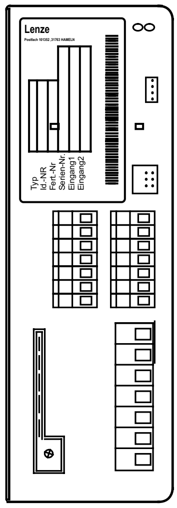
EDB8200UE
00398283

Lenze

Operating Instructions



K35.0110-3

Global Drive

Frequency inverters

8200 series

These Operating Instructions are valid for the 82XX controllers of the versions:

33.820X- E- 1x. 1x (8201 - 8204)
33.8202- E- 1x. 1x -V002 reduced assembly depth (8202)

Type

Design:
B = Module
C = Cold Plate
E = Enclosure IP20

Hardware level and index

Software level and index

Variant

Explanation

Corresponds to the German edition of 16/06/1997			
Edition of:	02/10/1997		

1 Preface and general information

1.1 About these Operating Instructions ...

- These Operating Instructions help you to connect and set up the 82XX frequency inverter. They contain safety information which must be observed.
- All persons who work on and with 82XX frequency inverters must have the Operating Instructions available and observe all relevant notes and instructions.
- The Operating Instructions must always be in a complete and perfectly readable state.

1.1.1 Terminology used

Term	In the following text used for
82XX	Any frequency inverter of the series 8200, 8210, 8220, 8240
Controller	82XX frequency inverter
Drive system	Drive systems with 82XX frequency inverters and other Lenze drive components

1.1.2 What is new?

Material no.	Edition of	Important	Content
375134	05/10/1994		8200/8210 Short Instructions
375190	13/02/1995		8200/8210 Operating Instructions
398283	02/10/1997	replaces 375134 replaces 375190	• Contents only for 8200 • Complete revision of the contents • Complete editorial revision

1.2 Scope of delivery

Scope of delivery	Important
• 1 82XX frequency inverter • 1 Operating Instructions • 1 accessory kit (components for the mechanical and electric installation)	After receipt of the delivery, check immediately whether the scope of supply matches with the accompanying papers. Lenze does not accept any liability for deficiencies claimed subsequently. Claim • visible transport damage immediately to the forwarder. • visible deficiencies/incompleteness immediately to your Lenze representative.

1.3 Legal regulations

Labelling	Nameplate	CE mark	Manufacturer
		Conforms to the EC Low Voltage Directive	Lenze GmbH & Co KG Postfach 101352 D-31763 Hameln
Application as directed	**82XX frequency inverter** ● must only be operated under the conditions prescribed in these Instructions. ● are components - used for open and closed loop control of variable speed drives withasynchronous standard motors, reluctance motors, PM-synchronous motors with asynchronous damping cage. - used for installation into a machine. - used for assembly together with other components to form a machine. ● are electric units for the installation into control cabinets or similar enclosed operating housing. ● comply with the requirements of the Low-Voltage Directive. ● are not machines for the purpose of the Machinery Directive. ● are not to be used as domestic appliances, but only for industrial purposes. **Drive systems with 82XX frequency inverters** ● comply with the EMC Directive if they are installed according to the guidelines of CE-typical drive systems. ● can be used - on public and non-public mains. - in industrial as well as residential and commercial premises. ● The user is responsible for the compliance of his application with the EC directives. **Any other use shall be deemed inappropriate!**		

<table>
<tr><td rowspan="5">Liability</td><td colspan="3">● The information, data and notes in these Operating Instructions met the state of the art at the time of printing. Claims referring to drive systems which have already been supplied cannot be derived from the information, illustrations, and descriptions given in these Operating Instructions.
● The specifications, processes, and circuitry described in these Operating Instructions are for guidance only and must be adapted to your own specific application. Lenze does not take responsibility for the suitability of the process and circuit proposals.
● The indications given in these Operating Instructions describe the features of the product without warranting them.
● Lenze does not accept any liability for damage and operating interference caused by:
- disregarding these Instructions
- unauthorized modifications to the controller
- operating errors
- improper working on and with the controller</td></tr>
<tr></tr><tr></tr><tr></tr><tr></tr>
<tr><td>Warranty</td><td colspan="3">● Warranty conditions: see Sales and Delivery Conditions of Lenze GmbH & Co KG.
● Warranty claims must be made immediately after detecting defects or faults.
● The warranty is void in all cases where liability claims cannot be made.</td></tr>
<tr><td rowspan="4">Disposal</td><td>Material</td><td>recycle</td><td>dispose</td></tr>
<tr><td>Metal</td><td>●</td><td>-</td></tr>
<tr><td>Plastic</td><td>●</td><td>-</td></tr>
<tr><td>Printed-board assemblies</td><td>-</td><td>●</td></tr>
</table>

2 Safety information

2.1 General safety information

Safety and application notes for controllers

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

1. General

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

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

Further information can be obtained from the documentation.

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

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

2. Application as directed

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

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

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

The drive controllers meet the requirements of the Low Voltage Directive 73/23/EEC. The harmonized standards of the prEN 50178/ DIN VDE 0160 series together with EN 60439-1/DIN VDE 0660 part 500 and EN 60146/DIN VDE 0558 are applicable to drive controllers.

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

3. Transport, storage

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

Climatic conditions must be observed according to prEN 50178.

4. Erection

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

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

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

5. Electrical connection

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

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

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

6. Operation

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

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

7. Maintenance and servicing

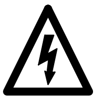
The manufacturer's documentation must be observed.

This safety information must be kept!

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

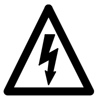
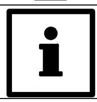
2.2 Layout of the safety information

- All safety notes have a uniform layout:
  - The icon characterizes the type of danger.
  - The signal word characterizes the severity of danger.
  - The note describes the danger and suggests how to avoid the danger.



Signal word

Note

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

2.3 Residual hazards

Operator's safety	After mains disconnections, the power terminals U, V, W and $+U_G$, $-U_G$ remain live for at least three minutes. ● Before working on the controller, check that no voltage is applied to the power terminals.
Protection of devices	Cyclic connection and disconnection of the controller supply voltage at L1, L2, L3 or $+U_G$, $-U_G$ may overload the internal input current load: ● Allow at least 3 minutes between disconnection and reconnection.
Overspeeds	Drive systems can reach dangerous overspeeds (e. g. setting of inappropriately high field frequencies): ● The controllers do not offer any protection against these operating conditions. Use additional components for this.

3 Technical data

3.1 General data/application conditions

Field	Values		
Vibration resistance	Germanischer Lloyd, general conditions		
Humidity class	Humidity class F without condensation (average relative humidity 85 %)		
Permissible temperature ranges	during transport of the controller:	-25 °C … +70 °C	
	during storage of the controller:	-25 °C … +55 °C	
	during operation of the controller:	0 °C …+40 °C +40 °C … +50 °C	without power derating with power derating
Permissible installation height h	h ≤ 1000 m.a.m.s.l 1000 m a.m.s.l < h ≤ 4000 m a.m.s.l		without power derating with power derating
Degree of pollution	VDE 0110 part 2 pollution degree 2		
Noise emission	Requirements acc. to EN 50081-2, EN 50082-1, IEC 22G-WG4 (Cv) 21 Limit value class A to EN 55011 (industrial area) with mains filter Limit value class B to EN 55022 (residential area) with mains filter and installation into control cabinet		
Noise immunity	Limit values maintained usig mains filter Requirements according to EN 50082-2, IEC 22G-WG4 (Cv) 21		
	Requirements	**Standard**	**Severities**
	ESD	EN61000-4-2	3, i.e. 8 kV with air discharge 6 kV with contact discharge
	RF interference(enclosure)	EN61000-4-3	3, i.e. 10 V/m; 27…1000 MHz
	Burst	EN61000-4-4	3/4, i.e. 2 kV/5 kHz
	Surge (Surge on mains cable)	EN 61000-4-5	3, i.e. 1.2/50 μs, 1 kV phase-phase, 2 kV phase-PE
Insulation strength	Overvoltage category III according to VDE 0110		
Packaging (DIN 4180)		Dust packaging	
Type of protection		IP20 NEMA 1: Protection against contact	
Approvals		CE:	Low Voltage Directive Electromagnetic compatibility

3.2 Rated data (Operation with 150 % overload)

3.2.1 Types 8201 to 8204

150 % overload	**Type**	**8201**	**8202**	**8203**	**8204**
	Order no.	EVF8201-E	EVF8202-E	EVF8203-E	EVF8204-E
Variant "reduced assembly depth"	**Type**		**8202-V002**		
	Order no.		EVF8202-E- V002		
Mains voltage	V_{rated} [V]	190V ± 0% ≤ V_{rated} ≤ 260V ± 0% ; 45Hz…65Hz ± 0%			
Alternative DC supply	V_{DC} [V]	270V ± 0% ≤ V_{DC} ≤ 360V ± 0%			
Mains current 4) with mains filter/mains choke without mains filter/mains choke	I_{mains} [A]	 4.2 5.0	 7.5 9.0	 12.5 15.0	 17.0 -
Data for mains operation with 1 AC / 230 V / 50 Hz/60 Hz; 270 ≤ V_{DC} ≤ 275V					
Motor power (4 pole ASM) at 9.2 kHz*	P_{rated} [kW]	0.37	0.75	1.5	2.2
	P_{rated} [hp]	0.5	1.0	2.0	2.9
Output power U, V, W at 9.2 kHz*	$S_{N9.2}$ [kVA]	1.0	1.5	2.7	3.6
Output power +U_G, -U_G 1)	P_{DC} [kW]	0.0	0.0	0.0	0.0
Output current	I_{rated} [A]	2.6	4.0	7.0	9.5
Max. output current for 60s 2)	I_{Nmax} [A]	3.9	6.0	10.5	14.2
Motor voltage 3)	V_M [V]	0 - 3 × V_{mains} / 0Hz … 50Hz, if required up to 240Hz			
Power loss (Operation with I_N)	P_V [W]	30	50	70	100

150 % overload		**Type**	**8201**	**8202**	**8203**	**8204**
		Order no.	EVF8201-E	EVF8202-E	EVF8203-E	EVF8204-E
Variant "reduced assembly depth"		**Type**		**8202-V002**		
		Order no.		EVF8202-E- V002		
Power derating		[%/K] [%/m]	40 °C < T_{amb} < 50 °C: 2,5%/K 1000 m a.m.s.l. < h ≤ 4000 m a.m.s.l.: 5%/1000 m			
Field frequency	Resolution	Absolute	0.05 Hz			
	Digital setpoint selection	Accuracy	± 0.05 Hz			
	Analog setpoint selection	Linearity	± 0.5 % (max. selected signal level, 5V or 10V)			
		Temperature sensitivity	0 … 40 °C: +0.4 %			
		Offset	± 0.3 %			
Weight		m [kg]	1.0	1.3 Variant 1.0	2.2	2.2

1) This power can be additionally obtained when operating a matching motor

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

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

4) Observe the N-conduction load when having a symmetrical mains distribution!
(See electrical installation)

* Chopper frequency of the inverter

3.3 Fuses and cable cross-sections

3.3.1 Single drives with 150 % overload

The table values are valid for the operation of 82XX controllers as single drives with a matching motor and 150 % overload.

Type	Mains input L1, N, PE / motor connection U, V, W, PE									
	Operation without mains filter/mains choke					Operation with mains filter/mains choke				
	Fuse F1, F2, F3		E.l.c.b.	Cable cross-section 1)		Fuse F1, F2, F3		E.l.c.b.	Cable cross-section 1)	
	VDE	UL	VDE	mm^2	AWG	VDE	UL	VDE	mm^2	AWG
8201	M 10A	-	C 10A	1.5	15	M 10A	-	C 10A	1.5	15
8202	M 15A	-	C 16A	2.5	13	M 15A	-	C 16A	2.5 [1.5]	13 [15]
8203	M 20A	-	C 20A	4	11	M 15A	-	C 16A	2.5 [1.5]	13 [15]
8204	-	-	-	-	-	M 20A	-	C 20A	4 [2.5]	11 [13]

Values in square brackets are valid for motor connection
1) Observe national and regional regulations (e. g. VDE/EVU)!

3.4 Dimensions

The controller dimensions depend on the mechanical installation (see chapter 4.1).

4 Installation

4.1 Mechanical installation

4.1.1 Important notes

- Use the controllers only as built-in devices!
- If the cooling air contains pollutants (dust, fluff, grease, aggressive gases):
  - take suitable preventive measures , e.g. separate air duct, installation of filters, regular cleaning, etc.
- Observe free space!
  - You can install several controllers next to each other without free space in a control cabinet.
  - Ensure unimpeded ventilation of cooling air and outlet of exhaust air!
  - Allow a free space of 100 mm at the top and at the bottom.
- Do not exceed the ambient temperature permissible during operation (see chapter. 3.1)
- With continous oscillations or vibrations:
  - Check whether shock absorbers are necessary.

Possible mounting positions

- In vertical position at the back of the control cabinet, terminals point to the front:
  - With attached fixing rails.
  - With special fixing unit on one or two DIN rails.
- Turned by 90° (flat assembly on the backside of the control cabinet):
  - Insert the attached fixing rail into the guides at the heat sink.
- Horizontally with an additional fan.
- On a pivoting frame for assembly depths < 198 mm:
  - Therefore easy handling and installation of the front interfaces possible.

4.1.2 Standard assembly with fixing rails or fixing angles

4.1.2.1 Types 8201 to 8204

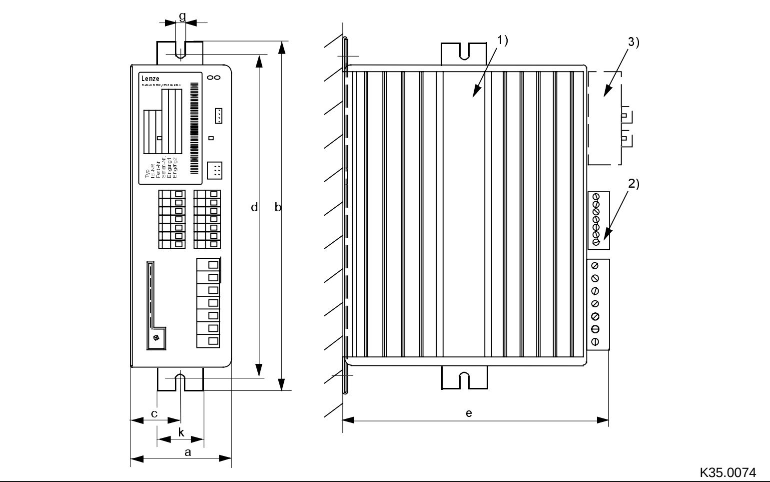


FIG 4-1 Dimensions 8201 - 8204: Standard assembly

1) Fixing rail for side assembly
2) Observe the free space required for the connection cables
3) With attachable fieldbus or I/O module:
Observe assembly depth and assembly space required for connection cables

[mm]	a	b	c	d	e 3)	g	k
8201	64	210	29	190	158	6.5	30
8202	64	210	29	190	198	6.5	30
8202- V002	64	210	29	190	158	6.5	30
8203 / 8204	83	283	38	263	211	6.5	30

4.1.2.2 Type 8202-V002 (reduced assembly depth)

This variant is equipped with a heat sink with a smaller surface. Observe the following points to comply with the technical data:

- Assembly on an unpainted, metallic assembly board.
- Area > 0.15 m^2.
- Sheet thickness at least 2 mm.

4.1.3 DIN-rail assembly

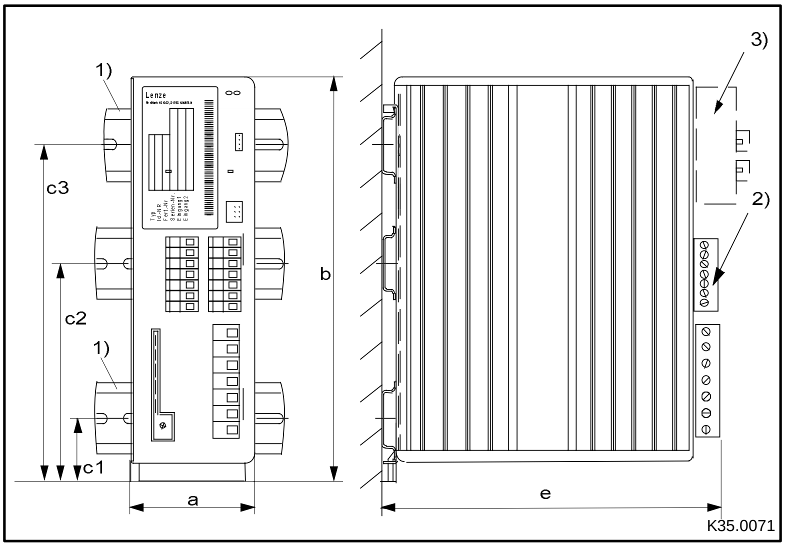


FIG 4-2 Dimensions 8201 - 8204: DIN-rail assembly

1) 8201/8202: Assembly on a DIN rail (middle) or on two DIN rails (top and bottom) possible
8203 - 8204: Assembly on two DIN rails

2) Observe the free space required for the connection cables

3) With attachable fieldbus or I/O module:
Observe assembly depth and assembly space required for connection cables

[mm]	a	b	c1	c2	c3	e 3)
8201	64	188	16	98	149	173
8202	64	188	16	98	149	213
8203 / 8204	83	258	16	-	149	237

4.2 Electrical installation

4.2.1 Important notes

- Ensure appropriate activation when using current-operated e.l.c.b.s.
- For information on the installation according to EMC see chapter 4.3
- Prior to assembly and service operations, the personnel must be free of electrostatic charge.
- Unused control inputs and outputs should be covered with plugs.
- In case of condensation, connect the controller to the mains voltage only after the visible humidity has evaporated.
- Please observe the restricitons of each mains type!

Mains	Operation of the controller	Notes
With grounded neutral	No restrictions	Observe controller ratings
	Operation of several 820X controllers connected to a mains 3AC / N / PE and symmetrical distribution to the three outer conductors excepted	• Observe the load of the shared N-conductor. - r.m.s. current, see chapter 3.2 • Possibly enlarge the cross-section of the N-conductor.
With isolated neutral (IT mains)	Operation with recommended mains filters is not possible	• Mains filter will be destroyed if "earth fault" occurs. • Contact Lenze.
With grounded phase	Operation only possible with one variant	Contact Lenze
DC supply via $+U_G/-U_G$	DC voltage must be symmetrical to PE	Controller will be destroyed when grounding $+U_G$-Leiter or $-U_G$-Leiter

4.2.2 Power connections

4.2.2.1 Mains connection

- Connect the mains cables with the screw terminals L1, L2, L3.
  - Tightening torques

Type	Terminals	
	L1, L2, L3, +UG, -UG	PE connection
8201 - 8204	0.5 ... 0.6 Nm (4.4 ... 5.3 lbin)	3.4 Nm (30 lbin)

4.2.2.2 Motor connection

Because of the EMC safety we recommend the use of screened motor cables only.

Screen connection

- 820X: On the front FAST-ON connector.
- Connect the motor cables to the screw terminals U, V, W anschließen.
  - Observe correct pole connection.
  - Tightening torques

Type	Terminals			
	U, V, W	PE connection	Screen/ strain relief	T1, T2
8201 - 8204	0.5 ... 0.6 Nm (4.4 ... 5.3 lbin)	3.4 Nm (30 lbin)	-	-

- Switching on the motor side of the controller is permitted
  - for safety switch off (emergency switch off).
  - during operation under load.

- The motor cable should be as short as possible because of the positive effect on the drive characteristic.
  - FIG 4-3 shows the relation between motor-cable length and the possible required output filters.
  - For group drives (several motors connected to one controller) it is necessary to calculate the resulting cable length l_{res}:

$$l_{res} = \text{Sum of all motor cable lengths} \cdot \sqrt{\text{No. of motor cables}}$$

  - When using unscreened motor cables, the data indicated in FIG 4-3 are valid for the double motor-cable length.
  - Please contact Lenze when the absolute or resulting motor-cable lengths are > 200 m.

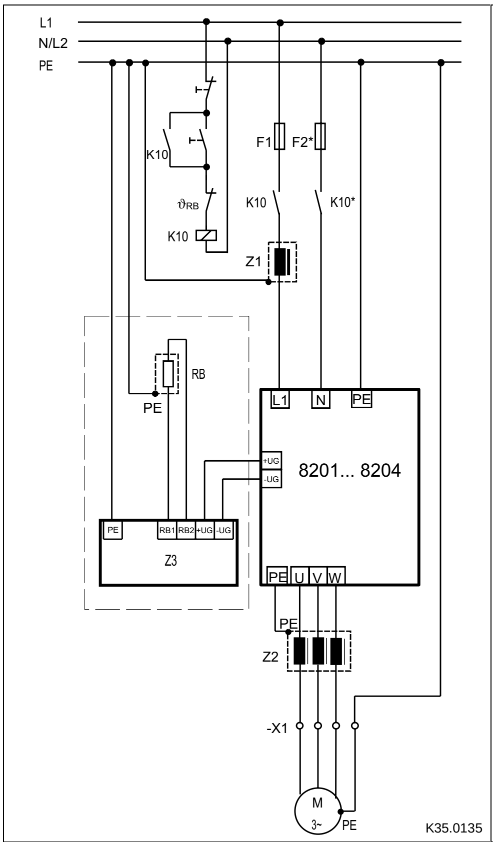
Type	Permissible control mode C014			
8201 8202 8203 8204	-0-, -1-, -2-, -3-	-2-, -3-	-2-, -3- + motor filter/	-2-, -3- + sine filter
	0 … 15	15 … 25	25 … 50 … 100	100 … 200

0 15 25 50 100 200

Motor-cable length (resulting), screened in m

FIG 4-3 Output filters additionally required in the motor cable

4.2.2.3 Connection diagram



F1	Fuse
F2*	Fuse only for supply with 2AC / PE / 190-260V
K10	Mains contactor
K10*	Mains contactor only for supply with 2AC / PE / 190-260V
Z1	Mains filter/mains choke, see Accessories
Z2	Motor filter/sine filter, see Accessories
Z3	Brake chopper/brake module, see Accessories
RB	Brake resistor, see Accessories
ϑ_{RB}	Temperature monitoring - brake resistor
X1	Terminal strip in control cabinet

8204 operation only with assigned mains choke/mains filter

FIG 4-4 820X power connections

4.2.3 Control connections

4.2.3.1 Control cables

- We recommend the unilateral screening of all cables for analog signals to avoid signal distortion.
- Connect the screens of the control cables as follows:
  - 820X:
    On the front FAST-ON connector.
- If the control cables are interrupted (terminal strips, relays), the screens must be reconnected over the shortest possible distance.
- Connnect the fixing screw of the setpoint potentiometer to PE.

4.2.3.2 Assignment of the control terminals

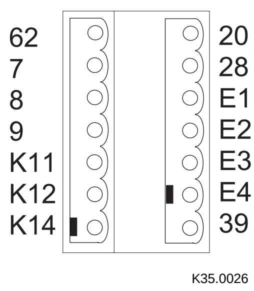
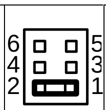


FIG 4-5 Position of the control terminals

	Terminal	Use (Factory setting is printed in bold)		Level	Data
Analog inputs	7	GND 1			
	8	Setpoint input, reference: Terminal 7 **(0 to 10V)**	 Jumper 5 - 6 5 - 6 3 - 4 **1 - 2**	0 to 20 mA 4 to 20 mA 0 to 5 V 0 to 10 V	Resolution: 9 bit Linearity fault: ±0.5 % Temperature fault: 0.3 % (0...+40 °C) Input resistance Voltage signal: > 100 kΩ Current signal: 250 Ω
	9	Supply for setpoint potentiometer		5.2V / 6mA	
Analog output	62	Analog output, reference: terminal 7 **(Field frequency)**		0... 6 V / 2 mA	Resolution: 8 bit
Digital inputs	20	Voltage supply for digital inputs 12 V/20 mA			
	28	Controller enable		HIGH	HIGH: 12 V ... 30 V LOW: 0 V ... 3 V
	E4	**CW rotation/ CCW rotation (CW/CCW)**		CW: LOW CCW: HIGH	
	E3	**DC-injection brake**		HIGH	
	E2	**JOG frequencies 20Hz, 30Hz, 40Hz**		Binary code	
	E1				
	39	GND 2 (reference for external voltages)			

	Terminal	Use (Factory setting is printed in bold)	Relay position (switched)	Data
Relay output K1	K 11	Relay output normally-closed contact **(TRIP)**	opened	24 V AC / 3,0 A or 60 V DC / 0.5 A
	K 22	Relay mid-position contact		
	K 24	Relay output normally-open contact **(TRIP)**	closed	

4.2.3.3 Connection diagrams

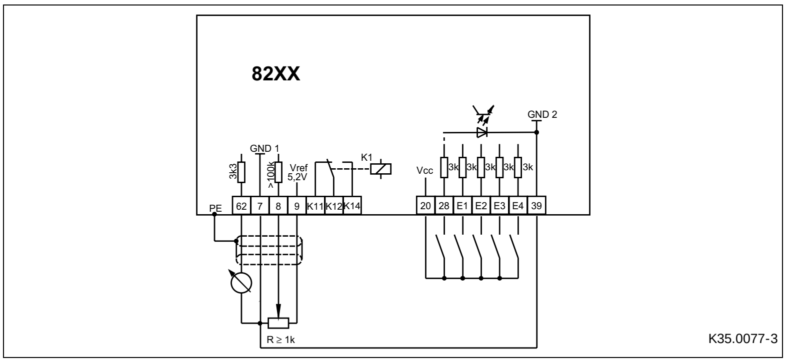


FIG 4-6 Control connections: Supply with internal control voltage

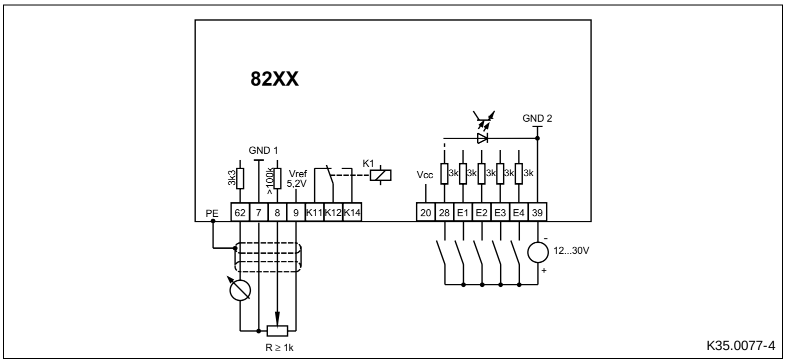


FIG 4-7 Control connections: External voltage supply (+12 V ... +30 V)

GND1 Reference for internal voltages
GND2 Reference for external voltages
GND1 and GND2 have a potential isolation inside the unit.

4.3 Installation of a CE-typical drive system

General notes	● **The user is responsible for the compliance of his application with the EC directives.** - If you observe the following measure you can be sure that the drive system will not cause any EMC problems, i.e. comply with the EMC Directive when running the machine. - If devices which do not comply with the CE requirement concerning noise immunity EN 50082-2 are operated close to the controller, these devices may be interfered electromagnetically by the controllers.
Assembly	● Connect controller, mains choke, and mains filter to the grounded mounting plate with a wire of large a cross-section as possible: - Mounting plates with conductive surfaces (zinc-coated, stainless steel) allow permanent contact. - Varnished boards should not be used for installation in accordance with EMC ● If you use several mounting plates: - Connect as much surface as possible of the mounting plates (e.g. with copper bands). ● Ensure the separation of motor cable and signal or mains cable. ● Do not use the same terminal strip for mains input and motor output. ● Cable guides as close as possible to the reference potential. Unguided cables have the same effect as aerials.
Filters	● Use mains filters or RFI filters and mains chokes which are assigned to the controller: - RFI filters reduce impermissible high-frequency interference to a permissible value. - Mains chokes reduce low-frequency interferences which depend on the motor cable and its length. - Mains filters combine the functions of mains choke and RFI filter.

Screening	• Connect the screen of the motor cable with the controller - to the screen connection of the controller. - additionally to the mounting plate with a surface as large as possible. - Recommendation: For the connection, use ground clamps on bare metal mounting surfaces. • If contactors, motor-protecting switches or terminals are located in the motor cable: - Connect the screens of the connected cables also to the mounting plate, with a surface as large as possible. • Connect the screen to PE, with a surface as large as possible. - Metal glands at the motor terminal box ensure a connection of the screen and the motor housing. • If the mains cable between mains filter and controller is longer than 300 mm: - Screen mains cables. - Connect the screen of the mains cable directly to the inverter and to the mains filter and connect it to the mounting plate with as large a surface as possible. • Use of a brake chopper: - Connect the screen of the brake resistor cable directly to the mounting plate, at the brake chopper and the brake resistor with as large a surface as possible. - Connect the screen of the cable between controller and brake chopper directly to the mounting plate, at the inverter and the brake chopper with a surface as large as possible. • Screen the control cables: - Connect both screen ends of the digital control cables. - Connect one screen end of the analog control cables. - Always connect the screens to the screen connection at the controller over the shortest possible distance. • Application of the controllers 821X/822X/824X in residential areas: - Use an additional screen damping $\geq$ 10 dB to limit the radio interference. This is usually achieved by installation in enclosed and grounded control cabinets made of metal.
Grounding	• Ground all conductive metal components (controller, mains filter, motor filter, mains choke) using suitable cables connected to a central point (PE bar). • Maintain the minimum cross-sections prescribed in the safety regulations: - For EMC, not the cable cross-section is important, but the surface and the contact with a cross-section as large as possible, i.e. large surface.

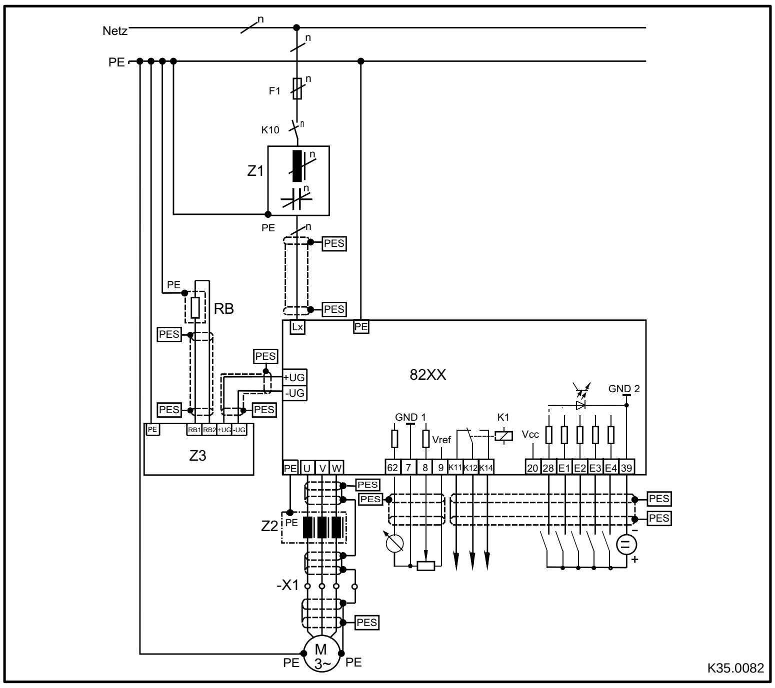


FIG 4-8 Example for an installation in accordance with the EMC regulations:

F1	Fuse
K10	Mains contactor
Z1	Mains filter ”A” or ”B”, see Accessories
Z2	Motor filter/sine filter, see Accessories
Z3	Brake module/brake chopper, see Accessories
-X1	Terminal strip in control cabinet
RB	Brake resistor
PES	HF screen because of a PE connection with a surface as large as possible (see ”Screening” in this chapter)
n	Number of phases

5 Commissioning

The controllers are factory-set to drive a corresponding four-pole standard motor with 230/400V, 50Hz. Further settings are not necessary.

Only a few settings via the 8201 BB operating module or a fieldbus module are necessary to adapt your drive to your application. The steps required are summarized in chapter 5.3 and in chapter 5.4.

5.1 Before you switch on

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

- Power connection:
  - Via terminals L1/N - 820X.
  - Alternatively via terminals +UG, -UG (DC-group drive)
- Control terminals:
  - Reference potential for the control terminals is terminal 39.
  - Controller enable: terminal 28
  - Selection of direction of rotation: terminal E3 or E4
  - External setpoint selection: terminals 8, 9
  - Check jumper position! Factpr settomg: 0 - 10 V (see page 4-10).
  - During operation with an internal voltage supply via terminal 20, bride the terminals 7 and 39.

- In case of condensation connect the controller to mains voltage only after the visible humidity has evaporated.
- The plug-in power terminals of the 820X controller must only be connected or disconnected when no voltage is applied.

Maintain the switch-on sequence!

5.2 Short set-up (Factory setting)

5.2.1 Switch-on sequence

Step	
1. Switch on mains voltage	
2. Select the direction of rotation.	● CW rotation: - Apply a LOW signal to terminal E4 (0...+3V). ● CCW rotation: - Apply a HIGH signal to terminal E4 (+12...+30V).
3. Select the setpoint.	Apply a voltage 0...+10 V to terminal 8.
4. Enable the controller.	Apply a HIGH signal (+12...+30V) to terminal 28.
5. The drive is now operating according to factory setting.	

5.2.2 Factory setting of the most important drive parameters

Setting		Code	Factory setting		Adaption to the application
Operating mode		C001	-0-	Setpoint selection via terminal 8 Control via terminals Parameter setting via 8201BB	See code table, chapter 7.2
Terminal configuration		C007	-0-	E4 E3 E2 E1 CW/CCW DC injection brake JOG1/2/3	See code table, chapter 7.2
Machine data					Chapter 5.3 ff.
Speed range	Min. field frequency	C010	0.0 Hz		Chapter 5.3.1
	Max. field frequency	C011	50.0 Hz		
Acceleration and deceleration times	Acceleration time	C012	5.0 s		Chapter 5.3.2
	Deceleration time	C013	5.0 s		
Current limit values	Motor mode	C022	150 %		Chapter 5.3.3
	Generator mode	C023	80 %		
Drive performance					Chapter 5.4 ff.
Current, torque, power characteristic	Operating mode	C014	-0-	Linear characteristic V ~ f_d with auto boost	V/f characteristic control ● with auto boost, see chapter 5.4.1.1 ● with V_{min} boost, see chapter 5.4.1.2
	V/f rated frequency	C015	50.0 Hz		
	V_{min} setting	C016	type dependent		
	Slip compensation	C021	0 %		

5.3 Adapt machine data

5.3.1 Determine speed range (f_{dmin}, f_{dmax})

Code	Name	Possible settings				IMPORTANT
		Lenze	Selection		Info	
C010	Minimum field frequency	0.0	0.0	{0.1Hz} 480.0		
C011	Maximum field frequency	50.0	30.0	{0.1Hz} 480.0		

Function

The speed range required for the application can be selected here by determing the field frequencies f_{dmin} and f_{dmax}:
- f_{dmin} corresponds to the speed at 0 % speed setpoint selection.
- f_{dmax} corresponds to the speed at 100 % speed setpoint selection.

Adjustment

Relation between field frequency and synchronous motor speed:

$$n_{rsyn} = \frac{f_{dmax} \cdot 60}{p}$$

n_{rsyn} synchronous motor speed [min^{-1}]
f_{dmax} max. field frequency [Hz]
p number of pole pairs

Example: 4 pole asynchronous motor:
$p = 2$, $f_{dmax} = 50$ Hz

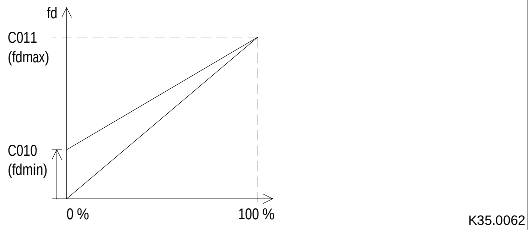
$$n_{rsyn} = \frac{50 \cdot 60}{2} = 1500\ min^{-1}$$

Important

- With the setting of f_{dmin} > f_{dmax} the field frequency is limited to f_{dmax}.
- When selecting the setpoint by means of JOG values, f_{dmax} acts as limitation.
- f_{dmax} is an internal standardization variable:
  - Use the LECOM interface only for important modifications, when the controller is inhibited.
- Observe the maximum motor speed!
- f_{dmin} is only effective under the following conditions:
  - With analog setpoint selection.
  - With the motor potentiometer function "DOWN".

Special features

- With field frequencies f_d > 240Hz:
  - The overcurrent switch-off can be activated.



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

Code	Name	Possible settings					IMPORTANT
		Lenze	Selection			Info	
C012	Acceleration time	5.0	0.0	{0.1s}	999.0	T_{ir}	
C013	Deceleration time	5.0	0.0	{0.1s}	999.0	T_{if}	

Function

The accleration and deceleration times determine the time required by the drive to follow a setpoint change.

Adjustment

- The acceleration and deceleration times refer to a change of the field frequency from 0 Hz to the max. field frequency set under C011.
- Calculate the times T_{ir} and T_{if}, which must be set under C012 and C013.
  - t_{ir} and t_{if} are the times required for the change between f_{d1} and f_{d2}:

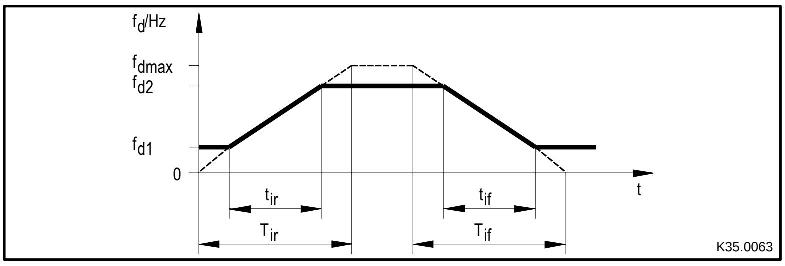
$$T_{ir} = t_{ir} \cdot \frac{f_{dmax}}{f_{d2} - f_{d1}} \qquad T_{if} = t_{if} \cdot \frac{f_{dmax}}{f_{d2} - f_{d1}}$$

Important

Under unfavourable operating conditions, too short acceleration and deceleration times can lead to the deactivation of the controller under overload with the indication of TRIP OC5. In these events, the acceleration and deceleration times should be set short enough so that the drive can follow the speed profile without reaching I_{max} of the controller.

Special features

The slope can be set between 0.095Hz/s and 780Hz/s.



5.3.3 Setting of the current limit (I_{max})

Code	Name	Possible settings				IMPORTANT
		Lenze	Selection		Info	
C022	I_{max} limit motor mode	150	30	{1 %}	150		
C023	I_{max} limit generator mode	80	30	{1 %}	110		

Function

The controllers are equipped with a current-limit control which determines the dynamic response under load. The measured load is compared with the limit values set under C022 for motor load and under C023 for generator load. If the current-limit values are exceeded, the controller will change its dynamic response.

Adjustment

The acceleration and decleration time should be set short enough so that the drive can follow the speed profile without reaching I_{max} of the controller.

Drive characteristic when reaching the limit value

- During acceleration:
  - Expansion of the acceleration ramp.
- During deceleration:
  - Expansion of the deceleration ramp.
- When the load increases at constant speed:
  - When the motor-current limit value is reached: Reduction of the field frequency to 10Hz.
  - When the generator-current limit value is reached: Increase the field frequency to the maximum frequency (C011).
  - Stop the field-frequency change if the load falls below the limit value.

5.4 Optimisation of the operating characteristic of the drive

By means of the following settings you can influence the current, torque and power characteristic or the connected motor.

You can choose between the control modes ”V/f-characteristic control with auto boost” and ”V/f-characteristic control with constant V_{min} boost”. In chapter 5.4.1 you will find some more information to help you with the selection.

5.4.1 Select the control mode

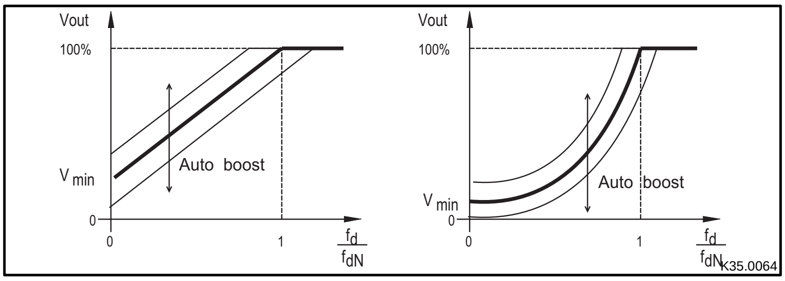
Code	Name	Possible settings			IMPORTANT
		Lenze	Selection	Info	
C014↲	Operating mode	-0-	-0- Linear characteristic $V \sim f_d$ with auto boost -1- Square characteristic $V \sim f_d^2$ with auto boost -2- Linear characteristic $V \sim f_d$ with constant V_{min} boost -3- Square characteristic $V \sim f_d^2$ with constant V_{min} boost	Control modes of the voltage characteristic	

Function

- Under C014 you can set the control mode and the voltage characteristic.
- The V/f-characteristic control with auto boost enables a low-loss operation of single drives with standard three-phase AC motors with load-dependent V_{min} boost.

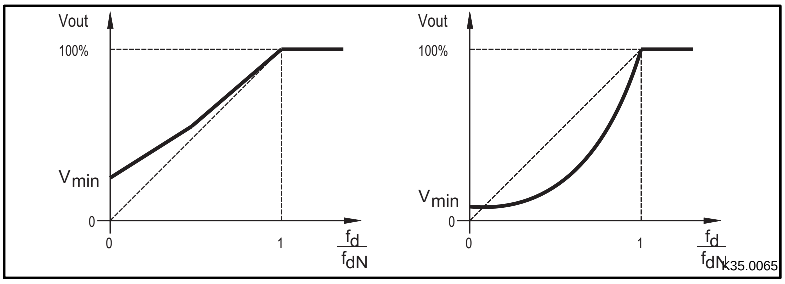
C014 = -0-
Linear characteristic

C014 = -1-
Square-law characteristic (e. g. for pumps, fans)



C014 = -2-
Linear characteristic

C014 = -3-
Square-law characteristic (e. g. for pumps, fans)



Help for decision	Motor cable			
	screened ≤ 25 m unscreened ≤ 50 m		screened > 25 m unscreened > 50 m	
	C014			
Single drives	recommended	alternatively	recommended	alternatively
With constant load	-0-	-2-	-2-	-
With changing loads	-0-	-2-	-2-	-
With heavy start conditions	-0-	-2-	-2-	-
High dynamic posotioning and feed drives	-0-	-	-2-	-
Lifts and hoists	-0-	-2-	-2-	-
Pumps and fan drives	-1-	-3-	-3-	-2-
Three-phase reluctance motors	-2-	-	-2-	-
Three-phase sliding rotor motors	-2-	-	-2-	-
Three-phase motors with assigned frequency-voltage characteristic	-2-	-	-2-	-
Group drives (depending on the resulting motor-cable length)	$I_{res} = \sqrt{i} \cdot (I_1 + I_2 + ... + I_i)$			
Simitas motors and loads	-2-	-	-2-	-
Different motors and/or changing loads	-2-	-	-2-	-

5.4.1.1 Optimisation of V/f-characteristic control with auto boost

Codes required

Code	Name	Possible settings					Info	IMPORTANT
		Lenze	Selection					
C015	V/f-rated frequency	50.0	30.0	{0.1Hz}	960.0			
C016	V_{min} setting	*	0	{1 %}	40			* type dependent
C021	Slip compensation	0	0	{1 %}	12			

Setting sequence

1. If necessary, select V/f characteristic (C014).
2. Select V/f-rated frequency (C015).
   - The V/f-rated frequency determines the slope of the V/f characteristic and has considerable influence on the current, torque and power performance of the motor.
   - An internal mains voltage compensation compensates deviations in the mains during operation. They therefore do not have to be considered for the setting of C015.

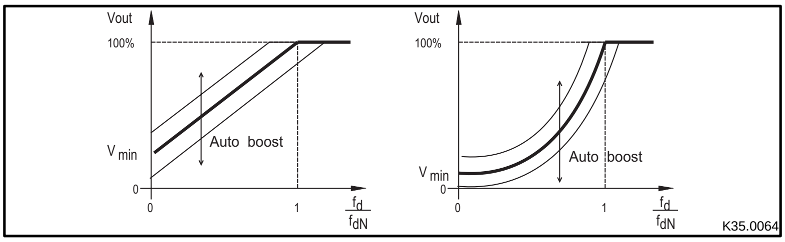
   Adjustment

   Calculate the frequency to be set under C015

$$C015[Hz] = \frac{230V}{V_{rated\ motor}[V]} \cdot \text{rated motor frequency[Hz]}$$

C014 = -0-
Linear characteristic

C014 = -1-
Square-law characteristic (e. g. for pumps, fans)



3. Set the Vmin boost (C016).	**Load-dependent** boost of the motor voltage in the field-frequency range below the V/f-rated frequency. C016 acts as gain factor of the auto-boost function.

Adjustment

In general, an adjustment is not necessary. An optimisation can be advantageous:

For drives with very high starting torques:

A Operate the motor under load.

B Select the frequency setpoint.

C Increase V_{min} until the required motor current (torque) occurs.
Too high settings of V_{min} can lead to a positive-feedback effect which activates the TRIP "Overcurrent" (OCx).

For drives with square load torques (fans, pumps):

A Operate the motor under load.

B Select the frequency setpoint.

C Adapt V_{min} until the motor is running steadily and smoothly over the whole frequency range.
Too high settings of V_{min} can activate the TRIP "Overcurrent" (OCx) and lead to an extensive motor temperature.

For drives with special motors:

A Operate the motor under load.

B Select the frequency setpoint.

C Increase V_{min} until the required motor current (torque) occurs.
Too high settings of V_{min} can lead to a positive-feedback effect which activates the TRIP "Overcurrent" (OCx).

D Check the current consumption during idle-running when no load is applied

4. Set slip compensation (C021).

Rough setting by means of the motor data:

$$s = \frac{n_{rsyn} - n_r}{n_{rsyn}} \cdot 100\%$$

$$n_{rsyn} = \frac{f_{dr} \cdot 60}{p}$$

s	Slip constant (C021)
n_{rsyn}	synchronous motor speed [min^{-1}]
n_r	rated speed to motor nameplate [min^{-1}]
f_{dr}	rated frequency to motor nameplate [Hz]
p	Number of pole pairs

Precise setting:

Change C021 under constant load until the speed is near the synchronous speed.
If C021 is set to too high values, the drive may become instable (overcompensation).

5.4.1.2 Optimisation of V/f-characteristic control

Codes required

Code	Name	Possible settings					IMPORTANT
		Lenze	Selection			Info	
C015	V/f-rated frequency	50.0	30.0	{0.1Hz}	960.0		
C016	V_{min} setting	*	0	{1 %}	40		* type dependent
C021	Slip compensation	0	0	{1 %}	12		

Setting sequence

1. If necessary, select V/f characteristic (C014).

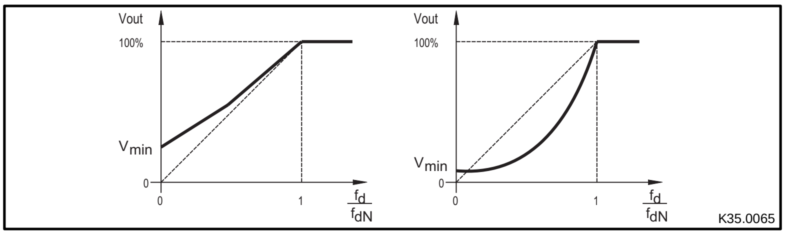
2. Select V/f-rated frequency (C015).
   - The V/f-rated frequency determines the slope of the V/f characteristic and has considerable influence on the current, torque and power performance of the motor.
   - An internal mains voltage compensation compensates deviations in the mains during operation. They therefore do not have to be considered for the setting of C015.

   Adjustment
   Calculate the frequency to be set under C015

$$C015[Hz] = \frac{230V}{V_{rated\ motor}[V]} \cdot \text{rated motor frequency [Hz]}$$

C014 = -2-
Linear characteristic

C014 = -3-
Square-law characteristic (e. g. for pumps, fans)



3. Set the Vmin boost (C016).

- **Load-independent** boost of the motor voltage for field frequencies below the U/f-rated frequency. You can thus optimize the torque performance of the inverter drive.
- It is absolutely necessary to adapt the asynchronous motor used, since otherwise, the motor can be destroyed by overtemperatue:

Adjustment

Please note the thermal characteristic of the connected motor under small field frequencies:

- Usually, standard asynchronous motors with insulation class B can be operated for a short time with rated current and frequencies between 0Hz $\leq f_d \leq$ 25Hz.
- Please ask the motor manufacturer for the exact setting values for the motor current.

A Operate the motor in idle running with a slip frequency of $f_d \approx$:

- $P_{mot} \leq 7.5$ kW: $f_d \approx 5$ Hz
- $P_{mot} > 7.5$ kW: $f_d \approx 2$ Hz

B Increase V_{min} until you reach the following motor current:

- Motor in short-term operation at 0Hz $\leq f_d \leq$ 25Hz:
  - with self-ventilated motors: $I_{motor} \leq I_{N\,motor}$
  - with forced-ventilated motors: $I_{motor} \leq I_{N\,motor}$
- Motor in permanent operation at 0Hz $\leq f_d \leq$ 25Hz:
  - with self-ventilated motors $I_{motor} \leq 0.8 \cdot I_{N\,motor}$
  - with forced-ventilated motors: $I_{motor} \leq I_{N\,motor}$

4. Set slip compensation (C021).

Rough setting by means of the motor data:

$$s = \frac{n_{rsyn} - n_r}{n_{rsyn}} \cdot 100\%$$

$$n_{rsyn} = \frac{f_{dr} \cdot 60}{p}$$

s	Slip constant (C021)
n_{rsyn}	synchronous motor speed [min $^{-1}$]
n_r	rated speed to motor nameplate [min^{-1}]
f_{dr}	rated frequency to motor nameplate [Hz]
p	Number of pole pairs

Precise setting:

Change C021 under constant load until the speed is near the synchronous speed.
If C021 is set to too high values, the drive may become instable (overcompensation).

6 During operation

- Replace defective fuses with the prescribed type only when no voltage is applied.
  There are no fuses in the controller.
- Cyclic mains switching:
  - Do not switch on the controller more than every 3 minutes, otherwise the internal initial-current limitation can be overloaded.
- Switching on the motor side:
  - Permissible for emergency switch-off.
  - Monitoring messages can be activated when switching the motor when the controller is enabled.
- The plug-in connection terminals of the 820X controllers must only be connected or disconnected when no voltage is applied.
- Depending on the controller settings, the connected motor can be overheated:
  - For instance, longer DC-braking operations.
  - Longer operation of self-ventilated motors at low speed.
- The controllers generate an output frequency of up to 480 Hz when setting it correspondingly:
  - If an inappropriate motor is connected, a hazardous overspeed may occur.
  - With frequencies >240 Hz, 820X controllers can activate the over-current switch-off.

- If you use the function CW/CCW (selection of the direction of rotation) with the configuration C007 = -0- to -13-:
  - The drive can reverse the direction of rotation in the event of a control-voltage failure or a cable break.
- If you use the function "Flying-restart circuit" (C142 = -2-, -3-) with machines with low inertia torque and friction:
  - The motor can start for a short time or reverse the direction of rotation for a short time after enabling the controller when the motor is in standstill.

7 Configuration

7.1 Basics

- The configuration of the controller is used to adapt the drive to your applications.
- For this, you have the following functions available:
  - Operating functions
  - Control function
  - Display functions
  - Monitoring functions
- The possible function settings are organized in codes:
  - Codes are numerically sorted, starting from the code with the smallest number to the one with the highest number. All codes start with a ”C”.
  - They are listed in the code table.
  - Each code provides parameters which can be used to adjust and optimize your drive.
- The configuration of the controller can be entered by means of the keypad of the 8201BB operating module or by means of a fieldbus via the serial interface.
  - The operating module and fieldbus modules are available as accessories.
- The changing of parameters by means of the operating module or fieldbus modules is described
  - in the Operating Instructions of the modules.
  - in the Manual.
- All functions of the controller are described shortly in the code table. A detailed description can be obtained from the Manual.

7.2 Code table

How to read the code table:

Column	Abbreviation	Meaning
Code	C013	Code C013 ● The parameter of the code can be different in PAR1 and PAR2. ● The parameter value is accepted immediately (ONLINE).
	C009*	● The parameter value of the code is always the same in PAR1 and PAR2, but is always displayed in PAR1.
	C001↲	● The parameter value of the code will be accepted after pressing SH+ PRG.
	[C002]	● The parameter value of the code will be accepted after pressing SH+ PRG but only if the controller is inhibited.
Name	820X	Name of the code. Unit-specific setting possibilites (here for 820X). Without unit designation the code is valid for all unit types.
Lenze		Factory setting of the code
	*	The column "Important" contains further information
Selection	1 {1 %} 99	Minimum value {smallest step/unit} maximum value
Info	-	Meaning of the code
IMPORTANT	-	Additional, important explanations of the code

Code	Name	Possible settings			IMPORTANT
		Lenze	Selection	Info	
C001 ↲	Operating mode	-0-	-0- Setpoint selection via term. 8 Control via terminals Parameter setting via 8201BB -1- Setpoint selection via 8201BB or via LECOM Control via terminals Parameter setting via 8201BB -2- Setpoint selection via term. 8 Control via terminals Parameter setting via LECOM -3- Setpoint selection via LECOM Control via LECOM Parameter setting via LECOM		
[C002]*	Parameter set		-0- Function executed -1- Overwrite PAR1 with factory setting -2- Overwrite PAR2 with factory setting -3- Overwrite PAR1 and PAR2 with the data of the operating module -4- Overwrite PAR1 with the data of the operating module -5- Overwrite PAR2 with the data of the operating module -6- Transmit PAR1 and PAR2 to the operating module		
C004 ↲	Switch-on display	-0-	-0- Field frequency f_d -1- Controller load -2- Motor current		

Code	Name	Possible settings			IMPORTANT
		Lenze	Selection	Info	
[C007]*	Terminal configuration	-0-	E4 E3 E2 E1 -0- CW/CCW DC brake JOG1/2/3 -1- CW/CCW PAR JOG1/2/3 -2- CW/CCW QSP JOG1/2/3 -3- CW/CCW PAR DC brake JOG1 -4- CW/CCW QSP PAR JOG1 -5- CW/CCW DC brake Trip set JOG1 -6- CW/CCW PAR Trip set JOG1 -7- CW/CCW PAR DC brake Trip set -8- CW/CCW QSP PAR Trip set -9- CW/CCW QSP Trip set JOG1 -10- CW/CCW Trip set UP DOWN -11- CW/CCW DC brake UP DOWN -12- CW/CCW PAR UP DOWN -13- CW/CCW QSP UP DOWN -14- CCW/QSP CW/QSP DC brake JOG1 -15- CCW/QSP CW/QSP PAR JOG1 -16- CCW/QSP CW/QSP JOG1/2/3 -17- CCW/QSP CW/QSP PAR DC brake -18- CCW/QSP CW/QSP PAR Trip set -19- CCW/QSP CW/QSP DC brake Trip set -20- CCW/QSP CW/QSP Trip set JOG1 -21- CCW/QSP CW/QSP UP DOWN -22- CCW/QSP CW/QSP UP JOG1		• CW = CW rotation • CCW = CCW rotation • DC brake = DC injection brake • PAR = Change of parameter sets • JOG = JOG frequency • QSP = Quick stop • Trip-Set = External fault • UP/DOWN = Motor potentiometer functions
C008 ↲	Function relay K1	-1-	-0- Ready for operation -1- TRIP fault message -2- Motor is running -3- Motor is running / CW rotation -4- Motor is running / CCW rotation -5- Field frequency $f_d = 0$ -6- f_{dset} reached -7- Q_{min} reached -8- I_{max} reached -9- Overtemperature (ϑ_{max} -10 °C) -10- TRIP or Q_{min} or IMP		

Code	Name		Possible settings					IMPORTANT
			Lenze	Selection			Info	
C009*	Device address		1	1	{1}	99		Only for LECOM applications
C010	Minimum field frequency		0.0	0.0	{0.1Hz}	480.0		
C011	Maximum field frequency							
		820X	50.0	30.0	{0.1Hz}	480.0		
		821X	50.0	7.5 30.0	{0.1Hz} {0.1Hz}	480.0 480.0	(Software 2x) (Software 1x)	
		822X/824X	50.0	7.5	{0.1Hz}	480.0		
C012	Acceleration time		5.0	0.0	{0.1s}	999.0		
C013	Deceleration time		5.0	0.0	{0.1s}	999.0		
C014 ↲	Operating mode							
		820X	-0-	-0- -1-	Linear characteristic V ~ f_d with auto boost Square characteristic V ~ f_d^2 with auto boost			
				-2- -3-	Linear characteristic V ~ f_d with constant V_{min} boost Square characteristic V ~ f_d^2 with constant V_{min} boost			
		821X/822X / 824X	-4-	-4-	Motor-current control			
C015	V/f-rated frequency							
		820X	50.0	30.0	{0.1Hz}	960.0		
		821X	50.0	7.5 30.0	{0.1Hz} {0.1Hz}	960.0 960.0	(Software 2x) (Software 1x)	
		822X/824X	50.0	7.5	{0.1Hz}	960.0		

Code	Name	Possible settings			IMPORTANT
		Lenze	Selection	Info	
C016	V_{min} setting				
	820X	*	0 {1 %} 40		* depends on the unit
	821X/822X / 824X	0	0 {1 %} 40		
C017	Threshold Q_{min}	0.0	0.0 {0.1Hz} 480.0		
C018 ↲	Chopper frequency 821X/822X/824X	-1-	-0- 4 kHz -1- 8 kHz -2- 12 kHz -3- 16 kHz -4- 12 kHz noise optimized -5- 16 kHz noise optimized		
C019	Threshold auto DC brake 821X/822X/824X	0.1	0.1 {0.1Hz} 5.0		
C021	Slip compensation				
	820X	0	0 {1 %} 12		
	821X	0	0 {1 %} 20 0 {1 %} 12	(Software 2x) (Software 1x)	
	822X/824X	0	0 {1 %} 20		
C022	I_{max} limit motor mode	150	30 {1 %} 150		
C023	I_{max} limit generator mode	80	30 {1 %} 110		
C034 ↲	Master current	-0-	-0- 0 to 20mA / 0 to 5V / 0 to 10V -1- 4 to 20mA		
C036	Voltage for DC brake	*	0 {1 %} 40		* depends on the unit
C037	JOG value 1	20	0 {1Hz} 480		

Code	Name		Possible settings				IMPORTANT
			Lenze	Selection		Info	
C038	JOG value 2		30	0 {1Hz} 480			
C039	JOG value 3		40	0 {1Hz} 480			
C050*	Output frequency						Only display
C052*	Motor voltage						Only display
C054*	Motor current						Only display
C056*	Controller load						Only display
C061*	Heat sink temperature						Only display
C079	Oscillation damping						Is not transferred when transferring parameters via the operating module.
		822X/824X	5	0 {1} 80			
C088	Rated motor current	821X/822X/824X	*	0.0 ... 1.2 · rated output current			* depends on the unit
C091	Motor cos φ	821X/822X/824X	*	0.4 {0.1} 1.0			* depends on the unit
C093*	Type						Only display
		820X		820X			
		821X		821X			
		822X/824X		822X			

Code	Name	Possible settings			IMPORTANT
		Lenze	Selection	Info	
C099*	Software version				Only display
	820X		82 1x (Software 1x)		
	821X		82 2x (Software 2x) 82 1x (Software 1x)		
	822X/824X		82 1x (Software 1x)		
C105	Deceleration time quick stop 821X/822X/824X	5.00	0.00 {0.01s} 999.00		
C106	Holding time for autom. DC injection brake				
	820X	0.00	0.00 {0.01s} 50.00		
	821X/822X 824X	0.02	0.00 {0.01s} 999.00		
C108*	Gain (C111)				
	820X	220	0 {1} 255		
	821X	128	0 {1} 255		
	822X/824X	128	0 {1} 255		
C111 ↲	Monitor signal	-0-	-0- Field frequency -1- Controller load -2- Motor current -3- DC-bus voltage		

Code	Name	Possible settings			IMPORTANT
		Lenze	Selection	Info	
C117 ↲	Function relay K2 822X/824X	-0-	-0- Ready for operation -1- TRIP fault message -2- Motor is running -3- Motor is running / CW rotation -4- Motor is running / CCW rotation -5- Field frequency f_d= 0 -6- f_{dSet} reached -7- Q_{min} reached -8- I_{max} reached -9- Overtemperature (ϑ_{max} -10°C) -10- TRIP or Q_{min} or IMP -11- PTC warning		
C119 ↲	Function PTC 822X/824X	-0-	-0- PTC input inactive -1- PTC input active, TRIP and IMP (pulse inhibit) are set -2- PTC input active, warning		
C120	$I^2 \cdot t$ switch off 822X/824X	0	0 {1 %} 100		
C125 ↲*	LECOM baud rate	-0-	-0- 9600 baud -1- 4800 baud -2- 2400 baud -3- 1200 baud -4- 19200 baud		Only for LECOM applications
C142 ↲	Start condition	-1-	-0- Automatic start inhibited, flying-restart circuit inactive -1- Automatic start, if term. 28 HIGH, flying-restart circuit not active -2- Automatic start inhibited, flying-restart circuit active -3- Automatic start, if term. 28 HIGH, flying-restart circuit active		

Code	Name	Possible settings			IMPORTANT
		Lenze	Selection	Info	
C144 ↲	Chopper-frequency reduction 821X/822X/824X	-1-	-0- No chopper-frequency reduction -1- Automatic chopper-frequency lowering when ϑ_{max} - 10 °C		
C161*	Current fault				Only display
C162*	Last fault				Only display
C163*	Last but one fault				Only display
C164*	Last but two fault				Only display
C170 ↲	TRIP-reset selection		-0- TRIP-reset by pressing the STP key or LOW signal at ctrl. enable -1- Auto-TRIP-Reset		
C171	Delay for Auto-TRIP-Reset	0	0 {1s} 60		
C178*	Operating time				Only display
C179*	Mains switch-on time				Only display
C377	Gain Zk-voltage detection 822X/824X				Should only be changed by the Lenze Service!
C500*	Display factor application datum numerator 821X/822X/824X	2000	1 {1} 25000		
C501*	Display factor for process variable denominator 821X/822X/824X	10	1 {1} 25000		

8 Troubleshooting and fault elimination

- Faults are immediately indicated via the display or status information (chapter 8.1).
- The fault can be analysed by using the history buffer (chapter 8.2) and the list in chapter 8.3. The list helps you with the elimination of faults.

8.1 Troubleshooting

8.1.1 Display at the controller

During operation without an operating module, the operating state of the controller is displayed on two LEDs at the front of the unit.

LED		Operating status
green	**red**	
on	off	Controller enabled
on	on	Mains switched on and automatic start inhibited (AS_LC)
blinking	off	Controller inhibited
off	blinking every second	Fault message, check under C161
off	blinking every 0.4 seconds	Undervoltage switch-off
off	off	Programming mode

8.1.2 Display at the operating module

Status indications in the display indicate the controller status.

Display	Meaning
OV	Overvoltage
UV	Undervoltage
IMAX	Set current limit exceeded
TEMP	Heat sink temperature near switch-off

8.1.3 Maloperation of the drive

Maloperation	Possible causes
Motor does not rotate	• DC-bus voltage too low (red LED is blinking every 0.4 s; message LU is displayed) • Controller inhibited (green LED is blinking, display of the operating module: OFF, STOP or AS_LC) • Setpoint = 0 • DC braking active • Quick-stop function active • JOG setpoint activated and JOG frequency = 0 • Fault is indicated (see chapter 8.3) • Mechanical motor brake is not released
Motor does not rotate smoothly	• Defective motor cable • Maximum current C022 and C023 too low • Motor underexcited or overexcited (check parameter setting)
Current consumption of motor too high	• Setting of C016 too high • Setting of C015 too low • C088 and C091 are not adapted to the motor data.

8.2 Fault analysis using the history buffer

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

The history buffer has 4 memory locations which can be addressed via codes.

Structure of the history buffer

Code	C0168	Entry	Note
C161	Memory locations 1	Active fault	If the fault is no longer active or has been acknowledged: • The contents of the memory locations 1-3 will be saved in a "higher" location. • The contents of the memory location 4 will be eliminated from the history buffer and cannot be read any longer. • Memory location 1 will be deleted (= no active fault).
C162	Memory location 2	Last fault	
C163	Memory location 3	Last but one fault	
C164	Memory location 4	Last but two fault	

8.3 Fault indications

Display	Fault	Cause	Remedy
---	No fault	-	-
EEr	External fault (TRIP-Set)	A digital input assigned to the TRIP-Set function has been activated	Check external encoder
H05	Internal fault		Contact Lenze
LU	Undervoltage	DC-bus voltage too low	• Check mains voltage • Check supply module
OC1	Short circuit	Short circuit	Find out cause of short circuit; check cable
		Excessive capacitive charging current of the motor cable	Use motor cable which is shorter or of lower capacitance
OC2	Earth fault	Grounded motor phase	Check motor; check cable
		Excessive capacitive charging current of the motor cable	Use motor cable which is shorter or of lower capacitance
OC3	Overload inverter during acceleration or short circuit	Acceleration time too short (C012)	• Increase acceleration time • Check drive selection
		Defective motor cable	Check wiring
		Interturn fault in the motor	Check motor
OC4	Overload controller during deceleration	Deceleration time too short (C013)	• Increase deceleration time • Check the selection of the brake resistor or connect the brake chopper
OC5	I x t overload	Frequent and too long acceleration processes with overcurrent	Check drive dimensioning
		Permanent overload with $I_{motor} > 1.05 \times I_{Nx}$	
OC6	Overload motor	Motor is thermally overloaded, for instance, because of	
		• impermissible continuous current	• Check drive selection
		• frequent or too long acceleration processes	• Check the setting under C120

Display	Fault	Cause	Remedy
OH	Heat sink temperature is higher than the value set in the controller	Ambient temperature T_{amb} > +40 °C or +50 °C	● Allow controller to cool and ensure ventilation ● Check the ambient temperature in the control cabinet
		Heat sink very dirty	Clean heat sink
		Incorrect mounting position	Change mounting position
OH3	PTC monitoring	Motor too hot because of excessive current or frequent and too long acceleration	Check drive dimensioning
		PTC not connected	Connect PTC or switch off monitoring (C0585=3)
OH4	Overtemperature unit	Inside unit too hot	● Reduce controller load ● Improve cooling ● Check fan in the controller
OU	Overvoltage	Mains voltage too high	Check voltage supply
		Feedback operation Braking operation	● Increase deceleration times. ● For operation with brake choppers: - Check the selection and connection of the brake resistor - Increase the deceleration times
		Earth leakage on the motor side	Check motor cable and motor for earth fault (disconnect motor from inverter)
OUE	Overvoltage	Mains overvoltage longer than 5 s	Check mains voltage
rSt	Faulty auto-TRIP reset	More than 8 fault messages in 10 minutes	Depends on the fault message
Pr	Faulty parameter transfer via the operating module	PAR1 and PAR2 are defective.	It is absolutely necessary to repeat the data transfer or load the factory setting before enabling the controller.
Pr1	Faulty PAR1 transfer via the operating module	PAR1 is defective.	
Pr2	Faulty PAR2 transfer via the operating module	PAR2 is defective.	

8.4 Reset of fault indications

TRIP

After eliminating the fault, the pulse inhibit will only be reset after the acknowledgement of TRIP.

Note!
If the TRIP source is still active, the TRIP cannot be reset.

Code	Name	Possible settings			IMPORTANT
		Lenze	Selection	Info	
C170↲	TRIP-reset selection		-0- TRIP-reset by pressing the STP key or a LOW signal at ctrl. enable -1- Auto-TRIP reset		
C171	Deceleration for Auto-TRIP reset	0	0 {1s} 60		

Function

You can select whether the active fault is to be reset automatically or manually.
Auto-Trip reset does not reset all faults automatically.

Activation

C170 = -0-:
- Manual TRIP-reset
- STP key
- LOW signal at terminal 28

C170 = -1-:
Auto-Trip reset resets the following fault messages after the time set under C171:
- OC3 (overload during acceleration)
- OC4 (overload during deceleration)
- OC5 (overload)
- OC6 (I · t switch-off)
- OH (overtemperature)
- OUE (overvoltage in DC bus)

Important

Mains switching always resets TRIP.
With more than 8 auto-trip resets within 10 minutes, the controller sets TRIP and indicates rST (numerator exceeded).

9 Accessories (Overview)

9.1 Accessories for all types

Name	Order number
8201BB operating module	EMZ8201BB
Diagnosis terminal (2.5 m cable)	EMZ8272BB-V001
Diagnosis terminal (5.0 m cable)	EMZ8272BB-V002
Diagnosis terminal (10 m cable)	EMZ8272BB-V003
Digital display	EPD203
Setpoint potentiometer	ERPD0001k0001W
Rotary button for potentiometer	ERZ0001
Scale for potentiometer	ERZ0002
RS232/485 fieldbus module	EMF2102IB-V001
RS485 fieldbus module	EMF2102IB-V002
Level converter for RS485	EMF2101IB
PC system cable RS232/485	EWL0020
Optical fibre fieldbus module	EMF2102IB-V003
Optical fibre adaptor for PLC 0...40m	EMF2125IB
Supply unit for optical fibre adaptor 2125	EJ0013
InterBus-S module	EMF2111IB
PROFIBUS module	EMF2131IB
System bus module (CAN)	EMF2171IB
System bus module (CAN) with addressing	EMF2172IB
PTC module	EMZ8274IB
I/O module	EMZ8275IB
Monitor module	EMZ8276IB
Bipolar setpoint module	EMZ8278IB

9.2 Software

Name	Order number
PC program for Global Drive controllers	ESP-GDC 1

9.3 Type-specific accessories

Name	Order number			
	8201	8202	8203	8204
E.l.c.b.	EFA1C10A	EFA1C16A	EFA1C20A	EFA1C20A
Fuse	EFSM-0100ASB	EFSM-0150ASB	EFSM-0200ASC	EFSM-0200ASC
Fuse holder	EFH30001	EFH30001	EFH30001	EFH30001
Mains filter type “A”	EZN2-004A001	EZN2-008A001	EZN2-013A001	EZN2-017A001
Mains choke	ELN1-0900H005	ELN1-0500H009	ELN1-0350H014	ELN1-0160H017
RFI filter for operation:				
With mains choke	EZF1-006A002	EZF1-009A002	EZF1-018A002	EZF1-018A002
Without mains choke	EZF1-006A002	EZF1-009A002	EZF1-018A002	inadmissible
Motor filter	ELM3-030H003	ELM3-020H004	ELM3-010H010	ELM3-014H010
Sine filter	EZS3-003A001	EZS3-004A002	EZS3-007A001	EZS3-010A001
Brake module	EMB8251-E	EMB8251-E	EMB8251-E	EMB8251-E
Swivel wall assembly	EJ0001	EJ0001	EJ0001	EJ0001
DIN-rail assembly	EJ0002	EJ0002	EJ0002	EJ0002
Fan for flat assembly	EJ0003	EJ0003	EJ0003	EJ0003
Current-limiting module	EMZ8201AB	EMZ8201AB	EMZ8203AB	EMZ8203AB
DC-bus fuse	EFSM-0060AWE	EFSM-0060AWE	EFSM-0100AWE	EFSM-0160AWE
Fuse holder	EFH10001	EFH10001	EFH10001	EFH10001

10 Index

D

E

F

G

H

I