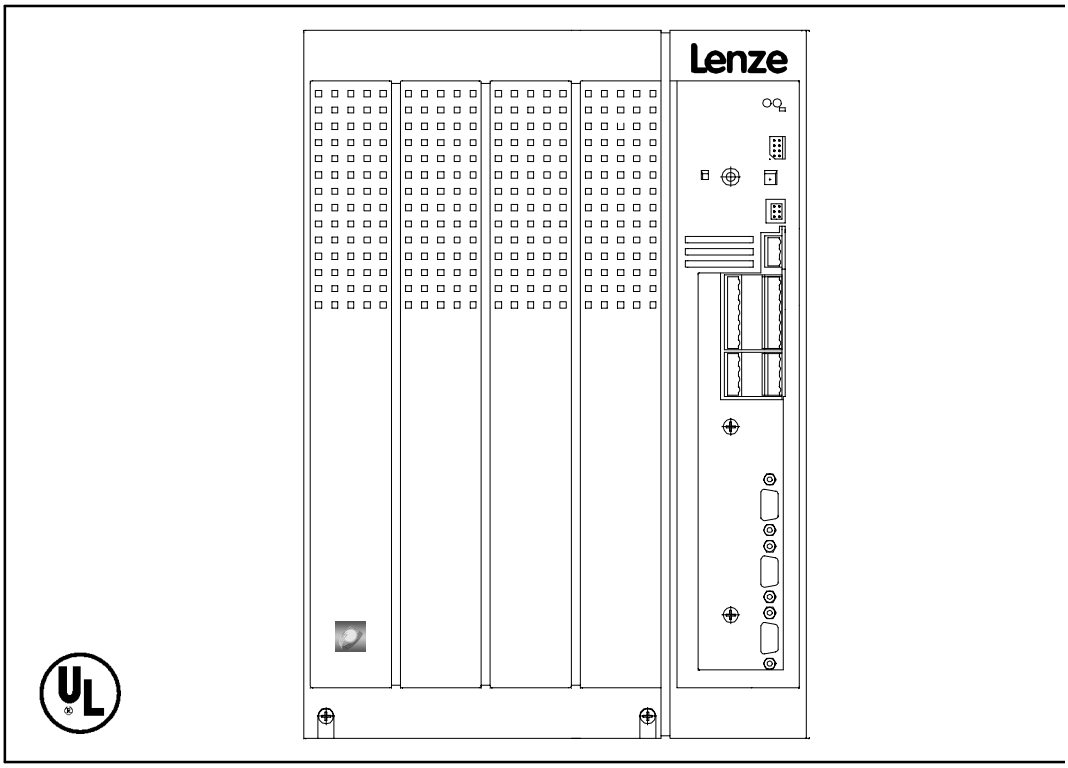
EDB9300UEV
00420707

Lenze

Operating Instructions

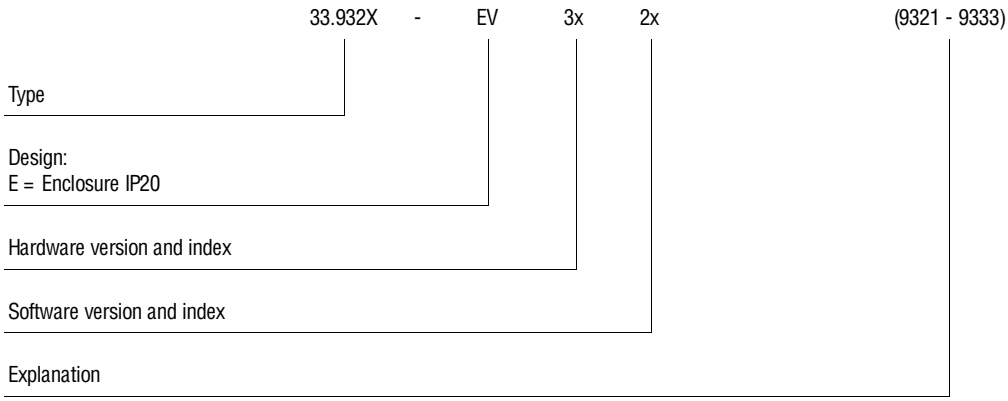


Global Drive

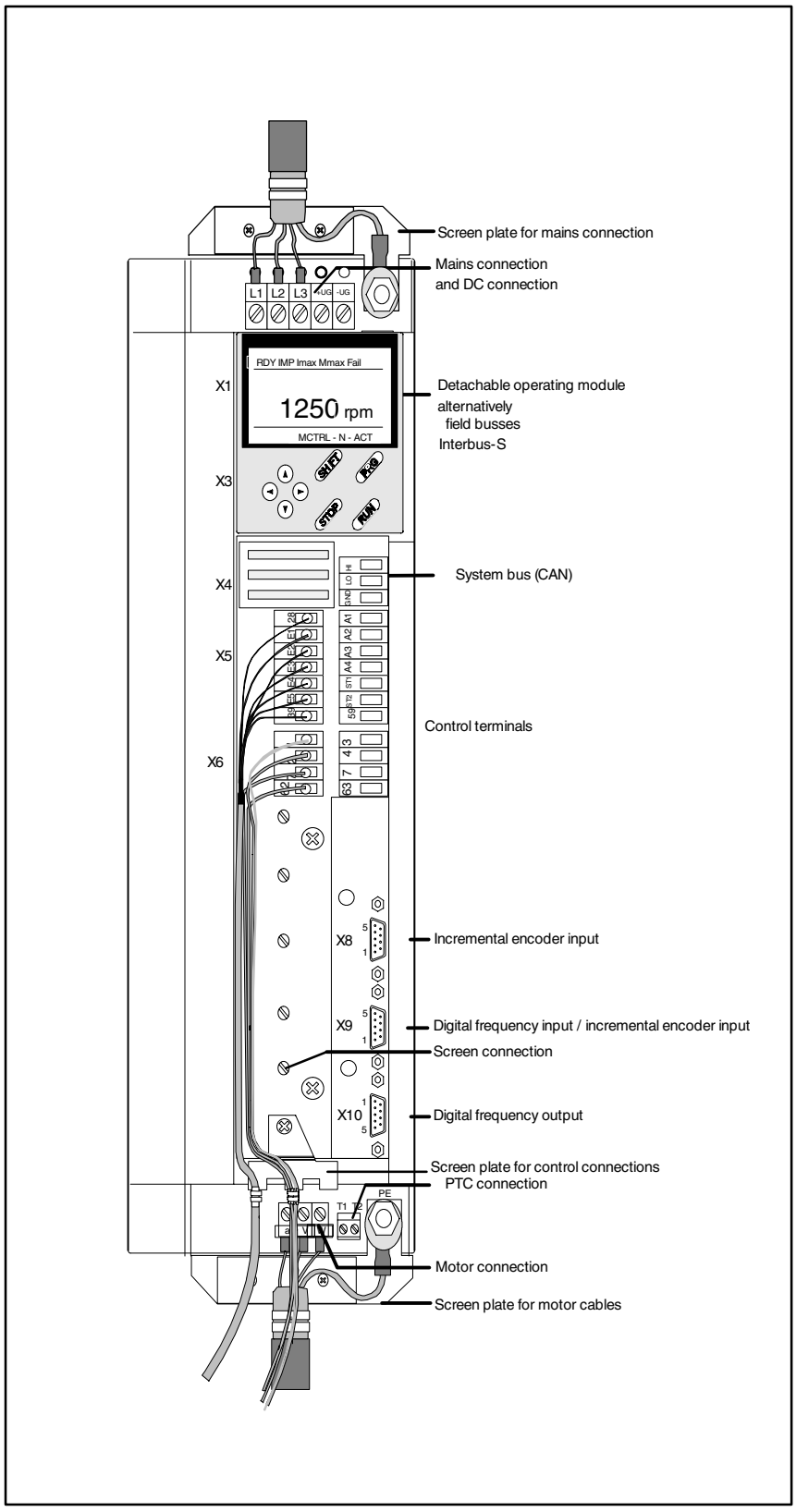
Frequency inverters

9300 vector control

This documentation is valid for controller types 9300 vector control as from the version



Version 3.1 04/2001


Screen plate for mains connection
Mains connection
and DC connection
L1
L2
L3
+UG
-UG
RDY IMP Imax Mmax Fail
1250 rpm
MCTRL - N - ACT
X1
X3
SHIFT
ESC
STOP
RUN
Detachable operating module
alternatively
field busses
Interbus-S
X4
HI
LO
GND
System bus (CAN)
X5
X6
Control terminals
X8
Incremental encoder input
X9
Digital frequency input / incremental encoder input
Screen connection
X10
Digital frequency output
Screen plate for control connections
PTC connection
PE
T1
T2
Motor connection
Screen plate for motor cables

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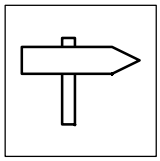

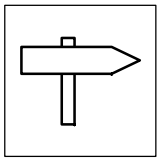

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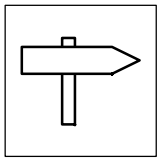
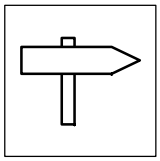




Contents

1 Preface and general information

1.1 How to use these Operating Instructions

- The present Operating Instructions are used for operations concerning safety measures on and with the frequency inverters of the 93XX vector control series. They include safety notes which you must observe.
- All persons working on and with the controllers of the 93XX vector control series must have the operating instructions available and must observe the information and notes relevant for their work.
- The Operating Instructions must always be in a complete and perfectly readable state.

1.1.1 Terminology used

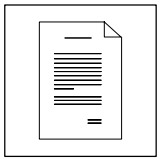
Term	In the following text used for
93XX	Any frequency inverter of the 9300 vector control series
Controller	Frequency inverter 93XX vector control
Drive system	Drive systems with frequency inverters of the 93XX vector control series and other Lenze drive components

1.1.2 What is new?/What has changed?

Id-No.	Version	Important	Changes
00420707	3.1 04/01	replaces 00409137	Technical Data: • General Data/Operating conditions, chapter 3.2 • Ratings, chapter 3.3 • Fuses and cable cross-sections, chapter 3.5 Short commissioning, chapter 5.2 Code table, chapter 7.7 Troubleshooting, chapter 8.1 Application examples, chapter 10.1

1.2 Scope of supply

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



1.3 Legal regulations

Identification	**Nameplate**	**CE-identification**	**Manufacturer**
	Lenze controllers are unambiguously designated by the contents of the nameplate.	Conforms to the EC Low Voltage Directive	Lenze GmbH & Co KG Postfach 101352 D-31763 Hameln
Application as directed	**Controllers 93XX vector control** • Operate the controller only under the conditions prescribed in these operating instructions. • are components – for open- and closed-loop control of variable speed drives with standard AC asynchronous motors or asynchronous servo motors. – for installation in a machine – used for assembly together with other components to form a machine. • are electric units for the installation into control cabinets or similar enclosed operating housing. • comply with the requirements of the Low-Voltage Directive. • are not machines for the purpose of the Machinery Directive. • are not to be used as domestic appliances, but only for industrial purposes. **Drive systems with controllers 93XX vector control** • 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!**		
Liability	• The information, data, and notes in these instructions met the state of the art at the time of printing. Claims on modifications referring to controllers which have already been supplied cannot be derived from the information, illustrations, and descriptions. • The specifications, processes, and circuitry described in these instructions are for guidance only and must be adapted to your own specific application. Lenze does not take responsibility for the suitability of the process and circuit proposals. • The specifications in these instructions describe the product features without guaranteeing them. • Lenze does not accept any liability for damage and operating interference caused by: – disregarding the operating instructions – unauthorized modifications to the controller – operating errors – improper working on and with the controller		
Warranty	• 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.		
Waste disposal	**Material**	**recycle**	**dispose**
	Metal	D	-
	Plastic	D	-
	Assembled PCBs	-	D

2 Safety information

2.1 Safety and application notes for Lenze controllers

(according to: Low-Voltage Directive 73/23/EC)

1. General

During operation, drive controllers may have live, bare, in some cases also movable or rotating parts as well as hot surfaces, depending on their level of protection.

Non-authorized removal of the required cover, inappropriate use, incorrect installation or operation, creates the risk of severe injury to persons or damage to material assets.

Further information can be obtained from the documentation.

All operations concerning transport, installation, and commissioning as well as maintenance must be carried out by qualified, skilled personnel (IEC 364 and CENELEC HD 384 or DIN VDE 0100 and IEC report 664 or DIN VDE 0110 and national regulations for the prevention of accidents must be observed).

According to this basic safety information qualified skilled personnel are persons who are familiar with the erection, assembly, commissioning, and operation of the product and who have the qualifications necessary for their occupation.

2. Application as directed

Drive controllers are components which are designed for installation in electrical systems or machinery.

When installing in machines, commissioning of the drive controllers (i.e. the starting of operation as directed) is prohibited until it is proven that the machine corresponds to the regulations of the EC Directive 89/392/EEC (Machinery Directive); EN 60204 must be observed.

Commissioning (i.e. starting of operation as directed) is only allowed when there is compliance with the EMC Directive (89/336/EEC).

The drive controllers meet the requirements of the Low Voltage Directive 73/23/EEC. The harmonized standards of the prEN 50178/ DINVDE 0160 series together with EN 60439-1/DIN VDE 0660 part 500 and EN60146/DIN VDE 0558 are applicable to drive controllers.

The technical data and information on the connection conditions must be obtained from the nameplate and the documentation and must be observed in all cases.

3. Transport, storage

Notes on transport, storage and appropriate handling must be observed.

Climatic conditions must be observed according to prEN 50178.

4. Erection

The devices must be erected and cooled according to the regulations of the corresponding documentation.

The drive controllers must be protected from inappropriate loads. Particularly during transport and handling, components must not be bent and/or isolating distances must not be changed. Touching of electronic components and contacts must be avoided.

Drive controllers contain electrostatically sensitive components which can easily be damaged by inappropriate handling. Electrical components must not be damaged or destroyed mechanically (health risks are possible!).

5. Electrical connection

When working on live drive controllers, the valid national regulations for the prevention of accidents (e.g. VBG 4) must be observed.

The electrical installation must be carried out according to the appropriate regulations (e.g. cable cross-sections, fuses, PE connection). More detailed information is included in the documentation.

Notes concerning the installation in compliance with EMC - such as screening, grounding, arrangement of filters and laying of cables - are included in the documentation of the drive controllers. These notes must also be observed in all cases for drive controllers with the CE mark. The compliance with the required limit values demanded by the EMC legislation is the responsibility of the manufacturer of the system or machine.

6. Operation

Systems where drive controllers are installed must be equipped, if necessary, with additional monitoring and protective devices according to the valid safety regulations, e.g. law on technical tools, regulations for the prevention of accidents, etc. Modifications of the drive controllers by the operating software are allowed.

After disconnecting the drive controllers from the supply voltage, live parts of the controller and power connections must not be touched immediately, because of possibly charged capacitors. For this, observe the corresponding labels on the drive controllers.

During operation, all covers and doors must be closed.

7. Maintenance and servicing

The manufacturer's documentation must be observed.

This safety information must be kept!

The product-specific safety and application notes in these Operating Instructions must also be observed!

2.2 Residual hazards

Protection of persons	After mains voltage disconnection the power terminals U, V, W and $+U_G$, $-U_G$ carry hazardous voltages at least 3 minutes after mains disconnection. • Before working on the controller, check that no voltage is applied to the power terminals.
Controller protection	Cyclic connection and disconnection of the controller supply voltage at L1, L2, L3 or $+U_G$, $+U_G$ may overload the internal input current load: • Allow at least 3 minutes between disconnection and reconnection.
Overspeeds	Drive systems can reach dangerous overspeeds (e.g. setting high speeds for motors and machines which are not suitable): • The controllers do not offer any protection against these operating conditions. Use additional components for this.

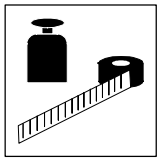
2.3 Layout of the safety information

- All safety information has a uniform layout:
  - The icon characterizes the type of danger.
  - The signal word characterizes the severity of danger.
  - The note text describes the danger and gives information how to prevent dangerous situations.

Signal word

Note

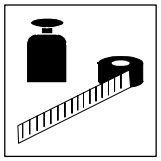
	Icons used		Signal words	
Warning of damage to persons		Warning of hazardous electrical voltage	**Danger!**	Warns of **impeding danger**. Consequences if disregarded: Death or severe injuries.
		Warning of a general danger	**Warning!**	Warns of **potential, very hazardous situation**. Possible consequences if disregarded: Death or severe injuries.
			Caution!	Warns of **a potential, hazardous situation**. Possible consequences if disregarded: Light or minor injuries.
Warning of damage to material			**Stop!**	Warns of **a potential damage to material**. Possible consequences if disregarded: Damage of the controller/drive system or its environment **.**
Other notes			**Tip!**	This note designates general, useful notes. If you observe it, handling of the controller/drive system is made easier.



3 Technical data

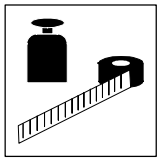
3.1 Features

- Single axis in narrow design
  – thus space-saving installation
- Power range: 370 W to 90 kW
  – uniform control module and thus uniform connection for the control cables over the complete power range
- Power connections from the top (supply) and from the bottom (motor)
  – simple connection for multi-axis applications
- Optimum motor adaptation via automatic detection of the motor parameters
- Integrated process controller (PID)
  – for pressure, temperature, and flow-rate controls, dancer position controls
- U/f characteristic control for single drives and multi-motor applications (several motors connected to one drive)
- Vector-oriented control for single drives
  – Sensorless speed control
- Direct connection of an incremental encoder feedback is possible
  – Pluggable connection cable, TTL and HTL levels possible
- Digital synchronization system via digital frequency
  – Digital frequency input, suitable for TTL and HTL levels
  – error-free offset and gain setpoint transmission
  – speed synchronization
- DC bus connection for multi-axis applications
- Simple programming via PC
- Application configuration for control functions and input/output signals
  – comprehensive function block library
  – high flexibility in the adaptation of the internal control structure to the application
- Integrated automation interface
  – Control and operating functions can be extended easily
- System bus (CAN) for the connection of inverters of the 9300 series and for the extension of input and output terminals
- Approval of standard devices UL508, File No. 132659 (listed) (in preparation)
- Approval 9371 BB (BAE) UL 508, File No. 132659 (listed)



3.2 General data/Operating conditions

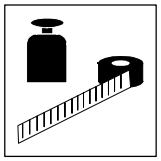
Field	Values
Vibration resistance	Germanischer Lloyd, general conditions
Permissible humidity	Humidity class F without condensation (average relative humidity 85 %)
Permissible temperature ranges	during transport of the controller: -25 °C 0 +70 °C during storage of the controller: -25 °C 0 +55 °C during operation of the controller: 0 °C 0 +40 °C without derating +40 °C 0 +50 °C with derating
Permissible installation height h	h ≤ 1000 m a.m.s.l. without derating 1000 m a.m.s.l. < h ≤ 4000 m a.m.s.l. with derating
Degree of pollution	VDE 0110 part 2 pollution degree 2
Noise emission	Requirements acc. to EN 50081-2, EN 50082-1, IEC 22G-WG4 (Cv) 21 Limit value class A acc. to EN 55011 (industrial area) with mains filter A Limit value class B acc. to EN55022 (residential area) with mains filter B and installation in a control cabinet
Noise immunity	Limit values maintained using mains filter. Requirements acc. to EN 50082-2, IEC 22G-WG4 (Cv) 21 . **Requirements** / **Standard** / **Severities** ESD / EN61000-4-2 / 3, i.e. 8 kV for air discharge and 6 kV for 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. i. 1.2/50 µs, 1 kV phase-phase, 2 kV phase-PE
Insulation strength	Overvoltage category III acc. to VDE 0110
Packing	according to DIN 4180 9321 to 9333: 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 EMC directive UL508: Industrial Control Equipment UL508C: Power Conversion Equipment



3.3 Ratings (Operation with 120 % overload)

3.3.1 Operating conditions

- Operation permitted only:
  – With mains filter or mains choke
  – on mains voltage 3 AC / 400 V /50 Hz / 60 Hz
- Accessories on the mains side:
  – Fuses and cable cross-sections (📖 3-11)
  – Mains filter (📖 3-12)
  – For data of other components see systems manual, part I, “Accessories”
- When C0018 = 6 (default setting) and the maximum output current is exceeded (I_{rmax8} or I_{rmax16}), the chopping frequency is reduced automatically from 8 kHz to 2 kHz.



Technical data

3.3.2 Type 9321 to 9324

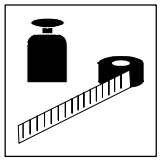
120 % overload capability		Type	9321	9322	9323	9324
		Order no.	EVF9321-EV	EVF9322-EV	EVF9323-EV	EVF9324-EV
	Version "Cold Plate"	Type	**9321-V003**	**9322-V003**	**9323-V003**	**9324-V003**
		Order no.	EVF9321-CVV003	EVF9322-CVV003	EVF9323-CVV003	EVF9324-CVV003
Mains voltage		U_r [V]	320 V ±0 % ≤ U_r ≤ 440 V ±0 % ; 45 Hz 0 65 Hz ±0 %			
Alternative DC supply		U_G [V]	460 V ±0 % ≤ U_G ≤ 620 V ±0 %			
Mains current with mains filter/choke		I_r [A]	1.7	2.8	5.0	8.8
Ratings for operation on a mains: 3 AC / 400 V / 50 Hz / 60 Hz; 460 V ≤ $_G$ ≤ 620 V						
Motor power (4-pole ASM) at 2 kHz / 4 kHz / 8 kHz*		P_r [kW]	0.55	1.1	2.2	4.0
		P_r [hp]	0.75	1.5	2.9	5.4
Output power U, V, W at 2 kHz / 4 kHz / 8 kHz*		$S_{r2/4}$ [kVA] S_{r8} [kVA]	1.3 1.0	2.1 1.7	3.8 2.7	6.5 4.8
Output power $+U_G$, $-U_G$ 1)		P_{DC} [kW]	1.9	0.7	0.0	2.0
Output current	2/4 kHz*	$I_{r2/4}$ [A]	1.8	3.0	5.5	9.2
	8 kHz*	I_{r8} [A]	1.5	2.5	3.9	7.0
	optimum noise 8 kHz*	I_{r8} [A]	1.5	2.5	3.9	7.0
	optimum noise 16 kHz*	I_{r16} [A]	1.1	1.8	2.9	5.2
Max. output current for 60sec2)	2/4 kHz*	$I_{rmax2/4}$ [A]	2.3	3.7	5.9	10.5
	8 kHz*	I_{rmax8} [A]	2.3	3.7	5.9	10.5
	optimum noise 8 kHz*	I_{rmax8} [A]	2.3	3.7	5.9	10.5
	optimum noise 16 kHz*	I_{rmax16} [A]	1.6	2.7	4.3	7.8
Motor voltage 3~ 3)		$_M$ [V]	0 ... U_{Mains} / 0 Hz ... 50 Hz, optionally up to 600 Hz			
Power loss (operation with I_{rx})		P_v [W]	50	65	115	165
Power derating		[%/°C] [%/m]	40 %/°C < T_a < 50 °C: 2 %/°C (no UL approval) 1000 m a.m.s.l. < h ≤ 4000 m a.m.s.l.: 5 %/1000 m			
Speed setpoint	Resolution	relative	2^{14} (related to C0011)			
	Analog setpoint selection	Linearity	±0.5 % (max. selected signal level: 5 V or 10 V)			
		Temperature sensitivity	0 ... 40 °C: +0.4 %			
		Offset	±0 %			
Weight		m [kg]	4.9	4.9	5.8	6.0

1) This power can be additionally obtained from the DC bus when operating a matching motor

2) 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}

3) With mains choke / mains filter: max. output voltage = approx. 96 % of the mains voltage

* Chopper frequency of the inverter



3.3.3 Type 9325 to 9327

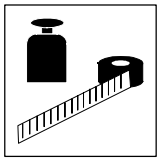
120 % overload capability		**Type**	**9325**	**9326**	**9327**
		Order no.	EVF9325-EV	EVF9326-EV	EVF9327-EV
	Version "Cold Plate"	**Type**	**9325-V003**	**9326-V003**	**9327-V003**
		Order no.	EVF9325-CVV003	EVF9326-CVV003	EVF9327-CVV003
Mains voltage		U_r [V]	320 V ±0 % ≤ U_r ≤ 440 V ±0 % ; 45 Hz 0 65 Hz ±0 %		
Alternative DC supply		U_G [V]	460 V ±0 % ≤ U_G ≤ 620 V ±0 %		
Mains current with mains filter/choke		I_r [A]	15.0	20.5	39.0
Ratings for operation on a mains: 3 AC / 400 V / 50 Hz / 60 Hz; 460 V ≤ a_G ≤ 620 V					
Motor power (4-pole ASM) at 2 kHz / 4 kHz / 8 kHz*		P_r [kW]	7.5	11.0	22.0
		P_r [hp]	10.0	15.0	30.0
Output power U, V, W at 2 kHz / 4 kHz / 8 kHz*		$S_{r2/4}$ [kVA] S_{r8} [kVA]	11.1 9.0	16.3 16.3	29.8 22.2
Output power +U_G, -U_G 1)		P_{DC} [kW]	0.0	0.0	10.2
Output current	2/4 kHz*	$I_{r2/4}$ [A]	15.0	23.5	43.0
	8 kHz*	I_{r8} [A]	13.0	23.5	32.0
	optimum noise 8 kHz*	I_{r8} [A]	13.0	23.5	29.0
	optimum noise 16 kHz*	I_{r16} [A]	9.7	15.2	21.0
Max. output current for 60sec2)	2/4 kHz*	$I_{rmax2/4}$ [A]	19.5	35.3	48.0
	8 kHz*	I_{rmax8} [A]	19.5	35.3	48.0
	optimum noise 8 kHz*	I_{rmax8} [A]	19.5	35.3	43.0
	optimum noise 16 kHz*	I_{rmax16} [A]	14.5	22.9	31.0
Motor voltage 3~ 3)		U_M [V]	0 ... U_{Mains} / 0 Hz ... 50 Hz, optionally up to 600 Hz		
Power loss (operation with I_{rx})		P_v [W]	260	360	640
Power derating		[%/K] [%/m]	40 °C < T_a < 50 °C: 2 %/°C (no UL approval) 1000 m a.m.s.l. < h ≤ 4000 m a.m.s.l.: 5 %/1000 m		
Speed setpoint	Resolution	relative	2^{14} (related to C0011)		
	Analog setpoint selection	Linearity	±0.5 % (max. selected signal level: 5 V or 10 V)		
		Temperature sensitivity	0 ... 40 °C: +0.4 %		
		Offset	±0 %		
Weight		m [kg]	7.8	7.8	18.0

1) This power can be additionally obtained from the DC bus when operating a matching motor

2) 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}

3) With mains choke / mains filter: max. output voltage = approx. 96 % of the mains voltage

* Chopping frequency of the inverter (C0018)



3.3.4 Type 9328 to 9330

120 % overload capability		**Type**	**9328**	**9329** [4]	**9330**
		Order no.	EVF9328-EV	EVF9329-EV	EVF9330-EV
	Version "Cold Plate"	**Type**	**9328-V003**	-	-
		Order no.	EVF9328-CVV003	-	-
Mains voltage		U_r [V]	320 V ±0 % ≤ U_r ≤ 440 V ±0% ; 45 Hz 0 65 Hz ±0 %		
Alternative DC supply		U_G [V]	460 V ±0 % ≤ U_G ≤ 620 V ±0 %		
Mains current with mains filter / choke		I_r [A]	50.0	60.0	97.0
Ratings for operation on a mains: 3 AC / 400 V / 50 Hz / 60 Hz; 460 V ≤ a_G ≤ 620 V					
Motor power (4-pole ASM) at 2 kHz / 4 kHz / 8 kHz*		P_r [kW]	30.0	37.5	55.0
		P_r [hp]	40.0	50.0	74.0
Output power U, V, W at 2 kHz / 4 kHz / 8 kHz*		$S_{r2/4}$ [kVA] S_{r8} [kVA]	39.5 32.6	46.4 41.6	74.8 61.7
Output power +U_G, -U_G [1]		P_{DC} [kW]	4.0	0.0	5.1
Output current	2/4 kHz*	$I_{r2/4}$ [A]	56.0	66.0	100.0
	8 kHz*	I_{r8} [A]	47.0	59.0	89.0
	optimum noise 8 kHz*	I_{r8} [A]	43.0	47.0	59.0
	optimum noise 16 kHz*	I_{r16} [A]	30.0	35.0	46.0
Max. output current for 60sec [2]	2/4 kHz*	$I_{rmax2/4}$ [A]	70.5	88.5	134.0
	8 kHz*	I_{rmax8} [A]	70.5	88.5	134.0
	optimum noise 8 kHz*	I_{rmax8} [A]	64.0	70.5	88.0
	optimum noise 16 kHz*	I_{rmax16} [A]	45.0	52.5	69.0
Motor voltage 3~ [3]		U_M [V]	0 ... U_{Mains} / 0 Hz ... 50 Hz, optionally up to 600 Hz		
Power loss (operation with I_{rx})		P_V [W]	610		1350
Power derating		[%/°C] [%/m]	40 °C < T_a < 50 °C: 2 %/°C (no UL approval) 1000 m a.m.s.l. < h ≤ 4000 m a.m.s.l.: 5 %/1000 m		
Speed setpoint	Resolution	relative	2^{14} (related to C0011)		
	Analog setpoint selection	Linearity	±0.5 % (max. selected signal level: 5 V or 10 V)		
		Temperature sensitivity	0 ... 40 °C: +0.4 %		
		Offset	±0 %		
Weight		m [kg]	18	18	36

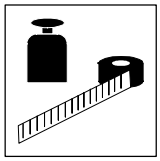
1) This power can be additionally obtained from the DC bus when operating a matching motor

2) 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}

3) With mains choke / mains filter: max. output voltage = approx. 96 % of the mains voltage

4) Max. ambient temperature during operation without power derating: +35 °C

* Chopping frequency of the inverter (C0018)



3.3.5 Type 9331 to 9333

120 % overload capability		**Type**	**9331** [4]	**9332**	**9333** [4]
		Order no.	EVF9331-EV	EVF9332-EV	EVF9333-EV
Mains voltage		U_r [V]	320 V ±0 % ≤ U_r ≤ 440 V ±0 % ; 45 Hz 0 65 Hz ±0 %		
Alternative DC supply		U_G [V]	460 V ±0 % ≤ U_G ≤ 620 V ±0 %		
Mains current with mains filter/choke		I_r [A]	119.0	144.0	185.0
Ratings for operation on a mains: 3 AC / 400 V / 50 Hz / 60 Hz; 460 V ≤ U_G ≤ 620 V					
Motor power (4-pole ASM) at 2 kHz / 4 kHz / 8 kHz*		P_r [kW]	75.0	90.0	110.0
		P_r [hp]	100.0	120.0	148.0
Output power U, V, W at 2 kHz / 4 kHz / 8 kHz*		$S_{r2/4}$ [kVA] S_{r8} [kVA]	91.5 76.2	110.0 103.9	142.0 124.7
Output power +U_G, -U_G [1]		P_{DC} [kW]	0	28.1	40.8
Output current	2/4 kHz*	$I_{r2/4}$ [A]	135.0	159.0	205.0
	8 kHz*	I_{r8} [A]	110.0	150.0	171.0
	optimum noise 8 kHz*	I_{r8} [A]	76.0	92.0	100.0
	optimum noise 16 kHz*	I_{r16} [A]	52.0	58.0	63.0
Max. output current for 60 sec [2]	2/4 kHz*	$I_{rmax2/4}$ [A]	165.0	225.0	270.0
	8 kHz*	I_{rmax8} [A]	165.0	225.0	221.0
	optimum noise 8 kHz*	I_{rmax8} [A]	114.0	138.5	150.0
	optimum noise 16 kHz*	I_{rmax16} [A]	78.0	87.0	94.0
Motor voltage 3~ [3]		U_M [V]	0 ... U_{Mains} / 0 Hz ... 50 Hz, optionally up to 600 Hz		
Power loss (operation with I_{rx})		P_V [W]	1470	2100	2400
Power derating		[%/°C] [%/m]	40 °C < T_a < 50 °C: 2.5 %/°C (no UL approval) 1000 m a.m.s.l. < h ≤ 4000 m a.m.s.l.: 5 %/1000 m		
Speed setpoint	Resolution	relative	2^{14} (related to C0011)		
	Analog setpoint selection	Linearity	±0.5 % (max. selected signal level: 5 V or 10 V)		
		Temperature sensitivity	0 ... 40 °C: +0.4 %		
		Offset	±0 %		
Weight		m [kg]	38	70	70

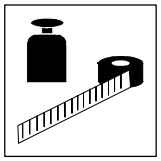
1) This power can be additionally obtained from the DC bus when operating a matching motor

2) 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}

3) With mains choke / mains filter: max. output voltage = approx. 96 % of the mains voltage

4) Max. ambient temperature during operation without power derating: +35 °C

* Chopping frequency of the inverter (C0018)



3.4 Ratings (Operation with 150 % overload)

3.4.1 Operating conditions

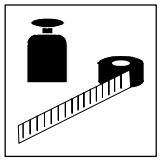
- Operation permitted only:
  – on mains voltage 3 AC / 400 ... 480 V / 50 Hz / 60 Hz
- Operate the controller types 9324, 9326, 9328 ... 9333 only with a suitable mains filter.
- Accessories on the mains side:
  – Fuses and cable cross-sections (📖 3-11)
  – Mains filter (📖 3-12)
  – For data of other components see systems manual, part I, “Accessories”
- When C0018 = 6 (default setting) and the maximum output current is exceeded (I_{rmax8}, the chopping frequency is reduced automatically from 8 kHz to 2 kHz.

3.4.2 Ratings for type 9321 to 9324

150 % overload capability		**Type**	**9321**		**9322**		**9323**		**9324**	
Mains voltage		U_r [V]	320 V ± 0 % ≤ U_r ≤ 528 V ± 0 % ; 45 Hz 0 65 Hz ± 0 %							
Alternative DC supply		U_G [V]	460 V ± 0 % ≤ U_G ≤ 740 V ± 0 %							
Mains current with mains filter/choke without mains filter/choke		 I_{Mains} [A] I_{Mains} [A]	 1.5 2.1		 2.5 3.5		 3.9 5.5		 7.0 -	
Ratings for operation on a mains: 3 AC / 400 V / 50 Hz / 60 Hz; 460 V ≤ U_G ≤ 620 V or 3 AC / 480 V / 50 Hz / 60 Hz; 460 V ≤ U_G ≤ 740 V			400 V	480 V	400 V	480 V	400 V	480 V	400V	480 V
Motor power (4-pole ASM) at 2 kHz / 4 kHz / 8 kHz*		P_r [kW] P_r [hp]	0.37 0.5	0.37 0.5	0.75 1.0	0.75 1.0	1.5 2.0	1.5 2.0	3.0 4.0	3.0 4.0
Output power U, V, W at 2 kHz / 4 kHz / 8kHz*		$S_{r2/4}$ [kVA] S_{r8} [kVA]	1.0 1.0	1.2 1.2	1.7 1.7	2.1 2.1	2.7 2.7	3.2 3.2	4.8 4.8	5.6 5.6
Output power + U_G, - U_G		P_{DC} [kW]	1.9	2.3	0.7	0.9	0.0	0.0	2.0	2.5
Output current	2/4 kHz*	$I_{r2/4}$ [A]	1.5	1.5	2.5	2.5	3.9	3.9	7.0	7.0
	8 kHz*	I_{r8} [A]	1.5	1.5	2.5	2.5	3.9	3.9	7.0	7.0
	optimum noise 8 kHz*	I_{r8} [A]	1.5	1.5	2.5	2.5	3.9	3.9	7.0	7.0
	optimum noise 16 kHz*	I_{r16} [A]	1.1	1.1	1.8	1.8	2.9	2.9	5.2	5.2
Max. output current for 60 sec	2/4 kHz*	$I_{rmax2/4}$ [A]	2.2	2.2	3.7	3.7	5.8	5.8	10.5	10.5
	8 kHz*	I_{rmax8}[A]	2.2	2.2	3.7	3.7	5.8	5.8	10.5	10.5
	optimum noise 8 kHz*	I_{rmax8} [A]	2.2	2.2	3.7	3.7	5.8	5.8	10.5	10.5
	optimum noise 16 kHz*	I_{rmax16} [A]	1.6	1.6	2.7	2.7	4.3	4.3	7.8	7.8
Power loss (operation with I_{rx})		P_v [W]	50		65		100		150	

* Chopper frequency of the inverter

All other data (📖 3-4)



3.4.3 Ratings for type 9325 to 9327

150 % overload capability		Type	9325		9326		9327	
Mains voltage		U_r [V]	320 V ±0 % ≤ U_r ≤ 528 V ±0 % ; 45 Hz 0 65 Hz ±0 %					
Alternative DC supply		U_G [V]	460 V ±0 % ≤ U_G ≤ 740 V ±0 %					
Mains current with mains filter/choke without mains filter/choke		 I_{Mains} [A] I_{Mains} [A]	 12.0 16.8		 20.5 -		 29.0 43.5	
Ratings for operation on a mains: 3 AC / 400 V / 50 Hz / 60 Hz; 460 V ≤ U_G ≤ 620 V or 3 AC / 480 V / 50 Hz / 60 Hz; 460 V ≤ U_G ≤ 740 V			400 V	480 V	400 V	480 V	400 V	480 V
Motor power (4-pole ASM) at 2 kHz / 4 kHz / 8 kHz*		P_r [kW]	5.5	5.5	11.0	11.0	15.0	18.5
		P_r [hp]	7.5	7.5	15.0	15.0	20.0	25.0
Output power U, V, W at 2 kHz / 4 kHz / 8kHz*		$S_{r2/4}$ [kVA] S_{r8} [kVA]	9.0 9.0	10.8 10.8	16.3 16.3	18.5 18.5	22.2 22.2	26.6 26.6
Output power +U_G, -U_G		P_{DC} [kW]	0.0	0.0	0.0	0.0	10.2	11.8
Output current	2/4 kHz*	$I_{r2/4}$ [A]	13.0	13.0	23.5	22.3	32.0	30.4
	8 kHz*	I_{r8} [A]	13.0	13.0	23.5	22.3	32.0	30.4
	optimum noise 8 kHz*	I_{r8} [A]	13.0	13.0	23.5	22.3	29.0	27.0
	optimum noise 16 kHz*	I_{r16} [A]	9.7	9.7	15.2	14.6	21.0	19.0
Max. output current for 60 sec	2/4 kHz*	$I_{rmax2/4}$ [A]	19.5	19.5	35.0	33.5	48.0	45.6
	8 kHz*	I_{rmax8} [A]	19.5	19.5	35.0	33.5	48.0	45.6
	optimum noise 8 kHz*	I_{rmax8} [A]	19.5	19.5	35.0	33.5	43.0	41.0
	optimum noise 16 kHz*	I_{rmax16} [A]	14.5	14.5	22.9	21.8	31.0	29.0
Power loss (operation with I_{rx})		P_v [W]	210		360		430	

* Chopper frequency of the inverter

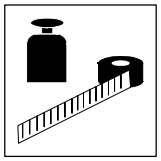
All other data (🕮 3-5)

3.4.4 Ratings for type 9328 to 9330

150 % overload capability		Type	9328		9329		9330	
Mains voltage		U_r [V]	320 V ±0 % ≤ U_r ≤ 528 V ±0 % ; 45 Hz 0 65 Hz ±0 %					
Alternative DC supply		U_G [V]	460 V ±0 % ≤ U_G ≤ 740 V ±0 %					
Mains current with mains filter/choke without mains filter/choke		 I_{Mains} [A] I_{Mains} [A]	 42.0 -		 55.0 -		 80.0 -	
Ratings for operation on a mains: 3 AC / 400 V / 50 Hz / 60 Hz; 460 V ≤ U_G ≤ 620 V or 3 AC / 480 V / 50 Hz / 60 Hz; 460 V ≤ U_G ≤ 740 V			400 V	480 V	400 V	480 V	400 V	480 V
Motor power (4-pole ASM) at 2 kHz / 4 kHz / 8 kHz*		P_r [kW]	22.0	30.0	30.0	37.0	45.0	55.0
		P_r [hp]	30.0	40.0	40.0	49.5	60.0	74.0
Output power U, V, W at 2 kHz / 4 kHz / 8kHz*		$S_{r2/4}$ [kVA] S_{r8} [kVA]	32.6 32.6	39.1 39.1	41.6 41.6	49.9 49.9	61.7 61.7	73.9 73.9
Output power +U_G, -U_G		P_{DC} [kW]	4.0	4.6	0.0	0.0	5.1	5.9
Output current	2/4 kHz*	$I_{r2/4}$ [A]	47.0	44.7	59.0	56.0	89.0	84.0
	8 kHz*	I_{r8} [A]	47.0	44.7	59.0	56.0	89.0	84.0
	optimum noise 8 kHz*	I_{r8} [A]	43.0	41.0	47.0	44.0	59.0	55.0
	optimum noise 16 kHz*	I_{r16} [A]	30.0	29.0	35.0	33.0	46.0	44.0
Max. output current for 60 sec	2/4 kHz*	$I_{rmax2/4}$ [A]	70.5	67.0	89.0	84.0	134.0	126.0
	8 kHz*	I_{rmax8} [A]	70.5	67.0	89.0	84.0	134.0	126.0
	optimum noise 8 kHz*	I_{rmax8} [A]	64.0	61.0	70.0	66.0	88.0	82.0
	optimum noise 16 kHz*	I_{rmax16} [A]	46.0	43.0	53.0	49.0	69.0	65.0
Power loss (operation with I_{rx})		P_v [W]	640		810		1100	

* Chopper frequency of the inverter

All other data (🕮 3-6)

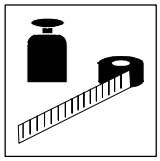


3.4.5 Ratings for type 9331 to 9333

150 % overload capability		**Type**	**9331**		**9332**		**9333**	
Mains voltage		U_r [V]	320 V ±0 % ≤ U_r ≤ 528 V ±0 % ; 45 Hz 0 65 Hz ±0 %					
Alternative DC supply		U_G [V]	460 V ±0% ≤ U_G ≤ 740 V ±0 %					
Mains current with mains filter/choke without mains filter/choke		 I_{Mains} [A] I_{Mains} [A]	 100.0 -		 135.0 -		 165.0 -	
Ratings for operation on a mains: 3 AC / 400 V / 50 Hz / 60 Hz; 460 V ≤ U_G ≤ 620 V or 3 AC / 480 V / 50 Hz / 60 Hz; 460 V ≤ U_G ≤ 740 V								
			400 V	480 V	400 V	480 V	400 V	480 V
Motor power (4-pole ASM) at 2 kHz / 4 kHz / 8 kHz*		P_r [kW]	55.0	75.0	75.0	90.0	90.0	110.0
		P_r [hp]	74.0	100.0	100.0	120.0	120.0	148.0
Output power U, V, W at 2 kHz / 4 kHz / 8kHz*		$S_{r2/4}$ [kVA] S_{r8} [kVA]	76.2 76.2	91.4 91.4	103.9 103.9	124.0 124.0	131.2 124.7	158.2 149.0
Output power +U_G, -U_G		P_{DC} [kW]	0.0	0.0	28.1	32.4	40.6	47.1
Output current	2/4 kHz*	$I_{r2/4}$ [A]	110.0	105.0	150.0	142.0	180.0	171.0
	8 kHz*	I_{r8} [A]	110.0	105.0	150.0	142.0	147.0	141.0
	optimum noise 8 kHz*	I_{r8} [A]	76.0	71.0	92.0	87.0	100.0	94.0
	optimum noise 16 kHz*	I_{r16} [A]	52.0	49.5	58.0	55.0	63.0	59.0
Max. output current for 60 sec	2/4 kHz*	$I_{rmax2/4}$ [A]	165.0	157.0	225.0	213.0	270.0	256.0
	8 kHz*	I_{rmax8} [A]	165.0	157.0	225.0	213.0	221.0	211.0
	optimum noise 8 kHz*	I_{rmax8} [A]	114.0	107.0	138.0	130.0	150.0	141.0
	optimum noise 16 kHz*	I_{rmax16} [A]	78.0	74.0	87.0	83.0	94.0	89.0
Power loss (operation with I_{rx})		P_v [W]	1470		1960		2400	

* Chopper frequency of the inverter

All other data (📖 3-7)



3.5 Fuses and cable cross-sections

3.5.1 Operation of controllers in a UL-approved system

- Only use UL-approved fuses and fuse holders:
  – 500 V to 600 V in the mains input (AC)
  – 700 V in the DC bus circuit
  – Activation characteristic ”H” or ”K5”
- Only use UL-approved cables

Tip!

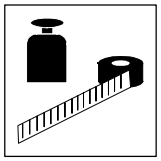
UL-approved fuses and fuse holders can be obtained from e.g. Bussmann or Ferraz.

3.5.2 Single drives with 120 % overload capability

The values in the table are valid for the operation of controllers with matching motor.

Type	Mains input L1, L2, L3, PE/motor connection U, V, W, PE Operation only with mains filter / mains choke				
	Fuse F1, F2, F3		E.l.c.b.	Cable cross-section [1]	
	VDE	UL	VDE	mm^2	AWG
9321	M 6A	5A	B 6A	1	17
9322	M 6A	5A	B 6A	1	17
9323	M 10A	10A	B 10A	1.5	15
9324	M 10A	10A	B 10A	1.5	15
9325	M 20A	20A	B 20A	4	11
9326	M 32A	25A	B 32A	6	10
9327	M 50A	50A	-	16	5
9328	M 63A	63A	-	25	3
9329	M 80A	80A	-	25	3
9330	M 125A	125A	-	70	2/0
9331	M 160A	175A	-	95	3/0
9332	M 160A	175A	-	95	3/0
9333	M 200A	200A	-	120	4/0

[1] The valid local regulations must be observed



3.5.3 Single drives with 150 % overload capability

The values in the table are valid for the operation of controllers with matching motor.

Type	Mains input L1, L2, L3, PE/motor connection U, V, W, PE									
	Operation without mains filter / mains choke					Operation with mains filter / mains choke				
	Fuse		E.l.c.b.	Cable cross-section [1]		Fuse		E.l.c.b.	Cable cross-section [1]	
	VDE	UL	VDE	mm^2	AWG	VDE	UL	VDE	mm^2	AWG
9321	M 6A	5A	B 6A	1	17	M 6A	5A	B 6A	1	17
9322	M 6A	5A	B 6A	1	17	M 6A	5A	B 6A	1	17
9323	M 10A	10A	B 10A	1.5	15	M 10A	10A	B 10A	1.5	15
9324	-	-	-	-	-	M 10A	10A	B 10A	1.5	15
9325	M 32A	25A	B 25A	6	10	M 20A	20A	B 20A	4	11
9326	-	-	-	-	-	M 32A	25A	B 32A	6	10
9327	M 63A	-	-	16	5	M 35A	35A	-	10	7
9328	-	-	-	-	-	M 50A	50A	-	16	5
9329	-	-	-	-	-	M 80A	80A	-	25	3
9330	-	-	-	-	-	M 100A	100A	-	50	0
9331	-	-	-	-	-	M 125A	125A	-	70	2/0
9332	-	-	-	-	-	M 160A	175A	-	95	3/0
9333	-	-	-	-	-	M 200A	200	-	120	4/0

[1] The valid local regulations must be observed

3.6 Mains filter

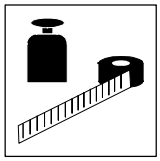
3.6.1 Mains filters for single drives with 120 % overload capability

The filter assignment is valid for the operation of controllers with a matching motor.

Type	Ratings (uk ≈ 6 %)		Lenze order number	
	Mains current	Inductance	for RFI degree A	for RFI degree B
9321	1.5 A	24.00 mH	EZN3A2400H002	EZN3B1500H003
9322	2.5 A	15.00 mH	EZN3A1500H003	EZN3B0900H004
9323	5.0 A	7.50 mH	EZN3A0750H005	EZN3B0750H005
9324	9.0 A	4.00 mH	EZN3A0400H009	EZN3B0400H009
9325	13.0 A	3.00 mH	EZN3A0300H013	EZN3B0250H015
9326	24.0 A	1.50 mH	EZN3A0150H024	EZN3B0150H024
9327	42.0 A	0.80 mH	EZN3A0080H042	EZN3B0080H042
9328	54.0 A	0.80 mH	EZN3A0060H054	EZN3B0060H054
9329	60.0 A	0.55 mH	EZN3A0055H060	EZN3B0055H060
9330	110.0 A	0.30 mH	EZN3A0030H110	EZN3B0030H110
9331	110.0 A	0.30 mH	EZN3A0030H110*	EZN3B0030H110*
9332	150.0 A	0.22 mH	EZN3A0022H150	EZN3B0022H150
9333	200.0 A	0.17 mH	EZN3A0017H200	EZN3B0017H200

* max. ambient temperature during operation without power derating: +35 °C

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

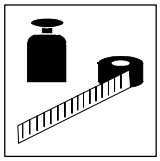


3.6.2 Mains filters for single drives with 150 % overload capability

The filter assignment is valid for the operation of controllers with a matching motor.

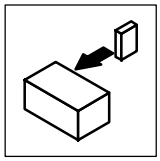
Type	Ratings (uk ≈ 6 %)		Lenze order number	
	Mains current	Inductance	for RFI degree A	for RFI degree B
9321	1.50 A	24.00 mH	EZN3A2400H002	EZN3B2400H002
9322	2.5 A	15.00 mH	EZN3A1500H003	EZN3B1500H003
9323	4.0 A	9.00 mH	EZN3A0900H004	EZN3B0900H004
9324	7.0 A	5.00 mH	EZN3A0500H007	EZN3B0500H007
9325	13.0 A	3.00 mH	EZN3A0250H013	EZN3B0250H013
9326	24.0 A	1.50 mH	EZN3A0150H024	EZN3B0150H024
9327	32.0 A	1.10 mH	EZN3A0110H030	EZN3B0110H030
9328	47.0 A	0.80 mH	EZN3A0080H042	EZN3B0080H042
9329	60.0 A	0.55 mH	EZN3A0055H060	EZN3B0055H060
9330	90.0 A	0.37 mH	EZN3A0037H090	EZN3B0037H090
9331	110.0 A	0.30 mH	EZN3A0030H110	EZN3B0030H110
9332	150.0 A	0.22 mH	EZN3A0022H150	EZN3B0022H150
9333	200.0 A	0.17 mH	EZN3A0017H200	EZN3B0017H200

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



3.7 Dimensions

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



4 Installation

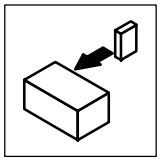
4.1 Mechanical installation

4.1.1 Important notes

- Use the controllers only as built-in devices!
- Observe the free space requirements!
  – You can install several controllers next to each other without free space in a control cabinet.
  – Allow a free space of 100 mm at the top and at the bottom.
- Ensure unimpeded ventilation of cooling air and outlet of exhaust air.
- If the cooling air contains pollutants (dust, flakes, grease, aggressive gases), which may impair the function of the controller:
  – Take suitable preventive measures , e.g. separate air duct, installation of filters, regular cleaning, etc.
- Do not exceed the permissible range of the operating ambient temperature. (📖 3-2)
- If the controllers are permanently subjected to vibration or shaking:
  – 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)
  – Version V003, thermally separated with an external radiator in ”Cold Plate” technology (e.g. with convection cooling).



4.1.2 Standard assembly with fixing rails or fixing brackets

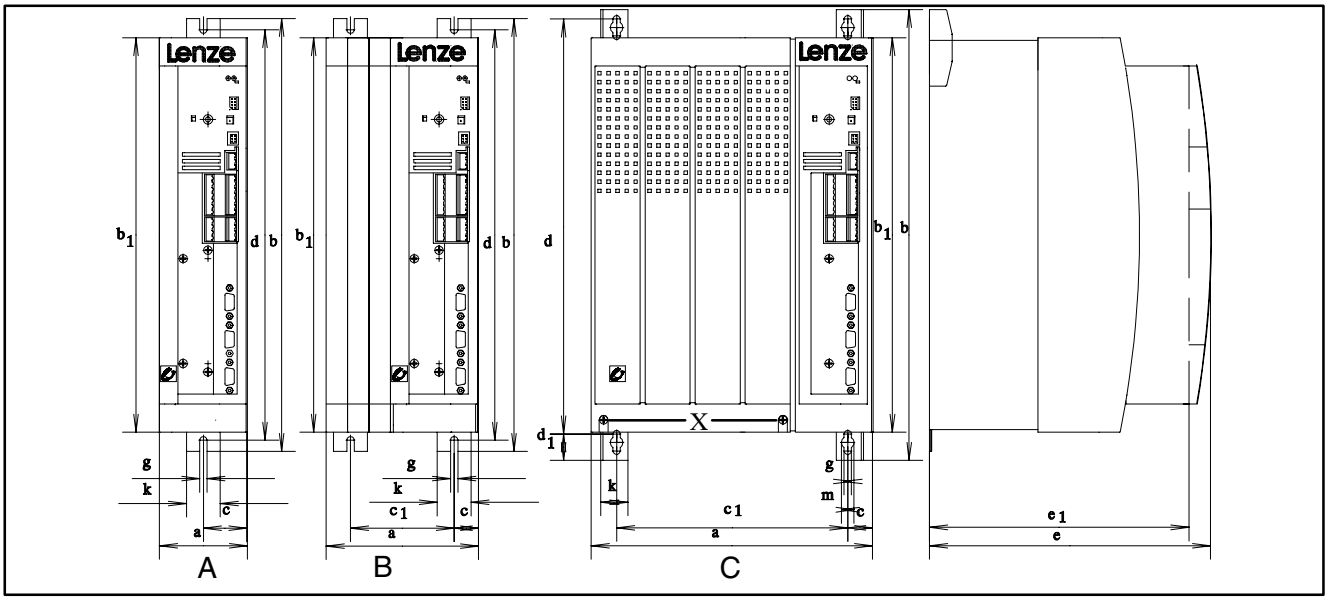


Fig. 4-1 Dimensions for assembly with fixing rails / fixing brackets

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	580	510	28.5	283	532	38	285	265	11	24	18
9331	C	340	672	591	28.5	283	624	38	285	265	11	28	18
9332, 9333	C	450	748.5	680	30.5	389	702	38	285	265	11	28	18

* When using a plug-on field bus module, allow a free space for assembling the connecting cable

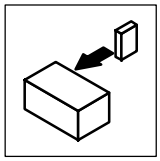
All dimensions in mm

Controllers 9321 to 9326

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

Controller types 9327 to 9333

- Remove cover:
  – Loosen screws (X)
  – Swing cover upwards, and detach.
  – Take accessory kit out of the interior of the controller
- Assembly preparation:
  – Take out fixing bracket and screws (accessory kit) and mount onto the controller housing



4.1.3 Assembly of the ”Cold Plate” version

4.1.3.1 General

Applications

- Use of radiators without independent blowers:
  – an intense pollution of the cooling air, for example, prevents the operation of external blowers, since it would have a negative effect on the correct functioning and on the operable life.
- High protection level with thermal separation:
  – if thermal separation must be achieved because of the heat developed within the control cabinet, and the level of protection for the external blower must be better than IP41.
- Use of the drive controller directly at the machine, with reduced mounting depth:
  – Parts of the machine construction take over the cooling function
- Common cooling units (water radiator, forced convection cooler etc.) for all drive controllers are provided in the system concept.
- For continuous power outputs > 22 kW convection cooling is technically not achievable. In such cases, forced convection (e.g with water cooling)is required.

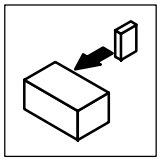
4.1.3.2 Requirements for the cooler/radiator

The waste heat generated by the drive controller can be removed by coolers/radiators that operate with various media (air, water, oil etc.).

In addition to the characteristics specified by the user, the following points are important fro reliable operation of the drive controller:

- good thermal contact with the cooler:
  – the contact area between the cooler and the drive controller must be at least as large as the cooling plate of the drive controller.
  – the surface flatness of the contact area must be approx. 0.05 mm.
  – the cooler and heatsink must be attached using all the screwed joints that are specified.
  – (📖 4-5 ff: further information)
- Thermal resistance $R_{thmin\ heatsink}$ (transition from cooler to cooling medium) must be within the values in the table. The values apply for
  – operating the drive controller under rated conditions. (📖 3-3 ff.)
  – a maximum heatsink temperature of 75 °C; for measurement point: see Fig. 4-2, Fig. 4-3.

Drive controller / brake units	Cooling path	
	power to be dissipated P_{vAR} [W]	$R_{thmin\ heatsink}$ [°C/W]
9321-V003	24	1.45
9322-V003	42	0.85
9323-V003	61	0.57
9324-V003	105	0.33
9325-V003	180	0.19
9326-V003	360	0.10
9327-V003	410	0.085
9328-V003	610	0.057
9351-V003	100	0.3
9352-V003	63	0.3



4.1.3.3 Thermal response of the complete system

The thermal behaviour of a system is affected by several ambient factors. When dimensioning a control cabinet / a system, please observe the following points:

Ambient temperature of the drive controller

The rated data and the derating for higher temperatures still apply for the ambient temperature of the drive controller.

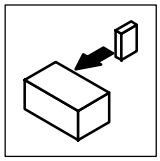
Heat dissipation inside control cabinets

In addition to the heat generated by the instruments, that is removed via the external coolers/radiators, there are further losses that must be taken into account during dimensioning:

- Losses within the drive controller:
  – these losses arise in the electronics supply, blower, DC-link(DC-bus) capacitors etc.
- Losses in the mains supply and motor side components:
  – the losses in these components can be found in the corresponding technical data (catalogue part I).
- Heat radiated by the external radiator in the enclosed space:
  – this portion of the thermal energy depends on the type of cooling aggregate, its mounting and other factors.
  – no data available at present.
- 9327-V003 and 9328-V003 with other coolers:
  – no data available at present, empirical determination is necessary.

Heat distribution between common heatsinks/coolers within the control cabinet

If you assemble several components (drive controller, brake units etc.) on a common radiator/cooler, then care must be taken that the temperature of the drive heatsink does not exceed 75 °C.

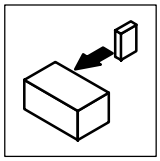


4.1.3.4 Assembly preparation

- Apply heat-conducting paste before bolting together the cooler and the heatsink of the drive controller, to keep the thermal resistance as low as possible.
- The quantity of heat-conducting paste supplied in the package is sufficient for an area of approx. 1000 cm^2.

Applying the heat-conducting paste

1. Clean the area of contact between the heatsink and the cooler with methylated spirits.
2. Apply the heat-conducting paste thinly, with a palette knife or a brush.



4.1.3.5 Mounting type 9321-V003 ... 9326-V003

- Mount the drive controller onto the heatsink, using the mounting brackets and the M5 x 20 bolts.
- Tightening torque: 3.4 Nm.

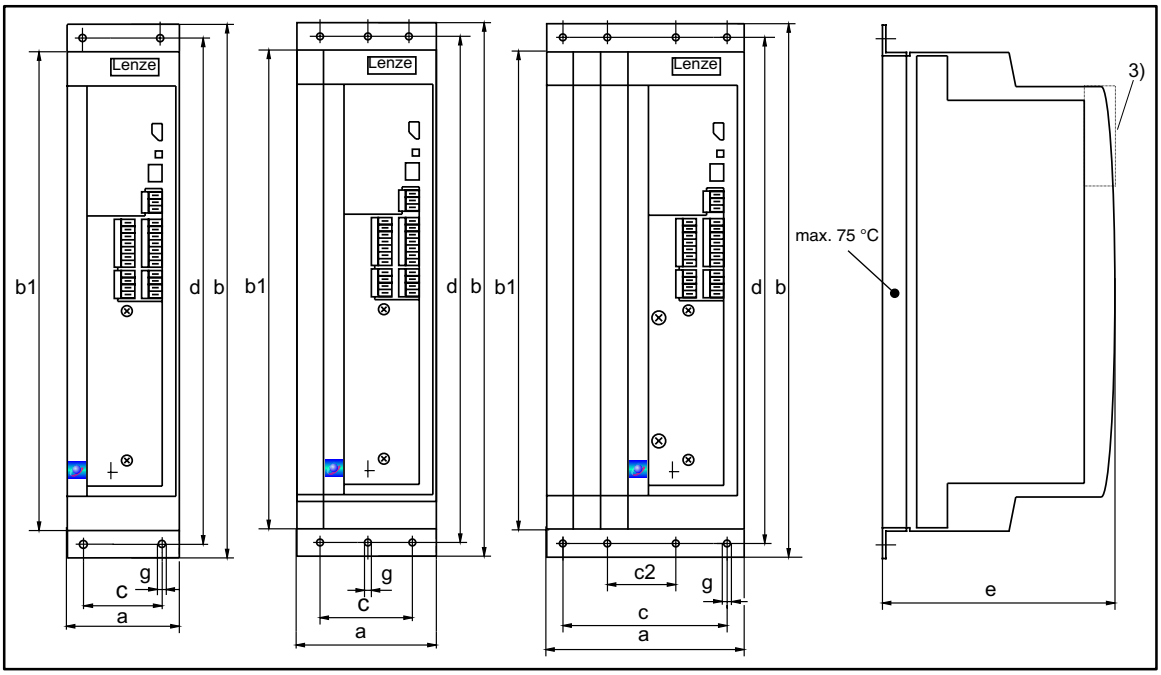
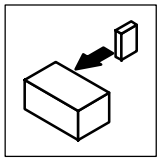


Fig. 4-2 Dimensions for 9321-V003 ... 9326-V003: mounting in a switchgear cabinet

Type	a	b	b1	c	c2	d	e 3)	g
9321-V003 **9322-V003**	78	381	350	48	-	367	168	6.5
9323-V003 **9324-V003**	97	381	350	67	-	367	168	6.5
9325-V003 **9326-V003**	135	381	350	105	38	367	168	6.5

All data indicated in mm

3) with pluggable fieldbus or I/O module:
Allow for the mounting depth and the space for installing the connecting cables



4.1.3.6 Mounting type 9327-V003 and 9328-V003

- Fix the drive controller to the heatsink, using the M5 x 25 fixing bolts.
- Tightening torque: 3.4 Nm.

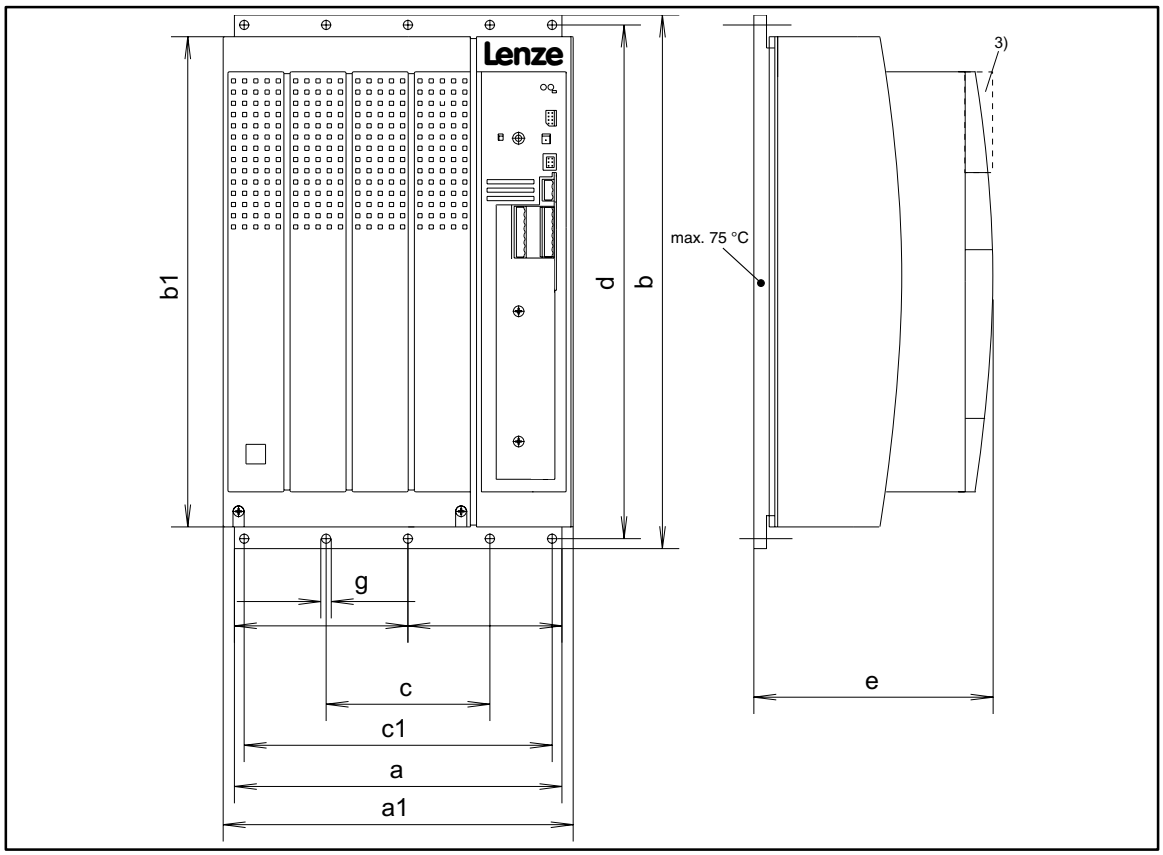
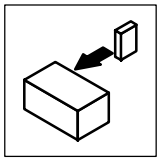


Fig. 4-3 Dimensions for 9327-V003 and 9328-V003: installation in a switchgear cabinet

Type	a	a1	b	b1	c	c1	d	e [3]	g
9327-V003 **9328-V003**	234	250	381	350	110	220	367	171	6.5

All data indicated in mm

3) with pluggable fieldbus or I/O module:
Allow for the mounting depth and the space for installing the connecting cables



4.2 Electrical installation

For information on the installation according to EMC see chapter 4.3. (📖 4-33)

4.2.1 Protection of persons

Danger!

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

Symbol on the RCCB	Meaning
	AC sensitive RCCB, type AC
	pulse-current sensitive RCCB, type A)
	universal-current sensitive RCCB, type B

For “residual-current circuit breaker” the expression “RCCB” is used in the following text.

Protection of persons and animals

DIN VDE 0100 with residual-current operated protective devices (RCCB):

- The controllers have an internal mains rectifier. In the event of a short-circuit to frame, a DC fault current can prevent the activation of the AC-sensitive or pulse-current sensitive RCCB and thus block the protective function for all electrical equipment operated on this RCCB. We therefore recommend:
  - ”pulse-current sensitive RCCB” in systems with controllers on a single-phase AC mains.
  - ”universal-current RCCB” in systems with controllers on a 3-phase mains.

Rated fault current

Observe the rated fault current for the selection of the RCCB.
The RCCB may cause false tripping because of:

- capacitive leakage currents between cable screens (especially with long screened motor cables),
- the simultaneous connection of several controllers to the mains supply,
- use of RFI filters.

Installation

You can install RCCBs only between the mains supply and the controller.

Note for the use of universal-current sensitive RCCBs

- Universal-current sensitive RCCBs have been defined for the first time in the European standard EN 50178 (as of October 1997). The EN 50178 was harmonized and has been effective since October 1997. It supersedes the national standard VDE 0160. Universal-current sensitive RCCBs are also described in the IEC 755.
- RCCBs with a fated fault current of:
  - 30 mA are suitable only in systems with controllers on a single-phase AC mains supply.
  - 300 mA are suitable in systems with controllers on a 3-phase mains.

Mains isolation / Protection against contact

The control inputs and outputs of all controllers are isolated from the mains. Please observe the description of the protection against contact on the following page.

Replace defective fuses

Replace defective fuses with the prescribed type only when no voltage is applied.

- 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.

Disconnect controller from the mains

Make a safety connection/disconnection between the controller and the mains only via a contactor on the input side.

- Please note that in a drive network all controllers must be inhibited.

Mains isolation

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 insulation (double isolating distance, safe insulation according to VDE0160). The protection against contact is ensured without any further measures.

Danger!

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

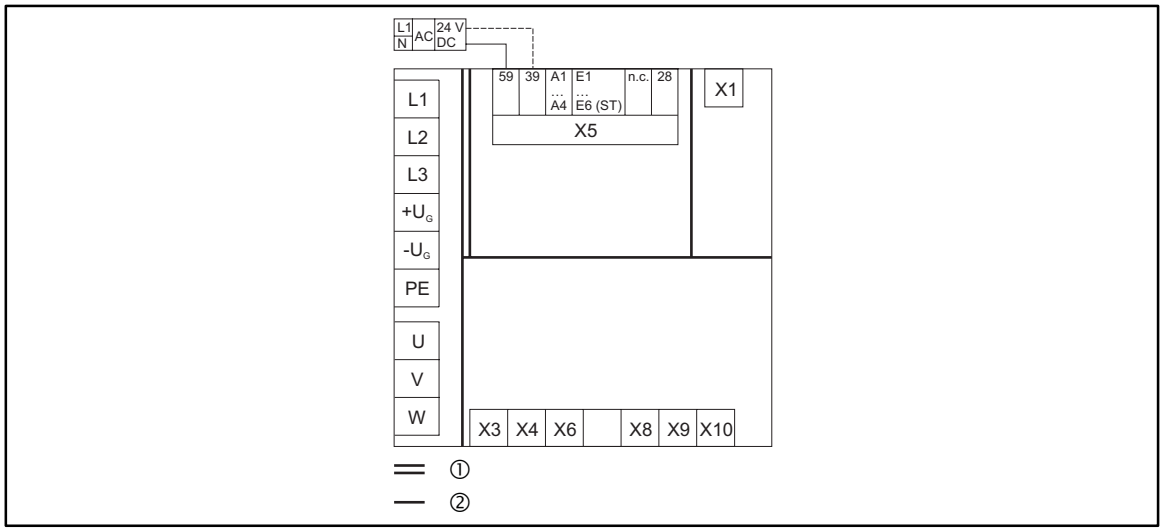
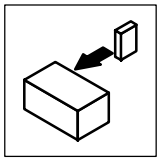


Fig. 4-4 Basic insulation on the controller

① reinforced insulation
② simple basic insulation



4.2.2 Protection of the controller

Stop!

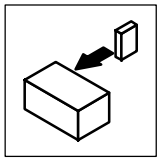
The controllers contain electrostatically sensitive components.

- The personnel must be free of electrostatic charge prior to assembly and service operations:
  – 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 of the screen cable/screen plate for type 9327 to 9333: < 12 mm.
- Frequent mains switching can overload the internal inrush-current limitation.For cyclic mains switching, the controller must not be switched more frequently than every three minutes.
- Operate the controller types 9324, 9326, 9328 and 9330 ... 9333 only with a suitable mains filter. (📖 3-13)
- The controller is protected by external fuses. (📖 3-11)
- In the event of condensation, connect the controller to the mains voltage only after the visible humidity has evaporated.
- Cover unused control inputs and outputs with plugs or with protective covers (included in the scope of supply) for the Sub-D inputs.

4.2.3 Motor protection

- Complete motor protection according to VDE:
  – By overcurrent relays or temperature monitoring
  – Required for group drives
  (motors connected in parallel to a controller)
  – We recommend using a PTC or thermostat with PTC characteristic (thermostats are standard in Lenze standard AC asynchronous DERAXX/DFRAXX) for temperature monitoring of the motor.
- 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 drive.



4.2.4 Mains types / mains conditions

Please observe the restrictions of each mains type!

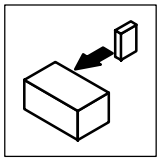
Mains	Operation of the controllers	Notes
With grounded neutral (TT/TN mains)	No restrictions	Observe controller ratings
with isolated neutral (IT mains)	Possible, if the controller is protected in the event of an earth fault in the mains supply • by suitable equipment for detecting an earth fault and • the controller is disconnected directly from the mains	A safe operation is not ensured at the inverter output in the event of an earth fault
With grounded phase	The operation is possible only with one version	Contact Lenze
DC supply via $+U_G/-U_G$	The DC voltage must be symmetrical with respect to PE	The controller will be destroyed if the $+U_G$ or $-U_G$ conductor is grounded

4.2.5 Interactions with compensation equipment

- Controllers only consume a very small fundamental reactive power from the AC mains. A compensation is therefore not necessary.
- If you operate controllers on mains with compensation equipment, you must use chokes for this equipment.
  – Please consult the supplier of the compensation equipment.

4.2.6 Specification of the cable used

- The cables used must comply with the required approvals of the application (e.g. UL).
- The prescribed minimum cross-sections for 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.
  – the contact ratio of the screen braid:
    at least 70 % to 80 % with cover angle 90°



4.2.7 Power connections

Controller	Preparation 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 ... 9333	• Remove cover: – Loosen screws (X) (see Fig. 4-1). – Swing cover upwards and detach. – Take accessory kit out of the interior of the controller.

4.2.7.1 Mains connection

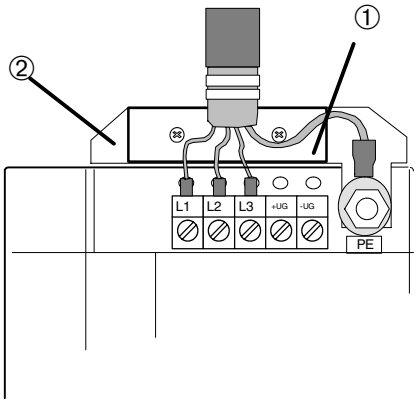
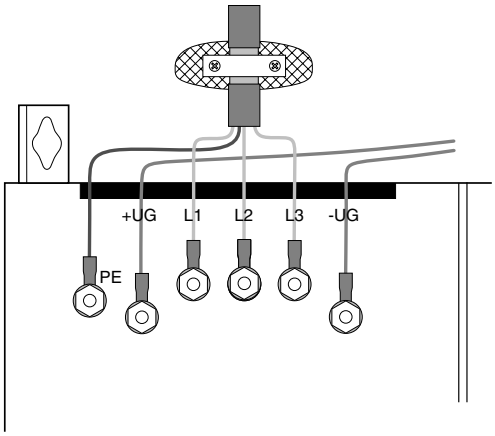
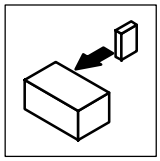
Type 9321 to 9326	Type 9327 to 9333
	
Make the correct screen connection with screened cables (required parts in the accessory kit): • Bolt screen plate ① to fixing brackets ②. • Fix screen using cable lugs. Do not use as a strain relief! • To improve the screen connection: Connect screen additionally 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. 4-5 Recommendation for a mains connection



- Connect 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 screw tightening torques:

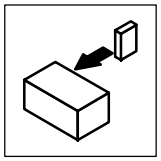
Type	Terminals		
	max. permissible cable cross-sections	L1, L2, L3, +UG, -UG	PE connection
9321 - 9326	4 mm² 1)	0.5 ... 0.6 Nm (4.4 ... 5.3 lbin)	3.4 Nm (30 lbin)
9327 - 9329	25 mm² 2)	4 Nm (35 lbin)	
9330 - 9331	95 mm² 2)	7 Nm (62 lbin)	
9332 - 9333	120 mm² 2)	12 Nm (106.2 lbin)	

1) with plug connector: 6 mm²
with wire crimp cap: 4 mm²

2) with ring cable lug: Cross-section is limited only by the cable entry in the housing

Fuses

Fuses and cable cross-sections	The specifications in Chapter 3.5 are recommendations. (🕮 3-11) They refer to the use • in control cabinets and machines • installation in the cable duct • max. ambient temperature +40 °C.
Selection of the cable cross-section	Take the voltage drop under load (acc. to DIN 18015 part 1: 3 %) into account for the selection. ≤ 3 %).
Protection of the cables and the controller on the AC side (L1, L2, L3)	• By standard commercial fuses. • Fuses in UL-conform plant 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 by "H" or "K5".
Protection of the cables and the drive controller on the DC side (+UG, -UG) (+UG, -UG)	• By means of recommended DC fuses. • The fuses /fuse holders recommended by Lenze are all UL approved.
For DC-bus connection or supply by means of a DC source	Please observe the notes in part F of the systems manual.
Connection of a brake unit	If the brake unit is connected to the terminals +UG / -UG, the fuses and cross-sections listed in Chapter 3.5 are not valid for the brake unit. These unit-specific data can be obtained from the technical documentation of the brake unit.
Further information	🕮 3-11 Protection of the cables and controllers
Other standards	The compliance with other standards (e.g. VDE 0113, VDE 0289) remains the responsibility of the user.

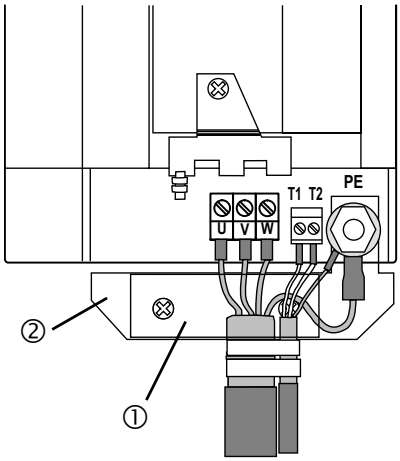
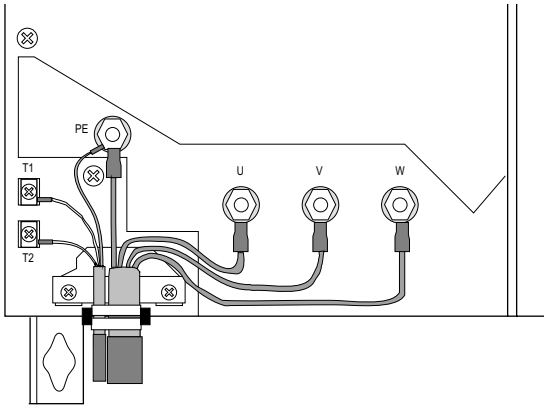


4.2.7.2 Motor connection

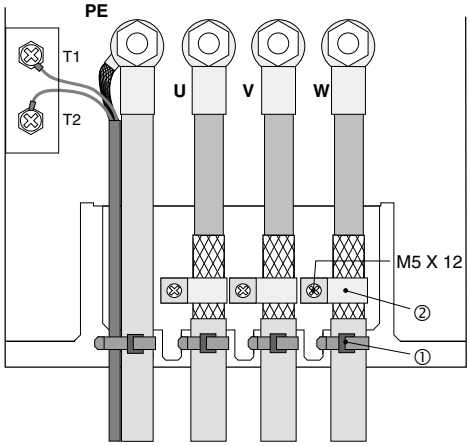
To ensure proper EMC suppression, we recommend using only screened motor cables.

Tip!

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

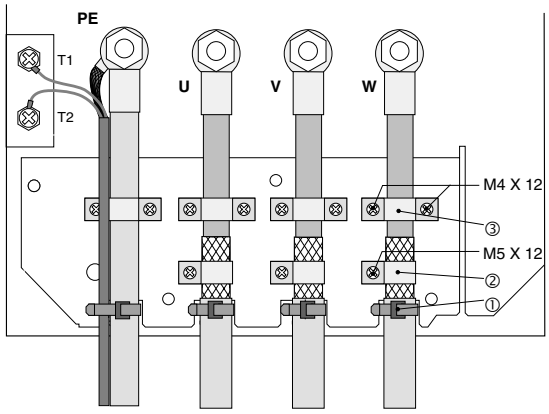
Type 9321 to 9326	
	Make a correct screen connection with screened cables (required parts in the accessory kit): • Bolt screen plate ① to fixing brackets ②. • Fix the screen of the motor cable and thermostat. Do not use as a strain relief! • To improve the screen connection: Connect screens additionally to the PE stud next to the motor connections.
Type 9327 to 9329	
	Make a correct screen connection with screened cables: • Fix the screen of the motor cable and thermostat. Do not use as a strain relief! • To improve the screen connection: Connect screens additionally to the PE stud next to the motor connections.

Type 9330 and 9331

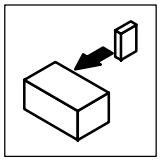


- Relieve strain using cable binders ①.
- Make a correct screen connection with screened cables:
  – Apply motor cable screen to the screening plate using clamp and screws M5x12 ②.
  – Connect the thermostat screen to the PE stud next to the motor connections over a large surface.

Type 9332 and 9333



- Relieve strain using clamps and M4x12 bolts ③.
  – An additional strain relief/fixing is possible with cable binders ①.
- Make a correct screen connection with screened cables:
  – Apply motor cable screen to the screening plate using clamp and M5x12 bolts ②.
  – Connect the thermostat screen to the PE stud next to the motor connections over a large surface.



Installation

- The motor cable should be as short as possible, because of the positive effect on the drive characteristic.
  - The table below indicates the relationship of the motor cable length and the (possibly) required output filters.
  - For group drives (several motors connected to one controller) it is necessary to calculate the resulting cable length I_{res}:

I_{res} = Total length of all motor cables @ number of motor cables

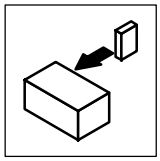
  - The values in the table below apply for switching frequencies ≤ 8 kHz (C0018 = 0, 1, 2, 3, 4, 6). When the drive controller is operated with switching frequencies > 8 kHz then other measures may be necessary. Please consult Lenze.
  - When using unscreened motor cables, the data indicated in the table below are valid for the double motor-cable length.
  - Please contact Lenze when the absolute or resulting motor-cable lengths are > 200 m.

Stop!

Observe the permissible chopping frequencies when using output filters and motor chokes.

Set the controller to a fixed frequency (e.g. C0018 = 4 ⇒ 8 kHz fixed).

Type	output filters additionally required in the motor cable		
9321/9322/9323 9324/9325/9326	none	Motor filter / Motor choke	Sine filter
9327/9328	none	Motor filter / Motor choke	motor choke (Contact Lenze)
9329/9330/9331 9332/9333		none	
(resulting) Motor cable length, screened	0 ... 50 m	50 ... 100 m	100 ... 200 m



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

Type	Terminals				
	max. permissible cable cross-sections	U, V, W	PE connection	Screen/ Strain relief	T1, T2
9321 - 9326	4 mm² 1)	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)		-	
9330 - 9331	95 mm² 2)	7 Nm (62 lbin)		3.4 Nm (30 lbin)	
9332 - 9333	120 mm² 2)	12 Nm (106.2 lbin)		M4: 1.7 Nm (15 lbin) M5: 3.4 Nm (30 lbin)	

1) with plug connector: 6 mm²
with wire crimp cap: 4 mm²
2) with ring cable lug: Cross-section is limited only by the cable entry in the housing

Tip!

Switching on the motor side of the controller is permitted. (📖 6-2)

4.2.7.3 Connection of a brake unit

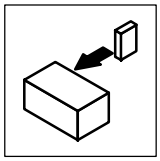
When connecting a brake unit (brake module 9351 with internal brake resistor or brake chopper 9351 with external brake resistor) observe the corresponding operating instructions in all cases.

Stop!

Design the circuit such that if the temperature monitoring of the brake unit is released

- the controllers are inhibited (X5/28 = LOW).
- the mains is disconnected.

(📖 4-33 or Fig. 4-7)



4.2.7.4 Connection diagram

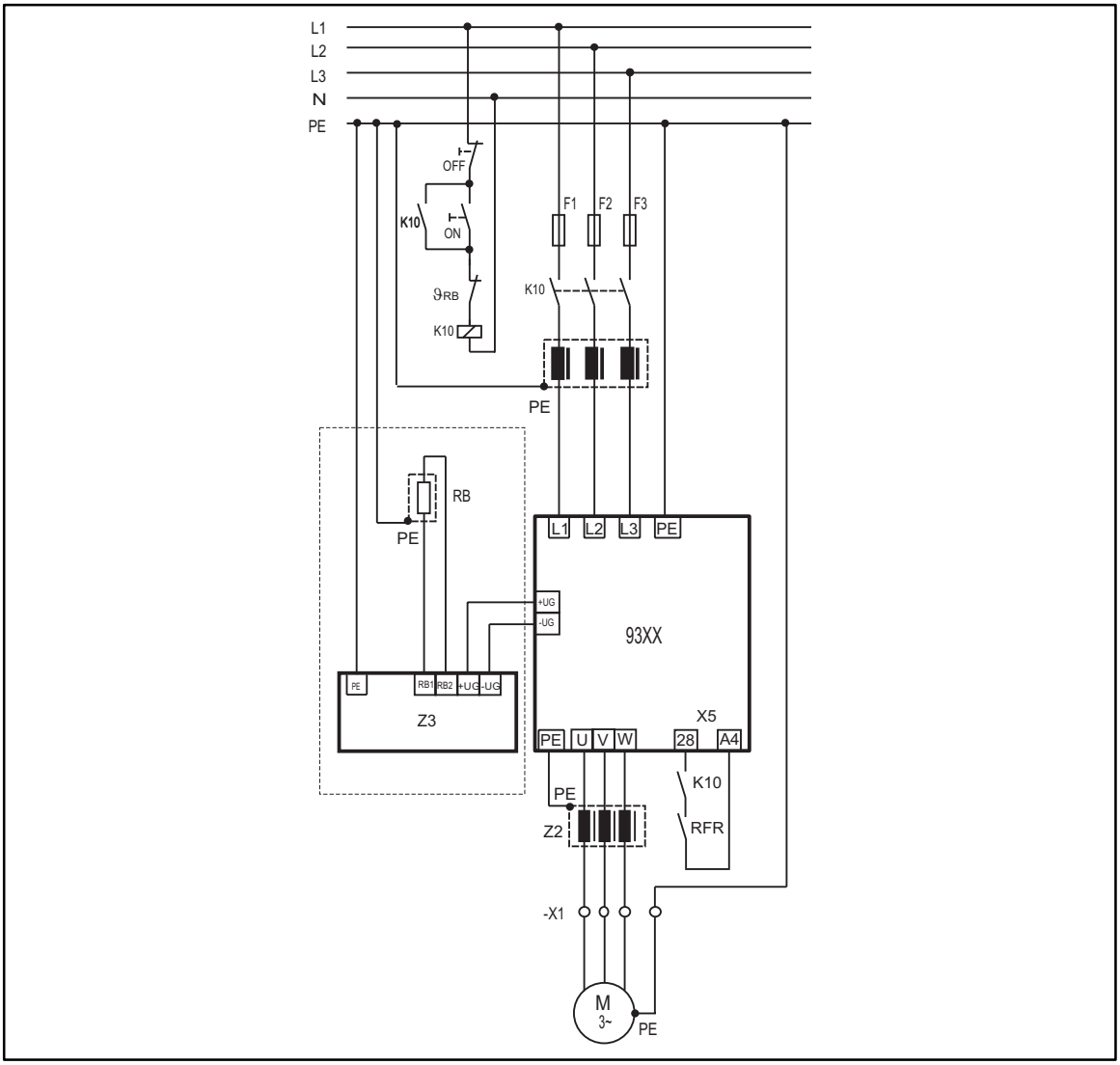
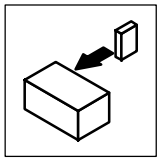


Fig. 4-6 Power connections 93XX

F1, F2, F3	Fuses
K10	Mains contactor
Z1	For mains choke / mains filters, see systems manual, part I, “Accessories”
	Operate type 9328-9333, 9324/9326 only with the assigned mains choke / mains filter
Z2	For motor filters / sine filters, see systems manual, part I, “Accessories”
Z3	For brake choppers / brake modules, see systems manual, part I, “Accessories”
RB	For brake resistors, see systems manual, part I, “Accessories”
ϑ_{RB}	Temperature monitoring for brake resistor
X1	Terminal strip in control cabinet



4.2.8 DC-bus connection of several drives

Decentralized supply with brake module

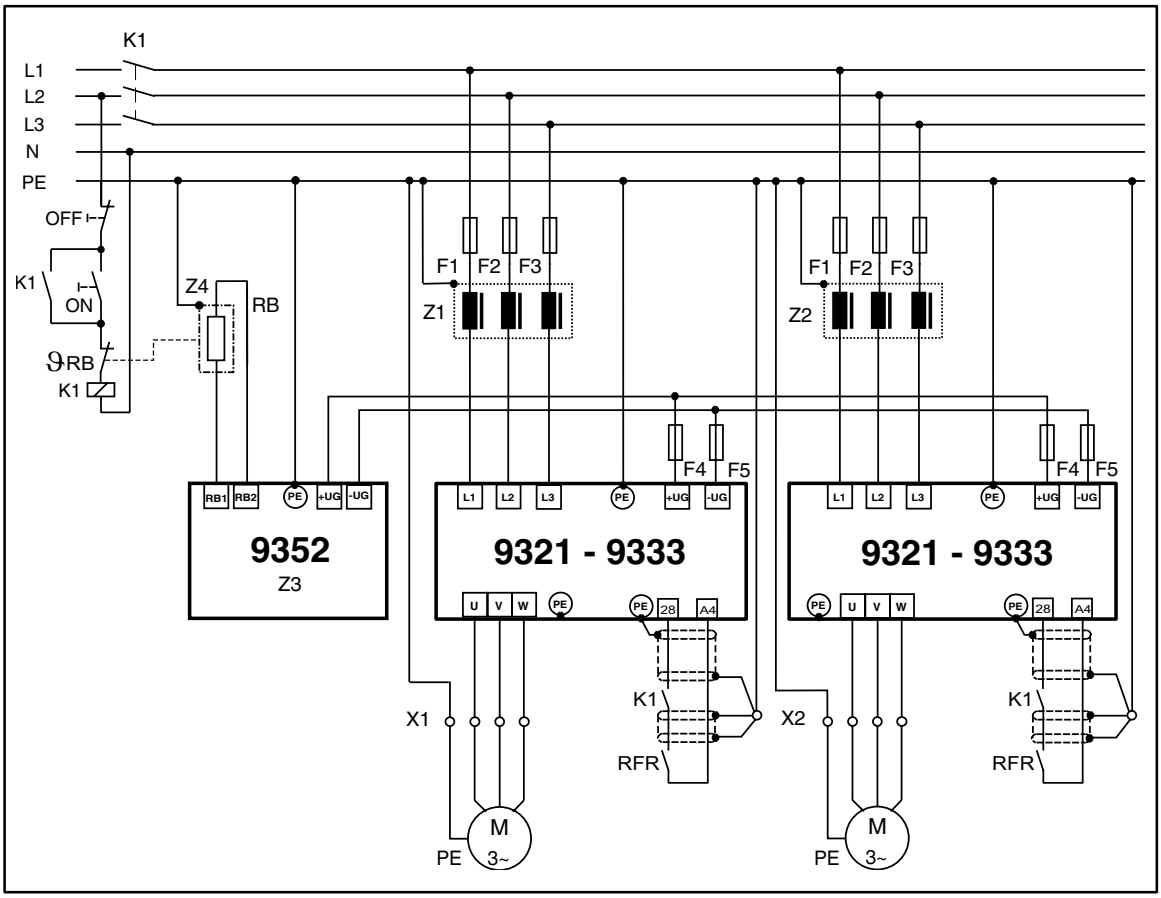


Fig. 4-7 Decentralized supply for DC-bus connection of several drives`

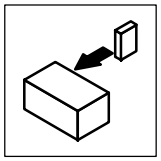
Z1, Z2	Mains filter (for dimensioning see systems manual, part F)
Z3	Brake chopper
Z4	Brake resistor (for r.m.s. current monitoring see systems manual, part F)
F1 ... F5	Fuses (📖 3-11 and 4-12)
K1	Main contactor

Stop!

- Set the DC-bus voltage thresholds of controller and brake unit to the same values.
  – Controller using C0173
  – Brake unit using switches S1 and S2
- A bimetallic relay is required for the monitoring of the mains supply.

Tip!

Please observe the specifications in part F of the systems manual and the application report “DC-bus connection” for the dimensioning and rating of the components.



Central supply with regenerative supply module

When connecting a supply and energy recovery (regenerative) module, observe the corresponding operating instructions in all cases.

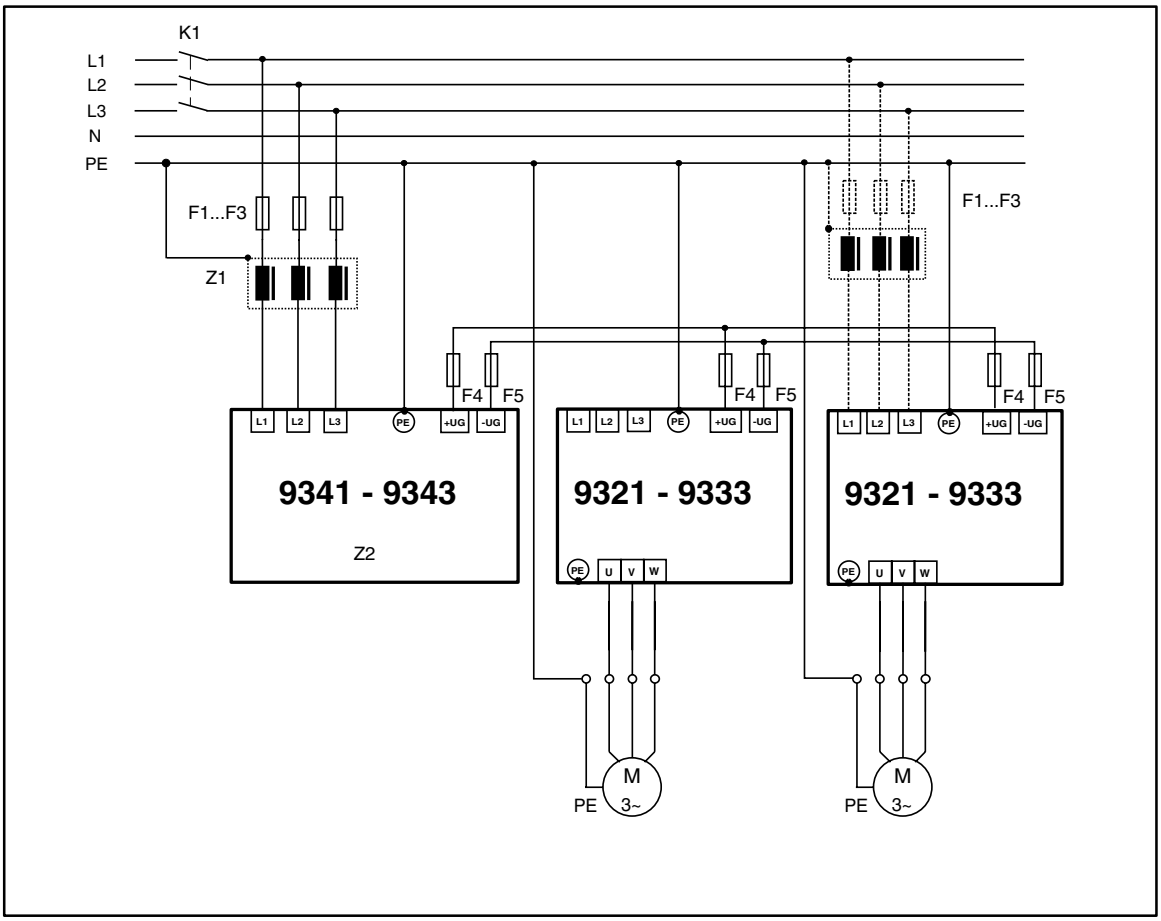


Fig. 4-8 Central supply for DC-bus connection of several drives

Z1	Mains filter
Z2	Supply module
F1 ... F5	Fuses (📖 3-11 and 4-12)
K1	Main contactor

Tip!

If the power supply of the supply module is not sufficient, a parallel supply can be installed via the mains input of the controller. In this case, the controller can only be operated with the assigned mains filters (at least acc. to limit value class A).

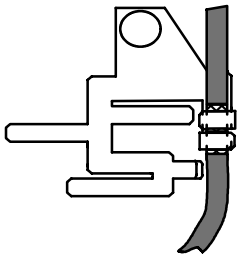
For dimensioning the mains filter, see Manual, part F.

4.2.9 Control connections

4.2.9.1 Control terminals

Connect control cables to the screw terminals:

max. permissible cable cross-section	Screw-tightening torques
1.5 mm^2	0.5 ... 0.6 Nm (4.4 ... 5.3 lbin)



- We recommend a one-sided screening of all cables for analog signals, to avoid signal distortion.
- Attach the screening of the control cables to the common screening plate on the metal front surface (bolt length max. 12 mm).

Protection against inverse polarity

This protection prevents the wrong connection of the internal control inputs.It is however possible to overcome the protection against polarity reversal by applying great force.

Assignment of the control terminals

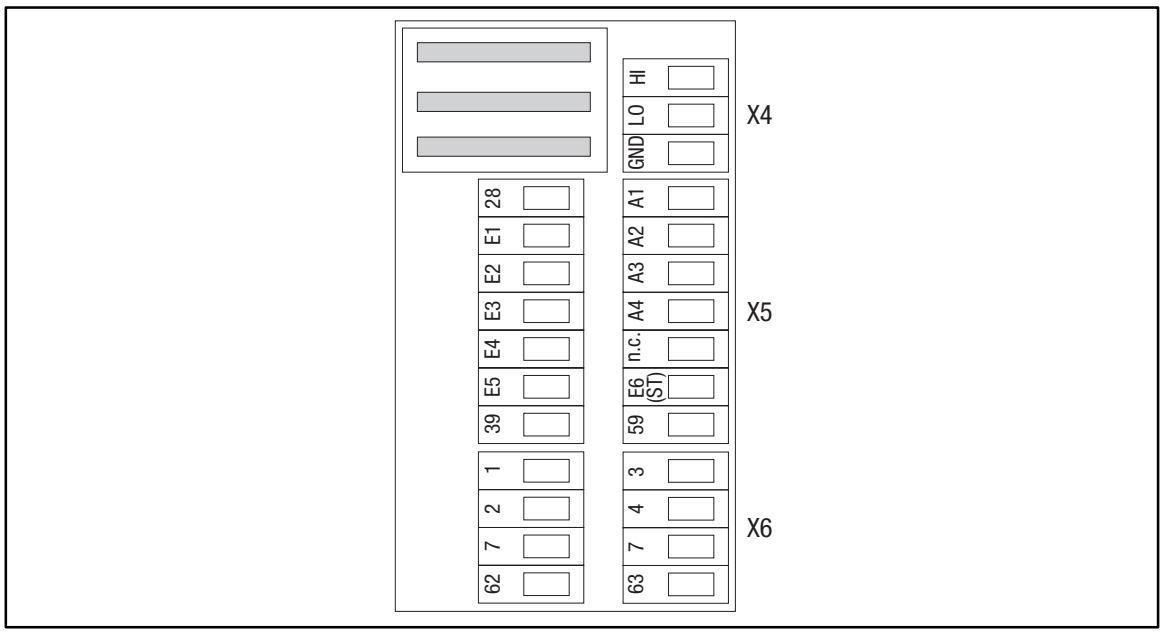
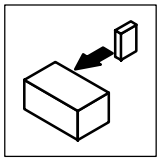
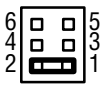
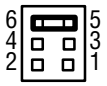


Fig. 4-9 Layout of the control connections on the front of the controller

X4	System bus
X5/E1 ... X5/E6 (ST)	DIGIN
X5/A1 ... X5/A4	DIGOUT
X6/1, X6/2	AIN1
X6/3, X6/4	AIN2

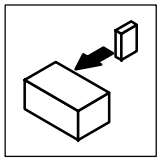


Installation

	Terminal	Use (Default setting is printed in bold)		Level	Data
Analog inputs	1, 2	Differential master-voltage input **(Main setpoint)**	 Jumper X3	-10 V to +10 V	Resolution: 5 mV (11 bit + sign)
		Differential master-current input	 Jumper X3	-20 mA to +20 mA	Resolution: 20 µA (10 Bit + sign)
	3, 4	Differential master-voltage input **(inactive)**	Jumper X3 has no effect	-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 **(Actual motor current)**		-10 V to +10 V; max. 2 mA	Resolution: 20 mV (9 bit + sign)
	7	Internal ground, GND		-	-
Digital inputs	28	Controller enable (RFR)		HIGH	LOW: 0 0 +4 V HIGH: +13 0 +30 V Input current at 24 V: 8 mA per input Reading and writing of the inputs: once per msec (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)**		LOW	
	E5	freely assignable **(TRIP-reset)**		LOW-HIGH edge	
	E6 (ST)	freely assignable		HIGH	
Digital outputs	A1	freely assignable **(TRIP)**		LOW	LOW: 0 0 +4 V HIGH: +13 0 +30 V Output current: max. 50 mA per output (external resistance at least 480 Ω at 24 V) Updating of the outputs: once per msec
	A2	freely assignable **(n_{act} < n_x) - Q_{min}**		LOW	
	A3	freely assignable **(standby/ready to operate RDY)**		HIGH	
	A4	freely assignable **(Maximum current reached - I_{max})**		HIGH	
	39	Ground for digital inputs and outputs		-	
	59	Supply input for the control module: 24 V external (I > 1 A)		-	

Tip!

To change the jumper, remove plug-on module, if necessary.

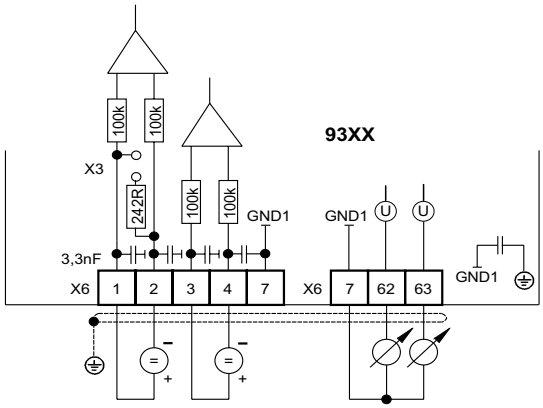


Connection of analog signals

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

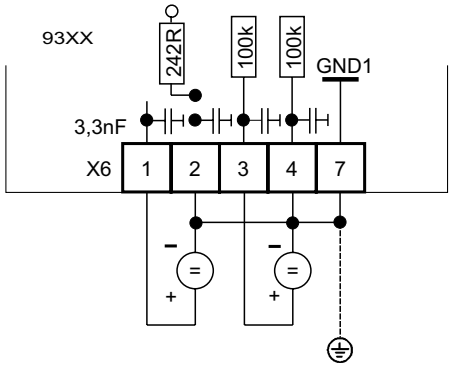
Depending on the use of the analog inputs, the jumper of X3 must be set accordingly.

Connection for external supply voltage



STOP!

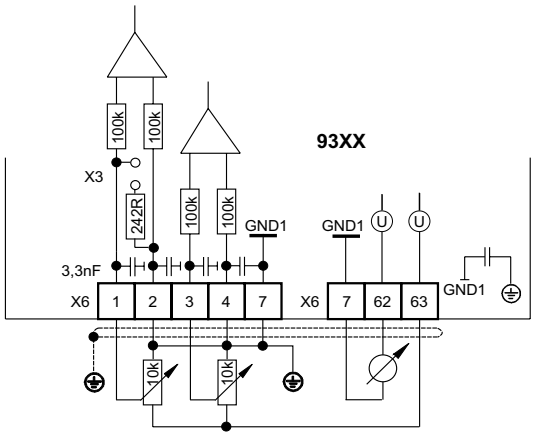
- The maximum permitted voltage difference between an external voltage source and the GND1 (terminal X6/7) of the controller is 10V (common mode).
- The maximum permitted voltage difference between GND1 (terminal X6/7) and the PE of the controller is 50 V.



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 diagram at left).

Connection for internal voltage supply

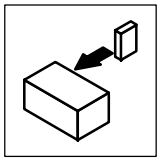


Configuration of the internal voltage supply:

- Set a freely assignable analog output (AOUTx) to HIGH level.
- e.g. terminal X6/63: Assign C0436 with FIXED100%.10V are thus applied across terminal X6/63.

Tip!

For this application, you may use one of the predefined configurations in C0005. The output is assigned automatically with FIXED100% (corresponds to 10 V at output X6/63) by C005 = XX1X (e.g. 1010 for speed control via terminals).



Installation

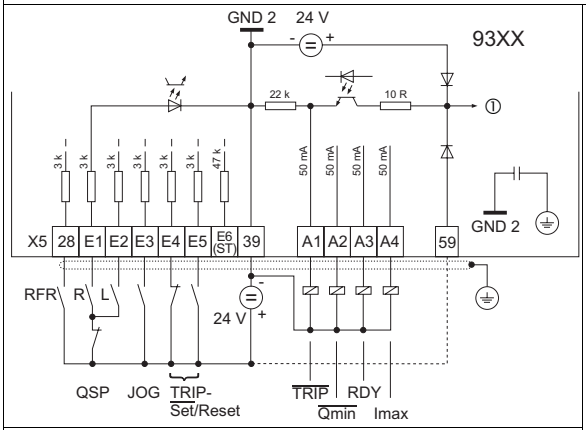
Connection of digital signals

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

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

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

Connection for external voltage supply



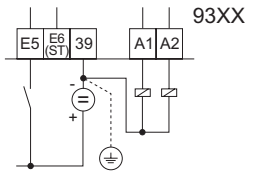
① Supply voltage for the control card

The external voltage source supplies the digital inputs and outputs.

- If the external supply voltage is also to be used as an alternative supply for the control electronics (backup operation in case of mains failure):
  - For this, make the connection illustrated as a broken line.
  - The external voltage source must be able to drive a current > 1 A.
  - This ensures that all actual values are still detected and processed, even after mains disconnection.
- Connection of the external voltage source:
  - supply voltage at X5/59
  - external ground at X5/39

STOP!

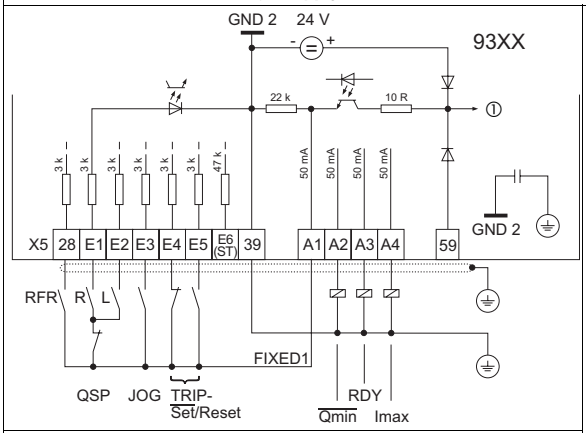
The maximum permitted voltage difference between GND2 (terminal X5/39) and the PE of the controller is 50 V.



Limit the voltage difference

- by overvoltage clamping components or
- by a direct PE connection of X5/39 (see diagram at left).

Connection for internal voltage supply



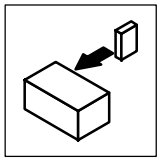
① Supply voltage for the control card

Configuration of the internal voltage supply

- Set a freely assignable digital output (DIGOUTx) to HIGH level.
- For example terminal X5/A1: Assign C0117/1 with FIXED1 and C0118/1 = 0 (HIGH active). 24V are thus applied across terminal X5/A1.

Tip!

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



4.2.9.2 Automation interface (X1)

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

- Operating module
- Fieldbus modules (see System Manual, Part H)
  – RS232, RS485, fibre optics, Type 2102 (LECOM-A/B/LI),
  – INTERBUS, Type 2111
  – PROFIBUS-DP, Type 2131

4.2.9.3 System bus connection (X4)

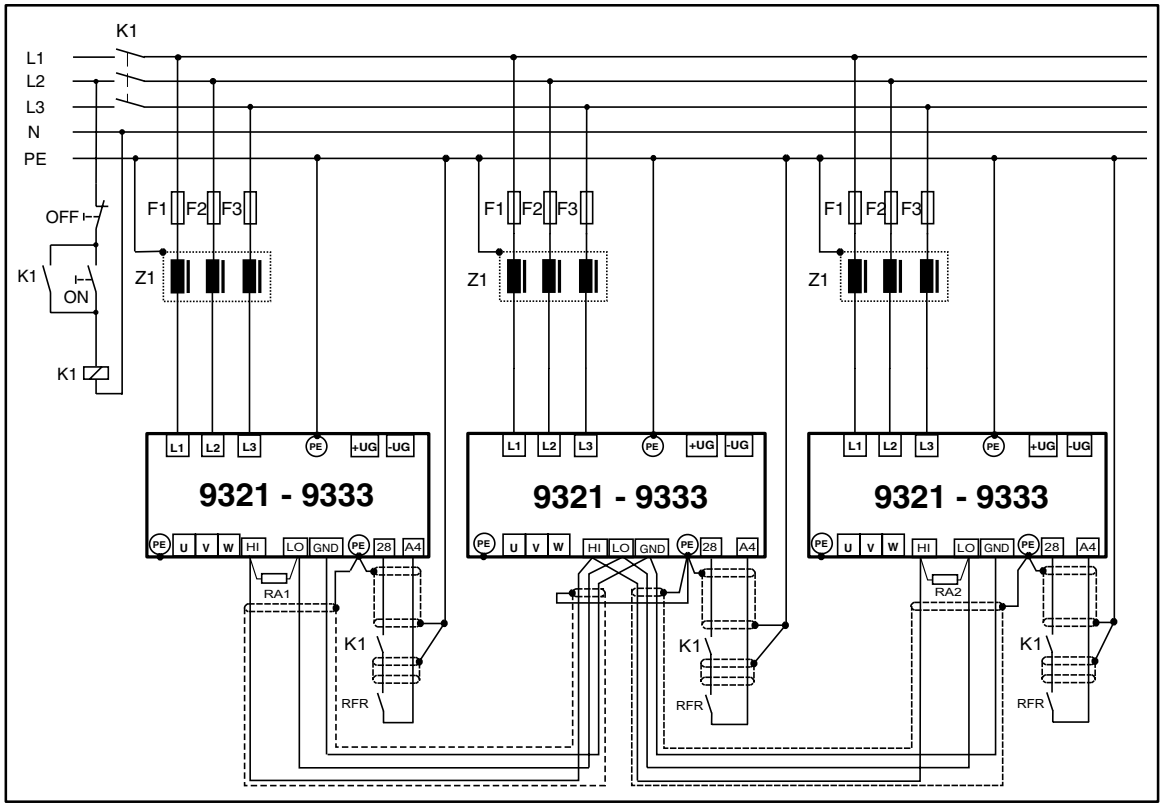
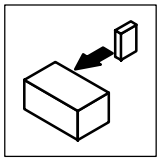


Fig. 4-10 System bus wiring

RA1, RA2 Termination resistor (120 Ω) for the system bus (included in accessory pack)

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



Installation

- Features of the system 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:
  – Each 1 x resistor 120 Ω on the first and last bus participants.
  – On the 93XX controller, the resistor is screwed directly under the terminals X4/HI and X4/LO.

Features:

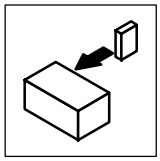
- CAN-based with bus protocol according to CANopen (CAL-based Communication Profile DS301)
- Bus expansion:
  – 25 m for max. 1 MBit/s baud rate
  – up to 1 km with reduced baud rate
- Very reliable data transmission (Hamming distance = 6)
- Signal level according to ISO 11898
- Up to 63 bus devices are possible
- Access to all Lenze parameters
- Master functions are integrated into the controller
  – Data exchange possible between controllers without the 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, decentralised inputs/outputs, operating terminal)
- Connection between several controllers

Tip!

For further information on the system bus as well as possible applications and commissioning please consult the Manual, Part H.

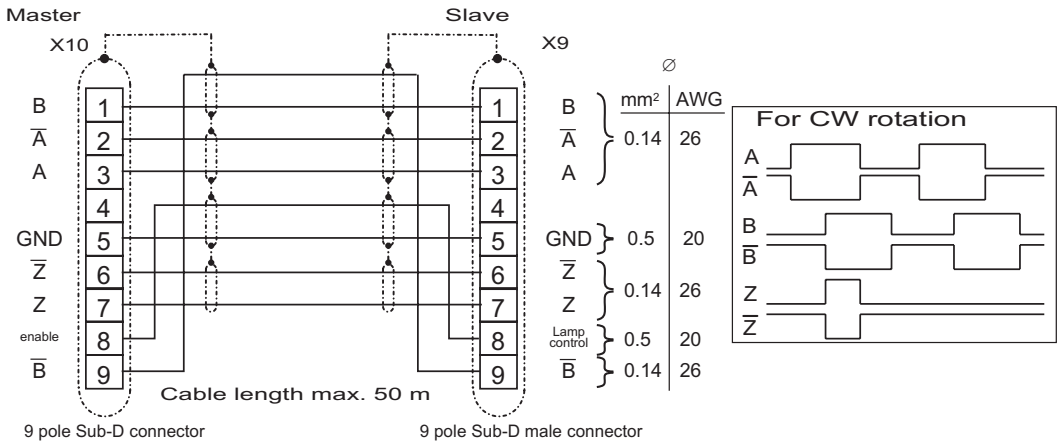


4.2.9.4 Digital frequency input (X9) / Digital frequency output (X10)

Tip!

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

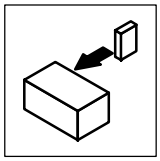
Digital frequency output X10	**Digital frequency input X9**
Features: • Sub-D female connector, 9-pole • Output frequency: 0 - 500 kHz • Current consumption per channel: max 20mA. • Two-track with inverse 5 V signals and zero track • X10 has a different basic setting depending on the selected configuration (C0005) – Factors setting: speed setpoint • Load capability: – For parallel connection, a maximum of three slaves can be connected. • 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 • Can also be used as incremental encoder input (📖 4-28 ff) • Frequency: – 0 - 500 kHz / TTL-level – 0 - 200 kHz / HTL-level • Current consumption: max. 5 mA • Two-track with inverse signals and zero track • Can also be used without inverse signals, for incremental encoders with HTL-level (📖 4-28 ff) • Evaluation of the input signals through C0427 (see below) • PIN 8 serves to monitor the connected controller. For this, the monitoring SD3 must be activated. – Trip or warning is triggered when a LOW level is applied to PIN 8.



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

Evaluation of the input signals:

Code	**Function**	
C0427 = 0	CW rotation:	Track A leads track B by 90° (positive value at DFIN-OUT)
	CCW rotation:	Track A leads track B by 90° (negative value at DFIN-OUT)
C0427 = 1	CW rotation:	Track A provides the speed Track B = LOW (positive value at DFIN-OUT)
	CCW rotation:	Track A provides the speed Track B = HIGH (negative value at DFIN-OUT)
C0427 = 2	CW rotation:	Track A provides the speed and the direction (positive value at DFIN-OUT) Track B = LOW
	CCW rotation:	Track B provides the speed and the direction (negative value at DFIN-OUT) Track A = LOW



4.2.9.5 Feedback system

- You can attach an incremental encoder to the controller, either to input X8 or to input X9.
- The incremental encoder signal can be output for slaves at the digital frequency output X10.
- The connection is made as shown in the connection diagrams:
  – Use twisted pair cables and screened pair cables.
  – Connect the screen at both ends.
  – Use the indicated cable cross-sections.

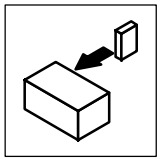
Incremental encoder at input X8

Tip!

- The evaluation of an incremental encoder through X8 cannot be activated if you use the master frequency input X9 **and** the master frequency output X10 in the signal configuration.
- This relationship does not apply if you set the master frequency output X10 to repeat the input signals on X8 or X9 (C0540 = 4 or 5).
  – If necessary, remove the internal signal link of the function block (FB) DFIN to the following FB, to deactivate the master frequency input X9.

At input X8 you can only attach an incremental encoder with TTL-levels.

- Activate the feedback system:
  – With C0025 = 100. Then set the no. of increments (1 ... 8192) with C0420 or
  – with C0025 = 110, 111, 112 or 113. This setting simultaneously sets the no. of increments (512, 1024, 2048 or 4096).
- The incremental encoder obtains its supply voltage from the drive controller.
- Use C0421 to adjust the supply voltage V_{CC5_E} (5 V) for the incremental encoder and, if necessary, to compensate for the voltage drop in the cable to the incremental encoder ($\Delta a \approx 2$ * cable length * core resistance/m * $I_{encoder}$).
  – The output V_{CC5_E} (X8/4) can be loaded with max. 200 mA.



Connection of the incremental encoder

Stop!

Observe the supply voltage for the incremental encoder that is used.

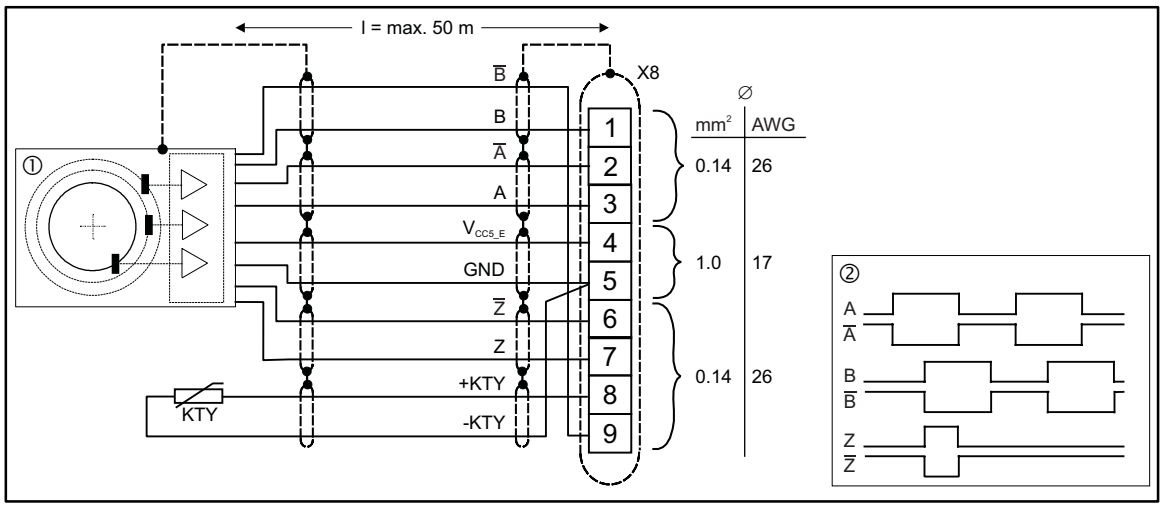


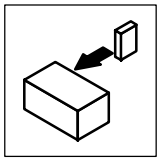
Fig. 4-11 Connection of the incremental encoder to input X8

① Incremental encoder with TTL-level
② Signal sequence for CW rotation

- Incremental encoders with two complementary 5 V signals with 90° electrical phase difference can be connected (TTL encoders).
  – 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 (-KTY)	$\overline{Z}$	Z	+KTY	$\overline{B}$

Terminal X8/8 🕮 4-31



Installation

Incremental encoder at input X9

Incremental encoders with HTL-level can only be connected to input X9.

- Activate the feedback system:
  – With C0025 = 101. Then set the no. of increments (1 ... 8192) with C0420

Connection of the incremental encoder

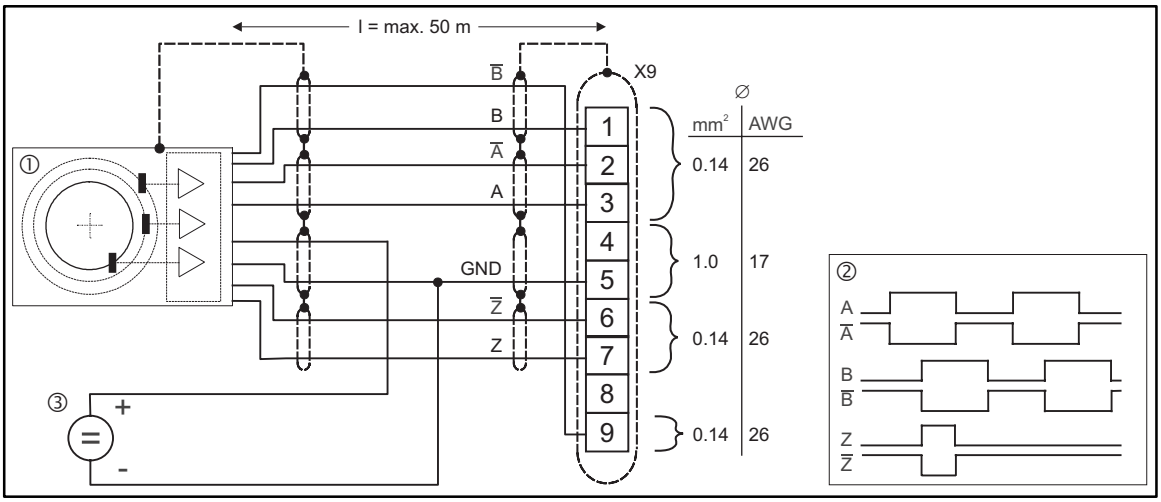


Fig. 4-12 Connection of the incremental encoder to input X9

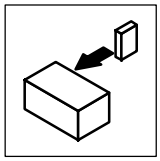
① Incremental encoder with HTL-level
② Signal sequence for CW rotation
③ Supply voltage for the incremental encoder

- 9-pole Sub-D female connector
- Input frequency: 0 - 200 kHz
- Current consumption per channel: 5 mA

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

Tip!

Incremental encoders with HTL-level, that only provide the A and B signals, can be connected to pin X9/2 ($\overline{A}$) and pin X9/9 ($\overline{B}$). The supply voltage for the incremental encoder is then applied to the A and B inputs (pin X9/3 and X9/1).



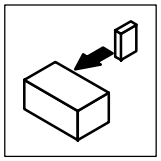
4.2.9.6 Motor temperature monitoring

Selection of the sensor type	• Thermal sensor KTY – "Linear" thermal sensor in the motor winding – standard in Lenze motors MDXKX and MDXQX • PTC thermistor – PTC thermistor with defined tripping temperature • Thermostat TKO – Thermostat/normally-closed contact
Other monitoring	KTY, PTC and TKO do not offer complete protection. To improve the monitoring, Lenze recommends the use of a bimetallic relay.
Alternative monitoring	Comparators (CMP1 ... CMP4) define the maximum motor current (locked-rotor current) for small speeds or motor standstill. A following timer unit (TRANS1, TRANS2) limits the time for the locked-rotor current. You can implement this function by linking the appropriate function blocks (see Manual).
Reactions	Depending on the type of temperature monitoring, different reactions can be provoked (🕮 7-21).

Stop!

Do not connect an external voltage to the inputs.

Motor	**Lenze motors with KTY temperature sensors**		**Lenze motors with thermostat**	**Motors of other brands with thermal sensor**
Connection	• Incremental encoder input X8: – X8/8 = +KTY, X8/5 = -KTY		Terminals T1/T2 next to the terminals U, V, W	
Fault indication	(MONIT-)OH3	(MONIT-)OH7	(MONIT-)OH8	
Possible reactions	• TRIP (C0583 = 0) • OFF (C0583 = 3)	• Warning (C0584 = 2) • OFF (C0584 = 3)	• TRIP (C0585 = 0) • Warning (C0585 = 2) • OFF (C0585 = 3)	
Tripping temperature	fixed at 150 °C	can be set under C0121	fixed, depending on the PTC/thermostat: PTC: at R ϑ > 1600 Ω	
Notes	• Monitoring is not active in the default setting. • A prerequisite for the temperature monitoring function is that the motor temperature monitoring is activated through C0594. This means that the KTY is monitored for open-circuit and short-circuit. • For further information on the connection of the thermal sensor, please consult the description of the corresponding feedback system.		• The monitoring is not active in the default setting. • The temperature monitoring using a thermostat or thermal sensor is activated under C0585 = 2 (Warning) or C0585 = 3 (TRIP). • The connection is made according to DIN 44081 (see also Fig. 4-13).	• We recommend a Ziehl PTC (up to 150 °C) K15301075 or a thermostat.



Installation

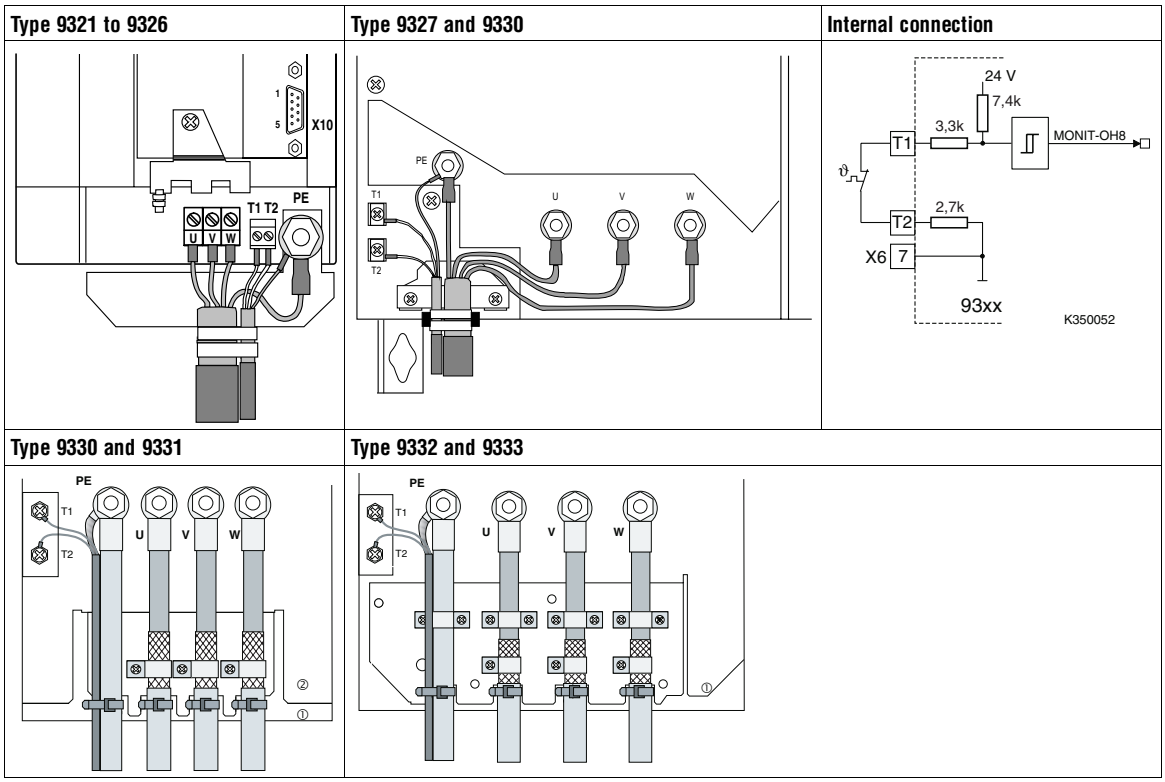
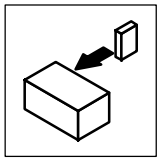


Fig. 4-13 Connection of a thermal sensor to the terminals T1 and T2 and internal connection

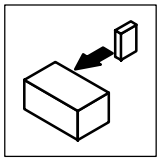
Tip!

- If you make up your own cables:
  – Always lay cables separately from motor cables.



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 – the use of unscreened cables – the use of group RFI filters instead of assigned RFI filters – Operation without mains filter • **The compliance of the machine application with the EMC Directive is in the responsibility of the user.** – If you observe the following measures, you can assume that the machine will operate without any EMC problems caused by the drive system, and that compliance with the EMC Directive and the EMC law is achieved. – If devices which do not comply with the CE requirement concerning noise immunity EN 50082-2 are operated close to the controller, these devices may be disturbed electromagnetically by the controllers.
Assembly	• 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 to 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. • Use of the 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 the 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.



Installation

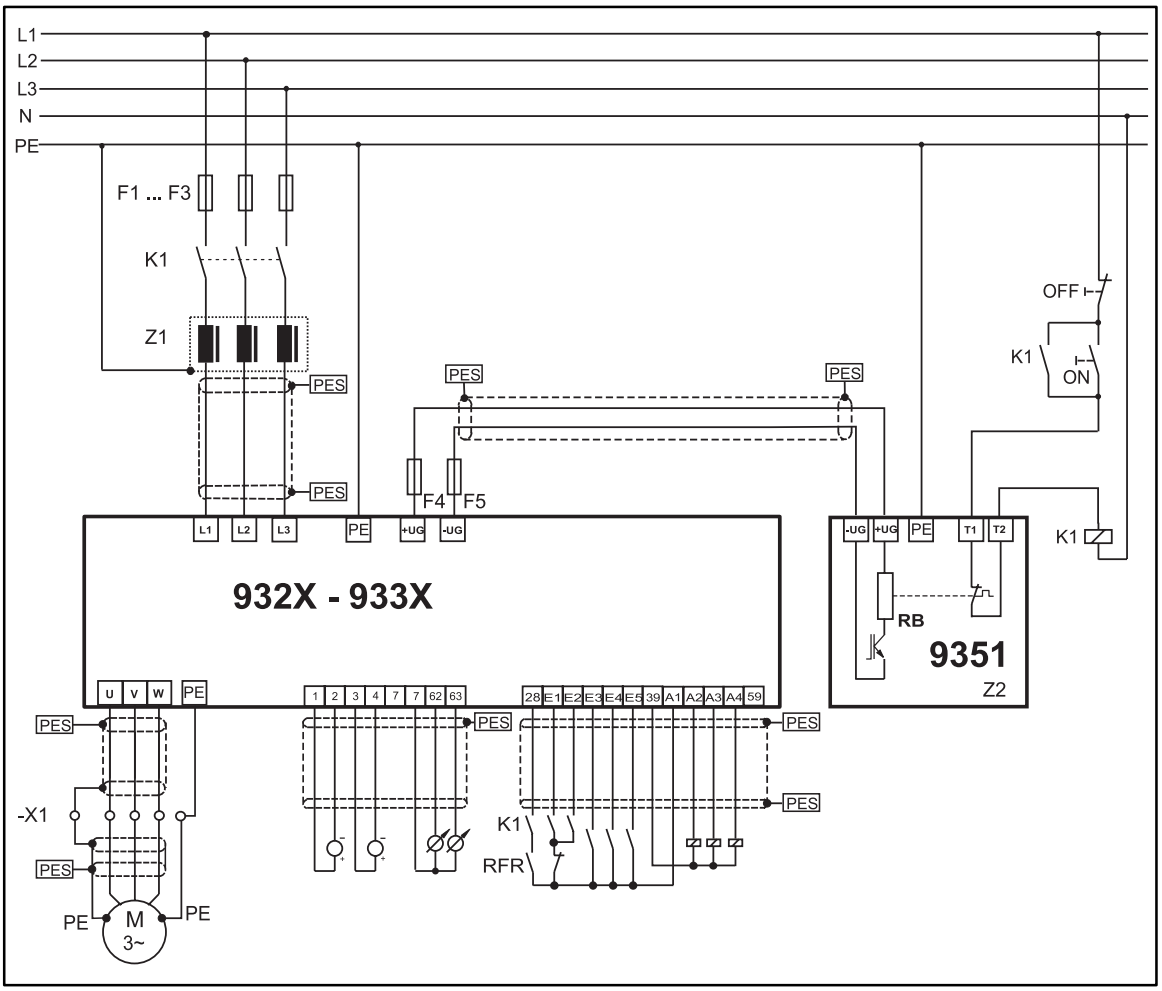
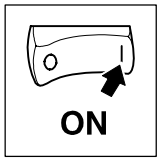


Fig. 4-14 Example of an installation in accordance with the EMC regulations

F1 ... F5	Fuses (📖 3-11 and 4-12)
K1	Mains contactor
Z1	For mains filters “A” or “B” see systems manual, part I, “Accessories”
Z2	For brake modules, see systems manual, part I, “Accessories”
-X1	Terminal strip in control cabinet
PES	HF screen termination by large-surface PE connection (see ”Screening” in this chapter)



5 Commissioning

The controllers are factory-set to drive the following matching four-pole asynchronous standard motors without any further settings:

- 400 V, 50 Hz
- 460 V, 60 Hz
- 480 V, 60 Hz

You can use the operating module 9371BB or a PC with GDC and fieldbus module to adapt the controller to your application with only a few settings. (📖 5-3 and 5-6)

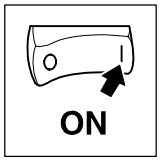
5.1 Initial switch-on

Stop!

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

- Power connection:
  - Via L1, L2 and L3 (direct mains connection)
  - Alternatively via terminals +UG, -UG (DC-bus connection, network of drives)
- Motor connection:
  - In-phase connection to the motor (direction of rotation)
- Incremental encoder (direction of rotation), if any
- Control terminals:
  - Reference potential for the control terminals is terminal X5/39.
  - Controller enable: terminal X5/28
  - Direction of rotation: terminal X5/E1 or X5/E2 (default setting)
  - External setpoint input: terminals X6/1, X6/2 (reference potential: terminal X6/7)
- In the event of condensation, connect the controller to the mains voltage only after the visible humidity has evaporated.

Keep to the switch-on sequence!



5.2 Short commissioning (factory setting)

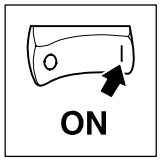
The following information on parameterization, including the assignment of the control terminals, refers to the basic configuration C0005 = 1000, speed control (default setting).

5.2.1 Switch-on sequence

Step	
1. Connect to the mains supply.	The controller is ready for operation after approx. 2 seconds.
2. Klemme X5/E4	• HIGH-Signal legen (+ 12 ... + 30 V) • Eingang E4 mit DC 24 V beschalten – Sonst wird TRIP gesetzt.
3. Enter the direction of rotation.	• CW rotation: – Apply a HIGH signal (+12 ... +30 V) to terminal X5/E1. • CCW rotation: – Apply a HIGH signal (+12 ... +30 V) to terminal X5/E2.
4. Enter the setpoint.	Apply a voltage 0 ... +10 V to terminal X6/1, X6/2.
5. Enable controller.	Apply a HIGH signal (+12 ... +30 V) to terminal X5/28.
6. The drive is now running with the factory setting.	

5.2.2 Default setting of essential drive parameters

Setting		Code	Default setting		Adaptation to the application
Configuration		C0005	1000		Speed control
Machine data					📖 5-3 ff.
Speed range	Min. speed	C0010	0 rpm	only for analog setpoint input via AIN1, terminal X6/1, X6/2	📖 5-3
	max. speed	C0011	3000 rpm		
Acceleration and deceleration times	Acceleration time	C0012	5.00 sec		📖 5-4
	Deceleration time	C0013	5.00 sec		
Current limits	Motor mode	C0022		I_{max} [A], maximum controller current	📖 5-5
	Generator mode	C0023		I_{max} [A], maximum controller current	
Drive performance					📖 5-6 ff.
Current Torque Power characteristic	Operating mode	C0006	5	V/f characteristic	
	V/f rated frequency	C0015	50 Hz		
	U_{min}setting	C0016	0 %		
	Slip compensation	C0021		Rated slip of the selected motor (depending on the motor)	
	Selection of the characteristic	C0014	0	linear	
	Motor voltage	C0090	400 V		



5.3 Adapt machine data

5.3.1 Determine speed range (n_{min}, n_{max})

Code	Name	Possible settings					IMPORTANT
		Lenze	Selection			Info	
C0010	minimum speed	0	0	{1 rpm}	36000	correct setting of C0087 and C0089 required	not higher than C0011
C0011	maximum speed	3000	0	{1 rpm}	36000		

Function

The speed setting range required for the application can be set via the speed input n_{min} and n_{max} :

- n_{min} corresponds to the speed at 0 % setpoint speed input.
- n_{max} corresponds to the speed at 100 % setpoint speed input.

Important

- With the setting $n_{min} > n_{max}$ the speed is limited to n_{max}.
- When entering the setpoint speed by means of JOG values n_{max} acts as a limit.
- n_{max} is an internal variable:
  – Use the LECOM interface only for important modifications, when the controller is inhibited.
- Observe the maximum speed of the motor!
- n_{min} is effective only:
  – for analog setpoint input via AIN1 (terminal X6/1 and X6/2).

Special features

Internal speed limits (p = pole pair number of the motor):

- Chopping frequency 16 kHz: n_{max} = 36000 rpm
- Chopping frequency 8 kHz: n_{max} = 36000/p rpm
- Chopping frequency 2/4 kHz: n_{max} = 36000/2p rpm

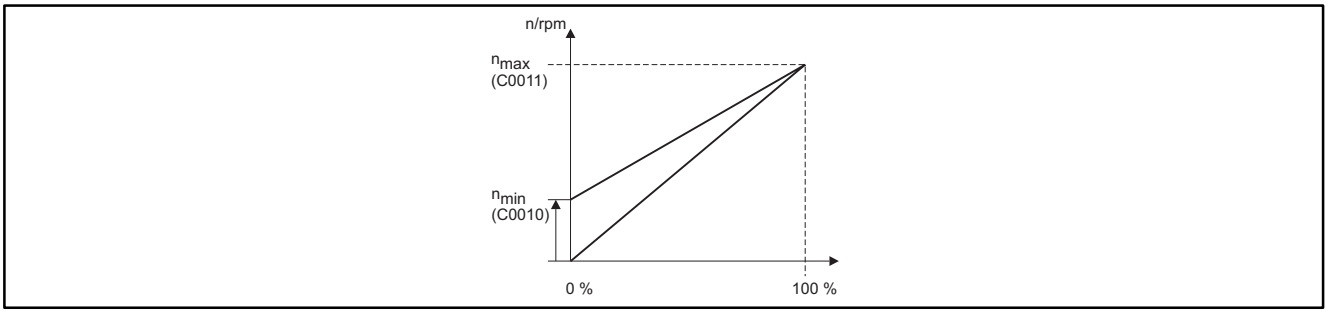
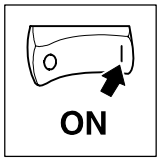


Fig. 5-1 Minimum and maximum speed

n/rpm	speed
n_{max}	Speed at 100 % setpoint speed
n_{min}	Speed at 0 % setpoint speed
0 ... 100 %	Setpoint



5.3.2 Setting acceleration and deceleration times (T_{ir}, T_{if})

Code	Name	Possible settings					IMPORTANT
		Lenze	Selection			Info	
C0012	Acceleration time	5.00	0.00	{0.01 sec}	9999.90	Acceleration time T_{ir} for the main setpoint of NSET	Related to the speed change 00 $n_{Max.}$
C0013	Deceleration time	5.00	0.00	{0.01 sec}	9999.90	Deceleration time T_{if} for the main setpoint of NSET	
C0105	QSP Tif	5.00	0.00	{0.01 sec}	9999.90	Deceleration time for quick stop (QSP)	

Function

The acceleration and deceleration times determine the controller response after a setpoint change.

Adjustment

- The acceleration and deceleration times refer to a speed change from 0 rpm to the max. speed set under C0011.
- Calculate the times T_{ir} and T_{if}, which you can set under C0012 and C0013.
  – t_{ir} and t_{if} are the desired times for the change between n_1 and n_2:

$$T_{ir} + t_{ir} @ \frac{n_{max}}{n_2 * n_1} \qquad T_{if} + t_{if} @ \frac{n_{max}}{n_2 * n_1}$$

Important

Under unfavourable operating conditions, too short acceleration and deceleration times can lead to the switch-off of the controller with the indication of TRIP overload (OC3). In these cases, set the acceleration and deceleration times in such a way that the drive can follow the speed profile without reaching I_{max} of the controller.

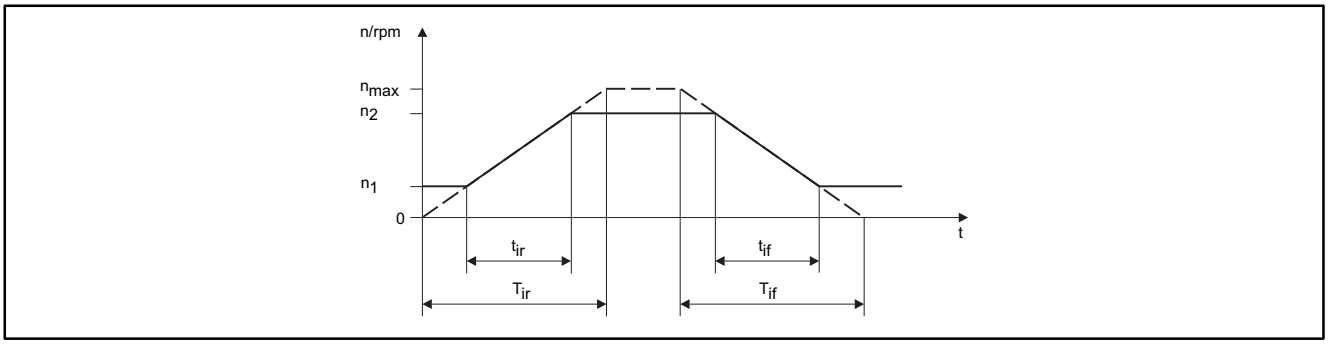
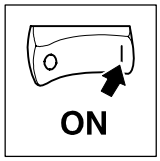


Fig. 5-2 Acceleration and deceleration times

n/rpm	speed
n_{max}	Speed at 100 % setpoint speed
n_1, n_2	Change of speed depending on t_{ir} or t_{if}
t	time



5.3.3 Set the current limits (I_{max}-limits)

Code	Name	Possible settings				IMPORTANT
		Lenze	Selection		Info	
C0022	I_{max} limit Motor mode	→	0.00	{0.01 A} 500.00		→ depending on C0086
C0023	I_{max} limit Generator mode	→	0.00	{0.01 A} 500.00		

Function

The controllers are equipped with a current-limit control which determines the dynamic response under load. The momentary motor current is compared with the limit values set under C0022 for motor load and under C0023 for generator load. If the current limits are exceeded, the controller changes its dynamic behaviour.

Adjustment

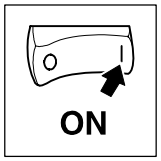
Set the acceleration and deceleration times in such a way that the drive can follow the speed profile without reaching I_{max} of the controller.

Controller performance when a limit value is reached

- During acceleration:
  – Increasing the acceleration ramp
- During deceleration:
  – Increasing the deceleration ramp:
- With increasing load and constant speed:
  – When the current limit of the motor mode is reached:
    Speed reduction to 0 rpm.
  – When the current limit in the generator mode is reached:
    Speed increase to$_{max}$ (C0011).
  – Stopping the speed change if the load falls below the limit value.

Important

- A correct current limitation control (PI controller: Vp = C0075, Tn = C0076) in the generator mode is possible only with a connected brake unit or in the DC bus connection with energy exchange.
- When using chopping frequencies > 8 kHz, set the current limits to the values specified in the ratings for "I_{max} for 60 sec" (derating at higher chopping frequencies).(📖 3-3 and 3-8)



5.4 Optimising the controller performance

The following settings are used to determine the current and torque behaviour as well as the performance of the connected motor.

The operating modes ”V/f-characteristic control” and ”vector control” are available for this.

Some decision-making aids make it easier to optimize the drive.

5.4.1 Input of the motor data

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

- If a LENZE motor is used:
  - Select the motor type under C0086 (see code table).
    The controller sets all other motor data automatically.
  - Select the operating mode under C0006 (V/f-characteristic control or vector control).
- If the motor type is not listed under C0086, enter the motor nameplate data. You can enter the following motor data manually:

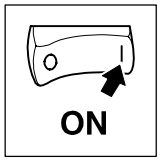
Code	Name
C0006	Operating mode
C0022	Adapt I_{max} to the maximum motor current.
C0023	I_{max}-limit in the generator mode
C0081	Rated motor power
C0087	Rated motor speed
C0088	Rated motor current
C0089	Rated motor frequency
C0090	Rated motor voltage
C0091	Motor cos-phi φ

- To optimize the selected operating mode, start the motor identification for automatic detection of additional motor parameters (C0148 = 1). This is valid for the initial set-up and after changing the drive system.

Caution!

If the setting of the machine parameters is incorrect, the motor may reverse in the ”Vector control” mode after controller enable. (📖 5-12)

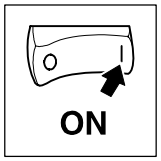
- Save the parameter set permanently under C0003, so that the established values are not lost when the mains supply is switched off.



Tip!

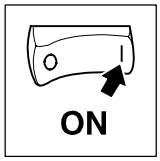
- All required inputs are contained in the menu "motor/feedb." ("motor/feedback system").
- If you select a motor type under C0086, and subsequently change one of the above listed motor data, C0086 = 0 (COMMON) is set (i.e. no Lenze motor is used).

C0086		C0081	C0087	C0088	C0089	C0090	C0091	Motor type	Thermal sensor
No.	Display	P_r [kW]	n_r [rpm]	I_r [A]	f_r [Hz]	a_r [V]	cos j		
9	DSGA056-22-100	0.24	2790	0.76	100		0.71	Asynchronous servo motor	KTY
10	MDSKA-56-140	0.80	3950	2.4	140		0.70		
11	MDFKA-71-120	2.20	3410	6.0	120		0.75		
12	MDSKA-71-140	1.70	4050	4.4	140		0.76		
13	MDFKA-80-60	2.10	1635	4.8	60		0.81		
14	MDSKA-80-70	1.40	2000	3.3	70	390	0.75		
15	MDFKA-80-120	3.90	3455	9.1	120		0.80		
16	MDSKA-80-140	2.30	4100	5.8	140		0.75		
17	MDFKA-90-60	3.80	1680	8.5	60		0.80		
18	MDSKA-90-80	2.60	2300	5.5	80		0.81		
19	MDFKA-90-120	6.90	3480	15.8	120		0.80		
20	MDSKA-90-140	4.10	4110	10.2	140	350	0.80		
21	MDFKA-100-60	6.40	1700	13.9	60		0.83		
22	MDSKA-100-80	4.00	2340	8.2	80	390	0.80		
23	MDFKA-100-120	13.20	3510	28.7	120		0.80		
24	MDSKA-100-140	5.20	4150	14.0	140	330	0.78		
25	MDFKA-112-60	11.00	1710	22.5	60		0.85		
26	MDSKA-112-85	6.40	2490	13.5	85	390	0.83		
27	MDFKA-112-120	20.30	3520	42.5	120		0.80		
28	MDSKA-112-140	7.40	4160	19.8	140	320	0.80		
30	MDFQA-100-50	10.6	1420	26.5	50		0.84	Asynchronous servo motor enclosed-ventilated (in Y configuration)	TKO (Thermostat)
31	MDFQA-100-100	20.30	2930	46.9	100		0.80		
32	MDFQA-112-28	11.50	760	27.2	28		0.87		
33	MDFQA-112-58	22.70	1670	49.1	58		0.85		
34	MDFQA-132-20	17.00	550	45.2	20	360	0.81		
35	MDFQA-132-42	35.4	1200	88.8	42		0.78		
40	MDFQA-112-50	20.10	1425	43.7	50		0.86	Asynchronous servo motor enclosed-ventilated (in Δ configuration)	
41	MDFQA-112-100	38.40	2935	81.9	100		0.83		
42	MDFQA-132-36	31.10	1030	77.4	36		0.78		
43	MDFQA-132-76	60.10	2235	144.8	76	340	0.80		
210	DXRA071-12-50	0.25	1410	0.9			0.69	Asynchronous inverter motor (in Y circuit)	
211	DXRA071-22-50	0.37	1398	1.2			0.70		
212	DXRA080-12-50	0.55	1400	1.7			0.66		
213	DXRA080-22-50	0.75	1410	2.3			0.67		
214	DXRA090-12-50	1.10	1420	2.7			0.77		
215	DXRA090-32-50	1.50	1415	3.6			0.77		
216	DXRA100-22-50	2.20	1425	4.8			0.80		
217	DXRA100-32-50	3.00	1415	6.6	50	400	0.81		
218	DXRA112-12-50	4.00	1435	8.3			0.82		
219	DXRA132-12-50	5.50	1450	11.0			0.84		
220	DXRA132-22-50	7.50	1450	14.6			0.85		
221	DXRA160-12-50	11.00	1460	21.0			0.85		
222	DXRA160-22-50	15.00	1460	27.8			0.87		
223	DXRA180-12-50	18.50	1470	32.8			0.90		
224	DXRA180-22-50	22.00	1456	38.8			0.90		



Commissioning

C0086		C0081	C0087	C0088	C0089	C0090	C0091	Motor type	Thermal sensor
No.	Display	P_r [kW]	n_r [rpm]	I_r [A]	f_r [Hz]	a_r [V]	cos j		
250	DXRA071-12-87	0.45	2525	1.5			0.69		
251	DXRA071-22-87	0.64	2515	2.0			0.70		
252	DXRA080-12-87	0.95	2515	2.9			0.66		
253	DXRA080-22-87	1.30	2525	4.0			0.67		
254	DXRA090-12-87	2.00	2535	4.7			0.77		
255	DXRA090-32-87	2.70	2530	6.2			0.77		
256	DXRA100-22-87	3.90	2535	8.3			0.80		
257	DXRA100-32-87	5.35	2530	11.4	87	400	0.81	Asynchronous inverter motor (in Δ configuration)	
258	DXRA112-12-87	7.10	2545	14.3			0.82		
259	DXRA132-12-87	9.70	2555	19.1			0.84		
260	DXRA132-22-87	13.20	2555	25.4			0.85		
261	DXRA160-12-87	19.30	2565	36.5			0.85		
262	DXRA160-22-87	26.40	2565	48.4			0.87		
263	DXRA180-12-87	32.40	2575	57.8			0.90		
264	DXRA180-22-87	38.70	2560	67.4			0.90		
410	DXMA071-12-50	0.25	1400	0.8			0.70		
411	DXMA071-32-50	0.37	1400	1.2			0.71		
412	DXMA080-12-50	0.55	1400	1.6			0.72		
413	DXMA080-32-50	0.75	1380	2.0			0.76		
414	DXMA090-12-50	1.10	1420	2.7	50		0.77	Asynchronous geared motor (in Y configuration)	TKO (Thermostat)
415	DXMA090-32-50	1.50	1420	3.5			0.80		
416	DXMA100-12-50	2.20	1400	5.6			0.78		
417	DXMA100-32-50	3.00	1400	7.3			0.81		
418	DXMA112-32-50	4.00	1430	8.5			0.85		
440	DXMA071-12-87	0.43	2436	1.4			0.70		
441	DXMA071-32-87	0.64	2419	2.1			0.71		
442	DXMA080-12-87	0.95	2436	2.8			0.72		
443	DXMA080-32-87	1.30	2401	3.5			0.76		
444	DXMA090-12-87	2.00	2453	4.5	87		0.80		
445	DXMA090-32-87	2.70	2471	6.1			0.80	Asynchronous geared motor (in Δ configuration)	
446	DXMA100-12-87	3.90	2436	9.7			0.78		
447	DXMA100-32-87	5.40	2436	12.7			0.81		
448	DXMA112-22-87	7.10	2506	14.8			0.85		
449	DXMA112-32-50	5.50	1460	12.5			0.78		
450	DXMA132-22-50	7.50	1460	16.8	50		0.77		
451	DXMA132-32-50	9.20	1450	19.5			0.85		



5.4.2 Select operating mode

Code	Name	Possible settings			IMPORTANT
		Lenze	Selection	Info	
[C0006]	Operating mode	5	1 Vector control 5 U/f characteristic with constant U_{min} boost	Voltage characteristic C0014	for vector control: • Enter motor data and start motor identification

Function

- You set the operating mode of the controller under C0006.
  – The vector control enables a "sensorless speed control". Compared to the U/f characteristic control, the vector control achieves a considerably higher torque and a lower off-load current consumption.

How to select the correct mode

How to select the correct mode	Motor cable			
	screened ≤ 50 m unscreened ≤ 100 m		screened > 50 m unscreened > 100 m	
	C0006		C0006	
Single drives	**recommended**	**alternatively**	**recommended**	**alternatively**
with constant load	1	5	5	-
with extremely alternating loads	1	5	5	-
with heavy start conditions	1	5	5	-
Positioning and infeed drives with high dynamic response	1	5	5	-
Rewinder with dancer	1	5	-	-
Unwinder with dancer	5	-	-	-
Hoists	5	-	5	-
Pumps and blowers [1]	5	-	5	-
Three-phase AC reluctance motors	5	-	5	-
Three-phase sliding rotor motors	5	-	5	-
Three-phase motors with fixed voltage-frequency characteristic	5	-	5	-
Group drives (the resulting motor cable length is decisive)	$I_{res} + \sum_{i} @(I_1 \; I_2) \; AAA) \; I_i)$			
identical motors and identical loads	1	5	5	-
different motors and/or changing loads	5	-	5	-

1) A square voltage characteristic (C0014 = 1) is recommended.

5.4.3 Optimizing operating modes

5.4.3.1 Optimizing V/f characteristic control

Required codes

Code	Name	Possible settings					
		Lenze	Selection			Info	Important
[C0014]	Voltage characteristic	0	0	linear characteristic U ~ fd with constant V_{min} boost			
			1	square-law characteristic U ~ fd^2 with constant V_{min} boost			
C0015	V/f rated frequency	50	0	{1 Hz}	5000		
C0016	a_{min} setting	0.00	0.00	{0.01 %}	100.00	FCODE	
C0021	Slip compensation	→	-20.00	{0.01 %}	20.00		→ Change of C0087 or C0089 sets C0021 to the calculated rated motor slip
C0090	Rated motor voltage	400	0	{1 V}	1000		

Setting sequence

1. Select the operating mode “V/f characteristic control” (C0006 = 5, factory setting).
2. Select V/f characteristic (C0014) if necessary
3. Set V/f rated frequency (C0015). Use the values specified on the motor nameplate.
4. Set rated motor voltage (C0090). Use the values specified on the motor nameplate.
5. Set Umin boost (C0016).

- Load-independent boost of the motor voltage for starting and operation at low speeds, to optimize the torque behaviour of the inverter.
- it is absolutely necessary to adapt C0016 to the asynchronous motor that is used, since the motor can otherwise be destroyed because of overheating.Observe the thermal behaviour of the connected motor for low speeds:
  - Experience shows that it is possible to drive standard asynchronous motors with insulation material Class B in the speed range $0.5 \cdot n_r$ for a short time with their rated current.
  - Please ask the motor manufacturer for the exact setting values for the motor current.

A Operate motor in idle running with 5 ... 10 % of the rated speed (n_r):
- $P_{Mot} \leq 7.5$ kW: $n_{set} \approx 10\ \%\ n_r$
- $P_{Mot} > 7.5$ kW: $n_{set} \approx 5\ \%\ n_r$

B Increase V_{min} until you reach the following motor current:
- **Motor in short-term operation** (up to 50 % n_r):
  for self-ventilated motors: $I_{motor} \leq I_{r\ motor}$
  for forced-ventilated motors: $I_{motor} \leq I_{r\ motor}$
- **Motor in continuous operation** (up to 50 % n_r):
  for self-ventilated motors: $I_{motor} \leq 0.8 \cdot I_{r\ motor}$
  for forced-ventilated motors: $I_{motor} \leq I_{r\ motor}$

Important

Only change between V/f characteristic control (C0006 = 5) and vector control (C0006 = 1) when the controller is inhibited.

C0014 = 0
Linear characteristic

C0014 = 1
Square-law (quadratic) characteristic (e.g. for pumps, blowers)

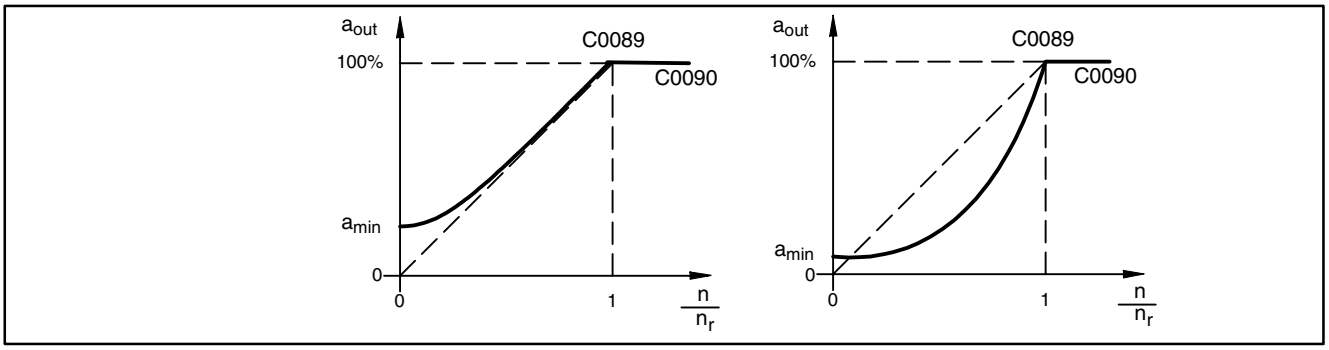
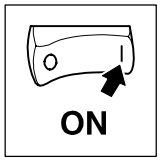


Fig. 5-3 Linear and square-law characteristic



5.4.3.2 Optimizing the vector control

Required codes

Code	Name	Possible settings				IMPORTANT
		Lenze	Selection		Info	
[C0014]	Voltage characteristic	0	0 1	linear characteristic U ~ fd with constant V_{min} boost square-law characteristic U ~ fd^2 with constant V_{min} boost		📖 5-10
C0081	Rated motor power	→	0.01	{0.01 kW} 500.00		→ depending on C0086
C0087	Rated motor speed	→	300	{1 rpm} 36000		
C0088	Rated motor current	→	0.5	{0.1 A} 500.0		
C0089	Rated motor frequency	→	10	{1 Hz} 5000		
C0090	Rated motor voltage	→	0	{1 V} 1000		
C0091	Motor cos-phi (p.f.) j	→	0.50	{0.01} 1.00		
C0092	Motor LS	0.0	0.0	{0.1 mH} 6553.0		

Setting sequence

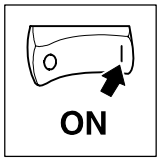
1. Select the operating mode “Vector control” (C0006 = 1).
2. Select motor:
   – For Lenze motors with C0086.
   – For motors of other makes, enter the nameplate data of the connected motor (📖 5-6)
3. Start motor identification (C0148 = 1).

Precise setting

4. If the motor identification does not result in an optimum operating behaviour, you can make a fine setting manually via C0092.
   – To achieve the maximum motor torque, increase the value under C0092 (max. +15 % of the value achieved by the motor identification).
   – If the control is not smooth at low speeds, reduce the value under C0092 (max. -15 % of the value achieved by the motor after identification).

Important

Only change between V/f characteristic control (C0006 = 5) and vector control (C0006 = 1) when the controller is inhibited.
When using motors of other brands:
For a correct display of the momentary speed and the reference torque, the rated frequency and rated power of the connected motor must be entered additionally.



5.4.3.3 Motor identification

Code	Name	Possible settings				IMPORTANT
		Lenze	Selection		Info	
C0148	Motor identification	0	0	Inhibit motor identification		
			1	Enable motor identification	Duration approx. 1 ... 2 min	Identification when the motor is at standstill

Function

The motor identification
- first optimizes the switching behaviour of the drive controller,
- then determines the internal motor parameters that are required for vector control, and
- measures the motor cable from the controller to the motor.

V/f characteristic control

In this operating mode, the motor identification is not mandatory. The drive controller operates with an internal default setting (factory setting), that has been defined for a motor with matching power and 10 m motor cable. The motor identification is necessary, if the smooth running does not meet your requirements.

Setting sequence

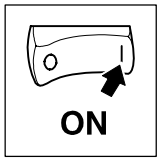
Manual motor identification with C0148

1. Setting controller inhibit
2. Select a Lenze motor under C0086 or enter motor data of the nameplate. (📖 5-6)
3. Start motor identification under C0148 = 1.
4. Remove the controller inhibit.
5. The motor identification takes approx. 1 ... 2 min (depending on the rated motor power). The motor is at standstill during this procedure.
6. After the motor identification is completed,
   – C0148 = 0 is set,
   – controller inhibit is set
   – a fault is indicated if the motor identification has failed.

Automatic motor identification with C0149

1. Select a Lenze motor under C0086 or enter motor data of the nameplate. (📖 5-6)
2. Use C0149 = 1 to activate the automatic motor identification, and store this setting in parameter set 1.
3. The motor identification starts automatically after switching on the mains supply and the subsequent enabling of the controller.
   – The motor identification takes approx. 1 ... 2 min (depending on the rated motor power). The motor is at standstill during this procedure.
4. After the motor identification is completed,
   – the controller inhibit is set, and the parameters that have been determined are automatically stored in parameter set 1,
   – a fault is indicated if the motor identification has failed. Acknowledging the fault with TRIP-reset will restart the motor identification.

- After a failed motor identification, if you switch the mains supply for the controller off and on again, the motor identification will start again.
- With C0149 = 0 you can deactivate the automatic motor identification.

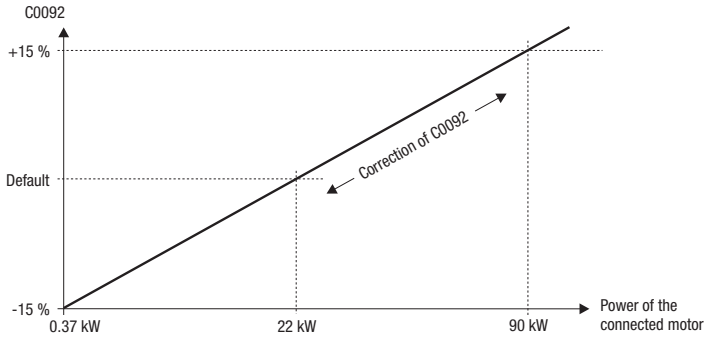


Caution!

If the setting of the machine parameters is incorrect, the motor may reverse in the "Vector control" mode after controller enable.

- Enter the nameplate data of the motor and start the motor identification.
- Under C0909 you can also inhibit a direction of rotation.
- It may be necessary to correct the stator inductance (C0092) manually, in individual cases.

Trend of the correction

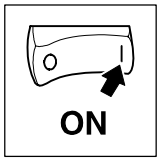


Special features

- You can carry out the motor identification for different parameter sets, and thus configure each parameter set for another motor.

Important

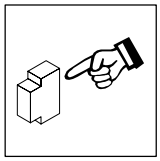
- Save the parameter set permanently under C0003.
- You can save the determined values via GDC or the operating module and copy it to an identical motor-controller combination.
- Carry out the motor identification for every controller/motor combination. This ensures an optimum control behaviour.



5.5 Adaptation of the signal processing

The adaptation of the internal signal processing to the drive task (e.g. step control or dancer control) is made by the selection of a ready-made basic configuration. With the factory setting you can already operate the drive under speed control. (📖 7-26)

- A detailed description of the individual basic configurations with terminal assignments, signal flow charts and application examples can be obtained from chapter 10.1. (📖 10-1)
- Before you can load a basic configuration through C0005, you must first set the controller inhibit.
- If you change the configuration under C0005, the assignment of all inputs and outputs with their corresponding default assignments will be overwritten. If necessary, you will have to alter the function assignment to match the wiring.
  – To alter the function assignment to match a particular wiring, or to expand the signal processing, see ”Using function blocks”. (📖 7-8)

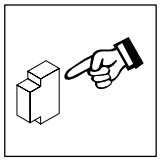


6 During operation

- Replace defective fuses with the prescribed type only when no voltage is applied.
  There are no fuses in the controller.
- For cyclic mains switching:
  – Do not switch on the controller more frequently than every 3 minutes, otherwise the internal inrush-current limitation can be overloaded.
- Switching on the motor side:
  – Monitoring messages can be activated when switching the motor while the controller is enabled. (📖 6-2)
- Depending on the controller settings, the connected motor can be overheated:
  – For instance, longer DC-braking operations.
  – Longer operation of self-ventilated motors at low speed.
- With the corresponding parameter setting, the controllers generate an output frequency of up to 600 Hz:
  – If an inappropriate motor is connected, a hazardous overspeed may occur.
- If you use the function ”Flying restart circuit” (C0142 = 2, 3) on machines with low inertia and friction:
  – The motor can start for a short time or reverse direction for a short time after enabling the controller when the motor is at standstill. In this case, make a slight adjustment to the values under C0146 and C0147.

6.1 Status messages of the operating module

Status indications of the operating module		
Display	**on**	**off**
RDY	Ready for operation	Initializing or fault
IMP	Power outputs inhibited	Power outputs enabled
FAIL	Active fault (TRIP, message or warning)	No fault
I_{MAX}	• Motor current setpoint ≥ C0022 • DC-injection braking active	Motor current setpoint < C0022
M_{MAX}	Speed controller within its limits. Drive is torque-controlled.	Drive is speed-controlled



6.2 Information on operation

Stop!

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

For mains supply switching it is irrelevant whether other controllers are supplied from the same mains rectifier.

6.2.1 Switching on the motor side

- Switching on the motor side of the controller is permitted.
- Please note:
  – Switching while a controller is enabled may cause the fault indication ”0Cx” (short-circuit / earth fault).
  – For long motor cables and operating controllers with smaller output power, leakage currents through parasitic cable capacitance may cause the fault indication ”OCx”.

6.3 Display functions

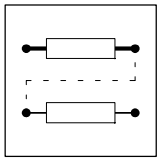
Actual speed displays

You can read out various actual values by using the following codes:

Code	Meaning
C0051	Absolute actual speed [rpm]
C0052	Absolute motor voltage [V]
C0053	Absolute DC bus voltage [V]
C0054	Absolute motor current [A]
C0058	Actual frequency at the inverter output [Hz]
C0061	Heatsink temperature [5C]
C0063	Motor temperature [°C]
C0064	Controller load [%]

Identification

- C0099 indicates the software version of the drive controller.
- C0093 shows you the controller type.



7 Configuration

In practice, every application requires an adapted controller-internal configuration. In general, a number of different function blocks are available which must be linked together in a suitable configuration. (📖 7-11)

7.1 Basic configurations

Function block links for frequent applications are already stored in the basic configurations. They can be selected and activated under code C0005. You can select a four-digit number; every digit stands for particular features.

First digit

Defines the basic function of the configuration.

Configuration C0005	Basic function
1xxx	Speed control
2xxx	Step control
3xxx	Traversing control
4xxx	Torque control
5xxx	Digital frequency master
6xxx	Digital frequency slave (bar)
7xxx	Digital frequency slave (cascade)
8xxx	Dancer position control (external diameter detection)
9xxx	Dancer position control (internal diameter detection)

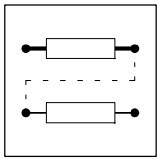
Second digit

Defines the additional function. It extends the basic function.

Configuration C0005	Additional function
x0xx	No additional function
x1xx	Brake control via digital output X5/A2
x2xx	Setpoint selection via motor potentiometer
x3xx	PID controller for control of process variables
x4xx	Mains failure control
x5xx	Setpoint selection via digital frequency input
x6xx	Analog gearbox factor trimming
x7xx	Digital gearbox factor trimming
x8xx	Digital ramp generator

Tip!

The most important codes for the parameter setting of the basic configuration can be found in GDC and the operating module, in the menu items “Short set-up”.



Configuration

Third digit

Defines whether the voltage of the analog and digital control inputs will be supplied internally or externally. (📖 4-21)

Configuration C0005	Supply voltage
xx0x	External
xx1x	Internal via terminal X5/A1 and X6/63

Fourth digit

Defines the controller interface for reading certain control signals (e.g. speed setpoint).

Configuration C0005	Interface
xxx0	Control terminals
xxx1	RS 232, RS 485 or fibre optics
xxx3	INTERBUS or PROFIBUS-DP
xxx5	System bus (CAN)

Tip!

Further information on the basic configurations as well as application examples can be obtained from Chapter 10.1 . (📖 10-1)

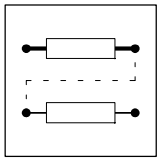
7.1.1 Changing the basic configuration

If the basic configuration must be changed for a special application, proceed as follows:

1. Select a basic configuration under C0005 which largely meets your requirements.
2. Add missing functions by:
   – reconfiguring inputs and/or outputs.
   – set the parameters for the function blocks. (📖 7-9)
   – adding or removing function blocks . (📖 7-15)

Tip!

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



7.2 Control

The drive controller can be operated via terminals (X5 and X6), via the fieldbus module at X1, or via the system bus (X4). Mixed modes are also possible.

Tip!

C0005 contains predefined configurations which allow a very simple change of the operating mode. (📖 7-1)

Example: C0005 = 1005

This configuration corresponds to a speed control with control via system bus.

If more inputs of the function blocks are to be controlled via another interface, proceed as follows:

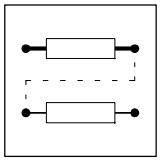
- Assign the function block inputs to be controlled to ”control objects” depending on the interface used. (📖 7-11)
  - – Free control codes
    in the case of control via LECOM-A/B/LI (RS232, RS485 or optical fibre interface) or operating module.
  - – AIF objects
    for control using the fieldbus module.
  - – CAN objects
    in case of control using the system bus.
- Afterwards, the inputs can be controlled through these codes or input objects, by accessing them via the interface.

Example for a distribution of the control on terminals and LECOM-A (RS232):

The main speed setpoint in the configuration C0005 = 1000 is to be controlled through LECOM-A/B/LI. All other inputs remain under terminal control.

1. Select C0780:
   - – C0780 is the configuration code for the main setpoint NSET-N in the function block ”Speed setpoint conditioning” (NSET).
2. Assign a free control code via a selection number.
   - – e.g. 19515 (control code C0141)

The main speed setpoint is controlled by C0141.



7.3 Parameterization

- The parameter setting of the controller is used to adapt the drive to your applications.
- The complete parameter set is organized in codes which are consecutively numbered and always begin with "C". (📖 7-26)
- You can save the parameter set of an application.
  - Four parameter sets are available, so that the controller can be adjusted rapidly from one application to another.
  - When delivered, the parameter sets have the factory-set default values.

7.3.1 Methods of parameterization

There are two ways of changing parameters:

- Using the operating module
- Using a superimposed host (PC or PLC) via fieldbus modules and operating programs (see systems manual, part I, "Accessories").

These instructions only describe the change of parameters using the operating module.

7.3.2 Structure of the parameter set

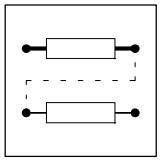
To simplify operation, the operating module 9371BB and the PC program GLOBAL DRIVE CONTROL (GDC) provide menu levels which will guide you rapidly to the desired codes:

- Main menu
  - contains submenus
  - contains the complete code list
- Submenus
  - contain the codes which are assigned to them

Codes consist of:

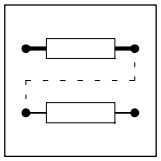
- Code level
  - Codes without subcodes contain one parameter
  - Codes with subcodes contain several parameters
- Parameter level / operating level
  There are four different types of parameter:
  - Absolute values of a physical variable
    (e. g. 400 V, 10 s)
  - Relative values of instrument variables
    (e.g. 50 % setpoint)
  - Codes for specific states
    (e.g. 0 = controller inhibited, 1 = controller enabled)
  - Display values
    These values can only be displayed and not changed.
    (e.g. actual motor current under C0054)

You can change absolute and relative values in discrete steps.



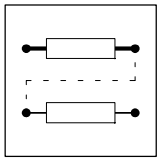
7.3.3 List of the selection menus

Operating module 9371 BB		Global Drive Control or LEMOC2	
Main menu	**Submenu**	**Main menu**	**Submenu**
USER menu		USER menu	
Code list		Code list	
Load/store		Parameter set management	
Diagnostics		Diagnostics	
	Actual info		Momentary operation
	History		History
Short setup		Short setup	
	Setup V/f		V/f characteristic mode
	Setup vector		Motor control
	Speed control		Speed control
	Step control		Step control
	Lead screw		Traversing control
	Torque control		Torque control
	DF master		Digital frequency master
	DF slave bus		Digital frequency slave bus
	DF slave cas		Digital frequency slave cascade
	Dancer control external		Dancer position control, external diameter detection
	Dancer control internal		Dancer position control, internal diameter detection
	User menu CFG		Configuration User Menu
Main FB		Main function blocks	
	NSET		NSET Speed preparation
	NSET-JOG		NSET-JOG JOG values
	NSET-RAMP1		NSET-RAMP1 Standard ramp generator
	MCTRL		MCTRL Motor control
	DFSET		DFSET Digital frequency processing
	DCTRL		DCTRL Device control
Terminal I/O		Terminal I/O	
	AIN1 X6.1/2		Analog input 1 X6.1/2
	AIN2 X6.3/4		Analog input 2 X6.3/4
	AOUT1 X6 62		Analog output 1 X6/62
	AOUT2 X6 63		Analog output 2 X6/63
	DIGIN		Digital inputs
	DIGOUT		Digital outputs
	DFIN		Digital frequency input
	DFOUT		Digital frequency output
Controller		Controller setting	
	Speed		speed
	Current		Current/torque
Motor/feedb.		Motor/feedback system	
	Motor adj		Motor adjustment
	Feedback		Feedback systems
Monitoring		Monitoring	
LECOM/AIF		LECOM/AIF interface	
	LECOM-A/B		LECOM-A/B
	AIF interface		AIF data interface
	Status word		Status word

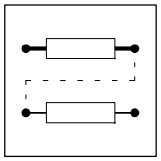


Configuration

Operating module 9371 BB		Global Drive Control or LEMOC2	
Main menu	**Submenu**	**Main menu**	**Submenu**
System bus		System bus	
	Management		CAN management
	CAN-IN1		CAN-IN1 Input block 1
	CAN-OUT1		CAN-OUT1 Output block 1
	CAN-IN2		CAN-IN2 Input block 2
	CAN-OUT2		CAN-OUT2 Output block 2
	CAN-IN3		CAN-IN3 Input block 3
	CAN-OUT3		CAN-OUT3 Output block 3
	Status word		Status word
	FDO		FDO Free digital outputs
	Diagnostics		Diagnostics
FB config		FB configuration	
Func. blocks		Function blocks	
	ABS1		ABS1 Absolute value
	ADD1		ADD1 Addition
	ADD2		ADD2 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
	ANEG1		ANEG1 Analog NOT
	ANEG2		ANEG2 Analog NOT
	AOUT1		AOUT1 Analog output term. 62
	AOUT2		AOUT2 Analog output term. 63
	ARIT1		ARIT1 Arithmetics
	ARIT2		ARIT2 Arithmetics
	ARIT3		ARIT3 Arithmetics
	ASW1		ASW1 Analog switch
	ASW2		ASW2 Analog switch
	ASW3		ASW3 Analog switch
	BRK1		BRK1 Brake logic
	CAN-OUT1		CAN-OUT1 Output block 1
	CAN-OUT2		CAN-OUT2 Output block 2
	CAN-OUT3		CAN-OUT3 Output block 3
	CFG-FB		CFG FB configuration
	CMP1		CMP1 Analog comparator
	CMP2		CMP2 Analog comparator
	CMP3		CMP3 Analog comparator
	CMP4		CMP4 Analog comparator
	CONV1		CONV1 Converter
	CONV2		CONV2 Converter
	CONV3		CONV3 Converter
	CONV4		CONV4 Converter
	CONV5		CONV5 Converter
	CONVPHA1		CONVPHA1 32-bit conversion
	CURVE1		CURVE1 Curve function
	DB1		DB1 Analog dead band
	DCALC1		DCALC1 Diameter calculator
	DCTRL		DCTRL Device control



Operating module 9371 BB		Global Drive Control or LEMOC2	
Main menu	**Submenu**	**Main menu**	**Submenu**
	DFIN		DFIN Digital frequency input
	DFOUT		DFOUT Digital frequency output
	DFRFG1		DFRFG1 Digital frequency ramp generator
	DFSET		DFSET Digital frequency processing
	DIGDEL1		DIGDEL1 Digital delay
	DIGDEL2		DIGDEL2 Digital delay
	DIGIN		DIGIN Digital input E1 - E5
	DIGOUT		DIGOUT Digital output A1 - A4
	DT1		DT1 Differential element
	FCNT1		FCNT1 Free-piece counter
	FDO		FDO Free digital outputs
	FEV-AN1		FEVAN1 Free analog input variable
	FIXSET		FIXSET Fixed setpoints
	FLIP1		FLIP1 Flip-flop
	FLIP2		FLIP2 Flip-Flop
	FOLL1		FOLL1 Sensor compensation
	INT1		INT1 Integrator
	INT2		INT2 Integrator
	LIM1		LIM1 Limiter
	MCTRL1		MCTRL1 V/f characteristic control
	MCTRL2		MCTRL2 Motor control
	MFAIL		MFAIL Mains failure detection
	MPOT1		MPOT1 Motor potentiometer
	NLIM1		NLIM1 Limit speeds
	NOT1		NOT1 Logic NOT
	NOT2		NOT2 Logic NOT
	NOT3		NOT3 Logic NOT
	NOT4		NOT4 Logic NOT
	NOT5		NOT5 Logic NOT
	NSET		NSET Speed preparation
	NSET-JOG		NSET-JOG JOG values
	NSET-RAMP1		NSET-RAMP1 Standard ramp generator
	OR1		OR1 Logic OR
	OR2		OR2 Logic OR
	OR3		OR3 Logic OR
	OR4		OR4 Logic OR
	OR5		OR5 Logic OR
	OSZ		OSZ Oscilloscope function
	PCTRL1		PCTRL1 Process controller
	PCTRL2		PCTRL2 Process controller
	PT1-1		PT1-1 Delay element
	PT1-2		PT1-2 Delay element
	R/L/Q		R/L/Q CW-CCW-QSP
	SRFG1		SRFG1 S-shaped ramp generator
	SQRT1		SQRT1 Square-root calculator
	S&H1		S&H1 Sample & Hold
	STAT		STAT Digital status signals
	TRANS1		TRANS1 Signal evaluation
	TRANS2		TRANS2 Signal evaluation
FCODE		Free codes	
Identify		Identification	
	Drive		Controller
	Op Keypad		LECOM



7.4 Working with function blocks

You can configure the signal flow in the controller yourself, by connecting function blocks. In this way, you can easily adapt the controller to different applications.

7.4.1 Signal types

Every function block has a number of inputs and outputs that can be connected (linked) together. Corresponding to their functions, there are only certain types of signals at the inputs and outputs:

- Quasi-analog signals
  - Symbol: O
  - Unit: %
  - Designation: a
  - Value range: +16384 = +100 %
  - Resolution: 16 bit
- Digital signals
  - Symbol: □
  - Unit: binary, with HIGH or LOW level
  - Designation: d
  - Resolution: 1 bit
- Speed signals
  - Symbol: n
  - Unit: rpm
  - Designation: phd
  - Resolution: 16 bit
- Phase signals
  - Symbol: ▲
  - Unit: inc
  - Designation: ph
  - Resolution: 16 bit

You can only connect signal types of the same kind, e.g. the analog signal of a function block can only be connected to the analog input of another function block. If you connect two different signal types, the connection will be rejected.

Tip!

A detailed description of all function blocks can be obtained from the Manual.

7.4.2 Elements of a function block

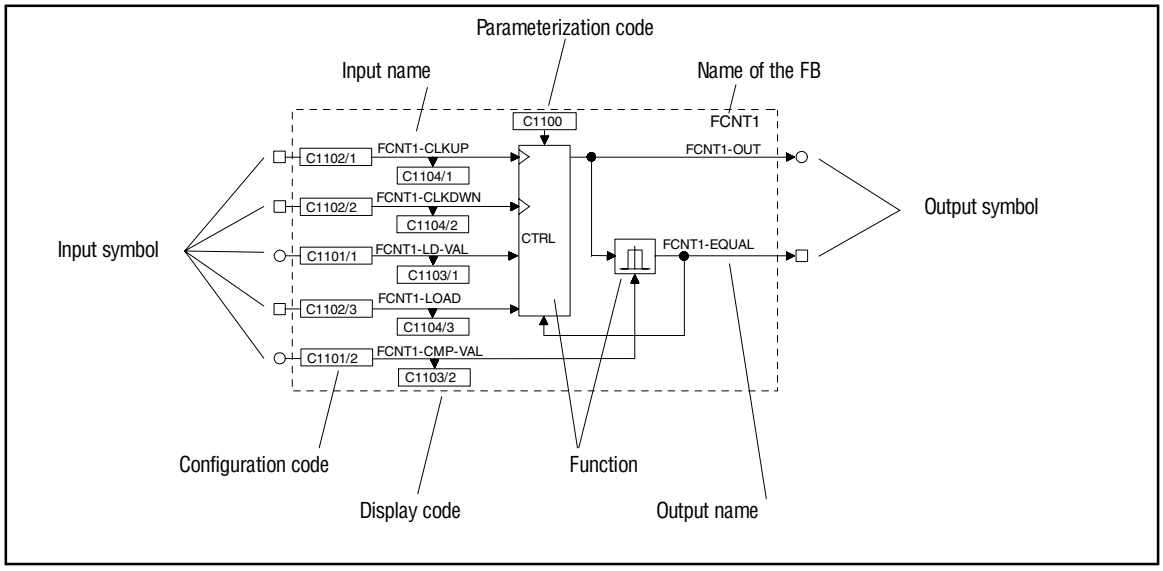


Fig. 7-1 The construction of a function block (FB). Example: FCNT1

Name of the FB

Identifies the FB unambiguously. FBs with the same function are distinguished by the number after their names.

Every FB is defined by its selection number. The input of the selection number into the processing table is always required for the calculation of the FB. (📖 7-15)

The selection numbers can be obtained from selection list 5. (📖 7-63)

Example:

(FCNT1, see Fig. 7-1)

- FCNT1 has the selection number 6400 (selection list 5).

Input symbol

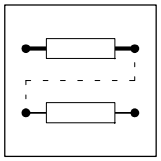
Designates the signal type which is permitted as a signal source for this input. (📖 7-8)

Tip!

You can only configure inputs which are connected.

Name of the input

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



Configuration

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 through their subcodes.

It is not possible to connect an input to more than one signal source.

Display code

Displays the present 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

Displays the mathematical function as a block diagram (see Fig. 7-1).

Parameterization code

Adaptation of the function or behaviour to the application. The settings are explained and shown in the text and/or the line diagram. (📖 7-18)

Output symbol

Designates the signal type. Connections to inputs of the same signal type are possible. (📖 7-8)

Every output is defined by the selection number. The selection numbers are divided into selection lists (1 to 4) according to the different signal types. An output is connected to an input by the selection numbers. (📖 7-63)

Example:

(FCNT1, see Fig. 7-1)

- FCNT1-OUT has the selection number 6400 (analog signal, selection list 1).
- FCNT1-EQUAL has the selection number 6400 (digital signal, selection list 2).

Tip!

You can only configure outputs which are connected.

Name of the output

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

7.4.3 Connecting function blocks

General rules

- Every input has a signal input assigned to it.
- Every input can only have one signal source.
- Inputs of different function blocks can have the same signal source.
- You can only connect signals of the same type.

Stop!

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

Tip!

For the visualization of existing connections, Lenze offers a network list generator (see Manual, Part I,“Accessories”: GDC PC program).

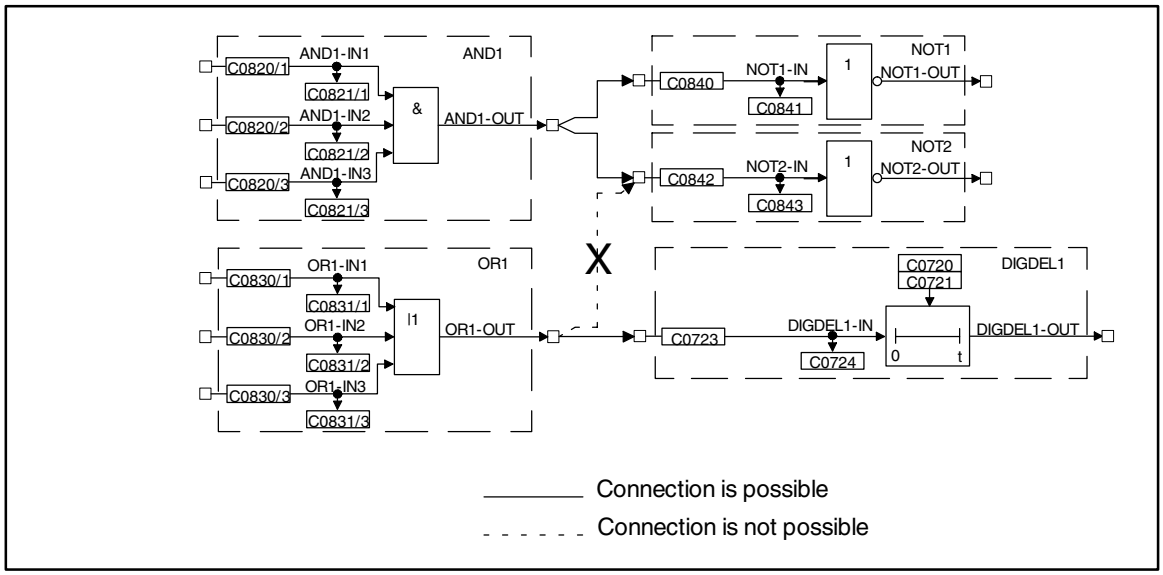
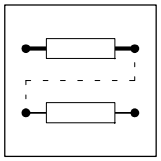


Fig. 7-2 Correct connection of function blocks



Configuration

Basic procedure

1. Select the configuration code of the function block input which is to be changed.
2. Select the signal source for the function block input (e.g. 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 the signal source and confirm.
5. Remove unwanted connections, if any.
   – To do 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 the modified configuration in the desired parameter set.

Example

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

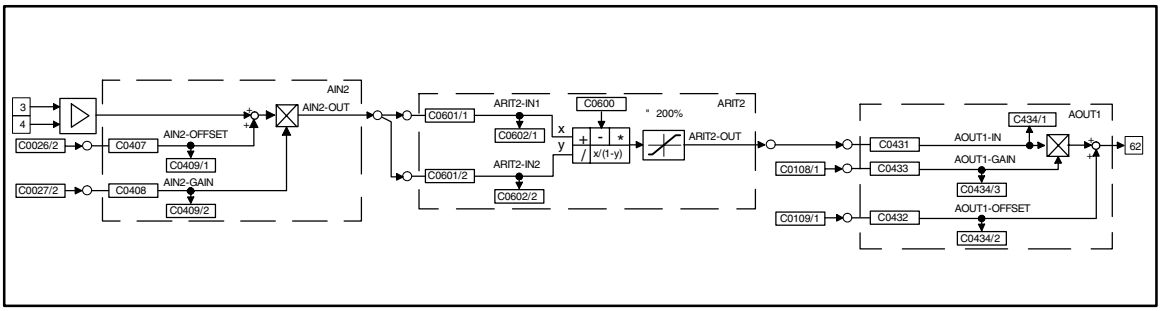
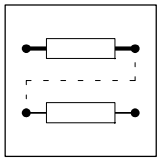
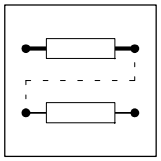


Fig. 7-3 Example of a simple configuration



Making 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 no. 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 no. 55) using ▲ or ▼ .
   – Confirm using SH + PRG
   – Change to the code level again using PRG.
3. Parameterize 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 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.



Configuration

Remove connections

- Since a source can have several targets, there may be further signal connections, which may not be wanted.
- Example:
  - In the default 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 the connection, it must be removed.

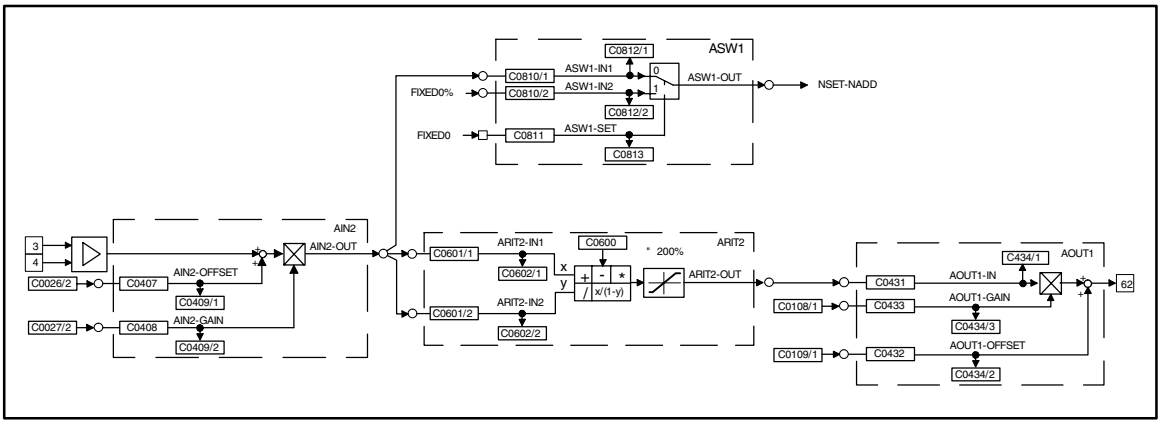


Fig. 7-4 Remove connections in a configuration

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.

7.4.4 Entries into the processing table

The 93XX controller provides a certain amount of processor time processing function blocks. Since the type and number of FB to be used depends on the application and can vary strongly, not all available FB are continually 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 you incorporate FBs into an existing configuration, they must be entered 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 an FB. If this time has elapsed, no further FBs can be integrated.

Sequence for entering FBs

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

Example:

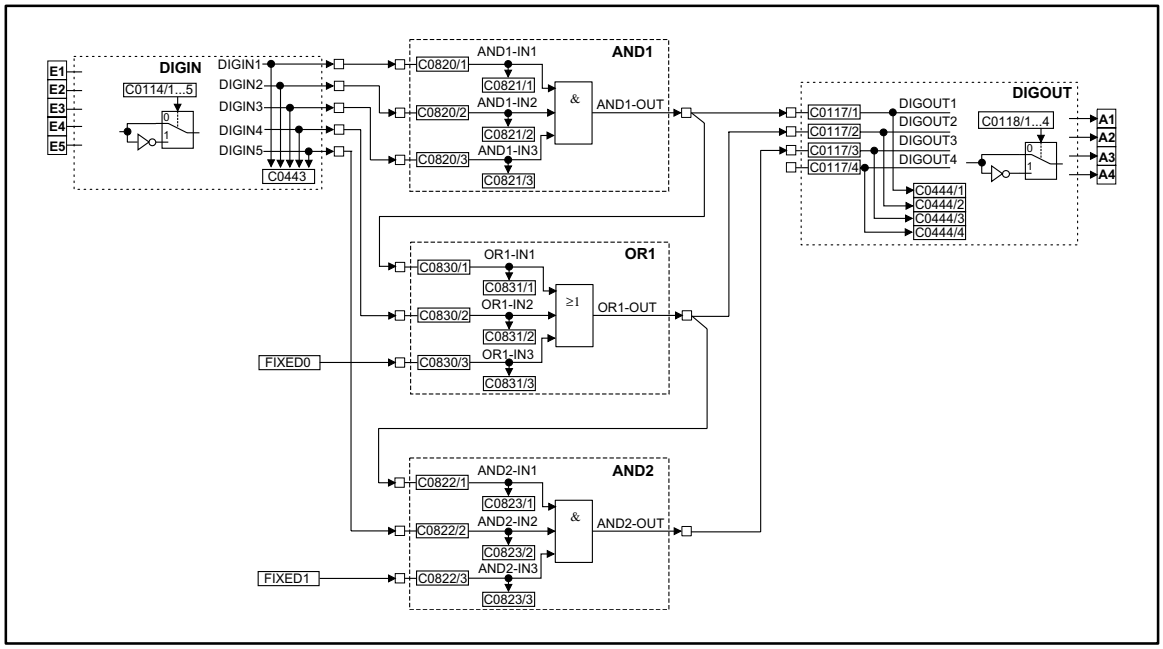
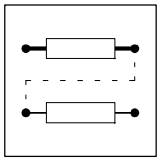


Fig. 7-5 Example of a configuration



Configuration

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

1. DIGIN does not have to be entered into the processing table
2. The first FB is AND1, since it receives its input signals from DIGIN and only has successors.
3. The second FB is OR1, since its signal source is the output of AND1 (predecessor). This means that the output signal in AND1 must be generated first, before it can be processed in OR1. At the same time, OR1 has a successor. This means that OR1 must be entered in the processing table before the successor.
4. The third FB is AND2, since it has a predecessor (see 3.)
5. The entries in C0465 are:
   – Position 10: AND1 10500
   – Position 11: OR1 10550
   – Position 12: AND2 10505

This example was started with position 10, because positions 10 to 12 are not assigned in the default setting.

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

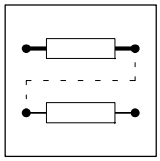
Tip!

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

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

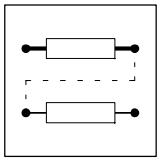
The following function blocks are always executed, and do not have to be entered into the processing table:

- AIF-IN
- CANx-IN
- DIGIN
- DIGOUT
- FCODE (all free codes)
- MCTRL1, MCTRL2
- fixed signal sources (FIXED0, FIXED0%, etc.)



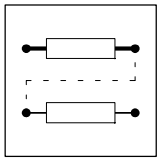
Frequent faults in the configuration

Malfunction	Cause	Remedy
FB only supplies an output signal = 0	FB was not entered into the processing table C0465	Enter FB
FB only supplies constant signals	FB was deleted from or overwritten in the processing table	Enter FB again, possibly under a different subcode (list position)
The output signal does not arrive at the following FB	The connection between the FBs has not be created	Make the connection (from the view of the next FB) through the configuration code (CFG)
FB cannot be entered in the table C0465	Residual processing time is too short (see C0466)	• Remove unused FBs (e.g. inputs and outputs not used) from the processing table • In networked drives, functions may be relocated to other controllers
The controller outputs the internally calculated signals with a delay	FB are processed in an incorrect sequence	Adapt the processing table under C0465 to the signal flow

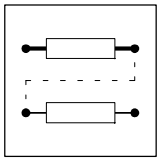


7.5 Table of existing function blocks

Function block	Description	CPU time [ms]	used in basic configuration C0005								
			1000	2000	3000	4000	5000	6000	7000	8000	9000
ABS1	Absolute value generator	4		D	D						
ADD1	Addition block 1	8		D	D			D		D	D
ADD2	Addition block 2										
AIF-IN	Fieldbus	-	D	D	D	D	D	D	D	D	D
AIF-OUT	Fieldbus	56	D	D	D	D	D	D	D	D	D
AIN1	Analog input X6/1, X6/2	10	D	D	D	D	D	D	D	D	D
AIN2	Analog input X6/3, X6/4	28	D	D	D	D	D	D	D	D	D
AND1	Logic AND, block1	6			D						
AND2	Logic AND, block2										
AND3	Logic AND, block3										
AND4	Logic AND, block4										
AND5	Logic AND, block5										
ANEG1	Analog inverter 1	4	D	D	D	D	D	D	D	D	D
ANEG2	Analog inverter 2					D		D	D	D	D
AOUT1	Analog output X6/62	12	D	D	D	D	D	D	D	D	D
AOUT2	Analog output X6/63		D	D	D	D	D	D	D	D	D
ARIT1	Arithmetic block 1	11		D	D					D	D
ARIT2	Arithmetic block 2										
ARIT3	Arithmetic block 3										
ASW1	Analog changeover 1	4				D		D	D	D	D
ASW2	Analog changeover 2							D	D		
ASW3	Analog changeover 3										
BRK1	Trigger holding brake	15									
CAN-IN	System bus	-	D	D	D	D	D	D	D	D	D
CAN-OUT	System bus	56	D	D	D	D	D	D	D	D	D
CMP1	Comparator 1	15	D	D	D	D	D	D	D	D	D
CMP2	Comparator 2			D	D						
CMP3	Comparator 3			D							
CMP4	Comparator 4										
CONV1	Conversion of analog signals	8		D	D						
CONV2	Conversion of analog signals										
CONV3	Conversion of speed signals into analog signals									D	D
CONV4	Conversion of speed signals into analog signals										
CONV5	Conversion of analog signals into speed signals				D						
CONVPHA1	32-bit conversion	6									
CURVE1	Curve function	15									
DB1	Dead band	7									
DCALC1	Diameter calculator	50								D	D
DCTRL	Device control	-	D	D	D	D	D	D	D	D	D
DFIN	Digital frequency input	5						D	D	D	D
DFOUT	Digital frequency output	35	D	D	D	D	D	D	D		
DFRFG1	Digital frequency ramp generator	40									
DFSET	Digital frequency processing	85					D	D	D		
DIGDEL1	Binary delay element 1	9			D						
DIGDEL2	Binary delay element 2										
DIGIN	Input terminals X5/E10 X5/E5	-	D	D	D	D	D	D	D	D	D
DIGOUT	Output terminals X5/A10 X5/A4	-	D	D	D	D	D	D	D	D	D
DT1-1	Differential element	12									
FCNT1	Free-piece counter	11									

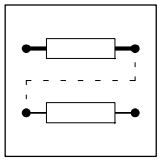


Function block	Description	CPU time [mS]	used in basic configuration C0005								
			1000	2000	3000	4000	5000	6000	7000	8000	9000
FCODE16	Free control codes	-	D	D	D	D	D	D	D	D	D
FCODE17			D	D	D	D	D	D	D	D	D
FCODE26/1			D	D	D	D	D	D	D	D	D
FCODE26/2			D	D	D	D	D	D	D	D	D
FCODE27/1			D	D	D	D	D	D	D	D	D
FCODE27/2			D	D	D	D	D	D	D	D	D
FCODE32							D	D	D		
FCODE37											
FCODE108/1			D	D	D	D	D	D	D	D	D
FCODE108/2			D	D	D	D	D	D	D	D	D
FCODE109/1			D	D	D	D	D	D	D	D	D
FCODE109/2			D	D	D	D	D	D	D	D	D
FCODE141					D			D	D	D	D
FCODE175											
FCODE250											
FCODE471											
FCODE472/1					D					D	D
FCODE472/2											
FCODE472/3											
FCODE472/4											
FCODE472/5											
FCODE472/6											
FCODE472/7											
FCODE472/8											
FCODE472/9											
FCODE472/10											
FCODE472/11											
FCODE472/12											
FCODE472/13											
FCODE472/14											
FCODE472/15											
FCODE472/16											
FCODE472/17											
FCODE472/18											
FCODE472/19											
FCODE472/20											
FCODE473/1							D	D	D		
FCODE473/2											
FCODE473/3											
FCODE473/4											
FCODE473/5											
FCODE473/6											
FCODE473/7											
FCODE473/8											
FCODE473/9											
FCODE473/10											
FCODE474/1					D			D			
FCODE474/2								D			
FCODE475/1											
FCODE475/2											



Configuration

Function block	Description	CPU time [ms]	used in basic configuration C0005								
			1000	2000	3000	4000	5000	6000	7000	8000	9000
FDO	Free digital outputs	-	D	D	D	D	D	D	D	D	D
FEVAN1	Freely assignable input variable	4									
FIXSET1	Fixed setpoints	9		D	D						
FLIP1	D-flipflop 1	6			D						
FLIP2	D-flipflop 2										
FOLL1	Sensor compensation	22									
INT1	Integrator 1	25		D	D						
INT2	Integrator 2										
LIM1	Limiter	6									
MCTRL	Motor control	-	D	D	D	D	D	D	D	D	D
MFAIL	Mains failure control	40									
MLP1	Motor phase failure detection	30									
MONIT	Monitoring	-	D	D	D	D	D	D	D	D	D
MPOT1	Motor potentiometer	20									
NLIM1	Limit frequencies	8	D								
NOT1	Logic NOT, block1	4		D	D						
NOT2	Logic NOT, block2										
NOT3	Logic NOT, block3										
NOT4	Logic NOT, block4										
NOT5	Logic NOT, block5										
NSET	Speed setpoint conditioning	70	D	D	D	D	D				
OR1	Logic OR, block1	6		D	D					D	D
OR2	Logic OR, block2									D	D
OR3	Logic OR, block3										
OR4	Logic OR, block4										
OR5	Logic OR, block5										
OSZ	Oscilloscope function	70									
PCTRL1	Process controller 1	58									
PCTRL2	Process controller 2	44								D	D
PT1-1	First order delay elements	8								D	
PT1-2											
R/L/Q	QSP / setpoint inversion	8	D	D	D	D	D	D	D	D	D
RFG1	Ramp generator	16						D	D		
S&H	Sample and Hold	4									
SQRT1	Root calculator	18									
SRFG1	S-shaped ramp generator	15									
STAT	Digital status signals	-	D	D	D	D	D	D	D	D	D
TRANS1	Binary flank evaluation	7		D	D						
TRANS2	Binary flank evaluation										



7.6 Monitoring

Various monitoring functions protect the drive from impermissible operating conditions.

If a monitoring function is activated,

- the corresponding set reaction is triggered, (📖 7-21)
- a digital output is set if it is assigned to the corresponding reaction,
- the fault code is entered in position 1 in the history buffer. (📖 8-2)

7.6.1 Reactions

The controller can react to interference in four different ways:

- TRIP (highest priority)
- Message
- Warning
- OFF=no reaction (lowest priority)

For some operating faults, you can determine the reaction of the controller. (📖 7-23)

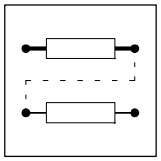
TRIP

Status indications of the operating module in case of TRIP		
RDY	IMP	FAIL
j	J	J

J : on j : off L : flashing

Drive behaviour:

- 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 accelerates to its setpoint along the set ramps. (📖 8-6)



Configuration

Message

Status indications of the operating module in the event of a message		
RDY	IMP	FAIL
j	J	J

J : on j : off L : flashing

Drive behaviour:

- Switches the power outputs U, V, W to a high resistance as long as the fault is active.
- Short-term fault ≤ 0.5 sec:
  – The drive is idling (no control!), as long as the fault is active.
  – If the fault is eliminated, the drive accelerates to its setpoint with maximum torque.
- Long-term fault > 0.5 sec:
  – The drive idles (no control!), as long as the fault is present.
  – Homing points are lost.
  – If the fault is eliminated, the drive moves to its setpoint along the set ramps.

Danger!

The drive restarts automatically if the fault is eliminated.

Warning

Status indication of the operating module in the event of a warning		
RDY	IMP	FAIL
j	J	J

J : on j : off L : flashing

Drive behaviour:

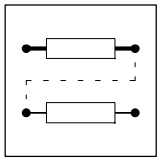
- The drive operates under control.

OFF

- No reaction on operating faults! Monitoring is deactivated.

Stop!

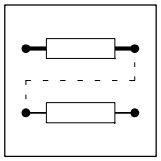
The drive may be destroyed if the monitoring functions are deactivated.



7.6.2 Monitoring functions

Overview of the fault sources detected by the controller, and the corresponding reactions

Fault indication			Possible reactions				
Display	**Error code**	**Meaning**	**T**	**M**	**W**	**off**	**Code**
CCr	T: 71	System fault	D	-	-	-	-
CE0	T: 61 W: 2061	Communication error (AIF)	n	-	n	D	C0126
CE1	T: 62 W: 2062	Communication error at the process data input object CAN-IN1 (time monitoring can be set under C0357/1)	n	-	n	D	C0591
CE2	T: 63 W: 2063	Communication error at the process data input object CAN-IN2 (time monitoring can be set under C0357/2)	n	-	n	D	C0592
CE3	T: 64 W: 2064	Communication error at the process data input object CAN-IN3 (time monitoring can be set under C0357/3)	n	-	n	D	C0593
CE4	T: 65 W: 2065	BUS-OFF state (many communication errors occurred)	n	-	n	D	C0595
EEr	T: 91 W: 2091 M: 1091	External monitoring	D	n	n	n	C0581
H05	T: 105	Internal fault	D	-	-	-	-
H07	T: 107	Internal fault	D	-	-	-	-
H10	T: 110	Sensor fault: heat sink temperature	D	-	-	n	C0588
H11	T: 111	Sensor fault: indoor temperature	D	-	-	n	
ID1	T: 140	Motor identification failed - characteristic	D	-	-	-	-
ID2	T: 141	Motor identification failed - motor data	D	-	-	-	-
LP1	T: 32	Motor phase failure detection (function block must be entered in C0465)	n	-	n	D	C0597
LU	M: 1030	Undervoltage	-	D	-	-	-
NMAX	T: 200	Maximum speed exceeded (C0596)	D	-	-	-	-
OC1	T: 11	Short-circuit	D	-	-	-	-
OC2	T: 12	Earth fault	D	-	-	-	-
OC3	T: 13	Overload during acceleration or deceleration	D	-	-	-	-
OC5	W: 2015	I x t overload	-	-	D	-	-
OH	T: 50	Heat sink temperature 1 (max. permissible, fixed)	D	-	-	-	-
OH3	T: 53	Motor temperature 1 (max. permissible, fixed)	n	-	-	D	C0583
OH4	W: 2054	Heat sink temperature 2 (adjustable; C0122)	-	-	D	n	C0582
OH7	W: 2057	Motor temperature 2 (can be set; code: C0121)	-	-	n	D	C0584
OH8	T: 58 W: 2058	Motor temperature (fixed) via inputs T1/T2	n	-	n *	D	C0585
OU	M: 1020	Overvoltage in the DC bus	-	D	-	-	-



Configuration

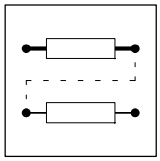
Fault indication			Possible reactions				
Display	**Error code**	**Meaning**	**T**	**M**	**W**	**off**	**Code**
PEr	T: 74	Program error	D	-	-	-	-
PI	T: 79	Fault during initialization	D	-	-	-	-
PR0	T: 75	General fault in parameter sets	D	-	-	-	-
PR1	T: 72	Fault in parameter set 1	D	-	-	-	-
PR2	T: 73	Fault in parameter set 2	D	-	-	-	-
PR3	T: 77	Fault in parameter set 3	D	-	-	-	-
PR4	T: 78	Fault in parameter set 4	D	-	-	-	-
Sd3	T: 83 W: 2083	Encoder fault at X9 PIN 8	n	-	n *	D	C0587
Sd5	T: 85 W: 2085	Encoder fault at X6/1 X6/2 (C0034 = 1)	n	-	n	D	C0598
Sd6	T: 86 W:2086	Sensor fault motor temperature (X8)	n	-	n	D	C0594

T: TRIP M: Message W: Warning D: Lenze n : possible -: not possible

n *: Possible, but the motor may be destroyed if the fault is not removed immediately.

Tip!

The information in the row ”Error code” is read from C0168/x if the history buffer is accessed via a fieldbus module or system.



7.6.3 Fault display via digital output

You can assign the fault indications TRIP, message, and warning in the function block DIGOUT to digital outputs (e.g. the terminals X5/A10 0 X5/A4).

Display TRIP or Message or Warning individually (individual indication):

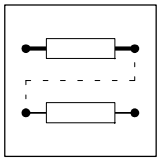
1. Select digital output in the code level under C0117 and subcode.
2. Assign DCTRL-TRIP or DCTRL-MESS or DCTRL-WARN in the parameter level.

Display TRIP, Message, Warning collectively (collective indication):

1. Assign DCTRL-TRIP, DCTRL-MESS and DCTRL-WARN to an OR element.
2. Select digital output in the code level under C0117 and subcode.
3. Assign output of the OR element (ORx-OUT) 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).

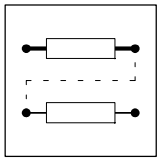


7.7 Code table

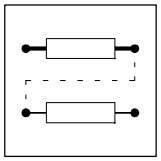
How to read the code table:

Row	Abbreviation	Meaning
Code	C0039 1 2 0 14 15	Code C0039 Subcode 1 of code C0039 Subcode 2 of code C0039 0 Subcode 14 of code C0039 Subcode 15 of code C0039
	[C0005]	Parameter value of the code can only be modified when the controller is inhibited
LCD		LCD display of the operating module
Lenze		Factory setting of the code
	→	The row "Important" contains further information
Selection	1 {1 %} 99	Minimum value {smallest step/unit} maximum value
Info	-	Meaning of the code
IMPORTANT	-	Additional, important explanation of the code

Code	Name	Possible settings				IMPORTANT
		Lenze	Selection		Info	
C0002	Par load	0	0	Load default	Load factory setting into RAM	Load parameter set • Parameter set 1 is loaded automatically after every mains connection
			1 2 3 4	Load PS1 Load PS2 Load PS3 Load PS4	Load parameter set x into the RAM and activate	
			11 12 13 14	Load ext PS1 Load ext PS2 Load ext PS3 Load ext PS4	Load parameter set x from the operating module into the RAM and activate	
			20	ext -> EEPROM	Transmit all parameter sets from the operating module to the controller and store non-volatile	
C0003	Par save	0	0	Ready	Saving completed	Save parameter set
			1 2 3 4	Save PS1 Save PS2 Save PS3 Save PS4	Non-volatile save of current parameter set x	
			11	Save extern	Save all parameter sets to the operating module	
C0004	Op-display	56	All available codes		Operating display	Operating module shows selected code in the operating level, if no other status indications of C0183 are active.

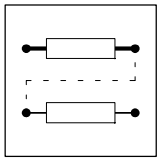


Code	Name	Possible settings			IMPORTANT
		Lenze	Selection	Info	
[C0005]	Signal CFG	1000		Signal configuration (predefined basic configurations)	
			0000 Common	Modified basic configuration	
			0100 CFG:empty	All internal connections are removed	
			10xx Speed mode 11xx Speed 100 12xx Speed 200 13xx Speed 300 14xx Speed 400 15xx Speed 500	Speed control	The **first** digit indicates the predefined basic function • 1xxx: Speed control • 2xxx: Step control • 3xxx: Traversing control • 4xxx: Torque control • 5xxx: Digital frequency - master • 6xxx: Digital frequency - slave (bus) • 7xxx: Digital frequency - slave (cascade) • 8xxx: Dancer control (external diameter detection) • 9xxx: Dancer control (internal diameter detection) The **second** digit indicates additional functions • x0xx: No additional function • x1xx: Brake control • x2xx: Setpoint input via motor potentiometer • x3xx: PID controller • x4xx: Mains failure control • x5xx: Setpoint input via digital frequency • x6xx: Gearbox factor Analog trimming • x7xx: Gearbox factor Digital trimming • x8xx: Digital frequency ramp generator The **third** digit indicates the predefined voltage source for the control terminals • xx0x: external supply voltage • xx1x: internal supply voltage The **fourth** digit indicates the predefined device control • xxx0: Control terminals • xxx1: RS232, RS485, Fibre optics • xxx3: INTERBUS or PROFIBUS-DP • xxx5: System bus (CAN)
			20xx Step mode 21xx Step 100 25xx Step 500	Step control	
			30xx Leadscrew 35xx Lead 500	Traversing control	
			40xx Torque mode 41xx Torque 100 45xx Torque 500	Torque control with speed limiting	
			50xx DF mst 51xx DF mst 100 52xx DF mst 200 54xx DF mst 400 55xx DF mst 500 56xx DF mst 600 57xx DF mst 700	Master for digital frequency coupling	
			60xx DF slv bus 63xx DF slv bus 300 66xx DF slv bus 600 67xx DF slv bus 700 68xx DF slv bus 800	Slave to digital frequency bus	
			70xx DF slv cas 76xx DF slv cas 600 77xx DF slv cas 700	Slave to digital frequency cascade	
			80xx Dancer ctrl extern	Dancer position control (external diameter detection)	
			90xx Dancer ctrl intern	Dancer position control (internal diameter detection)	

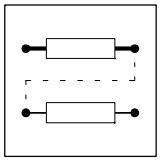


Configuration

Code	Name	Possible settings				IMPORTANT
		Lenze	Selection		Info	
[C0006]	Op mode	5			Operating mode of motor control	
			1	vector ctrl	Sensorless control	
			5	V/f	V/f characteristic with constant U_{min} boost	
C0009	LECOM address	1	1 {1} 99		Controller address	Bus device number when operated via interface • 10, 20, ..., 90 reserved for broadcast to device groups for RS232, RS485, fibre optics
C0010	Nmin	0	0 {1 rpm} 36000		Minimum speed • C0059 must be set correctly • C0010 < C0011 • only for analog setpoint input via AIN1	Reference values for the absolute and relative setpoint selection, for the acceleration and deceleration times • For parameterization via interface: Large changes in one step should only be made when the controller is inhibited.
C0011	Nmax	3000	0 {1 rpm} 36000		Maximum speed	
C0012	Tir (acc)	5.00	0.00 {0.01 sec} 9999.90		Acceleration time T_{ir} for the main setpoint of NSET	Related to the speed change 00 $n_{Max.}$
C0013	Tif (dec)	5.00	0.00 {0.01 sec} 9999.90		Deceleration time T_{if} for the main setpoint of NSET	Related to the speed change 00 $n_{Max.}$
C0014	V/f charact.	0	0	linear	Linear V/f characteristic	
			1	square-law	Square-law V/f characteristic	
C0015	Rated freq	50	0 {1 Hz} 5000			Identical to C0089
C0016	FCODE V boost	0.00	0.00 {0.01 %} 100.00		Freely assignable code for relative analog signals	Voltage boost
C0017	FCODE (Qmin)	50	-36000 {1 rpm} 36000		Switching threshold $n_{act} < n_x$	$n_{act} <$ C0017 activates the comparator output CMP1-OUT
C0018	fchop	6	0	16/8/2 kHz sin	Optimum noise reduction with automatic changeover to lower chopping frequencies	Observe derating indications for high chopping frequencies
			1	2 kHz sin	Operation with optimum power	
			2	4 kHz f_top	Operation with optimum power	
			3	8 kHZ f_top	Operation with optimum power	
			4	8 kHz sin	Operation with optimum noise reduction	
			5	16 kHz sin	Operation with optimum noise reduction	
			6	8/2 kHz sin	Optimum power reduction with automatic changeover to lower chopping frequencies	
C0019	Thresh nact=0	0	-36000 {1 rpm} 36000		Threshold when $n_{act} = 0$ is recognized	Going below this threshold releases the automatic DC injection braking, when the holding time under C0107 > 0
C0020	turn value	100	0 {1 %} 200		Smooth running of the motor	Manual influence on the smooth running of the motor
C0021	Slipcomp	→	-20.00 {0.01 %} 20.00		Slip compensation	→ Change of C0087 or C0089 sets C0021 to the calculated rated motor slip
C0022	I_{max} current	→	0 {0.01 A} 500.00		I_{max}- limit in the motor mode	→ depending on C0086 • Input of the maximum motor current
C0023	I_{max} gen.	→	0 {0.01 A} 500.00		I_{max}- limit in the generator mode	→ depending on C0086 • Input of the maximum generator current

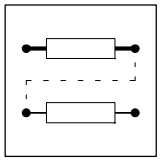


Code	Name	Possible settings					IMPORTANT
		Lenze	Selection			Info	
[C0025]	Feedback type	1				Selection of the feedback system	• Use only incremental encoder with 5 V TTL-level on X8 • Use only incremental encoder with HTL-level on X9
			1	no feedback		no feedback (sensorless control)	
			100	IT (C420) - X8		Incremental encoder on X8, and setting of no. of increments through C0420	
			101	IT (C420) - X9		Incremental encoder on X9, and setting of no. of increments through C0420	
			110 111 112 113	IT-512-5V IT-1024-5V IT-2048-5V IT-4096-5V		Incremental encoder on X8, with selection of following no. of increments: 110 = 512 111 = 1024 112 = 2048 113 = 4096	
C0026 1 2	 FCODE (offset) FCODE (offset)	 0.00 0.00	-199.99	{0.01 %}	199.99	Freely assignable code for relative analog signals	Used for: Offset for terminal X6/1,2 Offset for terminal X6/3,4
C0027 1 2	 FCODE (gain) FCODE (gain)	 100.00 100.00	-199.99	{0.01 %}	199.99	Freely assignable code for relative analog signals	Used for: Gain X6/1,2 Gain X6/3,4
C0030	DFOUT const	3	0 1 2 3 4 5 6	256 inc/rev 512 inc/rev 1024 inc/rev 2048 inc/rev 4096 inc/rev 8192 inc/rev 16384 inc/rev		Constant for the digital frequency output in increments per turn	
C0032	FCODE Gearbox	1	-32767	{1}	32767	Freely assignable code	Used for: Gearbox factor numerator
C0033	Gearbox denom	1	1	{1}	32767	Gearbox factor (denominator) for DFSET	
C0034	Mst current	0	0 1 2	-10 V ... +10 V +4 mA ... +20 mA -20 mA ... +20 mA		Selection: Master voltage/master current for setpoint input	
C0036	DC brk value	0.00	0.00	{0.01 A}	500.00	Brake current	
C0037	Set-value rpm	0	-36000	{1 rpm}	36000	Setpoint input in rpm	
C0038 1 2 3 4 5 6	 N 1 start N 1 stop N 2 start N 2 stop N 3 start N 3 stop	 0 0 0 0 0 0	0	{1 rpm}	36000	Functions of FB NLIM1	Input of speed ranges which can only be used dynamically Suppresses a static behaviour in an impermissible range
C0039 1 2 3 4 5 6 7 8 9 ... 14 15	 JOG setpoint JOG setpoint JOG setpoint JOG setpoint JOG setpoint JOG setpoint JOG setpoint JOG setpoint JOG setpoint ... JOG setpoint JOG setpoint	 1500 1000 500 200 100 50 0 0 0 ... 0 0	-36000	{1 rpm}	36000	Fixed speeds (JOG setpoints) can be selected for NSET using digital inputs	

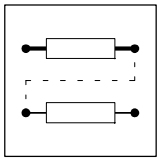


Configuration

Code	Name	Possible settings				IMPORTANT
		Lenze	Selection		Info	
C0040	Ctrl enable	0	0 1	Ctrl inhibit Ctrl enable	Controller inhibit	• Write: – controls the code • Read: – reads the controller status
C0042	DIS: QSP		0 1	QSP inactive QSP active	Quick stop status	display only
C0043	Trip reset	0	0 1	no/trip reset trip active	reset current trip Active trip	Reset of an active trip: • Set C0043 = 0
C0045	DIS: act JOG		0 1 2 ... 15	Nset active JOG 1 JOG 2 JOG 15	Active JOG setpoint	display only
C0046	DIS: N		-199.99	{0.01 %} 199.99	Main setpoint	display only
C0049	DIS: NADD		-199.99	{0.01 %} 199.99	Additional setpoint	display only
C0050	MCTRL-NSET2		-100.00	{0.01 %} 100.00	n_{set} at the speed controller input	display only
C0051	MCTRL-NACT		-36000	{1 rpm} 36000	Actual speed	display only
C0052	MCTRL-Umot		0	{1 V} 800	Actual motor voltage	display only
C0053	UG-VOLTAGE		0	{1 V} 900	DC bus voltage	display only
C0054	IMot		0.0	{0.1 A} 500.0	Actual motor current	display only
C0056	MCTRL-MSET2		-100	{1 %} 100	Torque setpoint (output of the speed controller)	display only
C0057	Max Torque		0	{1 Nm} 500	Maximum possible torque of the drive configuration	display only • depending on C0022, C0086
C0058	MCTRL-FACT	0.0	-600.0	{0.1 Hz} 600.0	Frequency at the inverter output	display only
C0059	Mot pole no.		1	{1} 50	Pole pair number of the motor	display only
C0061	Heatsink temp		0	{1 _C} 100	Heatsink temperature	display only
C0063	Mot temp		0	{1 _C} 200	Motor temperature	display only
C0064	Utilization		0	{1 %} 150	Controller load I x t during the last 180 sec	display only • C0064 > 100 % releases OC5 warning • C0064 > 140 % limits the output current to the rated controller current
C0067	Act trip		see selection list 10 All fault indications		Present fault indication	display only
C0070	Vp speed-CTRL	10	0.0	{0.1} 255.9	V_{pn} speed controller	
C0071	Tn speed-CTRL	50	1 6000 msec = switched off	{1 msec} 6000	T_{nn} speed controller	
C0074	value N	10.00	0.00	{0.01 %} 100.00	max. setpoint difference in percent	Limitation of the speed controller influence in feedback operation
C0075	Vp curr-CTRL	0.20	0.00	{0.01} 0.99	V_{pi} Current controller	• V_{pi} current controller for vector control • Maximum current controller for V/f characteristic control
C0076	Tn curr-CTRL	10.0	0.1 2000 ms switched off	{0.1 msec} 2000.0	T_{ni} Current controller	• T_{ni} current controller for vector control • Maximum current controller for V/f characteristic control
C0077	Ti field-CTRL	4.0	0.3	{0.1 msec} 5000.0	T_i Field controller	

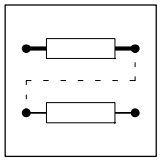


Code	Name	Possible settings					IMPORTANT
		Lenze	Selection			Info	
C0078	Tn slip-CTRL	100	1	{1 msec}	6000	T_n slip controller	• Filter time for slip compensation (C0021) • only for V/f characteristic control (C0006 = 5)
[C0081]	Mot power	→ 0.80	0.01	{0.01 kW}	500.00	Rated motor power acc. to nameplate	→ depending on C0086 • Change of C0086 resets value to the assigned default setting • Change of C0081 sets C0086 = 0
[C0082]	Mot Rr	→	0.000	{0.001 W}	65.000	Motor rotor resistance	→ Value is obtained after motor identification (C0148)
[C0084]	Mot Rs	→	0.00	{0.01 mW}	100000.00	Motor stator resistance	
[C0085]	Mot Lss	→	0.0	{0.1 mH}	6500.0	Motor leakage inductance	
[C0086]	Mot type	→				Selection motor type	→ depending on the controller • Change of C0086 resets C0022, C0081, C0087, C0088, C0089, C0090, C0091 to the assigned factory setting
			0	COMMON		no Lenze motor	
			9	DSGA056-22-100		SDSGAXX056-22, f_r : 100 Hz	Lenze asynchronous servo motors with integrated temperature monitoring via incremental encoder feedback
			10	MDSKA56-140		MDSKAXX056-22, f_r : 140 Hz	
			11	MDFKA71-120		MDFKAXX071-22, f_r : 120 Hz	
			12	MDSKA71-140		MDSKAXX071-22, f_r : 140 Hz	
			13	MDFKA80-60		MDFKAXX080-22, f_r : 60 Hz	
			14	MDSKA80-70		MDSKAXX080-22, f_r : 70 Hz	
			15	MDFKA80-120		MDFKAXX080-22, f_r : 120 Hz	
			16	MDSKA80-140		MDSKAXX080-22, f_r : 140 Hz	
			17	MDFKA90-60		MDFKAXX090-22, f_r : 60 Hz	
			18	MDSKA90-80		MDSKAXX090-22, f_r : 80 Hz	
			19	MDFKA90-120		MDFKAXX090-22, f_r : 120 Hz	
			20	MDSKA90-140		MDSKAXX090-22, f_r : 140 Hz	
			21	MDFKA100-60		MDFKAXX100-22, f_r : 60 Hz	
			22	MDSKA100-80		MDSKAXX100-22, f_r : 80 Hz	
			23	MDFKA100-120		MDFKAXX100-22, f_r : 120 Hz	
			24	MDSKA100-140		MDSKAXX100-22, f_r : 140 Hz	
			25	MDFKA112-60		MDFKAXX112-22, f_r : 60 Hz	
			26	MDSKA112-85		MDSKAXX112-22, f_r : 85 Hz	
			27	MDFKA112-120		MDFKAXX112-22, f_r : 120 Hz	
			28	MDSKA112-140		MDSKAXX112-22, f_r : 140 Hz	
			30	MDFQA-100-50		MDFQAXX100, f_r : 50 Hz	Lenze asynchronous servo motors in star connection with integrated temperature monitoring via thermostat
			31	MDFQA-100-100		MDFQAXX100, f_r : 100 Hz	
			32	MDFQA-112-28		MDFQAXX112, f_r : 28 Hz	
			33	MDFQA-112-58		MDFQAXX112, f_r : 58 Hz	
			34	MDFQA-132-20		MDFQAXX132, f_r : 20 Hz	
			35	MDFQA-132-42		MDFQAXX132, f_r : 42 Hz	
			40	MDFQA-112-50		MDFQAXX112, f_r : 50 Hz	Lenze asynchronous servo motors in D connection with integrated temperature monitoring via incremental encoder feedback
			41	MDFQA-112-100		MDFQAXX100, f_r : 100 Hz	
			42	MDFQA-132-36		MDFQAXX036, f_r : 36 Hz	
			43	MDFQA-132-76		MDFQAXX076, f_r : 76 Hz	

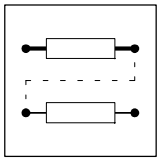


Configuration

Code	Name	Possible settings				IMPORTANT
		Lenze	Selection		Info	
[C0086]	Mot type		210	DXRA071-12-50	DXRAXX071-12, f_d: 50 Hz	Lenze inverter motor in star connection
			211	DXRA071-22-50	DXRAXX071-22, f_d: 50 Hz	
			212	DXRA080-12-50	DXRAXX080-12, f_d: 50 Hz	
			214	DXRA090-12-50	DXRAXX090-12, f_d: 50 Hz	
			215	DXRA090-32-50	DXRAXX090-32, f_d: 50 Hz	
			216	DXRA100-22-50	DXRAXX100-22, f_d: 50 Hz	
			217	DXRA100-32-50	DXRAXX100-32, f_d: 50 Hz	
			218	DXRA112-12-50	DXRAXX112-12, f_d: 50 Hz	
			219	DXRA132-12-50	DXRAXX132-12, f_d: 50 Hz	
			220	DXRA132-22-50	DXRAXX132-22, f_d: 50 Hz	
			221	DXRA160-12-50	DXRAXX160-12, f_d: 50 Hz	
			222	DXRA160-22-50	DXRAXX160-22, f_d: 50 Hz	
			223	DXRA180-12-50	DXRAXX180-12, f_d: 50 Hz	
			224	DXRA180-22-50	DXRAXX180-22, f_d: 50 Hz	
			250	DXRA071-12-87	DXRAXX071-12, f_d: 87 Hz	Lenze inverter motor in D connection
			251	DXRA071-22-87	DXRAXX071-22, f_d: 87 Hz	
			252	DXRA080-12-87	DXRAXX080-12, f_d: 87 Hz	
			254	DXRA090-12-87	DXRAXX090-12, f_d: 87 Hz	
			255	DXRA090-32-87	DXRAXX090-32, f_d: 87 Hz	
			256	DXRA100-22-87	DXRAXX100-22, f_d: 87 Hz	
			257	DXRA100-32-87	DXRAXX100-32, f_d: 87 Hz	
			258	DXRA112-12-87	DXRAXX112-12, f_d: 87 Hz	
			259	DXRA132-12-87	DXRAXX132-12, f_d: 87 Hz	
			260	DXRA132-22-87	DXRAXX132-22, f_d: 87 Hz	
			261	DXRA160-12-87	DXRAXX160-12, f_d: 87 Hz	
			262	DXRA160-22-87	DXRAXX160-22, f_d: 87 Hz	
			263	DXRA180-12-87	DXRAXX180-12, f_d: 87 Hz	
			264	DXRA180-22-87	DXRAXX180-22, f_d: 87 Hz	
			410	DXMA071-12-50	DXMAXX071-12, f_d: 50 Hz	Lenze asynchronous gearbox motor in star connection with integrated temperature monitoring via thermostat
			411	DXMA071-32-50	DXMAXX071-32, f_d: 50 Hz	
			412	DXMA080-12-50	DXMAXX080-12, f_d: 50 Hz	
			413	DXMA080-32-50	DXMAXX080-32, f_d: 50 Hz	
			414	DXMA090-12-50	DXMAXX090-12, f_d: 50 Hz	
			415	DXMA090-32-50	DXMAXX090-32, f_d: 50 Hz	
			416	DXMA100-12-50	DXMAXX100-12, f_d: 50 Hz	
			417	DXMA100-32-50	DXMAXX100-32, f_d: 50 Hz	
			418	DXMA112-32-50	DXMAXX112-32, f_d: 50 Hz	
			440	DXMA071-12-87	DXMAXX071-12, f_d: 87 Hz	Lenze asynchronous gearbox motor in D connection with integrated temperature monitoring via thermal contact
			441	DXMA071-32-87	DXMAXX071-32, f_d: 87 Hz	
			442	DXMA080-12-87	DXMAXX080-12, f_d: 87 Hz	
			443	DXMA080-32-87	DXMAXX080-32, f_d: 87 Hz	
			444	DXMA090-12-87	DXMAXX090-12, f_d: 87 Hz	
			445	DXMA090-32-87	DXMAXX090-32, f_d: 87 Hz	
			446	DXMA100-12-87	DXMAXX100-12, f_d: 87 Hz	
			447	DXMA100-32-87	DXMAXX100-32, f_d: 87 Hz	
			448	DXMA112-22-87	DXMAXX112-22, f_d: 87 Hz	
			449	DXMA112-32-50	DXMAXX112-32, f_d: 50 Hz	
			450	DXMA132-22-50	DXMAXX132-22, f_d: 50 Hz	
			451	DXMA132-32-50	DXMAXX132-32, f_d: 50 Hz	
[C0087]	Mot speed	→	50	{1 rpm} 36000	Rated motor speed	→ depending on C0086 • Change of C0086 resets value to the assigned default setting • Change of C0087 sets C0086 = 0
[C0088]	Mot current	→	0.5	{0.1 A} 500.0	Rated motor current	→ depending on C0086 • Change of C0086 resets value to the assigned default setting • Change of C0088 sets C0086 = 0
[C0089]	Mot frequency	→ 50	10	{1 Hz} 5000	Rated motor frequency	→ depending on C0086 • Change of C0086 resets value to the assigned default setting • Change of C0089 sets C0086 = 0

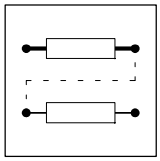


Code	Name	Possible settings					IMPORTANT
		Lenze	Selection			Info	
[C0090]	Mot voltage	→ 400	0	{1 V}	1000	Rated motor voltage	→ depending on C0086 • Change of C0086 resets value to the assigned default setting • Change of C0090 sets C0086 = 0
[C0091]	Mot cos-phi (p.f.)	→	0.50	{0.01}	1.00	Motor cos φ	→ depending on C0086 • Change of C0086 resets value to the assigned default setting • Change of C0091 sets C0086 = 0
C0092	Mot LS	→	0.0	{0.1 mH}	6500.0	Motor stator inductance	→ Value is obtained after motor identification (C0148)
C0093	Drive ident		0 invalid 1 none 93xx 9321 VC			Controller identification Lenze frequency inverter type 93XX Vector Control	display only
C0094	PASSWORD	0	0	{1}	9999		
[C0096] 1 2	 AIF protect CAN protect	 0 0	0 no password protection 1 Read protection 2 Write protection 3 Read/Write protection			extended password protection	SUB1: Fieldbus (AIF) SUB2: System bus (CAN)
C0099	S/W version		x.xx			Software version	display only
C0101 1 2 ... 15	 add Tir add Tir ... add Tir	 0.00 0.00 ... 0.00	0.00	{0.01 sec}	9999.90	Additional acceleration times T_{ir} for the main setpoint of NSET	Related to the speed change 00 $n_{Max.}$
C0103 1 2 ... 15	 add Tif add Tif ... add Tif	 0.00 0.00 ... 0.00	0.00	{0.01 sec}	9999.90	Additional deceleration times T_{if} for the main setpoint of NSET	Related to the speed change 00 $n_{Max.}$
C0104	Select acc	0	0 a=const 1 t=const 2 s=const			constant acceleration constant time constant distance	Selection of the acceleration and deceleration time reference for RFG = 0 or from RSP
C0105	QSP Tif	5.00	0.00	{0.01 sec}	9999.90	Deceleration time for quick stop (QSP)	Related to the speed change 00 $n_{Max.}$
C0107	Holding time	0.00	0.00	{0.01 sec}	9999.90	Holding time for automatic DC injection braking	
C0108 1 2	 FCODE (gain) FCODE (gain)	 100.00 100.00	-199.99	{0.01 %}	199.99	Freely assignable code for relative analog signals	
C0109 1 2	 FCODE (offset) FCODE (offset)	 0.00 0.00	-199.99	{0.01 %}	199.99	Freely assignable code for relative analog signals	
C0114 1 2 3 4 5 6	 DIGIN pol DIGIN pol DIGIN pol DIGIN pol DIGIN pol DIGIN pol	 0 0 0 1 0 0	0 HIGH active 1 LOW active			Terminal polarity X5/E1 X5/E2 X5/E3 X5/E4 X5/E5 X5/E6 (ST)	
[C0116] 1 2 ... 31 32	 CFG: FDO CFG: FDO ... CFG: FDO CFG: FDO	 1000 1000 ... 1000 1000	see selection list 2 FIXED 0 FIXED 0 ... FIXED 0 FIXED 0			Signal configuration FDO FDO 0 FDO 1 ... FDO 30 FDO 31	Free digital outputs can only be evaluated when networked with automation interfaces.

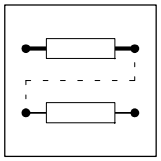


Configuration

Code	Name	Possible settings				IMPORTANT
		Lenze	Selection		Info	
[C0117]		→	see selection list 2		Signal configuration DIGOUT	→ depending on C0005
1	CFG: DIGOUT	15000	DCTRL-TRIP		X5/A1	
2	CFG: DIGOUT	10650	CMP1-OUT		X5/A2	
3	CFG: DIGOUT	500	DCTRL-RDY		X5/A3	
4	CFG: DIGOUT	5002	MCTRL-IMAX		X5/A4	
C0118					Terminal polarity DIGOUT	
1	DIGOUT pol	1	0	High active	X5/A1	
2	DIGOUT pol	1	1	Low active	X5/A2	
3	DIGOUT pol	0			X5/A3	
4	DIGOUT pol	0			X5/A4	
C0121	OH7 limit	150	45	{1 _C} 150	Temperature threshold for early-warning motor temperature (OH7 fault)	
C0122	OH4 limit	80	45	{1 _C} 95	Temperature threshold for warning heat sink temperature (fault OH4)	
C0125	Baud rate	0	0	9600 baud	LECOM baud rate for 2102 module	
			1	4800 baud		
			2	2400 baud		
			3	1200 baud		
			4	19200 baud		
C0126	MONIT CE0	3	0	TRIP	Configuration monitoring: communication error with automation interface CE0	
			2	Warning		
			3	Off		
C0130	DIS: act Ti				active $T_i$times of NSET	display only
			0	C12/C13	C0012/C0013 active	
			1	Ti 1	T_{ir1}/T_{if1} active	
			2	Ti 2	T_{ir2}/T_{if2} active	
			...		...	
			14	Ti 14	T_{ir14}/T_{if14} active	
			15	Ti 15	T_{ir15}/T_{if15} active	
C0134	RFG charac	0	0	linear	linear	Ramp characteristic for main setpoint
			1	S-shaped	S-shaped	
C0135	Control word		0	{1} 65535	Control word when networked with automation interfaces	Decimal control word • Device evaluates information 16 bit, binary coded
C0136						display only
1	DIS: CTRLWORD				Control word in DCTRL	
2	DIS: CTRLWORD				Control word in CAN-IN1	
3	DIS: CTRLWORD				Control word in AIF-IN	
C0141	FCODE (setval)	0.00	-199.99	{0.01 %} 199.99	Freely assignable code for relative analog signals	used as main setpoint in the configurations C0005 = xxx1
C0142	Start options	1			Start options	are executed: • after mains connection • after message (t > 0.5s) • after trip
			0	Start lock	0 = Start protection	
			1	Auto start	1 = Automatic start	
			2	flying lock	2 = Flying restart circuit	
			3	Flying restart	3 = Flying restart circuit active during start	
C0143	limit 2 kHz	0.0	0.0	{0.1 Hz} 20.0	Switching threshold 2 kHz, depending on the rotary field	The controller changes automatically to 2 kHz when this value falls below the threshold
C0144	OH switch	1	0	Switch off	Switching threshold 2 kHz, temperature-dependent Ref: C0122	When the OH4 threshold is reached, the controller switches automatically to 2 kHz
			1	Switch on		
C0145	select ref	1				Reference for flying restart start value during searching
			0	REF: C0011		
			1	REF: N-ACT		
			2	REF: N-SET		

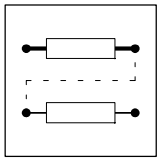


Code	Name	Possible settings			IMPORTANT
		Lenze	Selection	Info	
C0146	flying restart current	0	-500 {1} 500		Influences the current during the flying restart
C0147	fly dt-f	0	-82 {1} 82		Frequency steps during the flying restart
C0148	ident run	0	0 WRK stop 1 WRK run	Motor identification 0 = Stop 1 = Start	Identification when the motor is at standstill
C0149	Auto ident	0	0 Id inactive 1 Id active	Auto-Ident 0 = inactive 1 = active	starts the motor-identification automatically after enabling the controller, and stores the values that are detected in parameter set 1
C0150	Status word		0 {1} 65535	Status word when networked with automation interfaces	Decimal status word • display only • binary interpretation returns bit-states
C0151	DIS: FDO (DW)		output signals configured with C0116	Hexadecimal signal assignment of the free digital outputs.	• display only • binary interpretation returns bit-states
C0155	Status word 2		0 {1} 65535	Status word 2	Extended decimal status word • display only • binary interpretation returns bit-states
[C0156]			see 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				Status of the free bits of the status word	display only
1	DIS: STAT.B0		0 1		
2	DIS: STAT.B2				
3	DIS: STAT.B3				
4	DIS: STAT.B4				
5	DIS: STAT.B5				
6	DIS: STAT.B14				
7	DIS: STAT.B15				
C0161	Act trip		see selection list 10 All fault indications (see chapter 8.3)	Present fault indication (as under C0168/1)	display only
C0167	Reset failmem	0	0 No reset 1 Reset	Clears the history buffer	
C0168			see selection list 10	Faults occurred	History buffer
1	Fail no. act		All fault indications	now active	• List of fault occurred
2	Fail no. old1		(see chapter 8.3)	last	• display only
3	Fail no. old2			last but one	
4	Fail no. old3			last but two	
5	Fail no. old4			last but three	
6	Fail no. old5			last but four	
7	Fail no. old6			last but five	
8	Fail no. old7			last but six	
C0169			corresponding mains switch-on time	Occurrence of the faults	History buffer
1	Failtime act			now active	• List of times when the faults have occurred under C0168
2	Failtime old1			last	• related to C0179
3	Failtime old2			last but one	• display only
4	Failtime old3			last but two	
5	Failtime old4			last but three	
6	Failtime old5			last but four	
7	Failtime old6			last but five	
8	Failtime old7			last but six	

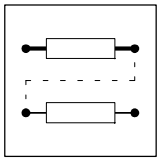


Configuration

Code	Name	Possible settings			IMPORTANT
		Lenze	Selection	Info	
C0170 1 2 3 4 5 6 7 8	 Counter act Counter old1 Counter old2 Counter old3 Counter old4 Counter old5 Counter old6 Counter old7			Fault frequency now active last last but one last but two last but three last but four last but five last but six	History buffer • List of how often the faults have occurred consecutively under C0168 • display only
[C0173]	UG limit	1		Adaptation of DC-bus voltage thresholds	• check during commissioning and adapt, if necessary • all drive components in DC-bus connections must have the same threshold
			0 Mains<400V+-B	Operation on mains < 400 V with or without brake unit	
			1 Mains=400V+-B	Operation on 400 V mains with or without brake unit	
			2 Mains=460V+-B	Operation on 460 V mains with or without brake unit	
			3 Mains=480V-B	Operation on 480 V mains without brake unit	
			4 Mains=480V+B	Operation on 480 V mains with brake unit	
C0178	Op timer	0	0 {1 sec} 4294967295	Elapsed operating time meter	Time when the controller was enabled
C0179	Mains timer	0	0 {1 sec} 4294967295	Mains switch-on time meter	Time when the mains was switched on
C0182	Ti S-shaped	20.00	0.01 sec {0.01 sec} 50.00 sec	T_i time of the S-shaped ramp generator for NSET	Determines the S-shape • low values å small S rounding • high values å large S rounding
C0183	Diagnostics			Drive diagnostics	• display only • indicates fault or status information • if several items or fault or status information are to be shown, the information with the smallest number is displayed
			0 OK	No fault	
			101 Init	Initialization phase	
			102 TRIP	TRIP active	
			103 RFG P-OFF	Emergency stop was released	
			104 IMP Message	Message active	
			105 Power off		
			111 BSP C135	Operation inhibited	
			112 BSP AIF		
			113 BSP CAN		
			121 CINH term 28	Controller inhibited via X5/28	
			122 CINH int 1	DCTRL-CINH1	
			123 CINH int 2	DCTRL-CINH2	
			124 CINH C135/STP	STOP key of 9371BB	
			125 CINH AIF	Controller inhibited via AIF	
			126 CINH CAN	Controller inhibited via CAN	
			141 Lock mode	Restart protection active	
			142 IMP	Power outputs with high resistance	
			151 QSP ext term	QSP via MCTRL-QSP	
			152 QSP C135/STP	QSP via STOP key	
			153 QSP AIF	QSP via AIF	
			154 QSP CAN	QSP via CAN	
			161 DC brk extern	DC injection braking via terminal	
			162 Dc brk C135	DC injection braking via C0135	
			163 DC brk AIF	DC injection braking via AIF	
			164 DC brk CAN	DC injection braking via CAN	
			170 Ident run	Motor identification active	
			250 Warning	Warning active	

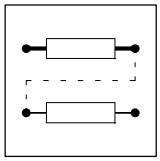


Code	Name	Possible settings				IMPORTANT
		Lenze	Selection		Info	
C0190	NSET arit	0	0 OUT = C46 1 C46 + C49 2 C46 - C49 3 C46 * C49 4 C46 / C49 5 C46/(100 - C49)		Arithmetics block in the function block NSET	Connects main setpoint C0046 and additional setpoint C0049
C0195	BRK T act	99.9	0.0 {0.1 sec} 99.9 99.9 sec = infinite		Brake engaging time	Engaging time of the mechanical holding brake (see technical data of the brake). • after the time elapsed under C0195, the status "mechanical brake closed" is reached
C0196	BRK T release	0.0	0.0 {0.1 sec} 60.0		Brake disengaging time	Disengaging time of the mechanical holding brake (see technical data of the brake). • After time has elapsed under C0195, the status "mechanical brake closed" is reached
C0200	S/W Id				Software identification	display only
C0201	S/W date				Software release date	display only
C0203	Comm. no.		x / xxxx / xxxxx		Commission number	display only
C0204	Serial-No.		0 {1} 65535		Serial number	display only
C0206	Product date				Production date	display only
C0207	DL info 1				Download-Info 1	display only
C0208	DL info 2				Download-Info 2	display only
C0209	DL info 3				Download-Info 3	display only
C0220	NSET Tir add	2.00	0.00 {0.01 sec} 9999.90		Acceleration time T_{ir} of the additional setpoint for NSET	Related to the speed change 00 $n_{Max.}$
C0221	NSET Tif add	2.00	0.00 {0.01 sec} 9999.90		Deceleration time T_{if} of the additional setpoint for NSET	Related to the speed change 00 $n_{Max.}$
C0222	PCTRL1 Vp	1.0	0.1 {0.1} 500.0		Gain V_p of PCTRL1	
C0223	PCTRL1 Tn	400	20 {1 msec} 99999 99999 msec = switched off		Adjustment time T_n of PCTRL1	
C0224	PCTRL1 Kd	0.0	0.0 {0.1} 5.0		Differential component K_d of PCTRL1	
C0234	damp value	20	-100 {1 %} 100		Oscillation damping, limitation of the difference	Influences the oscillation tendency of the drive
C0235	damping	5	1 {1 msec} 600		Filter time of the active current (oscillation damping)	Influences the oscillation tendency of the drive
C0236	damp limit	0.2	0.0 {0.1 Hz} 20.0		max. influence of the oscillation damping	Influences the oscillation tendency of the drive
C0241	CMP RFG I = O	1.00	0.00 {0.01 %} 100.00 100 % = n_{max}		Threshold ramp generator for main setpoint Input = output	
C0244	BRK M set	0.00	0.00 {0.01 %} 100.00 100 % = value of C0057		Holding torque of the DC injection brake	
C0250	FCODE 1Bit					
C0252	phase offset	0	-245760000 {1 inc} 245760000		Phase offset for DFSET	Fixed phase offset for digital frequency configuration • 1 rev. = 65536 inc
C0253	Angle n-trim	→ 4000	-32767 {1 inc} 32767		Phase trimming for DFSET	→ speed-dependent phase trimming depending on C0005, C0025 • The change of C0005 or C0025 resets C0253 to the default setting • 1 rev. = 65536 inc • C0253 is reached at 15000 rpm
C0260	MPOT1 high	100.00	-199.99 {0.01 %} 199.99		Upper limit of motor potentiometer	mandatory: • C0260 > C0261

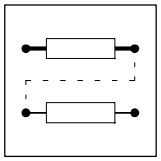


Configuration

Code	Name	Possible settings				IMPORTANT
		Lenze	Selection		Info	
C0261	MPOT1 low	-100.0	-199.99	{0.01 %} 199.99	Lower limit of motor potentiometer	mandatory: • C0261 < C0260
C0262	MPOT1 Tir	10.0	0.1	{0.1 sec} 6000.0	Motor pot acceleration time T_{ir}	Related to change 00 100 %
C0263	MPOT1 Tif	10.0	0.1	{0.1 sec} 6000.0	Motor pot deceleration time T_{if}	Related to change 00 100 %
C0264	MPOT1 on/off	0			Deactivation function of motor pot 0 no change 1 Deceleration with T_{if} to 0% 2 Deceleration with T_{if} to C0261 3 Inhibit with T_{if} = 0 to 0 % 4 Inhibit with T_{if} = 0 to C0261 5 Acceleration with T_{ir} to C0260	• Function which is executed when motor pot is deactivated via the input MPOT1-INACTIVE
C0265	MPOT1 init	0			Initialization function of motor pot 0 Value during mains failure 1 lower limit of C0261 2 0 %	• Value which is accepted during mains switching and activated motor pot
[C0267]			see selection list 2		Configuration of the digital inputs of motor pot MPOT1	
1	CFG: UP	1000	FIXED 0		Digital input acceleration	
2	CFG: DOWN	1000	FIXED 0		Digital input deceleration	
[C0268]			see selection list 2		Configuration of the motor pot input MPOT1-INACTIVE	
	CFG: INACT	1000	FIXED 0			
C0269					Input signals motor potentiometer	display only
1	DIS: UP					
2	DIS: DOWN					
3	DIS: INACTIVE					
C0325	Vp2 adapt	1.0	0.1	{0.1} 500.0	Process controller adaptation gain (V_{p2}) of PCTRL1	
C0326	Vp3 adapt	1.0	0.1	{0.1} 500.0	Process controller adaptation gain (V_{p3}) of PCTRL1	
C0327	Set2 adapt	100.00	0.00	{0.01 %} 100.00	Process controller adaptation n_{set2} of PCTRL1	Set speed threshold of the process controller adaptation mandatory: • C0327 > C0328
C0328	Set1 adapt	0.00	0.00	{0.01 %} 100.00	Process controller adaptation n_{set1} of PCTRL1	Set speed threshold of the process controller adaptation mandatory: • C0328 < C0327
C0329	Adapt on/off	0			Activate process controller adaptation of PCTRL1 0 no process controller adaptation 1 Extern Vp external via input 2 Setpoint Adaptation via setpoint 3 Ctrl diff Adaptation via control difference	
C0332	PCTRL1 Tir	0	0	{1 sec} 10000	Process controller acceleration time t_{ir} of PCTRL1	Related to a setpoint change 00 100 %
C0333	PCTRL1 Tif	0	0	{1 sec} 10000	Process controller deceleration time t_{ir} of PCTRL1	Related to a setpoint change 00 100 %
C0336	DIS: act Vp		0.0	{0.1} 500.0	Process controller momentary V_p of PCTRL1	display only
C0337	Bi/unipolar	0	0 bipolar 1 unipolar		Process controller range bipolar/unipolar of PCTRL1	

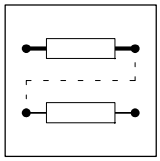


Code	Name	Possible settings			IMPORTANT
		Lenze	Selection	Info	
C0338	ARIT1 funct	1	0 OUT = IN1 1 IN1 + IN2 2 IN1 - IN2 3 IN1 * IN2 4 IN1 / IN2 5 IN1/(100 - IN2)	Function arithmetic block ARIT1	links inputs IN1 and IN2
[C0339]			see selection list 1	Configuration arithmetic block ARIT1	
1	CFG: IN	1000	FIXED 0 %		
2	CFG: IN	1000	FIXED 0 %		
C0340			-199.99 {0.01 %} 199.99	Input signals arithmetic block ARIT1	display only
1	DIS: IN				
2	DIS: IN				
[C0350]	CAN address	1	1 {1} 63	CAN bus node address	
[C0351]	CAN baud rate	0	0 500 kBit/s 1 250 kBit/sec 2 125 kBit/sec 3 50 kBit/sec 4 1000 kBit/sec 5 20 kBit/sec	CAN bus baud rate	
[C0352]	CAN mst	0	0 Slave 1 Master	Install CAN bus master operation	
C0353				Source for CAN bus IN/OUT addresses	
1	CAN addr sel1	0	0 C0350 1 C0354		
2	CAN addr sel2	0			
3	CAN addr sel3	0			
C0354				CAN bus IN/OUT node addresses	
1	IN1 addr2	129	1 {1} 512		
2	OUT1 addr2	1			
3	IN2 addr2	257			
4	OUT2 addr2	258			
5	IN3 addr2	385			
6	OUT3 addr2	386			
C0355				CAN bus identifier	display only
1	CAN-IN1 Id		0 {1} 2047		
2	CAN-OUT1 Id				
3	CAN-IN2 Id				
4	CAN-OUT2 Id				
5	CAN-IN3 Id				
6	CAN-OUT3 Id				
C0356				CAN bus time settings	
1	CAN boot up	3000	0 {1 msec} 65000		
2	CAN-OUT2 cycle	0			
3	CAN-OUT3 cycle	0			
4	CAN delay	20			
[C0357]				CAN bus monitoring time for I_{rx}	
1	CE1monit time	3000	0 {1 msec} 65000		
2	CE2monit time	3000			
3	CE3monit time	3000			
C0358	Reset node	0	0 no function 1 CAN reset	Install CAN bus reset node	
C0359	CAN state	0	0 Operational 1 Pre-Operat. 2 Warning 3 Bus off	CAN bus status	display only

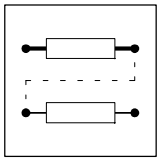


Configuration

Code	Name	Possible settings				IMPORTANT
		Lenze	Selection		Info	
C0360			0 {1} 65535		Telegram counter (number of telegrams)	display only • for values > 65535, the counting restarts with 0
1	Message OUT				all sent	
2	Message IN				all received	
3	Message OUT1				sent to CAN-OUT1	
4	Message OUT2				sent to CAN-OUT2	
5	Message OUT3				sent to CAN-OUT3	
6	Message POUT1				sent to parameter channel 1	
7	Message POUT2				sent to parameter channel 1	
8	Message IN1				received from CAN-IN1	
9	Message IN2				received from CAN-IN2	
10	Message IN3				received from CAN-IN3	
11	Message PIN1				received from parameter channel 1	
12	Message PIN2				received from parameter channel 2	
C0361			0.00 {0.01 %} 100.00		CAN bus load	• display only • To ensure a perfect operation, the total bus load (all connected devices) should be less than 80%
1	Load OUT				all sent	
2	Load IN				all received	
3	Load OUT1				sent to CAN-OUT1	
4	Load OUT2				sent to CAN-OUT2	
5	Load OUT3				sent to CAN-OUT3	
6	Load POUT1				sent to parameter channel 1	
7	Load POUT2				sent to parameter channel 2	
8	Load IN1				received from CAN-IN1	
9	Load IN2				received from CAN-IN2	
10	Load IN3				received from CAN-IN3	
11	Load PIN1				received from parameter channel1	
12	Load PIN2				received from parameter channel2	
C0364	CFG:CAN active	1000	see selection list 2 FIXED 0		Activate process data externally	Change over from pre-operation to operation
C0365	DIS:CAN activ		0	1	Input signal CAN active	display only
C0366	Sync Response	1	0 no sync response 1 sync response		0 = no response 1 = response	switch of response to a sync telegram from a master
C0367	Sync Rx ID	128	1 {1} 256		receive ID	Setting for a variable sync identifier for group building, for transfer of the data to the FB CAN-IN1
C0368	Sync Tx ID	128	1 {1} 256		transmit ID	variable setting of an identifier for generating a sync telegram
C0369	Sync Tx Time	0	0 {1} 65000		Sync transmission time	Transmission interval for the object set in C0368

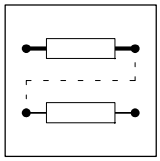


Code	Name	Possible settings				IMPORTANT
		Lenze	Selection		Info	
C0400	DIS: OUT		-199.99	{0.01 %} 199.99	Output of AIN1	display only
[C0402]	CFG: OFFSET	19502	see selection list 1 FCODE26/1		Configuration offset of AIN1	
[C0403]	CFG: GAIN	19504	see selection list 1 FCODE27/1		Configuration gain of AIN1	
C0404 1 2	DIS: OFFSET DIS: GAIN		-199.99	{0.01 %} 199.99	Input signals of AIN1	display only
C0405	DIS: OUT		-199.99	{1 %} 199.99	Output of AIN2	display only
[C0407]	CFG: OFFSET	19503	see selection list 1 FCODE26/2		Configuration offset of AIN2	
[C0408]	CFG: GAIN	19505	see selection list 1 FCODE27/2		Configuration gain of AIN2	
C0409 1 2	DIS: OFFSET DIS: GAIN		-199.99	{0.01 %} 199.99	Input signals of AIN2	display only
[C0420]	Encoder const	512	1	{1 inc/rev} 8192	Incremental encoder constant for incremental encoder inputs X8 and X9 in increments per turn	Use incremental encoder with HTL-level only at incremental encoder input X9
[C0421]	Encoder volt	5.0	5.0	{0.1 V} 8.0	Supply voltage for incremental encoder	a wrong entry can destroy the incremental encoder!
C0425	DFIN const	3	0 256 inc/rev 1 512 inc/rev 2 1024 inc/rev 3 2048 inc/rev 4 4096 inc/rev 5 8192 inc/rev 6 16384 inc/rev		Constant for the digital frequency input in increments per turn	
C0426	DIS: OUT		-36000	{1 rpm} 36000	Output signal of DFIN	display only
C0427	DFIN function	0	0 2-phase 1 A pulse/B dir 2 Pulse A or B		DFIN function	
C0429	TP5 delay	0	-32767	{1 inc} 32767	TP5 delay	
[C0431]	CFG: IN	5001	see selection list 1 MCTRL-NACT		Configuration input of AOUT1	
[C0432]	CFG: OFFSET	19512	see selection list 1 FCODE109/1		Configuration offset of AOUT1	
[C0433]	CFG: GAIN	19510	see selection list 1 FCODE108/1		Configuration gain of AOUT1	
C0434 1 2 3	DIS: IN DIS: OFFSET DIS: GAIN		-199.99	{0.01 %} 199.99	Input signals of AOUT1	display only
[C0436]	CFG: IN	5004	see selection list 1 MCTRL-IACT		Configuration input of AOUT2	
[C0437]	CFG: OFFSET	19513	see selection list 1 FCODE109/2		Configuration offset of AOUT2	
[C0438]	CFG: GAIN	19511	see selection list 1 FCODE108/2		Configuration gain of AOUT2	
C0439 1 2 3	DIS: IN DIS: OFFSET DIS: GAIN		-199.99	{0.01 %} 199.99	Input signals of AOUT2	display only
C0443	DIS: DIGIN-OUT		0	{1} 255	Signals at X5/E1 to X5/E5 decimal value	display only • Binary interpretation indicates terminal signals

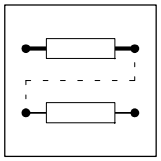


Configuration

Code	Name	Possible settings			IMPORTANT
		Lenze	Selection	Info	
C0444 1 2 3 4	 DIS: DIGOUT1 DIS: DIGOUT2 DIS: DIGOUT3 DIS: DIGOUT4		0 1	Signals at X5/A1 to X5/A4	display only
[C0450]	CFG: NX	1000	see selection list 1 FIXED 0 %	Configuration analog input of BRK1	
[C0451]	CFG: ON	1000	see selection list 2 FIXED 0	Configuration digital input of BRK1	
[C0452]	CFG: SIGN	1000	see selection list 1 FIXED 0 %	Configuration analog input of BRK1	
C0458 1 2	 DIS: NX DIS: SIGN		-199.99 {0.01 %} 199.99	Analog input signals of BRK1	display only
C0459	DIS: ON		0 1	Digital input signal of BRK1	display only
C0464	Customer I/F		0 original 1 changed	Status of selected basic configuration	display only • Reassignment of terminals in a basic configuration from C0005 does not change C0005 and sets C0464 = 1 • Adding or removing function blocks or changing the signal flow among the function blocks in a basic configuration of C0005 sets C0005 = 0 and C0464= 1
[C0465] 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 ... 19 ... 22 ... 25 ... 28 ... 31 ... 41 42 ... 49 50	 FB list FB list FB list FB list FB list FB list FB list FB list FB list FB list FB list FB list FB list FB list FB list FB list ... FB list ... FB list ... FB list ... FB list ... FB list ... FB list FB list ... FB list FB list	→ 200 0 50 0 0 55 0 0 10250 0 0 0 0 0 5250 5050 0 5700 0 10650 0 70 0 75 0 250 0 25000 20000 0 0 0	See selection list 5	Processing list of function blocks Contained in the program of signal processing (sequence in which the function blocks are processed)	→ depending on C0005 Change of C0005 loads assigned processing list → Valid for C0005 = 1000 • After changing the signal flow, adapt the processing list in every case. Otherwise, the device may use the wrong signals! • The function blocks DIGIN, DIGOUT, AIF-IN, CAN-IN, and MCTRL are always processed, and do not have to be entered in the list.
C0466	CPU T remain			Residual process time for the processing of function blocks	display only

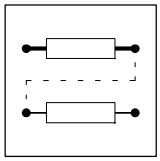


Code	Name	Possible settings					IMPORTANT
		Lenze	Selection			Info	
[C0469]	Fct STP key	2				Function of the STOP key of the operating module	Function is activated when pressing the STOP key.
			0 inactive 1 CINH 2 QSP			Deactivated Controller inhibit Quick stop	
C0470 1 2 3 4	 FCODE bit 0-7 FCODE bit 8-15 FCODE bit 16-23 FCODE bit 24-31	 0 0 0 0	0	{1}	255	Freely assignable code for digital signals	The data words C0470 and C0471 are in parallel and are identical
C0471	FCODE 32 bit	0	0	{1}	4294967296	Freely assignable code for digital signals	The data words C0470 and C0471 are in parallel and are identical
C0472 1 2 3 ... 19 20	 FCODE analog FCODE analog FCODE analog ... FCODE analog FCODE analog	 0.00 0.00 100.00 ... 0.00 0.00	-199.99	{0.01 %}	199.99	Freely assignable code for relative analog signals	
C0473 1 2 3 ... 9 10	 FCODE abs FCODE abs FCODE abs ... FCODE abs FCODE abs	 1 1 0 ... 0 0	-32767	{1}	32767	Freely assignable code for absolute analog signals	
C0474 1 2	 FCODE PH FCODE PH	 0 0	-2000000000	{1}	200000000	Freely assignable code for phase signals	1 turn = 65536 inc
C0475 1 2	 FCODE DF FCODE DF	 0 0	-16000	{1}	16000	Freely assignable code for phase difference signals	
C0497	Nact-filter	2.5	0.0 0 msec = switched off	{0.1 msec}	50.0	Time constant actual speed	
C0510	 CFG: IN1	 1000	see selection list 1 FIXED0%			Configuration NLIM1	
C0511	DIS: IN1		-199.99	{0.01 %}	199.99	Input signal of NLIM1	display only

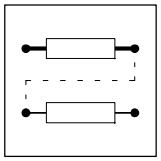


Configuration

Code	Name	Possible settings				IMPORTANT
		Lenze	Selection		Info	
[C0517]			0.00 {0.01} 1999.00		User menu with up to 32 entries	• The numbers of the desired codes are entered under the subcodes • The input is done in the format xxx.yy – xxx: Code number – yy: Subcode for code • There is no check whether the entered code exists
1	User menu	51.00	C0051/0 MCTRL-NACT			
2	User menu	54.00	C0054/0 Imot			
3	User menu	56.00	C0056/0 MCTRL-MSET2			
4	User menu	64.00	C0064/0 Utilisation			
5	User menu	183.00	C0183 Diagnostics			
6	User menu	168.01	C0168/1 Fault no. act			
7	User menu	39.01	JOG setpoint			
8	User menu	86.00	C0086/0 Mot type			
9	User menu	148.00	Ident run			
10	User menu	22.00	Imax current			
11	User menu	23.00	Imax gen.			
12	User menu	11.00	Nmax			
13	User menu	12.00	Tir (acc)			
14	User menu	13.00	Tif (dec)			
15	User menu	16.00	FCODE V boost			
16	User menu	70.00	Vp speed-CTRL			
17	User menu	71.00	Tn speed-CTRL			
18	User menu	75.00	Vp curr-CTRL			
19	User menu	76.00	Tn curr-CTRL			
20	User menu	142.00	Start options			
21	User menu	92.00	Mot LS			
22	User menu	36.00	DC brk value			
23	User menu	93.00	Drive ident			
24	User menu	99.00	S/W version			
...	...	0	not assigned			
31	User menu	94.00	C0094/0 Password			
32	User menu	3.00	C0003/0 Par save			
[C0520]	CFG: IN	1000	See selection list 4 FIXEDPHI0		Configuration input of DFSET	
[C0521]	CFG: VP-DIV	1000	see selection list 1 FIXED0%		Configuration gain factor numerator of DFSET	
[C0522]	CFG: RAT-DIV	1000	see selection list 1 FIXED0%		Configuration gearbox factor numerator of DFSET	
[C0523]	CFG: A-TRIM	1000	see selection list 1 FIXED0%		Configuration phase trimming of DFSET	
[C0524]	CFG: N-TRIM	1000	see selection list 1 FIXED0%		Configuration speed trimming of DFSET	
[C0525]	CFG: 0-PULSE	1000	see selection list 2 FIXED0		Configuration one-time zero pulse is activation of DFSET	
[C0526]	CFG: RESET	1000	see selection list 2 FIXED0		Configuration reset integrators of DFSET	
[C0527]	CFG: SET	1000	see selection list 2 FIXED0		Configuration set integrators of DFSET	
C0528						display only
1	DIS: 0-pulse A		-2000000000 {1} 2000000000		Phase difference between two zero pulses	
2	DIS: Offset				Offset of C0523*C0529 + C0252	
C0529	Multip offset	1	-20000 {1} 20000		Offset multiplier	
C0530	DF evaluation	0	0 with g factor 1 no g factor		Evaluation of the setpoint integrator of DFSET (with/without gearbox factor)	Evaluation of the setpoint integrator of DFSET
C0531	Act 0 div	1	1 {1} 16384		Actual zero pulse divider of DFSET	
C0532	0-pulse/TP	1	1 0-pulse 2 Touch probe		Selection zero pulse of the feedback system or touch probe for DFSET	
C0533	Vp denom	1	1 {1} 32767		Gain factor denominator of DFSET	

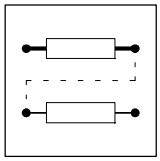


Code	Name	Possible settings				IMPORTANT
		Lenze	Selection		Info	
C0534	0-pulse fct	0	0 Inactive 1 Continuous 2 Cont. switch 10 Once, fast way 11 Once, CW 12 Once, CCW 13 Once, 2*0-puls		Zero pulse function of DFSET	
C0535	Set 0 div	1	1	{1} 16384	Set zero pulse divider of DFSET	
C0536 1 2 3	 DIS: VP-DIV DIS: RAT-DIV DIS: A-TRIM		 -32767	 {1} 32767	Absolute analog input signals of DFSET	display only
C0537	DIS: N-TRIM		-199.99	{0.01 %} 199.99	Relative analog input signal of DFSET	display only
C0538 1 2 3	 DIS: 0-PULSE DIS: RESET DIS: SET		0	1	Digital input signals of DFSET	display only
C0539	DIS: IN		-36000	{1 rpm} 36000	Input signal of DFSET	display only
[C0540]	Function	0	0 Analog input		Analog input	
			1 PH diff input		Phase difference input	X9 is inhibited if 0 or 1 was selected
			2 Res + int 0		inactive	
			3 Res + ext 0		inactive	
			4 X10 = X9		X9 is output on X10	The input signals get a gain
			5 X10 = X8		X8 is output on X10	
[C0541]	CFG: AN-IN	5001	see selection list 1 MCTRL-NACT		Configuration analog input of DFOUT	
[C0542]	CFG: DF-IN	1000	See selection list 4 FIXEDPHI 0		Configuration digital frequency input of DFOUT	
[C0544]	CFG: SYN-RDY	1000	see selection list 2 FIXED 0		Configuration synchronization signal for the zero pulse of DFOUT	
C0545	PH offset	0	0	{1 inc} 65535	Phase offset of DFOUT	1 turn = 65535 inc
C0546	Min inc/turn	1000	1	{1 inc} 1800000000		1 turn = 65535 inc
C0547	DIS: AN-IN		-199.99	{0.01 %} 199.99	Relative analog input signal of DFOUT	display only
C0548	DIS: SYN-RDY				Digital input signal of DFOUT	display only
C0549	DIS: DF-IN		-32767	{1 rpm} 32767	Absolute analog input signal of DFOUT	display only
C0560 1 2 3 4 5 ... 14 15	 Fix set-value Fix set-value Fix set-value Fix set-value Fix set-value ... Fix set-value Fix set-value	 100.00 75.00 50.00 25.00 0.00 ... 0.00 0.00	 -199.99	 {0.01 %} 199.99	Fixed setpoints of FIXSET1	
[C0561]	CFG: AIN	1000	see selection list 1 FIXED0%		Configuration analog input of FIXSET1	
[C0562] 1 2 3 4	 CFG: IN CFG: IN CFG: IN CFG: IN	 1000 1000 1000 1000	see selection list 2 FIXED0 FIXED0 FIXED0 FIXED0		Configuration digital inputs of FIXSET1	
C0563	DIS: AIN		-199.99	{0.01 %} 199.99	Analog input signal of FIXSET1	display only

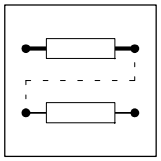


Configuration

Code	Name	Possible settings			IMPORTANT
		Lenze	Selection	Info	
C0564 1 2 3 4	 DIS: IN DIS: IN DIS: IN DIS: IN		0 1	Digital input signals of FIXSET1	display only
[C0570]	CFG: IN	1000	see selection list 1 FIXED0%	Configuration analog input of S&H1	
[C0571]	CFG: LOAD	1000	see selection list 2 FIXED0	Configuration digital input of S&H1	
C0572	DIS: IN		-199.99 {0.01 %} 199.99	Analog input signal of S&H1	display only
C0573	DIS: LOAD		0 1	Digital input signal of S&H1	display only
C0581	MONIT EEr	0	0 TRIP 1 IMP 2 Warning 3 Off	Configuration monitoring EEr (external fault)	
C0582	MONIT OH4	2	2 Warning 3 Off	Configuration monitoring OH4 (heat sink temperature)	
C0583	MONIT OH3	3	0 TRIP 3 Off	Configuration monitoring OH3 (motor temperature fixed)	
C0584	MONIT OH7	3	2 Warning 3 Off	Configuration monitoring OH7 (motor temperature adjustable)	
C0585	MONIT OH8	3	0 TRIP 2 Warning 3 Off	Configuration monitoring OH8 (motor temperature adjustable)	Temperature monitoring via PTC input
C0587	MONIT SD3	3	0 TRIP 2 Warning 3 Off	Configuration monitoring SD3 (encoder at X9)	
C0588	MONIT H10/H11	3	0 TRIP 3 Off	Configuration monitoring H10 and H11 (thermal sensors in the controller)	
C0591	MONIT CE1	3	0 TRIP 2 Warning 3 Off	Configuration monitoring CE1 (CAN-IN1 fault)	
C0592	MONIT CE2	3	0 TRIP 2 Warning 3 Off	Configuration monitoring CE2 (CAN-IN2 fault)	
C0593	MONIT CE3	3	0 TRIP 2 Warning 3 Off	Configuration monitoring CE3 (CAN-IN3 fault)	
C0594	MONIT SD6	3	0 TRIP 2 Warning 3 Off	Configuration monitoring SD6 (motor temperature sensor)	
C0595	MONIT CE4	3	0 TRIP 2 Warning 3 Off	Configuration monitoring CE4 (CAN bus off)	
C0596	Nmax limit	4000	0 {1 rpm} 36000	Monitoring: Speed of the machine	
C0597	MONIT LP1	0	0 TRIP 2 Warning 3 Off	Configuration monitoring motor phase failure	
C0598	MONIT SD5	3	0 TRIP 2 Warning 3 Off	Configuration monitoring master current at X5/1.2 < 2mA	
C0599	Limit LP1	5.0	1.0 {0.1 %} 10.0	Current limit LP1	Current limit for the motor phase failure monitoring LP1

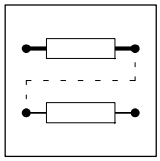


Code	Name	Possible settings				IMPORTANT
		Lenze	Selection		Info	
C0600	Function	1	0 OUT = IN1 1 IN1 + IN2 2 IN1 - IN2 3 IN1 * IN2 4 IN1 / IN2 5 IN1/(100 - IN2)		Function arithmetic block ARIT2	links inputs IN1 and IN2
[C0601] 1 2	 CFG: IN CFG: IN	 1000 1000	see selection list 1 FIXED 0 % FIXED 0 %		Configuration analog inputs of ARIT2	
C0602 1 2	 DIS: IN DIS: IN		 -199.99	 {0.01 %}	 199.99	Analog input signals of ARIT2	display only
C0603	Function	1	0 OUT = IN1 1 IN1 + IN2 2 IN1 - IN2 3 IN1 * IN2 4 IN1 / IN2 5 IN1/(100 - IN2)		Function arithmetic block ARIT3	links inputs IN1 and IN2
[C0604] 1 2	 CFG: IN CFG: IN	 1000 1000	see selection list 1 FIXED0% FIXED0%		Configuration analog inputs of ARIT3	
C0605 1 2	 DIS: IN DIS: IN		 -199.99	 {0.01 %}	 199.99	Analog input signals of ARIT3	display only
[C0608]	 CFG: IN	 1000	Selection list 1 FIXED0%		Configuration analog input of SQRT1	
C0609	DIS: IN		-199.99	{0.01 %}	199.99	Analog input signals of SQRT1	display only
[C0610] 1 2 3	 CFG: IN CFG: IN CFG: IN	 1000 1000 1000	see selection list 1 FIXED0% FIXED0% FIXED0%		Configuration analog inputs of addition block ADD1	Adds inputs IN1, IN2 and IN3
C0611 1 2 3	 DIS: IN DIS: IN DIS: IN		 -199.99	 {0.01 %}	 199.99	Analog input signals of ADD1	display only
[C0612]	 CFG: IN CFG: IN CFG: IN	 1000 1000 1000	see selection list 1 FIXED0% FIXED0% FIXED0%		Configuration analog inputs of addition block ADD2	Adds inputs IN1, IN2 and IN3
C0613 1 2 3	 DIS: IN DIS: IN DIS: IN		 -199.99	 {0.01 %}	 199.99	Analog input signals of ADD2	display only
C0620	DB1 gain	1.00	-10.00	{0.01}	10.00	Gain dead band component DB1	
C0621	DB1 value	1.00	0.00	{0.01 %}	100.00	Dead band of DB1	
[C0622]	 CFG: IN	 1000	see selection list 1 FIXED0%		Configuration analog input of DB1	
C0623	DIS: IN		-199.99	{0.01 %}	199.99	Analog input signal of DB1	display only
C0630	Max limit	100.00	-199.99	{0.01 %}	199.99	Upper limit of limiter LIM1	
C0631	Min limit	-100.0	-199.99	{0.01 %}	199.99	Lower limit of limiter LIM1	
[C0632]	 CFG: IN	 1000	see selection list 1 FIXED0%		Configuration analog input of LIM1	
C0633	DIS: IN		-199.99	{0.01 %}	199.99	Analog input signal of LIM1	display only
C0640	Delay T	20.00	0.01	{0.01 s}	50.00	Time constant of the PT1-1 component	
[C0641]	 CFG: IN	 1000	see selection list 1 FIXED0%		Configuration analog input of PT1-1	
C0642	DIS: IN		-199.99	{0.01 %}	199.99	Analog input signal of PT1-1	display only

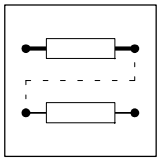


Configuration

Code	Name	Possible settings				IMPORTANT
		Lenze	Selection		Info	
C0643	Delay T	20	0	{1 sec} 50	Time constant of the PT1-2 component	
[C0644]	CFG: IN	1000	see selection list 1 FIXED0%		Configuration analog input of PT1-2	
C0645	DIS: IN		-199.99	{0.01 %} 199.99	Analog input signal of PT1-2	display only
C0650	DT1-1 gain	1.00	-320.00	{0.01} 320.00	Gain of DT1-1 component	
C0651	Delay T	1.000	0.005	{0.001 sec} 5.000	Time constant of DT1-1	
[C0652]	CFG: IN	1000	see selection list 1 FIXED0%		Configuration analog input of DT1-1	
C0653	Sensibility	1	1 15-bit 2 14-bit 3 13-bit 4 12-bit 5 11-bit 6 10-bit 7 9-bit		Input sensitivity of DT1-1	
C0654	DIS: IN		-199.99	{0.01 %} 199.99	Analog input signal of DT1-1	display only
C0655	Numerator	1	-32767	{1} 32767	Numerator for CONV5	
C0656	Denominator	1	1	{1} 32767	Denominator for CONV5	
[C0657]	CFG: IN	1000	see selection list 1 FIXED0%		Configuration analog input of CONV5	
C0658	DIS: IN		-199.99	{0.01 %} 199.99	Analog input signal of CONV5	display only
[C0661]	CFG: IN	1000	see selection list 1 FIXED0%		Configuration analog input absolute-value generator ABS1	
C0662	DIS: IN		-199.99	{0.01 %} 199.99	Analog input signal of ABS1	display only
C0671	RFG1 Tir	0.0	0.00	{0.01 sec} 9999.00	Acceleration time T_{ir} of ramp generator RFG1	
C0672	RFG1 Tif	0.00	0.00	{0.01 sec} 9999.00	Deceleration time T_{if} of RFG1	
[C0673]	CFG: IN	1000	see selection list 1 FIXED0%		Configuration analog input of RFG1	
[C0674]	CFG: SET	1000	see selection list 1 FIXED0%		Configuration set input of RFG1	
[C0675]	CFG: LOAD	1000	see selection list 2 FIXED0		Configuration digital input of RFG1	
C0676 1 2	 DIS: IN DIS: SET		-199.99	{0.01 %} 199.99	Analog input signals of RFG1	display only
C0677	DIS: LOAD		0	1	Digital input signal of RFG1	display only
C0680	Function	6	1 IN1 = IN 2 2 IN 1 > IN2 3 IN 1 < IN2 4 |IN1| = |IN2| 5 |IN1| > |IN2| 6 |IN1| < |IN2|		Function comparator CMP1	Compares the inputs IN1 and IN2
C0681	Hysteresis	1.00	0.00	{0.01 %} 100.00	Hysteresis of CMP1	
C0682	Window	1.00	0.00	{0.01 %} 100.00	Window of CMP1	
[C0683] 1 2	 CFG: IN CFG: IN	 5001 19500	see selection list 1 MCTRL-NACT FCODE17		Configuration analog inputs of CMP1	
C0684 1 2	 DIS: IN DIS: IN		-199.99	{0.01 %} 199.99	Analog input signals of CMP1	display only
C0685	Function	1	1 IN1 = IN 2 2 IN 1 > IN2 3 IN 1 < IN2 4 |IN1| = |IN2| 5 |IN1| > |IN2| 6 |IN1| < |IN2|		Function comparator CMP2	Compares the inputs IN1 and IN2

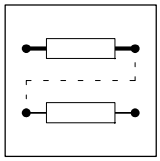


Code	Name	Possible settings					IMPORTANT
		Lenze	Selection			Info	
C0686	Hysteresis	1.00	0.00	{0.01 %}	100.00	Hysteresis of CMP2	
C0687	Window	1.00	0.00	{0.01 %}	100.00	Window of CMP2	
[C0688]			see selection list 1			Configuration analog inputs of CMP2	
1	CFG: IN	1000	FIXED0%				
2	CFG: IN	1000	FIXED0%				
C0689						Analog input signals of CMP2	display only
1	DIS: IN		-199.99	{0.01 %}	199.99		
2	DIS: IN						
C0690	Function	1	1	IN1 = IN 2		Function comparator CMP3	Compares the inputs IN1 and IN2
			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]			see selection list 1			Configuration analog inputs of CMP3	
1	CFG: IN	1000	FIXED0%				
2	CFG: IN	1000	FIXED0%				
C0694						Analog input signals of CMP3	display only
1	DIS: IN		-199.99	{0.01 %}	199.99		
2	DIS: IN						
[C0700]	CFG: IN		see selection list 1			Configuration input of ANEG1	
		19523	FCODE472/3				
C0701	DIS: IN		-199.99	{0.01 %}	199.99	Input signal of ANEG1	display only
[C0703]			see selection list 1			Configuration input of ANEG2	
	CFG: IN	1000	FIXED0%				
C0704	DIS: IN		-199.99	{0.01 %}	199.99	Input signal ANEG2	display only
C0705	Function	1	1	IN1 = IN 2		Function comparator CMP4	Compares the inputs IN1 and IN2
			2	IN 1 > IN2			
			3	IN 1 < IN2			
			4	|IN1| = |IN2|			
			5	|IN1| > |IN2|			
			6	|IN1| < |IN2|			
C0706	Hysteresis	1	0	{1 %}	100	Hysteresis of CMP4	
C0707	Window	1	0	{1 %}	100	Window of CMP4	
[C0708]			see selection list 1			Configuration analog inputs of CMP4	
1	CFG: IN	1000	FIXED0%				
2	CFG: IN	1000	FIXED0%				
C0709						Analog input signals of CMP4	display only
1	DIS: IN		-199.99	{0.01 %}	199.99		
2	DIS: IN						
C0710	Function	1	0	Rising edge		Function of edge evaluation TRANS1	
			1	Falling edge			
			2	Both edges			
C0711	Pulse T	0.001	0.001	{0.001 sec}	60.000	Pulse duration of TRANS1	
[C0713]			see selection list 2			Configuration digital input of TRANS1	
	CFG: IN	1000	FIXED0				
C0714	DIS: IN		0		1	Digital input signal of TRANS1	display only
C0715	Function	0	0	Rising trans		Function edge evaluation TRANS2	
			1	Falling trans			
			2	Both trans			
C0716	Pulse T	0.001	0.001	{0.001 sec}	60.000	Pulse time of TRANS2	
[C0718]			see selection list 2			Configuration digital input of TRANS2	
	CFG: IN	1000	FIXED0				
C0719	DIS: IN		0		1	Digital input signal of TRANS2	display only
C0720	Function	2	0	On delay		Function digital delay element DIGDEL1	
			1	Off delay			
			2	On/Off delay			

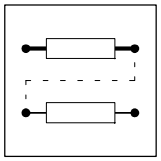


Configuration

Code	Name	Possible settings			IMPORTANT
		Lenze	Selection	Info	
C0721	Delay T	1.000	0.001 {0.001 sec} 60.000	Delay time of DIGDEL1	
[C0723]	CFG: IN	1000	see selection list 2 FIXED0	Configuration digital input of DIGDEL1	
C0724	DIS: IN		0 1	Digital input signal of DIGDEL1	display only
C0725	Function	0	0 On delay 1 Off delay 2 On/Off delay	Function digital delay component DIGDEL2	
C0726	Delay T	1.00	0.001 {0.001 sec} 60.000	Delay time of DIGDEL2	
[C0728]	CFG: IN	1000	see selection list 2 FIXED0	Configuration digital input of DIGDEL2	
C0729	DIS: IN		0 1	Digital input signal of DIGDEL2	display only
C0730	Mode	0	0 Start measurement 1 Stop measurement	Start / Stop of the measurement recording of OSZ	
C0731	Status		0 Measurement completed 1 Measurement active 2 Trigger recognized 3 Cancel 4 Cancel after trigger 5 Read memory	current operating state of OSZ	display only
[C0732]			see selection list 1	Configuration analog inputs of OSZ	
1	CFG: channel 1	1000	FIXED0%		
2	CFG: channel 2	1000	FIXED0%		
3	CFG: channel 3	1000	FIXED0%		
4	CFG: channel 4	1000	FIXED0%		
[C0733]			see selection list 2	Configuration trigger input of OSZ	
1	CFG: Dig. Trigger	1000	FIXED0		
C0734	Trigger source	0	0 dig. trigger input 1 Channel 1 2 Channel 2 3 Channel 3 4 Channel 4	Selection of the trigger source of OSZ	
C0735	Trigger level	0	-32767 {1} 32767	Set trigger level for channel 1 ... 4 of OSZ	
C0736	Trigger edge	0	0 LOW/HIGH edge 1 HIGH/LOW edge	Selection of the trigger edge of OSZ	
C0737	Trigger delay	0.0	-100.0 {0.1 %} 999.99	Setting pre- and post-triggering of OSZ	
C0738	Scanning period	3	3 1 msec 4 2 msec 5 5 msec 6 10 msec 7 20 msec 8 50 msec 9 100 msec 10 200 msec 11 500 msec 12 1 sec 13 2 sec 14 5 sec 15 10 sec 16 20 sec 17 50 sec 18 1 min 19 2 min 20 5 min 21 10 min	Selection of the scanning period of OSZ	
C0739	Number of channels	4	1 {1} 4	Number of channels to be measured of OSZ	

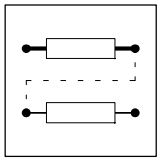


Code	Name	Possible settings			IMPORTANT
		Lenze	Selection	Info	
C0740 1	during start	0	0 {1} 16383	Determine start point when reading the data memory of OSZ Deliberate selection of a memory block	
2	Free/Inhibit	0	0 Data reading inhibited 1 Data reading enabled	The data memory of OSZ must be enabled for reading	
C0741 1 2 3 4	 DIS: Version DIS: Memory size DIS: Data width DIS: Number of channels			OSZ Sub1 Version Sub2 Memory size Sub3 Data width Sub4 Number of channels	display only
C0742	DIS: Data block length			Data block length of OSZ	display only
C0743	DIS: Read data block			Reading an 8 byte data block	display only
C0744	Memory size	2048	512 0 1024 1 1536 2 2048 3 3072 4 4096 5 8192 6	Adapt memory depth of the measurement task	
C0749 1 2 3	 DIS: Cancel index DIS: Index trigger DIS: Index end			Information on saving the measured values	display only
C0750	Vp denom	16	1 V_p = 1 2 V_p = 1/2 4 V_p = 1/4 8 V_p = 1/8 16 V_p = 1/16 32 V_p = 1/32 64 V_p = 1/64 128 V_p = 1/128 256 V_p = 1/256 512 V_p = 1/512 1024 V_p = 1/1024 2048 V_p = 1/2048 4096 V_p = 1/4096 8192 V_p = 1/8192 16384 V_p = 1/16384	Denominator gain of position controller of DFRFG1	
C0751	DFRFG1 Tir	1.000	0.000 {0.001 sec} 999.900	Acceleration time T_{ir} of DFRFG1	
C0752	Max speed	3000	1 {1 rpm} 16000	Maximum make up speed of DFRFG1	
C0753	DFRFG1 QSP	0.000	0.000 {0.001 sec} 999.900	Deceleration time T_{if} for QSP of DFRFG1	
C0754	PH error	→	10 {1 inc} 2000000000	Contouring error of DFRFG1	→ 2000000000 1 rev. = 65535 inc
C0755	Syn window	100	0 {1 inc} 65535	Synchronization window of DFRFG1	
C0756	Offset	0	-1000000000 {1 inc} 1000000000	DFRFG1 Offset	→ 2000000000 1 turn = 65535 inc
C0757	Function	0	0 No TP start 1 With TP start	DFRFG1 function	
[C0758]	CFG: IN	1000	See selection list 4 FIXEDPHI0	Configuration phase input of DFRFG1	
[C0759]	CFG: QSP	1000	see selection list 2 FIXED0	Configuration digital input (triggering QSP) of DFRFG1	

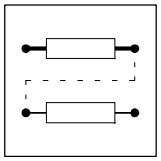


Configuration

Code	Name	Possible settings			IMPORTANT
		Lenze	Selection	Info	
[C0760]	CFG: STOP	1000	see selection list 2 FIXED0	Configuration digital input (ramp generator stop) of DFRFG1	
[C0761]	CFG: RESET	1000	see selection list 2 FIXED0	Configuration digital input (reset integrators) of DFRFG1	
C0764 1 2 3	 DIS: QSP DIS: STOP DIS: RESET		0 1	Digital input signals of DFRFG1	display only
C0765	DIS: IN		-32767 {1 rpm} 32767	Absolute analog input signal of DFRFG1	display only
[C0770]	CFG: D	1000	see selection list 2 FIXED0	Configuration data input of FLIP1	
[C0771]	CFG: CLK	1000	see selection list 2 FIXED0	Configuration clock input of FLIP1	
[C0772]	CFG: CLR	1000	see selection list 2 FIXED0	Configuration reset input of FLIP1	
C0773 1 2 3	 DIS: D DIS: CLK DIS: CLR		0 1	Digital input signals of FLIP1	display only
[C0775]	CFG: D	1000	see selection list 2 FIXED0	Configuration data input of FLIP2	
[C0776]	CFG: CLK	1000	see selection list 2 FIXED0	Configuration clock input of FLIP2	
[C0777]	CFG: CLR	1000	see selection list 2 FIXED0	Configuration reset input of FLIP2	
C0778 1 2 3	 DIS: D DIS: CLK DIS: CLR		0 1	Digital input signals of FLIP2	display only
[C0780]	CFG: N	1000	see selection list 1 FIXED0%	Configuration main setpoint input of NSET	
[C0781]	CFG: N-INV	10251	see selection list 2 R/L/Q-R/L	Configuration main setpoint inversion of NSET	
[C0782]	CFG: NADD	5650	see selection list 1 ASW1-OUT	Configuration additional setpoint input of NSET	
[C0783]	CFG: NADD-INV	1000	see selection list 2 FIXED0	Configuration additional setpoint inversion of NSET	
[C0784]	CFG: CINH-VAL	5001	see selection list 1 MCTRL-NACT	Configuration output signal with controller inhibit of NSET	
[C0785]	CFG: SET	5000	see selection list 1 MCTRL-NSET2	Configuration ramp generator of NSET	
[C0786]	CFG: LOAD	5001	see selection list 2 MCTRL-QSP-OUT	Configuration digital input (load ramp generator) of NSET	
[C0787] 1 2 3 4	 CFG: JOG*1 CFG: JOG*2 CFG: JOG*4 CFG: JOG*8	 53 1000 1000 1000	see selection list 2 DIGIN3 FIXED0 FIXED0 FIXED0	Configuration JOG selection and JOG activation of NSET	Binary interpretation
[C0788] 1 2 3 4	 CFG: TI*1 CFG: TI*2 CFG: TI*4 CFG: TI*8	 1000 1000 1000 1000	see selection list 2 FIXED0 FIXED0 FIXED0 FIXED0	Configuration Ti selection and Ti activation of NSET	• Binary interpretation • Tir and Tif pairs are identical
[C0789]	CFG: RFG-0	1000	see selection list 2 FIXED0	Configuration digital input (ramp generator 0) of NSET	
[C0790]	CFG: RFG-STOP	1000	see selection list 2 FIXED0	Configuration digital input (ramp generator stop) of NSET	

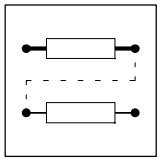


Code	Name	Possible settings			IMPORTANT
		Lenze	Selection	Info	
C0798 1 2	 DIS: CINH-VAL DIS: SET		-199.99 {0.01 %} 199.99	Analog input signals of NSET	display only
C0799 1 2 3 4 5 6 7 8 9 10 11 12 13	 DIS: N-INV DIS: NADD-INV DIS: LOAD DIS: JOG*1 DIS: JOG*2 DIS: JOG*4 DIS: JOG*8 DIS: TI*1 DIS: TI*2 DIS: TI*4 DIS: TI*8 DIS RFG-0 DIS: RFG-STOP		0 1	Digital input signals of NSET	display only
[C0800]	CFG: SET	1000	see selection list 1 FIXED0%	Configuration setpoint input of process controller PCTRL1	
[C0801]	CFG: ACT	1000	see selection list 1 FIXED0%	Configuration actual value input of PCTRL1	
[C0802]	CFG: INFLU	1000	see selection list 1 FIXED0%	Configuration evaluation input of PCTRL1	
[C0803]	CFG: ADAPT	1000	see selection list 1 FIXED0%	Configuration adaptation input of PCTRL1	
[C0804]	CFG: INACT	1000	see selection list 2 FIXED0	Configuration deactivation input of PCTRL1	
[C0805]	CFG: I-OFF	1000	see selection list 2 FIXED0	Configuration digital input (switch off I-component) of PCTRL1	
C0808 1 2 3 4	 DIS: SET DIS: ACT DIS: INFLU DIS: ADAPT		-199.99 {0.01 %} 199.99	Analog input signals of PCTRL1	display only
C809 1 2	 DIS: INACT DIS: I-OFF		0 1	Digital input signals of PCTRL1	display only
[C0810] 1 2	 CFG: IN CFG: IN	 55 1000	see selection list 1 AIN2-OUT FIXED0%	Configuration analog inputs of analog switch ASW1	
[C0811]	CFG: SET	1000	see selection list 2 FIXED0	Configuration set input of ASW1	
C0812 1 2	 DIS: IN DIS: IN		-199.99 {0.01 %} 199.99	Analog input signals of ASW1	display only
C0813	DIS: SET		0 1	Digital input signal of ASW1	display only
[C0815] 1 2	 CFG: IN CFG: IN	 1000 1000	see selection list 1 FIXED0% FIXED0%	Configuration analog inputs of analog switch ASW2	
[C0816]	CFG: SET	1000	see selection list 2 FIXED0	Configuration set input of ASW2	
C0817 1 2	 DIS: IN DIS: IN		-199.99 {0.01 %} 199.99	Analog input signals of ASW2	display only
C0818	DIS: SET		0 1	Digital input signal of ASW2	display only
[C0820] 1 2 3	 CFG: IN CFG: IN CFG: IN	 1000 1000 1000	see selection list 2 FIXED0 FIXED0 FIXED0	Configuration digital inputs of the AND element AND1	

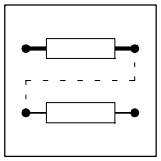


Configuration

Code	Name	Possible settings			IMPORTANT
		Lenze	Selection	Info	
C0821 1 2 3	 DIS: IN DIS: IN DIS: IN		 0 1	Digital input signals of AND1	display only
[C0822] 1 2 3	 CFG: IN CFG: IN CFG: IN	 1000 1000 1000	see selection list 2 FIXED0 FIXED0 FIXED0	Configuration digital inputs of the AND element AND2	
C0823 1 2 3	 DIS: IN DIS: IN DIS: IN		 0 1	Digital input signals of AND2	display only
[C0824] 1 2 3	 CFG: IN CFG: IN CFG: IN	 1000 1000 1000	see selection list 2 FIXED0 FIXED0 FIXED0	Configuration digital inputs of the AND element AND3	
C0825 1 2 3	 DIS: IN DIS: IN DIS: IN		 0 1	Digital input signals of AND3	display only
[C0826] 1 2 3	 CFG: IN CFG: IN CFG: IN	 1000 1000 1000	see selection list 2 FIXED0 FIXED0 FIXED0	Configuration digital inputs of the AND element AND4	
C0827 1 2 3	 DIS: IN DIS: IN DIS: IN		 0 1	Digital input signals of AND4	display only
[C0828] 1 2 3	 CFG: IN CFG: IN CFG: IN	 1000 1000 1000	see selection list 2 FIXED0 FIXED0 FIXED0	Configuration digital inputs of the AND element AND5	
C0829 1 2 3	 DIS: IN DIS: IN DIS: IN		 0 1	Digital input signals of AND5	display only
[C0830] 1 2 3	 CFG: IN CFG: IN CFG: IN	 1000 1000 1000	see selection list 2 FIXED0 FIXED0 FIXED0	Configuration digital inputs of the OR element OR1	
C0831 1 2 3	 DIS: IN DIS: IN DIS: IN		 0 1	Digital input signals of OR1	display only
[C0832] 1 2 3	 CFG: IN CFG: IN CFG: IN	 1000 1000 1000	see selection list 2 FIXED0 FIXED0 FIXED0	Configuration digital inputs of the OR element OR2	
C0833 1 2 3	 DIS: IN DIS: IN DIS: IN		 0 1	Digital input signals of OR2	display only
[C0834] 1 2 3	 CFG: IN CFG: IN CFG: IN	 1000 1000 1000	see selection list 2 FIXED0 FIXED0 FIXED0	Configuration digital inputs of the OR element OR3	
C0835 1 2 3	 DIS: IN DIS: IN DIS: IN		 0 1	Digital input signals of OR3	display only

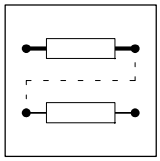


Code	Name	Possible settings			IMPORTANT
		Lenze	Selection	Info	
[C0836]			see selection list 2	Configuration digital inputs of the OR element OR4	
1	CFG: IN	1000	FIXED0		
2	CFG: IN	1000	FIXED0		
3	CFG: IN	1000	FIXED0		
C0837				Digital input signals of OR4	display only
1	DIS: IN		0 1		
2	DIS: IN				
3	DIS: IN				
[C0838]			see selection list 2	Configuration digital inputs of the OR element OR5	
1	CFG: IN	1000	FIXED0		
2	CFG: IN	1000	FIXED0		
3	CFG: IN	1000	FIXED0		
C0839				Digital input signals of OR5	display only
1	DIS: IN		0 1		
2	DIS: IN				
3	DIS: IN				
[C0840]	CFG: IN	1000	see selection list 2 FIXED0	Configuration digital input of the digital NOT element NOT1	
C0841	DIS: IN		0 1	Digital input signal of NOT1	display only
[C0842]	CFG: IN	1000	see selection list 2 FIXED0	Configuration digital input of the digital NOT element NOT2	
C0843	DIS: IN		0 1	Digital input signal of NOT2	display only
[C0844]	CFG: IN	1000	see selection list 2 FIXED0	Configuration digital input of the digital NOT element NOT3	
C0845	DIS: IN		0 1	Digital input signal of NOT3	display only
[C0846]	CFG: IN	1000	see selection list 2 FIXED0	Configuration digital input of the digital NOT element NOT4	
C0847	DIS: IN		0 1	Digital input signal of NOT4	display only
[C0848]	CFG: IN	1000	see selection list 2 FIXED0	Configuration digital input of the digital NOT element NOT5	
C0849	DIS: IN		0 1	Digital input signal of NOT5	display only
[C0850]			see selection list 1	Configuration process output words for automation interface AIF (X1)	
1	CFG: OUT.W1	1000	FIXED0%		
2	CFG: OUT.W2	1000	FIXED0%		
3	CFG: OUT.W3	1000	FIXED0%		
[C0851]			See selection list 3	Configuration 32-bit phase information	
1	CFG: OUT.D1	1000	FIXED0INC		
C0852	Type OUT.W2	0	0 analog 1 digital 0-15 2 low phase	Configuration process output word 2 for automation interface AIF (X1)	
C0853	Type OUT.W3	0	0 analog 1 digital 16-31 2 high phase	Configuration process output word 3 for automation interface AIF (X1)	
C0855	DIS: IN (0-15) ` DIS: IN (16-31)		0 FFFF	Hexadecimal process input word for automation interface AIF (X1)	display only
C0856				Process input words decimal	display only
1	DIS: IN.W1		-199.99 {0.01%} 199.99		100 % = 16384
2	DIS: IN.W2				
3	DIS: IN.W3				
C0857	DIS: IN.D1		-2147483648 {1} 2147483647	32-bit phase information	display only
C0858				Process output words	display only
1	DIS: OUT.W1		-199.99 {0.01 %} 199.99		100 % = 16384
2	DIS: OUT.W2				
3	DIS: OUT.W3				
C0859	DIS: OUT.D1		-2147483648 {1} 2147483647	32-bit phase information	display only

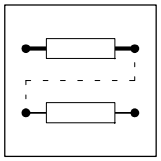


Configuration

Code	Name	Possible settings				IMPORTANT
		Lenze	Selection		Info	
[C0860]			see selection list 1		Configuration process output words for system bus output blocks (CAN)	
1	CFG: OUT1.W1	1000	FIXED0%			
2	CFG: OUT1.W2	1000	FIXED0%			
3	CFG: OUT1.W3	1000	FIXED0%			
4	CFG: OUT2.W1	1000	FIXED0%			
5	CFG: OUT2.W2	1000	FIXED0%			
6	CFG: OUT2.W3	1000	FIXED0%			
7	CFG: OUT2.W4	1000	FIXED0%			
8	CFG: OUT3.W1	1000	FIXED0%			
9	CFG: OUT3.W2	1000	FIXED0%			
10	CFG: OUT3.W3	1000	FIXED0%			
11	CFG: OUT3.W4	1000	FIXED0%			
[C0861]			See selection list 3		Configuration 32-bit phase information for system bus output blocks (CAN)	
1	CFG: OUT1.D1	1000	FIXED0INC			
2	CFG: OUT2.D1	1000	FIXED0INC			
3	CFG: OUT3.D1	1000	FIXED0INC			
C0863					Process input words for system bus (CAN)	display only
1	DIS: IN1 dig0		0	FFFF		
2	DIS: IN1 dig16					
3	DIS: IN2 dig0					
4	DIS: IN2 dig16					
5	DIS: IN3 dig0					
6	DIS: IN3 dig16					
C0864					Configuration process output words for system bus (CAN)	
1	Type OUT1.W2	0	0	analog sign		
2	Type OUT2.W1	0	1	digital 0-15		
3	Type OUT3.W1	0	2	low phase		
C0865					Configuration process output words for system bus (CAN)	
1	Type OUT1.W3	0	0	analog sign		
2	Type OUT2.W2	0	1	digital 16-31		
3	Type OUT3.W2	0	2	high phase		
C0866					Process input words for system bus (CAN)	display only 100% = 16384
1	DIS: IN1.W1		-199.99	{0.01 %} 199.99		
2	DIS: IN1.W3					
3	DIS: IN2.W1					
4	DIS: IN2.W2					
5	DIS: IN2.W3					
6	DIS: IN2.W4					
7	DIS: IN3.W1					
8	DIS: IN3.W2					
9	DIS: IN3.W3					
10	DIS: IN3.W3					
11	DIS: IN3.W4					
C0867					32-bit phase information for system bus (CAN)	display only
1	DIS: IN1.D1		-2147483648	{1} 2147483647		
2	DIS: IN2.D1					
3	DIS: IN3.D1					
C0868					Process output words system bus (CAN)	display only 100% = 16384
1	DIS: OUT1.W1		-199.99	{0.01 %} 199.99		
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					32-bit phase information for system bus (CAN)	display only
1	DIS: OUT1.D1		-2147483648	{1} 2147483647		
2	DIS: OUT2.D1					
3	DIS: OUT3.D1					

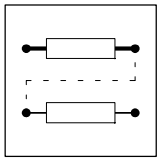


Code	Name	Possible settings			IMPORTANT
		Lenze	Selection	Info	
[C0870] 1 2	 CFG: CINH CFG: CINH	 1000 1000	see selection list 2 FIXED0 FIXED0	Configuration digital inputs (inhibit controller) of DCTRL	
[C0871]	CFG: TRIP-SET	54	see selection list 2 DIGIN 4	Configuration digital input (TRIP-Set) of DCTRL	
[C0876]	CFG: TRIP-RES	55	see selection list 2 DIGIN 5	Configuration digital input (TRIP-Reset) of DCTRL	
C0878 1 2 3 4	 DIS: CINH1 DIS: CINH2 DIS: TRIP-SET DIS: TRIP-RES		0 1	Digital input signals of DCTRL	display only
C0879 1 2 3	 Reset C135 Reset AIF Reset CAN	 0 0 0	 0 no reset 1 reset	Reset of control words	• C0879 = 1 performs one reset
[C0880] 1 2	 CFG: PAR*1 CFG: PAR*2	 1000 1000	see selection list 2 FIXED0 FIXED0	Configuration Select parameter set of DCTRL	
[C0881]	CFG:PAR-LOAD	1000	see selection list 2 FIXED0	Configuration Load parameter set of DCTRL	
C0884 1 2 3	 DIS: PAR*1 DIS: PAR*2 DIS: PAR-LOAD			Signals for parameter set selection of DCTRL	display only
[C0885]	CFG: R	51	see selection list 2 DIGIN 1	Configuration digital input (CW rotation) of CW/CCW/Q	
[C0886]	CFG: L	52	see selection list 2 DIGIN 2	Configuration digital input (CCW rotation) of CW/CCW/Q	
C0889 1 2	 DIS: R DIS: L		0 1	Digital input signals of R/L/Q	display only
[C0890]	CFG: N-SET	5050	see selection list 1 NSET-NOUT	Configuration speed setpoint input motor control MCTRL	
[C0891]	CFG: M-ADD	1000	see selection list 1 FIXED0%	Configuration torque setpoint input of MCTRL	
[C0892]	CFG: LO-M-LIM	5700	see selection list 1 ANEG1-OUT	Configuration lower torque limit of MCTRL	
[C0893]	CFG: HI-M-LIM	19523	see selection list 1 FCODE472/3	Configuration upper torque limit of MCTRL	
[C0899]	CFG: N/M-SWT	1000	see selection list 2 FIXED0	Configuration changeover between speed control and torque control MCTRL	
[C0900]	CFG: QSP	10250	see selection list 2 R/L/Q-QSP	Configuration control signal to activate QSP of MCTRL	
[C0901]	CFG: I-SET	1000	see selection list 1 FIXED0%	Configuration Load I-component of the MCTRL speed controller	
[C0902]	CFG: I-LOAD	1000	see selection list 2 FIXED0	Configuration release signal to load the I-component of the MCTRL speed controller	
[C0903]	CFG: BOOST	5015	see selection list 1 MCTRL-BOOST	Configuration of input MCTRL-BOOST	Standard = FCODE16
[C0904]	CFG: DC-BREAK	1000	see selection list 2 FIXED0	Configuration input signal MCTRL-GSB of MCTRL	
C0905	DIS: DC-BREAK		0 1	Input signal MCTRL-GSB of MCTRL	display only

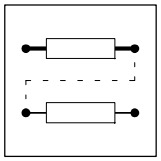


Configuration

Code	Name	Possible settings				IMPORTANT
		Lenze	Selection		Info	
C0906 1 2 3 4 5 6	 DIS: N-SET DIS: M-ADD DIS: LO-MLIM DIS: HI-MLIM DIS: I-SET DIS: BOOST		-199.99	{0.01 %} 199.99	Analog input signals of MCTRL	display only
C0907 2 3 4	 DIS: N/M-SWT DIS: QSP DIS: I-LOAD		0	1	Digital input signals of MCTRL	display only
C0909	speed limit	1	1 +/- 175 % 2 0 .. +175 % 3 -175 .. 0 %		Speed limitation for the MCTRL speed setpoint	
C0910	CFG: Vp-Adapt	1006	see selection list 1 FIXED100%		Configuration analog input signal for adaption of speed controller gain in MCTRL1	for varying N-gain, join to CURVE-OUT of FB CURVE
C0911	DIS: Vp-Adapt		-199.99	{0.01 %} 199.99	Analog input signal of MCTRL1	display only
C0940	Numerator	1	-32767	{1} 32767	Numerator for CONV1	
C0941	Denominator	1	1	{1} 32767	Denominator for CONV1	
[C0942]	CFG: IN	1000	see selection list 1 FIXED0%		Configuration analog input signal CONV1	
C0943	DIS: IN		-199.99	{0.01 %} 199.99	Analog input signal of CONV1	display only
C0945	Numerator	1	-32767	{1} 32767	Numerator for CONV2	
C0946	Denominator	1	1	{1} 32767	Denominator for CONV2	
[C0947]	CFG: IN	1000	see selection list 1 FIXED0%		Configuration analog input signal CONV2	
C0948	DIS: IN		-199.99	{0.01 %} 199.99	Analog input signal of CONV2	display only
C0950	Numerator	1	-32767	{1} 32767	Numerator for CONV3	
C0951	Denominator	1	1	{1} 32767	Denominator for CONV3	
[C0952]	CFG: IN	1000	See selection list 4 FIXEDPHI0		Configuration input speed signal CONV3	
C0953	DIS: IN		-32767	{1 rpm} 32767	Absolute input signal of CONV3	display only
C0955	Numerator	1	-32767	{1} 32767	Numerator for CONV4	
C0956	Denominator	1	1	{1} 32767	Denominator for CONV4	
[C0957]	CFG: IN	1000	See selection list 4 FIXEDPHI0		Configuration input speed Eingang signal CONV4	
C0958	DIS: IN		-32767	{1 rpm} 32767	Absolute input signal of CONV4	display only
C0960	Function	1	1 Function1 2 Function2 3 Function3		Characteristic CURVE1-IN	
C0961	y0	0.00	0.00	{0.01 %} 199.99	Ordinate of the value pair (x = 0 % / y0) of CURVE1	
C0962	y1	50.00	0.00	{0.01 %} 199.99	Ordinate of the value pair (x1 / y1) of CURVE1	
C0963	y2	75.00	0.00	{0.01 %} 199.99	Ordinate of the value pair (x2 / y2) of CURVE1	
C0964	y100	100.00	0.00	{0.01 %} 199.99	Ordinate of the value pair (x = 100 % / y100) of CURVE1	
C0965	x1	50.00	0.01	{0.01 %} 100.00	Abscissa of the value pair (x1 / y1) of CURVE1	
C0966	x2	75.00	0.01	{0.01 %} 100.00	Abscissa of the value pair (x2 / y2) of CURVE1	
[C0967]	CFG: IN	1000	see selection list 1 FIXED0		Configuration characteristic CURVE1-IN	

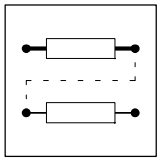


Code	Name	Possible settings				IMPORTANT
		Lenze	Selection		Info	
C0968	DIS: IN		-199.99	{0.01 %} 199.99	Relative analog input signal of CURVE1	display only
[C0970]	CFG: N-SET	1000	see selection list 1 FIXED0%		Configuration of mains failure control MFAIL	
[C0971]	CFG: FAULT	1000	see selection list 2 FIXED0		Configuration input mains failure detected of MFAIL	
[C0972]	CFG: RESET	1000	see selection list 2 FIXED0		Configuration reset mains failure control of MFAIL	
[C0973]	CFG: ADAPT	1000	see selection list 1 FIXED0%			
[C0974]	CFG: CONST	1000	see selection list 1 FIXED0%			
[C0975]	CFG: THRESHLD	1000	see selection list 1 FIXED0%			
[C0976]	CFG: NACT	1000	see selection list 1 FIXED0%			
[C0977]	CFG: SET	1000	see selection list 1 FIXED0%		Configuration speed start value for MFAIL	
[C0978]	CFG: DC-SET	1000	see selection list 1 FIXED0%		Configuration setpoint DC bus voltage for MFAIL	
C0980	MFAIL Vp	0.500	0.001	{0.001} 31.000	Gain Vp of MFAIL	
C0981	MFAIL Tn	100	20	{1 msec} 2000	Time constant of MFAIL	
C0982	MFAIL Tir	2.000	0.001	{1.000 sec} 16.00	Acceleration time Tir of MFAIL	
C0983	Retrigger T	1.000	0.001	{0.001 sec} 60.000		
C0988 1 2 3 4 5 6 7	 DIS: N-SET DIS: ADAPT DIS: CONST DIS: THRESHLD DIS: NACT DIS: SET DIS: DC-SET		-199.99	{0.01 %} 199.99	Analog input signals of MFAIL	display only
C0989 1 2	 DIS: FAULT DIS: RESET		0	1	Digital input signals of MFAIL	display only
C1040	Acceleration	100.000	0.001	{0.001} 5000.000	SRFG1 acceleration	
C1041	Jerk	0.200	0.001	{0.001} 999.999	SRFG1 jerk	
[C1042]	CFG: IN	1000	see selection list 1 FIXED0%		Configuration: SRFG1-IN	
[C1043]	CFG: SET	1000	see selection list 1 FIXED0%		Configuration of the signal SRFG1-SET	
[C1044]	CFG: LOAD	1000	see selection list 1 FIXED0%		Configuration of the signal SRFG1-LOAD	
C1045 1 2	 DIS: IN DIS: SET		-199.99	{0.01 %} 199.99	Analog input signals of SRFG1	display only
C1046	DIS: LOAD		0	1	Digital input signal of SRFG1	display only
C1090	Output signal		-2147483648	{1} 2147483647	Output signal signal output	display only
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	Denomiator	0.0001	0.0001	{1} 100000.0000	FEVAN1 denominator	
C1095	Offset	0	0	{1} 1000000000	FEVAN1 Offset	
[C1096]	CFG: IN	1000	see selection list 1 FIXED0%		Configuration analog input of FEVAN1	

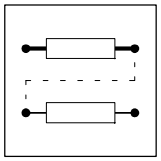


Configuration

Code	Name	Possible settings				Info	IMPORTANT
		Lenze	Selection				
[C1097]			see selection list 2			Configuration digital inputs of FEVAN1	
1	CFG: LOAD	1000	FIXED0				
2	CFG: BUSY-IN	1000	FIXED0				
3	CFG: FAIL-IN	1000	FIXED0				
C1098	DIS: IN		-32768	{1}	32767	Digital input signal of FEVAN1	display only
C1099	DIS: LOAD		0		1	Digital input signal of FEVAN1-LOAD	display only
C1100	Function	1	1 Return 2 Hold			Functions of FCNT1	
[C1101]			see selection list 1			Configuration analog inputs of FCNT1	
1	CFG: LD-VAL	1000	FIXED0%				
2	CFG: CMP-VAL	1000	FIXED0%				
[C1102]			see selection list 2			Configuration digital inputs of FCNT1	
1	CFG: CLKUP	1000	FIXED0				
2	CFG: CLKDWN	1000	FIXED0				
3	CFG: LOAD	1000	FIXED0				
C1103						Analog input signals of FCNT1	display only
1	DIS: LD-VAL		-32768	{1}	32768		
2	DIS: CMP-VAL						
C1104						Digital input signals of FCNT1	display only
1	DIS: CLKUP		0		1		
2	DIS: CLKDWN						
3	DIS: LOAD						
[C1160]			see selection list 1			Configuration analog inputs of ASW3	
1	CFG: IN	1000	FIXED0%				
2	CFG: IN	1000	FIXED0%				
[C1161]			see selection list 2			Configuration digital input of ASW3	
	CFG: SET	1000	FIXED0				
C1162						Analog input signals of ASW3	display only
1	DIS: IN		-199.99	{0.01 %}	199.99		
2	DIS: IN						
C1163	DIS: SET		0		1	Digital input signal of ASW3	display only
C1300	N-motor/Dmax	300	0	{1 rpm}	32767	Nominal speed winding drive	
C1301	N-line max	3000	0	{1 rpm}	32767	Nominal speed line drive	
C1302	calc cycle	1.0	0.1	{0.1 rev}	100.0	Calculation cycle	
C1303	time const	0.10	0.01	{0.01 sec}	50.00	Filter time constant	
C1304	D_{max}	500	1	{1 mm}	10000	Nominal winding diameter	
C1305	lower D-limit	50	1	{1 mm}	10000	Minimum winding diameter	
C1306	upper D-limit	500	1	{1 mm}	10000	Maximum winding diameter	
C1307	hyst D-limit	1.00	0.00	{0.01 %}	100.0	Hysteresis for D_{min} /D_{max} output	
C1308	arit function	1	0 DCALC1-OUT = D 1 DCALC1-OUT = 1/D			Arithmetic function	
C1309	D_{min}	50	1	{1 mm}	10000	Winding diameter	
C1310	Ti-time	0.000	0.000	{0.001 sec}	999.900	Acceleration and deceleration time	
C1311	window D-calc	1.00	0.00	{0.01 %}	100.00	Window for permissible diameter deviation	
[C1320]			see selection list 1			Configuration analog input of DCALC1	
	CFG: SET	1000	FIXED0%				
[C1321]			see selection list 2			Configuration digital inputs of DCALC1	
1	CFG: LOAD	1000	FIXED 0				
2	CFG: HOLD	1000	FIXED 0				
C1322						Winding inputs of DCALC1	display only
1	DIS: N-LINE		-32767	{1 rpm}	32767		
2	DIS: N-WIND						
C1325	DIS: SET		-199.99	{0.01 %}	199.99	Analog input signal of DCALC1	display only

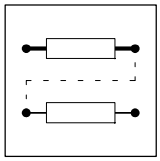


Code	Name	Possible settings					IMPORTANT
		Lenze	Selection			Info	
C1326 1 2	 DIS: LOAD DIS: HOLD		0		1	Digital input signals of DCALC1	display only
[C1327] 1 2	 CFG: N-LINE CFG: N-WIND	 1000 1000	See selection list 3 FIXED0INC FIXED0INC			Configuration winding inputs of DCALC1	
C1328	DIS: D-ACT		0	{1 mm}	10000	Momentary winding diameter of DCALC1	display only
C1330	PCTRL2 Tir	1.0	0.1	{0.1 sec}	6000.0	Process controller acceleration time t_{ir} of PCTRL2	Related to a setpoint change 00 100 %
C1331	PCTRL2 Tif	1.0	0.1	{0.1 sec}	6000.0	Process controller deceleration time t_{if} PCTRL2	Related to a setpoint change 00 100 %
C1332	PCTRL2 V_P	1.0	0.1	{0.1}	500.0	Gain V_p of PCTRL2	
C1333	PCTRL2 Tn	400	20	{1 msec}	99999	Adjustment time T_n of PCTRL2	
C1334	PCTRL2 Kd	0.0	0.0	{0.1}	5.0	Differential component K_d of PCTRL2	
C1335	bi-/unipolar	0	0 bipolar 1 unipolar			Function setting range of PCTRL2	
C1336	Tir overlay	1.0	0.1	{0.1 sec}	6000.0	Acceleration time T_{ir} of ramp generator controls the influence of the process controller PCTRL2	
C1337	Tif overlay	1.0	0.1	{0.1 sec}	6000.0	Deceleration time T_{if} of ramp generator controls the influence of the process controller PCTRL2	
[C1340] 1 2 3 4	 CFG: RFG-SET CFG: SET CFG: ACT CFG: INFL	 1000 1000 1000 1000	see selection list 1 FIXED0% FIXED0% FIXED0% FIXED0%			Configuration analog inputs of PCTRL2	
[C1341] 1 2 3 4	 CFG: RFG-LOAD CFG: I-OFF CFG: INACT CFG: OVERLAY	 1000 1000 1000 1000	see selection list 2 FIXED0 FIXED0 FIXED0 FIXED0			Configuration digital inputs of PCTRL2	
C1344 1 2 3 4	 DIS: RFG-SET DIS: SET DIS: ACT DIS: INFL		-199.99	{0.01 %}	199.99	Analog input signals of PCTRL2	display only
C1345 1 2 3 4	 DIS: RFG-LOAD DIS: I-OFF DIS: INACT DIS: OVERLAY		0		1	Digital input signals of PCTRL2	display only
C1350	INT1 funktion	0	0 ABS > REF 1 |ABS| >= REF			Comparison selection of INT1	
C1351	INT1 scaling	6553600	65536	{1}	1000000000	Scaling constant for INT1	
[C1354]	 CFG: REF	 1000	See selection list 3 FIXED0INC			Configuration 32-bit input of INT1	
[C1355]	 CFG: IN	 1000	See selection list 4 FIXEDPHI-0			Configuration phase input of INT1	
[C1356]	 CFG: RESET	 1000	see selection list 2 FIXED0			Configuration digital input of INT1	
C1357	DIS: REF		-199.99	{0.01}	199.99	32 Bit input of INT1	display only
C1358	DIS: IN		-32767	{1 rpm}	32767	Phase input of INT1	display only
C1359	DIS: RESET		0		1	Digital input of INT1	display only



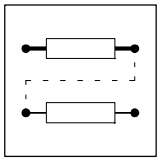
Configuration

Code	Name	Possible settings				IMPORTANT
		Lenze	Selection		Info	
C1360	INT2 funktion	0	0 ABS > REF 1 |ABS| >= REF		Comparison selection of INT2	
C1361	INT2 scaling	6553600	65536	{1} 1000000000	Scaling constant for INT2	
[C1364]	CFG: REF	1000	See selection list 3 FIXED0INC		Configuration 32 Bit input of INT2	
[C1365]	CFG: IN	1000	See selection list 4 FIXEDPHI-0		Configuration phase input of INT2	
[C1366]	CFG: RESET	1000	see selection list 2 FIXED0		Configuration digital input of INT2	
C1367	DIS: REF		-199.99	{0.01} 199.99	32 Bit input of INT2	display only
C1368	DIS: IN		-32767	{1 rpm} 32767	Phase input of INT2	display only
C1369	DIS: RESET		0	1	Digital input of INT2	display only
C1370	FOLL max	100.00	-199.99	{0.01 %} 199.99	Upper limit of FOLL1	
C1371	FOLL min	-100.00	-199.99	{0.01 %} 199.99	Lower limit of FOLL1	
C1372	FOLL Tir	10.0	0.1	{0.1 sec} 6000.0	Acceleration time of FOLL1	
C1373	FOLL Tif	10.0	0.1	{0.1 sec} 6000.0	Deceleration time of FOLL1	
[C1375] 1 2 3 4	 CFG: SIGN CFG: IN CFG: REF CFG: LOAD	 1000 1000 1000 1000	see selection list 1 FIXED0% FIXED0% FIXED0% FIXED0%		Configuration of analog input signals of FOLL1	
[C1376]	CFG: SET	1000	see selection list 2 FIXED 0		Configuration digital input of FOLL1	
C1377 1 2 3 4	 DIS: SIGN DIS: IN DIS: REF DIS: LOAD		-199.99	{0.01 %} 199.99	Configuration of analog input signals of FOLL1	display only
C1378	DIS: SET		0	1	Digital input signal of FOLL1	display only
C1810	S/W Id keypad					
C1811	S/W date keypad					



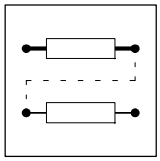
7.8 Selection lists

Selection list 1: Analog output signals (f)							
000050	AIN1-OUT	006100	MFAIL-NOUT	019500	FCODE-17	020101	CAN-IN1.W1
000055	AIN2-OUT	006150	DB1-OUT	019502	FCODE-26/1	020102	CAN-IN1.W2
000100	DFSET-NOUT	006200	CONV1-OUT	019503	FCODE-26/2	020103	CAN-IN1.W3
001000	FIXED0%	006205	CONV2-OUT	019504	FCODE-27/1	020201	CAN-IN2.W1
001006	FIXED100%	006210	CONV3-OUT	019505	FCODE-27/2	020202	CAN-IN2.W2
001007	FIXED-100%	006215	CONV4-OUT	019506	FCODE-32	020203	CAN-IN2.W3
005000	MCTRL-NSET2	006230	CONVPHA1-OUT	019507	FCODE-37	020204	CAN-IN2.W4
005001	MCTRL-NACT	006300	S&H1-OUT	019510	FCODE-108/1	020301	CAN-IN3.W1
005002	MCTRL-MSET2	006350	CURVE1-OUT	019511	FCODE-108/2	020302	CAN-IN3.W2
005003	MCTRL-MACT	006400	FCNT1-OUT	019512	FCODE-109/1	020303	CAN-IN3.W3
005004	MCTRL-IACT	010000	BRK1-M-SET	019513	FCODE-109/2	020304	CAN-IN3.W4
005005	MCTRL-DCVOLT	011000	DCALC1-D-OUT	019515	FCODE-141	025101	AIF-IN.W1
005006	MCTRL-VACT	011001	DCALC1-OUT	019521	FCODE-472/1	025102	AIF-IN.W2
005007	MCTRL-FACT	011050	PCTRL2-OUT	019522	FCODE-472/2	025103	AIF-IN.W3
005008	MCTRL-IxT	011100	INT1-AOUT	019523	FCODE-472/3		
005009	MCTRL-PHI-ACT	011105	INT2-AOUT	019524	FCODE-472/4		
005010	MCTRL-M-TEMP	011150	FOLL1-OUT	019525	FCODE-472/5		
005015	MCTRL-BOOST			019526	FCODE-472/6		
005050	NSET-NOUT			019527	FCODE-472/7		
005051	NSET-RFG-I			019528	FCODE-472/8		
005052	NSET-C10-C11			019529	FCODE-472/9		
005100	MPOT1-OUT			019530	FCODE-472/10		
005150	PCTRL1-OUT			019531	FCODE-472/11		
005250	NLIM1-OUT			019532	FCODE-472/12		
005500	ARIT1-OUT			019533	FCODE-472/13		
005505	ARIT2-OUT			019534	FCODE-472/14		
005510	ARIT3-OUT			019535	FCODE-472/15		
005540	SQRT1-OUT			019536	FCODE-472/16		
005550	ADD1-OUT			019537	FCODE-472/17		
005555	ADD2-OUT			019538	FCODE-472/18		
005600	RFG1-OUT			019539	FCODE-472/19		
005610	SRFG1-OUT			019540	FCODE-472/20		
005611	SRFG1-DIFF			019551	FCODE-473/1		
005650	ASW1-OUT			019552	FCODE-473/2		
005655	ASW2-OUT			019553	FCODE-473/3		
005660	ASW3-OUT			019554	FCODE-473/4		
005700	ANEG1-OUT			019555	FCODE-473/5		
005705	ANEG2-OUT			019556	FCODE-473/6		
005750	FIXSET1-OUT			019557	FCODE-473/7		
005800	LIM1-OUT			019558	FCODE-473/8		
005850	ABS1-OUT			019559	FCODE-473/9		
005900	PT1-1-OUT			019560	FCODE-473/10		
005905	PT1-2-OUT						
005950	DT1-1-OUT						

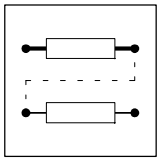


Configuration

Selection list 2: Digital output signals (j)							
000051	DIGIN1	010650	CMP1-OUT	019500	FCODE-250	019751	FCODE-135.B0
000052	DIGIN2	010655	CMP2-OUT	019521	FCODE-471.B0	019752	FCODE-135.B1
000053	DIGIN3	010660	CMP3-OUT	019522	FCODE-471.B1	019753	FCODE-135.B2
000054	DIGIN4	010665	CMP4-OUT	019523	FCODE-471.B2	019755	FCODE-135.B4
000055	DIGIN5	010700	DIGDEL1-OUT	019524	FCODE-471.B3	019756	FCODE-135.B5
000056	DIGIN6(ST)	010705	DIGDEL2-OUT	019525	FCODE-471.B4	019757	FCODE-135.B6
000065	DIGIN-CINH	010750	TRANS1-OUT	019526	FCODE-471.B5	019758	FCODE-135.B7
000100	DFSET-ACK	010755	TRANS2-OUT	019527	FCODE-471.B6	019763	FCODE-135.B12
000500	DCTRL-RDY	010900	FLIP1-OUT	019528	FCODE-471.B7	019764	FCODE-135.B13
000501	DCTRL-CINH	010905	FLIP2-OUT	019529	FCODE-471.B8	019765	FCODE-135.B14
000502	DCTRL-INIT	011000	DCALC1-DMAX	019530	FCODE-471.B9	019766	FCODE-135.B15
000503	DCTRL-IMP	011001	DCALC1-DMIN	019531	FCODE-471.B10		
000504	DCTRL-NACT=0	011002	DCALC1-I=0	019532	FCODE-471.B11		
000505	DCTRL-CW/CCW	011100	INT1-DOUT	019533	FCODE-471.B12		
001000	FIXED0	011105	INT2-DOUT	019534	FCODE-471.B13		
001001	FIXED1	013000	FEVAN1-BUSY	019535	FCODE-471.B14		
002000	DCTRL-PAR*1	013001	FEVAN1-FAIL	019536	FCODE-471.B15		
002001	DCTRL-PAR*2	015000	DCTRL-TRIP	019537	FCODE-471.B16		
002002	DCTRL-PAR-BUSY	015001	DCTRL-MESS	019538	FCODE-471.B17		
005001	MCTRL-QSP-OUT	015002	DCTRL-WARN	019539	FCODE-471.B18		
005002	MCTRL-IMAX	015003	DCTRL-FAIL	019540	FCODE-471.B19		
005003	MCTRL-MMAX	015010	MONIT-LU	019541	FCODE-471.B20		
005006	MCTRL-GSB-OUT	015011	MONIT-OU	019542	FCODE-471.B21		
005050	NSET-RFG-I=0	015012	MONIT-EEr	019543	FCODE-471.B22		
006000	DFRFG1-FAIL	015013	MONIT-OC1	019544	FCODE-471.B23		
006001	DFRFG1-SYNC	015014	MONIT-OC2	019545	FCODE-471.B24		
006100	MFAIL-STATUS	015015	MONIT-LP1	019546	FCODE-471.B25		
006101	MFAIL-I-RESET	015016	MONIT-OH	019547	FCODE-471.B26		
006400	FCNT1-EQUAL	015018	MONIT-OH4	019548	FCODE-471.B27		
010000	BRK1-OUT	015020	MONIT-OH8	019549	FCODE-471.B28		
010001	BRK1-CINH	015026	MONIT-CE0	019550	FCODE-471.B29		
010002	BRK1-QSP	015027	MONIT-NMAX	019551	FCODE-471.B30		
010003	BRK1-M-STORE	015028	MONIT-OC5	019552	FCODE-471.B31		
010250	R/L/Q-QSP	015029	MONIT-SD5				
010251	R/L/Q-R/L	015031	MONIT-SD7				
010500	AND1-OUT	015032	MONIT-H07				
010505	AND2-OUT	015033	MONIT-H10				
010510	AND3-OUT	015034	MONIT-H11				
010515	AND4-OUT	015040	MONIT-CE1				
010520	AND5-OUT	015041	MONIT-CE2				
010550	OR1-OUT	015042	MONIT-CE3				
010555	OR2-OUT	015043	MONIT-CE4				
010560	OR3-OUT	015044	MONIT-OC3				
010565	OR4-OUT	015045	MONIT-ID1				
010570	OR5-OUT	015046	MONIT-ID2				
010600	NOT1-OUT						
010605	NOT2-OUT						
010610	NOT3-OUT						
010615	NOT4-OUT						
010620	NOT5-OUT						

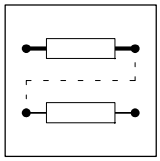


Selection list 2: Digital output signals (j) continued)							
020001	CAN-CTRL.B0	020201	CAN-IN2.B0	020301	CAN-IN3.B0	025001	AIF-CTRL.B0
020002	CAN-CTRL.B1	020202	CAN-IN2.B1	020302	CAN-IN3.B1	025002	AIF-CTRL.B1
020003	CAN-CTRL.B2	020203	CAN-IN2.B2	020303	CAN-IN3.B2	025003	AIF-CTRL.B2
020005	CAN-CTRL.B4	020204	CAN-IN2.B3	020304	CAN-IN3.B3	025005	AIF-CTRL.B4
020006	CAN-CTRL.B5	020205	CAN-IN2.B4	020305	CAN-IN3.B4	025006	AIF-CTRL.B5
020007	CAN-CTRL.B6	020206	CAN-IN2.B5	020306	CAN-IN3.B5	025007	AIF-CTRL.B6
020008	CAN-CTRL.B7	020207	CAN-IN2.B6	020307	CAN-IN3.B6	025008	AIF-CTRL.B7
020013	CAN-CTRL.B12	020208	CAN-IN2.B7	020308	CAN-IN3.B7	025013	AIF-CTRL.B12
020014	CAN-CTRL.B13	020209	CAN-IN2.B8	020309	CAN-IN3.B8	025014	AIF-CTRL.B13
020015	CAN-CTRL.B14	020210	CAN-IN2.B9	020310	CAN-IN3.B9	025015	AIF-CTRL.B14
020016	CAN-CTRL.B15	020211	CAN-IN2.B10	020311	CAN-IN3.B10	025016	AIF-CTRL.B15
020101	CAN-IN1.B0	020212	CAN.IN2.B11	020312	CAN-IN3.B11	025101	AIF-IN.B0
020102	CAN-IN1.B1	020213	CAN-IN2.B12	020313	CAN-IN3.B12	025102	AIF-IN.B1
020103	CAN-IN1.B2	020214	CAN-IN2.B13	020314	CAN-IN3.B13	025103	AIF-IN.B2
020104	CAN-IN1.B3	020215	CAN-IN2.B14	020315	CAN-IN3.B14	025104	AIF-IN.B3
020105	CAN-IN1.B4	020216	CAN-IN2.B15	020316	CAN-IN3.B15	025105	AIF-IN.B4
020106	CAN-IN1.B5	020217	CAN-IN2.B16	020317	CAN-IN3.B16	025106	AIF-IN.B5
020107	CAN-IN1.B6	020218	CAN-IN2.B17	020318	CAN-IN3.B17	025107	AIF-IN.B6
020108	CAN-IN1.B7	020219	CAN-IN2.B18	020319	CAN-IN3.B18	025108	AIF-IN.B7
020109	CAN-IN1.B8	020220	CAN-IN2.B19	020320	CAN-IN3.B19	025109	AIF-IN.B8
020110	CAN-IN1.B9	020221	CAN-IN2.B20	020321	CAN-IN3.B20	025110	AIF-IN.B9
020111	CAN-IN1.B10	020222	CAN-IN2.B21	020322	CAN-IN3.B21	025111	AIF-IN.B10
020112	CAN-IN1.B11	020223	CAN-IN2.B22	020323	CAN-IN3.B22	025112	AIF-IN.B11
020113	CAN-IN1.B12	020224	CAN-IN2.B23	020324	CAN-IN3.B23	025113	AIF-IN.B12
020114	CAN-IN1.B13	020225	CAN-IN2.B24	020325	CAN-IN3.B24	025114	AIF-IN.B13
020115	CAN-IN1.B14	020226	CAN-IN2.B25	020326	CAN-IN3.B25	025115	AIF-IN.B14
020116	CAN-IN1.B15	020227	CAN-IN2.B26	020327	CAN-IN3.B26	025116	AIF-IN.B15
020117	CAN-IN1.B16	020228	CAN-IN2.B27	020328	CAN-IN3.B27	025117	AIF-IN.B16
020118	CAN-IN1.B17	020229	CAN-IN2.B28	020329	CAN-IN3.B28	025118	AIF-IN.B17
020119	CAN-IN1.B18	020230	CAN-IN2.B29	020330	CAN-IN3.B29	025119	AIF-IN.B18
020120	CAN-IN1.B19	020231	CAN-IN2.B30	020331	CAN-IN3.B30	025120	AIF-IN.B19
020121	CAN-IN1.B20	020232	CAN-IN2.B31	020332	CAN-IN3.B31	025121	AIF-IN.B20
020122	CAN-IN1.B21			020400	CAN-SYNC-OUT	025122	AIF-IN.B21
020123	CAN-IN1.B22					025123	AIF-IN.B22
020124	CAN-IN1.B23					025124	AIF-IN.B23
020125	CAN-IN1.B24					025125	AIF-IN.B24
020126	CAN-IN1.B25					025126	AIF-IN.B25
020127	CAN-IN1.B26					025127	AIF-IN.B26
020128	CAN-IN1.B27					025128	AIF-IN.B27
020129	CAN-IN1.B28					025129	AIF-IN.B28
020130	CAN-IN1.B29					025130	AIF-IN.B29
020131	CAN-IN1.B30					025131	AIF-IN.B30
020132	CAN-IN1.B31					025132	AIF-IN.B31

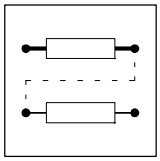


Configuration

Selection list 3: Phase signals (Y)		Selection list 4: Speed signals (Δ)		Selection list 5: Function blocks			
000100	DFSET-PSET	000050	DFIN-OUT	000000	empty	010000	BRK1
001000	FIXED0INC	000100	DFSET-POUT	000050	AIN1	010250	R/L/Q
005000	MCTRL-PHI-ANG	000250	DFOUT-OUT	000055	AIN2	010500	AND1
011100	INT1-POUT	001000	FIXEDPHI-0	000070	AOUT1	010505	AND2
011105	INT2-POUT	005000	MCTRL-PHI-ACT	000075	AOUT2	010510	AND3
019521	FCODE-474/1	006000	DFRFG-OUT	000100	DFSET	010515	AND4
019522	FCODE-474/2	006220	CONV5-OUT	000200	DFIN	010520	AND5
020103	CAN-IN1.D1	019521	FCODE-475/1	000250	DFOUT	010550	OR1
020201	CAN-IN2.D1	019522	FCODE-475/2	005050	NSET	010555	OR2
020301	CAN-IN3.D1			005100	MPOT1	010560	OR3
025103	AIF-IN.D1			005150	PCTRL1	010565	OR4
				005250	NLIM1	010570	OR5
				005500	ARIT1	010600	NOT1
				005505	ARIT2	010605	NOT2
				005510	ARIT3	010610	NOT3
				005540	SQRT1	010615	NOT4
				005550	ADD1	010620	NOT5
				005555	ADD2	010650	CMP1
				005600	RFG1	010655	CMP2
				005610	SRFG1	010660	CMP3
				005650	ASW1	010700	DIGDEL1
				005655	ASW2	010705	DIGDEL2
				005660	ASW3	010750	TRANS1
				005700	ANEG1	010755	TRANS2
				005705	ANEG2	010900	FLIP1
				005750	FIXSET1	010905	FLIP2
				005800	LIM1	011000	DCALC1
				005850	ABS1	011050	PCTRL2
				005900	PT1-1	011100	INT1
				005905	PT1-2	011105	INT2
				005950	DT1-1	011150	FOLL1
				006000	DFRFG1	013000	FEV-AN1
				006100	MFAIL	013100	OSZ
				006150	DB1	015100	MLP1
				006200	CONV1	020000	CAN-OUT
				006205	CONV2	025000	AIF-OUT
				006210	CONV3		
				006215	CONV4		
				006220	CONV5		
				006230	CONVPHA1		
				006300	S&H1		
				006350	CURVE1		
				006400	FCNT1		



Selection list 10: Error list		Selection list 10: Error list					
000000	No fail	000105	H05 trip	001030	LV message	002015	OC5 warning
000011	OC1 trip	000107	H07 trip	001091	EEr message	002020	OV warning
000012	OC2 trip	000110	H10 trip			002032	LP1 warning
000013	OC3 trip	000111	H11 trip			002054	OH4 warning
000022	LUQ trip	000140	Id1 trip			002057	OH7 warning
000032	LP1 trip	000141	Id2 trip			002058	OH8 warning
000050	OH trip	000200	NMAX trip			002061	CE0 warning
000053	OH3 trip					002062	CE1 warning
000057	OH7 trip					002063	CE2 warning
000058	OH8 trip					002064	CE3 warning
000061	CE0 trip					002065	CE4 warning
000062	CE1 trip					002083	Sd3 warning
000063	CE2 trip					002085	Sd5 warning
000064	CE3 trip					002086	Sd6 warning
000065	CE4 trip					002091	EER warning
000070	U15 trip						
000071	CCr trip						
000072	Pr1 trip						
000073	Pr2 trip						
000074	PEr trip						
000075	Pr0 trip						
000077	Pr3 trip						
000078	Pr4 trip						
000079	PI trip						
000083	Sd3 trip						
000085	Sd5 trip						
000086	Sd6 trip						
000091	EEr trip						



Configuration

8 Troubleshooting and fault elimination

- You can recognize immediately whether a fault has occurred, through display elements or status information. (📖 8-1)
- You can analyze the fault using the history buffer. (📖 8-2)
- The list of fault indications indicates how to eliminate the fault. (📖 8-4)

8.1 Troubleshooting

Display on the controller

Two LEDs indicate the controller status.

LED green	LED red	Check
J	**j**	Controller enabled; no fault
L	j	C0183; possibly C0168/1
j	L	C0168/1
L	L	C0168/1

J : on j :off L : flashing

Display on the operating module

Status messages in the display indicate the controller status.

FAIL = J : TRIP or message or warning is active

FAIL	RDY	IMP	Check
j	**J**	**j**	Controller enabled; no fault
J	j	J	C0168/1
j	j	J	C0183
j	J	J	C0183
J	J	j	C0168/1
J	J	J	C0168/1

J : on j : off

Display via the LECOM status word C0150

Four bits of the status word indicate the controller status.

Bit 7 Ctrl. enable	Bit 12 Warning	Bit 13 Message	Bit 15 Ready for operation	Check
1	0	0	1	C0183
1	1	1	0	C0168/1
0	1	0	1	C0168/1
1	0	1	1	C0168/1
0	1	0	1	C0168/1

8.2 Fault analysis with the history buffer

The history buffer is used to trace faults. The fault messages are stored in the history buffer in the order of their occurrence.

Tip!

The codes of the history buffer are contained in the Diagnostics menu.

8.2.1 Structure of the history buffer

- The history buffer has eight memory units which can be requested by subcodes.
- The first memory unit (subcode 1) contains information about the active fault.
  – The history buffer is written only after the fault has been eliminated or acknowledged. The last fault but six is eliminated from the history buffer and can no longer be read.
- The memory units 1 to 7 contain information on the last fault but six.
- For every fault that occurred, certain information is stored which can be retrieved by codes:

Code and information to be called				Memory unit
C0168	C0169	C0170	Subcode	
Fault recognition and reaction	Time of the last occurrence	Frequency of a fault immediately followed by the same fault	1	Active fault
			2	Memory unit 1
			3	Memory unit 2
			4	Memory unit 3
			5	Memory unit 4
			6	Memory unit 5
			7	Memory unit 6
			8	Memory unit 7

8.2.2 Working with the history buffer

Fault recognition and reaction

- C0168 contains the fault recognition for every memory unit and the reaction to the fault.
  – It is entered as a LECOM fault number. (📖 7-23)

Please note:

- If there are several faults with different reactions:
  – Only the reaction with the highest priority (TRIP " Message " Warning) is entered.
- If there are faults with the same reaction (e.g. 2 messages) simultaneously:
  – Only the fault which occurred first is entered.

Time

- The times when the faults occurred are entered under C0169:
  – Reference time is the state of the mains switch-on elapsed-time meter (C0179).

Please note:

- If a fault is immediately and repeatedly followed by another, only the time of the last occurrence is stored.

Frequency

- The frequency of a fault immediately followed by the same fault is entered under C0170. The time of the last occurrence is stored.

Clear history buffer

Set C0167 = 1, to clear the history buffer.

8.3 Fault indications

Tip!

If the fault indication is requested by a fieldbus, a LECOM no. is read from C0168/x instead of the abbreviation. You can find the meaning of the LECOM no. in the section "Monitoring functions". (📖 7-23)

Display	Fault	Cause	Remedy
---	No fault	-	-
CCr	System fault	Strong interference on control cables	Screen the control cables
		Ground or earth loops in the wiring	Ensure PE wiring complies with EMC requirements (📖 4-33)
CE0	Communication error	Interference during transmission of control commands via automation interface X1	Plug in automation module firmly, bolt down if necessary
CE1	Communication error in the process data 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	Communication error in the process data 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	Communication error in the process data 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	BUS-OFF state	Controller has received too many incorrect telegrams via system bus X4, and has disconnected from the bus	Check wiring Check bus termination (if any) Check screen contact of the cables Check PE connection Check bus load: Reduce baud rate (observe cable length)
EEr	External fault (TRIP-Set)	A digital input assigned to the TRIP set function has been activated	Check external encoder
H05	Internal fault		Contact Lenze
H07	Incorrect power stage	During initialization of the controller, an incorrect power stage was detected	Contact Lenze
H10	Sensor fault: heat sink temperature	Sensor for heat sink temperature detection indicates indefinite values	Contact Lenze
H11	Sensor fault: indoor temperature	Sensor for indoor temperature detection indicates indefinite values	Contact Lenze
ID1	Fault during motor identification	Measuring of the characteristic failed Motor clearly too small (P_{Motor} % $P_{controller}$)	Check motor cable Select larger motor
ID2	Fault during motor identification	No identification of the motor parameters	Enter data from the nameplate of the connected motor
LP1	Motor phase failure	A current-carrying motor phase has failed	Check motor; Check supply module
		The current limit is set too low	Set a higher current limit under C0599
		This monitoring is not suitable for: • Synchronous servo motors • for rotating-field frequencies > 480 Hz	Deactivate monitoring with C0597= 3
LU	Undervoltage	DC bus voltage is smaller than the value fixed under C0173	Check mains voltage Check supply cable
r_{MAX}	Max. plant speed exceeded (C0596)	Active load too high (e.g. for hoists)	Check drive dimensioning
		Drive is not speed-controlled, torque excessively limited	Increase torque limit if necessary
		The current speed has been detected incorrectly.	Check encoder selection (C0025) Check motor data
OC1	Short-circuit	Short-circuit Excessive capacitive charging current in the motor cable	Find out cause of short circuit; check cable Use motor cable which is shorter or has a lower capacitance

Troubleshooting and fault elimination

Display	Fault	Cause	Remedy
OC2	Earth fault	One of the motor phases has an earth contact Excessive capacitive charging current of the motor cable	Check motor; check cable Use motor cable which is shorter or has a lower capacitance
OC3	Trip due to overload	Acceleration and/or deceleration too short (C0012, C0013)	Increase acceleration and deceleration times
		Value for current parameter V_p (C0075) is too low	Check setting
OC5	I x t overload	acceleration with overcurrent is to frequent and too long Permanent overload with $I_{motor} > 1.5 \times I_{rx}$	Check drive dimensioning
OH	Heat sink temperature is higher than the value set in the controller	Ambient temperature $T_a > 40$ °C or 50 °C	Allow controller to cool and ensure better ventilation Check ambient temperature in the control cabinet
		Heat sink very dirty	Clean heat sink
		Incorrect mounting position	Change mounting position
OH3 [1)]	Motor temperature is higher than the value set in the controller	Motor too hot because of excessive current, or acceleration is too frequent and too long	Check drive dimensioning
		No PTC connected to X7 or X8	Connect PTC or switch off monitoring (C0583=3)
OH4	Heat sink temperature is higher than the value set under C0122	Ambient temperature $T_a > 40$ °C or 50 °C	Allow controller to cool and ensure better ventilation Check ambient temperature in the control cabinet
		Heat sink very dirty	Clean heat sink
		Incorrect mounting position	Change mounting position
		Value set under C0122 was too low	Enter higher value
OH7 [1)]	Motor temperature is higher than the value set under C0121	Motor too hot because of excessive current, or acceleration is too frequent and too long	Check drive dimensioning
		No PTC connected to X7 or X8	Connect PTC or switch off monitoring (C0584=3)
		Value set under C0121 was too low	Enter higher value
OH8	PTC at terminals T1, T2 indicates motor overheating	Motor too hot because of excessive current, or acceleration is too frequent and too long	Check drive dimensioning
		Terminals T1, T2 are not assigned	Connect PTC or thermostat or switch off monitoring (C0585=3)
OU	Overvoltage	Excessive braking energy (DC bus voltage higher than the value set under C0173)	Use brake unit or supply module and brake module or feedback module
PEr	Program fault	A fault in the program was detected	Send controller with data (on diskette) to Lenze
PI	Initializing error	A fault was detected during transfer of parameter set between the controllers Parameter set does not match the controller	Correct parameter set
PR0 PR1 PR2 PR3 PR4	Parameter set error	Fault when reading a parameter set CAUTION: • The factory setting is loaded automatically	Set the desired parameters and save under C0003. For PR0, the supply voltage must be switched off as well
Sd3	Encoder fault at X9/8	Cable interrupted Input X9 PIN 8 not assigned	Check cable for open circuit Assign input X9 PIN 8 with 5V or switch off monitoring (C0587 = 3)
Sd5	Master current source defective	Master current at X6/1, X6/2 < 2 mA	Check cable for open circuit Check master current source
Sd6	Sensor fault	Encoder of the motor temperature detection at X7 or X8 indicates undefined values	Check supply cable for firm connection Switch off monitoring with C0594 = 3 if necessary

1) Temperature sensing through incremental encoder X8

8.4 Reset of fault indications

TRIP

- After eliminating the fault, the pulse inhibit is only reset after acknowledgement of TRIP.
- Acknowledge TRIP by:
  - Operating module:
    Press STOP key.
    Then press RUN to enable the controller again.
  - LECOM: set C0043 = 0
  - Control word C0135
  - Terminal X5/E5
  - Control word AIF
  - Control word system bus

Tip!

If a TRIP source is still active, the TRIP cannot be reset

Message

- After eliminating the fault, the pulse inhibit is reset automatically.

9 Maintenance

9.1 Maintenance services

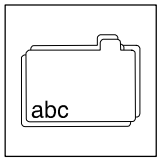
- The controller is free of maintenance, if the prescribed conditions of operation are observed. (📖 3-2)
- If the ambient air is polluted, the air vents of the controller may be obstructed.
  – Check the air vents periodically (depending on the degree of pollution approx. every 4 weeks).
  – Free the obstructed air vents using a vacuum cleaner.

Stop!

Do not use sharp or pointed tools such as a knife or screwdriver to clean the air vents.

9.2 Service addresses

The addresses of your Lenze world-wide representatives are listed on the back cover of every Lenze publication.



10 Appendix

10.1 Application examples

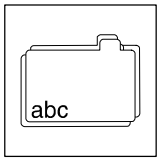
The internal signal processing in the controller is saved in basic configurations for common applications.

- You can select and activate the basic configurations via code C0005, and adapt them with only a few setings to your applications (short setup). (📖 7-1)
- The setting of the motor data and the adaptation of the motor control is in general independent of the configuration and is described in the section "Commissioning". (📖 5-1)

Configuration	Basic function	
1xxx	Speed control	📖 10-2
2xxx	Step control	📖 10-4
3xxx	Traversing control	📖 10-7
4xxx	Torque control	📖 10-10
5xxx	Digital frequency - master	📖 10-12
6xxx	Digital frequency - slave (bus)	📖 10-14
7xxx	Digital frequency - slave (cascade)	📖 10-16
8xxx	Dancer position control (external diameter detection)	📖 10-19
9xxx	Dancer position control (internal diameter calculation)	📖 10-22

Tip!

For the most important codes of the basic configurations, please refer to the "short setup" menus in GDC and the operating module.



10.1.1 Speed control (C0005 = 1000)

The configuration C0005 = 1000 (default setting) has been developed mainly for single drives.The speed setpoint is entered via the analog input X6/1. The signal is processed internally together with the digital control signals.

Short Setup

Setting	Code	Explanation	Default setting
Setpoint conditioning	C0010	Input of a minimum speed for setpoint = 0	0 rpm
	C0012	Acceleration time for the main setpoint	5.00 sec
	C0013	Deceleration time for the main setpoint	5.00 sec
	C0034	Changeover to current setpoint 4 ... 20 mA	0
	C0038/1...6	Input of prohibited ranges	0 rpm
	C0039/1	JOG speed, can be activated via digital input X5/E3	1500 rpm
	C0190	Activation of the additional setpoint channel	0
	C0220	Acceleration time for the additional setpoint	2.00 sec
	C0221	Deceleration time for the additional setpoint	2.00 sec
Motor control	C0006	Selection V/f-characteristic control or vector control	5
	C0011	Maximum speed	3000 rpm
	C0016	Voltage boost	0.00 %
	C0021	Slip compensation	depending on the controller
	C0022	Maximum current for motor mode	depending on the controller
	C0023	Maximum current for generator mode	depending on the controller
	C0105	Quick stop deceleration time	5.00 sec
	C0019	Threshold for automatic DC injection braking	0 rpm
	C0107	Holding time for automatic DC injection brake	0.00 sec
	C0036	Current setpoint for DC injection brake	0.00 A
	C0018	Inverter chopping frequency	6
	C0142	Behaviour after controller enable	1
For vector control or with incremental encoder	C0070	Gain of the speed controller	10
	C0071	Adjustment time of the speed controller	50 msec
	C0074	Influence of the speed controller (only for V/f characteristic control)	10.00 %

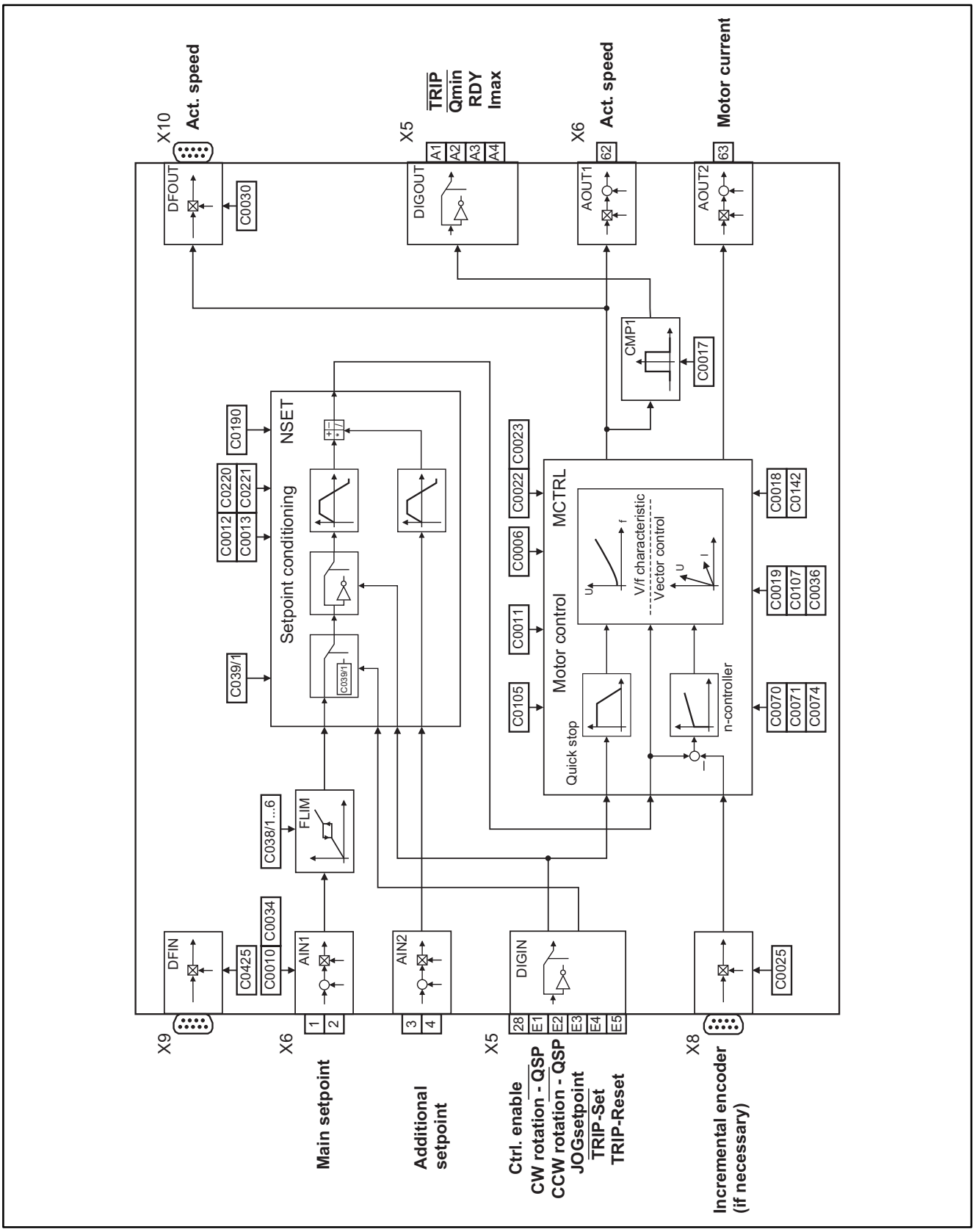
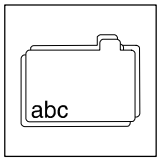


Fig. 10-1 Signal flow for configuration 1000: Speed control



10.1.2 Step control (C0005 = 2000)

The configuration C0005 = 2000 supports applications in which the drive has to perform a defined number of revolutions repetitively. In this way, pieces can be transported step by step on a conveyor belt or a worm conveyor can dose a specific amount repetitively.

Transportation speed and distance or dosing speed and amount can be controlled independently of each other via the two analog inputs. The execution of a step is started via the digital input X5/E4.

Short Setup

Setting	Code	Explanation	Default setting
Setpoint conditioning	C0010	Input of a minimum speed for speed setpoint = 0	0 rpm
	C0012	Acceleration time for the speed setpoint	1.00 sec
	C0013	Deceleration time for the speed setpoint	1.00 sec
	C0034	Changeover to current setpoint 4 ... 20 mA	0
	C1351	Scaling constant for the distance input (Value = Number of revolutions for distance setpoint = 100 %, 65536 = 1 revolution)	6553600
	C0560/1	internal distance setpoint, can be activated via digital input X5/E3	100 %
	C0940, C0941	Adaptation of the braking distance $\frac{[C0940]}{[C0941]} + \frac{[C0011] @ [C013] @ 65536}{120 @ [1351]}$	C0940 = 1 C0941 = 4
Motor control	C0006	Selection V/f-characteristic control or vector control	5
	C0011	Maximum speed	3000 rpm
	C0016	Voltage boost	0.00 %
	C0021	Slip compensation	depending on the controller
	C0022	Maximum current for motor mode	depending on the controller
	C0105	Quick stop deceleration time	5.00 sec
	C0019	Threshold for automatic DC injection braking	0 rpm
	C0107	Holding time for automatic DC injection brake	0.00 sec
	C0036	Current setpoint for DC injection brake	0.00 A
	C0018	Inverter chopping frequency	6
For vector control or with incremental encoder	C0070	Gain of the speed controller	10
	C0071	Adjustment time of the speed controller	50 msec
	C0074	Influence of the speed controller (only for V/f-characteristic control)	10.00 %

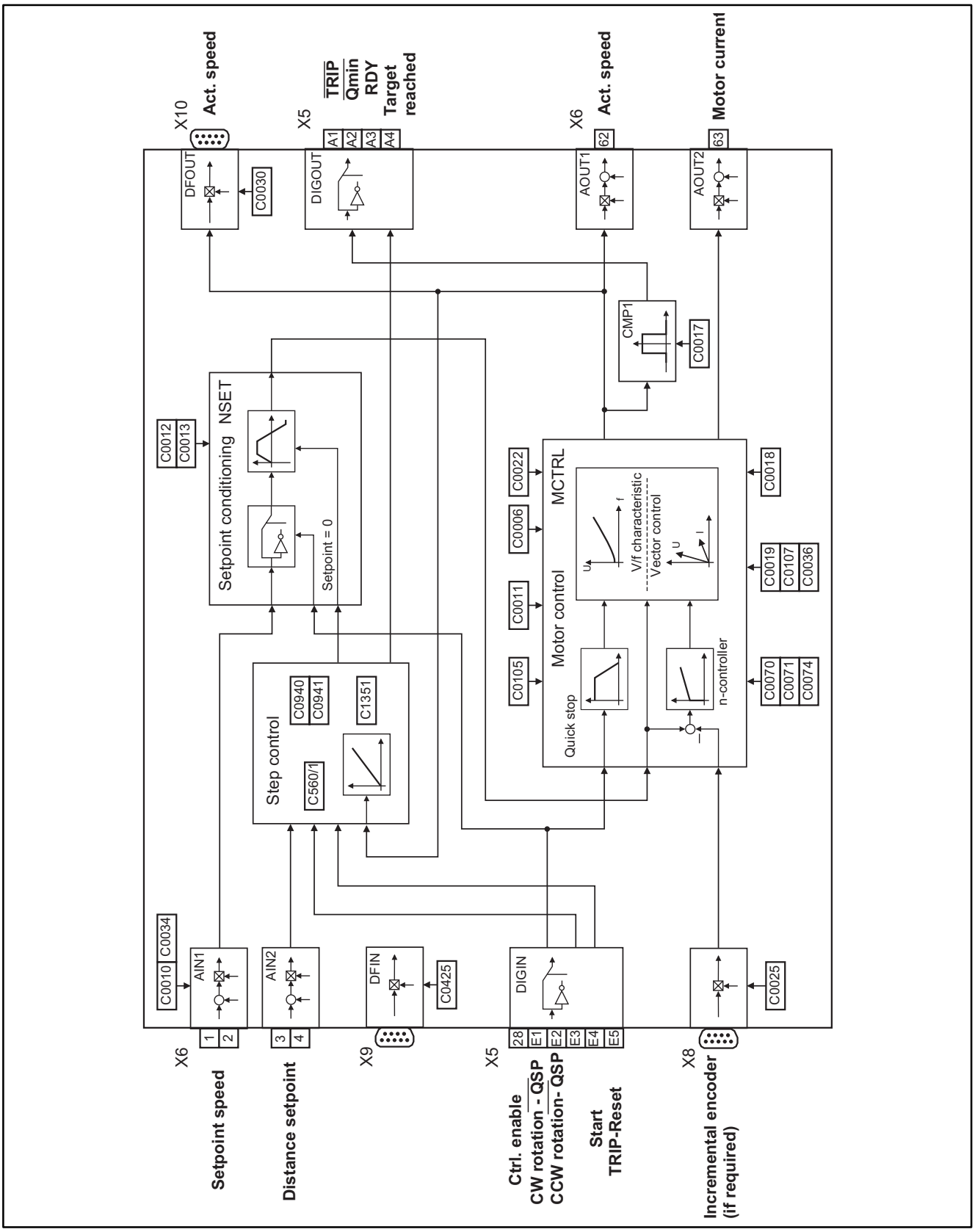


Fig. 10-2 Signal flow for configuration 2000: Step control

Appendix

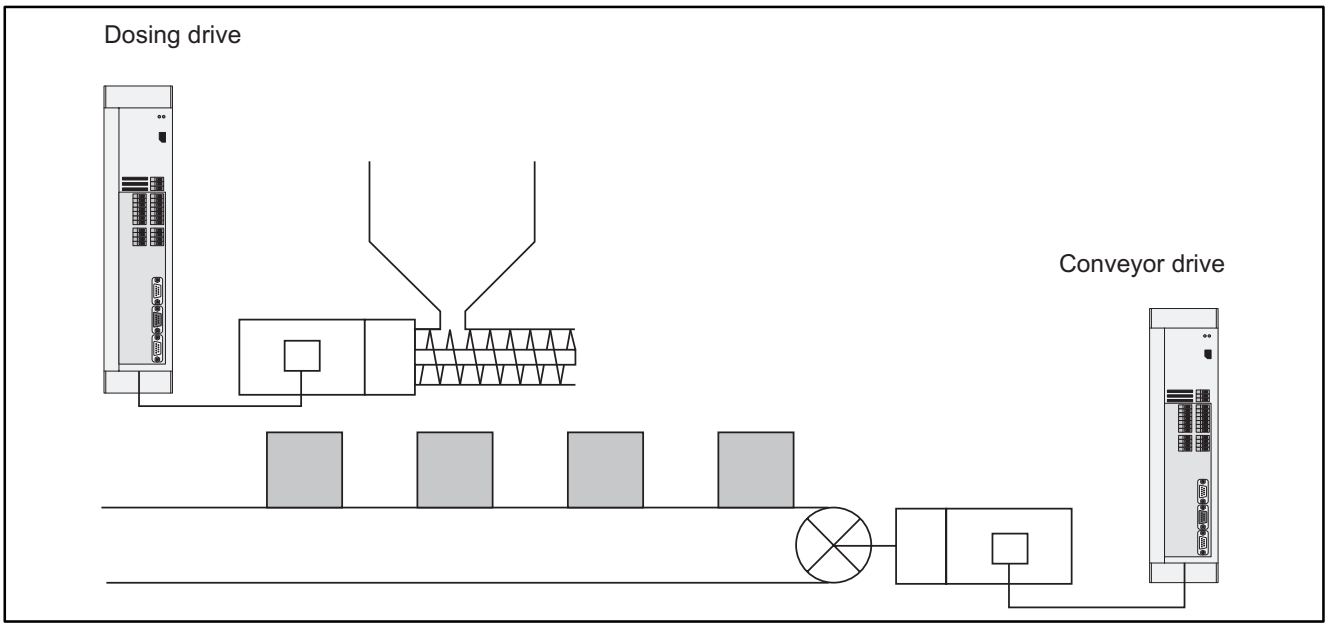
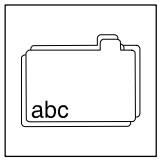


Fig. 10-3 Basic structure of a step control for a filling station of bulk material

Assignment of the inputs and outputs	Dosing drive	Conveyor drive
Analog inputs	• Dosing speed • Dosing amount	• Step speed • Step size
Digital inputs	• Controller enable • Direction of rotation • Fixed dosing amount • Start dosing • TRIP reset	• Controller enable • Step direction • Selected step size • Start step • TRIP reset
Digital outputs	• Fault (TRIP) • Actual speed > C0017 (Qmin) • Ready for operation (RDY) • Dosing completed	• Fault (TRIP) • Actual speed > C0017 (Qmin) • Ready for operation (RDY) • Step completed
Analog outputs	• Actual speed • Motor current	• Actual speed • Motor current



10.1.3 Traversing control (C0005 = 3000)

The configuration C0005 = 3000 has been developed for spindle drives which traverse the material on wind-up stands.

The winding drive speed, which controls the speed of the traversing drive, is transmitted via analog input 1. The specific reversal of rotational direction is controlled through the digital inputs X5/E1 and X5/E2. You can, for instance, use limit-switches as normally-closed contacts which inhibit the momentary direction of rotation.

Short Setup

Setting	Code	Explanation	Default setting
Setpoint conditioning	C0012	Acceleration time	1.00 sec
	C0013	Deceleration time	1.00 sec
	C0034	Changeover to current setpoint 4 ... 20 mA	0
	C0141	Additional setpoint for jog operation through digital input X5/E3	10.00 %
	C0472/1	Setting of the traversing step	100.00 %
	C0474/1	Setting of the traversing break (65536 corresponds to a break of one motor revolution, if 100% master setpoint equals to 3000 rpm)	10000
	C0104	Selection of the acceleration: constant distance (constant number of revolutions)	2
Motor control	C0006	Selection V/f-characteristic control or vector control	5
	C0011	Maximum speed	3000 rpm
	C0016	Voltage boost	0.00 %
	C0021	Slip compensation	depending on the controller
	C0022	Maximum current for motor mode	depending on the controller
	C0105	Quick stop deceleration time	5.00 sec
	C0019	Threshold for automatic DC injection braking	0 rpm
	C0107	Holding time for automatic DC injection brake	0.00 sec
	C0036	Current setpoint for DC injection brake	0.00 A
	C0018	Inverter chopping frequency	6
For vector control or with incremental encoder	C0070	Gain of the speed controller	10
	C0071	Adjustment time of the speed controller	50 msec
	C0074	Influence of the speed controller (only for V/f characteristic control)	10 %

Appendix

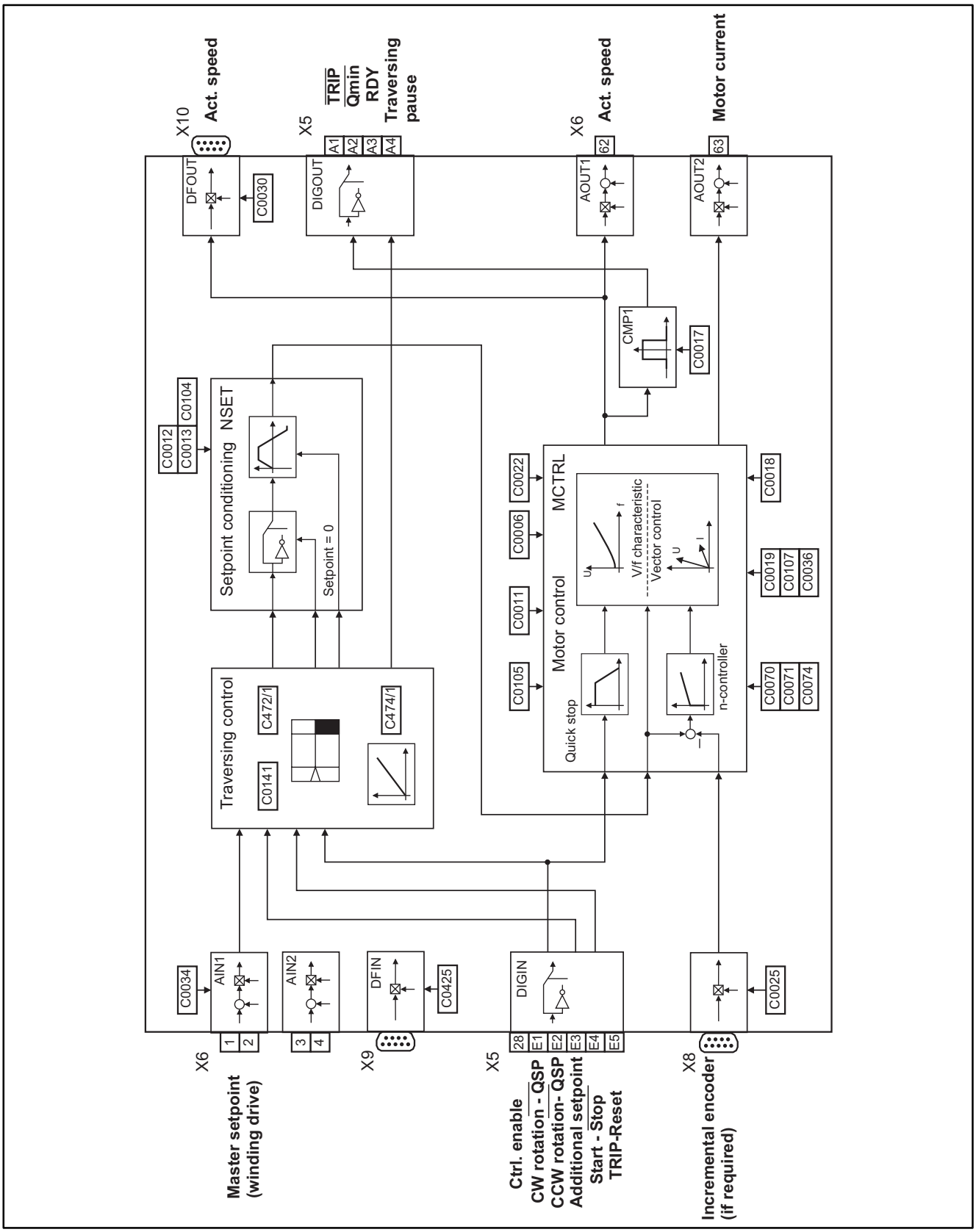


Fig. 10-4 Signal flow for configuration 3000: Traversing control

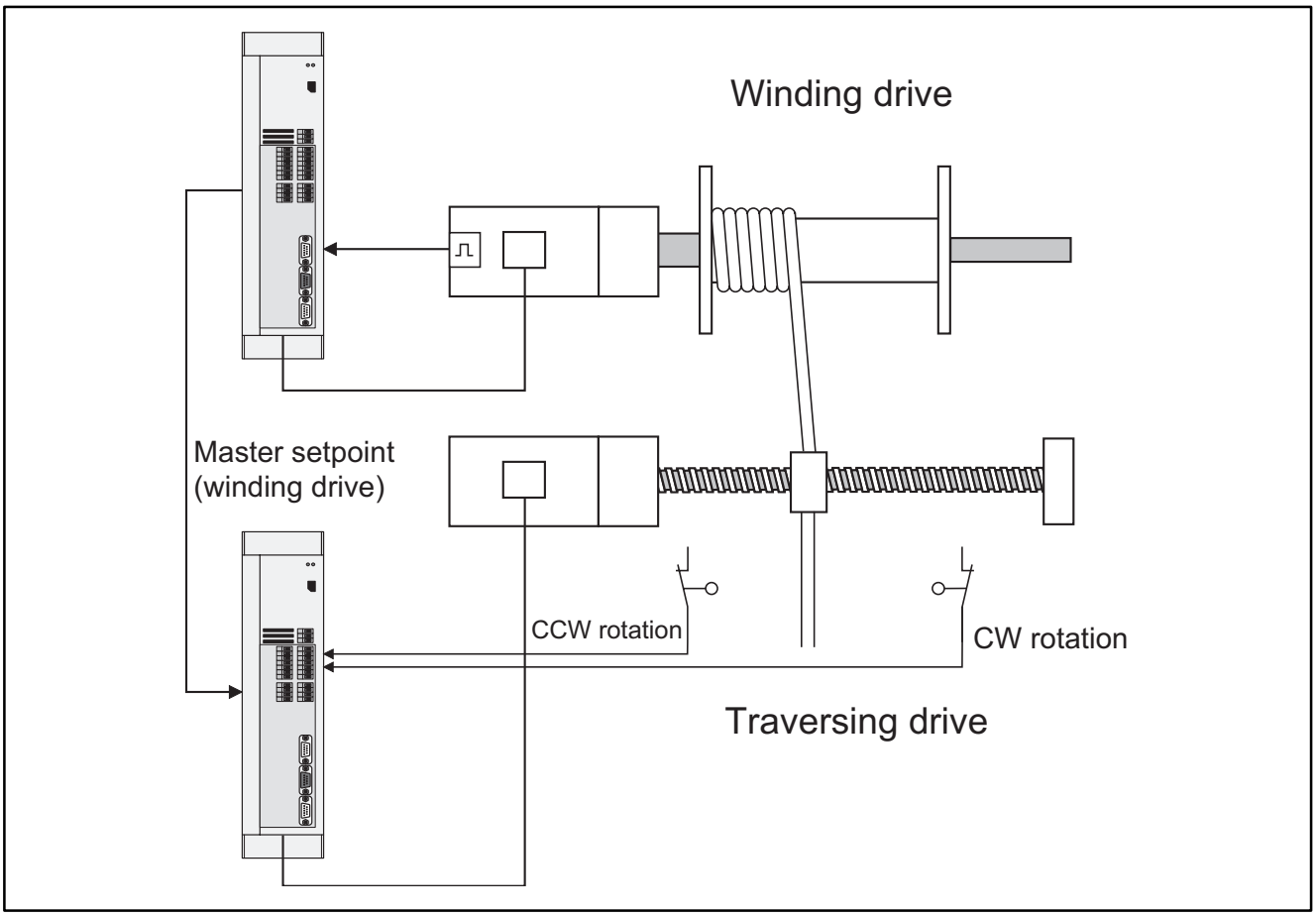
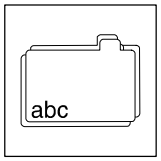


Fig. 10-5 Basic structure of a traversing control

Assignment of the inputs and outputs	Traversing control
Analog input	• Master setpoint
Digital inputs	• Controller enable • Direction of rotation • Additional setpoint • Start traversing • TRIP reset
Digital outputs	• Fault (TRIP) • Actual speed > C0017 (Qmin) • Ready for operation (RDY) • Traversing break
Analog outputs	• Actual speed • Motor current



10.1.4 Torque control (C0005 = 4000)

The drive can be controlled with a torque setpoint using the configuration C0005 = 4000.

The setpoint is selected via analog input X6/2. The direction of the torque results from the sign of the setpoint and the triggering of the digital inputs X5/E1 and X5/E2. The maximum permissible speed is set via analog input X6/1.

Short Setup

Setting	Code	Explanation	Default setting
Setpoint conditioning	C0010	Input of a minimum value for the speed limitation	0 rpm
	C0012	Acceleration time for the speed limit	5.00 sec
	C0013	Deceleration time for the speed setpoint	5.00 sec
	C0034	Changeover to current setpoint 4 ... 20 mA	0
	C0039/1	JOG speed as a limit value, can be activated via digital input X5/E3	1500 rpm
Motor control	C0006	Selection V/f-characteristic control or vector control The direct control of the motor torque is possible only when the vector control is activated!	5
	C0011	Maximum speed	3000 rpm
	C0022	Maximum current for motor mode	depending on the controller
	C0105	Quick stop deceleration time	5.00 sec
	C0018	Inverter chopping frequency	6
	C0142	Behaviour after controller enable	1
For vector control or with incremental encoder	C0070	Gain of the limiting controller	10
	C0071	Adjustment time of the limiting controller	50 msec

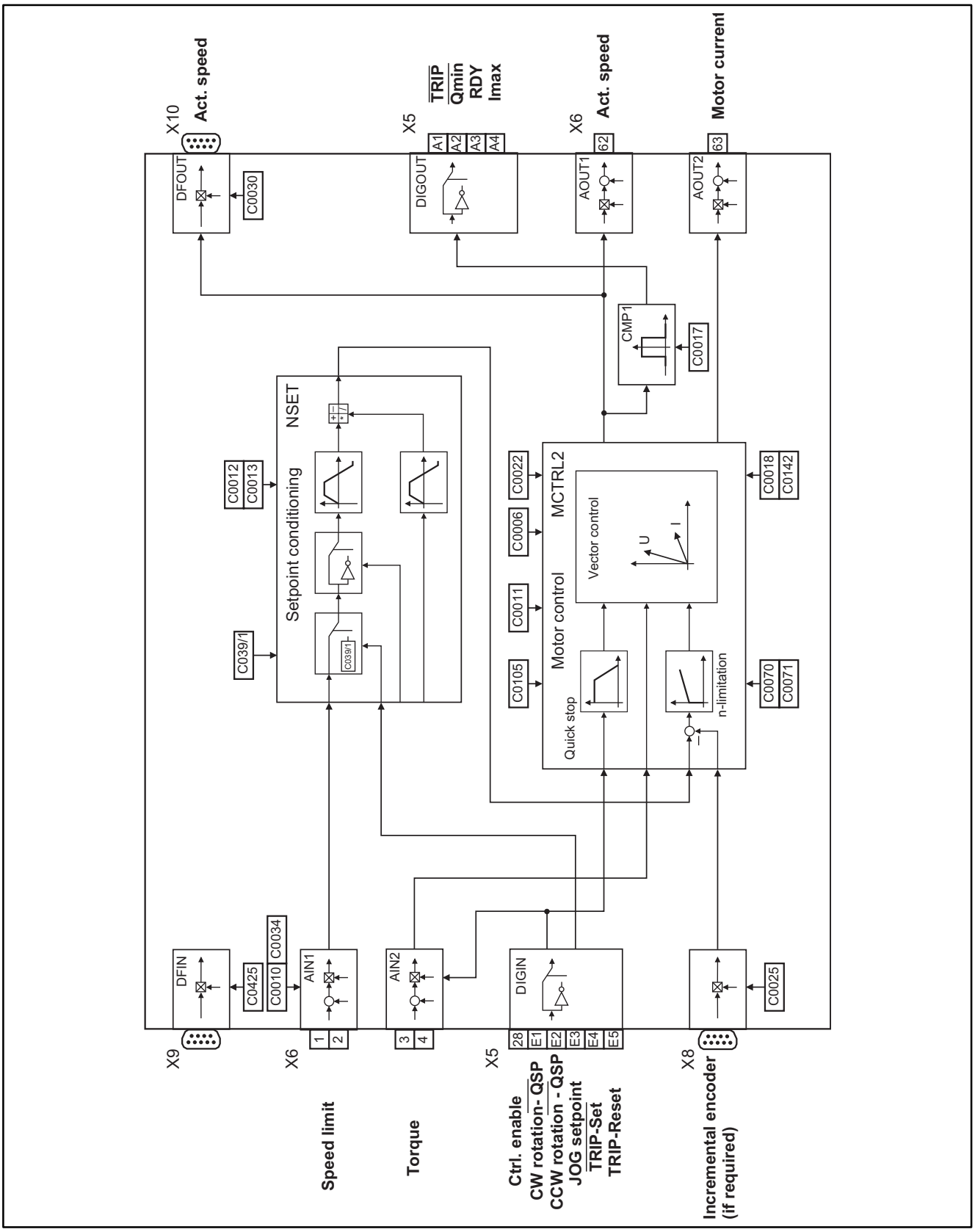


Fig. 10-6 Signal flow for configuration 4000: Torque control

10.1.5 Digital frequency - master (C0005 = 5000)

The configuration C0005 = 5000 is used to control a network of drives. The conditioned speed setpoint is used as a common reference variable in the master as well as in the slaves. The setpoint is passed on to the slaves via the digital frequency output X10.

Thanks to the adjustable rating of the reference variable, the speed ratio of the individual drive can be adapted to the process.

The basic structure of a digital frequecy network for a textile machine is shown in Fig. 10-10 (📖 10-18)

Short Setup

Setting	Code	Explanation	Default setting
Setpoint conditioning	C0010	Input of a minimum speed for setpoint = 0	0 rpm
	C0012	Acceleration time for the main setpoint	5.00 sec
	C0013	Deceleration time for the main setpoint	5.00 sec
	C0034	Changeover to current setpoint 4 ... 20 mA	0
	C0039/1	JOG speed, can be activated via digital input X5/E3	1500 rpm
	C0190	Activation of the additional setpoint channel	0
	C0220	Acceleration time for the additional setpoint	2.00 sec
	C0221	Deceleration time for the additional setpoint	2.00 sec
Digital frequency processing	C0030	Selection digital frequency constant output X10	3
	C0473/1, C0533	Denominator, numerator - digital frequency rating	C0473/1 = 1 C0533 = 1
	C0032, C0033	Denominator, numerator - gearbox factor	C0032 = 1 C0033 = 1
Motor control	C0006	Selection V/f-characteristic control or vector control	5
	C0011	Maximum speed	3000 rpm
	C0016	Voltage boost	0.00 %
	C0021	Slip compensation	depending on the controller
	C0022	Maximum current for motor mode	depending on the controller
	C0105	Quick stop deceleration time	5.00 sec
	C0019	Threshold for automatic DC injection braking	0 rpm
	C0107	Holding time for automatic DC injection brake	0.00 sec
	C0036	Current setpoint for DC injection brake	0.00 A
	C0018	Inverter chopping frequency	6
For vector control or with incremental encoder	C0070	Gain of the speed controller	10
	C0071	Adjustment time of the speed controller	50 msec
	C0074	Influence of the speed controller (only for V/f characteristic control)	10.00 %

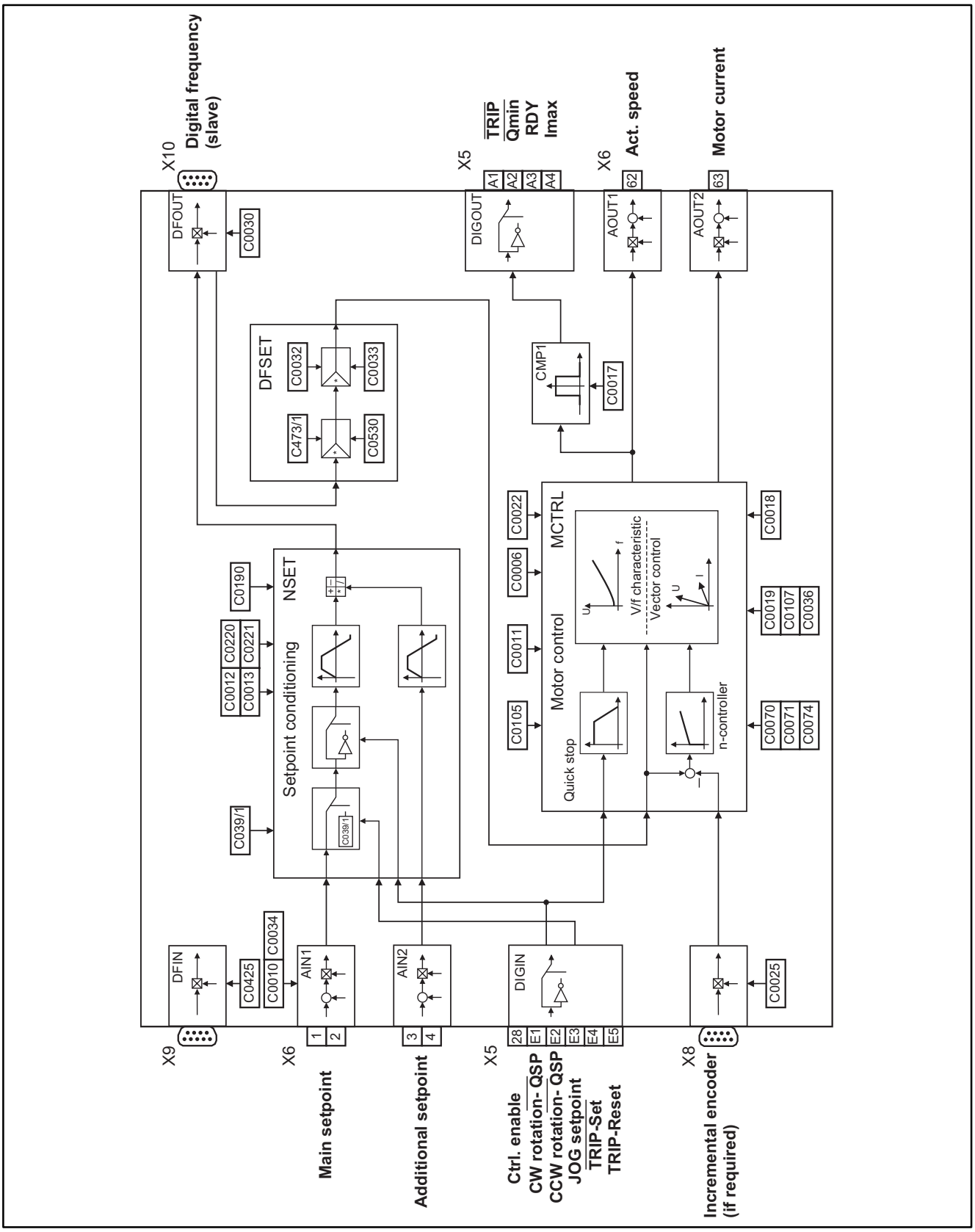
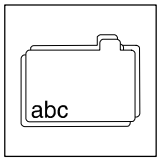


Fig. 10-7 Signal flow for configuration 5000: Digital frequency - master



10.1.6 Digital frequency – slave (bus) (C0005 = 6000)

The configuration C0005 = 6000 is used to integrate the controller into a network of drives.

The digital frequency setpoint is read in from input X9 to control the drive. An evaluation is then made, so that the drive speed can be adjusted to suit the process.

An internal additional setpoint can also be activated via the digital input X5/E3.

The digital frequency setpoint is passed on to the slaves without modification.

The basic structure of a digital frequency network for a textile machine is shown in Fig. 10-10 (📖 10-18)

Short Setup

Setting	Code	Explanation	Default setting
Setpoint conditioning	C0141	Additional setpoint, can be activated via digital input X5/E3	10.00 %
	C0671	Acceleration time for the additional setpoint	0.0 sec
	C0672	Deceleration time for the additional setpoint	0.00 sec
Digital frequency processing	C0425	Selection digital frequency constant input X9	3
	C0473/1, C0533	Denominator, numerator - digital frequency rating	C0473/1 = 1 C0533 = 1
	C0032, C0033	Denominator, numerator - gearbox factor	C0032 = 1 C0033 = 1
Motor control	C0006	Selection V/f-characteristic control or vector control	5
	C0011	Maximum speed	3000 rpm
	C0016	Voltage boost	0.00 %
	C0021	Slip compensation	depending on the controller
	C0022	Maximum current for motor mode	depending on the controller
	C0105	Quick stop deceleration time	5.00 sec
	C0019	Threshold for automatic DC injection braking	0 rpm
	C0107	Holding time for automatic DC injection brake	0.00 sec
	C0036	Current setpoint for DC injection brake	0.00 A
	C0018	Inverter chopping frequency	6
For vector control or with incremental encoder	C0070	Gain of the speed controller	10
	C0071	Adjustment time of the speed controller	50 msec
	C0074	Influence of the speed controller (only for V/f characteristic control)	10.00 %

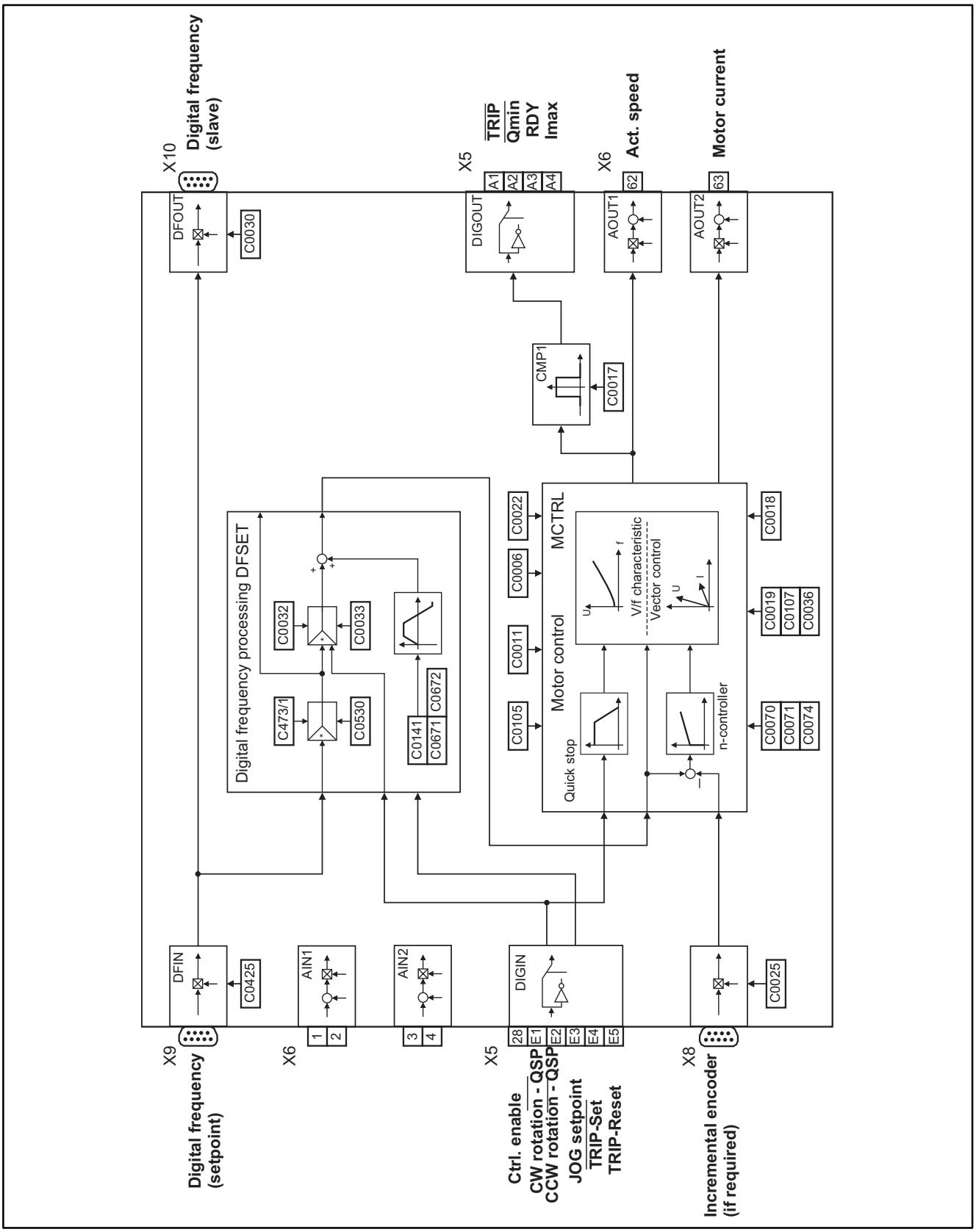
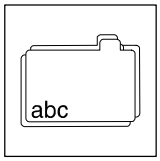


Fig. 10-8 Signal flow for configuration 6000: Digital frequency - slave (bus)



10.1.7 Digital frequency – slave (cascade) (C0005 = 7000)

The configuration C0005 = 7000 is used to integrate the controller into a network of drives.

The digital frequency setpoint is read in from input X9 to control the drive. An evaluation is then made, so that the drive speed can be adjusted to suit the process.

An internal additional setpoint can also be activated via the digital input X5/E3.

Unlike configuration 6000, the rated reference setpoint is passed on via the digital frequency output X10. Modifications of the rating thus also affect the subsequent drives.

The basic structure of a digital frequecy network for a textile machine is shown in Fig. 10-10 (📖 10-18)

Short Setup

Setting	Code	Explanation	Default setting
Setpoint conditioning	C0141	Additional setpoint, can be activated via digital input X5/E3	0.00 %
	C0671	Acceleration time for the additional setpoint	0.0 sec
	C0672	Deceleration time for the additional setpoint	0.00 sec
Digital frequency processing	C0425	Selection digital frequency constant input X9	3
	C0473/1, C0533	Denominator, numerator - digital frequency rating	C0473/1 = 1 C0533 = 1
	C0032, C0033	Denominator, numerator - electronic gearbox factor	C0032 = 1 C0033 = 1
Motor control	C0006	Selection V/f-characteristic control or vector control	5
	C0011	Maximum speed	3000 rpm
	C0016	Voltage boost	0.00 %
	C0021	Slip compensation	depending on the controller
	C0022	Maximum current for motor mode	depending on the controller
	C0105	Quick stop deceleration time	5.00 sec
	C0019	Threshold for automatic DC injection braking	0 rpm
	C0107	Holding time for automatic DC injection brake	0.00 sec
	C0036	Current setpoint for DC injection brake	0.00 A
	C0018	Inverter chopping frequency	6
For vector control or with incremental encoder	C0070	Gain of the speed controller	10
	C0071	Adjustment time of the speed controller	50 msec
	C0074	Influence of the speed controller (only for V/f characteristic control)	10.00 %

Tip!

In this configuration you cannot activate the incremental encoder input X8.

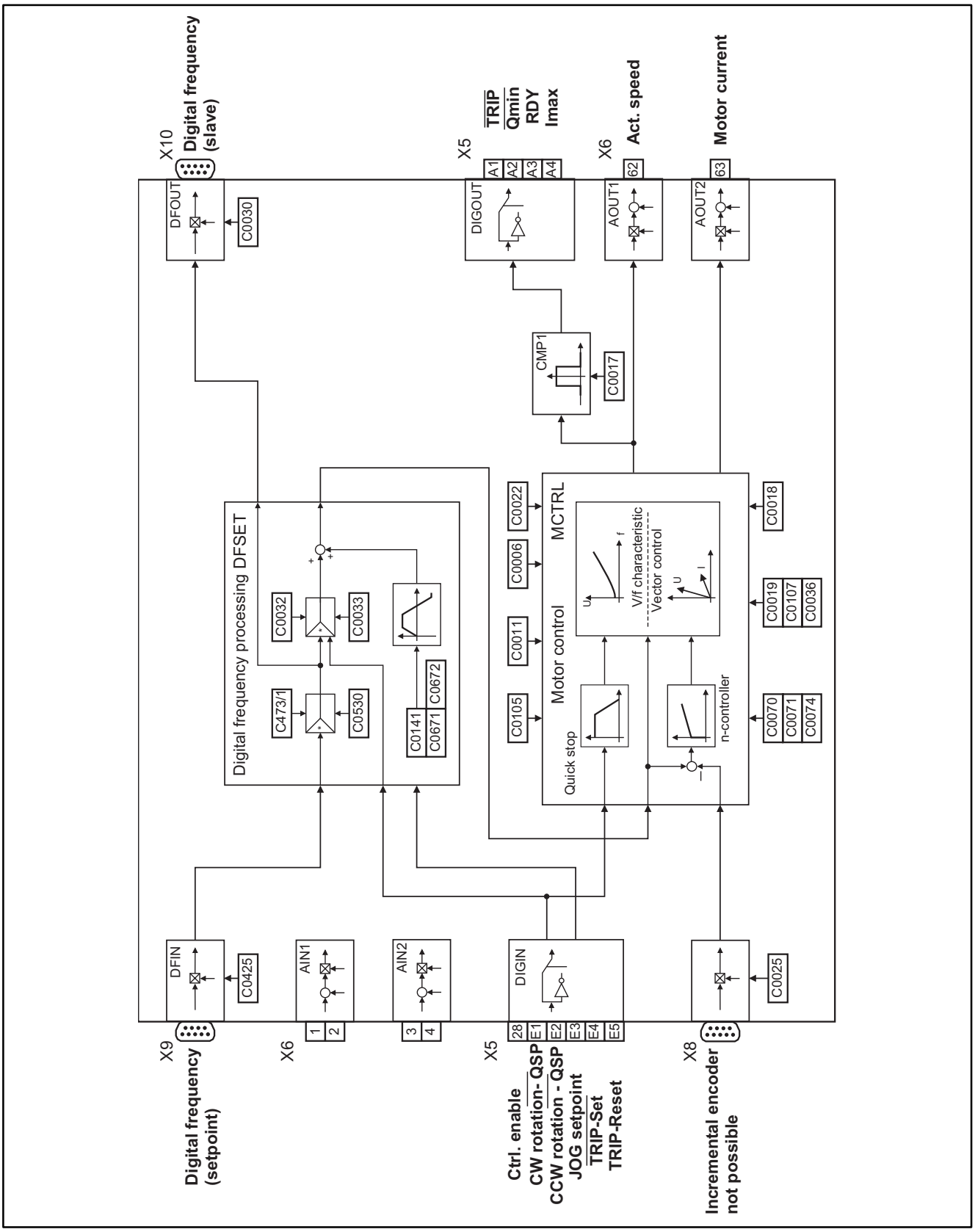


Fig. 10-9 Signal flow for configuration 7000: Digital frequency - slave (cascade)

Appendix

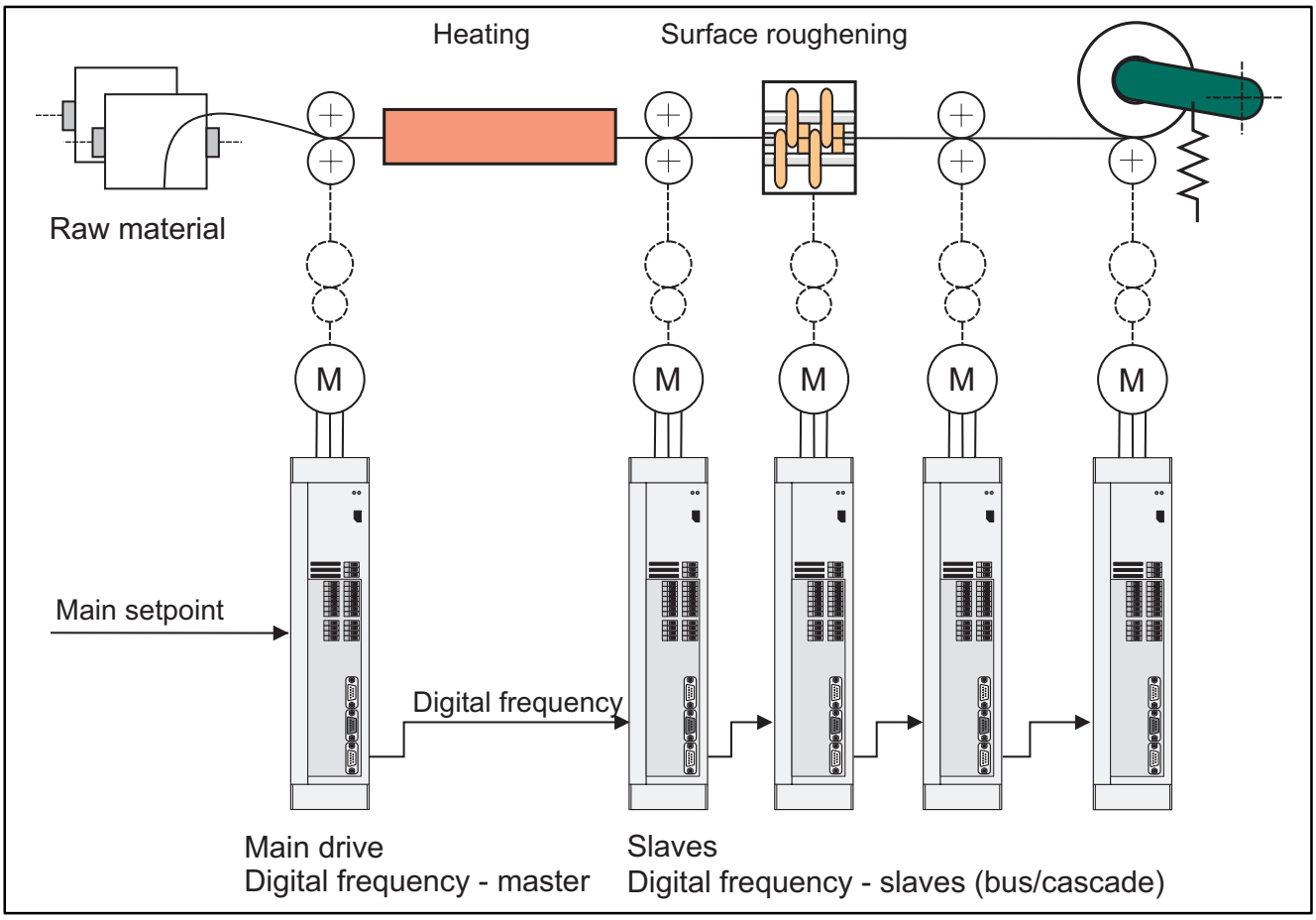
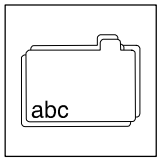


Fig. 10-10 Basic structure of a digital frequency network for a textile machine



10.1.8 Dancer position control (external diameter detection (C0005 = 8000)

The configuration C0005 = 8000 has been developed for winding drives with dancer position control and external diameter detection.

The drive is pilot-controlled with the plant or material speed via a digital frequency signal.Depending on the actual dancer position, the dancer position controller generates a correction signal which is added to the pilot control signal. The result is a setpoint circumferential speed which can be used direct as a speed setpoint for a contact winder.

The speed setpoint for a core winder is obtained by rating the winding diameter. The analog signal generated by the diameter sensor is conditioned in the controller.

Short Setup

Setting	Code	Explanation	Default setting
Digital frequency pilot control	C0425	Selection digital frequency constant input X9	3
	C0950	Numerator for the digital frequency rating	5
	C0951	Denominator for the digital frequency rating	1
Dancer position control	C0141	Dancer position setpoint	10.00 %
	C0687	Window actual dancer position = dancer position setpoint	1.00 %
	C1330	Acceleration time for the dancer position setpoint	1.0 sec
	C1331	Deceleration time for the dancer position setpoint	1.0 sec
	C1332	Gain of the dancer position controller	1.0
	C1333	Adjustment time of the dancer position controller	400 msec
	C0472/1	Influence of the dancer position controller	10.00 %
Diameter detection	C0026/2	Offset analog input X6/2	0.00 %
	C0027/2	Gain analog input X6/2	100.00 %
	C0640	Filter time constant of the actual diameter filter	1.00 sec
	C1304	Maximum diameter Dmax (corresponds to actual value = 100 %)	500 mm
	C1305	lower diameter limit	100 mm
	C1306	upper diameter limit	500 mm
	C1308	Selection arithmetic function 1/D	1
	C1309	minimum diameter Dmin	100
	C1310	Acceleration/Deceleration time for the new initial diameter	1.000 sec
Motor control	C0006	Selection V/f-characteristic control or vector control	5
	C0011	Maximum speed	3000 rpm
	C0016	Voltage boost	0.00 %
	C0021	Slip compensation	depending on the controller
	C0022	Maximum current for motor mode	depending on the controller
	C0023	Maximum current for generator mode	depending on the controller
	C0105	Quick stop deceleration time	5.00 sec
	C0018	Inverter chopping frequency	6
For vector control or with incremental encoder	C0070	Gain of the speed controller	10
	C0071	Adjustment time of the speed controller	50 msec
	C0074	Influence of the speed controller (only for V/f characteristic control)	10.00 %
	C0540	Selection of the signal output at digital frequency output X10	0

Tip!

In this configuration, you can activate the incremental encoder input X8, if you set the digital frequency input X10 to repeat the input signal at X8 (C0540 = 5).

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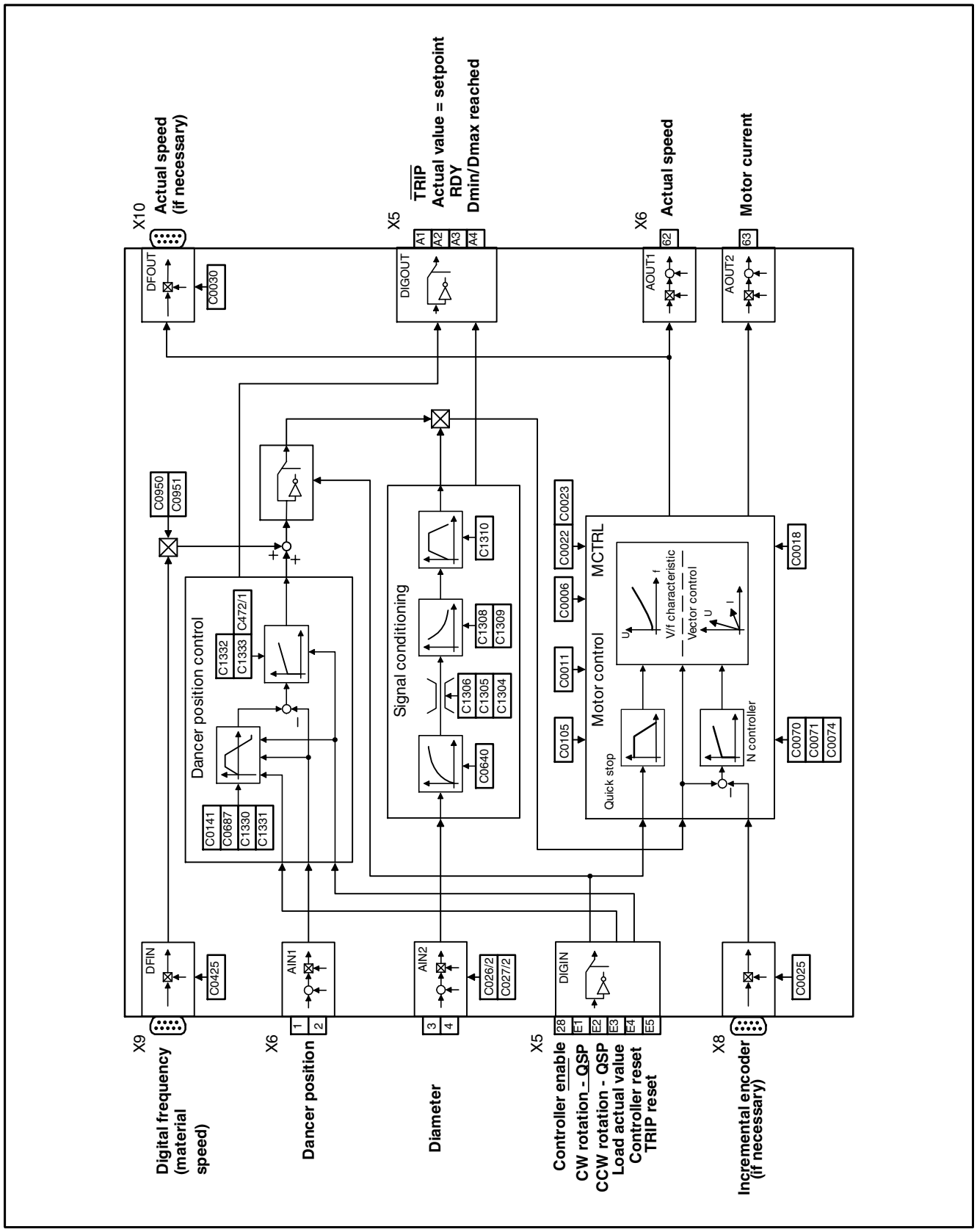


Fig. 10-11 Signal flow for configuration 8000: Dancer position control (external diameter detection)

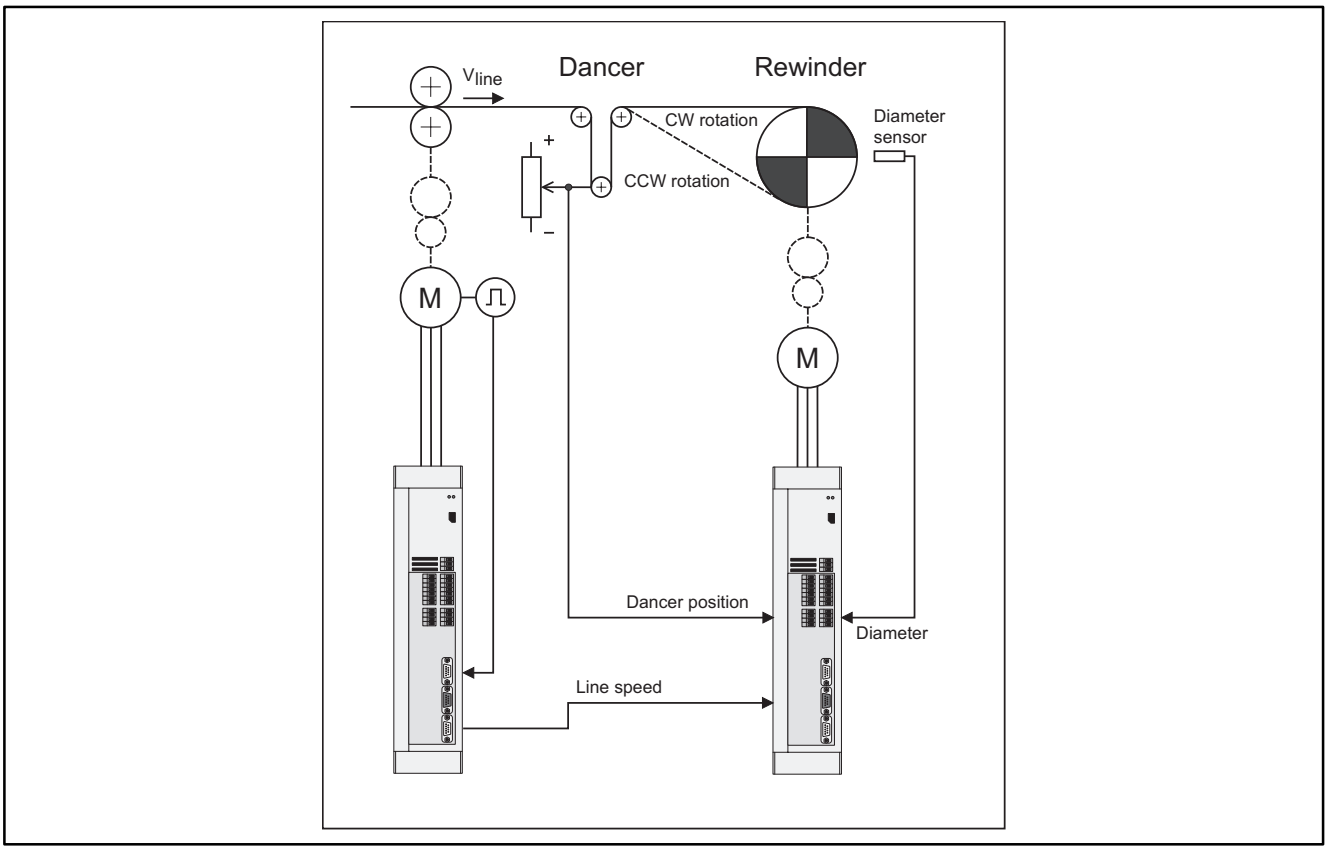


Fig. 10-12 Basic structure of a dancer position control with external diameter detection via a diameter sensor

10.1.9 Dancer position control (internal diameter calculator (C0005 = 9000)

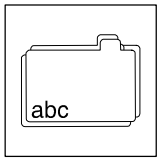
The configuration C0005 = 9000 has been delveoped for winding drives with dancer position control. Unlike configuration 8000, the diameter is calculated internally.

The drive is pilot-controlled with the plant or material speed via a digital frequency signal.Depending on the actual dancer position, the dancer position controller generates a correction signal which is added to the pilot control signal. The result is a setpoint circumferential which produces the speed setpoint when multiplied with 1/D.

The winding diameter is calculated from the signals for the line speed and the winding speed. After changing the core, the new initial diameter can be loaded.

Short Setup

Setting	Code	Explanation	Default setting
Digital frequency pilot control	C0425	Selection digital frequency constant input X9	3
Digital frequency pilot control	C0950	Numerator for the digital frequency rating	5
	C0951	Denominator for the digital frequency rating	1
Dancer position control	C0141	Dancer position setpoint	10.00 %
	C0687	Window actual dancer position = dancer position setpoint	1.00 %
	C1330	Acceleration time for the dancer position setpoint	1.0 sec
	C1331	Deceleration time for the dancer position setpoint	1.0 sec
	C1332	Gain of the dancer position controller	1.0
	C1333	Adjustment time of the dancer position controller	400 msec
	C0472/1	Influence of the dancer position controller	10.00 %
Diameter calculation	C1300	Rated speed for maximum diameter (C0051)	500 rpm
	C1301	Rated speed from digital frequency signal (C0426)	2500 rpm
	C1303	Filter time constant for actual diameter	1.0 sec
	C1304	Maximum diameter Dmax (corresponds to actual value = 100 %)	500 mm
	C1305	lower diameter limit	100 mm
	C1306	upper diameter limit	500 mm
	C1308	Selection arithmetic function 1/D	1
	C1309	minimum diameter Dmin	100
	C1310	Acceleration/Deceleration time for the new initial diameter	1.000 sec
Motor control	C0006	Selection V/f-characteristic control or vector control	5
	C0011	Maximum speed	3000 rpm
	C0016	Voltage boost	0.00 %
	C0021	Slip compensation	depending on the controller
	C0022	Maximum current for motor mode	depending on the controller
	C0023	Maximum current for generator mode	depending on the controller
	C0105	Quick stop deceleration time	5.00 sec
	C0018	Inverter chopping frequency	6
For vector control or with incremental encoder	C0070	Gain of the speed controller	10
	C0071	Adjustment time of the speed controller	50 msec
	C0074	Influence of the speed controller (only for V/f-characteristic control)	10.00 %
	C0540	Selection of the signal output at digital frequency output X10	0



Tip!

In this configuration, you can activate the incremental encoder input X8, if you set the digital frequency input X10 to repeat the input signal at X8 (C0540 = 5).

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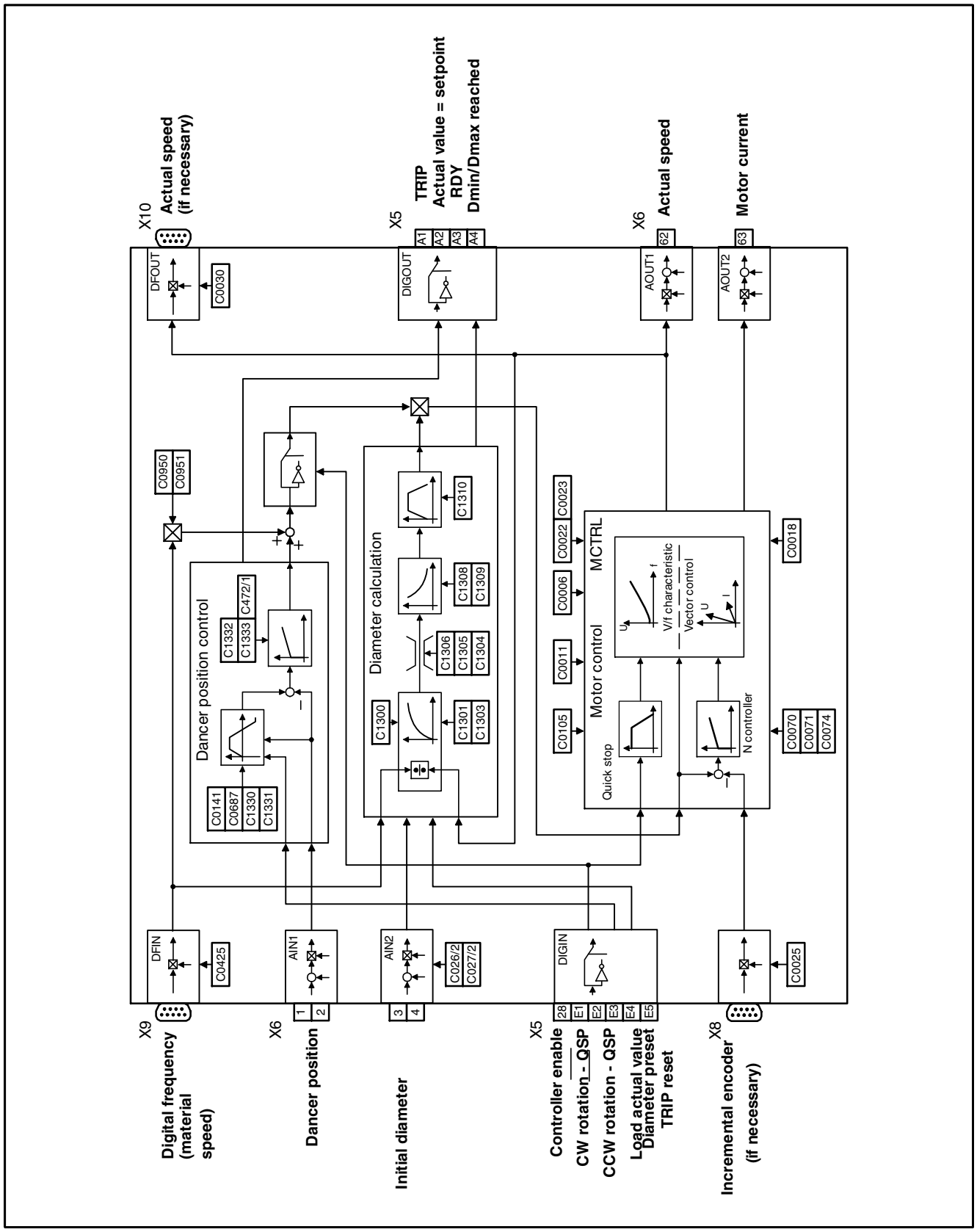


Fig. 10-13 Signal flow for configuration 9000: Dancer position control (internal diameter calculation)

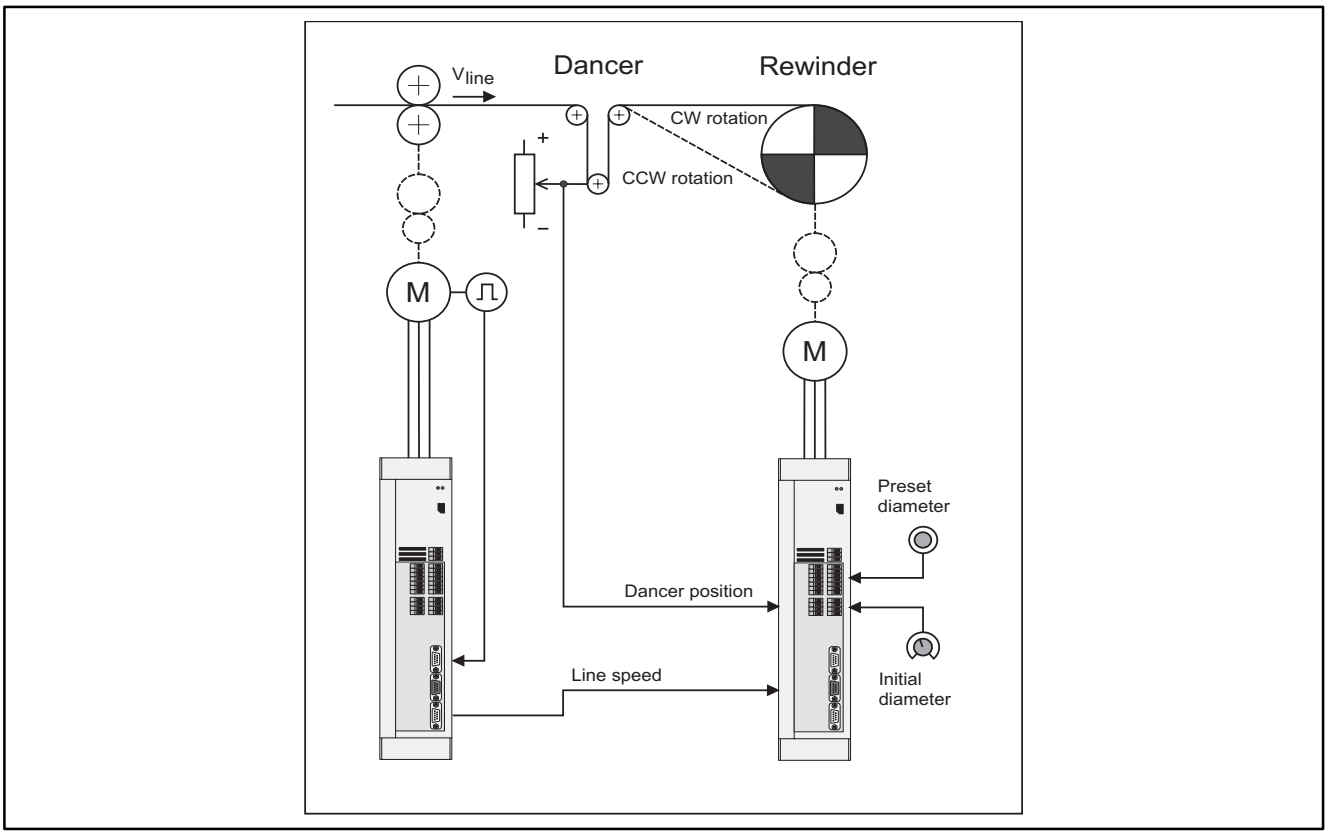
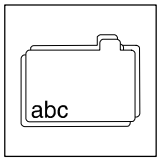
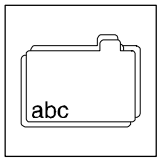


Fig. 10-14 Basic structure of a dancer position control with diameter calculation via the internal diameter calculator

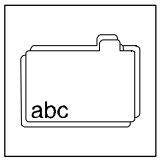


10.2 Glossary

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.
Ctrl. enable	Controller enable
Ctrl. inhibit	Controller inhibit (= $\overline{\text{Controller enable}}$)
FB	Function block
Fieldbus	For data exchange between superimposed control and positioning control, e.g. INTERBUS-S or PROFIBUS-DP
FPDA	Freely programmable digital output
FPDE	Freely programmable digital input
GDC	Global Drive Control (PC-program (Windows) for Lenze controllers)
INTERBUS	Industrial communication standard to DIN E19258
JOG	Fixed speed or input for fixed speed
KTY	"Linear" thermal sensor of the motor winding
LECOM	Lenze Communication
LEMOC2	PC-program (DOS) for Lenze controllers
LU	Undervoltage
Master	Masters are host systems, e.g. PLC or PC.
OU	Overvoltage
PC	Personal Computer
PLC	Programmable logic controller
PM	Permanent magnet
Process data	For instance, setpoints and actual values of controllers which must be exchanged within a minimum of time. Process data are usually small amounts of data which are to be transmitted cyclically. For PROFIBUS-DP, these data are transmitted in the logic process data channel.
PROFIBUS-DP	Communication standard DIN 19245, consisting of part 1, part 2 and part 3
PTC	PTC thermistor with defined tripping temperature
QSP	Quick stop
RFG	Ramp generator
Slave	Bus device which may only send after the request of the master. Controllers are slaves.
SSC	Sensorless control
SSI	Synchronous serial interface
Target position	The target which is to be approached by means of a defined traversing profile.
TKO	Thermostat / normally-closed contact



10.3 Index



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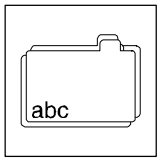

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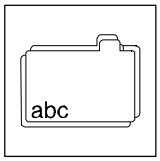

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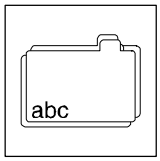

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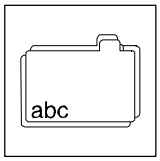

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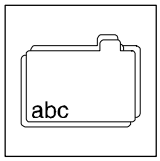

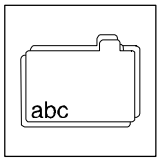

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