

SIMOREG DC Master

Operating Instructions

6RL70 Series

uncontrolled rectifier in circuit B6U



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We have checked that the contents of this publication agree with the hardware and software described herein. Nonetheless, differences might exist and therefore we cannot guarantee that they are completely identical. The information given in this publication is reviewed at regular intervals and any corrections that might be necessary are made in the subsequent printings. Suggestions for improvement are welcome at all times.

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ENGLISH

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1 Safety information

 	WARNING
	<p>Hazardous voltages and rotating parts (fans) are present in this electrical equipment during operation. Non-observance of the safety instructions can result in death, severe personal injury or substantial property damage.</p> <p>Only qualified personnel should work on or around the equipment after first becoming thoroughly familiar with all warning and safety notices and maintenance procedures contained herein. The successful and safe operation of this equipment is dependent on proper handling, installation, operation and maintenance.</p>

Definitions:

- **QUALIFIED PERSONNEL**

For the purpose of this Instruction Manual and product labels, a "Qualified person" is someone who is familiar with the installation, construction and operation of the equipment and the hazards involved. He or she must have the following qualifications:

1. Trained and authorized to energize, de-energize, clear, ground and tag circuits and equipment in accordance with established safety procedures.
2. Trained in the proper care and use of protective equipment in accordance with established safety procedures.
3. Trained in rendering first aid.

- ** DANGER**

indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

- ** WARNING**

indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

- ** CAUTION**

used with the safety alert symbol indicates a potentially hazardous situation which, if not avoided, may result in minor or moderata injury.

- **CAUTION**

used without the safety alert symbol indicates a potentially hazardous situation which, if not avoided, may result in property damage.

- **NOTICE**

NOTICE used without the safety alert symbol indicates a potentially situation which, if not avoided, may result in an undesirable result or state.

NOTE

These operating instructions do not purport to cover all details or variations in equipment, nor to provide for every possible contingency to be met in connection with installation, operation or maintenance.

Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purposes, the matter should be referred to the local Siemens Sales Office.

The contents of these operating instructions shall not become part or modify any prior or existing agreement, commitment or relationship. The Sales Contract contains the entire obligations of Siemens. The warranty contained in the contract between the parties is the sole warranty of Siemens. Any statements contained herein do not create new warranties or modify the existing warranty.

**DANGER**

Converters contain hazardous electrical voltages, Death, severe bodily injury or significant material damage can occur if the safety measures are not followed.

1. Only qualified personnel, who are knowledgeable about the converters and the provided information, can install, start up, operate, troubleshoot or repair the converters.
2. The converters must be installed in accordance with all relevant safety regulations (e.g. DIN VDE) as well as all other national or local regulations. Operational safety and reliability must be ensured by correct grounding, cable dimensioning and appropriate short-circuit protection.
3. All panels and doors must be kept closed during normal operation.
4. Before carrying out visual checks and maintenance work, ensure that the AC power supply is disconnected and locked out. Before the AC supply is disconnected, both converters and motors have hazardous voltage levels. Even when the converter contactor is open, hazardous voltages are still present.
5. When making measurements with the power supply switched on, electrical connections must not be touched under any circumstances. Remove all jewellery from wrists and fingers. Ensure that the test equipment is in good conditions and operationally safe.
6. When working on units which are switched on, stand on an insulating surface, i.e. ensure that you are not grounded.
7. Carefully follow the relevant instructions and observe all danger, warning and cautionary instructions.
8. This does not represent a full listing of all the measures necessary for safe operation of the equipment. If you require other information or if certain problems occur which are not handled in enough detail in the information provided in the Instruction Manual, please contact your local Siemens office.



**CAUTION****Electrostatically sensitive devices**

The converter contains electrostatically sensitive devices. These can easily be destroyed if they are not handled correctly. If, however, it is absolutely essential for you to work on electronic modules, please pay careful attention to the following instructions:

- Electronic modules (PCBs) should not be touched unless work has to be carried out on them.
- Before touching a PCB, the person carrying out the work must himself be electrostatically discharged. The simplest way of doing this is to touch an electrically conductive earthed object, e.g. socket outlet earth contact.
- PCBs must not be allowed to come into contact with electrically insulating materials – plastic foil, insulating table tops or clothing made of synthetic fibres –
- PCBs may only be set down or stored on electrically conducting surfaces.
- When carrying out soldering jobs on PCBs, make sure that the soldering tip has been earthed.
- PCBs and electronic components should generally be packed in electrically conducting containers (such as metallized-plastic boxes or metal cans) before being stored or shipped.
- If the use of non-conducting packing containers cannot be avoided, PCBs must be wrapped in a conducting material before being put in them. Examples of such materials include electrically conducting foam rubber or household aluminium foil.

For easy reference, the protective measures necessary when dealing with sensitive electronic components are illustrated in the sketches below.

a = Conductive flooring

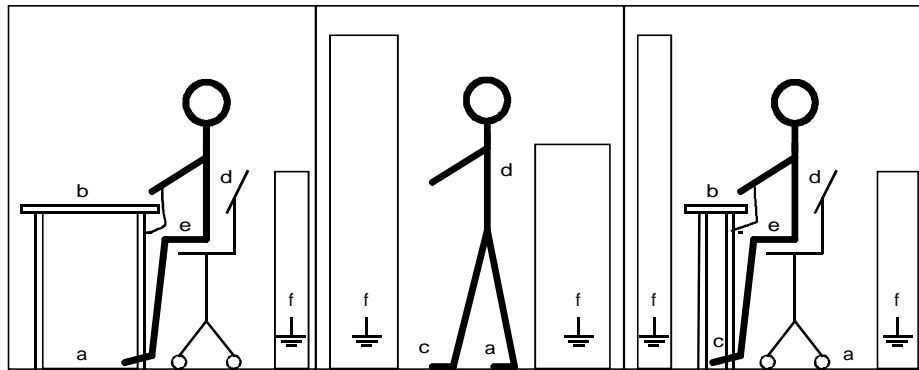
d = Anti-static overall

b = Anti-static table

e = Anti-static chain

c = Anti-static footwear

f = Earthing connections of cabinets





Seated workstation

Standing workstation

Standing/seated workstation

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	WARNING
	<p>Hazardous voltages and rotating parts (fans) are present in this electrical equipment during operation.</p> <p>Non-observance of the safety instructions can result in death, severe personal injury or substantial property damage.</p> <p>Only qualified personnel should work on or around the equipment after first becoming thoroughly familiar with all warning and safety notices and maintenance procedures contained herein.</p> <p>The successful and safe operation of this equipment is dependent on proper handling, installation, operation and maintenance.</p>

2 Description

2.1 Type spectrum

Converter order no.	Type designation
6RL7091 – 6KS00 - 0	D930 /1200
6RL7095 – 4KS00 - 0	D930 /2000
	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> <p>Rated DC voltage</p> </div> <div style="text-align: center;"> <p>Rated DC current</p> </div> </div>

2.2 Design

The design of SIMOREG series 6RL70 uncontrolled rectifiers is based on the 6RA70 series (single quadrant).

The 6RL70 rectifiers are fitted with diodes instead of thyristors, and do not contain any electronic assemblies. The fan voltage is 230V (single phase).

A KTY 84 temperature sensor for monitoring the heat sink temperature is connected to an external evaluation circuit via terminals. The device is also equipped with semiconductor cell fuses.

The load cycle is configured for MASTERDRIVES AC drives (60s overload 1.36 I_B – 240s previous load 0.91 I_B).

2.3 Application

For supplying general-purpose d.c. loads, which allow uncontrolled rectifiers (such as d.c. links for indirect converters in conjunction with a precharging device, field supplies, galvanic applications, half-converters in 12-pulse circuits in conjunction with thyristor converters for supplying d.c. motors and in subsynchronous converter cascades) to be used.

NOTICE

SIMOREG series 6RL70 rectifiers are plant-specific components. The plant engineering company is, therefore, responsible for ensuring that they are used in accordance with local regulations and with generally accepted engineering practices.

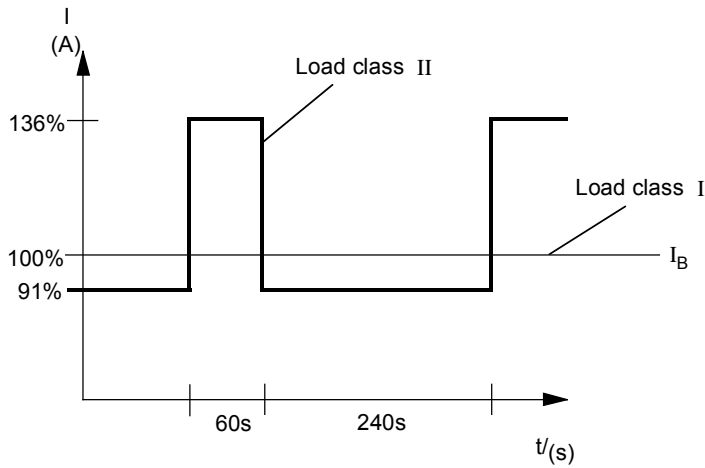
2.4 Technical data:

1000A and 2000A- converters, 3AC 690V

Order No.		6RL70 . . . K S00	
		91-6	95-4
Rated supply voltage ³⁾	V	3AC 690 (+10% / – 20%)	
Rated input current	A	865	1730
Rated supply voltage fan	V	1AC 230 (±10%) 50Hz / 60Hz	

Fan rated current	A	2,6 / 3,3	
Fan noise level	dBA	85 / 87	
Air flow rate	m ³ /h	1400	2400
Rated DC voltage	V	930	
Rated DC current	A	1000	2000
Load class II to EN 60146-1-1 ¹⁾			
Rated output current average	A	910	1820
Base load duration	S	240	
Excess output current average	A	1365	2720
Excess current duration	s	60	
Rated output	kW	930	1860
Power loss at rated DC current (approx.)	W	3200	5000
Operational ambient temperature	°C	0 to 40 at I _{rated} ²⁾ forced-cooled	
Storage and transport temperature	°C	– 25 bis +70	
Installation altitude above sea level		≤ 1000 m at rated DC current ⁴⁾	
Environmental class	DIN IEC 60721-3-3	3K3	
Degree of protect.	DIN EN 60529	IP00	
Dimensions		Refer to dimension drawings in Section 4	
Weights (approx.)	kg	82	142

1) Load cycle

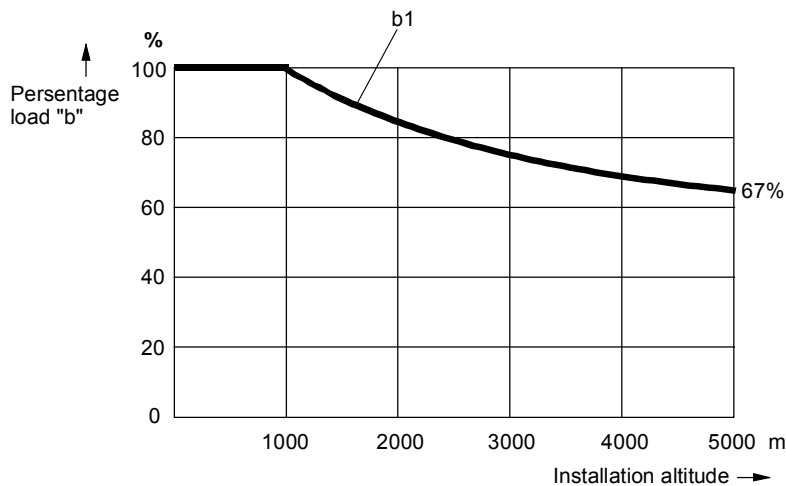


- 2) Load factor K1 (direct current) as a function of coolant temperature.
 $K1 > 1$ permitted only if $K1 * K2 \leq 1$.
 Total derating factor $K = K1 * K2$ ($K2$ see below)

Ambient temperature or coolant temperature	Load factor K1	
	in devices with self-cooling	in devices with enhanced air cooling
$\leq + 30^{\circ}\text{C}$	1,18	1,10
+ 35 $^{\circ}\text{C}$	1,12	1,05
+ 40 $^{\circ}\text{C}$	1,06	1,00
+ 45 $^{\circ}\text{C}$	1,00	0,95
+ 50 $^{\circ}\text{C}$	0,94	0,90
+ 55 $^{\circ}\text{C}$	0,88	
+ 60 $^{\circ}\text{C}$	0,82	

- 3) The rectifier can be operated with voltages up to rated line-side level (at corresponding output voltage).

- 4) Load values as a function of installation altitude.
 Total derating factor $K = K1 * K2$ ($K1$ see above)



Installation altitude [m]	Derating factor K2
1000	1,0
2000	0,835
3000	0,74
4000	0,71
5000	0,67

Curve b1: Reduction factor of load values (DC current) at installation altitudes above 1000 m

The supply voltages of all circuits are available up to an installation altitude of 5000 m for basic insulation.

2.5 Applicable standards

VDE 0106 Part 100

Arrangement of operator control elements in the vicinity of components/parts at hazardous voltage levels.

VDE 0110 Part 1

Insulation coordination for electrical equipment in low-voltage installations.

Degree of pollution 2 for boards and power section.

Only non-conductive contamination is permissible.

"Moisture condensation is excluded, as the components are only permitted for humidity class F."

EN60146 T1-1 / VDE 0558 T11

Semiconductor converter

General requirements and line-commutated converters

DIN EN50178 / VDE 0160

Regulations for equipping electrical power systems with electronic equipment.

EN61800-3

Variable-speed drives, part 3, EMC Product Standard including special testing procedures

DIN IEC 60068-2-6 acc. to severity grade 12 (SN29010 Part1)

Mechanical stressing

2.6 Certification

The products referred to in this document are manufactured and operated in accordance with DIN ISO 9001 (Certificate Register No.: 257-0).

3 Shipment, unpacking

SIMOREG converters are packed in the production works according to the relevant ordering data. A product packing label is attached to the box.

Protect the package against severe jolts and shocks during shipment, e.g. when setting it down.

Carefully observe the information on the packaging relating to transportation, storage and proper handling.

The SIMOREG device can be installed after it has been unpacked and the shipment checked for completeness and/or damage.

The packaging materials consist of cardboard and corrugated paper and can be disposed of according to locally applicable waste disposal regulations.

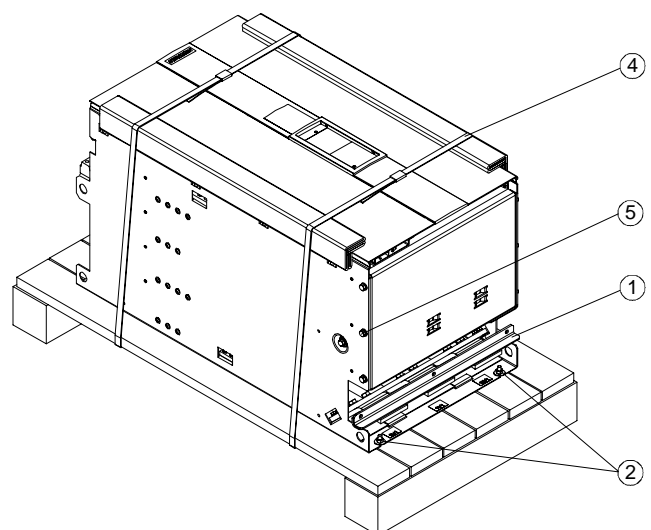
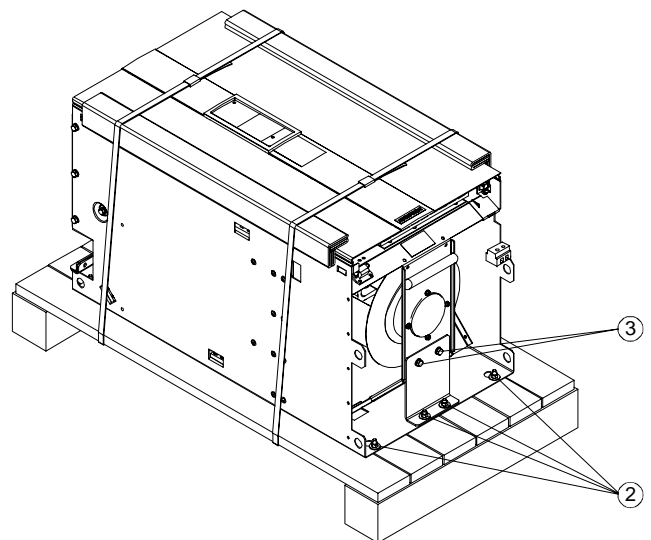
If you discover that the converter has been damaged during shipment, please inform your shipping agent immediately.

3.1 Remove the transportation safeguards on devices with a rated d.c. current of 2000 A.



Cut open the cable fasteners to remove the bracket for cabinet mounting and, if necessary, secure it to the outside of the device.

Remove the six hexagon nuts M8.

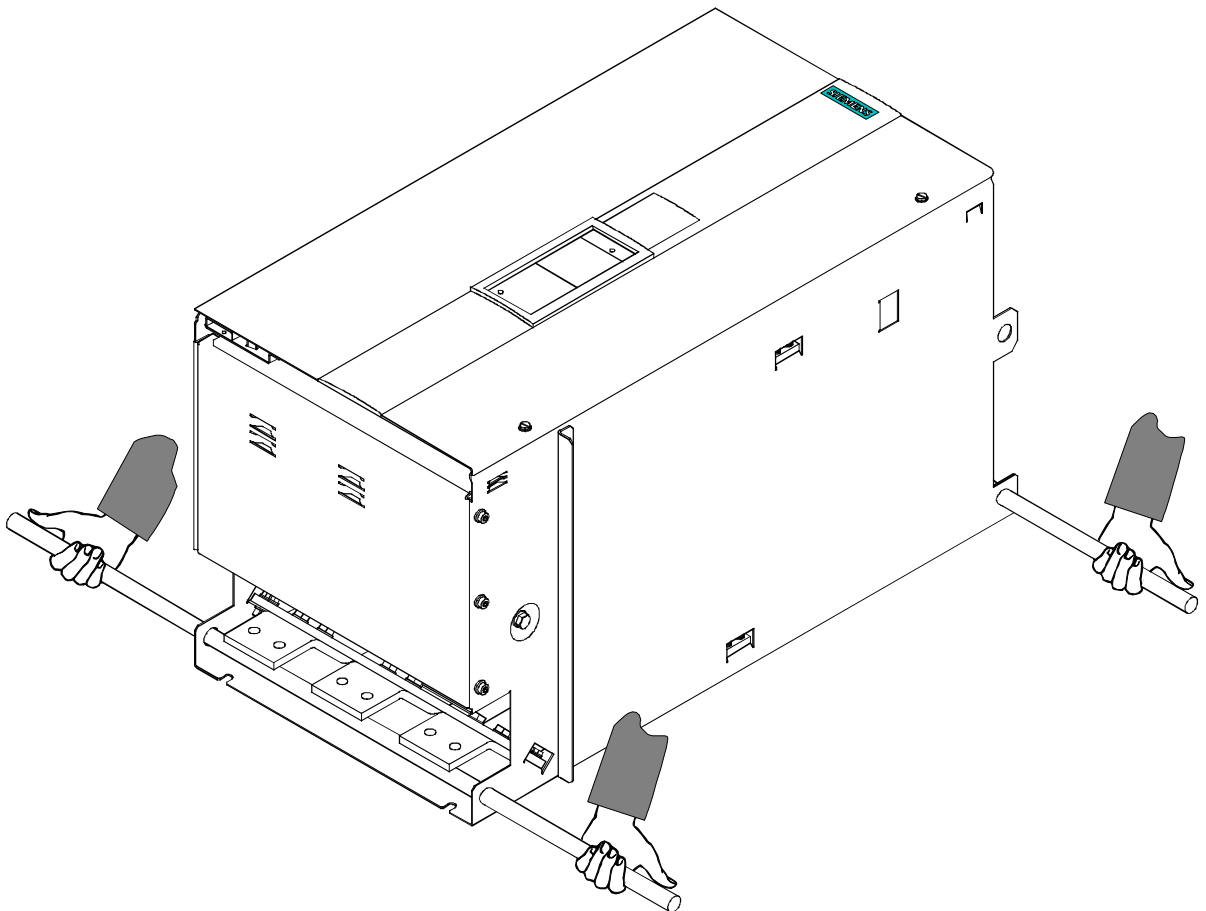
- ③ Unscrew the two hexagon bolts M8 and remove the transport bracket.
- ④ Remove the two mounting straps.
- ⑤ Unscrew the six hexagon bolts M6 to remove the transport baseplate after the device has been mounted but before it is started up.



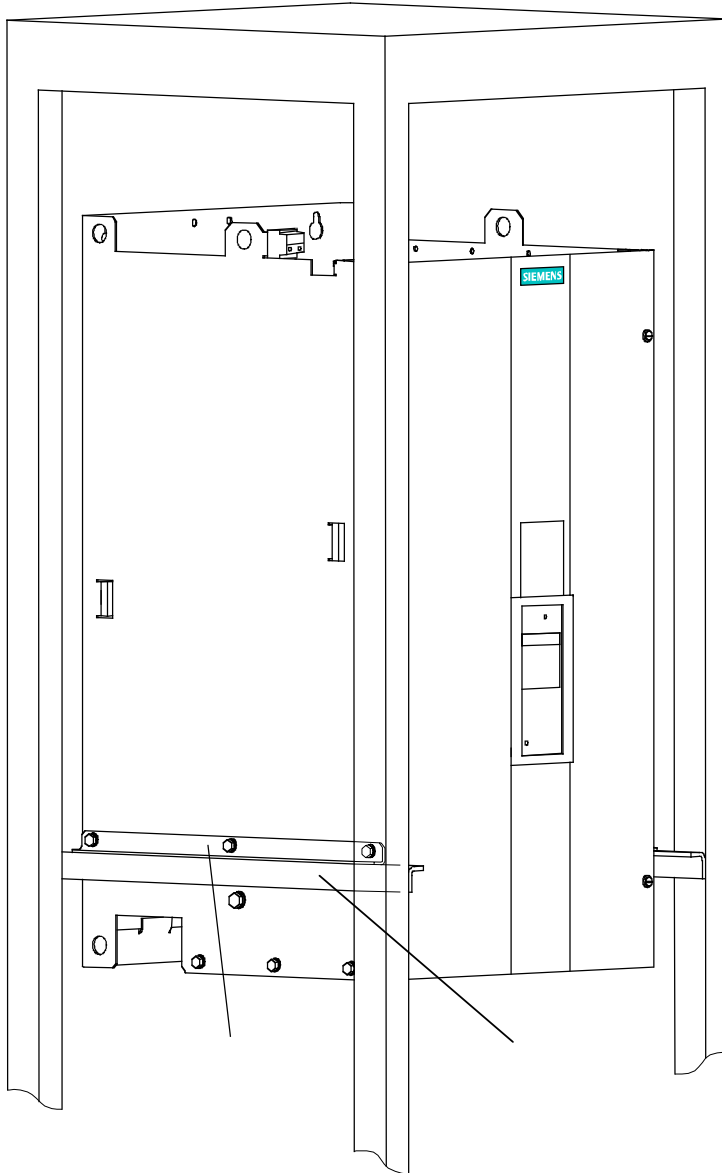
4 Installation

	<h3>CAUTION</h3>
	<p>Failure to lift the converter in the correct manner can result in bodily injury and/or property damage.</p>
	<p>The converter must be lifted using suitable equipment and under the instruction of appropriately qualified personnel.</p>
	<p>Make sure that no horizontal forces are applied to the lifting lugs in order to prevent the housing from deforming when the device is lifted.</p>
	<p>The user is responsible for mounting the SIMOREG device and all other equipment in accordance with the applicable safety regulations (e.g. DIN, VDE), as well as all other relevant national and local regulations regarding conductor dimensioning/protection, grounding, disconnectors, overcurrent protection, etc.</p>
	<p>The converter must be installed in accordance with the relevant safety regulations (e.g. DIN, VDE), as well as all other relevant national and local regulations. It must be ensured that the grounding, cable dimensioning and appropriate short-circuit protection have been implemented to guarantee operational safety and reliability.</p>

Possible lifting method for converters with rated DC current of 2000A




Cubicle mounting of converters with rated DC current of 2000A

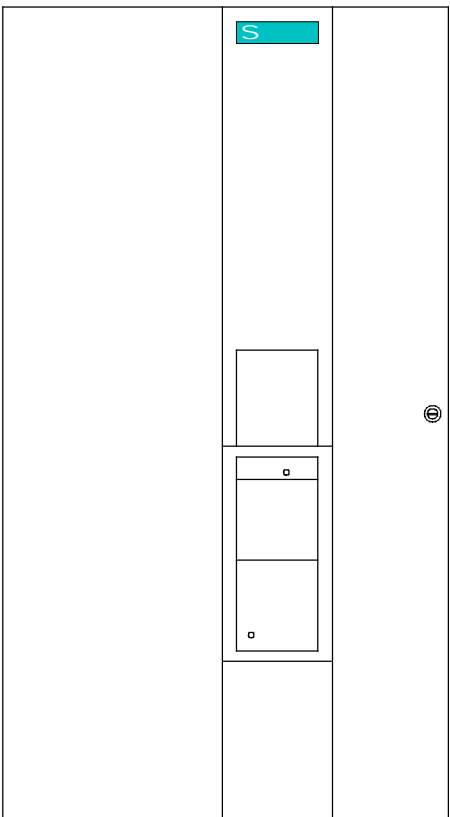


- These converters are supplied with 2 fixing angles . These can be bolted to the SIMOREG unit by means of the supplied M6 hexagon-head screws (3 per angle) to assist cubicle mounting.
- The unit can then be supported by 2 further angles (not included in scope of supply) in the control cubicle.
- The converters must be bolted to the cubicle rear panel in 4 places.

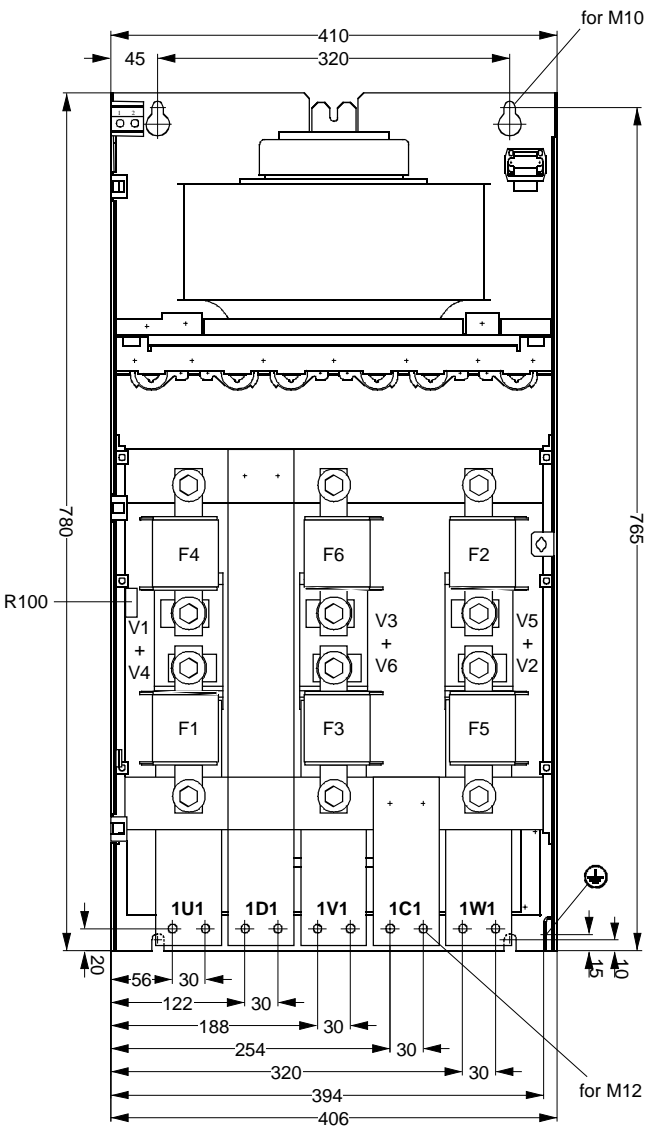
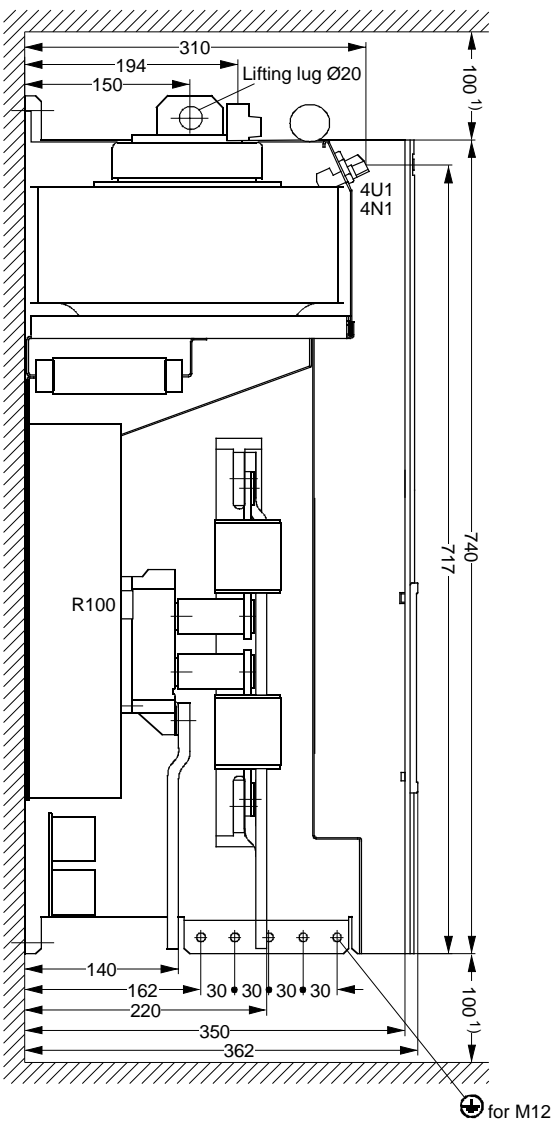
4.1 Dimension drawings

	WARNING
	<p>A clearance of at least 100 mm must be left above and below the converter in order to ensure an unrestricted cooling air intake and outlet.</p> <p>The converter may overheat if this clearance is not provided!</p>


Converter type D 930 / 1000



1) Minimum clearance for circulation
An adequate cooling air supply must be provided



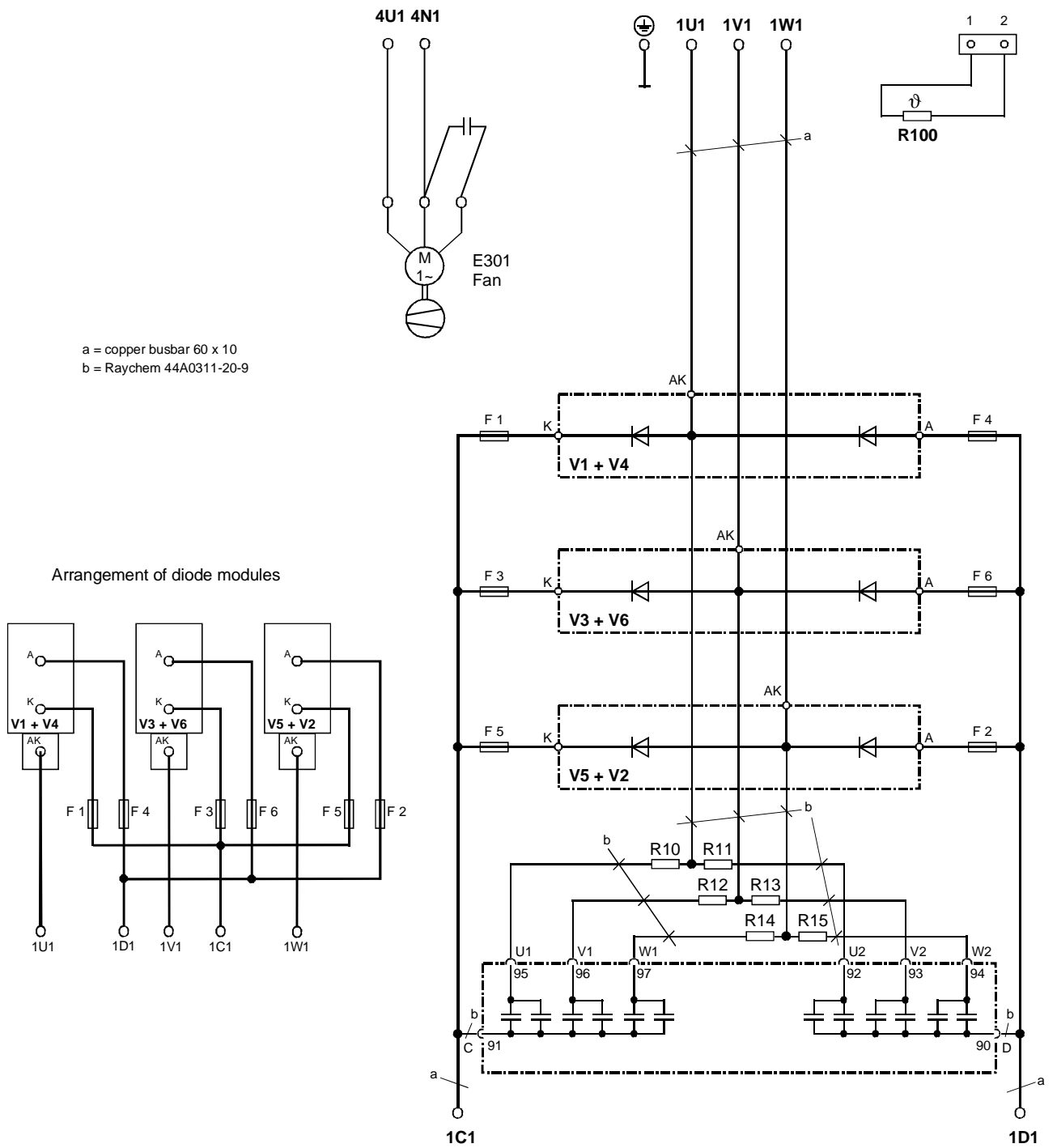
5 Connections

	<p>WARNING</p>
	<p>The converters are operated at high voltages.</p> <p>Disconnect the power supply before making any connections!</p> <p>Only qualified personnel who are thoroughly familiar with all safety notices contained in the operating instructions as well as erection, installation, operating and maintenance instructions should be allowed to work on these devices.</p> <p>Non-observance of the safety instructions can result in death, severe personal injury or substantial property damage.</p> <p>Failure to make the correct connections may result in irreparable damage to the unit.</p> <p>The suppression capacitors can still carry dangerous voltages after the device has been isolated. For this reason, wait for at least minutes before opening the converter.</p> <p>When working on the open converter, remember that live parts are exposed. The unit must always be operated with the standard front covers in place.</p> <p>The user is responsible for ensuring that the motor, SIMOREG converter and other devices are installed and connected up in accordance with the approved codes of practice of the country concerned and any other regional or local codes that may apply. Special attention must be paid to proper conductor sizing, fusing, grounding, isolation and disconnection measures and to overcurrent protection.</p> <p>The devices listed contain dangerous, rotating machine parts (fans) and may be used to drive rotating mechanical parts, for example. Death, serious bodily injury or substantial property damage may occur if the instructions in the relevant operating manuals are not observed.</p> <p>The successful and safe operation of this equipment is dependent on careful transportation, proper storage and installation as well as correct operation and maintenance.</p>

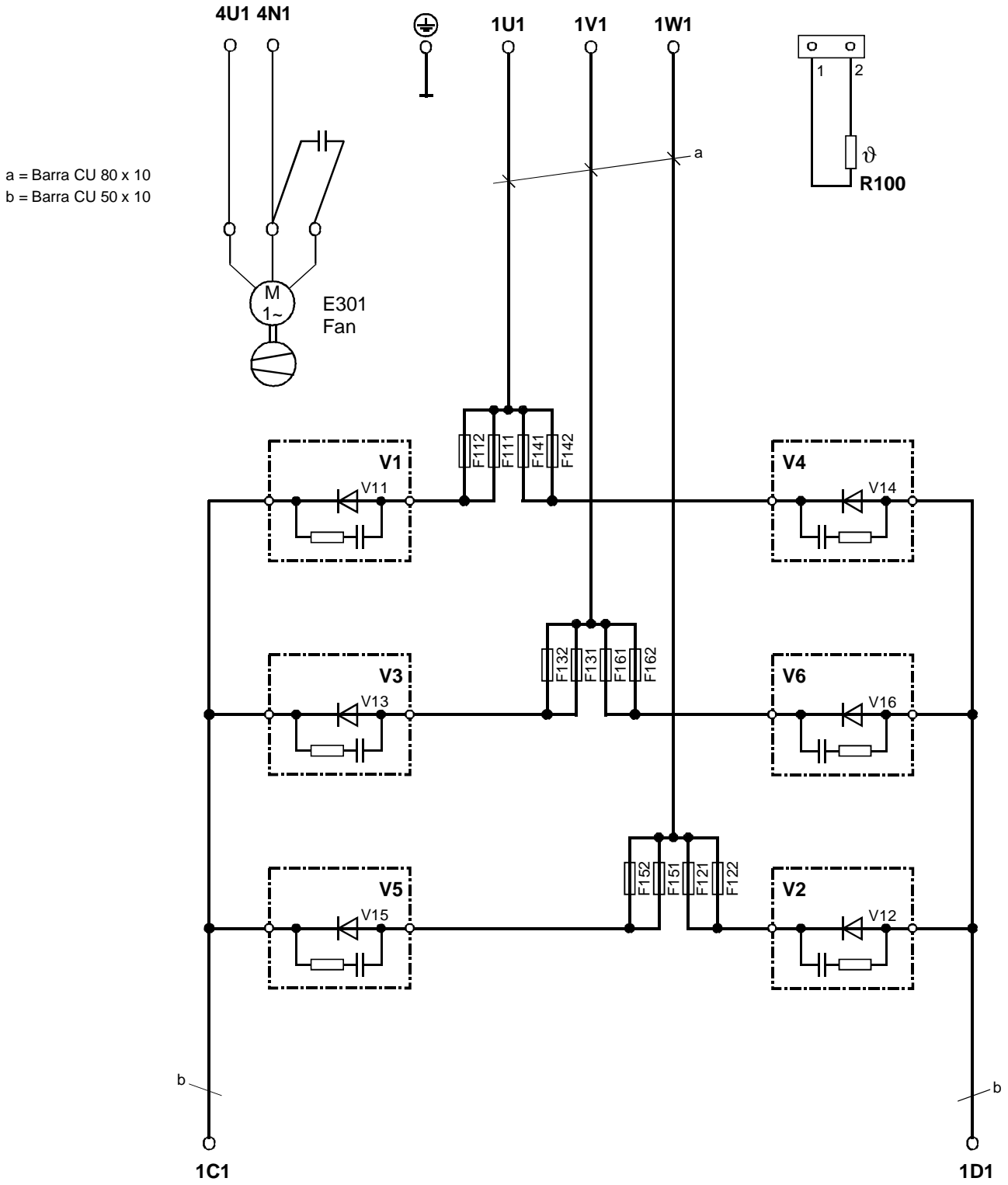
5.1 Power connections

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Converter type D 930 / 1000



Converter type D 930 / 2000



a = Barra CU 80 x 10
 b = Barra CU 50 x 10

Arrangement of diode blocks




5.2 Fuses

For technical data, configuring data and dimension drawings, please refer to Catalog DA94.1.

Converter Order No.	Rated current/ voltage A / V	Line fuses		
		Qty.	Order No.	Rated current/ voltage A / V
6RL7091-6KS00	1000 / 690	6	3NE3337-8	710 / 900
6RL7095-4KS00	2000 / 690	12	6RY1702-0BA04	630 / 1000

Branch fuses are included in converter, external semiconductor fuses are not needed.

5.3 Terminal assignments

	WARNING
	<p>The converter might sustain serious or irreparable damage if connected incorrectly.</p> <p>The power cables and/or busbars must be secured mechanically outside the converter.</p>

Power section

Terminal type:

- 1000A units Through-hole for M12 (60x10 copper bus)
- 2000A units 1U1, 1V1, 1W1: Through-hole for M12 (80x10 copper bus)
- 1C1,1D1: Through-hole for M12 (50x10 copper bus)

The converters are designed for a permanent power supply connection according to DIN VDE 0160 Section 6.5.2.1.
 PE conductor connection: Minimum cross-section 10mm². (see Section 5.1 for connection options).

The connection cross-sections must be determined according to the applicable regulations, e.g. DIN VDE 100 Part 523, DIN VDE 0276 Part 1000.

Function	Terminal	Connection values/Remarks
supply input	1U1	} see technical data in Section 2.4
	1V1	
	1W1	
PE conductor	⊕	
d.c. output	1C1	
	1D1	

Fan

Terminal type: DFK-PC4 plug-in terminal (screw-type)
 Maximum connection cross-section 4mm² , finely stranded

The insulation on the supply cables must be taken up to the terminal housing.

Function	Terminal	Connection values/Remarks
Incoming supply	4U1	1AC 230V
	4N1	see technical data in Section 2.4

Temperature sensor KTY84

Klemmenart: MSTB 2,5/2 – St plug-in terminal
 Maximum connection cross-section 2,5mm² , finely stranded

The insulation on the supply cables must be taken up to the terminal housing.

Function	Terminal	Connection values/Remarks
Heat sink temperature (external evaluation)	1	KTY84-130 sensor element Loading by external evaluation circuit: Recommended 2mA, max. 5mA. Response temperature for external overload protection: 95°C.
	2	

5.4 Radio interference suppression filters:

Even uncontrolled rectifiers generate interference voltages during commutation. Apart from this, the devices do not contain any interference voltage sources.

Radio interference suppression filters may be necessary depending on prevailing requirements.

The recommended radio interference suppression filters are connected to the three-phase supply of the rectifiers.

List of recommended RI suppression filters:

Rated current RI suppression filter (A)	RI suppression filter Order number	Terminal cross- section (mm ²)	Weight (kg)	Dimensions HxWxD (mm)
1000	6SE7041-0ES87-0FA0	Connecting lug	90	840x465x204
1600	6SE7041-6ES87-0FA0	Connecting lug	130	870x465x204

*) Filters generate discharge currents. VDE 0160 specifies a PE connection with 10 mm².

In the case of converters with 3-phase connection, the line current (filter current) equals the DC current x 0.82.


Important technical data of RI suppression filters:

Rated supply voltage	3AC 380-460 V (± 15%)
Rated frequency	50/60 Hz (± 6%)
Operating temperature	0° C to +40° C
Degree of protection	IP20 (EN60529) IP00 with 500 A and above

For further technical data about filters, please refer to the Operating Instructions:

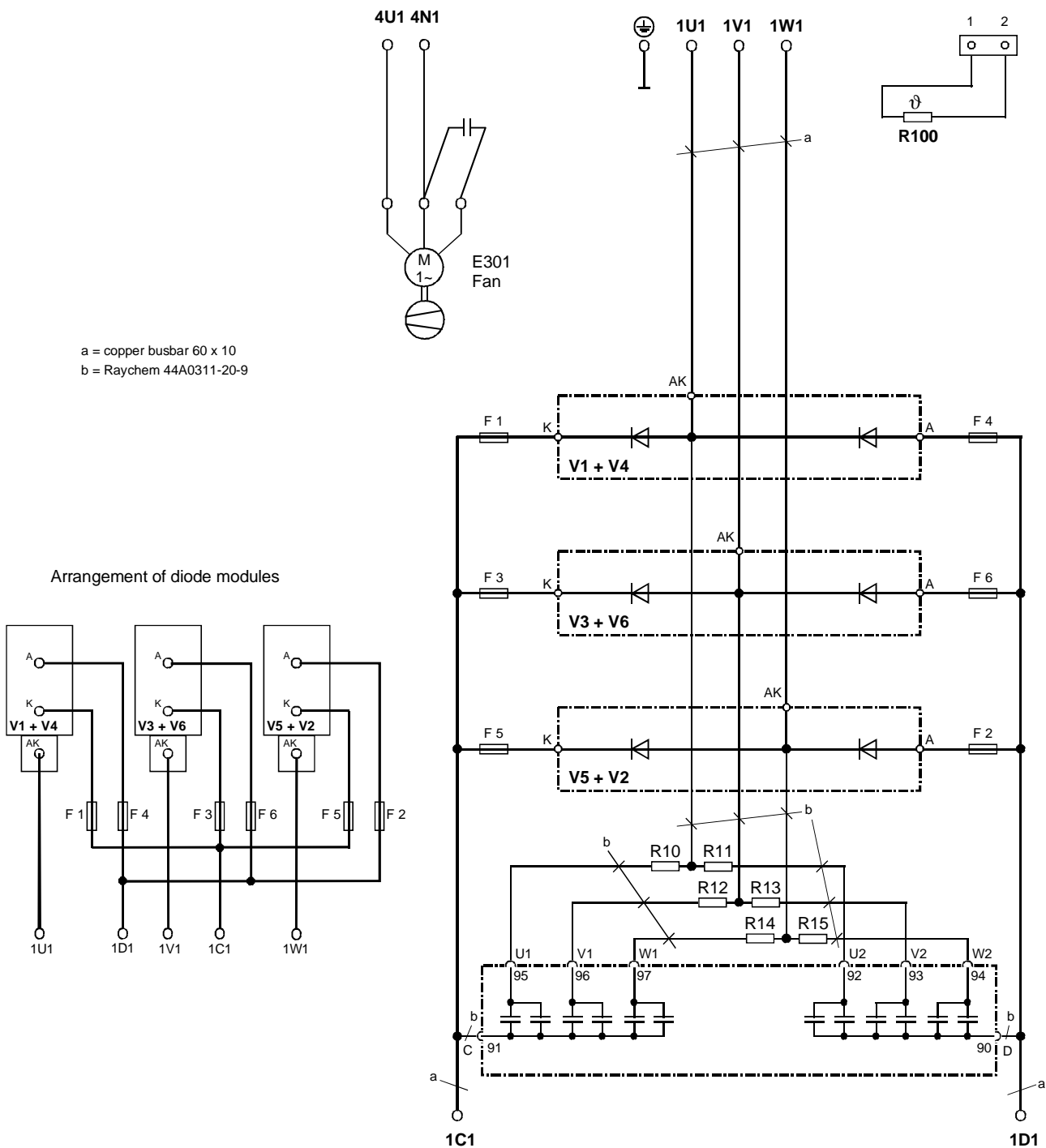
SIMOVER Master Drives RI Suppression Filters EMC Filters,
Order number: 6SE7087-6CX87-0FB0.

5 Connections

	<p>WARNING</p>
	<p>The converters are operated at high voltages.</p> <p>Disconnect the power supply before making any connections!</p> <p>Only qualified personnel who are thoroughly familiar with all safety notices contained in the operating instructions as well as erection, installation, operating and maintenance instructions should be allowed to work on these devices.</p> <p>Non-observance of the safety instructions can result in death, severe personal injury or substantial property damage.</p> <p>Failure to make the correct connections may result in irreparable damage to the unit.</p> <p>The suppression capacitors can still carry dangerous voltages after the device has been isolated. For this reason, wait for at least minutes before opening the converter.</p> <p>When working on the open converter, remember that live parts are exposed. The unit must always be operated with the standard front covers in place.</p> <p>The user is responsible for ensuring that the motor, SIMOREG converter and other devices are installed and connected up in accordance with the approved codes of practice of the country concerned and any other regional or local codes that may apply. Special attention must be paid to proper conductor sizing, fusing, grounding, isolation and disconnection measures and to overcurrent protection.</p> <p>The devices listed contain dangerous, rotating machine parts (fans) and may be used to drive rotating mechanical parts, for example. Death, serious bodily injury or substantial property damage may occur if the instructions in the relevant operating manuals are not observed.</p> <p>The successful and safe operation of this equipment is dependent on careful transportation, proper storage and installation as well as correct operation and maintenance.</p>

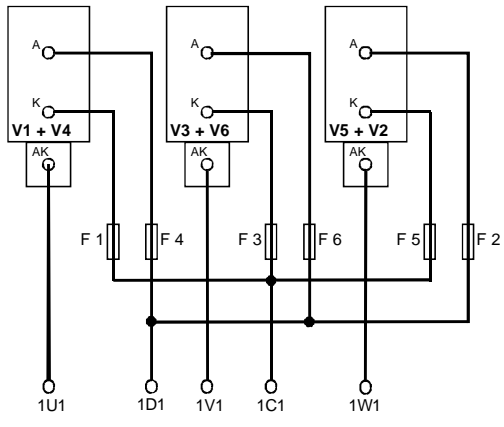
5.1 Power connections

Converter type D 930 / 1000



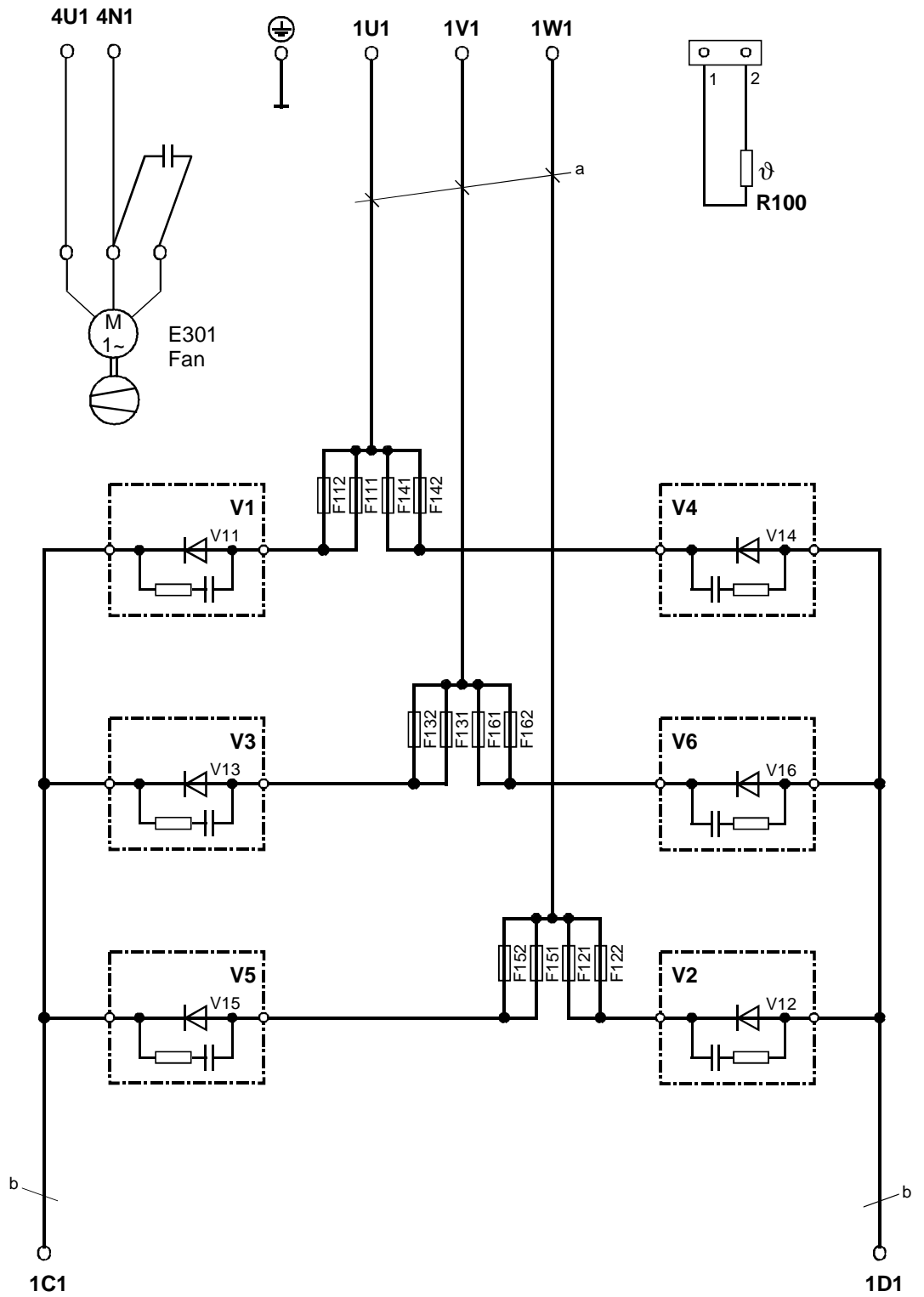
a = copper busbar 60 x 10
 b = Raychem 44A0311-20-9

Arrangement of diode modules



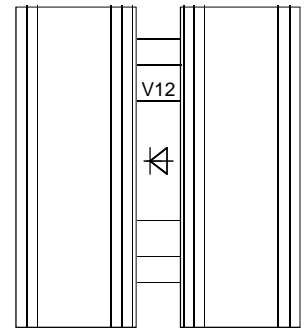
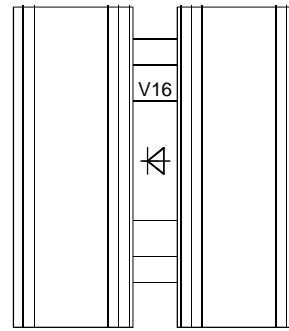
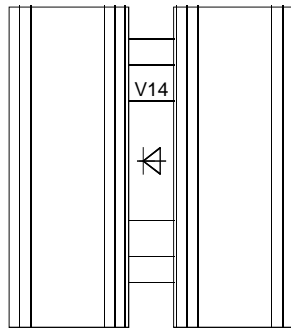
Converter type D 930 / 2000

a = Barra CU 80 x 10
 b = Barra CU 50 x 10

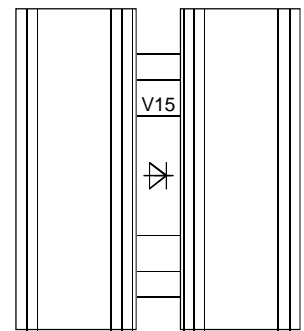
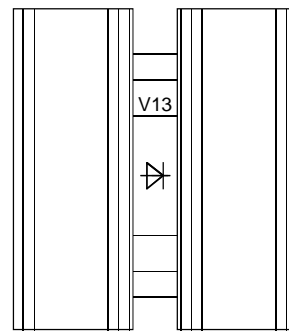
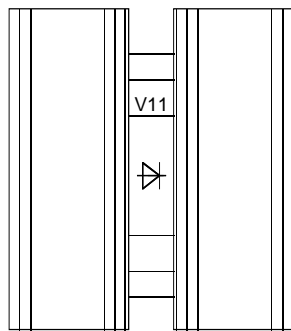


Arrangement of diode blocks

At rear



At front




5.2 Fuses

For technical data, configuring data and dimension drawings, please refer to Catalog DA94.1.

Converter Order No.	Rated current/ voltage A / V	Line fuses		
		Qty.	Order No.	Rated current/ voltage A / V
6RL7091-6KS00	1000 / 690	6	3NE3337-8	710 / 900
6RL7095-4KS00	2000 / 690	12	6RY1702-0BA04	630 / 1000

Branch fuses are included in converter, external semiconductor fuses are not needed.

5.3 Terminal assignments

	WARNING
	<p>The converter might sustain serious or irreparable damage if connected incorrectly.</p> <p>The power cables and/or busbars must be secured mechanically outside the converter.</p>

Power section

Terminal type:

- 1000A units Through-hole for M12 (60x10 copper bus)
- 2000A units 1U1, 1V1, 1W1: Through-hole for M12 (80x10 copper bus)
- 1C1,1D1: Through-hole for M12 (50x10 copper bus)

The converters are designed for a permanent power supply connection according to DIN VDE 0160 Section 6.5.2.1.
 PE conductor connection: Minimum cross-section 10mm². (see Section 5.1 for connection options).

The connection cross-sections must be determined according to the applicable regulations, e.g. DIN VDE 100 Part 523, DIN VDE 0276 Part 1000.

Function	Terminal	Connection values/Remarks
supply input	1U1	} see technical data in Section 2.4
	1V1	
	1W1	
PE conductor	⊕	
d.c. output	1C1	
	1D1	

Fan

Terminal type: DFK-PC4 plug-in terminal (screw-type)
 Maximum connection cross-section 4mm² , finely stranded

The insulation on the supply cables must be taken up to the terminal housing.

Function	Terminal	Connection values/Remarks
Incoming supply	4U1	1AC 230V
	4N1	see technical data in Section 2.4

Temperature sensor KTY84

Klemmenart: MSTB 2,5/2 – St plug-in terminal
 Maximum connection cross-section 2,5mm² , finely stranded

The insulation on the supply cables must be taken up to the terminal housing.

Function	Terminal	Connection values/Remarks
Heat sink temperature (external evaluation)	1	KTY84-130 sensor element Loading by external evaluation circuit: Recommended 2mA, max. 5mA. Response temperature for external overload protection: 95°C.
	2	

5.4 Radio interference suppression filters:

Even uncontrolled rectifiers generate interference voltages during commutation. Apart from this, the devices do not contain any interference voltage sources.

Radio interference suppression filters may be necessary depending on prevailing requirements.

The recommended radio interference suppression filters are connected to the three-phase supply of the rectifiers.

List of recommended RI suppression filters:

Rated current RI suppression filter (A)	RI suppression filter Order number	Terminal cross- section (mm ²)	Weight (kg)	Dimensions HxWxD (mm)
1000	6SE7041-0ES87-0FA0	Connecting lug	90	840x465x204
1600	6SE7041-6ES87-0FA0	Connecting lug	130	870x465x204

*) Filters generate discharge currents. VDE 0160 specifies a PE connection with 10 mm².

In the case of converters with 3-phase connection, the line current (filter current) equals the DC current x 0.82.




Important technical data of RI suppression filters:

Rated supply voltage	3AC 380-460 V (± 15%)
Rated frequency	50/60 Hz (± 6%)
Operating temperature	0° C to +40° C
Degree of protection	IP20 (EN60529) IP00 with 500 A and above

For further technical data about filters, please refer to the Operating Instructions:


SIMOVERT Master Drives RI Suppression Filters EMC Filters,
Order number: 6SE7087-6CX87-0FB0.

6 Start-Up

	<h3>WARNING</h3>	
	<p>Hazardous voltages and rotating parts (fans) are present in this electrical equipment during operation. Non-observance of the safety instructions can result in death, severe personal injury or substantial property damage.</p> <p>Hazardous voltage may be present at the signalling relays in the customer's installation.</p> <p>The converters must not be connected to a supply with earth-leakage circuit-breaker (VDE 0160, Section 6.5) since, in the event of a fault to frame or ground, the fault current may contain a DC component that will either prevent or hinder a higher-level e.l.c.b. from tripping. In this case, all loads connected to this e.l.c.b. have no protection either.</p> <p>Only qualified personnel who are thoroughly familiar with all safety notices contained in the operating instructions as well as erection, installation, operating and maintenance instructions should be allowed to work on these devices.</p> <td data-bbox="240 801 296 920" rowspan="2">  </td> <td data-bbox="359 797 1469 1317"> <p>The successful and safe operation of this equipment is dependent on careful transportation, proper storage and installation as well as correct operation and maintenance.</p> <p>The converter is at a hazardous voltage level even when the line contactor is open. The gating board (board mounted directly to lower part of housing) has many circuits at hazardous voltage levels. Before carrying out any maintenance or repair work, all converter power sources must be disconnected and locked out.</p> <p>These instructions do not claim to list all of the measures required to ensure safe and reliable operation of the converter. For special applications, additional, supplementary information or instructions might be required. If problems do occur and you feel in any way uncertain, please contact your local Siemens office or representative.</p> <p>The use of unauthorized parts in the repair of this converter and handling of the equipment by unqualified personnel can give rise to hazardous conditions which may cause death, severe personal injury or substantial property damage. All safety notices contained in this instruction manual and attached to the converter itself must be carefully observed.</p> <p>Please read the safety information given in Section 1 of this instruction manual.</p> </td>	

SIMOREG series 6RL70 rectifiers are plant-specific components. The plant engineering company is, therefore, responsible for ensuring that they are used in accordance with local regulations and with generally accepted engineering practices.

7 Maintenance



	<p>WARNING</p>
	<p>Hazardous voltage are present in this electrical equipment during operation.</p> <p>A hazardous voltage may be present at the signalling relays in the customer installation.</p> <p>Non-observance of the safety instructions can result in death, severe personal injury or substantial property damage.</p> <p>When carrying out maintenance work on this converter, please read all safety instructions included in this section and attached to the product itself.</p> <ul style="list-style-type: none"> • Maintenance work on the converter may be carried out only by qualified personnel who are thoroughly familiar with all safety notices in this manual and with the installation, operating and maintenance instructions. • Before carrying out visual checks and maintenance work, ensure that the AC power supply is disconnected and locked out and that the converter is grounded. Before the AC supply is disconnected, both converters and motors are at hazardous voltage levels. Even when the converter contactor is open, hazardous voltages are still present. • The suppression capacitors can still carry dangerous voltages after the device has been isolated. For this reason, the converter must not be opened for at least two minutes after switch-off. <p>Only spare parts authorized by the manufacturer may be used.</p>

The converter must be thoroughly protected against the ingress of dirt so as to prevent voltage flashovers and this irreparable damage. Dust and foreign bodies, and especially contamination drawn in through the cooling air flow, must be carefully removed at regular intervals depending on the degree of pollution, but at least once every 12 months. The converter must be cleaned with dry, compressed air, max. 1 bar, or with a vacuum cleaner.

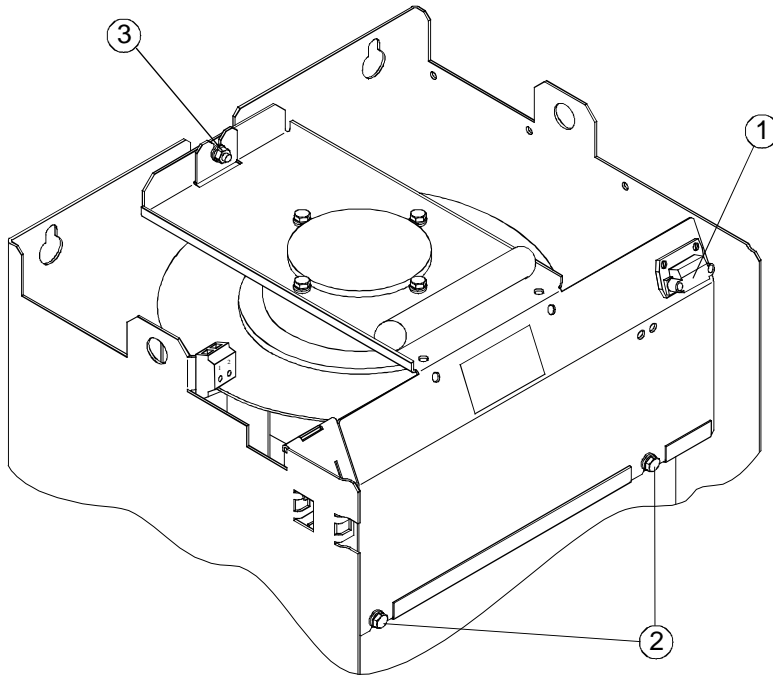
The fan bearings are designed for a service lifetime of 30000 hours. The fans should be replaced in accordance with the recommended intervals to maintain the availability of the diodes.

7.1 Replacement of components

7.1.1 Replacement of fan

 	WARNING
	<p>The converter fan may be replaced only by properly qualified personnel.</p> <p>The suppression capacitors can still carry dangerous voltages after the device has been isolated. For this reason, the converter must not be opened for at least two minutes after switch-off.</p> <p>Non-observance of the safety instructions can result in death, severe personal injury or substantial property damage.</p> <p>When dismantling the fan-mounting box, please remember that it weighs 12 kg.</p> <p>Non-observance of this warning can result in severe personal injury or substantial property damage.</p>

Replacement of fan on 1000A converters



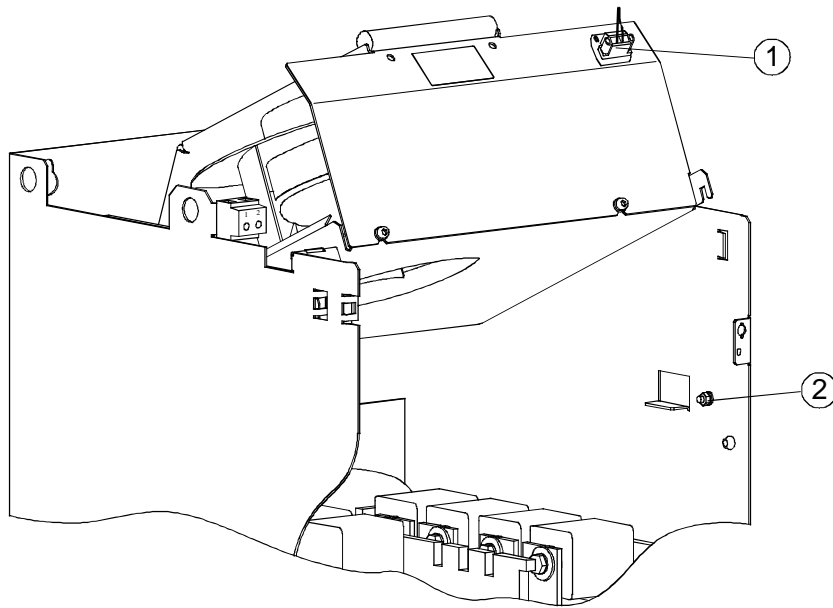
The fan is mounted on top of the converter.

- Remove connector .
- Use a T20 screwdriver to undo the two Torx screws .
- Undo the M6 hexagonal nuts ③.
- Pull fan upwards out of its guideway and then forwards to remove. Take care to protect the field module mounted on the left (risk of mechanical damage!).

Installation:

- Insert fan into guideway from above.
- Tighten the two Torx screws with 10 Nm.
- Tighten hexagonal nut M6 ③ with 10 Nm.
- Insert connector ①.

Replacement of fan on 2000A converters



The fan is mounted on top of the converter.

- Remove connector ① .
- Undo the M6 hexagonal nut M6 .
- Swing fan upwards and pull it out towards you, taking care to protect the field module mounted on the left against any mechanical damage!
- Install the new fan in the reverse order.

Installation:

- Tilting the fan from the front and upward (see Fig.), slot it into the two rear guide tabs and then tilt it downward as far as it will go.
- Tighten hexagonal nut M6 with 10 Nm.
- Insert connector ①.

7.1.2 Replacement of diode modules on 1000A converters

The diode modules are secured using self-tapping screws. When the modules are replaced, the contact surfaces of the heat sink must be cleaned; fresh heat transfer compound must also be applied to the diode modules. Original length bolts with metric threads and locking elements (washer/spring washer) must be used to secure the diode modules. Original length bolts with metric threads and locking elements (washer/spring washer) must also be used when the diode modules are connected to the conductor bars.

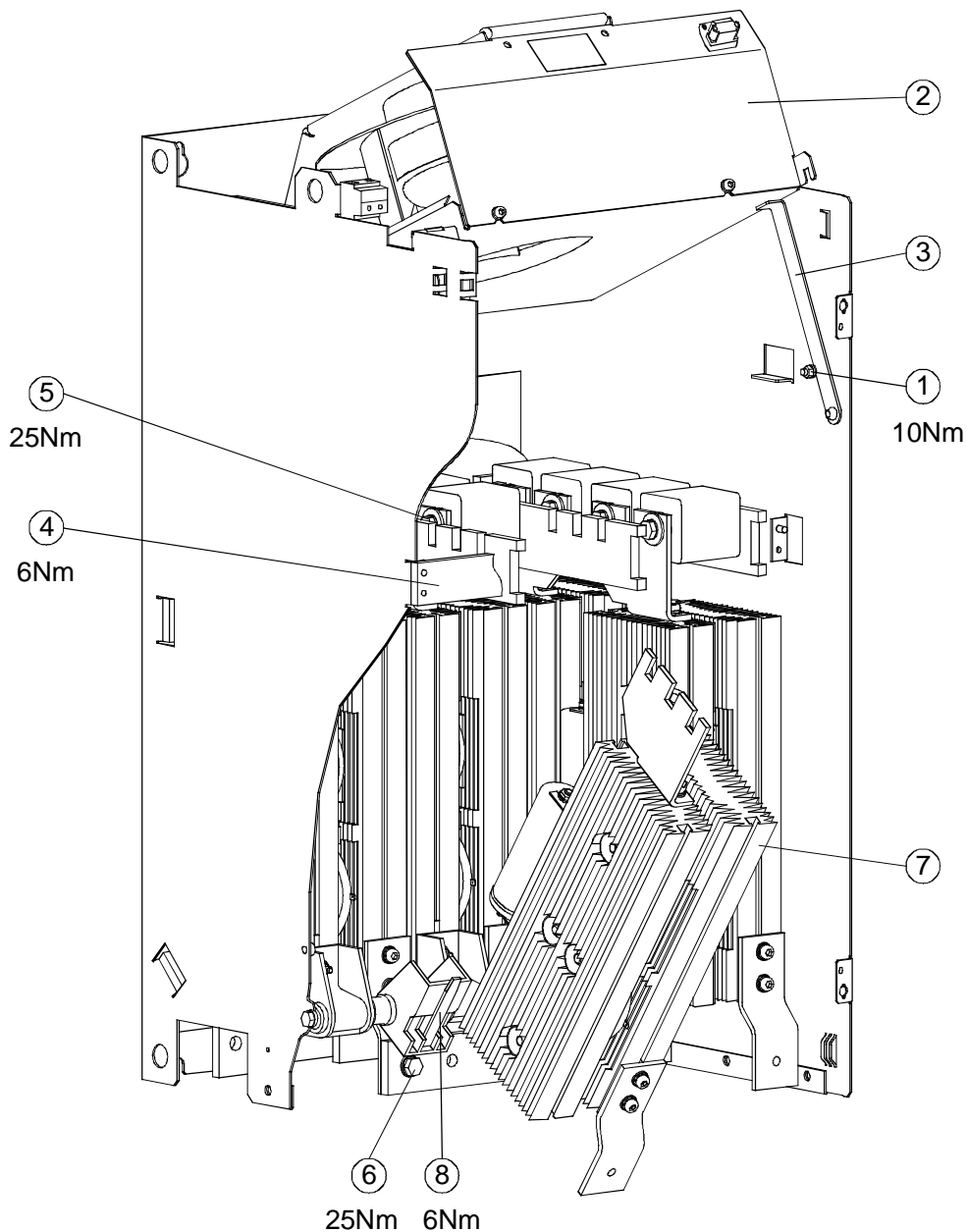
NOTICE

The layer of thermo-lubricant (silicone-free, type H-T-C made by Electrolube) applied to the modules must be so thin and even that the baseplate is still clearly visible underneath!

Tightening torque on module: 6 Nm

Tightening torque of current terminals: 15 Nm

7.1.3 Replacing fuses and diode trains in 2000 A devices



- Undo the M6 hexagonal nut ① .
- Swing the fan upwards and hold in place with support rail ③ .
- Remove the brace ④ with the attached protective cover by undoing the 2 M6 hexagon-head screws.
- Remove fuses ⑤ by undoing the 2 hexagon-head screws M12 on each.
- Unscrew the hexagon bolt M10 ⑥ and swivel the diode train ⑦ forwards.
- Loosen the train lock (hexagon nut M6) ⑧ and remove the diode train ⑦ by pulling it up out of the device at an angle.
- Install the new components in the reverse order.

Caution: The fuse mounting screws are of different lengths!

8 Servicing

Siemens supplies thoroughly tried and tested products and systems of the highest quality. To ensure maximum availability of our products and systems in your plant, we offer extensive after-sales services and support.

For further information about our services and **your regional Siemens contacts**, please go to our Internet website:

www.siemens.de/automation/csi_en/service

8.1 Technical Support

You can obtain technical assistance with our products, systems and solutions from our Technical Support service. Whether you have a simple query, or need help in solving a more difficult, complex task, our Central Technical Support specialists will be pleased to advise you. Our Central Technical Support service is available in English and German.

8.1.1 Time zone Europe and Africa

Tel.: +49 (0)180 5050-222

Fax: +49 (0)180 5050-223

Email: techsupport@ad.siemens.de

Mo.-Fr.: 7:00 to 17:00 (CET)

8.1.2 Time zone America

24-hour hotline: +1 800 333 7421

Tel.: +1 423 461 2522

Fax: +1 423 461 2466

Email: drives.support@sea.siemens.com

Mo.-Fr.: 8:00 to 17:00 (local time: Eastern Time)

8.1.3 Time zone Asia / Australia

Tel.: +65 (0)740-7000

Fax: +65 (0)740-7001

Email: drives.support@sae.siemens.com.sg

Mo.-Fr.: 8:30 to 17:30 (local time: Singapore)

8.2 Spare parts

Information about spare parts can be found in Catalog DA 21 E. You will find this catalog on the CD-ROM (order separately under order number: 6RX1700-0AD64, or with product order by specifying Z option –Z-D64) and via Internet website:

<http://www4.ad.siemens.de/view/cs/en/9260805>

Order no.	Product description	6RL70 KS00	
		91-6 1000A	95-4 2000A
	Diodes		
6RY1700-0BA02	Diode module	3x	
6RY1702-0CA27	Diode train, front		3x
6RY1702-0CA28	Diode train, rear		3x
	Fuses		
3NE3337-8	Fuse	6x	
6RY1702-0BA04	NH Fuse		12x
	Other spare parts		
6RY1700-0TF01	Temperature sensor KTY84	1x	1x
6RY1701-0AA00	Fan	1x	1x

8.3 Repairs

If you wish to have a part or unit repaired, please call or write to your **regional Siemens contact** for repairs.

8.4 On-site servicing

Qualified specialists can offer an on-site repair and maintenance service to increase the availability of your plant. Repair and/or maintenance support can be charged according to time and cost or provided within the scope of a service contract at a flat rate. Services charged on a time/cost basis will be available within the normal working hours of the relevant region subject to an appropriate call-out period.

For on-site servicing, please call your **regional Siemens contact**.

NOTE

Always state the device order number and serial number in all queries.

9 Environmental compatibility

Environmental aspects of development

The number of parts has been greatly reduced through the use of highly integrated components and a modular design of the entire converter series. As a consequence, the power consumed in the production process is significantly lower.

Particular importance has been attached to reducing the volume, mass and diversity of metal and plastic parts.

Front components:	PC + ABC	Bayblend
	ABS	Novodur
Plastic components in converter:	ABS	Novodur
	PA 6.6	
	SE1-GFN1	Noryl
Insulation:	PC (FR) fl	Makrolon or Lexan
Rating plate:	Polyester membrane	

Flame arresters containing halogen and insulating materials containing silicone have been replaced by pollutant-free materials on all major components.

Environmental compatibility was an important criterion in the selection of supplied parts.

Environmental aspects of production

Most supplied parts are shipped in reusable packaging. The packaging material itself is recyclable, consisting mainly of cardboard.

With the exception of the converter housing, surface coating materials have not been applied.

The production process is free of emissions.

Environmental aspects of disposal

The unit features screw and snap-on connections that can be separated easily to dismantle it into recyclable mechanical components.

The printed circuit boards can be disposed of by thermal processing. The percentage of components containing dangerous substances is low.

Comments sheet

We have made every effort to critically edit this Instruction Manual. However, if you still come across printing errors, we should be grateful if you would let us.

We would also be grateful if you could let us have your opinion of this Instruction Manual and the converter itself!

Contact your local Siemens office for any comments - either negative or positive!

Many thanks!

SIEMENS AG Austria, Electronics Plant, Vienna

From: Name:

Date:

Company:

Address:

Tel.:

To: SIEMENS Office

Address:

Please pass on to
SIEMENS AG Austria
Electronics Plant, Vienna

Concerns: Comments for the 6RL70 Instruction Manual, Edition

