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EDS9300U-K
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Lenze

Manual

Global Drive

9300 cam profiler

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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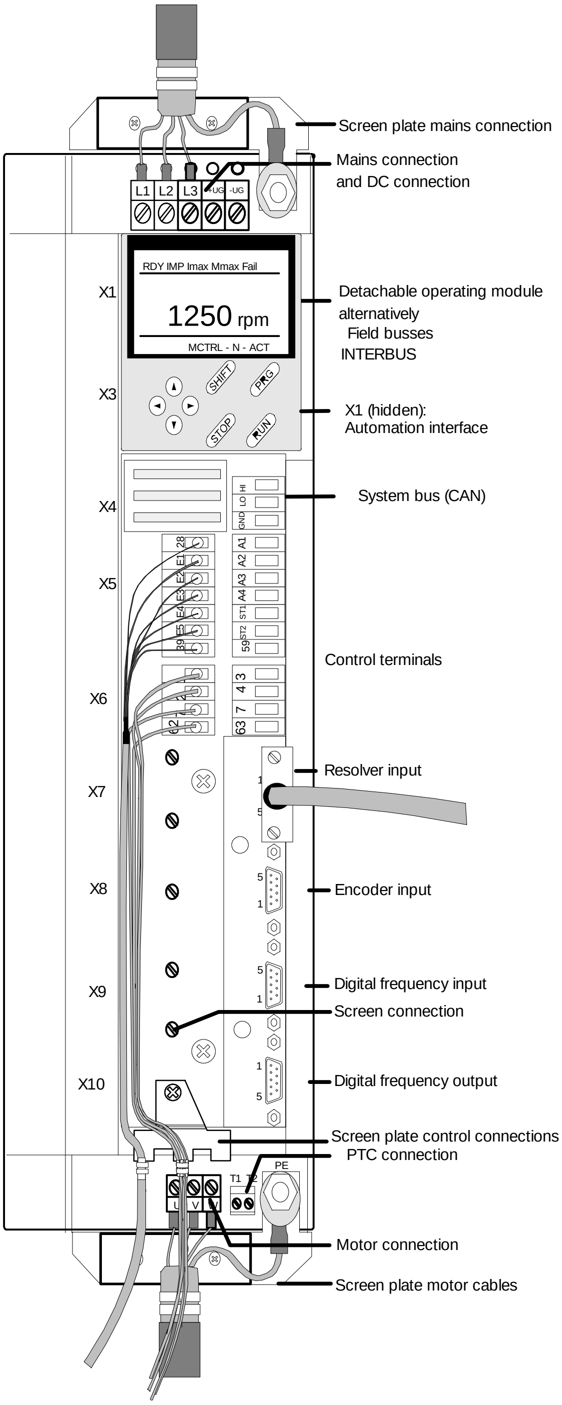

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Lenze

Manual
Part A

Table of contents

Preface and general information

Global Drive

9300 cam profiler

This documentation is only valid for 9300 cam profilers as of version:

33.932X	EK	2x	1x		(9321 - 9329)
33.933X	EK	2x	1x		(9330 - 9332)
33.932X	CK	2x	1x	- V003	Cold Plate (9321 - 9328)

Type

Desgin:
Ex = Built-in unit IP20
Cx = Cold Plate
xK = Cam profiler
xP = Positioning controller
xR = Register controller
xS = Servo inverter

Hardware level and index

Software level and index

Variant

Explanation

Version 2.0 03/99

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1 Preface and general information

1.1 How to use this Manual

- This Manual supplements the Operating Instructions of the cam profiler.
- It contains the Operating Instructions, which were valid when the Manual was printed, and additional information on planning, functionality and accessories.
  – In case of doubt, the Operating Instructions attached to the 93XX cam profiler is valid.
- The Manual assists you in selecting and dimensioning the 93XX cam profiler 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 cam profiler (types 9321 ... 9332)
Controller	93XX cam profiler
Drive system	Drive system with 93XX cam profiler and other Lenze drive components

1.2 Packing list

Packing list	Important
• 1 93XX cam profiler • 1 book of Operating Instructions • 1 accessory kit (parts for mechanical and electrical installation)	After receipt of the delivery, check immediately whether the items delivered match 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 cam profiler
● must only be operated under the conditions prescribed in these 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
– for assembly 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 cam profiler
● 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 faults
– 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">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. Funk) 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.

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

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

2 Safety information

2.1 See Operating Instructions

Safety information

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Manual
Part B

Technical data

Installation

Global Drive
9300 cam profiler

This documentation is only valid for 9300 cam profilers as of version:

33.932X	EK	2x	1x		(9321 - 9329)
33.933X	EK	2x	1x		(9330 - 9332)
33.932X	CK	2x	1x	- V003	Cold Plate (9321 - 9328)

Type

Desgin:
Ex = Built-in unit IP20
Cx = Cold Plate
xK = Cam profiler
xP = Positioning controller
xR = Register controller
xS = Servo inverter

Hardware level and index

Software level and index

Variant

Explanation

Version 2.0 03/99

Contents

Part B

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3 Technical data

3.1 Features

- Several profiles can be stored
- Cam switch function
- Stretching/compression/offset in X and Y direction
- Virtual master
- Clutch replacement / overload clutch
- Welding bar control
- Integrated oscilloscope function
- 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
  - Cooling is possible outside the control cabinet (push-through technique or ”cold plate technique”)
- Direct connection of resolver or encoder feedback
  - Easy connection because of prefabricated system cables (accessories)
  - Connecting cables can be plugged
- Integrated angular controller for driftfree standstill
- Digital synchronization system via digital frequency
  - Setpoint transmission without offset and gain errors
  - Synchronization of speed and rotor position
  - Homing function
- User configuration for control functions and input and output signals
  - Comprehensive function block library
  - High flexibility in the adaptation to the internal control structure of the application
- Integrated automation interface
  - Easy extension of the controller functionality
- 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 ≤ 1000 m amsl without power derating 1000 m amsl < h ≤ 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** **Severitye** 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-EK**	**EVS9322-EK**	**EVS9323-EK**	**EVS9324-EK**	**EVS9325-EK**
	Order no.	EVS9321-EK	EVS9322-EK	EVS9323-EK	EVS9324-EK	EVS9325-EK
	Type	**EVS9321-CK**	**EVS9322-CK**	**EVS9323-CK**	**EVS9324-CK**	**EVS9325-CK**
	Order no.	EVS9321-CK	EVS9322-CK	EVS9323-CK	EVS9324-CK	EVS9325-CK
Mains voltage	V_r [V]	$320\ V \pm 0\% \leq V_r \leq 528\ V \pm 0\%$; 45 Hz … 65 Hz ± 0%				
Alternative DC supply	V_G [V]	$460\ V \pm 0\% \leq V_{DC} \leq 740\ V \pm 0\%$				
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-EK	EVS9322-EK	EVS9323-EK	EVS9324-EK
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: 🕮 7-245

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-EK**	**EVS9327-EK**	**EVS9328-EK**	**EVS9329-EK**	**EVS9330-EK**	**EVS9331-EK**	**EVS9332-EK**
	Order no.	EVS9326-EK	EVS9327-EK	EVS9328-EK	EVS9329-EK	EVS9330-EK	EVS9331-EK	EVS9332-EK
	Type	**EVS9326-CK**	**EVS9327-CK**	**EVS9328-CK**				
	Order no.	EVS9326-CK	EVS9327-CK	EVS9328-CK				
Mains voltage	V_r [V]	$320\ V \pm 0\% \leq V_r \leq 528\ V \pm 0\%$; 45 Hz ... 65 Hz $\pm 0\%$						
Alternative DC supply	V_G [V]	$460\ V \pm 0\% \leq V_G \leq 740\ V \pm 0\%$						
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

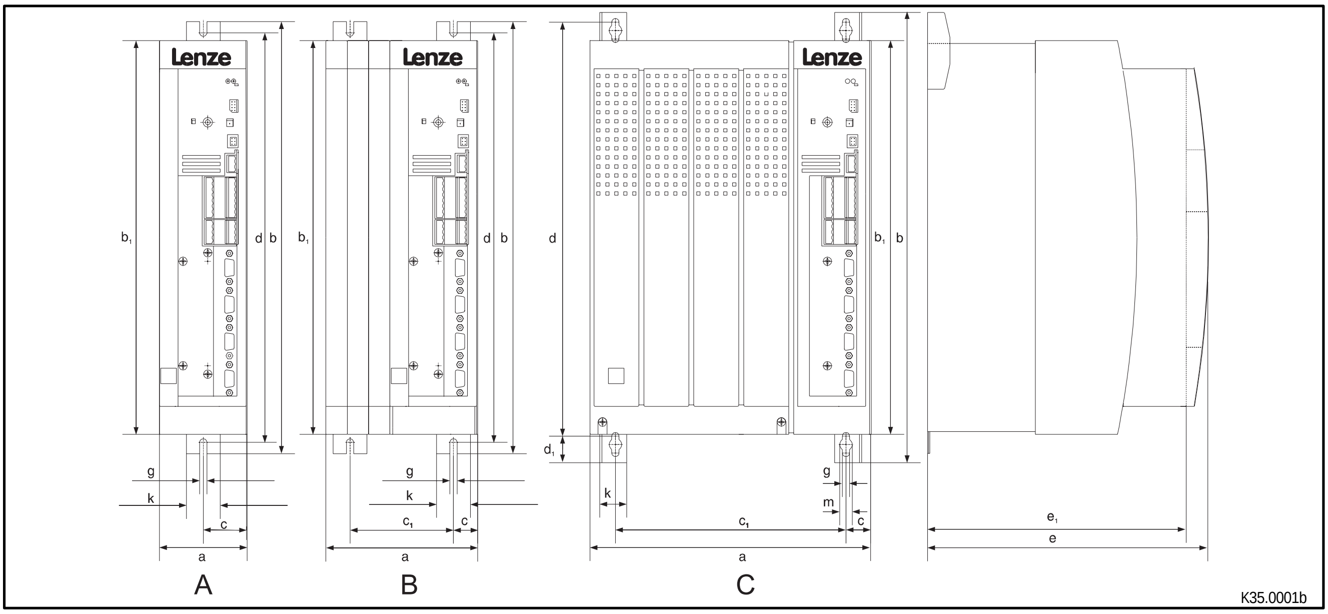


Fig. 4-1 Dimensions for assembly with fixing rails/fixing brackets

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 onto 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 heatsink 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 heatsink (heatsink + blower)
  – approx. 35 % inside the controller.
- The enclosure of the separated heatsink (heatsink + 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 over the heatsink and lay into the slot provided.

Installation

Dimensions for the types 9321 to 9326

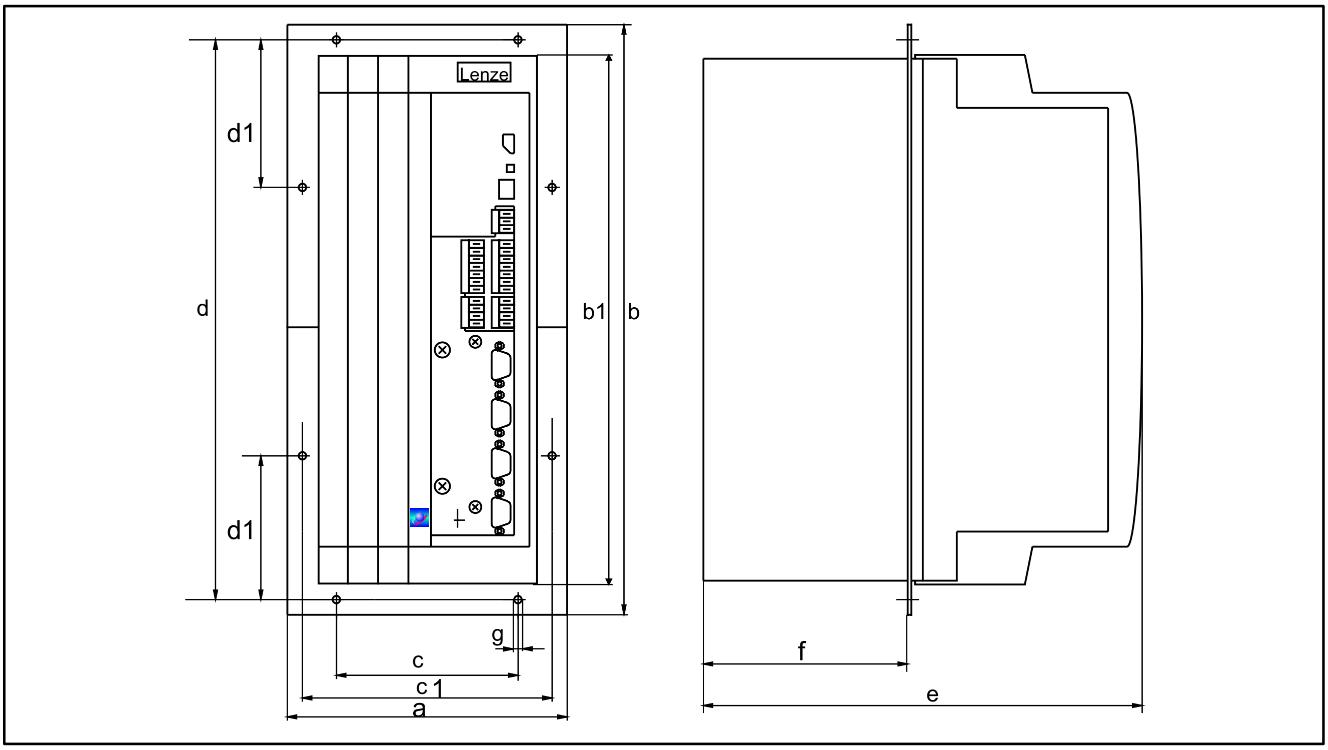


Fig. 4-2 Dimensions for the assembly with thermally separated power stage

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

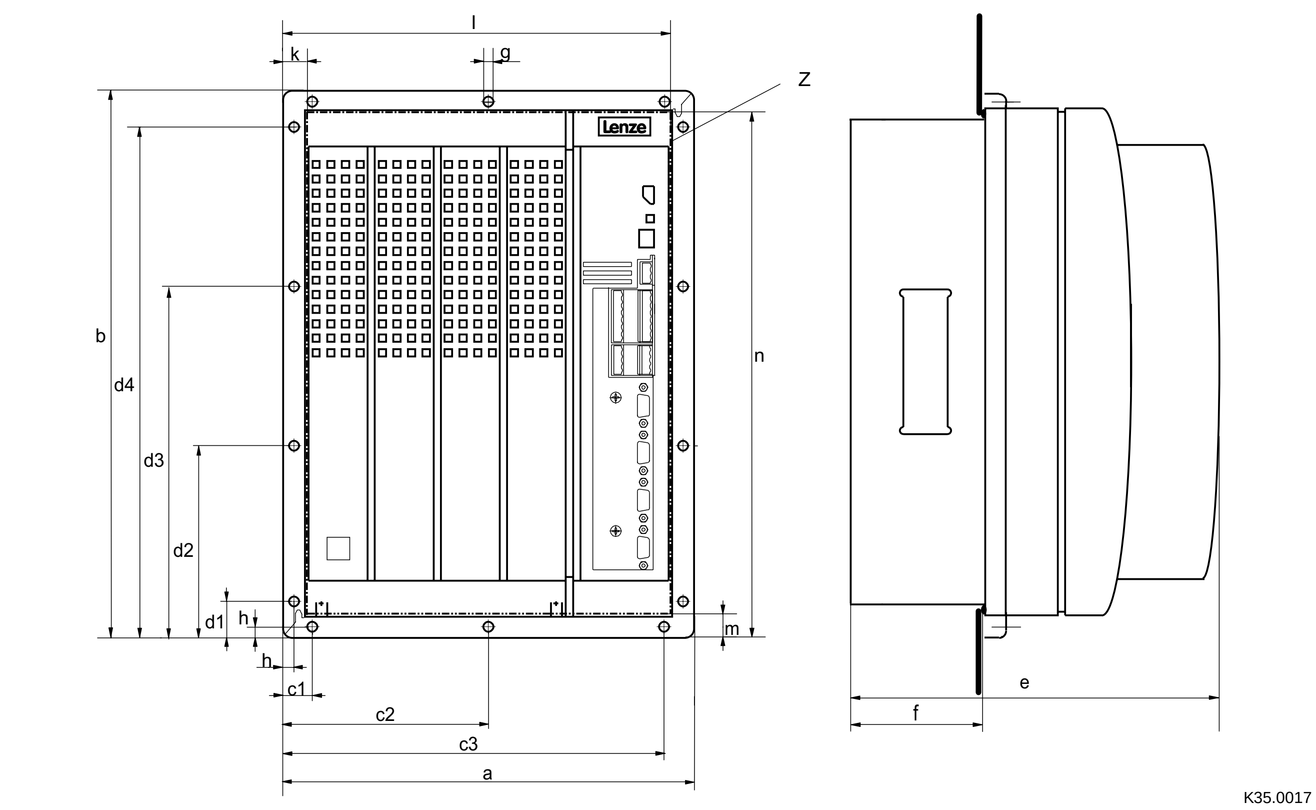


Fig. 4-3 Dimensions for the assembly with thermally separated power stage

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 inks in ”cold plate technique” (x = order designation; more information on the inner cover page).

Dimensions for the types 9321-Cx to 9326-Cx

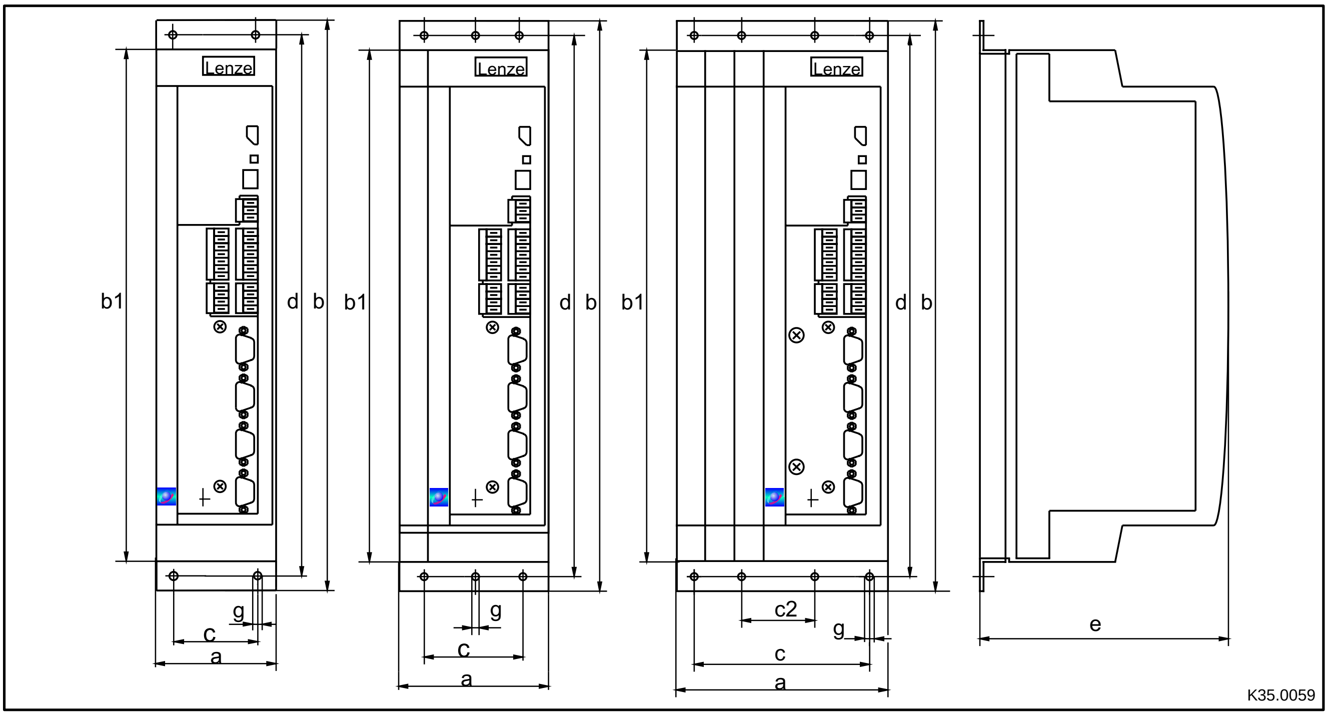


Fig. 4-4 Dimensions for the assembly in ”cold plate technique”

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

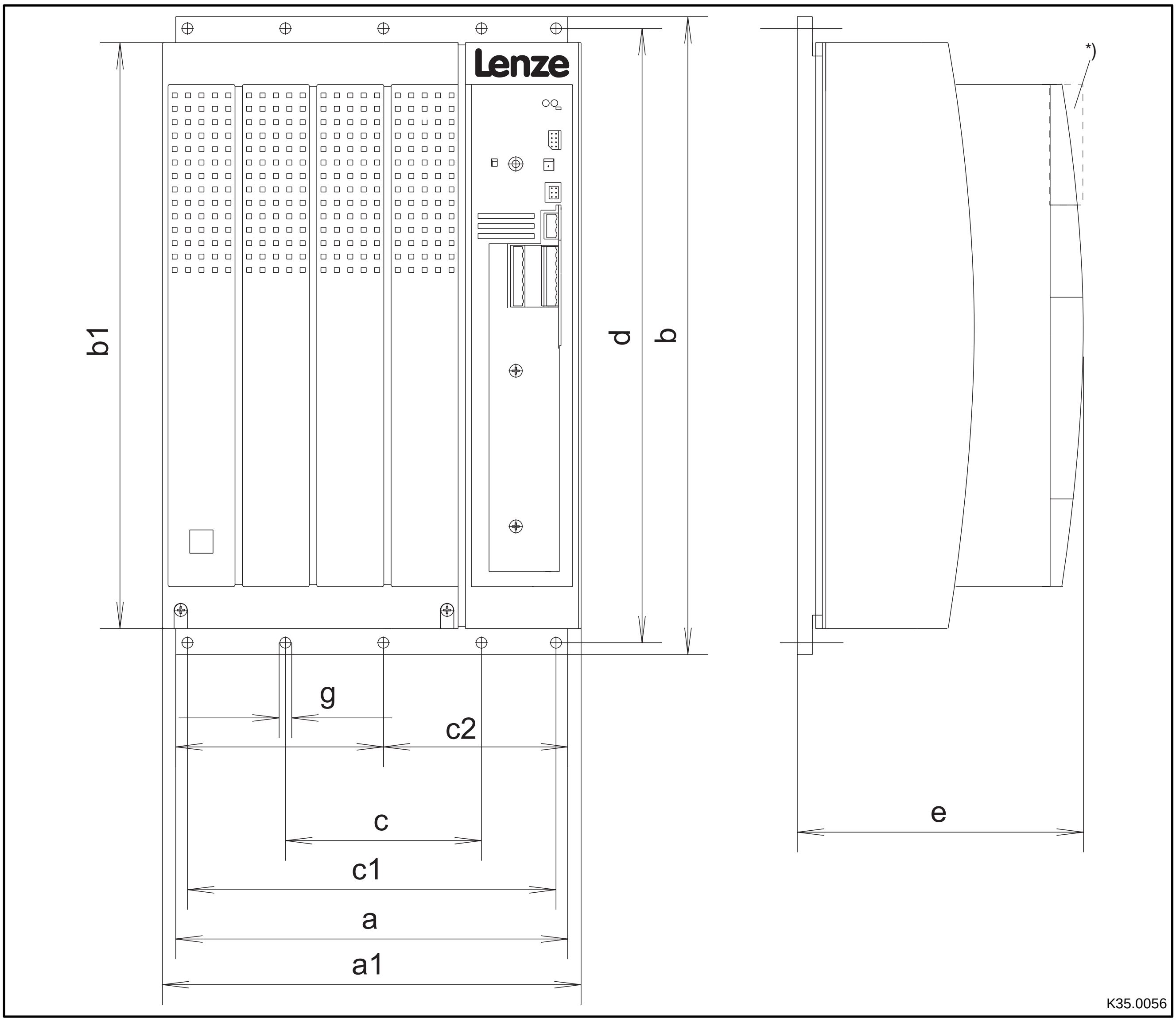


Fig. 4-5 Dimensions for the assembly in "cold plate technique"

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

Installation

- 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]	$R_{thmax\ heatsink}$ [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 heatsink please consult the factory.
- Apply the heat conducting paste (accessory kit) onto the cold plate of the controller.

4.2 Electrical installation

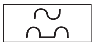
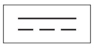
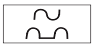
For information about the installation according to EMC, see chapter 4.3. (📖 4-34)

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

Signs on RCCBs	Meaning
	AC-sensitive residual current circuit breaker (RCCB, type AC)
	pulse-current sensitive residual current circuit breaker (RCCB, type A)
 	universal-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 ”universal-current RCCB” in systems equipped with controllers with single phase mains connection (L1/N).
  - ”universal-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 (Universal-current sentitive RCCB)

Universal-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 insulation (isolating distance) between the power terminals and the control terminals as well as to the housing:

- Terminals X1 and X5 have a double basic isolation (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 isolation (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.

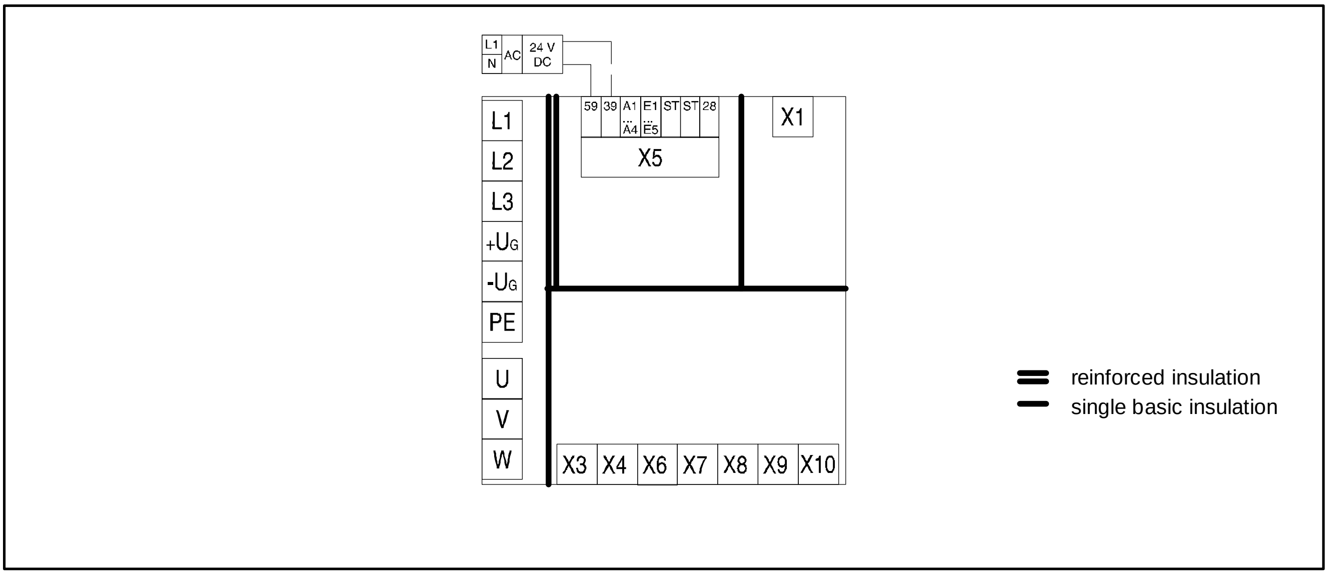


Fig. 4-6 Basic insulation in the controller

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 drive network, all controllers must be inhibited and disconnected 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 note that in a drive network all controllers must be inhibited.

4.2.2 Protection of the controller

STOP

Stop!

The controllers contain electrostatically sensitive components.

- Prior to assembly and service operations, the personnel must be free of electrostatic charge:
  - Discharging is possible 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 fuxes. (🕮 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 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 controller)
  - We recommend the use of PTC thermistors or thermostats with PTC characteristic to monitor the motor temperature.

STOP

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:
  - When operating inappropriate motors, dangerous overspeeds may occur and result in the destruction of the motor.

4.2.4 Mains types/conditions

Please observe the restrictions of 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 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 Fig. 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

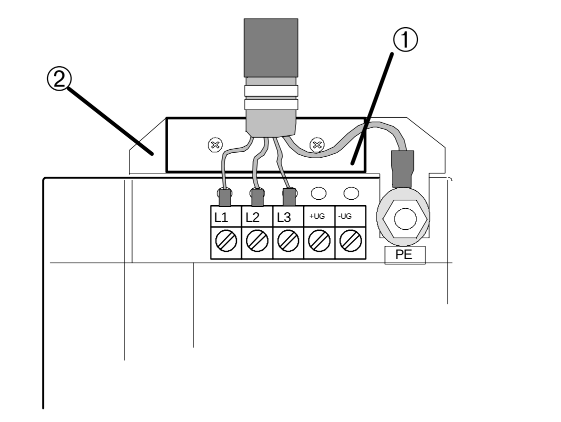
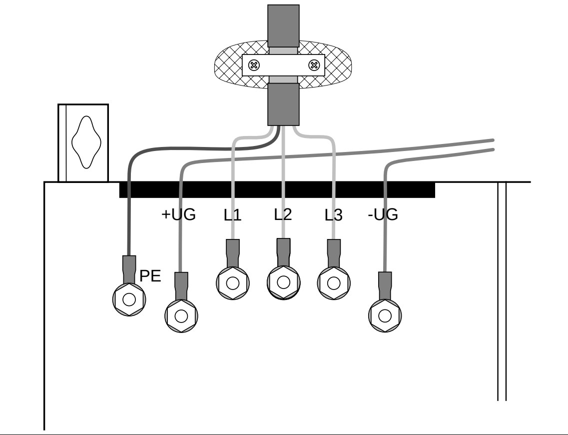
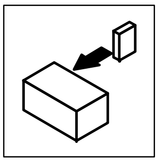
Types 9321 to 9326	Types 9327 to 9332
	
Correct screen connection with screened cables (required parts in the accessory kit): • Screw sreen plate ① on fixing bracket ② . • Fix screen using cable lugs. Do not use as a strain relief! • To improve the screen connection: Connect screen additionally at the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

Fig. 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 vable 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.



Installation

Fuses

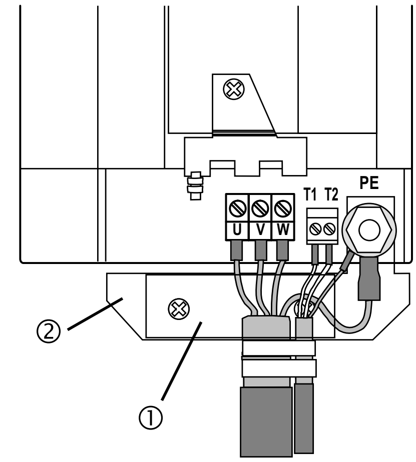
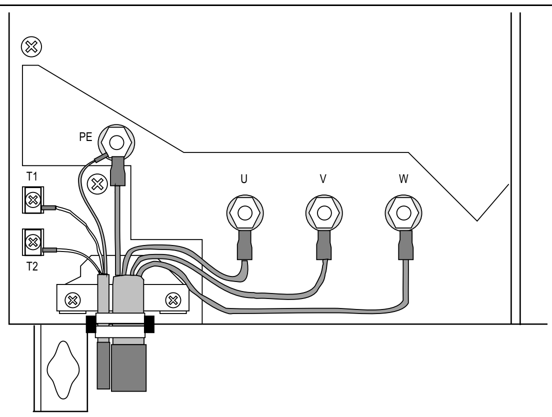
Fuses and cable cross-sections	The specifications in chapter 3.3.4 are recommendations and refer to the application ● in control cabinets and machines ● installation in the cable duct ● max. ambient temperature +40 °C.	3-6
Selection of the cable cross-section	Please take into account for selection that the voltage drops 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 screens additionally at 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 screens additionally at the stud PE next to the motor connections.

Installation

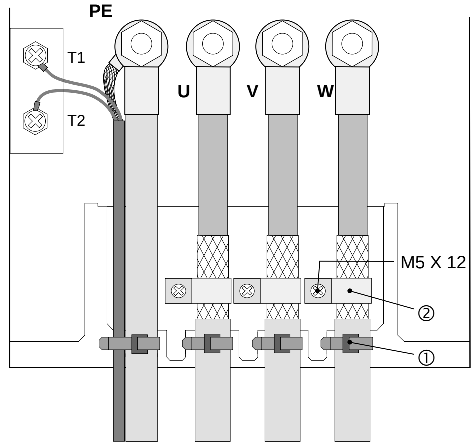
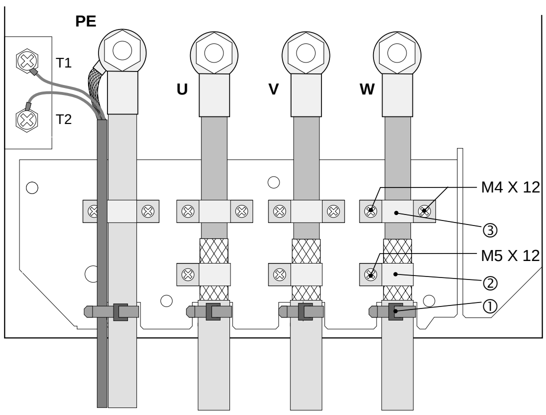
Types 9330 and 9331	
	• Strain relief by using cable binders ①. • Correct screen connection with screened cables: – Apply motor cable screen to the screening plate using clamp and screws M5x12 ②. – Connect thermal contact screen at the stud PE next to the motor connections over a large surface.
Type 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 at the stud PE next to the motor connections over a large surface.

Fig. 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. äpermissible 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 mm² 1)	1.5 mm²	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 mm² 2)		4 Nm (35 lbin)		-	0.5 ... 0.6 Nm (4.4 ... 5.3 lbin)
9330 - 9331	95 mm² 2)		7 Nm (62 lbin)		3.4 Nm (30 lbin)	
9332	120 mm² 2)		12 Nm (106.2 lbin)		M4: 1.7 Nm (15 lbin) M5: 3.4 Nm (30 lbin)	

1) with pin-end connector: 6 mm²
with wire crimp cap 4 mm²
2) with ring cable lug The cross-section is only limited by the cable cut-out

Note!
The switching on the motor side of the controller is only permitted for safety switch-off (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!
- 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)
  – Fig. 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

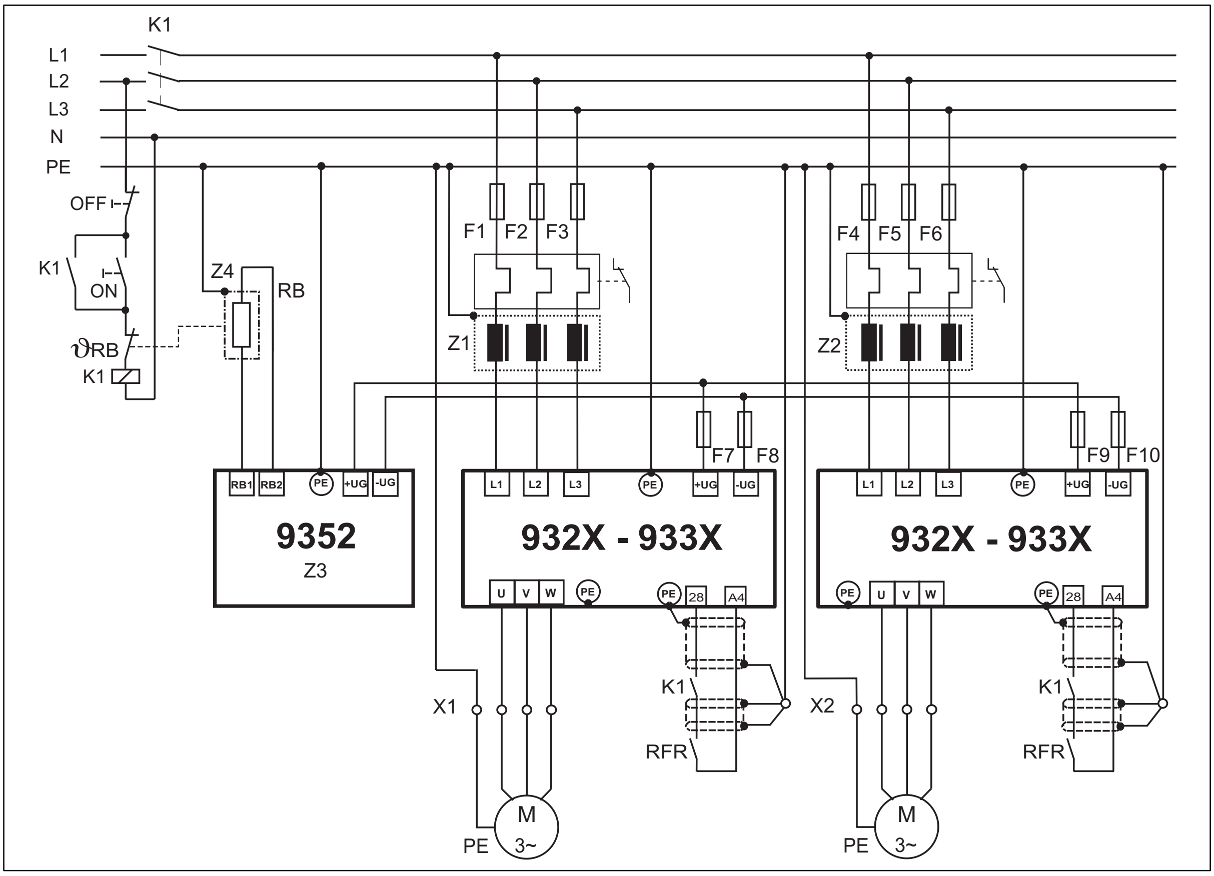


Fig. 4-9 Decentralized supply with DC-bus connection of several drives

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

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” to select the components.

Central supply with supply module

- When connecting the supply module, the corresponding operating instructions must be observed.

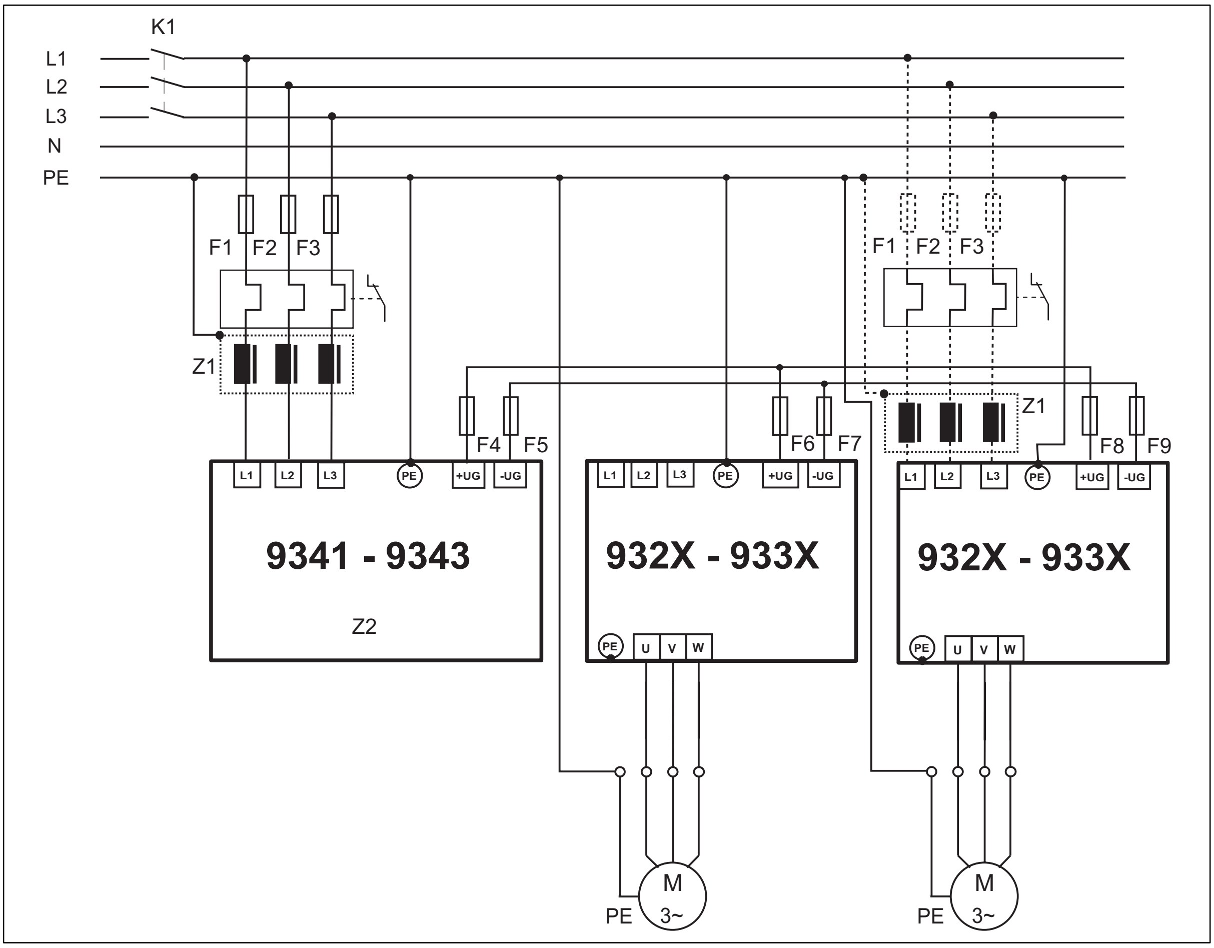


Fig. 4-10 Central supply for DC bus connection of several drives

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 (at least acc. to limit value class A).

Installation

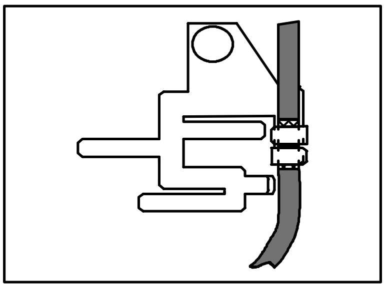
4.2.8 Control connections

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

Overview

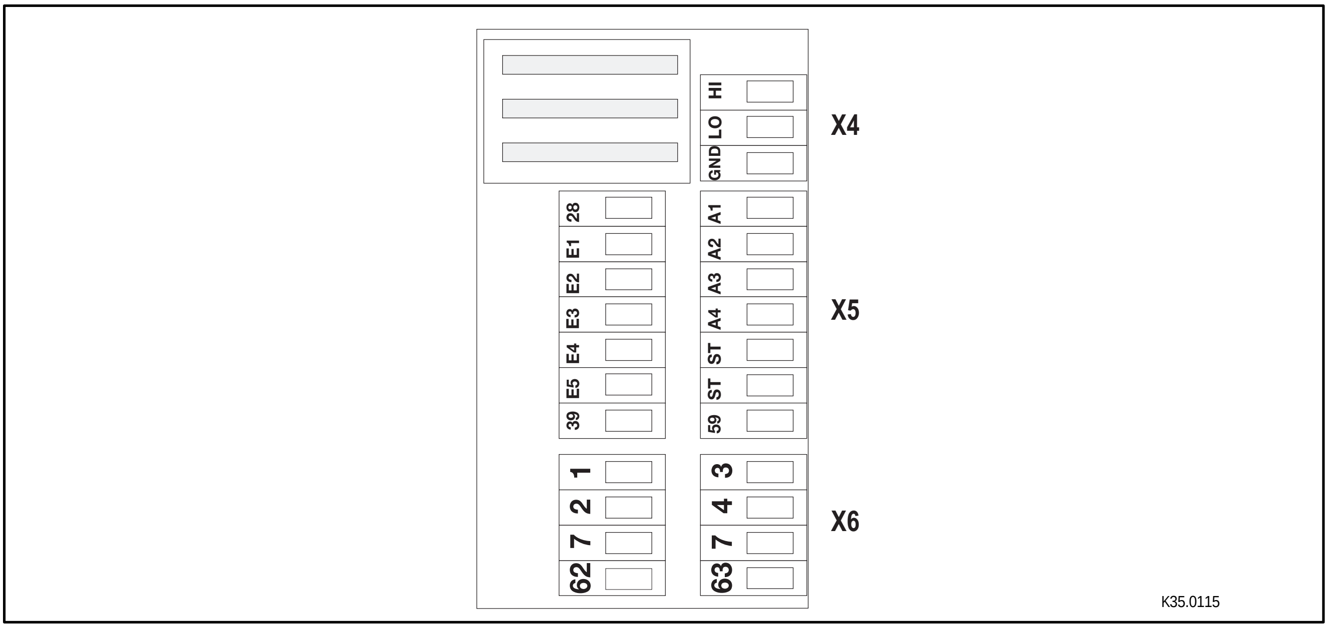
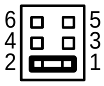
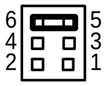


Fig. 4-11 View of the control connections of the controller front

	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 input	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-in module to change the jumper.

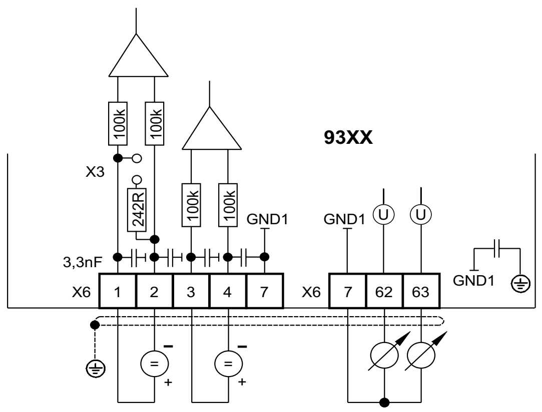
4.2.8.3 Connection diagrams

Connection of analog signals

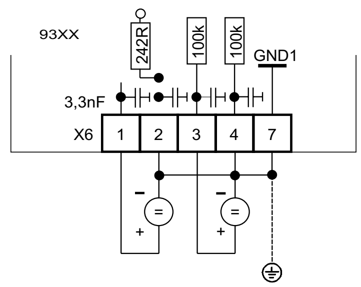
Analog signals are connected via the 2 x 4-pole terminal block X6.

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

Connection for external voltage supply

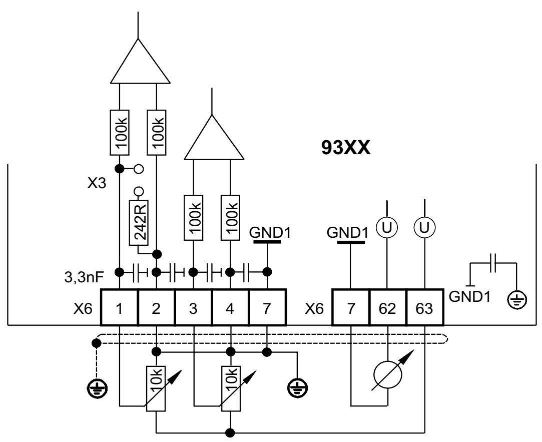


STOP!
- The maximum permitted voltage difference between an external voltage source and theGND1 (terminal X6/7) of the controller is 10V (common mode).
- The maximum permitted voltage difference between GND1 (terminal X6/7) and the PE of the controller is 50V.



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).

Connection for internal voltage supply



Configuration of the internal voltage supply:
- Set a freely assignable analog output (AOUTx) to HIGH level.
- E. g. terminal X6/63: Assign FIXED100% to C0436 (📖 7-10), 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).

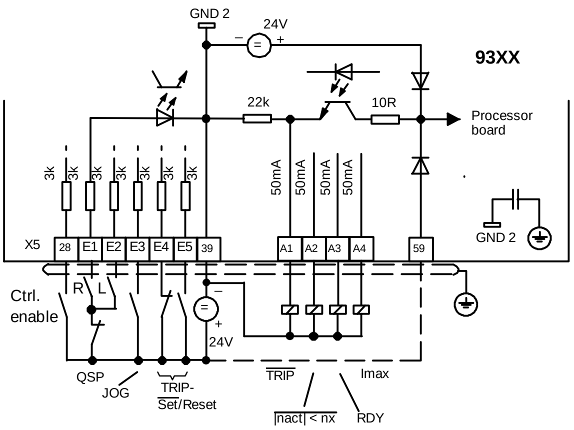
Connection of digital signals

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

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

Use relays with low-current contacts for switching the signal cables (recommendation: relays with gold contacts).

Connection for external voltage supply



The external voltage source supplies the digital inputs and outputs.

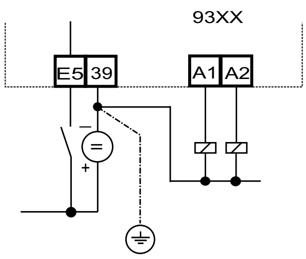
- If the external voltage supply is also used as an alternative supply for the control electronics (backup operation in the event of mains failure):
  - For this, make the connection illustrated as a broken line.
  - The external voltage source must be able to drive a current > 1 A.

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 mass at X5/39

STOP!

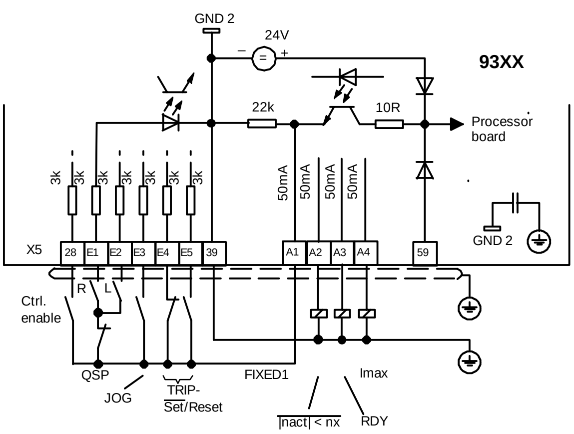
The voltage difference between GND2 (term. X5/39) and the PE of the controller must not exceed 50 V.



Limit the voltage difference

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

Connection for internal voltage supply



Configuration of the internal voltage supply

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

Note!

Use one of the predefined configurations in C0005 for this application. With C0005 = XX1X (e. g. 20010 for absoute positioning; limited travelling range) FIXED1 is automatically assigned to the output X5/A1 (corresponds to 24 V at terminal X5/A1).

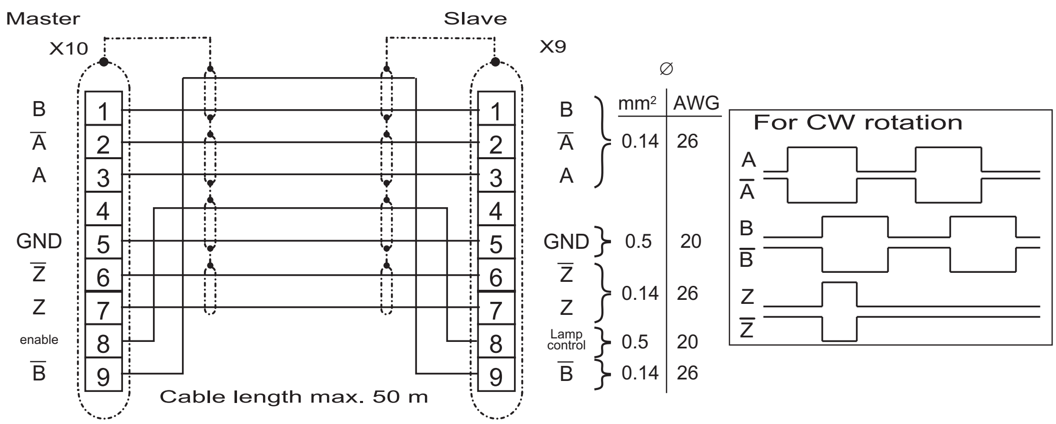
Installation

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 at C0540 = 0, 1, 2 or 3.



9 pole Sub-D connector 9 pole Sub-D male connector

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

Pin assignment X9								
1	2	3	4	5	6	7	8	9
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!

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

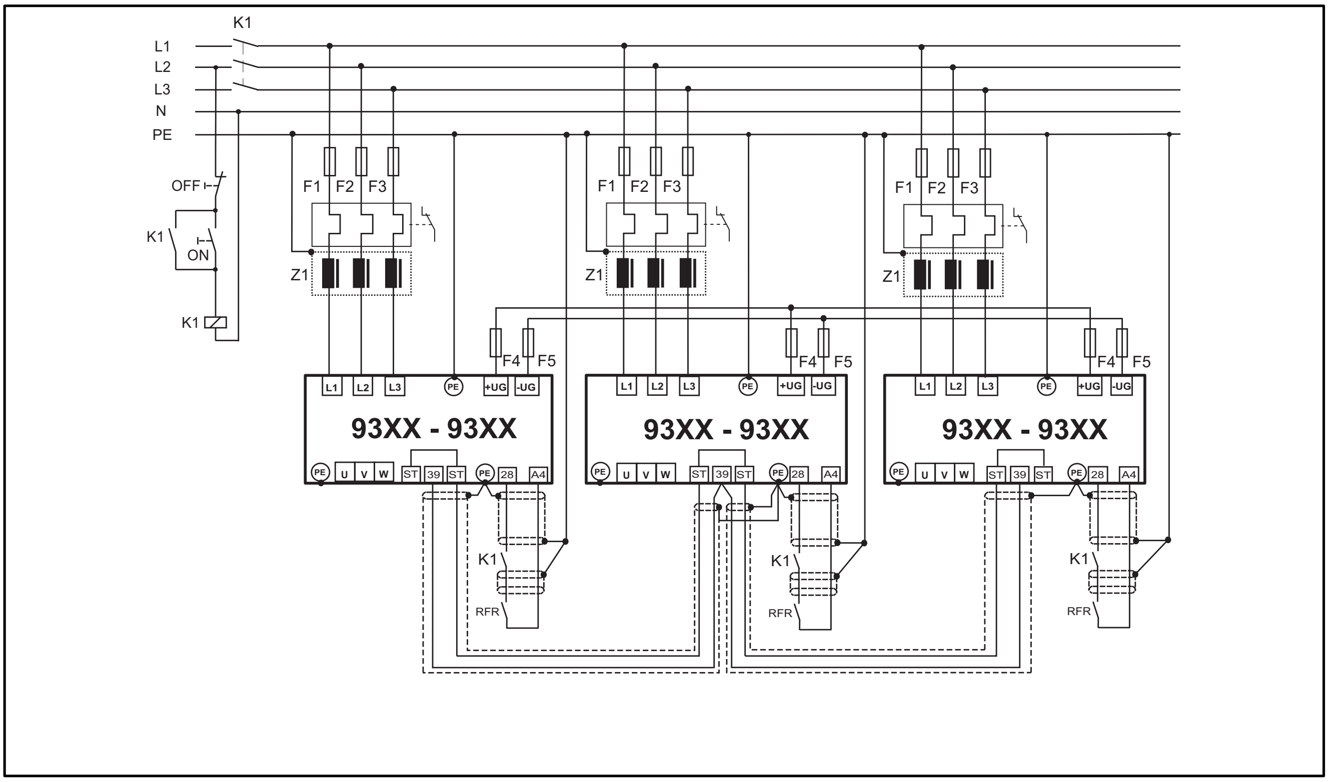


Fig. 4-12 Monitoring of a DC-bus drive network with the STATE-BUS

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

Installation

System bus connection (X4)

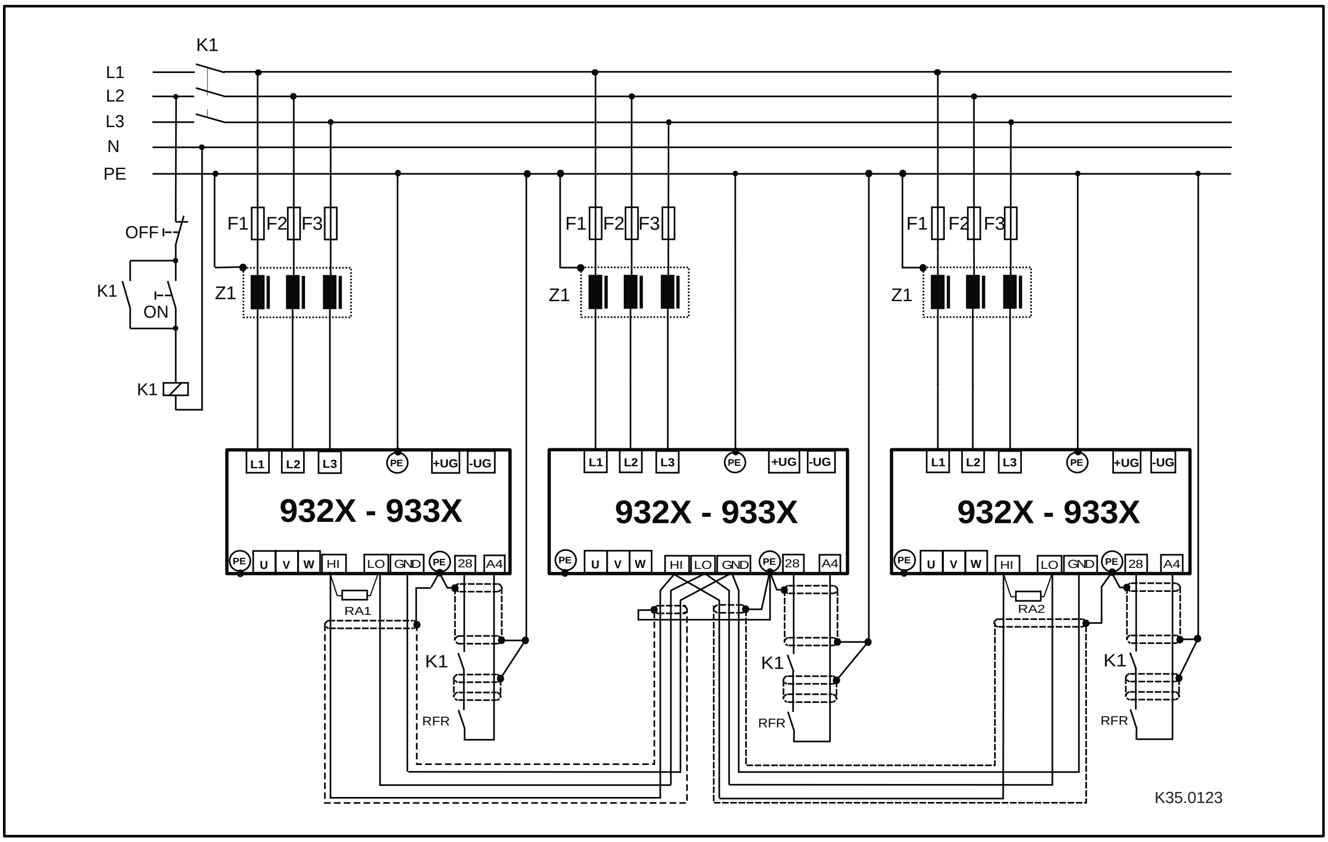


Fig. 4-13 Wiring of the system bus

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. 📖 7-243

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 • For 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 Fig. 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 Fig. 4-14).

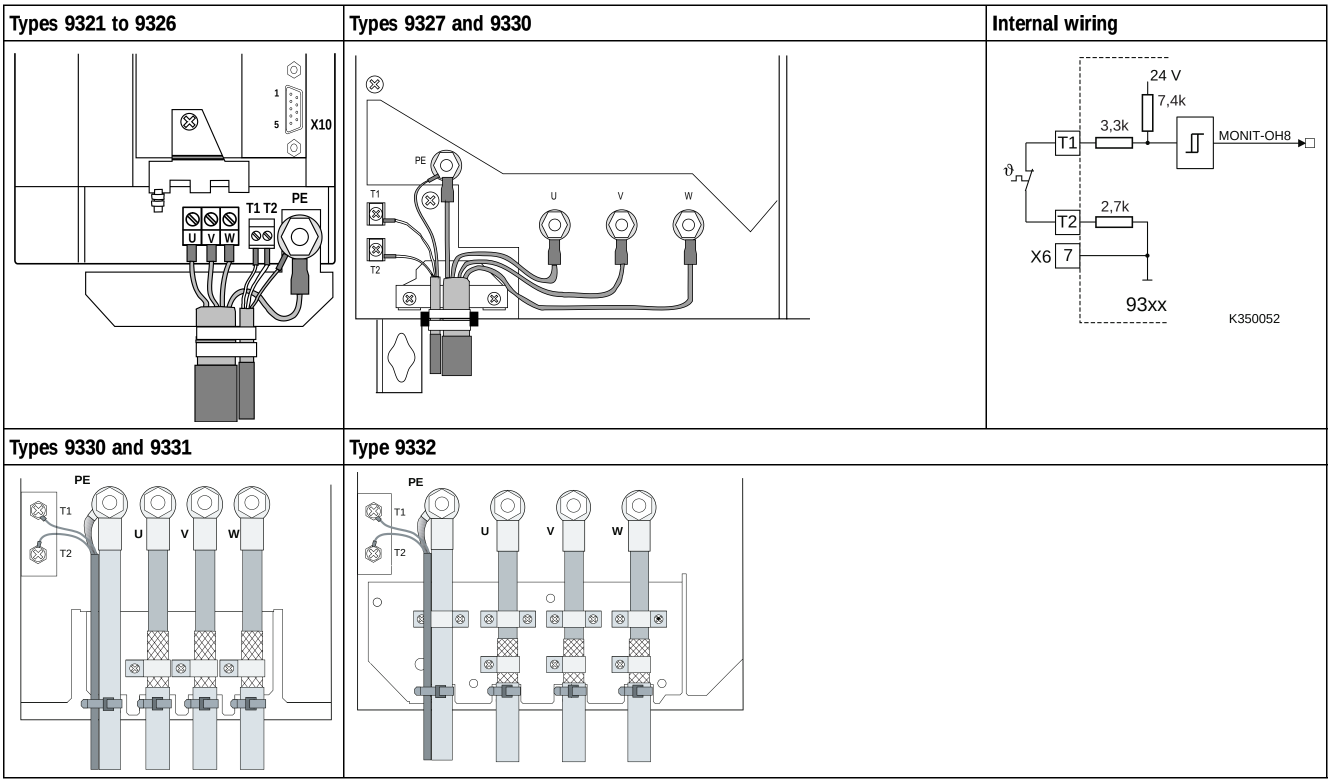
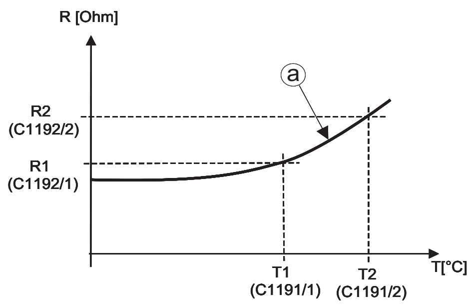


Fig. 4-14 Connection of a thermal sensor to the terminals T1 and T2 and interconnection

Note!

- The pre-cut 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 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 pre-cut Lenze system cables to connect the resolver.

Features:

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

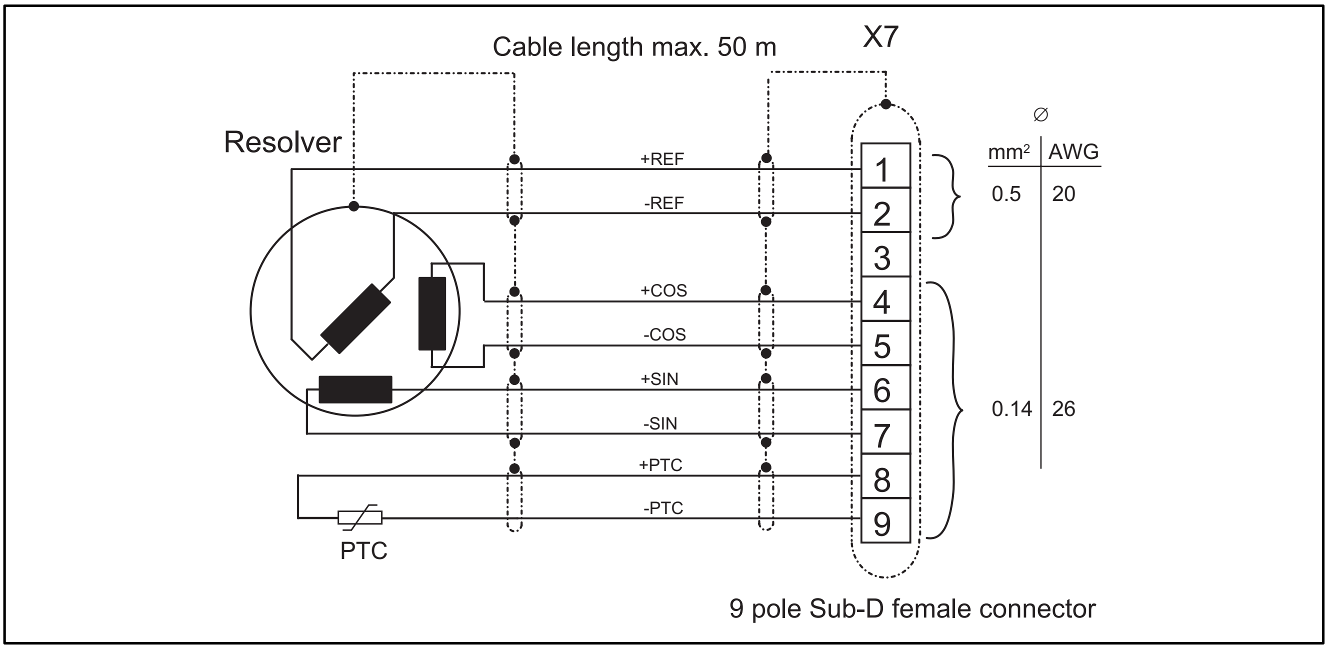


Fig. 4-15 Resolver connection

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 pre-cut Lenze system cables to connect the encoder.

- 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.

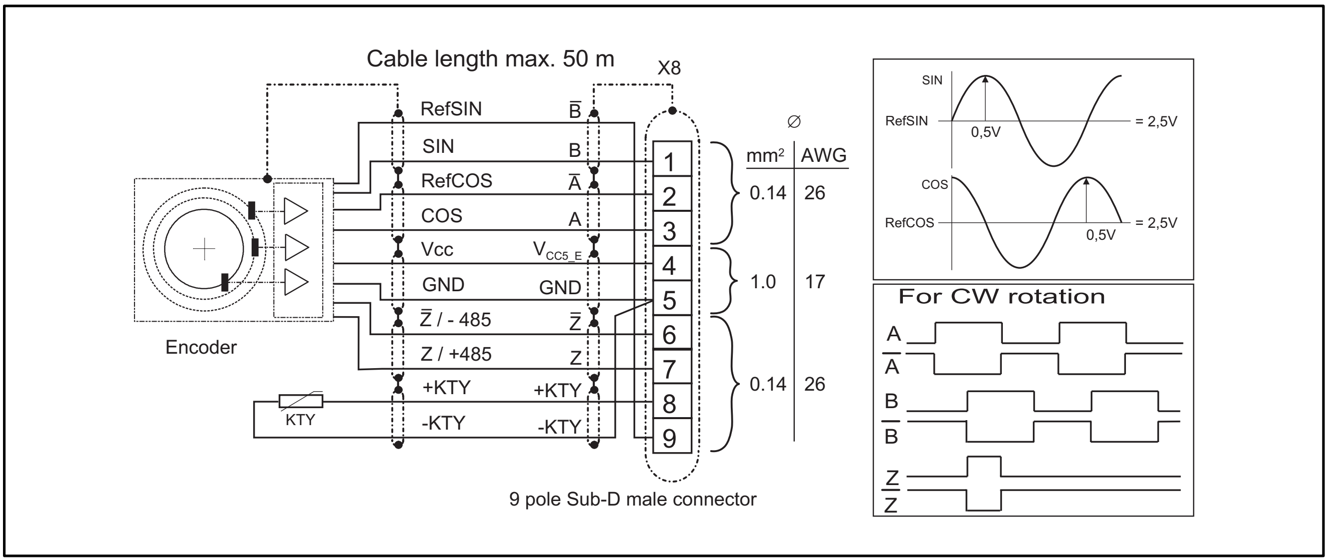


Fig. 4-16 Encoder connection

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, $\overline{sine}$ and cosine, $\overline{cosine}$:
Assign RefSIN with $\overline{sine}$ and RefCOS with $\overline{cosine}$.

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 unscreended 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 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.

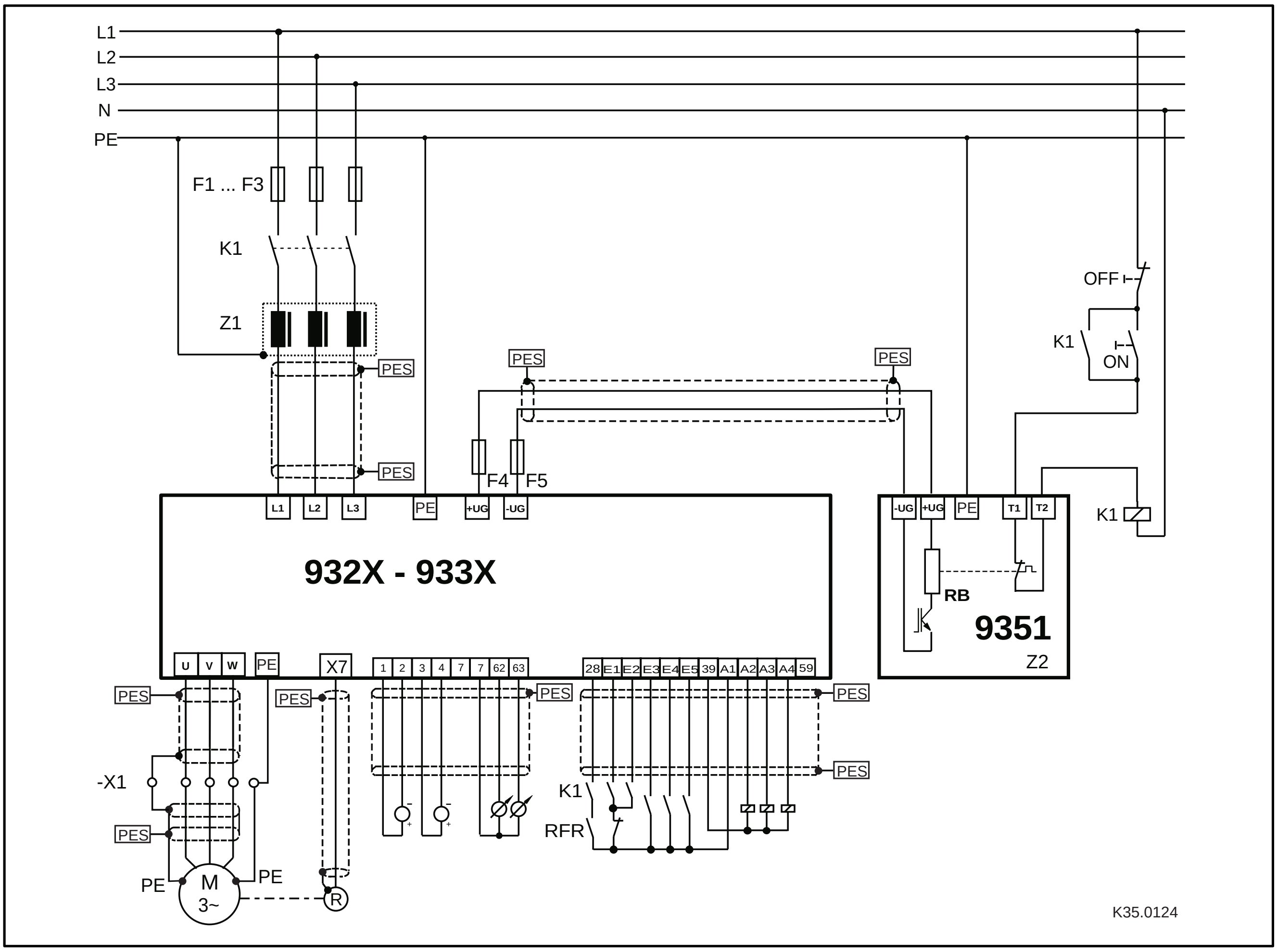


Fig. 4-17 Example for wiring in accordance with the EMC regulations

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).

Installation

Show/Hide Bookmarks

EDS9300U--KC
00407352

Lenze

Manual
Part C

Commissioning

During operation

Global Drive
9300 cam profiler

This documentation is only valid for 9300 cam profilers as of version:

Type	Design	Hardware level and index	Software level and index	Variant	Explanation
33.932X	EK	2x	1x		(9321 - 9329)
33.933X	EK	2x	1x		(9330 - 9332)
33.932X	CK	2x	1x	- V003	Cold Plate (9321 - 9328)

Type

Desgin:
Ex = Built-in unit IP20
Cx = Cold Plate
xK = Cam profiler
xP = Positioning controller
xR = Register controller
xS = Servo inverter

Hardware level and index

Software level 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 2.0 03/99

Contents

Part C

Contents

5 Commissioning

5.1 Before switching on

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).
- Covering the power connections:
  – Put on cover(s) and fix.
- **Keep to the switch-on sequence!** (📖 5-1)
- The commissioning steps described in chapter 5 refer to the configuration C0005 = 10000. Plese change the factory setting to this configuration!

Note!

The signal flow for configuration 1000 is described and shown in chapter 'Configuration'. (See chapter 5.8, (📖 5-12)).

5.2 Initial switch-on

Note!

- Use a PC with the Lenze program "Global Drive Control" (GDC) under Windows for commissioning. The convenient menus include the codes for the most important settings.
- A communication module type 2102 "RS232, RS485, optical fibre" (Lecom A/B) is required to run the GDC. As alternative you can also use a system bus module (2173) as from GDC version 3.0.
- GDC and the communication module are not included in the delivery package of the controller.
- The "Electronic cam profiler" requires GDC version ⩾ 3.6 required.

Commissioning described by means of an example

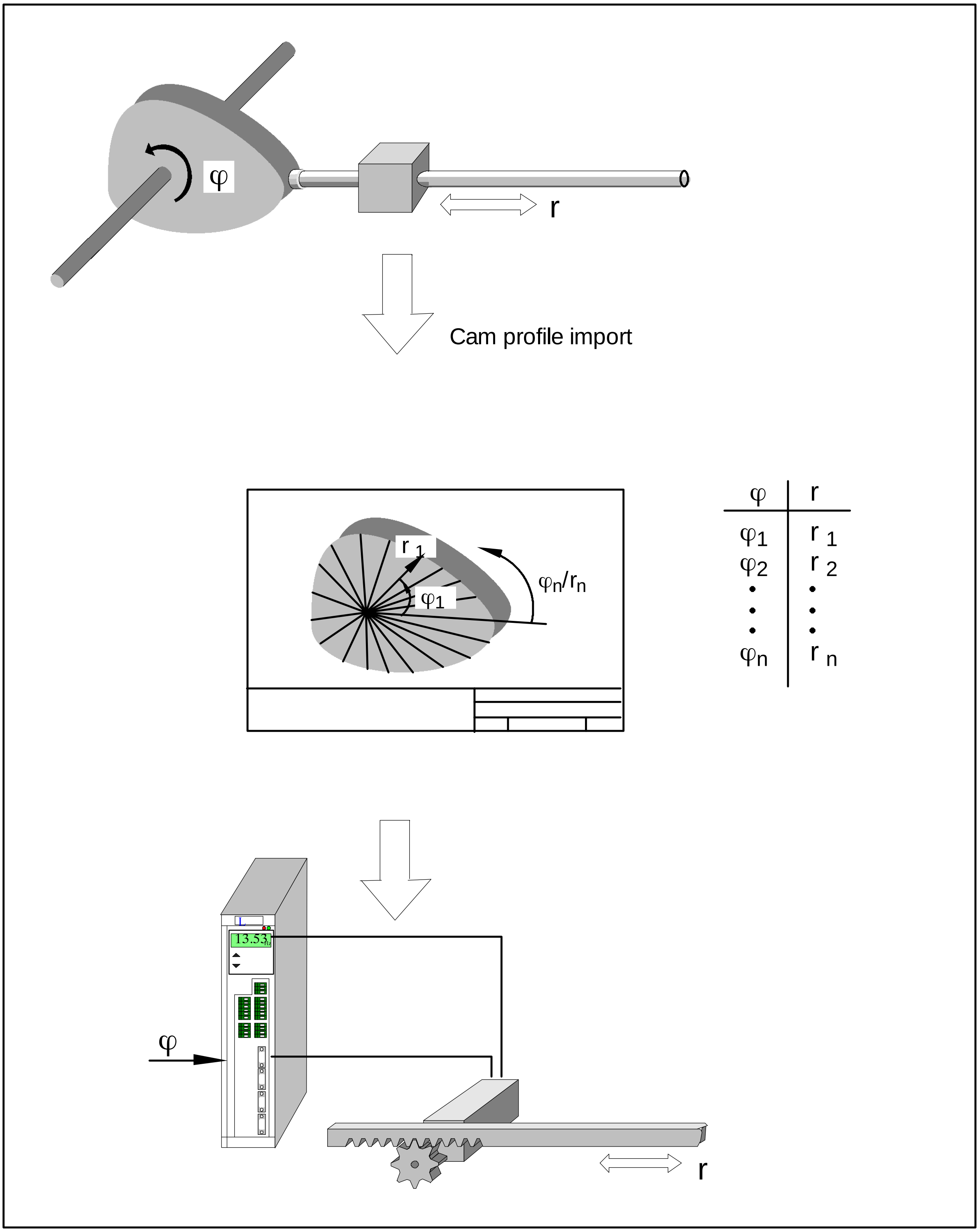


Fig. 5-1 Retrofitting of a mechanical cam

The following table lists the procedure for commissioning according to the example in Fig. 5-1. A detailed description of the commissioning can be obtained from the following chapters.

Section	Action	Detailed description in
Switch on controller	1. Assign terminal X5/28 (controller enable) to a LOW signal. 2. Apply digital terminal signals 3. Apply analog input signals 4. Switch on mains: – The controller is ready for operation after approx. 1s. (2 s for drives with sin/cos encoders with serial interface).	Chapter 5.3
Switch on PC	Start GDC on the PC – Set the communication parameters for on-line operation in the ”Momentary drive” dialog box. Confirm with ”OK”. – Select the controller in the ”Assign controller description” dialog box. Confirm with ”OK”.	Chapter 5.4
Generate parameter set	1. Adapt controller to the mains 2. Adapt controller to the motor 3. Enter machine parameters	Chapter 5.5.1 Chapter 5.5.2 Chapter 5.5.3
Basic cam data	1. Determine the number of profiles required. 2. Enter all required data for cam profiles selected.	Chapter 5.6
Cam profile generation	1. Open the dialog “Cam profile import” 2. Import the cam profile data and transfer them to the controller 3. Copy the transferred data to the active data set.	Chapter 5.7
Basic configuration	1. Load the basic configuration ’Replacement of a mechanical cam” via the code C0005 = 10000. Use the codes listed in the table in chapter 5.8 to adapt the drive to your application. 2. Store the data in the controller.	Chapter 5.8

5.3 Switch on the controller

1. Assign LOW level to terminal X5/28 (controller enable).
2. Digital inputs:
   The following terminal signals are to be applied to the digital terminals:

E1	E2	E3	E4	E5
L	L	L	H	L

3. Analog inputs:
   X6/E1 and X6/E2: not used
   X6/E3 and X6/E4: not used
4. Switch on mains:
   – The controller is ready for operation after approx. 1 s.
   (2 s for drives with sin/cos encoders with serial interface).
5. Check whether the controller is ready for operation:
   – If the green LED is flashing:
   Controller is ready for operation.
   – When green LED is off and red LED is blinking:
   There is a fault. Before proceeding with commissioning, eliminate the fault (see chapter 8 'Troubleshooting and fault elimination').
6. For operation with a fieldbus module, additional settings are necessary
   (see Operating Instructions for the fieldbus module used).

5.4 Switch on PC, start GDC

- Switch on PC.
- Start the GDC program under Windows.

GDC in "on-line operation"

- The "Find Lecom A/B drives" dialog box is opened.
- Click on "Find". GDC will now search for a controller.
- GDC selects the first controller found.
- GDC tests all baud rates which can be set.
- GDC loads the parameter set description for the connected controller.
  – If GDC does not find a parameter set description, you are asked which description you want to load alternatively.
- GDC automatically reads the parameter set from the controller.

GDC in "Off-line operation"

- You have to select the controller manually.
  – You can change to "online operation". GDC automatically selects a controller.
- Open the "Controller" menu in the menu bar and click on "Select". Make your choice for:
  – The desired parameter set description.
  – Baud rate.
  – Controller address.

5.5 Parameter set generation

Warning!

Do not change any controller settings not mentioned in this chapter.

Proceed systematically when generating a parameter set:

1. Select the basic configuration (use basic configuration 10000).
2. Adapt controller to mains conditions.
3. Adapt controller to motor.
4. Enter machine parameters.

5.5.1 Adapt the controller to the mains

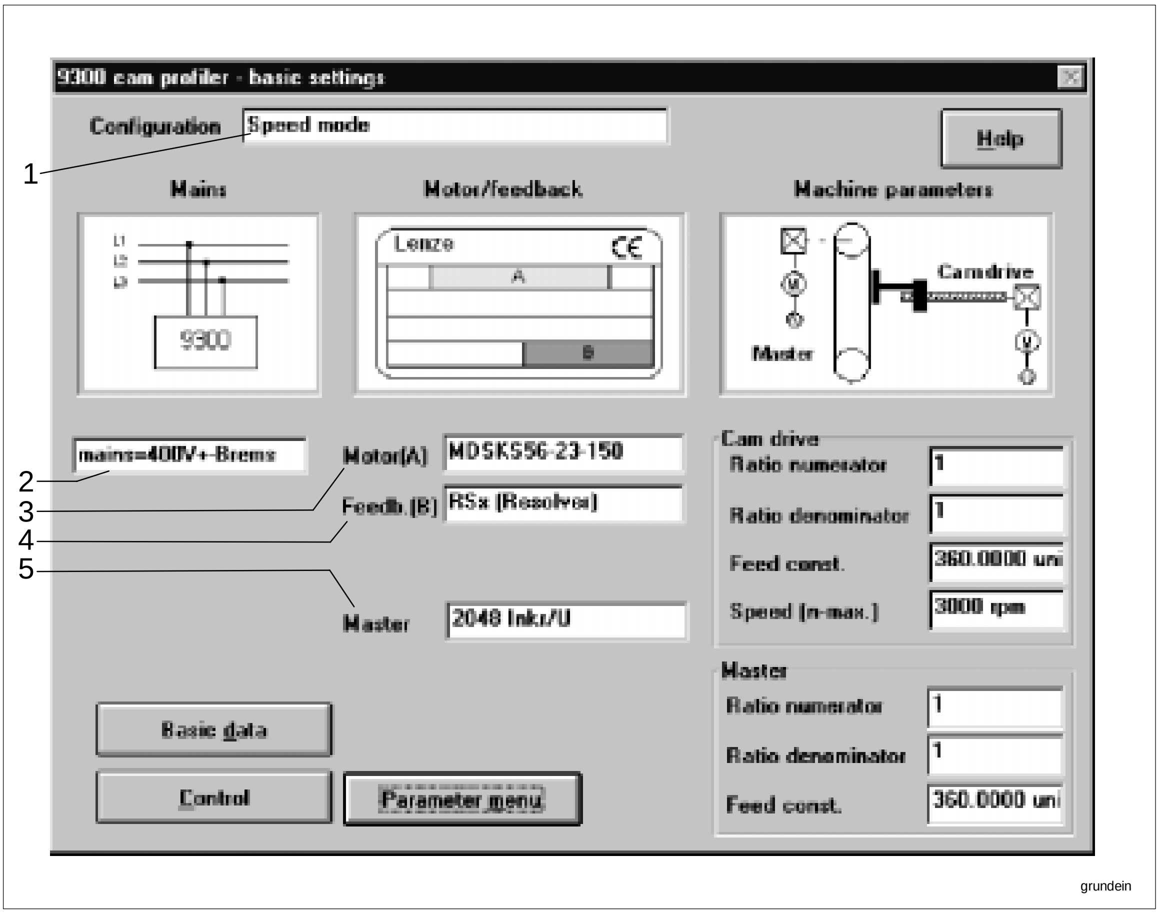


Fig. 5-2 "Basic settings" dialog box

Field	Command	Function
1	Click field	Selection of the configuration “10000”; cam
2	Click field	Select values for the actual mains and operating conditions.

5.5.2 Adapt controller to the motor

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

With Lenze motors:

Field	Command	Function
3	Click "motor type (A)".	Select connected motor.
4	Click "encoder (B)".	Selected feedback system used.
5	Click "master value".	Setting of the master-value incremental encoder

For motors with a resolver, use the eight-digit designation of the motor nameplate "encoder" (as an option).

- For this change to the parameter menu (see button Fig. 5-3) and select the menu "Motor/feedback system".

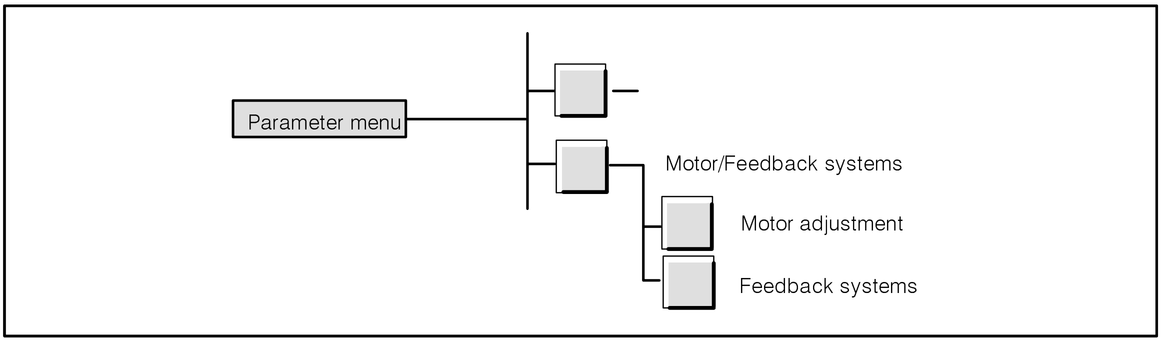


Fig. 5-3 How to find the menus "Motor setting" and "Feedback systems"

In the menu "Feedback systems":

Command	Function
Select C0416	Resolver fault Enter value from the motor nameplate
Select C0003	Save data (C0003 = 1).

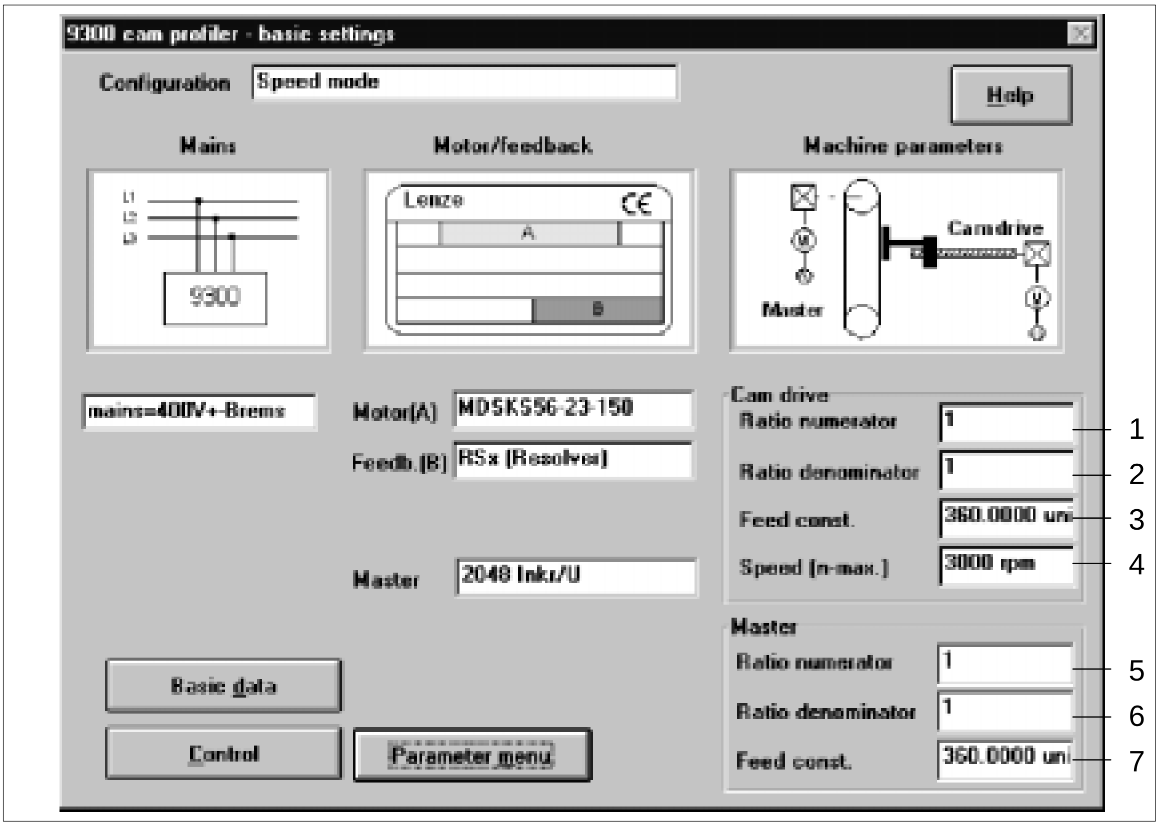
If you use a motor other than from Lenze:

Change to the menu "Motor setting" (see Fig. 5-3).

In the menu "motor setting":

Command	Function
Select C0086	Select a motor which best matches the motor used. A list of available motors can be obtained from chapter 7.11(📖 7-327) .
Select C0006	Operating mode of the motor control
Select C0022	Apapt I_{max} to the maximum motor current.
Select C0081	Rated motor power
Select C0084	Stator resistance of the motor (only for very high demands on the control characteristics).
Select C0085	Leakage inductance of the motor (only for very high demands on the control characteristics).
Select C0087	Rated motor speed
Select C0088	Rated motor current
Select C0089	Rated motor frequency
Select C0090	Rated motor voltage
Select C0091	Motor cos φ.
Select C0003	Save data (C0003 = 1).

5.5.3 Enter machine parameters



Field	Drive	Function
1	Cam drive	Enter numerator for the gear ratio of the cam drive
2		Enter denominator for the gear ratio of the cam drive
3		Output feed
4		Enter upper speed limit for the cam drive
5	Master drive	Enter numerator for the gear ratio of the cam drive
6		Enter denomintor for the gear ratio of the master drive
7		Output feed

Note!

For a detailed example with terminology definition see chapter 5.10.

5.6 Basic cam data

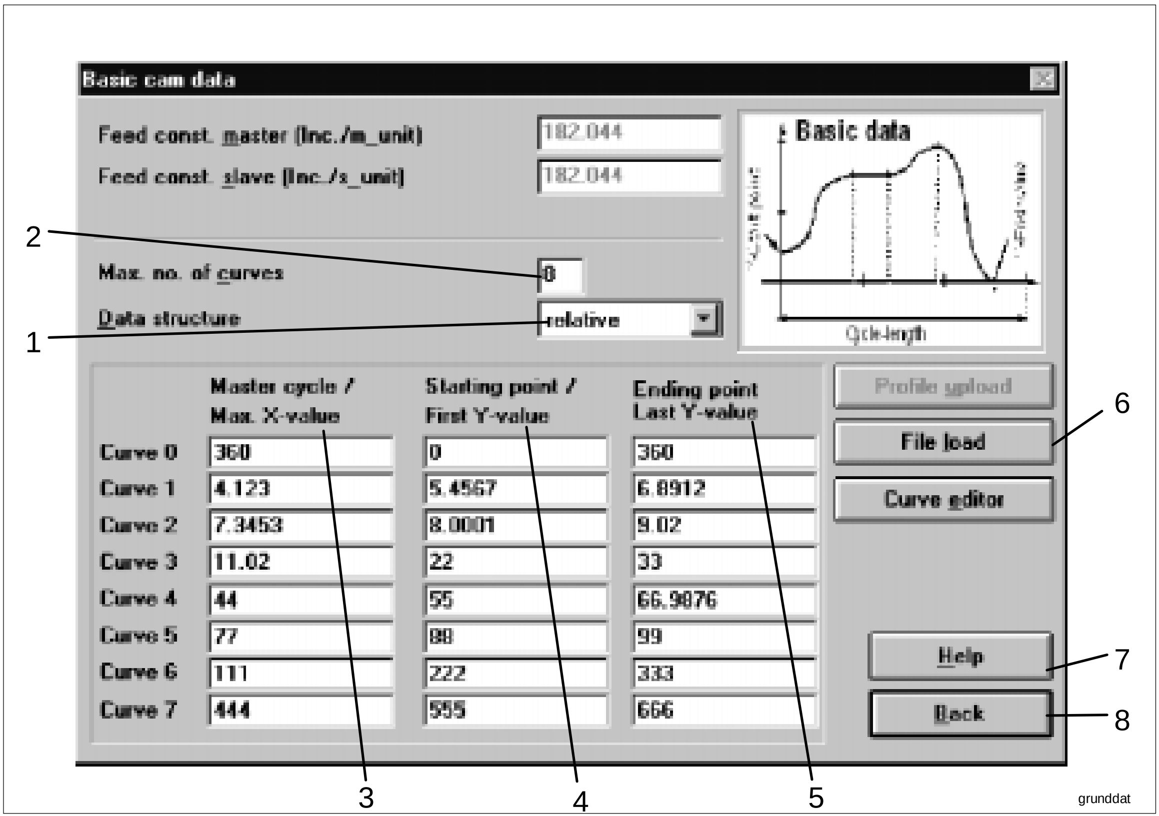


Fig. 5-4 Display - basic cam data

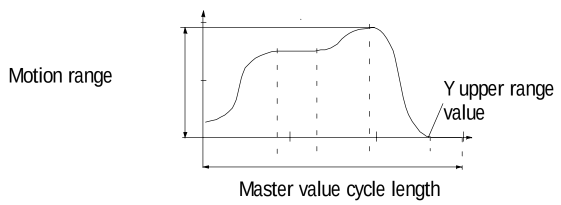


Fig. 5-5 Explanation to fig. 5-4

Field	Function	Notes
1	Determination of the data model	relative data model absolute data model
2	Number of profiles 1 ... 8	
3	Determines the length of a profile in X direction	Unit: m_units **STOP** **The profile length must be at least 1/4 master encoder revolutions in X direction (length in X direction > 16384 incr.). .** **The incremental profile length is displayed under code C1315/X.**
4	Determines the motion range in Y direction	Unit: s_units
5	Determines the upper range value of the profile in Y direction	Unit: s_units
6	Branches to the dialog 'cam import'	See chapter 5.7.2
7	Starts on-line help	
8	Back to the previous dialog	
All fields not used are not relevant for commissioning. For further information see on-line help.		

Data model evaluation

Data model	
Relative model	A profile consists of max. 5 sections with equidistant points. Linear interpolation between the points.
Absolute model	A profile consists of arbitrarily distributed points. Linear interpolation between the points.

- Depending on the data model selected and the number of profiles, different numbers of points are available:

Data model	Number of points available per profile*)
Relative model	256
Absolute model	64

*) For the use of 8 different cam profiles

Note!

Please observe when distributing the points that at max. line speed a maximum of 2 $^{points}/_{ms}$ will be exceeded.

- The field "profile number" of the dialog "basic data" determines the number of profiles used. It is possible to select between 1, 2, 4 and 8 different profiles. The number of points available depends on the settings selected:

Number of profiles	Number of points available per profile*
1	2048
2	1024
4	512
8	256

* For the relative data model

5.7 Cam profile generation

5.7.1 General

Our example shows how to replace the mechanical cam by the LENZE technology variant “electronic cam”. The ’mechanical cam’ must be numerically described by value pairs. These values must then be stored in the controller.

The source data for the numerical description of the cam profile can be generated in two ways from already existing data:

- Cam profile import
- Mathematical cam profile generation

For this commissioning, **cam profile import** has been selected, i.e. the source data can be obtained, for instance, from an already existing ASCII file. The file must contain X/Y value pairs. (For the description of the mathematical cam profile generation see chapter 7.5.)

All commissioning steps, including parameter setting, are carried out using the operation and parameter setting program “Global Drive Control” (GDC).

Note!

Please save all settings for the controller via code C0003 to ensure that they will not be lost in the event of a mains failure.

5.7.2 Cam profile import

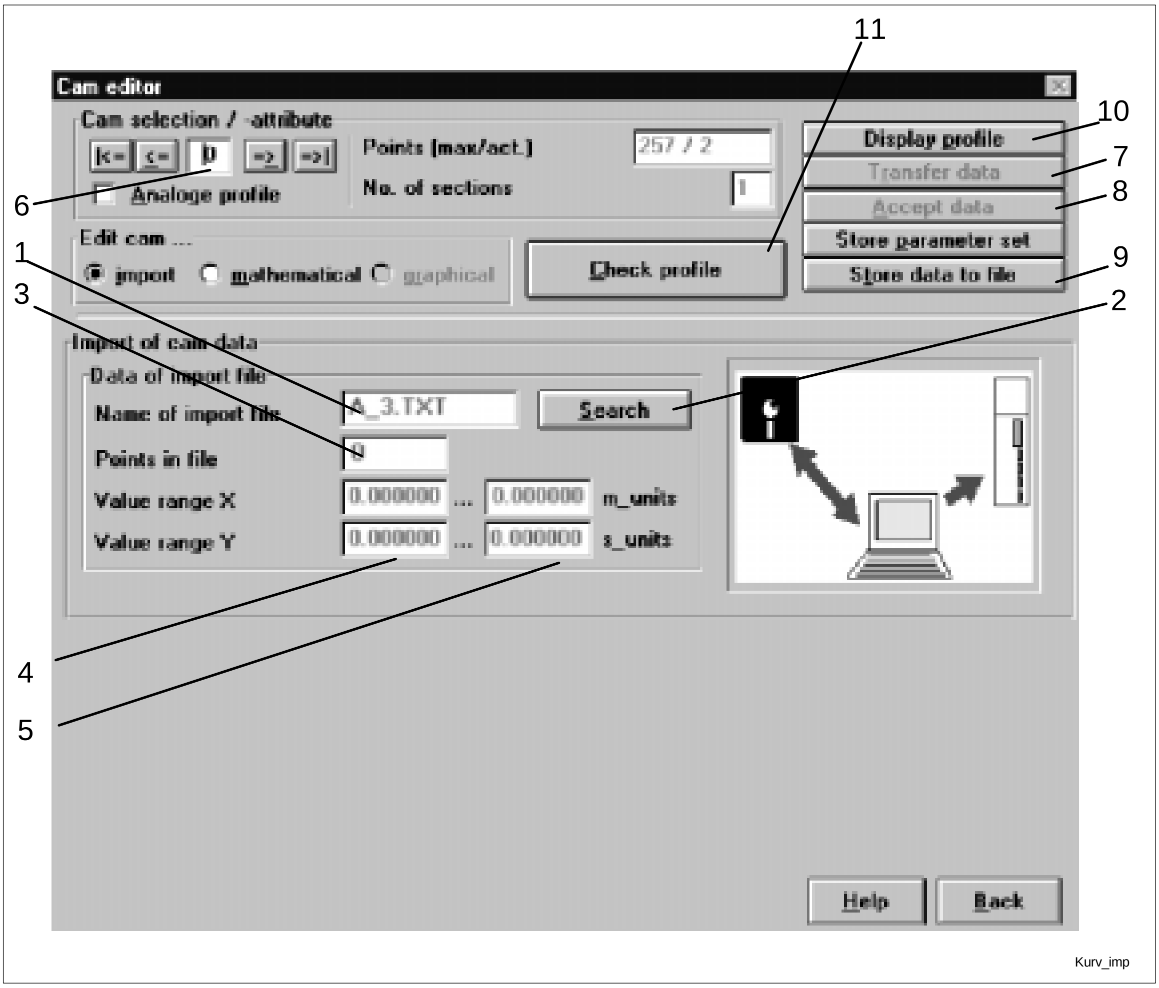
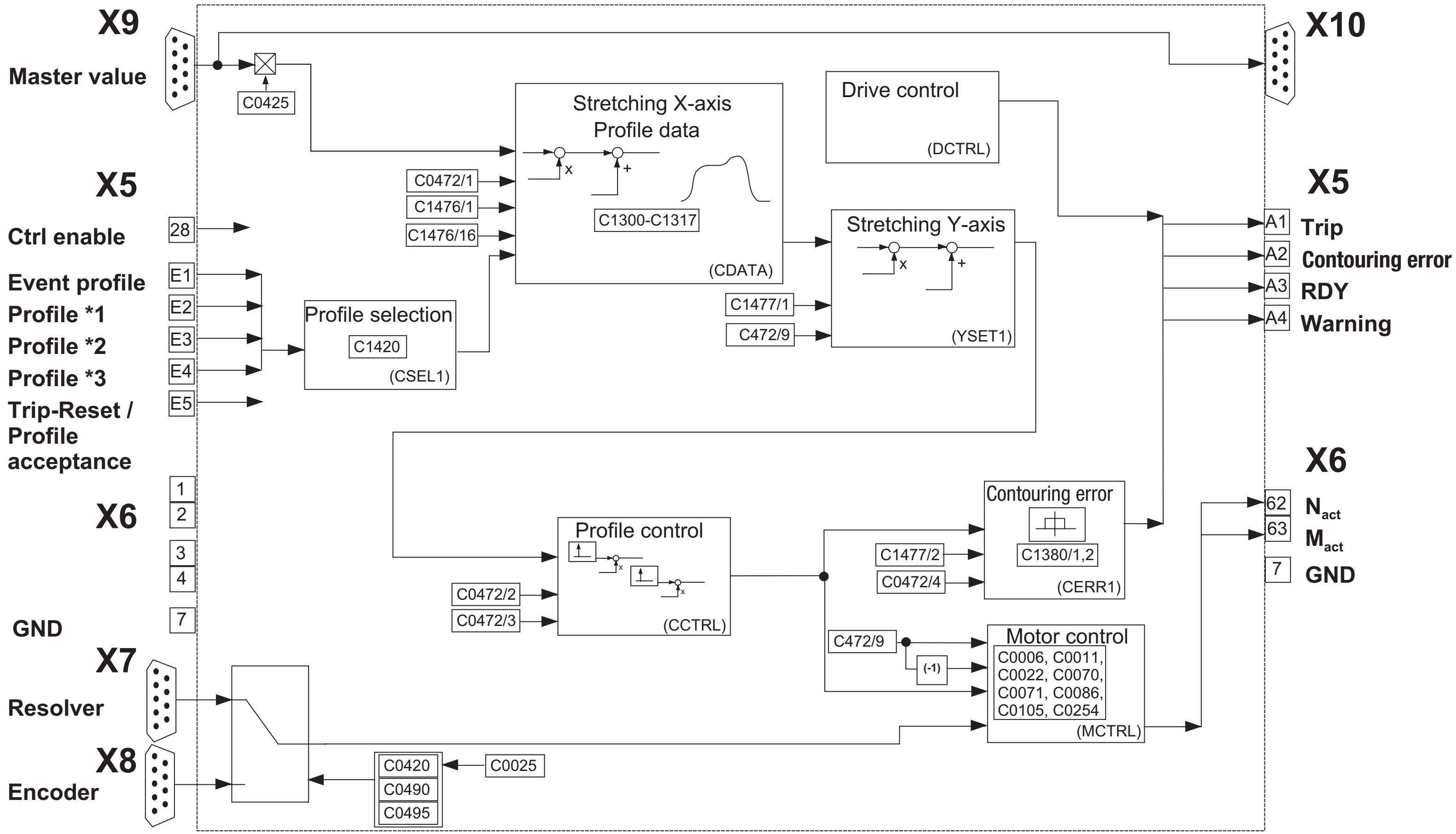


Fig. 5-6 Dialog “Cam profile import”

Commissioning procedure

1	A name for a file to be imported can be entered direcly or...
2	..selected from a disk by using the button “Open”.
3	After the selection of a file, a number of information about the data read in is indicated in the middle left screen area. Indicated are the value pairs (pointsl and
4	the minimum values in X and Y direction
5	as well as the maximum values in X and Y direction.
6	Select the target profile for the imported data in the upper screen area.
7	The data are transferred to the controller.
8	After data transmission, they must be accepted from the active data range of the controller (button “Accept data”). For this, connect the signal CDATA-LOAD (C1322/7) temporarily to FIXED1; reset to FIXED0 afterwards.
9	The converted data can be stored on a data carrier by pressing the button “Speichern”
10	The button “Display profile” leads to the corresponding program dialog. (See on-line help)
11	The button “Check profile” starts the calculation of the profile characteristic and checks whether the required conditions are met.

5.8 Configuration C0005 = 10000
Replacement of a mechanical cam



Code	Description
C0005=10000	The configuration C0005=10000 allows an electronical solution for a mechanical cam. Additional features and functions such as stretching / compression / phase trimming in X- and Y-direction are made available.
• Master value	
C0425	Encoder constant of the master value
• Cam profile data	
C1300-C1317	The cam profile data are determing with the generation of the profile. Usually, they do not have to be changed separately.
C1420	Determines the profile to be used when a event input is activated (digital input E1 = LOW).
• Contouring error evaluation	
C1380/1 and C1380/2	Determine comparison window and hysteresis of the contouring error evaluation.
• Adjustment values	
C0472/2	Influence of speed precontrol
C0472/3	Influence of torque precontrol
C1477/2	Contouring error limit (in s_units)
C0472/4	Reduction factor for contouring error warning Warning limit C0472/4 x C1477/2
• Profile influence	
C0472/1	Stretching / compression X axis (100% = no stretching / compression)
C1476/1	Phase trimming in X-direction
C1477/1	Phase trimming in Y-direction
C1476/16	TOUCH-PROBE position in X-direction
C472/9	Stretching/compression of Y-axis
C472/10	Torque limit value

5.9 Basic configuration

5.9.1 Predefined basic configurations

Several predefined signal configuration can be loaded by using C005. The numbers are used according to the following:

C0005 = 1 X X X X

Control
- 0 Terminal control
- 1 Control via LECOM A/B/LI
- 3 Control via AIF (INTERBUS,PROFIBUS)
- 5 Control via system bus (CAN)

Terminal supply
- 0 - External supply of control terminals
- 1 - Internal supply of control terminals

Additional functions (see chapter 5.9.5 ff.)
- 0 - None
- 1 - Homing function
- 2 - Clutch function
- 3 - Switch points
- 8 - Mark-controlled correction of the master value
- 9 - Mark-controlled correction of the act. value

Control mode
- 0 - Instead of a mechanical cam* (see chapeter 15.1)
- 1 - Welding bar drive* (see chapter 15.2)
- 2 - Operation with position storage* (see chapter LEERER MERKER)

* - Incremental master value

Identification
- 1 - Cam

Cam data

Before commissioning, the cam data must be generated with Global Drive Control and then transmitted to the drive. The following cam profiles are in factory setting. They are effective independently of the basic parameter setting.

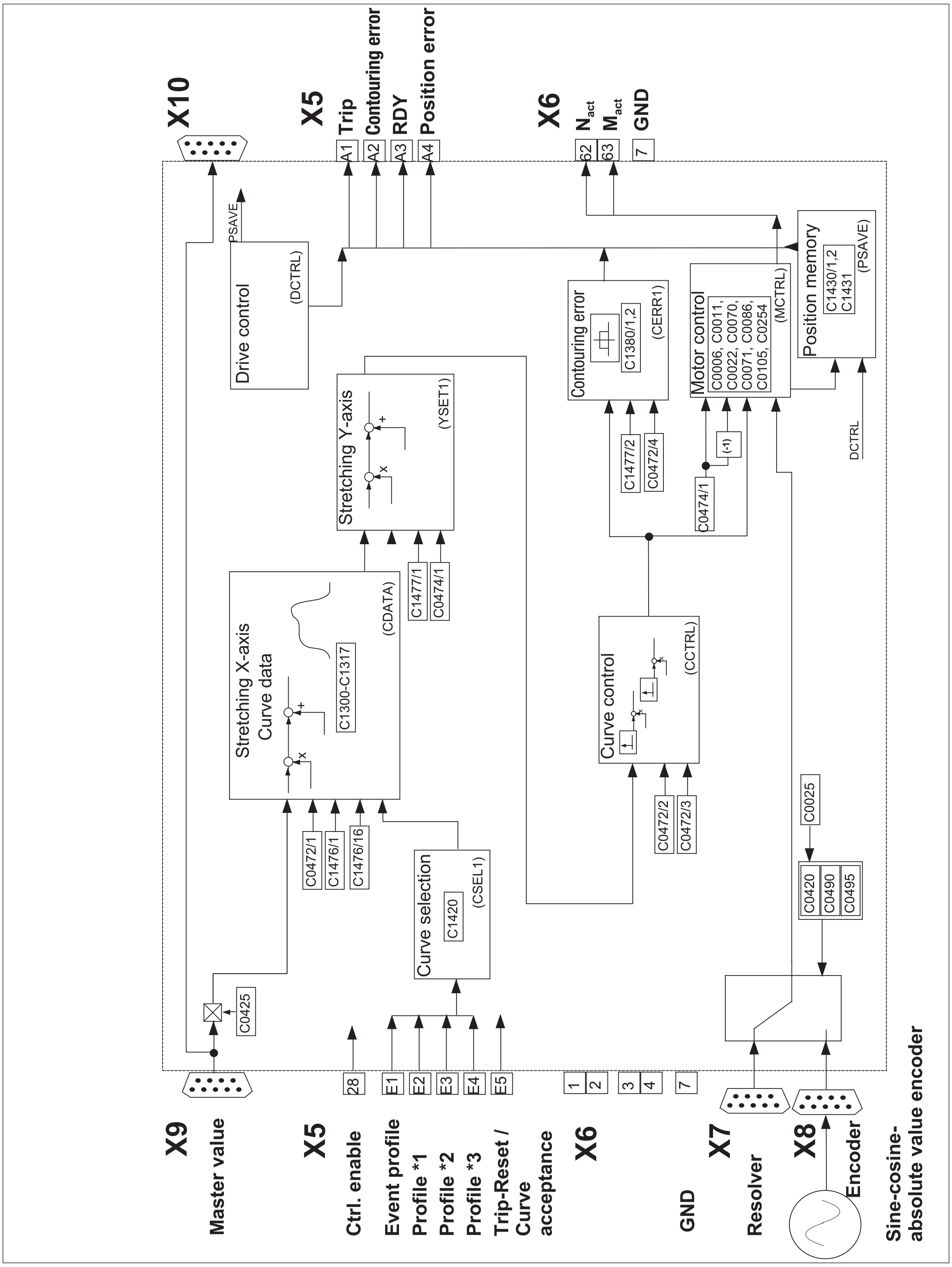
Profile 1	Electronic gear (linear position profile)
Profile 2	Forward / backward movement with a standstill in the intersection of the motion
Profile 3	Forward / backward movement with a standstill at the end of motion
Profile 4	Smooth feed
Profiles 5 - 8	No motion

Warning!
With factory setting, the motor must be off load, i.e. it must have a mechanical connection with the machine.

5.9.2 Configuration C0005 = 10000 cam profiler (see chapter 15.1, (📖 15-1))

5.9.3 Configuration C0005 = 11000 welding bar drive (see chapter 15.2, (📖 15-3))

5.9.4 Configuration C0005 = 12000 operation with positioning memory



With this configuration it is not reasonable to use an incremental encoder as *feedback system*.

Commissioning

Code	Description
C0005=12000	With this configuration and an absolute feedback system (resolver or sin/cos encoder), the position values of the motor shaft can be stored when switching off the mains. When the mains is switched on again, the actual values will compared to the stored values.
• Master value	
C0425	Encoder constant of the master value
• Cam profile data	
C1300-C1317	The cam profile data are determined when generating cam profile data. Usually, the don't have to be changed separately.
C1420	Determines the profile to be used when a event input is activated (digital input E1 = LOW).
• Contouring error evaluation	
C1380/1 and C1380/2	Determine comparison window and hysteresis of the following error evaluation.
• Adjustment values	
C0472/2	Influence of speed precontrol
C0472/3	Influence of torque precontrol
C1477/2	Contouring error limit (in s_units)
C0472/4	Reduction factor for contouring error warning; warning limit = C0472/4 x C1477/2
• Profile influence	
C1472/1	Stretching / compression X axis (100% = no stretching / compression)
C1476/1	Phase trimming in X-direction
C1477/1	Phase trimming in Y-direction
• Position memory	
C1430/1,2	Tolerance window of the comparison functions
C1431	Determination of values to be stored (master and/or actual value)
C1476/16	TOUCH-PROBE position in X-direction
C472/9	Stretching/compression of Y-axis
C472/10	Torque limit value

5.9.5 Basic configuration C0005 = 1xXxx

5.9.5.1 Configurations 1X0XX: No additional function

The signal flow corresponds to the basic functions described in chapters X.1 - X.3.

5.9.5.2 Configurations 1X1XX: Homing function

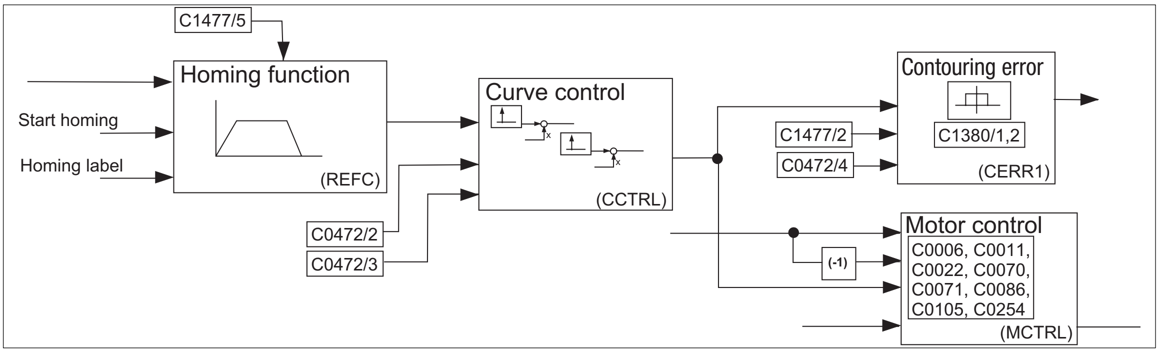


Fig. 5-7 Signal-flow section with homing function

Digital term. X5		Analog term. X6	
Input	Function	Input	Function
Terminal 28	Ctrl. enable	Terminals 1, 2	
E1	Event profile	Terminals 3, 4	
E2	Profile *1		
E3	Start homing		
E4	Home mark		
E5	Trip reset / profile acceptance		
Output	Function	Output	Function
A1	Trip	Terminal 62	Actual speed
A2	Contouring error	Terminal 63	Act. torque value
A3	RDY		
A4	Reference O.K.		

Additionally relevant codes:	
C1477/5	Home position
Parameter of FB REFC:	
C0011	Max. speed n_{max}

5.9.5.3 Configurations 1x2xx: Clutch function

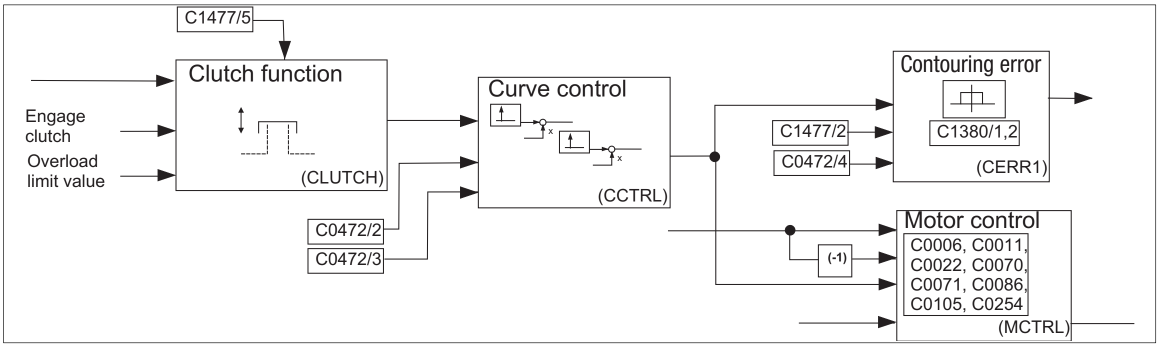


Fig. 5-8 Signal-flow section with clutch function

Digital term. X5			Analog term. X6	
Input	Function		Input	Function
Terminal 28	Ctrl. enable		Terminals 1, 2	
E1	Event profile		Terminals 3, 4	
E2	Profile *1			
E3	Profile *2			
E4	Engage clutch			
E5	Trip reset / profile acceptance			
Output	Function		Output	Function
A1	Trip		Terminal 62	Actual speed
A2	Contouring error		Terminal 63	Act. torque value
A3	RDY			
A4	Clutch disengaged			
Additionally relevant codes:				
C1477/5	Home position			
Parameter of FB Clutch:				
C1410	Clutch mode			
C1411	Max. velocity			
C1412/1	Open time ramp			
C1412/2	Ramp profile generator			
C1412/3	Time delay overload			
C1413	Catch hysteresis			

5.9.5.4 Configurations 1x3xx: Switch points (cam)

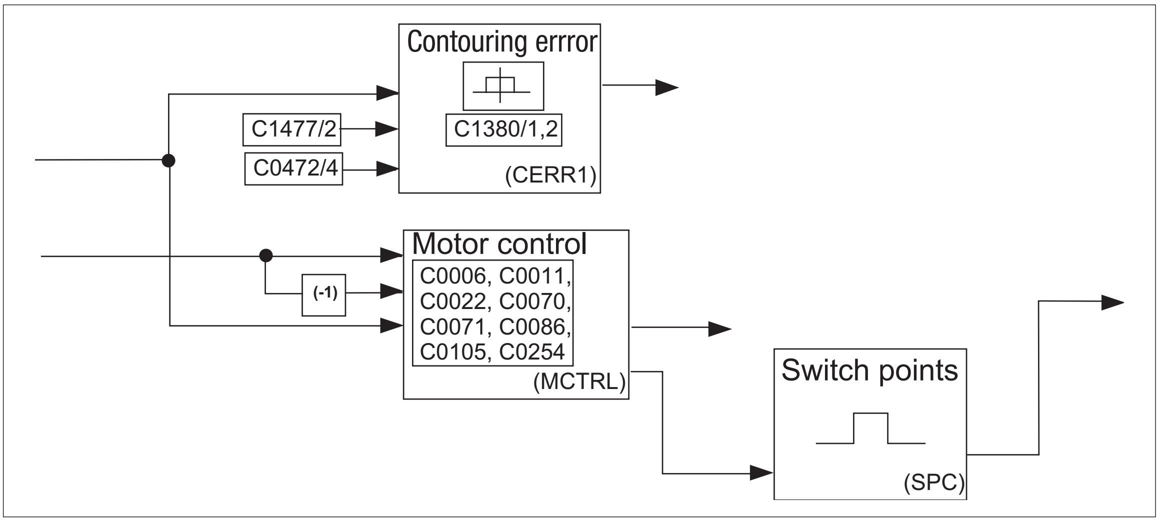


Fig. 5-9 Signal-flow section with switch points

Digital term. X5			Analog term. X6	
Input	Function		Input	Function
Terminal 28	Ctrl. enable		Terminals 1, 2	
E1	Event profile		Terminals 3, 4	
E2	Profile *1			
E3	Profile *2			
E4	Profile *4			
E5	Trip reset / profile acceptance			
Output	Function		Output	Function
A1	Trip		Terminal 62	Actual speed
A2	Contouring error		Terminal 63	Act. torque value
A3	RDY			
A4	Point 1			

Additionally relevant codes:
C1476/x or C1477/x can be used as switch point value.

Parameter of FB SPC1 / SPC2:	
C1645	SPC1 mode
C1655	SPC2 mode
C1657/1 ... 4	SPC2 dead time
C1658	SPC2 hysteresis
C1659	Filtering

5.9.5.5 Configurations 1x8xx: Mark-controlled correction of the master value

Changed terminal assignment	
E1	Event
E2	Profile *1
E3	Profile *2
E4	Trip reset / profile acceptance
E5	TOUCH-PROBE signal input
C1476/16	TOUCH-PROBE position X

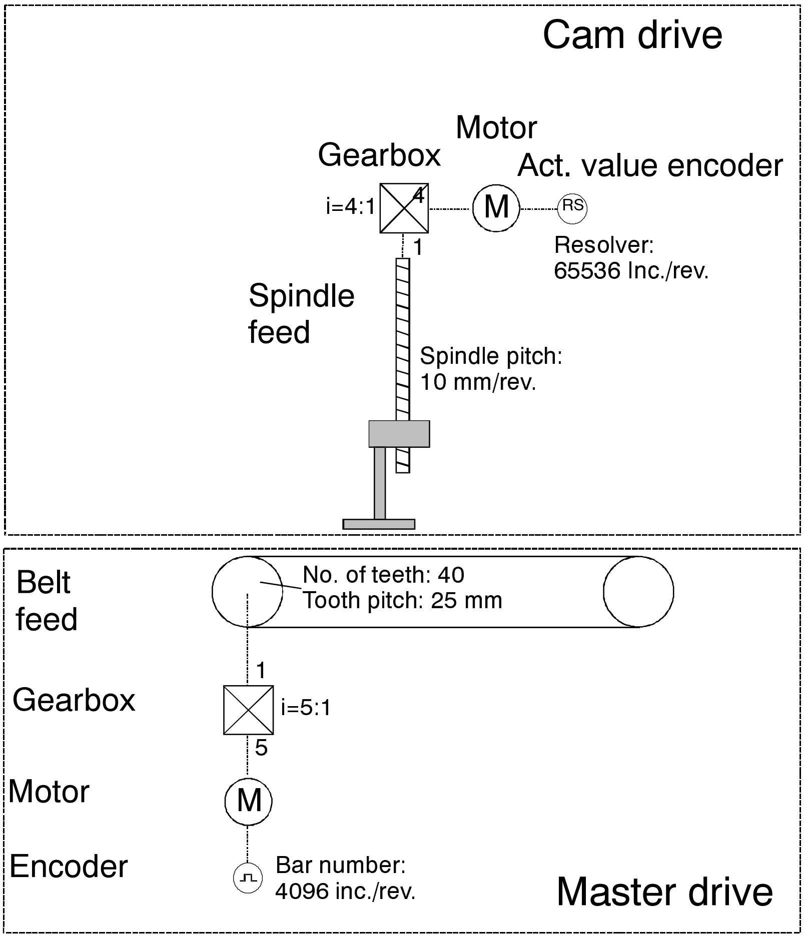
5.9.5.6 Configurations 1x9xx: Mark-controlled correction of the act. value

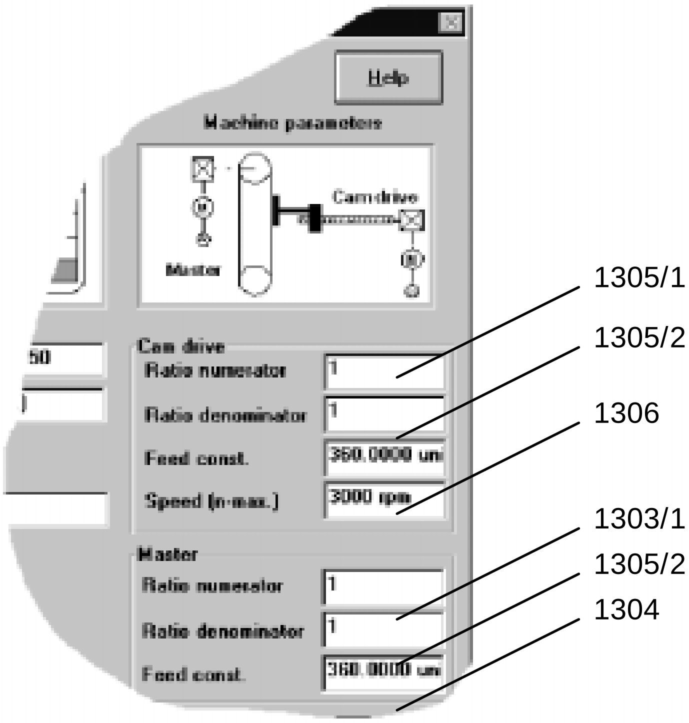
Changed terminal assignment	
E1	Event
E2	Profile *1
E3	Profile *2
E4	TOUCH-PROBE signal input: X
E5	TOUCH-PROBE / profile acceptance: Y
C1477/16	TOUCH-PROBE position : Y

5.10 Definition by means of an example

5.10.1 Normalization

- For normalization, mechanical system variables and encoder system variables are input. The units of the master drive (m-units) and the cam drive (s-units) are freely selectable (e.g. mm, pieces, etc.) .





Master drive: Belt feed

Unit master value: 1 m_unit (master-unit) = 1 mm

C1303/1	=	5
C1303/2	=	1
C1304	=	1000 mm/rev. (= 40 teeth x 25 mm per tooth)

The incremental reference is determined by the selection of the master encoder source.

Cam drive: Leadscrew feed

Unit cam drive: s_unit (slave-unit) = 1 mm

C1305/1	=	4
C1305/2	=	1
C1306	=	10 mm/rev (leadscrew pitch)

The incremental reference is determined by the position feedback system that is selected.

5.10.2 Data structures

The following structure is used in the following chapter:

Master value / master value direction	X / X axis / X direction
Actual value / output / cam profile direction	Y / Y axis / Y direction
Point	X/Y-value pair

Altogether 2048 points are available for cam profile data. The distribution depends on the number of cam profiles selected:

Number of profiles	Points per profile*
1	2048
2	1024
4	512
8	256

* The selection of the absolute data model can reduce the number of points to a quarter.

In general, two different data models are available. They are selected via GDC.

1. **Relative data model**
   A profile consists of 5 sections with equidistant points per section, i.e. the distance between the points is constant in the X direction. The number of points available depends on the number of profiles selected (see table). This data model makes optimum uses of the available data range.
2. **Absolute data model**
   A profile consists of arbitrarily distributed points. This data model is the most flexible one, but can however only be used for import data which have been optimised for linear interpolation. The number of points available is reduced to 25 % because of the memory space required by the absolute value pairs.

Note!

The procedure described in chapter 5ff. only refers to the use of the relative data model. For further information see the on-line help of GDC.

6 During operation

6.1 Status indications

6.1.1 At 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 $\geq$ C0022	Motor current setpoint $<$ C0022
M_{MAX}	Speed controller within its limitation. Drive is torque controlled.	Speed controlled drive

During operation

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.

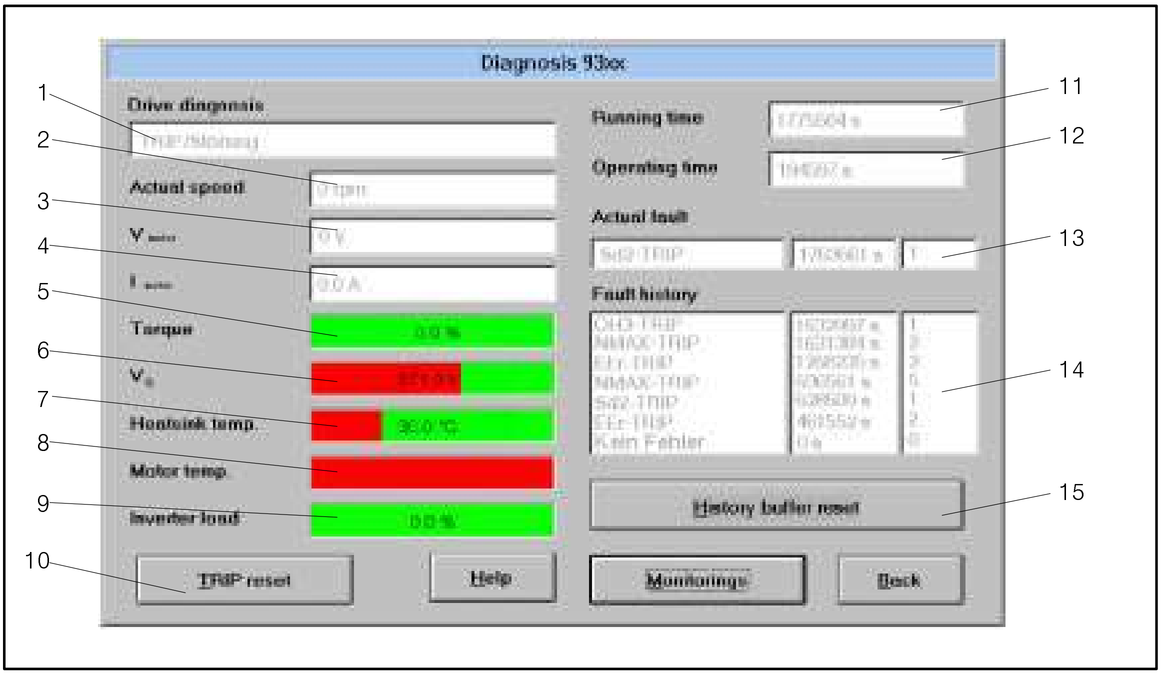


Fig. 6-1 Dialog box ”Diagnostics 9300”

1	Type of fault
2	Actual speed
3	Actual motor voltage
4	Actual motor current
5	Motor torque
6	DC-bus voltage
7	Heatsink 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 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).

During operation

6.2.2 Controller protection through 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 heatsink temperature (see Fig. 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 Fig. 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 Fig. 6-2).

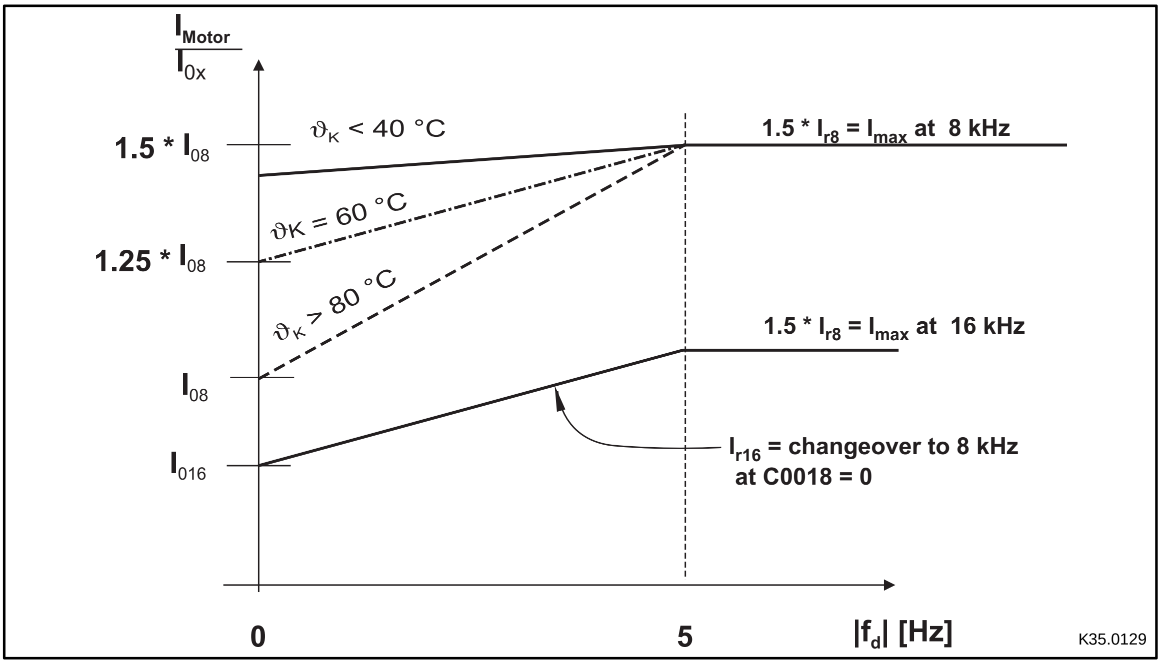


Fig. 6-2 Current derating function for types 9326 to 9332

ϑ_K	Heatsink temperature
I_{rx}	Rated current at U, V, W depends on the chopper frequency
f_d	Field frequency at the 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--KD3.1
00407353

Lenze

Manual
Part D3.1

Configuration

Global Drive

9300 cam profiler

This documentation is only valid for 9300 cam profilers as of version:

33.932X	EK	2x	1x		(9321 - 9329)
33.933X	EK	2x	1x		(9330 - 9332)
33.932X	CK	2x	1x	- V003	Cold Plate (9321 - 9328)

Type

Desgin:
Ex = Built-in unit IP20
Cx = Cold Plate
xK = Cam profiler
xP = Positioning controller
xR = Register controller
xS = Servo inverter

Hardware level and index

Software level 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 2.0 03/99

Show/Hide Bookmarks

Part D 3.1

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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 by means of codes. (📖 7-4)

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 the basic configuration under C0005.
2. Select the operating mode under C0005. (📖 7-289)
3. Configure different signal flow charts, if necessary:
   – Integrate or remove function blocks. (📖 7-4)
   – Set parameters for function blocks. (📖 7-5)
   – Change terminal configuration.

Note!

If the signal flow for the basic configuration has 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 has changed, C0005 remains the same. Under code C0464 an identification is displayed.

7.2 Operating modes

Determine the operating mode, the 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:

- 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 will be rejected.

7.3.2 Elements of a function block

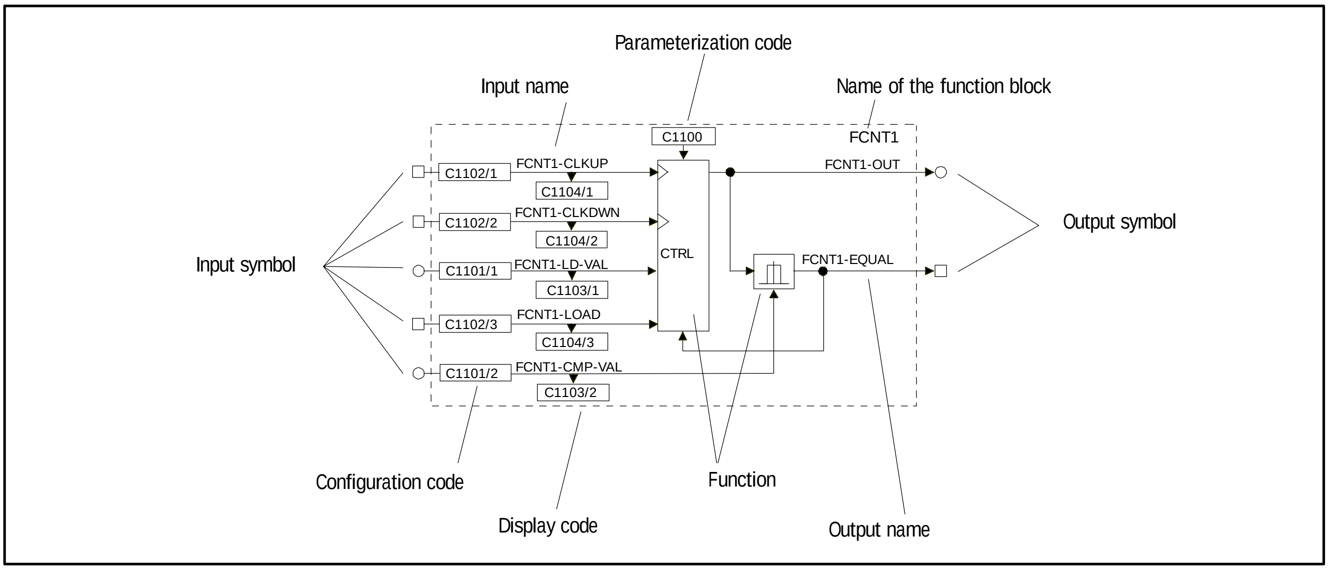


Fig. 7-1 Structure of a FB using the example of FCNT1

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.(🕮 7-14) . The selection numbers are listed in selection list 5. (🕮 7-323) .

Example:

(FCNT1, see Fig. 7-1)

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

Input symbol

Designates the signal type which is allowed as signal source for this input. (🕮 7-4)

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. Fig. 7-1

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. (🕮 7-4)

Every output is defined by a selection number.The selection numbers are subdivided into selection tables (1 ... 4) according to the different signal types. (🕮 7-323)

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

Example:

(FCNT1, see Fig. 7-1)

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

Note!

Output, 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). (🕮 13-4)

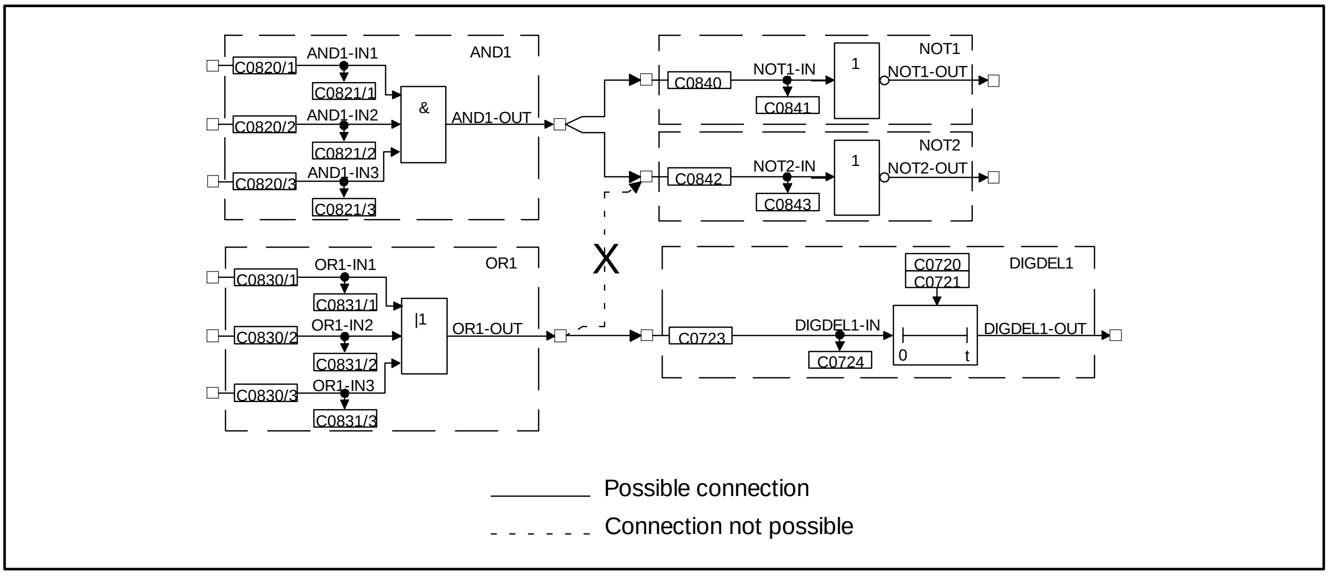


Fig. 7-2 Correct connection of function blocks

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.

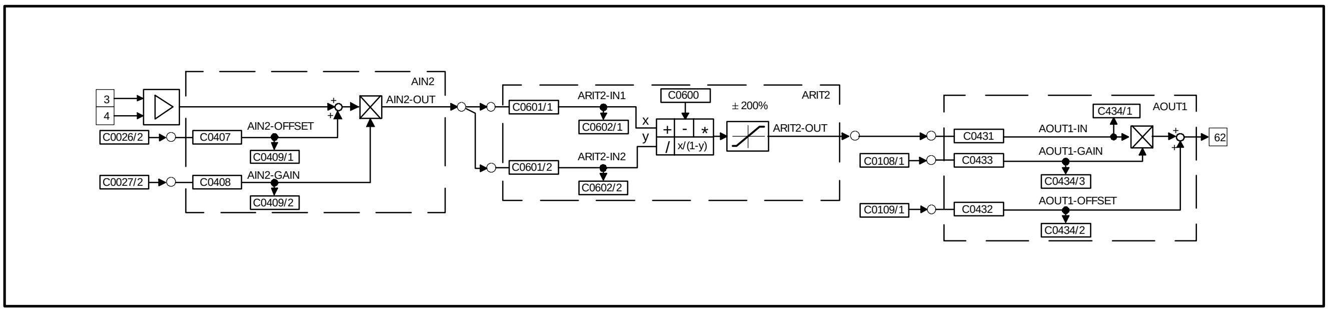


Fig. 7-3 Example of a simple configuration

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.

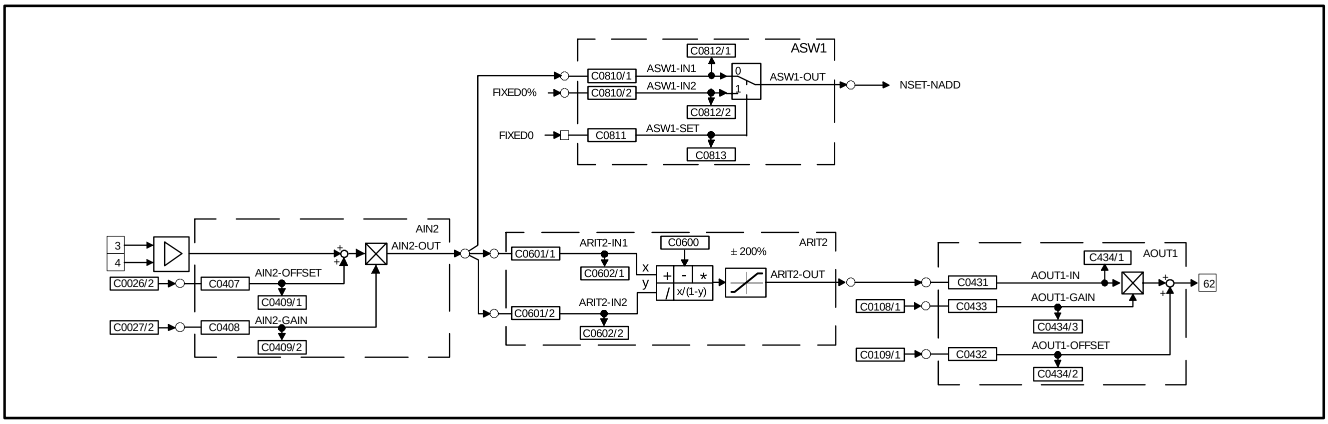


Fig. 7-4 Remove connections in a configuration

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.

7.4 Change of the terminal assignments

(see also chapter 7.3 "How to use function blocks")

If the configuration is changed via C0005, the assignment of all inputs and outputs will be overwritten with the corresponding basic assignment. If necessary, the function assignment must be adapted to the wiring.

Note!

Use the menu "Terminal I/O" for the keypad 9371BB or the menu "Terminal I/O" for Global Drive Control or LEMOC2.

Stop!

To reassign an input, the signal source assigned before will **not** be overwritten! Remove all active connections not wanted (see chapter 7.3.3).

7.4.1 Freely assignable digital inputs

There are 5 freely assignable digital inputs (X5/E1 ... X5/E5). It is possible to determine the polarity for each input, i.e. the input is HIGH active or LOW active.

Change assignment:

Note!

Use the submenu "DIGIN" for the keypad 9371BB or the submenu "Digital inputs" for Global Drive Control or LEMOC2.

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

Here are the most important aims for digital inputs

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 (Term. X5/E1)	0051	HIGH = do not invert main setpoint (CW rotation)
C0886	000	R/L/Q-L	DIGIN2 (Term. X5/E2)	0052	HIGH = Invert main setpoint (CCW rotation)
C0787	001	NSET-JOG*1	DIGIN3 (Term. X5/E3)	0053	HIGH = Main setpoint is substituted by the fixed speed from C0039/x The signals are binary coded.
	002	NSET-JOG*2	FIXED0 -	1000	
	003	NSET-JOG*4	FIXED0 -	1000	
	004	NSET-JOG*8	FIXED0 -	1000	
C0788	001	NSET-TI*1	FIXED0 -	1000	Additional acceleration and deceleration times from 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 7.8.2.4)
	002	DCTRL-PAR*2	FIXED0 -	1000	
C0881	000	DCTRL-PAR-LOAD	FIXED0 -	1000	Signal LOW-HIGH loads selected parameter set with DCTRL-PAR*x
C0871	000	DCTRL-TRIP-SET	DIGIN4 (Term. X5/E4)	0054	LOW = Controller sets TRIP (EEr)
C0876	-	DCTRL-TRIP-RES	DIGIN5 (Term. X5/E5)	0055	Signal LOW-HIGH = Resets active trip
C0920	000	REF-ON	FIXED0 -	1000	HIGH = Start homing
C0921	000	REF-MARK	FIXED0 -	1000	Singal LOW-HIGH = Stop homing

1. Select the input of the function blocks which is to be assigned to a new source under 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 indicated list. Please consider: Where does the signal for the control of this input come from?
   – Example:
   ”NSET-JOG*2” is to be controlled by terminal X5/E5 (interface).
   – For this, select DIGIN5 (signal) and acknowledge with SHIFT + PRG.
3. Change to the code level using 2 *.
4. Determine the polarity of the input terminals X5/E1 to X5/E5 (HIGH active or LOW active) under code C0114 and subcode.
   – In the code level the terminal is selected via subcode.
   – Change to the parameter level using PRG and select the polarity.
   – Change to the code level by 2 * PRG.
5. Repeat steps 1. to 4. until all inputs required are assigned.
6. Remove all connections not wanted (see chapter 7.3.3). The previous connection of terminal X5/E5 will not be removed automatically. Removal of 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 acknowledge with SHIFT+PRG.

7.4.2 Freely assignable digital outputs

4 freely assignable digital outputs are available (X5/A1 … X5/A4). It is possible to determine the polarity for each input, i.e. 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 via the subcode under C0117.
2. Change to the parameter level using PRG. Select the signal from the list which is to be output via the selected output terminal. Change to the code level using PRG.
3. Determine the polarity (HIGH active or LOW active) via the subcode of the output under C0118.
4. Repeat steps 1. to 3. until all outputs required are assigned.

7.4.3 Freely assignable analog inputs

The most important codes are indicated 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 be assigned to a new 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 from the list which is to be used as source for the selected input.
3. Repeat steps 1. and 2. until all inputs required are assigned.
4. Remove all connections not wanted (see chapter 7.3.3).

7.4.4 Freely assignable monitor outputs

Use the monitor outputs X6/62 and X6/63 to output internal signals as voltage signals.

Under C0108 and C0109 the outputs can be adapted to e.g. a measuring device or a slave drive.

The most important codes are indicated 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 be assigned to another signal (source) (e. g. C0431 for output X6/62) in the code level.
2. Change to the parameter level using PRG. Select the signal from the list which is to be output via the monitor output.
3. If necessary, adjust an offset in the hardware under C0109
4. If necessary, the signal gain can be adapted to the hardware under C0108.
5. Repeat 1. to 4. to assign the second output.

7.4.5 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 strongly, 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, these 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:

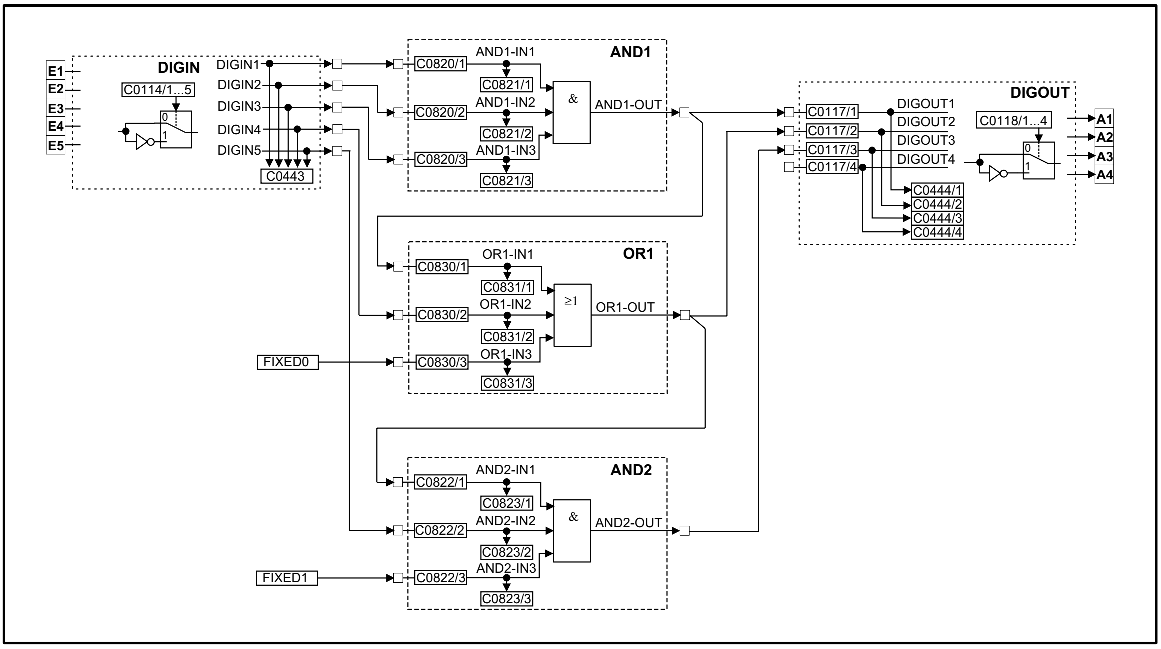


Fig. 7-5 Example of a configuration

Struction of the processing table for the configuration example in Fig. 7-5:

1. DIGIN need not to be entered into the processing table.
2. First FB is AND1, since it gets its input signals from DIGIN and is only connected to successors.
3. 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 into the processing table before its successor.
4. 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 started with position 10 because the factory setting is not assigned to any of these positions.

FBs need not to be entered into the processing table one after the other. The processing table tolerates unassigned positions.

Note!
It is also possible to enter FBs different from the FBs indicated in the example.

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

The following signal sources are always executed and need not 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

Faulty operation	Cause	Remedy
FB does not set an output signal	FB was not entered into the processing table C0465	Enter FB
FB indicates constant signals only	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 send to the next FB	No connection between the FBs	Create connection (following FBs) via the configuration code (CFG)
FB cannot be entered into table C0465	Not enough remaining processing time (see C0466)	If necessary, delecte 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 delays the transfer of internally calculated signal to the outputs.	The processing sequence for the FBs is wrong.	Adapt the processing table to the signal flow (C0465).

7.5 Description of cam profile generation

Three methods are available:

- Cam profile import
  - The method has already been described as an example in the chapter 'Commissioning' (see chapter 5.7 Cam profile import)
    The cam profile import enables the use of already existing cam data, e.g. from calculation programs or design data. The ASCII format is supported. The ASCII file must contain X/Y value pairs. For further information see the on-line help of GDC.
- Mathematical cam profile generation
  - The profile is determined by the input of mathematical functions. The basis is the 5th degree polynomial, the offset sine curve and standstill, which are indicated in the German regulation VDI 2143.
- Graphical cam profile generation (in preparation)

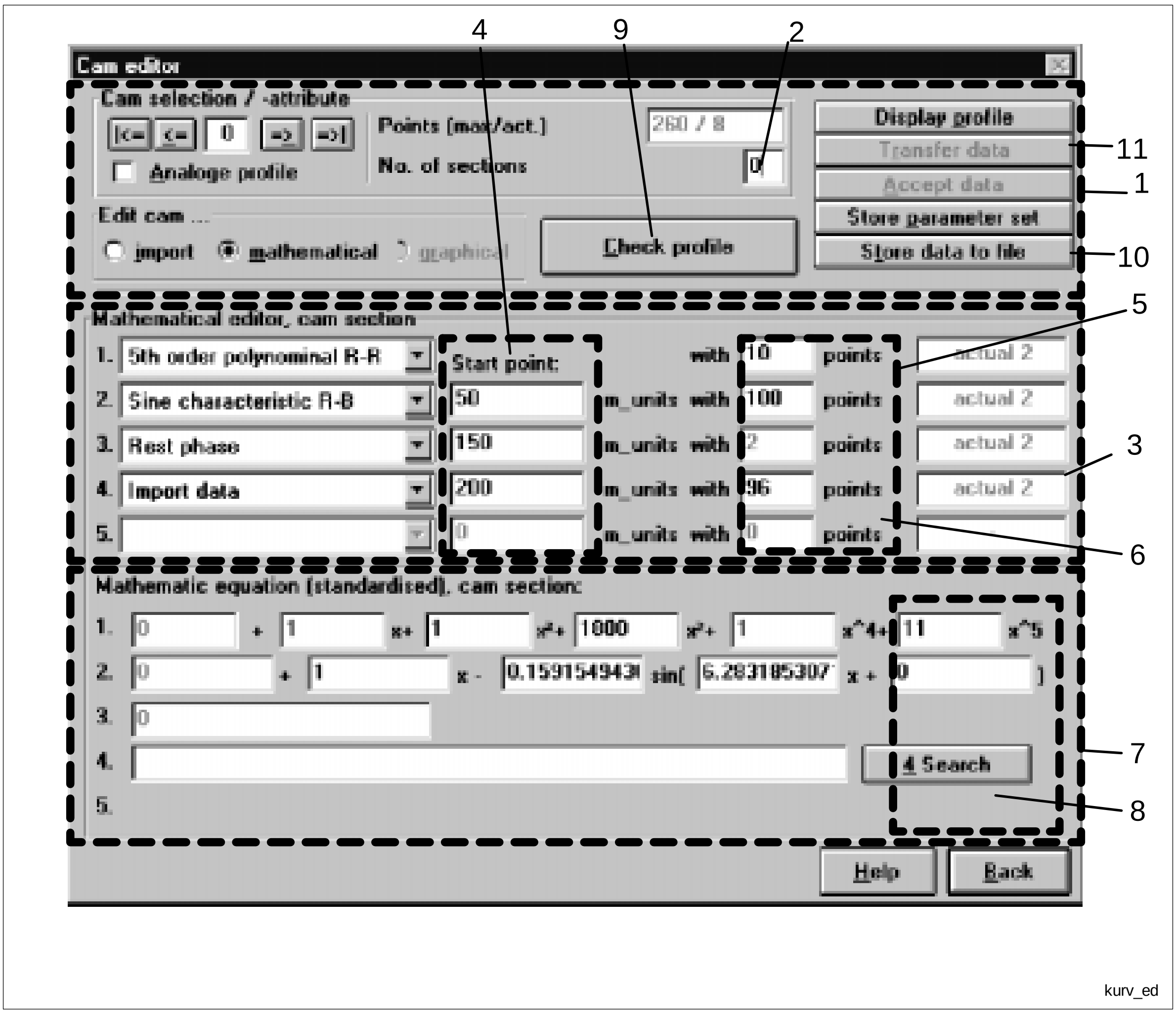


Fig. 7-6 Dialog “Mathematical profile generation”

Select the profile to be processed in the upper dialog area (1). Depending on the number of sections (2), the corresponding number of possible selections is provided in the middle dialog (3). Available are:

1. 5th degree polynomial
2. offset sine curve
3. standstill and
4. synchronous ranges (import data)

The length of a section is indicated in (4). The calculation is based on the first section starting at X=0 and the last section ending at $X=X_{max}$. Enter the number of points required for every section under (5). "Standstill" and synchronous ranges are exceptions because the required number of points is automatically selected depending on the section length. The number of points for the last section is also determined automatically by the remaining number of points (see basic data dialog).

Note!

Observe the number of points available (6).

The input fields assigned to the selected equation are indicated in the lower dialog area (7). The upper range value of each section is output in the right area of input fields (8). The profile characteristic is automatically calculated in the background. The status display (9) indicates whether the cam data have been input correctly or not (e.g. discontinuous profile).

After the calculation, the data can be stored on any data medium (10) transmitted to the controller (11) by using the corresponding buttons.

Note!

First process all the profiles used. Cam profile data are always transferred as a block. The transmission time is approx. 1-2 minutes.
Please observe, that the data must be accepted by the active data range of the controller after data transmission (see chapter 5.7.2).
If the data are to be used after mains disconnection, they must be stored via code C0003 after transmission.

7.6 Description of function blocks

Function blocks

Function block	Description	CPU time [µs]	used in basic configuration C0005			
			1000	10000	11000	12000
ABS1	Absolute value generator	5		●	●	●
ADD1	Addition block 1	9				
AIF-OUT	Field bus	60	●	●	●	●
AIN1	Analog input X6/1, X6/2	11				
AIN2	Analog input X6/3, X6/4	29				
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					
ANEG1	Analog inverter 1	4	●	●	●	●
ANEG2	Analog inverter 2					
AOUT1	Analog output X6/62	13	●	●	●	●
AOUT2	Analog output X6/63		●	●	●	●
ARIT1	Arithmetic block 1	12				
ARIT2	Arithmetic block 2					
ARITPH1	32-bit arithmetic block	15				
ARITPH2	32-bit arithmetic block					
ARITPH3	32-bit arithmetic block					
ARITPH4	32-bit arithmetic block					
ARITPH5	32-bit arithmetic block					
ARITPH6	32-bit arithmetic block					
ASW1	Analog changeover 1	4	●			
ASW2	Analog changeover 2					
ASW3	Analog changeover 3					
ASW4	Analog changeover 4					
BRK	Trigger holding brake	17				
CAN-OUT	System bus	60	●	●	●	●
CCTRL	Setpoint conditioning	40		●	●	●
CDATA	Cam data conditioning	150		●	●	●
CERR	Contouring error monitoring	20		●	●	●
CLUTCH	Virtual clutch	50				
CMP1	Comparator 1	15	●			
CMP2	Comparator 2					
CMP3	Comparator 3					
CONV1	Conversion	9				
CONV2	Conversion					
CONV3	Conversion					
CONV4	Conversion					
CONV5	Conversion					
CONV6	Conversion					
CONVPHA1	32 bit conversion	6				
CONVPHD1	Conversion - stretching factor	50				
CONVPHPH1	32 bit conversion	80				
CONVPHPHD1	Conversion - phase change into speed	50				
CONVPP1	32 bit / 16 bit conversion	55				
CSEL1	Cam profile selection	20		●	●	●

Function block	Description	CPU time [µs]	used in basic configuration C0005			
			1000	10000	11000	12000
CURVE1	Characteristic function	15				
CURVEC1	Characteristic function	90				
DB1	Dead band	8				
DCTRL	Device control	-	●			
DFIN	Digital frequency input	6	●	●	●	●
DFOUT	Digital frequency output	38	●		●	●
DFRFG1	Digital frequency ramp generator	44				
DFSET	Digital frequency processing	93				
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	-	●	●	●	●
DT1-1	Differential element	13				
FCNT1	Piece counter	11				
FCODE 108/1	Free control codes	-	●	●	●	●
FCODE 108/2			●	●	●	●
FCODE 109/1			●	●	●	●
FCODE 109/2			●	●	●	●
FCODE 141						
FCODE 17			●			
FCODE 175						
FCODE 250						
FCODE 26/1			●	●	●	●
FCODE 26/2			●	●	●	●
FCODE 27/1			●	●	●	●
FCODE 27/2			●	●	●	●
FCODE 32						
FCODE 37						
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						
FCODE 473/1						
FCODE 473/2						
FCODE 473/3						

Function block library

Function block	Description	CPU time [µs]	used in basic configuration C0005			
			1000	10000	11000	12000
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 474/6						
FCODE 474/7						
FCODE 474/8						
FCODE 474/9						
FCODE 474/10						
FCODE 475/1						
FCODE 475/2						
FCODE 1476/1				•	•	•
FCODE 1476/2						
FCODE 1476/3						
FCODE 1476/4						
FCODE 1476/5						
FCODE 1476/6						
FCODE 1476/7						
FCODE 1476/8						
FCODE 1476/9						
FCODE 1476/10						
FCODE 1476/11						
FCODE 1476/12						
FCODE 1476/13						
FCODE 1476/14						
FCODE 1476/15						
FCODE 1476/16				•	•	•
FCODE 1477/1				•		•
FCODE 1477/2				•	•	•
FCODE 1477/3						
FCODE 1477/4						
FCODE 1477/5						
FCODE 1477/6						
FCODE 1477/7						
FCODE 1477/8						
FCODE 1477/9						
FCODE 1477/10						
FCODE 1477/11						
FCODE 1477/12						
FCODE 1477/13						
FCODE 1477/14						
FCODE 1477/15						
FCODE 1477/16						
FDO		-				

Function block	Description	CPU time [μs]	used in basic configuration C0005			
			1000	10000	11000	12000
FEVAN1	Free analog input variable	4				
FEVAN2	Free analog input variable					
FIXSET1	Fixed setpoints	10				
FLIP1	D-flipflop 1	7				
FLIP2	D-flipflop 2					
GEARCOMP	Gear torsion	1				
LIM1	Limiter	6				
MCTRL	Servo control	-	•	•	•	•
MFAIL	Mains failure control	44				
MONIT	Monitoring	-	•	•	•	•
MPOT1	Motor potentiometer	22				
MSEL1	Master selection	15				
MSEL2	Master selection	20				
NOT1	Logic NOT, block1	4				•
NOT2	Logic NOT, block2					
NOT3	Logic NOT, block3					
NOT4	Logic NOT, block4					
NOT5	Logic NOT, block5					
NSET	Speed setpoint conditioning	77	•			
OR1	Logic OR, block1	7				•
OR2	Logic OR, block2					
OR3	Logic OR, block3					
OR4	Logic OR, block4					
OR5	Logic OR, block5					
OSZ	Oscilloscope function	70				
PCTRL1	Process controller	63				
PHADD1	32 bit addition block	10				
PHCMP1	Comparator	9				
PHCMP2	Comparator					
PHCMP3	Comparator					
PHDIFF1	32 bit setpoint/act. value comparison	10				
PHDIV1	Conversion	9				
PHINT1	Phase integrator	8				
PHINT2	Phase integrator	8				
PHINT3	Phase integrator					
PSAVE1	Position memory	10				•
PT1-1	1st order delay element	9				
R/L/Q	QSP / setpoint inversion		•			
REFC	Homing function	100				
RFG1	Ramp generator	18				
RFGPH1	Ramp function generator for phase signals	62				
S&H1	Sample and Hold	5				
SELPH1	Long-value selection	6				
SELPH2	Long-value selection					
SPC1	Switch points	80				
SPC2	Switch points	130				
SRFG1	S-shape ramp function generator	15				
STAT	Output of digital status signals	-				
STATE-BUS	Control of a drive network	-				
STORE1	Memory 1	35				
STORE2	Memory 2	20				
SYNC1	Multi-axis positioning	55				

Function block library

Function block	Description	CPU time [µs]	used in basic configuration C0005			
			1000	10000	11000	12000
SWPHD1	Switch - digital frequency	4				
SWPHD2	Switch - digital frequency					
TRANS1	Binary signal evaluation	8				
TRANS2	Binary signal evaluation					
TRANS3	Binary signal evaluation					
TRANS4	Binary signal evaluation					
VMAS	Virtual master	50				
VTPOSC	Positioning control (cam profiler)	45				
WELD1	Welding bar control	20			●	
YSET1	Stretching, compression, offset in Y direction	30		●		●

7.6.1 Absolute value generator (ABS)

Purpose

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

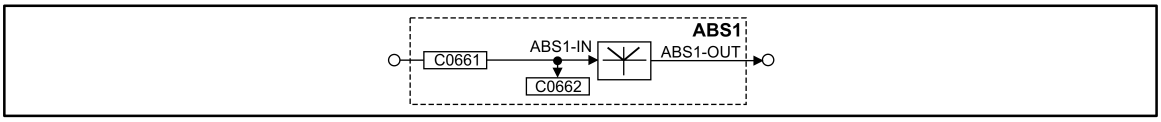
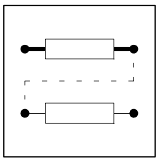


Fig. 7-7 Absolute value generator (ABS1)

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.



7.6.2 Addition block (ADD)

Purpose

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

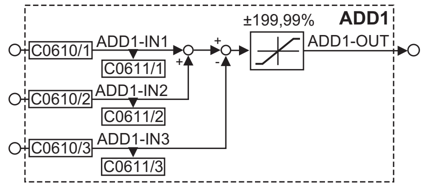


Fig. 7-8 Addition block (ADD1)

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 %.

7.6.3 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.

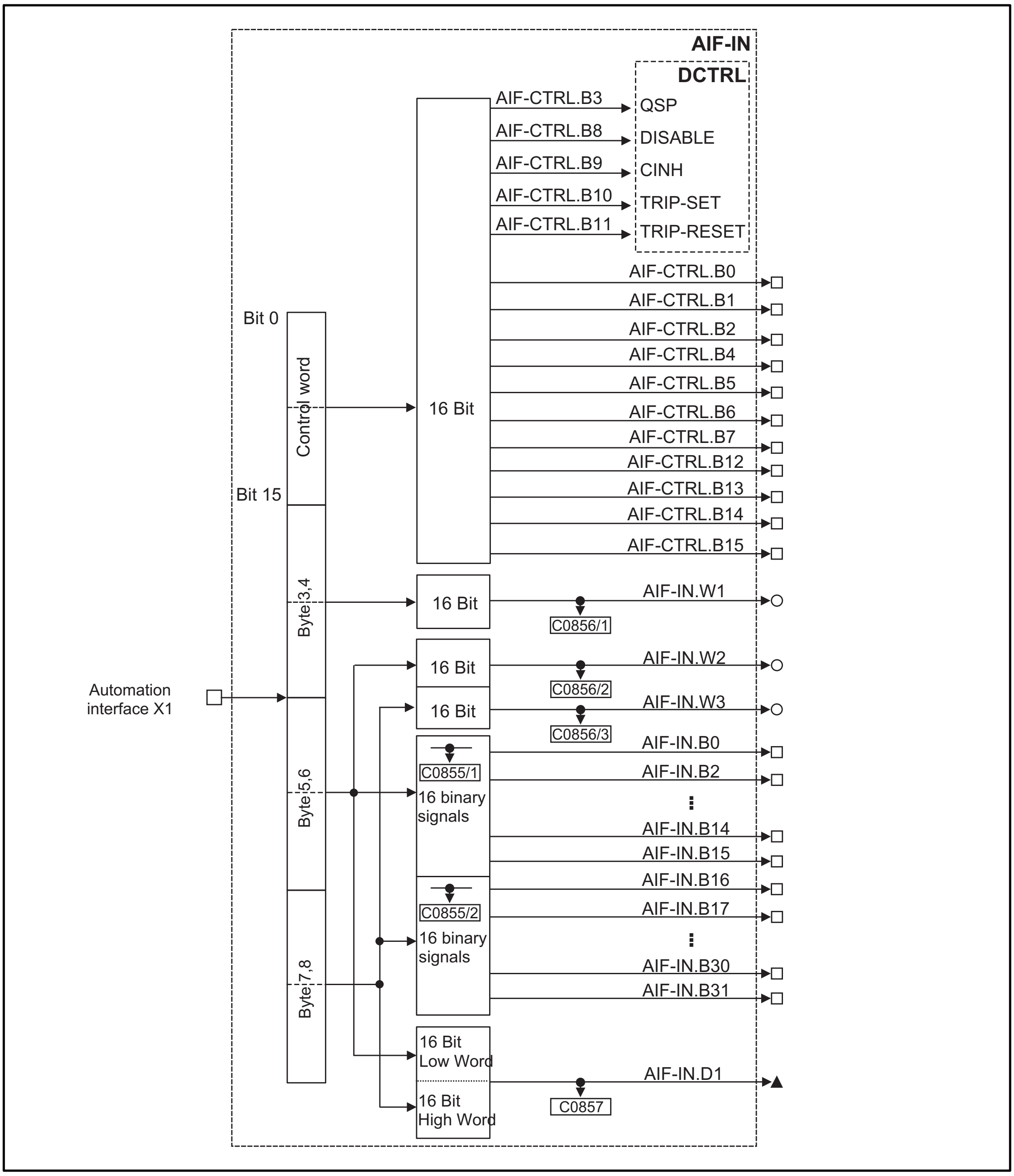


Fig. 7-9 Automation interface (AIF-IN)

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.

7.6.4 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.

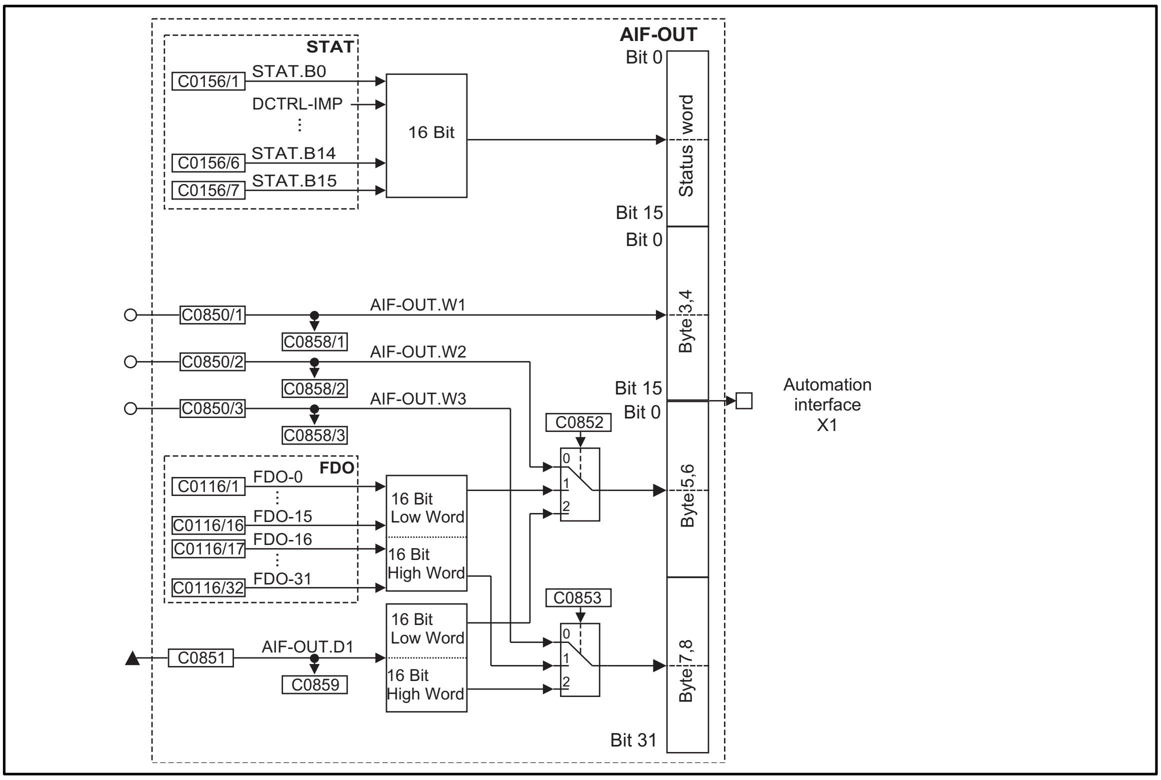


Fig. 7-10 Automation interface (AIF-OUT)

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 7.6.70)

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.

7.6.5 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.

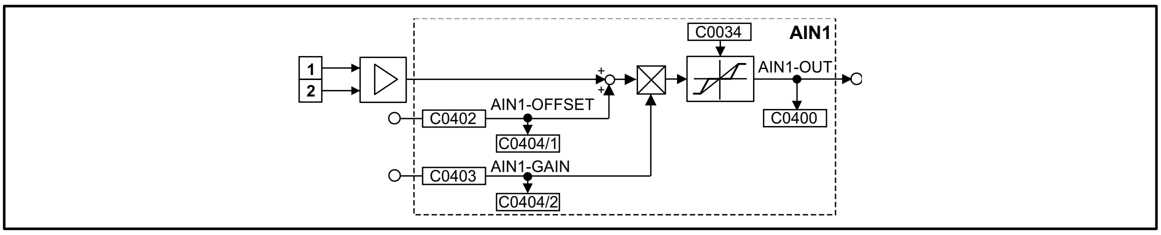


Fig. 7-11 Analog input via terminal 1,2 (AIN1)

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).

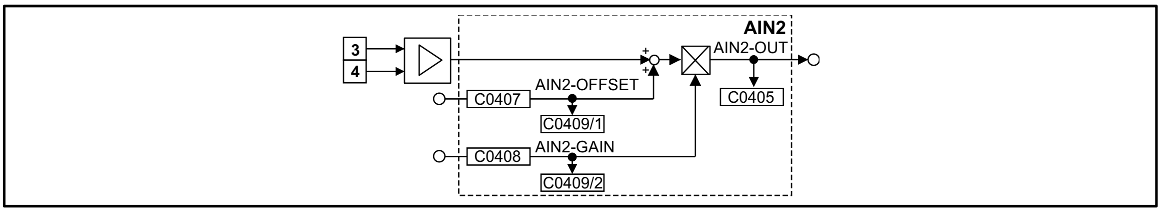


Fig. 7-12 Analog input via terminal 3, 4 (AIN2)

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.

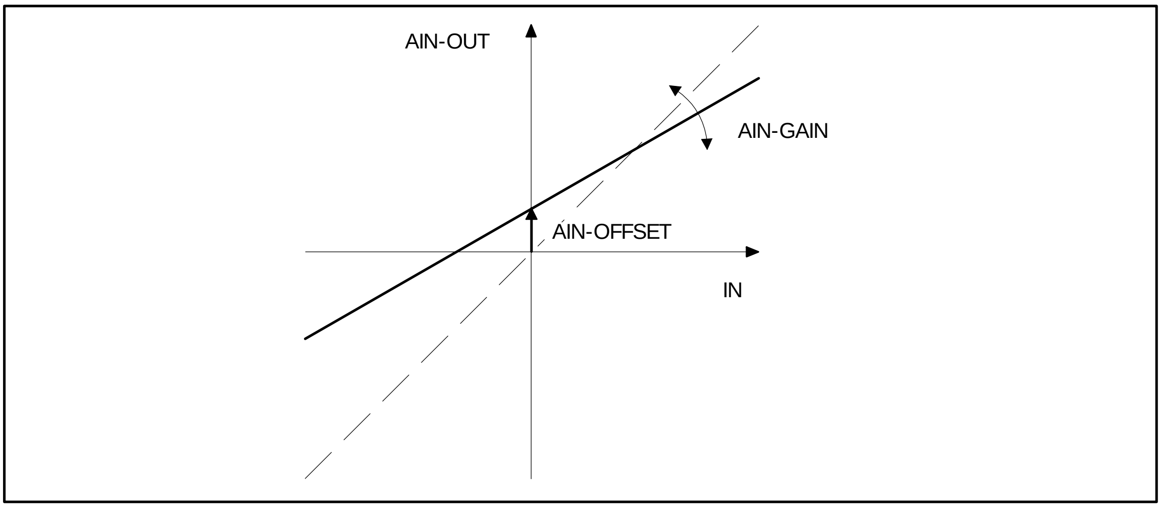


Fig. 7-13 Offset and gain of the analog input

7.6.6 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.

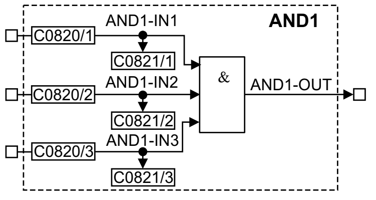


Fig. 7-14 AND function (AND1)

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	-	-	-	-	-	-

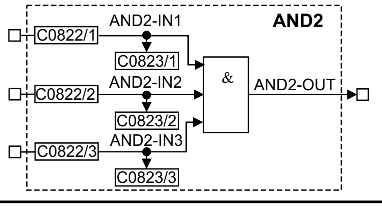


Fig. 7-15 AND function (AND2)

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	-	-	-	-	-	-

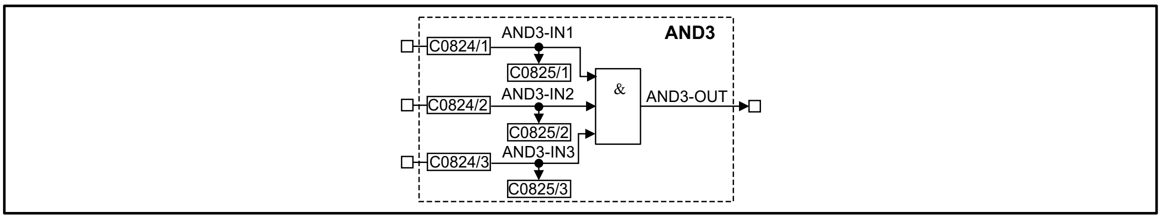


Fig. 7-16 AND function (AND3)

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	-	-	-	-	-	-

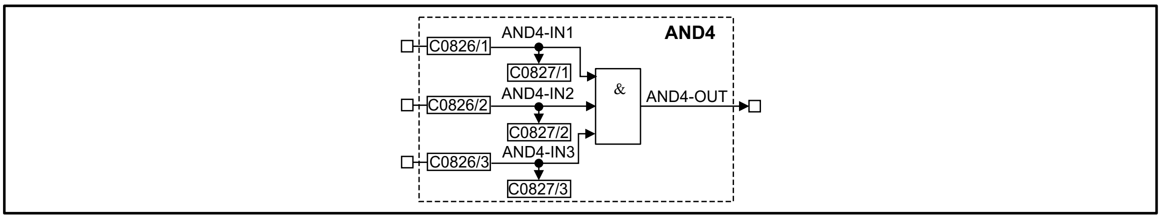


Fig. 7-17 AND function (AND4)

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	-	-	-	-	-	-

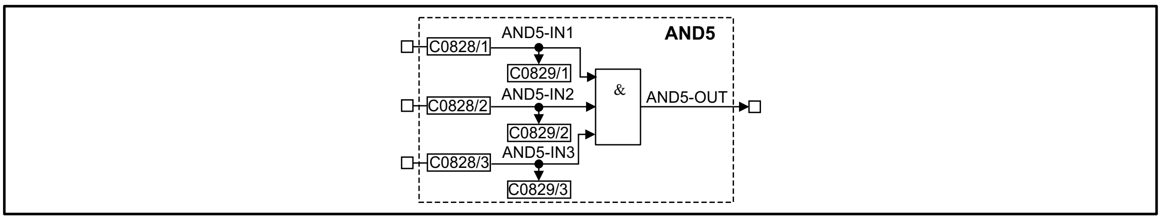


Fig. 7-18 AND function (AND5)

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	-	-	-	-	-	-

Function block library

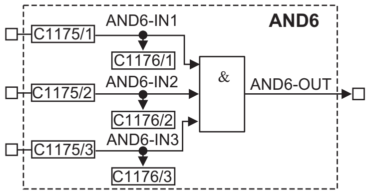


Fig. 7-19 AND function (AND6)

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	-	-	-	-	-	-

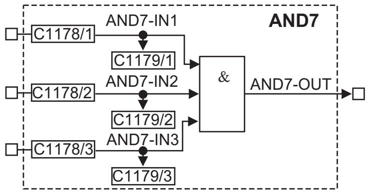


Fig. 7-20 AND function (AND7)

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.

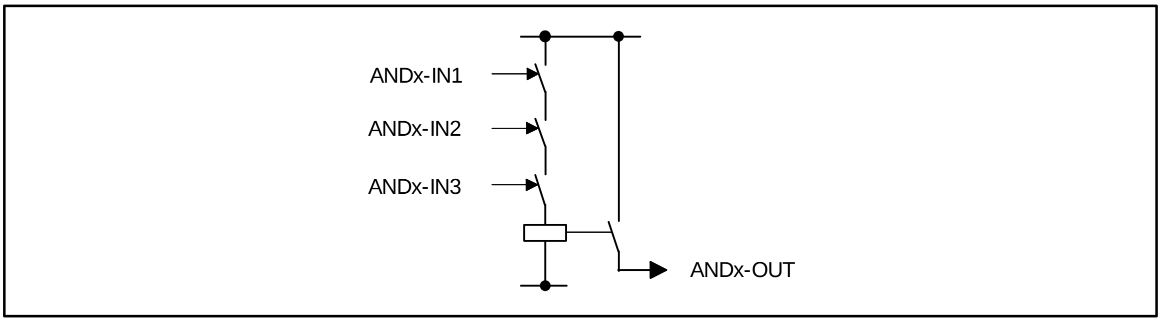


Fig. 7-21 AND function as a series connection of normally-open contacts

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.

7.6.7 Inverter (ANEG)

Purpose

This FB inverts the sign of an analog signal.

Two inverters are available:

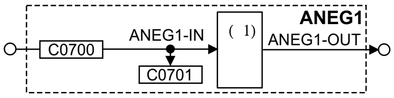


Fig. 7-22 Inverter (ANEG1)

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

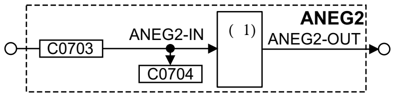


Fig. 7-23 Inverter (ANEG2)

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.

7.6.8 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.

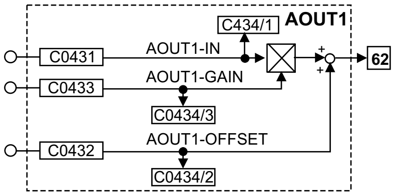


Fig. 7-24 Analog output via terminal X6/62 (AOUT1)

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	-

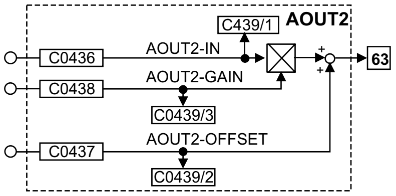


Fig. 7-25 Analog output via terminal X6/63 (AOUT2)

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

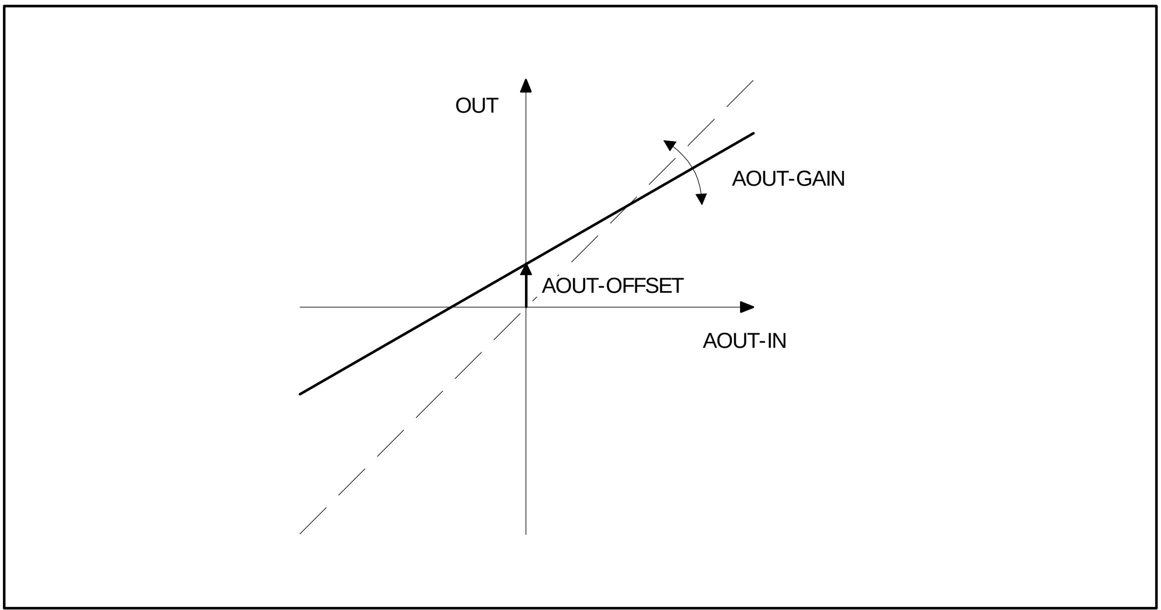


Fig. 7-26 Offset and gain of the analog output

7.6.9 Arithmetic block (ARIT)

Purpose

Logic operation of two ”analog” signals.

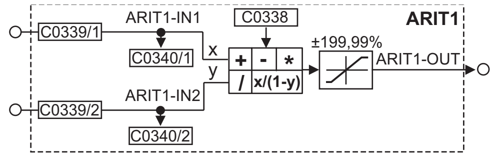


Fig. 7-27 Arithmetic block (ARIT1)

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 %

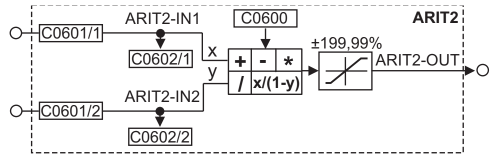


Fig. 7-28 Arithmetic block (ARIT2)

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%)

7.6.10 Arithmetic block (ARITPH)

Purpose

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

ARITPH1

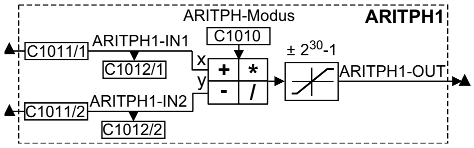


Fig. 7-29 Function block ARITPH1

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	-	-	-	-	

ARITPH2

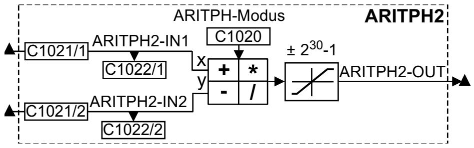


Fig. 7-30 Function block ARITPH2

Signal				Source		Note
Name	Type	DIS	DIS format	CFG	List	
ARITPH2-IN1	ph	C1022/1	dec [inc]	C1021/1	3	-
ARITPH2-IN2	ph	C1022/2	dec [inc]	C1021/2	3	-
ARITPH2-OUT	ph	-	-	-	-	

ARITPH3

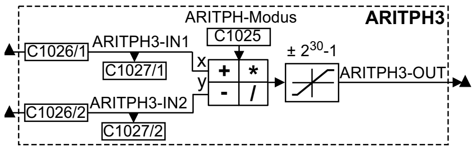


Fig. 7-31 Function block ARITPH3

Signal				Source		Note
Name	Type	DIS	DIS format	CFG	List	
ARITPH3-IN1	ph	C1027/1	dec [inc]	C1026/1	3	-
ARITPH3-IN2	ph	C1027/2	dec [inc]	C1026/2	3	-
ARITPH3-OUT	ph	-	-	-	-	

Function block library

ARITPH4

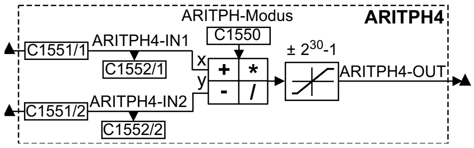


Fig. 7-32 Function block ARITPH4

Signal				Source		Note
Name	Type	DIS	DIS format	CFG	List	
ARITPH4-IN1	ph	C1552/1	dec [inc]	C1551/1	3	-
ARITPH4-IN2	ph	C1552/2	dec [inc]	C1551/2	3	-
ARITPH4-OUT	ph	-	-	-	-	

ARITPH5

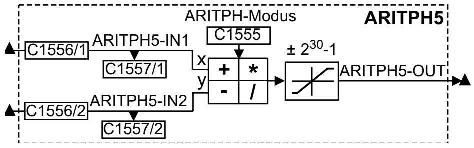


Fig. 7-33 Function block ARITPH5

Signal				Source		Note
Name	Type	DIS	DIS format	CFG	List	
ARITPH5-IN1	ph	C1557/1	dec [inc]	C1556/1	3	-
ARITPH5-IN2	ph	C1557/2	dec [inc]	C1556/2	3	-
ARITPH5-OUT	ph	-	-	-	-	

ARITPH6

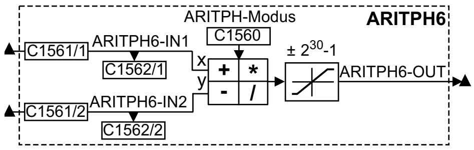


Fig. 7-34 Function block ARITPH6

Signal				Source		Note
Name	Type	DIS	DIS format	CFG	List	
ARITPH6-IN1	ph	C1562/1	dec [inc]	C1561/1	3	-
ARITPH6-IN2	ph	C1562/2	dec [inc]	C1561/2	3	-
ARITPH6-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	

ARITPH mode	Arithmetic function	Limitation	
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.

7.6.11 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.

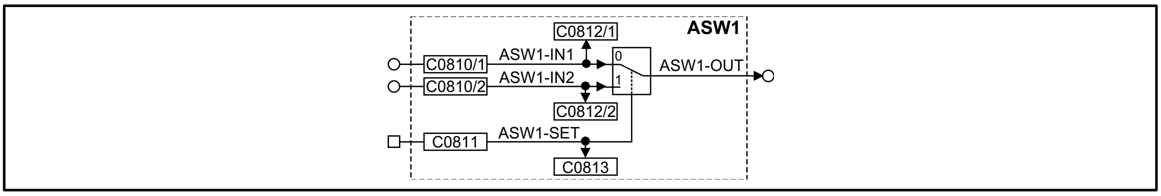


Fig. 7-35 Changeover switch for analog signals (ASW1)

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	-	-	-	-	-	-

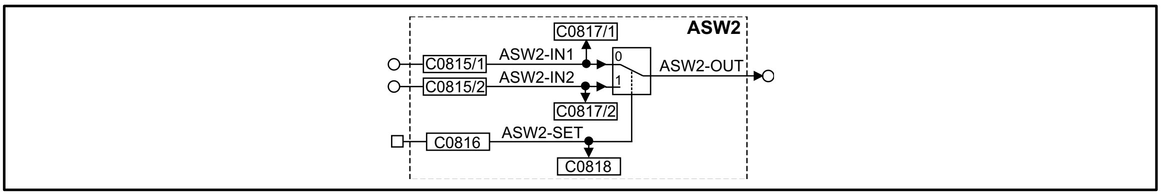


Fig. 7-36 Changeover switch for analog signals (ASW2)

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	-	-	-	-	-	-

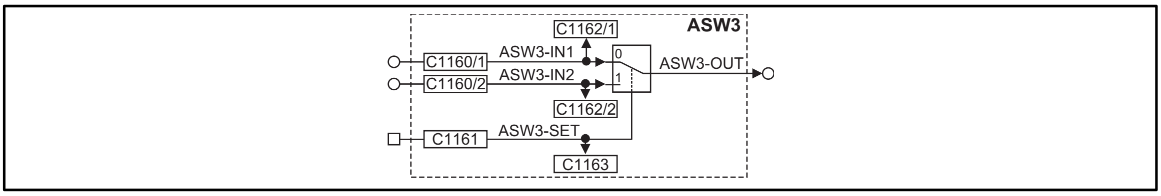


Fig. 7-37 Changeover switch for analog signals (ASW3)

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	-	-	-	-	-	-

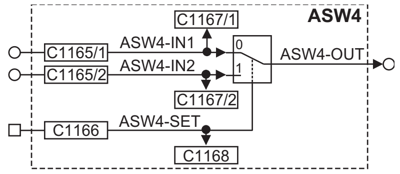


Fig. 7-38 Changeover switch for analog signals (ASW4)

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 the output.

7.6.12 Holding brake (BRK)

Purpose

The FB is used to trigger a holding brake.

Possible applications:

- Hoists
- Traversing drives
- Active loads

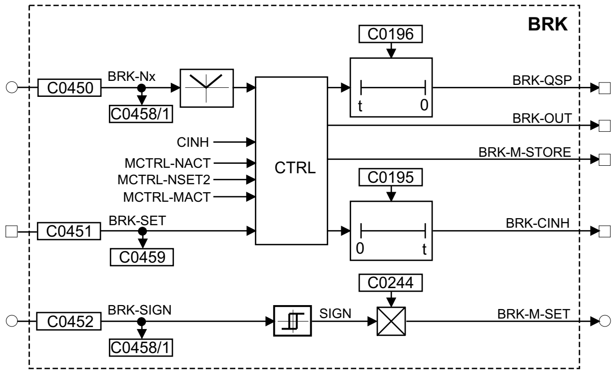


Fig. 7-39 Holding brake (BRK)

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.

7.6.12.1 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.

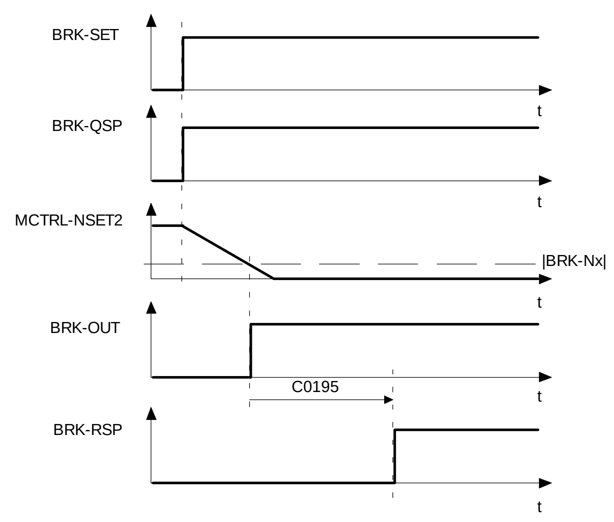


Fig. 7-40 Signal sequence when the brake is closed

7.6.12.2 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.

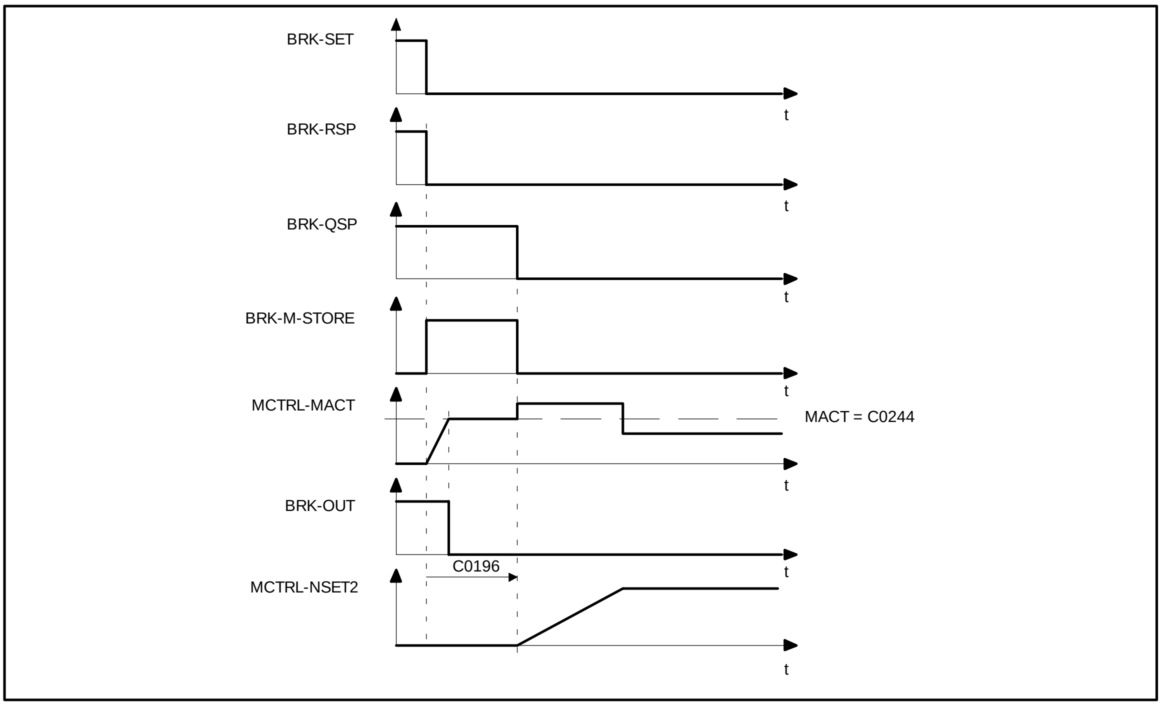


Fig. 7-41 Signal sequence when the brake is opened (released)

7.6.12.3 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”.

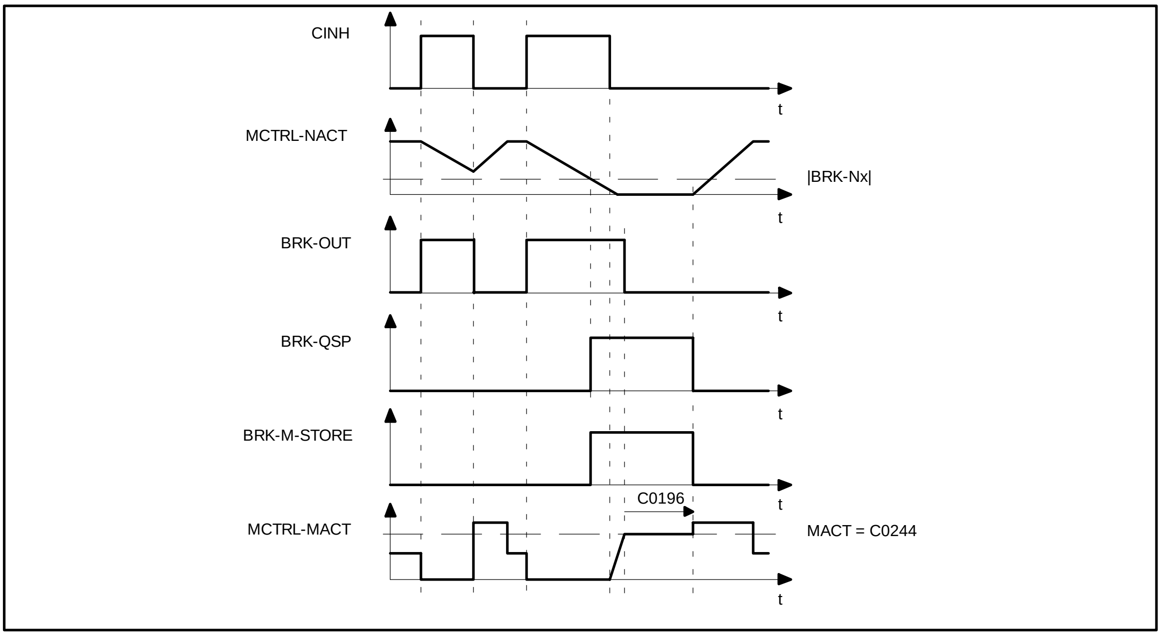


Fig. 7-42 Control brake by CINH

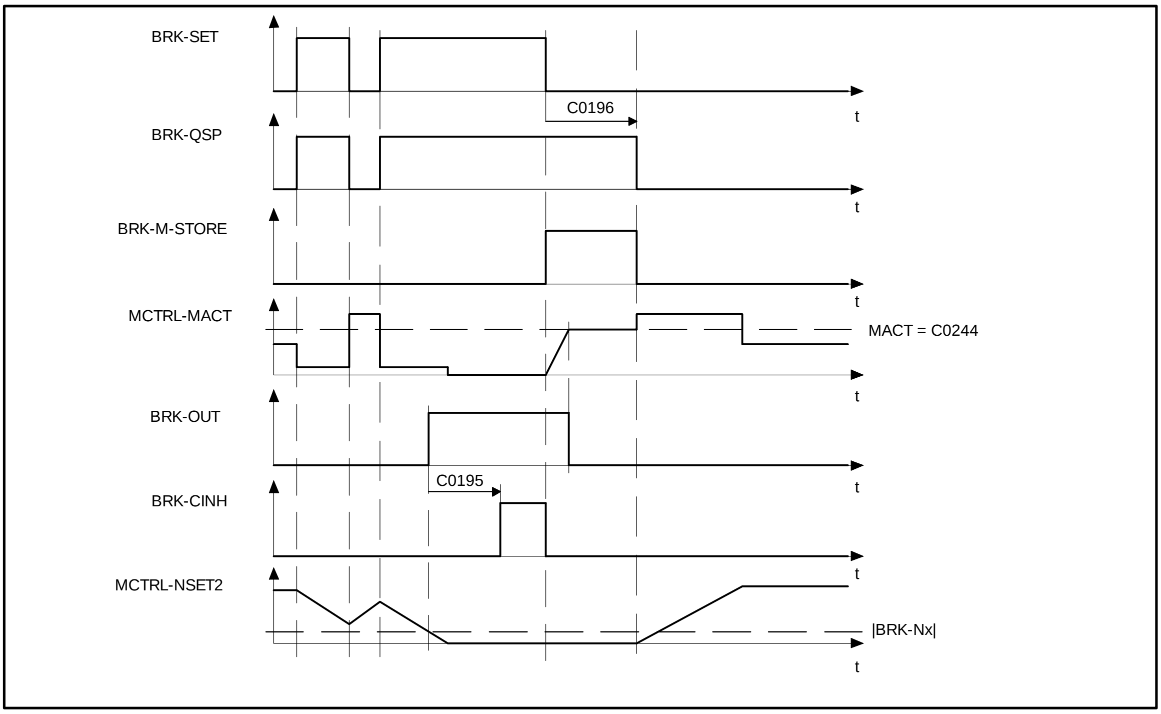


Fig. 7-43 Switching cycle when braking

7.6.13 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.

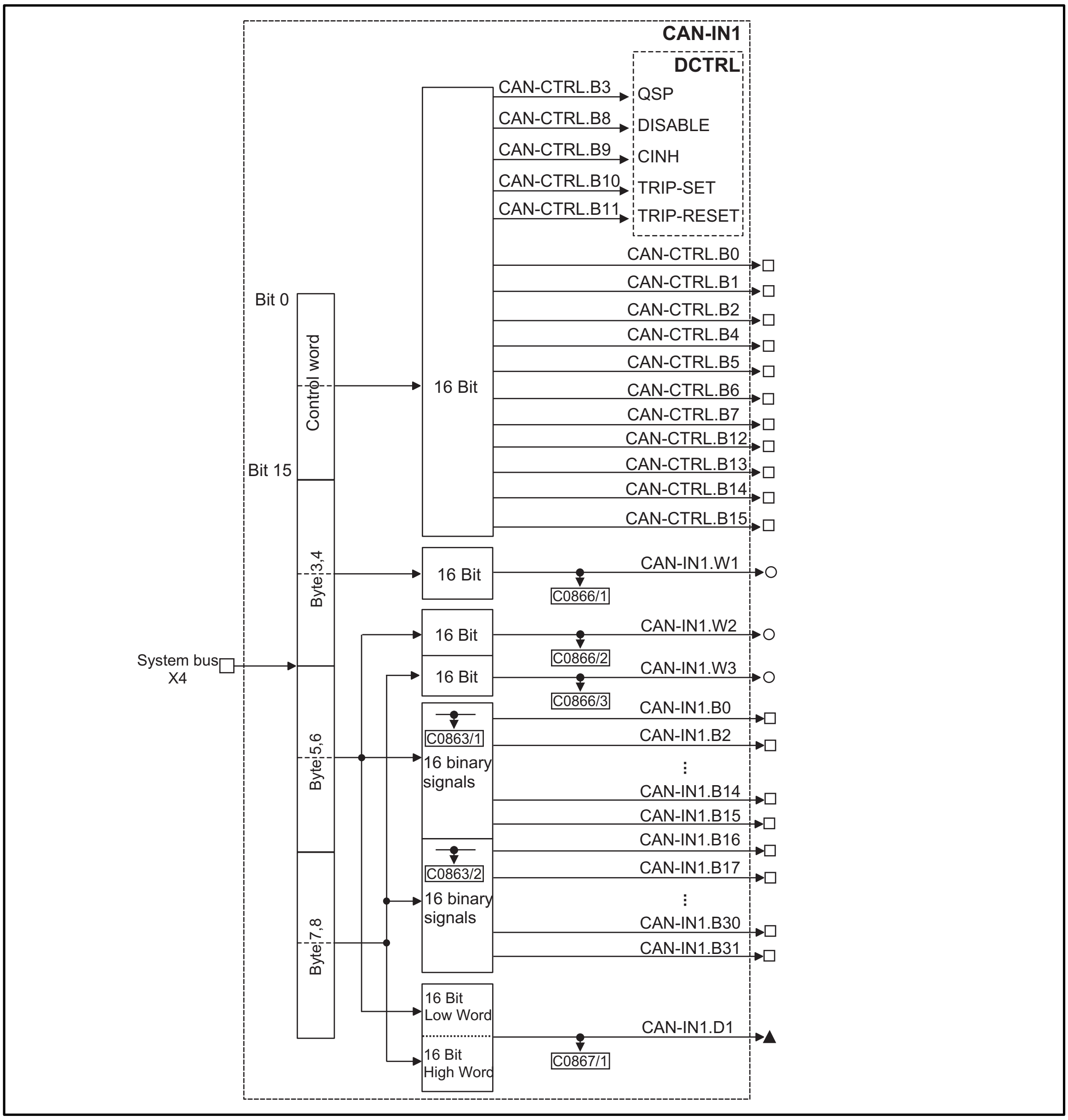


Fig. 7-44 System bus (CAN-IN1)

Function block library

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.

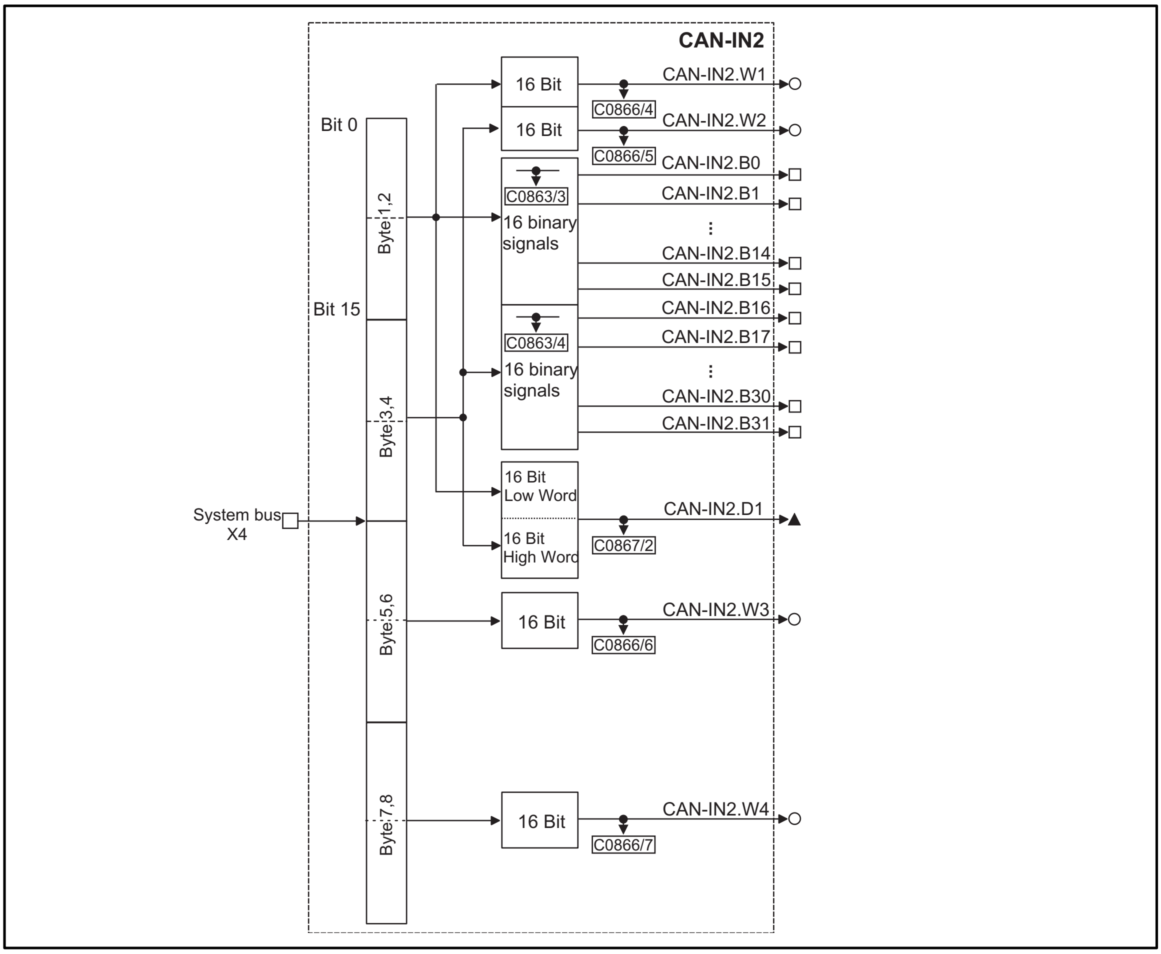


Fig. 7-45 System bus (CAN-IN2)

Function block library

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.

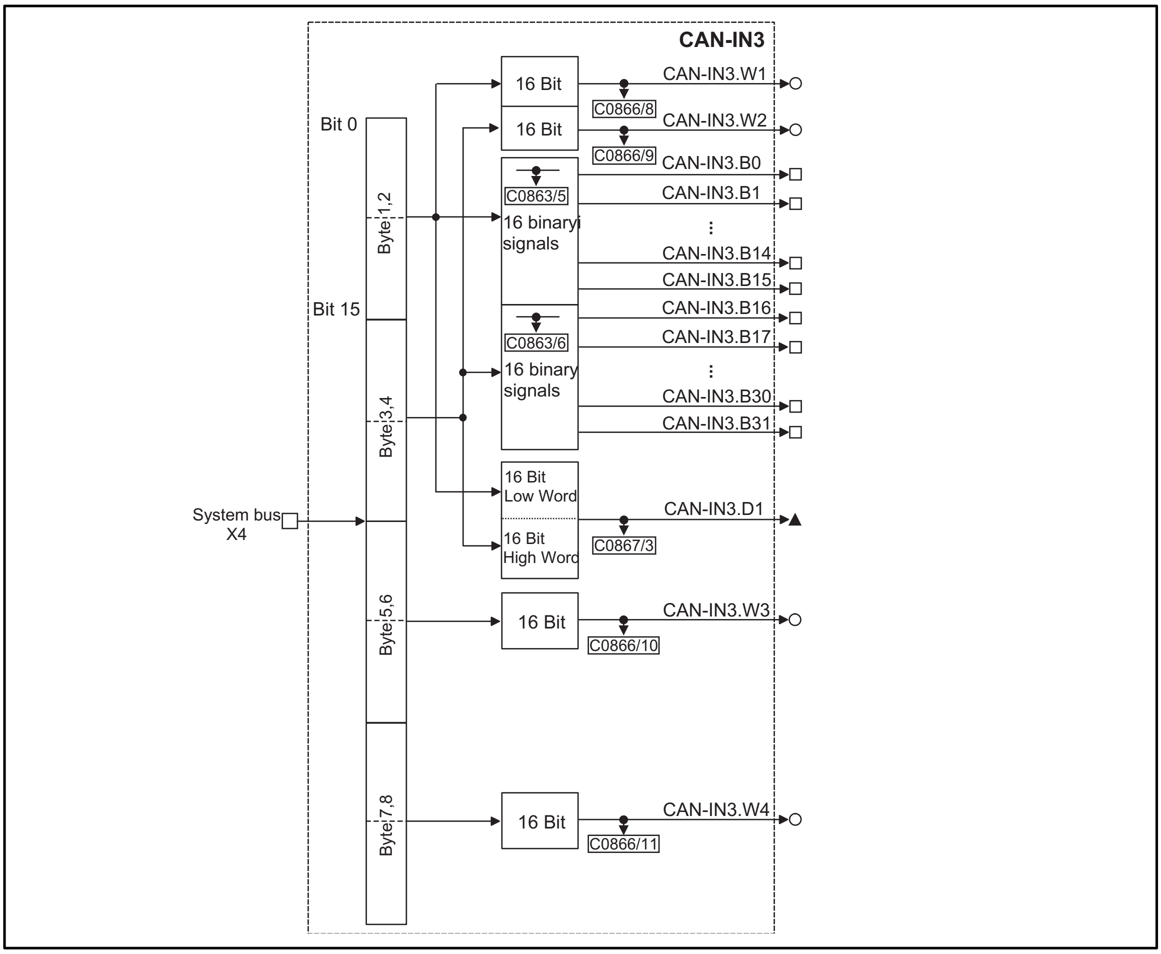


Fig. 7-46 System bus (CAN-IN3)

Function block library

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.

7.6.14 System bus (CAN-OUT)

Purpose

Interface for output signals from the system bus for setpoints and actual values as binary, analog, or phase information. (📖 7-51)

CAN-OUT1

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

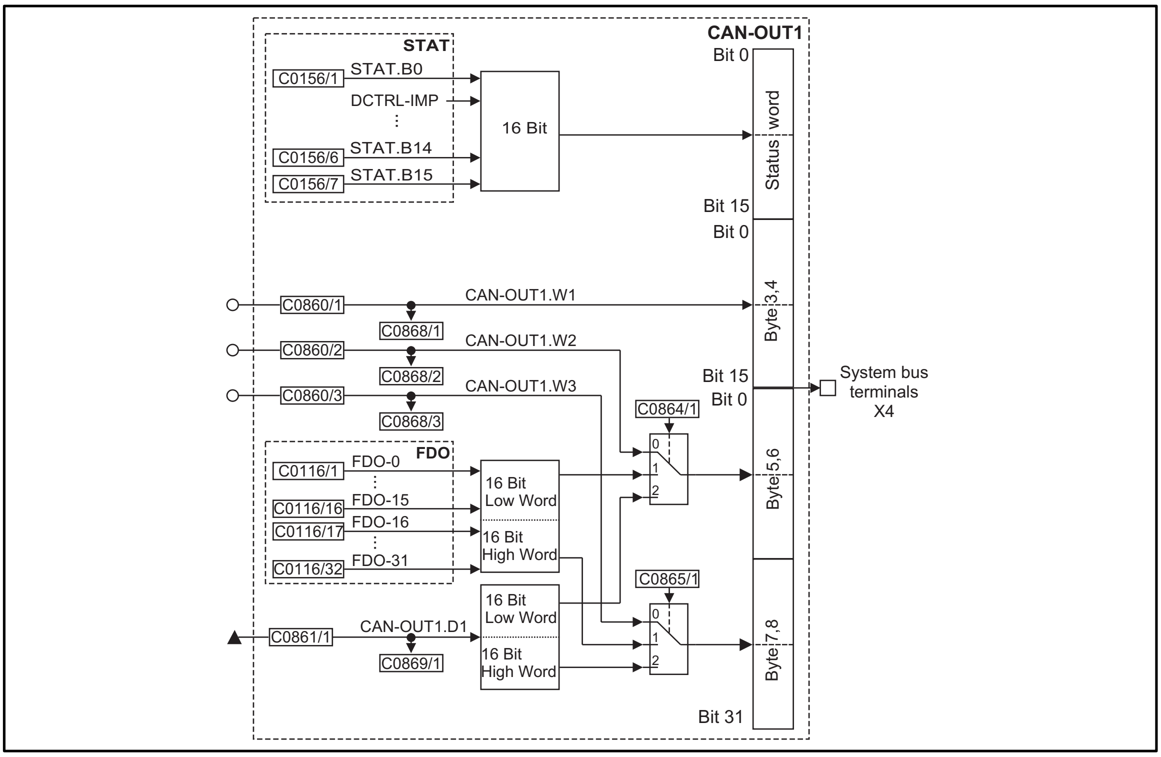


Fig. 7-47 System bus (CAN-OUT1)

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. (📖 7-214)
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.

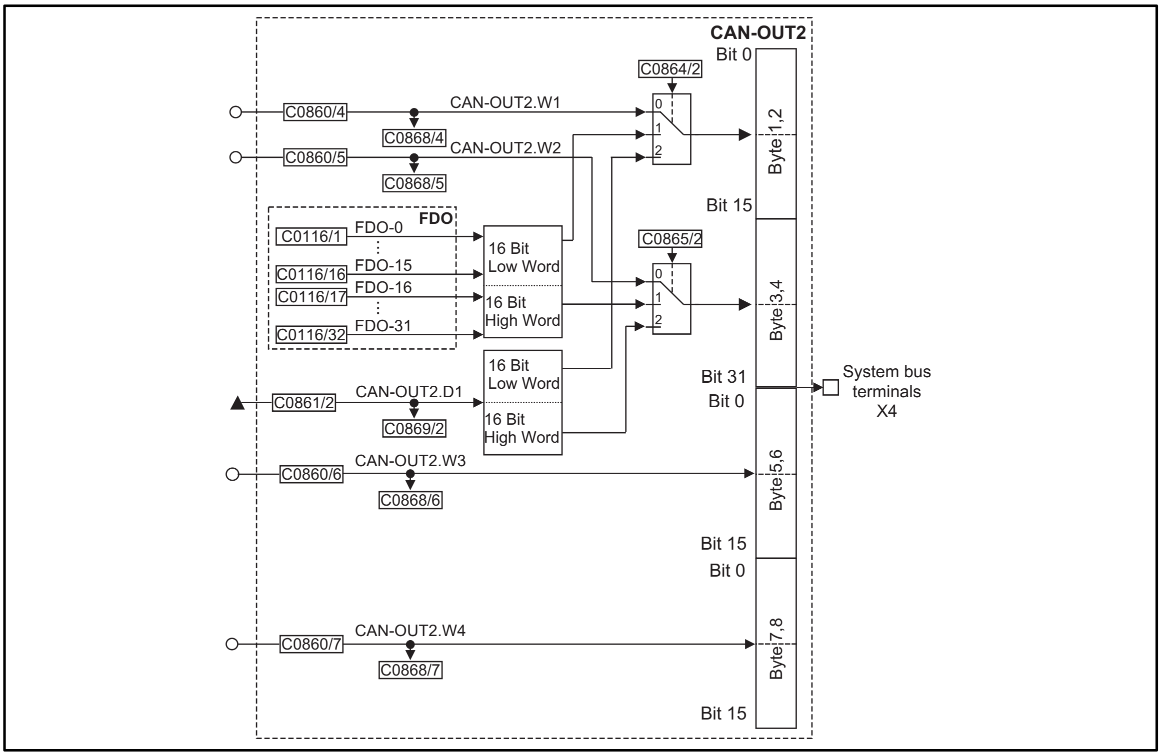


Fig. 7-48 System bus (CAN-OUT2)

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.

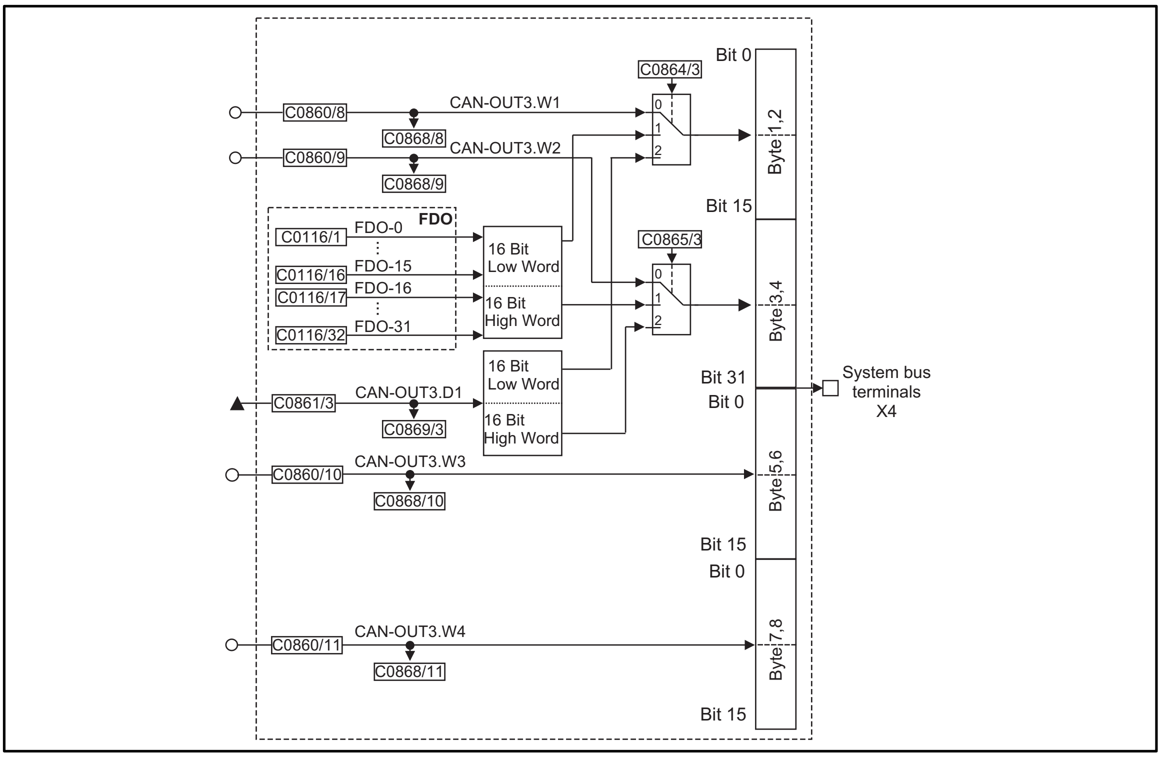


Fig. 7-49 System bus (CAN-OUT3)

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

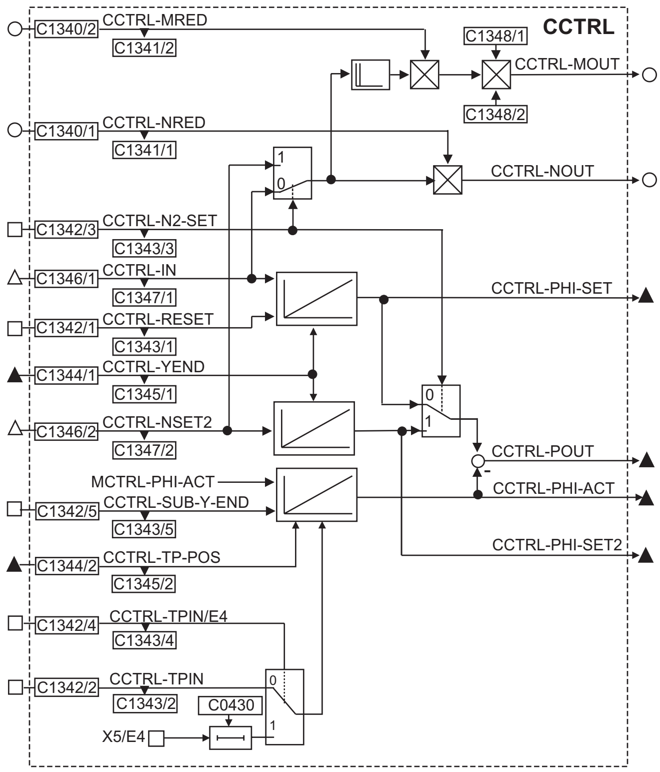
Here, the analog signal configured at the input CAN-OUT3.W4 is mapped.

7.6.15 Setpoint conditioning (CCTRL)

One function block is available (CCTRL).

Purpose

- Digital frequency signals are integrated in a position.
- It is possible to integrate an auxiliary position setpoint while the first position information remains active (application of function block CLUTCH (virtual clutch)).



Signal				Source		Note
Name	Type	DIS/selection	DIS format	CFG	List	
CCTRL-NRED	a	1341/1	dec [%]	1340/1	1	Gain for the speed setpoint precontrol
CCTRL-MRED	a	1341/2	dec [%]	1340/2	1	Gain for the troque setpoint precontrol
CCTRL-RESET	d	1343/1	bin	1342/1	2	HIGH = sets set phase = act. phase -> CCTRL-POUT = 0
CCTRL-SUB-Y-END	d	1343/5	bin	1342/5	2	Only with TP
CCTRL-TPIN	d	1343/2	bin	1342/2	2	External mark to set the position
CCTRL-N2-SET	d	1343/3	bin	1342/3	2	HIGH = input -NSET2 active
CCTRL-TPIN/E4	d	1343/4	bin	1342/4	2	HIGH = TP activated by terminal X5/E4 LOW = TP activated by input TPIN
CCTRL-Y-END	ph	1345/1	inc	1344/1	3	Upper range value of the profile (only required for touch probe)
CCTRL-IN	phd	1347/1	rpm	1346/1	4	Input for mains setpoint
CCTRL-NSET2	phd	1347/2	rpm	1346/2	4	Input for auxiliary setpoint (second setpoint)
CCTRL-NOUT	a				1	Speed setpoint for input MCTRL-N-SET (speed precontrol)
CCTRL-MOUT	a				1	Torque setpoint for input MCTRL-M-ADD (torque precontrol)
CCTRL-POUT	ph				3	Contouring error, input signal for MCTRL-PHI-SET
CCTRL-PHI-SET	ph				3	Position setpoint of CCTRL-IN
CCTRL-PHI-ACT	ph				3	Act. position value
CCTRL-PHI-SET2	ph				3	Position setpoint of CCTRL-NSET2

Principle of operation

- Main and auxiliary position setpoint
- Synchronization of machine and drive
- Reset of main position setpoint
- Speed precontrol
- Torque precontrol

7.6.15.1 Main and auxiliary position setpoint

Under normal operating conditions, the main position setpoint is a reference variable for the control of the cam profiler.

During operation however the operating conditions may require the change to the auxiliary position setpoint, e.g.:
  – impermissibly high slip between material and drive
  – overload
  – switch-off of the cam drive, etc.

The main position setpoint is not deleted when changing to the auxiliary setpoint. After the fault has been eliminated, the drive can go back to its original position.

The integrator of the auxiliary setpoint is reset by changing the level from HIGH → LOW at the input CCTRL-N2SET.

	Main position setpoint	Auxiliary position setpoint	Notes
Activate with	CCTRL-N2-SET = LOW and CCTRL-RESET = LOW	CCTRL-N2-SET = HIGH	For CCTRL-N2-SET = LOW: auxiliary position setpoint = actual position.
Inputs	CCTRL-IN	CCTRL-NSET2	

7.6.15.2 Synchronization of machine and drive

Two functions are available to synchronize the motor to the machine measuring system:

1. TP (Touch probe)
   Fastest possible and most accurate mark detection at terminal X5/E4.
2. CCTRL-TPIN
   Position detection of the drive in standstill

Note!

For applications with endless feed, the Y upper range value of the profile must be assigned to the input CCTRL-Y-END (e.g. of output CDATA-Y-END). This function cannot be used for stretching and compression.

Touch probe

For cyclic synchronization

- Activate with CCTRL-TPIN/E4 = HIGH
- Enter the position of the touch probe sensor at input CCTRL-TP-POS.
- With a H→L transition at terminal X5/E4, the drive is synchronized to the set position of the output CCTRL-PHI-SET.

CCTRL-TPIN

For single synchronization

- Activate with CCTRL-TPIN/E4 = LOW
- Enter the position of the touch probe sensor at input CCTRL-TP-POS.
- With a L->H transition at input CCTRL-TPIN the drive synchronizes to the set position of the output CCTRL-PHI-SET.

7.6.15.3 Reset of main position setpoint

CCTRL-PHI-SET = CCTRL-PHI-ACT is set with CCTRL-RESET = HIGH .

Stop!

Danger! Ensure that the drive is inhibited.

7.6.15.4 Speed precontrol

With speed precontrol, faster control circuits are activated earlier. It should be used if the drive generates a contouring error during acceleration (negative or positive).

- Via the input CCTRL-NRED the precontrol can be decreased or increased proportionally to the phase setpoint change $d\varphi/dt$.
- Values > 100% have the effect of a gain on the precontrol.If the values are too high, the drive operates too fast in dynamic processes or becomes instable.
- Values < 100% have a damping effect on the precontrol. If the gain is not high enough, a contouring error (drive too slow) will occur during acceleration or deceleration of the drive.

Note!

The input value at CCTRL-NRED is processed further as absolute value, i.e. neg. values are interpreted as being positive.

7.6.15.5 Torque precontrol

With torque precontrol, the faster (inner) control circuits are activated earlier. It should be used if the drive generates a contouring error during acceleration (negative or positive).

Stop!

The torque control has a much more sensitive influence on the drive than the speed precontrol. Therefore, please influence the drive acceleration with the possibilities of the speed control first (see above).

- The precontrol can be increased or decreased proportaionally to the speed change dn/dt via the CCTRL-MRED.
  - Values > 100% have the effect of a gain on the precontrol.If the values are too high, the drive operates too fast in dynamic processes or becomes instable.
  - Values < 100% have a damping effect on the precontrol. If the gain is not high enough, a contouring error (drive too slow) will occur during acceleration or deceleration of the drive.
- With codes C1348/1 (numerator) and C1348/2 (denominator), the precontrol can be adapted to the inertia of the machine.

Note!

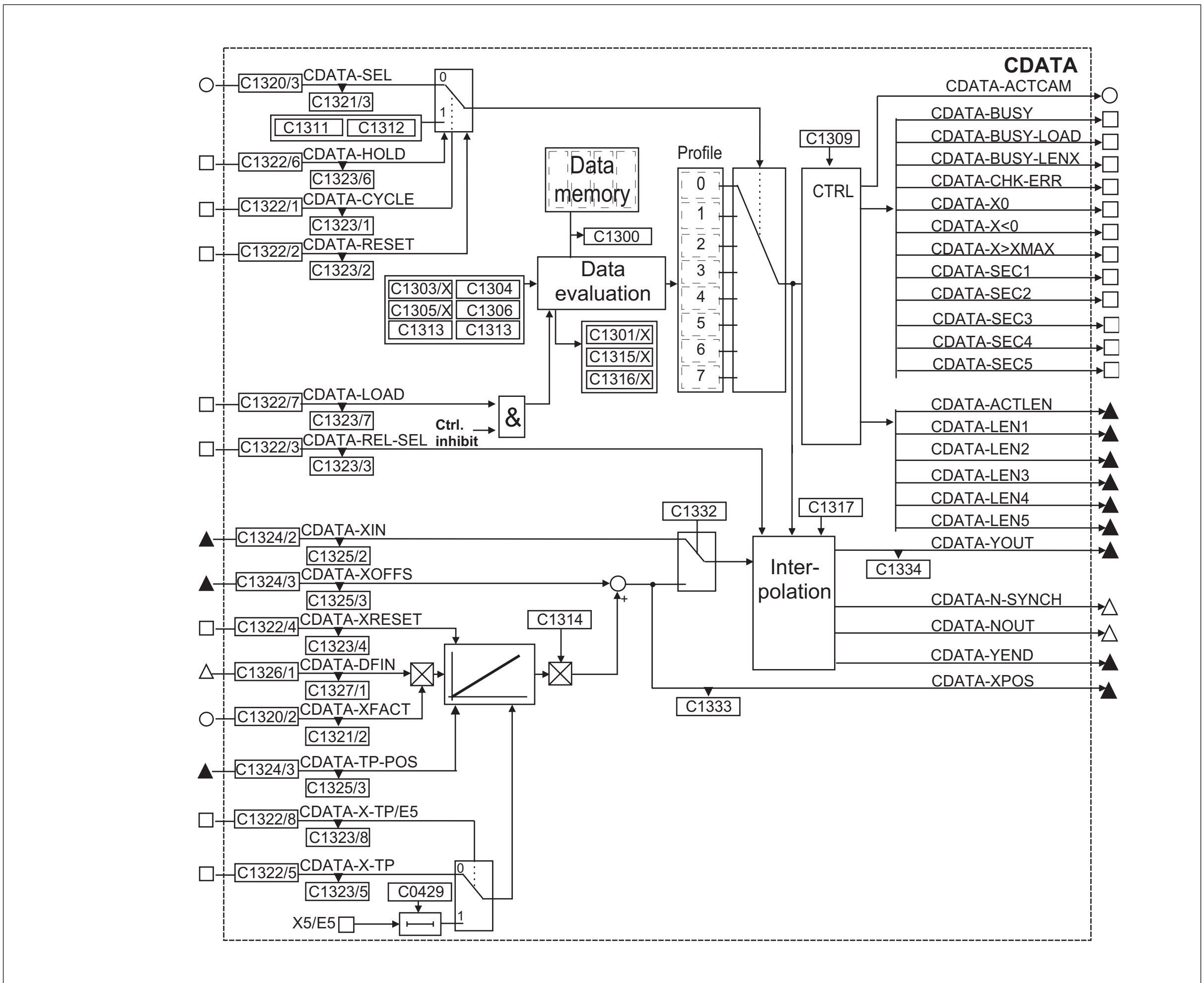
The input value at CCTRL-MRED is processed further as absolute value, i.e. neg. values are interpreted as being positive.

7.6.16 Cam profile data conditioning (CDATA)

One function block (CDATA) is available.

Purpose

- The function block calculates the Y coordinate from the preselected data according to the selected cam profile.
- Evaluation of the detected master angle (stretching/compression/offset in X direction)
- Mark-controlled correction of the master position



Signal				Source		Note
Name	Type	DIS	DIS format	CFG	List	
CDATA-SEL	a	1321/1	dec[abs]	1320/1	1	Profile selection 0 = profile 0 (1. profile)
CDATA-XFACT	a	1321/2	dec[%]	1320/2	1	Stretching/compression factor in X direction: +100% = no compression/stretching > 100% = compression < 100% = stretching
CDATA-CYCLE	d	1323/1	bin	1322/1	2	Automatic cam profile processing HIGH = the profiles from C1311 and C1312 are cyclically processed
CDATA-RESET	d	1323/2	bin	1322/2	2	= HIGH, if CDATA-CYCLE = LOW, the input CDATA-SEL is immediately evaluated; if CDATA-CYCLE = HIGH, the profile from C1311 will be processed
CDATA-REL-SEL	d	1323/3	bin	1322/3	2	= HIGH, feed function active
CDATA-XRESET	d	1323/4	bin	1322/4	2	= HIGH, sets master value integrator to 0*
CDATA-X-TP	d	1323/5	bin	1322/5	2	= HIGH, sets master value integrator to C1317/1
CDATA-HOLD	d	1323/6	bin	1322/6	2	= HIGH, avoids cam profile processing Input has priority over -RESET
CDATA-XIN	ph	1325/2	dec[inc]	1324/2	3	Input for the master value position if C1332 = 1
CDATA-XOFFS	ph	1325/3	dec[inc]	1324/3	3	Input for offset in X direction (only if C1332 = 0)
CDATA-TP-POS	ph	1325/4	dec[inc]	1324/4	3	Touch probe - master value position (if C1332 = 0)
CDATA-DFIN	phd	1327/1	dec[rpm]	1326/1	3	Input for digital frequency if (C1332 = 0)
CDATA-ACTCAM	a	13301	-	-	-	Output of active cam profile (No.)
CDATA-SEC1*	d	13301	-	-	-	HIGH = section 1 active *
CDATA-SEC2*	d	13302	-	-	-	HIGH = section 2 active *
CDATA-SEC3*	d	13303	-	-	-	HIGH = section 3 active *
CDATA-SEC4*	d	13304	-	-	-	HIGH = section 4 active *
CDATA-SEC5*	d	13305	-	-	-	HIGH = section 5 active *
CDATA-X0	d	13306	-	-	-	Transition L -> H = zero of the master value integrator
CDATA-X>Xmax	d	13307	-	-	-	HIGH = number range exceeded in X direction
CDATA-X<0	d	13308	-	-	-	Display of overrange in X direction
CDATA-BUSY-LENx	d	13309	-	-	-	HIGH = outputs CDATA-LENx and CDATA-Y-END are not valid and are being determined at present (e.g. profile processing)
CDATA-BUSY-LOAD	d	13310	-	-	-	HIGH = new cam data are being accepted at present, the controller is inhibited (only if input CDATA-LOAD = HIGH)
CDATA-BUSY	d	13315	-	-	-	LOW-HIGH signal = The point distribution is not perfect, select less points.
CDATA-CHK-ERR	d	13311	-	-	-	HIGH = the check sum transferred to C0509 does not correspond to the cam data
CDATA-LEN1*	ph	13301	-	-	-	Ouput of the actual X length section 1 of the selected cam profile (65536 inc = 1 encoder rev.)
CDATA-LEN2*	ph	13302	-	-	-	Ouput of the actual X length section 2 of the selected cam profile (65536 inc = 1 encoder rev.)
CDATA-LEN3*	ph	13303	-	-	-	Ouput of the actual X length section 3 of the selected cam profile (65536 inc = 1 encoder rev.)
CDATA-LEN4*	ph	13304	-	-	-	Ouput of the actual X length section 4 of the selected cam profile (65536 inc = 1 encoder rev.)
CDATA-LEN5*	ph	13305	-	-	-	Ouput of the actual X length section 5 of the selected cam profile (65536 inc = 1 encoder rev.)
CDATA-ACTLEN	ph	13306	-	-	-	Output of the actual master value clock pulse length (65536 inc = 1 encoder rev.)
CDATA-XPOS	ph	13307	-	-	-	Output of the master value integrator (65536 inc = 1 encoder rev.)
CDATA-YOUT	ph	13308	-	-	-	Set drive position (65536 inc = 1 motor rev.)
CDATA-Y-END	ph	13309	-	-	-	Y upper range value act. cam profile (65536 inc = 1 motor rev.)
CDATA-YNOUT	phd	13301	-	-	-	Set drive speed
CDATA-N-SYNCH	phd	13302	-	-	-	Synchronisation value for synchronised stretching and compression

* the outputs will not be output when using the absolute data model

Function

- Transmission and storage of cam data
- Determination of number of cam profiles to be stored
- Selection of cam profiles stored for processing
- Processing of the master position
- Additional functions
  – Stretching / compression / offset in X direction
  – Synchronized stretching/compression during drive motion
  – Change of direction
  – Output of other status signals
  – CW/CCW rotation
  – Reset/inhibit cam profile selection
  – Cam profile with relative feed

7.6.16.1 Cam profile generation

The Lenze operating software GLOBAL-DRIVE-CONTROL (GDC) provides two different methods for cam profile generation:

- Cam profile import
- Mathematical cam profile generation

Independently of the method, the cam profile data is generated by GDC only.

For more detailed information please refer to the description of the commissioning, chapter 5.7.

7.6.16.2 Transmission and storage of cam data

The cam data are stored after transmission.

Depending on their further use, the cam data can be stored in different memories. Available are:

- Temporary memory
  – The cam data are transferred to a “temporary memory” using, for instance, the RS232. The controller can thus accept new cam data while the machine is running.
- User memory
  – The CDATA-LOAD input must be set to HIGH for approx. 20 s to ensure the acceptance of the data in the user memory. For this, the controller must be inhibited first (e.g. terminal X5/28 = LOW).
- Non-volatile memory
  – After the changeover of the data, use C0003 to store the data in the power-failure protected memory.

Stop!

The codes required for the determiniation of the normalization factors (gear factors, feed factors) do **not** have an influence on the transmitted/stored cam profile data!

Master-units: C1303/1; C1303/2; C1304

Slave units: C1305/1; C1305/2; C1306

7.6.16.3 Determination of the number of cam profiles to be stored

The number of cam profiles to be stored in the controller are determined via GDC. The memory available can be used for max. 1, 2, 4 or 8 different cam profiles.

The points available per cam profile depend on the number of profiles selected:

Number of profiles	Number of points available per profile*
1	2048
2	1024
4	512
8	256

Code C1300 (FB CDATA) indicates the number of selected profiles.

Note!

The table above refers to the relative data model. With the absolute data model, the points can be accessed individually. The number of points is however reduced to 25%. A more detailed description of 'data models' can be obtained from the chapter 5.6

7.6.16.4 Selection of cam profiles stored for processing

Depending on the drive task it is necessary

- to change the constellation between the cam profiles (selection via analog input CDATA-SEL) or
- to cyclically process the cam profiles stored in the same sequence again and again (automatic cam profile processing).

Selection via analog input CDATA-SEL

The cam profile is selected with CDATA-CYCLE = LOW via the analog input CDATA-SEL (see fig. FB).

The permissible value range of the input -SEL is between 0 and the number of profiles selected in GDC.

Note!

Values to CDATA-SEL < 0, are interpreted as 0;
Values to CDATA-SEL ≥ max. number of profiles are limited to the values displayed in (C1300/0).

The value is accepted

– during operation after zero crossing in X direction.
  It is thus possible, for instance, to select a cam, which is to be activated after the next zero crossing, using the PLC.
– immediately, if CDATA-RESET = HIGH.

Automatic cam profile processing

The function is selected with CDATA-CYCLE = HIGH.

Code C1311 is used to determine the profile to start with.

Code C1312 is used to determine the cycle range (the range is limited by the number of cam profiles entered in GDC).

Example:

Profiles 2, 3 and 4 are to be processed cyclically:
C1311 = 2 (first cam profile)

C1312 = 2 (range: 2 other cam profiles)

7.6.16.5 Master position processing in CDATA

The X position is selected from the master drive

- directly (as absolute value) or
- as digital frequency.

Input CDATA-XIN: direct selection of X position

This input can be used if the synchronisation to the machine measuring system and the phase synchronous speed selection of the master drive is transmitted from a superimposed PLC to the controller in increments (1 encoder rev. ≙ 65536 inc). In this case, the signal for the X position is directly assigned to the input CDATA-XIN via one of the available bus systems.

Note!

Use the function block SYNC to synchronize the operation of multi-axis drives which have a common master value selected via a bus system.
With C1332 = 1 all inputs shown below CDATA-XIN are not effect (see function block figure).

A fault is indicated for negative input values (X<0):

CDATA-X<0 = HIGH.

Furthermore, the output will output a Y value which results from the cam function for X=0.

A fault is indicated for input values X>Xmax:

CDATA-X>Xmax = HIGH.

Furthermore, the output will output the Y value which results from the cam function for X=Xmax.

Note!

The outputs CDATA-X<0 and CDATA-X>Xmax can only be active if being selected with external master value. An internally conditioned master value (input at DFIN) cannot become negative or exceed the maximum value.

Input CDATA-DFIN: Generation of X position from a digital frequency

The digital frequency at CDATA-DFIN is integrated into the X position. With this control mode, the controller must be synchronised to the master value, if necessary (for description of synchronization of master drive and cam profiler see below).

With CDATA-XRESET = HIGH

- the integrator is set to position X = 0 and remains there, (CDATA-XPOS = 0)
- a HIGH signal is output at CDATA-X0
- value adjusted at CDATA-XOFFS are not effective on the output side and are not processed as X position.
- the cycle is set to the first profile for automatic cam processing (C1311).

Synchronization of X position to the machine

The TP initiator enables that the cam drive can be continuously synchronized to the position of the machine master phase. Slipping material or not integer cycle length can lead to a remaining phase difference between master and cam drive. This difference is detected by TP. It is compensated by an appropriate cam drive acceleration.

Note!

Design note:
The TP should be positioned such that accelerations do not occur in the event of synchronism. By this accelerations (positive or negative) occuring during the compensation phase can be reduced to a minimum (e.g. during standstill).

Select the TP position at the input CDATA-TP-POS. This input is connected to the code C1476/16 (factory setting).

Touch probe (TP) - correction of X position

The TP initiator (positive signal) must be applied to terminal X5/ input E5.

Stop!

The terminal might be assigned differently in the controller, see function block DIGIN.

The input CDATA-X-TP/E5 must be assigned to HIGH

Note!

The TP initiators can be subject to delay times when they respond. These delay times cause a speed-dependent phase offset, which are mainly disturbing at high speed. Enter the correction value for the phase offset in x.xxx[ms] under C0430/5.

Single X position setting

if a phase offset can be excluded, a X position must only be set once.

Therefore the master drive (machine) must be set to the posiiton applied to the input CDATA-TP-POS.

- CDATA-X-TP/E5 = LOW
- Acceptance of the X position by a L -> H transition at CDATA-X-TP

7.6.16.6 Additional functions

Stretching / compression / offset in X direction

This function is only available for the internal X integrator (C1332 = 0).

- Stretching/compression

+100% at CDATA-XFACT do not result in stretching/compression

-100% at CDATA-XFACT do not result in a stretching/compression but a direction reversal for the X position. The profile will then be processed “from the end”.

The following description is valid for CDATA-XFACT > 0:

CDATA-XFACT > 100% - no compression.

CDATA-XFACT < 100% - no stretching.

If stretching/compression is not wanted: connect CDATA-XFACT to FIXED100%.

- Offset function

It is possible to move the X position by a constant value via input -XOFFS.

Stop!

The drive follows this change at max. permissible torque.

Note!

XOFFS should be changed during standstill if possible, otherwise use a ramp function generator (e.g. RFGPH).

Synchronized stretching/compression during drive motion

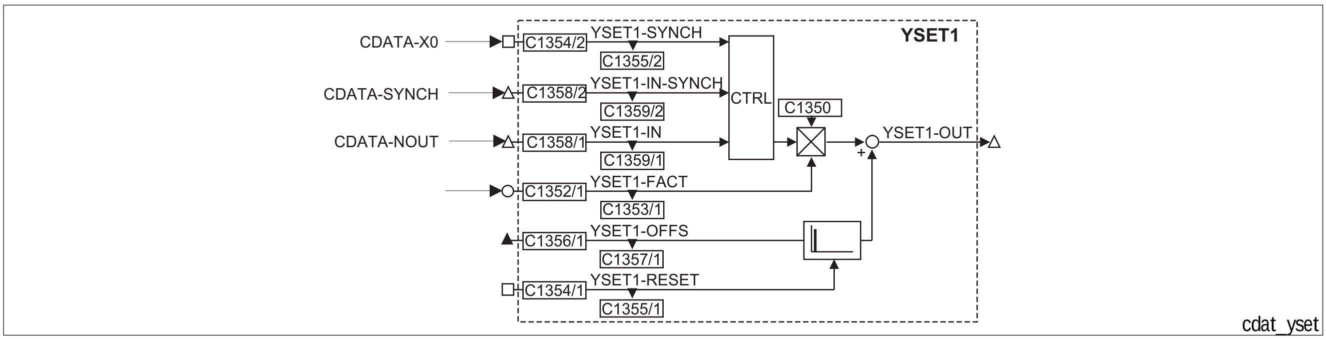
In most applications, master and cam drive must run absolutely synchronously. Therefore, the adjustment of the stretching or the compression factor during operation must also be synchronized.

This function should be used if more than 8 profiles are required to change the cam drive travel. The travel can be changed on-line through stretching and compression.

This function is only valid for the cam drive not for the master value.

- Function block interconnection

The figure shows the minimum interconnection. All function blocks used to generate a stretching/compression factor must be entered into the processing table between the function blocks DCATA and YSET1.



- Activate function

The function is only active if C1317 = 1.

The changeover between stretching and compressiong factor is carried out during zero crossing of the profile.

Change of direction

This function is only available for the internal X integrator (C1332 = 0).

“Direction” indicates the increase of the integrator (output -XPOS).

With positive input values at -DFIN the integrator runs from 0 to length X-cycle.

With negative input values at -DFIN the integrator runs from length X-cycle to 0.

The direction can be reversed under code C1314.

Input -XOFFS is not involved.

Output of other status signals

Use of function block CDATA with relative data model

- The actual profile section is indicated through the assigned digital output CDATA-SEC1 to 5.
- The lengths of the single sections are output at CDATA-LEN1 to 5 in X direction. If they are added they result in CDATA-ACTLEN. The actual length of a master value cycle is output at CDATA-ACTLEN (code C1315/X).
- CDATA-BUSY-LENx = High
  Outputs CDATA-LENx and CDATA-Y-END are being updated (important for cam profile processing).
- CDATA-ACTCAM
  CDATA-ACTCAM indicates which profile is being processed.
- CDATA-X0
  Output CDATA-X0 indicates a zero crossing of the master value. The window width for the comparison is determined via code C1309. The window is placed symmetrically around the effective zero of the master value.

CW/CCW rotation

- CW rotation

In CW direction, the profiles are processed in ascending order.

If the last profile is reached, the process starts again at the first profile.

- CCW rotation

In CCW direction, the profiles are selected in descending order.

If the first profile is reached, the process starts again with the profile: first profile + reach. About the example:

2 -> 4 -> 3 -> 2 -> 4 etc.

Profiles 0 and 1 cannot be reached with this setting.

Reset cam profile selection

After a fault (TRIP etc.) the first profile C1311 can be activated with CDATA-RESET = HIGH.

If the cycle is to start with a certain profile, this profile must be preselected at the analog input CDATA-SEL. Further steps

1. Set CDATA-RESET = HIGH and
2. CDATA-CYCLE = LOW then set
3. CDATA-RESET = LOW and afterwards set
4. CDATA-CYCLE = HIGH

Inhibit cam profile selection

The profile selection can be inhibited by setting CDATA-HOLD = HIGH.

The priority of this input is higher than the priority of CDATA-RESET, CDATA-CYCLE and CDATA-SEL

Profile selection are inhibited for instance with round tables with target position selection (other function blocks must be interconnected accordingly)

Cam profile with relative feed

The main characteristic of a profile like this is that one limit value is not 0. Profiles with rel. feed are used for drives with infinite feed.

Example:

- Round table (e.g. several feeds during one revolution)
- Conveyor belt (feed)

This function is selected with CDATA-REL-SEL = HIGH

Set CDATA-REL-SEL = HIGH (e.g. FIXED 1).

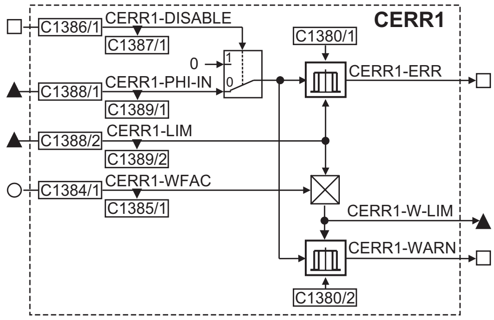
If the input remains LOW, the last Y value of the profile will not be stored and, depending on the cam data, the drive might “jump” to a new value.

7.6.17 Contouring error monitoring (CERR)

One function block (CERR1) is available.

Purpose

Contouring error monitoring with pre-warning stage



Signal				Source		Note
Name	Type	DIS	DIS format	CFG	List	
CERR1-WFAC	a	1385/1	dec [%]	1384/1	1	Reduction factor for CERR1-WARN: +100% = no reduction < 100% = reduction > 100% = increase
CERR1-DISABLE	d	1387/1	bin	1386/1	1	HIGH = sets CERR1-WARN and CERR1-EER = 0
CERR1-PHI-IN	ph	1389/1	dec [inc]	1388/1	4	Input
CERR1-LIM	ph	1389/2	dec [inc]	1388/2	4	Switch threshold, the absolute value is generated from the input value
CERR1-ERR	bin	-	-	-	-	Input value CERR1-PHI-IN has exceeded the limit CERR1-LIM
CERR1-WARN	bin	-	-	-	-	Input value CERR1-PHI-IN has exceeded the limit CERR1-LIM * CERR1-WFAC/100%
CERR1-WLIM	ph	-	-	-	-	Warning limit in inc

Function

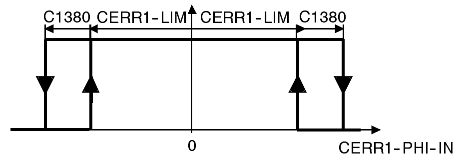
- Evaluation of the contouring error
- Determination of the contouring error limits
- Output of status signals
- Deactivate output

7.6.17.1 Evaluation of the contouring error

The actual contouring error signal is generated by the function block CCTRL (output CCTRL-POUT) and read at CERR1-PHI-IN (see e.g. signal-flow chart configuration 1000).

In the function block, it is compared to the configurable contouring error limit CERR1-LIM. If the limit is exceeded, the contouring error warning is available at the output CERR1-ERR:

Input signal		Output signal	
CERR1-PHI-IN	Within the window	CERR1-ERR	LOW
	Outside the window		HIGH



CERR1-LIM generates a window around 0 inc.

7.6.17.2 Determination of the contouring error limits

- The contouring error limit is selected at the input CERR1-LIM.
- The limit for the contouring error pre-warning is determined through the reduction value CERR1-WFAC.
  – Limit value calculation of the contouring error pre-warning:

$$|CERR1\text{-}LIM| \cdot \frac{|CERR1\text{-}WFAC|}{100\ \%}$$

Note!

The input values at CERR1-LIM are limited to a maximum of 4194300 inc (4194300 inc = 63.9 revolutions).

7.6.17.3 Output of status signals

The digital outputs CERR1-ERR and CERR1-WARN indicate if the actual limit values for contouring errors and contouring error pre-warning are exceeded or not reached yet.

Enter a hysteresis under codes C1380/1 and C1380/2 to avoid constant inversion at the turning point.

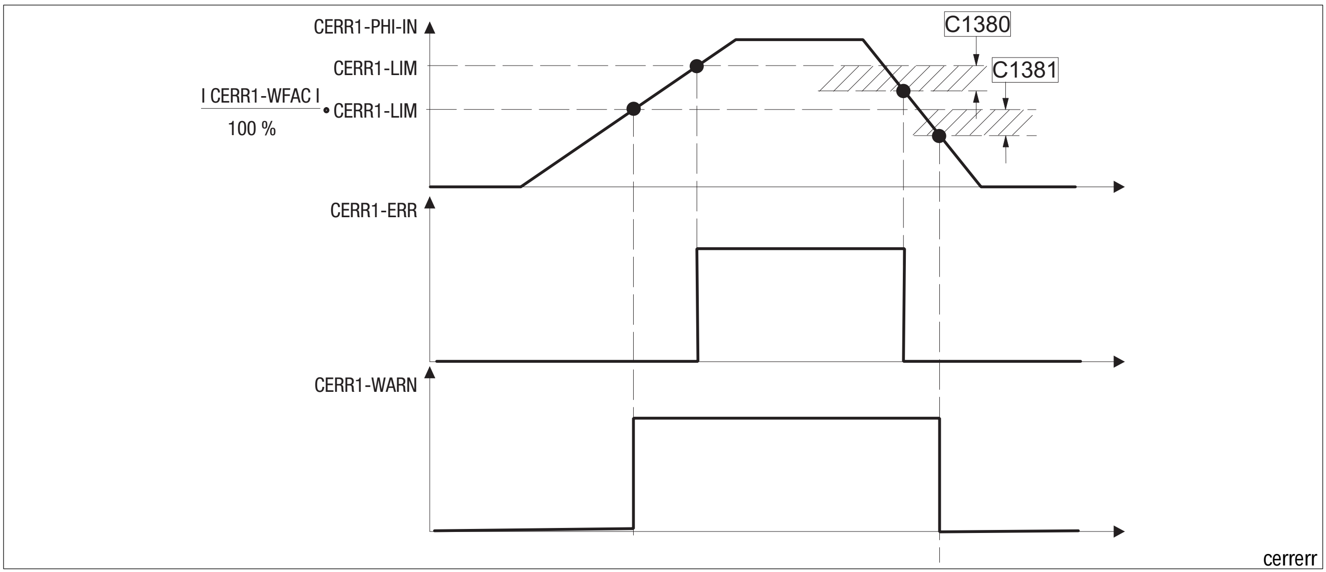


Fig. 7-50 Signals CERR1-ERR and CERR1-WARN

Code	Meaning	Note
C1380/1	Hysteresis contouring error	
C1380/2	Hysteresis warning	

7.6.17.4 Deactivate output

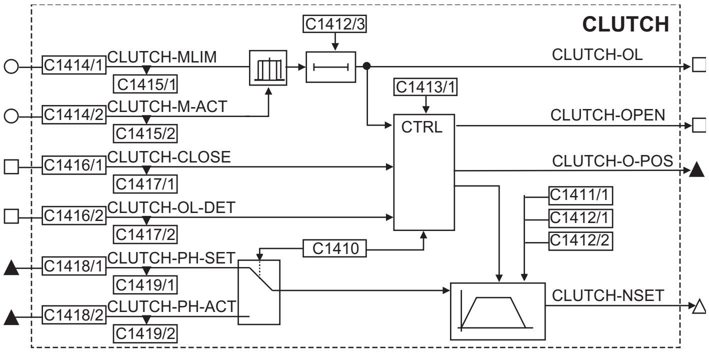
The output of contouring errors and contouring error warning can be deactivated with CERR1-DISABLE = HIGH.

7.6.18 Virtual clutch (CLUTCH)

One function block (CLUTCH) is available.

Purpose

With the clutch function the drive is positioned safely when being in an extreme situation.



Signal				Source		Note
Name	Type	DIS	DIS format	CFG	List	
CLUTCH-MLIM	a	1415/1	dec [%]	1414/1	1	Threshold for "overload" monitoring
CLUTCH-MACT	a	1415/2	dec [%]	1414/2	1	Act. value for "overload" monitoring
CLUTCH-CLOSE	d	1417/1	bin	1416/1	2	HIGH = engage clutch LOW = disengage clutch
CLUTCH-OL-DET	d	1417/2	bin	1416/2	2	HIGH = activate overload monitoring
CLUTCH - PHI-SET	ph	1419/1	inc	1418/1	3	Set drive position
CLUTCH - PHI-ACT	ph	1419/2	inc	1418/2	3	Act. drive position
CLUTCH -OPEN	d				1	HIGH = clutch open
CLUTCH -OL	d				1	HIGH = overload monitoring has responded
CLUTCH -O-POS	ph				3	Position, in which the clutch has been disengaged (65536 inc = 1 motor rev.)
CLUTCH -NSET	phd				4	Speed setpoint for: - Brake drive after command OPEN - Set drive to target position - Move drive to open-position

Principle of operation

- Overload monitoring
- Disengage clutch
- Engage clutch
- Engage clutch immediately
- Set drive back to open position
- Set drive to target position
- Latch at set position

7.6.18.1 Overload monitoring

The clutch function can be activated if torque and/or speed overload occurs.

- CLUTCH-OL-DET = HIGH (e.g. assign to FIXED1):
  Overload monitoring is active
  – CLUTCH-OL-DET = LOW:
  Monitoring only sets CLUTCH-OL = HIGH
- CLUTCH-MACT:
  Assign the actual value of the value to be monitored (e.g. MCTRL-MACT in configuration 10200). The input signal is processed further as absolute value.
- CLUTCH-MLIM:
  Determination of the monitoring threshold.
  – CLUTCH-MACT > CLUTCH-MLIM:
  Output CLUTCH-OL = HIGH (independently of input CLUTCH-OL-DET)
  The output remains at HIGH as long as a L → H-signal occurs at the input of CLUTCH-CLOSE.

Note!

Code C1412/3 is used to set a delay time which determines the time when the overload is indicated.

If normal load conditions can be achieved while the drive is being in the delay period, the monitoring will be reset.

This **will not** be entered in the history buffer.

7.6.18.2 Disengage clutch

Unlike the mechanical clutch, the CLUTCH function only separates the drive from the master value or the profile.Thus it is possible to decelerate the drive to standstill in a controlled way.

- CLUTCH-OPEN = HIGH (disengange the clutch):
  – Input CLUTCH-CLOSE = LOW or
  – Activation of the overload monitoring (see chapter 7.6.18.1)
- Speed control to standstill (CLUTCH-NSET)

The output CLUTCH-NSET provides a corresponding speed setpoint with which the drive is decelerated to standstill.
The deceleration time can be set under C1412/1.

7.6.18.3 Engage clutch

The function is activated through a L→H - transition at the input CLUTCH-CLOSE.

For the time required to start cam operation again, the function of the speed setpoint at CLUTCH-NSET can be configured under C1410. The following alternatives are possible:

– Engage clutch immediately
– Set drive back to open-position, engage clutch
– Set drive to target position, engage clutch
– Latch at set position

After the selected function has been processed the output CLUTCH-OPEN is set to LOW.

Engage clutch immediately

- C1410 = 0.

The output CLUTCH-OPEN is immediately set to LOW.

Set drive back to open-position

- C1410 = 1.

The current position is stored by the input CLUTCH-PHI-ACT when the monitoring is activated or a H→L transition occurs at the input CLUTCH-CLOSE.

Note!

The actual position is **not** available.

A L → H transition at the input CLUTCH-CLOSE starts a profile generator which sets the drive back to the open-position.

– Acceleration/deceleration time adjustable under C1412/2
– Max. speed adjustable under C1411/1
– A corresponding speed setpoint is output at -NSET.

CLUTCH-OPEN is set to LOW when the open-position is reached.

Set drive to target position

- C1410 = 2

A L → H transition at the input CLUTCH-CLOSE starts a profile generator which sets the drive to the target position. The target position must be selected through CLUTCH-PHI-SET.

– Acceleration/deceleration time adjustable under C1412/2
– Max. speed adjustable under C1411/1

A corresponding speed setpoint is output at CLUTCH-NSET.

CLUTCH-OPEN is set to LOW when the target position is reached.

Latch at set position

- C1410 = 3

The drive remains in standstill until CLUTCH - PHI-ACT = CLUTCH - PHI-SET.

After a L -> H transition at the input CLUTCH-CLOSE:

– the speed setpoint = 0 is output at -NSET
– with CLUTCH - PHI-ACT =CLUTCH - PHI-SET output CLUTCH - OPEN is set to LOW
– Hysteresis adjustable under C1413/1

7.6.19 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:

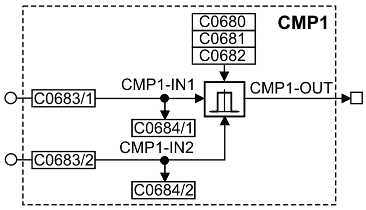


Fig. 7-51 Comparator (CMP1)

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	-	-	-	-	-	-

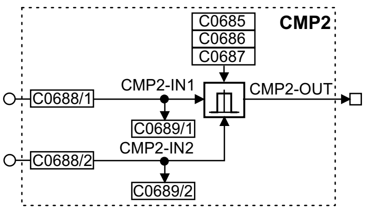


Fig. 7-52 Comparator (CMP2)

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	-	-	-	-	-	-

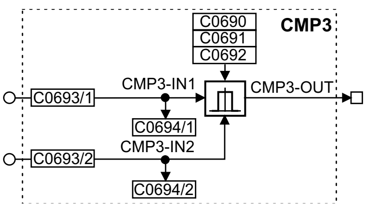


Fig. 7-53 Comparator (CMP3)

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|

7.6.19.1 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.

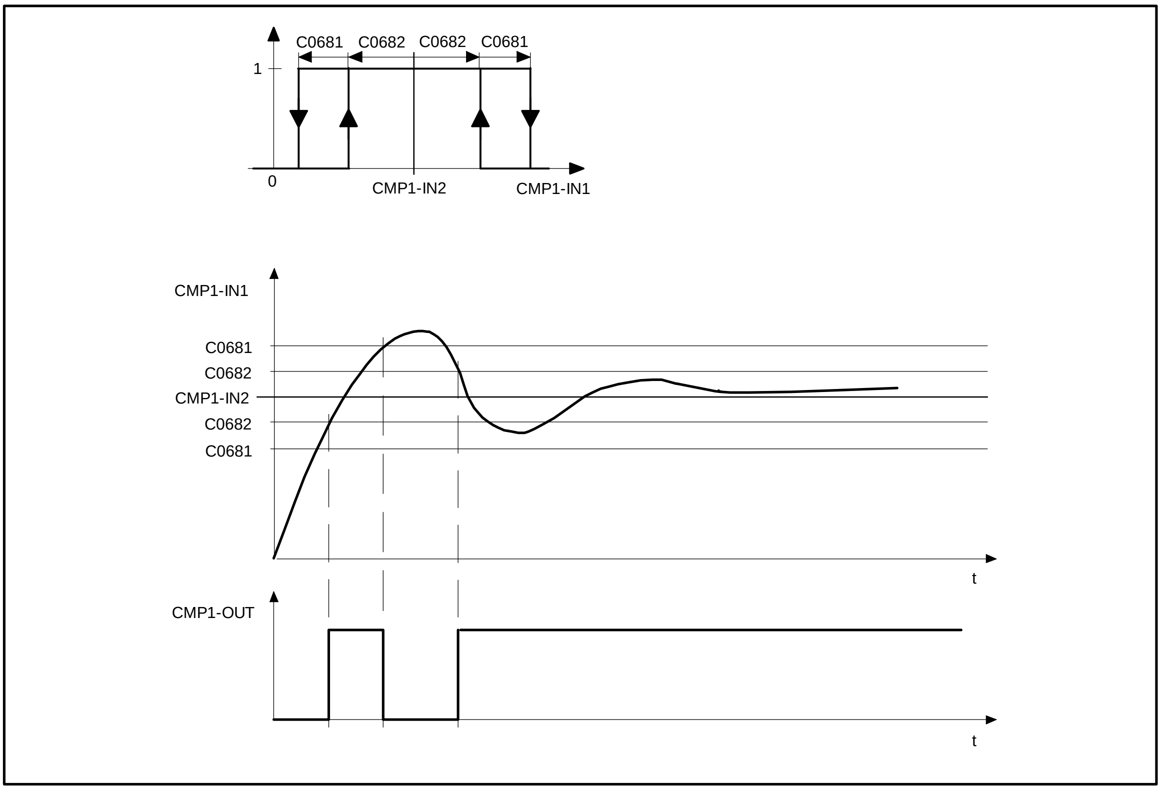


Fig. 7-54 Equality of signals (CMP1-IN1 = CMP1-IN2)

Example:

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

7.6.19.2 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.

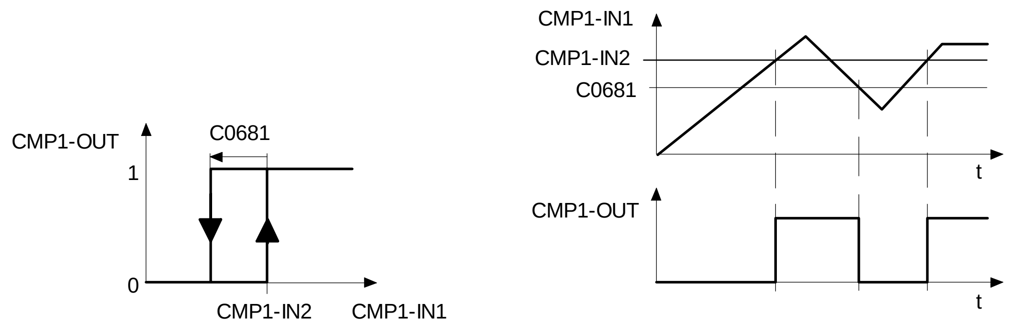


Fig. 7-55 Exceeding signal values (CMP1-IN1 > CMP1-IN2)

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.

7.6.19.3 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.

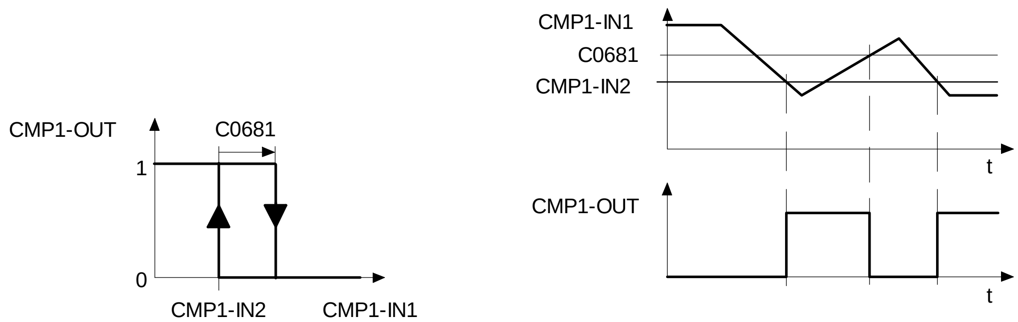


Fig. 7-56 A value falls below signal values (CMP1-IN1 < CMP1-IN2)

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.

7.6.19.4 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 "$n_{act} = 0$".

7.6.19.5 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.

7.6.19.6 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.

7.6.20 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

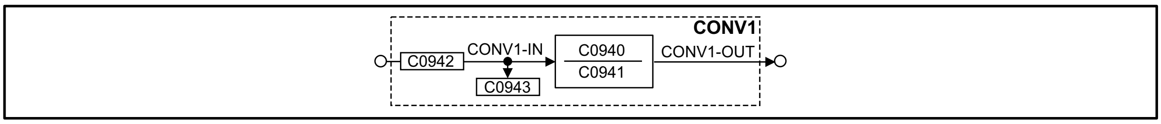


Fig. 7-57 Function block CONV1

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

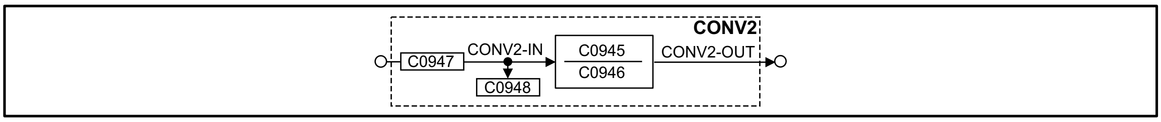


Fig. 7-58 Function block CONV2

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:

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

Function block library

CONV3

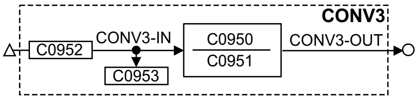


Fig. 7-59 Function block CONV3

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

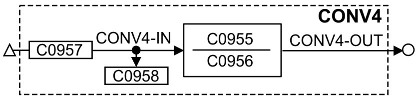


Fig. 7-60 Function block CONV4

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

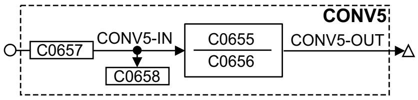


Fig. 7-61 Function block CONV5

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

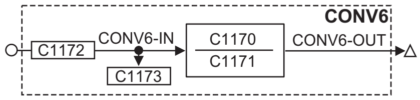


Fig. 7-62 Function block CONV6

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:

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

7.6.21 Phase conversion (CONVPHA)

Purpose

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

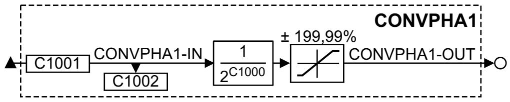


Fig. 7-63 Phase conversion (CONVPHA1)

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:

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

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

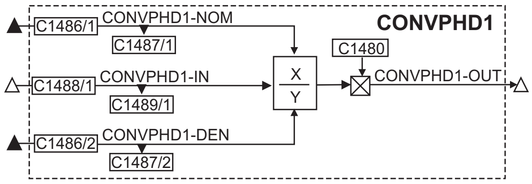
$$\text{CONVPHA1-OUT2 [inc]} = \text{CONVPHA1-IN [inc]} \cdot \frac{1}{2^{C1000}}$$

7.6.22 Conversion - stretching factor (CONVPHD)

One function block (CONVPHD1) is available.

Purpose

- Exact adaptation of the incrmental encoder
- CONVPHD1 for the adjustment of the stretching factor via free configurable inputs



Signal				Source		Note
Name	Type	DIS/selection	DIS format	CFG	List	
CONVPHD1-DEN	ph	1487/2	dec [inc]	1486/2	3	Stretching factor denominator, input limited to +1 to +200000000
CONVPHD1-IN	phd	1489/1	dec [inc]	1488/1	4	Input in rpm
CONVPHD1-NOM	ph	1487/1	dec [inc]	1486/1	3	Stretching factor numerator, input limited to ±1 to ±200000000
CONVPHD1-OUT	phd		-	-	-	Output in rpm

Function

- Interconnection of function blocks
- Encoder settings in single unit steps
- Set stretching factor through 6 decades

7.6.22.1 Interconnection of function blocks

The function block is connected directly behing the digital frequency input DFIN.

Stop!

The DFIN code C0425 must be set to selection 6 to evaluate the encoder signals correctly.

7.6.22.2 Encoder adaptation

The encoder is adapted to the controller using the freely adjustable encoder constants

- C1480 in CONVPHD1

The adaptation in the function block can be carried out in single units steps 1, 2, 3, 4... 32767 (instead of the steps of 2^0, 2^1, 2^3 etc.) possible with DFIN.

7.6.22.3 Set stretching factor through 6 decades

The function blocks can be used for fine adjustment of the stretching factor (6 decades).

The stretching factor is set:

- CONVPHD1:
  via freely connectable inputs

Note!

If only the stretching factor is used (the function block is then somewhere else in the circuit), set the encoder constant to 16384 incr./rev. Otherwise, the signal will be amplified additionally (lower values) or attenuated.

When setting negative values in the numerator, the output signal will be inverted.

7.6.23 Phase conversion (CONVPHPH)

Purpose

Conversion of a phase signal with dynamic fracture.

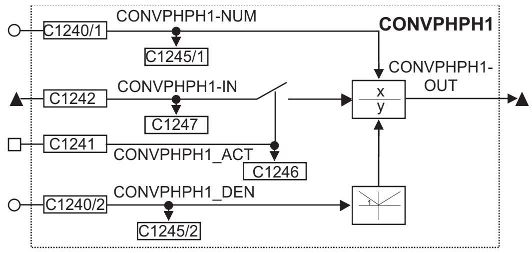


Fig. 7-64 Phase conversion (CONVPHPH1)

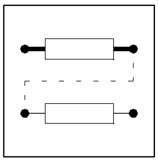
Signal				Source		Note
Name	Type	DIS	DIS format	CFG	List	
CONVPHPH1-IN	ph	C1247	dec [inc]	C1242	3	-
CONVPHPH1-NUM	a	C1245/1	dec	C1240/1	1	Numerator
CONVPHPH1-DEN	a	C1245/2	dec	C1240/2	1	Denominator (with absolute value generation)
CONVPHPH1-ACT	d	C1246	bin	C1241	2	-
CONVPHPH1-OUT	ph	-	-	-	-	without limitation,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

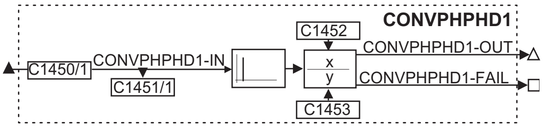


7.6.24 Conversion (CONVPHPHD)

Two function blocks are available (CONVPHPHD1)

Purpose

A phase change is converted into a speed (digital frequency).



Signal				Source		Note
Name	Type	DIS	DIS format	CFG	List	
CONVPHPHD1-IN	ph	1451/1	dec [inc]	1450/1	3	Phase input
CONVPHPHD1-FAIL	d		-	-	-	HIGH = Resulting speed > 30000 rpm
CONVPHPHD1-OUT	phd		-	-	-	Output in rpm

Function

A phase change at input CONVPHPHD1-IN is converted into a speed.

- Reference: 65536 inc = 1 motor rev.
- The speed can be adapted through the codes C1452 (numerator) and C1453 (denominator).
- The output is limited to ±n = 30000 rpm.

Status signals

CONVPHPHD1-FAIL = HIGH is set when the speed limit ±n = 30000 rpm is reached. Phase errors can occur in the following function blocks.

7.6.25 Speed conversion (CONVPP)

Purpose

Conversion of a speed signal with dynamic fracture

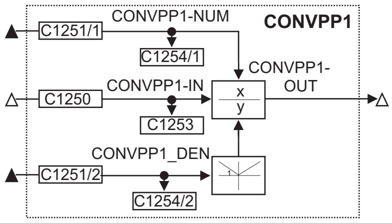


Fig. 7-65 Speed conversion (CONVPP1)

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.

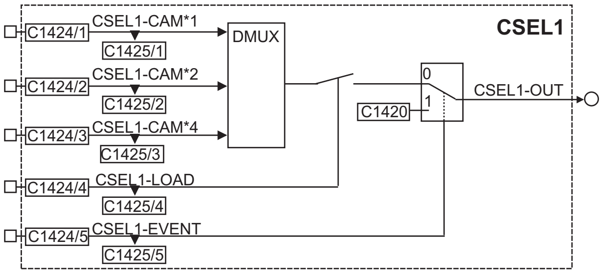
- The speed signal at CONVPP1-IN is evaluated using the factor from C1251/1 / C1251/2.

7.6.26 Cam profile selection (CSEL)

One function block (CSEL1) is available.

Purpose

- Selection of one cam profile out of eight profiles.
- Selection of an event profile



Signal				Source		Note
Name	Type	DIS/selection	DIS	CFG	List	
CSEL1-CAM*1	d	1425/1	bin	1424/1		Selection bit 0
CSEL1-CAM*2	d	1425/2	bin	1424/2		Selection bit 1
CSEL1-CAM*4	d	1425/3	bin	1424/3		Selection bit 2
CSEL1-LOAD	d	1425/4	bin	1424/4		Acceptance=LOW→HIGH transition
CSEL1-EVENT	d	1425/5	bin	1424/5		Selection value event cam profile
CSEL1-OUT	a	13651	-	-	-	

Function

- Conversion of a bit map into an analog value
- Acceptance of a converted value
- Event-dependent output of a fixed value

7.6.26.1 Change of an input bit map

1. input CSEL1-CAM*1	2. input CSEL1-CAM*2	3. input CSEL1-CAM*4	CSEL1-LOAD	CSEL1-Event	Output CSEL1-OUT
0	0	0	0 → 1	0	0
1	0	0	0 → 1	0	1
0	1	0	0 → 1	0	2
1	1	0	0 → 1	0	3
0	0	1	0 → 1	0	4
1	0	1	0 → 1	0	5
0	1	1	0 → 1	0	6
1	1	1	0 → 1	0	7
*	*	*	*	1	Value in C1420

* - Signal status has no meaning

- Depending on the number of profiles used, not all inputs must be assigned for cam profile selection.

Number of profiles used (Value of C1300)	Inputs to be assigned (CAM*1, CAM*2, CAM*4)
1 (only profile 0)	0
2 (profiles 0 and 1)	1 (CAM*1)
4 (profiles 0 to 3)	2 (CAM*1, CAM*2)
8 (profiles 0 to 7)	3 (CAM*1, CAM*2, CAM*4)

7.6.26.2 Acceptance of a converted value

Very often, a new profile is selected during operation. This new profile, i.e. of the changed value, must only be accepted, if the drive reaches a certain position. The acceptance is activated by a L→H transition at the input CSEL1-LOAD.

7.6.26.3 Event-dependent otuput of a fixed value

- The value entered under C1420 will be output at CSEL1-OUT (without signal transition at CSEL1-LOAD) when the input CSEL1-EVENT is addressed.

STOP

Stop!

The activation of a cam profile, which has been additionally defined in CSEL but exceeds the number of profiles selected in the FBCDATA, will be ignored.
Example: Input in CDATA = 4 profiles; profile additionally defined in CSEL (profile 5).
The special profile would be ignored!

Code	Meaning	Note
C1420	Input of fixed values for the selection via CSEL1-EVENT	

If the signal at input CSEL1-EVENT = LOW, the input CSEL1-LOAD must again set a L→H transition to activate the acceptance of the input values.

7.6.27 Characteristic function (CURVE)

Purpose

Conversion of an analog signal into a characteristic.

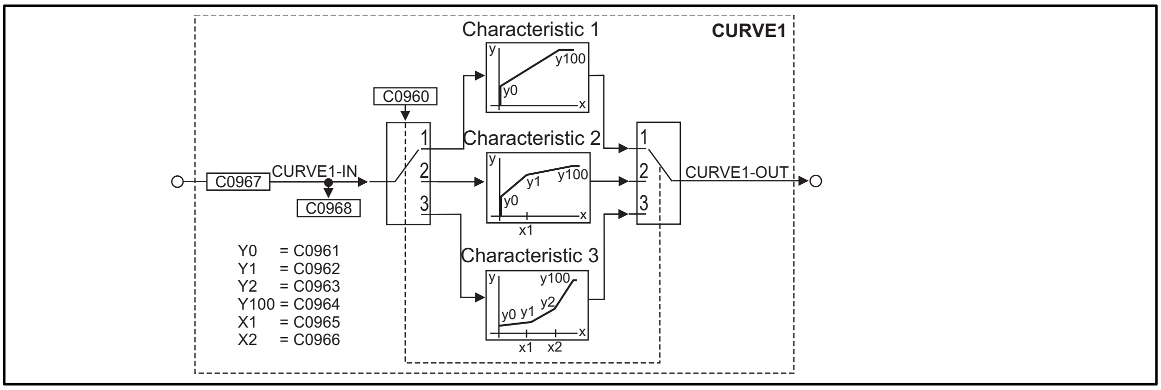


Fig. 7-66 Characteristic function (CURVE1)

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

7.6.27.1 Characteristic with two co-ordinates

Set C0960 = 1.

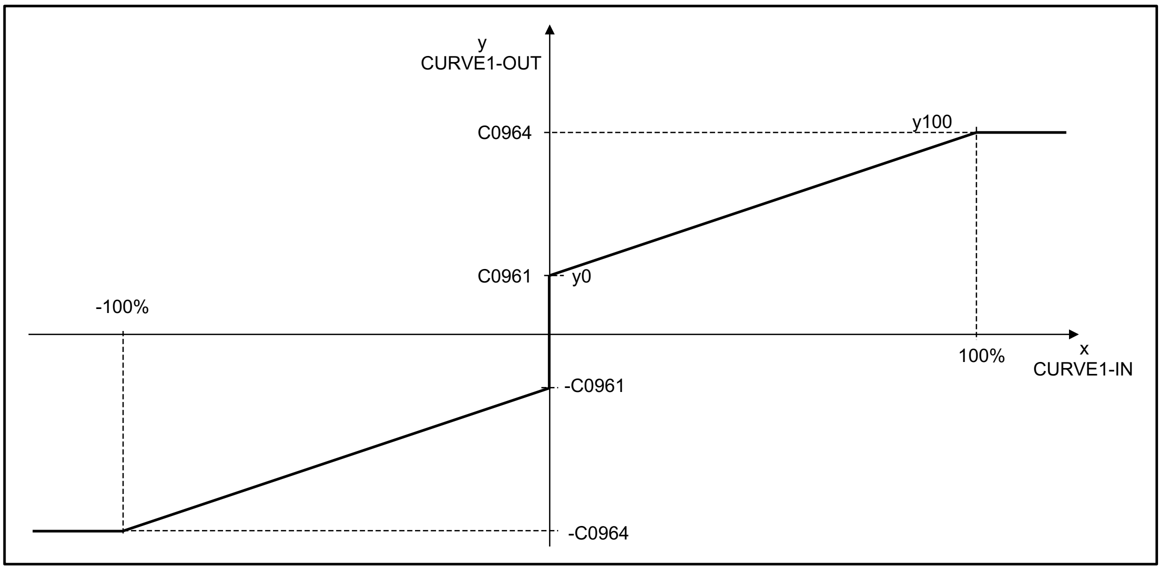


Fig. 7-67 Line diagram with 2 co-ordinates

7.6.27.2 Characteristic with three co-ordinates

Set C0960 = 2.

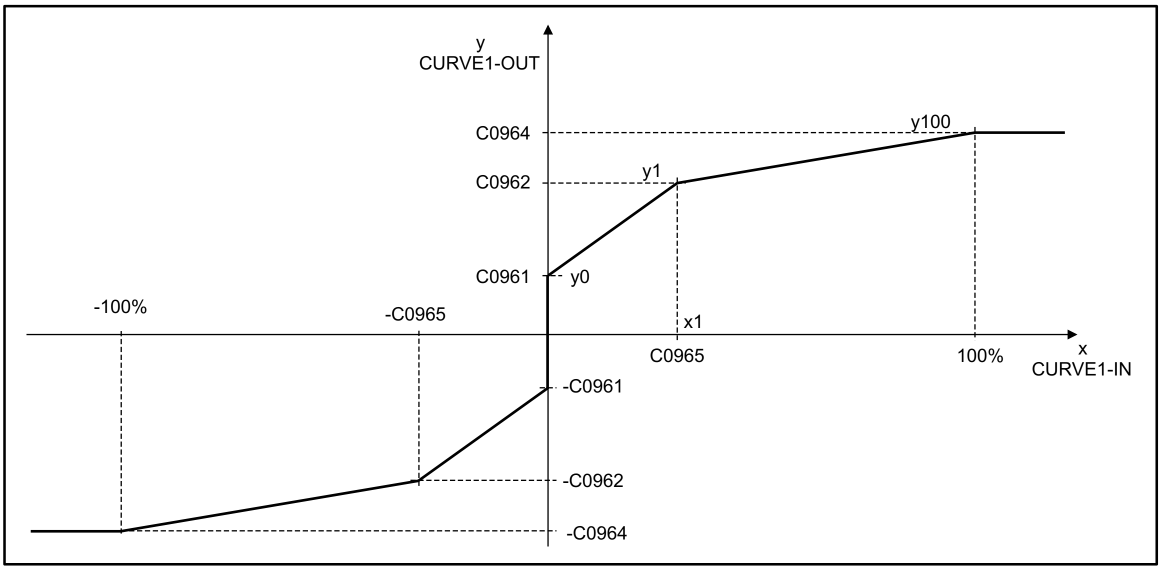


Fig. 7-68 Line diagram with three co-ordinates

7.6.27.3 Characteristic with four co-ordinates

Set C0960 = 3.

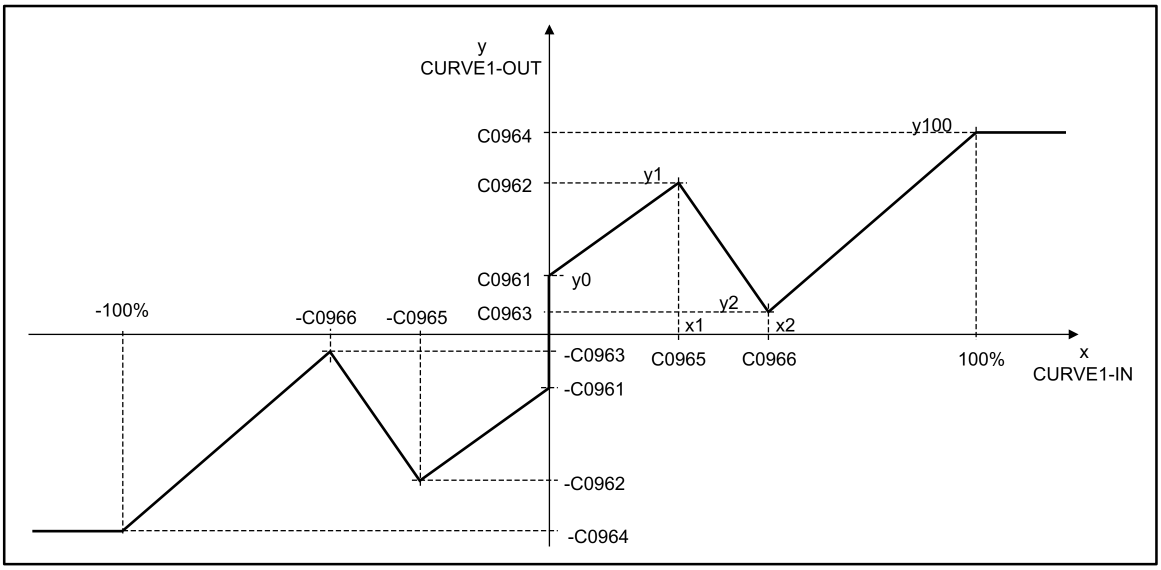


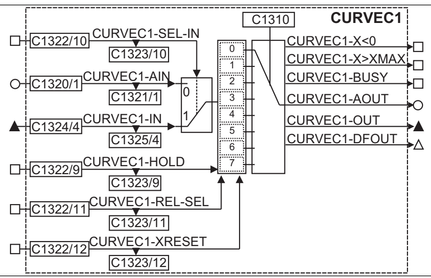
Fig. 7-69 Line diagram characteristic with four co-ordinates

7.6.28 Characterisitc function (CURVEC)

One function block (CURVEC1) is available.

Purpose

Analog profile mapping



Signal				Source		Note
Name	Type	DIS/selection	DIS format	CFG	List	
CURVEC1-AIN	a	C13321/1		C1320/1	1	Analog input (analog profile)
CURVEC1-AOUT	a					Analog output
CURVEC1-BUSY	d					LOW-HIGH transition = “The point distribution is not perfect, select less points”
CURVEC1-DFOUT	phd	13302		-	-	DF/speed output
CURVEC1-HOLD	d	C1323/9		C1322/9	1	HIGH = Outputs CURVEC-OUT and CURVEC-AOUT will be stored DFOUT = 0
CURVEC1-IN	ph	C1325/4		C1324/4	3	Phase input
CURVEC1-OUT	ph					Phase output
CURVEC1-RSEL-SEL	d	C1323/11		C1322/11	1	HIGH = Feed function
CURVEC1-SEL-IN	d	C1323/10		C1322/10	2	HIGH = Input CURVEC-IN active
CURVEC1-X<0	d					HIGH = Input value < 0
CURVEC1-X>XMAX	d					HIGH = Input value > X_{max}
CURVEC1-XRESET	d	C1323/12		C1322/12	1	HIGH = sets the input value internally = 0

Function

- Identical with FB CDATA, but with reduced functionality (cam position profile)
- General profile

Selection between general cam position profile and characteristic function

Select with CURVEC1-SEL-IN which input (-AIN or -IN) is to be processed further.

It is possible to change between a (quasi-)analog input (16 Bit-Eingang) and an input for phase signals (32 bit input).

Thus it is possible to use the function block CURVEC

- to implement any function within the limit ±199.99 % (z.B. Vp adaptation)

or

- to implement a mechanical cam function.

Note!

The input should be assigned to a FIXED value to avoid an unintentional change to another input.

Function block library

Freezing of the output value

With CURVEC1-HOLD = HIGH the output signals remain the same as of the switching instant independently of possibly changing input value.

The output are enabled again with CURVEC1-HOLD = LOW. Depending on the function, the output values change immediately to the now valid input values.

Stop!

They change suddenly!

Cam profile with relative feed

Profiles with relative feed are used for endless drives, e.g. feed processes. The end value of such a profile is not identical with its start position.

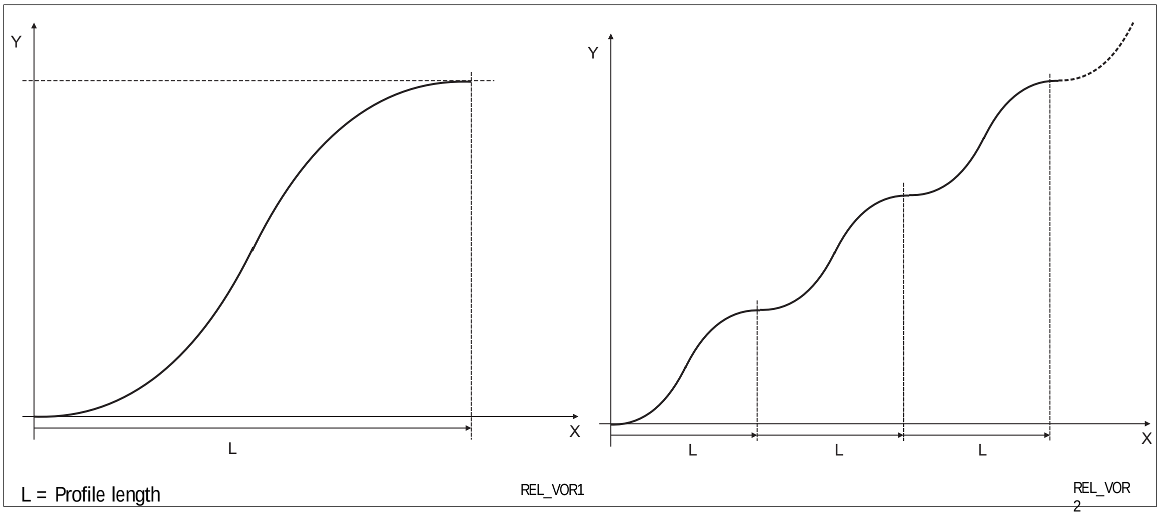
Endless drives are for instance:

- conveyor belts
- round tables with a feed over the entire revolution.

Select this function as follows:

CURVEC1-REL-SEL = HIGH (e.g. FIXED 1)

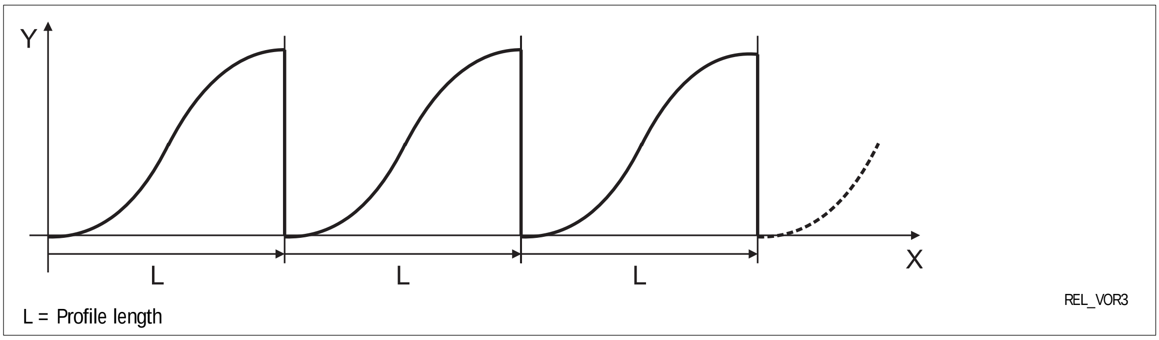
Examples



With CURVEC1-REL-SEL = LOW, the last Y value of the profile will not be stored!

Stop!

Depending on the cam profile data, this setting may result in a 'jump' of the drive to the new value (see fig. below).



Negative input values

A fault is indicated for negative input values (X<0):

CURVEC1-X<0 = HIGH.

Furthermore, the output will output a y value which results from the cam profile function for x=0.

Max. permissible input values exceeded

A fault is indicated for input values x>xmax:

CURVEC1-X>X_{max} = HIGH.

Furthermore, the output will output a Y value which results from the cam profile function for x=Xmax.

Note!

X_{max} is already determined when the profile is generated (GDC).

7.6.29 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.

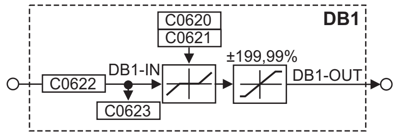


Fig. 7-70 Dead band element (DB1)

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.

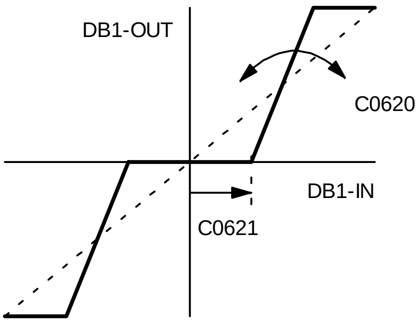


Fig. 7-71 Dead band and gain

7.6.30 Controller control (DCTRLC)

Purpose

Set certain controller states (e. g. trip, trip reset, quick stop or controller inhibit).

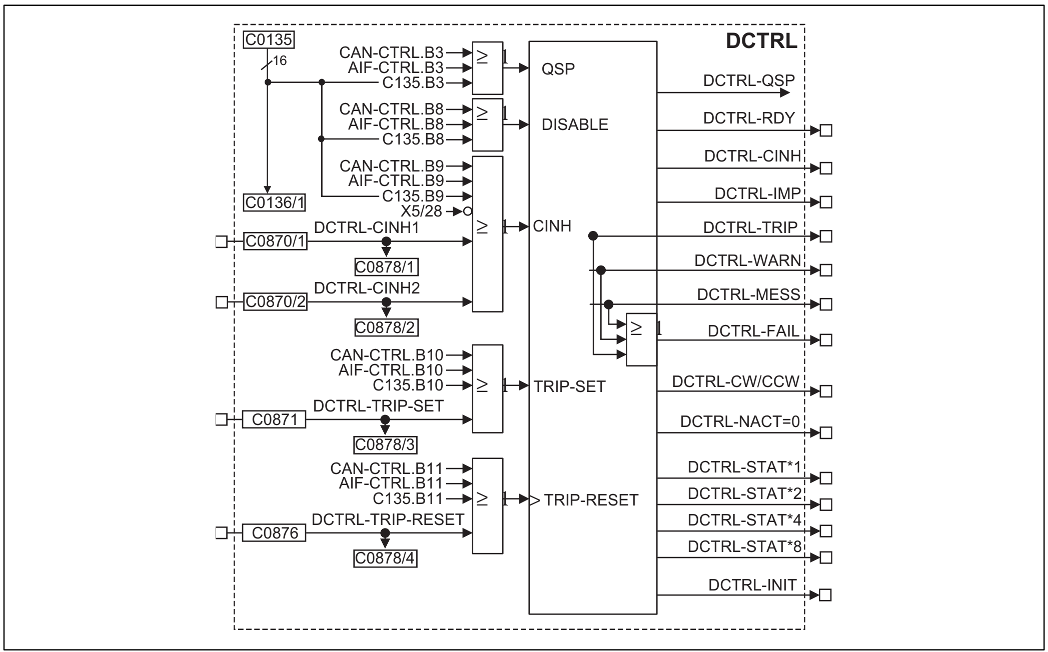


Fig. 7-72 Controller control (DCTRL)

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 = Error message EEr
DCTRL-TRIPRESET	d	C0878/4	bin	C0876	2	55	LOW-HIGH transition = Trip reset
DCTRL-RDY	d	-	-	-	-	-	HIGH = Ready for operation
DCTRL-CINH	d	-	-	-	-	-	HIGH = Controller reset
DCTRL-IMP	d	-	-	-	-	-	HIGH = High-ohmic power end stages
DCTRL-TRIP	d	-	-	-	-	-	HIGH = Error active
DCTRL-WARN	d	-	-	-	-	-	HIGH = Warning active
DCTRL-MESS	d	-	-	-	-	-	HIGH = Message active
DCTRL-FAIL	d	-	-	-	-	-	-
DCTRL-CW/CCW	d	-	-	-	-	-	LOW = CW rotation, HIGH = CCW rotation
DCTRL-NACT=0	d	-	-	-	-	-	HIGH = Motor speed < C0019
DCTRL-STAT*1	d	-	-	-	-	-	General status (binary coded)
DCTRL-STAT*2	d	-	-	-	-	-	General status (binary coded)
DCTRL-STAT*4	d	-	-	-	-	-	General status (binary coded)
DCTRL-STAT*8	d	-	-	-	-	-	General status (binary coded)
DCTRL-INIT	d	-	-	-	-	-	-

Function

- Quick stop (QSP)
- Operation inhibited (DISABLE)
- Controller inhibit (CINH)
- TRIP SET
- TRIP RESET
- Parameter-set changeover (PAR)
- Controller status

7.6.30.1 Quick stop (QSP)

The controller is braked to standstill following the deceleration ramp C0105. It generates a holding torque.

- This function can be controlled via 3 inputs.
  – Control word CAN-CTRL bit 3 from CAN-IN1
  – Control word AIF-CTRL bit 3 from AIF-IN
  – Control word C0135 bit 3
- All inputs are OR linked.
- C0136/1 indicates the control word C0135

7.6.30.2 Operation inhibited (DISABLE)

When being in this status, the drive cannot be started with the command: controller enable. The power end stages are inhibited. All controllers are reset.

- This function can be controlled via 3 inputs.
  – Control word CAN-CTRL bit 8 from CAN-IN1
  – Control word AIF-CTRL bit 8 from AIF-IN
  – Control word C0135 bit 8
- All inputs are OR linked.
- C0136/1 indicates the control word C0135

7.6.30.3 Controller inhibit (CINH)

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

- This function can be controlled via 6 inputs.
  – Terminal X5/28 (LOW = controller inhibit)
  – Control word CAN-CTRL bit 9 from CAN-IN1
  – Control word AIF-CTRL bit 9 from AIF-IN
  – Control word C0135 bit 9
  – Free inputs DCTRL-CINH1 and DCTRL-CINH2
- All inputs are OR linked.
- C0136/1 indicates the control word C0135

7.6.30.4 TRIP SET

The drive is controlled to the status set under code C0581 and indicates EEr(external error).

- This function can be controlled via 4 inputs.
  – Control word CAN-CTRL bit 10 from CAN-IN1
  – Control word AIF-CTRL bit 10 from AIF-IN
  – Control word C0135 bit 10
  – Free input DCTRL-TRIP-SET
- All inputs are OR linked.
- C0136/1 indicates the control word C0135

7.6.30.5 TRIP RESET

Resets an active trip after the cause has been eliminated. If the cause is still active, it does not respond.

- This function can be controlled via 4 inputs.
  – Control word CAN-CTRL bit 11 from CAN-IN1
  – Control word AIF-CTRL bit 11 from AIF-IN
  – Control word C0135 bit 11
  – Free input DCTRL-TRIP-RESET
- All inputs are OR linked.
- This function is only carried out by a LOW-HIGH transition of the signal resulting from the OR linkage.
- C0136/1 indicates the control word C0135

Note!

If one of the inputs is set to HIGH, it is not possible that a LOW-HIGH transition occurs at the resulting signal.

7.6.30.6 Controller status

The status is binary coded in the output DCTRL-STAT*x.

STAT*8	STAT*4	STAT*2	STAT*1	Controller action
0	0	0	0	Initialization after the supply voltage has been connected
0	0	0	1	LOCK-MODE, restart protection active C0142
0	0	1	1	Drive is inhibited
0	1	1	0	Controller enabled
0	1	1	1	The activation of a monitoring leads to a 'message'.
1	0	0	0	The activation of a monitoring leads to a 'trip'.

7.6.31 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).

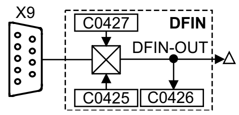


Fig. 7-73 Digital frequency input (DFIN)

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

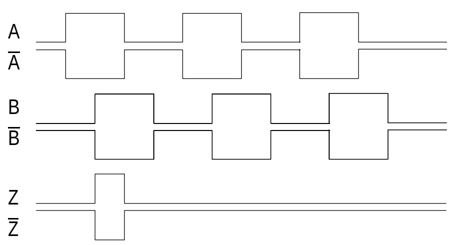


Fig. 7-74 Signal sequence with phase shift (CW rotation)

- 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

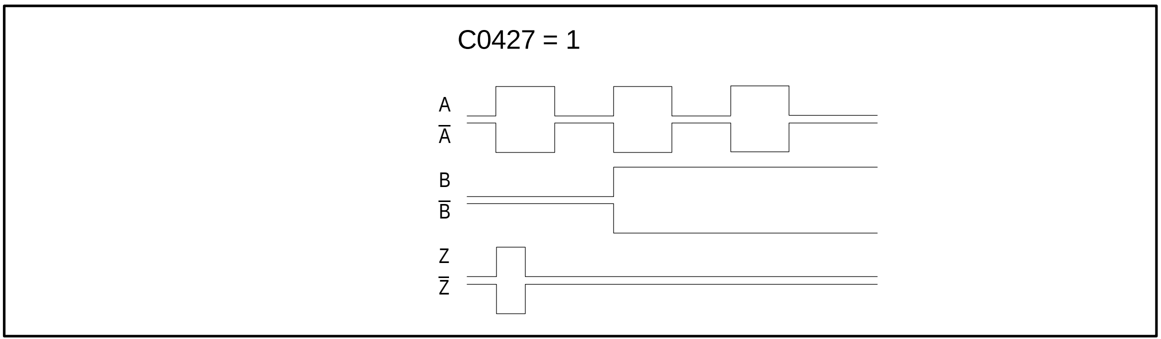


Fig. 7-75 Control of the direction of rotation by track B

- 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

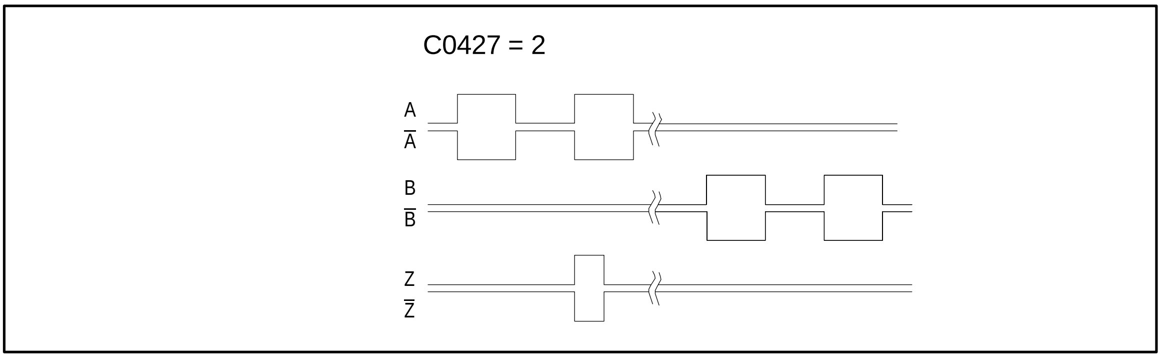


Fig. 7-76 Control of speed and direction of rotation via track A or track B

- 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:

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

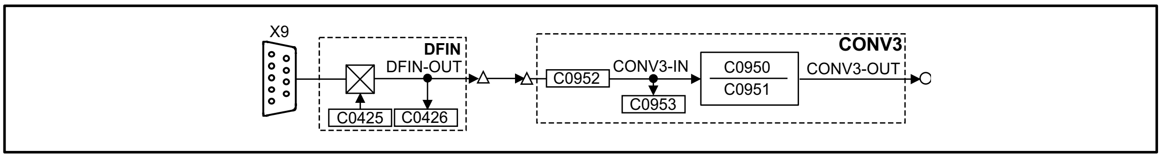


Fig. 7-77 Digital frequency input (DFIN) with connected converter

Stop!

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

7.6.32 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).

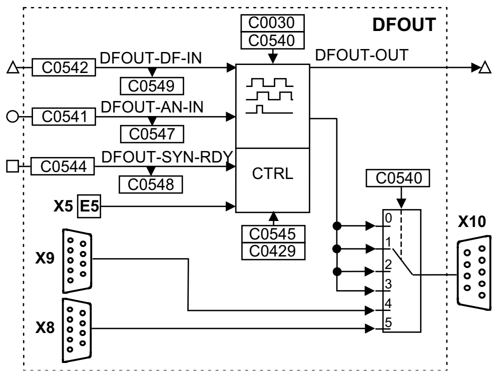


Fig. 7-78 Digital frequency output (DFOUT)

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

7.6.32.1 Output signals on X10

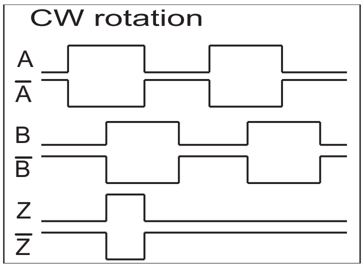


Fig. 7-79 Signal sequence for CW rotation (definition)

- 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!

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)

7.6.32.2 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

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

Example:

DFOUT-AN-IN = 50 %

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

C0011 = 3000 rpm

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

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°).

7.6.32.3 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

$$f\,[Hz] = DFOUT - DF - IN\,[rpm] \cdot \frac{\text{Increments from C0030}}{60}$$

Example:

DFOUT-DF-IN = 3000 rpm

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

$$f\,[Hz] = 3000\ rpm \cdot \frac{2048}{60} = 102400\ Hz$$

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°).

7.6.32.4 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°).

7.6.32.5 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.

7.6.32.6 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.

7.6.33 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.

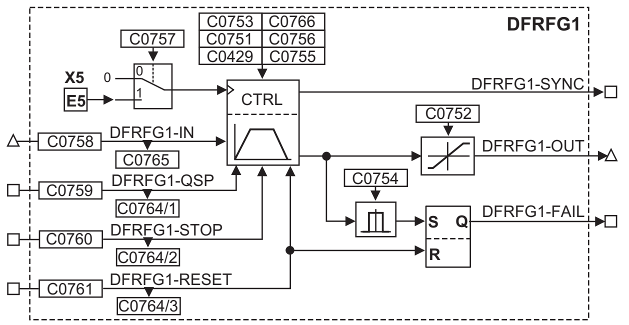


Fig. 7-80 Digital frequency ramp generator (DFRFG1)

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)

7.6.33.1 Profile generator

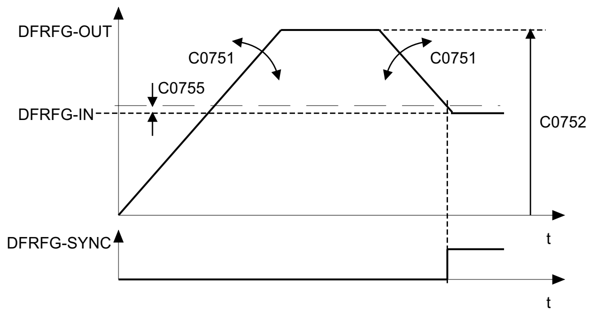


Fig. 7-81 Synchronize on DFRFG

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}.

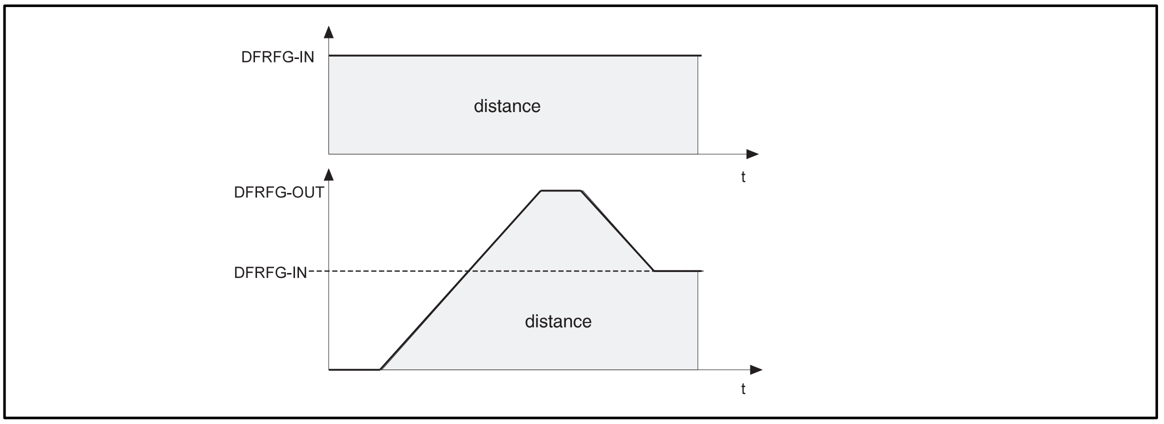


Fig. 7-82 Speed-time diagram DFRFG

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).

7.6.33.2 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.

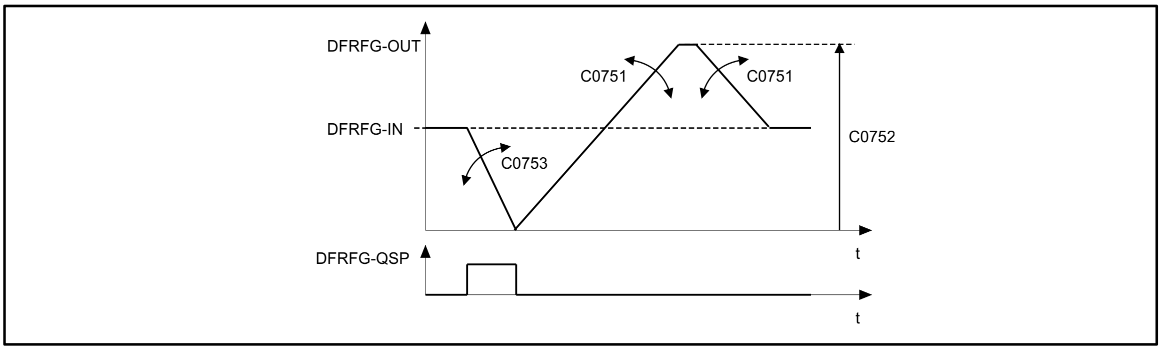


Fig. 7-83 Quick stop DFRFG

7.6.33.3 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.

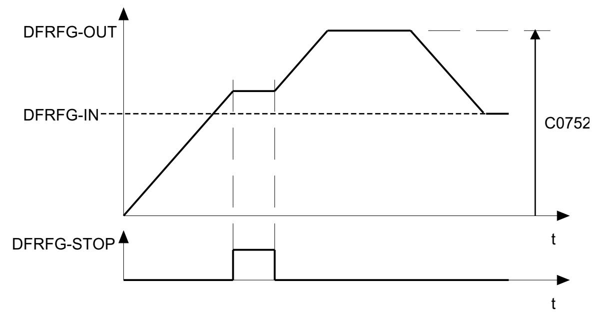


Fig. 7-84 Ramp generator stop

7.6.33.4 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

7.6.33.5 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).

7.6.33.6 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:

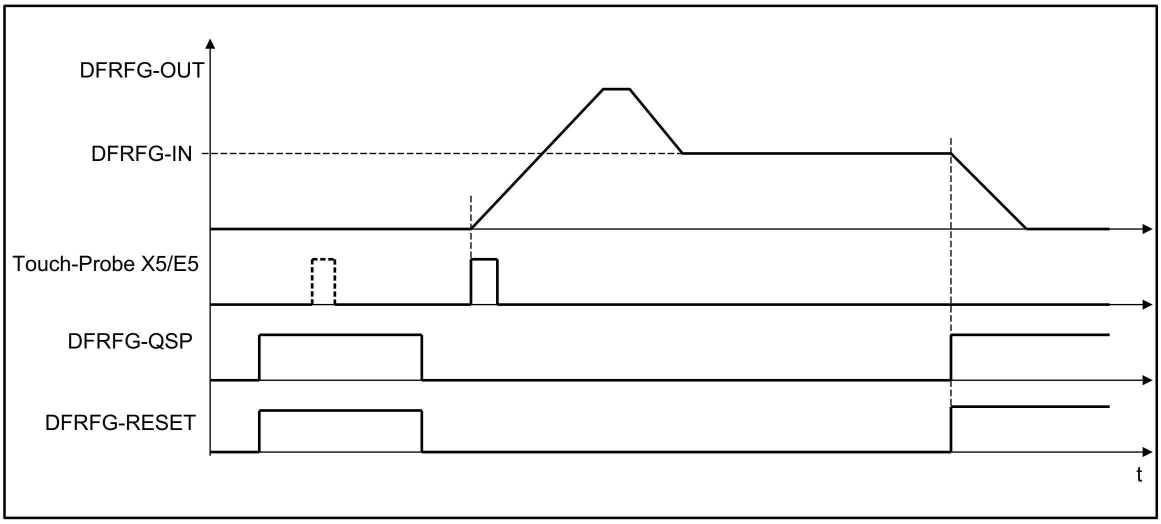


Fig. 7-85 Starting via touch probe initiator (terminal X5/E5)

Stop!

In the default setting, terminal X5/E5 has another function.

7.6.33.7 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.

7.6.33.8 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.

7.6.34 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.

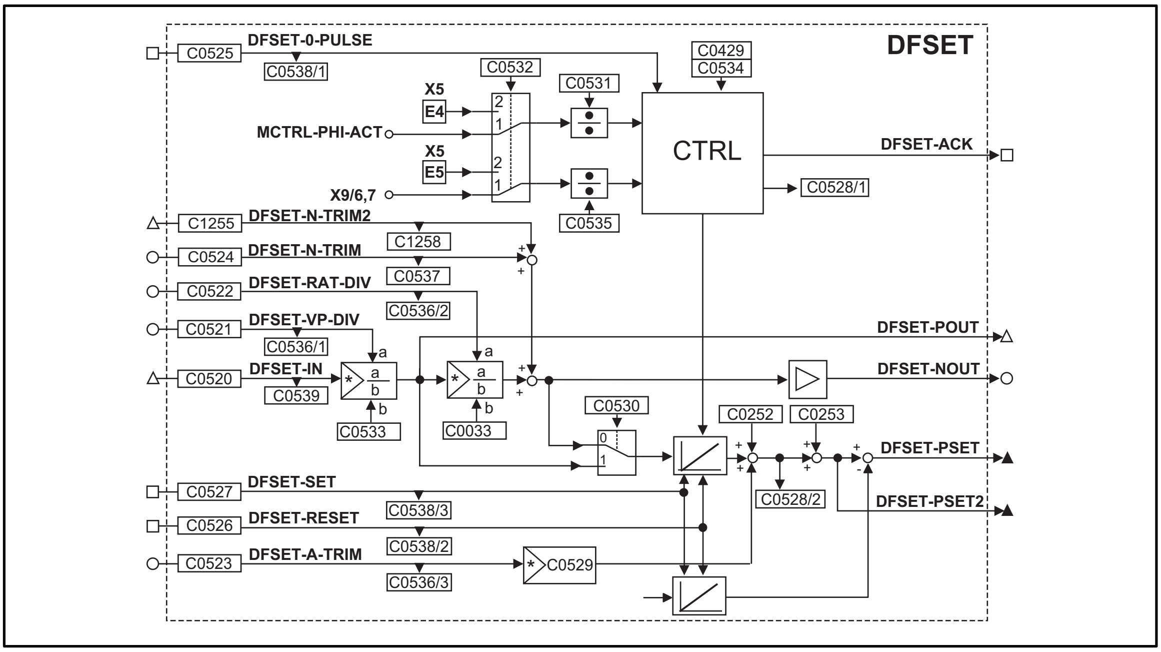


Fig. 7-86 Digital frequency processing (DFSET)

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)

7.6.34.1 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:

$$\text{DFSET} - \text{NOUT} = \text{stretch factor} \cdot \frac{\text{DFSET} - \text{RAT} - \text{DIV}}{\text{C0033}}$$

$$\text{DFSET–NOUT} = \text{DFSET–IN} \cdot \frac{\text{DFSET–VP–DIV}}{\text{C0533}} \cdot \frac{\text{DFSET–RAT–DIV}}{\text{C0033}}$$

7.6.34.2 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 ($\triangleq$ ±1/2 revolution). The source can be any analog signal.

- The input is done in increments (one revolution $\triangleq$ 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).

7.6.34.3 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

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

7.6.35 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.

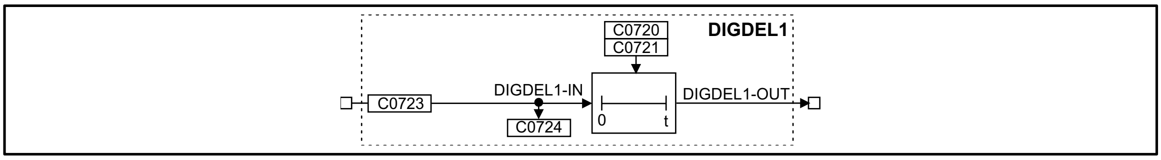


Fig. 7-87 Delay element (DIGDEL1)

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
DIGDEL1-IN	d	C0724	bin	C0723	2	1000	-
DIGDEL1-OUT	d	-	-	-	-	-	-

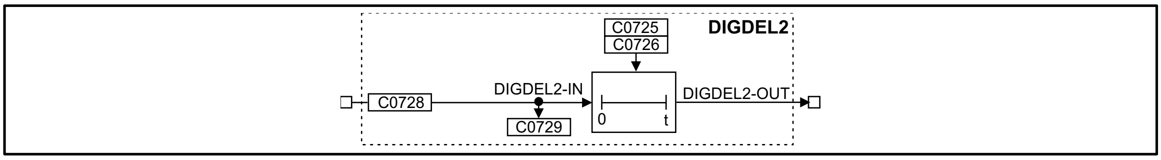


Fig. 7-88 Delay element (DIGDEL2)

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

7.6.35.1 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.

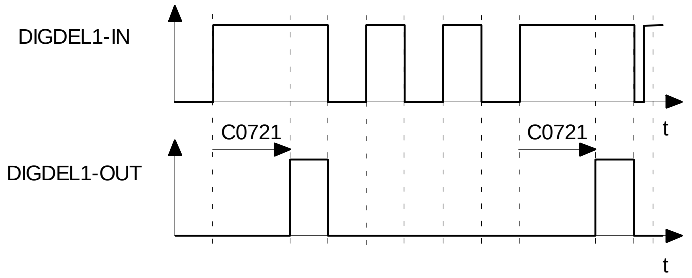


Fig. 7-89 On-delay (DIGDEL1)

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.

7.6.35.2 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.

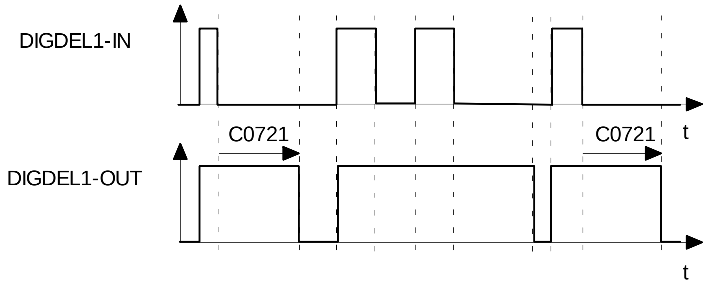


Fig. 7-90 Dropout delay (DIGDEL1)

- 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.

7.6.35.3 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.

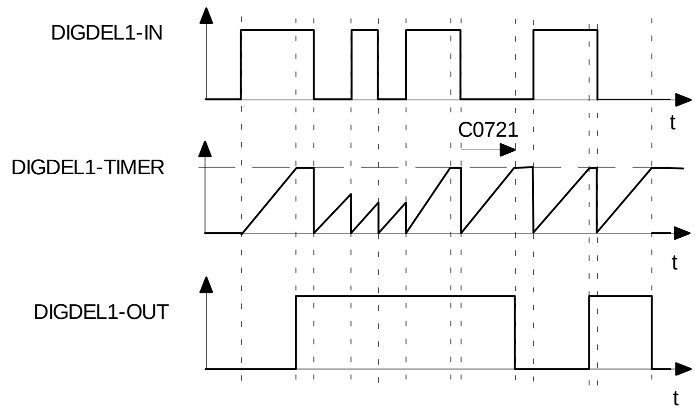


Fig. 7-91 General delay

- 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.

7.6.36 Freely assignable digital inputs (DIGIN)

Purpose

Reading and conditioning of the signals at the terminals X5/E1 to X5/E5.

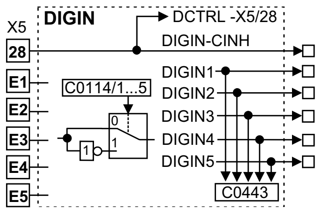


Fig. 7-92 Freely assignable digital inputs (DIGIN)

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)

7.6.37 Freely assignable digital outputs (DIGOUT)

Purpose

Conditioning of the digital signals and output to the terminals X5/A1 to X5/A4.

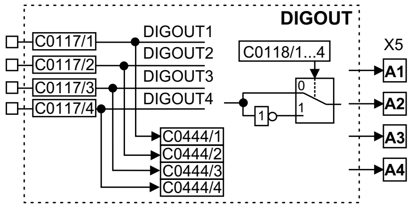


Fig. 7-93 Freely assignable digital outputs (DIGOUT)

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)

7.6.38 First order derivative-action element (DT1)

Purpose

Derivative action of signals

For instance, used for the speed injection (dv/dt).

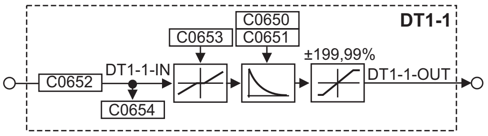


Fig. 7-94 First order derivative-action element (DT1-1)

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.

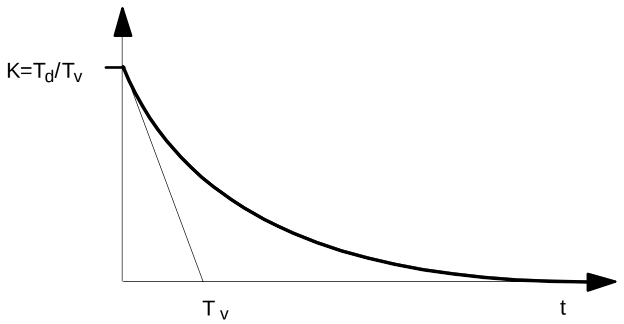


Fig. 7-95 Delay time T_v of the first order derivative-action element

7.6.39 Free piece counter (FCNT)

Purpose

Digital up/down counter.

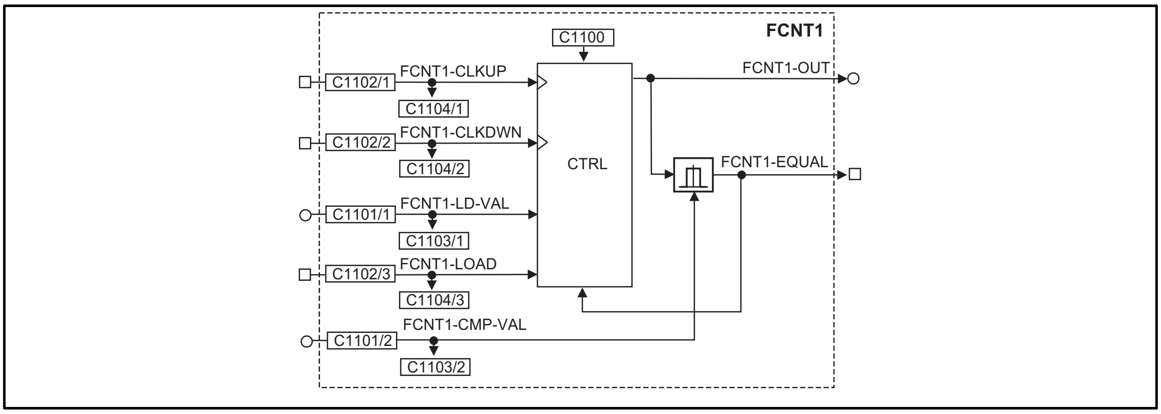


Fig. 7-96 Free piece counter (FCNT1)

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)

7.6.40 Free codes (FCODE)

2 x 16 free codes are available:
FCODE1476/1-16 and FCODE1477/1-16

Purpose

Input of length-related setpoints in physical units

Function

FCODE1476/1 -16

Input in [m_units]. (Measuring system of the master value)

FCODE1477/1 -16

Input in [s_units]. (Measuring system of the curve drive)

Stop!

The codes for the determination of the scaling factors (gearbox factors, feeding factors) affect the conversion of the units in incremental values.

Master units: C1303/1; C1303/2; C1304

Slave units: C1305/1; C1305/2; C1306

7.6.41 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.

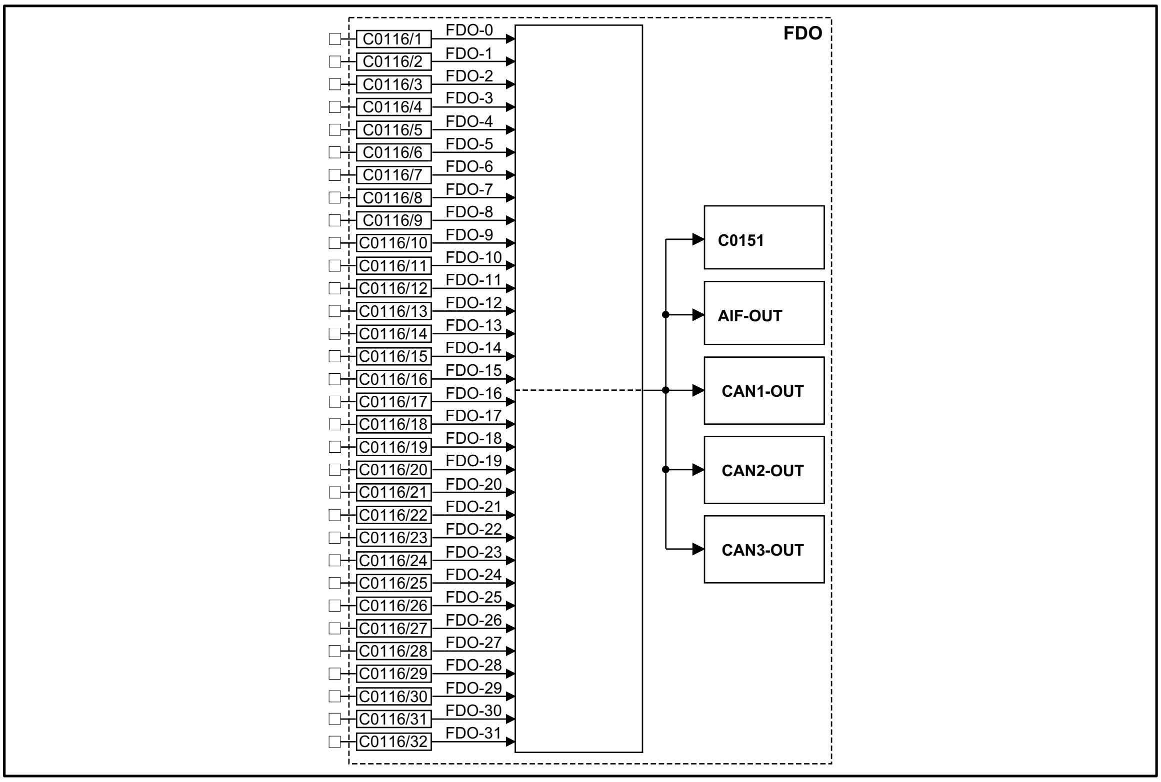


Fig. 7-97 Free digital outputs (FDO)

Function block library

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.

7.6.42 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.

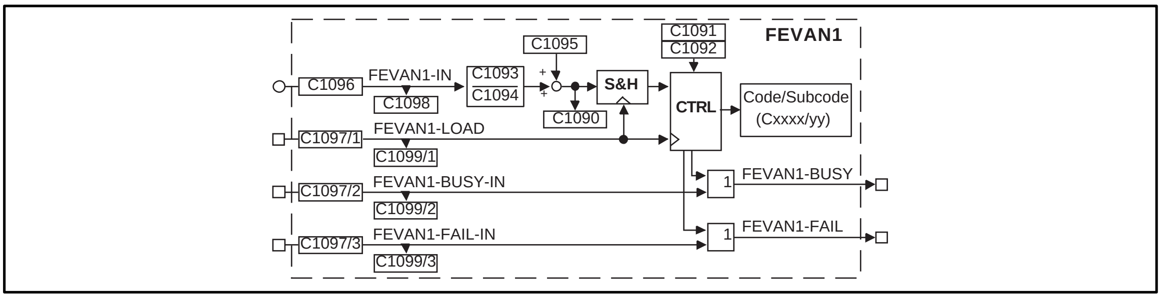


Fig. 7-98 Freely assignable input variables (FEVAN1)

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

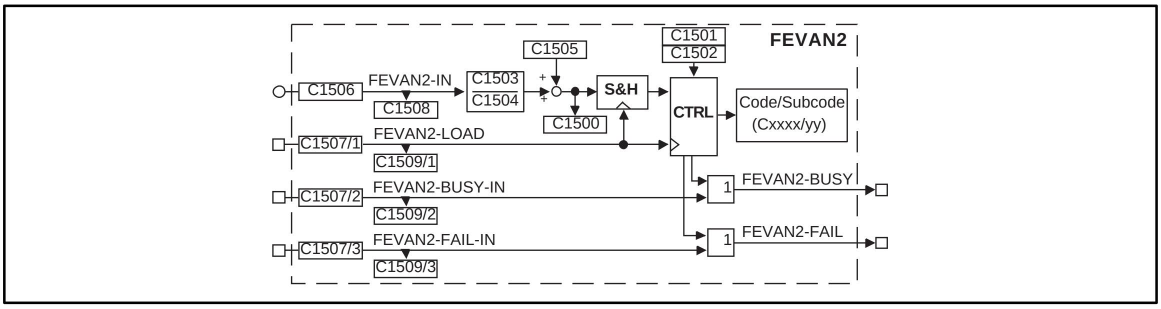


Fig. 7-99 Freely assignable input variables (FEVAN2)

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 block library

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

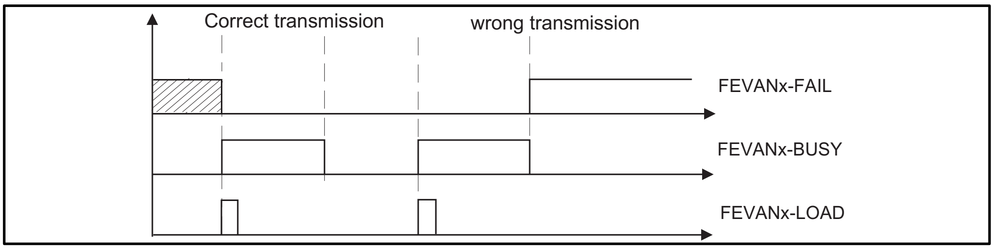


Fig. 7-100 Signal flow

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

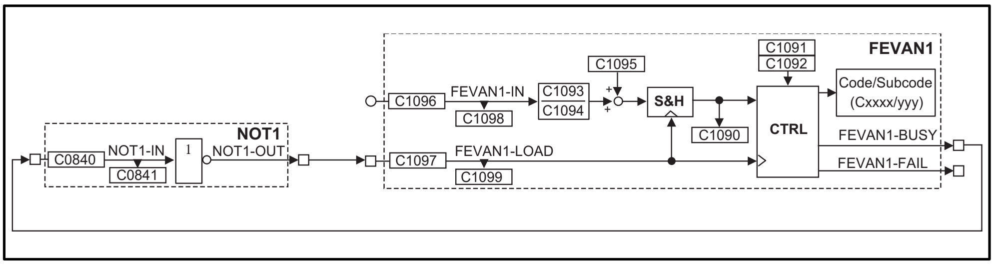


Fig. 7-101 Example for a cycle data transmission to a target code

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 7.12).
- 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):

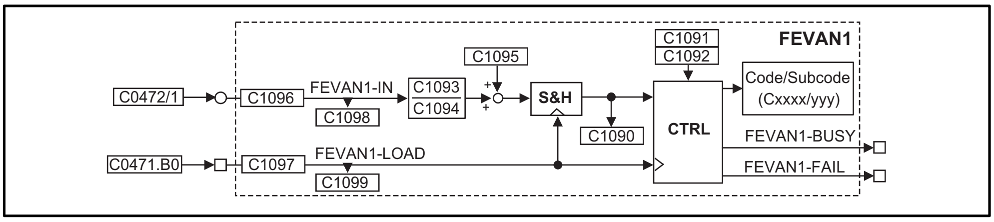


Fig. 7-102 Example of a circuit for FIX32 format with percentage scaling

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:

$$\text{FEVAN1–IN [\%]} \cdot \frac{1}{10000} \cdot \frac{16384}{100} \cdot \frac{C1093}{C1094} + C1095 = C0141\ [\%]$$

Scaling factor Scaling factor

Control:

- Set C0471.B0 = 1 (≙ 00000001h) so that the data are transmitted to the target code.

Example with target C1093:

$$1{,}05\ \% \cdot 10000 \cdot \frac{100}{16384} \cdot C1094 \cdot \frac{1}{1{,}05\ \%} = C1093 = 0.6103$$

Setpoint in C0141 FEVAN1-IN

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:

$$\text{FEVAN1–IN} \cdot \frac{1}{10000} \cdot \frac{\text{C1093}}{\text{C1094}} + \text{C1095} = \text{C0011 [rpm]}$$

Scaling factor

$$1000 \cdot \frac{1}{10000} \cdot \frac{1,0}{0.0001} + 0 = 1000\ \text{rpm}$$

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:

$$\text{FEVAN1–IN} \cdot \frac{\text{C1093}}{\text{C1094}} + \text{C1095} = x$$

7.6.43 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

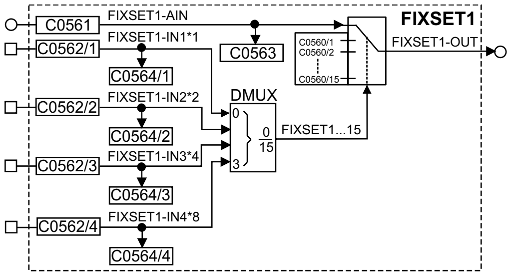


Fig. 7-103 Fixed setpoint (FIXSET1)

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%.

7.6.43.1 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

7.6.44 Flipflop (FLIP)

Purpose

This FB is a D flipflop. This function is used to evaluate and save digital signal transitions.

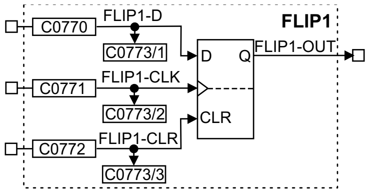


Fig. 7-104 Flipflop (FLIP1)

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	-	-	-	-	-	-

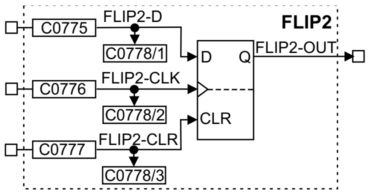


Fig. 7-105 Flipflop (FLIP2)

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

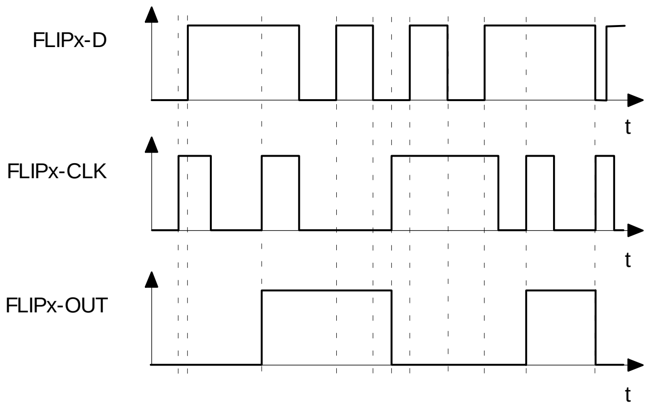


Fig. 7-106 Sequence of a flipflop

- 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.

7.6.45 Gearbox compensation (GEARCOMP)

Purpose

Compensates elasticity in the control circuit

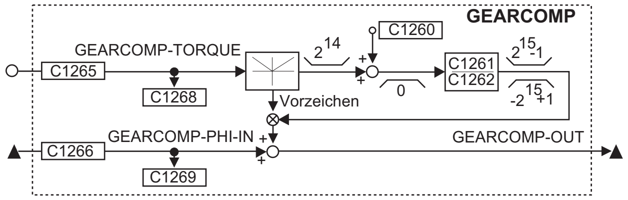


Fig. 7-107 Gearbox compensation (GEARCOMP)

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	

7.6.46 Limiter (LIM)

Purpose

This FB is used to limit signals to ranges which can be set.

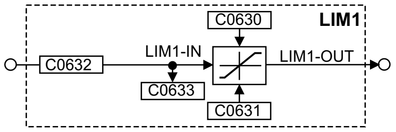


Fig. 7-108 Limiter (LIM1)

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).

7.6.47 Internal motor control (MCTRL)

Purpose

This function block consists of the control of the driving machine, including phase controller, speed controller and motor control.

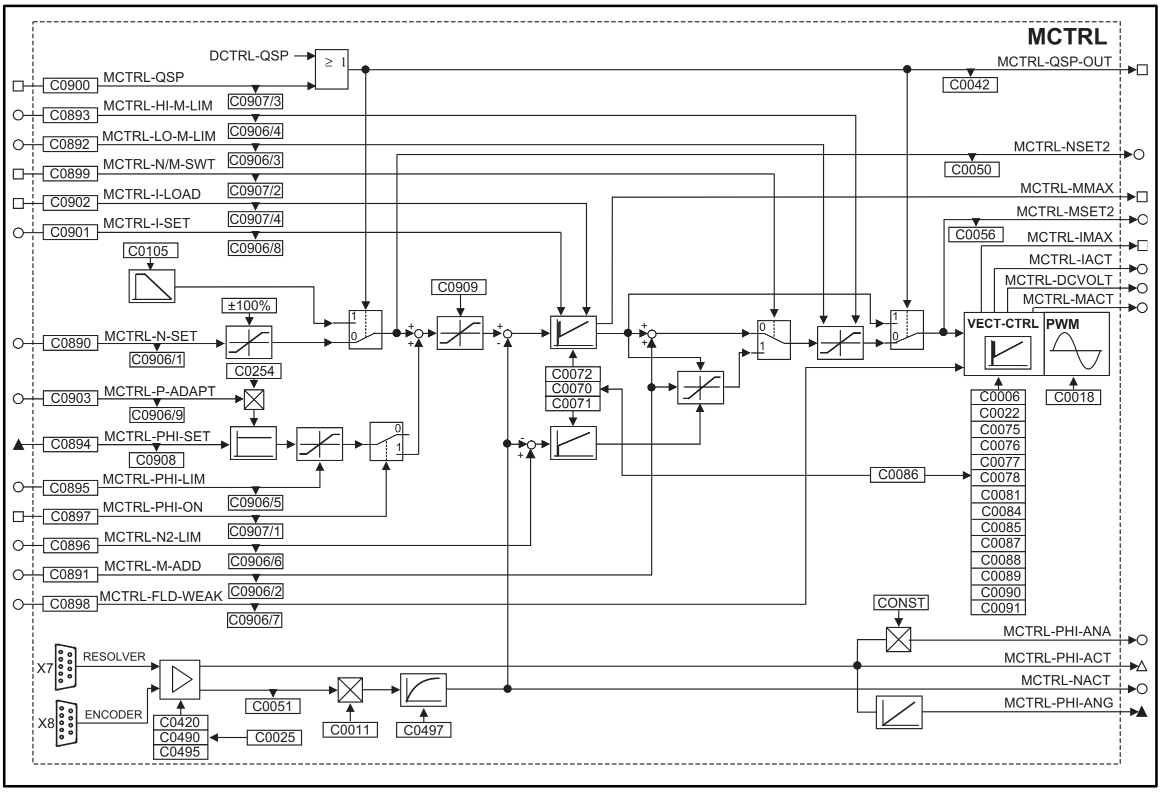


Fig. 7-109 Internal motor control (MCTRL)

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

7.6.47.1 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. (📖 7-327)
This automatically sets the parameters of the current controller correctly.

7.6.47.2 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

7.6.47.3 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

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.

7.6.47.4 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.

7.6.47.5 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.

7.6.47.6 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.

7.6.47.7 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 7.6.47.4)
   – 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.

7.6.47.8 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.

7.6.47.9 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.

7.6.47.10 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

7.6.48 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.

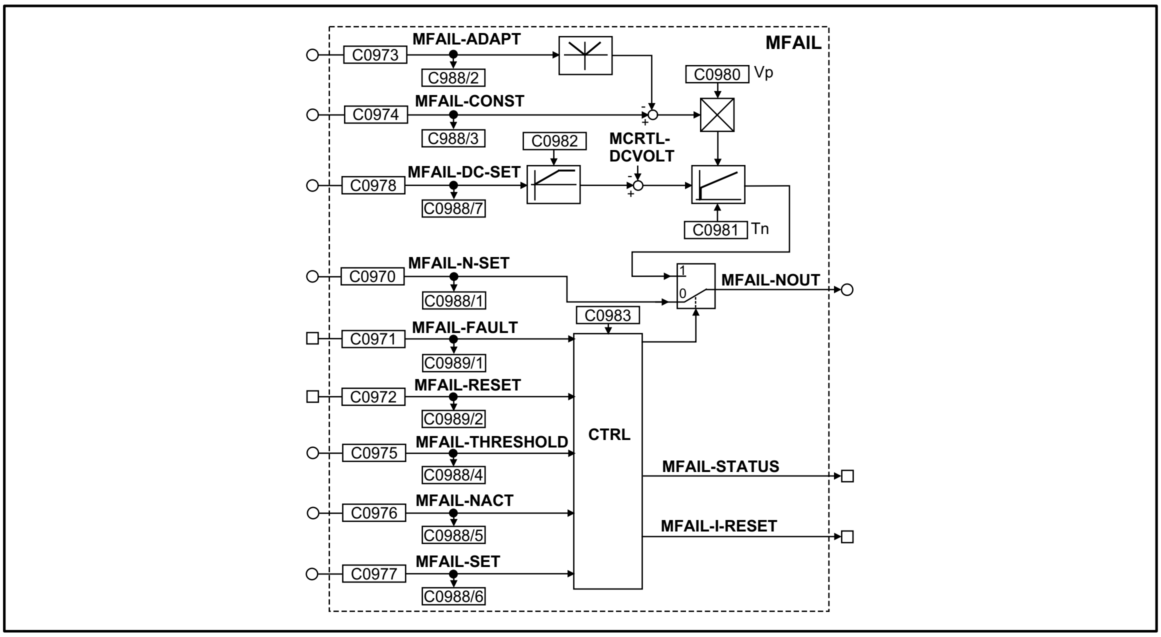


Fig. 7-110 Mains failure control (MFAIL)

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

7.6.48.1 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.

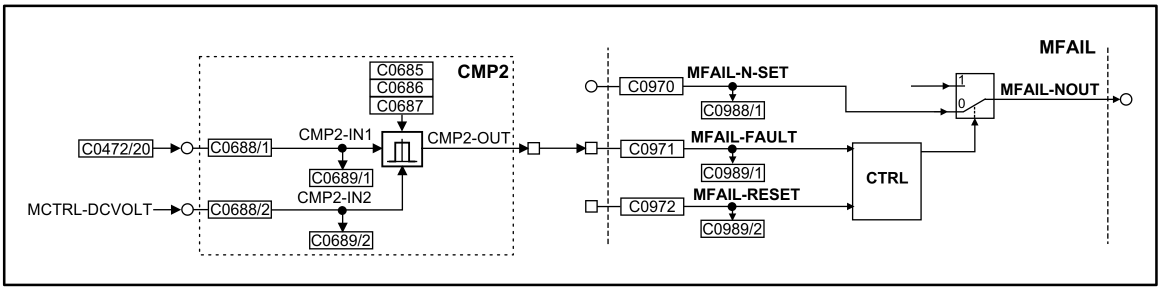


Fig. 7-111 Example of a mains failure detection with internal function blocks (section)

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.

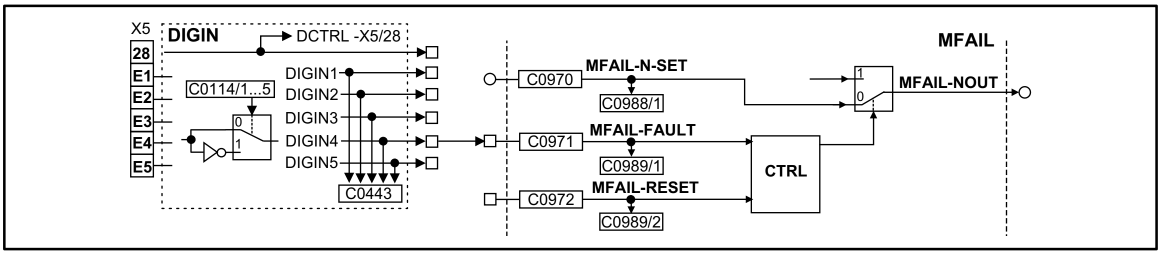


Fig. 7-112 Example of a mains failure detection by an external monitoring system

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.

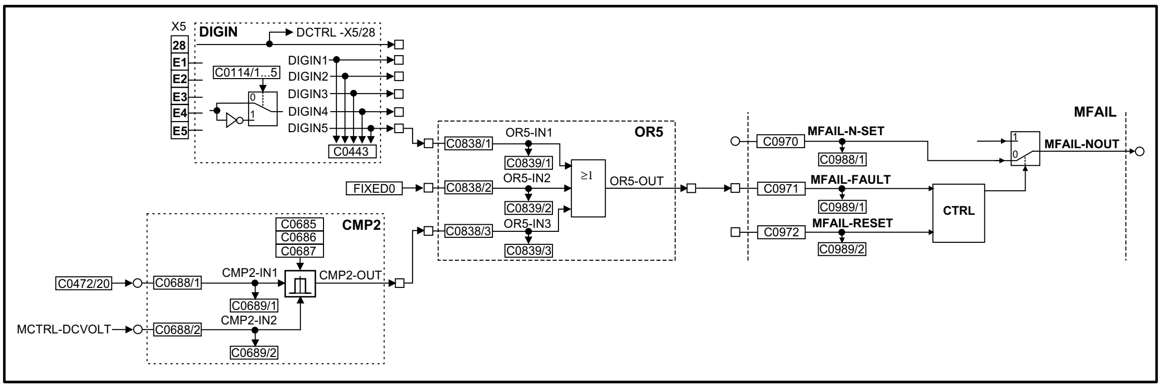


Fig. 7-113 Example of a mains failure detected by different sources

7.6.48.2 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 7.6.48.1
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.

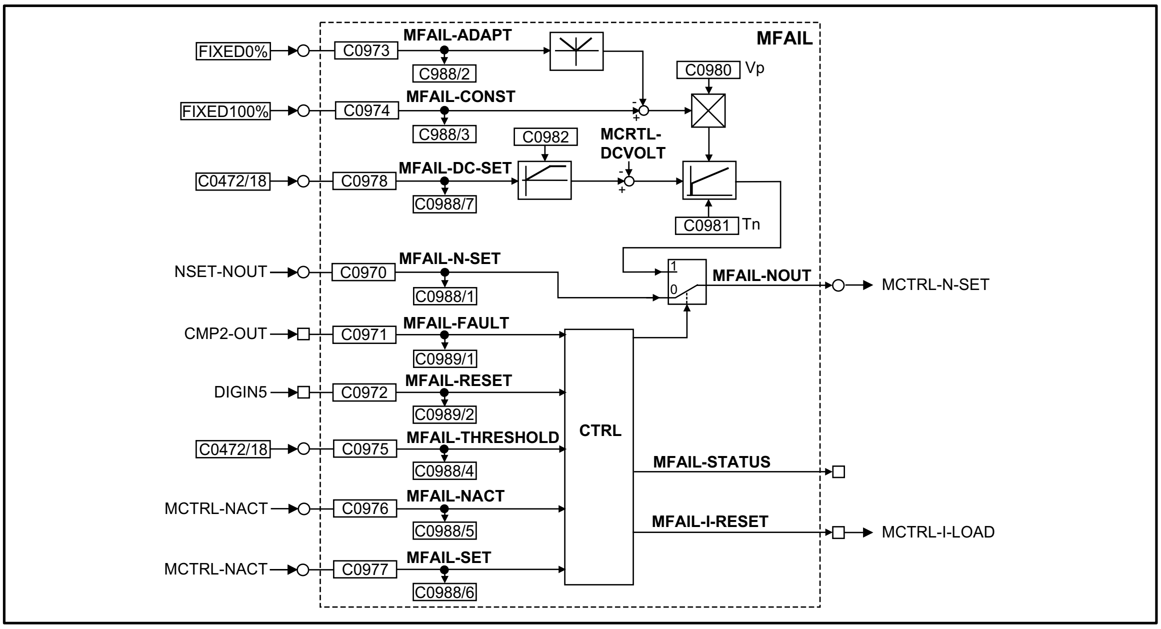


Fig. 7-114 Link for the basic configuration C0005 = 1000

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 7.6.48.6).
  – 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 7.6.48.3).
  – 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

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 7.6.48.1

Important settings prior to the initial set-up:

1. Save the previous setting in a parameter set (e.g. parameter set 4)

STOP

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:

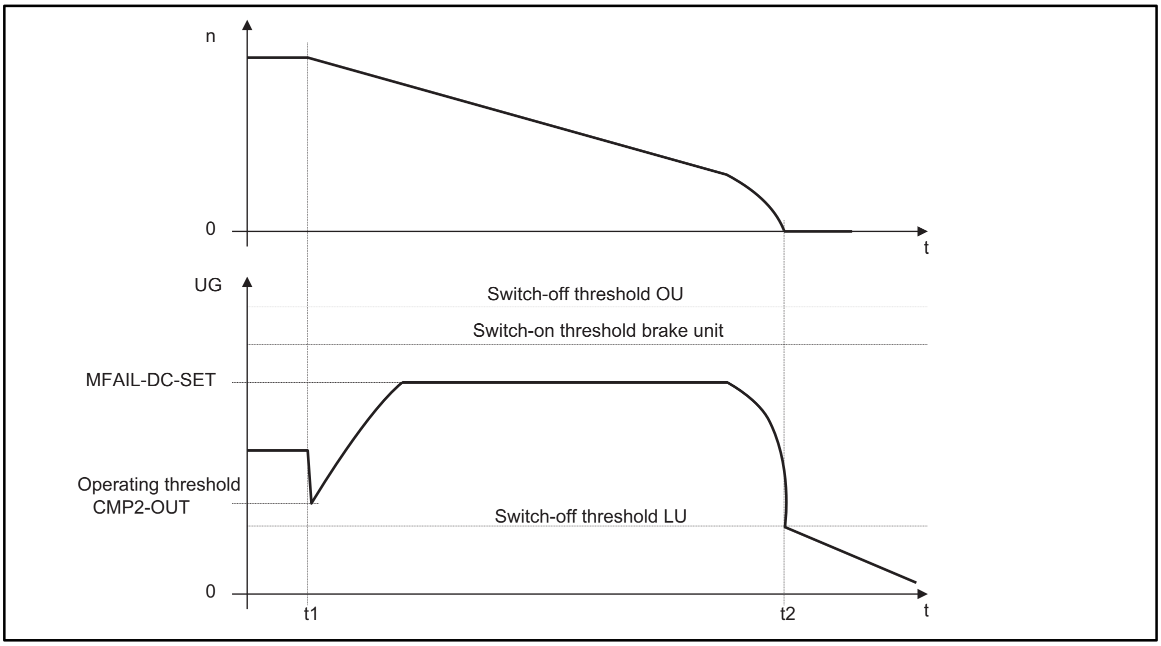


Fig. 7-115 Schematic representation with activated mains failure control (ideal characteristic)
t1 Mains failure
t2 Zero speed reached

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 Fig. 7-115 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 Fig. 7-116) 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.

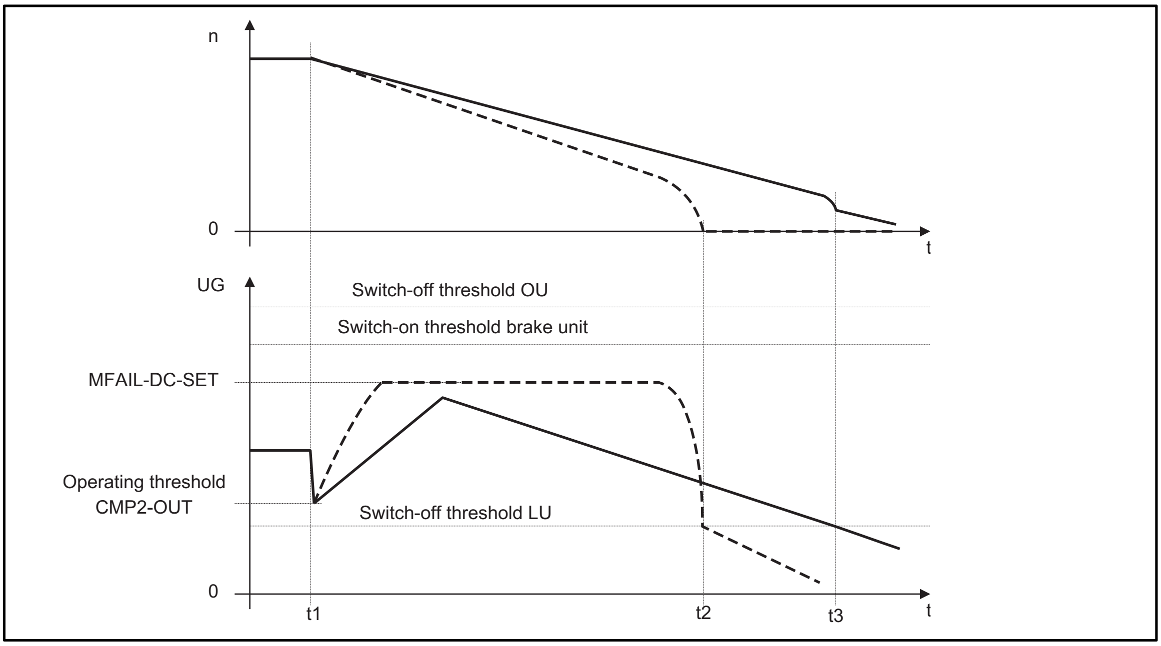


Fig. 7-116 Schematic with different brake torques

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)

7.6.48.3 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 7.6.48.2.
- 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

7.6.48.4 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.

7.6.48.5 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:

$$V_p = C0980 \cdot \frac{\text{MFAIL-CONST} - |\text{MFAIL-ADAPT}|}{100\ \%}$$

7.6.48.6 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 7.6.48.1).
- 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.

7.6.48.7 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.

7.6.49 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.

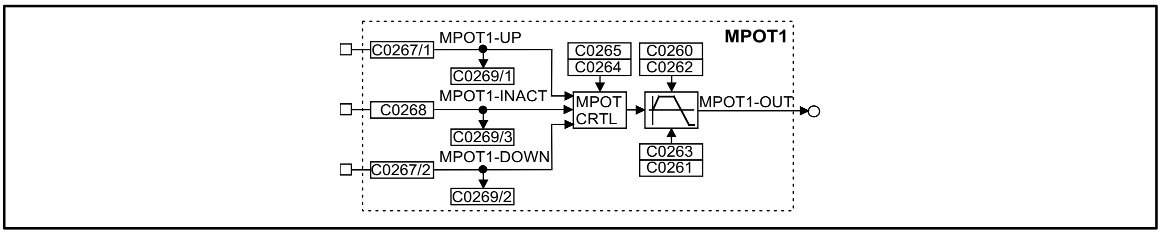


Fig. 7-117 Motor potentiometer (MPOT1)

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.

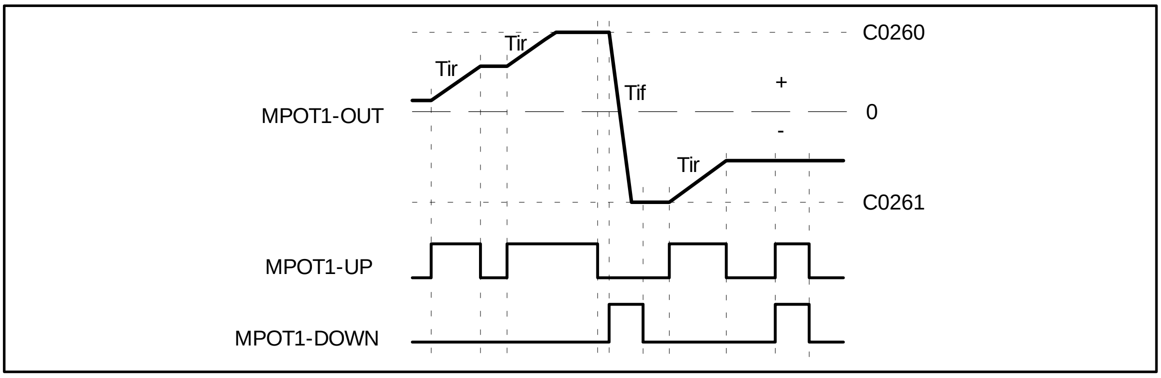


Fig. 7-118 Control signals of the motor potentiometer

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.

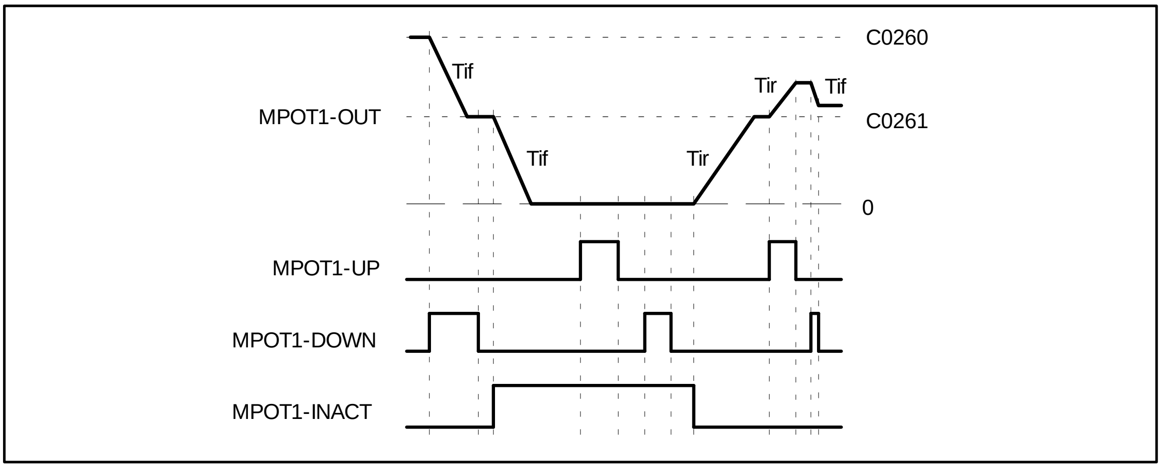


Fig. 7-119 Deactivation of the motor pot via the input MPOT1-INACT

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.

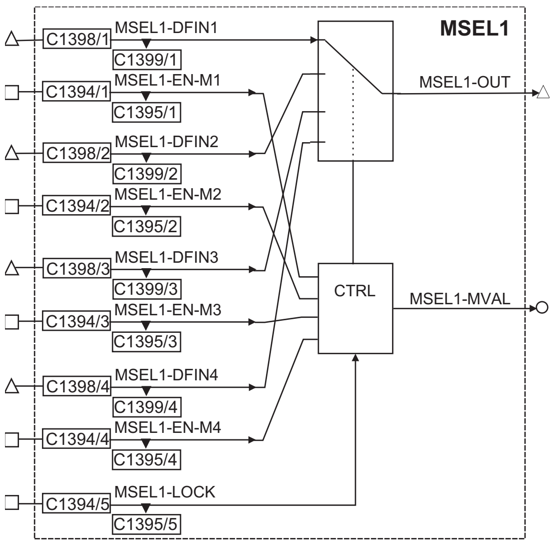
7.6.50 Master selection (MSEL)

Two function blocks (MSEL1 und MSEL2) are available.

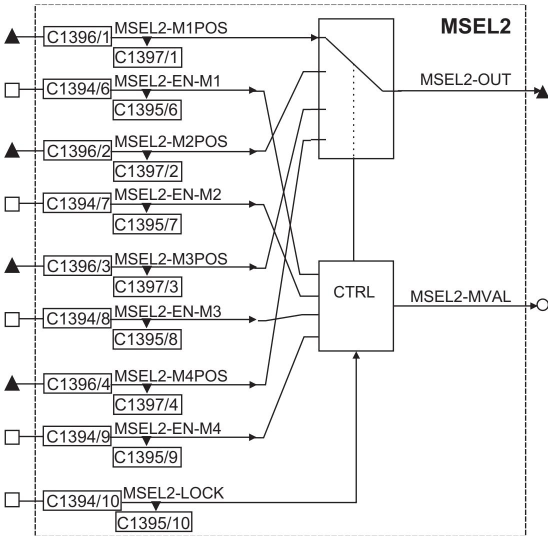
Purpose

Selection of a master value source from four possible master values.

- MSEL1: FB for digital frequency or speed signals
- MSEL2: FB for phase signals



Signal				Source		Note
Name	Type	DIS	DIS format	CFG	List	
MSEL1-EN-M1	d	1395/1	bin	1394/1	2	Activation master value 1
MSEL1-EN-M2	d	1395/2	bin	1394/2	2	Activation master value 2
MSEL1-EN-M3	d	1395/3	bin	1394/3	2	Activation master value 3
MSEL1-EN-M4	d	1395/4	bin	1394/4	2	Activation master value 4
MSEL1-LOCK	d	1395/5	bin	1394/5	2	Locking
MSEL1-DFIN1	phd	1399/1	dec[rpm]	1398/1	4	Master value input 1
MSEL1-DFIN2	phd	1399/2	dec[rpm]	1398/2	4	Master value input 2
MSEL1-DFIN3	phd	1399/3	dec[rpm]	1398/3	4	Master value input 3
MSEL1-DFIN4	phd	1399/4	dec[rpm]	1398/4	4	Master value input 4
MSEL1-OUT	phd	13701	-	-	-	Master value output
MSEL1-MVAL	a	13701	-	-	-	Selected master value input



Signal				Source		Note
Name	Type	DIS	DIS format	CFG	List	
MSEL2-EN-M1	d	1395/6	bin	1394/6	2	Activation master value 1
MSEL2-EN-M2	d	1395/7	bin	1394/7	2	Activation master value 2
MSEL2-EN-M3	d	1395/8	bin	1394/8	2	Activation master value 3
MSEL2-EN-M4	d	1395/9	bin	1394/9	2	Activation master value 4
MSEL2-LOCK	d	1395/10	bin	1394/10	2	Locking
MSEL2-M1POS	ph	1397/1	dec[inc]	1396/1	4	Master phase input 1
MSEL2-M2POS	ph	1397/2	dec[inc]	1396/2	4	Master phase input 2
MSEL2-M3POS	ph	1397/3	dec[inc]	1396/3	4	Master phase input 3
MSEL2-M4POS	ph	1397/4	dec[inc]	1396/4	4	Master phase input 4
MSEL2-OUT	ph	13711	-	-	-	Master phase output
MSEL2-MVAL	a	13711	-	-	-	Selected master phase input

Function

- 1 out of 4 selection of the master value source
- Locking of a selection

The description is valid for both function blocks. Please observe this for the following description of the MSEL1.

7.6.50.1 1 out of 4 selection of the master value source

- One master value source can be connected per input MSEL1-DFIN(1...4). The digital input assigned to MSEL1-EN-M(1...4) must be addressed with a L-H transition. If an input is set, this setting remains active until another master value source is selected.
- If two or more inputs are selected at the same time, the input with the lowest selection number will be activated.
- The selected input value is directly connected to the output MSEL1-OUT.

If no input has been selected (inputs MSEL1-EN-M(1...4) = LOW), 0 will be output

7.6.50.2 Locking of a selection

A H level at the input MSEL1-LOCK avoids a changeover to another source. The input channel output last remains locked until the input level at MSEL1-LOCK is reset to L.

7.6.51 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.

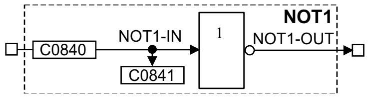


Fig. 7-120 Logic NOT

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
NOT1-IN	d	C0841	bin	C0840	2	1000	-
NOT1-OUT	d	-	-	-	-	-	-

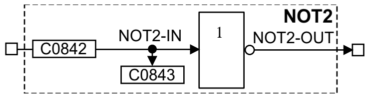


Fig. 7-121 Logic NOT (NOT2)

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
NOT2-IN	d	C0843	bin	C0842	2	1000	-
NOT2-OUT	d	-	-	-	-	-	-

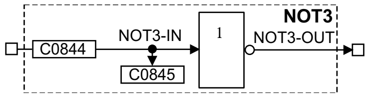


Fig. 7-122 Logic NOT (NOT3)

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
NOT3-IN	d	C0845	bin	C0844	2	1000	-
NOT3-OUT	d	-	-	-	-	-	-

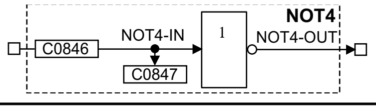


Fig. 7-123 Logic NOT (NOT4)

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
NOT4-IN	d	C0847	bin	C0846	2	1000	-
NOT4-OUT	d	-	-	-	-	-	-

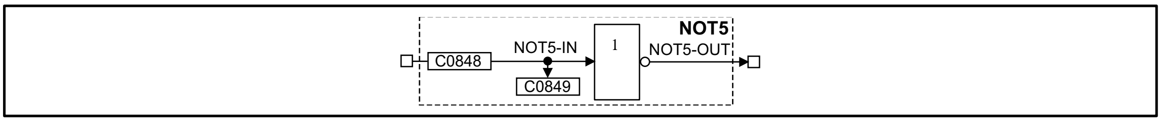


Fig. 7-124 Logic NOT (NOT5)

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.

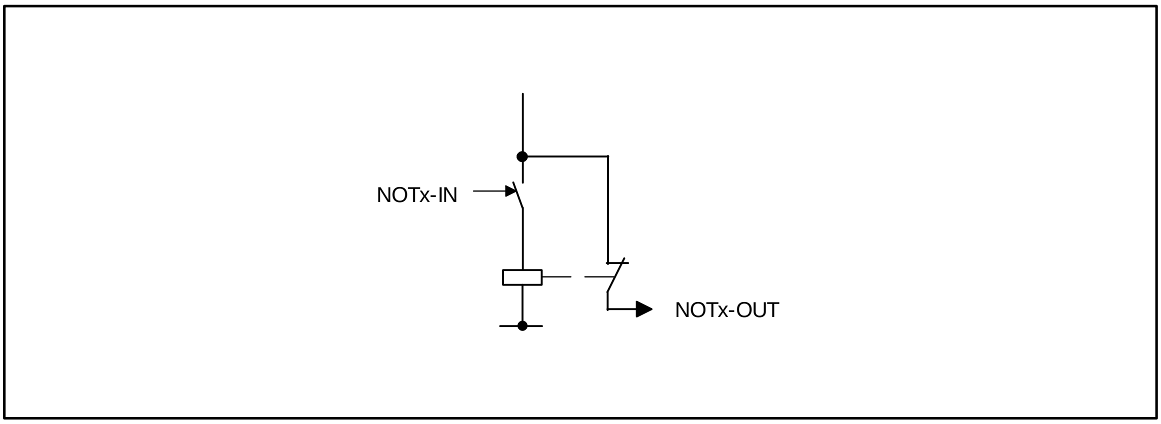


Fig. 7-125 Function of NOT as a change from a normally-open to a normally-closed contact

7.6.52 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.

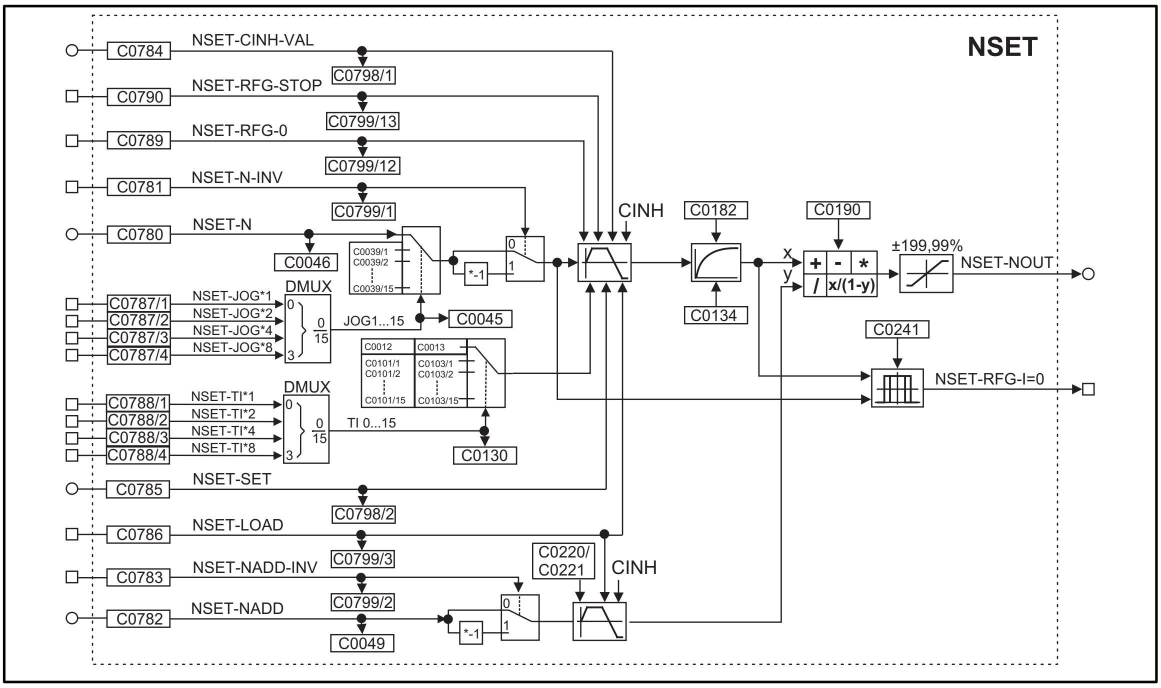


Fig. 7-126 Conditioning of the setpoint speed (NSET)

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

7.6.52.1 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.

7.6.52.2 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

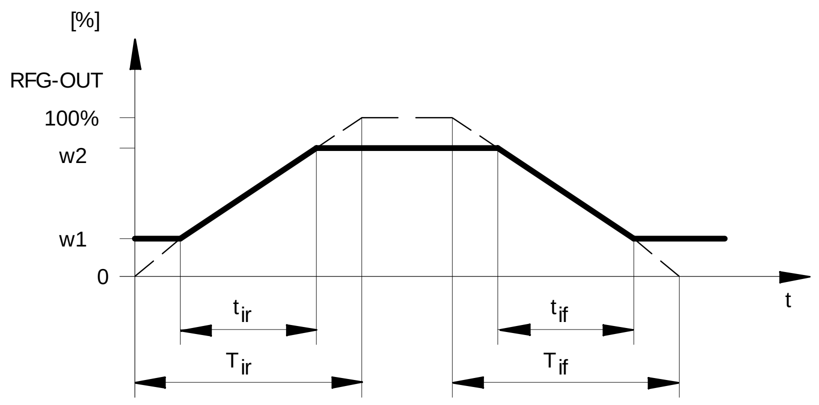
7.6.52.3 Setpoint inversion

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.



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

Fig. 7-127 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	

7.6.52.4 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.

7.6.52.5 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 %)

7.6.52.6 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.

7.6.53 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.

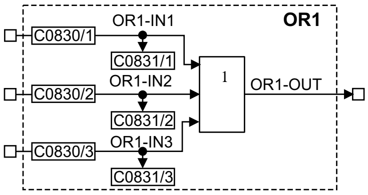


Fig. 7-128 OR operation

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	-	-	-	-	-	-

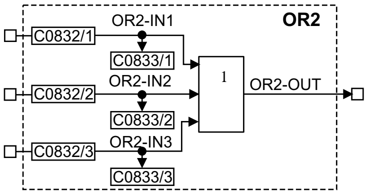


Fig. 7-129 OR operation (OR2)

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	-	-	-	-	-	-

Function block library

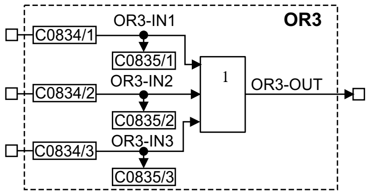


Fig. 7-130 OR operation (OR3)

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	-	-	-	-	-	-

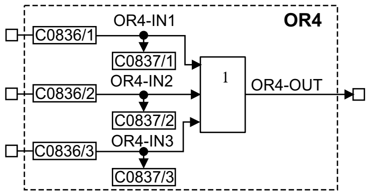


Fig. 7-131 OR operation (OR4)

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	-	-	-	-	-	-

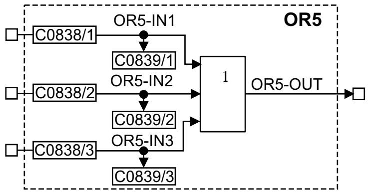


Fig. 7-132 OR operation (OR5)

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.

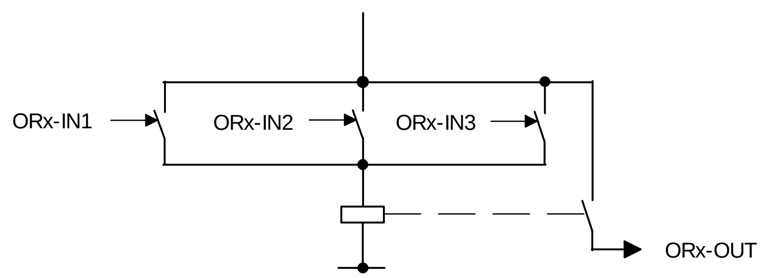


Fig. 7-133 Function of the OR operation as a parallel connection of normally-open contacts

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.

7.6.54 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.

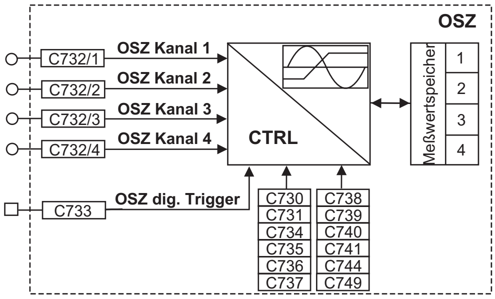


Fig. 7-134 Oscilloscope function (OSZ)

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. Fig. 7-135displays the triggering of an analog signal with positive edge.
	C0736	1	– HIGH-LOW trigger edge
		0	LOW-HIGH trigger edge

Function block library

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 Fig. 7-136).
		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 (Fig. 7-135).
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

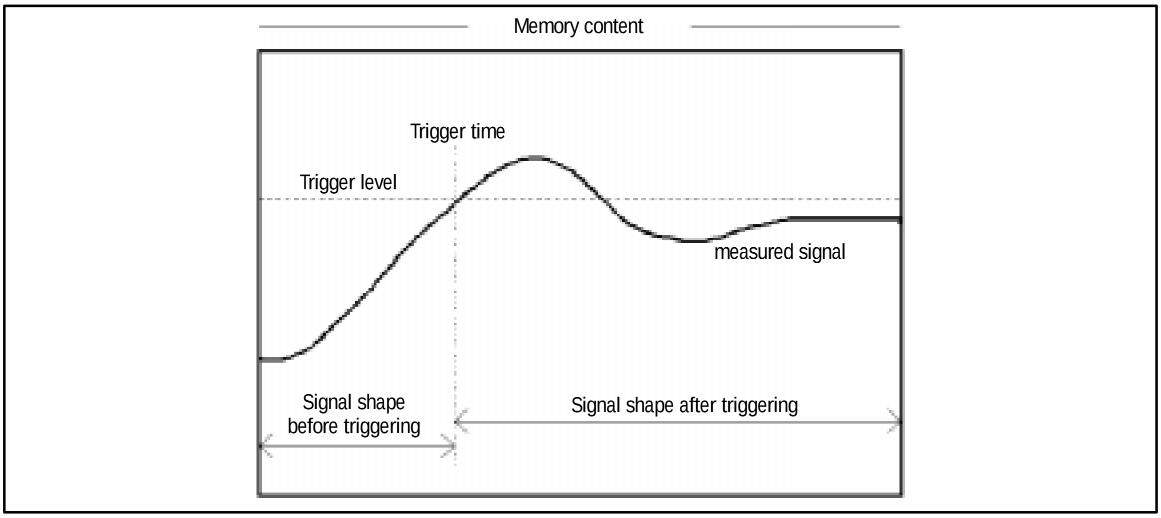


Fig. 7-135 Example: Trigger level and trigger delay with approx. -30 % post triggering

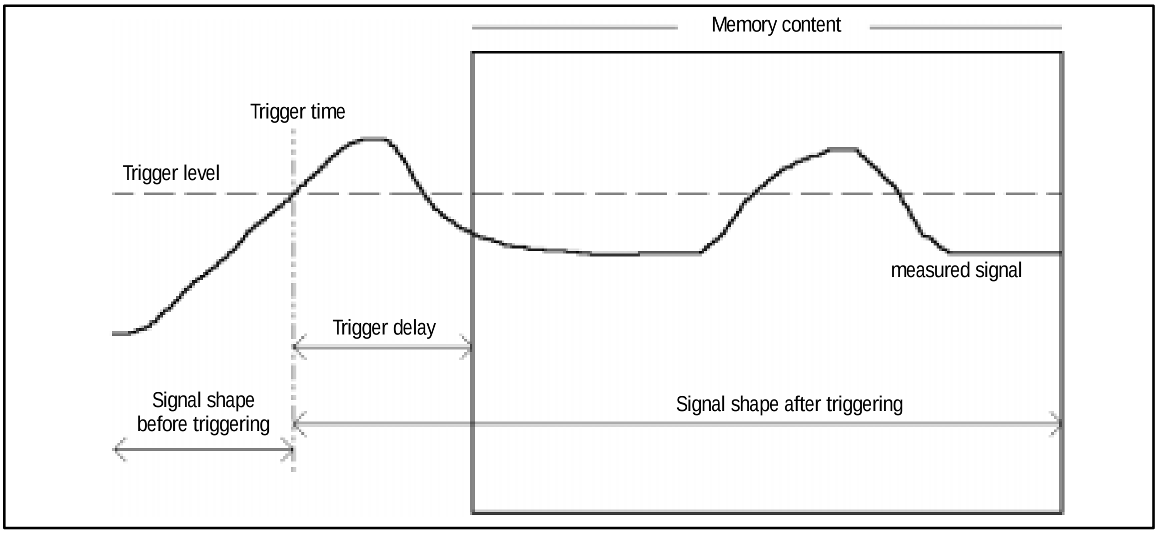


Fig. 7-136 Example: Trigger level and trigger delay with approx. -30% pre-triggering

7.6.55 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.

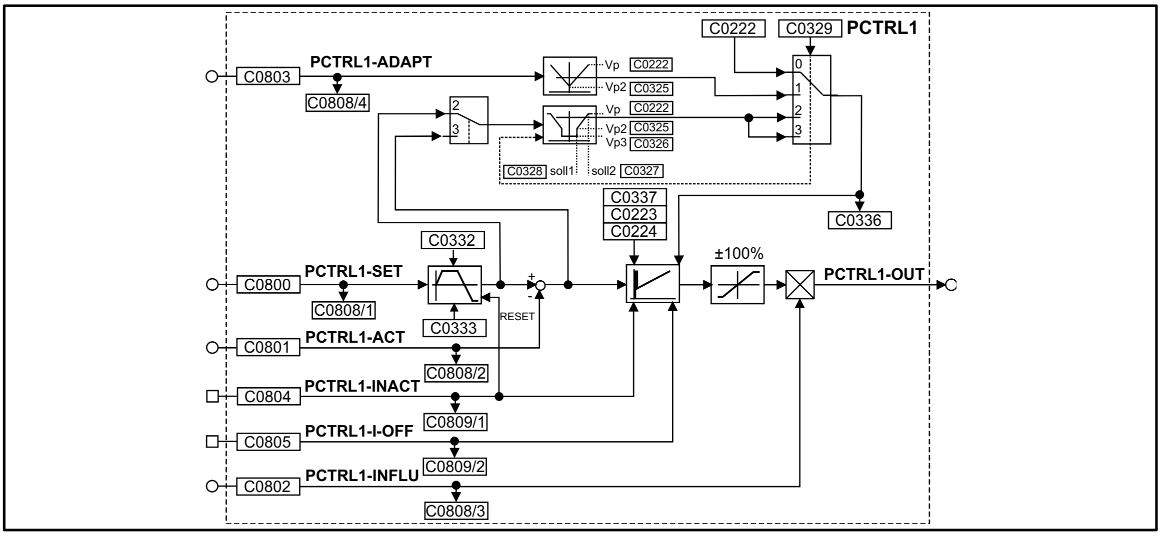


Fig. 7-137 Process controller (PCTRL1)

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).

7.6.55.1 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 %.

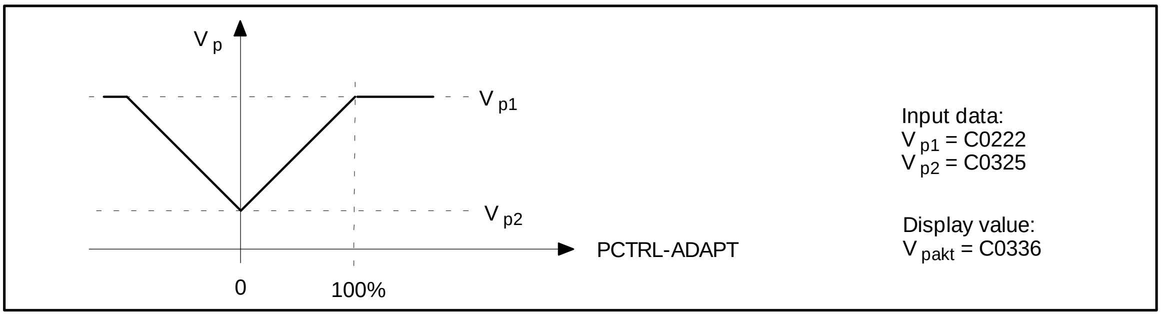


Fig. 7-138 Input of the P-gain via PCTRL-ADAPT input

  - 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.

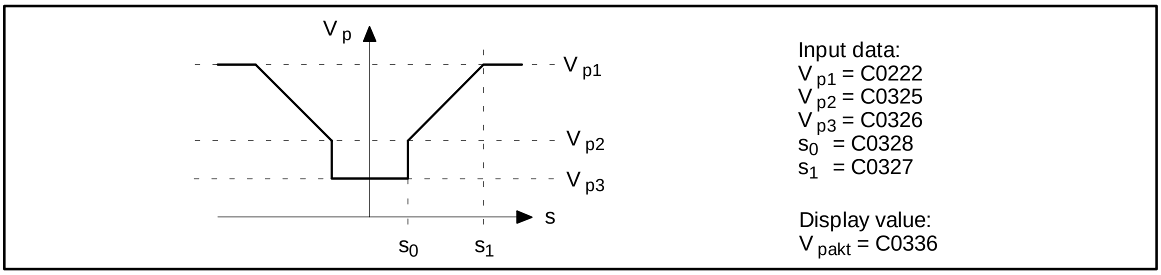


Fig. 7-139 Input of the P-gain derived from the PCTRL-SET process setpoint

  - C0329 = 3
    The input of the P-gain is derived from the control difference and led by the characteristic generation as C0329 = 2.

7.6.55.2 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.

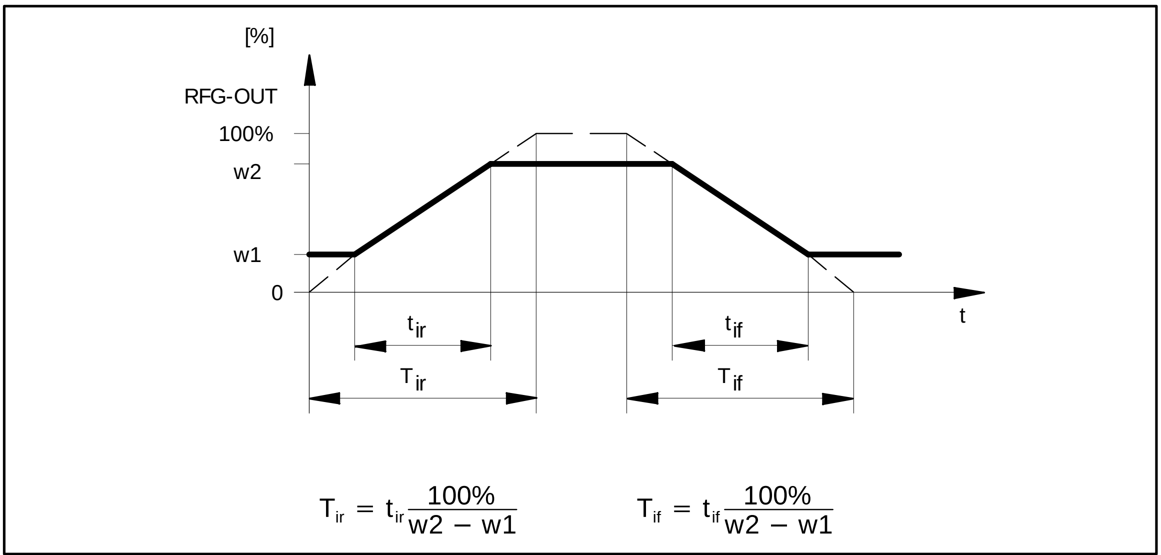


Fig. 7-140 Acceleration and deceleration times of the ramp generator

- 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.

7.6.55.3 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 %.

7.6.55.4 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).

7.6.55.5 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.

7.6.56 Phase addition block (PHADD)

Purpose

Adds or subtracts phase signals, depending on the input used.

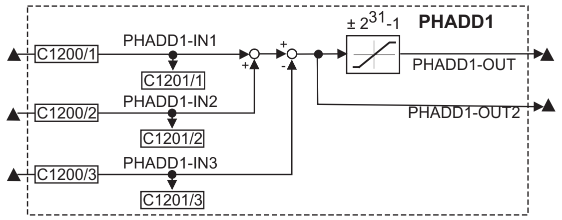


Fig. 7-141 Phase addition block (PHADD1)

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.

7.6.57 Phase comparator (PHCMP)

Purpose

Compares two phase signals (distances) with each other.

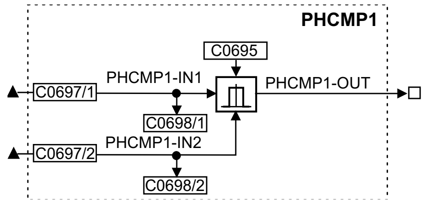


Fig. 7-142 Phase comparator (PHCMP1)

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	-	-	-	-	-	

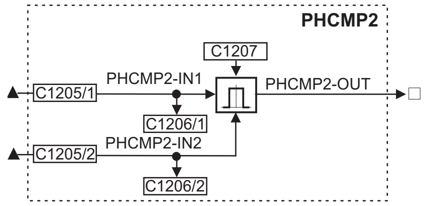


Fig. 7-143 Phase comparator (PHCMP2)

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	-	-	-	-	-	

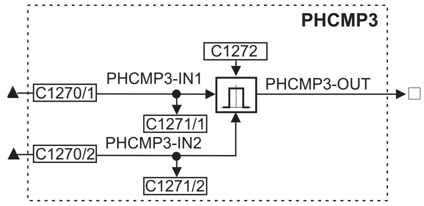


Fig. 7-144 Phase comparator (PHCMP3)

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		

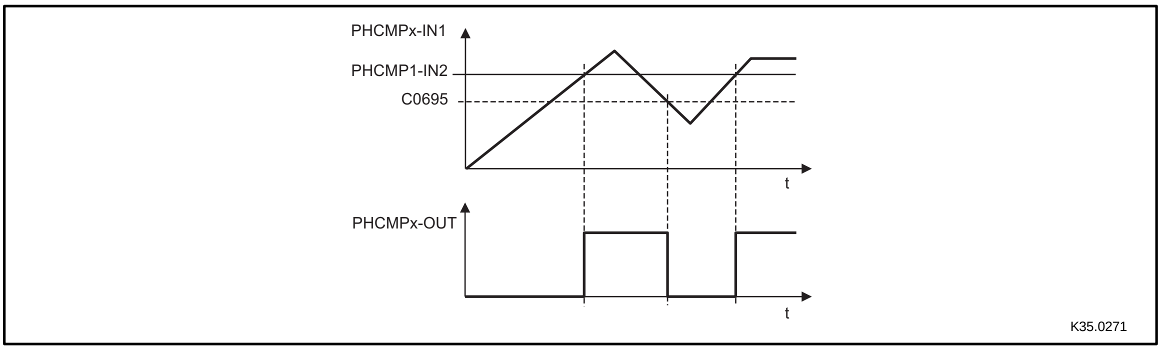


Fig. 7-145 Representation of the function using the example of PHCMP1

7.6.58 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.

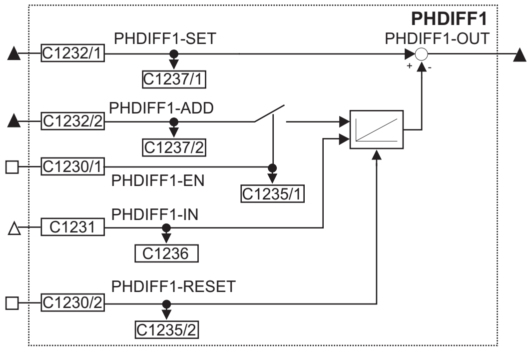


Fig. 7-146 Actual phase integrator (PHDIFF1)

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.

7.6.59 Signal adaptation for phase signals (PHDIV)

Purpose

Division or multiplication of phase signals as a power of two.

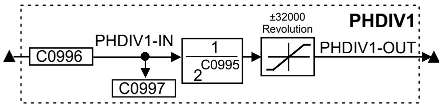


Fig. 7-147 Signal adaptation for phase signals (PHDIV1)

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:

$$\text{PHDIV1-OUT} = \frac{\text{PHDIV1-IN}}{2^{C0995}}$$

  – 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.

7.6.60 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.

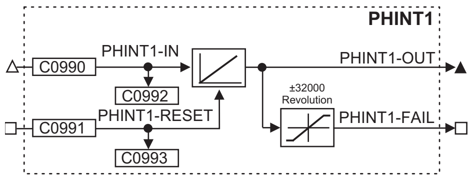


Fig. 7-148 Phase integrator (PHINT1)

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

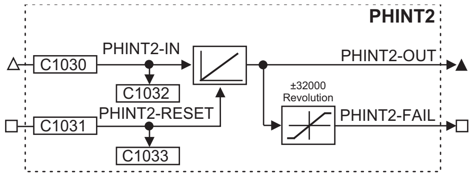


Fig. 7-149 Phase integrator (PHINT2)

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

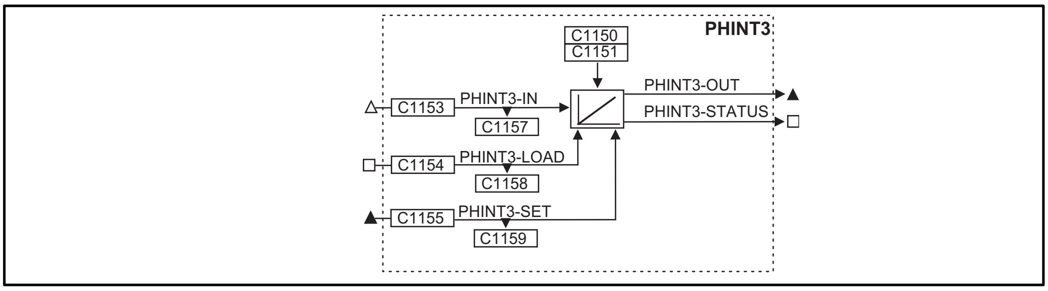


Fig. 7-150 Phase integrator (PHINT3)

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

7.6.60.1 Constant input value (PHINT1 and PHINT2)

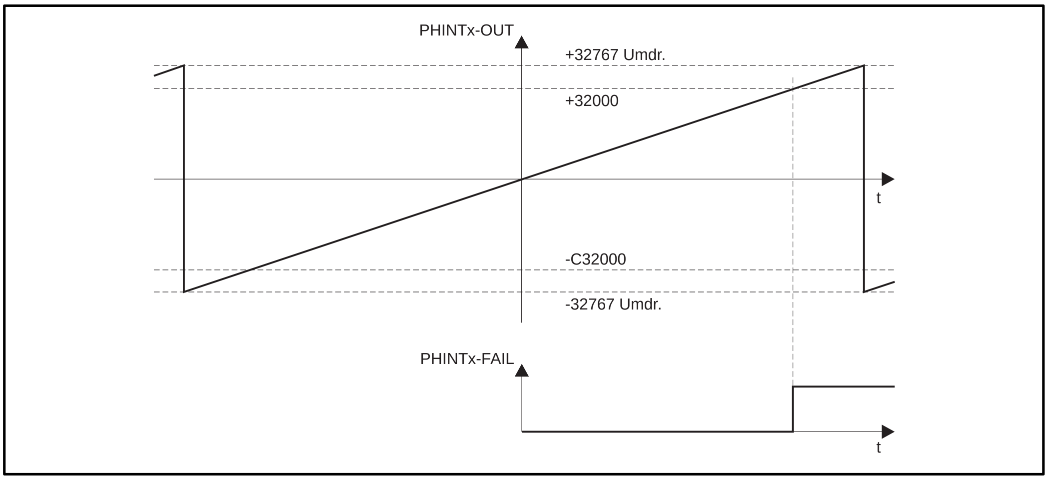


Fig. 7-151 Function of PHINTx with constant input value

- 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.

7.6.60.2 Constant input value (PHINT3)

The FB PHINT3 has three modes which can be set under C1150.

Mode C1150 = 2 is described in Chapter 7.6.60.3.

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

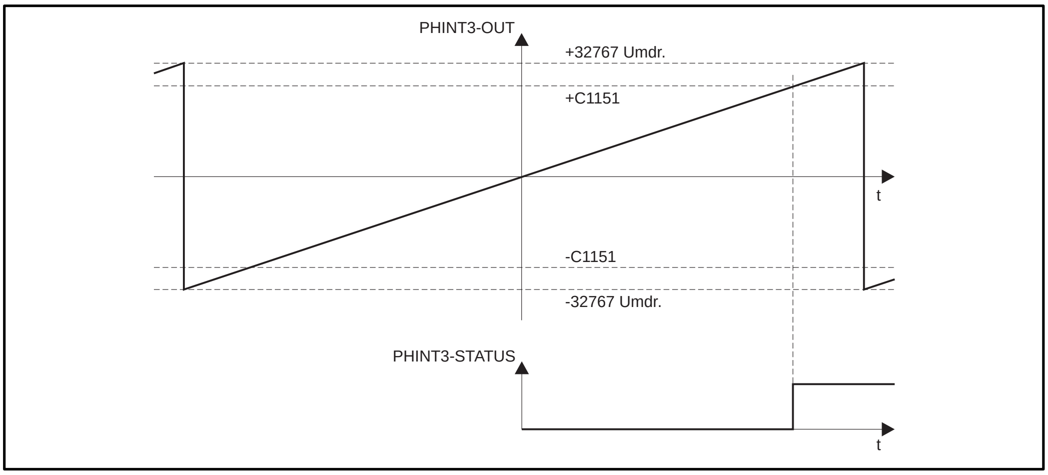


Fig. 7-152 Function of PHINT3 with constant input value when C1150 = 0 and C1150 = 1

- 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

7.6.60.3 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.

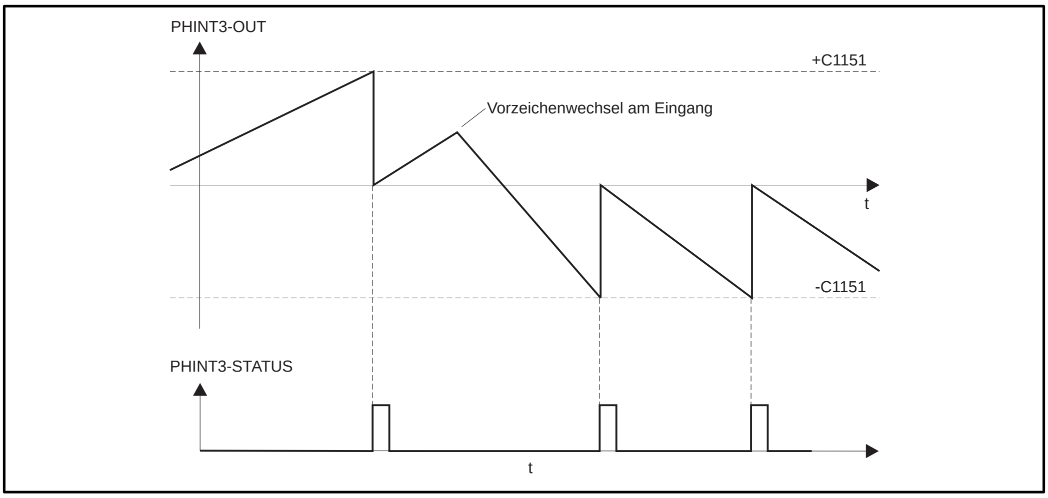


Fig. 7-153 Function of PHINT3 with change of sign when C1150 = 2

- 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.

7.6.60.4 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:

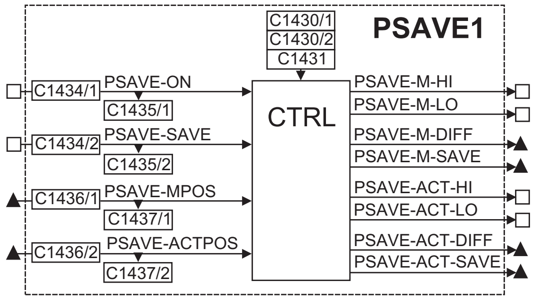
$$\text{PHINTx}-\text{OUT} = \frac{1000\ \text{rev.}}{60\ \text{s}} \cdot 10\ \text{s} \cdot \frac{65536\ \text{inc}}{\text{rev.}} = 10922666\ \text{inc}$$

7.6.61 Position memory (PSAVE)

One function block (PSAVE1) is available.

Purpose

Storage (mains-failure protected) of positions (master value and/or actual value) and comparison to the actual values. After mains connection it can be checked whether the master value position or the actual value position have changed. This is however only reasonable when using absolute value encoders (resolver or sin/cos encoders).



Signal				Source		Note
Name	Type	DIS	DIS format	CFG	List	
PSAVE1-ON	d	1435/1	bin	1434/1	2	HIGH = Comparison of inputs MPOS/ACTPOS with values saved and difference output
PSAVE1-SAVE	d	1435/2	bin	1434/2	2	HIGH =
PSAVE-MPOS	ph	1437/1	dec[inc]	1436/1	3	Input for master position
PSAVE-ACTPOS	ph	1437/2	dec[inc]	1436/2	3	Input for actual position (e.g. rotor position)
PSAVE-M-HI	d		-	-	-	HIGH = Input value > than position stored
PSAVE-M-LO	d		-	-	-	HIGH = Input value < than position stored
PSAVE-ACT-HI	d		-	-	-	HIGH = Input value > than position stored
PSAVE-ACT-LO	d		-	-	-	HIGH = Input value < than position stored
PSAVE-M-DIFF	ph		-	-	-	Position difference = Stored position - input
PSAVE-M-SAVE	ph		-	-	-	Stored position of master drive
PSAVE-ACT-DIFF	ph		-	-	-	Position difference = Stored position - input
PSAVE-ACT-SAVE	ph		-	-	-	Stored position of cam drive

Function

- Store position value
- Compare actual position with values stored
- Output of status signals

7.6.61.1 Store position value

- With PSAVE-SAVE = HIGH data from the inputs PSAVE-MPOS and PSAVE-ACTPOS are accepted and output at PSAVE-M-SAVE and PSAVE-ACT-SAVE. The reading and writing process is repeated cyclically (1000 $\frac{1}{s}$).
- The input data are stored if a H → L transition occurs at PSAVE-SAVE, i.e. they are available even if the controller has been disconnected from the mains.
- When the mains is switched on again, the data are transferred to the user memory and output at PSAVE-M-SAVE and PSAVE-ACT-SAVE.

7.6.61.2 Compare actual position with values stored

- PSAVE-ON = HIGH:
  - The inputs PSAVE-MPOS and PSAVE-ACTPOS are compared with the stored values. The deviations are output at PSAVE-M-DIFF or PSAVE-ACT-DIFF.

    $PSAVE\text{-}M\text{-}DIFF = gespeicherterWert - \{PSAVE\text{-}MPOS\}$

    $PSAVE\text{-}ACT\text{-}DIFF = gespeicherterWert - \{PSAVE\text{-}ACTPOS\}$
  - The evaluation of one of the channels can be suppressed by means of a code. In this case, PSAVE-DIFF = 0
- PSAVE-ON = LOW:
  - The outputs remain PSAVE-DIFF = 0.

7.6.61.3 Output of status signals

The digital outputs are set according to the difference calculated (PSAVE-DIFF), is PSAVE-ON = HIGH.

- The hysteresis can be set via code:
  - for MPOS C1430/1 in m-units
  - for ACTPOS C1430/2 in s-units
- as long as -DIFF < ±C1430/x:
  - -M-HI = LOW
  - -M-LO = LOW
  - ACT-HI = LOW
  - ACT-LO = LOW
- if -DIFF pos. and > +C1430/x
  - -M-LO = HIGH or
  - ACT-LO = HIGH
- if -DIFF neg. and < -C1430/x
  - -M-HI = HIGH bzw.
  - ACT-HI = HIGH
- If one channel is suppressed through code C1431, the outputs of the corresponding channel are set to LOW.

7.6.62 First order delay element (PT1)

Purpose

Filter and delay analog signals.

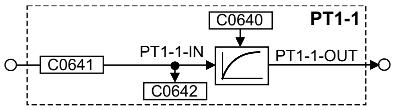


Fig. 7-154 First order delay element (PT1-1)

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.

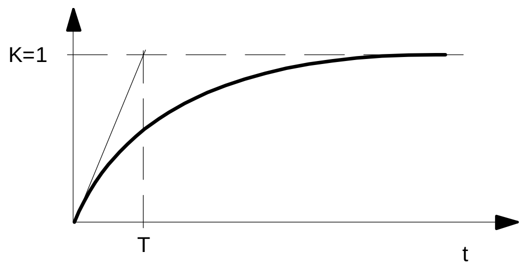


Fig. 7-155 Delay T of the first-order delay element

7.6.63 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.

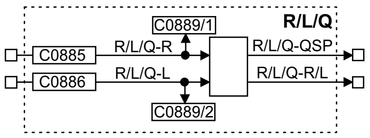


Fig. 7-156 CW-CCW-QSP link (R/L/Q)

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.

7.6.64 Homing function (REFC)

One function block (REFC1) is available.

Purpose

The homing function is used to bring the drive shaft to a certain position.

Note!

First, select a defined configuration under C0005, which already includes the function block REFC. This ensures that all important signals are connected automatically. Then adapt the configuration to your application.

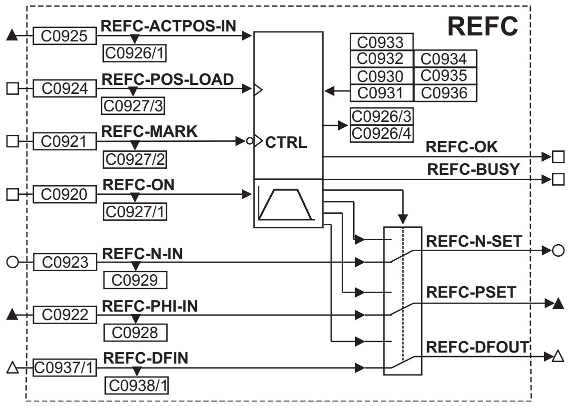


Fig. 7-157 Homing fucntion (REFC)

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
REFC-ACTPOS-IN	ph	C0926/1	dec [inc]	C0925	3	1000	Value for actual position (REFC-ACTPOS)
REFC-DFIN	phd	C0938/1	dec[rpm]	C0937/1	4		Speed input
REFC-MARK	d	C0927/2	bin	C0921	2	1000	Reference switch
REFC-N-IN	a	C0929	dec [%]	C0923	1	1000	Speed setpoint in [%] of nmax C0011
REFC-ON	d	C0927/1	bin	C0920	2	1000	HIGH = Start homing
REFC-PHI-IN	ph	C0928 C0926/2	dec [inc]	C0922	3	1000	Phase setpoint (contouring error for phase controller in FB MCTRL)
REFC-POS-LOAD	d	C0927/3	bin	C0924	2	1000	LOW-HIGH transition = Phase at input REFC-ACTPOS-IN is loaded in REFC-ACTPOS (start value)
REFC-PSET	ph	-	-	-	-	-	Phase setpoint (contouring error for phase controller in FB MCTRL)
REFC-BUSY	d	-	-	-	-	-	HIGH = Homing function active
REFC-DFOUT	phd	-	-	-	4		Speed output
REFC-N-SET	a	-	-	-	-	-	Speed setpoint for n-controller
REFC-OK	d	-	-	-	-	-	HIGH = Homing completed/home position known

Scope of function

- Profile generator
- Homing modes
- Control via input signals
- Output of status signals
- Speed/digital frequency input and output

7.6.64.1 Profile generator

The speed profile for homing can be adapted to the application.

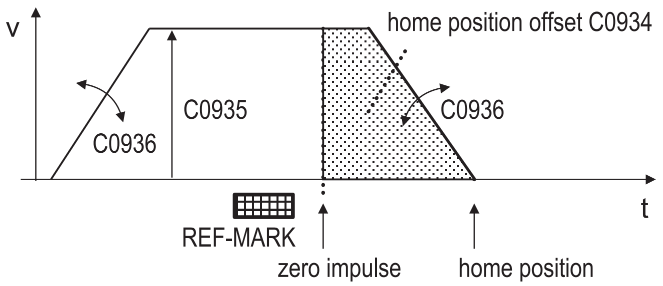


Fig. 7-158 Speed profile for homing

Code	Meaning	Note
C0930	Gear factor numerator, pinion circumference - motor side	Adjustment only required if the actual value encoder is not mounted to the motor.
C0931	Gear factor denominator, pinion circumference - encoder side	
C0933	Calculate the position for the rising or decreasing transition of the zero track or touch probe	Depending on the mode selected.
C0934	Home position offset = number of increments after the zero pulse has occured	Reference: 65536 inc = 1 rev. Input up to 2140000000 inc possible
C0935	Max. traversing speed	Input in [%] of nmax C0011
C0936	Deceleration/acceleration	Linear ramp
C0926/3	REFC-ACTPOS, actual position value	Only display
C0926/4	REFC-TARGET, actual target position	Only display

The profile generator calculates the speed profile from the set profile parameters.

- The parameters can be changed during homing.
  – C0935 and C0936 become effective if REFC-ON = LOW.
- The drive should not run at the torque limit (MCTRL-MMAX = HIGH) otherwise the drive might not be able to follow the speed profile.
  – Prolong acceleration / deceleration time C0936 until MCTRL-MMAX does not respond any more.
- The phase controller in FB MCTRL must be activated.

7.6.64.2 Homing modes

The home position is defined via:

- the homing mode C0932
- the signal transition of the zero pulse or the touch-probe signals C0933
- the home position offset C0934

Note!

For position feedback via the resolver not the zero pulse but the zero position is effective (depending on the resolver mounting) and for homing via touch probe the touch probe phase accordingly.

Homing with home switch to zero pulse / zero position

The home position is after the negative signal of the home switch REFC-MARK at the next zero pulse/zero position plus the home position offset.

- Mode 0 (C0932 = 0):
  – Go to home position in CW direction.
  – Select positive home position offset under C0934.

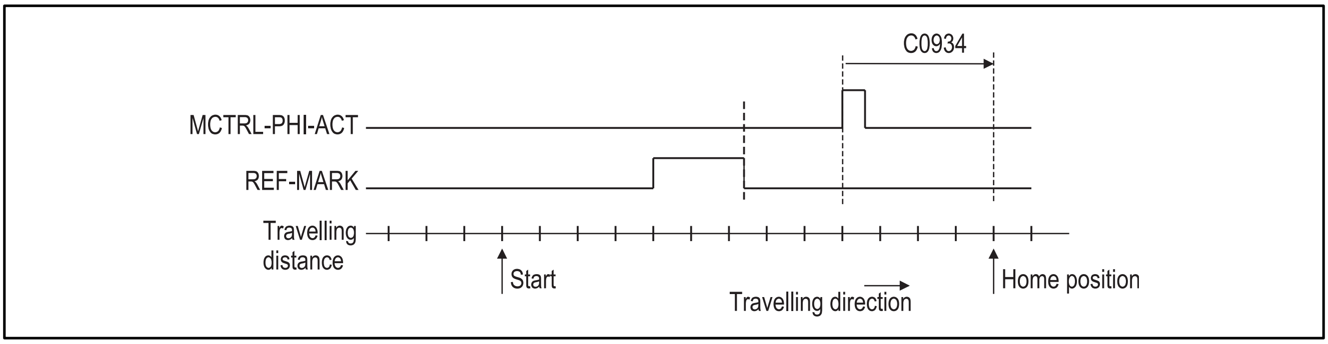


Fig. 7-159 Homing with zero pulse/zero position; go to home position in CW direction

- Mode 1 (C0932 = 1):
  – Go to home position in CCW direction.
  – Select negative home position offset under C0934

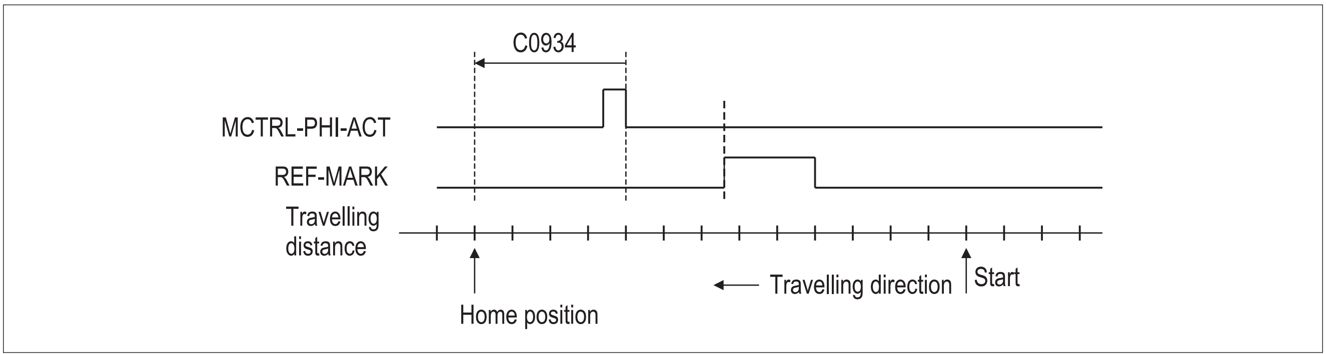


Fig. 7-160 Homing with zero pulse/zero position; go to home position in CCW direction

Homing with home switch and touch probe

The home position is after the negative transition of the home switch REFC-MARK at the touch probe signal (terminal X5/E4) plus the home position offset:

- Mode 6 (C0932 = 6):
  – Go to home position in CW direction.
  – Select positive home position offset under C0934.

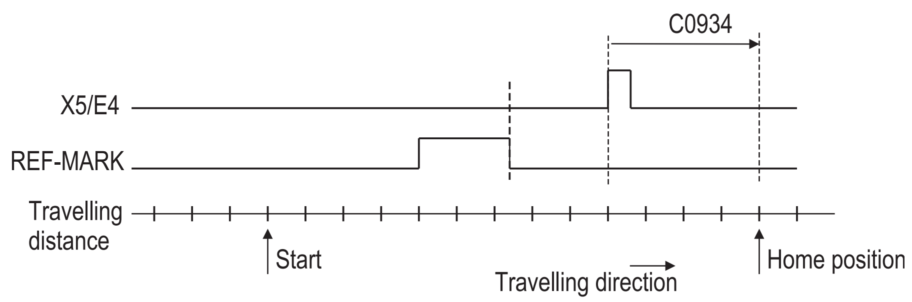


Fig. 7-161 Homing with touch probe; go to home position in CW direction

- Mode 7 (C0932 = 7):
  – Go to home position in CCW direction.
  – Select negative home position offset under 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):
  – Go to home position in CW direction.
  – Select positive home position offset under C0934.
- Mode 9 (C0932 = 9):
  – Go to home position in CCW direction.
  – Select negative home position offset under C0934

Direct homing

The home position is at the home position offset.

- Mode 20 (C0932 = 20):
  – The drive moves from the actual position (REFC-ACTPOS) to the home position directly after activation (REFC-ON = HIGH).
  – The actual position value (REFC-ACTPOS) can be loaded before using the input value REFC-ACTPOS-IN (see chapter LEERER MERKER).
  – The distance and the direction result from the actual position value (REFC-ACTPOS) and the home position offset set (C0934).

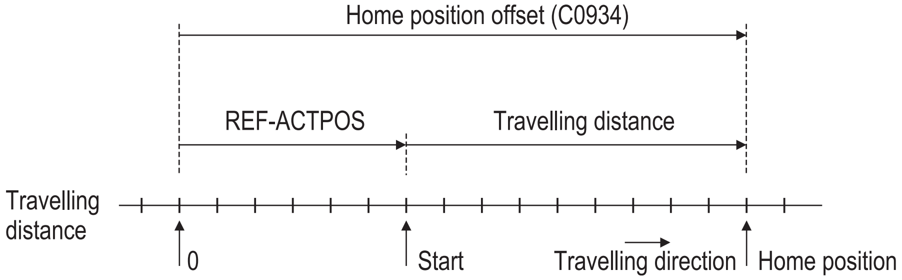


Fig. 7-162 Direct homing; go to home position in CW direction

- Mode 21 (C0932 = 21) like mode 20 plus the following:
  – The actual position value (REFC-ACTPOS) is stored when the drive is disconnected from the mains and loaded when the mains is switched on again.

7.6.64.3 Control via input signals

- REFC-ON = LOW-HIGH transition starts homing:
  – The input must remain on HIGH until the end of homing. Homing is interrupted if the input is set to LOW before the home position has been reached.
- REFC-ON = LOW interrupts homing:
  – The drive is decelerated to 0 according to the ramp selected.
  – The inputs REFC-N-IN and REFC-PHI-IN are connected to the outputs REFC-N-SET and REFC-PSET.
  – No effect if homing is already over (REFC-BUSY = LOW).
- REFC-POS-LOAD = LOW-HIGH transition
  – The profile generator accepts the phase applied to the input REFC-ACTPOS-IN as start value in actual position value REFC-ACTPOS.
  – The function is only effective if REFC-ON = LOW.
  – The function is only effective when using the modes 20 and 21.

7.6.64.4 Output of status signals

- REFC-BUSY = HIGH: homing function is active:
  – The profile generator is connected to the outputs REFC-PSET and REFC-N-SET.
- REFC-BUSY = LOW: homing function is not active or completed:
  – The inputs REFC-PHI-IN and REFC-N-IN are connected to the outputs REFC-PSET and REFC-N-SET.
- REFC-OK = HIGH: homing has been completed successfully:
  – Homing is completed if the setpoint of the profile generator has reached the home position.
- REFC-OK = LOW:
  – Homing is being carried out or
  – the home position is, for instance, because of a fault unknown or
  – homing has been interrupted.

7.6.64.5 Speed/dig. frequency input and output

The digital frequency/speed signal includes phase and speed information.

7.6.64.6 Connection of the function block

- REFC-PSET provides the phase setpoint (contouring error) related to REFC-N-SET for the phase controller in the function block MCTRL.
- REFC-DFOUT includes phase and speed information. Connect this signal to CCTRL-IN.

7.6.65 Ramp generator (RFG)

Purpose

The ramp generator limits the rise of signals.

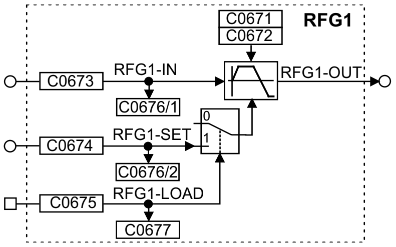


Fig. 7-163 Ramp generator (RFG1)

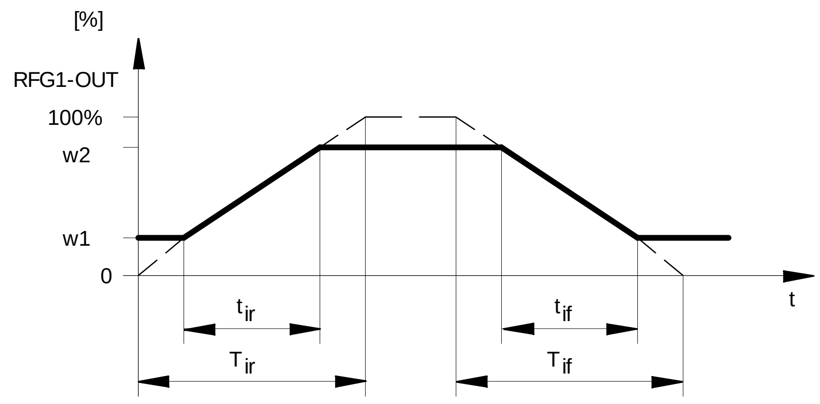
Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
RFG1-IN	a	C0676/1	dec [%]	C0673	1	1000	-
RFG1-SET	a	C0676/2	dec [%]	C0674	1	1000	-
RFG1-LOAD	d	C0677	-	C0675	2	1000	-
RFG1-OUT	a	-	-	-	-	-	-

Function

- Calculation and setting of the times T_{ir} and T_{if}
- Loading of the ramp generator

7.6.65.1 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:



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

Fig. 7-164 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.

7.6.65.2 Loading of the ramp generator

The ramp generator can be initialized with defined values via the inputs RFG1-SET and RFG1-LOAD.

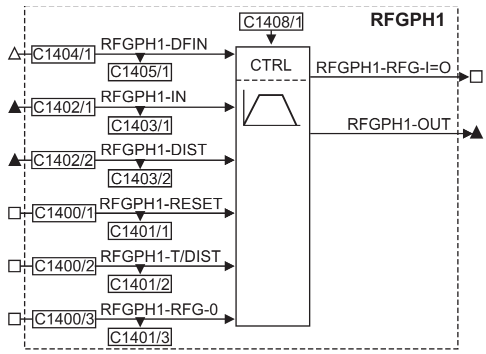
- As long as the input RFG1-LOAD = HIGH, the input RFG1-SET is switched to the output.
- If the input RFG1-LOAD = LOW, the ramp generator accelerates from this value to its input value via the set $T_i$times.

7.6.66 Ramp function generator for phase signals (RFGPH)

One function block (RFGPH) is available.

Purpose

Path or time controlled (jump) application to change position/phase (e.g. offset) relative to the master drive.



Signal				Source		Note
Name	Type	DIS	DIS format	CFG	List	
RFGPH1-RESET	d	1401/1	bin	1400/1	2	HIGH = sets RFGPH1-OUT = 0 (jump) LOW = RFGPH1-OUT is set to the value at RFGPH1-IN according to the selected function Input has priority over RFGPH1-RFG-0
RFGPH1-RFG-0	d	1401/2	bin	1400/2	2	HIGH = proceeds according to the selected function RFGPH1-OUT = 0 LOW = RFGPH1-OUT is set to the value at RFGPH1-IN according to the selected function
RFGPH1-T/DIST	d	1401/3	bin	1400/3	2	Function changeover HIGH = path-based path change LOW = time-based path change
RFGPH1-IN	ph	1403/1	dec [inc]	1402/1	3	Position setpoint (65536 inc = 1 rev.)
RFGPH1-DIST	ph	1403/2	dec [inc]	1402/2	3	Path difference by which the phase is to be changed at input -IN (65536 inc = 1 rev.)
RFGPH1-DFIN	phd	1405/1	dec [inc]	1404/1	4	Digital frequency input
RFGPH1-RFG-I=0	d		-	-	-	HIGH : RFGPH1 -OUT = RFGPH1 -IN
RFGPH1-OUT	ph		-	-	-	Output (65536 inc = 1 rev.)

Function

- Change phase/position through a defined speed
- Change phase/position through a defined path
- Output of status signals

Description of functions by means of an example

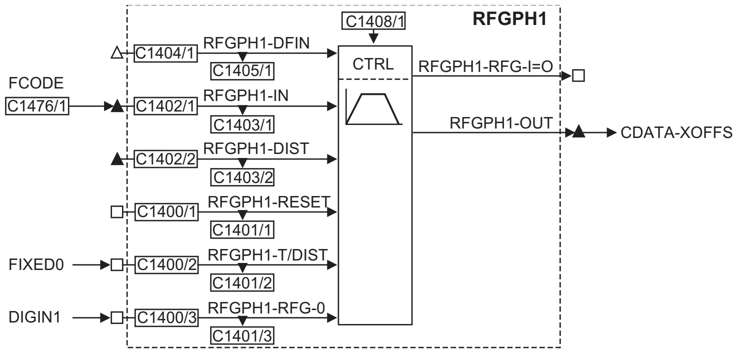
With the function “ramp function generator for phase signals” the drive can be moved by a defined distance compared to the master drive. It must be determined whether the drive reaches the target position with a predefined speed (-T/DIST = LOW) or - depending on the master drive speed - after a certain distance (-T/DIST = HIGH).

Example: The drive is to be moved by 5 m-units starting with the 0 position of the profile. The controller is enabled via terminal X5/E1.

Master units (m-units) can measured directly in the system at the object to be moved. Possible are mm, m, phases, etc. Referred to the motor, these actual values become slave units (s-units). The controller converts the s-units into encoder increments.

Function block library

Connection proposal:



The inputs not used must not be assigned.

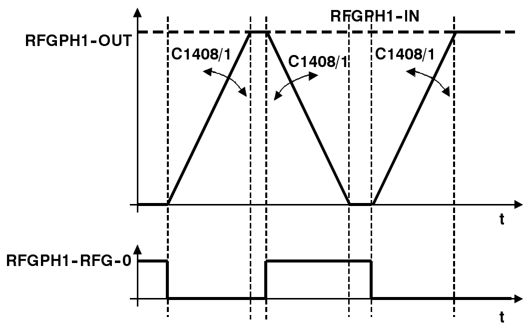
Change phase/position through a defined speed (-T/DIST = LOW)

Inputs for parameter setting:

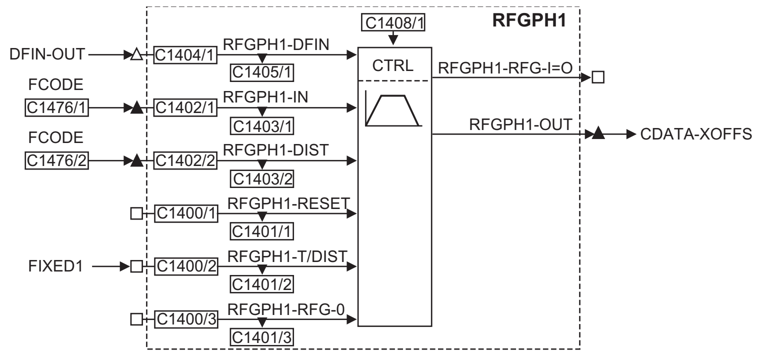
- FCODE C1476/1 = 5 m-units (position)
- C1408/1 = 200.0 rpm
  The drive traverses to the target position with a master value speed of 200 rpm.

Control:

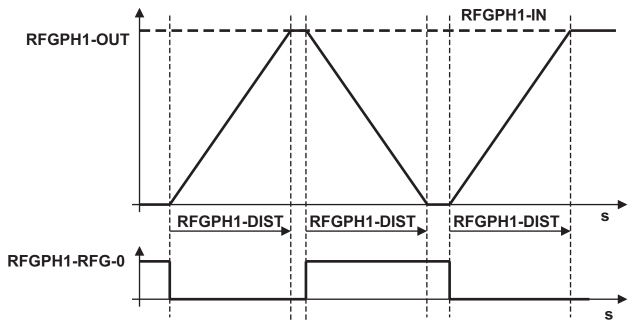
- X5/E1 = HIGH
  CDATA-XOFFS is traversed to 5 m-units at n = 200 rpm
- X5/E1 = LOW
  CDATA-XOFFS is traversed to 0 m-units at n = 200 rpm
- The time required to reach the position results from the physical parameters selected.



Change phase/position through a defined path (-T/DIST = HIGH)



- FCODE C1476/2 = 10 m-units (=RFGPH1-DIST)
- FCODE C1476/1 = 2.5 m-units (=RFGPH1-IN)
- Master value at RFGPH1-DFIN (the absolute value is generated from the input value)



Explanation:

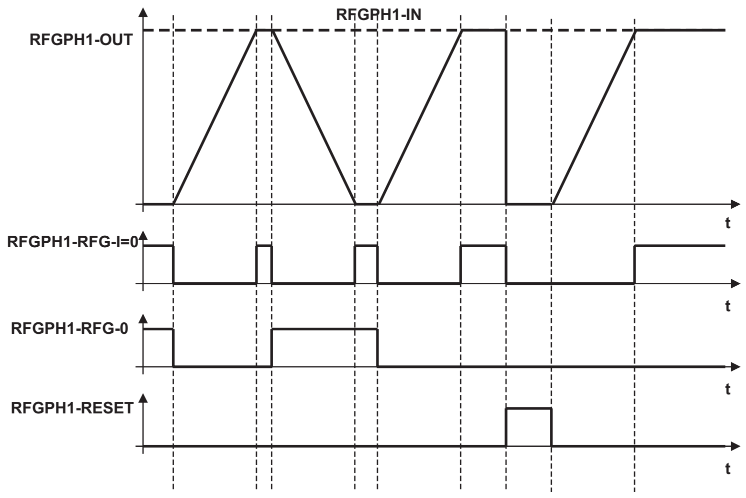
The drive to be moved must compensate the distance of 2.5 m-units set at RFGPH1-IN while the master drive traverses a distance of 10 m-units. Its speed is determined by the speed of the master drive (RFGPH1-DFIN) and the path difference (RFGPH1-DIST).

After the master value has traversed the distance (RFGPH1-DIST), RFGPH1-OUT = RFGPH1-IN. The position change is thus completed. Master drive and electronic cam profiler run synchronously again.

Status signals

RFGPH1-RFG-I=0 = HIGH indicates that the output RFGPH1-OUT has reached the end value selected (the output is not adjusted any more).

Function block library



7.6.67 Sample and hold function (S&H)

Purpose

The FB can save analog signals. The saved value is also available after mains disconnection.

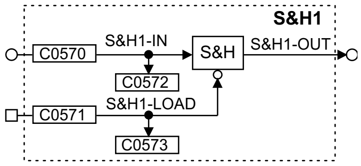


Fig. 7-165 Sample and hold function (S&H1)

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).

7.6.68 Switching points (SPC)

Two function blocks (SPC1, SPC2) are available.

Purpose

Switches an output signal, if the drive operates within a defined range (cam switch, control of injection nozzles).

SPC1

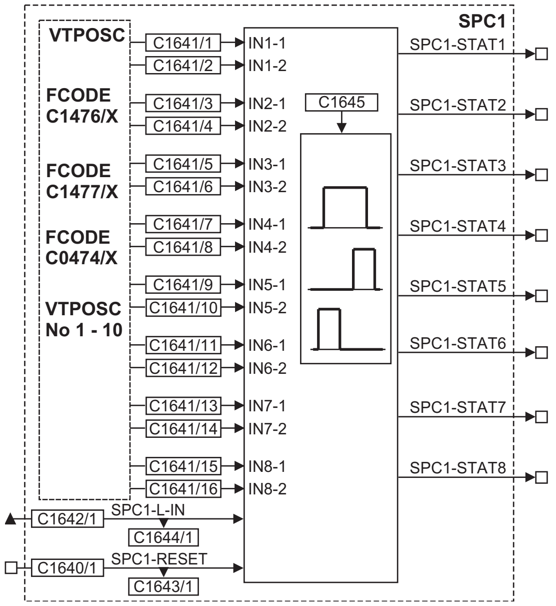


Fig. 7-166 Function block SPC1

Signal				Source		Note
Name	Type	DIS	DIS format	CFG	List	
SPC1-L-IN	ph	C1644/1	dec [inc]	C1642/1	3	65536 inc = 1 rev.
SPC1-RESET	d	C1643/1	bin	C1640/1	2	-
SPC1-STAT1	d	-	-	-	-	-
SPC1-STAT2	d	-	-	-	-	-
SPC1-STAT3	d	-	-	-	-	-
SPC1-STAT4	d	-	-	-	-	-
SPC1-STAT5	d	-	-	-	-	-
SPC1-STAT6	d	-	-	-	-	-
SPC1-STAT7	d	-	-	-	-	-
SPC1-STAT8	d	-	-	-	-	-

SPC2

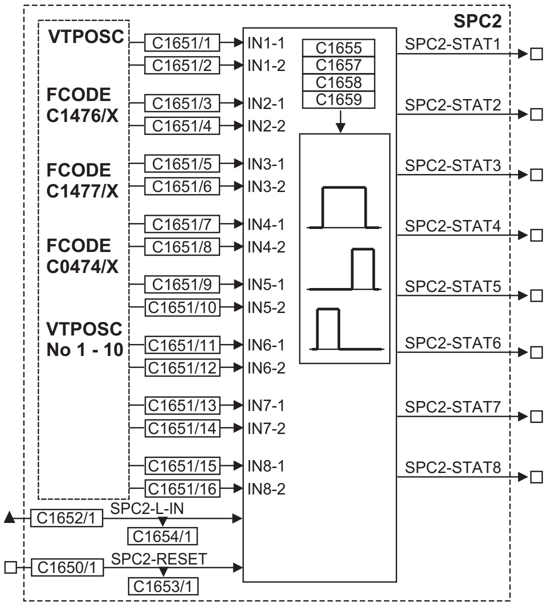


Fig. 7-167 Function block SPC2

Signal				Source		Note
Name	Type	DIS	DIS format	CFG	List	
SPC2-L-IN	ph	C1654/1	dec [inc]	C1652/1	3	65536 inc = 1 rev.
SPC2-RESET	d	C1653/1	bin	C1650/1	2	-
SPC2-STAT1	d	-	-	-	-	-
SPC2-STAT2	d	-	-	-	-	-
SPC2-STAT3	d	-	-	-	-	-
SPC2-STAT4	d	-	-	-	-	-
SPC2-STAT5	d	-	-	-	-	-
SPC2-STAT6	d	-	-	-	-	-
SPC2-STAT7	d	-	-	-	-	-
SPC2-STAT8	d	-	-	-	-	-

Function

- Switch points (beginning/end, center/range)
- Switch hysteresis
- Switch dead time
- Switch filter time constant

7.6.68.1 Switch points

- Switch points can be set in two ways:
  – Mode 1: Start and end position
  – Mode 2: Center with switch range
- The switch points are selected by means of the variable table VTPOSC.
  – Direct input of switch-on and switch-off positions, the center and the switch range in VTPOSC.
- If the value at SPCx-L-IN is within the range of the switch points sets, SPCx-STATx = HIGH

Function block library

- In factory setting, SPCx-L-IN is connected with the actual position value (POS-ACTPOS) of the FB POS.
  – Thus the switch points refer to the distance passed by the motor.

Assignment of switch-on and switch-off positions for SPC1 (see Fig. 7-166):

Code	Subcode	Switch point	Output FB
C1641	1	IN1-1	SPC1-STAT1
	2	IN1-2	
...	...	...	...
C1641	15	IN8-1	SPC1-STAT8
	16	IN8-2	

Assignment of switch-on and switch-off positions for SPC2 (see Fig. 7-167):

Code	Subcode	Switch point	Output FB
C1651	1	IN1-1	SPC2-STAT1
	2	IN1-2	
...	...	...	...
C1651	15	IN8-1	SPC2-STAT8
	16	IN8-2	

Mode 1: Start and end position

C1645 = set 0 (SPC1)

C1655 = set 0 (SPC2)

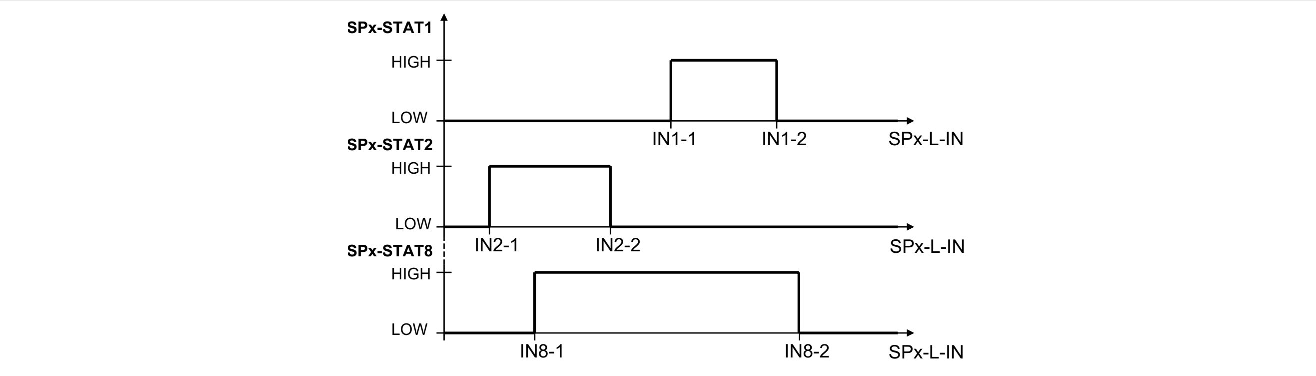


Fig. 7-168 Switch-on and switch-off positions for SPCx-STAT1, SPCx-STAT2 and SPCx-STAT8

Switch-on and switch-off positions depend on the travel direction:

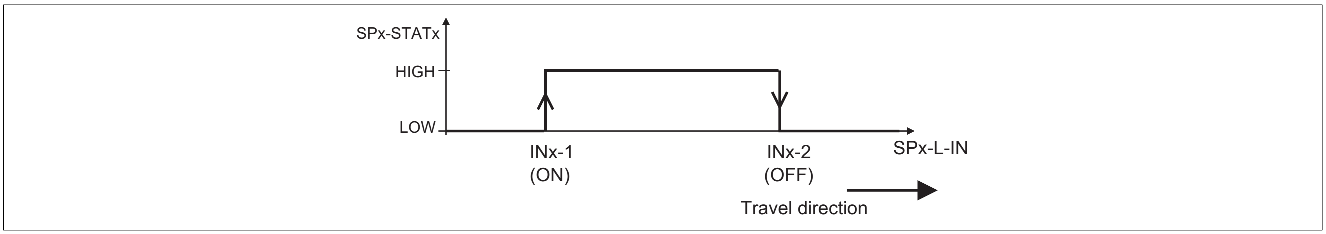


Fig. 7-169 Definition of a switch-on and switch-off position according to the travel direction

Mode 2: Center with switch range

C1645 = set 1 (SPC1)

C1655 = set 1 (SPC2)

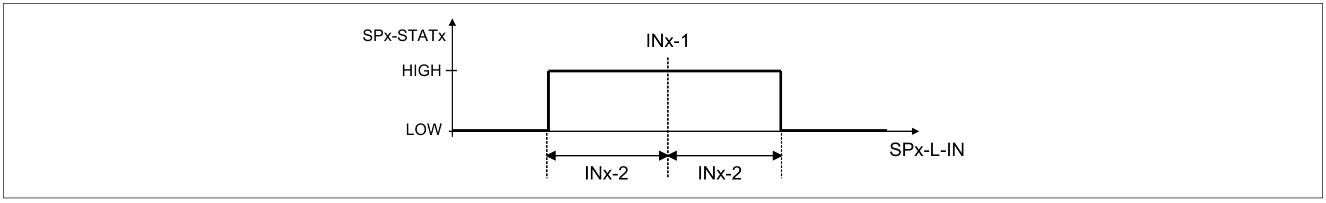


Fig. 7-170 Center with switch range

- INx-1 determines the center
- INx-2 determines the switch range with center

7.6.68.2 Hysteresis

This function is only available for FB SPC2.

Purpose

Avoids undefined switching of the output signals (in standstill the drive is exactly on a switch point).

Function

- The hysteresis is selected under C1658.
  – The setting is valid for SPC2-STAT1 ... SPC2-STAT8.

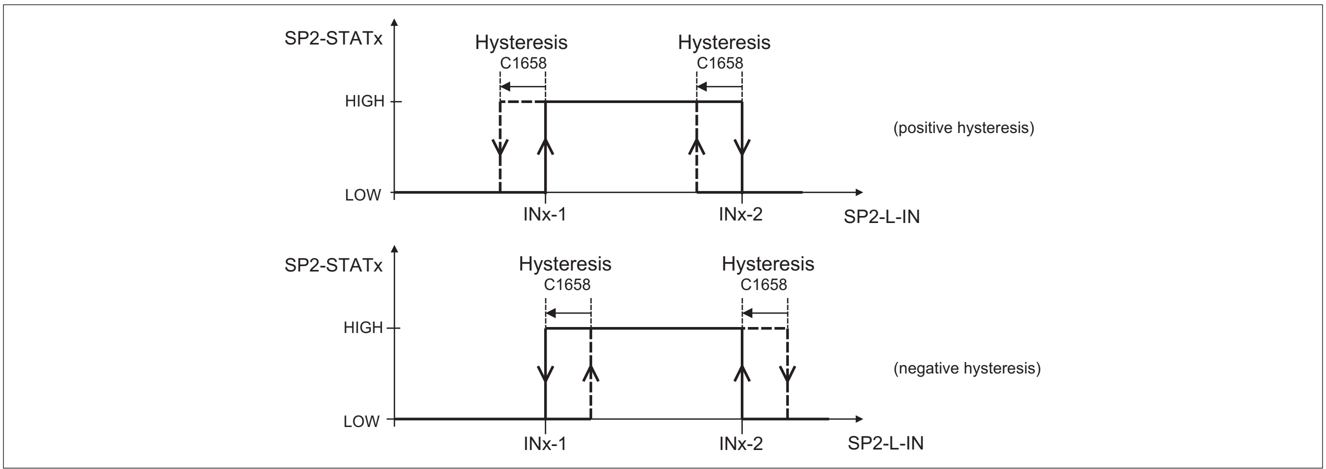


Fig. 7-171 Hysteresis for positive and negative values

7.6.68.3 Dead time

This function is only available for FB SPC2.

Purpose

Delayed addressing of the following components (injection nozzles).

Function

- The dead time is selected under C1657.
  – This setting is only possible for SPC2-STAT1 ... SPC2-STAT4.

Assignment of codes and outputs:

Code	Subcode	Output FB SPC2
C1657	1	SPC2-STAT1
	2	SPC2-STAT2
	3	SPC2-STAT3
	4	SPC2-STAT4

- The dead time influences the switch points and the hysteresis.

Positive dead time

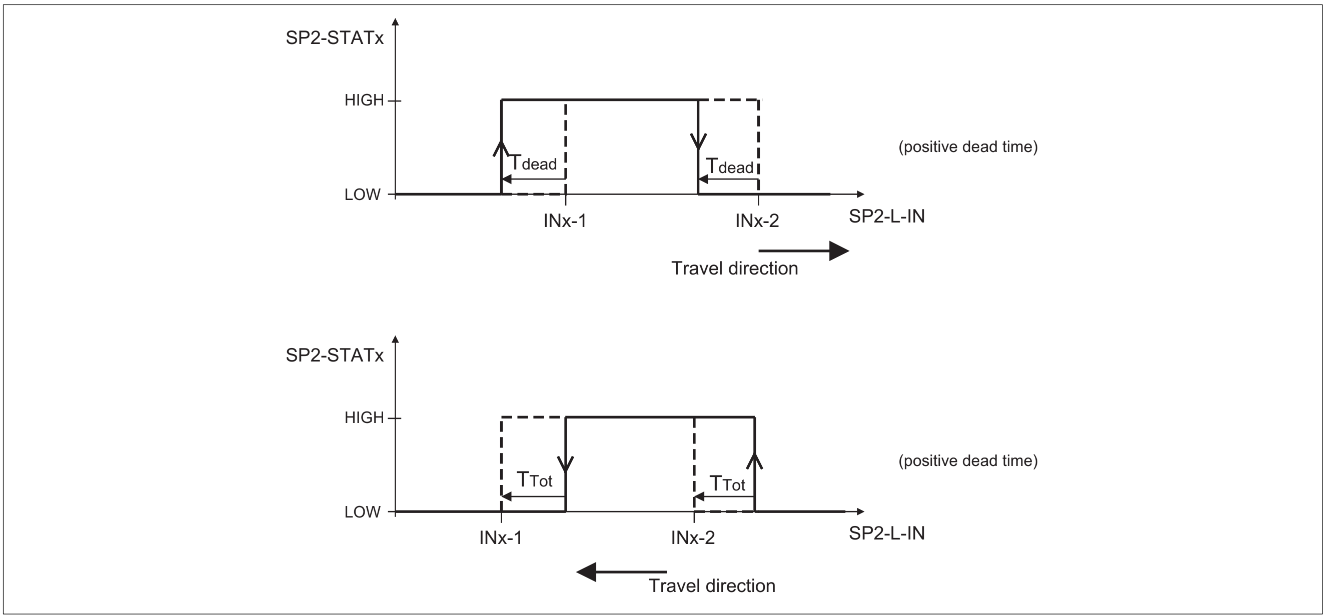


Fig. 7-172 Function of the positive dead time for different travel directions

- With a positive dead time, the drive reacts earlier by the time set.

Negative dead time

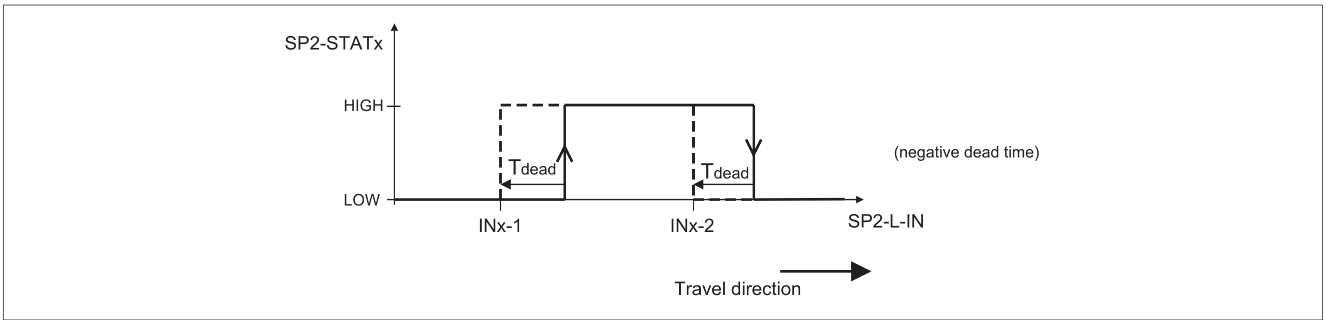


Fig. 7-173 Function of the negative dead time

- With a negative dead time, the drive reacts later by the time set.

7.6.68.4 Filter time constant

This function is only available for FB SPC2.

Purpose

Avoids undefined switching of the output signals at SPC2-STAT1 ... SPC2-STAT4 when the motor is running at low speed.

Function

- The filter time constant is selected under C1659.
  – This setting is valid for SPC2-STAT1 ... SPC2-STAT4.

Assignment of code and filter time constant

Code	Value	Filter time constant
C1659	0	Off
	1	1 ms
	2	2 ms
	4	4 ms
	8	8 ms
	16	16 ms

Note!

The correct setting can only be found by testing. In general:
The lower the resolution of the actual position encoder and the lower the travel speed, the higher the filter time constant.

7.6.69 S-shaped ramp generator (SRFG)

Purpose

The function block is used to evaluate a setpoint via an S-shape (sin^2 shape).

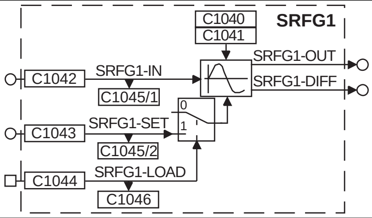


Fig. 7-174 S-shaped ramp generator (SRFG1)

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.

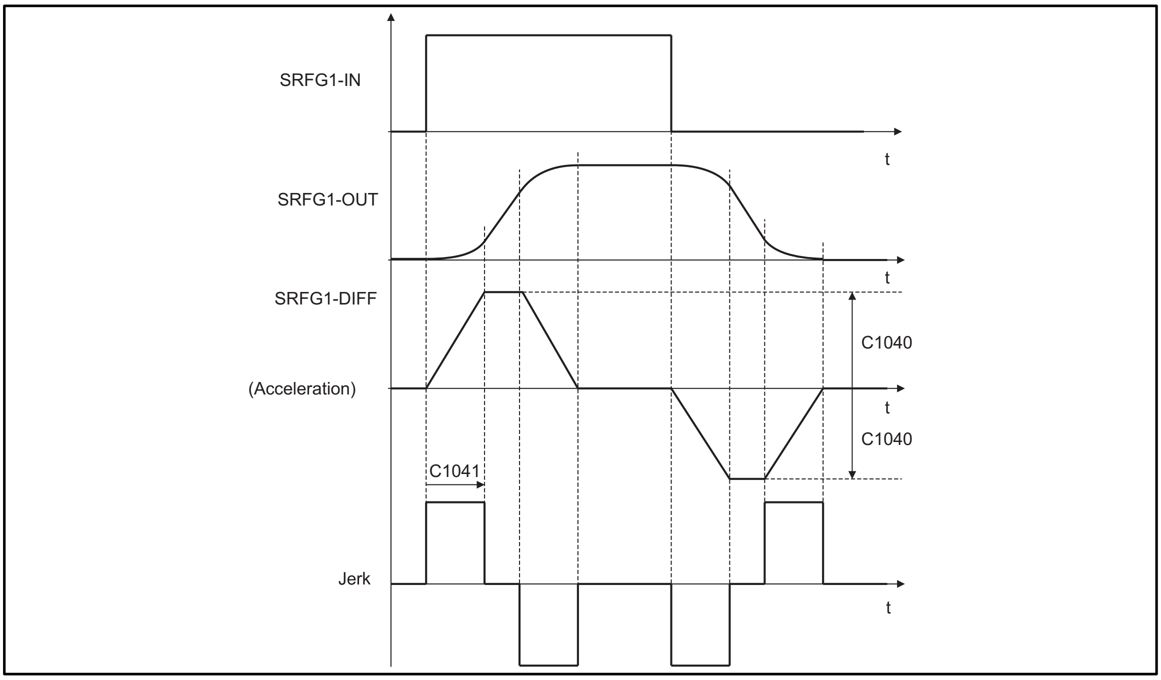
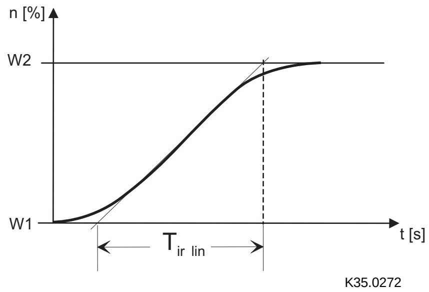


Fig. 7-175 Line diagram

- Max. acceleration:
  – For the positive as well as for the negative acceleration, C1040 applies.
  – The setting is calculated according to the formula:

$$T_{ir\ lin} = 1s \cdot \frac{W_2\,[\%] - W_1\,[\%]}{C1040\,[\%]}$$



- Jolt (C1041):
  – The jolt is entered in [s] until the ramp generator operates with maximum acceleration (see Fig. 7-175).

7.6.70 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.

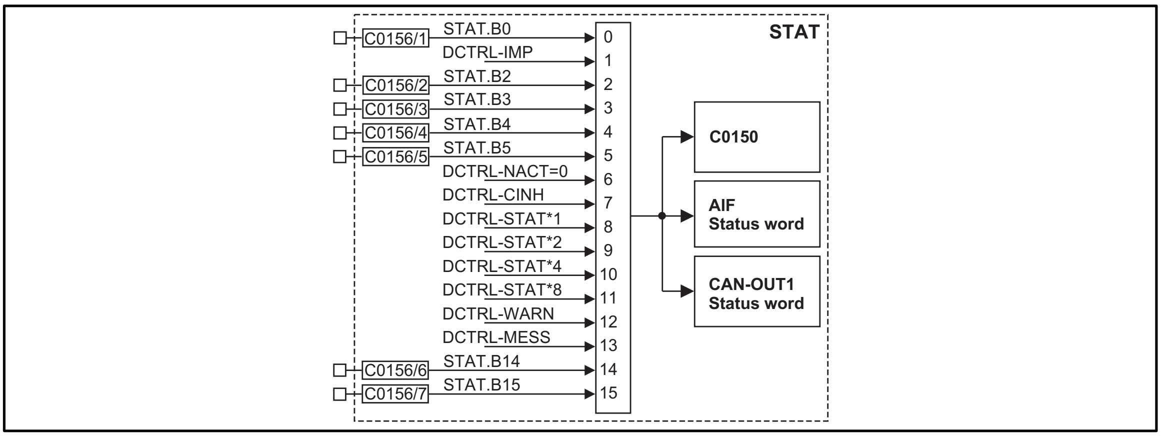


Fig. 7-176 Output of digital status signals (STAT)

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. (📖 7-103)

7.6.71 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).

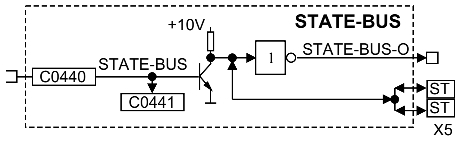


Fig. 7-177 Control of a function block STATE-BUS

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.

7.6.72 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.

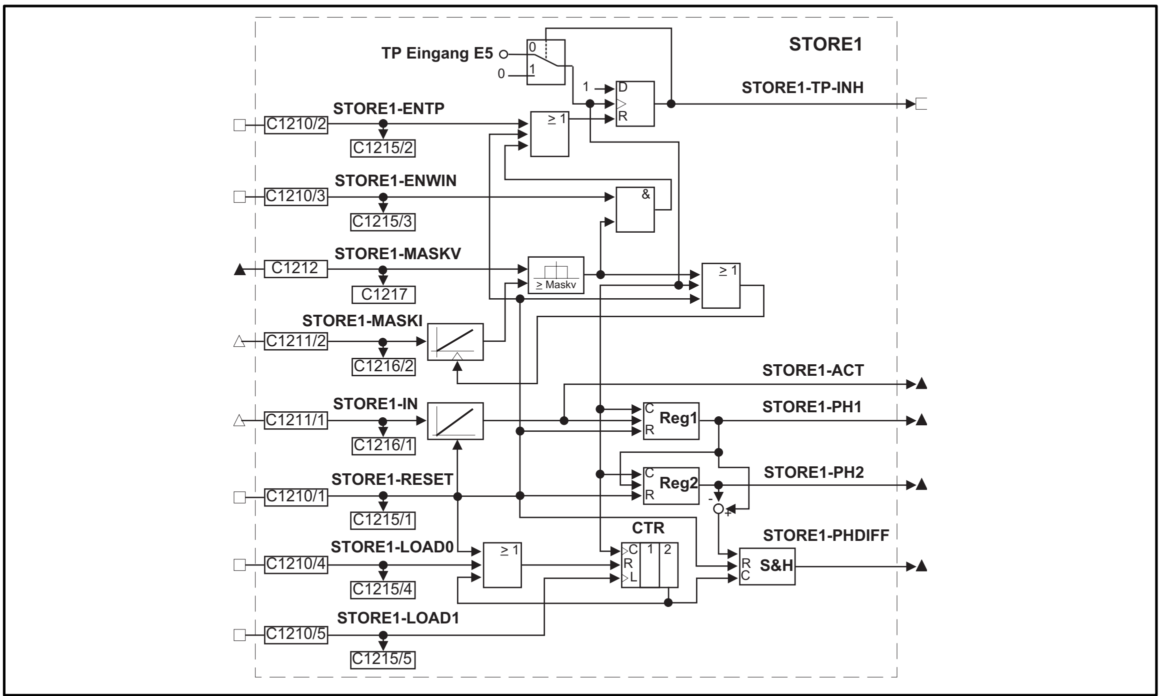


Fig. 7-178 Memory block (STORE1)

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.

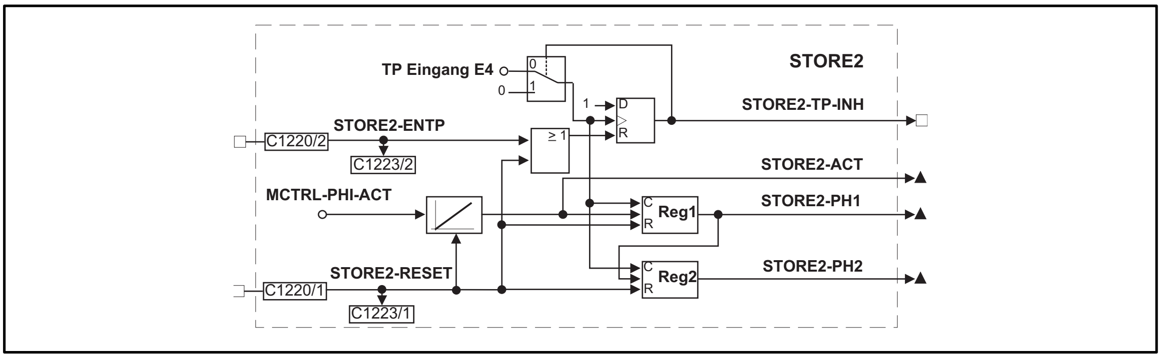


Fig. 7-179 Memory block (STORE2)

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

7.6.72.1 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.

7.6.72.2 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.

7.6.72.3 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.

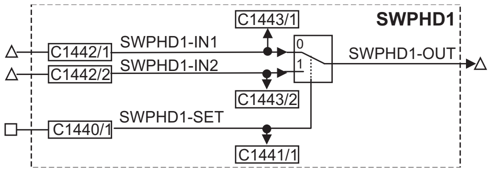
- STORE2-RESET = HIGH resets memory and integrator and enables the TP input E4 for the triggering.

7.6.73 Switch - digital frequency (SWPHD)

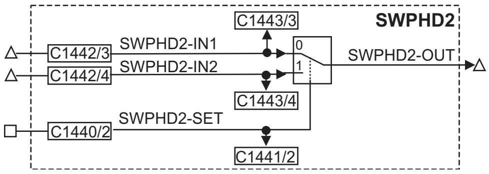
Two function blocks (SWPHD1, SWPHD2) are available.

Purpose

Changeover for the selection of two speed signals



Signal				Source		Note
Name	Type	DIS	DIS format	CFG	List	
SWPHD1-IN1	phd	C1443/1	dec [rpm]	C1442/1	4	–
SWPHD1-IN2	phd	C1443/2	dec [rpm]	C1442/2	4	–
SWPHD1-SET	d	C1441/1	bin	C1440/1	2	–
SWPHD1-OUT	phd	–	–	–	–	–



Signal				Source		Note
Name	Type	DIS	DIS format	CFG	List	
SWPHD1-IN1	phd	C1443/3	dec [rpm]	C1442/3	4	–
SWPHD1-IN2	phd	C1443/4	dec [rpm]	C1442/4	4	–
SWPHD1-SET	d	C1441/2	bin	C1440/2	2	–
SWPHD1-OUT	phd	–	–	–	–	–

Function

- Different signals are assigned to the inputs SWPHDx-IN1 and -IN2. One of these signals can be assigned to the output SWPHDx-OUT.
- Selection of the input with SWPHDx-SET
  - SWPHDx-SET = LOW:
    Input SWPHDx-IN1
  - SWPHDx-SET = HIGH:
    Input SWPHDx-IN2

7.6.74 Multi-axis synchronization (SYNC)

Purpose

Synchronizes the control program cycle of the drives with the cycle of a higher-level control.

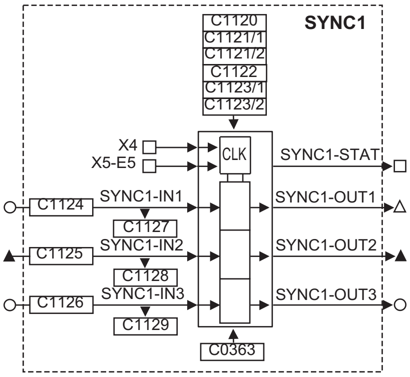


Fig. 7-180 Multi-axis synchronization (SYNC1)

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

7.6.74.1 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).

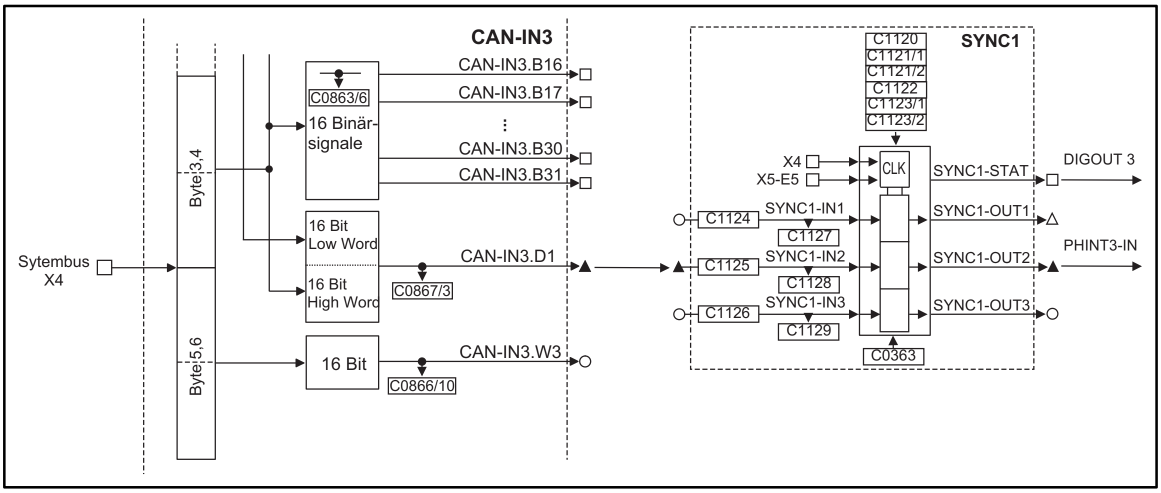


Fig. 7-181 Example for a link of the FB SYNC1

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.

7.6.74.2 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.

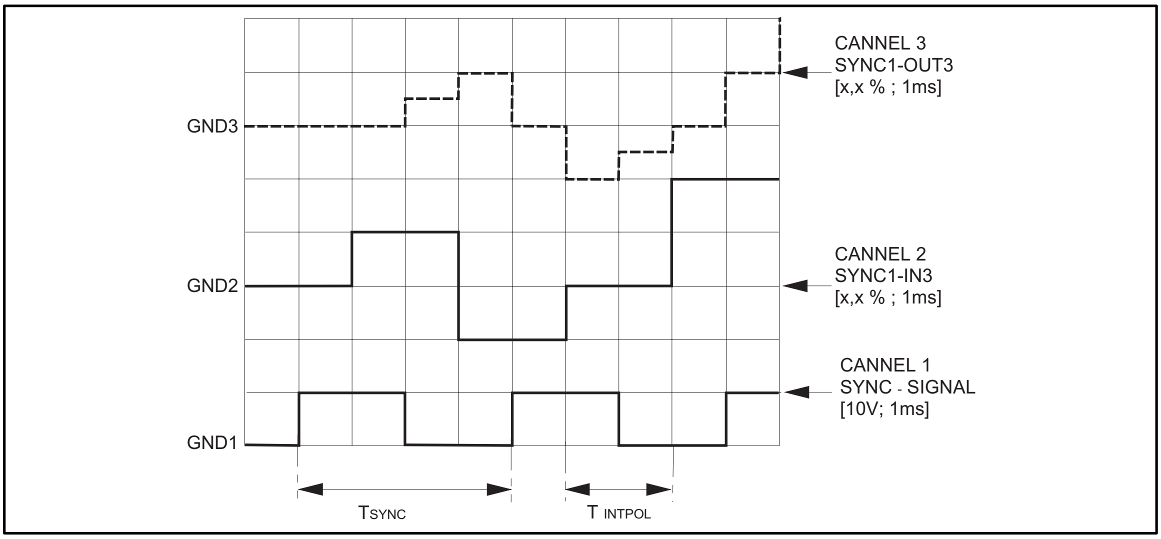


Fig. 7-182 Example of an interpolation

See Fig. 7-182:

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

7.6.74.3 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).

7.6.74.4 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.

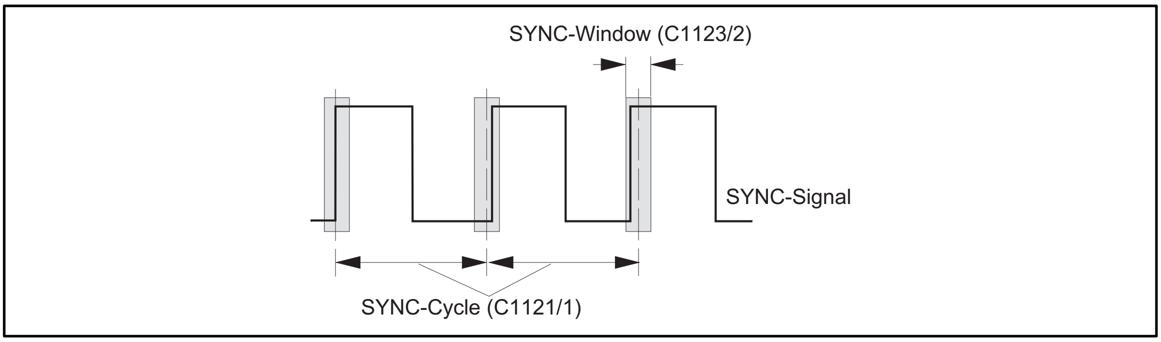


Fig. 7-183 ”Time window” for the LOW-HIGH edges of the sync signal

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”.

7.6.74.5 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.

7.6.74.6 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

7.6.74.7 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 $\geq$ 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

7.6.74.8 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.

7.6.75 Edge evaluation (TRANS)

Purpose

This function is used to evaluate digital signal edges and convert them into pulses with a defined time.

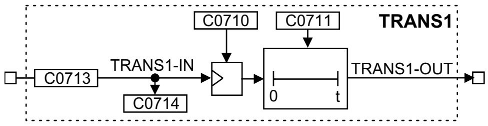


Fig. 7-184 Edge evaluation (TRANS1)

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
TRANS1-IN	d	C0714	bin	C0713	2	1000	-
TRANS1-OUT	d	-	-	-	-	-	-

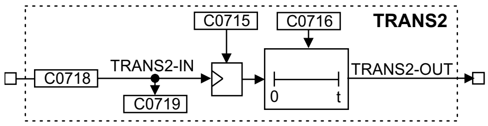


Fig. 7-185 Edge evaluation (TRANS2)

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
TRANS2-IN	d	C0719	bin	C0718	2	1000	-
TRANS2-OUT	d	-	-	-	-	-	-

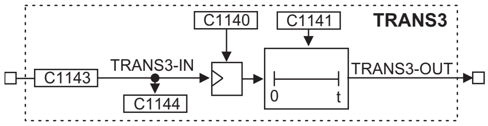


Fig. 7-186 Edge evaluation (TRANS3)

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
TRANS3-IN	d	C1144	bin	C1143	2	1000	-
TRANS3-OUT	d	-	-	-	-	-	-

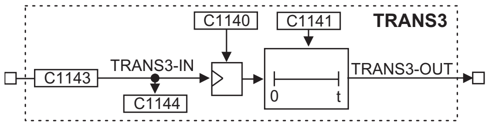


Fig. 7-187 Edge evaluation (TRANS4)

Signal				Source			Note
Name	Type	DIS	DIS format	CFG	List	Lenze	
TRANS4-IN	d	C1149	bin	C1148	2	1000	-
TRANS4-OUT	d	-	-	-	-	-	-

Function block library

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

7.6.75.1 Evaluate positive edge

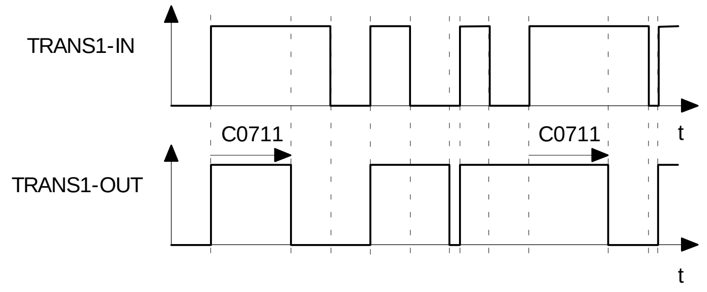


Fig. 7-188 Evaluation of positive edges (TRANS1)

- 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.

7.6.75.2 Evalute negative edge

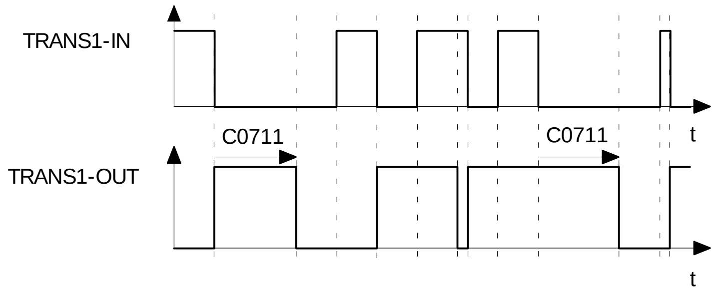


Fig. 7-189 Evaluation of negative edges (TRANS1)

- 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.

7.6.75.3 Evaluate positive or negative edge

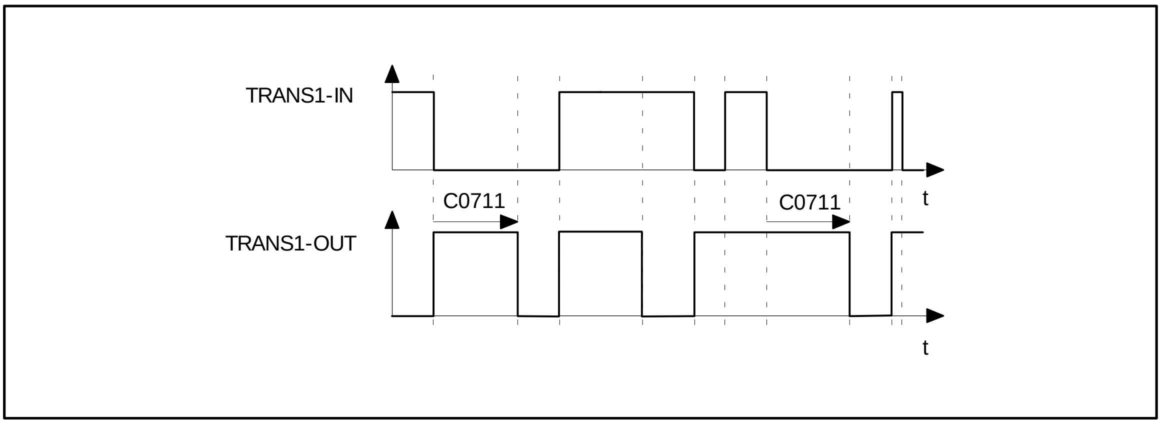


Fig. 7-190 Evaluation of positive and negative edges (TRANS1)

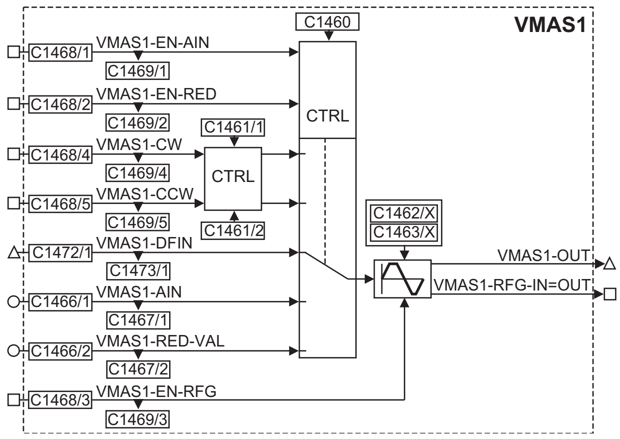
- The output TRANSx-OUT is set to HIGH as soon as a HIGH-LOW edge or a LOW-HIGH edge is sent to the input.
- After the time set under C0711 or C0716 has elapsed, the output changes again to LOW unless there is another HIGH-LOW edge or LOW-HIGH edge at the input.

7.6.76 Virtual master (VMAS)

One function block (VMAS1) is available.

Purpose

- Internal generation of a virtual digital frequency (drive operates as master value encoder).
- Change to alternative setpoint (master value), e.g. to reduce the line speed of sluggish drives.
- Inching



Signal				Source		Note
Name	Type	DIS	DIS format	CFG	List	
VMAS1-AIN	a	1467/1	dec[%]	1466/1		Analog setpoint
VMAS1-RED-VAL	a	1467/2	dec[%]	1466/2		Alternative analog setpoint, target for speed reduction
VMAS1-EN-AIN	d	1469/1	bin	1468/1		HIGH = Activate the analog input VMAS1-AIN or VMAS1-DFIN (depending on the selection under C1460)
VMAS1-EN-RED	d	1469/2	bin	1468/2		HIGH = Activate the analog input VMAS1-RED-VAL
VMAS1-EN-RFG	d	1469/3	bin	1468/3		HIGH = Activate the ramp function generator LOW = Input values are processed directly
VMAS1-CW	d	1469/4	bin	1468/4		Input CW rotation (determine speed in C1461/1)
VMAS1-CCW	d	1469/5	bin	1468/5		Input CCW rotation (determine speed in C1461/2)
VMAS1-DFIN	phd	1473/1	dec[rpm]	1472/1		Master speed input (digital frequency)
VMAS1-RFG-IN=OUT	d	13851	bin	-		HIGH= RFG has accelerated (input = output)
VMAS1-DFOUT	phd	13851	-	-		Output of digital frequency setpoint

Function

- Generation of a virtual master value (dig. frequency)
- Digital frequency input
- Changeover to alternative master value
- Inching
- Ramp function integrator

7.6.76.1 Generation of a virtual master value

If, for instance, no host is available, a virtual master value (potentiometer setpoint) can be assigned to the input VMAS1-AIN. This can happen if the drive is not in group operation and therefore synchronous running is not required.

The input signal is set to the output VMAS1-DFOUT if

- VMAS1-EN-AIN = HIGH and
- code C1460 = 0

The analog setpoint selection at VMAS1-AIN = 100% corresponds to the maximum motor speed, which is input in C0011 for commissioning (see Operating Instructions 9300 cam profiler).

7.6.76.2 Digital frequency input

As alternative to the analog input VMAS1-AIN (input in [%]), a signal, which must be input as absolute value [rpm], can be assigned to the digital frequency input VMAS1-DFIN.

The input signal is set to the output VMAS1-DFOUT if

- VMAS1-EN-AIN = HIGH and
- code C1460 = 1

STOP

Stop!

With the use of the digital frequency input (-DFIN) pulse losses occur when the ramp function generator (VMAS1-EN-RFG = HIGH) is activated. The drive loses the contact to its master. If the connection with the digital frequency input requires a ramp function generator, the FB DFRFG1 can be connected before the input. For this, set VMAS1-EN-RFG at LOW.

7.6.76.3 Changeover to alternative master value

This function is for instance required, if an impermissibly high contouring error occurs in a sluggish drive operating in a group. The resulting asynchronism between master drive and cam profiler might damage the system.

The master speed (input -AIN) can be decreased by changing to an alternative master value. The drive setpoint is then generated through the input VMAS1-RED-VAL, e. g. via code, analog input, motor potentiometer, etc. ... This master value input has priority over all other setpoint sources.

Before changeover, the input -RED-VAL must be activated:

- VMAS1-EN-RED = HIGH

Note!

With VMAS1-EN-RFG = HIGH the ramp function generator can be activated. The changeover to the alternative setpoint is carried out via adjustable ramps (C1462/1 and -/2).

7.6.76.4 Inching

- Activate:
  VMAS1-EN-AIN = LOW
- Activate inching from C1461/1:
  VMAS1-CW = HIGH and VMAS1-CCW = LOW
- Parameter setting for inching:
  C1461/1
- Activate inching speed from C1461/2:
- VMAS1-CCW = HIGH and VMAS1-CW = LOW
- Set inching speed n = 0:
  VMAS1-CCW = LOW and VMAS1-CW = LOW
- With VMAS1-CCW = HIGH and VMAS1-CW = HIGH the status remains the same.

Note!

For inching, activate the ramp function generator by setting VMAS1-EN-RFG = HIGH.

Code	Meaning	Note
C1461/1	Speed for VMAS1-CW = HIGH	in rpm
C1461/2	Speed for VMAS1-CCW = HIGH	in rpm

7.6.76.5 Ramp function integrator

With the ramp function integrator the setpoint can be smoothly set to the target point.

- Activate:
  VMAS1-EN-RFG = HIGH

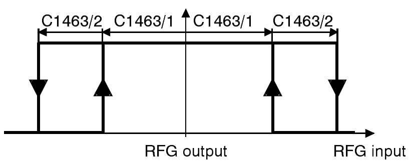
Code	Meaning	Note
C1462/1	Acceleration time	in seconds
C1462/2	Deceleration time	in seconds

The ramps set under C1462/ and -/2 are assigned to the output VMAS1-DFOUT.

Stop!

If the ramp function generator is used together with the input VMAS-DFIN, pulse losses occur (no phase synchronism). The drive loses contact to its master.

A HIGH signal at the output VMAS1-RFG-IN=OUT indicates that the ramp function integrator has reached its setpoint. For this status message set a window (C1463/1) or a hysteresis (C1463/2).

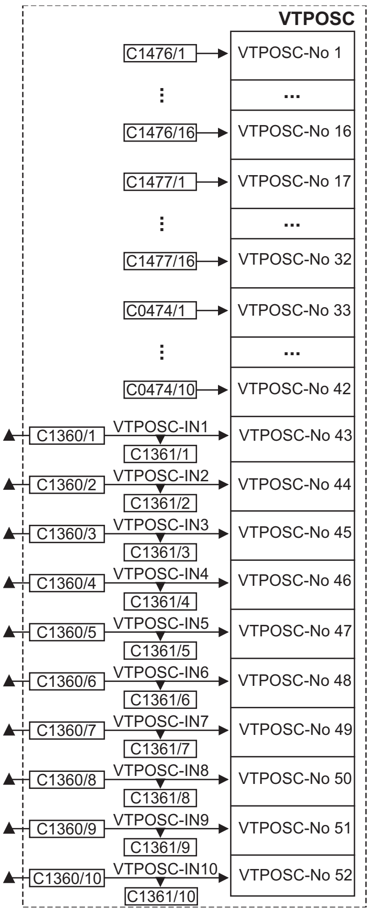


7.6.77 Positioning control (VTPOSC)

One function block (VTPOSC) is available.

Purpose

The FB is similar to the FB VTPOSC of the positioning controller (see Manual for Positioning Controller). Changes were made to adapt it to the cam profiler. It is used to provide the switch point positions for the switch point function blocks (SPC1/2).



Signal				Source		Note
Name	Type	DIS	DIS format	CFG	List	
VTPOSC-IN1	ph	C1361/1	dec[inc]	C1360/1		VTPOSC-No 43
VTPOSC-IN2	ph	C1361/2	dec[inc]	C1360/2		VTPOSC-No 44
VTPOSC-IN3	ph	C1361/3	dec[inc]	C1360/3		VTPOSC-No 45
VTPOSC-IN4	ph	C1361/4	dec[inc]	C1360/4		VTPOSC-No 46
VTPOSC-IN5	ph	C1361/5	dec[inc]	C1360/5		VTPOSC-No 47
VTPOSC-IN6	ph	C1361/6	dec[inc]	C1360/6		VTPOSC-No 48
VTPOSC-IN7	ph	C1361/7	dec[inc]	C1360/7		VTPOSC-No 49
VTPOSC-IN8	ph	C1361/8	dec[inc]	C1360/8		VTPOSC-No 50
VTPOSC-IN9	ph	C1361/9	dec[inc]	C1360/9		VTPOSC-No 51
VTPOSC-IN10	ph	C1361/10	dec[inc]	C1360/10		VTPOSC-No 52

Function

52 table positions are available.

- Enter fixed position values in m_units under C1476/x
  – 16 table positions (VTPOSC-No1 ... VTPOSC-No16) are available.
- Enter fixed position values in s_units under C1477/x
  – 16 table positions (VTPOSC-No17 ... VTPOSC-No32) are available.
- Enter fixed position values in [inc] under C0474.
  – 10 table positions (VTPOSC-No33 ... VTPOSC-No42) are available.
- Enter variable position target values via VTPOS-INx.
  – 10 table positions (VTPOS-No43 ... VTPOS-No52) are available.
  – Signal input via function blocks
  – The position target value must be transmitted to the table positions before the corresponding program set starts and accesses these values.

Note!

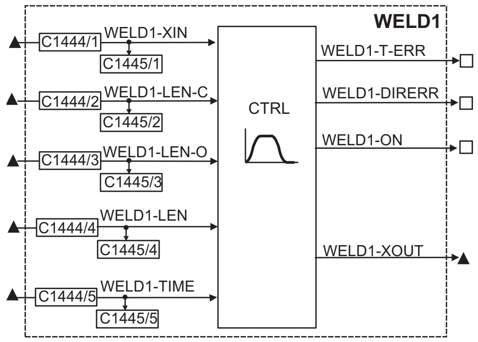
Entries in the processing table are only required if FB input and outputs are used.

7.6.78 Welding bar control (WELD)

One function block (WELD1) is available.

Purpose

This function block is used for the implementation of a welding bar control.



Signal				Source		Note
Name	Type	DIS	DIS format	CFG	List	
WELD1-XIN	ph	1445/1	dec[inc]	1444/1	3	Input X position
WELD1-LEN-C	ph	1445/2	dec[inc]	1444/3	3	Time of the closing phase
WELD1-LEN-O	ph	1445/3	dec[inc]	1444/2	3	Time of the opening phase
WELD1-LEN	ph	1445/4	dec[inc]	1444/4	3	Time of the cam profile
WELD1-TIME	ph	1445/5	dec[inc]	1444/5	3	Welding time in ms (1 inc = 1 ms)
WELD1-XOUT	ph	-		-	3	Output for profile control
WELD1-T-ERR	d	-	-	-	2	Welding time error
WELD1-ON	d	-	-	-	2	Active welding time
WELD1-DIR-ERR	d	-	-	-	2	Fault in the direction of rotation

Function

- Section adaptation of a welding bar (constant welding time)
- Output of status signals

Stop!

The welding bar control can process only positively directed master phases (see codes 1444/1 and 1445/1). With master phases in negative direction the drive is not running!

7.6.78.1 Basics of welding bar control

General

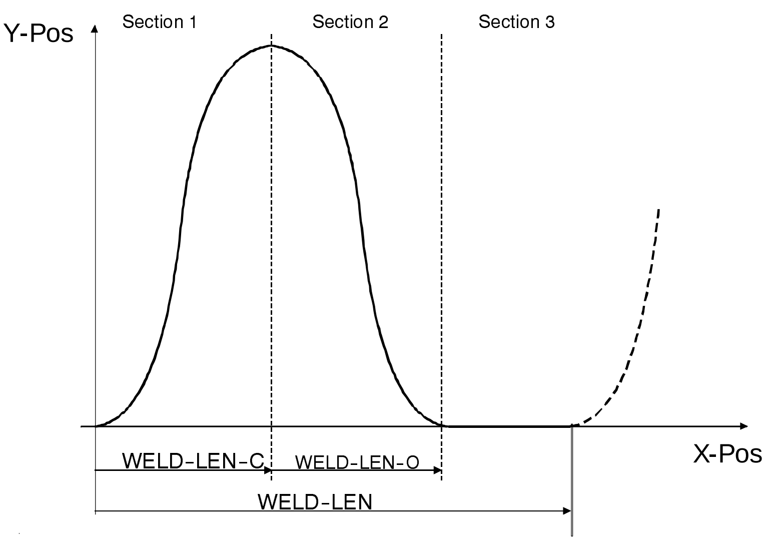
The material is positioned by the feed drive. The welding bar is then lowered (closes) and welds the material for the time preselected. After this time, the welding bar is opened and set to its waiting position. This is the time required for one welding cycle; the next cycle will be started when new material is applied.

Generation of a cam profile for welding bar control

Because of the motion sequences described above a welding bar control can usually be divided in 3 or more sections (max. 5 for Lenze controllers).

Example for 3 sections:

- Phase 1 = Welding bar moves down on material (section 1)
- Phase 2 = Welding, drive remains in position
- Phase 3 = Welding bar back to waiting position (section 2)
- Phase 4 = Welding bar remains in waiting position (section 3 of profile).



7.6.78.2 Cam data

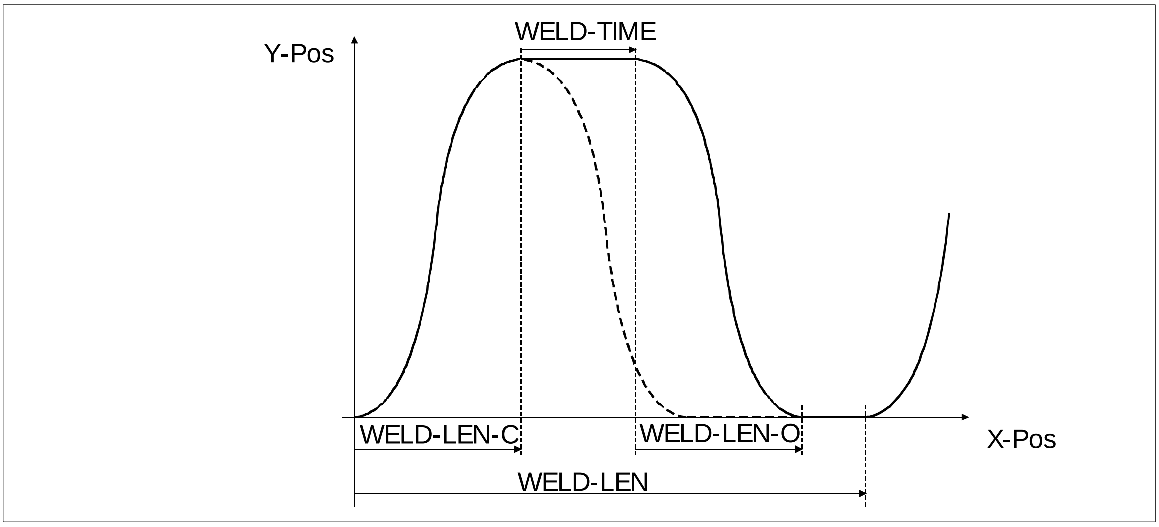
- Phase 1
  - Start position:
    X0 = 0 (master value) and Y0 = waiting position of the welding bar
  - End position
    X1 = WELD-LEN-C (time until welding bar reaches material)
    Y1 = Welding bar in welding position (= start position of phase 2)

Note!

The slope of the characteristic should correspond to the max. possible acceleration of the welding drive at max. line speed.

- Phase 2
  - The drive remains in welding position for the time set as WELD-TIME. For this, a waiting phase (latch) is automatically set (independently of the line speed) between section 1 and section 2. The waiting phase is **not** added when the cam data is generated.
- Phase 3
  - The end position must be selected such that the max. acceleration of the welding drive at max. line speed will not be exceeded (see also description phase 1).
- Phase 4
  - Add a standstill phase at the end of the motion profile.

With the corresponding line speed, the following profile is generated:



The selected welding time is converted into a distance.

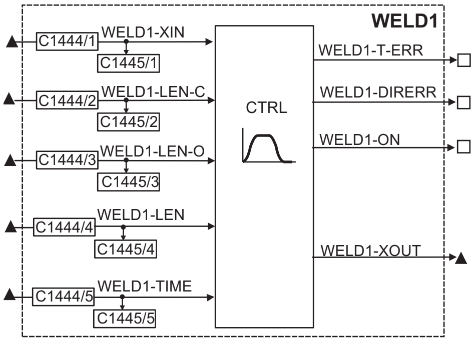
The welding time set (WELD-TIME) automatically delays the opening phase (WELD-LEN-O) by the selected welding time. The standstill phase at the end of the profile is automatically reduced. The phases 1 and 3 are not affected. The higher the line speed, the shorter the standstill phase at the end of the profile.

Interconnection and parameter setting for the function blocks

The implementation the welding bar function requires the function block CDATA with a correspondingly stored profile. Please select the basic configuration 11XXX. This configuration includes - among others - the function blocks CDATA, WELD and CCTRL:

- The cam data in CDATA determine the motion profile (path profile) of the welding bar.
- The function block WELD controls the welding time
  The welding time set in WELD-TIME, the welding bar is held in welding position, independently of the master speed.
- The function block CCTRL converts the path information into a rotor position at the motor.

Interconnection of inputs and outputs

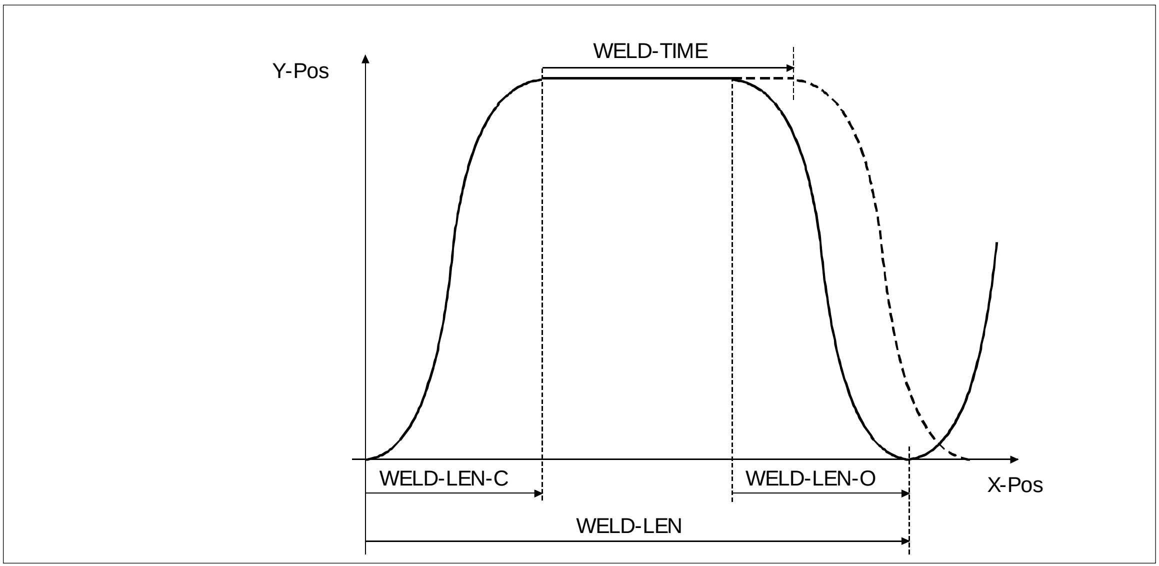


Input CDATA-XIN must be selected as master value input for function block CDATA.

Output of status information

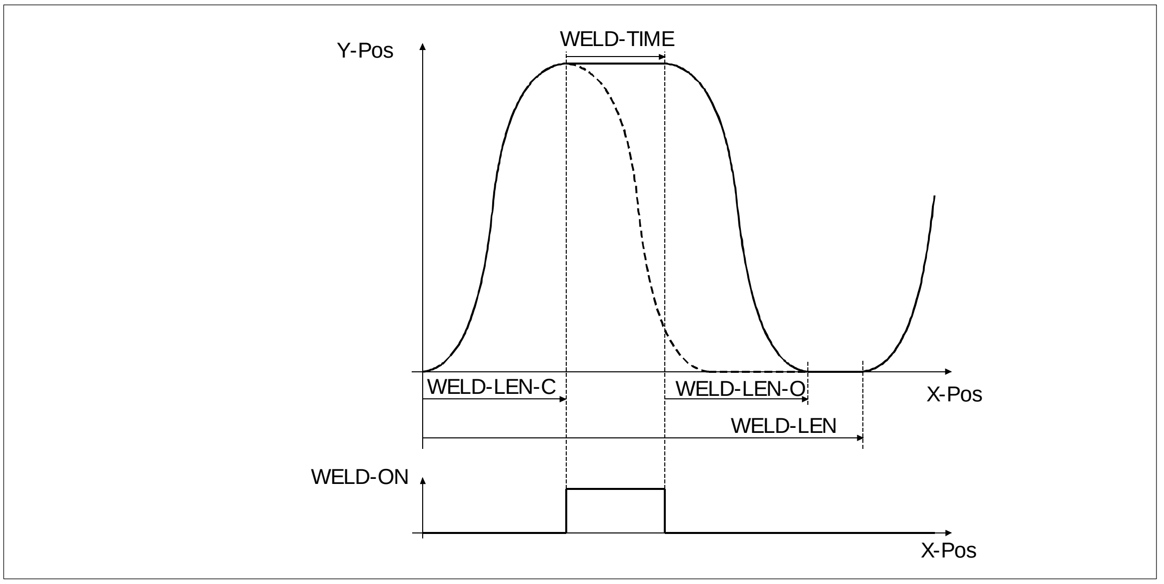
- WELD-T-ERR = HIGH:
  Total length and time of three sections do not match
  WELD-LEN-C (close),
  WELD-TIME (weld) and
  WELD-LEN-O (open).
  Reasons can be:
  – Wrong profile selection
  – Line speed too high

In such a case the welding time will be automatically reduced to avoid a disturbance or interruption of the motion sequence.



- WELD-DIR-ERR = HIGH:
  A negative master phase is assigned to the input WELD-XIN.
  Remedy:
  – Invert master phase
  – Invert the direction of rotation of the welding bar drive before FB CCTRL.
- WELD-ON = HIGH:
  Welding phase active

Function block library

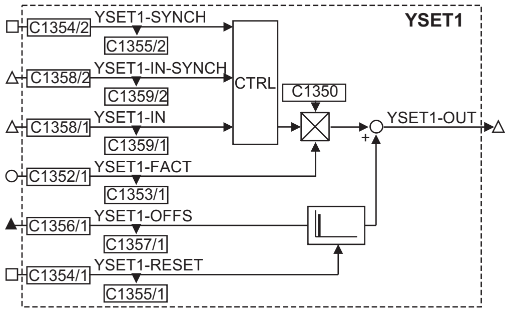


7.6.79 Stretching, compression, offset in Y direction (YSET)

One function block (YSET1) is available.

Purpose

Evaluation of the set position of the cam drive (stretching/compression/offset in Y direction).



Signal				Source		Note
Name	Type	DIS/selection	DIS format	CFG	List	
YSET1-IN	phd	1359/1	dec [inc]	1358/1	4	Input in [rpm]
YSET1-IN-SYNCH	phd	1359/2	dec [inc]	1358/2	4	Input in [rpm]
YSET1-FACT	a	1353/1	dec [abs]	1352/1	1	Stretching/compression factor: ± 100% = no stretching/compression > 100% = compression < 100% = stretching
YSET1-OFFS	ph	1357/1	dec [inc]	1356/1	3	Offset value
YSET1-RESET	d	1355/1	dec [inc]	1354/1	2	Reset of the -OFFS input
YSET1-SYNCH	d	1355/2	dec [inc]	1354/2	2	Clock pulse input for synchronous switching of the stretching/compression factor
YSET1-OUT	phd	13401	-	-	-	Set cam drive speed

Function

- Stretching / compression / offset in Y direction
- Direction reversal (direction of rotation of the cam drive)

7.6.79.1 Stretching/compression

YSET-FACT	Stretching/compression	Direction reversal
+100%	no	no
-100%	no	yes, in Y position
>100%	Stretching	no
<100%	Compression	no
FIXED100%	no	no

Synchronized stretching/compression of drive motion

Note!
This function is only valid for the cam drive, not for the master drive!

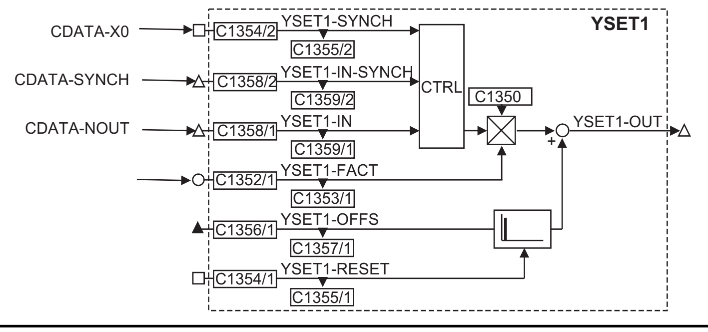
Synchronized stretching and compression is required for the following:

- If master value and cam drive must run absolutely synchronously.
- The factor must be changed during operation.

This function should be used if more than 8 profiles are required to change the cam drive travel.

The travel can be changed on-line via stretching and compression.

– Interconnection of function blocks



– Activate function

The function is only active if C1317 = 1.

The changeover is carried out during zero crossing of the profile.

Note!
Stretching/compression in X direction can be carried out via the input CDATA-XFACT.

7.6.79.2 Offset

It is possible to the X position by a constant value via input YSET-OFFS.

7.6.79.3 Direction reversal

There are two possibilities to inverse the direction of rotation:

1. Via code C1351/1.
2. Application of a stretching/compression factor
   YSET-FACT = –100% (see also table above).

7.7 Monitoring

Various monitoring functions protect the drive from impermissible operating conditions.

If a monitoring function is activated,

- the corresponding reaction is triggered. (📖Chapter "Reactions")
- a digital output is set, if it is assigned to the corresponding reaction.
- the indication is entered in position 1 in the history buffer. (📖 8-3)

7.7.1 Reactions

The controller reacts on four different operating faults:

- TRIP (highest priority)
- Message
- FAIL-QSP
- Warning
- Off=no reaction (lowest priority)

For some operating faults, you can determine the controller reactions
(📖 7-244, 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 ≤ 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 on 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 QSO ramp.
- The time for the QSP ramp is set via the dialog box "Basic settings".
- Factory setting of FAIL-QSP: (🕮 8-6)

7.7.2 Setting of reactions

1. Click "Parameter menu" in the "Basic settings" dialog box.
2. Select the menu "Dialog Diagnostics" by a double click.

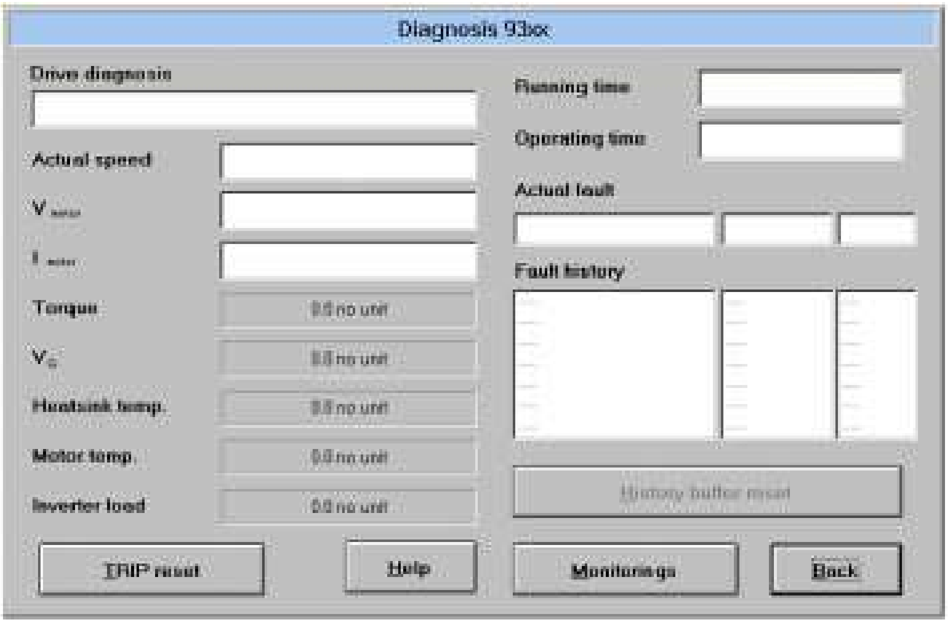


Fig. 7-191 Dialog box "Diagnostics 9300"

3. Click the button "Monitorings...".

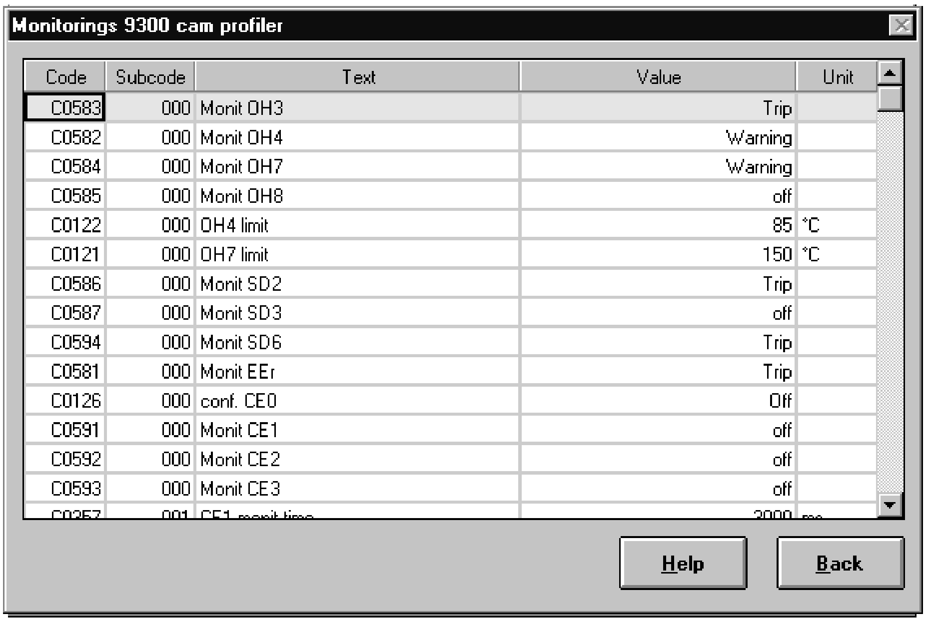


Fig. 7-192 Dialog box "Monitoring configuration 93xx"

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.

7.7.3 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	●	-	-	-	-	-

Configuration

Fault message		Possible reactions					
Display	Meaning	T	M	W	Q	off	Code
OH	Heatsink temperature 1 (max. permissible, fixed)	●	-	-	-	-	-
OH3	Motor temperature 1 (max. permissible, fixed)	●	-	-	-	✓	C0583
OH4	Heatsink 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	Actaul offset out of range	✓	-	-	●	-	C1291/2
P09	Impermissible programming	✓	-	-	●	-	C1291/3
P12	Encoder range exceeded	✓	-	-	●	-	C1288/1
P13	Phase overflow	●	-	✓	-	✓	C0590
P14	1. contouring error POS > C1218/1	✓	-	✓	●	✓	C1286/1
P15	2. 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 eliminated in time

Overcurrent diagram for fault message "OC5"

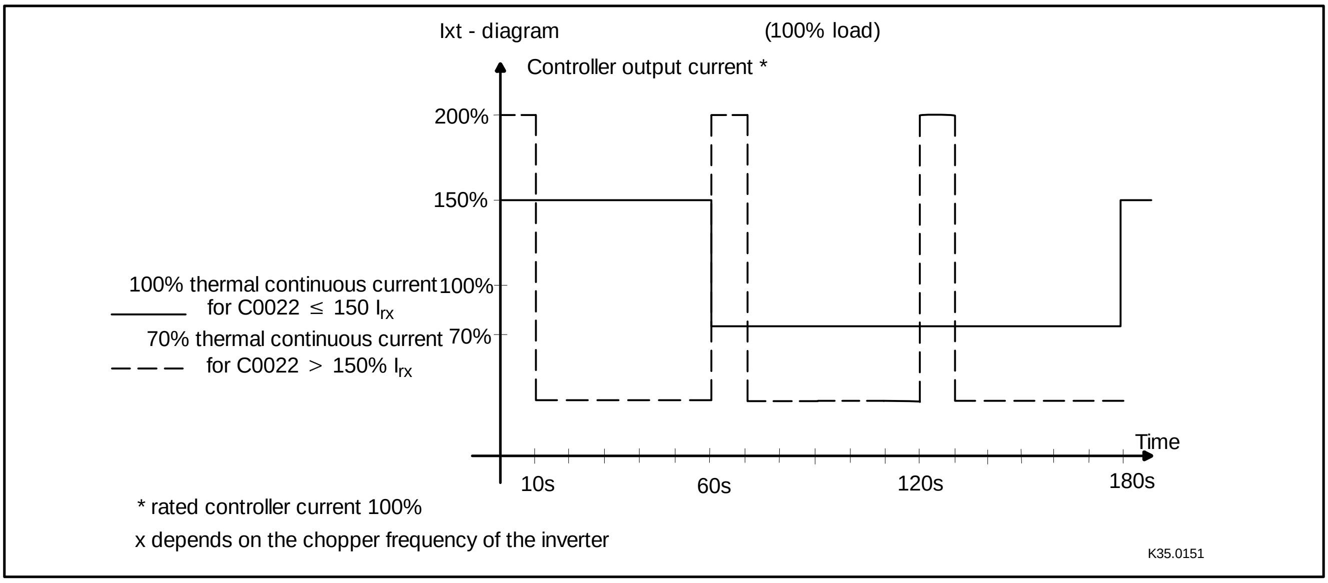


Fig. 7-193 Max. permissible overcurrent depending on the time

7.7.3.1 Undervoltage LU

Purpose

Monitores the DC-bus, protects the controller.

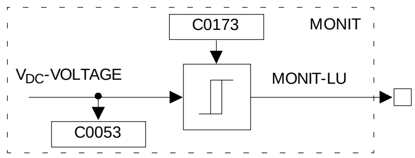


Fig. 7-194 Undervoltage LU

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)

7.7.3.2 Overvoltage OU

Purpose

Monitores the DC bus. Protects the controller.

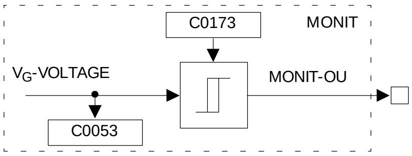


Fig. 7-195 Overvoltage OU

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.

7.7.3.3 Heatsink monitoring OH (fixed)

Purpose

Protects the controller.

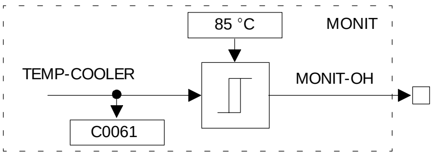


Fig. 7-196 Heat sink monitoring OH

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

7.7.3.4 Heatsink 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.

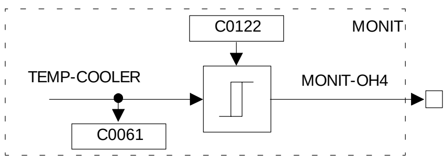


Fig. 7-197 Heatsink monitoring OH4 with adjustable threshold

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

7.7.3.5 Motor temperature monitoring OH8

Purpose

Motor protection

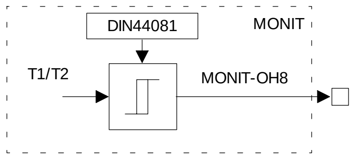


Fig. 7-198 Motor temperature monitoring OH8

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

7.7.3.6 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.

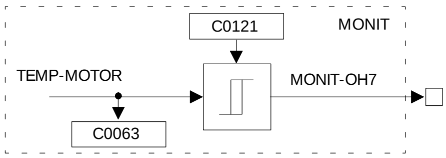


Fig. 7-199 Motor temperature monitoring OH7 with adjustable threshold

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

7.7.3.7 Motor temperature monitoring OH3 (fixed)

Purpose

Protects the motor from overheat

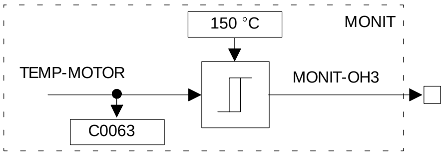
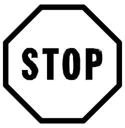


Fig. 7-200 Motor temperature monitoring OH3 with fixed threshold

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 inpputs 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

7.7.3.8 External fault EEr

Purpose

Monitores the process.

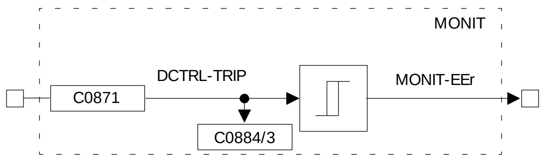


Fig. 7-201 External fault EEr

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

7.7.3.9 Earth fault monitoring OC2

Purpose

Protects the controller.

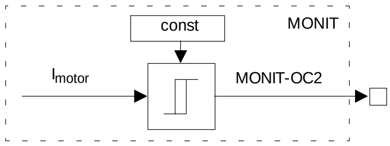


Fig. 7-202 Earth fault monitoring OC2

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

7.7.3.10 Monitoring for short-circuit OC1

Purpose

Protects the controller.

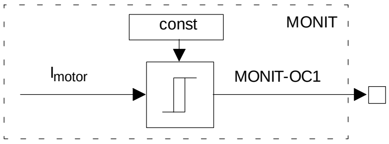


Fig. 7-203 Monitoring for short-circuit OC1

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)

7.7.3.11 Motor phase failure monitoring LP1

Purpose

Protects the motor.

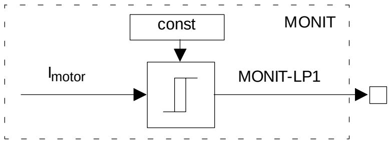


Fig. 7-204 Motor phase failure monitoring LP1

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)

7.7.3.12 Resolver monitoring for open circuit Sd2

Purpose

Protects the motor.

Monitors the resolver cables for open circuit.

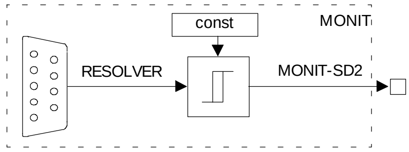


Fig. 7-205 Resolver monitoring for open circuit Sd2

	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).

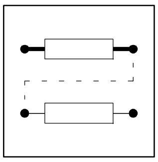
The monitoring will be automatically deactivated if another act. speed encoder is selected.

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



7.7.3.13 Dig-Set monitoring Sd3

Purpose

Monitors the process.

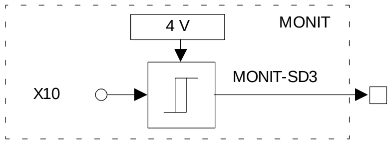


Fig. 7-206 Dig-Set monitoring Sd3

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

7.7.3.14 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)

7.7.3.15 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)

7.7.3.16 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)

7.7.3.17 Communication error CE0

Purpose

Process monitoring

Function

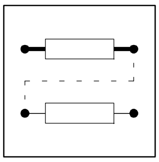
The communication between an automation interface X1 and a fieldbus module is interfered.

Remedy:

Plug in fieldbus module correctly and bolt.

Features:

- LECOM no.: 61
- Reaction: TRIP (cannot be modified)



7.7.3.18 Contouring error P03

Purpose

Process monitoring

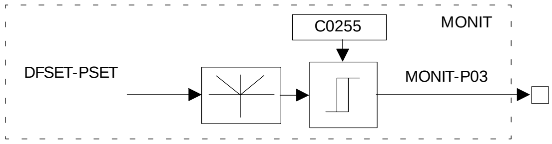


Fig. 7-207 Contouring error P03

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

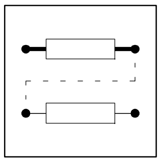
or

- 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 set-value 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



7.7.3.19 Phase controller overflow P13

Purpose

Process monitoring

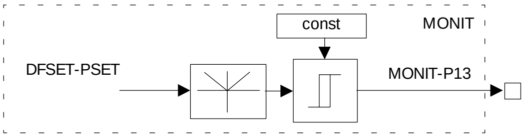


Fig. 7-208 Phase controller overflow P13

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

7.7.3.20 Power stage identification H07

Purpose

Controller protection

Function

This monitoring only acts on the control with history buffer. There is no additional binary output available.

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)

7.7.3.21 Fault after automatic adjustment H30

Purpose

Controller protection

Function

This monitoring only acts on the control with history buffer. There is no additional binary output available.

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)

7.7.3.22 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)

7.7.3.23 System speed monitoring N_{Max}

Purpose

Monitores the process.

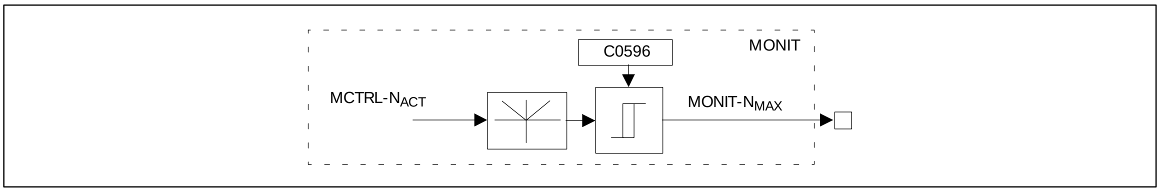


Fig. 7-209 System speed monitoring N_{Max}

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)

7.7.4 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).

7.8 Parameter setting

- 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 begin with "C" (see "Code table", (📖 7-289)).
- Save the parameter set for your application.
  – One parameter set is available.
  – The parameter sets are factory-set when delivered.

Ways of parameter setting

There are two ways of changing parameters:

- With a superimposed host (PC or PLC) via fieldbus modules and operating programs.
- With the keypad (for slight changes of the parameter set).

Stop!
Cam profile specific functions cannot be changed via the keypad!

Therefore, the following pages describe how to change parameters with the operating program Global Drive Control.

Except of the cam-specific functions, the controller can also be parameterized using the keypad. In the following you will find the corresponding description:

Structure of a parameter set

The 9371BB keypad and the PC programs Global Dirve Control and LEMOC2 have menu levels which help you to find the required 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 4 different parameter types:
  – Absolute values of a physical variable
    (e. g. 400 V, 10 s)
  – Relative values of unit variables
    (e. g. 50 % setpoint)
  – Numbers for certain states
    (e. g. 0 = controller inhibited, 1 = controller enabled)
  – Display values
    These values can only be displayed but not changed.
    (E. g. act. value of the motor current under C0054)

You can modify absolute and relative values in discrete steps.

Configuration

List of selection menus

9371BB keypad		Global Drive Control or LEMOC2	
Main menu	**Submenu**	**Main menu**	**Submenu**
USER menu		USER menu	
Code list		Code list	
Load / Store		Parameter-set management	
Diagnostics		Diagnostics	
	Actual info		Actual operation
	History		History
Short set-up		Short set-up	
	Speed mode		Speed operation
	Torque mode		Torque operation
	DF master		Digital frequency - master
	DF slave bus		Digital frequency - slave line
	DF slave cas		Digital frequency - slave cascade
	User menu CFG		Configuration user menu
Main FB		Main function blocks	
	NSET		NSET: Speed preprocessing
	NSET-JOG		NSET-JOG: JOG values
	NSET-RAMP1		NSET-RAMP1: Standard RFG
	MCTRL		MCTRL: Motor control
	DFSET		DFSET: Dig. 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		State bus
Controller		Controller setting	
	Speed		Speed
	Current		Current/torque
	Phase		Phase
Motor/feedb.		Motor/feedback system	
	Motor adj		Motor adjustment
	Feedback		Feedback systems
Monitoring		Monitorings	

9371BB keypad		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 Ouput 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
	Diagnostics		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 input 1 (term. 1/2
	AIN2		AIN2 Analog input 2 (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 negation
	ANEG2		ANEG2 Analog negation
	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

9371BB keypad		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
	CONV2		CONV2 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 Dig. frequency ramp functio generator
	DFSET		DFSET Dig. frequency processing
	DIGDEL1		DIGDEL1 Digital delay
	DIGDEL2		DIGDEL2 Dig. delay
	DIGIN		DIGIN Digital input E1 - E5
	DIGOUT		DIGOUT Digital output A1 - A4
	DT1		DT1 Differentiator element
	FCNT1		FCNT1 Piece 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 Gear compensation
	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 preprocessing
	NSET-JOG		NSET-JOG JOG values
	NSET-RAMP1		NSET-RAMP1 Standard RFG
	OR1		OR1 Logic OR
	OR2		OR2 Logic OR
	OR3		OR3 Logic OR
	OR4		OR4 Logic OR
	OR5		OR5 Logic OR

9371BB keypad		Global Drive Control or LEMOC2	
Main menu	**Submenu**	**Main menu**	**Submenu**
	PCTRL		PCTRL Process controller
	PHADD1		PHADD1 32 bit addition element
	PHCMP1		PHCMP1 Phase comparator
	PHCMP2		PHCMP2 Phase comparator
	PHCMP3		PHCMP3 Phase comparator
	PHDIFF1		PHDIFF1 32 bit setpoint/act. value comparison
	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 function generator
	SRFG1		SRFG1 S-shape ramp function generator
	STORE1		STORE1 Store phase, E5
	STORE2		STORE2 Store phase, E4
	SYNC1		SYNC1 Control program synchronization
	TRANS1		TRANS1 Transition evaluation
	TRANS2		TRANS2 Transition evaluation
	TRANS3		TRANS3 Transition evaluation
	TRANS4		TRANS4 Transition evaluation
FCODE		Free codes	
Identify		Identification	
	Drive		Controller
	Op keypad		LECOM

7.8.1 Parameter setting in GDC

7.8.1.1 Change parameters

The parameter setting is explained by means of the following example:

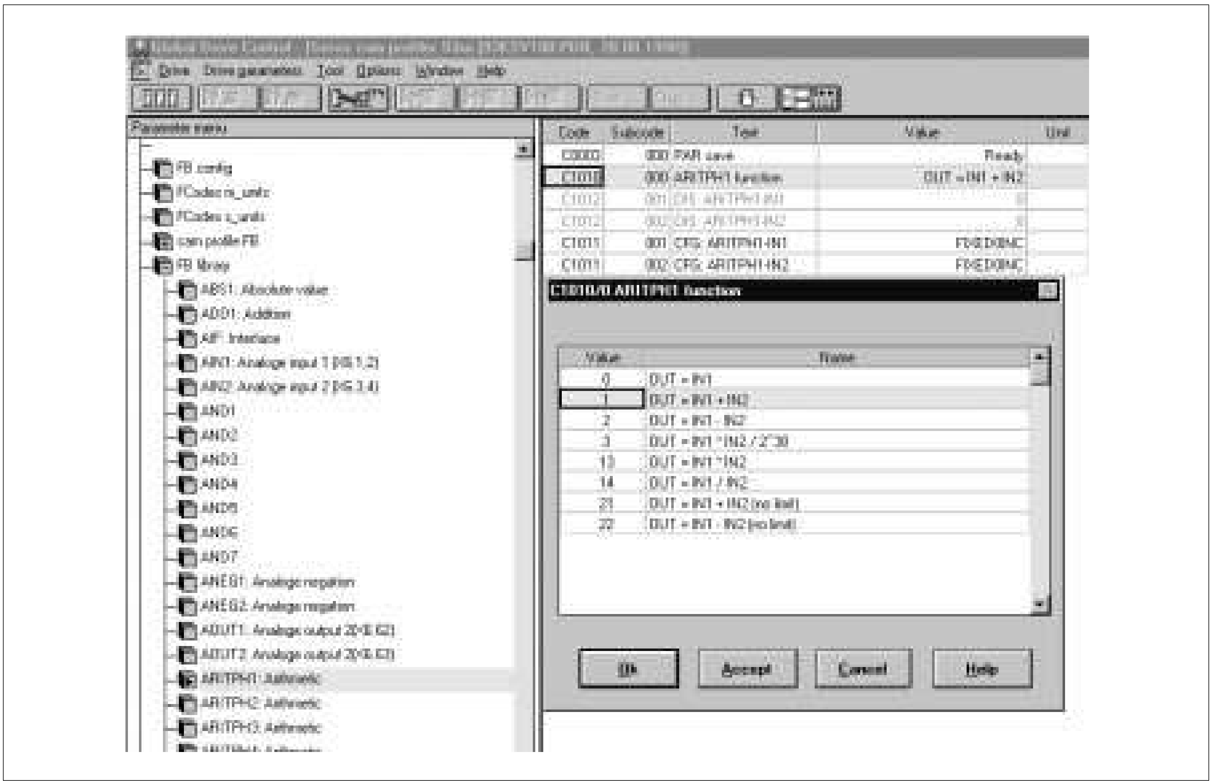


Fig. 7-210 Parameter setting for the FB “ARITPH1:Arithmetic operation with phase signals”

Step	Command	Function
	Initiate parameter menu	
	Open menu “Function blocks”.	Displays all FB menus.
3.	Example: Open menu “ARITPH1”.	Opens the parameter table for FB ARITPH1.
4.	Example: Click C1010 “ARITPH1 function”.	All available function are displayed. ● Select the function which is to be carried out by the FB. Confirm with “OK”.
5.	Click C0003 “Save parameter set”.	Saves the parameter set to avoid that all settings will be lost if the mains is switched off. All available parameter sets are displayed. ● Select ”PSet 1”. Confirm with “OK”.

Note!

Save the changed parameter set in a file on your harddisk of your PC or a diskette. You can use it for future applications or other controllers.

7.8.1.2 Parameter set transfer

Warning!

The controller is being new initialized because of the parameter set transfer from the PC to the controller: System configuration and terminal assignments can have changed!

- Ensure, that your wiring and drive configuration correspond to the settings of the parameter set.
- Only use terminal X5/28 or the STOP function of GDC as source for the controller inhibit.

A parameter set transfer is only possible when the controller is inhibited.

With the PC program Global Drive Control complete parameter sets can be transferred from one controller to another.

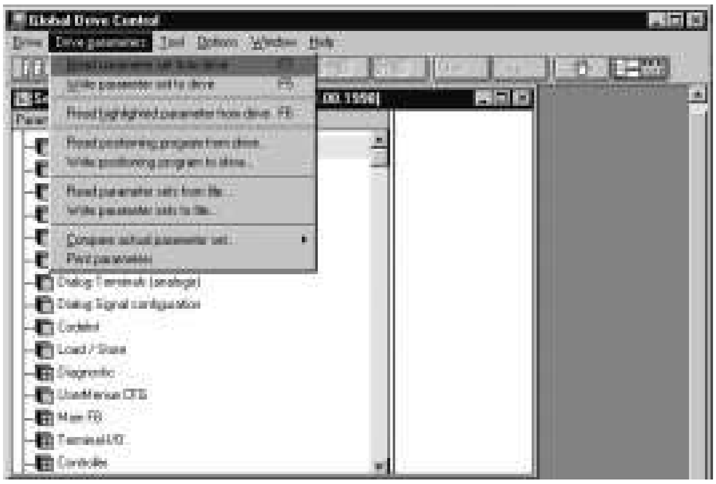


Fig. 7-211 Dialog box "Read parameter set from file"

Step	Command	Function
	At the PC of the first controller (source):	
	Select the entry "Read the actual parameter set from the controller" from the menu "Control parameters".	Loads the actual parameter set from the first controller in the PC. C0002 provides the following possibilities: ● Loading of factory setting (C0002=0) ● Loading of customer-specific parameter set (C0002=1)
	Select the entry "Write all parameter sets to file" from the menu "Control parameters".	Saves the parameter sets in a file on a hard disk or another data medium. ● Saves the parameter sets on a diskette.
3.		● Insert the diskette into the PC's drive of the second controller.
	At the PC of the second controller (target):	
4.	Select the entry "Read all parameter sets from file" from the menu "Control parameters".	Loads the parameter sets from a file on a hard disk or another data medium. ● Loads the parameter sets of the first controller from a diskette.
5.	Select the entry "Write actual parameter set to controller" from the menu "Control parameters".	Transfers the actual parameter set from the PC to the second controller. ● In the menu "Parameter set management" the data can be saved so that they are protected against mains failure with C0003=1.
6.		Check, whether the wiring and the drive configuration correspond to the settings of the new parameter set.
7.		Deactivate the controller inhibit (terminal X5/28=HIGH).

7.8.2 Parameter change using the keypad

7.8.2.1 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

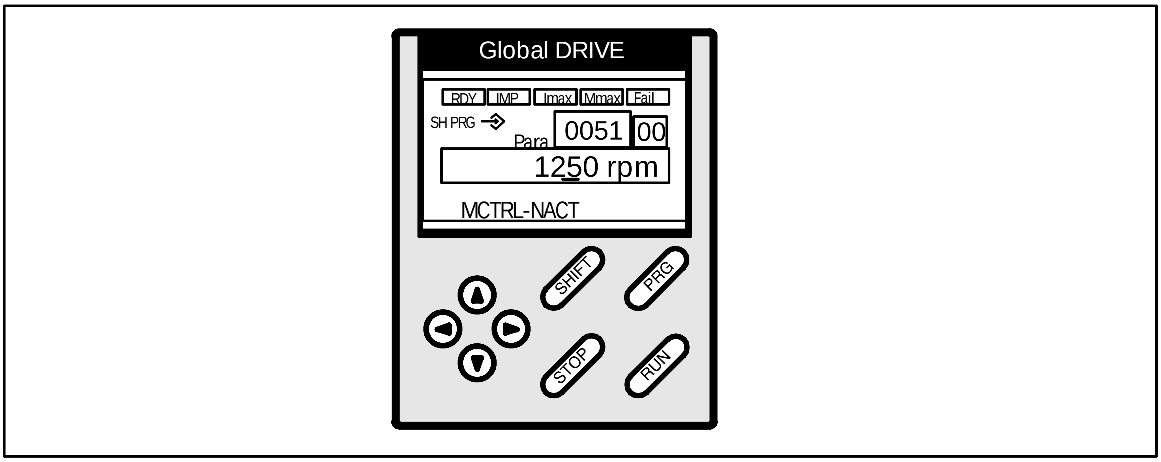


Fig. 7-212 The keypad

LCD

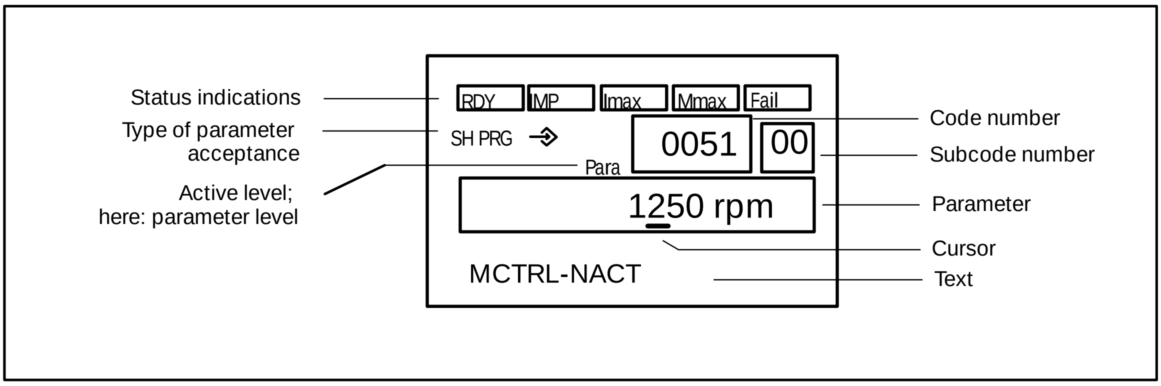


Fig. 7-213 LCD display on the keypad

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.

7.8.2.2 Change parameters

Note!

The changed parameter set must be saved if the changes are to remain valid after mains switch-off (see chapter 7.8.2.3).

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.

7.8.2.3 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).

7.8.2.4 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 termina 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 load 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 read 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.

7.8.2.5 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.

Configuration

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 7.8.2.3).

7.8.2.6 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]				Extended password protection for bus systems with activated password (C0094). • Full access to codes in the user menu.
1	AIF protect.	0	0 No password protection 1 Read protection 2 Write protection 3 Read/write protection	
2	CAN protect.	0		

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.

7.8.3 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.

Configuration

Show/Hide Bookmarks

EDS9300U--KD3.2
00407354

Lenze

Manual
Part D3.2

Code table

Global Drive
9300 cam profiler

This documentation is only valid for 9300 cam profilers as of version:

33.932X	EK	2x	1x		(9321 - 9329)
33.933X	EK	2x	1x		(9330 - 9332)
33.932X	CK	2x	1x	- V003	Cold Plate (9321 - 9328)

Type

Desgin:
Ex = Built-in unit IP20
Cx = Cold Plate
xK = Cam profiler
xP = Positioning controller
xR = Register controller
xS = Servo inverter

Hardware level and index

Software level and index

Variant

Explanation

Version 2.0 03/99

Contents

Part D 3.2

Contents

7.9 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
	🕮 7-289	Reference on page with further information on the code.

Code	LCD	Possible settings		Important
		Lenze	Selection	
ABS				
[C0661]	CFG: IN	1000	FIXED 0 % → Selection list 1	Analog input absolute value generator
C0662	DIS: C0661		-199.99 {0.01 %} 199.99	Display of C0661
ADD				
[C0610]		1000	FIXED0% → Selection list 1	Adds inputs IN1, IN2 and IN3
1	CFG: IN1			
2	CFG: IN2			
3	CFG:IN3			
C0611	DIS: C0610/1 ... 3		-199.99 {0.01 %} 199.99	
AIF				
C0136				
3	DIS: CTRLWORD			Control word in AIF-IN
C0151	DIS: FDO (DW)		Output signals configured with C0116	Hexadecimal signal assignment of the free digital outputs. ● Binary interpretation indicates the bit states
[C0850]		1000	FIXED 0 % → Selection list 1	Configuration process output words for automation interface AIF (X1)
1	CFG: OUT.W1			
2	CFG: OUT.W2			
3	CFG: OUT.W3			
[C0851]	CFG: OUT.D1	1000	FIXED 0INC → Selection list 3	Configuration 32-bit phase information
C0852	Type OUT.W2	0	0 Analog signal 1 Digital 0-15 2 Low phase 3 High phase	Configuration process output word 2 for automation interface AIF (X1)
C0853	Type OUT.W3	0	0 Analog signal 1 Digital 16-31 2 High phase	Configuration pocess output word 3 for automation interface AIF (X1)
C0854	Type OUT.W1	0	0 Analog signal 3 D2: Low phase	Configuration process output word 1 for automation interface AIF (X1)
C0855	DIS: IN (0-15) DIS: IN (16-31)		Bit 00 {1} Bit 15	Process input words hexadecimal for automation interface X1
C0856			-199.99 {0.01%} 199.99	Process input words decimal Display: 100% = 16384
1	DIS: IN.W1			
2	DIS: IN.W2			
3	DIS: IN.W3			

Code	LCD	Possible settings				Important
		Lenze	Selection			
C0857	DIS: IN.D1		-2147483648	{1}	2147483647	32-bit phase information
C0858			-199.99	{0.01 %}	199.99	Process output words Display: 100% = 16384
1	DIS: OUT.W1					
2	DIS: OUT.W2					
3	DIS: OUT.W3					
C0859	DIS: OUT.D1		-2147483648	{1}	2147483647	32-bit phase information
[C1195]	CFG: OUT.D2	1000	FIXED0INC		→ Selection list 3	Input phase signal AIF-OUT
C1196	DIS: OUT.D2		-2147483647	{1}	2147483647	Input signal of AIF-OUT
C1197	DIS: IN.D2					Input signal of AIF-IN
AIN						
C0034	Mst current	0	0 1 2	-10 V ... + 10 V +4 mA ... +20 mA -20 mA ... +20 mA		Selection: Master voltage/master current for setpoint input
C0400	DIS: OUT		-199.99	{0.01 %}	199.99	Output of AIN1
[C0402]	CFG: OFFSET	19502	FCODE-26/1		→ Selection list 1	Configuration offset of AIN1
[C0403]	CFG: GAIN	19504	FCODE-27/1		→ Selection list 1	Configuration gain of AIN1
C0404			-199.99	{0.01 %}	199.99	Input signals of AIN1
1	DIS: OFFSET					
2	DIS: GAIN					
C0405	DIS: OUT		-199.99	{1 %}	199.99	Output of AIN2
[C0407]	CFG: OFFSET	19503	FCODE-26/2		→ Selection list 1	Configuration offset of AIN2
[C0408]	CFG: GAIN	19505	FCODE-27/2		→ Selection list 1	Configuration gain of AIN2
C0409			-199.99	{0.01 %}	199.99	Input signals of AIN2
1	DIS: OFFSET					
2	DIS: GAIN					
AND						
[C0820]		1000	FIXED0		→ Selection list 2	Digital inputs AND1
1	CFG: IN1					
2	CFG: IN2					
3	CFG: IN3					
C0821	DIS: C082					Display of C0820
[C0822]		1000	FIXED0		→ Selection list 2	Digital inputs AND2
1	CFG: IN1					
2	CFG: IN2					
3	CFG: IN3					
C0823	DIS: C0822					Display of C0822
[C0824]		1000	FIXED0		→ Selection list 2	Digital inputs AND3
1	CFG: IN1					
2	CFG: IN2					
3	CFG: IN3					
C0825	DIS: C0824					Display of C0824
[C0826]		1000	FIXED0		→ Selection list 2	Digital inputs AND4
1	CFG: IN1					
2	CFG: IN2					
3	CFG: IN3					
C0827	DIS: C0826					Display of C0826
[C0828]		1000	FIXED0		→ Selection list 2	Digital inputs AND5
1	CFG: IN1					
2	CFG: IN2					
3	CFG: IN3					
C0829	DIS: C0828					Display of C0828
[C1175]		1000	FIXED0		→ Selection list 2	Digital inputs AND6
1	CFG: IN1					
2	CFG: IN2					
3	CFG: IN3					
C1176	DIS: C1175					Display of C1175

Code	LCD	Possible settings		Important
		Lenze	Selection	
[C1178]		1000	FIXED0 → Selection list 2	Digital inputs AND7
1	CFG: IN1			
2	CFG: IN2			
3	CFG: IN3			
C1179	DIS: C1178			Display of C1178
ANEG				
[C0700]	CFG: IN	19523	FCODE-472/3 → Selection list 1	Input ANEG1
C0701	DIS: C0700		-199.99 {0.01 %} 199.99	Display of C0700
[C0703]	CFG: IN	1000	FIXED 0 % → Selection list 1	Input ANEG2
C0704	DIS: C0703		-199.99 {0.01 %} 199.99	Display of C0703
AOUT				
[C0431]	CFG: IN	5001	MCTRL-NACT → Selection list 1	Input AOUT1
[C0432]	CFG: OFFSET	19512	FCODE-109/1 → Selection list 1	Offset AOUT1
[C0433]	CFG: GAIN	19510	FCODE-108/1 → Selection list 1	Gain AOUT1
C0434			-199.99 {0.01 %} 199.99	Display of C0431 ... C0433
1	DIS: C0431			
2	DIS: C0432			
3	DIS: C0433			
[C0436]	CFG: IN	5002	MCTRL-MSET2 → Selection list 1	Input AOUT2
[C0437]	CFG: OFFSET	19513	FCODE-109/2 → Selection list 1	Offset AOUT2
[C0438]	CFG: GAIN	19511	FCODE-108/2 → Selection list 1	Gain AOUT2
C0439			-199.99 {0.01 %} 199.99	Display of C0436 ... C0438
1	DIS: C0436			
2	DIS: C0437			
3	DIS: C0438			
ARIT				
C0338	ARIT1 funct	1	0 {1} 5	ARIT1 function 0 OUT = IN1 1 IN1 + IN2 2 IN1 - IN2 3 IN1 * IN2 4 IN1 / IN2 5 IN1/(100% - IN2)
[C0339]		1000	FIXED 0 % → Selection list 1	Configuration arithmetic blockARIT1
1	CFG: IN1			
2	CFG: IN2			
C0340	DIS: C0339			Display of C0339
C0600	ARIT2 funct	1	0 {1} 5	ARIT2 function 0 OUT = IN1 1 IN1 + IN2 2 IN1 - IN2 3 IN1 * IN2 4 IN1 / IN2 5 IN1/(100% - IN2)
[C0601]		1000	FIXED 0 % → Selection list 1	Analog inputs of ARIT2
1	CFG: IN			
2	CFG: IN			
C0602	DIS: C0602		-199.99 {0.01 %} 199.99	Display of C0601
ARITPH				
C1010	Function	1	0 / 1 / 2 / 3 / 13 / 14 / 21 / 22	Function of ARITPH1 0 OUT = IN1 1 IN1 + IN2 2 IN1 - IN2 3 IN1 * IN2 / 2^{30} 13 IN1 * IN2 14 IN1 / IN2 21 IN1 + IN2 (no limit) 22 IN1 - IN2 (no limit)
[C1011]		1000	FIXED0INC → Selection list 3	Inputs ARITPH1
1	CFG: IN			
2	CFG: IN			
C1012	DIS: C1011		-2147483647 {1} 2147483647	Display of C1011

Configuration

Code	LCD	Possible settings		Important
		Lenze	Selection	
C1020	ARITPH2 funct	1	0 / 1 / 2 / 3 / 13 / 14 / 21 / 22	ARITPH2 function 0 OUT = IN1 1 IN1 + IN2 2 IN1 - IN2 3 IN1 * IN2 / 2^{30} 13 IN1 * IN2 14 IN1 / IN2 21 IN1 + IN2 (no limit) 22 IN1 - IN2 (no limit)
[C1021] 1 2	 CFG: IN CFG: IN	1000	FIXED0INC → Selection list 3	Inputs ARITPH2
C1022	DIS: C1021		-2147483647 {1} 2147483647	Display of C1021
C1025	ARITPH3 funct	1	0 / 1 / 2 / 3 / 13 / 14 / 21 / 22	ARITPH3 function 0 OUT = IN1 1 IN1 + IN2 2 IN1 - IN2 3 IN1 * IN2 / 2^{30} 13 IN1 * IN2 14 IN1 / IN2 21 IN1 + IN2 (no limit) 22 IN1 - IN2 (no limit)
[C1026] 1 2	 CFG: IN CFG: IN	1000	FIXED0INC → Selection list 3	Inputs ARITPH3
C1027	DIS: C1026		-2147483647 {1} 2147483647	Display of C1026
C1550	ARITPH4 funct	1	0 / 1 / 2 / 3 / 13 / 14 / 21 / 22	ARITPH4 function 0 OUT = IN1 1 IN1 + IN2 2 IN1 - IN2 3 IN1 * IN2 / 2^{30} 13 IN1 * IN2 14 IN1 / IN2 21 IN1 + IN2 (no limit) 22 IN1 - IN2 (no limit)
[C1551] 1 2	 CFG: IN CFG: IN	1000	FIXED0INC → Selection list 3	Inputs ARITPH4
C1552	DIS: C1551		-2147483647 {1} 2147483647	Display of C1551
C1555	ARITPH5 funct	1	0 / 1 / 2 / 3 / 13 / 14 / 21 / 22	ARITPH5 function 0 OUT = IN1 1 IN1 + IN2 2 IN1 - IN2 3 IN1 * IN2 / 2^{30} 13 IN1 * IN2 14 IN1 / IN2 21 IN1 + IN2 (no limit) 22 IN1 - IN2 (no limit)
[C1556] 1 2	 CFG: IN CFG: IN	1000	FIXED0INC → Selection list 3	Inputs ARITPH5
C1557	DIS: C1556		-2147483647 {1} 2147483647	Display of C1556
C1560	ARITPH6 funct	1	0 / 1 / 2 / 3 / 13 / 14 / 21 / 22	ARITPH6 function 0 OUT = IN1 1 IN1 + IN2 2 IN1 - IN2 3 IN1 * IN2 / 2^{30} 13 IN1 * IN2 14 IN1 / IN2 21 IN1 + IN2 (no limit) 22 IN1 - IN2 (no limit)
[C1561] 1 2	 CFG: IN CFG: IN	1000	FIXED0INC → Selection list 3	Inputs ARITPH6

Code	LCD	Possible settings				Important
		Lenze	Selection			
C1562	DIS: C1561		-2147483647	{1}	2147483647	Display of C1561
ASW						
[C0810]					→ Selection list 1	Analog inputs ASW1
1	CFG: IN	55	AIN2-OUT			
2	CFG: IN	1000	FIXED0%			
[C0811]	CFG: SET	1000	FIXED0		→ Selection list 2	Digital input ASW1
C0812	DIS: C0810		-199.99	{0.01 %}	199.99	Display of C0810
C0813	DIS: C0811					Display of C0811
[C0815]			FIXED0%		→ Selection list 1	Analog input ASW2
1	CFG: IN	1000				
2	CFG: IN	1000				
[C0816]	CFG: SET	1000	FIXED0		→ Selection list 2	Digital input ASW2
C0817	DIS: C0817		-199.99	{0.01%}	199.99	Display of C0817
C0818	DIS: C0816					Display of C0816
[C1160]		1000	FIXED0%		→ Selection list 1	Analog inputs ASW3
1	CFG: IN					
2	CFG: IN					
[C1161]	CFG: SET	1000	FIXED0		→ Selection list 2	Digital input ASW3
C1162	DIS: C1160		-199.99	{0.01 %}	199.99	Display of C1160
C1163	DIS: C1161					Display of C1161
[C1165]		1000	FIXED0%		→ Selection list 1	Analog inputs ASW4
1	CFG: IN					
2	CFG: IN					
[C1166]	CFG: SET	1000	FIXED0		→ Selection list 2	Digital input ASW4
C1167	DIS: C1165		-199.99	{0.01 %}	199.99	Display of C1165
C1168	DIS: C1166					Display of C1166
BRK						
C0195	BRK1 T act	99.9	0.0	{0.1 s}	99.9	Brake-open time Engagement time of the mechanical holding brake • After the time elapsed under C0195, the status ”mechanical brake closed” is reached
C0196	BRK T release	0.0	0.0	{0.1 s}	60.0	Brake opening time Disengagement time of the mechanical holding brake (Technical data of brakes) • After the time has elapsed under C0196, the status ”mechancial brake open” is reached.
C0244	BRK M set	0.00	-100.00	{0.01 %}	100.00	Holding torque of the DC injection brake 100 % = value of C0057
[C0450]	CFG: NX	1000	FIXED 0 %		→ Selection list 1	Configuration analog input of BRK1
[C0451]	CFG: ON	1000	FIXED 0		→ Selection list 2	Digital input of BRK1
[C0452]	CFG: SIGN	1000	FIXED 0 %		→ Selection list 1	Configuration analog input of BRK1
C0458			-199.99	{0.01 %}	199.99	Display of
1	DIS: C0450					C0450
2	DIS: C0452					C0452
C0459	DIS: C0451					Display of C0451
CAN-IN						
C0136						
1	DIS: CTRLWORD					Control word in DCTRL
2	DIS: CTRLWORD					Control word in CAN-IN1
3	DIS: CTRLWORD					Control word in AIF-IN
C0863			0	1		Display parameter
1	DIS: IN3 dig0	0				DIS: IN1 (0-15)
2	DIS: IN2 dig16	0				DIS: CAN-IN1 (digital 1-16)
3	DIS: IN2 dig0	0				
4	DIS: IN3 dig16	0				
5	DIS:IN3 dig0	0				
6	DIS:IN3 dig16	0				

Configuration

Code	LCD	Possible settings		Important
		Lenze	Selection	
C0866			-32768.00 {0.01%} 32767.00	Display parameter DIS: CAN-IN1.W1 (analog)
1	DIS: IN1.W1	-31-,		
2	DIS: IN1.W2	-36-,		
3	DIS: IN1.W3	-51-		
4	DIS: IN2.W1			
5	DIS: IN2.W2			
6	DIS: IN2.W3			
7	DIS: IN2.W4			
8	DIS: IN3.W1			
9	DIS: IN3.W2			
10	DIS: IN3.W3			
11	DIS: IN3.W4			
C0867				Display parameter DIS: CAN-IN1.D1 (phase)
1	DIS: IN1.D1	0		
2	DIS: IN2.D1	0		
3	DIS: IN3.D1	0		
4	DIS: IN2.D2	0		
5	DIS: IN3.D2	0		
CAN-OUT				
C0151	DIS: FDO (DW)		Output signals configured with C0116	Hexadecimal signal assignment of the free digital outputs. • Binary interpretation indicates the bit states
C0353			0 {1} 1	Source for CAN bus IN/OUT addresses 0 C350 1 C354
1	CAN addr sel1	0		
2	CAN addr sel2	0		
3	CAN addr sel3	0		
C0354			1 {1} 513	CAN-Bus OUT node addresses 2
2	CAN OUT1 addr2	129		
4	CAN OUT2 addr2	258		
6	CAN OUT3 addr2	386		
C0355			0 {1} 2047	CAN bus identifier
2	CAN-OUT1 Id			
4	CAN-OUT2 Id			
6	CAN-OUT3 Id			
C0356			0 {1 ms} 65000	CAN bus time settings
2	CAN-OUT2 T	0		
3	CAN-OUT3 T	0		
[C0860]			→ Selection list 1	
1	CFG: OUT1.W1	5001		
2	CFG: OUT1.W2	1000		
3	CFG: OUT1.W3	1000		
4	CFG: OUT2.W1	1000		
5	CFG: OUT2.W2	1000		
6	CFG: OUT2.W3	1000		
7	CFG: OUT2.W4	1000		
8	CFG: OUT3.W1	1000		
9	CFG: OUT3.W2	1000		
10	CFG: OUT3.W3	1000		
11	CFG: OUT3.W4	1000		
[C0861]		1000	→ Selection list 3	
1	CFG: OUT1.D1			
2	CFG: OUT2.D1			
3	CFG: OUT3.D1			

Code	LCD	Possible settings		Important
		Lenze	Selection	
C0868			-199.99 {0.01%} 199.99	
1	DIS: OUT1.W1			
2	DIS: OUT1.W2			
3	DIS: OUT1.W3			
4	DIS: OUT2.W1			
5	DIS: OUT2.W2			
6	DIS: OUT2.W3			
7	DIS: OUT2.W4			
8	DIS: OUT3.W1			
9	DIS: OUT3.W2			
10	DIS: OUT3.W3			
11	DIS: OUT3.W4			
C0869		0	-2147483648/ {1} 2147483647	Display: CAN OUT1/OUT2.Dx (phase)
1	DIS: OUT1.D1			
2	DIS: OUT2.D1			
3	DIS: OUT3.D1			
CCTRL				
C0430			0.000 {0.001ms} 2.000	
4	TP4 delay	0.218		TP1 delay
C1340		1000	FIXED 0% → Selection list 1	1: Gain for speed setpoint precontrol 2: Gain for torque setpoint precontrol
1	CFG: NRED			
2	CFG: MRED			
C1341	DIS: C1340		-199.99 {0.01%} 199.99	Display of C1340
C1342		1000	FIXED 0 → Selection list 2	1: HIGH: Set phase = act. phase -> CCTRL-POUT = 0 2: External mark to set the position 3: HIGH = Input -NSET2 active 4: Selection:Input TPIN ↔ term. X5/E4 (TOUCH-PROBE initiator) 5: Acceptance for profile end
1	CFG: RESET			
2	CFG: TPIN			
3	CFG: N2-SET			
4	CFG: TPIN/E4			
5	CFG: SUB-Y-END			
C1343	DIS: C1342			Display of C1342
C1344		1000	FIXED0 INC → Selection list 3	Upper range value of the profile (only required for touch probe)
1	CFG: Y-END			
2	CFG: TP-POS			
C1345	DIS: C1344			Display of C1344
C1346		1000	FIXEDPHI-0 INC → Selection list 4	1:Input for main setpoint 2:Input for alternative setpoint (2nd setpoint)
1	CFG: IN			
2	CFG: NSET2			
C1347	DIS: C1346			Display of C1346
C1348			1 {1} 32767	
1		100		
2		1		
CDATA				
C1300		8	1/ ... /8	Display of number of profiles used
C1301 1 .. 8			0 ... 2048	Display of points in profile 1/ .. /8. Depends on the number of profiles selected.
C1303		1	1 {1} 65535	Gearbox factor
1				1 Master value numerator
2				2 Master value denominator
C1304		1.0000	0.0001 {0.0001 units/rev.} 214000.0000	Output feed constant - master value
C1305		1	1 {1} 65535	Gearbox factor
1				1: Act. value numerator
2				2: Act. value denominator
C1306		1.0000	0.0001 {0.0001 units/rev.} 214000.0000	Output feed constant - act. value
C1309		10	1 {1 inc.} $18 \cdot 10^8$	Window for zero crossing of the master value
C1311		0.0	0 {1} 7	Start profile for cyclic cam profile processing 0 = 1. profile, 1 = 2. profile, ... Input CDATA-CYCLE must be on 'H'. Is internally limited to a profile.

Configuration

Code	LCD	Possible settings		Important
		Lenze	Selection	
C1312		0.0	0 {1} 7	Reach of cam profile processing Another x profiles (starting with C1311) will be processed
C1314		0	0 CW rotation 1 CCW rotation	Direction of rotation - master value
C1315 1 .. 8	 DIS:			Clock pulse length of the master value Profile 1 .. 8
C1316 1 .. 8	 DIS:			Y upper range value of profile (1...8)
C1320 2 3	 CFG: XFACT CFG: SEL	 1006 1000	FIXED 0 % → Selection list 1	 2: Factor (stretch./compr.) +100% = no compression/stretching, > 100% = compression, < 100% = stretching 3: Profile selection, 0 = profile 0 (1. profile)
C1321 2 3	 DIS: XFACT DIS: SEL			
C1322 1 2 3 4 5 6 7 8	 CFG: CYCLE CFG: RESET CFG: REL-SEL CFG: XRESET CFG: X-TP CFG: HOLD CFG: LOAD CFG: X-TP/E5	1000	FIXED 0 → Selection list 2	Auto. cam profile processing 1. HIGH = Profiles (C1311 and C1312) are cyclically processed. 2. HIGH, if CDATA-CYCLE = LOW, the input CDATA-SEL is immediately evaluated; if CDATA-CYCLE = HIGH, the profile from C1311 will be processed. 3. HIGH, feed function active 4. HIGH, sets master value integrator to 0 5. HIGH, sets master value integrator to TP-POS, if input X-TP/E5 = LOW 6. HIGH, inhibits cam profile processing, input has priority 7. Transition LOW →H: activates profiles loaded later or new 8. Selection of TP initiator: LOW= Initiator at X-TP HIGH = Connect initiator to term. X5/E5
C1323	DIS:C1323			Display of C1323
C1324 2 3 4	 CFG: XIN CFG: XOFFS CFG: TP-POS	 1000 1000 19616	→ Selection list 3 FIXED0 INC FIXED0 INC FCODE 1476/16	 2: Input for the master value position if C1332 = 1 3: Input for offset in X direction (only if C1332 = 0) 4: TP position of the master value
C1325	DIS: C1324			Display of C1324
C1326	CFG: DFIN	1000	FIXEDPHI-0 → Selection list 3	Input for digital frequency if C1332 = 0
C1327	DIS: C1326			Display of C1326
C1332	Selection of master value	0	0 {1} 1	Selection of master value 0 = CDATA-DFIN (dig. frequency, internal master) 1 = CDATA-XIN (external selection of X position)
C1333	DIS: actual X position			Display of the actual X position
C1334	DIS: actual Y position			Display of the actual Y position
CERR				
C1380 1 2	 ERR ? WARN	10	10 {1 inc} 1800000000	 1: Hysteresis fault signal output-ERR 2: Hysteresis fault signal output-WARN
C1384	CFG: WFAC	1000	→ Selection list 1 FIXED0	Reduction factor for CERR1-WARN: +100% = no reduction < 100% = reduction > 100% = increase
C1385	DIS: C1384			Display of C1384

Code	LCD	Possible settings				Important
		Lenze	Selection			
C1386	CFG: DISABLE	1000	FIXED0%		→ Selection list 1	HIGH sets CERR1-WARN and CERR1-EER = 0
C1387	DIS: C1386					Display of C1386
C1388		1000	FIXED0INC		→ Selection list 4	
1	CFG: PHI-IN					1: Input
2	CFG: LIM					2: Threshold, absolute value is generated from input value
C1389	DIS: C1388					Display of C1388
CLUTCH						
C1410	Clutch mode	0	0	{1}	3	0 directly engaged 1 to open position 2 to target position 3 latch at set position
C1411	max. velocity	200.00	1	{0.0000 rpm}	16000.0000	
C1412		1.0	0.010	{0.010 s}	130.000	
1	Open time ramp					
2	Ramp profile generator					
3	Time delay overload					
C1413	Catch hysteresis	163	5	{1 inc}	$18 \cdot 10^8$	
C1414		1000	FIXED 0%		→ Selection list 1	
1	CFG: MLIM					1. 1: Threshold for monitoring “overload”
2	CFG: MACT					2. 2: Act. value for monitoring “overload”
C1415	DIS: C1414					Display of C1414
C1416		1000	FIXED 0		→ Selection list 2	
1	CFG: CLOSE					1. HIGH = engage clutch LOW = disengage clutch
2	CFG: OL-DET					2. HIGH = activate overload monitoring
C1417	DIS: C1416					Display of C1416
C1418		1000	FIXED0 INC		→ Selection list 3	
1	CFG: PHI-SET					1. Set drive position
2	CFG: PHI-ACT					2. Act. drive position
C1419	DIS: C1418					Display of C1418
CMP						
C0680	Function	6	1	{1}	6	Function comparator CMP1, compares inputs IN1 and IN2 1 IN1 = IN 2 2 IN 1 > IN2 3 IN 1 < IN2 4 |IN1| = |IN2| 5 |IN1| > |IN2| 6 |IN1| < |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]					→ Selection list 1	Configuration analog inputs of CMP1
1	CFG: IN	5001	MCTRL-NACT			
2	CFG: IN	19500	FCODE-17			
C0684	DIS: C0683		-199.99	{0.01 %}	199.99	Display of C0683
C0685	Function	00001	1	{1}	6	CMP2 Comparison function 1 IN1 = IN2 2 IN1 > IN2 3 IN1 < IN2 4 |IN1| = |IN2| 5 |IN1| > |IN2| 6 |IN1| < |IN2|
C0686	Hysteresis	1.00	0.00	{0.01 %}	100.00	CMP2 Hysteresis
C0687	Window	1.00	0.00	{0.01 %}	100.00	CMP2 window
[C0688]		1000	FIXED 0%		→ Selection list 1	Configuration analog inputs of CMP2
1	CFG: IN					
2	CFG: IN					
C0689	DIS: C0688		-199.99	{0.01 %}	199.99	Display of C0688

Configuration

Code	LCD	Possible settings				Important
		Lenze	Selection			
C0690	Function	1	1	{1}	6	Comparator CMP3, compares inputs IN1 and IN2 1 IN1 = IN 2 2 IN 1 > IN2 3 IN 1 < IN2 4 |IN1| = |IN2| 5 |IN1| > |IN2| 6 |IN1| < |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	FIXED 0%		→ Selection list 1	Configuration analog inputs of CMP3
C0694	DIS: C0693		-199.99	{0.01 %}	199.99	Display of C0693
CONV						
C0655	Numerator	1	-32767	{1}	32767	CONV5 Numerator
C0656	Denominator	1	1	{1}	32767	CONV5 Denominator
[C0657]	CFG: IN	1000	FIXED 0 %		→ Selection list 1	Configuration analog input of CONV5
C0658	DIS: C0657		-199.99	{0.01 %}	199.99	Display of C0657
C0940	Numerator	1	-32767	{1}	32767	CONV1 Numerator
C0941	Denomitator	1	1	{1}	32767	CONV1 Denominator
[C0942]	CFG: IN	1000	FIXED 0 %		→ Selection list 1	Configuration analog input CONV1
C0943	DIS: C0942		-199.99	{0.01 %}	199.99	Display of C0942
C0945	Numerator	1	-32767	{1}	32767	CONV2 Numerator
C0946	Denominator	1	1	{1}	32767	CONV2 Denominator
[C0947]	CFG: IN	1000	FIXED 0 %		→ Selection list 1	Configuration analog input CONV2
C0948	DIS: C0947		-199.99	{0.01 %}	199.99	Display of C0947
C0950	Numerator	1	-32767	{1}	32767	CONV3 Numerator
C0951	Denominator	1	1	{1}	32767	CONV3 Denominator
[C0952]	CFG: IN	1000	FIXEDPHI0		→ Selection list 4	Configuration analog input CONV3
C0953	DIS: C0952		-32767	{1 rpm}	32767	Display of C0952
C0955	Numerator	1	-32767	{1}	32767	CONV4 Numerator
C0956	Denominator	1	1	{1}	32767	CONV4 Denominator
[C0957]	CFG: IN	1000	FIXEDPHI0		→ Selection list 4	Configuration analog input CONV4
C0958	DIS: C0957		-32767	{1 rpm}	32767	Display of C0957
C1170	Numerator	1	-32767	{1}	32767	Numerator for CONV6
C1171	Denominator	1	1	{1}	32767	Denominator for CONV6
[C1172]	CFG: IN	1000	FIXED 0 %		→ Selection list 1	Configuration analog input of CONV6
C1173	DIS: C1172		-199.99	{0.01 %}	199.99	Display of C1172
CONVAD						
[C1580]	CFG: IN	1000	FIXED0%		→ Selection list 1	CONVAD1
C1581	DIS: C1580	0	-32768	{1}	32767	Display of C1580
[C1582]	CFG: IN	1000	FIXED0%		→ Selection list 1	CONVAD2
C1583	DIS: C1582	0	-32768	{1}	32767	Display of C1582
CONVPHA						
C1000	Division	1	0	{1}	31	Factor
[C1001]	CFG: IN	1000	FIXED0INC		→ Selection list 3	Configuration input of CONVPHA1
C1002	DIS: C1001		-2147483647	{1}	2147483647	Display of C1001
CONVPHD						
C1480	Encoder constant	512	10	{1}	32767	
C1486 1 2	 CFG: NOM CFG: DEN	 19521 19522	 FCODE-474/1 FCODE-474/2		→ Selection list 3	1. Stretching factor numerator, input limited to ±1000000 2. Stretching factor denominator, input limited to +1 to +200000000
C1487	DIS: C1486					Display of C1486
C1488	CFG: IN	1000	FIXEDPHI-0		→ Selection list 4	Input in rpm
C1489	DIS: C1488					Display of C1488
CONVPHPH						
[C1240] 1 2	 CFG: NUM CFG: DEN	1000	FIXED0%		→ Selection list 1	
[C1241]	CFG: ACT	1000	FIXED0		→ Selection list 2	
[C1242]	CFG: IN	1000	FIXED0INC		→ Selection list 3	

Code	LCD	Possible settings				Important
		Lenze	Selection			
C1245 1 2	 DIS: NUM DIS: DEN		-199.99	{0.01 %}	1999.99	
C1246	DIS: C1241					Display of C1241
C1247	DIS: C1242		-2147483647	{1}	2147483647	Display of C1242
CONVPHPHD						
C1450	CFG: IN	1000	FIXED0INC		→ Selection list 3	Phase input
C1451	DIS: C1450					Display of C1450
C1452	Numerator	1	-32767	{1}	32767	
C1453	Denominator	1	1	{1}	32767	
CONVPP						
[C1250]	CFG: IN	1000	FIXEDPHI-0		→ Selection list 4	
[C1251] 1 2	 CFG: NUM CFG: DEN	1000	FIXED0INC		→ Selection list 3	
C1253	DIS: C1250		-32767	{1 rpm }	32767	
C1254	DIS: C1251		-2147483647	{1}	2147483647	Display of C1251
CSEL						
C1420	Emergency off profile	0	0	{1}	7	
1424 1 2 3 4 5	 CFG: CAM*1 CFG: CAM*2 CFG: CAM*4 CFG: LOAD CFG: EVENT	1000	FIXED 0		→ Selection list 2	 1. Selection bit 0 2. Selection bit 1 3. Selection bit 2 4. Acceptance signal = LOW -> HIGH transition 5. Event profile
1425	DIS: C1424					Display of C1424
CURVE						
C0960	Function	1	1	{1}	3	Function 1 Characteristic 1 2 Characteristic 2 3 Characteristic 3
C0961	y0	0.00	0.00	{0.01 %}	199.99	
C0962	y1	50.00	0.00	{0.01 %}	199.99	
C0963	y2	75.00	0.00	{0.01 %}	199.99	
C0964	y100	100.00	0.00	{0.01 %}	199.99	
C0965	x1	50.00	0.01	{0.01 %}	100.00	
C0966	x2	75.00	0.01	{0.01 %}	100.00	
[C0967]	CFG: IN	1000	FIXED0%		→ Selection list 1	Characteristic CURVE1-IN
C0968	DIS: C0967		-199.99	{0.01 %}	199.99	Display of C0967
CURVEC						
C1310	Cam profile selection	0	0	{1}	7	
C1320	CFG: AIN	1000	FIXED0%		→ Selection list 1	
C1321	DIS: C1320					Display of C1320
C1322 9 10 11 12	 CFG: HOLD CFG: SEL-IN CFG: REL-SEL CFG: XRESET	1000	FIXED 0		→ Selection list 2	9: HIGH = Outputs AOUT and OUT are sto- red; DFOUT = 0 10: Selection input AIN ↔ IN LOW = AIN HIGH = IN
C1323	DIS: C1322					Display of C1322
C1324	CFG: IN	1000	FIXED0INC		→ Selection list 3	
C1325	DIS: C1324					Display of C1324
DB						
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	FIXED 0 %		→ Selection list 1	Configuration analog input of DB1
C0623	DIS: C0622		-199.99	{0.01 %}	199.99	Display of C0622
DCTRL						
C0040	Ctrl enable	1	0	{1}	1	Controller inhibit 0: “write”, controls the code 1: “read”, reads the controller status

Configuration

Code	LCD	Possible settings				Important
		Lenze	Selection			
C0042	DIS: QSP		0	{1}	1	Quick stop status 0 QSP inactive 1 QSP active
C0135	Control word	0	0	{1}	65535	Control word Controller control word for LECOM-A/B/LI or operating module.
C0136	DIS: C0135					Display of C0135
C0142	Start options	1	0	{1}	1	Start conditions are executed: • after mains connection • after message (t > 0.5s) • after trip 0 Start lock 1 Autostart
[C0870]		1000	FIXED0		→ Selection list 2	Digital inputs (inhibit controller)
1	CFG: CINH1					
2	CFG: CINH2					
[C0871]	CFG: TRIP-SET	54	DIGIN 4		→ Selection list 2	Digital input (TRIP set) of DCTRL
[C0876]	CFG: TRIP-RES	55	DIGIN 5		→ Selection list 2	Digital input (TRIP reset) of DCTRL
C0878						Display of
1	DIS: C0870/1					C0870 /1 /2
2	DIS: C0870/2					C0871
3	DIS: C0871					C0876
4	DIS: C0876					
C0879		0	0	{1}	1	Reset control words
1	Reset C135					0 no reset
2	Reset AIF					1 reset
3	Reset CAN					
DFIN						
C0425	DFIN const	3	0	{1}	6	DF input; increment of the digital frequency input 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
C0426	DIS: OUT		-32767	{1 rpm}	32767	Output signal of DFIN
C0427	DFIN function	0	0	{1}	2	Type of the digital frequency signal 0 2 phases 1 A pulse / B dir 2 Pulse A or B
C0429	TP5 delay	0	-32767	{1 inc}	32767	TP5 delay
C0430		0.218	0.000	{0.001ms}	2.000	TPx delay
1	TP1 delay					
2	TP2 delay					
3	TP3 delay					
4	TP4 delay					
DFOUT						
C0030	DFOUT const	3	0	{1 inc/rev}	6	Constant for the digital frequency output in increments per revolution 0 256 1 512 2 1024 3 2048 4 4096 5 8192 6 16384
C0430			0.000	{0.001ms}	2.000	TPx delay
1	TP1 delay	0.218				
2	TP2 delay	0.218				
3	TP3 delay	0.218				
4	TP4 delay	0.218				

Code	LCD	Possible settings				Important
		Lenze	Selection			
[C0540]	Function	1	0	{1}	5	Function of the encoder outputs 0 Analog input 1 PH diff input 2 RES+int 0 3 RES+ext 0 4 X10 = X9 5 X10 = X8
[C0541]	CFG: AN-IN	5001	MCTRL-NACT		→ Selection list 1	Of the analog input of DFOUT
[C0542]	CFG: DF-IN	1000	FIXEDPHI 0		→ Selection list 4	Configuration of the dig. frequency input
[C0544]	CFG: SYN-RDY	1000	FIXED 0		→ Selection list 2	Synchronisation signal for the zero pulse
C0545	Phase offset	0	0	{1 inc}	65535	
C0547	DIS: C0541		-199.99	{0.01 %}	199.99	Display of C0541
C0548	DIS: C0544		0		1	Display of C0544
C0549	DIS: C0542		-32767	{1 rpm}	32767	Display of C0542
C1799	DFOUT f_{max} (kHz)	1250	20	{1}	1250	
DFRFG						
C0430 5	 TP5 delay	0.218	0.000	{0.001ms}	2.000	TP5 delay
C0750	Vp denom	16	1 / 2 / 4 / 8 / 16 / 32 / 64 / 128 / 256 / 512 / 1024 / 2048 / 4096 / 8192 / 16384			Vp denominator position (denominator of the position controller gain) 1 Vp = 1 2 Vp = 1/2 4 Vp = 1/4 8 Vp = 1/8 16 Vp = 1/16 32 Vp = 1/32 64 Vp = 1/64 128 Vp = 1/128 256 Vp = 1/256 512 Vp = 1/512 1024 Vp = 1/1024 2048 Vp = 1/2048 4096 Vp = 1/4096 8192 Vp = 1/8192 16384 Vp = 1/16384
C0751	DFRFG1 Tir	1.000	0.000	{0.001s}	999.900	DFRFG1 Tir (acceleration time)
C0752	Max speed	3000	1	{1 rpm}	16000	max. speed; here: max. make-up speed
C0753	DFRFG1 QSP	0.000	0.000	{0.001s}	999.900	QSP-Tif, deceleration time when deceleration ramp is activated
C0754	PH error	$2 \cdot 10^9$	10	{1}	$2 \cdot 10^9$	DFRFG1 contouring error
C0755	Syn window	100	0	{1 inc}	65535	Synchronization window
C0756	Offset	0	$-1 \cdot 10^9$	{1 inc}	$/1 \cdot 10^9$	Offset
C0757	Function	0	0/1			0 No TP start 1 With TP start
[C0758]	CFG: IN	1000	FIXEDPHI-0		→ Selection list 4	Configuration phase input
[C0759]	CFG: QSP	1000	FIXED0		→ Selection list 2	Digital input (control QSP)
[C0760]	CFG: STOP	1000	FIXED0		→ Selection list 2	Digital input (ramp function generator stop)
[C0761]	CFG: RESET	1000	FIXED0		→ Selection list 2	Digital input (reset integrators)
C0764 1 2 3	 DIS: C0759 DIS: C0760 DIS: C0761					Display of C0759 C0760 C0761
C0765	DIS: C0758		-32767	{1 rpm}	32767	Display of C0758
C0766	Direction of rotation	1	1	{1}	3	1 Direction of rotation CW/CCW 2 CW rotation 3 CCW rotation
DFSET						
C0033	Gearbox denom	1	1	{1}	32767	Gearbox factor (denominator) for DFSET
C0252	phase offset	0	-245760000	{1 inc}	245760000	Phase offset for DFSET Fixed phase offset for digital frequency configuration • 1 rev. = 65536 inc

Configuration

Code	LCD	Possible settings				Important
		Lenze	Selection			
C0253	phase n-trim	*	-32767	{1 inc}	32767	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
C0255	Threshold P03	327680	10	{1 inc}	1800000000	Contouring error limit for fault P03 • 1 rev. = 65536 inc • Contouring error > C0255 sets trip "P03"
C0430			0.000	{0.001 ms}	2.000	TP1 delay
1	TP1 delay	0.218				
2	TP2 delay	0.218				
3	TP3 delay	0.218				
4	TP4 delay	0.218				
[C0520]	CFG: IN	1000	FIXEDPHI-0		→ Selection list 4	Configuration input
[C0521]	CFG: VP-DIV	1000	FIXED 0 %		→ Selection list 1	Configuration gain factor numerator
[C0522]	CFG: RAT-DIV	1000	FIXED 0 %		→ Selection list 1	Configuration gear factor numerator
[C0523]	CFG: A-TRIM	1000	FIXED 0 %		→ Selection list 1	Configuration phase trimming
[C0524]	CFG: N-TRIM	1000	FIXED 0 %		→ Selection list 1	Speed trimming of DFSET
[C0525]	CFG: 0-PULSE	1000	FIXED 0		→ Selection list 2	Configuration one-time zero pulse activation
[C0526]	CFG: RESET	1000	FIXED0		→ Selection list 2	CFG: DFSET-RESET Reset integrators
[C0527]	CFG: SET	1000	FIXED 0		→ Selection list 2	Configuration - set integrators
C0528		0	$-2 \cdot 10^9$	{1}	$2 \cdot 10^9$	Display parameter Zero pulse phase difference
1	DIS: 0-pulse A					
2	DIS: Offset					
C0529	Multip offset	1	-20000	{1}	20000	Offset multiplier
C0530	DF evaluation	0	0	{1}	1	Evaluation of the digital frequency 0 with factor 1 no factor
C0531	Act 0 div	1	1	{1}	16384	Actual zero pulse divider
C0532	0-pulse/TP	1	1	{1}	2	Selection of zero pulse or touch probe 1 0-pulse 2 Touch probe
C0533	Vp denom	1	1	{1}	32767	Gain factor denominator
C0534	0 pulse fct	0	0	{1}	13	DFSET zero pulse function 0 Inactive 1 Continuous 2 Cont. switch 10 Once,fast way 11 Once, CW 12 Once, CCW 13 Once,2*0-pulse
C0535	Set 0 div	1	1	{1}	16384	DFSET set zero pulse divider
C0536			-32767	{1}	32767	Absolute analog input signals
1	DIS: VP-DIV					
2	DIS: RAT-DIV					
3	DIS: A-TRIM					
C0537	DIS: N-TRIM		-199.99	{0.01 %}	199.99	Relative analog input signal
C0538						digital input signals
1	DIS: 0-PULSE					
2	DIS: RESET					
3	DIS: SET					
C0539	DIS: IN		-32767	{1 rpm}	32767	Input signal
C0546	Min inc/rev	1000	-245760000	{1inc}	245760000	Min. incr. per rev.
C1255	CFG: N-TRIM2	1000			→ Selection list 4	CFG: DFSET-N-TRIM2
C1258	DIS: C1255	0	-32767	{1 rpm}	32767	Display of C1255
DIGDEL						
C0720	Function	2	0	{1}	2	Selection of the function 0 On delay 1 Off delay 2 On/Off delay

Code	LCD	Possible settings				Important
		Lenze	Selection			
C0721	Delay T	1.000	0.001	{0.001 s}	60.000	Delay time DIGDEL1
[C0723]	CFG: IN	1000	FIXED 0		→ Selection list 2	Digital input of DIGDEL1
C0724	DIS: C0723					Display of C0723
C0725	Function	2	0	{1}	2	Selection of the function 0 ON delay 1 OFF delay 2 ON/OFF delay
C0726	Delay T	1.000	0.001	{0.001 s}	60.000	Delay time DIGDEL2
[C0728]	CFG: IN	1000	FIXED0		→ Selection list 2	Digital input
C0729	DIS: C0728					Display of C0728
DIGIN						
C0114 1 2 3 4 5	 DIGIN pol DIGIN pol DIGIN pol DIGIN pol DIGIN pol	 0 0 0 1 0	0	{1}	1	Terminal polarity 0:HIGH active; 1: LOW active 1 X5/E1 2 X5/E2 3 X5/E3 4 X5/E4 5 X5/E5
C0443	DIS: DIGIN-OUT		0	{1}	255	Signals at X5/E1 to X5/E5, decimal value • Binary interpretation indicates terminal signals
DIGOUT						
[C0117] 1 2 3 4	 CFG: DIGOUT1 CFG: DIGOUT2 CFG: DIGOUT3 CFG: DIGOUT4	* 15000 10650 500 5003	 DCTRL-TRIP CMP1-OUT DCTRL-RDY MCTRL-MMAX		→ Selection list 2	Signal configuration DIGOUT → depending on C0005 1 X5/A1 2 X5/A2 3 X5/A3 4 X5/A4
C0118 1 2 3 4	 DIGOUT pol DIGOUT pol DIGOUT pol DIGOUT pol	 1 1 0 0	0	{1}	1	Terminal polarity DIGOUT 0 High active 1 Low active 1: X5/A1, 2: X5/A2, 3: X5/A3, 4: X5/A4
C0444	DIS: C0118		0		1	Display of C0118
DT						
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	FIXED 0 %		→ Selection list 1	Configuration analog input of DT1-1
C0653	Sensibility	1	1	{1}	7	Input sensitivity of DT1-1 1 15-bit 2 14-bit 3 13-bit 4 12-bit 5 11-bit 6 10-bit 7 9-bit
C0654	DIS: IN		-199.99	{0.01 %}	199.99	Analog input signal of DT1-1
FCNT						
C1100	Function	1	1	{1}	2	1 Return 2 Hold
[C1101] 1 2	 CFG: LD-VAL CFG: CMP-VAL	1000	FIXED0%		→ Selection list 1	Configuration analog inputs
[C1102] 1 2 3	 CFG: CLKUP CFG: CLKDWN CFG: LOAD	1000	FIXED0		→ Selection list 2	Digital inputs
C1103	DIS: C1101		-32768	{1}	32768	Display of C1101
C1104	DIS: C1102					Display of C1102
FDO						

Configuration

Code	LCD	Possible settings				Important
		Lenze	Selection			
[C0116] 1 ... 32	 CFG: FDO ... CFG: FDO	1000	FIXED 0		→ Selection list 2	Signal configuration FDO FDO0 ... FDO31 Free digital outputs can only be evaluated when networ-ked with automation interfaces.
C0151	DIS: FDO (DW)	Bit00	Bit00	{01}	Bit 31	Display (hex.) of free digital outputs • Binary interpretation indicates the bit states
FEVAN						
C1090	Output signal		-2147483648	{1}	2147483647	Output signal of FEVAN1
C1091	Code	141	2	{1}	2000	FEVAN1 Code
C1092	Subcode	0	0	{1}	255	FEVAN1 Subcode
C1093	Numerator	1.0000	0.0001	{0.0001}	100000.0000	FEVAN1 numerator
C1094	Denominator	0.0001	0.0001	{0.0001}	100000.0000	FEVAN1 denominator
C1095	Offset	0	0	{1}	1000000000	FEVAN1 Offset
[C1096]	CFG: IN	1000	FIXED0%		→ Selection list 1	Configuration analog input of FEVAN1
[C1097]	CFG: LOAD	1000	FIXED0		→ Selection list 2	Digital inputs of FEVAN1
C1098	DIS: C1096		-32768	{1}	32767	Display of C1096
C1099	DIS: C1097					Display of C1097
C1500	Output signal		-2147483648	{1}	2147483647	Output signal of FEVAN2
C1501	Code	141	2	{1}	2000	Target code of FEVAN2
C1502	Subcode	0	0	{1}	255	Target subcode FEVAN2
C1503	Numerator	1.0000	0.0001	{0.0001}	100000.0000	Numerator of FEVAN2
C1504	Denominator	0.0001	0.0001	{0.0001}	100000.0000	FEVAN2 denominator
C1505	Offset	0	0	{1}	1000000000	Offset of FEVAN2
[C1506]	CFG: IN	1000	FIXED0%		→Selection list 1	Configuration analog input of FEVAN2
[C1507]	CFG: LOAD	1000	FIXED0		→ Selection list 2	Digital inputs of FEVAN2
C1508	DIS: C1506		-32768	{1}	32767	Display of C1506
C1509	DIS: C1507					Display of C1507
FIXSET						
C0560 1 2 3 4 5 .. 15	Fixed setpoints	 100 75 50 25 0 .. 0	-199.99	{0.01 %}	199.99	
[C0561]	CFG: AIN	1000	FIXED 0 %		→ Selection list 1	Configuration analog input of FIXSET1
[C0562] 1 2 3 4	 CFG: IN CFG: IN CFG: IN CFG: IN	1000	FIXED 0		→ Selection list 2	Configuration of digital inputs
C0563	DIS: C0561		-199.99	{0.01 %}	199.99	Display of C0561
C0564	DIS: C0562					Display of C0562
FLIP						
[C0770]	CFG: D	1000	FIXED0		→ Selection list 2	Data input of FLIP1
[C0771]	CFG: CLK	1000	FIXED0		→ Selection list 2	Configuration clock input of FLIP1
[C0772]	CFG: CLR	1000	FIXED0		→ Selection list 2	Configuration reset input of FLIP1
C0773 1 2 3	 DIS: C0770 DIS: C0771 DIS: C0772					Display of C0770 C0771 C0772
[C0775]	CFG: D	1000	FIXED0		→ Selection list 2	Data input of FLIP2
[C0776]	CFG: CLK	1000	FIXED0		→ Selection list 2	Configuration clock input of FLIP2
[C0777]	CFG: CLR	1000	FIXED0		→ Selection list 2	Configuration reset input of FLIP2
C0778 1 2 3	 DIS: C0775 DIS: C0776 DIS: C0777					Display of C0775 C0776 C0777
GEARCMP						
C1260	Offset	0	-16383	{1}	16383	Offset

Code	LCD	Possible settings				Important
		Lenze	Selection			
C1261	Num	1	-32767	{1}	32767	Numerator
C1262	Denom	1	1	{1}	32767	Denominator
[C1265]	CFG: TORQUE	1000	FIXED0%		→ Selection list 1	Configuration correction input
[C1266]	CFG: Phi In	1000	FIXED0INC		→ Selection list 3	Configuration input
C1268	DIS: C1265		-199.99	{0.01 %}	199.99	Display of C1265
C1269	DIS: C1266		-2147483647	{1}	2147483647	Display of C1266
LIM						
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	FIXED 0 %		→ Selection list 1	Configuration analog input of LIM1
C0633	DIS: C0632		-199.99	{0.01 %}	199.99	Display of C0632
MCTRL						
[C0006]	Ctrl. mode	*				Operating mode of the motor control → depends on C0086 • Change of C0086 resets value to the assigned default setting • Change of C0006 sets C0086 = 0!
C0011	Nmax	3000	500	{1 rpm}	16000	Maximum speed Reference value for the absolute and relative setpoint selection for the acceleration and deceleration times. • Parameter setting via interface: Large changes in one step should only be made when the controller is inhibited.
C0018	fchop	1	0	{1}	2	Chopping frequency Optimum noise reduction with automatic change-over to 8 kHz 0 16/8 kHz 1 8 kHz sine 2 16 kHz sine
C0022	Imax current	*	0	{0.01 A}	1.50 I_r	I_{max}-limit → depends on C0086 • Change of C0086 resets value to the assigned factory setting (1.5*Imotor)
[C0025]	Feedback type	10	0 / 1 / 10 / 110 ... 113 / 210 ... 213 / 310 / 410			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 Sin/cos encoder → 310 AS-512-8V Multi turn Sin/cos encoder with RS485 interface Type Stegmann → 410 AM-512-8V Single turn Sin/cos encoder with RS485 interface Type Stegmann
C0050	MCTRL-NSET2		-100.00	{0.01 %}	100.00	n_{set} at the speed controller input
C0051	MCTRL-NACT		-30000	{1 rpm}	30000	Actual speed

Configuration

Code	LCD	Possible settings				Important
		Lenze	Selection			
C0052	MCTRL-Umot		0	{1 V}	800	Actual motor voltage
C0053	UG-VOLTAGE		0	{1 V}	900	DC-bus voltage
C0054	IMot		0.0	{0.1 A}	300.0	Actual motor current
C0056	MCTRL-MSET2		-150.00	{0.01 %}	150.00	Torque setpoint (output of the speed controller)
C0057	Max Torque		0	{1 Nm}	400	Maximum possible torque of the drive configuration • depends on C0022, C0086
C0070	Vp speed-CTRL	*	0.0	{0.5}	255.0	V_{pn} speed controller → depends on C0086 • Change of C0086 resets value to the assigned default setting
C0071	Tn speed-CTRL	*	1.0	{0.5 ms}	600.0	T_{nn} speed controller >512 ms switched off → depends 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	0.35	0.00	{0.01}	15.99	V_{pi} current controller
C0076	Tn curr-CTRL	1.8	0.5	{0.1 ms}	1999.0	T_{ni} current controller 2000 ms switched off
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	T_{nF} field controller 8000 ms switched off
[C0081]	Mot power	*	0.01	{0.01 kW}	150.00	Rated motor power according to nameplate → depends on C0086 • Change of C0086 resets value to the assigned default setting • Change of C0081 sets C0086 = 0
[C0084]	Mot Rs	*	0.00	{0.01 Ω}	100.00	Stator resistance of the motor → depends on C0086 • Change of C0086 resets value to the assigned default setting
[C0085]	Mot Ls	*	0.00	{0.01}	200.00	Motor leakage inductance → depends on C0086 • Change of C0086 resets value to the assigned default setting
[C0086]	Mot type	*				Selection motor type → depends 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
			New generation of Lenze asynchronous servo motors integrated temperature monitoring via resolver or encoder cable • The temperature monitoring via resolver or encoder cable is automatically activated, i.e.: C0583 = 0 C0584 = 2 C0594 = 0			

Code	LCD	Possible settings			Important
		Lenze	Selection		
			10	DSKA56-140	MDSKAXX056-22, f_r: 140Hz
			11	DFKA71-120	MDFKAXX071-22, f_r: 120Hz
			12	DSKA71-140	MDSKAXX071-22, f_r: 140Hz
			13	DFKA80-60	MDFKAXX080-22, f_r: 60Hz
			14	DSKA80-70	MDSKAXX080-22, f_r: 70Hz
			15	DFKA80-120	MDFKAXX080-22, f_r: 120Hz
			16	DSKA80-140	MDSKAXX080-22, f_r: 140Hz
			17	DFKA90-60	MDFKAXX090-22, f_r: 60Hz
			18	DSKA90-80	MDSKAXX090-22, f_r: 80Hz
			19	DFKA90-120	MDFKAXX090-22, f_r: 120Hz
			20	DSKA90-140	MDSKAXX090-22, f_r: 140Hz
			21	DFKA100-60	MDFKAXX100-22, f_r: 60Hz
			22	DSKA100-80	MDSKAXX100-22, f_r: 80Hz
			23	DFKA100-120	MDFKAXX100-22, f_r: 120Hz
			24	DSKA100-140	MDSKAXX100-22, f_r: 140Hz
			25	DFKA112-60	MDFKAXX112-22, f_r: 60Hz
			26	DSKA112-85	MDSKAXX112-22, f_r: 85Hz
			27	DFKA112-120	MDFKAXX112-22, f_r: 120Hz
			28	DSKA112-140	MDSKAXX112-22, f_r: 140Hz
			Lenze asynchronous servo motors without integrated temperature monitoring ● The temperature monitoring via resolver or encoder cable is automatically deactivated, i.e.: C0583 = 3 C0584 = 3 C0594 = 3		
			50	DSVA56-140	DSVAXX056-22, f_r: 140Hz
			51	DFVA71-120	DFVAXX071-22, f_r: 120Hz
			52	DSVA71-140	DSVAXX071-22, f_r: 140Hz
			53	DFVA80-60	DFVAXX080-22, f_r: 60Hz
			54	DSVA80-70	DSVAXX080-22, f_r: 70Hz
			55	DFVA80-120	DFVAXX080-22, f_r: 120Hz
			56	DSVA80-140	DSVAXX080-22, f_r: 140Hz
			57	DFVA90-60	DFVAXX090-22, f_r: 60Hz
			58	DSVA90-80	DSVAXX090-22, f_r: 80Hz
			59	DFVA90-120	DFVAXX090-22, f_r: 120Hz
			60	DSVA90-140	DSVAXX090-22, f_r: 140Hz
			61	DFVA100-60	DFVAXX100-22, f_r: 60Hz
			62	DSVA100-80	DSVAXX100-22, f_r: 80Hz
			63	DFVA100-120	DFVAXX100-22, f_r: 120Hz
			64	DSVA100-140	DSVAXX100-22, f_r: 140Hz
			65	DFVA112-60	DFVAXX112-22, f_r: 60Hz
			66	DSVA112-85	DSVAXX112-22, f_r: 85Hz
			67	DFVA112-120	DFVAXX112-22, f_r: 120Hz
			68	DSVA112-140	DSVAXX112-22, f_r: 140Hz
			New generation of Lenze synchronous servo motors integrated temperature monitoring via resolver or encoder cable ● The temperature monitoring via resolver or encoder cable is automatically activated, i.e.: C0583 = 0 C0584 = 2 C0594 = 0		
			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
			Lenze inverter motor in star connection ● The temperature monitoring via resolver or encoder cable is automatically deactivated, i.e.: C0583 = 3 C0584 = 3 C0594 = 3		

Code	LCD	Possible settings				Important
		Lenze	Selection			
			210	DXRA071-12-50		DXRAXX071-12, f_d: 50Hz
			211	DXRA071-22-50		DXRAXX071-22, f_d: 50Hz
			212	DXRA080-12-50		DXRAXX080-12, f_d: 50Hz
			214	DXRA090-12-50		DXRAXX090-12, f_d: 50Hz
			215	DXRA090-32-50		DXRAXX090-32, f_d: 50Hz
			216	DXRA100-22-50		DXRAXX100-22, f_d: 50Hz
			217	DXRA100-32-50		DXRAXX100-32, f_d: 50Hz
			218	DXRA112-12-50		DXRAXX112-12, f_d: 50Hz
			219	DXRA132-12-50		DXRAXX132-12, f_d: 50Hz
			220	DXRA132-22-50		DXRAXX132-22, f_d: 50Hz
			221	DXRA160-12-50		DXRAXX160-12, f_d: 50Hz
			222	DXRA160-22-50		DXRAXX160-22, f_d: 50Hz
			223	DXRA180-12-50		DXRAXX180-12, f_d: 50Hz
			224	DXRA180-22-50		DXRAXX180-22, f_d: 50Hz
			Lenze inverter motor in delta connection • The temperature monitoring via resolver or encoder cable is automatically deactivated, i.e.: C0583 = 3 C0584 = 3 C0594 = 3			
			250	DXRA071-12-87		DXRAXX071-12, f_d: 87Hz
			251	DXRA071-22-87		DXRAXX071-22, f_d: 87Hz
			252	DXRA080-12-87		DXRAXX080-12, f_d: 87Hz
			254	DXRA090-12-87		DXRAXX090-12, f_d: 87Hz
			255	DXRA090-32-87		DXRAXX090-32, f_d: 87Hz
			256	DXRA100-22-87		DXRAXX100-22, f_d: 87Hz
			257	DXRA100-32-87		DXRAXX100-32, f_d: 87Hz
			258	DXRA112-12-87		DXRAXX112-12, f_d: 87Hz
			259	DXRA132-12-87		DXRAXX132-12, f_d: 87Hz
			260	DXRA132-22-87		DXRAXX132-22, f_d: 87Hz
			261	DXRA160-12-87		DXRAXX160-12, f_d: 87Hz
			262	DXRA160-22-87		DXRAXX160-22, f_d: 87Hz
			263	DXRA180-12-87		DXRAXX180-12, f_d: 87Hz
			264	DXRA180-22-87		DXRAXX180-22, f_d: 87Hz
[C0087]	Mot speed	*	300	{1 rpm}	16000	Rated motor speed → depends on C0086 • Change of C0086 resets value to the assigned default setting
[C0088]	Mot current	*	0.5	{0.1 A}	300.0	Rated motor current → depends on C0086 • Change of C0086 resets value to the assigned default setting
[C0089]	Mot frequency	*	10	{1 Hz}	1000	Rated motor frequency
[C0090]	Mot voltage	*	50	{1 V}	500	Rated motor voltage → depends on C0086 • Change of C0086 resets value to the assigned default setting
[C0091]	Mot cos phi	*	0.50	{0.01}	1.00	Motor cos φ → depends on C0086 • Change of C0086 resets value to the assigned default setting
			1	8 kHz sin		Power optimised operation
C0105	QSP Tif	0.000	0,000	{0,001 s}	999.900	Deceleration time for quick stop (QSP) Related to the speed change 0...$n_{max.}$
C0254	Vp phase-CTRL	0.40	0.0000	{0.0001}	3.9999	V_p Phase controller in MCTRL
[C0420]	Encoder const	512	256	{1 inc/rev}	8192	Encoder constant for encoder input X8 in increments per revolution
[C0490]	Feedback pos	0	0	{1}	4	Feedback system for position controller • C0490 = 0, 1, 2 can be mixed with C0495 = 0, 1, 2 • C0490 = 3, 4 sets C0495 to the same value 0 Resolver at X7 1 Encoder TTL at X8 2 Encoder sin at X8 3 Absolute ST at X8 4 Absolute MT at X8

Code	LCD	Possible settings				Important
		Lenze	Selection			
[C0495]	Feedback n	0	0	{1}	4	Feedback system for the speed controller • C0495 = 0, 1, 2 can be mixed with C0490 = 0, 1, 2 • C0495 = 3, 4 also sets C0490 to the same value 0 Resolver at X7 1 Encoder TTL at X8 2 Encoder sin at X8 3 Absolute ST at X8 4 Absolute MT at X8
C0497	Nact-filter	2.0	0.0 0 ms	{0.1 ms} switched off	50.0	Time constant actual speed
[C0890]	CFG: N-SET	 5050	 NSET-NOUT		→ Selection list 1	Speed setpoint input
[C0891]	CFG: M-ADD	1000	FIXED0%		→ Selection list 1	Configuration torque setpoint input
[C0892]	CFG: LO-M-LIM	5700	ANEG1-OUT		→ Selection list 1	Configuration lower torque limit
[C0893]	CFG: HI-M-LIM	19523	FCODE-472/3		→ Selection list 1	Configuration upper torque limit
[C0894]	CFG: PHI-SET	1000	FIXED0INC		→ Selection list 3	Configuration rotor position setpoint
[C0895]	CFG: PHI-LIM	1006	FIXED100%		→ Selection list 1	Configuration phase controller limit
[C0896]	CFG: N2-LIM	1000	FIXED0%		→ Selection list 1	Configuration 2nd speed limitation value
[C0897]	CFG: PHI-ON	1000	FIXED0		→ Selection list 2	Configuration switch-on signal phase controller
[C0898]	CFG: FLD-WEAK	1006	FIXED100%		→ Selection list 1	Signal for field weakening
[C0899]	CFG: N/M-SWT	1000	FIXED0		→ Selection list 2	Changeover between n and M control
[C0900]	CFG: QSP	10250	R/L/Q-QSP		→ Selection list 2	Control signal for release
[C0901]	CFG: I-SET	1000	FIXED0%		→ Selection list 1	Load I-component of the speed controller
[C0902]	CFG: I-LOAD	1000	FIXED0		→ Selection list 2	Release signal to load the I-component of the speed controller
[C0903]	CFG: P-ADAPT	1006	FIXED0%		→ Selection list 1	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
C0907 1 2 3 4	 DIS: PHI-ON DIS: N/M-SWT DIS: QSP DIS: I-LOAD					digital input signals
C0908	DIS: PHI-SET		-2147483647	{1 inc}	2147483647	Set phase signal • 1 rev. = 65536 inc
C0909	Speed limit	1	1	{1}	2	Limitation of direction of rotation for the speed setpoint 1 +/- 175 % 2 0 .. +175 % 3 -175 .. 0 %
MFAIL						
[C0970]	CFG: N-SET	1000	FIXED0%		→ Selection list 1	Speed input of the mains failure control Setpoint path
[C0971]	CFG: FAULT	1000	FIXED0		→ Selection list 2	Input mains failure detected, input for activation
[C0972]	CFG: RESET	1000	FIXED0		→ Selection list 2	Reset input mains failure control
[C0973]	CFG: ADAPT	1000	FIXED0%		→ Selection list 1	Adaptation of P-gain of the voltage controller
[C0974]	CFG: CONST	1000	FIXED0%		→ Selection list 1	Adaptation of P-gain of the voltage controller
[C0975]	CFG: THRESHLD	1000	FIXED0%		→ Selection list 1	Restart protection when the value falls below the speed threshold
[C0976]	CFG: NACT	1000	FIXED0%		→ Selection list 1	Comparison of threshold function • Start for V_2 controller
[C0977]	CFG: SET	1000	FIXED0%		→ Selection list 1	Speed start value
[C0978]	CFG: DC-SET	1000	FIXED0%		→ Selection list 1	Setpoint DC-bus voltage

Configuration

Code	LCD	Possible settings		Important
		Lenze	Selection	
C0988 1 2 3 4 5 6 7	 DIS: C0970 DIS: C0973 DIS: C0974 DIS: C0975 DIS: C0976 DIS: C0977 DIS: C0978		-199.99 {0.01 %} 199.99	Display of C0970 C0973 C0974 C0975 C0976 C0977 C0978
C0989 1 2	 DIS: C0971 DIS: C0972			Display of C0971 C0972
MPOT				
C0260	MPOT1 high	100.00	-199.99 {0.01 %} 199.99	Motor potentiometer upper limit, condition: C0260 > C0261
C0261	MPOT1 low	-100.0	-199.99 {0.01 %} 199.99	Motor potentiometer lower limit, condition: C0261 < C0260
C0262	MPOT1 Tir	10.0	0.1 {0.1 s} 6000.0	Motor potentiometer acceleration time $T_{ir,}$ Related to change 0…100 %
C0263	MPOT1 Tif	10.0	0.1 {0.1 s} 6000.0	Motor potentiometer deceleration time T_{if} Related to change 0…100 %
C0264	MPOT1 on/off	0	0 {1} 5	Deactivation function of motor pot • Function which is executed when motor pot is deactivated via the input MPOT1-INACTIVE. 0 no change 1 Deceleration with T_{if} to 0% 2 Deceleration with T_{if} to C0261 3 Jump with T_{if} = 0 to 0% 4 Jump with T_{if} = 0 to C0261 5 Acceleration with T_{ir} to C0260
C0265	MPOT1 init	0	0 {1} 2	Initialization function of motor pot • Value which is accepted during mains switching and activated motor pot. 0 Value during mains failure 1 lower limit of C0261 2 0 %
[C0267] 1 2	 CFG: UP CFG: DOWN	1000	FIXED0 →Selection list 2	Digital inputs motor potentiometers
[C0268]	CFG: INACT	1000	FIXED 0 → Selection list 2	Configuration motor potentiometer input
C0269 1 2 3	 DIS: C0267/1 DIS: C0267/2 DIS: C0268			Display of DIS: C0267/1 DIS: C0267/2 DIS: C0268
MSEL				
C1394 1 2 3 4 5 6 7 8 9 10	 CFG: EN-M1 CFG: EN-M2 CFG: EN-M3 CFG: EN-M4 CFG: LOCK CFG: EN-M1 CFG: EN-M2 CFG: EN-M3 CFG: EN-M4 CFG: LOCK	1000	FIXED 0 → Selection list 2	 1. MSEL1: Activation master value 1 2. MSEL1: Activation master value 2 3. MSEL1: Activation master value 3 4. MSEL1: Activation master value 4 5. MSEL1: Locking 6. MSEL2: Activation master position 1 7. MSEL2: Activation master position 2 8. MSEL2: Activation master position 3 9. MSEL2: Activation master position 4 10.MSEL2: Locking
C1395	DIS: C1394/1 ... 10			Display of C1394
C1396 1 2 3 4	 CFG: M1POS CFG: M2POS CFG: M3POS CFG: M4POS	1000	FIXED0 INC → Selection list 3	 1. MSEL2: Master position input 1 2. MSEL2: Master position input 2 3. MSEL2: Master position input 3 4. MSEL2: Master position input 4
C1397	DIS: C1396/1 ... 4			Display of C1396

Code	LCD	Possible settings				Important
		Lenze	Selection			
C1398 1 2 3 4	 CFG: DFIN1 CFG: DFIN2 CFG: DFIN3 CFG: DFIN4	1000	FIXEDPHI-0		→ Selection list 4	 1: Master value input 1 2: Master value input 2 3: Master value input 3 4: Master value input 4
C1399	DIS: C1398/1 ... 4					Display of C1398
NOT						
[C0840]	CFG: IN	1000	FIXED0		→ Selection list 2	Digital input NOT1
C0841	DIS: C0840					Display of C0840
[C0842]	CFG: IN	1000	FIXED0		→ Selection list 2	Digital input NOT2
C0843	DIS: C0842					Display of C0842
[C0844]	CFG: IN	1000	FIXED0		→ Selection list 2	Digital input NOT3
C0845	DIS: C0844					Display of C0844
[C0846]	CFG: IN	1000	FIXED0		→ Selection list 2	Digital input NOT4
C0847	DIS: C0846					Display of C0846
[C0848]	CFG: IN	1000	FIXED0		→ Selection list 2	Digital input NOT5
C0849	DIS: C0848					Display of C0848
NSET						
C0011	Nmax	3000	500	{1 rpm}	16000	Maximum speed Reference value for the absolute and relative setpoint selection for the acceleration and deceleration times. • Parameter setting 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 (ref. to 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 (ref. to speed change 0…$n_{max.}$)
C0039 1 2 3 4 5 ... 14 15	 JOG set-value JOG set-value JOG set-value JOG set-value JOG set-value ... JOG set-value JOG set-value	 100.00 75.00 50.00 25.00 0.00 ... 0.00 0.00	-199.99	{0.01 }	199.99	Fixed speeds (JOG setpoints) can be selec- ted for NSET using digital inputs
C0045	DIS: act JOG		0 1 2 ... 15	Nset active JOG 1 JOG 2 JOG 15		Active JOG set-value
C0046	DIS: N		-199.99	{0.01 %}	199.99	Main setpoint
C0049	DIS: NADD		-199.99	{0.01 %}	199.99	Additional setpoint
C0101 1 2 ... 15	 add Tir add Tir ... add Tir	 0. 0.000 ... 0.000	0,000	{0,001 s}	999.900	Additional acceleration times T_{ir} for the main setpoint of NSET (ref. to speed change 0…$n_{max.}$)
C0103 1 2 ... 15	 add Tif add Tif ... add Tif	 0. 0.000 ... 0.000	0,000	{0,001 s}	999.900	Additional deceleration times T_{if} for the main setpoint of NSET (ref. to speed change 0…$n_{max.}$)
C0130	DIS: act Ti					Active $T_i$times of NSET
C0134	RFG charac	0	0/1			Ramp characteristic for main setpoint 0: linear 1: S-curve

Configuration

Code	LCD	Possible settings		Important
		Lenze	Selection	
C0182	Ti S-curve	20.00	0.01 s {0.01 s} 50.00 s	T_i time of the S-curve ramp function generator for NSET Determines the S-curve • small values⇒ minimum S rounding • high values⇒ large S rounding
C0190	NSET arith	0	0 {1} 5	Arithmetic block in the function block NSET. Connects main setpoint C0046 and additional setpoint C0040 0 OUT = C46 1 C46 + C49 2 C46 - C49 3 C46 * C49 4 C46 / C49 5 C46/(100 - C49)
C0220	NSET Tir add	0.000	0.000 {0.001 s} 999.900	Acceleration time T_{ir} of the additional setpoint for NSET (ref. to 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 (ref. to speed change 0…$n_{max.}$)
C0241	NSET RFG I = O	1.00	0.00 {0.01 %} 100.00	Threshold ramp function generator for main setpoint Input = output , (100 % = n_{max})
[C0780]	CFG: N	50	AIN1-OUT → Selection list 1	Configuration main setpoint input
[C0781]	CFG: N-INV	10251	R/L/Q-R/L → Selection list 2	Configuration main setpoint inversion
[C0782]	CFG: NADD	5650	ASW1-OUT → Selection list 1	Configuration additional setpoint input
[C0783]	CFG: NADD-INV	1000	FIXED0 → Selection list 2	Configuration additional setpoint inversion
[C0784]	CFG: CINH-VAL	5001	MCTRL-NACT → Selection list 1	Configuration output signal with controller inhibit
[C0785]	CFG: SET	5000	MCTRL-NSET2 → Selection list 1	Configuration ramp function generator
[C0786]	CFG: LOAD	5001	MCTRL-QSP-OUT → Selection list 2	Digital input (load ramp function generator)
[C0787]			→ Selection list 2	Configuration JOG selection and JOG activation 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]			→ Selection list 2	Configuration Ti selection and Ti activation • 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	FIXED0 → Selection list 2	Digital input (ramp function generator 0)
[C0790]	CFG: RFG-STOP	1000	FIXED0 → Selection list 2	Digital input (ramp function generator stop)
C0798			-199.99 {0.01 %} 199.99	analog input signals
1	DIS: CINH-VAL			
2	DIS: SET			
C0799				Display digital input signals of NSET
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			
OR				
[C0830]		1000	FIXED0 → Selection list 2	Digital inputs OR1
1	CFG: IN1			
2	CFG: IN2			
3	CFG: IN3			
C0831	DIS: C0830			Display of C0830

Code	LCD	Possible settings		Important
		Lenze	Selection	
[C0832] 1 2 3	 CFG: IN1 CFG: IN2 CFG: IN3	1000	FIXED0 → Selection list 2	Digital inputs OR2
C0833	DIS: C0832			Display of C0832
[C0834] 1 2 3	 CFG: IN1 CFG: IN2 CFG: IN3	1000	FIXED0 → Selection list 2	Digital inputs of the OR element OR3
C0835	DIS: C0834			Display of C0834
[C0836] 1 2 3	 CFG: IN1 CFG: IN2 CFG: IN3	1000	FIXED0 → Selection list 2	Digital inputs of the OR element OR4
C0837	DIS: C0836			Display of C0836
[C0838] 1 2 3	 CFG: IN1 CFG: IN2 CFG: IN	1000	FIXED0 → Selection list 2	Digital inputs of the OR element OR5
C0839	DIS: C0838			Display of C0838
OSZ				
2	Free/Inhibit	0	0 {1} 1	For reading, the data memory must be ena-bled 0 Read data inhibited 1 Read data enabled
C0730	Mode	0	0 {1} 1	Start / stop of the measuring value recor-ding 0 Start measurement 1 Stop measurement
C0731	Status		0 {1} 5	Actual operating status 0 Measurement completed 1 Measurement active 2 Trigger detected 3 Cancel 4 Cancel after trigger 5 Read memory
[C0732] 1 2 3 4	 CFG: channel1 CFG: channel2 CFG: channel3 CFG: channel4	1000	FIXED0% → Selection list 1	Configuration analog inputs
[C0733] 1	 CFG: Dig. trigger	1000	FIXED0 → Selection list 2	Configuration trigger input
C0734	Trigger source	0	0 {1} 4	Selection of trigger source 0 dig. trigger input 1 Channel 1 2 Channel 2 3 Channel 3 4 Channel 4
C0735	Trigger level	0	-32767 {1} 32767	Adjust trigger level to channel 1 ... 4
C0736	Trigger signal	0	0 {1} 1	Selection of trigger signal 0 LOW/HIGH edge 1 HIGH/LOW edge
C0737	Trigger delay	0.0	-100.0 {0.1 %} 999.99	Setting of pre and post-triggerung

Configuration

Code	LCD	Possible settings				Important
		Lenze	Selection			
C0738	Scanning period	3	3	{1}	21	Selection of the scanning period 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
C0739	Number of channels	4	1	{1}	4	Number of channels to be measured
C0740	Start	0	0	{1}	16383	Determine the start point for reading the data memory Selection of a memory block
C0741 1 2 3 4	 DIS: Version DIS: Memory space DIS: Data width DIS: Number of channels					1 Version 2 Memory space 3 Data width 4 Number of channels
C0744	Memory space	2048	0	{1}	6	Adapt memory capacity to the measuring task 0 512 1 1024 2 1536 3 2048 4 3072 5 4096 6 8192
C0749 1 2 3	 DIS: Index cancel DIS: Index trigger DIS: Index end					Information about storing measured values
PCTRL						
C0222	PCTRL Vp	1.0	0.1	{0.1}	500.0	Process controller gain V_p
C0223	PCTRL Tn	400	20	{1 ms}	99998	Process controller integral component T_n 99999 ms switched off
C0224	PCTRL Kd	0.0	0.0	{0.1}	5.0	Process controller differential component K_d
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	Set speed threshold of the process controller adaptation Condition: C0327 > C0328
C0328	Set1 adapt	0.00	0.00	{0.01 %}	100.00	Set speed threshold of the process controller adaptation Condition: C0328 < C0327
C0329	Adapt on/off	0	 0 1 2 3	 no Extern Vp Set-value Ctrl diff		Activate process controller adaptation 0: No process controller adaptation 1: Externally via input 2: Adaptation via setpoint 3: Adaptation via control difference
C0332	PCTRL Tir	0.000	0.000	{0.001 s}	999.900	Process controller acceleration time T_{ir} Ref. to setpoint change 0…100 %
C0333	PCTRL Tif	0.000	0.000	{0.001 s}	999.900	Process controller deceleration time T_{ir} Ref. to setpoint change 0…100 %
C0336	DIS: act Vp		0.0	{0.1}	500.0	Process controller actual V_p

Code	LCD	Possible settings				Important
		Lenze	Selection			
C0337	Bi/unipolar	0	0	bipolar		Process controller range bipolar/unipolar
			1	unipolar		
[C0800]	CFG: SET	1000	FIXED0%		→ Selection list 1	Configuration setpoint input
[C0801]	CFG: ACT	1000	FIXED0%		→ Selection list 1	Configuration actual value input
[C0802]	CFG: INFLU	1000	FIXED0%		→ Selection list 1	Configuration evaluation input
[C0803]	CFG: ADAPT	1000	FIXED0%		→ Selection list 1	Configuration adaptation input
[C0804]	CFG: INACT	1000	FIXED0		→ Selection list 2	Configuration inactivation input
[C0805]	CFG: I-OFF	1000	FIXED0		→ Selection list 2	Digital input (switch-off I component)
C0808			-199.99	{0.01 %}	199.99	Display of
1	DIS: C0800					C0800
2	DIS: C0801					C0801
3	DIS: C0802					C0802
4	DIS: C0803					C0803
C809						Display of
1	DIS: C0804					C0804
2	DIS: C0805					C0805
PHADD						
[C1200]		1000	FIXED0INC		→ Selection list 3	Configuration input of PHADD1
1	CFG: IN					
2	CFG: IN					
3	CFG: IN					
C1201	DIS: C1200		-2147483647	{1}	2147483647	Display of C1200
PHCMP						
C0695	Function	2	1	{1}	2	Function comparator for phase signals PHCMP1
						Compares the inputs IN1 and IN2
						1 IN 1 < IN2
						2 |IN1| < |IN2|
[C0697]		1000	FIXED 0INC		→ Selection list 3	Configuration phase inputs of PHCMP1
1	CFG: IN					
2	CFG: IN					
C0698	DIS: C0697		-2147483647	{1}	2147483647	Display of C0697
[C1205]		1000	FIXED0INC		→ Selection list 3	Configuration inputs of PHCMP2
1	CFG: IN1					
2	CFG: IN2					
C1206	DIS: C1205		-2147483647	{1}	2147483647	Display of C1205
C1207	Function PHCMP2	2	1	{1}	2	Function of PHCMP2
						1 IN1 < IN2
						2 |IN1| < |IN2|
[C1270]		1000	FIXED0INC		→ Selection list 3	Configuration inputs of PHCMP3
1	CFG: IN					
2	CFG: IN					
C1271	DIS: C1270		-2147483647	{1}	2147483647	Display of C1270
C1272	Function PHCMP3	2	1	{1}	2	1 IN1 < IN2
						2 |IN1| < |IN2|
PHDIFF						
[C1230]		1000	FIXED0		→ Selection list 2	Digital inputs of PHDIFF1
1	CFG: EN					
2	CFG: RESET					
[C1231]	CFG: IN	1000	FIXEDPHI-0		→ Selection list 4	Configuration inputs of PHDIFF1
[C1232]		1000	FIXED0INC		→ Selection list 3	Configuration inputs of PHDIFF1
1	CFG: SET					
2	CFG: ADD					
C1235	DIS: C1230					Display of C1230
C1236	DIS: C1231		-32767	{1}	32767	Display of C1231
C1237	DIS: C1232		-2147483647	{1}	2147483647	Display of C1232
PHDIV						
C0995	Factor	0	-31	{1}	31	
[C0996]	CFG: IN	1000	FIXED0INC		→ Selection list 3	Configuration input phase division PHDIV1
C0997	DIS: C0996		-2147483647	{1}	2147483647	Display of C0996
PHINT						
[C0990]	CFG: IN	1000	FIXEDPHI0		→ Selection list 4	Input phase integrator PHINT1
[C0991]	CFG: RESET	1000	FIXED0		→ Selection list 2	Reset input of PHINT1
C0992	DIS: C0990		-32767	{1}	32767	Display of C0990

Configuration

Code	LCD	Possible settings				Important
		Lenze	Selection			
C0993	DIS: C0991					Display of C0991
[C1030]	CFG: IN	1000	FIXEDPHI0		→ Selection list 4	Input PHINT2
[C1031]	CFG: RESET	1000	FIXED0		→ Selection list 2	Reset input of PHINT2
C1032	DIS: C1030		-32767	{1}	32767	Display of C1030
C1033	DIS: C1031					Display of C1031
C1150	Function	0	0 1 2	Load perm Load edge Cmp & sub		Function of PHINT3
C1151	Comp. value	$2 \cdot 10^9$	0	{1}	2000000000	Comparison value of PHINT3
[C1153]	CFG: IN	1000	FIXEDPHI0		→ Selection list 4	Input phase integrator PHINT3
[C1154]	CFG: LOAD	1000	FIXED0		→ Selection list 2	Input of PHINT3
[C1155]	CFG: SET	1000	FIXED0INC		→ Selection list 3	Input of PHINT3
C1157	DIS: C1153		-32767	{1}	32767	Display of C1153
C1158	DIS: C1154					Display of C1154
C1159	DIS: C1155		-2147483647	{1}	2147483647	Display of C1155
PSAVE						
C1430 1 2	 Window for master value comparison Window for actual value comparison	1.0000	0	{0.0001 units}	214000.0000	
C1431	Memory function	0	0	{1}	2	0 Compare MPOS and ACTPOS 1 compare MPOS only 2 compare ACTPOS only
C1434 1 2	 CFG: ON CFG: SAVE	1000	FIEXED0		→ Selection list 2	1. HIGH = Comparison of inputs MPOS/ACTPOS with values saved and difference output 2. HIGH = Acceptance of the inputs MPOS and ACTPOS
C1435	DIS: C1434/1 ... 2					Disply of C1434
C1436 1 2	 CFG: MPOS CFG: ACTPOS	1000	FIXED0INC		→ Selection list 3	1. Input for master position 2. Input for actual position (e.g. rotor position)
C1437	DIS: C1436/1 ... 2					Display of C1436
PT1						
C0640	Delay T	20.00	0.01	{0.01 s}	50.00	Time constant of the PT1-1 component
C1641	CFG: 1-1IN	1000	FIXED0		→ Selection list 1	SP value for IN1-1
[C1642]	DIS: 1-1IN					Display of C1641
R/L/Q						
[C0885]	CFG: R	51	DIGIN 1		→ Selection list 2	Digital input (CW rotation) of R/L/Q
[C0886]	CFG: L	52	DIGIN 2		→ Selection list 2	Digital input (CCW rotation) of R/L/Q
C0889 1 2	 DIS: C0885 DIS: C0886					Display of C0885 C0886
REFC						
C0011	Nmax	3000	500	{1 rpm}	16000	Maximum speed Reference value for the absolute and relative setpoint selection for the acceleration and deceleration times. ● Parameter setting via interface: Large changes in one step should only be made when the controller is inhibited.
C0474 1	 FCODE PH	0	-2147483648	{1}	2147483648	Freely assignable code for phase signals 1 rev. = 65536 inc
[C0920]	CFG: ON	1000	FIXED0		→ Selection list 2	Activation input homing
[C0921]	CFG: MARK	1000	FIXED0		→ Selection list 2	Digital reference switch
[C0922]	CFG: PHI-IN	1000	FIXED0INC		→ Selection list 3	Phase input
[C0923]	CFG: N-IN	1000	FIXED0%		→ Selection list 1	Speed input
[C0924]	CFG: POS-LOAD	1000	FIXED0		→ Selection list 2	Control "set position"
[C0925]	CFG: ACTPOS-I	1000	FIXED0INC		→ Selection list 3	Position "set position"

Code	LCD	Possible settings				Important
		Lenze	Selection			
C0926 1 2 3 4	 DIS: C0925 DIS: C0922 DIS: ACTPOS DIS: TARGET		-2147483647	{1 inc}	2147483647	Display of 1. C0925 2. C0922 3. Display of the actual position 4. Display of the target position
C0927 1 2 3	 DIS: C0920 DIS: C0921 DIS: LOAD					Display of 1. C0920 2. C0921 3. C0924
C0928	DIS: C0922		-2147483647	{1 inc}	2147483647	Phase signal (contouring error) of REF • 1 rev. = 65536 inc
C0929	DIS: C0923		-199.99	{0.01 %}	199.99	Analog input signal
[C0930]	Gearbox mot	1	1	{1}	65535	Gearbox factor (numerator)
[C0931]	Gearbox enc	1	1	{1}	65535	Gearbox factor (denominator)
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
C0933	REF trans	0	 0 Rising trans 1 Falling trans			Reference signal transition rising transition falling transition
C0934	REF offset	0	-2140000000	{1 inc}	2140000000	Home position offset
C0935	REF speed	2.0000	0.0001	{0.0001 % N_{max}}	100.0000	Homing speed
C0936	REF Ti	1.00	0.01	{0.01 s}	990.00	T_i time homing • Tir and Tif are identical
C0937	CFG: DFIN	1000	FIXEDPHI-0			
C0938	DIS: C0937					Display of C0937
RFG						
C0671	RFG1 Tir	0.000	0.000	{0.01 s}	999.900	Acceleration time T_{ir} of ramp function generator RFG1
C0672	RFG1 Tif	0.000	0.000	{0.01 s}	999.900	Deceleration time T_{if} of RFG1
[C0673]	CFG: IN	1000	FIXED 0 %		→ Selection list 1	Configuration analog input of RFG1
[C0674]	CFG: SET	1000	FIXED 0 %		→ Selection list 1	Configuration set input of RFG1
[C0675]	CFG: LOAD	1000	FIXED 0		→ Selection list 2	Digital input of RFG1
C0676 1 2	 DIS: C0673 DIS: C0674		-199.99	{0.01 %}	199.99	Display of C0673 C0674
C0677	DIS: C0675					Display of C0675
RFGPH						
C1400 1 2 3	 CFG: RESET CFG: RFG-0 CFG: T/DIST	1000	FIXED 0		→ Selection list 2	1. HIGH = sets RFGPH1-OUT = 0 (jump) LOW = RFGPH1-OUT is set to the value at RFGPH1-IN according to the selected function Input has priority over RFGPH1-RFG-0 2. HIGH = proceeds according to the selected function RFGPH1-OUT = 0 LOW = RFGPH1-OUT is set to the value at RFGPH1-IN according to the selected function 3. Function changeover HIGH = path-based path change LOW = time-based path change
C1401	DIS: C1400/1 ... 3					Display of C1400
C1402 1 2	 CFG: IN CFG: DIST	1000	FIXED0 INC		→ Selection list 3	1. Position setpoint (65536 inc = 1 rev.) 2. Path difference by which the path is to be changed at the input -IN (65536 inc = 1 rev.)
C1403	DIS: C1402/1 ... 2					Display of C1402
C1404	CFG: DFIN	1000	FIXEDPHI-0		→ Selection list 4	Digital frequency input
C1405	DIS: C1404					Display of C1404
C1408	Speed	300.0	-16000.0000	{0.0001 rpm}	16000.0000	

Configuration

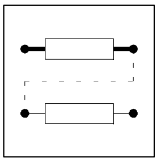
Code	LCD	Possible settings		Important
		Lenze	Selection	
S&H				
[C0570]	CFG: IN	1000	FIXED 0 % → Selection list 1	Configuration analog input of S&H1
[C0571]	CFG: LOAD	1000	FIXED 0 → Selection list 2	Digital input of S&H1
C0572	DIS: C0570		-199.99 {0.01 %} 199.99	Display of C0570
C0573	DIS: C0571			Display of C0571
SELPH				
C1660	DIS: act.sel.	0	0 {1} 8	Display of the actual selection
[C1661]	CFG: SELPH1-SE-LECT	1000	FIXED0% → Selection list 1	
[C1662] 1 .. 8	 CFG: SELPH1-IN1 ... CFG: SELPH1-IN8	1000	FIXED0INC → Selection list 3	
C1663	DIS: C1661	0	-32768 {1} 32767	Display of C1661
C1664	DIS: C1662	0	-2147483648 {1 inc} 147483647	Display of C1662
C1665	DIS: act.sel.	0	0 {1} 8	Display of the actual selection
[C1666]	CFG: SELPH2-SE-LECT	1000	FIXED0% → Selection list 1	
[C1667] 1 .. 8	 CFG: SELPH2-IN1 ... CFG: SELPH2IN8	1000	FIXED0INC → Selection list 3	
C1668	DIS: C1666	0	-32768 {1} 32767	Display of C1666
C1669	DIS: C1667	0	-2147483648 {1 inc} 2147483647	Display of C1667
SPC				
[C1640]	CFG: RESET	1000	FIXED0 → Selection list 2	
C1641 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16	 SP-value 1-1 SP-value 1-2 SP-value 2-1 SP-value 2-2 SP-value 3-1 SP-value 3-2 SP-value 4-1 SP-value 4-2 SP-value 5-1 SP-value 5-2 SP-value 6-1 SP-value 6-2 SP-value 7-1 SP-value 7-2 SP-value 8-1 SP-value 8-2	1	FCODE1476/x FCODE1477/x FCODE0474/x VTPOSC-No.x	SPC1 SP-value 1-1: Switch point output STAUS-01 SP-value 1-2: Switch point output STAUS-01 ... ... SP-value 8-1: Switch point output STAUS-08 SP-value 8-2: Switch point output STAUS-08
[C1642]	CFG: L-IN	1000	FIXED0INC → Selection list 3	
C1643	DIS: C1640	0	0 {1} 1	Display of C1640
C1644	DIS: C1642	0	-1073741824 {1 inc} 1073741823	Display of C1642
C1645	SPC1 mode	0	0 {1} 1	0 on / off 1 centre/range
[C1650]	CFG: RESET	1000	FIXED0 → Selection list 2	

Code	LCD	Possible settings				Important
		Lenze	Selection			
C1651		1	FCODE 1476/1		→ Selection list 1	SPC2
1	SP-value 1-1					SP-value 1-1: Switch point output STAUS-01
2	SP-value 1-2					SP-value 1-2: Switch point output STAUS-01
3	SP-value 2-1					...
4	SP-value 2-2					...
5	SP-value 3-1					
6	SP-value 3-2					SP-value 8-1: Switch point output STAUS-08
7	SP-value 4-1					SP-value 8-2: Switch point output STAUS-08
8	SP-value 4-2					
9	SP-value 5-1					
10	SP-value 5-2					
11	SP-value 6-1					
12	SP-value 6-2					
13	SP-value 7-1					
14	SP-value 7-2					
15	SP-value 8-1					
16	SP-value 8-2					
[C1652]	CFG: L-IN	1000	FIXED0INC		→ Selection list 3	
C1653	DIS: C1650	0	0	{1}	1	Display of C1640
C1654	DIS: C1652	0	-1073741824	{1 inc}	1073741823	Display of C1652
C1655	SPC2 mode	0	0	{1}	1	0 on / off 1 centre/range
C1657		0	-30000	{1 ms}	30000	SP2 dead time
1	Death time					
..	..					
4	Death time					
C1658	Hysteresis	0	-32767	{1 inc}	32767	SP2 hysteresis
C1659	Filter	1	0 / 1 / 2 / 4 / 8 / 16			Filters 0 Filter off 1 Filter 1 ms 2 Filter 2 ms 4 Filter 4 ms 8 Filter 8 ms 16 Filter 16 ms
SRFG						
C1040	Accelaration	100.00	0.001	{0.001}	5000.000	Acceleration of SRFG1
C1041	Jolt	0.200	0.001	{0.001 s}	999.999	Adjust jolt of SRFG1
[C1042]	CFG: IN	1000	FIXED0%		→ Selection list 1	Configuration input of SRFG1
[C1043]	CFG: SET	1000	FIXED0%		→ Selection list 1	Configuration input of SRFG1
[C1044]	CFG: LOAD	1000	FIXED0		→ Selection list 2	Digital input of SRFG1
C1045			-199.99	{0.01 %}	199.99	Display of
1	DIS: C1042					C1042
2	DIS: C1043					C1043
C1046	DIS: C1044					Display of C1044
STAT						
C0150	DIS: Status word		0	{1}	65535	Status word when networked with automation interfa-ces • Binary interpretation indicates the bit states
[C0156]					→ Selection list 2	Configuration of the free bits of the status word
1	CFG: STAT.B0	2000	DCTRL-PAR*1-O			
2	CFG: STAT.B2	5002	MCTRL-IMAX			
3	CFG: STAT.B3	5003	MCTRL-MMAX			
4	CFG: STAT.B4	5050	NSET-RFG I=O			
5	CFG: STAT.B5	10650	CMP1-OUT			
6	CFG: STAT.B14	505	DCTRL-CW/CCW			
7	CFG: STAT.B15	500	DCTRL-RDY			
C0157	DIS: C0156		0		1	Display of C0156
STATE-BUS						
[C0440]	CFG: STATE-BUS	1000			→ Selection list 2	Configuration state bus X5/ST
C0441	DIS: C0440					Display of C0440

Configuration

Code	LCD	Possible settings		Important
		Lenze	Selection	
STORE				
[C1210]		1000	FIXED0 → Selection list 2	Digital inputs of STORE1
1	CFG: RESET			
2	CFG: ENTP			
3	CFG: ENWIN			
4	CFG: LOAD0			
5	CFG: LOAD1			
[C1211]		1000	FIXEDPHI-0 → Selection list 4	Configuration inputs of STORE1
1	CFG: IN			
2	CFG: MASKI			
[C1212]	CFG: MASKV	1000	FIXED0INC → Selection list 3	Configuration input of STORE1
C1215	DIS: C12101 ... 5			Display of C1210
C1216	DIS: C1211/1 ... 2		-32767 {1} 32767	Display of C1211
C1217	DIS: C1212		-2147483647 {1} 2147483647	Display of C1212
[C1220]		1000	FIXED0 → Selection list 2	Digital inputs of STORE2
1	CFG: RESET			
2	CFG: ENTP			
C1223	DIS: C1220/1 ... 2			Display of C1220
SWPHD				
C1440		1000	FIXED 0 → Selection list 2	
1	CFG: SWPHD1-SET			
2	CFG: SWPHD2-SET			
C1441	DIS: C1440/1 ... 2			Display of C1440
C1442		1000	FIXEDPHI-0 → Selection list 4	
1	SWPHD1-IN1			
2	SWPHD1-IN2			
3	SWPHD2-IN1			
4	SWPHD2-IN2			
C1443	C1442/1 ... 4			Display of C1442
SYNC				
C1120	Sync mode	2	0 {1} 2	Function 0 off 1 CAN sync 2 Terminal sync
[C1121]		2	0 {1 ms} 13	• The interpolation is started with every sync signal 1. Definition for the cycle time of sync signals (slave); for SYSTEMBUS only 2. Definition for the interpolation time between the sync signals (slave); for terminal only
1	Sync cycle			
2	Interpol. cycl			
C1122	Sync time	0.460	0.000 {0.001 ms} 10.000	Phase shift between CAN sync and internal control program cycle • for SYSTEMBUS only • depends on baud rate and bus load
C1123		0	-1.000 {0.001 ms} 1.000	1. Phase shift between terminal synch and internal program cycle, for terminal sync only 2. Window for the synchronisation signal of the terminal synch (LOW/HIGH transition); for terminal sync only • activates when the sync start window is quit
1	Phase shift			
2	Sync window			
[C1124]	CFG: IN1	1000	FIXED0INC → Selection list 3	Input
[C1125]	CFG: IN2	1000	FIXED0INC → Selection list 3	Input
[C1126]	CFG:IN3	1000	FIXED0INC → Selection list 3	Input
C1127	DIS: C1124		-2147483647 {1} 2147483647	Display of C1124
C1128	DIS: C1125		-2147483647 {1} 2147483647	Display of C1125
C1129	DIS: C1126		-2147483647 {1} 2147483647	Display of C1126
C1290	MONIT P16	3	0 / 2 / 3	Monitoring of the synchronisation test 0 Trip 2 Warning 3 Off

Code	LCD	Possible settings				Important
		Lenze	Selection			
TRANS						
C0710	Function	0	0	{1}	2	Transition evaluation TRANS1 0 Rising trans 1 Falling trans 2 Both trans
C0711	Pulse T	0.001	0.001	{0.001 s}	60.000	Pulse time of TRANS1
[C0713]	CFG: IN	1000	FIXED 0		→ Selection list 2	Digital input of TRANS1
C0714	DIS: C0713					Display of C0713
C0715	Function	0	0	{1}	2	Transition evaluation TRANS2 0 Rising trans 1 Falling trans 2 Both trans
C0716	Pulse T	0.001	0.001	{0.001 s}	60.000	Pulse time of TRANS2
[C0718]	CFG: IN	1000	FIXED 0		→ Selection list 2	Digital input of TRANS2
C0719	DIS: C0718					Display of C0718
C1140	Function	0	0	{1}	2	Transition evaluation TRANS3 0 Rising trans 1 Falling trans 2 Both trans
C1141	Pulse T	0.001	0.001	{0.001 s}	60.000	Pulse time of TRANS3
[C1143]	CFG: IN	1000	FIXED 0		→ Selection list 2	Digital input of TRANS3
C1144	DIS: C1143					Display of C1143
C1145	Function	0	0	{1}	2	0 rising transition 1 falling transition 2 both transitions
C1146	pulse time	0.001	0.001	{0.001 s}	60.000	
[C1148]	CFG: IN	1000	FIXED 0		→ Selection list 2	Digital input of TRANS4
C1149	DIS: C1148					Display of C1148
VMAS						
C1460	Selection setpoint source	0	0	{1}	1	0 Analog setpoint AIN 1 Phase difference setpoint DFIN
C1461 1 2	 CW speed CCW speed	300	-16000.0000	{0.0001 rpm}	16000.0000	
C1462 1 2	 Acceleration time Deceleration time	1.000	0.010	{0.001 s}	999.990	
C1463 1 2	 Window ramp function generator Hysteresis ramp function generator	100	0	{1 rpm}	16000	
C1466 1 2	 VMAS1-AIN VMAS1-RED-VAL	1000	FIXED 0%		→ Selection list 1	1. Analog setpoint 2. Alternative analog setpoint, target for speed reduction
C1467	DIS: C1466					Display of C1466
C1468 1 2 3 4 5	 VMAS1-EN-AIN VMAS1-EN-RED VMAS1-EN-RFG VMAS1-CW VMAS1-CCW	1000	FIXED 0		→ Selection list 2	1. HIGH = Activate the analog input VMAS1-AIN or VMAS1-DFIN (depending on the selection under C1460) 2. HIGH = Activate the analog input VMAS1-RED-VAL 3. HIGH = Active the ramp function generator LOW = Input values are processed directly 4. Input CW rotation (determine speed in C1461/1) 5. Input CCW rotation (determine speed in C1461/2)
C1469	DIS: C1468					Display of C1468
C1472	VMAS1-DFIN	1000	FIXEDPHI-0		→ Selection list 4	Master speed input (digital frequency)
C1473	DIS: C1472					Display of C1472



Configuration

Code	LCD	Possible settings		Important
		Lenze	Selection	
VTPOSC				
[C1360]		1000	FIXED0INC → Selection list 3	
1	CFG: IN1			
2	CFG: IN2			
3	CFG:IN3			
4	CFG:IN4			
5	CFG:IN5			
6	CFG:IN6			
7	CFG:IN7			
8	CFG:IN8			
9	CFG:IN9			
10	CFG:IN10			
C1361	DIS: C1361	0	0/1	Display of C1361
WELD				
C1444		1000	FIXED0INC → Selection list 3	
1	CFG: XIN			1. Input X position
2	CFG: LEN-O			2. Time of the closing phase
3	CFG: LEN-C			3. Time of the opening phase
4	CFG: LEN			4. Time of the cam profile
5	CFG: TIME			5. Welding time in ms (1 inc = 1 ms)
C1445	DIS: C1444			Display of C1444
YSET				
C1350	Direction of rotation of actual value	0	0 {1} 1	0 CW rotation 1 CCW rotation
C1352	CFG: FACT	1000	FIXED 0% → Selection list 1	Stretching/compression factor: +100% = no compression/stretching > 100% = compression < 100% = stretching
C1353	DIS: C1352			Display of C1352
C1354		1000	FIXED 0 → Selection list 2	1: Reset of the -OFFS input
1	CFG: RESET			2: Clock pulse input for synchronous switching of the stretching/compression factor
2	CFG: SYNCH			
C1355	DIS: C1354			Display of C1354
C1356	CFG: OFFS	1000	FIXED0 INC → Selection list 3	Offset value
C1357	DIS: C1356			Display of C1356
C1358		1000	FIXEDPHI-0 → Selection list 4	Input in rpm
1	CFG: IN			
2	CFG: IN-SYNCH			
C1359	DIS: C1358			Display of C1358

7.10 Selection list for signal connections

The signals must be connected by entering their numbers to configure the controller via the keypad.

Selection list 1, analog output signals (◯)					
000050	AIN1-OUT	019500	FCODE-17	020101	CAN-IN1.W1
000055	AIN2-OUT	019502	FCODE-26/1	020102	CAN-IN1.W2
000100	DFSET-NOUT	019503	FCODE-26/2	020103	CAN-IN1.W3
001000	FIXED0%	019504	FCODE-27/1	020201	CAN-IN2.W1
001006	FIXED100%	019505	FCODE-27/2	020202	CAN-IN2.W2
001007	FIXED-100%	019506	FCODE-32	020203	CAN-IN2.W3
005000	MCTRL-NSET2	019507	FCODE-37	020204	CAN-IN2.W4
005001	MCTRL-NACT	019510	FCODE-108/1	020301	CAN-IN3.W1
005002	MCTRL-MSET2	019511	FCODE-108/2	020302	CAN-IN3.W2
005003	MCTRL-MACT	019512	FCODE-109/1	020303	CAN-IN3.W3
005005	MCTRL-DCVOLT	019513	FCODE-109/2	020304	CAN-IN3.W4
005009	MCTRL-PHI-ACT	019515	FCODE-141	025101	AIF-IN.W1
005050	NSET-NOUT	019521	FCODE-472/1	025102	AIF-IN.W2
005100	MPOT1-OUT	019522	FCODE-472/2	025103	AIF-IN.W3
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		
005650	ASW1-OUT	019529	FCODE-472/9		
005655	ASW2-OUT	019530	FCODE-472/10		
005700	ANEG1-OUT	019531	FCODE-472/11		
005705	ANEG2-OUT	019532	FCODE-472/12		
005750	FIXSET1-OUT	019533	FCODE-472/13		
005800	LIM1-OUT	019534	FCODE-472/14		
005850	ABS1-OUT	019535	FCODE-472/15		
005900	PT1-1-OUT	019536	FCODE-472/16		
005950	DT1-1-OUT	019537	FCODE-472/17		
006100	MFAIL-NOUT	019538	FCODE-472/18		
006150	DB1-OUT	019539	FCODE-472/19		
006200	CONV1-OUT	019540	FCODE-472/20		
006205	CONV2-OUT	019551	FCODE-473/1		
006210	CONV3-OUT	019552	FCODE-473/2		
006215	CONV4-OUT	019553	FCODE-473/3		
006230	CONVPHA1-OUT	019554	FCODE-473/4		
006400	FCNT1-OUT	019555	FCODE-473/5		
006300	S&H1-OUT	019556	FCODE-473/6		
006350	CURVE1-OUT	019557	FCODE-473/7		
010000	BRK-M-SET	019558	FCODE-473/8		
013301	CDATA-ACTCAM	019559	FCODE-473/9		
013302	CURVEC1-AOUT	019560	FCODE-473/10		
013601	CSEL1-OUT				
013351	CCTRL-NOUT				
013352	CCTL-MOUT				
013701	MSEL1-MVAL				
013711	MSEL2-MVAL				

Configuration

Selection list 2, digital output signals (☐)					
000051	DIGIN1	010620	NOT5-OUT	015012	MONIT-EEr
000052	DIGIN2	010650	CMP1-OUT	015013	MONIT-OC1
000053	DIGIN3	010655	CMP2-OUT	015014	MONIT-OC2
000054	DIGIN4	010660	CMP3-OUT	015015	MONIT-LP1
000055	DIGIN5	010680	PHCMP1-OUT	015016	MONIT-OH
000060	STATE-BUS	010685	PHCMP2-OUT	015017	MONIT-OH3
000065	DIGIN-CINH	010700	DIGDEL1-OUT	015018	MONIT-OH4
000100	DFSET-ACK	010705	DIGDEL2-OUT	015019	MONIT-OH7
000500	DCTRL-RDY	010750	TRANS1-OUT	015020	MONIT-OH8
000501	DCTRL-CINH1	010755	TRANS2-OUT	015021	MONIT-Sd2
000502	DCTRL-INIT	010900	FLIP1-OUT	015022	MONIT-Sd3
000503	DCTRL-IMP	010905	FLIP2-OUT	015023	MONIT-P03
000504	DCTRL-NACT=0	012000	PHINT1-FAIL	015024	MONIT-P13
000505	DCTRL-CW/CCW	012005	PHINT2-FAIL	015026	MONIT-CE0
001000	FIXED0	013000	FEVAN1-BUSY	015027	MONIT-NMAX
001001	FIXED1	013001	FEVAN1-FAIL	015028	MONIT-OC5
002000	PAR*1	013301	CDATA-SEC1	015029	MONIT-SD5
002001	PAR*2	013302	CDATA-SEC2	015030	MONIT-SD6
002002	PAR-BUSY	013303	CDATA-SEC3	015031	MONIT-SD7
005001	MCTRL-QSP	013304	CDATA-SEC4	015032	MONIT-H07
005002	MCTRL-IMAX	013305	CDATA-SEC5	015033	MONIT-H10
005003	MCTRL-MMAX	013306	CDATA-X0	015034	MONIT-H11
005050	NSET-RFG-I=0	013307	CDATA-X>XMAX	015040	MONIT-CE1
005200	REF-OK	013308	CDATA-X<0	015041	MONIT-CE2
005201	REF-BUSY	013309	CDATA-BUSY-LENx	015042	MONIT-CE3
006000	DFRFG1-FAIL	013310	CDATA-BSY.-LOAD	015043	MONIT-CE4
006001	DFRFG1-SYNC	013311	CDATA-CHK-ERR	019500	FCODE-250
006100	MFAIL-STATUS	013312	CURVEC1-X<0	019521	FCODE-471.B0
006101	MFAIL-I-RESET	013313	CURVEC1-X>XMAX	019522	FCODE-471.B1
006400	FCNT1-EQUAL	013314	CDATA-X0_CYCLE	019523	FCODE-471.B2
010000	BRK1-OUT	013551	CLUT-OPEN	019524	FCODE-471.B3
010001	BRK1-CINH	013552	CLUT-OL	019525	FCODE-471.B4
010002	BRK1-QSP	013651	PSAVE-M-HI	019526	FCODE-471.B5
010003	BRK1-M-STORE	013652	PSAVE-M-LO	019527	FCODE-471.B6
010250	CW/CCW/Q-QSP	013653	PSAVE-ACT-HI	019528	FCODE-471.B7
010251	CW/CCW/Q-CW/CCW	013654	PSAVE-ACT-LO	019529	FCODE-471.B8
010500	AND1-OUT	013751	WELD-T-ERR	019530	FCODE-471.B9
010505	AND2-OUT	013752	WELD-ON	019531	FCODE-471.B10
010510	AND3-OUT	013753	WELD-DIR-ERR	019532	FCODE-471.B11
010515	AND4-OUT	013801	VMAS1-RFG-IN=OUT	019533	FCODE-471.B12
010520	AND5-OUT	013911	CONVPHPHD1-FAIL	019534	FCODE-471.B13
010550	OR1-OUT	013951	RFGPH1-RFG-I=0	019535	FCODE-471.B14
010555	OR2-OUT	014050	STORE1-TP-INH	019536	FCODE-471.B15
010560	OR3-OUT	014055	STORE2-TP-INH	019537	FCODE-471.B16
010565	OR4-OUT	015000	DCTRL-TRIP	019538	FCODE-471.B17
010570	OR5-OUT	015001	DCTRL-MESS	019539	FCODE-471.B18
010600	NOT1-OUT	015002	DCTRL-WARN	019540	FCODE-471.B19
010605	NOT2-OUT	015003	DCTRL-FAIL	019541	FCODE-471.B20
010610	NOT3-OUT	015010	MONIT-LU	019542	FCODE-471.B21
010615	NOT4-OUT	015011	MONIT-OU	019543	FCODE-471.B22

Selection list 2, digital output signals (☐) - continued -

019544	FCODE-471.B23	020119	CAN-IN1.B18	020304	CAN-IN3.B3	025110	AIF-IN.B9
019545	FCODE-471.B24	020120	CAN-IN1.B19	020305	CAN-IN3.B4	025111	AIF-IN.B10
019546	FCODE-471.B25	020121	CAN-IN1.B20	020306	CAN-IN3.B5	025112	AIF-IN.B11
019547	FCODE-471.B26	020122	CAN-IN1.B21	020307	CAN-IN3.B6	025113	AIF-IN.B12
019548	FCODE-471.B27	020123	CAN-IN1.B22	020308	CAN-IN3.B7	025114	AIF-IN.B13
019549	FCODE-471.B28	020124	CAN-IN1.B23	020309	CAN-IN3.B8	025115	AIF-IN.B14
019550	FCODE-471.B29	020125	CAN-IN1.B24	020310	CAN-IN3.B9	025116	AIF-IN.B15
019551	FCODE-471.B30	020126	CAN-IN1.B25	020311	CAN-IN3.B10	025117	AIF-IN.B16
019552	FCODE-471.B31	020127	CAN-IN1.B26	020312	CAN-IN3.B11	025118	AIF-IN.B17
019751	FCODE-135.B0	020128	CAN-IN1.B27	020313	CAN-IN3.B12	025119	AIF-IN.B18
019752	FCODE-135.B1	020129	CAN-IN1.B28	020314	CAN-IN3.B13	025120	AIF-IN.B19
019753	FCODE-135.B2	020130	CAN-IN1.B29	020315	CAN-IN3.B14	025121	AIF-IN.B20
019755	FCODE-135.B4	020131	CAN-IN1.B30	020316	CAN-IN3.B15	025122	AIF-IN.B21
019756	FCODE-135.B5	020132	CAN-IN1.B31	020317	CAN-IN3.B16	025123	AIF-IN.B22
019757	FCODE-135.B6	020201	CAN-IN2.B0	020318	CAN-IN3.B17	025124	AIF-IN.B23
019758	FCODE-135.B7	020202	CAN-IN2.B1	020319	CAN-IN3.B18	025125	AIF-IN.B24
019763	FCODE-135.B12	020203	CAN-IN2.B2	020320	CAN-IN3.B19	025126	AIF-IN.B25
019764	FCODE-135.B13	020204	CAN-IN2.B3	020321	CAN-IN3.B20	025127	AIF-IN.B26
019765	FCODE-135.B14	020205	CAN-IN2.B4	020322	CAN-IN3.B21	025128	AIF-IN.B27
019766	FCODE-135.B15	020206	CAN-IN2.B5	020323	CAN-IN3.B22	025129	AIF-IN.B28
020001	CAN-CTRL.B0	020207	CAN-IN2.B6	020324	CAN-IN3.B23	025130	AIF-IN.B29
020002	CAN-CTRL.B1	020208	CAN-IN2.B7	020325	CAN-IN3.B24	025131	AIF-IN.B30
020003	CAN-CTRL.B2	020209	CAN-IN2.B8	020326	CAN-IN3.B25	025132	AIF-IN.B31
020005	CAN-CTRL.B4	020210	CAN-IN2.B9	020327	CAN-IN3.B26		
020006	CAN-CTRL.B5	020211	CAN-IN2.B10	020328	CAN-IN3.B27		
020007	CAN-CTRL.B6	020212	CAN.IN2.B11	020329	CAN-IN3.B28		
020008	CAN-CTRL.B7	020213	CAN-IN2.B12	020330	CAN-IN3.B29		
020013	CAN-CTRL.B12	020214	CAN-IN2.B13	020331	CAN-IN3.B30		
020014	CAN-CTRL.B13	020215	CAN-IN2.B14	020332	CAN-IN3.B31		
020015	CAN-CTRL.B14	020216	CAN-IN2.B15	025001	AIF-CTRL.B0		
020016	CAN-CTRL.B15	020217	CAN-IN2.B16	025002	AIF-CTRL.B1		
020101	CAN-IN1.B0	020218	CAN-IN2.B17	025003	AIF-CTRL.B2		
020102	CAN-IN1.B1	020219	CAN-IN2.B18	025005	AIF-CTRL.B4		
020103	CAN-IN1.B2	020220	CAN-IN2.B19	025006	AIF-CTRL.B5		
020104	CAN-IN1.B3	020221	CAN-IN2.B20	025007	AIF-CTRL.B6		
020105	CAN-IN1.B4	020222	CAN-IN2.B21	025008	AIF-CTRL.B7		
020106	CAN-IN1.B5	020223	CAN-IN2.B22	025013	AIF-CTRL.B12		
020107	CAN-IN1.B6	020224	CAN-IN2.B23	025014	AIF-CTRL.B13		
020108	CAN-IN1.B7	020225	CAN-IN2.B24	025015	AIF-CTRL.B14		
020109	CAN-IN1.B8	020226	CAN-IN2.B25	025016	AIF-CTRL.B15		
020110	CAN-IN1.B9	020227	CAN-IN2.B26	025101	AIF-IN.B0		
020111	CAN-IN1.B10	020228	CAN-IN2.B27	025102	AIF-IN.B1		
020112	CAN-IN1.B11	020229	CAN-IN2.B28	025103	AIF-IN.B2		
020113	CAN-IN1.B12	020230	CAN-IN2.B29	025104	AIF-IN.B3		
020114	CAN-IN1.B13	020231	CAN-IN2.B30	025105	AIF-IN.B4		
020115	CAN-IN1.B14	020232	CAN-IN2.B31	025106	AIF-IN.B5		
020116	CAN-IN1.B15	020301	CAN-IN3.B0	025107	AIF-IN.B6		
020117	CAN-IN1.B16	020302	CAN-IN3.B1	025108	AIF-IN.B7		
020118	CAN-IN1.B17	020303	CAN-IN3.B2	025109	AIF-IN.B8		

Configuration

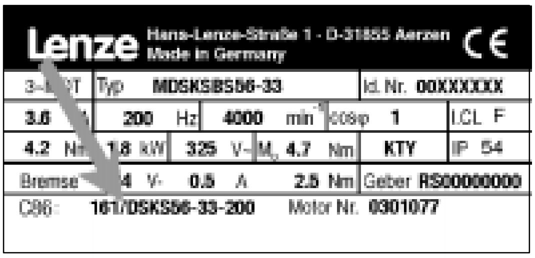
Selection list 3, signals (▲)		Selection list 4, signals (Δ)		Selection list 5, function blocks			
000100	DFSET-PSET	000050	DFIN-OUT	000000	empty	010570	OR5
000101	DFSET-PSET2	000100	DFSET-POUT	000050	AIN1	010600	NOT1
001000	FIXED0INC	000250	DFOUT-OUT	000055	AIN2	010605	NOT2
005000	MCTRL-PHI-ANG	001000	FIXEDPHI-0	000070	AOUT1	010610	NOT3
005200	REF-PSET	005000	MCTRL-PHI-ACT	000075	AOUT2	010615	NOT4
005520	ARITPH1-OUT	006000	DFRFG-OUT	000100	DFSET	010620	NOT5
005580	PHADD1-OUT	006220	CONV5-OUT	000200	DFIN	010650	CMP1
006235	CONVPHPH1-OUT	006230	CONVPHA1-OUT2	000250	DFOUT	010655	CMP2
012000	PHINT1-OUT	006240	CONVPP1-OUT	005050	NSET	010660	CMP3
012005	PHINT2-OUT	013301	CDATA-NOUT	005100	MPOT1	010680	PHCMP1
012050	PHDIV1-OUT	013302	CDATA-N-SYNCH	005150	PCTRL1	010685	PHCMP2
013301	CDATA-LEN1	013312	CURVEC1-DFOUT	005200	REF	010700	DIGDEL1
013302	CDATA-LEN2	013400	YSET1-OUT	005500	ARIT1	010705	DIGDEL2
013303	CDATA-LEN3	013501	CERR1-W-LIM	005505	ARIT2	010750	TRANS1
013304	CDATA-LEN4	013551	CLUT-NSET	005505	ARITPH1	010755	TRANS2
013305	CDATA-LEN5	013701	MSEL1-OUT	005550	ADD1	010900	FLIP1
013306	CDATA-ACTLEN	013851	CONVPHD1-OUT	005580	PHADD1	010905	FLIP2
013307	CDATA-XPOS	013911	CONVPHPHD1-OUT	005600	RFG1	012000	PHINT1
013308	CDATA-YOUT	014441	SWPHD1-OUT	005610	SRFG1	012005	PHINT2
013309	CDATA-YEND	014445	SWPHD2-OUT	005650	ASW1	012050	PHDIV1
013312	CURVEC1-OUT	019521	FCODE-475/1	005655	ASW2	013000	FEVAN1
013351	CCTRL-POUT	019522	FCODE-475/2	005700	ANEG1	014000	PHDIFF1
013352	CCTRL-PHI-SET			005705	ANEG2	014050	STORE1
013353	CCTRL-PHI-ACT			005750	FIXSET1	014055	STORE2
013354	CCTRL-PHI-SET2			005800	LIM1	014100	GEARCOMP
013501	CERR1-ERR			005850	ABS1	020000	CAN-OUT
013502	CERR1-WARN			005900	PT1-1	025000	AIF-OUT
013551	CLUT-O-POS			005950	DT1-1		
013651	PSAVE-M-DIFF			006000	DFRFG1		
013652	PSAVE-M-SAVE			006100	MFAIL		
013653	PSAVE-ACT-DIFF			006150	DB1		
013654	PSAVE-ACT-SAVE			006200	CONV1		
013711	MSEL2-OUT			006205	CONV2		
013751	WELD-XOUT			006210	CONV3		
013951	RFGPH1-OUT			006215	CONV4		
014000	PHDIFF1-OUT			006220	CONV5		
014050	STORE1-PHACT			006300	S&H1		
014051	STORE1-PH1			006350	CURVE1		
014052	STORE1-PH2			006400	FCNT1		
014053	STORE1-PHDIFF			010000	BRK1		
014055	STORE2-PHACT			010250	CW/CCW/Q		
014056	STORE2-PH1			010500	AND1		
014057	STORE2-PH2			010505	AND2		
014100	GEARCOMP-OUT			010510	AND3		
019521	FCODE-474/1			010515	AND4		
019522	FCODE-474/2			010520	AND5		
020103	CAN-IN1.D1			010550	OR1		
020201	CAN-IN2.D1			010555	OR2		
020301	CAN-IN3.D1			010560	OR3		
025103	AIF-IN.D1			010565	OR4		

7.11 Selection list - motors

Note!

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.



C0086 Value	C0086 Name	Lenze motor type	C0081 P_r [kW]	C0087 n_r [rpm]	C0088 I_r [A]	C0089 f_r [Hz]	C0090 V_r [V]	Motor type	Temperature sensor
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 Value	C0086 Name	Lenze motor type	C0081 P_r [kW]	C0087 n_r [rpm]	C0088 I_r [A]	C0089 f_r [Hz]	C0090 V_r [V]	Motor type	Temperature sensor
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	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		

C0086 Value	Name	Lenze motor type	C0081 P_r [kW]	C0087 n_r [rpm]	C0088 I_r [A]	C0089 f_r [Hz]	C0090 V_r [V]	Motor type	Temperature sensor
210	DXRAXX071-12-50	DXRAXX071-12	0.25	1410	0.9				
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				TKO (Thermal contact)
218	DXRAXX112-12-50	DXRAXX112-12	4.00	1435	8.3				
219	DXRAXX132-12-50	DXRAXX132-12	5.50	1450	11.0	50	400	Asynchronous inverter motor (in star connection)	
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				
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				TKO (Thermal contact)
258	DXRAXX112-12-87	DXRAXX112-12	7.10	2545	14.3				
259	DXRAXX132-12-87	DXRAXX132-12	9.7	2555	19.1	87	400	Asynchronous inverter motor (in delta connection)	
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				

7.12 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.	24575 - Lenze code	Is only required for control via InterBus-S, Profibus DP or system bus (CAN).
	hex	The subindex of array variables corresponds to the Lenze subcode number	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	

Configuration

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	

Configuration

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	

Configuration

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	

Configuration

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	

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EDS9300U--KE
00407355

Lenze

Manual
Part E

Troubleshooting and fault elimination

Maintenance

Global Drive
9300 cam profiler

This documentation is only valid for 9300 cam profilers as of version:

Type	Design	Hardware level and index	Software level and index	Variant	Explanation
33.932X	EK	2x	1x		(9321 - 9329)
33.933X	EK	2x	1x		(9330 - 9332)
33.932X	CK	2x	1x	- V003	Cold Plate (9321 - 9328)

Type

Desgin:
Ex = Built-in unit IP20
Cx = Cold Plate
xK = Cam profiler
xP = Positioning controller
xR = Register controller
xS = Servo inverter

Hardware level and index

Software level and index

Variant

Explanation

Version 2.0 03/99

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 at 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.

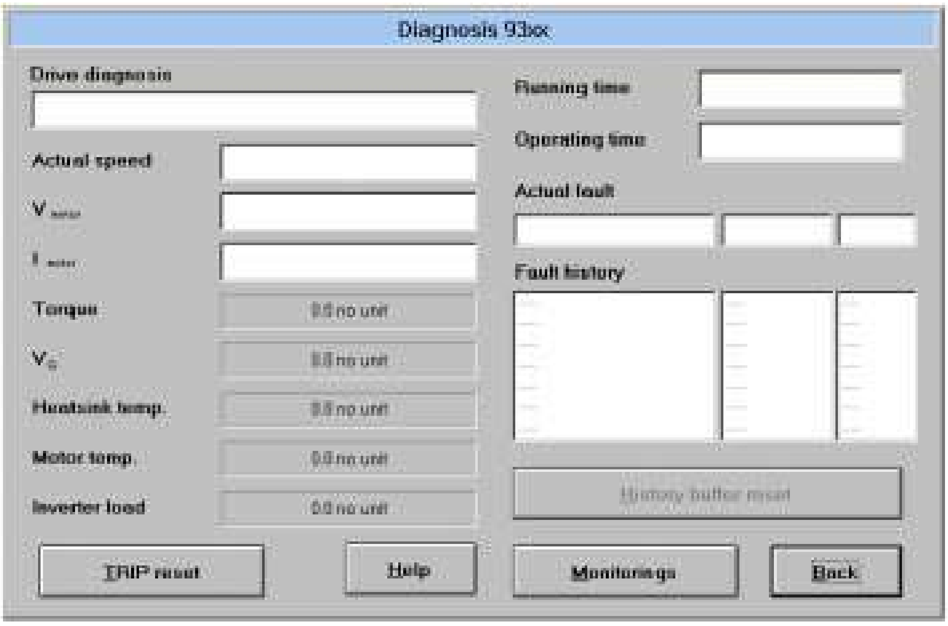


Fig. 8-1 Dialog box ”Diagnostics 9300”

- The dialog box ”Diagnosis 9300” indicates the controller status.

Troubleshooting and fault elimination

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 ocurrence.
- Open the "Dialog Diagnosis" menu in the parameter menu by a double click.

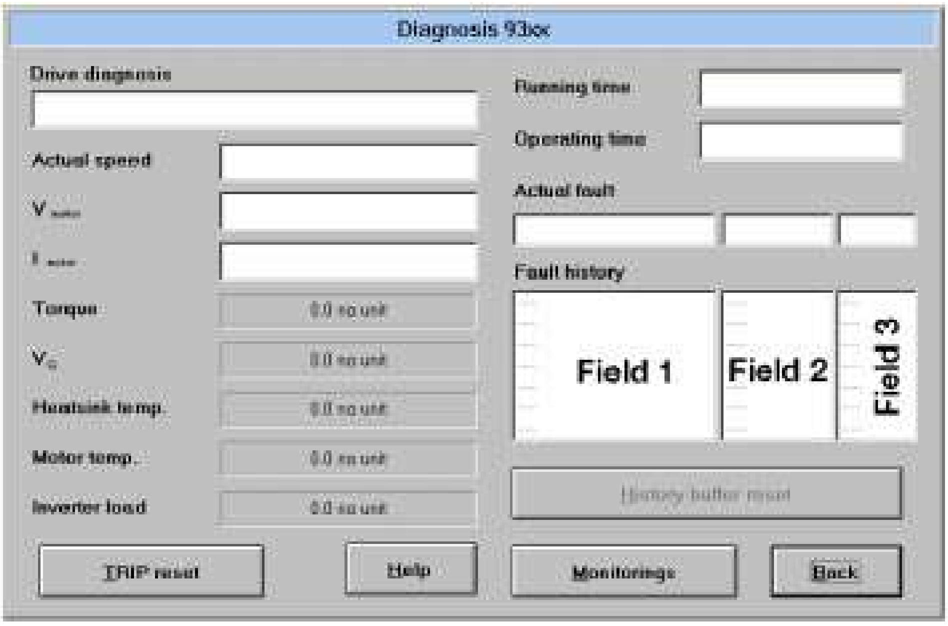


Fig. 8-2 Dialog box "Diagnostics 9300"

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 unit 1. It contains information on the active fault.
  – The first memory unit 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 contains 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 retrievable information				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.

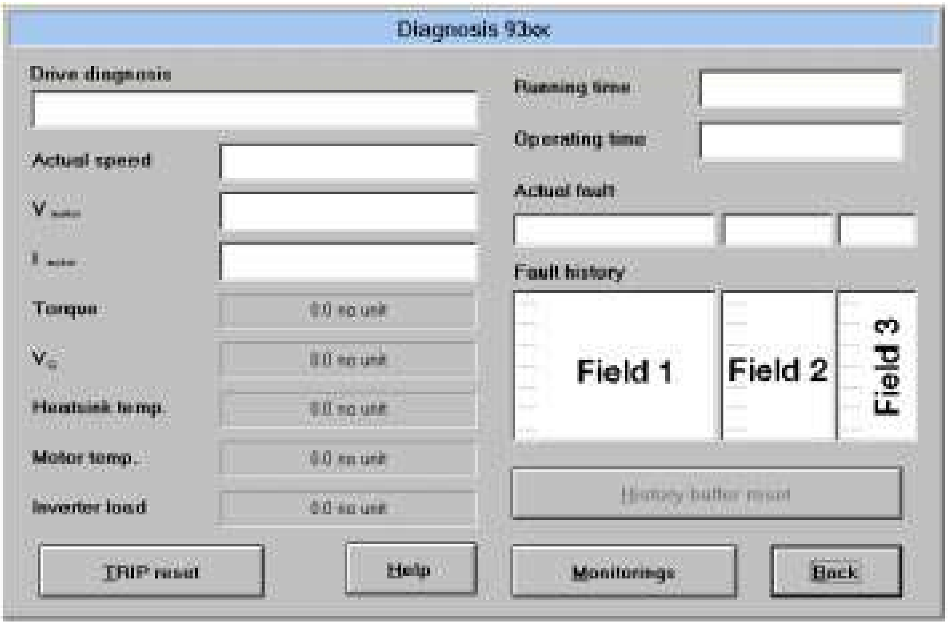


Fig. 8-3 Dialog box "Diagnostics 9300"

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.

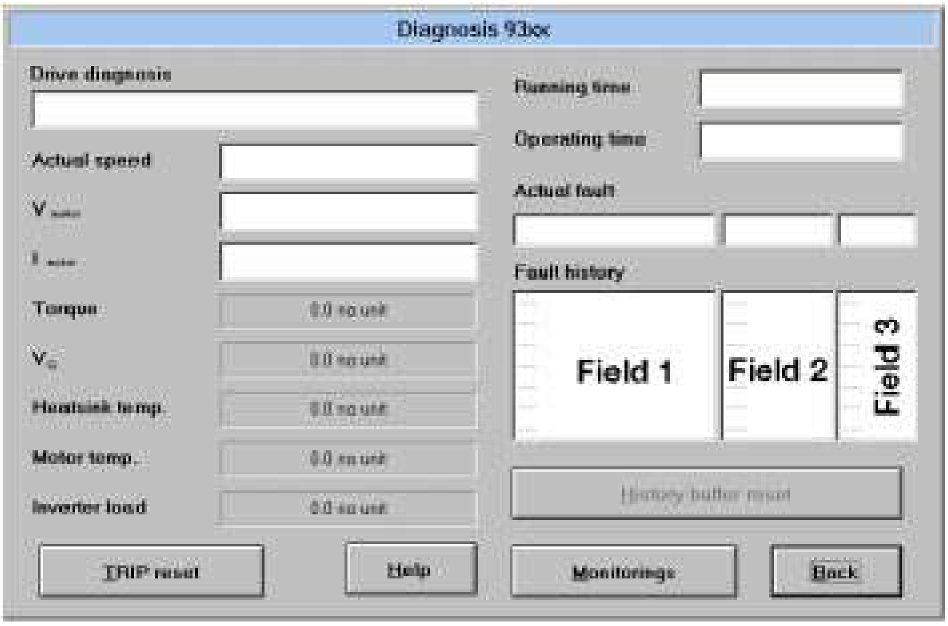


Fig. 8-4 Dialog box "Diagnostics 9300"

Time (field 2)

- Contains the times when the faults occurred
  - e.g. "1234567 s"
  - Reference time is the mains switch-on time (see Fig. 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 heatsink temperature	Sensor of the heatsink temperature detection indicates undefined values	Contact Lenze
H11	111	Sensor fault indor 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 • At 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.

Troubleshooting and fault elimination

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	heatsink 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.
			heatsink very dirty.	Clean heatsink
			Incorrect mounting position.	Change mounting position.
OH3 [1)]	53	heatsink 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	heatsink 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.
			heatsink very dirty.	Clean heatsink
			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 energy recovery 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.

Troubleshooting and fault elimination

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	1. 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	2. 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 buttung "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 buttung "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 having eliminated 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 in regular intervals (according to the degree of pollution approx. every four weeks :

Free the obstructed air vents using a vacuum cleaner.

Stop!

Do not use sharp or pointed tools such as knives or screwdrivers to clean the air vents.

Maintenance

Show/Hide Bookmarks

EDS9300U--KK
00407356

Lenze

Manual
Part K

Application examples

Global Drive
9300 cam profiler

This documentation is only valid for 9300 cam profilers as of version:

Type	Design	Hardware level and index	Software level and index	Variant	Explanation
33.932X	EK	2x	1x		(9321 - 9329)
33.933X	EK	2x	1x		(9330 - 9332)
33.932X	CK	2x	1x	- V003	Cold Plate (9321 - 9328)

Type

Desgin:
Ex = Built-in unit IP20
Cx = Cold Plate
xK = Cam profiler
xP = Positioning controller
xR = Register controller
xS = Servo inverter

Hardware level and index

Software level and index

Variant

Explanation

Version 2.0 03/99

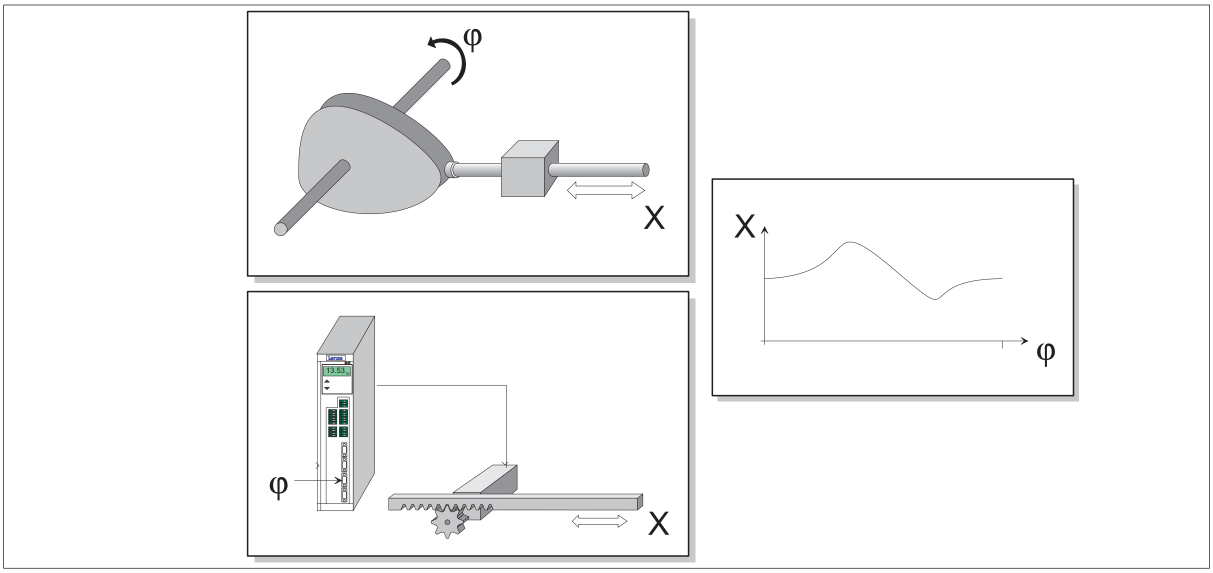
Contents

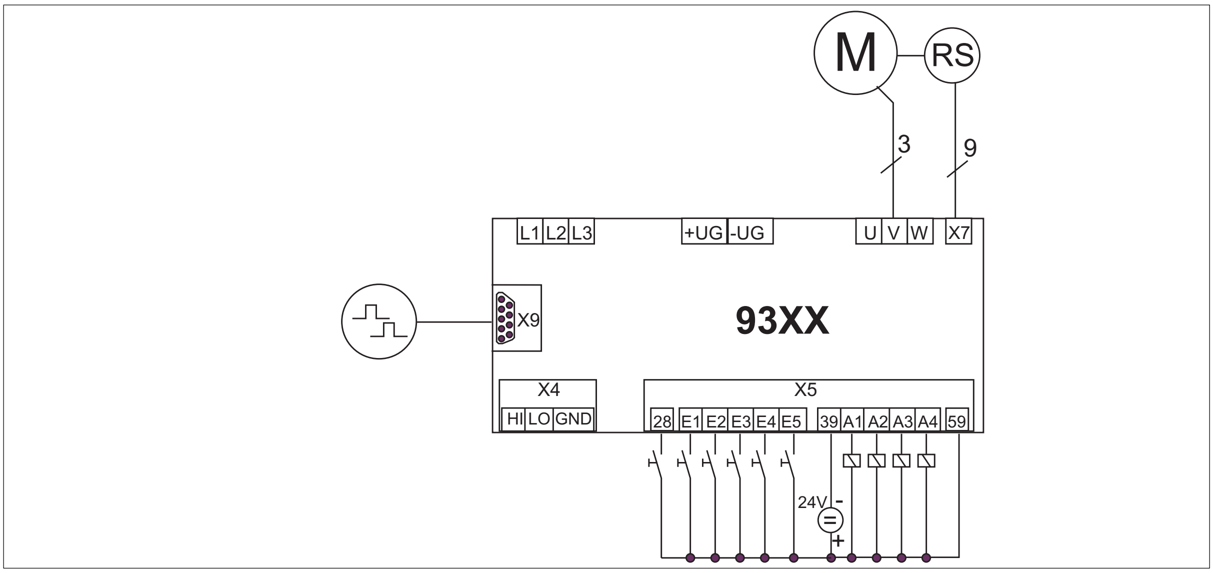
Part K

Contents

15 Application examples

15.1 Replacement of a mechanical cam





Selection of the configuration

- C0005 = 10000

Features

– Optimum adaptation to the process
– Easy changeover in the event of product changes
– Master value via incremental encoder

Application examples

Digital signals

Terminal	Function
X5, terminal 28	Controller enable
X5, E1	Selection of event profile (C1420)
X5, E2	Profile selection (see table *terminal layout*)
X5, E3	Profile selection (see table *terminal layout*)
X5, E4	Profile selection (see table *terminal layout*)
X5, E5	Fault reset (trip reset) / profile acceptance
X5, A1	Fault (trip)
X5, A2	Contouring error limit reached
X5, A3	Ready for operation (RDY)
X5, A4	Contouring error warning limit reached

Analog signals

Terminal	Function
Analog input 1: X6, terminals 1, 2	not assigned
Analog input 2: X6, terminals 3, 4	not assigned
Analog output 1: X6, terminal 62	Act. speed
Analog output 2: X6, terminal 63	Act. torque

Terminal layout for profile selection

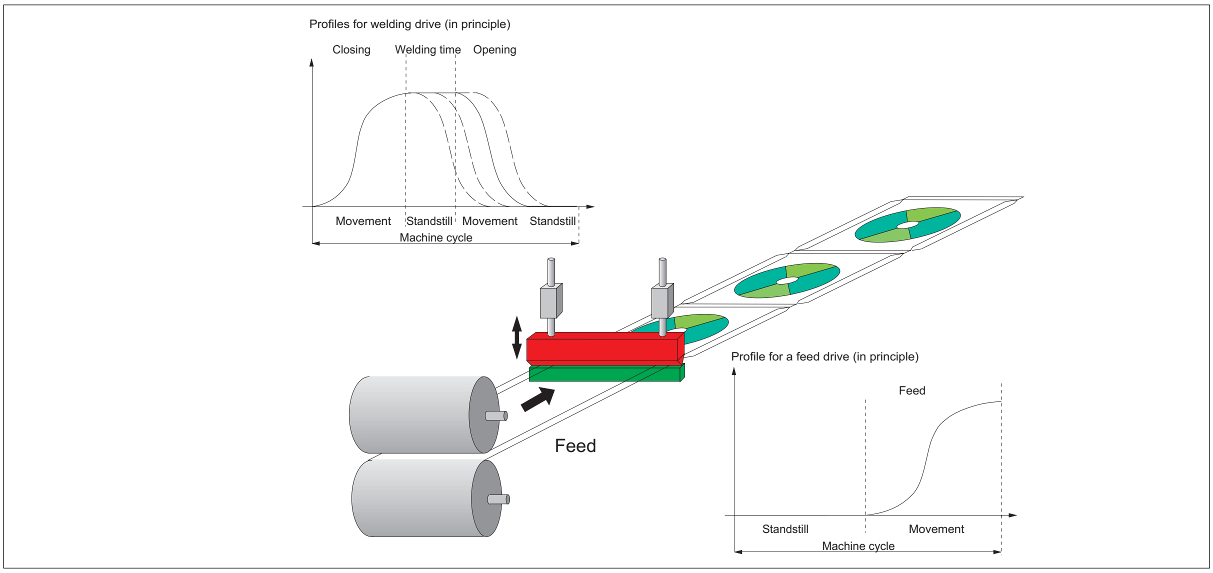
Profile no.	0	1	2	3	4	5	6	7
X5, E2	0	1	0	1	0	1	0	1
X5, E3	0	0	1	1	0	0	1	1
X5, E4	0	0	0	0	1	1	1	1

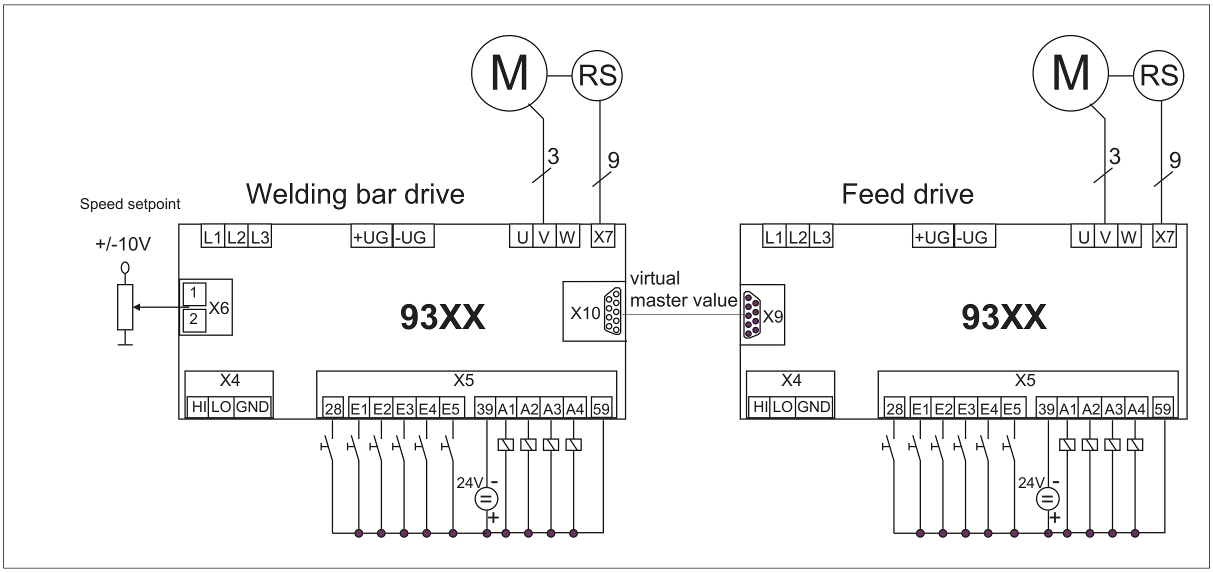
Code	Function
C0425	Encoder constant of the master value
C1420	Selection of the event profile (dig. input E1 = H)
C1380/1	Hysteresis of contouring error evaluation
C1380/2	Hysteresis of contouring error warning
0472/1	Stretching/compression of X-axis (100% = no stretching/compression)
0472/2	Influence of speed precontrol
0472/3	Influence of torque precontrol
0472/4	Reduction factor for contouring error warning (warning limit = C0472/4 x C1477/2)
0472/9	Stretching/compression of Y-axis (100% = no stretching/compression)
0472/10	Torque limit value
1476/1	Phase trimming in X-direction
1476/16	Touch-probe position in X-direction
1477/1	Phase trimming in Y-direction
1477/2	Contouring error limit (in s_units)

Application-specific codes

More information about the generation of profile data and its transmission to the controller can be obtained from chapter 5.6 of the Manual or chapter Basic cam profile data (see 'Commissioning) of the Operating Instructions.

15.2 Welding bar





Selection of the configuration

- C0005 = 14000

Features

– Speed-independent welding time
– Adjustable welding time
– Easy changeover in the event of material changes
– Material-specific feed
– Virtual master for the coordination of feed and welding bar

Application examples

Digital signals

Terminal	Function
X5, terminal 28	Controller enable
X5, E1	Selection of event profile (C1420)
X5, E2	Profile selection (see table *terminal layout*)
X5, E3	Profile selection (see table *terminal layout*)
X5, E4	Profile selection (see table *terminal layout*)
X5, E5	Fault reset (trip reset) / profile acceptance
X5, A1	Fault (trip)
X5, A2	Contouring error limit reached
X5, A3	Ready for operation (RDY)
X5, A4	Welding time error

Analog signals

Terminal	Function
Analog input 1: X6, terminals 1, 2	Setpoint of the virtual master
Analog input 2: X6, terminals 3, 4	not assigned
Analog output 1: X6, terminal 62	Act. speed
Analog output 2: X6, terminal 63	Act. torque

Digital frequency output: X10: Virtual master value

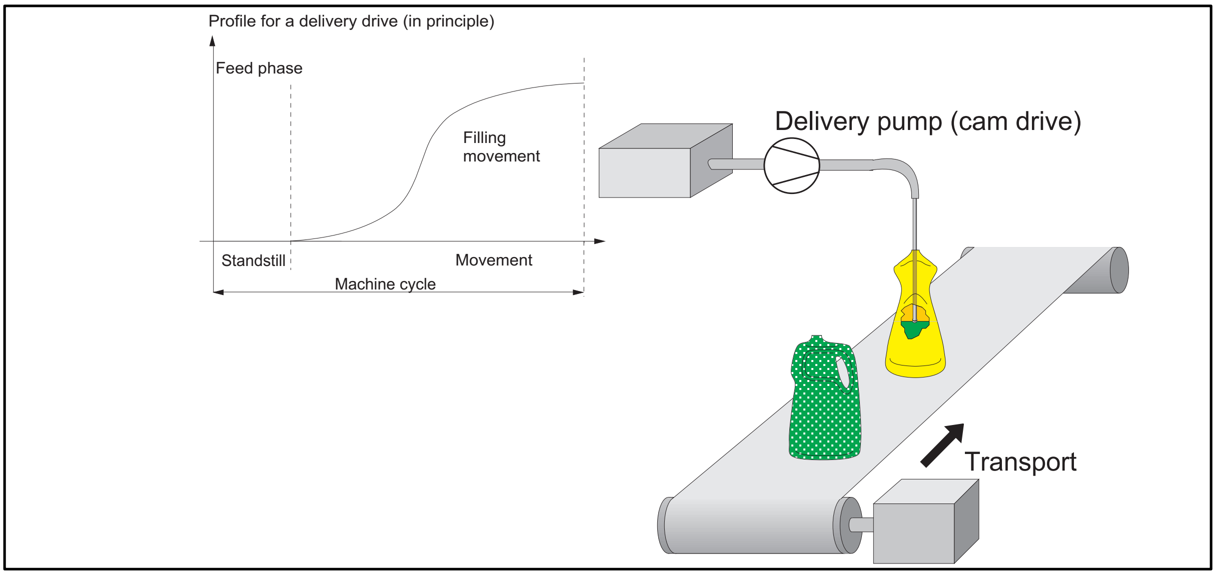
Terminal layout for profile selection

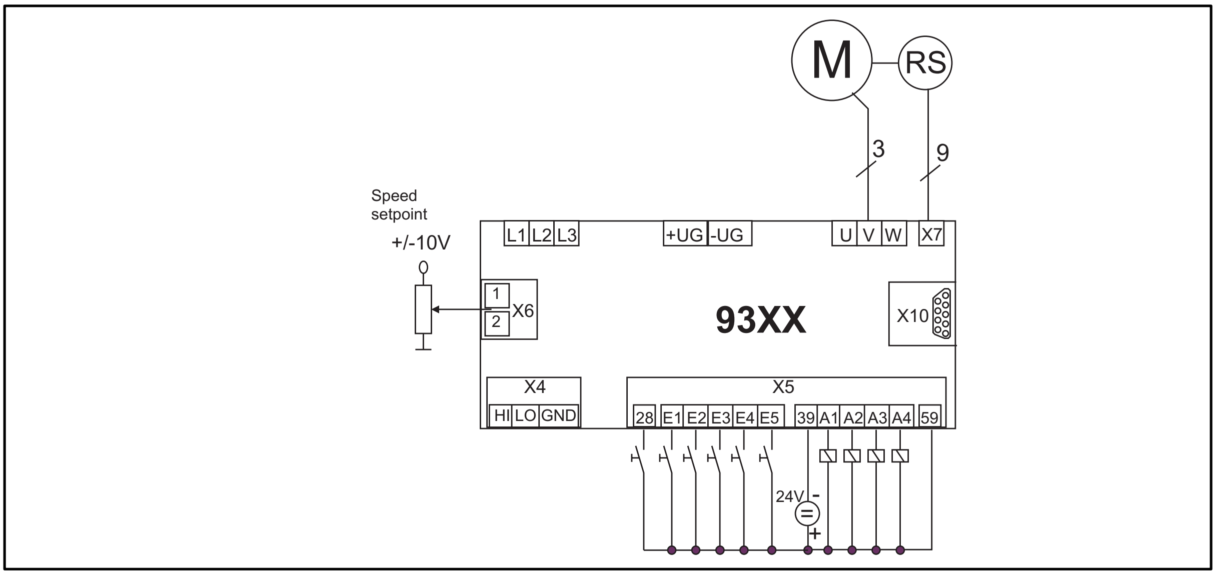
Profile no.	0	1	2	3	4	5	6	7
X5, E2	0	1	0	1	0	1	0	1
X5, E3	0	0	1	1	0	0	1	1
X5, E4	0	0	0	0	1	1	1	1

Application-specific codes

Code	Function
C1420	Selection of the event profile (dig. input E1 = H)
C1380/1	Hysteresis of contouring error evaluation
C1380/2	Hysteresis of contouring error warning
C0250	Activation of the master value reduction (C0250=1 => reduction value C0472/7 active)
0472/1	Stretching/compression of X-axis (100% = no stretching/compression)
0472/2	Influence of speed precontrol
0472/3	Influence of torque precontrol
0472/4	Reduction factor for contouring error warning (warning limit = C0472/4 x C1477/2)
0472/7	Reduced master value
0472/10	Torque limit value
0474/1	Welding time (1 incr. = 1 ms)
1476/1	Phase trimming in X-direction
1476/16	Touch-probe position in X-direction
1477/2	Contouring error limit (in s_units)

15.3 Filling





Selection of the configuration

- C0005 = 13000 / 13300

Features

– Product-specific filling with minimum bubble generation
– Virtual master value
– Product changes at every clock pulse
– Option: switching point for handshake with conveyor belt

Application examples

Digital signals (C0005=13000)

Terminal	Function
X5, terminal 28	Controller enable
X5, E1	Selection of event profile (C1420)
X5, E2	Profile selection (see table *Terminal layout*)
X5, E3	Profile selection (see table *Terminal layout*)
X5, E4	Profile selection (see table *Terminal layout*)
X5, E5	Fault reset (trip reset) / profile acceptance
X5, A1	Fault (trip)
X5, A2	Contouring error limit reached
X5, A3	Ready for operation (RDY)
X5, A4	Contouring error warning limit reached

Analog signals (C0005=13000)

Terminal	Function
Analog input 1: X6, terminals 1, 2	Setpoint virtual master
Analog input 2: X6, terminals 3, 4	not assigned
Analog output 1: X6, terminal 62	Act. speed
Analog output 2: X6, terminal 63	Act. torque

Dig. frequency output: X10: Virtual master value

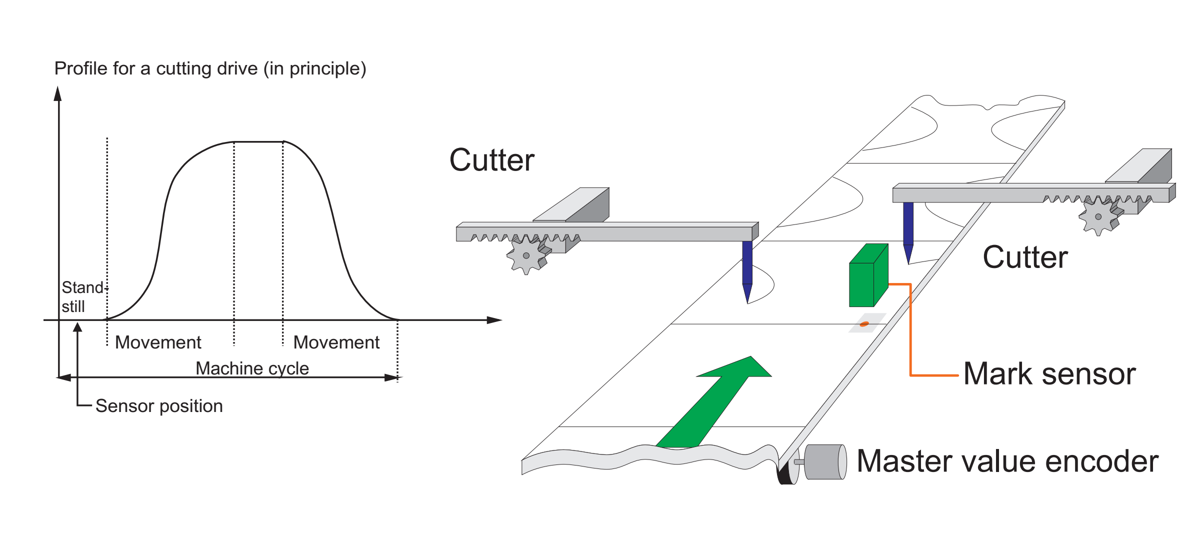
Terminals for profile selection (C0005=13000)

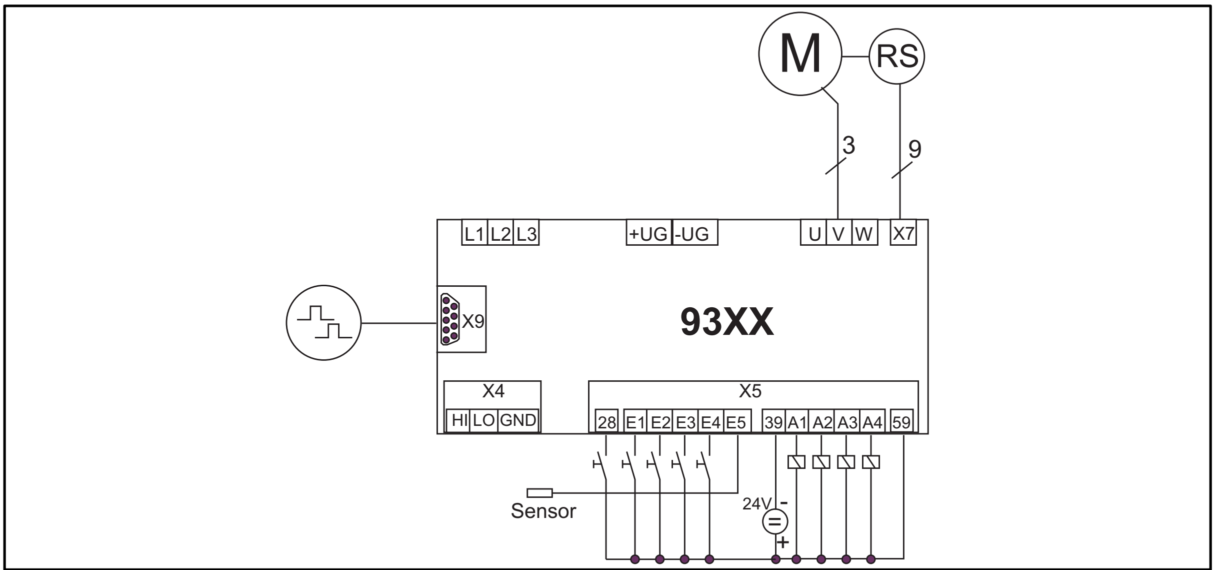
Profile no.	0	1	2	3	4	5	6	7
X5, E2	0	1	0	1	0	1	0	1
X5, E3	0	0	1	1	0	0	1	1
X5, E4	0	0	0	0	1	1	1	1

Application-specific codes (C0005=13000)

Code	Function
C1420	Selection of the event profile (dig. input E1 = H)
C1380/1	Hysteresis of contouring error evaluation
C1380/2	Hysteresis of contouring error warning
C0250	Activation of the master value reduction (C0250=1 => reduction value C0472/7 active)
0472/1	Stretching/compression of X-axis (100% = no stretching/compression)
0472/2	Influence of speed precontrol
0472/3	Influence of torque precontrol
0472/4	Reduction factor for contouring error warning (warning limit = C0472/4 x C1477/2)
0472/7	Reduced master value
0472/9	Stretching/compression of Y-axis (100% = no stretching/compression)
0472/10	Torque limit value
1476/1	Phase trimming in X-direction
1476/16	Touch-probe position in X-direction
1477/1	Phase trimming in Y-direction
1477/2	Contouring error limit (in s_units)

15.4 Mark-controlled cam profile start





Selection of the configuration

- C0005 = 10800

Features

– Mark-controlled start for the correct position for the cut
– Offset selection for the fine adjustment of the position
– Easy changeover in the event of product changes

Application examples

Digital signals

Terminal	Function
X5, terminal 28	Controller enable
X5, E1	Selection of event profile (C1420)
X5, E2	Profile selection (see table *terminal layout*)
X5, E3	Profile selection (see table *terminal layout*)
X5, E4	Fault reset (trip reset) / profile acceptance
X5, E5	Mark signal touch probe X-direction
X5, A1	Fault (trip)
X5, A2	Contouring error limit reached
X5, A3	Ready for operation (RDY)
X5, A4	Contouring error warning limit reached

Analog signals

Terminal	Function
Analog input 1: X6, terminals 1, 2	not assigned
Analog input 2: X6, terminals 3, 4	not assigned
Analog output 1: X6, terminal 62	Act. speed
Analog output 2: X6, terminal 63	Act. torque

Terminal layout for profile selection

Profile no.	0	1	2	3	4	5	6	7
X5, E2	0	1	0	1	**Not selectable**			
X5, E3	0	0	1	1				

Application-specific codes

Code	Function
C0425	Encoder constant of the master value
C1420	Selection of the event profile (dig. input E1 = H)
C1380/1	Hysteresis of contouring error evaluation
C1380/2	Hysteresis of contouring error warning
0472/1	Stretching/compression of X-axis (100% = no stretching/compression)
0472/2	Influence of speed precontrol
0472/3	Influence of torque precontrol
0472/4	Reduction factor for contouring error warning (warning limit = C0472/4 x C1477/2)
0472/9	Stretching/compression of Y-axis (100% = no stretching/compression)
0472/10	Torque limit value
1476/1	Phase trimming in X-direction
1476/16	Touch-probe position in X-direction
1477/1	Phase trimming in Y-direction
1477/2	Contouring error limit (in s_units)

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00407357

Lenze

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Part L

Signal flow charts

Global Drive

9300 cam profiler

This documentation is only valid for 9300 cam profilers as of version:

	33.932X	EK	2x	1x		(9321 - 9329)
	33.933X	EK	2x	1x		(9330 - 9332)
	33.932X	CK	2x	1x	- V003	Cold Plate (9321 - 9328)
Type	↑					
Desgin: Ex = Built-in unit IP20 Cx = Cold Plate xK = Cam profiler xP = Positioning controller xR = Register controller xS = Servo inverter		↑				
Hardware level and index			↑			
Software level and index				↑		
Variant					↑	
Explanation						↑

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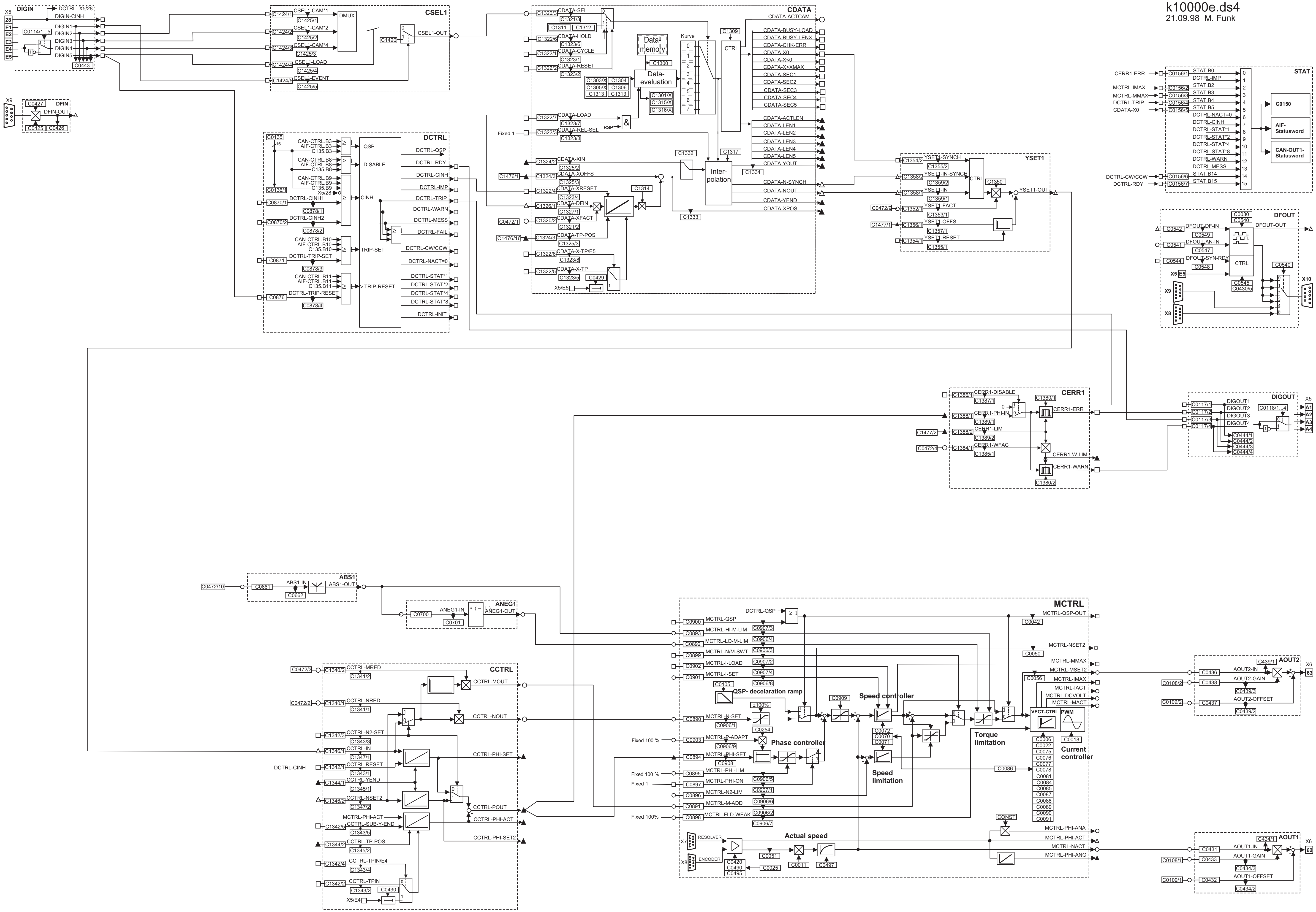
Configuration 10000
k10000e.ds4
21.09.98 M. Funk



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Servo cam profiler 9300
Configuration 10001
k10001e.ds4
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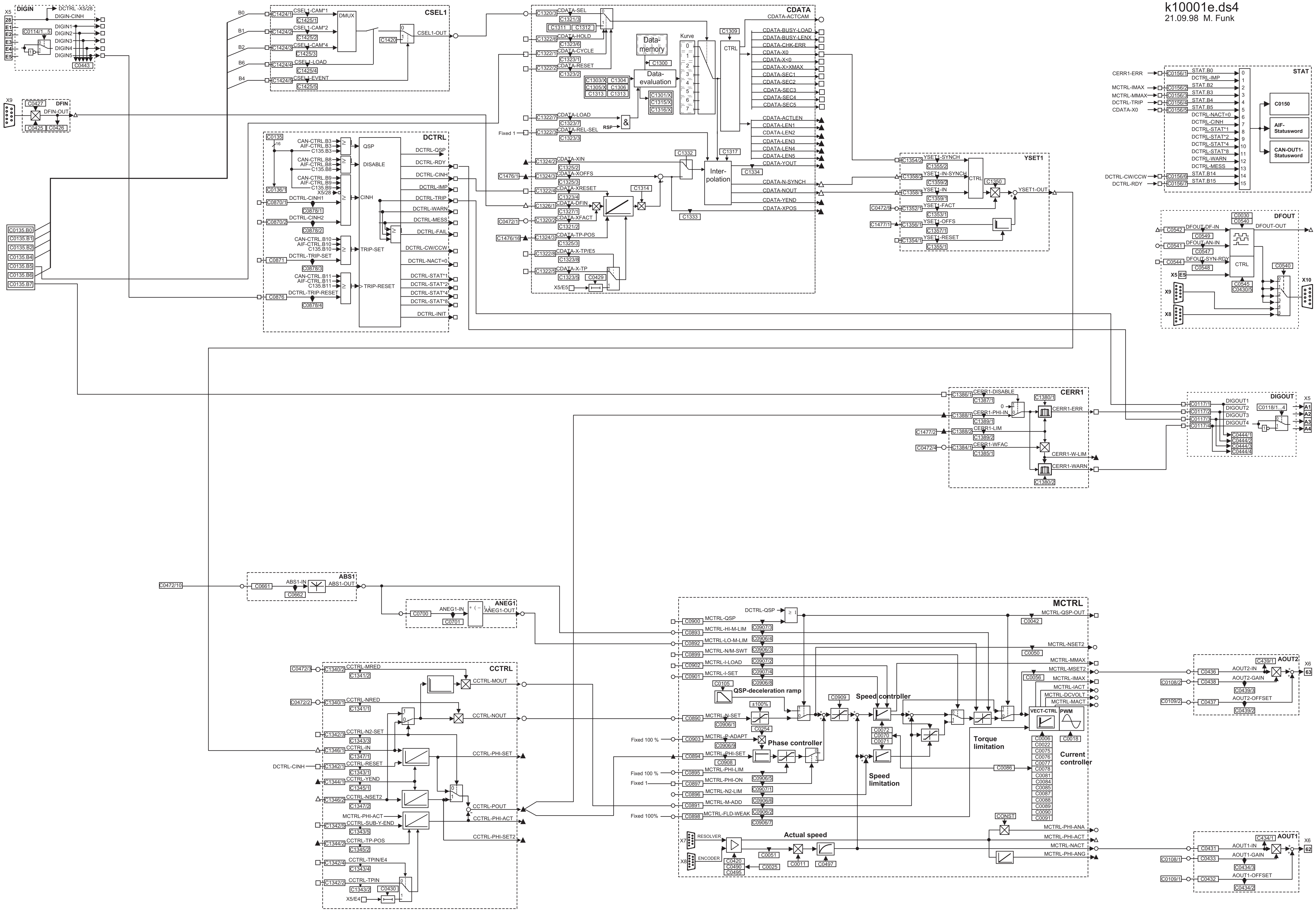

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Configuration 10003

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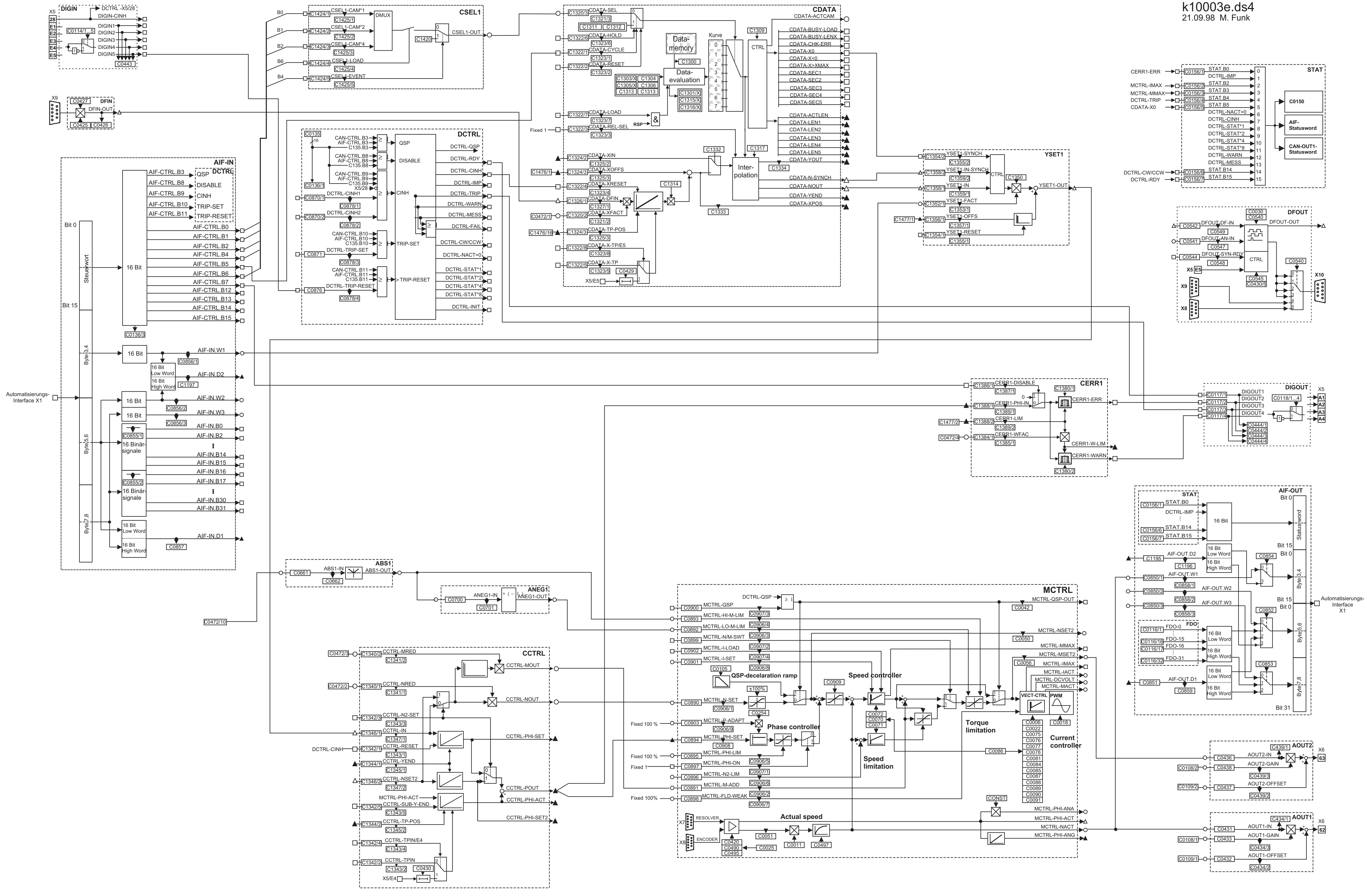
21.09.98 M. Funk



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Configuration 10005
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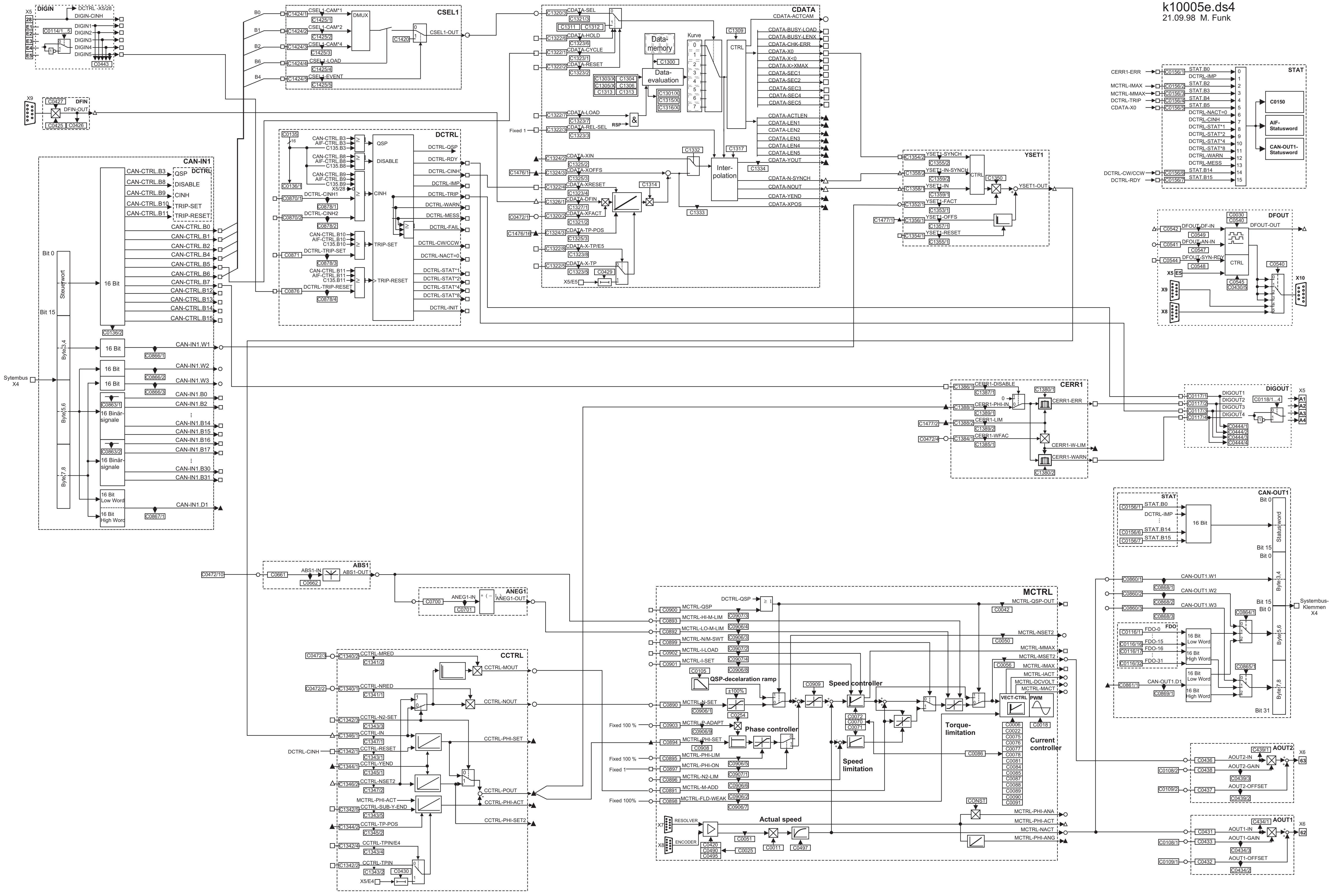
21.09.98 M. Funk



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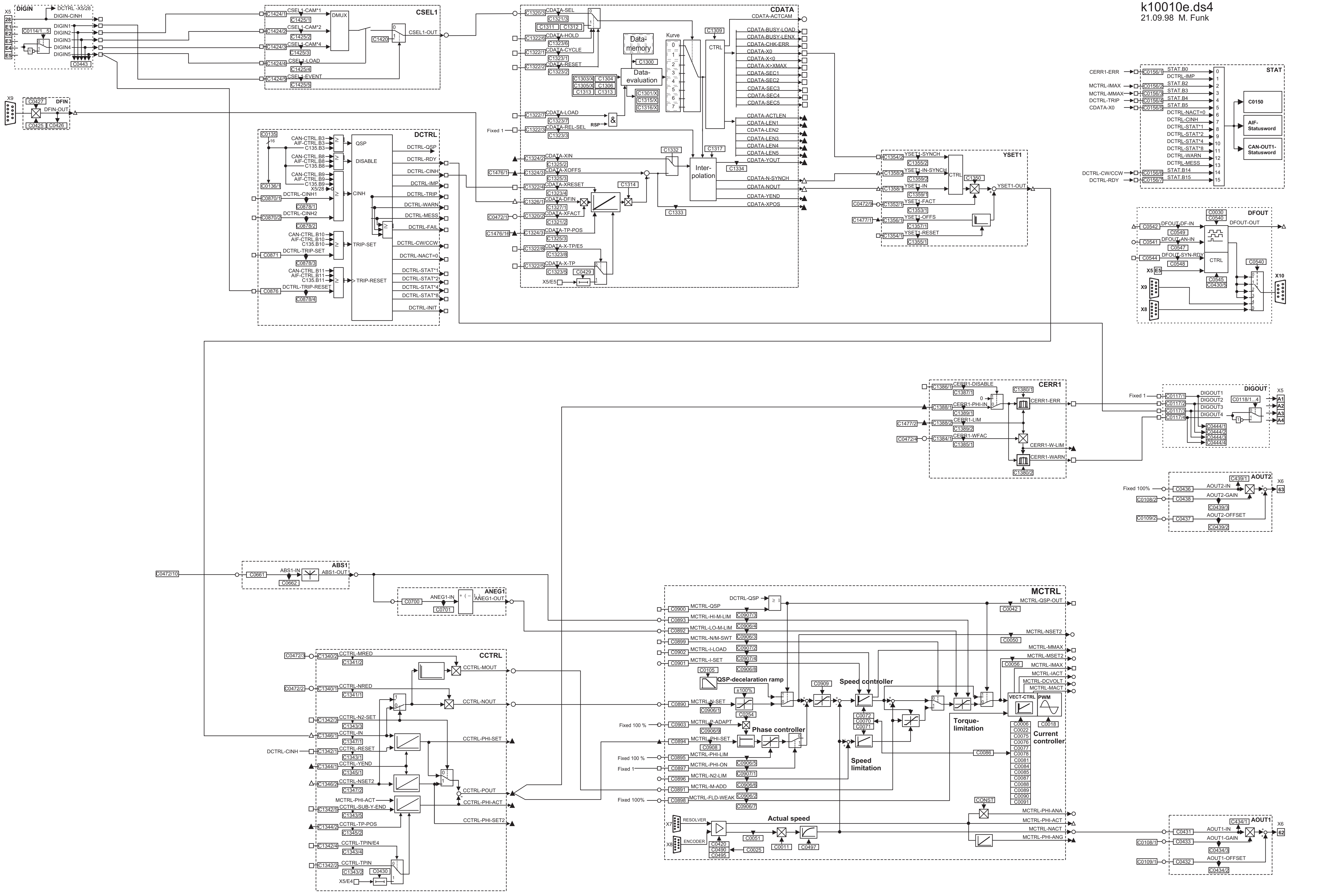

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Configuration 10100
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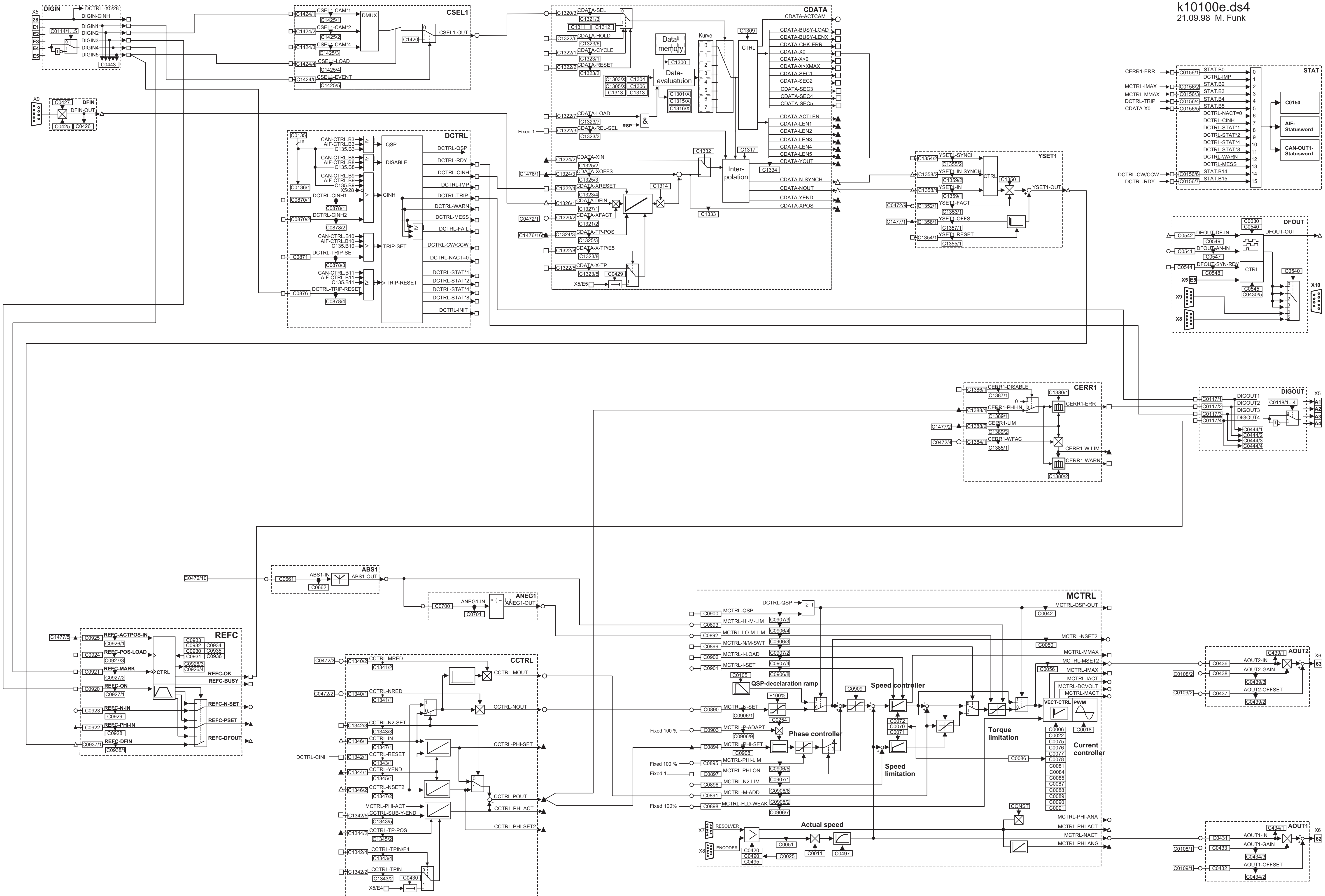
21.09.98 M. Funk



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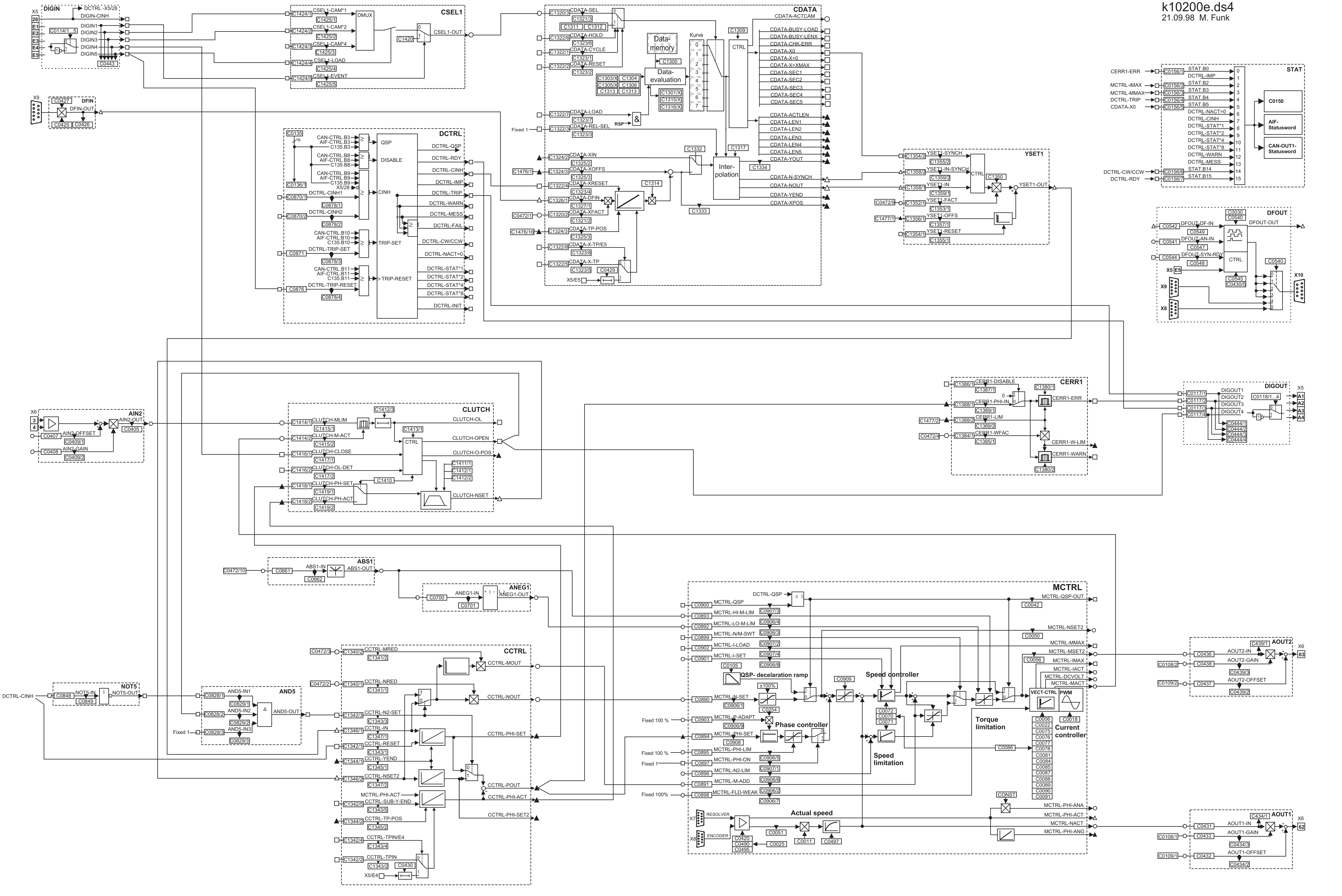
Servo cam profiler 9300
Configuration 10200
k10200e.ds4
21.09.98 M. Funk



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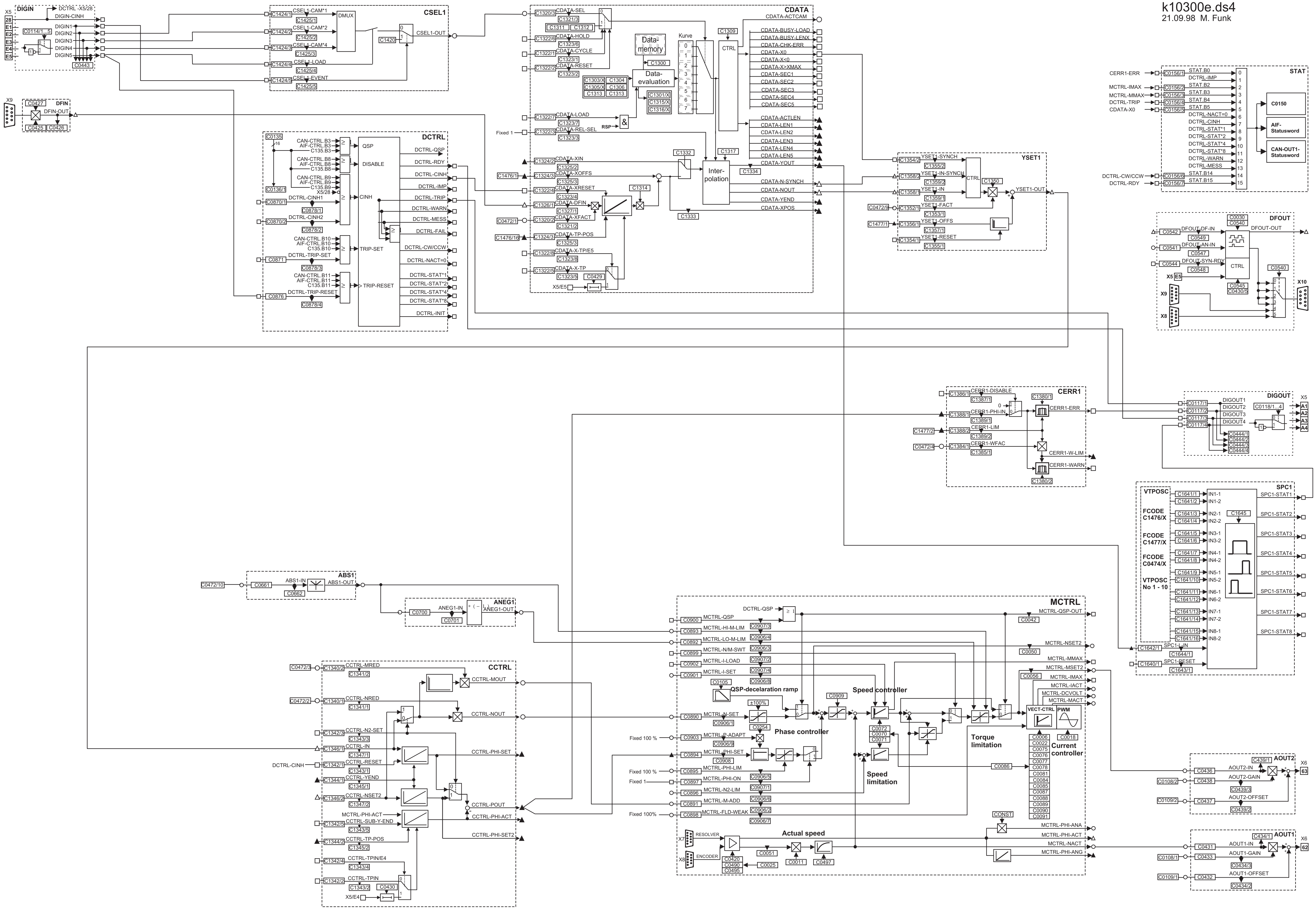
21.09.98 M. Funk



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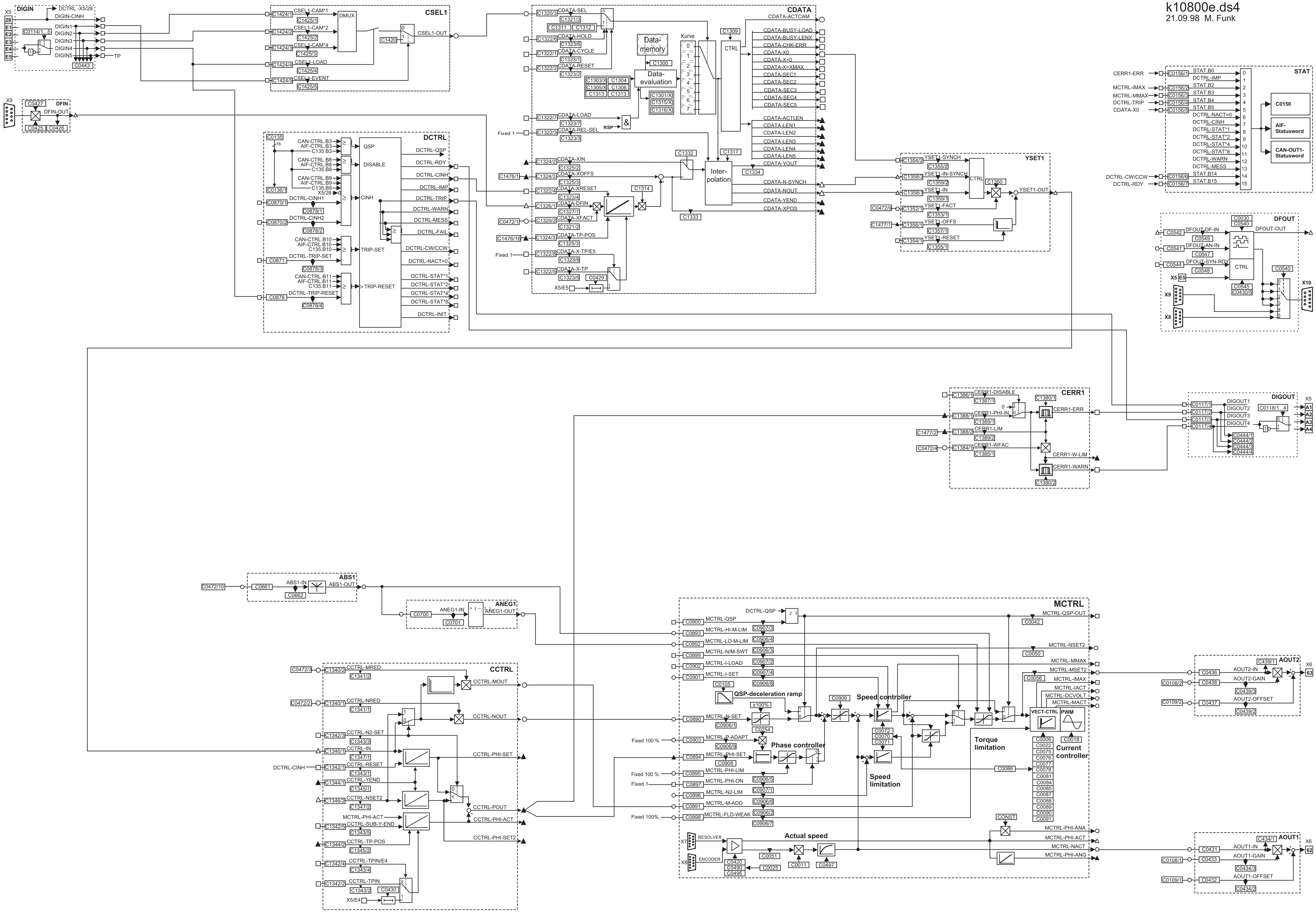

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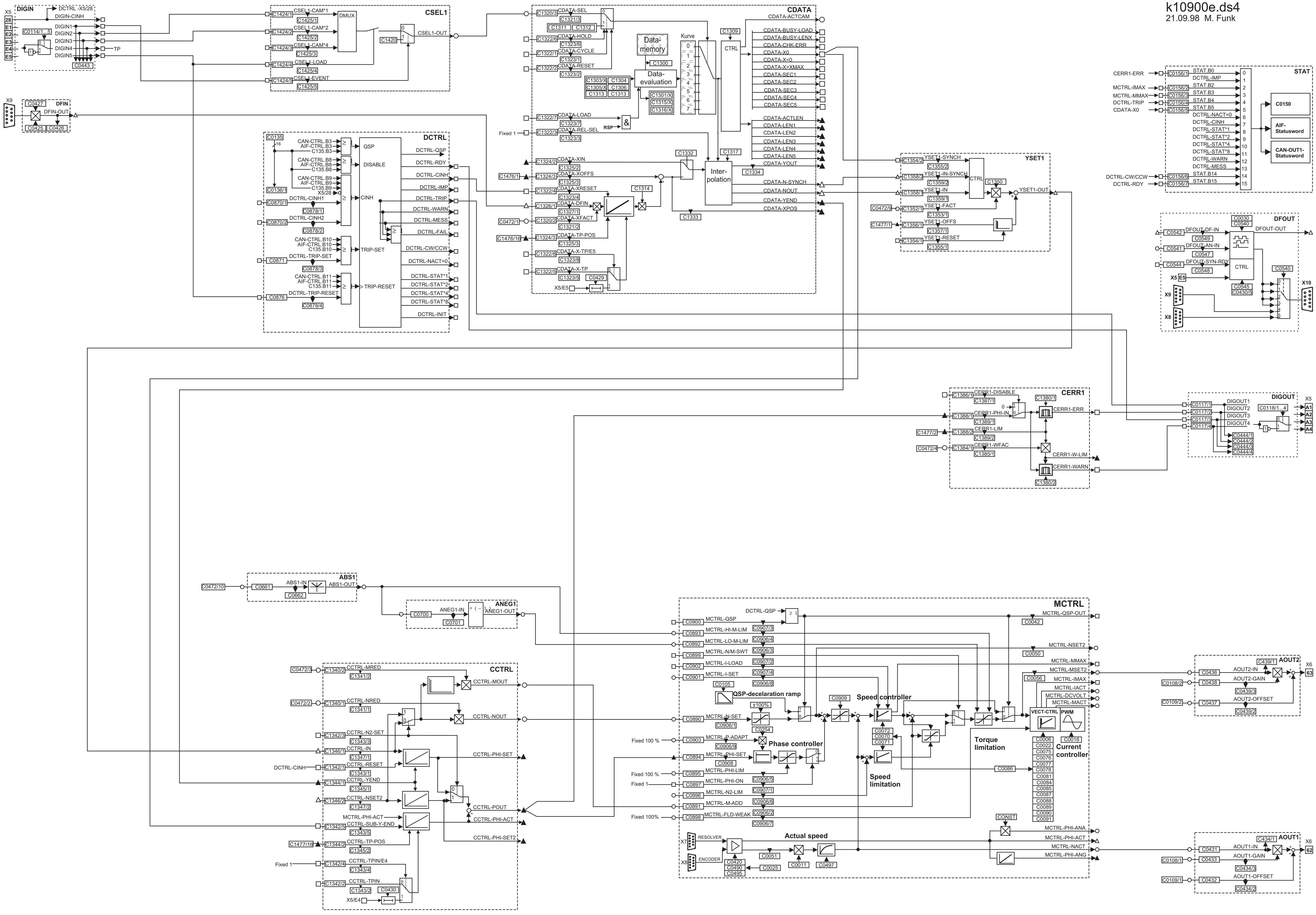

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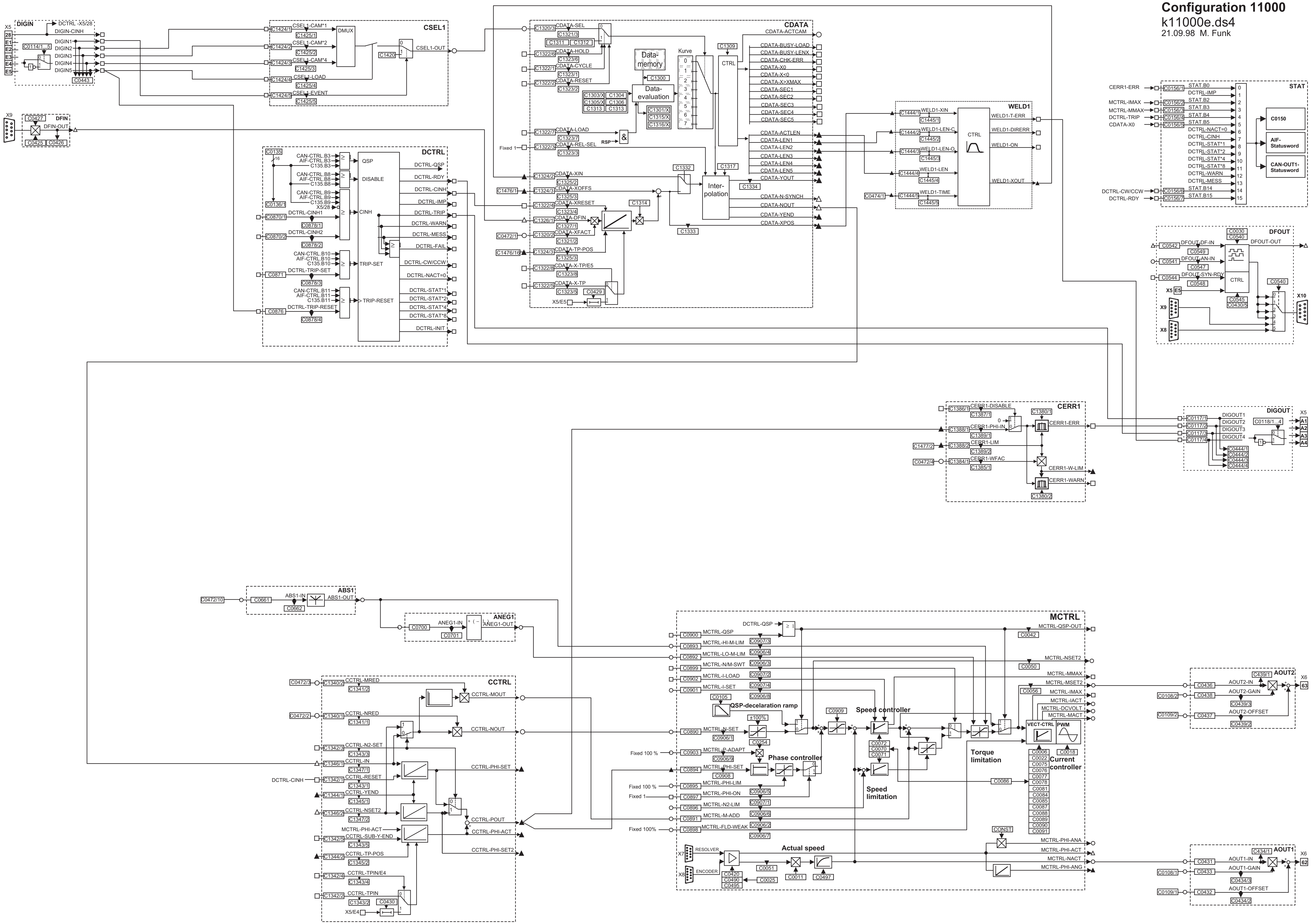

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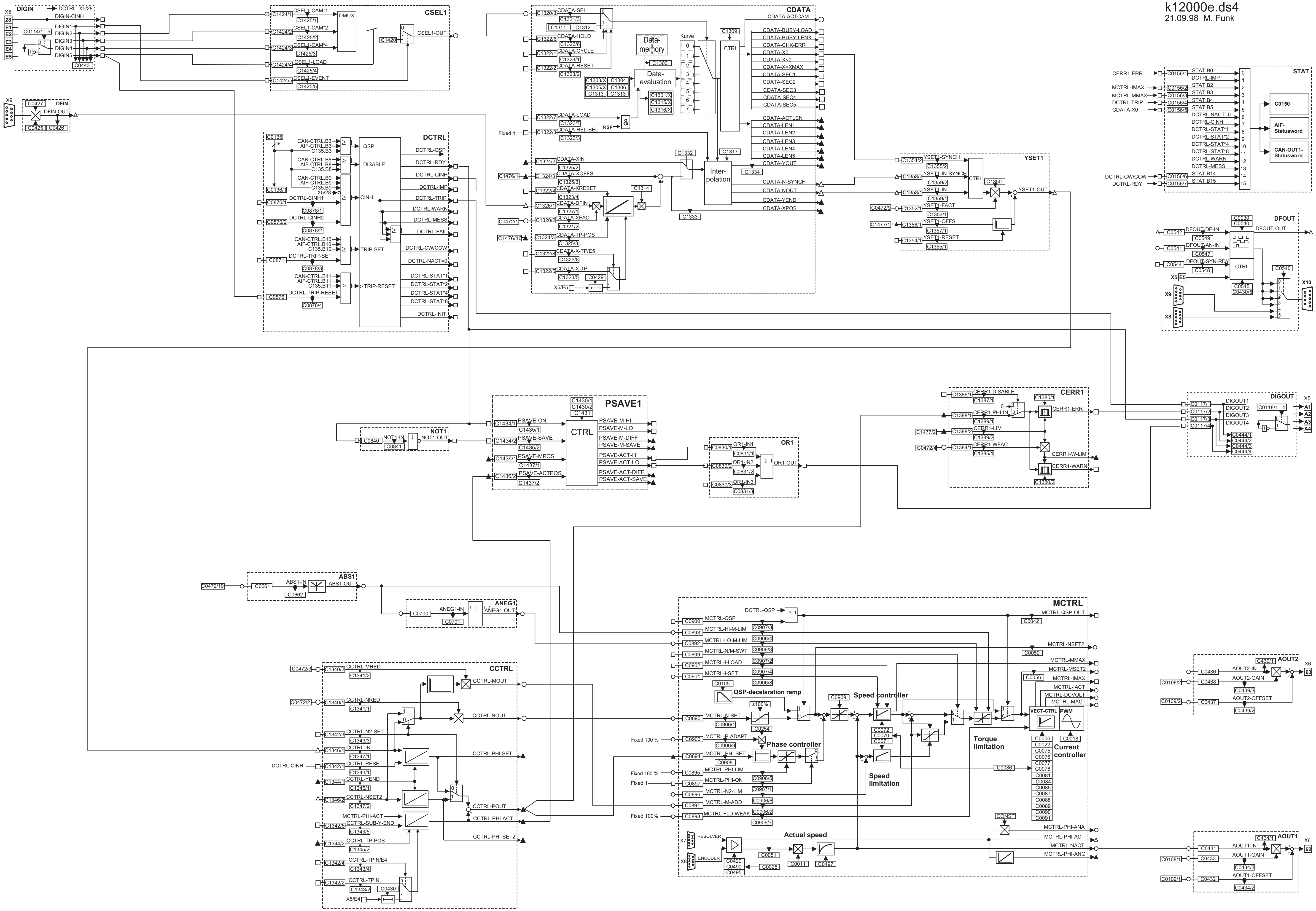

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Configuration 13000

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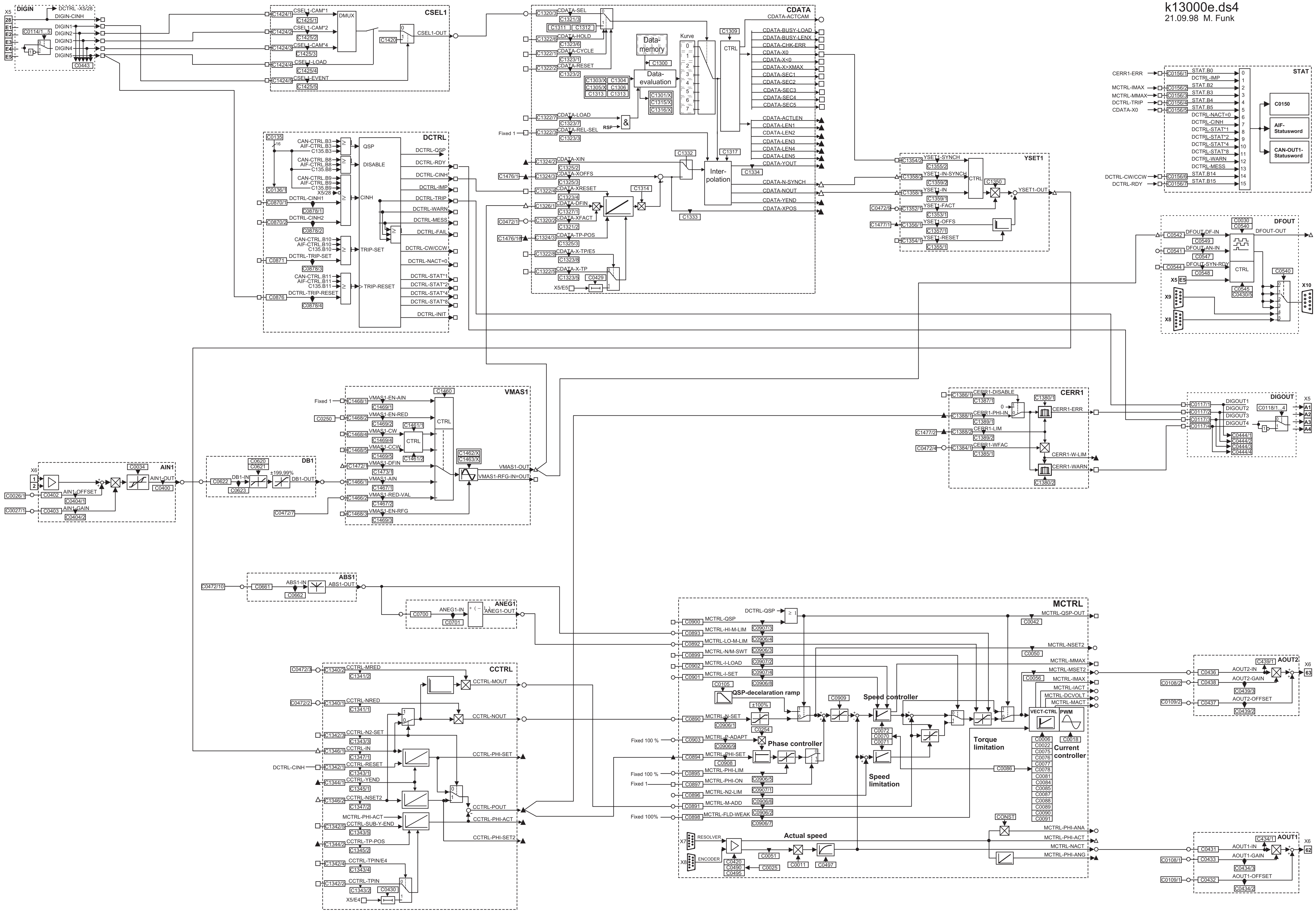

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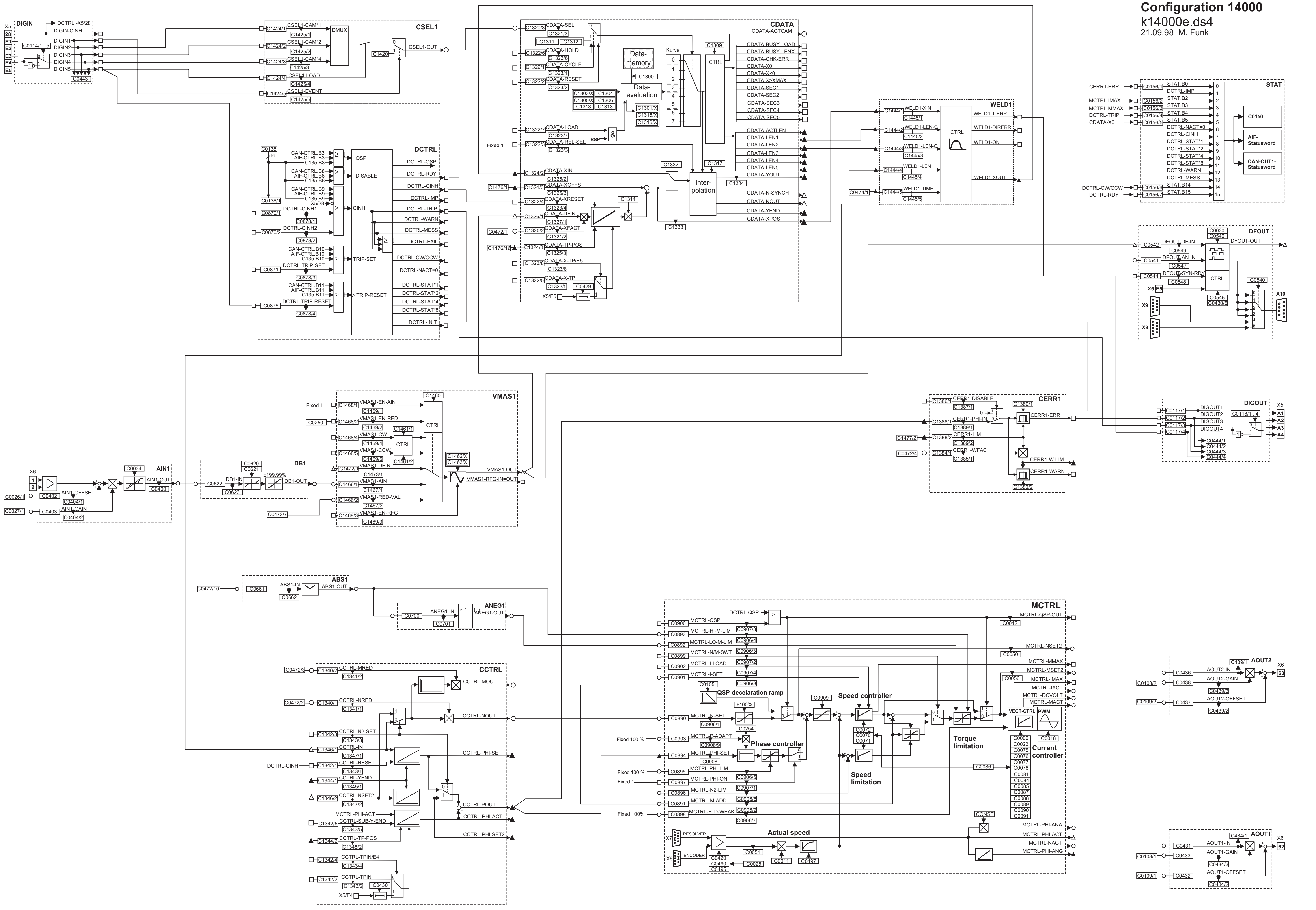

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Configuration 15000

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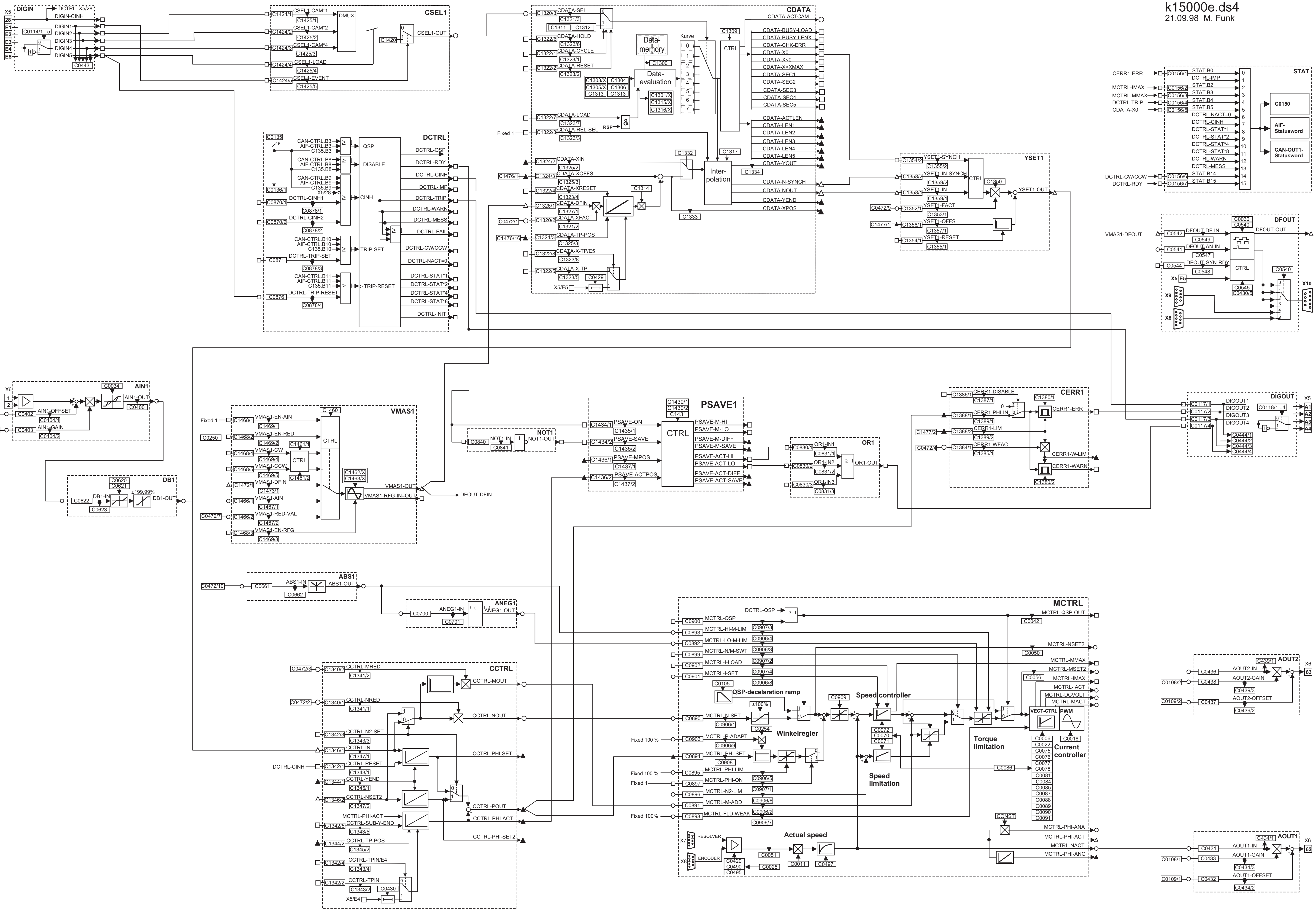

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Servo cam profiler 9300 Configuration 17000

k17000e.ds4

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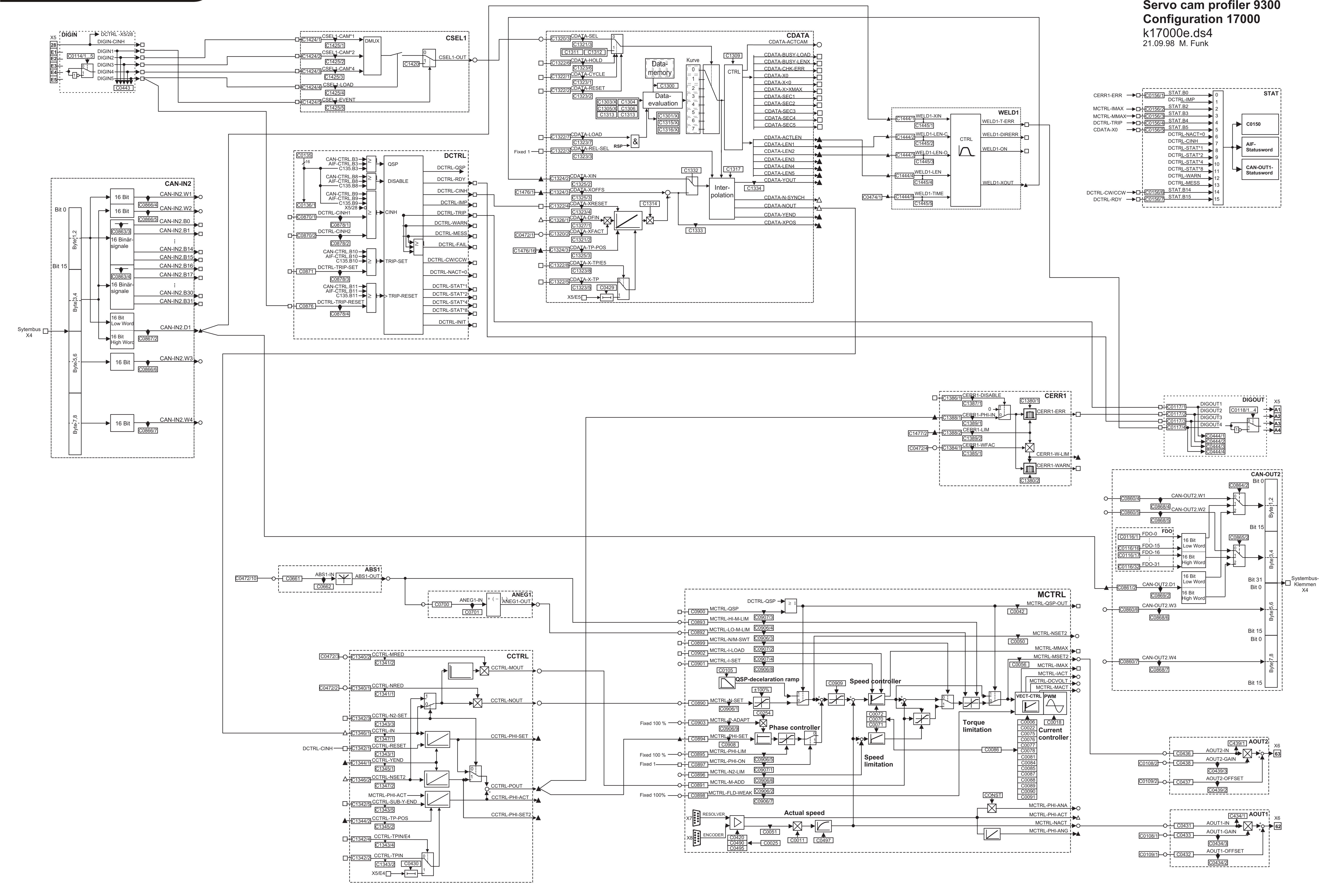

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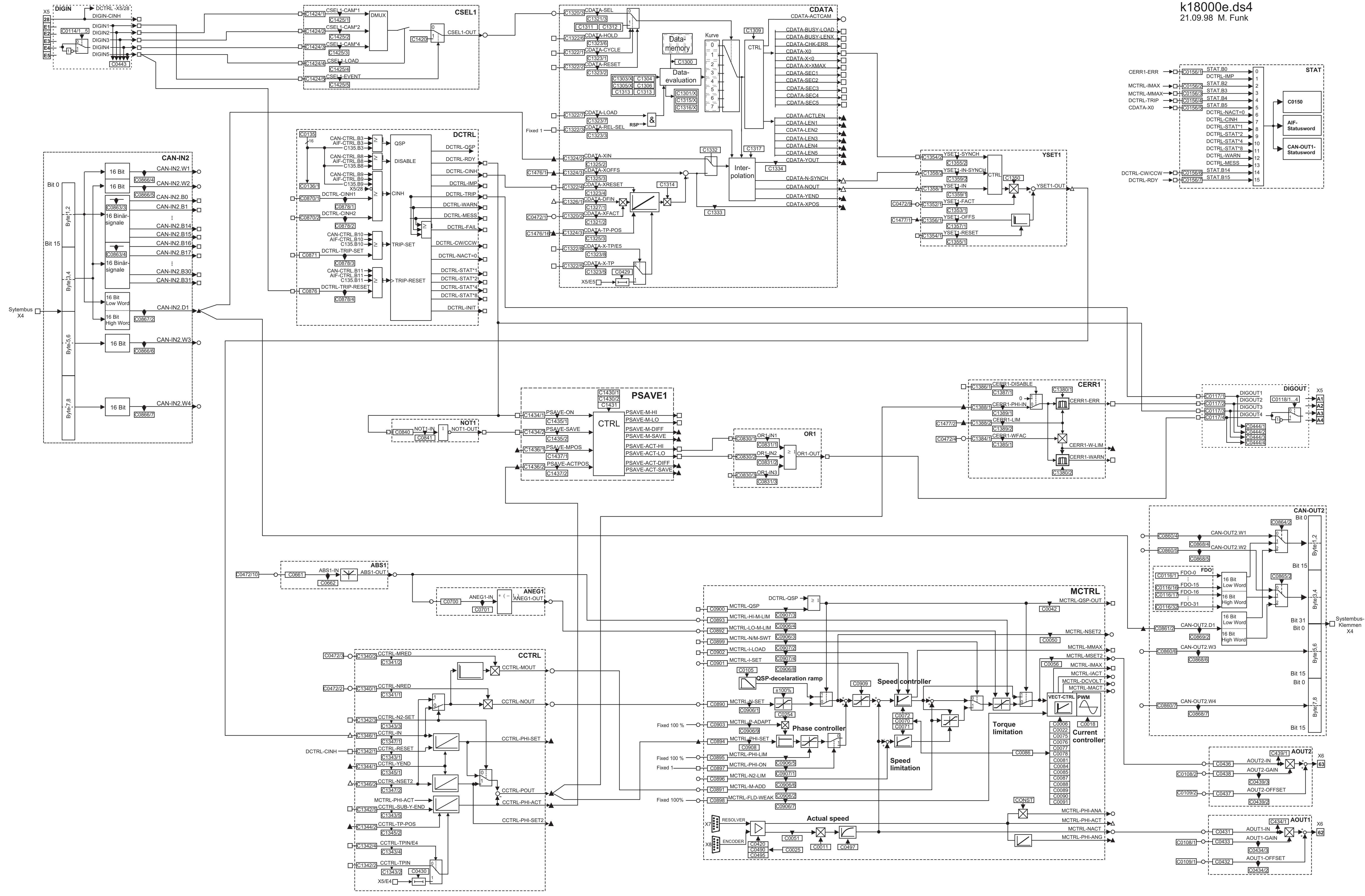
Servo cam profiler 9300
Configuration 18000
k18000e.ds4
21.09.98 M. Funk



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00407358

Lenze

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Glossary

Table of keywords

Global Drive
9300 cam profiler

This documentation is only valid for 9300 cam profilers as of version:

Type	Design	Hardware level and index	Software level and index	Variant	Explanation
33.932X	EK	2x	1x		(9321 - 9329)
33.933X	EK	2x	1x		(9330 - 9332)
33.932X	CK	2x	1x	- V003	Cold Plate (9321 - 9328)

Type

Desgin:
Ex = Built-in unit IP20
Cx = Cold Plate
xK = Cam profiler
xP = Positioning controller
xR = Register controller
xS = Servo inverter

Hardware level and index

Software level and index

Variant

Explanation

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17 Glossary

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.
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)
RFG	Ramp function generator
INTERBUS	Industrial communication standard to DIN E19258
JOG	JOG speed or input for JOG speed
KTY	"Linear" temperature sensor in the motor winding
Target position	The target which is to be approached by means of a defined traversing profile.
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
PM	Permanent magnet
PROFIBUS	Communication standard DIN 19245, consisting of three parts
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.
PTC	PTC thermistor with defined tripping temperature
QSP	Quick stop
Ctrl. enable	Controller enable
Ctrl. inhibit	Controller inhibit (= $\overline{\text{Controller enable}}$)
Contouring error	Deviation between momentary position setpoint and actual position. Display for a momentary following error under C0908.
Contouring error tolerance	If the contouring error reaches a defined contouring error tolerance, a fault indication is released.
Contouring error monitoring	Monitors the momentary following error if the contouring error tolerance is exceeded and releases a fault indication, if necessary.
Slave	Bus participant that must wait for the master's request to send data. Controllers are slaves.
PLC	Programmable logic controller
SSC	Sensorless control
SSI	Synchronous serial interface
TKO	Thermal contact / normally closed contact

Glossary

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