

490 826

# Lenze



**Global Drive**

*Frequency inverters  
8200/9300 vector  
0.37 ... 90 kW*

## Product selection and orders

This catalog will help you to select and order the AC drive you need quickly and easily.

It features:

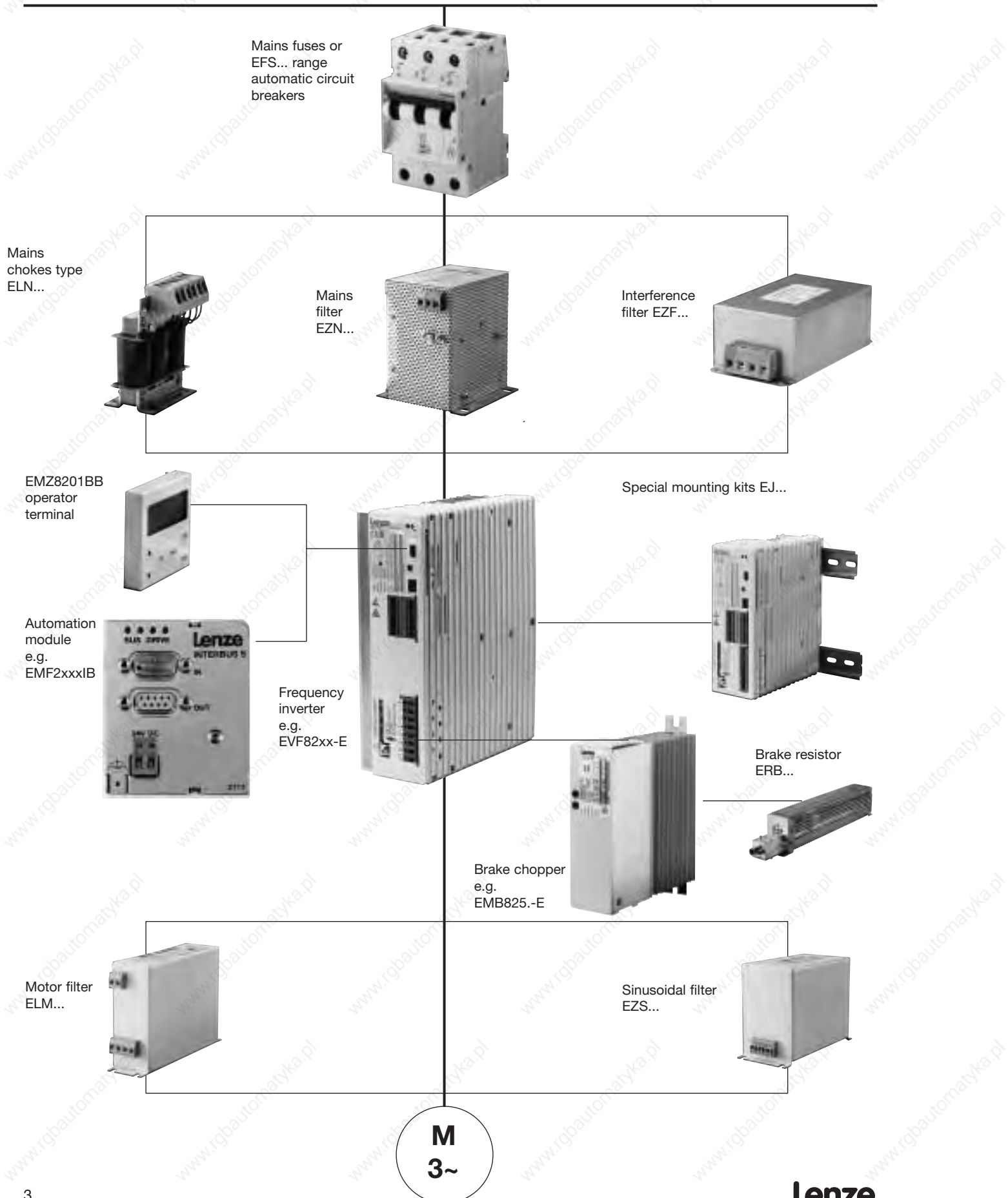
- Static frequency inverters for controlling three-phase AC motors
- Accessories for assembling and connecting the inverters
- Application examples
- Order forms



# Frequency inverter product information

## Overview

Mains



# **An introduction to Lenze**

## **Intelligent drives in automation**

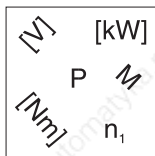
Application intelligence is the feature which sets the Global Drive controller apart. When used in machines, it offers designers enormous potential for reducing costs.

Starting with the Global Drive 8200 frequency inverters for use in standard applications or HVAC and pump drives, frequently used additional automation features (e.g. PID controller) have been integrated into the device.

The freely connectable internal control structure of the servo inverters, servo register control, servo cam and 9300 servo position controller eliminates the need for numerous external I/O devices. For example, complete position control has been integrated into the 9300 servo position controller via the software. Each device type provides technology functions which are able, for example, to execute subprocesses. The additional switching elements in the system can be evaluated via the control inputs and outputs or via the system bus.

There's only one name for intelligent drives: Global Drive.





## List of abbreviations

### Abbreviations used in this catalog

#### Drive controllers

|                    |       |                              |
|--------------------|-------|------------------------------|
| $U_{\text{mains}}$ | [V]   | Mains voltage                |
| $I_{\text{mains}}$ | [A]   | Mains current                |
| $U_{\text{DC}}$    | [V]   | DC bus voltage               |
| $I_r$              | [A]   | Rated current/Output current |
| $I_{\text{max}}$   | [A]   | Maximum output current       |
| $P_r$              | [kW]  | Rated motor power            |
| $S_r$              | [kVA] | Inverter output power        |
| $P_{\text{loss}}$  | [W]   | Inverter power loss          |
| $f_{\text{ch}}$    | [kHz] | Chopper frequency            |
| $f_{\text{max}}$   | [Hz]  | Set maximum frequency        |
| $f_d$              | [Hz]  | Field frequency              |
| $L$                | [mH]  | Inductance                   |
| $R$                | [Ω]   | Resistance                   |

#### General

|               |                                               |
|---------------|-----------------------------------------------|
| <b>82xxE</b>  | Types 8201 to 8204E and types 8211 to 8227E   |
| <b>820xE</b>  | Types 8201 to 8204E                           |
| <b>821xE</b>  | Types 8211 to 8218E (standard + Klima)        |
| <b>824xE</b>  | Types 8241 to 8246E (standard + Klima)        |
| <b>822xE</b>  | Types 8221 to 8227E (standard + Klima)        |
| <b>825xE</b>  | Types 8251 to 8253E                           |
| <b>93xxEV</b> | Types 9321EV to 9333EV                        |
| <b>AC</b>     | Alternating current/voltage                   |
| <b>DC</b>     | Direct current/voltage                        |
| <b>DIN</b>    | Deutsches Institut für Normung                |
| <b>EMC</b>    | Electromagnetic compatibility                 |
| <b>EN</b>     | European standard                             |
| <b>IEC</b>    | International Electrotechnical Commission     |
| <b>IP</b>     | International Protection Code                 |
| <b>NEMA</b>   | National Electrical Manufacturers Association |
| <b>VDE</b>    | Verband deutscher Elektrotechniker            |
| <b>CE</b>     | Communauté Européenne                         |
| <b>IM</b>     | International Mounting Code                   |

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## Application examples

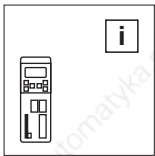
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## Lenze worldwide

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## Product information 8200

### A complete programme

- Frequency inverters for single-phase and three-phase mains connection
- Line-side and motor-side accessories
- Accessories for braking
- Accessories for networking with host system
- Device variants for special applications

### User-friendliness

An attachable operating module with an LCD display makes it easy to set parameters for and configure your drive system. The operating module also displays the status of the drive and is used for troubleshooting as well as for transferring parameters to other devices.

### Ready for immediate operation

The frequency inverters are preset for standard operation, e.g. with Lenze geared motors.

The preset parameters include:

- Maximum torque at low frequencies
- Safe start with maximum load
- Controlled acceleration and deceleration due to current limiting control
- Assignment of standard functions to inputs and outputs

### Communication options

The frequency inverters communicate with a higher-level host system via attachable communication modules:

- LECOM-AB: Networking via the RS232/485 interface
- LECOM-LI: Networking via optical fibres
- INTERBUS-S: Remote bus link with DRIVECOM profile 21
- System bus (CAN): Link to I/O terminals, as well as links between a number of inverters
- PROFIBUS: Serial coupling to PROFIBUS-DP

### HVAC version

The following features are amongst those required in HVAC and pump drive applications:

- PID controller
- Manual-remote changeover
- Belt monitoring

The 8200 HVAC and pump drive inverter meets these requirements.

### CE conformity

The 8200 range frequency inverters meet the requirements of the following EU guidelines:

- CE conformance according to the Low-Voltage Directive
- CE conformance with the EU's EMC directive for generic drive configurations with frequency inverters

### Overload capacity

Flux Torque Control (FTC) can make available up to 180% rated torque. This significantly increases the drive's torque and dynamics.

### Operational reliability

An adjustable slip compensation function compensates load-dependent speed deviations without complex speed feedback. The maximum current limitation ensures stable operation at all times with static and dynamic loads.

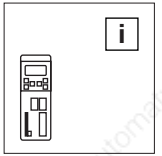
### Adaptability

The selectable form of the V/f characteristic enables the frequency inverter to be adapted to loads with constant or square-law torque. The integrated flying restart circuit enables the machine to be restarted even if the shaft is still rotating.

### Optimised performance

The performance of the devices can be optimised by applying 150% or 120% overload:

- 150% overload for example for transportation systems, packaging machines, etc.
- 120% overload for example for pumps, air conditioning systems, etc.



### **Versatility**

Many different types of three-phase AC motors can be controlled:

- Three-phase asynchronous motors
- Three-phase reluctance motors
- Motors for use in hazardous areas (pressure-enclosed)
- Medium-frequency motors up to max. 480 Hz

### **The correct setpoint source for every application:**

- Via setpoint potentiometer on the control terminals
- Via master reference voltage or master reference current on the control terminals
- Via the operating module on the frequency inverter
- Via a networking module directly from a host system

### **Energy-saving**

The power is adapted to the drive requirements, i.e. the momentary torque and current requirements.

### **Space in the control cabinet**

The frequency inverters are particularly compact as they can be mounted directly side by side, without the need for any clearance in between. Thanks to an extensive range of fixing accessories, they can be used in a variety of mounting positions.

### **Ease of controller connection**

The plug-in terminal system means that all control connections can be accessed easily from outside the unit.

### **A Lenze geared motor – Your ideal partner**

In terms of technology, Lenze geared motors are perfectly compatible with 8200 frequency inverters. Commissioning could not be easier, as the frequency inverter is configured for the motor data. There is no need to set motor data parameters. (You can find more information about Lenze geared motors in the corresponding catalog.)

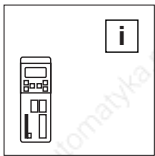
### **Special applications? No problem.**

Device variants mean that the ranges can be adapted for use in any application:

- Convection-cooled version 4.0 kW upwards

Please contact us should you require more information.





## Product information - 9300 vector

### A complete programme

- Frequency inverter for three-phase mains connection
- Line-side and motor-side accessories
- Accessories for braking
- Accessories for networking with host systems
- Device variants for special applications

### User-friendliness

An attachable operating module with an LCD display makes it easy to set parameters for and configure your drive system. The operating module also displays the status of the drive and is used for troubleshooting as well as for transferring parameters to other devices.

### Ready for immediate operation

The frequency inverters are preset for standard operation, e.g. with Lenze geared motors.

The preset parameters include:

- V/f characteristic control with adjusted slip compensation
- Controlled acceleration and deceleration due to preset current limiting control
- Assignment of standard functions to inputs and outputs

### Communication options

The frequency inverters communicate with a higher-level host system via attachable communication modules:

- LECOM-AB: Networking via the RS232/485 interface
- LECOM-LI: Networking via optical fibres
- INTERBUS-S: Remote bus link with DRIVECOM profile 21
- System bus (CAN): Link to I/O terminals, as well as links between a number of inverters (integrated)
- PROFIBUS: Serial coupling to PROFIBUS-DP

### CE conformity

9300 range frequency inverters meet the requirements of the following EU guidelines:

- CE conformance with the Low-Voltage Directive
- CE conformance with the EU's EMC directive for generic drive configurations with frequency inverters

### Overload capacity

Vector Control can make available up to twice the rated torque.

This significantly increases the drive's torque and dynamics.

### Operational reliability

Configurable slip compensation can be employed to compensate load-dependent fluctuations in speed without having to apply complex speed feedback. The maximum current limiting function ensures stable operation at every operating point for both static and dynamic loads.

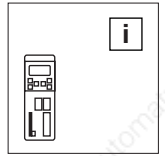
### Adaptability

The selectable form of the V/f characteristic enables the frequency inverter to be adapted to loads with constant or square-law torque. The integrated flying restart circuit enables the machine to be restarted even if the shaft is still rotating.

### Optimised performance

The performance of the devices can be optimised by applying 150% or 120% overload:

- 150% overload for example for transportation systems, packaging machines, etc.
- 120% overload for example for pumps, air conditioning systems, etc.



### **Versatility**

Many different types of three-phase AC motors can be controlled:

- Three-phase asynchronous motors
- Three-phase synchronous motors
- Three-phase reluctance motors
- Motors for use in hazardous areas (pressure-enclosed)
- Medium-frequency motors up to max. 600 Hz

### **The correct setpoint source for every application:**

- Via setpoint potentiometer on the control current on the control terminals
- Via master reference voltage or master reference current on the control terminals
- Via the operating module on the frequency inverter
- Via a networking module directly from a host system

### **Energy-saving**

The power is adapted to the drive requirements, i.e. the momentary torque and current requirements.

### **Space in the control cabinet**

The frequency inverters are particularly compact as they can be mounted directly side by side, without the need for any clearance in between. Thanks to an extensive range of fixing accessories, they can be used in a variety of mounting positions.

### **Increased functionality makes control significantly easier:**

- Pilot frequency for synchronous operation using simple connectors
- Vector Control for maximum dynamics and high starting torque
- Modular, freely configurable control/function blocks which can be linked incredibly easily
- Process controller and arithmetic blocks for closed-loop and open-loop control tasks
- Integrated system bus for linking a number of controllers

### **Regenerative feedback modules**

For energy-saving interconnected and multi-axis applications.

### **Ease of controller connection**

The plug-in terminal system means that all control current terminals can be accessed easily from outside the unit.

### **A Lenze geared motor – Your ideal partner**

In terms of technology, Lenze geared motors are perfectly compatible with 93xx frequency inverters. Commissioning could not be easier, as the frequency inverter is configured for the motor data. There is no need to set motor data parameters. (You can find more information about Lenze geared motors in the corresponding catalog.)

Please contact us should you require more information.

***Your application ...***



***Extruder technology***



***Dosing machines***

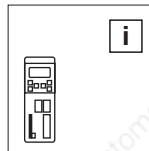


***Winding technology***

***... solved with 8200/9300 vector frequency inverters***

## Design - 8200 and 9300 vector

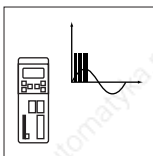
### Inverters for your application



|                   |                                                      |                                                                     |                                                             |                                                                |
|-------------------|------------------------------------------------------|---------------------------------------------------------------------|-------------------------------------------------------------|----------------------------------------------------------------|
| Your application  | Transport and conveyor drives                        | Flow drives, pumps, air conditioning systems                        | Miniature handling equipment, beverage and snack dispensers | Extruders, dosing machines, wood processing, warehousing, etc. |
| Task/ Application | Few                                                  | Industrial technology functions                                     | Small-scale applications                                    | Complex applications                                           |
| Single-phase      | 8201-8204<br>0.37 – 2.2 kW                           |                                                                     | 8201-8204 with Plug-in modules<br>0.37 – 2.2 kW             | –                                                              |
| Three-phase       | 8211-8218<br>8221-8227<br>8241-8246<br>0.37 – 110 kW | 8211-8218 V020<br>8221-8227 V020<br>8241-8246 V020<br>0.37 – 110 kW | 8211-8218 with plug-in modules<br>0.37 – 11 kW              | 9321-9333<br>Vector<br>0.37 – 110 kW                           |

|                                     |   |   |   |   |
|-------------------------------------|---|---|---|---|
| Compact design                      | ● | ● | ● | ● |
| Short circuit protected             | ● | ● | ● | ● |
| FTC process                         | ● | ● | ● |   |
| Vector Control                      | ● |   |   |   |
| Flying restart circuit              | ● | ● | ● | ● |
| Bipolar setpoint                    | ● | ● |   |   |
| Motor potentiometer                 | ● | ● | ● | ● |
| Freely assignable inputs/outputs    | ● | ● | ● | ● |
| Elapsed time meter                  | ● | ● | ● |   |
| Fault indication output             | ● | ● | ● | ● |
| DC braking                          | ● | ● | ● | ● |
| Slip compensation                   | ● | ● | ● | ● |
| Skip frequencies                    |   | ● | ● |   |
| PID controller                      |   | ● |   | ● |
| Manual/remote                       |   | ● |   |   |
| Belt monitoring                     |   | ● |   |   |
| 4 parameter sets                    |   |   |   | ● |
| Mains monitoring                    |   |   |   | ● |
| Pilot frequency input               |   |   |   | ● |
| Sensorless rotational speed control |   |   |   | ● |
| Modular function blocks             |   |   |   | ● |
| Integrated system bus               |   |   |   | ● |

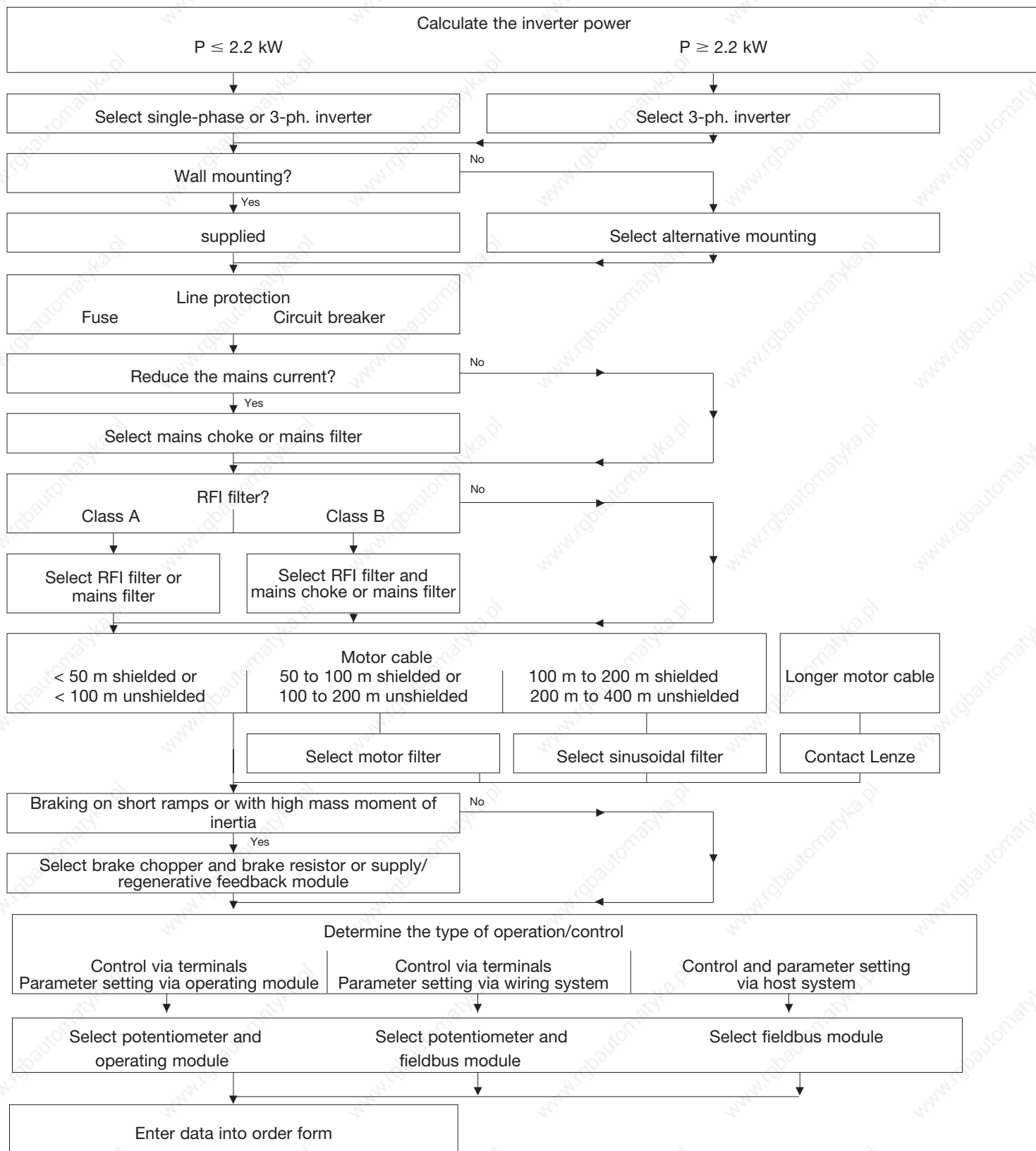


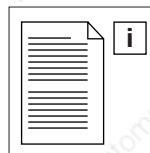


## Design - 8200 and 9300 vector

### Selecting a drive system

#### Sequence diagram

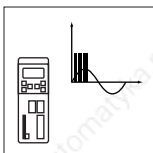




## A step-by-step guide to ordering your drive

|                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                              |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| The following sections of this catalog will assist you in finding a tailor-made frequency inverter for your machines. Enter your selection in the order form.                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                              |
| ⇒ This section provides extensive information                                                                                                                                                                                                                                                               | <b>Example:</b>                                                                                                                                                                                                                                                                                                                                                              |
| <b>1. Select the 82XX-E device type</b><br>(⇒ Design, Technical data)<br>Select the drive controller to control the speed of the three-phase AC motor. The type of device will depend on the motor power required.                                                                                          | <ul style="list-style-type: none"> <li>Inverter drive for 7.5 kW motor with 150% overload capacity</li> </ul> <p>EVF8217-E</p>                                                                                                                                                                                                                                               |
| <b>2. Select how the device is to be installed</b><br>(⇒ Design, Mechanical installation)<br>Select the accessories for installing your frequency inverter.                                                                                                                                                 | <ul style="list-style-type: none"> <li>As the heat sink is installed separately, a smaller control cabinet can be used.</li> </ul> <p>Frame for thermal separation EJ0004</p>                                                                                                                                                                                                |
| <b>3. Select the line-side accessories</b><br>(⇒ Design, Line-side electrical installation)<br>Select the appropriate fuses and the accessories to ensure conformance with the limiting value classes specified if the applicable European legislation.                                                     | <ul style="list-style-type: none"> <li>Drive location:<br/>On an industrial network</li> <li>Radio interference suppression:<br/>The environmental conditions require limiting value class A to EN 55011</li> </ul> <p>RFI filter EZF3-025A001</p>                                                                                                                           |
| <b>4. Select the motor-side accessories</b><br>(⇒ Design, Motor-side electrical installation)<br>Special measures may be required for motor cables longer than 50m:<br>Select your simple and cost-effective solution with compact motor filters or sinusoidal filters.                                     | <ul style="list-style-type: none"> <li>Motor cable:<br/>Length 210 m, unshielded</li> </ul> <p>Sinusoidal filter EZS3-025A</p>                                                                                                                                                                                                                                               |
| <b>5. Select additional accessories for controlling the device</b><br>(⇒ Design, Additional accessories)<br>Select useful accessories for controlling the device: <ul style="list-style-type: none"> <li>- Operating module</li> <li>- Automation accessories</li> <li>- Setpoint potentiometer.</li> </ul> | <ul style="list-style-type: none"> <li>For analog setpoint selection via master voltage or master current:<br/><br/> Setpoint potentiometer ERPD0001k0001W<br/> Scale for potentiometer ERZ0001<br/> Rotary button for potentiometer ERZ0002</li> <li>If you need a quick and easy device for changing the factory settings:<br/><br/> Operating module EMZ8201BB</li> </ul> |

Our example is based on the 82xx-E frequency inverter. Follow the same procedure for the 9300 vector frequency inverter.



## Design - 8200

### Overview of the 8200 frequency inverter

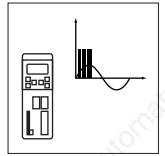
Compact frequency inverter for single-phase and three-phase mains connection:

- Single-phase: 8200 range 0.37 kW - 2.2 kW
- Three-phase: 8210 range 0.75 kW - 11.0 kW
- 8220 range 15.0 kW - 110.0 kW
- 8240 range 0.37 kW - 11.0 kW

#### Product features

|                                                                                | 8201-4<br>Single-phase<br>0.37 - 2.2 kW | 8211-18<br>Three-phase<br>0.75 - 11.0 kW | 8221-27<br>Three-phase<br>15.0-110.0 kW | 8241-46<br>Three-phase<br>0.37-11.0 kW |
|--------------------------------------------------------------------------------|-----------------------------------------|------------------------------------------|-----------------------------------------|----------------------------------------|
| Compact design                                                                 | ●                                       | ●                                        | ●                                       | ●                                      |
| Load capacity for 1 min. up to 150% I <sub>r</sub>                             | ●                                       | ●                                        | ●                                       | ●                                      |
| Inverter outputs protected against short-circuits                              | ●                                       | ●                                        | ●                                       | ●                                      |
| Earth fault check on mains disconnection                                       | ●                                       | ●                                        | ●                                       | ●                                      |
| Fixed chopper frequency 9.2 kHz                                                | ●                                       |                                          |                                         |                                        |
| Variable chopper frequency 4, 8, 12 or 16 kHz                                  | ●                                       | ●                                        | ●                                       |                                        |
| V/f characteristic control with constant V <sub>min</sub> boost or auto boost  | ●                                       |                                          |                                         |                                        |
| Motor current control or V/f characteristic control selectable (FTC technique) | ●                                       | ●                                        | ●                                       |                                        |
| Mains voltage compensation                                                     | ●                                       | ●                                        | ●                                       | ●                                      |
| Slip compensation                                                              | ●                                       | ●                                        | ●                                       | ●                                      |
| Adjustable current limitation with V/f control                                 | ●                                       | ●                                        | ●                                       | ●                                      |
| Pulse width modulation inverter with IGBT power stages                         | ●                                       | ●                                        | ●                                       | ●                                      |
| Connection for DC bus and brake units                                          | ●                                       | ●                                        | ●                                       | ●                                      |
| Potential-free analog input and output                                         | ●                                       | ●                                        | ●                                       | ●                                      |
| Relay outputs (changeover contacts)                                            | 1                                       | 1                                        | 2                                       | 2                                      |
| Isolated (potential-free) digital inputs with programmable functions           | 4                                       | 4                                        | 4                                       | 4                                      |
| Up to 3 fixed frequencies (JOG) per parameter set                              | ●                                       | ●                                        | ●                                       | ●                                      |
| DC braking                                                                     | ●                                       | ●                                        | ●                                       | ●                                      |
| TRIP set and TRIP reset functions                                              | ●                                       | ●                                        | ●                                       | ●                                      |
| Motor potentiometer                                                            | ●                                       | ●                                        | ●                                       | ●                                      |
| Output frequency up to 240 Hz/480 Hz                                           | ●                                       |                                          |                                         |                                        |
| Output frequency up to 480 Hz                                                  | ●                                       | ●                                        | ●                                       |                                        |
| Flying restart with coasting motor                                             | ●                                       | ●                                        | ●                                       | ●                                      |
| 2 parameter sets                                                               | ●                                       | ●                                        | ●                                       | ●                                      |
| Elapsed time and running time counter                                          | ●                                       | ●                                        | ●                                       | ●                                      |
| Assembly with thermal separation of power stage, 4.0 kW upwards                |                                         | ●                                        | ●                                       | ●                                      |

| Attachable accessories                                                                       |   |   |   |   |
|----------------------------------------------------------------------------------------------|---|---|---|---|
| 8201BB operating module for control and parameter setting with memory for parameter transfer | ● | ● | ● | ● |
| Serial RS232/485 module, wire or optical fibre 2102IB                                        | ● | ● | ● | ● |
| INTERBUS-S module 2111IB                                                                     | ● | ● | ● | ● |
| PROFIBUS module 2131IB                                                                       | ● | ● | ● | ● |
| System bus module 2171IB/2172IB                                                              | ● | ● | ● | ● |
| 8274-78IB plug-in modules for function extension                                             | ● | ● | ● | ● |



### 8200 klima range frequency inverters

All standard device features plus the following features for environment technology, HVAC and pump drives

|                                               | 8211-18E-V020<br>Three-phase<br>0.75 -11 kW | 8221-27E-V020<br>Three-phase<br>15 -110 kW | 8241-46E-V020<br>Three-phase<br>0.37 -11.0 kW |
|-----------------------------------------------|---------------------------------------------|--------------------------------------------|-----------------------------------------------|
| Integrated PID process controller             | ●                                           | ●                                          | ●                                             |
| Elimination of mechanical resonances          | ●                                           | ●                                          | ●                                             |
| Load loss (V-belt) monitoring                 | ●                                           | ●                                          | ●                                             |
| Smooth start/stop along S ramps               | ●                                           | ●                                          | ●                                             |
| Manual/automatic changeover                   | ●                                           | ●                                          | ●                                             |
| Motor phase failure detection                 |                                             | ●                                          | ●                                             |
| Mains failure detection                       | ●                                           | ●                                          | ●                                             |
| Inverse setpoint handling                     | ●                                           | ●                                          | ●                                             |
| Volume flow control without feedback          | ●                                           | ●                                          | ●                                             |
| Speed control with feedback                   | ●                                           | ●                                          | ●                                             |
| Torque control                                | ●                                           | ●                                          | ●                                             |
| Max. possibilities for analog input signals   | 2                                           | 2                                          | 2                                             |
| Max. possibilities for digital output signals | 2                                           | 3                                          | 3                                             |
| Level inversion of digital input signals      | ●                                           | ●                                          | ●                                             |
| Priority: bus control/terminal control        | ●                                           | ●                                          | ●                                             |

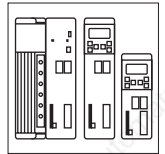
| Attachable accessories                                                                       |   |   |   |
|----------------------------------------------------------------------------------------------|---|---|---|
| Analog input module 8279                                                                     | ● | ● | ● |
| 8201BB operating module for control and parameter setting with memory for parameter transfer | ● | ● | ● |
| Serial RS232/485 module, wire or optical fibre 2102IB                                        | ● | ● | ● |
| INTERBUS-S module 2111IB                                                                     | ● | ● | ● |
| PROFIBUS module 2131IB                                                                       | ● | ● | ● |
| System bus module 2171IB/2172IB                                                              | ● | ● | ● |
| 8274-78IB plug-in modules for function extension                                             | ● | ● | ● |

See page 32 for details of 9300 vector frequency inverters.



| Range                             | Values                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                    |                 |                           |     |             |                                                                    |                       |             |                                   |       |             |                      |                           |              |                                                   |
|-----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|-----------------|---------------------------|-----|-------------|--------------------------------------------------------------------|-----------------------|-------------|-----------------------------------|-------|-------------|----------------------|---------------------------|--------------|---------------------------------------------------|
| Vibration resistance              | Germanischer Lloyd, general conditions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                    |                 |                           |     |             |                                                                    |                       |             |                                   |       |             |                      |                           |              |                                                   |
| Humidity                          | Humidity class F, no condensation<br>(average relative humidity 85%)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                    |                 |                           |     |             |                                                                    |                       |             |                                   |       |             |                      |                           |              |                                                   |
| Permissible temperature ranges    | During device transport: - 25°C ... +70°C<br>During device storage: - 25°C ... +55°C<br>During device operation: 0°C ... +40°C<br>+40°C ... +50°C with power derating 2.5% per K                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                    |                 |                           |     |             |                                                                    |                       |             |                                   |       |             |                      |                           |              |                                                   |
| Permissible installation height h | Up to 1000 m above sea level Without power derating<br>1000 m above sea level ... 4000 m above sea level 5%/1000m                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                    |                 |                           |     |             |                                                                    |                       |             |                                   |       |             |                      |                           |              |                                                   |
| Pollution degree                  | VDE 0110 Part 2 pollution degree 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                    |                 |                           |     |             |                                                                    |                       |             |                                   |       |             |                      |                           |              |                                                   |
| Noise emission                    | Requirements to EN 50081-1, EN 50081-2, IEC 22G-WG4 (Cv) 21<br>Limiting value class A to EN 55011 (industrial area) with mains filter<br>Limiting value class B to EN 55022 (residential area) with mains filter and control cabinet installation                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                    |                 |                           |     |             |                                                                    |                       |             |                                   |       |             |                      |                           |              |                                                   |
| Noise immunity                    | Complies with limit values with mains filter<br>Requirements to EN 50082-2, IEC 22G-WG4 (Cv) 21<br><table border="0"> <tr> <td><b>Requirements</b></td><td><b>Standard</b></td><td><b>Intensity of tests</b></td></tr> <tr> <td>ESD</td><td>EN61000-4-2</td><td>3, i.e. 8 kV with air discharge<br/>and 6 kV with contact discharge</td></tr> <tr> <td>HF field<br/>(housing)</td><td>EN61000-4-3</td><td>3, i.e. 10 V/m; 27 up to 1000 MHz</td></tr> <tr> <td>Burst</td><td>EN61000-4-4</td><td>3/4, i.e. 2 kV/5 kHz</td></tr> <tr> <td>Surge<br/>(on mains cable)</td><td>IEC 1000-4-5</td><td>3, i.e. 1.2/50 µs 1 kV phase-phase, 2 kV phase-PE</td></tr> </table> | <b>Requirements</b>                                                | <b>Standard</b> | <b>Intensity of tests</b> | ESD | EN61000-4-2 | 3, i.e. 8 kV with air discharge<br>and 6 kV with contact discharge | HF field<br>(housing) | EN61000-4-3 | 3, i.e. 10 V/m; 27 up to 1000 MHz | Burst | EN61000-4-4 | 3/4, i.e. 2 kV/5 kHz | Surge<br>(on mains cable) | IEC 1000-4-5 | 3, i.e. 1.2/50 µs 1 kV phase-phase, 2 kV phase-PE |
| <b>Requirements</b>               | <b>Standard</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <b>Intensity of tests</b>                                          |                 |                           |     |             |                                                                    |                       |             |                                   |       |             |                      |                           |              |                                                   |
| ESD                               | EN61000-4-2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 3, i.e. 8 kV with air discharge<br>and 6 kV with contact discharge |                 |                           |     |             |                                                                    |                       |             |                                   |       |             |                      |                           |              |                                                   |
| HF field<br>(housing)             | EN61000-4-3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 3, i.e. 10 V/m; 27 up to 1000 MHz                                  |                 |                           |     |             |                                                                    |                       |             |                                   |       |             |                      |                           |              |                                                   |
| Burst                             | EN61000-4-4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 3/4, i.e. 2 kV/5 kHz                                               |                 |                           |     |             |                                                                    |                       |             |                                   |       |             |                      |                           |              |                                                   |
| Surge<br>(on mains cable)         | IEC 1000-4-5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 3, i.e. 1.2/50 µs 1 kV phase-phase, 2 kV phase-PE                  |                 |                           |     |             |                                                                    |                       |             |                                   |       |             |                      |                           |              |                                                   |
| Insulation strength               | Overvoltage category III to VDE 0110                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                    |                 |                           |     |             |                                                                    |                       |             |                                   |       |             |                      |                           |              |                                                   |
| Packaging                         | To DIN 4180<br>- 8201 to 8218: Dust packaging<br>- 8221 to 8227: Shipping container                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                    |                 |                           |     |             |                                                                    |                       |             |                                   |       |             |                      |                           |              |                                                   |
| Degree of protection              | IP20<br>NEMA 1: Protection against contact                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                    |                 |                           |     |             |                                                                    |                       |             |                                   |       |             |                      |                           |              |                                                   |
| Approvals                         | CE: Low-Voltage Directive<br>8201 - 8218: VDE approval<br><br>8241 - 8246,<br>8221 - 8227: UL 508: Industrial control equipment<br>UL 508C: Power conversion equipment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                    |                 |                           |     |             |                                                                    |                       |             |                                   |       |             |                      |                           |              |                                                   |





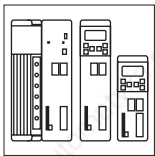
### Frequency inverter for single-phase mains connection

| Type                                                                                        |                     | 8201                                                                                                                                                                                                                                           | 8202                   | 8203             | 8204             |
|---------------------------------------------------------------------------------------------|---------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|------------------|------------------|
| Order ref.                                                                                  |                     | EVF8201-E                                                                                                                                                                                                                                      | EVF8202-E              | EVF8203-E        | EVF8204-E        |
| Order ref.<br>compact device                                                                |                     |                                                                                                                                                                                                                                                | EVF8202-E<br>-V002     |                  |                  |
| Mains voltage                                                                               | U <sub>M</sub> [V]  | 1 / N / PE / AC / 230V / 50 Hz / 60 Hz<br>permissible range 190...260 V ± 0% / 45...65 Hz ± 0%                                                                                                                                                 |                        |                  |                  |
| Alternative DC supply                                                                       | U <sub>DC</sub> [V] | 270 V...360 V ± 0%                                                                                                                                                                                                                             |                        |                  |                  |
| Output voltage <sup>1)</sup>                                                                |                     | 3 / PE / AC / 0...U <sub>mains</sub> / 0...50 Hz , up to 240 Hz as an option                                                                                                                                                                   |                        |                  |                  |
| Data for operation on mains: 1 AC / 230 V / 50 Hz / 60 Hz                                   |                     |                                                                                                                                                                                                                                                |                        |                  |                  |
| Motor power 4-pole ASM                                                                      | kW                  | 0.37                                                                                                                                                                                                                                           | 0.75                   | 1.50             | 2.20             |
| Output current                                                                              | A                   | 2.6                                                                                                                                                                                                                                            | 4.0                    | 7.0              | 9.5              |
| Max. output current 60 s                                                                    | A                   | 3.9                                                                                                                                                                                                                                            | 6.0                    | 10.5             | 14.2             |
| Output power                                                                                | kVA                 | 1.0                                                                                                                                                                                                                                            | 1.5                    | 2.7              | 3.6              |
| Mains r.m.s. current <sup>2)</sup><br>Without mains choke/filter<br>With mains choke/filter | A                   | 5.0<br>4.2                                                                                                                                                                                                                                     | 9.0<br>7.5             | 15.0<br>12.5     | –<br>17.0        |
| Power loss                                                                                  | W                   | 30                                                                                                                                                                                                                                             | 50                     | 70               | 100              |
| Chopper frequency                                                                           |                     | Up to 9.2 kHz                                                                                                                                                                                                                                  |                        |                  |                  |
| Field frequency                                                                             |                     | Resolution 50 mHz absolute<br>Accuracy<br>Digital setpoint preselection ± 0.05 Hz<br>Analog setpoint preselection<br>- Linearity ± 0.5% max. selected<br>- Temperature sensitivity 0...40°C + 0.4% signal level<br>- Offset ± 0.3% 5 V or 10 V |                        |                  |                  |
| Dimensions<br>a<br>b<br>e                                                                   | mm                  | 64<br>180<br>158                                                                                                                                                                                                                               | 64<br>180<br>198 (158) | 83<br>250<br>211 | 83<br>250<br>211 |
| Weight<br>Weight (compact device)                                                           | kg                  | 1.0                                                                                                                                                                                                                                            | 1.3<br>1.0             | 2.2              | 2.2              |

1) With mains choke/filter: Max. output voltage = approx. 96% of mains voltage

2) Take the N-conductor load into account if the mains power is being distributed symmetrically on a number of inverters!





## Design - 8200

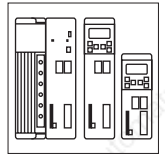
### Ratings

#### Frequency inverter for three-phase mains connection at 150% overload

| Type                                                                                        |                     | 8211E                                                                                                                                                                                                                                 | 8212E            | 8213E            | 8214E            |
|---------------------------------------------------------------------------------------------|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|------------------|------------------|
| Order ref.                                                                                  |                     | EVF8211-E                                                                                                                                                                                                                             | EVF8212-E        | EVF8213-E        | EVF8214-E        |
| Order ref. 8200 HVAC and pump drive                                                         |                     | EVF8211-E-V020                                                                                                                                                                                                                        | EVF8212-E-V020   | EVF8213-E-V020   | EVF8214-E-V020   |
| Mains voltage                                                                               | U <sub>M</sub> [V]  | 3 / N / PE / AC / 460 V / 50 Hz / 60 Hz<br>permissible range 320...510 V ± 0% / 45...65 Hz ± 0%                                                                                                                                       |                  |                  |                  |
| Alternative DC supply                                                                       | U <sub>DC</sub> [V] | 450 V...715 V ± 0 %                                                                                                                                                                                                                   |                  |                  |                  |
| Output voltage <sup>1)</sup>                                                                |                     | 3 / PE / AC / 0...U <sub>mains</sub> / 0...50 Hz , up to 480 Hz as an option                                                                                                                                                          |                  |                  |                  |
| Data for operation on 3 AC / 400 V / 50 Hz / 60 Hz mains                                    |                     |                                                                                                                                                                                                                                       |                  |                  |                  |
| Motor power 4-pole ASM                                                                      | kW                  | 0.75                                                                                                                                                                                                                                  | 1.5              | 2.2              | 3.0              |
| Output current                                                                              | A                   | 2.4                                                                                                                                                                                                                                   | 3.9              | 5.5              | 7.3              |
| Max. output current 60 s                                                                    | A                   | 3.6                                                                                                                                                                                                                                   | 5.9              | 8.3              | 11.0             |
| Output power                                                                                | kVA                 | 1.6                                                                                                                                                                                                                                   | 2.7              | 3.8              | 5.2              |
| Data for operation on 3 AC / 460 V / 50 Hz / 60 Hz mains                                    |                     |                                                                                                                                                                                                                                       |                  |                  |                  |
| Motor power 4-pole ASM                                                                      | kW                  | 1.1                                                                                                                                                                                                                                   | 1.5              | 2.2              | 3.7              |
| Output current                                                                              | A                   | 2.4                                                                                                                                                                                                                                   | 3.9              | 5.5              | 7.3              |
| Max. output current 60 s                                                                    | A                   | 3.6                                                                                                                                                                                                                                   | 5.9              | 8.3              | 11.0             |
| Output power                                                                                | kVA                 | 1.9                                                                                                                                                                                                                                   | 3.1              | 4.3              | 5.8              |
| Mains r.m.s. current <sup>1)</sup><br>Without mains choke/filter<br>With mains choke/filter | A                   | 3.75<br>2.5                                                                                                                                                                                                                           | 5.85<br>3.9      | 7.5<br>5.0       | -<br>7.0         |
| Power loss                                                                                  | W                   | 55                                                                                                                                                                                                                                    | 75               | 90               | 100              |
| Chopper frequency                                                                           |                     | Adjustable 4 kHz, <b>8 kHz</b> , 16 kHz                                                                                                                                                                                               |                  |                  |                  |
| Field frequency                                                                             |                     | Resolution<br>Accuracy<br>Digital setpoint preselection<br>Analog setpoint preselection<br>- Linearity<br>- Temperature sensitivity 0...40°C<br>- Offset<br>20 mHz absolute<br>± 0.05 Hz<br>± 0.5% Reference fmax<br>+ 0.4 %<br>± 0 % |                  |                  |                  |
| Dimensions<br>a<br>b<br>e                                                                   | mm                  | 83<br>250<br>211                                                                                                                                                                                                                      | 83<br>250<br>211 | 83<br>250<br>211 | 83<br>250<br>211 |
| Weight                                                                                      | kg                  | 2.2                                                                                                                                                                                                                                   | 2.2              | 2.2              | 2.2              |

<sup>1)</sup> Data for operation with factory setting of 8 kHz chopper frequency



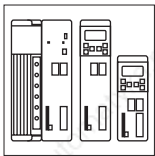


### Frequency inverter for three-phase mains connection at 120% overload

| Type                                                                                        |                     | 8211E                                                                                                                                                    | 8212E            | 8213E            | 8214E            |                                                                                 |
|---------------------------------------------------------------------------------------------|---------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|------------------|------------------|---------------------------------------------------------------------------------|
| Order ref.                                                                                  |                     | EVF8211-E                                                                                                                                                | EVF8212-E        | EVF8213-E        | EVF8214-E        |                                                                                 |
| Order ref. 8200 HVAC and pump drive                                                         |                     | EVF8211-E-V020                                                                                                                                           | EVF8212-E-V020   | EVF8213-E-V020   | EVF8214-E-V020   |                                                                                 |
| Mains voltage                                                                               | U <sub>M</sub> [V]  | 3 / N / PE / AC / 400 V / 50 Hz / 60 Hz<br>permissible range 320...440 V ± 0% / 45...65 Hz ± 0%                                                          |                  |                  |                  |                                                                                 |
| Alternative DC supply                                                                       | U <sub>DC</sub> [V] | 460 V...620 V ± 0 %                                                                                                                                      |                  |                  |                  |                                                                                 |
| Output voltage <sup>1)</sup>                                                                |                     | 3 / PE / AC / 0...U <sub>mains</sub> / 0...50 Hz , up to 480 Hz as an option                                                                             |                  |                  |                  |                                                                                 |
| Data for operation on 3 AC / 400 V / 50 Hz / 60 Hz mains                                    |                     |                                                                                                                                                          |                  |                  |                  |                                                                                 |
| Motor power 4-pole ASM                                                                      | kW                  | 1.1                                                                                                                                                      | 1.5              | 3.0              | 3.0              |                                                                                 |
| Output current                                                                              | A                   | 3.0                                                                                                                                                      | 3.9              | 7.3              | 7.3              |                                                                                 |
| Max. output current 60 s                                                                    | A                   | 3.6                                                                                                                                                      | 5.9              | 11.0             | 11.0             |                                                                                 |
| Output power                                                                                | kVA                 | 2.1                                                                                                                                                      | 2.7              | 5.2              | 5.2              |                                                                                 |
| Mains r.m.s. current <sup>1)</sup><br>Without mains choke/filter<br>With mains choke/filter | A                   | 3.75<br>2.5                                                                                                                                              | 5.85<br>3.9      | 7.5<br>5.0       | -<br>7.0         |                                                                                 |
| Power loss                                                                                  | W                   | 55                                                                                                                                                       | 75               | 90               | 100              |                                                                                 |
| Chopper frequency                                                                           |                     | Adjustable 4 kHz, <b>8 kHz</b> , 16 kHz                                                                                                                  |                  |                  |                  |                                                                                 |
| Field frequency                                                                             |                     | Resolution<br>Accuracy<br>Digital setpoint preselection<br>Analog setpoint preselection<br>- Linearity<br>- Temperature sensitivity 0...40°C<br>- Offset |                  |                  |                  | 20 mHz absolute<br><br>± 0.05 Hz<br><br>± 0.5% Reference fmax<br>+ 0.4%<br>± 0% |
| Dimensions<br>a<br>b<br>e                                                                   | mm                  | 83<br>250<br>211                                                                                                                                         | 83<br>250<br>211 | 83<br>250<br>211 | 83<br>250<br>211 |                                                                                 |
| Weight                                                                                      | kg                  | 2.2                                                                                                                                                      | 2.2              | 2.2              | 2.2              |                                                                                 |

<sup>1)</sup> Data for operation with factory setting of 8 kHz chopper frequency





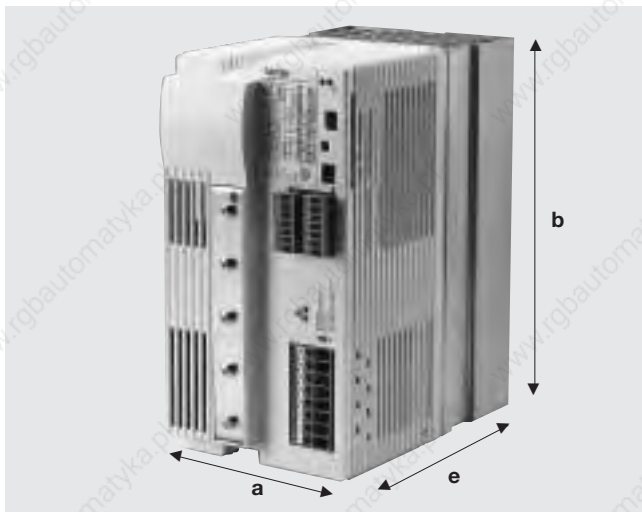
## Design - 8200

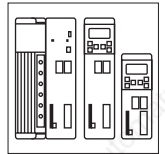
### Ratings

#### Frequency inverter for three-phase mains connection at 150% overload

| Type                                                                                        |                     | 8215E                                                                                                                                                                                                                                   | 8216E             | 8217E             | 8218E             |
|---------------------------------------------------------------------------------------------|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|-------------------|-------------------|
| Order ref.                                                                                  |                     | EVF8215-E                                                                                                                                                                                                                               | EVF8216-E         | EVF8217-E         | EVF8218-E         |
| Order ref. 8200 HVAC and pump drive                                                         |                     | EVF8215-E-V020                                                                                                                                                                                                                          | EVF8216-E-V020    | EVF8217-E-V020    | EVF8218-E-V020    |
| Mains voltage                                                                               | U <sub>M</sub> [V]  | 3 / N / PE / AC / 460 V / 50 Hz / 60 Hz<br>permissible range 320...510 V ± 0% / 45...65 Hz ± 0%                                                                                                                                         |                   |                   |                   |
| Alternative DC supply                                                                       | U <sub>DC</sub> [V] | 450 V...715 V ± 0 %                                                                                                                                                                                                                     |                   |                   |                   |
| Output voltage <sup>1)</sup>                                                                |                     | 3 / PE / AC / 0...U <sub>mains</sub> / 0...50 Hz , up to 480 Hz as an option                                                                                                                                                            |                   |                   |                   |
| Data for operation on 3 AC / 400 V / 50 Hz / 60 Hz mains                                    |                     |                                                                                                                                                                                                                                         |                   |                   |                   |
| Motor power 4-pole ASM                                                                      | kW                  | 4.0                                                                                                                                                                                                                                     | 5.5               | 7.5               | 11.0              |
| Output current                                                                              | A                   | 9.4                                                                                                                                                                                                                                     | 13.0              | 16.5              | 23.5              |
| Max. output current 60 s                                                                    | A                   | 14.1                                                                                                                                                                                                                                    | 19.5              | 24.8              | 35.3              |
| Output power                                                                                | kVA                 | 6.5                                                                                                                                                                                                                                     | 9.0               | 11.4              | 16.3              |
| Data for operation on 3 AC / 460 V / 50 Hz / 60 Hz mains                                    |                     |                                                                                                                                                                                                                                         |                   |                   |                   |
| Motor power 4-pole ASM                                                                      | kW                  | 5.5                                                                                                                                                                                                                                     | 7.5               | 11.0              | 15.0              |
| Output current                                                                              | A                   | 9.4                                                                                                                                                                                                                                     | 13.0              | 16.5              | 23.5              |
| Max. output current 60 s                                                                    | A                   | 14.1                                                                                                                                                                                                                                    | 19.5              | 24.8              | 35.3              |
| Output power                                                                                | kVA                 | 7.5                                                                                                                                                                                                                                     | 10.3              | 13.1              | 18.7              |
| Mains r.m.s. current <sup>1)</sup><br>Without mains choke/filter<br>With mains choke/filter | A                   | 13.2<br>8.8                                                                                                                                                                                                                             | 18.0<br>12.0      | 22.5<br>15.0      | -<br>20.5         |
| Power loss                                                                                  | W                   | 150                                                                                                                                                                                                                                     | 200               | 280               | 400               |
| Chopper frequency                                                                           |                     | Adjustable 4 kHz, <b>8 kHz</b> , 16 kHz                                                                                                                                                                                                 |                   |                   |                   |
| Field frequency                                                                             |                     | Resolution<br>Accuracy<br>Digital setpoint preselection<br>Analog setpoint preselection<br>- Linearity<br>- Temperature sensitivity 0...40°C<br>- Offset<br>20 mHz absolute<br>± 0.05 Hz<br>± 0.5% (reference fmax)<br>+ 0.4 %<br>± 0 % |                   |                   |                   |
| Dimensions<br>a<br>b<br>e                                                                   | mm                  | 125<br>250<br>218                                                                                                                                                                                                                       | 125<br>250<br>218 | 125<br>250<br>218 | 125<br>250<br>218 |
| Weight                                                                                      | kg                  | 5.3                                                                                                                                                                                                                                     | 5.3               | 5.3               | 5.3               |

<sup>1)</sup> Data for operation with factory setting of 8 kHz chopper frequency

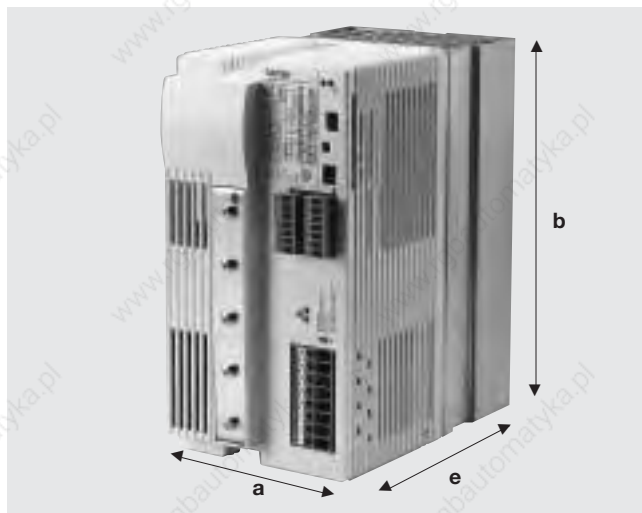




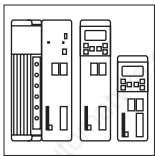
### Frequency inverter for three-phase mains connection at 120% overload

| Type                                                                                        |                     | 8215E                                                                                                                                                                                                                                    | 8216E             | 8217E             | 8218E             |
|---------------------------------------------------------------------------------------------|---------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|-------------------|-------------------|
| Order ref.                                                                                  |                     | EVF8215-E                                                                                                                                                                                                                                | EVF8216-E         | EVF8217-E         | EVF8218-E         |
| Order ref. 8200 HVAC and pump drive                                                         |                     | EVF8215-E-V020                                                                                                                                                                                                                           | EVF8216-E-V020    | EVF8217-E-V020    | EVF8218-E-V020    |
| Mains voltage                                                                               | U <sub>M</sub> [V]  | 3 / N / PE / AC / 400 V / 50 Hz / 60 Hz<br>permissible range 320...440 V ± 0 % / 45...65 Hz ± 0 %                                                                                                                                        |                   |                   |                   |
| Alternative DC supply                                                                       | U <sub>DC</sub> [V] | 460 V...620 V ± 0 %                                                                                                                                                                                                                      |                   |                   |                   |
| Output voltage <sup>1)</sup>                                                                |                     | 3 / PE / AC / 0...U <sub>mains</sub> / 0...50 Hz , up to 480 Hz as an option                                                                                                                                                             |                   |                   |                   |
| Data for operation on 3 AC / 400 V / 50 Hz / 60 Hz mains                                    |                     |                                                                                                                                                                                                                                          |                   |                   |                   |
| Motor power 4-pole ASM                                                                      | kW                  | 5.5                                                                                                                                                                                                                                      | 5.5               | 11.0              | 11.0              |
| Output current                                                                              | A                   | 13.0                                                                                                                                                                                                                                     | 13.0              | 23.5              | 23.5              |
| Max. output current 60 s                                                                    | A                   | 14.1                                                                                                                                                                                                                                     | 19.5              | 24.8              | 35.3              |
| Output power                                                                                | kVA                 | 9.0                                                                                                                                                                                                                                      | 9.0               | 16.3              | 16.3              |
| Mains r.m.s. current <sup>1)</sup><br>Without mains choke/filter<br>With mains choke/filter | A                   | 13.2<br>8.8                                                                                                                                                                                                                              | 18.0<br>12.0      | 22.5<br>15.0      | -<br>20.5         |
| Power loss                                                                                  | W                   | 150                                                                                                                                                                                                                                      | 200               | 280               | 400               |
| Chopper frequency                                                                           |                     | Adjustable 4 kHz, <b>8 kHz</b> , 16 kHz                                                                                                                                                                                                  |                   |                   |                   |
| Field frequency                                                                             |                     | Resolution<br>Accuracy<br>Digital setpoint preselection<br>Analog setpoint preselection<br>- Linearity<br>- Temperature sensitivity 0...40°C<br>- Offset<br>20 mHz absolute<br>± 0.05 Hz<br>± 0.5 % (reference fmax)<br>+ 0.4 %<br>± 0 % |                   |                   |                   |
| Dimensions<br>a<br>b<br>e                                                                   | mm                  | 125<br>250<br>218                                                                                                                                                                                                                        | 125<br>250<br>218 | 125<br>250<br>218 | 125<br>250<br>218 |
| Weight                                                                                      | kg                  | 5.3                                                                                                                                                                                                                                      | 5.3               | 5.3               | 5.3               |

<sup>1)</sup> Data for operation with factory setting of 8 kHz chopper frequency







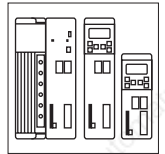
## Design - 8200

### Ratings

#### Frequency inverter for three-phase mains connection at 150% overload

| Type                                                      |                       | 8241                                                                                                                                                                                                                     | 8242                 | 8243                 | 8244                 |
|-----------------------------------------------------------|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|----------------------|----------------------|
|                                                           | Order ref.            | EVF8241-E                                                                                                                                                                                                                | EVF8242-E            | EVF8243-E            | EVF8244-E            |
| Order ref. 8200 HVAC and pump drive                       |                       | EVF8241-E-V020                                                                                                                                                                                                           | EVF8242-E-V020       | EVF8243-E-V020       | EVF8244-E-V020       |
| Mains voltage                                             | U <sub>M</sub> [V]    | 320 V... 528 V ± 0% ; 45 Hz ... 65 Hz ± 0%                                                                                                                                                                               |                      |                      |                      |
| Alternative DC supply                                     | U <sub>DC</sub> [V]   | 460 V... 740 V ± 0%                                                                                                                                                                                                      |                      |                      |                      |
| Data for operation on mains: 3 AC / 400 V / 50 Hz / 60 Hz |                       |                                                                                                                                                                                                                          |                      |                      |                      |
| Motor power (4-pole ASM)                                  | P <sub>r</sub> [kW]   | 0.37                                                                                                                                                                                                                     | 0.75                 | 1.5                  | 3.0                  |
| Output current                                            | I [A]                 | 1.5                                                                                                                                                                                                                      | 2.5                  | 3.9                  | 7.0                  |
| Max. output current 60 s                                  | I <sub>max</sub> [A]  | 2.2                                                                                                                                                                                                                      | 3.7                  | 5.8                  | 10.5                 |
| Output power                                              | S <sub>r</sub> [kVA]  | 1.0                                                                                                                                                                                                                      | 1.7                  | 2.7                  | 4.8                  |
| Data for operation on mains: 3 AC / 480 V / 50 Hz / 60 Hz |                       |                                                                                                                                                                                                                          |                      |                      |                      |
| Motor power (4-pole ASM)                                  | P <sub>r</sub> [kW]   | 0.37                                                                                                                                                                                                                     | 0.75                 | 1.5                  | 3.0                  |
| Output current                                            | I [A]                 | 1.5                                                                                                                                                                                                                      | 2.5                  | 3.9                  | 7.0                  |
| Max. output current 60 s                                  | I <sub>max</sub> [A]  | 2.25                                                                                                                                                                                                                     | 3.75                 | 5.85                 | 10.5                 |
| Output power                                              | S <sub>r</sub> [kVA]  | 1.2                                                                                                                                                                                                                      | 2.1                  | 3.2                  | 5.8                  |
| Mains current                                             | I <sub>r</sub> [A]    | 1.5                                                                                                                                                                                                                      | 2.5                  | 3.9                  | 7.0                  |
| Power loss                                                | P <sub>loss</sub> [W] | 50                                                                                                                                                                                                                       | 65                   | 100                  | 150                  |
| Chopper frequency                                         |                       | Adjustable 4 kHz, <b>8 kHz</b> , 12 kHz, 16 kHz                                                                                                                                                                          |                      |                      |                      |
| Field frequency                                           |                       | Resolution 20 mHz absolute<br>Accuracy<br>Digital setpoint preselection ± 0.05 Hz<br>Analog setpoint preselection<br>- Linearity ± 0.5% (reference fmax)<br>- Temperature sensitivity 0...40°C + 0.4 %<br>- Offset ± 0 % |                      |                      |                      |
| Dimensions<br>a<br>b<br>e                                 | [mm]                  | 78 x<br>350 x<br>250                                                                                                                                                                                                     | 78 x<br>350 x<br>250 | 97 x<br>350 x<br>250 | 97 x<br>350 x<br>250 |
| Weight                                                    | m [kg]                | 3.5                                                                                                                                                                                                                      | 3.5                  | 5.0                  | 5.0                  |

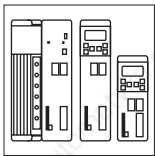




### Frequency inverter for three-phase mains connection at 120% overload

| Type                                                      |                       | 8241                                                                                                                                                                                                                     | 8242           | 8243           | 8244           |
|-----------------------------------------------------------|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|----------------|----------------|
|                                                           | Order ref.            | EVF8241-E                                                                                                                                                                                                                | EVF8242-E      | EVF8243-E      | EVF8244-E      |
| Order ref. 8200 HVAC and pump drive                       |                       | EVF8241-E-V020                                                                                                                                                                                                           | EVF8242-E-V020 | EVF8243-E-V020 | EVF8244-E-V020 |
| Mains voltage                                             | U <sub>M</sub> [V]    | 320 V... 440 V ± 0% ; 45 Hz ... 65 Hz ± 0%                                                                                                                                                                               |                |                |                |
| Alternative DC supply                                     | U <sub>DC</sub> [V]   | 460 V... 620 V ± 0%                                                                                                                                                                                                      |                |                |                |
| Data for operation on mains: 3 AC / 400 V / 50 Hz / 60 Hz |                       |                                                                                                                                                                                                                          |                |                |                |
| Motor power (4-pole ASM)                                  | P <sub>r</sub> [kW]   | 0.55                                                                                                                                                                                                                     | 1.1            | 2.2            | 4.0            |
| Output current                                            | I [A]                 | 1.8                                                                                                                                                                                                                      | 3.0            | 5.5            | 9.4            |
| Max. output current 60 s                                  | I <sub>max</sub> [A]  | 2.2                                                                                                                                                                                                                      | 3.7            | 5.8            | 10.5           |
| Output power                                              | S <sub>r</sub> [kVA]  | 1.3                                                                                                                                                                                                                      | 2.1            | 3.8            | 6.5            |
| Mains current                                             | I <sub>r</sub> [A]    | 1.5                                                                                                                                                                                                                      | 2.5            | 3.9            | 7.0            |
| Power loss                                                | P <sub>loss</sub> [W] | 50                                                                                                                                                                                                                       | 65             | 100            | 150            |
| Chopper frequency                                         |                       | Adjustable 4 kHz, <b>8 kHz</b> , 12 kHz, 16 kHz                                                                                                                                                                          |                |                |                |
| Field frequency                                           |                       | Resolution 20 mHz absolute<br>Accuracy<br>Digital setpoint preselection ± 0.05 Hz<br>Analog setpoint preselection<br>- Linearity ± 0.5% (reference fmax)<br>- Temperature sensitivity 0...40°C + 0.4 %<br>- Offset ± 0 % |                |                |                |
| Dimensions                                                | [mm]                  |                                                                                                                                                                                                                          |                |                |                |
| a                                                         |                       | 78 x                                                                                                                                                                                                                     | 78 x           | 97 x           | 97 x           |
| b                                                         |                       | 350 x                                                                                                                                                                                                                    | 350 x          | 350 x          | 350 x          |
| e                                                         |                       | 250                                                                                                                                                                                                                      | 250            | 250            | 250            |
| Weight                                                    | m [kg]                | 3.5                                                                                                                                                                                                                      | 3.5            | 5.0            | 5.0            |





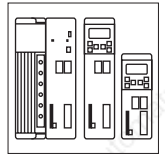
## Design - 8200

### Ratings

#### Frequency inverter for three-phase mains connection at 150% overload

| Type                                                      |                       | 8245                                                                                                                                                                                                                     | 8246                  |  |  |
|-----------------------------------------------------------|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|--|--|
|                                                           | Order ref.            | EVF8245-E                                                                                                                                                                                                                | EVF8246-E             |  |  |
| Order ref. 8200 HVAC and pump drive                       |                       | EVF8245-E-V020                                                                                                                                                                                                           | EVF8246-E-V020        |  |  |
| Mains voltage                                             | U <sub>M</sub> [V]    | 320 V... 528 V ± 0 % ; 45 Hz ... 65 Hz ± 0%                                                                                                                                                                              |                       |  |  |
| Alternative DC supply                                     | U <sub>DC</sub> [V]   | 460 V... 740 V ± 0%                                                                                                                                                                                                      |                       |  |  |
| Data for operation on mains: 3 AC / 400 V / 50 Hz / 60 Hz |                       |                                                                                                                                                                                                                          |                       |  |  |
| Motor power (4-pole ASM)                                  | P <sub>r</sub> [kW]   | 5.5                                                                                                                                                                                                                      | 11.0                  |  |  |
| Output current                                            | I [A]                 | 13.0                                                                                                                                                                                                                     | 23.5                  |  |  |
| Max. output current 60 s                                  | I <sub>max</sub> [A]  | 19.5                                                                                                                                                                                                                     | 35.0                  |  |  |
| Output power                                              | S <sub>r</sub> [kVA]  | 9.0                                                                                                                                                                                                                      | 16.3                  |  |  |
| Data for operation on mains: 3 AC / 480 V / 50 Hz / 60 Hz |                       |                                                                                                                                                                                                                          |                       |  |  |
| Motor power (4-pole ASM)                                  | P <sub>r</sub> [kW]   | 5.5                                                                                                                                                                                                                      | 11.0                  |  |  |
| Output current                                            | I [A]                 | 13.0                                                                                                                                                                                                                     | 23.5                  |  |  |
| Max. output current 60 s                                  | I <sub>max</sub> [A]  | 19.5                                                                                                                                                                                                                     | 33.5                  |  |  |
| Output power                                              | S <sub>r</sub> [kVA]  | 10.8                                                                                                                                                                                                                     | 18.5                  |  |  |
| Mains current                                             | I <sub>r</sub> [A]    | 12.0                                                                                                                                                                                                                     | 20.5                  |  |  |
| Power loss                                                | P <sub>loss</sub> [W] | 210                                                                                                                                                                                                                      | 360                   |  |  |
| Chopper frequency                                         |                       | Adjustable 4 kHz, <b>8 kHz</b> , 12 kHz, 16 kHz                                                                                                                                                                          |                       |  |  |
| Field frequency                                           |                       | Resolution 20 mHz absolute<br>Accuracy<br>Digital setpoint preselection ± 0.05 Hz<br>Analog setpoint preselection<br>- Linearity ± 0.5% (reference fmax)<br>- Temperature sensitivity 0...40°C + 0.4 %<br>- Offset ± 0 % |                       |  |  |
| Dimensions<br>a<br>b<br>e                                 | [mm]                  | 135 x<br>350 x<br>250                                                                                                                                                                                                    | 135 x<br>350 x<br>250 |  |  |
| Weight                                                    | m [kg]                | 7.5                                                                                                                                                                                                                      | 7.5                   |  |  |

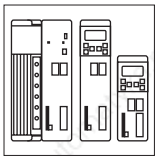




### Frequency inverter for three-phase mains connection at 120% overload

| Type                                                      |                       | 8245                                                                                                                                                                                                                    | 8246           |  |  |
|-----------------------------------------------------------|-----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|--|--|
|                                                           | Order ref.            | EVF8245-E                                                                                                                                                                                                               | EVF8246-E      |  |  |
| Order ref. 8200 HVAC and pump drive                       |                       | EVF8245-E-V020                                                                                                                                                                                                          | EVF8246-E-V020 |  |  |
| Mains voltage                                             | U <sub>M</sub> [V]    | 320 V... 440 V ± 0 % ; 45 Hz ... 65 Hz ± 0%                                                                                                                                                                             |                |  |  |
| Alternative DC supply                                     | U <sub>DC</sub> [V]   | 460 V... 620 V ± 0%                                                                                                                                                                                                     |                |  |  |
| Data for operation on mains: 3 AC / 400 V / 50 Hz / 60 Hz |                       |                                                                                                                                                                                                                         |                |  |  |
| Motor power (4-pole ASM)                                  | P <sub>r</sub> [kW]   | 7.5                                                                                                                                                                                                                     | 11.0           |  |  |
| Output current                                            | I [A]                 | 16.0                                                                                                                                                                                                                    | 23.5           |  |  |
| Max. output current 60 s                                  | I <sub>max</sub> [A]  | 19.5                                                                                                                                                                                                                    | 35.0           |  |  |
| Output power                                              | S <sub>r</sub> [kVA]  | 11.1                                                                                                                                                                                                                    | 16.3           |  |  |
| Mains current                                             | I <sub>r</sub> [A]    | 12.0                                                                                                                                                                                                                    | 20.5           |  |  |
| Power loss                                                | P <sub>loss</sub> [W] | 210                                                                                                                                                                                                                     | 360            |  |  |
| Chopper frequency                                         |                       | Adjustable 4 kHz, <b>8 kHz</b> , 12 kHz, 16 kHz                                                                                                                                                                         |                |  |  |
| Field frequency                                           |                       | Resolution 20 mHz absolute<br>Accuracy<br>Digital setpoint preselection ± 0.05 Hz<br>Analog setpoint preselection<br>- Linearity ± 0.5% (reference fmax)<br>- Temperature sensitivity 0...40°C + 0.4%<br>- Offset ± 0 % |                |  |  |
| Dimensions                                                | [mm]                  |                                                                                                                                                                                                                         |                |  |  |
| a                                                         |                       | 135 x                                                                                                                                                                                                                   | 135 x          |  |  |
| b                                                         |                       | 350 x                                                                                                                                                                                                                   | 350 x          |  |  |
| e                                                         |                       | 250                                                                                                                                                                                                                     | 250            |  |  |
| Weight                                                    | m [kg]                | 7.5                                                                                                                                                                                                                     | 7.5            |  |  |



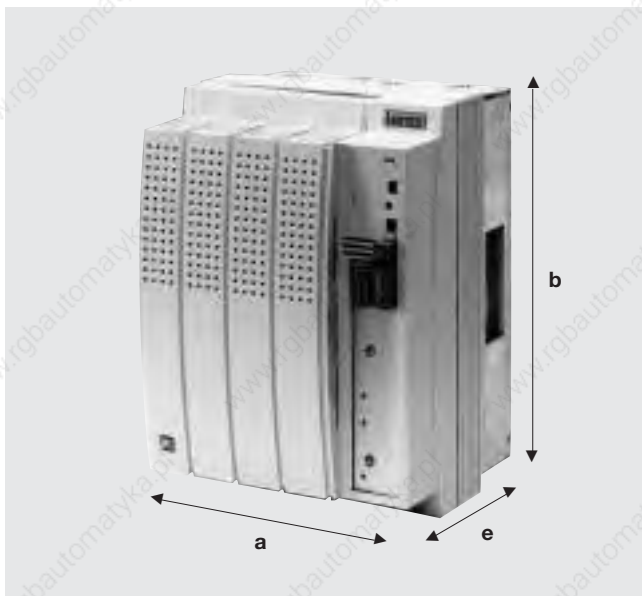


## Design - 8200

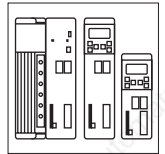
### Ratings

#### Frequency inverter for three-phase mains connection at 150% overload

| Type                                                      |                       | 8221                                                                                                                                                                                                                                                     | 8222                  | 8223                  | 8224                  |
|-----------------------------------------------------------|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|-----------------------|-----------------------|
|                                                           | Order ref.            | EVF8221-E                                                                                                                                                                                                                                                | EVF8222-E             | EVF8223-E             | EVF8224-E             |
| Order ref. 8200 HVAC and pump drive                       |                       | EVF8221-E-V020                                                                                                                                                                                                                                           | EVF8222-E-V020        | EVF8223-E-V020        | EVF8224-E-V020        |
| Mains voltage                                             | U <sub>M</sub> [V]    | 320 V... 528 V ± 0% ; 45 Hz ... 65 Hz ± 0%                                                                                                                                                                                                               |                       |                       |                       |
| Alternative DC supply                                     | U <sub>DC</sub> [V]   | 460 V... 740 V ± 0%                                                                                                                                                                                                                                      |                       |                       |                       |
| Data for operation on mains: 3 AC / 400 V / 50 Hz / 60 Hz |                       |                                                                                                                                                                                                                                                          |                       |                       |                       |
| Motor power (4-pole ASM)                                  | P <sub>r</sub> [kW]   | 15.0                                                                                                                                                                                                                                                     | 22.0                  | 30.0                  | 45.0                  |
| Output current                                            | I [A]                 | 32.0                                                                                                                                                                                                                                                     | 47.0                  | 59.0                  | 89.0                  |
| Max. output current 60 s                                  | I <sub>max</sub> [A]  | 48.0                                                                                                                                                                                                                                                     | 70.5                  | 89.0                  | 134.0                 |
| Output power                                              | S <sub>r</sub> [kVA]  | 22.2                                                                                                                                                                                                                                                     | 32.6                  | 41.6                  | 61.7                  |
| Data for operation on mains: 3 AC / 480 V / 50 Hz / 60 Hz |                       |                                                                                                                                                                                                                                                          |                       |                       |                       |
| Motor power (4-pole ASM)                                  | P <sub>r</sub> [kW]   | 18.5                                                                                                                                                                                                                                                     | 30.0                  | 37.0                  | 55.0                  |
| Output current                                            | I [A]                 | 32.0                                                                                                                                                                                                                                                     | 47.0                  | 56.0                  | 84.0                  |
| Max. output current 60 s                                  | I <sub>max</sub> [A]  | 48.0                                                                                                                                                                                                                                                     | 70.5                  | 84.0                  | 126.0                 |
| Output power                                              | S <sub>r</sub> [kVA]  | 26.6                                                                                                                                                                                                                                                     | 39.1                  | 49.9                  | 73.3                  |
| Mains current                                             | I <sub>r</sub> [A]    | 29.0                                                                                                                                                                                                                                                     | 42.0                  | 55.0                  | 80.0                  |
| Power loss                                                | P <sub>loss</sub> [W] | 430                                                                                                                                                                                                                                                      | 640                   | 810                   | 1100                  |
| Chopper frequency                                         |                       | Adjustable 4 kHz, <b>8 kHz</b> , 12 kHz, 16 kHz                                                                                                                                                                                                          |                       |                       |                       |
| Field frequency                                           |                       | Resolution 20 mHz absolute<br>Accuracy ± 0.05 Hz<br>Digital setpoint preselection ± 0.5% (reference fmax)<br>Analog setpoint preselection ± 0.4 %<br>- Linearity ± 0.5% (reference fmax)<br>- Temperature sensitivity 0...40°C + 0.4 %<br>- Offset ± 0 % |                       |                       |                       |
| Dimensions<br>a<br>b<br>e                                 | [mm]                  | 250 x<br>350 x<br>250                                                                                                                                                                                                                                    | 250 x<br>350 x<br>250 | 250 x<br>350 x<br>250 | 340 x<br>510 x<br>285 |
| Weight                                                    | m [kg]                | 12.5                                                                                                                                                                                                                                                     | 12.5                  | 12.5                  | 22.0                  |

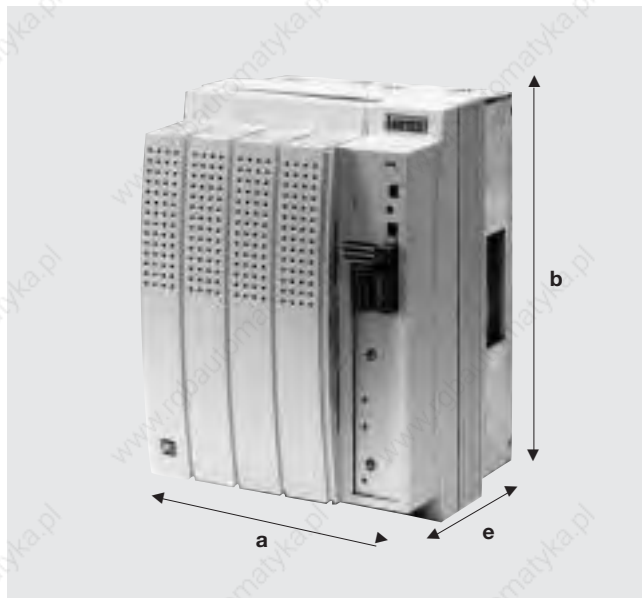


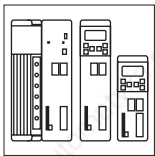




### Frequency inverter for three-phase mains connection at 120% overload

| Type                                                      |                       | 8221                                                                                                                                                                                                                     | 8222           | 8223           | 8224           |
|-----------------------------------------------------------|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|----------------|----------------|
|                                                           | Order ref.            | EVF8221-E                                                                                                                                                                                                                | EVF8222-E      | EVF8223-E      | EVF8224-E      |
| Order ref. 8200 HVAC and pump drive                       |                       | EVF8221-E-V020                                                                                                                                                                                                           | EVF8222-E-V020 | EVF8223-E-V020 | EVF8224-E-V020 |
| Mains voltage                                             | U <sub>M</sub> [V]    | 320 V... 440 V ± 0% ; 45 Hz ... 65 Hz ± 0%                                                                                                                                                                               |                |                |                |
| Alternative DC supply                                     | U <sub>DC</sub> [V]   | 460 V... 620 V ± 0%                                                                                                                                                                                                      |                |                |                |
| Data for operation on mains: 3 AC / 400 V / 50 Hz / 60 Hz |                       |                                                                                                                                                                                                                          |                |                |                |
| Motor power (4-pole ASM)                                  | P <sub>r</sub> [kW]   | 22.0                                                                                                                                                                                                                     | 30.0           | 37.5           | 55.0           |
| Output current                                            | I [A]                 | 43.0                                                                                                                                                                                                                     | 56.0           | 66.0           | 100.0          |
| Max. output current 60 s                                  | I <sub>max</sub> [A]  | 48.0                                                                                                                                                                                                                     | 70.5           | 89.0           | 134.0          |
| Output power                                              | S <sub>r</sub> [kVA]  | 29.8                                                                                                                                                                                                                     | 39.5           | 46.4           | 74.8           |
| Mains current                                             | I <sub>r</sub> [A]    | 29.0                                                                                                                                                                                                                     | 42.0           | 55.0           | 80.0           |
| Power loss                                                | P <sub>loss</sub> [W] | 430                                                                                                                                                                                                                      | 640            | 810            | 1100           |
| Chopper frequency                                         |                       | Adjustable 4 kHz, <b>8 kHz</b> , 12 kHz, 16 kHz                                                                                                                                                                          |                |                |                |
| Field frequency                                           |                       | Resolution 20 mHz absolute<br>Accuracy<br>Digital setpoint preselection ± 0.05 Hz<br>Analog setpoint preselection<br>- Linearity ± 0.5% (reference fmax)<br>- Temperature sensitivity 0...40°C + 0.4 %<br>- Offset ± 0 % |                |                |                |
| Dimensions                                                | [mm]                  |                                                                                                                                                                                                                          |                |                |                |
| a                                                         |                       | 250 x                                                                                                                                                                                                                    | 250 x          | 250 x          | 340 x          |
| b                                                         |                       | 350 x                                                                                                                                                                                                                    | 350 x          | 350 x          | 510 x          |
| e                                                         |                       | 250                                                                                                                                                                                                                      | 250            | 250            | 285            |
| Weight                                                    | m [kg]                | 12.5                                                                                                                                                                                                                     | 12.5           | 12.5           | 22.0           |



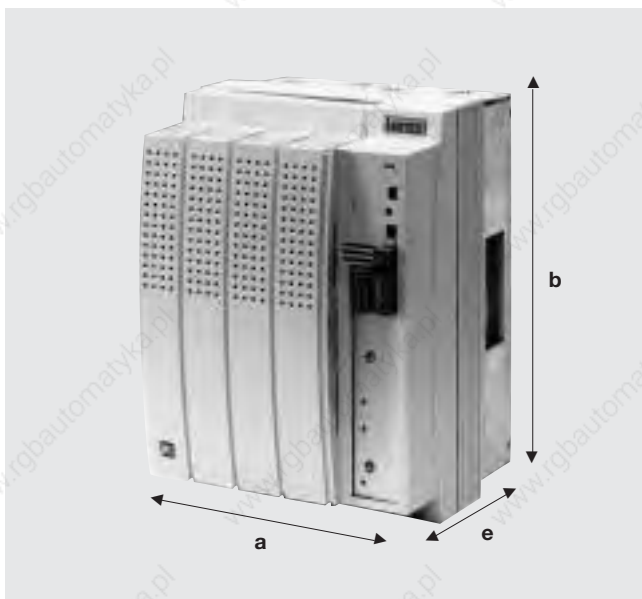


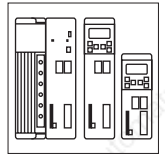
## Design - 8200

### Ratings

#### Frequency inverter for three-phase mains connection at 150% overload

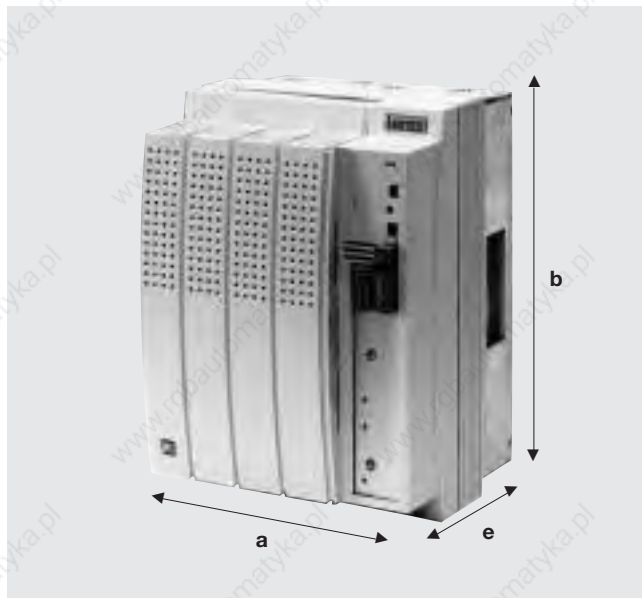
| Type                                                      |                       | 8225                                                                                                                                                                                                                           | 8226                  | 8227                  |  |
|-----------------------------------------------------------|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|-----------------------|--|
|                                                           | Order ref.            | EVF8225-E                                                                                                                                                                                                                      | EVF8226-E             | EVF8227-E             |  |
| Order ref. 8200 HVAC and pump drive                       |                       | EVF8225-E-V020                                                                                                                                                                                                                 | EVF8226-E-V020        | EVF8227-E-V020        |  |
| Mains voltage                                             | U <sub>M</sub> [V]    | 320 V... 528 V ± 0 % ; 45 Hz ... 65 Hz ± 0%                                                                                                                                                                                    |                       |                       |  |
| Alternative DC supply                                     | U <sub>DC</sub> [V]   | 460 V... 740 V ± 0%                                                                                                                                                                                                            |                       |                       |  |
| Data for operation on mains: 3 AC / 400 V / 50 Hz / 60 Hz |                       |                                                                                                                                                                                                                                |                       |                       |  |
| Motor power (4-pole ASM)                                  | P <sub>r</sub> [kW]   | 55.0                                                                                                                                                                                                                           | 75.0                  | 90.0                  |  |
| Output current                                            | I [A]                 | 110.0                                                                                                                                                                                                                          | 150.0                 | 180.0                 |  |
| Max. output current 60 s                                  | I <sub>max</sub> [A]  | 165.0                                                                                                                                                                                                                          | 225.0                 | 270.0                 |  |
| Output power                                              | S <sub>r</sub> [kVA]  | 76.2                                                                                                                                                                                                                           | 103.9                 | 124.7                 |  |
| Data for operation on mains: 3 AC / 480 V / 50 Hz / 60 Hz |                       |                                                                                                                                                                                                                                |                       |                       |  |
| Motor power (4-pole ASM)                                  | P <sub>r</sub> [kW]   | 75.0                                                                                                                                                                                                                           | 90.0                  | 110.0                 |  |
| Output current                                            | I [A]                 | 105.0                                                                                                                                                                                                                          | 142.0                 | 162.0                 |  |
| Max. output current 60 s                                  | I <sub>max</sub> [A]  | 157.0                                                                                                                                                                                                                          | 213.0                 | 256.0                 |  |
| Output power                                              | S <sub>r</sub> [kVA]  | 91.4                                                                                                                                                                                                                           | 124.0                 | 149.0                 |  |
| Mains current                                             | I <sub>r</sub> [A]    | 100.0                                                                                                                                                                                                                          | 135.0                 | 165.0                 |  |
| Power loss                                                | P <sub>loss</sub> [W] | 1470                                                                                                                                                                                                                           | 1960                  | 2400                  |  |
| Chopper frequency                                         |                       | Adjustable 4 kHz, <b>8 kHz</b> , 12 kHz, 16 kHz                                                                                                                                                                                |                       |                       |  |
| Field frequency                                           |                       | Resolution 20 mHz absolute<br>Accuracy ± 0.05 Hz<br>Digital setpoint preselection ± 0.5% (reference fmax)<br>Analog setpoint preselection ± 0.4 %<br>- Linearity ± 0 %<br>- Temperature sensitivity 0...40°C<br>- Offset ± 0 % |                       |                       |  |
| Dimensions<br>a<br>b<br>e                                 | [mm]                  | 340 x<br>591 x<br>285                                                                                                                                                                                                          | 450 x<br>680 x<br>285 | 450 x<br>680 x<br>285 |  |
| Weight                                                    | m [kg]                | 36.5                                                                                                                                                                                                                           | 59.0                  | 59.0                  |  |

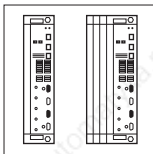




### Frequency inverter for three-phase mains connection at 120% overload

| Type                                                      |                       | 8225                                                                                                                                                                                                                     | 8226           | 8227           |  |
|-----------------------------------------------------------|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|----------------|--|
|                                                           | Order ref.            | EVF8225-E                                                                                                                                                                                                                | EVF8226-E      | EVF8227-E      |  |
| Order ref. 8200 HVAC and pump drive                       |                       | EVF8225-E-V020                                                                                                                                                                                                           | EVF8226-E-V020 | EVF8227-E-V020 |  |
| Mains voltage                                             | U <sub>M</sub> [V]    | 320 V... 440 V ± 0 % ; 45 Hz ... 65 Hz ± 0%                                                                                                                                                                              |                |                |  |
| Alternative DC supply                                     | U <sub>DC</sub> [V]   | 460 V... 620 V ± 0%                                                                                                                                                                                                      |                |                |  |
| Data for operation on mains: 3 AC / 400 V / 50 Hz / 60 Hz |                       |                                                                                                                                                                                                                          |                |                |  |
| Motor power (4-pole ASM)                                  | P <sub>r</sub> [kW]   | 75.0                                                                                                                                                                                                                     | 90.0           | 110.0          |  |
| Output current                                            | I [A]                 | 135.0                                                                                                                                                                                                                    | 159.0          | 205.0          |  |
| Max. output current 60 s                                  | I <sub>max</sub> [A]  | 165.0                                                                                                                                                                                                                    | 225.0          | 270.0          |  |
| Output power                                              | S <sub>r</sub> [kVA]  | 91.5                                                                                                                                                                                                                     | 110.0          | 142.0          |  |
| Mains current                                             | I <sub>r</sub> [A]    | 100.0                                                                                                                                                                                                                    | 135.0          | 165.0          |  |
| Power loss                                                | P <sub>loss</sub> [W] | 1470                                                                                                                                                                                                                     | 1960           | 2400           |  |
| Chopper frequency                                         |                       | Adjustable 4 kHz, <b>8 kHz</b> , 12 kHz, 16 kHz                                                                                                                                                                          |                |                |  |
| Field frequency                                           |                       | Resolution 20 mHz absolute<br>Accuracy<br>Digital setpoint preselection ± 0.05 Hz<br>Analog setpoint preselection<br>- Linearity ± 0.5% (reference fmax)<br>- Temperature sensitivity 0...40°C + 0.4 %<br>- Offset ± 0 % |                |                |  |
| Dimensions                                                | [mm]                  |                                                                                                                                                                                                                          |                |                |  |
| a                                                         |                       | 340 x                                                                                                                                                                                                                    | 450 x          | 450 x          |  |
| b                                                         |                       | 591 x                                                                                                                                                                                                                    | 680 x          | 680 x          |  |
| e                                                         |                       | 285                                                                                                                                                                                                                      | 285            | 285            |  |
| Weight                                                    | m [kg]                | 36.5                                                                                                                                                                                                                     | 59.0           | 59.0           |  |





## Design - 9300 vector

### Overview of the 9300

Compact frequency inverter for three-phase mains connection:

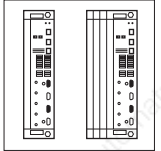
- Three-phase: 9300 range 0.37 kW - 110.0 kW

#### Product features

|                                                                        | Three-phase<br>0.37 - 110.0 kW |
|------------------------------------------------------------------------|--------------------------------|
| Single-axis, compact design                                            | ●                              |
| For 1 min. up to 150 % overload                                        | ●                              |
| Power terminals (top)                                                  | ●                              |
| Motor connections (bottom)                                             | ●                              |
| Direct connection of incremental encoder TTL 5-8 V                     | ●                              |
| Motor phase monitoring for asynchronous motor                          | ●                              |
| Mains monitoring                                                       | ●                              |
| Vector control or V/f characteristic control                           | ●                              |
| Sensorless speed control (vector control)                              | ●                              |
| Digital synchronization system via pilot frequency (speed-synchronous) | ●                              |
| Integrated pilot frequency input and output                            | ●                              |
| Accessible application configurations                                  | ●                              |
| Automatic detection of motor parameters                                | ●                              |
| Modular function blocks                                                | ●                              |
| Process controller and arithmetic blocks                               | ●                              |
| Integrated system bus interface (CAN)                                  | ●                              |
| Flying restart with coasting motor                                     | ●                              |
| Motor potentiometer                                                    | ●                              |
| Freely assignable inputs/outputs                                       | ●                              |
| 4 parameter sets                                                       | ●                              |
| 3 skip frequencies                                                     | ●                              |
| Output frequency up to 600 Hz                                          | ●                              |
| Up to 15 fixed frequencies (JOG) per parameter set                     | ●                              |
| Chopper frequencies 2, 4, 8, 16 kHz                                    | ●                              |

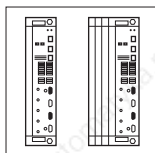
# Design - 9300 vector

## General data



| Range                             | Values                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|-----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Vibration resistance              | Germanischer Lloyd, general conditions                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Humidity                          | Humidity class F, no condensation<br>(average relative humidity 85%)                                                                                                                                                                                                                                                                                                                                                                                                |
| Permissible temperature ranges    | During device transport: -25 °C ... +70 °C<br>During device storage: -25 °C ... +55 °C<br>During device operation: 0 °C ... +40 °C<br>+40 °C ... +50 °C with power derating 2.5% per K                                                                                                                                                                                                                                                                              |
| Permissible installation height h | Up to 1000 m above sea level<br>1000 m above sea level ... 4000 m above sea level Without power derating<br>5%/1000m                                                                                                                                                                                                                                                                                                                                                |
| Pollution degree                  | VDE 0110 Part 2 pollution degree 2                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Noise emission                    | Requirements to EN 50081-1, EN 50081-2, IEC 22G-WG4 (Cv) 21<br>Limiting value class A to EN 55011 (industrial area) with mains filter<br>Limiting value class B to EN 55022 (residential area) with mains filter and control cabinet installation                                                                                                                                                                                                                   |
| Noise immunity                    | Complies with limit values with mains filter<br>Requirements to EN 50082-2, IEC 22G-WG4 (Cv) 21<br><b>Requirements</b> <b>Standard</b> <b>Intensity of tests</b><br>ESD EN61000-4-2 3, i.e. 8 kV with air discharge<br>and 6 kV with contact discharge<br>HF field EN61000-4-3 3, i.e. 10 V/m; 27 up to 1000 MHz<br>(housing) EN61000-4-4 3/4, i.e. 2 kV/5 kHz<br>Burst<br>Surge IEC 1000-4-5 3, i.e. 1.2/50 µs 1 kV phase-phase, 2 kV phase-PE<br>(on mains cable) |
| Insulation strength               | Overvoltage category III to VDE 0110                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Packaging                         | To DIN 4180<br>- 9321 to 9333EV: Shipping container                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Degree of protection              | IP20<br>NEMA 1: Protection against contact                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Approvals                         | CE: Low voltage directive<br>UL508: Industrial Control Equipment<br>UL508C: Power Conversion Equipment                                                                                                                                                                                                                                                                                                                                                              |





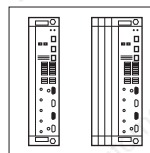
## Design - 9300 vector

### Ratings

#### Frequency inverter for three-phase mains connection at 150% overload

| Type                                                          |                       | 9321                                        | 9322       | 9323       | 9324       |
|---------------------------------------------------------------|-----------------------|---------------------------------------------|------------|------------|------------|
| Order ref.                                                    |                       | EVF9321-EV                                  | EVF9322-EV | EVF9323-EV | EVF9324-EV |
| Mains voltage                                                 | U <sub>M</sub> [V]    | 320 V... 528 V ± 0 % ; 45 Hz ... 65 Hz ± 0% |            |            |            |
| Alternative DC supply                                         | U <sub>DC</sub> [V]   | 460 V... 740 V +/-0%                        |            |            |            |
| Data for operation on a network: 3 AC / 400 V / 50 Hz / 60 Hz |                       |                                             |            |            |            |
| Motor power (4-pole ASM)                                      | P <sub>r</sub> [kW]   | 0.37                                        | 0.75       | 1.5        | 3.0        |
| Output current                                                | I [A]                 | 1.5                                         | 2.5        | 3.9        | 7.0        |
| Max. output current 60 s                                      | I <sub>max</sub> [A]  | 2.2                                         | 3.7        | 5.8        | 10.5       |
| Output power                                                  | S <sub>r</sub> [kVA]  | 1.0                                         | 1.7        | 2.7        | 4.8        |
| Data for operation on a network: 3 AC / 480 V / 50 Hz / 60 Hz |                       |                                             |            |            |            |
| Motor power (4-pole ASM)                                      | P <sub>r</sub> [kW]   | 0.37                                        | 0.75       | 1.5        | 3.0        |
| Output current                                                | I [A]                 | 1.5                                         | 2.5        | 3.9        | 7.0        |
| Max. output current 60 s                                      | I <sub>max</sub> [A]  | 2.2                                         | 3.7        | 5.8        | 10.5       |
| Mains current                                                 | I <sub>r</sub> [A]    | 1.5                                         | 2.5        | 3.9        | 7.0        |
| Power loss                                                    | P <sub>loss</sub> [W] | 50                                          | 65         | 100        | 150        |
| Chopper frequency                                             | [%/K]                 | Adjustable 2/4 kHz, <b>8 kHz</b> , 16 kHz   |            |            |            |
| Dimensions                                                    | [mm]                  |                                             |            |            |            |
| a                                                             |                       | 78 x                                        | 78 x       | 97 x       | 97 x       |
| b                                                             |                       | 350 x                                       | 350 x      | 350 x      | 350 x      |
| e                                                             |                       | 250                                         | 250        | 250        | 250        |
| Weight                                                        | m [kg]                | 4.9                                         | 4.9        | 5.8        | 6.0        |

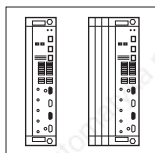




### Frequency inverter for three-phase mains connection at 120% overload

| Type                                                      |                       | 9321                                       | 9322                 | 9323                 | 9324                 |
|-----------------------------------------------------------|-----------------------|--------------------------------------------|----------------------|----------------------|----------------------|
|                                                           | Order ref.            | EVF9321-EV                                 | EVF9322-EV           | EVF9323-EV           | EVF9324-EV           |
| Mains voltage                                             | U <sub>M</sub> [V]    | 320 V... 528 V ± 0% ; 45 Hz ... 65 Hz ± 0% |                      |                      |                      |
| Alternative DC supply                                     | U <sub>DC</sub> [V]   | 460 V... 620 V ± 0%                        |                      |                      |                      |
| Data for operation on mains: 3 AC / 400 V / 50 Hz / 60 Hz |                       |                                            |                      |                      |                      |
| Motor power (4-pole ASM)                                  | P <sub>r</sub> [kW]   | 0.55                                       | 1.1                  | 2.2                  | 4.0                  |
| Output current                                            | I [A]                 | 1.8                                        | 3.0                  | 5.5                  | 9.2                  |
| Max. output current 60 s                                  | I <sub>max</sub> [A]  | 2.2                                        | 3.7                  | 5.8                  | 10.5                 |
| Output power                                              | S <sub>r</sub> [kVA]  | 1.3                                        | 2.1                  | 3.8                  | 6.5                  |
| Mains current                                             | I <sub>r</sub> [A]    | 1.5                                        | 2.5                  | 3.9                  | 7.0                  |
| Power loss                                                | P <sub>loss</sub> [W] | 50                                         | 65                   | 100                  | 150                  |
| Chopper frequency                                         |                       | Adjustable 2/4 kHz, <b>8 kHz</b> , 16 kHz  |                      |                      |                      |
| Dimensions<br>a<br>b<br>e                                 | [mm]                  | 78 x<br>350 x<br>250                       | 78 x<br>350 x<br>250 | 97 x<br>350 x<br>250 | 97 x<br>350 x<br>250 |
| Weight                                                    | m [kg]                | 4.9                                        | 4.9                  | 5.8                  | 6.0                  |





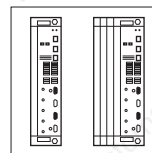
## Design - 9300 vector

### Ratings

#### Frequency inverter for three-phase mains connection at 150% overload

| Type                                                      |                       | 9325                                        | 9326                  |  |
|-----------------------------------------------------------|-----------------------|---------------------------------------------|-----------------------|--|
|                                                           | Order ref.            | EVF9325-EV                                  | EVF9326-EV            |  |
| Mains voltage                                             | U <sub>M</sub> [V]    | 320 V... 528 V ± 0 % ; 45 Hz ... 65 Hz ± 0% |                       |  |
| Alternative DC supply                                     | U <sub>DC</sub> [V]   | 460 V... 740 V ± 0%                         |                       |  |
| Data for operation on mains: 3 AC / 400 V / 50 Hz / 60 Hz |                       |                                             |                       |  |
| Motor power (4-pole ASM)                                  | P <sub>r</sub> [kW]   | 5.5                                         | 11.0                  |  |
| Output current                                            | I [A]                 | 13.0                                        | 23.5                  |  |
| Max. output current 60 s                                  | I <sub>max</sub> [A]  | 19.5                                        | 35.0                  |  |
| Output power                                              | S <sub>r</sub> [kVA]  | 9.0                                         | 16.3                  |  |
| Data for operation on mains: 3 AC / 480 V / 50 Hz / 60 Hz |                       |                                             |                       |  |
| Motor power (4-pole ASM)                                  | P <sub>r</sub> [kW]   | 5.5                                         | 11.0                  |  |
| Output current                                            | I [A]                 | 13.0                                        | 22.3                  |  |
| Max. output current 60 s                                  | I <sub>max</sub> [A]  | 19.5                                        | 33.5                  |  |
| Output power                                              | S <sub>r</sub> [kVA]  | 10.8                                        | 18.5                  |  |
| Mains current                                             | I <sub>r</sub> [A]    | 12.0                                        | 20.5                  |  |
| Power loss                                                | P <sub>loss</sub> [W] | 210                                         | 360                   |  |
| Chopper frequency                                         |                       | Adjustable 4 kHz, <b>8 kHz</b> , 16 kHz     |                       |  |
| Dimensions<br>a<br>b<br>e                                 | [mm]                  | 135 x<br>350 x<br>250                       | 135 x<br>350 x<br>250 |  |
| Weight                                                    | m [kg]                | 7.8                                         | 7.8                   |  |

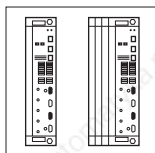




### Frequency inverter for three-phase mains connection at 120% overload

| Type                                                      |                       | 9325                                                   | 9326                  |  |  |
|-----------------------------------------------------------|-----------------------|--------------------------------------------------------|-----------------------|--|--|
|                                                           | Order ref.            | EVF9325-EV                                             | EVF9326-EV            |  |  |
| Mains voltage                                             | U <sub>M</sub> [V]    | 320 V... 440 V ± 0 % ; 45 Hz ... 65 Hz ± 0%            |                       |  |  |
| Alternative DC supply                                     | U <sub>DC</sub> [V]   | 460 V... 620 V ± 0%                                    |                       |  |  |
| Data for operation on mains: 3 AC / 400 V / 50 Hz / 60 Hz |                       |                                                        |                       |  |  |
| Motor power (4-pole ASM)                                  | P <sub>r</sub> [kW]   | 7.5                                                    | 11.0                  |  |  |
| Output current                                            | I [A]                 | 15.0                                                   | 23.5                  |  |  |
| Max. output current 60 s                                  | I <sub>max</sub> [A]  | 19.5                                                   | 35.0                  |  |  |
| Output power                                              | S <sub>r</sub> [kVA]  | 11.1                                                   | 16.3                  |  |  |
| Mains current                                             | I <sub>r</sub> [A]    | 12.0                                                   | 20.5                  |  |  |
| Power loss                                                | P <sub>loss</sub> [W] | 210                                                    | 360                   |  |  |
| Chopper frequency                                         |                       | Adjustable 2 kHz, 4 kHz, <b>8 kHz</b> , 12 kHz, 16 kHz |                       |  |  |
| Dimensions<br>a<br>b<br>e                                 | [mm]                  | 135 x<br>350 x<br>250                                  | 135 x<br>350 x<br>250 |  |  |
| Weight                                                    | m [kg]                | 7.8                                                    | 7.8                   |  |  |



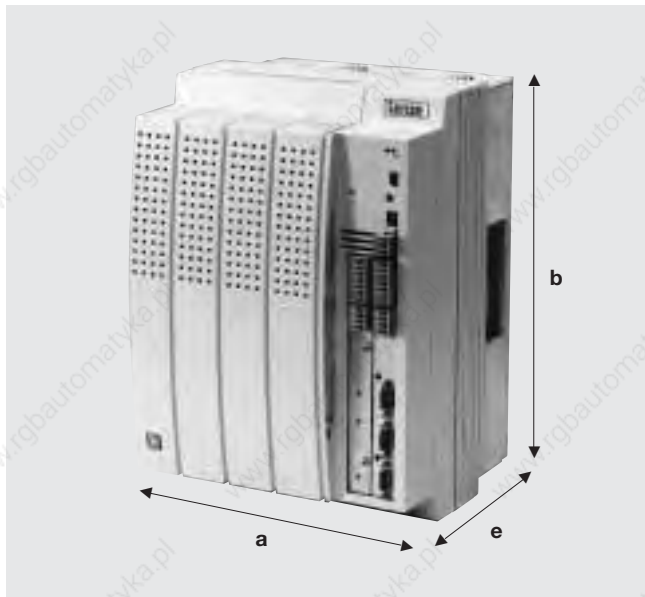


## Design - 9300 vector

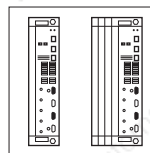
### Ratings

#### Frequency inverter for three-phase mains connection at 150% overload

| Type                                                      |                       | 9327                                                   | 9328                  | 9329                  | 9330                  |
|-----------------------------------------------------------|-----------------------|--------------------------------------------------------|-----------------------|-----------------------|-----------------------|
|                                                           | Order ref.            | EVF9327-EV                                             | EVF9328-EV            | EVF9329-EV            | EVF9330-EV            |
| Mains voltage                                             | U <sub>M</sub> [V]    | 320 V... 528 V ± 0% ; 45 Hz ... 65 Hz ± 0%             |                       |                       |                       |
| Alternative DC supply                                     | U <sub>DC</sub> [V]   | 460 V... 740 V ± 0%                                    |                       |                       |                       |
| Data for operation on mains: 3 AC / 400 V / 50 Hz / 60 Hz |                       |                                                        |                       |                       |                       |
| Motor power (4-pole ASM)                                  | P <sub>r</sub> [kW]   | 15.0                                                   | 22.0                  | 30.0                  | 45.0                  |
| Output current                                            | I [A]                 | 32.0                                                   | 47.0                  | 59.0                  | 89.0                  |
| Max. output current 60 s                                  | I <sub>max</sub> [A]  | 48.0                                                   | 70.5                  | 88.5                  | 134.0                 |
| Output power                                              | S <sub>r</sub> [kVA]  | 22.2                                                   | 32.6                  | 41.6                  | 61.7                  |
| Data for operation on mains: 3 AC / 480 V / 50 Hz / 60 Hz |                       |                                                        |                       |                       |                       |
| Motor power (4-pole ASM)                                  | P <sub>r</sub> [kW]   | 18.5                                                   | 30.0                  | 37.0                  | 55.0                  |
| Output current                                            | I [A]                 | 30.4                                                   | 44.7                  | 56.0                  | 84.0                  |
| Max. output current 60 s                                  | I <sub>max</sub> [A]  | 45.6                                                   | 67.0                  | 84.0                  | 126.0                 |
| Output power                                              | S <sub>r</sub> [kVA]  | 26.6                                                   | 39.1                  | 49.9                  | 73.3                  |
| Mains current                                             | I <sub>r</sub> [A]    | 29.0                                                   | 42.0                  | 55.0                  | 80.0                  |
| Power loss                                                | P <sub>loss</sub> [W] | 430                                                    | 640                   | 810                   | 1100                  |
| Chopper frequency                                         |                       | Adjustable 2 kHz, 4 kHz, <b>8 kHz</b> , 12 kHz, 16 kHz |                       |                       |                       |
| Dimensions<br>a<br>b<br>e                                 | [mm]                  | 250 x<br>350 x<br>250                                  | 250 x<br>350 x<br>250 | 250 x<br>350 x<br>250 | 340 x<br>510 x<br>285 |
| Weight                                                    | m [kg]                | 18.0                                                   | 18.0                  | 18.0                  | 36.0                  |

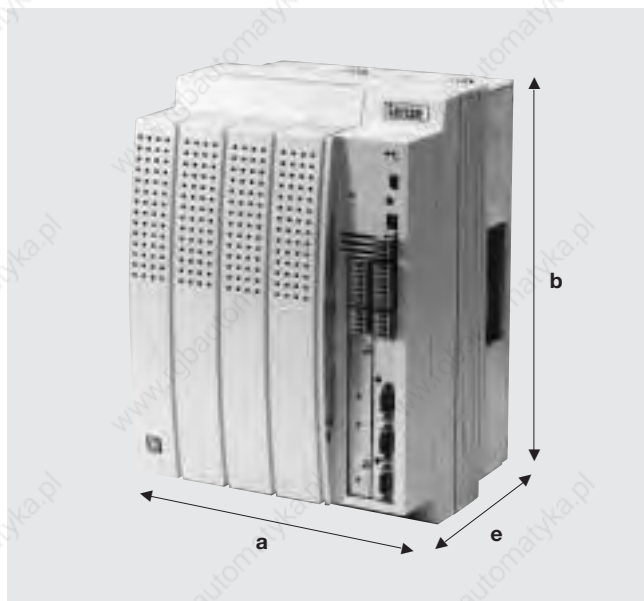


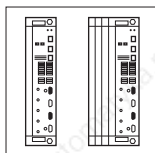




### Frequency inverter for three-phase mains connection at 120% overload

| Type                                                      |                       | 9327                                           | 9328                  | 9329                  | 9330                  |
|-----------------------------------------------------------|-----------------------|------------------------------------------------|-----------------------|-----------------------|-----------------------|
|                                                           | Order ref.            | EVF9327-EV                                     | EVF9328-EV            | EVF9329-EV            | EVF9330-EV            |
| Mains voltage                                             | U <sub>M</sub> [V]    | 320 V... 440 V ± 0% ; 45 Hz ... 65 Hz ± 0%     |                       |                       |                       |
| Alternative DC supply                                     | U <sub>DC</sub> [V]   | 460 V... 620 V ± 0%                            |                       |                       |                       |
| Data for operation on mains: 3 AC / 400 V / 50 Hz / 60 Hz |                       |                                                |                       |                       |                       |
| Motor power (4-pole ASM)                                  | P <sub>r</sub> [kW]   | 22.0                                           | 30.0                  | 37.5                  | 55.0                  |
| Output current                                            | I [A]                 | 43.0                                           | 56.0                  | 66.0                  | 100                   |
| Max. output current 60 s                                  | I <sub>max</sub> [A]  | 48.0                                           | 70.5                  | 88.5                  | 134.0                 |
| Output power                                              | S <sub>r</sub> [kVA]  | 29.8                                           | 39.5                  | 46.4                  | 74.8                  |
| Mains current                                             | I <sub>r</sub> [A]    | 29.0                                           | 42.0                  | 55.0                  | 80.0                  |
| Power loss                                                | P <sub>loss</sub> [W] | 430                                            | 640                   | 810                   | 1100                  |
| Chopper frequency                                         |                       | Adjustable 2 kHz, 4 kHz, <b>8 kHz</b> , 16 kHz |                       |                       |                       |
| Dimensions<br>a<br>b<br>e                                 | [mm]                  | 250 x<br>350 x<br>250                          | 250 x<br>350 x<br>250 | 250 x<br>350 x<br>250 | 340 x<br>510 x<br>285 |
| Weight                                                    | m [kg]                | 18.0                                           | 18.0                  | 18.0                  | 36.0                  |



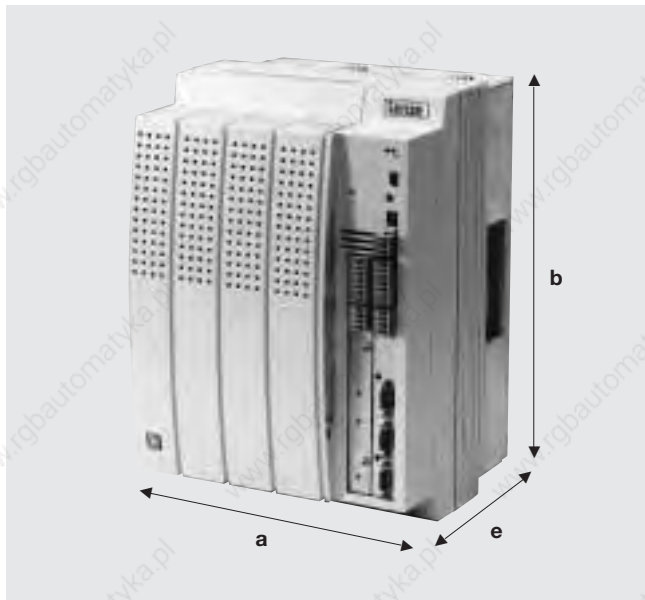


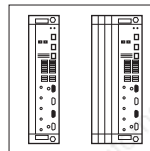
## Design - 9300 vector

### Ratings

#### Frequency inverter for three-phase mains connection at 150% overload

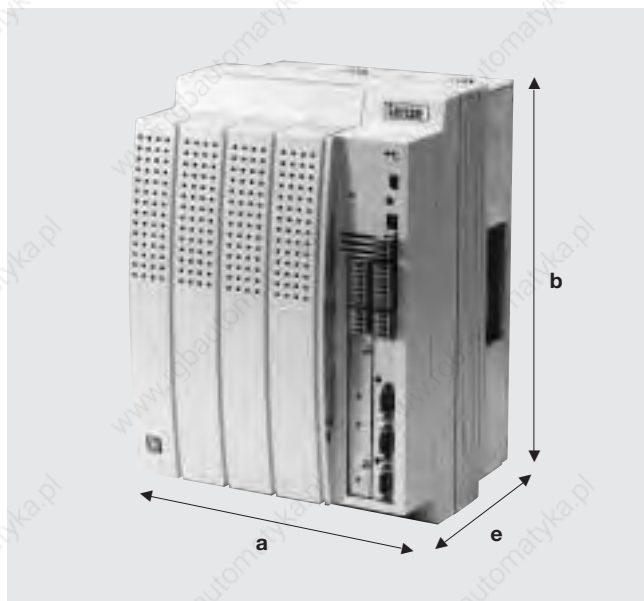
| Type                                                      |                       | 9331                                           | 9332      | 9333      |  |
|-----------------------------------------------------------|-----------------------|------------------------------------------------|-----------|-----------|--|
|                                                           | Order ref.            | EVF9331-E                                      | EVF9332-E | EVF9333-E |  |
| Mains voltage                                             | U <sub>M</sub> [V]    | 320 V... 528 V ± 0 % ; 45 Hz ... 65 Hz ± 0%    |           |           |  |
| Alternative DC supply                                     | U <sub>DC</sub> [V]   | 460 V... 740 V ± 0%                            |           |           |  |
| Data for operation on mains: 3 AC / 400 V / 50 Hz / 60 Hz |                       |                                                |           |           |  |
| Motor power (4-pole ASM)                                  | P <sub>r</sub> [kW]   | 55.0                                           | 75.0      | 90.0      |  |
| Output current                                            | I [A]                 | 110.0                                          | 150.0     | 180.0     |  |
| Max. output current 60 s                                  | I <sub>max</sub> [A]  | 165.0                                          | 225.0     | 270.0     |  |
| Output power                                              | S <sub>r</sub> [kVA]  | 76.2                                           | 103.9     | 124.7     |  |
| Data for operation on mains: 3 AC / 480 V / 50 Hz / 60 Hz |                       |                                                |           |           |  |
| Motor power (4-pole ASM)                                  | P <sub>r</sub> [kW]   | 75.0                                           | 90.0      | 110.0     |  |
| Output current                                            | I [A]                 | 105.0                                          | 142.0     | 171.0     |  |
| Max. output current 60 s                                  | I <sub>max</sub> [A]  | 157.0                                          | 213.0     | 256.0     |  |
| Output power                                              | S <sub>r</sub> [kVA]  | 91.4                                           | 124.0     | 149.0     |  |
| Mains current                                             | I <sub>r</sub> [A]    | 100.0                                          | 135.0     | 165.0     |  |
| Power loss                                                | P <sub>loss</sub> [W] | 1470                                           | 1960      | 2400      |  |
| Chopper frequency                                         |                       | Adjustable 2 kHz, 4 kHz, <b>8 kHz</b> , 16 kHz |           |           |  |
| Dimensions                                                | [mm]                  |                                                |           |           |  |
| a                                                         |                       | 340 x                                          | 450 x     | 450 x     |  |
| b                                                         |                       | 591 x                                          | 680 x     | 680 x     |  |
| e                                                         |                       | 285                                            | 285       | 285       |  |
| Weight                                                    | m [kg]                | 38.0                                           | 70.0      | 70.0      |  |





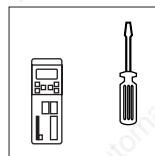
### Frequency inverter for three-phase mains connection at 120% overload

| Type                                                      |                       | 9331                                           | 9332                  | 9333                  |  |
|-----------------------------------------------------------|-----------------------|------------------------------------------------|-----------------------|-----------------------|--|
|                                                           | Order ref.            | EVF9331-EV                                     | EVF9332-EV            | EVF9333-EV            |  |
| Mains voltage                                             | U <sub>M</sub> [V]    | 320 V... 440 V ± 0 % ; 45 Hz ... 65 Hz ± 0%    |                       |                       |  |
| Alternative DC supply                                     | U <sub>DC</sub> [V]   | 460 V... 620 V ± 0%                            |                       |                       |  |
| Data for operation on mains: 3 AC / 400 V / 50 Hz / 60 Hz |                       |                                                |                       |                       |  |
| Motor power (4-pole ASM)                                  | P <sub>r</sub> [kW]   | 75.0                                           | 90.0                  | 110.0                 |  |
| Output current                                            | I [A]                 | 135.0                                          | 159.0                 | 205.0                 |  |
| Max. output current 60 s                                  | I <sub>max</sub> [A]  | 165.0                                          | 225.0                 | 270.0                 |  |
| Output power                                              | S <sub>r</sub> [kVA]  | 91.5                                           | 110.0                 | 142.0                 |  |
| Mains current                                             | I <sub>r</sub> [A]    | 100.0                                          | 135.0                 | 165.0                 |  |
| Power loss                                                | P <sub>loss</sub> [W] | 1470                                           | 1960                  | 2400                  |  |
| Chopper frequency                                         |                       | Adjustable 2 kHz, 4 kHz, <b>8 kHz</b> , 16 kHz |                       |                       |  |
| Dimensions<br>a<br>b<br>e                                 | [mm]                  | 340 x<br>591 x<br>285                          | 450 x<br>680 x<br>285 | 450 x<br>680 x<br>285 |  |
| Weight                                                    | m [kg]                | 38.0                                           | 70.0                  | 70.0                  |  |



## Design - 8200 and 9300 vector

### Mechanical installation

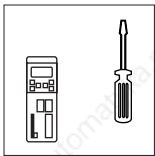


#### General information

- 8200 vector frequency inverters must only be used as built-in units.
- If the exhaust air contains pollutants (dust, lint, grease, aggressive gases) then appropriate counter-measures must be in place (e.g. installation of filters, regular cleaning etc.).
- Ensure there is enough mounting space.  
Several units can be mounted directly adjacent to one another without clearance.  
Ensure that there is free access for cooling air and that the outlet for used air is not blocked.  
Ensure clearance of 100 mm above and below.
- In the event of continuous oscillations or vibrations, check the use of vibration dampers.

The frequency inverters can be fitted as follows into a control cabinet:

With the **fixing rails** included in the scope of supply  
With a **DIN rail mounting up to 3.0 kW**  
With **thermal separation from 4.0 kW upwards**  
With special **fixing devices**



## Design - 8200 and 9300 vector

### Assembly with fixing rail

The devices are supplied with a mounting rail (8201-18, 8241-46, 9321-26) or mounting clamps (8221-27, 9327-33).

These can be used to fix the frequency inverter to the back panel of the control cabinet or to the mounting plate. The mounting rail is fixed to the device in a guideway,

providing access to fixing clamps from above and below. 8221-27 devices are installed with 4 lateral fixing clamps.

**A DIN rail assembly is also available for 8201-8214 devices and thermal separation is possible on 8215-8227 and 9321-33 devices.**

Figure A

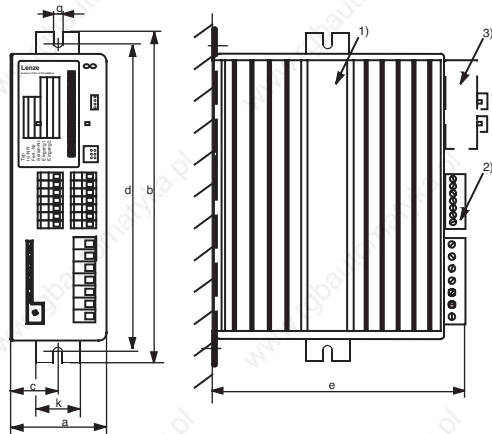


Figure B

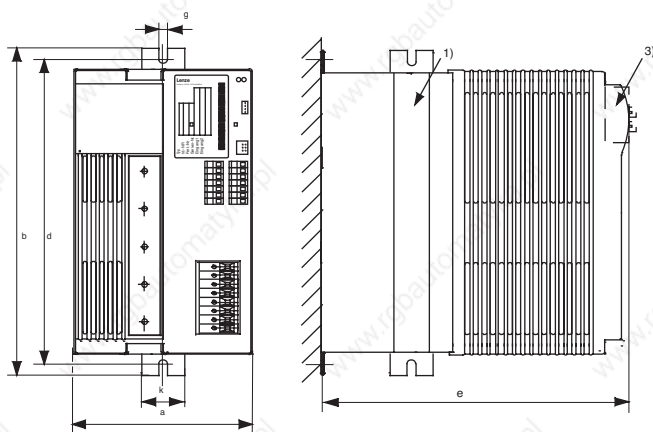
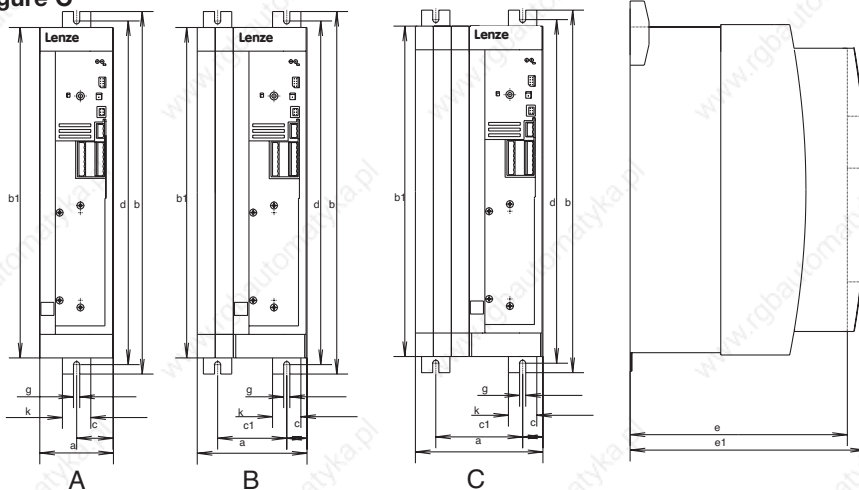


Figure C





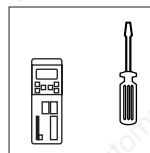
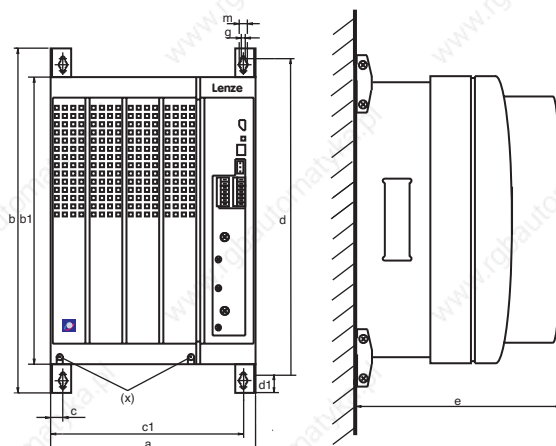


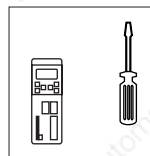
Figure D



| Device       | Figure | a [mm] | b [mm] | b1 [mm] | c [mm] | c1 [mm] | d [mm] | d1 [mm] | e [mm] | g [mm] | k [mm] | m [mm] |
|--------------|--------|--------|--------|---------|--------|---------|--------|---------|--------|--------|--------|--------|
| 8201E        | A      | 64     | 210    | –       | 29     | –       | 190    | –       | 158    | 6.5    | 30     | –      |
| 8202E        | A      | 64     | 210    | –       | 29     | –       | 190    | –       | 198    | 6.5    | 30     | –      |
| 8202E-V002   | A      | 64     | 210    | –       | 29     | –       | 190    | –       | 158    | 6.5    | 30     | –      |
| 8203E        | A      | 83     | 283    | –       | 38     | –       | 263    | –       | 211    | 6.5    | 30     | –      |
| 8204E        | A      | 83     | 283    | –       | 38     | –       | 263    | –       | 211    | 6.5    | 30     | –      |
| 8211E        | A      | 83     | 283    | –       | 38     | –       | 263    | –       | 211    | 6.5    | 30     | –      |
| 8212E        | A      | 83     | 283    | –       | 38     | –       | 263    | –       | 211    | 6.5    | 30     | –      |
| 8213E        | A      | 83     | 283    | –       | 38     | –       | 263    | –       | 211    | 6.5    | 30     | –      |
| 8214E        | A      | 83     | 283    | –       | 38     | –       | 263    | –       | 211    | 6.5    | 30     | –      |
| 8215E        | B      | 125    | 283    | –       | –      | –       | 263    | –       | 218    | 6.5    | 30     | –      |
| 8216E        | B      | 125    | 283    | –       | –      | –       | 263    | –       | 218    | 6.5    | 30     | –      |
| 8217E        | B      | 125    | 283    | –       | –      | –       | 263    | –       | 218    | 6.5    | 30     | –      |
| 8218E        | B      | 125    | 283    | –       | –      | –       | 263    | –       | 218    | 6.5    | 30     | –      |
| 8241E/9321EV | C      | 78     | 384    | 350     | 39     | –       | 365    | –       | 250    | 6.5    | 30     | –      |
| 8242E/9322EV | C      | 78     | 384    | 350     | 39     | –       | 365    | –       | 250    | 6.5    | 30     | –      |
| 8243E/9323EV | C      | 97     | 384    | 350     | 48.5   | –       | 365    | –       | 250    | 6.5    | 30     | –      |
| 8244E/9324EV | C      | 97     | 384    | 350     | 48.5   | –       | 365    | –       | 250    | 6.5    | 30     | –      |
| 8245E/9325EV | C      | 135    | 384    | 350     | 21.5   | 92      | 365    | –       | 250    | 6.5    | 30     | –      |
| 8246E/9326EV | C      | 135    | 384    | 350     | 21.5   | 92      | 365    | –       | 250    | 6.5    | 30     | –      |
| 8221E/9327EV | D      | 250    | 402    | 350     | 22     | 205     | 370    | 24      | 250    | 6.5    | –      | 11.0   |
| 8222E/9328EV | D      | 250    | 402    | 350     | 22     | 205     | 370    | 24      | 250    | 6.5    | –      | 11.0   |
| 8223E/9329EV | D      | 250    | 402    | 350     | 22     | 205     | 370    | 24      | 250    | 6.5    | –      | 11.0   |
| 8224E/9330EV | D      | 340    | 580    | 510     | 28     | 284     | 532    | 38      | 285    | 11.0   | –      | 18.0   |
| 8225E/9331EV | D      | 340    | 672    | 591     | 28     | 284     | 624    | 38      | 285    | 11.0   | –      | 18.0   |
| 8226E/9332EV | D      | 450    | 750    | 680     | 30.5   | 395     | 702    | 38      | 285    | 11.0   | –      | 18.0   |
| 8227E/9333EV | D      | 450    | 750    | 680     | 30.5   | 395     | 702    | 38      | 285    | 11.0   | –      | 18.0   |

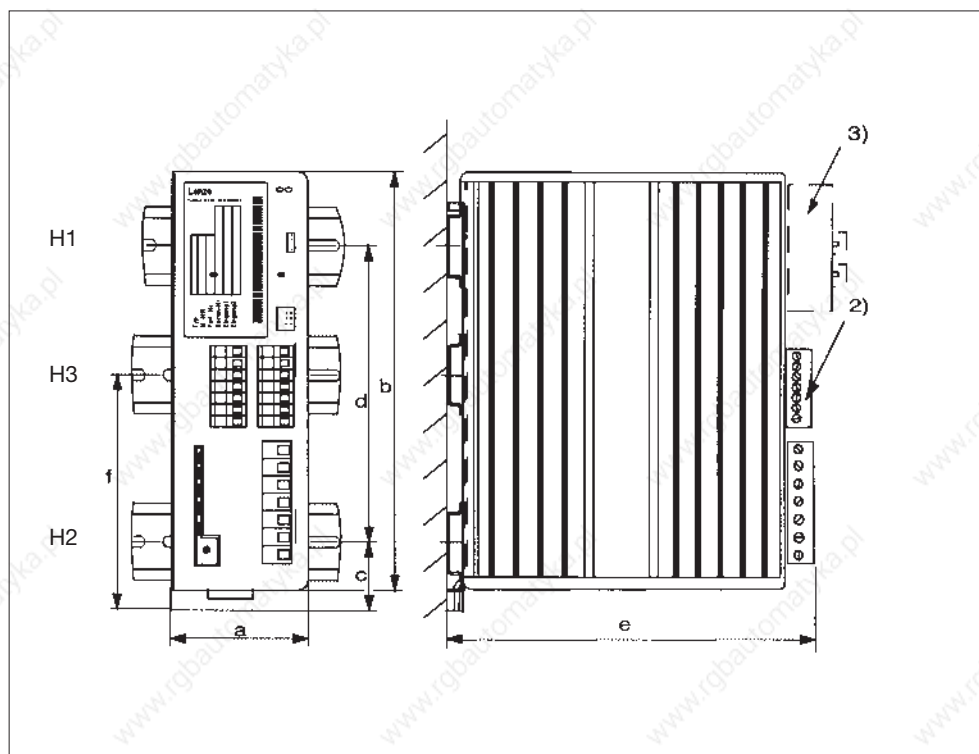
## Design - 8200 and 9300 vector

### Mounting with DIN rail assembly

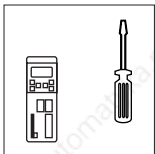


A special bracket can be used to fix 8201-8214 devices to two DIN rails (H1, H2).

8201/02 devices can also be fixed with one DIN rail (H3). Alternatively, the controller can be installed using a fixing rail.



| Device | a<br>[mm] | b<br>[mm] | c<br>[mm] | d<br>[mm] | e<br>[mm] | f<br>[mm] |
|--------|-----------|-----------|-----------|-----------|-----------|-----------|
| 8201E  | 64        | 180       | 16        | 125       | 173       | 98        |
| 8202E  | 64        | 180       | 16        | 125       | 213       | 98        |
| 8203E  | 83        | 250       | 16        | 125       | 237       | –         |
| 8204E  | 83        | 250       | 16        | 125       | 237       | –         |
| 8211E  | 83        | 250       | 16        | 125       | 226       | –         |
| 8212E  | 83        | 250       | 16        | 125       | 226       | –         |
| 8213E  | 83        | 250       | 16        | 125       | 226       | –         |
| 8214E  | 83        | 250       | 16        | 125       | 226       | –         |



## Design - 8200 and 9300 vector

### Assembly with thermal separation (push-through technology)

Thermal separation is required in some applications. It significantly reduces heat generation inside the control cabinet.

8215-8227/9321-9333 frequency inverters can be set up so that the heat sink remains outside the control cabinet. You will need an assembly frame and a seal.

- Distribution of power loss:  
Approx. 65% via separate cooler (heat sink and fan)  
Approx. 35% inside the device
- The device ratings continue to apply

Figure A

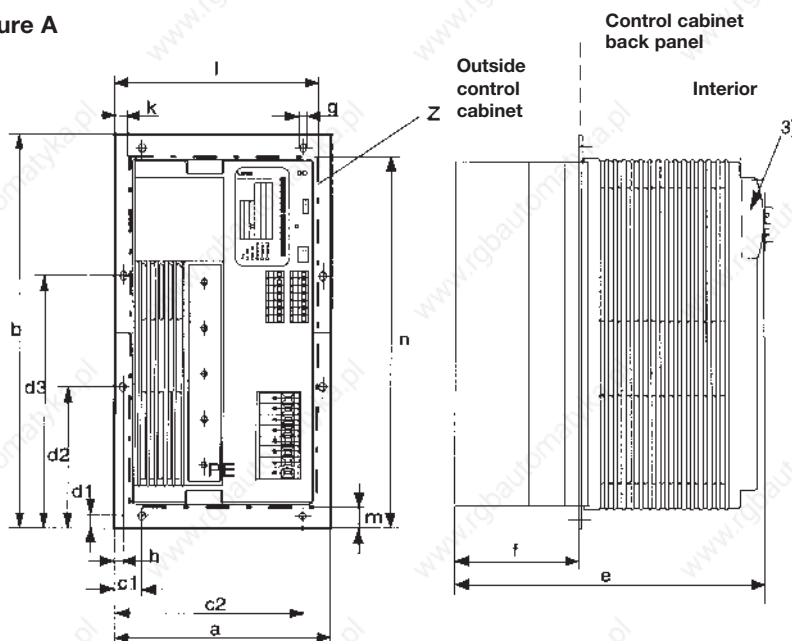
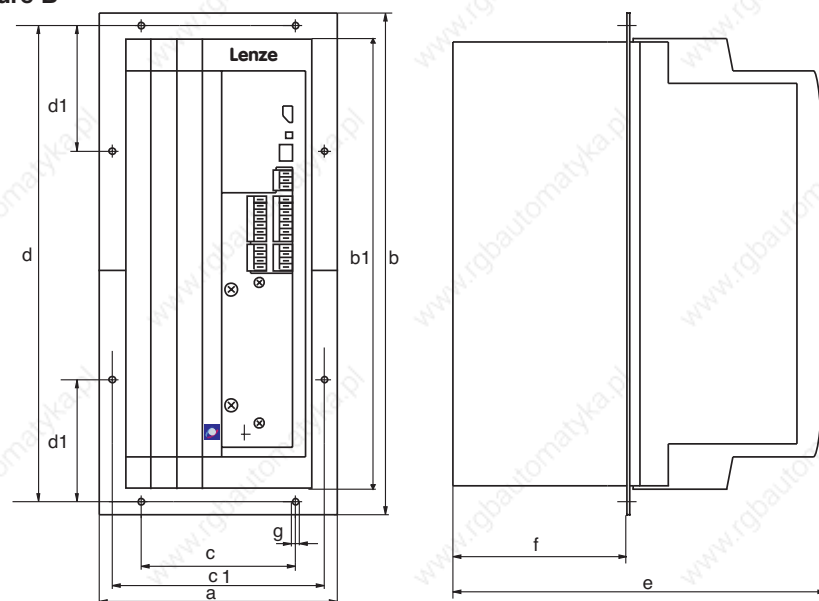


Figure B



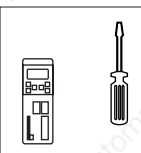
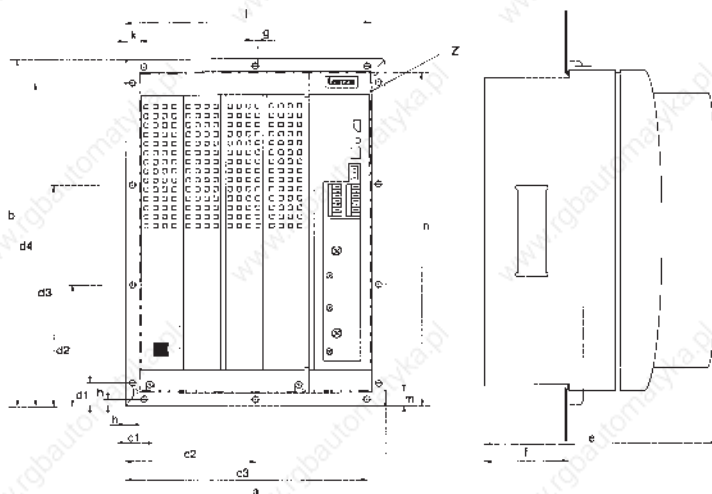


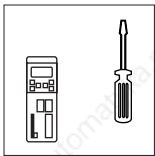
Figure C



| Device         | Figure | a [mm] | b [mm] | c [mm] | c1 [mm] | c2 [mm] | c3 [mm] | d [mm] | d1 [mm] | d2 [mm] | d3 [mm] | d4 [mm] | e [mm] | f [mm] | g [mm] | h [mm] |
|----------------|--------|--------|--------|--------|---------|---------|---------|--------|---------|---------|---------|---------|--------|--------|--------|--------|
| 8215E          | A      | 162    | 283    | –      | 31      | 132     | –       | –      | 10      | 90.5    | 192.5   | –       | 218    | 88     | 6.5    | 8.5    |
| 8216E          | A      | 162    | 283    | –      | 31      | 132     | –       | –      | 10      | 90.5    | 192.5   | –       | 218    | 88     | 6.5    | 8.5    |
| 8217E          | A      | 162    | 283    | –      | 31      | 132     | –       | –      | 10      | 90.5    | 192.5   | –       | 218    | 88     | 6.5    | 8.5    |
| 8218E          | A      | 162    | 283    | –      | 31      | 132     | –       | –      | 10      | 90.5    | 192.5   | –       | 218    | 88     | 6.5    | 8.5    |
| 8241E / 9321EV | B      | 112.5  | 385.5  | 60     | 95.5    | –       | –       | 365.5  | 105.5   | –       | –       | –       | 250    | 92     | 6.5    | –      |
| 8242E / 9322EV | B      | 112.5  | 385.5  | 60     | 95.5    | –       | –       | 365.5  | 105.5   | –       | –       | –       | 250    | 92     | 6.5    | –      |
| 8243E / 9323EV | B      | 131.5  | 385.5  | 79     | 114.5   | –       | –       | 365.5  | 105.5   | –       | –       | –       | 250    | 92     | 6.5    | –      |
| 8244E / 9324EV | B      | 131.5  | 385.5  | 79     | 114.5   | –       | –       | 365.5  | 105.5   | –       | –       | –       | 250    | 92     | 6.5    | –      |
| 8245E / 9325EV | B      | 169.5  | 385.5  | 117    | 152.5   | –       | –       | 365.5  | 105.5   | –       | –       | –       | 250    | 92     | 6.5    | –      |
| 8246E / 9326EV | B      | 169.5  | 385.5  | 117    | 152.5   | –       | –       | 365.5  | 105.5   | –       | –       | –       | 250    | 92     | 6.5    | –      |
| 8221E / 9327EV | C      | 280    | 379    | –      | 28      | 140     | 252     | –      | 41      | 141     | 238     | 338     | 250    | 90     | 6.0    | 9.0    |
| 8222E / 9328EV | C      | 280    | 379    | –      | 28      | 140     | 252     | –      | 41      | 141     | 238     | 338     | 250    | 90     | 6.0    | 9.0    |
| 8223E / 9329EV | C      | 280    | 379    | –      | 28      | 140     | 252     | –      | 41      | 141     | 238     | 338     | 250    | 90     | 6.0    | 9.0    |

### Installation section

|                            | Height [mm] | Width [mm] | k [mm] | l [mm]  | m [mm] | n [mm]  |
|----------------------------|-------------|------------|--------|---------|--------|---------|
| 8215 - 8218                | 250 ± 51    | 32 ± 5     | 16 ± 2 | 147 ± 2 | 19 ± 2 | 266 ± 2 |
| 8241 - 8242<br>9321 - 9322 | 350 ± 3     | 82 ± 3     | 20 ± 2 | 198 ± 2 | 20 ± 2 | 359 ± 2 |
| 8243 - 8244<br>9323 - 9324 | 350 ± 3     | 101 ± 3    | 20 ± 2 | 117 ± 2 | 20 ± 2 | 359 ± 2 |
| 8245 - 8246<br>9325 - 9326 | 350 ± 1     | 139 ± 3    | 20 ± 2 | 259 ± 2 | 20 ± 2 | 359 ± 2 |
| 8221 - 8223<br>9327 - 9329 | 338 ± 1     | 228 ± 1    | 20 ± 2 | 255 ± 2 | 20 ± 2 | 359 ± 2 |

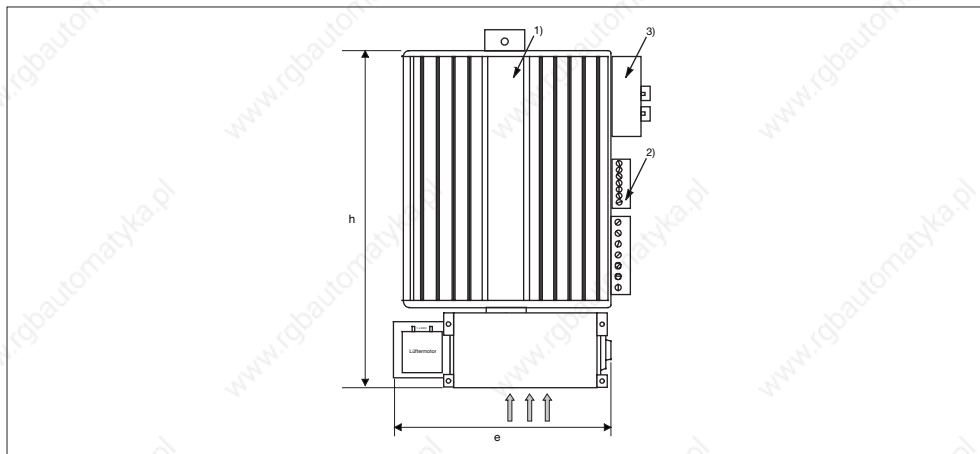


## Design - 8200 and 9300 vector

### Assembly with other types of fixing

#### Flat horizontal assembly

8201 - 8204 single-phase devices can also be installed flat with a small additional fan. This may be of particular interest if you are using small machine housings. The additional filter is assembled directly on the inverter.

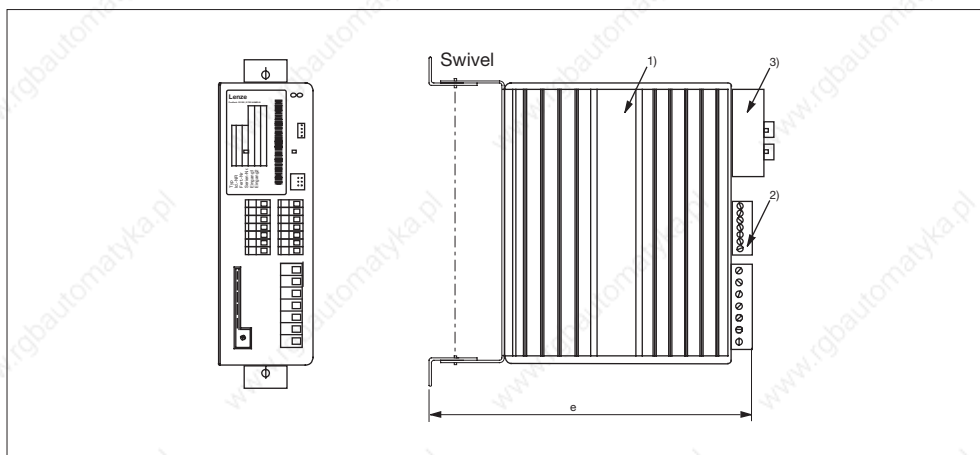


|         | h [mm] | e [mm] |
|---------|--------|--------|
| 8201/02 | 256    | 110    |
| 8203/04 | 328    | 110    |

#### Assembly on swivel rail

In housings where installation space is limited, the inverter can be installed with a swivel mounting rail.

The inverter can be swung out laterally by 90° for the purposes of installation, setting and diagnostics.

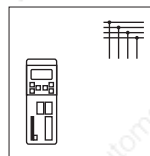


|         | e [mm] |
|---------|--------|
| 8201    | 172    |
| 8202    | 212    |
| 8203-14 | 225    |



## Design - 8200 and 9300 vector

### Overview of cable protection



#### Operation at 150% overload

Fuses or mains automatic circuit breakers can be used for cable protection. Depending on the mains current supply

of each drive controller, the following rated currents are required for the protection devices:

| Device                             | Rated current<br>Protection device | Device        | Rated current<br>Protection device |
|------------------------------------|------------------------------------|---------------|------------------------------------|
| 8201                               | 10 A                               | 8203          | 20 A                               |
| 8202                               | 15 (16) A                          | 8204          | 20 A                               |
| 8211 / 8241 / 8242 / 9321 / 9322EV | 6 A                                | 8221 / 9327EV | 50 A                               |
| 8212 / 8243 / 9323EV               | 10 A                               | 8222 / 9328EV | 63 A                               |
| 8213                               | 10 A                               | 8223 / 9329EV | 80 A                               |
| 8214 / 8244 / 9324EV               | 10 A                               | 8224 / 9330EV | 100 A                              |
| 8215                               | 16 (13) A                          | 8225 / 9331EV | 125 A                              |
| 8216 / 8245 / 9325EV               | 20 A                               | 8226 / 9332EV | 160 A                              |
| 8217                               | 25 A                               | 8227 / 9333EV | 200 A                              |
| 8218 / 8246 / 9326EV               | 32 A                               |               |                                    |

( ) Automatic circuit breakers

The values provided are valid for operation with mains choke/mains filter

#### Operation at 120% overload

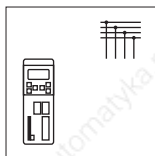
Fuses or automatic circuit breakers can be used for cable protection. Depending on the mains current supply of each

drive controller, the following rated currents are required for the protection devices:

| Device                             | Rated current<br>Protection device | Device        | Rated current<br>Protection device |
|------------------------------------|------------------------------------|---------------|------------------------------------|
| 8211 / 8241 / 9321EV               | 6 A                                |               |                                    |
| 8212 / 8242 / 9322EV               | 6 A                                | 8221 / 9327EV | 63 A                               |
| 8213                               | 10 A                               | 8222 / 9328EV | 80 A                               |
| 8214 / 8243 / 9323EV               | 10 A                               | 8223 / 9329EV | 100 A                              |
| 9324EV                             | 16 (13) A                          | 8224 / 9330EV | 125 A                              |
| 8215 / 8216 / 8244 / 9325EV        | 20 A                               | 8225 / 9331EV | 160 A                              |
|                                    |                                    | 8226 / 9332EV | 200 A                              |
| 8217 / 8218 / 8245 / 8246 / 9326EV | 32 A                               | 8227 / 9333EV | 250 A                              |

( ) Automatic circuit breakers

The values provided are valid for operation with mains choke/mains filter



## Design - 8200 and 9300 vector

### Overview of line protection fuses

#### Operation at 150% overload

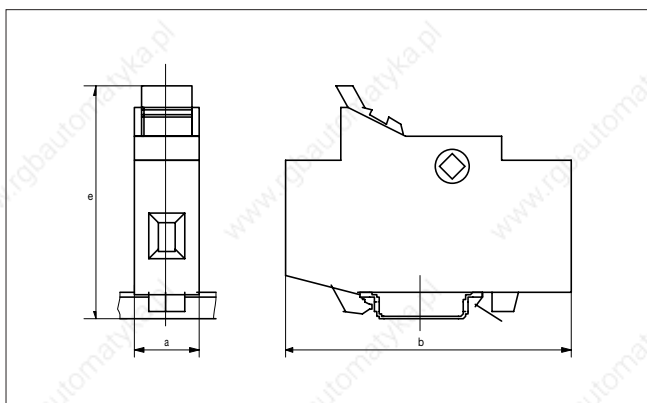
Line protection fuses with frequency-inverter-specific brackets are available for each type of frequency inverter.

| Device                            | Rated current | Fuse     |              | Required number | Fuse holder |                 |
|-----------------------------------|---------------|----------|--------------|-----------------|-------------|-----------------|
|                                   |               | Size     | Order ref.   |                 | Order ref.  | Required number |
| 8201                              | M10A          | 6.3 x 32 | EFSM-0100ASB | 1               | EFH30001    | 1               |
| 8202                              | M10A          | 6.3 x 32 | EFSM-0100ASB | 1               | EFH30001    | 1               |
| 8203                              | M15A          | 6.3 x 32 | EFSM-0150ASC | 1               | EFH30001    | 1               |
| 8204                              | M20A          | 6.3 x 32 | EFSM-0200ASC | 1               | EFH30001    | 1               |
| 8211 / 8241 / 8242<br>9321 / 9322 | M 6A          | 10 x 38  | EFSM-0060AWE | 3               | EFH10001    | 3               |
| 8212 / 8243 / 9323EV              | M10A          | 10 x 38  | EFSM-0100AWE | 3               | EFH10001    | 3               |
| 8213                              | M10A          | 10 x 38  | EFSM-0100AWE | 3               | EFH10001    | 3               |
| 8214 / 8244 / 9324EV              | M10A          | 10 x 38  | EFSM-0100AWE | 3               | EFH10001    | 3               |
| 8215                              | M16A          | 10 x 38  | EFSM-0160AWE | 3               | EFH10001    | 3               |
| 8216 / 8245 / 9325EV              | M20A          | 10 x 38  | EFSM-0200AWE | 3               | EFH10001    | 3               |
| 8217                              | M25A          | 14 x 51  | EFSM-0250AXH | 3               | EFH10002    | 3               |
| 8218 / 8246 / 9326EV              | M32A          | 14 x 51  | EFSM-0320AWH | 3               | EFH10002    | 3               |
| 8221* / 9327EV*                   | T50A          | –        | –            | 3               | –           | –               |
| 8222* / 9328EV*                   | T63A          | –        | –            | 3               | –           | –               |
| 8223* / 9329EV*                   | T80A          | –        | –            | 3               | –           | –               |
| 8224* / 9330EV*                   | T100A         | –        | –            | 3               | –           | –               |
| 8225* / 9331EV*                   | T125A         | –        | –            | 3               | –           | –               |
| 8226* / 9332EV*                   | T160A         | –        | –            | 3               | –           | –               |
| 8227* / 9333EV*                   | T200A         | –        | –            | 3               | –           | –               |

\* Recommended for standard fuses

#### Dimensions

Fuse holder

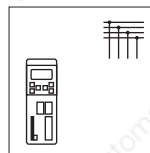


| Type       | a [mm] | b [mm] | e [mm] | Fuse dimensions |
|------------|--------|--------|--------|-----------------|
| EFH10001   | 17,5   | 81     | 68     | 10 x 38         |
| EFH10002   | 26     | 81     | 68     | 14 x 51         |
| EFH30001** | 15     | 63     | 52     | 6.3 x 32        |

\*\* Fixing: Bolt-on

## Design - 8200 and 9300 vector

### Overview of line protection fuses



#### Operation at 120% overload

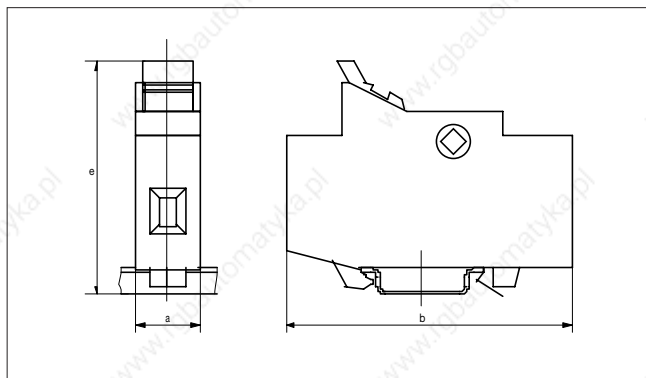
Line protection fuses with frequency-inverter-specific brackets are available for each type of frequency inverter.

| Device                               | Rated current | Fuse Size | Order ref.   | Required number | Fuse holder |                 |
|--------------------------------------|---------------|-----------|--------------|-----------------|-------------|-----------------|
|                                      |               |           |              |                 | Order ref.  | Required number |
| 8211 / 8241 / 9321EV                 | M 6A          | 10 x 38   | EFSM-0060AWE | 3               | EFH10001    | 3               |
| 8212 / 8242 / 9322EV                 | M 6A          | 10 x 38   | EFSM-0060AWE | 3               | EFH10001    | 3               |
| 8213 / 8214 / 8243 / 9323EV          | M10A          | 10 x 38   | EFSM-0100AWE | 3               | EFH10001    | 3               |
| 8244 / 9324EV                        | M16A          | 10 x 38   | EFSM-0160AWE | 3               | EFH10001    | 3               |
| 8215 / 8216 / 9325EV                 | M20A          | 10 x 38   | EFSM-0200AWE | 3               | EFH10001    | 3               |
| 8217 / 8218<br>8245 / 8246<br>9326EV | M32A          | 14 x 51   | EFSM-0320AWH | 3               | EFH10002    | 3               |
| 8221*/9327EV*                        | T63A          | –         | –            | 3               | –           | –               |
| 8222* / 9328EV*                      | T80A          | –         | –            | 3               | –           | –               |
| 8223* / 9329EV*                      | T100A         | –         | –            | 3               | –           | –               |
| 8224* / 9330EV*                      | T125A         | –         | –            | 3               | –           | –               |
| 8225* / 9331EV*                      | T160A         | –         | –            | 3               | –           | –               |
| 8226* / 9332EV*                      | T200A         | –         | –            | 3               | –           | –               |
| 8227* / 9333EV*                      | T250A         | –         | –            | 3               | –           | –               |

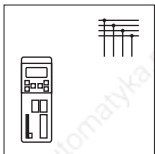
\* Recommended for standard fuses

#### Dimensions

Fuse holder



| Type     | a [mm] | b [mm] | e [mm] | Fuse dimensions |
|----------|--------|--------|--------|-----------------|
| EFH10001 | 17.5   | 81     | 68     | 10 x 38         |
| EFH10002 | 26     | 81     | 68     | 14 x 51         |



## Design - 8200 and 9300 vector

### Overview of line circuit breakers

#### Operation at 150% overload

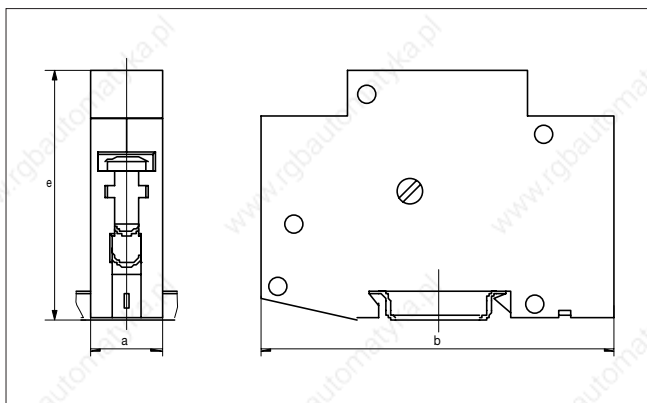
Frequency-inverter-specific mains automatic circuit breakers are available up to a rated current of 32 A.

| Device                        | Automatic circuit breakers |            |                 |
|-------------------------------|----------------------------|------------|-----------------|
|                               | Rated current              | Order ref. | Required number |
| 8201                          | C 10 A                     | EFA1C10A   | 1               |
| 8202                          | C 16 A                     | EFA1C16A   | 1               |
| 8203                          | C 20A                      | EFA1C20A   | 1               |
| 8204                          | C 20A                      | EFA1C20A   | 1               |
| 8211                          | B 6A                       | EFA3B06A   | 1               |
| 8241 / 8242 / 9321EV / 9322EV | B 6A / C 6A*               | EFA3B06A   | 1               |
| 8212 / 8243 / 9323EV          | B 10A                      | EFA3B10A   | 1               |
| 8213                          | B 10A                      | EFA3B10A   | 1               |
| 8214 / 8244 / 9324EV          | B 10A                      | EFA3B10A   | 1               |
| 8215                          | B 13A                      | EFA3B13A   | 1               |
| 8216 / 8245 / 9325EV          | B 20A                      | EFA3B20A   | 1               |
| 8217                          | B 25A                      | EFA3B25A   | 1               |
| 8218 / 8246 / 9326EV          | B 32A                      | EFA3B32A   | 1               |

\* Use circuit breakers with tripping characteristic C for short-term power failures or low-inductance systems.

#### Dimensions

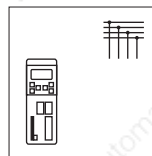
Automatic circuit breakers



| Type       | a [mm] | b [mm] | e [mm] |
|------------|--------|--------|--------|
| EFA1CXXXXA | 17.5   | 80     | 63     |
| EFA3BXXXXA | 53     | 90     | 63     |

## Design - 8200 and 9300 vector

### Overview of automatic circuit breakers



#### Operation at 120% overload

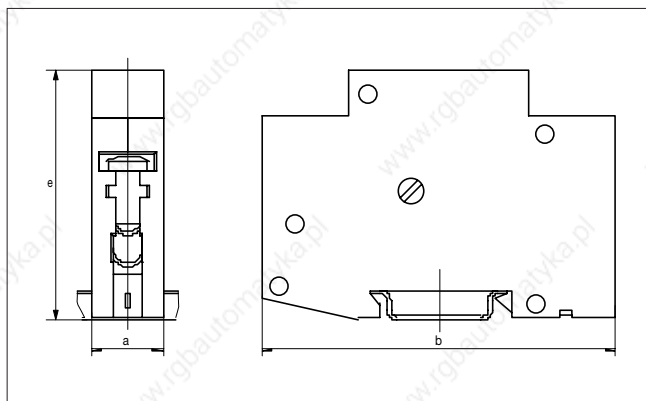
Frequency-inverter-specific mains automatic circuit breakers are available up to a rated current of 32 A.

| Device                             | Automatic circuit breakers |            |                 |
|------------------------------------|----------------------------|------------|-----------------|
|                                    | Rated current              | Order ref. | Required number |
| 8211 / 8212                        | B 6A                       | EFA3B06A   | 1               |
| 8241 / 8242 / 9321EV / 9322EV      | B 6A / C 6A*               | EFA3B06A   | 1               |
| 8213 / 8214 / 8243 / 9323EV        | B 10A                      | EFA3B10A   | 1               |
| 8244 / 9324EV                      | B 13A                      | EFA3B13A   | 1               |
| 8215 / 8216 / 9325EV               | B 20A                      | EFA3B20A   | 1               |
| 8217 / 8218 / 8245 / 8246 / 9326EV | B 32A                      | EFA3B32A   | 1               |

\* Use circuit breakers with tripping characteristic C for short-term power failures or low-inductance systems.

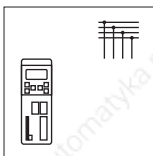
#### Dimensions

Automatic circuit breakers



| Type      | a [mm] | b [mm] | e [mm] |
|-----------|--------|--------|--------|
| EFA1CXXXA | 17.5   | 80     | 63     |
| EFA3BXXXA | 53     | 90     | 63     |





# Design - 8200 and 9300 vector

## CE-typical installation

### General information

- The electromagnetic compatibility of a piece of machinery depends on the installation method and the care taken during installation.

You should pay particular attention to:

- Mounting
- Filters
- Shielding
- Earth connections

The required components are listed in the overview table.

For wiring see the power supply connecting diagram

### Installation information

If you follow the measures outlined below you can be sure that no EMC problems caused by the drive system will occur whilst the system is in operation.

- Mounting
    - Ensure that there is sufficient contact between the drive controller and mains choke and the earthed mounting plate:
    - Mounting plates with a conductive surface (galvanised, cadmium-coated) ensure sufficient long-term contact.
    - On coated plates always remove the paint coating from the mounting surfaces.
    - Avoid DIN rail mounting.
  - If you are using more than one mounting plate:
    - Ensure generous contact surfaces when connecting the mounting plates (e.g. use copper bands).
  - When routing the cables make sure that the motor cables are located away from the signal and mains cables.
  - Avoid using a shared terminal strip for mains input and motor output.
  - Keep the wiring as close to the reference potential as possible.
- Free hanging cables act like aerials.

### Filters

- Only use the RFI filters and mains chokes assigned to the devices.
  - RFI filters reduce unwanted HF noise to an acceptable level.
  - Mains chokes reduce the amount of r.m.s. current picked up by the inverter from the mains.
  - Mains filters act both as a mains choke and an RFI filter.

### Reducing mains currents, radio interference suppression

| Task                                                        | Measure     |            |                |                | Inverter  |      |           |      |           |      |                            |      |                            | CE-typical installation |
|-------------------------------------------------------------|-------------|------------|----------------|----------------|-----------|------|-----------|------|-----------|------|----------------------------|------|----------------------------|-------------------------|
|                                                             | Mains choke | RFI filter | Mains filter A | Mains filter B | 8201-8203 | 8204 | 8211-8213 | 8214 | 8215-8217 | 8218 | 8241-8246<br>9321EV-9326EV | 8221 | 8222-8227<br>9327EV-9333EV |                         |
| No measures                                                 |             |            |                |                | ▲         |      | ▲         |      | ▲         |      | ▲                          | ▲    |                            | -                       |
| Reduced mains currents                                      | ●           |            |                |                | ▲         | ▲    | ▲         | ▲    | ▲         | ▲    | ▲                          | ▲    | ▲                          | -                       |
| Radio interference suppression A                            |             | ●          | ○              |                | ▲         |      |           |      |           |      |                            |      |                            | X                       |
| Radio interference suppression A                            |             | ●          |                | ●              |           | ▲    | ▲         |      | ▲         |      | ▲                          | ▲    | ▲                          | -                       |
| Radio interference suppression A and reduced mains currents | ●           | ●          | ○              |                | ▲         | ▲    |           |      |           |      |                            |      |                            | X                       |
|                                                             | ●           | ●          |                | ○              |           |      | ▲         | ▲    | ▲         | ▲    |                            |      |                            | X                       |
| Radio interference suppression B                            |             | ●          |                |                | ▲         |      |           |      |           |      |                            |      |                            | X                       |
|                                                             |             |            |                | ●              |           |      | ▲         | ▲    | ▲         | ▲    | ▲                          | ▲    | ▲                          | X                       |
| Radio interference suppression B and reduced mains currents | ●           | ●          |                | ○              |           |      | ▲         | ▲    | ▲         | ▲    |                            |      |                            | X                       |

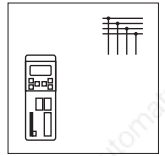
● = essential

○ = possible alternative

▲ = possible with inverter

X = CE-conformance ensured by Lenze

- = CE-conformance to be ensured by user



#### Shielding

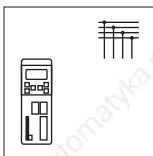
- Connect the motor cable shield with the drive controller shield connection.
- If contactors, motor protection switches or terminals are located on the motor cable:
  - Connect the shields of the cables connected there and ensure sufficient contact with the mounting plate.
- In the terminal box of the motor, connect the shield with PE:
  - Metal screw connections for the cables at the motor terminal box ensure sufficient contact between the shield and the housing of the motor.
- If the mains cable between the mains filter and the drive controller is longer than 300 mm:
  - Shield the mains cable.
  - Connect the shield of the mains cable directly with the drive controller and mains filter and ensure sufficient contact with the mounting plate.
- If you are using a brake chopper:
  - Connect the shield of the brake resistor cable directly with the brake copper and brake resistor and ensure sufficient contact with the mounting plate.
  - Connect the shield of the cable between the inverter and the brake chopper directly to the inverter and ensure sufficient contact between the brake chopper and the mounting plate.
- If you are operating the devices on a DC bus:
  - Shield the cables between the inverter (+UG/-UG) and the star point of the DC bus.
  - Ensure that there is sufficient contact on both sides between the shield and the mounting plate.

#### Shield the control cables:

- Shield both ends of the digital control cables.
  - Shield one end of the analog control cables.
  - Use the shortest route possible to connect the shields of the control cables with the designated shield connectors on the drive controller.
- If you are using the devices in residential areas:
    - Provide additional shield attenuation ( $\approx 10$  dB) to limit radiated interference. The usual way of doing this is to install the devices in standard enclosed metallic and grounded control cabinets or boxes.

#### Ground connections

- Use appropriate cables from a central grounding point (PE rail) to ground all components (drive controller, mains filter, motor filter).
- You must observe the minimum cross sections defined in the safety regulations:
  - However, in terms of EMC it is not the cable cross section but the cable area and the contact area which are of key importance, i.e. use the largest possible cross sections (large area).



## Design - 8200 and 9300 vector

### Mains chokes

#### Operation at 150% overload

##### Mains choke

A mains choke is an inductive resistor which can be connected before the inverter.

Function:

- Less effects on the mains - the wave form of the mains supply is a closer approximation of a sine wave
- Reduced mains current - reduction of the r.m.s. current (i.e. reduction of mains, cable and fuse load)

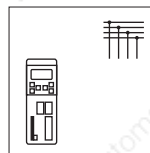
- Increased service life – The service life of electrolytic capacitors in the DC bus can be as much as doubled by reducing the AC load.

Please note:

- Only operate 8204, 8214, 8218, 8221–27 and 9327–33 devices with the appropriate mains choke or mains filter.
- If you are using a mains choke, the maximum possible output voltage does not reach the value of the mains voltage – the typical mains voltage drop at the rated value is around 4%.

#### Technical data

| Device                                | Mains choke   |                 |                    |        |
|---------------------------------------|---------------|-----------------|--------------------|--------|
|                                       | Order ref.    | Inductance [mH] | I <sub>r</sub> [A] | m [kg] |
| 8201                                  | ELN1-0900H005 | 9.0             | 5.0                | 1.0    |
| 8202                                  | ELN1-0500H009 | 5.0             | 9.0                | 1.0    |
| 8203                                  | ELN1-0350H014 | 3.5             | 14.0               | 2.5    |
| 8204                                  | ELN1-0160H017 | 1.6             | 17.0               | 2.5    |
| 8211 / 8241 / 8242<br>9321EV / 9322EV | ELN3-0700H003 | 7.0             | 2.5                | 0.5    |
| 8212 / 8243 / 9323EV                  | ELN3-0450H004 | 4.5             | 4.0                | 0.8    |
| 8213                                  | ELN3-0350H006 | 3.5             | 5.5                | 1.0    |
| 8214 / 8244 / 9324EV                  | ELN3-0250H007 | 2.5             | 7.0                | 1.8    |
| 8215                                  | ELN3-0160H012 | 1.6             | 12                 | 3.8    |
| 8216 / 8245 / 9325EV                  | ELN3-0160H012 | 1.6             | 12                 | 3.8    |
| 8217                                  | ELN3-0120H017 | 1.2             | 17                 | 4.7    |
| 8218 / 8246 / 9326EV                  | ELN3-0120H025 | 1.2             | 25                 | 6.0    |
| 8221 / 9327EV                         | ELN3-0088H035 | 0.88            | 35.0               | 9.8    |
| 8222 / 9328EV                         | ELN3-0075H045 | 0.75            | 45.0               | 9.8    |
| 8223 / 9329EV                         | ELN3-0055H055 | 0.55            | 55.0               | 19.0   |
| 8224 / 9330EV                         | ELN3-0038H085 | 0.38            | 85.0               | 19.5   |
| 8225 / 9331EV                         | ELN3-0027H105 | 0.27            | 105.0              | 20.0   |
| 8226 / 9332EV                         | ELN3-0022H130 | 0.22            | 130.0              | 20.0   |
| 8227 / 9333EV                         | ELN3-0017H170 | 0.17            | 170.0              | 32.0   |



### Operation at 120% overload

#### Mains choke

A mains choke is an inductive resistor which can be connected before the inverter.

#### Function:

- Less effects on the mains - the wave form of the mains supply is a closer approximation of a sine wave.
- Reduced mains current - reduction of the r.m.s. current (i.e. reduction of mains, cable and fuse load)

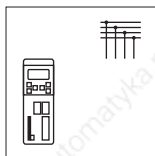
- Increased service life – The service life of electrolytic capacitors in the DC bus can be as much as doubled by reducing the AC load.

#### Please note:

- Only operate 8204, 8214, 8218, 8221–27 and 9327–33 devices with the appropriate mains choke or mains filter.
- If you are using a mains choke, the maximum possible output voltage does not reach the value of the mains voltage – the typical mains voltage drop at the rated value is around 4%.

### Technical data

| Device                                  | Mains choke   |                 |                    |        |
|-----------------------------------------|---------------|-----------------|--------------------|--------|
|                                         | Order ref.    | Inductance [mH] | I <sub>r</sub> [A] | m [kg] |
| 8241 / 9321EV                           | ELN3-0700H003 | 7.0             | 2.5                | 0.5    |
| 8211 / 8212 / 8242 / 9322EV             | ELN3-0450H004 | 4.5             | 4.0                | 0.8    |
| 8213 / 8214 / 8243 9323EV               | ELN3-0250H007 | 2.5             | 7.0                | 1.8    |
| 8215 / 8216 / 8244 9324EV               | ELN3-0160H012 | 1.6             | 12                 | 3.8    |
| 8217 / 8218 8245 / 8246 9325EV / 9326EV | ELN3-0120H025 | 1.2             | 25                 | 6.0    |
| 8221 / 9327EV                           | ELN3-0075H045 | 0.75            | 45.0               | 9.8    |
| 8222 / 9328EV                           | ELN3-0055H055 | 0.55            | 55.0               | 19.0   |
| 8223 / 9329EV                           | ELN3-0055H055 | 0.55            | 55.0               | 19.0   |
| 8224 / 9330EV                           | ELN3-0027H105 | 0.27            | 105.0              | 20.0   |
| 8225 / 9331EV                           | ELN3-0022H130 | 0.22            | 130.0              | 20.0   |
| 8226 / 9332EV                           | ELN3-0017H170 | 0.17            | 170.0              | 32.0   |
| 8227 / 9333EV                           | ELN3-0014H200 | 0.14            | 200.0              | 32.0   |



## Design - 8200 and 9300 vector

### Mains chokes

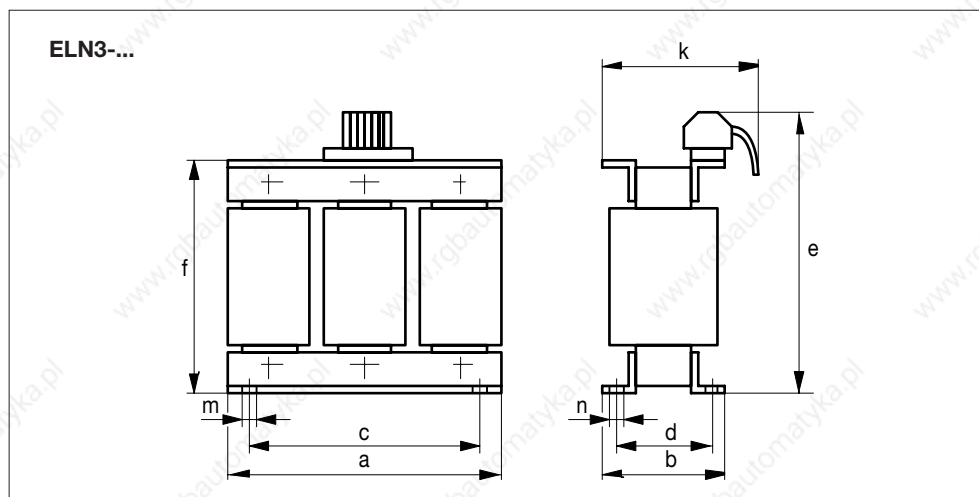
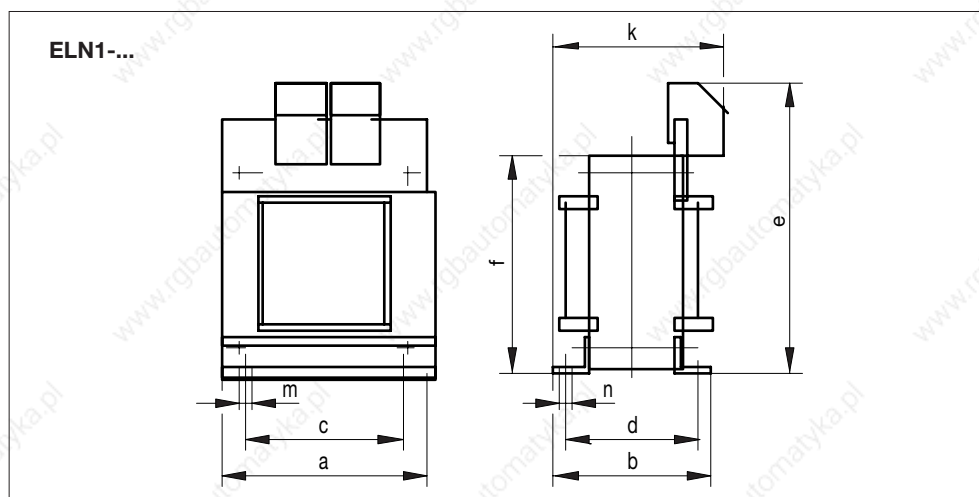
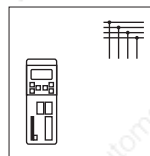
#### Dimensions of mains chokes

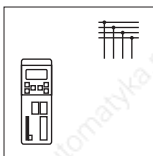
| Order ref.    | a [mm] | b [mm] | c [mm] | d [mm] | e [mm] | f [mm] | k [mm] | m [mm] | n [mm] |
|---------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| ELN1-0900H005 | 66     | 67     | 50     | 53     | 80     | 62     | 80     | 4.8    | 9      |
| ELN1-0500H009 | 66     | 67     | 50     | 53     | 80     | 62     | 80     | 4.8    | 9      |
| ELN1-0350H014 | 96     | 77     | 84     | 61     | 96     | 86     | 86     | 5.8    | 11     |
| ELN1-0160H017 | 96     | 77     | 84     | 61     | 96     | 86     | 86     | 5.8    | 11     |
| ELN3-0700H003 | 65     | 44     | 50     | 30     | 92     | 70     | 56     | 4.5    | 9      |
| ELN3-0450H004 | 65     | 50     | 50     | 36     | 92     | 70     | 62     | 4.5    | 9      |
| ELN3-0350H006 | 74     | 48     | 56     | 34     | 105    | 84     | 60     | 4.5    | 9      |
| ELN3-0250H007 | 120    | 61     | 84     | 45     | 130    | 105    | 73     | 6.0    | 11     |
| ELN3-0160H012 | 150    | 70     | 90     | 54     | 155    | 130    | 81     | 6.0    | 11     |
| ELN3-0120H017 | 120    | 65     | 109    | 51     | 162    | 110    | 80     | 5.0    | 10     |
| ELN3-0120H025 | 150    | 76     | 140    | 61     | 180    | 140    | 95     | 5.0    | 10     |
| ELN3-0088H035 | 180    | 91     | 161    | 74     | 225    | 165    | 120    | 6.3    | 11     |
| ELN3-0075H045 | 180    | 91     | 161    | 74     | 225    | 165    | 120    | 6.3    | 11     |
| ELN3-0055H055 | 228    | 88     | 206    | 69     | 263    | 205    | 120    | 6.3    | 11     |
| ELN3-0038H085 | 228    | 111    | 206    | 94     | 263    | 205    | 140    | 6.3    | 11     |
| ELN3-0027H105 | 228    | 111    | 206    | 94     | 273    | 205    | 150    | 6.3    | 11     |
| ELN3-0022H130 | 264    | 102    | 240    | 81     | 265    | 237    | 135    | 6.3    | 11     |
| ELN3-0017H170 | 264    | 128    | 240    | 107    | 257    | 237    | 166    | 8.3    | 16     |
| ELN3-0014H200 | 300    | 114    | 274    | 88     | 290    | 265    | 135    | 8.3    | 16     |



## Design - 8200 and 9300 vector

### Mains chokes





## Design - 8200 and 9300 vector

### RFI filters

#### Operation at 150% overload

##### Interference suppression to EN 55011 Limiting value class A

This limiting value class is often required for industrial networks operating separately from mains supplies in domestic areas. The noise emitted by the connected consumers must not exceed the defined characteristic. In order to meet the requirements of limiting value class A, you must connect an RFI filter before the devices.

##### RFI filters class A and B

An RFI filter reduces mains-bound electromagnetic interference into the mains network. The filter does not replace the function of the mains choke. In order to reduce the r.m.s. current it is also necessary to install a mains filter or use an additional mains choke.

##### Interference suppression to EN 55011 Limiting value class B

If the drive is not being operated on an industrial network but in a residential area, it may cause interference on other devices such as radio and television receivers. In this case you must provide a means of radio interference suppression to EN 55011, limiting value class B. Threshold characteristic B is significantly lower than and includes threshold characteristic A.

In order to meet the requirements of limiting value class B, you must connect an RFI filter before the devices. Mains chokes are also required for 821XE devices.

Please note:

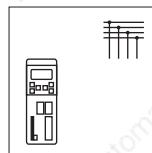
The filters indicated for types 821xE are suitable for mains voltages of 440 V +10%. Please contact Lenze if you are working with mains voltages of > 440 V.

#### Technical data

| Device | RFI filter for operation with mains choke |                    |                        |        | RFI filter for operation without mains choke |                    |                        |        |
|--------|-------------------------------------------|--------------------|------------------------|--------|----------------------------------------------|--------------------|------------------------|--------|
|        | Order ref.                                | I <sub>r</sub> [A] | U <sub>mains</sub> [V] | m [kg] | Order ref.                                   | I <sub>r</sub> [A] | U <sub>mains</sub> [V] | m [kg] |
| 8201   | EZF1-006A002                              | 6.0                | 230                    | 0.25   | EZF1-006A002                                 | 6.0                | 230                    | 0.25   |
| 8202   | EZF1-009A002                              | 9.0                |                        | 0.6    | EZF1-009A002                                 | 9.0                |                        | 0.6    |
| 8203   | EZF1-018A002                              | 18.0               |                        | 0.8    | EZF1-018A002                                 | 18.0               |                        | 0.8    |
| 8204   | EZF1-018A002                              | 18.0               |                        | 0.8    | Not permitted                                |                    |                        |        |
| 8211   | EZF3-008A003                              | 8.0                | 400                    | 1.0    | EZF3-008A003                                 | 8.0                | 400                    | 1.0    |
| 8212   | EZF3-008A003                              | 8.0                |                        | 1.0    | EZF3-008A003                                 | 8.0                |                        | 1.0    |
| 8213   | EZF3-008A003                              | 8.0                |                        | 1.0    | EZF3-008A003                                 | 8.0                |                        | 1.0    |
| 8214   | EZF3-008A003                              | 8.0                |                        | 1.0    | Not permitted                                |                    |                        |        |
| 8215   | EZF3-016A003                              | 16.0               |                        | 2.0    | EZF3-016A003                                 | 16.0               | 400                    | 2.0    |
| 8216   | EZF3-016A003                              | 16.0               |                        | 2.0    | EZF3-024A001                                 | 24.0               |                        | 2.0    |
| 8217   | EZF3-016A003                              | 16.0               |                        | 2.0    | EZF3-024A001                                 | 24.0               |                        | 2.0    |
| 8218   | EZF3-024A001                              | 24.0               |                        | 2.0    | Not permitted                                |                    |                        |        |

The RFI filters for 8202-8218 have been designed so that they can be installed underneath the inverter. The footprint RFI filters for 8202 frequency inverters can also be used for 8201 frequency inverters.

A mains filter is available for 8241-8246 and 8221-8227 frequency inverters instead of the combination of RFI filter and mains choke (see following pages).



### Operation at 120% overload

#### Interference suppression to EN 55011 Limiting value class A

This limiting value class is often required for industrial networks operating separately from mains supplies in domestic areas. The noise emitted by the connected consumers must not exceed the defined characteristic. In order to meet the requirements of limiting value class A, you must connect an RFI filter before the devices.

#### RFI filters class A and B

An RFI filter reduces mains-bound electromagnetic interference into the mains network. The filter does not replace the function of the mains choke. In order to reduce the r.m.s. current it is also necessary to install a mains filter or use an additional mains choke.

#### Interference suppression to EN 55011 Limiting value class B

If the drive is not being operated on an industrial network but in a residential area, it may cause interference on other devices such as radio and television receivers. In this case you must provide a means of radio interference suppression to EN 55011, limiting value class B. Threshold characteristic B is significantly lower than and includes threshold characteristic A.

In order to meet the requirements of limiting value class B, you must connect an RFI filter before the devices. Mains chokes are also required for 821XE devices.

Please note:

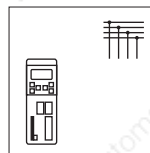
The filters indicated for types 821xE are suitable for mains voltages of 440 V +10%. Please contact Lenze if you are working with mains voltages of > 440 V.

### Technical data

| Device | RFI filter for operation with mains choke |                    |                        |        |
|--------|-------------------------------------------|--------------------|------------------------|--------|
|        | Order ref.                                | I <sub>r</sub> [A] | U <sub>mains</sub> [V] | m [kg] |
| 8211   | EZF3-008A003                              | 8.0                | 400                    | 1.0    |
| 8212   | EZF3-008A003                              | 8.0                |                        | 1.0    |
| 8213   | EZF3-008A003                              | 8.0                |                        | 1.0    |
| 8214   | EZF3-008A003                              | 8.0                |                        | 1.0    |
| 8215   | EZF3-016A003                              | 16.0               |                        | 2.0    |
| 8216   | EZF3-016A003                              | 16.0               |                        | 2.0    |
| 8217   | EZF3-024A001                              | 24.0               |                        | 2.0    |
| 8218   | EZF3-024A001                              | 24.0               |                        | 2.0    |

The RFI filters for 8202-8218 have been designed so that they can be installed underneath the inverter. The footprint RFI filters for 8202 frequency inverters can also be used for 8201 frequency inverters.

A mains filter is available for 8241-8246 and 8221-8227 frequency inverters instead of the combination of RFI filter and mains choke (see following pages).



### Dimensions of RFI filters

| Order ref.   | Figure | a [mm] | b [mm] | c [mm] | d [mm] | e [mm] | g [mm] |
|--------------|--------|--------|--------|--------|--------|--------|--------|
| EZF1-006A002 | B      | 85     | 50     | –      | 75     | 40     | –      |
| EZF1-009A002 | A      | 60     | 210    | –      | 190    | 30     | 6.5    |
| EZF1-018A002 | A      | 80     | 283    | –      | 263    | 40     | 6.5    |
| EZF3-008A003 | A      | 80     | 283    | –      | 263    | 40     | 6.5    |
| EZF3-016A003 | A      | 120    | 283    | –      | 263    | 50     | 6.5    |
| EZF3-024A001 | A      | 120    | 283    | –      | 263    | 50     | 6.5    |

Figure A

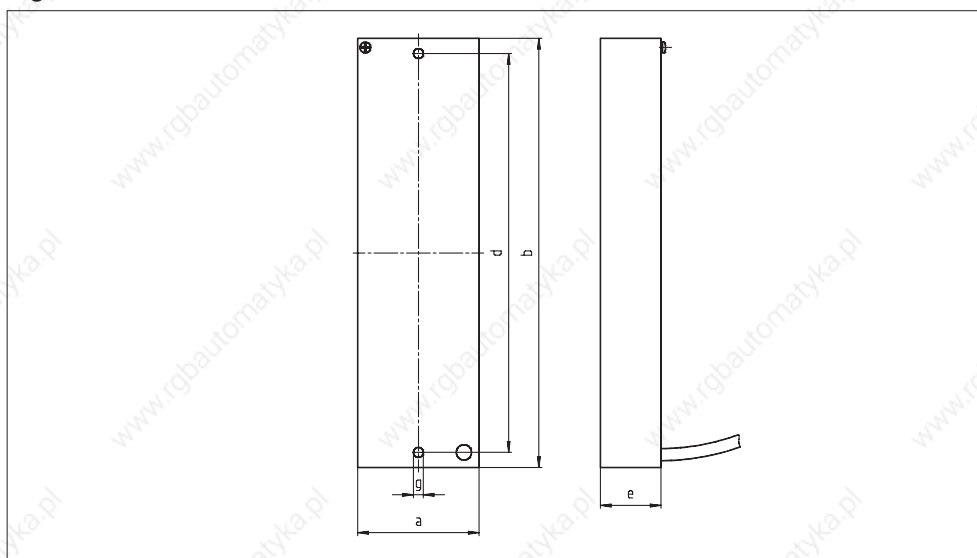
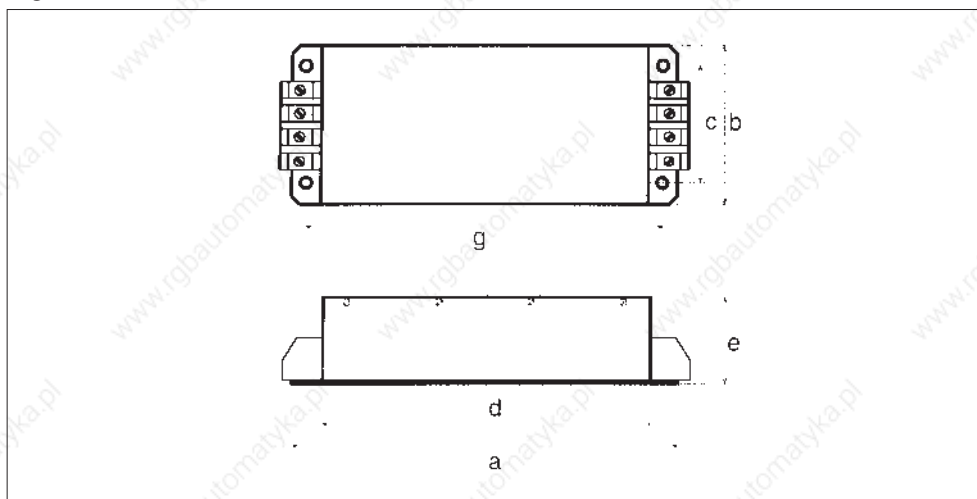
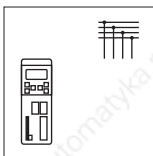


Figure B





## Design - 8200 and 9300 vector

### Mains filter A

#### Operation at 150% overload

##### Mains filter limiting value class A

A mains filter is a combination of inductive resistor and

RFI filter in one housing. It reduces electromagnetic interference into the mains and mains currents.

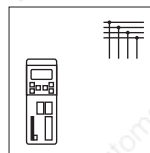
#### Technical data

| Device        | Mains filter  |           |        |                 |        |
|---------------|---------------|-----------|--------|-----------------|--------|
|               | Order ref.    | $I_r$ [A] | L [mH] | $U_{mains}$ [V] | m [kg] |
| 8201          | EZN2-004A001  | 4.0       | 2.0    | 230             | 0.9    |
| 8202          | EZN2-008A001  | 8.0       | 1.2    | 230             | 1.8    |
| 8203          | EZN2-013A001  | 13.0      | 0.7    | 230             | 3.0    |
| 8204          | EZN2-017A001  | 17.0      | 0.5    | 230             | 3.0    |
| 8241 / 9321EV | EZN3A2400H002 | 1.5       | 24.0   | 400...480       | 0.8    |
| 8242 / 9322EV | EZN3A1500H003 | 2.5       | 15.0   | 400...480       | 1.15   |
| 8243 / 9323EV | EZN3A0900H004 | 4.0       | 9.0    | 400...480       | 1.55   |
| 8244 / 9324EV | EZN3A0500H007 | 7.0       | 5.0    | 400...480       | 2.55   |
| 8245 / 9325EV | EZN3A0300H013 | 13.0      | 3.0    | 400...480       | 5.2    |
| 8246 / 9326EV | EZN3A0150H024 | 24.0      | 1.5    | 400...480       | 8.2    |
| 8221 / 9327EV | EZN3A0110H030 | 30.0      | 1.1    | 400...480       | 16.0   |
| 8222 / 9328EV | EZN3A0080H042 | 42.0      | 0.8    | 400...480       | 17.0   |
| 8223 / 9329EV | EZN3A0055H060 | 60.0      | 0.55   | 400...480       | 30.0   |
| 8224 / 9330EV | EZN3A0037H090 | 90.0      | 0.37   | 400...480       | 40.0   |
| 8225 / 9331EV | EZN3A0030H110 | 110.0     | 0.30   | 400...480       | 46.0   |
| 8226 / 9332EV | EZN3A0022H150 | 150.0     | 0.22   | 400...480       | 60.0   |
| 8227 / 9333EV | EZN3A0017H200 | 200.0     | 0.17   | 400...480       | 90.0   |

#### Dimensions of mains filter A for separate assembly

| Order ref.    | Figure | a [mm] | b [mm] | c [mm] | d [mm] | e [mm] | m [mm] | n [mm] |
|---------------|--------|--------|--------|--------|--------|--------|--------|--------|
| EZN2-004A001  | A      | 110    | 78     | 64     | 64     | 92     | 4.8    | 8      |
| EZN2-008A001  | A      | 121    | 91     | 84     | 76     | 135    | 5.8    | 9      |
| EZN2-013A001  | A      | 145    | 121    | 90     | 103    | 140    | 5.8    | 12     |
| EZN2-017A001  | A      | 145    | 121    | 90     | 103    | 140    | 5.8    | 12     |
| EZN3A2400H002 | B      | 77     | 71     | 50     | 38     | 98     | 5      | 9      |
| EZN3A1500H003 | B      | 95     | 82     | 56     | 35     | 115    | 5      | 9      |
| EZN3A0900H004 | B      | 95     | 90     | 56     | 43     | 116    | 5      | 9      |
| EZN3A0500H007 | B      | 119    | 95     | 90     | 49     | 138    | 5      | 9      |
| EZN3A0300H013 | B      | 150    | 106    | 113    | 64     | 162    | 6      | 11     |
| EZN3A0150H024 | B      | 180    | 120    | 136    | 67     | 192    | 7      | 12     |





### Operation at 120% overload

#### Mains filter limiting value class A

A mains filter is a combination of inductive resistor and

RFI filter in one housing. It reduces electromagnetic interference into the mains and mains currents.

#### Technical data

| Device                       | Mains filter  |           |        |                 |        |
|------------------------------|---------------|-----------|--------|-----------------|--------|
|                              | Order ref.    | $I_r$ [A] | L [mH] | $U_{mains}$ [V] | m [kg] |
| 8241 / 9321EV                | EZN3A2400H002 | 1.5       | 24.0   | 400...480       | 0.8    |
| 8242 / 9322EV                | EZN3A1500H003 | 2.5       | 15.0   | 400...480       | 11.5   |
| 8243 / 9323EV                | EZN3A0750H005 | 5.0       | 7.5    | 400...480       |        |
| 8244 / 9324EV                | EZN3A0400H009 | 9.0       | 4.0    | 400...480       |        |
| 8245 / 9325EV                | EZN3A0300H013 | 13.0      | 3.0    | 400...480       | 5.2    |
| 8246 / 9326EV                | EZN3A0150H024 | 24.0      | 1.5    | 400...480       |        |
| 8221 / 9327EV                | EZN3A0080H042 | 42.0      | 0.8    | 400...480       | 15.0   |
| 8222 / 9328EV                | EZN3A0060H054 | 60.0      | 0.55   | 400...480       | 22.0   |
| 8223 / 9329EV                | EZN3A0055H060 | 60.0      | 0.55   | 400...480       | 30.0   |
| 8224 / 8225<br>9330 / 9331EV | EZN3A0030H110 | 110.0     | 0.30   | 400...480       | 45.0   |
| 8226 / 9332EV                | EZN3A0022H150 | 150.0     | 0.22   | 400...480       | 60.0   |
| 8227 / 9333EV                | EZN3A0017H200 | 200.0     | 0.17   | 400...480       | 90.0   |

#### Dimensions of mains filter A for separate assembly

| Order ref.    | Figure | a [mm] | b [mm] | c [mm] | d [mm] | e [mm] | m [mm] | n [mm] |
|---------------|--------|--------|--------|--------|--------|--------|--------|--------|
| EZN3A2400H002 | B      | 77     | 71     | 50     | 38     | 98     | 5      | 9      |
| EZN3A1500H003 | B      | 95     | 82     | 56     | 35     | 115    | 5      | 9      |
| EZN3A0750H005 | B      | 100    | 53     | 90     | 39     | 135    | 5      | 9      |
| EZN3A0400H009 | B      | 125    | 67     | 113    | 49     | 156    | 6      | 11     |
| EZN3A0300H013 | B      | 150    | 106    | 113    | 64     | 162    | 6      | 11     |



## Design - 8200 and 9300 vector

### Mains filter A

Figure A

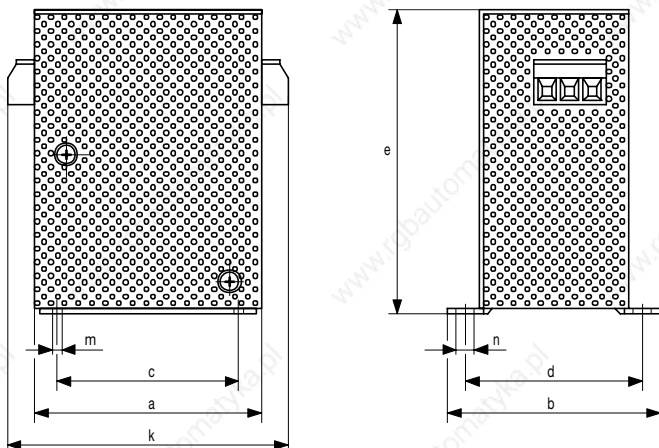
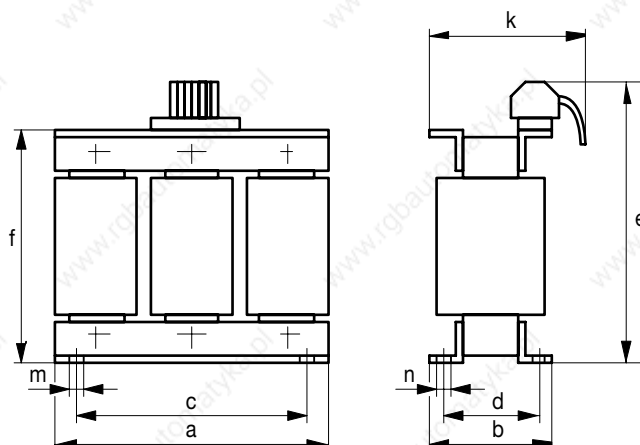
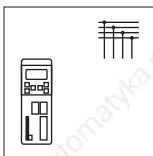


Figure B





## Design - 8200 and 9300 vector

### Mains filter B

#### Operation at 150% overload

##### Mains filter type B

A mains filter is a combination of inductive resistor and

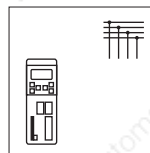
RFI filter in one housing. It reduces electromagnetic interference into the mains and mains currents.

#### Technical data

| Device               | Mains filter  |           |        |                        |        |
|----------------------|---------------|-----------|--------|------------------------|--------|
|                      | Order ref.    | $I_r$ [A] | L [mH] | $U_{\text{mains}}$ [V] | m [kg] |
| 8241 / 9321EV        | EZN3B2400H002 | 1.5       | 22.0   | 400...460              | 2.5    |
| 8211 / 8242 / 9322EV | EZN3B1500H003 | 2.5       | 15.0   | 400...460              | 3.0    |
| 8212 / 8243 / 9323EV | EZN3B0900H004 | 4.0       | 9.0    | 400...460              | 3.3    |
| 8213                 | EZN3B0750H005 | 5.0       | 7.5    | 400...460              | 4.0    |
| 8214 / 8244 / 9324EV | EZN3B0500H007 | 7.0       | 5.0    | 400...460              | 4.7    |
| 8215                 | EZN3B0400H009 | 9.0       | 4.0    | 400...460              | 6.5    |
| 8216 / 8245 / 9325EV | EZN3B0300H013 | 13.0      | 3.0    | 400...460              | 12.2   |
| 8217                 | EZN3B0250H015 | 15.0      | 2.5    | 400...460              | 14.0   |
| 8218 / 8246 / 9326EV | EZN3B0150H024 | 24.0      | 1.5    | 400...460              | 15.3   |
| 8221 / 9327EV        | EZN3B0110H030 | 30.0      | 1.10   | 400...480              | 20.0   |
| 8222 / 9328EV        | EZN3B0080H042 | 42.0      | 0.80   | 400...480              | 20.0   |
| 8223 / 9329EV        | EZN3B0055H060 | 60.0      | 0.55   | 400...480              | 32.0   |
| 8224 / 9330EV        | EZN3B0033H090 | 90.0      | 0.37   | 400...480              | 42.0   |
| 8225 / 9331EV        | EZN3B0030H110 | 110.0     | 0.33   | 400...480              | 50.0   |
| 8226 / 9332EV        | EZN3B0022H150 | 150.0     | 0.22   | 400...480              | 65.0   |
| 8227 / 9333EV        | EZN3B0017H200 | 200.0     | 0.17   | 400...480              | 95.0   |

#### Dimensions of mains filter B for separate assembly

| Order ref.    | Figure | a [mm] | b [mm] | c [mm] | d [mm] | e [mm] | m [mm] | n [mm] |
|---------------|--------|--------|--------|--------|--------|--------|--------|--------|
| EZN3B2200H002 | A      | 78     | 150    | –      | 135    | 2309   | 6.5    | –      |
| EZN3B1500H003 | A      | 78     | 150    | –      | 135    | 230    | 6.5    | –      |
| EZN3B0900H004 | A      | 78     | 150    | –      | 135    | 230    | 6.5    | –      |
| EZN3B0750H005 | A      | 97     | 180    | –      | 165    | 230    | 6.5    | –      |
| EZN3B0500H007 | A      | 97     | 180    | –      | 165    | 230    | 6.5    | –      |
| EZN3B0400H009 | A      | 97     | 180    | –      | 165    | 230    | 6.5    | –      |
| EZN3B0300H013 | A      | 135    | 260    | 92     | 245    | 230    | 6.5    | –      |
| EZN3B0250H015 | A      | 135    | 260    | 92     | 245    | 230    | 6.5    | –      |
| EZN3B0150H024 | A      | 135    | 260    | 92     | 245    | 230    | 6.5    | –      |



### Operation at 120% overload

#### Mains filter type B

A mains filter is a combination of inductive resistor and

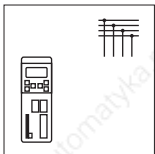
RFI filter in one housing. It reduces electromagnetic interference into the mains and mains currents.

#### Technical data

| Device                       | Mains filter  |           |        |                 |        |
|------------------------------|---------------|-----------|--------|-----------------|--------|
|                              | Order ref.    | $I_r$ [A] | L [mH] | $U_{mains}$ [V] | m [kg] |
| 8241 / 9321EV                | EZN3B2400H002 | 1.5       | 24.0   | 400...480       | 0.8    |
| 8242 / 9322EV                | EZN3B1500H003 | 2.5       | 15.0   | 400...480       | 1.15   |
| 8211 / 8212                  | EZN3B0900H004 | 4.0       | 9.0    | 400...480       | 1.55   |
| 8243 / 9323EV                | EZN3B0750H005 | 5.0       | 7.5    | 400...480       | 4.0    |
| 8213 / 8214                  | EZN3B0350H007 | 7.0       | 3.5    | 400...480       | 4.0    |
| 8244 / 9324EV                | EZN3B0400H009 | 9.0       | 4.0    | 400...480       | 6.5    |
| 8215 / 8216                  | EZN3B0300H013 | 13.0      | 3.0    | 400...480       | 12.2   |
| 8245 / 9325EV                | EZN3B0250H015 | 15.0      | 2.5    | 400...480       | 14.0   |
| 8218 / 8246 / 9326EV         | EZN3B0150H024 | 24.0      | 1.5    | 400...480       | 15.3   |
| 8217                         | EZN3B0120H021 | 21.0      | 1.2    | 400...480       | 14.0   |
| 8221 / 9327EV                | EZN3B0080H042 | 42.0      | 0.8    | 400...480       | 15.0   |
| 8222 / 9328EV                | EZN3B0055H060 | 60.0      | 0.55   | 400...480       | 22.0   |
| 8223 / 9329EV                | EZN3B0055H060 | 60.0      | 0.55   | 400...480       | 30.0   |
| 8224 / 8225<br>9330 / 9331EV | EZN3B0030H110 | 110.0     | 0.30   | 400...480       | 45.0   |
| 8226 / 9332EV                | EZN3B0022H150 | 150.0     | 0.22   | 400...480       | 65.0   |
| 8227 / 9333EV                | EZN3B0017H200 | 200.0     | 0.17   | 400...480       | 95.0   |

#### Dimensions of mains filter B for separate assembly

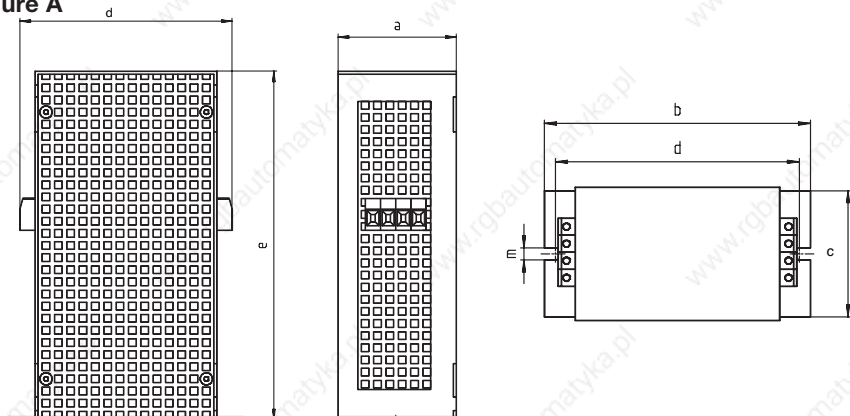
| Order ref.    | Figure | a [mm] | b [mm] | c [mm] | d [mm] | e [mm] | m [mm] | n [mm] |
|---------------|--------|--------|--------|--------|--------|--------|--------|--------|
| EZN3B2400H002 | A      | 78     | 150    | –      | 135    | 230    | 6.5    | –      |
| EZN3B1500H003 | A      | 78     | 150    | –      | 135    | 230    | 6.5    | –      |
| EZN3B0900H004 | A      | 78     | 150    | –      | 135    | 230    | 6.5    | –      |
| EZN3B0750H005 | A      | 97     | 180    | –      | 165    | 230    | 6.5    | –      |
| EZN3B0350H007 | A      | 97     | 180    | –      | 165    | 230    | 6.5    | –      |
| EZN3B0400H009 | A      | 97     | 180    | –      | 165    | 230    | 6.5    | –      |
| EZN3B0300H013 | A      | 135    | 260    | 92     | 245    | 230    | 6.5    | –      |
| EZN3B0150H024 | A      | 135    | 260    | 92     | 245    | 230    | 6.5    | –      |
| EZN3B0120H021 | A      | 135    | 260    | 92     | 245    | 230    | 6.5    | –      |



## Design - 8200 and 9300 vector

### Mains filter B

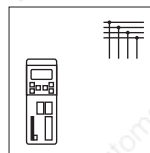
Figure A





## Design - 8200 and 9300 vector

### Footprint mains filters limiting value class A and B (15 kW ... 90 kW)



#### Operation at 150% overload

A mains filter is a combination of mains choke and RFI filter in one housing. It reduces line-bound noise emission into the mains network, thus ensuring that the requirements of limiting value class A/B are met. In addition, a mains filter replaces the function of a mains choke. The r.m.s. current is also reduced.

#### Important:

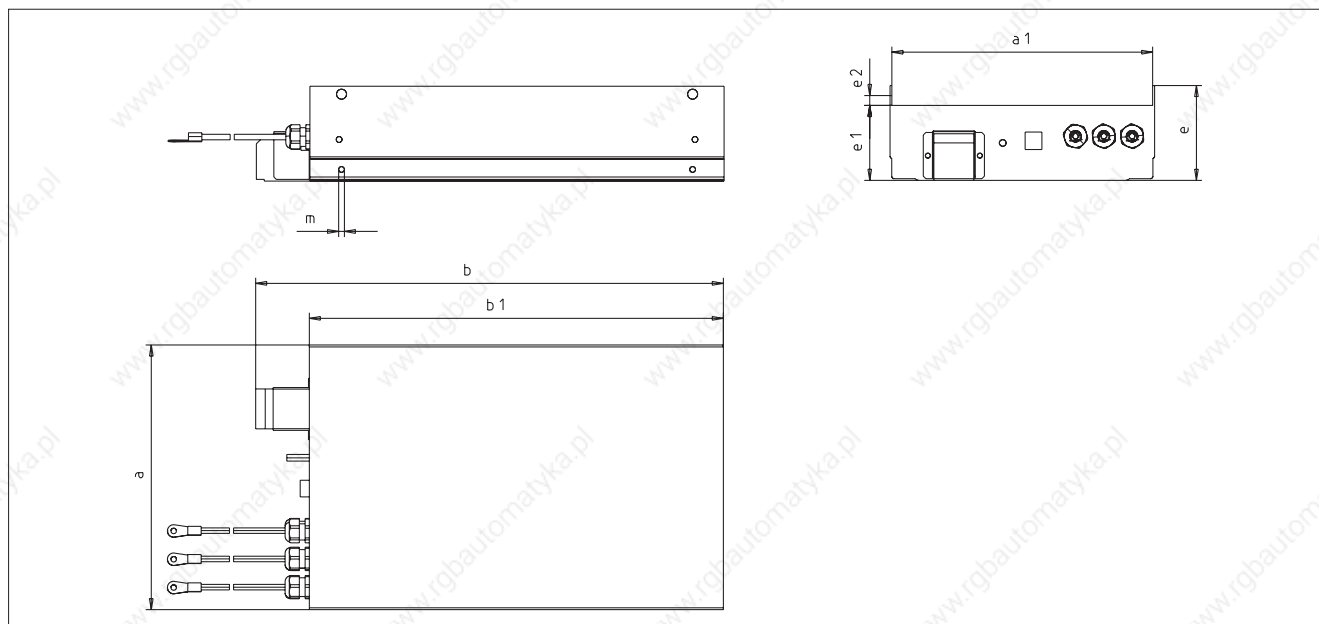
- When mounting the frequency inverter according to the "push-through technique" or "cold plate" technology only built-on mains filters can be used for interference suppression.

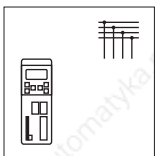
| Device    | Mains filter A/B, dimensions [mm] |       |       |     |     |     |    |      |    |             |
|-----------|-----------------------------------|-------|-------|-----|-----|-----|----|------|----|-------------|
| Type      | Order ref.                        | a     | a1    | b   | b1  | e   | e1 | e2   | m  | Weight [kg] |
| 8221/9327 | E82ZN22334B230                    | 235.5 | 231   | 410 | 350 | 110 | 90 | 11.5 | M5 | 13          |
| 8222/9328 | E82ZN22334B230                    |       |       | 430 |     |     |    |      |    |             |
| 8223/9329 | E82ZN30334B230                    |       |       |     |     |     |    |      |    |             |
| 8224/9330 | E82ZN45334B230                    | 318   | 313.5 | 580 | 500 | 114 | 90 | 14.5 | M8 | 26          |
| 8225/9331 | E82ZN55334B230                    |       |       | 685 | 590 |     |    |      |    | 29          |
| 8226/9332 | E82ZN75334B230                    | 428   | 423.5 | 760 | 670 |     |    |      |    | 53          |
| 8227/9333 | E82ZN90334B230                    |       |       | 765 |     |     |    |      |    | 53          |

#### Note:

- Max. permissible motor cable lengths in order to meet the requirements of limiting value class A/B: 50 m (A) or 10 m (B).
- The frequency inverter is installed on the footprint mains filter using the standard fixtures included in the scope of supply of the frequency inverter.
- The mains filters meet the requirements of UL/cUL.

#### Schematic diagram





## 8200 and 9300 vector ranges

### Subassembly mains filter limiting value class A and B (15 kW ... 90 kW)

#### Operating at 120% overload

A mains filter is a mains choke and RFI filter combined in one housing. It reduces line-bound noise emission into the mains network, thus ensuring that limiting value class A/B is satisfied. In addition, a mains filter performs the function of a mains choke. This also means that the mains current's r.m.s. value is reduced.

#### Important:

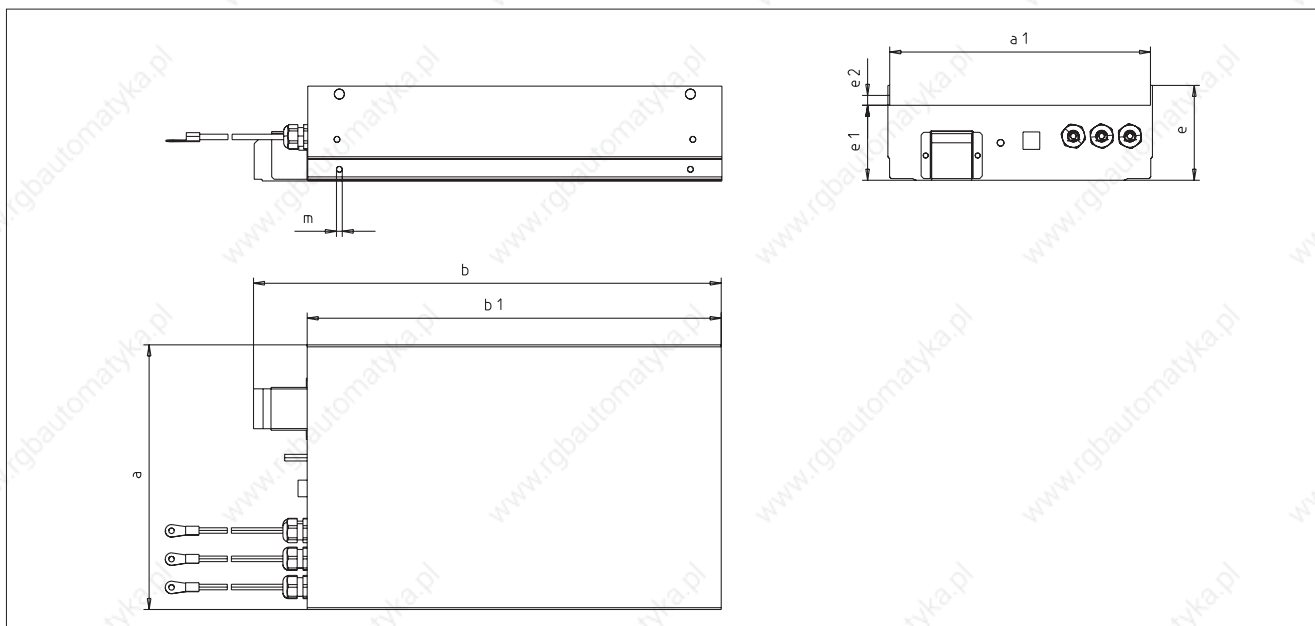
- When mounting the frequency inverter using the "push-through technique" or "cold plate" technology only integrated mains filters can be used for interference suppression.

| Device    | Mains filter A/B, dimensions [mm] |       |       |     |     |     |    |      |    |             |
|-----------|-----------------------------------|-------|-------|-----|-----|-----|----|------|----|-------------|
| Type      | Order ref.                        | a     | a1    | b   | b1  | e   | e1 | e2   | m  | Weight [kg] |
| 8221/9327 | E82ZN22334B230                    | 235.5 | 231   | 410 | 350 | 110 | 90 | 11.5 | M5 | 13          |
| 8222/9328 | E82ZN30334B230                    |       |       | 430 |     |     |    |      |    | 19          |
| 8224/9330 | E82ZN55334B230                    | 318   | 313.5 | 685 | 590 | 114 | 90 | 14.5 | M8 | 29          |
| 8226/9332 | E82ZN90334B230                    | 428   | 423.5 | 765 | 670 |     |    |      |    | 53          |

#### Note:

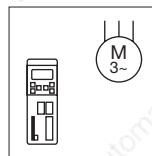
- Max. permitted motor cable lengths in compliance with limiting value class A or B: 50 m (A) or 10 m (B).
- The frequency inverter is installed on the subassembly mains filter using the standard fixtures included in the frequency inverter's scope of supply.
- The mains filters meet the requirements of UL/cUL.

#### Schematic diagram



## Design - 8200 and 9300 vector

### Overview of output filters



Output filters should be used to reduce the load on the motor coil, as well as to reduce the capacitive leakage currents to PE that may be caused by the use of long

motor cables. Motor filters and sinusoidal filters ensure the safe operation of your drive up to 400 m motor cable length.

| Motor filter                                 |                        | Motor filter   | Sinusoidal filter |
|----------------------------------------------|------------------------|----------------|-------------------|
| Required at and above motor cable length     | Shielded<br>Unshielded | 50 m<br>100 m  | 100<br>200 m      |
| Max. motor cable length                      | Shielded<br>Unshielded | 100 m<br>200 m | 200 m<br>400 m    |
| Min. chopper frequency                       |                        | 4 kHz          | 8 kHz             |
| Motor protection (du / dt = 500 V / $\mu$ s) |                        | Yes            | Yes               |
| Max. field frequency                         |                        | 300 Hz         | 120 Hz            |
| DC bus connection                            |                        | Yes            | -                 |
| Reduction of line-side radio interference    |                        | Low            | Average           |

Note:

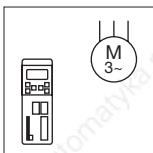
- If you are using motor cables > 200m (shielded) or > 400m (unshielded), please contact Lenze.
- If a number of motors are operating in parallel on the output of one inverter, the following formula should be used to calculate the length of the motor cable:

$$l_{res} = (l_1 + l_2 + \dots + l_n) \cdot \sqrt{n}$$

$l_{res}$  = resulting length

$l_1, l_2$  = individual motor cable lengths

$n$  = number of parallel motor cables



## Design - 8200 and 9300 vector

### Motor filter

A motor filter is required:

- For long motor cables  
> 50 m (shielded) or > 100 m (unshielded)
- If motors are used with an insulation system not suited for inverter operation. Lenze motors feature insulation with a high thermal reserve.

Please note:

- The frequency inverter is also loaded with approx. 12% of the motor filter rated current.
- Shielded motor cables are required for a CE-typical installation

- The typical mains voltage drop via the motor filter at rated current and rated frequency is 2-3% of the output voltage
- The filters indicated are suitable for a mains voltage of up to 3 x 460 V  $\pm$  10%
- The +U<sub>G</sub> and -U<sub>G</sub> terminals must be connected with the same cable cross-section as the motor cable.

#### Technical data for 150% overload

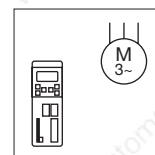
| Device                             | Motor filter |                 |                    |                        |        |
|------------------------------------|--------------|-----------------|--------------------|------------------------|--------|
|                                    | Order ref.   | Inductance [mH] | I <sub>r</sub> [A] | U <sub>mains</sub> [V] | m [kg] |
| 8201                               | ELM3-030H003 | 3.0             | 2.5                | 3 x 230                | 4.0    |
| 8202                               | ELM3-020H004 | 2.0             | 4.0                | 3 x 230                | 4.0    |
| 8203                               | ELM3-010H010 | 1.0             | 10.0               | 3 x 230                | 7.0    |
| 8204                               | ELM3-014H010 | 1.4             | 10.0               | 3 x 230                | 7.0    |
| 8211/ 8241/ 8242 / 9321EV / 9322EV | ELM3-030H004 | 3.0             | 4.0                | 3 x 460                | 4.0    |
| 8212 / 8243 / 9323EV               | ELM3-030H004 | 3.0             | 4.0                | 3 x 460                | 4.0    |
| 8213                               | ELM3-014H010 | 1.4             | 10.0               | 3 x 460                | 7.0    |
| 8214 / 8244 / 9324EV               | ELM3-014H010 | 1.4             | 10.0               | 3 x 460                | 7.0    |
| 8215                               | ELM3-014H010 | 1.4             | 10.0               | 3 x 460                | 7.0    |
| 8216 / 8245 / 9325EV               | ELM3-007H025 | 0.7             | 25.0               | 3 x 460                | 14.0   |
| 8217                               | ELM3-007H025 | 0.7             | 25.0               | 3 x 460                | 14.0   |
| 8218 / 8246 / 9326EV               | ELM3-007H025 | 0.7             | 25.0               | 3 x 460                | 14.0   |
| 8221-8222 / 9327-28EV              | ELM3-004H055 | 0.4             | 55.0               | 3 x 460                | 40.0   |
| 8223-8227 / 9329-33EV              | on request   |                 |                    |                        |        |

#### Technical data for 120% overload

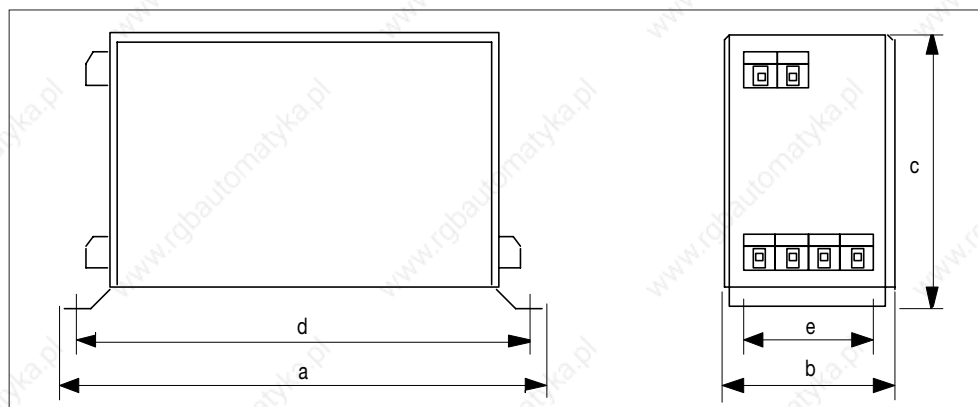
| Device                      | Motor filter |                 |                    |                        |        |
|-----------------------------|--------------|-----------------|--------------------|------------------------|--------|
|                             | Order ref.   | Inductance [mH] | I <sub>r</sub> [A] | U <sub>mains</sub> [V] | m [kg] |
| 8211 / 8241 / 9321EV        | ELM3-030H004 | 3.0             | 4.0                | 3 x 460                | 4.0    |
| 8212 / 8242 / 9322EV        | ELM3-030H004 | 3.0             | 4.0                | 3 x 460                | 4.0    |
| 8213 / 8214 / 8243 / 9323EV | ELM3-014H010 | 1.4             | 10.0               | 3 x 460                | 7.0    |
| 8215 / 8216 / 8244 / 9324EV | ELM3-007H025 | 0.7             | 25.0               | 3 x 460                | 14.0   |
| 8217 / 8245 / 9325EV        | ELM3-007H025 | 0.7             | 25.0               | 3 x 460                | 14.0   |
| 8218 / 8246 / 9326EV        | ELM3-007H025 | 0.7             | 25.0               | 3 x 460                | 14.0   |
| 8221 / 9327EV               | ELM3-004H055 | 0.4             | 55.0               | 3 x 460                | 40.0   |
| 8222-8227 / 9328EV-9333EV   | on request   |                 |                    |                        |        |

## Design - 8200 and 9300 vector

### Motor filters

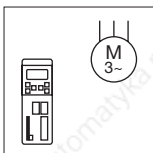


#### Dimensions of motor filters



| Type         | a [mm] | b [mm] | c [mm] | d [mm] | e [mm] |
|--------------|--------|--------|--------|--------|--------|
| ELM3-030H003 | 210    | 60     | 140    | 197    | 35     |
| ELM3-020H004 | 210    | 60     | 140    | 197    | 35     |
| ELM3-010H010 | 280    | 92     | 135    | 267    | 65     |
| ELM3-030H004 | 210    | 75     | 160    | 197    | 50     |
| ELM3-014H010 | 280    | 92     | 175    | 267    | 65     |
| ELM3-007H025 | 280    | 130    | 256    | 267    | 100    |
| ELM3-004H055 | 500    | 235    | 185    | 400    | 220    |





## Design - 8200 and 9300 vector

### Sinusoidal filters

A motor filter is required:

- For long motor cables > 100 - 200 m (shielded) or > 200 - 400 m (unshielded)

A sinusoidal filter is recommended:

- If inverters are being used for the mains supply to systems which require a specific mains frequency
- On UPS
- In applications in which the noise generation in the motor must be reduced

Please note:

- The frequency inverter is also loaded with approx. 10% of the sinusoidal filter rated current
- The typical mains voltage drop via the sinusoidal filter at rated current and rated frequency ( $f_n = 50$  Hz) is 7% of the inverter output voltage
- The maximum permissible field frequency is 120 Hz
- The filters indicated are suitable for a mains voltage of up to  $3 \times 460$  V  $\pm$  10%

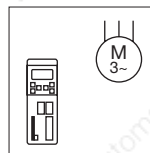
#### Technical data for 150% overload

| Device                               | Sinusoidal filter |                 |           |                 |        |
|--------------------------------------|-------------------|-----------------|-----------|-----------------|--------|
|                                      | Order ref.        | Inductance [mH] | $I_r$ [A] | $U_{mains}$ [V] | m [kg] |
| 8201                                 | EZS3-003A001      | 12.0            | 2.6       | 3 x 230         | 4.5    |
| 8202                                 | EZS3-004A002      | 8.0             | 4.0       | 3 x 230         | 4.5    |
| 8203                                 | EZS3-007A001      | 4.5             | 7.0       | 3 x 230         | 10.0   |
| 8204                                 | EZS3-010A001      | 3.5             | 10.0      | 3 x 230         | 10.0   |
| 8211 / 8241 / 8242 / 9321EV / 9322EV | EZS3-002A001      | 24.0            | 2.5       | 3 x 460         | 4.5    |
| 8212 / 8243 / 9323EV                 | EZS3-004A002      | 14.0            | 4.0       | 3 x 460         | 4.5    |
| 8213                                 | EZS3-006A001      | 10.0            | 5.5       | 3 x 460         | 9.0    |
| 8214 / 8244 / 9324EV                 | EZS3-007A002      | 7.5             | 7.0       | 3 x 460         | 9.0    |
| 8215                                 | EZS3-010A002      | 6.0             | 9.5       | 3 x 460         | 16.0   |
| 8216 / 8245 / 9325EV                 | EZS3-013A001      | 4.5             | 13.0      | 3 x 460         | 16.0   |
| 8217                                 | EZS3-017A001      | 3.5             | 16.5      | 3 x 460         | 19.0   |
| 8218 / 8246 / 9326EV                 | EZS3-024A001      | 2.5             | 24.0      | 3 x 460         | 20.0   |
| 8221-8227 / 9327-33EV                | on request        |                 |           |                 |        |

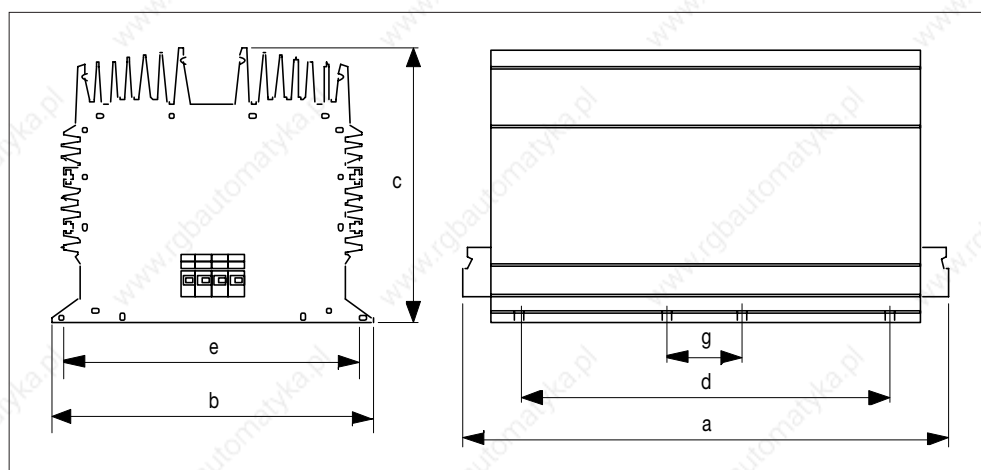
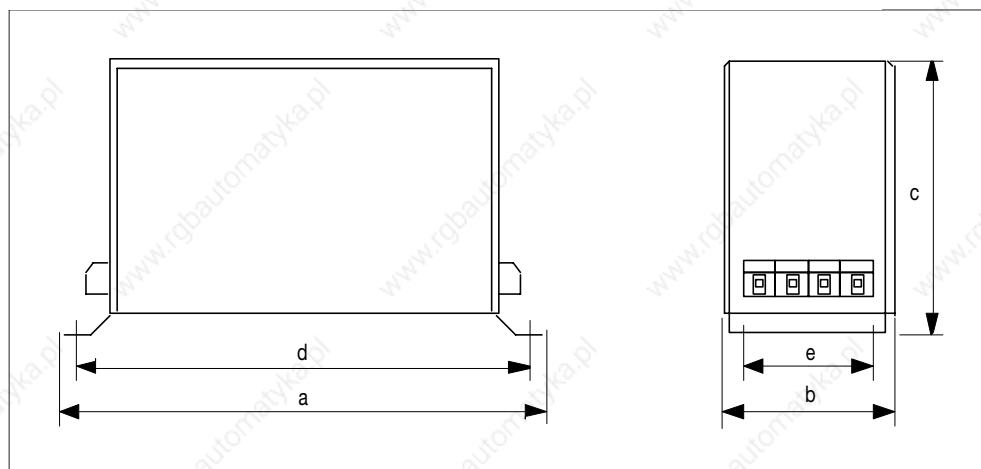
#### Technical data for 120% overload

| Device                      | Sinusoidal filter |                 |           |                 |        |
|-----------------------------|-------------------|-----------------|-----------|-----------------|--------|
|                             | Order ref.        | Inductance [mH] | $I_r$ [A] | $U_{mains}$ [V] | m [kg] |
| 8241 / 9321EV               | EZS3-002A001      | 24.0            | 2.5       | 3 x 460         | 4.5    |
| 8211 / 8212 / 8242 / 9322EV | EZS3-004A002      | 14.0            | 4.0       | 3 x 460         | 4.5    |
| 8243 / 9323EV               | EZS3-006A001      | 10.0            | 5.5       | 3 x 460         | 9.0    |
| 8213 / 8214                 | EZS3-007A002      | 7.5             | 7.0       | 3 x 460         | 9.0    |
| 8244 / 9324EV               | EZS3-009A002      | 10.0            | 5.5       | 3 x 460         | 9.0    |
| 8215 / 8216 / 8244 / 9324EV | EZS3-013A001      | 4.5             | 13.0      | 3 x 460         | 16.0   |
| 8245 / 9325EV               | EZS3-017A001      | 3.5             | 16.5      | 3 x 460         | 19.0   |
| 8217 / 8218 / 8246 / 9326EV | EZS3-024A001      | 2.5             | 24.0      | 3 x 460         | 20.0   |
| 8221-8227 / 9327-33EV       | on request        |                 |           |                 |        |





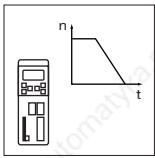
### Dimensions of sinusoidal filters



### Dimensions of sinusoidal filters

| Order ref.   | a [mm] | b [mm] | c [mm] | d [mm] | e [mm] |
|--------------|--------|--------|--------|--------|--------|
| EZS3-003A001 | 210    | 75     | 120    | 200    | 50     |
| EZS3-004A002 | 210    | 75     | 120    | 200    | 50     |
| EZS3-007A001 | 280    | 92     | 135    | 270    | 65     |
| EZS3-010A001 | 280    | 92     | 135    | 270    | 65     |
| EZS3-002A001 | 210    | 75     | 160    | 200    | 50     |
| EZS3-004A002 | 210    | 75     | 160    | 200    | 50     |
| EZS3-006A001 | 280    | 92     | 175    | 270    | 65     |
| EZS3-007A002 | 280    | 92     | 175    | 270    | 65     |
| EZS3-009A002 | 280    | 92     | 175    | 270    | 65     |
| EZS3-010A002 | 280    | 130    | 256    | 267    | 100    |
| EZS3-013A001 | 280    | 130    | 256    | 267    | 100    |
| EZS3-017A001 | 280    | 130    | 256    | 267    | 100    |
| EZS3-024A001 | 325    | 200    | 170    | 260    | 185    |

Larger filters are available on request



## Design - 8200 and 9300 vector

### Braking

#### Options

##### Braking with brake unit

If a motor is braked quickly by the frequency inverter, the motor will operate in generative mode and feed back energy to the frequency inverter. The DC bus voltage of the frequency inverter increases. If the voltage is too high, the frequency inverter will lock the power stages and the motor will coast to a stop. By using a brake unit comprising a brake module with integrated resistor or brake chopper with external resistor, the feedback energy can be dissipated via the brake resistor and converted into heat. The drive can be braked under controlled conditions.

##### Feedback mode

A supply and feedback module can also be used as an alternative, in particular on multi-axis and interconnected drives. These components help to reduce energy consumption and costs.

##### Selecting brake resistors

Brake resistors are selected according to the continuous energy loss exhibited and the energy to be braked. The following formula is used to calculate the rated power of the brake resistors:

$$P_N \geq \frac{t_{Br}}{t_{zyk}} \times P_{max} ; P_{max} = \frac{1}{2} \frac{W_{kin}}{t_{Br}}$$

The maximum kinetic energy to be suppressed is calculated on the basis of the peak brake power and the maximum duty time of the brake chopper.

$$W_{max} = P_{max} \cdot t_{0max}$$

$P_{max}$ : Brake power during braking

$t_{Br}$ : Braking time

$t_{cyc}$ : Time between two braking cycles

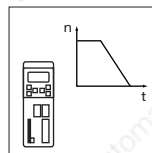
$W_{kin}$ : Kinetic energy to be braked

$t_{0max}$ : Maximum duty time of brake chopper

As the frequency change is also applied in the braking phase via the setpoint integrator on the inverter, the "Tif" value set on the inverter can also be used for the braking time  $t_{Br}$ .

## Design - 8200 and 9300 vector

### Brake module 8251 / 52



The 8251 and 8252 brake modules are supplied with a built-in brake resistor. The maximum peak brake power is 2.0 kW with a duty cycle of 3% for a maximum of 10 seconds.

The 8251 brake module is for 8201 - 8204 single-phase inverters; the 8252 brake module is for 8211 - 8218 three-phase inverters. If a higher brake power is required, the 8253 brake chopper can be used with an appropriate brake resistor.

#### Technical data for 8251 / 8252 brake modules

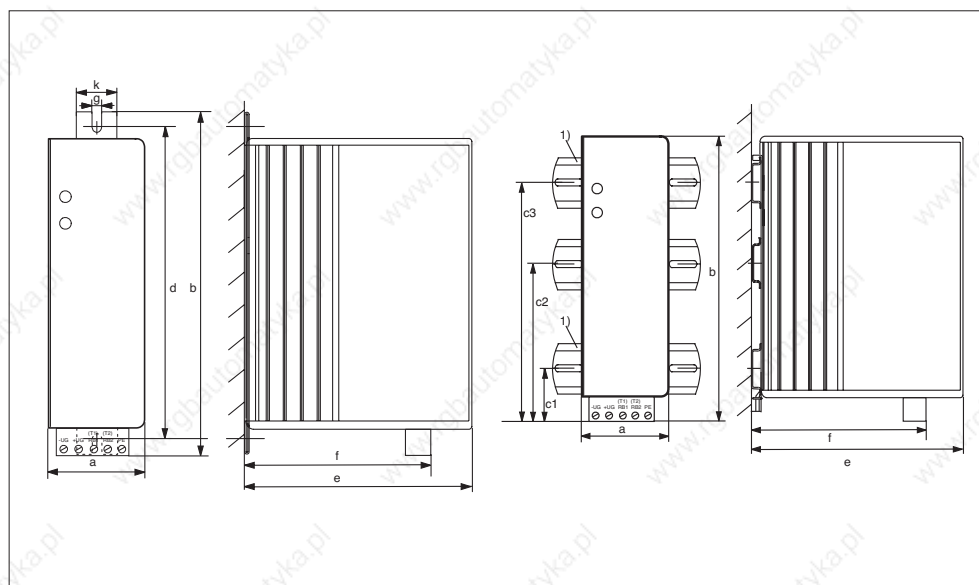
| Brake module 8251      |                                |                       |                  |
|------------------------|--------------------------------|-----------------------|------------------|
| Supply voltage         | 270...400 V DC                 |                       |                  |
| Threshold              |                                | Max. braking energy   | 20 kW s          |
| At 230 V AC            | 375 V DC                       | Min. brake resistance | Integrated       |
| Max. current           | 5.4 A DC                       | Ambient temperature   | 0...+ 40°C       |
| Continuous brake power | 70 W                           | Storage temperature   | -25...+ 70°C     |
| Peak brake power       | 2 kW 3% at max. Duty time 10 s | Humidity              | Humidity class F |
| Brake module 8252      |                                |                       |                  |
| Supply voltage         | 450...750 V DC                 |                       |                  |
| Threshold              |                                | Max. braking energy   | 20 kW s          |
| At 400 V AC            | 725 V DC                       |                       |                  |
| At 460 V AC            | 725 V DC                       | Min. brake resistance | Integrated       |
| Max. current           | 2.7 A DC                       | Ambient temperature   | 0...+ 4°C        |
| Continuous brake power | 70 W                           | Storage temperature   | -25...+ 70°C     |
| Peak brake power       | 2 kW 3% at max. duty time 10 s | Humidity              | Humidity class F |

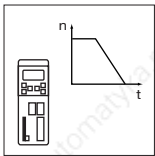
#### Dimensions of brake modules

| Device | Order ref. | Installation on mounting rail |        |        |        |        |        |        |        | Installation on DIN rail |         |         |         |        |        |        |
|--------|------------|-------------------------------|--------|--------|--------|--------|--------|--------|--------|--------------------------|---------|---------|---------|--------|--------|--------|
|        |            | a [mm]                        | b [mm] | c [mm] | d [mm] | e [mm] | f [mm] | g [mm] | k [mm] | b [mm]                   | c1 [mm] | c2 [mm] | c3 [mm] | e [mm] | f [mm] | m [kg] |
| 8251   | EMB8251-E  | 56                            | 210    | 28     | 190    | 170    | 130    | 65     | 30     | 190                      | 16      | 98      | 149     | 173    | 133    | 1.3    |
| 8252   | EMB8252-E  | 56                            | 210    | 28     | 190    | 170    | 130    | 65     | 30     | 190                      | 16      | 98      | 149     | 173    | 133    | 1.3    |

#### Fixing on mounting rail

#### Fixing on DIN rail





## Design - 8200 and 9300 vector

### Brake module 9351

The 9351 brake module is supplied with a built-in brake resistor. This brake resistor has a resistance of 47 ohms. The maximum peak brake power is 12 kW at a threshold of 765 V DC. At a pulse/break ratio of 1:250, the maximum duty time is 2 seconds. Depending on the brake power required, the brake module can be used with all

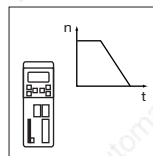
8241-8246, 8221-27 and 9321-33 devices. If a higher brake power is required, the 9352 brake chopper can be used with an appropriate external brake resistor.

#### Technical data for the 9351 brake module

|                        |                                   |                       |                  |
|------------------------|-----------------------------------|-----------------------|------------------|
| Supply voltage         | 270 ... 780 V DC                  |                       |                  |
| Threshold at 400 V AC  | 630 V DC                          | Max. braking energy   | 50 kWS           |
| Threshold at 460 V AC  | 725 V DC                          | Min. brake resistance | Integrated       |
| Threshold at 480 V AC  | 765 V DC                          |                       |                  |
| Max. current           | 16 A DC                           | Ambient temperature   | 0 ... 40°C       |
| Continuous brake power | 100 W                             | Storage temperature   | -20 ... 70°C     |
| Peak brake power       | 12 kW at<br>1% max. duty time 4 s | Humidity              | Humidity class F |

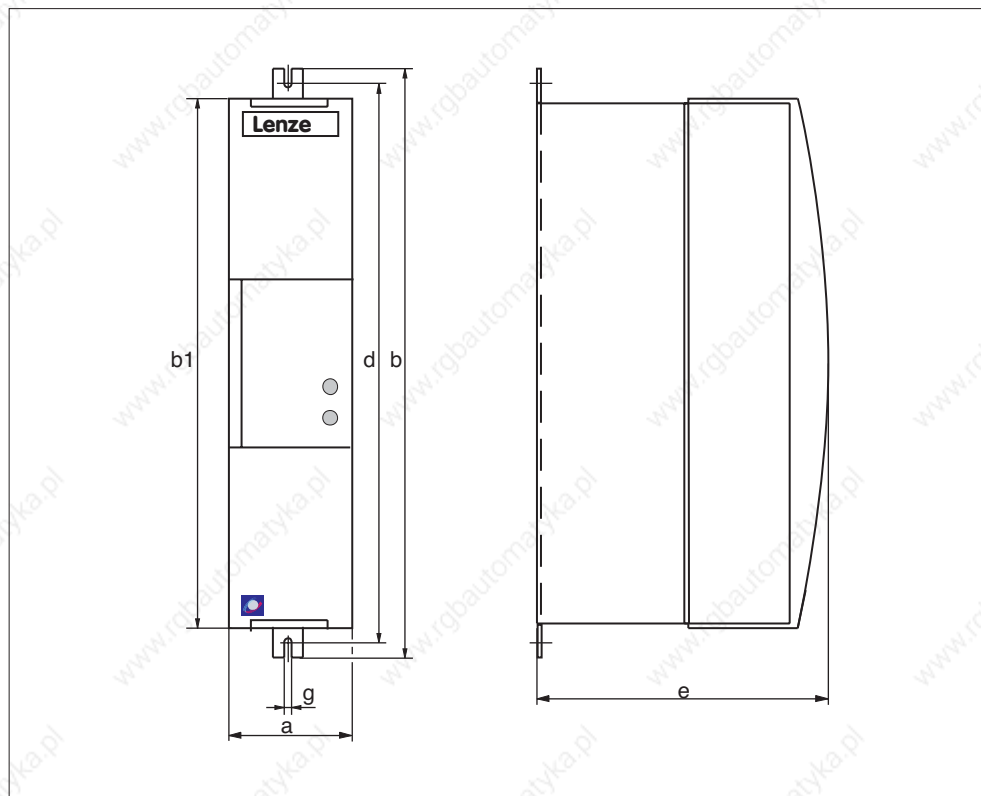
## Design - 8200 and 9300 vector

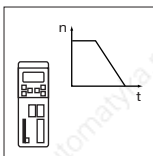
### Brake module 9351



#### Dimensions of the 9351 brake module

| Device    | Order ref. | a [mm] | b [mm] | b1 [mm] | c [mm] | d [mm] | e [mm] | g [mm] | k [mm] | m [mm] |
|-----------|------------|--------|--------|---------|--------|--------|--------|--------|--------|--------|
| EMB9351-E | EMB9351-E  | 52     | 384    | 350     | 26     | 365    | 186    | 6.5    | 30     | 2.6    |





## Design - 8200 and 9300 vector

### Brake chopper 8253 / 9352

8253 and 9352 brake choppers can be optimised for the required brake power. For this purpose, the brake choppers are operated with an external brake resistor. The minimum brake resistance is 47 ohms on the 8253 and 18 ohms on the 9352.

The brake chopper can be mounted directly adjacent to three-phase 8200 frequency inverters (8253 for 8211-18, 9352 for 8241-46, 8221-27 and 9321-33EV). If a lower brake power is required, a brake module with an integrated brake resistor can be used.

#### Technical data for the 8253 / 9352 brake choppers

| Brake chopper 8253       |                                     |                       |                               |
|--------------------------|-------------------------------------|-----------------------|-------------------------------|
| Supply voltage           | 450...750 V DC                      |                       |                               |
| Threshold at 400 V AC    | 725 V DC                            | Max. braking energy   | According to brake resistance |
| Threshold at 460 V AC    | 725 V DC                            | Min. brake resistance | 47 ohms                       |
| Max. current             | 15 A DC                             | Ambient temperature   | 0...+ 40°C                    |
| Continuous brake power   | 5.6 kW                              | Storage temperature   | -25...+ 70°C                  |
| Peak brake power         | 11.2 kW 50 % at max. duty time 60 s | Humidity              | Humidity class F              |
| Brake chopper 9352       |                                     |                       |                               |
| Supply voltage           | 270...780 V DC                      |                       |                               |
| Threshold at 400 V       | 630 V DC                            | Max. braking energy   | According to brake resistance |
| Threshold at 460 V       | 725 V DC                            | Min. brake resistance | 18 ohms internal              |
| Threshold at 480 V       | 765 V DC                            |                       |                               |
| Max. current             | 42 A DC                             | Ambient temperature   | 0...40°C                      |
| Continuous braking power | 19 kW                               | Storage temperature   | -20...70°C                    |
| Peak braking power       | 32.0 kW 50 % at max. duty time 60 s | Humidity              | Humidity class F              |

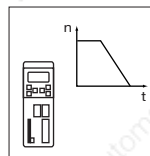
#### Assignment of brake resistor/brake chopper to frequency inverter (example for standard application)

| Device        | Brake chopper   |                          | Brake resistor     |                  |                 |                 |                        |        |
|---------------|-----------------|--------------------------|--------------------|------------------|-----------------|-----------------|------------------------|--------|
|               | Order ref.      | Minimum Resistance [ohm] | Order ref.         | Resistance [ohm] | Peak power [kW] | Perm. power [W] | Thermal capacity [kWs] | m [kg] |
| 8211          | EMB8253-E       | 47                       | ERBM470R100W       | 470              | 1.0             | 100             | 15                     | 0.6    |
| 8212          | EMB8253-E       | 47                       | ERBM370R150W       | 370              | 1.5             | 150             | 22.5                   | 1.0    |
| 8213          | EMB8253-E       | 47                       | ERBM240R200W       | 240              | 2.0             | 200             | 30                     | 1.3    |
| 8214          | EMB8253-E       | 47                       | ERBD180R300W       | 180              | 3.0             | 300             | 45                     | 2.0    |
| 8215          | EMB8253-E       | 47                       | ERBD100R600W       | 100              | 5.5             | 600             | 90                     | 3.1    |
| 8216          | EMB8253-E       | 47                       | ERBD082R600W       | 82               | 6.5             | 600             | 90                     | 4.1    |
| 8217          | EMB8253-E       | 47                       | ERBD068R800W       | 68               | 8.0             | 800             | 120                    | 4.1    |
| 8218          | EMB8253-E       | 47                       | ERBD047R01k2       | 47               | 12.0            | 1200            | 180                    | 4.9    |
| 8241 / 9321EV | EMB9352-E       | 18                       | ERBM470R050W       | 470              | 1.0             | 100             | 15.0                   | 0.6    |
| 8242 / 9322EV | EMB9352-E       | 18                       | ERBM470R100W       | 470              | 1.0             | 100             | 15.0                   | 0.6    |
| 8243 / 9323EV | EMB9352-E       | 18                       | ERBM370R150W       | 370              | 1.5             | 300             | 22.5                   | 1.0    |
| 8244 / 9324EV | EMB9352-E       | 18                       | ERBD180R300W       | 180              | 3.0             | 300             | 45.0                   | 2.0    |
| 8245 / 9325EV | EMB9352-E       | 18                       | ERBD100R600W       | 100              | 5.5             | 600             | 90.0                   | 3.1    |
| 8246 / 9326EV | EMB9352-E       | 18                       | ERBD047R01k2       | 47               | 12.0            | 1200            | 180.0                  | 4.9    |
| 8221 / 9327EV | EMB9352-E       | 18                       | ERBD033R02k0       | 33               | 17.0            | 2000            | 300                    | 7.1    |
| 8222 / 9328EV | EMB9352-E       | 18                       | ERBD022R03k0       | 22               | 26.5            | 3000            | 450                    | 10.6   |
| 8223 / 9329EV | EMB9352-E       | 18                       | ERBD018R03k0       | 18               | 32.5            | 3000            | 450                    | 10.6   |
| 8224 / 9330EV | EMB9352-E (2 x) | 18                       | ERBD022R03k0 (2 x) | 22               | 26.5            | 3000            | 450                    | 10.6   |
| 8225 / 9331EV | EMB9352-E (2 x) | 18                       | ERBD018R03k0 (2 x) | 18               | 26.5            | 3000            | 450                    | 10.6   |
| 8226 / 9332EV | EMB9352-E (3 x) | 18                       | ERBD022R03k0 (3 x) | 22               | 26.5            | 3000            | 450                    | 10.6   |
| 8227 / 9333EV | EMB9352-E (3 x) | 18                       | ERBD018R03k0 (3 x) | 18               | 32.5            | 3000            | 450                    | 10.6   |



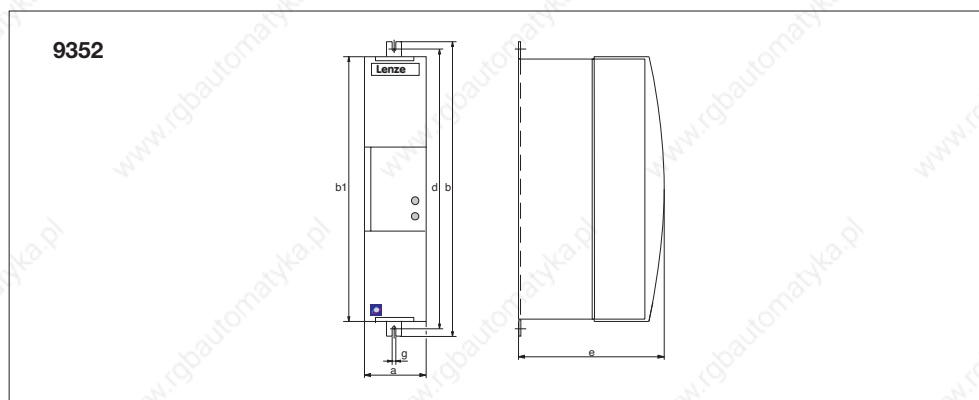
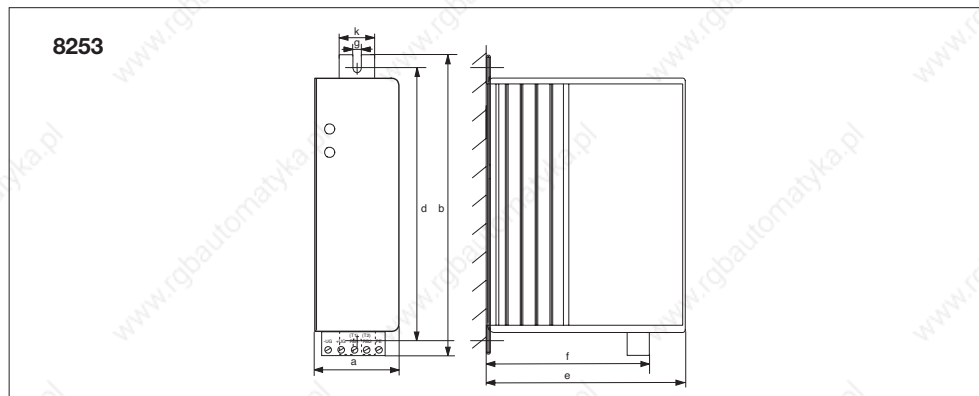
## Design - 8200 and 9300 vector

### Brake chopper 8253 / 9352



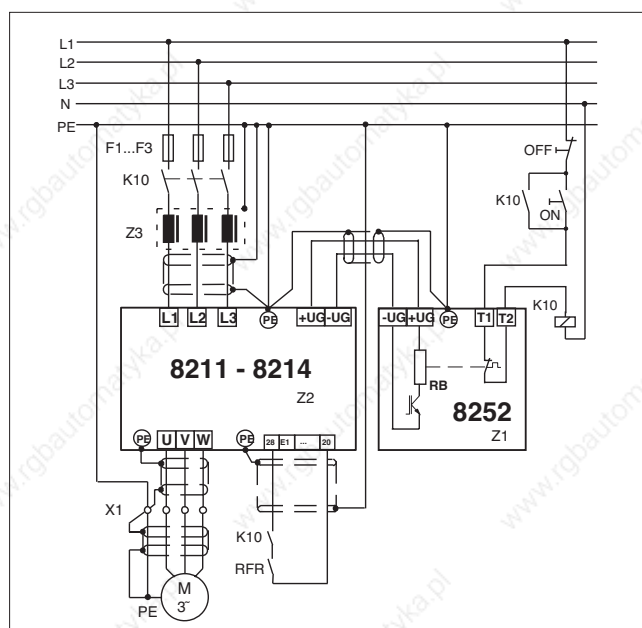
#### Dimensions of brake choppers

| Device | Order ref. | Installation on mounting rail |        |         |        |        |        |        |        |        | Installation on DIN rail |         |         |         |        |        |        |
|--------|------------|-------------------------------|--------|---------|--------|--------|--------|--------|--------|--------|--------------------------|---------|---------|---------|--------|--------|--------|
|        |            | a [mm]                        | b [mm] | b1 [mm] | c [mm] | d [mm] | e [mm] | f [mm] | g [mm] | k [mm] | b [mm]                   | c1 [mm] | c2 [mm] | c3 [mm] | e [mm] | f [mm] | m [kg] |
| 8253   | EMB8253-E  | 56                            | 210    | —       | 28     | 190    | 170    | 130    | 65     | 30     | 190                      | 16      | 98      | 149     | 173    | 133    | 1.3    |
| 9352   | EMB9352-E  | 52                            | 384    | 350     | 26     | 365    | 186    | —      | 6.5    | 30     | —                        | —       | —       | —       | —      | —      | 2.2    |

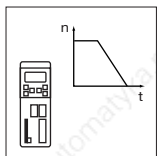


#### Brake units

- Please note:
  - The assignments listed in the table for the external brake resistors permit a maximum braking time of up to 15 seconds
  - The relative duty time of 10% for a maximum of 15 seconds
- The reference variable for the assignment is the set permanent power of the device.
- Although a higher brake power can be achieved by using other resistors or by connecting a number of resistors in parallel or series, the resistance value must not fall below the minimum specified.
- All brake resistors listed have integrated temperature monitoring with potential-free alarm contact for switching off the mains contactor.



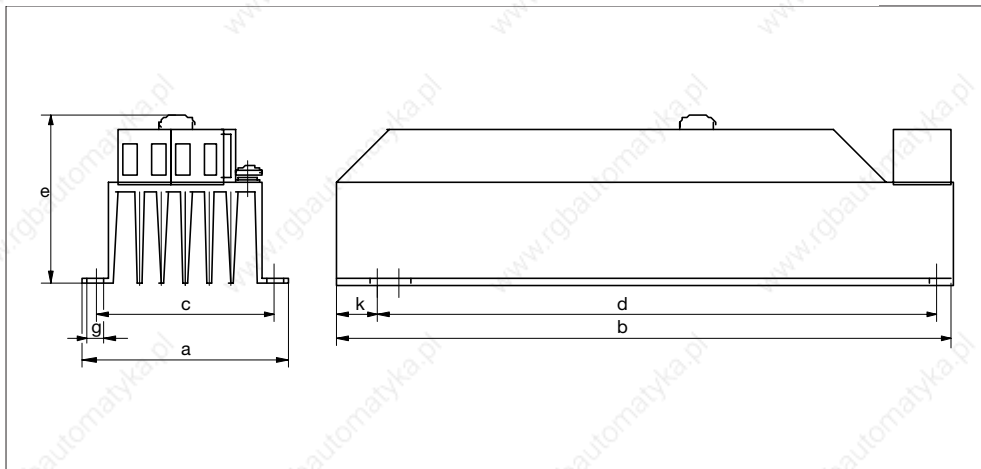
Connection example with brake module



## Design - 8200 and 9300 vector

### Brake resistors for the 8253 brake chopper

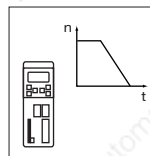
#### Dimensions of ERBM module brake resistors



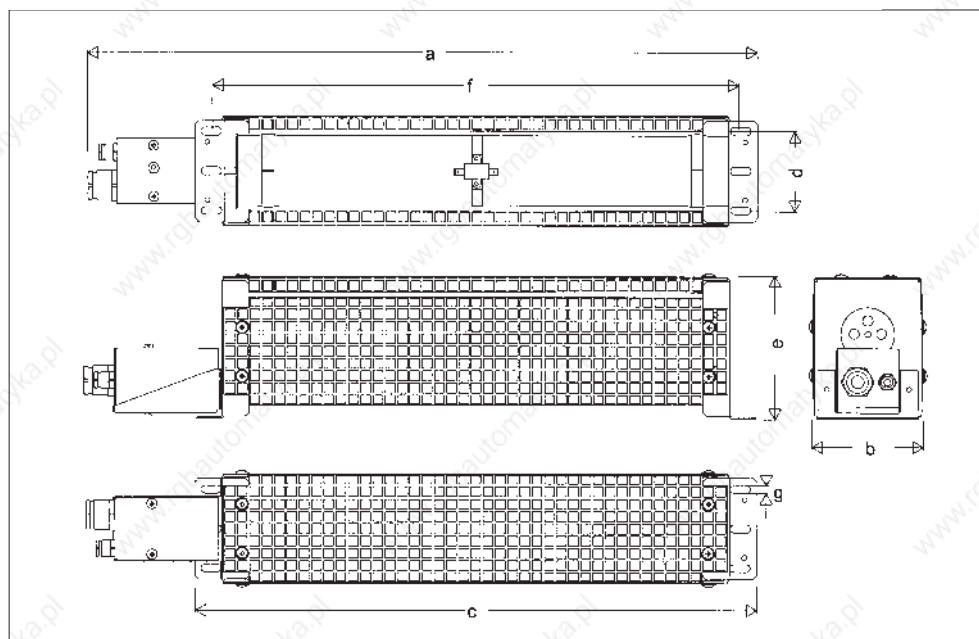
| Brake resistor | a [mm] | b [mm] | c [mm] | d [mm] | e [mm] | g [mm] | k [mm] |
|----------------|--------|--------|--------|--------|--------|--------|--------|
| ERBM470R100W   | 60     | 240    | 50     | 225    | 60     | 5      | 7.5    |
| ERBM470R100W   | 70     | 240    | 50     | 225    | 60     | 5      | 7.5    |
| ERBM370R150W   | 80     | 240    | 70     | 225    | 95     | 5      | 7.5    |
| ERBM240R200W   | 80     | 340    | 70     | 325    | 70     | 5      | 7.5    |

## Design - 8200 and 9300 vector

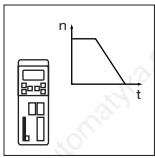
### Brake resistors for 8253 / 9352 brake choppers



Dimensions of ERBD wire brake resistors



| Brake resistor<br>Order ref. | a<br>[mm] | b<br>[mm] | c<br>[mm] | d<br>[mm] | e<br>[mm] | f<br>[mm] | g<br>[mm] | h<br>[mm] |
|------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| ERBD180R300W                 | 440       | 89        | 354       | 64        | 115       | 326       | 6.5       | 13        |
| ERBD100R600W                 | 640       | 89        | 554       | 64        | 115       | 526       | 6.5       | 13        |
| ERBD082R600W                 | 640       | 89        | 554       | 64        | 115       | 526       | 6.5       | 13        |
| ERBD068R800W                 | 540       | 177       | 454       | 150       | 115       | 426       | 6.5       | 13        |
| ERBD047R01k2                 | 640       | 177       | 554       | 150       | 115       | 526       | 6.5       | 13        |
| ERBD033R02k0                 | 640       | 265       | 554       | 240       | 115       | 526       | 6.5       | 13        |
| ERBD022R03k0                 | 740       | 177       | 654       | 150       | 229       | 626       | 6.5       | 13        |
| ERBD018R03k0                 | 740       | 177       | 654       | 150       | 229       | 626       | 6.5       | 13        |



## Design - 8200 and 9300 vector

### 9340 supply and feedback modules

9340 supply and feedback modules can be particularly useful for multi-axis and interconnected drives. These are compact devices with IP20 degree of protection. They can be connected to 8211-8227 and 9321-33EV drive controllers as add-on components and mounted directly adjacent to 8241-8246, 8221-8227 and 9321-33EV frequency inverters.

The brake energy of the frequency inverter is fed back into the mains via the supply and feedback modules.

There are no thermal problems dissipating the brake

energy. Mains filters can be used for the mains connection and DC bus fuses for DC-bus operation.

Brake modules or brake choppers can also be used instead of the supply and feedback module. These modules convert the brake energy into heat.

#### General data for supply and feedback modules

|                       |                                                                                                              |
|-----------------------|--------------------------------------------------------------------------------------------------------------|
| Humidity              | Humidity class F, no condensation<br>(relative humidity 85%, no condensation)                                |
| Transport temperature | -25 ... 70°C                                                                                                 |
| Storage temperature   | 25 ... 55°C                                                                                                  |
| Operating temperature | 0 ... 40°C<br>40 ... 50°C with power derating 2.5% per K                                                     |
| Noise immunity        | IEC801-2 to 5 intensity 4                                                                                    |
| Pollution degree      | VDE 110 Part 2 pollution degree 2                                                                            |
| Insulation strength   | VDE 0110 overvoltage category III                                                                            |
| Packaging             | To DIN 4180                                                                                                  |
| Degree of protection  | IP 20<br>NEMA 1                                                                                              |
| Approval              | CE conformance and UL approval                                                                               |
| Air pressure          | 100% rated current up to 900 mbar (approx. 1000 m above sea level)<br>acc. to VDE 875 Part 1 and pr EN 55082 |

#### Ratings

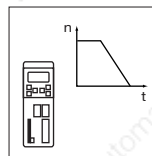
| Type                                                                    | 9341                    | 9342 | 9343 |
|-------------------------------------------------------------------------|-------------------------|------|------|
| Mains voltage                                                           | 320 ... 528 V $\pm 0\%$ |      |      |
| Mains frequency                                                         | 48 ... 62 Hz $\pm 0\%$  |      |      |
| Feedback power [kVA] <sup>1)</sup>                                      | 8.3                     | 16.6 | 31.2 |
| Mech. total power of the motors connected via the drive controller (kW) | 5.5                     | 11.0 | 22.0 |
| Rated mains current [A]                                                 | 12.0                    | 24.0 | 45.0 |
| Max. mains current [A]                                                  | 18.0                    | 36.0 | 67.5 |
| Power loss [W]                                                          | 100                     | 200  | 400  |

<sup>1)</sup> Electrical output power for motive and generative mode

DC bus fuses see page 91

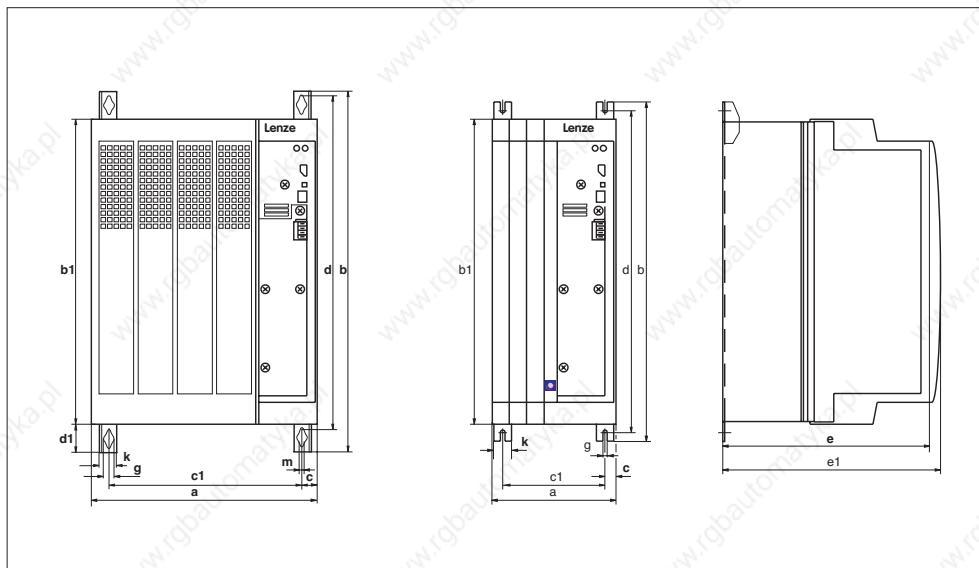
## Design - 8200 and 9300 vector

### 9340 supply and feedback modules

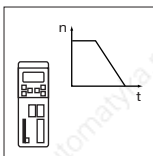


#### Dimensions

| Device | a [mm] | b [mm] | b1 [mm] | c [mm] | c1 [mm] | d [mm] | d1 [mm] | e [mm] | e1 [mm] | g [mm] | k [mm] | m [kg] |
|--------|--------|--------|---------|--------|---------|--------|---------|--------|---------|--------|--------|--------|
| 9341   | 135    | 384    | 350     | 21.5   | 92      | 365    | —       | 230    | 250     | 6.5    | 30     | 7.5    |
| 9342   | 135    | 384    | 350     | 21.5   | 92      | 365    | —       | 230    | 250     | 6.5    | 30     | 7.5    |
| 9343   | 250    | 404    | 350     | 14     | 205     | 396    | 24      | 230    | 250     | 6.5    | 25     | 12.5   |



Like 8215-27 frequency inverters, thermal separation can be integrated into supply and feedback modules.



## Design - 8200 and 9300 vector

### 9340 supply and feedback modules

#### Mains filter A

Depending on the application, various line-side measures can be used for mains current reduction and interference suppression on supply and feedback modules. The mains filter described overleaf or the assigned mains choke is required.

Limiting value class A is often required for industrial networks operating separately from mains supplies in domestic areas. The noise emitted by the connected consumers must not exceed the defined characteristic. In order to meet the requirements of limiting value class A, you can connect a mains filter A before the supply and feedback modules.

#### Technical data

| Device | Mains filter A |           |                        |                 |        |
|--------|----------------|-----------|------------------------|-----------------|--------|
|        | Order ref.     | $I_r$ [A] | $U_{\text{mains}}$ [V] | Inductance [mH] | m [kg] |
| 9341   | EZN3A0120H012  | 12.0      | 480                    | 1.20            | 4.7    |
| 9342   | EZN3A0088H024  | 24.0      | 480                    | 0.88            | 12.2   |
| 9343   | EZN3A0055H045  | 45.0      | 480                    | 0.55            | 15.0   |

#### Dimensions of mains filter A

| Order ref.    | Figure | a [mm] |     | b [mm]         |     | c [mm] |                | d [mm]         |                | e [mm]         |     | m [mm] |     | n [mm] |  |
|---------------|--------|--------|-----|----------------|-----|--------|----------------|----------------|----------------|----------------|-----|--------|-----|--------|--|
| EZN3A0120H012 | A      | 135    |     | 260            |     | 135    |                | 245            |                | 230            |     | 7.0    |     | –      |  |
| EZN3A0088H024 | A      | 135    |     | 380            |     | 135    |                | 365            |                | 230            |     | 7.0    |     | –      |  |
| EZN3A0055H045 | B      | a      | b   | b <sub>1</sub> | c   | d      | d <sub>1</sub> | d <sub>2</sub> | d <sub>3</sub> | d <sub>4</sub> | e   | m      | n   |        |  |
|               |        | 278    | 710 | 365            | 258 | 670    | 22             | 300            | 38             | 300            | 250 | 11     | 6.5 |        |  |

Figure A

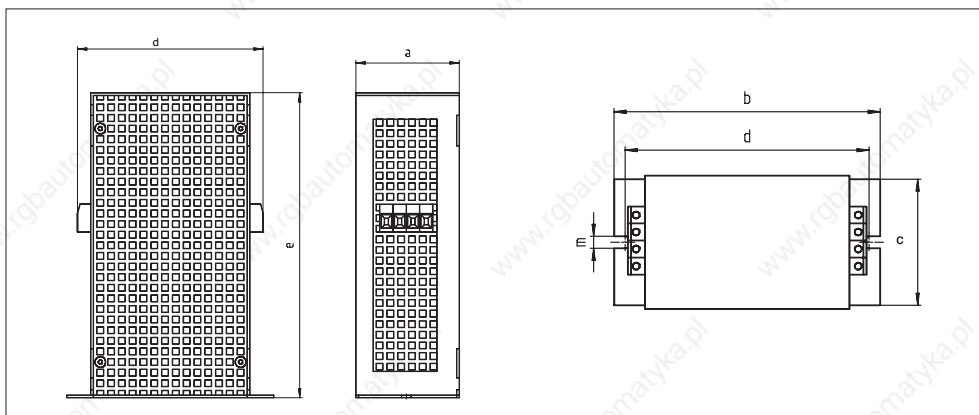
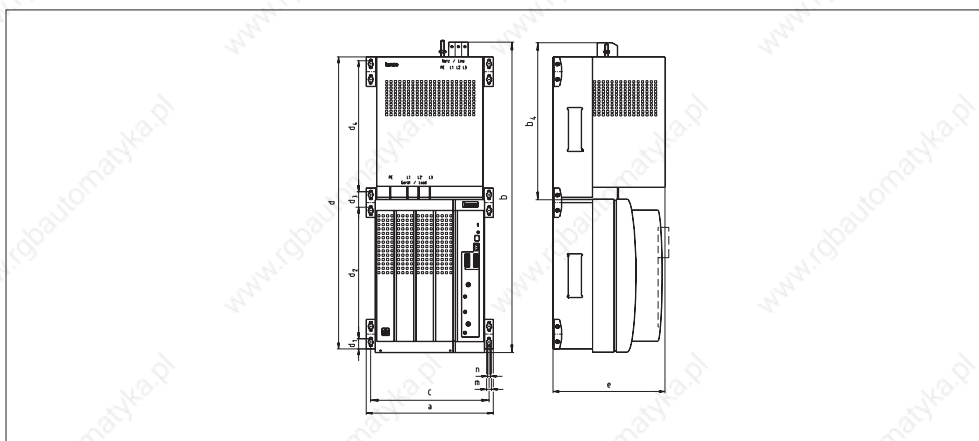
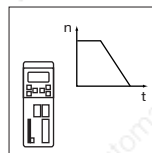


Figure B



The mains filter has an adapted connection cable and must therefore be connected directly to the supply and feedback unit.





### DC fuses for DC-bus operation and DC power supply

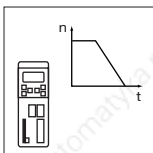
Two ranges of fuses are required to provide DC fuses for the entire power range of the drive controller. Fuse size 14\*51 mm covers the rated current range from 6 to 40 A and fuse size 22\*58 mm covers the range from 12 to 100 A. Only fuse holders of the same size may be interconnected via DC busbars. DC currents above 100 A

can be implemented by connecting 22\*58 mm DC fuses in parallel.

Note: A DC busbar system is available for each fuse range. At average supply levels, the current capacity  $I = 200$  A.

| Device |            | 14*51 fuse<br>without signalling device |                    |
|--------|------------|-----------------------------------------|--------------------|
| Type   | Power [kW] | Fuse<br>rated current [A]               | Order ref.         |
| 8211   | 0.75       | 6                                       | EFSGR0060AYHN (2x) |
| 8212   | 1.5        | 10                                      | EFSGR0100AYHN (2x) |
| 8213   | 2.2        | 12                                      | EFSGR0120AYHN (2x) |
| 8214   | 3          | 20                                      | EFSGR0200AYHN (2x) |
| 8215   | 4          | 25                                      | EFSGR0250AYHN (2x) |
| 8216   | 5.5        | 32                                      | EFSGR0320AYHN (2x) |
| 8217   | 7.5        | 40                                      | EFSGR0400AYHN (2x) |
| 8218   | 11         | 40                                      | EFSGR0400AYHN (2x) |
| 8241   | 0.37       | 10                                      | EFSGR0100AYHN (2x) |
| 8242   | 0.75       | 10                                      | EFSGR0100AYHN (2x) |
| 8243   | 1.5        | 10                                      | EFSGR0100AYHN (2x) |
| 8244   | 3          | 20                                      | EFSGR0200AYHN (2x) |
| 8245   | 5.5        | 32                                      | EFSGR0320AYHN (2x) |
| 8246   | 11         | 40                                      | EFSGR0400AYHN (2x) |
| 9321   | 0.37       | 10                                      | EFSGR0100AYHN (2x) |
| 9322   | 0.75       | 10                                      | EFSGR0100AYHN (2x) |
| 9323   | 1.5        | 10                                      | EFSGR0100AYHN (2x) |
| 9324   | 3          | 20                                      | EFSGR0200AYHN (2x) |
| 9325   | 5.5        | 32                                      | EFSGR0320AYHN (2x) |
| 9326   | 11         | 40                                      | EFSGR0400AYHN (2x) |
| 9341   |            | 32                                      | EFSGR0320AYHN (2x) |
| 9351   |            | 20                                      | EFSGR0200AYHN (2x) |

Lenze offers a DC busbar system - EWZ 0036 - for DC fuses 14\*51 mm.



## Design - 8200 and 9300 vector

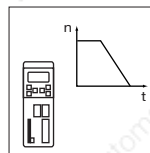
### DC fuses

| Device |            | 22*58 fuse<br>without signalling device |                    |
|--------|------------|-----------------------------------------|--------------------|
| Type   | Power [kW] | Fuse<br>rated current [A]               | Order ref.         |
| 8211   | 0.75       | 12                                      | EFSGR0120AYIN (2x) |
| 8212   | 1.5        | 12                                      | EFSGR0120AYIN (2x) |
| 8213   | 2.2        | 12                                      | EFSGR0120AYIN (2x) |
| 8214   | 3          | 20                                      | EFSGR0200AYIN (2x) |
| 8215   | 4          | 25                                      | EFSGR0250AYIN (2x) |
| 8216   | 5.5        | 32                                      | EFSGR0320AYIN (2x) |
| 8217   | 7.5        | 40                                      | EFSGR0400AYIN (2x) |
| 8218   | 11         | 40                                      | EFSGR0400AYIN (2x) |
| 8221   | 15         | 80                                      | EFSGR0800AYIN (2x) |
| 8222   | 22         | 100                                     | EFSGR1000AYIN (2x) |
| 8223   | 30         | 80                                      | EFSGR0800AYIN (4x) |
| 8224   | 45         | 100                                     | EFSGR1000AYIN (4x) |
| 8225   | 55         | 80                                      | EFSGR0800AYIN (6x) |
| 8226   | 75         | 100                                     | EFSGR1000AYIN (6x) |
| 8227   | 90         | 100                                     | EFSGR1000AYIN (8x) |
| 8241   | 0.37       | 12                                      | EFSGR0120AYIN (2x) |
| 8242   | 0.75       | 12                                      | EFSGR0120AYIN (2x) |
| 8243   | 1.5        | 12                                      | EFSGR0120AYIN (2x) |
| 8244   | 3          | 20                                      | EFSGR0200AYIN (2x) |
| 8245   | 5.5        | 32                                      | EFSGR0320AYIN (2x) |
| 8246   | 11         | 40                                      | EFSGR0400AYIN (2x) |
| 9321   | 0.37       | 12                                      | EFSGR0120AYIN (2x) |
| 9322   | 0.75       | 12                                      | EFSGR0120AYIN (2x) |
| 9323   | 1.5        | 12                                      | EFSGR0120AYIN (2x) |
| 9324   | 3          | 20                                      | EFSGR0200AYIN (2x) |
| 9325   | 5.5        | 32                                      | EFSGR0320AYIN (2x) |
| 9326   | 11         | 40                                      | EFSGR0400AYIN (2x) |
| 9327   | 15         | 80                                      | EFSGR0800AYIN (2x) |
| 9328   | 22         | 100                                     | EFSGR1000AYIN (2x) |
| 9329   | 30         | 80                                      | EFSGR0800AYIN (4x) |
| 9330   | 45         | 100                                     | EFSGR1000AYIN (4x) |
| 9331   | 55         | 80                                      | EFSGR0800AYIN (6x) |
| 9332   | 75         | 100                                     | EFSGR1000AYIN (6x) |
| 9333   | 90         | 100                                     | EFSGR1000AYIN (8x) |
| 9341   |            | 32                                      | EFSGR0320AYIN (2x) |
| 9342   |            | 50                                      | EFSGR0500AYIN (2x) |
| 9343   |            | 100                                     | EFSGR1000AYIN (2x) |
| 9351   |            | 20                                      | EFSGR0200AYIN (2x) |
| 9352   |            | 50                                      | EFSGR0500AYIN (2x) |

Lenze offers a DC busbar system - EWZ0037 - for DC fuses 22\*58 mm.

## Design - 8200 and 9300 vector

### DC fuses



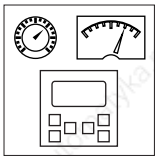
| Fuse holder 14*51 mm                                        |            |
|-------------------------------------------------------------|------------|
| Designation                                                 | Order ref. |
| Fuse holder, 2-pin, without signalling device <sup>1)</sup> | EFH20005   |

| Fuse holder 22*58 mm                                        |            |
|-------------------------------------------------------------|------------|
| Designation                                                 | Order ref. |
| Fuse holder, 2-pin, without signalling device <sup>1)</sup> | EFH20007   |

| Miscellaneous accessories <sup>2)</sup>                                            |            |
|------------------------------------------------------------------------------------|------------|
| Designation                                                                        | Order ref. |
| DC busbar for 14*51 mm, 1m                                                         | EWZ0036    |
| DC busbar for 22*58 mm, 1m                                                         | EWZ0037    |
| Fuse-link contacts for DC busbar (unit packs of 10)                                | EWZ0038    |
| 1-pin terminal for internal supply of busbars for 14*51 and 22*58 mm <sup>2)</sup> | EWZ0039    |

<sup>1)</sup> UL approval only for AC operation.

<sup>2)</sup> The terminal provides a simple way of connecting a central power supply to the busbar system and of connecting busbar systems. Two terminals are required in each instance.



## Design - 8200 and 9300 vector

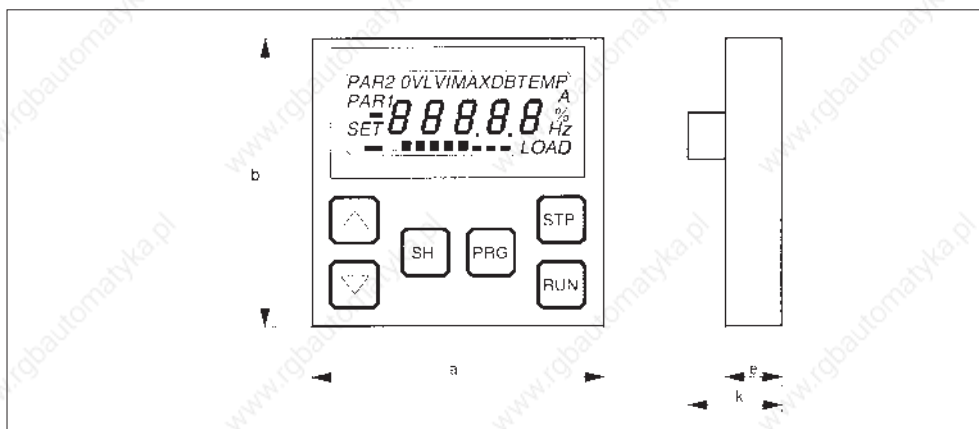
### 8201BB operating module

#### The key to the 8200 frequency inverter

- Parameter settings:  
The default factory settings of the 8200 frequency inverter (menus) meet the requirements of many common applications. The operating module, which can be attached to the front panel, provides an easy and user-friendly means of adapting all frequency inverter parameters to your requirements.
- Transferring parameter sets:  
Even when the voltage is not connected, the built-in non-volatile memory can be used to buffer the parameter sets in the operating module.

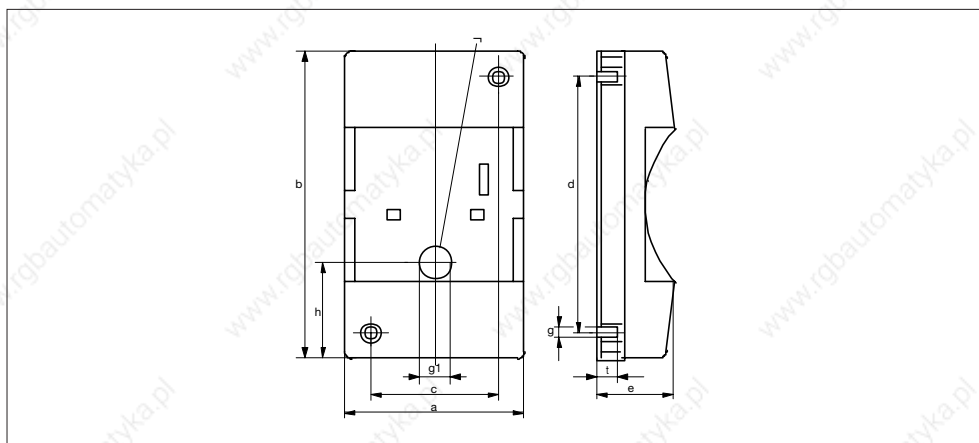
If several drives are in use then the operating module can be used to transfer parameter sets from one controller to another.

- Drive control:  
The drive can be controlled using the operator module keypad. The operating module can be expanded with a diagnosis terminal with up to 10 m of connection cable.
- Error and status message display:  
The LCD display provides an easy and quick means of monitoring your drive.



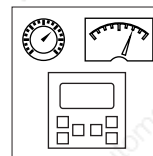
| Operating module | Order ref. | a [mm] | b [mm] | e [mm] | k [mm] |
|------------------|------------|--------|--------|--------|--------|
| EMZ8201BB        | EMZ8201BB  | 60.5   | 60     | 12     | 21     |

#### Diagnosis terminal for the operating module



① Bore for control cabinet installation

| Diagnosis terminal | Cable length [m] | a [mm] | b [mm] | c [mm] | d [mm] | e [mm] | g [mm] | g <sup>1</sup> [mm] | h [mm] | t [mm] |
|--------------------|------------------|--------|--------|--------|--------|--------|--------|---------------------|--------|--------|
| EMZ8272BB-V001     | 2.5              | 70     | 120    | 50     | 100    | 30     | 3.8    | 12                  | 37.5   | 8      |
| EMZ8272BB-V002     | 5.0              |        |        |        |        |        |        |                     |        |        |
| EMZ8272BB-V003     | 10.0             |        |        |        |        |        |        |                     |        |        |



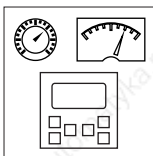
#### The key to the 9300 vector frequency inverter

- Parameter settings:  
The default factory settings of the 9300 frequency inverter (menus) meet the requirements of many common applications. The operating module, which can be attached to the front panel, provides an easy and user-friendly means of adapting all servo inverter parameters to your requirements.
- Transferring parameter sets:  
Even when the voltage is not connected, the built-in non-volatile memory can be used to buffer a parameter set in the operating module.

If several drives are in use then the operating module can be used to transfer parameter sets from one controller to another.

- Drive control:  
The drive can be controlled using the operator module keypad.
- Error and status message display:  
The LCD display provides an easy and quick means of monitoring your drive.





## Design - 8200

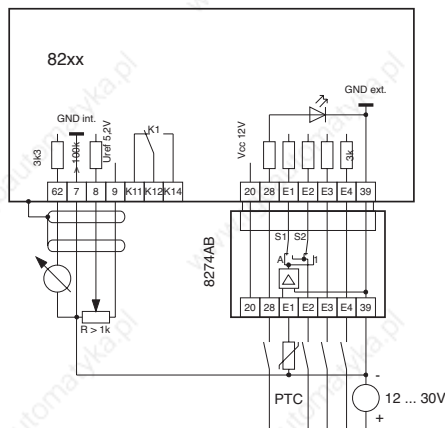
### Plug-in modules

#### PTC module EMZ 8274IB

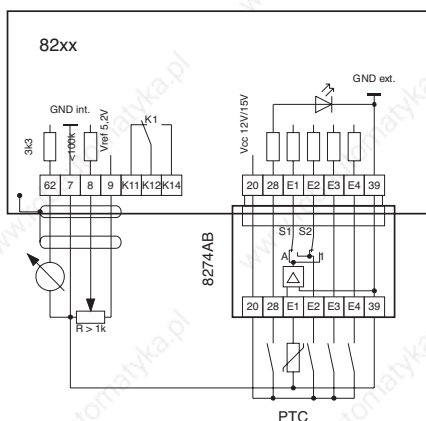
A PTC probe or thermal contact (NC contact) is very often used in three-phase AC motors to monitor winding temperatures. This motor protection can be evaluated directly by the frequency inverter via the PTC module.

When activated, the inverter triggers an error message which can for example be evaluated via a TRIP relay. This input is integrated as standard on 8241-8246 and 8221-8227 frequency inverters.

Connection with external power supply



Connection with internal power supply

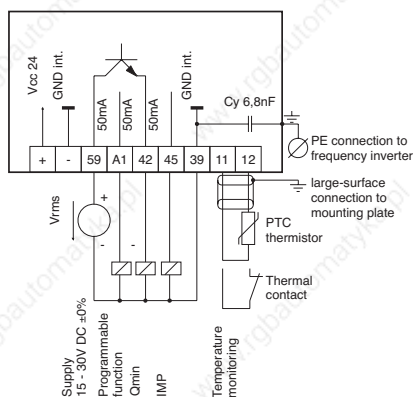


#### I/O module EMZ 8275IB

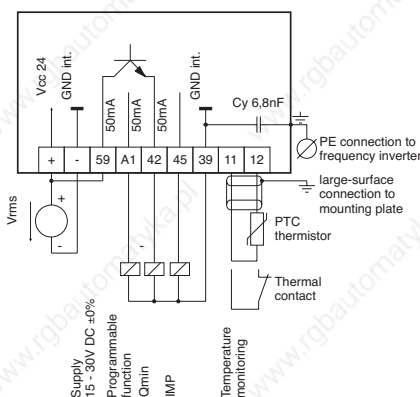
The I/O module enables the frequency inverter to perform additional functions. This module is connected in place of the operating unit and features the following functions:

- PTC input for motor temperature monitoring (function as 8274)
- 3 digital output terminals for functions (e.g.):  
Brake control via Q min signal  
Operating indicator for pulse inhibit  
Freely programmable output

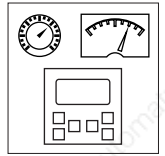
Connection with external power supply



Connection with internal power supply



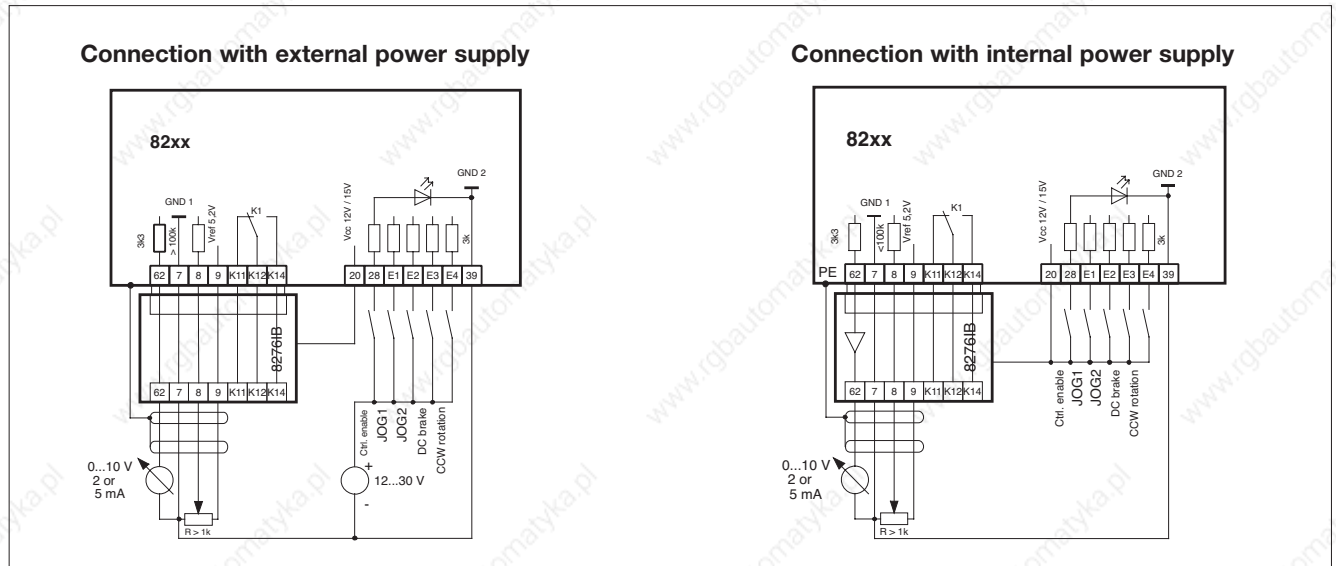




### EMZ 8276IB monitor module

As standard, the 8200 frequency inverter has a 0 - 6 V analog output. If this output is not used as an indicator but is required in another controller, a 0 - 10 V voltage is often required.

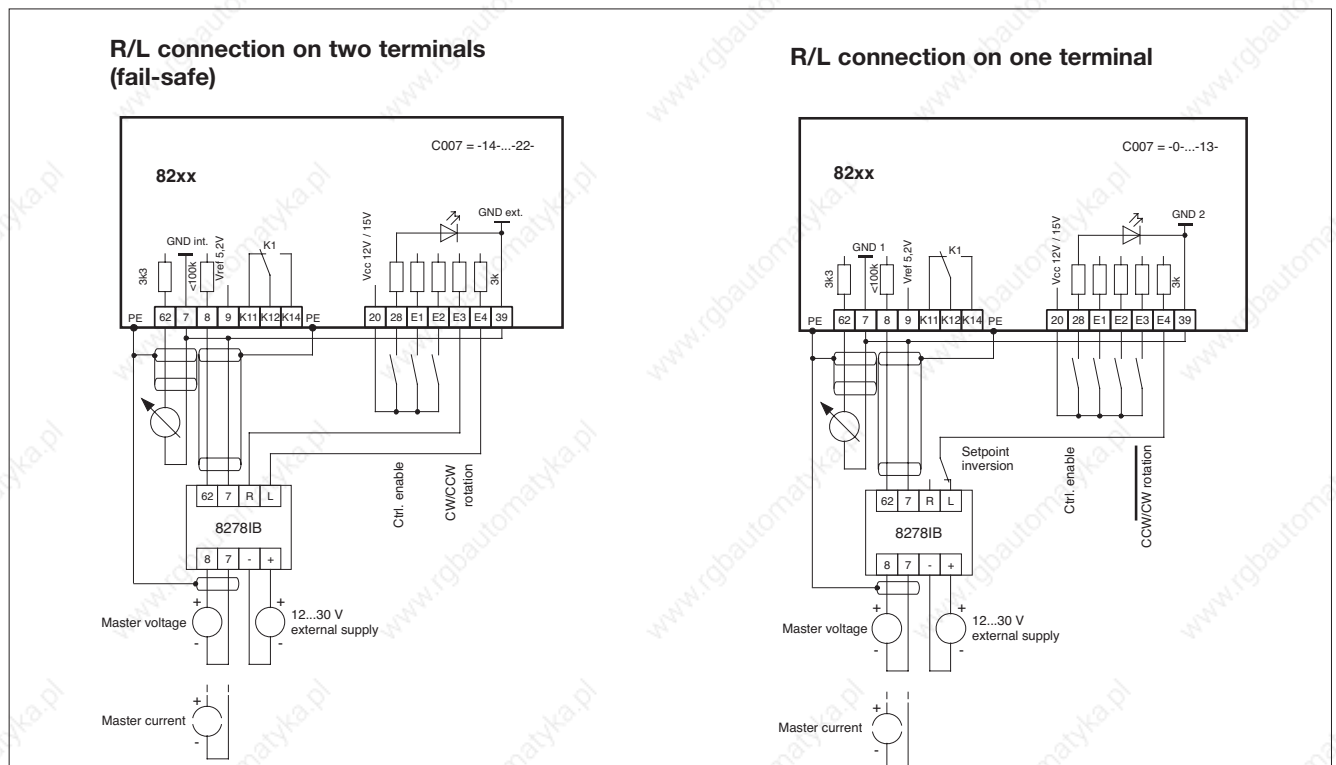
The output voltage is converted as necessary by the monitor module.

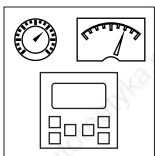


### EMZ 8278IB bipolar input module

In some applications, the setpoint and direction of rotation are preset via a bipolar voltage  $\pm 10$  V. The bipolar analog module can be used to connect this voltage directly.

This enables a direct connection to be established between the open-loop control and the controller. This solution can be particularly useful in transportation and material handling applications.





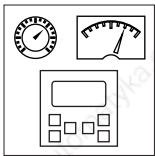
## **Design - 9300 vector**

### **System bus components**

#### **2173IB PC system bus converter**

The PC system bus converter can be used to set the parameters of the 9300 inverter via the system bus. This tool can be used for PC access to device data even if a fieldbus module is connected.





## Design - 8200 and 9300 vector

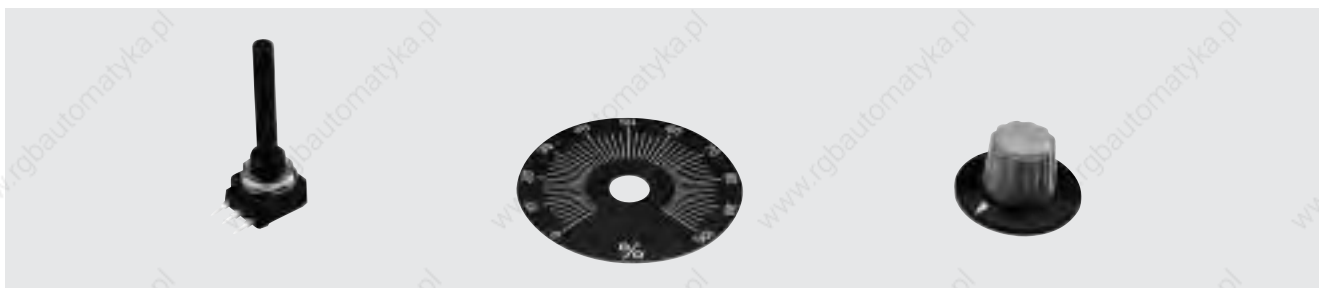
### Setpoint potentiometer

#### Setpoint potentiometer for 8200 frequency inverter

Speed can be preselected through an external potentiometer (setpoint preselection or field frequency preselection).

The setpoint potentiometer is connected to terminals 7, 8 and 9. A scale and a rotary knob are also available.

| Name                   | Order ref.     | Data                 | Dimensions     |
|------------------------|----------------|----------------------|----------------|
| Setpoint potentiometer | ERPD0001k0001W | 1 k $\Omega$ /1 Watt | 6 mm x 35 mm   |
| Rotary knob            | ERZ0001        |                      | 36 mm diameter |
| Scale                  | ERZ0002        | 0...100 %            | 62 mm diameter |



#### Setpoint potentiometer for 9300 vector frequency inverter

Speed can be preselected through an external potentiometer (setpoint preselection or field frequency preselection).

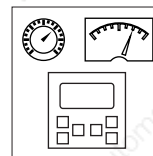
The setpoint potentiometer is connected to terminals 7, 8 and 9. A scale and a rotary knob are also available.

| Name                   | Order ref.     | Data                  | Dimensions     |
|------------------------|----------------|-----------------------|----------------|
| Setpoint potentiometer | ERPD0010k0001W | 10 k $\Omega$ /1 Watt | 6 mm x 35 mm   |
| Rotary knob            | ERZ0001        |                       | 36 mm diameter |
| Scale                  | ERZ0002        | 0...100 %             | 62 mm diameter |



## Design - 8200 and 9300 vector

### Digital display

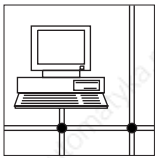


#### Digital display

A voltmeter can be connected to the monitor outputs to display the output frequency or the motor speed.

| Name                      | Type   | Measuring ranges                 | Mounting cut-out | Mounting depth |
|---------------------------|--------|----------------------------------|------------------|----------------|
| Voltmeter<br>3 1/2 digits | EPD203 | 0 - 6 V<br>0 - 20 V<br>0 - 200 V | 91 mm x 22.5 mm  | 81.5 mm        |





## Design - 8200

### Communication with a host system

#### Networking via the RS 232/485 interface

Attachable modules provide an easy way of networking 82XX frequency inverters e.g. with an RS 232 or RS 485 interface on a host system (PLC or PC). The modules are attached in place of the operating module. Three versions are available:

- 2102IBV001: RS 232/485 interface
  - 2102IBV002: RS 485 interface
- The RS 232 and RS 485 interfaces have been designed as 9-pin SUB-D connectors. On the RS 485 interface, there is an additional screw terminal for connecting through to the next drive.
- 2102IBV003: Optical fibres
- Networking via optical fibres (using a plastic core) is completely noise-free and very economical. The optical fibre can be easily adapted through an optical fibre socket at the module. For the host system we offer simple 2125IB plug-on optical fibre adapters which are attached to the interface of the communication module on your PLC.

All three interfaces communicate using the Lenze LECOM protocol. The LECOM protocol is completely open for your own applications. It is however also already integrated in various systems (e.g. Simatic S5), offering a simple option for integration into a control system. Lenze Global Drive Control 1 software can be used for parameter setting.

#### Networking via a system bus (CAN)

The 2171IB and 2172IB system bus modules are slave modules with the communication module to CIA DS 301. These modules can be used to preselect and read out all of the parameters of the drive. Process data can be transmitted directly in conjunction with a small control system.

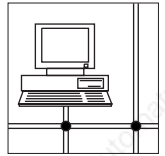
The 2172IB system bus module can be used to preset the data transmission speed and the addressing (via program switches) for the drive controller. This module is particularly useful for servicing applications.

#### Networking via host systems with high processing speeds

- InterBus-S module 2111IB
- The InterBus-S link via the 2111 module is connected directly to the remote bus. The DRIVECOM profile 21 is supported for this connection. A 9-pin SUB-D connector is used for this extremely user-friendly way of networking a drive controller. A 15 V connection for an external power supply to the remote bus is also available on the module.
- Profibus module 2131IB
- The PROFIBUS-DP function module is a slave connection module with the PROFIBUS-DP communication profile. This module can simply be attached in the same way as the other fieldbus module. It is an interesting way of connecting to a process with average process dynamics.







#### Networking via the RS 232/485 interface

Attachable modules provide an easy way of networking 9300 range devices e.g. with an RS 232 or RS 485 interface on a host system (PLC or PC). The modules are attached in place of the operating module. Three versions are available:

- 2102IBV001: RS 232/485 interface
  - 2102IBV002: RS 485 interface
- The RS 232 and RS 485 interfaces have been designed as 9-pin SUB-D connectors. On the RS 485 interface, there is an additional screw terminal for connecting through to the next drive. We recommend the addition of the 2101IB level converter for electrical isolation on the host.
- 2102IBV003: Optical fibres
- Networking via optical fibres (using a plastic core) is completely noise-free and very economical. The optical fibre can be easily adapted through an optical fibre socket at the module. For the host system we offer simple 2125IB plug-on optical fibre adapters which are attached to the interface of the communication module on your PLC.

All three interfaces communicate using the Lenze LECOM protocol. The LECOM protocol is completely open for your own applications. It is however also already integrated in various systems (e.g. Simatic S5), offering a simple option for integration into a control system. Lenze Global Drive Control 3 software can be used for parameter setting.

#### Networking via a system bus (CAN)

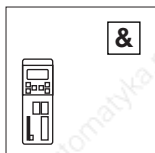
All of the drive controller parameters can be preselected and read out. Process data can be transmitted directly in conjunction with a small control system.

#### Networking via host systems with high processing speeds

- InterBus-S module 2111IB
- The InterBus-S link via the 2111 module is connected directly to the remote bus. The DRIVECOM profile 21 is supported for this connection. A 9-pin SUB-D connector is used for this extremely user-friendly way of networking a drive controller. A 15 V connection for an external power supply to the remote bus is also available on the module.
- Profibus module 2131IB
- The PROFIBUS-DP function module is a slave connection module with the PROFIBUS-DP communication profile. This module can simply be attached in the same way as the other fieldbus module. It is an interesting way of connecting to a process with average process dynamics. An external 24 V power supply can be used to maintain bus operation.





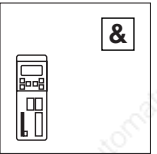


## Design - 8200

### Overview of accessories

#### Accessories for all types

| Name                                        | Order ref.                     |
|---------------------------------------------|--------------------------------|
| 8201BB operating module                     | EMZ8201BB                      |
| Diagnosis terminal (2.5 m cable)            | EMZ8272BB-V001                 |
| Diagnosis terminal (5.0 m cable)            | EMZ8272BB-V002                 |
| Diagnosis terminal (10 m cable)             | EMZ8272BB-V003                 |
| Digital display                             | EPD203                         |
| Setpoint potentiometer                      | ERPD0001k0001W                 |
| Rotary knob for potentiometer               | ERZ0001                        |
| Scale for potentiometer                     | ERZ0002                        |
| RS232/485 fieldbus module                   | EMF2102IB-V001                 |
| RS485 fieldbus module                       | EMF2102IB-V002                 |
| Level converter for RS485                   | EMF2101IB                      |
| PC system cable RS232/485                   | EWL0020                        |
| PC program for Global Drive controller      | ESP-GDC2 (GDCeasy: ESP-GDC2-E) |
| Optical fibre fieldbus module               | EMF2102IB-V003                 |
| Optical fibre adapter for PLC 0...40 m      | EMF2125IB                      |
| Power supply for optical fibre adapter 2125 | EJ0013                         |
| InterBus-S module                           | EMF2111IB                      |
| PROFIBUS module                             | EMF2131IB                      |
| System bus module with addressing           | EMF2172IB                      |
| System bus module (CAN)                     | EMF2171IB                      |
| PTC module                                  | EMZ8274IB                      |
| I/O module                                  | EMZ8275IB                      |
| Monitor module                              | EMZ8276IB                      |
| Bipolar setpoint module                     | EMZ8278IB                      |
| Analog input module                         | EMZ8279IB                      |



### Type-specific accessories 8201 to 8204

| Name<br>Device                                                | Order ref.                   |                              |                              |                               |
|---------------------------------------------------------------|------------------------------|------------------------------|------------------------------|-------------------------------|
|                                                               | 8201                         | 8202                         | 8203                         | 8204                          |
| Automatic circuit-breaker                                     | EFA1C10A                     | EFA1C16A                     | EFA1C20A                     | EFA1C20A                      |
| Fuse                                                          | EFSM-0100ASB                 | EFSM-0150ASB                 | EFSM-0200ASC                 | EFSM-0200ASC                  |
| Fuse holder                                                   | EFH30001                     | EFH30001                     | EFH30001                     | EFH30001                      |
| Mains filter type "A"                                         | EZN2-004A001                 | EZN2-008A001                 | EZN2-013A001                 | EZN2-017A001                  |
| Mains choke                                                   | ELN1-0900H005                | ELN1-0500H009                | ELN1-0350H014                | ELN1-0160H017                 |
| RFI filter for operation with mains choke without mains choke | EZF1-006A002<br>EZF1-006A002 | EZF1-009A002<br>EZF1-009A002 | EZF1-018A002<br>EZF1-018A002 | EZF1-018A002<br>Not permitted |
| Motor filter                                                  | ELM3-030H003                 | ELM3-020H004                 | ELM3-010H010                 | ELM3-014H010                  |
| Sinusoidal filter                                             | EZS3-003A001                 | EZS3-004A002                 | EZS3-007A001                 | EZS3-010A001                  |
| Brake module                                                  | EMB8251-E                    | EMB8251-E                    | EMB8251-E                    | EMB8251-E                     |
| Swivel wall fastening                                         | EJ0001                       | EJ0001                       | EJ0001                       | EJ0002                        |
| DIN rail mounting                                             | EJ0002                       | EJ0002                       | EJ0002                       | EJ0002                        |
| Fan for surface mounting                                      | EJ0003                       | EJ0003                       | EJ0003                       | EJ0003                        |
| Current limiting module                                       | EMZ8201AB                    | EMZ8201AB                    | EMZ8203AB                    | EMZ8203AB                     |



## Design - 8200

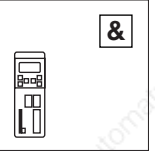
### Overview of accessories

#### Type-specific accessories 8211 to 8218 at 150% overload

| Name                                                                 | Order ref.                   |                              |                              |                               |
|----------------------------------------------------------------------|------------------------------|------------------------------|------------------------------|-------------------------------|
| Device                                                               | 8211                         | 8212                         | 8213                         | 8214                          |
| Automatic circuit-breaker*                                           | EFA3B06A                     | EFA3B06A                     | EFA3B10A                     | EFA3B10A                      |
| Fuse                                                                 | EFSM-0060AWE                 | EFSM-0060AWE                 | EFSM-0100AWE                 | EFSM-0100AWE                  |
| Fuse holder                                                          | EFH10001                     | EFH10001                     | EFH10001                     | EFH10001                      |
| Mains filter type B                                                  | EZN3B1500H003                | EZN3B0800H004                | EZN3B0750H005                | EZN3B0500H007                 |
| Mains choke                                                          | ELN3-0700H003                | ELN3-0450H004                | ELN3-0350H006                | ELN3-0250H007                 |
| RFI filter* for operation<br>with mains choke<br>without mains choke | EZF3-008A003<br>EZF3-008A003 | EZF3-008A003<br>EZF3-008A003 | EZF3-008A003<br>EZF3-008A003 | EZF3-008A003<br>Not permitted |
| Motor filter                                                         | ELM3-030H004                 | ELM3-030H004                 | ELM3-014H010                 | ELM3-014H010                  |
| Sinusoidal filter                                                    | EZS3-002A001                 | EZS3-004A002                 | EZS3-006A001                 | EZS3-007A001                  |
| Brake module                                                         | EMB8252-E                    | EMB8252-E                    | EMB8252-E                    | EMB8252-E                     |
| Brake chopper                                                        | EMB8253-E                    | EMB8253-E                    | EMB8253-E                    | EMB8253-E                     |
| Brake resistor                                                       | ERBM470R100W                 | ERBM370R150W                 | ERBM240R200W                 | ERBD180R300W                  |
| Swivel wall<br>fastening                                             | EJ0001                       | EJ0001                       | EJ0001                       | EJ0001                        |
| DIN rail<br>mounting                                                 | EJ0002                       | EJ0002                       | EJ0002                       | EJ0002                        |

| Name                                                                   | Order ref.                   |                              |                              |                               |
|------------------------------------------------------------------------|------------------------------|------------------------------|------------------------------|-------------------------------|
| Device                                                                 | 8215                         | 8216                         | 8217                         | 8218                          |
| Automatic circuit-breaker*                                             | EFA3B13A                     | EFA3B20A                     | EFA3B25A                     | EFA3B32A                      |
| Fuse                                                                   | EFSM-0160AWE                 | EFSM-0200AWE                 | EFSM-0250AXH                 | EFSM-0320AWH                  |
| Fuse holder                                                            | EFH10001                     | EFH10001                     | EFH10002                     | EFH10002                      |
| Mains filter type B                                                    | EZN3B0400H009                | EZN3B0300H013                | EZN3B0250H015                | EZN3B0150H024                 |
| Mains choke                                                            | ELN3-0160H012                | ELN3-0160H012                | ELN3-0120H017                | ELN3-0120H025                 |
| RFI filter* for<br>operation<br>with mains choke<br>without mainschoke | EZF3-016A003<br>EZF3-016A003 | EZF3-016A003<br>EZF3-024A001 | EZF3-016A003<br>EZF3-024A001 | EZF3-024A001<br>Not permitted |
| Motor filter                                                           | ELM3-014H010                 | ELM3-007H025                 | ELM3-007H025                 | ELM3-007H025                  |
| Sinusoidal filter                                                      | EZS3-010A002                 | EZS3-013A001                 | EZS3-017A001                 | EZS3-024A001                  |
| Brake module                                                           | EMB8252-E                    | EMB8252-E                    | EMB8252-E                    | EMB8252-E                     |
| Brake chopper                                                          | EMB8253-E                    | EMB8253-E                    | EMB8253-E                    | EMB8253-E                     |
| Brake resistor                                                         | ERBD100R600W                 | ERBD082R600W                 | ERBD068R800W                 | ERBD047R01k2                  |
| Thermal separation<br>("push-through<br>technology")                   | EJ0004                       | EJ0004                       | EJ0004                       | EJ0004                        |
| Heatsink with<br>mounting kit only for<br>version V003                 | EJ0005                       | EJ0005                       | EJ0005                       | EJ0005                        |

\* Operation at 400 V mains voltage

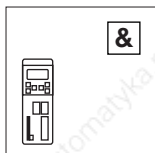


### Type-specific accessories 8211 to 8218 at 120% overload

| Name                                       | Order ref.    |               |               |               |
|--------------------------------------------|---------------|---------------|---------------|---------------|
| Device                                     | 8211          | 8212          | 8213          | 8214          |
| Automatic circuit-breaker*                 | EFA3B06A      | EFA3B06A      | EFA3B10A      | EFA3B10A      |
| Fuse                                       | EFSM-0060AWE  | EFSM-0060AWE  | EFSM-0100AWE  | EFSM-0100AWE  |
| Fuse holder                                | EFH10001      | EFH10001      | EFH10001      | EFH10001      |
| Mains filter type B                        | EZN3B0900H004 | EZN3B0900H004 | EZN3B0350H007 | EZN3B0350H007 |
| Mains choke                                | ELN3-0450H004 | ELN3-0450H004 | ELN3-0250H007 | ELN3-0250H007 |
| RFI filter* for operation with mains choke | EZF3-008A003  | EZF3-008A003  | EZF3-008A003  | EZF3-008A003  |
| Motor filter                               | ELM3-030H004  | ELM3-030H004  | ELM3-014H010  | ELM3-014H010  |
| Sinusoidal filter                          | EZS3-004A002  | EZS3-004A002  | EZS3-007A001  | EZS3-007A001  |
| Brake module                               | EMB8252-E     | EMB8252-E     | EMB8252-E     | EMB8252-E     |
| Brake chopper                              | EMB8253-E     | EMB8253-E     | EMB8253-E     | EMB8253-E     |
| Brake resistor                             | ERBM470R100W  | ERBM370R150W  | ERBM240R200W  | ERBD180R300W  |
| Swivel wall fastening                      | EJ0001        | EJ0001        | EJ0001        | EJ0001        |
| DIN rail mounting                          | EJ0002        | EJ0002        | EJ0002        | EJ0002        |

| Name                                             | Order ref.    |               |               |               |
|--------------------------------------------------|---------------|---------------|---------------|---------------|
| Device                                           | 8215          | 8216          | 8217          | 8218          |
| Automatic circuit-breaker*                       | EFA3B20A      | EFA3B20A      | EFA3B32A      | EFA3B32A      |
| Fuse                                             | EFSM-0200AWE  | EFSM-0200AWE  | EFSM-0320AWH  | EFSM-0320AWH  |
| Fuse holder                                      | EFH10001      | EFH10001      | EFH10002      | EFH10002      |
| Mains filter type B                              | EZN3B0300H013 | EZN3B0300H013 | EZN3B0120H021 | EZN3B0150H024 |
| Mains choke                                      | ELN3-0160H012 | ELN3-0160H012 | ELN3-0120H025 | ELN3-0120H025 |
| RFI filter* for operation with mains choke       | EZF3-016A003  | EZF3-016A003  | EZF3-024A001  | EZF3-024A001  |
| Motor filter                                     | ELM3-007H025  | ELM3-007H025  | ELM3-007H025  | ELM3-007H025  |
| Sinusoidal filter                                | EZS3-013A001  | EZS3-013A001  | EZS3-024A001  | EZS3-024A001  |
| Brake module                                     | EMB8252-E     | EMB8252-E     | EMB8252-E     | EMB8252-E     |
| Brake chopper                                    | EMB8253-E     | EMB8253-E     | EMB8253-E     | EMB8253-E     |
| Brake resistor                                   | ERBD100R600W  | ERBD082R600W  | ERBD068R800W  | ERBD047R01k2  |
| Thermal separation ("push-through technology")   | EJ0004        | EJ0004        | EJ0004        | EJ0004        |
| Heatsink with mounting kit only for version V003 | EJ0005        | EJ0005        | EJ0005        | EJ0005        |

\* Operation at 400 V mains voltage



## Design - 8200

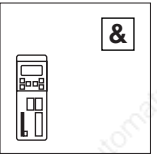
### Overview of accessories

#### Type-specific accessories 8241 to 8246 at 150% overload

| Name                                         | Order ref.    |               |               |               |
|----------------------------------------------|---------------|---------------|---------------|---------------|
| Device                                       | 8241          | 8242          | 8243          | 8244          |
| Automatic circuit breaker*                   | EFA3B06A      | EFA3B06A      | EFA3B10A      | EFA3B10A      |
| Fuse                                         | EFSM-0060AWE  | EFSM-0060AWE  | EFSM-0100AWE  | EFSM-0100AWE  |
| Fuse holder                                  | EFH10001      | EFH10001      | EFH10001      | EFH10001      |
| Mains filter type A                          | EZN3A2400H002 | EZN3A1500H003 | EZN3A0900H004 | EZN3A0500H007 |
| Mains filter type B                          | EZN3B2400H002 | EZN3B1500H003 | EZN3B0900H004 | EZN3B0500H007 |
| Motor filter                                 | ELM3-030H004  | ELM3-030H004  | ELM3-003H004  | ELM3-014H010  |
| Sinusoidal filter                            | EZS3-002A001  | EZS3-002A001  | EZS3-004A002  | EZS3-007A001  |
| Brake module                                 | EMB9351-E     | EMB9351-E     | EMB9351-E     | EMB9351-E     |
| Brake chopper                                | EMB9352-E     | EMB9352-E     | EMB9352-E     | EMB9352-E     |
| Brake resistor                               | ERBM470R050W  | ERBM470R100W  | ERBM370R150W  | ERBD180R300W  |
| Thermal separation (push-through technology) | EJ0036        | EJ0036        | EJ0037        | EJ0037        |

| Name                                         | Order ref.    |               |  |  |
|----------------------------------------------|---------------|---------------|--|--|
| Device                                       | 8245          | 8246          |  |  |
| Automatic circuit breaker*                   | EFA3B20A      | EFA3B32A      |  |  |
| Fuse                                         | EFSM-0200AWE  | EFSM-0320AWH  |  |  |
| Fuse holder                                  | EFH10001      | EFH10002      |  |  |
| Mains filter type A                          | EZN3A0300H013 | EZN3B0300H013 |  |  |
| Mains filter type B                          | EZN3B0300H013 | ELN3-0160H012 |  |  |
| Motor filter                                 | ELM3-007H025  | ELM3-007H025  |  |  |
| Sinusoidal filter                            | EZS3-013A001  | EZS3-024A001  |  |  |
| Brake module                                 | EMB9351-E     | EMB9351-E     |  |  |
| Brake chopper                                | EMB9352-E     | EMB9352-E     |  |  |
| Brake resistor                               | ERBD100R600W  | ERBD047R01k2  |  |  |
| Thermal separation (push-through technology) | EJ0038        | EJ0038        |  |  |

\* Operation at 400 V mains voltage



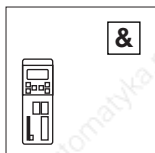
### Type-specific accessories 8241 to 8246 at 120% overload

| Name                                         | Order ref.    |               |               |               |
|----------------------------------------------|---------------|---------------|---------------|---------------|
| Device                                       | 8241          | 8242          | 8243          | 8244          |
| Automatic circuit breaker*                   | EFA3B06A      | EFA3B10A      | EFA3B10A      | EFA3B13A      |
| Fuse                                         | EFSM-0060AWE  | EFSM-0100AWE  | EFSM-0100AWE  | EFSM-0160AWE  |
| Fuse holder                                  | EFH10001      | EFH10001      | EFH10001      | EFH10001      |
| Mains filter type A                          | EZN3A2400H002 | EZN3A1500H003 | EZN3A0750H005 | EZN3A0400H009 |
| Mains filter type B                          | EZN3B2400H002 | EZN3B1500H003 | EZN3B0750H005 | EZN3B0400H009 |
| Motor filter                                 | ELM3-030H004  | ELM3-014H010  | ELM3-014H010  | ELM3-014H010  |
| Sinusoidal filter                            | EZS3-002A001  | EZS3-004A002  | EZS3-006A001  | EZS3-008A001  |
| Brake module                                 | EMB9351-E     | EMB9351-E     | EMB9351-E     | EMB9351-E     |
| Brake chopper                                | EMB9352-E     | EMB9352-E     | EMB9352-E     | EMB9352-E     |
| Brake resistor                               | ERBM470R050W  | ERBM470R100W  | ERBM370R150W  | ERBD180R300W  |
| Thermal separation (push-through technology) | EJ0036        | EJ0037        | EJ0037        | EJ0037        |

| Name                                         | Order ref.    |               |  |  |
|----------------------------------------------|---------------|---------------|--|--|
| Device                                       | 8245          | 8246          |  |  |
| Automatic circuit breaker*                   | EFA3B20A      | EFA3B32A      |  |  |
| Fuse                                         | EFSM-0200AWE  | EFSM-0320AWH  |  |  |
| Fuse holder                                  | EFH10001      | EFH10002      |  |  |
| Mains filter type A                          | EZN3A0300H013 | EZN3A0150H024 |  |  |
| Mains filter type B                          | EZN3B0250H015 | ELN3B0150H024 |  |  |
| Motor filter                                 | ELM3-0150H024 | ELM3-0150H024 |  |  |
| Sinusoidal filter                            | EZS3-017A001  | EZS3-024A001  |  |  |
| Brake module                                 | EMB9351-E     | EMB9351-E     |  |  |
| Brake chopper                                | EMB9352-E     | EMB9352-E     |  |  |
| Brake resistor                               | ERBD100R600W  | ERBD047R01k2  |  |  |
| Thermal separation (push-through technology) | EJ0038        | EJ0038        |  |  |

\* Operation at 400 V mains voltage





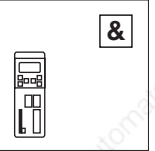
## Design - 8200

### Overview of accessories

#### Type-specific accessories 8221 to 8227 at 150% overload

| Name                | Order ref.    |               |               |                    |
|---------------------|---------------|---------------|---------------|--------------------|
| Device              | 8221          | 8222          | 8223          | 8224               |
| Mains filter type A | EZN3A0110H030 | EZN3A0080H042 | EZN3A0055H060 | EZN3A0037H090      |
| Mains filter type B | EZN3B0110H030 | EZN3B0080H042 | EZN3B0055H060 | EZN3B0037H090      |
| Mains choke         | ELN3-088H035  | ELN3-0075H045 | ELN3-0055H055 | ELN3-0038H085      |
| Motor filter        | ELM3-004H055  | ELM3-004H055  | on request    | on request         |
| Sinusoidal filter   | on request    | on request    | on request    | on request         |
| Brake module        | EMB9351-E     | EMB9351-E     | EMB9351-E     | EMB9351-E          |
| Brake chopper       | EMB9352-E     | EMB9352-E     | EMB9352-E     | EMB9352-E (2 x)    |
| Brake resistor      | ERBD033R02k0  | ERBD022R03k0  | ERBD018R03k0  | ERBD022R03k0 (2 x) |
| Thermal separation  | EJ0011        | EJ0011        | EJ0011        | EJ0010             |

| Name                | Order ref.         |                    |                    |
|---------------------|--------------------|--------------------|--------------------|
| Device              | 8225               | 8226               | 8227               |
| Mains filter type A | EZN3A0030H110      | EZN3A0022H150      | EZN3A0017H200      |
| Mains filter type B | EZN3B0030H110      | EZN3B0022H150      | EZN3B0017H200      |
| Mains choke         | ELN3-0027H105      | ELN3-0022H130      | ELN3-0017H170      |
| Motor filter        | on request         | on request         | on request         |
| Sinusoidal filter   | on request         | on request         | on request         |
| Brake module        | EMB9351-E          | EMB9351-E          | EMB9351-E          |
| Brake chopper       | EMB9352-E (2 x)    | EMB9352-E (3 x)    | EMB9352-E (3 x)    |
| Brake resistor      | ERBD018R03k0 (2 x) | ERBD022R03k0 (3 x) | ERBD018R03k0 (3 x) |
| Thermal separation  | EJ0010             | EJ0009             | EJ0009             |


**Type-specific accessories 8221 to 8227 at 120% overload**

| Name                | Order ref.    |               |                    |                    |
|---------------------|---------------|---------------|--------------------|--------------------|
| Device              | 8221          | 8222          | 8223               | 8224               |
| Mains filter type A | EZN3A0080H042 | EZN3A0060H054 | EZN3A0055H060      | EZN3A0030H110      |
| Mains filter type B | EZN3B0080H042 | EZN3B0060H054 | EZN3B0055H060      | EZN3B0030H110      |
| Mains choke         | ELN3-0075H045 | ELN3-0055H055 | ELN3-0055H055      | ELN3-0027H105      |
| Motor filter        | ELM3-004H055  | on request    | on request         | on request         |
| Sinusoidal filter   | on request    | on request    | on request         | on request         |
| Brake module        | EMB9351-E     | EMB9351-E     | EMB9351-E          | EMB9351-E          |
| Brake chopper       | EMB9352-E     | EMB9352-E     | EMB9352-E (2 x)    | EMB9352-E (2 x)    |
| Brake resistor      | ERBD033R02k0  | ERBD022R03k0  | ERBD018R03k0 (2 x) | ERBD022R03k0 (2 x) |
| Thermal separation  | EJ0011        | EJ0011        | EJ0011             | EJ0010             |

| Name                | Order ref.         |                    |                    |
|---------------------|--------------------|--------------------|--------------------|
| Device              | 8225               | 8226               | 8227               |
| Mains filter type A | EZN3A0030H110      | EZN3A0022H150      | EZN3A0017H200      |
| Mains filter type B | EZN3B0030H110      | EZN3B0022H150      | EZN3B0017H200      |
| Mains choke         | ELN3-0022H130      | ELN3-0017H170      | ELN3-0014H200      |
| Motor filter        | on request         | on request         | on request         |
| Sinusoidal filter   | on request         | on request         | on request         |
| Brake module        | EMB9351-E          | EMB9351-E          | EMB9351-E          |
| Brake chopper       | EMB9352-E (2 x)    | EMB9352-E (3 x)    | EMB9352-E (3 x)    |
| Brake resistor      | ERBD018R03k0 (2 x) | ERBD022R03k0 (3 x) | ERBD018R03k0 (3 x) |
| Thermal separation  | EJ0010             | EJ0009             | EJ0009             |

**Type-specific accessories 9341-9343**

| Name                                         | Order ref.   |               |               |
|----------------------------------------------|--------------|---------------|---------------|
| Device                                       | 9341         | 9342          | 9343          |
| Mains filter type A                          | EZN3A120H012 | EZN3A0088H024 | EZN3A0055H045 |
| Thermal separation (push-through technology) | EJ0038       | EJ0038        | EJ0011        |



## Design - 9300 vector

### Overview of accessories

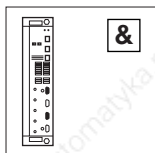
| Accessories           | Designation                                                                          | Order ref.                                                                                                                                                                                                                                                                    |
|-----------------------|--------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Communication modules | LECOM-LI (optical fibres)                                                            | EMF2102IB-V003                                                                                                                                                                                                                                                                |
|                       | LECOM-B (RS485)                                                                      | EMF2102IB-V002                                                                                                                                                                                                                                                                |
|                       | LECOM-A/B (RS232/485)                                                                | EMF2102IB-V001                                                                                                                                                                                                                                                                |
|                       | LON                                                                                  | EMF2141IB                                                                                                                                                                                                                                                                     |
|                       | INTERBUS                                                                             | EMF2113IB                                                                                                                                                                                                                                                                     |
|                       | INTERBUS Loop                                                                        | EMF2112IB                                                                                                                                                                                                                                                                     |
|                       | PROFIBUS-DP                                                                          | EMF2133IB                                                                                                                                                                                                                                                                     |
|                       | DeviceNet/CANopen                                                                    | EMF2175IB                                                                                                                                                                                                                                                                     |
|                       | Keypad XT operating module                                                           | EMZ9371BC                                                                                                                                                                                                                                                                     |
|                       | Diagnosis terminal (hand-held Keypad XT, IP20 <sup>1)</sup> )                        | E82ZBBXC                                                                                                                                                                                                                                                                      |
| Miscellaneous         | Connection cable                                                                     | 2.5 m<br>5 m<br>10 m<br>E82ZWL025<br>E82ZWL050<br>E82ZWL100                                                                                                                                                                                                                   |
|                       | “Global Drive Control” (GDC) parameter setting/operating software                    | ESP-GDC2                                                                                                                                                                                                                                                                      |
|                       | PC system bus converter<br>(voltage supply via DIN connection)                       | EMF2173IB                                                                                                                                                                                                                                                                     |
|                       | PC system bus converter<br>(voltage supply via PS2 connection)                       | EMF2173IB-V002                                                                                                                                                                                                                                                                |
|                       | PC system bus converter<br>(voltage supply via PS2 connection; electrical isolation) | EMF2173IB-V003                                                                                                                                                                                                                                                                |
|                       | PC system bus converter USB                                                          | EMF2177IB                                                                                                                                                                                                                                                                     |
|                       | PC system cable RS232                                                                | 5 m<br>10 m<br>EWL0020<br>EWL0021                                                                                                                                                                                                                                             |
|                       | Optical fibre adapter (normal transmission rating)                                   | EMF2125IB                                                                                                                                                                                                                                                                     |
|                       | Optical fibre adapter (high transmission rating)                                     | EMF2126IB                                                                                                                                                                                                                                                                     |
|                       | Power supply for optical fibre adapter                                               | EJ0013                                                                                                                                                                                                                                                                        |
|                       | Optical fibre, 1-wire, black PE sleeve (simple protection), sold by the metre        | EWZ0007                                                                                                                                                                                                                                                                       |
|                       | Optical fibre, 1-wire, red PUR sleeve (reinforced protection), sold by the metre     | EWZ0006                                                                                                                                                                                                                                                                       |
|                       | Setpoint potentiometer                                                               | ERPD0010K0001W                                                                                                                                                                                                                                                                |
|                       | Rotary knob for setpoint potentiometer                                               | ERZ0001                                                                                                                                                                                                                                                                       |
|                       | Scale for setpoint potentiometer                                                     | ERZ0002                                                                                                                                                                                                                                                                       |
|                       | Digital display                                                                      | EPD203                                                                                                                                                                                                                                                                        |
|                       | Encoder cable                                                                        | 2.5 m<br>5.0 m<br>10.0 m<br>15.0 m<br>20.0 m<br>25.0 m<br>30.0 m<br>35.0 m<br>40.0 m<br>45.0 m<br>50.0 m<br>EWLE002GX-T<br>EWLE005GX-T<br>EWLE010GX-T<br>EWLE015GX-T<br>EWLE020GX-T<br>EWLE025GX-T<br>EWLE030GX-T<br>EWLE035GX-T<br>EWLE040GX-T<br>EWLE045GX-T<br>EWLE050GX-T |
|                       | Connection cable for a master frequency connection (2.5 m)                           | EWLD002GGBS93                                                                                                                                                                                                                                                                 |

<sup>1)</sup> Additional connection cable required



| Accessories                                  | Designation | Order ref. |
|----------------------------------------------|-------------|------------|
| Communication manual CAN <sup>1)</sup>       | German      | EDSCAN     |
|                                              | English     |            |
|                                              | French      |            |
| Communication manual INTERBUS <sup>1)</sup>  | German      | EDSIBUS    |
|                                              | English     |            |
|                                              | French      |            |
| Communication manual PROFIBUS <sup>1)</sup>  | German      | EDSPBUS    |
|                                              | English     |            |
|                                              | French      |            |
| Communication manual LECOM <sup>1)</sup>     | German      | EDSLECOM   |
|                                              | English     |            |
|                                              | French      |            |
| Communication manual DeviceNet <sup>1)</sup> | German      | EDSDEN     |
|                                              | English     |            |
|                                              | French      |            |

<sup>1)</sup> Please specify the required language when ordering documentation.



## Design - 9300 vector

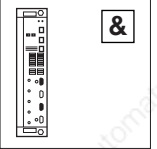
### Overview of accessories

#### Type-specific accessories 9321EV to 9326EV at 120% overload

| Name                                         | Order ref.    |               |               |               |
|----------------------------------------------|---------------|---------------|---------------|---------------|
| Device                                       | EVF9321EV     | EVF9322EV     | EVF9323EV     | EVF9324EV     |
| Automatic circuit breaker*                   | EFA3B06A      | EFA3B06A      | EFA3B10A      | EFA3B13A      |
| Fuse                                         | EFSM-0060AWE  | EFSM-0060AWE  | EFSM-0100AWE  | EFSM-0160AWE  |
| Fuse holder                                  | EFH10001      | EFH10001      | EFH10001      | EFH10001      |
| Mains filter type A                          | EZN3A2400H002 | EZN3A1500H003 | EZN3A0750H005 | EZN3A0400H009 |
| Mains filter type B                          | EZN3B2400H002 | EZN3B1500H003 | EZN3B0750H005 | EZN3B0400H009 |
| Motor filter                                 | ELM3-030H004  | ELM3-030H004  | ELM3-014H010  | ELM3-007H025  |
| Sinusoidal filter                            | EZS3-002A001  | EZS3-004A002  | EZS3-006A001  | EZS3-009A002  |
| Brake module                                 | EMB9351-E     | EMB9351-E     | EMB9351-E     | EMB9351-E     |
| Brake chopper                                | EMB9352-E     | EMB9352-E     | EMB9352-E     | EMB9352-E     |
| Brake resistor                               | ERBM470R050W  | ERBM470R100W  | ERBM370R150W  | ERBD180R300W  |
| Thermal separation (push-through technology) | EJ0036        | EJ0037        | EJ0037        | EJ0037        |

| Name                                         | Order ref.    |               |  |  |
|----------------------------------------------|---------------|---------------|--|--|
| Device                                       | EVF9325EV     | EVF9326EV     |  |  |
| Automatic circuit breaker*                   | EFA3B20A      | EFA3B32A      |  |  |
| Fuse                                         | EFSM-0200AWE  | EFSM-0320AWH  |  |  |
| Fuse holder                                  | EFH10001      | EFH10002      |  |  |
| Mains filter type A                          | EZN3A0300H013 | EZN3A0150H024 |  |  |
| Mains filter type B                          | EZN3B0250H015 | EZN3B0150H024 |  |  |
| Motor filter                                 | ELM3-007H025  | ELM3-007H025  |  |  |
| Sinusoidal filter                            | EZS3-017A001  | EZS3-024A001  |  |  |
| Brake module                                 | EMB9351-E     | EMB9351-E     |  |  |
| Brake chopper                                | EMB9352-E     | EMB9352-E     |  |  |
| Brake resistor                               | ERBD100R600W  | ERBD047R01k2  |  |  |
| Thermal separation (push-through technology) | EJ0038        | EJ0038        |  |  |

\* Operation at 400 V mains voltage



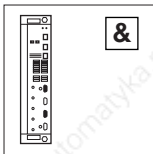
### Type-specific accessories 9321 to 9326 at 150% overload

| Name                                         | Order ref.    |               |               |               |
|----------------------------------------------|---------------|---------------|---------------|---------------|
| Device                                       | EVF9321EV     | EVF9322EV     | EVF9323EV     | EVF9324EV     |
| Automatic circuit breaker*                   | EFA3B06A      | EFA3B06A      | EFA3B10A      | EFA3B10A      |
| Fuse                                         | EFSM-0060AWE  | EFSM-0060AWE  | EFSM-0100AWE  | EFSM-0100AWE  |
| Fuse holder                                  | EFH10001      | EFH10001      | EFH10001      | EFH10001      |
| Mains filter type A                          | EZN3A2400H002 | EZN3A1500H003 | EZN3A0900H004 | EZN3A0500H007 |
| Mains filter type B                          | EZN3B2400H002 | EZN3B1500H003 | EZN3B0900H004 | EZN3B0500H007 |
| Motor filter                                 | ELM3-030H004  | ELM3-030H004  | ELM3-030H004  | ELM3-014H010  |
| Sinusoidal filter                            | EZS3-002A001  | EZS3-002A001  | EZS3-004A002  | EZS3-007A002  |
| Brake module                                 | EMB9351-E     | EMB9351-E     | EMB9351-E     | EMB9351-E     |
| Brake chopper                                | EMB9352-E     | EMB9352-E     | EMB9352-E     | EMB9352-E     |
| Brake resistor                               | ERBM470R050W  | ERBM470R100W  | ERBM370R150W  | ERBD180R300W  |
| Thermal separation (push-through technology) | EJ0036        | EJ0036        | EJ0037        | EJ0037        |

| Name                                         | Order ref.    |               |  |  |
|----------------------------------------------|---------------|---------------|--|--|
| Device                                       | EVF9325EV     | EVF9326EV     |  |  |
| Automatic circuit breaker*                   | EFA3B20A      | EFA3B32A      |  |  |
| Fuse                                         | EFSM-0200AWE  | EFSM-0320AWH  |  |  |
| Fuse holder                                  | EFH10002      | EFH10002      |  |  |
| Mains filter type A                          | EZN3A0300H013 | EZN3A0150H024 |  |  |
| Mains filter type B                          | EZN3B0300H013 | EZN3B0150H024 |  |  |
| Motor filter                                 | ELM3-007H025  | ELM3-007H025  |  |  |
| Sinusoidal filter                            | EZS3-013A001  | EZS3-024A001  |  |  |
| Brake module                                 | EMB9351-E     | EMB9351-E     |  |  |
| Brake chopper                                | EMB9352-E     | EMB9352-E     |  |  |
| Brake resistor                               | ERBD100R600W  | ERBD047R01k2  |  |  |
| Thermal separation (push-through technology) | EJ0038        | EJ0038        |  |  |

\* Operation at 400 V mains voltage





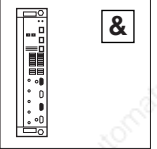
## Design - 9300 vector

### Overview of accessories

#### Type-specific accessories 9327EV to 9333EV at 150% overload

| Name                | Order ref.    |               |               |                    |
|---------------------|---------------|---------------|---------------|--------------------|
| Device              | EVF9327EV     | EVF9328EV     | EVF9329EV     | EVF9330EV          |
| Mains filter type A | EZN3A0110H030 | EZN3A0080H042 | EZN3A0055H060 | EZN3A0037H090      |
| Mains filter type B | EZN3B0110H030 | EZN3B0080H042 | EZN3B0055H060 | EZN3B0037H090      |
| Mains choke         | ELN3-0088H035 | ELN3-0075H045 | ELN3-0055H055 | ELN3-0038H085      |
| Motor filter        | ELM3-004H055  | ELM3-004H055  | on request    | on request         |
| Sinusoidal filter   | on request    | on request    | on request    | on request         |
| Brake module        | EMB9351-E     | EMB9351-E     | EMB9351-E     | EMB9351-E          |
| Brake chopper       | EMB9352-E     | EMB9352-E     | EMB9352-E     | EMB9352-E (2 x)    |
| Brake resistor      | ERBD033R02k0  | ERBD022R03k0  | ERBD018R03k0  | ERBD022R03k0 (2 x) |
| Thermal separation  | EJ0011        | EJ0011        | EJ0011        | EJ0010             |

| Name                | Order ref.         |                    |                    |
|---------------------|--------------------|--------------------|--------------------|
| Device              | EVF9331EV          | EVF9332EV          | EVF9333EV          |
| Mains filter type A | EZN3A0030H110      | EZN3A0022H150      | EZN3A0017H200      |
| Mains filter type B | EZN3B0030H110      | EZN3B0022H150      | EZN3B0017H200      |
| Mains choke         | ELN3-0027H105      | ELN3-0022H130      | ELN3-0017H170      |
| Motor filter        | on request         | on request         | on request         |
| Sinusoidal filter   | on request         | on request         | on request         |
| Brake module        | EMB9351-E          | EMB9351-E          | EMB9351-E          |
| Brake chopper       | EMB9352-E (2 x)    | EMB9352-E (3 x)    | EMB9352-E (3 x)    |
| Brake resistor      | ERBD018R03k0 (2 x) | ERBD022R03k0 (3 x) | ERBD018R03k0 (3 x) |
| Thermal separation  | EJ0010             | EJ0009             | EJ0009             |



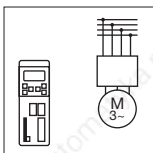
### Type-specific accessories 9327 to 9333 at 120% overload

| Name                | Order ref.    |               |                    |                    |
|---------------------|---------------|---------------|--------------------|--------------------|
| Device              | EVF9327EV     | EVF9328EV     | EVF9329EV          | EVF9330EV          |
| Mains filter type A | EZN3A0080A042 | EZN3A0060A054 | EZN3A0055H060      | EZN3A0030H110      |
| Mains filter type B | EZN3B0080A042 | EZN3B0055A060 | EZN3B0055H060      | EZN3B0030H110      |
| Mains choke         | ELN3-0075H045 | ELN3-0055H055 | ELN3-0055H055      | ELN3-0027H105      |
| Motor filter        | ELM3-004H055  | on request    | on request         | on request         |
| Sinusoidal filter   | on request    | on request    | on request         | on request         |
| Brake module        | EMB9351-E     | EMB9351-E     | EMB9351-E          | EMB9351-E          |
| Brake chopper       | EMB9352-E     | EMB9352-E     | EMB9352-E (2 x)    | EMB9352-E (2 x)    |
| Brake resistor      | ERBD033R02k0  | ERBD022R03k0  | ERBD018R03k0 (2 x) | ERBD022R03k0 (2 x) |
| Thermal separation  | EJ0011        | EJ0011        | EJ0011             | EJ0010             |

| Name                | Order ref.         |                    |                    |
|---------------------|--------------------|--------------------|--------------------|
| Device              | EVF9331EV          | EVF9332EV          | EVF9333EV          |
| Mains filter type A | EZN3A0030H110      | EZN3A0022H150      | EZN3A0017H200      |
| Mains filter type B | EZN3B0030H110      | EZN3B0022H150      | EZN3B0017H200      |
| Mains choke         | ELN3-0022H130      | ELN3-0017H170      | ELN3-0014H200      |
| Motor filter        | on request         | on request         | on request         |
| Sinusoidal filter   | on request         | on request         | on request         |
| Brake module        | EMB9351-E          | EMB9351-E          | EMB9351-E          |
| Brake chopper       | EMB9352-E (2 x)    | EMB9352-E (3 x)    | EMB9352-E (3 x)    |
| Brake resistor      | ERBD018R03k0 (2 x) | ERBD022R03k0 (3 x) | ERBD018R03k0 (3 x) |
| Thermal separation  | EJ0010             | EJ0009             | EJ0009             |

### Type-specific accessories 9341-9343

| Name                                         | Order ref.   |               |               |
|----------------------------------------------|--------------|---------------|---------------|
| Device                                       | 9341         | 9342          | 9343          |
| Mains filter type A                          | EZN3A120H012 | EZN3A0088H024 | EZN3A0055H045 |
| Thermal separation (push-through technology) | EJ0038       | EJ0038        | EJ0011        |

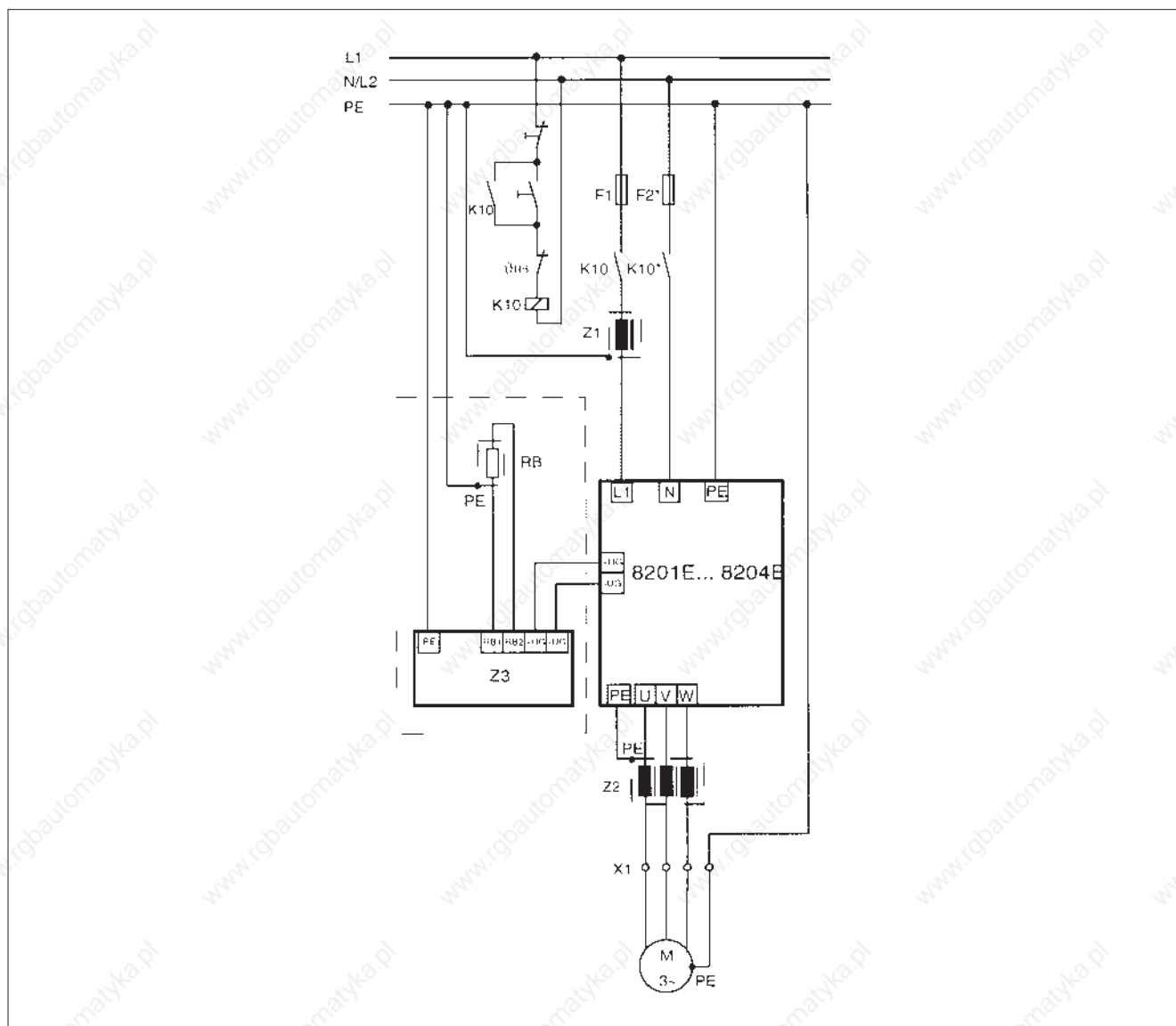


## Application examples

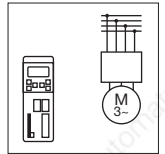
### Connecting diagrams

#### Power connection – 820XE frequency inverter

Connection to single-phase mains 1 x 220 ... 230 V

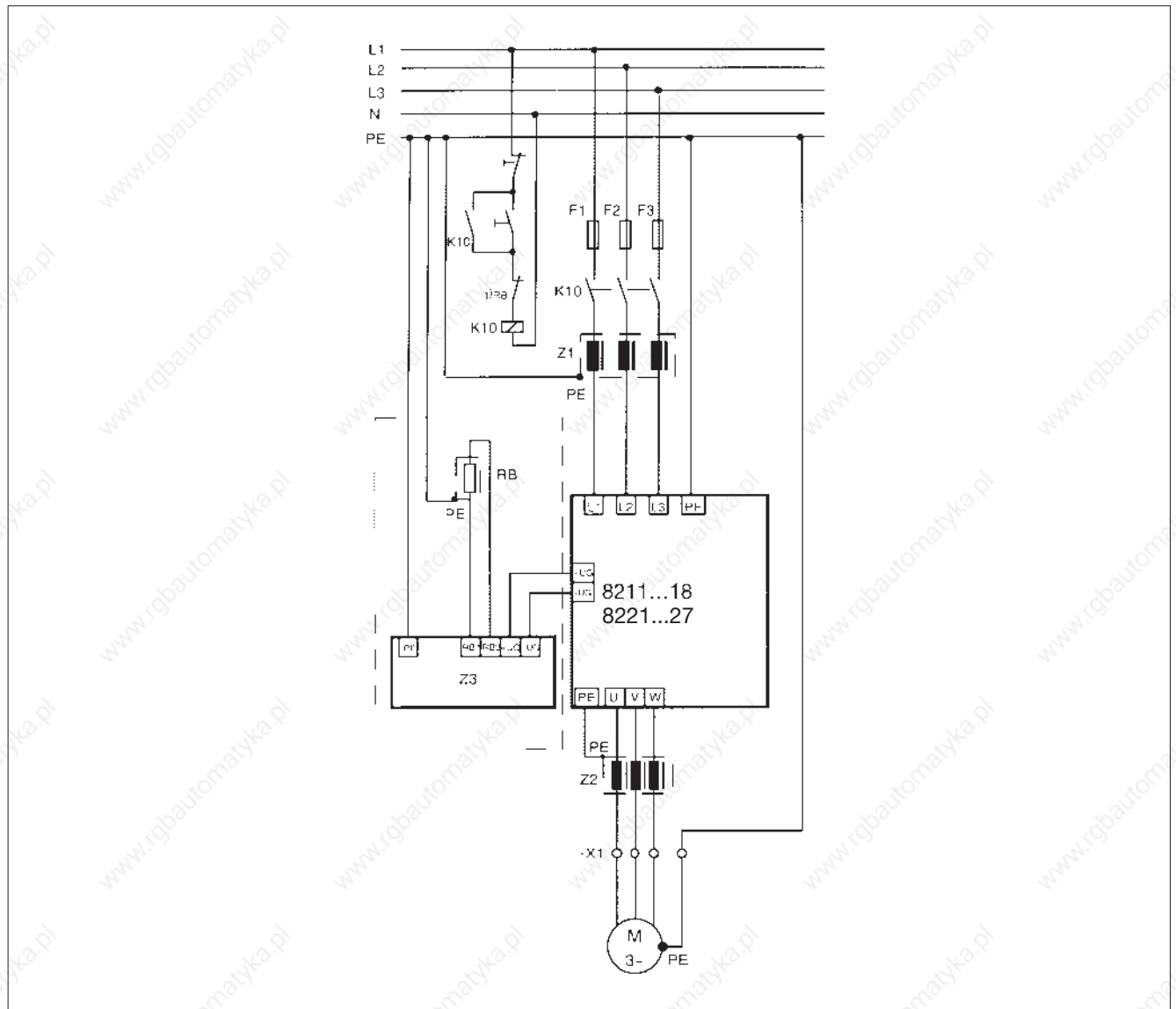


- F1, F2\* Line protection, F2\* only with 2 AC/PE/190 - 260 V power supply  
 K10, K10\* Mains contactor, K10\* only with 2 AC/PE/190 - 260 V power supply  
 Z1 Mains choke/mains filter, see Accessories  
 Only operate the 8204E with an assigned mains choke/mains filter  
 Z2 Motor filter/sinusoidal filter, see Accessories  
 Z3 Brake chopper/brake module, see Accessories  
 RB Brake resistor, see Accessories  
 $\vartheta_{RB}$  Temperature monitoring for brake resistor  
 -X1 Terminal strip in control cabinet



### Power connection - 821X, 824X and 822X frequency inverters

Connection to three-phase mains 3 x 400 ... 460 V/480 V



F1, F2, F3 Line protection

K10 Mains contactor

Z1 Mains choke/mains filter, see Accessories

Only operate the 8214E and 8221 to 8227 with an assigned mains choke/mains filter

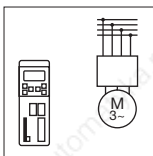
Z2 Motor filter/sinusoidal filter, see Accessories

Z3 Brake chopper/brake module, see Accessories

RB Brake resistor, see Accessories

θ<sub>RB</sub> Temperature monitoring for brake resistor

-X1 Terminal strip in control cabinet



## Application examples

### Connecting diagrams

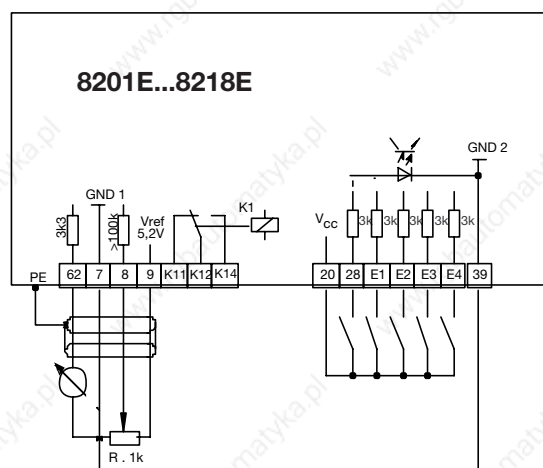
#### Control terminal connections – 820X and 821X frequency inverters

##### For power supply with internal control voltage

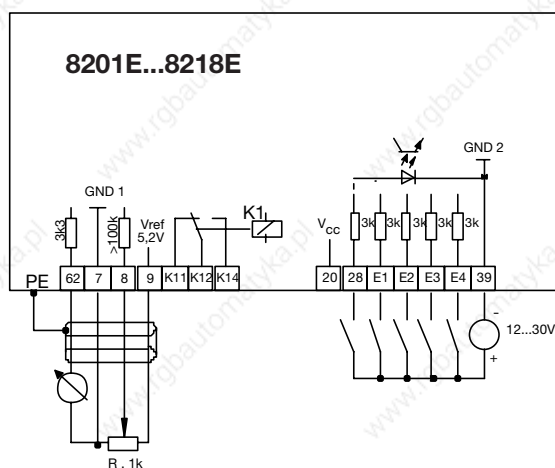
The control connectors have basic insulation (single insulating distances)

If protection against electrical contact is required,

- Double insulation must be implemented
- The components to be connected must be provided with the second isolating distance



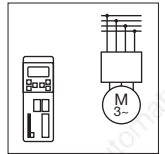
##### If the power is being supplied by an external control voltage (+12 ...+30 V)



GND 1: Reference point for internal voltages

GND 2: Reference point for external voltages

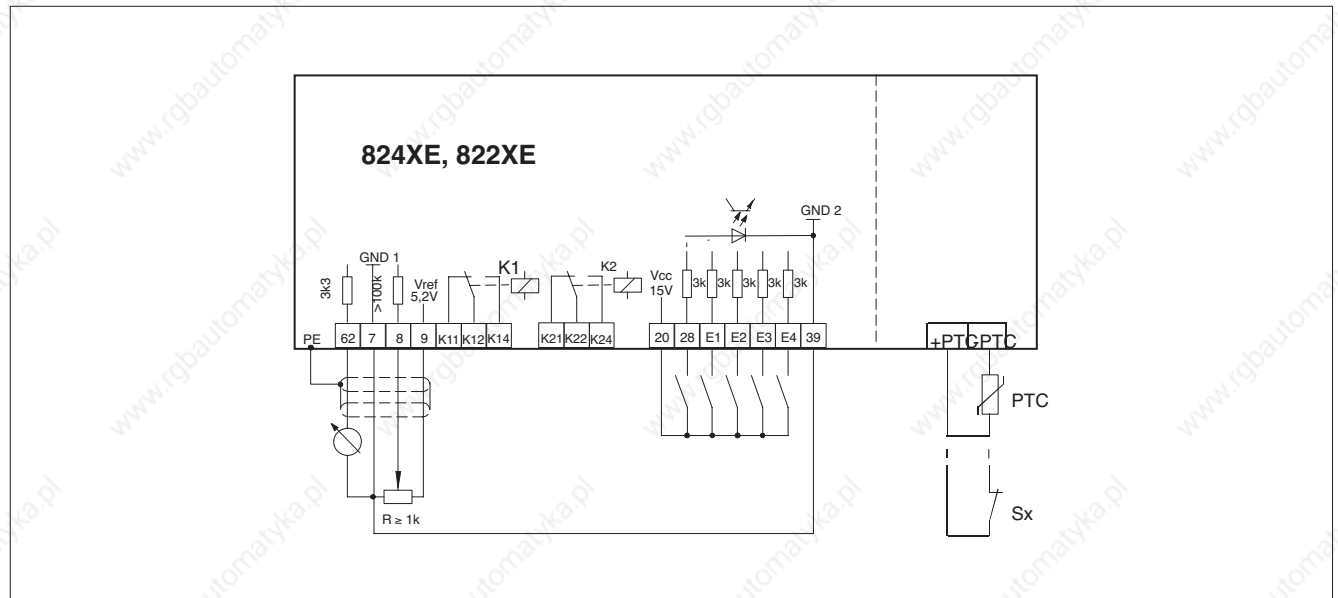
GND 1 and GND 2 are electrically isolated inside the device



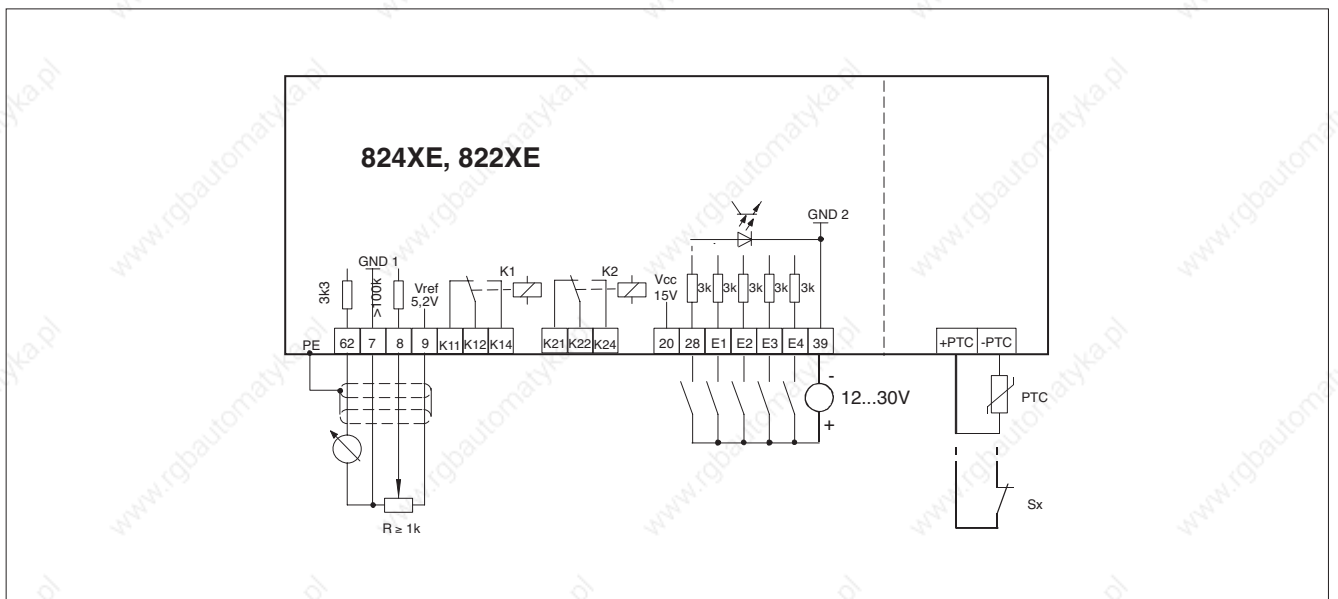
### Control terminal connections – 824X and 822X frequency inverters

#### For power supply with internal control voltage

The control current terminals have dual basic insulation.



#### If the power is being supplied by an external control voltage (+12 ... +30 V)

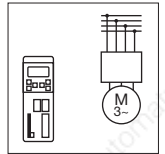


GND 1: Reference point for internal voltages

GND 2: Reference point for external voltages

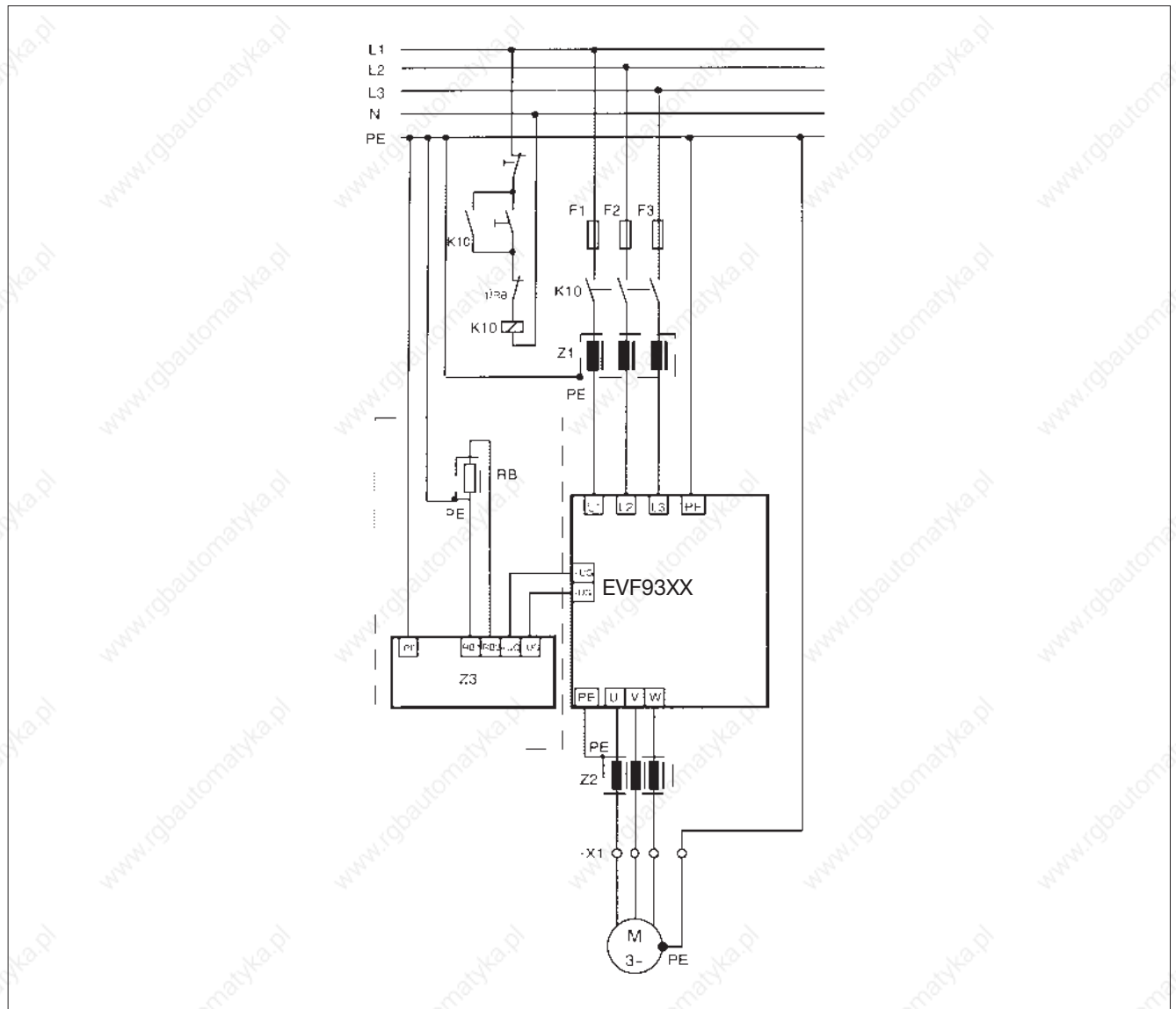
GND 1 and GND 2 are electrically isolated inside the device





### Power connection - 9300 vector frequency inverters

Connection to three-phase mains 3 x 400 ... 460 V/480 V



F1, F2, F3 Line protection

K10 Mains contactor

Z1 Mains choke/mains filter, see Accessories  
Only operate 9327-9333 inverters with  
an assigned mains choke/mains filter

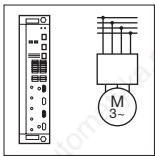
Z2 Motor filter/sinusoidal filter, see Accessories

Z3 Brake chopper/brake module, see Accessories

RB Brake resistor, see Accessories

θ<sub>RB</sub> Temperature monitoring for brake resistor

-X1 Terminal strip in control cabinet



## Application examples

### Connecting diagrams

#### Connecting diagrams for 9300 vector frequency inverters

##### Notes about control cables

The frequency inverters have a number of digital and analog inputs and outputs. An internal or external control voltage can be used to supply them with power. The control current terminals have basic insulation. If protection against electrical contact is required,

- Double insulation must be implemented
- The components to be connected must be provided with the second isolating distance

The following connecting diagrams should be used for the purposes of wiring:

##### Notes about wiring

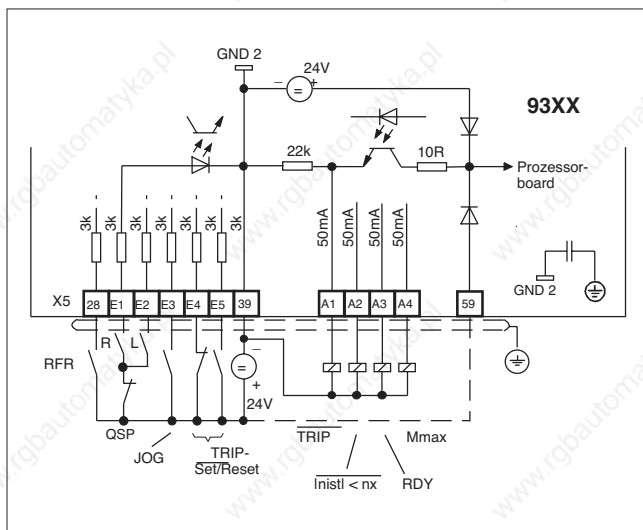
Connect the control cables to screw terminals X5 and X6 on the front of the drive controller. Torque: 0.5 - 0.6 Nm

Shielding the control cables:

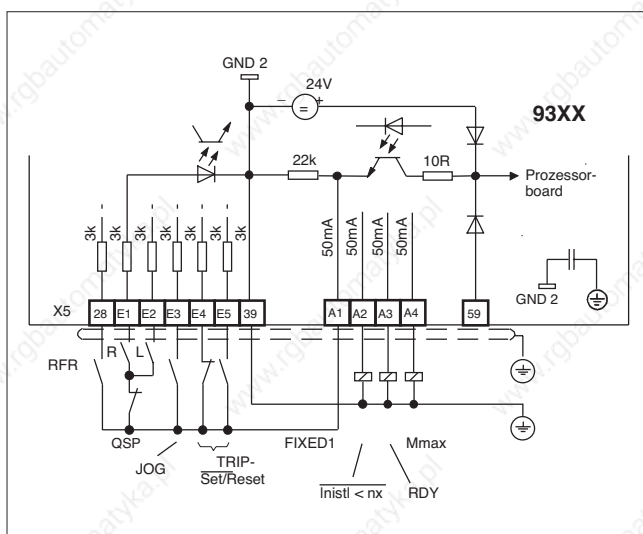
- The PE connection is made via the shield sheet shown (included in the assembly kit).  
Do not use it for the purposes of strain relief!
- Using a screw, connect the shield sheet on the drive controller with PE.

| With internal control voltage | With external control voltage |
|-------------------------------|-------------------------------|
| Digital inputs and outputs    | Digital inputs and outputs    |
| Analog inputs and outputs     | Analog inputs and outputs     |

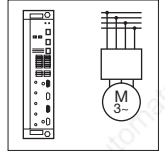
##### External control voltage



##### Internal control voltage



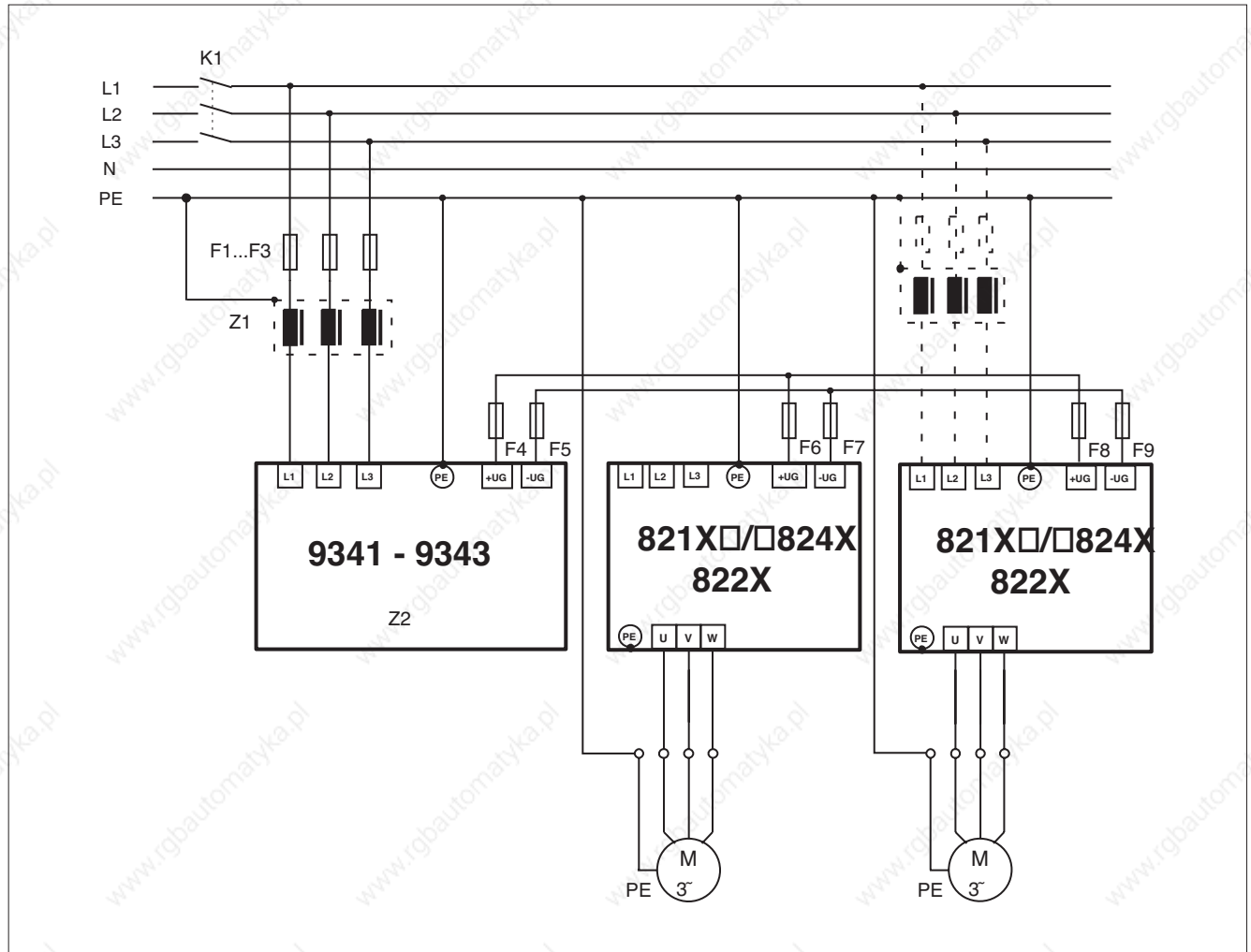
Example: Assignment of input and output terminals



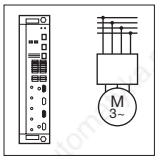
### DC-bus operation with 9340 supply and regenerative feedback modules

We recommend the use of a supply and regenerative feedback module if you are using the frequency inverters in

multi-axis applications. The wiring diagram below illustrates a possible circuit for DC-bus operation.



- Z1: Mains filter
- Z2: Supply and regenerative feedback module
- F1...F3: Mains fuses
- F4...F9: DC fuses
- K1: Mains contactor



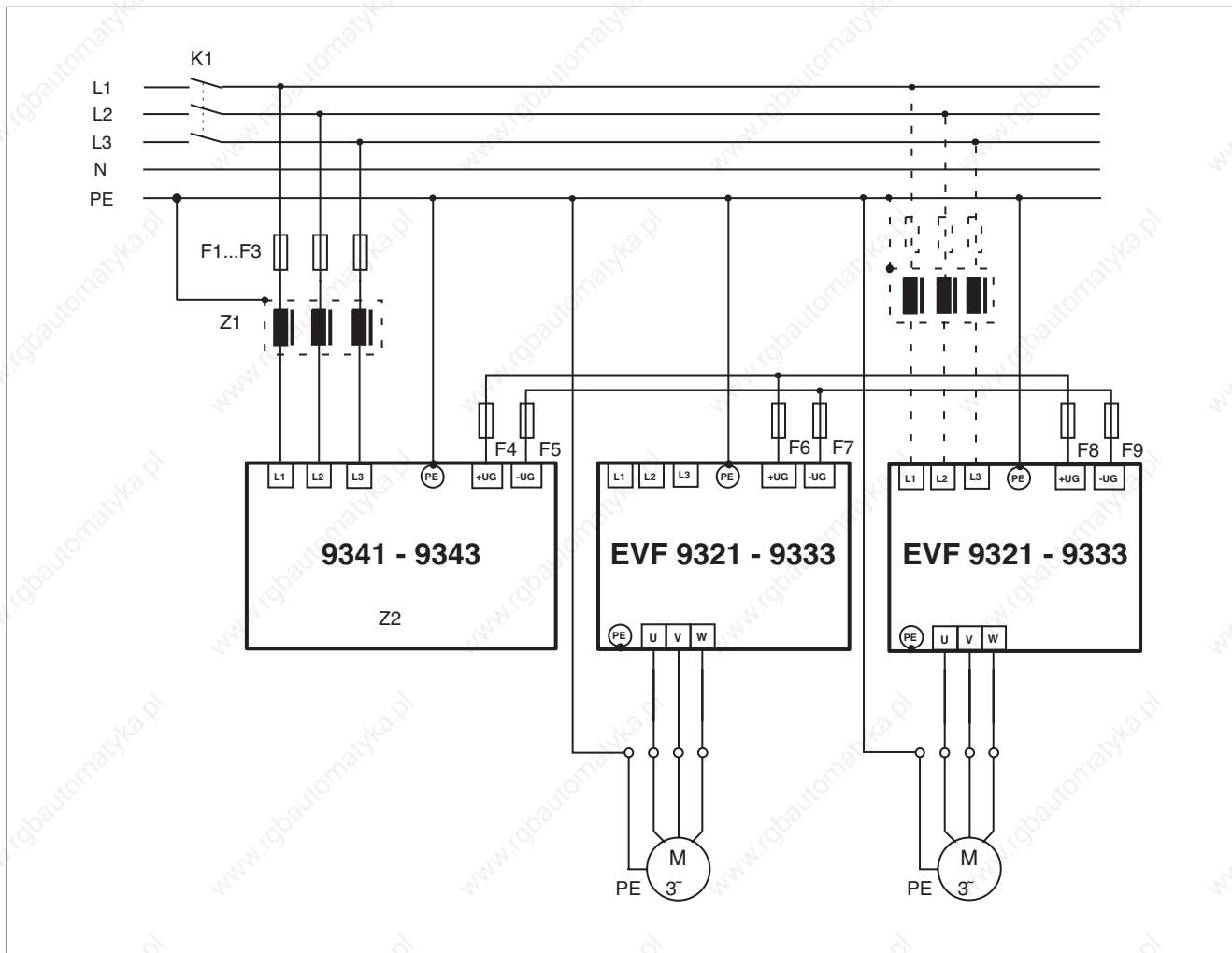
## Application examples

### Applications

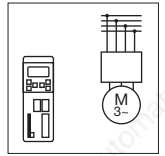
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- K1: Mains contactor

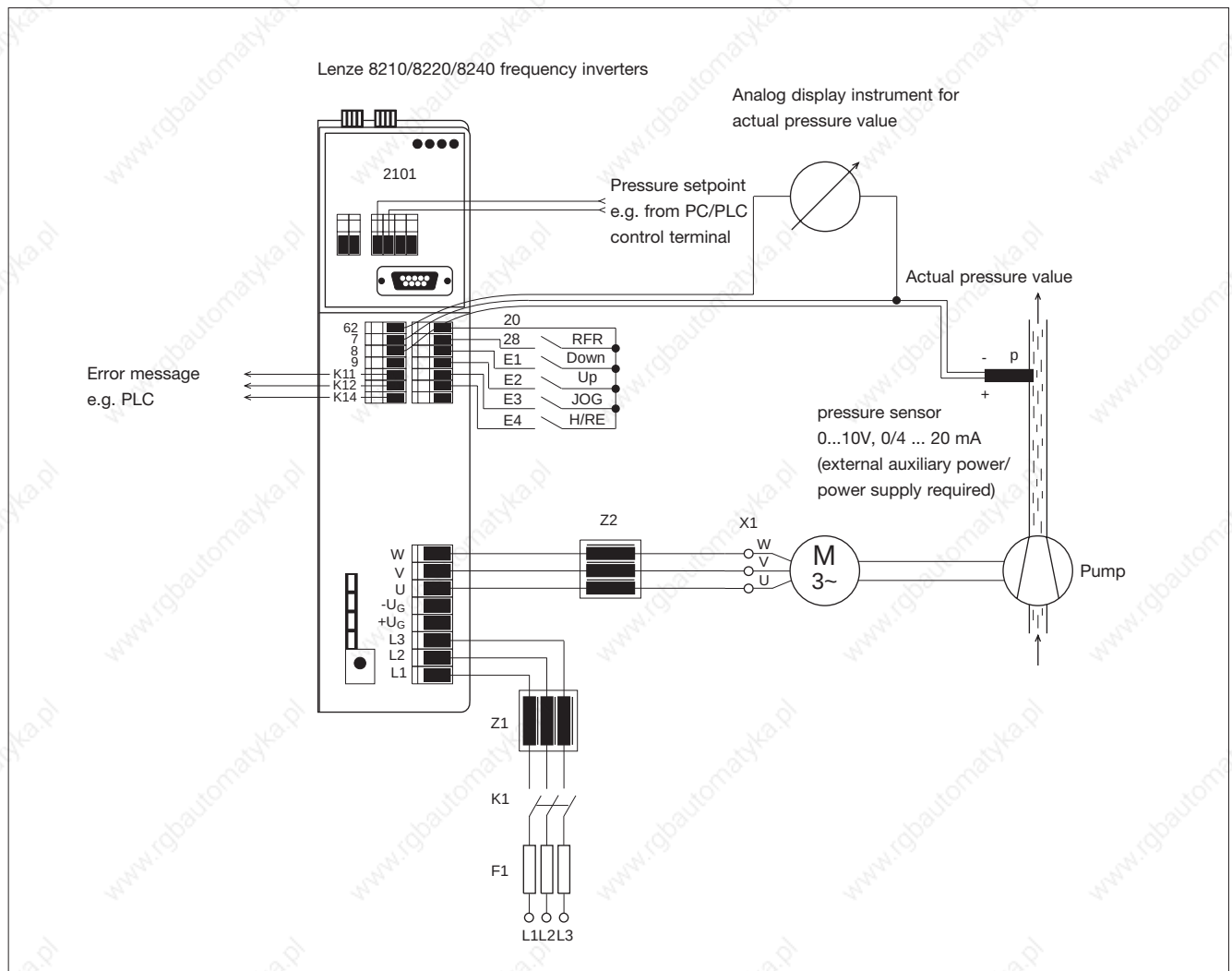


### Pump application with pressure control

A centrifugal pump is to maintain constant pressure in a pipe system (e.g. water supply for private households or industrial plants). In addition to a network connection to the control room, on-site set-up should also be possible. The pressure should drop to a fixed value for a specific period of time during which demand is reduced. This provides an indirect means of detecting possible breaks in the pipe by monitoring actual pressure values.

#### Functions used:

- Internal PID controller for humidity control
  - Normal control, setpoint selection via fieldbus with feedback via analog channel terminal 8
- Networking via fieldbus (e.g. via 2102)
- Manual/remote changeover (M/Re.)
  - Switch between setpoint selection via fieldbus and manual switch (terminal E1 = Down, terminal E2 = Up)
- Process setpoint selection via inverter JOG values
- Electronic device lock (RFR)



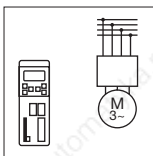
### Using a pump with pressure control

\*Z<sub>1</sub>: Mains filter required for radio interference level A or B

\*Z<sub>2</sub>: Motor filter required for motor cables 50 m and longer (shielded), 100 m and longer (unshielded)

Sinusoidal filter required for motor cables 100 and longer (shielded), 200 m and longer (unshielded)

All signal cables and motor cables must be shielded



## Application examples

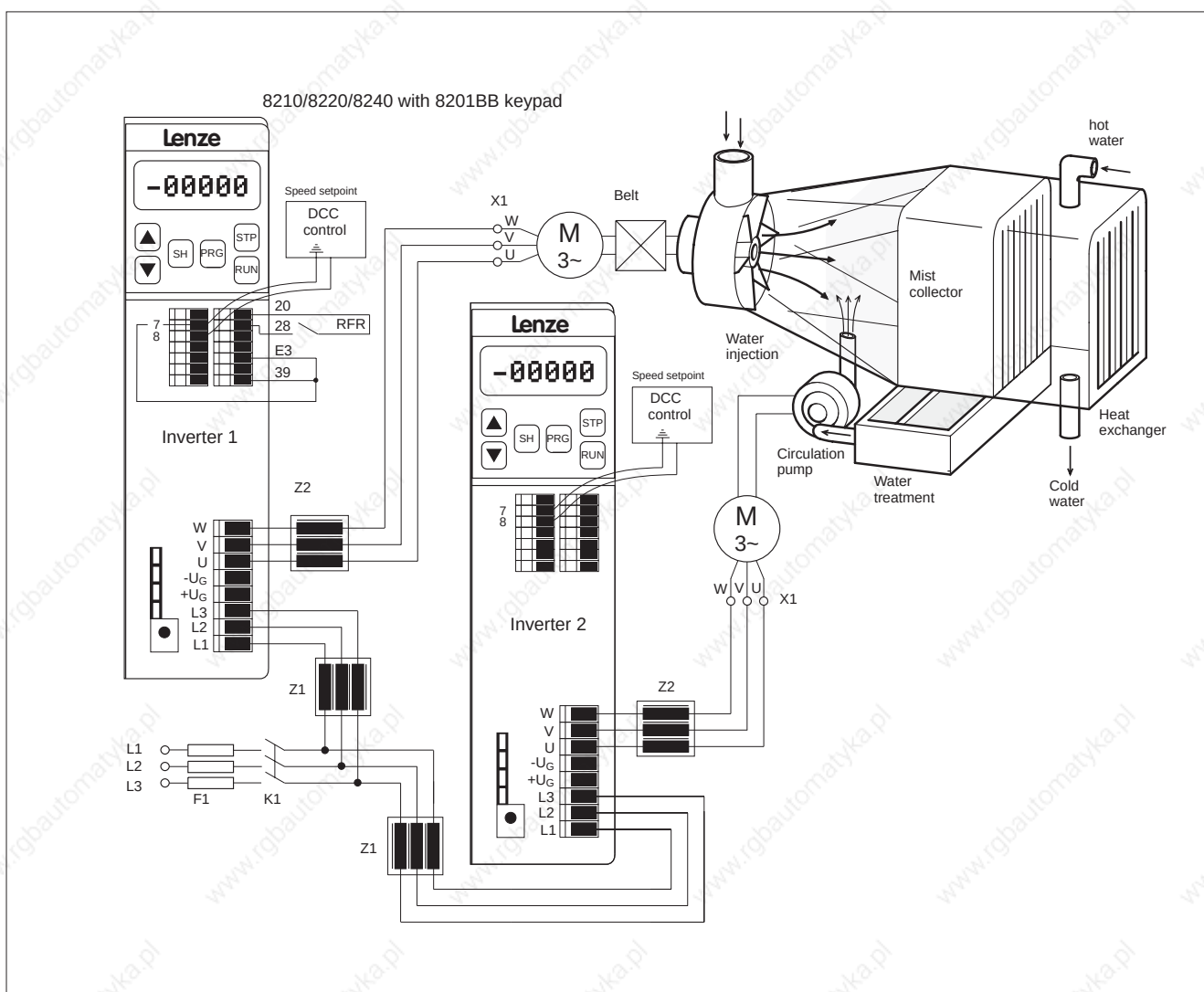
### Applications

#### Air conditioning system

An air conditioning system is for example to operate in a department store based on the number of people present in the building. The fans must increase or decrease the air circulation depending on the number of people present (preset e.g. based on a counter).

#### Functions used:

- V-belt monitoring
- Mains failure detection
  - Controlled shutdown of drive in the event of a mains failure
- Flying restart with coasting motor
- Elimination of mechanical resonances
- Smooth start/stop along S ramps



#### Application example for an air conditioning system

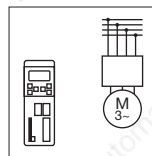
\*Z<sub>1</sub>: Mains filter required for radio interference level A or B

\*Z<sub>2</sub>: Motor filter required for motor cables 50 m and longer (shielded), 100 m and longer (unshielded)

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All signal cables and motor cables must be shielded



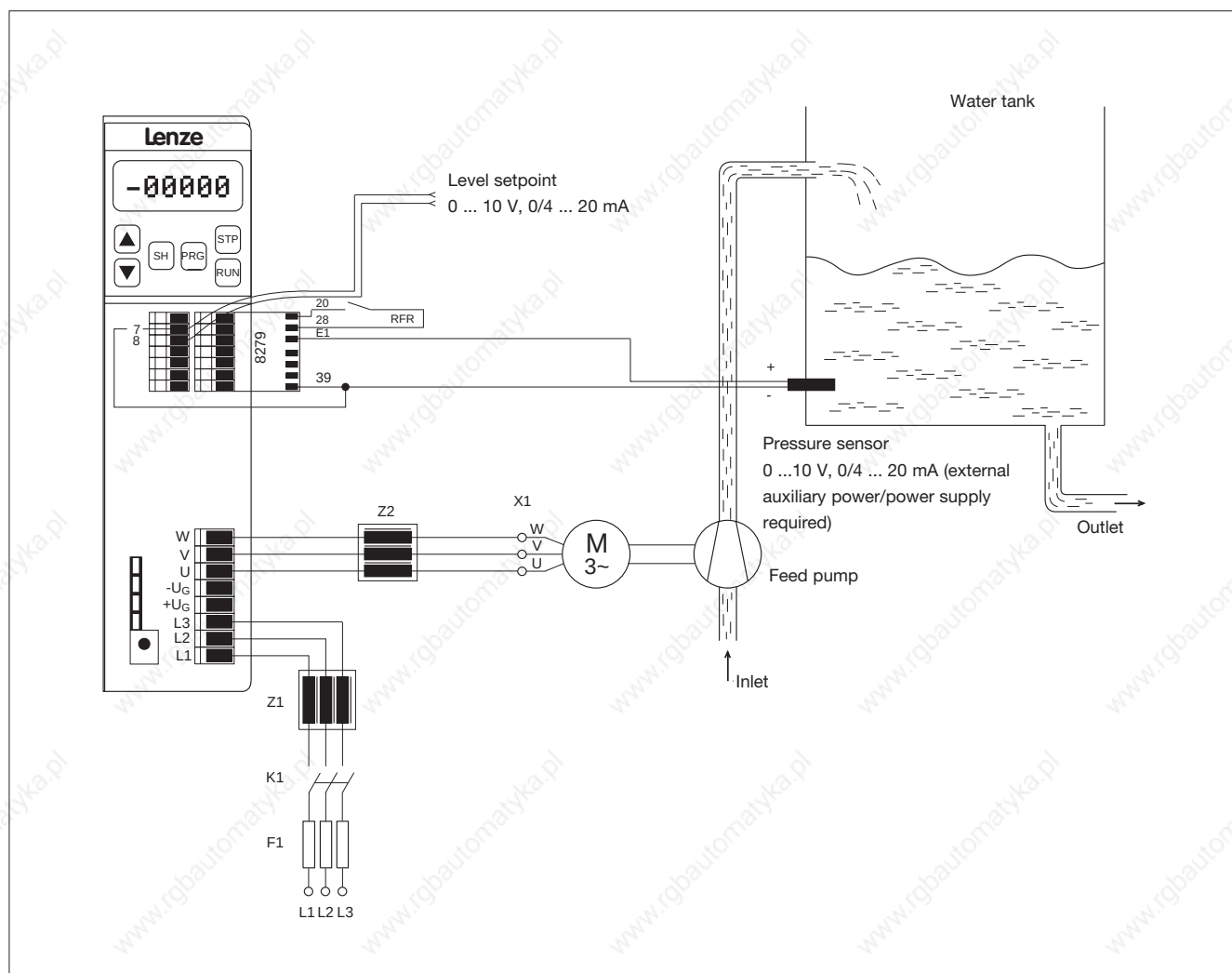


### Pump application with level control

The water level in a water tank must remain constant. Depending on the amount of water drained, the feed pumps must adjust the speed and refill the tank with water.

#### Functions used:

- Internal PID controller for level control
  - Normal control, analog setpoint selection via terminal 8 with feedback via analog channel E1 with plug-in module 8279



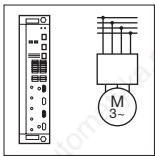
### Using a pump with level control

\*Z<sub>1</sub>: Mains filter required for radio interference level A or B

\*Z<sub>2</sub>: Motor filter required for motor cables 50 m and longer (shielded), 100 m and longer (unshielded)

Sinusoidal filter required for motor cables 100 and longer (shielded), 200 m and longer (unshielded)

All signal cables and motor cables must be shielded



## Application examples

### Applications

#### Step control

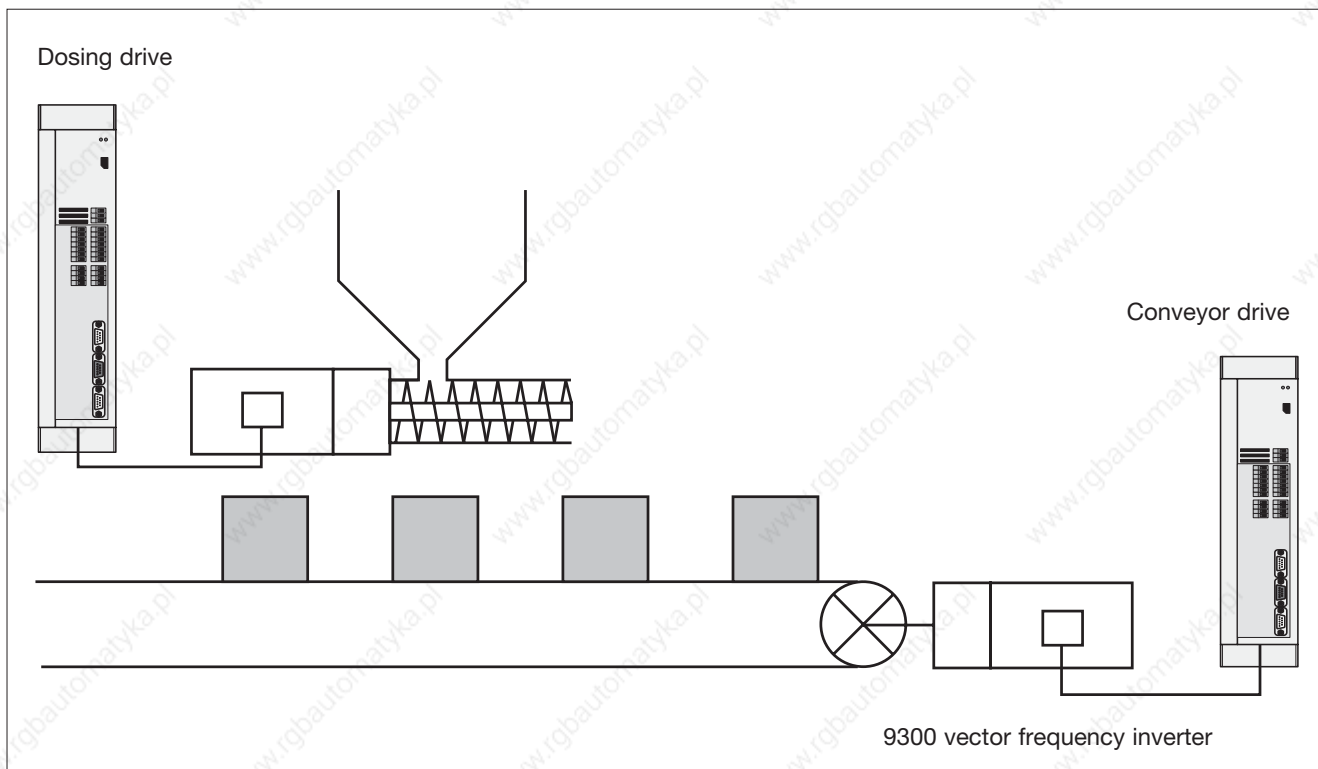
Applications in which the drive should repeatedly turn a specific number of revolutions. This type of application is used for example to move unit loads on a conveyor belt sequentially or for dosing specific amounts repeatedly on worm conveyors.

The conveyor speed and path or dosing speed and amount are controlled independently of one another via the two analog inputs.

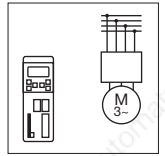
The execution of a step is started via a digital input.

#### Functions used:

- Optimum acceleration ramp generation
- Speed measurement
- Brake control



Basic structure of a step controller for a bulk material filling station

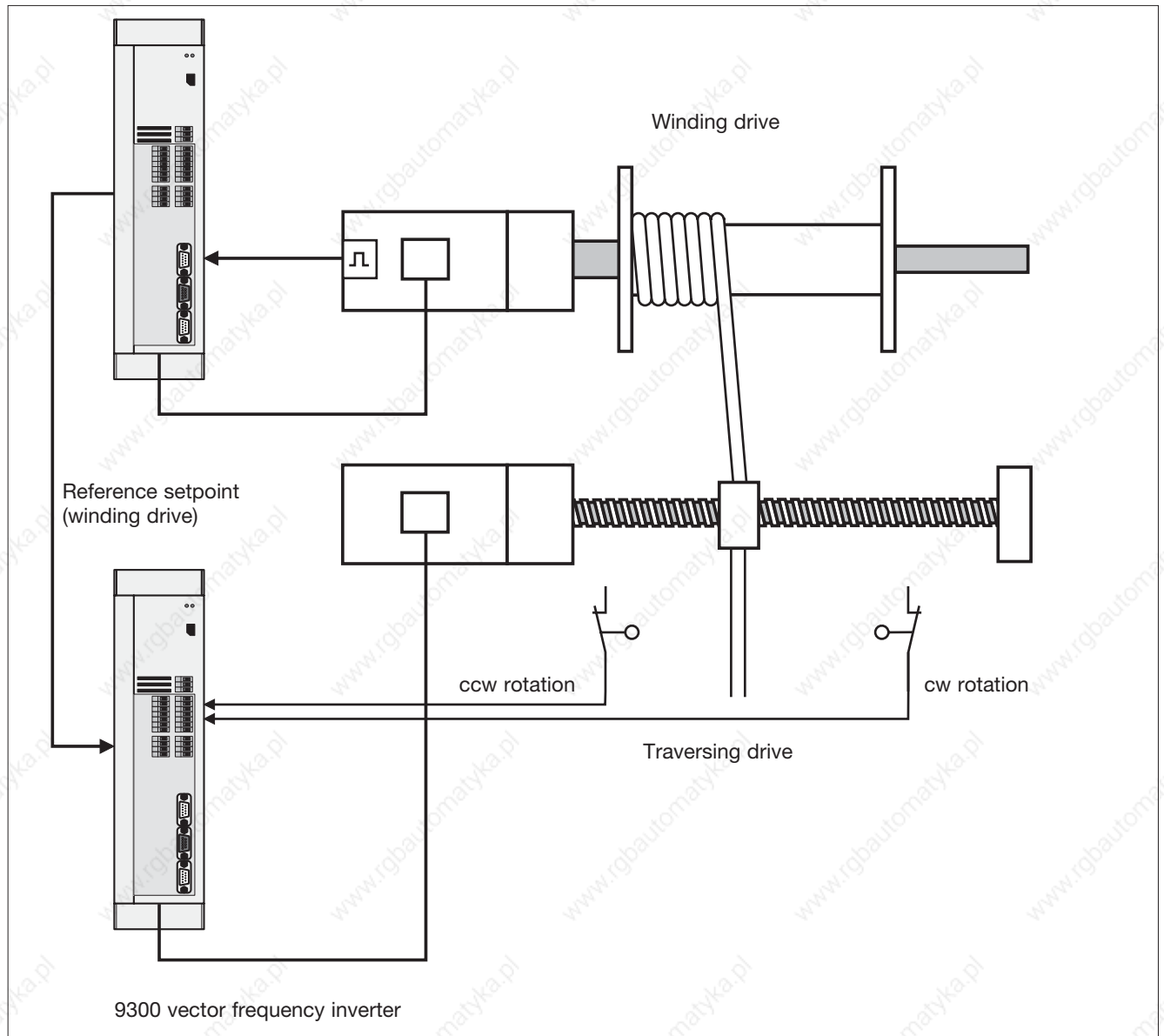


### Traversing control

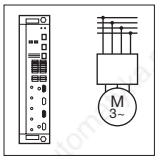
Spindle drives for moving material by means of winding. The speed of the winding drive is transferred in an analog input which is used to control the speed of the winder. The reversing of the direction of rotation is controlled via digital inputs. Limit switches operating as normally closed switch/break contacts which disable the active direction of rotation can for example be used for this purpose.

#### Functions used:

- Constant path ramp generation
- Speed measurement
- Pilot frequency input



Basic structure of a traversing controller for a spindle drive on rewinders



## Application examples

### Applications

#### Pilot frequency - Slave (cascade)

Integrating the drive controller into a drive system. The drive is controlled by reading in the pilot frequency setpoint via input X9. This value is then evaluated and the speed of the drive is adapted to the process based on the result of the evaluation.

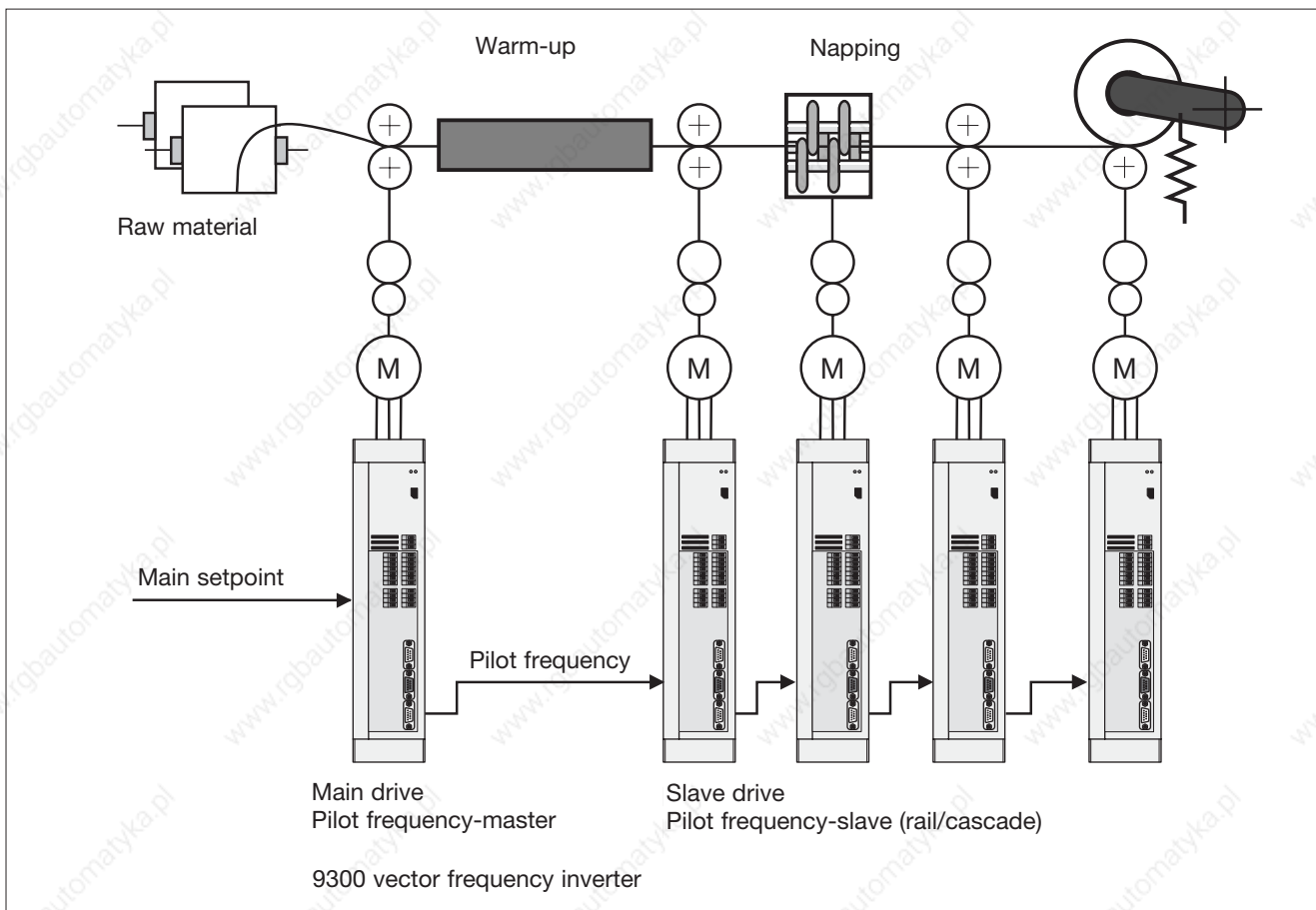
An internal additional setpoint can also be activated via digital input E3.

Unlike in the pilot frequency slave configuration (bus), the evaluated control setpoint is forwarded via pilot frequency

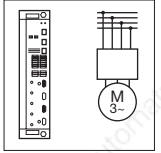
output X10. This means that changes in the evaluation also affect subsequent drives.

#### Functions used:

- Pilot frequency input
- Analysis of gearbox ratio
- Analog/digital gearbox ratio trimming
- Pilot frequency ramp function generator



Basic structure of a pilot frequency network for textile machinery



### Dancer position control (internal diameter calculator)

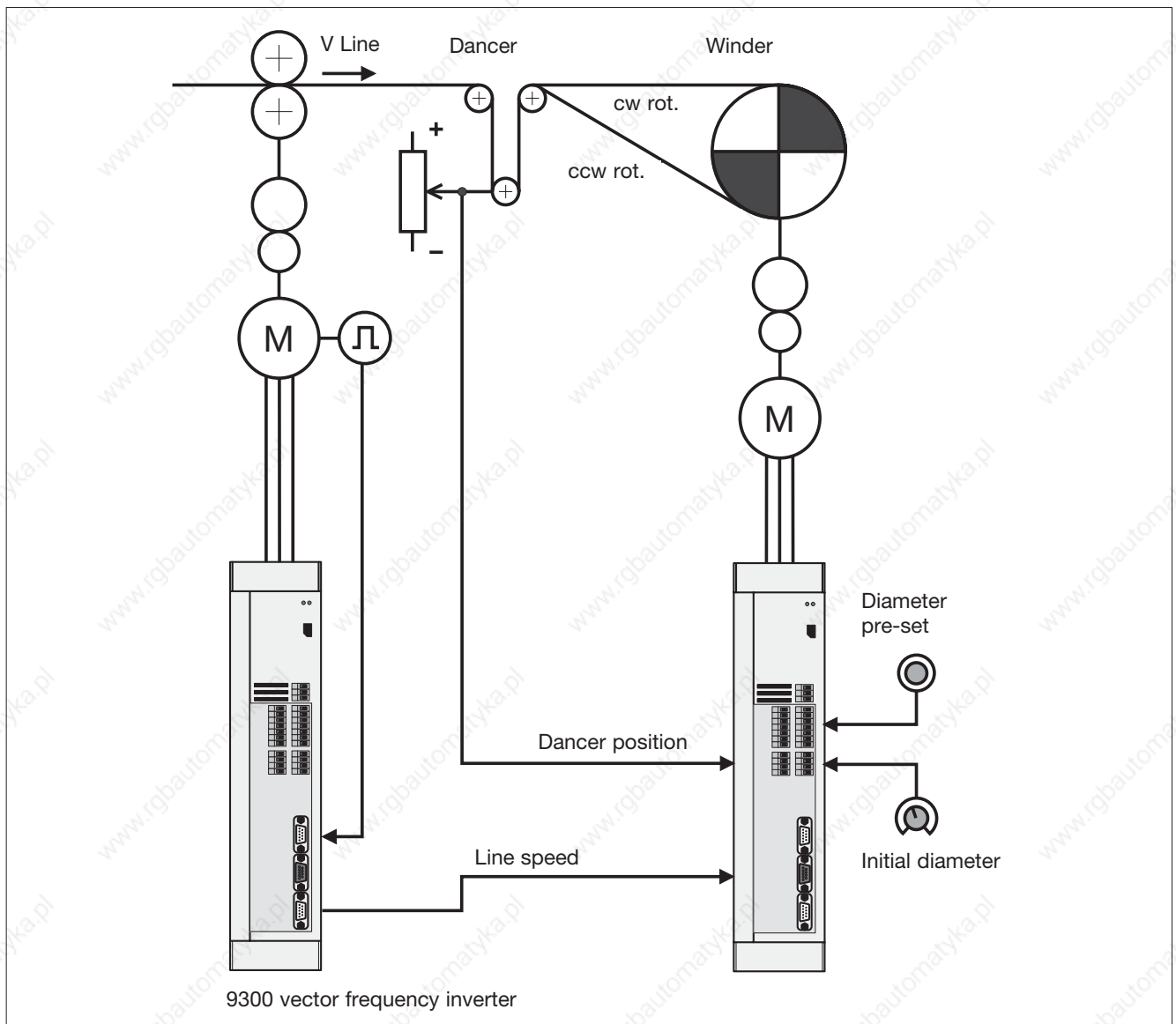
Winding drives with dancer position control. Unlike the dancer position control configuration with external diameter detection, in this type of application, the diameter is calculated internally.

A pilot frequency signal is sent for pilot control of the drive with the system/material speed. On the basis of the actual position of the dancing roller, the dancer position controller generates a correction signal which is added to the pilot control signal. This results in a circumferential speed setpoint which, when multiplied by  $1/D$ , provides the speed setpoint.

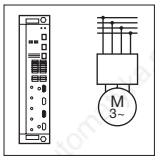
The reel diameter is calculated using the signals for the line speed and the winding speed. Each time the reel changes, the new initial diameter can be loaded.

#### Functions used:

- Pilot frequency input
- Dancer position control
- Diameter calculation



Basic structure of a dancer position controller with calculation of diameter via the internal diameter calculator



## Application examples

### Applications

#### Dancer position control (external diameter detection)

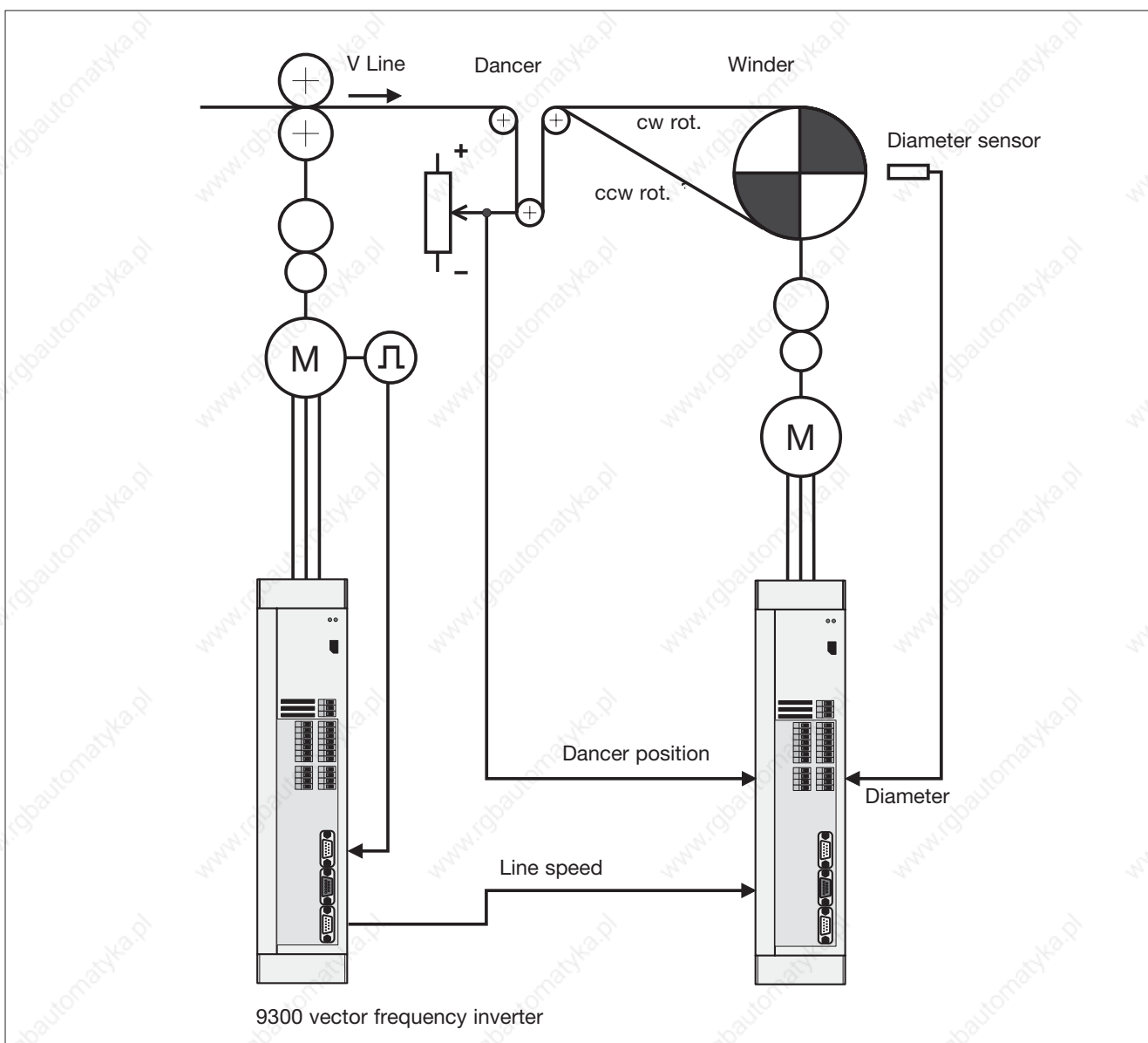
Winding drives with dancer position control and external diameter detection.

A pilot frequency signal is sent for pilot control of the drive with the system/material speed. On the basis of the actual position of the dancing roller, the dancer position controller generates a correction signal which is added to the pilot control signal. This results in a circumferential speed setpoint which, in the case of a surface winder, can be applied directly as the speed setpoint.

On a centre winding machine, the speed setpoint is obtained by evaluating the reel diameter. The analog signal generated by the diametrical sensor is preprocessed accordingly inside the controller.

#### Functions used:

- Pilot frequency input
- Dancer position control
- Diameter evaluation



Basic structure of a dancer position controller with external diameter detection via a diametrical sensor