

Products Tde Macno

Installation
RPU - RECTIFIER POWER UNIT



Cod. MP00800E00 V_2.3



INDEX

1	<i>The Purpose of this Manual</i>	2
2	<i>How to Use This Manual</i>	2
3	<i>Symbology</i>	2
4	<i>Safety Precautions</i>	3
4.1	<i>Safety standards</i>	3
5	<i>Introduction</i>	4
5.1	<i>RPU converter</i>	4
6	<i>Mechanical Installation</i>	5
6.1	<i>Unpacking the unit</i>	5
6.2	<i>Shipment control</i>	5
7	<i>Installation to the panel</i>	6
8	<i>Electrical installation</i>	8
8.1	<i>Busbar connections</i>	8
9	<i>Semiconductor protection</i>	10
10	<i>Ventilation</i>	10
11	<i>Technical Data</i>	11
	<i>Environmental conditions</i>	11
12	<i>Technical features</i>	12
13	<i>Mechanical configurations</i>	12
14	<i>Control card</i>	14
15	<i>Interface terminal board</i>	15
15.1	<i>IN-OUT RPU 200÷500A</i>	15
15.2	<i>Suggested connections</i>	16
15.3	<i>IN-OUT RPU 1000A</i>	16
15.4	<i>Suggested connections</i>	17
16	<i>Diagnostic LEDs</i>	17
17	<i>Norms and Standards</i>	18

1 The Purpose of this Manual



Why you should read this manual

- It contains important recommendations on the operation and safety
- It provides precise technical details and teaches how to properly install the AC/DC converter
- It indicates what should be done to improve the performance and ensure long system life
- Ensure the proper maintenance

2 How to Use This Manual

This manual is primarily intended for the operating and maintenance personnel of the power converter RPU. The targeted persons must have appropriate knowledge of electrical engineering and have the relevant experience.

3 Symbology



Danger: It indicates a serious danger that can cause serious injury or death



Caution: High voltage risk



Warning: It indicates a hazardous situation that can cause injury.

4 Safety Precautions



This section contains safety precautions that must be taken to ensure safety during operation and the execution of maintenance work.

4.1 Safety standards

On the doors of the cabinets the warning signs informing of the presence of the following are normally posted:

- operating voltages inside of control cabinets (over 50 volts)
- voltages present in the power section
- extremely high currents.

These signals are intended to highlight that the doors should not be opened during operation.

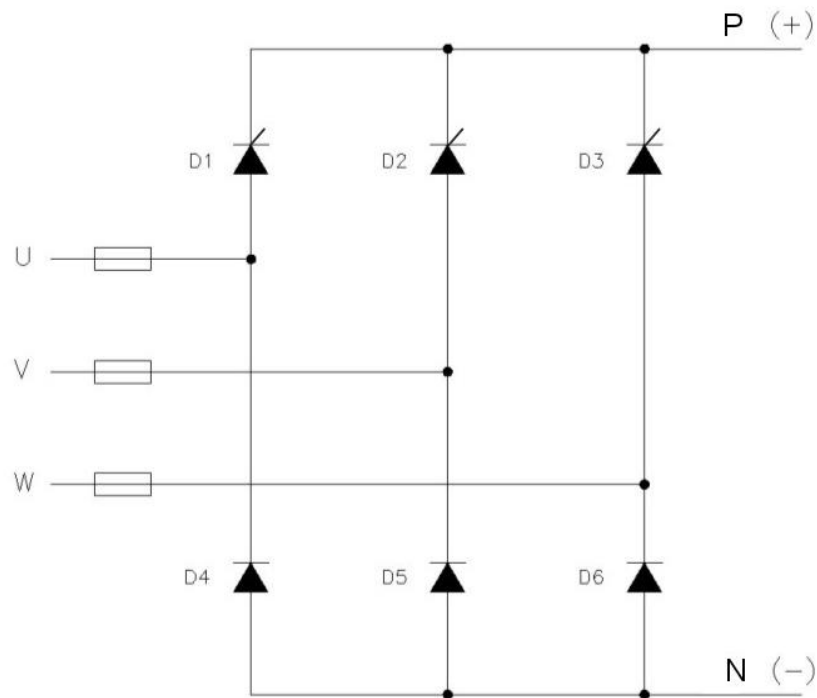
Signal	Definition
	General Danger!
	Caution: high voltage, danger of death!

One should take the necessary counter-measures in order to prevent that the already switched off systems can be accidentally switched on again with the wrong commands or by third parties. Furthermore, before you switch on the equipment, the operating personnel must ensure that the system is ready for operation and that safety devices have been restored.

5 Introduction

5.1 RPU converter

This operating manual describes the AC/DC converter RPU type.



In the semi-controlled converter it is installed the control board.

In case of power supply of drives that control electric motors, in order to provide adequate protection against short circuits or ground faults it is necessary the installation of the fuses also on the D.C. side.

6 Mechanical Installation

6.1 Unpacking the unit

All boxes must be checked upon delivery before removing the packaging, check for any transport damage. If the packaging shows signs of damage, the equipment must only be unpacked in the presence of insurance representatives and the manufacturer. External damage must be recorded immediately on the shipping documents! Any damage found only after the removal of the packaging must be reported in writing to the manufacturer and the insurance within one week.

6.2 Shipment control

- Open the box
- Remove the filler
- Shelf documents and accessories
- Verify that the unit is not damaged

Before starting the installation and commissioning it, check the information on the converter plate and verify that the unit is correct. The plate includes the rating values of current and voltage, the converter type and serial number.

7 Installation to the panel

The RPU converter is designed to be panel mounted in different positions; to this purpose in the package there are four corner elements which must be assembled in the suitable location.

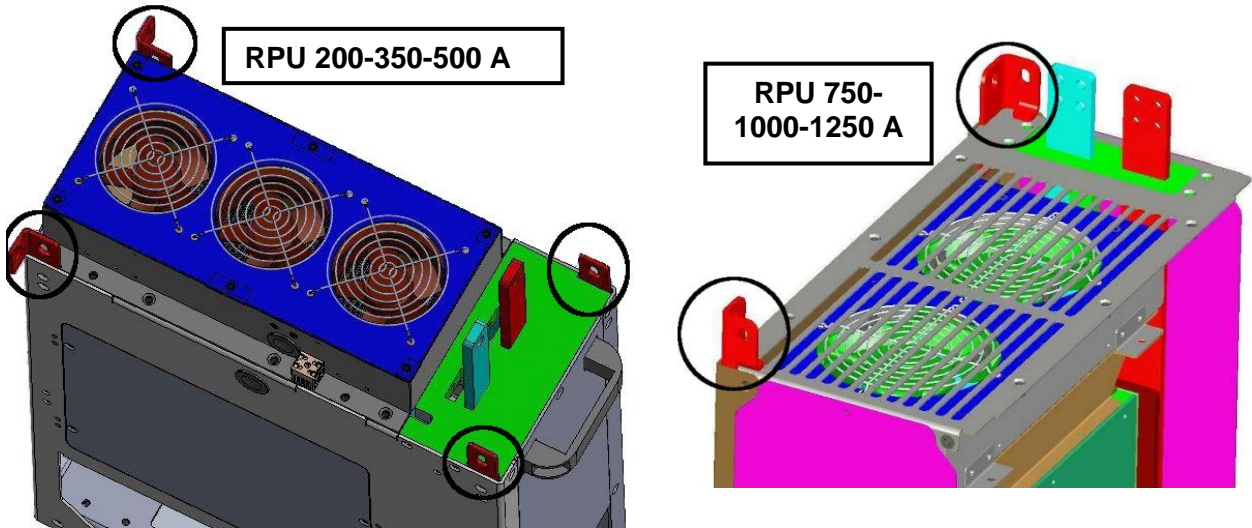


Fig. 1-Corner fixing elements

The converter can be mounted indifferently both on the short side or on the long one.

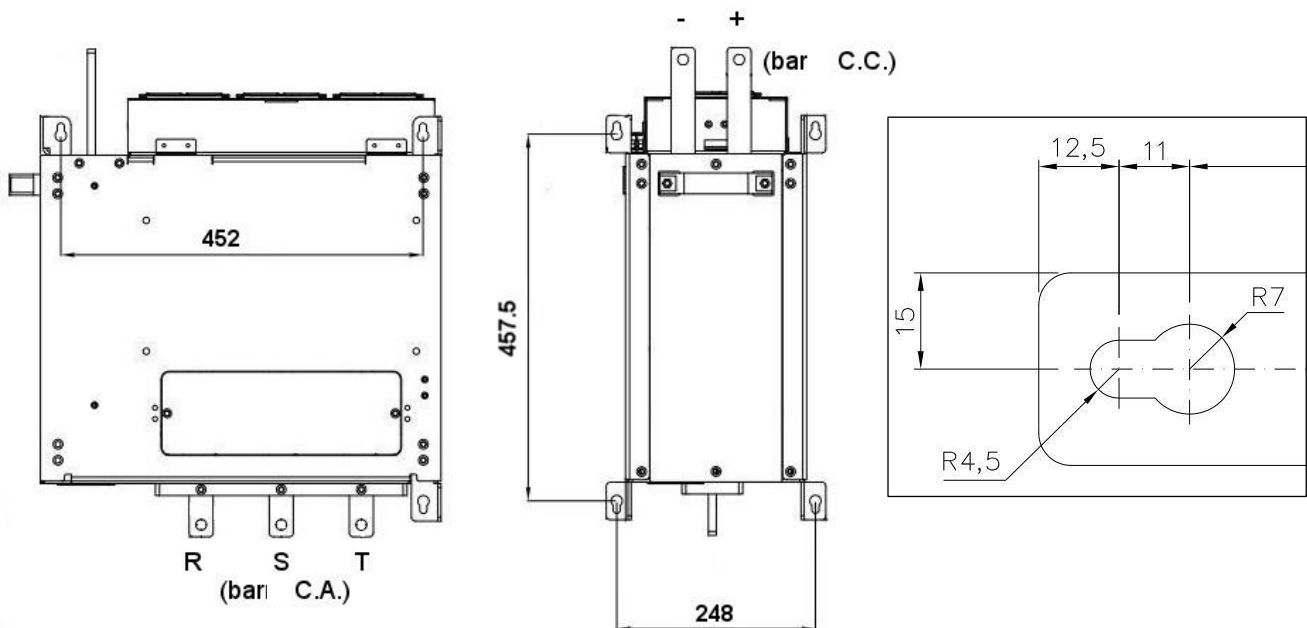


Fig. 2-RPU 200-350-500 A fixing dimensions

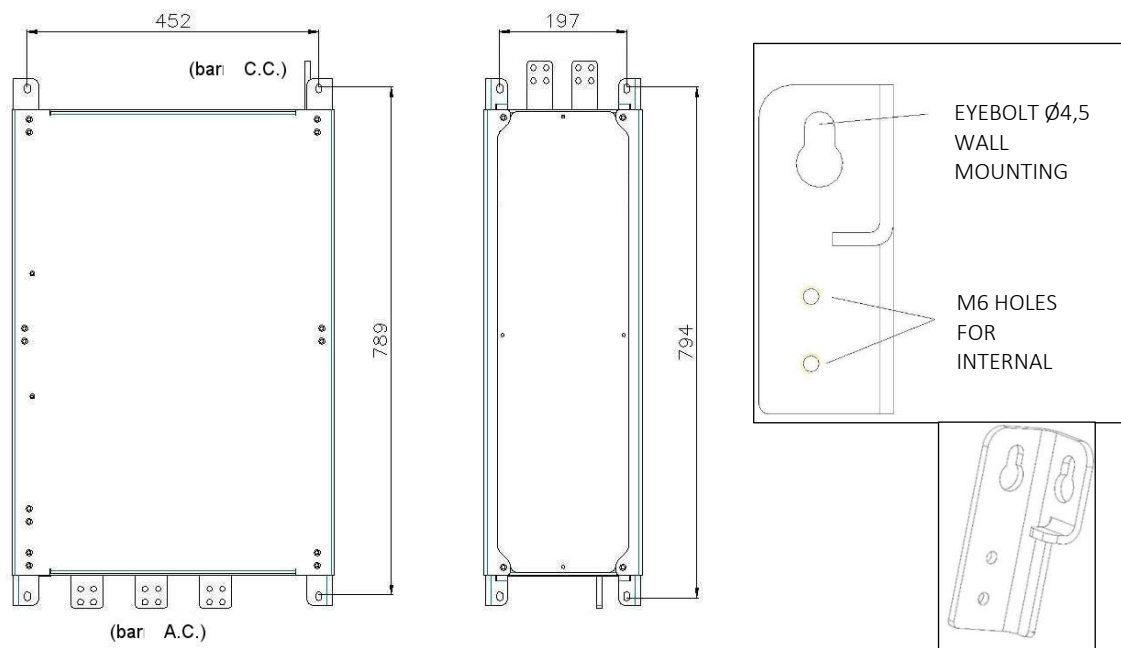


Fig. 3-RPU 750-1000-1250A fixing dimensions

The converter must be mounted in a vertical position, with the fans therefore positioned in the upper part. The cooling air must not exceed 40°C; if this temperature is exceeded, you will need to downgrade the unit (see chapter: Technical data).

The fans suck air from the bottom of the converter, so you must be careful not to install heating equipment under it.

8 Electrical installation

8.1 Busbar connections

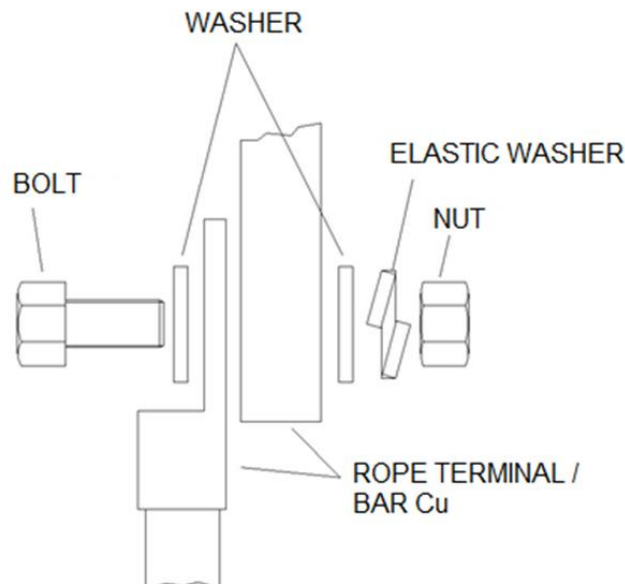
The connections to the busbars are specific to the system and are defined at the design level.

The user has to clean the ends of the busbars prior to connection.

Carefully clean the contact surfaces using a cloth. Surfaces should absolutely not bear traces of dirt or grease. Evenly apply contact grease with a sponge; there should only be a thin layer on the surfaces. Then you should immediately connect the busbars.

For electrical connection of the elements, use elements with screw fastening by tightening them according to the torques indicated below, making sure to lubricate them previously, with contact grease.

Bolt	M5		M6		M8		M10		M12	
Torque [Nm]	RPU 200- 350- 500 A	RPU 1000- 1250 A	RPU 200- 350- 500 A	RPU 1000- 1250 A	RPU 200- 350- 500 A	RPU 1000- 1250 A	RPU 200- 350- 500 A	RPU 1000- 1250 A	RPU 200- 350- 500 A	RPU 1000- 1250 A
	5.5	2.2	9.5	3.7	23	9	46	18.8	79	31.2



The mounting dimensions on power bars are shown in the drawing below represented.

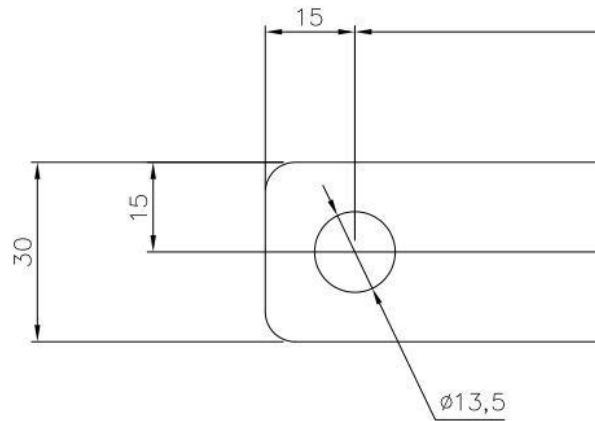


Fig. 4-A.C. - D.C. RPU 200-350-500A bars dimensions

BAR| C.A.

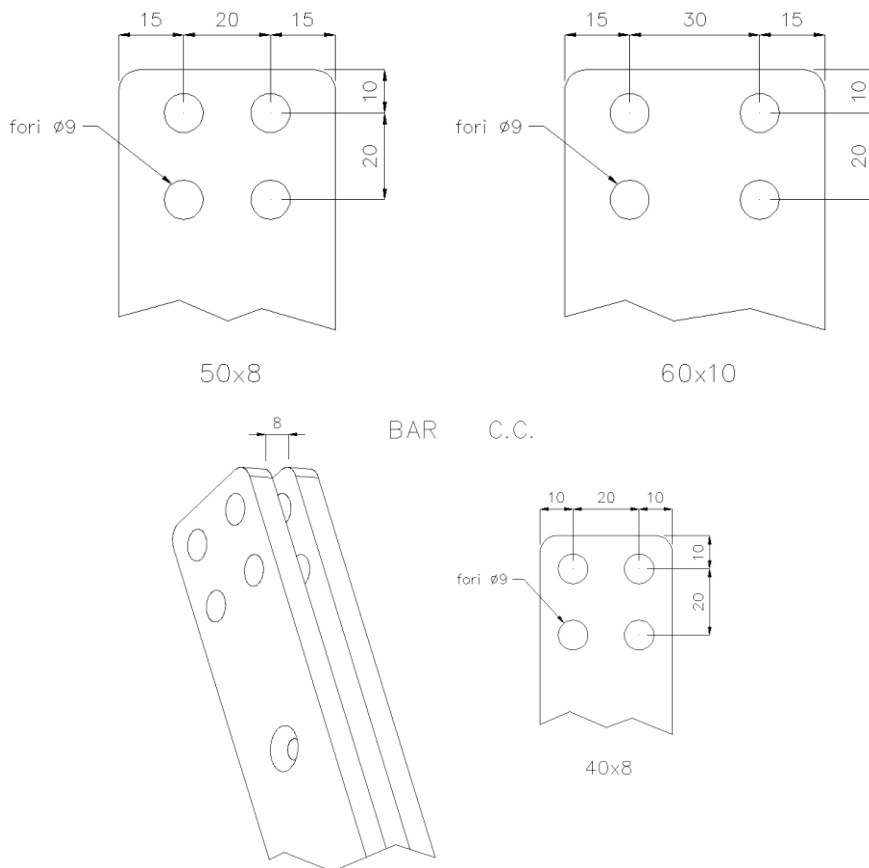


Fig. 5-A.C. - D.C. RPU 750-1000-1250A bars dimensions

In the case of D.C. output with two bars for polarity, the distance between them is 8mm.

9 Semiconductor protection

The RPU converters already mount inside the line fuses for semiconductor protection. The following table lists the types installed according to the electrical size of the converter.

Power supply up to 525Vac

Converters	Current DC [A]	Fuses		
		Type	Current AC [A]	Voltage AC [V]
RPU 200A	200	170M4458	200	690
RPU 350A	350	170M4460	315	690
RPU 500A	500	170M4464	500	690
RPU 750A	750	170M6460	630	690
RPU 1000A	1000	170M6463	900	690
RPU 1250A	1250	170M6465	1100	690

10 Ventilation

Converters	Fan		
	V power supply	P [W]	Q [m3/h]
RPU 200÷500 A	24 Vdc	3 x 12.4	3 x 260
RPU 750A	230 Vac	2 x 22/27	2 x 390/450
RPU 1000 A	230 Vac	2 x 22/27	2 x 390/450
RPU 1250 A	230 Vac	45	2 x 325

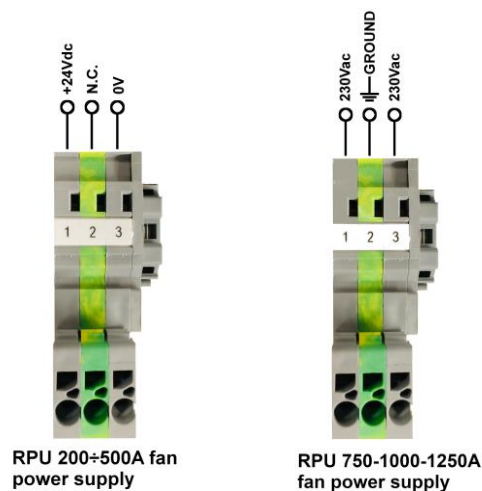


Fig. 6-Fans connectors

11 Technical Data

Environmental conditions

- Operating temperature: 0 ÷ 40°C (see derating curve fig.7)
- Relative humidity: 5 ÷ 95%, non-condensing
- Storage temperature: -40 ÷ 55°C
- Transport temperature: -40 ÷ 70°C
- Pollution degree (IEC60664-1, IEC60439-1): 2
- Installation: <1000 m., 100%
>1000 m., see diagram fig.8

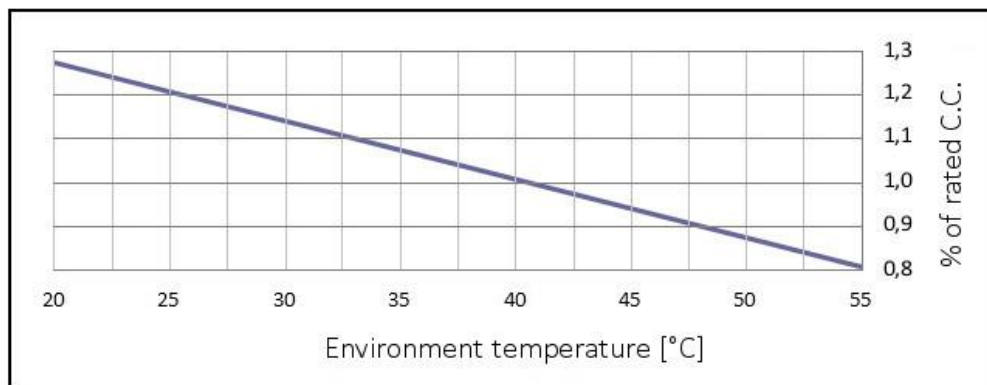


Fig. 7-Derating according to the temperature

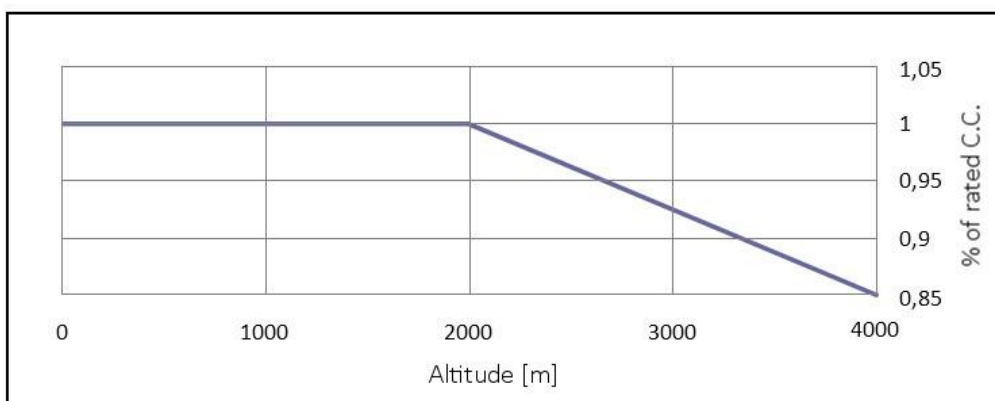


Fig. 8-Derating according to the altitude

12 Technical features

Converters	Three-phase voltage [Vac]	Rating frequency [Hz]	Rating current [A]	Protection degree
RPU 200÷500A	400 ± 10%	50/60 ± 2%	200-350-500	IP00
RPU 750A	400 ± 10%	50/60 ± 2%	750	IP00
RPU 1000-1250A	400 ± 10%	50/60 ± 2%	1000-1250	IP00

13 Mechanical configurations

Model	Dimensions (max)			Bars (section)		Weight [Kg]
	Height [mm]	Width [mm]	Depth [mm]	C.A.	C.C.	
RPU 200÷500A	607,5	500,5	226	30 x 10	30 x 10	63

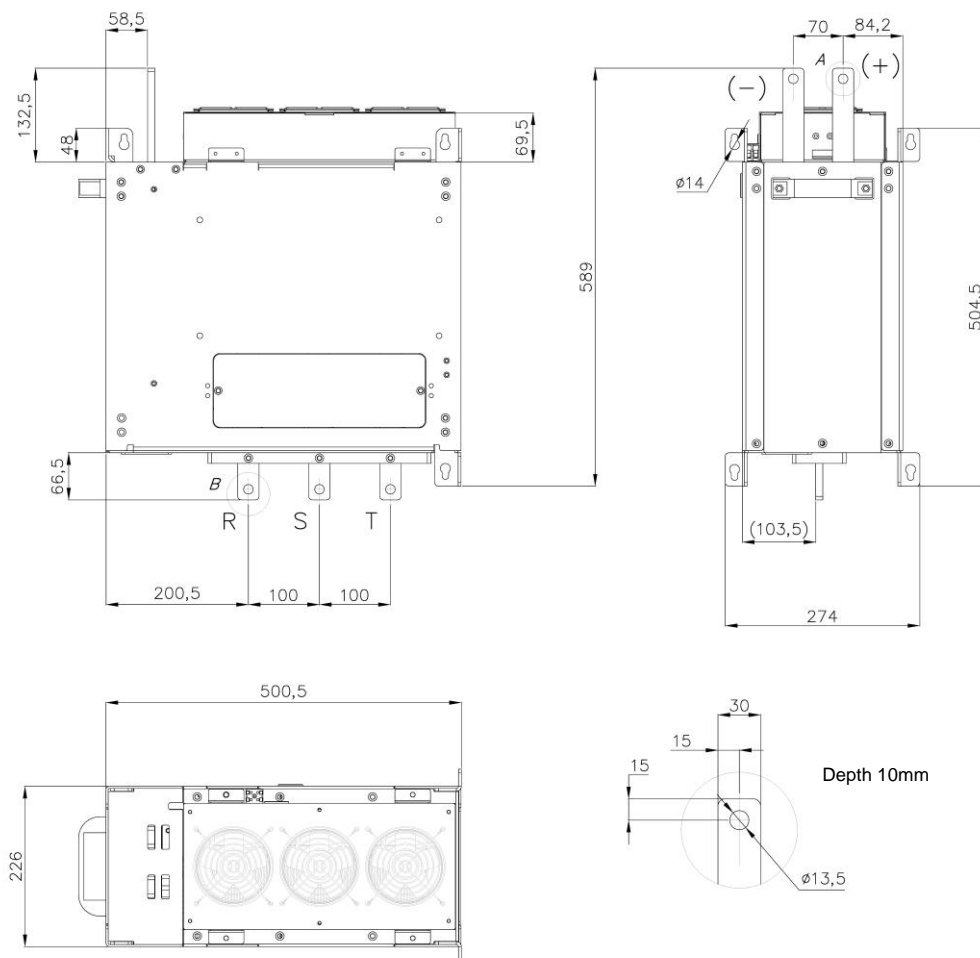


Fig. 9-RPU 200-350-500A dimensions

Model	Dimensions (max)			Bars (section)		Weight [Kg]
	Height [mm]	Width [mm]	Depth [mm]	C.A.	C.C.	
RPU 750A	677	500	245	50 x 8	40 x 8	63
RPU 1000A	677	500	245	50 x 8	40 x polarity	63
RPU 1250A	677	500	245	50 x 8	2 x 40 x 8	63

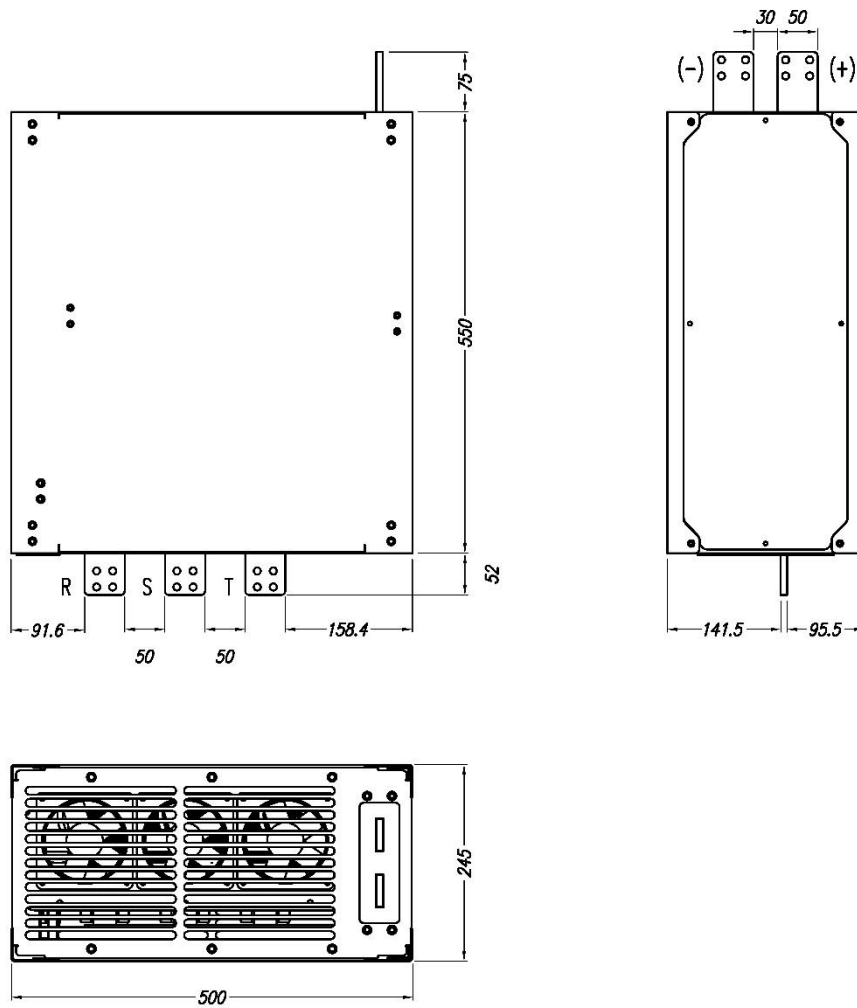


Fig. 10-RPU 750-1000-1250A dimensions

14 Control card

Description

The control card is used as a voltage regulator in AC/DC converters; a typical application of this card is the DC bus control with ramp up.

In the semicontrolled converters the card is able to control the ignition of the thyristors without the need to install other components.

The pulse transformers mounted on the card are dimensioned for an insulation voltage of 2.5 kV.

Ramp times for DC BUS precharge

The DC bus pre-charge times can be adjusted to suit particular application requirements and settable by means of Jumper JP1

	JP1		MEANING/VALUE	Remarks
	OPEN	CLOSE		
1	1-3 e 2-4		Instantaneous ramp < 1	*
2	2-4	1-3	Fast ramp ~ 15 sec	*
3	1-3	2-4	Average ramp ~ 30 sec	*
4		1-3 e 2-4	Slow ramp ~ 45 sec	*

*** The ramp times must be coordinated with the maximum absorption or current startup that can be admitted by the protections**

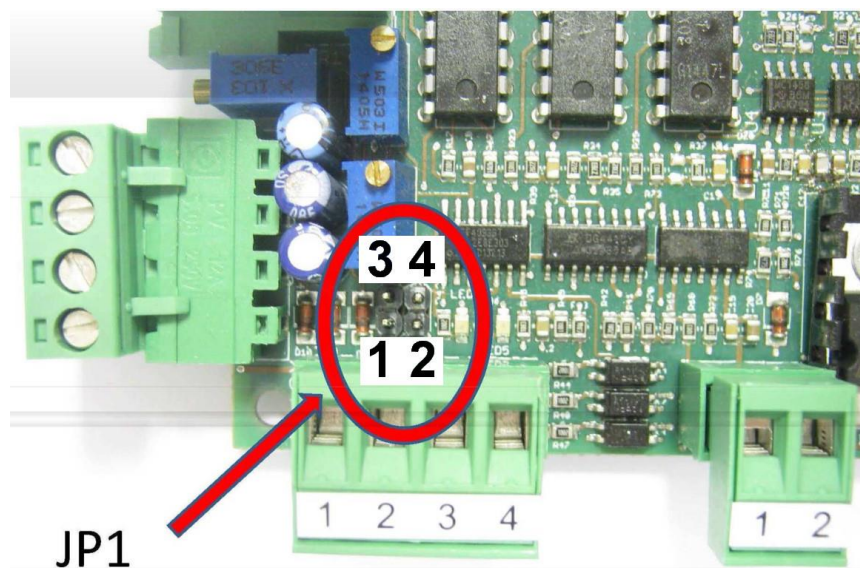


Fig. 11-Jumper JP1

15 Interface terminal board

15.1 IN-OUT RPU 200÷500A

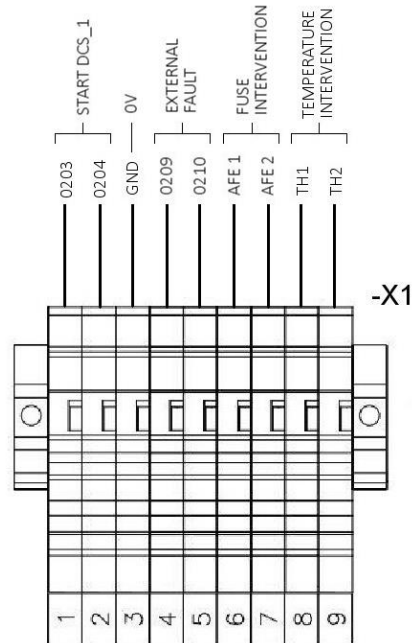
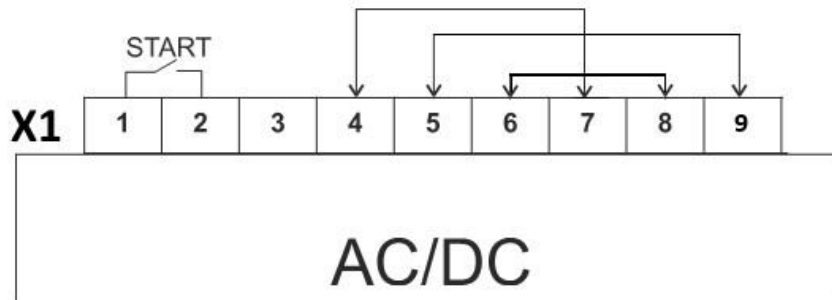


Fig. 12-RPU 200÷500A terminal block

X1	MEANING/VALUE	Remarks
1	START command of control board: active at 0V or by shortcircuiting this pin with pin 3 or sending +24V signal on this pin	
2	Reference 0V	
3	Reference 0V	Ground connected
4	Contact of external consent	
5		
6	Contact normally closed if fuses OK	
7		
8	Contact normally closed if temperature OK	
9		

15.2 Suggested connections



15.3 IN-OUT RPU 750-1000-1250A

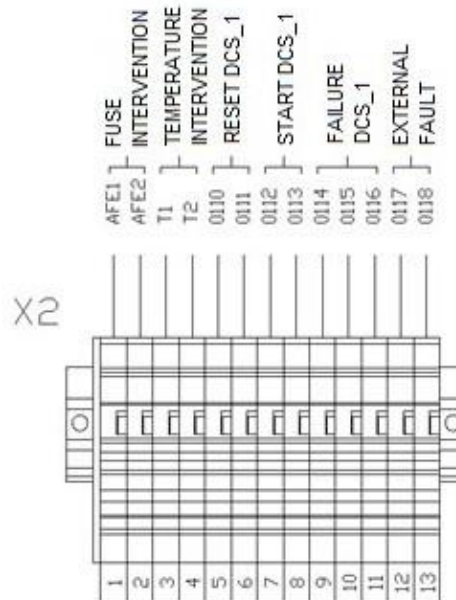
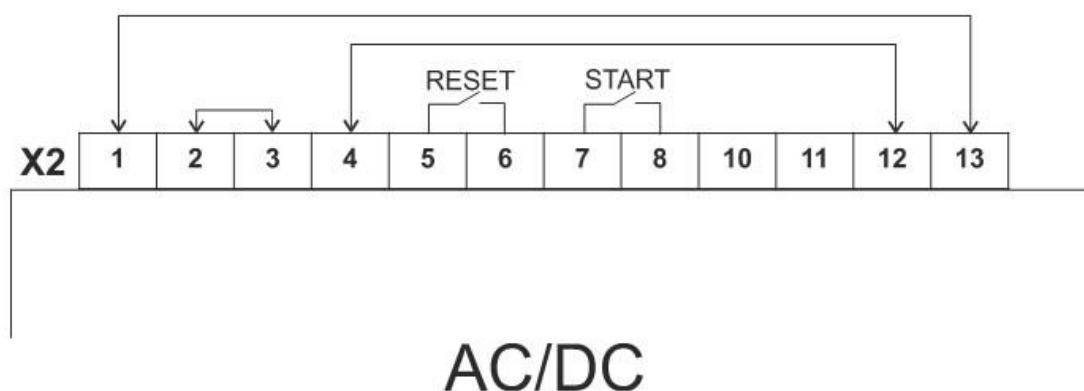


Fig. 13-RPU 750-1000-1250A terminal block

X2	MEANING/VALUE	Remarks
1	Contact normally closed if fuses OK	
2		
3	Contact normally closed if temperature OK	
4		
5	RESET Command of control board alarms: active at 0V or by short circuiting this pin with pin 6 or sending + 24V signal on this pin	RESET is active only when the START command is ABSENT
6	0V reference	Ground connected

7	START Command of control board: active at 0V or by short circuiting this pin with pin 8 or sending + 24V signal on this pin	
8	0V reference	Ground connected
9	Normally closed contact of the FAULT relay inside the control board	
10	Common of FAULT relay	
11	Normally open contact of the FAULT relay inside the control board	
12	Contact of external consent	
13		

15.4 Suggested connections



16 Diagnostic LEDs

On the control board there are various diagnostic LEDs and status displays. The following table shows the meanings.

	LED	MEANING/VALUE	Notes
1	LED1	Auxiliary voltage -15V present	Green
2	LED2	Auxiliary voltage +15V present	Green
3	LED3	FAULT Reporting	Red
4	LED4	Board signaling in START condition	Green
5	LED5	Signaling of active RESET	Red
6	LED6	It is lit with Firing present by thyristor phase U	Red
7	LED13	It is lit with Firing present by thyristor phase V	Red
8	LED15	It is lit with Firing present by thyristor phaseW	Red

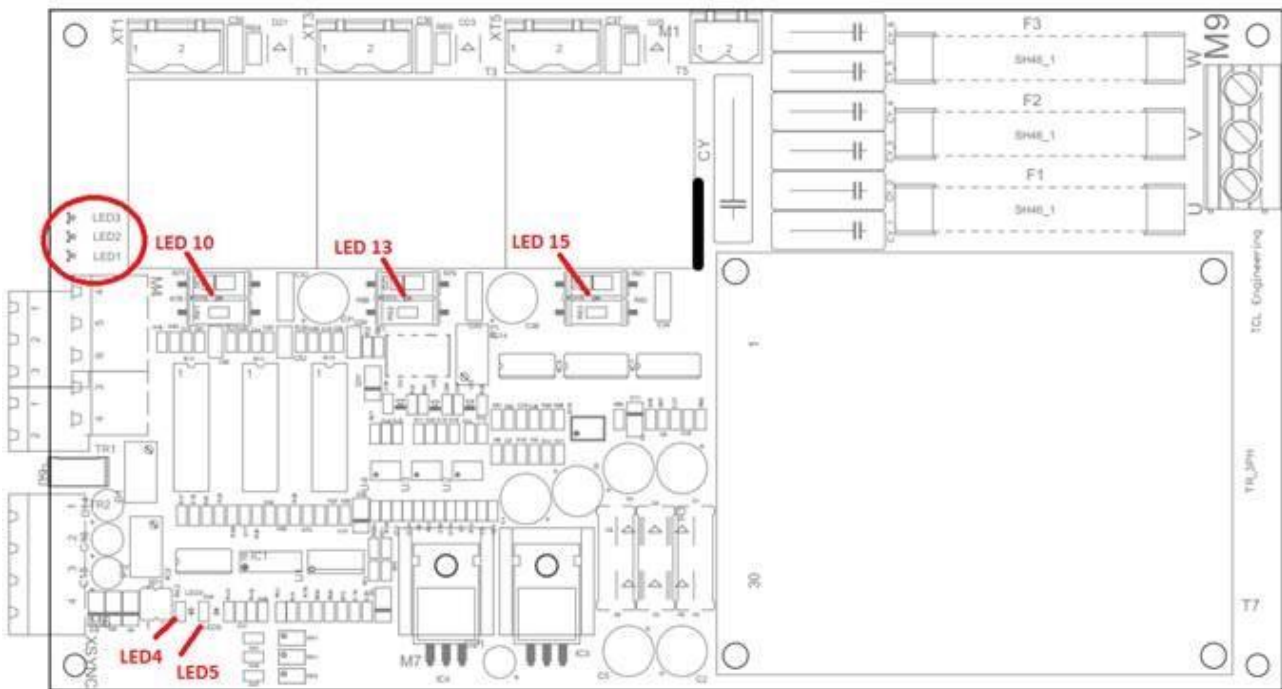


Fig. 14-Control board serigraphy

17 Norms and Standards

- IEC 60439-1 Low-voltage switchgear and controlgear assemblies - Part 1
- IEC 60204-1 Safety of machinery – Electrical equipment of machines – General requirements
- IEC 60664-1 Insulation coordination for equipment within low-voltage systems – Principles, requirements and tests
- IEC 60146-1 Semiconductor converters - specification of basic requirements
- IEC 60529-1 Degrees of protection provided by enclosures (IP Code)
- IEC 61800 Functional safety of electrical/electronic/programmable electronic safety-related systems



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