L-force
Servo Drives 9400

Productive, economical, easy to use

Lenze

This is what we stand for.
You want to implement your machine and plant concepts efficiently and easily or optimise existing concepts to reduce costs? Then, Lenze is the partner you are looking for. For more than 60 years, drive and automation systems have been our core competence.

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

Lenze | about us

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

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

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

L-force | Your future is our drive

L-force - your future is our drive
L-force is our new product philosophy introduced in response to the need to reduce costs, save time and increase efficiency. This generation of drive and automation technology sets innovation, flexibility, usability and system culture in perfect harmony.

L-force is innovation

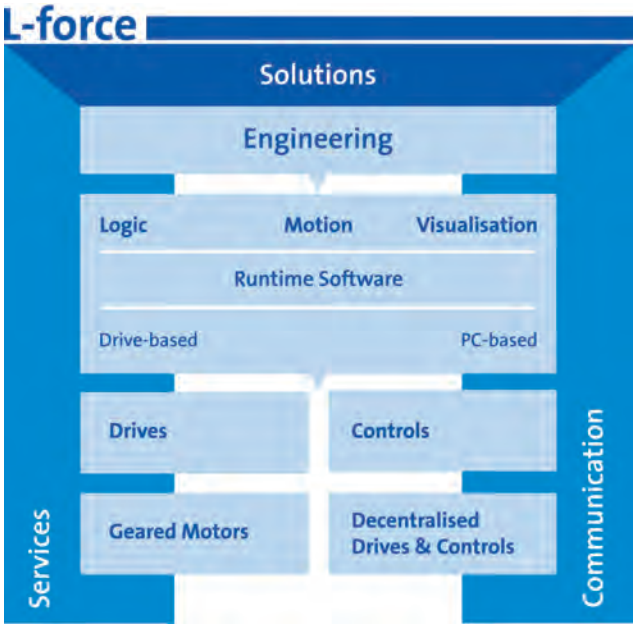
In order to offer you more options and (added) value, we are constantly working to improve our solution still further.

L-force means flexibility
Performance, functional range, software, technical services and after-sales service - you get exactly the combination you need.

L-force means usability
Commissioning is made easier thanks to preconfigured solutions and simple, function-based engineering.

L-force means system
With L-force, everything is perfectly matched.

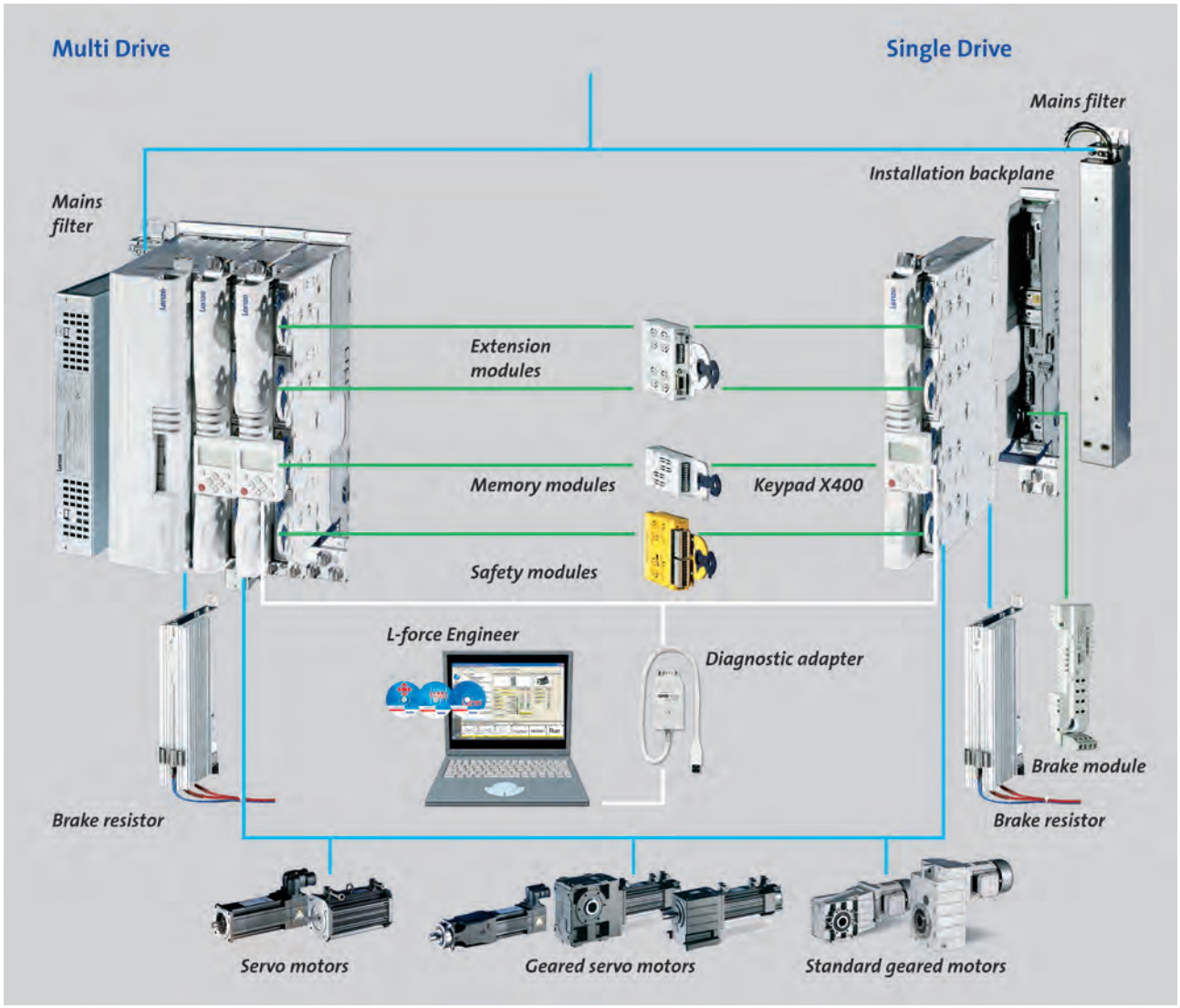
Let us help you shape your future.



L-force is an integrated range of components, solutions, systems and technical services. The overview shows the overall portfolio along with the individual product/solution segments.

System overview | 9400 Servo Drives

System overview



Further catalogues

This catalogue describes the 9400 Servo Drives and the accessories directly associated with this servo system. For information about the other components shown in the system overview above, please refer to the corresponding catalogues. In addition, automation components are dealt with in the PC-based
Automation catalogue.

components	Catalogue
SERVO MOTORS	▶ Servo motors
Geared servo motors	▶ Geared servo motors
Standard geared motors	▶ Geared motors

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9400 Servo Drives product key

E94A S H E 002 4 A 33 EN PM –

Version
S – Single Drive
M – Multi Drive

Series
S – StateLine
H – HighLine

Design
E – Installation

Rated current [A]
(rounded)

002	032	245
003	047	292
004	059	366
007	086	460
009	104	572
013	145	635
017	172	695
024	202	

Voltage class of drive
4 – 3 x 400 V

MXI 1
LF
CA
DN
ET
EN
EP
EC
PM
ER
NN

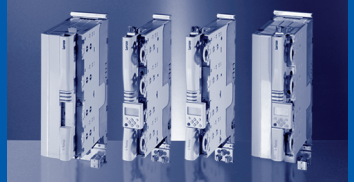
MXI 2
LF
CA
DN
ET
EN
EP
EC
PM
ER
NN

MMI
11 – MM110
22 – MM220
33 – MM330
43 – MM430

MSI
A – SM0
B – SM100
D – SM300
E – SM301

LF – Digital frequency
CA – CANopen
DN – DeviceNet
ET – EtherCAT
EN – Ethernet
EP – ETHERNET Powerlink MN/CN
EC – ETHERNET Powerlink CN
PM – PROFIBUS
ER – PROFINET
NN – no module

MXI 1 – Slot for extension module 1
MXI 2 – Slot for extension module 2
MMI – Slot for memory module
MSI – Slot for safety module



				H	Y	010	1 from 15 kW (without installation backplane)
S	003	4	H	X	005	1	up to 11 kW (with installation backplane)

Base design
S – Single Drive
M – Multi Drive

Rated current for base [A]
(rounded)
003
004
007
009
024

Voltage class of base
4 – 3 x 400 V

Additional component
N – no additional component
H – with brake module

Mounting
X – integrated into installation backplane
Y – integrated into drive

Current identification
(rounded)
002 – 1.0 A
005 – 2.5 A
010 – 5.0 A

Voltage class
1 – 24 V
5 – 205 V
6 – 180 V

Power supply module and regenerative power supply module product key for 9400 Servo Drives

E94A P N E 036 4 — P 036 (from 36.2 kW without installation backplane)

E94A R N E 024 4 A 22 EN PM – P 036

Version
P – Power supply module
R – Regenerative power supply module

Design
E – Installation

Rated current [A] (rounded)
Power supply module
010
036
100
245
Regenerative power supply module (data for regenerative feedback)
013
024

Voltage class of drive
4 – 3 x 400 V

Rated current for base [A]
010
036

Base design
P - Power suply module

MXI 1
CA
EN
PM
NN

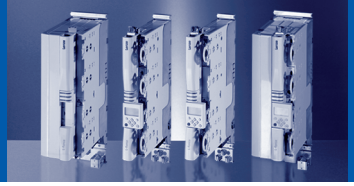
MXI 2
CA
EN
PM
NN

MMI
22 – MM220

MSI
A – SM0

CA – CANopen
EN – Ethernet
PM – PROFIBUS
NN – no module

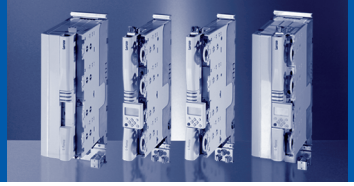
MXI 1 – Slot for extension module 1
MXI 2 – Slot for extension module 2
MMI – Slot for memory module
MSI – Slot for safety module



List of abbreviations

B [mm]	Width
f_d [Hz]	Field frequency
f_{ch} [kHz]	Switching frequency
f_{max} [Hz]	Maximum output frequency
H [mm]	Height
I_{max} [A]	Maximum output current
I_N [A]	Rated current
I_{DC} [A]	Rated DC-bus current
I_{Netz} [A]	Rated mains current
L [mH]	Inductance
l [m]	Motor cable length
m [kg]	Mass
M_{max} [Nm]	Maximum torque
M_{eff} [Nm]	Effective torque
n_{max} [1/min]	Maximum speed
P_{BRd}	Continuous braking power
P_{BRmax}	Peak braking power
P_N [kW]	Motor power
P_{NDC} [kW]	DC-bus rated power
P_v [W]	Power loss
R [Ohm]	Resistance
T [mm]	Depth
t_{re}	Recovery time
t_{on}	Running time
t_{ol}	Overload time
U_{Netz} [V]	Mains voltage range Rated mains voltage
U_{DC} [V]	DC input voltage
WK [kWs]	Thermal capacity

MMI	Modular memory interface (memory module)
MSI	Modular safety interface (safety module)
MXI 1 MXI 2	Modular extension interface (extension module)
DIAG	Slot for USB diagnostic adapter or X400 keypad
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
IEC 61131-2	Programmable logic controllers Part 2: Equipment and tests
IEC 61508	Functional safety of electrical/electronic/programmable electronic safety-related systems
DIN	Deutsches Institut für Normung e.V.
EN	European standard
IEC	International Electrotechnical Commission
IM	International Mounting Code
IP	International Protection Code
NEMA	National Electrical Manufacturers Association
VDE	Verband deutscher Elektrotechniker (Association of German Electrical Engineers)
UL	Underwriters Laboratory Listed Product
UR	Underwriters Laboratory Recognized Product



About this catalogue

This catalogue provides an overview of all the components in the 9400 Servo Drive product range. Here you can find the different axis modules (Single Drive and Multi Drive), the corresponding power supply modules, and all accessory components for a complete drive system. The same product range is also covered in the electronic DSC catalogue. The electronic catalogue is available on DVD and on the Internet at: www.lenze.de/dsc.
Additional information can also be downloaded from the Internet (e.g. rated data) for some components. These components are marked accordingly with the following arrow symbol and an identifier printed in bold.

→ Rated data for operation at 3/PE/AC 500 V
DS_9400_0001
Available for download at www.lenze.de/dsc

Just enter this identifier (e.g. **DS_9400_0001**) as the search term and you will get the information as a PDF file.

Inverters and accessories

All components of the 9400 Servo Drives range can be selected easily and quickly via a uniform product key.
To improve the clarity, wild cards are used to represent similar designs.

- The symbol □ stands for all designs carrying the represented designation. The □ is, for instance, used to summarise the different variants: in E94AS□E0174 the □ could be a wildcard for H (HighLine) or S (StateLine).
- In the type designations of mains/RFI filters (accessory components) the wild cards stand for the different rated currents.

9400 Servo Drives Single Drive and Multi Drive

When will it click?
A great many technical achievements make our everyday lives easier.
Just like that, with one click

- the lights come on
- a seat belt engages
- you can surf the World Wide Web
- take a great photo of your family.

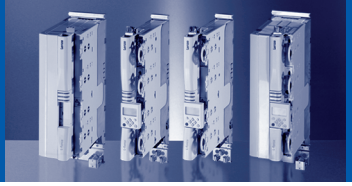
The 9400 Servo Drives will revolutionise your servo technology – with simple clicks.

Click – the innovative assembly concept
The 9400 Servo Drives have a revolutionary electromechanical assembly concept which wins its users over. Separating the installation backplane from the drive electronics (up to 11 kW) means that the installation, assembly and application procedures are unrivalled in their simplicity.

Single Drive
Our single-axis drives combine mains supply, DC bus and inverter in a single device. The filter elements and the brake chopper are integrated into the servo inverter and permit autonomous use in distributed control cabinet installations. Higher interference levels can be achieved without a larger mounting area by using suitable footprint filters (up to 55 kW).

Multi Drive
Our multi-axis drives are particularly suitable for centralised, compact multi-axis installations. The energy exchange via the DC bus reduces the power requirement on the mains side. The axes share the same mains supply, brake chopper and EMC filter. The materials requirements and installation efforts are thus significantly reduced. The integrated DC busbar system provides for compact installations for drives rated up to 11 kW.

9400 Servo Drives Single Drive and 9400 Servo Drives Multi Drive



9400 Servo Drives StateLine and HighLine

StateLine - for centralised control concepts
The 9400 StateLine Servo Drives use the standardised drive profile DS402 / IEC 61800-7-2 and are ideally suited for centralised topologies. Therefore the StateLine excels with fast commissioning.
Use the implemented operating modes "Homing" for referencing the machine and "Interpolated Position" for fast position following with speed and torque feedforward control. In addition the StateLine features the operating modes "Cyclic Synchronous Velocity" for fast speed following with torque feedforward control and "Cyclic Synchronous Torque" for fast torque following with speed limitation.
The drives communicate with a higher-level motion control or an industrial PC via the CANopen or EtherCAT extension module. The modular concept of the 9400 Servo Drives leaves the system open for future fieldbus systems. One of the highlights of the StateLine is the integrated modular safety engineering concept which makes your machine much safer.

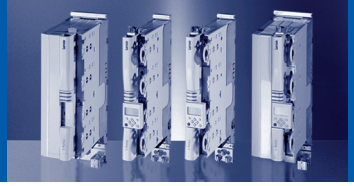
HighLine - for decentralised control concepts
The 9400 HighLine Servo Drives feature intelligence in the drive and are therefore designed for decentralised motion control applications as well as for centralised control topologies.
Lenze provides pre-programmed technology applications, e.g. table positioning, electronic gearbox and synchronism with mark registration for solving various applications simply by parameter setting. The function block editor integrated into the L-force Engineer HighLevel (PC setup tool) enables you to adapt the functions in an easy and flexible manner.
The HighLine Servo Drive comes with the CANopen fieldbus, conventional I/Os, diagnostic LEDs, a diagnostic interface, a resolver and a universal encoder input on board.
In addition, the HighLine is equipped with two extension slots for communication or extension modules as well as one slot each for a memory module and a safety module, so that the drive can be optimally adapted to your requirements.

9400 StateLine Servo Drives

9400 HighLine Servo Drives

Functions and features

Design	9400 StateLine Servo Drives	9400 HighLine Servo Drives
Control modes/motor control	Field-oriented servo control (SC) for synchronous and asynchronous servo motors and standard asynchronous motors	Field-oriented servo control (SC) for synchronous and asynchronous servo motors and standard asynchronous motors Sensorless vector control (SLVC) for standard asynchronous motors (for the drives: E94A□HE0024 to E94A□HE1044) V/f control (VFCplus) for standard and asynchronous servo motors
Basic functions	Motor control Drive monitoring and diagnosing Logbook, oscilloscope function Evaluation of electronic nameplate (ENP) for Lenze servo motors Speed, torque and position control Brake logic, homing	Motor control Drive monitoring and diagnosing Logbook, oscilloscope function Evaluation of electronic nameplate (ENP) for Lenze servo motors Speed, torque and position control Brake logic, homing, manual jog
Technology applications	Drive profile DS402 IEC 61800-7-2: - Homing mode - Interpolated position mode - Cyclic synchronous position - Cyclic synchronous velocity - Cyclic synchronous torque	Speed actuating drive Torque actuating drive Electronic gearbox Synchronism with mark registration Positioning (table positioning, positioning sequence control)
Advanced functions		Function blocks for cam function
Monitoring	Brake chopper Fan Motor phase failure DC-bus voltage	
Monitoring and protective measures	Short circuit Short to earth (protected against short to earth during operation, limited protection against short to earth on mains power-up) Overvoltage Overcurrent Overtemperature Undervoltage Motor stalling, motor overload Motor overtemperature (input for PTC or thermal contact, $I^2 x t$ monitoring)	
Diagnostics Diagnostic interface	Integrated For keypad or USB diagnostic adapter	
Status displays	4 LEDs	6 LEDs
Braking operation Brake chopper	Integrated in Single Drives	
Brake resistor	External	



Control connections

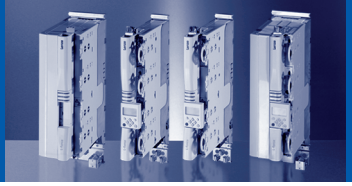
Click – the modular structure
The pluggable control connections of the 9400 Servo Drives are located at the front of the device to facilitate access to the control cabinet wiring. The USB diagnostic adapter E94AZCUS, the keypad EZAEBK1001 and the diagnosis terminal EZAEBK2001 are available for the diagnostic interface. For feedback, prefabricated system cables can be used to connect servo motors of the MCS and MCA series. Prefabricated system cables can be supplied in lengths of up to 150 m.

Design	9400 StateLine Servo Drives	9400 HighLine Servo Drives
Inputs/outputs Analog inputs	▶ Number: 1 ▶ Resolution: 11 bits + sign ▶ Value range: +/-10 V ▶ 1x switchable value range: +/-20 mA	▶ Number: 2 ▶ Resolution: 11 bits + sign ▶ Value range: +/-10 V ▶ 1x switchable value range: +/-20 mA
Analog outputs		▶ Number: 2 ▶ Resolution 10 bits + sign ▶ Value range: +/- 10 V Max. 2 mA
Digital inputs	▶ Number: 4 ▶ Touch-probe capable: 1 ▶ Switching level: PLC (IEC 61131-2) ▶ Max. input current: 8 mA	▶ Number: 8 ▶ Touch-probe capable: 8 ▶ Switching level: PLC (IEC 61131-2) ▶ Max. input current: 8 mA
Digital outputs	▶ Number: 1 ▶ Switching level: PLC (IEC 61131-2) ▶ Max. output current: 50 mA per output ▶ Load > 480 Ω at 24 V	▶ Number: 4 ▶ Switching level: PLC (IEC 61131-2) ▶ Max. output current: 50 mA per output ▶ Load > 480 Ω at 24 V

Control connections

Design	9400 StateLine Servo Drives	9400 HighLine Servo Drives
Interfaces		
CANopen	▶ Via slot MXI 1: extension	▶ Integrated
Extension modules	▶ Via slot MXI 1: extension ▶ Slot MXI 2: not available	▶ Via slot MXI 1: extension 1 ▶ Via slot MXI 2: extension 2
State bus	▶ Integrated	
Memory module	▶ Slot MMI	
Safety module	▶ Slot MSI	
Drive interface		
Resolver input	▶ Integrated ▶ Sub-D, 9-pin	
Encoder input	▶ Sub-D, 15-pin ▶ Multi-encoder input for: SinCos/TTL incremental encoder, SinCos absolute value encoder single-turn / multi-turn (Hiperface® / Endat V2.1)	
Motor temperature monitoring evaluation	▶ Via feedback: KTY evaluation ▶ Input on the device: PTC evaluation	
Motor brake control	▶ Optional, in the installation backplane up to 23.5 A or in the axis module from 32 A	
Control electronics supply		
Rated voltage	▶ 24 V in accordance with IEC 61131-2	
Voltage range	▶ 19.2 ... 28.8 V, residual ripple max. ± 5 %	
Current consumption	▶ Single Drive: approx. 1.2 A during operation, max. 3 A starting current for 100 ms [1)] ▶ Multi Drive: approx. 2.4 A during operation, max. 4 A starting current for 100 ms	

[1)] The supply voltage for the control electronics comes from the mains voltage. Alternatively, it can be provided by a 24 V supply that is independent of the mains (available as an option).



Power supply modules for 9400 Servo Drives

Power supply modules
The 9400 series power supply modules form the central AC mains connection for a Multi Drive axis grouping. A brake chopper is integrated, as is an outlet to the DC-bus busbar system of the 9400 Multi Drives. Filters and, if necessary, a brake resistor are to be provided by an external source.
The combined usage of the mains supply, the brake chopper, the DC-bus busbar system and the filter significantly reduces material and installation costs within a Multi Drive axis grouping.

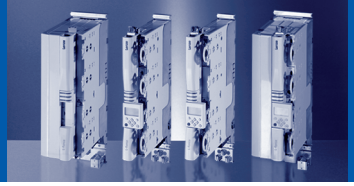
Regenerative power supply modules
In many applications, the electrical drives used must be accelerated and decelerated repeatedly. If the braking power that occurs is to be fed back into the mains, the power supply/regenerative modules can be used for this.
Both of the designs for rated powers of 15 kW and 27 kW fit seamlessly into the power supply and axis module series. The separation of the installation backplane and electronic module also makes installation and mounting very simple. The necessary mains filter is added simply and connected to the installation backplane and the regenerative power supply module via the available connecting cables. The mains filter is available both in a standard design and with increased interference suppression for long motor cables.
The regenerative power supply modules can increase their rated power for a short period. This means that they are ideally suited to intermittent drives. If more supply power is required, further uncontrolled rectifiers can be connected in parallel. Therefore, parallel operation with a power supply module is possible.

Power supply module

Regenerative power supply module

Functions and features

Design	Power supply modules	Regenerative power supply modules
Basic functions	Supply to an axis module or multi-axis system in DC-bus connection	Supply to an axis module or multi-axis system in DC-bus connection Power recovery of the surplus power arising during braking operation into the mains Operation monitoring and diagnostics Logbook, oscilloscope function
Monitoring	Brake chopper Mains voltage Overtemperature	Brake chopper Mains filter Mains voltage, DC-bus voltage Regenerative inverter Overtemperature
Monitoring and protective measures	Short circuit brake chopper	Short circuit brake chopper Mains and mains phase failure detection Overvoltage Device overload Mains filter overload Brake chopper overload Mains inverter overcurrent Undervoltage
Diagnostics		
Diagnostic interface		Integrated For keypad or USB diagnostic adapter
Status displays	5 LEDs	6 LEDs
Braking operation		
Power recovery		Via integrated mains inverter
Brake chopper	Integrated	
Brake resistor	External	



Control connections

Click – the modular structure
The pluggable control connections of the power supply modules and the regenerative power supply modules are located at the front of the drive to facilitate access to the control cabinet wiring. The USB diagnostic adapter E94AZCUS, the keypad EZAEBK1001 and the diagnosis terminal EZAEBK2001 are available for the diagnostic interface of the regenerative power supply module.

Design	Power supply modules	Regenerative power supply modules
Inputs/outputs		
Analog inputs		▶ Number: 2 ▶ Resolution: 11 bits + sign ▶ Value range: +/-10 V, 1x switchable, 0 ... 20 mA
Analog outputs		▶ Number: 2 ▶ Resolution 10 bits + sign ▶ Value range: +/- 10 V Max. 2 mA
Digital inputs	▶ Configured ▶ Number: 1 ▶ Switching level: PLC (IEC 61131-2) ▶ Max. input current: 8 mA	▶ Number: 8 ▶ Switching level: PLC (IEC 61131-2) ▶ Max. input current: 8 mA
Digital outputs	▶ Configured ▶ Number: 4 ▶ Switching level: PLC (IEC 61131-2) ▶ Max. output current: 50 mA per output ▶ Load > 480 Ω at 24 V	▶ Number: 4 ▶ Switching level: PLC (IEC 61131-2) ▶ Max. output current: 50 mA per output ▶ Load > 480 Ω at 24 V
Interfaces		
CANopen		▶ Integrated
Extension modules		▶ Via slot MXI 1: extension 1 ▶ Via slot MXI 2: extension 2
State bus		▶ Integrated
Memory module		▶ Slot MMI
Safety module		▶ Slot MSI
Application interfaces		
Resolver input		▶ Integrated (no function)
Mains synchronisation input		▶ Integrated ▶ Sub-D, 15-pin
Temperature monitoring input		▶ Input on the device: PTC evaluation
Control electronics supply		
Rated voltage	▶ 24 V in accordance with IEC 61131-2	
Voltage range	▶ 19.2 ... 28.8 V, residual ripple max. ± 5 %	
Current consumption	▶ Approx. 1.4 A during operation, max. 4 A starting current for 100 ms	▶ Approx. 1.2 A during operation, max. 3 A starting current for 100 ms [1]

[1] The supply to the control electronics comes from the mains voltage. Alternatively, it can be provided by a 24 V supply that is independent of the mains (available as an option).

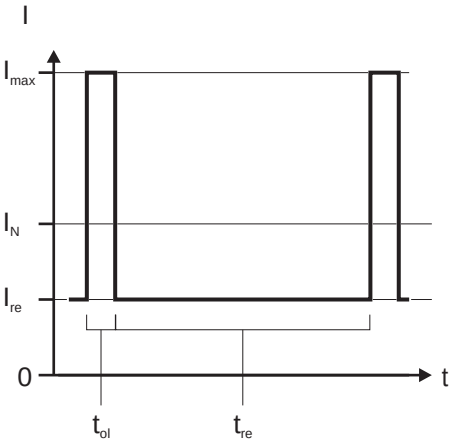
Basic dimensioning of axis modules

Here the most important steps for dimensioning Single Drive and Multi Drive 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 (synchronous motors), MCA or MDFQA (asynchronous motors) ranges.

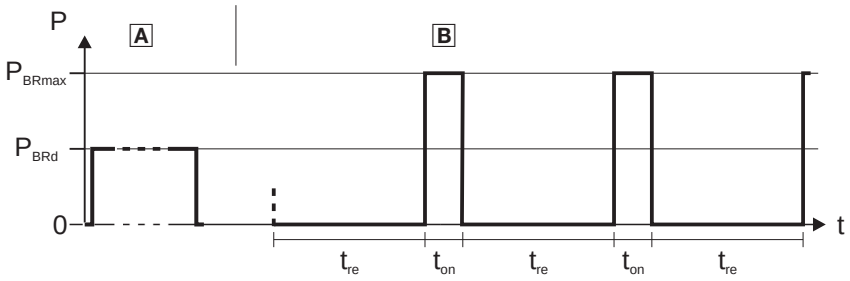
- **Selecting the axis module**
  The axis modules are selected on the basis of the maximum currents and power required.
  Depending on the drive, the 9400 Servo Drives and the power supply modules can be operated for overload time t_{ol} with maximum output current I_{max}, provided that the drive is then operated for recovery time t_{re} with a reduced output current.
  The switching frequency is automatically adapted to the rate of utilisation.



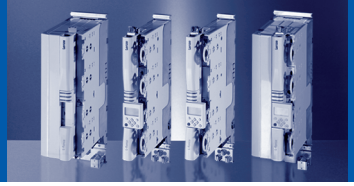
Maximum output current cycle

- **Braking operation**

If high moments of inertia are to be braked or if extended operation in generator mode is to be executed, braking energy can be transferred to an external brake resistor or converted into heat with Single Drive axis modules or with power supply modules via the integrated brake chopper.
The brake chopper can dissipate the continuous braking power P_{BRd} on a continual basis (case A) or the peak braking power P_{BRmax} for the running time t_{on} followed by the recovery time t_{re} (case B).

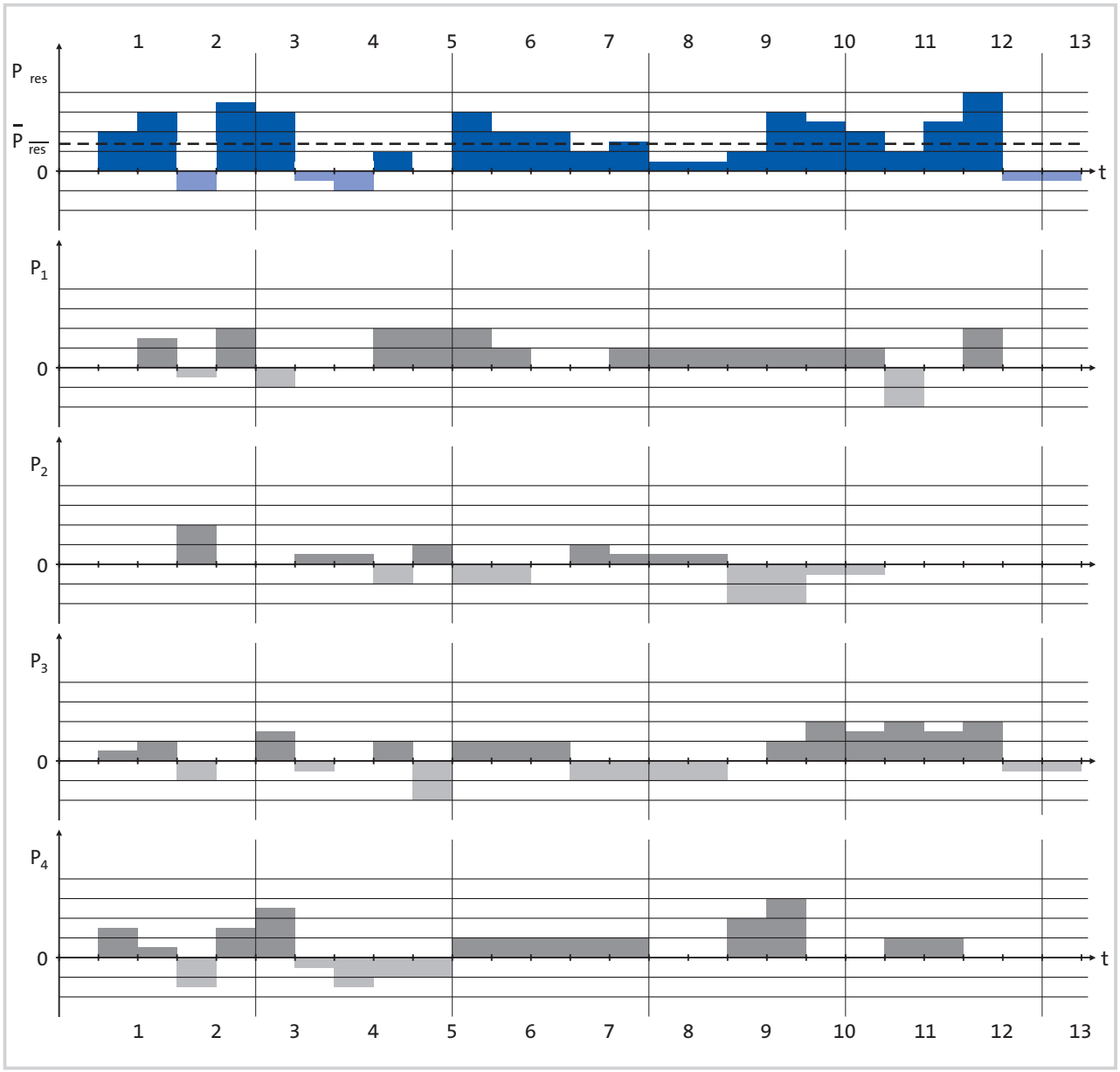


Brake chopper braking power



Dimensioning for DC-bus operation

- **Dimensioning of interconnected multi-axis modules**
  The best way to select the ideal power supply module required for a multi-axis application is to use a time/power diagram for the complete machine cycle for all axis modules. The total power required of the power supply module can be calculated by adding the time-based individual axis power ratings. In the same way the braking power required can be determined.



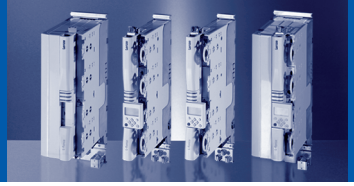
Time/power diagram of a multi-axis servo system
P_{1}...P_{4} = individual power of axis 1...axis 4
P_{res} = addition of individual powers
$P_{res\ 1-4}$ = mean value of individual powers

Standards and operating conditions

Conformity	CE: Low-Voltage Directive (2006/95/EC)
Approvals UL 508C	Power Conversion Equipment (file no. 132659) [1]
Enclosure EN 60529 NEMA	IP20 [2] Protection against contact according to NEMA 250 type 1 [2]
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 ... +60 °C) 2K3 (temperature: -25 °C ... +70 °C) 3K3 (temperature: -10 °C ... +55 °C) Above +45 °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 Transport EN 60721-3-2 Operation	2M2 Germanischer Lloyd: 5 Hz ≤ f ≤13.2 Hz ± 1 mm amplitude 13.2 Hz < f ≤ 100 Hz 0.7 g

[1] In preparation for products: communication module EtherCAT E94AYCET, regenerative power supply modules E94ARNE□□□4 and the accompanying mains filters E94AZMR□□□4□DB
[2] Not in the wire range of the on the motor-side terminals

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 disturbance: Max. shielded motor cable lengths for compliance with the C2 EMC protection requirements without external filters E94AS□E0024 to E94AS□E0244: 10 m E94AS□E0324 to E94AS□E1044: 50 m E94AS□E1454 to E94AS□E6954: 150 m
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 mains isolation through double/reinforced insulation for digital inputs and outputs



Rated data for Single Drives

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- Unless otherwise specified, the data refers to the default setting.

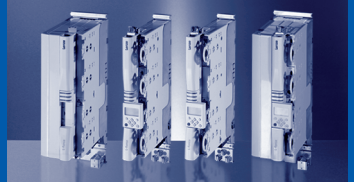
→ Rated data for operation at 3/PE/AC 500 V
DS_9400_0001
Available for download at www.lenze.de/dsc

Motor power (asynchronous motor, 4-pole)	P_N [kW]	**0.37**	**0.75**	**1.5**	**3**
Product key [1] Single Drive		**E94AS□E0024**	**E94AS□E0034**	**E94AS□E0044**	**E94AS□E0074**
Mains voltage range	U_{Netz} [V]	3/PE AC 180 V-0% ... 550 V+0%; 45 Hz-0% ... 65 Hz+0%			
Alternative DC supply	U_{DC} [V]	DC 260-0% ... 775 V+0%			
Rated output current					
2 kHz	I_N [A]	1.9 [3]	3.1 [3]	5 [3]	8.8 [3]
4 kHz	I_N [A]	1.9 [3]	3.1 [3]	5 [3]	8.8 [3]
8 kHz	I_N [A]	1.5	2.5	4	7
16 kHz	I_N [A]	1.1	1.9	3	5.3
Max. output current cycle (long) [2, 4]					
Max. output current	I_{max} [A]	2.8	4.7	7.5	13.1
Reduced output current	I_{re} [A]	1.4	2.3	3.8	6.6
Overload time	t_{ol} [s]	60			
Recovery time	t_{re} [s]	120			
Max. output current cycle (short) [2, 4]					
Max. output current	I_{max} [A]	6	10	16	21
Reduced output current	I_{re} [A]	1.4	2.3	3.8	6.6
Overload time	t_{ol} [s]	0.5			
Recovery time	t_{re} [s]	4.5			

[1] → 10 - see product key – illustration shows accessories / modules

[2] → 24 - See diagram

[3] Mains filter required
[4] Mains filter required; if no mains filter is installed, the stated values for I_{max} and I_{re} decrease



Rated data for Single Drives

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→ Rated data for operation at 3/PE/AC 500 V
DS_9400_0001
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Motor power (asynchronous motor, 4-pole)	P_N [kW]	**0.37**	**0.75**	**1.5**	**3**
Product key [1] Single Drive		**E94AS□E0024**	**E94AS□E0034**	**E94AS□E0044**	**E94AS□E0074**
Rated mains current With mains choke / mains filter	I_{Netz} [A]	1.5	2.5	3.9	7
Without mains choke / mains filter	I_{Netz} [A]	2.1	3.5	5.5	9.9
Rated DC-bus current	I_{DC} [A]	2.6	4.3	6.7	12.1
Braking unit data [2]					
Continuous braking power	P_{BRd} [kW]	1.3		1.9	2.6
Peak braking power	P_{BRmax} [kW]	6.4		11.2	
Running time	t_{on} [s]	0.7		0.6	0.8
Recovery time	t_{re} [s]	4.3		4.4	4.2
Min. brake resistance	R [Ohm]	82		47	
Power loss	P_V [W]	110	130	160	210
Dimensions					
Height	H [mm]	350 (with 481 installation backplane)			
Width	B [mm]	60		90	
Depth	T [mm]	288			
Mass	m [kg]	4		5.3	
Permissible motor cable length Shielded	l [m]	50		100	

[1] → 10 - see product key – illustration shows accessories / modules

[2] → 24 - See diagram

Rated data for Single Drives

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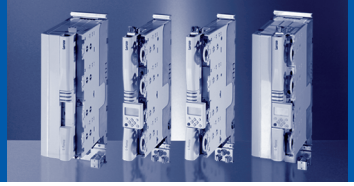
DS_9400_0001
Available for download at www.lenze.de/dsc

Motor power (asynchronous motor, 4-pole)	P_N [kW]	**5.5**	**7.5**	**11**
Product key [1] Single Drive		**E94AS□E0134**	**E94AS□E0174**	**E94AS□E0244**
Mains voltage range	U_{Netz} [V]	3/PE AC 180 V-0% ... 550 V+0%; 45 Hz-0% ... 65 Hz+0%		
Alternative DC supply	U_{DC} [V]	DC 260-0% ... 775 V+0%		
Rated output current				
2 kHz	I_N [A]	16.3 [3]	20.6 [3]	29.4 [3]
4 kHz	I_N [A]	16.3 [3]	20.6 [3]	29.4 [3]
8 kHz	I_N [A]	13	16.5	23.5
16 kHz	I_N [A]	9.8	12.4	17.6
Max. output current cycle (long) [2, 4]				
Max. output current	I_{max} [A]	24.4	30.9	44.1
Reduced output current	I_{re} [A]	12.2	15.5	22.1
Overload time	t_{ol} [s]	60		
Recovery time	t_{re} [s]	120		
Max. output current cycle (short) [2, 4]				
Max. output current	I_{max} [A]	39	49.5	58.8
Reduced output current	I_{re} [A]	12.2	15.5	22.1
Overload time	t_{ol} [s]	0.5		
Recovery time	t_{re} [s]	4.5		

[1] → 10 - see product key – illustration shows accessories / modules

[2] → 24 - See diagram

[3] Mains filter required
[4] Mains filter required; if no mains filter is installed, the stated values for I_{max} and I_{re} decrease



Rated data for Single Drives

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- Unless otherwise specified, the data refers to the default setting.

→ Rated data for operation at 3/PE/AC 500 V
DS_9400_0001
Available for download at www.lenze.de/dsc

Motor power (asynchronous motor, 4-pole)	P_N [kW]	**5.5**	**7.5**	**11**
Product key [1] Single Drive		**E94AS□E0134**	**E94AS□E0174**	**E94AS□E0244**
Rated mains current With mains choke / mains filter	I_{Netz} [A]	11.8	15	20.5
Without mains choke / mains filter	I_{Netz} [A]	16.8	21	29
Rated DC-bus current	I_{DC} [A]	20.6	25.7	35.5
Braking unit data [2]				
Continuous braking power	P_{BRd} [kW]	4.7	6.4	9.3
Peak braking power	P_{BRmax} [kW]	19.5	29.2	
Running time	t_{on} [s]	0.8	0.7	1.1
Recovery time	t_{re} [s]	4.2	4.3	3.9
Min. brake resistance	**R** [Ohm]	27	18	
Power loss	P_V [W]	320	380	500
Dimensions				
Height	**H** [mm]	350 (with 481 installation backplane)		
Width	**B** [mm]	120		
Depth	**T** [mm]	288		
Mass	**m** [kg]	8.1		
Permissible motor cable length Shielded	**l** [m]	100		

[1] → 10 - see product key – illustration shows accessories / modules

[2] → 24 - See diagram

Rated data for Single Drives

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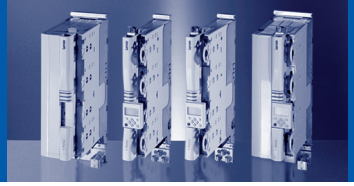
- Unless otherwise specified, the data refers to the default setting.

→ Rated data for operation at 3/PE/AC 500 V
DS_9400_0001
Available for download at www.lenze.de/dsc

Motor power (asynchronous motor, 4-pole)	P_N [kW]	**15**	**22**	**30**
Product key [1] Single Drive		**E94AS□E0324**	**E94AS□E0474**	**E94AS□E0594**
Mains voltage range	U_{Netz} [V]	3/PE AC 180 V-0% ... 550 V+0%; 45 Hz-0% ... 65 Hz+0%		
Alternative DC supply	U_{DC} [V]	DC 260-0% ... 775 V+0%		
Rated output current				
2 kHz	I_N [A]	38.4	47	59
4 kHz	I_N [A]	38.4	47	59
8 kHz	I_N [A]	32	41	
16 kHz	I_N [A]	16.8	21.5	
Max. output current cycle (long) [2]				
Max. output current	I_{max} [A]	57.6	70.5	88.5
Reduced output current	I_{re} [A]	28.8	35.3	44.3
Overload time	t_{ol} [s]	60		
Recovery time	t_{re} [s]	120		
Max. output current cycle (short) [2]				
Max. output current	I_{max} [A]	76.8	94	118
Reduced output current	I_{re} [A]	28.8	35.3	44.3
Overload time	t_{ol} [s]	0.5		
Recovery time	t_{re} [s]	4.5		

[1] → 10 - see product key – illustration shows accessories / modules

[2] → 24 - See diagram



Rated data for Single Drives

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→ Rated data for operation at 3/PE/AC 500 V
DS_9400_0001
Available for download at www.lenze.de/dsc

Motor power (asynchronous motor, 4-pole)	P_N [kW]	**15**	**22**	**30**
Product key [1] Single Drive		**E94AS□E0324**	**E94AS□E0474**	**E94AS□E0594**
Rated mains current				
With mains choke / mains filter	I_{Netz} [A]	29	43	54
Without mains choke / mains filter	I_{Netz} [A]	29	43	54
Rated DC-bus current	I_{DC} [A]	36	53	66
Braking unit data [2]				
Continuous braking power	P_{BRd} [kW]	12.6	18.6	25.3
Peak braking power	P_{BRmax} [kW]	29.2	35	
Running time	t_{on} [s]	260	320	430
Recovery time	t_{re} [s]	340	280	170
Min. brake resistance	**R** [Ohm]	18	15	
Power loss	P_V [W]	700	1050	1122
Dimensions				
Height	**H** [mm]		602	
Width	**B** [mm]		206	
Depth	**T** [mm]		294	
Mass	**m** [kg]		19	
Permissible motor cable length				
Shielded	**l** [m]		100	

[1] → 10 - see product key – illustration shows accessories / modules

[2] → 24 - See diagram

Rated data for Single Drives

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DS_9400_0001
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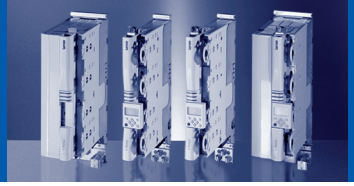
Motor power (asynchronous motor, 4-pole)	P_N [kW]	**45**	**55**
Product key [1] Single Drive		**E94AS□E0864**	**E94AS□E1044**
Mains voltage range	U_{Netz} [V]	3/PE AC 180 V-0% ... 550 V+0%; 45 Hz-0% ... 65 Hz+0%	
Alternative DC supply	U_{DC} [V]	Not possible	
Rated output current			
2 kHz	I_N [A]	86	104
4 kHz	I_N [A]	86	104
8 kHz	I_N [A]	73	78
16 kHz	I_N [A]	38.3	41
Max. output current cycle (long) [2]			
Max. output current	I_{max} [A]	129	156
Reduced output current	I_{re} [A]	64.5	78
Overload time	t_{ol} [s]	60	
Recovery time	t_{re} [s]	120	
Max. output current cycle (short) [2]			
Max. output current	I_{max} [A]	172	208
Reduced output current	I_{re} [A]	64.5	78
Overload time	t_{ol} [s]	0.5	
Recovery time	t_{re} [s]	4.5	

[1] → 10 - see product key – illustration shows accessories / modules

[2] → 24 - See diagram



Rated data for Single Drives

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→ Rated data for operation at 3/PE/AC 500 V
DS_9400_0001
Available for download at www.lenze.de/dsc

Motor power (asynchronous motor, 4-pole)	P_N [kW]	**45**	**55**
Product key [1] Single Drive		**E94AS□E0864**	**E94AS□E1044**
Rated mains current With mains choke / mains filter	I_{Netz} [A]	79	95
Without mains choke / mains filter	I_{Netz} [A]	79	95
Rated DC-bus current	I_{DC} [A]	96.8	116.4
Braking unit data [2] Continuous braking power	P_{BRd} [kW]	37.9	46.3
Peak braking power	P_{BRmax} [kW]	70.1	
Running time	t_{on} [s]	320	400
Recovery time	t_{re} [s]	280	200
Min. brake resistance	R [Ohm]	7.5	
Power loss	P_V [W]	1500	1800
Dimensions Height	H [mm]	702	
Width	B [mm]	266	
Depth	T [mm]	370	
Mass	m [kg]	42	
Permissible motor cable length Shielded	l [m]	100	

[1] → 10 - see product key – illustration shows accessories / modules

[2] → 24 - See diagram

Rated data for Single Drives

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DS_9400_0001
Available for download at www.lenze.de/dsc

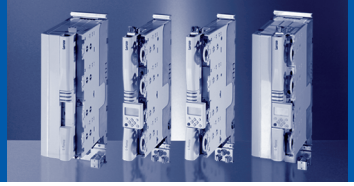
Motor power (asynchronous motor, 4-pole)	P_N [kW]	**75**	**85** [3]	**95** [4]	**90**	**105** [3]	**110** [4]	**105**	**125** [3]	**135** [4]
Product key [1] Single Drive		**E94AS□E1454**			**E94AS□E1724**			**E94AS□E2024**		
Mains voltage range	U_{Netz} [V]	3/PE AC 342 V-0% ... 550 V+0%; 48 Hz-0% ... 65 Hz+0%								
Alternative DC supply	U_{DC} [V]	Not possible								
Rated output current										
2 kHz	I_N [A]	145	160	177	172	195	212	202	240	260
4 kHz	I_N [A]	145			172			202		
8 kHz	I_N [A]	102			120			131		
16 kHz	I_N [A]									
Max. output current cycle (long) [2]										
Max. output current	I_{max} [A]	218		195	258		233	303		286
Reduced output current	I_{re} [A]	109		168	129		201	152		247
Overload time	t_{ol} [s]	60								
Recovery time	t_{re} [s]	120								
Max. output current cycle (short) [2]										
Max. output current	I_{max} [A]	261	218		310	258		364	303	
Reduced output current	I_{re} [A]	109	145		129	180		152	226	
Overload time	t_{ol} [s]	10								
Recovery time	t_{re} [s]	50								

[1] → 10 - see product key – illustration shows accessories / modules

[2] → 24 - See diagram

[3] The column is valid at an ambient temperature of 40 degrees Celsius and with a fixed switching frequency of 2 kHz.

[4] The column is valid at an ambient temperature of 40 degrees Celsius, with a fixed switching frequency of 2 kHz and a max. mains voltage of AC 440 V.



Rated data for Single Drives

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DS_9400_0001
Available for download at www.lenze.de/dsc

Motor power (asynchronous motor, 4-pole)	P_N [kW]	**75**	**85**	**95**	**90**	**105**	**110**	**105**	**125**	**135**
Product key [1] Single Drive		**E94AS□E1454**			**E94AS□E1724**			**E94AS□E2024**		
Rated mains current										
With mains choke / mains filter	I_{Netz} [A]	140			166			195		
Without mains choke / mains filter	I_{Netz} [A]	140			166			195		
Rated DC-bus current	I_{DC} [A]	171			203			239		
Braking unit data [2]										
Continuous braking power	P_{BRd} [kW]	31.5			36.7			45.1		
Peak braking power	P_{BRmax} [kW]	105.1			122.2			150.2		
Running time	t_{on} [s]				60					
Recovery time	t_{re} [s]				540					
Min. brake resistance	**R** [Ohm]	5			4.3			3.5		
Power loss	P_V [W]	2100			2200			2600		
Dimensions										
Height	**H** [mm]	930			1199					
Width	**B** [mm]				407					
Depth	**T** [mm]				427					
Mass	**m** [kg]	54			107			109		
Permissible motor cable length Shielded	**l** [m]				150					

[1] → 10 - see product key – illustration shows accessories / modules

[2] → 24 - See diagram

Rated data for Single Drives

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DS_9400_0001
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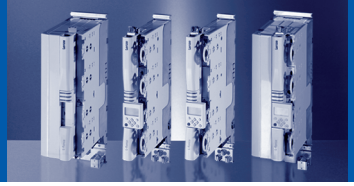
Motor power (asynchronous motor, 4-pole)	P_N [kW]	**130**	**160** [3]	**165** [4]	**150**	**190** [3]	**210** [4]	**190**	**235** [3]	**250** [4]
Product key [1] Single Drive		**E94AS□E2454**			**E94AS□E2924**			**E94AS□E3664**		
Mains voltage range	U_{Netz} [V]	3/PE AC 342 V-0% ... 550 V+0%; 48 Hz-0% ... 65 Hz+0%								
Alternative DC supply	U_{DC} [V]	Not possible								
Rated output current										
2 kHz	I_N [A]	245	302	315	292	361	395	366	443	480
4 kHz	I_N [A]	209			250			313		
8 kHz	I_N [A]	160			191			240		
16 kHz	I_N [A]									
Max. output current cycle (long) [2]										
Max. output current	I_{max} [A]	368		347	438		435	549		528
Reduced output current	I_{re} [A]	184		299	219		375	275		456
Overload time	t_{ol} [s]	60								
Recovery time	t_{re} [s]	120								
Max. output current cycle (short) [2]										
Max. output current	I_{max} [A]	441	368		526	438		659	549	
Reduced output current	I_{re} [A]	184	275		219	330		275	415	
Overload time	t_{ol} [s]	10								
Recovery time	t_{re} [s]	50								

[1] → 10 - see product key – illustration shows accessories / modules

[2] → 24 - See diagram

[3] The column is valid at an ambient temperature of 40 degrees Celsius and with a fixed switching frequency of 2 kHz.

[4] The column is valid at an ambient temperature of 40 degrees Celsius, with a fixed switching frequency of 2 kHz and a max. mains voltage of AC 440 V.



Rated data for Single Drives

- The data is valid for operation at 3/PE AC 400 V or DC 565 V.
- Unless otherwise specified, the data refers to the default setting.

→ Rated data for operation at 3/PE/AC 500 V
DS_9400_0001
Available for download at www.lenze.de/dsc

Motor power (asynchronous motor, 4-pole)	P_N [kW]	**130**	**160**	**165**	**150**	**190**	**210**	**190**	**235**	**250**
Product key [1] Single Drive		**E94AS□E2454**			**E94AS□E2924**			**E94AS□E3664**		
Rated mains current										
With mains choke / mains filter	I_{Netz} [A]	237			280			354		
Without mains choke / mains filter	I_{Netz} [A]	237			280			354		
Rated DC-bus current	I_{DC} [A]	290			343			434		
Braking unit data [2]										
Continuous braking power	P_{BRd} [kW]	56.3			68.6			90.1		
Peak braking power	P_{BRmax} [kW]	187.7			228.5			300.4		
Running time	t_{on} [s]				60					
Recovery time	t_{re} [s]				540					
Min. brake resistance	**R** [Ohm]	2.8			2.3			1.75		
Power loss	P_V [W]	3300			4100			4900		
Dimensions										
Height	**H** [mm]				1580					
Width	**B** [mm]				407					
Depth	**T** [mm]				427					
Mass	**m** [kg]			132				161		
Permissible motor cable length Shielded	**l** [m]				150					

[1] → 10 - see product key – illustration shows accessories / modules

[2] → 24 - See diagram

Rated data for Single Drives

- The data is valid for operation at 3/PE AC 400 V or DC 565 V.
- Unless otherwise specified, the data refers to the default setting.

→ Rated data for operation at 3/PE/AC 500 V
DS_9400_0001
Available for download at www.lenze.de/dsc

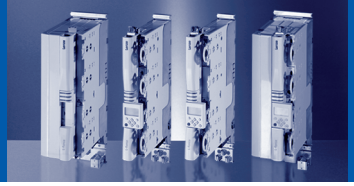
Motor power (asynchronous motor, 4-pole)	P_N [kW]	**240**	**290** [3]	**315** [4]	**300**	**320** [3]	**345** [4]
Product key [1] Single Drive		**E94AS□E4604**			**E94AS□E5724**		
Mains voltage range	U_{Netz} [V]	3/PE AC 342 V-0% ... 550 V+0%; 48 Hz-0% ... 65 Hz+0%					
Alternative DC supply	U_{DC} [V]	Not possible					
Rated output current							
2 kHz	I_N [A]	460	550	600	572	610	658
4 kHz	I_N [A]	368			458		
8 kHz	I_N [A]	260			286		
16 kHz	I_N [A]						
Max. output current cycle (long) [2]							
Max. output current	I_{max} [A]	690		660	858		724
Reduced output current	I_{re} [A]	345		570	429		625
Overload time	t_{ol} [s]	60					
Recovery time	t_{re} [s]	120					
Max. output current cycle (short) [2]							
Max. output current	I_{max} [A]	828	690		1030	858	
Reduced output current	I_{re} [A]	345	522		429	550	
Overload time	t_{ol} [s]	10					
Recovery time	t_{re} [s]	50					

[1] → 10 - see product key – illustration shows accessories / modules

[2] → 24 - See diagram

[3] The column is valid at an ambient temperature of 40 degrees Celsius and with a fixed switching frequency of 2 kHz.

[4] The column is valid at an ambient temperature of 40 degrees Celsius, with a fixed switching frequency of 2 kHz and a max. mains voltage of AC 440 V.



Rated data for Single Drives

- The data is valid for operation at 3/PE AC 400 V or DC 565 V.
- Unless otherwise specified, the data refers to the default setting.

→ Rated data for operation at 3/PE/AC 500 V
DS_9400_0001
Available for download at www.lenze.de/dsc

Motor power (asynchronous motor, 4-pole)	P_N [kW]	**240**	**290**	**315**	**300**	**320**	**345**
Product key [1] Single Drive		**E94AS□E4604**			**E94AS□E5724**		
Rated mains current							
With mains choke / mains filter	I_{Netz} [A]	444			553		
Without mains choke / mains filter	I_{Netz} [A]	444			553		
Rated DC-bus current	I_{DC} [A]	544			677		
Braking unit data [2]							
Continuous braking power	P_{BRd} [kW]	99					
Peak braking power	P_{BRmax} [kW]	375			438		
Running time	t_{on} [s]	30			28		
Recovery time	t_{re} [s]	270			272		
Min. brake resistance	**R** [Ohm]	1.4			1.2		
Power loss	P_V [W]	6200			7200		
Dimensions							
Height	**H** [mm]	1559					
Width	**B** [mm]	568					
Depth	**T** [mm]	541					
Mass	**m** [kg]	266			278		
Permissible motor cable length Shielded	**l** [m]	150					

[1] → 10 - see product key – illustration shows accessories / modules

[2] → 24 - See diagram

Rated data for Single Drives

- The data is valid for operation at 3/PE AC 400 V or DC 565 V.
- Unless otherwise specified, the data refers to the default setting.

→ Rated data for operation at 3/PE/AC 500 V
DS_9400_0001
Available for download at www.lenze.de/dsc

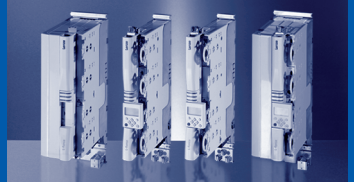
Motor power (asynchronous motor, 4-pole)	P_N [kW]	**335**	**355** [3]	**390** [4]	**370**	**385** [3]	**420** [4]
Product key [1] Single Drive		**E94AS□E6354**			**E94AS□E6954**		
Mains voltage range	U_{Netz} [V]	3/PE AC 342 V-0% ... 550 V+0%; 48 Hz-0% ... 65 Hz+0%					
Alternative DC supply	U_{DC} [V]	Not possible					
Rated output current							
2 kHz	I_N [A]	635	678	745	695	730	800
4 kHz	I_N [A]	508			556		
8 kHz	I_N [A]	318			348		
16 kHz	I_N [A]						
Max. output current cycle (long) [2]							
Max. output current	I_{max} [A]	953		820	1043		880
Reduced output current	I_{re} [A]	476		708	521		760
Overload time	t_{ol} [s]	60					
Recovery time	t_{re} [s]	120					
Max. output current cycle (short) [2]							
Max. output current	I_{max} [A]	1143	953		1251	1043	
Reduced output current	I_{re} [A]	476	610		521	653	
Overload time	t_{ol} [s]	10					
Recovery time	t_{re} [s]	50					

[1] → 10 - see product key – illustration shows accessories / modules

[2] → 24 - See diagram

[3] The column is valid at an ambient temperature of 40 degrees Celsius and with a fixed switching frequency of 2 kHz.

[4] The column is valid at an ambient temperature of 40 degrees Celsius, with a fixed switching frequency of 2 kHz and a max. mains voltage of AC 440 V.



Rated data for Single Drives

- The data is valid for operation at 3/PE AC 400 V or DC 565 V.
- Unless otherwise specified, the data refers to the default setting.

→ Rated data for operation at 3/PE/AC 500 V
DS_9400_0001
Available for download at www.lenze.de/dsc

Motor power (asynchronous motor, 4-pole)	P_N [kW]	**335**	**355**	**390**	**370**	**385**	**420**
Product key [1] Single Drive		**E94AS□E6354**			**E94AS□E6954**		
Rated mains current							
With mains choke / mains filter	I_{Netz} [A]	614			672		
Without mains choke / mains filter	I_{Netz} [A]	614			672		
Rated DC-bus current	I_{DC} [A]	752			823		
Braking unit data [2]							
Continuous braking power	P_{BRd} [kW]	99					
Peak braking power	P_{BRmax} [kW]	478					
Running time	t_{on} [s]	25					
Recovery time	t_{re} [s]	275					
Min. brake resistance	R [Ohm]	1.1					
Power loss	P_V [W]	7700			8700		
Dimensions							
Height	H [mm]	1559					
Width	B [mm]	568					
Depth	T [mm]	541					
Mass	m [kg]	300			321		
Permissible motor cable length Shielded	l [m]	150					

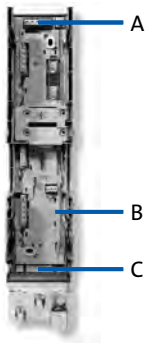
[1] → 10 - see product key – illustration shows accessories / modules

[2] → 24 - See diagram

Installation backplane

Click – the innovative concept
Up to a rated current of 23.5 A the 9400 Servo Drives consist of an axis module and an installation backplane. The backplane can be mounted without the axis module in the control cabinet, thus simplifying installation.
This offers additional advantages in terms of reduced spare part stocking and time savings in the event of drive replacements.
Further features of the installation backplane:

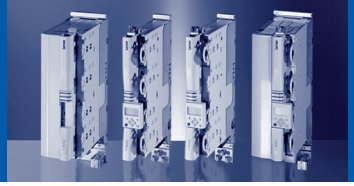
- A brake module for a 24 V DC 2.5 A brake can optionally be installed
- Connection options for shieldings of power and control connections



Installation backplane for Single Drive:
A: mains connection
B: brake module (optional)
C: motor connection

Assignment of Single Drive axes and backplanes

Motor power	Mains voltage	Product key		Installation backplane data
(asynchronous motor, 4-pole)		Single Drive	Installation backplane	Design
P_N [kW]	U_{Netz} [V]			
0.37	3 AC 180 - 550	E94AS□E0024	E94AZPS0034N	Without brake module
			E94AZPS0034HX0051	With brake module
0.75		E94AS□E0034	E94AZPS0034N	Without brake module
			E94AZPS0034HX0051	With brake module
1.5		E94AS□E0044	E94AZPS0074N	Without brake module
			E94AZPS0074HX0051	With brake module
3		E94AS□E0074	E94AZPS0074N	Without brake module
			E94AZPS0074HX0051	With brake module
5.5		E94AS□E0134	E94AZPS0244N	Without brake module
			E94AZPS0244HX0051	With brake module
7.5		E94AS□E0174	E94AZPS0244N	Without brake module
			E94AZPS0244HX0051	With brake module
11		E94AS□E0244	E94AZPS0244N	Without brake module
			E94AZPS0244HX0051	With brake module



DC busbar set for Single Drive installation backplane

If the Single Drive axis module is to be run in a DC-bus connection (multi-axis application), this requires retrofitting of the DC busbar system and DC fuses.
Mechanical coupling is possible via the following components:

- Power supply module
- DC input module
- Single Drive axis modules
- Multi Drive axis modules

For retrofitting the DC busbar set and the DC fuse have to be installed in the axis module's installation backplane which is provided with the appropriate fixtures.
The DC fuse required is part of the DC busbar set. Spare fuses are not contained in the scope of supply. We recommend the use of the SIBA fuses listed here in the table.

Product key		
Installation backplane	**DC busbar system**	**DC FUSE**
E94AZPS0034N	E94AZJA003	SIBA 5020106.16A
E94AZPS0034HX0051		
E94AZPS0074N	E94AZJA007	SIBA 5020106.40A
E94AZPS0074HX0051		
E94AZPS0244N	E94AZJA024	SIBA 2028221.100A
E94AZPS0244HX0051		

Brake modules

An intelligent motor brake logic system is included as standard in the axis modules' software in the form of a function block. The brake modules are available in numerous designs.
The optionally integrable brake modules enable a DC 24 V, DC 180 V or DC 205 V brake to be easily connected and this logic to be used.

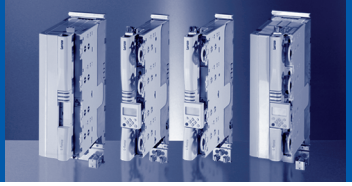
- For axis modules up to 23.5 A, the brake module is integrated into the installation backplane.
- For axis modules above 32 A, the brake module is integrated into the axis modules.

Brake module, can be integrated into installation backplane

Design		Features	Product key
Integrable		**Brake module**	
Brake module DC 24V/ 0.3 ... 2.5A		▶ External supply of supply voltage DC 24V ▶ Monitoring of power supply and brake cable for open circuit and short circuit ▶ Polarity reversal protection of supply voltage ▶ Can be integrated into the installation backplanes, up to 23.5 A	E94AZHX0051
Brake module DC 24V/ 1.0 ... 5.0A		▶ External supply of supply voltage DC 24V ▶ Monitoring of power supply and brake cable for open circuit and short circuit ▶ Polarity reversal protection of supply voltage ▶ Can be integrated into the axis modules, from 32 A	E94AZHY0101
Brake module DC 180V/ 0.1 ... 0.61A		▶ External supply of supply voltage AC 400V ▶ Monitoring of power supply and brake cable for open circuit and short circuit ▶ Polarity reversal protection of supply voltage ▶ Can be integrated into the axis modules, from 32 A	E94AZHY0026
Brake module DC 205V/ 0.1 ... 0.75A		▶ External supply of supply voltage AC 230V ▶ Monitoring of power supply and brake cable for open circuit and short circuit ▶ Polarity reversal protection of supply voltage ▶ Can be integrated into the axis modules, from 32 A	E94AZHY0025

The external brake modules are provided for DIN rail installation and can be used if axis modules up to 23.5 A require brake voltages of DC 180 V and DC 205 V.

Design		Features	Product key
External		**Brake module**	
Brake module DC 180V/ 0.1 ... 0.75A		▶ External supply of supply voltage AC 400V ▶ Monitoring of power supply and brake cable for open circuit and short circuit ▶ Polarity reversal protection of supply voltage ▶ Preconfigured for DIN rail mounting	E94AZHN0026
Brake module DC 205V/ 0.1 ... 0.75A		▶ External supply of supply voltage AC 230V ▶ Monitoring of power supply and brake cable for open circuit and short circuit ▶ Polarity reversal protection of supply voltage ▶ Preconfigured for DIN rail mounting	E94AZHN0025



Brake resistors

The brake resistor/Single Drive axis module assignment is listed in the following table.

82 ohm brake resistor

Motor power	Mains voltage	Product key		Brake resistor data				
(asynchron-ous motor, 4-pole)		Single Drive	Brake resistor	Resistance	Continuous power	Thermal capacity	Dimensions	Mass
P_N [kW]	U_{Netz} [V]			R [Ohm]	P [W]	WK [kWs]	H x B x T [mm]	m [kg]
0.37	3 AC 180 - 550 [1]	E94AS□E0024	ERBP082R200W	82	200	30	320 x 41 x 122	1
0.75		E94AS□E0034						
1.5		E94AS□E0044	ERBP047R200W	47				
			ERBS047R400W		400	60 90	400 x 110 x 105	2.3
			ERBS047R800W		800	120	710 x 110 x 105	4
3		E94AS□E0074	ERBP047R200W		200	30	320 x 41 x 122	1
			ERBS047R400W		400	60 90	400 x 110 x 105	2.3
			ERBS047R800W		800	120	710 x 110 x 105	4
5.5		E94AS□E0134	ERBP027R200W	27	200	30	320 x 41 x 122	1
			ERBS027R600W		600	90	550 x 110 x 105	3.1
			ERBS027R01K2		1200	180	1020 x 110 x 105	5.6
7.5		E94AS□E0174	ERBP018R300W	18	300	30	240 x 41 x 122	1.4
			ERBS018R800W		800	120	710 x 110 x 105	4
			ERBS018R02K8		2800	420	1110 x 200 x 105	12
11		E94AS□E0244	ERBP018R300W		300	30	240 x 41 x 122	1.4
			ERBS018R01K2		1200	180	1020 x 110 x 105	5.6
			ERBS018R02K8		2800	420	1110 x 200 x 105	12
15		E94AS□E0324	ERBS018R800W		800	120	710 x 110 x 105	4
			ERBS018R01K4		1400	210	1110 x 110 x 105	6.3
			ERBG018R04K3		4300	645	380 x 426 x 302	13.5
22		E94AS□E0474	ERBS015R800W	15	800	1500	380 x 736 x 302	4
			ERBS015R02K4		2400	495	380 x 326 x 302	10
			ERBG015R06K2		6200	930	380 x 526 x 302	17
30		E94AS□E0594	ERBS015R01K2		1200	180	1020 x 110 x 105	5.6
			ERBG015R03K3		3300	495	486 x 326 x 302	12.6
			ERBG015R10K0		10000	1500	380 x 736 x 302	22

[1] For 230 V mains voltage a different brake resistor assignment applies.

→ Data sheet on brake resistors
DS_9400_0002
Available for download at www.lenze.de/dsc

Brake resistors

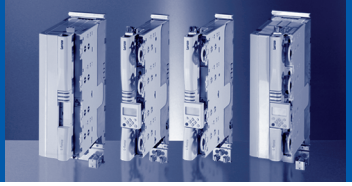
The brake resistor/Single Drive axis module assignment is listed in the following table.

3.5 ohm brake resistor

Motor power	Mains voltage	Product key		Brake resistor data				
(asynchron-ous motor, 4-pole)		Single Drive	Brake resistor	Resistance	Continuous power	Thermal capacity	Dimensions	Mass
P_N [kW]	U_{Netz} [V]			R [Ohm]	P [W]	WK [kWs]	H x B x T [mm]	m [kg]
45	3 AC 180 - 550 1)	E94AS□E0864	ERBG075D01K9	7.5	1900	285	486 x 236 x 302	9.5
55		E94AS□E1044						
75	3 AC 342-550	E94AS□E1454	ERBG005R02K6	5	2600	390	486 x 326 x 302	12.6
90		E94AS□E1724	ERBG043D03K0	4.3	3000	450		11.8
105		E94AS□E2024	ERBG035D03K3	3.5	3300	495		12.6
130		E94AS□E2454	ERBG028D04K1	2.8	4100	615	486 x 426 x 302	12.8
150		E94AS□E2924	ERBG023D05K6	2.3	5600	840		15.9
190		E94AS□E3664	ERBG035D03K3 2)	3.5	3300	495	486 x 326 x 302	12.6
240		E94AS□E4604	ERBG028D04K1 2)	2.8	4100	615	486 x 426 x 302	12.8
300		E94AS□E5724	ERBG023D05K6 2)	2.3	5600	840		15.9
335		E94AS□E6354						
370		E94AS□E6954						

1) For 230 V mains voltage a different brake resistor assignment applies.
2) Two resistors must be connected in parallel.

→ Data sheet on brake resistors
DS_9400_0002
Available for download at www.lenze.de/dsc



RFI and mains filters

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.

RFI filter, can be mounted beside or below the axis module

RFI filter

RFI filters are capacitive accessory components which can be connected directly upstream of the axis modules. This measure enables compliance with the corresponding conducted noise emission requirements according to EN61800-3.

Motor power	Mains voltage	Product key		RFI filter data					
(asynchronous motor, 4-pole)		Single Drive	RFI filter	Rated current	Power loss	Max. cable length C1	Max. cable length C2	Dimensions	Mass
P_N [kW]	U_{Netz} [V]			I_N [A]	P_v [W]	l [m]	l [m]	H x B x T [mm]	m [kg]
0.37	3 AC 180 - 550	E94AS□E0024	E94AZRS0044	3.5	4	0	50	522 x 60 x 60	1.8
0.75		E94AS□E0034							
1.5		E94AS□E0044	E94AZRS0104	10	8			522 x 90 x 60	2.3
3		E94AS□E0074							
5.5		E94AS□E0134	E94AZRS0294	29	22			522 x 120 x 60	3.6
7.5		E94AS□E0174							
11		E94AS□E0244							
15		E94AS□E0324	E94AZRS0544	54	50	50	100	670 x 201 x 60	9
22		E94AS□E0474							
30		E94AS□E0594							
45		E94AS□E0864	E94AZRS0954	95	70			780 x 261 x 60	13
55		E94AS□E1044							

→ Data sheet on RFI filters
DS_9400_0003
Available for download at www.lenze.de/dsc

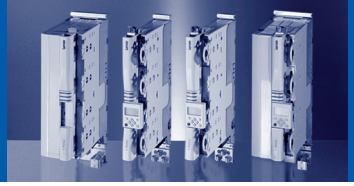
Mains filter

A mains filter is a combination of mains choke and RFI filter in one housing. It reduces line-bound noise emission into the mains, thus ensuring that the line-bound interference voltage is reduced to a permissible level according to EN61800-3.

Mains filter, can be mounted beside or below the axis module

Motor power	Mains voltage	Product key		Mains filter data					
(asynchronous motor, 4-pole)		Single Drive	Mains filter	Rated current	Voltage drop	Max. cable length C1	Max. cable length C2	Dimensions	Mass
P_N [kW]	U_{Netz} [V]			I [A]	U [V]	l [m]	l [m]	H x B x T [mm]	m [kg]
0.37	3 AC 180 - 550	E94AS□E0024	E94AZMS0034	3.2	10	25	50	522 x 60 x 60	3.2
0.75		E94AS□E0034							
1.5		E94AS□E0044	E94AZMS0094	9			100	522 x 90 x 60	5.2
3		E94AS□E0074							
5.5		E94AS□E0134	E94AZMS0184	18	7.4			522 x 120 x 60	8.4
7.5		E94AS□E0174							
11		E94AS□E0244	E94AZMS0314	31	7.3				8.8

→ Data sheet on mains filters
DS_9400_0004
Available for download at www.lenze.de/dsc



Sinusoidal filter

A sinusoidal filter in the motor cable limits the rate of rise of voltage and the capacitive charge/discharge currents that occur during inverter operation. In combination with a line filter, the EMC requirements of the limit class C2 for conducted noise emissions are still met, even if longer shielded or even unshielded motor cables are used.

Application range:

- Only use a sinusoidal filter with 0 to 550 V standard asynchronous motors
- Only operate with V/f or V/f²-characteristic control
- Fix the switching frequency to the stated value
- Limit the output frequency of the 9400 Servo Drive to a maximum of 150 Hz

Sinusoidal filter

Motor power	Mains voltage	Product key				Data for sinusoidal filters				
(asynchronous motor, 4-pole)		Single Drive	RFI filter	Mains filter	Sinusoidal filter	Rated current	Inductance	Switching frequency	Max. cable length C2, shielded	Max. cable length C2, unshielded
P_N [kW]	U_{Netz} [V]					I_N [A]	L [mH]	f_{ch} [kHz]	l [m]	l [m]
0.37	3 AC 180 - 550	E94AS□E0024		E94AZMS0034	EZS3-004A200	4	11	4; 8	100	300
0.75		E94AS□E0034								
1.5		E94AS□E0044		E94AZMS0094	EZS3-010A200	10	5.1			
3		E94AS□E0074								
5.5		E94AS□E0134		E94AZMS0184	EZS3-024A200	23.5	2.5			
7.5		E94AS□E0174								
11		E94AS□E0244		E94AZMS0314	EZS3-037A200	37	1.7			
15		E94AS□E0324	E94AZRS0544		EZS3-048A200	48	1.2		150	
22		E94AS□E0474			EZS3-061A200	61	1			
30		E94AS□E0594			EZS3-072A200	72	0.95			
45		E94AS□E0864	E94AZRS0954		EZS3-115A200	115	0.7	2; 4		
55		E94AS□E1044			EZS3-150A200	150	0.5			

→ Data sheet on sinusoidal filters
DS_ZB_EZS3_0001
Available for download at www.lenze.de/dsc

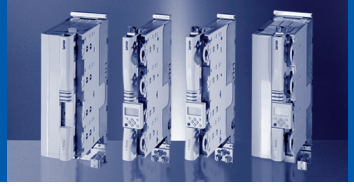
Rated data for Multi Drives

- The data is valid for operation at DC 565 V.
- Unless otherwise specified, the data refers to the default setting.

Motor power (asynchronous motor, 4-pole)	P_N [kW]	**0.37**	**0.75**	**1.5**	**3**
Product key [1] Multi Drive		**E94AM□E0024**	**E94AM□E0034**	**E94AM□E0044**	**E94AM□E0074**
DC supply	U_{DC} [V]	DC 260 - 0% ... 775 V + 0%			
Rated output current					
2 kHz	I_N [A]	1.9	3.1	5	8.8
4 kHz	I_N [A]	1.9	3.1	5	8.8
8 kHz	I_N [A]	1.5	2.5	4	7
16 kHz	I_N [A]	1.1	1.9	3	5.3
Max. output current cycle (long) [2]					
Max. output current	I_{max} [A]	2.8	4.7	7.5	13.1
Reduced output current	I_{re} [A]	1.4	2.3	3.8	6.6
Overload time	t_{ol} [s]	60			
Recovery time	t_{re} [s]	120			
Max. output current cycle (short) [2]					
Max. output current	I_{max} [A]	6	10	16	21
Reduced output current	I_{re} [A]	1.4	2.3	3.8	6.6
Overload time	t_{ol} [s]	0.5			
Recovery time	t_{re} [s]	4.5			

[1] → 10 - see product key – illustration shows accessories / modules

[2] → 24 - See diagram



Rated data for Multi Drives

- The data is valid for operation at DC 565 V.
- Unless otherwise specified, the data refers to the default setting.

Motor power (asynchronous motor, 4-pole)	P_N [kW]	**0.37**	**0.75**	**1.5**	**3**
Product key [1] Multi Drive		**E94AM□E0024**	**E94AM□E0034**	**E94AM□E0044**	**E94AM□E0074**
Rated DC-bus current	I_{DC} [A]	2.6	4.3	6.7	12.1
Power loss	P_V [W]	100	120	150	190
Dimensions					
Height	**H** [mm]	350 (with 481 installation backplane)			
Width	**B** [mm]	60			90
Depth	**T** [mm]	288			
Mass	**m** [kg]	4			5.3
Permissible motor cable length Shielded	**l** [m]	50			100

[1] → 10 - see product key – illustration shows accessories / modules

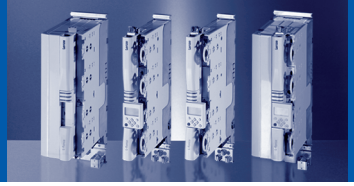
Rated data for Multi Drives

- The data is valid for operation at DC 565 V.
- Unless otherwise specified, the data refers to the default setting.

Motor power (asynchronous motor, 4-pole)	P_N [kW]	**4**	**5.5**	**7.5**	**11**
Product key [1] Multi Drive		**E94AM□E0094**	**E94AM□E0134**	**E94AM□E0174**	**E94AM□E0244**
DC supply	U_{DC} [V]	DC 260 - 0% ... 775 V + 0%			
Rated output current					
2 kHz	I_N [A]	11.7	16.3	20.6	29.4
4 kHz	I_N [A]	11.7	16.3	20.6	29.4
8 kHz	I_N [A]	9.3	13	16.5	23.5
16 kHz	I_N [A]	7	9.8	12.4	17.6
Max. output current cycle (long) [2]					
Max. output current	I_{max} [A]	17.5	24.4	30.9	44.1
Reduced output current	I_{re} [A]	8.8	12.2	15.5	22.1
Overload time	t_{ol} [s]	60			
Recovery time	t_{re} [s]	120			
Max. output current cycle (short) [2]					
Max. output current	I_{max} [A]	28	39	49.5	70.5
Reduced output current	I_{re} [A]	8.8	12.2	15.5	22.1
Overload time	t_{ol} [s]	0.5			
Recovery time	t_{re} [s]	4.5			

[1] → 10 - see product key – illustration shows accessories / modules

[2] → 24 - See diagram



Rated data for Multi Drives

- The data is valid for operation at DC 565 V.
- Unless otherwise specified, the data refers to the default setting.

Motor power (asynchronous motor, 4-pole)	P_N [kW]	**4**	**5.5**	**7.5**	**11**
Product key [1] Multi Drive		**E94AM□E0094**	**E94AM□E0134**	**E94AM□E0174**	**E94AM□E0244**
Rated DC-bus current	I_{DC} [A]	15.4	20.6	25.7	35.5
Power loss	P_V [W]	230	280	320	420
Dimensions					
Height	**H** [mm]		350 (with 481 installation backplane)		
Width	**B** [mm]	90		120	
Depth	**T** [mm]		288		
Mass	**m** [kg]	5.3		8.1	
Permissible motor cable length Shielded	**l** [m]		100		

[1] → 10 - see product key – illustration shows accessories / modules

Rated data for power supply modules

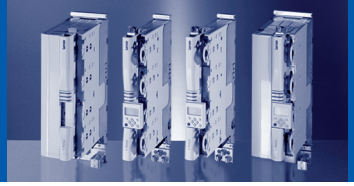
► The data is valid for operation at 3/PE AC 400 V.

Product key [1] Power supply modules		**E94APNE0104**	**E94APNE0364**	**E94APNE1004**	**E94APNE2454**
Rated power With mains filter	P_{NDC} [kW]	**4.9**	**17.5**	**48.6**	**119**
Without mains filter	P_{NDC} [kW]	**3.6**	**13**	**36.2**	**88.6**
Mains voltage range	U_{Netz} [V]	3/PE AC 180 V-0% ... 550 V+0%; 45 Hz-0% ... 65 Hz+0%			
Rated mains current	I_{Nnetz} [A]	8	29	82	200
Rated DC-bus current	I_{DC} [A]	10	36	100	245
Max. DC-bus current cycle (long) [2] Max. DC-bus current	I_{DCmax} [A]	15	54	150	368
Reduced DC-bus current	I_{DCre} [A]	7.5	27	75	183.5
Overload time	t_{ol} [s]	60			
Recovery time	t_{re} [s]	120			
Max. output power (long) [3]	P_{DCmax} [kW]	7.35	26.25	72.9	179
Max. DC-bus current cycle (short) [2] Max. DC-bus current	I_{DCmax} [A]	40	108	200	368
Reduced DC-bus current	I_{DCre} [A]	7.5	27	75	183.5
Overload time	t_{ol} [s]	0.5			
Recovery time	t_{re} [s]	4.5			
Max. output power (short) [3]	P_{DCmax} [kW]	19.6	52.5	146	357
Braking unit data [2] Continuous braking power	P_{BRd} [kW]	2.6	8.7	17	30.3
Peak braking power	P_{BRmax} [kW]	19.5	43.8	105.1	187.7
Running time	t_{on} [s]	0.5			
Recovery time	t_{re} [s]	3.8	2.5	3.1	
Min. brake resistance	**R** [Ohm]	27	12	5	2.8
Power loss	P_V [W]	55	110	230	550
Dimensions Height	**H** [mm]	350 (with 461.5 backplane)		510	
Width	**B** [mm]	60	120	210	390
Depth	**T** [mm]	288			
Mass	**m** [kg]	2.6	5.3	13.5	28.5

[1] → 12 - see product key – illustration shows accessories / modules

[2] → 24 - See diagram

[3] Mains filter required; if no mains filter is installed, the stated values for P_{DCmax} decrease



Rated data for regenerative power supply modules

- The data is valid for operation at 3/PE AC 400 V.
- Mains filter required, see "mains filter" accessory page

Product key [1] Regenerative power supply modules		**E94ARNE0134**		**E94ARNE0244**	
Operating mode		**Supply**	**Power recovery**	**Supply**	**Power recovery**
Rated power With mains filter	P_{NDC} [kW]	**15**	**7.5**	**27**	**13.5**
Mains voltage range	U_{Netz} [V]	3/PE AC 180 V-0% ... 550 V+0%; 45 Hz-0% ... 65 Hz+0%			
Rated mains current	I_{Netz} [A]	26	13	47	23.5
Rated DC-bus current	I_{DC} [A]	32	16	57	29
Max. DC-bus current cycle (long) [2]					
Max. DC-bus current	I_{DCmax} [A]	48	24	86	44
Reduced DC-bus current	I_{DCre} [A]	20	9.8	35	18
Overload time	t_{ol} [s]	60			
Recovery time	t_{re} [s]	120			
Max. output power (long)	P_{DCmax} [kW]	22.4	11.2	40.5	20.2
Max. DC-bus current cycle (short) [2]					
Max. DC-bus current	I_{DCmax} [A]	96	48	171	87
Reduced DC-bus current	I_{DCre} [A]	20	9.8	35	18
Overload time	t_{ol} [s]	0.5			
Recovery time	t_{re} [s]	4.5			
Max. output power (short)	P_{DCmax} [kW]	44.9	22.4	81.1	40.5
Braking unit data [2]					
Continuous braking power	P_{BRd} [kW]	4.7		9.3	
Peak braking power	P_{BRmax} [kW]	19.5		29.2	
Running time	t_{on} [s]	0.8		1.1	
Recovery time	t_{re} [s]	4.2		3.9	
Min. brake resistance	R_{BRmin} [Ohm]	27		18	
Power loss	P_V [W]	150	110	230	170
Dimensions					
Height	**H** [mm]	350 (with 481 installation backplane)			
Width	**B** [mm]	120			
Depth	**T** [mm]	288			
Mass	**m** [kg]	5.3			

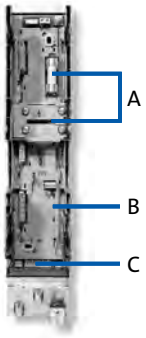
[1] → 12 - see product key – illustration shows accessories / modules

[2] → 24 - See diagram

Installation backplane

Click – the innovative concept
Up to a rated current of 23.5 A the 9400 Servo Drives consist of an axis module and an installation backplane. The backplane can be mounted without the axis module in the control cabinet, thus simplifying installation.
This offers additional advantages in terms of reduced spare part stocking and time savings in the event of drive replacements.
Further features of the installation backplane:

- A brake module for a 24 V DC 2.5 A brake can optionally be installed
- Connection options for shieldings of power and control connections



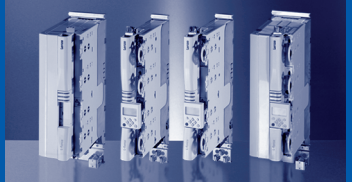
Multi Drive installation backplane:
A: DC fuse and DC busbar
B: brake module (optional)
C: motor connection

Assignment of Multi Drive axes and backplanes

Motor power	Mains voltage	Product key		Installation backplane data
(asynchronous motor, 4-pole)		Multi Drive	Installation backplane	Design
P_N [kW]	U_{Netz} [V]			
0.37	3 AC 180 - 550	E94AM□E0024	E94AZPM0044N	Without brake module
			E94AZPM0044HX0051	With brake module
0.75		E94AM□E0034	E94AZPM0044N	Without brake module
			E94AZPM0044HX0051	With brake module
1.5		E94AM□E0044	E94AZPM0044N	Without brake module
			E94AZPM0044HX0051	With brake module
3		E94AM□E0074	E94AZPM0094N	Without brake module
			E94AZPM0094HX0051	With brake module
4		E94AM□E0094	E94AZPM0094N	Without brake module
			E94AZPM0094HX0051	With brake module
5.5		E94AM□E0134	E94AZPM0244N	Without brake module
			E94AZPM0244HX0051	With brake module
7.5		E94AM□E0174	E94AZPM0244N	Without brake module
			E94AZPM0244HX0051	With brake module
11		E94AM□E0244	E94AZPM0244N	Without brake module
			E94AZPM0244HX0051	With brake module

Assignment of power supply modules and regenerative power supply modules and backplanes

Rated power	Mains voltage	Product key		
With mains filter		Power supply modules	Regenerative power supply modules	Installation backplane
P_{NDC} [kW]	U_{Netz} [V]			
4.9	3 AC 180 - 550	E94APNE0104		E94AZPP0104
17.5		E94APNE0364		E94AZPP0364
15			E94ARNE0134	
27			E94ARNE0244	



Brake modules

An intelligent motor brake logic system is included as standard in the axis modules' device software in the form of a function block.
The brake modules are available in numerous designs.
The optionally integrable brake module enables a DC 24 V brake to be easily connected and this logic to be used.

- For axis modules up to 23.5 A, the DC 24 V brake module is integrated into the installation backplane.

Brake module, can be integrated into installation backplane

Design		Features	Product key
Integrable		**Brake module**	
Brake module DC 24 V / 0.3 ... 2.5 A		► External supply of supply voltage DC 24 V ► Monitoring of power supply and brake cable for open circuit and short circuit ► Polarity reversal protection of supply voltage ► Can be integrated into the installation backplanes, up to 23.5 A	E94AZHX0051

The external brake modules are provided for DIN rail installation and can be used if axis modules up to 23.5 A require brake voltages of DC 180 V and DC 205 V.

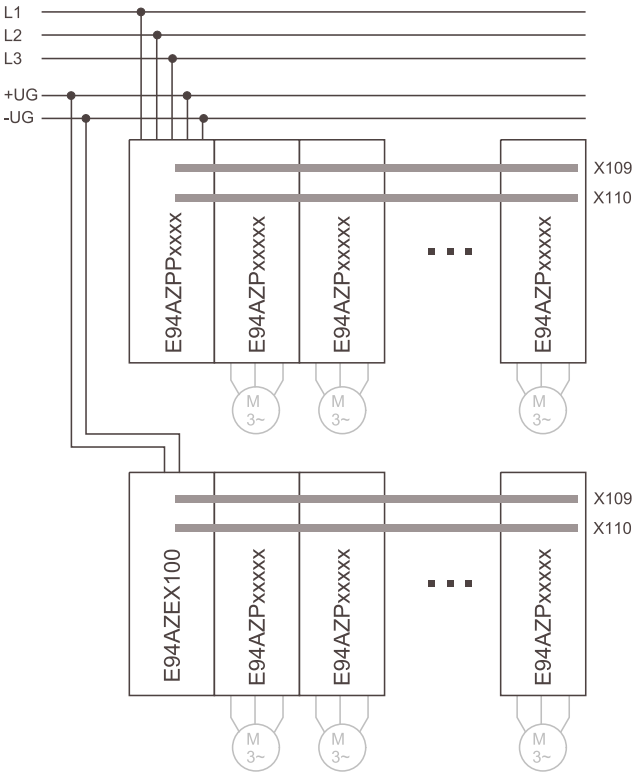
Design		Features	Product key
External		**Brake module**	
Brake module DC 180 V / 0.1 ... 0.75 A		► External supply of supply voltage AC 400 V ► Monitoring of power supply and brake cable for open circuit and short circuit ► Polarity reversal protection of supply voltage ► Preconfigured for DIN rail mounting	E94AZHN0026
Brake module DC 205 V / 0.1 ... 0.75 A		► External supply of supply voltage AC 230 V ► Monitoring of power supply and brake cable for open circuit and short circuit ► Polarity reversal protection of supply voltage ► Preconfigured for DIN rail mounting	E94AZHN0025

DC input module

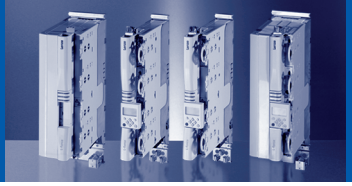
Via a DC input module, an axis module interconnection can be supplied with power from a central DC source (power supply module, Single Drive axis modules, Multi Drive axis modules). This is, for instance, required if a drive system with a multi-level structure installed in a control cabinet is to be supplied via a central DC power supply unit. The rated current of the DC input module is defined to be 100 A (DC).
The DC input module can be connected at the top or bottom offering great flexibility when integrating it into the system wiring. Especially for multi-row axis module mounting, optimum connection is thus possible.

DC input module 100 A

Design	Product key	Dimensions	Mass
	Input module		
		H x B x T [mm]	**m** [kg]
DC input module 100 A	E94AZEX100	422 x 60 x 95	0.9



Wiring example for multi-row mounting of axis modules



Brake resistors

The assignment of brake resistances to the supply and regenerative power supply modules is shown in the following tables.

27 ohm brake resistor

Brake resistors for power supply modules

Rated power	Mains voltage	Product key		Brake resistor data				
With mains filter		Power supply modules	Brake resistor	Resistance	Continuous power	Thermal capacity	Dimensions	Mass
P_{NDC} [kW]	U_{Netz} [V]			R [Ohm]	P [W]	WK [kWs]	H x B x T [mm]	m [kg]
4.9	3 AC 180 - 550 [1]	E94APNE0104	ERBP027R200W	27	200	30	320 x 41 x 122	1
			ERBS027R600W		600	90	550 x 110 x 105	3.1
			ERBS027R01K2		1200	180	1020 x 110 x 105	5.6
17.5		E94APNE0364	ERBG012R01K9	12	1900	285	486 x 236 x 302	9.5
			ERBG012R05K2		5200	780	486 x 426 x 302	15.1
48.6		E94APNE1004	ERBG005R02K6	5	2600	390	486 x 326 x 302	12.6
119		E94APNE2454	ERBG028D04K1	2.8	4100	615	486 x 426 x 302	12.8

[1] For 230 V mains voltage a different brake resistor assignment applies.

Brake resistances for regenerative power supply modules

Rated power	Mains voltage	Product key		Brake resistor data				
		Regenerative power supply modules	Brake resistor	Resistance	Continuous power	Thermal capacity	Dimensions	Mass
P_{NDC} [kW]	U_{Netz} [V]			R [Ohm]	P [W]	WK [kWs]	H x B x T [mm]	m [kg]
15	3 AC 180 - 550 [2]	E94ARNE0134	ERBP027R200W	27	200	30	320 x 41 x 122	1
			ERBS027R600W		600	90	550 x 110 x 105	3.1
			ERBS027R01K2		1200	180	1020 x 110 x 105	5.6
27		E94ARNE0244	ERBP018R300W	18	300	30	240 x 41 x 122	1.4
			ERBS018R01K2		1200	180	1020 x 110 x 105	5.6
			ERBS018R02K8		2800	420	1110 x 200 x 105	12

[2] For 230 V mains voltage a different brake resistor assignment applies.

→ Data sheet on brake resistors
DS_9400_0002
Available for download at www.lenze.de/dsc

RFI and mains filters

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.
For Multi Drives external filters must be used to comply with the EMC Directive.

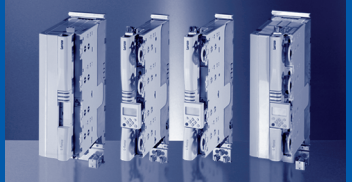
RFI filter, can be mounted beside the power supply module

RFI filter

RFI filters are capacitive accessory components which can be connected directly upstream of the power supply modules. This measure enables compliance with the corresponding conducted noise emission requirements according to EN 61800-3

Rated power	Mains voltage	Product key		RFI filter data				
With RFI filter		Power supply modules	RFI filter	Rated current	Power loss	Max. cable length Reference group C2	Dimensions	Mass
P_{NDC} [kW]	U_{Netz} [V]			I_N [A]	P_v [W]		H x B x T [mm]	m [kg]
3.6	3 AC 180 - 550	E94APNE0104	E94AZRP0084	8	20	6 axes of 10 m each	485 x 60 x 261	4.2
13		E94APNE0364	E94AZRP0294	29	50			4.5
36.2		E94APNE1004	E94AZRP0824	82	80		490 x 209 x 272	18.5
88.6		E94APNE2454	E94AZRP2004	200	150			21

→ Data sheet on RFI filters
DS_9400_0003
Available for download at www.lenze.de/dsc



Mains filter

A mains filter is a combination of mains choke and RFI filter in one housing. It reduces line-bound noise emission into the mains, thus ensuring that the line-bound interference voltage is reduced to a permissible level according to EN61800-3.

Mains filter, can be mounted beside the power supply module

Mains filters for power supply modules

Rated power	Mains voltage	Product key		Mains filter data				
With mains filter		Power supply modules	Mains filter	Rated current	Voltage drop	Max. cable length Reference group C2	Dimensions	Mass
P_{NDC} [kW]	U_{Netz} [V]			I [A]	U [V]		H x B x T [mm]	m [kg]
4.9	3 AC 180 - 550	E94APNE0104	E94AZMP0084	8	10	10 axes of 50 m each	485 x 90 x 261	8.6
17.5		E94APNE0364	E94AZMP0294	29	7.3		485 x 120 x 261	16
48.6		E94APNE1004	E94AZMP0824	82	6.4		490 x 270 x 272	29
119		E94APNE2454	E94AZMP2004	200	6.3		490 x 330 x 272	51.5

Mains filter, can be mounted beside the regenerative power supply module

Mains filters for regenerative power supply modules

Rated power	Mains voltage	Product key		Mains filter data				
With mains filter		Regenerative power supply modules	Mains filter	Rated current	Voltage drop	Max. cable length Reference group C2	Dimensions	Mass
P_{NDC} [kW]	U_{Netz} [V]			I [A]	U [V]		H x B x T [mm]	m [kg]
15	3 AC 180 - 550	E94ARNE0134	E94AZMR0264SDB	26	6.3	6 axes of 10 m each	485 x 149 x 272	25
			E94AZMR0264LDB			10 axes of 50 m each		26
27		E94ARNE0244	E94AZMR0474SDB	47	6.2	6 axes of 10 m each	485 x 209 x 272	36
			E94AZMR0474LDB			10 axes of 50 m each		37

→ Data sheet on mains filters
DS_9400_0004
Available for download at www.lenze.de/dsc

24 V power supply units

Multi-axis applications with Multi Drive axis modules require an external power supply unit to feed the control electronics. Depending on the number of axis modules, power supply units with a rated current of 5, 10 or 20 A at a voltage supply of 1 x AC 230 V or 3 x AC 400 V can be selected here.
Single Drive axis modules generally do not require the use of the power supply unit. If, however, a separate power supply of control electronics and power section is needed for a single-axis application, the same power supply units can be used.

24 V power supply unit

Rated data

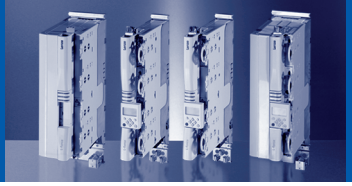
Product key		EZV1200-000	EZV2400-000	EZV4800-000	EZV1200-001	EZV2400-001	EZV4800-001
Mains voltage	U_{Netz} [V]	1 AC 230			3 AC 400		
Rated mains current	I_{Netz} [A]	0.84	1.2	2.3	0.34	0.57	1
Output voltage	U_{DC} [V]	DC 22.5 ... 28.5					
Rated output current	I_N [A]	5	10	20	5	10	20
Dimensions							
Height	**H** [mm]	130					
Width	**B** [mm]	55	85	157	73	85	160
Depth	**T** [mm]	125					
Mass	**m** [kg]	0.8	1.24	2.48	0.95	1.1	1.93

CAN bus connector

The connector is used to connect the CAN to those Lenze drives which are provided with a Sub-D connection for the CAN bus. An integrated CAN terminating resistor can be switched on/off. Internal spring terminals make the use of special mounting tools superfluous. The switch setting can be read from two sides.

Design	Product key
CAN bus connector "switch"	EWZ0046

CAN bus connector



USB diagnostic adapter

Diagnostics can be performed via a PC by using the USB diagnostic adapter. A connecting cable, which can be connected to the PC's USB interface, is supplied together with the adapter.
Connecting cables for connecting the USB diagnostic adapter to the axis module can be ordered separately. These are available in lengths of 2.5 m, 5 m or 10 m.
The software drivers for the adapter are automatically installed together with the Lenze software (e.g. L-force Engineer).

USB diagnostic adapter with cable to connect to the PC

Design		Features	Slot	Product key
		USB diagnostic adapter		
USB diagnostic adapter		▶ Input-side voltage supply via USB connection on PC ▶ Output-side voltage supply via diagnostic interface of the inverter ▶ Diagnostic LED ▶ Electrical isolation of PC and inverter ▶ Hot-pluggable ▶ Can also be used for 8400 Inverter Drives ▶ Supported operating systems: Microsoft® Windows® 2000/XP	DIAG	E94AZCUS

Accessories for the USB diagnostic adapter

Design	Features	Product key
	Connecting cable for USB diagnostic adapter	
Connection cable	▶ Length: 2.5 m	EWL0070
	▶ Length: 5 m	EWL0071
	▶ Length: 10 m	EWL0072

Keypad X400

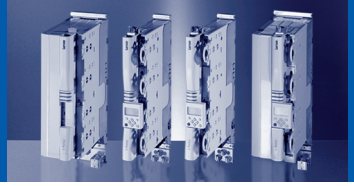
Local parameter setting and diagnostics can be performed very easily with the keypad. Data available in the device can be accessed quickly via structured menus and a plain text display. The language selection feature means that the keypad can be used around the world.
The keypad is attached to the front of the axis module.

Keypad X400

Design		Features	Slot	Product key
		Keypad		
Keypad X400		▶ Menu-driven diagnostics and parameter setting ▶ Graphics display with background lightning for clear presentation of information ▶ 4 navigation keys, 2 context-sensitive keys ▶ Adjustable RUN/STOP function ▶ Hot-pluggable ▶ Can also be used for 8400 Inverter Drives	DIAG	EZAEBK1001

Diagnosis terminal X400

Design		Features	Slot	Product key
		Diagnosis terminal X400		
Diagnosis terminal X400		▶ X400 keypad in a robust housing ▶ Also suitable for installation in the control cabinet door ▶ Menu navigation ▶ Graphics display with background lightning for clear presentation of information ▶ 4 navigation keys, 2 context-sensitive keys ▶ Adjustable RUN/STOP function ▶ Hot-pluggable ▶ Incl. 2.5 m cable ▶ IP20 enclosure, IP65 for control cabinet installation on front face ▶ Can also be used for 8400 Inverter Drives	DIAG	EZAEBK2001



Shield mounting kits for motor cable

The motor cable shielding can be connected to the shield plates of the installation backplanes or axis modules. To simplify the wiring, additional shield supports can be fitted to the shield plates. The shield support can easily be attached to a fixture on the shield plate and the connection cable just has to be passed through. For larger axis modules the shield support is part of the shield plate.

Product key		
Single Drive	**Multi Drive**	**Shield mounting**
	E94AM□E0024	E94AZJS003
E94AS□E0024		
	E94AM□E0034	
E94AS□E0034		
	E94AM□E0044	
E94AS□E0044		E94AZJS007
	E94AM□E0074	
E94AS□E0074		
	E94AM□E0094	
	E94AM□E0134	E94AZJS024
E94AS□E0134		
	E94AM□E0174	
E94AS□E0174		
	E94AM□E0244	
E94AS□E0244		

Further accessories

By way of supplementing the 9400 Servo Drives, Lenze offers a wide range of additional automation components. These components are not listed in this product catalogue, but in Lenze's PC-based Automation catalogue. Specifically, this includes the following components:

- Remote maintenance components
- I/O systems
- Human machine interfaces
- System bus adapters

Overview of modules

So that they can be adjusted to meet machine requirements, the 9400 Servo Drives and the regenerative power supply modules can be aligned with up to four different modules.
The following modules are available:

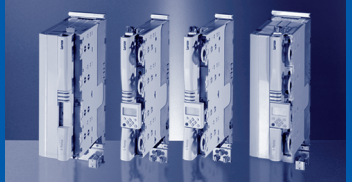
- Memory modules (module slot MMI) required for operation,
- safety modules (module slot MSI) required for operation
- extension modules (module slot MXI 1 and/or MXI 2)

The following tables show the modules available for the 9400 Servo Drives and the regenerative power supply modules.

Axis module with module slots MXI, MMI and MSI

Memory module

Module			Product key	Design		
Module slot		Module designation		StateLine	HighLine	Regenerative power supply module
MMI		Memory module MM110	E94AYM11	Standard		
MMI		Memory module MM220	E94AYM22		Standard	Standard
MMI		Memory module MM330	E94AYM33		Option	
MMI		Memory module MM430	E94AYM43		Option	



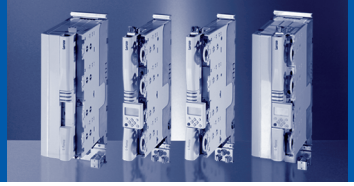
Safety module

Module			Product key	Design		
Module slot		Module designation		StateLine	HighLine	Regenerative power supply module
MSI		Safety module SM0	E94AYAA	Standard	Standard	Standard
MSI		Safety module SM100	E94AYAB	Option	Option	
MSI		Safety module SM300	E94AYAD		Option	
MSI		Safety module SM301	E94AYAE	Option	Option	

Extension modules

Module			Product key	Design		
Module slot		Module designation		StateLine [1]	HighLine [2]	Regenerative power supply module [2]
MXI		Extension module Digital frequency	E94AYFLF		Option	
MXI		Communication module CANopen	E94AYCCA	Option	Option	Option
MXI		Communication module DeviceNet	E94AYCDN		Option	
MXI		Communication module EtherCAT	E94AYCET	Option	Option	
MXI		Communication module Ethernet	E94AYCEN		Option	Option
MXI		Communication module ETHERNET Powerlink MN/CN	E94AYCEP		Option	
MXI		Communication module ETHERNET Powerlink CN	E94AYCEC		Option	
MXI		Communication module PROFIBUS	E94AYCPM		Option	Option
MXI		Communication module PROFINET	E94AYCER		Option	

[1] Number of available extension module slots: 1
[2] Number of available extension module slots: 2



Assignment of extension modules and module slots (HighLine)

Two module slots on the 9400 HighLine Servo Drives are included for extensions. The following table lists the possible combinations.

MXI 1	E94AYFLF	E94AYCCA	E94AYCDN	E94AYCET	E94AYCEN	E94AYCEP	E94AYCEC	E94AYCPM	E94AYCER
MXI 2									
E94AYFLF		●	●	●	●	●	●	●	●
E94AYCCA	●			●	●	●	●	●	●
E94AYCDN	●				●	●	●	●	●
E94AYCET	●	●			●				●
E94AYCEN	●	●	●	●		●	●	●	●
E94AYCEP	●	●	●		●			●	●
E94AYCEC	●	●	●		●				
E94AYCPM [1)]	●	●	●		●	●			●
E94AYCER [1)]	●	●	●	●	●	●		●	

[1)] Module slot MXI 1 must be used for PROFIsafe.

Assignment of extension modules and the module slot for the regenerative power supply module

Two module slots on the regenerative power supply modules are included for extensions. The following table lists the possible combinations.

MXI 1	E94AYCCA	E94AYCEN	E94AYCPM
MXI 2			
E94AYCCA		●	●
E94AYCEN	●		●
E94AYCPM	●	●	

Memory module

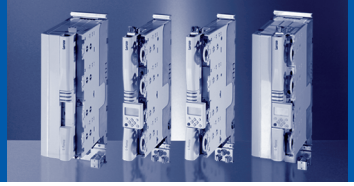
Click – the pluggable memory module
Different memory modules are available for the 9400 Servo Drives:

- Motion Control StateLevel (MM110)
- Motion Control HighLevel (MM220)
- Motion Control TopLevel (MM330 and MM430).

These modules activate the functional ranges described below. The activated functions can be loaded into the drive with the L-force Engineer.
In addition to the different functional ranges of the runtime software versions, depending on the memory module used, different storage capacities and a real-time function (battery-buffered) are also available.

Memory module MM330

Memory module		Features	Slot	Product key
Motion Control StateLevel MM110		► Application and parameter storage ► Functional range for Motion Control StateLevel device profile DS402 / IEC 61800-7-2 in connection with 9400 Servo Drives StateLine: - Homing mode - Interpolated position mode - Cyclic synchronous position - Cyclic synchronous velocity - Cyclic synchronous torque	MMI	E94AYM11
Motion Control HighLevel MM220		► Application and parameter storage ► Functional range for Motion Control HighLevel in connection with 9400 Servo Drives HighLine: - Speed actuating drive - Torque actuating drive - Electronic gearbox - Synchronism with mark synchronisation - Table positioning - Extension/adjustment via function block editor In connection with regenerative power supply module: - Operation of the regenerative power supply module ► Address switch and baud rate setting for onboard system bus CANopen		E94AYM22



Memory module

Memory module		Features	Slot	Product key
Motion Control TopLevel MM330		► Application and parameter storage ► Functional range for Motion Control TopLevel in connection with 9400 Servo Drives HighLine: - Speed actuating drive - Torque actuating drive - Electronic gearbox - Synchronism with mark synchronisation - Table positioning - Positioning sequence control (graphical sequence chain) - Extension/adjustment via function block editor - Function blocks with cam functionality ► Address switch and baud rate setting for onboard system bus CANopen	MMI	E94AYM33
Motion Control TopLevel MM430		► Application and parameter storage ► Functional range for Motion Control TopLevel in connection with 9400 Servo Drives HighLine: - Speed actuating drive - Torque actuating drive - Electronic gearbox - Synchronism with mark synchronisation - Table positioning - Positioning sequence control (graphical sequence chain) - Extension/adjustment via function block editor - Function blocks with cam functionality ► Address switch and baud rate setting for onboard system bus CANopen ► Real-time function (battery-buffered)		E94AYM43

Product key		E94AYM11	E94AYM22	E94AYM33	E94AYM43
Memory module		**Motion Control StateLevel MM110**	**Motion Control HighLevel MM220**	**Motion Control TopLevel MM330**	**Motion Control TopLevel MM430**
Storage medium Flash memory	[MB]	1	2	4	8
Additional functions Real-time function (battery-buffered)		No			Yes
System bus address switch (CAN)		No	Yes		

Safety module

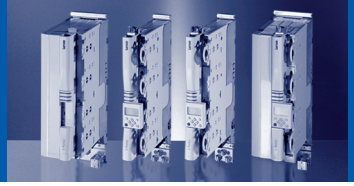
Click – integrated safety
Today one of the main tasks in plant engineering and construction is the integration of extensive safety engineering for almost all applications. Often this is only possible by means of time-consuming and expensive wiring. The drive-based safety solutions which can be integrated into the 9400 Servo Drives allow safety to be implemented via the axis modules. The optionally integrable safety engineering has a modular design. The scalable functionality starts with safe torque off (previously called safe standstill) and ends with the integration of safety bus systems. The modular approach of drive-based safety also guarantees it will be fit for the future and maintains flexibility. The following modules are available:

- SM0 (required as a cover for slot MSI when no safety functions are needed)
- SM100
- SM300
- SM301

Safety module SM301

Safety module		Features	Slot	Product key
SM0		► No safety functions	MSI	E94AYAA
SM100		► 1 safe input for active sensors, 1 monitor (1-channel output) ► Safe torque off (STO) ► Control category 4 to EN 954-1, PLe to EN ISO 13849-1		E94AYAB
SM300		► Connection of active and passive sensors ► Safe torque off (STO) ► Safe stop 1 (SS1) ► PROFIsafe safety bus via PROFIBUS (required) ► Control category 3 to EN 954-1		E94AYAD
SM301		► 4 safe inputs, for active or passive sensors ► 1 safe output, parameterisable ► Safe torque off (STO) ► Safe stop 1 (SS1) ► Safe stop 2 (SS2), safe operating stop (SOS) [1, 2] ► Safely limited speed (SLS) [1] ► Safe maximum speed (SMS) [1] ► Operation mode selector (OMS) with confirmation (ES)) ► Safe speed monitor (SSM) [1] ► PROFIsafe safety bus via PROFIBUS DP and PROFINET IO (optional) ► Control category 3 to EN 954-1, PLe to EN ISO 13849-1		E94AYAE

[1] Speed-dependent functions only in conjunction with MCS motors and SRS50 or SRM50 SinCos encoders
[2] Safety function following IEC 61800-5-2. SOS is performed with speed monitoring.



Safety module

Product key		E94AYAA	E94AYAB	E94AYAD	E94AYAE
Safety module		**SM0**	**SM100**	**SM300**	**SM301**
Certified to EN 954-1 EN ISO 13849-1			Category 4 PLe	Category 3	Category 3 PLe
Fail-safe state			Safe torque off	Safe torque off	Safe torque off
Safe inputs/outputs Number of connectable active safety sensors Number of connectable passive safety sensors Monitor (1-channel output) Safe speed monitor (2-channel output)			1 1	1 2	4 choice between active or passive 4 choice between active or passive 1 (2-channel output)
Safety bus PROFIsafe [1]				Communication module PROFIBUS DP (required)	Communication module PROFIBUS DP, PROFINET IO (optional)
Diagnostics Status displays			2 LEDs	5 LEDs	6 LEDs
DC supply voltage	U_{DC} [V]		24	24	24

[1] Module slot MXI 1 must be used for PROFIsafe.

Extension module for digital frequency

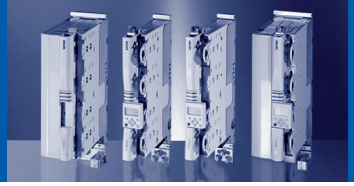
Some applications require several axes to be operated in synchronism. What was formerly implemented by means of the line shaft, can now be achieved in the 9400 HighLine Servo Drives with the digital frequency extension module.
The extension module provides a digital frequency input and output. The signals of the different axes can thus be looped through and simulated.

Extension module for digital frequency

Design		Features	Slot	Product key
Extension module				
Digital frequency		► Digital frequency 0 - 500 kHz ► Up to three slave drives connectable ► Sub-D connection for LFin and LFout	MXI	E94AYFLF

Standards and operating conditions

Product key	**E94AYFLF**
Design Extension module	**Digital frequency**
Enclosure EN 60529	IP20
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
Permissible installation height	0 ... 4000 m amsl
Climatic conditions Storage (EN 60721-3-1) Transport (EN 60721-3-2) Operation (EN 60721-3-3)	 1K3 (temperature: -25 °C ... +60 °C) 2K3 (temperature: -25 °C ... +70 °C) 3K3 (temperature: -10 °C ... +55 °C)
Insulation voltage to reference earth/PE EN 61800-5-1	AC 50 V



Extension module for digital frequency

Product key		E94AYFLF
Medium		System cables, type: EYD
Digital frequency Input Output		 0 to 500 kHz (TTL) 0 to 500 kHz (TTL)
Incremental encoder		TTL encoder 2 signals of 5 V offset by 90°
Slave drives Parallel connection Series connection		 3 drives For 250 kHz 20 drives For 500 kHz 10 drives
Max. cable length between two nodes	[m]	50
DC supply voltage	U_{DC} [V]	Internal via mains connection of the inverter

Communication module CANopen

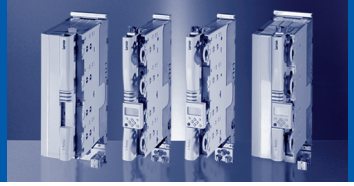
The 9400 HighLine Servo Drives and the regenerative power supply modules are equipped with an on board CANopen interface as standard. This interface enables communication between the axis modules and to other system bus components (e.g. I/O systems or HMIs).
If the 9400 StateLine Servo Drive is used or the system network requires a second CANopen interface, the CANopen communication module can be used for this purpose. CANopen is a communication protocol based on CAN technology. It is specified by the CiA user group (**C**AN **i**n **A**utomation) and can be configured for compatibility with the Lenze system bus (CAN).

Communication module CANopen

Design		Features	Slot	Product key
Communication module				
CANopen		▶ Automatic baud rate detection ▶ CANopen profile DS301, V4.02 Lenze system bus ▶ 2 LEDs for communication status display ▶ DIP switch for selecting baud rate and address ▶ Sub-D connection	MXI	E94AYCCA

Standards and operating conditions

Product key	**E94AYCCA**
Design Communication module	**CANopen**
Enclosure EN 60529	IP20
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
Permissible installation height	0 ... 4000 m amsl
Climatic conditions Storage (EN 60721-3-1) Transport (EN 60721-3-2) Operation (EN 60721-3-3)	 1K3 (temperature: -25 °C ... +60 °C) 2K3 (temperature: -25 °C ... +70 °C) 3K3 (temperature: -10 °C ... +55 °C)
Insulation voltage to reference earth/PE EN 61800-5-1	AC 50 V



Communication module CANopen

Product key		E94AYCCA
Communication Medium Communication profile Drive profile		 DIN ISO 11898 CANopen, DS301 V4.02, or Lenze system bus DS402 in combination with 9400 StateLine Servo Drives
Baud rate	[kBit/s]	10 20 50 125 250 500 800 1000
Node		Multi-master or slave
Network topology		Line with terminating resistors (120 ohm) at both ends
Number of logical process data channels		4 (each with 1 - 8 bytes)
Number of logic parameter data channels		5
Number of nodes		127 110 (no repeaters)
Max. distance between 2 nodes	[m]	Unlimited, determined by max. bus length
Max. cable length per bus segment [1)]	[m]	17 for 1000 kbps 40 for 800 kbps 110 for 500 kbps 290 for 250 kbps 630 for 125 kbps 1500 for 50 kbps 3900 for 20 kbps 8000 for 10 kbps
DC supply voltage	U_{DC} [V]	Internal via mains connection of the inverter

[1)] Max. bus cable lengths also depend on the number of nodes and the cable cross-section used.

Communication module DeviceNet

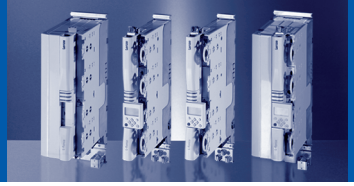
The American automation specialist Allan Bradley developed the DeviceNet fieldbus based on the CAN controller. This communication profile was published by the ODVA (Open DeviceNet Vendor Association) user organisation. A large number of sensors and actuators are available. Similar to CANopen, a DeviceNet master is used to control the DeviceNet.

Communication module DeviceNet

Design		Features	Slot	Product key
Communication module				
DeviceNet		▶ "Group 2 Only Server" functionality (slave) ▶ 1 LED for communication status display ▶ DIP switch for selecting baud rate and address ▶ Plug connector with screw connection, 5-pole	MXI	E94AYCDN

Standards and operating conditions

Product key	**E94AYCDN**
Design Communication module	**DeviceNet**
Enclosure EN 60529	IP20
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
Permissible installation height	0 ... 4000 m amsl
Climatic conditions Storage (EN 60721-3-1) Transport (EN 60721-3-2) Operation (EN 60721-3-3)	 1K3 (temperature: -25 °C ... +60 °C) 2K3 (temperature: -25 °C ... +70 °C) 3K3 (temperature: -10 °C ... +55 °C)
Insulation voltage to reference earth/PE EN 61800-5-1	AC 50 V



Communication module DeviceNet

Product key		E94AYCDN	
Communication Medium Communication profile		DIN ISO 11898 DeviceNet	
Baud rate	[kBit/s]	125 250 500	
Node		Slave	
Network topology		Line with terminating resistors (120 ohm) at both ends	
Process data words (PCD) 16 bits	[Wörter]	32	
Number of nodes		Max. 64	
Max. cable length per bus segment	[m]	Thick cable 100 for 500 kbps 250 for 250 kbps 500 for 125 kbps	Thin cable 100 for 125 kbps 100 for 250 kbps 100 for 500 kbps
DC supply voltage	U_{DC} [V]	External 24 via the DeviceNet cable to the 5-pole plug connector	

Communication module EtherCAT

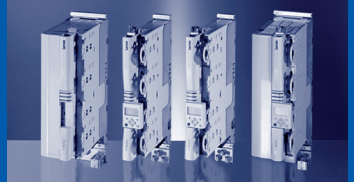
Physically speaking, EtherCAT is a ring system that uses a one-total-frame protocol, where the device manipulates the data during the cycle. It is found in the E-bus and Ethernet physical variants. E-bus is merely suitable for short distances within a device; only the Ethernet version offers the benefits of an Ethernet system.

Communication module EtherCAT

Design		Features	Slot	Product key
Communication module				
EtherCAT		▶ CANopen over EtherCAT (CoE) ▶ Distributed clock ▶ 2 RJ45 connections with LED for link/activity ▶ 2 LEDs for communication status display ▶ External voltage supply possible	MXI	E94AYCET

Standards and operating conditions

Product key	**E94AYCET**
Design Communication module	**EtherCAT**
Enclosure EN 60529	IP20
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
Permissible installation height	0 ... 4000 m amsl
Climatic conditions Storage (EN 60721-3-1) Transport (EN 60721-3-2) Operation (EN 60721-3-3)	 1K3 (temperature: -25 °C ... +60 °C) 2K3 (temperature: -25 °C ... +70 °C) 3K3 (temperature: -10 °C ... +55 °C)
Insulation voltage to reference earth/PE EN 61800-5-1	AC 50 V



Communication module EtherCAT

Product key		E94AYCET
Communication Medium Communication profile		CAT5e S/FTP according to ISO/ICE11801 (2002) CoE (CANopen over EtherCAT)
Baud rate	[Mbit/s]	100
Node		Slave
Network topology		Line (internal ring)
Number of logical process data channels		1
Process data words (PCD) 16 bits	[Wörter]	32
Number of nodes		65535
Max. distance between 2 nodes	[m]	100
DC supply voltage	U_{DC} [V]	External 24 V connection Internal via mains connection of the inverter

Communication module Ethernet

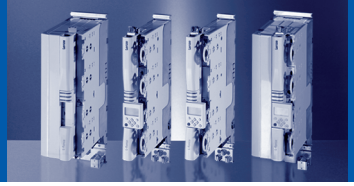
Initially the Ethernet network was reserved for the office, but today this communication system is also often used for system parameterisation. The 9400 Servo Drives can be expanded for this purpose using an Ethernet module.
The Ethernet module can be integrated into general IT infrastructures (e.g. control centres, production data acquisition) and is suitable for remote maintenance applications. It is intended for parameter setting, but not for real-time transmission of process data.

Communication module Ethernet

Design		Features	Slot	Product key
Communication module				
Ethernet		► Automatic setting of baud rate and transmission mode ► Automatic detection of wiring errors and polarity reversal ► Automatic switching between transmit and receive paths (autocrossing) ► 1 LED for communication status display ► Electrically isolated from the bus	MXI	E94AYCEN

Standards and operating conditions

Product key	**E94AYCEN**
Design Communication module	**Ethernet**
Enclosure EN 60529	IP20
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
Permissible installation height	0 ... 4000 m amsl
Climatic conditions Storage (EN 60721-3-1) Transport (EN 60721-3-2) Operation (EN 60721-3-3)	 1K3 (temperature: -25 °C ... +60 °C) 2K3 (temperature: -25 °C ... +70 °C) 3K3 (temperature: -10 °C ... +55 °C)
Insulation voltage to reference earth/PE EN 61800-5-1	AC 50 V



Communication module Ethernet

Product key		E94AYCEN
Communication Medium Communication profile		Twisted Pair, CAT 5e to IEEE802.3 GCI, based on TCP/IP
Baud rate Ethernet	[MBit/s]	10/100
Signalling Ethernet		Link and activity
Max. cable length between two nodes	[m]	100
Network topology		Star; use of hubs/switches
Transmission Mode		Half duplex/full duplex
Port		1200 and 9400
DC supply voltage	U_{DC} [V]	Internal via mains connection of the inverter

Communication module ETHERNET Powerlink

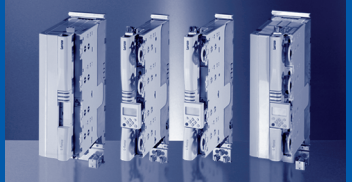
ETHERNET Powerlink (EPL) is an Ethernet-based bus system which also makes use of the tried-and-tested CANopen standards. Any CANopen drive profile can be transferred directly to the EPL context without the need for any adaptations. ETHERNET Powerlink is suitable for control/inverter networking, for pure PLC functionality and for motion control systems. The managing node (MN) takes care of the bus master functionality and the slaves are referred to as controlled nodes (CN).

Communication module ETHERNET Powerlink

Design		Features	Slot	Product key
Communication module				
POWERLINK MN/CN		▶ Managing node (MN) or controlled node (CN) ▶ 2 RJ45 connections with LED for link/activity ▶ Integrated hub ▶ 2 LEDs for communication status display ▶ External voltage supply possible	MXI	E94AYCEP
POWERLINK CN		▶ 2 RJ45 connections with LED for link/activity ▶ Integrated hub ▶ Controlled node (CN) ▶ 2 LEDs for communication status display ▶ External voltage supply possible		E94AYCEC

Standards and operating conditions

Product key	**E94AYCEP**	**E94AYCEC**
Design Communication module	**POWERLINK MN/CN**	**POWERLINK CN**
Enclosure EN 60529	IP20	
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	
Permissible installation height	0 ... 4000 m amsl	
Climatic conditions Storage (EN 60721-3-1) Transport (EN 60721-3-2) Operation (EN 60721-3-3)	1K3 (temperature: -25 °C ... +60 °C) 2K3 (temperature: -25 °C ... +70 °C) 3K3 (temperature: -10 °C ... +55 °C)	
Insulation voltage to reference earth/PE EN 61800-5-1	AC 50 V	



Communication module ETHERNET Powerlink

Product key		E94AYCEP	E94AYCEC
Communication Medium Communication profile		CAT5e S/FTP according to ISO/ICE11801 (2002) EPL2.0	
Baud rate	[Mbit/s]	100	
Node		Managing node (MN) Controlled node (CN)	Controlled node (CN)
Network topology		Star when external hubs are used, line when internal hubs are used	
Number of nodes		240	
Max. cable length between two nodes	[m]	100	
DC supply voltage	U_{DC} [V]	External 24 V connection Internal via mains connection of the inverter	

ETHERNET Powerlink hub

Lenze offers an external 8-fold hub supplementing the 2-fold hub integrated in the ETHERNET Powerlink interface module. This infrastructure component corresponds to a class-II repeater according to IEEE802.3u. It automatically detects the network baud rate (10 or 100 Mbps). The hubs can be cascaded via a special uplink port.

Design		Features	Product key
Communication module			
Powerlink Hub		▶ DC 24V ▶ 8-fold hub in industrial design ▶ Automatic baud rate detection (10/100 Mbps) ▶ Cascadable	E94AZCEH

Communication module PROFIBUS

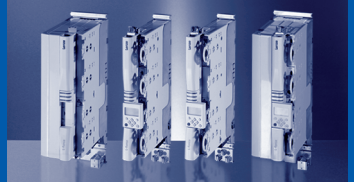
One of the communication channels most commonly used in industry is PROFIBUS. The 9400 Servo Drives series is provided with the corresponding interface module required for this type of communication.
The PROFIBUS module is a slave connection module with the PROFIBUS-DP communication profile. It is used for networking between the control and the inverter at high processing speeds. It provides a user-friendly way of integrating the inverter into the overall system network.

Communication module PROFIBUS

Design		Features	Slot	Product key
Communication module				
PROFIBUS		▶ 2 LEDs for communication status display ▶ Address can be set by means of a DIP switch ▶ Electrically isolated from the bus ▶ Compatibility switch for communication module EMF2133 IB	MXI	E94AYCPM

Standards and operating conditions

Product key	**E94AYCPM**
Design Communication module	**PROFIBUS**
Enclosure EN 60529	IP20
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
Permissible installation height	0 ... 4000 m amsl
Climatic conditions Storage (EN 60721-3-1) Transport (EN 60721-3-2) Operation (EN 60721-3-3)	 1K3 (temperature: -25 °C ... +60 °C) 2K3 (temperature: -25 °C ... +70 °C) 3K3 (temperature: -10 °C ... +55 °C)
Insulation voltage to reference earth/PE EN 61800-5-1	AC 50 V



Communication module PROFIBUS

Product key		E94AYCPM
Communication Medium Communication profile Drive profile		 RS 485, shielded twisted pair PROFIBUS-DP-V0 PROFIBUS-DP-V1 PROFIsafe in combination with SM300 and SM301 Drivecom profile "Drive technology 20" [1] Lenze drive control PROFIDrive, version 4 [1]
Baud rate	[kBit/s]	9.6 ... 12000 (automatic detection)
Node		Slave
Network topology		With repeater: line or tree Without repeater: line
Process data words (PCD) 16 bits	[Wörter]	1 ... 32
DP user data length		Optional parameter channel (4 words) + process data words
Number of nodes		31 slaves + 1 master per bus segment With repeaters: 125
Max. cable length per bus segment	[m]	1200 (depends on baud rate and cable type used)
DC supply voltage	U_{DC} [V]	External 24 V connection Internal via mains connection of the inverter

[1] In preparation.

Communication module PROFINET

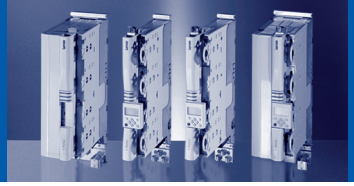
The PROFINET bus system based on Ethernet is often used as the successor of PROFIBUS. There are several variants of the PROFINET which differ regarding the deterministics and thus the cycle times possible. The most frequent variant of the PROFINET I/O is the RT variant which can be used for control/inverter networking but not for motion control applications.

Communication module PROFINET

Design		Features	Slot	Product key
Communication module				
PROFINET		▶ 1 RJ45 connection with LED for link/activity ▶ PROFINET I/O device ▶ Soft real time (RT) ▶ 2 LEDs for communication status display ▶ External voltage supply possible	MXI	E94AYCER

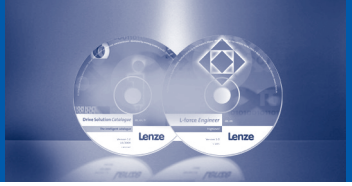
Standards and operating conditions

Product key	**E94AYCER**
Design Communication module	**PROFINET**
Enclosure EN 60529	IP20
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
Permissible installation height	0 ... 4000 m amsl
Climatic conditions Storage (EN 60721-3-1) Transport (EN 60721-3-2) Operation (EN 60721-3-3)	 1K3 (temperature: -25 °C ... +60 °C) 2K3 (temperature: -25 °C ... +70 °C) 3K3 (temperature: -10 °C ... +55 °C)
Insulation voltage to reference earth/PE EN 61800-5-1	AC 50 V



Communication module PROFINET

Product key		E94AYCER
Communication Medium Communication profile Drive profile		 CAT5e S/FTP according to ISO/ICE11801 (2002) PROFINET I/O (RT) PROFIsafe in combination with SM301
Baud rate	[kBit/s]	100
Node		PROFINET I/O device
Network topology		Star; use of switches
Process data words (PCD) 16 bits	[Wörter]	1 ... 32
Max. cable length between two nodes	[m]	100
DC supply voltage	U_{DC} [V]	External 24 V connection Internal via mains connection of the inverter

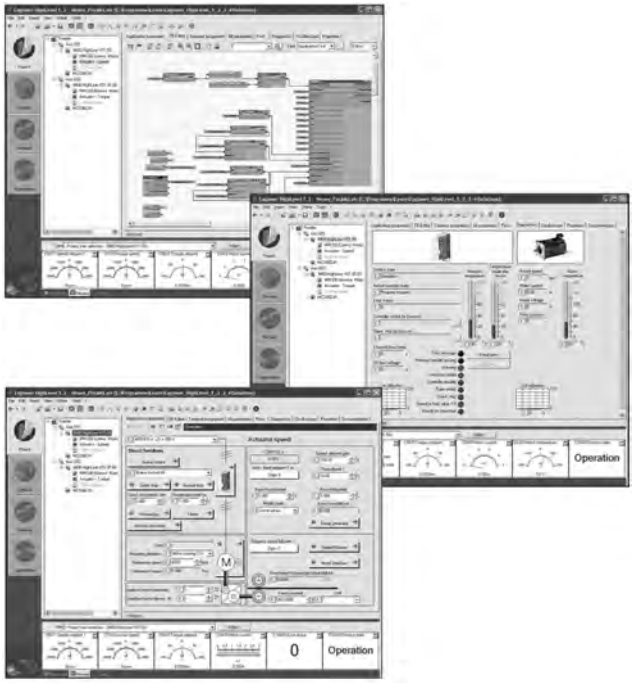


General information

The L-force Engineer is the engineering tool for commissioning and diagnosing the 9400 Servo Drives. The user interface is intuitive and easy to use. The clearly structured dialogs of the L-force Engineer are specially adapted to the requirements of users.
The various phases of a project are used as the primary navigation aid, as a result of which the key functions are sorted and presented in a clear manner. Numerous graphical interfaces are used in addition to simplify the configuration and parameter setting processes for the devices. As a result, in many cases more complicated programming processes can be replaced with a simpler configuration step.
Multi drive engineering comes naturally with the L-force Engineer. A large number of functions enable your machine to be optimally configured, commissioned and diagnosed.

The following versions are available:

- **Engineer StateLevel (can be downloaded free of charge)**
  Featuring all necessary diagnostic functions, this product is absolutely ideal for service engineers and commissioners. It is optimised for commissioning 9400 Servo Drives and can also be used to implement smaller projects with up to 5 target systems. The CD also includes the GDC easy parameter setting program as well as the L-Force Loader tool so that you can commission further target systems.
- **Engineer HighLevel**
  In addition to the functions provided by the Engineer StateLevel software, the Engineer HighLevel version offers essential functions for large projects, such as establishing networks, connecting communication stations and editing function blocks. You can even integrate your own documentation into the Engineer project, so that everything remains available centrally at all times - long searches are a thing of the past. The GDC easy parameter setting program and other programs included on this CD can be used for configuring and commissioning further target systems. This full version is available as a single user, multiple user or buyout licence type.



User interfaces of L-force Engineer HighLevel

Functions and features

The following table describes the functions and properties of the engineering software for 9400 Servo Drives.

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

Product key Short form		**ESPEVEHNNN□□1**
Design	**L-force Engineer StateLevel**	**L-force Engineer HighLevel**
Drives and components		
9400 Servo Drives	●	●
I/O system IP20	●	●
Lenze motors	●	●
Application motors	●	●
Project creation		
Limitation to 5 target systems	Yes	No
Project documentation		
Stored in project		●
Parameterisation		
Graphics-based	●	●
Parameter list	●	●
Networks and communication		
System bus (CAN) network configuration		●
Network configuration - ETHERNET Powerlink		●
Communication interconnection		●
Port editor (communication interface)		●
Creation of machine application		●
CONFIGURATION		
Function block editor		●
Diagnostics		
Terminal display/diagnostics overview	●	●
Monitor window	●	●
Logbook of all error messages	●	●
Online values in graphics-based parameterisation	●	●
Online values in function block editor		●
Network diagnostics		●
Online/offline comparison	●	●
Oscilloscope	2-channel	8-channel
Safety		
Safe configuration of SM301	●	●

Functions and features

The following table describes the functions and properties of the engineering software for 9400 Servo Drives.

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

Product key Short form		**ESPEVEHNNN□□1**
Design	**L-force Engineer StateLevel**	**L-force Engineer HighLevel**
Cams		
Cam Editor		●
Import, graphical entry		●
Straight line, 5th order polynomial and sloped sine line		●
Automatic addition of profiles with integrated export system		with Cam Designer
Technology applications		
Electronic gearbox	●	●
Synchronism with mark registration	●	●
Positioning sequence control	●	●
Torque actuating drive	●	●
Speed actuating drive	●	●
Table positioning	●	●

System requirements for L-force Engineer StateLevel / HighLevel V2.7

To be able to use the L-force Engineer, the following minimum hardware and software requirements must be met:

- Microsoft® Windows® 2000 SP2 or higher / XP
- IBM-compatible PC with Intel® Pentium® processor 1.4 GHz or higher (projects up to max. 5 axes from 750 MHz)
- At least 512 MB of RAM (projects up to max. 5 axes at least 256 MB)
- At least 950 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.

Overview of licences

Single user licence
Single user licences are always supplied with the software product on CD-ROM. The purchaser is entitled to install the software product on his/her PC. Multiple installations on different PCs are not permitted.

Multiple user licence
Some software products can be supplied with multiple user licences. When you purchase a multiple user licence, you acquire the right to install a specific software product (CD-ROM with single user licence) on the number of machines for which licences have been purchased. A legally valid single user licence must be held before multiple user licences can be purchased.

Corporate licence
Software products with corporate licences need only be purchased once. These products may be installed on multiple machines within a company on a single site. In such cases, additional multiple user licences are not required.

Buyout licence
A buyout licence permits multiple installations of the software within a company on a single site. Purchasers of buyout licences are also entitled to issue sublicences for machines in which Lenze devices are installed.

Selection and order data

Design	Features	Product key
L-force Engineer StateLevel, freeware	▶ Order free of charge ▶ Download via the Internet ▶ Includes GDC easy and L-force Loader ▶ Languages: German/English/French	Download free of charge
L-force Loader	▶ Order free of charge ▶ Download via the Internet ▶ Languages: German/English/French	
L-force Engineer HighLevel, single user licence	▶ CD-ROM included in scope of supply ▶ Installation on one PC ▶ Includes GDC, L-force Loader and GD Oscilloscope ▶ Languages: German/English/French	ESPEVEHXAOEC1
L-force Engineer HighLevel, 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	ESPEVEHNNNML1
L-force Engineer HighLevel, 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	ESPEVEHNNNFL1
L-force Engineer HighLevel, 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	ESPEVEHNNNBL1
Cam Designer, single user licence	▶ CD-ROM included in scope of supply ▶ Installation on one PC ▶ Languages: German/English/French	ESP-CAM1-P
Cam Designer V 2.3 upgrade to Cam Designer V 3.x	▶ Upgrade to Cam Designer V 3.0 ▶ Multiple user licence	ESP-CAM1-PU2

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.

Communication	
System bus (CAN)	► USB connection with USB system bus adapter EMF 2177IB ► Parallel interface with system bus adapter EMF 2173IB
Ethernet	► Network connection (10/100 Mbps Ethernet) switch or hub recommended
Diagnostic interface	► USB connection with diagnostic adapter E94AZCUS

L-force Loader

The L-force Loader makes standard set-up much easier to perform. Finished L-force projects can be transferred from the PC to the device directly. The
L-force Loader cannot be used to make any changes to these projects.
You can obtain the L-force Loader free of charge from the Internet at www.Lenze.de.

Cam Designer

You can use the Cam Designer to create and optimise motion profiles and cam groups for electronic cams quickly and intuitively. Whether you are importing data, using CAD or entering the profiles directly, the Cam Designer will support you from the very first step. Motion profiles can be entered really easily using the mouse and a graphical user interface.

Features:
- ► Fast entry of the relevant parts of the motion profile
- ► Clear overview of all motion profiles of other tools
- ► Complex motion tasks divided into several simple indexing movements
- ► The Cam Manager program is integrated for simple management of all drives, curves and cams

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