

Servo inverter



Dynamic, powerful and compact

Lenze

This is what we stand for.

Are you looking to implement your machine and plant concepts efficiently and easily or optimise existing concepts to reduce costs? Then Lenze is the partner you are looking for. Drive and automation systems have been our core competence for over 60 years.



Drive and automation technology set in motion by Lenze – for example in logistics centres, in the textile and printing industry, in the automotive industry or as the driving force behind robots.

Lenze | about us

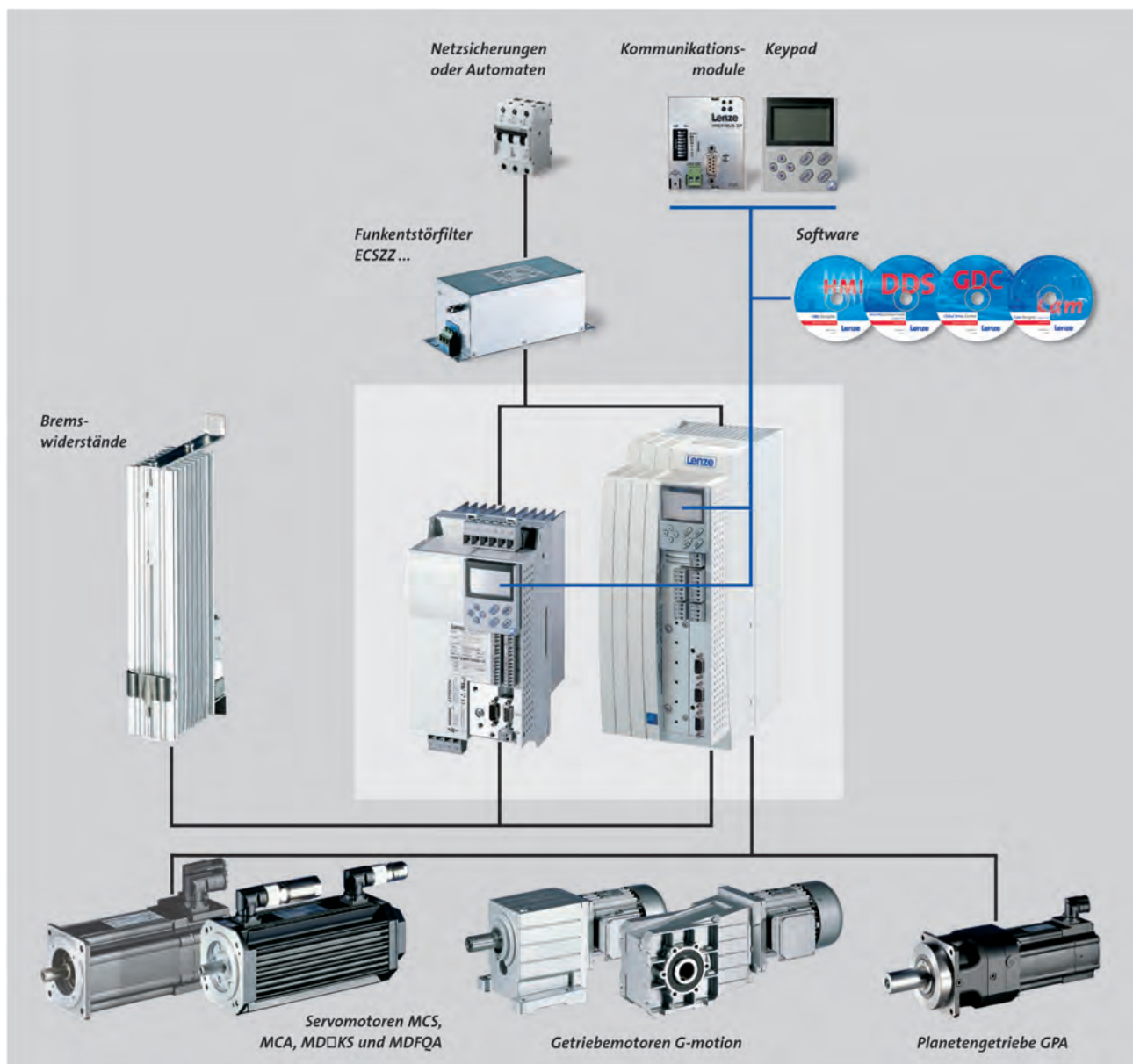
We can offer you automation solutions, including control, visualisation and drive technology, from a single source. Our drive systems will improve the performance of your machines. From project planning to commissioning, we have the know-how. Our international sales and service network can provide you with expert help and advice at any time.

Cut your process costs and increase your ability to compete. Let us analyse your drive technology tasks and support you with made-to-measure solutions. We can take an integrated approach to projects thanks to the scalability of our products and the scope of the overall portfolio. We can get the best from your machines and systems.



At your side all over the world – with thorough and professional support from our motivated team.

System overview | Servo inverter



Further catalogues

This catalogue is for servo inverters and accessories for the 9300 and ECS series. Additional components and system solutions can be found in the following catalogues.

components	Catalogue
Drive PLC	► PC-based automation
Human machine interface	► PC-based automation
Standard geared motors	► PC-based automation
Remote maintenance	► PC-based automation
SERVO MOTORS	► Servo motors
Geared servo motors	► G-motion MC
Standard geared motors	► G-motion const
9400 Servo Drives	► 9400 Servo Drives

Overview | Servo inverter

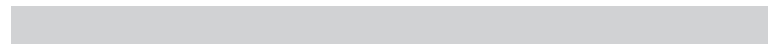
Contents	6
-----------------	---



General information	10
----------------------------	----



9300 servo inverter	13
----------------------------	----



ECS servo system	39
-------------------------	----



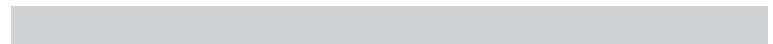
Runtime software	58
-------------------------	----



Engineering software	62
-----------------------------	----



Lenze worldwide	78
------------------------	----



Contents | Servo inverter



General information

Product information	
9300 servo inverter product key	10
ECS servo system product key	11
List of abbreviations	12

9300 servo inverter



Product information	
About this catalogue	13
9300 - the servo inverter family	14
Functions and features	16
Control connections	17
Basic dimensioning of axis modules	18
Dimensioning for DC-bus operation	19
Standards and operating conditions	20
PLC functions	21
Axis modules	
Rated data for axis modules	22
Power supply modules	
Standards and operating conditions	26
Rated data for regenerative power supply modules	27
Rated data for power supply modules	28
Braking units	29
Accessories	
Brake choppers and brake resistors	31
Vibration-resistant brake resistors (IP20 enclosure)	32
Mains chokes	33
Mains filter	34
Mains filter B, C1 up to 50 m	35
Interference filter for SinCos encoder	36
Mounting in push-through technique (thermal separation of the heatsink)	37
Keypad	38
Digital frequency distributor	38
Module	
Overview of modules	39

Contents | Servo inverter



ECS servo system

Product information	
About this catalogue	41
ECS servo system	42
Functions and features	44
Control connections	45
Basic dimensioning of axis modules	46
Dimensioning for DC-bus operation	47
Standards and operating conditions	48
PLC functions	49
Axis modules	
Rated data for axis modules	50
Power supply modules	
Rated data for power supply modules	51
Capacitor modules	
Rated data for capacitor modules	53
Accessories	
Brake resistors	54
Vibration-resistant brake resistors (IP20 enclosure)	55
Mains chokes	55
RFI filter	56
Interference filter for SinCos encoder	56
Keypad	57
Digital frequency distributor	57
Plug-in connector set for power connections and control connections	58
Shield connection	58
Module	
Overview of modules	59

Contents | Servo inverter



Runtime software

Positioner	
Software package - Positioner	60
Cam	
Software package - Cam	61
Winder	
Software package - Winder	62
Prepared Solutions	
Flying saw	63
Cross cutter	63



Engineering software

Global Drive Control	
Selection and order data	64
Functions and features	65
Data access/communication	66
Drive PLC Developer Studio	
Selection and order data	67
Functions and features	68
Data access/communication	69
Global Drive Oscilloscope	
Selection and order data	70
Data access/communication	71
Global Drive Loader	
Selection and order data	72
Data access/communication	73
Cam Designer	
Selection and order data	74
Data access/communication	75
Cam Loader	
Selection and order data	76
Data access/communication	77

Lenze worldwide

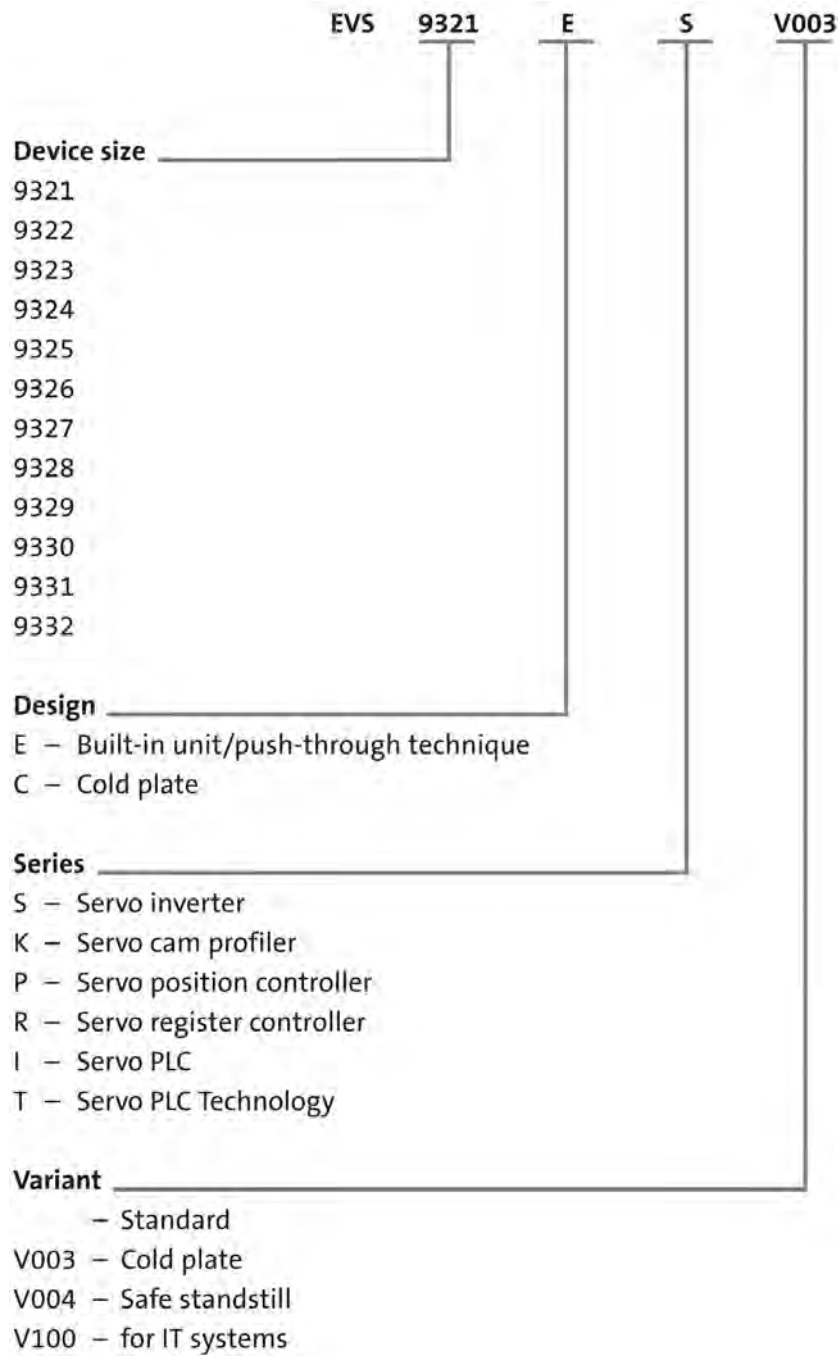
Lenze worldwide	78
-----------------	----



General information

Product information

9300 servo inverter product key





ECS servo system product key

	ECS	D	A	032	C	4	B
Design							
E – Built-in unit IP20							
D – Thermal separation							
C – Cold plate							
Version							
Axis module with application software							
P – Posi & Shaft							
S – Speed & Torque							
M – Motion							
A – Application							
E – Supply module							
K – Capacitor module							
Peak current							
Axis module							
004 – 4 A							
008 – 8 A							
016 – 16 A							
032 – 32 A							
048 – 48 A							
064 – 64 A							
Continuous on-state current							
Power supply module							
012 – 12 A							
020 – 20 A							
040 – 38.5 A							
Fieldbus interface							
System bus CAN							
Voltage class of device							
400 V/480 V							
Technical version							
B – Standard							
I – for IT systems							



List of abbreviations

B [mm]	Width
C [μF]	Integrated DC-bus capacity
CB [kW]	Thermal capacity
f_d [Hz]	Field frequency
f_{ch} [kHz]	Switching frequency
H [mm]	Height
i	Transmission ratio of the gearbox
I_{DC} [A]	Rated DC-bus current
I_{max} [A]	Maximum output current
I_N [A]	Rated current
I_{Netz} [A]	Rated mains current
I_{Z_KN} [A]	DC-bus current
I_{ZK_max} [A]	Maximum output current of supply module
l [m]	Motor cable length
m [kg]	Mass
M_{eff} [Nm]	Effective torque
M_{max} [Nm]	Maximum torque
n_{max}	Max. speed
P_N [kW]	Motor power
P_v [W]	Power loss
R [Ohm]	Resistance
T [mm]	Depth
U_{DC} [V]	DC input voltage
U_{Netz} [V]	Mains voltage range Rated mains voltage
U_{ZK} [V]	DC-bus voltage
v	Pulse/pause ratio

AIF	Application interface
cUL	Canadian Standard Underwriters Laboratory Listed Product
DIAG	Slot for diagnostic adapter
DIN	Deutsches Institut für Normung e.V.
EMC	Electromagnetic compatibility
EN	European standard
EN 60529	Degrees of protection provided by enclosures (IP code)
EN 60721-3	Classification of environmental conditions; Part 3: Classes of environmental parameters and their limit values
EN 61800-3	Electrical variable speed drives Part 3: EMC requirements including special test methods
EN 61800-5-1	Electric power drive systems with adjustable speed - part 5-1: Safety requirements; electrical, thermal, and energetic requirements
EN ISO 13849-1	Safety of machinery – Safety-related parts of control systems – Part 1: General principles for design.
IEC	International Electrotechnical Commission
IEC 61131-3	Programming languages for PLCs, part 3 Programming
IEC 61131-2	Programmable logic controllers Part 2: Equipment and tests
IEC 61508	Functional safety of electrical/electronic/programmable electronic safety-related systems
IM	International Mounting Code
IP	International Protection Code
KTY	Continuous temperature sensor
NEMA	National Electrical Manufacturers Association
PE	PE conductor
PLC	Programmable logic controller
TTL	Signal level 5V
UL	Underwriters Laboratory Listed Product
UR	Underwriters Laboratory Recognized Product
VDE	Verband deutscher Elektrotechniker (Association of German Electrical Engineers)
VDI 2143	Motion rules for cam mechanisms

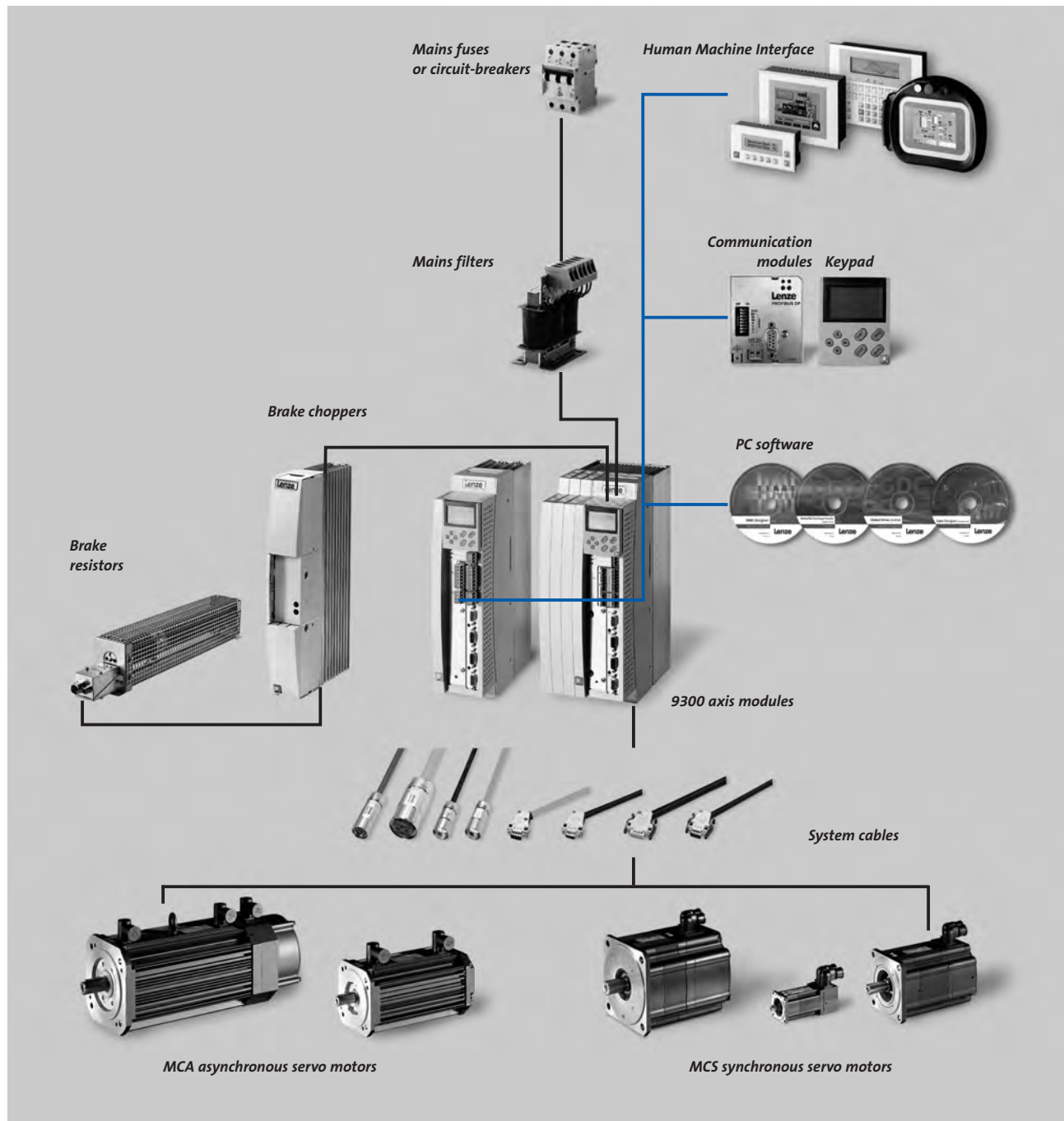


About this catalogue

This catalogue lists all components for the 9300 servo inverters. The device assignments to the individual accessories helps you make a quick and easily selection for your application. The same information can also be found in the DSC electronic catalogue on CD and on the Internet.

For some components the "arrow" symbol appears together with an identifier printed in **bold**. This identifier can be retrieved directly in the electronic catalogue. The catalogue can be found online at: www.lenze.de/dsc

Inverters and accessories





9300 servo inverter

Product information

9300 - the servo inverter family

In conjunction with the coordinated range of motors and geared motors, the 9300 family of servo inverters offers a wide range of potential solutions.

The preconfigured technology functions allow different drive tasks to be realised in a particularly easy way. Whether you require a simple speed control or need to operate multiple drives with angular synchronism, a preconfigured solution is available for every type of drive. The same applies to user-friendly positioning control or motion control systems based on cam functions for which device variants have been specially created. You are free to choose the internal layout of the function block structure, giving you plenty of options if you need to expand the functionality of the drive. This enables the drive controllers to completely take over the control of subprocesses.

Variants:

Types 9321 to 9328 are also available in a version known as "cold plate" for mounting on a separate heatsink. Instead of a built-in heatsink, these devices are supplied with a flat cooling surface on the rear. Special versions are also available for the integrated "Safe standstill" controller function and for operation on an IT supply system. Combinations of additional functions are also available.

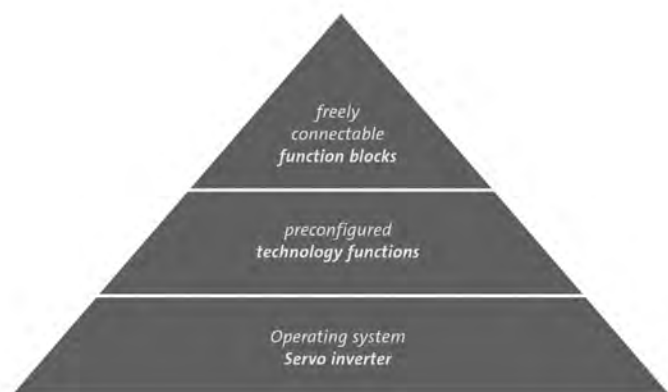
- ▶ Cold plate
- ▶ Safe standstill (safe torque off)
- ▶ IT system (operation on isolated systems)

Servo drive controller with integrated technology functions

The 9300 family of servo inverters deliver a convincing performance with easy handling and a high degree of flexibility which allows them to be adapted to particular operating conditions. On the basis of pre-configured technology functions, the way in which the individual function blocks are connected can be modified to enable the drive to deliver the right performance for the drive operation in hand. Six basic variants are available, enabling Lenze to offer comprehensive support for a wide variety of potential applications:

- ▶ 9300 servo inverter
- ▶ 9300 servo position controller
- ▶ 9300 servo cam
- ▶ 9300 servo register controller
- ▶ 9300 Servo PLC
- ▶ 9300 Servo PLC Technology

All six variants share standardised hardware, so you are free to combine them however you like. Parameterisation and operation also take place via standardised device interfaces.



9300 servo inverter family



9300 - the servo inverter family

9300 servo inverter

The basic functions which are most commonly required in a servo drive are all implemented in the 9300 servo inverter. The electronic gearbox is a very important technology function in this drive. As an alternative to a mechanical line shaft, multiple drives can be run in completely synchronous operation via digital frequency coupling. In the process, adjustable gearbox factors can be used to achieve synchronous ratios with a minimum of fuss and a maximum of flexibility. Feedback systems such as SinCos encoders are used as an alternative to the standard resolver solution to ensure utmost precision.

- ▶ Robotics
- ▶ Conveying and sorting
- ▶ Travelling drives
- ▶ Shaper drives
- ▶ ...

9300 servo cam

Mechanical cams are often important components of production machinery. Modifying the product or introducing product variants can be a complex process which involves long set-up times. Up to eight different curve profiles can be stored in the 9300 servo cam, allowing the machine to switch between these curves without delays during production. Curve profiles can also be expanded/compressed or phase-shifted in online operation. Several additional functions have been integrated to allow for the large number of potential applications for the servo cam, including for example electronic camshaft controllers and marker-controlled starting of curves. A function has been integrated especially for the opening and closing of welding bars, which achieves a constant welding period with variable speed.

- ▶ Contouring
- ▶ Welding bar
- ▶ Filling plant
- ▶ ...

9300 Servo PLC

The 9300 Servo PLC is bound to impress with its high levels of flexibility, making it suitable for use in a wide variety of industry sectors and applications. Pre-configured solutions which can be very easily adapted to your application requirements, are available for complex drive tasks. Individual function extensions can then be programmed using the IEC 61131-3 programming languages.

- ▶ Reel changer
- ▶ Handling and robotics with decentralised intelligence
- ▶ Rack drives
- ▶ Complex motion control
- ▶ ...

9300 servo position controller

Positioning made easy. A complete position control system with sequence control is integrated in the 9300 servo position controller. An easy commissioning process with only a few values to input is a much more modern solution compared to an external positioning control system which uses a more complicated programming language. The signals from limit switches or other drives can also be evaluated at the same time. If the reaching of the target position is subject to tolerances, then the setpoint position can be automatically corrected by evaluation of a target mark.

- ▶ Flying saw
- ▶ Palletizer
- ▶ Material feed
- ▶ Handling and robotics with distributed intelligence
- ▶ Cross cutter
- ▶ Hoist drive
- ▶ ...

9300 servo register controller

Material lengths are processed in many machines. Overprinting, cuts, perforations, embossing and cemented joints need to be accurately positioned in accordance with the given print image on the material length. However, due to fluctuations caused by the industrial processes (material properties, production parameters), the position of this print image can drift. In addition to the basic requirement for an "electric shaft", there is also a demand for a higher-level alignment of the rotational movement on the print image with high register accuracy. The register control which is already integrated in the drive controller continuously realigns the angular settings of feeder rollers, printing cylinders, cutting rollers and other processing stations with the print image. As a result, overprints, cuts, perforations, embossing, cemented joints, etc. are positioned exactly where they are meant to be.

- ▶ Inserter
- ▶ Cross cutter
- ▶ Printing units
- ▶ ...

9300 Servo PLC Technology

The 9300 Servo PLC Technology has been developed specifically for the general use of technology functions. It is required whenever you want to use library functions or preconfigured solutions from the technology packages. Technology packages are available for

- ▶ Point-to-point positioning drives
- ▶ Cam drives with individual motion profiles
- ▶ Winding drives with dancer control or tension control
- ▶ ...



9300 servo inverter

Product information

Functions and features

Control modes/motor control	Field-oriented servo control (SC) for synchronous and asynchronous servo motors and standard asynchronous motors
Basic functions	Motor control Drive monitoring and diagnosing Monitoring and diagnostic information Phase angle control Speed control Torque control
Predefined applications	Speed/phase synchronism Table positioning Curve profiles Register control
Monitoring	Motor phase failure Mains voltage and mains failure DC-bus voltage
Monitoring and protective measures	Motor overtemperature (input for KTY, PTC or thermal contact) $I^2 \times t$ -monitoring; cULus-acceptance for $I^2 \times t$ -monitoring Short circuit Short to earth (protected against short to earth during operation, limited protection against short to earth on mains power-up) Overvoltage Undervoltage Motor stalling, motor overload
Diagnostics Diagnostic interface Status displays	Via AIF interface 2 LEDs
Braking operation Brake chopper Brake resistor	With 935X braking unit External / in 9351 braking unit
Power recovery	Power recovery of generator-mode drive power into the supply system possible with 934x power supply modules
DC-bus connection	Exchange of the drive power produced in generator mode between the drives



Control connections

The 9300 servo inverter is equipped with digital and analog control connections which are designed as pluggable control terminals (cable cross sections up to 1.5 mm²). In addition, resolver and encoder feedback systems from the motor can be connected and a digital frequency connection can be implemented which are designed as 9-pole Sub-D plugs.

Design	Servo inverter in the power range 0.37 kW to 75 kW
Inputs/outputs	
Analog inputs	▶ Number: 2 ▶ Resolution: 11 bits + sign ▶ Value range: +/-10V, 1x switchable, 0 ... 20 mA
Analog outputs	▶ Number: 2 ▶ Resolution 9 bits + sign ▶ Value range: +/-10V
Digital inputs	▶ Quantity: 6 (controller enable + 5 freely assignable inputs) ▶ Switching level: PLC (IEC 61131-2)
Digital outputs	▶ Number: 4 ▶ Switching level: PLC (IEC 61131-2) ▶ Load capacity: 50 mA per output (for load, reverse current, polarity reversal, free-wheeling current)
Interfaces	
CANopen	
Extension modules	
Digital frequency	▶ Output, two-track ▶ Input, two-track
Drive interface	
Resolver input	▶ Sub-D, 9-pin ▶ PTC and thermal contact via separate terminals
Encoder input	▶ Multi-encoder input for: SinCos/TTL incremental encoder, SinCos absolute value encoder single-turn / multi-turn (Hiperface®)

¹⁾ Tip: Prefabricated encoder cables, prefabricated connection cables for digital frequency interconnection and cables suitable for trailing are described in the Servo Motors catalogue

→ Circuit diagrams
DS_SP_9300_0001
 Available for download at www.lenze.de/dsc



9300 servo inverter

Product information

Basic dimensioning of axis modules

Here the most important steps for dimensioning axis modules are listed.

► Motor power required

First, the maximum torque required $M_{\max}$, the maximum speed $n_{\max}$, the effective torque M_{eff} and - for geared motors - the transmission ratio i are determined from the system data.

► Motor selection

Based on these values, the appropriate servo motor can be selected from the MCS or MD□KS (synchronous motors), MCA or MDFQA (asynchronous motors) ranges. More detailed information can be found in the Servo Motors catalogue.

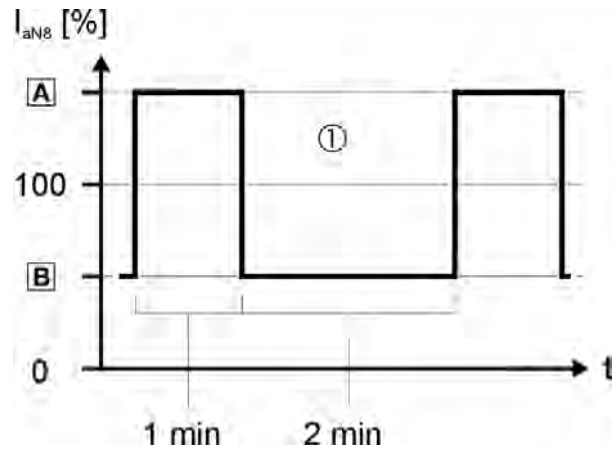
► Axis module selection

The selection of the axis module is determined by the maximum currents and the power required. The overload capacity of the axis modules is dimensioned according to the following overload mode:
3 min cycle

A: 1 min load period with max. 150% of output current

B: 2 min recovery period with 75% of rated current

For 9321 - 9325, 10 s with 200% of output current and 50 s with 44% of output current



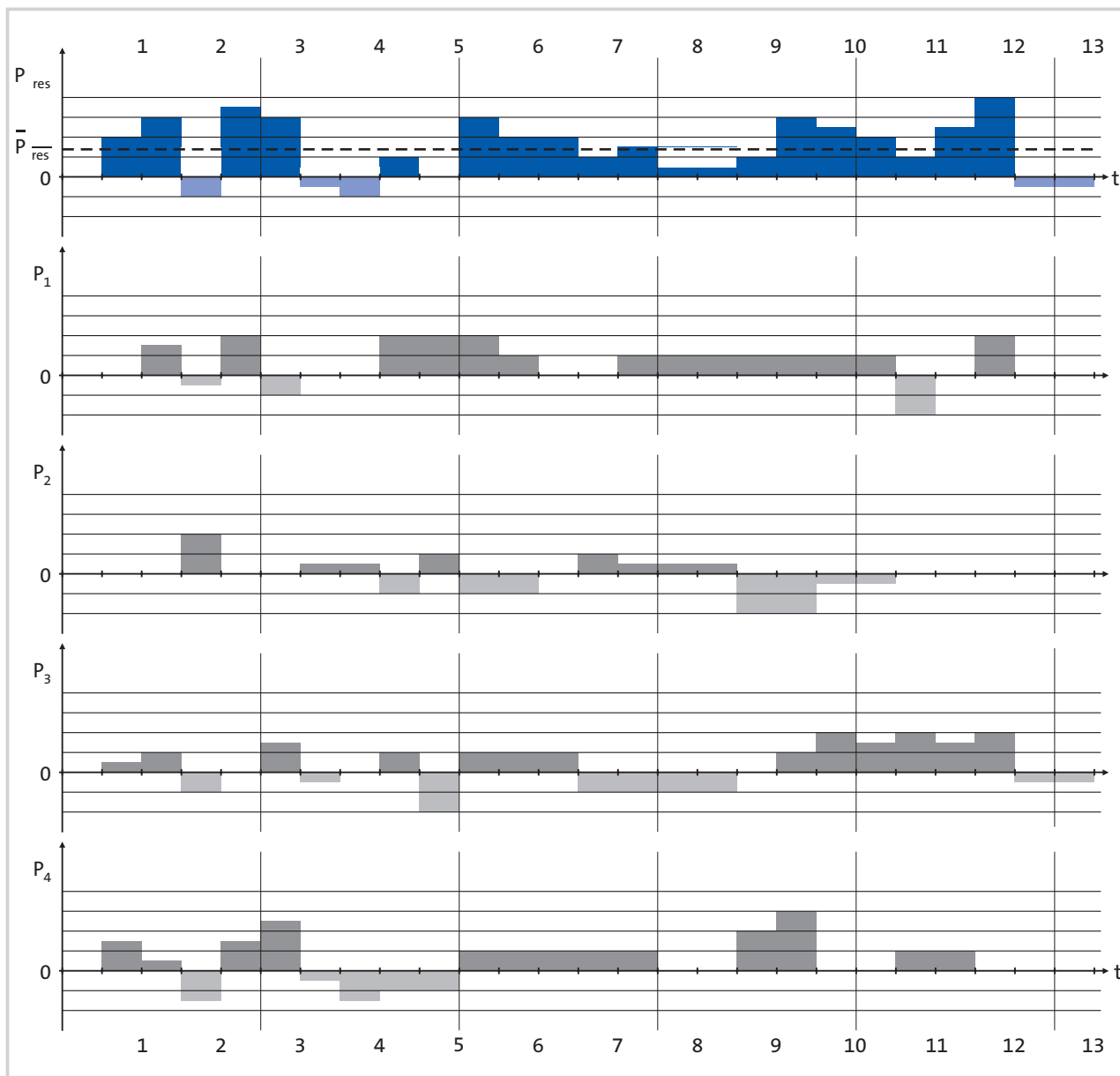
Overload mode: 3 min cycle



Dimensioning for DC-bus operation

► Dimensioning of multi-axis modules in a DC-bus connection

The best way to select the ideal supply module for a multi-axis application is to use a time/power diagram for a complete machine cycle for all axis modules. The required total power of the supply modules can be calculated by adding the isochronous individual power ratings. The required braking power can be calculated accordingly. The required power can be provided by the individual 93xx axis modules, 936x axis modules or 934x regenerative power supply modules.



Time/power diagram of a multi-axis servo system

$P_1 \dots P_4$ = individual power of axis 1...axis 4

P_{res} = addition of individual powers

$\bar{P}_{res}$ = mean value of individual powers



9300 servo inverter

Product information

Standards and operating conditions

Conformity	CE: Low-Voltage Directive (73/23/EEC)
Approvals UL 508C	Power Conversion Equipment (file no. 132659)
Enclosure EN 60529 NEMA	IP20 Protection against accidental contact according to NEMA 250 type 1
Climatic conditions Storage (EN 60721-3-1) Transport (EN 60721-3-2) Operation (EN 60721-3-3) Rated output current derating	1K3 (temperature: -25 °C ... + 55 °C) 2K3 (temperature: -25 °C ... + 70 °C) 0.37 ... 11 kW: 3K3 (temperature: 0 ... + 55 °C) 15 ... 75 kW: 3K3 (temperature: 0 ... + 50 °C) Above + 40 °C by 2.5%/°C
Permissible installation height Rated output current derating Overvoltage category at and above 2000 m	0 ... 4000 m amsl Above 1000 m amsl by 5%/1000 m Above 2000 m only for use in overvoltage category II
Vibration resistance Operation	Germanischer Lloyd: 5 Hz ≤ f ≤ 13.2 Hz ± 1 mm amplitude 13.2 Hz < f ≤ 100 Hz 0.7 g
Permissible supply forms Unrestricted use	Systems with earthed star point (TN and TT systems) Systems with high-resistance or isolated star point (IT systems)
Leakage current to PE EN 61800-5-1	> 3.5 mA
Noise emission EN 61800-3	Cable-guided: Category C2, motor cable length depends on the selected filter
Noise immunity EN 61800-3	Category C3
Insulation resistance EN 61800-5-1	Overvoltage category III, above 2000 m amsl overvoltage category II
Pollution degree EN 61800-5-1	2
Protective insulation of control circuits EN 61800-5-1	Safe isolation of mains: double/reinforced insulation for digital inputs and outputs



PLC functions

Design		Servo PLC	Servo PLC Technology
Product key		EVS93□□-EI	EVS93□□-ET
Technology functions		Preconfigured solutions from the technology packages cannot be used	Software package - Positioner Software package - Cam Software package - Winder Prepared Solutions - Cross cutter - Flying saw
Program memory ROM (flash)	[kByte]	655	
Main memory RAM ROM		2 x 64-kB sectors 15 x 64-kB sectors	
Data memory RAM		11.2 kB (10 kB symb. variables, 1.2 kB absolute flags)	
Buffered memory EEPROM	[byte]	6000	
NVRAM	[byte]	160 (retain) + 32 (persistent)	
Processing time/bit operation	t [μs]	0.7	
Task types		1 cyclic task, 8 tasks (time or event-controlled)	
Number of counters/timers		Freely selectable to IEC 61131-3	
Operation repertoire		acc. to IEC 61131-3	
Programming software Drive PLC Developer Studio		Programming languages IL, LD, FBD, ST, SFC and with CFC editor monitoring, visualisation, simulation and debugging	
DC supply voltage U _{DC} [V]		24	

9300 servo inverter

Axis modules

Rated data for axis modules

- ▶ The data is valid for operation at 3/PE AC 400 V.
- ▶ Unless otherwise specified, the data refers to the default setting with a switching frequency of 8 kHz.

→ Rated data for operation at 3/PE/AC 480 V
DS_GD_9300_0003
 Available for download at www.lenze.de/dsc

					
Motor power (asynchronous motor, 4-pole)	P _N [kW]	0.37	0.75	1.5	3
Product key		EVS9321-E□	EVS9322-E□	EVS9323-E□	EVS9324-E□
Mains voltage range	U _{Netz} [V]	3/PE AC 320 V -0% ... 528 V +0%; 45 Hz -0% ... 65 Hz +0%			
Alternative DC supply	U _{DC} [V]	DC 460-0% ... 740 V+0%			
Rated mains current With mains choke ¹⁾	I _{Netz} [A]	1.5	2.5	3.9	7
Without mains choke ¹⁾	I _{Netz} [A]	2.1	3.5	5.5	-
Rated output current 8 kHz	I _N [A]	1.5 / 1.05 ²⁾	2.5 / 1.75 ²⁾	3.9 / 2.7 ²⁾	7.0 / 4.9 ²⁾
16 kHz	I _N [A]	1.1 / 0.77 ²⁾	1.8 / 1.26 ²⁾	2.9 / 2.03 ²⁾	5.2 / 3.64 ²⁾
Max. output current 8 kHz	I _{max} [A]	2.3	3.8	5.9	10.5
16 kHz	I _{max} [A]	1.65	2.7	4.35	7.8
Brake chopper data Continuous braking power	P [kW]	11, depending on the external brake resistor			
Peak braking power	P _{BRmax} [kW]	25			
Min. brake resistance	R [Ohm]	27 ± 10%			
Power loss	P _V [W]	100	110	140	200
Dimensions Height	H [mm]			350	
Width	B [mm]	78			97
Depth	T [mm]			250	
Depth "cold plate"	T [mm]			158	
Mass	m [kg]	4			5
Permissible motor cable length Shielded	l [m]	50			

¹⁾ Without mains filter

²⁾ Operating mode acceleration drive: The maximum overcurrent duration is 10 s at 50 s base load duration at max. 44% I_{Nx}.

→ Dimensioned drawings for axis modules
DS_MB_9300_0001
 Available for download at www.lenze.de/dsc

→ Dimensioned drawings for "cold plate" axis modules
DS_MB_9300_0004
 Available for download at www.lenze.de/dsc



Rated data for axis modules

- ▶ The data is valid for operation at 3/PE AC 400 V.
- ▶ Unless otherwise specified, the data refers to the default setting with a switching frequency of 8 kHz.

→ Rated data for operation at 3/PE/AC 480 V
DS_GD_9300_0003
 Available for download at www.lenze.de/dsc

			
Motor power (asynchronous motor, 4-pole)	P_N [kW]	5.5	11
Product key		EV59325-E□	EV59326-E□
Mains voltage range	U_{Netz} [V]	3/PE AC 320 V -0% ... 528 V +0%; 45 Hz -0% ... 65 Hz +0%	
Alternative DC supply	U_{DC} [V]	DC 460-0% ... 740 V+0%	
Rated mains current With mains choke ¹⁾	I_{Netz} [A]	12	20.5
Without mains choke ¹⁾	I_{Netz} [A]	16.8	-
Rated output current 8 kHz	I_N [A]	13	23.5
16 kHz	I_N [A]	9.7	15.3
Max. output current 8 kHz	I_{max} [A]	19.5	35.3
16 kHz	I_{max} [A]	14.6	23
Brake chopper data Continuous braking power	P [kW]	11, depending on the external brake resistor	
Peak braking power	P_{BRmax} [kW]	25	
Min. brake resistance	R [Ohm]	$27 \pm 10\%$	
Power loss	P_V [W]	260	360
Dimensions Height	H [mm]	350	
Width	B [mm]	135	
Depth	T [mm]	250	
Depth "cold plate"	T [mm]	158	
Mass	m [kg]	7.5	
Permissible motor cable length Shielded	l [m]	50	

¹⁾ Without mains filter

→ Dimensioned drawings for axis modules
DS_MB_9300_0001
 Available for download at www.lenze.de/dsc

→ Dimensioned drawings for "cold plate" axis modules
DS_MB_9300_0004
 Available for download at www.lenze.de/dsc



9300 servo inverter

Axis modules

Rated data for axis modules

- ▶ The data is valid for operation at 3/PE AC 400 V.
- ▶ Unless otherwise specified, the data refers to the default setting with a switching frequency of 8 kHz.

→ Rated data for operation at 3/PE/AC 480 V
DS_GD_9300_0003
 Available for download at www.lenze.de/dsc

				
Motor power (asynchronous motor, 4-pole)	P_N [kW]	15	22	30
Product key		EVS9327-E□	EVS9328-E□	EVS9329-E□
Mains voltage range	U_{Netz} [V]	3/PE AC 320 V -0% ... 528 V +0%; 45 Hz -0% ... 65 Hz +0%		
Alternative DC supply	U_{DC} [V]	DC 480-0% ... 740 V+0%		
Rated mains current With mains choke ¹⁾	I_{Netz} [A]	27	44	53
Without mains choke ¹⁾	I_{Netz} [A]	43.5	-	-
Rated output current 8 kHz	I_N [A]	32	47	59
16 kHz	I_N [A]	20.8	30.6	38
Max. output current 8 kHz	I_{max} [A]	48	70.5	88.5
16 kHz	I_{max} [A]	31.2	45.9	57
Brake chopper data Continuous braking power	P [kW]	11, depending on the external brake resistor		
Peak braking power	P_{BRmax} [kW]	25		
Min. brake resistance	R [Ohm]	27 ± 10%		
Power loss	P_V [W]	430	640	810
Dimensions Height	H [mm]	350		
Width	B [mm]	250		
Depth	T [mm]	250		
Depth "cold plate"	T [mm]	160	-	-
Mass	m [kg]	13.5	15	-
Permissible motor cable length Shielded	l [m]	50		

¹⁾ Without mains filter

→ Dimensioned drawings for axis modules
DS_MB_9300_0001
 Available for download at www.lenze.de/dsc

→ Dimensioned drawings for "cold plate" axis modules
DS_MB_9300_0004
 Available for download at www.lenze.de/dsc



Rated data for axis modules

- ▶ The data is valid for operation at 3/PE AC 400 V.
- ▶ Unless otherwise specified, the data refers to the default setting with a switching frequency of 8 kHz.

→ Rated data for operation at 3/PE/AC 480 V
DS_GD_9300_0003
 Available for download at www.lenze.de/dsc

				
Motor power (asynchronous motor, 4-pole)	P _N [kW]	45	55	75
Product key		EVS9330-E□	EVS9331-E□	EVS9332-E□
Mains voltage range	U _{Netz} [V]	3/PE AC 320 V -0% ... 528 V +0%; 45 Hz -0% ... 65 Hz +0%		
Alternative DC supply	U _{DC} [V]	DC 480-0% ... 740 V+0%		
Rated mains current With mains choke ¹⁾ Without mains choke ¹⁾	I _{Netz} [A] I _{Netz} [A]	78	100	135
Rated output current 8 kHz 16 kHz	I _N [A] I _N [A]	89 58	110 70	145 90
Max. output current 8 kHz 16 kHz	I _{max} [A] I _{max} [A]	133.5 87	165 105	217.5 135
Brake chopper data Continuous braking power Peak braking power Min. brake resistance	P [kW] P _{BRmax} [kW] R [Ohm]	11, depending on the external brake resistor 25 27 ± 10%		
Power loss	P _V [W]	1100	1470	1960
Dimensions Height Width Depth Depth "cold plate"	H [mm] B [mm] T [mm] T [mm]	591 340	680 450 285 -	
Mass	m [kg]	38	59	
Permissible motor cable length Shielded	l [m]	50		

¹⁾ Without mains filter

→ Dimensioned drawings for axis modules
DS_MB_9300_0001
 Available for download at www.lenze.de/dsc

→ Dimensioned drawings for "cold plate" axis modules
DS_MB_9300_0004
 Available for download at www.lenze.de/dsc



9300 servo inverter

Regenerative power supply modules

Standards and operating conditions

Product key Short form	EMB934□-E
Conformity	CE: Low-Voltage Directive (73/23/EEC)
PWIS	Not fulfilled
RoHS	Not fulfilled
Approvals UL 508C	Power Conversion Equipment (file no. 132659)
Enclosure EN 60529	Protection degree of heatsink in design with thermal separation: IP 41 IP20
Packaging	25.9 kW: shipping container 7 kW ... 14 kW: dustproof packaging
Vibration resistance	Sinusoidal oscillation; Amplitude/acceleration (10 Hz ≤ f ≤ 57 Hz 0.075 mm, 57 Hz ≤ f ≤ 150 Hz 1 g), acceleration resistant up to 0.7 g acc. to Germanischer Lloyd
Pollution degree EN 61800-5-1	2
Permissible installation height	0 ... 4000 m amsl
Rated output current derating	Above 1000 m amsl by 5%/1000 m
Overvoltage category at and above 2000 m	Above 2000 m only for use in overvoltage category II
Climatic conditions	
Storage (EN 60721-3-1)	1K3 (temperature: -25°C ... + 55°C)
Transport (EN 60721-3-2)	2K3 (temperature: -25°C ... + 70°C)
Operation (EN 60721-3-3)	3K3 (temperature: 0°C ... + 50°C)
Rated output current derating	Above + 40°C by 2 %/°C
Product key Short form	EMB934□-E
Noise emission EN 61800-3	C2 with mains filter
Noise immunity EN 61800-3	Category C3
Insulation resistance EN 61800-5-1	Overvoltage category III, above 2000 m amsl overvoltage category II
Protective insulation of control circuits EN 61800-5-1	Safe isolation of mains: double/reinforced insulation for digital inputs and outputs
Permissible supply forms	Operation on TT systems, TN systems or systems with earthed neutral without additional measures Operation on IT systems not possible The devices are approved only for operation on symmetrical systems. Operation on systems with earthed phase conductor is not permitted.
Leakage current to PE EN 61800-5-1	> 3.5 mA
Operation on public mains supplies EN 61000-3-2	A limitation of harmonic currents to IEC 61000-3-2 is not relevant since the power limit of 1 kW is exceeded

¹⁾ Measured with eight 9300 controllers each with 10 m of shielded motor cable.



Rated data for regenerative power supply modules

				
Product key Regenerative power supply modules		EMB9341-E	EMB9342-E	EMB9343-E
Mains voltage range	U_{Netz} [V]	3/PE AC 320 V-0% ... 528 V+0%; 48 Hz-0% ... 62 Hz+0%		
Mains frequency range	f [Hz]	48 ... 62 +-0%		
Output power	P_N [kW]	7	14	25.9
Regenerative power	P [kW]	7	14	25.9
Rated mains current With mains choke	I_{Netz} [A]	12	24	45
Max. mains current	$I_{\text{Netz max}}$ [A]	18	36	67.5
Dimensions				
Height	H [mm]	384 (660 with filter)		404 (720 with filter)
Width	B [mm]	135		250
Depth	T [mm]	250		
Mass	m [kg]	7.5		13.5

→ Dimensioned drawings for power supply modules
DS_MB_9340_0002
 Available for download at www.lenze.de/dsc



9300 servo inverter

Regenerative power supply modules

Rated data for power supply modules

			
Product key Power supply modules		EME9364-E	EME9365-E
Mains voltage range	U_{Netz} [V]	3/PE AC 100 V-0% ... 550 V+0%; 48 Hz-0% ... 62 Hz+0%	
Mains frequency range	f [Hz]	48 ... 62 +-0%	
Rated mains current With mains choke	I_{Netz} [A]	74	148
Max. mains current	$I_{\text{Netz max}}$ [A]	111	222
Output power +UG, -UG	P_N [kW]	50	100
Max. output power +UG, -UG	P_{max} [kW]	75	
DC-bus current	I_{Z_KN} [A]	90	180
Max. DC-bus current	I_{ZK_max} [A]	135	270
Power loss	P_V [W]	173	389
Dimensions			
Height	H [mm]	280	
Width	B [mm]	175	
Depth	T [mm]	208	
Mass	m [kg]	4.8	5.8

¹⁾ Mains voltage range for the connected blower: 1/PE AC 230 V

²⁾ The following formula is used for dimensioning: $I_r \cdot \sqrt{I_{\text{mains}}}$ (I_{mains} is the mains current of the controller with mains filter/choke). If interconnected drives are operating in generator mode or if not all drives are operating at the same time, the resulting mains current will be reduced accordingly.

³⁾ Currents valid for periodic load change cycle with 1 minute overcurrent duration at the current specified here and 2 minutes base load duration at 75% I_N

⁴⁾ Measured with 8 9300 controllers each with 10 m of shielded motor cable

→ Dimensioned drawings for power supply modules

DS_MB_9360_0002

Available for download at www.lenze.de/dsc



Braking units

Brake module EMB9351-E

For lower braking powers, the brake module EMB9351-E with integrated brake resistor can be used.

Brake chopper EMB9352-E

If a higher braking power is required, the brake chopper EMB9352-E can be used to obtain an optimum adaptation to the required braking power. For this purpose, the brake chopper is operated with an external brake resistor.



Brake module and brake chopper

- ▶ Although a higher brake power can be achieved by using other resistors or by connecting a number of resistors in parallel or series, the resistance value must not fall below the minimum R_{min} specified.
- ▶ When brake choppers and brake modules are combined, parallel connections are permissible.

The braking units can be mounted in "cold plate" design. These variants carry the following version codes:

- ▶ Brake module EMB9351-C-V003
- ▶ Brake chopper EMB9352-C-V003

Standards and operating conditions

Product key Short form	EMB9351-□-□□□□	EMB9352-□-□□□□
Conformity	CE: Low-Voltage Directive (2006/95/EC) CE: Low-Voltage Directive (73/23/EEC)	
Approvals UL 508C	Power Conversion Equipment (file no. 132659)	
Enclosure EN 60529	IP20	
Packaging	Dustproof packaging	
Vibration resistance	Sinusoidal oscillation; Amplitude/acceleration (10 Hz ≤ f ≤ 57 Hz 0.075 mm, 57 Hz ≤ f ≤ 150 Hz 1 g), acceleration resistant up to 0.7 g acc. to Germanischer Lloyd	
Pollution degree EN 61800-5-1	2	
Permissible installation height	0 ... 4000 m amsl	
Rated output current derating	Above 1000 m amsl by 5%/1000 m	
Overvoltage category at and above 2000 m	Above 2000 m only for use in overvoltage category II	
Climatic conditions	- 25°C ... + 70°C	
Storage (EN 60721-3-1)	2K3 (temperature: -25°C ... + 70°C)	
Transport (EN 60721-3-2)	3K3 (temperature: 0°C ... + 55°C)	
Operation (EN 60721-3-3)	Above + 40°C by 2.5 %/°C	
Peak output current derating		
Protective insulation of control circuits EN 61800-5-1	Safe isolation of mains: double/reinforced insulation	
Clearance	Above and below 100 mm	



9300 servo inverter

Accessories

Functions and features

- ▶ The 9352-E brake chopper is designed for operation at brake resistances $\geq 27 \text{ Ohm}$ with a DC-bus voltage of 765 V.
- ▶ The rated data applies to a brake resistance with 27 Ohm. The 9352-E brake chopper can conduct brake resistances from 18 Ohm if the maximum braking times / application times according to the Operating Instructions are adhered to. At 18 Ohm and 765 V DC-bus voltage, the maximum running time is 1 s and the maximum power 32 kW.

If the running times are exceeded, this can result in a brake chopper failure - see EDBMB935X Operating Instructions.

			
Product key			
Brake module		EMB9351-E	
Brake chopper			EMB9352-E
Brake chopper data			
DC-bus voltage	$U_{ZK} \text{ [V]}$	270 ... 775	
Continuous braking power	$P \text{ [kW]}$	0.1	11, depending on the external brake resistor ¹⁾
Peak braking power ¹⁾	$P_{BRmax} \text{ [kW]}$	12	25
Running time	$t_{on} \text{ [s]}$	4	1.33
Recovery time	$t_{re} \text{ [s]}$	500	1.67
Peak current	$I_{max} \text{ [A]}$	16	32
Continuous current, mean value	$I \text{ [A]}$		14
Continuous current, r.m.s. value	$I \text{ [A]}$		20
Max. braking energy	$W \text{ [kWs]}$	50	Dependent on the brake resistor
Min. brake resistance	$R \text{ [Ohm]}$	47	$27 \pm 10\% \text{ } ^{1, 2)}$
Max. output current			
Braking unit	$I_{DC_max} \text{ [A]}$	16	42
Dimensions			
Height	$H \text{ [mm]}$	384	
Width	$B \text{ [mm]}$	52	
Depth	$T \text{ [mm]}$	186	
Mass			
Braking unit	$m \text{ [kg]}$	2.6	2.2

¹⁾ for 765 V DC-bus voltage

²⁾ Notes on the use of brake resistors < 27ohm can be found in the EDBMB935X Operating Instructions



Brake choppers and brake resistors

► Brake resistors in IP20 enclosure

When a three-phase AC motor or a servo motor is braked by a frequency inverter, the motor operates in generator mode and feeds back energy to the inverter. This energy can be dissipated by means of a brake chopper. Due to this it is possible to brake the motor within a short time interval.



Brake resistor

Motor power	Mains voltage	Product key			Brake resistor data			
(asynchronous motor, 4-pole)		Inverter	Brake chopper	Brake resistor ²⁾	Quantity ¹⁾	Resistance	Continuous power	Thermal capacity
P _N [kW]	U _{Netz} [V]					R [Ohm]	P [W]	CB [kW]
0.37	3 AC 400	EVS9321-E□	EMB9352-E	ERBD180R300W	1	180	300	45
0.75		EVS9322-E□						
1.5		EVS9323-E□		ERBD082R600W		82	600	87
3		EVS9324-E□		ERBD068R800W		68	800	120
5.5		EVS9325-E□		ERBD047R01K2		47	1200	174
11		EVS9326-E□						
15		EVS9327-E□		ERBD033R02K0	2	33	2000	240
22		EVS9328-E□						
30		EVS9329-E□						
45		EVS9330-E□		ERBD022R03K0 ERBD033R02K0		22 33	3000 2000	375 240
55		EVS9331-E□						
75		EVS9332-E□			3			

¹⁾ Brake resistors and brake choppers

²⁾ For maximum running time, see EDBMB935X Operating Instructions and page 30

Motor power	Mains voltage	Product key			Brake resistor data	
(asynchronous motor, 4-pole)		Inverter	Brake chopper	Brake resistor ³⁾	Dimensions	Mass
P _N [kW]	U _{Netz} [V]				H x B x T [mm]	m [kg]
0.37	3 AC 400	EVS9321-E□	EMB9352-E	ERBD180R300W	439 x 64 x 142	2
0.75		EVS9322-E□				
1.5		EVS9323-E□		ERBD082R600W	639 x 64 x 142	3.1
3		EVS9324-E□		ERBD068R800W	539 x 172 x 142	4.3
5.5		EVS9325-E□		ERBD047R01K2	639 x 172 x 142	4.9
11		EVS9326-E□				
15		EVS9327-E□		ERBD033R02K0	639 x 262 x 142	7.1
22		EVS9328-E□				
30		EVS9329-E□				
45		EVS9330-E□		ERBD022R03K0 ERBD033R02K0	739 x 172 x 247 639 x 262 x 142	10.6 7.1
55		EVS9331-E□				
75		EVS9332-E□				

³⁾ For maximum running time, see EDBMB935X Operating Instructions and page 30

Vibration-resistant brake resistors (IP20 enclosure)

Many electrical drives are used with their accompanying controllers in non-stationary units (e.g. storage and retrieval units). In order to achieve optimum operational reliability for these applications, Lenze also provides special vibration-resistant brake resistors.



Vibration-resistant brake resistor

Motor power	Mains voltage	Product key			Brake resistor data			
(asynchronous motor, 4-pole)		Inverter	Brake chopper	Brake resistor ²⁾	Quantity ¹⁾	Resistance	Continuous power	Thermal capacity
P _N [kW]	U _{Netz} [V]					R [Ohm]	P [W]	CB [kWs]
0.37	3 AC 400	EVS9321-E□	EMB9352-E	ERBD047R01K2RB	1	47	1200	180
0.75		EVS9322-E□						
1.5		EVS9323-E□						
3		EVS9324-E□						
5.5		EVS9325-E□						
11		EVS9326-E□						
15		EVS9327-E□		ERBD033R01K9RB	33	2000	285	
22		EVS9328-E□		ERBD020R03K0RB	2	20	3000	450
30		EVS9329-E□						
45		EVS9330-E□						
55		EVS9331-E□						
75		EVS9332-E□						

¹⁾ Brake resistors and brake choppers

²⁾ For maximum running time, see EDBMB935X Operating Instructions and page 30

Motor power	Mains voltage	Product key			Brake resistor data	
(asynchronous motor, 4-pole)		Inverter	Brake chopper	Brake resistor ³⁾	Dimensions	Mass
P _N [kW]	U _{Netz} [V]				H x B x T [mm]	m [kg]
0.37	3 AC 400	EVS9321-E□	EMB9352-E	ERBD047R01K2RB	549 x 185 x 120	4.8
0.75		EVS9322-E□				
1.5		EVS9323-E□				
3		EVS9324-E□				
5.5		EVS9325-E□				
11		EVS9326-E□				
15		EVS9327-E□		ERBD033R01K9RB	749 x 185 x 120	6.6
22		EVS9328-E□		ERBD020R03K0RB	749 x 275 x 120	9.1
30		EVS9329-E□				
45		EVS9330-E□				
55		EVS9331-E□				
75		EVS9332-E□				

³⁾ For maximum running time, see EDBMB935X Operating Instructions and page 30

→ Standards and operating conditions

DS_ZB_ERBDV_0001

Available for download at www.lenze.de/dsc



Mains chokes

A mains choke is an inductor that is connected to the mains cable of the inverter. Using a mains choke offers the following advantages:

- ▶ **Reduced system perturbation:**
The wave form of the mains current is a closer approximation of a sine wave.
- ▶ **Reduced r.m.s. mains current:**
Reduction in mains, line and fuse load
- ▶ **Longer inverter service life:**
Reducing the AC load on the electrolytic capacitors in the DC bus increases the service life of the capacitors.
- ▶ **DC-bus connection with multiple supplies**
The DC-bus connection can be used to exchange energy between the axis modules and to reduce energy consumption.

Mains chokes or mains filters are always required for some inverters because otherwise the permissible rated data of the components used might be exceeded by the mains currents.

- ▶ See Rated data
- ▶ Mains chokes can be used without restriction together with RFI filters and/or motor filters.
- ▶ Please note:
When using a mains choke, the maximum achievable output voltage of the axis modules is slightly reduced.



Mains choke

Motor power (asynchronous motor, 4-pole)	Mains voltage	Product key		Mains choke data		
P_N [kW]	U_{Netz} [V]		Mains choke	Rated current	Dimensions	Mass
				I_N [A]	H x B x T [mm]	m [kg]
0.37	3 AC 400	EVS9321-E□	ELN3-0700H003	2.5	80 x 60 x 94	0.5
0.75		EVS9322-E□	ELN3-0450H004	4	65 x 62 x 92	0.7
1.5		EVS9323-E□	ELN3-0250H007	7	120 x 65 x 117	1.5
3		EVS9324-E□	ELN3-0160H012	12	152 x 79 x 155	4
5.5		EVS9325-E□	ELN3-0120H025	25	150 x 100 x 185	5.7
11		EVS9326-E□				
15		EVS9327-E□	ELN3-0088H035	35	180 x 125 x 225	9.8
22		EVS9328-E□	ELN3-0075H045	45		10.1
30		EVS9329-E□	ELN3-0055H055	55	228 x 120 x 265	13
45		EVS9330-E□	ELN3-0027H105	105	228 x 155 x 265	20.2
55		EVS9331-E□				
75		EVS9332-E□	ELN3-0017H170	170	265 x 170 x 268	30.3

Mains filter

A mains filter is a combination of mains choke and RFI filter in one housing. Mains filters offer the same advantages as mains chokes. In addition, they enable compliance with the interference voltage categories of the European standard EN 61800-3. There a distinction is drawn between category C1 and category C2.

Category C1 describes the use on public supply networks.
Category C2 describes the use of drives which are intended for industrial purposes in areas also comprising residential areas.

For the 9300 servo inverters, the components mains filter A, mains filter B and mains filter are available for compliance with the interference voltage categories.

The components are selected in accordance with the motor cable length and the required interference voltage category.

- ▶ see data tables
- ▶ Category C2, cable length up to 5 / 25 m --> mains filter A
- ▶ Category C2, cable length up to 50 m --> mains filter
- ▶ Category C1, cable length up to 10 m --> mains filter
- ▶ Category C1, cable length up to 50 m --> mains filter B
- ▶ The filters are designed as side-by-side-mounted and footprint filters.
- ▶ When mounting the servo inverter according to the "push-through technique" or "cold plate" technology, only footprint mains filters can be used for interference suppression.

Mains filter, C1 up to 10 m and C2 up to 50 m

For controllers with a power range from 15 to 75 kW, the mains filter is used to operate drives with up to 50 m motor cable length in industrial areas or up to 10 m motor cable length on public supply systems. With the mains filters, EN 61800-3 category C1 up to 10 m motor cable length and EN 61800-3 category C2 up to 50 m motor cable length is complied with.

In addition to reducing the line-bound noise emission into the mains network, a mains filter replaces the function of a mains choke. The r.m.s. current is also reduced. Some drive controllers always require the use of mains chokes or mains filters because otherwise the permissible rated component data might be exceeded by the mains currents.

- ▶ See Rated data

The mains filters are available in the power range from 15 to 75 kW.



Mains filters A and B

- ▶ The filters are designed as footprint filters.
- ▶ When mounting the servo inverter according to the "push-through technique" or "cold plate" technology, only footprint mains filters A and B can be used for interference suppression.
- ▶ The filters meet the requirements of UL/cUL.
- ▶ They have an adapted connecting cable and must be mounted in the direct proximity of the inverter to ensure compliance with the limit values.

Motor power	Mains voltage	Product key		Mains filter data		
(asynchronous motor, 4-pole)		Inverter	Mains filter	Rated current	Dimensions	Mass
P_N [kW]	U_{Netz} [V]			I_N [A]	H x B x T [mm]	m [kg]
15	3 AC 400	EVS9327-E□	E82ZZ15334B230	43	410 x 236 x 110	6
22		EVS9328-E□	E82ZN22334B230	42		13
30		EVS9329-E□	E82ZN30334B230	55		19
45		EVS9330-E□	E82ZN55334B230	100	685 x 318 x 114	29
55		EVS9331-E□	E82ZN75334B230	135	760 x 428 x 114	53
75		EVS9332-E□				



Mains filter A, C2 up to 5m or 25m

Mains filter A is used to operate 9300 controllers in industrial areas, e.g. on industrial supply networks. With mains filter A, EN 61800-3 category C2 up to 5 m or 25 m motor cable length is complied with.

Motor power	Mains voltage	Product key		Mains filter A data			
(asynchronous motor, 4-pole)		Inverter	Mains filter	Max. cable length C2	Rated current	Dimensions	Mass
P _N [kW]	U _{Netz} [V]			l [m]	I _N [A]	H x B x T [mm]	m [kg]
0.37	3 AC 400	EVS9321-E□	EZN3A2400H002 ¹⁾	5	1.5	80 x 68 x 92	0.8
0.75		EVS9322-E□	EZN3A1500H003 ¹⁾		2.5	95 x 82 x 115	1.2
1.5		EVS9323-E□	EZN3A0900H004 ¹⁾		4	98 x 70 x 105	1.4
3		EVS9324-E□	EZN3A0500H007 ¹⁾		7	120 x 75 x 122	2.4
5.5		EVS9325-E□	EZN3A0300H013 ¹⁾		13	152 x 100 x 142	5.2
11		EVS9326-E□	EZN3A0150H024 ¹⁾		24	260 x 135 x 230	8.9
15		EVS9327-E□	EZN3A0110H030 ²⁾	25	30	365 x 234 x 228	14.4
22		EVS9328-E□	EZN3A0080H042 ²⁾		42		16.3
30		EVS9329-E□	EZN3A0055H060 ²⁾		60	366 x 241 x 285	30.5
45		EVS9330-E□	EZN3A0030H110 ²⁾		110	515 x 323 x 285	47
55		EVS9331-E□	EZN3A0022H150 ²⁾		150	655 x 426 x 208	60
75		EVS9332-E□					

¹⁾ The mains filter meets the requirements to UL/cUL.

²⁾ The filter has an adapted connection cable and must be mounted directly above the inverter for complying with the limit values.

Output power	Mains voltage	Product key		Mains filter A data			
+UG, -UG			Mains filter	Max. cable length C2	Rated current	Dimensions	Mass
P _N [kW]	U _{Netz} [V]			l [m]	I _N [A]	H x B x T [mm]	m [kg]
7	3 AC 400	EMB9341-E	EZN3A0120H012	10	12	178 x 130 x 210	9.9
14		EMB9342-E	EZN3A0088H024		24	380 x 135 x 230	23.4
25.9		EMB9343-E	EZN3A0055H045		45	366 x 241 x 285	38



9300 servo inverter

Accessories

Mains filter B, C1 up to 50 m

Mains filter B is used to operate 9300 controllers on public supply networks or in industrial areas. With mains filter B, EN 61800-3 category C1 up to 50 m motor cable length is complied with.

Motor power	Mains voltage	Product key		Mains filter B data				
(asynchronous motor, 4-pole)		Inverter	Mains filter	Rated current	Max. cable length C1	Dimensions	Mass	
P _N [kW]	U _{Netz} [V]			I [A]	l [m]	H x B x T [mm]	m [kg]	
0.37	3 AC 400	EVS9321-E□	EZN3B2400H002 ¹⁾	1.5	50	150 x 78 x 230	2.5	
0.75		EVS9322-E□	EZN3B1500H003 ¹⁾	2.5			3	
1.5		EVS9323-E□	EZN3B0900H004 ¹⁾	4			3.1	
3		EVS9324-E□	EZN3B0500H007 ¹⁾	7		180 x 97 x 230	4.6	
5.5		EVS9325-E□	EZN3B0300H013 ¹⁾	13		260 x 135 x 230	11.8	
11		EVS9326-E□	EZN3B0150H024 ¹⁾	24			12.1	
15		EVS9327-E□	EZN3B0110H030 ²⁾	30		365 x 234 x 228	20.5	
22		EVS9328-E□	EZN3B0080H042 ²⁾	42				
30		EVS9329-E□	EZN3B0055H060 ²⁾	60		336 x 241 x 285	30	
45		EVS9330-E□	EZN3B0030H110 ²⁾	110		515 x 323 x 285	50	
55		EVS9331-E□	EZN3B0022H150 ²⁾	150			655 x 426 x 208	65
75		EVS9332-E□						

¹⁾ The mains filter meets the requirements to UL/cUL.

²⁾ The filter has an adapted connection cable and must be mounted directly above the inverter for complying with the limit values.

Output power	Mains voltage	Product key		Mains filter B data			
+UG, -UG			Mains filter	Rated current	Max. cable length C1	Dimensions	Mass
P _N [kW]	U _{Netz} [V]			I [A]	l [m]	H x B x T [mm]	m [kg]
50	3 AC 400/500	EME9364-E	EZN3B0110H030U	30	50	361 x 235 x 140	14.2
			EZN3B0080H042	42		365 x 234 x 228	20.5
			EZN3B0055H060	60		336 x 241 x 285	30
100		EME9365-E	EZN3B0037H090	90		515 x 323 x 285	42
			EZN3B0030H110	110			50
			EZN3B0022H150	150		655 x 426 x 208	65

Interference filter for SinCos encoder

If the connection between the motor cable shield and PE is not large enough, this may cause interference on the encoder lines. We recommend the use of an interference filter on SinCos encoders in particular if you are using long motor cables and the earthing conditions are not ideal. The filter is then simply mounted on the encoder input of the controller (design: Gender Changer 9-pin Sub-D socket/plug).

Design	Product key
Interference filter for SinCos encoder	EZZ0014



Mounting in push-through technique (thermal separation of the heatsink)

- ▶ For units in the power range 0.37 kW to 75 kW mounting sets for thermal separation ("push-through technique") are available.
- ▶ The protection class of the separate cooler is IP 41.
- ▶ When the servo inverters are mounted in "push-through" technique or "cold plate" technique, only built-on mains filters can be used for interference suppression.

Thermal separation of the heatsink is recommended for some applications. It significantly reduces heat generation inside the control cabinet.

Units with the heatsink outside the control cabinet can be supplied for such applications. The power loss is distributed as follows:

- ▶ Approx. 65% via separated cooler (heatsink and fan),
- ▶ Approx. 35% internally in the drive.

The use of thermally separated heatsinks is particularly suitable for applications in which self-ventilation via the control cabinet surface is insufficient. The "push-through technique" special design enables air conditioners or fans with lower ratings to be used or, in some cases, to be left out altogether.

Motor power	Mains voltage	Product key		Mounting cut-out		Dimensions		
(asyn- chronous motor, 4- pole)			Mounting frame	Height	Width	Width - "push- through tech- nique"	Height - "push- through tech- nique"	Depth (cabinet side)
P _N [kW]	U _{Netz} [V]					B [mm]	H [mm]	f [mm]
0.37	3 AC 400	EVS9321-E□	EJ0036	350 ± 3	82 ± 3	112.5	385.5	158
0.75		EVS9322-E□						
1.5		EVS9323-E□	EJ0037		101 ± 3	131.5		
3		EVS9324-E□						
5.5		EVS9325-E□	EJ0038		139 ± 3	169.5		
11		EVS9326-E□						
15		EVS9327-E□	EJ0011	336 + 1	236 + 1	279.5	379.5	159.5
22		EVS9328-E□						
30		EVS9329-E□						
45		EVS9330-E□	EJ0010	429 ± 1	320 ± 1	373	543	163.5
55		EVS9331-E□		698 + 1	428.5 +1	488	718	
75		EVS9332-E□	EJ0009					

→ Dimensioned drawings for axis modules in push-through technique

DS_MB_9300_0005

Available for download at www.lenze.de/dsc

Keypad

The keypad XT operating module is provided to visualise the operating parameters and to set the inverter parameters. The keypad XT is inserted in the AIF automation interface and is also used for status display, error diagnosis and, with its integrated memory, to transfer parameters to other inverters.

Features:

- ▶ read/write codes
- ▶ display short code texts
- ▶ menu structure with configurable "user menu"
- ▶ password protection
- ▶ non-volatile memory for parameter transfer (not for 9300 Servo PLC, Drive PLC)
- ▶ disable/enable the drive
- ▶ IP 20 enclosure



Keypad XT

Design		Features	Slot	Product key
		Keypads and accessories		
Keypad XT ¹⁾		▶ Password protection ▶ Plain text display ▶ predefined basic configurations ▶ user-specific menus ▶ suitable for device series 8200 vector and 9300 ▶ IP20 enclosure	AIF	EMZ9371BC
Keypad		▶ Password protection ▶ suitable for control cabinet installation ▶ suitable for device series 8200 ▶ IP55 enclosure		E82ZBC
Diagnosis terminal with XT keypad		▶ Diagnosis terminal with XT keypad (EMZ9371BC) ▶ suitable for device series 8200 and 9300 ▶ IP20 enclosure		E82ZBBXC
Diagnosis terminal with keypad		▶ Diagnosis terminal with keypad (E82ZBC) ▶ suitable for device series 8200 ▶ IP55 enclosure		E82ZBB
Assembly kit		▶ Control cabinet installation kit (for keypad E82ZBC)		E82ZBHT
Connection cable		▶ Connection cable, 2.5 m		E82ZWL025
		▶ Connection cable, 5 m		E82ZWL050
		▶ Connection cable, 10 m		E82ZWL100

¹⁾ Only LECOM communication modules or the keypad XT can be used for parameter setting on the power supply modules.

Digital frequency distributor

A passive digital frequency distributor is available for the parallel distribution of the digital frequency.

Design	Product key
Passive digital frequency distributor	EWZ0011



Overview of modules

The 9300 servo inverter is equipped with a slot for the operating unit or a communication module, the so-called application interface (AIF interface).

The slot is located at the front of the drive. The following tables describe the available modules.

Design		Features	Slot	Product key
Communication module				
DeviceNet¹⁾		▶ 2 LED for communication status display ▶ DIP switch for selecting baud rate and address ▶ Pluggable terminal strips	AIF	EMF2179IB
INTERBUS¹⁾		▶ 2 LED for communication status display ▶ DIP switch for specifying the number of process and parameter data words		EMF2113IB
LECOM-A/B¹⁾		▶ 3 LED for communication status display ▶ RS 232 or RS 485 ▶ Electrically isolated from the bus ▶ Electrically isolated from external voltage supply		EMF2102BCV001
LECOM-B¹⁾		▶ 3 LED for communication status display ▶ RS 485 ▶ Electrically isolated from the bus ▶ Electrically isolated from external voltage supply		EMF2102BCV002
LECOM-LI¹⁾		▶ 3 LED for communication status display ▶ Optical fibre ▶ Electrically isolated from external voltage supply		EMF2102BCV003
PROFIBUS¹⁾		▶ 2 LED for communication status display ▶ Address can be set by means of a DIP switch ▶ Electrically isolated from the bus ▶ Compatibility switch for predecessor module EMF2131 IB		EMF2133IB
Card module¹⁾		▶ Data backup device for 9300 ET (Servo PLC technology). ▶ Data backup device for 9300 EI (Servo PLC). ▶ Data backup device for ECS□A, ECS□P, ECS□M, ECS□S		EMZ2221IB

¹⁾ Only LECOM communication modules or the keypad XT can be used for parameter setting on the power supply modules.



9300 servo inverter

Notes

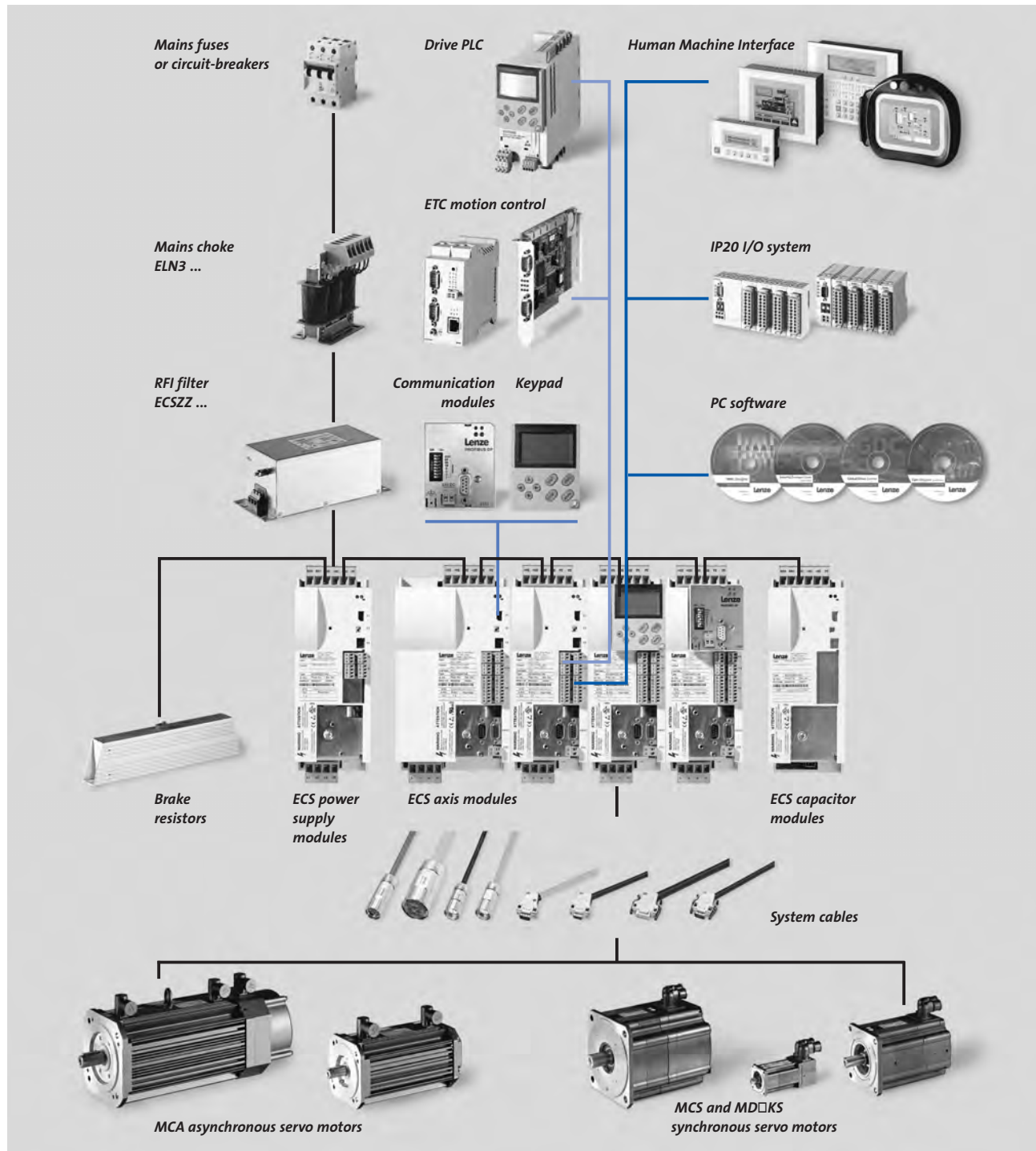


About this catalogue

This catalogue contains all components for the ECS servo system. Assignments of the controllers to the individual accessories help you to select the right product range for your application - quickly and easily. The corresponding automation components and the PLC functionality of the ECS Application can be found in the Automation catalogue.

For some components the "arrow" symbol appears together with an identifier printed in bold. This identifier can be retrieved directly in the electronic catalogue. The catalogue can be found online at: www.lenze.de/dsc

Inverters and accessories





ECS servo system

Product information

ECS servo system - dynamic, powerful, compact

Lenze's ECS servo system is the ideal solution wherever high overload capacity for highly dynamic drive tasks is required in conjunction with compact dimensions, fast assembly and problem-free commissioning.

The rugged axis modules, which are supplied with power via the DC bus, provide peak currents up to 64 A. Designs for control cabinet installation, thermal separation (push-through technique), or cold plate mounting support operation in a confined space in almost any operating conditions. Dedicated software modules ensure optimum adaptation to the required function combined with fast and problem-free commissioning. The "safe standstill" function (EN 954-1, "Safe standstill", control category 3) is a standard component in all axis modules.

Built-in monitoring functions in the central supply modules support a simple and transparent system structure. The high overload capacity optimises the power supply whatever the operating conditions.

Common to all modules are the compact dimensions, fast and well-designed assembly and easy commissioning. An extensive range of system accessories supports tailoring even to specific operating requirements. Two on-board CAN system bus interfaces and a slot for all standard fieldbus systems complete the picture.

High degree of precision

A high degree of precision is achieved when carrying out multi-axis coordinated movements by transferring synchronised speed and torque setpoints via the integrated CAN motion bus at cycle times as low as 1 ms. The ECS servo system is therefore ideal for gantry systems, robots, packaging machines or feeding and removal devices in industrial handling.



Power supply module ECSDE020 (built-in variant)

Axis module ECSCx008 (cold-plate technique)

Axis module ECSDx064 (push-through technique)



ECS servo system - dynamic, powerful, compact

ECS servo system – Posi and Shaft

The Posi & Shaft controller variant solves complex positioning tasks easily by setting a few parameters:

- ▶ 15 positioning profile can be saved
- ▶ Absolute, relative, modulo (relative and continuous) positioning
- ▶ Speed override
- ▶ Torque limitation after positioning
- ▶ 14 homing modes
- ▶ Manual jog
- ▶ Motor brake control with integrated brake logic
- ▶ Easy commissioning and parameter setting with the Lenze parameter setting and operating programs Global Drive Control (GDC) and GDC easy
- ▶ Coordination of positioning sequences through the higher-level controller (e.g. Drive PLC, ETC Motion Control)

ECS servo system – Speed and Torque

The Speed and Torque controller variant is tailored to the application areas "speed and torque control". The setpoints can either be selected via analog input signals, via the integrated CAN system bus or via fieldbus systems. In addition, there are also up to 15 predefined fixed speeds which can be used. The acceleration ramps can be either linear or S-shaped. A drift-free standstill is provided for quick stops.

Other features:

- ▶ Motor brake control with integrated brake logic
- ▶ Direction-dependent torque limitation
- ▶ Resolver or encoder as feedback system
- ▶ 15 freely adjustable ramps each for accelerating and braking

ECS servo system – Motion version

This Motion version of the controller has been specially designed for co-ordinated movements of several axes under one central control system. The axes are synchronised by the CAN motion bus as an angle follower.

The following operating modes are available:

- ▶ Interpolated position mode
- ▶ Velocity mode
- ▶ Homing mode
- ▶ Manual jog

In addition, touch-probe position detection is implemented.

Easy commissioning and parameter setting with the Lenze parameter setting and operating programs Global Drive Control (GDC) and GDC easy.

ECS servo system – Application

Freely programmable, intelligent servo controllers are the key elements for an efficient implementation of modular machine concepts in complex systems. The Application ECS controller variant provides the greatest degree of flexibility for your application. It is freely programmable in the languages specified in IEC 61131-3. If you want to take advantage of prepared solutions for complex drive tasks, there are also prepared technology templates available. Communication with higher-level control systems takes place either directly via digital and analog interfaces, via all common fieldbuses or via the CAN motion bus.

Available Software Packages:

- ▶ Positioning (Software Package Positioner)
- ▶ Cam (Software Package Cam)
- ▶ Winding drive (Software Package Winder)



ECS servo system

Product information

Functions and features

Control modes/motor control	Field-oriented servo control (SC) for synchronous and asynchronous servo motors and standard asynchronous motors
Basic functions	Brake logic Safe torque off (safe standstill), according to EN 954-1 control category 3 Motor control Drive monitoring and diagnosing Monitoring and diagnostic information Oscilloscope function
Predefined applications	Speed control Torque control Speed/phase synchronism Digital frequency follower Process controls
Monitoring	Brake chopper Open and/or short circuit of the motor holding brake connection cable Motor phase failure Mains voltage and mains failure, phase-specific DC-bus voltage
Monitoring and protective measures	Motor overtemperature (input for PTC or thermal contact, $I^2 \times t$ -monitoring); cULus-acceptance for $I^2 \times t$ -monitoring Short circuit Short to earth (protected against short to earth during operation, limited protection against short to earth on mains power-up) Overvoltage Motor stalling, motor overload
Diagnostics	
Diagnostic interface	Via AIF interface
Status displays	2 LEDs
Braking operation	
Brake chopper	Integrated
Brake resistor	Integrated/external
Power recovery	Possible with 934x power supply modules
DC-bus connection	Possible without DC-bus fuses



Control connections

The ECS servo system is equipped with digital and analog control connections in the form of pluggable control terminals (cable cross-section 1.5 mm²). In addition, the options of connecting resolver and encoder feedbacks from the motor and implementing a digital frequency connection are available in the form of multipole Sub-D connectors.

Design	ECS - application
Inputs/outputs Analog inputs Analog outputs Digital inputs Digital outputs	▶ Number: 1, pluggable ▶ Resolution: 11 bits ▶ Value range: +/-10V, 1x switchable, 0 ... 20 mA ▶ - ▶ Number: 4, pluggable ▶ Switching level: PLC (IEC 61131-2) ▶ Number: 2, pluggable ▶ Load capacity: 1 x 50 mA; 1 x 1.5 A ▶ Switching level: PLC (IEC 61131-2)
Interfaces CANopen Extension modules Digital frequency	▶ 2 x CAN bus ▶ Via AIF slot: communication modules ▶ Output, two-track ▶ Input, two-track (parameterisable)
Drive interface Resolver input Encoder input	▶ Sub-D, 9-pin ▶ Multi-encoder input for: SinCos/TTL incremental encoder, SinCos absolute value encoder single-turn / multi-turn (Hiperface®)

→ Circuit diagrams
DS_SP_ECS_0001
 Available for download at www.lenze.de/dsc



Basic dimensioning of axis modules

Here the most important steps for dimensioning axis modules are listed.

► **Motor power required**

First, the maximum torque required $M_{\max}$, the maximum speed $n_{\max}$, the effective torque M_{eff} and - for geared motors - the transmission ratio i are determined from the system data.

► **Motor selection**

Based on these values, the appropriate servo motor can be selected from the MCS or MD□KS (synchronous motors), MCA or MDFQA (asynchronous motors) ranges. More detailed information can be found in the Servo Motors catalogue.

► **Axis module selection**

The selection of the axis module is determined by the maximum currents and the continuous power required. For overload capacity dimensioning we recommend the use of the Drive Solution Designer (DSD) tool from Lenze.



Basic dimensioning

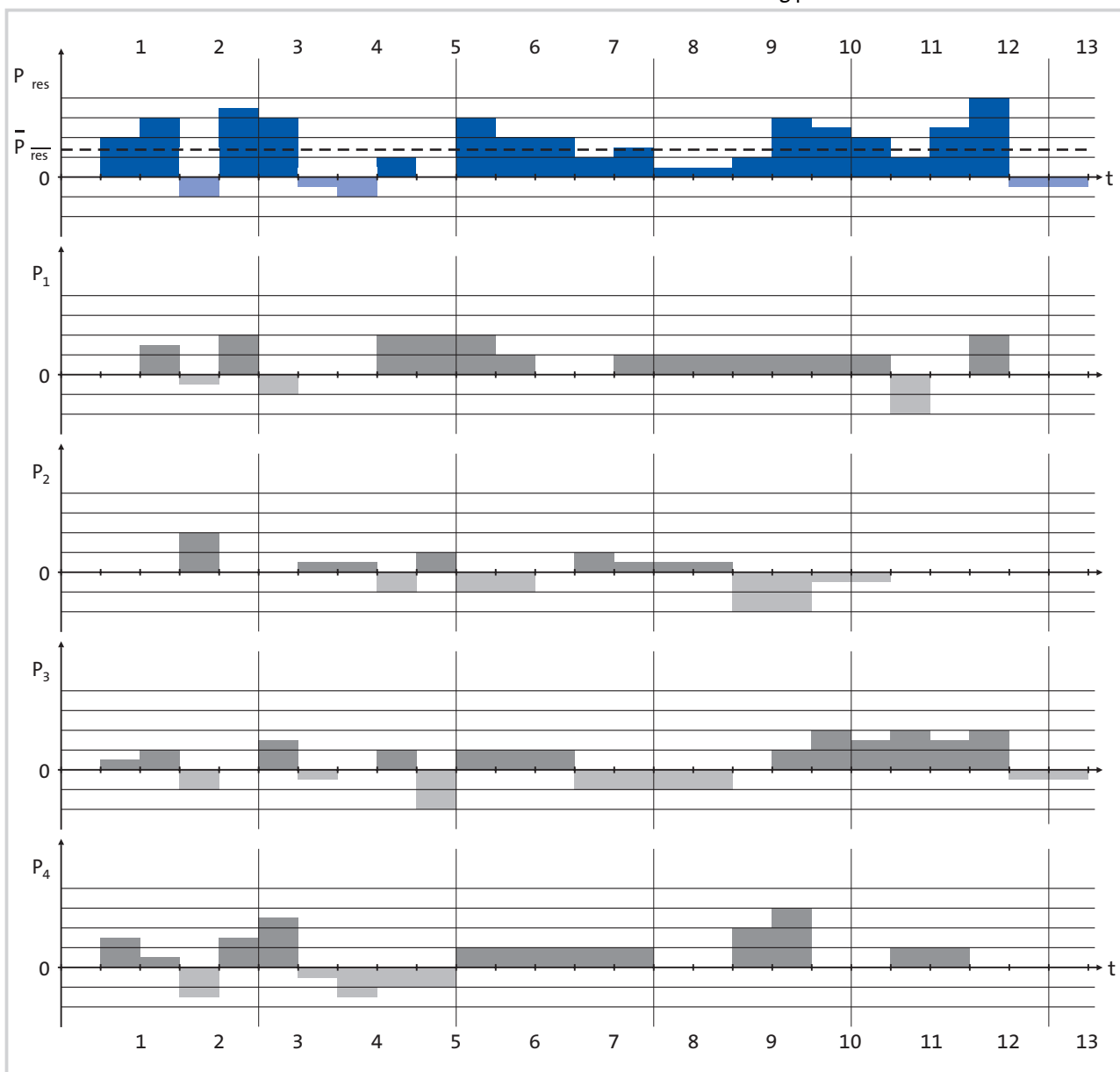
Selection of the required ECS supply module

The best way to select the ideal ECS supply module for a multi-axis application is to use a time/power diagram for a complete machine cycle for all axes. The total power characteristic can be calculated by adding the time-based individual axis power ratings and used as the basis for selecting the most suitable ECS supply module.

Specification of the installation methods for axis and supply modules

ECS servo system axis and supply modules are available in three different versions:

- ▶ as built-in units for fixing to an appropriate mounting plate in the control cabinet
- ▶ in a push-through technique (thermal separation) design, in which the heatsink is plugged into the modules via the backplane of the control cabinet or other assembly space so that the heat loss is dissipated directly outwards.
- ▶ as a cold-plate unit. In this version, the ECS modules do not have their own heatsinks, but are mounted directly on an existing heatsink in the customer system via the rear-side mounting plate.



Time/power diagram of a multi-axis servo system

$P_1 \dots P_4$ = individual power of axis 1...axis 4

P_{res} = addition of individual powers

$\bar{P}_{res 1-4}$ = mean value of individual powers



ECS servo system

Product information

Standards and operating conditions

Conformity	CE: Low-Voltage Directive (73/23/EEC)
Approvals UL 508C	Power Conversion Equipment (file no. 132659)
Enclosure EN 60529	IP20 Protection degree of heatsink in design with thermal separation: IP54 Protection against accidental contact according to NEMA 250 type 1
Climatic conditions Storage (EN 60721-3-1) Transport (EN 60721-3-2) Operation (EN 60721-3-3) Rated output current derating	1K3 (temperature: -25 °C ... + 55 °C) 2K3 (temperature: -25 °C ... + 70 °C) 3K3 (temperature: 0 °C ... + 55 °C) Above + 40 °C by 2 %/°C
Permissible installation height Rated output current derating Overvoltage category at and above 2000 m	0 ... 4000 m amsl Above 1000 m amsl by 5%/1000 m Above 2000 m only for use in overvoltage category II
Vibration resistance Operation	Germanischer Lloyd: 5 Hz ≤ f ≤ 13.2 Hz ± 1 mm amplitude 13.2 Hz < f ≤ 100 Hz 0.7 g
Permissible supply forms Unrestricted use	Systems with earthed star point (TN and TT systems) Systems with high-resistance or isolated star point (IT systems)
Leakage current to PE EN 61800-5-1	> 3.5 mA, fixed installation required, PE must be reinforced
Noise emission EN 61800-3	Conducted: Category C2 up to 25 m motor cable length with application-typical collective filter
Noise immunity EN 61800-3	Category C3
Insulation resistance EN 61800-5-1	Overvoltage category III, above 2000 m amsl overvoltage category II
Pollution degree EN 61800-5-1	2
Protective insulation of control circuits EN 61800-5-1	Safe isolation of mains: double/reinforced insulation



PLC functions

Design		ECS - application
Product key		ECS□A0□□
Technology functions		Software package - Positioner Software package - Cam Software package - Winder Prepared Solutions - Cross cutter - Flying saw
Program memory ROM (flash)	[kByte]	524
Main memory RAM		2 x 64-kB sectors
Data memory RAM		11.2 kB (10 kB symb. variables, 1.2 kB absolute flags)
Buffered memory EEPROM	[byte]	6000
NVRAM	[byte]	160 (retain) + 32 (persistent)
Processing time/bit operation	t [μs]	0.7
Task types		1 cyclic task, 8 tasks (time or event-controlled)
Number of counters/timers		Freely selectable to IEC 61131-3
Operation repertoire		acc. to IEC 61131-3
Programming software Drive PLC Developer Studio		Programming languages IL, LD, FBD, ST, SFC and with CFC editor monitoring, visualisation, simulation and debugging



ECS servo system

Axis modules

Rated data for axis modules

- ▶ The data is valid for operation at 3/PE AC 400 V.
- ▶ Unless otherwise specified, the data refers to the default setting with a switching frequency of 8/4 kHz.

→ Rated data for operation at 3/PE/AC 480 V
DS_GD_ECS_0003
 Available for download at www.lenze.de/dsc

					
Product key Axis modules		ECS□x004	ECS□x008	ECS□x016	ECS□x032
DC supply	U_{DC} [V]	DC 0 V 0% ... 770 V + 0%			
Rated DC-bus current	I_{DC} [A]	2.5	4.9	9.8	15.6
Rated output current 4 kHz	I_N [A]	2	4	8	12.7 ¹⁾
8 kHz	I_N [A]	1.35	2.7	5.3	8.5 ¹⁾
Max. output current Inverter	I_{max} [A]	4	8	16	32
Max. short-term output current	I_{max} [A]	4	8	16	32
Power loss Module interior	P_V [W]	13.3	17.3	20.7	27.5
Heatsink	P_V [W]	14	29	64	117
Integrated DC-bus capacity	C [uF]	165			
Dimensions Height	H [mm]	247			
Height "cold plate"	H [mm]	287			
Width	B [mm]	88			
Depth	T [mm]	176			
Depth "cold plate"	T [mm]	121			
Mass	m [kg]	2.2			
Permissible motor cable length Shielded ²⁾	l [m]	50			
Unshielded ²⁾	l [m]	100			

¹⁾ 26% - 35% higher output current possible depending on the control factor.

²⁾ Permissible cable length may be affected if EMC conditions have to be met.

→ Dimensioned drawings for power supply modules
DS_MB_ECS_0001
 Available for download at www.lenze.de/dsc

→ Dimensioned drawings for "cold plate" axis modules
DS_MB_ECS_0004
 Available for download at www.lenze.de/dsc



Rated data for axis modules

- ▶ The data is valid for operation at 3/PE AC 400 V.
- ▶ Unless otherwise specified, the data refers to the default setting with a switching frequency of 4 kHz.

→ Rated data for operation at 3/PE/AC 480 V
DS_GD_ECS_0003
 Available for download at www.lenze.de/dsc

			
Product key Axis modules		ECS□x048	ECS□x064
DC supply	U_{DC} [V]	DC 0 V 0% ... 770 V + 0%	
Rated DC-bus current	I_{DC} [A]	20.9	24.5
Rated output current 4 kHz	I_N [A]	17 ¹⁾	20 ¹⁾
8 kHz	I_N [A]	11.3 ¹⁾	13.3 ¹⁾
Max. output current 4 kHz	I_{max} [A]	48	64
8 kHz	I_{max} [A]	48	64
Max. short-term output current 4 kHz	I_{max} [A]	48	64
8 kHz	I_{max} [A]	48	64
Power loss Module interior	P_V [W]	34.5	41
Heatsink	P_V [W]	132	158
Integrated DC-bus capacity	C [uF]	330	
Dimensions³⁾ Height	H [mm]	247	
Height "cold plate"	H [mm]	287	
Width	B [mm]	132	
Depth	T [mm]	176	
Depth "cold plate"	T [mm]	121	
Mass	m [kg]	3.1	
Permissible motor cable length Shielded ²⁾	l [m]	50	
Unshielded ²⁾	l [m]	100	

¹⁾ 26% - 35% higher output current possible depending on the control factor.

²⁾ Permissible cable length may be affected if EMC conditions have to be met.

³⁾ The dimensions do not include the fixing material and eventually attached AIF modules, dimensions with attached AIF module: dimension d (depth) + 8 mm

→ Dimensioned drawings for power supply modules
DS_MB_ECS_0001
 Available for download at www.lenze.de/dsc

→ Dimensioned drawings for "cold plate" axis modules
DS_MB_ECS_0004
 Available for download at www.lenze.de/dsc



ECS servo system

Power supply modules

Rated data for power supply modules

- The data is valid for operation at 3/PE AC 400 V.

				
Product key Power supply modules		ECS□E012	ECS□E020	ECS□E040
Rated power ¹⁾ Without mains filter	P _{NDC} [kW]	6	10	20
Mains voltage range	U _{Netz} [V]	3/PE AC 180 V-0% ... 528 V+0%; 45 Hz-0% ... 65 Hz+0%		
Rated mains current	I _{Netz} [A]	9.6	15.9	31.3
Max. mains current	I _{Netz max} [A]	5x rated mains current for 50 ms 2x rated mains current for 1 s 1.5x rated mains current for 10 s		
Rated DC-bus current	I _{DC} [A]	12	20	38.5
Max. DC-bus capacity	C [uF]	6600		
Brake chopper data				
Continuous power for integrated resistor	P [kW]	0.12		0.15
Continuous power for external resistor	P [kW]	1.2		3.2
Peak braking power	P _{BRmax} [kW]	13.8		31.2
Min. brake resistance	R [Ohm]	39		20
Power loss				
Module interior	P _V [W]	20	23	30
Heatsink	P _V [W]	30	45	81
Dimensions ²⁾				
Height	H [mm]	247		
Height "cold plate"	H [mm]	287		
Width	B [mm]	88	132	
Depth	T [mm]	176		
Depth "cold plate"	T [mm]	121		
Mass	m [kg]	2.5		3

¹⁾ At operation with an upstream choke on the AC side the rated power is reduced according to the voltage drop caused by the choke.

²⁾ The dimensions do not include the fixing material and eventually attached AIF modules, dimensions with attached AIF module: dimension d (depth) + 8 mm

→ Dimensioned drawings for power supply modules
DS_MB_ECS_0001
Available for download at www.lenze.de/dsc

→ Dimensioned drawings for "cold plate" power supply modules
DS_MB_ECS_0004
Available for download at www.lenze.de/dsc



Rated data for capacitor modules

The ECS servo system is ideal for use in dynamic multi-axis applications. As, depending on the specific conditions, operating modes may be used in these applications which require significantly increased DC-bus power for longer periods of time, ECS capacitor modules have been provided. These modules will optimise the dimensioning of the required DC-bus capacity for the specific application.



ECS capacitor module □K001

Capacitor module dimensioning

The following values must be calculated to determine whether a capacitor module is required:

- ▶ C: Total capacity of DC-bus connection in μF
- ▶ P: Temporal average of total active power of all drives in kW

Use the following formula:

$$k = \frac{C}{P}$$

If $k \geq 100$ ($\mu\text{F}/\text{kW}$), a capacitor module will generally not be required.

			
Product key		ECS□K001	ECS□K002
Rated power	P_N [kW]	10	20
DC-bus voltage	U_{ZK} [V]	0 ... 770	
DC-bus capacity	C_{ZK} [μF]	705	1410
Dimensions			
Height	H [mm]	247	
Height "cold plate"	H [mm]	287	
Width	B [mm]	88	132
Depth	T [mm]	176	
Depth "cold plate"	T [mm]	121	
Mass	m [kg]	2	3.1

→ Dimensioned drawings for capacitor modules
DS_MB_ECS_0006
 Available for download at www.lenze.de/dsc

→ Dimensioned drawings for "cold plate" capacitor modules
DS_MB_ECS_0006
 Available for download at www.lenze.de/dsc

Brake resistors

You can choose between three external brake resistor types:

- ▶ ERBD resistors in IP20 enclosure for installation in the control cabinet
- ▶ ERBS resistors in IP65 enclosure for installation outside the control cabinet. Advantage: The heat loss does not lead to a temperature rise inside the control cabinet.
- ▶ ERBM resistors in IP50 enclosure for power supply modules in cold-plate design.

The ERBM brake resistors have exactly the same dimensions as the brake resistors integrated in the ECSEE and ECSDE power supply modules.



Brake resistors

Brake resistors in IP20 and IP65 enclosure

Rated DC-bus current	Mains voltage	Product key		Brake resistor data				
		Power supply modules	Brake resistor	Resistance	Continuous power	Thermal capacity	Dimensions	Mass
I_{DC} [A]	U_{Netz} [V]			R [Ohm]	P [W]	CB [kWs]	H x B x T [mm]	m [kg]
12	3 AC 180 - 550	ECS□E012	ERBD047R01K2	47	1200	174	639 x 172 x 142	4.9
20		ECS□E020	ERBS039R01K6	39	1600	246	748 x 200 x 122	7.8
38.5		ECS□E040	ERBD022R03K0 ERBS020R03K2	22 20	3000 3200	375 480	739 x 172 x 247 811 x 276 x 132	10.6 9.5

Brake resistors in IP50 enclosure

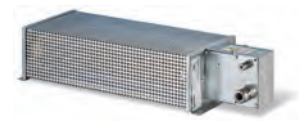
- ▶ Due to their design, the cold-plate power supply module variants are not equipped with an integrated brake resistor.

Rated DC-bus current	Mains voltage	Product key		Brake resistor data				
		Power supply modules	Brake resistor	Resistance	Continuous power	Thermal capacity	Dimensions	Mass
I_{DC} [A]	U_{Netz} [V]			R [Ohm]	P [W]	CB [kWs]	H x B x T [mm]	m [kg]
12	3 AC 180 - 550	ECS□E012	ERBM039R120W	39	120	6	267 x 31 x 69	0.9
20		ECS□E020						
38.5		ECS□E040	ERBM020R150W	20	150	13	337 x 31 x 69	1.1



Vibration-resistant brake resistors (IP20 enclosure)

Many electrical drives are used with their accompanying controllers in non-stationary units (e.g. storage and retrieval units). In order to achieve optimum operational reliability for these applications, Lenze also provides special vibration-resistant brake resistors.



Vibration-resistant brake resistor

Rated DC-bus current	Mains voltage	Product key		Brake resistor data				
		Power supply modules	Brake resistor	Resistance	Continuous power	Thermal capacity	Dimensions	Mass
I_{DC} [A]	U_{Netz} [V]			R [Ohm]	P [W]	CB [kW]	H x B x T [mm]	m [kg]
12	3 AC 180 - 550	ECS□E012	ERBD047R01K2RB	47	1200	180	549 x 185 x 120	4.8
20		ECS□E020	ERBD033R01K9RB	33	2000	285	749 x 185 x 120	6.6
38.5		ECS□E040	ERBD020R03K0RB	20	3000	450	749 x 275 x 120	9.1

→ Standards and operating conditions
DS_ZB_ERBDV_0001
 Available for download at www.lenze.de/dsc

Mains chokes

A mains choke is an inductor that is connected to the mains cable of the inverter. Using a mains choke offers the following advantages:

- ▶ **Reduced system perturbation:**
The wave form of the mains current is a closer approximation of a sine wave.
- ▶ **Reduced r.m.s. mains current:**
Reduction in mains, line and fuse load
- ▶ **Longer inverter service life:**
Reducing the AC load on the electrolytic capacitors in the DC bus increases the service life of the capacitors.



Mains choke

Rated DC-bus current	Mains voltage	Product key		Mains choke data		
			Mains choke	Rated current	Dimensions	Mass
I_{DC} [A]	U_{Netz} [V]			I_N [A]	H x B x T [mm]	m [kg]
12	3 AC 180 - 550	ECS□E012	ELN3-0150H024	24	180 x 86 x 192	8
20		ECS□E020	ELN3-0088H035	35	180 x 125 x 225	9.8
38.5		ECS□E040	ELN3-0055H055	55	228 x 120 x 265	13



ECS servo system

Accessories

RFI filter

The measures required for servo systems on the mains side in order to reduce the mains current and for interference suppression will vary depending on the area of application. Although these measures are not usually essential, they will enable universal use of a servo system.

RFI filters and mains filters enable compliance with the interference voltage categories of the European standard EN 61800-3. There a distinction is drawn between category C1 and category C2.

Category C1 describes the use on public supply networks.

Category C2 describes the use of drives which are intended to be used for industrial purposes in areas also comprising residential areas.

The use of Lenze mains filters type ECSZZ ensures compliance with the requirements of category C1.

The RFI filters are designed for the assigned ECS supply module and up to 10 axis modules, each with 25 m of motor cable (Lenze system cable). If your motor cables are longer than 25 m, please contact your local Lenze sales representative.



RFI filter ECSZZ020x4B

Rated DC-bus current	Mains voltage	Product key		RFI filter data				
			RFI filter	Rated current	Power loss	Max. cable length class A	Dimensions	Mass
I_{DC} [A]	U_{Netz} [V]			I_N [A]	P_v [W]	l [m]	H x B x T [mm]	m [kg]
12	3 AC 180 - 550	ECS□E012	ECSZZ020X4B	20	6.2	25 ¹⁾	260 x 96 x 105	3
20		ECS□E020						
38.5		ECS□E040						
			ECSZZ040X4B	40	9.3			

¹⁾ Max. 10 axes

Interference filter for SinCos encoder

If the connection between the motor cable shield and PE is not large enough, this may cause interference on the encoder lines. We recommend the use of an interference filter on SinCos encoders in particular if you are using long motor cables and the earthing conditions are not ideal. The filter is then simply mounted on the encoder input of the controller (design: Gender Changer 9-pin Sub-D socket/plug).

Design	Product key
Interference filter for SinCos encoder	EZZ0014



Keypad

The keypad XT operating module is provided to visualise the operating parameters and to set the inverter parameters. The keypad XT is inserted in the AIF automation interface and is also used for status display, error diagnosis and, with its integrated memory, to transfer parameters to other inverters.

Features:

- ▶ read/write codes
- ▶ display short code texts
- ▶ menu structure with configurable "user menu"
- ▶ password protection
- ▶ non-volatile memory for parameter transfer (not for 9300 Servo PLC, Drive PLC)
- ▶ disable/enable the drive
- ▶ IP 20 enclosure

The keypad can be installed in a control cabinet.

Accessories for the operating modules:

- ▶ Diagnosis terminal
- ▶ Connecting cables
- ▶ Installation kit for control cabinets



Keypad XT

Design		Features	Slot	Product key
Keypads and accessories				
Keypad XT ¹⁾		▶ Password protection ▶ Plain text display ▶ predefined basic configurations ▶ user-specific menus ▶ suitable for device series 8200 vector and 9300 ▶ IP20 enclosure	AIF	EMZ9371BC
Keypad		▶ Password protection ▶ suitable for control cabinet installation ▶ suitable for device series 8200 ▶ IP55 enclosure		E82ZBC
Diagnosis terminal with XT keypad		▶ Diagnosis terminal with XT keypad (EMZ9371BC) ▶ suitable for device series 8200 and 9300 ▶ IP20 enclosure		E82ZBBXC
Assembly kit		▶ Control cabinet installation kit (for keypad E82ZBC)		E82ZBHT
Connection cable		▶ Connection cable, 2.5 m ▶ Connection cable, 5 m ▶ Connection cable, 10 m		E82ZWL025 E82ZWL050 E82ZWL100

¹⁾ Only LECOM communication modules or the keypad XT can be used for parameter setting on the power supply modules.

Digital frequency distributor

A passive digital frequency distributor is available for the parallel distribution of the digital frequency.

Design	Product key
Passive digital frequency distributor	EWZ0011



ECS servo system

Accessories

Plug-in connector set for power connections and control connections

The universal connection concept for all power and control connections on the ECS servo system ensures fast and service-friendly connections between the ECS modules, the connected motors and all control connections. As the system connectors can be ordered separately from the active system components, this concept enables the user to set up the entire system cabling in advance under optimum conditions before inserting the active components at a later point in time.



Connectors for ECS control and power connections

Design	Product key
	Plug-in connectors for control/power connections
Connectors for ECS control and power connections, axis modules	ECSZA000XB
Connectors for ECS control and power connections, power supply modules	ECSZE000XB
Connectors for ECS control and power connections, capacitor modules	ECSZK000XB

Shield connection

The ECSZS shield fixtures ensure the EMC-compliant and safe connection of cable shields for all cables connected to ECS modules. The wide cable shield contact area ensures safe and problem-free operation with minimum noise radiation. The shield assembly set can be used on all ECS axis and supply modules.



EMC shield connections power connections

Design	Product key
	Shield connection
Shield connection for ECS axis and power supply modules	ECSZS000X0B001



Overview of modules

The power supply and axis modules of the ECS servo system are equipped with a slot for the keypad or a communication module, the so-called application interface (AIF interface). This slot is located at the front of the drive. The following tables describe the available modules.

Design		Features	Slot	Product key
Communication module				
DeviceNet¹⁾		2 LED for communication status display - DIP switch for selecting baud rate and address - Pluggable terminal strips	AIF	EMF2179IB
INTERBUS¹⁾		2 LED for communication status display - DIP switch for specifying the number of process and parameter data words		EMF2113IB
LECOM-A/B¹⁾		3 LED for communication status display - RS 232 or RS 485 - Electrically isolated from the bus - Electrically isolated from external voltage supply		EMF2102IBCV001
LECOM-B¹⁾		3 LED for communication status display - RS 485 - Electrically isolated from the bus - Electrically isolated from external voltage supply		EMF2102IBCV002
LECOM-LI¹⁾		3 LED for communication status display - Optical fibre - Electrically isolated from external voltage supply		EMF2102IBCV003
PROFIBUS		2 LED for communication status display - Address can be set by means of a DIP switch - Electrically isolated from the bus - Compatibility switch for predecessor module EMF2131 IB		EMF2133IB
Card module¹⁾		- Data backup device for 9300 ET (Servo PLC technology). - Data backup device for 9300 EI (Servo PLC). - Data backup device for ECS□A, ECS□P, ECS□M, ECS□S		EMZ2221IB

¹⁾ Only LECOM communication modules or the keypad XT can be used for parameter setting on the power supply modules.



Runtime software Positioner

Software package - Positioner

In modern production processes, positioning tasks are increasingly being solved with intelligent servo drives. Motion sequences are stored in the controller.

The advantages:

- ▶ Increased flexibility due to programming freedom
- ▶ Reduced energy consumption due to optimum motion sequences
- ▶ Reduced wear due to jerk-free acceleration

Application examples:

- ▶ Transporting materials
- ▶ Stacking and storage
- ▶ Surface machining
- ▶ Rotary tables
- ▶ Robots
- ▶ Machine tools

Features:

- ▶ Freely selectable number of travel profiles (max. 128)
- ▶ Travel profiles can be activated in any order
- ▶ Sequence control via IEC 61131-3
- ▶ Positioning with:
 - Jerk limitation
 - Speed/acceleration override
 - Final speed (velocity changeover)
 - Distance-to-go (touch probe)
 - 16 reference modes including set reference
 - Manual control e.g. for reading in positions (teach-in)
 - Software stop monitoring

Application ranges:

The "Winder" software package offers solutions for center winding machines with open-loop tension control, standard tension control or dancer control:

- ▶ Dancer position control for cables, wires, textiles, paper
 - ▶ Open-loop tension control for sheet metal, textiles, foils, paper
 - ▶ Tension control for thin foils, paper
- ▶ Please note that the software packages are a supplement to the Drive PLC Developer Studio. They can be used with the ECS Application devices and the 9300 Servo PLC Technology.



Software package - Positioner

Design	Features	Product key
Software package – Positioner, corporate licence	▶ CD-ROM included in scope of supply ▶ Multiple installations within a company ▶ Languages: German/English	ESP-SPAC-POS1



Software package - Cam

In mechanical engineering, mechanical solutions for dynamic motion control are increasingly being replaced by intelligent servo drives with electronic cam functions.

The advantages:

- ▶ High dynamics due to optimum drive management
- ▶ Low-jerk acceleration reduces wear
- ▶ Significant reduction in setup and operating time and costs

Application examples:

- ▶ Contouring
- ▶ Filling
- ▶ Packaging
- ▶ Paper handling
- ▶ Cross cutters
- ▶ Please note that the software packages are add-ons for the Drive PLC Developer Studio. They can be used in conjunction with the ECS Application and 9300 Servo PLC Technology drives.
- ▶ The Cam software package already includes a basic version of the Cam Designer for the simple graphical creation of motion profiles. Data for cam profile creation can, however, also be transferred with the Cam Loader. For software data see chapter "Engineering software".



Software package - Cam

Features:

- ▶ Up to 48 cams with a maximum of 4096 interpolation points
- ▶ Pilot control of speed and torque for high dynamics
- ▶ Cam group with 3 tracks each with 4 cams, maximum 48 data records
- ▶ Motion profiles can be activated in any order, sequence control via scheduler
- ▶ The current profile can be stretched, compressed and even moved online
- ▶ 14 reference modes, including set reference
- ▶ Virtual master with:
 - Inching mode/manual operation
 - Handwheel
 - Cyclic operation
 - Automatic mode
- ▶ Virtual clutch with position override function

Design	Features	Product key
Software package – Cam, corporate licence	▶ CD-ROM included in scope of supply ▶ Multiple installations within a company ▶ Languages: German/English	ESP-SPAC-CAM1
Cam Designer, single user licence	▶ CD-ROM included in scope of supply ▶ Installation on one PC ▶ Languages: German/English/French	ESP-CAM1-P
Cam Loader, single user licence	▶ CD-ROM included in scope of supply ▶ Installation on one PC ▶ Languages: German/English	ESP-CAL1
Cam Loader, multiple user licence	▶ CD-ROM not included in scope of supply ▶ Multiple installations on the number of machines for which licences have been purchased ▶ The basis is a single user licence	ESPMCAL1



Runtime software Winder

Software package - Winder

Many manufacturing processes use winding drives to pick up produced material or pass it on for further processing. While the necessary control engineering was previously implemented using higher-level PLCs, intelligent controllers are today capable of taking over these functions.

The advantages include:

- ▶ Reduced load on the higher-level control system and the bus systems
- ▶ Simple and fast commissioning through prepared solutions
- ▶ Integration of drive-based functions directly in the drive itself

Application ranges:

The "Winder" software package offers solutions for center winding machines with open-loop tension control, standard tension control or dancer control:

- ▶ Dancer position control for cables, wires, textiles, paper
- ▶ Open-loop tension control for sheet metal, textiles, foils, paper
- ▶ Tension control for thin foils, paper
- ▶ Please note that the software packages are a supplement to the Drive PLC Developer Studio. They can be used with the ECS Application devices and the 9300 Servo PLC Technology.



Software package - Winder

Features:

- ▶ Open-loop/closed-loop tension control:
 - Internal diameter calculation
 - Tensile force configured via ramp generator
 - Tensile force controlled via characteristic curve function
 - Automatic identification of the current moment of inertia and prevailing friction
 - Acceleration torque and friction compensation
 - Calculation of material density with stop controller
- ▶ Dancer position control:
 - Diameter calculated internally with dancing roller motion compensation
 - Teaching of dancing roller stops
 - Tensile force controlled via characteristic curve function using dancing roller
 - Automatic identification of the current moment of inertia
 - Compensation of accelerating torque
 - Calculation of material density with stop controller

Design	Features	Product key
Software package – Winder, corporate licence	▶ CD-ROM included in scope of supply ▶ Multiple installations within a company ▶ Languages: German/English	ESP-SPAC-WND1



Prepared Solutions

With the Prepared Solutions software, you can implement your machine concepts with ease and at low cost and commission them quickly and reliably.

The advantages for you

- ▶ High level of operational reliability Simple commissioning through integration into Global Drive Control
- ▶ Time and cost savings through parameterisation
- ▶ Simple integration into existing topologies
- ▶ Can be extended by your own IEC61131-3 code (option)

Compatibility

- ▶ Please note that the Prepared Solutions can only be used in conjunction with the ECS Application and 9300 Servo Technology drives. The programmable variant also requires the Drive PLC Developer Studio software package.

Flying saw

With this application, processing can be undertaken on the product during ongoing production processes without the process having to be stopped. The processing tool is accelerated to the same speed as the conveying belt in a translational manner, the product is processed and once the work is complete, the tool returns to its home position.

Areas of application

- ▶ Cutting to length and dividing
- ▶ Printing, embossing and marking of material in motion
- ▶ Processing, gripping and checking moving workpieces

Features

- ▶ Homing
- ▶ Manual jog, including hardware and software limit positions
- ▶ Positioning in the home position
- ▶ Top cut
- ▶ Item and length counter
- ▶ Cutting length and cutting mark control
- ▶ Gap formation
- ▶ Error handling

Cross cutter

Cross cutters are used in cases where rotary processing is to be carried out on the material during an ongoing production process such as cutting, printing, embossing or marking. Depending on the cutting length required, the knife drum outside the cutting phase moves faster or slower than the material speed. Synchronisation to the path speed is controlled simply by registration of marks.

Areas of application

- ▶ Cutting, embossing cards, envelopes or films
- ▶ Production and assembly of packaging material
- ▶ Format cuts
- ▶ Heat-sealing films

Features

- ▶ Homing and manual jog
- ▶ Simple positioning
- ▶ Cutting length and cutting mark control
- ▶ Continuous cutting, test and reject mode
- ▶ Synchronous and asynchronous operations
- ▶ Manual X trimming
- ▶ Error handling

Design		Features	Product key
Prepared Solutions Flying saw corporate licence		▶ CD-ROM included in scope of supply ▶ Multiple installations within a company ▶ Languages: German/English	ESPLV01XA0FC1
Prepared Solutions Cross cutter corporate licence		▶ CD-ROM included in scope of supply ▶ Multiple installations within a company ▶ Languages: German/English	ESPLV02XA0FC1



Engineering software Global Drive Control

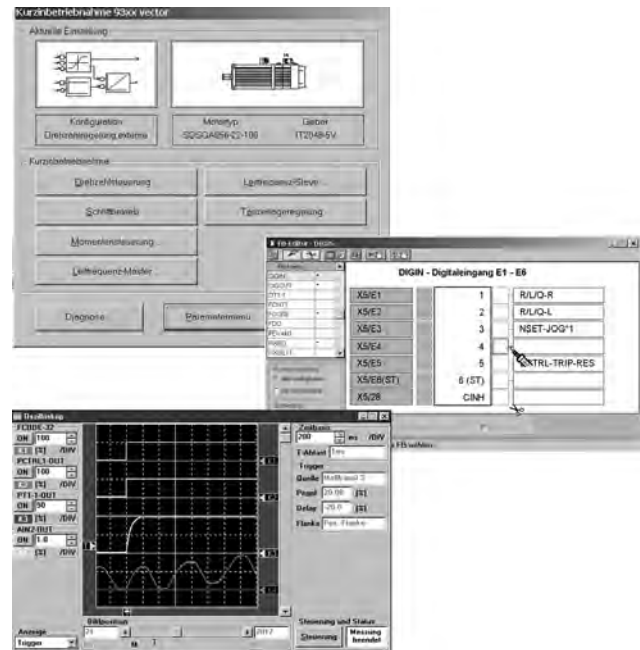
Selection and order data

The "Global Drive Control" (GDC) PC program is an easy-to-use and transparent tool for operating, parameter setting, configuring and diagnosing many Lenze drives and programmable controllers.

Advantages at a glance:

- ▶ Quick and easy commissioning of the drive by means of the short setup function
- ▶ Easy and intuitive operation even for inexperienced users
- ▶ Extensive help functions
- ▶ User-friendly diagnostics options via various monitor windows and oscilloscope functions make external measuring instruments superfluous
- ▶ Function block interconnection via the function block editor possible without programming knowledge

Please also pay attention to the new L-force Engineer, the successor to Global Drive Control.



User interfaces of Global Drive Control

Design	Features	Product key
Global Drive Control "easy", freeware	▶ Order free of charge ▶ Download via the Internet ▶ Languages: German/English	Download free of charge
GDC starter package	▶ Includes: - Global Drive Control, single user licence - USB system bus adapter	ESP-GDC-2S
Global Drive Control, single user licence	▶ CD-ROM included in scope of supply ▶ Installation on one PC ▶ Includes GD Loader and GD Oscilloscope ▶ Languages: German/English	ESP-GDC2
Global Drive Control, multiple user licence	▶ CD-ROM not included in scope of supply ▶ Multiple installations on the number of machines for which licences have been purchased ▶ The basis is a single user licence	ESPMGDC2
Global Drive Control, corporate licence	▶ CD-ROM not included in scope of supply ▶ Multiple installations within a company at one location ▶ The basis is a single user licence	ESPPGDC2
Global Drive Control, buyout licence	▶ CD-ROM not included in scope of supply ▶ Multiple installations within a company at one location ▶ Issuing of sublicences in conjunction with Lenze drives installed in a machine ▶ The basis is a single user licence	ESPBGDC2



Functions and features

The following table describes functions and features of the engineering software.

Since not all functions can be accessed by every drive, the engineering software appears differently, depending on the selected drive.

Product key Short form		ESP□GDC2
Design	GDC easy	GDC
Code list, access to all parameters		
starttec	•	•
8200 vector / 8200 motec	•	•
9300 vector	•	•
9300 servo inverter	•	•
Drive PLC	•	•
9300 Servo PLC	•	•
ECS axis and power supply module	•	•
I/O system IP20	•	•
EthernetCAN	•	•
ModemCAN	•	•
Function block editor		
8200 vector / 8200 motec		•
9300 vector		•
9300 servo inverter		•
ECSxS (Speed & Torque)		•
Short setup dialogs		
starttec	•	•
8200 vector / 8200 motec	•	•
9300 vector	•	•
9300 servo inverter		•
ECSxx		•
Assisted setup		
8200 vector / 8200 motec	•	•
Diagnostics		
Monitor window	•	•
Input / output diagnostics		
8200 vector / 8200 motec	•	•
Oscilloscope function		
9300 vector		•
9300 servo inverter		•
ECSxx		•
Additional integrated software		
Global Drive Oscilloscope		•

¹⁾ PLC program variables can be declared as parameters and then parameterised via GDC.

²⁾ Not valid for the 9300 servo register controller.



Engineering software Global Drive Control

Data access/communication

The following table describes the communication paths of the engineering software to the connected drives. Some drives do not support all communication paths, so that some communication paths may not be possible.

Product key Short form		ESP□GDC2
Design	GDC easy	GDC
Communication		
System bus (CAN)	▶ USB connection with USB system bus adapter EMF 2177IB ▶ Parallel interface with system bus adapter EMF 2173IB	
LECOM	▶ RS485 with interface converter (LECOM B)¹⁾ ▶ Optical fibre via RS232 converter of PC (LECOM LI) ▶ RS232 (LECOM A)	
OPC Drive Server	▶ Via all connections defined on the OPC Drive Server (bus server)	

¹⁾ Possible using one of the intelligent interface converters freely available on the market (not supplied by Lenze).

System requirements

To be able to use Global Drive Control, the following minimum hardware and software requirements must be met:

- ▶ Microsoft® Windows® 98/Me, Windows NT® 4.0 SP5 or higher or Windows 2000 SP2/XP or higher
- ▶ IBM compatible PC with Intel® Pentium® processor 333 MHz or higher
- ▶ At least 128 MB RAM
- ▶ At least 250 MB free hard disk space
- ▶ At least 1024 x 768 pixels screen resolution with 256 colours
- ▶ Mouse
- ▶ CD-ROM drive
- ▶ Internet Explorer Version 5 or higher
- ▶ Free slots/interfaces in accordance with the requirements of the individual fieldbus interface modules

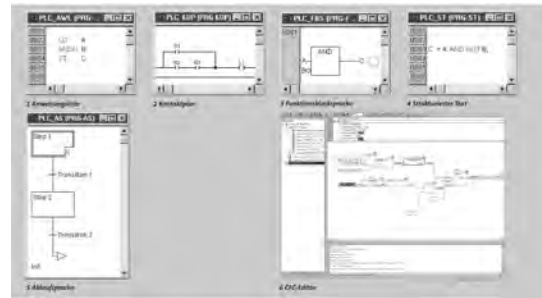


Selection and order data

The 9300 Servo PLC, the Drive PLC and the ECS servo system are programmed using a powerful software development environment in which experienced PLC programmers will want for nothing. The Drive PLC Developer Studio (DDS) provides five different editors for the programming languages standardised in IEC 61131-3.

In addition, a high-performance CFC editor is available. This means that programmers can select the most suitable language on the basis of application or knowledge. Languages can even be mixed.

All variable values are displayed in debugging and monitoring mode. Break points can be set as a means of optimising the program quickly and easily.



Design	Features	Product key
Drive Developer Studio "Basic", single user licence	▶ CD-ROM included in scope of supply ▶ Installation on one PC ▶ Includes GDC easy ▶ Languages: German/English	ESP-DDS2-B
Drive Developer Studio "Basic", multiple user licence	▶ CD-ROM not included in scope of supply ▶ Multiple installations on the number of machines for which licences have been purchased ▶ The basis is a single user licence	ESPMDDS2-B
Drive Developer Studio "Basic", buyout licence	▶ CD-ROM not included in scope of supply ▶ Multiple installations within a company at one location ▶ Issuing of sublicences in conjunction with Lenze drives installed in a machine ▶ The basis is a single user licence	ESPBDDS2-B
DDS starter package	▶ Includes: - Drive Developer Studio "Professional", single user licence - USB system bus adapter	ESP-DDS-PS
Drive Developer Studio "Professional", single user licence	▶ CD-ROM included in scope of supply ▶ Installation on one PC ▶ Includes GDC easy, GD Loader and GD Oscilloscope ▶ Languages: German/English	ESP-DDS2-P
Drive Developer Studio "Professional", multi-user licence	▶ CD-ROM not included in scope of supply ▶ Multiple installations on the number of machines for which licences have been purchased ▶ The basis is a single user licence	ESPMDDS2-P
Drive Developer Studio "Professional", corporate licence	▶ CD-ROM not included in scope of supply ▶ Multiple installations within a company at one location ▶ The basis is a single user licence	ESPFDDS2-P
Drive Developer Studio "Professional", buyout licence	▶ CD-ROM not included in scope of supply ▶ Multiple installations within a company at one location ▶ Issuing of sublicences in conjunction with Lenze drives installed in a machine ▶ The basis is a single user licence	ESPBDDS2-P



Engineering software Drive PLC Developer Studio

Functions and features

The following table describes functions and features of the engineering software.

Since not all functions can be accessed by every drive, the engineering software appears differently, depending on the selected drive.

Product key Short form	ESP-DDS2-B	ESP□DDS2-P
Design	DDS Basic	DDS Professional
Drives		
Drive PLC	•	•
Servo PLC	•	•
ECSxA (application modules)	•	•
Programming languages		
CFC editor		•
Instruction List	•	•
Ladder Diagram	•	•
Function Block Diagram	•	•
Structured Text		•
Sequential Function Chart		•
Diagnostics		
Monitoring	•	•
Debugging	•	•
Graphics-based visualisation		•
Simulation		•
Additional integrated software		
Global Drive Control easy	•	•
Global Drive Oscilloscope		•



Data access/communication

The following table describes the communication paths of the engineering software to the connected drives. Some drives do not support all communication paths, so that some communication paths may not be possible.

Product key Short form	ESP-DDS2-B	ESP□DDS2-P
Design	DDS Basic	DDS Professional
Communication System bus (CAN)	▶ USB connection with USB system bus adapter EMF 2177IB ¹⁾ ▶ Parallel interface with system bus adapter EMF 2173IB	
LECOM	▶ -	
OPC Drive Server	▶ Via all connections defined on the OPC Drive Server (bus server)	

¹⁾ Not valid for Windows NT®. This operating system does not support the USB port.

System requirements

To be able to use the Drive PLC Developer Studio, the following minimum hardware and software requirements must be met:

- ▶ Microsoft®Windows® 98/Me, Windows NT® 4.0 SP5 or higher or Windows 2000 SP2/XP or higher
- ▶ IBM compatible PC with Intel® Pentium® processor 90 MHz or higher
- ▶ At least 64 MB RAM; 128 MB RAM for Windows® 2000/XP
- ▶ At least 250 MB free hard disk space
- ▶ At least 1024 x 768 pixels screen resolution with 256 colours
- ▶ Mouse
- ▶ CD-ROM drive
- ▶ Free slots/interfaces in accordance with the requirements of the individual fieldbus interface modules



Engineering software Global Drive Oscilloscope

Selection and order data

The Global Drive Oscilloscope (GD Oscilloscope) has been developed specifically for the 9300 Servo PLC, the Drive PLC and the ECS servo system.

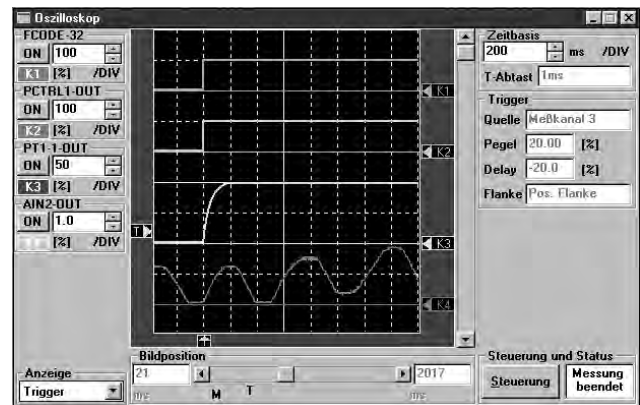
On machines and systems, it can be difficult to determine speeds or torques on individual drives. However, the knowledge of precisely these values can lead to a significant simplification. The GD Oscilloscope means that it is no longer necessary to connect and install complex measuring instruments – the drive controllers themselves are the comprehensive measuring instrument for all measured variables affecting the drive.

The advantages for you

- ▶ Precise detection of drive-specific process factors with 8 channels
- ▶ No need to install provisional measuring sensors in the system
- ▶ User-friendly documentation when fine-tuning control loops
- ▶ Easy optimisation, maintenance and troubleshooting

The GD Oscilloscope is characterised by the following features:

- ▶ Recording and storage of measured values in the controller
- ▶ The size of the measured value memory can be configured
- ▶ Measurement of up to eight independent channels at the same time
- ▶ Configurable time per scan for measuring fast and slow signals
- ▶ Trigger on channel, variable
- ▶ Trigger on error message
- ▶ Pretriggering and posttriggering (detection of pretrigger and posttrigger history)
- ▶ Graphics display and evaluation of measured values on a PC
- ▶ Cursor and zoom function for analysing measurements
- ▶ Loading and saving of cams
- ▶ Messages can be annotated and printed
- ▶ Overlap function makes it easy to compare measurements
- ▶ Cam data can be transferred to the clipboard for subsequent processing



User interface of oscilloscope function

Design	Features	Product key
GD Oscilloscope	▶ Installation on one PC ▶ Included on the CD-ROMs of the following software: - Global Drive Control V4.5 and higher - Global Drive Developer Studio Professional V2.0 and higher ▶ Languages: German/English	ESP-GDC2 ESP-DDS2-P

¹⁾ Depending on the software product version, the CD ROM may not contain the latest version of GD Oscilloscope.



Data access/communication

The following table describes the communication paths of the engineering software to the connected drives. Some drives do not support all communication paths, so that some communication paths may not be possible.

Product key Short form	ESP□GDC2 ESP□DDS2-P
Design	GD Oscilloscope
Communication System bus (CAN)	▶ USB connection with USB system bus adapter EMF 2177IB ▶ Parallel interface with system bus adapter EMF 2173IB
LECOM	
OPC Drive Server	▶ Via all connections defined on the OPC Drive Server (bus server)

System requirements

To be able to use the Global Drive oscilloscope, the following minimum hardware and software requirements must be met:

- ▶ Microsoft®Windows® 95/98/Me, Windows NT® 4.0 SP5 or higher or Windows 2000 SP2/XP or higher
- ▶ IBM compatible PC with Intel® Pentium® processor 166 MHz or higher
- ▶ At least 64 MB RAM
- ▶ At least 40 MB free hard disk space
- ▶ At least 1024 x 768 pixels screen resolution with 256 colours
- ▶ Mouse
- ▶ CD-ROM drive
- ▶ The 9300 Servo PLC operating system must be V6.0 or higher



Engineering software Global Drive Loader

Selection and order data

The Global Drive Loader (GD Loader) makes commissioning of several drives in a system significantly easier. It is very easy to use, as there is no need for a development environment or parameter settings.

- ▶ Parameter set files (files from Global Drive Control),
- ▶ compiled PLC programs (files from the Drive PLC Developer Studio)

can simply be transferred from the PC to the drive. As these files cannot be modified with GD Loader, this prevents data being tampered with by unauthorised users.

The advantages for you

- ▶ Simplest possible transfer of software to standard machines
- ▶ Automatic batch mode provides a quick and easy way of transferring a variety of files to a number of drives
- ▶ Data cannot be tampered with
- ▶ Simplest possible operation without development environment
- ▶ Suitable for Global Drive Control (V4.31 and higher) and Drive PLC Developer Studio (V1.0 and higher)
- ▶ Dialog languages: German, English and French
- ▶ Software free of charge

Design	Features	Product key
GD Loader, freeware for download	▶ Order free of charge ▶ Download via the Internet ▶ Languages: German/English/French	Download free of charge

¹⁾ Depending on the software product version, the CD ROM may not contain the latest version of GD Oscilloscope.

Functions and features

Design	GD Loader, freeware
Drives	
8400 BaseLine, StateLine and HighLine	•
9400 Stateline and HighLine	•
starttec	•
8200 vector / 8200 motec	•
9300 vector	•
9300 servo inverter	•
Servo PLC	•
Drive PLC	•
ECS axis modules	•
I/O system IP20	•
EthernetCAN	•
ModemCAN	•
Download	
Parameter set data (*.gdc)	•
Binary-coded data (*.bin)	•
Cam data for 9300 EK	•
Cam data for ECS Servo PLC	•
L-force Loader files (*.lfl)	•



Data access/communication

The following table describes the communication paths of the engineering software to the connected drives. Some drives do not support all communication paths, so that some communication paths may not be possible.

Design	GD Loader, freeware
Communication System bus (CAN)	▶ USB connection with USB system bus adapter EMF 2177IB ▶ Parallel interface with system bus adapter EMF 2173IB
LECOM	▶ RS485 with interface converter (LECOM B) ¹⁾ ▶ Optical fibre via RS232 converter of PC (LECOM LI) ▶ RS232 (LECOM A)
OPC Drive Server	▶ Via all connections defined on the OPC Drive Server (bus server)

¹⁾ Possible using one of the intelligent interface converters freely available on the market (not supplied by Lenze).

System requirements

In order to be able to use the L-force Loader, the following minimum hardware and software requirements must be met:

- ▶ Microsoft® Windows® 98 / Me, Windows NT® 4.0 SP5 or higher or Windows 2000 SP2/XP or higher
- ▶ IBM compatible PC with Intel® Pentium® processor 333 MHz or higher
- ▶ At least 128 MB RAM
- ▶ At least 100 MB free hard disk space
- ▶ At least 1024 x 768 pixels screen resolution with 256 colours
- ▶ Mouse
- ▶ CD-ROM drive
- ▶ Free slots/interfaces in accordance with the requirements of the different fieldbus interface modules



Engineering software Cam Designer

Selection and order data

With Cam Designer, you can quickly create and optimise motion profiles for electronic cams and cam controllers.

Whether you are importing data from a CAD system or inputting profiles directly, Cam Designer can support users throughout the motion profile creation process.

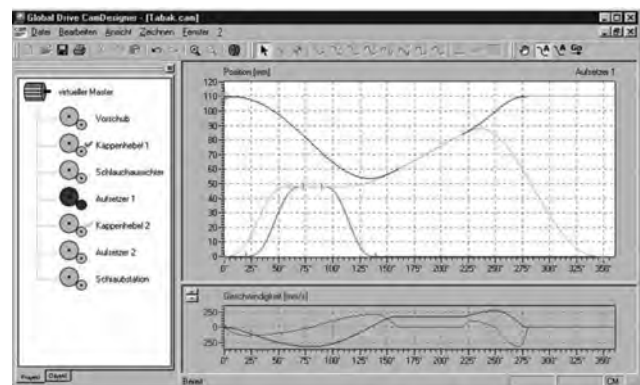
Motion profiles can be entered very easily in graphic format using the mouse. Simply enter the parts of the motion profile which are actually relevant. If required, Cam Designer will then automatically create the motion profiles in accordance with the motion principles of VDI 2143 and optimise them in terms of acceleration and speed. It is possible to display the motion profiles of other axes. This means that the user can see all axes and very easily match one motion profile to another.

Even complex motion profiles can be very easily created using the "combining axes" function, e.g. for controlling a milling tool which is synchronised with a moving wooden panel before cutting an outline into it. This means that the user can divide a complex motion task into as many simple indexing movements as required and input the task in this simplified format. Cam Designer expands these indexing movements and can if required combine them to create a motion profile. In this way, up to eight motion profiles can be created for the 9300 servo cam.

The Cam Manager tool is integrated for easy management of all data. Cam Manager guides the user through all of the necessary inputs. All of the required data are then automatically transferred to Cam Designer, and processing of motion profiles can start straight away.

The advantages for you:

- ▶ Central management of all required machine data
- ▶ Clear processing of several motion profiles through multi-slave relations
- ▶ Easy optimisation of complex motion profiles through combinatorial axes
- ▶ Import of externally created coordinate tables, e.g. from a CAD system
- ▶ All important motion objects are available:
 - 2nd degree polynomial, 3rd degree polynomial, 5th degree polynomial,
 - simple, sloping, modified sine curve
 - sine-straight line combination
 - modified acceleration trapezium
- ▶ Up to 4096 points per curve
- ▶ Up to 48 cam controllers



User interface of Cam Designer

Design	Features	Product key
Cam Designer, single user licence	▶ CD-ROM included in scope of supply ▶ Installation on one PC ▶ Languages: German/English/French	ESP-CAM1-P



Data access/communication

The following table describes the communication paths of the engineering software to the connected drives. Some drives do not support all communication paths, so that some communication paths may not be possible.

Product key Short form	ESP□CAM1-P
Design	Cam Designer
Communication System bus (CAN)	▶ USB connection with USB system bus adapter EMF 2177IB ¹⁾ ▶ Parallel interface with system bus adapter EMF 2173IB
LECOM	
OPC Drive Server	▶ Via all connections defined on the OPC Drive Server (bus server)

¹⁾ Not valid for Windows NT®. This operating system does not support the USB port.

System requirements

In order to be able to use the Cam Designer, the following minimum hardware and software requirements must be met:

- ▶ Microsoft®Windows® 95/98/Me, Windows NT® 4.0 SP5 or higher or Windows 2000 SP2/XP or higher
- ▶ IBM compatible PC with Intel® Pentium® processor 90 MHz or higher
- ▶ At least 128 MB RAM
- ▶ At least 70 MB free hard disk space
- ▶ At least 1024 x 768 pixels screen resolution with 256 colours
- ▶ Mouse
- ▶ CD-ROM drive
- ▶ Parallel interface for connecting the copyright dongle



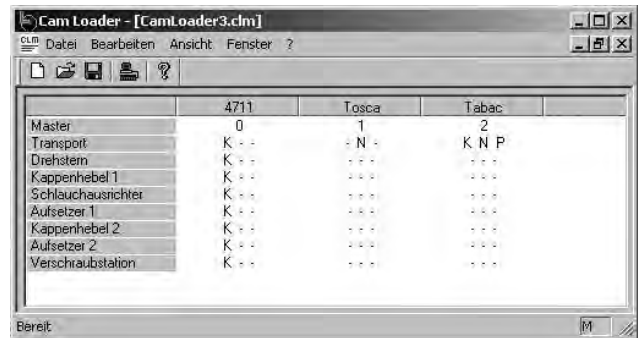
Engineering software Cam Loader

Selection and order data

The Cam Loader provides you with a software for transferring recipes consisting of motion profiles, cam tracks and position markers from the PC to Lenze target systems.

Special features of the Cam Loader:

- ▶ Import of CAD data via standardised interfaces (VDI 2143).
- ▶ Program operation via a user-friendly PC user interface for initial commissioning as well as for preparing additional functions which are to be made available to the end user by the mechanical engineer.
- ▶ Program control through script files from an IPC for automated processes without additional user entries and for recipe extension through end users.
- ▶ Smoothing of the imported CAD data (motion profiles) for smoother drive operation.
- ▶ Logging of all important events.



User interface of Cam Loader

Design	Features	Product key
Cam Loader, single user licence	▶ CD-ROM included in scope of supply ▶ Installation on one PC ▶ Languages: German/English	ESP-CAL1
Cam Loader, multiple user licence	▶ CD-ROM not included in scope of supply ▶ Multiple installations on the number of machines for which licences have been purchased ▶ The basis is a single user licence	ESPMCAL1
Cam Loader, corporate licence	▶ CD-ROM not included in scope of supply ▶ Multiple installations within a company at one location ▶ The basis is a single user licence	ESPFCAL1
Cam Loader, buyout licence	▶ CD-ROM not included in scope of supply ▶ Multiple installations within a company at one location ▶ Issuing of sublicences in conjunction with Lenze drives installed in a machine ▶ The basis is a single user licence	ESPBCAL1



Data access/communication

The following table describes the communication paths of the engineering software to the connected drives. Some drives do not support all communication paths, so that some communication paths may not be possible.

Product key Short form	ESP□CAL1
Design	Cam Loader
Communication System bus (CAN)	▶ USB connection with USB system bus adapter EMF 2177IB ¹⁾ ▶ Parallel interface with system bus adapter EMF 2173IB
LECOM	
OPC Drive Server	▶ Via all connections defined on the OPC Drive Server (bus server)

¹⁾ Not valid for Windows NT®. This operating system does not support the USB port.

System requirements

In order to be able to use the Cam Loader, the following minimum hardware and software requirements must be met:

- ▶ Microsoft®Windows® 95/98/Me, Windows NT® 4.0 SP5 or higher or Windows 2000 SP2/XP or higher
- ▶ IBM compatible PC with Intel® Pentium® processor 90 MHz or higher
- ▶ At least 128 MB RAM
- ▶ At least 120 MB free hard disk space
- ▶ At least 1024 x 768 pixels screen resolution with 256 colours
- ▶ Mouse
- ▶ CD-ROM drive
- ▶ Free slots/interfaces in accordance with the requirements of the different fieldbus interface modules

It's good to know | why we are there for you



"Our customers come first. Customer satisfaction is what motivates us. By thinking in terms of how we can add value for our customers we can increase productivity through reliability."



Vitamin L:

Ideas and added value for your drive and automation solutions.



"We will provide you with exactly what you need – perfectly co-ordinated products and solutions with the right functions for your machines and installations. That is what we mean by 'quality'."



"Take advantage of our wealth of expertise. For more than 60 years now we have been gathering experience in various fields and implementing it consistently and rigorously in our products, motion functions and pre-configured solutions for industry."



"We identify with your targets and strive towards a long-term partnership which benefits both sides. Our competent support and consultation process means that we can provide you with tailor-made solutions. We are there for you and can offer assistance in all of the key processes."

You can rely on our service. Expert advice is available 24 hours a day, 365 days a year, in more than 30 countries via our international helpline: 008000 24 Hours (008000 2446877).

www.Lenze.com

13287683

EDKCSXX0XX
00484651



Sicherheitshinweise

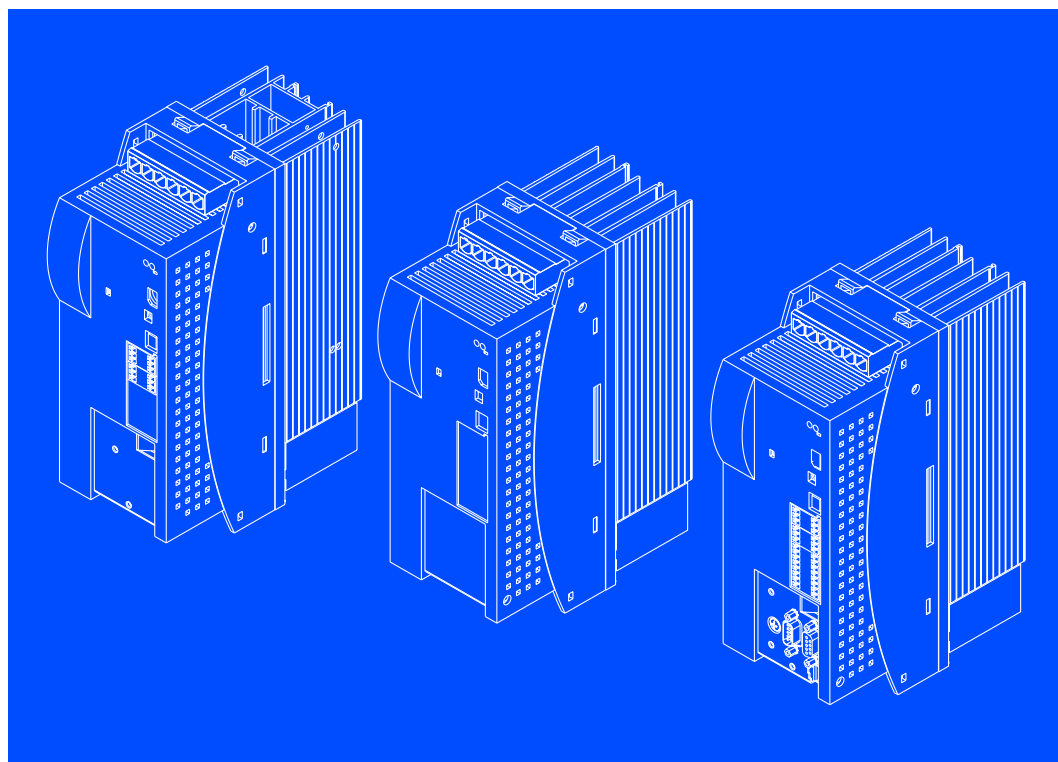
Safety Instructions

Consignes de sécurité

Instrucciones de seguridad

Istruzioni di sicurezza

ECS



Module der Reihe ECS

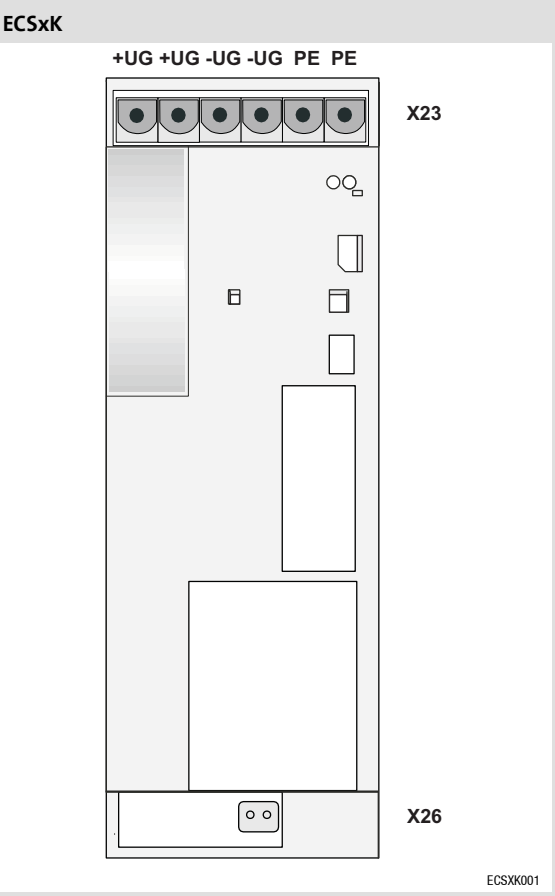
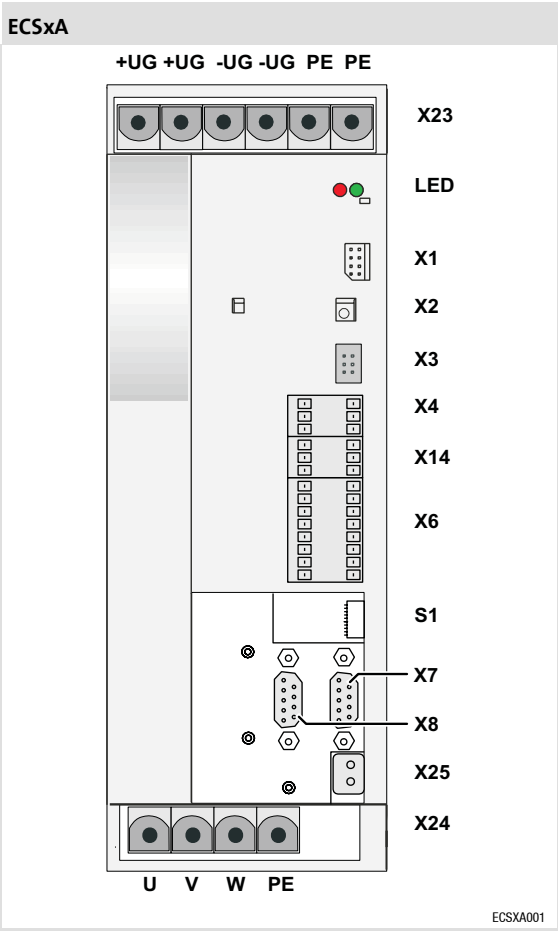
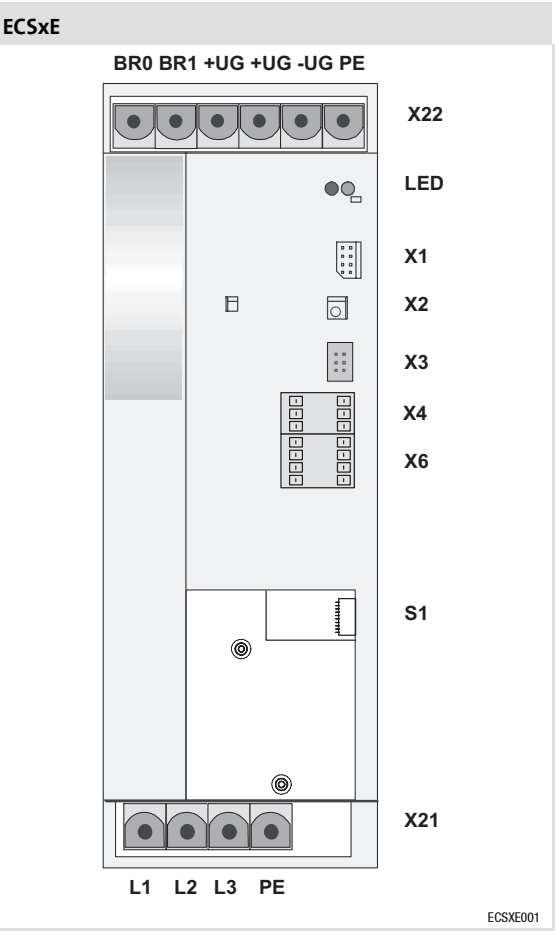
Modules of the ECS series

Modules série ECS

Módulos de la serie ECS

Moduli serie ECS

Lenze



Diese Dokumentation ist gültig für Achsmodule, Versorgungsmodule und Kondensatormodule der Reihe ECS ab dem Gerätestand:

[illegible]

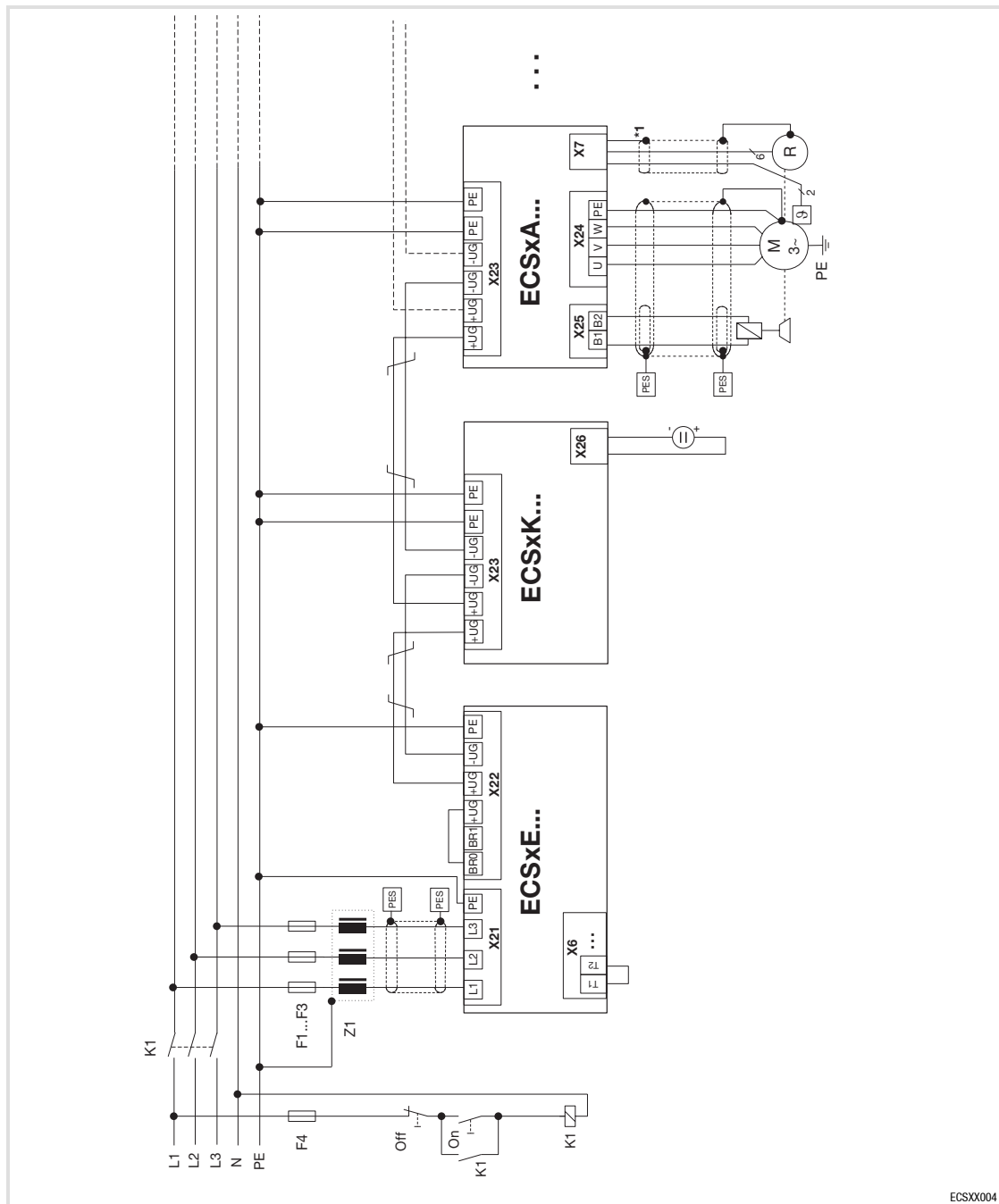
Achsmodul	ECS	x	A	xxx	C	4	x	xxx	XX	1A	13
Gerätetyp											
Bauform:	E = Einbaugerät IP20 C = Cold Plate D = Durchstoßmontage										
Spitzenstrom:	004 = 4 A 008 = 8 A 016 = 16 A 032 = 32 A 048 = 48 A 064 = 64 A										
Feldbusschnittstellen:	C = Systembus CAN										
Spannungsklasse:	4 = 400 V										
Technische Ausführung:	B = Standardausführung I = Variante für Betrieb an IT-Netzen										
Variante											
Hardwarestand											
Softwarestand											

[illegible]

ECSxE - Versorgungsmodul		ECSxA - Achsmodul	
Position	Bedeutung	Position	Bedeutung
X22	Anschlüsse: • Zwischenkreisspannung • PE • externer Bremswiderstand	X23	Anschlüsse: • Zwischenkreisspannung • PE
LED	Anzeige Status und Fehler	LED	Anzeige Status und Fehler
X1	Automatisierungsinterface AIF	X1	Automatisierungsinterface AIF
X2	PE-Anschluss AIF	X2	PE-Anschluss AIF
X3	nicht belegt	X3	Konfiguration Analogeingang
X4	Anschluss CAN	X4	Anschluss CAN
		X14	Anschluss CAN-AUX
X6	Anschlüsse: • digitale Eingänge • digitale Ausgänge • 24 V-Versorgung	X6	Anschlüsse: • analoger Eingang • digitale Eingänge • digitale Ausgänge • 24 V-Versorgung • Sicherer Halt
S1	Schalter: • CAN-Adresse • CAN-Übertragungsrate	S1	Schalter: • CAN-Adresse • CAN-Übertragungsrate
X21	Anschluss Netz	X7	Anschluss Resolver
		X8	Anschluss: • Encoder oder • Encodernachbildung
		X25	Anschluss Bremsenansteuerung
		X24	Anschluss Motor

ECSxK - Kondensatormodul	
Position	Bedeutung
X23	Anschlüsse: • Zwischenkreisspannung • PE
X26	Anschluss 24 V-Versorgung

Installieren Sie das Kondensatormodul zwischen dem Versorgungsmodul und dem Achsmodul:



ECSXX004

Abb. 1-1 Verschaltung ECS-Module

- PES** HF-Schirmabschluss durch großflächige PE-Anbindung
-  verdrehte Leitungen
- * 1** Systemleitung - Rückführung

2 Sicherheit

2.1 Allgemeine Sicherheits- und Anwendungshinweise für Lenze-Antriebsregler

(gemäß Niederspannungsrichtlinie 73/23/EWG)

Allgemein

Lenze-Antriebsregler (Frequenzumrichter, Servo-Umrichter, Stromrichter) und zugehörige Komponenten können während des Betriebs - ihrer Schutzart entsprechend - spannungsführende, auch bewegliche oder rotierende Teile haben. Oberflächen können heiß sein.

Bei unzulässigem Entfernen der erforderlichen Abdeckung, bei unsachgemäßem Einsatz, bei falscher Installation oder Bedienung besteht die Gefahr von schweren Personen- oder Sachschäden.

Weitere Informationen entnehmen Sie der Dokumentation.

Alle Arbeiten zum Transport, zur Installation, zur Inbetriebnahme und zur Instandhaltung darf nur qualifiziertes Fachpersonal ausführen (IEC 364 bzw. CENELEC HD 384 oder DIN VDE 0100 und IEC-Report 664 oder DIN VDE 0110 und nationale Unfallverhütungsvorschriften beachten).

Qualifiziertes Fachpersonal im Sinne dieser grundsätzlichen Sicherheitshinweise sind Personen, die mit Aufstellung, Montage, Inbetriebsetzung und Betrieb des Produkts vertraut sind und die über die ihrer Tätigkeit entsprechenden Qualifikationen verfügen.

Bestimmungsgemäße Verwendung

Antriebsregler sind Komponenten, die zum Einbau in elektrische Anlagen oder Maschinen bestimmt sind. Sie sind keine Haushaltsgeräte, sondern als Komponenten ausschließlich für die Verwendung zur gewerblichen Nutzung bzw. professionellen Nutzung im Sinne der EN 61000-3-2 bestimmt. Die Dokumentation enthält Hinweise zur Einhaltung der Grenzwerte nach EN 61000-3-2.

Bei Einbau der Antriebsregler in Maschinen ist die Inbetriebnahme (d. h. die Aufnahme des bestimmungsgemäßen Betriebs) solange untersagt, bis festgestellt wurde, dass die Maschine den Bestimmungen der EG-Richtlinie 98/37/EG (Maschinenrichtlinie) entspricht; EN 60204 beachten.

Die Inbetriebnahme (d. h. die Aufnahme des bestimmungsgemäßen Betriebs) ist nur bei Einhaltung der EMV-Richtlinie (89/336/EWG) erlaubt.

Die Antriebsregler erfüllen die Anforderungen der Niederspannungsrichtlinie 73/23/EWG. Die harmonisierten Normen der Reihe EN 50178/DIN VDE 0160 werden für die Antriebsregler angewendet.

Die technischen Daten und die Angaben zu Anschlussbedingungen entnehmen Sie dem Leistungsschild und der Dokumentation. Halten Sie sie unbedingt ein.

Warnung: Die Antriebsregler sind Produkte mit eingeschränkter Erhältlichkeit nach EN 61800-3. Diese Produkte können im Wohnbereich Funkstörungen verursachen. In diesem Fall kann es für den Betreiber erforderlich sein, entsprechende Maßnahmen durchzuführen.

Transport, Einlagerung

Beachten Sie die Hinweise für Transport, Lagerung und sachgemäße Handhabung.

Halten Sie die klimatischen Bedingungen nach EN 50178 ein.

Aufstellung

Sie müssen die Antriebsregler nach den Vorschriften der zugehörigen Dokumentation aufstellen und kühlen.

Sorgen Sie für sorgfältige Handhabung und vermeiden Sie mechanische Überlastung. Verbiegen Sie bei Transport und Handhabung weder Bauelemente noch ändern Sie Isolationsabstände. Berühren Sie keine elektronischen Bauelemente und Kontakte.

Antriebsregler enthalten elektrostatisch gefährdete Bauelemente, die Sie durch unsachgemäße Handhabung leicht beschädigen können. Beschädigen oder zerstören Sie keine elektrischen Komponenten, da Sie dadurch Ihre Gesundheit gefährden können!

Elektrischer Anschluss

Beachten Sie bei Arbeiten an unter Spannung stehenden Antriebsreglern die geltenden nationalen Unfallverhütungsvorschriften (z. B. VBG 4).

Führen Sie die elektrische Installation nach den einschlägigen Vorschriften durch (z. B. Leitungsquerschnitte, Absicherungen, Schutzleiteranbindung). Zusätzliche Hinweise enthält die Dokumentation.

Die Dokumentation enthält Hinweise für die EMV-gerechte Installation (Schirmung, Erdung, Anordnung von Filtern und Verlegung der Leitungen). Beachten Sie diese Hinweise ebenso bei CE-gekennzeichneten Antriebsreglern. Der Hersteller der Anlage oder Maschine ist verantwortlich für die Einhaltung der durch die EMV-Gesetzgebung geforderten Grenzwerte.

Lenze-Antriebsregler können im Fehlerfall (Körper- oder Erdschluss) einen Fehler-Gleichstrom im Schutzleiter verursachen. Wird für den Schutz im Falle einer direkten oder indirekten Berührung ein Fehlerstrom-Schutzschalter (Differenzstromgerät) verwendet, ist auf der Stromversorgungsseite nur ein Fehlerstrom-Schutzschalter vom Typ B zulässig. Anderenfalls muss eine andere Schutzmaßnahme angewendet werden, wie z. B. Trennung von der Umgebung durch doppelte oder verstärkte Isolierung oder Trennung vom Versorgungsnetz durch einen Transformator.

Betrieb

Sie müssen Anlagen mit eingebauten Antriebsreglern ggf. mit zusätzlichen Überwachungs- und Schutzeinrichtungen gemäß den jeweils gültigen Sicherheitsbestimmungen ausrüsten (z. B. Gesetz über technische Arbeitsmittel, Unfallverhütungsvorschriften). Sie dürfen die Antriebsregler an Ihre Anwendung anpassen. Beachten Sie dazu die Hinweise in der Dokumentation.

Nachdem der Antriebsregler von der Versorgungsspannung getrennt ist, dürfen Sie spannungsführende Geräteteile und Leistungsanschlüsse nicht sofort berühren, weil Kondensatoren aufgeladen sein können. Beachten Sie dazu die entsprechenden Hinweisschilder auf dem Antriebsregler.

Halten Sie während des Betriebs alle Schutzabdeckungen und Türen geschlossen.

Hinweis für UL-approbrierte Anlagen mit eingebauten Antriebsreglern: UL warnings sind Hinweise, die nur für UL-Anlagen gelten. Die Dokumentation enthält spezielle Hinweise zu UL.

Sicherer Halt

Die Variante V004 der Antriebsregler 9300 und 9300 vector, die Variante x4x der Antriebsregler 8200 vector und die Achsmodule ECSxAxxx unterstützen die Funktion "Sicherer Halt", Schutz gegen unerwarteten Anlauf, nach den Anforderungen von Anhang I Nr. 1.2.7 der EG-Richtlinie "Maschinen" 98/37/EG, DIN EN 954-1 Kategorie 3 und DIN EN 1037. Beachten Sie unbedingt die Hinweise zur Funktion "Sicherer Halt" in der Dokumentation zu den Varianten.

Wartung und Instandhaltung

Die Antriebsregler sind wartungsfrei, wenn die vorgeschriebenen Einsatzbedingungen eingehalten werden.

Bei verunreinigter Umgebungsluft können die Kühlflächen des Antriebsreglers verschmutzen oder Kühlöffnungen verstopft werden. Bei diesen Betriebsbedingungen deshalb regelmäßig die Kühlflächen und Kühlöffnungen reinigen. Dazu niemals scharfe oder spitze Gegenstände verwenden!

Entsorgung

Metalle und Kunststoffe zur Wiederverwertung geben. Bestückte Leiterplatten fachgerecht entsorgen.

Beachten Sie unbedingt die produktspezifischen Sicherheits- und Anwendungshinweise in dieser Anleitung!

2.2

Allgemeine Sicherheits- und Anwenderhinweise für Lenze-Motoren

(gemäß Niederspannungsrichtlinie 73/23/EWG)

Allgemein

Niederspannungsmaschinen haben gefährliche, spannungsführende und rotierende Teile sowie möglicherweise heiße Oberflächen. Alle Arbeiten zu Transport, Anschluss, Inbetriebnahme und Instandhaltung sind von qualifiziertem, verantwortlichem Fachpersonal auszuführen (EN 50110-1 (VDE 0105-100); IEC 60364 beachten). Unsachgemäßes Verhalten kann schwere Personen- und Sachschäden verursachen.

Bei Synchronmaschinen werden bei drehender Maschine auch an den offenen Klemmen Spannungen induziert.

Bestimmungsgemäße Verwendung

Diese Niederspannungsmaschinen sind für gewerbliche Anlagen bestimmt. Sie entsprechen den harmonisierten Normen der Reihe EN 60034 (VDE 0530). Der Einsatz im Ex-Bereich ist verboten, sofern nicht ausdrücklich hierfür vorgesehen (Zusatzhinweise beachten).

Schutzarten $\leq$ IP23 nicht ohne besondere Schutzmaßnahmen im Freien verwenden. Luftgekühlte Ausführungen sind für Umgebungstemperaturen von -15 °C bzw. -10 °C bis $+40\text{ °C}$ und Aufstellungshöhen $\leq 1000\text{ m üNN}$ bemessen, von -20 °C bis $+40\text{ °C}$ ohne Bremse oder mit Federkraftbremse, unbelüftet oder mit Eigenlüfter, von -15 °C bis $+40\text{ °C}$ mit Permanentmagnetbremse und von -10 °C bis $+40\text{ °C}$ mit Fremdlüfter. Abweichende Angaben auf dem Leistungsschild unbedingt beachten. Die Bedingungen am Einsatzort müssen allen Leistungsschildangaben entsprechen.

Niederspannungsmaschinen sind Komponenten zum Einbau in Maschinen im Sinne der Maschinenrichtlinie 98/37/EG. Die Inbetriebnahme ist solange untersagt, bis die Konformität des Endprodukts mit dieser Richtlinie festgestellt ist (u. a. EN 60204-1 beachten).

Die eingebauten Bremsen sind keine Sicherheitsbremsen. Es ist nicht auszuschließen, dass durch nicht zu beeinflussende Störfaktoren, z. B. Öleintritt durch Versagen des A-seitigen Wellendichtrings, eine Drehmomentreduzierung auftreten kann.

Transport, Einlagerung

Nach der Auslieferung festgestellte Beschädigungen dem Transportunternehmen sofort mitteilen; die Inbetriebnahme ist ggf. auszuschließen. Eingeschraubte Transportösen fest anziehen. Sie sind für das Gewicht der Niederspannungsmaschine ausgelegt, keine zusätzlichen Lasten anbringen. Wenn notwendig, ausreichend bemessene Transportmittel (z. B. Seilführungen) verwenden.

Vorhandene Transportsicherungen vor Inbetriebnahme entfernen. Für weitere Transporte erneut verwenden. Werden Niederspannungsmaschinen eingelagert, auf eine trockene, staubfreie und schwingungsarme ($v_{\text{eff}} \leq 0.2\text{ mm/s}$) Umgebung achten (Lagerstandsschäden). Vor Inbetriebnahme Isolationswiderstand messen. Bei Werten $\leq 1\text{ k}\Omega$ je Volt Bemessungsspannung Wicklung trocknen.

Aufstellung

Auf plane Auflage, gute Fuß- bzw. Flanschbefestigung und genaue Ausrichtung bei direkter Kupplung achten. Aufbaubedingte Resonanzen mit der Drehfrequenz und der doppelten Speisefrequenz vermeiden. Läufer von Hand drehen, auf ungewöhnliche Schleifgeräusche achten. Drehrichtung im ungekuppelten Zustand kontrollieren (Abschn. 5 beachten).

Riemenscheiben und Kupplungen nur mit geeigneten Vorrichtungen auf- bzw. abziehen (Erwärmen!) und mit einem Berührschutz abdecken. Unzulässige Riemenspannungen vermeiden (Techn. Liste).

Die Maschinen sind mit halber Passfeder gewuchtet. Die Kupplung muss ebenfalls mit halber Passfeder gewuchtet sein. Überstehenden, sichtbaren Passfederanteil abarbeiten.

Eventuell erforderliche Rohranschlüsse herstellen. Bauformen mit Wellenende nach unten bauseits mit einer Abdeckung ausrüsten, die verhindert, dass Fremdkörper in den Lüfter hineinfallen. Die Belüftung darf nicht behindert werden und die Abluft - auch benachbarter Aggregate - nicht unmittelbar wieder angesaugt werden.

Elektrischer Anschluss

Alle Arbeiten dürfen nur von qualifiziertem Fachpersonal an der stillstehenden Niederspannungsmaschine im freigeschalteten und gegen Wiedereinschalten gesicherten Zustand vorgenommen werden. Das gilt auch für Hilfsstromkreise (z. B. Bremse, Geber, Fremdlüfter).

Spannungsfreiheit prüfen!

Überschreiten der Toleranzen in EN 60034-1; IEC 34 (VDE 0530-1) - Spannung $\pm 5\%$, Frequenz $\pm 2\%$, Kurvenform, Symmetrie - erhöht die Erwärmung und beeinflusst die elektromagnetische Verträglichkeit.

Schaltungshinweise, Angaben auf dem Leistungsschild und Anschlussschema im Anschlusskasten beachten.

Der Anschluss muss so erfolgen, dass eine dauerhaft sichere, elektrische Verbindung aufrecht erhalten wird (keine abstehenden Drahtenden); zugeordnete Kabelendbestückung verwenden. Sichere Schutzleiterverbindung herstellen. Steckverbinder bis zum Anschlag festschrauben.

Die kleinsten Luftabstände dürfen zwischen blanken, spannungsführenden Teilen und gegen Erde folgende Werte nicht unterschreiten: 8 mm bei $U_N \leq 550\text{ V}$, 10 mm bei $U_N \leq 725\text{ V}$, 14 mm bei $U_N \leq 1000\text{ V}$.

Der Anschlusskasten muss frei sein von Fremdkörpern, Schmutz und Feuchtigkeit. Nicht benötigte Kabeleinführungsöffnungen und den Kasten selbst staub- und wasserdicht verschließen. Für den Probetrieb ohne Abtriebsselemente Passfeder sichern. Bei Niederspannungsmaschinen mit Bremse vor der Inbetriebnahme die einwandfreie Funktion der Bremse prüfen.

Betrieb

Schwingstärken $v_{\text{eff}} \leq 3.5 \text{ mm/s}$ ($P_N \leq 15 \text{ kW}$) bzw. 4.5 mm/s ($P_N > 15 \text{ kW}$) sind in gekuppeltem Betrieb unbedenklich. Bei Veränderungen gegenüber dem Normalbetrieb, z. B. erhöhte Temperaturen, Geräusche, Schwingungen, Ursache ermitteln, ggf. Rücksprache mit dem Hersteller. Im Zweifelsfall Niederspannungsmaschine abschalten.

Bei starkem Schmutzanfall Luftwege regelmäßig reinigen.

Schutzeinrichtungen auch im Probetrieb nicht außer Funktion setzen.

Eingebaute Temperaturfühler sind kein Vollschutz der Maschine, ggf. Maximalstrom begrenzen. Funktionsblockverschaltung mit Abschaltung nach einigen Sekunden Betrieb mit $I > I_N$ vornehmen, insbesondere bei Gefahr des Blockierens.

Wellendichtringe und Wälzlager haben eine begrenzte Lebensdauer.

Lagerungen mit Nachschmiereinrichtung bei laufender Niederspannungsmaschine nachfetten. Verseifungsart beachten. Wenn Fettaustrittsbohrungen mit Stopfen verschlossen sind (IP54 Abtriebsseite; IP23 Abtriebs- und Nichtabtriebsseite), vor Inbetriebnahme Stopfen entfernen. Bohrungen mit Fett verschließen. Lagerwechsel bei Dauerschmierung (2Z-Lager) nach ca. 10.000 h - 20.000 h, spätestens jedoch nach 3 - 4 Jahren bzw. nach Herstellerangaben.

2.3 Restgefahren

2.3.1 Restgefahren Versorgungsmodul ECSxE

Personenschutz

- ▶ Überprüfen Sie vor Arbeiten am Versorgungsmodul, ob alle Leistungsklemmen spannungslos sind, da
 - nach dem Abschalten der Netzspannung die Leistungsklemmen +UG, -UG, BR0 und BR1 noch mindestens 3 Minuten gefährliche Spannung führen.
- ▶ Die Betriebstemperatur des Kühlkörpers ist $> 70\text{ °C}$:
 - Hautkontakt mit dem Kühlkörper führt zu Verbrennungen.
- ▶ Der Ableitstrom gegen PE ist $> 3,5\text{ mA AC}$ bzw. $> 10\text{ mA DC}$. Deshalb ist zum Schutz der PE-Anschluss doppelt ausgeführt.
 - Bedingungen der EN 50178 für hohen Ableitstrom einhalten!
- ▶ Bei Betrieb des Versorgungsmoduls am Fehlerstrom-Schutzschalter:
 - Die Versorgungsmodule haben intern einen Netzgleichrichter. Bei einem Körperschluss kann ein nicht pulsierender Fehler-Gleichstrom die Auslösung wechselstromsensitiver bzw. pulsstromsensitiver Fehlerstrom-Schutzschalter blockieren und somit die Schutzfunktion für alle an diesem Fehlerstrom-Schutzschalter betriebenen Betriebsmittel aufheben.

Geräteschutz

- ▶ Alle steckbaren Anschlussklemmen nur im spannungslosen Zustand aufstecken oder abziehen!
- ▶ Die Leistungsklemmen +UG, -UG und PE sind nicht verpolungssicher ausgelegt.
 - Polarität der Leistungsklemmen beim Verdrahten beachten!

2.3.2

Restgefahren Achsmodul ECSxA

Personenschutz

- ▶ Überprüfen Sie vor Arbeiten am Achsmodul, ob alle Leistungsklemmen spannungslos sind, da
 - nach dem Abschalten der Netzspannung am Versorgungsmodul die Leistungsklemmen +UG, -UG, U, V und W noch mindestens 3 Minuten gefährliche Spannung führen.
 - bei gestopptem Motor die Leistungsklemmen +UG, -UG, U, V und W gefährliche Spannung führen.
- ▶ Die Betriebstemperatur des Kühlkörpers ist $> 70\text{ °C}$:
 - Hautkontakt mit dem Kühlkörper führt zu Verbrennungen.
- ▶ Der Ableitstrom gegen PE ist $> 3,5\text{ mA AC}$ bzw. $> 10\text{ mA DC}$. Deshalb ist zum Schutz der PE-Anschluss doppelt ausgeführt.
 - Bedingungen der EN 50178 für hohen Ableitstrom einhalten!

Geräteschutz

- ▶ Alle steckbaren Anschlussklemmen nur im spannungslosen Zustand aufstecken oder abziehen!
- ▶ Die Leistungsklemmen +UG, -UG, U, V, W und PE sind nicht verpolungssicher ausgelegt.
 - Polarität der Leistungsklemmen beim Verdrahten beachten!
- ▶ Erst wenn alle Geräte im Leistungsverbund betriebsbereit sind, darf Leistung umgesetzt werden. Sonst kann die Eingangsstrombegrenzung zerstört werden.

Zyklisches Ein- und Ausschalten der Netzspannung am Versorgungsmodul kann die Eingangsstrombegrenzung des Achsmoduls überlasten und zerstören, wenn

- ▶ das Achsmodul über das Versorgungsmodul ECSxE versorgt wird und die Eingangsstrombegrenzung abhängig von der Zwischenkreisspannung ausgeschaltet wird (C0175 = 1 oder 2).
- ▶ das Achsmodul über ein nicht von Lenze geliefertes Versorgungsmodul versorgt wird.
- ▶ die 24 V-Versorgung ausgeschaltet ist.

Deshalb müssen bei diesen Betriebsbedingungen bei zyklischem Netzschalten über einen längeren Zeitraum zwischen zwei Einschaltvorgängen mindestens 3 Minuten vergehen!

Motorschutz

- ▶ Bei bestimmten Einstellungen der Achsmodule kann der angeschlossene Motor überhitzt werden, z. B. längerer Betrieb eigenbelüfteter Motoren bei kleinen Drehzahlen.

2.3.3 Restgefahren Kondensatormodul ECSxK

Personenschutz

- ▶ Überprüfen Sie vor Arbeiten am Kondensatormodul, ob alle Leistungsklemmen spannungslos sind, da
 - nach dem Abschalten der Netzspannung am Versorgungsmodul die Leistungsklemmen +UG und -UG noch mindestens 3 Minuten gefährliche Spannung führen.
 - bei gestopptem Motor die Leistungsklemmen +UG und -UG gefährliche Spannung führen.

Geräteschutz

- ▶ Alle steckbaren Anschlussklemmen nur im spannungslosen Zustand aufstecken oder abziehen!
- ▶ Die Leistungsklemmen +UG, -UG und PE sind nicht verpolungssicher ausgelegt.
 - Polarität der Leistungsklemmen beim Verdrahten beachten!
- ▶ Erst wenn alle Geräte im Leistungsverbund betriebsbereit sind, darf Leistung umgesetzt werden. Sonst kann die Eingangsstrombegrenzung zerstört werden.

Zyklisches Ein- und Ausschalten der Netzspannung am Versorgungsmodul kann die Eingangsstrombegrenzung des Kondensatormoduls überlasten und zerstören, wenn

- ▶ das Relais bzw. die 24 V-Versorgung ausgeschaltet ist.
- ▶ das Kondensatormodul über ein nicht von Lenze geliefertes Versorgungsmodul versorgt wird.

Wenn die Eingangsstrombegrenzung verwendet wird, müssen bei zyklischem Netzschalten über einen längeren Zeitraum zwischen zwei Einschaltvorgängen mindestens 3 Minuten vergehen!

2.3.4

Sicherheitshinweise für die Installation nach U_L oder 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 12 ... AWG 8
- ▶ X4, X6, X14
– AWG 28 ... AWG 16
- ▶ X 25
– AWG 24 ... AWG 12



This documentation is only valid for axis modules, supply modules and capacitor modules of the ECS series as of version:

Supply module	ECS	x	E	xxx	C	4	x	xxx	1A	12
Type										
Design:	E = Built-in unit IP20 C = Cold plate D = Push-through mounting									
Rated direct current:	012 = 12 A 020 = 20 A 040 = 40 A									
Fieldbus interfaces:	C = CAN system bus									
Voltage class:	4 = 400 V									
Technical version:	B = Standard version I = Variant for operation at IT systems									
Variant										
Hardware version										
Software version										

Axis module	ECS	x	O	xxx	C	4	x	xxx	XX	1A	13
Type											
Design:	E = Built-in unit IP20 C = Cold plate D = Push-through mounting										
Peak current:	004 = 4 A 008 = 8 A 016 = 16 A 032 = 32 A 048 = 48 A 064 = 64 A										
Fieldbus interfaces:	C = CAN system bus										
Voltage class:	4 = 400 V										
Technical version:	B = Standard version I = Variant for operation at IT systems										
Variant											
Hardware version											
Software version											

Capacitor module	ECS	x	k	xxx	x	4	b	xxx	1A
Type									
Design:	E = Built-in unit IP20 C = Cold plate D = Push-through mounting								
Capacitance:	001 = 705 μF ±20 % 002 = 1410 μF ±20 %								
Voltage class:	4 = 400 V								
Technical version:	B = Standard version I = Variant for operation at IT systems								
Variant									
Hardware version									

ECSxE - supply module		ECSxA - axis module	
Position	Meaning	Position	Meaning
X22	Connections: • DC bus voltage • PE • External brake resistor	X23	Connections: • DC bus voltage • PE
LED	Status and error display	LED	Status and error display
X1	AIF automation interface	X1	AIF automation interface
X2	AIF PE connection	X2	AIF PE connection
X3	Not assigned	X3	Analog input configuration
X4	CAN connection	X4	CAN connection
		X14	CAN-AUX connection
X6	Connections: • Digital inputs • Digital outputs • 24 V supply	X6	Connections: • Analog input • Digital inputs • Digital outputs • 24 V supply • Safe standstill
S1	Switches: • CAN address • CAN transfer rate	S1	Switches: • CAN address • CAN transfer rate
X21	Mains connection	X7	Resolver connection
		X8	Connection: • Encoder or • Encoder simulation
		X25	Brake control connection
		X24	Motor connection

ECSxK - capacitor module	
Position	Meaning
X23	Connections: • DC bus voltage • PE
X26	24V supply connection

1 Installation of the ECS modules

1 Installation of the ECS modules

Install the capacitor module between the supply module and the axis module:

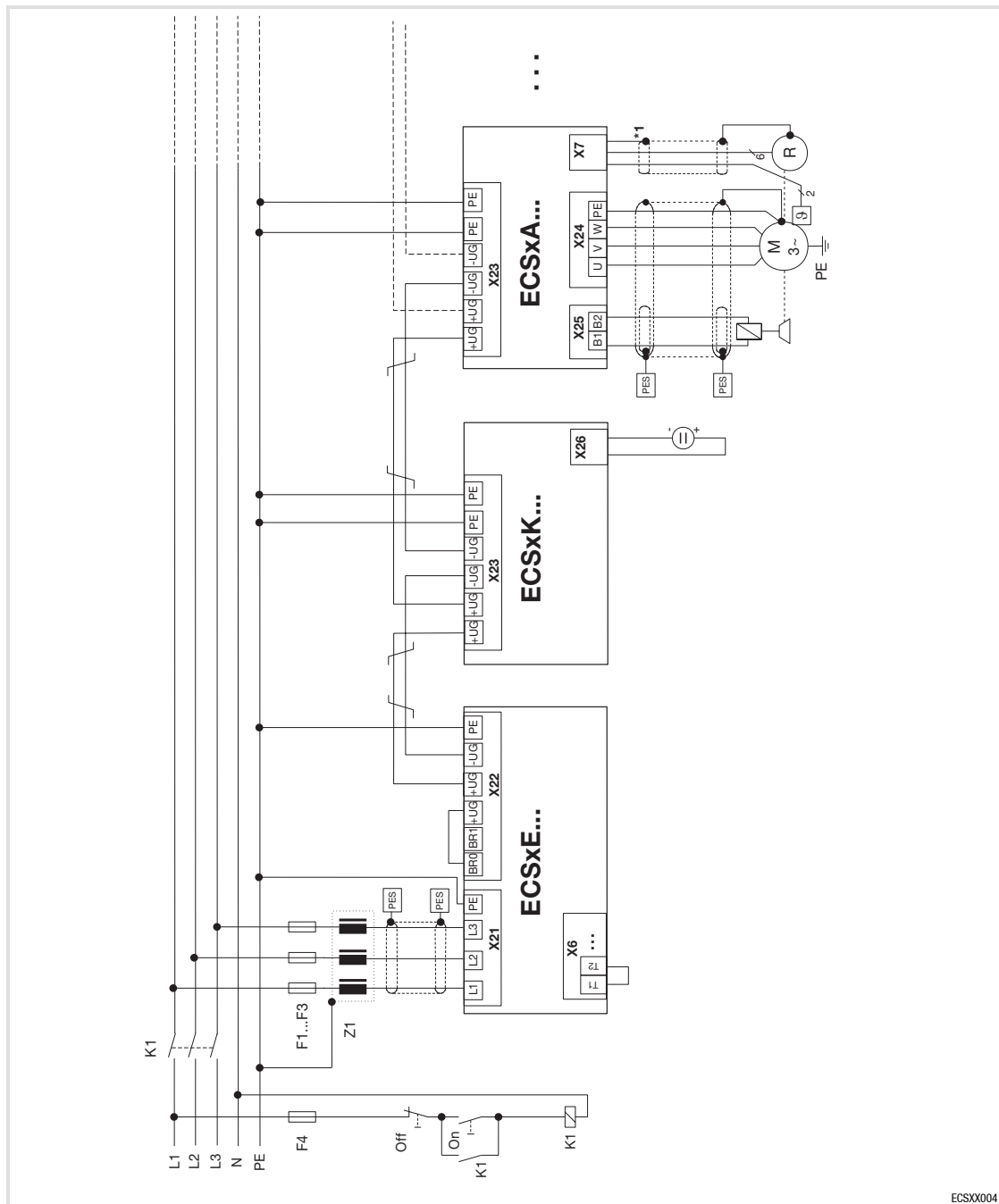


Fig. 3-1 Wiring of ECS modules

- PES** HF shield termination by large-surface PE connection
-  Twisted cables
- *1** System cable - feedback

2 Safety

2.1 General safety and application notes for Lenze controllers

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

General

Depending on their degree of protection, some parts of Lenze controllers (frequency inverters, servo inverters, DC controllers) and their accessory components can be live, moving and rotating during operation. Surfaces can be hot.

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.

For more information please see 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 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 the installation into electrical systems or machinery. They are not to be used as domestic appliances, but only for industrial purposes according to EN 61000-3-2. The documentation contains information about the compliance with the limit values to EN 61000-3-2.

When installing drive controllers into machines, commissioning of these 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 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/EEC).

The drive controllers meet the requirements of the Low-Voltage Directive 73/23/EEC. The harmonised standards of the EN 50178/DIN VDE 0160 series apply 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: Drive controllers are products with restricted availability according to EN 61800-3. These products can cause interferences in residential premises. If controllers are used in residential premises, corresponding measures are required.

Transport, storage

The notes on transport, storage and appropriate handling must be observed.

The climatic conditions according to EN 50178 must be observed.

Installation

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

Ensure careful handling and avoid mechanical overload. Do not bend any components and do not change the insulation distances during transport and handling. Electronic components and contacts must not be touched.

Drive controllers contain electrostatically sensitive components which can easily be damaged by inappropriate handling. Do not damage or destroy any electrical components since this could mean hazards to your health!

Electrical connection

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

Carry out the electrical installation in compliance with the corresponding regulations (e.g. cable cross-sections, fuses, PE connection). More detailed information is given in the corresponding documentation.

Notes about wiring 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.

In the case of a malfunction (short circuit to frame or earth fault), Lenze controllers can cause a DC residual current in the protective conductor. If an earth-leakage circuit breaker (residual current device) is used as a protective means in the case of direct or indirect contact, only an e.l.c.b. of type B may be used on the current supply side. 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.

Safe standstill

The V004 variant of the 9300 and 9300 vector controllers, the x4x variant of the 8200 vector controllers and the ECSxAxxx axis modules support the "safe standstill" function, protection against unexpected start-up, according to the requirements of Annex I No. 1.2.7 of the EC Directive "Machinery" 98/37/EC, DIN EN 954-1 Category 3 and DIN EN 1037. Observe the notes on the "safe standstill" function given in the documentation on the respective variants.

Maintenance and servicing

The drive controllers are maintenance-free when the specified operating conditions are met.

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 instructions must be observed!

2.2

General safety and application notes for Lenze motors

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

General

Low-voltage machines have dangerous, live and rotating parts as well as possibly hot surfaces. All operations serving transport, connection, commissioning and maintenance are to be carried out by qualified, skilled personnel (observe EN 50110-1 (VDE 0105-100); IEC 60364). Improper handling may cause severe injury to persons or damage to material assets.

Synchronous machines induce voltages at open terminals during operation.

Application as directed

These low-voltage machines are intended for industrial and commercial installations. They comply with the harmonized standards of the EN 60034 (VDE 0530) series. Their use in hazardous areas is prohibited unless they are expressly intended for such use (follow additional instructions).

Degrees of protection $\leq$ IP23 are only intended for outdoor use when applying special protective measures. Air-cooled designs are rated for ambient temperatures from -15 °C and -10 °C to +40 °C and altitudes $\leq$ 1000 m a.m.s.l., from -20 °C to +40 °C without brake or with spring-operated brake, non-ventilated or with integral fan, from -15 °C to +40 °C with permanent magnet brake and from -10 °C to +40 °C with separate fan. Check indications on the nameplate and if they are different, observe them. The conditions on site must correspond to all nameplate data.

Low-voltage machines are components for the installation into machines as defined in the Machinery Directive 98/37/EC. Commissioning is prohibited until the conformity of the end product with this Directive has been established (follow a.o. EN 60204-1).

The integrated brakes cannot be used as safety brakes. It cannot be guaranteed that factors which cannot be influenced, such as oil ingress because of a defective A-side shaft seal, do not cause a torque reduction.

Transport, storage

The forwarder must be informed directly after receipt of the goods about all damages or deficiencies; if necessary, commissioning must be stopped. Tighten screwed-in ring bolts before transport. They are designed for the weight of the low-voltage machine, do not apply extra loads. If necessary, use suitable and adequately dimensioned means of transport (e.g. rope guides).

Remove the shipping braces before commissioning. Reuse them for further transports. For storage of low-voltage machines ensure a dry, dust-free and low-vibration ($v_{rms} \leq 0.2$ mm/s) environment (damage while being stored). Measure the insulation resistance before commissioning. If the values are ≤ 1 k Ω per volt of rated voltage, dry the winding.

Installation

Ensure an even surface, solid foot or flange mounting and exact alignment if a direct clutch is connected. Avoid resonances with the rotational frequency and double mains frequency which may be caused during assembly. Turn rotor by hand, listen for unusual slipping noises. Check the direction of rotation when the clutch is not active (observe section 5).

Use appropriate tools to mount or remove belt pulleys and clutches (heat generation!) and cover them with a touch guard. Impermissible belt tensions must be avoided (technical list).

The machines are half-key balanced. The clutch must be half-key balanced, too. The visible outstanding part of the key must be removed.

If required, provide pipe connections. Designs with shaft end at bottom must be protected with a cover which prevents the ingress of foreign particles into the fan. Free circulation of the cooling air must be ensured. The exhaust air - also the exhaust air of other machines next to the drive system - must not be taken in again immediately.

Electrical connection

All operations must only be carried out by qualified and skilled personnel when the low-voltage machine is at standstill and when the machine is de-energized and protected against unintentional restart. This also applies to auxiliary circuits (e.g. brake, encoder, separate fan).

Check safe isolation from the supply!

If the tolerances in EN 60034-1; IEC 34 (VDE 0530-1) - voltage $\pm 5\%$, frequency $\pm 2\%$, wave form, symmetry - are exceeded, more heat will be generated and the electromagnetic compatibility will be influenced.

Observe the indications on the nameplate, operating notes, and the connection diagram in the terminal box.

The connection must ensure a continuous and safe electrical supply (no loose wire ends); use appropriate cable terminals. The connection to the PE conductor must be safe. The plug-in connector must be bolt tightly (to stop).

The clearances between blank, live parts and earth must not fall below 8 mm at $V_r \leq 550$ V, 10 mm at $V_r \leq 725$ V, 14 mm at $V_r \leq 1000$ V.

The terminal box must be clean and dry; foreign particles, dirt and moisture disturb operation. All unused cable entries and the box itself must be sealed against dust and water. For the trial run without output elements, lock the key. Check brake operation before commissioning of low-voltage machines with brakes.

Operation

Vibration severities $v_{rms} \leq 3.5 \text{ mm/s}$ ($P_r \leq 15 \text{ kW}$) and 4.5 mm/s ($P_r > 15 \text{ kW}$) are acceptable when the clutch is activated. If deviations from normal operation occur, e.g. increased temperatures, noises, vibrations, find the cause and, if necessary, contact the manufacturer. Switch off the machine in problematic situations.

If the drive is exposed to dirt, clean it regularly.

Do not switch off the protection devices, not even for trial runs.

Integrated temperature sensors do not provide full protection. If necessary, limit the maximum current. Connect the function blocks such that the machine switches off after several seconds of operation at $I > I_r$, especially if blocking may occur.

Shaft seals and bearings have a limited service life.

Regrease the bearings using the relubrication facility while the low-voltage machine is running. Observe the saponification number. If the grease drain hole is sealed with a plug (IP54 driven end; IP23 driven end and non-driven end), remove the plug before commissioning. Seal the bore holes with grease. Replace the prelubricated bearings (2Z bearings) after approx. 10,000 h - 20,000 h, at the latest however after 3 - 4 years. Observe the manufacturer's instructions.

2.3 Residual hazards

2.3.1 Residual hazards - ECSxE supply module

Protection of persons

- ▶ Before working on the supply module, check that no voltage is applied to the power terminals
 - because the power terminals +UG, -UG, BR0 and BR1 carry hazardous voltages for at least 3 minutes after mains disconnection.
- ▶ The heatsink has an operating temperature of $> 70\text{ °C}$:
 - Direct skin contact with the heatsink results in burnings.
- ▶ The leakage current to PE is $> 3.5\text{ mA AC}$ or $> 10\text{ mA DC}$. Therefore, two PE connections are installed for protective reasons.
 - Comply with the requirements of EN 50178 for high leakage currents!
- ▶ For operation of the supply module on an earth-leakage circuit breaker:
 - The supply modules are internally equipped with a mains rectifier. In the case of a short circuit to frame, a non-pulsating DC residual current can prevent AC -sensitive or pulsating DC-sensitive earth-leakage circuit breakers from being tripped and thus neutralize the protective function for the whole equipment operated on this earth-leakage circuit breaker.

Protection of devices

- ▶ All pluggable terminals must only be connected or disconnected when no voltage is applied!
- ▶ The power terminals +UG, -UG and PE are not protected against polarity reversal.
 - Observe the polarity when wiring the power terminals!

2.3.2 Residual hazards - ECSxA axis module

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 carry hazardous voltages for at least 3 minutes after mains disconnection at the supply module.
 - because the power terminals +UG, -UG, U, V and W carry hazardous voltages when the motor is stopped.
- ▶ The heatsink has an operating temperature of $> 70\text{ °C}$:
 - Direct skin contact with the heatsink results in burnings.
- ▶ The leakage current to PE is $> 3.5\text{ mA AC}$ or $> 10\text{ mA DC}$. Therefore, two PE connections are installed for protective reasons.
 - Comply with the requirements of EN 50178 for high leakage currents!

Protection of devices

- ▶ All pluggable 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.
 - Observe the polarity when wiring the power terminals!
- ▶ Only when all devices of the interconnected power system are ready for operation, power can be applied. Otherwise, the input current limitation may be destroyed.

Connecting and disconnecting the supply module cyclically to and from the mains 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).
- ▶ if the axis module is not supplied via a supply module delivered by Lenze.
- ▶ if the 24 V supply is switched off.

Under these operating conditions allow a break of at least 3 minutes between two starting operations in the case of cyclic mains switching over a longer period of time!

Motor protection

- ▶ Some settings of the axis module can cause the connected motor to overheat, e.g. longer operation of self-ventilated motors with low speeds.

2.3.3 Residual hazards - ECSxK capacitor module

Protection of persons

- ▶ Before working on the capacitor module, check that no voltage is applied to the power terminals
 - because the power terminals +UG and -UG carry hazardous voltages for at least 3 minutes after mains disconnection at the supply module.
 - because the power terminals +UG and -UG carry hazardous voltages when the motor is stopped.

Protection of devices

- ▶ All pluggable terminals must only be connected or disconnected when no voltage is applied!
- ▶ The power terminals +UG, -UG and PE are not protected against polarity reversal.
 - Observe the polarity when wiring the power terminals!
- ▶ Only when all devices of the interconnected power system are ready for operation, power can be applied. Otherwise, the input current limitation may be destroyed.

Connecting and disconnecting the supply module cyclically to and from the mains can overload and destroy the input current limitation of the capacitor module

- ▶ if the relay or the 24 V supply are switched off.
- ▶ if the capacitor module is not supplied via a supply module delivered by Lenze.

If the input current limitation is used, allow a break of at least 3 minutes between two starting operations in the case of cyclic mains switching over a longer period of time!

2.3.4

Safety notes 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 12 ... AWG 8
- ▶ X4, X6, X14
– AWG 28 ... AWG 16
- ▶ X 25
– AWG 24 ... AWG 12



Cette documentation s'applique aux modules d'axe, modules d'alimentation et modules condensateurs de la série ECS à partir de la version suivante :

[illegible]

Module d'axe		ECS	x	a	xxx	C	4	x	xxx	XX	1A	13
Type d'appareil												
Forme de construction	E = appareil IP20 C = montage sur semelle de refroidissement D = montage traversant (le fond de l'armoire)											
Courant de pointe	004 = 4 A 008 = 8 A 016 = 16 A 032 = 32 A 048 = 48 A 064 = 64 A											
Interfaces bus de terrain	C = Bus Système CAN											
Classe de tension	4 = 400 V											
Version technique	B = version standard I = variante pour fonctionnement sur réseau IT											
Variante												
Version de matériel												
Version de logiciel												

Module condensateur		ECS	x	K	xxx	x	4	b	xxx	1A
Type d'appareil										
Forme de construction	E = appareil IP20 C = montage sur semelle de refroidissement D = montage traversant (le fond de l'armoire)									
Capacité	001 = 705 µF ±20 % 002 = 1410 µF ±20 %									
Classe de tension	4 = 400 V									
Version technique	B = version standard I = variante pour fonctionnement sur réseau IT									
Variante										
Version de matériel										

Module d'alimentation ECSxE		Module d'axe ECSxA	
Position	Signification	Position	Signification
X22	Raccordements - Tension du bus CC - PE - Résistance de freinage externe	X23	Raccordements - Tension du bus CC - PE
LED	Affichage d'état et de défaut	LED	Affichage d'état et de défaut
X1	Interface d'automatisme AIF	X1	Interface d'automatisme AIF
X2	Raccordement PE pour AIF	X2	Raccordement PE pour AIF
X3	Non affecté	X3	Configuration entrée analogique
X4	Raccordement CAN	X4	Raccordement CAN
		X14	Raccordement CAN-AUX
X6	Raccordements - Entrées numériques - Sorties numériques - Alimentation 24 V	X6	Raccordements - Entrée analogique - Entrées numériques - Sorties numériques - Alimentation 24 V - Arrêt sécurisé
S1	Interrupteur DIP - Adresse CAN - Vitesse de transmission CAN	S1	Interrupteur DIP - Adresse CAN - Vitesse de transmission CAN
X21	Raccordement réseau	X7	Raccordement résolveur
		X8	Raccordement - Codeur ou - émulation codeur
		X25	Raccordement pilotage du frein
		X24	Raccordement moteur

Module condensateur ECSxK	
Position	Signification
X23	Raccordements - Tension du bus CC - PE
X26	Raccordement alimentation 24 V

1 Installation des modules ECS

1 Installation des modules ECS

Installer le module condensateur entre le module d'alimentation et le module d'axe :

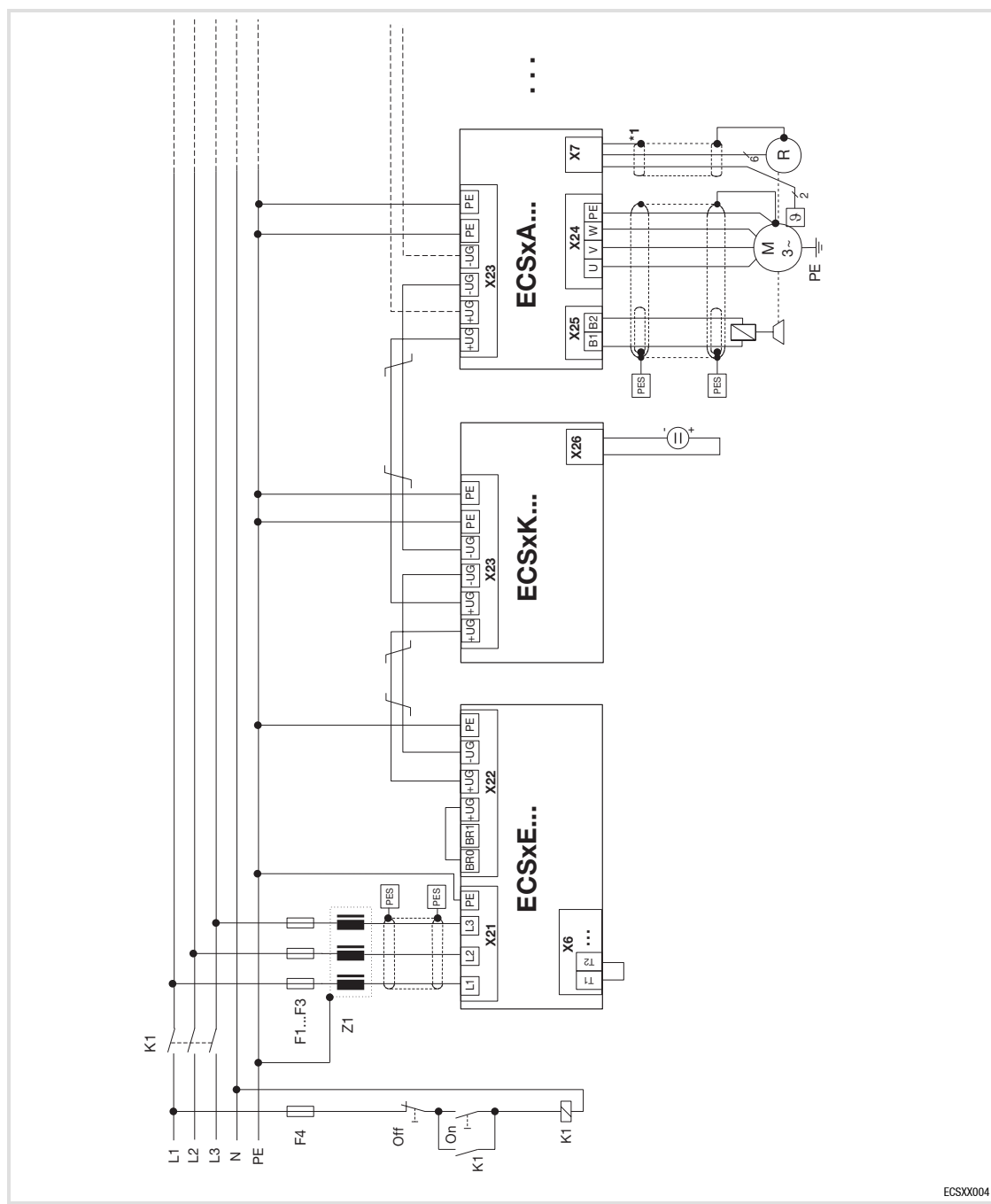


Fig.5-1

Câblage des modules ECS

- PES** Raccordement du blindage HF via connexion avec PE par surface importante
-  Câbles torsadés
- *1** Câble système - bouclage

2 Sécurité

2.1 Instructions générales de sécurité et d'utilisation relatives aux variateurs Lenze

(conformes à la directive Basse Tension 73/23/CEE)

Généralités

Selon leur degré de protection, les variateurs de vitesse Lenze (convertisseurs de fréquence, servovariateurs, variateurs de vitesse CC) peuvent avoir, pendant leur fonctionnement, des parties accessibles sous tension, éventuellement en mouvement ou en rotation. Les surfaces peuvent aussi être brûlantes.

La suppression non autorisée des protections prescrites, un usage non conforme à la fonction, une installation défectueuse ou une manoeuvre erronée peuvent entraîner des dommages corporels et matériels graves.

Pour obtenir des informations complémentaires, consulter la documentation.

Tous travaux relatifs au transport, à l'installation, à la mise en service et à la maintenance doivent être exécutés par du personnel qualifié et habilité (voir CEI 364 ou CENELEC HD 384 ou DIN VDE 0100 et CEI 664 ou DIN VDE 0110, ainsi que les prescriptions nationales de prévention d'accidents).

Au sens des présentes instructions de sécurité générales, on entend par personnel qualifié des personnes compétentes en matière d'installation, de montage, de mise en service et de fonctionnement du produit et possédant les qualifications correspondant à leurs activités.

Utilisation conforme à l'application

Les variateurs de vitesse sont des composants destinés à être incorporés dans des installations ou machines électriques. Ils ne constituent pas des appareils domestiques, mais des éléments à usage industriel et professionnel au sens de la norme EN 61000-3-2. Cette documentation contient des indications au sujet du respect des valeurs limites selon EN 61000-3-2.

Lorsque les variateurs de vitesse sont incorporés dans une machine, leur mise en service (c'est-à-dire leur mise en fonctionnement conformément à leur fonction) est interdite tant que la conformité de la machine avec les dispositions de la directive 98/37/CE (directive sur les machines) n'a pas été vérifiée ; respecter la norme EN 60204.

Leur mise en service (c'est-à-dire leur mise en fonctionnement conformément à leur fonction) n'est admise que si les dispositions de la directive sur la compatibilité électromagnétique (89/336/CEE) sont respectées.

Les variateurs de vitesse répondent aux exigences de la directive Basse Tension 73/23/CEE. Les normes harmonisées série EN 50178/DIN VDE 0160 sont appliquées aux variateurs de vitesse.

Les caractéristiques techniques et les indications relatives aux conditions de raccordement selon la plaque signalétique et la documentation doivent obligatoirement être respectées.

Attention ! Les variateurs de vitesse sont des produits de commerce à disponibilité restreinte selon EN 61800-3. Dans un environnement résidentiel, ces produits risquent de provoquer des interférences radio. Dans ce cas, il peut s'avérer nécessaire de mettre en oeuvre des mesures appropriées.

Transport, stockage

Les indications relatives au transport, au stockage et au maniement approprié doivent être respectées.

Les conditions climatiques selon EN 50178 doivent être respectées.

Installation

L'installation et le refroidissement des variateurs de vitesse doivent répondre aux prescriptions de la documentation fournie avec le produit.

Manipuler avec précaution et éviter toute contrainte mécanique. Lors du transport et de la manutention, veiller à ne pas déformer les composants ou modifier les distances d'isolement. Ne pas toucher les composants électroniques et les contacts électriques.

Les variateurs de vitesse comportent des pièces sensibles aux contraintes électrostatiques et facilement endommageables par un maniement inadéquat. Ne pas endommager ou détruire des composants électroniques sous risque de nuire à la santé !

Raccordement électrique

Lorsque des travaux sont effectués sur le variateur de vitesse sous tension, les prescriptions nationales en vigueur pour la prévention d'accidents doivent être respectées (par exemple VBG 4).

L'installation électrique doit être exécutée en conformité avec les prescriptions proposées (par exemple sections des conducteurs, protection par coupe-circuit à fusibles, raccordement du conducteur de protection). Des renseignements plus détaillés figurent dans la documentation.

Les indications concernant une installation conforme aux exigences de compatibilité électromagnétique, tels que blindage, mise à la terre, présence de filtres et pose adéquate des câbles et conducteurs, figurent dans la documentation qui accompagne les variateurs de vitesse. Ces indications doivent également être respectées pour les variateurs avec marquage CE. Le respect des valeurs limites imposées par la législation sur la CEM relève de la responsabilité du constructeur de l'installation ou de la machine.

En cas de court-circuit ou de mise à la terre accidentelle, les variateurs de vitesse Lenze risquent de provoquer un courant continu de défaut dans le conducteur de protection. Si un disjoncteur différentiel est utilisé pour la protection contre contact direct ou indirect, seul un disjoncteur différentiel de type B est autorisé du côté alimentation. Autrement, il faut prévoir une autre mesure de protection telle que la séparation de l'environnement par une double isolation ou une isolation renforcée ou la séparation du réseau d'alimentation par un transformateur d'isolation.

Fonctionnement

Les installations dans lesquelles sont incorporés des variateurs de vitesse doivent être équipées de dispositifs de protection et de surveillance supplémentaires prévus par les prescriptions de sécurité appropriées en vigueur, telles que la loi sur le matériel technique, les prescriptions pour la prévention d'accidents, etc. Il est possible qu'il faille adapter les variateurs de vitesse à votre application. Respecter les indications à ce sujet figurant dans la documentation.

Après coupure de l'alimentation du variateur, ne pas toucher immédiatement aux éléments conducteurs et aux borniers de puissance précédemment sous tension, en raison des condensateurs éventuellement chargés. A ce sujet, tenir compte des informations indiquées sur les variateurs de vitesse.

Pendant le fonctionnement, les capots de protection et portes doivent rester fermés.

Remarque concernant les installations homologuées UL fonctionnant avec variateurs de vitesse : les instructions "UL warnings" sont des indications uniquement applicables aux installations UL. Cette notice comprend des indications spéciales au sujet de la norme UL.

Arrêt sécurisé

La variante V004 des variateurs de vitesse 9300 et 9300 vector, la variante x4x des variateurs de vitesse 8200 vector et les modules d'axe ECSxAxxx intègrent la fonction "arrêt sécurisé" qui assure la protection contre un démarrage incontrôlé selon l'annexe I n° 1.2.7 de la directive CE relative aux machines 98/37/CE, DIN EN 954-1 catégorie 3 et DIN EN 1037. Respecter impérativement toutes les indications concernant la fonction "arrêt sécurisé" figurant dans cette documentation.

Entretien et maintenance

Les variateurs ne nécessitent aucun entretien à condition de respecter les conditions d'utilisation prescrites.

Dans des ambiances poussiéreuses, il se peut que les surfaces de refroidissement du variateur soient salies ou que les grilles d'aération soient bouchées. Il convient alors de procéder à un nettoyage régulier des surfaces de refroidissement et des grilles d'aération. Ne pas utiliser d'objets pointus ou tranchants !

Traitement des déchets

Les métaux et les matières plastiques sont recyclables. Les cartes électroniques sont à évacuer selon un traitement spécifique.

Tenir impérativement compte des instructions de sécurité et d'utilisation des produits contenues dans ce document !

2.2

Instructions générales de sécurité et d'utilisation relatives aux moteurs Lenze

(conformes à la directive Basse Tension 73/23/CEE)

Généralités

Les machines BT comportent des parties dangereuses, sous tension et tournantes, ainsi que, le cas échéant, des surfaces brûlantes. L'ensemble des opérations relatives au transport, au raccordement, à la mise en service et à la maintenance doit être exécuté par du personnel qualifié et responsable (voir EN 50110-1 (VDE 0105-100) ; CEI 60364). Tout comportement ou maniement inapproprié est susceptible de causer des dommages corporels et matériels graves.

Avec des machines synchrones, des tensions induites sont présentes, lors de la rotation, sur des bornes non protégées.

Utilisation conforme à l'application

Ces machines BT sont destinées à être utilisées dans des installations industrielles. Elles répondent aux normes harmonisées série EN 60034 (VDE 0530). Leur utilisation dans des atmosphères explosives est interdite, à moins qu'elles ne soient expressément prévues à cet effet (respecter les indications supplémentaires).

Sans mesure de protection supplémentaire, les machines dotées d'un indice de protection $\leq$ IP23 ne doivent en aucun cas être utilisées en environnement extérieur. Les machines à refroidissement par air sont conçues pour des températures ambiantes de -15 °C ou -10 °C à +40 °C et des altitudes d'implantation de $\leq$ 1000 m au-dessus du niveau de la mer, de -20 °C à +40 °C sans frein ou avec frein à manque de courant, sans ventilateur ou avec autoventilation, de -15 °C à +40 °C avec frein à aimant permanent et de -10 °C à +40 °C avec motoventilateur. Respecter impérativement les indications éventuellement divergentes figurant sur la plaque signalétique. Les conditions sur site doivent être entièrement conformes aux indications figurant sur la plaque signalétique.

Les machines BT sont des composants destinés à être incorporés dans des machines au sens de la directive sur les machines 98/37/CE. Leur mise en service est interdite tant que la conformité du produit final avec cette directive n'a pas été établie (respecter entre autres la norme EN 60204-1).

Les freins installés ne sont pas des freins de sécurité. On ne peut pas exclure une diminution du couple en raison de conditions défavorables souvent inévitables (exemple : pénétration d'huile à cause de la défaillance de la bague d'étanchéité d'arbre côté A).

Transport, stockage

D'éventuels dommages constatés après la livraison doivent être signalés immédiatement à l'entreprise de transport ; si nécessaire, la mise en service doit être annulée. Les dispositifs de transport vissés doivent être bien serrés. Ils sont dimensionnés en fonction du poids de la machine BT ; par conséquent, aucune charge supplémentaire ne doit leur être appliquée. En cas de besoin, utiliser des moyens auxiliaires de transport appropriés de dimensions adéquates (par exemple chariot élévateur).

Avant la mise en service, enlever les sécurités de transport. Les réutiliser pour d'autres opérations de transport. Lorsque des machines BT sont entreposées, veiller à ce que l'environnement soit sec, exempt de poussière et, dans la mesure du possible, de vibrations ($v_{\text{eff}} \leq 0,2 \text{ mm/s}$) (risque d'endommagement des roulements suite à l'arrêt prolongé des machines). Avant la mise en service, mesurer la résistance d'isolement. En cas de valeurs mesurées $\leq 1 \text{ k}\Omega$ par volt de tension nominale, sécher les enroulements.

Installation

Veiller à une surface d'appui plane, une bonne fixation des pattes, ou selon le cas, des brides, et à un alignement précis en cas d'accouplement direct. Eviter que le montage ne provoque des résonances dues à la fréquence de rotation et à la fréquence d'alimentation. Faire tourner le rotor manuellement pour détecter d'éventuels bruits de fonctionnement anormaux. Vérifier le sens de rotation à l'état désaccouplé (tenir compte de ce qui est dit dans le paragraphe "Raccordement électrique").

Ne monter et démonter les poulies et accouplements qu'à l'aide de dispositifs appropriés (chauffés !) et les protéger contre les contacts par un recouvrement adéquat. Respecter les tensions de courroie préconisées par les fabricants.

Les machines sont équilibrées par demi-clavette. L'équilibrage de l'accouplement doit également se faire par demi-clavette. Faire sortir la clavette de sa rainure.

Le cas échéant, réaliser les raccords de conduits nécessaires aux ouïes d'air. Les modèles avec bout d'arbre orienté vers le bas doivent être recouverts, lors du montage, pour empêcher la chute de corps étrangers dans le ventilateur. La ventilation ne doit pas être entravée et l'air évacué - aussi par un ensemble voisin - ne doit pas être immédiatement réutilisé.

Raccordement électrique

Les travaux ne doivent être effectués que par du personnel qualifié et habilité, la machine étant au repos, alimentation coupée et protégée contre tout réenclenchement intempestif. Ceci vaut également pour les circuits auxiliaires (exemples : frein, codeur, motoventilateur).

Vérifier l'absence de tension !

Tout dépassement des tolérances selon les normes EN 60034-1 ; CEI 34 (VDE 0530-1) (tension $\pm 5\%$, fréquence $\pm 2\%$, forme et symétrie des tensions et courants) a pour effet une augmentation de l'échauffement et influe sur la compatibilité électromagnétique.

Respecter les indications de couplage et les données de la plaque signalétique ainsi que le schéma de raccordement dans la boîte à bornes.

Le raccordement doit être réalisé de manière à assurer une liaison électrique durable et sûre (pas de brins effilochés !) ; utiliser les embouts prévus à cet effet. Réaliser une connexion sécurisée du conducteur de protection. Serrer les prises à fond.

Les distances dans l'air minimales entre les parties nues sous tension et entre celles-ci et la terre ne doivent pas être inférieures aux valeurs suivantes : 8 mm pour $U_N \leq 550$ V, 10 mm pour $U_N \leq 725$ V, 14 mm pour $U_N \leq 1000$ V.

La boîte de connexion ne doit contenir ni corps étranger, ni poussière ni humidité. Les entrées de câbles non utilisées doivent être obturées, la boîte elle-même devant être fermée de façon à être étanche à l'eau et à la poussière. Pour l'essai de fonctionnement sans élément d'entraînement, veiller à ce que la clavette soit immobilisée. Dans le cas des machines BT munies de frein, vérifier le bon état de fonctionnement du frein avant la mise en service de la machine.

Fonctionnement

Des vibrations de vitesse $v_{eff} \leq 3,5$ mm/s ($P_N \leq 15$ kW) ou 4,5 mm/s ($P_N > 15$ kW) en marche couplé sont sans conséquence. En cas d'écart par rapport au fonctionnement normal - par exemple température élevée, bruit, vibrations - en rechercher l'origine. Le cas échéant, contacter le constructeur. En cas de doute, déconnecter la machine BT.

En présence de poussières abondantes, nettoyer régulièrement les ouies de ventilation.

Les dispositifs de protection ne doivent pas être mis hors d'état de marche même lors de l'essai de fonctionnement.

Une sonde thermique installée ne constitue pas une protection totale de la machine, le cas échéant réduire le courant maximal. Réaliser une programmation via blocs fonction assurant une coupure après quelques secondes de fonctionnement à $I > I_n$, surtout dans l'éventualité d'un blocage du rotor.

Les bagues d'étanchéité et les roulements ont une durée de vie limitée.

Les paliers à dispositif de regraissage doivent être regraissés lorsque la machine BT est en marche. Faire attention à la nature du lubrifiant ! Au cas où les trous de sortie de graisse seraient obturés par des bouchons (IP 54 du côté d'entraînement, IP23 des côtés entraînement et opposé à l'entraînement), enlever les bouchons avant la mise en service. Fermer les trous à l'aide de graisse. Les roulements à lubrification permanente (roulement 2Z) doivent être changés après environ 10 000 h à 20 000 h ou au plus tard après 3 à 4 années, ou encore suivant les indications du constructeur.

2.3 Dangers résiduels

2.3.1 Dangers résiduels - module d'alimentation ECSxE

Protection des personnes

- ▶ Avant de procéder aux travaux sur le module d'alimentation, vérifier si toutes les bornes de puissance sont hors tension. En effet,
 - les bornes de puissance +UG, -UG, BR0 et BR1 sont encore sous tension pendant 3 minutes au minimum après la coupure réseau.
- ▶ Pendant le fonctionnement, le radiateur peut atteindre une température $> 70^{\circ}\text{C}$:
 - ne pas toucher au radiateur sous risque de brûlures.
- ▶ Le courant de fuite vers PE est $> 3,5\text{ mA CA}$ ou $> 10\text{ mA CC}$. Prévoir un double raccordement de protection pour le raccordement PE.
 - Respecter la norme EN 50178 concernant des courants de fuite élevés !
- ▶ En fonctionnement du module d'alimentation avec un disjoncteur différentiel :
 - Un pont redresseur de la tension réseau se trouve à l'intérieur des modules d'alimentation. De ce fait, après un court-circuit à la masse, un courant continu de défaut peut empêcher le déclenchement d'un disjoncteur différentiel sensitif courant alternatif ou d'un disjoncteur différentiel sensitif courant impulsionnel et peut inhiber ainsi la fonction de protection de tous les équipements fonctionnant sur ce disjoncteur différentiel.

Protection des appareils

- ▶ Ne retirer ou n'enficher les borniers de raccordement que lorsque l'appareil est hors tension !
- ▶ Les bornes de puissance +UG, -UG et PE ne sont pas protégées contre une inversion de polarité.
 - Lors du câblage, tenir compte de la polarité des bornes de puissance !

2.3.2 Dangers résiduels - module d'axe ECSxA

Protection des personnes

- ▶ Avant de procéder aux travaux sur le module d'axe, vérifier si toutes les bornes de puissance sont hors tension. En effet,
 - les bornes de puissance +UG, -UG, U, V et W sont encore sous tension pendant 3 minutes au minimum après la coupure réseau du module d'alimentation ;
 - le moteur arrêté, les bornes de puissance +UG, -UG, U, V et W sont encore sous tension.
- ▶ Pendant le fonctionnement, le radiateur peut atteindre une température $> 70^{\circ}\text{C}$:
 - ne pas toucher au radiateur sous risque de brûlures.
- ▶ Le courant de fuite vers PE est $> 3,5\text{ mA CA}$ ou $> 10\text{ mA CC}$. Prévoir un double raccordement de protection pour le raccordement PE.
 - Respecter la norme EN 50178 concernant des courants de fuite élevés !

Protection des appareils

- ▶ Ne retirer ou n'enficher les borniers de raccordement que lorsque l'appareil est hors tension !
- ▶ Les bornes de puissance +UG, -UG, U, V, W et PE ne sont pas protégées contre une inversion de polarité.
 - Lors du câblage, tenir compte de la polarité des bornes de puissance !
- ▶ La transmission de puissance ne doit s'effectuer que si tous les appareils reliés en bus CC sont prêts à fonctionner. Autrement, le limiteur du courant d'entrée risque d'être détruit.

Des mises sous tension répétées du module d'alimentation peuvent provoquer une surcharge du limiteur du courant d'entrée du module d'axe et une destruction de celui-ci lorsque

- ▶ le module d'axe est alimenté par le module d'alimentation ECSxE et que la limitation du courant d'entrée en fonction de la tension du bus CC est désactivée (C0175 = 1 ou 2) ;
- ▶ le module d'axe n'est pas alimenté par un module d'alimentation Lenze ;
- ▶ l'alimentation 24 V est coupée.

En cas de mises sous tension régulières, respecter impérativement une durée de 3 minutes entre la coupure et la mise sous tension !

Protection du moteur

- ▶ Certains réglages du module d'axe peuvent provoquer une surchauffe du moteur connecté (exemple : fonctionnement prolongé dans la plage des basses vitesses pour des moteurs autoventilés).

2.3.3 Dangers résiduels - module condensateur ECSxK

Protection des personnes

- ▶ Avant de procéder aux travaux sur le module condensateur, vérifier si toutes les bornes de puissance sont hors tension. En effet,
 - les bornes de puissance +UG et -UG sont encore sous tension pendant 3 minutes au minimum après la coupure réseau du module d'alimentation ;
 - le moteur arrêté, les bornes de puissance +UG et -UG sont encore sous tension.

Protection des appareils

- ▶ Ne retirer ou n'enficher les borniers de raccordement que lorsque l'appareil est hors tension !
- ▶ Les bornes de puissance +UG, -UG et PE ne sont pas protégées contre une inversion de polarité.
 - Lors du câblage, tenir compte de la polarité des bornes de puissance !
- ▶ La transmission de puissance ne doit s'effectuer que si tous les appareils reliés en bus CC sont prêts à fonctionner. Autrement, le limiteur du courant d'entrée risque d'être détruit.

Des mises sous tension répétées du module d'alimentation peuvent provoquer une surcharge du limiteur du courant d'entrée du module condensateur et une destruction de celui-ci lorsque

- ▶ le relais ou l'alimentation 24 V sont coupés ;
- ▶ le module condensateur n'est pas alimenté par un module d'alimentation Lenze.

En utilisant un limiteur du courant d'entrée, respecter impérativement une durée de 3 minutes entre la coupure et la mise sous tension !

2.3.4

Consignes de sécurité pour l'installation selon U_L ou 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 12 ... AWG 8
- ▶ X4, X6, X14
– AWG 28 ... AWG 16
- ▶ X 25
– AWG 24 ... AWG 12



Esta documentación es de aplicación para módulos de eje, módulos de alimentación y módulos de condensador de la serie ECS a partir de la versión:

Módulo de alimentación	ECS	x	e	xxx	c	4	x	xxx	1A	12
Tipo de equipo										
Formato:	E = Equipo empotrable IP20 C = Cold Plate D = Montaje con técnica de perforación									
Corriente continua nominal:	012 = 12 A 020 = 20 A 040 = 40 A									
Interfaces de bus de campo:	C = Systembus CAN									
Categoría de voltaje:	4 = 400 V									
Ejecución técnica:	B = versión estándar I = variante para el funcionamiento en redes IT									
Variante										
Versión de hardware										
Versión de software										

Módulo de eje	ECS	x	a	xxx	c	4	x	xxx	xx	1A	13
Tipo de equipo											
Formato:	E = Equipo empotrable IP20 C = Cold Plate D = Montaje con técnica de perforación										
Corriente punta:	004 = 4 A 008 = 8 A 016 = 16 A 032 = 32 A 048 = 48 A 064 = 64 A										
Interfaces de bus de campo:	C = Systembus CAN										
Categoría de voltaje:	4 = 400 V										
Ejecución técnica:	B = versión estándar I = variante para el funcionamiento en redes IT										
Variante											
Versión de hardware											
Versión de software											

Módulo de condensador		ECS	x	k	xxx	x	4	B	xxx	1A
Tipo de equipo										
Formato:	E = Equipo empotrable IP20 C = Cold Plate D = Montaje con técnica de perforación									
Capacidad:	001 = 705 µF ±20 % 002 = 1410 µF ±20 %									
Categoría de voltaje:	4 = 400 V									
Ejecución técnica:	B = versión estándar I = variante para el funcionamiento en redes IT									
Variante										
Versión de hardware										

Módulo de alimentación ECSxE		Módulo de eje ECSxA	
Posición	Significado	Posición	Significado
X22	Conexiones: - Voltaje del DC bus - PE - Resistencia de frenado externa	X23	Conexiones: - Voltaje del DC bus - PE
LED	Indicación de estado y errores	LED	Indicación de estado y errores
X1	Interface de automatización AIF	X1	Interface de automatización AIF
X2	Conexión PE AIF	X2	Conexión PE AIF
X3	No asignado	X3	Configuración entrada analógica
X4	Conexión CAN	X4	Conexión CAN
		X14	Conexión CAN-AUX
X6	Conexiones: - Entradas digitales - Salidas digitales - Alimentación 24 V	X6	Conexiones: - Entrada analógica - Entradas digitales - Salidas digitales - Alimentación 24 V - Paro seguro
S1	Interruptores: - Dirección CAN - Velocidad de transmisión CAN	S1	Interruptores: - Dirección CAN - Velocidad de transmisión CAN
X21	Conexión red	X7	Conexión resolver
		X8	Conexión: - Encoder o - simulación de encoder
		X25	Conexión control de frenos
		X24	Conexión motor

Módulo de condensador ECSxK	
Posición	Significado
X23	Conexiones: - Voltaje del DC bus - PE
X26	Conexión alimentación de 24 V

1 Instalación de los módulos ECS

1 Instalación de los módulos ECS

Instale el módulo de condensador entre el módulo de alimentación y el módulo de eje:

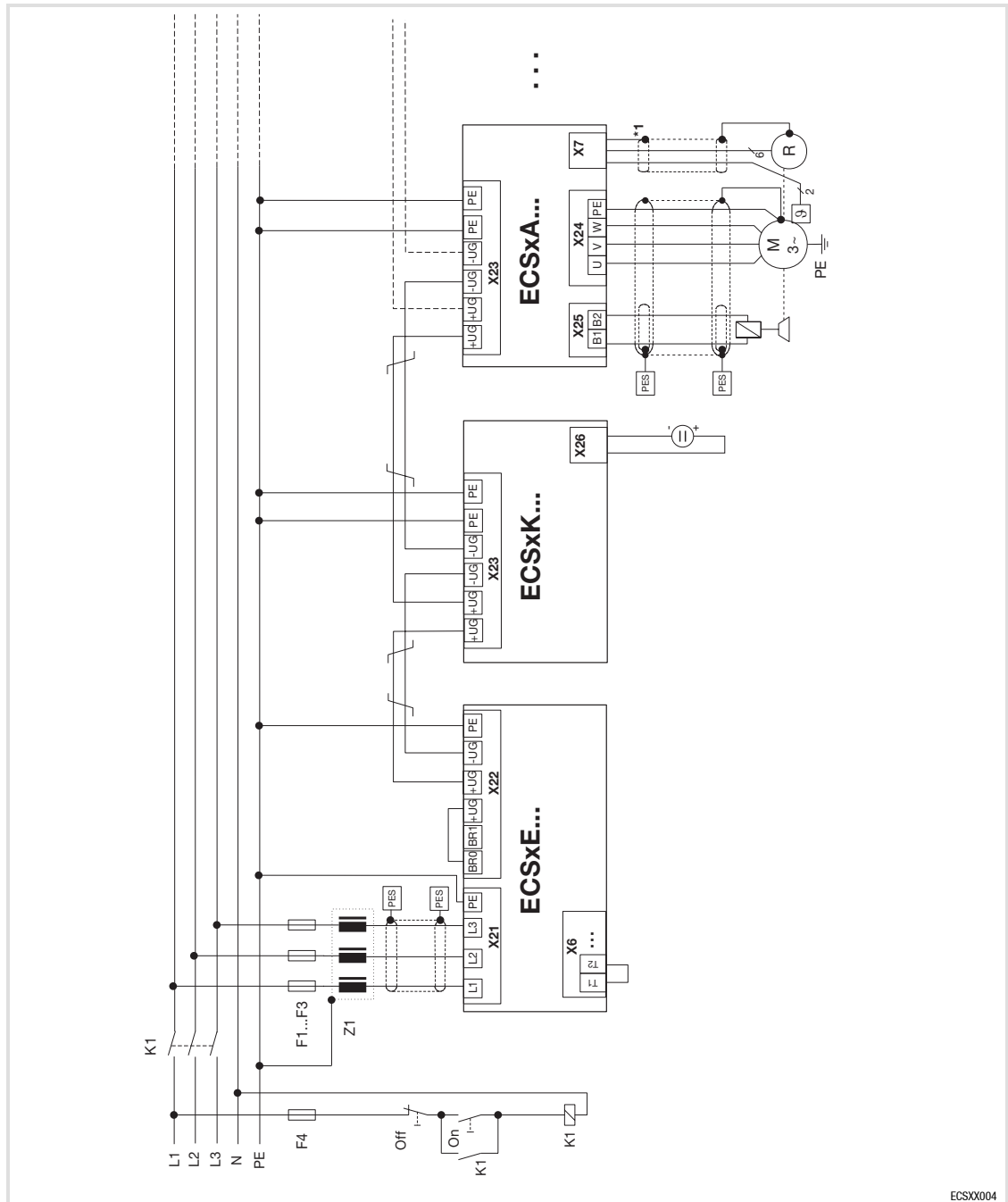


Fig.7-1 Conexión de los módulos ECS

- PES** Terminación de malla mediante conexión de gran superficie a PE
-  Cables trenzados
- *1** Cable de sistema - realimentación

2 Seguridad

2.1 Instrucciones de seguridad y uso para convertidores Lenze

(según Directiva de Bajo Voltaje 73/23/CEE)

Generalidades

Los reguladores de accionamiento Lenze (convertidores de frecuencia, servo-convertidores, controladores) y sus correspondientes componentes, pueden presentar, dependiendo del tipo de seguridad incorporado, piezas bajo tensión, así como piezas móviles o giratorias. Las superficies pueden estar calientes.

La retirada no autorizada de la cubierta necesaria, el uso inadecuado o la instalación u operación incorrecta pueden ocasionar serios daños a personas o materiales.

Para más información consulte la documentación correspondiente.

Todos los trabajos relacionados con el transporte, la instalación, la puesta en marcha y el mantenimiento han de ser realizados por personal cualificado (se han de observar las normas IEC 364, CENELEC HD 384 o DIN VDE 0100 y IEC-Report 664 o DIN VDE 0110 así como la normativa nacional referente a la prevención de accidentes).

Personal cualificado en el sentido de estas instrucciones de seguridad son aquellas personas que están familiarizadas con la instalación, montaje, puesta en marcha y operación del producto y que disponen de la cualificación correspondiente para el desarrollo de dichas actividades.

Uso apropiado

Los convertidores son componentes previstos para ser montados en instalaciones o máquinas eléctricas. No son electrodomésticos, sino componentes para ser utilizados con fines industriales o profesionales en el sentido de la norma EN 61000-3-2. La documentación contiene información para el mantenimiento de los valores límite según la norma EN 61000-3-2.

En el caso de montar los convertidores en máquinas, la puesta en marcha (es decir la incorporación en la operación según lo indicado) no está permitida hasta que se haya determinado si la máquina cumple con las disposiciones de la Directiva CE 98/37/CE (Directiva de Máquinas); observar la norma EN 60204.

La puesta en marcha (es decir la incorporación en la operación según lo indicado) sólo está permitida bajo cumplimiento de la Directiva sobre Compatibilidad Electromagnética (89/336/CEE).

Los convertidores cumplen con las exigencias de la Directiva de Bajo Voltaje 73/23/CEE. Las normas armonizadas de la serie EN 50178/DIN VDE 0160 han sido aplicadas para los convertidores.

Los datos técnicos y las instrucciones sobre las condiciones de conexión se encuentran en la placa de identificación y en la documentación. Estas se han de cumplir obligatoriamente.

Advertencia: Los convertidores son productos con disponibilidad limitada según la norma EN 61800-3. Estos productos pueden ocasionar radiointerferencias en el ámbito doméstico. En tal caso puede ser necesario para el usuario tomar las medidas adecuadas.

Transporte, almacenaje

Se han de observar las instrucciones para el transporte, almacenaje y la manipulación correcta.

Observe las condiciones climatológicas según la norma EN 50178.

Montaje

La instalación y refrigeración de los convertidores se ha de realizar de acuerdo con las directrices que figuran en la documentación correspondiente.

Los equipos se han de manipular con cuidado y se han de evitar sobrecargas mecánicas. Sobre todo se ha de evitar que durante el transporte y la manipulación se doblen elementos de la máquina y/o se modifiquen las distancias de aislamiento. También se ha de evitar entrar en contacto con elementos electrónicos y contactos.

Los convertidores contienen elementos sensibles a la electrostática que se pueden dañar fácilmente si no se manipulan correctamente. ¡No dañar ni destruir elementos electrónicos ya que podrían ocasionar riesgos para la salud!

Conexión eléctrica

Al trabajar con convertidores bajo tensión, se ha de observar la normativa nacional referente a la prevención de accidentes (p.ej. VBG 4).

La instalación eléctrica se ha de realizar de acuerdo con la normativa vigente (p.ej. secciones de cable, fusibles, conexión de los cables de puesta a tierra). Para más información consulte la documentación correspondiente.

La documentación contiene las instrucciones para la instalación según las disposiciones sobre EMC (mallado, puesta a tierra, posición de los filtros y cableado). Observe estas instrucciones incluso al trabajar con convertidores que lleven la marca CE. El cumplimiento de los valores límite impuestos por la normativa EMC es responsabilidad del fabricante de la instalación o de la máquina.

En caso de fallo (contacto a masa o a tierra) los reguladores Lenze pueden causar una corriente continua de defecto en el cable de puesta a tierra. Si para la protección en caso de contacto directo o indirecto se utiliza un conmutador protector contra corriente de defecto (equipo de corriente diferencial), en el lado de la alimentación de corriente sólo está permitido el uso de un conmutador protector contra corriente de defecto del tipo B. En caso contrario se deberá aplicar una medida de seguridad distinta, como p.ej. la separación del entorno mediante aislamiento doble o reforzado de la red de alimentación a través de un transformador.

Funcionamiento

Las instalaciones en las que se haya incorporado un convertidor, en algunos casos se deberán equipar con dispositivos adicionales de control y protección, en cumplimiento de la normativa de seguridad correspondiente (p. ej. ley sobre medios de trabajo técnicos, normativa sobre prevención de accidentes). El convertidor puede ser adaptado a la aplicación deseada. Para ello se han de tener en cuenta las instrucciones correspondientes en la documentación.

Después de desconectar el convertidor de la fuente de alimentación, no se deberán tocar inmediatamente las piezas y conexiones vivas debido a la posibilidad de que algunos condensadores estén cargados. Observe las correspondientes placas de instrucciones en el convertidor.

Durante el funcionamiento, todas las cubiertas y puertas deberán permanecer cerradas.

Nota para instalaciones con aprobación UL con convertidores incorporados: UL warnings son instrucciones que sólo son de aplicación para instalaciones UL. La documentación contiene instrucciones especiales para UL.

Paro seguro

La variante V004 de los convertidores 9300 y 9300 vector, la variante x4x de los convertidores 8200 vector y los módulos de eje ECSxAxxx soportan la función "Paro seguro", protección contra arranque inesperado, según los requisitos del Anexo I nº 1.2.7 de la Directiva CE "Máquinas" 98/37/EG, DIN EN 954-1 categoría 3 y DIN EN 1037. Es indispensable observar las instrucciones relativas a la función "Paro seguro" en la documentación de las variantes.

Mantenimiento y servicio

Los convertidores no precisan de mantenimiento si se cumplen las condiciones de uso indicadas.

Si el aire del entorno está contaminado, las superficies de refrigeración del regulador se podrían ensuciar o se podrían atascar las aberturas de refrigeración. En consecuencia, bajo condiciones de funcionamiento como estas, las superficies y aberturas de refrigeración se deberán limpiar regularmente. ¡Nunca utilizar para ello objetos afilados o puntiagudos!

Eliminación

Los metales y plásticos se deberán llevar a reciclar. Eliminar correctamente las placas de circuitos.

¡Es indispensable observar las instrucciones de seguridad y uso específicas del producto que se encuentran en este manual!

2.2**Instrucciones de seguridad y uso para motores Lenze**

(según Directiva de Bajo Voltaje 73/23/CEE)

Generalidades

Los equipos de bajo voltaje tienen piezas bajo tensión y giratorias peligrosas, así como posiblemente superficies calientes. Todos los trabajos relativos al transporte, conexión, puesta en marcha y mantenimiento han de ser realizados por personal cualificado y responsable (observar las normas EN 50110-1 (VDE 0105-100); IEC 60364). El comportamiento incorrecto puede ocasionar serios daños personales y materiales.

En el caso de máquinas síncronas, cuando la máquina esté girando se puede inducir tensión incluso en los bornes abiertos.

Uso apropiado

Estas máquinas de bajo voltaje están previstas para instalaciones industriales. Cumplen con los requisitos de las normas armonizadas de la serie EN 60034 (VDE 0530). El uso en atmósferas potencialmente explosivas está prohibido salvo que hayan sido previstos especialmente para ello (ver instrucciones adicionales).

No utilizar los tipos de protección $\leq$ IP23 en el exterior sin aplicar medidas protectoras especiales. Los modelos refrigerados por aire están dimensionados para temperaturas ambiente de -15 °C resp. -10 °C hasta +40 °C y alturas de montaje de $\leq$ 1000 m snm, desde -20 °C hasta +40 °C sin freno o con freno de muelle, sin ventilar o con autoventilación, desde -15 °C hasta +40 °C con freno de imán permanente y desde -10 °C hasta +40 °C con ventilación forzada. Es importante observar las instrucciones especiales en la placa del equipo. Las condiciones en el lugar de uso han de corresponder con las instrucciones y datos de la placa de características.

Los equipos de bajo voltaje son componentes para ser montados en máquinas de acuerdo con la Directiva de Máquinas 98/37/CE. La puesta en marcha no está permitida hasta que se compruebe la conformidad del producto final con esta directiva (observar entre otras EN 60204-1).

Los frenos incorporados no son frenos de seguridad. No se puede descartar que por factores sobre los que no se puede influir, p.ej. entrada de aceite por fallo de la junta del eje en el lado A, pueda aparecer una reducción de par.

Transporte, almacenaje

Los daños detectados tras la entrega se han de comunicar de inmediato al transportista. Dado el caso se deberá evitar la puesta en marcha. Ajustar firmemente los cáncamos para el transporte atornillados. Están dimensionados para el peso del equipo de bajo voltaje, no se deberán aplicar cargas adicionales. Si es necesario, utilizar medios de transporte adecuadamente dimensionados (p.ej. guías de cables).

Retirar seguros de transporte antes de la puesta en marcha. Guardarlos para eventuales transportes posteriores. Si los equipos de bajo voltaje han de ser almacenados, se ha de tener en cuenta que sea un entorno seco, libre de polvo y vibraciones ($v_{\text{eff}} \leq 0,2 \text{ mm/s}$) (daño de los cojinetes). Medir resistencia de aislamiento antes de la puesta en marcha. En caso de valores $\leq 1 \text{ k}\Omega$ por voltio de voltaje nominal, secar bobinado.

Montaje

Los equipos se han de montar sobre una superficie plana, con correcta sujeción de las patas o bridas y, en caso de acoplamiento directo, en dirección correcta. Evitar resonancias debidas al montaje con la frecuencia de giro y la doble frecuencia de alimentación. Girar el inducido a mano y prestar atención por si se generan ruidos de arrastre no habituales. Controlar sentido de giro en estado desacoplado (ver sección 5).

Colocar y retirar poleas y acoplamientos sólo con los dispositivos adecuados (¡calentamiento!) y cubrir con una protección contra el contacto. Evitar tensiones no permitidas en la polea (lista técnica).

Las máquinas han sido equilibradas a media chaveta. El acoplamiento también tiene que ser equilibrado a media chaveta. Eliminar trozo sobresaliente de la chaveta.

Dado el caso montar las conexiones de tubo necesarias. Los modelos con extremo de eje hacia arriba, deberán ser equipados por el cliente con una cubierta para evitar que caigan cuerpos extraños dentro del ventilador. La ventilación no debe quedar impedida y el aire de salida - incluyendo el de módulos vecinos - no debe ser aspirado inmediatamente.

Conexión eléctrica

Todos los trabajos deben ser realizados por personal experto cualificado, con el equipo de bajo voltaje apagado, en estado habilitado pero protegido contra posible conexiones. Esto también es de aplicación para circuitos de corriente auxiliares (p.ej. freno, encoder, ventilador externo).

¡Comprobar que esté libre de tensión!

El superar las tolerancias de EN 60034-1; IEC 34 (VDE 0530-1) - voltaje $\pm 5\%$, frecuencia $\pm 2\%$, forma de curva, simetría - incrementa el calentamiento e influye sobre la compatibilidad electromagnética.

Se han de observar las instrucciones para la conexión, las indicaciones en la placa del equipo y el esquema de conexiones de la caja de conexiones.

La conexión se ha de realizar de tal manera que se establezca y mantenga una unión eléctrica segura y duradera (sin extremos de cables sobresalientes); utilizar los terminales de cable correspondientes. Establecer una conexión segura de los cables de puesta a tierra. Roscar los conectores hasta el tope.

Las distancias mínimas entre piezas desnudas y bajo tensión y tierra no deben estar por debajo de los siguientes valores: 8 mm si $U_N \leq 550\text{ V}$, 10 mm si $U_N \leq 725\text{ V}$, 14 mm si $U_N \leq 1000\text{ V}$.

La caja de conexiones debe estar libre de cuerpos extraños, suciedad y humedad. Las aberturas para el paso de cables y la caja misma han de estar cerradas de forma hermética y protegidas contra el polvo. Para el funcionamiento de prueba sin elementos de salida se deberá asegurar la chaveta. En el caso de equipos de bajo voltaje con freno, comprobar el funcionamiento correcto del freno antes de la puesta en marcha.

Funcionamiento

Vibraciones $v_{\text{eff}} \leq 3,5 \text{ mm/s}$ ($P_N \leq 15 \text{ kW}$) o resp. $4,5 \text{ mm/s}$ ($P_N > 15 \text{ kW}$) no son preocupantes durante el funcionamiento acoplado. En el caso de aparecer cambios en relación con el funcionamiento normal, p.ej. temperaturas más elevadas, ruidos o vibraciones, determinar la causa y, dado el caso, consultar al fabricante. En caso de duda, desconectar el equipo de bajo voltaje.

En caso de entornos con fuerte generación de suciedad, limpiar las vías de aire regularmente.

Los dispositivos de protección se han de mantener en funcionamiento incluso durante las pruebas de funcionamiento.

Los sensores de temperatura incorporados no son una protección total para la máquina, dado el caso, limitar la corriente máxima. Realizar la conexión de bloques de función con desconexión tras unos segundos de funcionamiento con $I > I_N$, especialmente en caso de peligro de bloqueo.

Las juntas de los ejes y los rodamientos tienen una vida útil limitada.

Los alojamientos con dispositivo de engrase se han de engrasar estando el equipo de bajo voltaje en funcionamiento. Observar tipo de saponificación. Si los agujeros para la salida de grasa están cerrados con tapones (IP54 lado salida; IP23 lado salida y lado no salida), retirar los tapones antes de la puesta en marcha. Tapar agujeros con grasa. Cambio de alojamientos en caso de engrase permanente (alojamientos 2Z) tras aprox. 10.000 h - 20.000 h, aunque a más tardar a los 3 - 4 años, dependiendo de los datos del fabricante.

2.3 Peligros residuales

2.3.1 Peligros residuales del módulo de alimentación ECSxE

Protección personal

- ▶ Antes de trabajar con el módulo de alimentación, compruebe que todos los bornes de potencia están libres de voltaje ya que
 - tras la desconexión de la corriente de red, los bornes de potencia +UG, -UG, BR0 y BR1 siguen vivos durante por lo menos 3 minutos.
- ▶ La temperatura de funcionamiento del radiador es $> 70\text{ °C}$:
 - El contacto de la piel con el radiador puede causar quemaduras.
- ▶ La corriente de fuga contra PE es $> 3,5\text{ mA AC}$ o resp. $> 10\text{ mA DC}$. En consecuencia, para disponer de la protección suficiente, la conexión PE es doble.
 - ¡Respetar con las condiciones de la norma EN 50178 respecto a altas corrientes de fuga!
- ▶ Si el módulo de alimentación está funcionando con el conmutador protector contra corriente de fuga:
 - Los módulos de alimentación llevan incorporado un controlador de red interno. En caso de contacto a masa, una corriente continua de defecto sin impulsos podría bloquear la reacción de un conmutador de protección contra corriente de defecto sensible a la corriente alterna o corriente de impulso y, en consecuencia, eliminar la función protectora para todos los componentes operados con este conmutador de protección.

Protección de los equipos

- ▶ ¡Enchufar o desenchufar los bornes de conexión enchufables sólo cuando estén libres de tensión!
- ▶ Los bornes de potencia +UG, -UG y PE no han sido diseñados con protección contra polarización inversa.
 - ¡Observar la polaridad de los bornes de potencia durante el cableado!

2.3.2 Peligros residuales del módulo de eje ECSxA**Protección personal**

- ▶ Antes de trabajar con el módulo de eje, compruebe que todos los bornes de potencia estén libres de voltaje ya que
 - tras la desconexión de la corriente de red en el módulo de alimentación, los bornes de potencia +UG, -UG, U, V y W siguen vivos durante por lo menos 3 minutos.
 - estando el motor parado, los bornes de potencia +UG, -UG, U, V y W siguen vivos.
- ▶ La temperatura de funcionamiento del radiador es $> 70^{\circ}\text{C}$:
 - El contacto de la piel con el radiador puede causar quemaduras.
- ▶ La corriente de fuga contra PE es $> 3,5\text{ mA AC}$ o resp. $> 10\text{ mA DC}$. En consecuencia, para disponer de la protección suficiente, la conexión PE es doble.
 - ¡Respetar con las condiciones de la norma EN 50178 respecto a altas corrientes de fuga!

Protección de los equipos

- ▶ ¡Enchufar o desenchufar los bornes de conexión enchufables sólo cuando estén libres de tensión!
- ▶ Los bornes de potencia +UG, -UG, U, V, W y PE no han sido diseñados con protección contra polarización inversa.
 - ¡Observar la polaridad de los bornes de potencia durante el cableado!
- ▶ Sólo se podrá transferir potencia una vez que todos los equipos interconectados estén listos para funcionar. En caso contrario podría resultar destruida la limitación de corriente de entrada.

La conexión y desconexión cíclica del voltaje de red en el módulo de alimentación puede sobrecargar la limitación de corriente de entrada del módulo de eje y destruirlo si

- ▶ el módulo de eje está siendo alimentado a través del módulo de alimentación ECSXE y la limitación de corriente de entrada se desconecta dependiendo del voltaje del DC bus ($C0175 = 1$ o 2).
- ▶ el módulo de eje está siendo alimentado a través de un módulo de alimentación no suministrado por Lenze.
- ▶ la alimentación de 24 V esté desconectada.

¡Por ello, bajo estas condiciones de funcionamiento con conexión cíclica a red durante un largo período, deben pasar por lo menos 3 minutos entre dos procesos de conexión!

Protección del motor

- ▶ Bajo determinadas configuraciones de los módulos de eje, el motor conectado se podría sobrecalentar, p.ej. funcionamiento durante largo tiempo de motores autoventilados a bajas velocidades.

2.3.3 Peligros residuales del módulo de condensador ECSxK

Protección personal

- ▶ Antes de trabajar con el módulo de condensador, compruebe que todos los bornes de potencia están libres de voltaje ya que
 - tras la desconexión de la corriente de red en el módulo de alimentación, los bornes de potencia +UG y -UG siguen vivos durante por lo menos 3 segundos.
 - estando el motor parado, los bornes de potencia +UG y -UG siguen vivos.

Protección de los equipos

- ▶ ¡Enchufar o desenchufar los bornes de conexión enchufables sólo cuando estén libres de tensión!
- ▶ Los bornes de potencia +UG, -UG y PE no han sido diseñados con protección contra polarización inversa.
 - ¡Observar la polaridad de los bornes de potencia durante el cableado!
- ▶ Sólo se podrá transferir potencia una vez que todos los equipos interconectados estén listos para funcionar. En caso contrario podría resultar destruida la limitación de corriente de entrada.

La conexión y desconexión cíclica del voltaje de red en el módulo de alimentación puede sobrecargar la limitación de corriente de entrada del módulo de condensador y destruirlo si

- ▶ el relé o la alimentación de 24 V está desconectada.
- ▶ el módulo de condensador está siendo alimentado a través de un módulo de alimentación no suministrado por Lenze.

¡Si se utiliza la limitación de corriente de entrada, en caso de conexión cíclica a red durante un largo período, deben pasar por lo menos 3 minutos entre dos procesos de conexión!

2.3.4

Instrucciones de seguridad para la instalación según U_L o 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 12 ... AWG 8
- ▶ X4, X6, X14
– AWG 28 ... AWG 16
- ▶ X 25
– AWG 24 ... AWG 12



La presente documentazione è valida per moduli asse, moduli di alimentazione e moduli condensatore della serie ECS a partire dalla seguente versione:

Modulo di alimentazione		ECS	x	E	xxx	C	4	x	xxx	1A	12
Tipo di dispositivo											
Forma costruttiva:	E = Dispositivo incorporato IP20 C = Cold Plate D = Montaggio Push-Through										
Corrente continua nominale:	012 = 12 A 020 = 20 A 040 = 40 A										
Interfacce bus di campo:	C = System bus CAN										
Classe di tensione:	4 = 400 V										
Esecuzione tecnica:	B = Esecuzione standard I = Variante per funzionamento in reti IT										
Variante											
Versione hardware											
Versione software											

[illegible]

Modulo condensatore		ECS	x	K	xxx	x	4	B	xxx	1A
Tipo di dispositivo										
Forma costruttiva:	E = Dispositivo incorporato IP20 C = Cold Plate D = Montaggio Push-Through									
Capacità:	001 = 705 µF ±20 % 002 = 1410 µF ±20 %									
Classe di tensione:	4 = 400 V									
Esecuzione tecnica:	B = Esecuzione standard I = Variante per funzionamento in reti IT									
Variante										
Versione hardware										

ECSxE - Modulo di alimentazione		ECSxA - Modulo asse	
Posizione	Significato	Posizione	Significato
X22	Collegamenti: - Tensione DC bus - PE - Resistenza di frenatura esterna	X23	Collegamenti: - Tensione DC bus - PE
LED	Visualizzazione stato ed errori	LED	Visualizzazione stato ed errori
X1	Interfaccia di automazione AIF	X1	Interfaccia di automazione AIF
X2	Collegamento PE AIF	X2	Collegamento PE AIF
X3	Non assegnato	X3	Configurazione ingresso analogico
X4	Collegamento CAN	X4	Collegamento CAN
		X14	Collegamento CAN-AUX
X6	Collegamenti: - Ingressi digitali - Uscite digitali - Alimentazione 24 V	X6	Collegamenti: - Ingresso analogico - Ingressi digitali - Uscite digitali - Alimentazione 24 V - Arresto sicuro
S1	Switch: - Indirizzo CAN - Velocità di trasmissione CAN	S1	Switch: - Indirizzo CAN - Velocità di trasmissione CAN
X21	Collegamento rete	X7	Collegamento resolver
		X8	Collegamento: - Encoder o - Simulazione encoder
		X25	Collegamento comando freni
		X24	Collegamento motore

ECSxK - Modulo condensatore	
Posizione	Significato
X23	Collegamenti: - Tensione DC bus - PE
X26	Collegamento alimentazione 24 V

1 Installazione dei moduli ECS

1 Installazione dei moduli ECS

Installare il modulo condensatore tra il modulo di alimentazione e il modulo asse:

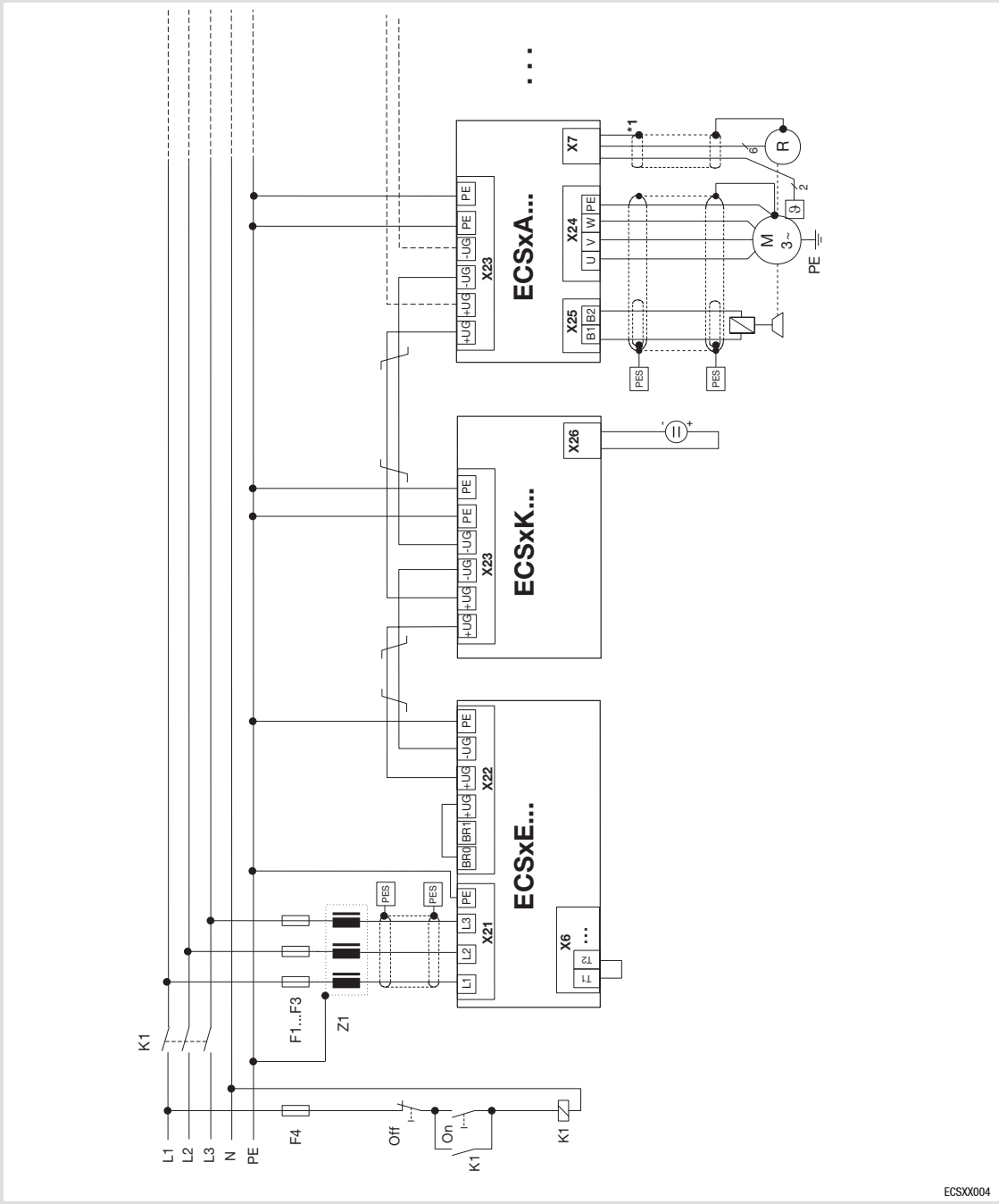


Fig.9-1 Schema di collegamento moduli ECS

PES Terminazione schermatura HF con connessione a PE ad ampia superficie

Cavi trasposti

***1** Linea di sistema - retroazione

2 Sicurezza

2.1 Norme generali di utilizzo e di sicurezza per controlli Lenze

(ai sensi della Direttiva Bassa Tensione 73/23/CEE)

Informazioni generali

Durante il funzionamento, a seconda del tipo di protezione, i controlli Lenze (inverter, servoinverter, convertitori) e i relativi componenti possono presentare parti in tensione, non isolate, mobili e/o rotanti, nonché parti con superfici bollenti.

La rimozione della necessaria copertura, l'impiego non idoneo, l'installazione o l'utilizzo errati possono procurare gravi danni a cose e/o persone.

Per ulteriori informazioni consultare la documentazione acclusa.

Tutte le operazioni di trasporto, installazione, messa in servizio e manutenzione devono essere affidate a personale altamente qualificato (fare riferimento alle norme IEC 364 o CENELEC HD 384 oppure DIN VDE 0100 e IEC-Report 664 o DIN VDE 0110, nonché alle norme antinfortunistiche nazionali).

Ai sensi delle predette fondamentali norme di sicurezza, per "personale qualificato" si intendono persone che hanno esperienza nell'installazione, nel montaggio, nella messa in servizio e nell'utilizzo del prodotto e che dispongono delle qualifiche professionali idonee a svolgere la propria attività.

Campi di applicazione

I controlli sono componenti destinati all'installazione in impianti o macchinari elettrici. Non sono da intendersi per uso domestico, bensì esclusivamente per l'impiego in ambito industriale o professionale ai sensi della norma EN 61000-3-2. La presente documentazione contiene indicazioni sull'osservanza dei limiti in base alla EN 61000-3-2.

In seguito all'installazione, la messa in servizio del controllo (ossia il relativo utilizzo per l'impiego preposto) potrà essere eseguita solo quando sarà stato appurato che la macchina in cui è installato è conforme alle disposizioni della direttiva comunitaria 98/37/CEE (Direttiva Macchine); fare riferimento alla norma EN 60204.

La messa in servizio (ossia l'utilizzo per l'impiego preposto) è permessa soltanto in osservanza della Direttiva (89/336/CEE).

I controlli soddisfano i requisiti della Direttiva Bassa Tensione 73/23/CEE. Per i controlli si applicano le norme armonizzate della serie EN 50178/DIN VDE 0160.

La targhetta e la documentazione forniscono i dati tecnici e le informazioni circa le condizioni di allacciamento. Osservare assolutamente tali indicazioni.

Avvertenza: i controlli sono prodotti a reperibilità limitata ai sensi della norma EN 61800-3. Questi prodotti possono causare radiodisturbi in aree residenziali. In tal caso, l'utilizzatore dovrà adottare le necessarie contromisure.

Trasporto e magazzinaggio

Rispettare le indicazioni per il trasporto, la conservazione a magazzino e l'uso conforme.

Attenersi alle indicazioni climatiche come da EN 50178.

Installazione

Installare e raffreddare i controlli secondo quanto indicato nella documentazione acclusa.

Maneggiare con attenzione ed evitare un sovraccarico meccanico. Non piegare alcun componente durante il trasporto e l'uso, né variare le distanze di isolamento. Non toccare gli elementi e i contatti elettronici.

I controlli contengono componenti elettrostatiche pericolose, che possono essere danneggiate da manovre improprie. Eventuali danni meccanici a componenti elettriche e/o la relativa distruzione possono mettere in serio pericolo l'incolumità personale.

Collegamento elettrico

In caso di interventi su controlli in tensione, osservare le norme nazionali antinfortunistiche in vigore.

Eseguire il collegamento elettrico secondo le normative applicabili (ad es., sezione dei cavi, protezioni, attacco del conduttore di protezione). La documentazione contiene ulteriori informazioni al riguardo.

La documentazione contiene indicazioni per l'installazione a norma EMC (schermatura, collegamento a terra, sistemazione dei filtri e posa dei cavi). Tali istruzioni vanno osservate anche nel caso di controlli contrassegnati dalla sigla CE. Il produttore dell'impianto o del macchinario è responsabile dell'osservanza dei valori-limite richiesti dalla legislazione sulla compatibilità elettromagnetica (EMC).

In caso di guasto (contatto a massa o a terra), i controlli Lenze possono indurre una corrente continua di guasto nel conduttore di protezione. Se per la protezione da contatto diretto o indiretto si utilizza un interruttore automatico (differenziale di corrente), sul lato dell'alimentazione è consentito solo l'utilizzo di un interruttore automatico di tipo B. In caso contrario è necessario intraprendere una ulteriore misura di protezione, quali l'applicazione di un isolamento rafforzato o doppio o la separazione dalla rete di alimentazione mediante un trasformatore.

Utilizzo

È necessario dotare gli impianti con controlli incorporati di eventuali apparecchiature di sorveglianza e di protezione ausiliarie in base alle disposizioni sulla sicurezza di volta in volta vigenti (ad es., legislazione sulla strumentazione tecnica, norme antinfortunistiche e così via). È consentito apportare modifiche alla configurazione del controllo. Al riguardo, seguire le indicazioni fornite nella documentazione.

Dopo avere staccato il controllo dalla tensione di alimentazione, non è possibile toccare subito le parti sotto tensione e i collegamenti di potenza perché i condensatori possono essere carichi. Attenersi a quanto riportato sulla targhetta di avvertenza posta sul controllo.

Durante l'impiego, tenere chiuse tutte le coperture di protezione e gli sportelli.

Nota sugli impianti omologati UL con controlli incorporati: Le note "UL Warning" sono avvertenze valide solo per gli impianti UL. La documentazione include indicazioni speciali per gli impianti UL.

Arresto sicuro

La variante V004 del controllo 9300 e 9300 vector, la variante x4x del controllo 8200 vector e il modulo asse ECSxAxxx supportano la funzione "arresto sicuro", contro il rischio di avviamento imprevisto, secondo quanto stabilito nell'appendice I n° 1.2.7 della Direttiva Comunitaria "Macchine" 98/37/CEE, nonché nelle norme DIN EN 954-1 Categoria 3 e DIN EN 1037. Attenersi scrupolosamente alle indicazioni riportate al riguardo nella documentazione delle diverse varianti.

Manutenzione

I controlli non richiedono alcuna manutenzione se vengono rispettate le condizioni di impiego prescritte.

Qualora l'aria dell'ambiente di utilizzo non sia pulita, le superfici di raffreddamento del controllo potrebbero sporcarsi o le aperture di raffreddamento potrebbero otturarsi. In tali condizioni operative, pulire regolarmente le superfici e le aperture di raffreddamento. Per la pulizia, non utilizzare mai oggetti taglienti o appuntiti.

Smaltimento

Provvedere al riciclaggio di metallo e plastica. Smaltire correttamente le schede PCB assemblate.

Rispettare le indicazioni specifiche relative all'utilizzo e alla sicurezza riportate nel presente manuale.

2.2

Norme generali di utilizzo e di sicurezza per motori Lenze

(ai sensi della Direttiva Bassa Tensione 73/23/CEE)

Informazioni generali

Le apparecchiature a bassa tensione presentano parti pericolose, perché in tensione e/o rotanti, e talvolta superfici bollenti. Tutte le operazioni di trasporto, installazione, messa in servizio e manutenzione devono essere affidate a personale altamente qualificato, facendo riferimento alle norme EN 50110-1 (VDE 0105-100) e IEC 60364. Un comportamento improprio può essere causa di gravi danni a persone e/o cose.

Durante il funzionamento di macchine sincrone, vengono indotte tensioni anche sui morsetti aperti.

Campi di applicazione

Le apparecchiature a bassa tensione sono destinate all'impiego in impianti industriali e sono conformi alle norme armonizzate della serie EN 60034 (VDE 0530). È vietato il loro impiego in aree a rischio esplosione, a meno che non siano espressamente destinate a tale scopo (attenersi a eventuali indicazioni supplementari).

Non utilizzare tipi di protezione $\leq$ IP23 all'aperto senza speciali misure di protezione. I modelli raffreddati ad aria sono tarati per temperature ambientali che vanno da -15°C o -10°C fino a $+40^{\circ}\text{C}$ e per un'altitudine di installazione di ≤ 1000 m s.l.m., da -20°C a $+40^{\circ}\text{C}$ senza freno o con freno a molle, non ventilato o con autoventilazione, da -15°C a $+40^{\circ}\text{C}$ con freno a magneti permanenti e da -10°C a $+40^{\circ}\text{C}$ con servoventilazione. Attenersi scrupolosamente a eventuali specifiche divergenti riportate sulla targhetta dei dati. Le condizioni sul luogo di impiego devono essere conformi ai dati riportati sulla targhetta.

Gli apparecchi a bassa tensione sono componenti integrati in altri macchinari ai sensi della Direttiva Macchine 98/37/CEE. Ne è vietata la messa in servizio, fino a quando non sia stata appurata la conformità del prodotto finale a tale normativa (far riferimento, tra l'altro, alla norma EN 60204-1).

I freni installati non sono freni di sicurezza. Non si può escludere che fattori di non particolare influenza, come ad es. l'infiltrazione di olio a causa di un guasto della guarnizione ad anello dell'albero del lato A, possano condurre ad una riduzione della coppia.

Trasporto e magazzinaggio

Dopo la consegna, comunicare immediatamente eventuali danni alla ditta di trasporti; in questo caso la messa in servizio è da escludere. Stringere accuratamente i golfari di trasporto. Poiché tarati per il peso dell'apparecchiatura a bassa tensione, non applicare alcun carico aggiuntivo. Se necessario, utilizzare ausili di trasporto di dimensioni adeguate (ad es. passacavi).

Prima della messa in servizio, rimuovere tutte le protezioni utilizzate per il trasporto. In caso di ulteriori spostamenti usarne di nuove. Qualora le apparecchiature a bassa tensione vengano tenute a magazzino, fare attenzione che l'ambiente sia asciutto, privo di polvere ed esente da vibrazioni ($v_{\text{eff}} \leq 0,2$ mm/s) (danni da inattività a magazzino). Prima della messa in servizio, misurare la resistenza di isolamento. In caso di valori ≤ 1 k Ω per ogni volt di tensione di taratura, asciugare l'avvolgimento.

Installazione

Su una superficie piana assicurare i piedi o le flange di fissaggio e l'esatto allineamento in accoppiamento diretto. Evitare risonanze condizionate dal montaggio con la frequenza di rotazione e con la doppia frequenza di alimentazione. Girare il rotore manualmente, fare attenzione a insoliti fruscii. Controllare il senso di rotazione in condizione di non accoppiamento (v. capitolo 5).

Montare e smontare le pulegge e i giunti solamente con gli appositi attrezzi (riscaldamento!) e coprire con una protezione contro le scariche. Evitare tensioni della cinghia non ammissibili (v. dati tecnici).

Le macchine sono equilibrate con metà linguetta. L'equilibratura del giunto deve quindi avvenire allo stesso modo con metà linguetta. Resecare le estremità della linguetta sporgenti.

Creare gli eventuali allacciamenti dei tubi necessari. Dotare le forme costruttive con direzione dell'estremità dell'albero verso il basso di una copertura adeguata che impedisca la caduta di corpi estranei all'interno del ventilatore. La ventilazione non deve essere ostacolata e l'aria viziata - anche di gruppi contigui - non può essere aspirata di nuovo immediatamente.

Collegamento elettrico

Tutte le operazioni devono essere eseguite da personale altamente qualificato, con l'apparecchiatura a bassa tensione spenta e con il blocco contro la riaccensione inserito. Questo vale anche per il circuito elettrico ausiliario (ad es. freno, encoder, servoventilatore).

Verificare l'assenza di tensione.

L'eventuale superamento delle tolleranze prescritte in EN 60034-1; IEC 34 (VDE 0530-1) - tensione $\pm 5\%$, frequenza $\pm 2\%$, forma d'onda, simmetria - aumenta il riscaldamento e influenza la compatibilità elettromagnetica.

Rispettare le indicazioni relative ai collegamenti, i dati sulla targhetta e lo schema degli allacciamenti nella morsettiera.

L'allacciamento deve creare un collegamento elettrico sicuro e duraturo (non devono esservi estremità di fili sporgenti); utilizzare un idoneo corredo di cavi. Creare un collegamento sicuro per il conduttore di protezione. Avvitare saldamente i connettori.

Gli intervalli d'aria minimi tra parti non isolate sotto tensione e verso il suolo non devono essere inferiori ai seguenti valori: 8 mm per $U_N \leq 550\text{ V}$, 10 mm per $U_N \leq 725\text{ V}$, 14 mm per $U_N \leq 1000\text{ V}$.

La morsettiera non deve contenere corpi estranei, sporcizia e umidità. Proteggere i fori di entrata dei cavi non necessari e la stessa morsettiera dall'acqua e dalla polvere. Per l'impiego di prova, senza elementi di azionamento, assicurare la linguetta. Prima della messa in servizio delle macchine a bassa tensione con freno, verificare il corretto funzionamento del freno.

Utilizzo

Le forze di oscillazione $v_{eff} \leq 3,5 \text{ mm/s}$ ($P_N \leq 15 \text{ kW}$) oppure $4,5 \text{ mm/s}$ ($P_N > 15 \text{ kW}$) non sono pericolose nel funzionamento accoppiato. In caso di variazioni rispetto al funzionamento normale - ad es. aumento di temperatura, rumori, oscillazioni - ricercarne la causa ed eventualmente consultare il produttore. In caso di dubbio, staccare la macchina.

Nel caso di un grosso accumulo di sporcizia, pulire regolarmente le vie di aerazione.

Attivare le dotazioni di sicurezza anche durante l'impiego di prova.

I sensori termici incorporati non costituiscono una protezione totale della macchina, quindi è possibile limitare eventualmente la corrente massima. Eseguire il cablaggio del blocco funzione con disinserzione dopo alcuni secondi di impiego con $I > I_N$ soprattutto in caso di pericolo di bloccaggio.

Le guarnizioni ad anello e i cuscinetti a sfere hanno una durata limitata.

Oliare i supporti con un dispositivo lubrificante mentre la macchina è in funzione. Prestare attenzione al tipo di saponificazione. Se i fori di uscita del grasso sono tappati (dal lato di uscita azionamento in IP54; da entrambi i lati in IP23), rimuovere l'otturazione prima della messa in servizio. Chiudere i fori con grasso. In caso di lubrificazione continua, sostituire i cuscinetti (tipo 2Z) dopo ca. 10.000 - 20.000 ore, e comunque non oltre 3-4 anni o quando consigliato dal produttore.

2.3 Altri pericoli

2.3.1 Altri pericoli - Modulo di alimentazione ECSxE

Protezione delle persone

- ▶ Prima di eseguire interventi sul modulo di alimentazione, controllare che non vi sia tensione a tutti i morsetti di potenza, poiché
 - in seguito alla disinserzione della tensione di rete sul modulo di alimentazione, i morsetti di potenza +UG, -UG, BR0 e BR1 conducono ancora una tensione pericolosa per almeno 3 minuti.
- ▶ La temperatura d'esercizio del dissipatore di calore è $> 70\text{ °C}$:
 - L'eventuale contatto della pelle con il dissipatore di calore può causare ustioni.
- ▶ La corrente dispersa verso terra (PE) è $> 3,5\text{ mA c.a.}$ o $> 10\text{ mA c.c.}$ Per una migliore protezione il collegamento a PE è doppio.
 - Osservare le condizioni prescritte nella norma EN 50178 per un'alta corrente di dispersione!
- ▶ In caso di funzionamento del modulo di alimentazione collegato ad interruttore automatico:
 - I moduli di alimentazione hanno internamente un raddrizzatore di rete. In caso di contatto a massa, un'eventuale corrente continua di guasto non pulsante può bloccare il rilascio dell'interruttore automatico sensibile alla componente alternata o alla componente continua della corrente di dispersione, determinando in tal modo il venir meno della funzione di protezione per tutti dispositivi collegati a tale interruttore automatico.

Protezione del dispositivo

- ▶ Inserire o scollegare i morsetti di collegamento a innesto solo in assenza di tensione.
- ▶ I morsetti di potenza +UG, -UG e PE non sono protetti contro inversione di polarità.
 - Durante il cablaggio, prestare attenzione alla polarità dei morsetti di potenza!

2.3.2

Altri pericoli - Modulo asse ECSxA

Protezione delle persone

- ▶ Prima di eseguire interventi sul modulo asse, controllare che non vi sia tensione a tutti i morsetti di potenza, poiché
 - in seguito alla disinserzione della tensione di rete sul modulo di alimentazione, i morsetti di potenza +UG, -UG, U, V e W conducono ancora una tensione pericolosa per almeno 3 minuti;
 - a motore fermo, i morsetti di potenza +UG, -UG, U, V e W conducono ancora una tensione pericolosa.
- ▶ La temperatura d'esercizio del dissipatore di calore è $> 70\text{ °C}$:
 - l'eventuale contatto della pelle con il dissipatore di calore può causare ustioni.
- ▶ La corrente dispersa verso terra (PE) è $> 3,5\text{ mA c.a.}$ o $> 10\text{ mA c.c.}$ Per una migliore protezione il collegamento a PE è d'obbligo.
 - Osservare le condizioni prescritte nella norma EN 50178 per un'alta corrente di dispersione!

Protezione del dispositivo

- ▶ Inserire o scollegare i morsetti di collegamento a innesto solo in assenza di tensione.
- ▶ I morsetti di potenza +UG, -UG, U, V, W e PE non sono protetti contro inversione di polarità.
 - Durante il cablaggio, prestare attenzione alla polarità dei morsetti di potenza!
- ▶ La conversione della potenza può essere eseguita solo quando tutti i dispositivi del gruppo di potenza sono pronti per il funzionamento. In caso contrario, il dispositivo di limitazione della corrente d'ingresso può distruggersi.

L'inserzione e disinserzione ciclica della tensione di rete sul modulo di alimentazione può provocare il sovraccarico e il guasto del dispositivo di limitazione della corrente d'ingresso sul modulo asse nei seguenti casi:

- ▶ il modulo asse è alimentato tramite il modulo di alimentazione ECSxE e il dispositivo di limitazione della corrente d'ingresso viene disattivato a seconda della tensione del DC bus ($C0175 = 1$ o 2);
- ▶ il modulo asse è alimentato tramite un modulo di alimentazione non Lenze;
- ▶ viene interrotta l'alimentazione a 24 V.

A queste condizioni operative, in caso di inserzione ciclica della rete, deve intercorrere un lasso di tempo più lungo di minimo 3 minuti tra due procedure di inserzione!

Protezione del motore

- ▶ Per determinate impostazioni del modulo asse, il motore accoppiato può surriscaldarsi, ad esempio in caso di funzionamento prolungato di motori autoventilati a basse velocità.

2.3.3 Altri pericoli - Modulo condensatore ECSxK

Protezione delle persone

- ▶ Prima di eseguire interventi sul modulo condensatore, controllare che non vi sia tensione a tutti i morsetti di potenza, poiché
 - in seguito alla disinserizione della tensione di rete sul modulo di alimentazione, i morsetti di potenza +UG e -UG conducono ancora una tensione pericolosa per almeno 3 minuti;
 - a motore fermo, i morsetti di potenza +UG e -UG conducono ancora una tensione pericolosa.

Protezione del dispositivo

- ▶ Inserire o scollegare i morsetti di collegamento a innesto solo in assenza di tensione.
- ▶ I morsetti di potenza +UG, -UG e PE non sono protetti contro inversione di polarità.
 - Durante il cablaggio, prestare attenzione alla polarità dei morsetti di potenza!
- ▶ La conversione della potenza può essere eseguita solo quando tutti i dispositivi del gruppo di potenza sono pronti per il funzionamento. In caso contrario, il dispositivo di limitazione della corrente d'ingresso può distruggersi.

L'inserzione e disinserzione ciclica della tensione di rete sul modulo di alimentazione può provocare il sovraccarico e il guasto del dispositivo di limitazione della corrente d'ingresso sul modulo condensatore nei seguenti casi:

- ▶ viene disinserito il relè o l'alimentazione a 24 V;
- ▶ il modulo condensatore è alimentato tramite un modulo di alimentazione non fornito da Lenze.

Quando viene utilizzato un dispositivo di limitazione della corrente d'ingresso, in caso di inserzione ciclica della rete, deve intercorrere un lasso di tempo più lungo di minimo 3 minuti tra due procedure di inserzione!

2.3.4

Istruzioni di sicurezza per l'installazione secondo U_L o 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 12 ... AWG 8
- ▶ X4, X6, X14
– AWG 28 ... AWG 16
- ▶ X 25
– AWG 24 ... AWG 12





Lenze Drive Systems GmbH
Hans-Lenze-Straße 1
31855 Aerzen
Germany

EDKCSXX0XX 4.0 05/2004 TD17
© 2004

 +49 (0) 51 54 82-0
 Service 00 80 00 24 4 68 77 (24 h helpline)
 Service +49 (0) 51 54 82-1112
E-Mail lenze@lenze.de
Internet www.lenze.com