

Servo inverter



Dynamic, powerful and compact

Lenze

Lenze | about us

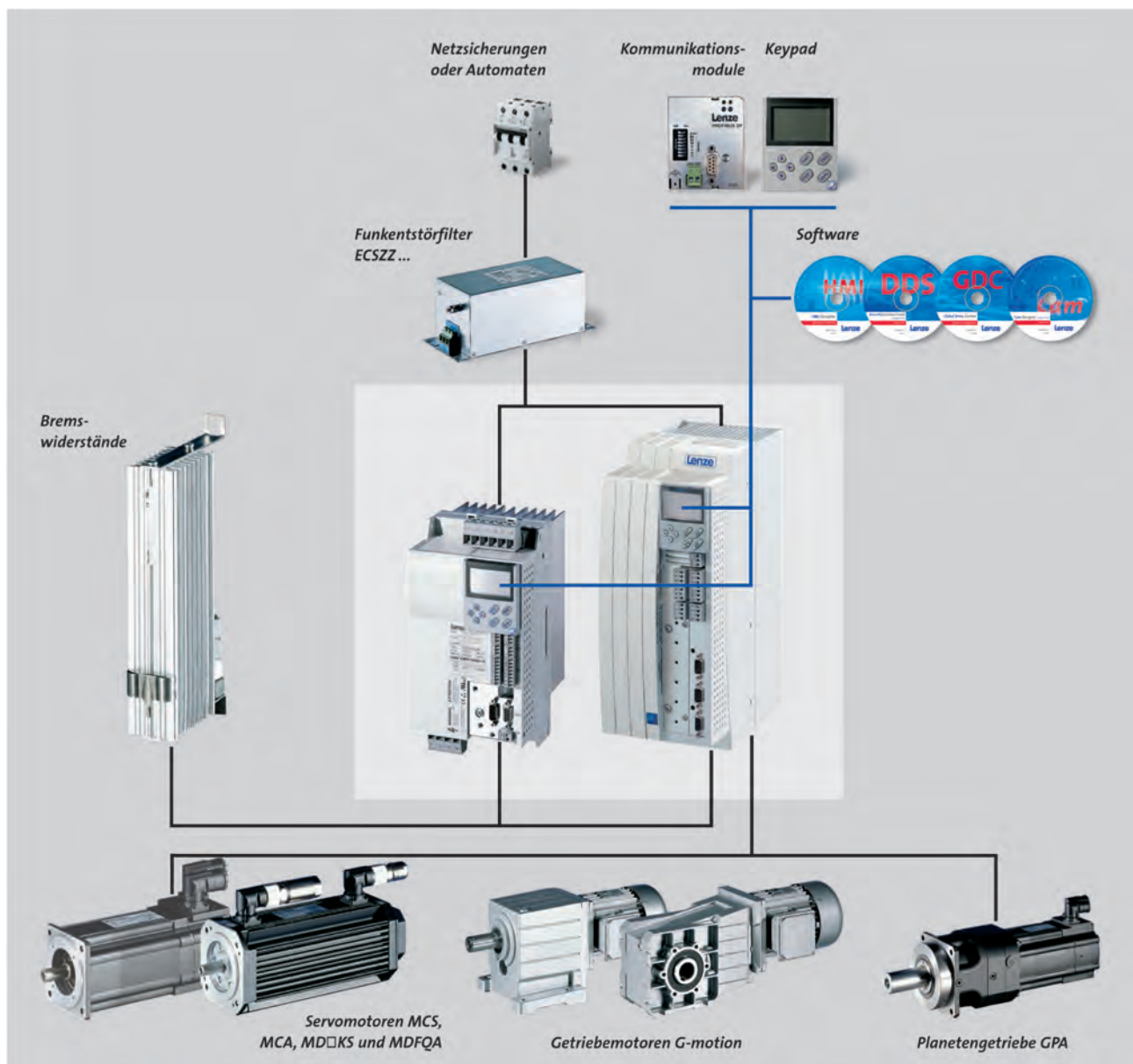
We can offer you automation solutions, including control, visualisation and drive technology, from a single source. Our drive systems will improve the performance of your machines. From project planning to commissioning, we have the know-how. Our international sales and service network can provide you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

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



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

System overview | Servo inverter



Further catalogues

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

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

Overview | Servo inverter

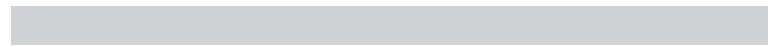
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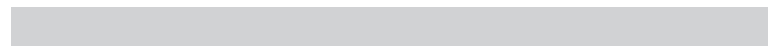
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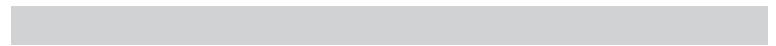
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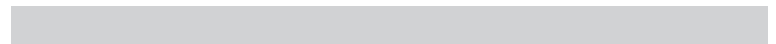
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9300 servo inverter



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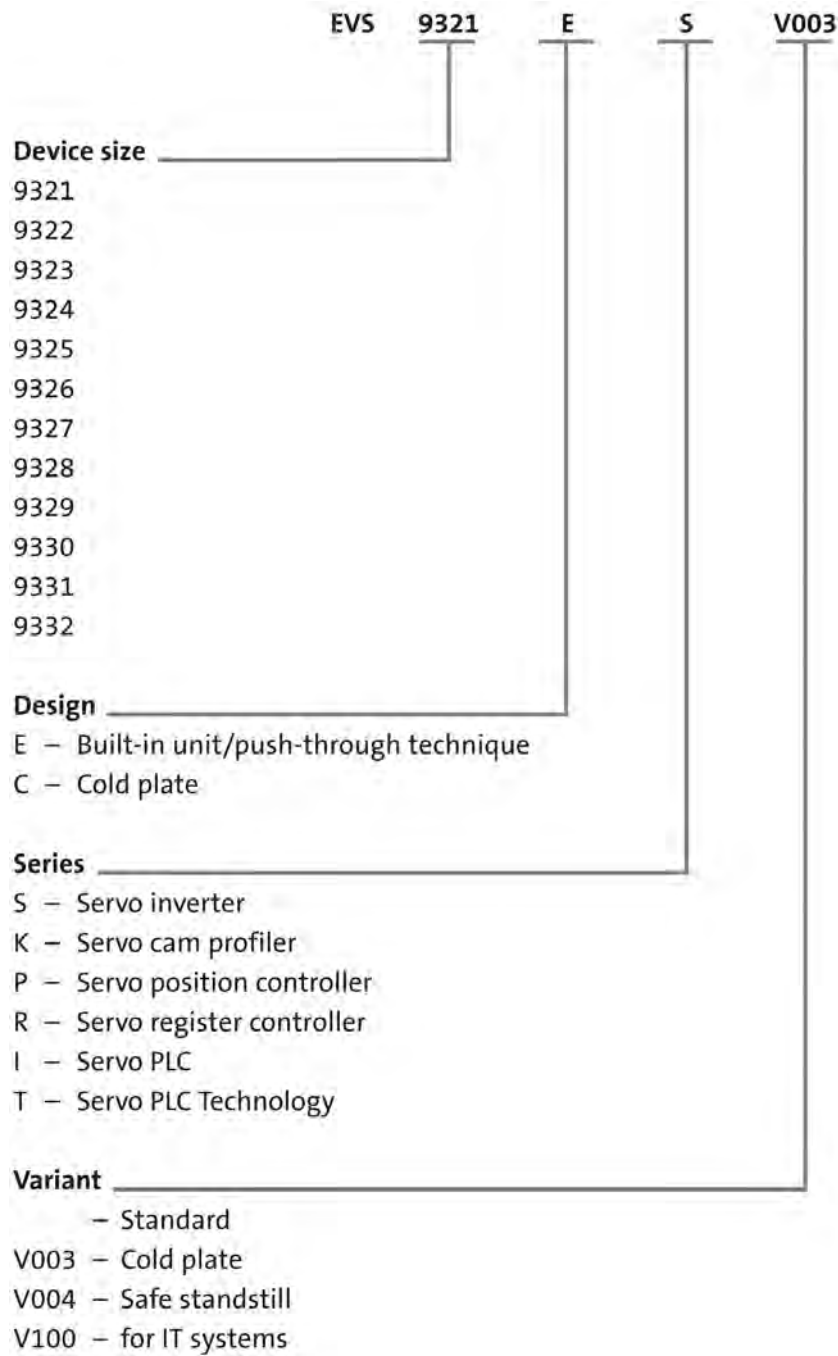




General information

Product information

9300 servo inverter product key





General information

Product information

List of abbreviations

b [mm]	Width
C [μF]	Integrated DC-bus 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
WK [kWs]	Thermal capacity

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 954-1	Safety-related parts of control systems Control category 3
IEC	International Electrotechnical Commission
IEC 61131-3	Programming languages for PLCs, part 3 Programming
IEC 61131-2	Programmable logic controllers Part 2: Equipment and tests
IEC 61508	Functional safety of electrical/electronic/programmable electronic safety-related systems
IM	International Mounting Code
IP	International Protection Code
KTY	Continuous temperature sensor
NEMA	National Electrical Manufacturers Association
PE	PE conductor
PLC	Programmable logic controller
TTL	Signal level 5V
UL	Underwriters Laboratory Listed Product
UR	Underwriters Laboratory Recognized Product
VDE	Verband deutscher Elektrotechniker (Association of German Electrical Engineers)
VDI 2143	Motion rules for cam mechanisms

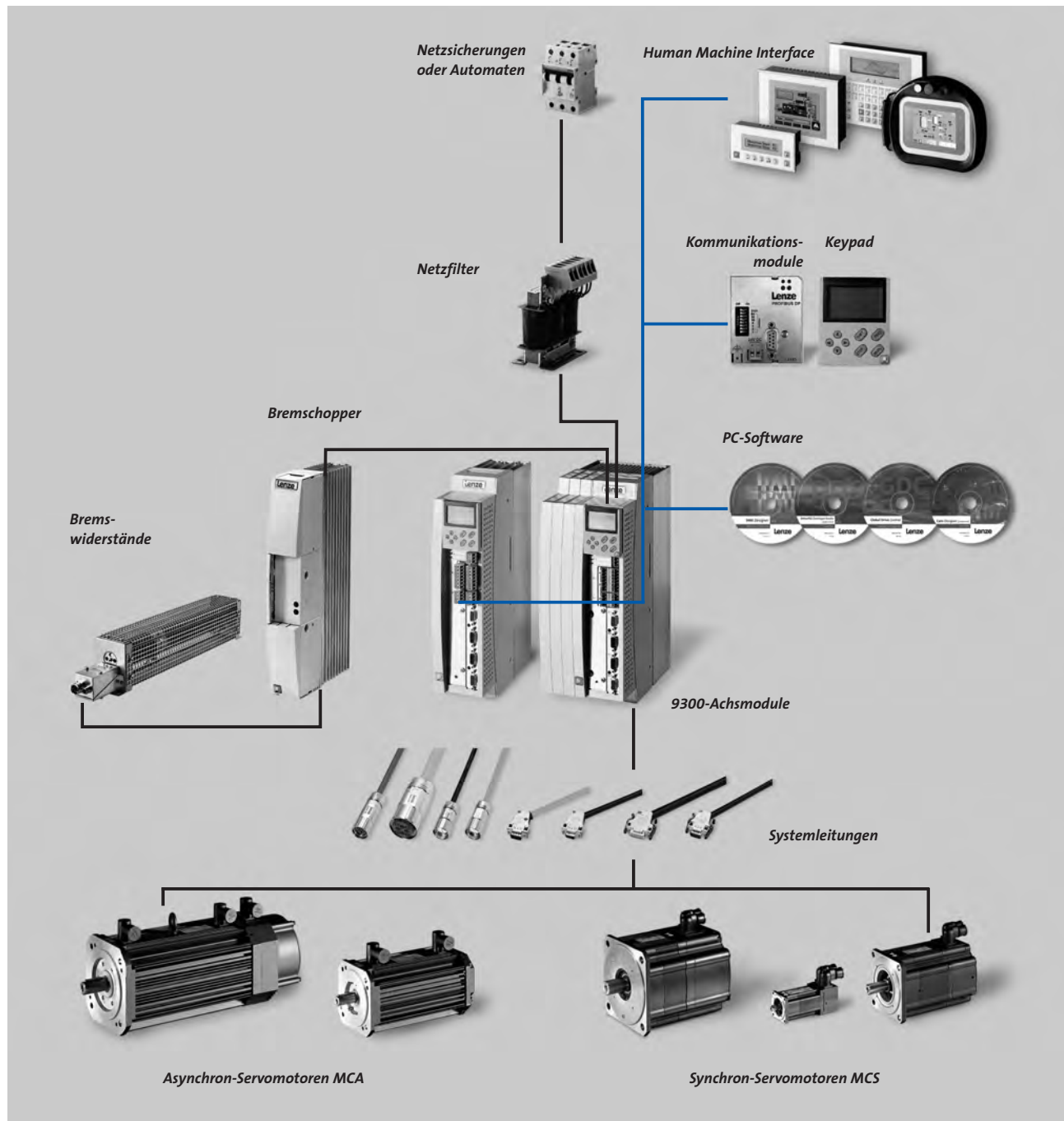


About this catalogue

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

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

Inverters and accessories





9300 servo inverter

Product information

9300 - the servo inverter family

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

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

Variants:

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

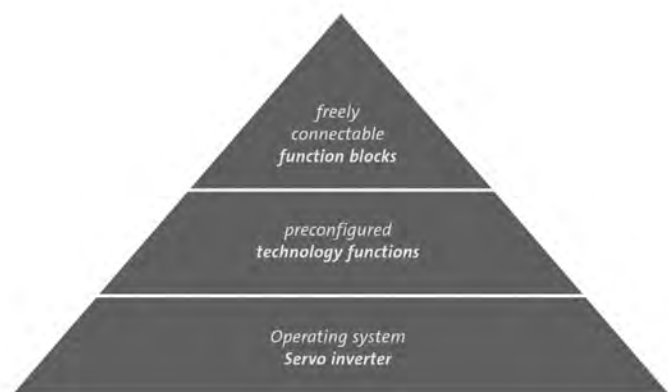
- ▶ Cold plate
- ▶ Safe standstill (safe torque off)
- ▶ IT system (operation on isolated systems)

Servo drive controller with integrated technology functions

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

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

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



9300 servo inverter family



9300 - the servo inverter family

9300 servo inverter

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

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

9300 servo cam

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

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

9300 Servo PLC

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

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

9300 servo position controller

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

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

9300 servo register controller

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

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

9300 Servo PLC Technology

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

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



9300 servo inverter

Product information

Functions and features

Control modes/motor control	Field-oriented servo control 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) 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



Control connections

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

Design	Servo inverter in the power range 0.37 kW to 75 kW
Inputs/outputs	
Analog inputs	▶ Number: 2 ▶ Resolution 11 bits + sign ▶ Value range: +/-10V, 1x switchable, 0 ... 20 mA
Analog outputs	▶ Number: 2 ▶ Resolution 9 bits + sign ▶ Value range: +/-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 each output (for load, reverse current, polarity reversal, free-wheeling current)
Interfaces	
Integrated	▶ CAN bus (system bus)
Optional	▶ Via AIF slot: communication 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®)
Motor temperature monitoring evaluation	▶ KTY evaluation at resolver input/encoder input

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

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



9300 servo inverter

Product information

Basic dimensioning of axis modules

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

► Motor power required

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

► Motor selection

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

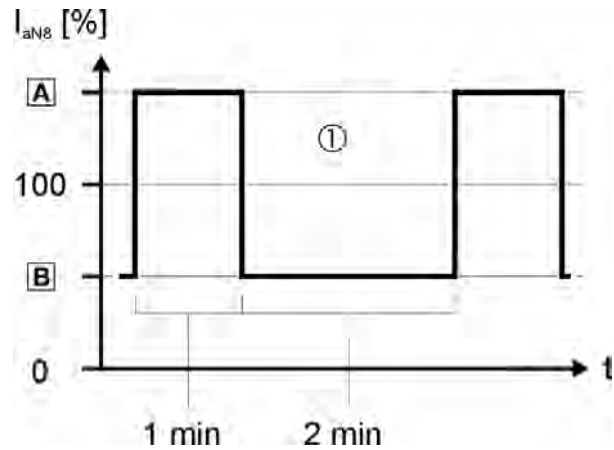
► Axis module selection

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

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

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

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



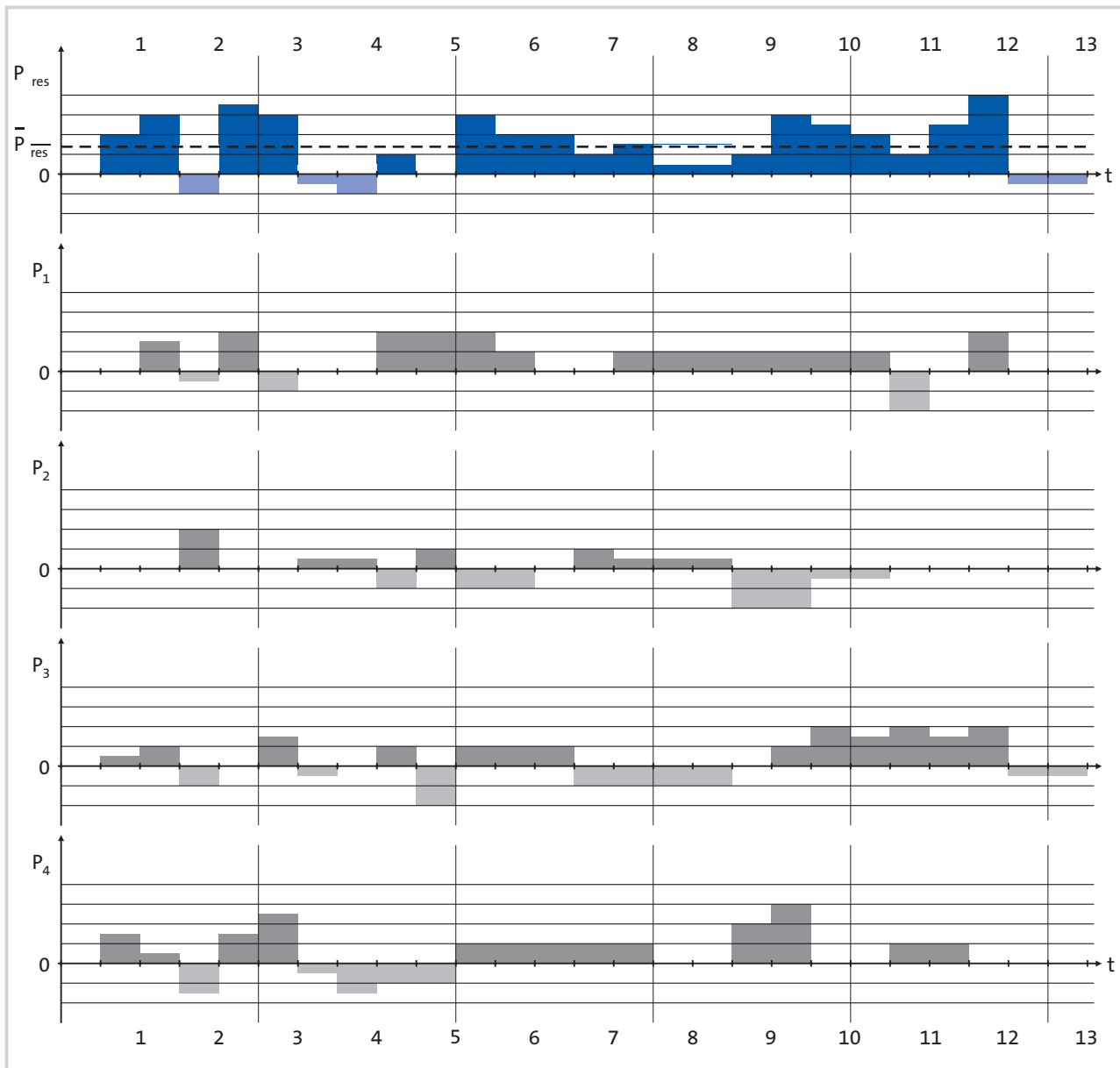
Overload mode: 3 min cycle



Dimensioning for DC-bus operation

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

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



Time/power diagram of a multi-axis servo system

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

P_{res} = addition of individual powers

$P_{res\ 1-4}$ = mean value of individual powers



9300 servo inverter

Product information

Standards and operating conditions

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



PLC functions

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

9300 servo inverter

Axis modules

Rated data for axis modules

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

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

					
Motor power (asynchronous motor, 4-pole)	P _N [kW]	0.37	0.75	1.5	3
Product key		EVS9321-E□	EVS9322-E□	EVS9323-E□	EVS9324-E□
Mains voltage range	U _{Netz} [V]	3/PE AC 320 V -0% ... 528 V +0%; 45 Hz -0% ... 65 Hz +0%			
Alternative DC supply	U _{DC} [V]	DC 460-0% ... 740 V+0%			
Rated mains current With mains choke / mains filter ¹⁾	I _{Netz} [A]	1.5	2.5	3.9	7
Without mains choke / mains filter 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
Braking unit data Continuous braking power	P [kW]	11, depending on the external brake resistor			
Peak braking power	P _{BRmax} [kW]	25			
Min. brake resistance	R [Ohm]	27 ± 10%			
Power loss	P _V [W]	100	110	140	200
Dimensions Height	h [mm]	350			
Width	b [mm]	78		97	
Depth	t [mm]	250			
Depth "cold plate"	t [mm]	158			
Mass	m [kg]	4		5	
Permissible motor cable length Shielded	l [m]	50			

¹⁾ Without mains filter

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

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

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



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DS_GD_9300_0003
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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 / mains filter ¹⁾	I_{Netz} [A]	12	20.5
Without mains choke / mains filter 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
Braking unit data Continuous braking power	P [kW]	11, depending on the external brake resistor	
Peak braking power	P_{BRmax} [kW]	25	
Min. brake resistance	R [Ohm]	$27 \pm 10\%$	
Power loss	P_V [W]	260	360
Dimensions Height	h [mm]	350	
Width	b [mm]	135	
Depth	t [mm]	250	
Depth "cold plate"	t [mm]	158	
Mass	m [kg]	7.5	
Permissible motor cable length Shielded	l [m]	50	

¹⁾ Without mains filter

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→ 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 / mains filter ¹⁾	I_{Netz} [A]	27	44	53
Without mains choke / mains filter 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
Braking unit 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

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→ 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 / mains filter ¹⁾ Without mains choke / mains filter ¹⁾	I_{Netz} [A] I_{Netz} [A]	78	100	135
Rated output current 8 kHz 16 kHz	I_N [A] I_N [A]	89 58	110 70	145 90
Max. output current 8 kHz 16 kHz	I_{max} [A] I_{max} [A]	133.5 87	165 105	217.5 135
Braking unit data Continuous braking power Peak braking power Min. brake resistance	P [kW] P_{BRmax} [kW] R [Ohm]	11, depending on the external brake resistor 25 27 ± 10%		
Power loss	P_V [W]	1100	1470	1960
Dimensions Height Width Depth Depth "cold plate"	h [mm] b [mm] t [mm] t [mm]	591 340	680 450 285 -	
Mass	m [kg]	38	59	
Permissible motor cable length Shielded	l [m]	50		

¹⁾ Without mains filter

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

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



9300 servo inverter

Regenerative power supply modules

Standards and operating conditions

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

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



Rated data for regenerative power supply modules

				
Product key Regenerative power supply module		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 / mains filter	I_{Netz} [A]	12	24	45
Max. mains current	$I_{\text{Netz max}}$ [A]	18	36	67.5
Dimensions				
Height	h [mm]	384 (660 with filter)		404 (720 with filter)
Width	b [mm]	135		250
Depth	t [mm]	250		
Mass	m [kg]	7.5		13.5

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



9300 servo inverter

Regenerative power supply modules

Rated data for power supply modules

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

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

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

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

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

→ Dimensioned drawings for power supply modules

DS_MB_9360_0002

Available for download at www.lenze.de/dsc



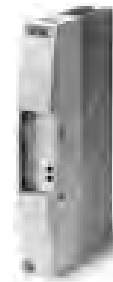
Braking units

Brake module EMB9351-E

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

Brake chopper EMB9352-E

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



Brake module and brake chopper

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

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

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

Standards and operating conditions

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



9300 servo inverter

Accessories

Functions and features

- ▶ The 9352-E brake chopper is designed for operation with brake resistors ≥ 27 ohms at a DC-bus voltage of 765 V.
- ▶ The rated data refer to a brake resistor with 27 ohms. The 9352-E brake chopper can be operated with brake resistors of 18 ohm and higher if the maximum braking times / operating times are in accordance with the Operating Instructions. For 18 ohm and a DC-bus voltage of 765 V, the maximum ON-time is 1 s and the maximum power is 32 kW.

If the ON-time is exceeded, the brake chopper may fail, see EDBMB935X Operating Instructions.

			
Product key		EMB9351-E	EMB9352-E
Brake module			
Brake chopper			
Braking unit 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	$27 \pm 10\%$ ^{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 < 27 ohm can be found in the EDBMB935X Operating Instructions



Brake choppers and brake resistors

► Brake resistors in IP20 enclosure

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



Brake resistor

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

¹⁾ Brake resistors and brake choppers

²⁾ Maximum ON-time see EDBMB935X Operating Instructions and page 30

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

³⁾ Maximum ON-time see EDBMB935X Operating Instructions and page 30



9300 servo inverter

Accessories

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 supply**
The DC-bus connection can be used to exchange energy between the axis modules and to reduce energy consumption.

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

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



Mains choke

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



Mains filter

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

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

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

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

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



Mains filters A and B

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)			Mains filter	Rated current	Max. cable length C1	Max. cable length C2	Dimensions	Mass		
P _N [kW]	U _{Netz} [V]			I _N [A]	l [m]	l [m]	h x b x t [mm]	m [kg]		
15	3 AC 400	EVS9327-E□	E82ZZ15334B230	43	10	50	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□								



9300 servo inverter

Accessories

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

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

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

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



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

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

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

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

Interference filter for SinCos encoder

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

Design	Product key
Interference filter for SinCos encoder	EZZ0014



9300 servo inverter

Accessories

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

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

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

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

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

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

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

→ Dimensioned drawings for axis modules in push-through technique

DS_MB_9300_0005

Available for download at www.lenze.de/dsc



Keypad

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

Features:

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



Keypad XT

Design	Features	Product key
Keypads and accessories		
Keypad XT¹⁾	▶ Password protection, plain text display, menu structure, predefined basic configurations, user-specific menus, "quick commissioning" menu, IP20 enclosure	EMZ9371BC
Keypad	▶ Password protection, suitable for control cabinet installation, IP 55 enclosure	E82ZBC
Diagnosis terminal with keypad XT	▶ Diagnosis terminal complete with "keypad XT" (EMZ9371BC), IP 20 enclosure	E82ZBBXC
Diagnosis terminal with keypad	▶ Diagnosis terminal complete with "keypad" (E82ZBC), IP 55 enclosure	E82ZBB
Assembly kit	▶ Control cabinet assembly 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



9300 servo inverter Module

Overview of modules

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

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

Design		Features	Slot	Product key
Communication module				
DeviceNet¹⁾		2 LEDs for communication status display - Node address and baud rate can be set by means of a DIP switch - With twin screw terminal for easy diagnosing without interrupting the bus operation	AIF	EMF2179IB
INTERBUS¹⁾		2 LEDs for communication status display - DIP switch for selecting process data and PCP data size - Electrical isolation from the incoming bus - Compatibility switch for predecessor module EMF2111 IB	AIF	EMF2113IB
LECOM-A/B¹⁾		- RS 232 or RS 485 2 LEDs for communication status display - Electrically isolated from the bus - Electrically isolated from external voltage supply	AIF	EMF2102IBCV001
LECOM-B¹⁾		- RS 485 2 LEDs for communication status display - Electrically isolated from the bus - Electrically isolated from external voltage supply	AIF	EMF2102IBCV002
LECOM-LI¹⁾		- Optical fibre 2 LEDs for communication status display - Electrically isolated from external voltage supply	AIF	EMF2102IBCV003
PROFIBUS¹⁾		2 LEDs 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	AIF	EMF2133IB
Card module¹⁾		- Data backup device for 9300 T (Servo PLC Technology). - Data backup device for 9300 I (Servo PLC). - Data backup device for ECSxA.	AIF	EMZ2221IB

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



Runtime software Positioner

Software package - Positioner

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

The advantages:

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

Application examples:

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

Application ranges:

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

- ▶ Dancer position control for cables, wires, textiles, paper
- ▶ Open-loop tension control for sheet metal, textiles, foils, paper
- ▶ Tension control for thin foils, paper

- ▶ Please note that the software packages are a supplement to the Drive PLC Developer Studio. They can be used with the ECS Application devices and the 9300 Servo PLC Technology.



Software package - Positioner

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

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



Software package - Cam

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

The advantages:

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

Application examples:

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



Software package - Cam

Features:

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

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



Runtime software Winder

Software package - Winder

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

The advantages include:

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

Application ranges:

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

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



Software package - Winder

Features:

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

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



Prepared Solutions

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

The advantages for you

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

Compatibility

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

Flying saw

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

Areas of application

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

Features

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

Cross cutter

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

Areas of application

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

Features

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

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



Engineering software Global Drive Control

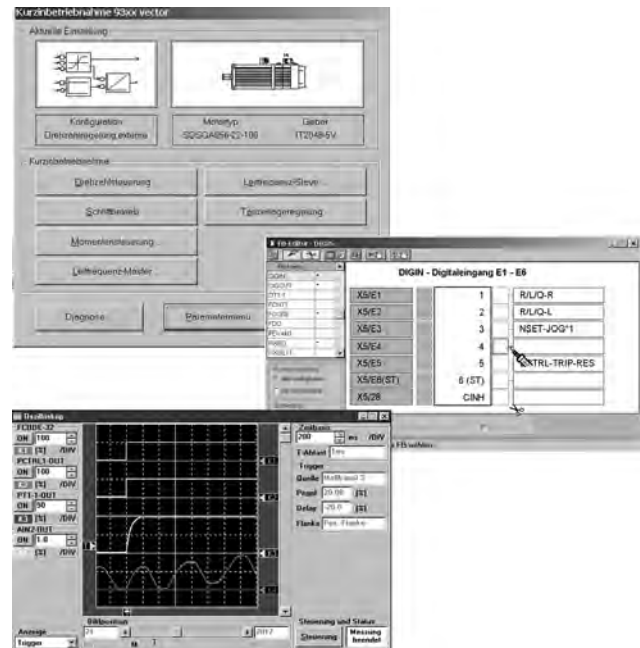
Selection and order data

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

Advantages at a glance:

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

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



User interfaces of Global Drive Control

Design	Features	Product key
Global Drive Control "easy", freeware	▶ Order free of charge ▶ Download via the Internet ▶ Includes GD Loader ▶ 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



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	-		ESP□GDC2
Short form	-		
Design	GDC easy	GDC	
Version	V4.10		V4.10
Latest software version	V4.10		V4.10
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			•
Global Drive Loader	•		•

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

²⁾ Not valid for the 9300 servo register controller.



Engineering software Global Drive Control

Data access/communication

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

Product key Short form	-	ESP□GDC2
Design	GDC easy	GDC
Version Latest software version	V4.10	
Communication System bus (CAN)	▶ USB connection with USB system bus adapter EMF 2177IB ¹⁾ ▶ Parallel interface with system bus adapter EMF 2173IB	
LECOM	▶ RS485 with interface converter (LECOM B) ²⁾ ▶ 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⁾ Not valid for Windows NT®. This operating system does not support the USB port.

²⁾ Possible using one of the intelligent interface converters freely available on the market (not supplied by Lenze).

System requirements

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

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

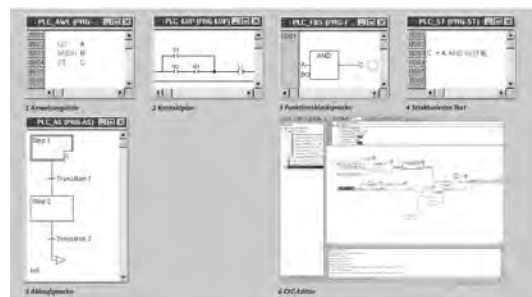


Selection and order data

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

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

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



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



Engineering software

Drive PLC Developer Studio

Functions and features

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

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

Product key Short form	ESP-DDS2-B	ESP□DDS2-P
Design	DDS Basic	DDS Professional
Version		
Latest software version	V2.3	V2.3
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		•
Global Drive Loader	•	•



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
Version Latest software version	V2.3	
Communication		
System bus (CAN)	▶ USB connection with USB system bus adapter EMF 2177IB ¹⁾ ▶ Parallel interface with system bus adapter EMF 2173IB	
LECOM	▶ -	
OPC Drive Server	▶ Via all connections defined on the OPC Drive Server (bus server)	

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

System requirements

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

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



Engineering software Global Drive Oscilloscope

Selection and order data

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

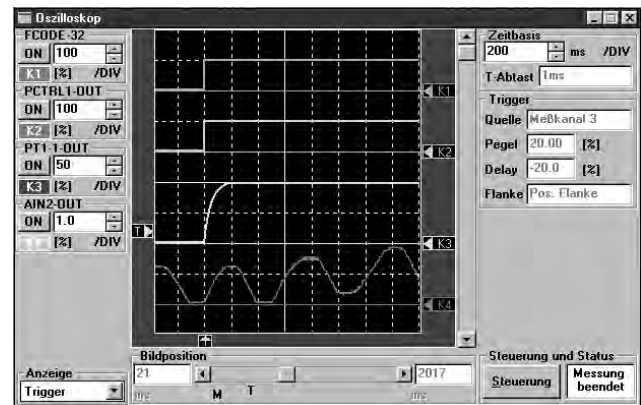
On machines and systems, it can be difficult to determine speeds or torques on individual drives. However, the knowledge of precisely these values can lead to a significant simplification. The GD Oscilloscope means that it is no longer necessary to connect and install complex measuring instruments –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

The advantages for you

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

The GD Oscilloscope is characterised by the following features:

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



User interface of oscilloscope function

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

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



Data access/communication

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

Product key Short form	ESP□GDC2 ESP□DDS2-P
Design	GD Oscilloscope
Version Latest software version	V1.2
Communication System bus (CAN)	▶ USB connection with USB system bus adapter EMF 2177IB¹⁾ ▶ 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 Global Drive oscilloscope, the following minimum hardware and software requirements must be met :

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



Engineering software Global Drive Loader

Selection and order data

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

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

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

The advantages for you

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

Design	Features	Product key
GD Loader, freeware for download	▶ Order free of charge ▶ Download via the Internet ▶ Languages: German/English/French	Download free of charge
GD Loader, freeware on CD-ROM¹⁾	▶ Included on the CD-ROMs of the following software: - Global Drive Control easy V4.5 and higher - 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.

Functions and features

Product key Short form	ESP□GDC2 ESP□DDS2-P
Design	GD Loader, freeware
Version Latest software version	V3.0
Drives	
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	•



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 Loader, freeware
Version Latest software version	V3.0
Communication System bus (CAN)	▶ USB connection with USB system bus adapter EMF 2177IB¹⁾ ▶ Parallel interface with system bus adapter EMF 2173IB
LECOM	▶ RS485 with interface converter (LECOM B)²⁾ ▶ 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⁾ Not valid for Windows NT®. This operating system does not support the USB port.

²⁾ Possible using one of the intelligent interface converters freely available on the market (not supplied by Lenze).

System requirements

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

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



Engineering software Cam Designer

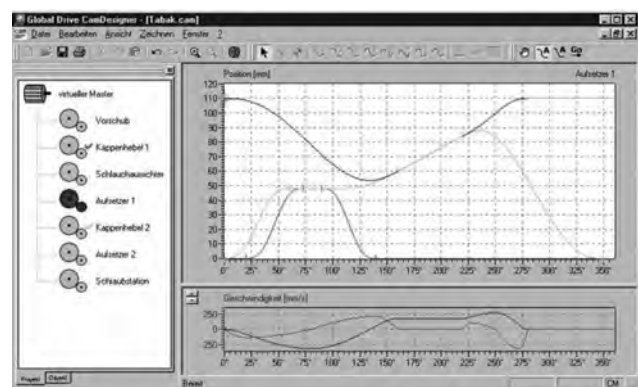
Selection and order data

With Cam Designer, you can quickly create and optimise motion profiles for electronic cams and cam controllers. Whether you are importing data from a CAD system or inputting profiles directly, Cam Designer can support users throughout the motion profile creation process. Motion profiles can be entered very easily in graphic format using the mouse. Simply enter the parts of the motion profile which are actually relevant. If required, Cam Designer will then automatically create the motion profiles in accordance with the motion principles of VDI 2143 and optimise them in terms of acceleration and speed. It is possible to display the motion profiles of other axes. This means that the user can see all axes and very easily match one motion profile to another. Even complex motion profiles can be very easily created using the "combining axes" function, e.g. for controlling a milling tool which is synchronised with a moving wooden panel before cutting an outline into it. This means that the user can divide a complex motion task into as many simple indexing movements as required and input the task in this simplified format. Cam Designer expands these indexing movements and can if required combine them to create a motion profile. In this way, up to eight motion profiles can be created for the 9300 servo cam.

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

The advantages for you:

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



User interface of Cam Designer

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



Data access/communication

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

Product key Short form	ESP-CAM1-P
Design	Cam Designer
Version Latest software version	V2.3
Communication System bus (CAN)	▶ USB connection with USB system bus adapter EMF 2177IB ¹⁾ ▶ Parallel interface with system bus adapter EMF 2173IB
LECOM	
OPC Drive Server	▶ Via all connections defined on the OPC Drive Server (bus server)

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

System requirements

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

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



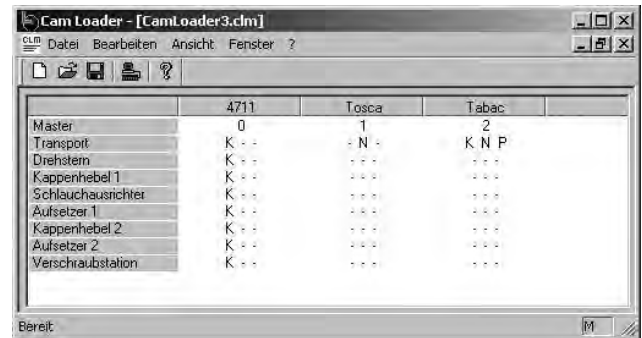
Engineering software Cam Loader

Selection and order data

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

Special features of the Cam Loader:

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



User interface of Cam Loader

Design	Features	Product key
Cam Loader, single user licence	▶ CD-ROM included in scope of supply ▶ Installation on one PC ▶ Languages: German/English	ESP-CAL1
Cam Loader, multiple user licence	▶ CD-ROM not included in scope of supply ▶ Multiple installations on the number of machines for which licences have been purchased ▶ The basis is a single user licence	ESPMCAL1
Cam Loader, corporate licence	▶ CD-ROM not included in scope of supply ▶ Multiple installations within a company at one location ▶ The basis is a single user licence	ESPFAL1
Cam Loader, buyout licence	▶ CD-ROM not included in scope of supply ▶ Multiple installations within a company at one location ▶ Issuing of sublicences in conjunction with Lenze drives installed in a machine ▶ The basis is a single user licence	ESPBCAL1



Data access/communication

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

Product key Short form	ESP□CAL1
Design	Cam Loader
Version Latest software version	V1.1
Communication System bus (CAN)	▶ USB connection with USB system bus adapter EMF 2177IB ¹⁾ ▶ Parallel interface with system bus adapter EMF 2173IB
LECOM	
OPC Drive Server	▶ Via all connections defined on the OPC Drive Server (bus server)

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

System requirements

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

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

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



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