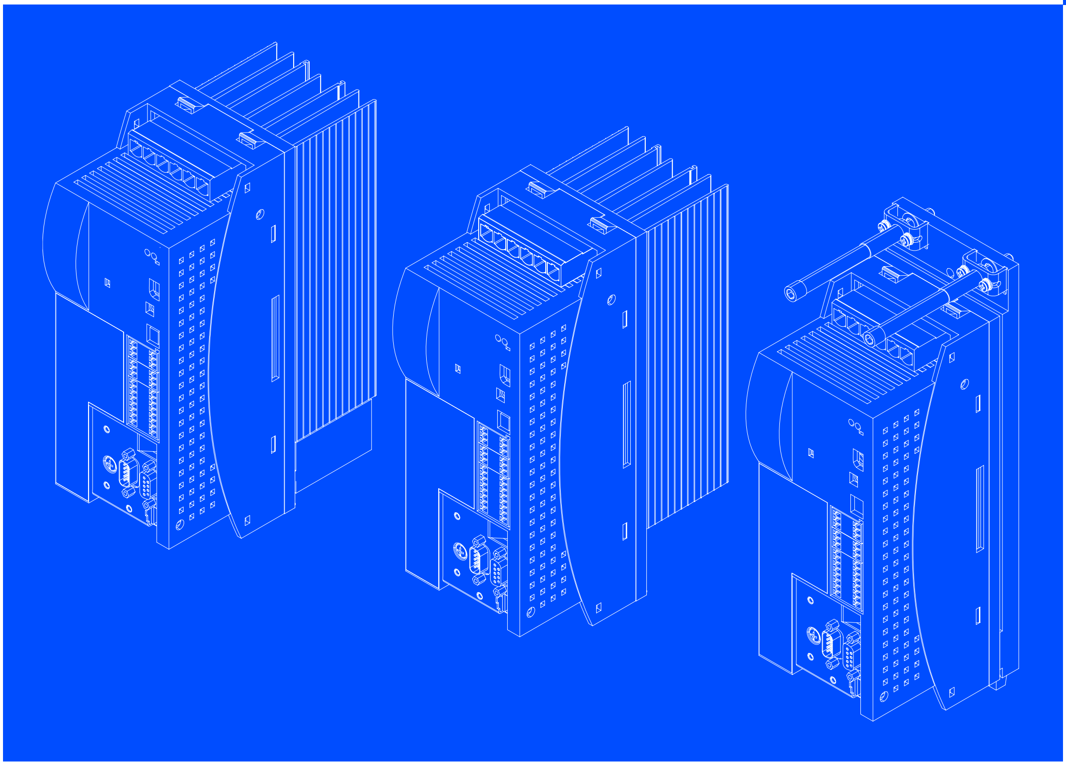
EDBCSXS064
13129227

Operating Instructions

ECS



ECSESxxx / ECSDSxxx / ECSCSxxx

Axis module – ”Speed and Torque” application

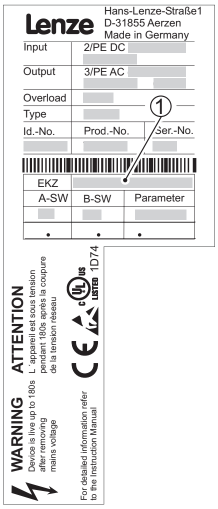
Lenze

Please read these instructions before you start working!
Follow the enclosed safety instructions.

These Instructions are valid for ECSxS... axis modules as of version:

①

ECS x S xxx C 4 x xxx XX XX XX



Device type

Design

E = standard panel-mounted unit, IP20
D = push-through technique (thermally separated)
C = cold-plate technique

Application

S = "Speed and Torque"

Peak current

004 = 4 A
008 = 8 A
016 = 16 A
032 = 32 A
048 = 48 A
064 = 64 A

Fieldbus interface

C = MotionBus/system bus CAN

Voltage class

4 = 400 V/500 V

Technical version

B = standard
I = for IT systems

Variant

Hardware version

1A or higher

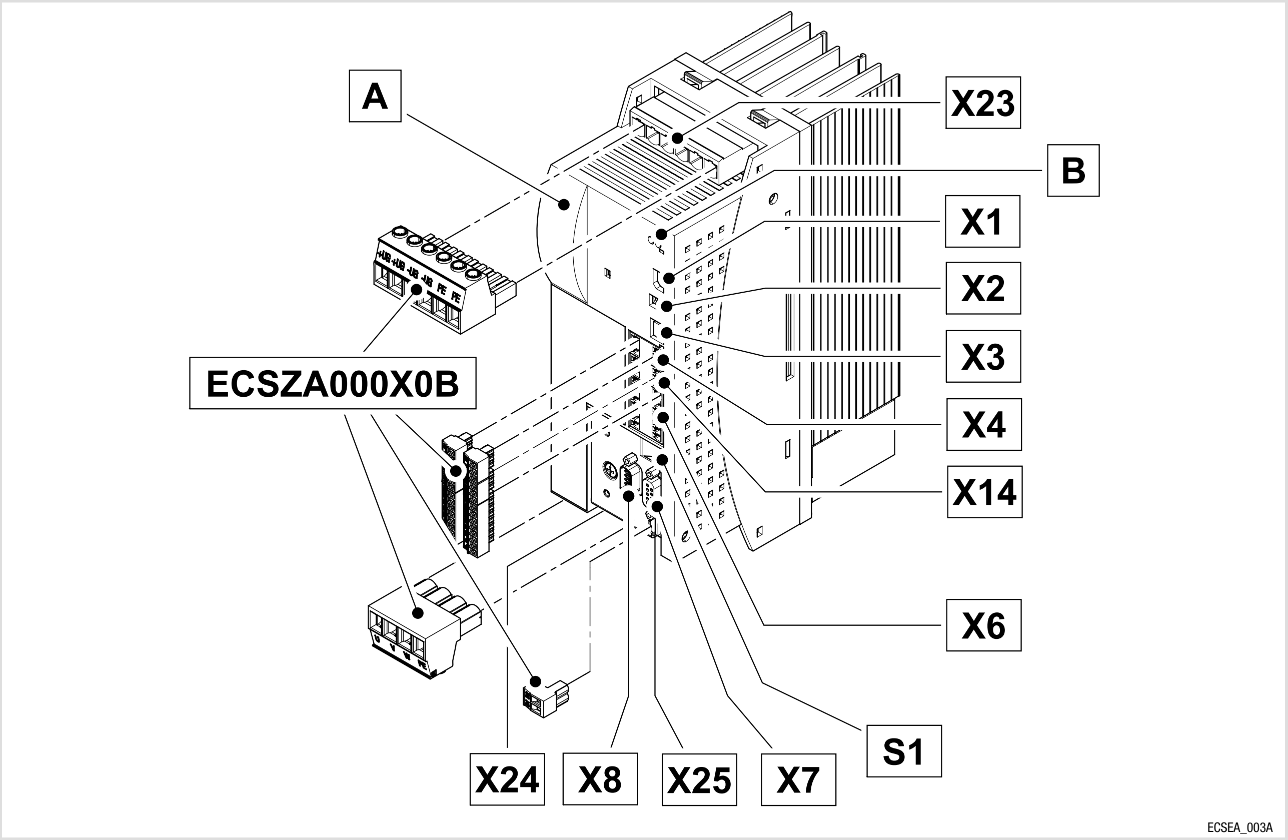
Version of operating software (B-SW)

6.0 or higher

Tip!

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

http://www.Lenze.com


A
X23
B
X1
X2
X3
X4
X14
ECSZA000X0B
X6
S1
X24
X8
X25
X7
+UB
+UB
-UB
-UB
PE
PE
ECSEA_003A

Scope of supply

Position	Description	Quantity
A	Axis module ECS☐S...	1
	Accessory kit with fixing material according to the design (☐): ● "E" - standard panel-mounted unit ● "D" - push-through technique ● "C" - cold-plate technique	1
	Mounting Instructions	1
	Drilling jig	1
	Only axis module **ECSDS...**: functional earth conductor (available in the scope of supply from March 2006)	1

Note!

The **ECSZA000X0B** connectors must be ordered separately.

Connections and interfaces

Position	Description	Detailed information
X23	Connections ● DC-bus voltage ● PE	🕮 44
B	LEDs: Status and error display	
X1	Automation interface (AIF) for ● Operating module (Keypad XT) ● Communication module	🕮 62
x2	PE connection AIF	
X3	Configuration of analog input	🕮 54
X4	CAN connection ● MotionBus (CAN) ● Interface to higher-level control	🕮 63
X14	CAN-AUX connection ● System bus (CAN) ● PC interface / HMI for parameter setting and diagnosing	
X6	Connections ● 24 V supply ● Digital inputs and outputs ● Analog input ● "Safe torque off" (formerly "safe standstill")	🕮 51 🕮 53 🕮 54 🕮 55
S1	DIP switch ● CAN address ● CAN baud rate	🕮 150
X7	Resolver connection	🕮 68
X8	Encoder connection ● Incremental encoder (TTL encoder) ● Sin/cos encoder	🕮 69
X25	Connection of brake control	🕮 48
X24	Motor connection	🕮 47

Status displays

LED		Operating state	Check test
Red	Green		
Off	On	Controller enabled, no fault	
Off	Blinking	Controller inhibited (CINH), switch-on inhibit	Code C0183
Blinking	Off	Trouble/fault (TRIP) is active	Code C0168/1
Blinking	On	Warning/FAIL-QSP is active	Code C0168/1

1 Preface and general information

1.1 How to use these Operating Instructions

These Operating Instructions will assist you in connecting and commissioning the ECSxS... axis modules.

They contain safety instructions which must be observed!

All persons working on and with the ECSxS... axis modules 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.

1.2 Terminology used

Term	In the following text used for
Power supply module	ECSxE... power supply module
ECSxE...	Any power supply module of ECS series
Capacitor module	ECSxK... capacitor module
ECSxK...	Any capacitor module of ECS series
Axis module Controller	ECSxS... axis module
ECSxS... ECSxP... ECSxM... ECSxA ...	Any axis module of ECS series: ● ECSxS... application ”Speed and Torque” ● ECSxP... application ”Posi and Shaft” ● ECSxM... application ”Motion” ● ECSxA... application ”Application”
Drive system	Drive systems with: ● ECSxS... / ECSxP... / ECSxM... / ECSxA... axis modules ● ECSxE... power supply modules ● ECSxK... capacitor modules ● Other Lenze drive components
24 V supply Low-voltage supply	Voltage supply ● of the control card, voltage range 20 ... 30 V DC (±0 V) ● of the ”safe torque off”(formerly ”safe standstill”), voltage range 18 ... 30 V DC (±0 V) ● of the motor holding brake, voltage range 23 ... 30 V DC (±0 V)
KSB	Short-circuit braking: quick discharge of the DC bus via the brake resistor
AIF	**A**utomation **I**nter**F**ace
Cxxxx/y	Subcode y of code Cxxxx (e.g. C0470/3 = subcode 3 of code C0470)
Xk/y	Terminal y on the plug connector Xk (e.g. X6/B+ = terminal B+ on the plug connector X6)

1.3 Symbols used

Signal types

Symbol	Signal type (labelling)	Unit	Value range	Resolution
H/L	Analog (a)	%	±16384 ≙ ±100 %	16 bits, scaling: ±16384 ≙ ±100 %
Disp	Digital (d)	Binary (with HIGH or LOW level)		1 bit
△	Speed signal (phd)	● rpm (for display) ● inc/ms (internal presentation)	±(2^{15} - 1)	Bit 16
▲	Phase signal (ph)	inc	±(231 - 1)	32 bits, scaling: 1 revolution ≙ 65536 inc

1.4 Features of the ECSxS axis module

- Speed control/torque control with the subfunctions:
  - Selectable direction of rotation
  - Setpoint conditioning
  - Motor control
  - Brake control
  - Monitoring functions
- Selectable control interfaces (via code C3005):
  - Automation interface (AIF)
  - CAN (PDO1 (sync-based), PDO2, PDO3)
- Safety function ”safe torque off” (formerly ”safe standstill”)
- Double CAN ON BOARD:
  - **MotionBus (CAN):** Control interface ”CAN” (PDO1, sync-based)
  - **System bus (CAN):** Interface ”CAN-AUX” for parameter setting/diagnostics
- Supported feedback systems:
  - Resolver with and without position storage
  - Encoder (incremental encoder (TTL encoder), sin/cos encoder)
- Commissioning and parameter setting with the Lenze parameter setting and operating program ”Global Drive Control” (GDC)

1.5 Scope of supply

The scope of supply of the ECSxS... axis module comprises:

- Basic device
- Accessory kit with fixing material corresponding to the design:
  - ”E” - standard panel-mounted unit
  - ”D” - push-through technique
  - ”C” - cold-plate technique
- Mounting Instructions
- Drilling jig
- **ECSDS...** axis module only:
  Functional earth conductor (included in the scope of supply from March 2006)

Accessories

The appendix includes information on the following accessories: (🕮 375).

- Connectors for
  - power supply modules: ECSZE000X0B
  - capacitor modules: ECSZK000X0B
  - axis modules: ECSZA000X0B
- Shield mounting kit ECSZS000X0B001 (EMC accessories)
- Communication modules for the automation interface (AIF)
- Power supply module ECSxE...
- Capacitor module ECSxK...
- Brake resistors
- Mains fuses
- Mains chokes
- RFI filters
- Motors
- Master frequency connections (for ECSxS/P/A axis modules)

1.6 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 Drive Systems GmbH PO box 10 13 52 D-31763 Hameln

Application as directed

ECSxS... axis modules

- must only be operated under the conditions prescribed in these instructions.
- are components
  - for open and closed loop control of variable speed drives with PM synchronous motors and asynchronous motors.
  - for installation in a machine.
  - for assembly with other components to form a machine.
- are electrical equipment for the installation in control cabinets or similar closed operating areas.
- comply with the protective requirements of the EC Low-Voltage Directive.
- are not machines for the purpose of the EC Machinery Directive.
- are not to be used as domestic appliances, but for industrial purposes only.

Drive systems with ECSxS... axis modules

- comply with the EC Directive ”Electromagnetic compatibility” if they are installed according to the guidelines of CE-typical drive systems.
- can be used
  - at public and non-public mains.
  - in industrial premises.
- The user is responsible for the compliance of his application with the EC directives.

Any other use shall be deemed 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 axis modules and components which have already been supplied cannot be derived from the information, illustrations and descriptions given in these instructions.
- 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.
- Lenze does not accept any liability for damages and failures caused by:
  - Disregarding the Operating Instructions
  - Unauthorised modifications to the axis module
  - Operating errors
  - Improper working on and with the axis module

Warranty

- Terms of warranty: See terms of sales and delivery of Lenze Drive Systems GmbH.
- 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.

2 Safety instructions

2.1 General safety and application notes for Lenze controllers

(According to: Low-Voltage Directive 73/23/EEC)

General

Lenze controllers (frequency inverters, servo inverters, DC controllers) and the accessory components can include live and rotating parts - depending on their type of protection - during operation. Surfaces can be hot.

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

More 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/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 assembly, installation, commissioning, and operation of the product and who have the qualifications necessary for their occupation.

Application as directed

Drive controllers are components which are designed for installation in electrical systems or machinery. They are not to be used as domestic appliances, but only for industrial purposes according to EN 61000-3-2.

When installing the controllers into machines, commissioning (i.e. starting of operation as directed) is prohibited until it is proven that the machine corresponds to the regulations of the EC Directive 98/37/EC (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/EWG).

The controllers meet the requirements of the Low-Voltage Directive 73/23/EEC. The harmonised standard EN 61800-5-1 applies to the controllers.

The technical data as well as the connection conditions can be obtained from the nameplate and the documentation. They must be strictly observed.

Warning: The controllers are products which can be installed in drive systems of category C2 according to EN 61800-3. These products can cause radio interference in residential areas. In this case, special measures can be necessary.

Transport, storage

Please observe the notes on transport, storage and appropriate handling.

Observe the climatic conditions according to EN 50178.

Installation

The controllers must be installed and cooled according to the instructions given in the corresponding documentation.

Ensure proper handling and avoid mechanical stress. Do not bend any components and do not change any insulation distances during transport or handling. Do not touch any electronic components and contacts.

Controllers contain electrostatically sensitive components, which can easily be damaged by inappropriate handling. Do not damage or destroy any electrical components since this might endanger your health!

Electrical connection

When working on live 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). Additional information can be obtained from the documentation.

Notes about installation according to EMC regulations (shielding, earthing, filters and cable routing) are included in the documentation. These notes also apply to CE-marked controllers. The compliance with limit values required by the EMC legislation is the responsibility of the manufacturer of the machine or system. The controllers must be installed in housings (e.g. control cabinets) to meet the limit values for radio interferences valid at the site of installation. The housings must enable an EMC-compliant installation. Observe in particular that e.g. the control cabinet doors should have a circumferential metal connection to the housing. Reduce housing openings and cutouts to a minimum.

Lenze controllers can cause a DC residual current in the protective conductor. If a residual current device (RCD) is used as a protective means in the case of direct or indirect contact, only a residual current device (RCD) of type B may be used on the current supply side of the controller. Otherwise, another protective measure, such as separation from the environment through double or reinforced insulation or disconnection from the mains by means of a transformer must be used.

Operation

If necessary, systems including controllers must be equipped with additional monitoring and protection devices according to the valid safety regulations (e.g. law on technical equipment, regulations for the prevention of accidents). The controller can be adapted to your application. Please observe the corresponding information given in the documentation.

After a controller has been disconnected from the voltage supply, all live components and power connections must not be touched immediately because capacitors can still be charged. Please observe the corresponding stickers on the controller.

All protection covers and doors must be shut during operation.

Note for UL approved systems with integrated controllers: UL warnings are notes that only apply to UL systems. The documentation contains special UL notes.

Safety functions

Special controller variants support safety functions (e.g. ”safe torque off”, formerly ”safe standstill”) according to the requirements of Annex I No. 1.2.7 of the EC Directive ”Machinery” 98/37/EC, EN 954-1 Category 3 and EN 1037. Strictly observe the notes on the safety functions given in the documentation on the respective variants.

Maintenance and servicing

The controllers do not require any maintenance, if the prescribed conditions of operation are observed.

If the ambient air is polluted, the cooling surfaces of the controller may become dirty or the air vents of the controller may be obstructed. Therefore, clean the cooling surfaces and air vents periodically under these operating conditions. Do not use sharp or pointed tools for this purpose!

Waste disposal

Recycle metal and plastic materials. Ensure professional disposal of assembled PCBs.

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

2.2 Residual hazards

Protection of persons

- Before working on the axis module, check that no voltage is applied to the power terminals
  - because the power terminals +UG, -UG, U, V and W remain live for at least 3 minutes after mains switch-off.
  - because the power terminals +UG, -UG, U, V and W remain live when the motor is stopped.
- The heatsink has an operating temperature of > 70 °C:
  - Direct skin contact with the heatsink results in burns.
- The discharge current against PE is > 3.5 mA AC or > 10 mA DC.
  - EN 61800 -5-1 requires a fixed installation.
  - The PE connection has to be effected in accordance with EN 61800-5-1.
  - Observe further conditions of EN 61800-5-1 with regard to a high discharge current.

Device protection

- All pluggable connection terminals must only be connected or disconnected when no voltage is applied!
- The power terminals +UG, -UG, U, V, W, and PE are not protected against polarity reversal.
  - When wiring, observe the polarity of the power terminals!
- Power must not be converted until all devices of the power system are ready for operation. Otherwise, the input current limitation may be destroyed.

Cyclic connection and disconnection of the mains voltage of the power supply module can overload and destroy the input current limitation of the axis module, if

- the axis module is supplied via the ECSXE supply module and the input current limitation is deactivated depending on the DC bus voltage (C0175 = 1 or 2).
- the axis module is not supplied via a supply module delivered by Lenze.
- the low-voltage supply (24 V) is switched off.

For this reason allow a break of three minutes between two starting operations in case of cyclic mains switching over a longer period of time!

Motor protection

- Only use motors with a minimum insulation resistance of û = 1.5 kV, min. du/dt = 5 kV/μs.
  – Lenze motors meet these requirements.
- When using motors with an unknown insulation resistance, please contact your motor supplier.
- Some settings of the axis module lead to an overheating of the connected motor, e.g. longer operation of self-ventilated motors with low speeds.
- Use PTC thermistors or thermostats with PTC characteristic for motor temperature monitoring.

2.3 Safety instructions for the installation according to U_L or U_R

Warnings!

General markings:

- ► Use 60/75 °C or 75 °C copper wire only.
- ► Maximum ambient temperature 55 °C, with reduced output current.

Markings provided for the supply units:

- ► Suitable for use on a circuit capable of delivering not more than 5000 rms symmetrical amperes, 480 V max, when protected by K5 or H Fuses (400/480 V devices).
- ► Alternate - Circuit breakers (either inverse-time, instantaneous trip types or combination motor controller type E) may be used in lieu of above fuses when it is shown that the let-through energy (i^2t) and peak let-through current (I_p) of the inverse-time current-limiting circuit breaker will be less than that of the non-semiconductor type K5 fuses with which the drive has been tested.
- ► Alternate - An inverse-time circuit breaker may be used, sized upon the input rating of the drive, multiplied by 300 %.

Markings provided for the inverter units:

- ► The inverter units shall be used with supply units which are provided with overvoltage devices or systems in accordance with UL840 2nd ed., Table 5.1.
- ► The devices are provided with integral overload and integral thermal protection for the motor.
- ► The devices are not provided with overspeed protection.

Terminal tightening torque of lb-in (Nm)

- ► X 21, X 22, X 23, X 24
  - – 10.6 ... 13.3 lb-in (1.2 ... 1.5 Nm)
- ► X4, X6, X14
  - – 1.95 ... 2.2 lb-in (0.22 ... 0.25 Nm)
- ► X 25
  - – 4.4 ... 7.1 lb-in (0.5 ... 0.8 Nm)

Wiring diagram AWG

- ► X 21, X 22, X 23, X 24
  - – AWG 24 ... AWG 8
- ► X4, X6, X14
  - – AWG 28 ... AWG 16
- ► X 25
  - – AWG 24 ... AWG 12

2.4 Definition of notes used

The following pictographs and signal words are used in this documentation to indicate dangers and important information:

Safety instructions

Structure of safety instructions:

⚠ **Danger!**

(characterises the type and severity of danger)

Note

(describes the danger and gives information about how to prevent dangerous situations)

Pictograph and signal word	Meaning
⚡ **Danger!**	**Danger of personal injury through dangerous electrical voltage.** Reference to an imminent danger that may result in death or serious personal injury if the corresponding measures are not taken.
⚠ **Danger!**	**Danger of personal injury through a general source of danger.** Reference to an imminent danger that may result in death or serious personal injury if the corresponding measures are not taken.
STOP **Stop!**	**Danger of property damage.** Reference to a possible danger that may result in property damage if the corresponding measures are not taken.

Application notes

Pictograph and signal word	Meaning
ℹ **Note!**	Important note to ensure troublefree operation
💡 **Tip!**	Useful tip for simple handling
📖	Reference to another documentation

Special safety instructions and application notes for UL and UR

Pictograph and signal word	Meaning
c UL us LISTED **Warnings!**	**Safety or application note for the operation of a UL-approved device in UL-approved systems.** Possibly the drive system is not operated in compliance with UL if the corresponding measures are not taken.
c ЯU us **Warnings!**	**Safety or application note for the operation of a UR-approved device in UL-approved systems.** Possibly the drive system is not operated in compliance with UL if the corresponding measures are not taken.

3 Technical data

3.1 General data and operating conditions

Standards and operating conditions			
Conformity		CE	Low-Voltage Directive (73/23/EWG)
Approvals		UL 508C	Power Conversion Equipment Underwriter Laboratories (file no. E132659) for USA and Canada
Max. permissible motor cable length	shielded	50 m	For rated mains voltage and switching frequency of 8 kHz
Vibration resistance		Accelerational stability up to 0.7 g (Germanischer Lloyd, general conditions)	
Degree of pollution		VDE 0110 part 2 pollution degree 2	
Packaging (DIN 4180)		Delivery packing	
Permissible site altitude		0 ... 4000 m amsl	Reduce rated output current by 5 %/1000 m above 1000 m amsl. From 2000 m use permitted in environments with overvoltage category II only
Installation		Installation into IP20 control cabinet For the function ”safe torque off” (formerly ”safe standstill”): Installation into IP54 control cabinet	
Mounting position		Vertically suspended	
Free space	above	≥ 65 mm	
	below	≥ 65 mm With shield mounting kit ECSZS000B0B001: > 195 mm	
	to the sides	Side-by-side mounting without any clearance	

Climatic conditions		**Class/standard**	**Deviations from the standard**
Temperature		3K3 in accordance with IEC/EN 60721-3-3 Condensation, splash water and ice-formation not permissible.	
	Storage	1K3 in accordance with IEC/EN 60721-3-1	-25 °C ... + 55 °C
	Transport	2K3 in accordance with IEC/EN 60721-3-2	
	Operation	3K3 in accordance with IEC/EN 60721-3-3	0 °C ... + 55 °C > +40 °C: reduce the rated output current by 2 %/°C
Air humidity		3K3 in accordance with IEC/EN 60721-3-3	
Atmospheric pressure		3K3 in accordance with IEC/EN 60721-3-3	86 ... 106 kPa

<table>
<tr><th colspan="4">General electrical data</th></tr>
<tr><td>EMC</td><td colspan="3">Compliance with EN 61800-3</td></tr>
<tr><td>Noise emission</td><td colspan="3">Compliance with limit value class A to EN 55011
(released with application-specific collective filter)</td></tr>
<tr><td rowspan="7">Noise immunity</td><td colspan="3">Requirements to EN 61800-3</td></tr>
<tr><td>Requirements</td><td>Standard</td><td>Severity</td></tr>
<tr><td>ESD [1]</td><td>EN 61000-4-2</td><td>3, i. e.
● 8 kV with air discharge
● 6 kV with contact discharge</td></tr>
<tr><td>High frequency in cables</td><td>EN 61000-4-6</td><td>10 V; 0.15 ... 80 MHz</td></tr>
<tr><td>RF interference (enclosure)</td><td>EN 61000-4-3</td><td>3, i. e. 10 V/m;
80 ... 1000 MHz</td></tr>
<tr><td>Burst</td><td>EN 61000-4-4</td><td>3/4, i. e. 2 kV/5 kHz</td></tr>
<tr><td>Surge (on mains cable)</td><td>EN 61000-4-5</td><td>3, i. e. 1.2/50 µs
● 1 kV phase-phase
● 2 kV phase-PE</td></tr>
<tr><td>Insulation resistance</td><td colspan="3">Overvoltage category III in accordance with VDE 0110</td></tr>
<tr><td>Discharge current against PE (in accordance with EN 61800-5-1)</td><td colspan="3">> 3.5 mA AC during operation</td></tr>
<tr><td>Enclosure</td><td colspan="3">IP20 for
● standard mounting (built-in unit)
● mounting in cold plate technique
● mounting with thermal separation (push-through technique), IP54 on the heatsink side</td></tr>
<tr><td>Protective measures against</td><td colspan="3">Short circuit, earth fault (earth-fault protected during operation, limited earth-fault protection during power-up), overvoltage, motor stalling, motor overtemperature (input for PTC, I²t monitoring)</td></tr>
<tr><td>Protective insulation of control circuits</td><td colspan="3">Safe mains isolation
Double/reinforced insulation in accordance with EN 61800-5-1</td></tr>
</table>

[1] Noise immunity in the above-mentioned severities must be guaranteed through the control cabinet. The user must check the compliance with the severities!

3.2 Rated data

Rated data		Type	ECSxS004		ECSxS008		ECSxS016	
Output power 400 V mains		S_r [kVA]	1.3		2.6		5.3	
Data for operation with upstream supply module on mains voltage		U_{mains} [V]	400	480	400	480	400	480
DC-bus voltage		U_{DC} [V]	0 ... 770					
DC-bus current		I_{DC} [A]	2.5	2.0	4.9	3.9	9.8	7.8
Rated output current at 4 kHz (causes a heatsink temperature of 70°C at an ambient temperature of 20 °C)		I_r [A]	2.0	1.6	4.0	3.2	8.0	6.4
Rated output current at 8 kHz 1) (causes a heatsink temperature of 70 °C at an ambient temperature of 20 °C)		I_r [A]	1.4	1.1	2.7	2.2	5.3	4.2
Max. output current (acceleration current)		I_{max} [A]	4.0		8.0		16.0	
Continuous current at standstill (holding current at 90 °C, 4 kHz)		$I_{0,eff\ 4\ kHz}$ [A]	2.0	1.6	4.0	3.2	8.0	6.4
Short-time standstill current (holding current at 90 °C, 4 kHz) 2)		$I_{0,eff\ 4\ kHz}$ [A]	2.3		4.6		9.1	
Short-time standstill current (holding current at 70 °C, 4 kHz) 2)		$I_{0,eff\ 4\ kHz}$ [A]	3.0		6.0		12.0	
Short-time standstill current (holding current at 70 °C, 8 kHz) 2)		$I_{0,eff\ 8\ kHz}$ [A]	1.5		3.0		6.0	
Power loss (operation with rated current at 4 kHz / 8 kHz)	Interior	P_{loss} [W]	13.3		17.3		20.7	
	Heatsink		14.0		29.0		64.0	
Max. output frequency		f_{out} [Hz]	600					
Weight		m [kg]	2.2					
Dimensions 3)	ECSES...	(W x H x D) [mm]	88.5 x 247 x 176					
	ECSDS...							
	ECSCS...		88.5 x 282 x 121					

1) If the heatsink temperature reaches 70 °C, the switching frequency automatically changes to 4 kHz.

2) The indicated temperature is the measured temperature of the heatsink (C0061).

3) Change of the mounting depth: + 36 mm, depending on the plugged-on communication module

Rated data		Type	ECSxS032		ECSxS048		ECSxS064	
Output power 400 V mains		S_r [kVA]	8.3		11.2		13.2	
Data for operation with upstream supply module on mains voltage		U_{mains} [V]	400	480	400	480	400	480
DC-bus voltage		U_{DC} [V]	0 ... 770					
DC-bus current		I_{DC} [A]	15.6	12.5	20.9	16.8	24.5	19.6
Rated output current at 4 kHz (causes a heatsink temperature of 70°C at an ambient temperature of 20 °C)		I_r [A]	12.7	10.2	17.0	13.6	20.0	16.0
Rated output current at 8 kHz 1) (causes a heatsink temperature of 70 °C at an ambient temperature of 20 °C)		I_r [A]	8.5	6.8	11.3	9.0	13.3	10.6
Max. output current (acceleration current)		I_{max} [A]	32.0		48.0		64.0	
Continuous current at standstill 2) (holding current at 90 °C, 4 kHz)		$I_{0,eff\ 4\ kHz}$ [A]	16.0	12.8	23.0	18.4	27.0	21.6
Short-time standstill current (holding current at 90 °C, 4 kHz) 2)		$I_{0,eff\ 4\ kHz}$ [A]	18.1		27.2		36.3	
Short-time standstill current (holding current at 70 °C, 4 kHz) 2)		$I_{0,eff\ 4\ kHz}$ [A]	24.0		36.0		48.0	
Short-time standstill current (holding current at 70 °C, 8 kHz) 2)		$I_{0,eff\ 8\ kHz}$ [A]	12.1		18.1		24.2	
Power loss (operation with rated current at 4 kHz / 8 kHz)	Interior	P_{loss} [W]	27.5		34.5		41.0	
	Heatsink		117.0		132.0		158.0	
Max. output frequency		f_{out} [Hz]	600					
Weight		m [kg]	2.2		3.1			
Dimensions 3)	ECSES...	(W x H x D) [mm]	88.5 x 247 x 176		131 x 247 x 176			
	ECSDS...							
	ECSCS...		88.5 x 282 x 121		131 x 282 x 121			

1) If the heatsink temperature reaches 70 °C, the switching frequency automatically changes to 4 kHz.

2) The indicated temperature is the measured temperature of the heatsink (C0061).

3) Change of the mounting depth: + 36 mm, depending on the plugged-on communication module

3.3 Current characteristics

3.3.1 Increased continuous current depending on the control factor

In the lower speed range – the motor does not need the full motor voltage – particularly the more powerful ECS axis modules can be permanently operated with increased output current (cp. continuous current $I_{0,eff}$ 🕮 24).

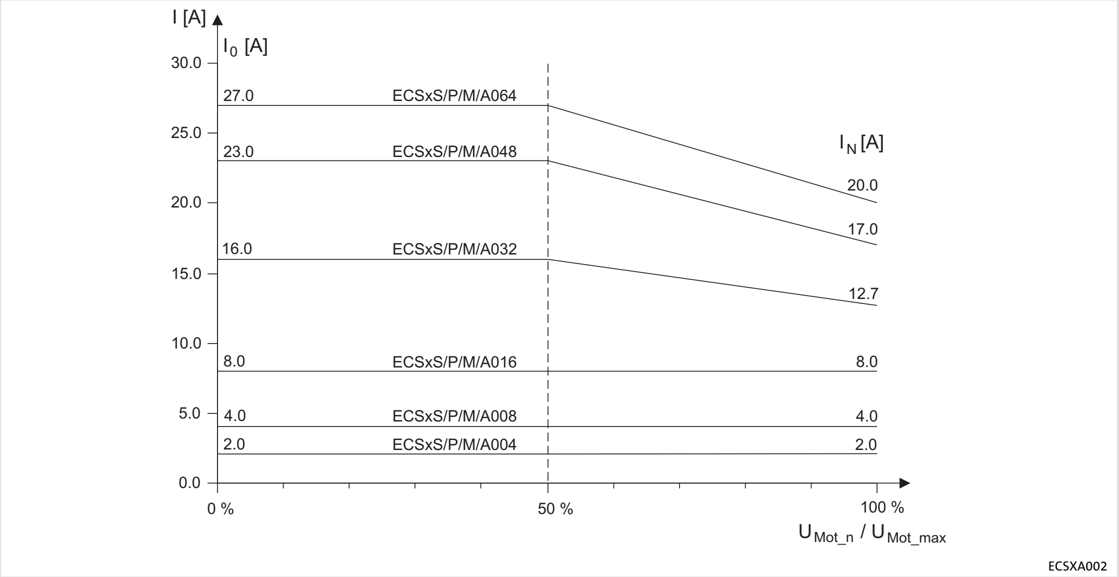


Fig.3-1 Continuous device current, depending on the output voltage for $U_{mains} \leq 400$ V at 4 kHz

I_r	Rated output current of the axis module
U_{Mot_n}	Actual controller output voltage
U_{Mot_max}	0.9 x current mains voltage

The permissible continuous current depends on the control factor of the power output stages, approximately on the ratio of the motor voltage output in the operating point (U_{Mot_n}) to the maximum possible output voltage (U_{Mot_max}). Due to voltage drops across the components involved at rated load and a control margin, U_{Mot_max} can be estimated with 90 % of the mains voltage.

The following table represents the connections between mains voltage, DC-bus voltage and motor voltage:

Mains voltage **[U_{mains}]**	**DC-bus voltage** **[$U_{ZK} = U_{mains} \times 1.35$]**	**Output voltage (motor voltage) nominally achievable for 100 % modulation** **[$U_{mot} = 0.66 \times U_{ZK}$]**
3 x 230 V AC	310 V DC	3 x 205 V AC
3 x 380 V AC	510 V DC	3 x 340 V AC
3 x 400 V AC	540 V DC	3 x 360 V AC
3 x 415 V AC	560 V DC	3 x 370 V AC
3 x 460 V AC	620 V DC	3 x 415 V AC
3 x 480 V AC	650 V DC	3 x 435 V AC
3 x 528 V AC	712 V DC	3 x 475 V AC

For steady-state operation in generator mode with increased DC-bus voltage or supply from a closed-loop controlled DC voltage source, interpolate accordingly between the values given in the table.

The increased rated currents are valid for the entire specified voltage range at switching frequencies of 4 kHz and 8 kHz.

Note!

If in this connection a heatsink temperature of > 70 °C is reached, the drive switches to a switching frequency of 4 kHz, independently of the adjusted switching frequency.

Tip!

The operating threshold of the I x t monitoring (🕮 172) is automatically derived from the variable continuous currents.

Example:

The ECS axis module suitable for operation in conjunction with a Lenze motor of type MCS 14L32 is to be determined.

- Rated motor data
  - – Rated motor torque (M_{mot}) = 17.2 Nm
  - – Rated motor speed (n_{mot}) = 3225 rpm
  - – Motor voltage at 3250 rpm (U_{mot_n3250}) = 275 V
  - – Rated motor current (I_{mot}) = 15 A
  - – Max. motor current (I_{mot_max}) = 92 A
- Application data:
  - – Max. torque (M_{max}) = 35 Nm
  - – Max. operating speed (n_{max}) = 2500 rpm
  - – An effective process power (P_{eff}) of 4.5 kW arises on the basis of the Mn diagram.
  - – The drive rating results in an effective motor current (I_{Mot_eff}) of 14.8 A.

A first estimation based on the rated current of the ECS axis module would probably lead to selecting the ECSxS048 module with a rated current of 17.0 A.

However, if we take into account the increased continuous current for smaller control factors, the more cost-effective ECSxS032 axis module with a rated current of 12.7 A can be used here.

- When the MCS 14L32 is operated with 2500 rpm, the real motor voltage is (U_{Mot_n2500}):

$$U_{Mot\_n2500} = U_{Mot\_n3250} \cdot \frac{n_{max}}{n_{Mot}} \qquad \Rightarrow \qquad 275\ \text{V} \cdot \frac{2500\ \text{rpm}}{3250\ \text{rpm}} = 212\ \text{V}$$

- This leads to the following max. control factor (α_{max}) of the axis module:

$$\alpha_{max} = \frac{U_{Mot\_n2500}}{U_{max}} \qquad \Rightarrow \qquad \frac{212\ \text{V}}{360\ \text{V}} = 0.59 = 59\ \%$$

  Using the current characteristic of Fig.3-1 (🕮 26), a continuous current of 15.5 A can be determined for the ECSxS032 axis module when the control factor (α_{max}) is 59 %.

- **Result:**

  Under the conditions mentioned above the MCS 14L32 Lenze motor can be operated continuously on the ECSxS032 axis module.

3.3.2 Device protection by current derating

The maximum output current is limited. With output frequencies < 5 Hz the limitation depends on the heatsink temperature.

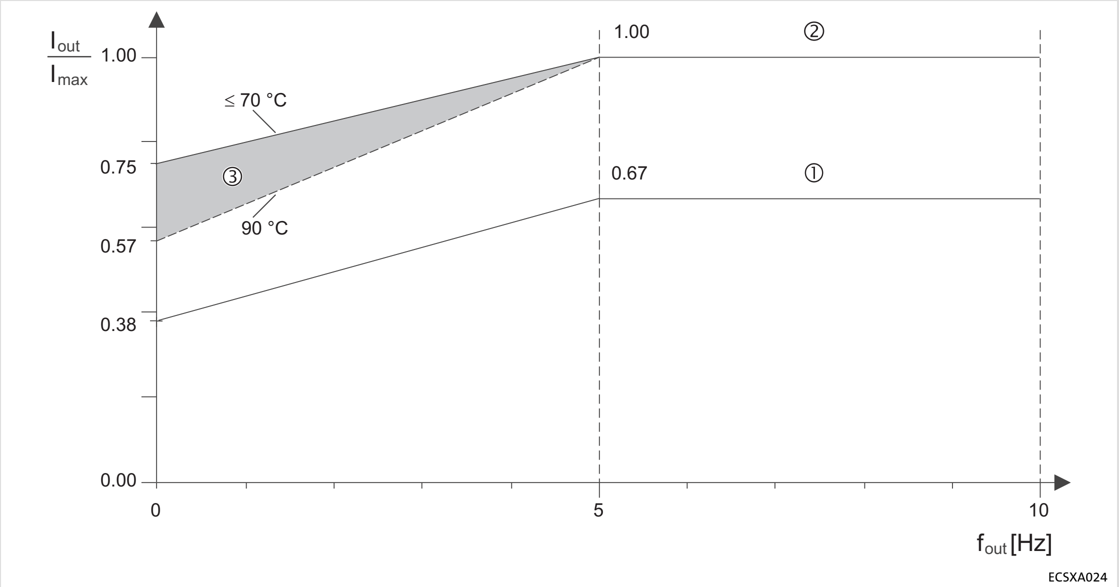


Fig.3-2 Current derating characteristics

① Operation with switching frequency = 8 kHz (C0018 = 1).
  - If the current exceeds the characteristic ①, the switching frequency is automatically changed to 4 kHz (e.g. for higher torque in acceleration processes).

② Operation with switching frequency = 4 kHz (C0018 = 0).
  - The current limitation follows the characteristic ②.
  - With output frequencies < 5 Hz and heatsink temperatures between 70 and 90 °C the current limit is steplessly adjusted in the range ③.

Type	**I_{max} [A]**				
	Switching frequency 8 kHz ①		**Switching frequency 4 kHz ②**		
	f_{out} > 5 Hz	**f_{out} → 0 Hz**	**f_{out} > 5 Hz**	**f_{out} → 0 Hz ≤ 70 °C**	**f_{out} → 0 Hz 90 °C**
ECSxS004	2.7	1.5	4.0	3.0	2.3
ECSxS008	5.3	3.0	8.0	6.0	4.6
ECSxS016	10.7	6.0	16.0	12.0	9.1
ECSxS032	21.3	12.1	32.0	24.0	18.1
ECSxS048	32.0	18.1	48.0	36.3	27.2
ECSxS064	42.7	24.2	64.0	48.0	36.3

4 Mechanical installation

4.1 Important notes

- Axis modules of the ECS series provide IP20 enclosure and can therefore only be used for installation in control cabinets.
- If the cooling air contains pollutants (dust, fluff, grease, aggressive gases):
  - Take suitable preventive measures , e.g. separate air duct, installation of filters, regular cleaning.
- Possible mounting positions:
  - Vertically at the mounting plate
  - DC bus connections (X23) at the top
  - Motor connection (X24) at the bottom
- Maintain the specified clearances (above and below) to other installations!
  - If the shield mounting kit ECSZS000X0B001 is used, an additional clearance is required.
  - Ensure unimpeded ventilation of cooling air and outlet of exhaust air.
  - Several modules of the ECS series can be installed in the control cabinet next to each other without any clearance.
- The mounting plate of the control cabinet
  - must be electrically conductive.
  - must not be varnished.
- In case of continuous vibrations or shocks use shock absorbers.

4.2 Mounting with fixing rails (standard installation)

4.2.1 Dimensions

Note!

Mounting with shield mounting kit ECSZS000X0B001:

► Clearance below the module > 195 mm

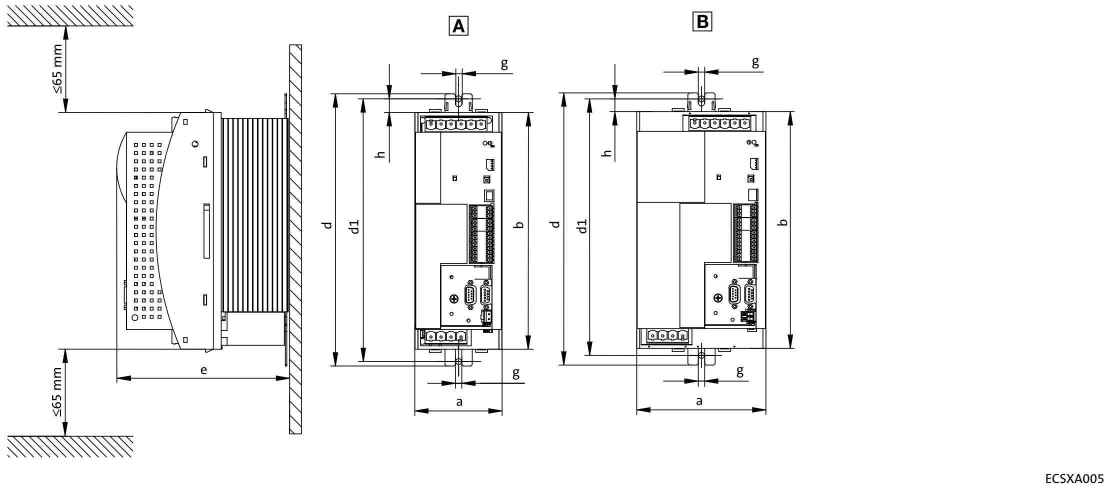


Fig.4-1 Dimensions for ”panel-mounted” design

Axis module		Dimensions [mm]						
Type	**Size**	**a**	**b**	**d**	**d1**	**e**	**h**	**g**
ECSES004	A	88.5	240	276	260	176 212 [1]	10	6.5 (M6)
ECSES008								
ECSES016								
ECSES032								
ECSES048	B	131						
ECSES064								

[1] max. 212 mm, depending on the plugged-on communication module

4.2.2 Assembly steps

How to install the axis module:

1. Prepare the fixing holes on the mounting surface.
   – Use the drilling jig for this purpose.
2. Take the fixing rails from the accessory kit in the cardboard box.
3. Push the rails into the slots of the heatsink:
   – From above: Push in the long side.
   – From below: Push in the short side.
4. Attach the axis module to the mounting surface.

4.3 Mounting with thermal separation (push-through technique)

For the push-through technique the rear panel of the control cabinet must be a steel plate with a thickness of at least 2 mm.

The edges of the mounting cutout and the fixing holes for the clamps must be slightly curved inwards (towards the axis module).

Cooling

With the separated heatsink the heat generation in the control cabinet can be reduced.

- ► Distribution of the power loss:
  - – approx. 65 % via separated cooler
  - – approx. 35 % in the inside of the axis module
- ► Protection class of the separated cooler: IP54
  - – The sealing surface at the heatsink of the axis module must rest completely against the mounting plate.
  - – Use a liquid thread sealant to bond the screws of the clamps.
- ► For sufficient cooling of the drive system:
  - – Air flow behind the rear panel of the control cabinet must be ≥ 3 m/s (e.g. by means of a collective fan).
- ► With sufficient cooling, the rated data of the axis modules remain valid.

4.3.1 Dimensions

Note!

Mounting with shield mounting kit ECSZS000X0B001:

► Clearance below the module > 195 mm

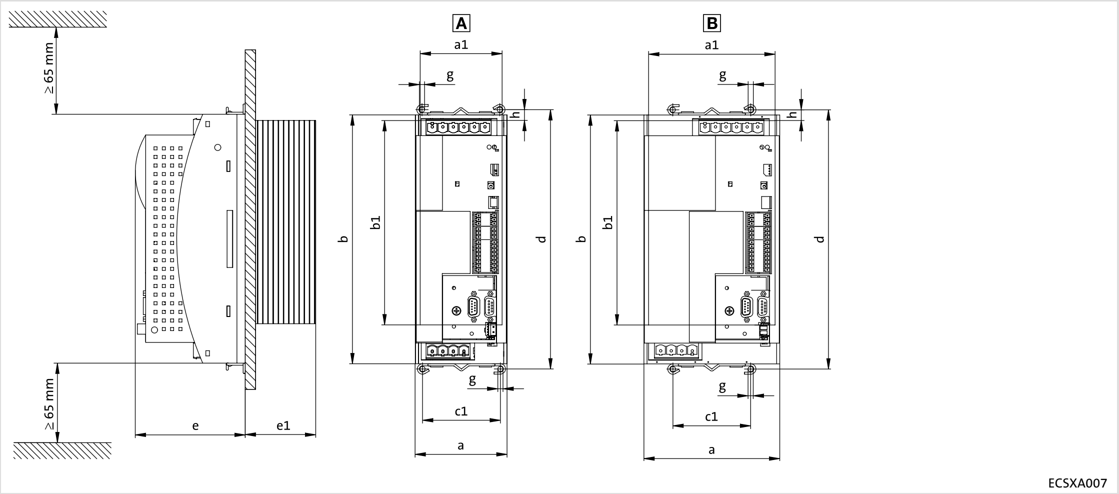


Fig.4-2 Dimensions for "push-through design"

Z Mounting cutout (a1 x b1), 🕮 34

Axis module		Dimensions [mm]									
Type	**Size**	**a**	**a1**	**b**	**b1**	**c1**	**d**	**e**	**e1**	**g**	**h**
ECSDS004	A	88.5	78.5	240	197	75	250	109 145 1)	67	M5	10.5
ECSDS008											
ECSDS016											
ECSDS032											
ECSDS048	B	131	121.5								
ECSDS064											

1) max. 145 mm, depending on the plugged-on communication module

Dimensions of mounting cutout

Note!

Mounting with shield mounting kit ECSZS000X0B001:

► Clearance below the mounting cutout > 220 mm

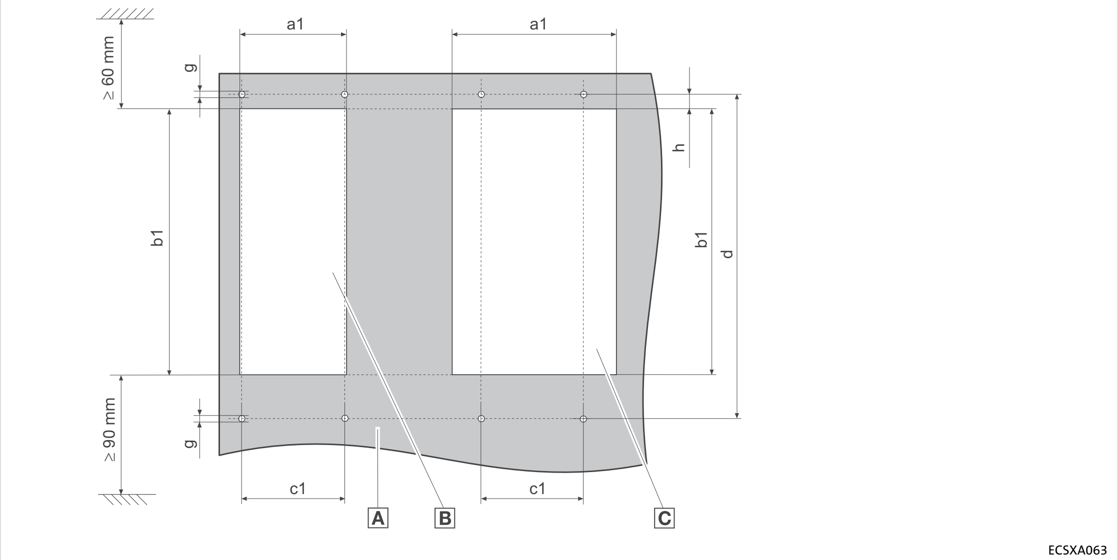


Fig.4-3 Dimensions of mounting cutout

- A Mounting surface
- B Mounting cutout for size A
- C Mounting cutout for size B

Axis module		Dimensions [mm]					
Type	**Size**	**a1**	**b1**	**c1**	**d**	**g**	**h**
ECSDS004	A	78.5	197	75	250	M5	10.5
ECSDS008							
ECSDS016							
ECSDS032							
ECSDS048	B	121.5					
ECSDS064							

4.3.2 Assembly steps

Proceed as follows to mount the axis module:

1. Prepare the fixing holes for the clamps on the mounting surface.
   – Use the drilling jig for this purpose.
2. Prepare mounting cutout.
   – The edges of the mounting cutout and the fixing holes for the clamps must be slightly curved inwards (towards the axis module).
3. Use a liquid sealant to bond the thread of the screws for the clamps.
4. Fasten the clamps together with the supplied functional earth conductor (see Fig.4-4).
   – The functional earth conductor is included in the scope of supply of the ECS**D**S... axis modules from March 2006.
5. Push the axis module into the mounting cutout.
6. Let the axis module snap into the clamps at the top and at the bottom.
7. Connect functional earth conductor with the axis module (see Fig.4-4).

Note!

The functional earth conductor must be connected to the axis module ECS**D**S... for a better electromagnetic compatibility (EMC).

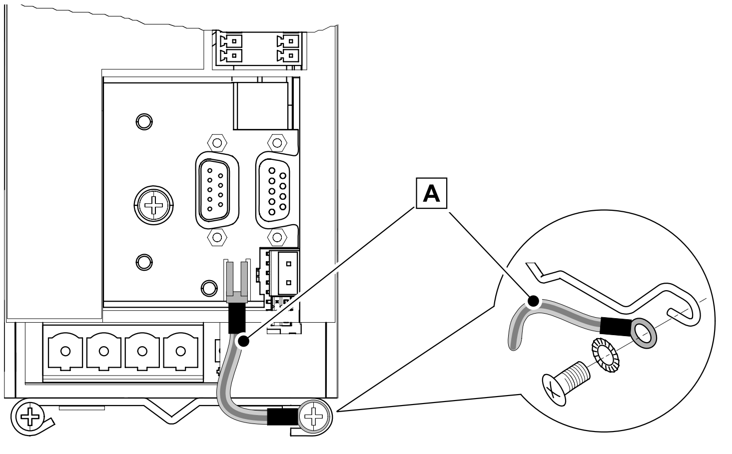


Fig.4-4 Functional earth conductor at the axis module ECSDS...

A Functional earth conductor

4.4 Mounting in cold-plate technique

The axis modules ECSC... are intended for mounting in cold-plate design (e.g. on collective coolers).

Requirements for collective coolers

The following requirements must be met to ensure a safe operation of the axis modules:

- Good thermal contact with the cooler
  - The contact surface between collective cooler and axis module must be at least as large as the cooling plate of the axis module.
  - Smooth contact surface, max. deviation 0.05 mm.
  - Connect the collective cooler with all specified screwed connections to the axis module.
- Maintain the thermal resistance R_{th} according to the table.
  - The values apply for operating the axis modules under rated conditions.

Axis module	**Power to be dissipated**	**Heat sink - environment**
Type	**Ploss [W]**	**R_{th} [k/W]**
ECSCS004	14.0	0.31
ECSCS008	29.0	
ECSCS016	64.0	
ECSCS032	117.0	0.13
ECSCS048	132.0	
ECSCS064	158.0	0.11

- Ambient conditions:
  - The rating for the ambient temperature and the derating factors for higher temperatures still apply to the axis modules (see detailed documentation).
  - Temperature of the cooling plate (”cold plate”): max. +85 °C

4.4.1 Dimensions

Note!

Mounting with shield mounting kit ECSZS000X0B001:

► Clearance below the module > 195 mm

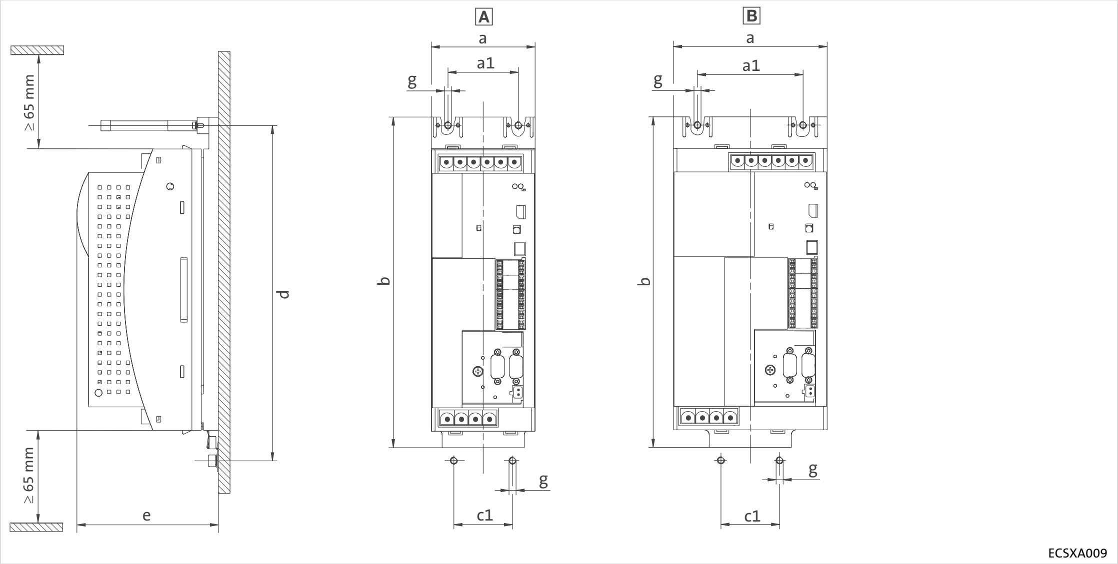


Fig.4-5 Dimensions for ”cold-plate design”

Axis module		Dimensions [mm]						
Type	**Size**	**a**	**a1**	**b**	**c1**	**d**	**e**	**g**
ECSCS004	A	88.5	60	282	50	286	121 157 1)	M6
ECSCS008								
ECSCS016								
ECSCS032								
ECSCS048	B	131	90					
ECSCS064								

1) max. 157 mm, depending on the plugged-on communication module

4.4.2 Assembly steps

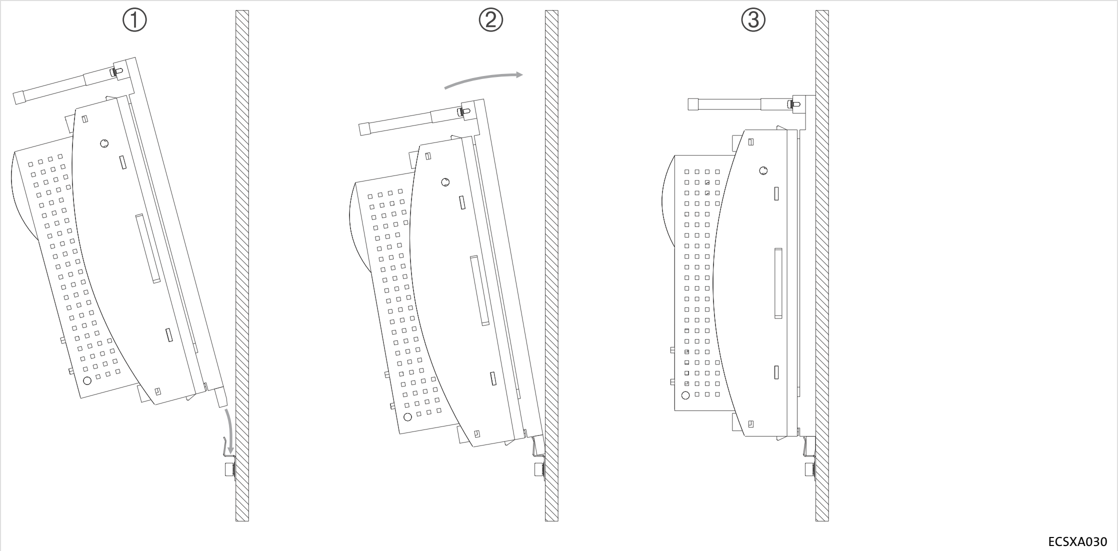


Fig.4-6 Mounting for ”cold-plate design”

Proceed as follows to mount the axis module:

1. Prepare the fixing holes on the mounting plate.
   – Use a drilling jig for this purpose.
2. Clean and degrease the contact area of collective cooler and heatsink of the axis module (e.g. with methylated spirit).
3. Screw the support onto the collective cooler.
4. Insert the axis module from above ① into the support ② and fasten the two stud bolts with 3.5 ... 4.5 Nm ③.

Note!

Penetration depth of the screws into the collective cooler: approx. 15 mm!

Tip!

The heat transfer resistance is reduced if - following step 2. -

► a thin layer of heat conducting paste is applied to the contact surface or

► heat conducting foil is used.

5 Electrical installation

5.1 Installation according to EMC (installation of a CE-typical drive system)

General notes

- The electromagnetic compatibility of a machine depends on the type of installation and care taken. Especially consider the following:
  - Assembly
  - Filters
  - Shielding
  - Earthing
- For diverging installations, the evaluation of the conformity to the EMC Directive requires a check of the machine or system regarding the EMC limit values. This is valid, for instance, when:
  - Using unshielded cables
  - Using collective suppression filters in place of the assigned RFI filters
  - Operating without RFI 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 61000-6-2 are operated close to the axis modules, these devices may be disturbed electromagnetically by the axis modules.

Assembly

- Connect the power supply modules, capacitor modules (optional), axis modules, RFI filters and mains chokes to the earthed mounting plate with a surface as large as possible.
  - Mounting plates with conductive surfaces (zinc-coated or stainless steel) allow permanent contact.
  - Painted plates are not suitable for an EMC-compliant installation.
- If you use the ECSxK... capacitor module:
  - Install the capacitor module between the power supply module and the axis module(s).
  - If the total cable length in the DC-bus connection exceeds 5 m, install the capacitor module as close as possible to the axis module with the highest power.
- If you use several mounting plates:
  - Connect as much surface of the mounting plates as possible (e.g. with copper bands).
- Ensure the separation of motor cable and signal or mains cables.
- Do not use the same terminal/power strip for mains input and motor output.
- Lay the cables as close as possible to the reference potential. Freely suspended cables act like aerials.

Filters

Use RFI filters and mains chokes which are assigned to the power supply modules:

- RFI filters reduce impermissible high-frequency interference to a permissible value.
- Mains chokes reduce low-frequency interferences which depend on the motor cables and their lengths.

Shielding

- Connect the motor cable shield to the axis module
  - with the ECSZS000X0B001 shield mounting kit.
  - to the mounting plate below the axis module with a large surface.
  - Recommendation: For the shield connection, use earthing clamps on bare metal mounting surfaces.
- If contactors, motor-protecting switches or terminals are located in the motor cable:
  - Connect the shields of the connected cables to each other and connect them to the mounting plate, too, with a surface as large as possible.
- Connect the shield in the motor terminal box or on the motor housing to PE:
  - Metal cable glands at the motor terminal box ensure a large-surface connection of the shield and the motor housing.
- Shield the control cables:
  - Connect both shield ends of the digital control cables.
  - Connect one shield end of the analog control cables.
  - Always connect the shields to the shield connection at the axis module over the shortest possible distance.
- Using the axis modules in residential areas:
  - Additionally dampen the shield in order to limit the interfering radiation: ≥ 10 dB . This can be realised by using standard, enclosed, metallic, and earthed control cabinets or boxes.

Earthing

- Earth all metallically conductive components (e.g. power supply module, capacitor module, axis module, RFI filter, motor filter, mains choke) using suitable cables connected to a central point (PE bar).
- Maintain the minimum cross-sections prescribed in the safety regulations:
  - For EMC, not the cable cross-section is decisive, but the cable surface and a contact area as large as possible.

5.2 Power connections

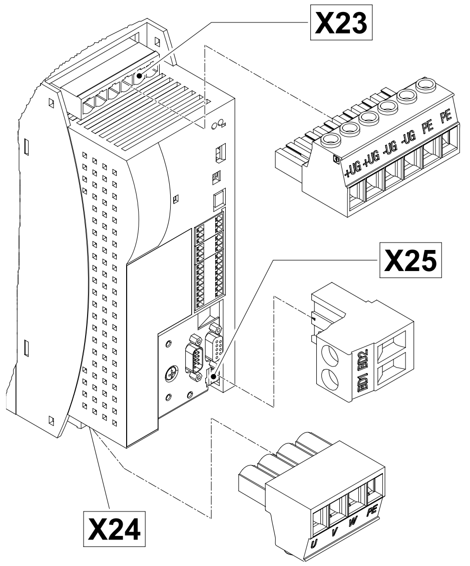


Fig.5-1 Plug connectors for power terminals

Danger!

The discharge current against ground (PE) is > 3.5 mA AC or > 10 mA DC.

- EN 61800-5-1 requires a fixed installation.
- The PE connection has to be effected in accordance with EN 61800-5-1.
- Observe further conditions of EN 61800-5-1 with regard to a high discharge current.

Stop!

Observe the maximum permissible mains voltage. Any higher voltage will destroy the device.

- All power connections are plug connections and are coded. The ECSZA000X0B connectors must be ordered separately.
- Installation of the cables according to EN 60204-1.
- The cables used must comply with the approvals required at the site of use (e.g. VDE, UL, etc.).

Note!

ECSDS... axis modules:

Connect the functional earth conductor (part of the scope of supply from March 2006) to the ECS**D**S... axis module for a better electromagnetic compatibility (EMC) (see 🕮 35).

This is not required for the ECS**E**S... (standard installation) and ECS**C**S... (cold plate) axis modules!

Terminal assignment

Terminal	Function	Electrical data
X23	**Connection of DC-bus voltage**	
X23/+UG	Positive supply of DC-bus voltage	Dependent on application and type 0 ... 770 V 2 ... 24.5 A (🕮 24)
X23/+UG		
X23/-UG	Negative supply of DC-bus voltage	
X23/-UG		
X23/PE	Earth connection	
X23/PE		
X24	**Motor connection**	
X24/U	Motor phase U	Dependent on application and type 0 ... 480 V 1.6 ... 20 A (🕮 24)
X24/V	Motor phase V	
X24/W	Motor phase W	
X24/PE	Earth connection	
X25	**Connection of motor holding brake**	
X25/BD1	Brake connection +	23 ... 30 V DC, max. 1.5 A
X25/BD2	Brake connection -	

Cable cross-sections and screw-tightening torques

Cable type	Wire end ferrule	Possible cable cross-sections	Starting torque	Stripping length
Plug connector X23 and X24				
rigid	–	0.2 ... 10 mm^2 (AWG 24 ... 8)	1.2 ... 1.5 Nm (10.6 ... 13.3 lb-in)	5 mm
Flexible	Without wire end ferrule	0.2 ... 10 mm^2 (AWG 24 ... 8)		
	With wire end ferrule	0.25 ... 6 mm^2 (AWG 22 ... 10)		
	With TWIN wire end ferrule	0.25 ... 4 mm^2 (AWG 22 ... 12)		
Plug connector X25				
Flexible	Without wire end ferrule	0.2 ... 2.5 mm^2 (AWG 24 ... 12)	0.5 ... 0.8 Nm (4.4 ... 7.1 lb-in)	5 mm

Shielded cables

The following factors decisively determine the effect of shielded cables:

- Good shield connection
  - Ensure a contact surface as large as possible
- Low shield resistance
  - Only use shields with tin-plated or nickel-plated copper braids (shields with steel braids cannot be used).
- High overlap rate of the braid
  - At least 70 ... 80 % with 90° overlap angle

The ECSZS000X0B001 shield mounting kit includes wire clamp and shield sheet.

5.2.1 Connection to the DC bus (+U_G, -U_G)

- With a total cable length > 20 m, install an axis module or a capacitor module directly at the power supply module.
- Twist ±U_G cables and keep the cable length as short as possible. Pay attention to short-circuit-proof installation!
- Cable length (module ↔ module) > 30 cm:
  – Shield ±U_G cables.

Fuses

- Fusing the DC-bus supply is not required if power supply modules of the ECSxE series are used, which are fused on the supply side.
- If Lenze devices of the **82xx** and **93xx** series are used in the DC-bus connection with a **DC continuous current > 40 A**, use the following fuses between the supplying device and the ECS devices:

Fuse		Support
Value [A]	**Lenze type**	**Lenze type**
50	EFSGR0500ANIN	EFH20007

Warnings!

- Use UL-approved cables, fuses and fuse holders only.
- UL fuse:
  – Voltage 500 ... 600 V
  – Tripping characteristic ”H”, ”K5” or ”CC”

Danger!

Exchanging defect fuses

- Only replace defect fuses in deenergised state and only with the prescribed type.
- In DC-bus operation it is vital to set controller inhibit (CINH) for all axis modules and separate all power supply modules from the mains.

Cable cross-sections

Cable length [1]	Wire end ferrule	Cable cross-section	Starting torque	Stripping length
up to 20 m	Without wire end ferrule	6 mm^2 (AWG 10)	1.2 ... 1.5 Nm (10.6 ... 13.3 lb-in)	5 mm
	With wire end ferrule			
> 20 m	Without wire end ferrule	10 mm^2 (AWG 8)		
	With wire end ferrule **For wiring, use pin-end connector!**			

[1] Cable length from module to module

5.2.2 Connection plans

Stop!

ECS power supply modules must always be operated with a brake resistor.

Mimimum wiring with power supply module ECSEE... / ECSDE...

A brake resistor is integrated in the ECS**E**E... and ECS**D**E... power supply modules. The internal brake resistor is used with the following jumpers:

- from X22/BR0 to X22/+UG
- from X6/T1 to X6/T2

Note!

Power supply modules can also be connected to external brake resistors (📖 377) with a higher power. Observe the notes in the detailed documentation of the power supply module.

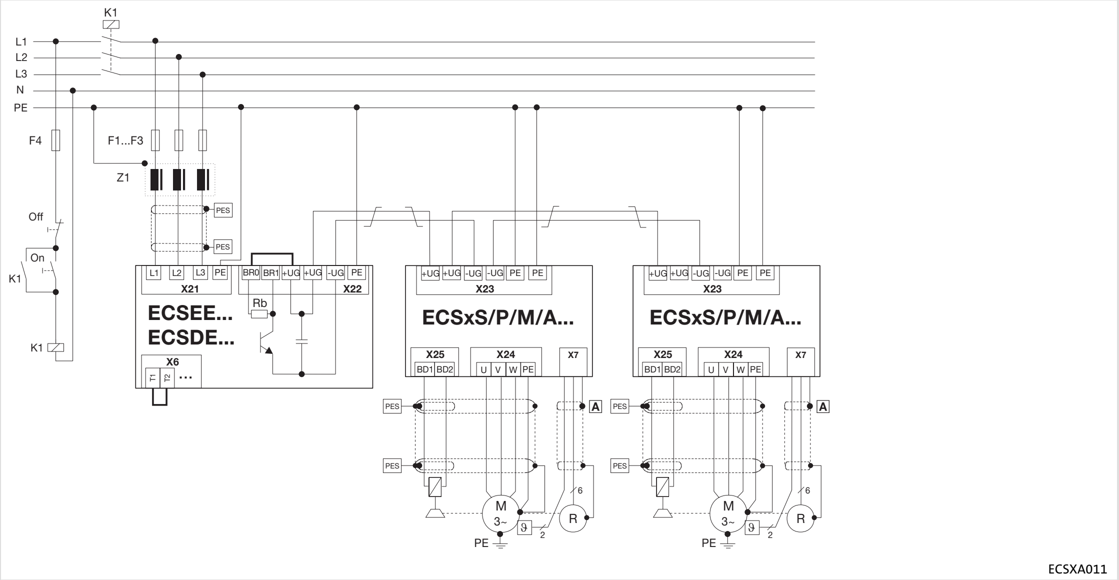


Fig.5-2 Interconnected power system with internal brake resistor

PES	HF shield termination by large-surface PE connection
ʃ	Twisted cables
K1	Mains contactor
F1 ... F4	Fuse
Z1	Mains choke / mains filter, optional
Rb	Brake resistor
A	System cable – feedback

Mimimum wiring with power supply module ECSCE...

The power supply module ECS**C**E... has, according to its construction, no integrated brake resistor. Therefore, install an external brake resistor of the ERBM..., ERBS... or ERBD... (🕮 377) series:

► Connect the brake resistor to X22/BR1 and X22/+UG.

► Connect a thermal detector (NC contact) to X6/T1 and X6/T2.

Observe ...
the notes in the detailed documentation of the power supply module ECSxE...!

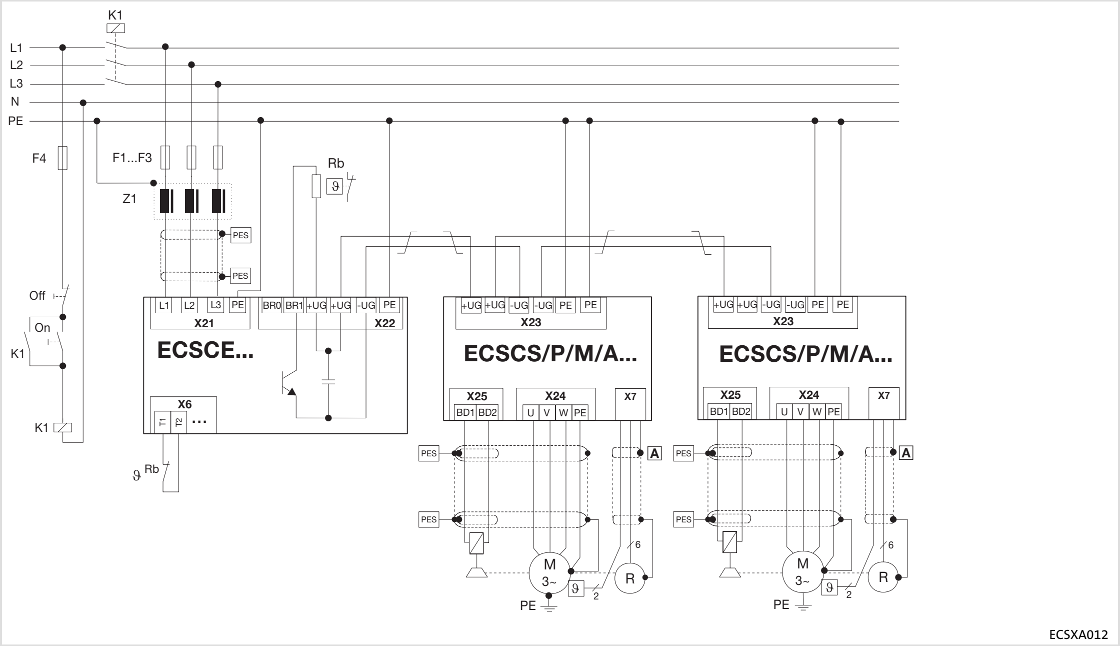


Fig.5-3 Interconnected power system with external brake resistor

PES	HF shield termination by large-surface PE connection
ʃ	Twisted cables
K1	Mains contactor
F1 ... F4	Fuse
Z1	Mains choke / mains filter, optional
Rb	Brake resistor
A	System cable – feedback

5.2.3 Motor connection

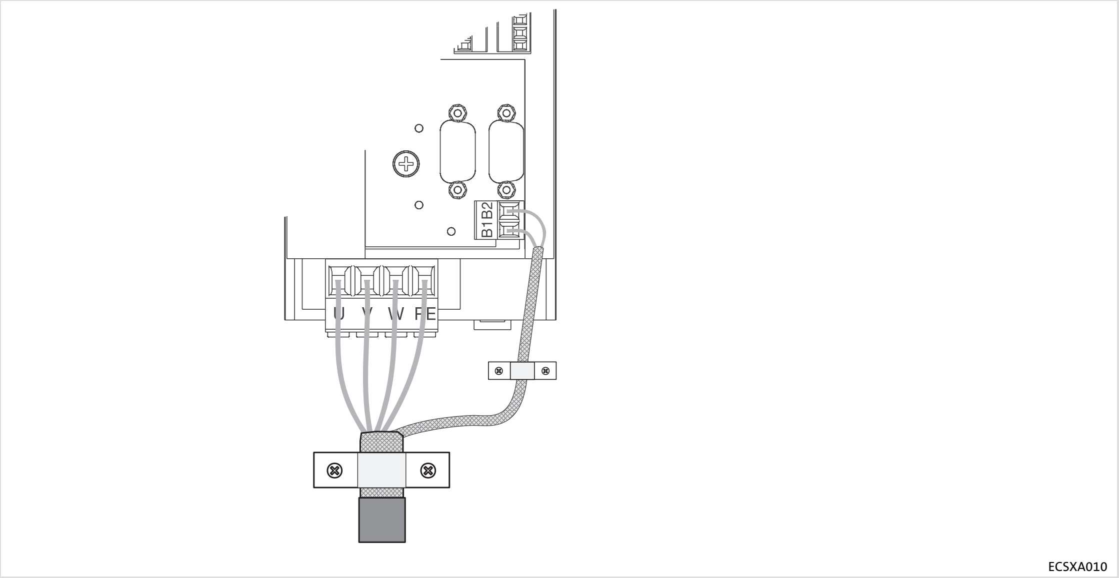


Fig.5-4 Motor and motor holding brake connection

Motor cables

- Use low-capacitance motor cables. Capacitance per unit length:
  - – Core/core: max. 75 pF/m
  - – Core/shield: max. 150 pF/m
- Length: max. 50 m, shielded
- The cross-section of the motor cables are selected according to the motor standstill current (I_0) when using synchronuous motors or according to the rated motor current (I_N) for asynchronuous motors.
- Length of the unshielded ends: 40 ... 100 mm (depending on the cable cross-section)
- Lenze system cables meet these requirements.
- Use the shield mounting kit ECSZS000X0B001 for EMC-compliant wiring.

Further information ....
on EMC-compliant wiring with the ECSZS000X0B001 shield mounting kit can be found in the Mounting Instructions of the shield mounting.

5.2.4 Motor holding brake connection

The motor holding brake

- is connected to X25/BD1 and X25/BD2.
- and is supplied with low voltage via the terminals X6/B+ and X6/B-:
  – +23 ... +30 V DC, max. 1.5 A

STOP **Stop!**

- X6/B+ must be provided with a fuse F 1.6 A.
- If no suitable voltage (wrong value, wrong polarity) is impressed on the brake, it is applied and can be overheated and destroyed by the further rotating motor.

5.2.4.1 Spark suppressor

A spark suppressor is integrated into the axis module for the motor holding brake.

5.2.4.2 Brake monitoring

The connection of the motor holding brake can be monitored for voltage failure and cable breakage if monitoring is activated under C0602.

Motor holding brake opened (inactive):

The connection of the motor holding brake is monitored for voltage failure and cable breakage:

- Threshold value for cable breakage: 140 mA ±10 %
- Threshold value for voltage failure: +4 V ±10 %

Motor holding brake closed (active):

The connection of the motor holding brake is monitored for cable breakage if the threshold value of the voltage supply X6/B+ and X6/B- exceeds 4 V.

5.2.4.3 Requirements on the brake cables

- Use a Lenze system cable with integrated brake cable.
  – The shielding of the brake cable must be separated.
- Length: max. 50 m
- If a separately installed brake cable is required, shield it.

Note!

Please note:

- The ohmic voltage loss along the motor supply cable.
- Due to the current monitoring a voltage loss of 1.5 V arises.

A higher voltage at the cable entry can compensate the voltage loss.

The following applies to all Lenze system cables:

$$U_K\,[V] = U_B\,[V] + 0.08\left[\frac{V}{m \cdot A}\right] \cdot L_L\,[m] \cdot I_B\,[A] + 1.5\,[V]$$

U_{comp}	Voltage for compensating the voltage loss [V]
U_{brake}	Supply voltage at X6/B+, X6/B- [V]
L_L	Cable length [m]
I_{brake}	Brake current [A]

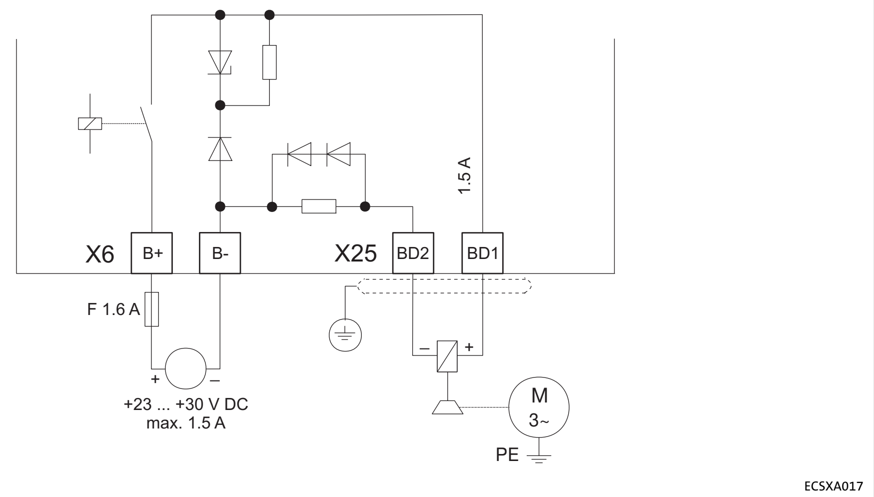


Fig.5-5 Connection of the motor holding brake to X25

5.2.5 Connection at capacitor module ECSxK... (optional)

Observe ...

the notes in the detailed documentation of the capacitor module ECSxK...!

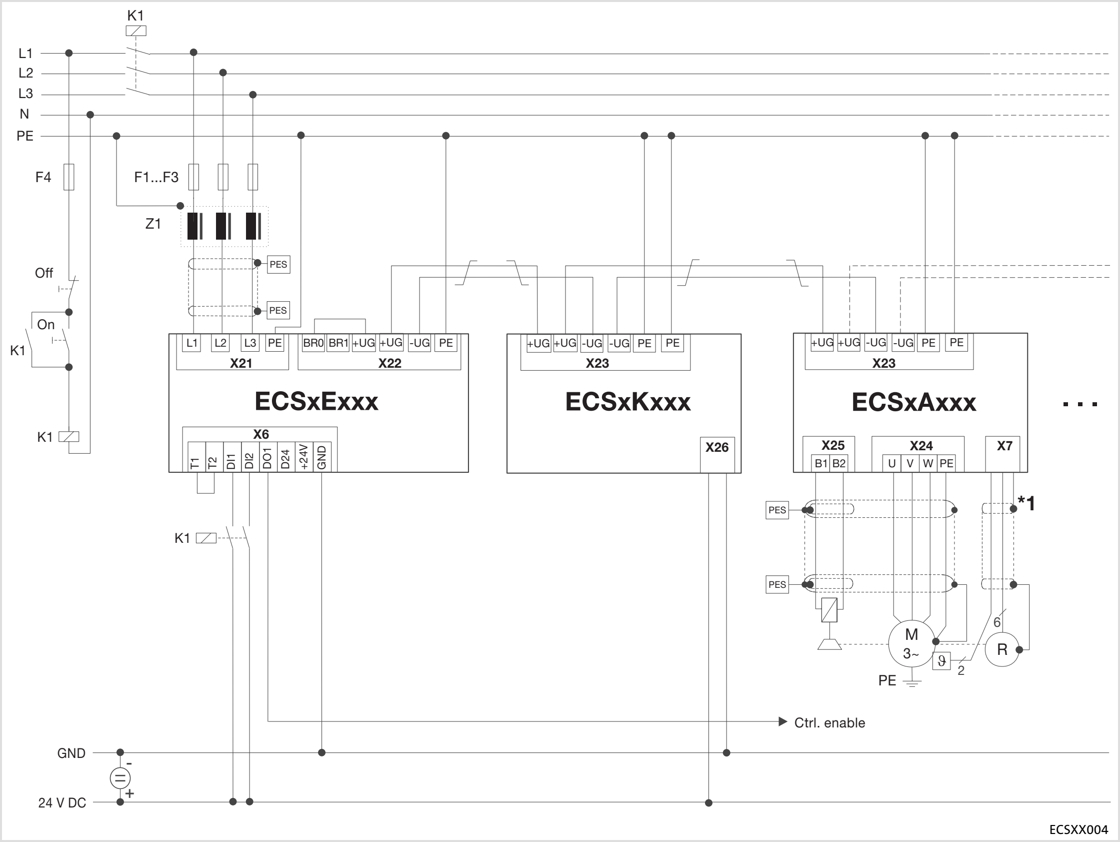


Fig.5-6 Wiring of capacitor module ECSxK...

PES	HF shield termination by large-surface PE connection
ʃ	Twisted cables
K1	Mains contactor
F1 ... F4	Fuse
Z1	Mains choke / mains filter, optional
A	Contactor relay
B	System cable – feedback
C	Terminal X6/SI1 of the connected axis modules (controller enable/inhibit)

5.3 Control terminals (X6)

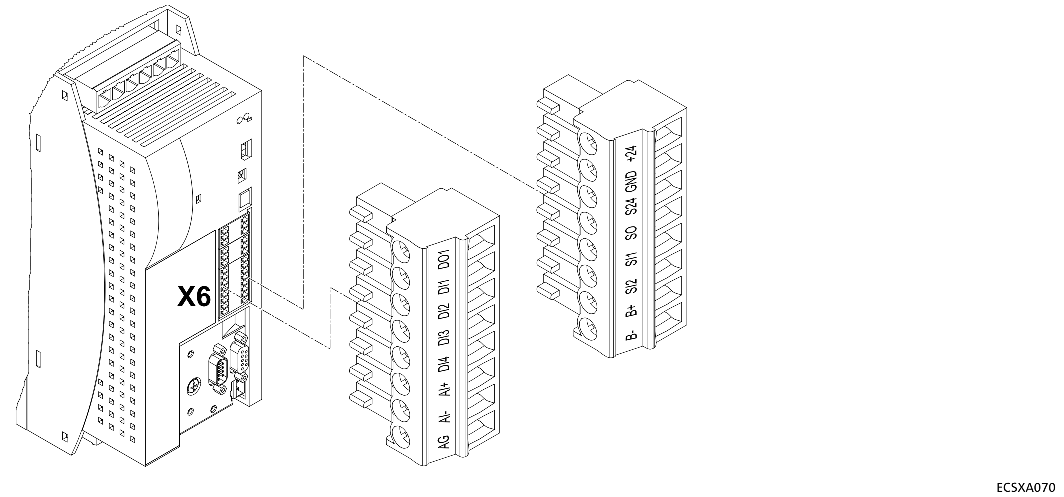


Fig.5-7 Plug connectors for control terminals (X6)

For the supply of the control electronics, an external 24 V DC voltage on the terminals X6/+24 and X6/GND is required.

Stop!

- The control cables must always be shielded to prevent interference injections.
- The voltage difference between X6/AG, X6/GND and PE of the axis module may maximally amount to 50 V.
- The voltage difference is limited by:
  – overvoltage-limiting components or
  – direct connection of X6/AG and X6/GND to PE.
- The wiring has to ensure that for X6/DO1 = 0 (LOW level) the connected axis modules do not draw energy from the DC bus. Otherwise, the power supply module may be damaged.

Shield connection of control cables and signal cables

The plate on the front of the device serves as the mounting place (two threaded holes M4) for the shield connection of the signal cables. The screws used may extend into the inside of the device by up to 10 mm. For optimum contact of the shield connection, use the wire clamps from the ECSZS000X0B001 shield mounting kit.

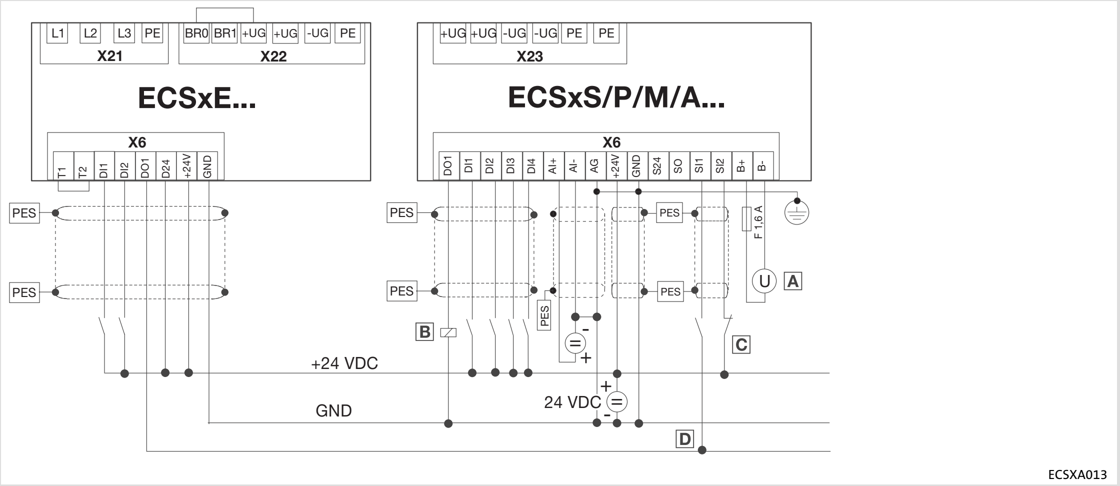


Fig.5-8 System: control signals with internal brake resistor

PES	HF shield termination by large-surface PE connection
A	Voltage supply of motor holding brake 23 ... 30 V DC, max. 1.5 A
B	Contactor relay
C	Safe torque off (formerly "safe standstill")
D	Controller enable/inhibit

Terminal assignment

Plug connector X6		
Terminal	**Function**	**Electrical data**
X6/+24	Low-voltage supply of the control electronics	20 ... 30 V DC, 0.5 A (max. 1 A) at 24 V starting current: max. 2 A for 50 ms
X6/GND	Reference potential of low-voltage supply	
X6/DO1	Digital output 1	24 V DC, 0.7 A (max. 1.4 A) short-circuit-proof
X6/DI1	Digital input 1	LOW: -3 ... +5 V; -3 ... +1.5 mA HIGH: +15 ... +30 V; +2 ... +15 mA Input current at 24 V DC: 8 mA per input
X6/DI2	Digital input 2	
X6/DI3	Digital input 3	
X6/DI4	Digital input 4	
X6/AI+	Analog input +	Adjustable with jumper bar X3: -10 ... +10 V, max. 2 mA -20 ... +20 mA Resolution: 11 bits + sign
X6/AI-	Analog input -	
X6/AG	Reference potential of analog input (internal ground)	
X6/B+	Brake supply +	23 ... 30 VDC max. 1.5 A **Set the brake voltage so that the permissible voltage at the brake will not be exceeded or the values do not fall below the threshold – otherwise malfunction or destruction may occur!**
X6/B-	Brake supply -	
X6/S24	Connection of "safe torque off" (formerly "safe standstill")	🕮 55
X6/SO		
X6/SI1		
X6/SI2		

Cable cross-sections and screw-tightening torques

Cable type	Wire end ferrule	Cable cross-section	Starting torque	Stripping length
flexible	Without wire end ferrule	0.08 ... 1.5 mm^2 (AWG 28 ... 16)	0,22 ... 0,25 Nm (1.95 ... 2.2 lb-in)	5 mm
	Insulated with wire end ferrule	0.25 ... 0,5 mm^2 (AWG 22 ... 20)		

We recommend control cables with a cable cross-section of 0.25 mm^2.

5.3.1 Digital inputs and outputs

Stop!

If an inductive load is connected to X6/DO1, a spark suppressor with a limiting function to max. 50 V ± 0 % must be provided.

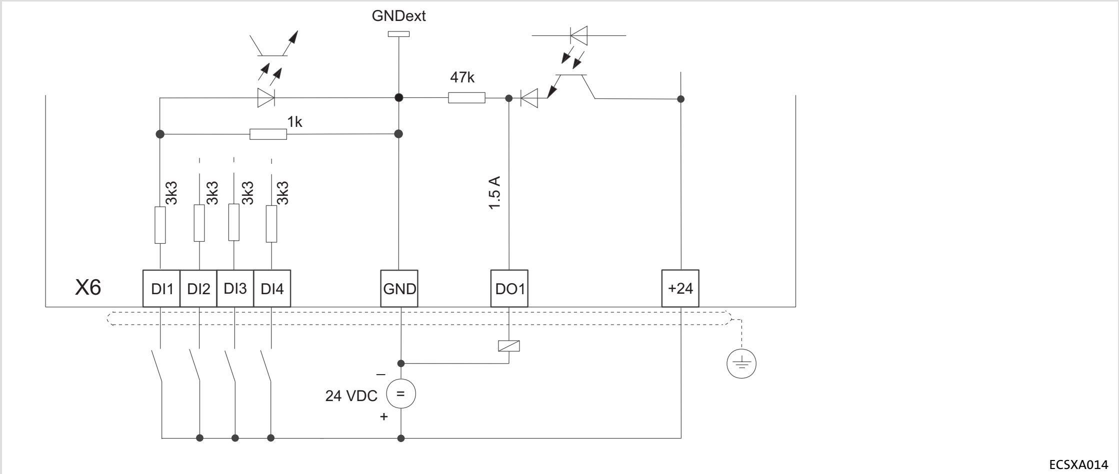


Fig.5-9 Digital inputs and outputs at X6

- ► The polarity of the digital inputs (X6/DI1 ... DI4) is set via C0114/x. The digital inputs (depending on the operating mode/control structure) are assigned with the following functions:

Terminal	Function	Further information
Operating mode/control structure ”Speed control”		
X6/DI1	● CW rotation/CCW rotation	🕮 92, 269
X6/DI2	● Quick stop (QSP)	🕮 112, 280
X6/DI3	Fixed speed (JOG)	🕮 93, 270
X6/DI4	Activation of the holding brake	🕮 83, 281
Operating mode/control structure ”Torque control”		
X6/DI1	● CW rotation/CCW rotation	🕮 92, 291
X6/DI2	● Quick stop (QSP)	🕮 112, 295
X6/DI3	Not assigned	
X6/DI4	Activation of the holding brake	🕮 83, 298

- ► The polarity of the digital output (X6/DO1) is set via C0118/1.

5.3.2 Analog input

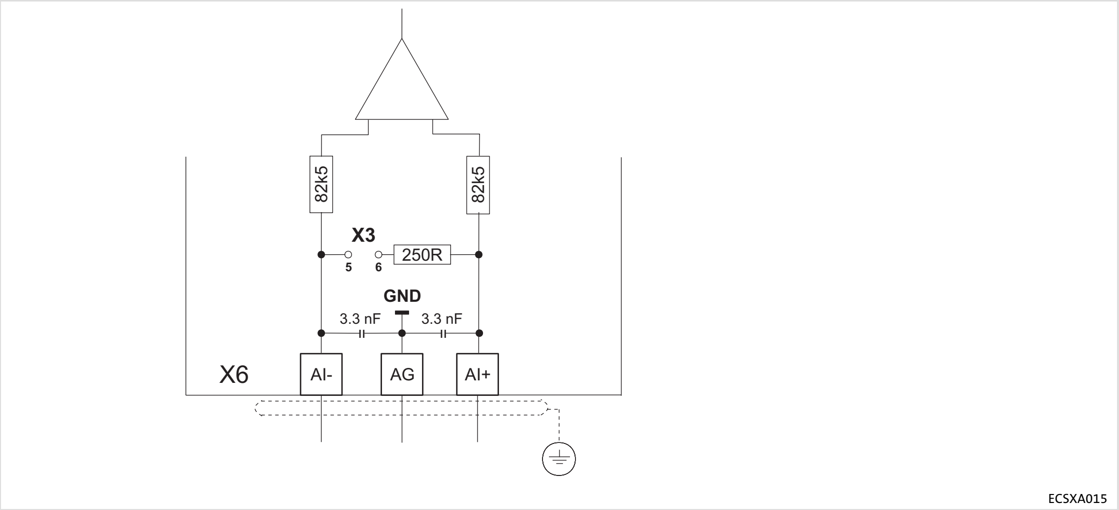


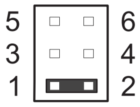
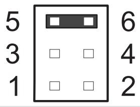
Fig.5-10 Analog input at X6

Analog input configuration

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

Stop!

Do not plug the jumper on 3-4! The axis module cannot be initialised like this.

Jumper strip X3	Setting	Measuring range
	5-6 open Jumper on 1-2: parking position	● Level: -10 ... +10 V (see also C0034) ● Resolution: 5 mV (11 bit + sign) ● Scaling: ±10 V ≡ ±16384 ≡ ±100%
	5-6 closed	● Level: -20 ... +20 mA / +4 ... +20 mA (see also C0034) ● Resolution: 20 μA (11 bit + sign) ● Scaling: ±20 mA ≡ ±16384 ≡ ±100%

5.3.3 Safe torque off

The axis modules support the safety function ”safe torque off” (formerly ”safe standstill”), ”protection against unexpected start-up”, according to the requirements of the control category 3 of EN 954 Part 1 and Part 2 (from 01.01.2007: EN ISO 13849). For this purpose the axis modules are provided with two independent safety routes which are connected in parallel. Control category 3 is reached when the output signal at X6/SO is verified additionally.

5.3.3.1 Additional safety instructions

Installation/commissioning

- Only qualified personnel is permitted to install and set up the function ”safe torque off”.
- All control components (switches relays, PLC, ...) and the control cabinet must comply with the requirements of the EN 954-1 and EN 954-2 (from 01.01.2007: EN ISO 13849). This includes among other things:
  - Switches, relays with enclosure IP54.
  - Control cabinet with enclosure IP54.
  - Gather all further requirements from EN 954-1 and EN 954-2 (from 01.01.2007: EN ISO 13849).
- Wiring with insulated wire end ferrules is essential.
- All safety-relevant cables (e. g. control cable for the safety relay, feedback contact) must be installed outside the control cabinet, e. g. in the cable duct. It must be ensured that short circuits between the single cables cannot occur! For further measures see EN 954-2 (from 01.01.2007:13849), table D4.
- When an external force is likely to act with the ”safe torque off” function (e.g. sagging of hanging loads), additional measures have to be provided (e.g. mechanical brakes).

Danger!

When using the function ”safe torque off”, additional measures are required for emergency-off”:

- There is neither an electrical isolation between motor and axis module nor a ”service switch” or a ”repair switch”.!
- An ”emergency-off” requires an electrical isolation of the cable path to the motor, e.g. by means of a central mains contactor with ”emergency-off” connection.

During operation

- After installation the operator must check the ”safe torque off” function.
- The function check must be regularly repeated, after one year at the latest.

5.3.3.2 Implementation

In the axis module, the ”safe torque off” connection is implemented with optocouplers. The optocouplers isolate the following areas electrically from each other:

- The digital inputs and outputs:
  - input X6/SI1 (controller enable/inhibit)
  - input X6/SI2 (pulse enable/inhibit)
  - brake output X6/B+, B-
  - output X6/SO (”safe torque off” active/inactive)
- The circuit for the internal control
- The final power stage

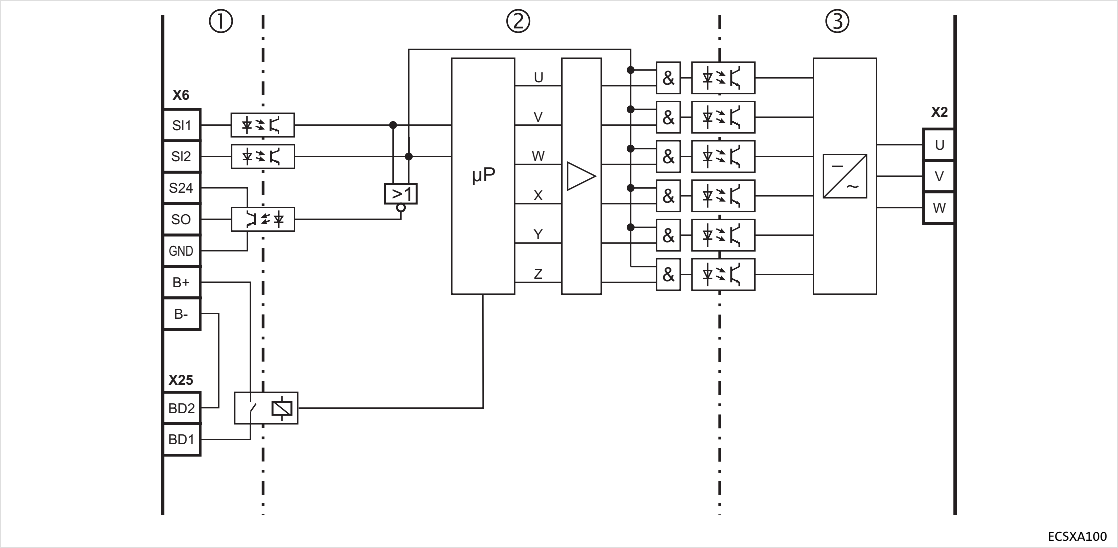


Fig.5-11 Implementation of the ”safe torque off” function

Area 1:	Inputs and outputs
Area 2:	Circuit for the internal control
Area 3:	Power output stage

Stop!

Use insulated wire end ferrules when wiring the ”safe torque off” circuits to X6.

5.3.3.3 Principle of operation

The status ”safe torque off” can be initiated any time via the input terminals X6/SI1 (controller enable/inhibit) and X6/SI2 (pulse enable/inhibit). For this purpose, a LOW level has to be applied to both terminals:

- X6/SI1 = LOW (controller inhibited):

  The inverter is inhibited via the microcontroller system.
- X6/SI2 = LOW (pulses inhibited):

  The supply voltage for the optocouplers of the power section driver is switched off, i. e. the inverter cannot be enabled or activated via the microcontroller system anymore.

  The input signal on X6/SI2 to the hardware is additionally directed to the microcontroller system and is evaluated there for purposes of state control. For the external further processing, a HIGH level is output for the status ”safe torque off active” on the digital output X6/SO.

Therefore control of the inverter is prevented by two methods which are independent from each other. It is therefore prevented that the motor can start again.

5.3.3.4 Technical data

Terminal assignment

Plug connector X6				
Terminal	**Function**	**Level**		**Electrical data**
X6/S24	Low-voltage supply			18 ... 30 V DC 0.7 A
X6/SO	Output feedback ”safe torque off”	LOW	During operation	24 V DC 0.7 A (max. 1.4 A) Short-circuit-proof
		HIGH	”Safe torque off” active	
X6/SI1	Input 1 (controller enable/inhibit)	LOW	Controller is inhibited	LOW level: -3 ... +5 V -3 ... +1.5 mA HIGH level: +15 ... +30 V +2 ... +15 mA Input current at 24 V DC: 8 mA per input
		HIGH	Controller enabled	
X6/SI2	Input 2 (pulse enable/inhibit)	LOW	Pulses for power stage inhibited	
		HIGH	Pulses for power stage enabled	

Cable cross-sections and screw-tightening torques

Cable type	Wire end ferrule	Cable cross-section	Tightening torque	Stripping length
Flexible	With insulated wire end ferrule	0.25 ... 0.5 mm^2 (AWG 22 ... 20)	0.22 ... 0.25 Nm (1.95 ... 2.2 lb-in)	5 mm

5.3.3.5 Minimum wiring

In order to reach the control category 3, the signal at X6/SO must be verified additionally. This requires external wiring. The external wiring must be adapted to the existing safety concepts and checked for a correct operation.

”Safe torque off” with multiple-contact switches

This circuit shows the minimum external wiring of the axis module with multiple-contact switches for a motor with brake.

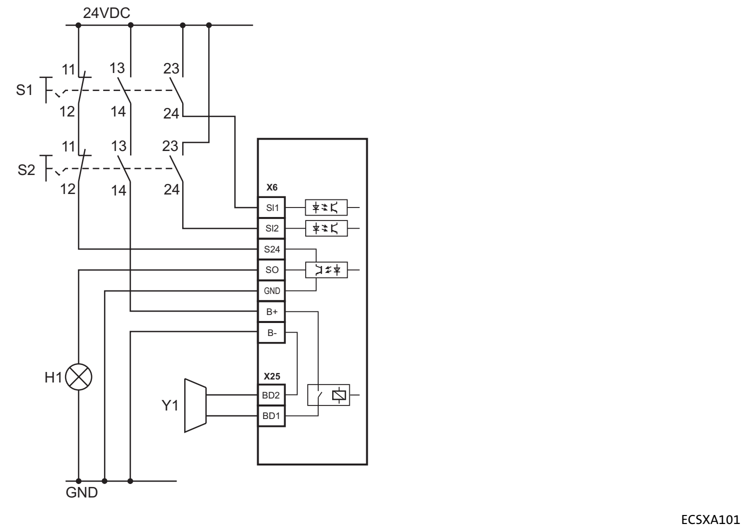


Fig.5-12 Minimum external wiring with multiple-contact switches

Stop!

Observe the reaction of the drive when you activate controller enable and/or pulse enable (X6/SI1 or SI2 = HIGH level):

- The motor brake is applied immediately. This can lead to high wear on the motor holding brake (see data sheet of the brake).
- If the brake monitoring is active (C0602 = 0), the TRIP is set to TRIP ”Rel1”. Before recommissioning, the TRIP must be reset (🕮 191).

Preconditions for the external wiring with multiple-contact switches:

- The switches S1 and S2 must have at least three contacts:
  - At least one NC contact and two NO contacts being all electrically independent and positively driven.
  - The contacts must not be bridged.
- The switches S1 and S2 must be mechanically separated to avoid that all contacts switch at the same time when being operated.
- The NO contacts of S1 and S2 may only close when the NC contacts are open. NO contacts and NC contacts must not be operated at the same time.
- Design S1 and S2 for a voltage of 24 V DC. If a higher voltage occurs in the electrical environment, the switches must have an insulation voltage. This insulation voltage must at least correspond to the highest voltage that can occur in case of an error.
- Ensure that double channel is available for control category 3:
  - For every disconnection (also single-channel) via the contacts 13/14 of the switches S1 and S2, the supply of the brake is interrupted, so that the brake is applied. Additionally the internal brake relay has to be switched off by the application.
  - The supply of the output (X6/S24) via the NC contacts 11/12 of the switches S1 and S2 only is put through if the controller is switched off by two channels. By this it is prevented that the output X6/SO outputs a HIGH level in case of a short circuit of the internal transistor, while the drive is not switched off by two channels.
- The switch contacts must resist the maximum current of the 24 V DC voltage supply.
- All control components (switches relays, PLC, ...) and the control cabinet must comply with the requirements of the EN 954-1 and EN 954-2 (from 01.01.2007: EN ISO 13849). This includes among other things:
  - Switches, relays with enclosure IP54.
  - Control cabinet with enclosure IP54.
  - Gather all further requirements from EN 954-1 and EN 954-2 (from 01.01.2007: EN ISO 13849).
- The wiring with wire end ferrules is essential.
- All safety-relevant cables (e. g. control cable for the safety relay, feedback contact) must be installed outside the control cabinet, e. g. in the cable duct. It must be ensured that short circuits between the single cables cannot occur! For further measures see EN 954-2 (from 01.01.2007:13849), table D4.

”Safe torque off” with safety PLC

The version ”safe torque off” with safety PLC must ensure the functions of the multiple-contact switches. The following conditions must be fulfilled:

- The NO contacts only close after the NC contacts are open.
- Voltage supply for the brake must be safely switched off in the event of LOW level at X6/SI1 and/or LOW level at X6/SI2.
- Voltage supply for the output X6/SO must be safely switched off in the event of HIGH level at x6/SI1 and/or HIGH level at x6/SI2.
- Safe processing of the output signal at X6/SO for higher-level safety concepts.
- The PLC must be programmed so that the following requirements are met:
  - The input and output states of output X6/SO are checked for plausibility according to the following truth table.
  - The entire system is put into a safe state, when the plausibility check results in an impermissible state.

Permissible and impermissible states of the ”safe torque off” function at the axis module

Level at input terminal		Resulting level at output terminal	Impermissible level at output terminal
X6/SI1	**X6/SI2**	**X6/SO**	**X6/SO**
LOW	LOW	HIGH	LOW
LOW	HIGH	LOW	HIGH
HIGH	LOW	LOW	
HIGH	HIGH	LOW	

- All control components (switches relays, PLC, ...) and the control cabinet must comply with the requirements of the EN 954-1 and EN 954-2 (from 01.01.2007: EN ISO 13849). This includes among other things:
  - Switches, relays with enclosure IP54.
  - Control cabinet with enclosure IP54.
  - Gather all further requirements from EN 954-1 and EN 954-2 (from 01.01.2007: EN ISO 13849).
- The wiring with wire end ferrules is essential.
- All safety-relevant cables (e.g. control cable for the safety relay, feedback contact) must be installed outside the control cabinet, e. g. in the cable duct. It must be ensured that short circuits between the single cables cannot occur! For further measures see EN 954-2 (from 01.01.2007:13849), table D4.

5.3.3.6 Function check

- After installation the operator must check the ”safe torque off” function.
- The function check must be regularly repeated, after one year at the latest.

STOP **Stop!**

If the function check leads to impermissible states at the terminals, the commissioning cannot take place!

Test specifications

- Check the circuitry for correct function.
- Check directly at the terminals whether the ”safe torque off” function operates faultlessly in the axis module:

Permissible and impermissible states of the ”safe torque off” function at the axis module

Level at input terminal		Resulting level at output terminal	Impermissible level at output terminal
X6/SI1	X6/SI2	X6/SO	X6/SO
LOW	LOW	HIGH	LOW
LOW	HIGH	LOW	HIGH
HIGH	LOW	LOW	
HIGH	HIGH	LOW	

5.4 Automation interface (AIF)

A communication module can be plugged on or removed from the automation interface (X1). This can also be done during operation.

A variety of communication modules are available for power supply modules and axis modules of the ECS series:

Communication module		**Type/order number**
Keypad XT		EMZ9371BC
Diagnosis terminal (hand-held keypad XT)		E82ZBBXC
LECOM-A (RS232)		EMF2102IB-V004
LECOM-B (RS485)		EMF2102IB-V002
LECOM-A/B (RS232/485)		EMF2102IB-V001
LECOM-LI (optical fibre)		EMF2102IB-V003
LON		EMF2141IB
INTERBUS		EMF2113IB
PROFIBUS-DP		EMF2133IB
DeviceNet/CANopen		EMF2175IB
CAN addressing		EMF2174IB
PC system bus adapter	Voltage supply via DIN connection	EMF2173IB
	Voltage supply via PS2 connection	EMF2173IB-V002
	Voltage supply via PS2 connection, electrical isolation to the CAN bus	EMF2173IB-V003
	USB system bus adapter	EMF2177IB

Further information ....

on wiring and application of communication modules can be found in the corresponding Mounting Instructions and Communication Manuals.

5.5 Wiring of MotionBus/system bus (CAN)

Basic wiring of CAN buses

The following two basic schematic diagrams show drive systems with different conductivity concepts:

- In Fig.5-13 a higher-level control assumes the function of the master, e.g. ETC.
- In Fig.5-14 the function of the master is enabled by a controller intended as master.

In both representations the master values are transmitted via the MotionBus (CAN).

The system bus (CAN) serves to diagnose and/or parameterise the drives.

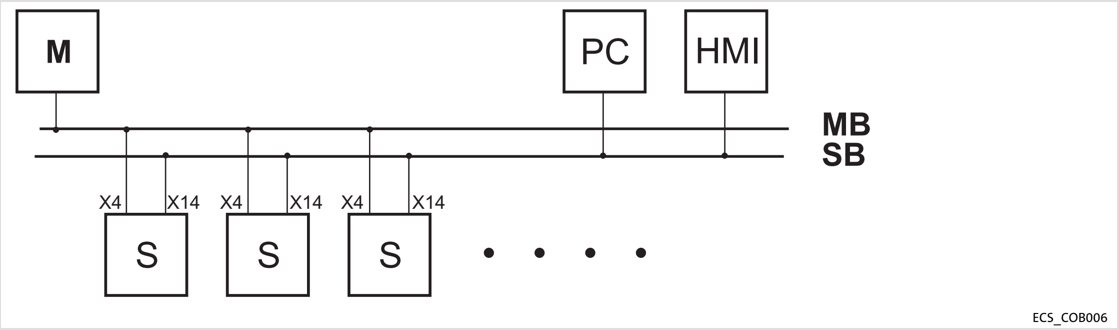


Fig.5-13 MotionBus (CAN) with master control

MB	MotionBus (CAN), connection to plug connector X4
SB	System bus (CAN), connection to plug connector X14
M	Master
E	Slave
PC	PC
HMI	HMI / operating unit

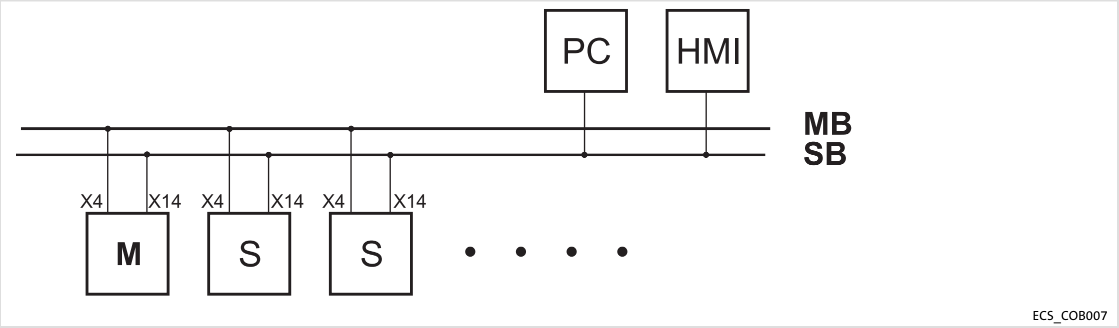


Fig.5-14 MotionBus (CAN) with controller as master

MB	MotionBus (CAN), connection to plug connector X4
SB	System bus (CAN), connection to plug connector X14
M	Master
E	Slave
PC	PC
HMI	HMI / operating unit

Wiring of the MotionBus (CAN)

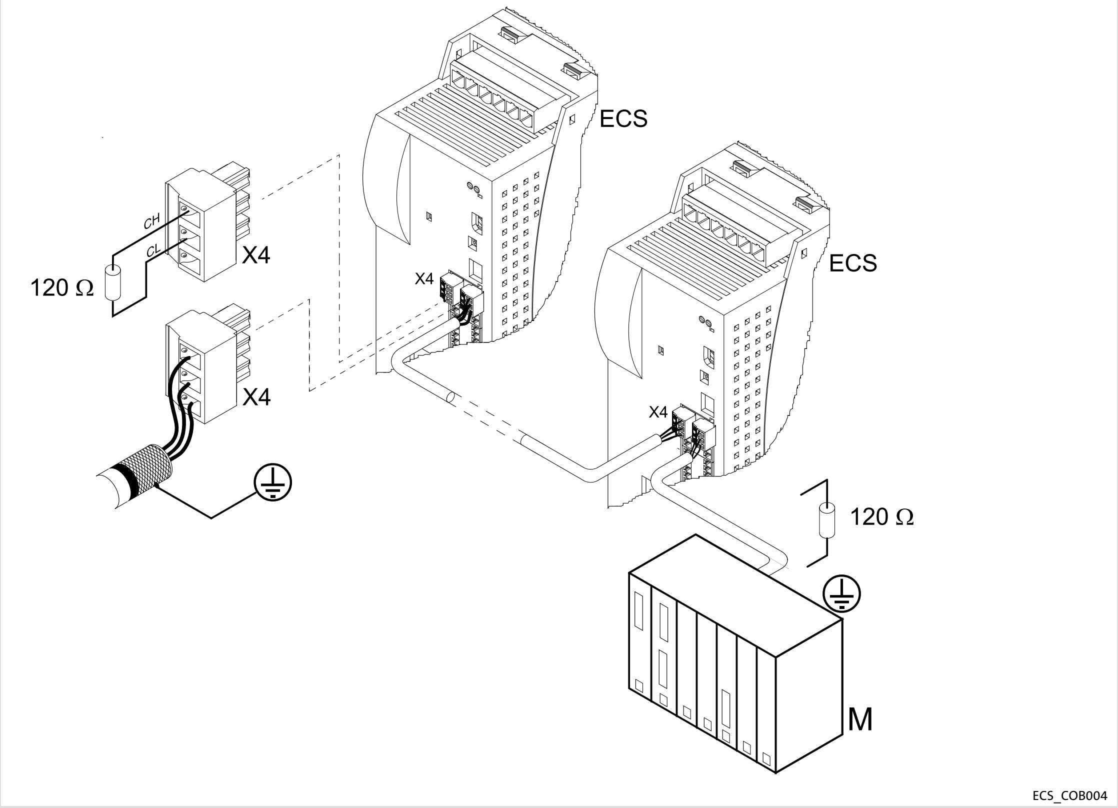


Fig.5-15 Wiring example for the MotionBus (CAN)

ECS	ECS axis module
M	Master control, e.g. ETC

Stop!

Connect a 120 Ω terminating resistor to the first and last node of the MotionBus/system bus (CAN).

Specification of the transmission cable

Please observe our recommendations for signal cables:

Transmission cable specification		
Total length	≤ 300 m	≤ 1000 m
Cable type	LIYCY 2 x 2 x 0.5 mm^2 (twisted in pairs with shield)	CYPIMF 2 x 2 x 0.5 mm^2 (twisted in pairs with shield)
Specific resistance	≤ 80 Ω/km	≤ 80 Ω/km
Capacitance per unit length	≤ 130 nF/km	≤ 60 nF/km

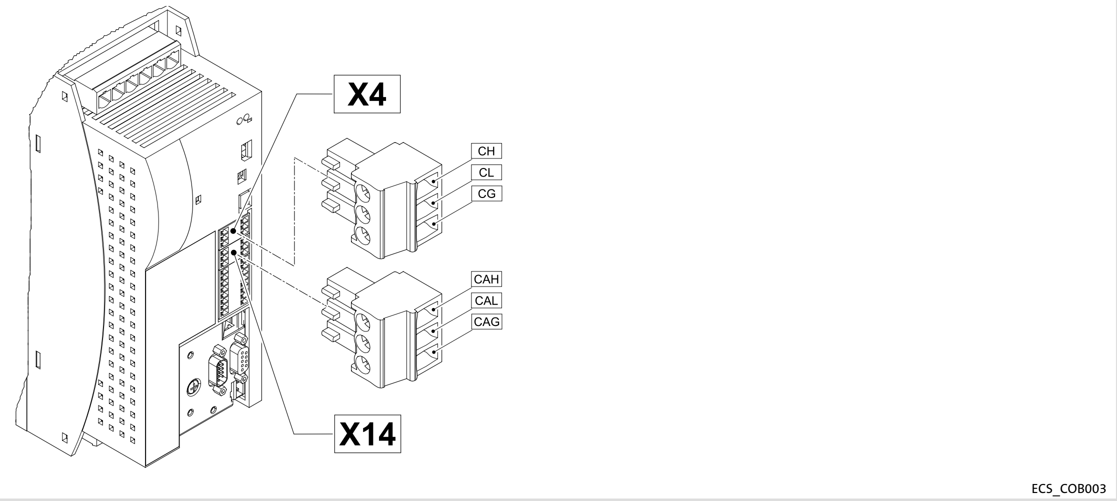


Fig.5-16 Bus connections at the controller

Assignment of the plug connector for the MotionBus (CAN)

X4	Explanation
CH	CAN-HIGH
CL	CAN-LOW
CG	Reference potential of the MotionBus (CAN)

Assignment of the plug connector for the system bus (CAN)

X14	Explanation
CAH	CAN-HIGH
CAL	CAN-LOW
CAG	Reference potential of the system bus (CAN)

Bus cable length

Note!

Be sure to observe the permissible cable lengths.

1. Check the compliance with the total cable length in Tab. 5-1.

The baud rate specifies the total cable length.

Baud rate [kBit/s]	**Max. bus length** [m]
50	1500
125	630
250	290
500	120
1000	25

Tab. 5-1 Total cable length

2. Check the compliance of the segment cable length in Tab. 5-2.

The segment cable length is specified by the cable cross-section used, and by the number of nodes. Without a repeater, the segment cable length equals the total cable length.

	Cable cross-section			
Nodes	**0.25 mm^2**	**0.5 mm^2**	**0.75 mm^2**	**1.0 mm^2**
2	240 m	430 m	650 m	940 m
5	230 m	420 m	640 m	920 m
10	230 m	410 m	620 m	900 m
20	210 m	390 m	580 m	850 m
32	200 m	360 m	550 m	800 m
63	170 m	310 m	470 m	690 m

Tab. 5-2 Segment cable length

3. Compare the two determined values to each other.

If the value determined from Tab. 5-2 is smaller than the total cable length from Tab. 5-1 to be implemented, repeaters have to be used. Repeaters divide the total cable length in segments.

Note!

- Observe the reduction of the total cable length due to the signal delay of the repeater (see example 🕮 67).
- Mixed mode
  - Mixed mode is available if different nodes are operated on one mains.
  - If the respective total cable lengths of the nodes are different at the same baud rate, the smaller value has to be used for determining the max. cable length.

Example: Selection help

Specifications	
● Cable cross-section:	0.5 mm^2 (according to cable specification 🕮 65)
● Number of nodes:	63
● Repeater:	Lenze repeater, type 2176 (cable reduction: 30 m)

For the max. number of nodes (63), the following cable lengths / number of repeaters are observed from the specification:

Baud rate [kBit/s]	**50**	**120**	**250**	**500**	**1000**
Max. cable length [m]	1500	630	290	120	25
Segment cable length [m]	310	310	290	120	25
Number of repeaters	5	2	-	-	-

Check repeater application

Specifications	
● Baud rate:	125 kbits/sec
● Cable cross-section:	0.5 mm^2
● Number of nodes:	28
● Cable length:	450 m

Test steps	**Cable length**	**see**
1. Total cable length at 125 kBit/s:	630 m	Off Tab. 5-1
2. Segment cable length for 28 nodes and for a cable cross-section of 0.5 mm^2:	360 m	Off Tab. 5-2
3. Comparison: The value in point 2 is smaller than the cable length of 450 m to be implemented.		

Conclusion

- Without the use of repeaters, the cable length of 450 m that is to be implemented is not possible.
- After 360 m (point 2), a repeater has to be used.

Result

- The Lenze repeater, type 2176 (cable reduction: 30 m) is used
- Calculation of the max. cable length:
  First segment: 360
  Second segment: 360 m (according to Tab. 5-1) *minus* 30 m (cable reduction if a repeater is used)

→ Max. cable length to be implemented with a repeater: 690 m.
→ Therefore, the specified cable length can be implemented.

Note!

The use of a further repeater is recommended as

- ► a service interface
  Advantage: A trouble-free coupling in the running bus operation can be achieved.
- ► Calibration interface
  Advantage: The calibration/programming device is isolated.

5.6 Wiring the feedback system

Different feedback system can be connected to the axis module:

- Resolver on X7 (📖 68)
- Encoder on X8 (📖 69)
  - Incremental encoder with TTL level
  - Sin/cos encoder with rated voltage (5 ... 8 V)
  - SinCos absolute value encoder (single-turn/multi-turn) with serial communication (hyperface interface)

Note!

- We recommend to use Lenze system cables for wiring.
- With self-prepared cables only use cables with shielded cores twisted in pairs.

5.6.1 Resolver connection

Note!

Before using a resolver from another manufacturer, please consult Lenze.

Via the 9-pole Sub-D socket X7, you connect a resolver.

Features

- 2-pole resolver (U = 10 V, f = 4 kHz)
- The resolver and resolver supply cable are monitored with regard to open circuit (error message ”Sd2”)

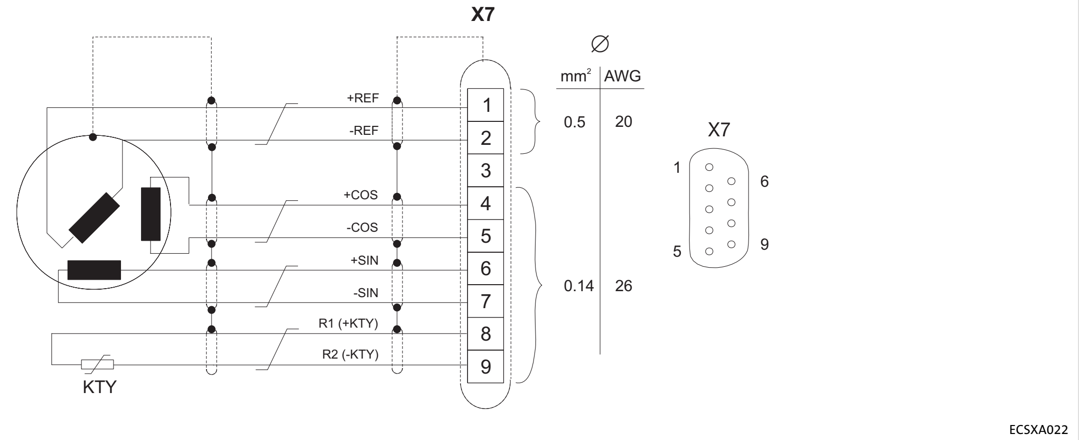


Fig.5-17 Resolver connection

Connector assignment X7: socket , Sub-D 9-pole

Pin	1	2	3	4	5	6	7	8	9
Signal	+Ref	-Ref	GND	+COS	-COS	+SIN	-SIN	R1 (+KTY)	R2 (-KTY)
	0.5 mm² (AWG 20)		–	0.14 mm² (AWG 26)					

5.6.2 Encoder connection

Via the 9-pole Sub-D-plug X8, you can connect the following encoders:

- Incremental encoder
  - with two 5 V complementary signals (TTL encoders) that are electrically shifted by 90°.
  - Optionally, the zero track can be connected.
- Sin/cos encoder
  - with rated voltage (5 ... 8 V).
  - with serial communication (single-turn or multi-turn; the initialisation time of the axis module is extended to approx. 2 s).

The controller supplies the encoder with voltage.

Use C0421 to set the supply voltage V_{CC} (5 ... 8 V) to compensate, if required, the voltage loss [ΔU] on the encoder cable:

$$\Delta U \cong 2 \cdot L_L\,[\mathrm{m}] \cdot R/m\,[\Omega/\mathrm{m}] \cdot I_G\,[\mathrm{A}]$$

ΔU	Voltage loss on the encoder cable [V]
L_L	Cable length [m]
R/m	Resistance per meter of cable length [Ω/m]
I_G	Encoder current [A]

STOP

Stop!

Observe the permissible connection voltage of the encoder used. If the values in C0421 are set too high, the encoder can be destroyed!

Incremental encoder (TTL encoder)

Features	
Input/output frequency:	0 ... 200 kHz
Current consumption:	6 mA per channel
Current on output V_{CC} (X8/pin 4):	Max. 200 mA

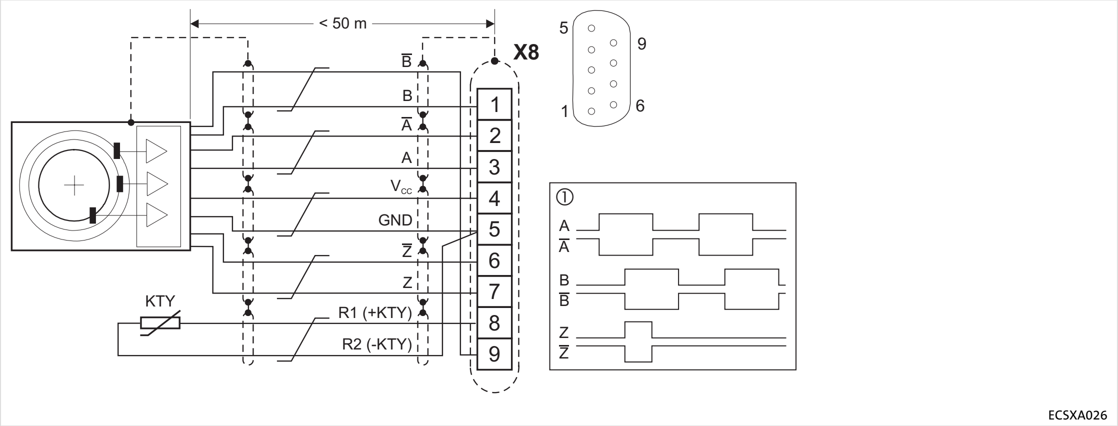


Fig.5-18 Connection of incremental encoder with TTL level

① Signals in case of clockwise rotation
╱ Cores twisted in pairs

Connector assignment X8: pins, Sub-D 9-pole									
Pin	1	2	3	4	5	6	7	8	9
Signal	B	$\overline{A}$	A	V_{CC}	GND (R1/+KTY)	$\overline{Z}$	Z	R2 (-KTY)	$\overline{B}$
	0.14 mm² (AWG 26)			1 mm² (AWG 18)		0.14 mm² (AWG 26)			

SinCos encoder

Features	
Input/output frequency:	0 ... 200 kHz
Internal resistance (R_i):	221 Ω
Offset voltage for signals SIN, COS, Z:	2.5 V

- ► The differential voltage between the signal track and the reference track must not exceed 1 V ± 10 % !
- ► The connection is open-circuit monitored (error message Sd8)
- ► For encoders with tracks sine, $\overline{\text{sine}}$ and cosine, $\overline{\text{cosine}}$:
  - – Assign RefSIN with $\overline{\text{sine}}$.
  - – Assign RefCOS with $\overline{\text{cosine}}$.

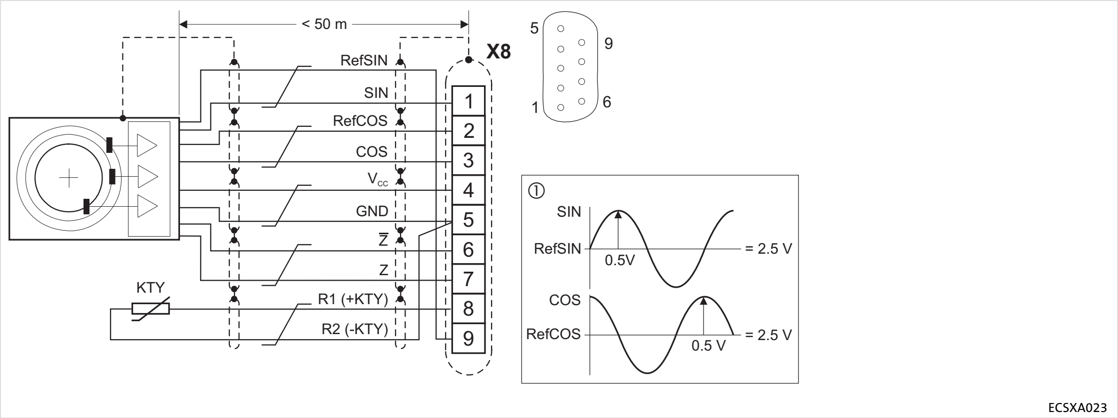


Fig.5-19 Sin/cos encoder connection

① Signals in case of clockwise rotation

⟋ Cores twisted in pairs

Connector assignment X8: pins, Sub-D 9-pole									
Pin	1	2	3	4	5	6	7	8	9
Signal	SIN	RefCOS ($\overline{\text{cosinus}}$)	COS	V_{CC}	GND (R2/-KTY)	$\overline{Z}$ or -RS458	Z or +RS485	R1 (+KTY)	RefSIN ($\overline{\text{sinus}}$)
	0.14 mm² (AWG 26)			1 mm² (AWG 18)		0.14 mm² (AWG 26)			

5.7 Master frequency input/output (encoder simulation)

Note!

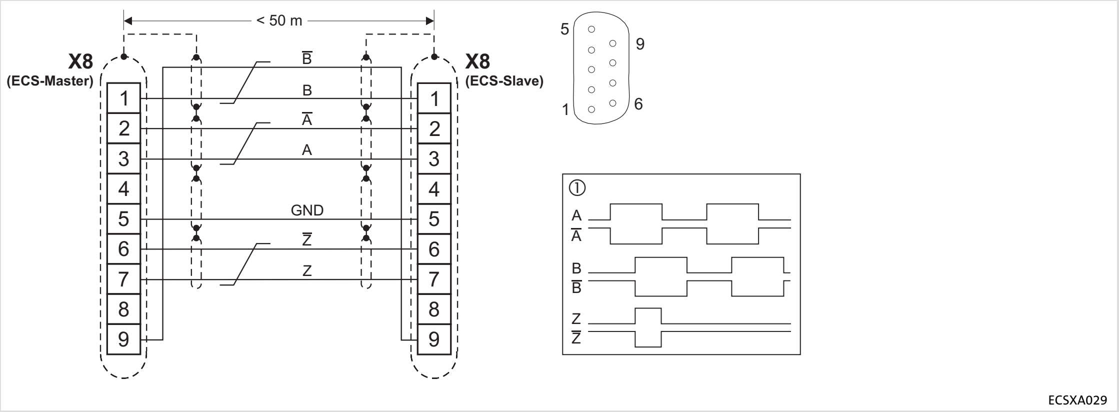
- ► We recommend to use Lenze system cables for wiring.
- ► With self-prepared cables only use cables with shielded cores twisted in pairs.

The 9-pole Sub-D plug X8 can be used as a digital frequency input **or** as a digital frequency output (e.g. for encoder simulation) (configuration via C0491).

The digital frequency coupling of ECS axis modules in principle is effected as a master-slave connection. If several ECS axis modules (max. 3 slaves) are connected to a master, the **EMF2131IB** digital frequency distributor is required for this purpose (🕮 73).

Features

X8 as master frequency input	X8 as master frequency output
● Input frequency: 0 ... 200 kHz ● Current consumption: max. 6 mA per channel ● Two-track with inverse 5 V signals and zero track ● Possible input signals: – incremental encoder with two 5 V complementary signals (TTL encoders) offset by 90° ● The function of the input signals can be set via C0427 (🕮 245).	● Output frequency: 0 ... 200 kHz ● Permissible current loading: max. 20 mA per channel ● Two-track with inverse 5 V signals (RS422) ● The function of the output signals can be set via C0540 (🕮 248).



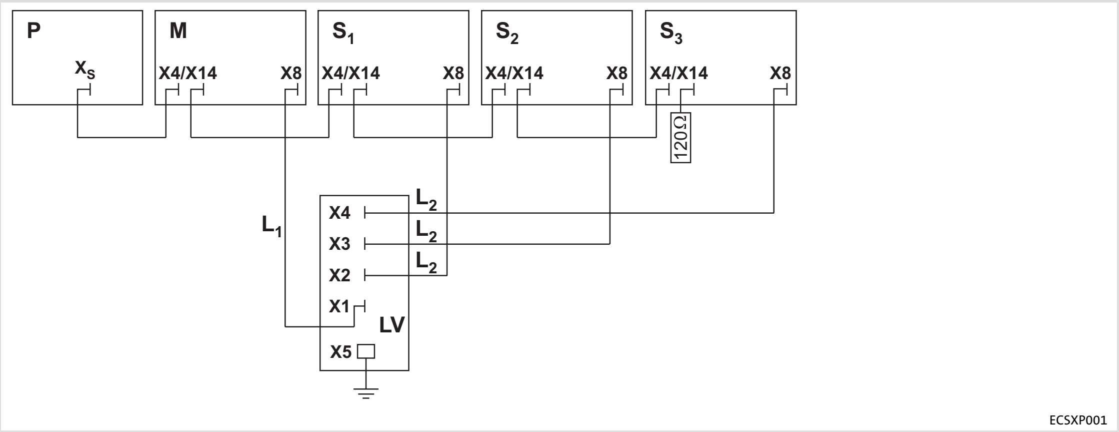
ECSXA029

Fig.5-20 Connection of the master frequency input/output X8 (master ↔ slave)

①	Signals for clockwise rotation
╱	Cores twisted in pairs

Connector assignment X8: pins, Sub-D 9-pole

Pin	1	2	3	4	5	6	7	8	9
Input signal	B	$\overline{A}$	A	–	GND	$\overline{Z}$	Z	–	$\overline{B}$
Output signal	B	$\overline{A}$	A	–	GND	$\overline{Z}$	Z	–	$\overline{B}$
	0.14 mm² (AWG 26)			1 mm² (AWG 18)		0.14 mm² (AWG 26)			



ECSXP001

Fig.5-21 ECS devices in the CAN network with digital frequency distributor

p	Drive PLC or client PLC for activating the drive system
M	Conductivity master (ECSxS/P/A axis module)
$S_{1,2,3}$	Slave 1, slave 2, slave 3 (ECSxS/P/A axis module)
LV	EMF2132IB Digital frequency distributor
L1	EYD0017AxxxxW01W01, connecting cable
L2	EYD0017AxxxxW01S01, connecting cable

6 Commissioning

6.1 Before you start

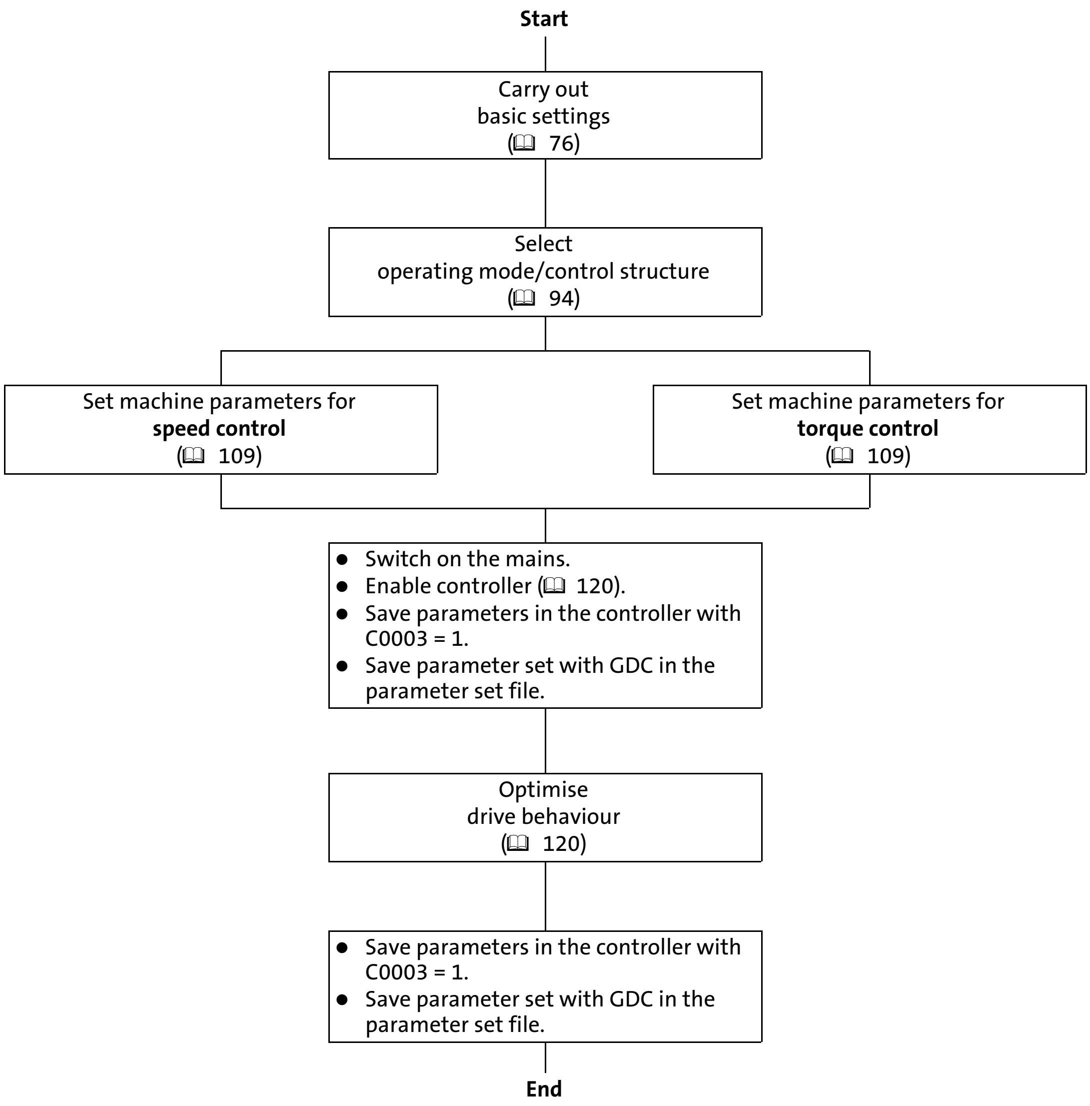
Note!

- ► In the description of the commissioning steps the use of a Lenze motor is assumed. For details on the operation with other motors see 🕮 114.
- ► The operation with the Lenze parameter setting and operating program **Global Drive Control (GDC)** is taken as a basis. The parameters are displayed in the online mode, i.e. GDC can directly access the codes of the axis module.

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

- ► Power connection:
  - – Polarity of the DC-bus voltage supply via terminals +UG, -UG
- ► Motor connection:
  - – Connection to the motor in correct phase relation (direction of rotation)
- ► Wiring of “safe torque off” (formerly ”safe standstill”)
- ► Feedback system
- ► Control terminals:
  - – Wiring adjusted to the signal assignment of the control terminals.

6.2 Commissioning steps (overview)



6.3 Carrying out basic settings with GDC

Note!

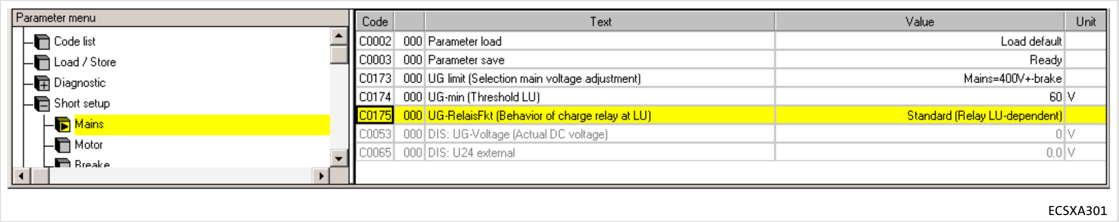
- ► Switch on the low-voltage supply (24 V DC) before carrying out the settings.
- ► Observe the commissioning steps in the given order.

Setting	Short description	Detailed information
Basic settings of the device		
Preconditions	● Green LED off, red LED blinking (mains is disconnected). ● Ensure that the controller inhibit is active if the low-voltage supply is switched on.	
1. Switch on low-voltage supply.		
2. Connect PC / laptop (with installed GDC parameter setting program) to the controller.	Connection to terminal X14 (CAN-AUX) with PC system bus adapter.	🕮 127
3. Start GDC and select the device to be set.	**Selecting a device:** Change to the online mode via the GDC tool bar with the <F4> key and select ”Searching for drives” using the <F2> key. ⇨ Drive is identified and the parameter menu is opened.	GDC online help
4. If the controller is operated within a CAN network, set communication parameters.	● CAN node address (via DIP switch) ● Baud rate (via DIP switch) ● C0356 (CAN boot up/cycle time) ● C1120 = 1 (sync connection via MotionBus (CAN)) ● C1121 (synchronisation cycle [in ms])	🕮 150 🕮 154 🕮 155
5. Set mains data.	Set the codes in the GDC parameter menu under **Short setup → Mains**. ● C0173 (voltage thresholds) ● C0175 (function of the charge relay) – For operation with power supply module ECSxE set C0175 = 3.	🕮 78
6. Enter motor data.	Lenze motors: Use the motor assistant of the GDC.	🕮 81
	Motors of other manufacturers	🕮 114
7. Configure holding brake.	● Not required if a holding brake is not available; *otherwise* ● set C0472/10 (speed threshold) > 0 (e. g. 1 %) for closing the holding brake.	🕮 83
8. Set feedback system.	● With resolver feedback system (standard): Set the codes in the GDC parameter menu under **Short setup → Feedback**. ● Alternative feedback systems can be set in the GDC parameter menu under **Motor/Feedback → Feedback**.	🕮 84
9. A Set direction of rotation of the motor/polarity of the digital inputs.	Set C0114/x (polarity dig. inputs) in the parameter menu of the GDC under **Terminal E/A → Digital inputs**: ● CW rotation – C0114/1 = HIGH level active (X6/DI1) – C0114/2 = LOW level active (X6/DI2) ● CCW rotation – C0114/1 = LOW level active (X6/DI1) – C0114/2 = HIGH level active (X6/DI2) ● Quick stop (QSP) – C0114/1 = LOW level active (X6/DI1) – C0114/2 = LOW level active (X6/DI2)	🕮 92 🕮 112
B Set polarity of the digital outputs.	Set C0118/1 (polarity of dig. output X6/DO1) in the GDC parameter menu under **Terminal I/O → Digital outputs**.	🕮 92

Setting		Short description		Detailed information
Basic control settings				
10.	Select operating mode/control structure.	A	Speed control: Set the following in the parameter menu of the GDC under **Short setup → Speed**: – C3005 = 1000: setpoint via analog input – C3005 = 1003: setpoint via AIF – C3005 = 1005: setpoint via MotionBus (CAN)	🕮 94
		B	Torque control: Set the following in the parameter menu of the GDC under **Short setup → Torque**: – C3005 = 4000: setpoint via analog input – C3005 = 4003: setpoint via AIF – C3005 = 4005: setpoint via MotionBus (CAN)	
11.	The basic settings are now completed. Continue with the ...	A	parameter settings for speed control	🕮 109
		B	parameter settings for torque control	

6.4 Setting of mains data

The GDC includes the parameters and codes to be set in the parameter menu under **Short setup → Mains**:



Code		Text	Value	Unit
C0002	000	Parameter load	Load default	
C0003	000	Parameter save	Ready	
C0173	000	UG limit (Selection main voltage adjustment)	Mains=400V+-brake	
C0174	000	UG-min (Threshold LU)	60	V
C0175	000	UG-RelaisFkt (Behavior of charge relay at LU)	Standard (Relay LU-dependent)	
C0053	000	DIS: UG-Voltage (Actual DC voltage)	0	V
C0065	000	DIS: U24 external	0.0	V

Fig.6-1 GDC view: Short setup of the mains data

6.4.1 Selecting the function of the charge relay

The ECS axis modules are provided with a charging current limitation by means of charge resistors and charge relays. In the Lenze setting the charging current limitation is activated (C0175 = 1).

At mains connection the charge relay remains open for a while so that the charging current of the DC bus is limited by the charging resistors. When a certain voltage level has been reached, the charging resistors are short circuited by switching on (closing) the charge relay contacts.

Stop!

- ▶ If the DC-bus voltage is generated with an **ECSxE** power supply module, the DC bus is loaded in a controlled way. Therefore **C0175 = 3** must be set for the axis module.
- ▶ Cyclic switching of the mains voltage at the power supply module can overload and destroy the input current limitation of the axis module if C0175 = 1 or C0175 = 2.

  For this reason allow a break of three minutes between two starting operations in case of cyclic mains switching over a longer period of time!

Code		**Possible settings**			**IMPORTANT**	
No.	**Designation**	**Lenze/ appl.**	**Selection**			
C0175	UG-Relais Fkt	1			Charge relay behaviour with undervoltage (LU) in the DC bus.	🕮 78
			1	Standard	Relay switches as a function of LU.	
			2	One Time	Relay switches when LU is exceeded for the first time and remains on.	
			3	Fixed On	Charging current limitation is inactive. ● Relay is always switched on and the charging resistors of the axis module are thus permanently jumpered. ● Setting for operation with ECSxE power supply module.	

6.4.2 Setting the voltage thresholds

Note!
All drive components in DC-bus connections must have the same thresholds!

Selection	Mains voltage	Brake unit	LU message (Undervoltage)		OU message (Overvoltage)	
C0173	Power supply module [V AC]		Setting [V DC]	Resetting [V DC]	Setting [V DC]	Resetting [V DC]
0	230	yes/no	130	275	400	390
1	400	yes/no	285	430	800	790
2	400 ... 460	yes/no	328	473	800	790
3	480	no	342	487	800	785
4	480	yes	342	487	800	785
10	230	yes/no	C0174	C0174 + 5 V	400	390
11	400 (Lenze setting)	yes/no	C0174	C0174 + 5 V	800	790
12	400 ... 460	yes/no	C0174	C0174 + 5 V	800	790
13	480	no	C0174	C0174 + 5 V	800	785
14	480	yes	C0174	C0174 + 5 V	800	785

Code		Possible settings				IMPORTANT	
No.	Designation	Lenze/ appl.	Selection				
C0173	UG limit	11				Adaptation of the DC-bus voltage thresholds: ● Check during commissioning and adapt, if necessary. ● All drive components in DC bus connections must have the same thresholds. – LU = Undervoltage threshold – OU = Overvoltage threshold	🕮 78
			0	Mains = 230V +- B		Operation on 230 V mains with or without brake unit LU = 130 V, OU = 400 V	
			1	Mains = 400V +- B		Operation on 400 V mains with or without brake unit LU = 285 V, OU = 800 V	
			2	Mains = 460V +- B		Operation on 460 V mains with or without brake unit LU = 328 V, OU = 800 V	
			3	Mains = 480V - B		Operation on 480 V mains without brake unit LU = 342 V, OU = 800 V	
			4	Mains = 480V + B		Operation on 480 V mains with brake unit LU = 342 V, OU = 800 V	
			10	Mains = 230V +- B		Operation on 230 V mains with or without brake unit LU = C0174, OU = 400 V	
			11	Mains = 400V +- B		Operation on 400 V mains with or without brake unit LU = C0174, OU = 800 V	
			12	Mains = 460V +- B		Operation on 460 V mains with or without brake unit LU = C0174, OU = 800 V	
			13	Mains = 480V - B		Operation on 480 V mains without brake unit LU = C0174, OU = 800 V	
			14	Mains = 480V + B		Operation on 480 V mains with brake unit LU = C0174, OU = 800 V	
C0174	UG min	60				Undervoltage threshold of DC bus (LU)	🕮 78
			15	{1 V}	342		

6.5 Entry of motor data for Lenze motors

Note!

The following only describes the parameter setting for Lenze motors! (If you use a motor from another manufacturer, see 🕮 114)

Parameter setting with the ”Input assistant for motor data” of the GDC

1. Select the menu item **Tool → Motor data** from the menu bar of the GDC or click on the button with the voltage divider symbol in the tool bar (the rightmost symbol in the illustration):

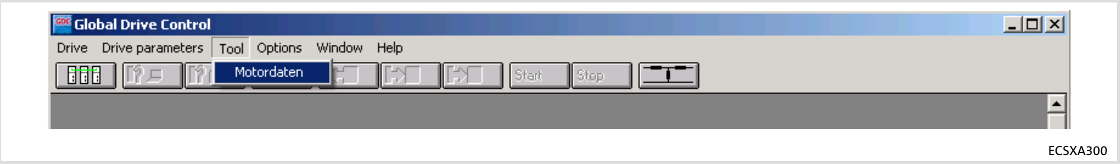
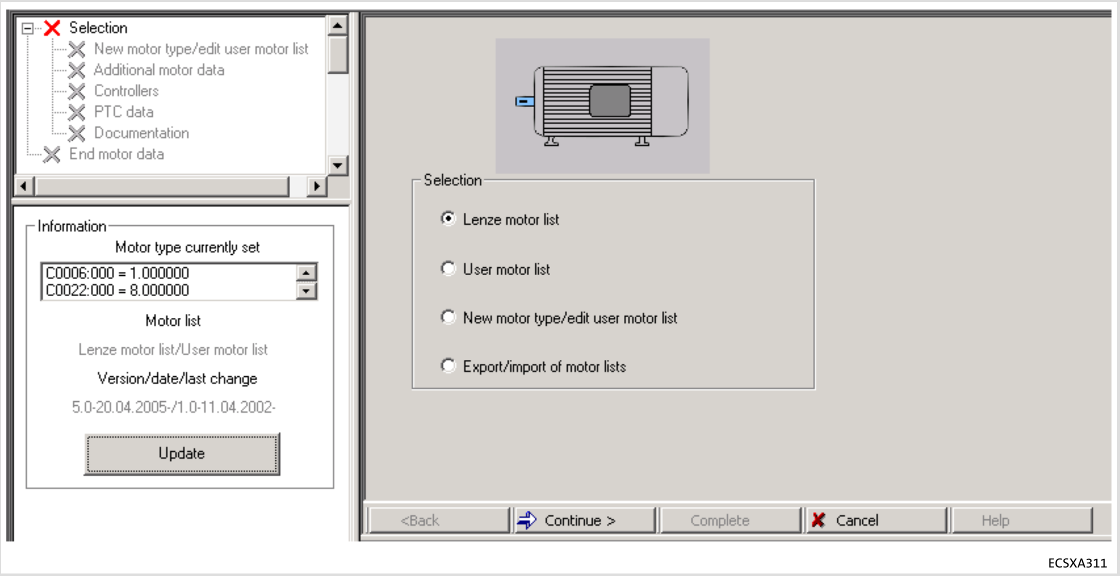


Fig.6-2 GDC view: Menu bar and tool bar

– The ”Input assistant for motor data” opens:



Motor type currently set

C0006:000 = 1.000000
C0022:000 = 8.000000

Motor list

Lenze motor list/User motor list

Version/date/last change

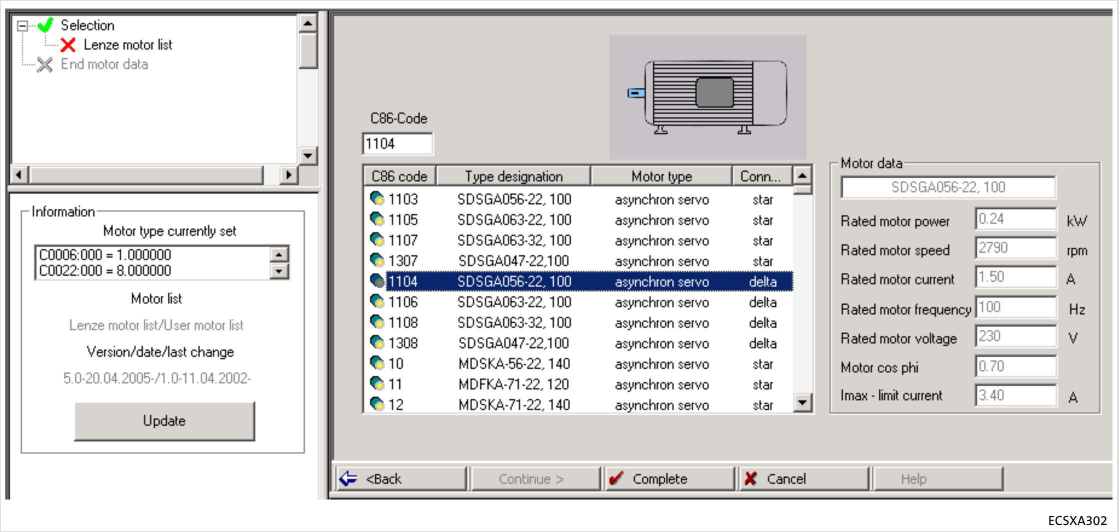
5.0-20.04.2005-/1.0-11.04.2002-

Selection

● Lenze motor list
○ User motor list
○ New motor type/edit user motor list
○ Export/import of motor lists

Fig.6-3 GDC view: Selection of motor list

2. Select the ”Lenze motor list” and then click on the [Continue] button.



Information

Motor type currently set

C0006:000 = 1.000000
C0022:000 = 8.000000

Motor list

Lenze motor list/User motor list

Version/date/last change

5.0-20.04.2005-/1.0-11.04.2002-

C86-Code: 1104

C86 code	Type designation	Motor type	Conn...
1103	SDSGA056-22, 100	asynchron servo	star
1105	SDSGA063-22, 100	asynchron servo	star
1107	SDSGA063-32, 100	asynchron servo	star
1307	SDSGA047-22,100	asynchron servo	star
1104	SDSGA056-22, 100	asynchron servo	delta
1106	SDSGA063-22, 100	asynchron servo	delta
1108	SDSGA063-32, 100	asynchron servo	delta
1308	SDSGA047-22,100	asynchron servo	delta
10	MDSKA-56-22, 140	asynchron servo	star
11	MDFKA-71-22, 120	asynchron servo	star
12	MDSKA-71-22, 140	asynchron servo	star

Motor data

SDSGA056-22, 100

Rated motor power	0.24	kW
Rated motor speed	2790	rpm
Rated motor current	1.50	A
Rated motor frequency	100	Hz
Rated motor voltage	230	V
Motor cos phi	0.70	
Imax - limit current	3.40	A

ECSXA302

Fig.6-4 GDC view: Selection of motor

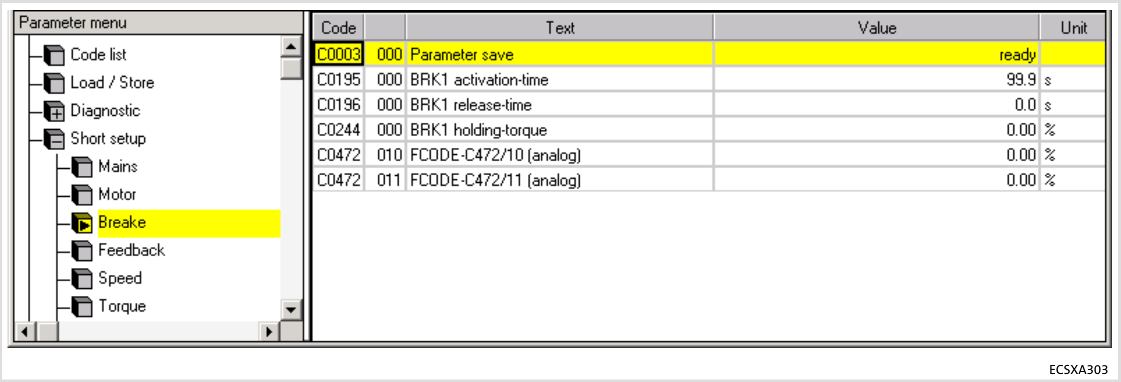
3. Select the connected motor from the list (see motor nameplate).
   – The corresponding motor data are displayed in the ”Motor data” fields.
4. Click on the [Complete] button.
   – The data are transferred to the controller. This process can take a few seconds and is confirmed by a message after being completed.

6.6 Holding brake configuration

Tip!

If you use a motor without a holding brake, you can skip this chapter.

In the GDC, the parameters or codes to be set can be found in the parameter menu under **Short setup → Brake**:



Code		Text	Value	Unit
C0003	000	Parameter save	ready	
C0195	000	BRK1 activation-time	99.9	s
C0196	000	BRK1 release-time	0.0	s
C0244	000	BRK1 holding-torque	0.00	%
C0472	010	FCODE-C472/10 (analog)	0.00	%
C0472	011	FCODE-C472/11 (analog)	0.00	%

Fig.6-5 GDC view: Short setup of the holding brake

Code	Designation	Description
C0195	Brake closing time/engagement time	The time required for closing the holding brake. ● Only after this time has elapsed, the controller inhibit is activated (control bit *CINH* = 1 (TRUE)).
C0196	Brake opening time/disengagement time	The time required for opening the holding brake. ● During the time set the drive generates the torque set under C0244 against the holding brake. ● If an actual speed higher than the value in C0472/10 is detected before the brake opening time (C0196) has expired, the drive can immediately change to speed-controlled operation.
C0244	Holding torque	Holding torque of the drive against the holding brake ● 100 % ≙ value of C0057
C0472/10	FCODE analog [%]	Speed threshold from which the drive is allowed to output the signal ”Close brake”. ● This code refers to the maximum speed set in C0011. **Note:** Enter a value > 0 so that the brake can be opened.
C0472/11	FCODE analog [%]	Value/direction of the torque against the holding brake.

6.7 Setting of the feedback system for position and speed control

These feedback systems can be set for position and speed control:

- Resolver (🕮 84) on X7
- Incremental encoder/sin/cos encoder without serial communication on X8 (🕮 87)
- Absolute value encoder (hyperface, single-turn/multi-turn) on X8 (🕮 88)

6.7.1 Resolver for position and speed control

If a resolver is connected to X7 and used for position and speed control, no settings are required.

Lenze setting:

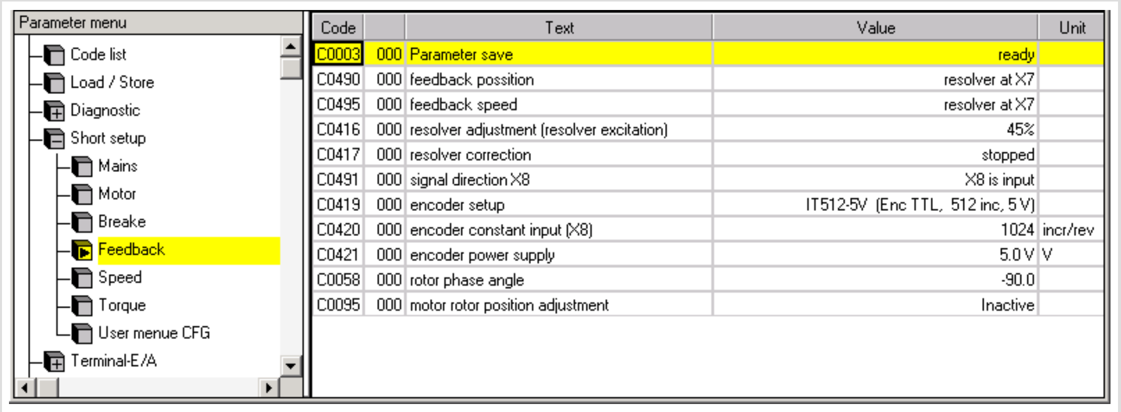
- Feedback system for position control: C0490 = 0
- Feedback system for speed control: C0495 = 0

Note!

When an absolute value encoder (hyperface, single-turn/multi-turn) is used, the settings for C0490 and C0495 must be the same.

6.7.2 Codes for setting the resolver feedback

The GDC includes the parameters or codes to be set in the parameter menu under **Short setup → Feedback**:



Code		Text	Value	Unit
C0003	000	Parameter save	ready	
C0490	000	feedback possition	resolver at X7	
C0495	000	feedback speed	resolver at X7	
C0416	000	resolver adjustment (resolver excitation)	45%	
C0417	000	resolver correction	stopped	
C0491	000	signal direction X8	X8 is input	
C0419	000	encoder setup	IT512-5V (Enc TTL, 512 inc, 5 V)	
C0420	000	encoder constant input (X8)	1024	incr/rev
C0421	000	encoder power supply	5.0 V	V
C0058	000	rotor phase angle	-90.0	
C0095	000	motor rotor position adjustment	Inactive	

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Fig.6-6 GDC view: Short setup of the feedback system

Code		Possible settings			IMPORTANT	
No.	**Designation**	**Lenze/ appl.**	**Selection**			
[C0490]	Feedback pos	0			Selection of feedback system for positioning control **When an absolute value encoder (single-turn, multi-turn) is used, the settings for C0490 and C0495 must be the same.**	🕮 84
			0	Resolver at X7	Standard setting	
			1	TTL encoder at X8		
			2	Sin/cos encoder at X8		
			3	Absolute value encoder (single-turn) at X8		
			4	Absolute value encoder (multi-turn) at X8		
[C0495]	Feedback n	0			Selection of feedback system for speed control **When an absolute value encoder (single-turn, multi-turn) is used, the settings for C0490 and C0495 must be the same.**	🕮 84
			0	Resolver at X7	Standard setting	
			1	TTL encoder at X8		
			2	Sin/cos encoder at X8		
			3	Absolute value encoder (single-turn) at X8		
			4	Absolute value encoder (multi-turn) at X8		

Codes for optimising the operation and display

Code		Possible settings				IMPORTANT	
No.	**Designation**	**Lenze/ appl.**	**Selection**				
C0058	Rotor diff	-90.0				Rotor displacement angle for synchronous motors (C0095) Only display	🕮 117
			-180.0	{0.1 °}	179.9		
[C0080]	Res pole no.	1				Number of pole pairs of resolver	
			1	{1}	10		
[C0095]	Rotor pos adj	0				Rotor position adjustment of a synchronous motor C0058 shows the rotor displacement angle.	🕮 117
			0	Inactive			
			1	Active			

Code		Possible settings			IMPORTANT	
No.	Designation	Lenze/ appl.	Selection			
[C0416]	Resolver adj.	5			Setting of resolver excitation amplitude	🕮 84
			0	100 %		
			1	80 %		
			2	68 %		
			3	58 %		
			4	50 %		
			5	45 %		
			6	40 %		
			7	37 %		
[C0417]	Resolver cor.	0			Resolver adjustment	🕮 125
			0	Ready		
			1	Start adjustment		
			2	Loading default values		

6.7.3 Incremental encoder / sin/cos encoder without serial communication

If an incremental encoder or a sin/cos encoder without serial communication is connected to X8 and used for position and speed control, comply with the following setting sequence:

1. Select encoder for position and speed control.
   - Incremental encoder (TTL encoder): C0490 and C0495 = 1
   - Sin/cos encoder without serial communication: C0490 and C0495 = 2

   If X8 has been selected as output due to a change of C0491, an automatic reset to input is made due to the encoder selection.
2. Select encoder used.
   - Incremental encoder (TTL encoder): C0419 = 110 ... 113
   - Sin/cos encoder without serial communication: C0419 = 210 ... 213
   - Encoder used is not in the list: C0419 = 1 (”Common”)
3. When setting C0419 = 1 (”Common”) configure encoder data.

Note!

When setting **C0419 = 11x or 21x** do **not** configure encoder data.

The encoder data (C0420, C0421, C0427) are set automatically in accordance with the selection.

   - C0420 (number of increments of the encoder)
   - C0421 (encoder voltage)
   - C0427 (signal type of the encoder)
4. Set encoder mounting position.
   - C3001 = 0: normal (direction of rotation CW with regard to direction of rotation of the motor)
   - C3001 = 1: inverse (direction of rotation CCW with regard to direction of rotation of the motor)
5. Save settings with C0003 = 1.

6.7.4 Absolute value encoder (hyperface, single-turn/multi-turn)

If an absolute value encoder with a hyperface interface is connected to X8 and is used for position and speed control, comply with the following setting sequence:

1. Select absolute value encoder for position and speed control.
   - – Single-turn encoder: C0490 and C0495 = 3
   - – Multi-turn encoder: C0490 and C0495 = 4

   If X8 has been selected as output due to a change of C0491, an automatic reset of X8 as an input is effected due to the encoder selection.

Note!

When an absolute value encoder (hyperface, single-turn/multi-turn) is used, the settings for C0490 and C0495 must be the same.

2. Select an absolute value encoder.
   - – Single-turn encoder: C0419 = 307 ... 311
   - – Multi-turn encoder: C0419 = 407 ... 411

   The encoder data (C0420, C0421, C0427) is set automatically in accordance with the selection.

Danger!

Injury to persons/breakdown of machinery may occur when **absolute value encoders** are used!

This means:

- ► In case of an **operating system up to and including version 6.7**, a connected motor may start in an uncontrolled manner with high speed and torque after mains connection and controller enable.

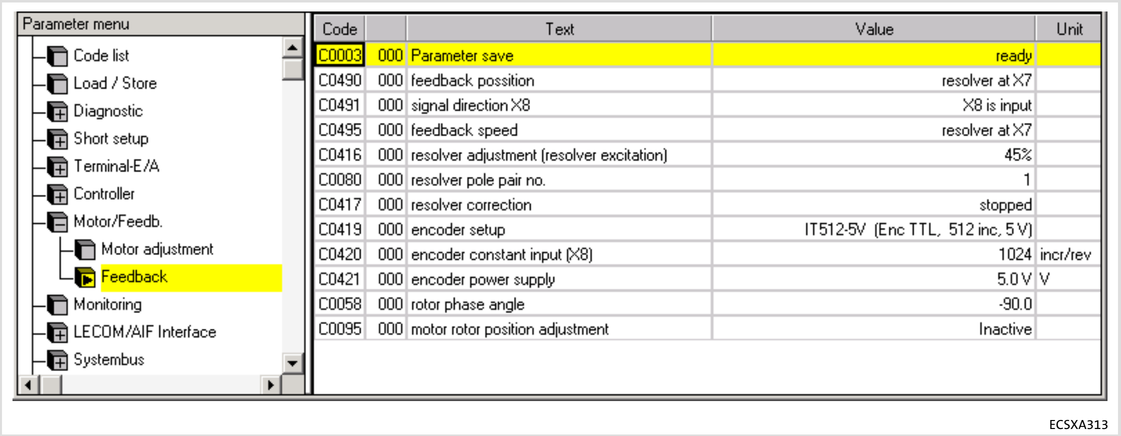
Therefore:

- ► Do not parameterise codes C0420, C0421 and C0427!

3. Set encoder mounting position.
   - – C3001 = 0: normal (same direction of rotation as direction of rotation of the motor)
   - – C3001 = 1: inverse (opposite direction of rotation to direction of rotation of the motor)
4. Save settings with C0003 = 1.

6.7.5 Codes for setting the encoder feedback

The GDC contains the parameters or codes to be set in the parameter menu under **Motor/Feedback → Feedback**.



Code		Text	Value	Unit
C0003	000	Parameter save	ready	
C0490	000	feedback possition	resolver at X7	
C0491	000	signal direction X8	X8 is input	
C0495	000	feedback speed	resolver at X7	
C0416	000	resolver adjustment (resolver excitation)	45%	
C0080	000	resolver pole pair no.	1	
C0417	000	resolver correction	stopped	
C0419	000	encoder setup	IT512-5V (Enc TTL, 512 inc, 5 V)	
C0420	000	encoder constant input (X8)	1024	incr/rev
C0421	000	encoder power supply	5.0 V	V
C0058	000	rotor phase angle	-90.0	
C0095	000	motor rotor position adjustment	Inactive	

Fig.6-7 GDC view: Commissioning of further feedback systems

Code		**Possible settings**			**IMPORTANT**	
No.	**Designation**	**Lenze/ appl.**	**Selection**			
[C0419]	Enc. setup	110			Encoder selection ● Selection of encoder which is indicated on the nameplate of the Lenze motor. ● The encoder data (C0420, C0421, C0427) is set automatically in accordance with the selection.	🕮 245 🕮 87 🕮 88
			0	COMMON		
			110	IT512-5V	Incremental encoder with TTL level	
			111	IT1024-5V		
			112	IT2048-5V		
			113	IT4096-5V		
			210	IS512-5V	Sin/cos encoder	
			211	IS1024-5V		
			212	IS2048-5V		
			213	IS4096-5V		
			307	AS64-8V	SinCos absolute value encoder with hyperface interface (single-turn) 307, 308, 309 can only be selected using the operating system 7.0 or higher.	
			308	AS128-8V		
			309	AS256-8V		
			310	AS512-8V		
			311	AS1024-8V		
			407	AM64-8V	SinCos absolute value encoder with hyperface interface (multi-turn) 407, 408, 409 can only be selected using the operating system 7.0 or higher.	
			408	AM128-8V		
			409	AM256-8V		
			410	AM512-8V		
			411	AM1024-8V		

Code		Possible settings				IMPORTANT	
No.	Designation	Lenze/ appl.	Selection				
[C0490]	Feedback pos	0				Selection of feedback system for positioning control **When an absolute value encoder (single-turn, multi-turn) is used, the settings for C0490 and C0495 must be the same.**	🕮 84
			0	Resolver at X7		Standard setting	
			1	TTL encoder at X8			
			2	Sin/cos encoder at X8			
			3	Absolute value encoder (single-turn) at X8			
			4	Absolute value encoder (multi-turn) at X8			
[C0495]	Feedback n	0				Selection of feedback system for speed control **When an absolute value encoder (single-turn, multi-turn) is used, the settings for C0490 and C0495 must be the same.**	🕮 84
			0	Resolver at X7		Standard setting	
			1	TTL encoder at X8			
			2	Sin/cos encoder at X8			
			3	Absolute value encoder (single-turn) at X8			
			4	Absolute value encoder (multi-turn) at X8			
[C0491]	X8 in/out	0				Function of X8	🕮 245 🕮 248 🕮 87 🕮 88
			0	X8 is input			
			1	X8 is output			
[C0420]	Encoder const.	1024				Number of increments of the encoder	🕮 245 🕮 87 🕮 88
			1	{1 inc/rev}	8192	Sets C0419 = 0 (”common”) if the value is altered.	
[C0421]	Encoder volt	0				Encoder voltage	🕮 245 🕮 87 🕮 88
			0	5.0 V		Sets C0419 = 0 (”common”) if the value is altered.	
			1	5.6 V			
			2	6.3 V			
			3	6.9 V			
			4	7.5 V			
			5	8.1 V			
[C0427]	Enc. signal	0				Function of the master frequency input signals on X8 (DFIN)	🕮 245 🕮 87 🕮 88
			0	2-phase			
			1	A: speed B: direction			
			2	A or B: speed or direction			
C0058	Rotor diff	-90.0				Rotor displacement angle for synchronous motors (C0095) Only display	🕮 117
			-180.0	{0.1 °}	179.9		

Code		Possible settings			IMPORTANT	
No.	Designation	Lenze/ appl.	Selection			
[C0095]	Rotor pos adj	0			Rotor position adjustment of a synchronous motor C0058 shows the rotor displacement angle.	🕮 117
			0	Inactive		
			1	Active		

6.8 Configuring the digital inputs and outputs

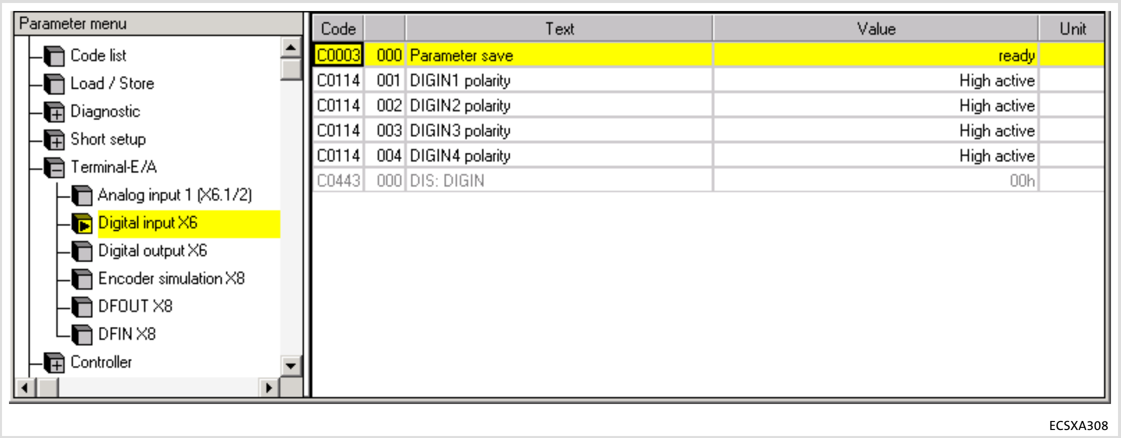
6.8.1 Setting the polarity

For each digital input and digital output the polarity can be defined. By this, you determine whether the input or output is HIGH active or LOW active.

The following is provided:

- 4 freely assignable digital inputs (X6/DI1 ... DI4)
- 1 digital output (X6/DO1)
- 1 relay output (X25/BD1, BD2)

The GDC contains codes for setting the polarity of digital inputs and outputs in the parameter menu under **Terminal I/O**:



Code		Text	Value	Unit
C0003	000	Parameter save	ready	
C0114	001	DIGIN1 polarity	High active	
C0114	002	DIGIN2 polarity	High active	
C0114	003	DIGIN3 polarity	High active	
C0114	004	DIGIN4 polarity	High active	
C0443	000	DIS: DIGIN	00h	

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Fig.6-8 GDC view: Setting of the polarity of digital inputs and outputs

6.8.2 Setting the direction of rotation

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

- the sign of the speed setpoint.
- the polarity of the digital inputs X6/DI1 and X6/DI2.

How to set the polarity/direction of rotation via C0114/x:

- **CW rotation**
  – C0114/1 = HIGH level active (X6/DI1)
  – C0114/2 = LOW level active (X6/DI2)
- **CCW rotation**
  – C0114/1 = LOW level active (X6/DI1)
  – C0114/2 = HIGH level active (X6/DI2)
- **Quick stop (QSP)**
  – C0114/1 = LOW level active (X6/DI1)
  – C0114/2 = LOW level active (X6/DI2)
  – See also page 🕮 112.

6.8.3 Change of the terminal assignment

The input terminals are to be considered as signal sources for the internal functions (signal name). The assignment of the digital inputs is effected indirectly, as a signal source for controlling the function is selected from the list of all digital signal sources on the basis of the internal function.

Stop!

► If you change the configuration via C3005, the assignment of all inputs and outputs is overwritten with the corresponding basic assignment. If necessary, the function assignment must be readjusted to your wiring.

► Signal sources, i. e. also digital inputs, can be connected parallel to more than one function (signal name).

► If you allocate (assign) an input as a new signal source, undesired connections have to be deleted, if required.

► **Example:** digital inputs/outputs in basic configuration C3005 = 1000

Here the most important targets for digital inputs and outputs for ”speed control” are listed:

Code	Subcode	Signal name	Controlled by Signal (interface)	Note
C7411	1	SPEED-RLQ.CW	DIGIn-In1 (terminal X6/DI1)	HIGH level = do not invert main setpoint (CW rotation)
	2	SPEED-RLQ.CCW	DIGIn-In2 (terminal X6/DI2)	HIGH level = Invert main setpoint (CCW rotation)
	3	SPEED-Nset.Jog1	DIGIn-In3 (terminal X6/DI3)	HIGH level = main setpoint is substituted by the fixed speed from C0039/x The signals are binary coded.
	4	SPEED-Nset.Jog2	FIXED 0, not interconnected	
	5	SPEED-NSET.Jog4	FIXED 0, not interconnected	
	6	SPEED-Nset.Jog8	FIXED 0, not interconnected	
	10	SPEED-BRK.SetBrake	DIGIn-In4 (terminal X6/DI4)	HIGH level = close holding brake when the speed falls below the threshold in C0472/10.
C6371	1	DigOut1-Out1	FIXED 0, not interconnected	
	2	DigOut relay	SPEED-BRK.NegOut	Control of the holding brake by the ”Speed” function block.

Note!

For ”Speed control”, carry out settings in C7511 and C6371.

6.9 Selecting the operating mode/control structure

For frequent applications, the controller-internal signal processing is saved in basic configurations hich can be selected via C3005:

- Speed control:

Code	Value	Interfaces	Application examples	Functional description
C3005	1000	Activation/setpoint via analog input	🕮 95	🕮 262
	1003	Control / setpoint via AIF	🕮 98	
	1005	Control / setpoint via MotionBus (CAN)	🕮 100	

- Torque control:

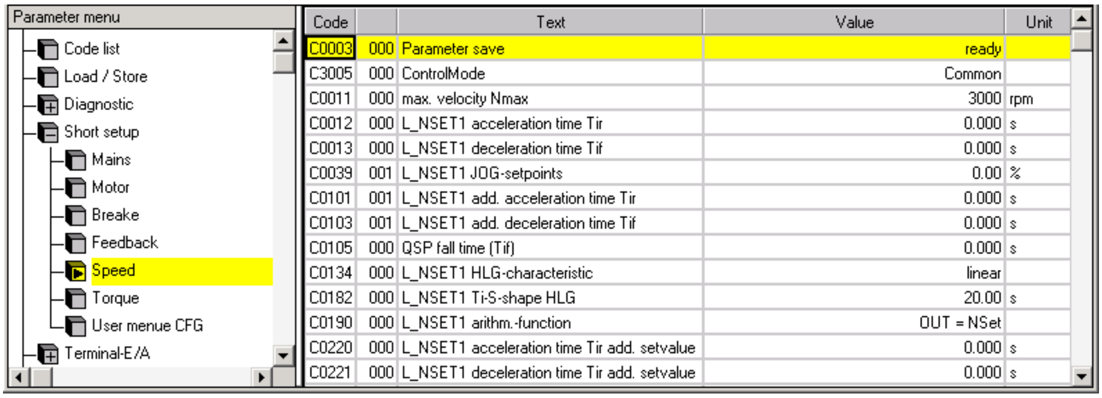
Code	Value	Interfaces	Application examples	Functional description
C3005	4000	Activation/setpoint via analog input	🕮 102	🕮 284
	4003	Control / setpoint via AIF	🕮 105	
	4005	Control / setpoint via MotionBus (CAN)	🕮 107	

Stop!

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

In the GDC the code C3005 can be found in the parameter menu under

- **Short setup → Speed** (for speed control).
- **Short setup → Torque** (for torque control).



Code		Text	Value	Unit
C0003	000	Parameter save	ready	
C3005	000	ControlMode	Common	
C0011	000	max. velocity Nmax	3000	rpm
C0012	000	L_NSET1 acceleration time Tir	0.000	s
C0013	000	L_NSET1 deceleration time Tif	0.000	s
C0039	001	L_NSET1 JOG-setpoints	0.00	%
C0101	001	L_NSET1 add. acceleration time Tir	0.000	s
C0103	001	L_NSET1 add. deceleration time Tif	0.000	s
C0105	000	QSP fall time (Tif)	0.000	s
C0134	000	L_NSET1 HLG-characteristic	linear	
C0182	000	L_NSET1 Ti-S-shape HLG	20.00	s
C0190	000	L_NSET1 arithm.-function	OUT = NSet	
C0220	000	L_NSET1 acceleration time Tir add. setvalue	0.000	s
C0221	000	L_NSET1 deceleration time Tir add. setvalue	0.000	s

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Fig.6-9 GDC view: short setup of the speed control ("Speed")

6.9.1 Speed control with setpoint via analog input

Configuration C3005 = 1000

Note!

Use the ”input assistant for motor data” of the GDC for setting the motor data (🕮 81).

Set the following codes:

Code	Meaning	Further information
DC-bus voltage thresholds and charge relay function		
C0173 = x	DC-bus voltage thresholds	
C0175 = x	Charge relay function (when using an ECS supply module: C0175 = 3)	
Maximum motor current		
C0022 = x [A]	Maximum motor current (I_{max})	
Controller configuration and feedback system		
C3005 = 1000	Speed control with setpoint via analog input	🕮 94
C0495 = x	Feedback system	🕮 84
Speed setpoint settings		
C0011 = x [rpm]	Maximum speed	🕮 276
C0012 = x [s]	Acceleration time	🕮 271
C0013 = x [s]	Deceleration time	
C0105 = x [s]	Quick stop deceleration time	🕮 280
Application parameters		
C0070 = x	Proportional gain (V_p) of speed controller	🕮 277
C0071 = x [ms]	Integral-action time (T_n) of speed controller	
Save parameters		
C0003 = 1	Save all parameters	

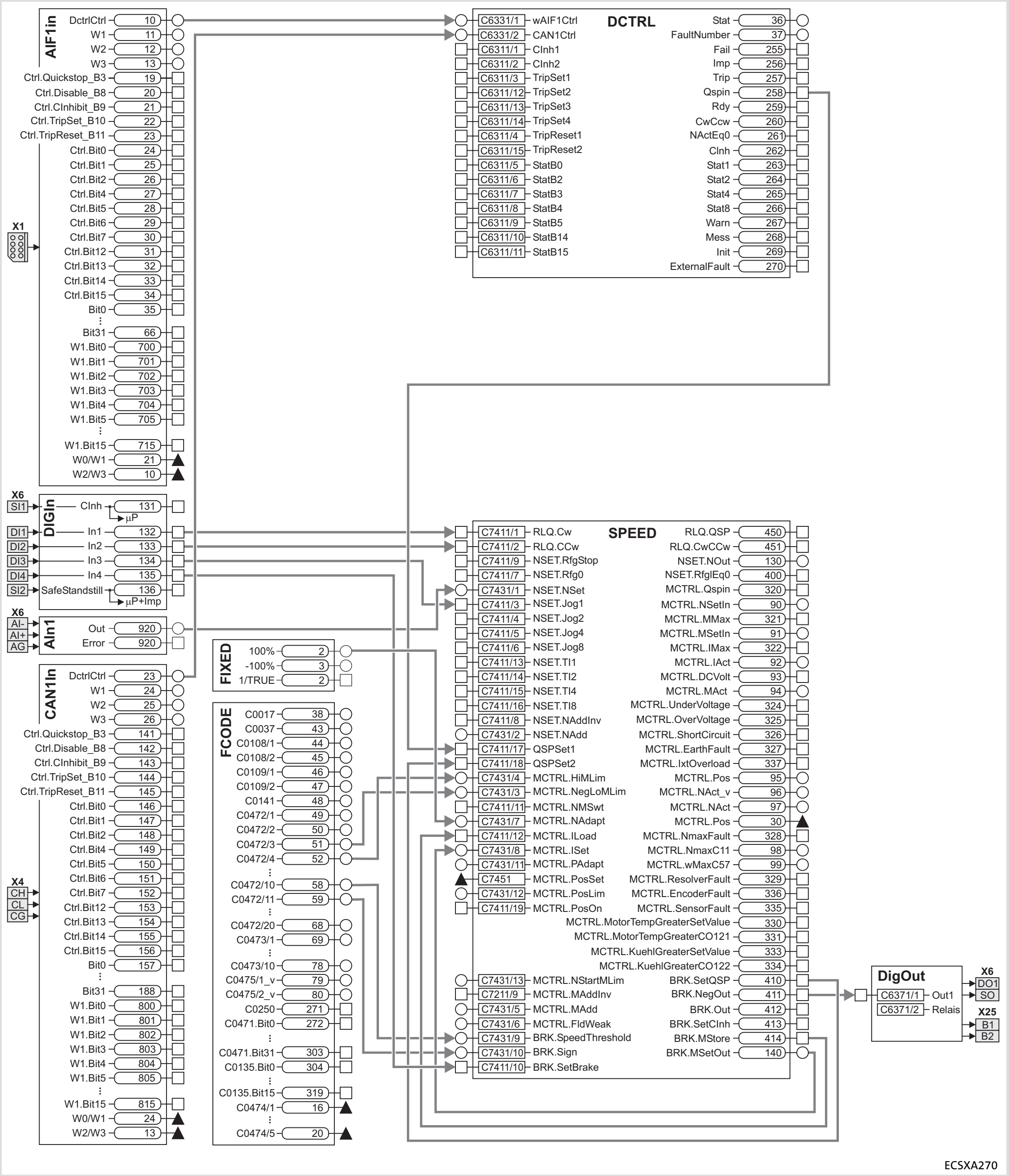

Fig.6-10 Signal flow diagram for configuration 1000 (setpoint via analog input)

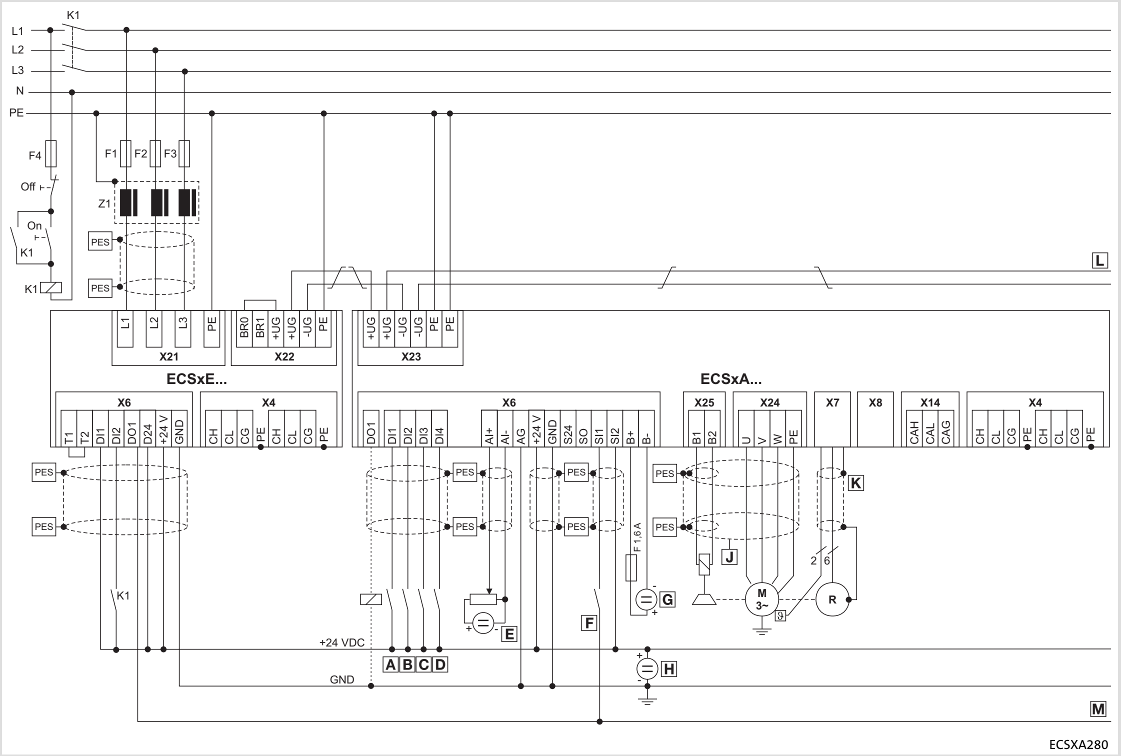

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Fig.6-11 Connection diagram for configuration 1000 (setpoint via analog input)

A	Direction of rotation / quick stop (QSP)
B	Direction of rotation / quick stop (QSP)
C	Fixed speed C0039/1
D	Holding brake
E	Analog input voltage supply
F	Switch for controller enable/inhibit
G	Motor system cable
H	Voltage supply of motor holding brake
J	Voltage supply of control
K	Controller enable
L	System cable feedback
M	DC-bus voltage
PES	HF shield termination by large-surface PE connection
ʃ	Twisted cables

Note!

In the wiring example (Fig.6-11) a HIGH level is fixedly applied on X6/SI2 (pulses for power section enabled).

6.9.2 Speed control with setpoint via AIF

Configuration C3005 = 1003

Note!

- Use the ”input assistant for motor data” of the GDC for setting the motor data (🕮 81).
- Further information can be obtained from the documentation for the corresponding fieldbus module.

Set the following codes:

Code	Meaning	Further information
DC-bus voltage thresholds and charge relay function		
C0173 = x	DC-bus voltage thresholds	
C0175 = x	Charge relay function (when using an ECS supply module: C0175 = 3)	
Maximum motor current		
C0022 = x [A]	Maximum motor current (I_{max})	
Controller configuration and feedback system		
C3005 = 1003	Speed control with setpoint via AIF	🕮 94
C0495 = x	Feedback system	🕮 84
Speed setpoint settings		
C0011 = x [rpm]	Maximum speed	🕮 276
C0012 = x [s]	Acceleration time	🕮 271
C0013 = x [s]	Deceleration time	
C0105 = x [s]	Quick stop deceleration time	🕮 280
Application parameters		
C0070 = x	Proportional gain (V_p) of speed controller	🕮 277
C0071 = x [ms]	Integral-action time (T_n) of speed controller	
Save parameters		
C0003 = 1	Save all parameters	

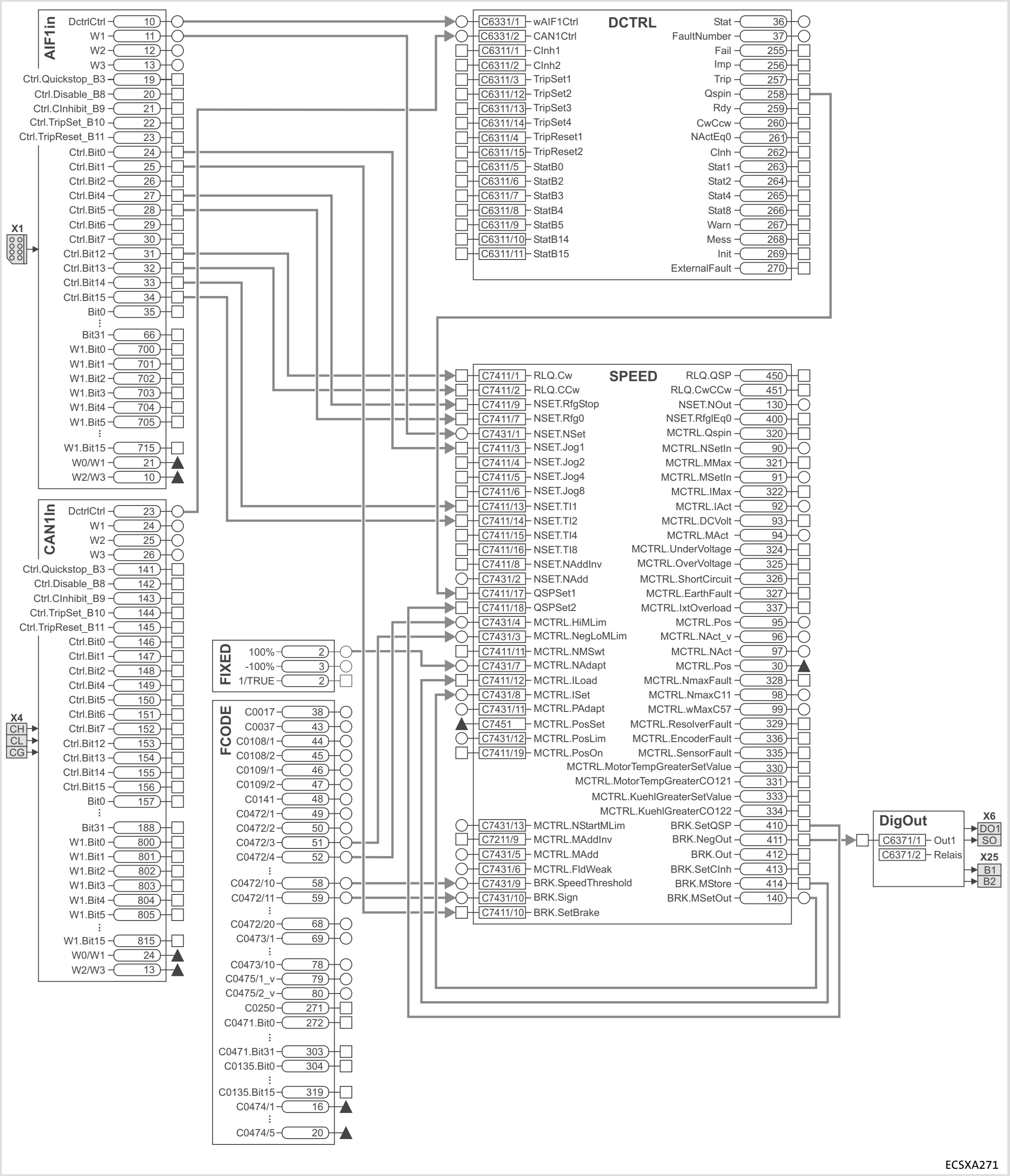


Fig.6-12 Signal flow diagram for configuration 1003 (setpoint via AIF)

6.9.3 Speed control with setpoint via MotionBus (CAN)

Configuration C3005 = 1005

Note!

- Use the ”input assistant for motor data” of the GDC for setting the motor data (🕮 81).
- Reading the data via CAN1_In requires an external sync signal (from the master control).

Set the following codes:

Code	Meaning	Further information
DC-bus voltage thresholds and charge relay function		
C0173 = x	DC-bus voltage thresholds	
C0175 = x	Charge relay function (when using an ECS supply module: C0175 = 3)	
Maximum motor current		
C0022 = x [A]	Maximum motor current (I_{max})	
Controller configuration and feedback system		
C3005 = 1005	Speed control with setpoint via MotionBus (CAN)	🕮 94
C0495 = x	Feedback system	🕮 84
Speed setpoint settings		
C0011 = x [rpm]	Maximum speed	🕮 276
C0012 = x [s]	Acceleration time	🕮 271
C0013 = x [s]	Deceleration time	
C0105 = x [s]	Quick stop deceleration time	🕮 280
Application parameters		
C0070 = x	Proportional gain (V_p) of speed controller	🕮 277
C0071 = x [ms]	Integral-action time (T_n) of speed controller	
Save parameters		
C0003 = 1	Save all parameters	

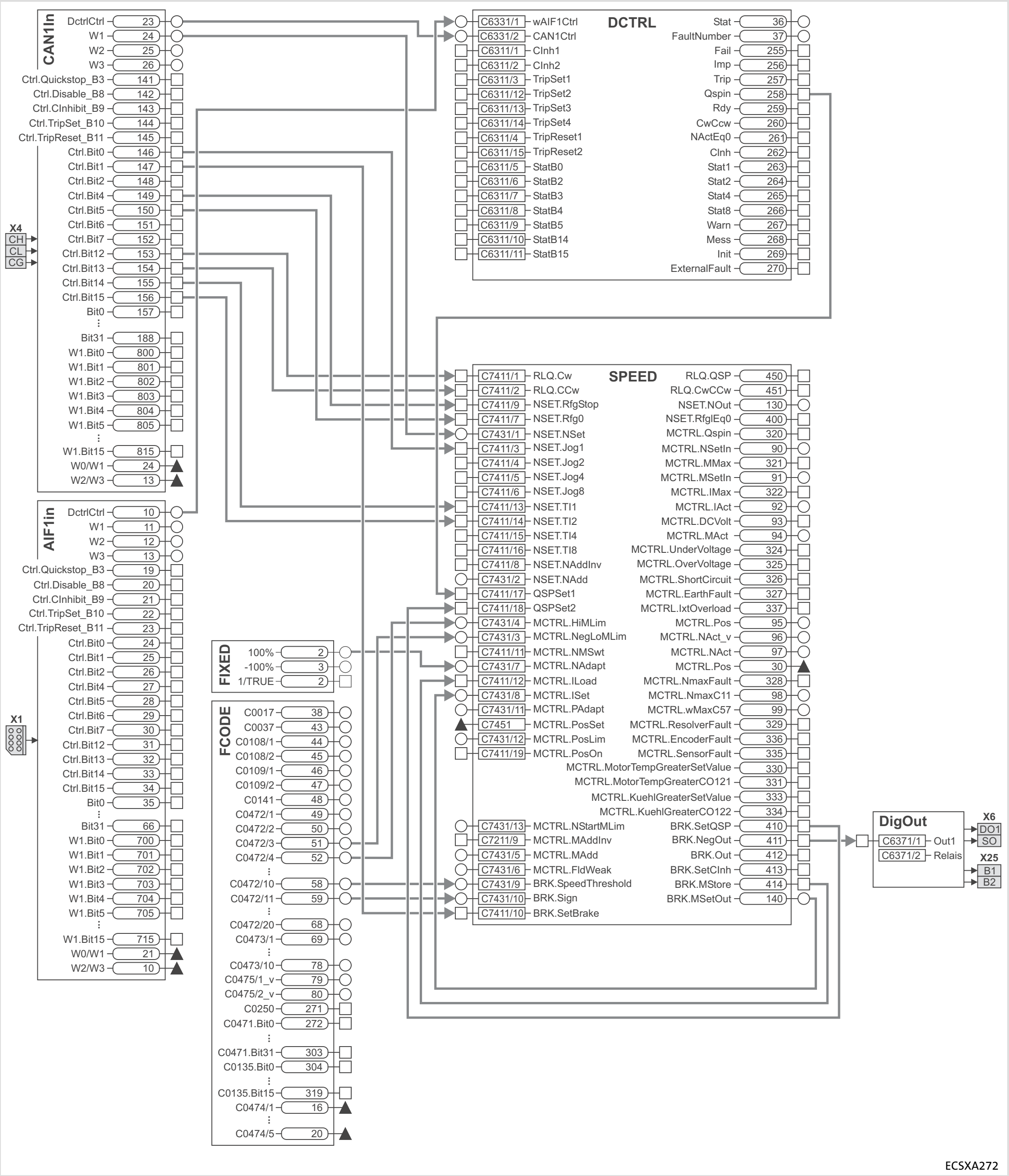


Fig.6-13 Signal flow diagram for configuration 1005 (setpoint via MotionBus (CAN))

6.9.4 Torque control with setpoint via analog input

Configuration C3005 = 4000

Note!

Use the ”input assistant for motor data” of the GDC for setting the motor data (🕮 81).

Set the following codes:

Code	Meaning	Further information
DC-bus voltage thresholds and charge relay function		
C0173 = x	DC-bus voltage thresholds	
C0175 = x	Charge relay function (when using an ECS supply module: C0175 = 3)	
Maximum motor current		
C0022 = x [A]	Maximum motor current (I_{max})	
Controller configuration and feedback system		
C3005 = 4000	Torque control with setpoint via analog input	🕮 94
C0495 = x	Feedback system	🕮 84
Speed setpoint settings		
C0011 = x [rpm]	Maximum speed	🕮 295
C0012 = x [s]	Acceleration time	🕮 292
C0013 = x [s]	Deceleration time	
C0105 = x [s]	Quick stop deceleration time	🕮 295
Speed limitation		
C0472/4 = x [%]	Speed limit (positive value)	🕮 290
C7131/1 = 52	FCODE C0472/4	
C7531/2 = 651	InNeg-AnOut1	
C7531/5 = 52	FCODE C0472/4	
Application parameters		
C0070 = x	Proportional gain (V_p) of speed controller	🕮 296
C0071 = x [ms]	Integral-action time (T_n) of speed controller	
Save parameters		
C0003 = 1	Save all parameters	

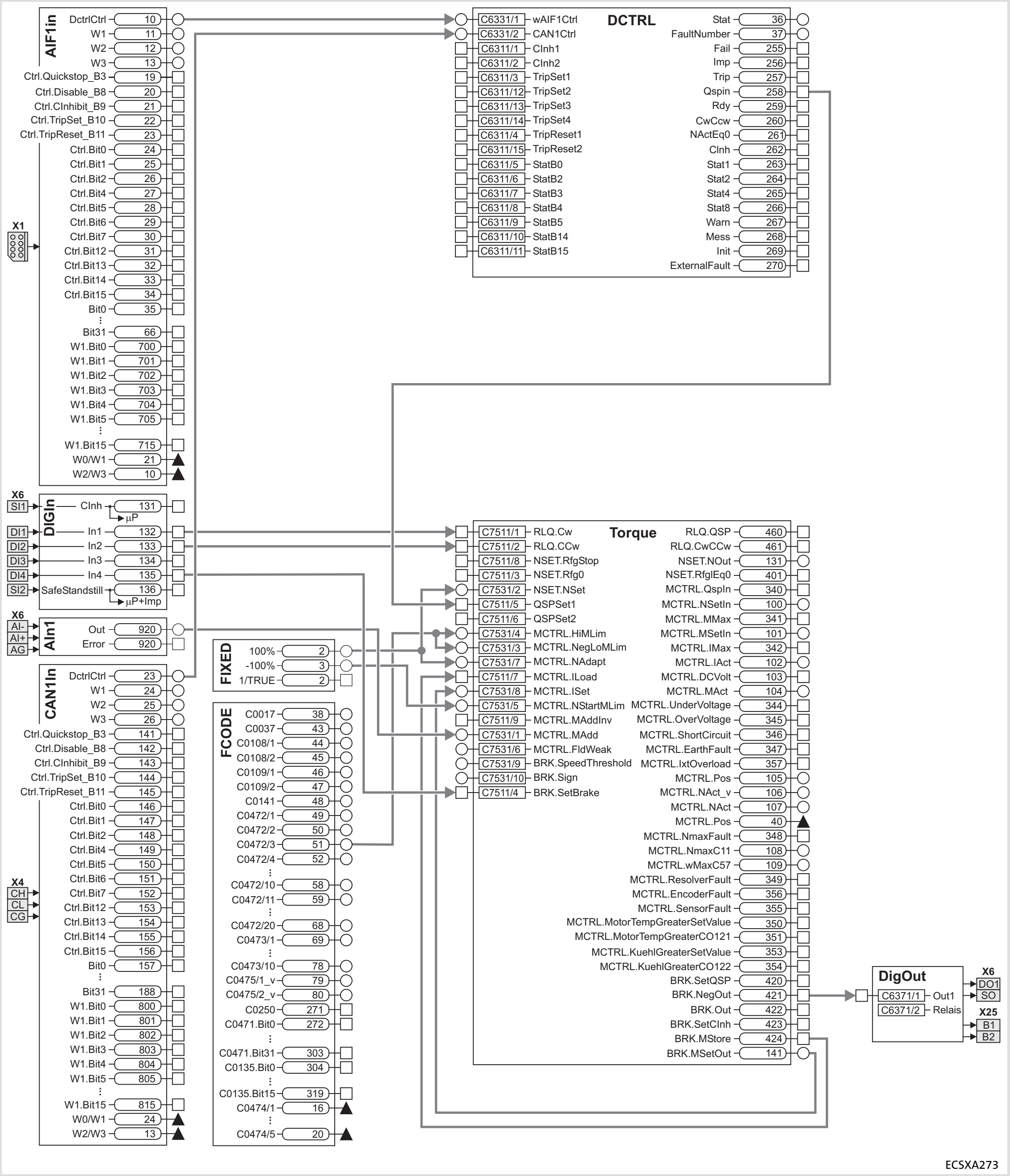


Fig.6-14 Signal flow diagram for configuration 4000 (setpoint via analog input)

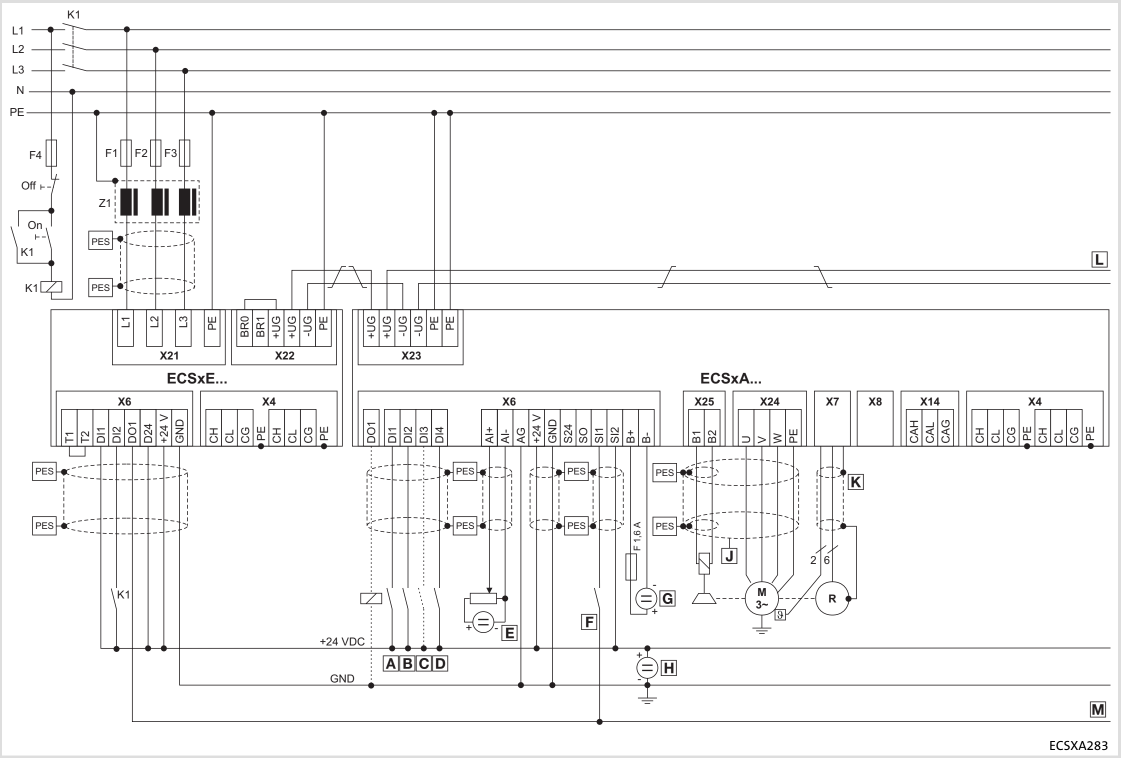


Fig.6-15 Connection diagram for configuration 4000 (setpoint via analog input)

A	Direction of rotation / quick stop (QSP)
B	Direction of rotation / quick stop (QSP)
C	Fixed speed C0039/1
D	Holding brake
E	Analog input voltage supply
F	Switch for controller enable/inhibit
G	Motor system cable
H	Voltage supply of motor holding brake
J	Voltage supply of control
K	Controller enable
L	System cable feedback
M	DC-bus voltage
PES	HF shield termination by large-surface PE connection
ʃ	Twisted cables

Note!

In the wiring example (Fig.6-15) a HIGH level is fixedly applied on X6/SI2 (pulses for power section enabled).

6.9.5 Torque control with setpoint via AIF

Configuration C3005 = 4003

Note!

- ► Use the ”input assistant for motor data” of the GDC for setting the motor data (🕮 81).
- ► Further information can be obtained from the documentation for the corresponding fieldbus module.

Set the following codes:

Code	Meaning	Further information
DC-bus voltage thresholds and charge relay function		
C0173 = x	DC-bus voltage thresholds	
C0175 = x	Charge relay function (when using an ECS supply module: C0175 = 3)	
Maximum motor current		
C0022 = x [A]	Maximum motor current (I_{max})	
Controller configuration and feedback system		
C3005 = 4003	Torque control with setpoint via AIF	🕮 94
C0495 = x	Feedback system	🕮 84
Speed setpoint settings		
C0011 = x [rpm]	Maximum speed	🕮 295
C0012 = x [s]	Acceleration time	🕮 292
C0013 = x [s]	Deceleration time	
C0105 = x [s]	Quick stop deceleration time	🕮 295
Speed limitation		
C0472/4 = x [%]	Speed limit (positive value)	🕮 290
C7131/1 = 52	FCODE C0472/4	
C7531/2 = 651	InNeg-AnOut1	
C7531/5 = 52	FCODE C0472/4	
Application parameters		
C0070 = x	Proportional gain (V_p) of speed controller	🕮 296
C0071 = x [ms]	Integral-action time (T_n) of speed controller	
Save parameters		
C0003 = 1	Save all parameters	

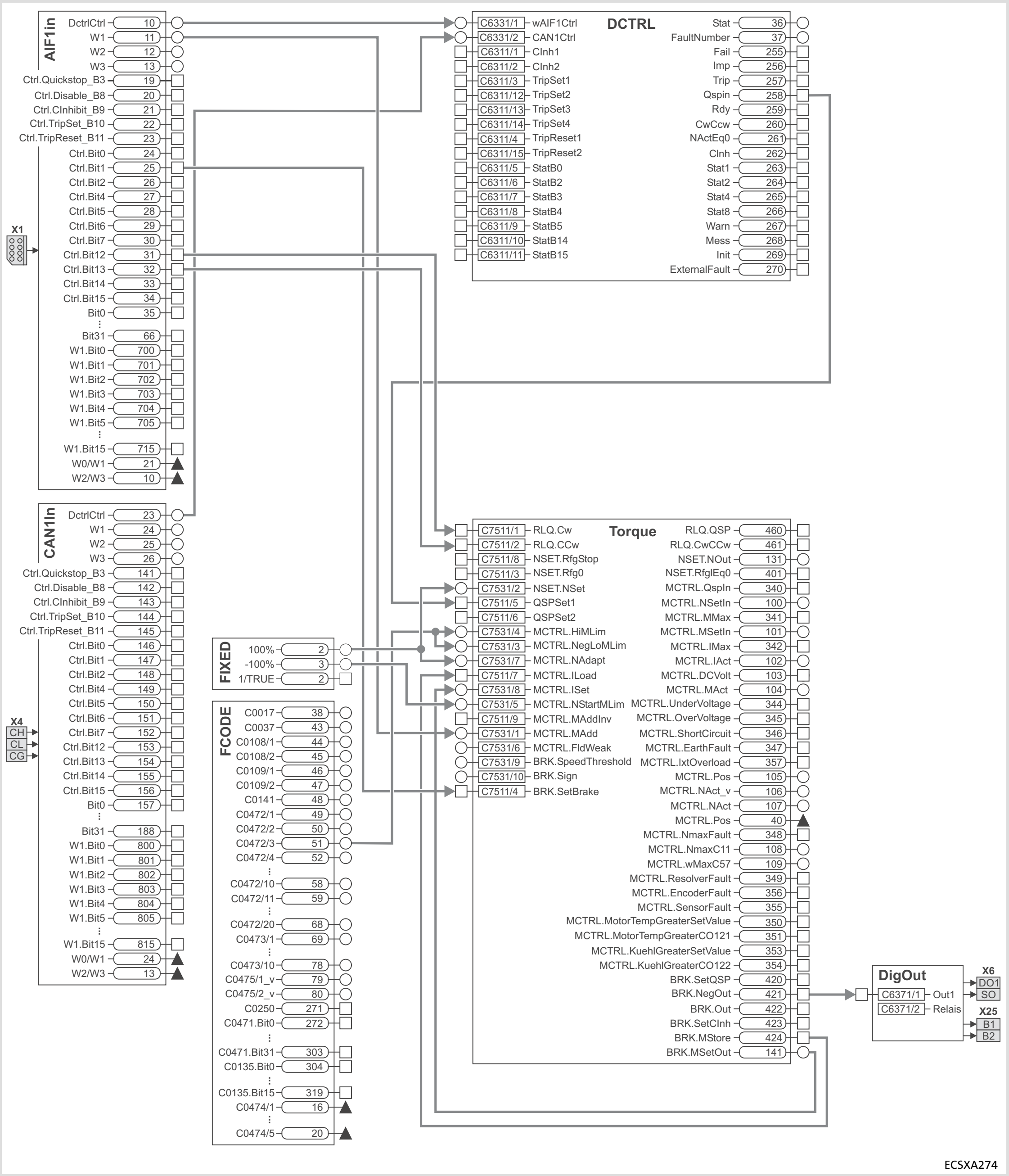


Fig.6-16 Signal flow diagram for configuration 4003 (setpoint via AIF)

6.9.6 Torque control with setpoint via MotionBus (CAN)

Configuration C3005 = 4005

Note!

- Use the ”input assistant for motor data” of the GDC for setting the motor data (🕮 81).
- Reading the data via CAN1In requires an external Sync signal (from the master control).

Set the following codes:

Code	Meaning	Further information
DC-bus voltage thresholds and charge relay function		
C0173 = x	DC-bus voltage thresholds	
C0175 = x	Charge relay function (when using an ECS supply module: C0175 = 3)	
Maximum motor current		
C0022 = x [A]	Maximum motor current (I_{max})	
Controller configuration and feedback system		
C3005 = 4005	Torque control with setpoint via MotionBus (CAN)	🕮 94
C0495 = x	Feedback system	🕮 84
Speed setpoint settings		
C0011 = x [rpm]	Maximum speed	🕮 295
C0012 = x [s]	Acceleration time	🕮 292
C0013 = x [s]	Deceleration time	
C0105 = x [s]	Quick stop deceleration time	🕮 295
Speed limitation		
C0472/4 = x [%]	Speed limit (positive value)	🕮 290
C7131/1 = 52	FCODE C0472/4	
C7531/2 = 651	InNeg-AnOut1	
C7531/5 = 52	FCODE C0472/4	
Application parameters		
C0070 = x	Proportional gain (V_p) of speed controller	🕮 296
C0071 = x [ms]	Integral-action time (T_n) of speed controller	
Save parameters		
C0003 = 1	Save all parameters	

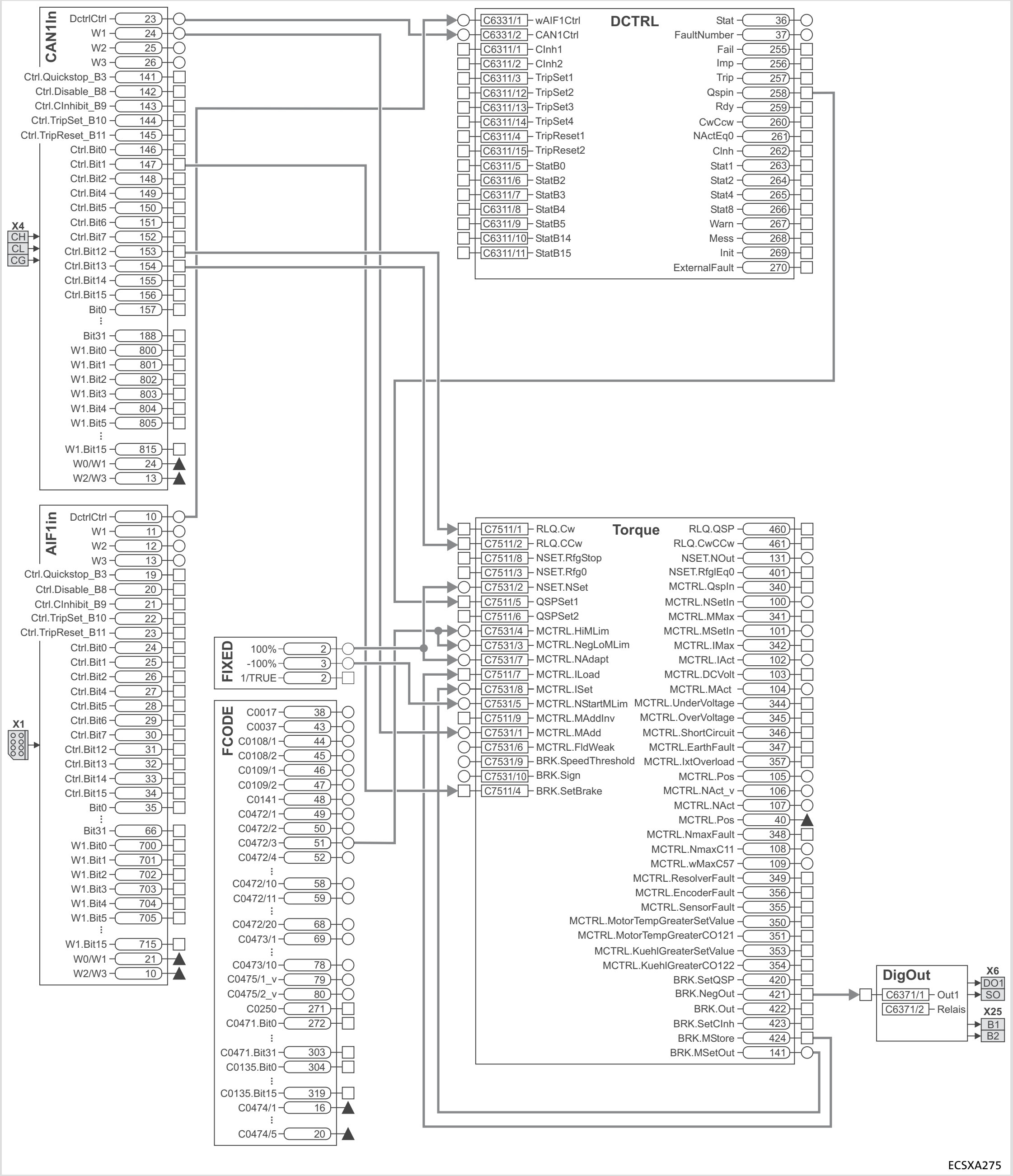


Fig.6-17 Signal flow diagram for configuration 4005 (setpoint via MotionBus (CAN))

6.10 Entry of machine parameters

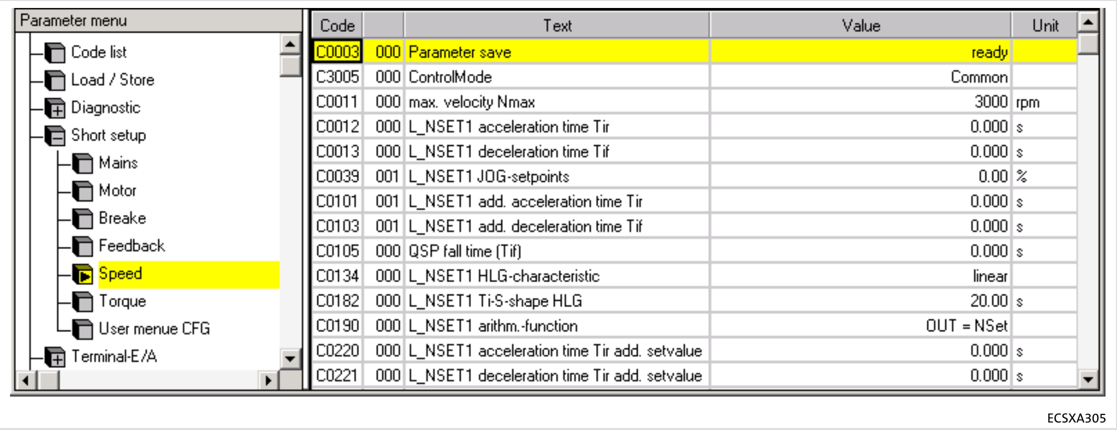
In the GDC the codes for machine parameters, like for example maximum speed and ramp times can be found in the parameter menu under

- **Short setup → Speed** (for speed control).
- **Short setup → Torque** (for torque control).

Note!

Detailed information concerning the possible settings can be gathered from the function block descriptions:

- Function block ”Speed”: 🕮 262
- Function block ”Torque”: 🕮 284



Code		Text	Value	Unit
C0003	000	Parameter save	ready	
C3005	000	ControlMode	Common	
C0011	000	max. velocity Nmax	3000	rpm
C0012	000	L_NSET1 acceleration time Tir	0.000	s
C0013	000	L_NSET1 deceleration time Tif	0.000	s
C0039	001	L_NSET1 JOG-setpoints	0.00	%
C0101	001	L_NSET1 add. acceleration time Tir	0.000	s
C0103	001	L_NSET1 add. deceleration time Tif	0.000	s
C0105	000	QSP fall time (Tif)	0.000	s
C0134	000	L_NSET1 HLG-characteristic	linear	
C0182	000	L_NSET1 Ti-S-shape HLG	20.00	s
C0190	000	L_NSET1 arithm.-function	OUT = NSet	
C0220	000	L_NSET1 acceleration time Tir add. setvalue	0.000	s
C0221	000	L_NSET1 deceleration time Tir add. setvalue	0.000	s

Fig.6-18 GDC view: short setup of the speed control (”Speed”)

6.11 Setpoint selection

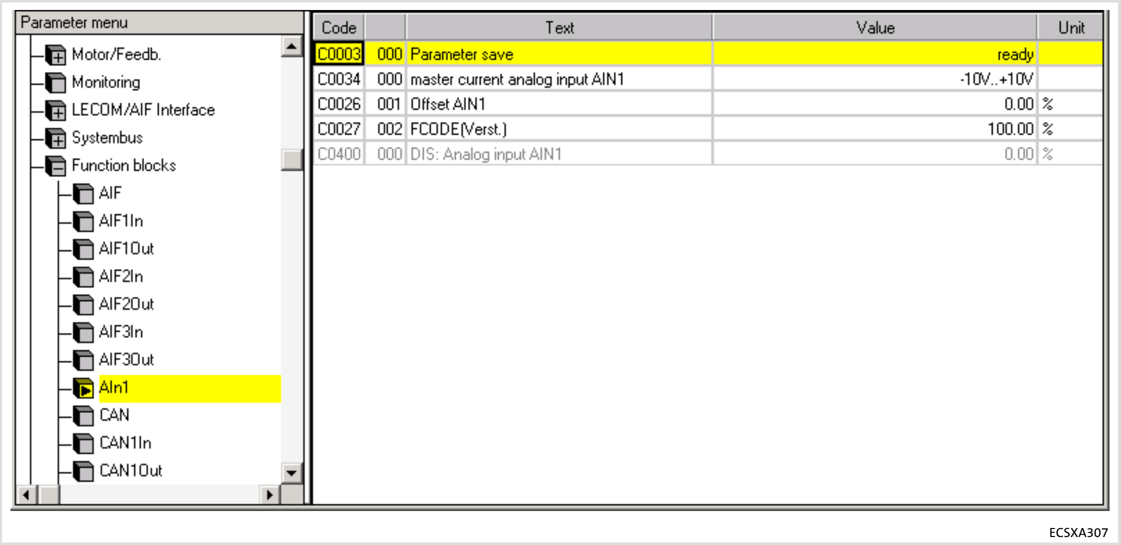
The operating mode selected in C3005 enables a pre-assignment from different setpoint sources:

Code	Value [1]	Setpoint source	Setpoints
C3005	1000 4000	Analog input	● Fixed speed ● Analog setpoints (e. g. master voltage or master current)
	1003 4003	AIF module	● Fixed speed ● Fieldbus setpoints
	1005 4005	MotionBus (CAN)	● Fixed speed ● CAN setpoints

[1] 100x = speed control ("Speed")
400x = torque control ("Torque")

Example: selection of analog setpoints

For selecting analog setpoints you can for instance configure the analog input signal in GDC in the parameter menu under **Function blocks → AIn1**:

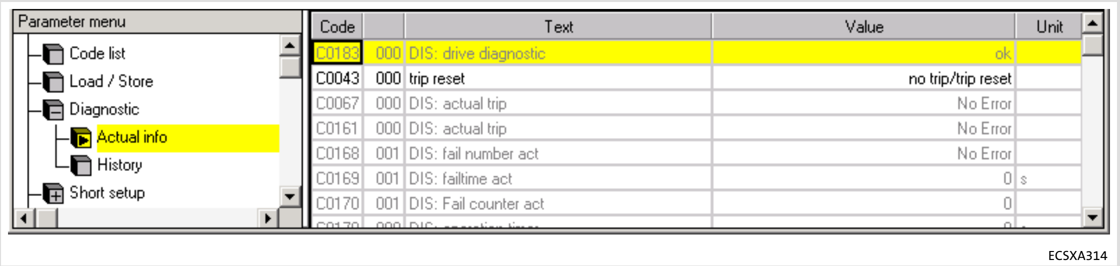


Code		Text	Value	Unit
C0003	000	Parameter save	ready	
C0034	000	master current analog input AIN1	-10V..+10V	
C0026	001	Offset AIN1	0.00	%
C0027	002	FCODE(Verst.)	100.00	%
C0400	000	DIS: Analog input AIN1	0.00	%

Fig.6-19 GDC view: Codes of the function block AIn1

6.12 Controller enable

- ► The controller is only enabled if enable is issued by all signal sources that are relevant for this process (AND operation).
- ► If the controller is enabled, the green LED on the controller is illuminated. If the controller is not enabled (inhibited), the causal signal source is displayed under C0183 (drive diagnostics) in the parameter menu under **Diagnostics → Actual info**:



Code		Text	Value	Unit
C0183	000	DIS: drive diagnostic	ok	
C0043	000	trip reset	no trip/trip reset	
C0067	000	DIS: actual trip	No Error	
C0161	000	DIS: actual trip	No Error	
C0168	001	DIS: fail number act	No Error	
C0169	001	DIS: failtime act	0	s
C0170	001	DIS: Fail counter act	0	

Fig.6-20 GDC view: Diagnostics of current operation

The following table shows the signal sources for controller enable:

Signal source	Controller inhibit	Controller enable	Note
Terminal X6/SI1	0 ... +4 V (LOW level)	+13 ... +30 V (HIGH level)	For controller enable, X6/SI1 has to be = HIGH **and** X6/SI2 = HIGH.
Terminal X6/SI2	0 ... +4 V (LOW level)	+13 ... +30 V (HIGH level)	
Operating module/keypad	STOP key	RUN key	Inhibiting with STOP key is only possible if the STOP key is assigned with ”CINH” via C0469.
Fault	● in case of TRIP ● in case of message	TRIP-RESET	For check see 📖 179.
MotionBus/system bus (CAN)	Transmission of the control information INHIBIT via C0135.	Transmission of the control information ENABLE via C0135.	See ”CAN Communication Manual”. Observe the function keys in the GDC: ● key <F8> (controller enable) ● key <F9> (controller stop)
Fieldbus module	See Operating Instructions of the corresponding fieldbus module.		

Note!

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

6.13 Quick stop

By means of the quick stop function, the drive is braked to standstill within a set deceleration time (C0105).

Quick stop (QSP) is activated by the following signal sources:

Configuration/operating mode		QSP active if
Lenze setting	During mains connection	● X6/DI1 and DI2 = HIGH or ● X6/DI1 and DI2 = LOW
	During operation	● X6/DI1 and DI2 = LOW QSP is recognised device-internally if a LOW signal is applied to X6/DI1 and DI2 for more than 2 ms.
Speed control (”Speed”)		● SPEED-QSP.Set1 (C7411/17) = TRUE or ● SPEED-QSP.Set2 (C7411/18) = TRUE (further information: 🕮 280)
Torque control (”Torque”):		● TORQUE-QSP.Set1 (C7511/17) = TRUE or ● TORQUE-QSP.Set2 (C7511/18) = TRUE (further information: 🕮 295)

The deceleration time for the brake application is set via C0105 in the GDC parameter menu under

- ► **Short setup → Speed** (for speed control).
- ► **Short setup → Torque** (for torque control).

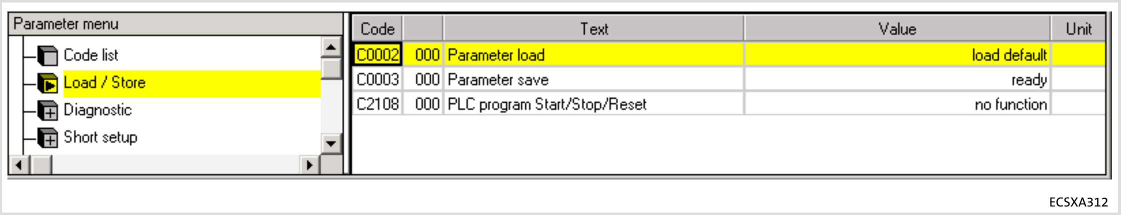
Code		**Possible settings**		**IMPORTANT**	
No.	**Designation**	**Lenze/ appl.**	**Selection**		
C0042	DIS: QSP			Quick stop status (QSP) Only display	🕮 242 🕮 112
			0 QSP not active		
			1 QSP active		
C0105	QSP Tif	0.000		Deceleration time for quick stop (QSP)	🕮 242 🕮 112
			0.000 {0.001 s} 999.999	Relating to speed variation n_{max} (C0011) ... 0 rpm.	

6.14 Loading Lenze settings

Note!

After loading the Lenze setting, all parameters are set to basic setting defined by Lenze. Settings that have been adjusted before get lost during this process!

In the GDC the parameters or codes to be set can be found in the parameter menu under **Load / Store**:



Code		Text	Value	Unit
C0002	000	Parameter load	load default	
C0003	000	Parameter save	ready	
C2108	000	PLC program Start/Stop/Reset	no function	

Fig.6-21 GDC view: parameter set management

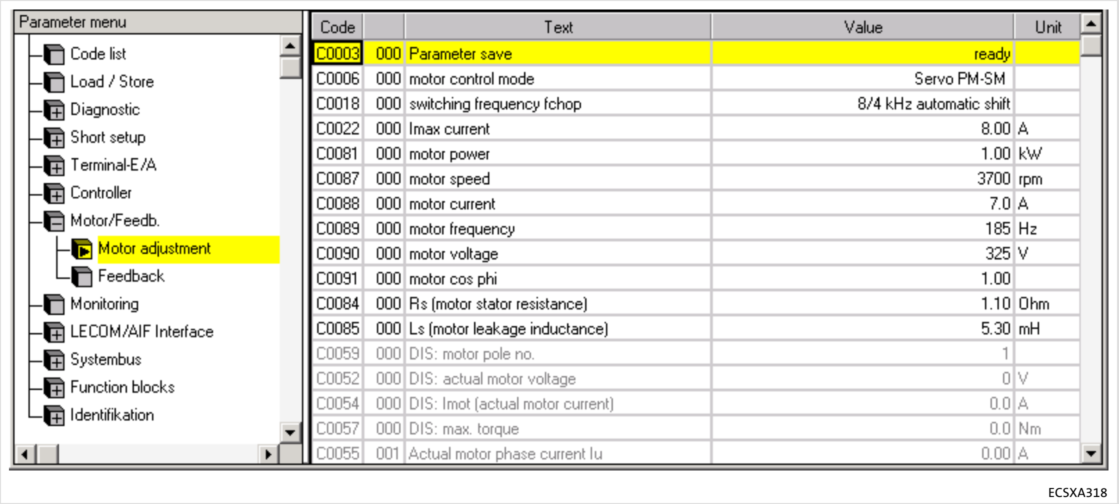
How to load the Lenze setting:

1. Stop the PLC program: C2108 = 2.
2. Load the Lenze setting: C0002 = 0.
3. Automatic start of the PLC program after mains connection: C2104 = 1.
4. Start the PLC program: C2108 = 1
5. Save parameter set: C0003 = 1

6.15 Operation with servo motors from other manufacturers

6.15.1 Entering motor data manually

If you operate servo motors of other manufacturers on the controller, you have to enter the motor data manually. The GDC includes the corresponding codes in the parameter menu under **Motor/Feedb. → Motor adjustment**.



Code		Text	Value	Unit
C0003	000	Parameter save	ready	
C0006	000	motor control mode	Servo PM-SM	
C0018	000	switching frequency fchop	8/4 kHz automatic shift	
C0022	000	Imax current	8.00	A
C0081	000	motor power	1.00	kW
C0087	000	motor speed	3700	rpm
C0088	000	motor current	7.0	A
C0089	000	motor frequency	185	Hz
C0090	000	motor voltage	325	V
C0091	000	motor cos phi	1.00	
C0084	000	Rs (motor stator resistance)	1.10	Ohm
C0085	000	Ls (motor leakage inductance)	5.30	mH
C0059	000	DIS: motor pole no.	1	
C0052	000	DIS: actual motor voltage	0	V
C0054	000	DIS: Imot (actual motor current)	0.0	A
C0057	000	DIS: max. torque	0.0	Nm
C0055	001	Actual motor phase current Iu	0.00	A

Fig.6-22 GDC view: Manual setting of the motor data

Code		**Possible settings**				**IMPORTANT**	
No.	**Designation**	**Lenze/ appl.**	**Selection**				
[C0006]	Op mode	1				Operating mode of the motor control **Only possible with C2108 = 2 (Stop)**	🕮 114
			1	Servo PM-SM		Servo control of synchronous motors	
			2	Servo ASM		Servo control of asynchronous motors	
C0018	fchop	2				Switching frequency	
			1	4 kHz sin		4 kHz permanent PWM frequency	
			2	8/4 kHz sin		8 kHz PWM frequency with automatic derating to 4 kHz at high load	
C0022	Imax current	→				I_{max} limit	
			0	{0.01 A}		→ device-dependent list The maximum current can be obtained from the ”Technical data”.	
C0058	Rotor diff	-90.0				Rotor displacement angle for synchronous motors (C0095) Only display	🕮 117
			-180.0	{0.1 °}	179.9		
[C0081]	Mot power	3.20				Rated motor power according to nameplate	
			0.01	{0.01 kW}	500.00		

Code		Possible settings				IMPORTANT	
No.	**Designation**	**Lenze/ appl.**	**Selection**				
[C0084]	Mot Rs	1.10				Motor stator resistance The upper limit is device-dependent.	
			0.00	{0.01 Ω}	95.44	ECSxS/P/M/A004	
					47.72	ECSxS/P/M/A008	
					23.86	ECSxS/P/M/A016	
					11.93	ECSxS/P/M/A032	
					7.95	ECSxS/P/M/A048	
					5.96	ECSxS/P/M/A064	
[C0085]	Mot Ls	5.30				Leakage inductance of the motor	
			0.00	{0.01 mH}	200.00		
[C0087]	Mot speed	3700				Rated motor speed	
			300	{1 rpm}	16000		
[C0088]	Mot current	7.0				Rated motor current	
			0.5	{0.1 A}	500.0		
[C0089]	Mot frequency	185				Rated motor frequency	
			10	{1 Hz}	1000		
[C0090]	Mot voltage	325				Rated motor voltage	
			50	{1 V}	500		
[C0091]	Mot cos phi	1.00				cos φ of the asynchronous motor	
			0.50	{ 0.01}	1.00		
[C0095]	Rotor pos adj	0				Rotor position adjustment of a synchronous motor C0058 shows the rotor displacement angle.	🕮 117
			0	Inactive			
			1	Active			
[C0418]	Test Cur.Ctrl	0				Controller adjustment:	🕮 116
			0	Deactivated		Deactivate test mode	
			1	Activated		Activate test mode	

6.15.2 Checking resolver polarity

The GDC contains the parameters/codes to be set in the parameter menu under **Motor/Feedb. → Motor adjustment**.

Code C0060 indicates the rotational angle of a revolution as a numerical value between 0 ... 2047.

- This value must increase when the rotor rotates in CW direction (with view to the front of the motor shaft).
- If the values decrease, exchange the connections of Sin+ and Sin-.

Code		Possible settings				IMPORTANT	
No.	**Designation**	**Lenze/ appl.**	**Selection**				
C0060	Rotor pos					Current rotor position Only display	
			0	{1 inc}	2047	1 rev = 2048 inc	

6.15.3 Adjusting current controller

For optimum machine operation, the current controller must be adapted to the electrical values of the motor.

Note!

When using MCS motors ...

adjust the current controller with the maximum current intended for operation.

Leakage inductance and stator resistance of the motor are known:

The gain of the current controller V_p and the integral-action time of the current controller T_n can be calculated by approximation:

Current controller gain (V_p)	Integral-action time of the current controller (T_n)
$V_p = \frac{L1_S}{250\ \mu s}$	$T_n = \frac{L1_S}{R1_S}$

$L1_S$	Motor leakage inductance
$R1_S$	Motor stator resistance

Note!

Depending on the leakage inductance of the motor, the calculated values can be outside the adjustable range. In this case

- ► set a lower gain and a higher integral-action time;
- ► adjust the current controller metrologically (🕮 117).

For applications with high current controller dynamics the pilot control of the current controller outputs can be activated with C0074 (C0074 = 1). For this, it is vital to enter the correct values for the stator resistance (C0084) and leakage inductance (C0085).These can be obtained from the data sheet of the motor used!

Leakage inductance and stator resistance of the motor are not known:

The current controller can be optimised metrologically with a current probe and an oscilloscope. For this, a test mode is available in which the current C0022 x √2 flows in phase U after controller enable.

Stop!

Avoid any damages to the motor and the machine

- During the controller adjustment the motor must be able to rotate freely.
- The test current must not exceed the maximum permissible motor current.
- Always adjust the current controller at a switching frequency of 8 kHz.

Observe the current step in phase U to adjust the current controller.

Setting sequence:

1. Set the switching frequency = 8 kHz (C0018 = 2).
2. Set the quantity of the test current under C0022:
   – Start with low current, e. g. half rated motor current.
3. Activate the test mode with C0418 = 1.
4. Enable the controller (X6/SI1 = HIGH, 🕮 111).
   – Let the synchronous motor adjust.
   – Asynchronous motor stops.
5. Enable and inhibit the controller several times in a row, changing V_p via C0075 and T_n via C0076 so that the current characteristic is free of harmonics.
6. After the adjustment has been successfully completed, deactivate the test mode with C0418 = 0.
7. If necessary, change the switching frequency via C0018.

6.15.4 Effecting rotor position adjustment

Note!

Resolver / absolute value encoder with hyperface interface

- If the rotor zero phase is not known, the rotor position adjustment only has to be carried out once for commissioning.
- For SinCos absolute value encoders with a hyperface interface, the encoder value is set to ”0” automatically after the rotor position adjustment.

Incremental encoder / SinCos encoder with zero track

- If these encoder types are used for operating synchronous motors, the rotor position adjustment has to be carried out every time after the low-voltage supply has been switched on.

The rotor position must be adjusted if:

- A servo motor from another manufacturer is operated on the controller.
- Another encoder has been mounted subsequently.
- A defective encoder has been replaced.

The rotor position can only be adjusted if:

- The resolver is polarised correctly.
- The current controller has been adjusted.

Note!

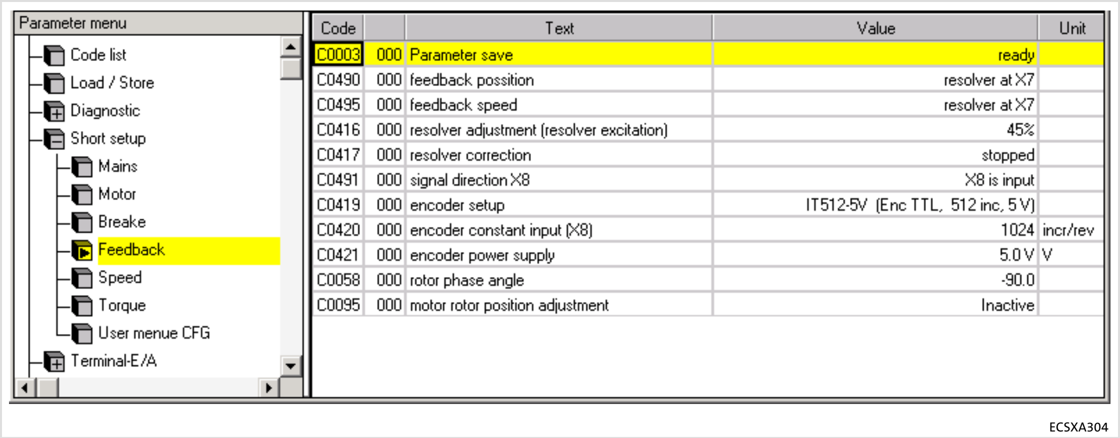
Resolver

- If the zero angle of the rotor is not known, adjust the rotor zero angle once during commissioning.

Incremental encoder/encoder

- If encoders without absolute position transfer are used (C0490 / C0495 = 1 or 2), adjust the zero angle of the rotor after every switch-on of the low-voltage supply.
- For multi-turn encoders, the traversing range must be within the display area of the encoder (0 ... 4095 revolutions) when the traversing range is limited.

The GDC parameter menu contains the codes for adjusting the rotor position under **Short setup → Feedback**.



Code		Text	Value	Unit
C0003	000	Parameter save	ready	
C0490	000	feedback possition	resolver at X7	
C0495	000	feedback speed	resolver at X7	
C0416	000	resolver adjustment (resolver excitation)	45%	
C0417	000	resolver correction	stopped	
C0491	000	signal direction X8	X8 is input	
C0419	000	encoder setup	IT512-5V (Enc TTL, 512 inc, 5 V)	
C0420	000	encoder constant input (X8)	1024	incr/rev
C0421	000	encoder power supply	5.0 V	V
C0058	000	rotor phase angle	-90.0	
C0095	000	motor rotor position adjustment	Inactive	

Fig.6-23 GDC view: Short setup of the feedback system

Setting sequence:

1. Inhibit controller (e. g. with X6/SI1 = LOW).
   – Green LED is blinking, red LED is off
2. Unload motor mechanically.
   – Separate motor from gearbox or machine.
   – Remove toothed lock washers, gear wheels, etc. from motor shaft if necessary.
   – Support holding torques which are held by a mounted motor brake by means of arresting devices if necessary.
3. Deactivate ”safe torque off” (🕮 55) so that the motor can be energised during rotor position adjustment.
   – X6/SI1 = HIGH
   – X6/SI2 = HIGH
4. Open holding brake (if available).
5. Activate rotor position adjustment with C0095 = 1.
6. Enable controller (X6/SI1 = HIGH, 🕮 111).
   The rotor position adjustment program of the controller is started:
   – The rotor rotates half a revolution in 16 steps (for resolver with 1 pole pair: 180° electrically ≙ 180° mechanically).
   – C0095 is reset to ’0’ after one revolution.
   – The rotor zero phase is stored under C0058. (For incremental encoder/encoder at X8, C0058 is always ”0” since the value is stored in the encoder!)

Note!

If the rotor position adjustment is terminated with the error message ”Sd7” (🕮 184), the controller may not be enabled!

► Repeat the rotor position adjustment (start with step 1).

► Check the wiring and the interference immunity of the incremental encoder/encoder at X8.

7. Save the data detected by the controller with C0003 = 1.

Code		**Possible settings**				**IMPORTANT**	
No.	**Designation**	**Lenze/ appl.**	**Selection**				
C0058	Rotor diff	-90.0				Rotor displacement angle for synchronous motors (C0095) Only display	🕮 117
			-180.0	{0.1 °}	179.9		
[C0095]	Rotor pos adj	0				Rotor position adjustment of a synchronous motor C0058 shows the rotor displacement angle.	🕮 117
			0	Inactive			
			1	Active			

6.16 Optimising the drive behaviour after start

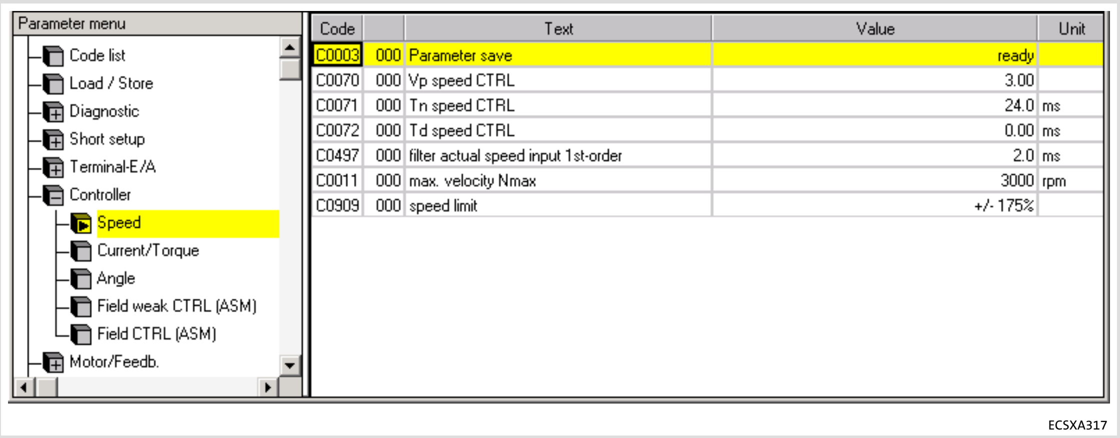
For applications with high current controller dynamics, the pilot control for the current controller can be adjusted under C0074:

Code		Possible settings			IMPORTANT	
No.	Designation	Lenze/ appl.	Selection			
C0074	Dynamics	0			Pilot control of the current controller for higher dynamics	🕮 116
			0	Normal	Normal	
			1	Enhanced	Enhanced	

6.16.1 Speed controller adjustment

- The speed controller can only be set correctly when the system constellation has been completed.
- Please note that the input variables and output variables of the speed controller are scaled:
  - Input: scaling to n_{max} (C0011)
  - Output: scaling to I_{max} (C0022)
- Hence, C0011 and C0022 have a direct impact on the speed controller gain (C0070).
- The speed controller cannot be optimally adjusted if
  - the current controller is set incorrectly.
  - the time constant for the actual speed value filter is set too high (C0497).
  - the axis module is poorly connected to PE, as this results in noisy speed and current signals.
  - there are elastic or loose connections between the drive and the load.
- The speed controller is designed as an ideal PID controller.

The codes for adjusting the speed controller can be found in the parameter menu of the GDC under **Controller settings → Speed**.



Code		Text	Value	Unit
C0003	000	Parameter save	ready	
C0070	000	Vp speed CTRL	3.00	
C0071	000	Tn speed CTRL	24.0	ms
C0072	000	Td speed CTRL	0.00	ms
C0497	000	filter actual speed input 1st-order	2.0	ms
C0011	000	max. velocity Nmax	3000	rpm
C0909	000	speed limit	+/- 175%	

ECSXA317

Fig.6-24 GDC view: Adjustment of the speed controller

Code		Possible settings				IMPORTANT	
No.	Designation	Lenze/ appl.	Selection				
C0070	Vp speedCTRL	3.00				Proportional gain of speed controller (V_{pn})	📖 120
			0.00	{ 0.01}	127.99		
C0071	Tn speedCTRL	24.0				Integral-action time of speed controller (T_{nn})	📖 120
			1.0	{0.5 ms}	6000.0		
C0072	Td speedCTRL	0.00				Derivative gain of speed controller (T_{dn})	📖 120
			0.0	{0.1 ms}	32.0		

Parameter setting:

- Via C0070 you set the proportional gain (V_p):
  - – Enter approx. 50 % of the speed setpoint (100 % = 16384 = N_{max}).
  - – Increase C0070 until the drive becomes instable (pay attention to engine noises).
  - – Reduce C0070 until the drive runs stable again.
  - – Reduce C0070 to approx. half the value.

Note!

For speed control (”Speed”):

The proportional gain (V_p) can be altered via SPEED-MCTRL.NAdapt (C7431/7):

- V_p = SPEED-MCTRL.NAdapt[%] x C0070
- If SPEED-MCTRL.NAdapt is not assigned, the following applies: V_p = 100 %, C0070 = C0070

For torque control (”Torque”):

The proportional gain (V_p) can be altered via TORQUE-MCTRL.NAdapt (C7531/7):

- V_p = TORQUE-MCTRL.NAdapt[%] x C0070
- If TORQUE-MCTRL.NAdap is not assigned, the following applies: V_p = 100 %, C0070 = C0070

- The reset time (T_n) is set via C0071:
  - – Reduce C0071 until the drive becomes unstable (pay attention to motor noise).
  - – Increase C0071, until the drive runs stable again.
  - – Increase C0071 to approx. the double value.
- The derivative gain (T_d) is set via C0072:
  - – Increase C0072 during operation until an optimal control mode is reached.

6.16.2 Adjustment of field controller and field weakening controller

Stop!

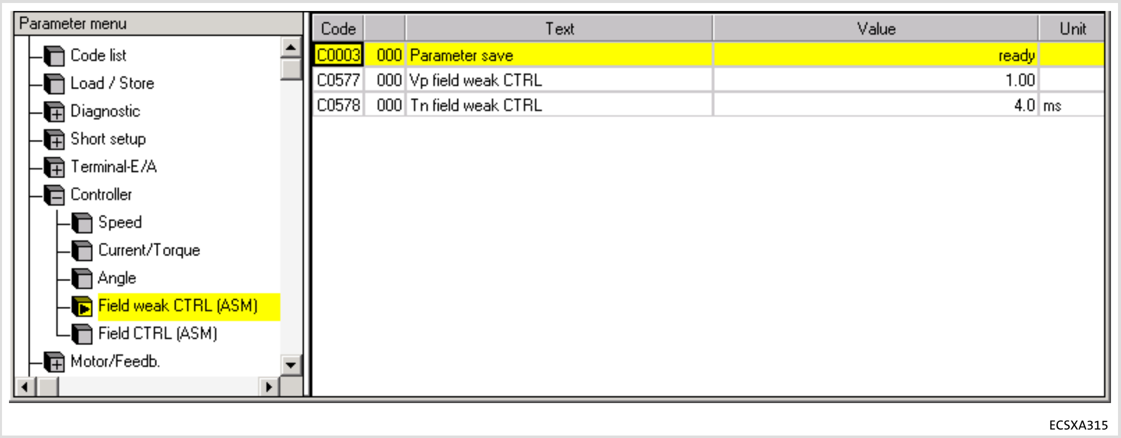
- The field controller and the field weakening controller must only be adjusted for operation with asynchronous motors.
- The available torque is reduced by the field weakening.

An optimal machine operation in the field weakening range requires a correct setting of the field controller and field weakening controller.

The motor is operated in the field weakening range if

- the output voltage of the controller exceeds the rated motor voltage (C0090).
- the controller cannot increase the output voltage with rising speed due to the mains voltage or DC-bus voltage.

The GDC includes the codes for adjusting the field controller and field weakening controller in the parameter menu under **Controller**:



Code		Text	Value	Unit
C0003	000	Parameter save	ready	
C0577	000	Vp field weak CTRL	1.00	
C0578	000	Tn field weak CTRL	4.0	ms

Fig.6-25 GDC view: Field controller / field weakening controller adjustment

6.16.2.1 Field controller adjustment

The field controller settings depend on the motor data.

Setting sequence:

1. Stop the PLC program: C2108 = 2
2. Set motor control for asynchronous motors: C0006 = 2
   – The motor nameplate data must be entered correctly!
3. Read rotor time constant T_r (C0083).
4. Read magnetising current I_d (C0092).
5. Calculate field controller gain V_{pF} and enter it into C0077.

$$V_{pF} = \frac{T_r\ (C0083) \cdot I_d\ (C0092)}{875\ \mu s \cdot I_{max}}$$

I_{max} Maximum current of axis module

6. Enter rotor time constant T_r as integral-action time T_{nF} for the field controller in C0078.

6.16.2.2 Field weakening controller adjustment

- The field weakening controller determines the speed performance of the asynchronous motor in the field weakening range.
- The field weakening controller can only be set correctly when the system constellation has been completed and is under load.

Note!

An excessive value of I_{max} (C0022) can cause a malfunction of the drive in the field weakening range of the asynchronous motor. For this reason, the current is limited in terms of speed in the field weakening range. The limitation has a 1/n characteristic and is derived from the motor parameters.

The limitation can be adjusted with the stator leakage inductance (C0085):

- Low values cause a limitation at higher speeds.
- Higher values cause a limitation at lower speeds.

Setting sequence:

1. Set gain V_p: C0577 = 0.01 ... 0.99
   - V_p must not be ”0”!
2. Set integral-action time T_n: C0578 = 1 ... 40 ms
3. Select a speed setpoint so that the motor is operated in the field weakening range.
4. Observe the speed curve
   - If the speed takes an irregular course, the field weakening controller must be readjusted.
   - The field weakening controller must be provided with a distinct integral action.

6.16.3 Resolver adjustment

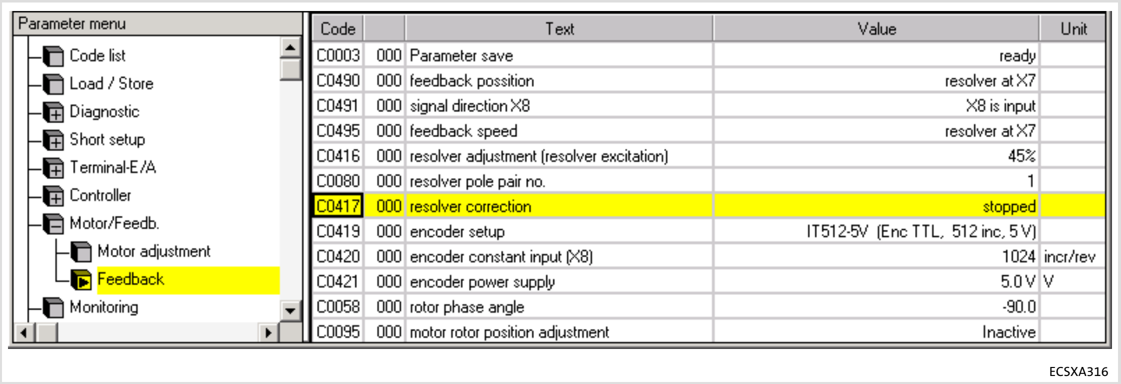
For resolver adjustment, mainly component tolerances of the resolver evaluation are compensated in the device. A resolver error characteristic is not included.

The resolver adjustment

- is required if the speed characteristic is unstable.
- is carried out by C0417 = 1 while the motor is idling.
- is started after controller enable has been effected. It stops automatically after 16 shaft revolutions by selecting a setpoint or by manual rotation in the inhibited state (X6/SI1 or X6/SI2 = LOW).

If it is not possible to adjust the resolver (due to a fault or a defective cable), the original adjustment values can be restored with C0417 = 2.

C0417 can be found in the GDC in the parameter menu under **Motor/Feedback → Feedback**.



Code		Text	Value	Unit
C0003	000	Parameter save	ready	
C0490	000	feedback possition	resolver at X7	
C0491	000	signal direction X8	X8 is input	
C0495	000	feedback speed	resolver at X7	
C0416	000	resolver adjustment (resolver excitation)	45%	
C0080	000	resolver pole pair no.	1	
C0417	000	resolver correction	stopped	
C0419	000	encoder setup	IT512-5V (Enc TTL, 512 inc, 5 V)	
C0420	000	encoder constant input (X8)	1024	incr/rev
C0421	000	encoder power supply	5.0 V	V
C0058	000	rotor phase angle	-90.0	
C0095	000	motor rotor position adjustment	Inactive	

ECSXA316

Fig.6-26 GDC view: Resolver adjustment

7 Parameter setting

7.1 General information

- The controller can be adapted to your application by setting the parameters. A detailed description of the functions can be found in the chapter ”Commissioning” (🕮 74).
- The parameters for the functions are stored in numbered codes:
  - The codes are marked in the text with a ”C”.
  - The code table (🕮 301) provides a quick overview of all codes. The codes are sorted in numerical ascending order, thus serving as a ”reference book”.

Parameter setting with keypad XT or PC/laptop

Detailed information on parameter setting with the keypad XT can be found in the following chapters.

Detailed information ...

on the parameter setting with a PC/laptop can be found in the documentation of the parameter setting and operating program ”Global Drive Control” (GDC).

In addition to parameter setting the keypad XT or PC/laptop serves to:

- Control the controller (e. g. inhibiting or enabling)
- Select the setpoints
- Display operating data
- Transfer parameter sets to other controllers (only via PC/laptop).

Parameter setting with a bus system

Detailed information ...

on the parameter setting with a bus system can be found in the documentation of the communication module to be applied (🕮 376).

7.2 Parameter setting with ”Global Drive Control” (GDC)

With the **Global Drive Control (GDC)** parameterisation and operating program, Lenze offers a plain, concise, and comfortable tool for the configuration of your application-specific drive task with the PC/laptop:

- The input assistant of the GDC offers a comfortable motor selection.
- The menu structure supports the commissioning process by its clear organisation.

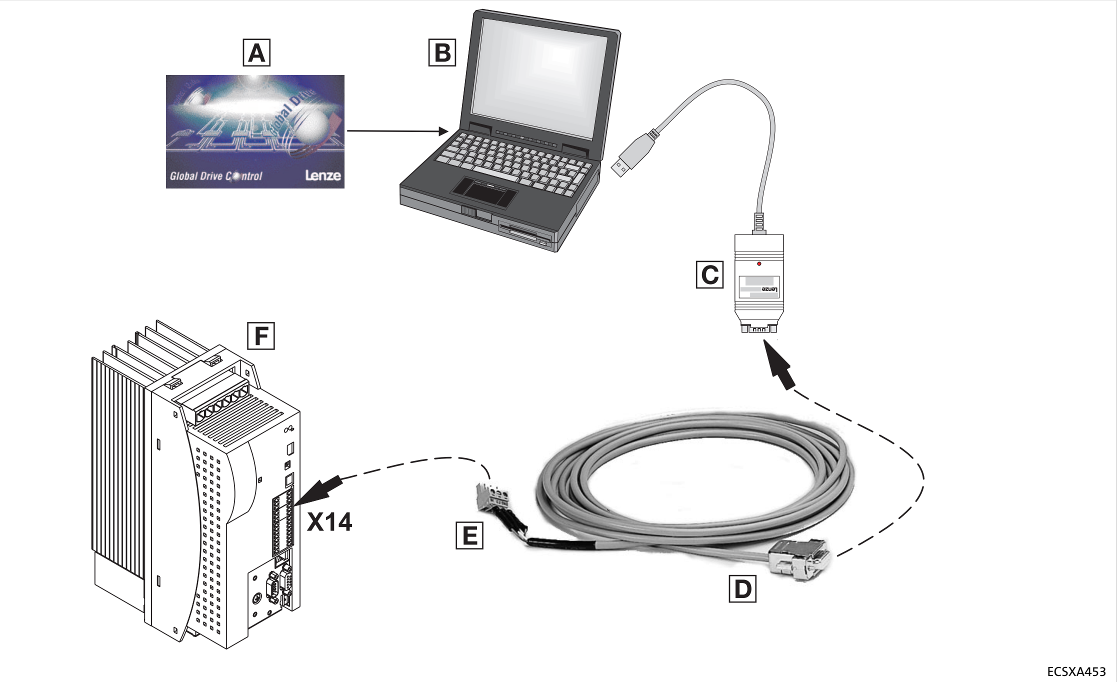


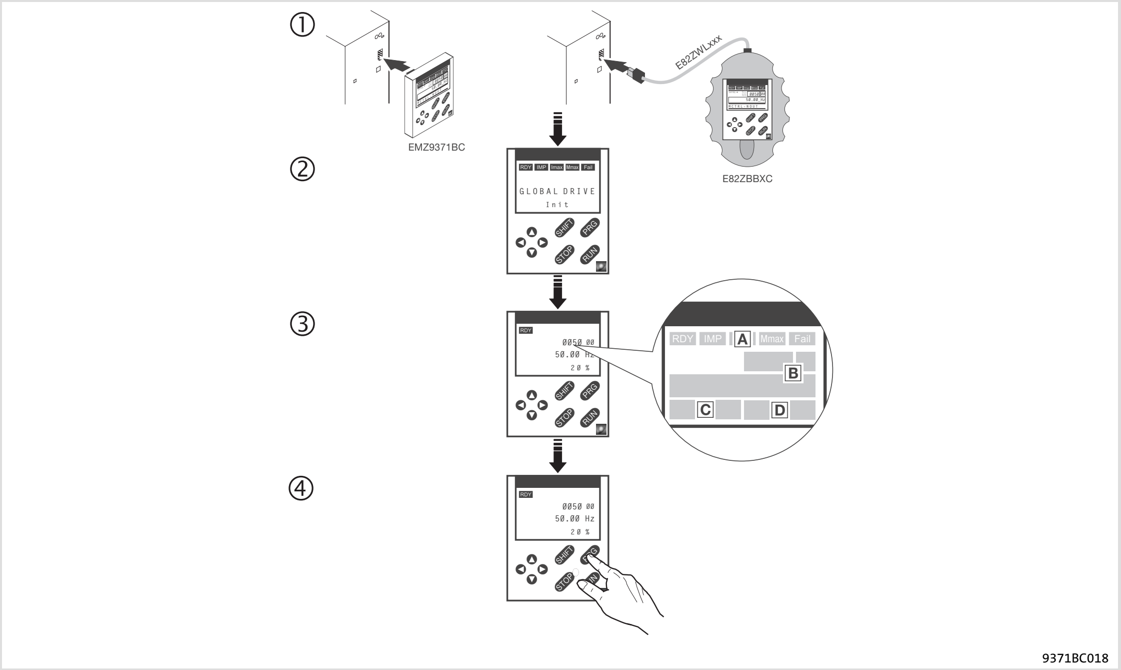
Fig.7-1 Using the GDC

A Lenze parameterisation program ”Global Drive Control” (GDC)
B PC/laptop
C PC system bus adapter (EMF2173IB/2177IB) with connecting cable
D Sub-D-plug with 3-pole cable
E 3-pole plug (CAG – CAL – CAH) of ECSZA000X0B connector set
F ECSxS... axis module

7.3 Parameter setting with the keypad XT EMZ9371BC

The keypad is available as accessories.
A complete description is given in the documentation on the keypad.

7.3.1 Connecting the keypad



① Connect the keypad to the AIF interface (X1) of the axis module/power supply module.
It is possible to connect/disconnect the keypad during operation.
② As soon as the keypad is supplied with voltage, it carries out a short self-test.
③ The operation level indicates when the keypad is ready for operation:
A Current status of the axis module/power supply module
B Code number, subcode number, and current value
C Active fault message or additional status message
D Current value in % of the status display defined in C0004
④ PRG must be pressed to leave the operation level

7.3.2 Description of the display elements

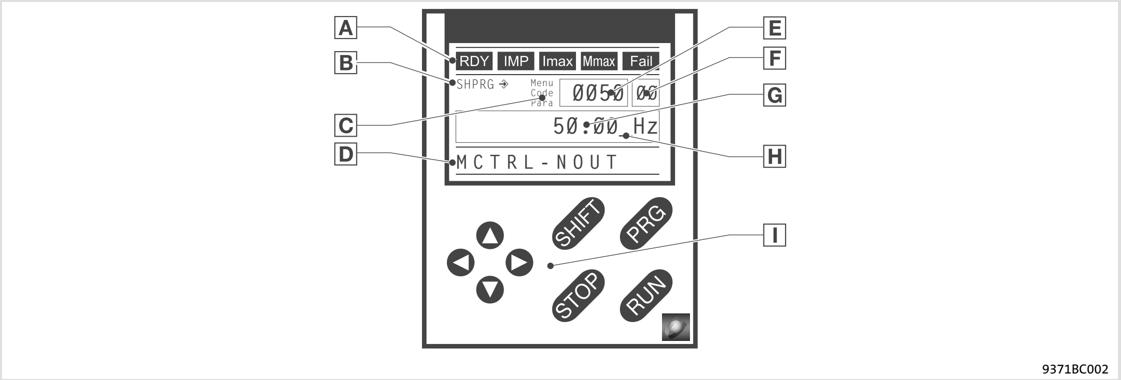


Fig.7-2 Keypad: Front view

A **Status displays**

Display	Meaning	Explanation
RDY	Ready for operation	
IMP	Pulse inhibit active	Power outputs inhibited
Imax	Adjusted current limitation is exceeded in motor mode or generator mode	
Mmax	Speed controller 1 within its limitation	● Drive is torque-controlled ● Only active for operation with Lenze devices of the 9300 series!
Fail	Active fault	

B **Parameter acceptance**

Display	Meaning	Explanation
⇨	Parameter is accepted immediately	The device immediately operates with the new parameter value.
SHPRG ⇨	The parameter must be confirmed with SHIFT PRG	The device operates with the new parameter value after being confirmed.
SHPRG	When the controller is inhibited, the parameter must be confirmed with SHIFT PRG	The device operates with the new parameter value after the controller has been released again.
None	Display parameters	Cannot be changed.

C **Active level**

Display	Meaning	Explanation
Menu	Active menu level	● Selection of main menu and submenus ● No menu for ECSxE... power supply module!
Code	Active code level	Selection of codes and subcodes
Para	Active parameter level	Change of parameters in the codes or subcodes
None	Active operating level	Display of operating parameters

D **Short text**

Display	Meaning	Explanation
Alphanumerical	Contents of the menus, meaning of the codes and parameters	
	Display of C0004 in % and the active fault in the operating level	

E	**Number**		
	Active level	**Meaning**	**Explanation**
	Menu level	Menu number	● Display is only active when operating Lenze devices of the 8200 vector or 8200 motec series. ● No menu for ECSxE... power supply module!
	Code level	Four-digit code number	
F	**Number**		
	Active level	**Meaning**	**Explanation**
	Menu level	Submenu number	● Display is only active when operating Lenze devices of the 8200 vector or 8200 motec series. ● No menu for ECSxE... power supply module!
	Code level	Two-digit subcode number	
G	**Parameter value**		
	Parameter value with unit		
H	**Cursor**		
	The figure over the cursor can be directly changed in the parameter level.		
I	**Function keys**		
	For description see the following table.		

7.3.3 Description of the function keys

Note!

Key combinations with SHIFT:

Press SHIFT and keep it pressed, then press second key in addition.

Key	**Function**			
	Menu level [1]	**Code level**	**Parameter level**	**Operating level**
PRG		Change to parameter level	Change to operating level	Change to code level
SHIFT PRG	Load predefined configurations in the menu ”Short setup” [2]		Accept parameters when SHPRG ⇨ or SHPRG is displayed	
▲ ▼	Change between menu items	Change code number	Change figure over cursor	
SHIFT ▲ SHIFT ▼	Quick change between menu items	Quick change of code number	Quick change of figure over cursor	
▶ ◀	Change between main menu, submenus and code level		Cursor to the right Cursor to the left	
RUN	Cancel function of STOP key, the LED in the key goes out.			
STOP	Inhibit the controller, LED in the key lights up.			
	Reset fault (TRIP reset):	1. Remove cause of malfunction 2. Press STOP 3. Press RUN		

---

[1] No menu for ECSxE... power supply module

[2] Only active when operating Lenze devices of the 8200 vector or 8200 motec series.

7.3.4 Saving and changing parameters

All parameters for axis module/power supply module parameterisation or monitoring are stored in codes. The codes are numbered and marked with a ”C” in the documentation. Some codes store the parameters in numbered ”subcodes” to provide a clear structure for parameter setting (e.g. C0517 user menu).

Stop!

Your settings have an effect on the current parameters in the RAM. You must store your settings as a parameter set to prevent that they will get lost when switching the mains!

Step			Keys	Action
1.	Select menu		▲ ▼ ▶ ◀	Select the desired menu with arrow keys.
2.	Change to code level		▶	Display of first code in the menu
3.	Select code or subcode		▼ ▲	Display of current parameter value
4.	Change to parameter level		PRG	
5.	If SHPRG is displayed, inhibit controller		STOP	The drive is idling.
6.	Change parameters			
		A	▶ ◀	Move cursor under the digit to be changed
		B	▼ ▲	Change digit
			SHIFT ▼ SHIFT ▲	Change digit quickly
7.	Accept changed parameters			
	Display SHPRG or SHPRG ➾		SHIFT PRG	Confirm change to accept parameter Display ”OK”
	Display ➾		-	The parameter was accepted immediately.
8.	If necessary, enable controller		RUN	The drive should be running again.
9.	Change to code level			
		A	PRG	Display of operating level
		B	PRG	Display of the code with changed parameters
10.	Change further parameters			Restart the ”loop” at step 1. or step 3.
11.	Save changed parameters			
		A	▲ ▼ ▶ ◀	Select code C0003 ”PAR SAVE” in the menu ”Load/Store”
		B	PRG	Change to parameter level Display ”0” and ”Ready”
	Select parameter set in which the parameters are to be saved permanently	C	▲	Save as parameter set 1: ⇨ set ”1” ”Save PS1”
		D	SHIFT PRG	When ”OK” is displayed, the settings are permanently saved.
12.	Change to code level			
		A	PRG	Display of operating level
		B	PRG	Display C0003 ”PAR SAVE”

7.3.5 Menu structure

For easy operation, the codes are clearly arranged in function-related menus:

Main menu Display	Submenus Display	Description
USER menu		**Codes defined under C0517**
Code list		**All available codes**
User code list		**List of all application-specific codes**
Load / Store		**Parameter set management** Parameter set transfer, restore delivery state
Multitasking		
Diagnostic		**Diagnostics**
	Actual info	Display codes to monitor the drive
	History	Fault analysis with history buffer
System blocks		**Configuration of the main function blocks**
	MCTRL	Motor control
	DCTRL	Internal control
Terminal I/O		**Linkage of the inputs and outputs with internal signals**
	AIN1	Analog input 1
	DIGIN	Digital inputs
	DIGOUT	Digital outputs
	DFIN	Master frequency input
	DFOUT	Master frequency output
Controller		**Configuration of internal control parameters**
	Speed	Speed controller
	Current	Current controller or torque controller
	Phase	Phase controller
	Field	Field controller
	Field weak	Field weakening controller
Motor/Feedb.		**Input of motor data, configuration of speed feedback**
	Motor adj	Motor data
	Feedback	Configuration of feedback systems
Monitoring		**Configuration of monitoring functions**
LECOM/AIF		**Configuration of operation with communication modules**
	LECOM A/B	Serial interface
	AIF interface	Process data
	Status word	Display of status words

Main menu	**Submenus**	**Description**
Display	**Display**	
System bus 1)		**Configuration of MotionBus (CAN)**
	Management	CAN communication parameters
	CAN-IN1	CAN object 1
	CAN-OUT1	
	CAN-IN2	CAN object 2
	CAN-OUT2	
	CAN-IN3	CAN object 3
	CAN-OUT3	
	Status word	Display of status words
	Sync.manag.	
	Diagnostic	CAN diagnostics
FCODE		**Configuration of free codes**
Identify		**Identification**
	Drive	Software version of basic device
	Op Keypad	Software version of keypad

1) Only in case of ECS modules the configuration of the MotionBus (CAN) is executed under the menu level ”System bus”!

8 Configuration

By configuring the axis module you can adapt the drive system to your application. The axis module can be configured via the following interfaces:

- X1 – AIF (automation interface)
  - For connecting the keypad XT EMZ9371BC or another communication module (🕮 376) with which you can access the codes.
- X14 – system bus (CAN) interface
  - PC interface/HMI for parameter setting and diagnostics (e.g. with the Lenze parameter setting and operating program "Global Drive Control")

    or
  - Interface to a decentralised I/O system

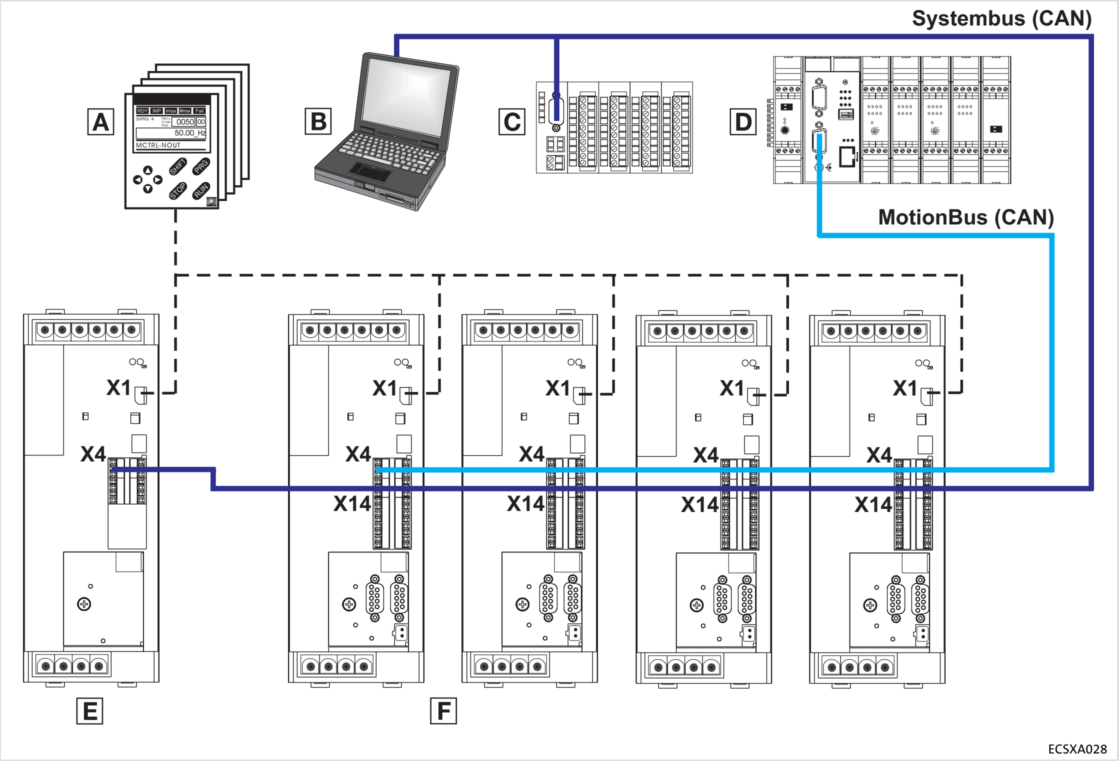


Fig.8-1 MotionBus/system bus (CAN)

A	XT EMZ9371BC keypad or another communication module
B	PC/laptop or HMI
C	Decentralised I/O system
D	Higher-level master system / MotionBus control
E	ECSxE...power supply module
F	ECSxx...axis modules

8.1 Communication with MotionBus/system bus (CAN)

For communication between the components of the drive system the axis modules ECSxS... have two CAN bus terminals:

- Terminal X4 (”CAN”)
  - MotionBus (CAN)
  - For communication with a higher-level master system or further controllers
  - The data is exchanged via process data channels and parameter data channels.
  - Parameter setting/diagnostics via code range **C03xx**
- Terminal X14 (”CAN-AUX”)
  - System bus (CAN)
  - PC interface / HMI for parameter setting and diagnosing
  - Interface to a decentralised I/O system
  - The data is exchanged via parameter data channels only.
  - Parameter setting/diagnostics via code range **C24xx**

The communication is effected via data telegrams.

Note!

In case of ECSxS... axis modules

only the parameter channels (SDO) are supported for the system bus – connection X14 (CAN-AUX) –.

8.1.1 Structure of the CAN data telegram

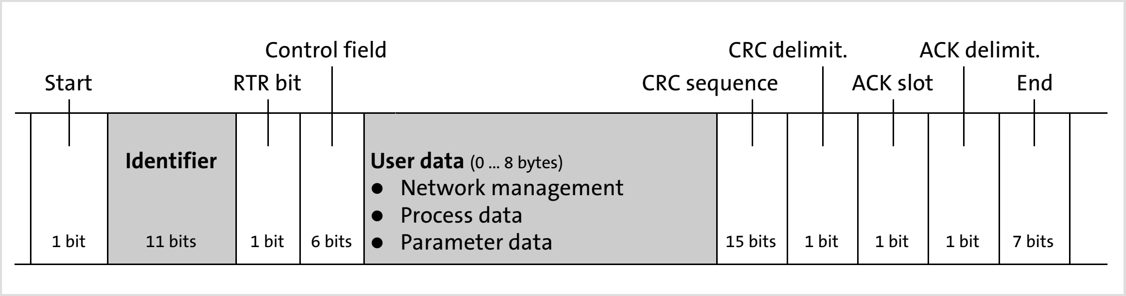


Fig.8-2 Basic structure of the CAN telegram

Identifier

The identifier determines the priority of the message. Moreover, the following is coded:

- The CAN node address (device address in the CAN network) of the node which is to receive the CAN telegram.
  See also chapter ”Addressing of the parameter and process data objects” (🕮 149).
- The type of user data to be transferred

User data

The user data area of the CAN telegram either contains network management data, process data or parameter data:

User data	Description
Network management data (NMT data)	The information serves to establish communication via the CAN network
Process data (PDO, Process Data Objects)	● Process data are transmitted via the process data channel. ● The process data serve to control the controller. ● Process data can be accessed directly by the higher-level host system. The data are, for instance, stored directly in the I/O area of the PLC. It is necessary that the data can be exchanged between the host system and the controller within the shortest time possible. In this connection, small amounts of data can be transferred cyclically. ● Process data are transmitted between the higher-level host system and the controllers to ensure a permanent exchange of current input and output data. ● Process data are not stored in the controller. ● Process data are, for instance, setpoints and actual values.
Parameter data (SDO, Service Data Objects)	● Parameter data are transferred via the parameter data channel and acknowledged by the receiver, i.e. the receiver gets a feedback whether the transmission was successful. ● Parameter data of Lenze devices are called codes. ● The parameter data channel enables access to all Lenze codes and all CANopen indexes. ● Parameters are set, for instance, for the initial commissioning of a plant or when material of a production machine is exchanged. ● Usually the transfer of parameters is not time-critical. ● Parameter changes are stored in the controller. ● Parameter data are, for instance, operating parameters, diagnostic information and motor data.

Tip!

The other signals refer to the transfer features of the CAN telegram that are not described in these instructions.

For further information visit the homepage of the CAN user organisation CiA (CAN in Automation): www.can-cia.org.

8.1.2 Communication phases of the CAN network (NMT)

With reference to communication the drive knows the following states:

State	Explanation
”Initialisation” (Initialisation)	After the controller is switched on the initialisation phase is run through. During this phase, the controller is not involved in the data transfer on the bus. Furthermore it is possible to run through a part of the initialisation in each NMT state due to the transfer of different telegrams (see ”State transitions”). Here, all parameters already set are rewritten with their standard values. After completing the initialisation the drive is automatically in the ”Pre-Operational” state.
”Pre-operational” (before operation)	The drive can receive parameter data. The process data are ignored.
”Operational” (ready for operation)	The drive can receive parameter data and process data.
”Stopped”	Only network management telegrams can be received.

Status transitions

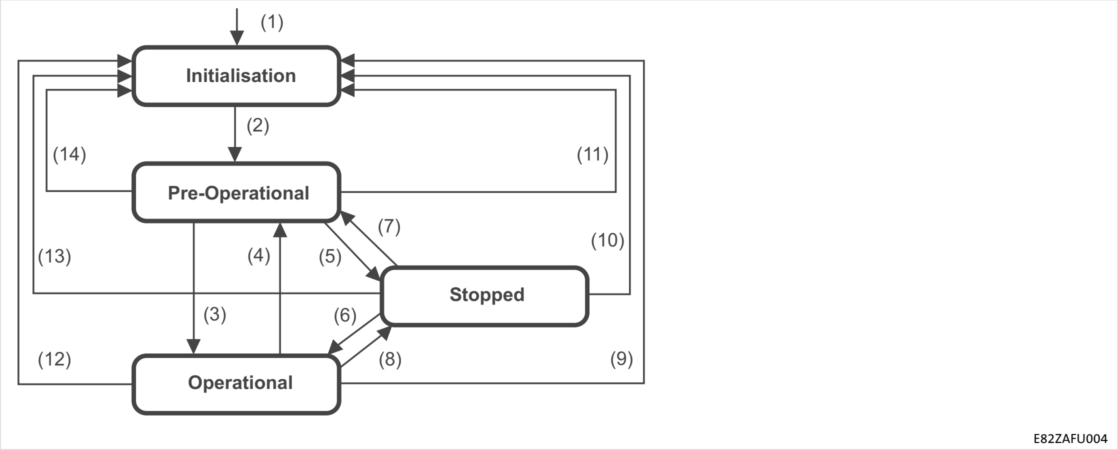


Fig.8-3 State transitions in the CAN network (NMT)

State transition	Command (hex)	Network state after change	Impact on process or parameter data after state change
(1)	-	Initialisation	If the mains is switched ON, initialisation is started automatically. During the initialisation phase the drive is not involved in the data exchange. After the initialisation is completed, a boot-up message of the node with an own identifier is sent to the master and the node automatically changes to the state ”Pre-Operational”.
(2)	-	Pre-Operational	The master decides in this phase in which way the controllers take part in communication.
From here on, the states are changed by the master for the entire network. A target address included in the command specifies the receiver(s).			
(3), (6)	01xx	Operational	Network management telegrams, sync, emergency, process data (PDO) and parameter data (SDO) are active (corresponds to ”Start Remote Node”) Optional: During the change event-controlled and time-controlled process data (PDO) are transmitted once.
(4), (7)	80xx	Pre-Operational	Network management telegrams, sync, emergency and parameter data (SDO) are active (corresponds to ”Enter Pre-Operational State”)
(5), (8)	02xx	Stopped	Only network management telegrams can be received.
(9)	81xx	Initialisation	Initialisation of all parameters in the communication module with the values stored (corresponds to ”Reset-Node”)
(10)			
(11)			
(12)	82xx		Initialisation of parameters relevant to communication (CiA DS 301) in the communication module with the values stored (corresponds to ”Reset Communication”)
(13)			
(14)			

xx = 00_{hex}	With this assignment, all devices connected are addressed by the telegram. The status can be changed for all devices at the same time.
xx = node ID	If a node address is indicated, the status will only be changed for the device addressed.

Network management (NMT)

The telegram structure used for the network management contains the identifier and the command included in the user data which consists of the command byte and the node address.

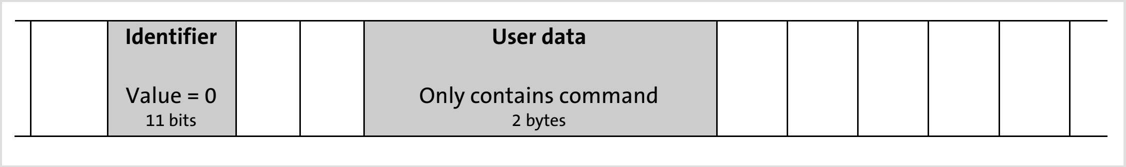


Fig.8-4 Telegram for switching over the communcation phases

The communication phases are changed over by a node, the network master, for the entire network. The change-over can also be done by a controller (see chapter ”CAN-boot-up”, 🕮 154).

With a certain delay after mains connection, a telegram is sent once that changes the state of the entire drive system to the ”Operational” state. The delay time for the

- **MotionBus (CAN)** can be set under code C0356/subcode 1.
- **System bus (CAN)** can be set under code C2456/subcode 1.

Note!

Communication via process data is only possible with a status change to “operational”!

Example:
For changing the status of all nodes on the bus from ”pre-operational” to “operational” via the CAN master, the following identifier and user data must be set in the telegram:

- Identifier: 00 (broadcast telegram)
- User data: 0100 (hex)

8.1.3 Process data transfer

Definitions

- Process data telegrams between host and drive are distinguished as follows:
  - Process data telegrams **to** the drive
  - Process data telegrams **from** the drive
- The CANopen process data objects are designated as seen from the node’s view:
  - RPDOx: process data object received by a node
  - TPDOx: process data object sent by a node

8.1.3.1 Available process data objects

The following process data objects are available for the ECS axis modules via the CAN interfaces X4 and X14:

CAN interface	RPDOs	TPDOs	Axismodule			
			ECSxS	ECSxP	ECSxM	ECSxA
X4 MotionBus (CAN)	CAN1_IN	CAN1_OUT	✓	✓	✓	✓
	CAN2_IN	CAN2_OUT	✓	✓	–	✓
	CAN3_IN	CAN3_OUT	✓	–	–	✓
X14 System bus (CAN)	CANaux1_IN	CANaux1_OUT	–	✓	–	✓
	CANaux2_IN	CANaux2_OUT	–	✓	–	✓
	CANaux3_IN	CANaux3_OUT	–	–	–	✓

- The CANx_IN/OUT process data objects are integrated into the ECSxS... axis modules in the form of function blocks.
- In the function blocks the user data is converted to corresponding signal types for further use.
- These are the function blocks provided:
  - – CAN (🕮 212) – CAN management
  - – CAN1In (🕮 215)
  - – CAN1Out (🕮 218)
  - – CAN2In (🕮 224)
  - – CAN2Out (🕮 227)
  - – CAN3In (🕮 230)
  - – CAN3Out (🕮 233)
  - – CANSync (🕮 236) – CAN sychronisation

8.1.3.2 Structure of the process data

Each process data telegram has a maximum user data length of eight bytes.

Process data telegram CAN1...3_IN/CANaux1...3_IN (RPDO)

- CAN1...3_IN/CANaux1...3_IN transfers control information to the axis module.
- The control word is transmitted in byte 1 and 2 of the user data.

	Identifier			User data (8 bytes)								
				Control word		00_{hex}	00_{hex}	00_{hex}	00_{hex}	00_{hex}	00_{hex}	
	11 bits			LOW byte	HIGH byte							

Fig.8-5 Structure of process data telegram CAN1...3_IN/CANaux1...3_IN

Process data telegram CAN1...3_OUT/CANaux1...3_OUT (TPDO)

- CAN1...3_OUT/CANaux1...3_OUT indicates status information from the axis module. Status information can be as follows:
  - Current status of the axis module
  - Status of the digital inputs
  - States of internal analog values
  - Error messages

  This information enables the master system to react.
- The status word 1 is transmitted in byte 1 and 2 of the user data.
- The status word 2 is transmitted in byte 3 and 4 of the user data.

	Identifier			User data (8 bytes)								
				Status word 1		Status word 2		00_{hex}	00_{hex}	00_{hex}	00_{hex}	
	11 bits			LOW byte	HIGH byte	LOW byte	HIGH byte					

Fig.8-6 Structure of process data telegram CAN1...3_OUT/CANaux1...3_OUT

8.1.3.3 Transfer of the process data objects

Process data objects		Data transmission
RPDOs	CAN1_IN CANaux1_IN	cyclic (sync-controlled)
	CAN2_IN CANaux2_IN	cyclic (sync-controlled)
	CAN3_IN CANaux3_IN	cyclic (sync-controlled)
TPDOs	CAN1_OUT CANaux1_OUT	cyclic (sync-controlled)
	CAN2_OUT CANaux2_OUT	time or event-controlled
	CAN3_OUT CANaux3_OUT	time or event-controlled

- The cyclic data transmission is activated for each PDO only by a sync telegram.
- The event-controlled data transmission is caused if a value in the corresponding output object changes.
- For the time-controlled transmission the boot-up time, cycle time or delay time can be set via code C0356/C2456 (🕮 154).

8.1.3.4 Cyclic process data objects

The process data via CAN1_IN and CAN1_OUT are determined for a master system.

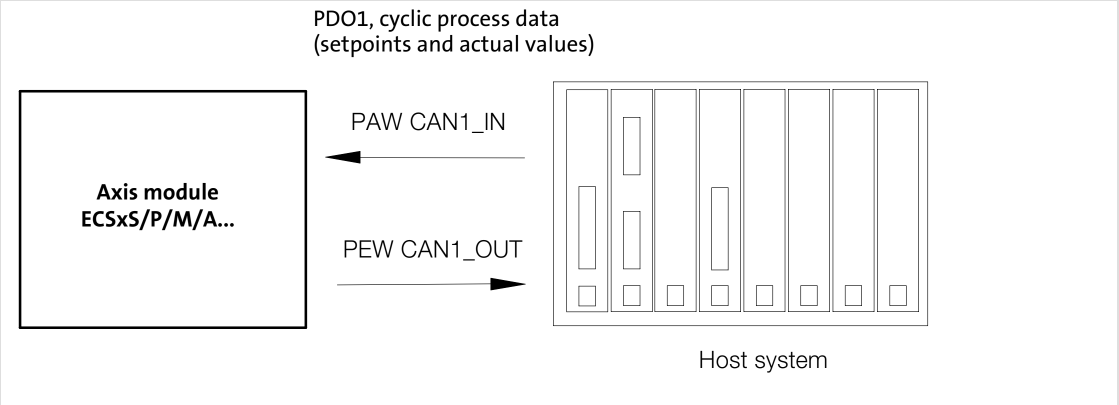


Fig.8-7 Example: Process data transfer via CAN1_IN and CAN1_OUT

For a quick cyclic data transfer one process data object for input signals and one for output signals with eight bytes of user data each is available.

Synchronisation of PDOs with cyclic transmission

In order that the process data from the controller are read cyclically or the controllers accept the process data, an additional special telegram, the sync telegram, is used.

The sync telegram is the trigger point for the data acceptance in the controller and starts the transmission process from the controller. The sync telegram must be generated accordingly for a cyclic process data processing.

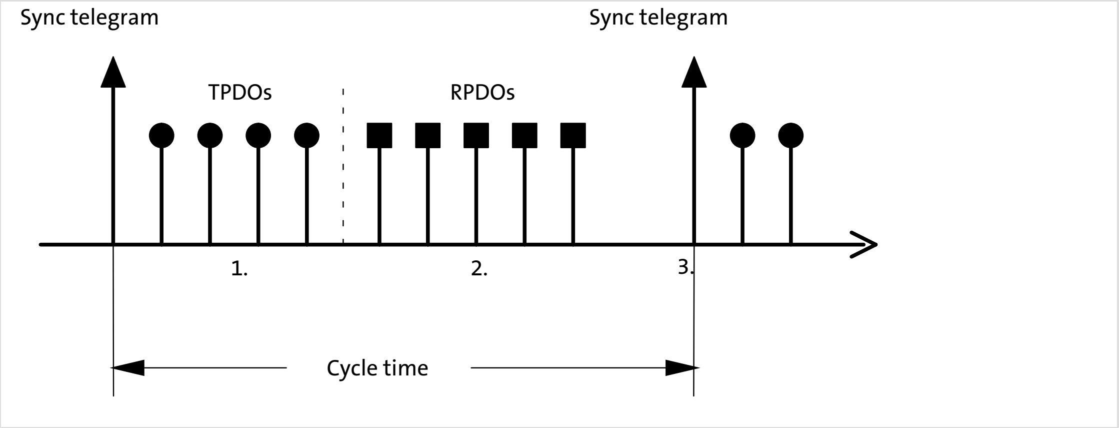


Fig.8-8 Sync telegram

1. After the sync telegram has been received, the cyclic process data of the controllers are sent to the master (TPDOs). In the master they are read as process input data.
2. When the transmission process is completed, the process output data (of the master) are received by the controllers (RPDO’s).

   All other telegrams (e.g. parameters or event-controlled process data) are accepted acyclically by the controllers. The acyclic data are not described in the above-mentioned graphics. They must be considered when the cycle time is dimensioned.
3. The data acceptance in the controller is carried out with the next sync telegram.

Tip!

The response to a sync telegram is determined by the transmission type selected.

Note!

Information on how to set the synchronisation can be found from 🕮 155.

8.1.3.5 Event-controlled process data objects

The event-controlled process data objects are especially suitable for the data exchange between axis modules and for distributed terminal extensions. However, they can also be used by a master system.

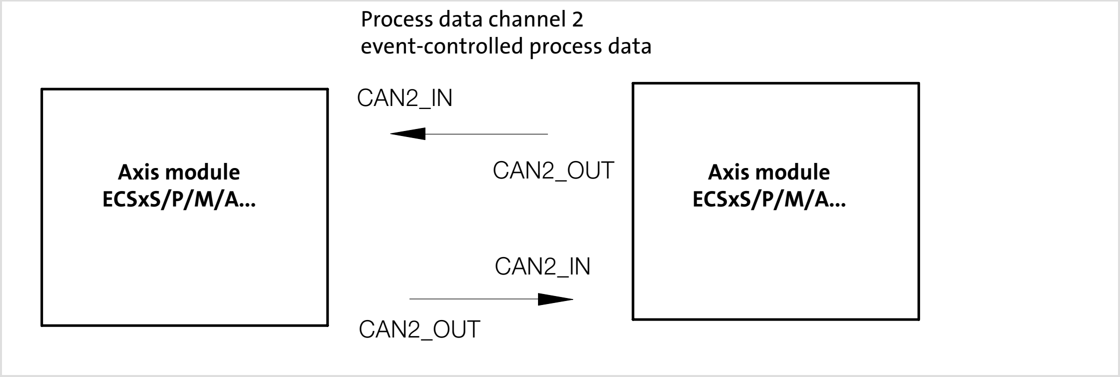


Fig.8-9 Example: Transfer of event-controlled process data objects

The process data objects serve to transmit simple binary signals (e.g. states of digital input terminals) or complete values in 16 and 32 bits (e.g. analog signals).

Event-controlled process data objects with adjustable cycle time (optional)

The output data are transmitted

- *event-controlled* if a value changes within the user data (8 bytes) or
- *cyclically* with the cycle time set (🕮 154) for the
  - **MotionBus (CAN)** under the code C0356.
  - **System bus (CAN)** under the code C2456.

Monitoring times for the inputs CAN1...3_IN/CANaux1...3_IN can be set under code C0357/C2457.

8.1.4 Parameter data transfer

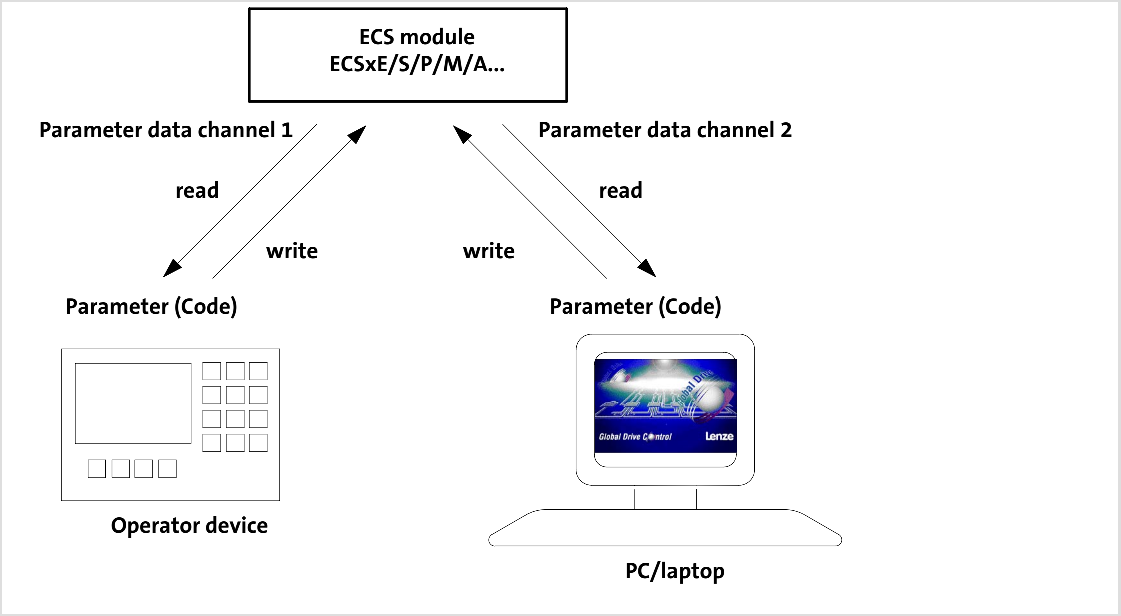


Fig.8-10 Device connection for parameterisation via two parameter data channels

Parameters

- are values which are stored in Lenze controllers under a code.
- are carried out, for instance, for initial commissioning of a plant or when material of a production machine is exchanged.
- are transmitted with low priority.

Parameter data is transferred as SDOs (Service Data Objects) via the system bus and acknowledged by the receiver. The SDOs enable the reading and writing access to the object directory.

Both CAN interfaces (X4, X14) are provided with two separated parameter data channels each which serve to simultaneously connect different devices for parameter setting and diagnostics.

The codes for parameter setting and diagnostics of the MotionBus (CAN) and the system bus (CAN) are divided in separate ranges:

Bus	Connection	Code range
MotionBus (CAN)	X4 (”CAN”)	C03xx
System bus (CAN)	X14 (”CAN-AUX”)	C24xx

8.1.4.1 User data

Structure of the parameter data telegram

User data (up to 8 bytes)							
1. byte	2. byte	3. byte	4. byte	5. byte	6. byte	7. byte	8. byte
Command	**Index** Low byte	**Index** High byte	**Subindex**	**Data 1**	**Data 2**	**Data 3**	**Data4**
				Low word		High word	
				Low byte	High byte	Low byte	High byte
				Error code			

Note!

The user data are displayed in Motorola format.

Examples of parameter data transfer can be found from 🕮 147.

Command

The command contains services for writing and reading parameters and the information on the length of the user data:

	Bit 7 MSB	**Bit6**	**Bit5**	**Bit 4**	**Bit3**	**Bit2**	**Bit1**	**Bit 0** LSB
Command	Command specifier (cs)			toggle (t)	Length		E	E
Write request	0	0	1	0	00 = 4 bytes 01 = 3 bytes 10 = 2 bytes 11 = 1 byte		1	1
Write response	0	1	1	0			0	0
Read request	0	1	0	0			0	0
Read response	0	1	0	0			1	1
Error response	1	0	0	0	0	0	0	0

The following information are contained or must be entered in the command.

	4 byte data (5. ... 8. byte)		**2 byte data** (5. and 6. byte)		**1 byte data** (5. byte)		**Block**	
Command	**hex**	dec	**hex**	dec	**hex**	dec	**hex**	dec
Write request (Transmit parameters to the drive)	**23**	35	**2B**	43	**2F**	47	**21**	33
Write response (Acknowledgement, controller response to write request)	**60**	96	**60**	96	**60**	96	**60**	96
Read request (Request to read a controller parameter)	**40**	64	**40**	64	**40**	64	**40**	64
Read response (Response to read request with current value)	**43**	67	**4B**	75	**4F**	79	**41**	65
Error response (The controller indicates a communication error)	**80**	128	**80**	128	**80**	128	**80**	128

Command ”Error response”:

In the event of an error, the node addressed generates an ”error response”. This telegram always contains the value ”6” in data 4 and an error code in data 3.

The error codes are standardised according to DS301, V4.02.

Addressing by index and subindex

The parameter or Lenze code is addressed with these bytes according to the following formula:

Index = 24575 - (Lenze code number + 2000 (parameter set - 1))

Example

The acceleration time (code C0012) in the parameter set 2 is to respond. This code has the subindex 0 (no subindex).

Calculation:

- Index: 24575 - 12 -2000 = 22563_{dec} = 5823_{hex}
- Subindex: 0_{hex}

Data 1 ... Data 4

Parameter value length depending on the data format			
Parameter value **(Length: 1 byte)**	00	00	00
Parameter value **(length: 2 bytes)**		00	00
Low byte	High byte		
Parameter value **(length: 4 bytes)**			
Low word		High word	
Low byte	High byte	Low byte	High byte

Note!

Lenze parameters are mainly represented as data type FIX32 (32 bit value with sign, decimally with four decimal positions). To obtain integer values, the desired parameter value must be multiplied by $10{,}000_{dec}$.

The parameters C0135 and C0150 must be transmitted bit-coded and without a factor.

Error messages

User data (up to 8 bytes)							
1. byte	2. byte	3. byte	4. byte	5. byte	6. byte	7. byte	8. byte
Command	Index Low byte	Index High byte	Subindex	**Display**			

- Byte 1:

  In the **command** byte the code **128_{dec}** or **80_{hex}** indicates that a fault has occurred.

- Byte 2, 3 and 4:

  In these bytes the **index** (byte 2 and 3) and **subindex** (byte 4) of the code in which an error occurred are entered.

- Byte 5 to 8:

  In the data bytes 5 to 8 the **error code** is entered. The structure of the error code is reversed to the read direction.

Example:
The representation of the error code 06 04 00 41$_{hex}$ in the bytes 5 to 8

← Read direction of the error code

41	**00**	**04**	**06**
5. byte	6. byte	7. byte	8. byte
Low word		High word	
Low byte	High byte	Low byte	High byte

Possible error codes:

Command	7th byte	8th byte	Meaning
80_{hex}	6	6	Wrong index
80_{hex}	5	6	Wrong subindex
80_{hex}	3	6	Access denied

8.1.4.2 Examples of the parameter data telegram

Read parameters

The heatsink temperature C0061 (value: 43 °C) is to be read out by the controller with the node address 5 via the parameter data channel 1.

- Identifier calculation

Identifier of SDO 1 to the controller	Calculation
1536 + node address	1536 + 5 = 1541

- Command ”Read Request” (request to read controller parameter)

Command	Value
Read request	**40_{hex}**

- Index calculation

Index	Calculation
24575 - code number	24575 - 61 = 24514 = $5FC2_{hex}$

- Telegram to drive:

Identifier	User data							
	Command	**Index** Low byte	**Index** High byte	**Subindex**	**Data 1**	**Data 2**	**Data 3**	**Data 4**
1541	40_{hex}	$C2_{hex}$	$5F_{hex}$	00	00	00	00	00

- Telegram from drive

Identifier:
SDO 1 from controller (= 1408) + node address = 1413

Command:
”Read Response” response to read request with the actual value = 43_{hex}

Index of read request:
$5FC2_{hex}$

Subindex:
0

Data 1 to data 4:
00 06 8F B0 = 430,000 → 430,000 : 10,000 = 43 °C

	User data							
Identifier	Command	**Index** Low byte	**Index** High byte	**Subindex**	**Data 1**	**Data 2**	**Data 3**	**Data 4**
1413	43_{hex}	$C2_{hex}$	$5F_{hex}$	00	$B0_{hex}$	$8F_{hex}$	06_{hex}	00

Write parameters

The acceleration time C0012 (parameter set 1) of the controller with the node address 1 is to be changed via the SDO 1 (parameter data channel 1) to 20 seconds.

- ► Identifier calculation

Identifier of SDO 1 to the controller	Calculation
1536 + node address	1536 + 1 = 1537

- ► Command ”Write Request” (transmit parameters to the drive)

Command	Value
Write request	**23_{hex}**

- ► Index calculation

Index	Calculation
24575 - code number	24575 - 12 = 24563 = $5FF3_{hex}$

- ► Subindex: 0
- ► Calculation of the acceleration time

Data 1 ... 4	Calculation
Value of acceleration time	20 s · 10,000 = $200{,}000_{dec}$ = 00 03 0D 40_{hex}

- ► Telegram to drive

	User data							
Identifier	Command	**Index** Low byte	**Index** High byte	**Subindex**	**Data 1**	**Data 2**	**Data 3**	**Data 4**
1537	23_{hex}	$F3_{hex}$	$5F_{hex}$	00	40_{hex}	$0D_{hex}$	03_{hex}	00

- ► Drive response to correct execution

	User data							
Identifier	Command	**Index** Low byte	**Index** High byte	**Subindex**	**Data 1**	**Data 2**	**Data 3**	**Data 4**
1409	60_{hex}	$F3_{hex}$	$5F_{hex}$	00	00	00	00	00

- ► Identifier SDO 1 from controller = 1408 + node address = 1409
- ► Command = ”Write Response” (controller response (acknowledgement)) = 60_{hex}

8.1.5 Addressing of the parameter and process data objects

The CAN bus system is based on a message-oriented data exchange between a transmitter and many receivers. Thus, all nodes can transmit and receive messages at the same time.

The identifier in the CAN telegram – also called *COB-ID (Communication Object Identifier)* controls which node is to receive a transmitted message. With the exception of the network management (NMT) and the sync telegram (Sync) the identifier contains the node address of the drive besides the basic identifier:

Identifier (COB-ID) = basic identifier + adjustable node address (node ID)

The basic identifier is preset with the following values:

Object			Direction		Basic identifier	
			to the drive	from the drive	dec	hex
NMT					0	0
Sync					128	80
PDO1 (Process data channel 1)	RPDO1	CAN1_IN CANaux1_IN	x		512	200
	TPDO1	CAN1_OUT CANaux1_OUT		x	384	180
PDO2 (Process data channel 2)	RPDO1	CAN2_IN CANaux2_IN	x		640	280
	TPDO1	CAN2_OUT CANaux2_OUT		x	641	281
PDO3 (Process data channel 3)	RPDO1	CAN3_IN CANaux3_IN	x		768	300
	TPDO1	CAN3_OUT CANaux3_OUT		x	769	301
SDO1 (Parameter data channel 1)			x		1536	600
				x	1408	580
SDO2 (Parameter data channel 2)			x		1600	640
				x	1472	5C0
Node-Guarding			x		1792	700

Note!

Chapter ”8.2.1 Setting of CAN node address and baud rate” contains information on

- ► Setting of the node address (🕮 150).
- ► Selective addressing (🕮 152).

Display of the resulting identifiers

The display code for the resulting identifiers is for the

- ► MotionBus (CAN) C0355.
- ► System bus (CAN) C2455.

Here you cannot predefine values.

8.2 Configuring MotionBus/system bus (CAN)

Note!

In case of ECSxS... axis modules

only the parameter channels (SDO) are supported for the system bus – connection X14 (CAN-AUX) –.

8.2.1 Setting CAN node address and baud rate

- The node address and baud rate for the **MotionBus (CAN)** can be set via
  – DIP switch *or*
  – codes.
- The node address and baud rate for the **system bus (CAN)** must be set via codes only.

8.2.1.1 Settings via DIP switch

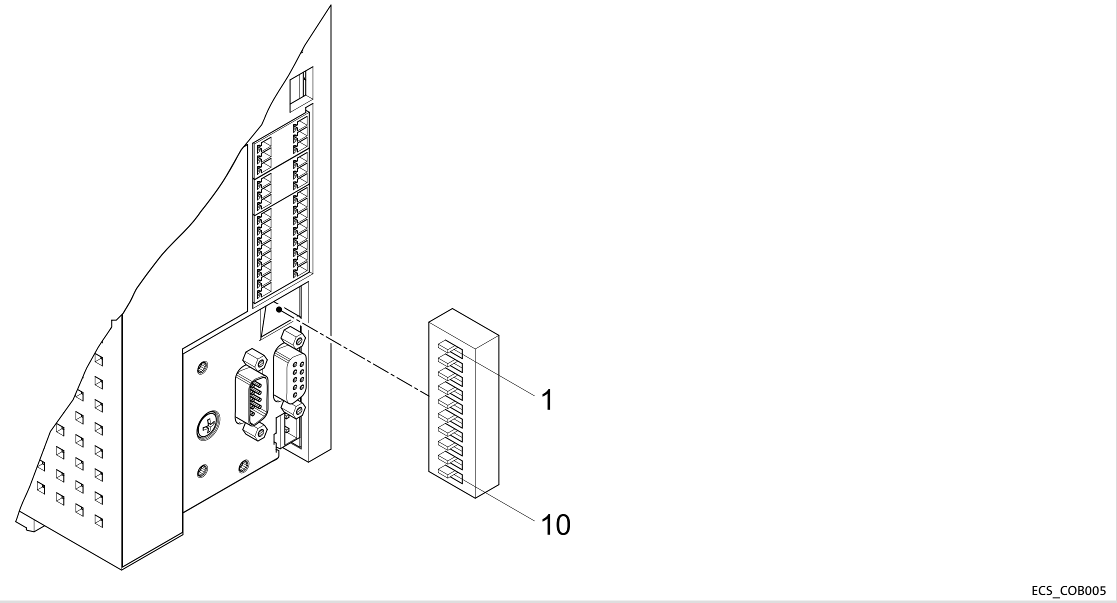


Fig.8-11 DIP switch for node address and baud rate (all switches: OFF)

Node address setting

The node address is set via DIP switches 2 ... 7. These switches are assigned to certain valencies. The sum of valencies results in the node address to be set (see example).

Switch	Valency	Example	
		Switching status	Node address
1	–	Any	32 + 16 + 8 = 56
2	32	**ON**	
3	16	**ON**	
4	8	**ON**	
5	4	OFF	
6	2	OFF	
7	1	OFF	

Baud rate setting

Note!

The baud rate must be set identically for all controllers and the master computer.

Switch	Baud rate [kbit/s]				
	1000	500	250	125	50
8	ON	OFF	OFF	OFF	OFF
9	OFF	OFF	OFF	ON	ON
10	OFF	OFF	ON	OFF	ON

8.2.1.2 Settings via codes

Note!

- ► The codes C0350 (MotionBus node address) and C0351 (MotionBus baud rate) are active if one of the DIP switches is set to the ”ON” position.
- ► The baud rate must be identical for all controllers and the master computer.

Code		Possible settings		IMPORTANT	
No.	Designation	Lenze/ appl.	Selection		
C0350	CAN address	1		Node address MotionBus (CAN)	🕮 150 🕮 149
			1 {1} 63		
C0351	CAN Baud rate	0		MotionBus (CAN)baud rate	🕮 150
			0 500 kbits/s		
			1 250 kbits/sec		
			2 125 kbits/sec		
			3 50 kbits/sec		
			4 1000 kbits/sec		

Save changes with C0003 = 1.

The settings are only accepted after carrying out one of the following actions:

- ► Switching-on of the low-voltage supply
- ► Command “Reset node” via the bus system
- ► Reset node via C0358 (🕮 154)

8.2.1.3 Selective addressing

C0354 serves to set the controller address irrespective of the node address in C0350. To make it valid, set C0353/1 = 1.

Code		Possible settings		IMPORTANT	
No.	Designation	Lenze/ appl.	Selection		
C0354				Alternative node addresses for MotionBus (CAN)	🕮 152
1	CAN addr.	129	1 {1} 512	Address 2 CAN1_IN	
2	CAN addr.	1		Address 2 CAN1_OUT	
3	CAN addr.	257		Address 2 CAN2_IN	
4	CAN addr.	258		Address 2 CAN2_OUT	
5	CAN addr.	385		Address 2 CAN3_IN	
6	CAN addr.	386		Address 2 CAN3_OUT	

To make the alternative node address valid, set the corresponding subcode of C0353 = 1.

Bus	code	Value	The addresses are defined by
MotionBus (CAN)	C0353/1	0	C0350 (Lenze setting)
		1	C0354/1 for CAN1_IN C0354/2 for CAN1_OUT
	C0353/2	0	C0350 (Lenze setting)
		1	C0354/3 for CAN2_IN C0354/4 for CAN2_OUT
	C0353/3	0	C0350 (Lenze setting)
		1	C0354/5 for CAN3_IN C0354/6 for CAN3_OUT

Save changes with C0003 = 1.

The settings are only accepted after carrying out one of the following actions:

- Switching-on of the low-voltage supply
- Command “Reset node” via the bus system
- Reset node via C0358 (🕮 154)

8.2.2 Defining boot-up master in the drive system

If the bus initialisation and the related state change of ”Pre-Operational” to ”Operational” is not executed by a higher-level master system, the controller can be intended for the master to execute this task.

The MotionBus (CAN) is configured via code C0352.

The master functionality is only required for the initialisation phase of the drive system. In the initialisation phase, C0356 serves to set a boot-up time for the master. (🕮 154).

With the NMT telegram *start_remote_node* (broadcast telegram) the master sets **all** nodes in the NMT status ”Operational”. Data via the process data objects can only be exchanged during this status.

Note!

The change of the master/slave operation only becomes effective after a renewed mains switching of the controller or by sending one of the NMT telegrams *reset_node* or *reset_communication* to the controller.

As an alternative to the NMT telegram *reset_node* the code C0358 (”Reset Node”) is available for a reinitialisation of the CAN-specific device parameters.

Code		Possible settings			IMPORTANT	
No.	Designation	Lenze/ appl.	Selection			
C0352	CAN mst	0			MotionBus (CAN) master/slave configuration	🕮 153
			0	Slave	CAN boot-up is not active	
			1	Master	CAN boot up is active	
			2	Master with node guarding		
			3	Slave and heartbeat producer		
			4	Slave with node guarding		

8.2.3 Setting of boot-up time/cycle time

Use C0356 to change the times required for data exchange.

Setting boot-up time for MotionBus (CAN)

code	Meaning
C0356/1	● Here the time is set when the activation is started after switching on the low-voltage supply. – Only valid when C0352 = 1. – Normally the Lenze setting (3000 ms) is sufficient. ● If several controllers are interconnected and there is no higher-level host, one of the controllers must initialise the CAN network. The master activates the entire network once at a specific instant and thus starts the process data transfer. – Status changes from ”pre-operational” to operational”.

Setting the cycle time for MotionBus (CAN) output data:

code	Meaning
C0356/2	Cycle time CAN2_OUT/CAN3_OUT (reserved)
C0356/3	Cycle time CAN1_OUT in cyclic or event-controlled operation
C0356/4	Delay time for sending telegrams via the process data object

- ► **C0356/2...4 = 0:** event-controlled process data transfer
  The output data will only be sent if a value in the output object changes.
- ► **C0356/2...4 > 0:** cycle time [ms]

8.2.4 Executing a reset node

The following changes only become valid after a reset node:

- ► Changes of the baud rates
- ► Changes of the addresses of process data objects
- ► Changes of the MotionBus node addresses.

Reset node can be made by:

- ► Switching on the low-voltage supply
- ► Reset node via the bus system
- ► Reset node via C0358

Code		Possible settings			IMPORTANT	
No.	Designation	Lenze/ appl.	Selection			
C0358	Reset Node	0			Carry out reset node of MotionBus (CAN)	🕮 154
			0	No function		
			1	CAN reset		

8.2.5 CAN bus synchronisation

By means of this function, the internal time base can be synchronised with the instant of reception of the sync signal. By this, the start of cyclic and time-controlled internal processes of all drives involved in the synchronisation takes place in a synchronous manner.

Operating mode

Via C1120, the operating mode (source of the sync signal) is set:

Code		Possible settings			IMPORTANT	
No.	Designation	Lenze/ appl.	Selection			
C1120	Sync mode	0			Sync signal source	
			0	Off	Off	
			1	CAN Sync	Sync connection via MotionBus (CAN)	🕮 159
			2	Terminal sync	Sync connection via terminal	🕮 160

Synchronisation time

The synchronisation process requires an additional period of time after the mains connection and the initialisation phase.

The synchronisation time depends on

- the baud rate of the CAN bus,
- the starting time (arrival of the first sync signal),
- the time interval between the sync signals,
- the sync correction factor (C0363),
- the operating mode (C1120).

The synchronisation time can be set via the code C0369.

Code		Possible settings				IMPORTANT	
No.	Designation	Lenze/ appl.	Selection				
C0369	SyNc Tx time	0				CAN sync transmitting cycle A sync telegram with the identifier set in C0368 is sent with the set cycle time.	🕮 155
			0	{1 ms}	65000	0 = switched off	

Axis sychronisation

The CAN bus transfers the sync signal and the process signals.

Application example:

- Presetting of cyclic, synchronised position setpoint information for multi-axis applications via the CAN bus.

Synchronisation cycle

For the purpose of synchronisation the master sends a periodic sync signal.

The controllers receive the sync signal and compare the time between two LOW-HIGH edges of the signal with the preselected cycle time (C1121).

Code		Possible settings				IMPORTANT	
No.	**Designation**	**Lenze/ appl.**	**Selection**				
C1121	Sync cycle	2				Synchronisation cycle	🕮 156
			1	{1 ms}	13		

CAN sync identifier

Code		Possible settings				IMPORTANT	
No.	**Designation**	**Lenze/ appl.**	**Selection**				
C0367	Sync Rx ID	128				MotionBus (CAN) Sync receipt ID	🕮 156
			1	{1}	256		

Phase shift

The synchronisation phase (C1122) defines the period of time of the offset by which the start of the controller-internal cycle lags behind the sync signal received.

Note!

Always set the synchronisation phase greater than the maximum possible temporal jitter* of the sync signals received!

* Jitters are phase shiftings and hence periodic changes of signal frequencies. They are shiftings of fixed instants of a digital signal (e.g. the transition instant from one signal amplitude to another). Jitters especially occur at high frequencies and may cause data losses.

Code		Possible settings				IMPORTANT	
No.	**Designation**	**Lenze/ appl.**	**Selection**				
C1122	Sync phase	0.046				Synchronisation phase	🕮 156
			0.000	{0.001 ms}	6.500		

Correction value of phase controller

The CAN sync correction increment (C0363) specifies the increment by means of which the rule cycle is extended or shortened (e. g. in order to shift the starting time).

As a rule, the factory-set smallest value can be maintained. Only in disadvantageous cases (e. g. if the sync master does not observe its cycle time precisely enough), it may be necessary to extend the CAN sync correction increment so that the value in C4264 becomes minimal. Otherwise, an extension has rather disdavantageous effects on the drive features.

Code		Possible settings			IMPORTANT	
No.	Designation	Lenze/ appl.	Selection			
C0363	Sync correct.	1			CAN sync correction increment	🕮 157
			1	0.2 µs/ms		
			2	0.4 µs/ms		
			3	0.6 µs/ms		
			4	0.8 µs/ms		
			5	1.0 µs/ms		

Monitoring of the synchronisation (time slot)

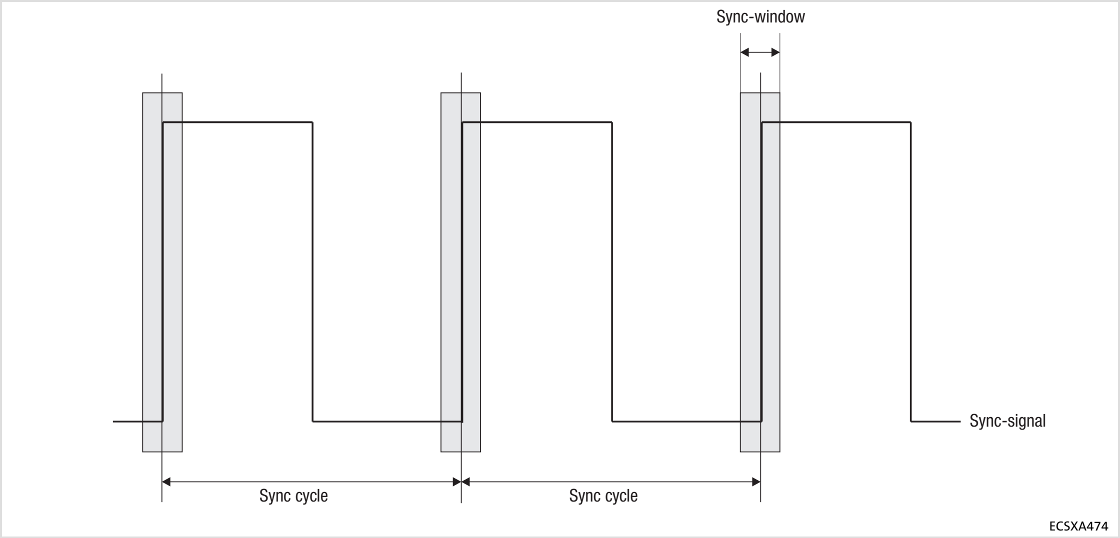


Fig.8-12 ”Time slot” for the LOW-HIGH edges of the sync signal

Note!

A jitter (see note 🕮 156) up to ±200 µs on the LOW-HIGH edges of the sync signal is permissible. The amount of the jitter has an impact on the parameterisation of the ”time slot”.

C3165 can be used for monitoring the synchronisation.

Code		Possible settings				IMPORTANT	
No.	Designation	Lenze/ appl.	Selection				
C1123	Sync window	0.010				Synchronisation window	🕮 157
			0.000	{0.001 ms}	6.500		

CAN sync response

Code		Possible settings			IMPORTANT	
No.	Designation	Lenze/appl.	Selection			
C0366	Sync Response	1			MotionBus (CAN) Sync response	🕮 158
			0	No response		
			1	Response		

Note!

In C0366 the value ”1” must be set permanently.

8.2.5.1 Synchronisation via MotionBus (CAN)

During the commissioning phase, comply with the following sequence:

Device	Step		Description
All devices	1.	Commission the controller and MotionBus (CAN).	🕮 74
	2.	Inhibit the controller.	
Slaves	3.	Connect ”CANSync-InsideWindow” with digital output.	
	4.	C1120 = 1	Synchronisation by means of sync telegram via MotionBus (CAN) active.
	5.	C0366 = 1 (Lenze setting)	CAN sync reaction: Slaves respond to sync telegram.
Master	6.	Define the telegram sequence (identifier): 1. . Send new setpoint to all slaves 2. Send sync telegram 3. Receive response of all slaves	
	4.	Start communication/send sync telegrams.	
Slaves	5.	Read C0362 of the master.	Retrieve cycle time of the sync telegram of the master.
	6.	Set C1121 according to C0362 of the master.	Adjust the time distance of the sync telegrams to be received to the cycle time of the master.
	7.	Set C1123.	Set optimum size for the ”time slot”. ● If the sync signal ”jitters” heavily (🕮 156), increase ”time slot”.
	8.	Enable the controller via the signal ”CANSync-InsideWindow” applied to the digital output.	Monitoring of the synchronisation. ● If ”CANSync-InsideWindow” = TRUE, enable the controller.

8.2.5.2 Synchronisation via terminal

During the commissioning phase, comply with the following sequence:

Site	Step		Description
All devices	1.	Commission the controller and MotionBus (CAN).	🕮 74
	2.	Inhibit the controller.	
Slaves	3.	Connect ”CANSync-InsideWindow” with digital output.	
	4.	Apply the sync signal of the master to terminal X4/CH.	
Slaves	5.	C1120 = 2	Active synchronisation by sync signal via terminal X4/CH.
Slaves	6.	C0366 = 1 (Lenze setting)	CAN sync reaction: Slaves respond to sync telegram.
Master	7.	Start communication/send sync signals.	
Slaves	8.	Read C0362 of the master.	Retrieve cycle time of the sync signal from the master.
	9.	Set C1121 according to C0362 of the master.	Adjust the time distance of the sync signal to be received to the cycle time of the master.
	10.	Set C1123.	Set optimum size for the ”time slot”. ● If the sync signal ”jitters” heavily (🕮 156), increase ”time slot”.
	11.	Enable the controller via the signal ”CANSync-InsideWindow” applied to the digital output.	Monitoring of the synchronisation. ● If ”CANSync-InsideWindow” = TRUE, enable the controller.

8.2.6 Diagnostic codes

The operation via the MotionBus (CAN) can be observed via the following diagnostic codes:

- ► C0359: Bus state
- ► C0360: Telegram counter
- ► C0361: Bus load

8.2.6.1 Bus status (C0359)

C0359 shows the current operating state of the MotionBus (CAN).

Value of C0359	Operating state	Description
0	Operational	The bus system is fully operational.
1	Pre-Operational	Only parameters (codes) can be transferred via the bus system. Data exchange between controllers is not possible. A change into the state operational" can be made via a special signal on the MotionBus (CAN). Changing from "pre-operational" to "operational" can be carried out by the following actions: ● Master functionality of a higher-level host system ● If a drive is determined as master via C0352, the operating state is automatically changed for the entire drive system after the set boot-up time C0356 (subcode 1), when power is switched on. ● Reset node via C0358 (🕮 154) ● With a binary input signal Reset node", which can be set correspondingly. ● Reset node via connected host system
2	Warning	Faulty telegrams have been received. The controller remains passive (does not send any data). Possible reasons: ● Missing bus termination ● Insufficient shielding ● Potential differences in the grounding of the control electronics ● Bus load is too high ● Controller is not connected to MotionBus (CAN)
3	Bus off	Too many faulty telegrams. The controller is disconnected from the MotionBus (CAN). It can be reconnected by: ● TRIP reset ● Reset node (🕮 154) ● Renewed mains connection

8.2.6.2 Telegram counter (C0360)

C0360 counts for all parameter channels those telegrams that are valid for the controller. The counters have a width of 16 bits. If a counter exceeds the value '65535', the counting process restarts with '0'.

Counted messages:

C0360	Meaning
Subcode 1	All sent telegrams
Subcode 2	All received telegrams
Subcode 3	Sent telegrams of CAN1_OUT
Subcode 4	Telegrams sent from CAN2_OUT ● Always "0" since channel is not used!
Subcode 5	Telegrams sent from CAN3_OUT ● Always "0" since channel is not used!
Subcode 6	Telegrams sent from parameter data channel 1
Subcode 7	Telegrams sent from parameter data channel 2
Subcode 8	Telegrams received from CAN1_IN
Subcode 9	Telegrams received from CAN2_IN ● Always "0" since channel is not used!
Subcode 10	Telegrams received from CAN3_IN ● Always "0" since channel is not used!
Subcode 11	Telegrams received from parameter data channel 1
Subcode 12	Telegrams received from parameter data channel 2

8.2.6.3 Bus load (C0361)

It can be detected via C0361 which bus load in percent is needed by the controller or by the single data channels. Faulty telegrams are not considered.

Bus load of the single subcodes:

C0361	Meaning
Subcode 1	All sent telegrams
Subcode 2	All received telegrams
Subcode 3	Sent telegrams of CAN1_OUT
Subcode 4	Telegrams sent from CAN2_OUT ● Always ”0” since channel is not used!
Subcode 5	Telegrams sent from CAN3_OUT ● Always ”0” since channel is not used!
Subcode 6	Telegrams sent from parameter data channel 1
Subcode 7	Telegrams sent from parameter data channel 2
Subcode 8	Received telegrams of CAN1_IN
Subcode 9	Telegrams received from CAN2_IN ● Always ”0” since channel is not used!
Subcode 10	Telegrams received from CAN3_IN ● Always ”0” since channel is not used!
Subcode 11	Telegrams received from parameter data channel 1
Subcode 12	Telegrams received from parameter data channel 2

The data transfer is limited. The limits are determined by the number of telegrams transferred per time unit and by the data transfer speed.

The limits can be determined during data exchange in a drive network by adding all drives involved under code C0361/1.

Example:

Drives/host system	Bus load
C0361/1 - controller 1	23.5 %
C0361/1 - controller 2	12.6 %
Host system	16.0 %
	52.1 % (total)

Two drives and the master system are interconnected via the MotionBus (CAN).

Note!

- ► Max. bus load of all devices involved: 80 %
- ► If other devices are connected, as for instance decentralised inputs and outputs, their telegrams must be taken into consideration.
- ► Bus overload can, for instance, be caused by sync telegrams sent with a too short time interval.
  - – **Remedy:** Change synchronisation cycle of higher-level control and controller (C1121).

8.3 Monitoring

Various monitoring functions (🕮 164) protect the drive system against impermissible operating conditions.

If a monitoring function responds,

- the set reaction is triggered to protect the drive.
- the fault message is entered at position 1 in the history buffer (🕮 180).

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

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

Example: C0168/1 = 2061

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

8.3.1 Reactions

According to the failure, one or more of the following responses are possible:

<table>
<tr><th>Response</th><th colspan="2">Effects on drive or controller</th><th>Danger warnings</th></tr>
<tr><td>TRIP
(highest priority)</td><td colspan="2">● 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.</td><td></td></tr>
<tr><td rowspan="3">Message</td><td colspan="2">Switches the power outputs U, V, W to a high resistance as long as the message is active.</td><td rowspan="3">⚠ Danger!
The drive restarts automatically if the message is removed.</td></tr>
<tr><td>● Short-term message ≤ 0.5 s</td><td>The drive is idling (no control!) as long as the message is active.
If the message is removed, the drive accelerates to its setpoint with maximum torque.</td></tr>
<tr><td>● Long-term message > 0.5 s</td><td>The drive is idling (because of internal controller inhibit) as long as the message is active.
If necessary, restart the drive.</td></tr>
<tr><td>FAIL-QSP</td><td colspan="2">If a fault occurs, the drive brakes to standstill along the QSP ramp (C0105).</td><td></td></tr>
<tr><td>Warning</td><td colspan="2">● Only failure is displayed.
● The drive operates under control.</td><td rowspan="2">STOP Stop!
Since these responses have no effect on the drive behaviour, the drive may be destroyed.</td></tr>
<tr><td>Off</td><td colspan="2">● No response to failure! Monitoring is deactivated.</td></tr>
</table>

8.3.2 Monitoring functions

The responses partly can be parameterised via codes.

Monitoring				**Possible responses** ● Lenze setting ✓ Setting possible					
Error message		**Description**	**Source**	Code	TRIP	Message	Warning	FAIL-QSP	Off
x071	CCR	System fault	Internal		●				
x091	EEr	External monitoring (activated via DCTRL)	FWM	C0581	●	✓	✓	✓	✓
x191	HSF	Internal error	Internal		●				
Voltage supply									
x020	OU	Overvoltage in the DC bus (C0173)	MCTRL			●			
x030	LU	DC bus undervoltage (C0174)	MCTRL			●			
x107	H07	Internal fault (power stage)	Internal		●				
Communication									
x041	ap1	Internal fault (signal processor)	MCTRL		●				
x061	CE0	Communication error on the automation interface (AIF)	AIF	C0126	✓		✓		●
x062	CE1	Communication error on the CAN1_IN process data input object (monitoring time adjustable via C0357/1)	CAN1_IN	C0591	✓		✓		●
x063	CE2	Communication error on the CAN2_IN process data input object (monitoring time adjustable via C0357/2)	CAN2_IN	C0592	✓		✓		●
x064	CE3	Communication error on the CAN3_IN process data input object (monitoring time adjustable via C0357/3)	CAN3_IN	C0593	✓		✓		●
x065	CE4	BUS-OFF status of MotionBus (CAN) (too many faulty telegrams)	CAN	C0595	✓		✓		●
x066	CE5	Communication error of the Gateway function (C0370, C0371) via MotionBus (CAN)	CAN	C0603	✓		✓		●
x122	CE11	Communication error on the CANaux1_IN process data input object (time monitoring adjustable via C2457/1)	CANaux1_IN	C2481	✓		✓		●
x123	CE12	Communication error on the CANaux2_IN process data input object (time monitoring adjustable via C2457/2)	CANaux2_IN	C2482	✓		✓		●
x124	CE13	Communication error on the CANaux3_IN process data input object (time monitoring adjustable via C2457/3)	CANaux3_IN	C2483	✓		✓		●
x125	CE14	BUS-OFF status of system bus (CAN) (too many faulty telegrams)	CANaux	C2484	✓		✓		●
x126	CE15	Communication error of the Gateway function (C0370, C0371) via system bus (CAN)	CANaux	C2485	✓		✓		●

x 0 = TRIP, 1 = message, 2 = warning, 3 = FAIL-QSP

[1] Adjustable in the DDS under **Project → Exceptional handling**

[2] For ECSxA... only

Monitoring				Possible responses ● Lenze setting ✓ Setting possible					
Error message		**Description**	**Source**	Code	TRIP	Message	Warning	FAIL-QSP	Off
x260	Err Node Guard	”Life Guarding Event”: The controller configured as CAN slave does not receive a ”Node Guarding” telegram with the ”Node Life Time” from the CAN master.	Node Guarding	C0384	●	✓	✓	✓2)	✓
Temperatures / sensors									
x050	OH	Heatsink temperature > 90C	MCTRL		●				
x051	OH1	Interior temperature > 90C	MCTRL		●				
x053	OH3	Motor temperature > 150° C	MCTRL	C0583	●		✓		✓
x054	OH4	Heatsink temperature > C0122	MCTRL	C0582	✓		●		✓
x055	OH5	Interior temperature > C0124	MCTRL	C0605	✓		●		✓
x057	OH7	Motor temperature > C0121	MCTRL	C0584	✓		●		✓
x058	OH8	Motor temperature via inputs T1 and T2 is too high.	MCTRL	C0585	✓		●		✓
x086	Sd6	Thermal sensor error on the motor (X7 or X8)	MCTRL	C0594	✓		✓		●
x095	FAN1	Fan monitoring (only for built-in units)			✓	●			
X110	H10	Thermal sensor error on heatsink	FWM	C0588	●				✓
x111	H11	Thermal sensor error in the interior of the device	FWM	C0588	●				✓
Motor / feedback system									
x011	OC1	Motor cable short circuit	MCTRL		●				
x012	OC2	Motor cable earth fault	MCTRL		●				
x015	OC5	I x t overload	MCTRL		●				
x016	OC6	I^2 x t overload (C0120)	MCTRL		●				
x017	OC7	I x t warning (C0123)	MCTRL	C0604	✓		●		✓
x018	OC8	I^2 x t warning (C0127)	MCTRL	C0606	✓		●		✓
x032	LP1	Motor phase failure **Caution: applicable for asynchronous motors only. By activating the motor phase failure detection the calculating time provided to the user is minimised!**	MCTRL	C0599	✓		✓		●
x082	Sd2	Resolver error at X7 **Caution: In case of ”Warning” (C0586 = 2) the drive may be destroyed if the trouble is not corrected in time!**	MCTRL	C0586	●		✓		✓
x085	Sd5	Master current value encoder error on analog input X6/AI+, AI- (C0034 = 1)	MCTRL	C0598	✓		✓		●
x087	Sd7	Absolute value encoder error at X8	MCTRL		●				
x088	sd8	SinCos encoder error on X8	MCTRL	C0580	✓		✓		●
x089	PL	Error with regard to rotor position adjustment	MCTRL		●				
Speed									

x 0 = TRIP, 1 = message, 2 = warning, 3 = FAIL-QSP

1) Adjustable in the DDS under **Project → Exceptional handling**

2) For ECSxA... only

Monitoring				Possible responses ● Lenze setting ✓ Setting possible					
Error message		Description	Source	Code	TRIP	Message	Warning	FAIL-QSP	Off
x190	nErr	Speed control error (monitoring window C0576)	MCTRL	C0579	✓	✓	✓	✓	●
x200	Nmax	Maximum speed (C0596) has been exceeded.	MCTRL	C0607	●		✓		✓
Float error									
x209	float Sys-T	Float error in system task (ID 0)	Internal		●		✓	✓	1)
x210	float Cycl.-T	Float error in cyclic task (PLC_PRG, ID 1)	Internal		●		✓	✓	1)
x211	float Task1	Float error in task 1 (ID 2)	Internal		●		✓	✓	1)
x212	float Task2	Float error in task 2 (ID 3)	Internal		●		✓	✓	1)
x213	float Task3	Float error in task 3 (ID 4)	Internal		●		✓	✓	1)
x214	float Task4	Float error in task 4 (ID 5)	Internal		●		✓	✓	1)
x215	float Task5	Float error in task 5 (ID 6)	Internal		●		✓	✓	1)
x216	float Task6	Float error in task 6 (ID 7)	Internal		●		✓	✓	1)
x217	float Task7	Float error in task 7 (ID 8)	Internal		●		✓	✓	1)
x218	float Task8	Float error in task 8 (ID 9)	Internal		●		✓	✓	1)
Time-out / overflow									
X105	H05	Internal fault (memory)	Internal		●				
x108	H08	Extension board not connected properly or not supported by program.	Internal		●				
x201	overrun Task1	Time-out in task 1 (ID 2)	Internal		●		✓	✓	1)
x202	overrun Task2	Time-out in task 2 (ID 3)	Internal		●		✓	✓	1)
x203	overrun Task3	Time-out in task 3 (ID 4)	Internal		●		✓	✓	1)
x204	overrun Task4	Time-out in task 4 (ID 5)	Internal		●		✓	✓	1)
x205	overrun Task5	Time-out in task 5 (ID 6)	Internal		●		✓	✓	1)
x206	overrun Task6	Time-out in task 6 (ID 7)	Internal		●		✓	✓	1)
x207	overrun Task7	Time-out in task 7 (ID 8)	Internal		●		✓	✓	1)
x208	overrun Task8	Time-out in task 8 (ID 9)	Internal		●		✓	✓	1)
x219	overrun Cycl.-T	Time-out in cyclic task (PLC_PRG, ID 1)	Internal		●		✓	✓	

x 0 = TRIP, 1 = message, 2 = warning, 3 = FAIL-QSP

1) Adjustable in the DDS under **Project → Exceptional handling**

2) For ECSxA... only

Monitoring				**Possible responses** ● Lenze setting ✓ Setting possible					
Error message		**Description**	**Source**	Code	TRIP	Message	Warning	FAIL-QSP	Off
X220	noT-Fkt Credit	Not enough technology units available in the PLC.	Internal		●				
x230	No program	No PLC program loaded in the PLC.	Internal		●				
x231	Unallowed Lib	You have called the library function in the PLC program. This function is not supported.	Internal		●				
x232	NoCamData	Motion profiles (cam data) are not available.	Internal		●				
x240	ovrTrans Queue	Overflow of the transmit request memory	Free CAN objects		●	✓	✓	✓	✓
x241	ovr Receive	Too many receive telegrams	Free CAN objects		●			✓	
Parameter setting									
x072	PR1	Check sum error in parameter set 1	Internal		●				
x074	PEr	Program error	Internal		●				
x075	PR0	Error in the parameter sets	Internal		●				
x079	PI	Error during parameter initialisation	Internal		●				
x080	PR6	● **With ECSxS/P/M:**Internal error ● **With ECSxA:** Too many user codes	Internal		●				

x 0 = TRIP, 1 = message, 2 = warning, 3 = FAIL-QSP

[1] Adjustable in the DDS under **Project → Exceptional handling**

[2] For ECSxA... only

8.3.3 Monitoring times for process data input objects

Each process data input object can monitor whether a telegram has been received within a time set. As soon as a telegram arrives, the corresponding monitoring time (C0357) is restarted (”retriggerable monoflop” function).

The following assignments are valid:

Code		Possible settings				IMPORTANT	
No.	Designation	Lenze/ appl.	Selection				
C0357						MotionBus (CAN) monitoring time for CAN1...3_IN	🕮 168
1	CE monit time	3000	1	{1 ms}	65000	CE1 monitoring time	
2	CE monit time	3000				CE2 monitoring time	
3	CE monit time	3000				CE3 monitoring time	

Determining the reaction to monitoring:

- C0591 for CAN1_IN (”CE1”)
- C0592 for CAN2_IN (”CE2”)
- C0593 for CAN3_IN (”CE3”)

The following can be set:

- 0 = fault (TRIP) - controller sets controller inhibit (CINH)
- 2 = warning
- 3 = monitoring is switched off

You can also use the signals as binary output signal, e. g. for assigning the output terminal.

Bus off

If the controller disconnects from the CAN bus due to faulty telegrams, the signal ”BusOffState” (CE4) is set.

BusOffState” can trip an error (TRIP) or warning (as CE1, CE2, CE3). The signal can be switched off and the reaction can be set via C0595. It is also possible to assign the terminal output for this purpose.

Reset node

Changes of the baud rates, the CAN node addresses or the addresses of process objects are only valid after a reset node.

A node can be reset by:

- Switching on the low-voltage supply
- Reset node via the bus system
- Reset node via C0358 (🕮 154)

8.3.4 Motor temperature (OH3, OH7)

The motor temperature is monitored by means of a continuous thermal sensor (KTY). Wire the thermal sensor to the resolver cable on X7 (🕮 68) or to the encoder cable on X8 (🕮 69).

- Adjustable warning threshold (OH7) via C0121
- Fixed threshold (OH3) = 150 °C

The reaction to exceeding the thresholds can be defined via:

- C0584 (adjustable threshold)
- C0583 (fixed threshold)

Code		**Possible settings**				**IMPORTANT**	
No.	**Designation**	**Lenze/ appl.**	**Selection**				
C0121	OH7 limit	120				Adjustable threshold for early motor temperature warning	🕮 169
			45	{1 °C}	150	Motor temperature > C0121 ⇨ fault OH7	
C0583	MONIT OH3	0				Configuration of motor temperature monitoring via resolver input X7 or encoder input X8	🕮 169
			0	TRIP			
			2	Warning			
			3	Off			
C0584	MONIT OH7	2				Configuration of motor temperature monitoring via resolver input X7 or encoder input X8 Threshold setting in C0121	🕮 169
			0	TRIP			
			2	Warning			
			3	Off			

8.3.5 Heatsink temperature (OH, OH4)

The heatsink temperature of the controller can be monitored with a temperature threshold:

- Adjustable threshold (OH4) via C0122
- Fixed threshold (OH) = 90 °C

The reaction to exceeding the adjustable threshold can be defined via C0582.

Code		Possible settings			IMPORTANT	
No.	**Designation**	**Lenze/ appl.**	**Selection**			
C0122	OH4 limit	80			Adjustable threshold for early heatsink temperature warning	🕮 170
			45 {1 °C} 90		Heatsink temperature > C0122 ⇨ fault OH4	
C0582	MONIT OH4	2			Configuration of heatsink temperature monitoring Threshold setting in C0122	🕮 170
			0	TRIP		
			2	Warning		
			3	Off		

8.3.6 Interior temperature (OH1, OH5)

The temperature inside the device is permanently monitored with two temperature thresholds:

- Adjustable threshold (OH5) via C0124
- Fixed threshold (OH1) = 90 °C

The reaction to exceeding the adjustable threshold can be defined via C0605.

Code		**Possible settings**		**IMPORTANT**	
No.	**Designation**	**Lenze/ appl.**	**Selection**		
C0124	OH5 limit	75		Adjustable threshold for early warning of temperature inside the device	🕮 171
			10 {1 %} 90	C0062 > C0124 ⇨ fault OH5	
C0605	MONIT OH5	2		Configuration of early warning of temperature inside the device Threshold setting in C0124	🕮 171
			0 TRIP		
			2 Warning		
			3 Off		

8.3.7 Function monitoring of the thermal sensors (H10, H11)

The function of the thermal sensors of heatsink and the interior of the device. If the thermal sensors report values beyond the measuring range, the fault H10 (heatsink) or H11 (interior) is reported. The response to the faults can be defined via C0588.

Code		**Possible settings**		**IMPORTANT**	
No.	**Designation**	**Lenze/ appl.**	**Selection**		
C0588	MONIT H10/H11	0		Configuration of thermal sensor monitoring (H10, H11) in the controller ”SensFaultTht/SensFaultTid” (FWM H10/H11)	🕮 171
			0 TRIP		
			2 Warning		
			3 Off		

8.3.8 Controller current load (I x t monitoring – OC5, OC7)

The I x t monitoring controls the current load of the axis module. The monitoring is set in a way that renders operation possible

- with continuous device output current = Ir.
- for ≤ 30 s with device output current ≤ 1.5 x I_N.

The overload protection of the controller can be set with thresholds:

- Adjustable threshold (OC7) with C0123
- Fixed threshold (OC5) = 100 %

After an overcurrent phase a recovery phase of 120 s must be taken into account. For a more precise consideration, use the overcurrent characteristic and the value 3 x $\tau_{\text{axis module}}$ (📖 173).

The reaction to exceeding the adjustable threshold can be defined via C0604.

Code		**Possible settings**				**IMPORTANT**	
No.	**Designation**	**Lenze/ appl.**	**Selection**				
C0123	OC7 limit	90				Adjustable threshold for I x t early warning	📖 172
			0	{1 %}	100	C0064 > C0123 ⇨ fault OC7	
C0604	MONIT OC7	2				Configuration of early warning I x t, threshold setting in C0123	📖 172
			0	TRIP			
			2	Warning			
			3	Off			

Overcurrent characteristic

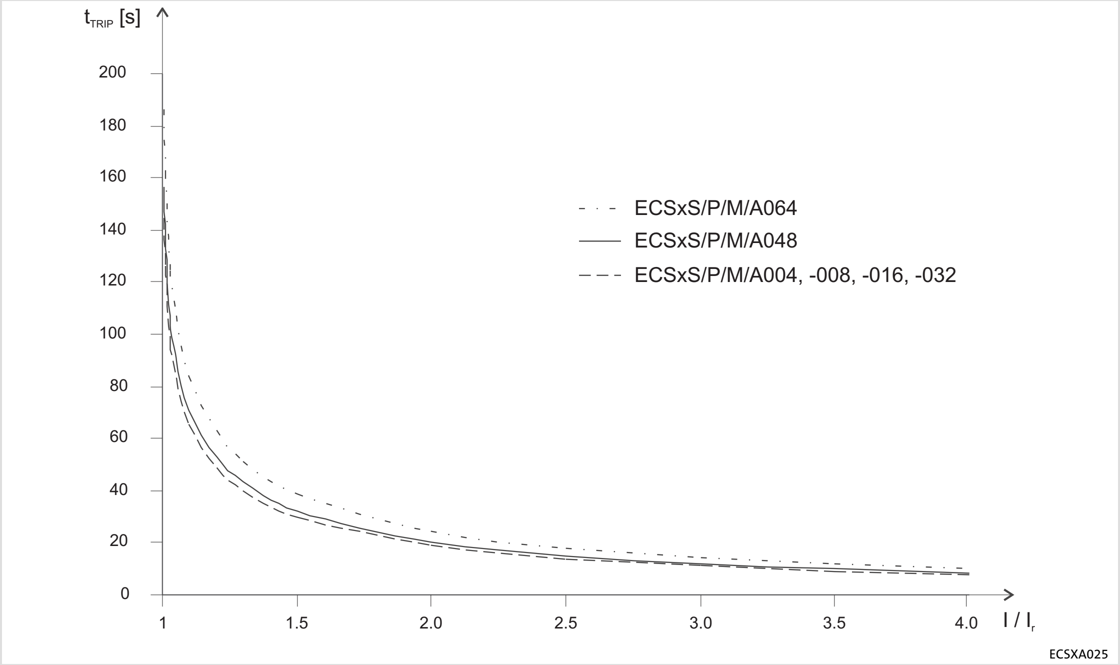


Fig.8-13 Overcurrent characteristic ECSxS..., see also "Rated data" 🕮 24

The overcurrent characteristic shows the maximum time t_{TRIP} till the axis module generates an I x t error. In order to reach this time t_{TRIP} again, the time 3 x $\tau_{axis\ module}$ with the load I/I_r = 0 A must be observed.

Device	$\tau_{axis\ module}$ [s]	Overcurrent characteristic
ECSxS004	54.6	$I \cdot t = \frac{I_{subprofile\_x}}{I_{rated}} - \left(\frac{I_{subprofile\_x}}{I_{rated}} - I \cdot t_{subprofile\_x-1}\right) \cdot e^{-\frac{t_{subprofile\_x}}{\tau_{axis\_module}}}$
ECSxS008	27.3	
ECSxS016	27.3	
ECSxS032	27.3	
ECSxS048	29.5	
ECSxS064	35.1	

8.3.9 Motor current load (I^2 x t monitoring – OC6, OC8)

The I^2 x t load of the motor is continually calculated by the axis module and displayed in C0066. Two tripping thresholds can be set via C0120 and C0127. If threshold 1 is exceeded, the reaction set in C0606 (OC8) is activated. If threshold 2 is exceeded, OC6-TRIP is activated.

The I^2 x t monitoring is designed so that it trips after 179 s at a motor current of 1.5 x I_r and a set threshold of 100 % (thermal motor-time constant C0128 = 5 min).

Code		**Possible settings**				**IMPORTANT**	
No.	**Designation**	**Lenze/ appl.**	**Selection**				
C0120	OC6 limit	105				Threshold for I^2xt disconnection	🕮 174
			0	{1 %}	120	0 = I^2xt monitoring is switched off I^2xt > C0120 ⇨TRIP 006	
C0127	OC8 limit	100				Threshold for I^2xt early warning	🕮 174
			0	{1 %}	120	I^2xt > C0127 ⇨ reaction as adjusted in C0606	
C0128	Tau motor	5.0				Thermal time constant of the motor	🕮 174
			1.0	{0.1 min}	25.0	For calculating the I^2xt disconnection	
C0606	MONIT OC8	2				Configuration of I^2xt early warning Threshold setting in C0120	🕮 174
			0	TRIP			
			2	Warning			
			3	Off			

Calculation of the release time:

$$t = -(\mathrm{C0128}) \cdot \ln\left(1 - \frac{y+1}{\left(\frac{I_M}{I_r}\right)^2 \cdot 100}\right)$$

I_M Current motor current

I_r Rated motor current

y C0120 or C0127

The release time for different motor currents and thresholds can be taken from the diagram (C0128 = 5.0 min):

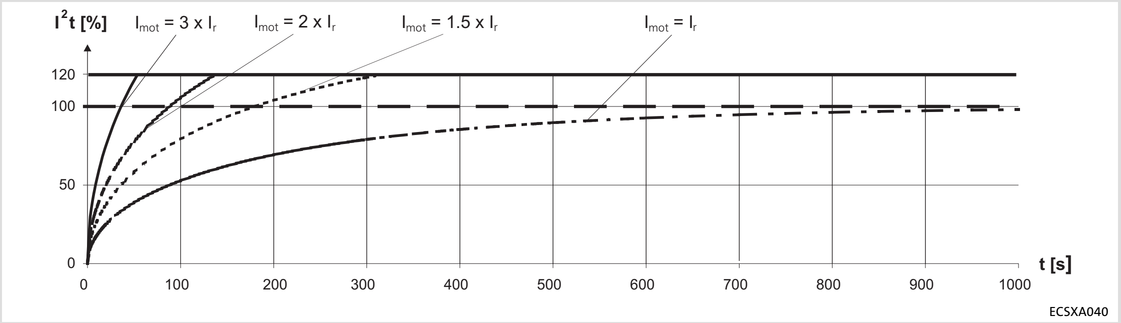


Fig.8-14 I^2 x t monitoring: Release times with different motor currents

Imot	Motor current
I_r	Rated motor current
I^2t	I^2t load
T	Time

8.3.10 DC-bus voltage (OU)

The DC-bus voltage is monitored for overvoltage and undervoltage via C0173 and C0174.

Overvoltage

If the DC-bus voltage exceeds the upper threshold, an OU message is released.

Selection	Mains voltage	Brake unit	LU message (Undervoltage)		OU message (Overvoltage)	
C0173	Power supply module [V AC]		Setting [V DC]	Resetting [V DC]	Setting [V DC]	Resetting [V DC]
0	230	yes/no	130	275	400	390
1	400	yes/no	285	430	800	790
2	400 ... 460	yes/no	328	473	800	790
3	480	no	342	487	800	785
4	480	yes	342	487	800	785
10	230	yes/no	C0174	C0174 + 5 V	400	390
11	400 (Lenze setting)	yes/no	C0174	C0174 + 5 V	800	790
12	400 ... 460	yes/no	C0174	C0174 + 5 V	800	790
13	480	no	C0174	C0174 + 5 V	800	785
14	480	yes	C0174	C0174 + 5 V	800	785

Undervoltage

If the DC-bus voltage falls below the lower threshold set under C0174, an LU message is released.

Code		Possible settings				IMPORTANT	
No.	Designation	Lenze/appl.	Selection				
C0174	UG min	60				Undervoltage threshold of DC bus (LU)	📖 78
			15	{1 V}	342		

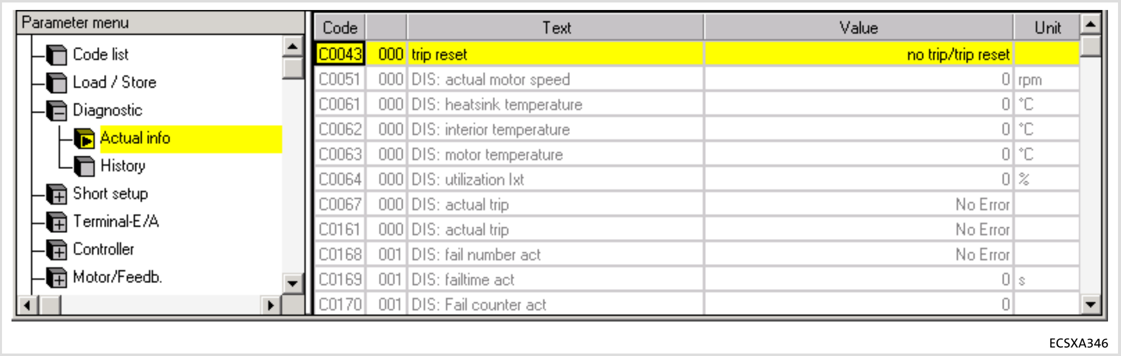
8.3.11 Control electronics voltage supply (U15)

If the voltage at X6/DI1 or X6/DI3 falls below 17 V, TRIP ”U15” is released. The error can only be acknowledged if U > 19 V.

9 Diagnostics

9.1 Diagnostics with Global Drive Control (GDC)

In order to diagnose the current controller operation, click on **Diagnostic → Actual info** in the GDC parameter menu. The table which appears then shows the current motor data, operating times, error messages, etc.



Code		Text	Value	Unit
C0043	000	trip reset	no trip/trip reset	
C0051	000	DIS: actual motor speed	0	rpm
C0061	000	DIS: heatsink temperature	0	°C
C0062	000	DIS: interior temperature	0	°C
C0063	000	DIS: motor temperature	0	°C
C0064	000	DIS: utilization Ixt	0	%
C0067	000	DIS: actual trip	No Error	
C0161	000	DIS: actual trip	No Error	
C0168	001	DIS: fail number act	No Error	
C0169	001	DIS: failtime act	0	s
C0170	001	DIS: Fail counter act	0	

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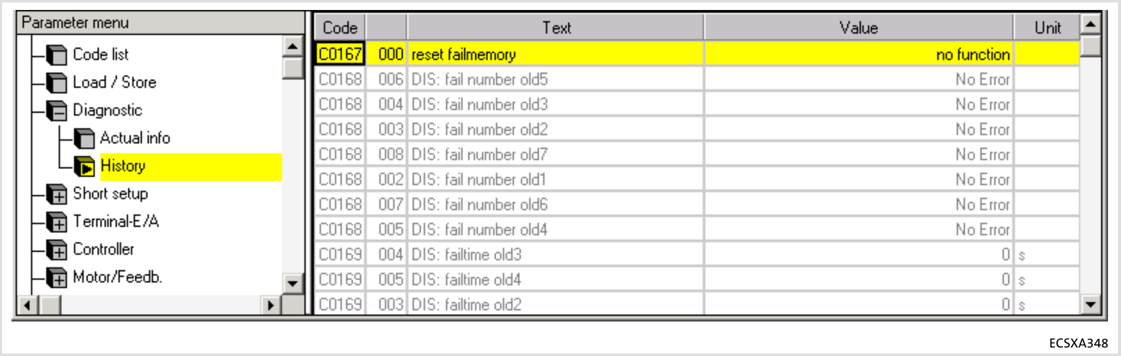
Fig.9-1 GDC view: Diagnostic of the current operation

The parameter menu of the GDC displays values regarding the fault history under **Diagnostic → History**:



Code		Text	Value	Unit
C0167	000	reset failmemory	no function	
C0168	006	DIS: fail number old5	No Error	
C0168	004	DIS: fail number old3	No Error	
C0168	003	DIS: fail number old2	No Error	
C0168	008	DIS: fail number old7	No Error	
C0168	002	DIS: fail number old1	No Error	
C0168	007	DIS: fail number old6	No Error	
C0168	005	DIS: fail number old4	No Error	
C0169	004	DIS: failtime old3	0	s
C0169	005	DIS: failtime old4	0	s
C0169	003	DIS: failtime old2	0	s

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Fig.9-2 GDC view: Diagnostic history

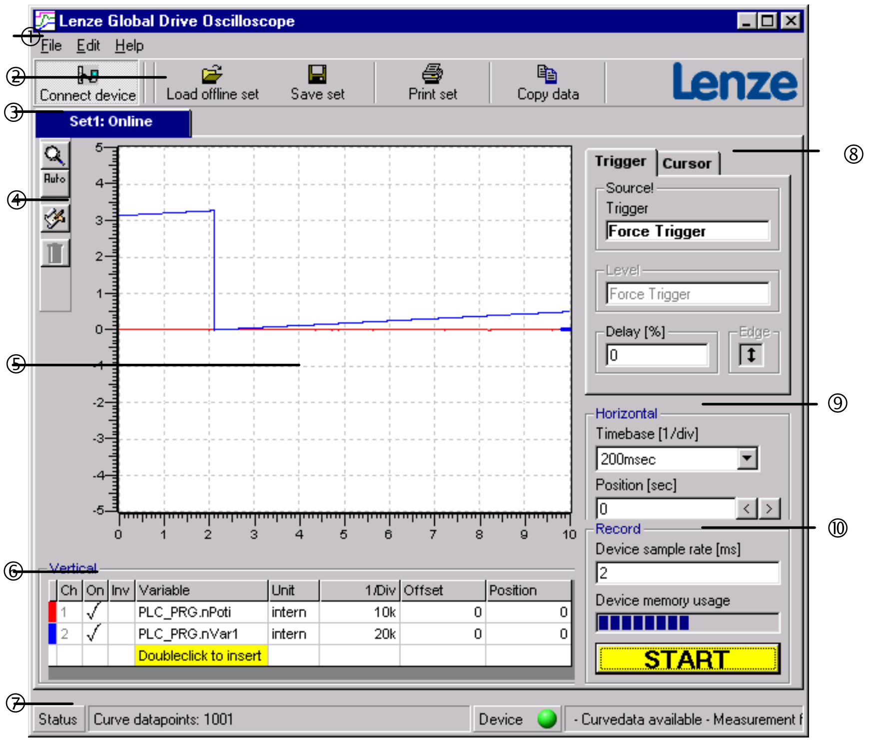
9.2 Diagnostics with Global Drive Oscilloscope (GDO)

The **Global Drive Oscilloscope (GDO)** is included in the scope of supply of the Lenze parameter setting and operating program "Global Drive Control (GDC)" and can be used as an additional diagnostics program.

The GDO serves to e. g. record input and output data and device-internal states during the controller operation.

Note!

- ▶ Detailed information concerning the handling and functional range of GDO can be gathered from the Manual "Global Drive Oscilloscope (GDO), First steps".
- ▶ Overview of the variables used in the GDO: 🕮 362



Source/Trigger: Force Trigger

Level: Force Trigger

Delay [%]: 0

Timebase [1/div]: 200msec

Position [sec]: 0

Device sample rate [ms]: 2

Device memory usage

Ch	On	Inv	Variable	Unit	1/Div	Offset	Position
1	√		PLC_PRG.nPoti	intern	10k	0	0
2	√		PLC_PRG.nVar1	intern	20k	0	0
			Doubleclick to insert				

Status | Curve datapoints: 1001 | Device | - Curvedata available - Measurement f

ECSXA480

Fig.9-3 Global Drive Oscilloscope (GDO)

① Menu bar
② Symbol bar at the top
③ Data sets
④ Symbol bar on the left
⑤ Graph display field
⑥ Vertical operating elements
⑦ Status display
⑧ Trigger/cursor operating elements
⑨ Horizontal operating elements
⑩ Operating elements for recording

9.3 Diagnostics with keypad XT EMZ9371BC

The two submenus ”Actual info” and ”History” in the ”Diagnostic” menu contain all codes for the

- Monitoring of the drive
- Error diagnosis

Status messages are additionally displayed in the operating level. If several messages are active, the message with the highest priority is displayed.

Priority	Display	Meaning
1	GLOBAL DRIVE INIT	Initialisation or communication error between keypad and controller
2	XXX - TRIP	Active TRIP (contents of C0168/1)
3	XXX - MESSAGE	Active message (contents of C0168/1)
4	Special device states:	
		Switch-on inhibit
5	Source for controller inhibit (the value of C0004 is displayed simultaneously):	
	STP1	Terminal X5/28
	STP3	Operating module or LECOM A/B/LI
	STP4	INTERBUS or PROFIBUS-DP
	STP5	System bus (CAN) is called MotionBus for ECS modules (CAN)
	STP6	C0040
6	Source for quick stop (QSP):	
	QSP-term-Ext	MCTRL-QSP input of the MCTRL function block is applied to HIGH signal
	QSP-C0135	Operating module or LECOM A/B/LI
	QSP-AIF	INTERBUS or PROFIBUS-DP
	QSP-CAN	System bus (CAN) is called MotionBus for ECS modules (CAN)
7	XXX - WARNING	Active warning (contents of C0168/1)
8	xxxx	Value below C0004

10 Troubleshooting and fault elimination

A failure can be quickly detected by means of display elements or status information via the MotionBus (CAN)

Display elements and status messages provide a rough classification of the trouble.

The chapter ”10.3 System error message” (📖 184) provides notes on causes and eliminations of trouble.

10.1 Fault analysis

10.1.1 Fault analysis via the LED display

LED		**Operating state**	**Check**
Red	**Green**		
Off	On	Controller enabled, no fault	
Off	Blinking	Controller inhibit (CINH) active, switch-on inhibit	Code C0183
Blinking	Off	Trouble/fault (TRIP) is active	Code C0168/1
Blinking	On	Warning/FAIL-QSP is active	Code C0168/1

10.1.2 Fault analysis with keypad XT EMZ9371BC

The status messages in the display indicate the controller status.

Display	**Controller status**	**Check**
rdy	Controller ready for operation, controller can be inhibited.	Code C0183, C0168/1
imp	Pulses at the power stage inhibited.	Code C0183, C0168/1
Imax	Maximum current reached.	
Mmax	Maximum torque reached.	
FAIL	Fault through TRIP, message, fail QSP or warning.	Code C0183, C0168/1

10.1.3 Fault analysis with the history buffer

The history buffer enables you to trace faults. The corresponding fault messages are stored in 8 memory locations in the sequence of their occurrence.

The memory locations can be retrieved via the codes.

Structure of the history buffer

- The fields under ”fault history” show the memory locations 2 ... 7.
- The fields under ”current faults” indicate memory location 1. It gives information on the active fault.
- If the fault is no longer active or has been acknowledged,
  - all information in the fault memory will by automatically shifted upwards by one subcode.
  - memory location 1 will be deleted (no active fault). The information on the formerly active fault is now in subcode 2.
  - the contents of subcode 8 will be eliminated from the history buffer and cannot be read any longer.
- The history buffer contains three information units for every fault occurred:
  - Error number and response
  - Time of the last occurrence
  - Frequency of the immediately following occurrence

Note!

- If several faults with different responses occur at the same time, only the fault the response of which has the highest priority is entered in the fault memory.
  - TRIP (highest) → message → FAIL-QSP → warning (lowest)
- If several faults with the same response occur at the same time, (e.g. two error messages) only the fault that occurred first is entered in the fault memory.
- If a fault occurs several times in quick succession, only the time of the last occurrence is entered in the fault memory.

Assignment of information to the codes

Code and retrievable information				contains information on ...
C0168	**C0169**	**C0170**	**Subcode**	
Number and **response** of the error message	**Time** of the last occurrence	**Frequency** of the immediately following occurrence	1	active fault
			2	last fault
			3	second-to-last fault
			4	third-to-last fault
			5	fourth-to-last fault
			6	fifth-to-last fault
			7	six-to-last fault
			8	seventh-to-last fault

Reset fault

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

Code		Possible settings			IMPORTANT	
No.	**Designation**	**Lenze/ appl.**	**Selection**			
C0043	Trip reset				Reset active TRIP	
			0	Reset TRIP		
			1	TRIP active		

Delete entries in the history buffer

The entries in the history buffer can be deleted via C0167.

► This function only works when no trouble is active.

Code		Possible settings			IMPORTANT	
No.	**Designation**	**Lenze/ appl.**	**Selection**			
C0167	Reset failmem	0			Delete history buffer (C0168)	🕮 180
			0	No reaction		
			1	Delete history buffer		

10.1.4 Fault analysis via LECOM status words (C0150/C0155)

The LECOM status words (C0150/C0155) are coded as follows:

Code		Possible settings			IMPORTANT	
No.	**Designation**	**Lenze/ appl.**	**Selection**			
C0150	Status word	0			Status word for networking via automation interface (AIF) Only display	
			0	{1} 65535	Controller evaluates information as 16 bits (binary coded)	
			Bit 0	Not assigned		
			Bit 1	Pulse inhibit (IMP) is active		
			Bit 2	Not assigned		
			Bit 3	Not assigned		
			Bit 4	Not assigned		
			Bit 5	Not assigned		
			Bit 6	n=0		
			Bit 7	Controller inhibit (CINH) is active		
			Bit 8	Controller status		
			Bit 9	Controller status		
			Bit 10	Controller status		
			Bit 11	Controller status		
			Bit 12	Warning is active		
			Bit 13	Message is active		
			Bit 14	Not assigned		
			Bit 15	Not assigned		

Code		Possible settings			IMPORTANT
No.	Designation	Lenze/ appl.	Selection		
C0155	Status word 2	0			Status word 2 (extended status word) Only display
			0 {1} 65535		Controller evaluates information as 16 bits (binary coded)
			Bit 0	Fail	
			Bit 1	Mmax	
			Bit 2	Imax	
			Bit 3	Pulse inhibit is active (IMP)	
			Bit 4	Ready for operation (RDY)	
			Bit 5	Controller inhibited (CINH)	
			Bit 6	TRIP is active	
			Bit 7	Init	
			Bit 8	Direction of rotation of the motor (CW/CCW)	
			Bit 9	Not assigned	
			Bit 10	Not assigned	
			Bit 11	Not assigned	
			Bit 12	Not assigned	
			Bit 13	Not assigned	
			Bit 14	Not assigned	
			Bit 15	Not assigned	

10.2 Malfunction of the drive

Maloperation / fault	Cause	Remedy
Feedback system		
● Motor rotates CCW when viewed to the motor shaft. ● C0060 counts down after controller enable.	Feedback system is not connected in correct phase relation.	Connect feedback system in correct phase relation.
Asynchronous motor		
● Motor rotates with I_{max} and half slip frequency. ● Motor does not react to setpoint change.	Motor is not connected in correct phase relation.	Connect motor in correct phase relation at the terminals U, V, W
Synchronous motor		
● Motor does not follow the setpoint change. ● I_{max} follows the setpoint selection in idle state.	Motor is not connected in correct phase relation.	Connect motor in correct phase relation at the terminals U, V, W
● Motor rotates CCW when viewed to the motor shaft. ● The synchronous motor accelerates with a speed setpoint = 0 to the rated speed. ● The torque of the synchronous motor is too low.	The rotor angle (offset of electrical and mechanical rotor angle) is not correct.	Carry out rotor position adjustment (C0095 = 1) or set rotor displacement angle manually. **Operate motor without load for this purpose!**
● Motor blocks in certain positions.	The number of pole pairs of the resolver or motor is not set correctly.	Number of pole pairs (C0080) must be set correctly.

10.3 System error messages

10.3.1 Causes and remedies

Tip!

For enquiry of the system errors via the MotionBus/system bus (CAN), the error messages are represented as numbers (see ”Error message – number” column of the following table).

Error message		**Description**	**Cause**	**Remedy**
No.	**Display**			
---	---	No fault	–	–
x011	OC1	Short circuit of motor cable	Short circuit	• Search for the cause of short circuit. • Check motor cable.
			Capacitive charging current of the motor cable is too high.	Use motor cable which is shorter or of lower capacitance.
x012	OC2	Earth fault - motor cable	One of the motor phases has earth contact.	• Search for the cause of the short circuit. • Check motor cable.
x015	OC5	I x t overload	• Frequent and too long acceleration with overcurrent • Continuous overload with I_{motor} > 1.05 x I_{rx}	Check drive dimensioning.
0016	OC6	Motor overload (I^2 x t overload)	Motor is thermally overloaded due to: • impermissible continuous current • frequent or too long acceleration processes	• Check drive dimensioning. • Check setting of C0120.
x017	OC7	I x t warning	Thermal load of motor > C0123 (e. g. by frequent or too long acceleration processes)	• Check drive dimensioning. • Check setting of C0123.
x018	OC8	I^2 x t warning	Thermal load of the motor > C0127 (e. g. by frequent or too long acceleration processes)	• Check drive dimensioning. • Check setting of C0127.
x020	OU	Overvoltage in DC bus	Braking energy is too high. (DC-bus voltage is higher than set in C0173.)	• Insert braking unit or regenerative module. • Check dimensioning of the brake resistor.
x030	LU	Undervoltage in DC bus	DC-bus voltage is lower than determined in C0174.	• Check mains voltage. • Check power supply module.
x032	LP1	Motor phase failure	A current-carrying motor phase has failed.	• Check motor. • Check motor cable. • Switch off monitoring (C0597 = 3).
			The current limit value is set too low.	• Set higher current limit value via C0599.
x041	ap1	Internal error		Contact Lenze.

x 0 = TRIP, 1 = message, 2 = warning, 3 = FAIL-QSP

Error message		Description	Cause	Remedy
No.	Display			
x050	OH	Heatsink temperature > +90 °C	Ambient temperature T_u > +40 °C or > +50 °C	● Allow module to cool and ensure better ventilation. ● Check ambient temperature in the control cabinet.
			Heatsink is very dirty.	Clean heatsink
			Wrong mounting position	Change mounting position.
x051	OH1	Interior temperature > +90 °C	Ambient temperature T_u > +40 °C or > +50 °C	● Allow module to cool and ensure better ventilation. ● Check ambient temperature in the control cabinet.
			Wrong mounting position	Change mounting position.
x053	OH3	Motor temperature > +150 °C threshold (temperature detection via resolver or incremental value encoder)	Motor is thermally overloaded due to: ● impermissible continuous current ● frequent or too long acceleration processes	● Check drive dimensioning. ● Switch off monitoring (C0583 = 3).
			No PTC/temperature contact connected.	Correct wiring.
x054	OH4	Heatsink temperature > C0122	Ambient temperature T_u > +40 °C or > +50 °C	● Allow module to cool and ensure better ventilation. ● Check ambient temperature in the control cabinet. ● Switch off monitoring (C0582 = 3).
			Heatsink is very dirty.	Clean heatsink
			Wrong mounting position	Change mounting position.
			The value under C0122 is set too low.	Enter a higher value under C0122.
x055	OH5	Interior temperature > C0124		● Allow module to cool and ensure better ventilation. ● Check ambient temperature in the control cabinet. ● Switch off monitoring (C0605 = 3).
			The value under C0124 is set too low.	Enter a higher value under C0124.
x057	OH7	Motor temperature > C0121 (temperature detection via resolver or incremental value encoder)	Motor is thermally overloaded due to: ● impermissible continuous current ● frequent or too long acceleration processes	● Check drive dimensioning. ● Switch off monitoring (C0584 = 3).
			No PTC/temperature contact connected.	Correct wiring.
			The value under C0121 is set too low.	Enter a higher value in C0121.
x058	OH8	Motor temperature via inputs T1 and T2 is too high.	Motor is thermally overloaded due to: ● impermissible continuous current ● frequent or too long acceleration processes	● Check drive dimensioning. ● Switch off monitoring (C0585 = 3).
			Terminals T1 and T2 are not assigned	Connect PTC/temperature contact.

x 0 = TRIP, 1 = message, 2 = warning, 3 = FAIL-QSP

Error message		Description	Cause	Remedy
No.	Display			
x061	CE0	Communication error Automation interface (AIF)	Faulty transfer of control commands via AIF.	• Plug on the communication module/keypad XT firmly, screw down, if necessary. • Switch off monitoring (C0126 = 3).
x062	CE1	Communication error at the process data input object CAN1_IN	CAN1_IN object receives faulty data or communication is interrupted.	• Check wiring at X4. • Check transmitter. • Increase monitoring time under C0357/1, if necessary. • Switch off monitoring (C0591 = 3).
x063	CE2	Communication error at the process data input object CAN2_IN	CAN2_IN object receives faulty data or communication is interrupted.	• Check wiring at X4. • Check transmitter. • Increase monitoring time under C0357/2, if necessary. • Switch off monitoring (C0592 = 3).
x064	CE3	Communication error at the process data input object CAN3_IN	CAN3_IN object receives faulty data or communication is interrupted.	• Check wiring on X4. • Check transmitter. • Increase monitoring time under C0357/3, if necessary. • Switch off monitoring (C0593 = 3).
x065	CE4	BUS-OFF status of MotionBus (CAN)	The module has received too many incorrect telegrams via MotionBus (CAN) and has disconnected from the bus.	• Check wiring at X4: bus termination available? • Check shield contact of the cables. • Check PE connection. • Check bus load, reduce baud rate, if necessary (observe cable length!) • Switch off monitoring (C0595 = 3).
x066	ce5	MotionBus (CAN) time-out (communication error of gateway function)	For remote parameterisation (C0370, C0371) via MotionBus (CAN): • Slave does not respond. • Communication monitoring time has been exceeded.	• Check wiring on X4. • Check CAN bus configuration. • Switch off monitoring (C0603 = 3).
x070	U15	Undervoltage of internal 15 V voltage supply		Check voltage supply.
x071	CCR	System failure	Strong interference on the control cables	Control cables must be shielded.
			Earth loops in the wiring	• Check wiring. • Check PE connection.
0072	PR1	Check sum error in parameter set 1 **ATTENTION: Lenze setting is loaded automatically!**	• Fault when loading a parameter set. • Interruption during transmission of the parameter set via operating unit/keypad.	• Set the required parameters and save them with C0003 = 1. • For ”PR0”, additionally switch off the supply voltage. • Check use of pointers.
			The saved parameters do not match the loaded software version.	In order to be able to acknowledge the error, first save the parameter set by means of C0003 = 1.
0074	PEr	Program error	Error in the program flow	• Check use of pointers. • Send module with PLC program and parameter set to Lenze (on floppy disk/CD-ROM).

x 0 = TRIP, 1 = message, 2 = warning, 3 = FAIL-QSP

Error message		Description	Cause	Remedy
No.	**Display**			
0075	PR0	Parameter set error **ATTENTION: Lenze setting is loaded automatically!**	- Fault when loading a parameter set. - Interruption during transmission of the parameter set via operating unit/keypad.	- Set the required parameters and save them with C0003 = 1. - For ”PR0”, additionally switch off the supply voltage. - Check use of pointers.
			The saved parameters do not match the loaded software version.	In order to be able to acknowledge the error, first save the parameter set by means of C0003 = 1.
0079	PI	Error during parameter initialisation	- A fault was detected during parameter set transfer between two devices. - Parameter set does not match the controller, e.g. when data has been transmitted from a controller with a higher performance to a controller with less performance.	- Correct parameter set. - Check code initialisation values.
0080	PR6	**With ECSxS/P/M:** internal error		Contact Lenze.
		With ECSxA: too many user codes		Reduce number of user codes.
x082	Sd2	Resolver error on X7	Resolver cable is interrupted.	- Check cable for wire breakage. - Check resolver. - Switch off monitoring (C0586 = 3).
			Excitation amplitude is too low.	Increase excitation amplitude of resolver (C0416).
x085	Sd5	Master current value encoder error on analog input X6/AI+, AI- (C0034 = 1)	Master current value on X6/AI+, AI- < 2mA	- Check cable for wire breakage. - Check master current value encoder. - Switch off monitoring (C0598 = 3).
x086	Sd6	Thermal sensor error on the motor (X7 or X8)	Encoder for detecting the motor temperature on X7 or X8 indicates undefined values.	- Check cable with regard to firm connection. - Switch off monitoring (C0594 = 3).
x087	Sd7	Absolute value encoder error on X8	Absolute value encoder on X8 does not send any data.	- Check cable for wire breakage. - Check absolute value encoder. - Check voltage supply (C0421). - No Stegmann encoder connected. **Error reset:** Disconnect and then reconnect the low-voltage supply.
x088	sd8	SinCos encoder error on X8	SinCos encoder on X8 does not send any data.	- Check cable for wire breakage. - Check SinCos encoder. - Check voltage supply (C0421). - No Stegmann encoder connected. **Error reset:** Disconnect and then reconnect the low-voltage supply.
x089	PL	Error with regard to rotor position adjustment		
x091	EEr	External monitoring has been activated via **DCTRL**.	A digital signal assigned to the TRIP set function has been activated.	- Check external encoder. - Switch off monitoring (C0581 = 3).
x095	FAN1	Fan monitoring (for built-in units)	Heatsink fan is locked, dirty or defect.	Clean or exchange heatsink fan.
0105	H05	Internal fault (memory)		Contact Lenze.

x 0 = TRIP, 1 = message, 2 = warning, 3 = FAIL-QSP

Error message		Description	Cause	Remedy
No.	**Display**			
0107	H07	Internal fault (power stage)	During initialisation of the controller, an incorrect power stage was detected.	Contact Lenze.
x108	H08	”Extension board” error	”Extension board” not connected correctly.	● Connect ”extension board” correctly. ● Check connecting plug.
			”Extension board” is not supported by PLC program.	● Adapt PLC program to ”extension board”. ● Use ”extension board” which is supported by PLC program.
X110	H10	Thermal sensor error on heatsink	Sensor for detecting the heatsink temperature indicates undefined values.	● Contact Lenze. ● Switch off monitoring (C0588 = 3).
x111	H11	Thermal sensor error in the interior of the device	Sensor for detecting the internal temperature indicates undefined values.	● Contact Lenze. ● Switch off monitoring (C0588 = 3).
x122	CE11	Communication error at the process data input object CANaux1_IN	CANaux1_IN object receives faulty data or communication is interrupted.	● Check wiring at X14. ● Check transmitter. ● Increase monitoring time under C2457/1, if necessary. ● Switch off monitoring (C2481 = 3).
x123	CE12	Communication error at the process data input object CANaux2_IN	CANaux2_IN object receives faulty data or communication is interrupted.	● Check wiring at X14. ● Check transmitter. ● Increase monitoring time under C2457/2, if necessary. ● Switch off monitoring (C2482 = 3).
x124	ce13	Communication error at the process data input object CANaux3_IN	CANaux3_IN object receives faulty data or communication is interrupted.	● Check wiring on X14. ● Check transmitter. ● Increase monitoring time under C2457/3, if necessary. ● Switch off monitoring (C2483 = 3).
x125	CE14	BUS-OFF status of system bus (CAN)	The module has received too many incorrect telegrams via system bus (CAN) and has disconnected from the bus.	● Check wiring at X14: bus termination available? ● Check shield contact of the cables. ● Check PE connection. ● Check bus load, reduce baud rate, if necessary (observe cable length!) ● Switch off monitoring (C2484 = 3).
x126	ce15	System bus (CAN) time-out (communication error of gateway function)	For remote parameterisation (C0370, C0371) via system bus (CAN): ● Slave does not respond. ● Communication monitoring time has been exceeded.	● Check wiring at X14. ● Check CAN bus configuration. ● Switch off monitoring (C2485 = 3).
x190	nErr	Speed control error (speed beyond the tolerance window (C0576))	● Active load (e.g. for hoists) is too high. ● Mechanical blockades on the load side	Check drive dimensioning.
x191	HSF	Internal error		Contact Lenze.
x200	Nmax	Maximum speed (C0596) has been exceeded.	● Active load (e.g. for hoists) is too high. ● Drive is not speed-controlled, torque is excessively limited.	● Check drive dimensioning. ● Increase torque limit, if necessary.

x 0 = TRIP, 1 = message, 2 = warning, 3 = FAIL-QSP

Error message		Description	Cause	Remedy
No.	Display			
x201	Overrun Task1	Time-out in task 1 (ID 2)	Processing of the task lasts longer than the monitoring time set.	● Adapt length of the task runtime. ● Adapt monitoring time. ● Determine the cause of the time-out by checking the task runtime on the task monitor. ● Remove time-critical program parts to a slower task.
x202	Overrun Task2	Time-out in task 2 (ID 3)		
x203	Overrun Task3	Time-out in task 3 (ID 4)		
x204	Overrun Task4	Time-out in task 4 (ID 5)		
x205	Overrun Task5	Time-out in task 5 (ID 6)		
x206	Overrun Task6	Time-out in task 6 (ID 7)		
x207	Overrun Task7	Time-out in task 7 (ID 8)		
x208	Overrun Task8	Time-out in task 8 (ID 9)		
x209	float Sys-T	Float error in system task (ID 0)	Error in real calculation (e.g. division by 0)	Check calculations (program code).
x210	float Cycl.-T	Float error in cyclic task (PLC_PRG, ID 1)		
x211	float Task1	Float error in task 1 (ID 2)		
x212	float Task2	Float error in task 2 (ID 3)		
x213	float Task3	Float error in task 3 (ID 4)		
x214	float Task4	Float error in task 4 (ID 5)		
x215	float Task5	Float error in task 5 (ID 6)		
x216	float Task6	Float error in task 6 (ID 7)		
x217	float Task7	Float error in task 7 (ID 8)		
x218	float Task8	Float error in task 8 (ID 9)		
x219	Overrun Cyc.-t	Time-out in cyclic task (PLC_PRG, ID 1)	Processing of the task lasts longer than the monitoring time set.	● Adapt length of the task runtime. ● Adapt monitoring time. ● Determine the cause of the time-out by checking the task runtime on the task monitor. ● Remove time-critical program parts to a slower task.
0220	noT-Fkt Credit	Not enough technology units available.	A program with technology functions to a drive controller not providing corresponding units has been tried to be loaded	● Insert technology variants of the controller. ● Contact Lenze, if necessary.
0230	No Program	Missing PLC program	No PLC program loaded.	Load PLC program.
0231	Unallowed Lib	PLC program calls invalid library function.	In the PLC program a library function was called which is not supported by the controller (e.g. because the corresponding hardware is missing).	● Remove library function or ensure that the corresponding hardware is available. ● Contact Lenze, if necessary.
0232	NoCam Data	Motion profiles (cam data) are not available.	When calling functions of the function library **LenzeCamControl.lib** we noted that no motion profiles (CAM data) are loaded in the memory of the controller.	● Ensure that valid data has been attached to the project via the DDS CAM support. ● Reload the PLC program into the controller. (Possibly the command **Online→Reset (origin)** has been executed in DDS.)

x 0 = TRIP, 1 = message, 2 = warning, 3 = FAIL-QSP

Error message		Description	Cause	Remedy
No.	Display			
x240	ovrTrans Queue	Error ”Free CAN objects”	Overflow of the transmit request memory	● Reduce number of transmit requests. ● Prolong cycle time.
x241	ovr Receive		Too many receive telegrams	Reduce number of telegrams on the MotionBus/system bus (CAN).
x260	Err Node Guard	”Life guarding event”	The controller configured as CAN slave does not receive a ”Node Guarding” telegram with the ”Node Life Time” from the CAN master.	● Check wiring on X4/X14. ● Check CAN configuration. ● Ensure that ”Node Guarding” has been activated in the CAN master. ● Adjust ”Node Life Time” (C0383) to the setting in the CAN master.

x 0 = TRIP, 1 = message, 2 = warning, 3 = FAIL-QSP

10.3.2 Resetting system error messages

Response	Measures for resetting the error message
TRIP/ FAIL-QSP	**Note!** ● For resetting the TRIP/FAIL-QSP, an acknowledgement is required. ● If a TRIP/FAIL-QSP source is still active, the upcoming TRIP/FAIL-QSP cannot be reset. The acknowledgement of the TRIP/FAIL-QSP can be effected by: ● ”Diagnostics” dialog box in the GDC ⇨, activate ”Fault memory reset” button. ● pressing XT EMZ9371 BB ⇨ STOP keypad. Afterwards, press RUN to enable the axis module again. ● Setting code C0043 = 0. ● Control word C0135, bit 11 ● Control word AIF ● Control word MotionBus/system bus (CAN)
Message	**Danger!** After eliminating the fault, the error message cancels itself automatically, and the drive starts automatically!
Warning	After eliminating the fault, the error message is reset automatically.

11 Function library

11.1 AIF (automation interface management)

Function

This function block serves to monitor communication faults by means of a fieldbus module connected to the automation interface (AIF).

- If a fault occurs, the monitoring sets ”AIF-Ce0CommErr” to TRUE and releases the communication error CE0 (LECOM No. 61); the corresponding response can be configured via C0126 (default setting: Off).
- When using more current AIF fieldbus modules (e.g. EMF2133IB and EMF2175IB), a fault number is output in addition from the fieldbus module via the ”AIF-FieldBusStateBit0 ...7”.

Please read the documentation for the plug-on fieldbus module.

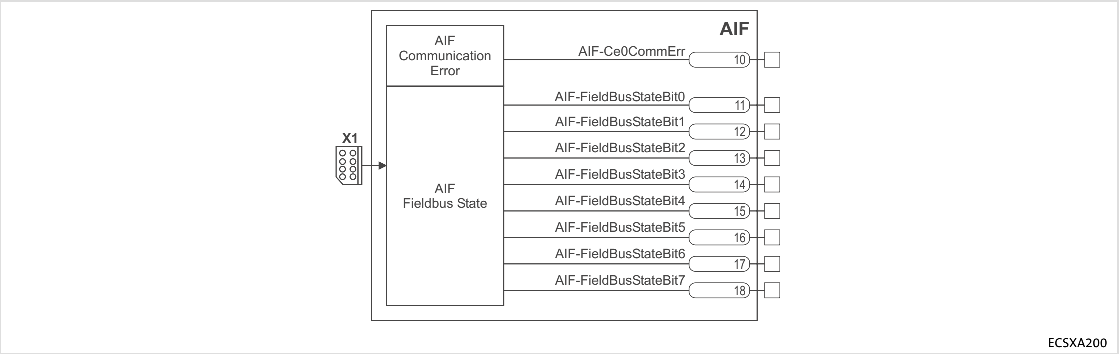


Fig.11-1 AIF function block

Response to CE0 communication error

Code		Possible settings			IMPORTANT
No.	Designation	Lenze/ appl.	Selection		
C0126	MONIT CE0	3			Monitoring of the communication on the automation interface (AIF).
			0	TRIP	A communication error (”CommErr”) releases the adjusted reaction.
			2	Warning	
			3	Off	Monitoring is switched off.

11.2 AIF1In

Function

This function block serves as an interface for input signals (e. g. setpoint and actual values) from the attached fieldbus module.

Please read the documentation for the plug-on fieldbus module.

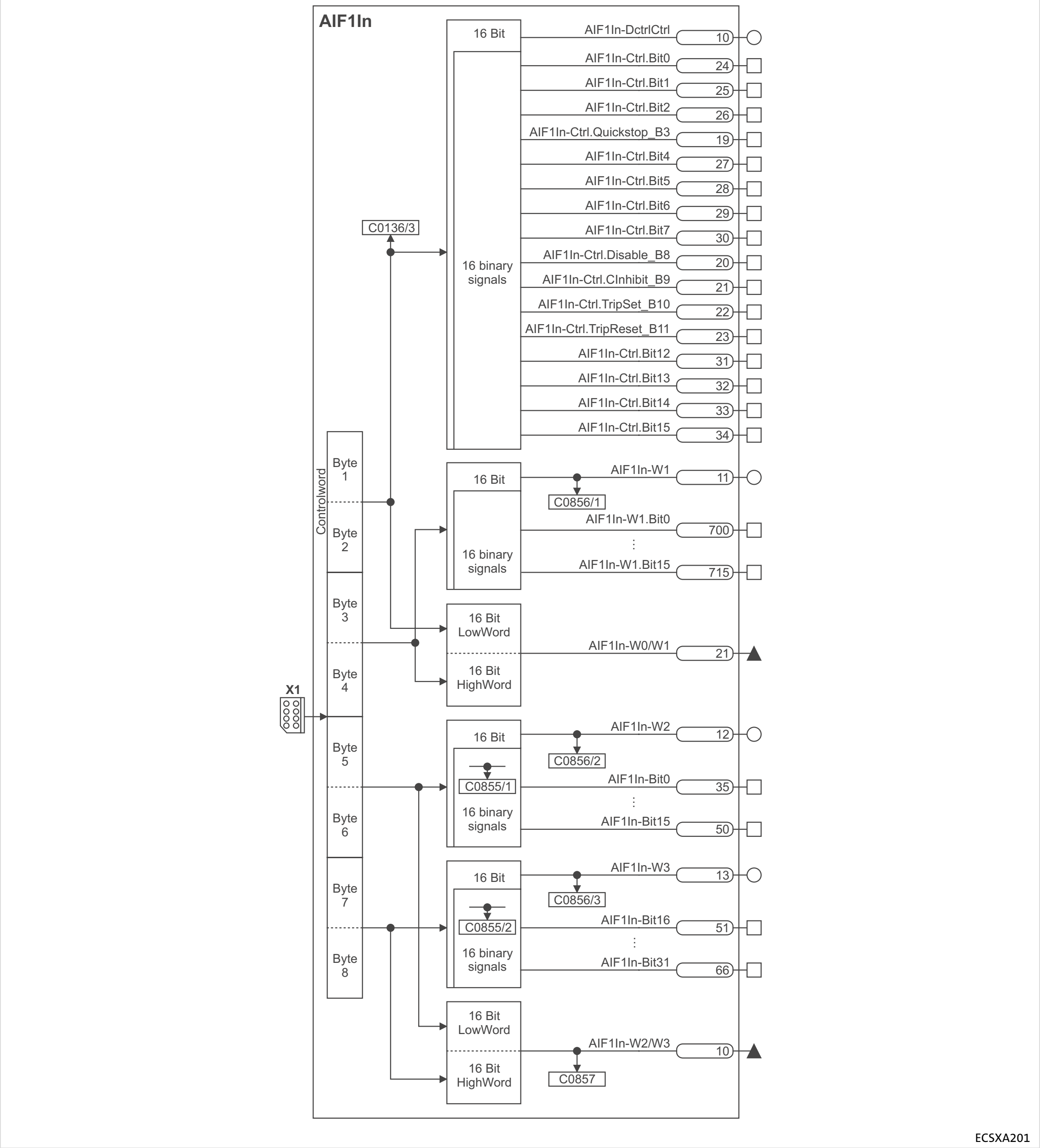


Fig.11-2 AIF1In function block

Codes

Code		Possible settings				IMPORTANT	
No.	Designation	Lenze/ appl.	Selection				
C0136						Control words Only display	
1	Ctrl word		0	{hex}	FFFF	Control word in DCTRL	
2	Ctrl word					Control word in CANaux_IN	
3	Ctrl word					Control word in AIF1In	
C0855						Digital process data input words indicated hexadecimally on the AIF interface (AIF1_IN) Read only	🕮 193
1	AIF1 IN bits		0000	{hex}	FFFF	Input word 2 (bit 0 ... 15)	
2	AIF1 IN bits					Input word 3 (bit 0 ... 15)	
C0856						Analog process data input words are indicated decimally on the AIF interface (AIF1_IN) 100.00% = 16384 Read only	🕮 193
1	AIF1 IN words		-199.99	{0.01 %}	199.99	Input word 1	
2	AIF1 IN words					Input word 2	
3	AIF1 IN words					Input word 3	
C0857	AIF1 IN phi					32 bits of phase information on the AIF interface (AIF1_IN) Read only	🕮 193
			-2147483648	{1}	2147483647		

User data

Each of the eight bytes of received user data is assigned to different signal types. For this reason, they can be evaluated –as required– as

- digital signals (1 bit)
- control word / analog signals (16 bits)
- phase signals (32 Bit)

in the axis module:

Byte	Digital signals (1 bit)	Analog signals (16 bit)	Phase signals (32 Bit)
1, 2	AIF1In-Ctrl.Bit0 AIF1In-Ctrl.Bit1 AIF1In-Ctrl.Bit2 AIF1In-Ctrl.Quickstop_B3 AIF1In-Ctrl.Bit4 ... AIF1In-Ctrl.Bit7 AIF1In-Ctrl.Disable_B8 AIF1In-Ctrl.CInhibit_B9 AIF1In-Ctrl.TripSet_B10 AIF1In-Ctrl.TripReset_B11 AIF1In-Ctrl.Bit12 ... AIF1In-Ctrl.Bit15	AIF1In-DctrlCtrl	AIF1In-W0/W1
	Note: The internal control word is firmly allocated to bytes 1 and 2. Via this control word it is possible touse ● signals for the functions ”quick stop” (QSP), DISABLE, CINH, TRIP-SET und TRIP-RESET and ● the other 11 control bits (AIF1In-Ctrl.Bit...) in further functions/function blocks.		
3, 4	AIF1In-W1.Bit0 ... AIF1In-W1.Bit15	AIF1In-W1	
5, 6	AIF1In-Bit0 ... AIF1In-Bit15	AIF1In-W2	AIF1In-W2/W3
7, 8	AIF1In-Bit16 ... AIF1In-Bit31	AIF1In-W3	

11.3 AIF1Out

Function

This function block provides the interface for output signals (e. g. setpoint and actual values) to the attached fieldbus module.

Please read the documentation for the plug-on fieldbus module.

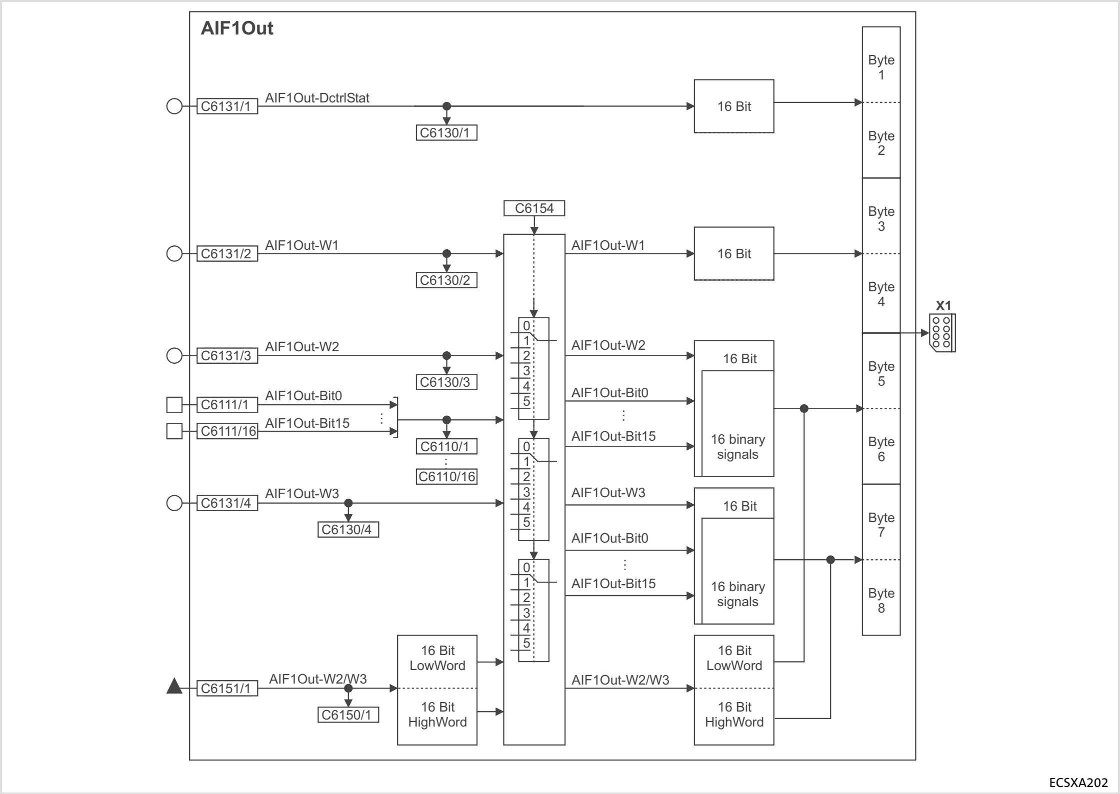


Fig.11-3 AIF1Out function block

Codes

Code		Possible settings		IMPORTANT	
No.	Designation	Lenze/ appl.	Selection		
C6110			0 (= FALSE) 1 (= TRUE)	Display of the digital output signals to the fieldbus module	🕮 196
1	AIF-DigOut			AIF1Out-Bit0 (bit 0)	
2	AIF-DigOut			AIF1Out-Bit1 (bit 1)	
3	AIF-DigOut			AIF1Out-Bit2 (bit 2)	
4	AIF-DigOut			AIF1Out-Bit3 (bit 3)	
5	AIF-DigOut			AIF1Out-Bit4 (bit 4)	
6	AIF-DigOut			AIF1Out-Bit5 (bit 5)	
7	AIF-DigOut			AIF1Out-Bit6 (bit 6)	
8	AIF-DigOut			AIF1Out-Bit7 (bit 7)	
9	AIF-DigOut			AIF1Out-Bit8 (bit 8)	
10	AIF-DigOut			AIF1Out-Bit9 (bit 9)	
11	AIF-DigOut			AIF1Out-Bit10 (bit 10)	
12	AIF-DigOut			AIF1Out-Bit11 (bit 11)	
13	AIF-DigOut			AIF1Out-Bit12 (bit 12)	
14	AIF-DigOut			AIF1Out-Bit13 (bit 13)	
15	AIF-DigOut			AIF1Out-Bit14 (bit 14)	
16	AIF-DigOut			AIF1Out-Bit15 (bit 15)	
[C6111]				Selection of the digital output signals to the fieldbus module	
1	AIF1Out-dig	1000	0 (FALSE, not assigned)	Source for AIF1Out-Bit0 (bit 0)	🕮 196
2	AIF1Out-dig	1000	0 (FALSE, not assigned)	Source for AIF1Out-Bit1 (bit 1)	
3	AIF1Out-dig	1000	0 (FALSE, not assigned)	Source for AIF1Out-Bit2 (bit 2)	
4	AIF1Out-dig	1000	0 (FALSE, not assigned)	Source for AIF1Out-Bit3 (bit 3)	
5	AIF1Out-dig	1000	0 (FALSE, not assigned)	Source for AIF1Out-Bit4 (bit 4)	
6	AIF1Out-dig	1000	0 (FALSE, not assigned)	Source for AIF1Out-Bit5 (bit 5)	
7	AIF1Out-dig	1000	0 (FALSE, not assigned)	Source for AIF1Out-Bit6 (bit 6)	
8	AIF1Out-dig	1000	0 (FALSE, not assigned)	Source for AIF1Out-Bit7 (bit 7)	
9	AIF1Out-dig	1000	0 (FALSE, not assigned)	Source for AIF1Out-Bit8 (bit 8)	
10	AIF1Out-dig	1000	0 (FALSE, not assigned)	Source for AIF1Out-Bit9 (bit 9)	
11	AIF1Out-dig	1000	0 (FALSE, not assigned)	Source for AIF1Out-Bit10 (bit 10)	
12	AIF1Out-dig	1000	0 (FALSE, not assigned)	Source for AIF1Out-Bit11 (bit 11)	
13	AIF1Out-dig	1000	0 (FALSE, not assigned)	Source for AIF1Out-Bit12 (bit 12)	
14	AIF1Out-dig	1000	0 (FALSE, not assigned)	Source for AIF1Out-Bit13 (bit 13)	
15	AIF1Out-dig	1000	0 (FALSE, not assigned)	Source for AIF1Out-Bit14 (bit 14)	
16	AIF1Out-dig	1000	0 (FALSE, not assigned)	Source for AIF1Out-Bit15 (bit 15)	
			For possible signals see ”selection list - digital signals”		🕮 362

Code		Possible settings		IMPORTANT	
No.	Designation	Lenze/ appl.	Selection		
C6130			-32768 {1} 32767	Display of the analog output signals to the fieldbus module	
1	AIF-AnOut			Output word AIF1Out-DctrlStat	📖 196
2	AIF-AnOut			Output word AIF1Out-W1	
3	AIF-AnOut			Output word AIF1Out-W2	
4	AIF-AnOut			Output word AIF1Out-W3	
5	AIF-AnOut			Output word AIF2Out-W0	📖 203
6	AIF-AnOut			Output word AIF2Out-W1	
7	AIF-AnOut			Output word AIF2Out-W2	
8	AIF-AnOut			Output word AIF2Out-W3	
9	AIF-AnOut			Output word AIF3Out-W0	📖 208
10	AIF-AnOut			Output word AIF3Out-W1	
11	AIF-AnOut			Output word AIF3Out-W2	
12	AIF-AnOut			Output word AIF3Out-W3	
[C6131]				Selection of the analog output signals to the fieldbus module	
1	AIF1Out-anl	1000	FIXED 0 % (not assigned)	Source for output word AIF1Out-DctrlStat	📖 196
2	AIF1Out-anl	1000	FIXED 0 % (not assigned)	Source for output word AIF1Out-W1	
3	AIF1Out-anl	1000	FIXED 0 % (not assigned)	Source for output word AIF1Out-W2	
4	AIF1Out-anl	1000	FIXED 0 % (not assigned)	Source for output word AIF1Out-W3	
5	AIF2Out-anl	1000	FIXED 0 % (not assigned)	Source for output word AIF2Out-W0	📖 203
6	AIF2Out-anl	1000	FIXED 0 % (not assigned)	Source for output word AIF2Out-W1	
7	AIF2Out-anl	1000	FIXED 0 % (not assigned)	Source for output word AIF2Out-W2	
8	AIF2Out-anl	1000	FIXED 0 % (not assigned)	Source for output word AIF2Out-W3	
9	AIF3Out-anl	1000	FIXED 0 % (not assigned)	Source for output word AIF3Out-W0	📖 208
10	AIF3Out-anl	1000	FIXED 0 % (not assigned)	Source for output word AIF3Out-W1	
11	AIF3Out-anl	1000	FIXED 0 % (not assigned)	Source for output word AIF3Out-W2	
12	AIF3Out-anl	1000	FIXED 0 % (not assigned)	Source for output word AIF3Out-W3	
			For possible signals see ”selection list - analog signals”		📖 371
C6150			-2147483647 {1} 2147483647	Display of the phase output signals to the fieldbus module	
1	AIF-PhiOut			Output double word AIF1Out-W2/W3	📖 196
2	AIF-PhiOut			Output double word AIF2Out-W0/W1	📖 203
3	AIF-PhiOut			Output double word AIF3Out-W0/W1	📖 208

Code		Possible settings			IMPORTANT	
No.	Designation	Lenze/ appl.	Selection			
[C6151]					Selection of the phase output signals to the fieldbus module	
1	AIF1Out-phi	1000		FIXED 0 (not assigned)	Source for output double word AIF1Out-W2/W3	🕮 196
2	AIF2Out-phi	1000		FIXED 0 (not assigned)	Source for output double word AIF2Out-W0/W1	🕮 203
3	AIF3Out-phi	1000		FIXED 0 (not assigned)	Source for output double word AIF3Out-W0/W1	🕮 208
			For possible signals see ”selection list - phase signals”			🕮 374
C6154	AIF1PdoMap	0			Assignment of the 8 byte user data of the AIF1Out function block to the fieldbus module	🕮 196
			0	W2=Int W3=Int	Byte 1, byte 2 = AIF1Out-DctrlStat	
					Byte 3, byte 4 = AIF1Out-W1	
					Byte 5, byte 6 = AIF1Out-W2	
					Byte 7, byte 8 = AIF1Out-W3	
			1	W2 / W3=Dint	Byte 1, byte 2 = AIF1Out-DctrlStat	
					Byte 3, byte 4 = AIF1Out-W1	
					Byte 5, byte 6 = AIF1Out-W2/W3	
					Byte 7, byte 8 = AIF1Out-W2/W3	
			2	W2=Int W3=bit	Byte 1, byte 2 = AIF1Out-DctrlStat	
					Byte 3, byte 4 = AIF1Out-W1	
					Byte 5, byte 6 = AIF1Out-W2	
					Byte 7, byte 8 = AIF1Out-Bit0...Bit15	
			3	W2=Bit W3=Int	Byte 1, byte 2 = AIF1Out-DctrlStat	
					Byte 3, byte 4 = AIF1Out-W1	
					Byte 5, byte 6 = AIF1Out-Bit0...Bit15	
					Byte 7, byte 8 = AIF1Out-W3	
			4	W1=Bit W23=I	Byte 1, byte 2 = AIF1Out-DctrlStat	
					Byte 3, byte 4 = AIF1Out-Bit0...Bit15	
					Byte 5, byte 6 = AIF1Out-W2	
					Byte 7, byte 8 = AIF1Out-W3	
			5	W1=Bit W23=Di	Byte 1, byte 2 = AIF1Out-DctrlStat	
					Byte 3, byte 4 = AIF1Out-Bit0...Bit15	
					Byte 5, byte 6 = AIF1Out-W2/W3	
					Byte 7, byte 8 = AIF1Out-W2/W3	

User data

The eight bytes of user data to the fieldbus module can be assigned with

- digital signals (1 bit).
- analog signals (16 bits).
- phase signals (32 bits).

The switch C6154 is used to assign the eight bytes of user data to the fieldbus module:

Value in C6154	**User data**			
	Byte 1, 2	**Byte 3, 4**	**Byte 5, 6**	**Byte 7, 8**
0	**AIF1Out-DctrlStat** 16 bits (C6131/1)	**AIF1Out-W1** 16 bits (C6131/2)	**AIF1Out-W2** 16 bits (C6131/3)	**AIF1Out-W3** 16 bits (C6131/4)
1	**AIF1Out-DctrlStat** 16 bits (C6131/1)	**AIF1Out-W1** 16 bits (C6131/2)	**AIF1Out-W2/W3** 32 bits (C6151/1)	
2	**AIF1Out-DctrlStat** 16 bits (C6131/1)	**AIF1Out-W1** 16 bits (C6131/2)	**AIF1Out-W2** 16 bits (C6131/3)	**AIF1Out-Bit0 ... 15** 1 bit (C6111/1 ... 15)
3	**AIF1Out-DctrlStat** 16 bits (C6131/1)	**AIF1Out-W1** 16 bits (C6131/2)	**AIF1Out-Bit0 ... 15** 1 bit (C6111/1 ... 15)	**AIF1Out-W3** 16 bits (C6131/4)
4	**AIF1Out-DctrlStat** 16 bits (C6131/1)	**AIF1Out-Bit0 ... 15** 1 bit (C6111/1 ... 15)	**AIF1Out-W2** 16 bits (C6131/3)	**AIF1Out-W3** 16 bits (C6131/4)
5	**AIF1Out-DctrlStat** 16 bits (C6131/1)	**AIF1Out-Bit0 ... 15** 1 bit (C6111/1 ... 15)	**AIF1Out-W2/W3** 32 bits (C6151/1)	

Note!

You can use byte 1 and byte 2 to transfer the status word from the DCTRL function block (🕮 239) to the fieldbus module.

11.4 AIF2In

Function

This function block serves as an interface for input signals (e. g. setpoint and actual values) from the attached fieldbus module.

Please read the documentation for the plug-on fieldbus module.

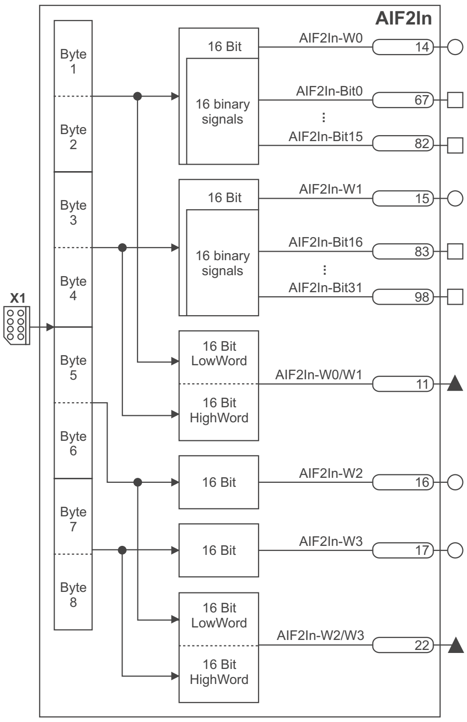


Fig.11-4 AIF2In function block

User data

Each of the eight bytes of received user data is assigned to different signal types. For this reason, they can be evaluated –as required– as

- digital signals (1 bit)
- analog signals (16 bit)
- phase signals (32 Bit)

in the axis module:

Byte	Digital signals (1 bit)	Analog signals (16 Bit)	Phase signals (32 Bit)
1, 2	AIF2In-Bit0 ... AIF2In-Bit15	AIF2In-W0	AIF2In-W0/W1
3, 4	AIF2In-Bit16 ... AIF2In-Bit31	AIF2In-W1	
5, 6		AIF2In-W2	AIF2In-W2/W3
7, 8		AIF2In-W3	

11.5 AIF2Out

Function

This function block provides the interface for output signals (e. g. setpoint and actual values) to the attached fieldbus module.

Please read the documentation for the plug-on fieldbus module.

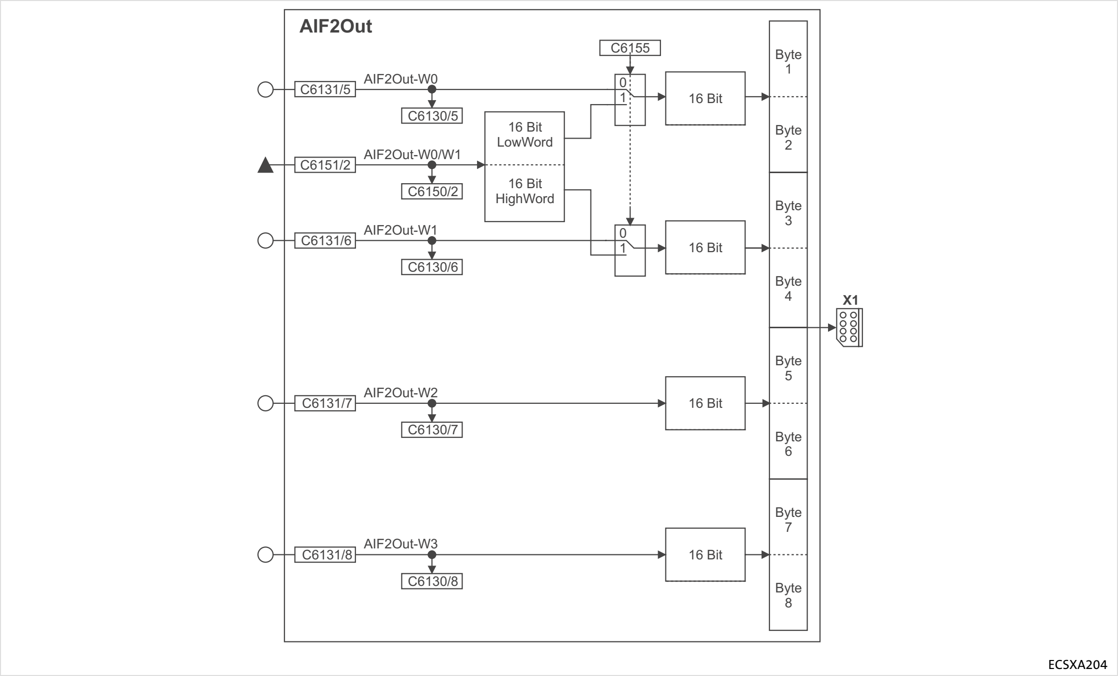


Fig.11-5 AIF2Out function block

Codes

Code		Possible settings				IMPORTANT	
No.	Designation	Lenze/ appl.	Selection				
C6130			-32768	{1}	32767	Display of the analog output signals to the fieldbus module	
1	AIF-AnOut					Output word AIF1Out-DctrlStat	📖 196
2	AIF-AnOut					Output word AIF1Out-W1	
3	AIF-AnOut					Output word AIF1Out-W2	
4	AIF-AnOut					Output word AIF1Out-W3	
5	AIF-AnOut					Output word AIF2Out-W0	📖 203
6	AIF-AnOut					Output word AIF2Out-W1	
7	AIF-AnOut					Output word AIF2Out-W2	
8	AIF-AnOut					Output word AIF2Out-W3	
9	AIF-AnOut					Output word AIF3Out-W0	📖 208
10	AIF-AnOut					Output word AIF3Out-W1	
11	AIF-AnOut					Output word AIF3Out-W2	
12	AIF-AnOut					Output word AIF3Out-W3	

Code		Possible settings		IMPORTANT	
No.	Designation	Lenze/ appl.	Selection		
[C6131]				Selection of the analog output signals to the fieldbus module	
1	AIF1Out-anl	1000	FIXED 0 % (not assigned)	Source for output word AIF1Out-DctrlStat	🕮 196
2	AIF1Out-anl	1000	FIXED 0 % (not assigned)	Source for output word AIF1Out-W1	
3	AIF1Out-anl	1000	FIXED 0 % (not assigned)	Source for output word AIF1Out-W2	
4	AIF1Out-anl	1000	FIXED 0 % (not assigned)	Source for output word AIF1Out-W3	
5	AIF2Out-anl	1000	FIXED 0 % (not assigned)	Source for output word AIF2Out-W0	🕮 203
6	AIF2Out-anl	1000	FIXED 0 % (not assigned)	Source for output word AIF2Out-W1	
7	AIF2Out-anl	1000	FIXED 0 % (not assigned)	Source for output word AIF2Out-W2	
8	AIF2Out-anl	1000	FIXED 0 % (not assigned)	Source for output word AIF2Out-W3	
9	AIF3Out-anl	1000	FIXED 0 % (not assigned)	Source for output word AIF3Out-W0	🕮 208
10	AIF3Out-anl	1000	FIXED 0 % (not assigned)	Source for output word AIF3Out-W1	
11	AIF3Out-anl	1000	FIXED 0 % (not assigned)	Source for output word AIF3Out-W2	
12	AIF3Out-anl	1000	FIXED 0 % (not assigned)	Source for output word AIF3Out-W3	
			For possible signals see ”selection list - analog signals”		🕮 371
C6150			-2147483647 {1} 2147483647	Display of the phase output signals to the fieldbus module	
1	AIF-PhiOut			Output double word AIF1Out-W2/W3	🕮 196
2	AIF-PhiOut			Output double word AIF2Out-W0/W1	🕮 203
3	AIF-PhiOut			Output double word AIF3Out-W0/W1	🕮 208
[C6151]				Selection of the phase output signals to the fieldbus module	
1	AIF1Out-phi	1000	FIXED 0 (not assigned)	Source for output double word AIF1Out-W2/W3	🕮 196
2	AIF2Out-phi	1000	FIXED 0 (not assigned)	Source for output double word AIF2Out-W0/W1	🕮 203
3	AIF3Out-phi	1000	FIXED 0 (not assigned)	Source for output double word AIF3Out-W0/W1	🕮 208
			For possible signals see ”selection list - phase signals”		🕮 374

Code		Possible settings			IMPORTANT	
No.	Designation	Lenze/ appl.	Selection			
C6155	AIF2PdoMap	0			Assignment of the 8 byte user data of the AIF2Out function block to the fieldbus module	🕮 203
			0	W0=Int W1=Int	Byte 1, byte 2 = AIF2Out-W0	
					Byte 3, byte 4 = AIF2Out-W1	
					Byte 5, byte 6 = AIF2Out-W2	
					Byte 7, byte 8 = AIF2Out-W3	
			1	W0 / W1=Dint	Byte 1, byte 2 = AIF2Out-W0/W1	
					Byte 3, byte 4 = AIF2Out-W0/W1	
					Byte 5, byte 6 = AIF2Out-W2	
					Byte 7, byte 8 = AIF2Out-W3	

User data

The eight bytes of user data to the fieldbus module can be assigned with

- analog signals (16 bits).
- phase signals (32 bits).

The switch C6155 is used to assign the eight bytes of user data to the fieldbus module:

Value in C6155	User data			
	Byte 1, 2	Byte 3, 4	Byte 5, 6	Byte 7, 8
0	**AIF2Out-W0** 16 bits (C6131/5)	**AIF2Out-W1** 16 bits (C6131/6)	**AIF2Out-W2** 16 bits (C6131/7)	**AIF2Out-W3** 16 bits (C6131/8)
1	**AIF1Out-W0/W1** 32 bits (C6151/2)		**AIF2Out-W2** 16 bits (C6131/7)	**AIF2Out-W3** 16 bits (C6131/8)

11.6 AIF3In

Function

This function block serves as an interface for input signals (e. g. setpoint and actual values) from the attached fieldbus module.

Please read the documentation for the plug-on fieldbus module.

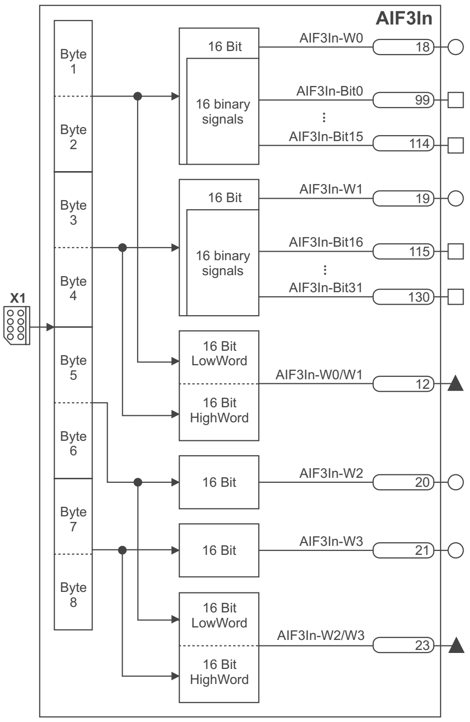


Fig.11-6 AIF3In function block

User data

Each of the eight bytes of received user data is assigned to different signal types. For this reason, they can be evaluated –as required– as

- digital signals (1 bit)
- analog signals (16 bit)
- phase signals (32 Bit)

in the axis module:

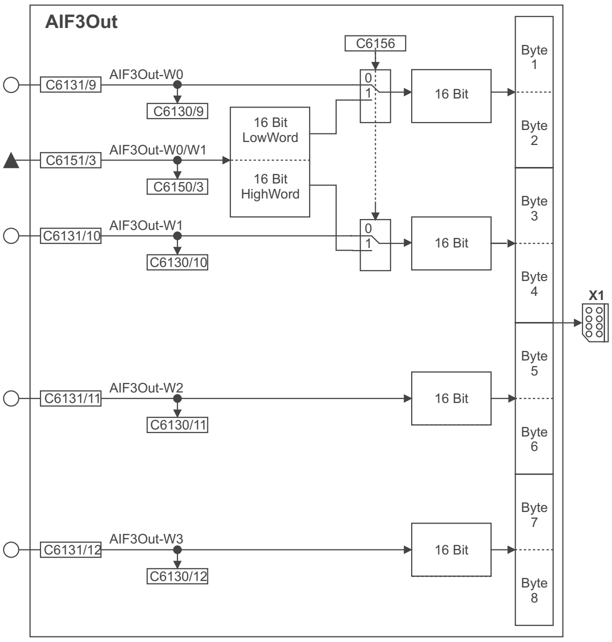
Byte	Digital signals (1 bit)	Analog signals (16 bit)	Phase signals (32 Bit)
1, 2	AIF3In-Bit0 ... AIF3In-Bit15	AIF3In-W0	AIF3In-W0/W1
3, 4	AIF3In-Bit16 ... AIF3In-Bit31	AIF3In-W1	
5, 6		AIF3In-W2	AIF3In-W0/W1
7, 8		AIF3In-W3	

11.7 AIF3Out

Function

This function block provides the interface for output signals (e. g. setpoint and actual values) to the attached fieldbus module.

Please read the documentation for the plug-on fieldbus module.



ECSXA206

Fig.11-7 AIF3Out function block

Codes

Code		Possible settings				IMPORTANT	
No.	Designation	Lenze/ appl.	Selection				
C6130			-32768	{1}	32767	Display of the analog output signals to the fieldbus module	
1	AIF-AnOut					Output word AIF1Out-DctrlStat	🕮 196
2	AIF-AnOut					Output word AIF1Out-W1	
3	AIF-AnOut					Output word AIF1Out-W2	
4	AIF-AnOut					Output word AIF1Out-W3	
5	AIF-AnOut					Output word AIF2Out-W0	🕮 203
6	AIF-AnOut					Output word AIF2Out-W1	
7	AIF-AnOut					Output word AIF2Out-W2	
8	AIF-AnOut					Output word AIF2Out-W3	
9	AIF-AnOut					Output word AIF3Out-W0	🕮 208
10	AIF-AnOut					Output word AIF3Out-W1	
11	AIF-AnOut					Output word AIF3Out-W2	
12	AIF-AnOut					Output word AIF3Out-W3	

Code		Possible settings		IMPORTANT	
No.	Designation	Lenze/ appl.	Selection		
[C6131]				Selection of the analog output signals to the fieldbus module	
1	AIF1Out-anl	1000	FIXED 0 % (not assigned)	Source for output word AIF1Out-DctrlStat	🕮 196
2	AIF1Out-anl	1000	FIXED 0 % (not assigned)	Source for output word AIF1Out-W1	
3	AIF1Out-anl	1000	FIXED 0 % (not assigned)	Source for output word AIF1Out-W2	
4	AIF1Out-anl	1000	FIXED 0 % (not assigned)	Source for output word AIF1Out-W3	
5	AIF2Out-anl	1000	FIXED 0 % (not assigned)	Source for output word AIF2Out-W0	🕮 203
6	AIF2Out-anl	1000	FIXED 0 % (not assigned)	Source for output word AIF2Out-W1	
7	AIF2Out-anl	1000	FIXED 0 % (not assigned)	Source for output word AIF2Out-W2	
8	AIF2Out-anl	1000	FIXED 0 % (not assigned)	Source for output word AIF2Out-W3	
9	AIF3Out-anl	1000	FIXED 0 % (not assigned)	Source for output word AIF3Out-W0	🕮 208
10	AIF3Out-anl	1000	FIXED 0 % (not assigned)	Source for output word AIF3Out-W1	
11	AIF3Out-anl	1000	FIXED 0 % (not assigned)	Source for output word AIF3Out-W2	
12	AIF3Out-anl	1000	FIXED 0 % (not assigned)	Source for output word AIF3Out-W3	
			For possible signals see ”selection list - analog signals”		🕮 371
C6150			-2147483647 {1} 2147483647	Display of the phase output signals to the fieldbus module	
1	AIF-PhiOut			Output double word AIF1Out-W2/W3	🕮 196
2	AIF-PhiOut			Output double word AIF2Out-W0/W1	🕮 203
3	AIF-PhiOut			Output double word AIF3Out-W0/W1	🕮 208
[C6151]				Selection of the phase output signals to the fieldbus module	
1	AIF1Out-phi	1000	FIXED 0 (not assigned)	Source for output double word AIF1Out-W2/W3	🕮 196
2	AIF2Out-phi	1000	FIXED 0 (not assigned)	Source for output double word AIF2Out-W0/W1	🕮 203
3	AIF3Out-phi	1000	FIXED 0 (not assigned)	Source for output double word AIF3Out-W0/W1	🕮 208
			For possible signals see ”selection list - phase signals”		🕮 374

Code		Possible settings			IMPORTANT	
No.	**Designation**	**Lenze/ appl.**	**Selection**			
C6156	AIF3PdoMap	0			Assignment of the 8 byte user data of the AIF3Out function block to the fieldbus module	🕮 208
			0	W0=Int W1=Int	Byte 1, byte 2 = AIF3Out-W0	
					Byte 3, byte 4 = AIF3Out-W1	
					Byte 5, byte 6 = AIF3Out-W2	
					Byte 7, byte 8 = AIF3Out-W3	
			1	W0 / W1=Dint	Byte 1, byte 2 = AIF3Out-W0/W1	
					Byte 3, byte 4 = AIF3Out-W0/W1	
					Byte 5, byte 6 = AIF3Out-W2	
					Byte 7, byte 8 = AIF3Out-W3	

User data

The eight bytes of user data to the fieldbus module can be assigned with

- ► analog signals (16 bits).
- ► phase signals (32 bits).

The switch C6156 is used to assign the eight bytes of user data to the fieldbus module:

Value in C6156	User data			
	Byte 1, 2	**Byte 3, 4**	**Byte 5, 6**	**Byte 7, 8**
0	**AIF3Out-W0** 16 bits (C6131/9)	**AIF3Out-W1** 16 bits (C6131/10)	**AIF3Out-W2** 16 bits (C6131/11)	**AIF3Out-W3** 16 bits (C6131/12)
1	**AIF3Out-W0/W1** 32 bits (C6151/3)		**AIF3Out-W2** 16 bits (C6131/11)	**AIF3Out-W3** 16 bits (C6131/12)

11.8 AIn1

Function

This function block provides the interface for analog input signals (differential signals) via X6/AI-, AI+. The conditioned input signal is available at the function block output. When using X6/AI-, AI+ as a master current input, cable-break monitoring is possible.

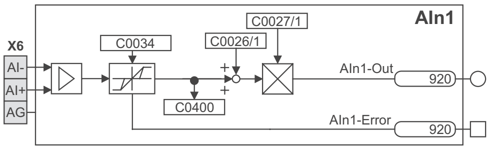


Fig.11-8 AIn1 function block

Codes

Code		Possible settings				IMPORTANT	
No.	Designation	Lenze/ appl.	Selection				
C0026						Used for relative analog signals	📖 211 📖 253
1	FCODE (offset)	0.00	-199.99	{0.01 %}	199.99		
2	FCODE (offset)	0.00					
C0027						Used for relative analog signals	📖 211 📖 253
1	FCODE (GAIN)	100.00	-199.99	{0.01 %}	199.99		
2	FCODE (GAIN)	100.00					
C0034	MST CURRENT	0				Selection: master voltage/master current for analog setpoint selection	📖 211
			0	-10 ... + 10 V		Master voltage	
			1	+4 ... +20 mA		Master current	
			2	-20 ... +20 mA			
C0400	DIS: AnalogIn					Signal at analog input Only display	📖 211
			-199.99	{0.01 %}	199.99		

11.9 CAN (CAN management)

Function

By means of this function block,

- a **reset node** can be carried out, e. g. in order to accept changes with regard to the baud rate and addressing.
- the instant of transmission of CAN2_Out and CAN3_Out can be influenced.

In addition, the MotionBus communication can be monitored.

Note!

Even if the CAN function block has not been assigned to the control configuration, a reset node can be carried out via C0358.

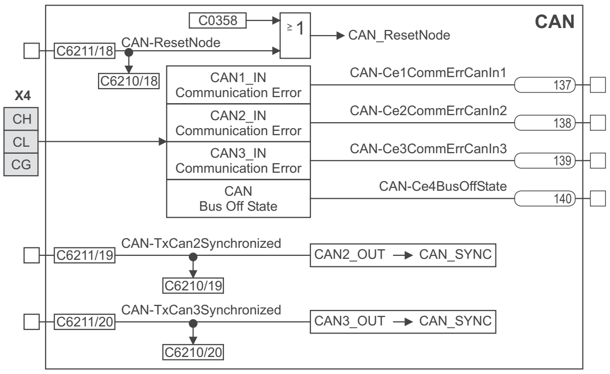


Fig.11-9 CAN function block (system bus management)

”CAN-TxCan2Syncronized”/”CAN-TxCan3Syncronized” function

- **FALSE**: data from CAN2_OUT/CAN3_OUT is sent at the end of the process image.
- **TRUE**: data from CAN2_OUT/CAN3_OUT is sent after the CAN bus synchronisation.
  - The identifiers for sync transmission and reception telegrams can be set via C0367/C0368.
  - The ”Sync Tx time” can be set via C0369.

Note!

Detailed information concerning the CAN bus synchronisation: 🕮 155

Codes

Code		Possible settings			IMPORTANT	
No.	Designation	Lenze/ appl.	Selection			
C0358	Reset Node	0			Carry out reset node of MotionBus (CAN)	🕮 154
			0	No function		
			1	CAN reset		
C6210					Display of the digital output signals to the MotionBus (CAN)	
			0 (= FALSE)	1 (= TRUE)		
1	CAN-DigOut				CAN1Out-Bit0 (bit 0)	🕮 218
2	CAN-DigOut				CAN1Out-Bit1 (bit 1)	
3	CAN-DigOut				CAN1Out-Bit2 (bit 2)	
4	CAN-DigOut				CAN1Out-Bit3 (bit 3)	
5	CAN-DigOut				CAN1Out-Bit4 (bit 4)	
6	CAN-DigOut				CAN1Out-Bit5 (bit 5)	
7	CAN-DigOut				CAN1Out-Bit6 (bit 6)	
8	CAN-DigOut				CAN1Out-Bit7 (bit 7)	
9	CAN-DigOut				CAN1Out-Bit8 (bit 8)	
10	CAN-DigOut				CAN1Out-Bit9 (bit 9)	
11	CAN-DigOut				CAN1Out-Bit10 (bit 10)	
12	CAN-DigOut				CAN1Out-Bit11 (bit 11)	
13	CAN-DigOut				CAN1Out-Bit12 (bit 12)	
14	CAN-DigOut				CAN1Out-Bit13 (bit 13)	
15	CAN-DigOut				CAN1Out-Bit14 (bit 14)	
16	CAN-DigOut				CAN1Out-Bit15 (bit 15)	
17	CAN-DigOut				CANSync-ResetSyncForInterpolatord	🕮 212
18	CAN-DigOut				CAN-ResetNode	
19	CAN-DigOut				CAN-TxCan2Synchronized	
20	CAN-DigOut				CAN-TxCan3Synchronized	

Code		**Possible settings**		**IMPORTANT**	
No.	**Designation**	**Lenze/ appl.**	**Selection**		
[C6211]				Selection of the digital output signals to the MotionBus (CAN)	
1	CAN1Out-dig	1000	0 (FALSE, not assigned)	Source for CAN1Out-Bit0 (bit 0)	🕮 218
2	CAN1Out-dig	1000	0 (FALSE, not assigned)	Source for CAN1Out-Bit1 (bit 1)	
3	CAN1Out-dig	1000	0 (FALSE, not assigned)	Source for CAN1Out-Bit2 (bit 2)	
4	CAN1Out-dig	1000	0 (FALSE, not assigned)	Source for CAN1Out-Bit3 (bit 3)	
5	CAN1Out-dig	1000	0 (FALSE, not assigned)	Source for CAN1Out-Bit4 (bit 4)	
6	CAN1Out-dig	1000	0 (FALSE, not assigned)	Source for CAN1Out-Bit5 (bit 5)	
7	CAN1Out-dig	1000	0 (FALSE, not assigned)	Source for CAN1Out-Bit6 (bit 6)	
8	CAN1Out-dig	1000	0 (FALSE, not assigned)	Source for CAN1Out-Bit7 (bit 7)	
9	CAN1Out-dig	1000	0 (FALSE, not assigned)	Source for CAN1Out-Bit8 (bit 8)	
10	CAN1Out-dig	1000	0 (FALSE, not assigned)	Source for CAN1Out-Bit9 (bit 9)	
11	CAN1Out-dig	1000	0 (FALSE, not assigned)	Source for CAN1Out-Bit10 (bit 10)	
12	CAN1Out-dig	1000	0 (FALSE, not assigned)	Source for CAN1Out-Bit11 (bit 11)	
13	CAN1Out-dig	1000	0 (FALSE, not assigned)	Source for CAN1Out-Bit12 (bit 12)	
14	CAN1Out-dig	1000	0 (FALSE, not assigned)	Source for CAN1Out-Bit13 (bit 13)	
15	CAN1Out-dig	1000	0 (FALSE, not assigned)	Source for CAN1Out-Bit14 (bit 14)	
16	CAN1Out-dig	1000	0 (FALSE, not assigned)	Source for CAN1Out-Bit15 (bit 15)	
17	CAN1Out-dig	1000	0 (FALSE, not assigned)	Source for CANSync-ResetSyncForInterpolatord	🕮 212
18	CAN1Out-dig	1000	0 (FALSE, not assigned)	Source for CAN reset node	
19	CAN1Out-dig	1000	0 (FALSE, not assigned)	Source for CAN-TxCan2Synchronized	
20	CAN1Out-dig	1000	0 (FALSE, not assigned)	Source for CAN-TxCan3Synchronized	
			For possible signals see ”selection list - digital signals”		🕮 362

11.10 CAN1In

Function

This function block serves to transfer cyclic process data (🕮 138) via the MotionBus (CAN).

For receiving the data, a sync telegram (🕮 142) is required, which has to be generated by another node.

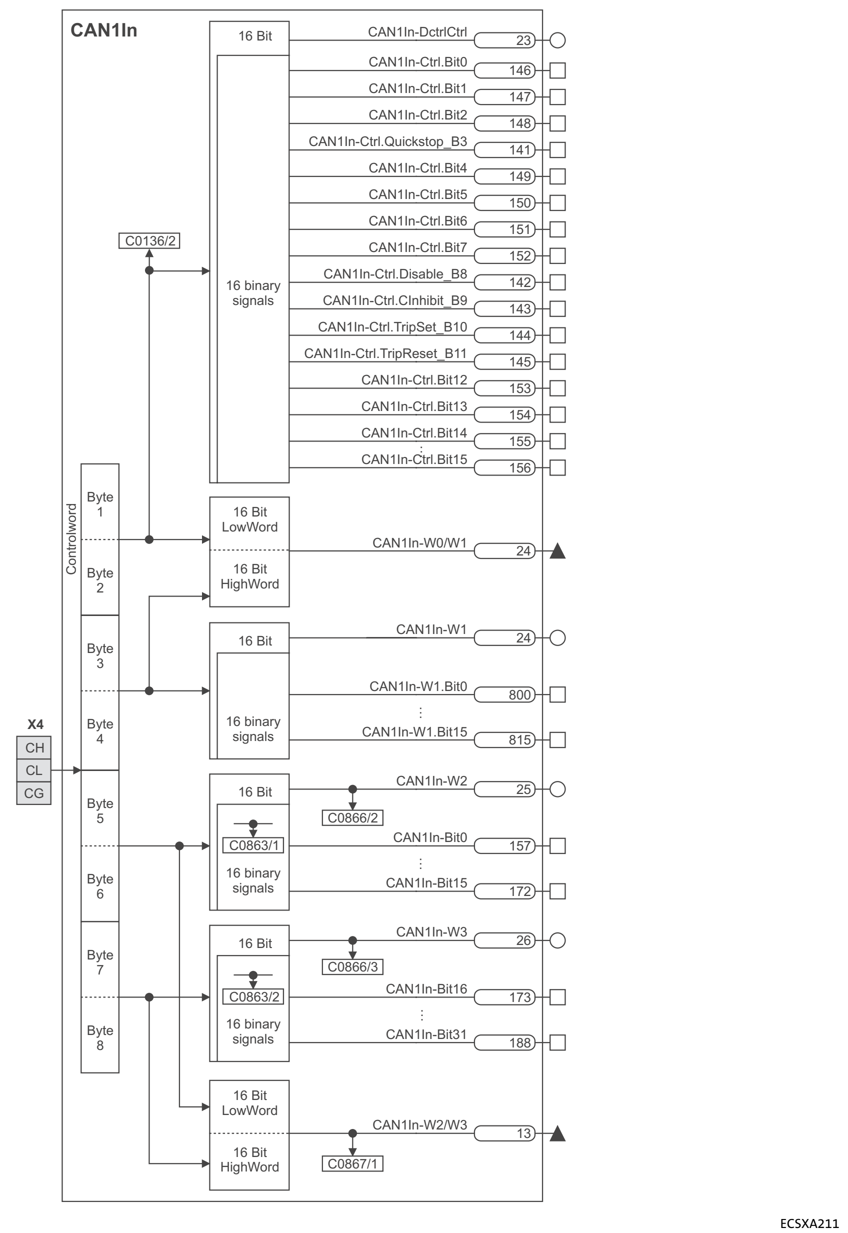


Fig.11-10 CAN1In function block

Codes

Code		Possible settings				IMPORTANT	
No.	Designation	Lenze/ appl.	Selection				
C0136						Control words Only display	
1	Ctrl word		0	{hex}	FFFF	Control word in DCTRL	
2	Ctrl word					Control word in CANaux_IN	
3	Ctrl word					Control word in AIF1In	
C0863						Digital process data input words indicated hexadecimally for MotionBus (CAN) Read only	🕮 140 🕮 215
			0000	{hex}	FFFF		
1	CAN IN bits		Bit 0	...	Bit15	CAN1_IN: process data input word 1	
2	CAN IN bits		Bit 16	...	Bit 31	CAN1_IN: process data input word 2	
3	CAN IN bits		Bit 0	...	Bit15	CAN2_IN: process data input word 1	
4	CAN IN bits		Bit 16	...	Bit 31	CAN2_IN: process data input word 2	
5	CAN IN bits		Bit 0	...	Bit15	CAN3_IN: process data input word 1	
6	CAN IN bits		Bit 16	...	Bit 31	CAN3_IN: process data input word 2	
C0866						Analog process data input words indicated decimally for MotionBus (CAN) 100.00% = 16384 Read only	🕮 140 🕮 215
1	CAN IN words		-199.99	{0.01 %}	199.99	CAN1_IN word 1	
2	CAN IN words					CAN1_IN word 2	
3	CAN IN words					CAN1_IN word 3	
4	CAN IN words					CAN2_IN word 1	
5	CAN IN words					CAN2_IN word 2	
6	CAN IN words					CAN2_IN word 3	
7	CAN IN words					CAN2_IN word 4	
8	CAN IN words					CAN3_IN word 1	
9	CAN IN words					CAN3_IN word 2	
10	CAN IN words					CAN3_IN word 3	
11	CAN IN words					CAN3_IN word 4	
C0867						32 -bit phase information for MotionBus (CAN) Only display	
1	CAN IN phi		-2147483648	{1}	2147483647	CAN1_IN	
2	CAN IN phi					CAN2_IN	
3	CAN IN phi					CAN3_IN	

User data

Each of the eight bytes of received user data is assigned to different signal types. For this reason, they can be evaluated –as required– as

- digital signals (1 bit)
- control word / analog signals (16 bits)
- phase signals (32 Bit)

in the axis module:

Byte	Digital signals (1 bit)	Analog signals (16 bit)	Phase signals (32 Bit)
1, 2	CAN1In-Ctrl.Bit0 CAN1In-Ctrl.Bit1 CAN1In-Ctrl.Bit2 CAN1In-Ctrl.Quickstop_B3 CAN1In-Ctrl.Bit4 ... CAN1In-Ctrl.Bit7 CAN1In-Ctrl.Disable_B8 CAN1In-Ctrl.CInhibit_B9 CAN1In-Ctrl.TripSet_B10 CAN1In-Ctrl.TripReset_B11 CAN1In-Ctrl.Bit12 ... CAN1In-Ctrl.Bit15	CAN1In-DctrlCtrl	CAN1In-W0/W1
	Note: The internal control word is firmly allocated to bytes 1 and 2. Via this control word it is possible touse ● signals for the functions "quick stop" (QSP), DISABLE, CINH, TRIP-SET und TRIP-RESET and ● the other 11 control bits (CAN1In-Ctrl.Bit...) in further functions/function blocks.		
3, 4	CAN1In-W1.Bit0 ... CAN1In-W1.Bit15	CAN1In-W1	
5, 6	CAN1In-Bit0 ... CAN1In-Bit15	CAN1In-W2	CAN1In-W2/W3
7, 8	CAN1In-Bit16 ... CAN1In-Bit31	CAN1In-W3	

Note!

Via C0357 you can set the monitoring time (Lenze setting: 3000 ms) for data reception. (🕮 168)

11.11 CAN1Out

Function

This function block serves to transfer cyclic process data (🕮 138) via the MotionBus (CAN).

For receiving the data, a sync telegram (🕮 142) is required, which has to be generated by another node.

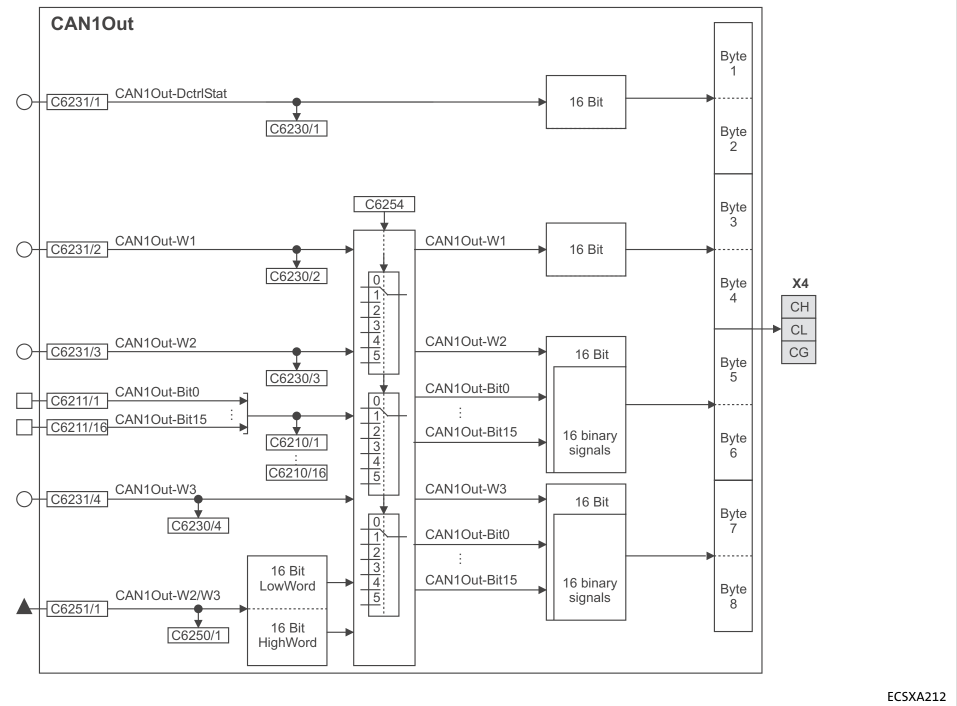


Fig.11-11 CAN1Out function block

Codes

Code		Possible settings			IMPORTANT	
No.	Designation	Lenze/ appl.	Selection			
C6210			0 (= FALSE)	1 (= TRUE)	Display of the digital output signals to the MotionBus (CAN)	
1	CAN-DigOut				CAN1Out-Bit0 (bit 0)	🕮 218
2	CAN-DigOut				CAN1Out-Bit1 (bit 1)	
3	CAN-DigOut				CAN1Out-Bit2 (bit 2)	
4	CAN-DigOut				CAN1Out-Bit3 (bit 3)	
5	CAN-DigOut				CAN1Out-Bit4 (bit 4)	
6	CAN-DigOut				CAN1Out-Bit5 (bit 5)	
7	CAN-DigOut				CAN1Out-Bit6 (bit 6)	
8	CAN-DigOut				CAN1Out-Bit7 (bit 7)	
9	CAN-DigOut				CAN1Out-Bit8 (bit 8)	
10	CAN-DigOut				CAN1Out-Bit9 (bit 9)	
11	CAN-DigOut				CAN1Out-Bit10 (bit 10)	
12	CAN-DigOut				CAN1Out-Bit11 (bit 11)	
13	CAN-DigOut				CAN1Out-Bit12 (bit 12)	
14	CAN-DigOut				CAN1Out-Bit13 (bit 13)	
15	CAN-DigOut				CAN1Out-Bit14 (bit 14)	
16	CAN-DigOut				CAN1Out-Bit15 (bit 15)	
17	CAN-DigOut				CANSync-ResetSyncForInterpolator	🕮 212
18	CAN-DigOut				CAN-ResetNode	
19	CAN-DigOut				CAN-TxCan2Synchronized	
20	CAN-DigOut				CAN-TxCan3Synchronized	

Code		Possible settings		IMPORTANT	
No.	Designation	Lenze/ appl.	Selection		
[C6211]				Selection of the digital output signals to the MotionBus (CAN)	
1	CAN1Out-dig	1000	0 (FALSE, not assigned)	Source for CAN1Out-Bit0 (bit 0)	🕮 218
2	CAN1Out-dig	1000	0 (FALSE, not assigned)	Source for CAN1Out-Bit1 (bit 1)	
3	CAN1Out-dig	1000	0 (FALSE, not assigned)	Source for CAN1Out-Bit2 (bit 2)	
4	CAN1Out-dig	1000	0 (FALSE, not assigned)	Source for CAN1Out-Bit3 (bit 3)	
5	CAN1Out-dig	1000	0 (FALSE, not assigned)	Source for CAN1Out-Bit4 (bit 4)	
6	CAN1Out-dig	1000	0 (FALSE, not assigned)	Source for CAN1Out-Bit5 (bit 5)	
7	CAN1Out-dig	1000	0 (FALSE, not assigned)	Source for CAN1Out-Bit6 (bit 6)	
8	CAN1Out-dig	1000	0 (FALSE, not assigned)	Source for CAN1Out-Bit7 (bit 7)	
9	CAN1Out-dig	1000	0 (FALSE, not assigned)	Source for CAN1Out-Bit8 (bit 8)	
10	CAN1Out-dig	1000	0 (FALSE, not assigned)	Source for CAN1Out-Bit9 (bit 9)	
11	CAN1Out-dig	1000	0 (FALSE, not assigned)	Source for CAN1Out-Bit10 (bit 10)	
12	CAN1Out-dig	1000	0 (FALSE, not assigned)	Source for CAN1Out-Bit11 (bit 11)	
13	CAN1Out-dig	1000	0 (FALSE, not assigned)	Source for CAN1Out-Bit12 (bit 12)	
14	CAN1Out-dig	1000	0 (FALSE, not assigned)	Source for CAN1Out-Bit13 (bit 13)	
15	CAN1Out-dig	1000	0 (FALSE, not assigned)	Source for CAN1Out-Bit14 (bit 14)	
16	CAN1Out-dig	1000	0 (FALSE, not assigned)	Source for CAN1Out-Bit15 (bit 15)	
17	CAN1Out-dig	1000	0 (FALSE, not assigned)	Source for CANSync-ResetSyncForInterpolatord	🕮 212
18	CAN1Out-dig	1000	0 (FALSE, not assigned)	Source for CAN reset node	
19	CAN1Out-dig	1000	0 (FALSE, not assigned)	Source for CAN-TxCan2Synchronized	
20	CAN1Out-dig	1000	0 (FALSE, not assigned)	Source for CAN-TxCan3Synchronized	
			For possible signals see ”selection list - digital signals”		🕮 362
C6230			-32768 {1} 32767	Display of the analog output signals to the MotionBus (CAN)	
1	CAN-AnOut			Output word CAN1Out-DctrlStat	🕮 218
2	CAN-AnOut			Output word CAN1Out-W1	
3	CAN-AnOut			Output word CAN1Out-W2	
4	CAN-AnOut			Output word CAN1Out-W3	
5	CAN-AnOut			Output word CAN2Out-W0	🕮 227
6	CAN-AnOut			Output word CAN2Out-W1	
7	CAN-AnOut			Output word CAN2Out-W2	
8	CAN-AnOut			Output word CAN2Out-W3	
9	CAN-AnOut			Output word CAN3Out-W0	🕮 233
10	CAN-AnOut			Output word CAN3Out-W1	
11	CAN-AnOut			Output word CAN3Out-W2	
12	CAN-AnOut			Output word CAN3Out-W3	

Code		Possible settings		IMPORTANT	
No.	Designation	Lenze/ appl.	Selection		
[C6231]				Selection of the analog output signals to the MotionBus (CAN)	
1	CAN1Out-anl	1000	FIXED 0 % (not assigned)	Source for output word CAN1Out-DctrlStat	📖 218
2	CAN1Out-anl	1000	FIXED 0 % (not assigned)	Source for output word CAN1Out-W1	
3	CAN1Out-anl	1000	FIXED 0 % (not assigned)	Source for output word CAN1Out-W2	
4	CAN1Out-anl	1000	FIXED 0 % (not assigned)	Source for output word CAN1Out-W3	
5	CAN2Out-anl	1000	FIXED 0 % (not assigned)	Source for output word CAN2Out-W0	📖 227
6	CAN2Out-anl	1000	FIXED 0 % (not assigned)	Source for output word CAN2Out-W1	
7	CAN2Out-anl	1000	FIXED 0 % (not assigned)	Source for output word CAN2Out-W2	
8	CAN2Out-anl	1000	FIXED 0 % (not assigned)	Source for output word CAN2Out-W3	
9	CAN3Out-anl	1000	FIXED 0 % (not assigned)	Source for output word CAN3Out-W0	📖 233
10	CAN3Out-anl	1000	FIXED 0 % (not assigned)	Source for output word CAN3Out-W1	
11	CAN3Out-anl	1000	FIXED 0 % (not assigned)	Source for output word CAN3Out-W2	
12	CAN3Out-anl	1000	FIXED 0 % (not assigned)	Source for output word CAN3Out-W3	
			For possible signals see ”selection list - analog signals”		📖 371
C6250			-2147483647 {1} 2147483647	Display of the phase output signals to the MotionBus (CAN)	
1	CAN-PhiOut			Output double word CAN1Out-W2/W3	📖 218
2	CAN-PhiOut			Output double word CAN2Out-W0/W1	📖 227
3	CAN-PhiOut			Output double word CAN3Out-W0/W1	📖 233
[C6251]				Selection of the phase output signals to the MotionBus (CAN)	
1	CAN1Out-phi	1000	FIXED 0 (not assigned)	Source for output double word CAN1Out-W2/W3	📖 218
2	CAN2Out-phi	1000	FIXED 0 (not assigned)	Source for output double word CAN2Out-W0/W1	📖 227
3	CAN3Out-phi	1000	FIXED 0 (not assigned)	Source for output double word CAN3Out-W0/W1	📖 233
			For possible signals see ”selection list - phase signals”		📖 374

Code		Possible settings			IMPORTANT	
No.	Designation	Lenze/ appl.	Selection			
C6254	CAN1PdoMap	0			Assignment of the 8 byte user data of the CAN1Out function block to the MotionBus (CAN)	🕮 218
			0	W2=Int W3=Int	Byte 1, byte 2 = CAN1Out-DctrlStat	
					Byte 3, byte 4 = CAN1Out-W1	
					Byte 5, byte 6 = CAN1Out-W2	
					Byte 7, byte 8 = CAN1Out-W3	
			1	W2 / W3=Dint	Byte 1, byte 2 = CAN1Out-DctrlStat	
					Byte 3, byte 4 = CAN1Out-W1	
					Byte 5, byte 6 = CAN1Out-W2/W3	
					Byte 7, byte 8 = CAN1Out-W2/W3	
			2	W2=Int W3=bit	Byte 1, byte 2 = CAN1Out-DctrlStat	
					Byte 3, byte 4 = CAN1Out-W1	
					Byte 5, byte 6 = CAN1Out-W2	
					Byte 7, byte 8 = CAN1Out-Bit0...Bit15	
			3	W2=Bit W3=Int	Byte 1, byte 2 = CAN1Out-DctrlStat	
					Byte 3, byte 4 = CAN1Out-W1	
					Byte 5, byte 6 = CAN1Out-Bit0...Bit15	
					Byte 7, byte 8 = CAN1Out-W3	
			4	W1=Bit W23=I	Byte 1, byte 2 = CAN1Out-DctrlStat	
					Byte 3, byte 4 = CAN1Out-Bit0...Bit15	
					Byte 5, byte 6 = CAN1Out-W2	
					Byte 7, byte 8 = CAN1Out-W3	
			5	W1=Bit W23=Di	Byte 1, byte 2 = CAN1Out-DctrlStat	
					Byte 3, byte 4 = CAN1Out-Bit0...Bit15	
					Byte 5, byte 6 = CAN1Out-W2/W3	
					Byte 7, byte 8 = CAN1Out-W2/W3	

User data

The eight bytes of user data to the MotionBus (CAN) can be assigned with

- digital signals (1 bit).
- analog signals (16 bits).
- phase signals (32 bits).

The switch C6254 is used to assign the eight bytes of user data to the MotionBus (CAN):

Value in C6254	User data			
	Byte 1, 2	**Byte 3, 4**	**Byte 5, 6**	**Byte 7, 8**
0	**CAN1Out-DctrlStat** 16 bits (C6231/1)	**CAN1Out-W1** 16 bits (C6231/2)	**CAN1Out-W2** 16 bits (C6231/3)	**CAN1Out-W3** 16 bits (C6231/4)
1	**CAN1Out-DctrlStat** 16 bits (C6231/1)	**CAN1Out-W1** 16 bits (C6231/2)	**CAN1Out-W2/W3** 32 bits (C6251/1)	
2	**CAN1Out-DctrlStat** 16 bits (C6231/1)	**CAN1Out-W1** 16 bits (C6231/2)	**CAN1Out-W2** 16 bits (C6231/3)	**CAN1Out-Bit0 ... 15** 1 bit (C6211/1 ... 15)
3	**CAN1Out-DctrlStat** 16 bits (C6231/1)	**CAN1Out-W1** 16 bits (C6231/2)	**CAN1Out-Bit0 ... 15** 1 bit (C6211/1 ... 15)	**CAN1Out-W3** 16 bits (C6231/4)
4	**CAN1Out-DctrlStat** 16 bits (C6231/1)	**CAN1Out-Bit0 ... 15** 1 bit (C6211/1 ... 15)	**CAN1Out-W2** 16 bits (C6231/3)	**CAN1Out-W3** 16 bits (C6231/4)
5	**CAN1Out-DctrlStat** 16 bits (C6231/1)	**CAN1Out-Bit0 ... 15** 1 bit (C6211/1 ... 15)	**CAN1Out-W2/W3** 32 bits (C6251/1)	

Note!

You can use byte 1 and byte 2 to transfer the status word from the DCTRL function block (🕮 239) to the MotionBus (CAN).

11.12 CAN2In

Function

This function block serves to transfer event-controlled or time-controlled process data (🕮 138) via the MotionBus (CAN).

A sync telegram is not required.

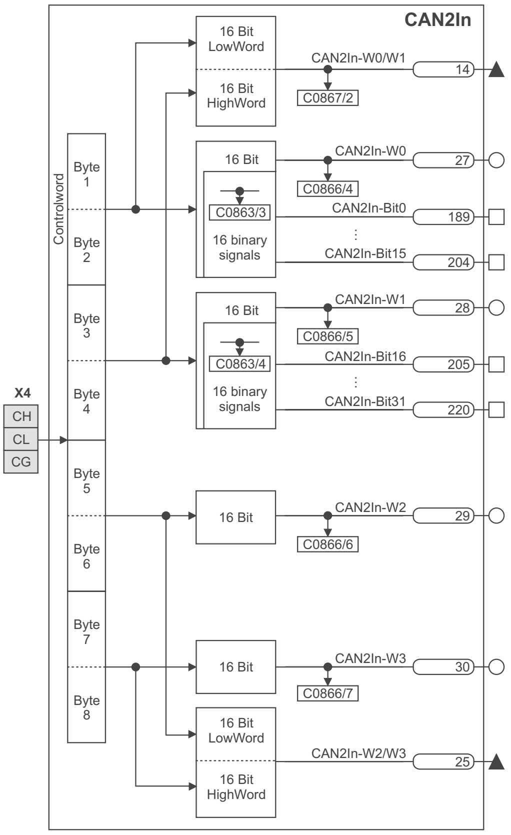


Fig.11-12 CAN2In function block

Codes

Code		Possible settings				IMPORTANT	
No.	Designation	Lenze/ appl.	Selection				
C0863			0000	{hex}	FFFF	Digital process data input words indicated hexadecimally for MotionBus (CAN) Read only	📖 140 📖 215
1	CAN IN bits		Bit 0	...	Bit15	CAN1_IN: process data input word 1	
2	CAN IN bits		Bit 16	...	Bit 31	CAN1_IN: process data input word 2	
3	CAN IN bits		Bit 0	...	Bit15	CAN2_IN: process data input word 1	
4	CAN IN bits		Bit 16	...	Bit 31	CAN2_IN: process data input word 2	
5	CAN IN bits		Bit 0	...	Bit15	CAN3_IN: process data input word 1	
6	CAN IN bits		Bit 16	...	Bit 31	CAN3_IN: process data input word 2	
C0866						Analog process data input words indicated decimally for MotionBus (CAN) 100.00% = 16384 Read only	📖 140 📖 215
1	CAN IN words		-199.99	{0.01 %}	199.99	CAN1_IN word 1	
2	CAN IN words					CAN1_IN word 2	
3	CAN IN words					CAN1_IN word 3	
4	CAN IN words					CAN2_IN word 1	
5	CAN IN words					CAN2_IN word 2	
6	CAN IN words					CAN2_IN word 3	
7	CAN IN words					CAN2_IN word 4	
8	CAN IN words					CAN3_IN word 1	
9	CAN IN words					CAN3_IN word 2	
10	CAN IN words					CAN3_IN word 3	
11	CAN IN words					CAN3_IN word 4	
C0867						32 -bit phase information for MotionBus (CAN) Only display	
1	CAN IN phi		-2147483648	{1}	2147483647	CAN1_IN	
2	CAN IN phi					CAN2_IN	
3	CAN IN phi					CAN3_IN	

User data

Each of the eight bytes of received user data is assigned to different signal types. For this reason, they can be evaluated –as required– as

- digital signals (1 bit)
- analog signals (16 bit)
- phase signals (32 Bit)

in the axis module:

Byte	Digital signals (1 bit)	Analog signals (16 bit)	Phase signals (32 Bit)
1, 2	CAN2In-Bit0 ... CAN2In-Bit15	CAN2In-W0	CAN2In-W0/W1
3, 4	CAN2In-Bit16 ... CAN2In-Bit31	CAN2In-W1	
5, 6		CAN2In-W2	CAN2In-W2/W3
7, 8		CAN2In-W3	

Note!

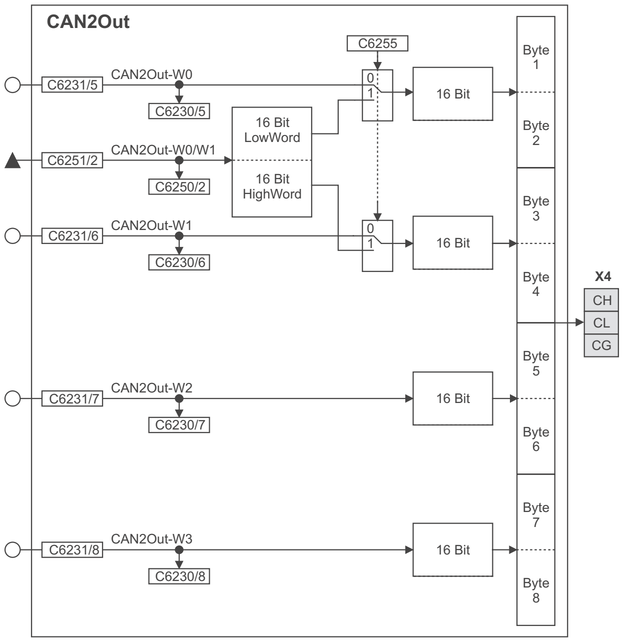
Via C0357 you can set the monitoring time (Lenze setting: 3000 ms) for data reception. (🕮 168)

11.13 CAN2Out

Function

This function block serves to transfer event-controlled or time-controlled process data (🕮 138) via the MotionBus (CAN).

- A sync telegram is not required.
- The process data is transmitted when a value within the eight bytes of user data has changed (event-controlled) or with the cycle time set under C0356/2 (time-controlled, (🕮 154).



ECSXA214

Fig.11-13 CAN2Out function block

Codes

Code		Possible settings				IMPORTANT	
No.	Designation	Lenze/ appl.	Selection				
C6230						Display of the analog output signals to the MotionBus (CAN)	
			-32768	{1}	32767		
1	CAN-AnOut					Output word CAN1Out-DctrlStat	🕮 218
2	CAN-AnOut					Output word CAN1Out-W1	
3	CAN-AnOut					Output word CAN1Out-W2	
4	CAN-AnOut					Output word CAN1Out-W3	
5	CAN-AnOut					Output word CAN2Out-W0	🕮 227
6	CAN-AnOut					Output word CAN2Out-W1	
7	CAN-AnOut					Output word CAN2Out-W2	
8	CAN-AnOut					Output word CAN2Out-W3	
9	CAN-AnOut					Output word CAN3Out-W0	🕮 233
10	CAN-AnOut					Output word CAN3Out-W1	
11	CAN-AnOut					Output word CAN3Out-W2	
12	CAN-AnOut					Output word CAN3Out-W3	
[C6231]						Selection of the analog output signals to the MotionBus (CAN)	
1	CAN1Out-anl	1000	FIXED 0 % (not assigned)			Source for output word CAN1Out-DctrlStat	🕮 218
2	CAN1Out-anl	1000	FIXED 0 % (not assigned)			Source for output word CAN1Out-W1	
3	CAN1Out-anl	1000	FIXED 0 % (not assigned)			Source for output word CAN1Out-W2	
4	CAN1Out-anl	1000	FIXED 0 % (not assigned)			Source for output word CAN1Out-W3	
5	CAN2Out-anl	1000	FIXED 0 % (not assigned)			Source for output word CAN2Out-W0	🕮 227
6	CAN2Out-anl	1000	FIXED 0 % (not assigned)			Source for output word CAN2Out-W1	
7	CAN2Out-anl	1000	FIXED 0 % (not assigned)			Source for output word CAN2Out-W2	
8	CAN2Out-anl	1000	FIXED 0 % (not assigned)			Source for output word CAN2Out-W3	
9	CAN3Out-anl	1000	FIXED 0 % (not assigned)			Source for output word CAN3Out-W0	🕮 233
10	CAN3Out-anl	1000	FIXED 0 % (not assigned)			Source for output word CAN3Out-W1	
11	CAN3Out-anl	1000	FIXED 0 % (not assigned)			Source for output word CAN3Out-W2	
12	CAN3Out-anl	1000	FIXED 0 % (not assigned)			Source for output word CAN3Out-W3	
			For possible signals see ”selection list - analog signals”				🕮 371
C6250						Display of the phase output signals to the MotionBus (CAN)	
			-2147483647	{1}	2147483647		
1	CAN-PhiOut					Output double word CAN1Out-W2/W3	🕮 218
2	CAN-PhiOut					Output double word CAN2Out-W0/W1	🕮 227
3	CAN-PhiOut					Output double word CAN3Out-W0/W1	🕮 233

Code		Possible settings			IMPORTANT	
No.	Designation	Lenze/ appl.	Selection			
[C6251]					Selection of the phase output signals to the MotionBus (CAN)	
1	CAN1Out-phi	1000		FIXED 0 (not assigned)	Source for output double word CAN1Out-W2/W3	🕮 218
2	CAN2Out-phi	1000		FIXED 0 (not assigned)	Source for output double word CAN2Out-W0/W1	🕮 227
3	CAN3Out-phi	1000		FIXED 0 (not assigned)	Source for output double word CAN3Out-W0/W1	🕮 233
			For possible signals see ”selection list - phase signals”			🕮 374
C6255	CAN2PdoMap	0			Assignment of the 8 byte user data of the CAN2Out function block to the MotionBus (CAN)	🕮 227
			0	W0=Int W1=Int	Byte 1, byte 2 = CAN2Out-W0	
					Byte 3, byte 4 = CAN2Out-W1	
					Byte 5, byte 6 = CAN2Out-W2	
					Byte 7, byte 8 = CAN2Out-W3	
			1	W0 / W1=Dint	Byte 1, byte 2 = CAN2Out-W0/W1	
					Byte 3, byte 4 = CAN2Out-W0/W1	
					Byte 5, byte 6 = CAN2Out-W2	
					Byte 7, byte 8 = CAN2Out-W3	

User data

The eight bytes of user data to the MotionBus (CAN) can be assigned with

- analog signals (16 bits).
- phase signals (32 bits).

The switch C6255 is used to assign the eight bytes of user data to the MotionBus (CAN):

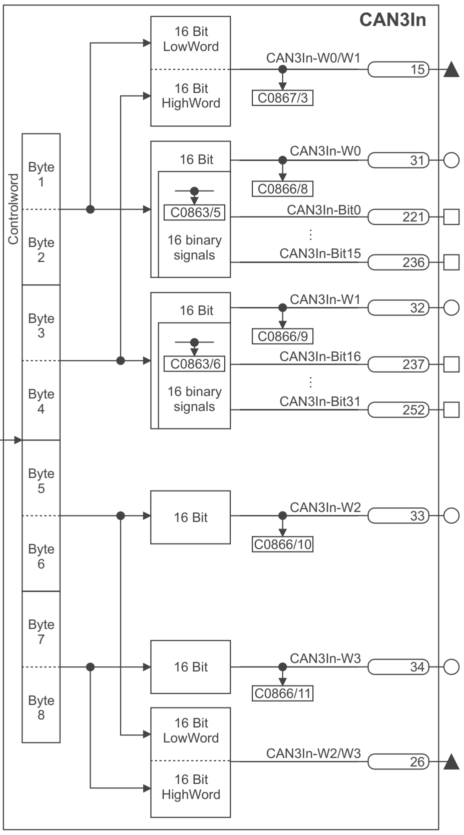
Value in C6255	User data			
	Byte 1, 2	Byte 3, 4	Byte 5, 6	Byte 7, 8
0	**CAN2Out-W0** 16 bits (C6231/5)	**CAN2Out-W1** 16 bits (C6231/6)	**CAN2Out-W2** 16 bits (C6231/7)	**CAN2Out-W3** 16 bits (C6231/8)
1	**CAN1Out-W0/W1** 32 bits (C6251/2)		**CAN2Out-W2** 16 bits (C6231/7)	**CAN2Out-W3** 16 bits (C6231/8)

11.14 CAN3In

Function

This function block serves to transfer event-controlled or time-controlled process data (🕮 138) via the MotionBus (CAN).

A sync telegram is not required.



ECSXA215

Fig.11-14 CAN3In function block

Codes

Code		Possible settings				IMPORTANT	
No.	Designation	Lenze/ appl.	Selection				
C0863			0000	{hex}	FFFF	Digital process data input words indicated hexadecimally for MotionBus (CAN) Read only	🕮 140 🕮 215
1	CAN IN bits		Bit 0	...	Bit15	CAN1_IN: process data input word 1	
2	CAN IN bits		Bit 16	...	Bit 31	CAN1_IN: process data input word 2	
3	CAN IN bits		Bit 0	...	Bit15	CAN2_IN: process data input word 1	
4	CAN IN bits		Bit 16	...	Bit 31	CAN2_IN: process data input word 2	
5	CAN IN bits		Bit 0	...	Bit15	CAN3_IN: process data input word 1	
6	CAN IN bits		Bit 16	...	Bit 31	CAN3_IN: process data input word 2	
C0866						Analog process data input words indicated decimally for MotionBus (CAN) 100.00% = 16384 Read only	🕮 140 🕮 215
1	CAN IN words		-199.99	{0.01 %}	199.99	CAN1_IN word 1	
2	CAN IN words					CAN1_IN word 2	
3	CAN IN words					CAN1_IN word 3	
4	CAN IN words					CAN2_IN word 1	
5	CAN IN words					CAN2_IN word 2	
6	CAN IN words					CAN2_IN word 3	
7	CAN IN words					CAN2_IN word 4	
8	CAN IN words					CAN3_IN word 1	
9	CAN IN words					CAN3_IN word 2	
10	CAN IN words					CAN3_IN word 3	
11	CAN IN words					CAN3_IN word 4	
C0867						32 -bit phase information for MotionBus (CAN) Only display	
1	CAN IN phi		-2147483648	{1}	2147483647	CAN1_IN	
2	CAN IN phi					CAN2_IN	
3	CAN IN phi					CAN3_IN	

User data

Each of the eight bytes of received user data is assigned to different signal types. For this reason, they can be evaluated –as required– as

- digital signals (1 bit)
- analog signals (16 bit)
- phase signals (32 Bit)

in the axis module:

Byte	Digital signals (1 bit)	Analog signals (16 bit)	Phase signals (32 Bit)
1, 2	CAN3In-Bit0 ... CAN3In-Bit15	CAN3In-W0	CAN3In-W0/W1
3, 4	CAN3In-Bit16 ... CAN3In-Bit31	CAN3In-W1	
5, 6		CAN3In-W2	CAN3In-W2/W3
7, 8		CAN3In-W3	

Note!

Via C0357 you can set the monitoring time (Lenze setting: 3000 ms) for data reception. (🕮 168)

11.15 CAN3Out

Function

This function block serves to transfer event-controlled or time-controlled process data (🕮 138) via the MotionBus (CAN).

- A sync telegram is not required.
- The process data is transmitted when a value within the eight bytes of user data has changed (event-controlled) or with the cycle time set under C0356/2 (time-controlled, (🕮 154).

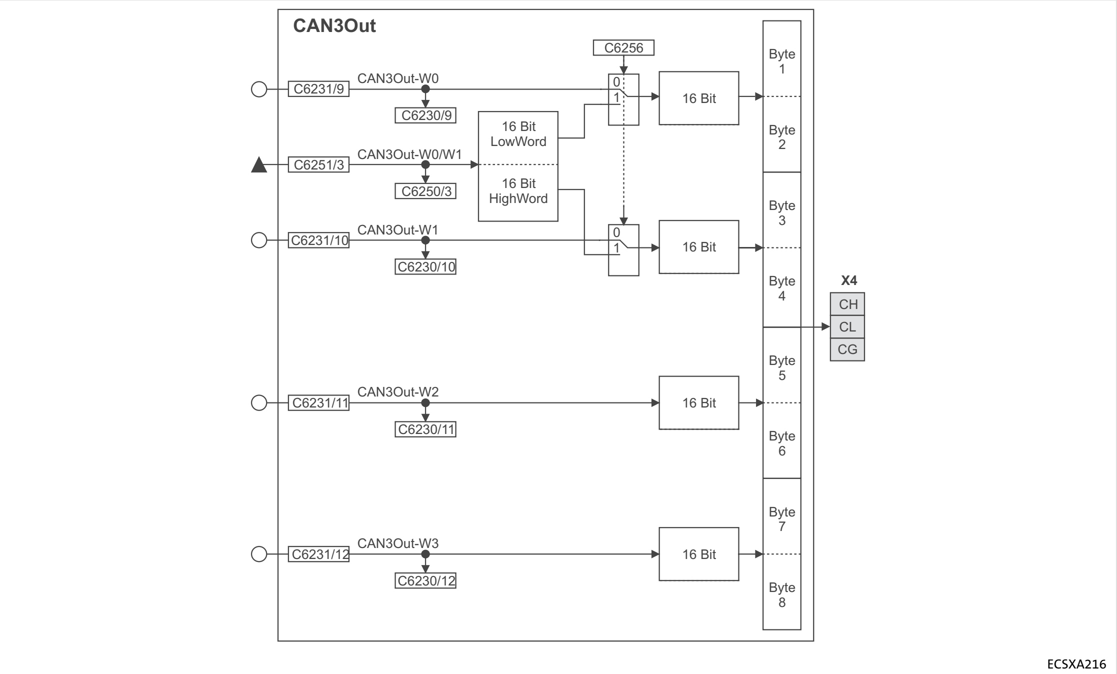


Fig.11-15 CAN3Out function block

Codes

Code		Possible settings		IMPORTANT	
No.	Designation	Lenze/ appl.	Selection		
C6230			-32768 {1} 32767	Display of the analog output signals to the MotionBus (CAN)	
1	CAN-AnOut			Output word CAN1Out-DctrlStat	📖 218
2	CAN-AnOut			Output word CAN1Out-W1	
3	CAN-AnOut			Output word CAN1Out-W2	
4	CAN-AnOut			Output word CAN1Out-W3	
5	CAN-AnOut			Output word CAN2Out-W0	📖 227
6	CAN-AnOut			Output word CAN2Out-W1	
7	CAN-AnOut			Output word CAN2Out-W2	
8	CAN-AnOut			Output word CAN2Out-W3	
9	CAN-AnOut			Output word CAN3Out-W0	📖 233
10	CAN-AnOut			Output word CAN3Out-W1	
11	CAN-AnOut			Output word CAN3Out-W2	
12	CAN-AnOut			Output word CAN3Out-W3	
[C6231]				Selection of the analog output signals to the MotionBus (CAN)	
1	CAN1Out-anl	1000	FIXED 0 % (not assigned)	Source for output word CAN1Out-DctrlStat	📖 218
2	CAN1Out-anl	1000	FIXED 0 % (not assigned)	Source for output word CAN1Out-W1	
3	CAN1Out-anl	1000	FIXED 0 % (not assigned)	Source for output word CAN1Out-W2	
4	CAN1Out-anl	1000	FIXED 0 % (not assigned)	Source for output word CAN1Out-W3	
5	CAN2Out-anl	1000	FIXED 0 % (not assigned)	Source for output word CAN2Out-W0	📖 227
6	CAN2Out-anl	1000	FIXED 0 % (not assigned)	Source for output word CAN2Out-W1	
7	CAN2Out-anl	1000	FIXED 0 % (not assigned)	Source for output word CAN2Out-W2	
8	CAN2Out-anl	1000	FIXED 0 % (not assigned)	Source for output word CAN2Out-W3	
9	CAN3Out-anl	1000	FIXED 0 % (not assigned)	Source for output word CAN3Out-W0	📖 233
10	CAN3Out-anl	1000	FIXED 0 % (not assigned)	Source for output word CAN3Out-W1	
11	CAN3Out-anl	1000	FIXED 0 % (not assigned)	Source for output word CAN3Out-W2	
12	CAN3Out-anl	1000	FIXED 0 % (not assigned)	Source for output word CAN3Out-W3	
			For possible signals see ”selection list - analog signals”		📖 371
C6250			-2147483647 {1} 2147483647	Display of the phase output signals to the MotionBus (CAN)	
1	CAN-PhiOut			Output double word CAN1Out-W2/W3	📖 218
2	CAN-PhiOut			Output double word CAN2Out-W0/W1	📖 227
3	CAN-PhiOut			Output double word CAN3Out-W0/W1	📖 233

Code		Possible settings			IMPORTANT	
No.	Designation	Lenze/ appl.	Selection			
[C6251]					Selection of the phase output signals to the MotionBus (CAN)	
1	CAN1Out-phi	1000		FIXED 0 (not assigned)	Source for output double word CAN1Out-W2/W3	🕮 218
2	CAN2Out-phi	1000		FIXED 0 (not assigned)	Source for output double word CAN2Out-W0/W1	🕮 227
3	CAN3Out-phi	1000		FIXED 0 (not assigned)	Source for output double word CAN3Out-W0/W1	🕮 233
			For possible signals see ”selection list - phase signals”			🕮 374
C6256	CAN3PdoMap	0			Assignment of the 8 byte user data of the CAN3Out function block to the MotionBus (CAN)	🕮 233
			0	W0=Int W1=Int	Byte 1, byte 2 = CAN3Out-W0	
					Byte 3, byte 4 = CAN3Out-W1	
					Byte 5, byte 6 = CAN3Out-W2	
					Byte 7, byte 8 = CAN3Out-W3	
			1	W0 / W1=Dint	Byte 1, byte 2 = CAN3Out-W0/W1	
					Byte 3, byte 4 = CAN3Out-W0/W1	
					Byte 5, byte 6 = CAN3Out-W2	
					Byte 7, byte 8 = CAN3Out-W3	

User data

The eight bytes of user data to the MotionBus (CAN) can be assigned with

- analog signals (16 bits).
- phase signals (32 bits).

The switch C6256 is used to assign the eight bytes of user data to the MotionBus (CAN):

Value in C6256	User data			
	Byte 1, 2	Byte 3, 4	Byte 5, 6	Byte 7, 8
0	**CAN3Out-W0** 16 bits (C6231/9)	**CAN3Out-W1** 16 bits (C6231/10)	**CAN3Out-W2** 16 bits (C6231/11)	**CAN3Out-W3** 16 bits (C6231/12)
1	**CAN3Out-W0/W1** 32 bits (C6251/3)		**CAN3Out-W2** 16 bits (C6231/11)	**CAN3Out-W3** 16 bits (C6231/12)

11.16 CANSync (CAN bus synchronisation)

Function

By means of this function block, the internal time base of the controller can be synchronised with the instant of reception of the sync telegram or a terminal signal. Thereby the start of cyclical and time-controlled internal processes of all controllers involved in the synchronisation (e. g. data transfer from tasks to the DCTRL function block) is effected in a synchronuous manner.

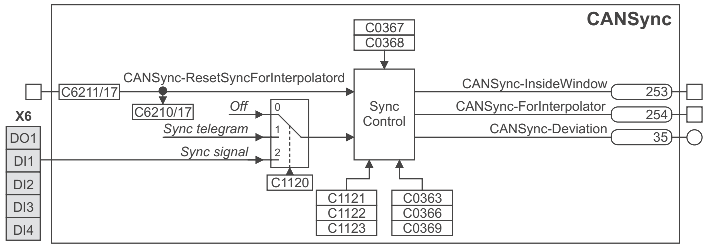


Fig.11-16 CANSync function block

Note!

Detailed information concerning the CAN bus synchronisation: 🕮 155

Codes

The operating mode is set via C1120:

Code		Possible settings				IMPORTANT	
No.	Designation	Lenze/ appl.	Selection				
C0363	Sync correct.	1				CAN sync correction increment	🕮 157
			1	0.2 µs/ms			
			2	0.4 µs/ms			
			3	0.6 µs/ms			
			4	0.8 µs/ms			
			5	1.0 µs/ms			
C0366	Sync Response	1				MotionBus (CAN) Sync response	🕮 158
			0	No response			
			1	Response			
C0367	Sync Rx ID	128				MotionBus (CAN) Sync receipt ID	🕮 156
			1	{1}	256		
C0368	Sync Tx ID	128				MotionBus (CAN) Sync transmission ID	
			1	{1}	256		
C0369	SyNc Tx time	0				CAN sync transmitting cycle A sync telegram with the identifier set in C0368 is sent with the set cycle time.	🕮 155
			0	{1 ms}	65000	0 = switched off	

Code		Possible settings				IMPORTANT	
No.	Designation	Lenze/ appl.	Selection				
C1120	Sync mode	0				Sync signal source	
			0	Off		Off	
			1	CAN Sync		Sync connection via MotionBus (CAN)	🕮 159
			2	Terminal sync		Sync connection via terminal	🕮 160
C1121	Sync cycle	2				Synchronisation cycle	🕮 156
			1	{1 ms}	13		
C1122	Sync phase	0.050				Synchronisation phase	
			0.000	{0.001 ms}	6.500		
C1123	Sync window	0.010				Synchronisation window	🕮 157
			0.000	{0.001 ms}	6.500		
C6210						Display of the digital output signals to the MotionBus (CAN)	
			0 (= FALSE)		1 (= TRUE)		
1	CAN-DigOut					CAN1Out-Bit0 (bit 0)	🕮 218
2	CAN-DigOut					CAN1Out-Bit1 (bit 1)	
3	CAN-DigOut					CAN1Out-Bit2 (bit 2)	
4	CAN-DigOut					CAN1Out-Bit3 (bit 3)	
5	CAN-DigOut					CAN1Out-Bit4 (bit 4)	
6	CAN-DigOut					CAN1Out-Bit5 (bit 5)	
7	CAN-DigOut					CAN1Out-Bit6 (bit 6)	
8	CAN-DigOut					CAN1Out-Bit7 (bit 7)	
9	CAN-DigOut					CAN1Out-Bit8 (bit 8)	
10	CAN-DigOut					CAN1Out-Bit9 (bit 9)	
11	CAN-DigOut					CAN1Out-Bit10 (bit 10)	
12	CAN-DigOut					CAN1Out-Bit11 (bit 11)	
13	CAN-DigOut					CAN1Out-Bit12 (bit 12)	
14	CAN-DigOut					CAN1Out-Bit13 (bit 13)	
15	CAN-DigOut					CAN1Out-Bit14 (bit 14)	
16	CAN-DigOut					CAN1Out-Bit15 (bit 15)	
17	CAN-DigOut					CANSync-ResetSyncForInterpolatord	🕮 212
18	CAN-DigOut					CAN-ResetNode	
19	CAN-DigOut					CAN-TxCan2Synchronized	
20	CAN-DigOut					CAN-TxCan3Synchronized	

Code		Possible settings		IMPORTANT	
No.	Designation	Lenze/ appl.	Selection		
[C6211]				Selection of the digital output signals to the MotionBus (CAN)	
1	CAN1Out-dig	1000	0 (FALSE, not assigned)	Source for CAN1Out-Bit0 (bit 0)	🕮 218
2	CAN1Out-dig	1000	0 (FALSE, not assigned)	Source for CAN1Out-Bit1 (bit 1)	
3	CAN1Out-dig	1000	0 (FALSE, not assigned)	Source for CAN1Out-Bit2 (bit 2)	
4	CAN1Out-dig	1000	0 (FALSE, not assigned)	Source for CAN1Out-Bit3 (bit 3)	
5	CAN1Out-dig	1000	0 (FALSE, not assigned)	Source for CAN1Out-Bit4 (bit 4)	
6	CAN1Out-dig	1000	0 (FALSE, not assigned)	Source for CAN1Out-Bit5 (bit 5)	
7	CAN1Out-dig	1000	0 (FALSE, not assigned)	Source for CAN1Out-Bit6 (bit 6)	
8	CAN1Out-dig	1000	0 (FALSE, not assigned)	Source for CAN1Out-Bit7 (bit 7)	
9	CAN1Out-dig	1000	0 (FALSE, not assigned)	Source for CAN1Out-Bit8 (bit 8)	
10	CAN1Out-dig	1000	0 (FALSE, not assigned)	Source for CAN1Out-Bit9 (bit 9)	
11	CAN1Out-dig	1000	0 (FALSE, not assigned)	Source for CAN1Out-Bit10 (bit 10)	
12	CAN1Out-dig	1000	0 (FALSE, not assigned)	Source for CAN1Out-Bit11 (bit 11)	
13	CAN1Out-dig	1000	0 (FALSE, not assigned)	Source for CAN1Out-Bit12 (bit 12)	
14	CAN1Out-dig	1000	0 (FALSE, not assigned)	Source for CAN1Out-Bit13 (bit 13)	
15	CAN1Out-dig	1000	0 (FALSE, not assigned)	Source for CAN1Out-Bit14 (bit 14)	
16	CAN1Out-dig	1000	0 (FALSE, not assigned)	Source for CAN1Out-Bit15 (bit 15)	
17	CAN1Out-dig	1000	0 (FALSE, not assigned)	Source for CANSync-ResetSyncForInterpolatord	🕮 212
18	CAN1Out-dig	1000	0 (FALSE, not assigned)	Source for CAN reset node	
19	CAN1Out-dig	1000	0 (FALSE, not assigned)	Source for CAN-TxCan2Synchronized	
20	CAN1Out-dig	1000	0 (FALSE, not assigned)	Source for CAN-TxCan3Synchronized	
			For possible signals see ”selection list - digital signals”		🕮 362

11.17 DCTRL

Function

This function block controls the controller into certain states:

- Quick stop (QSP, 🕮 242)
- Operation inhibit (DISABLE, 🕮 242)
- Controller inhibit (CINH, 🕮 242)
- Setting a TRIP (TRIP-SET, 🕮 243)
- Resetting a TRIP (TRIP-RESET, 🕮 243)
- Status of the controller (🕮 244)

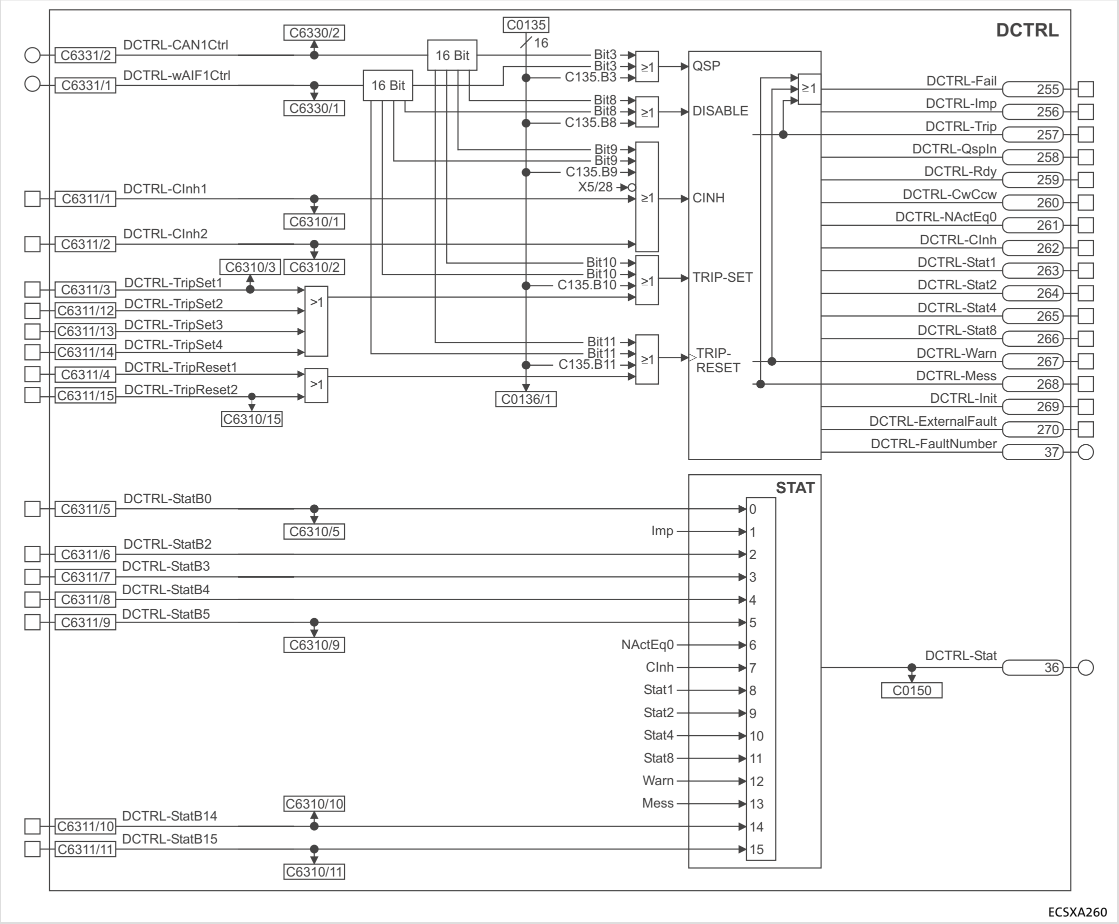


Fig.11-17 DCTRL function block

Codes

Code		Possible settings				IMPORTANT
No.	**Designation**	**Lenze/ appl.**	**Selection**			
C0135	Control word	0				Control word for networking via automation interface (AIF)
			0	{1}	65535	Controller evaluates information as 16 bits (binary coded)
			Bit 0	Not assigned		
			Bit 1	Not assigned		
			Bit 2	Not assigned		
			Bit 3	Activate quick stop (QSP)		
			Bit 4	Not assigned		
			Bit 5	Not assigned		
			Bit 6	Not assigned		
			Bit 7	Not assigned		
			Bit 8	Activate operation inhibit (DISABLE)		
			Bit 9	Activate controller inhibit (CINH)		
			Bit 10	Set TRIP		
			Bit 11	Reset TRIP		
			Bit 12	Not assigned		
			Bit 13	Not assigned		
			Bit 14	Not assigned		
			Bit 15	Not assigned		
C0136						Control words Only display
1	Ctrl word		0	{hex}	FFFF	Control word in DCTRL
2	Ctrl word					Control word in CANaux_IN
3	Ctrl word					Control word in AIF1In
C0150	Status word	0				Status word for networking via automation interface (AIF) Only display
			0	{1}	65535	Controller evaluates information as 16 bits (binary coded)
			Bit 0	Not assigned		
			Bit 1	Pulse inhibit (IMP) is active		
			Bit 2	Not assigned		
			Bit 3	Not assigned		
			Bit 4	Not assigned		
			Bit 5	Not assigned		
			Bit 6	n=0		
			Bit 7	Controller inhibit (CINH) is active		
			Bit 8	Controller status		
			Bit 9	Controller status		
			Bit 10	Controller status		
			Bit 11	Controller status		
			Bit 12	Warning is active		
			Bit 13	Message is active		
			Bit 14	Not assigned		
			Bit 15	Not assigned		

Code		Possible settings		IMPORTANT	
No.	Designation	Lenze/ appl.	Selection		
C6310			0 (= FALSE) 1 (= TRUE)	Display of the digital input signals in the DCTRL function block	🕮 239
1	DCTRL-DigOut			DCTRL-CINH1	
2	DCTRL-DigOut			DCTRL-CINH2	
3	DCTRL-DigOut			DCTRL-TripSet1	
4	DCTRL-DigOut			DCTRL-TripReset1	
5	DCTRL-DigOut			DCTRL-StatB0	
6	DCTRL-DigOut			DCTRL-StatB2	
7	DCTRL-DigOut			DCTRL-StatB3	
8	DCTRL-DigOut			DCTRL-StatB4	
9	DCTRL-DigOut			DCTRL-StatB5	
10	DCTRL-DigOut			DCTRL-StatB14	
11	DCTRL-DigOut			DCTRL-StatB15	
12	DCTRL-DigOut			DCTRL-TripSet2	
13	DCTRL-DigOut			DCTRL-TripSet3	
14	DCTRL-DigOut			DCTRL-TripSet4	
15	DCTRL-DigOut			DCTRL-TripReset2	
[C6311]				Selection of the digital input signals of the DCTRL function block	🕮 239
1	DCTRL-dig	1000	0 (FALSE, not assigned)	Source for DCTRL-CInh1	
2	DCTRL-dig	1000	0 (FALSE, not assigned)	Source for DCTRL-CInh2	
3	DCTRL-dig	1000	0 (FALSE, not assigned)	Source for DCTRL-TripSet1	
4	DCTRL-dig	1000	0 (FALSE, not assigned)	Source for DCTRL-TripReset1	
5	DCTRL-dig	1000	0 (FALSE, not assigned)	Source for DCTRL-StatB0	
6	DCTRL-dig	1000	0 (FALSE, not assigned)	Source for DCTRL-StatB2	
7	DCTRL-dig	1000	0 (FALSE, not assigned)	Source for DCTRL-StatB3	
8	DCTRL-dig	1000	0 (FALSE, not assigned)	Source for DCTRL-StatB4	
9	DCTRL-dig	1000	0 (FALSE, not assigned)	Source for DCTRL-StatB5	
10	DCTRL-dig	1000	0 (FALSE, not assigned)	Source for DCTRL-StatB14	
11	DCTRL-dig	1000	0 (FALSE, not assigned)	Source for DCTRL-StatB15	
12	DCTRL-dig	1000	0 (FALSE, not assigned)	Source for DCTRL-TripSet2	
13	DCTRL-dig	1000	0 (FALSE, not assigned)	Source for DCTRL-TripSet3	
14	DCTRL-dig	1000	0 (FALSE, not assigned)	Source for DCTRL-TripSet4	
15	DCTRL-dig	1000	0 (FALSE, not assigned)	Source for DCTRL-TripReset2	
			For possible signals see ”selection list - digital signals”		🕮 362
C6330			-32768 {1} 32767	Display of the analog input signals in the DCTRL function block	🕮 239
1	DCTRL-AnOut			DCTRL-wAIF1Ctrl	
2	DCTRL-AnOut			DCTRL-CAN1Ctrl	

Code		Possible settings		IMPORTANT	
No.	Designation	Lenze/ appl.	Selection		
[C6331]				Selection of the analog input signals of the DCTRL function block	📖 239
1	DCTRL-anl	1000	FIXED 0 % (not assigned)	Source for DCTRL-wAIF1Ctrl	
2	DCTRL-anl	1000	FIXED 0 % (not assigned)	Source for DCTRL-CAN1Ctrl	
			For possible signals see ”selection list - analog signals”		📖 371

11.17.1 Quick stop (QSP)

The QSP function serves to stop the drive in an adjustable time irrespective of the setpoint selection.

- The function can be controlled via the following inputs (OR’d):
  – Control word ”CAN1In-DctrlCtrl” bit 3 of CAN1In function block
  – Control word ”AIF1In-DctrlCtrl” bit 3 of AIF1In function block
  – C0135/3 (control word for networking via AIF)
- C0136/1 indicates the control word C0135.
- The speed is reduced to ”0” within the deceleration time set via C0105.

11.17.2 Operation inhibit (DISABLE)

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

- The function can be controlled via the following inputs (OR’d):
  – Control word ”CAN1In-DctrlCtrl” bit 8 of CAN1_IN function block
  – Control word ”AIF1In-DctrlCtrl” bit 8 of AIF1_IN function block
  – C0135/8 (control word for networking via AIF)
- C0136/1 indicates the control word C0135.

11.17.3 Controller inhibit (CINH)

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

- The function can be controlled via the following inputs (OR’d):
  – Terminal X6 (FALSE = controller inhibit)
  – Control word ”CAN1In-DctrlCtrl” bit 9 of CAN1In function block
  – Control word ”AIF1In-DctrlCtrl” bit 9 of AIF1In function block
  – C0135/9 (control word for networking via AIF)
  – Signal ”DCTRL-CInh1” and ”DCTRL-CInh2” (ANDed, TRUE = set controller inhibit)
- C0136/1 indicates the control word C0135.

11.17.4 Setting TRIP (TRIP-SET)

This function sets TRIP” in the drive and indicates ”External error” (error message ”EEr”).

- The function can be controlled via the following inputs (OR’d):
  - Control word ”CAN1In-DctrlCtrl” bit 10 of CAN1In function block
  - Control word ”AIF1In-DctrlCtrl” bit 10 of AIF1In function block
  - C0135/10 (control word for networking via AIF)
  - Signal ”DCTRL-TripSet1” ... ”DCTRL-TripSet4” (ANDed, TRUE = set TRIP)
- C0136/1 indicates the control word C0135.
- The response to TRIP can be set via C0581.

Code		**Possible settings**			**IMPORTANT**	
No.	**Designation**	**Lenze/ appl.**	**Selection**			
C0581	MONIT EEr	0			Configuration of external fault monitoring ”ExternalFault” (FWM EEr)	🕮 243
			0	TRIP		
			1	Message		
			2	Warning		
			3	Off		
			4	FAIL-QSP		

11.17.5 Resetting TRIP (TRIP-RESET)

This function resets an upcoming TRIP, provided that the cause of malfunction has been eliminated. If the cause of malfunction is still active, there will be no reaction.

- The function can be controlled via the following inputs (OR’d):
  - Control word ”CAN1In-DctrlCtrl” bit 11 of CAN1In function block
  - Control word ”AIF1In-DctrlCtrl” bit 11 of AIF1In function block
  - C0135/11 (control word for networking via AIF)
  - Signal ”DCTRL-TripReset1” and ”DCTRL-TripReset2” (ANDed, set TRUE = TRIP)
- C0136/1 indicates the control word C0135.

Note!

The function is only carried out by a FALSE-TRUE edge of the signal resulting from the OR operation.
If one input is assigned to TRUE, a FALSE-TRUE edge cannot occur.

11.17.6 Controller status

Via ”DCTRL-Stat” a status word is output, consisting of signals generated by the DCTRL function block and signals of freely configurable function block inputs.

- The status is analog coded in the output 36.
- The status word can be displayed via C0150.

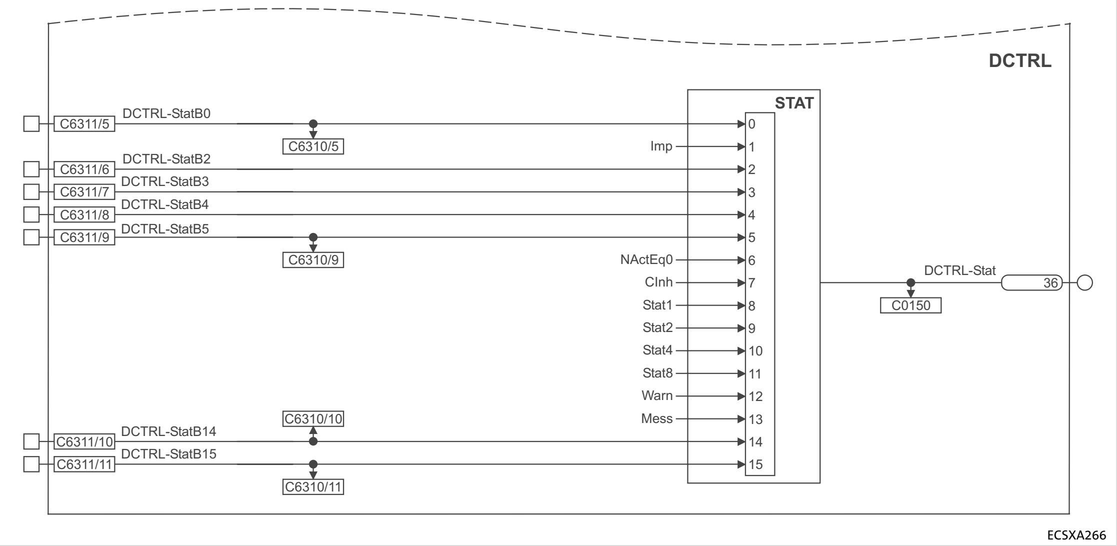


Fig.11-18 DCTRL function block: Output of the status word DCTRL-Stat

11.18 DFIN (master frequency input)

Function

This function block can convert a power pulse current at the master frequency input X8 into a speed value and scale it. A master frequency can be transferred with high precision without any offset and gain errors.

- The master frequency input X8 is designed for signals with TTL level.
- The zero track entry is optional.
- The master frequency input X8 can be configured as a master frequency output via C0491.
- An encoder can be selected and configured via the codes:
  – C0419 (encoder selection)
  – C0420 (encoder increments)
  – C0421 (encoder bias)
  – C0427 (Type of master frequency input signal)
- Output of the analog signal ”DFIN_In_v”

The digital frequency coupling of ECS axis modules in principle is effected as a master-slave connection. If several ECS axis modules (max. 3 slaves) are connected to a master, the **EMF2131IB** digital frequency distributor is required for this purpose (🕮 73).

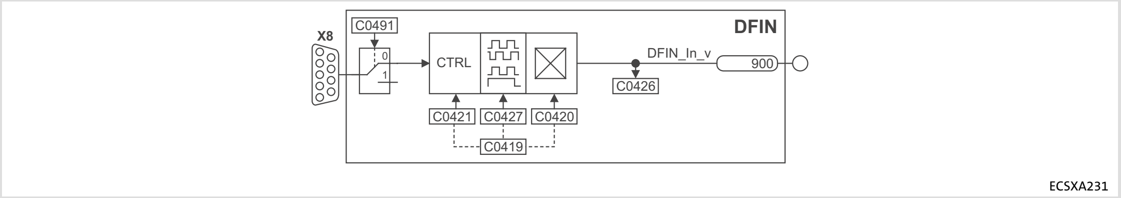


Fig.11-19 DFIN function block

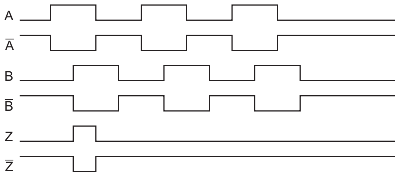
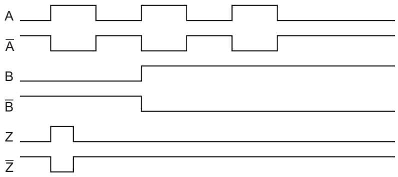
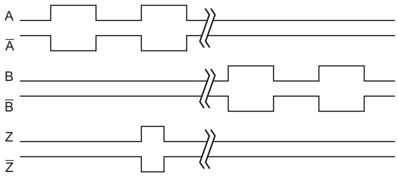
Codes

Code		Possible settings				IMPORTANT	
No.	Designation	Lenze/ appl.	Selection				
[C0419]	Enc. setup	110				Encoder selection ● Selection of encoder which is indicated on the nameplate of the Lenze motor. ● The encoder data (C0420, C0421, C0427) is set automatically in accordance with the selection.	🕮 245 🕮 87 🕮 88
			0	COMMON			
			110	IT512-5V		Incremental encoder with TTL level	
			111	IT1024-5V			
			112	IT2048-5V			
			113	IT4096-5V			
			210	IS512-5V		Sin/cos encoder	
			211	IS1024-5V			
			212	IS2048-5V			
			213	IS4096-5V			
			307	AS64-8V		SinCos absolute value encoder with hyperface interface (single-turn) 307, 308, 309 can only be selected using the operating system 7.0 or higher.	
			308	AS128-8V			
			309	AS256-8V			
			310	AS512-8V			
			311	AS1024-8V			
			407	AM64-8V		SinCos absolute value encoder with hyperface interface (multi-turn) 407, 408, 409 can only be selected using the operating system 7.0 or higher.	
			408	AM128-8V			
			409	AM256-8V			
			410	AM512-8V			
			411	AM1024-8V			
[C0420]	Encoder const.	1024				Number of increments of the encoder	🕮 245 🕮 87 🕮 88
			1	{1 inc/rev}	8192	Sets C0419 = 0 (”common”) if the value is altered.	
[C0421]	Encoder volt	0				Encoder voltage	🕮 245 🕮 87 🕮 88
			0	5.0 V		Sets C0419 = 0 (”common”) if the value is altered.	
			1	5.6 V			
			2	6.3 V			
			3	6.9 V			
			4	7.5 V			
			5	8.1 V			
C0426	DIS: In					Signal at DFIN input Only display	🕮 245
			-32767	{1 rpm}	32767		
[C0427]	Enc. signal	0				Function of the master frequency input signals on X8 (DFIN)	🕮 245 🕮 87 🕮 88
			0	2-phase			
			1	A: speed B: direction			
			2	A or B: speed or direction			

Code		Possible settings			IMPORTANT	
No.	Designation	Lenze/ appl.	Selection			
[C0491]	X8 in/out	0			Function of X8	📖 245 📖 248 📖 87 📖 88
			0	X8 is input		
			1	X8 is output		

Configuring the master frequency input signal

Via C0427, you configure the master frequency input signal:

Configuration C0427	Track	CW rotation	CCW rotation
C0427 = 0 (2 phases)			
 Signal sequence with phase shift (CW rotation)	**a**	Track A leads by 90º (positive value at *DFIN_In_v*)	Track A lags by 90º (negative value at *DFIN_In_v*)
	B	–	–
C0427 = 1 (A = speed, B = direction)			
 Control of the direction of rotation via track B	**a**	transmits the speed.	transmits the speed
	B	= FALSE (positive value at *DFIN_In_v*)	= TRUE (negative value at *DFIN_In_v*)
C0427 = 2 (A or B = speed or direction)			
 Control of speed and direction of rotation via track A or track B	**a**	transmits speed and direction of rotation (positive value at *DFIN_In_v*)	= FALSE
	B	= FALSE	transmits speed and direction of rotation (negative value at *DFIN_In_v*)

Transfer function

$$\text{DFIN\_In\_v} = f\,[\text{Hz}] \cdot \frac{60}{\text{C0420}} \cdot \frac{2^{14}}{15000}$$

Example:

- Input frequency = 200 kHz
- C0420 = 2048 (increments/revolution)

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

11.19 DFOUT (master frequency output)

Function

This function block converts internal speed signals into frequency signals. Transmission is effected with high precision (without offset and gain errors) with residual value treatment.

- The master frequency output X8 can be configured as a master frequency input via C0491.
- The type of the master frequency output signals can be set via C0540:
  - Output of an analog signal ”DFOut-In_v”
  - Output of a speed signal
  - Encoder simulation of the resolver with zero track

The digital frequency coupling of ECS axis modules in principle is effected as a master-slave connection. If several ECS axis modules (max. 3 slaves) are connected to a master, the **EMF2131IB** digital frequency distributor is required for this purpose (🕮 73).

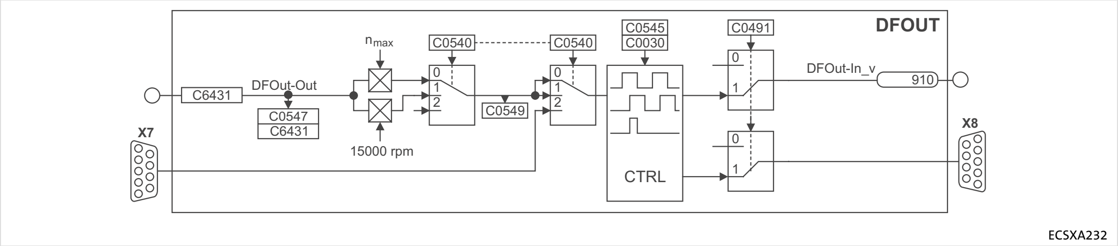


Fig.11-20 DFOUT function block

Codes

Code		Possible settings			IMPORTANT	
No.	Designation	Lenze/ appl.	Selection			
C0030	DFOUT CONST	3			Constant for the master frequency output in increments per revolution	🕮 248 🕮 87 🕮 88
			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		
[C0491]	X8 in/out	0			Function of X8	🕮 245 🕮 248 🕮 87 🕮 88
			0	X8 is input		
			1	X8 is output		
[C0540]	X8 Signal out	2			Function of the master frequency output signals on X8 (DFOUT)	🕮 69 🕮 248 🕮 87 🕮 88
			0	Analog → DFOUT		
			1	PH-diff → DFOUT		
			2	EncSim → DFOUT		

Code		Possible settings				IMPORTANT	
No.	Designation	Lenze/ appl.	Selection				
C0545	PH offset	0				Phase offset	🕮 248
			0	{1 inc}	65535	1 revolution = 65535 increments	
C0547	DIS: AN-IN					Analog signal on the input of the DFOUT block Only display	🕮 248
			-199.99	{0.00 %}	199.99		
C0549	DIS: DF-IN					Speed on the input of the DFOUT block Only display	🕮 248
			-32767	{1 rpm}	32767		
C6430	DFOUT					Display of the analog output signal DFOut-Out in the DFOUT function block	🕮 248
			-32768	{1}	32767		
[C6431]	DFOUT	1000				Selection of the analog output signal DFOut-Out for the DFOUT function block	🕮 248
			FIXED 0 % (not assigned)				
			For possible signals see ”selection list - analog signals”				🕮 371

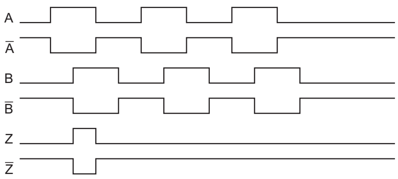
Configuring the master frequency output signal

Note!

Dependent on the system, the master frequency output X8 has a delay time of $T_d = 1$ ms.

Via code C0540 you configure the type of the master frequency output signal:

C0540 = 0	**Output of an analog signal**
Function	The input signal *DFOUT_nOut_v*is interpreted as an analog signal [%] and is output as a frequency signal on the master frequency output X8.
Scaling	100 % ≡ (INT)16384 ≡ C0011 (n_{max})
Transfer function	$f\,[\text{Hz}] = \text{DFOUT-Out}\,[\%] \cdot \frac{\text{C0030}}{100} \cdot \frac{\text{C0011}\,(n_{max})}{60}$ $\text{DFOUT-In\_v} = f\,[\text{Hz}] \cdot \frac{60}{\text{C0030}} \cdot \frac{2^{14}}{15000}$
Example	● *DFOUT_nOut_v* = 50 % ● C0030 = 3, this corresponds to a number of increments of 2048 increments/revolution ● C0011 = 3000 rpm $f\,[\text{Hz}] = 50\,\% \cdot \frac{2048}{100} \cdot \frac{3000}{60} = 51200\,\text{Hz}$
C0540 = 1	**Output of a speed signal**
Function	The input signal *DFOUT_nOut_v*is interpreted as a speed signal [rpm] and is output as a frequency signal on the master frequency output X8.
Scaling	15000 rpm ≡ (INT)16384
Transfer function	$f\,[\text{Hz}] = \text{DFOUT-Out}\,[\text{rpm}] \cdot \frac{\text{C0030}}{60}$
Example	● *DFOUT_nOut_v* = 3000 rpm ● C0030 = 3, this corresponds to a number of increments of 2048 increments/revolution $f\,[\text{Hz}] = 3000\,\text{rpm} \cdot \frac{2048}{60} = 102400\,\text{Hz}$
C0540 = 2	**Encoder simulation of the resolver with zero track in resolver position**
Function	● The function is used if a resolver is connected to X7. ● The encoder constant for output X8 is set in C0030. ● The output of the zero pulse with reference to the rotor depends on how the resolver is mounted to the motor. ● The zero pulse can be shifted by +360 ° via code C0545 (65536 inc = 360 °).

Signal sequence	**Track**	**CW rotation**	**CCW rotation**
 Signal sequence with phase shift (CW rotation)	**A**	If the input values are positive, track A leads by 90º.	If the input values are negative, track A lags by 90º.
	B	–	–

► The output signal corresponds to the message of an incremental encoder:
  - Track A, B and, if selected, zero track as well as the corresponding inverted tracks are output with tracks shifted by 90 degrees.
  - The levels are TTL compatible.

► The zero track is output in accordance with the function set in code C0540.

11.20 DigIn (freely assignable digital inputs)

Function

This function block reads and conditions the signals on X6/DI1 ... DI4.

- The configuration of the terminal polarity for the inputs X6/DI1 ... DI4 is effected via C0114.
- The ”safe torque off” safety function (🕮 55) is controlled via X6/SI1 and X6/SI2.

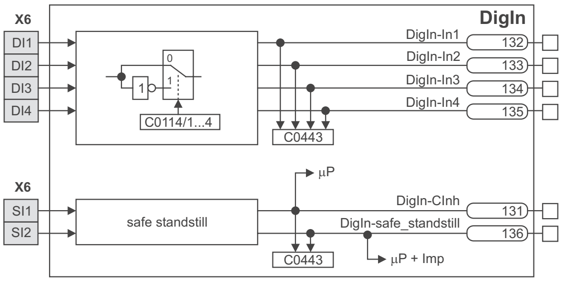


Fig.11-21 DigIn function block

Codes

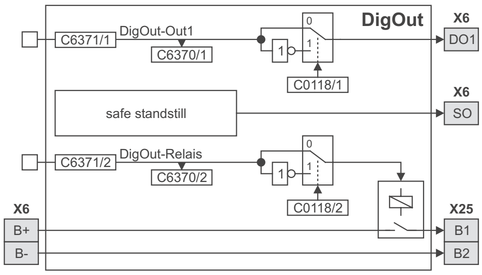
Code		Possible settings			IMPORTANT	
No.	**Designation**	**Lenze/ appl.**	**Selection**			
C0114					Polarity of the digital inputs (DIGIN)	🕮 251 🕮 92
1	DIGIN pol	0		HIGH level active	X6/DI1	
2	DIGIN pol	0		HIGH level active	X6/DI2	
3	DIGIN pol	0		HIGH level active	X6/DI3	
4	DIGIN pol	0		HIGH level active	X6/DI4	
			0	HIGH level active		
			1	LOW level active		
C0443	DIS: DIGIN				Input signals at X6 Terminal states are described by binary interpretation Only display	🕮 251
			0	{1} 255		
			Bit 0	DIGIN1	X6/DI1	
			Bit1	DIGIN2	X6/DI2	
			Bit2	DIGIN3	X6/DI3	
			Bit3	DIGIN4	X6/DI4	
			Bit4	DIGIN_safe_standstill	X6/SI1	
			Bit5	free		
			Bit6	DIGIN_CInh	X6/SI2	
			Bit5	free		

11.21 DigOut (freely assignable digital outputs)

Function

This function block conditions the digital signal ”DigOut-Out1” and outputs it via X6/DO1.

- A motor holding brake supplied with low voltage via X6/B+ and X6/B- can be connected to X25/B1 and X25/B2 48
  - The motor holding brake can be switched by the signal DigOut-Relay .
  - The terminal polarity for the outputs X6/DO1, X25/B1 and X25/B2 can be configured via C0118.
- X6/SO serves to return information concerning the safety function ”safe torque off” (🕮 55).



ECSXA242

Fig.11-22 DigOut function block

Codes

Code		Possible settings			IMPORTANT	
No.	**Designation**	**Lenze/ appl.**	**Selection**			
C0118					Polarity of the digital outputs (DIGOUT)	🕮 252 🕮 92
1	DIGOUT pol	0		No inversion	X6/DO1	
2	DIGOUT pol	0		No inversion	X25/BD1, X25/BD2 (brake connection)	
			0	No inversion		
			1	Logic inversion of the level		
C6370					Display of the output signals at the digital output and the brake relay	🕮 252
			0 (= FALSE)	1 (= TRUE)		
1	DIGOUT				Output signal at the digital output X6/DO1 (DigOut-Out1)	
2	DIGOUT				Control of the brake relay (DigOut relay)	
[C6371]					Selection of the digital output signals for the digital output and the brake relay	🕮 252
1	DigoutIn-dig	1000		0 (FALSE, not assigned)	Source for the output signal at the digital output X6/DO1 (DigOut-Out1)	
2	DigoutIn-dig	1000		0 (FALSE, not assigned)	Source for the control of the brake relay (DigOut relay)	
			For possible signals see ”selection list - digital signals”			🕮 362

11.22 FCODE (free codes)

Function

This function block provides different signals. The signals can be directly read out and processed via the assigned ”free” codes of the controller.

- Values in the codes of the function block are assigned to the corresponding output signals.
- The code value is converted into a signal value via a fixed scaling routine.

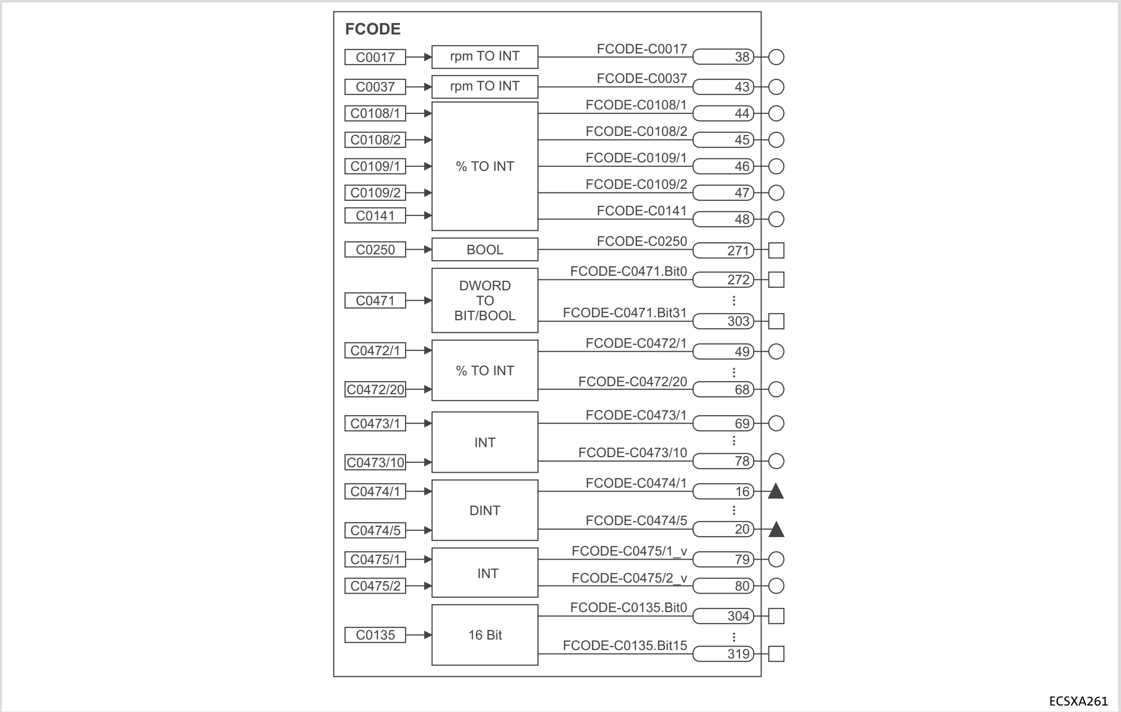


Fig.11-23 FCODE function block

Beispiel

You can enter a percentage value [%] in C0472/1 (e.g. by using the keypad). The value is directly assigned to the signal ”FCODE-C0472/1” (data type ”integer”) via a fixed scaling routine and can be processed in the PLC program.

Note!

The free code C0470 has the same memory address as C0471. C0470 can be read out via the signals ”FCODE-C0471.Bit0 ... 31” in C0471.

In contrast to code C0471 which can accept a 32-bit value, code C0470 is divided into four subcodes with eight bits each.

Codes

Code		Possible settings				IMPORTANT	
No.	Designation	Lenze/ appl.	Selection				
C0017	FCODE (QMIN)	50				Used for speed signals	🕮 253
			-16000	{1 rpm}	16000		
C0037	Set-value rpm	0				Setpoint selection in rpm	🕮 253
			-16000	{1 rpm}	16000		
C0108						Used for relative analog signals	🕮 253
1	FCODE (GAIN)	100.00	-199.99	{0.01 %}	199.99		
2	FCODE (GAIN)	100.00					
C0109						Used for relative analog signals	🕮 253
1	FCODE (offset)	0.00	-199.99	{0.01 %}	199.99		
2	FCODE (offset)	0.00					
C0135	Control word	0				Control word for networking via automation interface (AIF)	
			0	{1}	65535	Controller evaluates information as 16 bits (binary coded)	
			Bit 0	Not assigned			
			Bit 1	Not assigned			
			Bit 2	Not assigned			
			Bit 3	Activate quick stop (QSP)			
			Bit 4	Not assigned			
			Bit 5	Not assigned			
			Bit 6	Not assigned			
			Bit 7	Not assigned			
			Bit 8	Activate operation inhibit (DISABLE)			
			Bit 9	Activate controller inhibit (CINH)			
			Bit 10	Set TRIP			
			Bit 11	Reset TRIP			
			Bit 12	Not assigned			
			Bit 13	Not assigned			
			Bit 14	Not assigned			
			Bit 15	Not assigned			
C0141	FCODE (setval)	0.00				Used for relative analog signals	🕮 253
			-199.99	{0.01 %}	199.99		
C0250	FCODE 1 Bit	0				Freely selectable digital signal (1 bit)	🕮 253
			0		1		
C0470						Freely configurable code for digital signals	🕮 253
1	FCODE 8bit	0	0	{1}	255	C0470/1 = C0471, bit 0 ... 7	
2	FCODE 8bit	0				C0470/2 = C0471, bit 8 ... 15	
3	FCODE 8bit	0				C0470/3 = C0471, bit 16 ... 23	
4	FCODE 8bit	0				C0470/4 = C0471, bit 24 ... 31	
C0471	FCODE 32bit	0				Hexadecimal 32-bit interpretation of C0470	🕮 253
			0	{1}	4294967295		

Code		Possible settings				IMPORTANT	
No.	Designation	Lenze/ appl.	Selection				
C0472	FCODE analog					Freely configurable code for relative analog signals	🕮 253
1		0.00	-199.99	{0.01 %}	199.99	FCODE_bC472_1_a	
2		0.00				FCODE_bC472_2_a	
3		100.00				FCODE_bC472_3_a	
4		0.00				FCODE_bC472_4_a	
...		...				...	
20		0.00				FCODE_bC472_20_a	
C0473						Freely configurable code for absolute analog signals	🕮 253
1	FCODE abs	1	-32767	{1}	32767		
2	FCODE abs	1					
3	FCODE abs	0					
...	...	...					
10	FCODE abs	0					
C0474						Freely configurable code for phase signals	🕮 253
1	FCODE PH	0	-2147483647	{1}	2147483647		
...	...	...					
5	FCODE PH	0					
C0475						Freely configurable code for phase difference signals	🕮 253
1	FCODE DF	0	-16000	{1 rpm}	16000		
2	FCODE DF	0					

11.23 FIXED (output of constant signals)

Function

This function block outputs fixed values to provide easy programming in the standard calculation of percentage (100 % = 16384) of the drive technology.

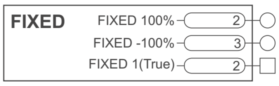


Fig.11-24 FIXED function block (output of constant signals)

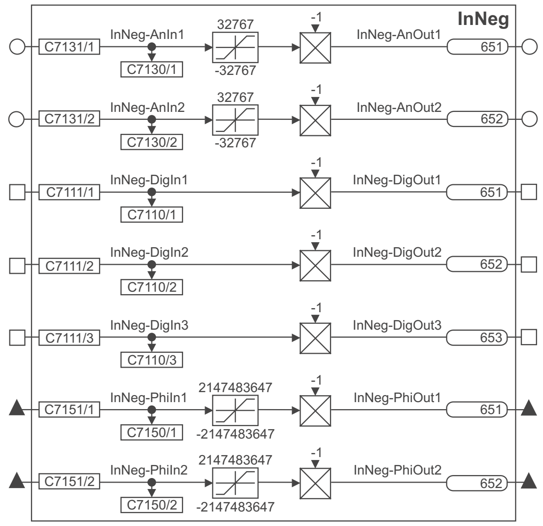
11.24 InNeg

Function

This function block serves to invert the input signals. The function block can invert digital, analog and phase signals.

- The values of the analog signals are in a decimal range of ±32767.
- The values of the phase signals are in a decimal range of ±2147483648.

The values are calculated before the selected main function block is calculated. Thus the calculated values are made available to the subsequent blocks in the current cycle.



ECSXA251

Fig.11-25 InNeg function block

Codes

Code		Possible settings		IMPORTANT	
No.	**Designation**	**Lenze/ appl.**	**Selection**		
C7110				Display of the digital input signals in the function block InNeg (signal inversion)	🕮 257
1	InNeg-digV			InNeg-DigIn1	
2	InNeg-digV			InNeg-DigIn2	
3	InNeg-digV			InNeg-DigIn3	
C7111				Selection of the digital input signals for the InNeg function block (signal inversion)	🕮 257
1	InNeg-dig	1000	0 (FALSE, not assigned)	Source for InNeg-DigIn1	
2	InNeg-dig	1000	0 (FALSE, not assigned)	Source for InNeg-DigIn2	
3	InNeg-dig	1000	0 (FALSE, not assigned)	Source for InNeg-DigIn3	
			For possible signals see ”selection list - digital signals”		🕮 362

Code		Possible settings		IMPORTANT	
No.	Designation	Lenze/ appl.	Selection		
C7130			-32768 (= -100 %) {1} 32767 (= 100 %)	Display of the analog input signals in the InNeg function block (signal inversion)	🕮 257
1	InNeg-AnV			InNeg-AnIn1	
2	InNeg-AnV			InNeg-AnIn2	
C7131				Selection of the analog input signals for the InNeg function block (signal inversion)	🕮 257
1	InNeg-An	1000	FIXED 0 % (not assigned)	Source for InNeg-AnIn1	
2	InNeg-An	1000	FIXED 0 % (not assigned)	Source for InNeg-AnIn2	
			For possible signals see ”selection list - analog signals”		🕮 371
C7150			-2147483647 {1} 2147483647	Display of the phase input signals in the InNeg function block (signal inversion)	🕮 257
1	InNeg-PhiV			InNeg-PhiIn1	
2	InNeg-PhiV			InNeg-PhiIn2	
C7151				Selection of the phase input signals for the InNeg function block (signal inversion)	🕮 257
1	InNeg-Phi	1000	FIXED 0 (not assigned)	Source for InNeg-PhiIn1	
2	InNeg-Phi	1000	FIXED 0 (not assigned)	Source for InNeg-PhiIn2	
			For possible signals see ”selection list - phase signals”		🕮 374

11.25 OutNeg

Function

This function block serves to invert the output signals. The function block can invert digital, analog and phase signals.

- The values of the analog signals are in a decimal range of ±32767.
- The values of the phase signals are in a decimal range of ±2147483648.

The values are calculated before the selected main function block is calculated. Thus the calculated values are made available to the subsequent blocks in the current cycle.

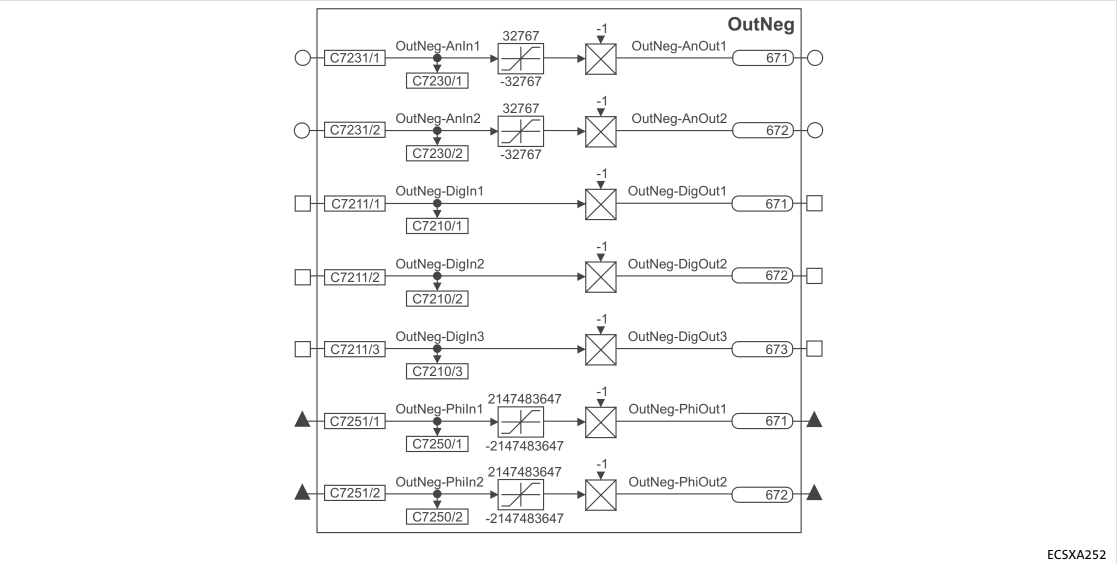


Fig.11-26 OutNeg function block

Codes

Code		Possible settings		IMPORTANT	
No.	Designation	Lenze/ appl.	Selection		
C7210				Display of the digital input signals in the OutNeg function block (signal inversion)	🕮 259
1	OutNeg-digV			OutNeg-DigIn1	
2	OutNeg-digV			OutNeg-DigIn2	
3	OutNeg-digV			OutNeg-DigIn3	
C7211				Selection of the digital input signals for the OutNeg function block (signal inversion)	🕮 259
1	OutNeg-dig	1000	0 (FALSE, not assigned)	Source for OutNeg-DigIn1	
2	OutNeg-dig	1000	0 (FALSE, not assigned)	Source for OutNeg-DigIn2	
3	OutNeg-dig	1000	0 (FALSE, not assigned)	Source for OutNeg-DigIn3	
			For possible signals see ”selection list - digital signals”		🕮 362

Code		Possible settings				IMPORTANT	
No.	Designation	Lenze/ appl.	Selection				
C7230			-32768 (= -100 %)	{1}	32767 (= 100 %)	Display of the analog input signals in the OutNeg function block (signal inversion)	🕮 259
1	OutNeg-AnV					OutNeg-AnIn1	
2	OutNeg-AnV					OutNeg-AnIn2	
C7231						Selection of the analog input signals for the OutNeg function block (signal inversion)	🕮 259
1	OutNeg-An	1000	FIXED 0 % (not assigned)			Source for OutNeg-AnIn1	
2	OutNeg-An	1000	FIXED 0 % (not assigned)			Source for OutNeg-AnIn2	
			For possible signals see ”selection list - analog signals”				🕮 371
C7250			-2147483647	{1}	2147483647	Display of the phase input signals in the OutNeg function block (signal inversion)	🕮 259
1	OutNeg-PhiV					OutNeg-PhiIn1	
2	OutNeg-PhiV					OutNeg-PhiIn2	
C7251						Selection of the phase input signals for the OutNeg function block (signal inversion)	🕮 259
1	OutNeg-Phi	1000	FIXED 0 (not assigned)			Source for OutNeg-PhiIn1	
2	OutNeg-Phi	1000	FIXED 0 (not assigned)			Source for OutNeg-PhiIn2	
			For possible signals see ”selection list - phase signals”				🕮 374

11.26 SYS

Function

This function block contains global system variables which are firmly integrated into the run-time system. They provide functions for programming relief.

- On the function block outputs clock signals with the same pulse/pause ratio are output.
- The outputs are toggled in real time.
- If you use these output signals, observe the scanning frequency at which the outputs are scanned (Aliasing effect). It should at least be twice the toggle frequency.

The following outputs are integrated:

Output	Toggle frequency	Period
Clock01Hz	0.1 Hz	T = 10 s
Clock1Hz	1.0 Hz	T = 1 s
Clock10Hz	10 Hz	T = 100 ms
Clock0100Hz	100 Hz	T = 10 ms

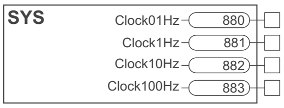


Fig.11-27 SYS function block

11.27 Speed (speed control)

Function

Completely wired speed control with the subfunctions:

- Selection of direction of rotation (🕮 269)
- Setpoint conditioning (🕮 270)
- Motor control (🕮 276)
- Brake control (🕮 281)
- Monitoring functions (🕮 163)

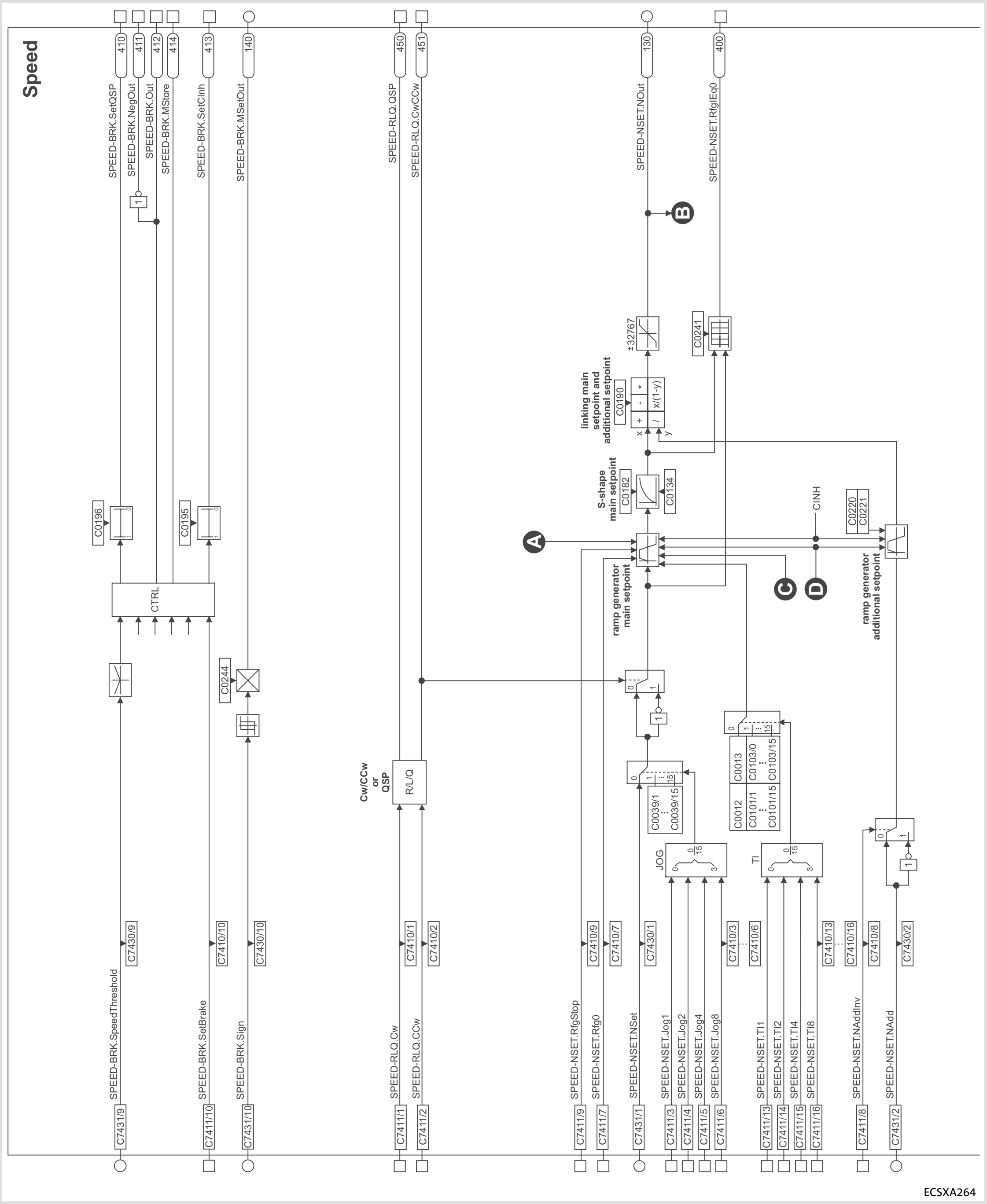


Fig.11-28 ”Speed” function block (speed control) - Page 1 of 2

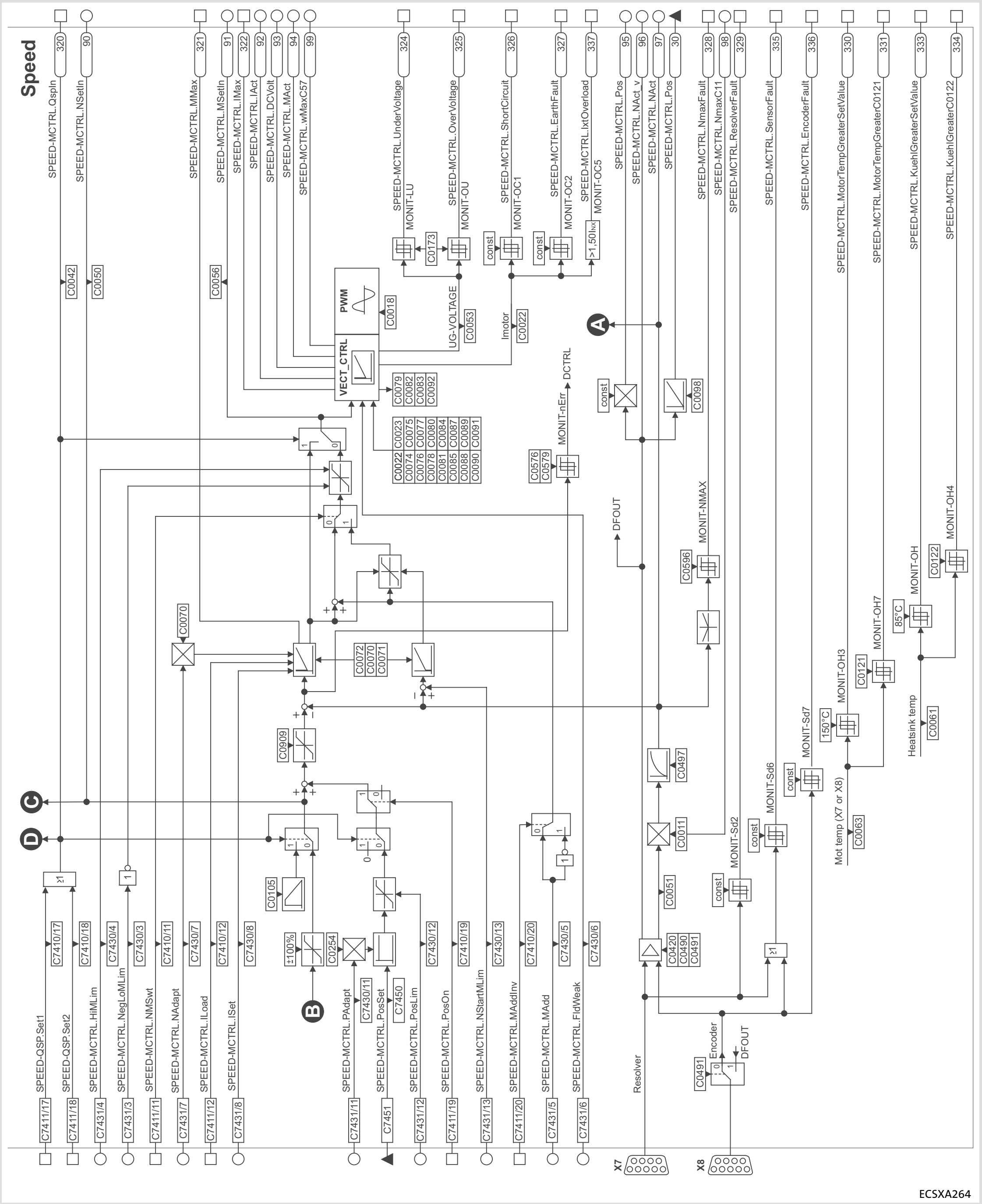


Fig.11-29 ”Speed” function block (speed control) - Page 2 of 2

Codes

Code		Possible settings		IMPORTANT	
No.	Designation	Lenze/ appl.	Selection		
C7410			0 (= FALSE) 1 (= TRUE)	Display of the current signal states on the digital inputs of the ”Speed” function block	
1	Speed-dig			CW rotation (SPEED-RLQ.Cw)	📖 269
2	Speed-dig			CCW rotation (SPEED-RLQ.CCw)	
3	Speed-dig			Selection of the fixed speeds (SPEED-NSET.Jog1)saved in C0039	📖 270
4	Speed-dig			Selection of the fixed speeds (SPEED-NSET.Jog2)saved in C0039	
5	Speed-dig			Selection of the fixed speeds (SPEED-NSET.Jog4)saved in C0039	
6	Speed-dig			Selection of the fixed speeds (SPEED-NSET.Jog8)saved in C0039	
7	Speed-dig			Setting of the speed setpoint integrator to ”0” along the adjusted ramps (SPEED-NSET.Rfg0)	📖 270
8	Speed-dig			Inversion of additional speed setpoint (SPEED-NAddInv)	
9	Speed-dig			Keeping (freezing) the speed setpoint integrator to the actual value (SPEED-NSET.RfgStop)	
10	Speed-dig			Activation of the motor holding brake (SPEED-BRK.SetBrake)	📖 281
11	Speed-dig			Switching of speed/torque (SPEED-MCTRL.NMSwt)	📖 276
12	Speed-dig			Source for the integral-action component of the speed controller (SPEED-MCTRL.ILoad)	
13	Speed-dig			Selection of the acceleration and deceleration times stored in C0101 and C0103 (SPEED-NSET.TI1)	📖 270
14	Speed-dig			Selection of the acceleration and deceleration times stored in C0101 and C0103 (SPEED-NSET.TI2)	
15	Speed-dig			Selection of the acceleration and deceleration times stored in C0101 and C0103 (SPEED-NSET.TI4)	
16	Speed-dig			Selection of the acceleration and deceleration times stored in C0101 and C0103 (SPEED-NSET.TI8)	
17	Speed-dig			Setting of quick stop (SPEED-QSP.Set1)	📖 276
18	Speed-dig			Setting of quick stop (SPEED-QSP.Set2)	
19	Speed-dig			Activation of phase controller (SPEED-MCTRL.PosOn)	

Code		Possible settings		IMPORTANT	
No.	Designation	Lenze/ appl.	Selection		
20	Speed-dig			Inversion of additional torque setpoint (SPEED-MAddInv)	
[C7411]				Selection of the signal source for the digital input signals of the ”Speed” function block	
1	SpeedIn-dig	1000	0 (FALSE, not assigned)	CW rotation (SPEED-RLQ.Cw)	🕮 269
2	SpeedIn-dig	1000	0 (FALSE, not assigned)	CCW rotation (SPEED-RLQ.CCw)	
3	SpeedIn-dig	1000	0 (FALSE, not assigned)	Selection of the fixed speeds (SPEED-NSET.Jog1) saved in C0039	🕮 270
4	SpeedIn-dig	1000	0 (FALSE, not assigned)	Selection of the fixed speeds (SPEED-NSET.Jog2)saved in C0039	
5	SpeedIn-dig	1000	0 (FALSE, not assigned)	Selection of the fixed speeds (SPEED-NSET.Jog4)saved in C0039	
6	SpeedIn-dig	1000	0 (FALSE, not assigned)	Selection of the fixed speeds (SPEED-NSET.Jog8)saved in C0039	
7	SpeedIn-dig	1000	0 (FALSE, not assigned)	Setting of the speed setpoint integrator to 0 along the adjusted ramps (SPEED-NSET.Rfg0)	🕮 270
8	SpeedIn-dig	1000	0 (FALSE, not assigned)	Inversion of additional speed setpoint (SPEED-NAddInv)	
9	SpeedIn-dig	1000	0 (FALSE, not assigned)	Keeping (freezing) the speed setpoint integrator to the actual value (SPEED-NSET.RfgStop)	
10	SpeedIn-dig	1000	0 (FALSE, not assigned)	Activation of the motor holding brake (SPEED-BRK.SetBrake)	🕮 281
11	SpeedIn-dig	1000	0 (FALSE, not assigned)	Switching of speed - torque (SPEED-MCTRL.NMSwt)	🕮 276
12	SpeedIn-dig	1000	0 (FALSE, not assigned)	Source for the integral-action component of the speed controller (SPEED-MCTRL.ILoad)	
13	SpeedIn-dig	1000	0 (FALSE, not assigned)	Selection of the acceleration and deceleration times stored in C0101 and C0103 (SPEED-NSET.TI1)	🕮 270
14	SpeedIn-dig	1000	0 (FALSE, not assigned)	Selection of the acceleration and deceleration times stored in C0101 and C0103 (SPEED-NSET.TI2)	
15	SpeedIn-dig	1000	0 (FALSE, not assigned)	Selection of the acceleration and deceleration times stored in C0101 and C0103 (SPEED-NSET.TI4)	
16	SpeedIn-dig	1000	0 (FALSE, not assigned)	Selection of the acceleration and deceleration times stored in C0101 and C0103 (SPEED-NSET.TI8)	
17	SpeedIn-dig	1000	0 (FALSE, not assigned)	Setting of quick stop (SPEED-QSP.Set1)	🕮 276
18	SpeedIn-dig	1000	0 (FALSE, not assigned)	Setting of quick stop (SPEED-QSP.Set2)	
19	SpeedIn-dig	1000	0 (FALSE, not assigned)	Activation of phase controller (SPEED-MCTRL.PosOn)	

Code		Possible settings		IMPORTANT	
No.	Designation	Lenze/ appl.	Selection		
20	SpeedIn-dig	1000	0 (FALSE, not assigned)	Inversion of additional torque setpoint (SPEED-MAddInv)	
			For possible signals see ”selection list - digital signals”		🕮 362
C7430				Display of the current signal states on the analog input of the ”Speed” function block	
			-32768 (= -100 %) {1} 32767 (= 100 %)		
1	Speed-an			Speed setpoint (SPEED-NSET.NSet)	🕮 270
2	Speed-an			Additional speed setpoint (SPEED-NSET.NAdd)	
3	Speed-an			Lower torque limit (SPEED-MCTRL.negLoMLim)	🕮 276
4	Speed-an			Upper torque limit (SPEED-MCTRL.HiMLim)	
5	Speed-an			Additional torque setpoint (SPEED-MCTRL.MAdd)	
6	Speed-an			Manual field weakening (SPEED-MCTRL.FldWeak)	
7	Speed-an			Manual adaptation of the proportional gain of the speed controller (SPEED-MCTRL.NAdapt)	
8	Speed-an			Manual adaptation of the integral-action component of the speed controller (SPEED-MCTRL.ISet)	
9	Speed-an			Speed threshold for the motor holding brake (SPEED-BRK.SpeedThreshold)	🕮 281
10	Speed-an			Direction of torque created by the drive against the motor holding brake (SPEED-BRK.Sign)	
11	Speed-an			Manual adaptation of the phase controller (SPEED-MCTRL.PAdapt)	🕮 276
12	Speed-an			Limit value for influencing the phase controller (SPEED-MCTRL.PosLim)	
13	Speed-an			Lower speed limit for speed limitation (SPEED-MCTRL.NStartMLim)	

Code		Possible settings		IMPORTANT	
No.	Designation	Lenze/ appl.	Selection		
[C7431]				Selection of the signal source for the analog input signals of the ”Speed” function block	
1	SpeedIn-anl	1000	FIXED 0 % (not assigned)	Speed setpoint (SPEED-NSET.NSet)	🕮 270
2	SpeedIn-anl	1000	FIXED 0 % (not assigned)	Additional speed setpoint (SPEED-NSET.NAdd)	
3	SpeedIn-anl	1000	FIXED 0 % (not assigned)	Lower torque limit (SPEED-MCTRL.negLoMLim)	🕮 276
4	SpeedIn-anl	1000	FIXED 0 % (not assigned)	Upper torque limit (SPEED-MCTRL.HiMLim)	
5	SpeedIn-anl	1000	FIXED 0 % (not assigned)	Additional torque setpoint (SPEED-MCTRL.MAdd)	
6	SpeedIn-anl	1000	FIXED 0 % (not assigned)	Manual field weakening (SPEED-MCTRL.FldWeak)	
7	SpeedIn-anl	1000	FIXED 0 % (not assigned)	Manual adaptation of the proportional gain of the speed controller (SPEED-MCTRL.NAdapt)	
8	SpeedIn-anl	1000	FIXED 0 % (not assigned)	Manual adaptation of the Integral-action component of the speed controller (SPEED-MCTRL.ISet)	
9	SpeedIn-anl	1000	FIXED 0 % (not assigned)	Speed threshold for the motor holding brake (SPEED-BRK.SpeedThreshold)	🕮 281
10	SpeedIn-anl	1000	FIXED 0 % (not assigned)	Direction of torque created by the drive against the motor holding brake (SPEED-BRK.Sign)	
11	SpeedIn-anl	1000	FIXED 0 % (not assigned)	Manual adaptation of the phase controller (SPEED-MCTRL.PAdapt)	🕮 276
12	SpeedIn-anl	1000	FIXED 0 % (not assigned)	Limit value for influencing the phase controller (SPEED-MCTRL.PosLim)	
13	SpeedIn-anl	1000	FIXED 0 % (not assigned)	Lower speed limit for speed limitation (SPEED-MCTRL.NStartMLim)	
			For possible signals see ”selection list - analog signals”		🕮 371
C7450	Speed-phi			Display of the setpoint for the phase controller in the ”Speed” function block (speed controlSPEED-MCTRL.PosSet)	🕮 276
			-2147483647 {1} 2147483647		
[C7451]	SpeedIn-phi	1000		Setpoint for the phase controller in the ”Speed” function block (SPEED-MCTRL.PosSet)	🕮 276
			FIXED 0 (not assigned)		
			For possible signals see ”selection list - phase signals”		🕮 374

11.27.1 Changing the direction of rotation

By means of the inputs SPEED-RLQ.Cw (C7411/1) and SPEED-RLQ.CCw (C7411/2) of the function block ”Speed”, two functions are carried out:

- Changing the direction of rotation
- Set quick stop (QSP)

Note!

Both inputs only have an effect on the speed setpoint.

Stop!

The speed and direction of torque have to be selected according to the application.

Signal name		Response	
SPEED-RLQ.CW	**SPEED-RLQ.CCW**	**Rotation**	**Quick stop (QSP)**
0	0	None	Yes
1	0	To the right	No
0	1	To the left	No
1	1	No change	No

11.27.2 Setpoint processing

11.27.2.1 Selecting the source for the speed setpoint

The function block ”Speed” is supplied with the speed setpoint via the input SPEED-NSET.NSet (C7431/1). The valid values are within the decimal range ±32767. The speed setpoint is conditioned by a ramp function generator and special controllers.

In C0039/1 ... 15, 15 fixed setpoints (JOG) can be stored. The values can be stored independent of the direction of rotation, since the direction of rotation can also be changed with activated JOG values.

The fixed setpoints can be activated via the inputs SPEED-NSET.Jogx (C7411/3 ... /6). When the fixed setpoints are active, the input SPEED-NSET.NSet is switched off.

Signal name				Source for the speed setpoint
SPEED-Nset.Jog8	SPEED-NSET.Jog4	SPEED-Nset.Jog2	SPEED-Nset.Jog1	
0	0	0	0	SPEED-NSET.NSet
0	0	0	1	C0039/1
0	0	1	0	C0039/2
0	0	1	1	C0039/3
0	1	0	0	C0039/4
0	1	0	1	C0039/5
0	1	1	0	C0039/6
0	1	1	1	C0039/7
1	0	0	0	C0039/8
1	0	0	1	C0039/9
1	0	1	0	C0039/10
1	0	1	1	C0039/11
1	1	0	0	C0039/12
1	1	0	1	C0039/13
1	1	1	0	C0039/14
1	1	1	1	C0039/15

Code		Possible settings				IMPORTANT	
No.	Designation	Lenze/ appl.	Selection				
C0039						15 fixed setpoints Can be retrieved via digital signals SPEED-NSET.Jogx.	🕮 270
1	JOG SET-VALUE	0.00	-199.99	{0.01 %}	199.99	Relating to n_{max} (C0011)	
2	JOG SET-VALUE	0.00					
...	JOG SET-VALUE	0.00					
14	JOG SET-VALUE	0.00					
15	JOG SET-VALUE	0.00					

11.27.2.2 Setting acceleration and deceleration times

The speed setpoint is led via a ramp function generator. This enables input steps to be converted into a ramp.

The acceleration time (T_{ir}) and deceleration time (T_{if}) refer to a change in speed from ”0” to n_{max} (0 ... 100%). The times to be set are calculated according to the formulae:

Acceleration time (code C0012)	Deceleration time (code C0013)
$T_{ir} = t_{ir} \cdot \frac{100\ \%}{w2 - w1}$	$T_{if} = t_{if} \cdot \frac{100\ \%}{w2 - w1}$

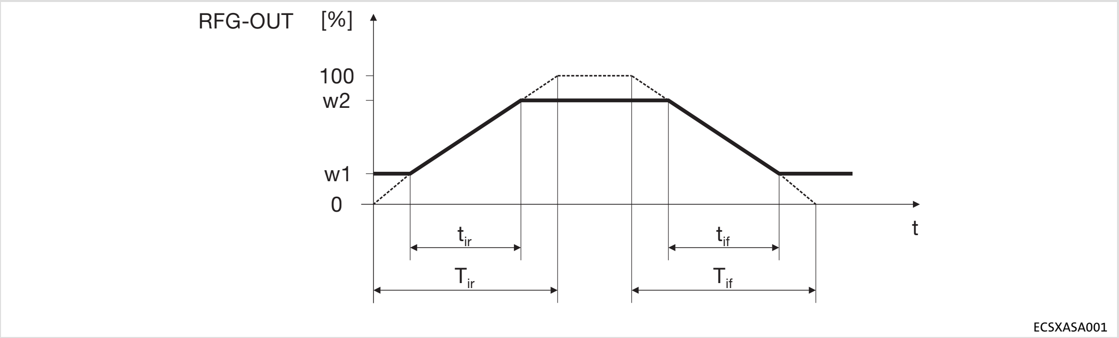


Fig.11-30 Diagram for acceleration and deceleration time

In C0101/1 ... 15 and C0103/1 ... 15, 15 time pairs (T_i times) can be stored additionally. Via the inputs SPEED-NSET.TIx (C7411/13 ... C7411/16) the T_i times can be activated:

Signal name				Source for active time pair	
SPEED-NSET.TI8	SPEED-NSET.TI4	SPEED-NSET.TI2	SPEED-NSET.TI1	Acceleration time	Deceleration time
0	0	0	0	C0012	C0013
0	0	0	1	C0101/1	C0103/1
0	0	1	0	C0101/2	C0103/2
0	0	1	1	C0101/3	C0103/3
0	1	0	0	C0101/4	C0103/4
0	1	0	1	C0101/5	C0103/5
0	1	1	0	C0101/6	C0103/6
0	1	1	1	C0101/7	C0103/7
1	0	0	0	C0101/8	C0103/8
1	0	0	1	C0101/9	C0103/9
1	0	1	0	C0101/10	C0103/10
1	0	1	1	C0101/11	C0103/11
1	1	0	0	C0101/12	C0103/12
1	1	0	1	C0101/13	C0103/13
1	1	1	0	C0101/14	C0103/14
1	1	1	1	C0101/15	C0103/15

Code		Possible settings				IMPORTANT	
No.	Designation	Lenze/ appl.	Selection				
C0012	TIR (ACC)	0.000				Acceleration time for the ● speed setpoint (for ”speed control”) ● torque setpoint (for ”torque control”)	🕮 271
			0.000	{0.001 s}	999.999	Relating to speed variation 0 rpm ... n_{max} (C0011)	
C0013	TIF (DEC)	0.000				Deceleration time for the ● speed setpoint (for ”speed control”) ● torque setpoint (for ”torque control”)	🕮 271
			0.000	{0.001 s}	999.999	Relating to speed variation 0 rpm ... n_{max} (C0011)	
C0101						15 additional acceleration times for the speed setpoint. Can be retrieved via digital signals SPEED-NSET.TIx.	🕮 271
1	add Tir	0.000	0.000	{0.001 s}	999.999	Relating to speed variation 0 rpm ... n_{max} (C0011)	
2	add Tir	0.000					
...	add Tir	0.000					
14	add Tir	0.000					
15	add Tir	0.000					
C0103	add Tif					15 additional deceleration times for the speed setpoint. Can be retrieved via digital signals SPEED-NSET.TIx.	🕮 271
1	add Tif	0.000	0.000	{0.001 s}	999.999	Relating to speed variation 0 rpm ... n_{max} (C0011)	
2	add Tif	0.000					
...		0.000					
14	add Tif	0.000					
15	add Tif	0.000					

11.27.2.3 Influencing the ramp function generator

- ► If the controller is inhibited, the ramp function generator accepts the actual speed and passes it to the downstream function. This function has priority over all other functions.
- ► If the input SPEED-NSET.RfgStop = TRUE (C7411/9), the ramp function generator is stopped. Changes of the input of the ramp function generator have no effect on the output signal.
- ► If the input SPEED-NSET.Rfg0 = TRUE (C7411/7) the ramp function generator reaches zero along the deceleration ramp.
- ► The threshold in C0241 specifies when the message ”Setpoint reached” is output.

  On the ramp function generator for the speed setpoint, the following applies: input signal = output signal

Code		Possible settings				IMPORTANT	
No.	Designation	Lenze/ appl.	Selection				
C0241	NSET RFG I = O	1.00				Threshold for message ”Setpoint reached” On the ramp function generator for ● speed setpoint (for ”speed control”) ● torque setpoint (for ”torque control”) input signal = output signal.	🕮 273 🕮 293
			0.00	{0.01 %}	100.00	100 % = n_{max}	

11.27.2.4 Changing the characteristic of the ramp function generator

You can select two different characteristics for the ramp function generator of the speed setpoint via C0134:

- ► A linear characteristic for all acceleration processes that are required for a constant acceleration.
- ► S-shaped characteristic for all acceleration processes that require a jerk-free acceleration.

Code		Possible settings				IMPORTANT	
No.	Designation	Lenze/ appl.	Selection				
C0134	RFG charac	0				Characteristic of the ramp function generator for the ● speed setpoint (for ”speed control”) ● torque setpoint (for ”torque control”)	🕮 274
			1	Linear		Ramp function generator operates linearly.	
			2	S-shaped		Ramp function generator operates without jerk (S-shaped).	
C0182	Ti S-shaped	20.00				Form of the S-curve for the ● speed setpoint (for ”speed control”) ● torque setpoint (for ”torque control”) of the ramp function generator (C0134 = 1)	🕮 274
			0.01	{0.01 s}	50.00	The higher the value, the bigger the S-rounding.	

11.27.2.5 Connecting an additional setpoint

An additional setpoint can be connected via the input SPEED-NSET.NAdd (C7431/2). The additional setpoint is inverted by an anlog switch. Then, a ramp function generator follows before the additional setpoint is connected to the speed setpoint in the arithmetic block. The additional setpoint can be used, for instance, as a correction signal for grinding machines for controlling a constant circumferential speed when the grinding wheel diameter decreases.

If you want to use the additional setpoint, set C0190 to the desired arithmetical connection. In the Lenze setting, the additional setpoint is switched off.

Value in C0190	Output signal SPEED-NSET.NOut =	Values used from the codes
0	SPEED-NSET.NSet	C7431/1
1	SPEED-NSET.NSet + SPEED-NSET.NAdd	C7431/1 + C7431/2
2	SPEED-NSET.NSet - SPEED-NSET.NAdd	C7431/1 - C7431/2
3	SPEED-NSET.NSet x SPEED-NSET.NAdd	C7431/1 x C7431/2
4	SPEED-NSET.NSet / I SPEED-NSET.NAdd I	$\frac{C7431/1}{\lvert C7431/2 \rvert}$
5	SPEED-NSET.NSet / (100 - SPEED-NSET.NAdd)	$\frac{C7431/1}{100 - C7431/2}$

Code		Possible settings				IMPORTANT	
No.	Designation	Lenze/appl.	Selection				
C0190	NSET ARIT	0				Linking of speed setpoint (NSet) and additional setpoint (NAdd)	🕮 275
			0	OUT = NAdd		Additional setpoint is not considered.	
			1	NSet + NAdd		Additional setpoint is added to speed setpoint.	
			2	NSET-NADD		Additional setpoint is subtracted from speed setpoint.	
			3	NSet x NAdd		Additional setpoint is multiplied by speed setpoint.	
			4	NSet / NAdd		Speed setpoint is divided by additional setpoint.	
			5	NSet / (100 - NAdd)		Speed setpoint is divided by (100 - additional setpoint).	
C0220	NSET Tir add	0.000				Acceleration time for the additional setpoint	🕮 275
			0.000	{0.001 s}	999.999	Relating to speed variation 0 rpm ... n_{max} (C0022)	
C0221	NSET Tif add	0.000				Deceleration time for the additional setpoint	🕮 275
			0.000	{0.001 s}	999.999	Relating to speed variation 0 rpm ... n_{max} (C0011)	

11.27.3 Setting of motor control

11.27.3.1 Torque setpoint/additional setpoint

SPEED-MCTRL.MAdd (C7431/5) serves as a torque setpoint or additional torque setpoint, depending on the setting of SPEED-MCTRL.NMSwt (C7411/11). The controller calculates the maximum possible torque from the motor parameters. You can read it off C0057.

- Torque setpointorque setpoint”#
  - If SPEED-MCTRL.NMSwt = TRUE, the torque control is active.
  - SPEED-MCTRL.MAdd acts as torque setpoint.
  - The speed controllers carry out a monitoring function.
  - The torque setpoint is defined in [%] of the maximum possible torque.
  - Negative values cause a torque in CCW rotation of the motor.
  - Positive values cause a torque in CW rotation of the motor.
- Additional torque setpoint ”additional torque setpoint”#
  - If SPEED-MCTRL.NMSwt = FALSE, the speed control is active.
  - SPEED-MCTRL.MAdd is added to the output of the speed controller.
  - The limits determined by the torque limitation SPEED-MCTRL.NegLoMLim (C7431/3) and SPEED-MCTRL.HiMLim (C7431/4) are not exceeded.
  - The additional torque setpoint is used e. g. for friction compensation or increase in acceleration (dv/dt).

11.27.3.2 Torque limitation

An external torque limitation can be set via SPEED-MCTRL.NegLoMLim (C7431/3) and SPEED-MCTRL.HiMLim (C7431/4). This enables you to select different torques for the quadrants ”driving” and ”braking”.

- SPEED-MCTRL.HiMLim is the upper limit in [%] of the maximum possible torque.
- SPEED-MCTRL.LoMLim is the lower limit [%] of the maximum possible torque.

The maximum possible torque depends on the motor parameters (C0057).

Note!

In case of quick stop (QSP), the torque limitation is switched to an inactive state, i. e. the operation runs with ±100 %.

11.27.3.3 Maximum speed

The maximum speed N_{max} speed is set via C0011. It is the reference value for:

- the absolute and relative setpoint selection for acceleration and deceleration times
- the upper and lower speed limit.
- n_{max} = 100 % = 16384 (data type ”Integer”).

11.27.3.4 Speed controller adjusting

The speed controller is designed as an ideal PID controller.

Parameter setting:

- Via C0070 you set the proportional gain (V_p):
  - Enter approx. 50 % of the speed setpoint (100 % = 16384 = N_{max}).
  - Increase C0070 until the drive becomes instable (pay attention to engine noises).
  - Reduce C0070 until the drive runs stable again.
  - Reduce C0070 to approx. half the value.
- The proportional gain (V_p) can be altered via SPEED-MCTRL.NAdapt (C7431/7):
  - V_p = SPEED-MCTRL.NAdapt[%] x C0070
  - If SPEED-MCTRL.NAdapt is not assigned, the following applies: V_p = 100 %, C0070 = C0070
- The reset time (T_n) is set via C0071:
  - Reduce C0071 until the drive becomes unstable (pay attention to motor noise).
  - Increase C0071, until the drive runs stable again.
  - Increase C0071 to approx. the double value.
- The derivative gain (T_d) is set via C0072:
  - Increase C0072 during operation until an optimal control mode is reached.

Code		Possible settings				IMPORTANT	
No.	Designation	Lenze/ appl.	Selection				
C0070	Vp speedCTRL	3.00				Proportional gain of speed controller (V_{pn})	🕮 120
			0.00	{ 0.01}	127.99		
C0071	Tn speedCTRL	24.0				Integral-action time of speed controller (T_{nn})	🕮 120
			1.0	{0.5 ms}	6000.0		
C0072	Td speedCTRL	0.00				Derivative gain of speed controller (T_{dn})	🕮 120
			0.0	{0.1 ms}	32.0		

Signal limitation

- If the drive operates with the maximum torque, the speed controller operates within the limitation.
- The drive cannot follow the speed setpoint.
- The output SPEED-MCTRL.MMax is set to TRUE.

Setting the integral component

For selecting torque starting values the integral component of the speed controller can be set externally (e.g. when using the brake control).

- SPEED-MCTRL.ILoad = TRUE (C7411/12):
  - The speed controller accepts the value applied at SPEED-MCTRL.ISet (C7431/8) into its integral component.
  - The value at SPEED-MCTRL.ISet (C7431/8) acts as a torque setpoint for the motor control.
- SPEED-MCTRL.ILoad = FALSE (C7411/12):
  - The function is switched off.

11.27.3.5 Torque control with speed limitation

If SPEED-MCTRL.NMSwt = TRUE (C7411/11), this function is activated. For the speed limitation, a second speed controller (auxiliary speed controller) is connected. SPEED-MCTRL.MAdd (C7431/5) operates as a bipolar torque setpoint. ”torque control with speed limitation”#

- The speed controller 1 is used to make up the upper speed limit.
  - The upper speed limit is defined at SPEED-NSET.NSet (C7431/8) in [%] by N_{max} (positive sign for CW rotation).
- The speed controller 2 (auxiliary speed controller) is used to make up the lower speed limit.
  - The lower speed limit is defined at SPEED-MCTRL.NStartMLim (C7431/13) in [%] by N_{max} (negative sign for CCW rotation).
- N_{max} is selected via C0011.

Stop!

The upper speed limit is only to be used for CW rotation (positive values) and the lower speed limit only for CCW rotation (negative values); Otherwise the drive may accelerate in an uncontrolled way.

Note!

The value at SPEED-MCTRL.NegLoMLim (C7431/3) is negated in the ”Speed” function block.

11.27.3.6 Phase controller

The phase controller is required, for instance, to achieve a phase-synchronous operation and a driftfree standstill.

Parameter setting:

1. Assign SPEED-MCTRL.PosSet (C7451) with a signal source, which provides the phase difference between set angle and actual angle.

Note!

For the application ”Speed and Torque”, the phase difference has to be generated externally (e .g. in a master control) and transferred via bus system.

2. Select a value > 0 at SPEED-MCTRL.PosLim (C7431/12).
3. Set SPEED-MCTRL.PosOn = TRUE (C7431/19) .
4. Set the gain of the phase controller > 0 via C0254.
   - – Before C0254 is set, a preferably high proportional gain of the speed controller has to be set via C0070.
   - – Increase C0254 during operation until the drive has the required control mode.

Code		**Possible settings**		**IMPORTANT**	
No.	**Designation**	**Lenze/ appl.**	**Selection**		
C0254	Vp angle CTRL	0.4000		Phase controller gain (V_p)	🕮 279
			0.0000 {0.0001} 3.9999		

Phase controller influence

The output of the phase controller is added to the speed setpoint. When the actual angle is lagging, the drive is accelerated. When the actual angle is leading, the drive is decelerated until the required angular synchronism has been reached.

The influence of the phase controller consists of:

- phase difference multiplied by the proportional gain V_p (C0254).
- influence of the analog signal at SPEED-MCTRL.NAdapt (C7431/7).
  V_p = C0254 x SPEED-MCTRL.NAdapt / 16384
- Limitation of the phase controller output
  - – The output of the phase controller is limited to ±SPEED-MCTRL.PosLim (C7431/12).
  - – ±SPEED-MCTRL.PosLim limits the maximum speed-up of the drive with great angular displacements.

11.27.3.7 Quick stop (QSP)

By means of the QSP function, the drive can be stopped within an adujstable time, irrespective of the setpoint selection. The QSP function is active if:

- SPEED-QSP.Set1 (C7411/17) = TRUE
  or
- SPEED-QSP.Set2 (C7411/18) = TRUE

Function:

If a torque control has been selected, it is switched inactive. The drive is guided by the speed controller. The speed is reduced to zero within the deceleration time set under C0105. The torque limitation SPEED-MCTRL.NegLoMLim (C7431/3) and SPEED-MCTRL.HiMLim (C7431/4) is switched inactive, i. e. the operation runs with ±100 %. The phase controller is switched active, achieving a drift-free standstill. If the rotor position is actively displaced, the drive creates a torque against the displacement if

- C0254 ≠ 0
  or
- SPEED-MCTRL.PosLim (C7431/12) > 0 %

11.27.3.8 Field weakening

Stop!

The available torque decreases with the field weakening.

The motor is operated in the field weakening range if the controller can no longer increase the output voltage proportionally at increasing speed due to the mains voltage or the DC-bus voltage.

Note!

An optimal machine operation in the field weakening range requires a correct setting of the field controller and field weakening controller.

Information on the setting: 🕮 122

Manual field weakening

Stop!

If the field is weakened manually (SPEED-MCTRL.FldWeak (C7431/6) < 100 %), the drive cannot create the maximum torque.

A manual field weakening is possible via SPEED-MCTRL.FldWeak (7431/6). For a maximum excitation, SPEED-MCTRL.FldWeak must be triggered with +100 % (= 16384).

11.27.4 Holding brake control

By means of this function, you can control a motor holding brake. Possible applications are:

- Hoists
- Traverse drives
- Drives with active loads

Codes

Code		**Possible settings**				**IMPORTANT**	
No.	**Designation**	**Lenze/ appl.**	**Selection**				
C0195	BRK T act	99.9				Closing time of the motor holding brake	📖 281 📖 298 📖 83
			0.0	{0.1 sec}	99.9	During the time set the drive continues to generate a torque. After the set time is expired, the status ”mechanical brake closed” is reached.	
C0196	BRK T rel	0.0				Opening time of the motor holding brake	📖 281 📖 298 📖 83
			0.0	{0.1 sec}	60.0	During the time set the drive can generate the torque set under C0244 against the holding brake. After the set time is expired, the status ”mechanical brake opened” is reached.	
C0244	BRK M set	0.00				Holding torque of the drive against the motor holding brake	📖 281 📖 298 📖 83
			-199.99	{0.01 %}	199.99	Referring to M_{max} (C0057). During the time set in C0196 the drive generates the set torque against the holding brake.	

11.27.4.1 Closing holding brake

A HIGH level on the input SPEED-BRK.SetBrake (C7411/10 = TRUE) activates the function. At the same time, the output SPEED-BRK.SetQSP is set to HIGH. This signal can be used to brake the drive to standstill via a deceleration ramp (speed = 0).

If the setpoint speed falls below the value set at the input SPEED-BRK.SpeedThreshold (C7431/9), the output SPEED-BRK.Out is set to HIGH.

Note!

For a fail-safe design this signal must be inverted at the output (e. g. via C0118).

After the brake closing time set C0195 has lapsed, the output SPEED-BRK.SetCInh switches to TRUE. By means of this signal you can for example activate controller inhibit (device-internal on the function block DCTRL). The setting of the brake closing time is required because the brake is not immediately activated at SPEED-BRK.Out = TRUE (the drive has to provide another holding torque for the set time).

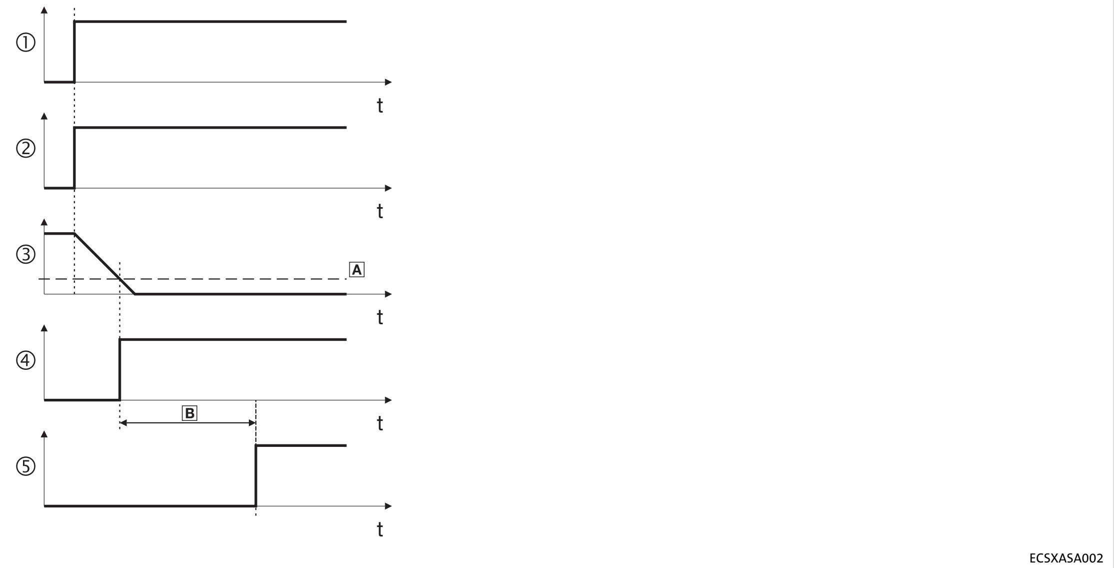


Fig.11-31 Signal characteristic - closing of holding brake

① SPEED-BRK.SetBrake
② SPEED-BRK.SetQSP
③ SPEED-BRK.MSetOut
④ SPEED-BRK.Out
⑤ SPEED-BRK.SetCInh
A SPEED-BRK.SpeedThreshold
B Brake closing time (C0195)

11.27.4.2 Opening holding brake

A LOW level on the input SPEED-BRK.SetBrake (7411/10 = FALSE) immediately sets the output SPEED-BRK.SetCInh to LOW (controller inhibit is deactivated). At the same time, the output SPEED-BRK.MStore is set to HIGH. This signal can be used to let the drive create a defined torque against the brake. The drive takes over the torque while the brake is released. The signal is only reset after the brake opening time set in C0196 has lapsed.

After the brake opening time has lapsed, the output SPEED-BRK.SetQSP is reset to LOW. This signal serves to e. g. release the setpoint integrator after the brake opening time has expired.

If an actual speed value higher than the value at SPEED-BRK.SpeedThreshold (C7431/9) is recognised before the brake opening time has expired, the signals SPEED-BRK.SetQSP and SPEED-BRK.MStore are immediately reset to LOW. Then, the drive can immediately pass over to the speed-controlled operation.

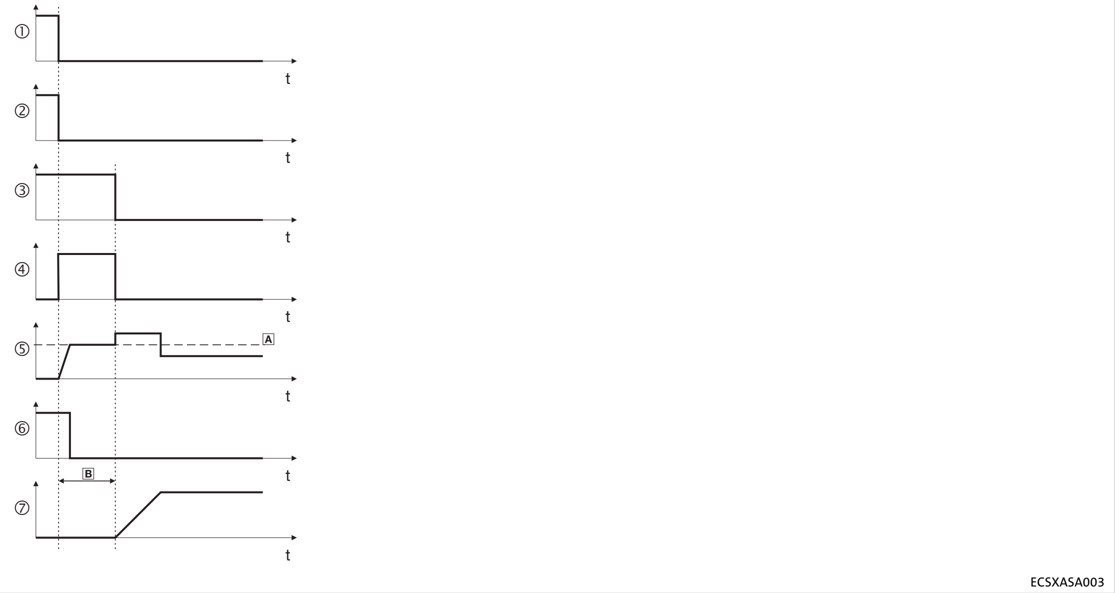


Fig.11-32 Signal characteristic - opening of holding brake

① SPEED-BRK.SetBrake
② SPEED-BRK.SetCInh
③ SPEED-BRK.SetQSP
④ SPEED-BRK.MStore
⑤ SPEED-MCTRL.MAct
⑥ SPEED-BRK.Out
⑦ SPEED-BRK.MSetOut
A SPEED-MCTRL.MAct
B Brake opening time (C0196)

11.28 Torque (torque control)

Function

Completely wired torque control with the subfunctions:

- Torque control with speed limitation (📖 290)
- Selection of direction of rotation (📖 291)
- Setpoint conditioning (📖 291)
- Motor control (📖 294)
- Brake control (📖 298)
- Monitoring functions (📖 163)

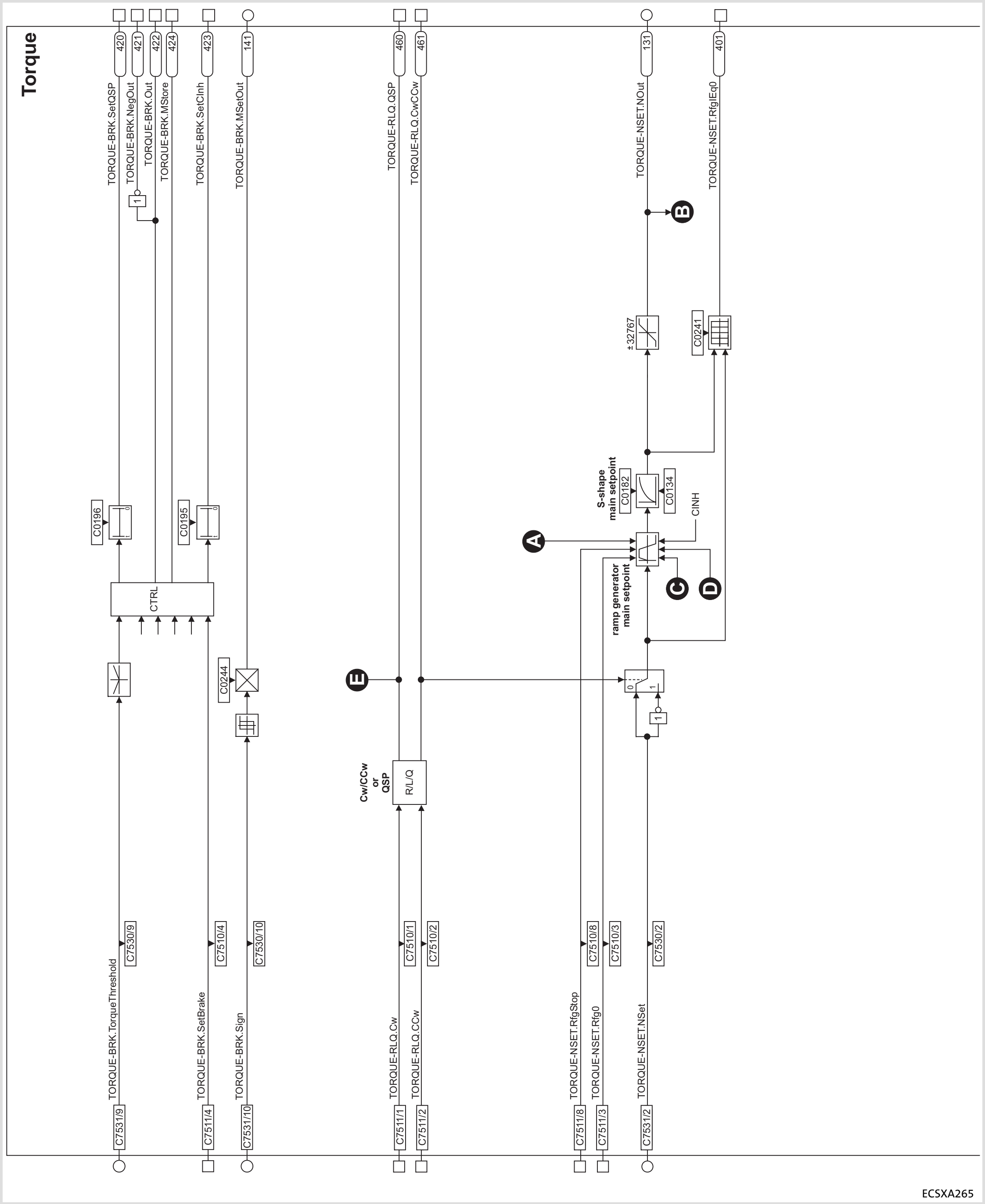


Fig.11-33 ”Torque” function block (torque control) - Page 1 of 2

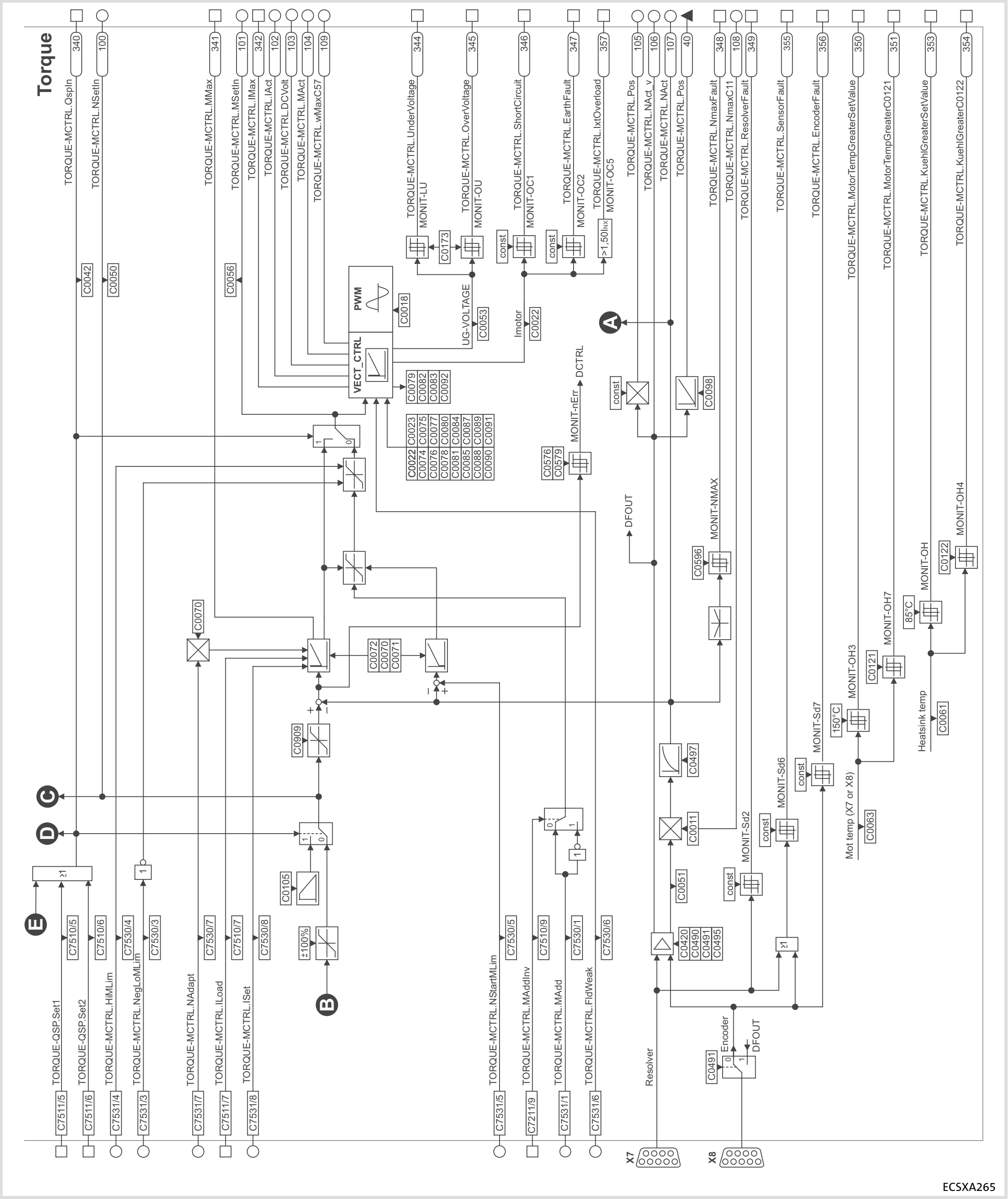


Fig.11-34 ”Torque” function block (torque control) - Page 2 of 2

Codes

Code		Possible settings		IMPORTANT	
No.	Designation	Lenze/ appl.	Selection		
C7510			0 (= FALSE) 1 (= TRUE)	Display of the current signal states on the digital inputs of the ”Torque” function block	
1	TorqueIn-dig			CW rotation (TORQUE-RLQ.Cw)	🕮 291
2	TorqueIn-dig			CCW rotation (TORQUE-RLQ.CCw)	
3	TorqueIn-dig			Setting of the torque setpoint integrator to ”0” along the adjusted ramps (TORQUE-NSET.Rfg0)	🕮 291
4	TorqueIn-dig			Activation of the motor holding brake (TORQUE-BRK.SetBrake)	🕮 298
5	TorqueIn-dig			Setting of quick stop (TORQUE-QSP.Set1)	🕮 294
6	TorqueIn-dig			Setting of quick stop (TORQUE-QSP.Set2)	
7	TorqueIn-dig			Source for the integral-action component of the controller (TORQUE-MCTRL.ILoad)	
8	TorqueIn-dig			Keeping (freezing) the torque setpoint integrator to the current value (TORQUE-NSET.RfgStop)	
9	TorqueIn-dig			Inversion of additional torque setpoint (TORQUE-MAddInv)	
[C7511]				Selection of the signal source for the digital input signals of the ”Torque” function block	
1	TorqueIn-dig	1000	0 (FALSE, not assigned)	CW rotation (TORQUE-RLQ.Cw)	🕮 291
2	TorqueIn-dig	1000	0 (FALSE, not assigned)	CCW rotation (TORQUE-RLQ.CCw)	
3	TorqueIn-dig	1000	0 (FALSE, not assigned)	Setting of the torque setpoint integrator to 0 along the adjusted ramps (TORQUE-NSET.Rfg0)	🕮 291
4	TorqueIn-dig	1000	0 (FALSE, not assigned)	Activation of the motor holding brake (TORQUE-BRK.SetBrake)	🕮 298
5	TorqueIn-dig	1000	0 (FALSE, not assigned)	Setting of quick stop (TORQUE-QSP.Set1)	🕮 294
6	TorqueIn-dig	1000	0 (FALSE, not assigned)	Setting of quick stop (TORQUE-QSP.Set2)	
7	TorqueIn-dig	1000	0 (FALSE, not assigned)	Source for the integral-action component of the controller (TORQUE-MCTRL.ILoad)	
8	TorqueIn-dig	1000	0 (FALSE, not assigned)	Keeping (freezing) the torque setpoint integrator to the current value (TORQUE-NSET.RfgStop)	
9	TorqueIn-dig	1000	0 (FALSE, not assigned)	Inversion of additional torque setpoint (TORQUE-MAddInv)	
			For possible signals see ”selection list - digital signals”		🕮 362

Code		Possible settings		IMPORTANT	
No.	Designation	Lenze/ appl.	Selection		
C7530			-32768 (= -100 %) {1} 32767 (= 100 %)	Display of the current signal states on the analog input of the "Torque" function block	
1	TorqueIn-anl			Torque setpoint (SPEED-MCTRL.MAdd)	📖 294
2	TorqueIn-anl			Setpoint for the upper limit of speed limitation (TORQUE-NSET.NSet)	📖 291
3	TorqueIn-anl			Lower torque limit (TORQUE-MCTRL.negLoMLim)	📖 294
4	TorqueIn-anl			Upper torque limit (TORQUE-MCTRL.HiMLim)	
5	TorqueIn-anl			Setpoint for the lower limit of speed limitation (TORQUE-MCTRL.NStartMLim)	
6	TorqueIn-anl			Manual field weakening (TORQUE-MCTRL.FldWeak)	
7	TorqueIn-anl			Manual adaptation of the proportional gain of the speed controller (TORQUE-MCTRL.NAdapt)	
8	TorqueIn-anl			Manual adaptation of the integral-action component of the speed controller (TORQUE-MCTRL.ISet)	
9	TorqueIn-anl			Torque threshold for the motor holding brake (TORQUE-BRK.TorqueThreshold)	📖 298
10	TorqueIn-anl			Direction of torque created by the drive against the motor holding brake (TORQUE-BRK.Sign)	

Code		Possible settings		IMPORTANT	
No.	Designation	Lenze/ appl.	Selection		
[C7531]				Selection of the signal source for the analog input signals of the ”Torque” function block	
1	TorqueIn-anl	1000	FIXED 0 % (not assigned)	Torque setpoint (SPEED-MCTRL.MAdd)	🕮 294
2	TorqueIn-anl	1000	FIXED 0 % (not assigned)	Setpoint for the upper limit of speed limitation (TORQUE-NSET.NSet)	🕮 291
3	TorqueIn-anl	1000	FIXED 0 % (not assigned)	Lower torque limit (TORQUE-MCTRL.negLoMLim)	🕮 294
4	TorqueIn-anl	1000	FIXED 0 % (not assigned)	Upper torque limit (TORQUE-MCTRL.HiMLim)	
5	TorqueIn-anl	1000	FIXED 0 % (not assigned)	Setpoint for the lower limit of speed limitation (TORQUE-MCTRL.NStartMLim)	
6	TorqueIn-anl	1000	FIXED 0 % (not assigned)	Manual field weakening (TORQUE-MCTRL.FldWeak)	
7	TorqueIn-anl	1000	FIXED 0 % (not assigned)	Manual adaptation of the proportional gain of the speed controller (TORQUE-MCTRL.NAdapt)	
8	TorqueIn-anl	1000	FIXED 0 % (not assigned)	Manual adaptation of the Integral-action component of the speed controller (TORQUE-MCTRL.ISet)	
9	TorqueIn-anl	1000	FIXED 0 % (not assigned)	Torque threshold for the motor holding brake (TORQUE-BRK.TorqueThreshold)	🕮 298
10	TorqueIn-anl	1000	FIXED 0 % (not assigned)	Direction of torque created by the drive against the motor holding brake (TORQUE-BRK.Sign)	
			For possible signals see ”selection list - analog signals”		🕮 371

11.28.1 Torque control with speed limitation

The ”torque control with speed limitation” is the basic function of the ”Torque” function block. Thereby, only the current control loop (torque control loop) is in the axis module. The torque setpoint is generated externally and is defined as a bipolar torque setpoint on TORQUE-MCTRL.MAdd (C7531/1). Within the external setpoint source, there can possibly be higher-level control loops (speed, position, pressure, ...). ”torque control with speed limitation”#

By means of the specification of speed limits (speed limitation in the ”Torque” function block it is provided that the drive does not operate in an uncontrolled manner if the load torque suddenly fails, e. g. due to a defect. The speed limits for positive and negative directions of rotations can be altered dynamically. For this purpose, the unused speed controller and a second speed controller (auxiliary speed controller) are used.

- The speed controller 1 is used to make up the upper speed limit.
  - The upper speed limit is defined at TORQUE-NSET.NSet (C7531/8) in [%] by N_{max} (positive sign for CW rotation).
- The speed controller 2 (auxiliary speed controller) is used to make up the lower speed limit.
  - The lower speed limit is defined at TORQUE-MCTRL.NStartMLim (C7531/5) in [%] by N_{max} (negative sign for CCW rotation).
- N_{max} is selected via code C0011.

Stop!

The upper speed limit is only to be used for CW rotation (positive values) and the lower speed limit only for CCW rotation (negative values); otherwise the drive may accelerate in an uncontrolled way.

Note!

The value at TORQUE-MCTRL.NegLoMLim (C7531/3) is negated in the ”Torque” function block.

11.28.2 Changing the direction of rotation

By means of the inputs TORQUE-RLQ.Cw (C7511/1) and TORQUE-RLQ.CCw (C7511/2) of the "Torque" function block, two functions are carried out: "changing the direction of rotation"#

- Changing the direction of rotation
- Set quick stop (QSP)

Stop!

The speed and direction of torque have to be selected according to the application.

Note!

Both input signals only have an effect on the torque setpoint path.

Signal name		Response	
TORQUE-RLQ.Cw	**TORQUE-RLQ.CCw**	**Direction of rotation**	**Quick stop (QSP)**
0	0	None	Yes
1	0	To the right	No
0	1	To the left	No
1	1	No change	No

11.28.3 Setpoint processing

11.28.3.1 Selecting the source for the torque setpoint

The "Torque" function block is supplied with the torque setpoint via the input TORQUE-NSET.NSet (code C7531/2). The valid values are within the decimal range ±32767. The torque setpoint is conditioned by a ramp function generator and special controllers.

11.28.3.2 Setting acceleration and deceleration times

The torque setpoint is led via a ramp function generator. This enables input steps to be converted into a ramp.

The acceleration time (T_{ir}) and deceleration time (T_{if}) refer to a change in speed from ”0” to n_{max} (0 ... 100%). The times to be set are calculated according to the formulae:

Acceleration time (code C0012)	Deceleration time (code C0013)
$T_{ir} = t_{ir} \cdot \frac{100\ \%}{w2 - w1}$	$T_{if} = t_{if} \cdot \frac{100\ \%}{w2 - w1}$

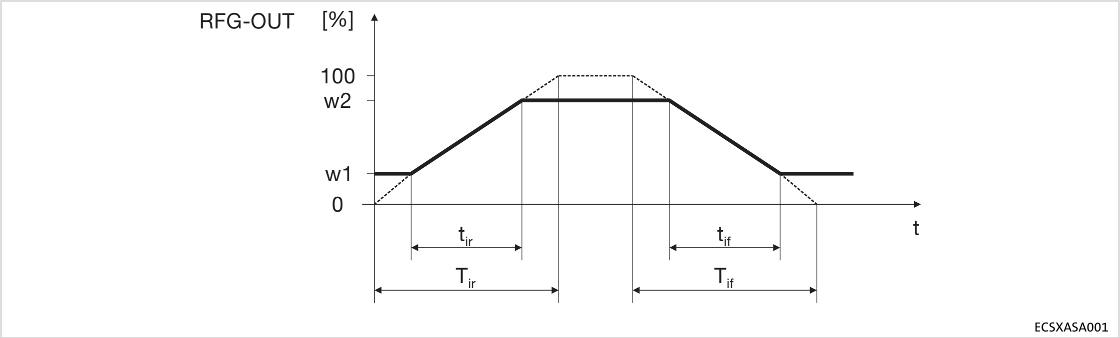


Fig.11-35 Diagram for acceleration and deceleration time

Code		Possible settings				IMPORTANT	
No.	Designation	Lenze/ appl.	Selection				
C0012	TIR (ACC)	0.000				Acceleration time for the ● speed setpoint (for ”speed control”) ● torque setpoint (for ”torque control”)	📖 271
			0.000	{0.001 s}	999.999	Relating to speed variation 0 rpm ... n_{max} (C0011)	
C0013	TIF (DEC)	0.000				Deceleration time for the ● speed setpoint (for ”speed control”) ● torque setpoint (for ”torque control”)	📖 271
			0.000	{0.001 s}	999.999	Relating to speed variation 0 rpm ... n_{max} (C0011)	

11.28.3.3 Influencing the ramp function generator

- If the controller is inhibited, the ramp function generator accepts the actual speed and passes it to the downstream function. This function has priority over all other functions.
- If the input TORQUE-NSET.RfgStop = TRUE (C7511/8), the ramp function generator is stopped. Changes of the input of the ramp function generator have no effect on the output signal.
- If the input TORQUE-NSET.Rfg0 = TRUE (C7511/3) the ramp function generator reaches zero along the deceleration ramp.
- The threshold in C0241 specifies when the message "Setpoint reached" is output.

  On the ramp function generator for the torque setpoint, the following applies: input signal = output signal

Code		Possible settings				IMPORTANT	
No.	Designation	Lenze/ appl.	Selection				
C0241	NSET RFG I = O	1.00				Threshold for message "Setpoint reached" On the ramp function generator for ● speed setpoint (for "speed control") ● torque setpoint (for "torque control") input signal = output signal.	🕮 273 🕮 293
			0.00	{0.01 %}	100.00	100 % = n_{max}	

11.28.3.4 Changing the characteristic of the ramp function generator

You can select two different characteristics for the ramp function generator via C0134:

- A linear characteristic for all acceleration processes that are required for a constant acceleration.
- S-shaped characteristic for all acceleration processes that require a jerk-free acceleration.

Code		**Possible settings**				**IMPORTANT**	
No.	**Designation**	**Lenze/ appl.**	**Selection**				
C0134	RFG charac	0				Characteristic of the ramp function generator for the ● speed setpoint (for ”speed control”) ● torque setpoint (for ”torque control”)	🕮 274
			1	Linear		Ramp function generator operates linearly.	
			2	S-shaped		Ramp function generator operates without jerk (S-shaped).	
C0182	Ti S-shaped	20.00				Form of the S-curve for the ● speed setpoint (for ”speed control”) ● torque setpoint (for ”torque control”) of the ramp function generator (C0134 = 1)	🕮 274
			0.01	{0.01 s}	50.00	The higher the value, the bigger the S-rounding.	

11.28.4 Setting of motor control

11.28.4.1 Torque setpoint

- The maximum possible torque is calculated from the motor parameters by the controller. It can be read in C0057.
- Torque setpoint ”torque setpoint”#
  - TORQUE-MCTRL.MAdd (C7531/1) acts as a torque setpoint.
  - The speed controllers carry out a monitoring function.
  - The torque setpoint is defined in [%] of the maximum possible torque.
  - Negative values cause a torque in CCW rotation of the motor.
  - Positive values cause a torque in CW rotation of the motor.

11.28.4.2 Torque limitation

An external torque limitation can be set via TORQUE-MCTRL.NegLoMLim (C7531/3) and TORQUE-MCTRL.HiMLim (C7531/4). This enables you to select different torques for the quadrants ”driving” and ”braking”.

- TORQUE-MCTRL.HiMLim is the limit in the positive direction in [%] of the maximum possible torque.
- TORQUE-MCTRL.HoMLim is the limit in the negative direction in [%] of the maximum possible torque.

The maximum possible torque (C0057) depends on the motor parameters (C0022, C0081, C0087, C0088).

Note!

In case of quick stop (QSP), the torque limitation is switched to an inactive state, i. e. the operation runs with ±100 %.

11.28.4.3 Maximum speed

The maximum speed N_{max} speed is set via C0011. It is the reference value for:

- The absolute and relative setpoint selection for the acceleration and deceleration times.
- The upper and lower speed limit.
- n_{max} = 100 % = 16384 (data type ”Integer”).

11.28.4.4 Quick stop (QSP)

By means of the QSP function, the drive can be stopped within an adujstable time, irrespective of the setpoint selection. The QSP function is active if:

- Input TORQUE-QSP.Set1 (C7511/5) = TRUE
- Input TORQUE-QSP.Set2 (C7511/6) = TRUE
- Output TORQUE-RLQ.QSP = TRUE

Function:

If a torque control has been selected, it is switched inactive. The drive is guided by the speed controller. The speed is reduced to zero within the deceleration time set under C0105. The torque limitation TORQUE-MCTRL.NegLoMLim (C7531/3) and TORQUE-MCTRL.HiMLim (C7531/4) is switched inactive, i. e. the operation runs with ±100 %. The phase controller is switched active. If the rotor position is actively displaced, the drive creates a torque against the displacement if C0254 is unequal to 0.0

11.28.4.5 Adjusting the speed controller

The speed controller is designed as an ideal PID controller.

Parameter setting:

- Via C0070 you set the proportional gain (V_p):
  - – Enter approx. 50 % of the speed setpoint (100 % = 16384 = N_{max}).
  - – Increase C0070 until the drive becomes instable (pay attention to engine noises).
  - – Reduce C0070 until the drive runs stable again.
  - – Reduce C0070 to approx. half the value.
- The proportional gain (V_p) can be altered via TORQUE-MCTRL.NAdapt (C7531/7):
  - – Vp = TORQUE-MCTRL.NAdapt [%] x C0070
  - – If TORQUE-MCTRL.NAdapt is not assigned, the following applies: Vp = 100 % x C0070 = C0070.
- The reset time (T_n) is set via C0071:
  - – Reduce C0071 until the drive becomes unstable (pay attention to motor noise).
  - – Increase C0071, until the drive runs stable again.
  - – Increase C0071 to approx. the double value.
- The derivative gain (T_d) is set via C0072:
  - – Increase C0072 during operation until an optimal control mode is reached.

Code		Possible settings				IMPORTANT	
No.	Designation	Lenze/ appl.	Selection				
C0070	Vp speedCTRL	3.00				Proportional gain of speed controller (V_{pn})	📖 120
			0.00	{ 0.01}	127.99		
C0071	Tn speedCTRL	24.0				Integral-action time of speed controller (T_{nn})	📖 120
			1.0	{0.5 ms}	6000.0		
C0072	Td speedCTRL	0.00				Derivative gain of speed controller (T_{dn})	📖 120
			0.0	{0.1 ms}	32.0		

Signal limiting

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

The drive cannot follow the speed setpoint.

The output TORQUE-MCTRL.MMax is set to TRUE.

Setting the integral component

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

- TORQUE-MCTRL.ILoad = TRUE (C7511/7):
  - The speed controller accepts the value applied at TORQUE-MCTRL.ISet (C7531/8) into its integral component.
  - The value at TORQUE-MCTRL.ISet (C7431/8) acts as a torque setpoint for the motor control.
- TORQUE-MCTRL.ILoad = FALSE (C7511/7):
  - The function is switched off.

11.28.4.6 Field weakening

Stop!

The available torque decreases with the field weakening.

The motor is operated in the field weakening range if

- the output voltage of the controller exceeds the rated motor voltage (C0090).
- the controller is no longer able to increase the output voltage with rising speed due to the mains voltage or DC-bus voltage.

Note!

An optimal machine operation in the field weakening range requires a correct setting of the field controller and field weakening controller.

Information on the setting: 🕮 122

Manual field weakening

Stop!

If the field is weakened manually (TORQUE-MCTRL.FldWeak (C7531/6) < 100 %), the drive cannot create the maximum torque.

A manual field weakening is possible via TORQUE-MCTRL.FldWeak (7531/6). For a maximum excitation, TORQUE-MCTRL.FldWeak must be triggered with +100 % (= 16384).

11.28.5 Holding brake control

By means of this function, you can control a motor holding brake. Possible applications are:

- Hoists
- Traverse drives
- Drives with active loads

Codes

Code		Possible settings				IMPORTANT	
No.	Designation	Lenze/ appl.	Selection				
C0195	BRK T act	99.9				Closing time of the motor holding brake	🕮 281 🕮 298 🕮 83
			0.0	{0.1 sec}	99.9	During the time set the drive continues to generate a torque. After the set time is expired, the status ”mechanical brake closed” is reached.	
C0196	BRK T rel	0.0				Opening time of the motor holding brake	🕮 281 🕮 298 🕮 83
			0.0	{0.1 sec}	60.0	During the time set the drive can generate the torque set under C0244 against the holding brake. After the set time is expired, the status ”mechanical brake opened” is reached.	
C0244	BRK M set	0.00				Holding torque of the drive against the motor holding brake	🕮 281 🕮 298 🕮 83
			-199.99	{0.01 %}	199.99	Referring to M_{max} (C0057). During the time set in C0196 the drive generates the set torque against the holding brake.	

11.28.5.1 Closing the holding brake

A HIGH level on the input TORQUE-BRK.SetBrake (C7511/4 = TRUE) activates the function. At the same time, the output TORQUE-BRK.SetQSP is set to HIGH. This signal can be used to brake the drive to standstill via a deceleration ramp (speed = 0).

If the setpoint speed falls below the value set at the input TORQUE-BRK.SpeedThreshold (C7531/9), the output TORQUE-BRK.Out is set to HIGH.

Note!

For a fail-safe design this signal must be inverted at the output (e. g. via C0118).

After the brake closing time set C0195 has lapsed, the output TORQUE-BRK.CInh switches to TRUE. By means of this signal you can for example activate controller inhibit (device-internal on the DCTRL function block). The setting of the brake closing time is required because the brake is not immediately activated at TORQUE-BRK.Out = TRUE (the drive has to provide another holding torque for the set time).

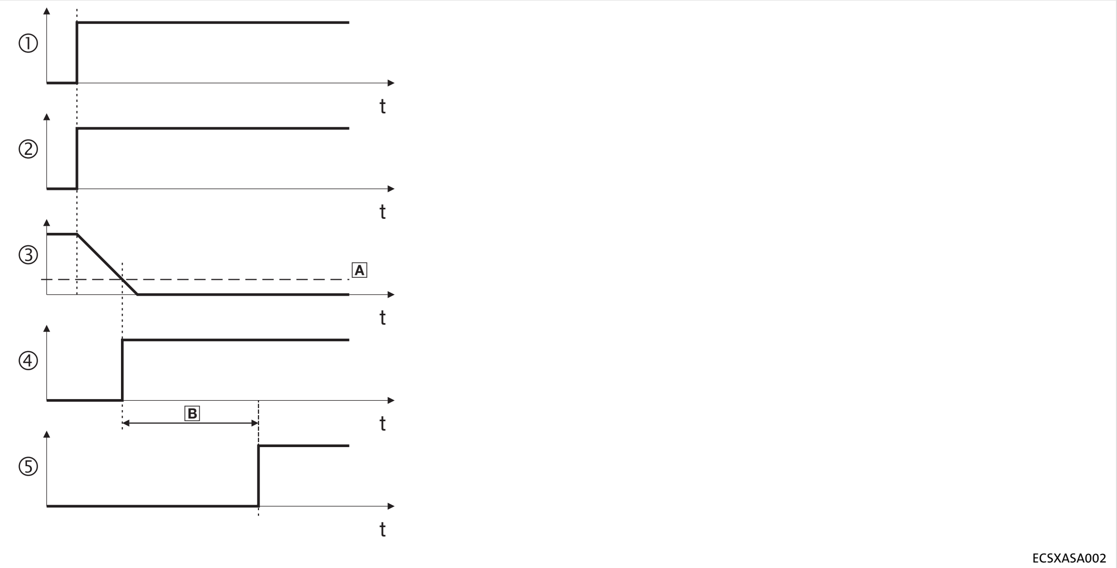


Fig.11-36 Signal characteristic - closing of holding brake

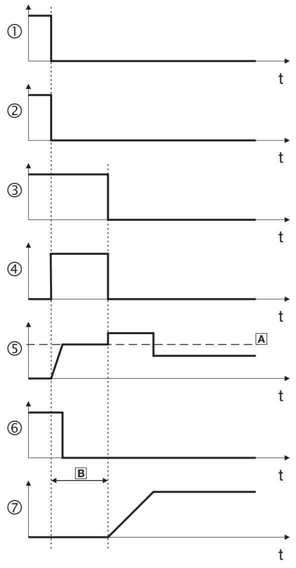
①	TORQUE-BRK.SetBrake
②	TORQUE-BRK.SetQSP
③	TORQUE-BRK.MSetOut
④	TORQUE-BRK.Out
⑤	TORQUE-BRK.SetCInh
A	TORQUE-BRK.TorqueThreshold
B	Brake closing time (C0195)

11.28.5.2 Opening the holding brake

A LOW level on the input TORQUE-BRK.SetBrake (C7511/4 = FALSE) immediately sets the output TORQUE-BRK.SetCInh to LOW (controller inhibit is deactivated). At the same time, the output TORQUE-BRK.MStore is set to HIGH. This signal can be used to let the drive create a defined torque against the brake. The drive takes over the torque while the brake is released. The signal is only reset after the brake opening time set in C0196 has lapsed.

After the brake opening time has lapsed, the output TORQUE-BRK.SetQSP is reset to LOW. This signal serves to e. g. release the setpoint integrator after the brake opening time has expired.

If an actual speed value higher than the value at TORQUE-BRK.TorqueThreshold (C7531/9) is recognised before the brake opening time has expired, the signals TORQUE-BRK.SetQSP and TORQUE-BRK.MStore are immediately reset to LOW. Then, the drive can immediately pass over to the speed-controlled operation.



ECSXASA003

Fig.11-37 Signal characteristic - opening of holding brake

① TORQUE-BRK.SetBrake
② TORQUE-BRK.SetCInh
③ TORQUE-BRK.SetQSP
④ TORQUE-BRK.MStore
⑤ TORQUE-MCTRL.MAct
⑥ TORQUE-BRK.Out
⑦ TORQUE-BRK.MSetOut
A TORQUE-MCTRL.MAct
B Brake opening time (C0196)

12 Appendix

12.1 Code table

How to read the code table

Column	Abbreviation		Meaning
No.	Cxxxx		Code no. Cxxxx
	1		Subcode 1 of Cxxxx
	2		Subcode 2 of Cxxxx
	Cxxxx		Changed parameter of code or subcode are accepted after pressing SHIFT PRG.
	[Cxxxx]		Changed parameter of code or subcode are accepted after pressing SHIFT PRG when the controller is inhibited
Designation			LCD display of the keypad XT EMZ9371BC
Lenze/appl.	x		Lenze setting: ● Value at the time of delivery or after loading the Lenze setting using C0002.
	{xxx...}		Varying application initialisation value ● Value at the time of delivery ● After loading the Lenze setting using C0002 the application initialisation value is overwritten with the Lenze setting. ● The application initialisation value can be re-established by loading the application software using ”Global Drive Loader” (GDL).
	→		The column ”Important” contains further information
Selection	1 {%} 99		minimum value {unit} maximum value
IMPORTANT			Short code description

Code		Possible settings				IMPORTANT
No.	**Designation**	**Lenze/ appl.**	**Selection**			
C0002	Par load	0				Load parameter set
			0	Loading Lenze setting		Load Lenze setting into the RAM and activate it: **Only possible with C2108 = 2 (Stop)**
			1	Load parameter set 1		Load parameter set 1 into the RAM and activate it: **Parameter set 1 is loaded automatically after every mains connection.**
C0003	Par save	0				Save parameter set
			0	Done		Saving completed
			1	Save parameter set 1		Non-volatile saving of parameter set 1
C0004	Op display	56				Keypad status display
			1	{Code no.}	9999	The keypad displays the selected code in the operating level, if no status messages from C0183 are active (e. g.: 56 = torque setpoint (C0056))

Code		Possible settings				IMPORTANT	
No.	**Designation**	**Lenze/ appl.**	**Selection**				
[C0006]	Op mode	1				Operating mode of the motor control **Only possible with C2108 = 2 (Stop)**	🕮 114
			1	Servo PM-SM		Servo control of synchronous motors	
			2	Servo ASM		Servo control of asynchronous motors	
C0009	LECOM ADDRESS	1				Device address for operation via AIF interface	
			1	{1}	99	Communication modules on AIF interface: ● LECOM-A/B/LI 2102 – 10, 20, ..., 90 are reserved for broadcast to groups of nodes ● PROFIBUS-DP 213x Operation via MotionBus (CAN): ● Set CAN node address in C0350	
C0011	Nmax	3000				Maximum speed:	
			500	{1 rpm}	16000	Reference value for the absolute and relative setpoint selection for the acceleration and deceleration times. **For parameter setting via interface: greater changes in one step should only be made when the controller is inhibited (CINH)!**	
C0012	TIR (ACC)	0.000				Acceleration time for the ● speed setpoint (for ”speed control”) ● torque setpoint (for ”torque control”)	🕮 271
			0.000	{0.001 s}	999.999	Relating to speed variation 0 rpm ... n_{max} (C0011)	
C0013	TIF (DEC)	0.000				Deceleration time for the ● speed setpoint (for ”speed control”) ● torque setpoint (for ”torque control”)	🕮 271
			0.000	{0.001 s}	999.999	Relating to speed variation 0 rpm ... n_{max} (C0011)	
C0017	FCODE (QMIN)	50				Used for speed signals	🕮 253
			-16000	{1 rpm}	16000		
C0018	fchop	2				Switching frequency	
			1	4 kHz sin		4 kHz permanent PWM frequency	
			2	8/4 kHz sin		8 kHz PWM frequency with automatic derating to 4 kHz at high load	
C0019	Thresh nact = 0	0				Threshold, when N_{act} = 0 rpm is detected	
			0	{1 rpm}	16000		

Code		Possible settings				IMPORTANT	
No.	**Designation**	**Lenze/ appl.**	**Selection**				
C0022	Imax current	→				I_{max} limit	
			0	{0.01 A}		→ device-dependent list The maximum current can be obtained from the ”Technical data”.	
C0023	Imax fld.weak	0				Maximum field weakening current for synchronous machines	
			0	{1 %}	100		
C0026						Used for relative analog signals	📖 211 📖 253
1	FCODE (offset)	0.00	-199.99	{0.01 %}	199.99		
2	FCODE (offset)	0.00					
C0027						Used for relative analog signals	📖 211 📖 253
1	FCODE (GAIN)	100.00	-199.99	{0.01 %}	199.99		
2	FCODE (GAIN)	100.00					
C0030	DFOUT CONST	3				Constant for the master frequency output in increments per revolution	📖 248 📖 87 📖 88
			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			
C0034	MST CURRENT	0				Selection: master voltage/master current for analog setpoint selection	📖 211
			0	-10 ... + 10 V		Master voltage	
			1	+4 ... +20 mA		Master current	
			2	-20 ... +20 mA			
C0037	Set-value rpm	0				Setpoint selection in rpm	📖 253
			-16000	{1 rpm}	16000		
C0039						15 fixed setpoints Can be retrieved via digital signals SPEED-NSET.Jogx.	📖 270
1	JOG SET-VALUE	0.00	-199.99	{0.01 %}	199.99	Relating to n_{max} (C0011)	
2	JOG SET-VALUE	0.00					
...	JOG SET-VALUE	0.00					
14	JOG SET-VALUE	0.00					
15	JOG SET-VALUE	0.00					

Code		Possible settings				IMPORTANT	
No.	Designation	Lenze/ appl.	Selection				
C0040	Ctrl enable	1				Controller inhibit (CINH) ● Writing: Controls the controller inhibit ● Reading: Reads the status of the controller inhibit	
			0	Controller inhibited			
			1	Controller enabled			
C0042	DIS: QSP					Quick stop status (QSP) Only display	🕮 242 🕮 112
			0	QSP not active			
			1	QSP active			
C0043	Trip reset					Reset active TRIP	
			0	Reset TRIP			
			1	TRIP active			
C0050	MCTRL-NSET2					Speed setpoint on the input of the speed controller Only display	
			-100.00	{0.01 %}	100.00		
C0051	MCTRL-NACT					Actual speed Only display	
			-30000	{1 rpm}	30000		
C0052	MCTRL Umot					Actual motor voltage Only display	
			0	{1 V}	800		
C0053	UG-VOLTAGE					DC-bus voltage Only display	
			0	{1 V}	900		
C0054	Imot					Actual motor current Only display	
			0.0	{0.1 A}	500.0		
C0055	Phase current					Actual phase current Only display	
1	Iu		0.0	{0.1 A}	500.0	Actual current in U phase	
2	Iv					Actual current in V phase	
3	Iw					Actual current in W phase	
4	Io					Actual theoretical star-point current	
C0056	MCTRL-MSET2					Speed setpoint on the output of the speed controller Only display	
			-100	{1 %}	100		
C0057	Max torque					Maximum possible torque of the drive configuration Dependent on C0022, C0081, C0087, C0088 Only display	
			0.0	{0.1 Nm}	500.0		
C0058	Rotor diff	-90.0				Rotor displacement angle for synchronous motors (C0095) Only display	🕮 117
			-180.0	{0.1 °}	179.9		

Code		Possible settings				IMPORTANT	
No.	**Designation**	**Lenze/ appl.**	**Selection**				
C0059	Mot pole no.					Pole pair number of the motor Only display	
			1	{1}	200		
C0060	Rotor pos					Current rotor position Only display	
			0	{1 inc}	2047	1 rev = 2048 inc	
C0061	Heatsink temp					Heatsink temperature Only display	
			0	{1 °C}	100		
C0062	Interior temp					Temperature inside the device Only display	
			0	{1 °C}	100		
C0063	Mot temp					Motor temperature Only display	🕮 169
			0	{1 °C}	200		
C0064	Utilization					Drive load I x t during the last 180 s Only display	
			0	{1 %}	150	● C0064 > 100 % releases TRIP OC5 ● TRIP reset is only possible if C0064 < 95 %	
C0065	U24 ext					External supply voltage Only display	
			0.0	{0.1V}	100.0		
C0066	Motor load					Thermal motor load $I^{2x}t$ Only display	🕮 174
			0	{1 %}	250		
C0067	ACT TRIP					Current TRIP (in case of FAIL-QSP, warning and message, ”0” is displayed.) Read only	🕮 184
C0070	Vp speedCTRL	3.00				Proportional gain of speed controller (V_{pn})	🕮 120
			0.00	{ 0.01}	127.99		
C0071	Tn speedCTRL	24.0				Integral-action time of speed controller (T_{nn})	🕮 120
			1.0	{0.5 ms}	6000.0		
C0072	Td speedCTRL	0.00				Derivative gain of speed controller (T_{dn})	🕮 120
			0.0	{0.1 ms}	32.0		
C0074	Dynamics	0				Pilot control of the current controller for higher dynamics	🕮 116
			0	Normal		Normal	
			1	Enhanced		Enhanced	

Code		Possible settings				IMPORTANT	
No.	Designation	Lenze/ appl.	Selection				
C0075	Vp currCTRL	4.00				Proportional gain of current controller (V_{pi}) The upper limit is device-dependent.	🕮 116
			0.00	{0.01 Ω}	381.80	ECSxS/P/M/A004	
					190.90	ECSxS/P/M/A008	
					95.46	ECSxS/P/M/A016	
					47.72	ECSxS/P/M/A032	
					31.82	ECSxS/P/M/A048	
					23.86	ECSxS/P/M/A064	
C0076	Tn currCTRL	5.00				Integral-action time of current controller (T_{ni})	🕮 116
			0.01	{0.01 ms}	200.00		
C0077	Vp fieldCTRL	5.00				Field controller gain V_{pF}	🕮 122
			0.00	{ 0.01}	63.99		
C0078	Tn fieldCTRL	20.0				Integral-action time of field controller T_{nF}	🕮 122
			1.0	{0.5 ms}	6000.0		
C0079	DIS:Lh					Mutual inductance of the asynchronous motor Only display	
			0.0	{0.1 mH}	3276.7		
[C0080]	Res pole no.	1				Number of pole pairs of resolver	
			1	{1}	10		
[C0081]	Mot power	3.20				Rated motor power according to nameplate	
			0.01	{0.01 kW}	500.00		
[C0082]	DIS:Rr					Rotor resistance of the asynchronous motor Only display	
			0.000	{0.001 Ω}	32.767		
C0083	DIS:Tr					Rotor time constant of the asynchronous motor Only display	
			0.00	{0.01 ms}	327.67		
[C0084]	Mot Rs	1.10				Motor stator resistance The upper limit is device-dependent.	
			0.00	{0.01 Ω}	95.44	ECSxS/P/M/A004	
					47.72	ECSxS/P/M/A008	
					23.86	ECSxS/P/M/A016	
					11.93	ECSxS/P/M/A032	
					7.95	ECSxS/P/M/A048	
					5.96	ECSxS/P/M/A064	
[C0085]	Mot Ls	5.30				Leakage inductance of the motor	
			0.00	{0.01 mH}	200.00		
[C0087]	Mot speed	3700				Rated motor speed	
			300	{1 rpm}	16000		
[C0088]	Mot current	7.0				Rated motor current	
			0.5	{0.1 A}	500.0		

Code		Possible settings				IMPORTANT	
No.	Designation	Lenze/ appl.	Selection				
[C0089]	Mot frequency	185				Rated motor frequency	
			10	{1 Hz}	1000		
[C0090]	Mot voltage	325				Rated motor voltage	
			50	{1 V}	500		
[C0091]	Mot cos phi	1.00				cos φ of the asynchronous motor	
			0.50	{ 0.01}	1.00		
C0092	DIS:Isdeff					Magnetising current of the asynchronous motor Only display	
			0.00	{0.01 A}	327.67		
C0093	Drive ident					Device identification of the ECS axis module Read only	
			0	Defective power section			
			1	No power section recognised			
			4	ECSxS/P/M/A004C4			
			8	ECSxS/P/M/A008C4			
			16	ECSxS/P/M/A016C4			
			32	ECSxS/P/M/A032C4			
			48	ECSxS/P/M/A048C4			
			64	ECSxS/P/M/A064C4			
			65	ECSxS/P/M/A064C2			
C0094	Password	0				Password Parameter access protection for the keypad	
			0 0 = no password	{1}	9999	When the password is activated, only the codes of the user menu (C0517) can be accessed. Further possible selections: see C0096	
[C0095]	Rotor pos adj	0				Rotor position adjustment of a synchronous motor C0058 shows the rotor displacement angle.	🕮 117
			0	Inactive			
			1	Active			
C0096						Extended password protection for bus systems with activated password (C0094) All codes in the user menu can be accessed.	
1	AIF/CAN prot.	0		No access protection		AIF access protection	
2	AIF/CAN prot.	0		No access protection		CAN access protection	
			0	No access protection		Full access	
			1	Write protection		Reading not possible	
			2	Write protection		Writing not possible	
			3	Read/write protection		Reading and writing not possible	
C0097	DIS:Lt-Ident					Without function	
C0098	zero pos off	0				Position offset	
			-2147483647	{1 inc}	2147483647		
C0099	S/W version					Software version Only display	

Code		Possible settings				IMPORTANT	
No.	Designation	Lenze/ appl.	Selection				
C0101						15 additional acceleration times for the speed setpoint. Can be retrieved via digital signals SPEED-NSET.TIx.	🕮 271
1	add Tir	0.000	0.000	{0.001 s}	999.999	Relating to speed variation 0 rpm ... n_{max} (C0011)	
2	add Tir	0.000					
...	add Tir	0.000					
14	add Tir	0.000					
15	add Tir	0.000					
C0103	add Tif					15 additional deceleration times for the speed setpoint. Can be retrieved via digital signals SPEED-NSET.TIx.	🕮 271
1	add Tif	0.000	0.000	{0.001 s}	999.999	Relating to speed variation 0 rpm ... n_{max} (C0011)	
2	add Tif	0.000					
...		0.000					
14	add Tif	0.000					
15	add Tif	0.000					
C0105	QSP Tif	0.000				Deceleration time for quick stop (QSP)	🕮 242 🕮 112
			0.000	{0.001 s}	999.999	Relating to speed variation n_{max} (C0011) ... 0 rpm.	
C0108						Used for relative analog signals	🕮 253
1	FCODE (GAIN)	100.00	-199.99	{0.01 %}	199.99		
2	FCODE (GAIN)	100.00					
C0109						Used for relative analog signals	🕮 253
1	FCODE (offset)	0.00	-199.99	{0.01 %}	199.99		
2	FCODE (offset)	0.00					
C0110 ... C0113	Service codes					**Only the Lenze service is allowed to make changes!**	
			50	{1 %}	200	For controlling an asynchronous motor	
C0114						Polarity of the digital inputs (DIGIN)	🕮 251 🕮 92
1	DIGIN pol	0		HIGH level active		X6/DI1	
2	DIGIN pol	0		HIGH level active		X6/DI2	
3	DIGIN pol	0		HIGH level active		X6/DI3	
4	DIGIN pol	0		HIGH level active		X6/DI4	
			0	HIGH level active			
			1	LOW level active			
C0118						Polarity of the digital outputs (DIGOUT)	🕮 252 🕮 92
1	DIGOUT pol	0		No inversion		X6/DO1	
2	DIGOUT pol	0		No inversion		X25/BD1, X25/BD2 (brake connection)	
			0	No inversion			
			1	Logic inversion of the level			

Code		Possible settings				IMPORTANT	
No.	**Designation**	**Lenze/ appl.**	**Selection**				
C0120	OC6 limit	105				Threshold for I^2xt disconnection	📖 174
			0	{1 %}	120	0 = I^2xt monitoring is switched off I^2xt > C0120 ⇨TRIP 006	
C0121	OH7 limit	120				Adjustable threshold for early motor temperature warning	📖 169
			45	{1 °C}	150	Motor temperature > C0121 ⇨ fault OH7	
C0122	OH4 limit	80				Adjustable threshold for early heatsink temperature warning	📖 170
			45	{1 °C}	90	Heatsink temperature > C0122 ⇨ fault OH4	
C0123	OC7 limit	90				Adjustable threshold for I x t early warning	📖 172
			0	{1 %}	100	C0064 > C0123 ⇨ fault OC7	
C0124	OH5 limit	75				Adjustable threshold for early warning of temperature inside the device	📖 171
			10	{1 %}	90	C0062 > C0124 ⇨ fault OH5	
C0125	Baud rate	0				Baud rate for accessory module LECOM A/B/LI	
			0	9600 bit/s			
			1	4800 bit/s			
			2	2400 bit/s			
			3	1200 bit/s			
			4	19200 bit/s			
C0126	MONIT CE0	3				Monitoring of the communication on the automation interface (AIF).	
			0	TRIP		A communication error (”CommErr”) releases the adjusted reaction.	
			2	Warning			
			3	Off		Monitoring is switched off.	
C0127	OC8 limit	100				Threshold for I^2xt early warning	📖 174
			0	{1 %}	120	I^2xt > C0127 ⇨ reaction as adjusted in C0606	
C0128	Tau motor	5.0				Thermal time constant of the motor	📖 174
			1.0	{0.1 min}	25.0	For calculating the I^2xt disconnection	
C0134	RFG charac	0				Characteristic of the ramp function generator for the ● speed setpoint (for ”speed control”) ● torque setpoint (for ”torque control”)	📖 274
			1	Linear		Ramp function generator operates linearly.	
			2	S-shaped		Ramp function generator operates without jerk (S-shaped).	

Code		Possible settings				IMPORTANT	
No.	Designation	Lenze/ appl.	Selection				
C0135	Control word	0				Control word for networking via automation interface (AIF)	
			0	{1}	65535	Controller evaluates information as 16 bits (binary coded)	
			Bit 0	Not assigned			
			Bit 1	Not assigned			
			Bit 2	Not assigned			
			Bit 3	Activate quick stop (QSP)			
			Bit 4	Not assigned			
			Bit 5	Not assigned			
			Bit 6	Not assigned			
			Bit 7	Not assigned			
			Bit 8	Activate operation inhibit (DISABLE)			
			Bit 9	Activate controller inhibit (CINH)			
			Bit 10	Set TRIP			
			Bit 11	Reset TRIP			
			Bit 12	Not assigned			
			Bit 13	Not assigned			
			Bit 14	Not assigned			
			Bit 15	Not assigned			
C0136						Control words Only display	
1	Ctrl word		0	{hex}	FFFF	Control word in DCTRL	
2	Ctrl word					Control word in CANaux_IN	
3	Ctrl word					Control word in AIF1In	
C0141	FCODE (setval)	0.00				Used for relative analog signals	🕮 253
			-199.99	{0.01 %}	199.99		
C0142	Start options	1				Starting condition for start (controller enable) executed ● after mains connection ● after message (t > 0.5 s) ● after TRIP	
			0	Start protection			
			1	Automatic start			

Code		Possible settings			IMPORTANT
No.	Designation	Lenze/ appl.	Selection		
C0150	Status word	0			Status word for networking via automation interface (AIF) Only display
			0	{1} 65535	Controller evaluates information as 16 bits (binary coded)
			Bit 0	Not assigned	
			Bit 1	Pulse inhibit (IMP) is active	
			Bit 2	Not assigned	
			Bit 3	Not assigned	
			Bit 4	Not assigned	
			Bit 5	Not assigned	
			Bit 6	n=0	
			Bit 7	Controller inhibit (CINH) is active	
			Bit 8	Controller status	
			Bit 9	Controller status	
			Bit 10	Controller status	
			Bit 11	Controller status	
			Bit 12	Warning is active	
			Bit 13	Message is active	
			Bit 14	Not assigned	
			Bit 15	Not assigned	
C0155	Status word 2	0			Status word 2 (extended status word) Only display
			0	{1} 65535	Controller evaluates information as 16 bits (binary coded)
			Bit 0	Fail	
			Bit 1	Mmax	
			Bit 2	Imax	
			Bit 3	Pulse inhibit is active (IMP)	
			Bit 4	Ready for operation (RDY)	
			Bit 5	Controller inhibited (CINH)	
			Bit 6	TRIP is active	
			Bit 7	Init	
			Bit 8	Direction of rotation of the motor (CW/CCW)	
			Bit 9	Not assigned	
			Bit 10	Not assigned	
			Bit 11	Not assigned	
			Bit 12	Not assigned	
			Bit 13	Not assigned	
			Bit 14	Not assigned	
			Bit 15	Not assigned	

Code		Possible settings		IMPORTANT	
No.	Designation	Lenze/ appl.	Selection		
C0157				State of the user-definable bits of the status word Only display	
1	Stat. FreeBit		0 1	Bit 0	
2	Stat. FreeBit			Bit 2	
3	Stat. FreeBit			Bit 3	
4	Stat. FreeBit			Bit 4	
5	Stat. FreeBit			Bit 5	
6	Stat. FreeBit			Bit 14	
7	Stat. FreeBit			Bit 15	
C0161	ACT TRIP			Current TRIP ● as in C0168/1 ● in case of FAIL-QSP, warning and message, ”0” is displayed. Read only	🕮 184
C0167	Reset failmem	0		Delete history buffer (C0168)	🕮 180
			0 No reaction		
			1 Delete history buffer		
C0168				History buffer (list of faults occurred) Read only	🕮 180
1	Fail number			Currently active	
2	Fail number			Last	
3	Fail number			Last but one	
4	Fail number			Last but two	
5	Fail number			Last but three	
6	Fail number			Last but four	
7	Fail number			Last but five	
8	Fail number			Last but six	
			All fault indications (TRIP, short-circuit brake, TRIP, FAIL-QSP, warning, message)		
C0169				Time at which the faults entered into the history buffer (C0168) occurred Only display	🕮 180
1	Failtime		Respective power-on time (C0179)	Currently active	
2	Failtime			Last	
3	Failtime			Last but one	
4	Failtime			Last but two	
5	Failtime			Last but three	
6	Failtime			Last but four	
7	Failtime			Last but five	
8	Failtime			Last but six	
			0 {1 h} 65535		

Code		Possible settings		IMPORTANT	
No.	Designation	Lenze/ appl.	Selection		
C0170				Frequency of successive occurrence of the faults entered in the history buffer (C0168) Only display	📖 180
1	Counter		Respective fault frequency	Currently active	
2	Counter			Last	
3	Counter			Last but one	
4	Counter			Last but two	
5	Counter			Last but three	
6	Counter			Last but four	
7	Counter			Last but five	
8	Counter			Last but six	
			0 {1} 65535		
C0173	UG limit	11		Adaptation of the DC-bus voltage thresholds: ● Check during commissioning and adapt, if necessary. ● All drive components in DC bus connections must have the same thresholds. – LU = Undervoltage threshold – OU = Overvoltage threshold	📖 78
			0 Mains = 230V +- B	Operation on 230 V mains with or without brake unit LU = 130 V, OU = 400 V	
			1 Mains = 400V +- B	Operation on 400 V mains with or without brake unit LU = 285 V, OU = 800 V	
			2 Mains = 460V +- B	Operation on 460 V mains with or without brake unit LU = 328 V, OU = 800 V	
			3 Mains = 480V - B	Operation on 480 V mains without brake unit LU = 342 V, OU = 800 V	
			4 Mains = 480V + B	Operation on 480 V mains with brake unit LU = 342 V, OU = 800 V	
			10 Mains = 230V +- B	Operation on 230 V mains with or without brake unit LU = C0174, OU = 400 V	
			11 Mains = 400V +- B	Operation on 400 V mains with or without brake unit LU = C0174, OU = 800 V	
			12 Mains = 460V +- B	Operation on 460 V mains with or without brake unit LU = C0174, OU = 800 V	
			13 Mains = 480V - B	Operation on 480 V mains without brake unit LU = C0174, OU = 800 V	
			14 Mains = 480V + B	Operation on 480 V mains with brake unit LU = C0174, OU = 800 V	

Code		Possible settings				IMPORTANT	
No.	Designation	Lenze/ appl.	Selection				
C0174	UG min	60				Undervoltage threshold of DC bus (LU)	🕮 78
			15	{1 V}	342		
C0175	UG-Relais Fkt	1				Charge relay behaviour with undervoltage (LU) in the DC bus.	🕮 78
			1	Standard		Relay switches as a function of LU.	
			2	One Time		Relay switches when LU is exceeded for the first time and remains on.	
			3	Fixed On		Charging current limitation is inactive. ● Relay is always switched on and the charging resistors of the axis module are thus permanently jumpered. ● Setting for operation with ECSxE power supply module.	
C0178	Op timer					Running time meter Read only	
			0	{1 sec}	4294967295	Time when the controller was enabled	
C0179	Mains timer					Power-on time meter Only display	
			0	{1 sec}	4294967295	Time when the mains was switched on	
C0182	Ti S-shaped	20.00				Form of the S-curve for the ● speed setpoint (for ”speed control”) ● torque setpoint (for ”torque control”) of the ramp function generator (C0134 = 1)	🕮 274
			0.01	{0.01 s}	50.00	The higher the value, the bigger the S-rounding.	

Code		Possible settings			IMPORTANT	
No.	**Designation**	**Lenze/ appl.**	**Selection**			
C0183	Diagnostics				Drive diagnostics Only display ● Indicates fault or status information ● If several fault or status information units are to be shown, the information unit with the smallest number is displayed.	
			0	OK	No fault	
			101	Initialisation phase		
			102	TRIP/trouble		
			103	Emergency stop activated		
			104	IMP message		
			105	Power off		
			111	Operation inhibit C0135		
			112	Operation inhibit AIF		
			113	Operation inhibit CAN		
			121	Controller inhibit via X6/SI1		
			122	Internal controller inhibit 1		
			123	Internal controller inhibit 2		
			124	Controller inhibit via STOP key of the keypad		
			125	Controller inhibit via AIF		
			126	Controller inhibit via CAN		
			131	FAIL-QSP		
			141	Restart protection		
			142	Pulse inhibit	High resistance power outputs	
			151	Quick stop (QSP) via terminal		
			152	Quick stop (QSP) via STOP key of the keypad		
			153	Quick stop (QSP) via AIF		
			154	Quick stop (QSP) via CAN		
			160	PLC Stop		
			250	Warning		
C0190	NSET ARIT	0			Linking of speed setpoint (NSet) and additional setpoint (NAdd)	📖 275
			0	OUT = NAdd	Additional setpoint is not considered.	
			1	NSet + NAdd	Additional setpoint is added to speed setpoint.	
			2	NSET-NADD	Additional setpoint is subtracted from speed setpoint.	
			3	NSet x NAdd	Additional setpoint is multiplied by speed setpoint.	
			4	NSet / NAdd	Speed setpoint is divided by additional setpoint.	
			5	NSet / (100 - NAdd)	Speed setpoint is divided by (100 - additional setpoint).	

Code		Possible settings				IMPORTANT	
No.	Designation	Lenze/ appl.	Selection				
C0195	BRK T act	99.9				Closing time of the motor holding brake	🕮 281 🕮 298 🕮 83
			0.0	{0.1 sec}	99.9	During the time set the drive continues to generate a torque. After the set time is expired, the status ”mechanical brake closed” is reached.	
C0196	BRK T rel	0.0				Opening time of the motor holding brake	🕮 281 🕮 298 🕮 83
			0.0	{0.1 sec}	60.0	During the time set the drive can generate the torque set under C0244 against the holding brake. After the set time is expired, the status ”mechanical brake opened” is reached.	
C0199	BuildNumber					Software identification Only display	
C0200	S/W Id					Software identification Only display	
C0201	S/W date					Software release date Only display	
C0202						Service code Only display	
1						Product code 1	
...						...	
4						Product code 4	
C0203	Komm.-No.		x / xxxx / xxxxx			Commission number Only display	
C0204	Serial No.					Serial number Only display	
C0205	PLC Target ID					Identification key Only display	
C0206	Product. date					Production date Only display	
C0207	DL info 1					Download info 1 Only display	
C0208	DL info 2					Download info 2 Only display	
C0209	DL info 3					Download info 3 Only display	
C0220	NSET Tir add	0.000				Acceleration time for the additional setpoint	🕮 275
			0.000	{0.001 s}	999.999	Relating to speed variation 0 rpm ... n_{max} (C0022)	
C0221	NSET Tif add	0.000				Deceleration time for the additional setpoint	🕮 275
			0.000	{0.001 s}	999.999	Relating to speed variation 0 rpm ... n_{max} (C0011)	

Code		Possible settings				IMPORTANT	
No.	Designation	Lenze/ appl.	Selection				
C0241	NSET RFG I = O	1.00				Threshold for message ”Setpoint reached” On the ramp function generator for ● speed setpoint (for ”speed control”) ● torque setpoint (for ”torque control”) input signal = output signal.	🕮 273 🕮 293
			0.00	{0.01 %}	100.00	100 % = n_{max}	
C0244	BRK M set	0.00				Holding torque of the drive against the motor holding brake	🕮 281 🕮 298 🕮 83
			-199.99	{0.01 %}	199.99	Referring to M_{max} (C0057). During the time set in C0196 the drive generates the set torque against the holding brake.	
C0250	FCODE 1 Bit	0				Freely selectable digital signal (1 bit)	🕮 253
			0		1		
C0254	Vp angle CTRL	0.4000				Phase controller gain (V_p)	🕮 279
			0.0000	{0.0001}	3.9999		
C0300 ... C0302	Service Codes					**Only the Lenze service is allowed to make changes!**	
C0304 ... C0310	Service Codes					**Only the Lenze service is allowed to make changes!**	
C0349						Status of DIP switch for MotionBus (CAN) Only display	
1	CAN DIP-SW		0	{1}	63	Node address set on the DIP switch	
2	CAN DIP-SW		0		4	For setting the DIP switches > 4, set the display to 0.	
C0350	CAN address	1				Node address MotionBus (CAN)	🕮 150 🕮 149
			1	{1}	63		
C0351	CAN Baud rate	0				MotionBus (CAN)baud rate	🕮 150
			0	500 kbits/s			
			1	250 kbits/sec			
			2	125 kbits/sec			
			3	50 kbits/sec			
			4	1000 kbits/sec			
C0352	CAN mst	0				MotionBus (CAN) master/slave configuration	🕮 153
			0	Slave		CAN boot-up is not active	
			1	Master		CAN boot up is active	
			2	Master with node guarding			
			3	Slave and heartbeat producer			
			4	Slave with node guarding			

Code		Possible settings				IMPORTANT	
No.	Designation	Lenze/ appl.	Selection				
C0353						Source for system bus node addresses of CAN-IN/CAN-OUT	
			0		1		
1	CAN addr sel	0		CAN node address (C0350)		CAN1_IN/CAN1_OUT addr.	
2	CAN addr sel	0		CAN node address (C0350)		CAN2_IN/CAN2_OUT addr.	
3	CAN addr sel	0		CAN node address (C0350)		CAN3_IN/CAN3_OUT addr.	
			0	C0350 (auto)		Automatically determined by C0350	
			1	C0354 (man.)		Determined by C0354	
C0354						Alternative node addresses for MotionBus (CAN)	📖 152
1	CAN addr.	129	1	{1}	512	Address 2 CAN1_IN	
2	CAN addr.	1				Address 2 CAN1_OUT	
3	CAN addr.	257				Address 2 CAN2_IN	
4	CAN addr.	258				Address 2 CAN2_OUT	
5	CAN addr.	385				Address 2 CAN3_IN	
6	CAN addr.	386				Address 2 CAN3_OUT	
C0355						MotionBus (CAN) identifier Readonly	📖 149
1	CAN Id		1	{1}	2047	Identifier CAN1_IN	
2	CAN Id					Identifier CAN1_OUT	
3	CAN Id					Identifier CAN2_IN	
4	CAN Id					Identifier CAN2_OUT	
5	CAN Id					Identifier CAN3_IN	
6	CAN Id					Identifier CAN3_OUT	
C0356						MotionBus (CAN) time settings	📖 154
1	CAN times	3000	0	{1 ms}	65000	CAN boot-up time: Delay time after mains connection for initialisation through the master.	
2	CAN times	0				CAN2_OUT/CAN3_OUT times: Factor for the task time to send process data telegram. 0 = event-controlled transmission	
3	CAN times	0					
4	CAN times	20				CAN delay time: Delay time for sending telegrams via the process data object	
C0357						MotionBus (CAN) monitoring time for CAN1...3_IN	📖 168
1	CE monit time	3000	1	{1 ms}	65000	CE1 monitoring time	
2	CE monit time	3000				CE2 monitoring time	
3	CE monit time	3000				CE3 monitoring time	
C0358	Reset Node	0				Carry out reset node of MotionBus (CAN)	📖 154
			0	No function			
			1	CAN reset			

Code		Possible settings				IMPORTANT	
No.	Designation	Lenze/ appl.	Selection				
C0359	CAN state	0				Status MotionBus (CAN) Only display	🕮 161
			0	Operational			
			1	Pre-operational			
			2	Warning			
			3	Bus off			
			4	Stopped			
C0360						Telegram counter of MotionBus (CAN), number of telegrams Only display	🕮 161
1	CAN Messages		0	{1}	65535	All sent telegrams	
2	CAN Messages		With a count value > 65535 the counter restarts with 0			All received telegrams	
3	CAN Messages					Sent to CAN1_OUT	
4	CAN Messages					Sent to CAN2_OUT	
5	CAN Messages					Sent to CAN3_OUT	
6	CAN Messages					Sent on parameter data channel 1	
7	CAN Messages					Sent on parameter data channel 2	
8	CAN Messages					Received from CAN1_IN	
9	CAN Messages					Received from CAN2_IN	
10	CAN Messages					Received from CAN3_IN	
11	CAN Messages					Received from parameter data channel 1	
12	CAN Messages					Received from parameter data channel 2	

Code		Possible settings				IMPORTANT	
No.	Designation	Lenze/ appl.	Selection				
C0361						Detected load of the MotionBus (CAN) Only display **A faultless operation is only guaranteed if the total bus load of all connected nodes amounts to a value ≤ 80 %.**	📖 162
1	Load IN/OUT		0	{1 %}	100	All sent telegrams	
2	Load IN/OUT					All received telegrams	
3	Load IN/OUT					Sent to CAN1_OUT	
4	Load IN/OUT					Sent to CAN2_OUT	
5	Load IN/OUT					Sent to CAN3_OUT	
6	Load IN/OUT					Sent on parameter data channel 1	
7	Load IN/OUT					Sent on parameter data channel 2	
8	Load IN/OUT					Received from CAN1_IN	
9	Load IN/OUT					Received from CAN2_IN	
10	Load IN/OUT					Received from CAN3_IN	
11	Load IN/OUT					Received from parameter data channel 1	
12	Load IN/OUT					Received from parameter data channel 2	
C0362	Sync cycle					Time between 2 sync telegrams on the MotionBus (CAN) Only display	📖 155
			1	{1 ms}	30		
C0363	Sync correct.	1				CAN sync correction increment	📖 157
			1	0.2 µs/ms			
			2	0.4 µs/ms			
			3	0.6 µs/ms			
			4	0.8 µs/ms			
			5	1.0 µs/ms			
C0365	DIS:CAN active					Input signal CAN active Only display	
			0	CAN not active			
			1	CAN active			
C0366	Sync Response	1				MotionBus (CAN) Sync response	📖 158
			0	No response			
			1	Response			
C0367	Sync Rx ID	128				MotionBus (CAN) Sync receipt ID	📖 156
			1	{1}	256		
C0368	Sync Tx ID	128				MotionBus (CAN) Sync transmission ID	
			1	{1}	256		
C0369	SyNc Tx time	0				CAN sync transmitting cycle A sync telegram with the identifier set in C0368 is sent with the set cycle time.	📖 155
			0	{1 ms}	65000	0 = switched off	

Code		Possible settings		IMPORTANT	
No.	Designation	Lenze/ appl.	Selection		
[C0370]	SDO Gateway	0		Gateway address Activating remote parameter setting ● When selecting a setting ≠0, all code read/write accesses will be redirected to the system bus device with the corresponding CAN node address. ● The respective code is accessed via parameter data channel 1 of the target device.	🕮 154
			0 {1} 63	0 = remote parameterisation deactivated	
C0371	Gateway Ch.	1		Selection of the gateway channel	
			0 CAN	Use MotionBus (CAN)	
			1 CAN-AUX	Use system bus (CAN)	
C0381	HeartProTime	0		Heartbeat (slave): HeartbeatProducerTime ● Time interval for transmitting the heartbeat message. ● Only relevant if C0352 = 3.	
			0 {1 ms} 65535		
C0382	GuardTime	0		Node Guarding (slave): NodeGuardTime ● Time interval of the status inquiry of the master. ● Only relevant if C0352 = 4.	
			0 {1 ms} 65535		
C0383	LifeTimeFact	0		Node Guarding (slave): NodeLifeTime factor ● Factor for the monitoring time of NodeLifeTime ● NodeLifeTime = C0383 x C0382 (NodeGuardTime) ● Only relevant if C0352 = 4.	
			0 {1} 255		
C0384	Err NodeGuard	0		Node Guarding (slave) ● Reaction if a NodeGuard event occurs. ● Only relevant if C0352 = 4.	
			0 TRIP		
			1 Message		
			2 Warning		
			3 Off		
			4 Fail-QSP		
C0400	DIS: AnalogIn			Signal at analog input Only display	🕮 211
			-199.99 {0.01 %} 199.99		

Code		Possible settings				IMPORTANT	
No.	Designation	Lenze/ appl.	Selection				
[C0416]	Resolver adj.	5				Setting of resolver excitation amplitude	🕮 84
			0	100 %			
			1	80 %			
			2	68 %			
			3	58 %			
			4	50 %			
			5	45 %			
			6	40 %			
			7	37 %			
[C0417]	Resolver cor.	0				Resolver adjustment	🕮 125
			0	Ready			
			1	Start adjustment			
			2	Loading default values			
[C0418]	Test Cur.Ctrl	0				Controller adjustment:	🕮 116
			0	Deactivated		Deactivate test mode	
			1	Activated		Activate test mode	
[C0419]	Enc. setup	110				Encoder selection ● Selection of encoder which is indicated on the nameplate of the Lenze motor. ● The encoder data (C0420, C0421, C0427) is set automatically in accordance with the selection.	🕮 245 🕮 87 🕮 88
			0	COMMON			
			110	IT512-5V		Incremental encoder with TTL level	
			111	IT1024-5V			
			112	IT2048-5V			
			113	IT4096-5V			
			210	IS512-5V		Sin/cos encoder	
			211	IS1024-5V			
			212	IS2048-5V			
			213	IS4096-5V			
			307	AS64-8V		SinCos absolute value encoder with hyperface interface (single-turn) 307, 308, 309 can only be selected using the operating system 7.0 or higher.	
			308	AS128-8V			
			309	AS256-8V			
			310	AS512-8V			
			311	AS1024-8V			
			407	AM64-8V		SinCos absolute value encoder with hyperface interface (multi-turn) 407, 408, 409 can only be selected using the operating system 7.0 or higher.	
			408	AM128-8V			
			409	AM256-8V			
			410	AM512-8V			
			411	AM1024-8V			
[C0420]	Encoder const.	1024				Number of increments of the encoder	🕮 245 🕮 87 🕮 88
			1	{1 inc/rev}	8192	Sets C0419 = 0 (”common”) if the value is altered.	

Code		Possible settings				IMPORTANT	
No.	Designation	Lenze/ appl.	Selection				
[C0421]	Encoder volt	0				Encoder voltage	🕮 245 🕮 87 🕮 88
			0	5.0 V		Sets C0419 = 0 (”common”) if the value is altered.	
			1	5.6 V			
			2	6.3 V			
			3	6.9 V			
			4	7.5 V			
			5	8.1 V			
C0426	DIS: In					Signal at DFIN input Only display	🕮 245
			-32767	{1 rpm}	32767		
[C0427]	Enc. signal	0				Function of the master frequency input signals on X8 (DFIN)	🕮 245 🕮 87 🕮 88
			0	2-phase			
			1	A: speed B: direction			
			2	A or B: speed or direction			
C0428	DFIN TP sel.	0				DFIN selection of zero pulse/touch probe	
			0	Master pulse			
			1	Touch probe			
C0429	TP1 delay	0				Touch probe offset	
			-32767	{1 inc}	32767		
C0431	DFIN TP Edge					DFIN touch probe edge	
			0	Rising edge			
			1	Falling edge			
			2	Rising and falling edge			
			3	Switched off			
C0443	DIS: DIGIN					Input signals at X6 Terminal states are described by binary interpretation Only display	🕮 251
			0	{1}	255		
			Bit 0	DIGIN1		X6/DI1	
			Bit1	DIGIN2		X6/DI2	
			Bit2	DIGIN3		X6/DI3	
			Bit3	DIGIN4		X6/DI4	
			Bit4	DIGIN_safe_standstill		X6/SI1	
			Bit5	free			
			Bit6	DIGIN_CInh		X6/SI2	
			Bit5	free			
C0444						Status of the digital outputs Only display	
1	DIS: DIGOUT		0		1	Status of the digital output X6/DO1	
2	DIS: DIGOUT					Relay control status	

Code		Possible settings				IMPORTANT	
No.	Designation	Lenze/ appl.	Selection				
[C0469]	Fct STP key	2				Function of the STOP key of the keypad **Must not be changed if the ”STOP” key is pressed!**	
			0	Inactive		Without function	
			1	Controller inhibit (CINH)			
			2	Quick stop (QSP)			
C0470						Freely configurable code for digital signals	📖 253
1	FCODE 8bit	0	0	{1}	255	C0470/1 = C0471, bit 0 ... 7	
2	FCODE 8bit	0				C0470/2 = C0471, bit 8 ... 15	
3	FCODE 8bit	0				C0470/3 = C0471, bit 16 ... 23	
4	FCODE 8bit	0				C0470/4 = C0471, bit 24 ... 31	
C0471	FCODE 32bit	0				Hexadecimal 32-bit interpretation of C0470	📖 253
			0	{1}	4294967295		
C0472	FCODE analog					Freely configurable code for relative analog signals	📖 253
1		0.00	-199.99	{0.01 %}	199.99	FCODE_bC472_1_a	
2		0.00				FCODE_bC472_2_a	
3		100.00				FCODE_bC472_3_a	
4		0.00				FCODE_bC472_4_a	
...		...				...	
20		0.00				FCODE_bC472_20_a	
C0473						Freely configurable code for absolute analog signals	📖 253
1	FCODE abs	1	-32767	{1}	32767		
2	FCODE abs	1					
3	FCODE abs	0					
...	...	...					
10	FCODE abs	0					
C0474						Freely configurable code for phase signals	📖 253
1	FCODE PH	0	-2147483647	{1}	2147483647		
...	...	...					
5	FCODE PH	0					
C0475						Freely configurable code for phase difference signals	📖 253
1	FCODE DF	0	-16000	{1 rpm}	16000		
2	FCODE DF	0					

Code		Possible settings				IMPORTANT	
No.	**Designation**	**Lenze/ appl.**	**Selection**				
[C0490]	Feedback pos	0				Selection of feedback system for positioning control **When an absolute value encoder (single-turn, multi-turn) is used, the settings for C0490 and C0495 must be the same.**	📖 84
			0	Resolver at X7		Standard setting	
			1	TTL encoder at X8			
			2	Sin/cos encoder at X8			
			3	Absolute value encoder (single-turn) at X8			
			4	Absolute value encoder (multi-turn) at X8			
[C0491]	X8 in/out	0				Function of X8	📖 245 📖 248 📖 87 📖 88
			0	X8 is input			
			1	X8 is output			
[C0495]	Feedback n	0				Selection of feedback system for speed control **When an absolute value encoder (single-turn, multi-turn) is used, the settings for C0490 and C0495 must be the same.**	📖 84
			0	Resolver at X7		Standard setting	
			1	TTL encoder at X8			
			2	Sin/cos encoder at X8			
			3	Absolute value encoder (single-turn) at X8			
			4	Absolute value encoder (multi-turn) at X8			
C0497	Nact filter	2.0				Time constant of actual speed	
			0.0	{0.1 ms}	50.0	0.0 ms = switched off	
C0504 ... C0509	Service codes					**Only the Lenze service is allowed to make changes!**	
C0510	ProtAppFlash	0				Write-protection application FLASH	
			0	No write protection			
			1	Write protection is active			

Code		Possible settings		IMPORTANT
No.	Designation	Lenze/ appl.	Selection	
C0517				User menu with up to 32 entries
1	User menu	51.00	C0051 MCTRL-NACT	Display of actual speed
2	User menu	54.00	C0054 Imot	Display of motor current
3	User menu	56.00	C0056 MCTRL-MSET2	
4	User menu	0.00	Not assigned	
5	User menu	0.00	Not assigned	
6	User menu	183.00	C0183 Diagnostics	
7	User menu	168.01	C0183 Fail number	Display of current faults
8	User menu	0.00	0 Not assigned	
9	User menu	22.00	C0022 Imax current	Input of maximum output current
10	User menu	0.00	Not assigned	
11	User menu	11.00	C0011 Nmax	Input of the maximum speed
12	User menu	0.00	Not assigned	
13	User menu	0.00	Not assigned	
14	User menu	105.00	C0105 QSP Tif	Input of the deceleration time for quick stop
15	User menu	0.00	Not assigned	
16	User menu	70.00	C0070 Vp speed CTRL	Input of gain for speed controller
17	User menu	71.00	C0071 Tn speed CTRL	Input of integral-action time for speed controller
18	User menu	0.00	Not assigned	
19	User menu	2100.00	C2100 Time slice	Input of time slice of cyclic task
20	User menu	2102.00	C2102 Task switch	Selection of switching function of cyclic task
21	User menu	2104.00	C2104 PLC autorun	Autom. start of the PLC program after mains power-up
22	User menu	2106.00	C2106 Download protect	Write protection PLC program
23	User menu	2108.00	C2108 PLC run/stop	Control PLC program
24	User menu	2111.00	C2111 GDC ID	Creation date of PLC application program
25	User menu	2113.00	C2113 PLC prog name	Name of PLC user program
26	User menu	2115.00	C2115 T-fct Credit	Number of technology units
27	User menu	0.00	Not assigned	
28	User menu	0.00	Not assigned	
29	User menu	0.00	Not assigned	
30	User menu	0.00	Not assigned	
31	User menu	94.00	C0094 Password	
32	User menu	3.00	C0003 Par save	Save parameter set
			0.00 {0.01} 7999.00	• Enter the numbers of the required codes into the subcodes. • Entry in the format xxxx.yy – xxxx = code number – yy = subcode of the code • It is not checked whether the entered code exists.

Code		Possible settings				IMPORTANT	
No.	Designation	Lenze/ appl.	Selection				
[C0540]	X8 Signal out	2				Function of the master frequency output signals on X8 (DFOUT)	🕮 69 🕮 248 🕮 87 🕮 88
			0	Analog → DFOUT			
			1	PH-diff → DFOUT			
			2	EncSim → DFOUT			
C0545	PH offset	0				Phase offset	🕮 248
			0	{1 inc}	65535	1 revolution = 65535 increments	
C0547	DIS: AN-IN					Analog signal on the input of the DFOUT block Only display	🕮 248
			-199.99	{0.00 %}	199.99		
C0549	DIS: DF-IN					Speed on the input of the DFOUT block Only display	🕮 248
			-32767	{1 rpm}	32767		
C0576	nErr Window	100				Monitoring window of the speed control error referring to n_{max}. 100 % = lowest monitoring sensitivity	
			0	{1 %}	100		
C0577	Vp fld weak	1.00				Gain of the field weakening controller V_p	🕮 122
			0.00	{ 0.01}	63.99		
C0578	TN fld weak	4.00				Integral-action time of the field weakening controller V_n	
			0.1	{0.1 ms}	6000.0		
C0579	Monit nErr	3				Configuration of speed control error monitoring	
			0	TRIP			
			1	Message			
			2	Warning			
			3	Off			
			4	FAIL-QSP			
C0580	Monit SD8	3				Configuration of open-circuit monitoring for sin/cos encoders	
			0	TRIP			
			3	Off			
C0581	MONIT EEr	0				Configuration of external fault monitoring ”ExternalFault” (FWM EEr)	🕮 243
			0	TRIP			
			1	Message			
			2	Warning			
			3	Off			
			4	FAIL-QSP			

Code		Possible settings			IMPORTANT	
No.	Designation	Lenze/ appl.	Selection			
C0582	MONIT OH4	2			Configuration of heatsink temperature monitoring Threshold setting in C0122	🕮 170
			0	TRIP		
			2	Warning		
			3	Off		
C0583	MONIT OH3	0			Configuration of motor temperature monitoring via resolver input X7 or encoder input X8	🕮 169
			0	TRIP		
			2	Warning		
			3	Off		
C0584	MONIT OH7	2			Configuration of motor temperature monitoring via resolver input X7 or encoder input X8 Threshold setting in C0121	🕮 169
			0	TRIP		
			2	Warning		
			3	Off		
C0586	MONIT SD2	0			Configuration of resolver monitoring ”ResolverFault” (MCTRL Sd2)	
			0	TRIP		
			2	Warning		
			3	Off		
C0588	MONIT H10/H11	0			Configuration of thermal sensor monitoring (H10, H11) in the controller ”SensFaultTht/SensFaultTid” (FWM H10/H11)	🕮 171
			0	TRIP		
			2	Warning		
			3	Off		
C0591	MONIT CE1	3			Configuration of CAN1_IN error monitoring ”CommErrCANIN1” (CAN CE1)	🕮 168
			0	TRIP		
			2	Warning		
			3	Off		
C0592	MONIT CE2	3			Configuration of CAN2_IN error monitoring ”CommErrCANIN2” (CAN CE2)	🕮 168
			0	TRIP		
			2	Warning		
			3	Off		

Code		Possible settings				IMPORTANT	
No.	Designation	Lenze/ appl.	Selection				
C0593	MONIT CE3	3				Configuration of CAN3_IN error monitoring”CommErrCANIN3” (CAN CE3)	🕮 168
			0	TRIP			
			2	Warning			
			3	Off			
C0594	MONIT SD6	3				Configuration of motor temperature sensor monitoring ”SensorFault” (MCTRL Sd6)	
			0	TRIP			
			2	Warning			
			3	Off			
C0595	MONIT CE4	3				Configuration of system bus (CAN) off monitoring ”BusOffState” (CANMan CE4)	🕮 168
			0	TRIP			
			2	Warning			
			3	Off			
C0596	NMAX limit	5500				Monitoring: Maximum speed of the machine	
			0	{1 rpm}	16000		
C0598	MONIT SD5	3				Configuration of monitoring for master current at X6 < 2 mA ”MastISourceDef”	
			0	TRIP			
			2	Warning			
			3	Off			
C0602	MONIT REL1	3				Configuration of open-circuit monitoring of the relay output	
			0	TRIP			
			3	Off			
C0603	MONIT CE5	3				Configuration of gateway function monitoring	
			0	TRIP			
			2	Warning			
			3	Off			
C0604	MONIT OC7	2				Configuration of early warning I x t, threshold setting in C0123	🕮 172
			0	TRIP			
			2	Warning			
			3	Off			
C0605	MONIT OH5	2				Configuration of early warning of temperature inside the device Threshold setting in C0124	🕮 171
			0	TRIP			
			2	Warning			
			3	Off			

Code		Possible settings				IMPORTANT	
No.	Designation	Lenze/ appl.	Selection				
C0606	MONIT OC8	2				Configuration of I^2xt early warning Threshold setting in C0120	🕮 174
			0	TRIP			
			2	Warning			
			3	Off			
C0607	MONIT NMAX	0				Configuration of maximum speed monitoring	
			0	TRIP			
			2	Warning			
			3	Off			
C0608	ovr. Tx-Queue	2				Fault configuration Transmission memory overflow of free CAN objects	
			0	TRIP			
			1	Message			
			2	Warning			
			3	Off			
			4	FAIL-QSP			
C0609	ovr. Rx-Isr	0				Fault configuration Receipt memory overflow of free CAN objects	
			0	TRIP			
			4	FAIL-QSP			
C0745						**Only the Lenze service is allowed to make changes!** Oscilloscope - internal service	
C0746						**Only the Lenze service is allowed to make changes!** Oscilloscope - internal service	
1							
...							
24							
C0747						**Only the Lenze service is allowed to make changes!** Oscilloscope - internal service	
C0855						Digital process data input words indicated hexadecimally on the AIF interface (AIF1_IN) Read only	🕮 193
1	AIF1 IN bits		0000	{hex}	FFFF	Input word 2 (bit 0 ... 15)	
2	AIF1 IN bits					Input word 3 (bit 0 ... 15)	
C0856						Analog process data input words are indicated decimally on the AIF interface (AIF1_IN) 100.00% = 16384 Read only	🕮 193
1	AIF1 IN words		-199.99	{0.01 %}	199.99	Input word 1	
2	AIF1 IN words					Input word 2	
3	AIF1 IN words					Input word 3	

Code		Possible settings				IMPORTANT	
No.	Designation	Lenze/ appl.	Selection				
C0857	AIF1 IN phi					32 bits of phase information on the AIF interface (AIF1_IN) Read only	📖 193
			-2147483648	{1}	2147483647		
C0858						Analog process data output words indicated decimally on the AIF interface (AIF1_OUT) 100.00% = 16384 Only display	
1	AIF1 OUT words		-199.99	{0.01 %}	199.99	Output word 1	
2	AIF1 OUT words					Output word 2	
3	AIF1 OUT words					Output word 3	
C0859	AIF1 OUT phi					32-bit phase information at the AIF interface (AIF1_OUT) Only display	
			-2147483648	{1}	2147483647		
C0863			0000	{hex}	FFFF	Digital process data input words indicated hexadecimally for MotionBus (CAN) Read only	📖 140 📖 215
1	CAN IN bits		Bit 0	...	Bit15	CAN1_IN: process data input word 1	
2	CAN IN bits		Bit 16	...	Bit 31	CAN1_IN: process data input word 2	
3	CAN IN bits		Bit 0	...	Bit15	CAN2_IN: process data input word 1	
4	CAN IN bits		Bit 16	...	Bit 31	CAN2_IN: process data input word 2	
5	CAN IN bits		Bit 0	...	Bit15	CAN3_IN: process data input word 1	
6	CAN IN bits		Bit 16	...	Bit 31	CAN3_IN: process data input word 2	
C0866						Analog process data input words indicated decimally for MotionBus (CAN) 100.00% = 16384 Read only	📖 140 📖 215
1	CAN IN words		-199.99	{0.01 %}	199.99	CAN1_IN word 1	
2	CAN IN words					CAN1_IN word 2	
3	CAN IN words					CAN1_IN word 3	
4	CAN IN words					CAN2_IN word 1	
5	CAN IN words					CAN2_IN word 2	
6	CAN IN words					CAN2_IN word 3	
7	CAN IN words					CAN2_IN word 4	
8	CAN IN words					CAN3_IN word 1	
9	CAN IN words					CAN3_IN word 2	
10	CAN IN words					CAN3_IN word 3	
11	CAN IN words					CAN3_IN word 4	

Code		**Possible settings**				**IMPORTANT**
No.	**Designation**	**Lenze/ appl.**	**Selection**			
C0867						32 -bit phase information for MotionBus (CAN) Only display
1	CAN IN phi		-2147483648	{1}	2147483647	CAN1_IN
2	CAN IN phi					CAN2_IN
3	CAN IN phi					CAN3_IN
C0868	DIS:OUTx.Wx					Analog process data output words decimally for MotionBus (CAN) 100.00% = 16384 Readonly
1	CAN OUT words		-32768	{1 %}	32768	CAN1_OUT word 1
2	CAN OUT words					CAN1_OUT word 2
3	CAN OUT words					CAN1_OUT word 3
4	CAN OUT words					CAN2_OUT word 1
5	CAN OUT words					CAN2_OUT word 2
6	CAN OUT words					CAN2_OUT word 3
7	CAN OUT words					CAN2_OUT word 4
8	CAN OUT words					CAN3_OUT word 1
9	CAN OUT words					CAN3_OUT word 2
10	CAN OUT words					CAN3_OUT word 3
11	CAN OUT words					CAN3_OUT word 4
C0869						32 -bit phase information for MotionBus (CAN) Only display
1	CAN OUT phi		-2147483648	{1}	2147483647	CAN1_OUT
2	CAN OUT phi					CAN2_OUT
3	CAN OUT phi					CAN3_OUT
C0878						Digital input signals to DCTRL Only display
1	DigInOfDCTRL		0		1	Controller inhibit (CINH) 1
2	DigInOfDCTRL					Controller inhibit (CINH) 2
3	DigInOfDCTRL					TRIP-set
4	DigInOfDCTRL					TRIP-RESET
C0879						
1	Reset CTRL	0		No reset		Reset C0135
2	Reset CTRL	0		No reset		Reset AIF
3	Reset CTRL	0		No reset		Reset CAN
			0	No reset		
			1	Reset		Performs one ”reset”

Code		Possible settings				IMPORTANT	
No.	Designation	Lenze/ appl.	Selection				
C0906						Analog input signals to MCTRL Only display	
1	MCTRL analog		-199.99	{0.01 %}	199.99	Speed controller input	
2	MCTRL analog					Torque setpoint	
3	MCTRL analog					Lower torque limit	
4	MCTRL analog					Upper torque limit	
5	MCTRL analog					Limit of the position controller	
6	MCTRL analog					Speed for activating the torque limitation	
7	MCTRL analog					Field weakening	
8	MCTRL analog					Integrator of the speed controller	
9	MCTRL analog					P adaptation of the position controller	
C0907						Digital input signals to MCTRL Only display	
1	MCTRL digital		0		1	Activating position controller	
2	MCTRL digital					Speed control or torque control	
3	MCTRL digital					Set quick stop (QSP)	
4	MCTRL digital					Loading integral-action component of the speed controller	
C0908	MCTRL PosSet					Set phase signal 1 revolution = 65536 increments Only display	
			-2147483648	{1 inc}	2147483647		
C0909	speed limit	1				Limitation of direction of rotation for speed setpoint	
			1	-175 ... +175 %			
			2	0 ... +175 %			
			3	-175 ... 0 %			
C0910	TP delay	0				Touch probe delay, compensation of delay times of the TP signal source X6/DI2	
			-32767	{1 inc}	32767	1 inc ≡ approx. 60 μs	
C0911	MCTRL TP sel.	0				MCTRL selection zero pulse/touch probe	
			0	Master pulse			
			1	Touch probe			
C0912	MCTRL TP Edge	0				MCTRL touch probe edge	
			0	Rising edge			
			1	Falling edge			
			2	Rising and falling edge			
			3	Switched off			
C1120	Sync mode	0				Sync signal source	
			0	Off		Off	
			1	CAN Sync		Sync connection via MotionBus (CAN)	🕮 159
			2	Terminal sync		Sync connection via terminal	🕮 160

Code		Possible settings				IMPORTANT	
No.	Designation	Lenze/ appl.	Selection				
C1121	Sync cycle	2				Synchronisation cycle	📖 156
			1	{1 ms}	13		
C1122	Sync phase	0.046				Synchronisation phase	📖 156
			0.000	{0.001 ms}	6.500		
C1123	Sync window	0.010				Synchronisation window	📖 157
			0.000	{0.001 ms}	6.500		
C1190	MPTC mode	0				Selection of PTC evaluation for motor	
			0	Standard			
			1	Characterist.			
C1191						Selection of PTC temperature characteristic	
1	Char.: temp	25	0	{1 °C}	255	Temperature 1	
2	Char.: temp	150				Temperature 2	
C1192						Selection of resistance characteristic for PTC	
1	Char.: OHM	1000	0	{1 Ω}	30000	Resistance at temperature 1	
2	Char.: OHM	2225				Resistance at temperature 2	
C1798						Lenze-internal Only display	
1							
...							
13							
C1810	SW ID LECOM					Software identification LECOM Only display	
C1811	SW date LECOM					Software creation date LECOM Only display	
C2100	Time slice	13				Time slice for cyclic task	
			6	{1 ms}	26		
C2102	Task switch	0				Change-over: System task →cycl. task (PLC)	
			0	Time slice		No change-over	
			1	Time slice + end of PLC_PRG			
			2	Time slice + end of PLC_PRG + end of system task			
C2104	PLC Autorun	0				Automatic start of PLC program after power-up	
			0	Off			
			1	On			
C2106	Downl.protect	0				Write protection PLC program	
			0	not protected			
			1	protected			
			2	Reserved			
C2108	PLC run/stop	0				Control PLC program	
			0	No function			
			1	Run			
			2	Stop			
			3	Reset			

Code		Possible settings				IMPORTANT
No.	Designation	Lenze/ appl.	Selection			
C2111	GDC Id					Creation date of PLC application program Only display
C2113	PLC Prog Name					Name of PLC user program Only display
C2115	T-Fkt Credit	0				Number of technology units
C2116	CreditPinCode	0				Code for technology units if service is required (please consult Lenze)
			0	{1}	4294967295	
C2117	Full Credit	0				Service code
C2118	ParWriteChan.	0				CAN object for L_ParRead and L_ParWrite
			0	Process data channel (CAN1...3_IN/CAN1...3_OUT)		
			1	Parameter data channel 2		
C2120	AIF: Control	0				AIF-CAN: control word
			0	{1}	255	Binary interpretation reflects bit states
			0	No command		**Note:** The MSB (bit 7) of the control word automatically changes its state with every access to the code. Observe this when interpreting the data!
			1	Read XCAN codes + reinitialisation		
			2	Read XCAN code		
			10	Read XCAN C2356/1 ... 4		
			11	Read XCAN C2357		
			12	Read XCAN C2375		
			13	Read XCAN C2376 ... C2378		
			14	Read XCAN C2382		
			255	Not assigned		
C2121	AIF:State					AIF-CAN: Status ● For detailed information: See description of the corresponding fieldbus module. Only display
			1	{1}	255	Binary interpretation reflects bit states
			Bit 0	XCAN1_IN monitoring time		
			Bit1	XCAN2_IN monitoring time		
			Bit2	XCAN3_IN monitoring time		
			Bit3	XCAN bus off		
			Bit 4	XCAN operational		
			Bit 5	XCAN pre-operational		
			Bit6	XCAN warning		
			Bit 7	Internally assigned		
C2130	FileNameAddDa		Symbolic data name			Information on the additional data that have been transmitted together with the application program. Only display
C2131	Type AddData		Specification identification of the data			
C2132	VersionAddData		Data version			
C2133	TimeStamp		Time stamp of the data			

Code		Possible settings				IMPORTANT
No.	Designation	Lenze/ appl.	Selection			
C2350	XCAN address	1				**XCAN = system bus (CAN) on AIF** Node address XCAN
			1	{1}	63	
C2351	XCAN baud rate	0				Baud rate XCAN
			0	500 kbit/s		
			1	250 kbit/s		
			2	125 kbit/s		
			3	50 kbit/s		
			4	1000 kbit/s		
C2352	XCAN mst	0				Setting master operation XCAN
			0	Slave		
			1	Master		
C2353						Source for system bus node addresses of XCAN_IN/XCAN_OUT
1	XCAN addr sel	0		CAN node address (C2350)		XCAN1_IN/XCAN1_OUT addr.
2	XCAN addr sel	0		CAN node address (C2350)		XCAN2_IN/XCAN2_OUT addr.
3	XCAN addr sel	0		CAN node address (C2350)		XCAN3_IN/XCAN3_OUT addr.
			0	C2350 (auto)		Automatically determined by C2350
			1	C2354 (man.)		Determined by C2354
C2354						XCAN: altern. node addresses for XCAN_IN/XCAN_OUT
1	XCAN addr.	129	1	{1}	512	XCAN1_IN address 2
2	XCAN addr.	1				XCAN1_OUT address 2
3	XCAN addr.	257				XCAN2_IN address 2
4	XCAN addr.	258				XCAN2_OUT address 2
5	XCAN addr.	385				XCAN3_IN address 2
6	XCAN addr.	386				XCAN3_OUT address 2
C2355						Identifier for XCAN_IN/XCAN_OUT Only display
1	XCAN Id		1	{1}	2047	Identifier XCAN1_IN
2	XCAN Id					Identifier XCAN1_OUT
3	XCAN Id					Identifier XCAN2_IN
4	XCAN Id					Identifier XCAN2_OUT
5	XCAN Id					Identifier XCAN3_IN
6	XCAN Id					Identifier XCAN3_OUT
C2356						Time settings for XCAN
1	XCAN times	3000	0	{1 ms}	65000	XCAN boot-up time
2	XCAN times	0				XCAN2_OUT/XCAN3_OUT times: Factor for the task time to send process data object.
3	XCAN times	0				
4	XCAN times	0				
5	XCAN times	0				XCAN delay time

Code		Possible settings				IMPORTANT
No.	Designation	Lenze/ appl.	Selection			
C2357						Monitoring time for XCAN process data input objects
1	CE monit time	3000	1	{1 ms}	65000	XCAN1_IN monitoring time
2	CE monit time	3000				XCAN2_IN monitoring time
3	CE monit time	3000				XCAN3_IN monitoring time
4	CE monit time	1				Bus off
C2359	AIF HW Set.	0				
			0	{1}	65535	
C2367	Sync Rx ID	128				XCAN receipt identifier of the sync telegram
			1	{1}	2047	
C2368	Sync Tx ID	128				XCAN transmission identifier of the sync telegram
			1	{1}	2047	
C2373						Sync counter
1	Sync Rate IN	1	1	{1}	240	XCAN1_IN
2	Sync Rate IN	1				XCAN2_IN
3	Sync Rate IN	1				XCAN3_IN
C2374						Sync counter
1	Sync Rate OUT	1	1	{1}	240	XCAN1_OUT
2	Sync Rate OUT	1				XCAN2_OUT
3	Sync Rate OUT	1				XCAN3_OUT
C2375						TX mode for XCANx_OUT
1	XCAN Tx-Mode	0		Response to sync		XCAN1_OUT
2	XCAN Tx-Mode	0		Response to sync		XCAN2_OUT
3	XCAN Tx-Mode	0		Response to sync		XCAN3_OUT
			0	Response to sync		
			1	No response to sync		
			2	Event		
			3	Event, cycle C2356 superimposed		
C2376						XCAN1_OUT mask
1	XCAN1 Mask	FFFF	0000	{hex}	FFFF	Mask for process data output word 1
2	XCAN1 Mask	FFFF				Mask for process data output word 2
3	XCAN1 Mask	FFFF				Mask for process data output word 3
4	XCAN1 Mask	FFFF				Mask for process data output word 4

Code		Possible settings				IMPORTANT	
No.	Designation	Lenze/ appl.	Selection				
C2377						XCAN2_OUT mask	
1	XCAN2 Mask	FFFF	0000	{hex}	FFFF	Mask for process data output word 1	
2	XCAN2 Mask	FFFF				Mask for process data output word 2	
3	XCAN2 Mask	FFFF				Mask for process data output word 3	
4	XCAN2 Mask	FFFF				Mask for process data output word 4	
C2378						XCAN3_OUT mask	
1	XCAN3 Mask	FFFF	0000	{hex}	FFFF	Mask for process data output word 1	
2	XCAN3 Mask	FFFF				Mask for process data output word 2	
3	XCAN3 Mask	FFFF				Mask for process data output word 3	
4	XCAN3 Mask	FFFF				Mask for process data output word 4	
C2382						Configuration of monitoring XCAN (no telegrams received)	
1	XCAN Conf. CE	0		Off		XCAN1_IN	
2	XCAN Conf. CE	0		Off		XCAN2_IN	
3	XCAN Conf. CE	0		Off		XCAN3_IN	
4	XCAN Conf. CE	0		Off		Bus off	
5	XCAN Conf. CE	0		Off		Life Guarding Event	
			0	Off			
			1	Controller inhibit (CINH)			
			2	Quick stop (QSP)			
C2450	CANa address	1				Node address of system bus (CAN)	📖 150 📖 149
			1	{1}	63		
C2451	CAN baud rate	0				System bus (CAN) baud rate	📖 150
			0	500 kbits/s			
			1	250 kbits/sec			
			2	125 kbits/sec			
			3	50 kbits/sec			
			4	1000 kbits/sec			
C2452	CANa mst	0				System bus (CAN) master/slave configuration	📖 153
			0	Slave			
			1	Master			
C2453						Source for system bus (CAN) node addresses	📖 152
1	CANa addr sel	0		CAN node address (C2450)		Address CANaux1_IN/OUT	
2	CANa addr sel	0		CAN node address (C2450)		Address CANaux2_IN/OUT	
3	CANa addr sel	0		CAN node address (C2450)		Address CANaux3_IN/OUT	
			0	C2450 (auto)		Automatically determined by C2450	
			1	C2454 (man.)		Determined by C2454	

Code		Possible settings				IMPORTANT	
No.	Designation	Lenze/ appl.	Selection				
C2454						Alternative node addresses for system bus (CAN)	🕮 152
1	CANa addr.	129	1	{1}	512	CANaux1_IN addr. 2	
2	CANa addr.	1				CANaux1_OUT addr. 2	
3	CANa addr.	257				CANaux2_IN addr. 2	
4	CANa addr.	258				CANaux2_OUT addr. 2	
5	CANa addr.	385				CANaux3_IN addr. 2	
6	CANa addr.	386				CANaux3_OUT addr. 2	
C2455						System bus (CAN) identifier Readonly	🕮 149
1	CANa Id		1	{1}	2047	Identifier CANaux1_IN	
2	CANa Id					Identifier CANaux1_OUT	
3	CANa Id					Identifier CANaux2_IN	
4	CANa Id					Identifier CANaux2_OUT	
5	CANa Id					Identifier CANaux3_IN	
6	CANa Id					Identifier CANaux3_OUT	
C2456						System bus (CAN) time settings	🕮 154
1	CANa times	3000	0	{1 ms}	65000	CAN-AUX boot-up time	
2	CANa times	0				CANaux2_OUT/CANaux3_OUT times: Factor for the task time to send process data object.	
3	CANa times	0					
4	CANa times	20				CAN-AUX delay time	
C2457						System bus (CAN) monitoring time for CANaux1...3_IN	🕮 168
1	CE monit time	3000	1	{1 ms}	65000	CE11 monitoring time	
2	CE monit time	3000				CE12 monitoring time	
3	CE monit time	3000				CE13 monitoring time	
C2458	Reset node	0				Execute reset node of system bus (CAN)	🕮 154
			0	No function			
			1	CAN-AUX reset			
C2459	CANa state	0				System bus (CAN) status Only display	🕮 161
			0	Operational			
			1	Pre-operational			
			2	Warning			
			3	Bus off			

Code		Possible settings				IMPORTANT	
No.	Designation	Lenze/appl.	Selection				
C2460						Telegram counter of system bus (CAN), number of telegrams Only display	🕮 161
1	CANa Messages		0	{1}	65535	All sent telegrams	
2	CANa Messages		With a count value > 65535 the counter restarts with 0			All received telegrams	
3	CANa Messages					Sent to CANaux1_OUT	
4	CANa Messages					Sent to CANaux2_OUT	
5	CANa Messages					Sent to CANaux3_OUT	
6	CANa Messages					Sent on parameter data channel 1	
7	CANa Messages					Sent on parameter data channel 2	
8	CANa Messages					Received from CANaux1_IN	
9	CANa Messages					Received from CANaux2_IN	
10	CANa Messages					Received from CANaux3_IN	
11	CANa Messages					Received from parameter data channel 1	
12	CANa Messages					Received from parameter data channel 2	
C2461						Detected load of the system bus (CAN) Only display **A faultless operation is only guaranteed if the total bus load of all connected nodes amounts to a value < 80 %!**	🕮 162
1	Load IN/OUT		0	{1 %}	100	All sent telegrams	
2	Load IN/OUT					All received telegrams	
3	Load IN/OUT					Sent to CANaux1_OUT	
4	Load IN/OUT					Sent on CANaux2_OUT	
5	Load IN/OUT					Sent on CANaux3_OUT	
6	Load IN/OUT					Sent on parameter data channel 1	
7	Load IN/OUT					Sent on parameter data channel 2	
8	Load IN/OUT					Received from CANaux1_IN	
9	Load IN/OUT					Received from CANaux2_IN	
10	Load IN/OUT					Received from CANaux3_IN	
11	Load IN/OUT					Received from parameter data channel 1	
12	Load IN/OUT					Received from parameter data channel 2	
C2466	Sync Response	1				MotionBus (CAN) sync response	🕮 158
			0	No response			
			1	Response			

Code		Possible settings				IMPORTANT	
No.	Designation	Lenze/ appl.	Selection				
C2467	Sync Rx ID	128				MotionBus (CAN) Sync receipt ID	📖 156
			1	{1}	256		
C2468	Sync Tx ID	128				MotionBus (CAN) Sync transmission ID	📖 158
			1	{1}	256		
C2469	Sync Tx Time	0				MotionBus (CAN) sync transmission cycle A sync telegram with the identifier set in C0368 is sent with the set cycle time.	📖 154 📖 158
			0	{1 ms}	65000	0 = switched off	
C2481	MONIT CE11	3				Configuration of monitoring CANaux1_IN error ”CommErrCANauxIN1” (CAN-AUX CE11)	📖 168
			0	TRIP			
			2	Warning			
			3	Off			
C2482	MONIT CE12	3				Configuration of monitoring CANaux2_IN error ”CommErrCANauxIN2” (CAN-AUX CE12)	📖 168
			0	TRIP			
			2	Warning			
			3	Off			
C2483	MONIT CE13	3				Configuration of monitoring CANaux3_IN error ”CommErrCANauxIN3” (CAN-AUX CE13)	📖 168
			0	TRIP			
			2	Warning			
			3	Off			
C2484	MONIT CE14	3				Configuration of monitoring CAN-AUX Off ”BusOffState” (CANauxMan CE14)	📖 168
			0	TRIP			
			2	Warning			
			3	Off			
C2485	MONIT CE15	3				Configuration of gateway function	
			0	TRIP			
			2	Warning			
			3	Off			

Code		Possible settings				IMPORTANT
No.	**Designation**	**Lenze/ appl.**	**Selection**			
C2491						Process data input words - system bus (CAN), indicated hexadecimally (CAN) Only display
1	CANa IN bits		0	{1 hex}	FFFF	CANaux1_IN (bit 0 ... 15)
2	CANa IN bits					CANaux1_IN (bit 16 ... 31)
3	CANa IN bits					CANaux2_IN (bit 0 ... 15)
4	CANa IN bits					CANaux2_IN (bit 16 ... 31)
5	CANa IN bits					CANaux3_IN (bit 0 ... 15)
6	CANa IN bits					CANaux3_IN (bit 16 ... 31)
C2492						Process data input words - system bus (CAN) 100.00% = 16384 Only display
1	CANa IN words		-199.99	{0.01 %}	199.99	CANaux1_IN word 1
2	CANa IN words					CANaux1_IN word 2
3	CANa IN words					CANaux1_IN word 3
4	CANa IN words					CANaux2_IN word 1
5	CANa IN words					CANaux2_IN word 2
6	CANa IN words					CANaux2_IN word 3
7	CANa IN words					CANaux2_IN word 4
8	CANa IN words					CANaux3_IN word 1
9	CANa IN words					CANaux3_IN word 2
10	CANa IN words					CANaux3_IN word 3
11	CANa IN words					CANaux3_IN word 4

Code		Possible settings				IMPORTANT	
No.	Designation	Lenze/ appl.	Selection				
C2493						Process data output words - system bus (CAN) 100.00% = 16384 Only display	
1	CANa OUT words		-199.99	{0.01 %}	199.99	CANaux1_OUT word 1	
2	CANa OUT words					CANaux1_OUT word 2	
3	CANa OUT words					CANaux1_OUT word 3	
4	CANa OUT words					CANaux2_OUT word 1	
5	CANa OUT words					CANaux2_OUT word 2	
6	CANa OUT words					CANaux2_OUT word 3	
7	CANa OUT words					CANaux2_OUT word 4	
8	CANa OUT words					CANaux3_OUT word 1	
9	CANa OUT words					CANaux3_OUT word 2	
10	CANa OUT words					CANaux3_OUT word 3	
11	CANa OUT words					CANaux3_OUT word 4	
C2500						PLC flag 1 ... 255	
			0	{1}	65535		
C2501						PLC flag 256 ... 512	
			0	{1}	65535		
3005	ControlMode	0				Selection of operating modes	🕮 94
			0	Common		Display with changed standard application	
			100	None		Reset of all signal connections	
			1000	SpeedTerm		Speed-controlled, setpoint via analog input	🕮 262
			1003	SpeedAIF		Speed-controlled, setpoint via AIF	
			1005	SpeedCAN		Speed-controlled, setpoint via MotionBus (CAN)	
			4000	TorqueTerm		Torque-controlled, setpoint via analog input	🕮 284
			4003	TorqueAIF		Torque-controlled, setpoint via AIF	
			4005	TorqueCAN		Torque-controlled, setpoint via MotionBus (CAN)	
C3998	BuildNo					Build no. of the application software Read only	
C3999	Version					Version of the application software Read only	

Code		Possible settings		IMPORTANT	
No.	Designation	Lenze/ appl.	Selection		
C6110			0 (= FALSE) 1 (= TRUE)	Display of the digital output signals to the fieldbus module	📖 196
1	AIF-DigOut			AIF1Out-Bit0 (bit 0)	
2	AIF-DigOut			AIF1Out-Bit1 (bit 1)	
3	AIF-DigOut			AIF1Out-Bit2 (bit 2)	
4	AIF-DigOut			AIF1Out-Bit3 (bit 3)	
5	AIF-DigOut			AIF1Out-Bit4 (bit 4)	
6	AIF-DigOut			AIF1Out-Bit5 (bit 5)	
7	AIF-DigOut			AIF1Out-Bit6 (bit 6)	
8	AIF-DigOut			AIF1Out-Bit7 (bit 7)	
9	AIF-DigOut			AIF1Out-Bit8 (bit 8)	
10	AIF-DigOut			AIF1Out-Bit9 (bit 9)	
11	AIF-DigOut			AIF1Out-Bit10 (bit 10)	
12	AIF-DigOut			AIF1Out-Bit11 (bit 11)	
13	AIF-DigOut			AIF1Out-Bit12 (bit 12)	
14	AIF-DigOut			AIF1Out-Bit13 (bit 13)	
15	AIF-DigOut			AIF1Out-Bit14 (bit 14)	
16	AIF-DigOut			AIF1Out-Bit15 (bit 15)	
[C6111]				Selection of the digital output signals to the fieldbus module	
1	AIF1Out-dig	1000	0 (FALSE, not assigned)	Source for AIF1Out-Bit0 (bit 0)	📖 196
2	AIF1Out-dig	1000	0 (FALSE, not assigned)	Source for AIF1Out-Bit1 (bit 1)	
3	AIF1Out-dig	1000	0 (FALSE, not assigned)	Source for AIF1Out-Bit2 (bit 2)	
4	AIF1Out-dig	1000	0 (FALSE, not assigned)	Source for AIF1Out-Bit3 (bit 3)	
5	AIF1Out-dig	1000	0 (FALSE, not assigned)	Source for AIF1Out-Bit4 (bit 4)	
6	AIF1Out-dig	1000	0 (FALSE, not assigned)	Source for AIF1Out-Bit5 (bit 5)	
7	AIF1Out-dig	1000	0 (FALSE, not assigned)	Source for AIF1Out-Bit6 (bit 6)	
8	AIF1Out-dig	1000	0 (FALSE, not assigned)	Source for AIF1Out-Bit7 (bit 7)	
9	AIF1Out-dig	1000	0 (FALSE, not assigned)	Source for AIF1Out-Bit8 (bit 8)	
10	AIF1Out-dig	1000	0 (FALSE, not assigned)	Source for AIF1Out-Bit9 (bit 9)	
11	AIF1Out-dig	1000	0 (FALSE, not assigned)	Source for AIF1Out-Bit10 (bit 10)	
12	AIF1Out-dig	1000	0 (FALSE, not assigned)	Source for AIF1Out-Bit11 (bit 11)	
13	AIF1Out-dig	1000	0 (FALSE, not assigned)	Source for AIF1Out-Bit12 (bit 12)	
14	AIF1Out-dig	1000	0 (FALSE, not assigned)	Source for AIF1Out-Bit13 (bit 13)	
15	AIF1Out-dig	1000	0 (FALSE, not assigned)	Source for AIF1Out-Bit14 (bit 14)	
16	AIF1Out-dig	1000	0 (FALSE, not assigned)	Source for AIF1Out-Bit15 (bit 15)	
			For possible signals see ”selection list - digital signals”		📖 362

Code		Possible settings		IMPORTANT	
No.	Designation	Lenze/ appl.	Selection		
C6130			-32768 {1} 32767	Display of the analog output signals to the fieldbus module	
1	AIF-AnOut			Output word AIF1Out-DctrlStat	📖 196
2	AIF-AnOut			Output word AIF1Out-W1	
3	AIF-AnOut			Output word AIF1Out-W2	
4	AIF-AnOut			Output word AIF1Out-W3	
5	AIF-AnOut			Output word AIF2Out-W0	📖 203
6	AIF-AnOut			Output word AIF2Out-W1	
7	AIF-AnOut			Output word AIF2Out-W2	
8	AIF-AnOut			Output word AIF2Out-W3	
9	AIF-AnOut			Output word AIF3Out-W0	📖 208
10	AIF-AnOut			Output word AIF3Out-W1	
11	AIF-AnOut			Output word AIF3Out-W2	
12	AIF-AnOut			Output word AIF3Out-W3	
[C6131]				Selection of the analog output signals to the fieldbus module	
1	AIF1Out-anl	1000	FIXED 0 % (not assigned)	Source for output word AIF1Out-DctrlStat	📖 196
2	AIF1Out-anl	1000	FIXED 0 % (not assigned)	Source for output word AIF1Out-W1	
3	AIF1Out-anl	1000	FIXED 0 % (not assigned)	Source for output word AIF1Out-W2	
4	AIF1Out-anl	1000	FIXED 0 % (not assigned)	Source for output word AIF1Out-W3	
5	AIF2Out-anl	1000	FIXED 0 % (not assigned)	Source for output word AIF2Out-W0	📖 203
6	AIF2Out-anl	1000	FIXED 0 % (not assigned)	Source for output word AIF2Out-W1	
7	AIF2Out-anl	1000	FIXED 0 % (not assigned)	Source for output word AIF2Out-W2	
8	AIF2Out-anl	1000	FIXED 0 % (not assigned)	Source for output word AIF2Out-W3	
9	AIF3Out-anl	1000	FIXED 0 % (not assigned)	Source for output word AIF3Out-W0	📖 208
10	AIF3Out-anl	1000	FIXED 0 % (not assigned)	Source for output word AIF3Out-W1	
11	AIF3Out-anl	1000	FIXED 0 % (not assigned)	Source for output word AIF3Out-W2	
12	AIF3Out-anl	1000	FIXED 0 % (not assigned)	Source for output word AIF3Out-W3	
			For possible signals see ”selection list - analog signals”		📖 371
C6150			-2147483647 {1} 2147483647	Display of the phase output signals to the fieldbus module	
1	AIF-PhiOut			Output double word AIF1Out-W2/W3	📖 196
2	AIF-PhiOut			Output double word AIF2Out-W0/W1	📖 203
3	AIF-PhiOut			Output double word AIF3Out-W0/W1	📖 208

Code		Possible settings			IMPORTANT	
No.	Designation	Lenze/ appl.	Selection			
[C6151]					Selection of the phase output signals to the fieldbus module	
1	AIF1Out-phi	1000		FIXED 0 (not assigned)	Source for output double word AIF1Out-W2/W3	🕮 196
2	AIF2Out-phi	1000		FIXED 0 (not assigned)	Source for output double word AIF2Out-W0/W1	🕮 203
3	AIF3Out-phi	1000		FIXED 0 (not assigned)	Source for output double word AIF3Out-W0/W1	🕮 208
			For possible signals see ”selection list - phase signals”			🕮 374
C6154	AIF1PdoMap	0			Assignment of the 8 byte user data of the AIF1Out function block to the fieldbus module	🕮 196
			0	W2=Int W3=Int	Byte 1, byte 2 = AIF1Out-DctrlStat	
					Byte 3, byte 4 = AIF1Out-W1	
					Byte 5, byte 6 = AIF1Out-W2	
					Byte 7, byte 8 = AIF1Out-W3	
			1	W2 / W3=Dint	Byte 1, byte 2 = AIF1Out-DctrlStat	
					Byte 3, byte 4 = AIF1Out-W1	
					Byte 5, byte 6 = AIF1Out-W2/W3	
					Byte 7, byte 8 = AIF1Out-W2/W3	
			2	W2=Int W3=bit	Byte 1, byte 2 = AIF1Out-DctrlStat	
					Byte 3, byte 4 = AIF1Out-W1	
					Byte 5, byte 6 = AIF1Out-W2	
					Byte 7, byte 8 = AIF1Out-Bit0...Bit15	
			3	W2=Bit W3=Int	Byte 1, byte 2 = AIF1Out-DctrlStat	
					Byte 3, byte 4 = AIF1Out-W1	
					Byte 5, byte 6 = AIF1Out-Bit0...Bit15	
					Byte 7, byte 8 = AIF1Out-W3	
			4	W1=Bit W23=I	Byte 1, byte 2 = AIF1Out-DctrlStat	
					Byte 3, byte 4 = AIF1Out-Bit0...Bit15	
					Byte 5, byte 6 = AIF1Out-W2	
					Byte 7, byte 8 = AIF1Out-W3	
			5	W1=Bit W23=Di	Byte 1, byte 2 = AIF1Out-DctrlStat	
					Byte 3, byte 4 = AIF1Out-Bit0...Bit15	
					Byte 5, byte 6 = AIF1Out-W2/W3	
					Byte 7, byte 8 = AIF1Out-W2/W3	

Code		Possible settings			IMPORTANT	
No.	Designation	Lenze/ appl.	Selection			
C6155	AIF2PdoMap	0			Assignment of the 8 byte user data of the AIF2Out function block to the fieldbus module	🕮 203
			0	W0=Int W1=Int	Byte 1, byte 2 = AIF2Out-W0	
					Byte 3, byte 4 = AIF2Out-W1	
					Byte 5, byte 6 = AIF2Out-W2	
					Byte 7, byte 8 = AIF2Out-W3	
			1	W0 / W1=Dint	Byte 1, byte 2 = AIF2Out-W0/W1	
					Byte 3, byte 4 = AIF2Out-W0/W1	
					Byte 5, byte 6 = AIF2Out-W2	
					Byte 7, byte 8 = AIF2Out-W3	
C6156	AIF3PdoMap	0			Assignment of the 8 byte user data of the AIF3Out function block to the fieldbus module	🕮 208
			0	W0=Int W1=Int	Byte 1, byte 2 = AIF3Out-W0	
					Byte 3, byte 4 = AIF3Out-W1	
					Byte 5, byte 6 = AIF3Out-W2	
					Byte 7, byte 8 = AIF3Out-W3	
			1	W0 / W1=Dint	Byte 1, byte 2 = AIF3Out-W0/W1	
					Byte 3, byte 4 = AIF3Out-W0/W1	
					Byte 5, byte 6 = AIF3Out-W2	
					Byte 7, byte 8 = AIF3Out-W3	
C6210					Display of the digital output signals to the MotionBus (CAN)	
			0 (= FALSE)	1 (= TRUE)		
1	CAN-DigOut				CAN1Out-Bit0 (bit 0)	🕮 218
2	CAN-DigOut				CAN1Out-Bit1 (bit 1)	
3	CAN-DigOut				CAN1Out-Bit2 (bit 2)	
4	CAN-DigOut				CAN1Out-Bit3 (bit 3)	
5	CAN-DigOut				CAN1Out-Bit4 (bit 4)	
6	CAN-DigOut				CAN1Out-Bit5 (bit 5)	
7	CAN-DigOut				CAN1Out-Bit6 (bit 6)	
8	CAN-DigOut				CAN1Out-Bit7 (bit 7)	
9	CAN-DigOut				CAN1Out-Bit8 (bit 8)	
10	CAN-DigOut				CAN1Out-Bit9 (bit 9)	
11	CAN-DigOut				CAN1Out-Bit10 (bit 10)	
12	CAN-DigOut				CAN1Out-Bit11 (bit 11)	
13	CAN-DigOut				CAN1Out-Bit12 (bit 12)	
14	CAN-DigOut				CAN1Out-Bit13 (bit 13)	
15	CAN-DigOut				CAN1Out-Bit14 (bit 14)	
16	CAN-DigOut				CAN1Out-Bit15 (bit 15)	
17	CAN-DigOut				CANSync-ResetSyncForInterpolatord	🕮 212
18	CAN-DigOut				CAN-ResetNode	
19	CAN-DigOut				CAN-TxCan2Synchronized	
20	CAN-DigOut				CAN-TxCan3Synchronized	

Code		Possible settings		IMPORTANT	
No.	Designation	Lenze/ appl.	Selection		
[C6211]				Selection of the digital output signals to the MotionBus (CAN)	
1	CAN1Out-dig	1000	0 (FALSE, not assigned)	Source for CAN1Out-Bit0 (bit 0)	🕮 218
2	CAN1Out-dig	1000	0 (FALSE, not assigned)	Source for CAN1Out-Bit1 (bit 1)	
3	CAN1Out-dig	1000	0 (FALSE, not assigned)	Source for CAN1Out-Bit2 (bit 2)	
4	CAN1Out-dig	1000	0 (FALSE, not assigned)	Source for CAN1Out-Bit3 (bit 3)	
5	CAN1Out-dig	1000	0 (FALSE, not assigned)	Source for CAN1Out-Bit4 (bit 4)	
6	CAN1Out-dig	1000	0 (FALSE, not assigned)	Source for CAN1Out-Bit5 (bit 5)	
7	CAN1Out-dig	1000	0 (FALSE, not assigned)	Source for CAN1Out-Bit6 (bit 6)	
8	CAN1Out-dig	1000	0 (FALSE, not assigned)	Source for CAN1Out-Bit7 (bit 7)	
9	CAN1Out-dig	1000	0 (FALSE, not assigned)	Source for CAN1Out-Bit8 (bit 8)	
10	CAN1Out-dig	1000	0 (FALSE, not assigned)	Source for CAN1Out-Bit9 (bit 9)	
11	CAN1Out-dig	1000	0 (FALSE, not assigned)	Source for CAN1Out-Bit10 (bit 10)	
12	CAN1Out-dig	1000	0 (FALSE, not assigned)	Source for CAN1Out-Bit11 (bit 11)	
13	CAN1Out-dig	1000	0 (FALSE, not assigned)	Source for CAN1Out-Bit12 (bit 12)	
14	CAN1Out-dig	1000	0 (FALSE, not assigned)	Source for CAN1Out-Bit13 (bit 13)	
15	CAN1Out-dig	1000	0 (FALSE, not assigned)	Source for CAN1Out-Bit14 (bit 14)	
16	CAN1Out-dig	1000	0 (FALSE, not assigned)	Source for CAN1Out-Bit15 (bit 15)	
17	CAN1Out-dig	1000	0 (FALSE, not assigned)	Source for CANSync-ResetSyncForInterpolatord	🕮 212
18	CAN1Out-dig	1000	0 (FALSE, not assigned)	Source for CAN reset node	
19	CAN1Out-dig	1000	0 (FALSE, not assigned)	Source for CAN-TxCan2Synchronized	
20	CAN1Out-dig	1000	0 (FALSE, not assigned)	Source for CAN-TxCan3Synchronized	
			For possible signals see ”selection list - digital signals”		🕮 362
C6230			-32768 {1} 32767	Display of the analog output signals to the MotionBus (CAN)	
1	CAN-AnOut			Output word CAN1Out-DctrlStat	🕮 218
2	CAN-AnOut			Output word CAN1Out-W1	
3	CAN-AnOut			Output word CAN1Out-W2	
4	CAN-AnOut			Output word CAN1Out-W3	
5	CAN-AnOut			Output word CAN2Out-W0	🕮 227
6	CAN-AnOut			Output word CAN2Out-W1	
7	CAN-AnOut			Output word CAN2Out-W2	
8	CAN-AnOut			Output word CAN2Out-W3	
9	CAN-AnOut			Output word CAN3Out-W0	🕮 233
10	CAN-AnOut			Output word CAN3Out-W1	
11	CAN-AnOut			Output word CAN3Out-W2	
12	CAN-AnOut			Output word CAN3Out-W3	

Code		Possible settings		IMPORTANT	
No.	Designation	Lenze/ appl.	Selection		
[C6231]				Selection of the analog output signals to the MotionBus (CAN)	
1	CAN1Out-anl	1000	FIXED 0 % (not assigned)	Source for output word CAN1Out-DctrlStat	🕮 218
2	CAN1Out-anl	1000	FIXED 0 % (not assigned)	Source for output word CAN1Out-W1	
3	CAN1Out-anl	1000	FIXED 0 % (not assigned)	Source for output word CAN1Out-W2	
4	CAN1Out-anl	1000	FIXED 0 % (not assigned)	Source for output word CAN1Out-W3	
5	CAN2Out-anl	1000	FIXED 0 % (not assigned)	Source for output word CAN2Out-W0	🕮 227
6	CAN2Out-anl	1000	FIXED 0 % (not assigned)	Source for output word CAN2Out-W1	
7	CAN2Out-anl	1000	FIXED 0 % (not assigned)	Source for output word CAN2Out-W2	
8	CAN2Out-anl	1000	FIXED 0 % (not assigned)	Source for output word CAN2Out-W3	
9	CAN3Out-anl	1000	FIXED 0 % (not assigned)	Source for output word CAN3Out-W0	🕮 233
10	CAN3Out-anl	1000	FIXED 0 % (not assigned)	Source for output word CAN3Out-W1	
11	CAN3Out-anl	1000	FIXED 0 % (not assigned)	Source for output word CAN3Out-W2	
12	CAN3Out-anl	1000	FIXED 0 % (not assigned)	Source for output word CAN3Out-W3	
			For possible signals see ”selection list - analog signals”		🕮 371
C6250			-2147483647 {1} 2147483647	Display of the phase output signals to the MotionBus (CAN)	
1	CAN-PhiOut			Output double word CAN1Out-W2/W3	🕮 218
2	CAN-PhiOut			Output double word CAN2Out-W0/W1	🕮 227
3	CAN-PhiOut			Output double word CAN3Out-W0/W1	🕮 233
[C6251]				Selection of the phase output signals to the MotionBus (CAN)	
1	CAN1Out-phi	1000	FIXED 0 (not assigned)	Source for output double word CAN1Out-W2/W3	🕮 218
2	CAN2Out-phi	1000	FIXED 0 (not assigned)	Source for output double word CAN2Out-W0/W1	🕮 227
3	CAN3Out-phi	1000	FIXED 0 (not assigned)	Source for output double word CAN3Out-W0/W1	🕮 233
			For possible signals see ”selection list - phase signals”		🕮 374

Code		Possible settings			IMPORTANT	
No.	Designation	Lenze/ appl.	Selection			
C6254	CAN1PdoMap	0			Assignment of the 8 byte user data of the CAN1Out function block to the MotionBus (CAN)	🕮 218
			0	W2=Int W3=Int	Byte 1, byte 2 = CAN1Out-DctrlStat	
					Byte 3, byte 4 = CAN1Out-W1	
					Byte 5, byte 6 = CAN1Out-W2	
					Byte 7, byte 8 = CAN1Out-W3	
			1	W2 / W3=Dint	Byte 1, byte 2 = CAN1Out-DctrlStat	
					Byte 3, byte 4 = CAN1Out-W1	
					Byte 5, byte 6 = CAN1Out-W2/W3	
					Byte 7, byte 8 = CAN1Out-W2/W3	
			2	W2=Int W3=bit	Byte 1, byte 2 = CAN1Out-DctrlStat	
					Byte 3, byte 4 = CAN1Out-W1	
					Byte 5, byte 6 = CAN1Out-W2	
					Byte 7, byte 8 = CAN1Out-Bit0...Bit15	
			3	W2=Bit W3=Int	Byte 1, byte 2 = CAN1Out-DctrlStat	
					Byte 3, byte 4 = CAN1Out-W1	
					Byte 5, byte 6 = CAN1Out-Bit0...Bit15	
					Byte 7, byte 8 = CAN1Out-W3	
			4	W1=Bit W23=I	Byte 1, byte 2 = CAN1Out-DctrlStat	
					Byte 3, byte 4 = CAN1Out-Bit0...Bit15	
					Byte 5, byte 6 = CAN1Out-W2	
					Byte 7, byte 8 = CAN1Out-W3	
			5	W1=Bit W23=Di	Byte 1, byte 2 = CAN1Out-DctrlStat	
					Byte 3, byte 4 = CAN1Out-Bit0...Bit15	
					Byte 5, byte 6 = CAN1Out-W2/W3	
					Byte 7, byte 8 = CAN1Out-W2/W3	

Code		Possible settings			IMPORTANT	
No.	Designation	Lenze/ appl.	Selection			
C6255	CAN2PdoMap	0			Assignment of the 8 byte user data of the CAN2Out function block to the MotionBus (CAN)	🕮 227
			0	W0=Int W1=Int	Byte 1, byte 2 = CAN2Out-W0	
					Byte 3, byte 4 = CAN2Out-W1	
					Byte 5, byte 6 = CAN2Out-W2	
					Byte 7, byte 8 = CAN2Out-W3	
			1	W0 / W1=Dint	Byte 1, byte 2 = CAN2Out-W0/W1	
					Byte 3, byte 4 = CAN2Out-W0/W1	
					Byte 5, byte 6 = CAN2Out-W2	
					Byte 7, byte 8 = CAN2Out-W3	
C6256	CAN3PdoMap	0			Assignment of the 8 byte user data of the CAN3Out function block to the MotionBus (CAN)	🕮 233
			0	W0=Int W1=Int	Byte 1, byte 2 = CAN3Out-W0	
					Byte 3, byte 4 = CAN3Out-W1	
					Byte 5, byte 6 = CAN3Out-W2	
					Byte 7, byte 8 = CAN3Out-W3	
			1	W0 / W1=Dint	Byte 1, byte 2 = CAN3Out-W0/W1	
					Byte 3, byte 4 = CAN3Out-W0/W1	
					Byte 5, byte 6 = CAN3Out-W2	
					Byte 7, byte 8 = CAN3Out-W3	
C6310					Display of the digital input signals in the DCTRL function block	🕮 239
			0 (= FALSE)	1 (= TRUE)		
1	DCTRL-DigOut				DCTRL-CINH1	
2	DCTRL-DigOut				DCTRL-CINH2	
3	DCTRL-DigOut				DCTRL-TripSet1	
4	DCTRL-DigOut				DCTRL-TripReset1	
5	DCTRL-DigOut				DCTRL-StatB0	
6	DCTRL-DigOut				DCTRL-StatB2	
7	DCTRL-DigOut				DCTRL-StatB3	
8	DCTRL-DigOut				DCTRL-StatB4	
9	DCTRL-DigOut				DCTRL-StatB5	
10	DCTRL-DigOut				DCTRL-StatB14	
11	DCTRL-DigOut				DCTRL-StatB15	
12	DCTRL-DigOut				DCTRL-TripSet2	
13	DCTRL-DigOut				DCTRL-TripSet3	
14	DCTRL-DigOut				DCTRL-TripSet4	
15	DCTRL-DigOut				DCTRL-TripReset2	

Code		Possible settings		IMPORTANT	
No.	Designation	Lenze/ appl.	Selection		
[C6311]				Selection of the digital input signals of the DCTRL function block	🕮 239
1	DCTRL-dig	1000	0 (FALSE, not assigned)	Source for DCTRL-CInh1	
2	DCTRL-dig	1000	0 (FALSE, not assigned)	Source for DCTRL-CInh2	
3	DCTRL-dig	1000	0 (FALSE, not assigned)	Source for DCTRL-TripSet1	
4	DCTRL-dig	1000	0 (FALSE, not assigned)	Source for DCTRL-TripReset1	
5	DCTRL-dig	1000	0 (FALSE, not assigned)	Source for DCTRL-StatB0	
6	DCTRL-dig	1000	0 (FALSE, not assigned)	Source for DCTRL-StatB2	
7	DCTRL-dig	1000	0 (FALSE, not assigned)	Source for DCTRL-StatB3	
8	DCTRL-dig	1000	0 (FALSE, not assigned)	Source for DCTRL-StatB4	
9	DCTRL-dig	1000	0 (FALSE, not assigned)	Source for DCTRL-StatB5	
10	DCTRL-dig	1000	0 (FALSE, not assigned)	Source for DCTRL-StatB14	
11	DCTRL-dig	1000	0 (FALSE, not assigned)	Source for DCTRL-StatB15	
12	DCTRL-dig	1000	0 (FALSE, not assigned)	Source for DCTRL-TripSet2	
13	DCTRL-dig	1000	0 (FALSE, not assigned)	Source for DCTRL-TripSet3	
14	DCTRL-dig	1000	0 (FALSE, not assigned)	Source for DCTRL-TripSet4	
15	DCTRL-dig	1000	0 (FALSE, not assigned)	Source for DCTRL-TripReset2	
			For possible signals see ”selection list - digital signals”		🕮 362
C6330			-32768 {1} 32767	Display of the analog input signals in the DCTRL function block	🕮 239
1	DCTRL-AnOut			DCTRL-wAIF1Ctrl	
2	DCTRL-AnOut			DCTRL-CAN1Ctrl	
[C6331]				Selection of the analog input signals of the DCTRL function block	🕮 239
1	DCTRL-anl	1000	FIXED 0 % (not assigned)	Source for DCTRL-wAIF1Ctrl	
2	DCTRL-anl	1000	FIXED 0 % (not assigned)	Source for DCTRL-CAN1Ctrl	
			For possible signals see ”selection list - analog signals”		🕮 371
C6370			0 (= FALSE) 1 (= TRUE)	Display of the output signals at the digital output and the brake relay	🕮 252
1	DIGOUT			Output signal at the digital output X6/DO1 (DigOut-Out1)	
2	DIGOUT			Control of the brake relay (DigOut relay)	

Code		Possible settings		IMPORTANT	
No.	Designation	Lenze/ appl.	Selection		
[C6371]				Selection of the digital output signals for the digital output and the brake relay	🕮 252
1	DigoutIn-dig	1000	0 (FALSE, not assigned)	Source for the output signal at the digital output X6/DO1 (DigOut-Out1)	
2	DigoutIn-dig	1000	0 (FALSE, not assigned)	Source for the control of the brake relay (DigOut relay)	
			For possible signals see "selection list - digital signals"		🕮 362
C6430	DFOUT			Display of the analog output signal DFOut-Out in the DFOUT function block	🕮 248
			-32768 {1} 32767		
[C6431]	DFOUT	1000		Selection of the analog output signal DFOut-Out for the DFOUT function block	🕮 248
			FIXED 0 % (not assigned)		
			For possible signals see "selection list - analog signals"		🕮 371
C7110				Display of the digital input signals in the function block InNeg (signal inversion)	🕮 257
1	InNeg-digV			InNeg-DigIn1	
2	InNeg-digV			InNeg-DigIn2	
3	InNeg-digV			InNeg-DigIn3	
C7111				Selection of the digital input signals for the InNeg function block (signal inversion)	🕮 257
1	InNeg-dig	1000	0 (FALSE, not assigned)	Source for InNeg-DigIn1	
2	InNeg-dig	1000	0 (FALSE, not assigned)	Source for InNeg-DigIn2	
3	InNeg-dig	1000	0 (FALSE, not assigned)	Source for InNeg-DigIn3	
			For possible signals see "selection list - digital signals"		🕮 362
C7130				Display of the analog input signals in the InNeg function block (signal inversion)	🕮 257
			-32768 (= -100 %) {1} 32767 (= 100 %)		
1	InNeg-AnV			InNeg-AnIn1	
2	InNeg-AnV			InNeg-AnIn2	
C7131				Selection of the analog input signals for the InNeg function block (signal inversion)	🕮 257
1	InNeg-An	1000	FIXED 0 % (not assigned)	Source for InNeg-AnIn1	
2	InNeg-An	1000	FIXED 0 % (not assigned)	Source for InNeg-AnIn2	
			For possible signals see "selection list - analog signals"		🕮 371
C7150				Display of the phase input signals in the InNeg function block (signal inversion)	🕮 257
			-2147483647 {1} 2147483647		
1	InNeg-PhiV			InNeg-PhiIn1	
2	InNeg-PhiV			InNeg-PhiIn2	

Code		Possible settings		IMPORTANT	
No.	Designation	Lenze/ appl.	Selection		
C7151				Selection of the phase input signals for the InNeg function block (signal inversion)	🕮 257
1	InNeg-Phi	1000	FIXED 0 (not assigned)	Source for InNeg-PhiIn1	
2	InNeg-Phi	1000	FIXED 0 (not assigned)	Source for InNeg-PhiIn2	
			For possible signals see ”selection list - phase signals”		🕮 374
C7210				Display of the digital input signals in the OutNeg function block (signal inversion)	🕮 259
1	OutNeg-digV			OutNeg-DigIn1	
2	OutNeg-digV			OutNeg-DigIn2	
3	OutNeg-digV			OutNeg-DigIn3	
C7211				Selection of the digital input signals for the OutNeg function block (signal inversion)	🕮 259
1	OutNeg-dig	1000	0 (FALSE, not assigned)	Source for OutNeg-DigIn1	
2	OutNeg-dig	1000	0 (FALSE, not assigned)	Source for OutNeg-DigIn2	
3	OutNeg-dig	1000	0 (FALSE, not assigned)	Source for OutNeg-DigIn3	
			For possible signals see ”selection list - digital signals”		🕮 362
C7230			-32768 (= -100 %) {1} 32767 (= 100 %)	Display of the analog input signals in the OutNeg function block (signal inversion)	🕮 259
1	OutNeg-AnV			OutNeg-AnIn1	
2	OutNeg-AnV			OutNeg-AnIn2	
C7231				Selection of the analog input signals for the OutNeg function block (signal inversion)	🕮 259
1	OutNeg-An	1000	FIXED 0 % (not assigned)	Source for OutNeg-AnIn1	
2	OutNeg-An	1000	FIXED 0 % (not assigned)	Source for OutNeg-AnIn2	
			For possible signals see ”selection list - analog signals”		🕮 371
C7250			-2147483647 {1} 2147483647	Display of the phase input signals in the OutNeg function block (signal inversion)	🕮 259
1	OutNeg-PhiV			OutNeg-PhiIn1	
2	OutNeg-PhiV			OutNeg-PhiIn2	
C7251				Selection of the phase input signals for the OutNeg function block (signal inversion)	🕮 259
1	OutNeg-Phi	1000	FIXED 0 (not assigned)	Source for OutNeg-PhiIn1	
2	OutNeg-Phi	1000	FIXED 0 (not assigned)	Source for OutNeg-PhiIn2	
			For possible signals see ”selection list - phase signals”		🕮 374

Code		Possible settings		IMPORTANT	
No.	**Designation**	**Lenze/ appl.**	**Selection**		
C7410			0 (= FALSE) 1 (= TRUE)	Display of the current signal states on the digital inputs of the ”Speed” function block	
1	Speed-dig			CW rotation (SPEED-RLQ.Cw)	📖 269
2	Speed-dig			CCW rotation (SPEED-RLQ.CCw)	
3	Speed-dig			Selection of the fixed speeds (SPEED-NSET.Jog1)saved in C0039	📖 270
4	Speed-dig			Selection of the fixed speeds (SPEED-NSET.Jog2)saved in C0039	
5	Speed-dig			Selection of the fixed speeds (SPEED-NSET.Jog4)saved in C0039	
6	Speed-dig			Selection of the fixed speeds (SPEED-NSET.Jog8)saved in C0039	
7	Speed-dig			Setting of the speed setpoint integrator to ”0” along the adjusted ramps (SPEED-NSET.Rfg0)	📖 270
8	Speed-dig			Inversion of additional speed setpoint (SPEED-NAddInv)	
9	Speed-dig			Keeping (freezing) the speed setpoint integrator to the actual value (SPEED-NSET.RfgStop)	
10	Speed-dig			Activation of the motor holding brake (SPEED-BRK.SetBrake)	📖 281
11	Speed-dig			Switching of speed/torque (SPEED-MCTRL.NMSwt)	📖 276
12	Speed-dig			Source for the integral-action component of the speed controller (SPEED-MCTRL.ILoad)	
13	Speed-dig			Selection of the acceleration and deceleration times stored in C0101 and C0103 (SPEED-NSET.TI1)	📖 270
14	Speed-dig			Selection of the acceleration and deceleration times stored in C0101 and C0103 (SPEED-NSET.TI2)	
15	Speed-dig			Selection of the acceleration and deceleration times stored in C0101 and C0103 (SPEED-NSET.TI4)	
16	Speed-dig			Selection of the acceleration and deceleration times stored in C0101 and C0103 (SPEED-NSET.TI8)	
17	Speed-dig			Setting of quick stop (SPEED-QSP.Set1)	📖 276
18	Speed-dig			Setting of quick stop (SPEED-QSP.Set2)	
19	Speed-dig			Activation of phase controller (SPEED-MCTRL.PosOn)	
20	Speed-dig			Inversion of additional torque setpoint (SPEED-MAddInv)	

Code		Possible settings		IMPORTANT	
No.	Designation	Lenze/ appl.	Selection		
[C7411]				Selection of the signal source for the digital input signals of the ”Speed” function block	
1	SpeedIn-dig	1000	0 (FALSE, not assigned)	CW rotation (SPEED-RLQ.Cw)	🕮 269
2	SpeedIn-dig	1000	0 (FALSE, not assigned)	CCW rotation (SPEED-RLQ.CCw)	
3	SpeedIn-dig	1000	0 (FALSE, not assigned)	Selection of the fixed speeds (SPEED-NSET.Jog1) saved in C0039	🕮 270
4	SpeedIn-dig	1000	0 (FALSE, not assigned)	Selection of the fixed speeds (SPEED-NSET.Jog2)saved in C0039	
5	SpeedIn-dig	1000	0 (FALSE, not assigned)	Selection of the fixed speeds (SPEED-NSET.Jog4)saved in C0039	
6	SpeedIn-dig	1000	0 (FALSE, not assigned)	Selection of the fixed speeds (SPEED-NSET.Jog8)saved in C0039	
7	SpeedIn-dig	1000	0 (FALSE, not assigned)	Setting of the speed setpoint integrator to 0 along the adjusted ramps (SPEED-NSET.Rfg0)	🕮 270
8	SpeedIn-dig	1000	0 (FALSE, not assigned)	Inversion of additional speed setpoint (SPEED-NAddInv)	
9	SpeedIn-dig	1000	0 (FALSE, not assigned)	Keeping (freezing) the speed setpoint integrator to the actual value (SPEED-NSET.RfgStop)	
10	SpeedIn-dig	1000	0 (FALSE, not assigned)	Activation of the motor holding brake (SPEED-BRK.SetBrake)	🕮 281
11	SpeedIn-dig	1000	0 (FALSE, not assigned)	Switching of speed - torque (SPEED-MCTRL.NMSwt)	🕮 276
12	SpeedIn-dig	1000	0 (FALSE, not assigned)	Source for the integral-action component of the speed controller (SPEED-MCTRL.ILoad)	
13	SpeedIn-dig	1000	0 (FALSE, not assigned)	Selection of the acceleration and deceleration times stored in C0101 and C0103 (SPEED-NSET.TI1)	🕮 270
14	SpeedIn-dig	1000	0 (FALSE, not assigned)	Selection of the acceleration and deceleration times stored in C0101 and C0103 (SPEED-NSET.TI2)	
15	SpeedIn-dig	1000	0 (FALSE, not assigned)	Selection of the acceleration and deceleration times stored in C0101 and C0103 (SPEED-NSET.TI4)	
16	SpeedIn-dig	1000	0 (FALSE, not assigned)	Selection of the acceleration and deceleration times stored in C0101 and C0103 (SPEED-NSET.TI8)	
17	SpeedIn-dig	1000	0 (FALSE, not assigned)	Setting of quick stop (SPEED-QSP.Set1)	🕮 276
18	SpeedIn-dig	1000	0 (FALSE, not assigned)	Setting of quick stop (SPEED-QSP.Set2)	
19	SpeedIn-dig	1000	0 (FALSE, not assigned)	Activation of phase controller (SPEED-MCTRL.PosOn)	
20	SpeedIn-dig	1000	0 (FALSE, not assigned)	Inversion of additional torque setpoint (SPEED-MAddInv)	

Code		Possible settings		IMPORTANT	
No.	Designation	Lenze/ appl.	Selection		
			For possible signals see ”selection list - digital signals”		📖 362
C7430			-32768 (= -100 %) {1} 32767 (= 100 %)	Display of the current signal states on the analog input of the ”Speed” function block	
1	Speed-an			Speed setpoint (SPEED-NSET.NSet)	📖 270
2	Speed-an			Additional speed setpoint (SPEED-NSET.NAdd)	
3	Speed-an			Lower torque limit (SPEED-MCTRL.negLoMLim)	📖 276
4	Speed-an			Upper torque limit (SPEED-MCTRL.HiMLim)	
5	Speed-an			Additional torque setpoint (SPEED-MCTRL.MAdd)	
6	Speed-an			Manual field weakening (SPEED-MCTRL.FldWeak)	
7	Speed-an			Manual adaptation of the proportional gain of the speed controller (SPEED-MCTRL.NAdapt)	
8	Speed-an			Manual adaptation of the integral-action component of the speed controller (SPEED-MCTRL.ISet)	
9	Speed-an			Speed threshold for the motor holding brake (SPEED-BRK.SpeedThreshold)	📖 281
10	Speed-an			Direction of torque created by the drive against the motor holding brake (SPEED-BRK.Sign)	
11	Speed-an			Manual adaptation of the phase controller (SPEED-MCTRL.PAdapt)	📖 276
12	Speed-an			Limit value for influencing the phase controller (SPEED-MCTRL.PosLim)	
13	Speed-an			Lower speed limit for speed limitation (SPEED-MCTRL.NStartMLim)	

Code		Possible settings		IMPORTANT	
No.	Designation	Lenze/ appl.	Selection		
[C7431]				Selection of the signal source for the analog input signals of the ”Speed” function block	
1	SpeedIn-anl	1000	FIXED 0 % (not assigned)	Speed setpoint (SPEED-NSET.NSet)	🕮 270
2	SpeedIn-anl	1000	FIXED 0 % (not assigned)	Additional speed setpoint (SPEED-NSET.NAdd)	
3	SpeedIn-anl	1000	FIXED 0 % (not assigned)	Lower torque limit (SPEED-MCTRL.negLoMLim)	🕮 276
4	SpeedIn-anl	1000	FIXED 0 % (not assigned)	Upper torque limit (SPEED-MCTRL.HiMLim)	
5	SpeedIn-anl	1000	FIXED 0 % (not assigned)	Additional torque setpoint (SPEED-MCTRL.MAdd)	
6	SpeedIn-anl	1000	FIXED 0 % (not assigned)	Manual field weakening (SPEED-MCTRL.FldWeak)	
7	SpeedIn-anl	1000	FIXED 0 % (not assigned)	Manual adaptation of the proportional gain of the speed controller (SPEED-MCTRL.NAdapt)	
8	SpeedIn-anl	1000	FIXED 0 % (not assigned)	Manual adaptation of the Integral-action component of the speed controller (SPEED-MCTRL.ISet)	
9	SpeedIn-anl	1000	FIXED 0 % (not assigned)	Speed threshold for the motor holding brake (SPEED-BRK.SpeedThreshold)	🕮 281
10	SpeedIn-anl	1000	FIXED 0 % (not assigned)	Direction of torque created by the drive against the motor holding brake (SPEED-BRK.Sign)	
11	SpeedIn-anl	1000	FIXED 0 % (not assigned)	Manual adaptation of the phase controller (SPEED-MCTRL.PAdapt)	🕮 276
12	SpeedIn-anl	1000	FIXED 0 % (not assigned)	Limit value for influencing the phase controller (SPEED-MCTRL.PosLim)	
13	SpeedIn-anl	1000	FIXED 0 % (not assigned)	Lower speed limit for speed limitation (SPEED-MCTRL.NStartMLim)	
			For possible signals see ”selection list - analog signals”		🕮 371
C7450	Speed-phi			Display of the setpoint for the phase controller in the ”Speed” function block (speed controlSPEED-MCTRL.PosSet)	🕮 276
			-2147483647 {1} 2147483647		
[C7451]	SpeedIn-phi	1000		Setpoint for the phase controller in the ”Speed” function block (SPEED-MCTRL.PosSet)	🕮 276
			FIXED 0 (not assigned)		
			For possible signals see ”selection list - phase signals”		🕮 374

Code		Possible settings		IMPORTANT	
No.	Designation	Lenze/ appl.	Selection		
C7510			0 (= FALSE) 1 (= TRUE)	Display of the current signal states on the digital inputs of the ”Torque” function block	
1	TorqueIn-dig			CW rotation (TORQUE-RLQ.Cw)	🕮 291
2	TorqueIn-dig			CCW rotation (TORQUE-RLQ.CCw)	
3	TorqueIn-dig			Setting of the torque setpoint integrator to ”0” along the adjusted ramps (TORQUE-NSET.Rfg0)	🕮 291
4	TorqueIn-dig			Activation of the motor holding brake (TORQUE-BRK.SetBrake)	🕮 298
5	TorqueIn-dig			Setting of quick stop (TORQUE-QSP.Set1)	🕮 294
6	TorqueIn-dig			Setting of quick stop (TORQUE-QSP.Set2)	
7	TorqueIn-dig			Source for the integral-action component of the controller (TORQUE-MCTRL.ILoad)	
8	TorqueIn-dig			Keeping (freezing) the torque setpoint integrator to the current value (TORQUE-NSET.RfgStop)	
9	TorqueIn-dig			Inversion of additional torque setpoint (TORQUE-MAddInv)	
[C7511]				Selection of the signal source for the digital input signals of the ”Torque” function block	
1	TorqueIn-dig	1000	0 (FALSE, not assigned)	CW rotation (TORQUE-RLQ.Cw)	🕮 291
2	TorqueIn-dig	1000	0 (FALSE, not assigned)	CCW rotation (TORQUE-RLQ.CCw)	
3	TorqueIn-dig	1000	0 (FALSE, not assigned)	Setting of the torque setpoint integrator to 0 along the adjusted ramps (TORQUE-NSET.Rfg0)	🕮 291
4	TorqueIn-dig	1000	0 (FALSE, not assigned)	Activation of the motor holding brake (TORQUE-BRK.SetBrake)	🕮 298
5	TorqueIn-dig	1000	0 (FALSE, not assigned)	Setting of quick stop (TORQUE-QSP.Set1)	🕮 294
6	TorqueIn-dig	1000	0 (FALSE, not assigned)	Setting of quick stop (TORQUE-QSP.Set2)	
7	TorqueIn-dig	1000	0 (FALSE, not assigned)	Source for the integral-action component of the controller (TORQUE-MCTRL.ILoad)	
8	TorqueIn-dig	1000	0 (FALSE, not assigned)	Keeping (freezing) the torque setpoint integrator to the current value (TORQUE-NSET.RfgStop)	
9	TorqueIn-dig	1000	0 (FALSE, not assigned)	Inversion of additional torque setpoint (TORQUE-MAddInv)	
			For possible signals see ”selection list - digital signals”		🕮 362

Code		Possible settings		IMPORTANT	
No.	Designation	Lenze/ appl.	Selection		
C7530			-32768 (= -100 %) {1} 32767 (= 100 %)	Display of the current signal states on the analog input of the ”Torque” function block	
1	TorqueIn-anl			Torque setpoint (SPEED-MCTRL.MAdd)	📖 294
2	TorqueIn-anl			Setpoint for the upper limit of speed limitation (TORQUE-NSET.NSet)	📖 291
3	TorqueIn-anl			Lower torque limit (TORQUE-MCTRL.negLoMLim)	📖 294
4	TorqueIn-anl			Upper torque limit (TORQUE-MCTRL.HiMLim)	
5	TorqueIn-anl			Setpoint for the lower limit of speed limitation (TORQUE-MCTRL.NStartMLim)	
6	TorqueIn-anl			Manual field weakening (TORQUE-MCTRL.FldWeak)	
7	TorqueIn-anl			Manual adaptation of the proportional gain of the speed controller (TORQUE-MCTRL.NAdapt)	
8	TorqueIn-anl			Manual adaptation of the integral-action component of the speed controller (TORQUE-MCTRL.ISet)	
9	TorqueIn-anl			Torque threshold for the motor holding brake (TORQUE-BRK.TorqueThreshold)	📖 298
10	TorqueIn-anl			Direction of torque created by the drive against the motor holding brake (TORQUE-BRK.Sign)	

Code		Possible settings		IMPORTANT	
No.	Designation	Lenze/ appl.	Selection		
[C7531]				Selection of the signal source for the analog input signals of the ”Torque” function block	
1	TorqueIn-anl	1000	FIXED 0 % (not assigned)	Torque setpoint (SPEED-MCTRL.MAdd)	🕮 294
2	TorqueIn-anl	1000	FIXED 0 % (not assigned)	Setpoint for the upper limit of speed limitation (TORQUE-NSET.NSet)	🕮 291
3	TorqueIn-anl	1000	FIXED 0 % (not assigned)	Lower torque limit (TORQUE-MCTRL.negLoMLim)	🕮 294
4	TorqueIn-anl	1000	FIXED 0 % (not assigned)	Upper torque limit (TORQUE-MCTRL.HiMLim)	
5	TorqueIn-anl	1000	FIXED 0 % (not assigned)	Setpoint for the lower limit of speed limitation (TORQUE-MCTRL.NStartMLim)	
6	TorqueIn-anl	1000	FIXED 0 % (not assigned)	Manual field weakening (TORQUE-MCTRL.FldWeak)	
7	TorqueIn-anl	1000	FIXED 0 % (not assigned)	Manual adaptation of the proportional gain of the speed controller (TORQUE-MCTRL.NAdapt)	
8	TorqueIn-anl	1000	FIXED 0 % (not assigned)	Manual adaptation of the Integral-action component of the speed controller (TORQUE-MCTRL.ISet)	
9	TorqueIn-anl	1000	FIXED 0 % (not assigned)	Torque threshold for the motor holding brake (TORQUE-BRK.TorqueThreshold)	🕮 298
10	TorqueIn-anl	1000	FIXED 0 % (not assigned)	Direction of torque created by the drive against the motor holding brake (TORQUE-BRK.Sign)	
			For possible signals see ”selection list - analog signals”		🕮 371

12.2 Selection lists for signal linking

12.2.1 List of the digital signal sources

Symbol in signal flow diagrams: ☐

Selection No.	Signal	Keypad display	Variable for Global Drive Oscilloscope (GDO)
2	FIXED 1(TRUE)	FI 1 / TRUE	gC_bTrue
10	AIF-bCe0CommErr	AIF-Ce0	AIF_bCe0CommErr_b
11	AIF-bFieldBusStateBit0	AIF-Bit0	AIF_bFieldBusStateBit0_b
12	AIF-bFieldBusStateBit1	AIF-Bit1	AIF_bFieldBusStateBit1_b
13	AIF-bFieldBusStateBit2	AIF-Bit2	AIF_bFieldBusStateBit2_b
14	AIF-bFieldBusStateBit3	AIF-Bit3	AIF_bFieldBusStateBit3_b
15	AIF-bFieldBusStateBit4	AIF-Bit4	AIF_bFieldBusStateBit4_b
16	AIF-bFieldBusStateBit5	AIF-Bit5	AIF_bFieldBusStateBit5_b
17	AIF-bFieldBusStateBit6	AIF-Bit6	AIF_bFieldBusStateBit6_b
18	AIF-bFieldBusStateBit7	AIF-Bit7	AIF_bFieldBusStateBit7_b
19	AIF1In-Ctrl.Quickstop_B3	AIF1-CB3	AIF1_bCtrlQuickstop_b
20	AIF1In-Ctrl.Disable_B8	AIF1-CB8	AIF1_bCtrlDisable_b
21	AIF1In-Ctrl.CInhibit_B9	AIF1-CB9	AIF1_bCtrlCInhibit_b
22	AIF1In-Ctrl.TripSet_B10	AIF1-CB10	AIF1_bCtrlTripSet_b
23	AIF1In-Ctrl.TripReset_B11	AIF1-CB11	AIF1_bCtrlTripReset_b
24	AIF1In-Ctrl.Bit0	AIF1-CB0	AIF1_bCtrlB0_b
25	AIF1In-Ctrl.Bit1	AIF1-CB1	AIF1_bCtrlB1_b
26	AIF1In-Ctrl.Bit2	AIF1-CB2	AIF1_bCtrlB2_b
27	AIF1In-Ctrl.Bit4	AIF1-CB4	AIF1_bCtrlB4_b
28	AIF1In-Ctrl.Bit5	AIF1-CB5	AIF1_bCtrlB5_b
29	AIF1In-Ctrl.Bit6	AIF1-CB6	AIF1_bCtrlB6_b
30	AIF1In-Ctrl.Bit7	AIF1-CB7	AIF1_bCtrlB7_b
31	AIF1In-Ctrl.Bit12	AIF1-CB12	AIF1_bCtrlB12_b
32	AIF1In-Ctrl.Bit13	AIF1-CB13	AIF1_bCtrlB13_b
33	AIF1In-Ctrl.Bit14	AIF1-CB14	AIF1_bCtrlB14_b
34	AIF1In-Ctrl.Bit15	AIF1-CB15	AIF1_bCtrlB15_b
35	AIF1In-Bit0	AIF1-Bit0	AIF1_bInB0_b
36	AIF1In-Bit1	AIF1-Bit1	AIF1_bInB1_b
37	AIF1In-Bit2	AIF1-Bit2	AIF1_bInB2_b
38	AIF1In-Bit3	AIF1-Bit3	AIF1_bInB3_b
39	AIF1In-Bit4	AIF1-Bit4	AIF1_bInB4_b
40	AIF1In-Bit5	AIF1-Bit5	AIF1_bInB5_b
41	AIF1In-Bit6	AIF1-Bit6	AIF1_bInB6_b
42	AIF1In-Bit7	AIF1-Bit7	AIF1_bInB7_b
43	AIF1In-Bit8	AIF1-Bit8	AIF1_bInB8_b
44	AIF1In-Bit9	AIF1-Bit9	AIF1_bInB9_b
45	AIF1In-Bit10	AIF1-Bit10	AIF1_bInB10_b
46	AIF1In-Bit11	AIF1-Bit11	AIF1_bInB11_b
47	AIF1In-Bit12	AIF1-Bit12	AIF1_bInB12_b
48	AIF1In-Bit13	AIF1-Bit13	AIF1_bInB13_b
49	AIF1In-Bit14	AIF1-Bit14	AIF1_bInB14_b
50	AIF1In-Bit15	AIF1-Bit15	AIF1_bInB15_b

Selection No.	Signal	Keypad display	Variable for Global Drive Oscilloscope (GDO)
51	AIF1In-Bit16	AIF1-Bit16	AIF1_bInB16_b
52	AIF1In-Bit17	AIF1-Bit17	AIF1_bInB17_b
53	AIF1In-Bit18	AIF1-Bit18	AIF1_bInB18_b
54	AIF1In-Bit19	AIF1-Bit19	AIF1_bInB19_b
55	AIF1In-Bit20	AIF1-Bit20	AIF1_bInB20_b
56	AIF1In-Bit21	AIF1-Bit21	AIF1_bInB21_b
57	AIF1In-Bit22	AIF1-Bit22	AIF1_bInB22_b
58	AIF1In-Bit23	AIF1-Bit23	AIF1_bInB23_b
59	AIF1In-Bit24	AIF1-Bit24	AIF1_bInB24_b
60	AIF1In-Bit25	AIF1-Bit25	AIF1_bInB25_b
61	AIF1In-Bit26	AIF1-Bit26	AIF1_bInB26_b
62	AIF1In-Bit27	AIF1-Bit27	AIF1_bInB27_b
63	AIF1In-Bit28	AIF1-Bit28	AIF1_bInB28_b
64	AIF1In-Bit29	AIF1-Bit29	AIF1_bInB29_b
65	AIF1In-Bit30	AIF1-Bit30	AIF1_bInB30_b
66	AIF1In-Bit31	AIF1-Bit31	AIF1_bInB31_b
67	AIF2In-Bit0	AIF2-Bit0	AIF2_bInB0_b
68	AIF2In-Bit1	AIF2-Bit1	AIF2_bInB1_b
69	AIF2In-Bit2	AIF2-Bit2	AIF2_bInB2_b
70	AIF2In-Bit3	AIF2-Bit3	AIF2_bInB3_b
71	AIF2In-Bit4	AIF2-Bit4	AIF2_bInB4_b
72	AIF2In-Bit5	AIF2-Bit5	AIF2_bInB5_b
73	AIF2In-Bit6	AIF2-Bit6	AIF2_bInB6_b
74	AIF2In-Bit7	AIF2-Bit7	AIF2_bInB7_b
75	AIF2In-Bit8	AIF2-Bit8	AIF2_bInB8_b
76	AIF2In-Bit9	AIF2-Bit9	AIF2_bInB9_b
77	AIF2In-Bit10	AIF2-Bit10	AIF2_bInB10_b
78	AIF2In-Bit11	AIF2-Bit11	AIF2_bInB11_b
79	AIF2In-Bit12	AIF2-Bit12	AIF2_bInB12_b
80	AIF2In-Bit13	AIF2-Bit13	AIF2_bInB13_b
81	AIF2In-Bit14	AIF2-Bit14	AIF2_bInB14_b
82	AIF2In-Bit15	AIF2-Bit15	AIF2_bInB15_b
83	AIF2In-Bit16	AIF2-Bit16	AIF2_bInB16_b
84	AIF2In-Bit17	AIF2-Bit17	AIF2_bInB17_b
85	AIF2In-Bit18	AIF2-Bit18	AIF2_bInB18_b
86	AIF2In-Bit19	AIF2-Bit19	AIF2_bInB19_b
87	AIF2In-Bit20	AIF2-Bit20	AIF2_bInB20_b
88	AIF2In-Bit21	AIF2-Bit21	AIF2_bInB21_b
89	AIF2In-Bit22	AIF2-Bit22	AIF2_bInB22_b
90	AIF2In-Bit23	AIF2-Bit23	AIF2_bInB23_b
91	AIF2In-Bit24	AIF2-Bit24	AIF2_bInB24_b
92	AIF2In-Bit25	AIF2-Bit25	AIF2_bInB25_b
93	AIF2In-Bit26	AIF2-Bit26	AIF2_bInB26_b
94	AIF2In-Bit27	AIF2-Bit27	AIF2_bInB27_b
95	AIF2In-Bit28	AIF2-Bit28	AIF2_bInB28_b
96	AIF2In-Bit29	AIF2-Bit29	AIF2_bInB29_b
97	AIF2In-Bit30	AIF2-Bit30	AIF2_bInB30_b
98	AIF2In-Bit31	AIF2-Bit31	AIF2_bInB31_b

Selection No.	Signal	Keypad display	Variable for Global Drive Oscilloscope (GDO)
99	AIF3In-Bit0	AIF3-Bit0	AIF3_bInB0_b
100	AIF3In-Bit1	AIF3-Bit1	AIF3_bInB1_b
101	AIF3In-Bit2	AIF3-Bit2	AIF3_bInB2_b
102	AIF3In-Bit3	AIF3-Bit3	AIF3_bInB3_b
103	AIF3In-Bit4	AIF3-Bit4	AIF3_bInB4_b
104	AIF3In-Bit5	AIF3-Bit5	AIF3_bInB5_b
105	AIF3In-Bit6	AIF3-Bit6	AIF3_bInB6_b
106	AIF3In-Bit7	AIF3-Bit7	AIF3_bInB7_b
107	AIF3In-Bit8	AIF3-Bit8	AIF3_bInB8_b
108	AIF3In-Bit9	AIF3-Bit9	AIF3_bInB9_b
109	AIF3In-Bit10	AIF3-Bit10	AIF3_bInB10_b
110	AIF3In-Bit11	AIF3-Bit11	AIF3_bInB11_b
111	AIF3In-Bit12	AIF3-Bit12	AIF3_bInB12_b
112	AIF3In-Bit13	AIF3-Bit13	AIF3_bInB13_b
113	AIF3In-Bit14	AIF3-Bit14	AIF3_bInB14_b
114	AIF3In-Bit15	AIF3-Bit15	AIF3_bInB15_b
115	AIF3In-Bit16	AIF3-Bit16	AIF3_bInB16_b
116	AIF3In-Bit17	AIF3-Bit17	AIF3_bInB17_b
117	AIF3In-Bit18	AIF3-Bit18	AIF3_bInB18_b
118	AIF3In-Bit19	AIF3-Bit19	AIF3_bInB19_b
119	AIF3In-Bit20	AIF3-Bit20	AIF3_bInB20_b
120	AIF3In-Bit21	AIF3-Bit21	AIF3_bInB21_b
121	AIF3In-Bit22	AIF3-Bit22	AIF3_bInB22_b
122	AIF3In-Bit23	AIF3-Bit23	AIF3_bInB23_b
123	AIF3In-Bit24	AIF3-Bit24	AIF3_bInB24_b
124	AIF3In-Bit25	AIF3-Bit25	AIF3_bInB25_b
125	AIF3In-Bit26	AIF3-Bit26	AIF3_bInB26_b
126	AIF3In-Bit27	AIF3-Bit27	AIF3_bInB27_b
127	AIF3In-Bit28	AIF3-Bit28	AIF3_bInB28_b
128	AIF3In-Bit29	AIF3-Bit29	AIF3_bInB29_b
129	AIF3In-Bit30	AIF3-Bit30	AIF3_bInB30_b
130	AIF3In-Bit31	AIF3-Bit31	AIF3_bInB31_b
131	DIGIN-CINH	DIG-CInh	DIGIN_bCInh_b
132	DigIn-In1	DIG-In1	DIGIN_bIn1_b
133	DigIn-In2	DIG-In2	DIGIN_bIn2_b
134	DigIn-In3	DIG-In3	DIGIN_bIn3_b
135	DigIn-In4	DIG-In4	DIGIN_bIn4_b
136	DigIn-safe_standstill	DIG-SS	DIGIN_b_safe_standstill_b
137	CAN-Ce1CommErrCanIn1	CAN-Ce1	CAN_bCe1CommErrCanIn1_b
138	CAN-Ce2CommErrCanIn2	CAN-Ce2	CAN_bCe2CommErrCanIn2_b
139	CAN-Ce3CommErrCanIn3	CAN-Ce3	CAN_bCe3CommErrCanIn3_b
140	CAN-Ce4BusOffState	CAN-Ce4	CAN_bCe4BusOffState_b
141	CAN1In-Ctrl.Quickstop_B3	CAN1-CB3	CAN1_bCtrlQuickstop_b
142	CAN1In-Ctrl.Disable_B8	CAN1-CB8	CAN1_bCtrlDisable_b
143	CAN1In-Ctrl.CInhibit_B9	CAN1-CB9	CAN1_bCtrlCInhibit_b
144	CAN1In-Ctrl.TripSet_B10	CAN1-CB10	CAN1_bCtrlTripSet_b
145	CAN1In-Ctrl.TripReset_B11	CAN1-CB11	CAN1_bCtrlTripReset_b
146	CAN1In-Ctrl.Bit0	CAN1-CB0	CAN1_bCtrlB0_b

Selection No.	Signal	Keypad display	Variable for Global Drive Oscilloscope (GDO)
147	CAN1In-Ctrl.Bit1	CAN1-CB1	CAN1_bCtrlB1_b
148	CAN1In-Ctrl.Bit2	CAN1-CB2	CAN1_bCtrlB2_b
149	CAN1In-Ctrl.Bit4	CAN1-CB4	CAN1_bCtrlB4_b
150	CAN1In-Ctrl.Bit5	CAN1-CB5	CAN1_bCtrlB5_b
151	CAN1In-Ctrl.Bit6	CAN1-CB6	CAN1_bCtrlB6_b
152	CAN1In-Ctrl.Bit7	CAN1-CB7	CAN1_bCtrlB7_b
153	CAN1In-Ctrl.Bit12	CAN1-CB12	CAN1_bCtrlB12_b
154	CAN1In-Ctrl.Bit13	CAN1-CB13	CAN1_bCtrlB13_b
155	CAN1In-Ctrl.Bit14	CAN1-CB14	CAN1_bCtrlB14_b
156	CAN1In-Ctrl.Bit15	CAN1-CB15	CAN1_bCtrlB15_b
157	CAN1In-Bit0	CAN1-Bit0	CAN1_bInB0_b
158	CAN1In-Bit1	CAN1-Bit1	CAN1_bInB1_b
159	CAN1In-Bit2	CAN1-Bit2	CAN1_bInB2_b
160	CAN1In-Bit3	CAN1-Bit3	CAN1_bInB3_b
161	CAN1In-Bit4	CAN1-Bit4	CAN1_bInB4_b
162	CAN1In-Bit5	CAN1-Bit5	CAN1_bInB5_b
163	CAN1In-Bit6	CAN1-Bit6	CAN1_bInB6_b
164	CAN1In-Bit7	CAN1-Bit7	CAN1_bInB7_b
165	CAN1In-Bit8	CAN1-Bit8	CAN1_bInB8_b
166	CAN1In-Bit9	CAN1-Bit9	CAN1_bInB9_b
167	CAN1In-Bit10	CAN1-Bit10	CAN1_bInB10_b
168	CAN1In-Bit11	CAN1-Bit11	CAN1_bInB11_b
169	CAN1In-Bit12	CAN1-Bit12	CAN1_bInB12_b
170	CAN1In-Bit13	CAN1-Bit13	CAN1_bInB13_b
171	CAN1In-Bit14	CAN1-Bit14	CAN1_bInB14_b
172	CAN1In-Bit15	CAN1-Bit15	CAN1_bInB15_b
173	CAN1In-Bit16	CAN1-Bit16	CAN1_bInB16_b
174	CAN1In-Bit17	CAN1-Bit17	CAN1_bInB17_b
175	CAN1In-Bit18	CAN1-Bit18	CAN1_bInB18_b
176	CAN1In-Bit19	CAN1-Bit19	CAN1_bInB19_b
177	CAN1In-Bit20	CAN1-Bit20	CAN1_bInB20_b
178	CAN1In-Bit21	CAN1-Bit21	CAN1_bInB21_b
179	CAN1In-Bit22	CAN1-Bit22	CAN1_bInB22_b
180	CAN1In-Bit23	CAN1-Bit23	CAN1_bInB23_b
181	CAN1In-Bit24	CAN1-Bit24	CAN1_bInB24_b
182	CAN1In-Bit25	CAN1-Bit25	CAN1_bInB25_b
183	CAN1In-Bit26	CAN1-Bit26	CAN1_bInB26_b
184	CAN1In-Bit27	CAN1-Bit27	CAN1_bInB27_b
185	CAN1In-Bit28	CAN1-Bit28	CAN1_bInB28_b
186	CAN1In-Bit29	CAN1-Bit29	CAN1_bInB29_b
187	CAN1In-Bit30	CAN1-Bit30	CAN1_bInB30_b
188	CAN1In-Bit31	CAN1-Bit31	CAN1_bInB31_b
189	CAN2In-Bit0	CAN2-Bit0	CAN2_bInB0_b
190	CAN2In-Bit1	CAN2-Bit1	CAN2_bInB1_b
191	CAN2In-Bit2	CAN2-Bit2	CAN2_bInB2_b
192	CAN2In-Bit3	CAN2-Bit3	CAN2_bInB3_b
193	CAN2In-Bit4	CAN2-Bit4	CAN2_bInB4_b
194	CAN2In-Bit5	CAN2-Bit5	CAN2_bInB5_b

Selection No.	Signal	Keypad display	Variable for Global Drive Oscilloscope (GDO)
195	CAN2In-Bit6	CAN2-Bit6	CAN2_bInB6_b
196	CAN2In-Bit7	CAN2-Bit7	CAN2_bInB7_b
197	CAN2In-Bit8	CAN2-Bit8	CAN2_bInB8_b
198	CAN2In-Bit9	CAN2-Bit9	CAN2_bInB9_b
199	CAN2In-Bit10	CAN2-Bit10	CAN2_bInB10_b
200	CAN2In-Bit11	CAN2-Bit11	CAN2_bInB11_b
201	CAN2In-Bit12	CAN2-Bit12	CAN2_bInB12_b
202	CAN2In-Bit13	CAN2-Bit13	CAN2_bInB13_b
203	CAN2In-Bit14	CAN2-Bit14	CAN2_bInB14_b
204	CAN2In-Bit15	CAN2-Bit15	CAN2_bInB15_b
205	CAN2In-Bit16	CAN2-Bit16	CAN2_bInB16_b
206	CAN2In-Bit17	CAN2-Bit17	CAN2_bInB17_b
207	CAN2In-Bit18	CAN2-Bit18	CAN2_bInB18_b
208	CAN2In-Bit19	CAN2-Bit19	CAN2_bInB19_b
209	CAN2In-Bit20	CAN2-Bit20	CAN2_bInB20_b
210	CAN2In-Bit21	CAN2-Bit21	CAN2_bInB21_b
211	CAN2In-Bit22	CAN2-Bit22	CAN2_bInB22_b
212	CAN2In-Bit23	CAN2-Bit23	CAN2_bInB23_b
213	CAN2In-Bit24	CAN2-Bit24	CAN2_bInB24_b
214	CAN2In-Bit25	CAN2-Bit25	CAN2_bInB25_b
215	CAN2In-Bit26	CAN2-Bit26	CAN2_bInB26_b
216	CAN2In-Bit27	CAN2-Bit27	CAN2_bInB27_b
217	CAN2In-Bit28	CAN2-Bit28	CAN2_bInB28_b
218	CAN2In-Bit29	CAN2-Bit29	CAN2_bInB29_b
219	CAN2In-Bit30	CAN2-Bit30	CAN2_bInB30_b
220	CAN2In-Bit31	CAN2-Bit31	CAN2_bInB31_b
221	CAN3In-Bit0	CAN3-Bit0	CAN3_bInB0_b
222	CAN3In-Bit1	CAN3-Bit1	CAN3_bInB1_b
223	CAN3In-Bit2	CAN3-Bit2	CAN3_bInB2_b
224	CAN3In-Bit3	CAN3-Bit3	CAN3_bInB3_b
225	CAN3In-Bit4	CAN3-Bit4	CAN3_bInB4_b
226	CAN3In-Bit5	CAN3-Bit5	CAN3_bInB5_b
227	CAN3In-Bit6	CAN3-Bit6	CAN3_bInB6_b
228	CAN3In-Bit7	CAN3-Bit7	CAN3_bInB7_b
229	CAN3In-Bit8	CAN3-Bit8	CAN3_bInB8_b
230	CAN3In-Bit9	CAN3-Bit9	CAN3_bInB9_b
231	CAN3In-Bit10	CAN3-Bit10	CAN3_bInB10_b
232	CAN3In-Bit11	CAN3-Bit11	CAN3_bInB11_b
233	CAN3In-Bit12	CAN3-Bit12	CAN3_bInB12_b
234	CAN3In-Bit13	CAN3-Bit13	CAN3_bInB13_b
235	CAN3In-Bit14	CAN3-Bit14	CAN3_bInB14_b
236	CAN3In-Bit15	CAN3-Bit15	CAN3_bInB15_b
237	CAN3In-Bit16	CAN3-Bit16	CAN3_bInB16_b
238	CAN3In-Bit17	CAN3-Bit17	CAN3_bInB17_b
239	CAN3In-Bit18	CAN3-Bit18	CAN3_bInB18_b
240	CAN3In-Bit19	CAN3-Bit19	CAN3_bInB19_b
241	CAN3In-Bit20	CAN3-Bit20	CAN3_bInB20_b
242	CAN3In-Bit21	CAN3-Bit21	CAN3_bInB21_b

Selection No.	Signal	Keypad display	Variable for Global Drive Oscilloscope (GDO)
243	CAN3In-Bit22	CAN3-Bit22	CAN3_bInB22_b
244	CAN3In-Bit23	CAN3-Bit23	CAN3_bInB23_b
245	CAN3In-Bit24	CAN3-Bit24	CAN3_bInB24_b
246	CAN3In-Bit25	CAN3-Bit25	CAN3_bInB25_b
247	CAN3In-Bit26	CAN3-Bit26	CAN3_bInB26_b
248	CAN3In-Bit27	CAN3-Bit27	CAN3_bInB27_b
249	CAN3In-Bit28	CAN3-Bit28	CAN3_bInB28_b
250	CAN3In-Bit29	CAN3-Bit29	CAN3_bInB29_b
251	CAN3In-Bit30	CAN3-Bit30	CAN3_bInB30_b
252	CAN3In-Bit31	CAN3-Bit31	CAN3_bInB31_b
253	CANSync-InsideWindow	CSync-IW	CAN_bSyncInsideWindow_b
254	CANSync-ForInterpolator	CSync-FIn	CAN_bSyncForInterpolator_b
255	DCTRL-FAIL	DCT-Fail	DCTRL_bFail_b
256	DCTRL-IMP	DCT-Imp	DCTRL_bImp_b
257	DCTRL-TRIP	DCT-Trip	DCTRL_bTrip_b
258	DCTRL-QspIn	DCT-QspIn	DCTRL_bQspIn_b
259	DCTRL-RDY	DCT-Rdy	DCTRL_bRdy_b
260	DCTRL-CwCcw	DCT-CwCcw	DCTRL_bCwCcw_b
261	DCTRL-NActEq0	DCT-NEq0	DCTRL_bNActEq0_b
262	DCTRL-CINH	DCT-CInh	DCTRL_bCInh_b
263	DCTRL-Stat1	DCT-Stat1	DCTRL_bStat1_b
264	DCTRL-Stat2	DCT-Stat2	DCTRL_bStat2_b
265	DCTRL-Stat4	DCT-Stat4	DCTRL_bStat4_b
266	DCTRL-Stat8	DCT-Stat8	DCTRL_bStat8_b
267	DCTRL-WARN	DCT-Warn	DCTRL_bWarn_b
268	DCTRL-MESS	DCT-Mess	DCTRL_bMess_b
269	DCTRL-INIT	DCT-Init	DCTRL_bInit_b
270	DCTRL-ExternalFault	DCT-EEr	DCTRL_bExternalFault_b
271	FCODE-C0250	FC-250	FCODE_bC250_b
272	FCODE-C0471.Bit0	FC-471.0	FCODE_bC471Bit0_b
273	FCODE-C0471.Bit1	FC-471.1	FCODE_bC471Bit1_b
274	FCODE-C0471.Bit2	FC-471.2	FCODE_bC471Bit2_b
275	FCODE-C0471.Bit3	FC-471.3	FCODE_bC471Bit3_b
276	FCODE-C0471.Bit4	FC-471.4	FCODE_bC471Bit4_b
277	FCODE-C0471.Bit5	FC-471.5	FCODE_bC471Bit5_b
278	FCODE-C0471.Bit6	FC-471.6	FCODE_bC471Bit6_b
279	FCODE-C0471.Bit7	FC-471.7	FCODE_bC471Bit7_b
280	FCODE-C0471.Bit8	FC-471.8	FCODE_bC471Bit8_b
281	FCODE-C0471.Bit9	FC-471.9	FCODE_bC471Bit9_b
282	FCODE-C0471.Bit10	FC-471.10	FCODE_bC471Bit10_b
283	FCODE-C0471.Bit11	FC-471.11	FCODE_bC471Bit11_b
284	FCODE-C0471.Bit12	FC-471.12	FCODE_bC471Bit12_b
285	FCODE-C0471.Bit13	FC-471.13	FCODE_bC471Bit13_b
286	FCODE-C0471.Bit14	FC-471.14	FCODE_bC471Bit14_b
287	FCODE-C0471.Bit15	FC-471.15	FCODE_bC471Bit15_b
288	FCODE-C0471.Bit16	FC-471.16	FCODE_bC471Bit16_b
289	FCODE-C0471.Bit17	FC-471.17	FCODE_bC471Bit17_b
290	FCODE-C0471.Bit18	FC-471.18	FCODE_bC471Bit18_b

Selection No.	Signal	Keypad display	Variable for Global Drive Oscilloscope (GDO)
291	FCODE-C0471.Bit19	FC-471.19	FCODE_bC471Bit19_b
292	FCODE-C0471.Bit20	FC-471.20	FCODE_bC471Bit20_b
293	FCODE-C0471.Bit21	FC-471.21	FCODE_bC471Bit21_b
294	FCODE-C0471.Bit22	FC-471.22	FCODE_bC471Bit22_b
295	FCODE-C0471.Bit23	FC-471.23	FCODE_bC471Bit23_b
296	FCODE-C0471.Bit24	FC-471.24	FCODE_bC471Bit24_b
297	FCODE-C0471.Bit25	FC-471.25	FCODE_bC471Bit25_b
298	FCODE-C0471.Bit26	FC-471.26	FCODE_bC471Bit26_b
299	FCODE-C0471.Bit27	FC-471.27	FCODE_bC471Bit27_b
300	FCODE-C0471.Bit28	FC-471.28	FCODE_bC471Bit28_b
301	FCODE-C0471.Bit29	FC-471.29	FCODE_bC471Bit29_b
302	FCODE-C0471.Bit30	FC-471.30	FCODE_bC471Bit30_b
303	FCODE-C0471.Bit31	FC-471.31	FCODE_bC471Bit31_b
304	FCODE-C0135.Bit0	FC-135.0	FCODE_bC135Bit0_b
305	FCODE-C0135.Bit1	FC-135.1	FCODE_bC135Bit1_b
306	FCODE-C0135.Bit2	FC-135.2	FCODE_bC135Bit2_b
307	FCODE-C0135.Bit3	FC-135.3	FCODE_bC135Bit3_b
308	FCODE-C0135.Bit4	FC-135.4	FCODE_bC135Bit4_b
309	FCODE-C0135.Bit5	FC-135.5	FCODE_bC135Bit5_b
310	FCODE-C0135.Bit6	FC-135.6	FCODE_bC135Bit6_b
311	FCODE-C0135.Bit7	FC-135.7	FCODE_bC135Bit7_b
312	FCODE-C0135.Bit8	FC-135.8	FCODE_bC135Bit8_b
313	FCODE-C0135.Bit9	FC-135.9	FCODE_bC135Bit9_b
314	FCODE-C0135.Bit10	FC-135.10	FCODE_bC135Bit10_b
315	FCODE-C0135.Bit11	FC-135.11	FCODE_bC135Bit11_b
316	FCODE-C0135.Bit12	FC-135.12	FCODE_bC135Bit12_b
317	FCODE-C0135.Bit13	FC-135.13	FCODE_bC135Bit13_b
318	FCODE-C0135.Bit14	FC-135.14	FCODE_bC135Bit14_b
319	FCODE-C0135.Bit15	FC-135.15	FCODE_bC135Bit15_b
320	SPEED-MCTRL.QspIn	SP-M.Qsp	MCTRL_bQspIn_b
321	SPEED-MCTRL.MMax	SP-M.MMax	MCTRL_bMMax_b
322	SPEED-MCTRL.IMax	SP-M.IMax	MCTRL_bIMax_b
324	SPEED-MCTRL.UnderVoltage	SP-M.UnV	MCTRL_bUnderVoltage_b
325	SPEED-MCTRL.OverVoltage	SP-M.OvV	MCTRL_bOverVoltage_b
326	SPEED-MCTRL.ShortCircuit	SP-M.ShC	MCTRL_bShortCircuit_b
327	SPEED-MCTRL.EarthFault	SP-M.EaF	MCTRL_bEarthFault_b
328	SPEED-MCTRL.NmaxFault	SP-M.NmaF	MCTRL_bNmaxFault_b
329	SPEED-MCTRL.ResolverFault	SP-M.ResF	MCTRL_bResolverFault_b
330	SPEED-MCTRL.MotorTempGreaterSetValue	SP-M.MoVa	MCTRL_bMotorTempGreaterSetValue_b
331	SPEED-MCTRL.MotorTempGreaterC0121	SP-M.M121	MCTRL_bMotorTempGreaterC0121_b
333	SPEED-MCTRL.KuehlGreaterSetValue	SP-M.KuVa	MCTRL_bKuehlGreaterSetValue_b
334	SPEED-MCTRL.KuehlGreaterC0122	SP-M.K122	MCTRL_bKuehlGreaterC0122_b
335	SPEED-MCTRL.SensorFault	SP-M.SenF	MCTRL_bSensorFault_b
336	SPEED-MCTRL.EncoderFault	SP-M.EncF	MCTRL_bEncoderFault_b
337	SPEED-MCTRL.IxtOverload	SP-M.Ixt	MCTRL_bIxtOverload_b
340	TORQUE-MCTRL.QspIn	T-M.Qsp	MCTRL_bQspIn_b
341	TORQUE-MCTRL.MMax	T-M.MMax	MCTRL_bMMax_b
342	TORQUE-MCTRL.IMax	T-M.IMax	MCTRL_bIMax_b

Selection No.	Signal	Keypad display	Variable for Global Drive Oscilloscope (GDO)
344	TORQUE-MCTRL.UnderVoltage	T-M.UnV	MCTRL_bUnderVoltage_b
345	TORQUE-MCTRL.OverVoltage	T-M.OvV	MCTRL_bOverVoltage_b
346	TORQUE-MCTRL.ShortCircuit	T-M.ShC	MCTRL_bShortCircuit_b
347	TORQUE-MCTRL.EarthFault	T-M.EaF	MCTRL_bEarthFault_b
348	TORQUE-MCTRL.NmaxFault	T-M.NmaF	MCTRL_bNmaxFault_b
349	TORQUE-MCTRL.ResolverFault	T-M.ResF	MCTRL_bResolverFault_b
350	TORQUE-MCTRL.MotorTempGreaterSetValue	T-M.MoVa	MCTRL_bMotorTempGreaterSetValue_b
351	TORQUE-MCTRL.MotorTempGreaterC0121	T-M.M121	MCTRL_bMotorTempGreaterC0121_b
353	TORQUE-MCTRL.KuehlGreaterSetValue	T-M.KuVa	MCTRL_bKuehlGreaterSetValue_b
354	TORQUE-MCTRL.KuehlGreaterC0122	T-M.K122	MCTRL_bKuehlGreaterC0122_b
355	TORQUE-MCTRL.SensorFault	T-M.SenF	MCTRL_bSensorFault_b
356	TORQUE-MCTRL.EncoderFault	T-M.EncF	MCTRL_bEncoderFault_b
357	TORQUE-MCTRL.IxtOverload	T-M.Ixt	MCTRL_bIxtOverload_b
400	SPEED-NSET.RfgIEqO	SP-N.REqO	ECS_MAIN.L_NSET1.bRfgIEqO_b
401	TORQUE-NSET.RfgIEqO	T-N.REqO	ECS_MAIN.L_NSET1.bRfgIEqO_b
410	SPEED-BRK.SetQSP	SP-B.QSP	ECS_MAIN.L_BRK1.bQSP_b
411	SPEED-BRK.NegOut	SP-B.NOut	ECS_MAIN.BRK_bNegOut_b
412	SPEED-BRK.Out	SP-B.Out	ECS_MAIN.L_BRK1.bOut_b
413	SPEED-BRK.SetCInh	SP-B.CInh	ECS_MAIN.L_BRK1.bCInh_b
414	SPEED-BRK.MStore	SP-B.MSt	ECS_MAIN.L_BRK1.bMStore_b
420	TORQUE-BRK.SetQSP	T-B.QSP	ECS_MAIN.L_BRK1.bQSP_b
421	TORQUE-BRK.NegOut	T-B.NOut	ECS_MAIN.BRK_bNegOut_b
422	TORQUE-BRK.Out	T-B.Out	ECS_MAIN.L_BRK1.bOut_b
423	TORQUE-BRK.SetCInh	T-B.CInh	ECS_MAIN.L_BRK1.bCInh_b
424	TORQUE-BRK.MStore	T-B.MSt	ECS_MAIN.L_BRK1.bMStore_b
450	SPEED-RLQ.QSP	SP-RL.QSP	ECS_MAIN.L_RLQ1.bQSP_b
451	SPEED-RLQ.CwCCw	SP-RL.Cw	ECS_MAIN.L_RLQ1.bCwCCw_b
460	TORQUE-RLQ.QSP	T-RL.QSP	ECS_MAIN.L_RLQ1.bQSP_b
461	TORQUE-RLQ.CwCCw	T-RL.Cw	ECS_MAIN.L_RLQ1.bCwCCw_b
651	InNeg-DigOut1	IN-AnOut1	InNeg_bDigOut1
652	InNeg-DigOut2	IN-AnOut2	InNeg_bDigOut2
653	InNeg-DigOut3	IN-AnOut3	InNeg_bDigOut3
671	OutNeg-DigOut1	ON-AnOut1	OutNeg_bDigOut1
672	OutNeg-DigOut2	ON-AnOut2	OutNeg_bDigOut2
673	OutNeg-DigOut3	ON-AnOut3	OutNeg_bDigOut3
700	AIF1In-W1.Bit0	AIF1-1.0	AIF1_bInWord1B0_b
701	AIF1In-W1.Bit1	AIF1-1.1	AIF1_bInWord1B1_b
702	AIF1In-W1.Bit2	AIF1-1.2	AIF1_bInWord1B2_b
703	AIF1In-W1.Bit3	AIF1-1.3	AIF1_bInWord1B3_b
704	AIF1In-W1.Bit4	AIF1-1.4	AIF1_bInWord1B4_b
705	AIF1In-W1.Bit5	AIF1-1.5	AIF1_bInWord1B5_b
706	AIF1In-W1.Bit6	AIF1-1.6	AIF1_bInWord1B6_b
707	AIF1In-W1.Bit7	AIF1-1.7	AIF1_bInWord1B7_b
708	AIF1In-W1.Bit8	AIF1-1.8	AIF1_bInWord1B8_b
709	AIF1In-W1.Bit9	AIF1-1.9	AIF1_bInWord1B9_b
710	AIF1In-W1.Bit10	AIF1-1.10	AIF1_bInWord1B10_b
711	AIF1In-W1.Bit11	AIF1-1.11	AIF1_bInWord1B11_b
712	AIF1In-W1.Bit12	AIF1-1.12	AIF1_bInWord1B12_b

Selection No.	Signal	Keypad display	Variable for Global Drive Oscilloscope (GDO)
713	AIF1In-W1.Bit13	AIF1-1.13	AIF1_bInWord1B13_b
714	AIF1In-W1.Bit14	AIF1-1.14	AIF1_bInWord1B14_b
715	AIF1In-W1.Bit15	AIF1-1.15	AIF1_bInWord1B15_b
800	CAN1In-W1.Bit0	CAN1-1.0	CAN1_bInWord1B0_b
801	CAN1In-W1.Bit1	CAN1-1.1	CAN1_bInWord1B1_b
802	CAN1In-W1.Bit2	CAN1-1.2	CAN1_bInWord1B2_b
803	CAN1In-W1.Bit3	CAN1-1.3	CAN1_bInWord1B3_b
804	CAN1In-W1.Bit4	CAN1-1.4	CAN1_bInWord1B4_b
805	CAN1In-W1.Bit5	CAN1-1.5	CAN1_bInWord1B5_b
806	CAN1In-W1.Bit6	CAN1-1.6	CAN1_bInWord1B6_b
807	CAN1In-W1.Bit7	CAN1-1.7	CAN1_bInWord1B7_b
808	CAN1In-W1.Bit8	CAN1-1.8	CAN1_bInWord1B8_b
809	CAN1In-W1.Bit9	CAN1-1.9	CAN1_bInWord1B9_b
810	CAN1In-W1.Bit10	CAN1-1.10	CAN1_bInWord1B10_b
811	CAN1In-W1.Bit11	CAN1-1.11	CAN1_bInWord1B11_b
812	CAN1In-W1.Bit12	CAN1-1.12	CAN1_bInWord1B12_b
813	CAN1In-W1.Bit13	CAN1-1.13	CAN1_bInWord1B13_b
814	CAN1In-W1.Bit14	CAN1-1.14	CAN1_bInWord1B14_b
815	CAN1In-W1.Bit15	CAN1-1.15	CAN1_bInWord1B15_b
880	SYS-Clock01Hz	SYS-0.1Hz	SYSTEM_bClock01Hz
881	SYS-Clock1Hz	SYS-1Hz	SYSTEM_bClock1Hz
882	SYS-Clock10Hz	SYS-10Hz	SYSTEM_bClock10Hz
883	SYS-Clock100Hz	SYS-100Hz	SYSTEM_bClock100Hz
920	AIn1-Error	AIN1-Err	AIN1_bError_b
1000	FIXED 0/FALSE	0/FALSE	gC_bFalse

12.2.2 List of the analog signal sources

Symbol in signal flow diagrams: ○

Selection No.	Signal	Keypad display	Variable for Global Drive Oscilloscope (GDO)
2	FIXED100%	FIXED100%	gC_wPos16384
3	FIXED-100%	FIXED-100%	gC_wNeg16384
10	AIF1In-DctrlCtrl	AIF1-Dctrl	AIF1_wDctrlCtrl
11	AIF1In-W1	AIF1In-W1	AIF1_nInW1_a
12	AIF1In-W2	AIF1In-W2	AIF1_nInW2_a
13	AIF1In-W3	AIF1In-W3	AIF1_nInW3_a
14	AIF2In-W1	AIF2In-W1	AIF2_nInW1_a
15	AIF2In-W2	AIF2In-W2	AIF2_nInW2_a
16	AIF2In-W3	AIF2In-W3	AIF2_nInW3_a
17	AIF2In-W4	AIF2In-W4	AIF2_nInW4_a
18	AIF3In-W1	AIF3In-W1	AIF3_nInW1_a
19	AIF3In-W2	AIF3In-W2	AIF3_nInW2_a
20	AIF3In-W3	AIF3In-W3	AIF3_nInW3_a
21	AIF3In-W4	AIF3In-W4	AIF3_nInW4_a
23	CAN1In-DctrlCtrl	CAN1-Dctrl	CAN1_wDctrlCtrl
24	CAN1In-W1	CAN1In-W1	CAN1_nInW1_a
25	CAN1In-W2	CAN1In-W2	CAN1_nInW2_a
26	CAN1In-W3	CAN1In-W3	CAN1_nInW3_a
27	CAN2In-W1	CAN2In-W1	CAN2_nInW1_a
28	CAN2In-W2	CAN2In-W2	CAN2_nInW2_a
29	CAN2In-W3	CAN2In-W3	CAN2_nInW3_a
30	CAN2In-W4	CAN2In-W4	CAN2_nInW4_a
31	CAN3In-W1	CAN3In-W1	CAN3_nInW1_a
32	CAN3In-W2	CAN3In-W2	CAN3_nInW2_a
33	CAN3In-W3	CAN3In-W3	CAN3_nInW3_a
34	CAN3In-W4	CAN3In-W4	CAN3_nInW4_a
35	CANSync-Deviation	CANSync-De	CAN_nSyncDeviation
36	DCTRL-Stat	DCTRL-Stat	DCTRL_wStat
37	DCTRL-FaultNumber	DCTRL-FNr	DCTRL_wFaultNumber
38	FCODE-C0017	FCODE-C17	FCODE_nC17_a
43	FCODE-C0037	FCODE-C37	FCODE_nC37_a
44	FCODE-C0108/1	FC-C108_1	FCODE_nC108_1_a
45	FCODE-C0108/2	FC-C108_2	FCODE_nC108_2_a
46	FCODE-C0109/1	FC-C109_1	FCODE_nC109_1_a
47	FCODE-C0109/2	FC-C109_2	FCODE_nC109_2_a
48	FCODE-C0141	FC-C141	FCODE_nC141_a
49	FCODE-C0472/1	FC-C472_1	FCODE_nC472_1_a
50	FCODE-C0472/2	FC-C472_2	FCODE_nC472_2_a
51	FCODE-C0472/3	FC-C472_3	FCODE_nC472_3_a
52	FCODE-C0472/4	FC-C472_4	FCODE_nC472_4_a
53	FCODE-C0472/5	FC-C472_5	FCODE_nC472_5_a
54	FCODE-C0472/6	FC-C472_6	FCODE_nC472_6_a
55	FCODE-C0472/7	FC-C472_7	FCODE_nC472_7_a
56	FCODE-C0472/8	FC-C472_8	FCODE_nC472_8_a

Selection No.	Signal	Keypad display	Variable for Global Drive Oscilloscope (GDO)
57	FCODE-C0472/9	FC-C472_9	FCODE_nC472_9_a
58	FCODE-C0472/10	FC-C472_10	FCODE_nC472_10_a
59	FCODE-C0472/11	FC-C472_11	FCODE_nC472_11_a
60	FCODE-C0472/12	FC-C472_12	FCODE_nC472_12_a
61	FCODE-C0472/13	FC-C472_13	FCODE_nC472_13_a
62	FCODE-C0472/14	FC-C472_14	FCODE_nC472_14_a
63	FCODE-C0472/15	FC-C472_15	FCODE_nC472_15_a
64	FCODE-C0472/16	FC-C472_16	FCODE_nC472_16_a
65	FCODE-C0472/17	FC-C472_17	FCODE_nC472_17_a
66	FCODE-C0472/18	FC-C472_18	FCODE_nC472_18_a
67	FCODE-C0472/19	FC-C472_19	FCODE_nC472_19_a
68	FCODE-C0472/20	FC-C472_20	FCODE_nC472_20_a
69	FCODE-C0473/1	FC-C473_1	FCODE_nC473_1_a
70	FCODE-C0473/2	FC-C473_2	FCODE_nC473_2_a
71	FCODE-C0473/3	FC-C473_3	FCODE_nC473_3_a
72	FCODE-C0473/4	FC-C473_4	FCODE_nC473_4_a
73	FCODE-C0473/5	FC-C473_5	FCODE_nC473_5_a
74	FCODE-C0473/6	FC-C473_6	FCODE_nC473_6_a
75	FCODE-C0473/7	FC-C473_7	FCODE_nC473_7_a
76	FCODE-C0473/8	FC-C473_8	FCODE_nC473_8_a
77	FCODE-C0473/9	FC-C473_9	FCODE_nC473_9_a
78	FCODE-C0473/10	FC-C473_10	FCODE_nC473_10_a
79	FCODE-C0475/1_v	FC-475_1_v	FCODE_nC475_1_v
80	FCODE-C0475/2_v	FC-475_2_v	FCODE_nC475_2_v
90	SPEED-MCTRL.NSetIn	SP-MC.NSe	MCTRL_nNSetIn_a
91	SPEED-MCTRL.MSetIn	SP-MC.MSe	MCTRL_nMSetIn_a
92	SPEED-MCTRL.IAct	SP-MC.IAct	MCTRL_nIAct_a
93	SPEED-MCTRL.DCVolt	SP-MC.DCV	MCTRL_nDCVolt_a
94	SPEED-MCTRL.MAct	SP-MC.MAct	MCTRL_nMAct_a
95	SPEED-MCTRL.Pos	SP-MC.Pos	MCTRL_nPos_a
96	SPEED-MCTRL.NAct_v	SP-MC.NA_v	MCTRL_nNAct_v
97	SPEED-MCTRL.NAct	SP-MC.NAct	MCTRL_nNAct_a
98	SPEED-MCTRL.NmaxC11	SP-MC.NC11	MCTRL_nNmaxC11
99	SPEED-MCTRL.wMmaxC57	SP-MC.MC57	MCTRL_wMmaxC57
100	TORQUE-MCTRL.NSetIn	T-MC.NSe	MCTRL_nNSetIn_a
101	TORQUE-MCTRL.MSetIn	T-MC.MSe	MCTRL_nMSetIn_a
102	TORQUE-MCTRL.IAct	T-MC.IAct	MCTRL_nIAct_a
103	TORQUE-MCTRL.DCVolt	T-MC.DCV	MCTRL_nDCVolt_a
104	TORQUE-MCTRL.MAct	T-MC.MAct	MCTRL_nMAct_a
105	TORQUE-MCTRL.Pos	T-MC.Pos	MCTRL_nPos_a
106	TORQUE-MCTRL.NAct_v	T-MC.NA_v	MCTRL_nNAct_v
107	TORQUE-MCTRL.NAct	T-MC.NAct	MCTRL_nNAct_a
108	TORQUE-MCTRL.NmaxC11	T-MC.NC11	MCTRL_nNmaxC11
109	TORQUE-MCTRL.wMmaxC57	T-MC.MC57	MCTRL_wMmaxC57
130	SPEED-NSET.NOut	SP-NS.NOu	ECS_MAIN.L_NSET1.nNOut_a
131	TORQUE-NSET.NOut	T-NS.NOu	ECS_MAIN.L_NSET1.nNOut_a
140	SPEED-BRK.MSetOut	SP-BR.MOu	ECS_MAIN.L_BRK1.nMSetOut_a
141	TORQUE-BRK.MSetOut	T-BR.MOu	ECS_MAIN.L_BRK1.nMSetOut_a

Selection No.	Signal	Keypad display	Variable for Global Drive Oscilloscope (GDO)
651	InNeg-AnOut1	IN-AnOut1	InNeg_nAnOut1
652	InNeg-AnOut2	IN-AnOut2	InNeg_nAnOut2
671	OutNeg-AnOut1	ON-AnOut1	OutNeg_nAnOut1
672	OutNeg-AnOut2	ON-AnOut2	OutNeg_nAnOut2
900	DFIn-In_v	DFIn-In_v	DFIN_nIn_v_Shadow
910	DFOut-In_v	DFOUT-I_v	DFOUT_nIn_v_Shadow
920	AIN1-OUT	AIN1-OUT	L_AIN1.nOut_a

12.2.3 List of the phase signal sources

Symbol in signal flow diagrams: ▲

Selection No.	Signal	Keypad display	Variable for Global Drive Oscilloscope (GDO)
10	AIF1In-W2/W3	AIF1-W2/W3	AIF1_dnInD1_p
11	AIF2In-W0/W1	AIF2-W0/W1	AIF2_dnInD1_p
12	AIF3In-W0/W1	AIF3-W0/W1	AIF3_dnInD1_p
13	CAN1In-W2/W3	CAN1-W2/W3	CAN1_dnInD1_p
14	CAN2In-W0/W1	CAN2-W0/W1	CAN2_dnInD1_p
15	CAN3In-W0/W1	CAN3-W0/W1	CAN3_dnInD1_p
16	FCODE-C0474/1	FCE-474_1	FCODE_dnC474_1_p
17	FCODE-C0474/2	FC-474_2	FCODE_dnC474_2_p
18	FCODE-C0474/3	FC-474_3	FCODE_dnC474_3_p
19	FCODE-C0474/4	FC-474_4	FCODE_dnC474_4_p
20	FCODE-C0474/5	FC-474_5	FCODE_dnC474_5_p
21	AIF1In-W0/W1	AIF1-W0/W1	AIF1_dnInD0_p
22	AIF2In-W2/W3	AIF2-W2/W3	AIF2_dnInD2_p
23	AIF3In-W2/W3	AIF3-W2/W3	AIF3_dnInD2_p
24	CAN1In-W0/W1	CAN1-W0/W1	CAN1_dnInD0_p
25	CAN2In-W2/W3	CAN2-W2/W3	CAN2_dnInD2_p
26	CAN3In-W2/W3	CAN3-W2/W3	CAN3_dnInD2_p
30	SPEED-MCTRL.Pos	SP-M.Pos	MCTRL_dnPos_p
40	TORQUE-MCTRL.Pos	T-M.Pos	MCTRL_dnPos_p
651	InNeg-PhiOut1	IN-PhiO1	InNeg_dnPhiOut1
652	InNeg-PhiOut2	IN-PhiO2	InNeg_dnPhiOut2
671	OutNeg-PhiOut1	ON-PhiO1	OutNeg_dnPhiOut1
672	OutNeg-PhiOut2	ON-PhiO2	OutNeg_dnPhiOut2

12.3 Overview of accessories

The accessories are not included in the scope of supply. Lenze's basic devices and accessories are carefully matched to each other. With the basic device and the accessories, all components for a complete drive system are available. The component selection must be matched to the respective application.

12.3.1 Connectors

In order to provide a flexible purchasing, the connectors are available as separate delivery units complementing the power supply, capacitor and axis modules of the ECS series:

- ECSZ**E**000X0B (connectors for power supply modules)
- ECSZ**K**000X0B (connectors for capacitor modules)
- ECSZ**A**000X0B (connectors for axis modules)

12.3.2 Shield mounting kit

The shield mounting kit ECSZS000X0B001 contains components for reliable and quick fixing of the cable shields. The scope of supply includes:

- Shield sheet for motor cable
- Wire clamp for shield connection of motor cable
- Wire clamp for shield connection of control cables
- Wire clamp for shield connection of motor monitoring cable

12.3.3 Power supply modules

For generating the DC-bus voltage for the axis modules:

- ECSxE012
- ECSxE020
- ECSxE040

The modules are delivered in three different mounting designs (x): standard panel mounting **(E)**, push-through mounting **(D)** and cold-plate mounting **(C)**.

12.3.4 Capacitor modules

For backing up the DC-bus voltage for the drive system:

- ECSxK001
- ECSxK002

The modules are delivered in three different mounting designs (x): standard panel mounting **(E)**, push-through mounting **(D)** and cold-plate mounting **(C)**.

12.3.5 Communication modules

For the AIF automation interface various modules are available:

- LECOM-LI (optical fibre) ... EMF2102IB-V003
- LECOM-A (RS232) ... EMF2102IB-V004
- LECOM-B (RS485) ... EMF2102IB-V002
- LECOM-A/B (RS232/RS485) ... EMF2102IB-V001
- LON ... EMF2141IB
- INTERBUS ... EMF2113IB
- PROFIBUS-DP ... EMF2133IB
- DeviceNet/CANopen ... EMF2175IB
- CAN addressing ... EMF2174IB
- Keypad XT ... EMZ9371BC
- Diagnosis terminal = Keypad XT in hand-held design ... E82ZBBXC
- PC system bus adapter:

Module	**Short description**
EMF2173IB	PC printer interface/system bus converter Voltage supply via DIN connection
EMF2173IB V002	PC printer interface/system bus converter Voltage supply via PS2 connection
EMF2173IB V003	PC printer interface/system bus converter Voltage supply via PS2 connection, electrical isolation to the CAN bus
EMF2177IB	USB system bus adapter

12.3.6 Brake resistors

External brake resistors with specially adjusted pulse capability for the cold-plate variant in IP50 design:

- ► ERBM039R120W (39 Ω, 0.12 kW)
- ► ERBM020R150W (20 Ω, 0.15 kW)

External brake resistors with increased power loss in IP20 design (protection against accidental contact according to NEMA 250 type 1):

- ► ERBD047R01K2 (47 Ω, 1.2 kW)
- ► ERBD022R03K0 (22 Ω, 3.0 kW)

External brake resistors with increased power loss in IP65 design (NEMA 250 type 4x):

- ► ERBS039R01K6 (39 Ω, 1.6 kW)
- ► ERBS020R03K2 (20 Ω, 3.2 kW)

Assignment of external brake resistors

Brake resistor	Ω	P_D [kW]	Power supply module								
			ECSEE...			ECSDE...			ECSCE...		
			012	020	040	012	020	040	012	020	040
ERBM039R120W	39	0.12							●	●	
ERBM020R150W	20	0.15									●
ERBD047R01K2	47	1.2	●	●		●	●		●	●	
ERBD022R03K0	22	3.0			●			●			●
ERBS039R01K6	39	1.6	●	●		●	●		●	●	
ERBS020R03K2	20	3.2			●			●			●

P_D Permanent power

12.3.7 Mains fuses

Fuses are not offered by Lenze. Please use standard fuses.

Observe the national and regional regulations (VDE, UL, EVU, ...).

Only circuit-breakers or UL-approved fuses can be used for cable protection.

In UL-approved systems, only UL-approved cables, fuses and fuse holders are to be used.

12.3.8 Mains chokes

It is not mandatory to use a mains choke for operating the ECS modules. The respective application determines whether a mains choke is required or not.

Advantages when using a mains choke:

- Lower system perturbations
  - The waveform of the mains current is approximated to the sinusoidal shape.
  - Reduction of the effective mains current by up to 25%.
  - Reduction of the mains, cable and fuse load.
- The effective DC-bus current also decreases by up to 25%.
- Increased service life of the connected axis modules
  - A mains choke reduces the AC current load of the DC-bus capacitors and thus increases their service life.
- Low-frequency radio interference voltages are reduced.

Please note:

- With mains choke operation the maximally possible output voltage does not fully reach the value of the mains voltage.
- For operation of drives for accelerating duty with high peak currents, it is recommended to use mains chokes with linear L/I characteristic (Lenze types ELN3...).
- The choke rating is to be checked and adapted to the respective conditions.

Mains chokes for the power supply modules:

Power supply module type	Mains choke type	I_r [A]	L_r [mH]	Short-circuit voltage (U_k)
ECSxE012	ELN3-0150H024	3 x 24	3 x 1.5	4 %
ECSxE020	ELN3-0088H035	3 x 35	3 x 0.88	
ECSxE040	ELN3-0055H055	3 x 55	3 x 0.55	

12.3.9 RFI filters

Depending on the application case, servo systems require different mains-side measures for reducing the mains current and for suppressing radio interference. These measures are generally not compulsory but ensure the universal use of a servo system.

For every power supply module, Lenze offers a built-on filter for interference level A. These filters are designed for a configuration of 10 axes and 25 m of motor cable length each (Lenze system cable). The interference level A is also complied with in other combinations of ECS axis modules, as long as the motor cable length per axis module does not exceed 25 m (Lenze system cables) and the maximum number of ECS axis modules is 10.

The following table shows the rated operation.

Type	Axes in idle state (0 ... 100 % speed, evenly spread, motors in idle state)	Axes with 25% partial load (50 % speed, motors with 50% load)	Axes with 100% load (100 % speed, motors with approx. 100% rated load)	Sum of the input power 400V
ECSxE012	5 × ECSx☐008	3 × ECSx☐008	2 × ECSx☐008	6 KW
ECSxE020	5 × ECSx☐008	3 × ECSx☐008	2 × ECSx☐016	10 KW
ECSxE040	5 × ECSx☐008	3 × ECSx☐016	2 × ECSx☐048 (approx. 70 % load)	20 KW

☐ Application software:
S = Speed & Torque
P = Posi & Shaft
M = Motion
A = Application

Designation	I_r [A]	U_{mains} [V]
ECSZZ020X4B	16	500
ECSZZ040X4B	32	

12.3.10 Motors

Matched motors can be obtained under the following type designations:

- MCA series asynchronous motor (high speeds by means of wide field weakening range)
- MCS series synchronous motor (for high-dynamic applications)
- MDxMA series asynchronous motor (cost-effective)

12.3.11 Master frequency connection for ECSxS/P/A axis modules

Master frequency connection	Connection
EMF 2132 IB master frequency distributor	Several slaves on the master
EYD0017AxxxxW01W01 master frequency cable	One slave on the master
	ECS (master) ↔ EMF 2132 IB
EYD0017AxxxxW01S01 master frequency cable	ECS (slave) ↔ EMF 2132 IB

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