

# COMBIVERT



**US** Instruction Manual  
Type R6-S

**Power Supply and Regenerative Unit**  
Type 25R6S3R-R00A

Mat.No.	Rev.
00R6SUB-KR01	1A



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## 1. Introduction

### 1.1 Preface

First we would like to welcome you as a customer of KEB and congratulate you on the purchase of this product. You have decided on a product of the highest technical innovation.

The enclosed documents as well as the specified hardware and software are developments of KEB. KEB has created these documents, hardware, and software and they are to the best of KEB's knowledge error free. KEB reserves the right to change specifications without prior notice. This statement is not exclusive.

The icons used throughout this document have the following significance:

	Danger
	Warning
	Caution
	Pay Attention
	Important Warning
	Information
	Help
	Tip

### 1.2 Product description

This instruction manual describes the power supply and recovery unit KEB COMBIVERT R6-S. The COMBIVERT R6-S has the following technical features.

As a supply unit

- converts a three-phase input voltage into DC voltage.
- supplies a single KEB frequency inverter or multiple units via DC interconnection.
- can be connected in parallel, if higher supply power is required.
- increases the stability of the DC Bus voltage in shared DC Bus applications.

As a regeneration unit

- returns the excess energy from generating operation (i.e. overhauling load) to the utility supply system.
- reduces the net energy demand.
- reduces the heat dissipation.
- is environmentally friendly.
- replaces braking resistor and braking transistor.
- is cost saving and space saving.

The COMBIVERT R6-S is generally protected against over current, ground fault and high temperature. Appropriately dimensioned DC fuses protect the DC Bus circuit against short-circuit. The following accessories are necessary for operation with the COMBIVERT R6-S:

- Commutation choke
- HF filter (for observance of European EMC standard)

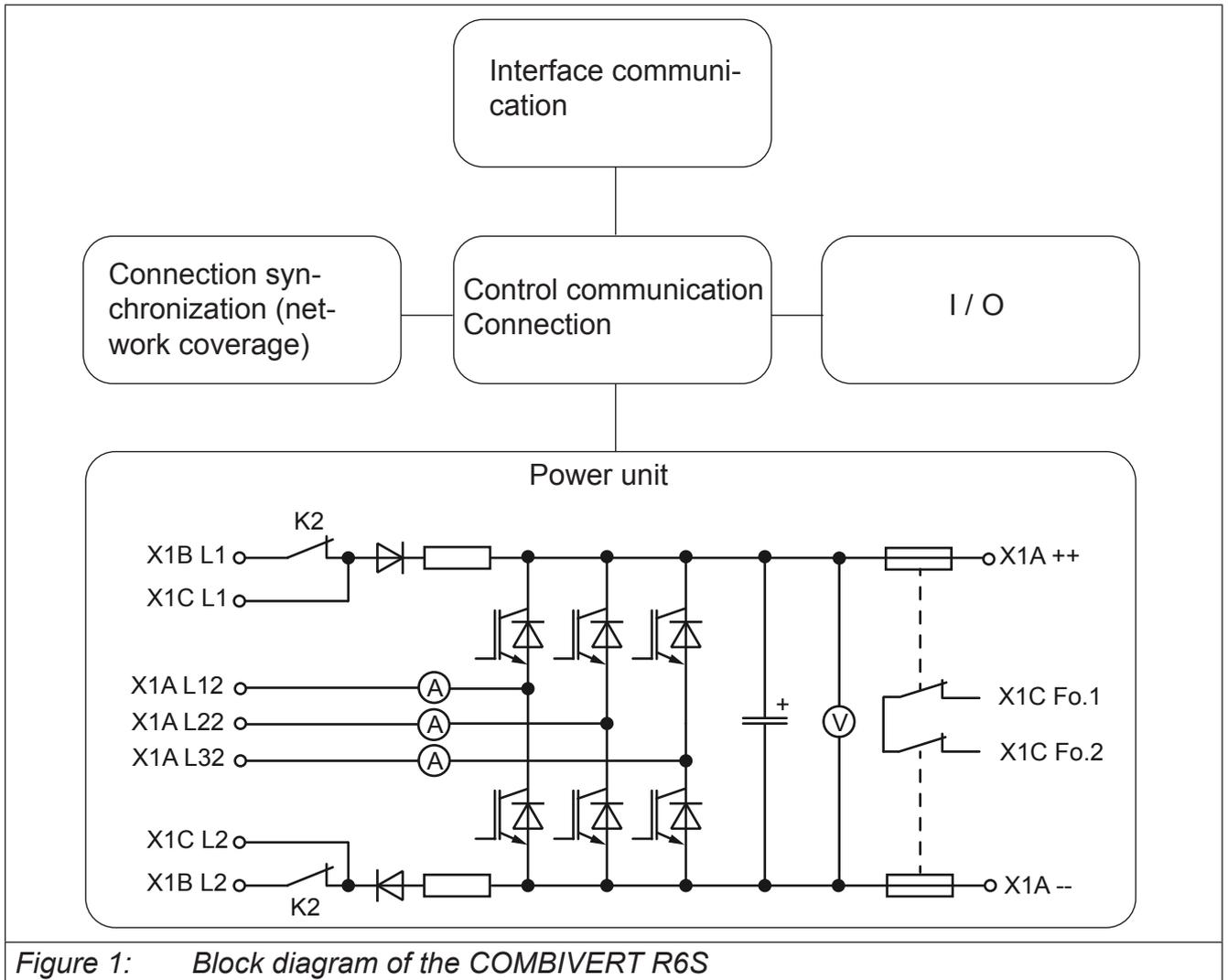


Figure 1: Block diagram of the COMBIVERT R6S

### 1.3 Validity and liability

**Application and use of our units in the target products is outside of our control and therefore is exclusively the responsibility of the machine manufacturer.**

The information contained in the technical documentation, as well as any user-specific advice in spoken and written communication are made to best of our knowledge and information about the application. However, they are considered for information only without responsibility. This also applies to any violation of industrial property rights of a third-party.

Selection of our units in view of their suitability for the intended use must be done generally by the user.

Inspections and tests can only be done by the machine manufacturer within the framework of the application. Inspections and tests must be repeated, even if only parts of hardware, software, or the unit adjustment are modified.

Unauthorized opening and improper tampering can lead to bodily injuries or liability issues and this causes loss of the warranty. Only use original spare parts and authorized accessories by the manufacturer. The use of other parts excludes liability for the consequences arising out of such use.

The suspension of liability is valid also for shutdown damages, lost profit, data loss, or other consequential damages. This is also valid if we have referred to the possibility of such damages.

Should any part of this agreement be invalid for any reason, it is to be replaced with a corresponding text, which is valid and equivalent to the intended meaning. The rest of the agreement shall remain unaffected and valid.

### 1.4 Copyright

The customer may use the instruction manual as well as further enclosed documents or parts from it for internal purposes. KEB has the copyrights and they remain effective also to the full extent. All rights reserved. KEB®, COMBIVERT®, KEB COMBICONTROL® and COMBIVIS® are registered trademarks of KEB Automation KG. Other wordmarks or/and logos are trademarks (TM) or registered trademarks (®) of their respective owners and are listed in the footnote on the first occurrence. When creating our documents we pay attention with the utmost care to the rights of third parties. Should we have not marked a trademark or breached a copyright, please inform us in order to rectify the issue.

### 1.5 Specified application

The COMBIVERT R6-S serves exclusively for the supply of frequency inverters with DC input and/or regeneration of excess energy into the supply system. The operation of other electrical loads is prohibited and can lead to malfunctions or destruction of the unit.

The used semiconductors and components of KEB are developed and dimensioned for use in industrial products. If the product is used in machines, which work under exceptional conditions or if essential functions, life-supporting measures or an extraordinary safety step must be fulfilled, the necessary reliability and security must be ensured by the machine manufacturer. The operation of our products outside the indicated limit values of the technical data leads to the loss of any liability claims.

All control card outputs of the R6 are „one-channel, no diagnostic coverage and therefore not safe“ according to ISO 13849. If required, additional protective measures must be met by the user.

#### 1.5.1 Standard operation

If the DC Bus voltage increases to a value above the peak value of the line voltage (negative power), regeneration of the current to the line occurs automatically. The line voltage is measured by the R6 unit. Regeneration occurs in a square-wave format, whereby the current flow period corresponds to the line frequency and the normal conduction times of a standard 6 pulse bridge rectifier circuit. Regeneration stops if the DC bus voltage decreases below the line supply peak voltage (positive power).

## 1.5.2 Abnormal operation

When exceeding the permissible limit values for voltage, current or temperature the current flow between DC link and mains is blocked during regeneration. An appropriate error message is also displayed during supply. The unit must be disconnected from the supply system or the load must be switched off in case of overcurrent or overload. This can be done by opening the control release of the frequency inverter.

At factory setting the modulation is switched off in case of a net phase failure and error message E.nEt is displayed.

Special adjustments from KEB are necessary if the modulation and/or the standard operation should start again within a defined time in case of return of power supply.

## 1.6 Unit identification

<b>25</b>	<b>R6</b>	<b>S</b>	<b>3</b>	<b>R</b>	<b>R</b>	<b>0</b>	<b>0</b>	<b>A</b>	
									Type
									A: Standard
									D. ext. fan power supply
									H: Water cooling
									Design
									0: Standard
									reserved
									0: Standard
									1: modified standard
									Voltage
									R: 3-ph.; 480V; AC
									Housing
									R
									Options
									3: Precharging, DC fuses
									Control
									S: 2B.R6
									Series
									R6
									Unit size
									25

## 2. Safety Instructions

### 2.1 General instructions

 <p><b>CAUTION</b> - Risk of Electrical Shock</p>	<p>The COMBIVERT R6 power supply and recovery unit contains dangerous voltages which can cause death or serious injury.</p> <p>The COMBIVERT R6 can be adjusted such that energy is returned to the line supply system even in case of power failure during generator operation. Therefore dangerous high voltage can exist in the unit even after disconnection from the line supply system.</p> <p><b>Before working with the unit always verify the voltage has dropped to a safe value by measuring both the DC bus voltage and the AC line voltage at the R6 unit.</b></p> <p>Care should be taken to ensure correct and safe operation and to minimize risk to personnel and equipment.</p>
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 <p><b>Only quali- fied electro- personnel</b></p>	<p>All work from the transport, to installation and start-up as well as maintenance may only be done by qualified personnel (IEC 364 and/or CENELEC HD 384 and IEC-Report 664 and note national safety regulations). According to this manual, qualified personnel means those who are able to recognize and judge the possible dangers based on their technical training and experience as well as those with knowledge of the relevant standards and who are familiar with the field of power transmission or conversion.</p>
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 <p><b>Observe standards</b></p>	<p>The COMBIVERT R6 must not be started until it is determined that the installation complies with 89/392/EEC (machine directive) as well as the EMC-directive (89/336/EEC)(note EN60204), the US - NEC, and the OSHA machine safety code.</p> <p>The COMBIVERT R6 meets the requirements of the Low-Voltage Directive 73/231/EEC. The harmonized standard of the series EN 61800-5-1 (VDE 0160) is used.</p> <p>This is a product of limited interference susceptibility in accordance with IEC 61800-3. This product may cause radio interference in residential areas. In this case the installer/operator may need to take corresponding measures.</p>
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### 2.2 Transport, storage and installation

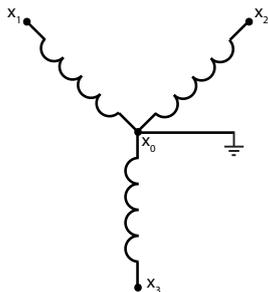
The storage and transport of the COMBIVERT must be done in the original packing. It is to be protected against humidity and excessive cooling and thermal effects. Long-distance transportation must be carried out in the original packing. It is to be secured against physical impact and shock during transport. Verify the packaging for signs of mishandling before removal from the packaging. Contact the shipper in case of damage. After removing the final packing, the COMBIVERT R6 must be mounted on a stable mounting base.

 <p><b>Protect Against Accidental Contact</b></p>	<p>The COMBIVERT R6 must be protected against abnormal operation. Components and covers must not be bent or moved as this may affect insulation distances. The units contain electrostatically endangered components which can be destroyed by inappropriate handling. For that reason the contact of electronic components and circuit boards is to be avoided. The equipment must not be switched on if it is damaged as it may no longer comply with mandatory standards.</p> <p>Make sure during installation there is at least the minimum clearance and enough cooling. Climate conditions must be observed in accordance with this instruction manual.</p>
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 <p><b>Hot surface</b></p>	<p>Heatsinks can reach high temperatures, which can cause burns when touched. A warning notice "hot surface" must be mounted on the machine control panel if direct physical contact with the heatsink can not be avoided.</p>
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## 2. Safety Instructions

### 2.3 Electrical connection

 <p><b>Note Capacitor Discharge Time</b></p>	<p>Before any installation and connection work, the system must be switched off and secured. After switch off, the intermediate circuit capacitors are still charged with high voltage for a short period of time. The unit can be worked on after it has been switched off for 5 minutes.</p>
 <p><b>Secure Isolation</b></p>	<p>The terminals of the control terminal strip are securely isolated in accordance with EN 61800-5-1. With existing or newly wired circuits the person installing the units or machines must ensure the EN requirements are met. When used together with frequency inverters that are not isolated from the supply circuit, all control lines must be secured by other protective measures (e.g. double insulation or shielded, earthed and insulated).</p>
 <p><b>Voltage With Respect to Ground</b></p>	<p>Connection of the COMBIVERT R6 is only permissible on symmetrical networks with a maximum line voltage (L1, L2, L3) with respect to ground (N/GND) of 305V. An isolating transformer must be used for networks which exceed this value! The unit may be damaged if this is not observed.</p>
 <p><b>Grounded Delta Supply</b></p>	<p>Connection of the R6 series inverters to voltage systems configured as a corner grounded delta, center tap grounded delta, open delta, or ungrounded delta may defeat the internal noise suppression of the inverter. Increased high frequency disturbance in the controller and on the line may be experienced. <b>A balanced, neutral grounded wye connection is required.</b> The three phase voltage imbalance must be less than 2% phase-to-phase. Greater imbalance can lead to damage of the inverter's power circuit. It is acceptable to use a transformer with a WYE connection on the secondary.</p> <p>Example of a center grounded wye transformer:</p> 
 <p><b>Stationary connection</b></p>	<p>The COMBIVERT R6 is designed for fixed connection only as high frequency ground leakage currents of &gt; 3.5 mA may occur especially when using EMI filters. It is therefore necessary to use a ground conductor with a section of at least a #4 AWG (16mm<sup>2</sup>) copper conductor or a second ground conductor in compliance with EN61800-5-1. Ground point-to-point with the shortest connection possible to the main ground point in the system (avoid ground loops).</p>
 <p><b>Insulation Measurement</b></p>	<p>When doing a high voltage insulation measurement in accordance with VDE 0100 / Part 620, the power semiconductor of the unit and existing radio interference filters must be disconnected because of the danger of destruction. This is permissible in compliance with the standard, since all units are given a high voltage test during the quality testing at KEB in accordance with EN 50178.</p>

 <p><b>Different Ground Potentials</b></p>	<p>When using components without isolated inputs / outputs, it is necessary that equal potential bonding exist between the components to be connected (e.g. through the equalizer). Disregard can cause destruction of the components by the equalizing currents.</p>
 <p><b>Fuse Sizing with Isolation Transformer</b></p>	<p>When the R6 unit is supplied through an isolation transformer, the maximum allowable fuse size is dictated by the size of the transformer as defined in the National Electric Code (NFPA-70 or CSA 22.1). As per Article 450-3(B) of NFPA-70 (similar statements can be found in CSA 22.1), the max fuse size is defined in table 450.3(B) with a rating not greater than 125% of the rated secondary current. In the case of multiple secondaries, it is the rated value of the winding which the unit is supplied from. In this case it is to be assumed that the end customer will fuse the transformer primary side with fuses exceeding 125% of transformer rated input current. The value of this secondary fuse may be less than the max fuse value listed in the technical data section 3.1 of this manual. The fusing of the transformer supercedes the fuse rating of the unit because the value required for the transformer is lower than the max value with which the unit was tested.</p>
 <p><b>Prevent disturbances</b></p>	<p>Trouble-free and safe operation of the COMBIVERT R6 is only guaranteed when the connection instructions below are strictly followed. Incorrect operation or damage may result from incorrect installation.</p> <ul style="list-style-type: none"> <li>• Pay attention to the line supply voltage.</li> <li>• <b>Supply connection must be a symmetrical, center-grounded wye.</b></li> <li>• Install power cables and control cables separately (&gt;6.0 inches (15 cm) separation).</li> <li>• Use shielded / twisted control lines. Connect the shield at one end to the COMBIVERT R6-S GND terminal!</li> <li>• Only use suitable circuit elements to control the logic and analog inputs, whose contacts are rated for extra-low voltages.</li> <li>• The heatsink of the COMBIVERT R6 must be well grounded. Shields of large power cables must be directly and securely attached to both the inverter GND terminal and the motor ground terminal. Remove paint finish where necessary.</li> <li>• Ground the cabinet or the system with the shortest connection to the main ground point (avoid ground loops)</li> <li>• <b>Use exclusively the commutation choke or harmonic filter specified by KEB.</b></li> <li>• The average value of the supplied DC current may not exceed the maximum DC current.</li> <li>• If several frequency inverters are connected to the COMBIVERT R6, the maximum permissible DC bus capacities of all connected frequency inverters must be considered during supply operation (see technical data).</li> <li>• <b>A ferrite ring must be installed over both + and - DC bus connections to the COMBIVERT R6 unit to limit common mode noise on the DC bus.</b></li> </ul>
 <p><b>Automatic Restart</b></p>	<p>The COMBIVERT R6 can be adjusted in such a way that the unit will restart automatically after an error (e.g. single phase brown out or loss). System design must take this into account. If appropriate, additional monitoring or protective features should be added where necessary.</p>
 <p><b>Not Short-Circuit Proof (Supply)</b></p>	<p>The COMBIVERT R6 is not short-circuit proof as a power supply input! If the I2t - protection is adapted with a class gR fuse, a conditional protection at supply input is possible. If necessary the short-circuit protection at DC output is ensured by internal class aR fuse.</p>

## 2. Safety Instructions

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 <p><b>Conditionally Short-Circuit Proof</b></p>	<p>The COMBIVERT R6 is conditionally short-circuit proof (EN61800-5-1 / VDE0160). After resetting the internal protection devices, the function as directed is guaranteed.</p> <p>Exception:</p> <ul style="list-style-type: none"><li>• A ground fault or short-circuit frequently occurring at the output, can lead to damage to the unit.</li></ul>
 <p><b>Cyclic Turn On and Turn Off</b></p>	<p>With applications requiring the COMBIVERT R6 to be switched on and off cyclically, maintain an off-time of at least 5 min. If you require shorter cycle times please contact KEB. Switching off during the initialization phase can cause undetermined conditions.</p>
 <p><b>GFI (Ground Fault Interrupt Circuit-Breaker)</b></p>	<p>If personnel protection of the system against ground fault is required, the COMBIVERT R6-S must be protected according to EN61800-5-1:</p> <ul style="list-style-type: none"><li>• 3-phase inverters (with B6 bridge-connected rectifier) by RCMA's with separation (use privileged) or RCD's type B (all-current sensitive GFI's)</li></ul> <p>The tripping current should be 300mA or more, in order to avoid a premature triggering by leakage currents (about 200mA. Dependent on the load, the length of the motor cable and the use of a radio interference filter, substantially higher leakage current can occur). The connection instructions from the manufacturer and the valid local requirements must be observed.</p> <p>Dependent on the available supply type (TN, IT, TT) further protective measures are necessary in accordance with VDE Part 410 4( Part4; Chapter 41).</p> <p>For example, with TN-mains this protection is made with over current protective devices, with IT-mains it is insulation monitoring with a pulse-code measuring method. A protective separation can be used with all mains forms as long as the required power and cable lengths permit this.</p> <p>The person setting up the unit must present proof of compatibility before installing the converter!</p>

## 2.4 EMC instructions

The COMBIVERT R6-S represents electrical equipment designed for use in industrial and commercial installations. In accordance with the EMC directive 89/336/EEC, it is not mandatory to mark these devices as they represent components to be further handled by the respective machine and system manufacturer and are not operable independently according to the EMC directive. The person installing / operating the machine / system is obliged to prove the protective measures demanded by the EMC directive are complied with. The prescribed ratings can usually be complied with when using the radio interference voltage filters as specified by KEB, and when observing the following measures and installation guidelines.

## 2.5 EMC conforming installation

The COMBIVERT R6 is designed to be used in a second environment as defined in EN 61800-3 (unit with its own supply transformer). Take additional measures when using it in the first environment (residential and commercial area connected to public low-voltage line)!

- Install the control cabinet or system in an appropriate and correct manner (see chapter “control cabinet installation”)
- To avoid coupled noise, separate during installation high voltage supply lines, motor lines, control and data lines (low-voltage level < 48V) and leave a space of at least 6.0 inches, 15 cm between them.
- In order to maintain low-resistance high frequency connections, grounding and shielding, as well as other metallic connections (e.g. mounting plate, installed units), must be made with bare metal to metal contact with the mounting plate, over as large a surface area as possible. Use ground conductors with a section as large as possible, minimum #4 AWG (16mm<sup>2</sup>) or use thick ground straps.
- Only use shielded cable with copper or tin-plated braid, since steel braid is not suitable for high frequency ranges. The shield must always be connected to the ground bare on the unit or fastened with clamps to the bare metal of the sub mounting plate. Do not connect the shield using the drain wires alone, this reduces the effectiveness of the shield by 70%!
- If external interference suppression filters are used, then these must be installed as close as possible <12 inches (30 cm) to the interference source and must be in metal to metal contact with the sub mounting plate, over as large a surface area as possible.
- Always equip inductive control elements, (contactors, relays etc.), with suppressors such as varistors, RC-elements or diodes.

All connections must be kept as short as possible and as close as possible to the ground plane. Free floating cables act as active and passive antenna.

- Keep connection cables straight (do not loop). Tie all spare unassigned wires at one end to the ground.
- The twisted pair cables should be used when the conductors are not shielded in order to dampen common-mode noise.
- The cable for phase synchronization between the commutation choke and COMBIVERT R6-S may not exceed a line length of 39 inches (1 m) .
- Further information can be found on the internet, see “[www.kebamerica.com](http://www.kebamerica.com)”.

### 3. Technical Data

### 3. Technical Data

Unit size		25
Housing size		R
Phases		3
permitted mains forms	5)	TN, TT
Rated voltage	[V]	400
Mains voltage range	[V]	305...528
Mains frequency	[Hz]	50 / 60 ±2
DC voltage range	[V <sub>DC</sub> ]	420...747
Regenerative operation		
Output rated power	Sn [kVA]	153
Rated active power	[kW]	140
Max. power output	[kVA]	230
Max. active power	[kW]	210
Regenerative rated current	*) [A]	221 (184)
Regenerative DC current	1) [A <sub>DC</sub> ]	270
Over load current (E.OL) 60s	2) [A]	331
Max. regenerative DC current 60s	[A <sub>DC</sub> ]	405
Power supply operation		
Input rated power	Sn [kVA]	153
Rated active power	[kW]	140
Max. input power	[kVA]	230
Max. active power	[kW]	210
Rated supply current	*) , 3) [A]	221 (184)
DC supply current	1) [A <sub>DC</sub> ]	270
Overload current (E.OL) 60s	[A]	331
Max. DC supply current 60s	[A <sub>DC</sub> ]	405
Overload disconnection (E.OL)	[%]	160
Overvoltage switch-off (E.OP)	[V <sub>DC</sub> ]	840
Output rated voltage	[V <sub>DC</sub> ]	540
Max. permissible DC link capacity	4) [mF]	50 (400 V class) 35 (480 V class)
Max. permissible total load current at precharging (I <sub>LSF</sub> )	[A <sub>AC</sub> ]	≤4
I <sup>2</sup> t Integral of the limiting load of the semiconductor	[A <sup>2</sup> s]	39000
Max. permissible mains fuse type gR / aR	[A]	315
Permissible mains fuse (no delta power system)		Siemens 3NE8731 / Eaton Bussmann 170M1372 or 170M1422
Permissible mains fuse (no delta power system) for UL		Ferraz Shawmut HSJ300, rated 300A / 600Vac
Max. permissible DC fuse Bussmann Type aR		see options
Short-circuit factor at the connection point (S <sub>kn</sub> /S <sub>n</sub> ) or (S <sub>scp</sub> /S <sub>n</sub> )		15 < S <sub>kn</sub> <sup>4</sup> /S <sub>n</sub> < 350
Power loss at nominal operating	[W]	1300
Max. heat sink temperature	[°C]	88

\*) The values in brackets must be observed when UL approval is required!

1) Lay two connection cables parallel at supply and regenerative current > 230 A DC.

2) The overload current is specified for 1 minute. The overload cycle is 300 seconds. This corresponds to duty class 2 EN2-60146-1.

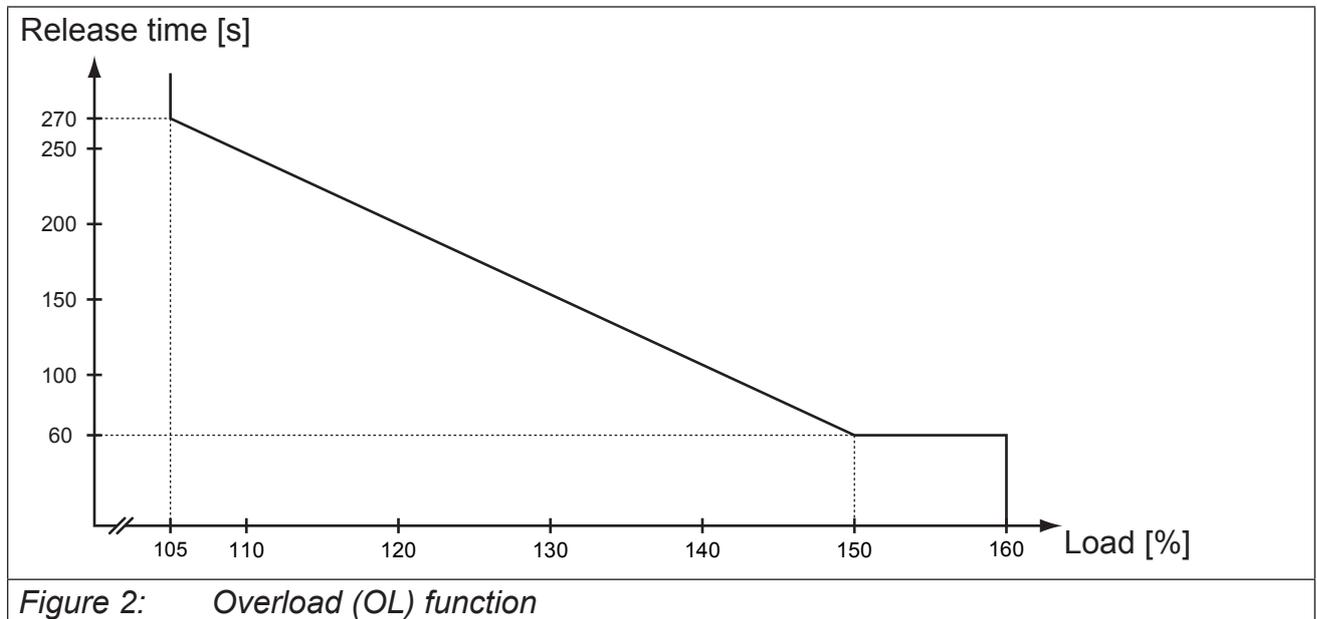
3) The current data are based on a fundamental frequency component of g=0.95. The fundamental frequency component or the effective value of the input current is dependent on load and line supply conditions. At uncontrolled B6 converters the phase angle cosφ1 can be set to one, so the value of the fundamental frequency components is equal to the value of the power factor.

4) Please contact KEB for higher values.

5) Connection to IT and delta power systems after consultation KEB.

	Voltage stabilization must be activated at the inverter if a harmonic filter is used. If a harmonic filter is used, voltage stabilization must be activated for the inverter which is connected to the DC circuit.
	Exceeding of the max. rechargeable DC link capacity can lead to a defect.
	A load removal in the DC link circle may be done only after the message „ready“.
	If the control release is set when switching off the mains, this can lead to an overcurrent error and the lifetime of the module can be reduced.
	The load must be disconnected in case of overcurrent or overload.
	The device must be disconnected from the mains supply if a mains fuse has triggered.

### 3.1 Overload (OL) function



### 3. Technical Data

#### 3.2 Operating conditions

		Standard	Standard/ class	Instructions
<b>Definition according to</b>		EN 61800-2		Inverter product standard: <b>rated specifications</b>
		EN 61800-5-1		Inverter product standard: <b>general safety</b>
<b>Site altitude</b>				max. 2000 m above sea level (with site altitudes over 1000 m a derating of 1% per 100 m must be taken into consideration)
<b>Ambient conditions during operation</b>				
Climate	Temperature	EN 60721-3-3	3K3	extended to -10...45°C (with temperature over 45°C to max. 55°C a derating of 5% per 1 K must be taken into consideration)
	Humidity		3K3	5...85% (without condensation)
Mechanical	Vibration		3M1	max. amplitude of a vibration 1 mm (5...13 Hz) max. acceleration amplitude 7 m/s <sup>2</sup> (13...200 Hz)
Contamination	Gas		3C2	
	Solids	3S2		
<b>Ambient conditions during transport</b>				
Climate	Temperature	EN 60721-3-2	2K3	
	Humidity		2K3	(without condensation)
Mechanical	Vibration		2M1	max. vibration amplitude 3.5 mm (2...9 Hz) max. acceleration amplitude 15 m/s <sup>2</sup> (9...200 Hz)
	Surge		2M1	max. 100 m/s <sup>2</sup> ; 11 ms
Contamination	Gas	2C2		
	Solids	2S2		
<b>Ambient conditions for the storage</b>				
Climate	Temperature	EN 60721-3-1	1K4	
	Humidity		1K3	(without condensation)
Mechanical	Vibration		1M1	max. amplitude of a vibration 1 mm (5...13 Hz) max. acceleration amplitude 7 m/s <sup>2</sup> (13...200 Hz)
	Surge		1M1	max. 100 m/s <sup>2</sup> ; 11 ms
Contamination	Gas	1C2		
	Solids	1S2		
<b>Type of protection</b>		EN 60529	IP20	
<b>Environment</b>		IEC 664-1		Pollution degree 2
<b>Definition according to</b>		EN 61800-3		Inverter product standard: <b>EMC</b>
<b>EMC emitted interference</b>				
Cable-based interferences	EN 55011	C2	with EMC filter & ferrite up to 100m line length	
Radiated interferences	EN 55011	C2	with EMC filter and ferrite	
<b>Interference immunity</b>				
Electro-static discharge	EN 61000-4-2	8 kV	AD (air discharge) and CD (contact discharge)	
Burst - control lines + bus	EN 61000-4-4	2 kV		
Burst - mains supply	EN 61000-4-4	4 kV		
Surge - mains supply	EN 61000-4-5	1 / 2 kV	Phase-phase / phase-ground	
Immunity to conducted disturbances, induced by radio-frequency fields	EN 61000-4-6	10 V	0.15-80 MHz	
Electromagnetic fields	EN 61000-4-3	10 V/m		
Voltage variation / voltage drop	EN 61000-2-1		+10%, -15%; 90%	
Voltage unsymmetries / frequency changes	EN 61000-2-4		3%; 2%	

### 3.3 Accessories

Unit size	25
Rated voltage	400 V
Commutation choke	25Z1B04-1000
Synchronization unit	00R6940-2407 Control cabinet installation; max. distance to the power supply and regenerative unit 1m
Sync cable	00F50C3-4010 Length 1 m for connection of the synchronization unit with R6 regenerative unit

### 3. Technical Data

#### 3.4 Options

Unit size	25
HF radio interference filter (EMC)	For an ED of max. 82 % -> 24E6T60-3000 For an ED of 100 % -> 25E4T60-1001 in accordance with EN 61800-3 C2 (only with ferrite rings) C1 (after consultation with KEB)
DC fuses	690V/400A Mat.No. 009025H-4651
Micro switch for fuse 009025H-4651	0090278-0001
Fuse holder for NH00 and NH000 fuses	0090574-0001
Harmonic filter (no UL certification)	25Z1C04-1000 <sup>2)</sup> Please contact KEB for data to the THD value at regenerative operation in accordance with EN 61800-2-12.
Harmonic filter (with UL certification)	Compliance with the IEEE519 requirements at a 480V / 60Hz mains is possible with the following harmonic filter: 22Z1C05-1000, 23Z1C05-1000, 24Z1C05-1000, 25Z1C05-1000
Operators	Digital operator, interface operator
Bus operators	CAN®, ProfiBus®, INTERBUS®, EtherCAT®, Ethernet®, Sercos, ModBus, PROFINET® <sup>3)</sup> , LCD, Devicenet, HSP5
<sup>1)</sup>	The ON time ED refers to the regenerative unit R6-S
<sup>2)</sup>	Depending on the load, the following harmonic filters are also possible with the technical data given therein: 20Z1C04-1000, 21Z1C04-1000, 22Z1C04-1000, 23Z1C04-1000, 24Z1C04-1000
<sup>3)</sup>	ProfiNet from operator firmware V3.4 of 30.01.2015

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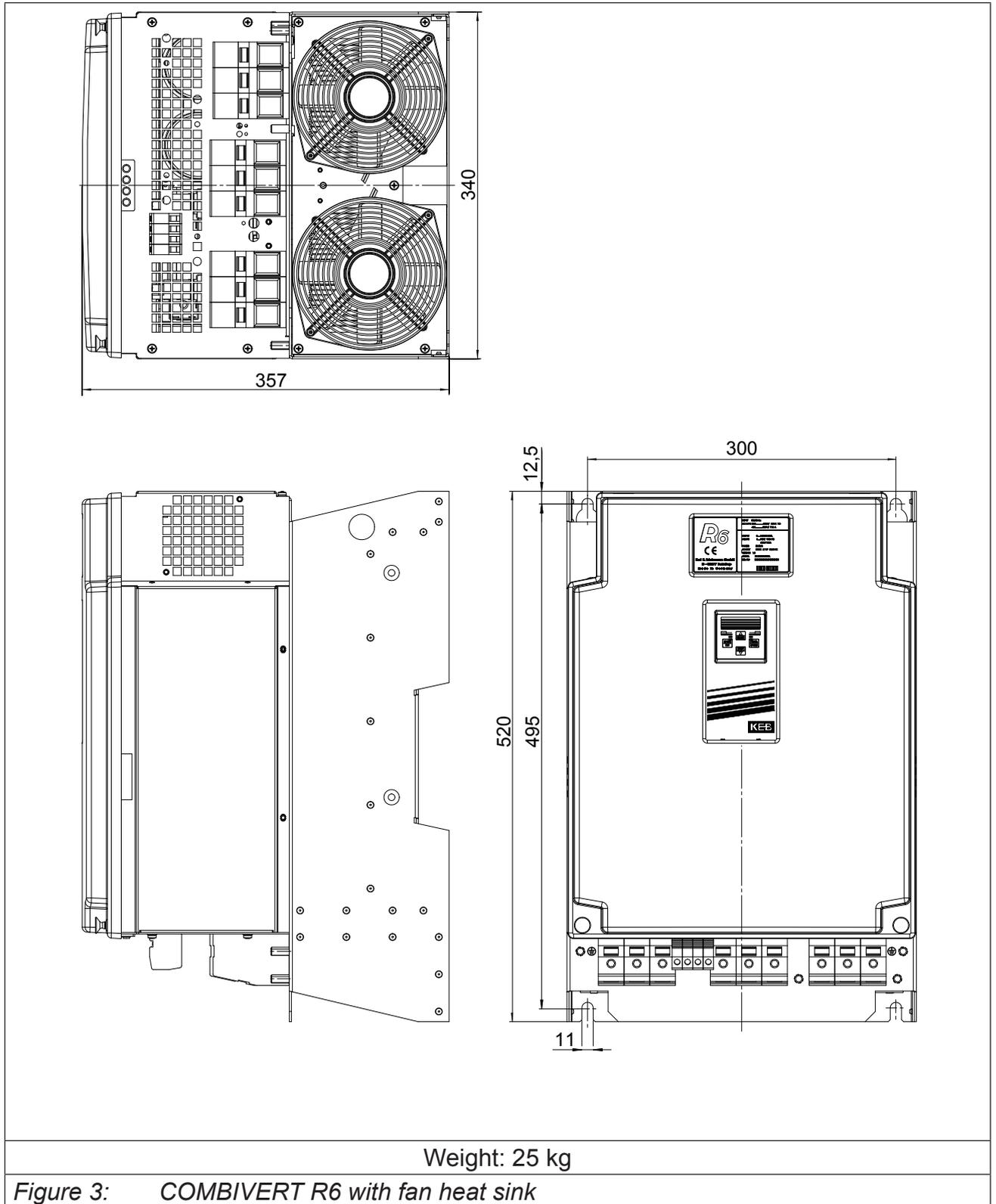
### 3.4.1 Ferrite rings

Ferrite rings are used for the reduction of the cable-based and radiated interferences. For high damping, the ferrite rings are attached as close as possible to the interference source, i.e. at the DC bus connections and at the motor output terminals of the frequency inverter. The conductors must be passed through the ferrite core for use as a current-compensated choke. PE must be passed outside of the ferrite ring. Further information can be taken from the provided documentation. Which ferrite ring shall be used is dependent on the used cable cross-section.

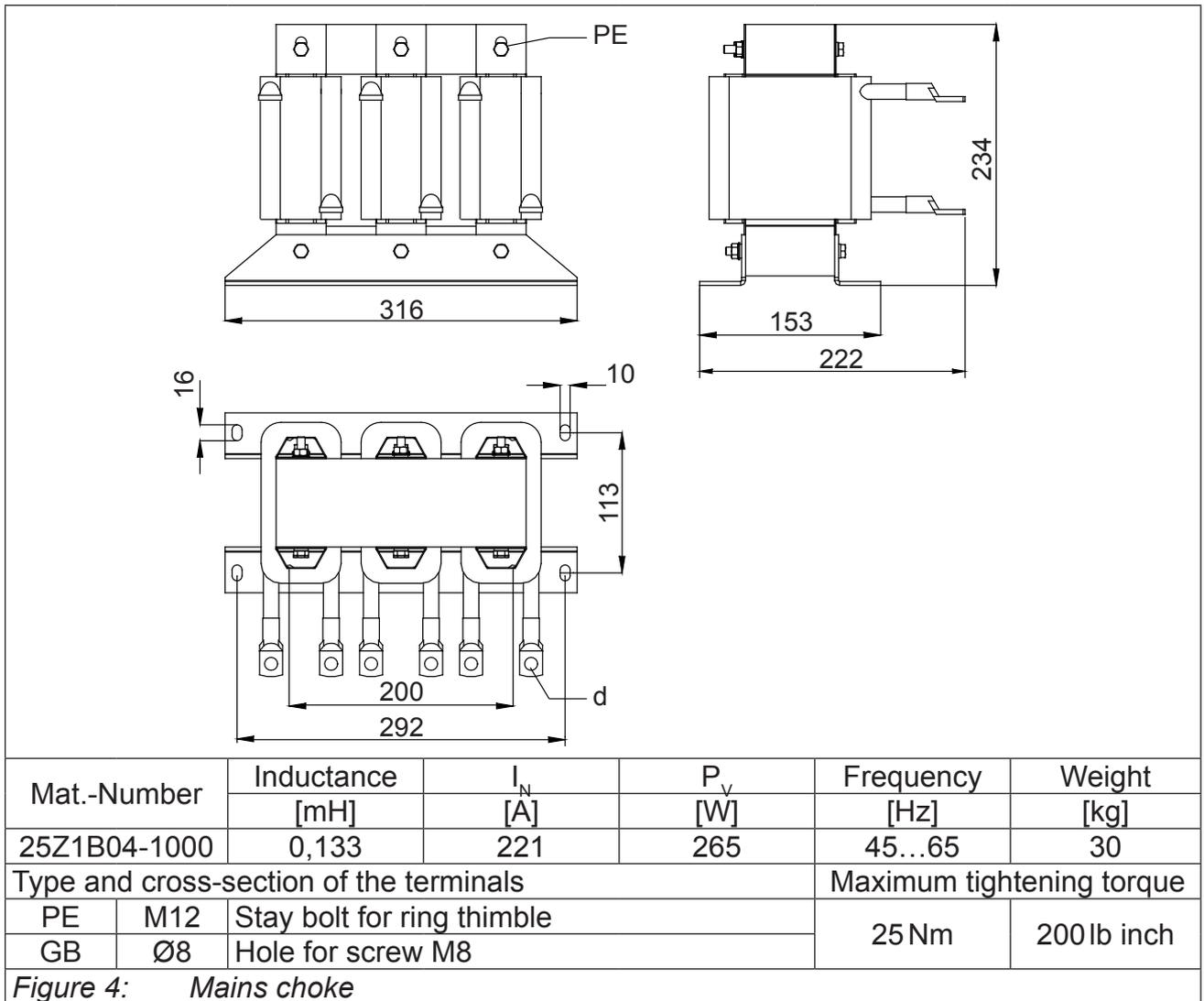
Part number	Nominal size in mm	Inside diameter in mm
0090396-2621	R 42/26/18	24.9
0090390-5241	R 56/32/18	29.5
0090395-3820	R 63/38/25	36.0
0090395-5222	R 87/54/30	54.5
0090395-5520	R 102/66/15	64.5

### 3.5 Dimensions and weights

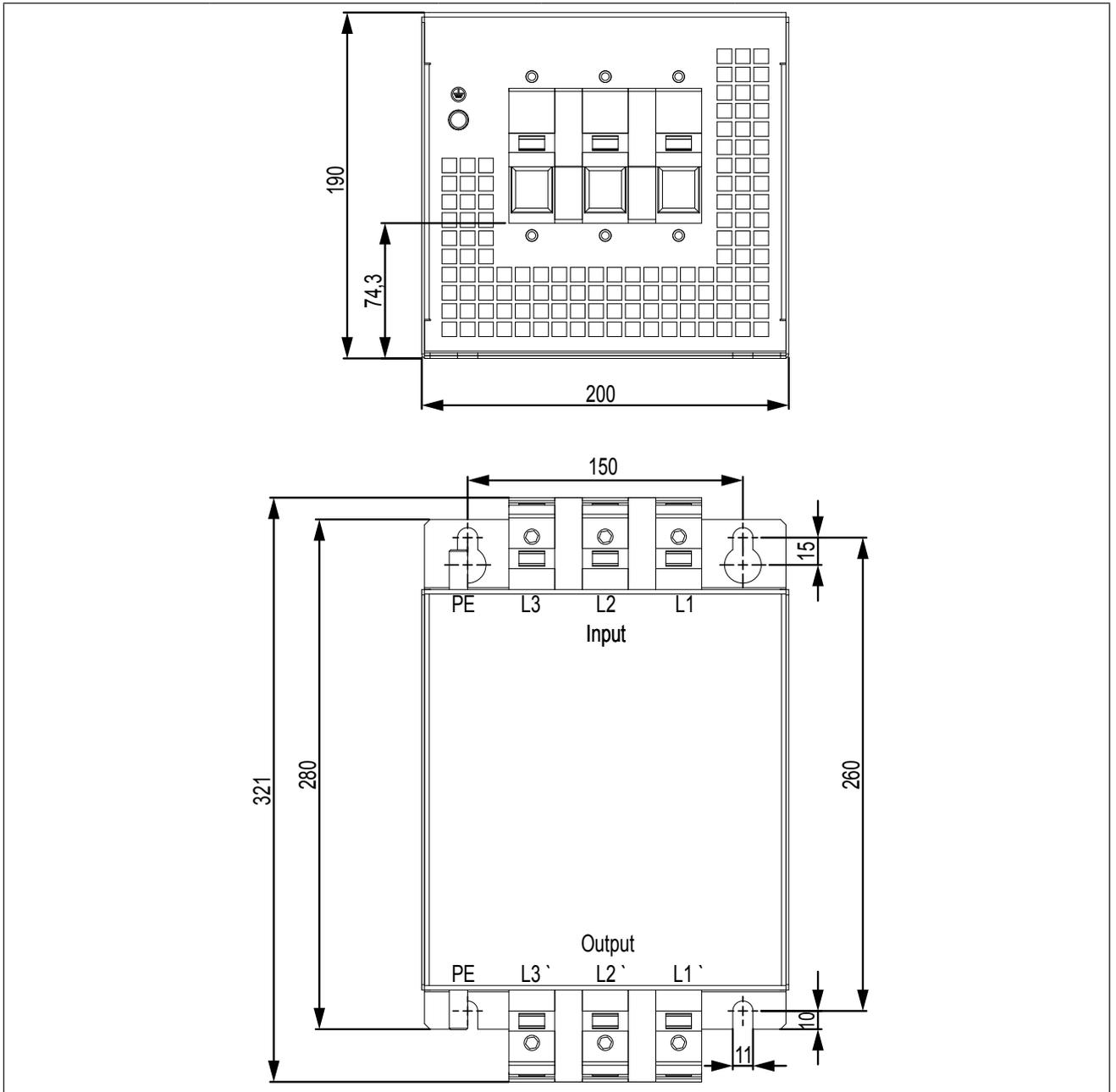
#### 3.5.1 Dimensions air cooling system mounted version



### 3.5.2 Commutation reactor / mains choke



### 3.5.3 Radio interference filter (side-mounted)



Mat.-Number	$U_N$	$I_N$	$P_V$	$f_N$	Weight
	[V]	[A]	[W]	[Hz]	[kg]
24E6T60-3000	3x480	200	100	50 / 60 ± 2	9.2
Type and cross-section of the terminals/-cable				Maximum tightening torque	
PE	M10 stay bolt for ring thimble			35 Nm / 310 lb inch	
Terminals L1, L2, L3, L1', L2', L3'	35...95 mm <sup>2</sup> / AWG 4...AWG 4/0			15 Nm / 133 lb inch	

Figure 5: Radio interference filter 24E6T60-3000 (side-mounted)

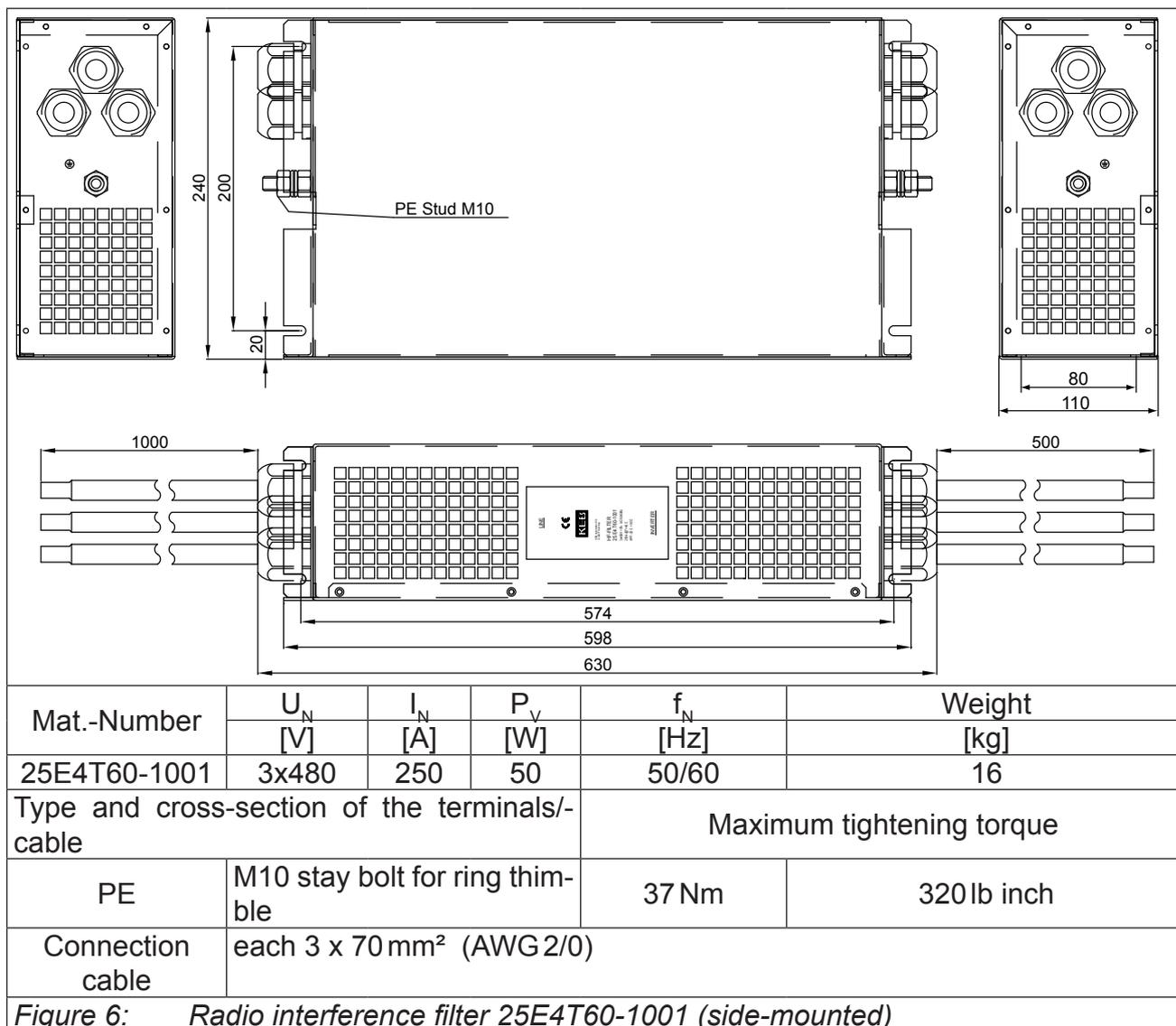
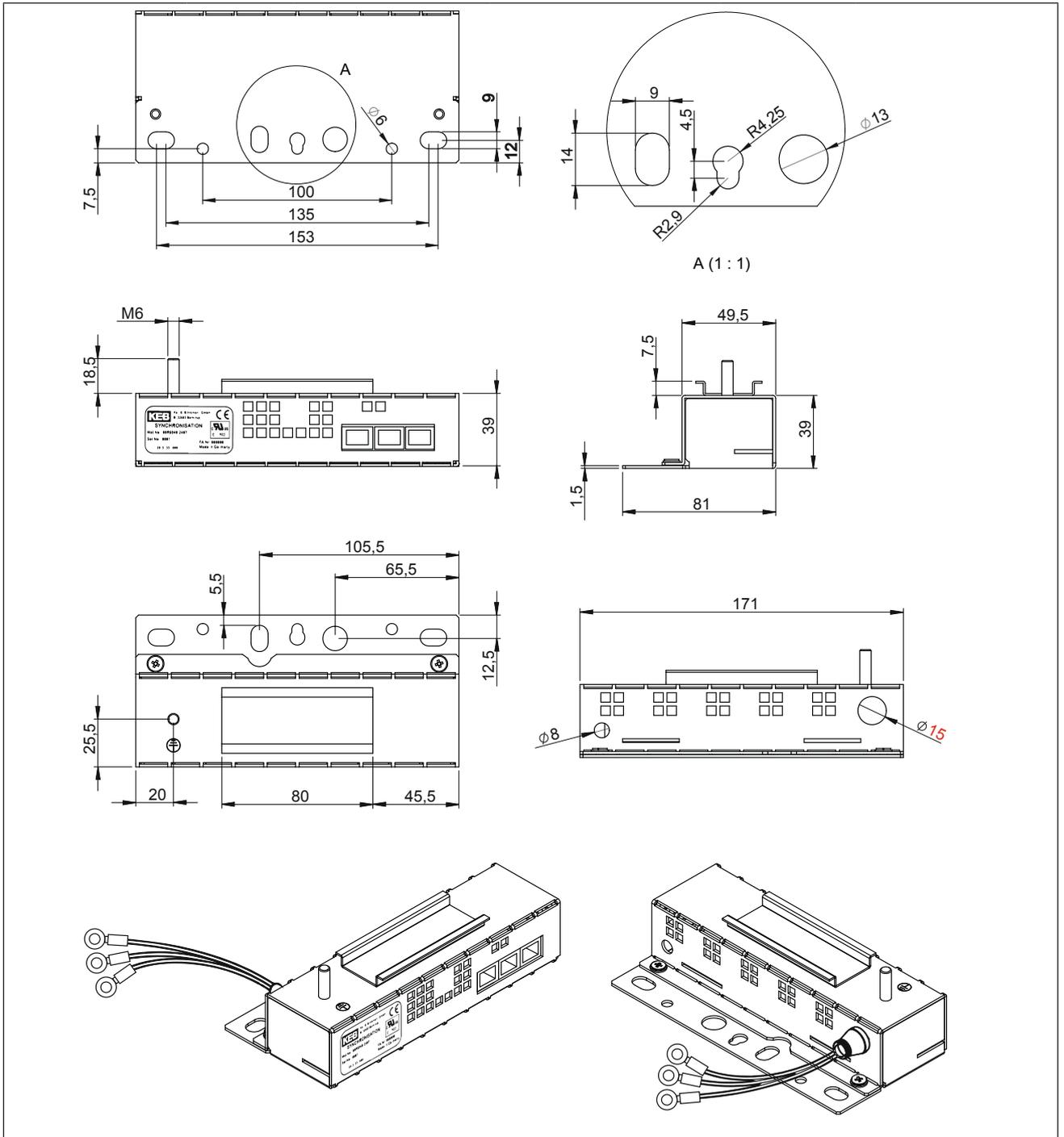


Figure 6: Radio interference filter 25E4T60-1001 (side-mounted)

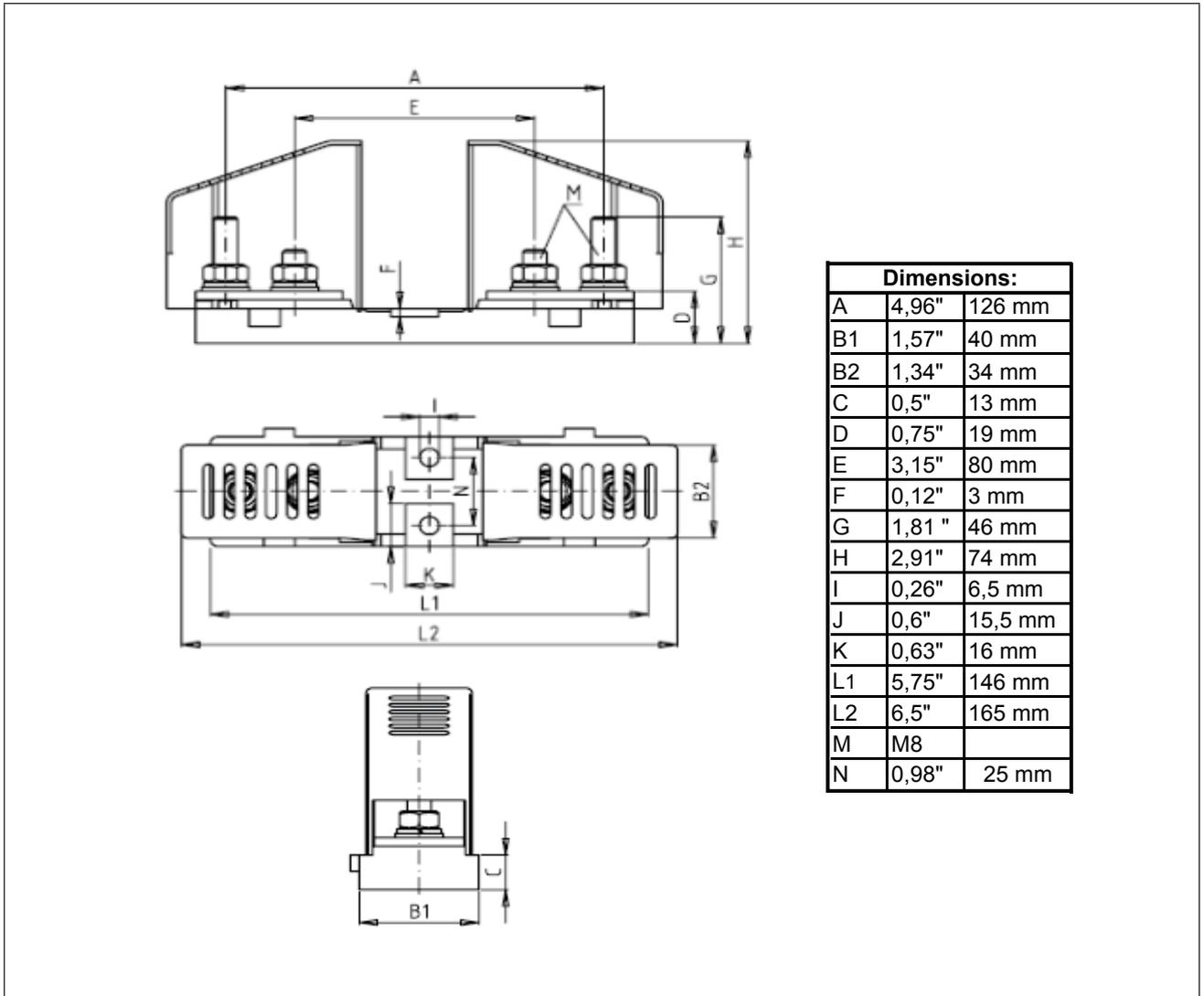
### 3.5.4 Synchronization unit



Part number	Weight	Terminal	connection	Line length	Max. tightening torque
00R6940-2407	0.65 kg	PE	M6 stay bolt for ring thimble	-	4.5 Nm / 40 lb inch
		L1.1, L2.1, L3.1	M4 ring cable lug (AWG 16)	240 mm	-

Figure 7: Synchronization unit

### 3.5.5 Fuse holder with cover



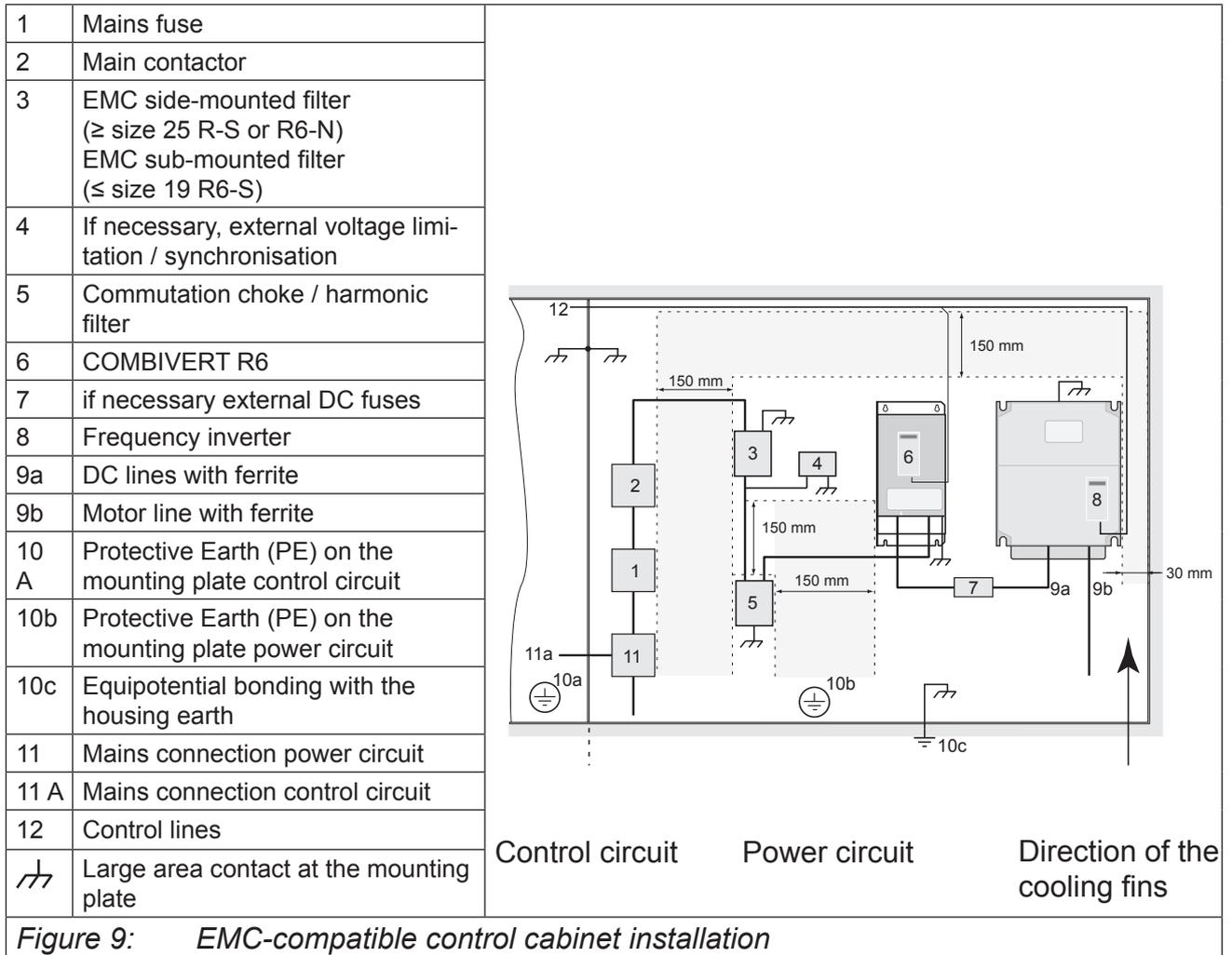
Part number: 0090574-0001

Figure 8: Fuse holder

## 4. Installation

### 4. Installation

#### 4.1 EMC-compatible control cabinet installation



#### 4.2 Installation instructions

	<ul style="list-style-type: none"> <li>• Install and ground the R6 on a stationary system.</li> </ul>
	<ul style="list-style-type: none"> <li>• Mist, water, or other liquids and vapors must not be allowed to permeate the device.</li> </ul>
	<ul style="list-style-type: none"> <li>• Allow for sufficient heat dissipation if installed in a dust-proof housing.</li> </ul>
	<ul style="list-style-type: none"> <li>• When operating the COMBIVERT in an explosion proof environment, install the unit in an appropriate enclosure in accordance with the local regulations and codes.</li> </ul>
	<ul style="list-style-type: none"> <li>• Protect COMBIVERT against conductive and aggressive gases and liquids.</li> </ul>
	<ul style="list-style-type: none"> <li>• For EMC reasons, the lines between R6 and commutation reactor/harmonic filter must be limited to &lt; 1m or shielding must be carried out.</li> </ul>
	<ul style="list-style-type: none"> <li>• The frequency inverters must be placed in the immediate vicinity of the R6-S.</li> </ul>

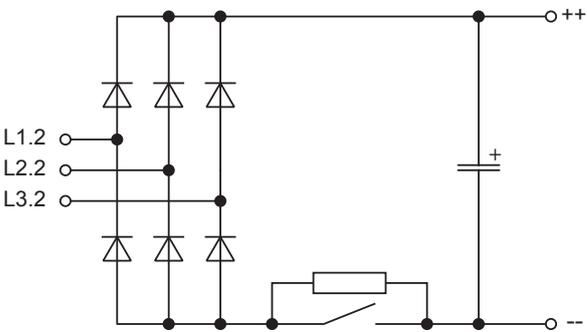
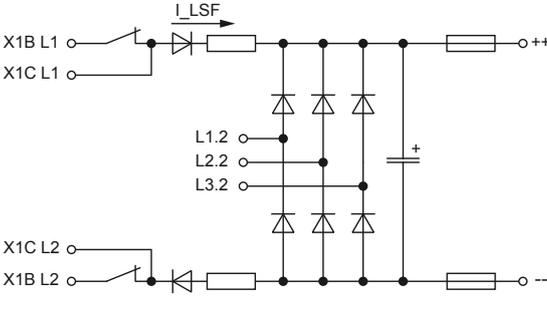
## 4.3 Connection of the COMBIVERT R6

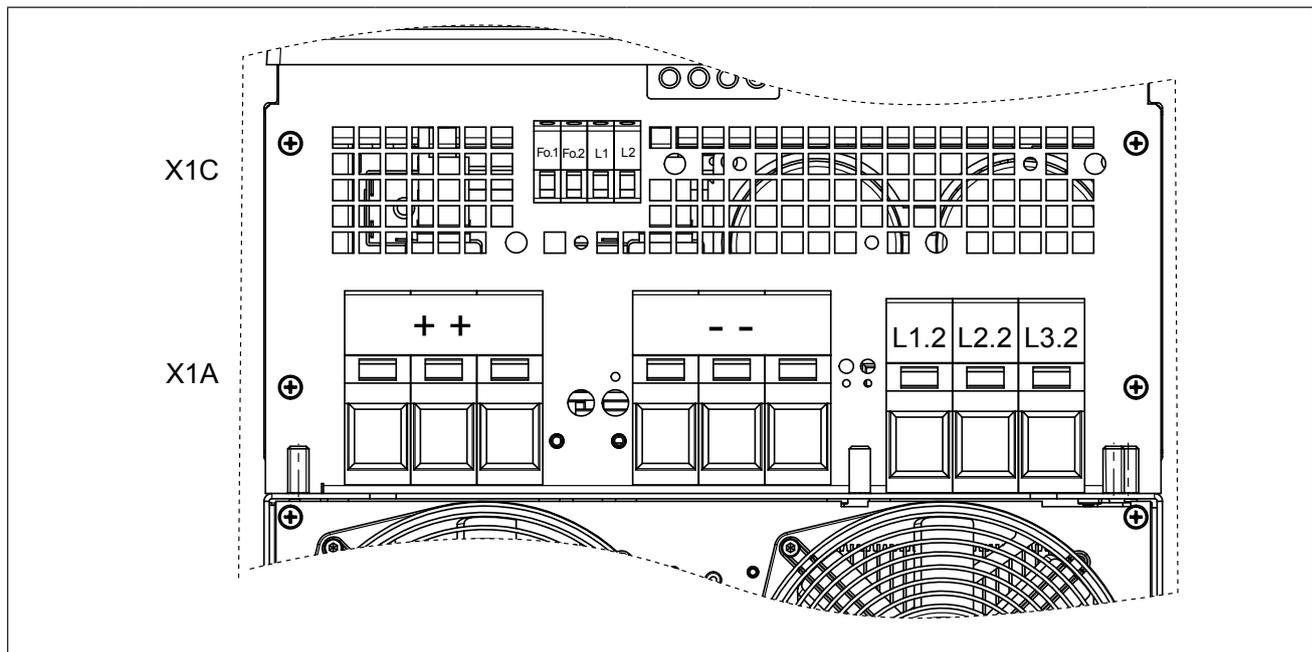
### 4.3.1 General description of inverter input terminals

	<p><b>Starting current limiting</b></p> <p>When connecting inverters to a DC bus pay attention to the internal wiring of the DC voltage inputs! Inverters that directly output the DC link bus to the DC terminals must be integrated into the DC bus in a way that the supply unit(s) limit the starting current. The precharging must be completed within ten seconds.</p>
	<p><b>Maximum DC link capacity</b></p> <p>The maximum DC link capacity can be calculated by adding the DC link capacities of all inverters in the DC bus. The supply source (supply unit or inverter with AC input) must be suitable for this value.</p>

Terminals	Description of terminals at KEB inverters
++, --	DC voltage input with starting current limiting; usable as output only if all units supplied by the DC bus have a starting current limiting at the DC voltage input.
+(PA), -	DC voltage output with starting current limiting; usable as input only if the starting current is limited by the supply source.
PA, PB	Connection for braking resistor; optionally only if a braking transistor is installed
L1, L2, L3	Mains input 3-phase

### 4.3.2 Connection terminals of the power circuit

	<p>All terminal strips meet the requirements on EN 60947-7-1 (IEC 60947-7-1)</p>
	<p><b>View of power supply and regenerative units</b></p> <p>The terminals of a power supply and regenerative unit can be input or output dependent on the actual operating status (power supply or regeneration). For standardization, the line side is always regarded as input and the DC voltage side is always regarded as output.</p>
<p>Equivalent circuit diagram for R6-S in E housing</p>	<p>Equivalent circuit diagram for R6-S in R housing with internal DC fuses</p>
	
<p>Terminals</p>	<p>Description of terminals at KEB inverters</p>
<p>++, --</p>	<p>DC voltage output with starting current limiting for loading the connected inverters; usable as input for regenerative operation. If inverters with mains supply of type A1 or A2 (see 4.3.1) are available in the DC bus, these may be switched to mains only after loading the DC bus. Note the maximum DC link capacity or decoupling diodes!</p>
<p>L1.2, L2.2, L3.2</p>	<p>Mains input 3-phase coming from the commutation reactor</p>
<p><i>Figure 10: Description of the input terminals of the COMBIVERT R6</i></p>	



Terminal	Name	Function
X1A	L1.2, L2.2, L3.2	3-phase mains connection to the commutation choke
	+, --	DC voltage output with starting current limiting; Connection for the inverter, the connection terminals are each internally connected in parallel.
X1C	Fo.1, Fo.2	NC contact for safety monitoring (250Vac /2A, 24Vdc / 0.4A <sup>1)</sup> )
	L1, L2	precharging
PE		Connection for shielding /earthing

<sup>1)</sup> Min. 20V / 30mA

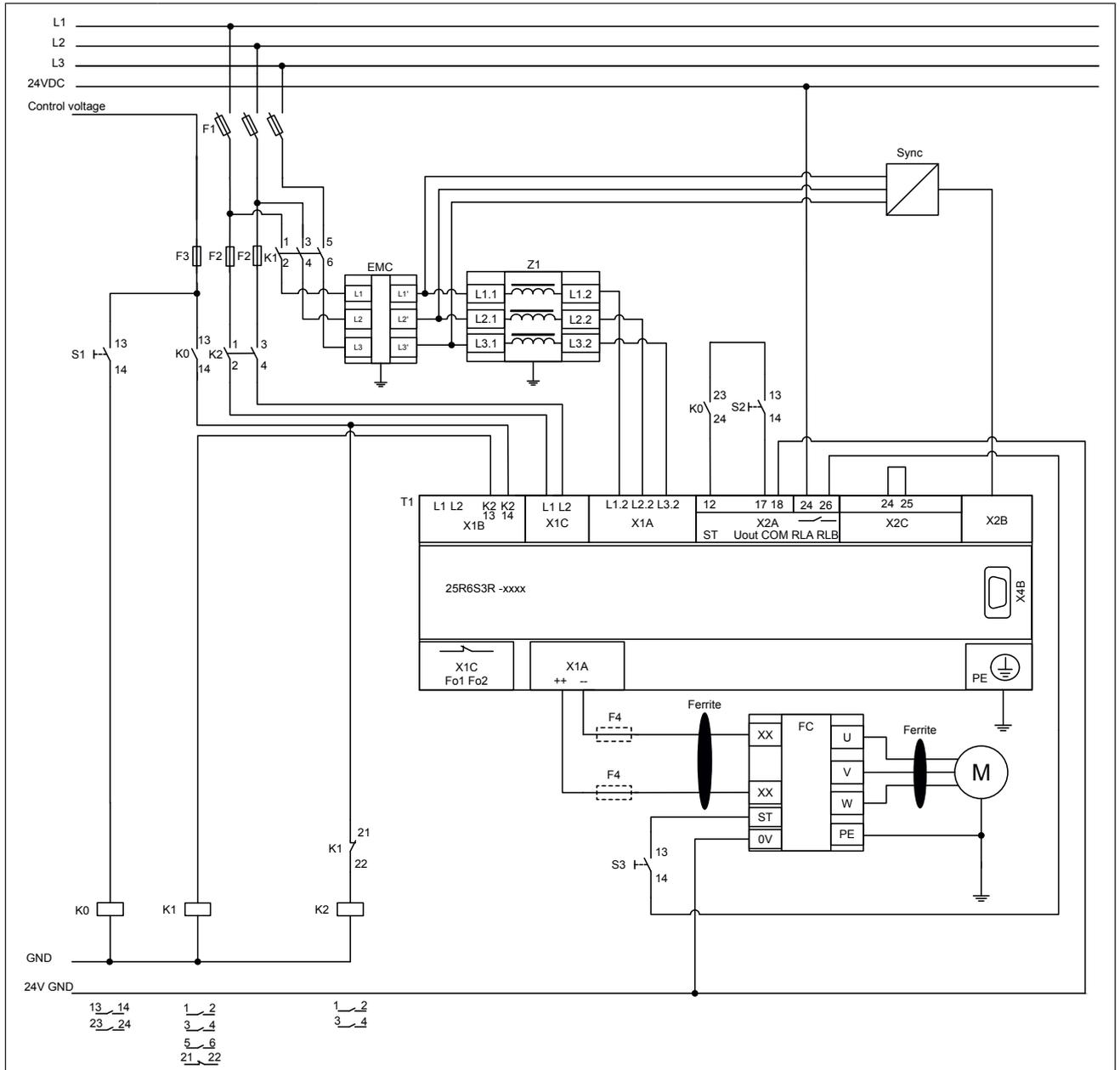
Type and cross-section of the terminals	Conductor cross-section [mm <sup>2</sup> ]		Tightening torque	
	min	max	Nm	lb inch
Screw terminals (8mm internal hexagon)	35	95	15...20	175
Screw terminals Fo.1, Fo.2, L1, L2 (slit)	0.5	16	1.5...1.8	11...20
Stay bolt M10	Stay bolt for ring thimble 10 mm		15...25	133...220

Figure 11: Connection terminals of the power circuit

	Unused terminals must be tightened with the preset torque!
	Mains potential may be at terminals X1A, X1B or X1C (see the following chapter)!

## 4.4 Connection power unit R6-S with UL

### 4.4.1 Power supply and regenerative operation at inverter current $\leq$ inverter current of one COMBIVERT R6-S with UL



F1	Mains fuses type aR/gR	
F2	10A fuse gG/gL or automat characteristic K	
F3	10A fuse gG/gL	
F4	DC fuses type aR/gR (optional)	The cable cross section as well as the DC fuses must be dimensioned to the DC rated current of the load (see technical data of the inverter).
S1/K0	Power on/off	
S2/S3	External control release	
K1	Line contactor with auxiliary contacts	

continued on next page

K2	Pre-charging contactor (400 V / 12 AAC3)	
Sync	Synchronization unit (max. length of the phase lines 1 m)	
Z1	Commutation choke / harmonic filter	
t1	Regenerative unit COMBIVERT R6-S	
	X1A	Power circuit terminals
	X1B	Connection for line contactor
	X1C	Connection for precharging and DC fuse monitoring
	X2A	Control terminal strip (X2A.12: control release; X2A.17: voltage output)
	X2B	Connection for synchronization line
	X2C	Activation of the self-holding of the load shunt relay
EMC	EMC filter	
M	Motor	
FC	Frequency inverter	
K0	Switch on relay	
	Ferrite (optional)	

*Figure 12: Power supply and regenerative operation at inverter current  $\leq$  current of one COMBIVERT R6-S*

### Attention

#### Destruction of the regenerative unit!

- ▶ A load draw may be done only if relay 1 is active.
- ▶ In case of failure disconnect the line contactor with S1/K1 from the supply system.

#### 4.4.2 Power supply and regenerative operation at parallel operation with one frequency inverter

	<p>More information and a detailed wiring diagram can be found under the following link: <a href="https://www.keb.com/ftp/ti_wiring_r6s_diode_fu_0501_0001_gbr.pdf">ti_wiring_r6s_diode_fu_0501_0001_gbr.pdf</a></p>	
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#### 4.4.3 Power supply and regenerative operation at parallel operation with a second regenerative unit

	<p>More information and a detailed wiring diagram can be found under the following link: <a href="https://www.keb.com/ftp/ti_wiring_r6s_para_r6s_0501_0002_gbr.pdf">ti_wiring_r6s_para_r6s_0501_0002_gbr.pdf</a></p>	
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	<p><b>Parallel operation</b> When connecting in parallel operation, the parameter defaults record must be changed. See application instructions R6-S under „Special Functions for the parallel connection“.</p>
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#### 4.4.4 Brief Description of the Pre-Charging Sequence

There are three switches coming from the external controller.

S1 engages the contactor K0, which sub-sequentially engages contactor K2 for system pre-charging. This should be activated first.

S2 enables the R6 unit given that K0 is already engaged.

S3 enables the F5 drive given that there is not fault on the R6 unit.

Sequence of events:

1. S1 switch is closed by the external controller, closing the K0 contactor.
2. K0 13-14 (NO) closes, sending the control voltage (120VAC) to X1B.14 and through K1 21-22 (NC) to the K2 pre-charging contactor coil. Also K0 23-24 (NO) closes, allowing S2 to enable the R6 unit when switched by the external controller.
3. K2 pre-charging contactor closes, allowing L1 and L2 to connect with pre-charging terminals X1C L1 and L2.
4. Once pre-charging is complete, X1B.13 activates contactor K1. K1 closes, allowing L1, L2, and L3 to connect with the main power terminals on the R6 and the auxiliary contact K1 21-22 opens, opening K2 pre-charging contactor so the pre-charging is disconnected.

## 4.5 Connection of the control board version S

### 4.5.1 Assignment of the control terminal strip X2A

X2A					
Conductor cross-section 0.14...1.5 mm <sup>2</sup> , tightening torque 0.22...0.25 Nm					
PIN	Function	Name	Default	Description	Specifications
10	24V input	Uin		External supply of the control board	21.6...26.4 VDC / 1A
11	Mass	COM		Reference potential	
12	Digital input 1	ST		Control release / reset	Ri: 4.4 kΩ
13	Digital input 2	I1	Set selection	programmable	
14	Digital input 3	I2	Set selection	programmable	
15	Digital input 4	I3	Ext. error	programmable	
16	Digital input or output	I/O (I4)		Active signal (connection of all R6 at parallel operation in master-slave mode)	
17	24 V output	Uout		Voltage supply for in- and outputs	approx. 24 V / max. 100 mA
18	Mass	COM		Reference potential	
19	Digital output 1	O1	DC >600 V	Transistor output (DC > CP.19)	I <sub>max</sub> : 25 mA
20	Digital output 2	O2	Error message	Transistor output (error message)	I <sub>max</sub> : 25 mA
21	Analog output	AN-OUT		Difference to mains frequency (CP.18)	0...±10 V / max. 5 mA
22	24 V output	Uout		see terminal 17	
23	Mass	COM		Reference potential	
24	Relay 1 / NO contact	RLA	Ready for operation (no error)	Relay output Ready signal (status "Stb" or "rEGEn")	max. 30 VDC *) 0.01...2 ADC
25	Relay 1 / NC contact	RLB			
26	Relay 1 / switching contact	RLC			
27	Relay 2 / NO contact	FLA	DC > 600 V	Relay output (DC > CP.19)	max. 30 VDC *) 0.01...2 ADC
28	Relay 2 / NC contact	FLB			
29	Relay 2 / switching contact	FLC			

\*) The relay outputs must be operated with max. 48 VDC protective separation voltage to guarantee the CE standard. After consultation with KEB a current of max. 2ADC is permissible for 120 VAC (depending on the switching capacity etc.).

#### 4.5.2 Assignment of the socket X2B

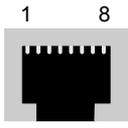
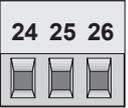
RJ45 socket for phase synchronization and temperature sensor	No.	Name	Function
	1	T1	Connection for temperature sensor (option)
	2	T2	
	3	U13_syn	Synchronization phase 1 / 3
	4	–	reserved
	5	U21_syn	Synchronization phase 2 / 1
	6	–	reserved
	7	U32_syn	Synchronization phase 3 / 2
	8	–	reserved

Figure 13: RJ45 socket

The connection is made with a sync cable 1:1 with the socket X2B, X2C or X2D at the commutation reactor or synchronization unit.

#### 4.5.3 Assignment of the terminal block X2C

		
Conductor cross-section 0.14...1.5 mm <sup>2</sup> , tightening torque 0.22...0.25 Nm		
PIN	Function	Description
24	Bridge between pin 24 and pin 25	Activation of the self-holding of the line contactor
25		
26	not assigned	-

#### 4.5.4 Wiring example

In order to prevent a malfunction caused by interference voltage supply on the control inputs, the following directions should be observed:

 EMC	• Use shielded/drilled cables
	• Lay shield on one side of the inverter onto earth potential
	• Lay control and power cable separately (about 10...20 cm apart); lay crossings in a right angle

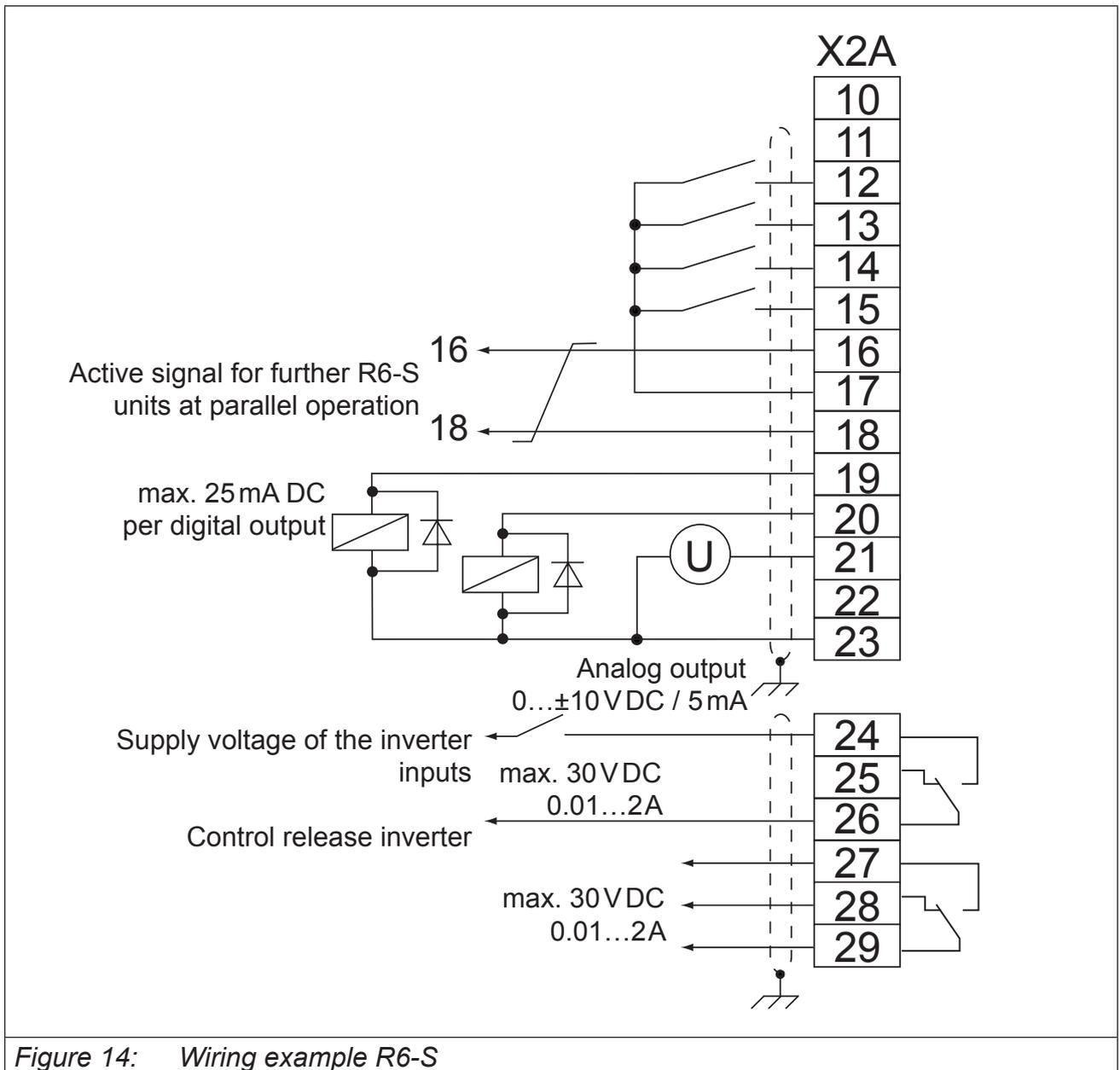


Figure 14: Wiring example R6-S

## 5. Operation of the Unit

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### 5. Operation of the Unit

#### 5.1 Operation with PC and system software COMBIVIS 6

Instructions for the installation and operation of the system software COMBIVIS can be taken from the appropriate software instruction. See [kebblog.com/elevator-support](http://kebblog.com/elevator-support) for videos.

#### 5.2 Switch-on procedure

The COMBIVERT R6-S is initialized after connection of the power supply. The power circuit identification is checked first. If an invalid power unit is recognized, error „E.Puci” (Power unit code invalid) is released and displayed in the operator. This error cannot be reset, the power circuit must be checked.

The COMBIVERT R6-S changes into synchronization phase if a valid power circuit is recognized. The following procedures happen one after another during this synchronization phase:

- Inspection of correct synchronization connection (error "E.nEt" is triggered, if the synchronous signal is missing)
- Inspection of the phase allocation of synchronous signals to the mains phases. Error "E.SYn" is triggered if a phase is missing or in case of phase allocation failure.

The actual line frequency and the mains voltage is determined after successful synchronization. The correct connection of the COMBIVERT R6-S is now ensured. If the control release (terminal ST) is set, the COMBIVERT R6-S starts independently with the normal operation. Depending whether regenerative requirement is available, the COMBIVERT R6-S is in status „rEGEn” or „Stb”.

##### **Status „Stb“**

COMBIVERT R6-S detects a typical voltage level in the DC link circuit of the connected frequency inverter (motor operation) and keeps the modulation signals of the regenerative unit deactivated.

##### **Status „rEGEn”**

If the DC voltage in the DC link (CP.09 or ru.19) exceeds the value of the regeneration level referring to the reference value ru.18, the modulation signals are activated and the unit changes into regenerative operation. Furthermore the regenerative unit is switched active, if regenerative operation is requested by an additional installed COMBIVERT R6-S in the system (master/slave operation).

### 5.3 Parameter summary

The CP parameters are the parameter selections defined by KEB. You need an application manual in order to get access to the entire parameter list.

Display	Parameter	Setting range	Resolution	Factory
CP.0	Password input	0...9999	1	-
CP.1	Status display	-	-	Read Only
CP.2	Main Line Frequency	-	0.1 Hz	Read Only
CP.3	AC-Phase current L1	-	0.1 A	Read Only
CP.4	AC-Phase current L2	-	0.1 A	Read Only
CP.5	AC-Phase current L3	-	0.1 A	Read Only
CP.6	Actual Load	-	1%	Read Only
CP.7	Actual Load / peak value	-	1%	Read Only
CP.8	DC output current	-	0.1 A	Read Only
CP.9	Actual DC voltage	-	1V	Read Only
CP.10	DC voltage / peak value	-	1V	Read Only
CP.11	Heat sink temperature	-	1°C	Read Only
CP.12	Over load counter	-	1%	Read Only
CP.13	Active power	-	0.1 kW	Read Only
CP.14	Total regen kWhr counter	-	0.1 kWh	Read Only
CP.15	Total motor kWhr counter	-	0.1 kWh	Read Only
CP.16	Total net kWhr counter	-	0.1 kWh	Read Only
CP.17	Apparent power / Line input	-	0.1 kVA	Read Only
CP.18	Analog output 1 / amplification factor	-20.00...20.00	0.01	1.00
CP.19	DC bus switching level	+/-30000.00	0.01	550.00
CP.20	Auto error reset counter	0...10	1	3
CP.21	Last Error	-	-	Read Only
CP.22	Last Error 1	-	-	Read Only
CP.23	Last Error 2	-	-	Read Only
CP.24	Last Error 3	-	-	Read Only
CP.25	Last Error 4	-	-	Read Only
CP.26	Last Error 5	-	-	Read Only
CP.27	Last Error 6	-	-	Read Only
CP.28	Last Error 7	-	-	Read Only
CP.29	Software version	-	-	1.4
CP.30	Software date code	DDMM.Y	-	Read Only
CP.32	Pulse off level	-100kW...0.0kW	0.1kW	-0.8kW
CP.33	Operating mode	0...3	1	0
CP.34	Control angle	0.0...60.0	0.1	22.0
CP.35	Input Type	PNP or NPN	-	PNP

	<b>Approach of the working meters</b>
	The displayed values of the working meters offer only an estimate value because of measurement and calculation inaccuracies. These displayed values are unsuitable for tariff applications and cannot replace any measuring devices.

## 5.4 Monitoring and analysis parameters

The following parameters serve for the functional monitoring during operation.

No.	Name	r/w	Enter	Origin
CP.01	status display	–	–	ru.00
The status display shows the actual working conditions of the COMBIVERT.				
<b>Status Messages</b>				
rEGEn	Regeneration active (regenerative operation)			
bbL	Count down of the base-block time, R6-S released			
noP	„no Operation“ control release not bridged, modulation switched off			
nEtoF	Mains power failure; regenerative operation is further possible, if the disconnecting time E.nEt (Pn.14) > 0 s			
Stb	R6-S regenerative unit in stand-by operation (motoric operation)			
<b>Error Messages</b>				
E.dOH	„ERROR! overheat choke“, temperature monitoring of the commutation choke has triggered and the cooling-off period is up.			
E. EF	„ERROR! external fault“, error message by an external unit			
E.FnEt	„ERROR! mains frequency“, the mains frequency deviates more than 5 %. The max. mains frequency deviation can be adjusted in the application mode with CS.03.			
E.LSF	ERROR! load-shunt defective or input voltage too low. This message is displayed for a short time during the power-on phase (no error message follows).			
E.nEt	„ERROR net“, one or more phases are missing			
E.nOH	no ERROR overheat pow.mod. (E.OH) not any longer present, error can be reset.			
E.nOL	No Over Load, cooling time after E.OL is up , error can be reset.			
E. OC	„ERROR overcurrent, output current too high or ground fault			
E. OH	„ERROR overheat pow.mod.“, overheating at heat sink (see „Technical data“)			
E.OHI	„ERROR overheat internal“, temperature in the interior > 70°C			
E. OL	„ERROR overload, overload monitoring of the regenerative unit has responded			
E. OP	„ERROR overpotential, DC link voltage too high			
E.PFd	„ERROR initialisation“, power failure (phase) during the initialisation phase			
E. Pu	„ERROR power unit“, power unit code is missing, load shunt relay defective			
E.Puci	„ERROR pow.unit code inv.“ power unit code is invalid			
E.Puch	„ERROR power unit changed“.			
E.PUIN	„ERROR net“, ripple of the rectified mains voltage too high			
continued on the next page				

No.	Name	r/w	Enter	Origin
CP.01	status display	–	–	ru.00
E.SYn	„ERROR synchronisation, phase allocation at commutation choke not correct			
E. UP	„ERROR underpotential, DC link voltage too low			

No.	Name	r/w	Enter	Origin
CP.02	actual line frequency	–	–	ru.03
<p>After switching on, the actual mains frequency is determined during the initialization phase. Slow changes of the line frequency during the operation are recognized and displayed in CP.02. CP.02 displays the actual regenerative frequency, if the COMBIVERT R6-S is in "netof" status.</p>				
Resolution		Meaning		
0.01 Hz		positive values = clockwise rotating field		
		negative values = counterclockwise rotating field		

No.	Name	r/w	Enter	Origin
CP.03	AC current L1	–	–	ru.08
CP.04	AC current L2	–	–	ru.09
CP.05	AC current L3	–	–	ru.10
Resolution		Meaning		
0.1 A		Display of the actual input current of the respective phase.		

No.	Name	r/w	Enter	Origin
CP.06	actual DC utilization	–	–	ru.13
Resolution		Meaning		
1 %		Independent whether power supply or regenerative operation, the display indicates the actual utilization of the COMBIVERT R6-S. 100 % correspond to the rated current of the COMBIVERT R6-S.		

No.	Name	r/w	Enter	Origin
CP.07	peak DC utilization	–	–	ru.14
Resolution		Meaning		
1 %		Parameter CP.07 enables to recognize short-term peak utilization within an operating cycle. For that the highest value of CP.06 is stored in CP.07. The peak value memory can be cleared by pressing the UP and DOWN key or over bus by writing any value you like to the address of CP.07. Switching off COMBIVERT R6-S also clears the memory.		

No.	Name	r/w	Enter	Origin
CP.08	DC current	–	–	ru.15
Resolution		Meaning		
0.1 A		Display of the calculated DC output current in ampere.		

No.	Name	r/w	Enter	Origin
CP.09	DC voltage	–	–	ru.19
Resolution		Meaning		
1 V		Display of actual DC link voltage in volt. The value is measured at the DC output terminals of the COMBIVERT R6-S.		

No.	Name	r/w	Enter	Origin
CP.10	peak DC voltage	–	–	ru.20
Value range		Meaning		
0...1000 V		Parameter CP.10 enables to recognize voltage peaks within an operating cycle. For that the highest value of CP.09 is stored in CP.10. The peak value memory can be cleared by pressing the UP and DOWN key or over bus by writing any value you like to the address of CP.10. Switching off COMBIVERT R6-S also clears the memory.		

No.	Name	r/w	Enter	Origin
CP.11	power module temperature	–	–	ru.38
Resolution		Meaning		
1 °C		Display of the actual power module temperature. On exceeding the maximum power module temperature (see "technical data") the modulation is switched off and error E.OH is displayed. Message E.nOH is displayed after the cooling period. The error can be reset now.		

No.	Name	r/w	Enter	Origin
CP.12	OL counter display	–	–	ru.39
Resolution		Meaning		
1 %		The permanent load of the COMBIVERT R6-S can be evaluated with this parameter, in order to avoid an E.OL error (in-time load reduction). Error E.OL is released, if the overload counter reaches 100 %.		

No.	Name	r/w	Enter	Origin
CP.13	active power	–	–	ru.81
Resolution		Meaning		
0.1 kW		CP.13 displays the actual power of the COMBIVERT R6-S. Motor power is displayed with positive values, generative power is displayed with negative values.		

No.	Name	r/w	Enter	Origin
CP.14	total regen	–	–	ru.82
Resolution		Meaning		
1 kW		Counter for the regenerative electric work to the mains.		

No.	Name	r/w	Enter	Origin
CP.15	total motor	–	–	ru.83
Resolution		Meaning		
1 kW		Counter for the supplied electrical work from the mains in kWh.		

No.	Name	r/w	Enter	Origin
CP.16	total net	–	–	ru.84
Resolution		Meaning		
1 kW		Display of the difference between supplied and regenerative work. The result is displayed by right sign.		

No.	Name	r/w	Enter	Origin
CP.17	actual net	–	–	ru.85
Resolution		Meaning		
0.01 kVA		Display of the current apparent power at the mains input.		

## 5.5 Special adjustments

The power supply and regenerative unit can be adapted to the application with the following parameters.

No.	Name	r/w	Enter	Origin
CP.18	ANOUT 1 gain	yes	–	An.33
The analog output displays the difference between actual supply frequency and set supply frequency. At factory setting of CP.18 this corresponds to 1 V per 0.1 Hz difference. The display occurs with right sign. The reference value of 50 or 60 Hz is determined during power on.				
Setting range		Setting	Meaning	
0...±20.00		1.00	The amplification to the desired output voltage can be adapted with CP.18. Max. possible: ±10V.	

No.	Name	r/w	Enter	Origin
CP.19	comparison level 0	yes	–	LE.00
This parameter determines the switching level for transistor output O1, as well as relay output 2. When the DC bus voltage drops below this level, the error E.EF(External Fault) will be triggered to indicate mainline voltage sag and high regenerative / supply current.				
Setting range		Setting	Meaning	
0...3200.00 V		600.00 V	The switching condition is fulfilled and the transistor output is set if the DC voltage level exceeds the adjusted value in CP.19. Relay output 2 is set, if the load shunt relay is additionally tightened.	

No.	Name	r/w	Enter	Origin
CP.20	general fault reset	yes	–	Pn.15
		A general fault reset can be activated with this parameter. Attention, the machine manufacturer must observe appropriate protective measures for operators staff and machine.		
Setting range		Setting	Meaning	
0		3	No general fault reset.	
1...10			Maximum errors, which are reset within one hour. If the number of errors per hour exceeds the adjusted value in CP.20, only a manual reset via terminal strip can be made.	

No.	Name	r/w	Enter	Origin
CP.21	last error	–	–	In.24 set 0
CP.22	last error -1	–	–	In.24 set 1
CP.23	last error -2	–	–	In.24 set 2
CP.24	last error -3	–	–	In.24 set 3
CP.25	last error -4	–	–	In.24 set 4
CP.26	last error -5	–	–	In.24 set 5
CP.27	last error -6	–	–	In.24 set 6
CP.28	last error -7	–	–	In.24 set 7

Parameters CP.21...CP.28 display the last eight errors. With exception error "underpotential E.UP" is not stored. The oldest error is displayed in CP.28. A new error is stored in CP.21. All other errors are shifted to the next parameter. The oldest error (CP.28) is not applicable. The meaning of the error messages is described in parameter CP.01.

No.	Name	r/w	Enter	Origin
CP.29	software version	–	–	In.06
	Value range	Meaning		
	0.00...9.99	Display of the inverter software version number (e.g. 1,11).		

No.	Name	r/w	Enter	Origin
CP.30	software date	–	–	In.07
	Value range	Meaning		
	0...6553.5	Display of the inverter software date in the format „ddmm.y“.		

No.	Name	r/w	Enter	Origin
CP.32	puls off level	yes	–	cS.06
	Value range	default	Meaning	
	0.0...-1000.0 kW	-0.8 kW	If the adjusted regenerative power is decreased, the COM-BIVERT R6-S switches the modulation off after turn-off delay and changes into standby mode (display: „Stb“).	

No.	Name	r/w	Enter	Origin
CP.33	operating mode	yes	yes	Pn.19
This parameter determines the master or slave of regenerative units at parallel connection. Further it is adjusted whether a harmonic filter or a commutation choke is series-connected. Single units must be adjusted to master.				
	Value range	Meaning		
	0	Master with commutation choke		
	1	Master with harmonic filter		
	2	Slave with commutation choke		
	3	Slave with harmonic filter		

No.	Name	r/w	Enter	Origin
CP.34	control angle	yes	–	–
Value range		Meaning		
0.0...60.0		This parameter adjust the conduction angle during regen mode. By lowering this value, the audible sound from the commutation choke may be reduced. If the value is too high or too low, available regen power may be limited and random E.OC errors can occur.		

No.	Name	r/w	Enter	Origin
CP.35	input type	yes	–	di.00
Value range		Meaning		
PNP...NPN		This parameter adjusts the inputs for the type of signals; PNP (sourcing) or NPN (sinking).		

## A. Appendix A

### A.1 Certification

#### A.1.1 CE Marking

CE marked power supply and regenerative units were developed and manufactured to comply with the regulations of the Low-Voltage Directive 2014/3/5EU.

The described units must not be started until it is determined that the installation complies with the Machine directive (2006/42/EC) as well as the EMC-directive (2014/30/EU)(note EN 60204).

The power supply and regenerative units meet the requirements of the Low-Voltage Directive 2014/35/EU. The harmonized standards of the series EN61800-5-1 in connection with EN60439-1 and EN60146 were used.

This is a product of limited availability in accordance with IEC61800-3. This product may cause radio interference in residential areas. In this case the operator may need to take corresponding measures.

#### A.1.2 UL Certification

	<p>Acceptance according to UL is marked at KEB power supply and regenerative units with the adjacent logo on the type plate.</p>
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To be conform according to UL for the use on the North American Market the following instructions must be observed (original text of the UL file in English):

- Maximum Surrounding Air Temperature 45°C“
- Suitable For Use On A Circuit Capable Of Delivering Not More Than 100kA rms Symmetrical Amperes, 480 Volts Maximum“ and „When Protected by Fuses as listed below:

Feedback unit Cat. No.	Fuse
25.R6 (400 /480 V)	Type HSJ300 mfr. by Ferraz Shawmut, rated 300A/600Vac, high speed, UL listed NDB6-26

- Use 75°C Copper Conductors Only“
- Use in a Pollution Degree 2 environment
- Writing terminals are marked to show a range of values or a nominal value of tightening torque in pound-inches to be applied to the clamping screws as shown below:
- Mains Terminals of all 25.R6 units: 175 lb-in (20 Nm)



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