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Servo inverter



Dynamic, powerful and compact

Lenze

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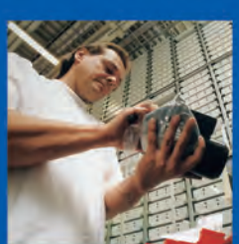
Lenze | about us

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.

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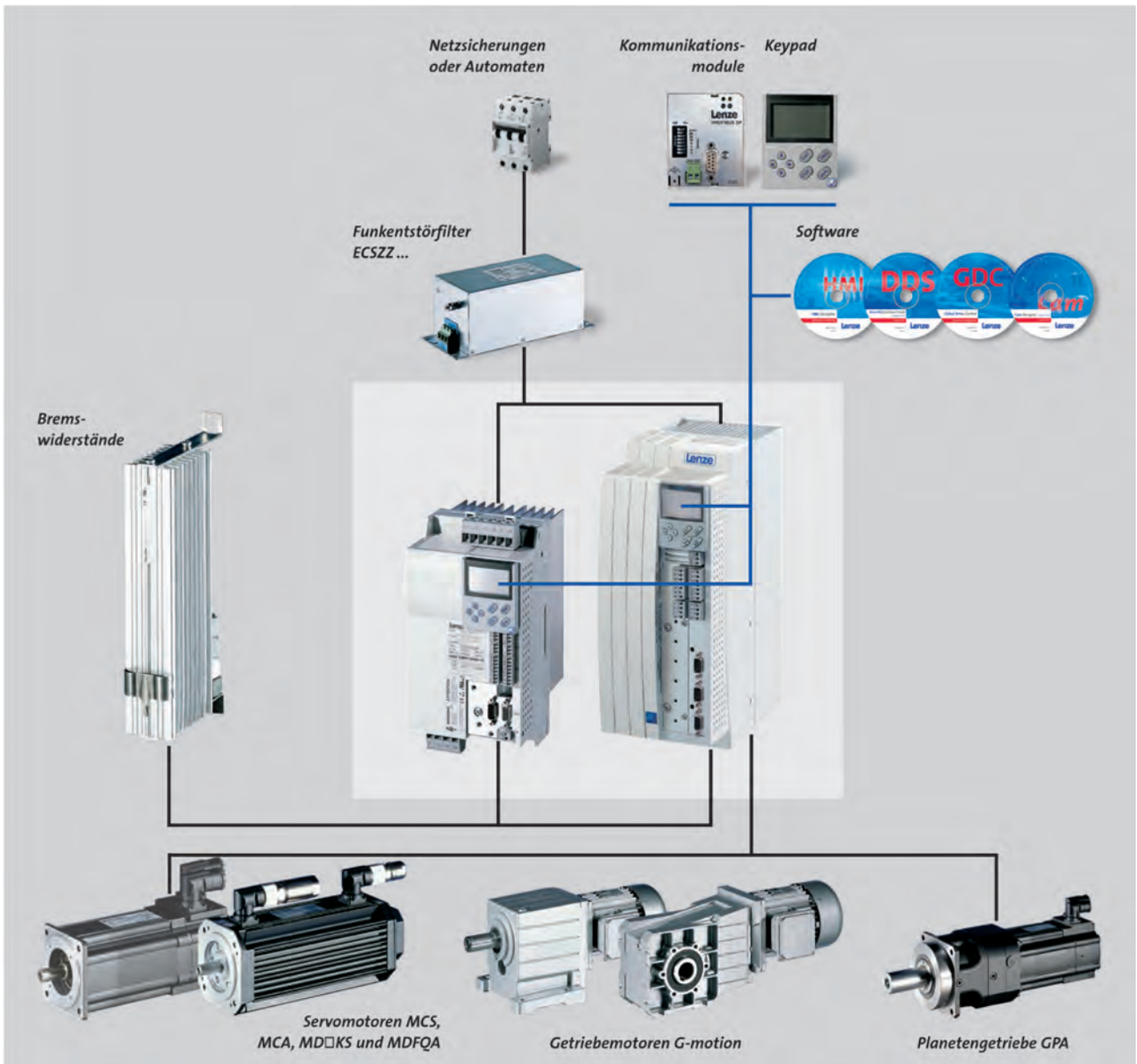


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System overview | Servo inverter



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

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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

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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

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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

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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

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9300 servo inverter product key

EVS 9321 E S V003

Device size
9321
9322
9323
9324
9325
9326
9327
9328
9329
9330
9331
9332

Design
E – Built-in unit/push-through technique
C – Cold plate

Series
S – Servo inverter
K – Servo cam profiler
P – Servo position controller
R – Servo register controller
I – Servo PLC
T – Servo PLC Technology

Variant
– Standard
V003 – Cold plate
V004 – Safe standstill
V100 – for IT systems



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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



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List of abbreviations

B [mm]	Width
C [µF]	Integrated DC-bus capacity
CB [kWs]	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

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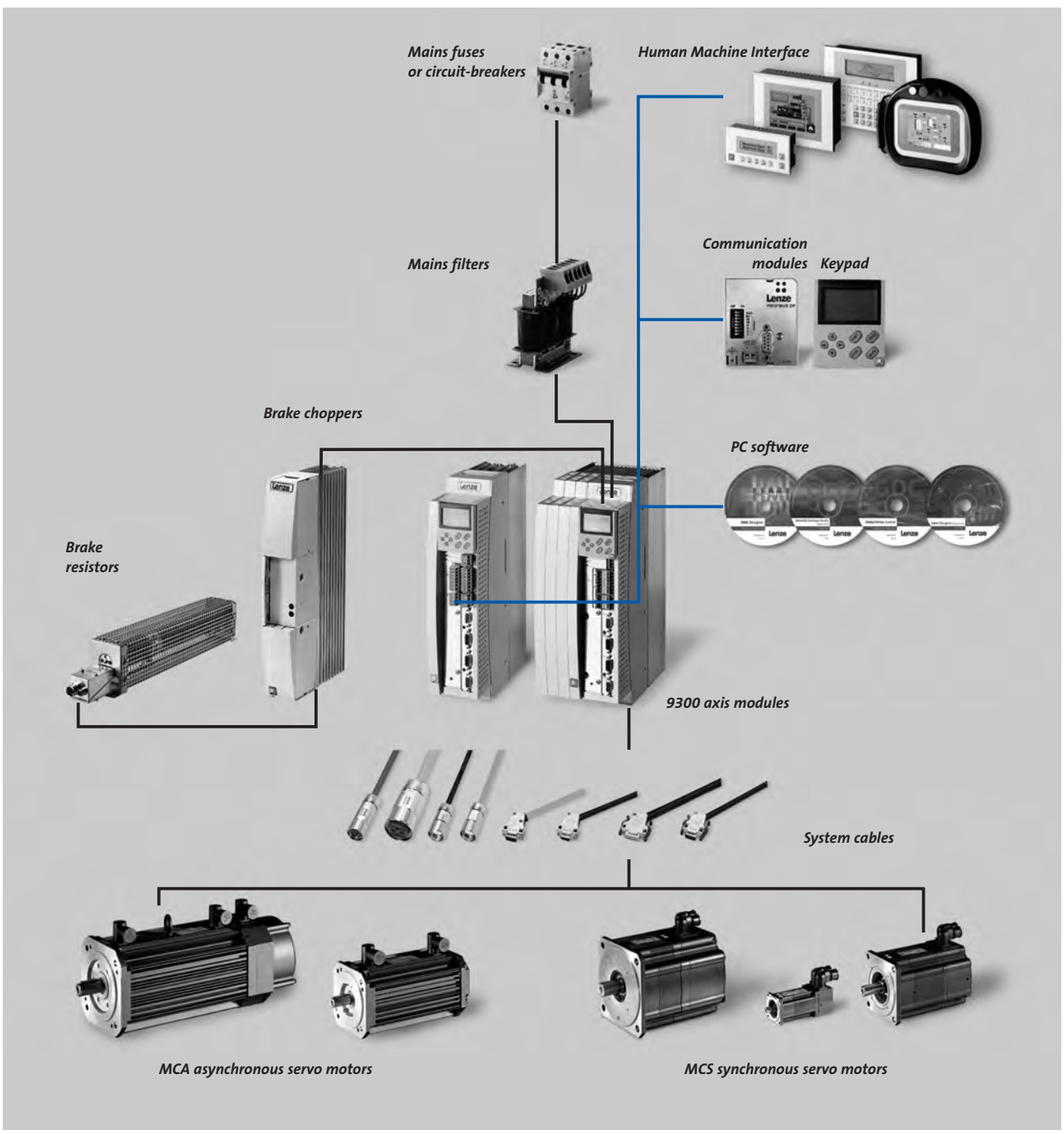


About this catalogue

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



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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.

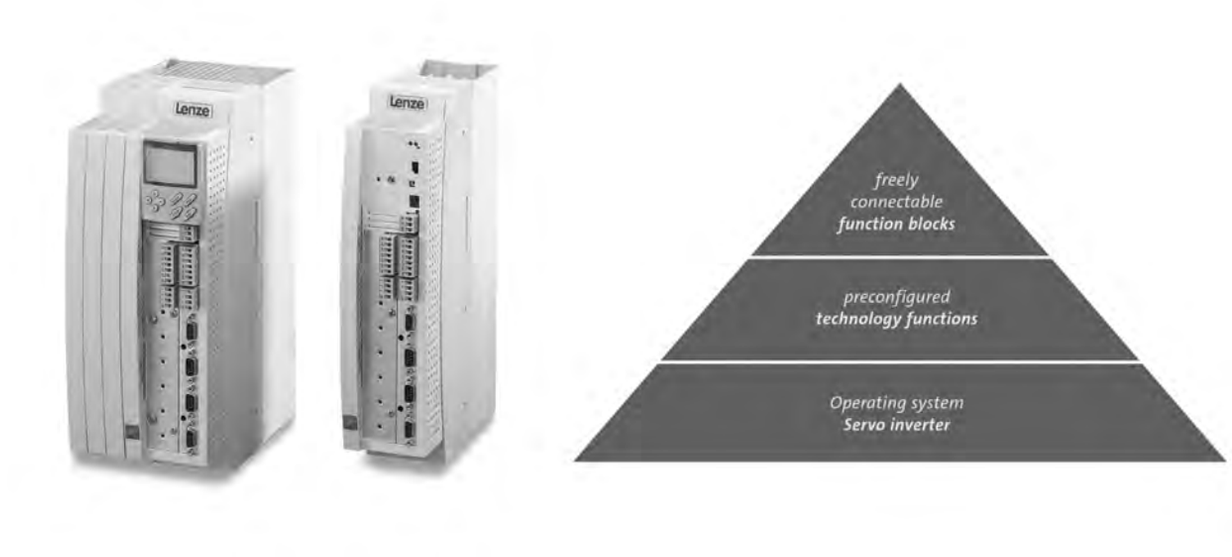
Variants:
Types 9321 to 9328 are also available in a version known as "cold plate" for mounting on a separate heatsink. Instead of a built-in heatsink, these devices are supplied with a flat cooling surface on the rear. Special versions are also available for the integrated "Safe standstill" controller 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

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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.
- Insetter
- 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
- ...

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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 x t-monitoring; cULus-acceptance for I^2 x 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	Via AIF interface
Status displays	2 LEDs
Braking operation	
Brake chopper	With 935X braking unit
Brake resistor	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

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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: +/-10 V, 1x switchable, 0 ... 20 mA
Analog outputs	▶ Number: 2 ▶ Resolution 9 bits + sign ▶ Value range: +/-10 V
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

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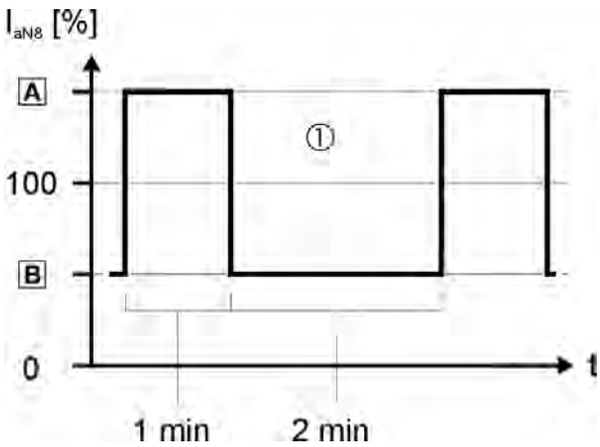
Basic dimensioning of axis modules

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



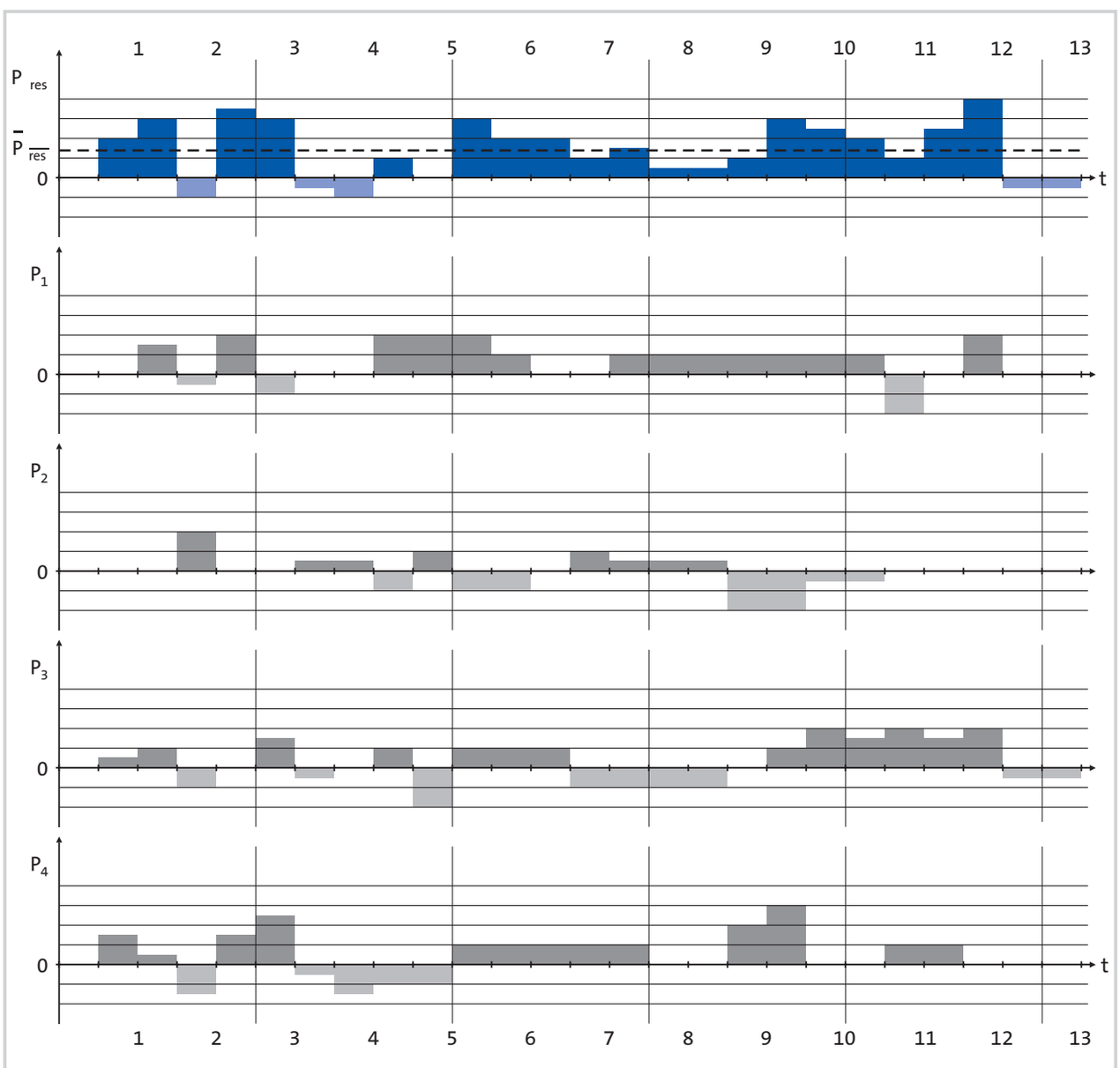
Overload mode: 3 min cycle

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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}...P_{4} = individual power of axis 1...axis 4
P_{res} = addition of individual powers
$P_{res\ 1\text{-}4}$ = mean value of individual powers

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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

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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 NVRAM	[byte] [byte]	6000 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	

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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% INx.

→ 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

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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		**EVS9325-E□**	**EVS9326-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 ± 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

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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

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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]	I_{Netz} [A]	78	100	135
Without mains choke [1]	I_{Netz} [A]		-	
Rated output current				
8 kHz	I_N [A]	89	110	145
16 kHz	I_N [A]	58	70	90
Max. output current				
8 kHz	I_{max} [A]	133.5	165	217.5
16 kHz	I_{max} [A]	87	105	135
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]	1100	1470	1960
Dimensions				
Height	**H** [mm]	591	680	
Width	**B** [mm]	340	450	
Depth	**T** [mm]	285		
Depth "cold plate"	**T** [mm]	-		
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

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Standards and operating conditions

Product key Short form	**EMB934□-E**
Conformity PWIS RoHS	CE: Low-Voltage Directive (73/23/EEC) Not fulfilled 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 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
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 ... + 50 °C) 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.

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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	**$I_{Netz\ max}$** [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
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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	$I_{Netz\ max}$ [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 ¡Ý¡ÆI_{mains} (Imains 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

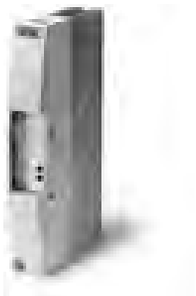
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Braking units

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 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	
Climatic conditions Storage (EN 60721-3-1) Transport (EN 60721-3-2) Operation (EN 60721-3-3) Peak output current derating	- 25 °C ... + 70 °C 2K3 (temperature: -25 °C ... + 70 °C) 3K3 (temperature: 0 °C ... + 55 °C) Above + 40 °C by 2.5 %/°C	
Protective insulation of control circuits EN 61800-5-1	Safe isolation of mains: double/reinforced insulation	
Clearance	Above and below 100 mm	

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Functions and features

- The 9352-E brake chopper is designed for operation at brake resistances >=27 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 Brake chopper		**EMB9351-E**	**EMB9352-E**
Brake chopper data DC-bus voltage	U_{ZK} [V]	270 ... 775	
Continuous braking power	**P** [kW]	0.1	11, depending on the external brake resistor [1]
Peak braking power [1]	P_{BRmax} [kW]	12	25
Running time	t_{on} [s]	4	1.33
Recovery time	t_{re} [s]	500	1.67
Peak current	I_{max} [A]	16	32
Continuous current, mean value	**I** [A]		14
Continuous current, r.m.s. value	**I** [A]		20
Max. braking energy	**W** [kWs]	50	Dependent on the brake resistor
Min. brake resistance	**R** [Ohm]	47	27 ± 10 % [1, 2]
Max. output current Braking unit	I_{DC_max} [A]	16	42
Dimensions Height	**H** [mm]	384	
Width	**B** [mm]	52	
Depth	**T** [mm]	186	
Mass Braking unit	**m** [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

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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 [kWs]
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		33	2000	240
22		EVS9328-E☐		ERBD022R03K0 ERBD033R02K0	2	22 33	3000 2000	375 240
30		EVS9329-E☐						
45		EVS9330-E☐						
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☐		ERBD022R03K0 ERBD033R02K0	739 x 172 x 247 639 x 262 x 142	10.6 7.1
30		EVS9329-E☐				
45		EVS9330-E☐				
55		EVS9331-E☐				
75		EVS9332-E☐				

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

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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☐			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	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
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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	Mains voltage	Product key		Mains choke data		
(asynchronous motor, 4-pole)			Mains choke	Rated current	Dimensions	Mass
P_N [kW]	U_{Netz} [V]			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

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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.



Mains filters A and B

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.

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 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.

- 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□				

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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 130x 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

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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
			EZN3B0037H090	90		515 x 323 x 285	42
100		EME9365-E	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

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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		
(asynchronous motor, 4-pole)			Mounting frame	Height	Width	Width - "push-through technique"	Height - "push-through technique"	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-trough technique
DS_MB_9300_0005
Available for download at www.lenze.de/dsc

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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

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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				
DeviceNet [1]		▶ 2 LED for communication status display ▶ DIP switch for selecting baud rate and address ▶ Pluggable terminal strips	AIF	EMF2179IB
INTERBUS [1]		▶ 2 LED for communication status display ▶ DIP switch for specifying the number of process and parameter data words		EMF2113IB
LECOM-A/B [1]		▶ 3 LED for communication status display ▶ RS 232 or RS 485 ▶ Electrically isolated from the bus ▶ Electrically isolated from external voltage supply		EMF2102IBCV001
LECOM-B [1]		▶ 3 LED for communication status display ▶ RS 485 ▶ Electrically isolated from the bus ▶ Electrically isolated from external voltage supply		EMF2102IBCV002
LECOM-LI [1]		▶ 3 LED for communication status display ▶ Optical fibre ▶ Electrically isolated from external voltage supply		EMF2102IBCV003
PROFIBUS [1]		▶ 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 module [1]		▶ 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.

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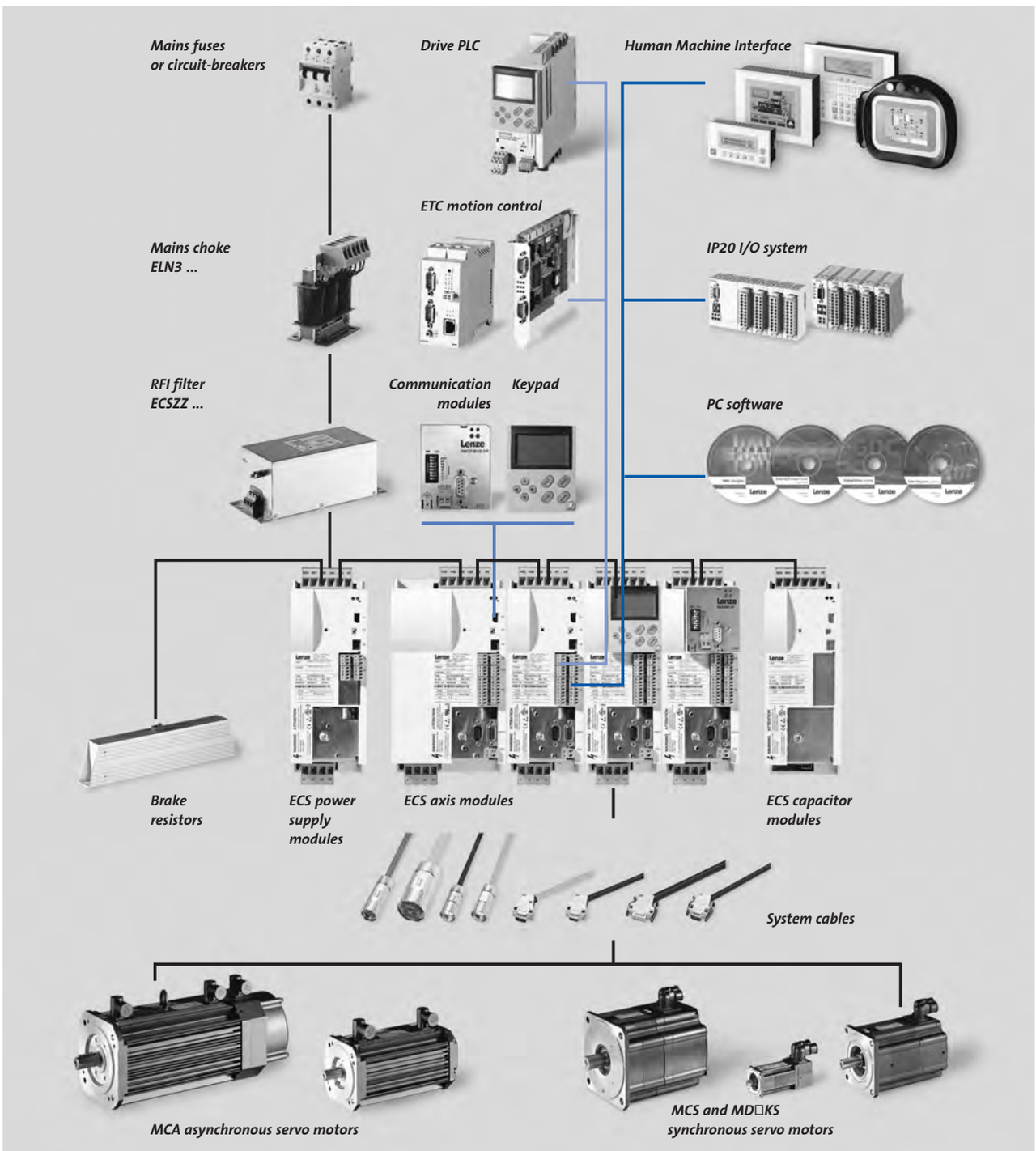


About this catalogue

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



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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.

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.

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.



Power supply module ECSDE020 (built-in variant)
Axis module ECSCx008 (cold-plate technique)
Axis module ECSDx064 (push-through technique)

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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)

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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, $I^2 x t$-monitoring); cULus-acceptance for $I^2 x t$-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

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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	▶ Number: 1, pluggable ▶ Resolution: 11 bits ▶ Value range: +/-10 V, 1x switchable, 0 ... 20 mA
Analog outputs	▶ -
Digital inputs	▶ Number: 4, pluggable ▶ Switching level: PLC (IEC 61131-2)
Digital outputs	▶ Number: 2, pluggable ▶ Load capacity: 1 x 50 mA; 1 x 1.5 A ▶ Switching level: PLC (IEC 61131-2)
Interfaces	
CANopen	▶ 2 x CAN bus
Extension modules	▶ Via AIF slot: communication modules
Digital frequency	▶ Output, two-track ▶ Input, two-track (parameterisable)
Drive interface	
Resolver input	▶ Sub-D, 9-pin
Encoder input	▶ 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

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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.

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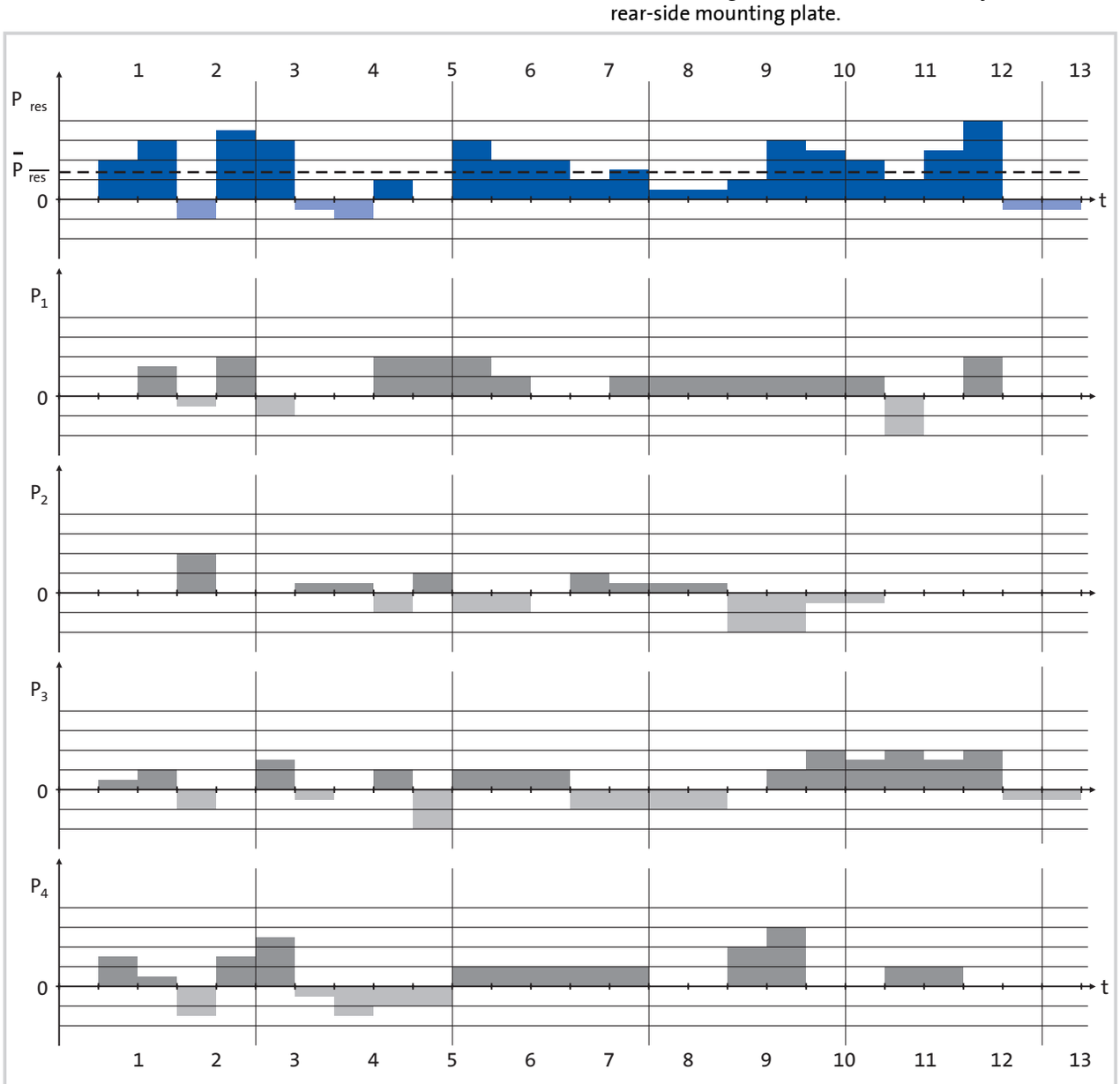


Basic dimensioning

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}...P_{4} = individual power of axis 1...axis 4
P_{res} = addition of individual powers
$P_{res\ 1\text{-}4}$ = mean value of individual powers

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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 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

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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 NVRAM	[byte] [byte]	6000 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

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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

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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	
Dimensions [3]			
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

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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

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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 ≥ 100 (µF/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

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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	22	3000	375	739 x 172 x 247	10.6
			ERBS020R03K2	20	3200	480	811 x 276 x 132	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

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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** [kWs]	**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

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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

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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		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

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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.

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



Connectors for ECS control and power connections

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.

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



EMC shield connections power connections

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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				
DeviceNet [1]		▶ 2 LED for communication status display ▶ DIP switch for selecting baud rate and address ▶ Pluggable terminal strips	AIF	EMF2179IB
INTERBUS [1]		▶ 2 LED for communication status display ▶ DIP switch for specifying the number of process and parameter data words		EMF2113IB
LECOM-A/B [1]		▶ 3 LED for communication status display ▶ RS 232 or RS 485 ▶ Electrically isolated from the bus ▶ Electrically isolated from external voltage supply		EMF2102IBCV001
LECOM-B [1]		▶ 3 LED for communication status display ▶ RS 485 ▶ Electrically isolated from the bus ▶ Electrically isolated from external voltage supply		EMF2102IBCV002
LECOM-LI [1]		▶ 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 module [1]		▶ 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.

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Software package - Positioner

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



Software package - Positioner

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.

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

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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



Software package - Cam

- 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".

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

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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.



Software package - Winder

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.

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

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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

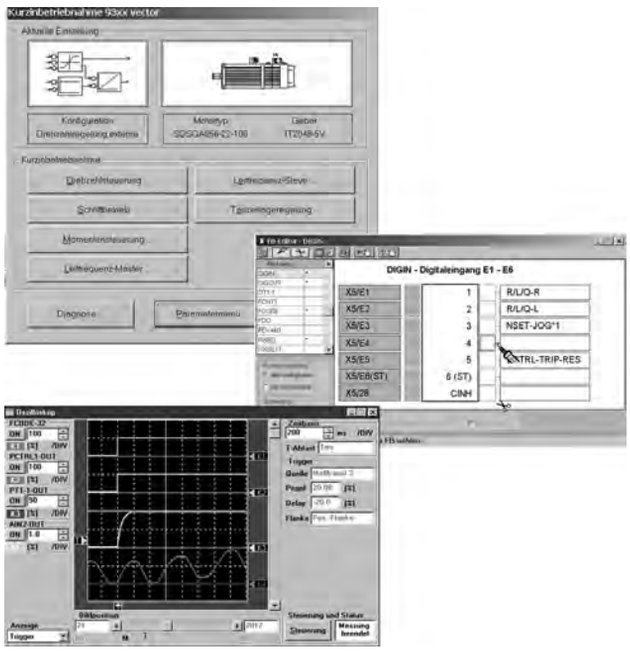
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Selection and order data

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	ESPFGDC2
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

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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.

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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:

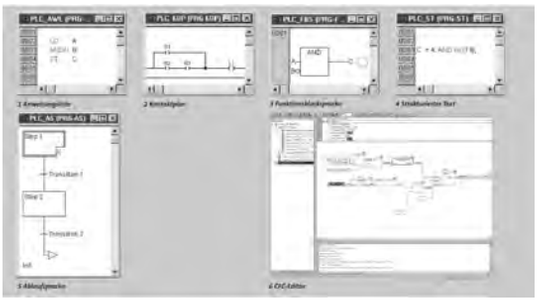
- ▶ Microsoft®Windows® 98/Me, Windows NT® 4.0 SP5 or higher or Windows 2000 SP2/XP or higher
- ▶ IBM compatible PC with Intel® Pentium® processor 333 MHz or higher
- ▶ At least 128 MB RAM
- ▶ At least 250 MB free hard disk space
- ▶ At least 1024 x 768 pixels screen resolution with 256 colours
- ▶ Mouse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

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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

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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		●

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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

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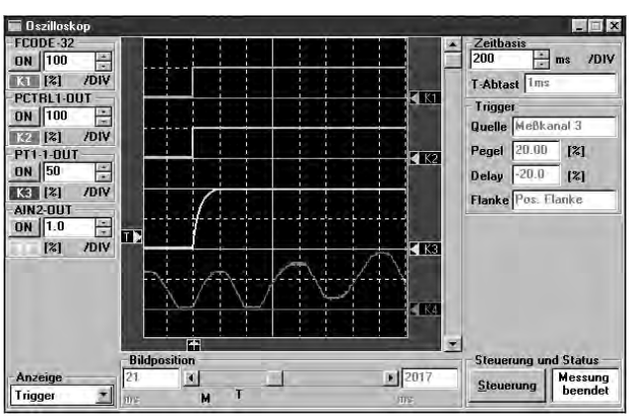
Selection and order data

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.

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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

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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)	●

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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

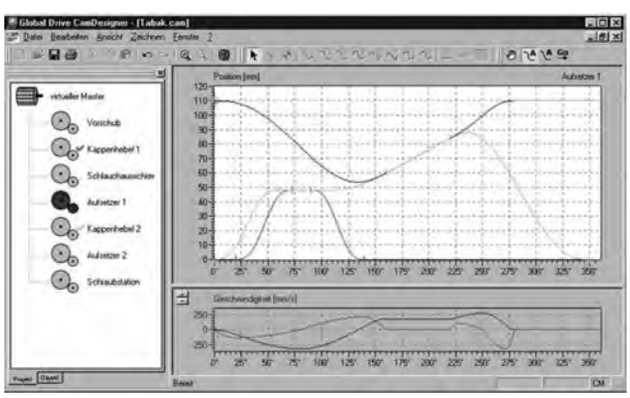
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Selection and order data

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

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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:

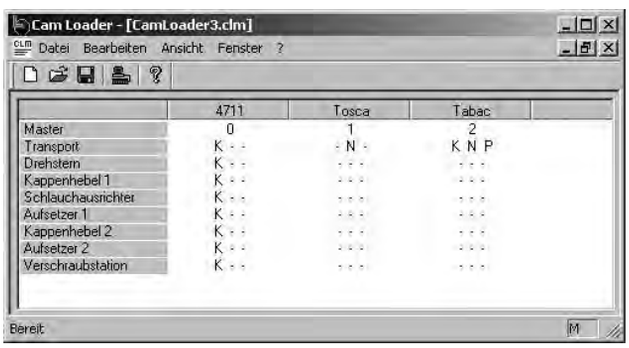
- Microsoft®Windows® 95/98/Me, Windows NT® 4.0 SP5 or higher or Windows 2000 SP2/XP or higher
- IBM compatible PC with Intel® Pentium® processor 90 MHz or higher
- At least 128 MB RAM
- At least 70 MB free hard disk space
- At least 1024 x 768 pixels screen resolution with 256 colours
- Mouse
- CD-ROM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

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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

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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) LECOM OPC Drive Server	► USB connection with USB system bus adapter EMF 2177IB [1)] ► Parallel interface with system bus adapter EMF 2173IB ► 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

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"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."



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