	24210	5E92h	E	1	FIX32	VD	4	Ra	
C0366	24209	5E91h	E	1	FIX32	VD	4	Ra/Wa	
C0367	24208	5E90h	E	1	FIX32	VD	4	Ra/Wa	
C0368	24207	5E8Fh	E	1	FIX32	VD	4	Ra/Wa	
C0369	24206	5E8Eh	E	1	FIX32	VD	4	Ra/Wa	
C0400	24175	5E6Fh	E	1	FIX32	VD	4	Ra	
C0402	24173	5E6Dh	E	1	FIX32	VD	4	Ra/W	CINH
C0403	24172	5E6Ch	E	1	FIX32	VD	4	Ra/W	CINH
C0404	24171	5E6Bh	A	2	FIX32	VD	4	Ra	

Code	Index		Data					Access	
	dec	hex	DS	DA	DT	Format	DL	LCM-R/W	Condition
C0405	24170	5E6Ah	E	1	FIX32	VD	4	Ra	
C0407	24168	5E68h	E	1	FIX32	VD	4	Ra/W	CINH
C0408	24167	5E67h	E	1	FIX32	VD	4	Ra/W	CINH
C0409	24166	5E66h	A	2	FIX32	VD	4	Ra	
C0416	24159	5E5Fh	E	1	U32	VH	4	Ra/W	CINH
C0420	24155	5E5Bh	E	1	FIX32	VD	4	Ra/W	CINH
C0421	24154	5E5Ah	E	1	FIX32	VD	4	Ra/W	CINH
C0425	24150	5E56h	E	1	FIX32	VD	4	Ra/Wa	
C0426	24149	5E55h	E	1	FIX32	VD	4	Ra	
C0427	24148	5E54h	E	1	FIX32	VD	4	Ra/Wa	
C0429	24146	5E52h	E	1	FIX32	VD	4	Ra/Wa	
C0431	24144	5E50h	E	1	FIX32	VD	4	Ra/W	CINH
C0432	24143	5E4Fh	E	1	FIX32	VD	4	Ra/W	CINH
C0433	24142	5E4Eh	E	1	FIX32	VD	4	Ra/W	CINH
C0434	24141	5E4Dh	A	3	FIX32	VD	4	Ra	
C0436	24139	5E4Bh	E	1	FIX32	VD	4	Ra/W	CINH
C0437	24138	5E4Ah	E	1	FIX32	VD	4	Ra/W	CINH
C0438	24137	5E49h	E	1	FIX32	VD	4	Ra/W	CINH
C0439	24136	5E48h	A	3	FIX32	VD	4	Ra	
C0440	24135	5E47h	E	1	FIX32	VD	4	Ra/W	CINH
C0441	24134	5E46h	E	1	FIX32	VD	4	Ra	
C0443	24132	5E44h	E	1	B8	VH	1	Ra	
C0444	24131	5E43h	A	4	FIX32	VD	4	Ra	
C0450	24125	5E3Dh	E	1	FIX32	VD	4	Ra/W	CINH
C0451	24124	5E3Ch	E	1	FIX32	VD	4	Ra/W	CINH
C0452	24123	5E3Bh	E	1	FIX32	VD	4	Ra/W	CINH
C0458	24117	5E35h	A	2	FIX32	VD	4	Ra	
C0459	24116	5E34h	E	1	FIX32	VD	4	Ra	
C0464	24111	5E2Fh	E	1	FIX32	VD	4	Ra	
C0465	24110	5E2Eh	A	50	FIX32	VD	4	Ra/W	CINH
C0466	24109	5E2Dh	E	1	FIX32	VD	4	Ra	
C0469	24106	5E2Ah	E	1	FIX32	VD	4	Ra/W	CINH
C0470	24105	5E29h	A	4	B8	VH	1	Ra/Wa	
C0471	24104	5E28h	E	1	B32	VH	4	Ra/Wa	
C0472	24103	5E27h	A	20	FIX32	VD	4	Ra/Wa	
C0473	24102	5E26h	A	10	FIX32	VD	4	Ra/Wa	
C0474	24101	5E25h	A	5	I32	VH	4	Ra/Wa	
C0475	24100	5E24h	A	2	FIX32	VD	4	Ra/Wa	
C0490	24085	5E15h	E	1	FIX32	VD	4	Ra/W	CINH
C0495	24080	5E10h	E	1	FIX32	VD	4	Ra/W	CINH
C0497	24078	5E0Eh	E	1	FIX32	VD	4	Ra/Wa	
C0517	24058	5DFAh	A	32	FIX32	VD	4	Ra/Wa	
C0520	24055	5DF7h	E	1	FIX32	VD	4	Ra/W	CINH
C0521	24054	5DF6h	E	1	FIX32	VD	4	Ra/W	CINH
C0522	24053	5DF5h	E	1	FIX32	VD	4	Ra/W	CINH
C0523	24052	5DF4h	E	1	FIX32	VD	4	Ra/W	CINH
C0524	24051	5DF3h	E	1	FIX32	VD	4	Ra/W	CINH
C0525	24050	5DF2h	E	1	FIX32	VD	4	Ra/W	CINH
C0526	24049	5DF1h	E	1	FIX32	VD	4	Ra/W	CINH
C0527	24048	5DF0h	E	1	FIX32	VD	4	Ra/W	CINH
C0528	24047	5DEFh	A	2	I32	VH	4	Ra	
C0529	24046	5DEEh	E	1	FIX32	VD	4	Ra/Wa	

Code	Index		Data					Access	
	dec	hex	DS	DA	DT	Format	DL	LCM-R/W	Condition
C0530	24045	5DEDh	E	1	FIX32	VD	4	Ra/Wa	
C0531	24044	5DECh	E	1	FIX32	VD	4	Ra/Wa	
C0532	24043	5DEBh	E	1	FIX32	VD	4	Ra/Wa	
C0533	24042	5DEAh	E	1	FIX32	VD	4	Ra/Wa	
C0534	24041	5DE9h	E	1	FIX32	VD	4	Ra/Wa	
C0535	24040	5DE8h	E	1	FIX32	VD	4	Ra/Wa	
C0536	24039	5DE7h	A	3	FIX32	VD	4	Ra	
C0537	24038	5DE6h	E	1	FIX32	VD	4	Ra	
C0538	24037	5DE5h	A	3	FIX32	VD	4	Ra	
C0539	24036	5DE4h	E	1	FIX32	VD	4	Ra	
C0540	24035	5DE3h	E	1	FIX32	VD	4	Ra/Wa	
C0541	24034	5DE2h	E	1	FIX32	VD	4	Ra/W	CINH
C0542	24033	5DE1h	E	1	FIX32	VD	4	Ra/W	CINH
C0544	24031	5DDFh	E	1	FIX32	VD	4	Ra/W	CINH
C0545	24030	5DDEh	E	1	FIX32	VD	4	Ra/Wa	
C0546	24029	5DDDh	E	1	U32	VH	4	Ra/Wa	
C0547	24028	5DDCh	E	1	FIX32	VD	4	Ra	
C0548	24027	5DDBh	E	1	FIX32	VD	4	Ra	
C0549	24026	5DDAh	E	1	FIX32	VD	4	Ra	
C0560	24015	5DCFh	A	15	FIX32	VD	4	Ra/Wa	
C0561	24014	5DCEh	E	1	FIX32	VD	4	Ra/W	CINH
C0562	24013	5DCDh	A	4	FIX32	VD	4	Ra/W	CINH
C0563	24012	5DCCh	E	1	FIX32	VD	4	Ra	
C0564	24011	5DCBh	A	4	FIX32	VD	4	Ra	
C0570	24005	5DC5h	E	1	FIX32	VD	4	Ra/W	CINH
C0571	24004	5DC4h	E	1	FIX32	VD	4	Ra/W	CINH
C0572	24003	5DC3h	E	1	FIX32	VD	4	Ra	
C0573	24002	5DC2h	E	1	FIX32	VD	4	Ra	
C0577	23998	5DBEh	E	1	FIX32	VD	4	Ra/Wa	
C0578	23997	5DBDh	E	1	FIX32	VD	4	Ra/Wa	
C0581	23994	5DBAh	E	1	FIX32	VD	4	Ra/Wa	
C0582	23993	5DB9h	E	1	FIX32	VD	4	Ra/Wa	
C0583	23992	5DB8h	E	1	FIX32	VD	4	Ra/Wa	
C0584	23991	5DB7h	E	1	FIX32	VD	4	Ra/Wa	
C0585	23990	5DB6h	E	1	FIX32	VD	4	Ra/Wa	
C0586	23989	5DB5h	E	1	FIX32	VD	4	Ra/Wa	
C0587	23988	5DB4h	E	1	FIX32	VD	4	Ra/Wa	
C0588	23987	5DB3h	E	1	FIX32	VD	4	Ra/Wa	
C0589	23986	5DB2h	E	1	FIX32	VD	4	Ra/Wa	
C0590	23985	5DB1h	E	1	FIX32	VD	4	Ra/Wa	
C0591	23984	5DB0h	E	1	FIX32	VD	4	Ra/Wa	
C0592	23983	5DAFh	E	1	FIX32	VD	4	Ra/Wa	
C0593	23982	5DAEh	E	1	FIX32	VD	4	Ra/Wa	
C0594	23981	5DADh	E	1	FIX32	VD	4	Ra/Wa	
C0595	23980	5DACh	E	1	FIX32	VD	4	Ra/Wa	
C0596	23979	5DABh	E	1	FIX32	VD	4	Ra/Wa	
C0597	23978	5DAAh	E	1	FIX32	VD	4	Ra/Wa	
C0598	23977	5DA9h	E	1	FIX32	VD	4	Ra/Wa	
C0599	23976	5DA8h	E	1	FIX32	VD	4	Ra/Wa	
C0600	23975	5DA7h	E	1	FIX32	VD	4	Ra/Wa	
C0601	23974	5DA6h	A	2	FIX32	VD	4	Ra/W	CINH
C0602	23973	5DA5h	A	2	FIX32	VD	4	Ra	

Code	Index		Data					Access	
	dec	hex	DS	DA	DT	Format	DL	LCM-R/W	Condition
C0610	23965	5D9Dh	A	3	FIX32	VD	4	Ra/W	CINH
C0611	23964	5D9Ch	A	3	FIX32	VD	4	Ra	
C0620	23955	5D93h	E	1	FIX32	VD	4	Ra/Wa	
C0621	23954	5D92h	E	1	FIX32	VD	4	Ra/Wa	
C0622	23953	5D91h	E	1	FIX32	VD	4	Ra/W	CINH
C0623	23952	5D90h	E	1	FIX32	VD	4	Ra	
C0630	23945	5D89h	E	1	FIX32	VD	4	Ra/Wa	
C0631	23944	5D88h	E	1	FIX32	VD	4	Ra/Wa	
C0632	23943	5D87h	E	1	FIX32	VD	4	Ra/W	CINH
C0633	23942	5D86h	E	1	FIX32	VD	4	Ra	
C0640	23935	5D7Fh	E	1	FIX32	VD	4	Ra/Wa	
C0641	23934	5D7Eh	E	1	FIX32	VD	4	Ra/W	CINH
C0642	23933	5D7Dh	E	1	FIX32	VD	4	Ra	
C0650	23925	5D75h	E	1	FIX32	VD	4	Ra/Wa	
C0651	23924	5D74h	E	1	FIX32	VD	4	Ra/Wa	
C0652	23923	5D73h	E	1	FIX32	VD	4	Ra/W	CINH
C0653	23922	5D72h	E	1	FIX32	VD	4	Ra/Wa	
C0654	23921	5D71h	E	1	FIX32	VD	4	Ra	
C0655	23920	5D70h	E	1	FIX32	VD	4	Ra/Wa	
C0656	23919	5D6Fh	E	1	FIX32	VD	4	Ra/Wa	
C0657	23918	5D6Eh	E	1	FIX32	VD	4	Ra/W	CINH
C0658	23917	5D6Dh	E	1	FIX32	VD	4	Ra	
C0661	23914	5D6Ah	E	1	FIX32	VD	4	Ra/W	CINH
C0662	23913	5D69h	E	1	FIX32	VD	4	Ra	
C0671	23904	5D60h	E	1	FIX32	VD	4	Ra/Wa	
C0672	23903	5D5Fh	E	1	FIX32	VD	4	Ra/Wa	
C0673	23902	5D5Eh	E	1	FIX32	VD	4	Ra/W	CINH
C0674	23901	5D5Dh	E	1	FIX32	VD	4	Ra/W	CINH
C0675	23900	5D5Ch	E	1	FIX32	VD	4	Ra/W	CINH
C0676	23899	5D5Bh	A	2	FIX32	VD	4	Ra	
C0677	23898	5D5Ah	E	1	FIX32	VD	4	Ra	
C0680	23895	5D57h	E	1	FIX32	VD	4	Ra/Wa	
C0681	23894	5D56h	E	1	FIX32	VD	4	Ra/Wa	
C0682	23893	5D55h	E	1	FIX32	VD	4	Ra/Wa	
C0683	23892	5D54h	A	2	FIX32	VD	4	Ra/W	CINH
C0684	23891	5D53h	A	2	FIX32	VD	4	Ra	
C0685	23890	5D52h	E	1	FIX32	VD	4	Ra/Wa	
C0686	23889	5D51h	E	1	FIX32	VD	4	Ra/Wa	
C0687	23888	5D50h	E	1	FIX32	VD	4	Ra/Wa	
C0688	23887	5D4Fh	A	2	FIX32	VD	4	Ra/W	CINH
C0689	23886	5D4Eh	A	2	FIX32	VD	4	Ra	
C0690	23885	5D4Dh	E	1	FIX32	VD	4	Ra/Wa	
C0691	23884	5D4Ch	E	1	FIX32	VD	4	Ra/Wa	
C0692	23883	5D4Bh	E	1	FIX32	VD	4	Ra/Wa	
C0693	23882	5D4Ah	A	2	FIX32	VD	4	Ra/W	CINH
C0694	23881	5D49h	A	2	FIX32	VD	4	Ra	
C0695	23880	5D48h	E	1	FIX32	VD	4	Ra/Wa	
C0697	23878	5D46h	A	2	FIX32	VD	4	Ra/W	CINH
C0698	23877	5D45h	A	2	I32	VH	4	Ra	
C0700	23875	5D43h	E	1	FIX32	VD	4	Ra/W	CINH
C0701	23874	5D42h	E	1	FIX32	VD	4	Ra	
C0703	23872	5D40h	E	1	FIX32	VD	4	Ra/W	CINH

Code	Index		Data					Access	
	dec	hex	DS	DA	DT	Format	DL	LCM-R/W	Condition
C0704	23871	5D3Fh	E	1	FIX32	VD	4	Ra	
C0710	23865	5D39h	E	1	FIX32	VD	4	Ra/Wa	
C0711	23864	5D38h	E	1	FIX32	VD	4	Ra/Wa	
C0713	23862	5D36h	E	1	FIX32	VD	4	Ra/W	CINH
C0714	23861	5D35h	E	1	FIX32	VD	4	Ra	
C0715	23860	5D34h	E	1	FIX32	VD	4	Ra/Wa	
C0716	23859	5D33h	E	1	FIX32	VD	4	Ra/Wa	
C0718	23857	5D31h	E	1	FIX32	VD	4	Ra/W	CINH
C0719	23856	5D30h	E	1	FIX32	VD	4	Ra	
C0720	23855	5D2Fh	E	1	FIX32	VD	4	Ra/Wa	
C0721	23854	5D2Eh	E	1	FIX32	VD	4	Ra/Wa	
C0723	23852	5D2Ch	E	1	FIX32	VD	4	Ra/W	CINH
C0724	23851	5D2Bh	E	1	FIX32	VD	4	Ra	
C0725	23850	5D2Ah	E	1	FIX32	VD	4	Ra/Wa	
C0726	23849	5D29h	E	1	FIX32	VD	4	Ra/Wa	
C0728	23847	5D27h	E	1	FIX32	VD	4	Ra/W	CINH
C0729	23846	5D26h	E	1	FIX32	VD	4	Ra	
C0750	23825	5D11h	E	1	FIX32	VD	4	Ra/Wa	
C0751	23824	5D10h	E	1	FIX32	VD	4	Ra/Wa	
C0752	23823	5D0Fh	E	1	FIX32	VD	4	Ra/Wa	
C0753	23822	5D0Eh	E	1	FIX32	VD	4	Ra/Wa	
C0754	23821	5D0Dh	E	1	U32	VH	4	Ra/Wa	
C0755	23820	5D0Ch	E	1	FIX32	VD	4	Ra/Wa	
C0756	23819	5D0Bh	E	1	I32	VH	4	Ra/Wa	
C0757	23818	5D0Ah	E	1	FIX32	VD	4	Ra/Wa	
C0758	23817	5D09h	E	1	FIX32	VD	4	Ra/W	CINH
C0759	23816	5D08h	E	1	FIX32	VD	4	Ra/W	CINH
C0760	23815	5D07h	E	1	FIX32	VD	4	Ra/W	CINH
C0761	23814	5D06h	E	1	FIX32	VD	4	Ra/W	CINH
C0764	23811	5D03h	A	3	FIX32	VD	4	Ra	
C0765	23810	5D02h	E	1	FIX32	VD	4	Ra	
C0766	23809	5D01h	E	1	FIX32	VD	4	Ra/Wa	
C0770	23805	5CFDh	E	1	FIX32	VD	4	Ra/W	CINH
C0771	23804	5CFCh	E	1	FIX32	VD	4	Ra/W	CINH
C0772	23803	5CFBh	E	1	FIX32	VD	4	Ra/W	CINH
C0773	23802	5CFAh	A	3	FIX32	VD	4	Ra	
C0775	23800	5CF8h	E	1	FIX32	VD	4	Ra/W	CINH
C0776	23799	5CF7h	E	1	FIX32	VD	4	Ra/W	CINH
C0777	23798	5CF6h	E	1	FIX32	VD	4	Ra/W	CINH
C0778	23797	5CF5h	A	3	FIX32	VD	4	Ra	
C0780	23795	5CF3h	E	1	FIX32	VD	4	Ra/W	CINH
C0781	23794	5CF2h	E	1	FIX32	VD	4	Ra/W	CINH
C0782	23793	5CF1h	E	1	FIX32	VD	4	Ra/W	CINH
C0783	23792	5CF0h	E	1	FIX32	VD	4	Ra/W	CINH
C0784	23791	5CEFh	E	1	FIX32	VD	4	Ra/W	CINH
C0785	23790	5CEEh	E	1	FIX32	VD	4	Ra/W	CINH
C0786	23789	5CEDh	E	1	FIX32	VD	4	Ra/W	CINH
C0787	23788	5CECh	A	4	FIX32	VD	4	Ra/W	CINH
C0788	23787	5CEBh	A	4	FIX32	VD	4	Ra/W	CINH
C0789	23786	5CEAh	E	1	FIX32	VD	4	Ra/W	CINH
C0790	23785	5CE9h	E	1	FIX32	VD	4	Ra/W	CINH
C0798	23777	5CE1h	A	2	FIX32	VD	4	Ra	

Configuration

Code	Index		Data					Access	
	dec	hex	DS	DA	DT	Format	DL	LCM-R/W	Condition
C0799	23776	5CE0h	A	13	FIX32	VD	4	Ra	
C0800	23775	5CDFh	E	1	FIX32	VD	4	Ra/W	CINH
C0801	23774	5CDEh	E	1	FIX32	VD	4	Ra/W	CINH
C0802	23773	5CDDh	E	1	FIX32	VD	4	Ra/W	CINH
C0803	23772	5CDCh	E	1	FIX32	VD	4	Ra/W	CINH
C0804	23771	5CDBh	E	1	FIX32	VD	4	Ra/W	CINH
C0805	23770	5CDAh	E	1	FIX32	VD	4	Ra/W	CINH
C0808	23767	5CD7h	A	4	FIX32	VD	4	Ra	
C0809	23766	5CD6h	A	2	FIX32	VD	4	Ra	
C0810	23765	5CD5h	A	2	FIX32	VD	4	Ra/W	CINH
C0811	23764	5CD4h	E	1	FIX32	VD	4	Ra/W	CINH
C0812	23763	5CD3h	A	2	FIX32	VD	4	Ra	
C0813	23762	5CD2h	E	1	FIX32	VD	4	Ra	
C0815	23760	5CD0h	A	2	FIX32	VD	4	Ra/W	CINH
C0816	23759	5CCFh	E	1	FIX32	VD	4	Ra/W	CINH
C0817	23758	5CCEh	A	2	FIX32	VD	4	Ra	
C0818	23757	5CCDh	E	1	FIX32	VD	4	Ra	
C0820	23755	5CCBh	A	3	FIX32	VD	4	Ra/W	CINH
C0821	23754	5CCAh	A	3	FIX32	VD	4	Ra	
C0822	23753	5CC9h	A	3	FIX32	VD	4	Ra/W	CINH
C0823	23752	5CC8h	A	3	FIX32	VD	4	Ra	
C0824	23751	5CC7h	A	3	FIX32	VD	4	Ra/W	CINH
C0825	23750	5CC6h	A	3	FIX32	VD	4	Ra	
C0826	23749	5CC5h	A	3	FIX32	VD	4	Ra/W	CINH
C0827	23748	5CC4h	A	3	FIX32	VD	4	Ra	
C0828	23747	5CC3h	A	3	FIX32	VD	4	Ra/W	CINH
C0829	23746	5CC2h	A	3	FIX32	VD	4	Ra	
C0830	23745	5CC1h	A	3	FIX32	VD	4	Ra/W	CINH
C0831	23744	5CC0h	A	3	FIX32	VD	4	Ra	
C0832	23743	5CBFh	A	3	FIX32	VD	4	Ra/W	CINH
C0833	23742	5CBEh	A	3	FIX32	VD	4	Ra	
C0834	23741	5CBDh	A	3	FIX32	VD	4	Ra/W	CINH
C0835	23740	5CBCh	A	3	FIX32	VD	4	Ra	
C0836	23739	5CBBh	A	3	FIX32	VD	4	Ra/W	CINH
C0837	23738	5CBAh	A	3	FIX32	VD	4	Ra	
C0838	23737	5CB9h	A	3	FIX32	VD	4	Ra/W	CINH
C0839	23736	5CB8h	A	3	FIX32	VD	4	Ra	
C0840	23735	5CB7h	E	1	FIX32	VD	4	Ra/W	CINH
C0841	23734	5CB6h	E	1	FIX32	VD	4	Ra	
C0842	23733	5CB5h	E	1	FIX32	VD	4	Ra/W	CINH
C0843	23732	5CB4h	E	1	FIX32	VD	4	Ra	
C0844	23731	5CB3h	E	1	FIX32	VD	4	Ra/W	CINH
C0845	23730	5CB2h	E	1	FIX32	VD	4	Ra	
C0846	23729	5CB1h	E	1	FIX32	VD	4	Ra/W	CINH
C0847	23728	5CB0h	E	1	FIX32	VD	4	Ra	
C0848	23727	5CAFh	E	1	FIX32	VD	4	Ra/W	CINH
C0849	23726	5CAEh	E	1	FIX32	VD	4	Ra	
C0850	23725	5CADh	A	3	FIX32	VD	4	Ra/W	CINH
C0851	23724	5CACh	E	1	FIX32	VD	4	Ra/W	CINH
C0852	23723	5CABh	E	1	FIX32	VD	4	Ra/Wa	
C0853	23722	5CAAh	E	1	FIX32	VD	4	Ra/Wa	
C0854	23721	5CA9h	E	1	FIX32	VD	4	Ra/Wa	

Code	Index		Data					Access	
	dec	hex	DS	DA	DT	Format	DL	LCM-R/W	Condition
C0855	23720	5CA8h	A	2	B16	VH	2	Ra	
C0856	23719	5CA7h	A	3	I32	VH	4	Ra	
C0857	23718	5CA6h	E	1	I32	VH	4	Ra	
C0858	23717	5CA5h	A	3	I32	VH	4	Ra	
C0859	23716	5CA4h	E	1	I32	VH	4	Ra	
C0860	23715	5CA3h	A	11	FIX32	VD	4	Ra/W	CINH
C0861	23714	5CA2h	A	3	FIX32	VD	4	Ra/W	CINH
C0863	23712	5CA0h	A	6	B16	VH	2	Ra	
C0864	23711	5C9Fh	A	3	FIX32	VD	4	Ra/Wa	
C0865	23710	5C9Eh	A	3	FIX32	VD	4	Ra/Wa	
C0866	23709	5C9Dh	A	11	FIX32	VD	4	Ra	
C0867	23708	5C9Ch	A	3	I32	VH	4	Ra	
C0868	23707	5C9Bh	A	11	FIX32	VD	4	Ra	
C0869	23706	5C9Ah	A	3	I32	VH	4	Ra	
C0870	23705	5C99h	A	2	FIX32	VD	4	Ra/W	CINH
C0871	23704	5C98h	E	1	FIX32	VD	4	Ra/W	CINH
C0876	23699	5C93h	E	1	FIX32	VD	4	Ra/W	CINH
C0878	23697	5C91h	A	4	FIX32	VD	4	Ra	
C0879	23696	5C90h	A	3	FIX32	VD	4	Ra/Wa	
C0880	23695	5C8Fh	A	2	FIX32	VD	4	Ra/W	CINH
C0881	23694	5C8Eh	E	1	FIX32	VD	4	Ra/W	CINH
C0884	23691	5C8Bh	A	3	FIX32	VD	4	Ra	
C0885	23690	5C8Ah	E	1	FIX32	VD	4	Ra/W	CINH
C0886	23689	5C89h	E	1	FIX32	VD	4	Ra/W	CINH
C0889	23686	5C86h	A	2	FIX32	VD	4	Ra	
C0890	23685	5C85h	E	1	FIX32	VD	4	Ra/W	CINH
C0891	23684	5C84h	E	1	FIX32	VD	4	Ra/W	CINH
C0892	23683	5C83h	E	1	FIX32	VD	4	Ra/W	CINH
C0893	23682	5C82h	E	1	FIX32	VD	4	Ra/W	CINH
C0894	23681	5C81h	E	1	FIX32	VD	4	Ra/W	CINH
C0895	23680	5C80h	E	1	FIX32	VD	4	Ra/W	CINH
C0896	23679	5C7Fh	E	1	FIX32	VD	4	Ra/W	CINH
C0897	23678	5C7Eh	E	1	FIX32	VD	4	Ra/W	CINH
C0898	23677	5C7Dh	E	1	FIX32	VD	4	Ra/W	CINH
C0899	23676	5C7Ch	E	1	FIX32	VD	4	Ra/W	CINH
C0900	23675	5C7Bh	E	1	FIX32	VD	4	Ra/W	CINH
C0901	23674	5C7Ah	E	1	FIX32	VD	4	Ra/W	CINH
C0902	23673	5C79h	E	1	FIX32	VD	4	Ra/W	CINH
C0903	23672	5C78h	E	1	FIX32	VD	4	Ra/W	CINH
C0906	23669	5C75h	A	9	FIX32	VD	4	Ra	
C0907	23668	5C74h	A	4	FIX32	VD	4	Ra	
C0908	23667	5C73h	E	1	I32	VH	4	Ra	
C0909	23666	5C72h	E	1	FIX32	VD	4	Ra/Wa	
C0920	23655	5C67h	E	1	FIX32	VD	4	Ra/W	CINH
C0921	23654	5C66h	E	1	FIX32	VD	4	Ra/W	CINH
C0922	23653	5C65h	E	1	FIX32	VD	4	Ra/W	CINH
C0923	23652	5C64h	E	1	FIX32	VD	4	Ra/W	CINH
C0924	23651	5C63h	E	1	FIX32	VD	4	Ra/W	CINH
C0925	23650	5C62h	E	1	FIX32	VD	4	Ra/W	CINH
C0926	23649	5C61h	A	4	I32	VH	4	Ra	
C0927	23648	5C60h	A	3	FIX32	VD	4	Ra	
C0928	23647	5C5Fh	E	1	I32	VH	4	Ra	

Code	Index		Data					Access	
	dec	hex	DS	DA	DT	Format	DL	LCM-R/W	Condition
C0929	23646	5C5Eh	E	1	FIX32	VD	4	Ra	
C0930	23645	5C5Dh	E	1	FIX32	VD	4	Ra/W	CINH
C0931	23644	5C5Ch	E	1	FIX32	VD	4	Ra/W	CINH
C0932	23643	5C5Bh	E	1	FIX32	VD	4	Ra/Wa	
C0933	23642	5C5Ah	E	1	FIX32	VD	4	Ra/Wa	
C0934	23641	5C59h	E	1	I32	VH	4	Ra/Wa	
C0935	23640	5C58h	E	1	FIX32	VD	4	Ra/Wa	
C0936	23639	5C57h	E	1	FIX32	VD	4	Ra/Wa	
C0940	23635	5C53h	E	1	FIX32	VD	4	Ra/Wa	
C0941	23634	5C52h	E	1	FIX32	VD	4	Ra/Wa	
C0942	23633	5C51h	E	1	FIX32	VD	4	Ra/W	CINH
C0943	23632	5C50h	E	1	FIX32	VD	4	Ra	
C0945	23630	5C4Eh	E	1	FIX32	VD	4	Ra/Wa	
C0946	23629	5C4Dh	E	1	FIX32	VD	4	Ra/Wa	
C0947	23628	5C4Ch	E	1	FIX32	VD	4	Ra/W	CINH
C0948	23627	5C4Bh	E	1	FIX32	VD	4	Ra	
C0950	23625	5C49h	E	1	FIX32	VD	4	Ra/Wa	
C0951	23624	5C48h	E	1	FIX32	VD	4	Ra/Wa	
C0952	23623	5C47h	E	1	FIX32	VD	4	Ra/W	CINH
C0953	23622	5C46h	E	1	FIX32	VD	4	Ra	
C0955	23620	5C44h	E	1	FIX32	VD	4	Ra/Wa	
C0956	23619	5C43h	E	1	FIX32	VD	4	Ra/Wa	
C0957	23618	5C42h	E	1	FIX32	VD	4	Ra/W	CINH
C0958	23617	5C41h	E	1	FIX32	VD	4	Ra	
C0960	23615	5C3Fh	E	1	FIX32	VD	4	Ra/Wa	
C0961	23614	5C3Eh	E	1	FIX32	VD	4	Ra/Wa	
C0962	23613	5C3Dh	E	1	FIX32	VD	4	Ra/Wa	
C0963	23612	5C3Ch	E	1	FIX32	VD	4	Ra/Wa	
C0964	23611	5C3Bh	E	1	FIX32	VD	4	Ra/Wa	
C0965	23610	5C3Ah	E	1	FIX32	VD	4	Ra/Wa	
C0966	23609	5C39h	E	1	FIX32	VD	4	Ra/Wa	
C0967	23608	5C38h	E	1	FIX32	VD	4	Ra/W	CINH
C0968	23607	5C37h	E	1	FIX32	VD	4	Ra	
C0970	23605	5C35h	E	1	FIX32	VD	4	Ra/W	CINH
C0971	23604	5C34h	E	1	FIX32	VD	4	Ra/W	CINH
C0972	23603	5C33h	E	1	FIX32	VD	4	Ra/W	CINH
C0973	23602	5C32h	E	1	FIX32	VD	4	Ra/W	CINH
C0974	23601	5C31h	E	1	FIX32	VD	4	Ra/W	CINH
C0975	23600	5C30h	E	1	FIX32	VD	4	Ra/W	CINH
C0976	23599	5C2Fh	E	1	FIX32	VD	4	Ra/W	CINH
C0977	23598	5C2Eh	E	1	FIX32	VD	4	Ra/W	CINH
C0978	23597	5C2Dh	E	1	FIX32	VD	4	Ra/W	CINH
C0980	23595	5C2Bh	E	1	FIX32	VD	4	Ra/Wa	
C0981	23594	5C2Ah	E	1	FIX32	VD	4	Ra/Wa	
C0982	23593	5C29h	E	1	FIX32	VD	4	Ra/Wa	
C0983	23592	5C28h	E	1	FIX32	VD	4	Ra/Wa	
C0988	23587	5C23h	A	7	FIX32	VD	4	Ra	
C0989	23586	5C22h	A	2	FIX32	VD	4	Ra	
C0990	23585	5C21h	E	1	FIX32	VD	4	Ra/W	CINH
C0991	23584	5C20h	E	1	FIX32	VD	4	Ra/W	CINH
C0992	23583	5C1Fh	E	1	FIX32	VD	4	Ra	
C0993	23582	5C1Eh	E	1	FIX32	VD	4	Ra	

Code	Index		Data					Access	
	dec	hex	DS	DA	DT	Format	DL	LCM-R/W	Condition
C0995	23580	5C1Ch	E	1	FIX32	VD	4	Ra/Wa	
C0996	23579	5C1Bh	E	1	FIX32	VD	4	Ra/W	CINH
C0997	23578	5C1Ah	E	1	I32	VH	4	Ra	
C1000	23575	5C17h	E	1	FIX32	VD	4	Ra/Wa	
C1001	23574	5C16h	E	1	FIX32	VD	4	Ra/W	CINH
C1002	23573	5C15h	E	1	I32	VH	4	Ra	
C1010	23565	5C0Dh	E	1	FIX32	VD	4	Ra/Wa	
C1011	23564	5C0Ch	A	2	FIX32	VD	4	Ra/W	CINH
C1012	23563	5C0Bh	A	2	I32	VH	4	Ra	
C1030	23545	5BF9h	E	1	FIX32	VD	4	Ra/W	CINH
C1031	23544	5BF8h	E	1	FIX32	VD	4	Ra/W	CINH
C1032	23543	5BF7h	E	1	FIX32	VD	4	Ra	
C1033	23542	5BF6h	E	1	FIX32	VD	4	Ra	
C1040	23535	5BEFh	E	1	FIX32	VD	4	Ra/Wa	
C1041	23534	5BEEh	E	1	FIX32	VD	4	Ra/Wa	
C1042	23533	5BEDh	E	1	FIX32	VD	4	Ra/W	CINH
C1043	23532	5BECh	E	1	FIX32	VD	4	Ra/W	CINH
C1044	23531	5BEBh	E	1	FIX32	VD	4	Ra/W	CINH
C1045	23530	5BEAh	A	2	FIX32	VD	4	Ra	
C1046	23529	5BE9h	E	1	FIX32	VD	4	Ra	
C1090	23485	5BBDh	E	1	I32	VH	4	Ra	
C1091	23484	5BBCh	E	1	FIX32	VD	4	Ra/Wa	
C1092	23483	5BBBh	E	1	FIX32	VD	4	Ra/Wa	
C1093	23482	5BBAh	E	1	FIX32	VD	4	Ra/Wa	
C1094	23481	5BB9h	E	1	FIX32	VD	4	Ra/Wa	
C1095	23480	5BB8h	E	1	I32	VH	4	Ra/Wa	
C1096	23479	5BB7h	E	1	FIX32	VD	4	Ra/W	CINH
C1097	23478	5BB6h	E	1	FIX32	VD	4	Ra/W	CINH
C1098	23477	5BB5h	E	1	FIX32	VD	4	Ra	
C1099	23476	5BB4h	E	1	FIX32	VD	4	Ra	
C1100	23475	5BB3h	E	1	FIX32	VD	4	Ra/Wa	
C1101	23474	5BB2h	A	2	FIX32	VD	4	Ra/W	CINH
C1102	23473	5BB1h	A	3	FIX32	VD	4	Ra/W	CINH
C1103	23472	5BB0h	A	2	FIX32	VD	4	Ra	
C1104	23471	5BAFh	A	3	FIX32	VD	4	Ra	
C1120	23455	5B9Fh	E	1	FIX32	VD	4	Ra/Wa	
C1121	23454	5B9Eh	A	2	FIX32	VD	4	Ra/Wa	
C1122	23453	5B9Dh	E	1	FIX32	VD	4	Ra/Wa	
C1123	23452	5B9Ch	A	2	FIX32	VD	4	Ra/Wa	
C1124	23451	5B9Bh	E	1	FIX32	VD	4	Ra/W	CINH
C1125	23450	5B9Ah	E	1	FIX32	VD	4	Ra/W	CINH
C1126	23449	5B99h	E	1	FIX32	VD	4	Ra/W	CINH
C1127	23448	5B98h	E	1	I32	VH	4	Ra	
C1128	23447	5B97h	E	1	I32	VH	4	Ra	
C1129	23446	5B96h	E	1	I32	VH	4	Ra	
C1140	23435	5B8Bh	E	1	FIX32	VD	4	Ra/Wa	
C1141	23434	5B8Ah	E	1	FIX32	VD	4	Ra/Wa	
C1143	23432	5B88h	E	1	FIX32	VD	4	Ra/W	CINH
C1144	23431	5B87h	E	1	FIX32	VD	4	Ra	
C1145	23430	5B86h	E	1	FIX32	VD	4	Ra/Wa	
C1146	23429	5B85h	E	1	FIX32	VD	4	Ra/Wa	
C1148	23427	5B83h	E	1	FIX32	VD	4	Ra/W	CINH

Configuration

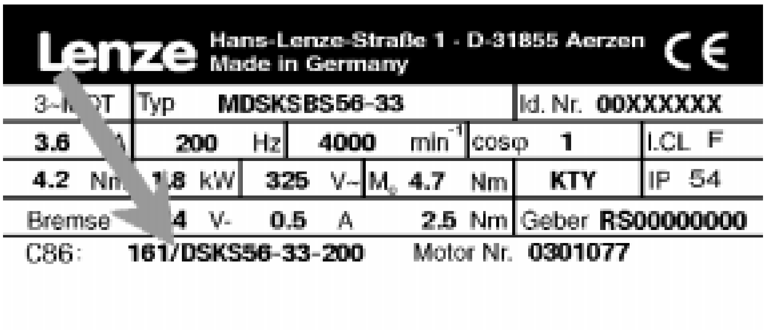
Code	Index		Data					Access	
	dec	hex	DS	DA	DT	Format	DL	LCM-R/W	Condition
C1149	23426	5B82h	E	1	FIX32	VD	4	Ra	
C1150	23425	5B81h	E	1	FIX32	VD	4	Ra/Wa	
C1151	23424	5B80h	E	1	I32	VH	4	Ra/Wa	
C1153	23422	5B7Eh	E	1	FIX32	VD	4	Ra/W	CINH
C1154	23421	5B7Dh	E	1	FIX32	VD	4	Ra/W	CINH
C1155	23420	5B7Ch	E	1	FIX32	VD	4	Ra/W	CINH
C1157	23418	5B7Ah	E	1	FIX32	VD	4	Ra	
C1158	23417	5B79h	E	1	FIX32	VD	4	Ra	
C1159	23416	5B78h	E	1	I32	VH	4	Ra	
C1160	23415	5B77h	A	2	FIX32	VD	4	Ra/W	CINH
C1161	23414	5B76h	E	1	FIX32	VD	4	Ra/W	CINH
C1162	23413	5B75h	A	2	FIX32	VD	4	Ra	
C1163	23412	5B74h	E	1	FIX32	VD	4	Ra	
C1165	23410	5B72h	A	2	FIX32	VD	4	Ra/W	CINH
C1166	23409	5B71h	E	1	FIX32	VD	4	Ra/W	CINH
C1167	23408	5B70h	A	2	FIX32	VD	4	Ra	
C1168	23407	5B6Fh	E	1	FIX32	VD	4	Ra	
C1170	23405	5B6Dh	E	1	FIX32	VD	4	Ra/Wa	
C1171	23404	5B6Ch	E	1	FIX32	VD	4	Ra/Wa	
C1172	23403	5B6Bh	E	1	FIX32	VD	4	Ra/W	CINH
C1173	23402	5B6Ah	E	1	FIX32	VD	4	Ra	
C1175	23400	5B68h	A	3	FIX32	VD	4	Ra/W	CINH
C1176	23399	5B67h	A	3	FIX32	VD	4	Ra	
C1178	23397	5B65h	A	3	FIX32	VD	4	Ra/W	CINH
C1179	23396	5B64h	A	3	FIX32	VD	4	Ra	
C1190	23385	5B59h	E	1	FIX32	VD	4	Ra/Wa	
C1191	23384	5B58h	A	2	FIX32	VD	4	Ra/Wa	
C1192	23383	5B57h	A	2	FIX32	VD	4	Ra/Wa	
C1195	23380	5B54h	E	1	FIX32	VD	4	Ra/W	CINH
C1196	23379	5B53h	E	1	I32	VH	4	Ra	
C1197	23378	5B52h	E	1	I32	VH	4	Ra	
C1200	23375	5B4Fh	A	3	FIX32	VD	4	Ra/W	CINH
C1201	23374	5B4Eh	A	3	I32	VH	4	Ra	
C1205	23370	5B4Ah	A	2	FIX32	VD	4	Ra/W	CINH
C1206	23369	5B49h	A	2	I32	VH	4	Ra	
C1207	23368	5B48h	E	1	FIX32	VD	4	Ra/Wa	
C1210	23365	5B45h	A	5	FIX32	VD	4	Ra/W	CINH
C1211	23364	5B44h	A	2	FIX32	VD	4	Ra/W	CINH
C1212	23363	5B43h	E	1	FIX32	VD	4	Ra/W	CINH
C1215	23360	5B40h	A	5	FIX32	VD	4	Ra	
C1216	23359	5B3Fh	A	2	FIX32	VD	4	Ra	
C1217	23358	5B3Eh	E	1	I32	VH	4	Ra	
C1220	23355	5B3Bh	A	2	FIX32	VD	4	Ra/W	CINH
C1223	23352	5B38h	A	2	FIX32	VD	4	Ra	
C1230	23345	5B31h	A	2	FIX32	VD	4	Ra/W	CINH
C1231	23344	5B30h	E	1	FIX32	VD	4	Ra/W	CINH
C1232	23343	5B2Fh	A	2	FIX32	VD	4	Ra/W	CINH
C1235	23340	5B2Ch	A	2	FIX32	VD	4	Ra	
C1236	23339	5B2Bh	E	1	FIX32	VD	4	Ra	
C1237	23338	5B2Ah	A	2	I32	VH	4	Ra	
C1240	23335	5B27h	A	2	FIX32	VD	4	Ra/W	CINH
C1241	23334	5B26h	E	1	FIX32	VD	4	Ra/W	CINH

Code	Index		Data					Access	
	dec	hex	DS	DA	DT	Format	DL	LCM-R/W	Condition
C1242	23333	5B25h	E	1	FIX32	VD	4	Ra/W	CINH
C1245	23330	5B22h	A	2	FIX32	VD	4	Ra	
C1246	23329	5B21h	E	1	FIX32	VD	4	Ra	
C1247	23328	5B20h	E	1	I32	VH	4	Ra	
C1250	23325	5B1Dh	E	1	FIX32	VD	4	Ra/W	CINH
C1251	23324	5B1Ch	A	2	FIX32	VD	4	Ra/W	CINH
C1253	23322	5B1Ah	E	1	FIX32	VD	4	Ra	
C1254	23321	5B19h	A	2	I32	VH	4	Ra	
C1255	23320	5B18h	E	1	FIX32	VD	4	Ra/W	CINH
C1258	23317	5B15h	E	1	FIX32	VD	4	Ra	
C1260	23315	5B13h	E	1	FIX32	VD	4	Ra/W	CINH
C1261	23314	5B12h	E	1	FIX32	VD	4	Ra/W	CINH
C1262	23313	5B11h	E	1	FIX32	VD	4	Ra/W	CINH
C1265	23310	5B0Eh	E	1	FIX32	VD	4	Ra/W	CINH
C1266	23309	5B0Dh	E	1	FIX32	VD	4	Ra/W	CINH
C1268	23307	5B0Bh	E	1	FIX32	VD	4	Ra	
C1269	23306	5B0Ah	E	1	I32	VH	4	Ra	
C1270	23305	5B09h	A	2	FIX32	VD	4	Ra/W	CINH
C1271	23304	5B08h	A	2	I32	VH	4	Ra	
C1272	23303	5B07h	E	1	FIX32	VD	4	Ra/Wa	
C1290	23285	5AF5h	E	1	FIX32	VD	4	Ra/Wa	
C1500	23075	5A23h	E	1	I32	VH	4	Ra	
C1501	23074	5A22h	E	1	FIX32	VD	4	Ra/Wa	
C1502	23073	5A21h	E	1	FIX32	VD	4	Ra/Wa	
C1503	23072	5A20h	E	1	FIX32	VD	4	Ra/Wa	
C1504	23071	5A1Fh	E	1	FIX32	VD	4	Ra/Wa	
C1505	23070	5A1Eh	E	1	I32	VH	4	Ra/Wa	
C1506	23069	5A1Dh	E	1	FIX32	VD	4	Ra/W	CINH
C1507	23068	5A1Ch	E	1	FIX32	VD	4	Ra/W	CINH
C1508	23067	5A1Bh	E	1	FIX32	VD	4	Ra	
C1509	23066	5A1Ah	E	1	FIX32	VD	4	Ra	
C1799	22776	58F8h	E	1	FIX32	VD	4	Ra/Wa	

7.11 Motor selection list

Tip!

For the parameter setting of the drive the available motor type is to be entered under code C0086. In future, this value will be indicated on the nameplate.
Example: “161”. Indicates the motor designation ”DSKS56-33-200” in the display.



Lenze Hans-Lenze-Straße 1 · D-31855 Aerzen
Made in Germany
3-~ T | Typ MDSKSBS56-33 | Id. Nr. 00XXXXXX
3.6 | 200 Hz | 4000 min^{-1} | cosφ 1 | I.CL F
4.2 N | 8 kW | 325 V~ | M_0 4.7 Nm | KTY | IP 54
Bremse 4 V- 0.5 A 2.5 Nm | Geber RS00000000
C86: 161/DSKS56-33-200 Motor Nr. 0301077

C0086		Lenze motor type	C0081	C0087	C0088	C0089	C0090	Motor type	Thermal sensor
Value	Name		P_{rated} [kW]	n_{rated} [rpm]	I_{rated} [A]	f_{rated} [Hz]	a_{rated} [V]		
10	MDSKA56-140	MDSKAXX056-22	0.80	3950	2.4	140	390	Asynchronous servo motor	KTY
11	MDFKA71-120	MDFKAXX071-22	2.20	3410	6.0	120			
12	MDSKA71-140	MDSKAXX071-22	1.70	4050	4.4	140			
13	MDFKA80-60	MDFKAXX080-22	2.10	1635	4.8	60			
14	MDSKA80-70	MDSKAXX080-22	1.40	2000	3.3	70			
15	MDFKA80-120	MDFKAXX080-22	3.90	3455	9.1	120			
16	MDSKA80-140	MDSKAXX080-22	2.30	4100	5.8	140			
17	MDFKA90-60	MDFKAXX090-22	3.80	1680	8.5	60			
18	MDSKA90-80	MDSKAXX090-22	2.60	2300	5.5	80			
19	MDFKA90-120	MDFKAXX090-22	6.90	3480	15.8	120			
20	MDSKA90-140	MDSKAXX090-22	4.10	4110	10.2	140	350		
21	MDFKA100-60	MDFKAXX100-22	6.40	1700	13.9	60	390		
22	MDSKA100-80	MDSKAXX100-22	4.00	2340	8.2	80			
23	MDFKA100-120	MDFKAXX100-22	13.20	3510	28.7	120			
24	MDSKA100-140	MDSKAXX100-22	5.20	4150	14.0	140	330		
25	MDFKA112-60	MDFKAXX112-22	11.00	1710	22.5	60	390		
26	MDSKA112-85	MDSKAXX112-22	6.40	2490	13.5	85			
27	MDFKA112-120	MDFKAXX112-22	20.30	3520	42.5	120			
28	MDSKA112-140	MDSKAXX112-22	7.40	4160	19.8	140	320		
30	DFQA100-50	MDFQAXX100-22	10.60	1420	26.5	50	360		
31	DFQA100-100	MDFQAXX100-22	20.30	2930	46.9	100			
32	DFQA112-28	MDFQAXX112-22	11.50	760	27.2	28			
33	DFQA112-58	MDFQAXX112-22	22.70	1670	49.1	58			
34	DFQA132-20	MDFQAXX132-32	17.00	550	45.2	20			
35	DFQA132-42	MDFQAXX132-32	40.30	1200	88.8	42			
40	DFQA112-50	MDFQAXX112-22	20.10	1425	43.7	50			
41	DFQA112-100	MDFQAXX112-22	38.40	2935	81.9	100			
42	DFQA132-36	MDFQAXX132-32	36.40	1030	77.4	39			
43	DFQA132-76	MDFQAXX132-32	60.10	2235	144.8	76	340		

C0086		Lenze motor type	C0081	C0087	C0088	C0089	C0090	Motor type	Thermal sensor
Value	Name		P_{rated} [kW]	n_{rated} [rpm]	I_{rated} [A]	f_{rated} [Hz]	a_{rated} [V]		
50	DSVA56-140	DSVAXX056-22	0.80	3950	2.4	140	390	Asynchronous servo motor	TKO (Thermostat)
51	DFVA71-120	DFVAXX071-22	2.20	3410	6.0	120			
52	DSVA71-140	DSVAXX071-22	1.70	4050	4.4	140			
53	DFVA80-60	DFVAXX080-22	2.10	1635	4.8	60			
54	DSVA80-70	DSVAXX080-22	1.40	2000	3.3	70			
55	DFVA80-120	DFVAXX080-22	3.90	3455	9.1	120			
56	DSVA80-140	DSVAXX080-22	2.30	4100	5.8	140			
57	DFVA90-60	DFVAXX090-22	3.80	1680	8.5	60			
58	DSVA90-80	DSVAXX090-22	2.60	2300	5.5	80			
59	DFVA90-120	DFVAXX090-22	6.90	3480	15.8	120			
60	DSVA90-140	DSVAXX090-22	4.10	4110	10.2	140	350		
61	DFVA100-60	DFVAXX100-22	6.40	1700	13.9	60	390		
62	DSVA100-80	DSVAXX100-22	4.00	2340	8.2	80			
63	DFVA100-120	DFVAXX100-22	13.20	3510	28.7	120			
64	DSVA100-140	DSVAXX100-22	5.20	4150	14.0	140	330		
65	DFVA112-60	DFVAXX112-22	11.00	1710	22.5	60	390		
66	DSVA112-85	DSVAXX112-22	6.40	2490	13.5	85			
67	DFVA112-120	DFVAXX112-22	20.30	3520	42.5	120			
68	DSVA112-140	DSVAXX112-22	7.40	4160	19.8	140	320		
108	DSKS36-13-200	MDSKSXX036-13	0.25	4000	0.9	200	245	Synchronous servo motor	KTY
109	DSKS36-23-200	MDSKSXX036-23	0.54	4000	1.1	200	345		
110	MDSKS56-23-150	MDSKSXX056-23	0.60	3000	1.25	150	350		
111	MDSKS56-33-150	MDSKSXX056-33	0.91	3000	2.0	150	340		
112	MDSKS71-13-150	MDSKSXX071-13	1.57	3000	3.1	150	360		
113	MDFKS71-13-150	MDFKSXX071-13	2.29	3000	4.35	150	385		
114	MDSKS71-23-150	MDSKSXX071-23	2.33	3000	4.85	150	360		
115	MDFKS71-23-150	MDFKSXX071-23	3.14	3000	6.25	150	375		
116	MDSKS71-33-150	MDSKSXX071-33	3.11	3000	6.7	150	330		
117	MDFKS71-33-150	MDFKSXX071-33	4.24	3000	9.1	150	345		
160	DSKS56-23-190	MDSKSXX056-23	1.1	3800	2.3	190	330		
161	DSKS56-33-200	MDSKSXX056-33	1.8	4000	3.6	200	325		
162	DSKS71-03-170	MDSKSXX071-03	2.0	3400	4.2	170	330		
163	DFKS71-03-165	MDFKSXX071-03	2.6	3300	5.6	165	330		
164	DSKS71-13-185	MDSKSXX071-13	3.2	3700	7.0	185	325		
165	DFKS71-13-180	MDFKSXX071-13	4.1	3600	9.2	180	325		
166	DSKS71-33-180	MDSKSXX071-33	4.6	3600	10.0	180	325		
167	DFKS71-33-175	MDFKSXX071-33	5.9	3500	13.1	175	325		

Configuration

C0086		Lenze motor type	C0081	C0087	C0088	C0089	C0090	Motor type	Thermal sensor
Value	Name		P_{rated} [kW]	n_{rated} [rpm]	I_{rated}[A]	f_{rated} [Hz]	a_{rated} [V]		
210	DXRAXX071-12-50	DXRAXX071-12	0.25	1410	0.9	50	400	Asynchronous inverter motor (in star connection)	TKO (Thermostat)
211	DXRAXX071-22-50	DXRAXX071-22	0.37	1398	1.2				
212	DXRAXX080-12-50	DXRAXX080-12	0.55	1400	1.7				
213	DXRAXX080-22-50	DXRAXX080-22	0.75	1410	2.3				
214	DXRAXX090-12-50	DXRAXX090-12	1.10	1420	2.7				
215	DXRAXX090-32-50	DXRAXX090-32	1.50	1415	3.6				
216	DXRAXX100-22-50	DXRAXX100-22	2.20	1425	4.8				
217	DXRAXX100-32-50	DXRAXX100-32	3.00	1415	6.6				
218	DXRAXX112-12-50	DXRAXX112-12	4.00	1435	8.3				
219	DXRAXX132-12-50	DXRAXX132-12	5.50	1450	11.0				
220	DXRAXX132-22-50	DXRAXX132-22	7.50	1450	14.6				
221	DXRAXX160-12-50	DXRAXX160-12	11.00	1460	21.0				
222	DXRAXX160-22-50	DXRAXX160-22	15.00	1460	27.8				
223	DXRAXX180-12-50	DXRAXX180-12	18.50	1470	32.8				
224	DXRAXX180-22-50	DXRAXX180-22	22.00	1456	38.8				
225	30kW-ASM-50	-	30.00	1470	52.0				–
226	37kW-ASM-50	-	37.00	1470	66.0				
227	45kW-ASM-50	-	45.00	1480	82.0				
228	55kW-ASM-50	-	55.00	1480	93.0				
229	75kW-ASM-50	-	75.00	1480	132.0				
250	DXRAXX071-12-87	DXRAXX071-12	0.43	2525	1.5	87	400	Asynchronous inverter motor (in delta connection)	TKO (Thermostat)
251	DXRAXX071-22-87	DXRAXX071-22	0.64	2515	2.0				
252	DXRAXX080-12-87	DXRAXX080-12	0.95	2515	2.9				
253	DXRAXX080-22-87	DXRAXX080-22	1.3	2525	4.0				
254	DXRAXX090-12-87	DXRAXX090-12	2.0	2535	4.7				
255	DXRAXX090-32-87	DXRAXX090-32	2.7	2530	6.2				
256	DXRAXX100-22-87	DXRAXX100-22	3.9	2535	8.3				
257	DXRAXX100-32-87	DXRAXX100-32	5.35	2530	11.4				
258	DXRAXX112-12-87	DXRAXX112-12	7.10	2545	14.3				
259	DXRAXX132-12-87	DXRAXX132-12	9.7	2555	19.1				
260	DXRAXX132-22-87	DXRAXX132-22	13.2	2555	25.4				
261	DXRAXX160-12-87	DXRAXX160-12	19.3	2565	36.5				
262	DXRAXX160-22-87	DXRAXX160-22	26.4	2565	48.4				
263	DXRAXX180-12-87	DXRAXX180-12	32.4	2575	57.8				
264	DXRAXX180-22-87	DXRAXX180-22	38.7	2560	67.4				
265	30kW-ASM-50	-	52.00	2546	90.0				–
266	37kW-ASM-50	-	64.00	2546	114.0				
267	45kW-ASM-50	-	78.00	2563	142.0				
268	55kW-ASM-50	-	95.00	2563	161.0				
269	75kW-ASM-50	-	130.00	2563	228.0				

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Lenze

Manual
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Trouble shooting and fault elimination

Maintenance

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Show/Hide Bookmarks

This manual is valid for the 93XX controllers of the versions

33.932X-	ES	2x.	2x		(9321 - 9329)
33.933X-	ES	2x.	2x		(9330 - 9332)
33.932X-	CS	2x.	2x	-V003	Cold Plate (9321 - 9328)

Controller type

Design:
Ex = Enclosure IP20
Cx = Cold Plate
xK = Cam profiler
xP = Servo position controller
xR = Register controller
xS = Servo inverter

Hardware version and index

Software version and index

Variant

Explanation

Version 1.0 07/99

Contents

Part E

Contents

8 Troubleshooting and fault elimination

- Operational faults are indicated immediately via the display elements or the status information (📖 8-1, chapter “Troubleshooting”).
- Faults can be analysed using
  - the history bufferr (📖 8-3)
  - and the list “Fault messages”. (📖 8-6)
- The list “Fault messages” gives information on how to eliminate faults. (📖 8-6)

8.1 Troubleshooting

Display on the controller

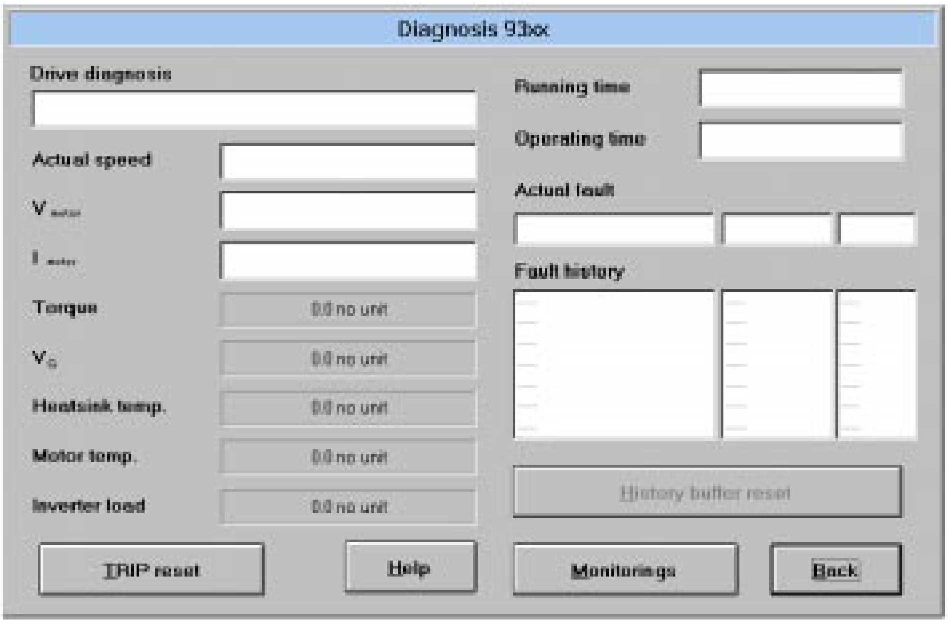
Two LEDs on the front of the controller indicate the controller status.

LED green	LED red	Cause	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

Display in Global Drive Control

- Open the ”Dialog Diagnosis” menu in the parameter menu by a double click.



Torque 0.0 no unit

V G 0.0 no unit

Heatsink temp. 0.0 no unit

Motor temp. 0.0 no unit

Inverter load 0.0 no unit

Abb. 8-1 Dialog box ”Diagnostics 9300”

- The dialog box ”Diagnosis 9300” indicates the controller status.

Display at the operating module

Status indications in the display indicate the controller status.

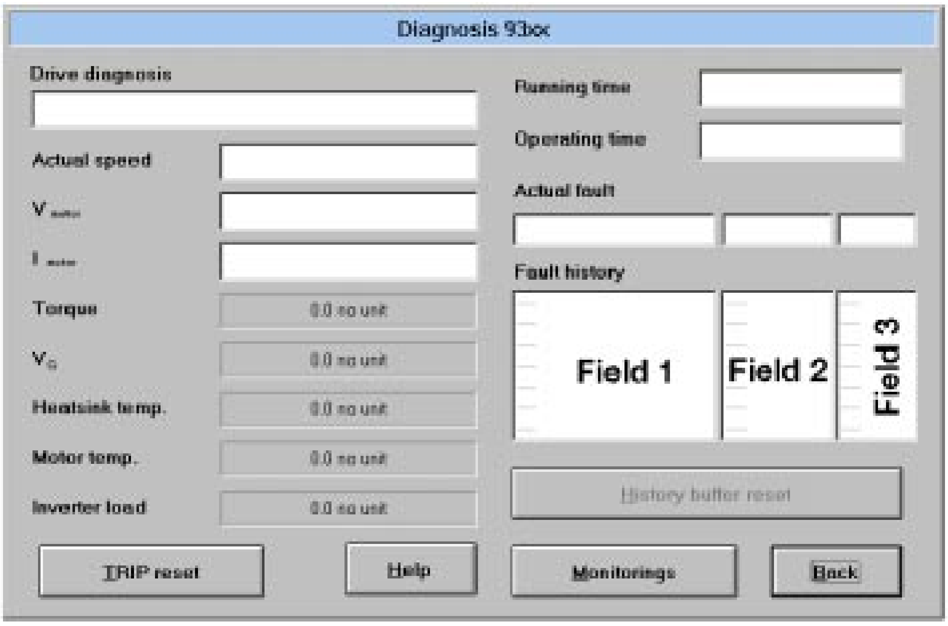
Display	Controller status	Check
RDY	Controller ready for operation, controller can be inhibited	C0183, C0168/1
IMP	Pulses at the power stage inhibited	C0183, C0168/1
I_{max}	Max. current reached	
M_{max}	Max. torque reached	
Fail	Fault through TRIP, message, fail-QSP or warning	C0183, C0168/1

Display via the LECOM status word C0150

Bit	Meaning	
0	FREE 0	freely linkable
1	IMP (pulse inhibit)	0 = enable pulses for power stage 1 = inhibit pulses for power stage
2	FREE 2	freely linkable
3	FREE 3	freely linkable
4	FREE 4	freely linkable
5	FREE 5	freely linkable
6	f_d = 0 (act. speed = 0)	0 = n <> 0 1 = n = 0
7	Ctrl. inhibit (controller inhibit)	0 = no controller inhibit 1 = controller inhibit
8-11	Controller status	0 = controller initialization 1 = switch-on inhibited 3 = operation inhibited (controller inhibit) 6 = operation enabled 7 = message active 8 = fault active 9 = power off A = fail-QSP
12	Warning	0 = no warning 1 = warning
13	Message	0 = no message 1 = message
14	FREE 14	freely linkable
15	FREE 15	freely linkable

8.2 Fault analysis with the history buffer

- The history buffer is used to trace faults.
- Fault messages are stored in the history buffer in the order of their occurrence.
- Open the "Dialog Diagnosis" menu in the parameter menu by a double click.



Torque 0.0 no unit

V_G 0.0 no unit

Heatsink temp. 0.0 no unit

Motor temp. 0.0 no unit

Inverter load 0.0 no unit

Abb. 8-2 Dialog box "Diagnostics 9300"

8.2.1 Structure of the history buffer

- The history buffer provides 8 memory locations. The fields under "fault history" show the memory locations 2 to 7.
- The fields under "Actual fault" show memory location 1. It contains information on the active fault.
  - The first memory location is written only after the elimination or acknowledgement of the active fault. This entry eliminates the last fault from the history buffer so that it can no longer be read.
- The history buffer provides three information units for every fault occurred. The fields under "Actual fault" and "Fault history" have the following meaning:
  - **Field 1:** Fault recognition and reaction
  - **Field 2:** Instant of fault
  - **Field 3:** Frequency of fault

The following table shows the assignment of information and codes.

Codes and information to be retrieved				Memory location
C0168	C0169	C0170	Subcode	
Fault recognition and reaction	Time of the last occurrence	Frequency of the immediately following occurrence	1	Active fault
			2	History buffer location 1
			3	History buffer location 2
			4	History buffer location 3
			5	History buffer location 4
			6	History buffer location 5
			7	History buffer location 6
			8	History buffer location 7

8.2.2 Working with the history buffer

- Open the "Dialog Diagnostics" menu in the parameter menu by a double click.

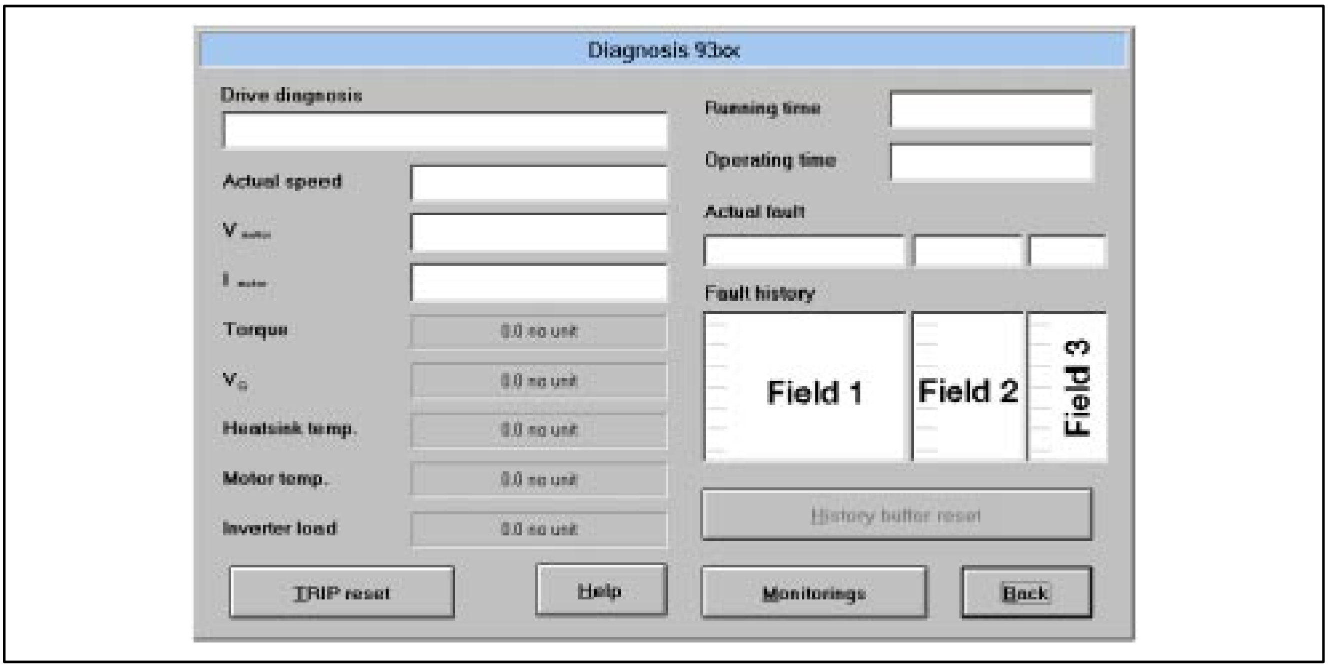


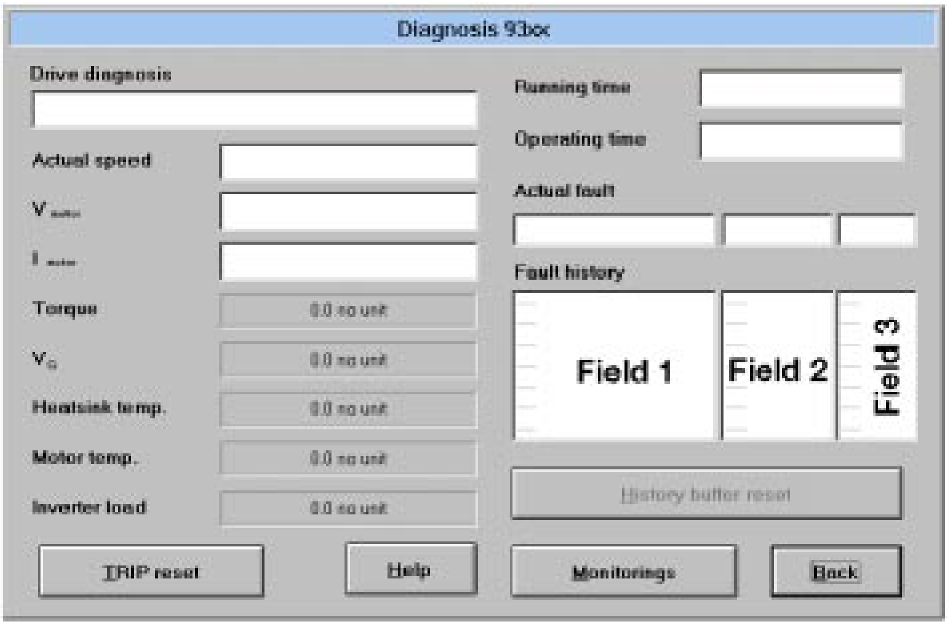
Abb. 8-3 Dialog box "Diagnostics 9300"

Fault recognition and reaction (field 1)

- Contains the fault recognition for every memory location and the reaction to the fault.
  - – e.g. "OH3 TRIP"
  - – With a fieldbus, the faults are indicated by a fault number. (🕮 8-6, column 2)

Please note:

- For faults occuring at the same time with different reactions:
  - – Only the fault of which the reaction has highest priority is input in the memory (priority = TRIP → message → FAIL-QSP → warning).
- For faults occuring at the same time and with the same reaction (e.g. 2 messages):
  - – Only the fault which occurred first is entered.



Torque 0.0 no unit

V_G 0.0 no unit

Heatsink temp. 0.0 no unit

Motor temp. 0.0 no unit

Inverter load 0.0 no unit

Abb. 8-4 Dialog box ”Diagnostics 9300”

Time (field 2)

- Contains the times when the faults occurred
  – e.g. ”1234567 s”
  – Reference time is the mains switch-on time (see Abb. 8-4, field top right).

Please note:

- If a fault is immediately followed by another several times, only the time of the last occurrence is stored.

Frequency (field 3)

- Contains the frequency of a fault immediately followed by the same fault. The time of the last occurrence is stored.

Reset fault

- Click on the ”TRIP reset” button.

Delete history buffer

- This function is possible only when no fault is active.
- Click on the ”fault memory reset” button”.

8.3 Fault messages

Note!

If the fault indication is requested by a fieldbus, the fault indication is represented by a fault number (C0168/x). See column 2 and the footnote at the end of this table.

Display	Fault No.2)	Fault	Cause	Remedy
---	---	No fault	-	-
CCr	71	System fault	Strong interference on control cables	Screen the control cables
			Ground or earth loops in the wiring	PE wiring. 📖 4-34
CDE	220	Data error	Attempt to accept faulty data	New data transfer
	2221	Data error warning	The check sum of the transferred data is not correct.	New data transfer and check
CE0	61	Communication error	Interference during transmission of control commands via automation interface X1	Plug in automation module firmly, bolt down, if necessary
CE1	62	Communication error at the process data input object CAN_IN_1	CAN_IN_1 object receives faulty data or communication is interrupted	• Check cable at X4 • Check transmitter • Increase monitoring time under C0357/1 if necessary
CE2	63	Communication error at the process data input object CAN_IN_2	CAN_IN_2 object receives faulty data or communication is interrupted	• Check cable at X4 • Check transmitter • Increase monitoring time under C0357/2 if necessary
CE3	64	Communication error at the process data input object CAN_IN_3	CAN_IN_3 object receives faulty data or communication is interrupted	• Check cable at X4 • Check transmitter • Increase monitoring time under C0357/3 if necessary
CE4	65	BUS-OFF state	Controller has received too many incorrect telegrams by system bus X4 and has disconnected from the bus	• Check wiring • Check bus terminator (if any) • Check screen contact of the cables • Check PE connection • Check bus load: • Reduce baud rate (observe cable length)
EEr	91	External fault (TRIP-Set)	A digital input assigned to the TRIP-Set function has been activated	Check external encoder
H05	105	Internal fault		Contact Lenze
H07	107	Incorrect power stage	During initialization of the controller, an incorrect power stage was detected	Contact Lenze
H10	110	Sensor fault heat sink temperature	Sensor of the heat sink temperature detection indicates undefined values	Contact Lenze
H11	111	Sensor fault indoor temperature	Sensor of indoor temperature detection indicates undefined values	Contact Lenze
LP1	32	Motor phase failure	A current-carrying motor phase has failed	• Check motor • Check supply cables
			The current limit is set too low	Set a higher current limit under C0599
			This monitoring is not suitable for: • Synchronous servo motors • Field frequencies > 480 Hz	Deactivate monitoring with C0597= 3
LU	30	Undervoltage	DC bus voltage is smaller than the value fixed under C0173	• Check mains voltage • Check supply cable
r_{MAX}	200	Max. speed exceeded (C0596)	Active load (e.g. for hoists) too high Drive is not speed-controlled, torque excessively limited.	Check drive dimensioning. Increase torque limit if necessary.

Display	**Fault No.**[2]	**Fault**	**Cause**	**Remedy**
OC1	11	Short-circuit	Short-circuit	Find out cause of short-circuit; check cable.
			Excessive capacitive charging current of the motor cable.	Use motor cable which is shorter or of lower capacitance.
OC2	12	Earth fault	One of the motor phases has earth contact.	● Check motor ● Check supply cables
			Excessive capacitive charging current of the motor cable.	Use motor cable which is shorter or of lower capacitance.
OC5	15	I x t overload	Frequent and too long acceleration with overcurrent Continuous overload with $I_{motor} > 1.05 \times I_{rx.}$	Check drive dimensioning.
OH	50	Heat sink temperature is higher than the value set in the controller	Ambient temperature $T_{amb} > 40$ °C or 50 °C.	● Allow controller to cool and ensure better ventilation. ● Check ambient temperature in the control cabinet.
			Heat sink very dirty.	Clean heat sink
			Incorrect mounting position.	Change mounting position.
OH3 [1]	53	Heat sink temperature is higher than the value set in the controller	Motor too hot because of excessive current or frequent and too long acceleration	Check drive dimensioning.
			No PTC connected.	Connect PTC or switch-off monitoring (C0583=3).
OH4	54	Heat sink temperature is higher than the value set under C0122.	Ambient temperature $T_{amb} > 40$ °C or 50 °C.	● Allow controller to cool and ensure better ventilation. ● Check ambient temperature in the control cabinet.
			Heat sink very dirty.	Clean heat sink
			Incorrect mounting position.	Change mounting position.
			Value set under C0122 was too low.	Enter higher value.
OH7 [1]	57	Motor temperature is higher than the value set under C0121.	Motor too hot because of excessive current or frequent and too long acceleration	Check drive dimensioning.
			No PTC connected.	Connect PTC or switch-off monitoring (C0584=3).
			Value set under C0121 was too low.	Enter higher value.
OH8	58	PTC at terminals T1, T2 indicates motor overheat.	Motor too hot because of excessive current or frequent and too long acceleration	Check drive dimensioning.
			Terminals T1, T2 are not assigned.	Connect PTC or thermostat or switch off monitoring (C0585=3).
OU	20	Overvoltage	Excessive brake energy (DC bus voltage higher than set under C0173).	Use brake module or regenerative power supply module.
P01	151	Limit switch negative	Negative limit switch was reached.	● Control drive in positive direction. ● Check terminal connection X5/E2.
P02	152	Positive limit switch	Positive limit switch was reached.	● Control drive in negative direction. ● Check terminal connection X5/E1.
P03	153	Contouring error	Phase difference between set and actual position is larger than the contouring error limit set under C0255.	● Extend contouring error limit under C0255 ● Switch off the monitoring if necessary (C0589 = 3).
			Drive cannot follow the digital frequency (I_{max} limit).	Check drive dimensioning.
P04	154	Negative position limit	Negative position limit (C1224) was not reached.	Find out why the value was not reached (e.g. "incorrect" position targets, set function position value) and adjust the negative position limit (C1224) if necessary.
P05	155	Positive position limit	Positive position limit (C1223) was exceeded.	Find out why the value was exceeded (e.g. "incorrect" position targets, set function position value) and adjust the positive position limit (C1223) if necessary.
P06	156	No reference	The homing point is unknown. For absolute positioning no homing was performed before the first positioning.	Perform one of the following functions and restart: ● Manual homing. ● Start homing in the program. ● Set reference.

Display	Fault No.2)	Fault	Cause	Remedy
P07	157	PS absolute mode instead of relative mode.	An absolute PS (C1311) was performed during relative positioning (position mode C1210).	Perform one of the following functions and restart: ● Change from absolute PS to relative PS. ● Change position mode.
P08	158	Actual offset out of range.	Actual home offset (C1226) out of position limits. Fault of the program function "Set position value".	Adjust position limits if necessary, or check whether program function "Set position value" is to be applied.
P09	159	Impermissible programming	Impermissible programming	Check position program: ● After a PS with final speed a PS with positioning has to follow; waiting for input is not permissible.
P12	162	Encoder range	The range of the absolute encoder was exceeded.	● Return drive by manual positioning. ● Check position limits and adjustment of the encoder. ● The absolute encoder has to be dimensioned and mounted such that its range is not exceeded over the complete positioning range.
P13	163	Phase overflow	● Phase controller limit reached ● Drive cannot follow the digital frequency (I_{max} limit).	● Enable drive ● Check drive dimensioning
P14	164	1st contouring error	The drive cannot follow the setpoint. Contouring error is higher than limit value in C1218/1.	● Increase current limit C0022 (observe max. motor current). ● Reduce acceleration. ● Check drive dimensioning. ● Increase limit value under C1218.
P15	165	2nd contouring error.	The drive cannot follow the setpoint. Contouring error is higher than limit value in C1218/2.	● Increase current limit C0022 (observe max. motor current). ● Reduce acceleration. ● Check drive dimensioning. ● Increase limit value under C1218.
P16	166	Transmission error of a synch telegram on the system bus.	Sync telegram from master (PLC) is out of time pattern.*	Set C1121 (Sync cycle) to the transmission cycle of the master (PLC).
			Sync telegram of master (PLC) is not received.*	● Check communication channel. ● Check baud rate, controller address.
			Controller enable (RFR) too soon.	Enable controller with delay. The required delay depends on the time between the synch telegrams.
			* C0362 indicates the time between 2 sync telegrams (C0362 = 0, communication interrupted).	
P17	167	TP control error	Simultaneous use of the TP input by different function blocks (e.g. FB DFSET and POS). A conflict occurs.	Configure another TP input for FB POS (not possible for DFSET) or switch off monitoring under C0580.
P18	168	Internal limitation	Input of extremely high or low machine parameters.	Check machine parameters.
P21	171	Contouring error RC	Phase difference between set and actual position is larger than the contouring error limit set under C1328.	Extend contouring error limit with C1328. If necessary, switch-off the monitoring (C1329=3).
			Drive cannot follow the digital frequency (I_{max} limit).	Check drive selection.
PEr	74	Program interference	A fault in the program was detected.	Send controller with data (on diskette) to Lenze.
PI	79	Initializing error	● A fault was detected during transfer of parameter set between the controllers ● Parameter set does not match controller.	Correct parameter set.
PR0 PR1	75 72	Parameter set error	Fault when loading a parameter set. CAUTION: The factory setting loaded automatically.	● Set the required parameters and store them under C0003. ● For PR0 the supply voltage must be switched off additionally.

Display	**Fault No.2)**	**Fault**	**Cause**	**Remedy**
Sd2	82	Resolver fault	Resolver cable interrupted.	● Check the resolver cable for open circuit ● Check resolver ● Or switch off monitoring (C0586 = 3).
Sd3	83	Encoder fault at X9/8	Cable interrupted.	Check cable for open circuit.
			Input X9 PIN 8 not assigned.	Assign input X9 PIN 8 with 5V or switch off monitoring (C0587 = 3).
Sd5	85	Master current source defective	Master current at X6/1 X6/2 < 2mA.	● Check cable for open circuit. ● Check master current source.
Sd6	86	Sensor fault	Encoder of the motor temperature detection at X7 or X8 indicates indefinite values.	Check supply cable for firm connection. Switch off monitoring with C0594 = 3 if necessary.
Sd7	87	Encoder fault	Absolute encoder with RS485 interface does not transmit data.	Check supply cable. Check encoder. Check voltage supply C0421. No Stegmann encoder connected.

1) Temperature detection via resolver or incremental encoder.

2) Displayed value = {fault no.} + 0 ≙ TRIP
= {fault no.} + 1000 ≙ Message
= {fault no.} + 2000 ≙ Warning
= {fault no.} + 2000 ≙ FAIL-QSP

8.4 Reset of fault messages

TRIP

- After eliminating the fault, the pulse inhibit is only reset after acknowledgement of TRIP.
- Acknowledge TRIP by:
  - – Global Drive Control: Click the button ”TRIP reset” in the dialog box ”Diagnostics 9300”. (🕮 8-4, “Working with the history buffer”)
  - – Keypad 9371 BB: Press STOP key. Then press RUN to enable the controller again.
  - – Fieldbus module: Set C0043 = 0
  - – Control word C0135
  - – Terminal X5/E5
  - – Control word AIF
  - – Control word system bus (CAN)

Note!

If a TRIP source is still active, TRIP cannot be reset.

Message

- After eliminating the fault, the pulse inhibit is reset automatically.

Warning!

After eliminating the fault, the drive starts automatically.

FAIL-QSP

- After eliminating the fault, the pulse inhibit is only reset after acknowledgement of TRIP.
- Acknowledge TRIP by:
  - – Global Drive Control: Click the button ”TRIP reset” in the dialog box ”Diagnostics 9300”. (🕮 8-4, “Working with the history buffer”)
  - – Keypad 9371 BB: Press STOP key. Then press RUN to enable the controller again.
  - – Fieldbus module: Set C0043 = 0
  - – Control word C0135
  - – Terminal X5/E5
  - – Control word AIF
  - – Control word system bus (CAN)

Note!

If a TRIP source is still active, TRIP cannot be reset.

Warning

- After eliminating the fault, the warning is reset automatically.

9 Maintenance

- The controller is free of maintenance if the prescribed conditions of operation are observed. (📖 3-2)
- If the ambient air is polluted, the air vents of the controller may be obstructed. Therefore, check the air vents periodically (depending on the degree of pollution approx. every four weeks):

Free the obstructed air vents using a vacuum cleaner.

STOP

Stop!

Do not use sharp or pointed tools such as knives or screwdrivers to clean the air vents.

Maintenance

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Lenze

Manual
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Application examples

Global Drive
9300 servo inverter

This manual is valid for the 93XX controllers of the versions

33.932X- ES 2x. 2x (9321 - 9329)
33.933X- ES 2x. 2x (9330 - 9332)
33.932X- CS 2x. 2x -V003 Cold Plate (9321 - 9328)

Controller type

Design:
Ex = Enclosure IP20
Cx = Cold Plate
xK = Cam profiler
xP = Servo position controller
xR = Register controller
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14 Selection help

See folder “Planning”

15 Application examples

15.1 Speed control

The most important settings (short setup)

Tip!

The following codes are contained in the menu: ”Short Setup / Speed mode” of the operating module or Global Drive Control or LEMOC 2.

Input motor type (contains all nameplate data of the motor)

C0173	xxx	Enter UG limit (mains voltage)
C0086	xxx	Enter LENZE motor type

Enter maximum motor current

C0022	xxxA	Determine Imax

Enter controller configuration

C0005	1000	Select speed control
C0025	xxx	Enter feedback system

Speed setpoint settings

C0011	xxx rpm	Determine max. speed
C0012	xxx s	Set acceleration time
C0013	xxx s	Set deceleration time
C0105	xxx s	Set QSP deceleration time

Application parameters

C0070	xxx	Vp n controller
C0071	xxx	Tn n-controller

Save parameters

C0003	xxx	Save all parameters

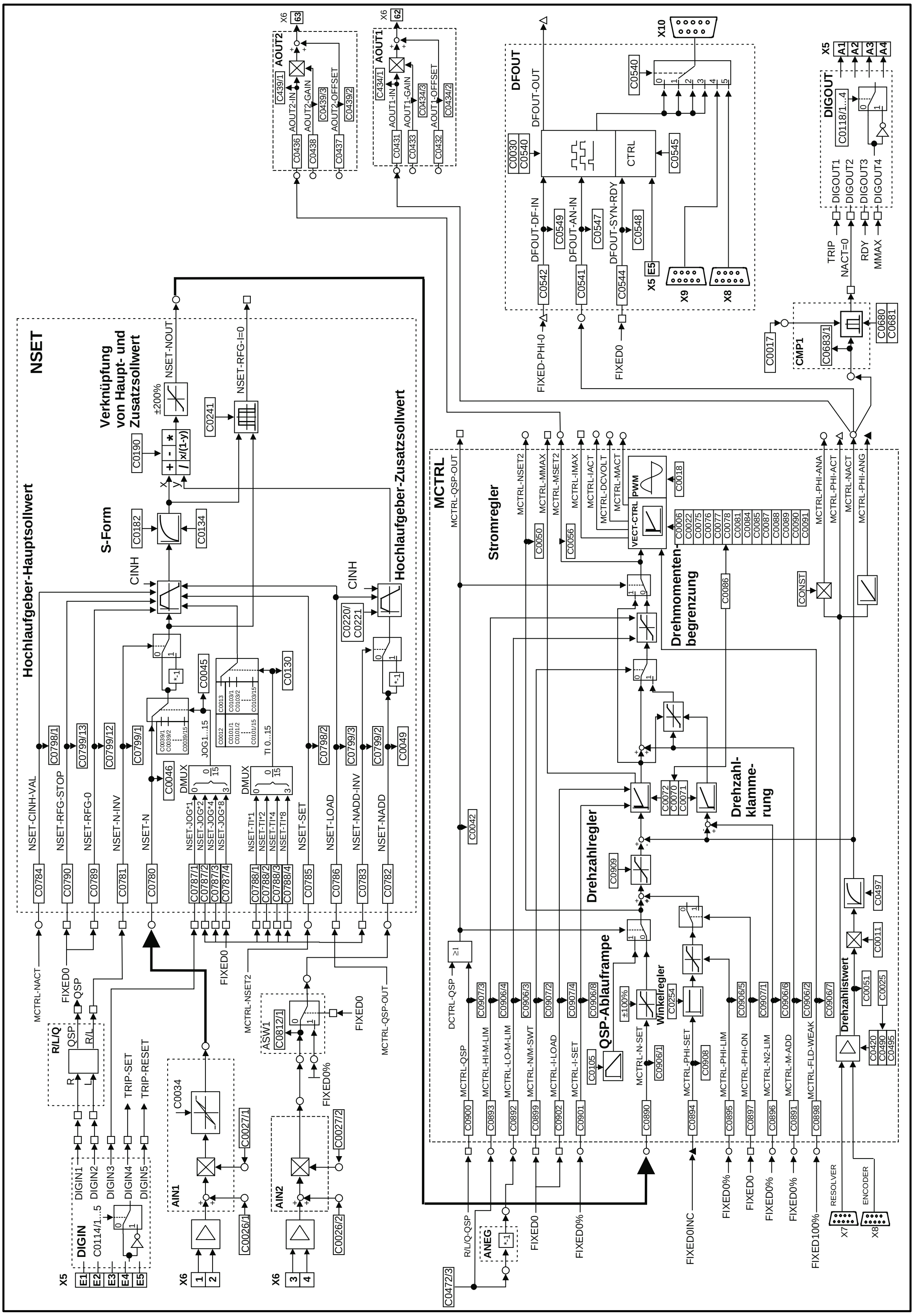


Abb. 15-1   Signal flow chart of configuration 1000

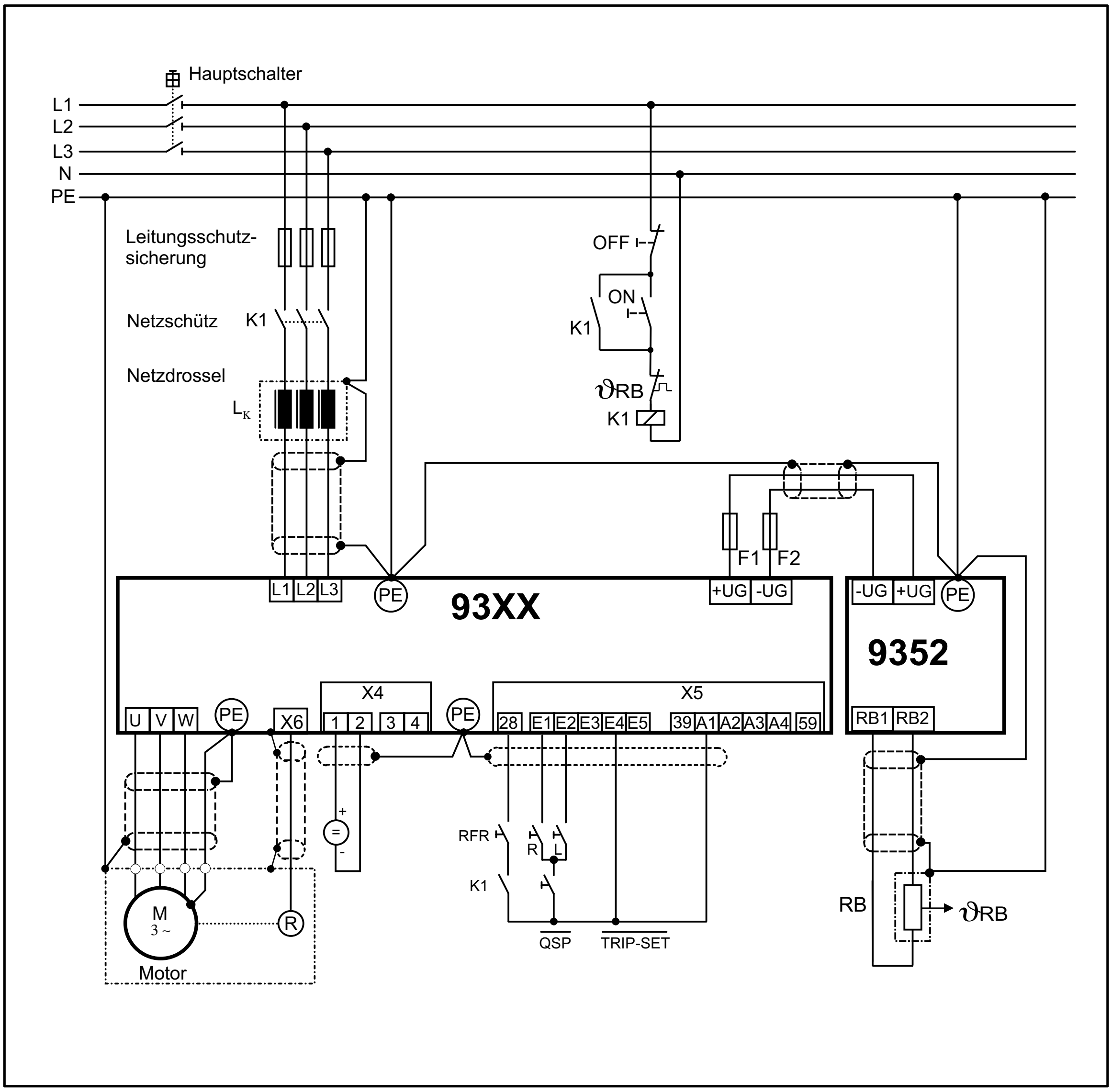


Abb. 15-2 Connection diagram of configuration 1000

Tip!

A brake unit is required only if the DC bus voltage of the 93XX servo inverter in the generator mode exceeds the upper switch-off threshold set under C0173 (activation of the OU monitoring function).The brake unit avoids the activation of ”OU” by converting the kinetic energy of the machine into heat and thus keeps the DC bus voltage below the upper switch-off threshold.

15.2 Torque control with speed limitation

The most important settings (short setup)

Tip!

The following codes are contained in the menu: "Short Setup / Torque mode" of the operating module or Global Drive Control or LEMOC 2.

Input motor type (contains all nameplate data of the motor)

C0173	xxx	Enter UG limit (mains voltage)
C0086	xxx	Enter LENZE motor type

Enter maximum motor current

C0022	xxxA	Determine Imax

Enter controller configuration

C0005	4000	Select torque control
C0025	xxx	Enter feedback system

Speed setpoint settings

C0011	xxx rpm	Determine max. speed
C0105	xxx s	Set QSP deceleration time

Speed limitation

C0472/4	xxx % nmax	Determine lower speed limit

Application parameters

C0070	xxx	Vp n controller
C0071	xxx	Tn n-controller

Save parameters

C0003	xxx	Save all parameters

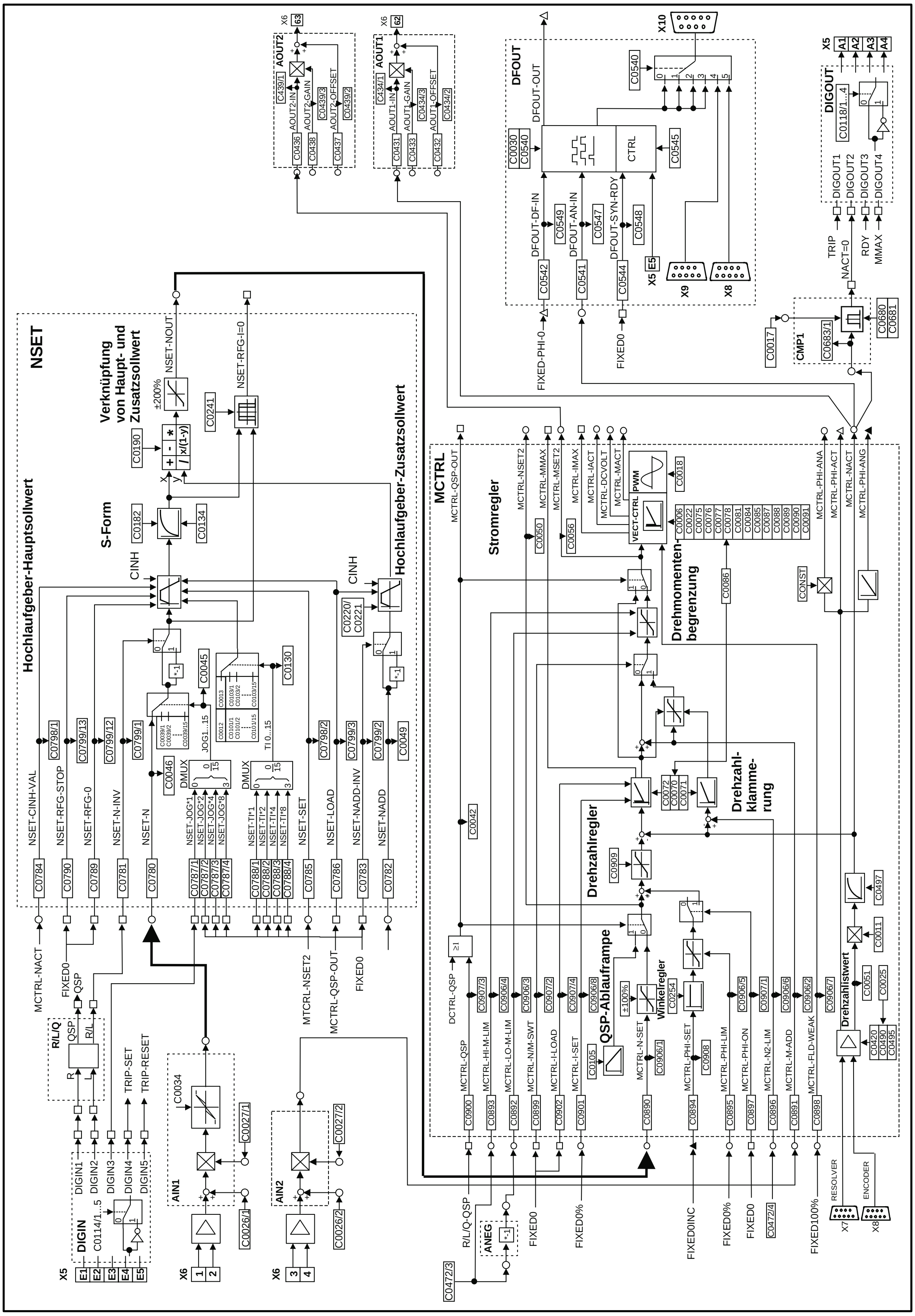


Abb. 15-3 Signal flow chart of configuration 4000

15.3 Digital frequency - master

The most important settings (short setup)

Tip!

The following codes are contained in the menu: "Short Setup / DF master" of the operating module or Global Drive Control or LEMOC 2.

Input motor type (contains all nameplate data of the motor)

C0173	xxx	Enter UG limit (mains voltage)
C0086	xxx	Enter LENZE motor type

Enter maximum motor current

C0022	xxxA	Determine Imax

Enter controller configuration

C0005	5000	Digital frequency - master in general
	5900	with emergency stop for the drive network for QSP
C0025	xxx	Enter feedback system

Speed setpoint settings

C0011	xxx rpm	Determine max. speed
C0012	xxx s	Set acceleration time
C0013	xxx s	Set deceleration time
C0105	xxx s	Set QSP deceleration time for C0005 = 5000
C0672	xxx s	Set QSP deceleration time for C0005 = 59xx
C0032	xxx	Gearbox factor numerator
C0033	xxx	Gearbox factor denominator
C0473/1	xxx	Numerator of the stretch factor
C0533	xxx	Denominator of the stretch factor

Application parameters

C0070	xxx	Vp n controller
C0071	xxx	Tn n-controller
C0254	xxx	Gain of the phase controller

Save parameters

C0003	xxx	Save all parameters

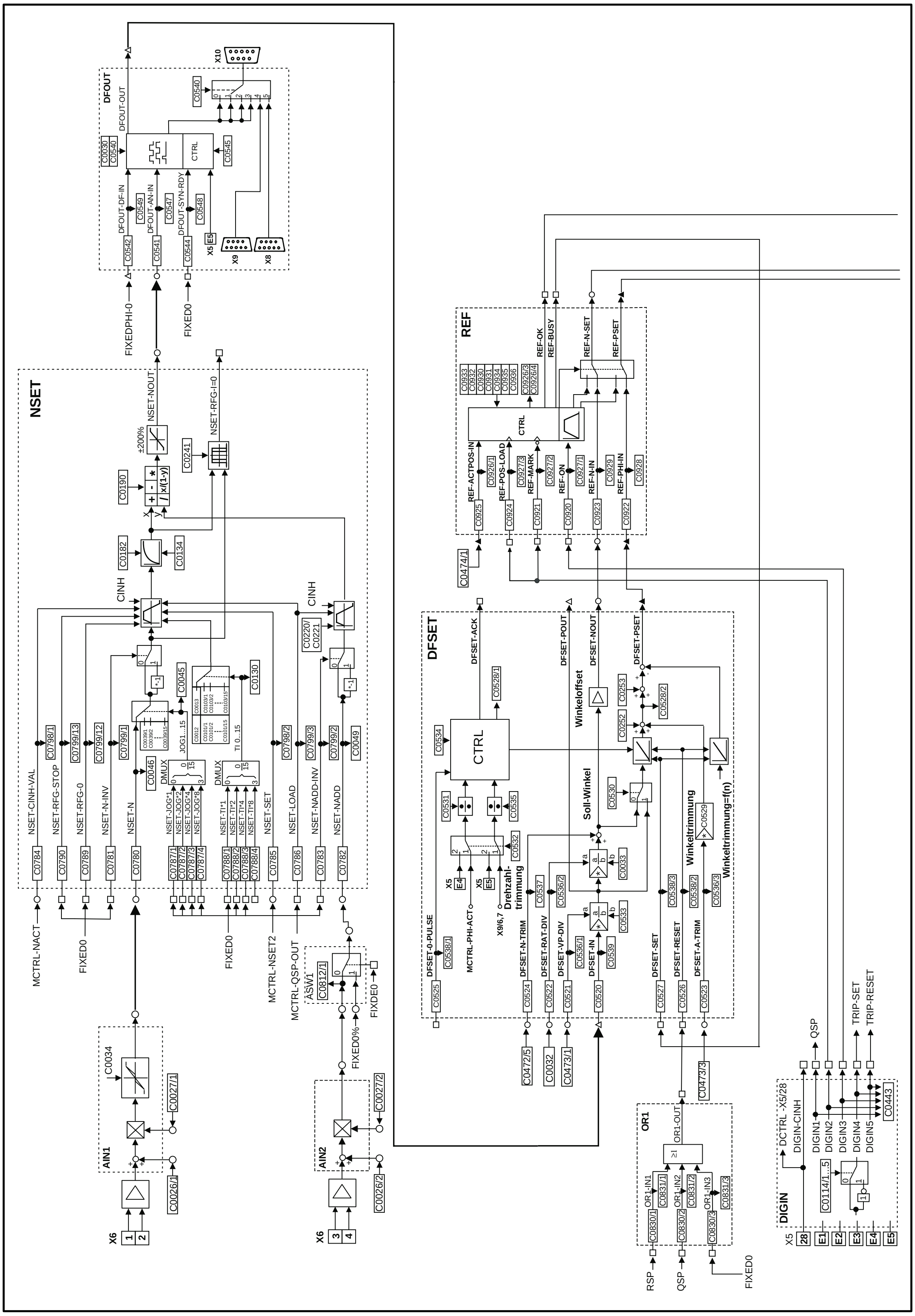
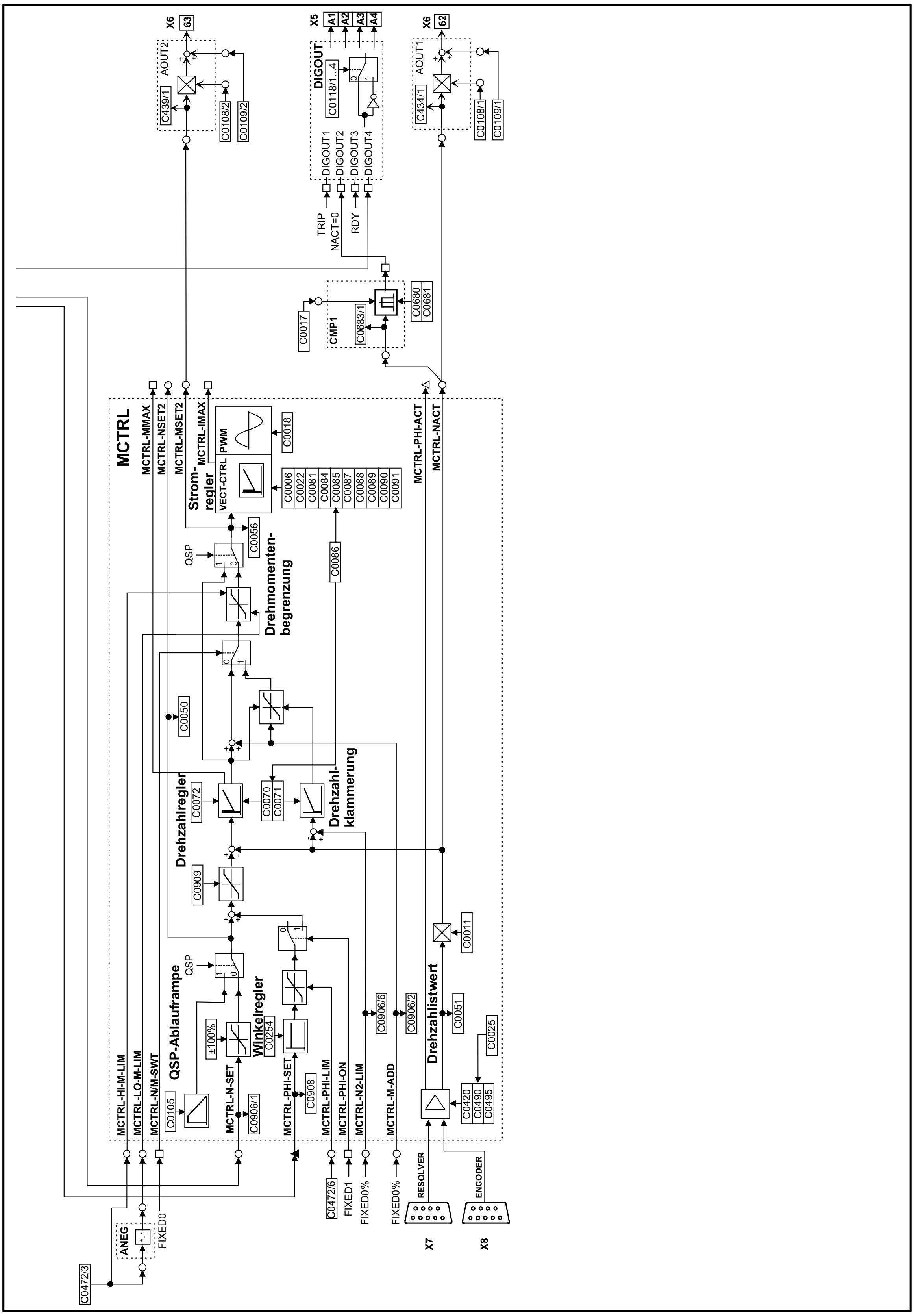


Abb. 15-4 Signal flow chart of configuration 5000


MCTRL
MCTRL-MMAX
MCTRL-NSET2
MCTRL-MSET2
MCTRL-IMAX
Strom-regler
VECT-CTRL
PWM
C0018
C0006
C0022
C0081
C0084
C0085
C0087
C0088
C0089
C0090
C0091
C0056
QSP
C0086
Drehmomenten-begrenzung
C0050
Drehzahlregler
C0072
C0070
C0071
Drehzahl-klammerung
C0909
QSP-Ablauframpe
QSP
±100%
Winkelregler
C0254
C0105
MCTRL-HI-M-LIM
MCTRL-LO-M-LIM
MCTRL-N/M-SWT
MCTRL-N-SET
C0906/1
MCTRL-PHI-SET
C0908
MCTRL-PHI-LIM
MCTRL-PHI-ON
MCTRL-N2-LIM
MCTRL-M-ADD
C0906/6
C0906/2
Drehzahlistwert
C0051
C0011
C0025
C0420
C0490
C0495
MCTRL-PHI-ACT
MCTRL-NACT
C0472/6
FIXED1
FIXED0%
FIXED0%
RESOLVER
ENCODER
X7
X8
ANEG
-1
FIXED0
C0472/3
CMP1
C0017
C0683/1
C0680
C0681
TRIP
NACT=0
RDY
DIGOUT1
DIGOUT2
DIGOUT3
DIGOUT4
DIGOUT
C0118/1...4
X5
A1
A2
A3
A4
AOUT2
C439/1
C0108/2
C0109/2
X6
63
AOUT1
C434/1
C0108/1
C0109/1
X6
62

15.4 Digital frequency bus - slave

The most important settings (short setup)

Tip!

The following codes are contained in the menu: "Short Setup / DF slave bus" of the operating module or Global Drive Control or LEMOC 2.

Input motor type (contains all nameplate data of the motor)

C0173	xxx	Enter UG limit (mains voltage)
C0086	xxx	Enter LENZE motor type

Enter maximum motor current

C0022	xxxA	Determine Imax

Enter controller configuration

C0005	6000	Select digital frequency bus - slave
C0025	xxx	Enter feedback system

Speed setpoint settings

C0011	xxx rpm	Determine max. speed
C0032	xxx	Gearbox factor numerator
C0033	xxx	Gearbox factor denominator
C0425	xxx	Adapt encoder constant to the master

Application parameters

C0070	xxx	Vp n controller
C0071	xxx	Tn n-controller
C0254	xxx	Gain of the phase controller

Save parameters

C0003	xxx	Save all parameters

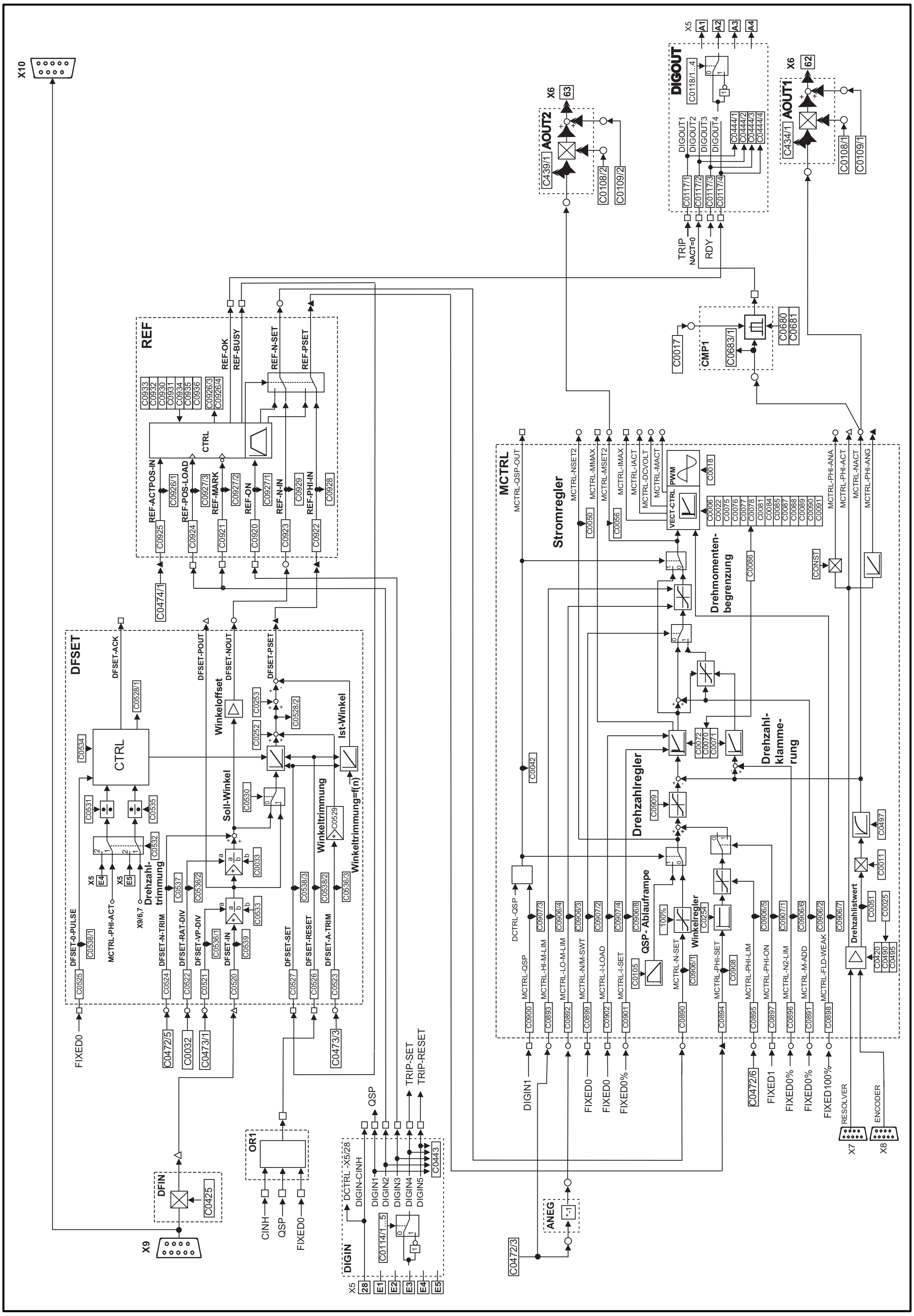


Abb. 15-5 Signal flow chart of configuration 6000

15.5 Digital frequency cascade - slave

The most important settings (short setup)

Tip!

The following codes are contained in the menu: "Short Setup / DF slave cas" of the operating module or Global Drive Control or LEMOC 2.

Input motor type (contains all nameplate data of the motor)

C0173	xxx	Enter UG limit (mains voltage)
C0086	xxx	Enter LENZE motor type

Enter maximum motor current

C0022	xxxA	Determine Imax

Enter controller configuration

C0005	7000	Select digital frequency cascade - slave

Speed setpoint settings

C0011	xxx rpm	Determine max. speed
C0032	xxx	Gearbox factor numerator
C0033	xxx	Gearbox factor denominator
C0425	xxx	Adapt encoder constant to the master
C0473/1	xxx	Numerator of the stretch factor
C0533	xxx	Denominator of the stretch factor

Application parameters

C0070	xxx	Vp n controller
C0071	xxx	Tn n-controller
C0254	xxx	Gain of the phase controller

Save parameters

C0003	xxx	Save all parameters

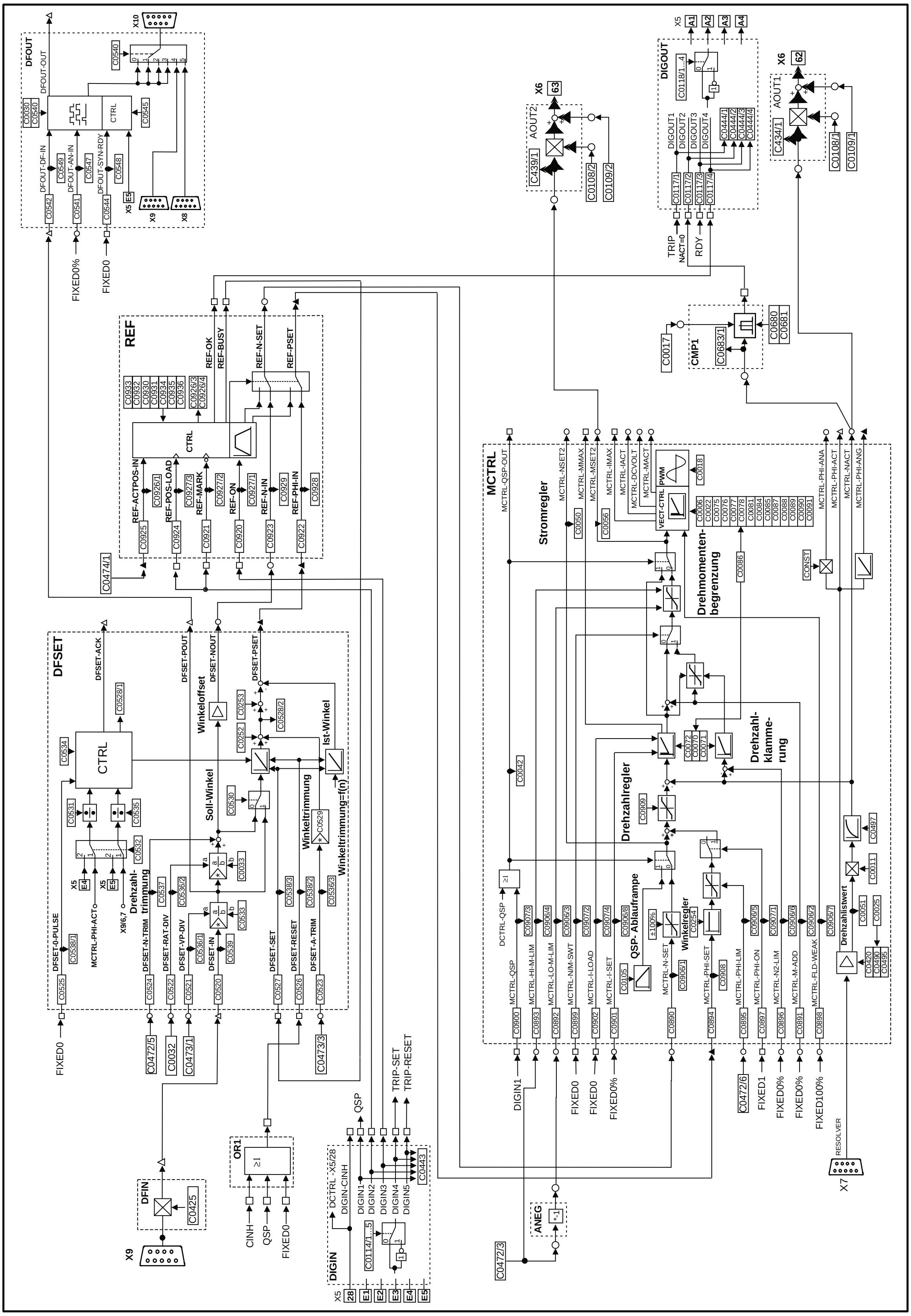


Abb. 15-6   Signal flow chart of configuration 7000

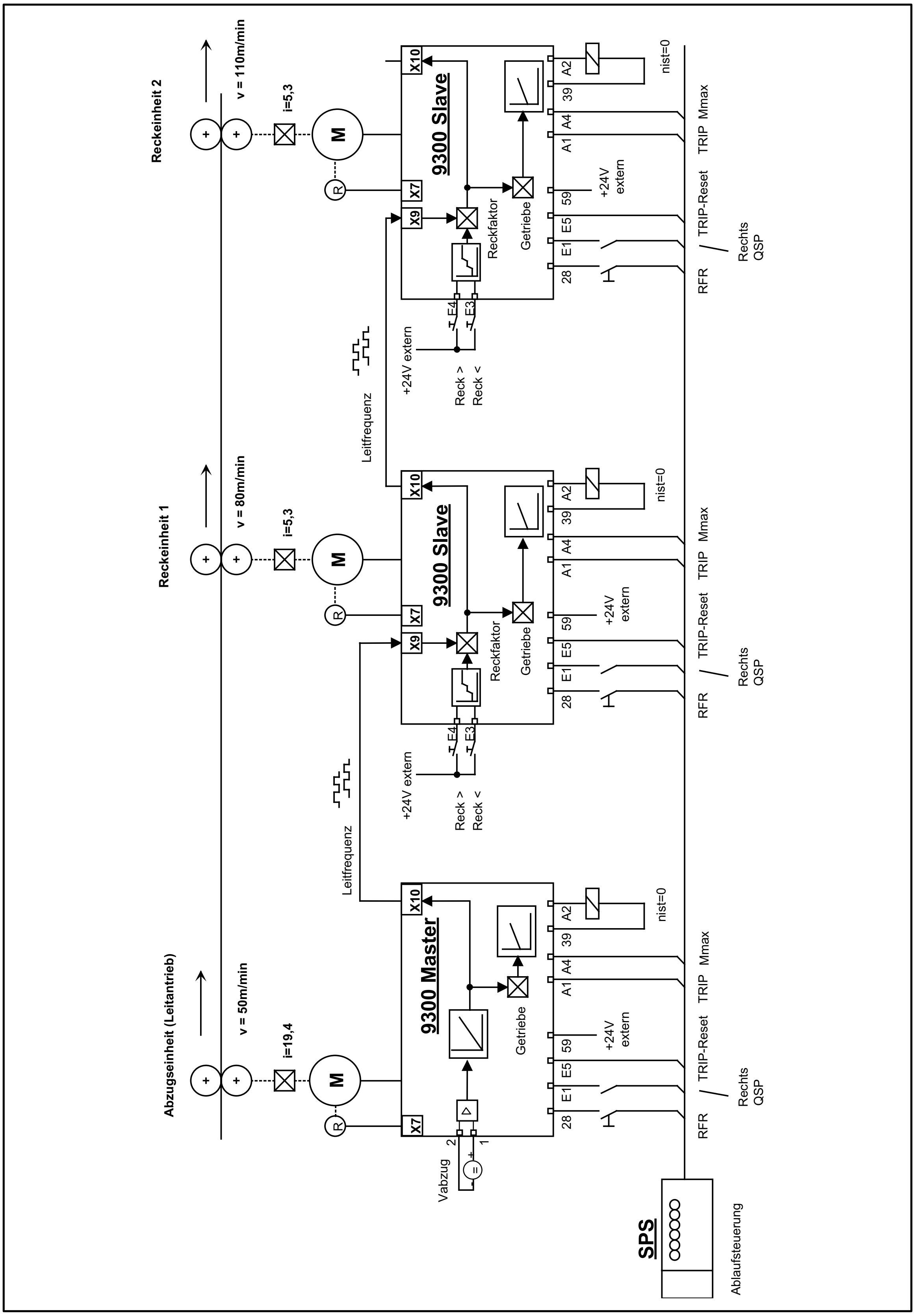


Abb. 15-7 Connection diagram of configuration digital frequency

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Lenze

Manual
Part L

Signal flowcharts

Global Drive
Servo inverters 9300

16 Signal-flow charts

Dear user,

The signal-flow charts of the basic configurations and function blocks are available as Designer® 4.x format.

Please contact the sales office in charge of you.

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Lenze

Manual
Part M

Glossary

Table of keywords

Global Drive
9300 servo inverter

This manual is valid for the 93XX controllers of the versions

33.932X-	ES	2x.	2x		(9321 - 9329)
33.933X-	ES	2x.	2x		(9330 - 9332)
33.932X-	CS	2x.	2x	-V003	Cold Plate (9321 - 9328)

Controller type

Design:
Ex = Enclosure IP20
Cx = Cold Plate
xK = Cam profiler
xP = Servo position controller
xR = Register controller
xS = Servo inverter

Hardware version and index

Software version and index

Variant

Explanation

All indications given in these Operating instructions have been selected carefully and comply with the hardware and software described. Nevertheless, deviations cannot be ruled out. We do not take any responsibility or liability for damages which might possibly occur. Required corrections will be made in the following editions.

Version 1.0 07/99

Part M

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Term	Meaning
AIF	Automation interface (X1)
CAN	Controller Area Network
CE	Communauté Européenne (English: European Community)
Code	For entry and display (access) of parameter values. Variable addressing according to the format ”code/subcode” (Cxxxx/xx). All variables can be addressed via the code digits.
Contouring error	Deviation between momentary position setpoint and actual position. Display for a momentary contouring error under C0908.
Contouring error monitoring	Monitors the momentary contouring error if the contouring error tolerance is exceeded and releases a fault indication, if necessary.
Contouring error tolerance	If the contouring error reaches a defined contouring error tolerance, a fault indication is released.
Ctrl. enable	Controller enable
Ctrl. inhibit	Controller inhibit (= $\overline{\text{Controller enable}}$)
FB	Function block
Fieldbus	For data exchange between higher-level control and positioning control, e.g. INTERBUS or PROFIBUS.
FPDA	Freely programmable digital output
FPDE	Freely programmable digital input
GDC	Global Drive Control (PC program for Lenze controllers - Windows)
INTERBUS	Industrial communication standard to DIN E19258
JOG	JOG speed or input for JOG speed
KTY	“Linear” temperature sensor in the motor winding
LECOM	Lenze Communication
LEMOC2	PC program for Lenze controllers - DOS
LU	Undervoltage
Master	A master is for instance a PLC or PC.
OU	Overvoltage
PC	Personal Computer
PLC	Programmable logic controller
PM	Permanent magnet
Process data	For instance, setpoints and actual value which are to be exchanged as quickly as possible. Usually, this applies to smaller data amounts which are transmitted cyclically. With PORFIBUS these data are transmitted via the logic process data channel.
PROFIBUS	Communication standard DIN 19245, consisting of three parts
PTC	PTC thermistor with defined tripping temperature
QSP	Quick stop
RFG	Ramp function generator
Slave	Bus participant that must wait for the master’s request to send data. Controllers are slaves.
SSC	Sensorless speed control
SSI	Synchronous serial interface
Target position	The target which is to be approached by means of a defined traversing profile.
TKO	Thermal contact / normally closed contact

Glossary

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