

Automation systems Drive solutions

Controls

Inverter



Motors

Gearboxes

Engineering Tools

Contents of the L-force catalogue

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 Selected portfolio
 Additional portfolio

Lenze makes many things easy for you.

With our motivated and committed approach, we work together with you to create the best possible solution and set your ideas in motion - whether you are looking to optimise an existing machine or develop a new one. We always strive to make things easy and seek perfection therein. This is anchored in our thinking, in our services and in every detail of our products. It's as easy as that!

1

Developing ideas

Are you looking to build the best machine possible and already have some initial ideas? Then get these down on paper together with us, starting with small innovative details and stretching all the way to completely new machines. Working together, we will develop an intelligent and sustainable concept that is perfectly aligned with your specific requirements.

2

Drafting concepts

We see welcome challenges in your machine tasks, supporting you with our comprehensive expertise and providing valuable impetus for your innovations. We take a holistic view of the individual motion and control functions here and draw up consistent, end-to-end drive and automation solutions for you - keeping everything as easy as possible and as extensive as necessary.

3

Implementing solutions

Our easy formula for satisfied customers is to establish an active partnership with fast decision making processes and an individually tailored offer. We have been using this principle to meet the ever more specialised customer requirements in the field of machine engineering for many years.

4

Manufacturing machines

Functional diversity in perfect harmony: as one of the few full-range providers in the market, we can provide you with precisely those products that you actually need for any machine task – no more and no less. Our L-force product portfolio, a consistent platform for implementing drive and automation tasks, is invaluable in this regard.

5

Ensuring productivity

Productivity, reliability and new performance peaks on a daily basis – these are our key success factors for your machine. After delivery, we offer you cleverly devised service concepts to ensure continued safe operation. The primary focus here is on technical support, based on the excellent application expertise of our highly-skilled and knowledgeable after-sales team.

A matter of principle: the right products for every application.

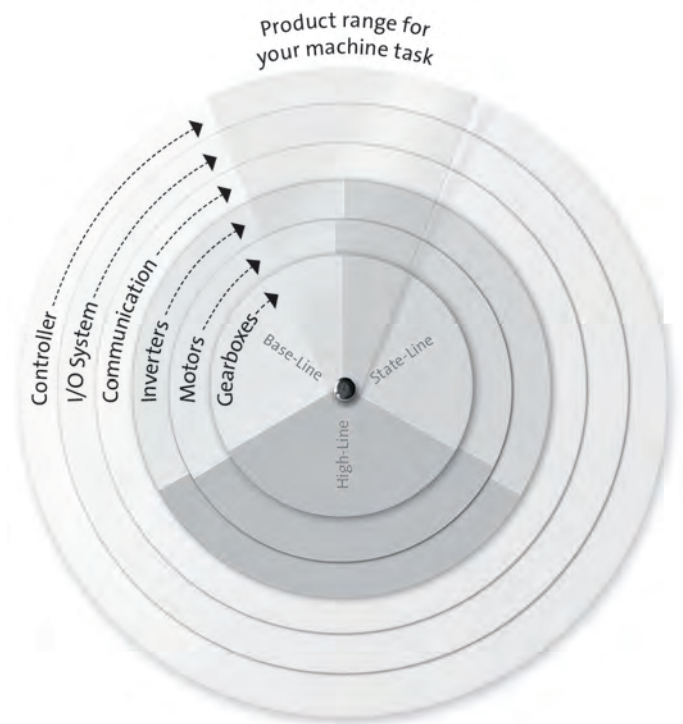
Lenze's extensive L-force product portfolio follows a very simple principle. The functions of our finely scaled products are assigned to the three lines Base-Line, State-Line or High-Line.

But what does this mean for you? It allows you to quickly recognise which products represent the best solution for your own specific requirements.

Powerful products with a major impact:

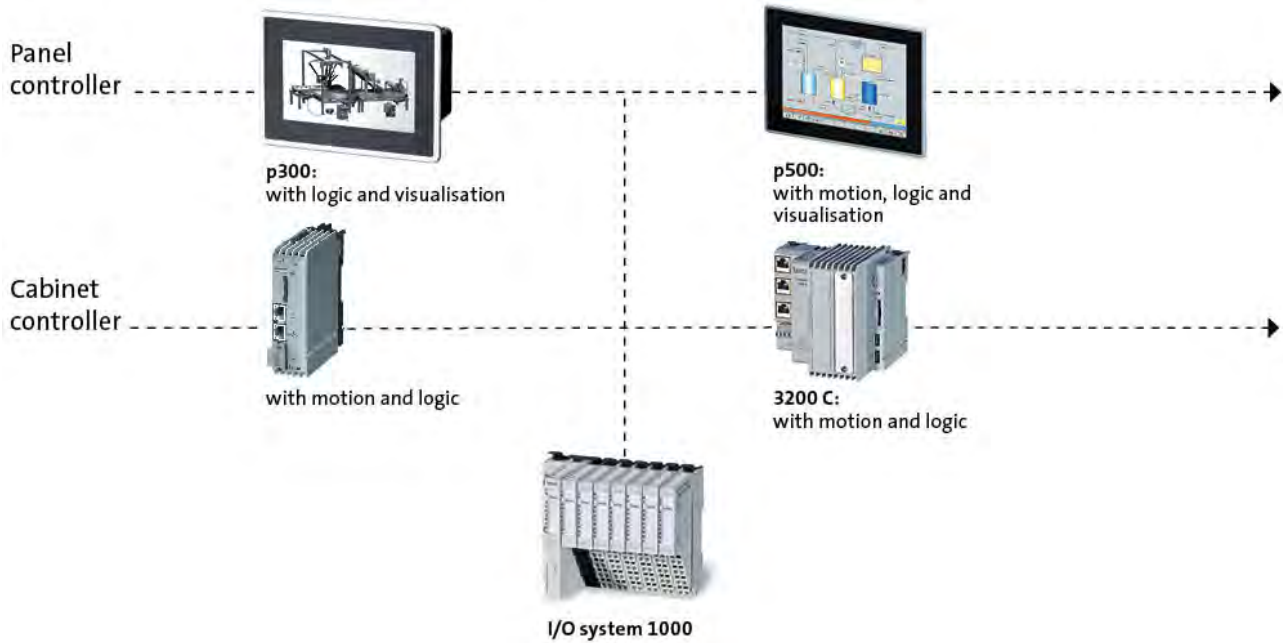
- Easy handling
- High quality and durability
- Reliable technologies in tune with the latest developments

Lenze products undergo the most stringent testing in our own laboratory. This allows us to ensure that you will receive consistently high quality and a long service life. In addition to this, five logistics centres ensure that the Lenze products you select are available for quick delivery anywhere across the globe. It's as easy as that!

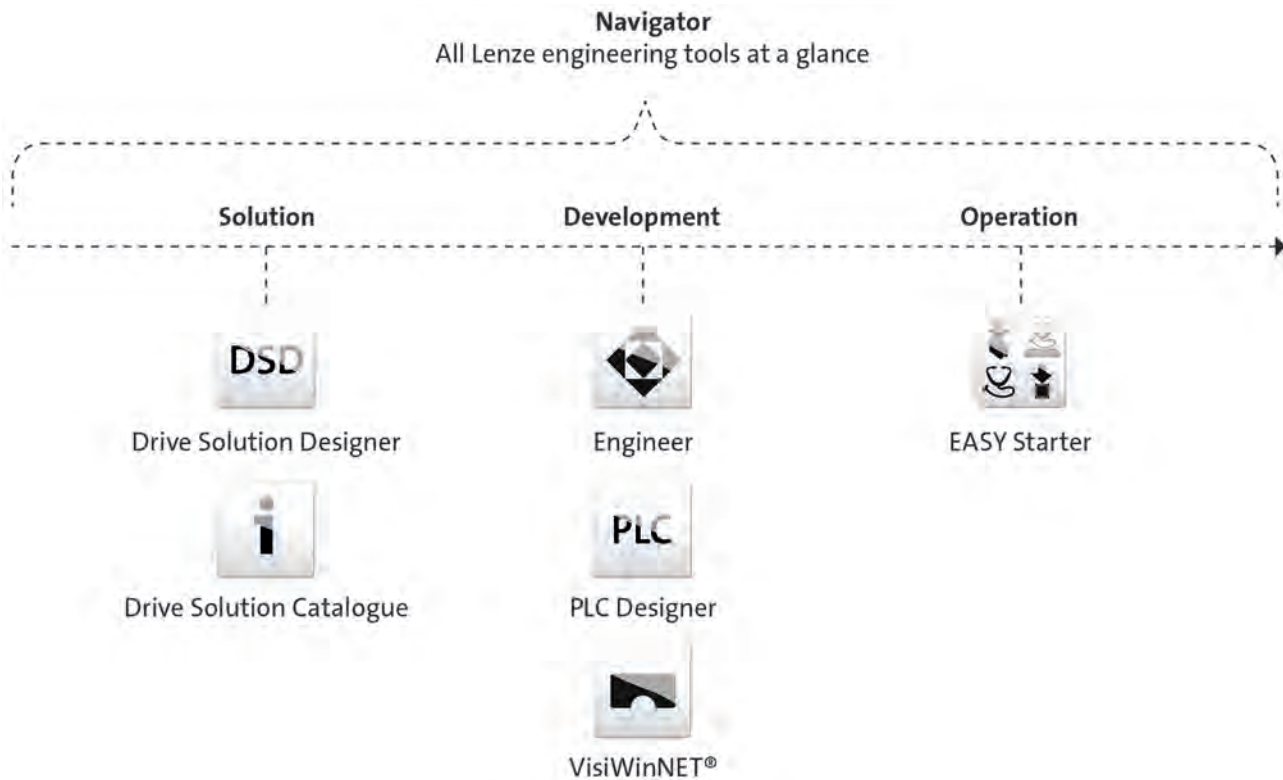


L-force product portfolio

Controls

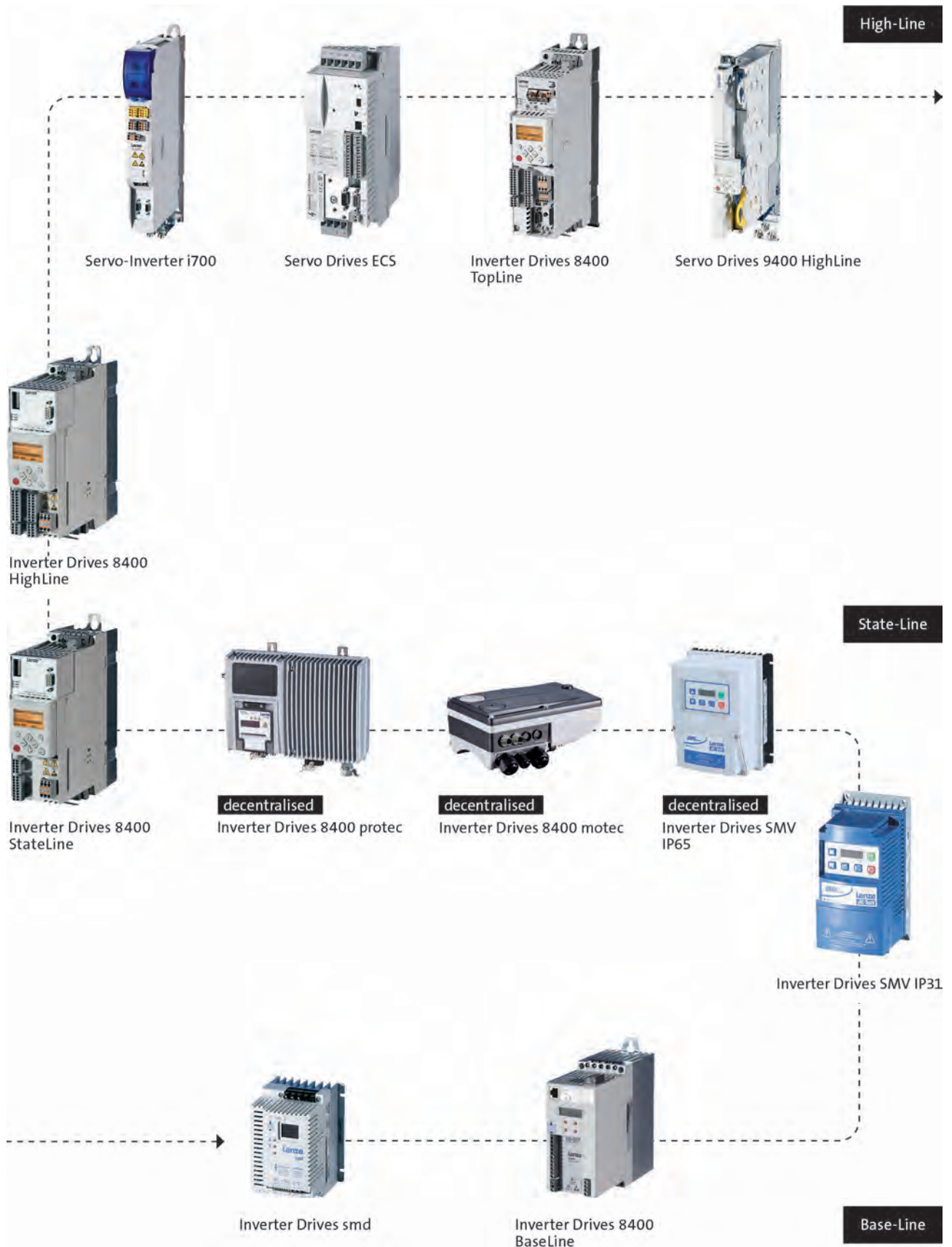


Engineering Tools



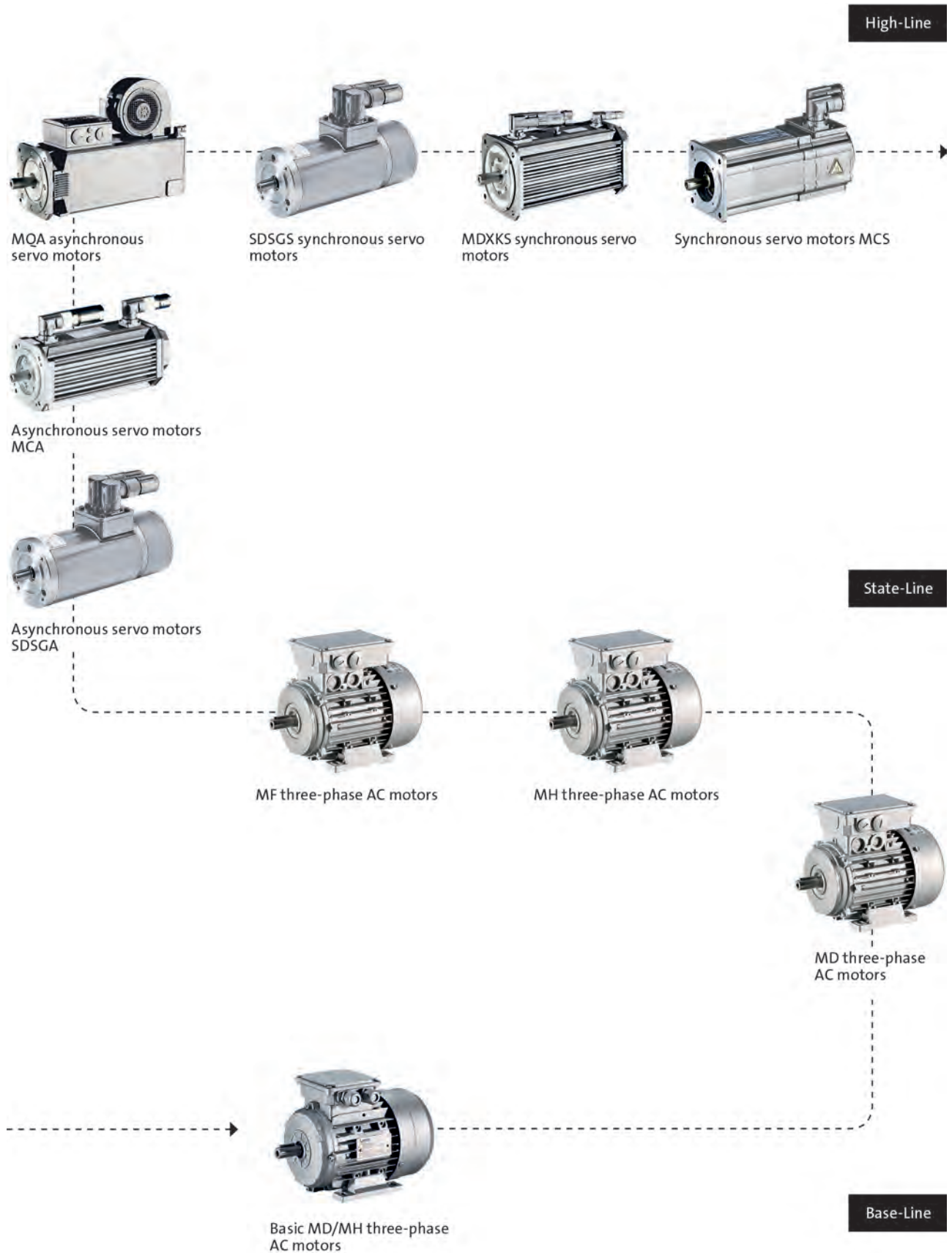
L-force product portfolio

Inverter



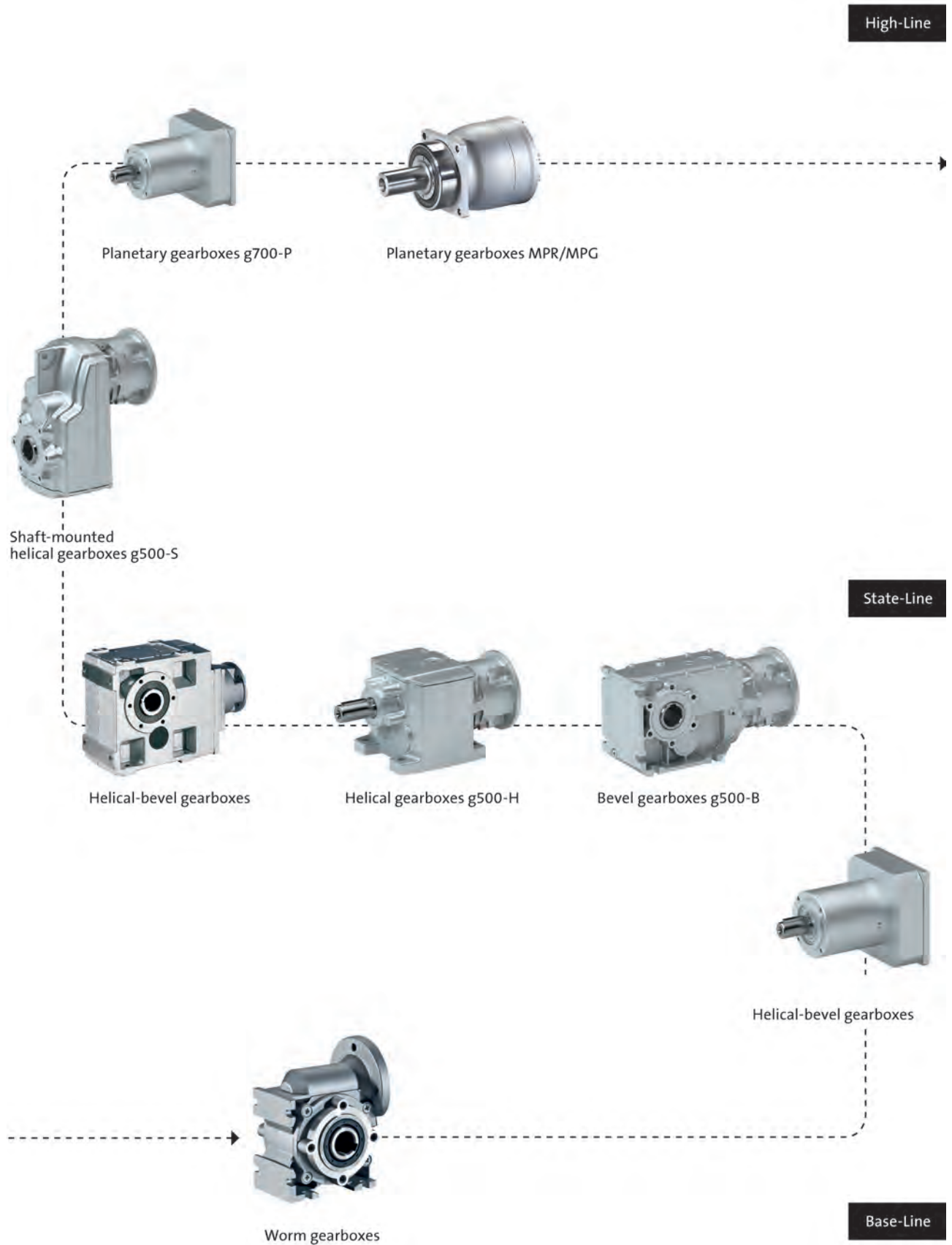
L-force product portfolio

Motors



L-force product portfolio

Gearboxes



Inverter

Servo Drives 9400 HighLine

0.37 ... 240 kW



Servo Drives 9400 HighLine

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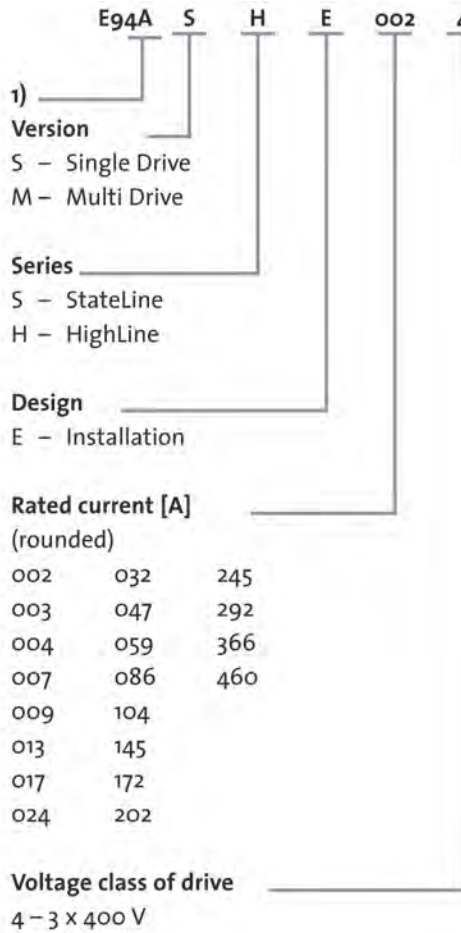
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Servo Drives 9400 HighLine

General information

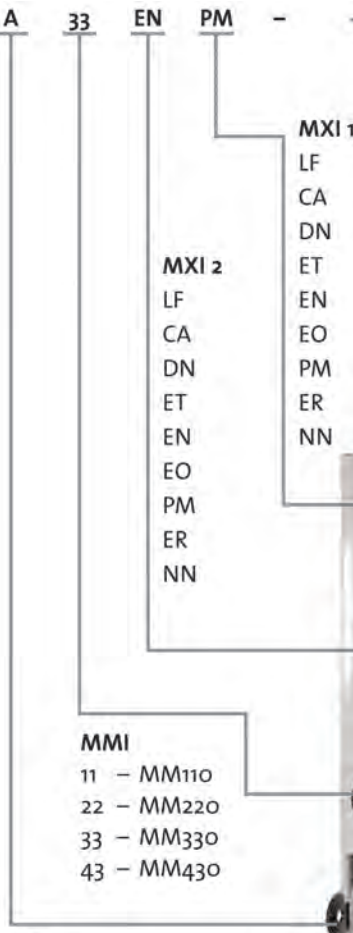


Product key



- LF - Digital frequency
- CA - CANopen
- DN - DeviceNet
- ET - EtherCAT
- EN - EtherNet
- EO - EtherNet/IP
- PM - PROFIBUS
- ER - PROFINET
- NN - no module

- 1) generation
A - 0,37 ... 55 kW
B - 75 ... 240 kW



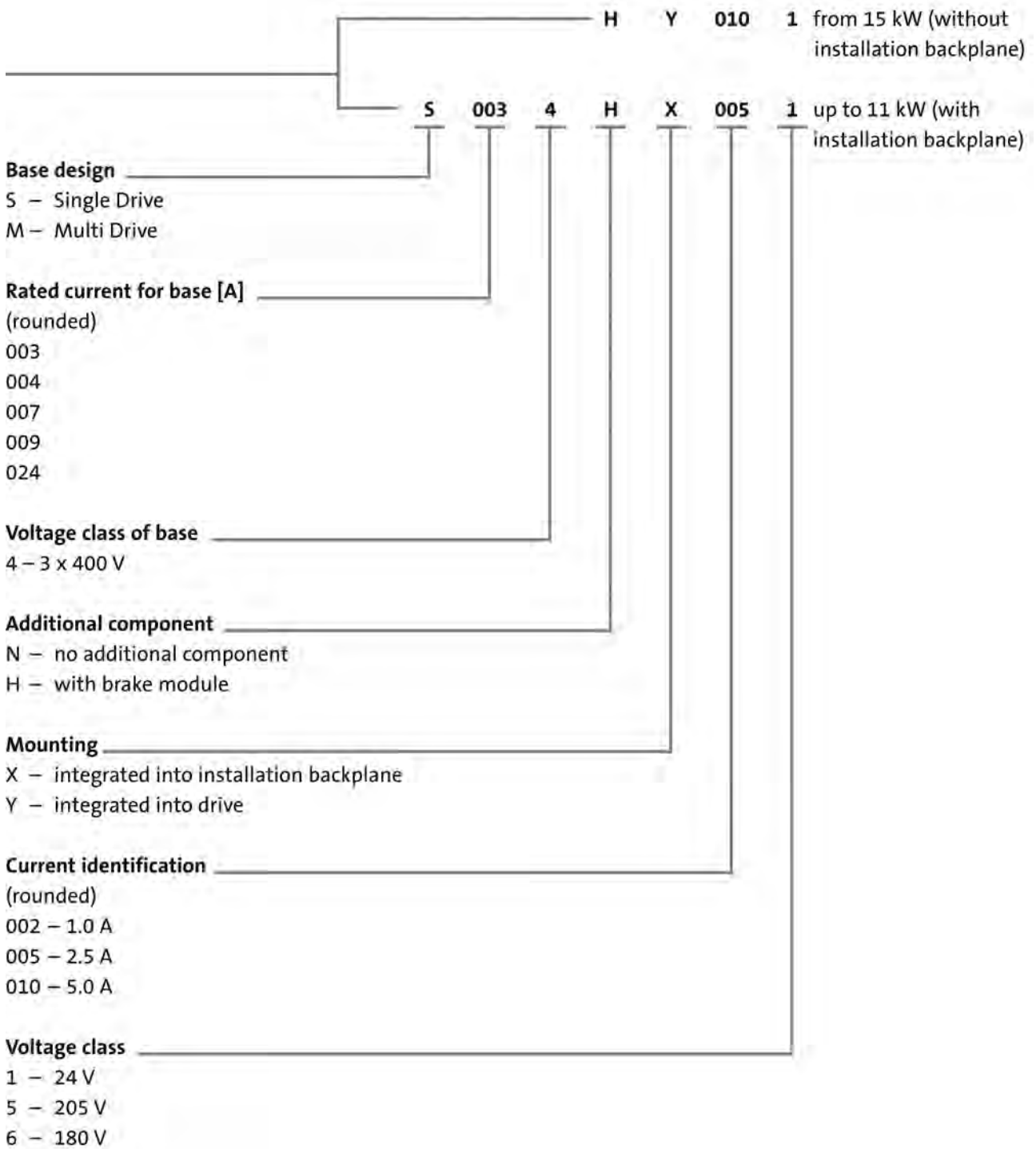
- MSI
A - SMo
B - SM100
D - SM300
E - SM301
F - SM302

- MXI 1 - Slot for extensions module 1
MXI 2 - Slot for extensions module 2
MMI - Slot for memory module
MSI - Slot for safety module



Servo Drives 9400 HighLine

General information

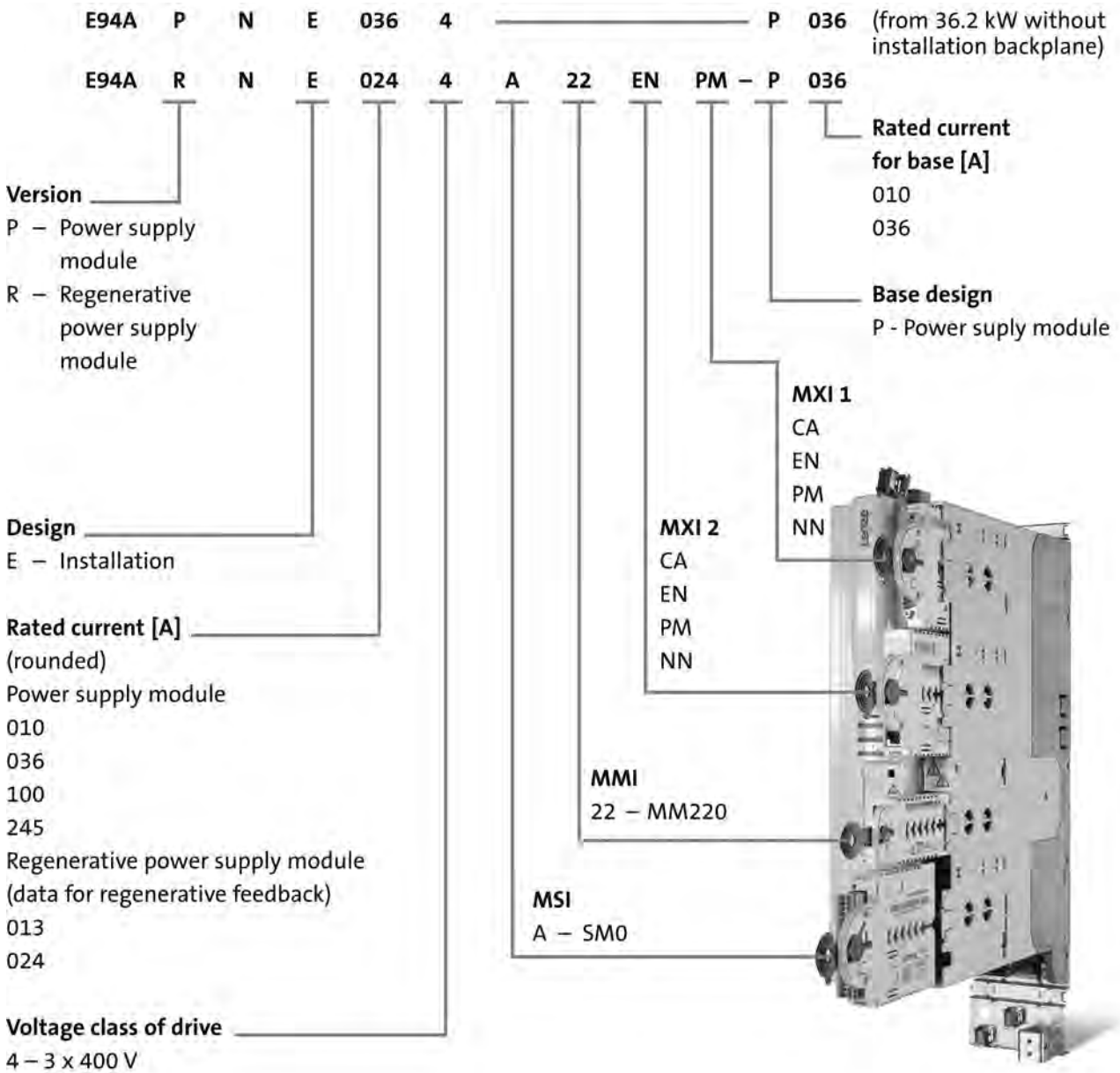


Servo Drives 9400 HighLine

General information



Product key for power supply modules and regenerative power supply modules



4.3

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

Servo Drives 9400 HighLine

General information



List of abbreviations

| | | |
|----------------|---------|------------------------------|
| b | [mm] | Dimensions |
| C_{th} | [KWs] | Thermal capacity |
| f_{ch} | [kHz] | Rated switching frequency |
| h | [mm] | Dimensions |
| i | | Ratio |
| $I_{N, out}$ | [A] | Rated output current |
| $I_{N, AC}$ | [A] | Rated mains current |
| $I_{N, DC}$ | [A] | Rated DC-bus current |
| $I_{red, out}$ | [A] | Reduced output current |
| $I_{red, DC}$ | [A] | Reduced DC-bus current |
| m | [kg] | Mass |
| n_{max} | [r/min] | Max. speed |
| P | [kW] | Typical motor power |
| P_N | [kW] | Rated power |
| $P_{max, 1}$ | [kW] | Max. output power |
| $P_{max, 2}$ | [kW] | Max. short-time output power |
| P_V | [kW] | Power loss |
| R_N | [Ω] | Rated resistance |
| R_{min} | [Ω] | Min. brake resistance |
| t | [mm] | Dimensions |
| U | [V] | Voltage drop |
| U_{AC} | [V] | Mains voltage |
| U_{DC} | [V] | DC supply |
| $U_{N, AC}$ | [V] | Rated voltage |
| $U_{N, DC}$ | [V] | Rated voltage |
| U_{out} | [V] | Output voltage |

| | |
|-------------|--|
| DIAG | Slot for diagnostic adapter |
| DIN | Deutsches Institut für Normung e.V. |
| EN | European standard |
| EN 60529 | Degrees of protection provided by enclosures (IP code) |
| EN 60721-3 | Classification of environmental conditions; Part 3: Classes of environmental parameters and their limit values |
| EN 61800-3 | Electrical variable speed drives Part 3: EMC requirements including special test methods |
| IEC 61131-2 | Programmable logic controllers Part 2: Equipment and tests |
| IEC | International Electrotechnical Commission |
| IEC 61508 | Functional safety of electrical/electronic/programmable electronic safety-related systems |
| IM | International Mounting Code |
| IP | International Protection Code |
| MMI | Modular memory interface (memory module) |
| MSI | Modular safety interface (safety module) |
| NEMA | National Electrical Manufacturers Association |
| UL | Underwriters Laboratory Listed Product |
| UR | Underwriters Laboratory Recognized Product |
| VDE | Verband deutscher Elektrotechniker (Association of German Electrical Engineers) |

Servo Drives 9400 HighLine

General information



Servo Drives 9400 Single Drive and Multi Drive

Many technical advances make our day-to-day life easier. A simply click is all that is needed and

- the lights come on
- a safety belt is engaged
- you can surf the Internet
- you can take a snapshot of your family.

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

Single drive

Our single-axis devices combine mains supply, DC bus and inverter in a single unit. The filter elements and the brake chopper are integrated in the servo inverter and allow autonomous use in distributed control cabinet installations. By using corresponding footprint filters (up to 55 kW), greater interference suppression can be achieved without additional mounting area.

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 parts requirements and installation work are thus significantly reduced. The integrated DC busbar system provides for compact installations for drives rated up to 15 kW.

HighLine - for decentralised control concepts

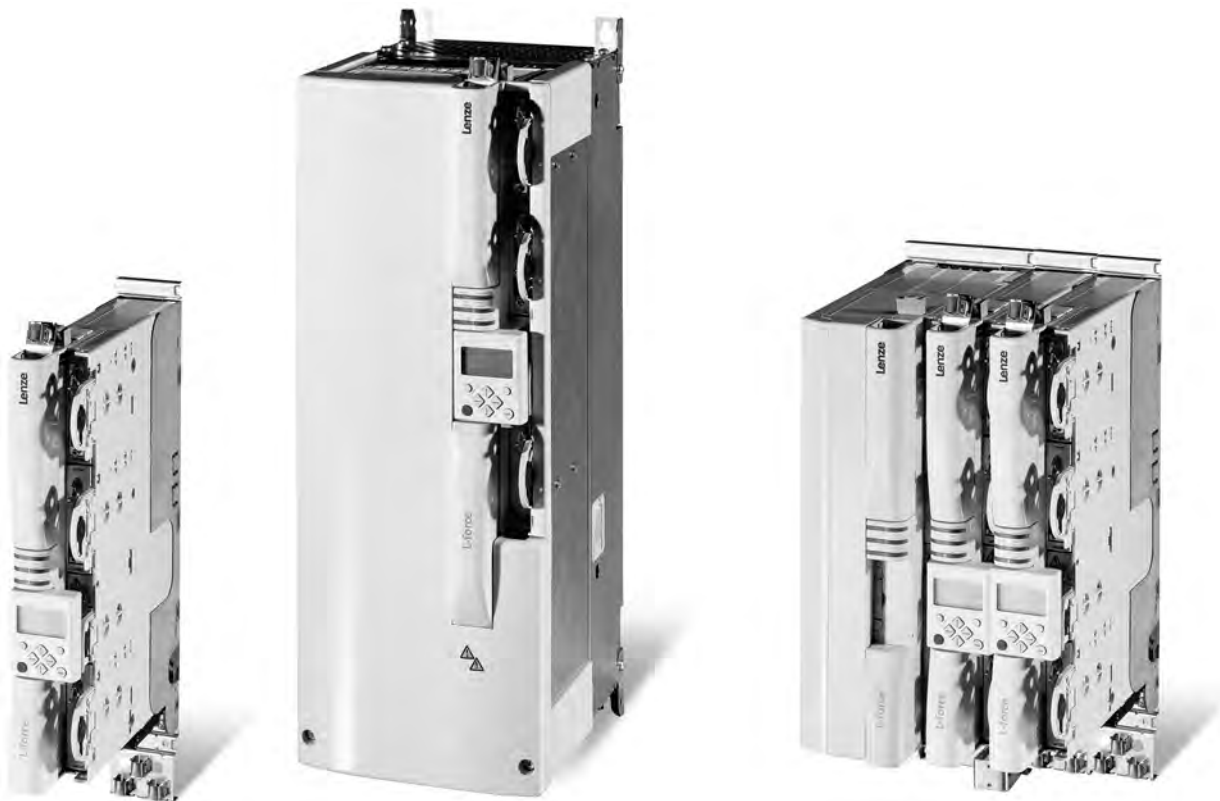
The Servo Drives 9400 HighLine feature intelligence in the drive and are therefore designed for decentralised motion control applications as well as for centralised control topologies.

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.

4.3



Servo Drives 9400 Single Drive and Servo Drives 9400 Multi Drive

Servo Drives 9400 HighLine

General information



Functions and features

| | |
|---|--|
| Mode | Servo Drives 9400 HighLine |
| Control types, motor control | |
| Field-oriented servo control (SC) | For synchronous servo motors, asynchronous servo motors and three-phase asynchronous motors |
| Sensorless control (SLPSM) | For synchronous servo motors |
| V/f control (VFCplus) | For three-phase AC motors and asynchronous servo motor (linear or square-law) |
| Basic functions | <ul style="list-style-type: none"> Freely assignable user menu Free function block interconnection with extensive function library Parameter change-over DC brake function Brake management for brake control with low rate of wear Flying restart circuit S-shaped ramps for smooth acceleration PID controller |
| Operating modes to CiA 402 | <ul style="list-style-type: none"> - Homing mode Interpolated position mode Cyclic synchronous position (csp) - cyclic position setpoint Cyclic synchronous velocity (csv) - cyclic velocity setpoint Cyclic synchronous torque (cst) - cyclic torque setpoint |
| Evaluation of ENP (ETS) | For Lenze servo motors |
| Technology applications | <ul style="list-style-type: none"> Speed actuating drive Torque actuating drive Electronic gearbox Synchronism with mark registration Table positioning Positioning sequence control |
| Advanced functions | Function blocks for cam function |
| Monitoring and protective measures | <ul style="list-style-type: none"> Short circuit Earth fault Overvoltage Undervoltage Motor phase failure Overcurrent I² x t-Motor monitoring Overtemperature Motor overtemperature Brake chopper, brake resistance Fan Motor stalling |
| Diagnostics | Data logger, logbook, oscilloscope functions |
| Status display | 6 LEDs |
| Diagnostic interface | Integrated For USB diagnostic adapter or keypad (diagnosis terminal) |
| Braking operation | |
| Brake chopper | Integrated in Single Drives |
| Brake resistor | External |



Basic dimensioning of axis modules

The most important steps for dimensioning Single Drive and Multi Drive axis modules are listed here:

- **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**

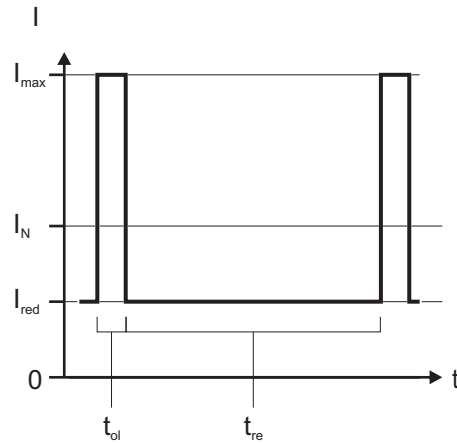
Based on these values, the appropriate servo motor can be selected from the MCS (synchronous motors), MCA, MQA or MDFQA (asynchronous motors) ranges.

- **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.

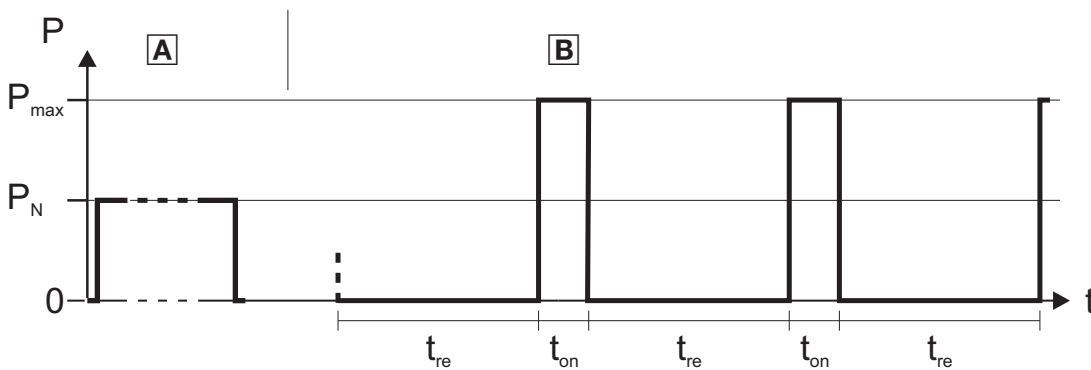


Maximum output current cycle

- **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_N on a continual basis (case A) or the peak braking power P_{max} for the running time t_{on} followed by the recovery time t_{re} (case B).



Brake chopper output power

Servo Drives 9400 HighLine

General information

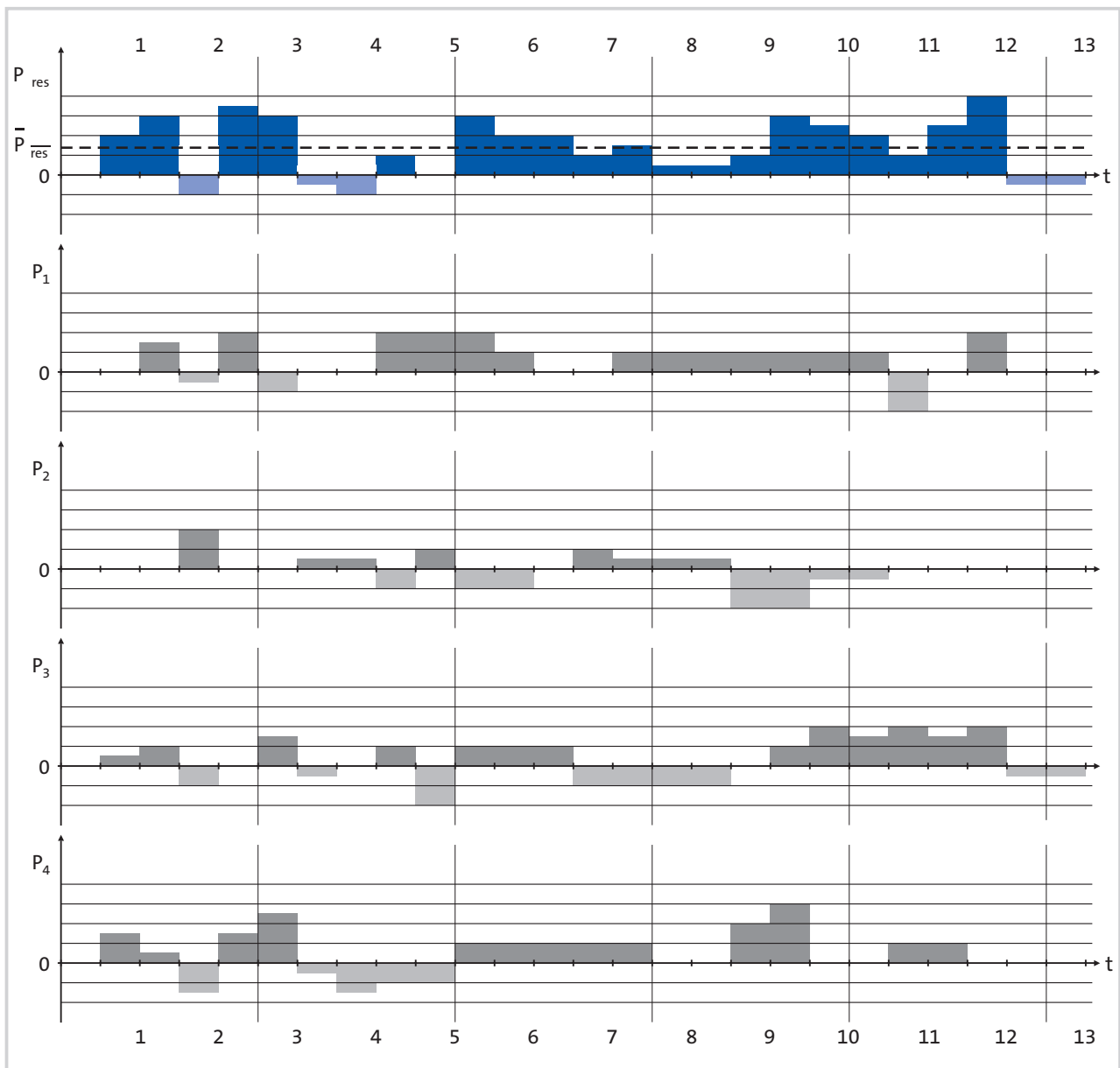


Dimensioning for DC-bus operation

Dimensioning of DC-bus operation for axis modules

The most effective way of determining the correct power supply module for a multi-axis application is if the time/power diagrams for the complete machine cycle are available for all axis modules. Adding together the simultaneous individual power levels gives the required overall power and thereby the minimum power of the power supply module. The necessary braking power or regenerative power can be determined in the same way.

- The axis modules in the interconnection can be easily implemented using DSD. Including an energy analysis and Energy Performance Certificate.



Time/power diagram of a multi-axis servo system

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

P_{res} = addition of individual powers

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

Servo Drives 9400 HighLine

General information



Servo Drives 9400 HighLine

Technical data



Standards and operating conditions

| | | | |
|---------------------------------|------------------|------------|---|
| Conformity | | | |
| CE | | | Low-Voltage Directive 2006/95/EC |
| EAC | | | TP TC 004/2011 (TR CU 004/2011) TP TC 020/2011 (TR CU 020/2011) |
| Approval | | | |
| UL 61800-5-1 | | | Power Conversion Equipment (file no. E132659) ¹⁾ |
| Degree of protection | | | |
| EN 60529 | | | IP20 ²⁾ |
| NEMA 250 | | | Type 1 |
| Climatic conditions | | | |
| Storage (EN 60721-3-1) | | | 1K3 (temperature: -25 °C ... +60 °C) |
| Transport (EN 60721-3-2) | | | 2K3 (temperature: -25 °C ... +70 °C) |
| Operation (EN 60721-3-3) | | | 3K3 (temperature: -10 °C ... +55 °C) |
| Site altitude | | | |
| Amsl | H _{max} | [m] | 4000 |
| Current derating at over 1000 m | | [%/1000 m] | 5 |
| Vibration resistance | | | |
| Transport (EN 60721-3-2) | | | 2M2 |
| Operation (Germanischer Lloyd) | | | 5 Hz ≤ f ≤ 13.2 Hz: ± 1 mm amplitude 13.2 Hz ≤ f ≤ 100 Hz: 0.7 g |

¹⁾ In preparation for the E94B products

²⁾ Not in the wire range of the on the motor-side terminals

| | | | |
|--|---|------|---|
| Supply form | | | |
| | | | Systems with earthed star point (TN and TT systems) Systems with high-resistance or isolated star point (IT systems) ³⁾ |
| Discharge current to PE | | | |
| EN 61800-5-1 | I | [mA] | > 3.5 mA, fixed installation required, PE must be reinforced |
| Noise emission | | | |
| EN 61800-3 | | | Cable-guided disturbance: Max. shielded motor cable lengths for compliance with EMC protection requirement C2 without external filters E94AS□E0024 to E94AS□E0244: 10 m E94AS□E0324 to E94AS□E1044: 50 m Max. shielded motor cable lengths for compliance with EMC protection requirement C3 without external filters E94BS□E1454 up to E94BS□E4604: 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 |
| Degree of pollution | | | |
| EN 61800-5-1 | | | 2 |
| Protective insulation of control circuits | | | |
| EN 61800-5-1 | | | for digital inputs and outputs Safe mains isolation: double/reinforced insulation |

³⁾ For the device sizes 366 A and 460 A on request





Servo Drives 9400 HighLine

Technical data



Rated data for Single Drive

- ▶ 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.


| | | |  |  |  |  |
|----------------------------------|---------------------|-------|---|---|---|---|
| Typical motor power | | | | | | |
| 4-pole asynchronous motor | P | [kW] | 0.37 | 0.75 | 1.50 | 3.00 |
| Product key²⁾ | | | | | | |
| Single Drive | | | E94AS□E0024 | E94AS□E0034 | E94AS□E0044 | E94AS□E0074 |
| Mains voltage range | | | 3/PE AC 340 V-0% ... 528 V+0 %, 45 Hz-0 % ... 65 Hz+0 % | | | |
| | U _{AC} | [V] | | | | |
| Rated mains current | | | | | | |
| With mains choke | I _{N, AC} | [A] | 1.5 | 2.5 | 3.9 | 7.0 |
| Without mains choke | I _{N, AC} | [A] | 2.1 | 3.5 | 5.5 | 9.9 |
| Rated output current | | | | | | |
| | I _{N, out} | [A] | 1.5 | 2.5 | 4.0 | 7.0 |
| Rated switching frequency | | | | | | |
| | f _{ch} | [kHz] | 8 | | | |
| Output current | | | | | | |
| 2 kHz | I _{out} | [A] | 1.9 ³⁾ | 3.1 ³⁾ | 5.0 ³⁾ | 8.8 ³⁾ |
| 4 kHz | I _{out} | [A] | 1.9 ³⁾ | 3.1 ³⁾ | 5.0 ³⁾ | 8.8 ³⁾ |
| 8 kHz | I _{out} | [A] | 1.5 | 2.5 | 4.0 | 7.0 |
| 16 kHz | I _{out} | [A] | 1.1 | 1.9 | 3.0 | 5.3 |


Data for 60 s overload

| | | | | | | |
|---|-----------------------|-----|-------|------|------|------|
| Max. output current^{1, 4)} | | | | | | |
| | I _{max, out} | [A] | 2.8 | 4.7 | 7.5 | 13.1 |
| Reduced output current^{1, 4)} | | | | | | |
| | I _{red, out} | [A] | 1.40 | 2.30 | 3.80 | 6.60 |
| Overload time^{1, 4)} | | | 60.0 | | | |
| | t _{ol} | [s] | | | | |
| Recovery time^{1, 4)} | | | 120.0 | | | |
| | t _{re} | [s] | | | | |

Data for 0.5 s overload

| | | | | | | |
|---|-----------------------|-----|------|------|------|------|
| Max. short-time output current^{1, 4)} | | | | | | |
| | I _{max, out} | [A] | 6.0 | 10.0 | 16.0 | 21.0 |
| Reduced output current^{1, 4)} | | | | | | |
| | I _{red, out} | [A] | 1.40 | 2.30 | 3.80 | 6.60 |
| Overload time^{1, 4)} | | | 0.5 | | | |
| | t _{ol} | [s] | | | | |
| Recovery time^{1, 4)} | | | 4.5 | | | |
| | t _{re} | [s] | | | | |

²⁾  1 - Please refer to the Product key section

¹⁾  10 - See diagram

³⁾ Operation only permitted with mains choke or mains filter

⁴⁾ Mains filter necessary. Without a mains filter, the indicated values for I_{max} and I_{red} decrease



Servo Drives 9400 HighLine

Technical data



Rated data for Single Drive


- ▶ 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.
- ▶ $I_{N,DC}$: R.m.s. value, consisting of DC current and harmonic current.


| | | |  |  | | |
|---------------------------------------|------------|------|---|---|-------------|-------------|
| Typical motor power | | | | | | |
| 4-pole asynchronous motor | P | [kW] | 0.37 | 0.75 | 1.50 | 3.00 |
| Product key²⁾ | | | | | | |
| Single Drive | | | E94AS□E0024 | E94AS□E0034 | E94AS□E0044 | E94AS□E0074 |
| DC supply | | | | | | |
| | U_{DC} | [V] | DC 460 -0% ... 740 V +0% | | | |
| Rated DC-bus current | | | | | | |
| | $I_{N,DC}$ | [A] | 2.6 | 4.3 | 6.7 | 12.1 |
| Power loss | | | | | | |
| | P_V | [kW] | 0.11 | 0.13 | 0.16 | 0.21 |
| Dimensions | | | | | | |
| Height | h | [mm] | 350 | | | |
| Height, including fastening | h | [mm] | 481 | | | |
| Width | b | [mm] | 60 | 90 | | |
| Depth | t | [mm] | 288 | | | |
| Mass | | | | | | |
| | m | [kg] | 4.0 | 5.3 | | |
| Max. cable length | | | | | | |
| shielded C1 with external measures | l_{max} | [m] | 25 | | | |
| shielded C2 without external measures | l_{max} | [m] | 10 | | | |
| shielded C2 with external measures | l_{max} | [m] | 50 | 100 | | |

4.3

Brake chopper rated data

| | | | | | |
|--|-------------|------|------|------|-----|
| Rated power, Brake chopper¹⁾ | | | | | |
| | P_N | [kW] | 1.3 | 1.9 | 2.6 |
| Max. output power, Brake chopper¹⁾ | | | | | |
| | $P_{max,1}$ | [kW] | 6.4 | 11.2 | |
| Running time¹⁾ | | | | | |
| | t_{on} | [s] | 1.0 | | |
| Recovery time¹⁾ | | | | | |
| | t_{re} | [s] | 4.3 | 4.4 | 4.2 |
| Min. brake resistance¹⁾ | | | | | |
| | R_{min} | [Ω] | 82.0 | 47.0 | |

²⁾  1 - Please refer to the Product key section

¹⁾  10 - See diagram


Servo Drives 9400 HighLine

Technical data



Rated data for Single Drive

- ▶ 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.

| | | |  | | |
|----------------------------------|---------------------|-------|---|--------------------|--------------------|
| Typical motor power | | | | | |
| 4-pole asynchronous motor | P | [kW] | 5.50 | 7.50 | 11.0 |
| Product key¹⁾ | | | | | |
| Single Drive | | | E94AS□E0134 | E94AS□E0174 | E94AS□E0244 |
| Mains voltage range | | | | | |
| | U _{AC} | [V] | 3/PE AC 340 V-0% ... 528 V+0 %, 45 Hz-0 % ... 65 Hz+0 % | | |
| Rated mains current | | | | | |
| With mains choke | I _{N, AC} | [A] | 11.8 | 15.0 | 20.5 |
| Without mains choke | I _{N, AC} | [A] | 16.8 | 21.0 | 29.0 |
| Rated output current | | | | | |
| | I _{N, out} | [A] | 13.0 | 16.5 | 23.5 |
| Rated switching frequency | | | | | |
| | f _{ch} | [kHz] | 8 | | |
| Output current | | | | | |
| 2 kHz | I _{out} | [A] | 16.3 ³⁾ | 20.6 ³⁾ | 29.4 ³⁾ |
| 4 kHz | I _{out} | [A] | 16.3 ³⁾ | 20.6 ³⁾ | 29.4 ³⁾ |
| 8 kHz | I _{out} | [A] | 13.0 | 16.5 | 23.5 |
| 16 kHz | I _{out} | [A] | 9.8 | 12.4 | 17.6 |


4.3


Data for 60 s overload

| | | | | | |
|---|-----------------------|-----|-------|------|------|
| Max. output current^{2, 4)} | | | | | |
| | I _{max, out} | [A] | 24.4 | 30.9 | 44.1 |
| Reduced output current^{2, 4)} | | | | | |
| | I _{red, out} | [A] | 12.2 | 15.5 | 22.1 |
| Overload time^{2, 4)} | | | | | |
| | t _{ol} | [s] | 60.0 | | |
| Recovery time^{2, 4)} | | | | | |
| | t _{re} | [s] | 120.0 | | |

Data for 0.5 s overload

| | | | | | |
|---|-----------------------|-----|------|------|------|
| Max. short-time output current^{2, 4)} | | | | | |
| | I _{max, out} | [A] | 39.0 | 49.5 | 58.8 |
| Reduced output current^{2, 4)} | | | | | |
| | I _{red, out} | [A] | 12.2 | 15.5 | 22.1 |
| Overload time^{2, 4)} | | | | | |
| | t _{ol} | [s] | 0.5 | | |
| Recovery time^{2, 4)} | | | | | |
| | t _{re} | [s] | 4.5 | | |

¹⁾  1 - Please refer to the Product key section

²⁾  10 - See diagram

³⁾ Operation only permitted with mains choke or mains filter

⁴⁾ Mains filter necessary. Without a mains filter, the indicated values for I_{max} and I_{red} decrease


Servo Drives 9400 HighLine

Technical data



Rated data for Single Drive


- ▶ 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.
- ▶ $I_{N,DC}$: R.m.s. value, consisting of DC current and harmonic current.


| | | |  | | |
|---------------------------------------|------------|------|---|-------------|-------------|
| Typical motor power | | | | | |
| 4-pole asynchronous motor | P | [kW] | 5.50 | 7.50 | 11.0 |
| Product key²⁾ | | | | | |
| Single Drive | | | E94AS□E0134 | E94AS□E0174 | E94AS□E0244 |
| DC supply | | | | | |
| | U_{DC} | [V] | DC 460 -0% ... 740 V +0% | | |
| Rated DC-bus current | | | | | |
| | $I_{N,DC}$ | [A] | 20.6 | 25.7 | 35.5 |
| Power loss | | | | | |
| | P_V | [kW] | 0.32 | 0.38 | 0.50 |
| Dimensions | | | | | |
| Height | h | [mm] | 350 | | |
| Height, including fastening | h | [mm] | 481 | | |
| Width | b | [mm] | 120 | | |
| Depth | t | [mm] | 288 | | |
| Mass | | | | | |
| | m | [kg] | 8.1 | | |
| Max. cable length | | | | | |
| shielded C1 with external measures | l_{max} | [m] | 25 | | |
| shielded C2 without external measures | l_{max} | [m] | 10 | | |
| shielded C2 with external measures | l_{max} | [m] | 100 | | |

4.3

Brake chopper rated data

| | | | | | |
|--|-------------|------|------|------|-----|
| Rated power, Brake chopper¹⁾ | | | | | |
| | P_N | [kW] | 4.7 | 6.4 | 9.3 |
| Max. output power, Brake chopper¹⁾ | | | | | |
| | $P_{max,1}$ | [kW] | 19.5 | 29.2 | |
| Running time¹⁾ | | | | | |
| | t_{on} | [s] | 1.0 | | |
| Recovery time¹⁾ | | | | | |
| | t_{re} | [s] | 4.2 | 4.3 | 3.9 |
| Min. brake resistance¹⁾ | | | | | |
| | R_{min} | [Ω] | 27.0 | 18.0 | |

²⁾  1 - Please refer to the Product key section

¹⁾  10 - See diagram


Servo Drives 9400 HighLine

Technical data



Rated data for Single Drive

- ▶ 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.


| | | |  | | |
|----------------------------------|---------------------|-------|---|-------------|-------------|
| Typical motor power | | | | | |
| 4-pole asynchronous motor | P | [kW] | 15.0 | 22.0 | 30.0 |
| Product key ¹⁾ | | | | | |
| Single Drive | | | E94AS□E0324 | E94AS□E0474 | E94AS□E0594 |
| Mains voltage range | | | | | |
| | U _{AC} | [V] | 3/PE AC 340 V-0% ... 528 V+0 %, 45 Hz-0 % ... 65 Hz+0 % | | |
| Rated mains current | | | | | |
| With mains choke | I _{N, AC} | [A] | 29.0 | 43.0 | 54.0 |
| Without mains choke | I _{N, AC} | [A] | 29.0 | 43.0 | 54.0 |
| Rated output current | | | | | |
| | I _{N, out} | [A] | 32.0 | 47.0 | 59.0 |
| Rated switching frequency | | | | | |
| | f _{ch} | [kHz] | 8 | 4 | |
| Output current | | | | | |
| 2 kHz | I _{out} | [A] | 38.4 | 47.0 | 59.0 |
| 4 kHz | I _{out} | [A] | 38.4 | 47.0 | 59.0 |
| 8 kHz | I _{out} | [A] | 32.0 | 41.0 | |
| 16 kHz | I _{out} | [A] | 16.8 | 21.5 | |


Data for 60 s overload

| | | | | | |
|---|-----------------------|-----|-------|------|------|
| Max. output current ²⁾ | | | | | |
| | I _{max, out} | [A] | 57.6 | 70.5 | 88.5 |
| Reduced output current ²⁾ | | | | | |
| | I _{red, out} | [A] | 28.8 | 35.3 | 44.3 |
| Overload time ²⁾ | | | | | |
| | t _{ol} | [s] | 60.0 | | |
| Recovery time ²⁾ | | | | | |
| | t _{re} | [s] | 120.0 | | |

Data for 0.5 s overload

| | | | | | |
|---|-----------------------|-----|------|------|-------|
| Max. short-time output current ²⁾ | | | | | |
| | I _{max, out} | [A] | 76.8 | 94.0 | 118.0 |
| Reduced output current ²⁾ | | | | | |
| | I _{red, out} | [A] | 28.8 | 35.3 | 44.3 |
| Overload time ²⁾ | | | | | |
| | t _{ol} | [s] | 0.5 | | |
| Recovery time ²⁾ | | | | | |
| | t _{re} | [s] | 4.5 | | |

¹⁾  1 - Please refer to the Product key section

²⁾  10 - See diagram


Servo Drives 9400 HighLine

Technical data



Rated data for Single Drive


- ▶ 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.
- ▶ $I_{N,DC}$: R.m.s. value, consisting of DC current and harmonic current.


| | | |  | | |
|---------------------------------------|------------|------|---|-------------|-------------|
| Typical motor power | | | | | |
| 4-pole asynchronous motor | P | [kW] | 15.0 | 22.0 | 30.0 |
| Product key²⁾ | | | | | |
| Single Drive | | | E94AS□E0324 | E94AS□E0474 | E94AS□E0594 |
| DC supply | | | DC 460 -0% ... 740 V +0% | | |
| | U_{DC} | [V] | | | |
| Rated DC-bus current | | | | | |
| | $I_{N,DC}$ | [A] | 36.0 | 53.0 | 66.0 |
| Power loss | | | | | |
| | P_V | [kW] | 0.70 | 1.05 | 1.12 |
| Dimensions | | | | | |
| Height | h | [mm] | 556 | | |
| Height, including fastening | h | [mm] | 606 | | |
| Width | b | [mm] | 206 | | |
| Depth | t | [mm] | 294 | | |
| Mass | | | | | |
| | m | [kg] | 26.5 | | |
| Max. cable length | | | | | |
| shielded C1 with external measures | l_{max} | [m] | 50 | | |
| shielded C2 without external measures | l_{max} | [m] | 50 | | |
| shielded C2 with external measures | l_{max} | [m] | 100 | | |

4.3

Brake chopper rated data

| | | | | | |
|--|-------------|------|-------|-------|-------|
| Rated power, Brake chopper¹⁾ | | | | | |
| | P_N | [kW] | 12.6 | 18.6 | 25.3 |
| Max. output power, Brake chopper¹⁾ | | | | | |
| | $P_{max,1}$ | [kW] | 29.2 | 35.0 | |
| Running time¹⁾ | | | | | |
| | t_{on} | [s] | 260.0 | 320.0 | 430.0 |
| Recovery time¹⁾ | | | | | |
| | t_{re} | [s] | 340.0 | 280.0 | 170.0 |
| Min. brake resistance¹⁾ | | | | | |
| | R_{min} | [Ω] | 18.0 | 15.0 | |

²⁾  1 - Please refer to the Product key section

¹⁾  10 - See diagram


Servo Drives 9400 HighLine

Technical data



Rated data for Single Drive

- ▶ 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.


| | | | |  | |
|----------------------------------|---------------------|-------|---|---|--|
| Typical motor power | | | | | |
| 4-pole asynchronous motor | P | [kW] | 45.0 | 55.0 | |
| Product key ¹⁾ | | | | | |
| Single Drive | | | E94AS□E0864 | E94AS□E1044 | |
| Mains voltage range | | | | | |
| | U _{AC} | [V] | 3/PE AC 340 V-0% ... 528 V+0 %, 45 Hz-0 % ... 65 Hz+0 % | | |
| Rated mains current | | | | | |
| With mains choke | I _{N, AC} | [A] | 79.0 | 95.0 | |
| Without mains choke | I _{N, AC} | [A] | 79.0 | 95.0 | |
| Rated output current | | | | | |
| | I _{N, out} | [A] | 86.0 | 104.0 | |
| Rated switching frequency | | | | | |
| | f _{ch} | [kHz] | 4 | | |
| Output current | | | | | |
| 2 kHz | I _{out} | [A] | 86.0 | 104.0 | |
| 4 kHz | I _{out} | [A] | 86.0 | 104.0 | |
| 8 kHz | I _{out} | [A] | 73.0 | 78.0 | |
| 16 kHz | I _{out} | [A] | 38.3 | 41.0 | |


Data for 60 s overload

| | | | | | |
|---|-----------------------|-----|-------|-------|--|
| Max. output current ²⁾ | | | | | |
| | I _{max, out} | [A] | 129.0 | 156.0 | |
| Reduced output current ²⁾ | | | | | |
| | I _{red, out} | [A] | 64.5 | 78.0 | |
| Overload time ²⁾ | | | | | |
| | t _{ol} | [s] | 60.0 | | |
| Recovery time ²⁾ | | | | | |
| | t _{re} | [s] | 120.0 | | |

Data for 0.5 s overload

| | | | | | |
|---|-----------------------|-----|-------|-------|--|
| Max. short-time output current ²⁾ | | | | | |
| | I _{max, out} | [A] | 172.0 | 208.0 | |
| Reduced output current ²⁾ | | | | | |
| | I _{red, out} | [A] | 64.5 | 78.0 | |
| Overload time ²⁾ | | | | | |
| | t _{ol} | [s] | 0.5 | | |
| Recovery time ²⁾ | | | | | |
| | t _{re} | [s] | 4.5 | | |

¹⁾  1 - Please refer to the Product key section

²⁾  10 - See diagram


Servo Drives 9400 HighLine

Technical data



Rated data for Single Drive


- ▶ 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.
- ▶ $I_{N,DC}$: R.m.s. value, consisting of DC current and harmonic current.


| | | | |  | |
|---------------------------------------|------------|------|-------------|---|--|
| Typical motor power | | | | | |
| 4-pole asynchronous motor | P | [kW] | 45.0 | 55.0 | |
| Product key²⁾ | | | | | |
| Single Drive | | | E94AS□E0864 | E94AS□E1044 | |
| Rated DC-bus current | | | | | |
| | $I_{N,DC}$ | [A] | 96.8 | 116.4 | |
| Power loss | | | | | |
| | P_V | [kW] | 1.50 | 1.80 | |
| Dimensions | | | | | |
| Height | h | [mm] | 655 | | |
| Height, including fastening | h | [mm] | 706 | | |
| Width | b | [mm] | 266 | | |
| Depth | t | [mm] | 370 | | |
| Mass | | | | | |
| | m | [kg] | 42.0 | | |
| Max. cable length | | | | | |
| shielded C2 without external measures | l_{max} | [m] | 50 | | |
| shielded C2 with external measures | l_{max} | [m] | 100 | | |

4.3

Brake chopper rated data

| | | | | | |
|--|-------------|------|-------|-------|--|
| Rated power, Brake chopper¹⁾ | | | | | |
| | P_N | [kW] | 37.9 | 46.3 | |
| Max. output power, Brake chopper¹⁾ | | | | | |
| | $P_{max,1}$ | [kW] | 70.1 | | |
| Running time¹⁾ | | | | | |
| | t_{on} | [s] | 320.0 | 400.0 | |
| Recovery time¹⁾ | | | | | |
| | t_{re} | [s] | 280.0 | 200.0 | |
| Min. brake resistance¹⁾ | | | | | |
| | R_{min} | [Ω] | 7.5 | | |

²⁾  1 - Please refer to the Product key section

¹⁾  10 - See diagram



Servo Drives 9400 HighLine

Technical data



Rated data for Single Drive

- ▶ 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.

| | | |  | | |  | | | | | |
|----------------------------------|--------------|-------|---|--------------------|--------------------|---|-------------------|-------------------|-------------|-------------------|-------------------|
| Typical motor power | | | | | | | | | | | |
| 4-pole asynchronous motor | P | [kW] | 75.0 | 85.0 ³⁾ | 95.0 ⁴⁾ | 90.0 | 105 ³⁾ | 110 ⁴⁾ | 105 | 125 ³⁾ | 135 ⁴⁾ |
| Product key¹⁾ | | | E94BS□E1454 | | | E94BS□E1724 | | | E94BS□E2024 | | |
| Mains voltage range | | | 3/PE AC 340 V-0% ... 528 V+0 %, 45 Hz-0 % ... 65 Hz+0 % | | | | | | | | |
| Rated mains current | | | | | | | | | | | |
| With mains choke | $I_{N, AC}$ | [A] | 138.0 | | | 164.0 | | | 192.0 | | |
| Rated output current | | | | | | | | | | | |
| | $I_{N, out}$ | [A] | 145.0 | | | 172.0 | | | 202.0 | | |
| Rated switching frequency | | | | | | | | | | | |
| | f_{ch} | [kHz] | 4 | | | | | | | | |
| Output current | | | | | | | | | | | |
| 2 kHz | I_{out} | [A] | 145.0 | 160.0 | 177.0 | 172.0 | 195.0 | 212.0 | 202.0 | 240.0 | 260.0 |
| 4 kHz | I_{out} | [A] | 145.0 | | | 172.0 | | | 202.0 | | |
| 8 kHz | I_{out} | [A] | 102.0 | | | 120.0 | | | 131.0 | | |
| 16 kHz | I_{out} | [A] | | | | | | | | | |


4.3


Data for 60 s overload

| | | | | | | | | | | | |
|--|----------------|-----|-------|-------|-------|-------|-------|-------|-----|-----|-----|
| Max. output current²⁾ | | | | | | | | | | | |
| | $I_{max, out}$ | [A] | 218.0 | 195.0 | 258.0 | 233.0 | 303.0 | 286.0 | | | |
| Reduced output current²⁾ | | | | | | | | | | | |
| | $I_{red, out}$ | [A] | 109 | 145 | 168 | 129 | 180 | 201 | 152 | 226 | 247 |
| Overload time²⁾ | | | | | | | | | | | |
| | t_{ol} | [s] | 60.0 | | | | | | | | |
| Recovery time²⁾ | | | | | | | | | | | |
| | t_{re} | [s] | 120.0 | | | | | | | | |

Data for 10 s overload

| | | | | | | | | | | | |
|--|----------------|-----|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Max. short-time output current²⁾ | | | | | | | | | | | |
| | $I_{max, out}$ | [A] | 261.0 | 218.0 | 195.0 | 310.0 | 258.0 | 233.0 | 364.0 | 303.0 | 286.0 |
| Reduced output current²⁾ | | | | | | | | | | | |
| | $I_{red, out}$ | [A] | 109 | 145 | 168 | 129 | 180 | 201 | 152 | 226 | 247 |

¹⁾  1 - Please refer to the Product key section

²⁾  10 - See diagram

³⁾ This column applies to an ambient temperature of 40 °C and 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.



Servo Drives 9400 HighLine

Technical data



Rated data for Single Drive


- ▶ 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.
- ▶ $I_{N,DC}$: R.m.s. value, consisting of DC current and harmonic current.


| | | |  | | |  | | | | | |
|---------------------------------------|------------|------|---|------|------|---|-----|-----|-------------|-----|-----|
| Typical motor power | | | | | | | | | | | |
| 4-pole asynchronous motor | P | [kW] | 75.0 | 85.0 | 95.0 | 90.0 | 105 | 110 | 105 | 125 | 135 |
| Product key²⁾ | | | E94BS□E1454 | | | E94BS□E1724 | | | E94BS□E2024 | | |
| Single Drive | | | | | | | | | | | |
| Rated DC-bus current | | | | | | | | | | | |
| | $I_{N,DC}$ | [A] | 171.0 | | | 203.0 | | | 239.0 | | |
| Power loss | | | | | | | | | | | |
| | P_V | [kW] | 2.10 | | | 2.20 | | | 2.60 | | |
| Dimensions | | | | | | | | | | | |
| Height | h | [mm] | | | | 923 | | | | | |
| Height, including fastening | h | [mm] | | | | 950 | | | | | |
| Width | b | [mm] | 285 | | | | | | 345 | | |
| Depth | t | [mm] | | | | 395 | | | | | |
| Mass | | | | | | | | | | | |
| | m | [kg] | 64.0 | | | | | | 77.0 | | |
| Max. cable length | | | | | | | | | | | |
| shielded C3 without external measures | l_{max} | [m] | | | | | | | 150 | | |
| shielded C2 with external measures | l_{max} | [m] | | | | | | | 150 | | |

4.3

Brake chopper rated data

| | | | | | | | | | | | |
|--|-------------|------|-------|--|--|-------|--|--|-------|--|--|
| Rated power, Brake chopper¹⁾ | | | | | | | | | | | |
| | P_N | [kW] | 31.5 | | | 36.7 | | | 45.1 | | |
| Max. output power, Brake chopper¹⁾ | | | | | | | | | | | |
| | $P_{max,1}$ | [kW] | 105.1 | | | 122.2 | | | 150.2 | | |
| Running time¹⁾ | | | | | | | | | | | |
| | t_{on} | [s] | | | | 60.0 | | | | | |
| Recovery time¹⁾ | | | | | | | | | | | |
| | t_{re} | [s] | | | | 540.0 | | | | | |
| Min. brake resistance¹⁾ | | | | | | | | | | | |
| | R_{min} | [Ω] | 5.0 | | | 4.3 | | | 3.5 | | |

²⁾  1 - Please refer to the Product key section

¹⁾  10 - See diagram

Servo Drives 9400 HighLine

Technical data



Rated data for Single Drive

- ▶ 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.

| | | | | | | | | |
|----------------------------------|---------------------|-------|---|-------------------|-------------------|-------------|-------------------|-------------------|
| | | | | | | | | |
| Typical motor power | | | | | | | | |
| 4-pole asynchronous motor | P | [kW] | 130 | 160 ³⁾ | 165 ⁴⁾ | 150 | 190 ³⁾ | 210 ⁴⁾ |
| Product key¹⁾ | | | E94BS□E2454 | | | E94BS□E2924 | | |
| Single Drive | | | | | | | | |
| Mains voltage range | | | 3/PE AC 340 V-0% ... 528 V+0 %, 45 Hz-0 % ... 65 Hz+0 % | | | | | |
| | U _{AC} | [V] | | | | | | |
| Rated mains current | | | 236.0 | | | 285.0 | | |
| With mains choke | I _{N, AC} | [A] | | | | | | |
| Rated output current | | | 245.0 | | | 292.0 | | |
| | I _{N, out} | [A] | | | | | | |
| Rated switching frequency | | | 2 | | | | | |
| | f _{ch} | [kHz] | | | | | | |
| Output current | | | | | | | | |
| 2 kHz | I _{out} | [A] | 245.0 | 302.0 | 315.0 | 292.0 | 361.0 | 395.0 |
| 4 kHz | I _{out} | [A] | 209.0 | | | 251.0 | | |
| 8 kHz | I _{out} | [A] | 160.0 | | | 191.0 | | |
| 16 kHz | I _{out} | [A] | | | | | | |

4.3

Data for 60 s overload

| | | | | | | | | |
|--|-----------------------|-----|-------|-----|-------|-------|-----|-------|
| Max. output current²⁾ | | | 368.0 | | 347.0 | 438.0 | | 435.0 |
| | I _{max, out} | [A] | | | | | | |
| Reduced output current²⁾ | | | 184 | 275 | 299 | 219 | 330 | 375 |
| | I _{red, out} | [A] | | | | | | |
| Overload time²⁾ | | | 60.0 | | | | | |
| | t _{ol} | [s] | | | | | | |
| Recovery time²⁾ | | | 120.0 | | | | | |
| | t _{re} | [s] | | | | | | |

Data for 10 s overload

| | | | | | | | | |
|--|-----------------------|-----|-------|-------|-------|-------|-------|-------|
| Max. short-time output current²⁾ | | | 441.0 | 368.0 | 347.0 | 526.0 | 438.0 | 435.0 |
| | I _{max, out} | [A] | | | | | | |
| Reduced output current²⁾ | | | 184 | 275 | 299 | 219 | 330 | 375 |
| | I _{red, out} | [A] | | | | | | |

¹⁾ 1 - Please refer to the Product key section

²⁾ 10 - See diagram

³⁾ This column applies to an ambient temperature of 40 °C and 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.


Servo Drives 9400 HighLine

Technical data



Rated data for Single Drive


- ▶ 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.
- ▶ $I_{N,DC}$: R.m.s. value, consisting of DC current and harmonic current.


| | | |  | | | | | |
|---------------------------------------|------------|------|---|-----|-----|-------------|-----|-----|
| Typical motor power | | | | | | | | |
| 4-pole asynchronous motor | P | [kW] | 130 | 160 | 165 | 150 | 190 | 210 |
| Product key²⁾ | | | E94BS□E2454 | | | E94BS□E2924 | | |
| Single Drive | | | | | | | | |
| Rated DC-bus current | | | | | | | | |
| | $I_{N,DC}$ | [A] | 290.0 | | | 343.0 | | |
| Power loss | | | | | | | | |
| | P_V | [kW] | 3.30 | | | 4.10 | | |
| Dimensions | | | | | | | | |
| Height | h | [mm] | 923 | | | 1063 | | |
| Height, including fastening | h | [mm] | 950 | | | 1090 | | |
| Width | b | [mm] | | | | 345 | | |
| Depth | t | [mm] | | | | 395 | | |
| Mass | | | | | | | | |
| | m | [kg] | 77.0 | | | 80.0 | | |
| Max. cable length | | | | | | | | |
| shielded C3 without external measures | l_{max} | [m] | | | | 150 | | |
| shielded C2 with external measures | l_{max} | [m] | | | | 150 | | |

4.3

Brake chopper rated data

| | | | | | | | | |
|--|-------------|------|-------|--|--|-------|--|--|
| Rated power, Brake chopper¹⁾ | | | | | | | | |
| | P_N | [kW] | 56.3 | | | 68.6 | | |
| Max. output power, Brake chopper¹⁾ | | | | | | | | |
| | $P_{max,1}$ | [kW] | 187.7 | | | 228.5 | | |
| Running time¹⁾ | | | | | | | | |
| | t_{on} | [s] | | | | 60.0 | | |
| Recovery time¹⁾ | | | | | | | | |
| | t_{re} | [s] | | | | 540.0 | | |
| Min. brake resistance¹⁾ | | | | | | | | |
| | R_{min} | [Ω] | 2.8 | | | 2.3 | | |

²⁾  1 - Please refer to the Product key section

¹⁾  10 - See diagram



Servo Drives 9400 HighLine

Technical data



Rated data for Single Drive

- ▶ 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.

| | | |  | | |  | | |
|----------------------------------|--------------|-------|---|-------------------|-------------------|---|-------------------|-------------------|
| Typical motor power | | | | | | | | |
| 4-pole asynchronous motor | P | [kW] | 190 | 235 ³⁾ | 250 ⁴⁾ | 240 | 290 ³⁾ | 315 ⁴⁾ |
| Product key¹⁾ | | | E94BS□E3664 | | | E94BS□E4604 | | |
| Single Drive | | | | | | | | |
| Mains voltage range | | | 3/PE AC 340 V-0% ... 528 V+0 %, 45 Hz-0 % ... 65 Hz+0 % | | | | | |
| Rated mains current | | | | | | | | |
| With mains choke | $I_{N, AC}$ | [A] | 349.0 | | | 436.0 | | |
| Rated output current | | | | | | | | |
| | $I_{N, out}$ | [A] | 366.0 | | | 460.0 | | |
| Rated switching frequency | | | 2 | | | | | |
| | f_{ch} | [kHz] | | | | | | |
| Output current | | | | | | | | |
| 2 kHz | I_{out} | [A] | 366.0 | 443.0 | 480.0 | 460.0 | 550.0 | 600.0 |
| 4 kHz | I_{out} | [A] | 313.0 | | | 368.0 | | |
| 8 kHz | I_{out} | [A] | 240.0 | | | 260.0 | | |
| 16 kHz | I_{out} | [A] | | | | | | |


4.3


Data for 60 s overload

| | | | | | | | | | | | | | | | | | | | | |
|--|----------------|-----|-------|--|--|-------|--|--|-------|--|--|-------|--|--|-----|--|--|-----|--|--|
| Max. output current²⁾ | | | 549.0 | | | 528.0 | | | 690.0 | | | 660.0 | | | | | | | | |
| | $I_{max, out}$ | [A] | | | | | | | | | | | | | | | | | | |
| Reduced output current²⁾ | | | 275 | | | 415 | | | 456 | | | 345 | | | 522 | | | 570 | | |
| | $I_{red, out}$ | [A] | | | | | | | | | | | | | | | | | | |
| Overload time²⁾ | | | 60.0 | | | | | | | | | | | | | | | | | |
| | t_{ol} | [s] | | | | | | | | | | | | | | | | | | |
| Recovery time²⁾ | | | 120.0 | | | | | | | | | | | | | | | | | |
| | t_{re} | [s] | | | | | | | | | | | | | | | | | | |

Data for 10 s overload

| | | | | | | | | | | | | | | | | | | | | |
|--|----------------|-----|-------|--|--|-------|--|--|-------|--|--|-------|--|--|-------|--|--|-------|--|--|
| Max. short-time output current²⁾ | | | 659.0 | | | 549.0 | | | 528.0 | | | 828.0 | | | 690.0 | | | 660.0 | | |
| | $I_{max, out}$ | [A] | | | | | | | | | | | | | | | | | | |
| Reduced output current²⁾ | | | 275 | | | 415 | | | 456 | | | 345 | | | 522 | | | 570 | | |
| | $I_{red, out}$ | [A] | | | | | | | | | | | | | | | | | | |

¹⁾  1 - Please refer to the Product key section

²⁾  10 - See diagram

³⁾ This column applies to an ambient temperature of 40 °C and 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.



Servo Drives 9400 HighLine

Technical data



Rated data for Single Drive


- ▶ 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.
- ▶ $I_{N,DC}$: R.m.s. value, consisting of DC current and harmonic current.


| | | |  | | |  | | |
|---------------------------------------|------------|------|---|-----|-----|---|-----|-----|
| Typical motor power | | | | | | | | |
| 4-pole asynchronous motor | P | [kW] | 190 | 235 | 250 | 240 | 290 | 315 |
| Product key²⁾ | | | E94BS□E3664 | | | E94BS□E4604 | | |
| Single Drive | | | | | | | | |
| Rated DC-bus current | | | | | | | | |
| | $I_{N,DC}$ | [A] | 434.0 | | | 544.0 | | |
| Power loss | | | | | | | | |
| | P_V | [kW] | 4.90 | | | 6.20 | | |
| Dimensions | | | | | | | | |
| Height | h | [mm] | | | | 1522 | | |
| Height, including fastening | h | [mm] | | | | 1522 | | |
| Width | b | [mm] | | | | 500 | | |
| Depth | t | [mm] | | | | 544 | | |
| Mass | | | | | | | | |
| | m | [kg] | | | | 189.0 | | |
| Max. cable length | | | | | | | | |
| shielded C3 without external measures | l_{max} | [m] | | | | 150 | | |
| shielded C2 with external measures | l_{max} | [m] | | | | 150 | | |

4.3

Brake chopper rated data

| | | | | | | | | |
|--|-------------|------|-------|--|--|-------|--|--|
| Rated power, Brake chopper¹⁾ | | | | | | | | |
| | P_N | [kW] | 90.1 | | | 99.0 | | |
| Max. output power, Brake chopper¹⁾ | | | | | | | | |
| | $P_{max,1}$ | [kW] | 300.4 | | | 375.0 | | |
| Running time¹⁾ | | | | | | | | |
| | t_{on} | [s] | 60.0 | | | 30.0 | | |
| Recovery time¹⁾ | | | | | | | | |
| | t_{re} | [s] | 540.0 | | | 270.0 | | |
| Min. brake resistance¹⁾ | | | | | | | | |
| | R_{min} | [Ω] | 1.8 | | | 1.4 | | |

²⁾  1 - Please refer to the Product key section

¹⁾  10 - See diagram


Servo Drives 9400 HighLine

Technical data



Rated data for Multi Drive

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

| | | |  | | |
|----------------------------------|---------------------|-------|---|-------------|-------------|
| Typical motor power | | | | | |
| 4-pole asynchronous motor | P | [kW] | 0.37 | 0.75 | 1.50 |
| Product key⁻¹⁾ | | | | | |
| Multi Drive | | | E94AM□E0024 | E94AM□E0034 | E94AM□E0044 |
| DC supply | | | DC 460 -0% ... 740 V +0% | | |
| | U _{DC} | [V] | | | |
| Rated output current | | | | | |
| | I _{N, out} | [A] | 1.5 | 2.5 | 4.0 |
| Rated switching frequency | | | 8 | | |
| | f _{ch} | [kHz] | | | |
| Output current | | | | | |
| 2 kHz | I _{out} | [A] | 1.9 | 3.1 | 5.0 |
| 4 kHz | I _{out} | [A] | 1.9 | 3.1 | 5.0 |
| 8 kHz | I _{out} | [A] | 1.5 | 2.5 | 4.0 |
| 16 kHz | I _{out} | [A] | 1.1 | 1.9 | 3.0 |


4.3


Data for 60 s overload

| | | | | | |
|--|-----------------------|-----|-------|------|------|
| Max. output current²⁾ | | | | | |
| | I _{max, out} | [A] | 2.8 | 4.7 | 7.5 |
| Reduced output current²⁾ | | | | | |
| | I _{red, out} | [A] | 1.40 | 2.30 | 3.80 |
| Overload time²⁾ | | | 60.0 | | |
| | t _{ol} | [s] | | | |
| Recovery time²⁾ | | | 120.0 | | |
| | t _{re} | [s] | | | |

Data for 0.5 s overload

| | | | | | |
|--|-----------------------|-----|------|------|------|
| Max. short-time output current²⁾ | | | | | |
| | I _{max, out} | [A] | 6.0 | 10.0 | 16.0 |
| Reduced output current²⁾ | | | | | |
| | I _{red, out} | [A] | 1.40 | 2.30 | 3.80 |
| Overload time²⁾ | | | 0.5 | | |
| | t _{ol} | [s] | | | |
| Recovery time²⁾ | | | 4.5 | | |
| | t _{re} | [s] | | | |

¹⁾  1 - Please refer to the Product key section

²⁾  10 - See diagram


Servo Drives 9400 HighLine



Technical data



Rated data for Multi Drive

- ▶ The data is valid for operation at DC 565 V.
- ▶ Unless otherwise specified, the data refers to the default setting.
- ▶ $I_{N,DC}$: R.m.s. value, consisting of DC current and harmonic current.

| | | |  | | |
|---------------------------------------|------------|------|---|-------------|-------------|
| Typical motor power | | | | | |
| 4-pole asynchronous motor | P | [kW] | 0.37 | 0.75 | 1.50 |
| Product key¹⁾ | | | | | |
| Multi Drive | | | E94AM□E0024 | E94AM□E0034 | E94AM□E0044 |
| Rated DC-bus current | | | | | |
| | $I_{N,DC}$ | [A] | 2.6 | 4.3 | 6.7 |
| Power loss | | | | | |
| | P_V | [kW] | 0.10 | 0.12 | 0.15 |
| Dimensions | | | | | |
| Height | h | [mm] | | 350 | |
| Height, including fastening | h | [mm] | | 481 | |
| Width | b | [mm] | | 60 | |
| Depth | t | [mm] | | 288 | |
| Mass | | | | | |
| | m | [kg] | | 4.0 | |
| Max. cable length | | | | | |
| shielded C1 with external measures | l_{max} | [m] | | 25 | |
| shielded C2 without external measures | l_{max} | [m] | | 10 | |
| shielded C2 with external measures | l_{max} | [m] | | 50 | |

¹⁾   1 - Please refer to the Product key section




Servo Drives 9400 HighLine

Technical data



Rated data for Multi Drive

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

| | | |  |  |  |
|----------------------------------|---------------------|-------|---|---|---|
| Typical motor power | | | | | |
| 4-pole asynchronous motor | P | [kW] | 3.00 | 4.00 | 5.50 |
| Product key⁻¹⁾ | | | | | |
| Multi Drive | | | E94AM□E0074 | E94AM□E0094 | E94AM□E0134 |
| DC supply | | | DC 460 -0% ... 740 V +0% | | |
| | U _{DC} | [V] | | | |
| Rated output current | | | | | |
| | I _{N, out} | [A] | 7.0 | 9.3 | 13.0 |
| Rated switching frequency | | | 8 | | |
| | f _{ch} | [kHz] | | | |
| Output current | | | | | |
| 2 kHz | I _{out} | [A] | 8.8 | 11.7 | 16.3 |
| 4 kHz | I _{out} | [A] | 8.8 | 11.7 | 16.3 |
| 8 kHz | I _{out} | [A] | 7.0 | 9.3 | 13.0 |
| 16 kHz | I _{out} | [A] | 5.3 | 7.0 | 9.8 |


4.3


Data for 60 s overload

| | | | | | |
|--|-----------------------|-----|-------|------|------|
| Max. output current²⁾ | | | | | |
| | I _{max, out} | [A] | 13.1 | 17.5 | 24.4 |
| Reduced output current²⁾ | | | | | |
| | I _{red, out} | [A] | 6.60 | 8.80 | 12.2 |
| Overload time²⁾ | | | 60.0 | | |
| | t _{ol} | [s] | | | |
| Recovery time²⁾ | | | 120.0 | | |
| | t _{re} | [s] | | | |

Data for 0.5 s overload

| | | | | | |
|--|-----------------------|-----|------|------|------|
| Max. short-time output current²⁾ | | | | | |
| | I _{max, out} | [A] | 21.0 | 28.0 | 39.0 |
| Reduced output current²⁾ | | | | | |
| | I _{red, out} | [A] | 6.60 | 8.80 | 12.2 |
| Overload time²⁾ | | | 0.5 | | |
| | t _{ol} | [s] | | | |
| Recovery time²⁾ | | | 4.5 | | |
| | t _{re} | [s] | | | |

¹⁾  1 - Please refer to the Product key section

²⁾  10 - See diagram



Servo Drives 9400 HighLine



Technical data



Rated data for Multi Drive

- ▶ The data is valid for operation at DC 565 V.
- ▶ Unless otherwise specified, the data refers to the default setting.
- ▶ $I_{N,DC}$: R.m.s. value, consisting of DC current and harmonic current.

| | | |  |  | |
|---------------------------------------|------------|------|---|---|-------------|
| Typical motor power | | | | | |
| 4-pole asynchronous motor | P | [kW] | 3.00 | 4.00 | 5.50 |
| Product key⁻¹⁾ | | | | | |
| Multi Drive | | | E94AM□E0074 | E94AM□E0094 | E94AM□E0134 |
| Rated DC-bus current | | | | | |
| | $I_{N,DC}$ | [A] | 12.1 | 15.4 | 20.6 |
| Power loss | | | | | |
| | P_V | [kW] | 0.19 | 0.23 | 0.28 |
| Dimensions | | | | | |
| Height | h | [mm] | 350 | | |
| Height, including fastening | h | [mm] | 481 | | |
| Width | b | [mm] | 90 | 120 | |
| Depth | t | [mm] | 288 | | |
| Mass | | | | | |
| | m | [kg] | 5.3 | 8.1 | |
| Max. cable length | | | | | |
| shielded C1 with external measures | l_{max} | [m] | 25 | | |
| shielded C2 without external measures | l_{max} | [m] | 10 | | |
| shielded C2 with external measures | l_{max} | [m] | 100 | | |

¹⁾   1 - Please refer to the Product key section


Servo Drives 9400 HighLine

Technical data



Rated data for Multi Drive

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

| | | |  | | |
|----------------------------------|---------------------|-------|---|-------------|-------------|
| Typical motor power | | | | | |
| 4-pole asynchronous motor | P | [kW] | 7.50 | 11.0 | 15.0 |
| Product key⁻¹⁾ | | | | | |
| Multi Drive | | | E94AM□E0174 | E94AM□E0244 | E94AM□E0324 |
| DC supply | | | DC 460 -0% ... 740 V +0% | | |
| | U _{DC} | [V] | | | |
| Rated output current | | | | | |
| | I _{N, out} | [A] | 16.5 | 23.5 | 32.0 |
| Rated switching frequency | | | 8 | | |
| | f _{ch} | [kHz] | | | |
| Output current | | | | | |
| 2 kHz | I _{out} | [A] | 20.6 | 29.4 | 40.0 |
| 4 kHz | I _{out} | [A] | 20.6 | 29.4 | 40.0 |
| 8 kHz | I _{out} | [A] | 16.5 | 23.5 | 32.0 |
| 16 kHz | I _{out} | [A] | 12.4 | 17.6 | 24.0 |


4.3


Data for 60 s overload

| | | | | | |
|--|-----------------------|-----|-------|------|------|
| Max. output current²⁾ | | | | | |
| | I _{max, out} | [A] | 30.9 | 44.1 | 60.0 |
| Reduced output current²⁾ | | | | | |
| | I _{red, out} | [A] | 15.5 | 22.1 | 30.0 |
| Overload time²⁾ | | | 60.0 | | |
| | t _{ol} | [s] | | | |
| Recovery time²⁾ | | | 120.0 | | |
| | t _{re} | [s] | | | |

Data for 0.5 s overload

| | | | | | |
|--|-----------------------|-----|------|------|------|
| Max. short-time output current²⁾ | | | | | |
| | I _{max, out} | [A] | 49.5 | 70.5 | 76.8 |
| Reduced output current²⁾ | | | | | |
| | I _{red, out} | [A] | 15.5 | 22.1 | 30.0 |
| Overload time²⁾ | | | 0.5 | | |
| | t _{ol} | [s] | | | |
| Recovery time²⁾ | | | 4.5 | | |
| | t _{re} | [s] | | | |

¹⁾  1 - Please refer to the Product key section

²⁾  10 - See diagram


Servo Drives 9400 HighLine



Technical data



Rated data for Multi Drive

- ▶ The data is valid for operation at DC 565 V.
- ▶ Unless otherwise specified, the data refers to the default setting.
- ▶ $I_{N,DC}$: R.m.s. value, consisting of DC current and harmonic current.

| | | |  | | |
|---------------------------------------|------------|------|---|-------------|-------------|
| Typical motor power | | | | | |
| 4-pole asynchronous motor | P | [kW] | 7.50 | 11.0 | 15.0 |
| Product key¹⁾ | | | | | |
| Multi Drive | | | E94AM□E0174 | E94AM□E0244 | E94AM□E0324 |
| Rated DC-bus current | | | | | |
| | $I_{N,DC}$ | [A] | 25.7 | 35.5 | 48.0 |
| Power loss | | | | | |
| | P_V | [kW] | 0.32 | 0.42 | 0.49 |
| Dimensions | | | | | |
| Height | h | [mm] | | 350 | |
| Height, including fastening | h | [mm] | | 481 | |
| Width | b | [mm] | | 120 | |
| Depth | t | [mm] | | 288 | |
| Mass | | | | | |
| | m | [kg] | | 8.1 | |
| Max. cable length | | | | | |
| shielded C1 with external measures | l_{max} | [m] | | 25 | |
| shielded C2 without external measures | l_{max} | [m] | | 10 | |
| shielded C2 with external measures | l_{max} | [m] | | 100 | |

¹⁾   1 - Please refer to the Product key section


Servo Drives 9400 HighLine

Technical data



Rated data for Multi Drive

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

| | | | | |
|-----------------------------------|---------------------|-------|---|-------------|
| | | |  | |
| Typical motor power | | | | |
| 4-pole asynchronous motor | P | [kW] | 22.0 | 30.0 |
| Product key ⁻¹⁾ | | | | |
| Multi Drive | | | E94AM□E0474 | E94AM□E0594 |
| DC supply | | | | |
| | U _{DC} | [V] | DC 460 -0% ... 740 V +0% | |
| Rated output current | | | | |
| | I _{N, out} | [A] | 47.0 | 59.0 |
| Rated switching frequency | | | | |
| | f _{ch} | [kHz] | 4 | |
| Output current | | | | |
| 2 kHz | I _{out} | [A] | 47.0 | 59.0 |
| 4 kHz | I _{out} | [A] | 47.0 | 59.0 |
| 8 kHz | I _{out} | [A] | 41.0 | |
| 16 kHz | I _{out} | [A] | 21.5 | |


4.3


Data for 60 s overload

| | | | | |
|---|-----------------------|-----|-------|------|
| Max. output current ²⁾ | | | | |
| | I _{max, out} | [A] | 70.5 | 88.5 |
| Reduced output current ²⁾ | | | | |
| | I _{red, out} | [A] | 35.3 | 44.3 |
| Overload time ²⁾ | | | | |
| | t _{ol} | [s] | 60.0 | |
| Recovery time ²⁾ | | | | |
| | t _{re} | [s] | 120.0 | |

Data for 0.5 s overload

| | | | | |
|---|-----------------------|-----|------|-------|
| Max. short-time output current ²⁾ | | | | |
| | I _{max, out} | [A] | 94.0 | 118.0 |
| Reduced output current ²⁾ | | | | |
| | I _{red, out} | [A] | 35.3 | 44.3 |
| Overload time ²⁾ | | | | |
| | t _{ol} | [s] | 0.5 | |
| Recovery time ²⁾ | | | | |
| | t _{re} | [s] | 4.5 | |

¹⁾  1 - Please refer to the Product key section

²⁾  10 - See diagram


Servo Drives 9400 HighLine


Technical data



Rated data for Multi Drive

- ▶ The data is valid for operation at DC 565 V.
- ▶ Unless otherwise specified, the data refers to the default setting.
- ▶ $I_{N,DC}$: R.m.s. value, consisting of DC current and harmonic current.

| | | |  | |
|---------------------------------------|------------|------|---|-------------|
| Typical motor power | | | | |
| 4-pole asynchronous motor | P | [kW] | 22.0 | 30.0 |
| Product key¹⁾ | | | | |
| Multi Drive | | | E94AM□E0474 | E94AM□E0594 |
| Rated DC-bus current | | | | |
| | $I_{N,DC}$ | [A] | 53.0 | 66.0 |
| Power loss | | | | |
| | P_V | [kW] | 1.05 | 1.12 |
| Dimensions | | | | |
| Height | h | [mm] | 556 | |
| Height, including fastening | h | [mm] | 606 | |
| Width | b | [mm] | 206 | |
| Depth | t | [mm] | 294 | |
| Mass | | | | |
| | m | [kg] | 26.5 | |
| Max. cable length | | | | |
| shielded C1 with external measures | l_{max} | [m] | 50 | |
| shielded C2 without external measures | l_{max} | [m] | 50 | |
| shielded C2 with external measures | l_{max} | [m] | 100 | |

¹⁾  1 - Please refer to the Product key section

Servo Drives 9400 HighLine

Interfaces



Mains connection

- ▶ The mains fuse and cable cross-section specifications are for a mains connection of 1 x 230V or 3 x 400V.
- ▶ Class gG/gI fuses or class gRL semiconductor fuses.
- ▶ The cable cross-sections apply to PVC-insulated copper cables.
- ▶ Use for installation with UL-approved cables, fuses and brackets.

Operation with mains choke

| Typical motor power | Mains voltage | Product key | Circuit breaker | Fuse | | Mains connection |
|---------------------------|---------------------|--------------|-----------------|------------|-----|----------------------------------|
| | | | | EN 60204-1 | UL | |
| 4-pole asynchronous motor | | Single Drive | | | | Cross-section (with mains choke) |
| P | U_{AC} | | I | I | I | q |
| [kW] | [V] | | [A] | [A] | [A] | [mm ²] |
| 0.37 | 3 AC 340 ... 528 | E94AS□E0024 | C10 | 10 | 10 | 1.5 |
| 0.75 | | E94AS□E0034 | | | | |
| 1.50 | | E94AS□E0044 | | | | |
| 3.00 | | E94AS□E0074 | C16 | 16 | 15 | 2.5 |
| 5.50 | | E94AS□E0134 | C20 | 20 | 20 | |
| 7.50 | | E94AS□E0174 | C25 | 32 | 25 | 4.0 |
| 11.0 | | E94AS□E0244 | C32 | | 30 | 10.0 |

4.3

Servo Drives 9400 HighLine

Interfaces



Mains connection

- ▶ The mains fuse and cable cross-section specifications are for a mains connection of 1 x 230V or 3 x 400V.
- ▶ Class gG/gI fuses or class gRL semiconductor fuses.
- ▶ The cable cross-sections apply to PVC-insulated copper cables.
- ▶ Use for installation with UL-approved cables, fuses and brackets.

Operation without mains choke

| Typical motor power | Mains voltage | Product key | Circuit breaker | Fuse | | Mains connection |
|---------------------------|---------------------|--------------|-----------------|------------|-----|-------------------------------------|
| | | | | EN 60204-1 | UL | |
| 4-pole asynchronous motor | | Single Drive | | | | Cross-section (without mains choke) |
| P | U_{AC} | | I | I | I | q |
| [kW] | [V] | | [A] | [A] | [A] | [mm ²] |
| 0.37 | 3 AC 340 ... 528 | E94AS□E0024 | C10 | 10 | 10 | 1.5 |
| 0.75 | | E94AS□E0034 | | | | |
| 1.50 | | E94AS□E0044 | | | | |
| 3.00 | | E94AS□E0074 | C16 | 16 | 15 | 2.5 |
| 5.50 | | E94AS□E0134 | C20 | 20 | 20 | |
| 7.50 | | E94AS□E0174 | C25 | 32 | 25 | 4.0 |
| 11.0 | | E94AS□E0244 | C40 | 50 | 40 | 70.0 |
| 15.0 | | E94AS□E0324 | | | | |
| 22.0 | | E94AS□E0474 | | | | |
| 30.0 | | E94AS□E0594 | | | | |
| 45.0 | | E94AS□E0864 | | | | |
| 55.0 | | E94AS□E1044 | | | | |
| 75.0 | | E94BS□E1454 | | | | |
| 90.0 | | E94BS□E1724 | | | | |
| 105 | | E94BS□E2024 | | | | |
| 130 | | E94BS□E2454 | | | | |
| 150 | | E94BS□E2924 | | | | |
| 190 | | E94BS□E3664 | | | | |
| 240 | | E94BS□E4604 | | 500 | 125 | 150.0 |
| | | | | | | |
| | | | | | | 240.0 |
| | | | | | | 150.0 |

Servo Drives 9400 HighLine

Interfaces



Motor connection

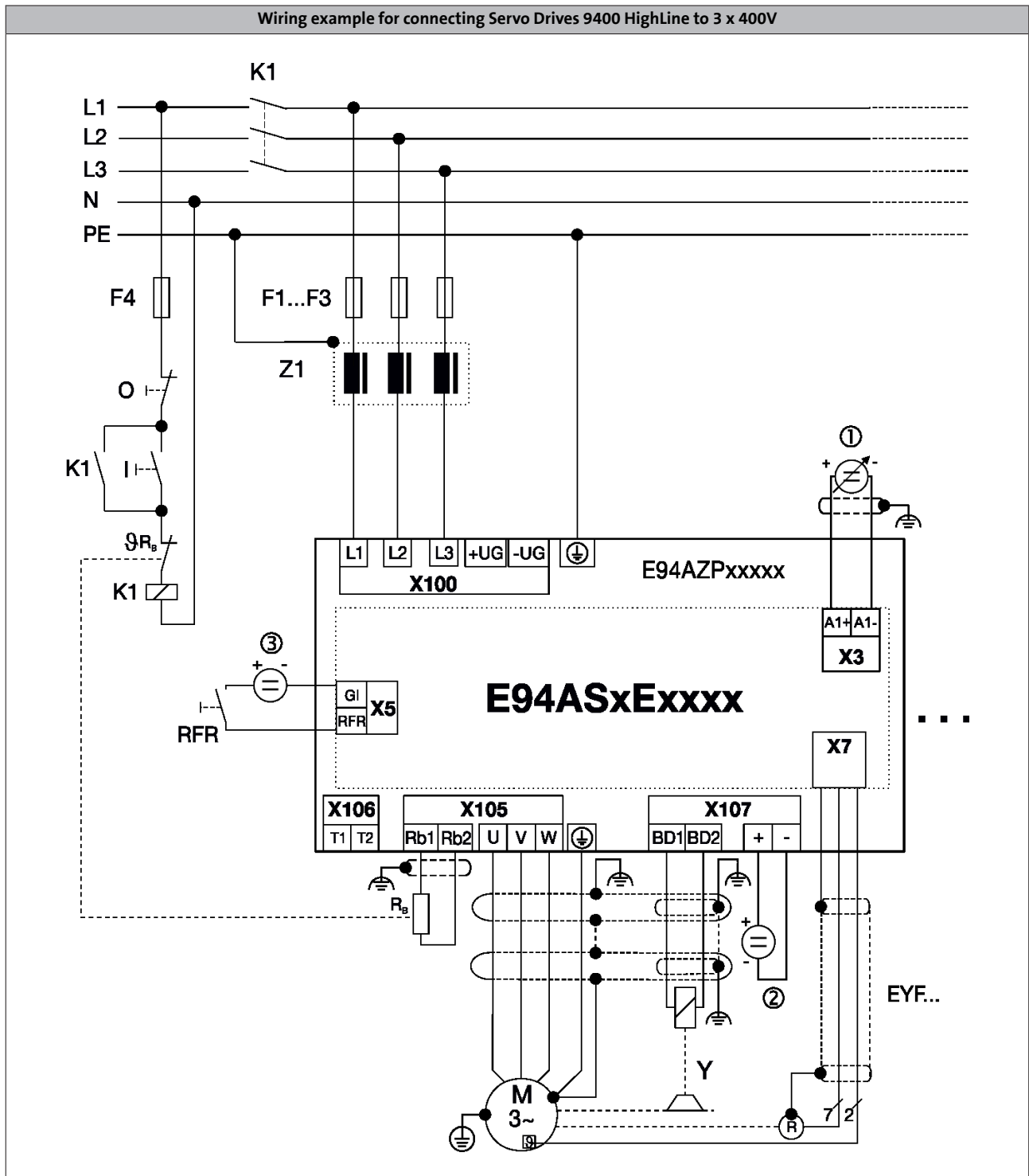
- ▶ Keep motor cables as short as possible, as this has a positive effect on the drive behaviour.
- ▶ With group drives (multiple motors on one inverter), the resulting cable length is the key factor. This can be calculated using the hardware manual.
- ▶ Electric strength of the motor cable: 1 kV as per VDE 250-1.

| Typical motor power | Mains voltage | Product key | Max. cable length | | | |
|---------------------------|---------------------|--------------|------------------------------------|---------------------------------------|------------------------------------|---------------------------------------|
| | | | shielded C1 with external measures | shielded C2 without external measures | shielded C2 with external measures | shielded C3 without external measures |
| 4-pole asynchronous motor | | Single Drive | | | | |
| P | U_{AC} | | I_{max} | I_{max} | I_{max} | I_{max} |
| [kW] | [V] | | [m] | [m] | [m] | [m] |
| 0.37 | 3 AC 340 ... 528 | E94AS□E0024 | 25 | 10 | 50 | |
| 0.75 | | E94AS□E0034 | | | | |
| 1.50 | | E94AS□E0044 | | | | |
| 3.00 | | E94AS□E0074 | | | | |
| 5.50 | | E94AS□E0134 | | | | |
| 7.50 | | E94AS□E0174 | | | | |
| 11.0 | | E94AS□E0244 | 50 | 50 | 100 | |
| 15.0 | | E94AS□E0324 | | | | |
| 22.0 | | E94AS□E0474 | | | | |
| 30.0 | | E94AS□E0594 | | | | |
| 45.0 | | E94AS□E0864 | 150 | | 150 | |
| 55.0 | | E94AS□E1044 | | | | |
| 75.0 | | E94BS□E1454 | | | | |
| 90.0 | | E94BS□E1724 | | | | |
| 105 | | E94BS□E2024 | | | | |
| 130 | | E94BS□E2454 | | | | |
| 150 | E94BS□E2924 | | | | | |
| 190 | E94BS□E3664 | | | | | |
| 240 | E94BS□E4604 | | | | | |

4.3



Connection diagrams



Servo Drives 9400 HighLine

Interfaces



Control connections

| Mode | Servo Drives 9400 HighLine |
|---------------------------|---|
| Analog inputs | |
| Number | 2 |
| Resolution | 11 bits + sign |
| Value range | +/- 10V 1 x switchable 20 mA |
| Analog outputs | |
| Number | 2 |
| Resolution | 10 bits + sign |
| Value range | +/- 10V max. 2 mA |
| Digital inputs | |
| Number | 8 |
| Touch-probe-capable | 8 |
| Switching level | PLC (IEC 61131-2) |
| Max. input current | 8 mA |
| Digital outputs | |
| Number | 4 |
| Switching level | PLC (IEC 61131-2) |
| Max. output current | 50 mA |
| Load capacity | >480 Ω at 24 V |
| External DC supply | |
| Rated voltage | 24 V in accordance with IEC 61131-2 |
| Voltage range | 19.2 ... 28.8 V, max. residual ripple ± 5% |
| Current | 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 |
| Interfaces | |
| CANopen | Integrated |
| Extensions | Via slot MXI 2: extension 2 Via slot MXI 1: extension 1 |
| State bus | Integrated |
| Memory | Slot MMI |
| Safety engineering | Slot MSI |
| Drive interface | |
| Resolver input | Integrated Sub-D, 9-pin |
| Encoder input | Sub-D, 15-pin Multiple encoder input for: SinCos/TTL incremental encoder, SinCos absolute value encoder single-turn/multi-turn (HIPERFACE® / Endat V2.1) SSI encoder with Stegmann SSI protocol as position encoder or master encoder with minimum cycle time of 1 ms |
| Motor temperature | Input on the device: PTC evaluation Via feedback: KTY evaluation |
| Motor brake | Optional, in installation backplane up to 32 A or in axis module from 32 A |

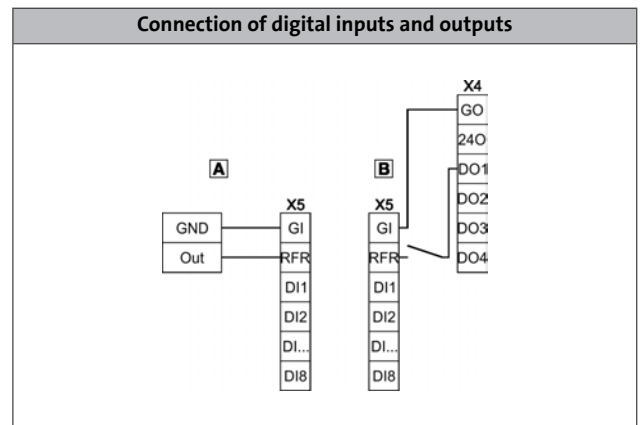
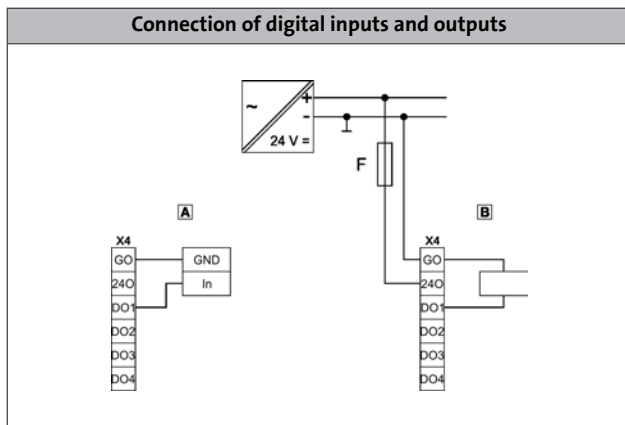
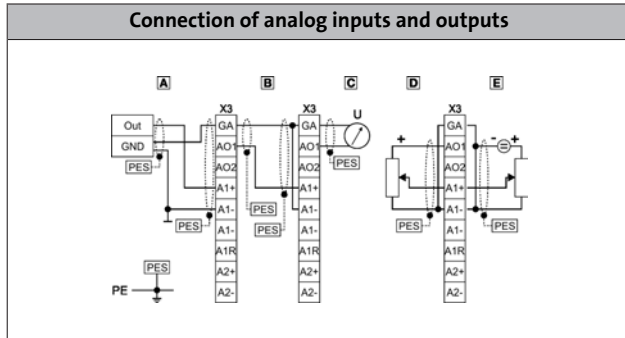
¹⁾ The supply voltage for the control electronics comes from the mains voltage. Alternatively, it can be provided by a 24 V supply that is independent of the mains (available as an option).

Servo Drives 9400 HighLine

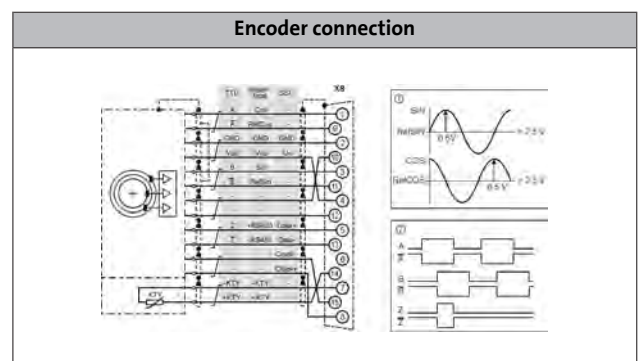
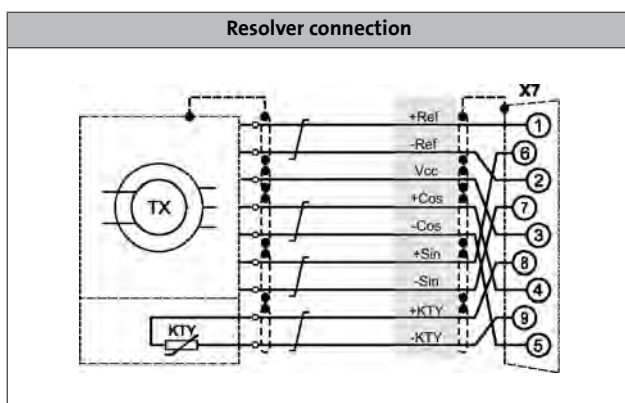
Interfaces



Control connections



4.3



Servo Drives 9400 HighLine

Interfaces



Overview of modules

For adaptation to the machine requirements, up to four different modules can be used to adjust the Servo Drives 9400 and regenerative power supply modules. The following slots are available:




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



Axis module with module slots MXI, MMI and MSI

The tables below show the modules available for Servo Drive 9400 and the regenerative power supply modules.

Memory module

| Slot | Image | Mode Memory module | Product key | Mode | |
|------|---|--------------------------------------|-------------|----------|---------------|
| | | | | HighLine | Regen. module |
| MMI |  | Motion control HighLevel MM220 | E94AYM22 | Standard | Standard |
| MMI |  | Motion control TopLevel MM330 | E94AYM33 | Option | |
| MMI |  | Motion control TopLevel MM430 | E94AYM43 | Option | |





Servo Drives 9400 HighLine

Interfaces



Overview of modules

Safety modules

| Slot | | Mode | | Mode | |
|------|--|---------------|-------------|----------|---------------|
| | | Safety module | Product key | HighLine | Regen. module |
| MSI |  | SM0 | E94AYAA | Standard | Standard |
| MSI |  | SM100 | E94AYAB | Option | |
| MSI |  | SM301 | E94AYAE | Option | |
| MSI |  | SM302 | E94AYAF | Option | |


Servo Drives 9400 HighLine

Interfaces










Overview of modules

Extension modules

| Slot | | Mode | Product key | Mode | |
|--------------|---|-------------------|-------------|------------------|----------|
| | | | | Extension module | HighLine |
| MXI1 MXI2 |  | Digital frequency | E94AYFLF | Option | |

Communication modules

| Slot | | Mode | Product key | Mode | |
|--------------|---|-------------|-------------|----------------------|----------|
| | | | | Communication module | HighLine |
| MXI1 MXI2 |  | CANopen | E94AYCCA | Option | Option |
| MXI1 MXI2 |  | DeviceNet | E94AYCDN | Option | Option |
| MXI1 MXI2 |  | EtherCAT | E94AYCET | Option | Option |
| MXI1 MXI2 |  | Ethernet | E94AYCEN | Option | Option |
| MXI1 MXI2 |  | EtherNet/IP | E94AYCEO | Option | Option |
| MXI1 MXI2 |  | PROFIBUS | E94AYCPM | Option | Option |
| MXI1 MXI2 |  | PROFINET | E94AYCER | Option | Option |

Servo Drives 9400 HighLine

Interfaces



Overview of modules

Assignment of extension modules and module slots (HighLine)

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

| MXI 1 | E94AYFLF | E94AYCCA | E94AYCDN | E94AYCET | E94AYCEN | E94AYCEO | E94AYCPM | E94AYCER |
|------------------------|----------|----------|----------|----------|----------|----------|----------|----------|
| MXI 2 | | • | • | • | • | • | • | • |
| E94AYFLF | | • | • | • | • | • | • | • |
| E94AYCCA | • | | | • | • | • | • | • |
| E94AYCDN | • | | | | • | • | • | • |
| E94AYCET | • | • | | | • | • | | • |
| E94AYCEN | • | • | • | • | | • | • | • |
| E94AYCEO | • | • | • | • | • | | • | • |
| 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 intended for extensions. The following table lists the possible combinations.

| MXI 1 | E94AYCCA | E94AYCDN | E94AYCET | E94AYCEN | E94AYCEO | E94AYCPM | E94AYCER |
|----------|----------|----------|----------|----------|----------|----------|----------|
| MXI 2 | | | • | • | • | • | • |
| E94AYCCA | | | • | • | • | • | • |
| E94AYCDN | | | | • | • | • | • |
| E94AYCET | • | • | | • | • | | |
| E94AYCEN | • | • | • | | • | • | • |
| E94AYCEO | • | • | • | • | | • | • |
| E94AYCPM | • | • | | • | • | | |
| E94AYCER | • | • | • | • | • | | |

Servo Drives 9400 HighLine

Interfaces



Memory module

Various memory modules are available for the Servo Drives 9400:

- Motion Control HighLevel (MM220)
- Motion Control TopLevel (MM330 and MM430)



With these modules, the functions described below are activated. The functions can be loaded into the drive using L-force Engineer.

In addition to the different functions of the Runtime software versions, different memory sizes or a real-time clock function (battery-backed) are available, depending on which memory module is used.



MM330 memory module

4.3


| Mode | | Features | Slot | Product key |
|--------------------------------|---|---|------|-------------|
| Memory module | | | | |
| Motion control HighLevel MM220 |  | <ul style="list-style-type: none"> • Application and parameter storage • Functional range of HighLevel Motion Control with Servo Drives 9400 HighLine: <ul style="list-style-type: none"> - Speed actuating drive - Torque actuating drive - Electronic gearbox - Synchronism using mark synchronisation - Table positioning - Expansion/adaptation by means of function block editor In conjunction with regenerative power supply module: <ul style="list-style-type: none"> - operation of the regenerative power supply module - expansion/adaptation by means of function block editor • Address switch and baud rate setting for onboard system bus CANopen | MMI | E94AYM22 |
| Motion control TopLevel MM330 |  | <ul style="list-style-type: none"> • Application and parameter storage • Functional range of Motion Control TopLevel with Servo Drives 9400 HighLine: <ul style="list-style-type: none"> - Speed actuating drive - Torque actuating drive - Electronic gearbox - Synchronism using mark synchronisation - Table positioning - Positioning sequence control (graphical sequencer) -Expansion/adaptation by means of function block editor <ul style="list-style-type: none"> - Function blocks with cam functionality • Address switch and baud rate setting for onboard system bus CANopen | MMI | E94AYM33 |

Servo Drives 9400 HighLine

Interfaces



Memory module

| Mode | | Features | Slot | Product key |
|-------------------------------------|---|--|------|-------------|
| Memory module | | | | |
| Motion control TopLevel MM430 |  | <ul style="list-style-type: none"> • Application and parameter storage • Functional range of Motion Control TopLevel with Servo Drives 9400 HighLine: <ul style="list-style-type: none"> - Speed actuating drive - Torque actuating drive - Electronic gearbox - Synchronism using mark synchronisation - Table positioning - Positioning sequence control (graphical sequencer) - Expansion/adaptation by means of function block editor - Function blocks with cam functionality • Address switch and baud rate setting for onboard system bus CANopen • Real-time clock (battery-buffered) | MMI | E94AYM43 |

| Product key | | E94AYM22 | E94AYM33 | E94AYM43 |
|------------------------------------|------|--------------------------------------|-------------------------------------|-------------------------------------|
| Mode | | Motion control HighLevel MM220 | Motion control TopLevel MM330 | Motion control TopLevel MM430 |
| Storage medium | | | | |
| Flash memory | [MB] | 2.00 | 4.00 | 8.00 |
| Additional function | | No | | Yes |
| Real-time clock | | No | | Yes |
| System bus addressing switch (CAN) | | Yes | | |

4.3



Safety modules

For virtually any application, the provision of extensive safety engineering is one of the most important tasks of the plant constructor. However, this issue can only be solved with the help of complicated wiring. Thanks to the "Drive-based Safety" solution that can be integrated in servo drives 9400, this can be implemented using axis modules. The safety engineering, which can be integrated as an option, has a modular structure.

The range of functions begins with the "safe torque off" function (formerly "safe standstill") and extends as far as integration in safety bus systems. The modular approach of drive-based safety also provides the option for expanding systems in future and, at the same time, ensures flexibility.

The following modules are available with safety functions in accordance with IEC 61800-5-2:

- SM0 (necessary for the MSI slot if no safety functions are required)
- SM100
- SM301
- SM302



SM301 safety module

4.3

| Mode | SM100 | SM301 | SM302 |
|--|-----------------------|---|--------------------------------------|
| Safety module | SM100 | SM301 | SM302 |
| Function | | | |
| Safe torque off (STO) | • | • | • |
| Safety sensor connection | • | • | • |
| Safe stop 1 (SS1) | | • | • |
| Safe stop 2 (SS2) ¹⁾ | | • | • |
| Safe operational stop (SOS) ¹⁾ | | • | • |
| Safely limited speed (SLS) ¹⁾ | | • | • |
| Safe maximum speed (SMS) ¹⁾ | | • | • |
| Safe speed monitoring (SSM) ¹⁾ | | • | • |
| Safe direction (SDI) ¹⁾ | | • | • |
| Operation mode selector (OMS) with enable switch (ES) | | • | • |
| Safely limited increment (SLI) ¹⁾ | | • | • |
| Cascading of the STO safety function | | • | • |
| Safe limited position (SLP) ¹⁾ | | | • |
| Position-dependent safely limited speed (PDSS) ¹⁾ | | | • |
| Safe cam (SCA) ¹⁾ | | | • |
| Safety bus PROFIsafe | | PROFIBUS DP PROFINET IO (optionally via MX11) | PROFINET IO (optionally via MX11) |
| Safety bus FSoE | | | EtherCAT (optionally via MX11) |
| Operation with safety PLC | | Optional | Optional |
| Transmission of position and speed data to safety control | | | PROFIsafe or FSoE |
| Certification according to IEC 61508 | Cat 4 PL e / SIL 3 | Cat 3 PL e / SIL 3 | Cat 4 PL e / SIL 3 |

¹⁾ For speed-dependent safety functions, the motor-feedback system combinations listed on the following page are available.



Safety modules

| Product key | | | E94AYAA | E94AYAB | E94AYAE | E94AYAF |
|--|------------|-----|---------|-----------------|-------------------------------------|-------------------------------------|
| Mode | | | | | | |
| Safety module | | | SM0 | SM100 | SM301 | SM302 |
| Certification | | | | | | |
| EN 954-1 | | | | Category 4 | Category 3 | Category 4 |
| EN ISO 13849-1 | | | | PLe | PLe | PLe |
| Fail-safe state | | | | | | |
| | | | | Safe torque off | Safe torque off | Safe torque off |
| Safe inputs/outputs | | | | | | |
| Number of connectable active safety sensors | | | | 1 | 4, choice between active or passive | 4, choice between active or passive |
| Number of connectable passive safety sensors | | | | | 4, choice between active or passive | 4, choice between active or passive |
| Monitor (1-channel output) | | | | 1 | | |
| Diagnostics | | | | | | |
| Status display | | | | 2 LEDs | 6 LEDs | 6 LEDs |
| Rated voltage | | | | | | |
| | $U_{N,DC}$ | [V] | | 24.0 | 24.0 | 24.0 |

Speed-dependent safety functions in connection with the SM301 safety module

For the following speed-dependent safety functions, the motor-feedback system combinations listed in the following table are available:

- Safe stop 1 (SS1)
- Safe stop 2 (SS2)
- Safe operational stop (SOS)
- Safely Limited Speed (SLS)
- Safe Maximum Speed (SMS)
- Safe direction (SDI)
- Operation mode selector (OMS) with confirmation (ES)
- Safe speed monitor (SSM)
- Safely limited increment (SLI)
- Position-dependent safely limited speed (PDSS)
- Safe limited position (SLP)
- Safe cam (SCA).

| | Encoder type | Encoder type | Product key | | Safe speed monitoring |
|---------------------------------------|-----------------------|--------------|--------------|-------------------|-----------------------|
| Synchronous servo motors (MCS, MDXKS) | SinCos absolute value | Single-turn | AS1024-8V-K2 | 2-encoder concept | PL d/SIL 2 |
| | | Multi-turn | AM1024-8V-K2 | | PL e/SIL 3 |
| | Resolver | | RV03 | | up to PL e / SIL 3 |

| | Encoder type | Encoder type | Product key | | Safe speed monitoring |
|--------------------------------------|--------------------|--------------|--------------|-------------------|-----------------------|
| Asynchronous servo motors (MCA, MQA) | SinCos incremental | Multi-turn | IG1024-5V-V3 | 2-encoder concept | PL e/SIL 3 |
| | | | RV03 | | up to PL e / SIL 3 |
| | Resolver | | | | |

Please refer to the servo motors catalogue for details on the concrete assignments of the individual motor frame sizes and the corresponding technical properties.

A "2-encoder concept" is a resolver as motor feedback unit and, at the same time, an absolute value encoder (SinCos), and incremental encoder (TTL), an SSI encoder or bus encoder as position encoder at the machine

Servo Drives 9400 HighLine

Interfaces




Extension module: 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 Servo Drives 9400 HighLine 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: digital frequency

| Mode | | Features | Slot | Product key |
|----------------------|---|---|--------------|-------------|
| Communication module | | | | |
| |  | <ul style="list-style-type: none"> • Digital frequency 0 to 500 kHz • Up to three slave drives connectable • Sub-D connection for LFin and LFour | MX11 MX12 | E94AYFLF |

4.3

Standards and operating conditions

| | | | | |
|---|------------------|-----|--|--|
| Product key | | | | E94AYFLF |
| Mode | | | | |
| Communication module | | | | |
| Degree of protection | | | | |
| EN 60529 | | | | IP20 |
| Vibration resistance | | | | |
| | | | | Sinusoidal vibration Amplitude/Acceleration Acceleration resistant up to 0.7 g acc. to Germanischer Lloyd 10 Hz ≤ f ≤ 57 Hz: ±0.075 mm amplitude, |
| Site altitude | | | | |
| Amsl | H _{max} | [m] | | 4000 |
| Climatic conditions | | | | |
| Storage (EN 60721-3-1) | | | | 1K3 (temperature: -25 °C ... +60 °C) |
| Transport (EN 60721-3-2) | | | | 2K3 (temperature: -25 °C ... +70 °C) |
| Operation (EN 60721-3-3) | | | | 3K3 (temperature: -10 °C ... +55 °C) |
| Insulation voltage to reference earth/PE | | | | |
| | U _{AC} | [V] | | 50.0 |

Servo Drives 9400 HighLine

Interfaces



Extension module: digital frequency

Rated data

| | | | |
|-----------------------------|------------|-------|--|
| Product key | | | E94AYFLF |
| Mode | | | |
| System cables | | | Type: EYD |
| Digital frequency | | | |
| Input | f | [kHz] | 0 to 500 (TTL) |
| Output | f | [kHz] | 0 to 500 (TTL) |
| Feedback | | | |
| Incremental encoder type | | | TTL encoder |
| Incremental encoder signal | | | 2 signals of 5 V offset by 90° |
| Sequence connections | | | |
| In parallel | | | 3 drives |
| In series | | | For 250 kHz 20 drives For 500 kHz 10 drives |
| Max. cable length | | | |
| between two nodes | I_{\max} | [m] | 50 |
| Rated voltage | | | |
| | $U_{N,DC}$ | [V] | 24.0 |

Servo Drives 9400 HighLine

Interfaces




Communication module: CANopen

The Servo Drives 9400 HighLine and the regenerative power supply modules have a CANopen interface on board as a standard feature. It enables the axis modules to communicate with each other and with other system bus components (e.g. I/O systems or HMIs). If a second CANopen interface is necessary for system networking, the CANopen communication module can be used for this purpose. CANopen is a communication protocol based on CAN physics. Its specifications are determined by the CiA user group (CAN in Automation). Compatibility with the Lenze system bus (CAN) can be established by means of configuration.



Communication module: AS-Interface

4.3

| Mode | | Features | Slot | Product key |
|----------------------|---|--|--------------|-------------|
| Communication module | | | | |
| CANopen |  | <ul style="list-style-type: none"> CANopen profile DS301, V4.02 Lenze system bus Automatic baud rate detection 2 LEDs for communication status display DIP switch for selecting baud rate and address Sub-D connection | MX11 MX12 | E94AYCCA |

Standards and operating conditions

| | | | | |
|---|------------------|-----|--|---|
| Product key | | | | E94AYCCA |
| Mode | | | | CANopen |
| Degree of protection | | | | IP20 |
| Vibration resistance | | | | Sinusoidal vibration Amplitude/Acceleration Acceleration resistant up to 0.7 g acc. to Germanischer Lloyd 5 Hz ≤ f ≤ 13.2 Hz ± 1 mm amplitude, 13.2 Hz ≤ f ≤ 100 Hz: 10 Hz ≤ f ≤ 57 Hz: ±0.075 mm amplitude, |
| Site altitude | | | | 4000 |
| Amsl | H _{max} | [m] | | |
| Climatic conditions | | | | |
| Storage (EN 60721-3-1) | | | | 1K3 (temperature: -25 °C ... +60 °C) |
| Transport (EN 60721-3-2) | | | | 2K3 (temperature: -25 °C ... +70 °C) |
| Operation (EN 60721-3-3) | | | | 3K3 (temperature: -10°C ... +55 °C) |
| Insulation voltage to reference earth/PE | | | | 50.0 |
| | U _{AC} | [V] | | |

Servo Drives 9400 HighLine

Interfaces



Communication module: CANopen

Rated data

| | | | |
|--|------------|----------|---|
| Product key | | | E94AYCCA |
| Communication | | | |
| Medium | | | DIN ISO 11898 |
| Communication profile | | | CANopen, DS301 V4.02 Lenze system bus |
| Baud rate | | | |
| | b | [kBit/s] | 10 20 50 125 250 500 800 1000 |
| Node | | | |
| | | | Slave Multi-master |
| 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 bus nodes | | | |
| | | | 127 Without repeaters: 110 |
| Max. cable length | | | |
| between two nodes | l_{max} | [m] | 100 |
| per bus segment ¹⁾ | l_{max} | [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 |
| Rated voltage | | | |
| | $U_{N,DC}$ | [V] | 24.0 |

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

Servo Drives 9400 HighLine

Interfaces




DeviceNet communication module

The American automation specialist Allan Bradley developed the DeviceNet fieldbus based on the CAN controller. This communication profile is 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.



DeviceNet communication module

| Mode | | Features | Slot | Product key |
|----------------------|---|--|--------------|-------------|
| Communication module | | | | |
| DeviceNet |  | <ul style="list-style-type: none"> • "Group 2 Only Server" functionality (slave) • DIP switch for selecting baud rate and address • 1 LED for communication status display • Push-on terminal strip with screw connection, 5-pin | MXI1 MXI2 | E94AYCDN |

4.3

Standards and operating conditions

| | | | |
|---|------------------|-----|--|
| Product key | | | E94AYCDN |
| Mode | | | DeviceNet |
| Degree of protection | | | IP20 |
| EN 60529 | | | |
| Vibration resistance | | | Sinusoidal vibration Amplitude/Acceleration Acceleration resistant up to 0.7 g acc. to Germanischer Lloyd 10 Hz ≤ f ≤ 57 Hz: ±0.075 mm amplitude, |
| Site altitude | | | 4000 |
| Amsl | H _{max} | [m] | |
| Climatic conditions | | | |
| Storage (EN 60721-3-1) | | | 1K3 (temperature: -25 °C ... +60 °C) |
| Transport (EN 60721-3-2) | | | 2K3 (temperature: -25 °C ... +70 °C) |
| Operation (EN 60721-3-3) | | | 3K3 (temperature: -10°C ... +55 °C) |
| Insulation voltage to reference earth/PE | | | 50.0 |
| | U _{AC} | [V] | |

Servo Drives 9400 HighLine

Interfaces



DeviceNet communication module

Rated data

| | | | |
|---------------------------------|------------|----------|---|
| Product key | | | E94AYCDN |
| Communication | | | |
| Medium | | | DIN ISO 11898 |
| Communication profile | | | DeviceNet |
| Baud rate | | | |
| | b | [kBit/s] | 125 250 500 |
| Node | | | Slave |
| Network topology | | | Line with terminating resistors (120 ohm) at both ends |
| Process data words (PZD) | | | |
| 16 Bit | | | 32 |
| Number of bus nodes | | | Max. 64 |
| Max. cable length | | | |
| per bus segment | I_{max} | [m] | 100 for 500 kbps, Thick Cable 250 for 250 kbps, Thick Cable 500 for 125 kbps, Thick Cable 100 for 500 kbps, Thin Cable 100 for 250 kbps, Thin Cable 100 for 125 kbps, Thin Cable |
| Rated voltage | | | |
| | $U_{N,DC}$ | [V] | 24.0 |

Servo Drives 9400 HighLine

Interfaces




EtherCAT® communication module

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



EtherCAT® communication module

| Mode | | Features | Slot | Product key |
|----------------------|---|---|--------------|-------------|
| Communication module | | | | |
| EtherCAT |  | <ul style="list-style-type: none"> • CANopen over EtherCAT (CoE) • Distributed clock • 2 RJ45 connections with LEDs for link and activity • 2 LEDs for communication status display • External voltage supply possible | MXI1 MXI2 | E94AYCET |

4.3

Standards and operating conditions

| | | | | |
|---|------------------|-----|--|--|
| Product key | | | | E94AYCET |
| Mode | | | | EtherCAT |
| Degree of protection | | | | IP20 |
| EN 60529 | | | | |
| Vibration resistance | | | | Sinusoidal vibration Amplitude/Acceleration Acceleration resistant up to 0.7 g acc. to Germanischer Lloyd 10 Hz ≤ f ≤ 57 Hz: ±0.075 mm amplitude, |
| Site altitude | | | | 4000 |
| Amsl | H _{max} | [m] | | |
| Climatic conditions | | | | |
| Storage (EN 60721-3-1) | | | | 1K3 (temperature: -25 °C ... +60 °C) |
| Transport (EN 60721-3-2) | | | | 2K3 (temperature: -25 °C ... +70 °C) |
| Operation (EN 60721-3-3) | | | | 3K3 (temperature: -10°C ... +55 °C) |
| Insulation voltage to reference earth/PE | | | | 50.0 |
| | U _{AC} | [V] | | |

Servo Drives 9400 HighLine

Interfaces



EtherCAT® communication module

Rated data

| | | | |
|--|------------|----------|---|
| Product key | | | E94AYCET |
| Communication | | | |
| Medium | | | CAT5e S/FTP according to ISO/ICE11801 (2002) |
| Communication profile | | | CoE (CANopen over EtherCAT) FSoE in combination with SM302 |
| Baud rate | | | |
| | b | [MBit/s] | 100 |
| Node | | | |
| | | | Slave |
| Network topology | | | |
| | | | Line (internal ring) |
| Number of logical process data channels | | | |
| | | | 1 |
| Process data words (PZD) | | | |
| 16 Bit | | | 1 ... 32 |
| Number of bus nodes | | | |
| | | | Max. 65535 |
| Max. cable length | | | |
| between two nodes | I_{max} | [m] | 100 |
| Rated voltage | | | |
| | $U_{N,DC}$ | [V] | 24.0 |

Servo Drives 9400 HighLine

Interfaces



EtherNet communication module


Initially the EtherNet network was reserved for the office, but today this communication system is also often used for system parameterisation. The Servo Drives 9400 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.



EtherNet communication module

4.3

| Mode | | Features | Slot | Product key |
|----------------------|--|---|--------------|-------------|
| Communication module | | | | |
| Ethernet |  | <ul style="list-style-type: none"> • Automatic setting of baud rate and transmission mode • 2 RJ45 connections with LEDs for link and activity • Automatic detection of wiring errors and polarity reversal • Integrated 2-port switch • Electrical isolation from the bus • Automatic switching between transmit and receive paths (auto-crossing) | MXI1 MXI2 | E94AYCEN |

Standards and operating conditions

| | | | |
|---|------------------|-----|--|
| Product key | | | E94AYCEN |
| Mode | | | Ethernet |
| Degree of protection | | | IP20 |
| EN 60529 | | | |
| Vibration resistance | | | Sinusoidal vibration Amplitude/Acceleration Acceleration resistant up to 0.7 g acc. to Germanischer Lloyd 10 Hz ≤ f ≤ 57 Hz: ±0.075 mm amplitude, |
| Site altitude | | | 4000 |
| Amsl | H _{max} | [m] | |
| Climatic conditions | | | |
| Storage (EN 60721-3-1) | | | 1K3 (temperature: -25 °C ... +60 °C) |
| Transport (EN 60721-3-2) | | | 2K3 (temperature: -25 °C ... +70 °C) |
| Operation (EN 60721-3-3) | | | 3K3 (temperature: -10°C ... +55 °C) |
| Insulation voltage to reference earth/PE | | | 50.0 |
| | U _{AC} | [V] | |

Servo Drives 9400 HighLine

Interfaces



EtherNet communication module

Rated data

| | | | |
|--------------------------|------------|----------|----------------------------------|
| Product key | | | E94AYCEN |
| Communication | | | |
| Medium | | | Twisted Pair, CAT5e to IEEE802.3 |
| Communication profile | | | GCI, based on TCP/IP |
| Baud rate | | | |
| | b | [MBit/s] | 100 |
| Signalling | | | |
| | | | Link Activity |
| Max. cable length | | | |
| between two nodes | l_{max} | [m] | 100 |
| Network topology | | | |
| | | | Star Use of hubs/switches |
| Transmission | | | |
| Mode | | | Half duplex/full duplex |
| Rated voltage | | | |
| | $U_{N,DC}$ | [V] | 24.0 |

Servo Drives 9400 HighLine

Interfaces



EtherNet/IP communication module

The communication module serves to connect the Servo Drives 9400 to an Ethernet/IP network.


It can be both supplied internally by the standard device and externally by a separate voltage source. The access to all Lenze parameters can be configured via TCP/IP with the Engineer engineering tool. Further advantages of the EtherNet/IP:

- Support of multicast messages,
- "IGMP snooping" (V2 according to RFC 2236),
- UCMM, ACD, BOOTP/DHCP and VLAN-Tagging/DSCP.



EtherNet/IP communication module

4.3

| Mode | | Features | Slot | Product key |
|----------------------|---|--|--------------|-------------|
| Communication module | | | | |
| EtherNet/IP |  | <ul style="list-style-type: none"> • EtherNet/IP adapter with "Level 2" functionality • Integrated 2-port switch • Up to zu 3 TCP/IP socket connections for communication with the Lenze »Engineer« Support of the "IP Config Pending • Support of the redundancy protocol DLR (Device Level Ring) as "Beacon-based Ring Node" | MX11 MX12 | E94AYCEO |

Standards and operating conditions

| | | | |
|---|------------------|-----|--|
| Product key | | | E94AYCEO |
| Mode | | | EtherNet/IP |
| Degree of protection | | | IP20 |
| Vibration resistance | | | Sinusoidal vibration Amplitude/Acceleration Acceleration resistant up to 0.7 g acc. to Germanischer Lloyd 10 Hz ≤ f ≤ 57 Hz: ±0.075 mm amplitude, |
| Site altitude | | | 4000 |
| Amsl | H _{max} | [m] | |
| Climatic conditions | | | |
| Storage (EN 60721-3-1) | | | 1K3 (temperature: -25 °C ... +60 °C) |
| Transport (EN 60721-3-2) | | | 2K3 (temperature: -25 °C ... +70 °C) |
| Operation (EN 60721-3-3) | | | 3K3 (temperature: -10°C ... +55 °C) |
| Insulation voltage to reference earth/PE | | | |
| | U _{AC} | [V] | 50.0 |

Servo Drives 9400 HighLine

Interfaces



EtherNet/IP communication module

Rated data

| | | | |
|--------------------------|------------|----------|---|
| Product key | | | E94AYCEO |
| Communication | | | |
| Medium | | | S/FTP (Screened Foiled Twisted Pair), ISO/IEC 11801 or EN 50173, CAT 5e |
| Communication profile | | | EtherNet/IP |
| Baud rate | | | |
| | b | [MBit/s] | 10/100 |
| Signalling | | | |
| | | | Link Activity CIP™ states |
| Max. cable length | | | |
| between two nodes | l_{max} | [m] | 100 |
| Network topology | | | |
| | | | Star Use of hubs/switches |
| Transmission | | | |
| Mode | | | Half duplex/full duplex |
| Rated voltage | | | |
| | $U_{N,DC}$ | [V] | 24.0 |

Servo Drives 9400 HighLine

Interfaces




PROFIBUS communication module

One of the most commonly used industrial communication channels is PROFIBUS. The Servo Drives 9400 range offers the corresponding interface module for this communication.

The PROFIBUS module is a slave connection module with the PROFIBUS-DP communication profile. It is used for networking between control and inverter at fast processing speeds. This allows the inverter to be easily and conveniently integrated into the installation's entire network.



PROFIBUS communication module

| Mode | | Features | Slot | Product key |
|----------------------|---|---|--------------|-------------|
| Communication module | | | | |
| PROFIBUS |  | <ul style="list-style-type: none"> • Electrical isolation from the bus • 2 LEDs for communication status display • Address can be set via DIP switch • Compatibility switch for communication module EMF2133 IB | MX11 MX12 | E94AYCPM |

4.3

Standards and operating conditions

| | | | |
|--|------------------|-----|--|
| Product key | | | E94AYCPM |
| Mode | | | PROFIBUS |
| Degree of protection | | | IP20 |
| EN 60529 | | | IP20 |
| Vibration resistance | | | Sinusoidal vibration Amplitude/Acceleration Acceleration resistant up to 0.7 g acc. to Germanischer Lloyd 10 Hz ≤ f ≤ 57 Hz: ±0.075 mm amplitude, |
| Site altitude | | | 4000 |
| Amsl | H _{max} | [m] | 4000 |
| Climatic conditions | | | |
| Storage (EN 60721-3-1) | | | 1K3 (temperature: -25 °C ... +60 °C) |
| Transport (EN 60721-3-2) | | | 2K3 (temperature: -25 °C ... +70 °C) |
| Operation (EN 60721-3-3) | | | 3K3 (temperature: -10 °C ... +55 °C) |
| Insulation voltage to reference earth/PE | | | 50.0 |
| | U _{AC} | [V] | 50.0 |



PROFIBUS communication module

Rated data

| | | | |
|---------------------------------|------------|----------|---|
| Product key | | | E94AYCPM |
| Communication | | | |
| Medium | | | RS 485, shielded twisted pair |
| Communication profile | | | PROFIBUS-DP-V1 PROFIBUS-DP-V0 PROFIsafe in combination with SM301 |
| Device profile | | | Lenze device control |
| Baud rate | | | |
| | b | [kBit/s] | 9.6 ... 12 000 (automatic detection) |
| Node | | | |
| | | | Slave |
| Network topology | | | |
| | | | Line with repeater: Line or tree without repeater: |
| Process data words (PZD) | | | |
| 16 Bit | | | 1 ... 32 |
| DP user data length | | | |
| | | | Optional parameter channel (4 words) + process data words |
| Number of bus nodes | | | |
| | | | 31 slaves + 1 master per bus segment With repeaters: 125 |
| Max. cable length | | | |
| per bus segment | I_{max} | [m] | 1200 (depending on the baud rate and the cable type used) |
| Rated voltage | | | |
| | $U_{N,DC}$ | [V] | 24.0 |

Servo Drives 9400 HighLine

Interfaces




PROFINET communication module

The Ethernet-based PROFINET bus system, the successor to PROFIBUS, is often used. There are currently various versions of PROFINET available, which differ with regard to deterministics and thereby also possible cycle times. The most commonly used system is the RT version of PROFINET I/O, which is suitable for networking between control and inverter, although not for motion control applications.



PROFINET communication module

| Mode | | Features | Slot | Product key |
|----------------------|---|---|--------------|-------------|
| Communication module | | | | |
| PROFINET |  | <ul style="list-style-type: none"> • 2 RJ45 connections with LEDs for link and activity • Integrated 2-port switch • PROFINET I/O device • Soft Real Time (RT) • 2 LEDs for communication status display • External voltage supply possible | MXI1 MXI2 | E94AYCER |

4.3

Standards and operating conditions

| | | | |
|---|------------------|-----|--|
| Product key | | | E94AYCER |
| Mode | | | PROFINET |
| Degree of protection | | | IP20 |
| EN 60529 | | | |
| Vibration resistance | | | Sinusoidal vibration Amplitude/Acceleration Acceleration resistant up to 0.7 g acc. to Germanischer Lloyd 10 Hz ≤ f ≤ 57 Hz: ±0.075 mm amplitude, |
| Site altitude | | | 4000 |
| Amsl | H _{max} | [m] | |
| Climatic conditions | | | |
| Storage (EN 60721-3-1) | | | 1K3 (temperature: -25 °C ... +60 °C) |
| Transport (EN 60721-3-2) | | | 2K3 (temperature: -25 °C ... +70 °C) |
| Operation (EN 60721-3-3) | | | 3K3 (temperature: -10°C ... +55 °C) |
| Insulation voltage to reference earth/PE | | | 50.0 |
| | U _{AC} | [V] | |

Servo Drives 9400 HighLine

Interfaces



PROFINET communication module

Rated data

| | | | |
|---------------------------------|------------|----------|--|
| Product key | | | E94AYCER |
| Communication | | | |
| Medium | | | CAT5e S/FTP according to ISO/ICE11801 (2002) |
| Communication profile | | | PROFINET I/O (RT) PROFIsafe in combination with SM301 and SM302 |
| Baud rate | | | |
| | b | [kBit/s] | 100 |
| Node | | | |
| | | | PROFINET I/O device |
| Network topology | | | |
| | | | Star Use of switches |
| Process data words (PZD) | | | |
| 16 Bit | | | 1 ... 32 |
| Max. cable length | | | |
| between two nodes | l_{max} | [m] | 100 |
| Rated voltage | | | |
| | $U_{N,DC}$ | [V] | 24.0 |

Servo Drives 9400 HighLine

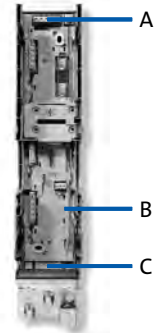
Accessories



Installation backplane

Up to a rated current of 23.5 A, the Servo Drives 9400 consist of an axis module and an installation backplane. The backplane can initially be mounted in the control cabinet without the axis module. This mechanical structure is also used for power supply modules up to a rated power of 17.5 kW and for regenerative power supply modules for a supply power of up to 27 kW, which simplifies installation. This also offers additional advantages in terms of reduced spare part inventories 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 be installed as an option
- Shields for power and control cables can be connected



Installation backplane for Single Drive:

- A: mains connection
- B: brake module (optional)
- C: motor connection

Assignment of Single Drive axes and backplanes

| Typical motor power | Mains voltage | Product key | | Mode |
|---------------------------|------------------|--------------|------------------------|------------------------|
| | | Single Drive | Installation backplane | |
| 4-pole asynchronous motor | | | | Installation backplane |
| P | U_{AC} | | | |
| [kW] | [V] | | | |
| 0.37 | 3 AC 340 ... 528 | E94AS□E0024 | E94AZPS0034N | Without brake module |
| | | | E94AZPS0034H□0051 | With brake module |
| 0.75 | | E94AS□E0034 | E94AZPS0034N | Without brake module |
| | | | E94AZPS0034H□0051 | With brake module |
| 1.50 | | E94AS□E0044 | E94AZPS0074N | Without brake module |
| | | | E94AZPS0074H□0051 | With brake module |
| 3.00 | | E94AS□E0074 | E94AZPS0074N | Without brake module |
| | | | E94AZPS0074H□0051 | With brake module |
| 5.50 | | E94AS□E0134 | E94AZPS0244N | Without brake module |
| | | | E94AZPS0244H□0051 | With brake module |
| 7.50 | | E94AS□E0174 | E94AZPS0244N | Without brake module |
| | | | E94AZPS0244H□0051 | With brake module |
| 11.0 | | E94AS□E0244 | E94AZPS0244N | Without brake module |
| | | | E94AZPS0244H□0051 | With brake module |

DC busbar set for Single Drive installation backplane

Running the Single Drive axis module in a DC-bus connection (multi-axis application) requires retrofitting the DC busbar system and using DC fuses.

Mechanical coupling is possible with the following components:

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

For retrofitting the DC busbar system 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.

| Product key | | |
|------------------------|------------------------|---------------|
| Installation backplane | DC busbar mounting set | DC fuses |
| E94AZPS0034N | E94AZJA003 | EFSAR0016ARHN |
| E94AZPS0034H□0051 | | |
| E94AZPS0074N | E94AZJA007 | EFSAR0040ARHN |
| E94AZPS0074H□0051 | | |
| E94AZPS0244N | E94AZJA024 | EFSAR0100ARZN |
| E94AZPS0244H□0051 | | |

Servo Drives 9400 HighLine

Accessories



Installation backplane

Assignment of Multi Drive axes and backplanes

| Typical motor power 4-pole asynchronous motor P [kW] | Mains voltage U_{AC} [V] | Product key | | Mode |
|---|----------------------------------|-------------------|------------------------|----------------------|
| | | Multi Drive | Installation backplane | |
| 0.37 | 3 AC 340 ... 528 | E94AM□E0024 | E94AZPM0044N | Without brake module |
| | | | E94AZPM0044H□0051 | With brake module |
| E94AM□E0034 | | E94AZPM0044N | Without brake module | |
| | | E94AZPM0044H□0051 | With brake module | |
| 1.50 | | E94AM□E0044 | E94AZPM0044N | Without brake module |
| | | | E94AZPM0044H□0051 | With brake module |
| 3.00 | | E94AM□E0074 | E94AZPM0094N | Without brake module |
| | | | E94AZPM0094H□0051 | With brake module |
| 4.00 | | E94AM□E0094 | E94AZPM0094N | Without brake module |
| | | | E94AZPM0094H□0051 | With brake module |
| 5.50 | | E94AM□E0134 | E94AZPM0244N | Without brake module |
| | | | E94AZPM0244H□0051 | With brake module |
| 7.50 | | E94AM□E0174 | E94AZPM0244N | Without brake module |
| | | | E94AZPM0244H□0051 | With brake module |
| 11.0 | | E94AM□E0244 | E94AZPM0244N | Without brake module |
| | | | E94AZPM0244H□0051 | With brake module |
| 15.0 | E94AM□E0324 | E94AZPM0324N | Without brake module | |
| | | E94AZPM0324H□0051 | With brake module | |

4.3

Assignment: power supply modules / regenerative power supply modules and mounting backplane

| Rated power With mains filter/mains choke P_N [kW] | Mains voltage U_{AC} [V] | Product key | | |
|---|----------------------------------|---------------------|-------------------------------|------------------------|
| | | Power supply module | Supply- / regenerative module | Installation backplane |
| 4.90 | 3 AC 340 ... 528 | E94APNE0104 | | E94AZPP0104 |
| 17.5 | | E94APNE0364 | | E94ARNE0134 |
| 15.0 | | | E94ARNE0244 | |
| 27.0 | | | | |

Replacement DC fuses for Multi Drive installation backplane

If you need to replace the DC fuse in the Multi Drive installation backplane, the available types are listed in the table below.

| Product key | |
|------------------------|---------------|
| Installation backplane | DC fuses |
| E94AZPM0044N | EFSAR0016ARHN |
| E94AZPM0044H□0051 | |
| E94AZPM0094N | EFSAR0040ARHN |
| E94AZPM0094H□0051 | |
| E94AZPM0244N | EFSAR0100ARZN |
| E94AZPM0244H□0051 | |
| E94AZPM0324N | |
| E94AZPM0324H□0051 | |



Brake modules

Internal activation

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 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

| Mode | | Features | Product key |
|-----------------------|---|---|-------------|
| Brake module | | | |
| 24 V DC/0.3 - 2.5 A |  | <ul style="list-style-type: none"> • 24 V DC external supply voltage • Monitoring of power supply and brake cable for open circuit and short circuit • Polarity reversal protection for supply voltage • Can be integrated into the installation backplanes, up to 32 A | E94AZHX0051 |
| 24 V DC/1.0 - 5.0 A |  | <ul style="list-style-type: none"> • 24 V DC external supply voltage • Monitoring of power supply and brake cable for open circuit and short circuit • Polarity reversal protection for supply voltage • Can be integrated into the axis modules, from 32 A | E94AZHY0101 |
| 180 V DC/0.1 - 0.61 A |  | <ul style="list-style-type: none"> • 400 V AC external supply voltage • Monitoring of power supply and brake cable for open circuit and short circuit • Polarity reversal protection for supply voltage • Can be integrated into the axis modules, from 32 A | E94AZHY0026 |
| 205 V DC/0.1 - 0.75 A |  | <ul style="list-style-type: none"> • External supply voltage 230 V AC • Monitoring of power supply and brake cable for open circuit and short circuit • Polarity reversal protection for supply voltage • Can be integrated into the axis modules, from 32 A | E94AZHY0025 |

4.3

External activation

Due to their functional principle, the motor brake in Single Drives cannot be released if there is no mains or DC-bus voltage. Brake modules which can be activated externally are therefore provided for a 24V brake.

| Mode | Features | Product key |
|---------------------|---|-------------|
| Brake module | | |
| 24 V DC/0.3 - 2.5 A | <ul style="list-style-type: none"> • 24 V DC external supply voltage • Monitoring of power supply and brake cable for open circuit and short circuit • Polarity reversal protection for supply voltage • Can be integrated into the installation backplanes, up to 32 A | E94AZHA0051 |
| 24 V DC/1.0 - 5.0 A | <ul style="list-style-type: none"> • 24 V DC external supply voltage • Monitoring of power supply and brake cable for open circuit and short circuit • Polarity reversal protection for supply voltage • Can be integrated into the axis modules, from 32 A | E94AZHB0101 |

Servo Drives 9400 HighLine



Accessories



Brake modules

External brake modules

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

| Mode | | Features | Product key |
|-----------------------|---|--|-------------|
| Brake module | | | |
| 180 V DC/0.1 - 0.75 A |  | <ul style="list-style-type: none">• 400 V AC external supply voltage• Monitoring of power supply and brake cable for open circuit and short circuit• Polarity reversal protection for supply voltage• Preconfigured for DIN rail mounting | E94AZHN0026 |
| 205 V DC/0.1 - 0.75 A |  | <ul style="list-style-type: none">• External supply voltage 230 V AC• Monitoring of power supply and brake cable for open circuit and short circuit• Polarity reversal protection for supply voltage• Preconfigured for DIN rail mounting | E94AZHN0025 |

Servo Drives 9400 HighLine

Accessories



Brake resistors

The assignment of brake resistors to the Single Drive axis modules is shown in the table below.



Brake resistor 82 ohms

| Typical motor power | Mains voltage | Product key | | Rated resistance | Rated power | Thermal capacity | Dimensions | Mass |
|---------------------|-----------------------------------|--------------|----------------|------------------|----------------|--------------------|------------------|------|
| | | Single Drive | Brake resistor | | | | | |
| P | U _{AC} | | | R _N | P _N | C _{th} | h x b x t | m |
| [kW] | [V] | | | [Ω] | [kW] | [KW _s] | [mm] | [kg] |
| 0.37 | 3 AC 340 ... 528 ¹⁾ | E94AS□E0024 | ERBP082R200W | 82.0 | 0.20 | 30.0 | 320 x 41 x 122 | 1.0 |
| | | E94AS□E0034 | | | | | | |
| 1.50 | | E94AS□E0044 | ERBP047R200W | 47.0 | 0.40 | 60.0 | 400 x 110 x 105 | 2.3 |
| | | | ERBS047R400W | | | | | |
| | | | ERBS047R800W | | | | | |
| 3.00 | | E94AS□E0074 | ERBP047R200W | 47.0 | 0.20 | 30.0 | 320 x 41 x 122 | 1.0 |
| | | | ERBS047R400W | | | | | |
| | | | ERBS047R800W | | | | | |
| 5.50 | | E94AS□E0134 | ERBP027R200W | 27.0 | 0.20 | 30.0 | 320 x 41 x 122 | 1.0 |
| | | | ERBS027R600W | | | | | |
| | | | ERBS027R01K2 | | | | | |
| 7.50 | | E94AS□E0174 | ERBP018R300W | 18.0 | 0.30 | 30.0 | 240 x 41 x 122 | 1.4 |
| | | | ERBS018R800W | | | | | |
| | | | ERBS018R02K8 | | | | | |
| 11.0 | | E94AS□E0244 | ERBP018R300W | 18.0 | 1.20 | 180 | 1020 x 110 x 105 | 5.6 |
| | | | ERBS018R01K2 | | | | | |
| | ERBS018R02K8 | | | | | | | |
| 15.0 | E94AS□E0324 | ERBS018R800W | 15.0 | 0.80 | 120 | 710 x 110 x 105 | 3.9 | |
| | | ERBS018R01K4 | | | | | | |
| | | ERBG018R04K3 | | | | | | |
| 22.0 | E94AS□E0474 | ERBS015R800W | 15.0 | 0.80 | 120 | 710 x 110 x 105 | 3.9 | |
| | | ERBS015R02K4 | | | | | | |
| | | ERBG015R06K2 | | | | | | |
| 30.0 | E94AS□E0594 | ERBS015R01K2 | 15.0 | 1.20 | 180 | 1020 x 110 x 105 | 5.6 | |
| | | ERBG015R03K3 | | | | | | |
| | | ERBG015R10K0 | | | | | | |

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

Servo Drives 9400 HighLine

Accessories



Brake resistors

The assignment of brake resistors to Single Drive axis modules is shown in the table below.

- Two resistors should be connected in parallel for the following combinations:
E94BS□E3664 and ERBG035D03K3
E94BS□E4604 and ERBG028D04K1.



3.5 ohm brake resistor

| Typical motor power | Mains voltage | Product key | | Rated resistance | Rated power | Thermal capacity | Dimensions | Mass |
|---------------------|-----------------------------------|--------------|----------------|------------------|----------------|--------------------|-----------------|-----------------|
| | | Single Drive | Brake resistor | | | | | |
| P | U _{AC} | | | R _N | P _N | C _{th} | h x b x t | m |
| [kW] | [V] | | | [Ω] | [kW] | [KW _s] | [mm] | [kg] |
| 45.0 | 3 AC 340 ... 528 ¹⁾ | E94AS□E0864 | ERBG075D01K9 | 7.5 | 1.90 | 285 | 486 x 236 x 302 | 9.5 |
| 55.0 | | E94AS□E1044 | | | | | | |
| 75.0 | | E94BS□E1454 | ERBG005R02K6 | 5.0 | 2.60 | 390 | 486 x 326 x 302 | 12.6 |
| 90.0 | | E94BS□E1724 | ERBG043D03K0 | 4.3 | 3.00 | 450 | | 11.8 |
| 105 | | E94BS□E2024 | ERBG035D03K3 | 3.5 | 3.30 | 495 | | 12.6 |
| 130 | | E94BS□E2454 | ERBG028D04K1 | 2.8 | 4.10 | 615 | | 486 x 426 x 302 |
| 150 | | E94BS□E2924 | ERBG023D05K6 | 2.3 | 5.60 | 840 | 15.9 | |
| 190 | | E94BS□E3664 | ERBG035D03K3 | 3.5 | 3.30 | 495 | 486 x 326 x 302 | 12.6 |
| 240 | | E94BS□E4604 | ERBG028D04K1 | 2.8 | 4.10 | 615 | 486 x 426 x 302 | 12.8 |

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

Servo Drives 9400 HighLine

Accessories



Mains chokes

A mains choke is an inductive resistor which is connected in the mains cable of the power supply module. The use of a mains choke provides the following advantages:

- **Fewer effects on the mains:**
The wave form of the mains current is a close approximation to a sine wave.
- **Reduction in the effective mains current:**
Reduction of mains, cable and fuse loads

Mains chokes can be used without restrictions in conjunction with RFI filters and/or sinusoidal filters.

Please note:

: The use of a mains choke slightly reduces the mains voltage at the input of the inverter - the typical voltage drop across the mains choke at the rated values is around 4%.



Mains choke

4.3

| Typical motor power | Mains voltage | Product key | | Rated current | Dimensions | Mass |
|---------------------------|---------------------|--------------|----------------|---------------|-----------------------|------|
| | | Single Drive | Mains choke | | | |
| 4-pole asynchronous motor | | | | | | |
| P | U_{AC} | | | I_N | $h \times b \times t$ | m |
| [kW] | [V] | | | [A] | [mm] | [kg] |
| 0.37 | 3 AC 340 ... 528 | E94AS□E0024 | EZAELN3002B153 | 2.00 | 56 x 77 x 100 | 0.5 |
| 0.75 | | E94AS□E0034 | EZAELN3004B742 | 4.00 | 60 x 95 x 114 | 1.3 |
| 1.50 | | E94AS□E0044 | EZAELN3006B492 | 6.00 | 69 x 95 x 117 | 1.5 |
| 3.00 | | E94AS□E0074 | EZAELN3010B292 | 10.0 | 85 x 120 x 134 | 2.0 |
| 5.50 | | E94AS□E0134 | EZAELN3020B152 | 20.0 | 95 x 155 x 162 | 3.8 |
| 7.50 | | E94AS□E0174 | EZAELN3025B122 | 25.0 | 110 x 155 x 167 | 5.8 |
| 11.0 | | E94AS□E0244 | EZAELN3035B841 | 35.0 | | 6.0 |

- The mains choke is integrated in the Single Drives as of a 32 A rated current.

Servo Drives 9400 HighLine

Accessories



RFI and mains filters

RFI filters

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.

| Typical motor power | Mains voltage | Product key | | Rated current | Power loss | Max. cable length | | Dimensions | Mass |
|---------------------|---------------------|--------------|-------------|----------------|----------------|------------------------------------|------------------------------------|----------------|------|
| | | Single Drive | RFI filter | | | shielded C1 with external measures | shielded C2 with external measures | | |
| P | U _{AC} | | | I _N | P _V | I _{max} | I _{max} | h x b x t | m |
| [kW] | [V] | | | [A] | [kW] | [m] | [m] | [mm] | [kg] |
| 0.37 | 3 AC 340 ... 528 | E94AS□E0024 | E94AZRS0044 | 3.50 | 0.004 | 0 | 50 | 522 x 60 x 60 | 1.8 |
| 0.75 | | E94AS□E0034 | | | | | | | |
| 1.50 | | E94AS□E0044 | E94AZRS0104 | 10.0 | 0.008 | | | 522 x 90 x 60 | 2.3 |
| 3.00 | | E94AS□E0074 | | | | | | | |
| 5.50 | | E94AS□E0134 | E94AZRS0294 | 29.0 | 0.022 | | | 522 x 120 x 60 | 3.6 |
| 7.50 | | E94AS□E0174 | | | | | | | |
| 11.0 | | E94AS□E0244 | E94AZRS0544 | 54.0 | 0.050 | 670 x 201 x 60 | 9.0 | | |
| 15.0 | | E94AS□E0324 | | | | | | | |
| 22.0 | | E94AS□E0474 | E94AZRS0954 | 95.0 | 0.070 | 780 x 261 x 60 | 13.0 | | |
| 30.0 | | E94AS□E0594 | | | | | | | |
| 45.0 | | E94AS□E0864 | | | | | | | |
| 55.0 | | E94AS□E1044 | | | | | | | |

4.3

| Typical motor power | Mains voltage | Product key | | Rated current | Power loss | Max. cable length | Dimensions | Mass |
|---------------------|---------------------|--------------|-------------|----------------|----------------|-------------------|-----------------|------|
| | | Single Drive | RFI filter | | | | | |
| P | U _{AC} | | | I _N | P _V | I _{max} | h x b x t | m |
| [kW] | [V] | | | [A] | [kW] | [m] | [mm] | [kg] |
| 75.0 | 3 AC 340 ... 528 | E94BS□E1454 | E94AZRS1804 | 180 | 0.014 | 150 | 264 x 135 x 265 | 7.9 |
| 90.0 | | E94BS□E1724 | | | | | | |
| 105 | | E94BS□E2024 | E94AZRS3004 | 300 | 0.021 | | | 12.0 |
| 130 | | E94BS□E2454 | | | | | | |
| 150 | | E94BS□E2924 | E94AZRS4154 | 415 | 0.027 | | | |
| 190 | | E94BS□E3664 | | | | | | |
| 240 | | E94BS□E4604 | | | | | | |

- Filter identifier for E94B:
 type: E94AZRS1804 - Filter identifier: 3F480-180.290EM
 type: E94AZRS3004 - Filter identifier: 3F480-300.290EM
 type: E94AZRS4154 - Filter identifier: 3F480-415.290EM.

Servo Drives 9400 HighLine

Accessories



RFI and mains filters

Mains filters

A mains filter is a combination of mains choke and RFI filter in a single 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

4.3

| Typical motor power | Mains voltage | Product key | | Rated current | Voltage drop | Max. cable length | | Dimensions | Mass |
|---------------------------|---------------------|--------------|--------------|---------------|--------------|------------------------------------|------------------------------------|---------------|------|
| | | Single Drive | Mains filter | | | shielded C1 with external measures | shielded C2 with external measures | | |
| 4-pole asynchronous motor | | | | | | | | | |
| P | U_{AC} | | | I_N | U | I_{max} | I_{max} | h x b x t | m |
| [kW] | [V] | | | [A] | [V] | [m] | [m] | [mm] | [kg] |
| 0.37 | 3 AC 340 ... 528 | E94AS□E0024 | E94AZMS0034 | 3.20 | 10.0 | 25 | 50 | 522 x 60 x 60 | 3.3 |
| 0.75 | | E94AS□E0034 | | | | | | | |
| 1.50 | | E94AS□E0044 | E94AZMS0094 | 9.00 | | | 100 | 522 x 90 x 60 | 3.9 |
| 3.00 | | E94AS□E0074 | | | | | | | |
| 5.50 | | E94AS□E0134 | E94AZMS0184 | 18.0 | 7.4 | | 522 x 120 x 60 | 8.4 | |
| 7.50 | | E94AS□E0174 | | | | | | | |
| 11.0 | | E94AS□E0244 | E94AZMS0314 | 31.0 | 7.3 | | | 8.8 | |

Servo Drives 9400 HighLine

Accessories



Sinusoidal filters

A sinusoidal filter in the motor cable limits the rate of voltage rise and the capacitive charge/discharge currents that occur during inverter operation. In combination with the specified 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 standard 0 to 550 V asynchronous motors
- Operation only with V/f or V/f² characteristic control
- Set the switching frequency permanently to the specified value
- Limit the output frequency of the Servo Drives 9400 to the specified value



Sinusoidal filters

| Typical motor power | Mains voltage | Product key | | | | Rated inductance | Switching frequency | Mass |
|---------------------|---------------------|--------------|--------------|--------------|-------------------|------------------|---------------------|--------------|
| | | Single Drive | RFI filter | Mains filter | Sinusoidal filter | | | |
| P | U _{AC} | | | | | L _N | f _{ch} | m |
| [kW] | [V] | | | | | [mH] | [kHz] | [kg] |
| 0.37 | 3 AC 340 ... 528 | E94AS□E0024 | | E94AZMS0034 | EZS3-004A200 | 11.0 | 4 8 | 4.0 |
| 0.75 | | E94AS□E0034 | | E94AZMS0094 | EZS3-010A200 | | | |
| 1.50 | | E94AS□E0044 | | | | E94AZMS0184 | | EZS3-024A200 |
| 3.00 | | E94AS□E0074 | | E94AZMS0314 | EZS3-037A200 | | | |
| 5.50 | | E94AS□E0134 | E94AZRS0544 | | | EZS3-048A200 | 1.20 | 25.5 |
| 7.50 | | E94AS□E0174 | | EZS3-061A200 | 1.00 | | | |
| 11.0 | | E94AS□E0244 | EZS3-072A200 | | | 0.95 | 37.0 | |
| 15.0 | | E94AS□E0324 | | E94AZRS0954 | EZS3-115A200 | | | 0.70 |
| 22.0 | | E94AS□E0474 | EZS3-150A200 | | | 0.50 | 69.0 | |
| 30.0 | | E94AS□E0594 | | | | | | |
| 45.0 | | E94AS□E0864 | | | | | | |
| 55.0 | | E94AS□E1044 | | | | | | |

4.3

| Typical motor power | Mains voltage | Product key | | Max. output frequency | Rated inductance | Switching frequency | Mass |
|---------------------|---------------------|---------------------------|----------------------------|----------------------------|------------------|---------------------|-------|
| | | Single Drive | Sinusoidal filter | | | | |
| P | U _{AC} | | | f _{max, 2} | L _N | f _{ch} | m |
| [kW] | [V] | | | [Hz] | [mH] | [kHz] | [kg] |
| 75.0 | 3 AC 340 ... 528 | E94BS□E1454 | EZS3-180A200 ²⁾ | | 0.40 | 2 4 | 64.0 |
| 90.0 | | E94BS□E1724 | EZS3-250A200 ²⁾ | | 0.35 | | 77.0 |
| 105 | | E94BS□E2024 | | EZS3-350A200 ²⁾ | | | |
| 130 | | E94BS□E2454 | EZS3-480A200 ²⁾ | | 0.14 | | 189.0 |
| 150 | | E94BS□E2924 | | EZS3-350A200 ²⁾ | | 0.21 | |
| 190 | | E94BS□E3664 | | | | | |
| 240 | | E94BS□E4604 ¹⁾ | | | | | |

¹⁾ Two sinusoidal filters must be connected in parallel

²⁾ If the parameters for devices over 75 kW/145 A are set for operation with "increased rated output current" (code C01199), different assignments may be necessary.





Servo Drives 9400 HighLine

Accessories



Rated data for power supply modules

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

| | | |  |  |  |  |
|----------------------------------|------------|------|---|---|---|---|
| Product key | | | | | | |
| Power supply module | | | E94APNE0104 | E94APNE0364 | E94APNE1004 | E94APNE2454 |
| Rated power | | | | | | |
| With mains filter/mains choke | P_N | [kW] | 4.90 | 17.5 | 48.6 | 119 |
| Without mains filter/mains choke | P_N | [kW] | 3.60 | 13.0 | 36.2 | 88.6 |
| Mains voltage range | | | 3/PE AC 340 V-0% ... 528 V+0%, 45 Hz-0% ... 65 Hz+0% | | | |
| Rated mains current | | | | | | |
| | $I_{N,AC}$ | [A] | 8.0 | 29.0 | 82.0 | 200.0 |
| Rated DC-bus current | | | | | | |
| | $I_{N,DC}$ | [A] | 10.0 | 36.0 | 100.0 | 245.0 |

4.3

Data for 60 s overload

| | | | | | | |
|---------------------------------------|--------------|------|-------|------|-------|-------|
| Max. DC-bus current | | | | | | |
| | I_{max} | [A] | 15.0 | 54.0 | 150.0 | 368.0 |
| Reduced DC-bus current | | | | | | |
| | $I_{red,DC}$ | [A] | 7.5 | 27.0 | 75.0 | 183.5 |
| Overload time | | | | | | |
| | t_{ol} | [s] | 120.0 | | | |
| Recovery time | | | | | | |
| | t_{re} | [s] | 60.0 | | | |
| Max. output power¹⁾ | | | | | | |
| | $P_{max,1}$ | [kW] | 7.4 | 26.3 | 72.9 | 179.0 |

Data for 0.5 s overload

| | | | | | | |
|--|--------------|------|------|-------|-------|-------|
| Max. short-time DC-bus current | | | | | | |
| | I_{max} | [A] | 40.0 | 108.0 | 200.0 | 368.0 |
| Reduced DC-bus current | | | | | | |
| | $I_{red,DC}$ | [A] | 7.5 | 27.0 | 75.0 | 183.5 |
| Overload time | | | | | | |
| | t_{ol} | [s] | 0.5 | | | |
| Recovery time | | | | | | |
| | t_{re} | [s] | 4.5 | | | |
| Max. short-time output power¹⁾ | | | | | | |
| | $P_{max,2}$ | [kW] | 19.6 | 52.5 | 146.0 | 357.0 |

¹⁾ Mains filter required; if no mains filter is installed, the stated values for P_{max} decrease





Servo Drives 9400 HighLine

Accessories



Rated data for power supply modules

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

| | | |  |  |  |  |
|----------------------------------|------------|------|---|---|---|---|
| Product key | | | | | | |
| Power supply module | | | E94APNE0104 | E94APNE0364 | E94APNE1004 | E94APNE2454 |
| Rated power | | | | | | |
| With mains filter/mains choke | P_N | [kW] | 4.90 | 17.5 | 48.6 | 119 |
| Without mains filter/mains choke | P_N | [kW] | 3.60 | 13.0 | 36.2 | 88.6 |
| Rated DC-bus current | | | | | | |
| | $I_{N,DC}$ | [A] | 10.0 | 36.0 | 100.0 | 245.0 |
| Power loss | | | | | | |
| | P_V | [kW] | 0.055 | 0.11 | 0.23 | 0.55 |
| Dimensions | | | | | | |
| Height | h | [mm] | 350 | | | 383 |
| Height, including fastening | h | [mm] | 481 | | | 510 |
| Width | b | [mm] | 60 | 120 | 210 | 390 |
| Depth | t | [mm] | 288 | | | |
| Mass | | | | | | |
| | m | [kg] | 2.6 | 5.3 | 13.5 | 28.5 |

4.3

Brake chopper rated data

| | | | | | | |
|---|-------------|------|------|------|-------|-------|
| Rated power, Brake chopper | | | | | | |
| | P_N | [kW] | 2.6 | 8.7 | 17.0 | 30.3 |
| Max. output power, Brake chopper | | | | | | |
| | $P_{max,1}$ | [kW] | 19.5 | 43.8 | 105.1 | 187.7 |
| Running time | | | | | | |
| | t_{on} | [s] | 1.0 | | | |
| Recovery time | | | | | | |
| | t_{re} | [s] | 3.8 | 2.5 | 3.1 | |
| Min. brake resistance | | | | | | |
| | R_{min} | [Ω] | 27.0 | 12.0 | 5.0 | 2.8 |


Servo Drives 9400 HighLine

Accessories



Rated data for regenerative power supply modules

- ▶ The data is valid for operation at 3/PE AC 400 V.
- ▶ Mains filter required, please refer to the following pages

| | | |  | | | |
|-------------------------------|-------------|------|---|----------|-------------|----------|
| Product key | | | E94ARNE0134 | | E94ARNE0244 | |
| Supply- / regenerative module | | | | | | |
| Operating mode | | | Feed | Feedback | Feed | Feedback |
| Rated power | | | | | | |
| With mains filter/mains choke | P_N | [kW] | 15.0 | 7.50 | 27.0 | 13.5 |
| Mains voltage range | | | 3/PE AC 340 V-0% ... 528 V+0%, 45 Hz-0% ... 65 Hz+0% | | | |
| | U_{AC} | [V] | | | | |
| Rated mains current | | | | | | |
| | $I_{N, AC}$ | [A] | 26.0 | 13.0 | 47.0 | 23.5 |
| Rated DC-bus current | | | | | | |
| | $I_{N, DC}$ | [A] | 32.0 | 16.0 | 57.0 | 29.0 |

4.3

Data for 60 s overload

| Max. DC-bus current | | | | | | |
|------------------------|---------------|------|-------|------|------|------|
| | I_{max} | [A] | 48.0 | 24.0 | 86.0 | 44.0 |
| Reduced DC-bus current | | | | | | |
| | $I_{red, DC}$ | [A] | 20.0 | 9.8 | 35.0 | 18.0 |
| Overload time | | | 60.0 | | | |
| | t_{ol} | [s] | | | | |
| Recovery time | | | 120.0 | | | |
| | t_{re} | [s] | | | | |
| Max. output power | | | | | | |
| | $P_{max, 1}$ | [kW] | 22.4 | 11.2 | 40.5 | 20.2 |

Data for 0.5 s overload

| Max. short-time DC-bus current | | | | | | |
|--------------------------------|---------------|------|------|------|-------|------|
| | I_{max} | [A] | 96.0 | 48.0 | 171.0 | 87.0 |
| Reduced DC-bus current | | | | | | |
| | $I_{red, DC}$ | [A] | 20.0 | 9.8 | 35.0 | 18.0 |
| Max. short-time output power | | | | | | |
| | $P_{max, 2}$ | [kW] | 44.9 | 22.4 | 81.1 | 40.5 |
| with brake chopper support | $P_{max, 2}$ | [kW] | | 35.1 | | 59.6 |


Servo Drives 9400 HighLine

Accessories



Rated data for regenerative power supply modules

- ▶ The data is valid for operation at 3/PE AC 400 V.
- ▶ Mains filter required, please refer to the following pages

| | | |  | | | |
|-------------------------------|------------|------|---|----------|-------------|----------|
| Product key | | | E94ARNE0134 | | E94ARNE0244 | |
| Supply- / regenerative module | | | | | | |
| Operating mode | | | Feed | Feedback | Feed | Feedback |
| Rated power | | | | | | |
| With mains filter/mains choke | P_N | [kW] | 15.0 | 7.50 | 27.0 | 13.5 |
| Rated DC-bus current | | | | | | |
| | $I_{N,DC}$ | [A] | 32.0 | 16.0 | 57.0 | 29.0 |
| Power loss | | | | | | |
| | P_V | [kW] | 0.15 | 0.11 | 0.23 | 0.19 |
| Dimensions | | | | | | |
| Height | h | [mm] | 350 | | | |
| Height, including fastening | h | [mm] | 481 | | | |
| Width | b | [mm] | 120 | | | |
| Depth | t | [mm] | 288 | | | |
| Mass | | | | | | |
| | m | [kg] | 6.0 | | | |

4.3

Brake chopper rated data

| Rated power, Brake chopper | | | | |
|---|-------------|------|------|------|
| | P_N | [kW] | 4.7 | 9.3 |
| Max. output power, Brake chopper | | | | |
| | $P_{max,1}$ | [kW] | 19.5 | 29.2 |
| Running time | | | | |
| | t_{on} | [s] | 1.0 | |
| Recovery time | | | | |
| | t_{re} | [s] | 4.2 | 3.9 |
| Min. brake resistance | | | | |
| | R_{min} | [Ω] | 27.0 | 18.0 |

Servo Drives 9400 HighLine

Accessories



Control connections

| Mode | Power supply modules | Regenerative power supply modules |
|-----------------------------|--|--|
| Analog inputs | | |
| Number | | 2 |
| Resolution | | 11 bits + sign |
| Value range | | +/- 10V 1 x switchable 20 mA |
| Analog outputs | | |
| Number | | 2 |
| Resolution | | 10 bits + sign |
| Value range | | +/- 10V max. 2 mA |
| Digital inputs | | |
| Number | 1 Permanently configured | 8 |
| Switching level | PLC (IEC 61131-2) | |
| Max. input current | 8 mA | |
| Digital outputs | | |
| Number | 4 fest konfiguriert | 4 |
| Switching level | PLC (IEC 61131-2) | |
| Max. output current | 50 mA per output | |
| Load capacity | >480 Ω at 24 V | |
| External DC supply | | |
| Rated voltage | 24 V in accordance with IEC 61131-2 | |
| Voltage range | 19.2 ... 28.8 V, max. residual ripple ± 5% | |
| Current | 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⁾ |
| Interfaces | | |
| CANopen | | Integrated |
| Extensions | | Via slot MXI 2: extension 2 Via slot MXI 1: extension 1 |
| State bus | | Integrated |
| Memory | | Slot MMI |
| Safety engineering | | Slot MSI |
| Drive interface | | |
| Resolver input | | Integrated (no function) |
| Mains synchronisation input | | Integrated Sub-D, 15-pin |

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).

Servo Drives 9400 HighLine

Accessories



Brake resistors of the regenerative power supply modules

Assignment of brake resistors to the supply and regenerative power supply modules is shown in the tables below.



Brake resistor 27 ohms

Brake resistors for power supply modules

| Rated power | Mains voltage | Product key | | Rated resistance | Rated power | Thermal capacity | Dimensions | Mass |
|----------------------------------|-----------------------------------|---------------------|----------------|------------------|-------------|------------------|-----------------------|------|
| Without mains filter/mains choke | | Power supply module | Brake resistor | | | | | |
| P_N | U_{AC} | | | R_N | P_N | C_{th} | $h \times b \times t$ | m |
| [kW] | [V] | | | [Ω] | [kW] | [KWs] | [mm] | [kg] |
| 3.60 | 3 AC 340 ... 528 ¹⁾ | E94APNE0104 | ERBP027R200W | 27.0 | 0.20 | 30.0 | 320 x 41 x 122 | 1.0 |
| | | | ERBS027R600W | | 0.60 | 90.0 | 550 x 110 x 105 | 3.1 |
| | | | ERBS027R01K2 | | 1.20 | 180 | 1020 x 110 x 105 | 5.6 |
| 13.0 | | E94APNE0364 | ERBG012R01K9 | 12.0 | 1.90 | 285 | 486 x 236 x 302 | 13.0 |
| | | | ERBG012R05K2 | | 5.20 | 750 | 486 x 426 x 302 | 28.0 |
| 36.2 | | E94APNE1004 | ERBG005R02K6 | 5.0 | 2.60 | 390 | 486 x 326 x 302 | 12.6 |
| 88.6 | | E94APNE2454 | ERBG028D04K1 | 2.8 | 4.10 | 615 | 486 x 426 x 302 | 12.8 |

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

Brake resistors for regenerative power supply modules

| Rated power | Mains voltage | Product key | | Rated resistance | Rated power | Thermal capacity | Dimensions | Mass |
|-------------------------------|-----------------------------------|-------------------------------|----------------|------------------|-------------|------------------|-----------------------|------|
| With mains filter/mains choke | | Supply- / regenerative module | Brake resistor | | | | | |
| P_N | U_{AC} | | | R_N | P_N | C_{th} | $h \times b \times t$ | m |
| [kW] | [V] | | | [Ω] | [kW] | [KWs] | [mm] | [kg] |
| 15.0 | 3 AC 340 ... 528 ²⁾ | E94ARNE0134 | ERBP027R200W | 27.0 | 0.20 | 30.0 | 320 x 41 x 122 | 1.0 |
| | | | ERBS027R600W | | 0.60 | 90.0 | 550 x 110 x 105 | 3.1 |
| | | | ERBS027R01K2 | | 1.20 | 180 | 1020 x 110 x 105 | 5.6 |
| 27.0 | | E94ARNE0244 | ERBP018R300W | 18.0 | 0.30 | 30.0 | 240 x 41 x 122 | 1.4 |
| | | | ERBS018R01K2 | | 1.20 | 180 | 1020 x 110 x 105 | 5.6 |
| | | | ERBS018R02K8 | | 2.80 | 420 | 1110 x 200 x 105 | 12.0 |

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

Servo Drives 9400 HighLine

Accessories



Mains chokes of the power supply modules

A mains choke is an inductive resistor which is connected in the mains cable of the power supply module. The use of a mains choke provides the following advantages:

- **Fewer effects on the mains:**
The wave form of the mains current is a close approximation to a sine wave.
- **Reduction in the effective mains current:**
Reduction of mains, cable and fuse loads

Mains chokes can be used without restrictions in conjunction with RFI filters and/or sinusoidal filters.

Please note:

: The use of a mains choke slightly reduces the mains voltage at the input of the inverter - the typical voltage drop across the mains choke at the rated values is around 4%.



Mains choke

| Rated power | Mains voltage | Product key | | Rated current | Dimensions | Mass |
|-------------|---------------------|---------------------|----------------|---------------|-----------------------|------|
| | | Power supply module | Mains choke | | | |
| P_N | U_{AC} | | | I_N | $h \times b \times t$ | m |
| [kW] | [V] | | | [A] | [mm] | [kg] |
| 4.90 | 3 AC 340 ... 528 | E94APNE0104 | EZAELN3008B372 | 8.00 | 85 x 120 x 137 | 1.9 |
| 17.5 | | E94APNE0364 | EZAELN3030B982 | 30.0 | 110 x 155 x 167 | 5.9 |
| 48.6 | | E94APNE1004 | EZAELN3080B371 | 80.0 | 125 x 210 x 239 | 12.5 |
| 119 | | E94APNE2454 | EZAELN3200B151 | 200 | 352 x 144 x 264 | 32.0 |

Servo Drives 9400 HighLine

Accessories



Interference suppression of the regenerative power supply modules

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

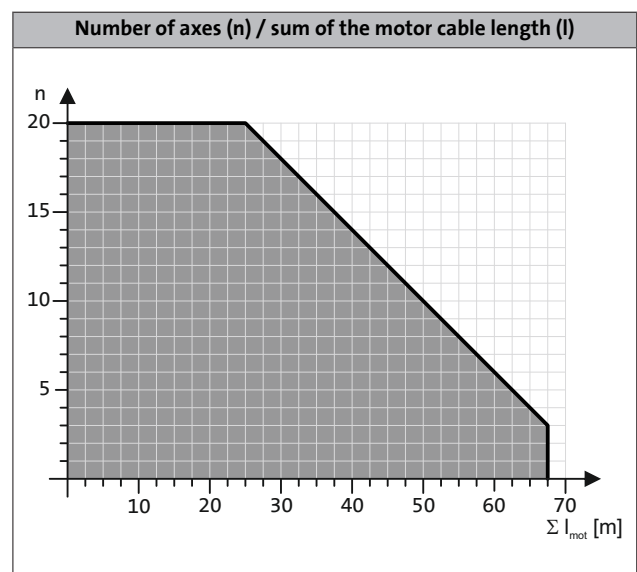
RFI filters

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

4.3

| Rated power | Mains voltage | Product key | | Rated current | Power loss | Max. cable length | Dimensions | Mass |
|----------------------------------|---------------------|---------------------|-------------|---------------|------------|---------------------|-----------------------|------|
| | | Power supply module | RFI filter | | | | | |
| Without mains filter/mains choke | | | | | | Reference group C2 | | |
| P_N | U_{AC} | | | I_N | P_V | l_{max} | $h \times b \times t$ | m |
| [kW] | [V] | | | [A] | [kW] | [m] | [mm] | [kg] |
| 3.60 | 3 AC 340 ... 528 | E94APNE0104 | E94AZRP0084 | 8.00 | 0.020 | 6 axes of 10 m each | 485 x 60 x 261 | 4.2 |
| 13.0 | | E94APNE0364 | E94AZRP0294 | 29.0 | 0.050 | | | 4.5 |
| 36.2 | | E94APNE1004 | E94AZRP0824 | 82.0 | 0.080 | | 490 x 209 x 272 | 18.5 |
| 88.6 | | E94APNE2454 | E94AZRP2004 | 200 | 0.15 | | | 20.5 |

The following diagram shows the possible number of axes and the possible sum of motor cable lengths to ensure compliance with interference suppression according to category C2.





Interference suppression of the regenerative power supply modules

Mains filters

A mains filter is a combination of mains choke and RFI filter in a single 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.



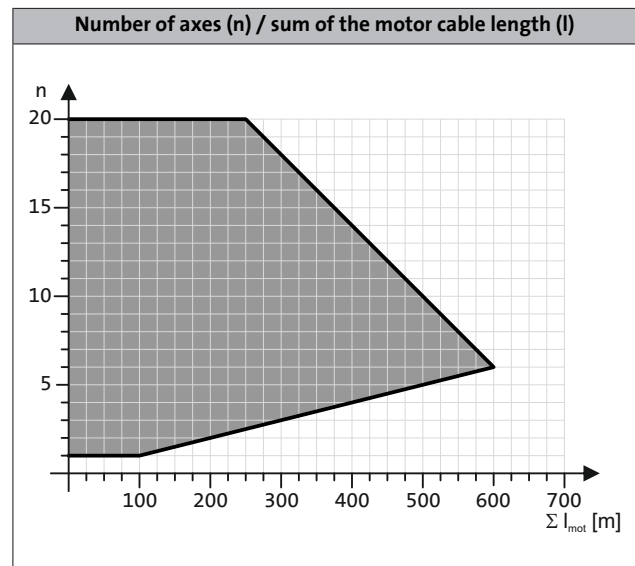
Mains filter, can be mounted beside the power supply modules (right) or the regenerative power supply modules (left)

RFI filters

| Rated power | Mains voltage | Product key | | Rated current | Voltage drop | Max. cable length | Dimensions | Mass |
|-------------------------------|---------------------|---------------------|---------------------------|---------------|--------------|----------------------|-----------------------|------|
| | | Power supply module | Mains filter | | | | | |
| With mains filter/mains choke | | | | | | Reference group C2 | | |
| P_N | U_{AC} | | | I_N | U | I_{max} | $h \times b \times t$ | m |
| [kW] | [V] | | | [A] | [V] | [m] | [mm] | [kg] |
| 4.90 | 3 AC 340 ... 528 | E94APNE0104 | E94AZMP0084 | 8.00 | 10.0 | 10 axes of 50 m each | 485 x 90 x 261 | 8.6 |
| 17.5 | | E94APNE0364 | E94AZMP0294 | 29.0 | 7.3 | | 485 x 120 x 261 | 16.5 |
| 48.6 | | E94APNE1004 | E94AZMP0824 ¹⁾ | 82.0 | 6.4 | | 490 x 270 x 272 | 29.0 |
| 119 | | E94APNE2454 | E94AZMP2004 ¹⁾ | 200 | 6.3 | | 490 x 330 x 272 | 52.0 |

¹⁾ External 24 V supply from a safely separated power supply unit (SELV/PELV) required for integrated fan.

The following diagram shows the possible number of axes and the possible sum of motor cable lengths to ensure compliance with interference suppression according to category C2.



Servo Drives 9400 HighLine

Accessories



Interference suppression of the regenerative power supply modules

Mains filters for regenerative power supply modules

| Rated power | Mains voltage | Product key | | Rated current | Voltage drop | Max. cable length | Dimensions | Mass |
|-------------------------------|---------------------|-------------------------------|------------------------------|---------------|--------------|----------------------|-----------------------|------|
| | | Supply- / regenerative module | Mains filter | | | | | |
| With mains filter/mains choke | | | | | | Reference group C2 | | |
| P_N | U_{AC} | | | I_N | U | I_{max} | $h \times b \times t$ | m |
| [kW] | [V] | | | [A] | [V] | [m] | [mm] | [kg] |
| 15.0 | 3 AC 340 ... 528 | E94ARNE0134 | E94AZMR0264SDB ¹⁾ | 26.0 | 6.3 | 6 axes of 10 m each | 485 x 149 x 272 | 25.0 |
| | | | E94AZMR0264LDB ¹⁾ | | | 10 axes of 50 m each | | 26.0 |
| 27.0 | | E94ARNE0244 | E94AZMR0474SDB ¹⁾ | 47.0 | 6.2 | 6 axes of 10 m each | 485 x 209 x 272 | 36.0 |
| | | | E94AZMR0474LDB ¹⁾ | | | 10 axes of 50 m each | | 37.0 |

¹⁾ External 24 V supply through safely separated power supply unit (SELV/PELV) required for integrated mains voltage recording.

Servo Drives 9400 HighLine

Accessories



DC input module

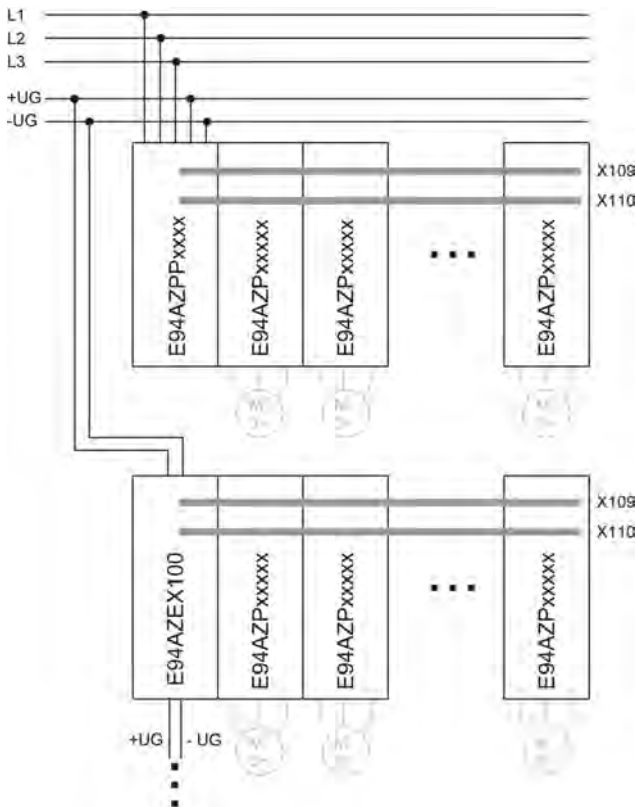
Via a DC input module, an axis module interconnection can be supplied with power from a central DC source (power supply module, Single Drive axis modules, Multi Drive axis modules). This is required for example if a drive system with a multi-level structure installed in a control cabinet is to be supplied 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 with regard to integration into the system wiring. This provides an ideal way of connecting multi-row axis modules in particular.



DC input module
100 A

| Mode | Product key | Dimensions | Mass |
|-----------------------|--------------|---------------|------|
| | Input module | | |
| | | h x b x t | m |
| | | [mm] | [kg] |
| DC input module 100 A | E94AZEX100 | 422 x 60 x 95 | 0.9 |

4.3



Wiring example for multi-row mounting of axis modules

Servo Drives 9400 HighLine

Accessories



DC-bus connection

The Servo Drives 9400 HighLine can be operated in a DC-bus connection. The 400 V devices have a direct connection for this.

The components listed here are used to interconnect the individual devices for operation with or without a regenerative power supply module. With a DC-bus connection, energy can be exchanged between the individual devices. This makes particular sense with cyclic operation of multiple devices.

The design of a DC-bus connection requires extremely precise dimensioning of the devices' energy requirements among one another.

Lenze Sales is happy to advise you here to ensure the most energy-efficient drive dimensioning. The components listed here form the basis for this.

- ▶ Two DC fuses are always required.
- ▶ The fuse holders EFH10005 and EFH10004 are single-pole, while the holders EFH20005 and EFH20007 are 2-pole.
- ▶ The DC fuses are not UL-approved
- ▶ Please consult Lenze Sales to ensure the right dimensioning.

Components for DC-bus connection

| Product key | Rated current | Design |
|---------------|---------------|-------------------------|
| DC fuses | | |
| | I_N | |
| | [A] | |
| EFSGR0060AYHN | 6.00 | 14x51 without indicator |
| EFSGR0100AYHN | 10.0 | |
| EFSGR0160AYHN | 16.0 | |
| EFSGR0200AYHN | 20.0 | |
| EFSGR0250AYHN | 25.0 | |
| EFSGR0320AYHN | 32.0 | |
| EFSGR0400AYHN | 40.0 | |
| EFSGR0060AYHK | 6.00 | 14x51 with indicator |
| EFSGR0100AYHK | 10.0 | |
| EFSGR0160AYHK | 16.0 | |
| EFSGR0200AYHK | 20.0 | |
| EFSGR0250AYHK | 25.0 | |
| EFSGR0320AYHK | 32.0 | |
| EFSGR0400AYHK | 40.0 | |
| EFSGR1000ANVN | 100 | NH1 |
| EFSGR2000ANVN | 200 | |
| EFSGR2500ANVN | 250 | |
| EFSGR3500ANVN | 350 | NH2 |
| EFSGR4000ANVN | 400 | |
| EFSGR5000ANVN | 500 | |

| Product key | Rated current | Design |
|---------------|---------------|-------------------------|
| DC fuses | | |
| | I_N | |
| | [A] | |
| EFSGR0120AYIN | 12.0 | 22x58 without indicator |
| EFSGR0160AYIN | 16.0 | |
| EFSGR0200AYIN | 20.0 | |
| EFSGR0250AYIN | 25.0 | |
| EFSGR0320AYIN | 32.0 | |
| EFSGR0400AYIN | 40.0 | |
| EFSGR0500AYIN | 50.0 | |
| EFSGR0630AYIN | 63.0 | |
| EFSGR0800AYIN | 80.0 | |
| EFSGR1000AYIN | 100 | |
| EFSGR0120AYIK | 12.0 | 22x58 with indicator |
| EFSGR0160AYIK | 16.0 | |
| EFSGR0200AYIK | 20.0 | |
| EFSGR0250AYIK | 25.0 | |
| EFSGR0320AYIK | 32.0 | |
| EFSGR0400AYIK | 40.0 | |
| EFSGR0500AYIK | 50.0 | |
| EFSGR0630AYIK | 63.0 | |
| EFSGR0800AYIK | 80.0 | |
| EFSGR1000AYIK | 100 | |

4.3

| Mode | Features | Product key |
|-----------|---|-------------|
| DC busbar | <ul style="list-style-type: none"> • Busbar system 14 x 51 • DC busbar length 1m, cross-section 25 mm² | EWZ0036 |
| | <ul style="list-style-type: none"> • Busbar system 22 x 58 • DC busbar length 1m, cross-section 25 mm² | EWZ0037 |
| End cap | <ul style="list-style-type: none"> • End caps for DC busbar (packaging unit 10 pcs) | EWZ0038 |
| Terminal | <ul style="list-style-type: none"> • Single-pole terminal for internal supply | EWZ0039 |

Servo Drives 9400 HighLine

Accessories



DC-bus connection

DC fuses size 14 x 51 mm

| Typical motor power 4-pole asynchronous motor | Mains voltage U_{AC} | Product key | | | | | | | |
|--|---------------------------|--------------|-------------|---------------|----------|---------------|----------|---------------|----------|
| | | Single Drive | Multi Drive | DC fuses | | | | | |
| P [kW] | [V] | | | | | | | | |
| 0.37 | 3 AC 340 ... 528 | E94AS□E0024 | | EFSGR0200AYHN | EFH20005 | EFSGR0200AYHK | EFH10005 | | |
| | | | E94AM□E0024 | | | | | | |
| 0.75 | | E94AS□E0034 | | | | | | | |
| | | | E94AM□E0034 | | | | | | |
| 1.50 | | E94AS□E0044 | | EFSGR0320AYHN | | EFH20005 | | EFSGR0320AYHK | EFH10005 |
| | | | E94AM□E0044 | EFSGR0200AYHN | | | | EFSGR0200AYHK | |
| 3.00 | | E94AS□E0074 | | EFSGR0320AYHN | | | | EFSGR0320AYHK | |
| | | | E94AM□E0074 | | | | | | |
| 4.00 | | | | E94AM□E0094 | | | | | |

4.3

DC fuses size 22 x 58 mm

| Typical motor power 4-pole asynchronous motor | Mains voltage U_{AC} | Product key | | | | | | | |
|--|---------------------------|--------------|-------------|---------------|----------|---------------|----------|---------------|---------------|
| | | Single Drive | Multi Drive | DC fuses | | | | | |
| P [kW] | [V] | | | | | | | | |
| 0.37 | 3 AC 340 ... 528 | E94AS□E0024 | | EFSGR0200AYIN | EFH20007 | EFSGR0200AYIK | EFH10004 | | |
| | | | E94AM□E0024 | | | | | | |
| 0.75 | | E94AS□E0034 | | | | | | | |
| | | | E94AM□E0034 | | | | | | |
| 1.50 | | E94AS□E0044 | | EFSGR0320AYIN | | EFH20007 | | EFSGR0320AYIK | EFH10004 |
| | | | E94AM□E0044 | EFSGR0200AYIN | | | | EFSGR0200AYIK | |
| 3.00 | | E94AS□E0074 | | EFSGR0320AYIN | | | | EFSGR0320AYIK | |
| | | | E94AM□E0074 | | | | | | |
| 4.00 | | | | E94AM□E0094 | | | | | |
| | | 5.50 | E94AS□E0134 | | | EFSGR0630AYIN | | | EFSGR0630AYIK |
| | | | E94AM□E0134 | | | | | | |
| 7.50 | | E94AS□E0174 | | | | | | | |
| | | | E94AM□E0174 | | | | | | |
| 11.0 | | E94AS□E0244 | | EFSGR1000AYIN | | | | EFSGR1000AYIK | |
| | | | E94AM□E0244 | | | | | | |
| 15.0 | | E94AS□E0324 | | | | | | | |
| | | E94AM□E0324 | | | | | | | |
| 22.0 | E94AS□E0474 | | | | | | | | |

Servo Drives 9400 HighLine

Accessories



DC-bus connection

NH1 and NH2 DC fuses

| Typical motor power 4-pole asynchronous motor | Mains voltage U_{AC} | Product key | | | | | |
|--|---------------------------|--------------|-------------|---------------|--|--|--|
| | | Single Drive | Multi Drive | DC fuses | | | |
| P [kW] | [V] | | | | | | |
| 11.0 | 3 AC 340 ... 528 | E94AS□E0244 | | EFSGR1000ANVN | | | |
| 15.0 | | E94AS□E0324 | | | | | |
| 22.0 | | E94AS□E0474 | | | | | |
| 30.0 | | E94AS□E0594 | | EFSGR2000ANVN | | | |
| 45.0 | | E94AS□E0864 | | EFSGR2500ANVN | | | |
| 55.0 | | E94AS□E1044 | | | | | |

- The inverters E94BS□E1454, E94BS□E1724, E94BS□E2024, E94BS□E2454, E94BS□E2924, E94BS□E3664, E94BS□E4604 come with an integrated DC fuse.

Servo Drives 9400 HighLine

Accessories



24 V power supply unit

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 can be selected with a voltage supply of 1 x 230 V AC or 3 x 400 V AC.

Single Drive axis modules generally do not require the use of the power supply unit. If, however, separate power supplies are needed for the control electronics and power section in 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 |
|---------------------|-------------|------|-----------------|-------------|-------------|-------------|-------------|-------------|
| Rated voltage | | | 230 | | | 400 | | |
| | $U_{N, AC}$ | [V] | 230 | | | 400 | | |
| Rated mains current | | | 0.8 | 1.2 | 2.3 | 0.3 | 0.6 | 1.0 |
| | $I_{N, AC}$ | [A] | 0.8 | 1.2 | 2.3 | 0.3 | 0.6 | 1.0 |
| Output voltage | | | DC 22.5 ...28.5 | | | | | |
| | U_{out} | [V] | DC 22.5 ...28.5 | | | | | |
| Rated current | | | 5.00 | 10.0 | 20.0 | 5.00 | 10.0 | 20.0 |
| | I_N | [A] | 5.00 | 10.0 | 20.0 | 5.00 | 10.0 | 20.0 |
| Dimensions | | | | | | | | |
| Height | h | [mm] | 130 | | | | | |
| Width | b | [mm] | 55 | 85 | 157 | 73 | 85 | 160 |
| Depth | t | [mm] | 125 | | | | | |
| Mass | | | | | | | | |
| | m | [kg] | 0.8 | 1.2 | 2.5 | 1.0 | 1.1 | 1.9 |

4.3

CAN bus connector

The connector is used to connect the CAN to inverters 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.



CAN bus connector

| Mode | Product key |
|---------------------------|-------------|
| CAN bus connector: Switch | EWZ0046 |

Servo Drives 9400 HighLine

Accessories



USB diagnostic adapter

The operation, parameter setting and diagnostics of the Inverter Drives 8400 and the Servo Drives 9400 via the L-force diagnostics is made with the keypad X400 or a PC. The connection of a PC can be made via a USB interface and the USB diagnostic adapter.


For connecting the USB diagnostic adapter with the L-force diagnostics interface (DIAG) at the inverter, three different connecting cables are separately available in the lengths 2.5 m, 5 m and 10 m. The connection can be established during operation. The engineering tools EASY Starter or Engineer can be used to carry out the operation, parameter setting or diagnostics of the inverters. Both tools have simple intuitive surfaces. This enables a quick and easy commissioning.

Optionally to the USB diagnostic adapter, the PC system bus adapter can be used. For this purpose, a CANopen interface must be available at the inverter.



USB diagnostic adapter incl. connecting cable to the PC

- The engineering tools EASY Starter or Engineer are used for operation, parameter setting and diagnostics of the inverters.

| Mode | | Features | Product key |
|------------------------|--|---|-------------|
| USB diagnostic adapter |  | <ul style="list-style-type: none"> • Input-side voltage supply via USB connection on PC • Output-side voltage supply via inverter's diagnostic interface • Diagnostic LEDs • Electrical isolation of PC and inverter • Hot-pluggable | E94AZCUS |

Connecting cables for USB diagnostic adapter

| Mode | Features | Product key |
|---|-----------------|-------------|
| Connecting cable for USB diagnostic adapter | • Length: 2.5 m | EWL0070 |
| | • Length: 5 m | EWL0071 |
| | • Length: 10 m | EWL0072 |

Servo Drives 9400 HighLine

Accessories




X400 keypad

As an alternative to the PC, the X400 keypad can be used for local operation, parameter setting or diagnostics. The X400 keypad plugs into the L-force diagnostics interface (DIAG) on the front of the inverter.




X400 keypad

| Mode | | Features | Slot | Product key |
|-------------|---|--|------|-------------|
| X400 keypad |  | <ul style="list-style-type: none"> • Menu navigation • Graphics display with background lightning for clear presentation of information • 4 navigation keys, 2 context-sensitive keys • Adjustable RUN/STOP function | DIAG | EZAEBK1001 |

4.3

X400 diagnosis terminal

| Mode | | Features | Slot | Product key |
|-------------------------|--|--|------|-------------|
| X400 diagnosis terminal |  | <ul style="list-style-type: none"> • X400 keypad in a robust housing • Also suitable for installation in the control cabinet door • incl. 2.5 m cable • IP20 degree of protection, IP65 for control cabinet installation on front face | DIAG | EZAEBK2001 |

Shield connection 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.

| Mode | Features | Product key |
|------------|--|---------------|
| Wire clamp | <ul style="list-style-type: none"> • Cable diameter: 4...15 mm • Packaging unit: 10 items | EZAMBHXM006/M |
| | <ul style="list-style-type: none"> • Cable diameter: 10...20 mm • Packaging unit: 10 items | EZAMBHXM003/M |
| | <ul style="list-style-type: none"> • Cable diameter: 15...28 mm • Packaging unit: 10 items | EZAMBHXM004/M |

Other accessories

Lenze offers a number of other automation components for the Servo Drives 9400. They do not form part of this product catalogue, but can be found in the Controller-based Automation catalogues.

13524141

Lenze SE
Hans-Lenze-Straße 1
D-31855 Aenzen
Phone: +49 (0)5154 82-0
Telefax: +49 (0)5154 82 28 00

www.Lenze.com

Lenze