

# DC Power Rack

## DCR PSR327-8.1 LV/HV

# USER MANUAL



## Notes to this manual

ATTENTION! Read this manual very carefully before installing and commissioning the DC power rack. This manual is a part of the delivered DC power rack. Familiarity with the contents of this manual is required for installing and operating the DC power rack. The rules for prevention of accidents for the specific country and the general safety rules in accordance with IEC 364 must be observed.

The function description in this manual corresponds to the date of publishing. Technical changes and changes in form and content can be made at any time by the manufacturer without notice. There are no obligations to update the manual continually.

The module is manufactured in accordance with applicable DIN and VDE standards such as VDE 0106 (part 100) and VDE 0100 (part 410). The CE marking on the module confirms compliance with EU standards 2006-95-EG (low voltage) and 89/339 EWG (electromagnetic compatibility) if the installation and operation instructions are followed.

### Supplier:

	ELTEK VALERE DEUTSCHLAND GmbH GB Industrial Schillerstraße 16 D-32052 Herford
	+ 49 (0) 5221 1708-210
FAX	+ 49 (0) 5221 1708-222
Email	Info.industrial@eltekvalere.com
Internet	<a href="http://www.eltekvalere.com">http://www.eltekvalere.com</a>

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**DC Power Rack**  
**DCR PSR327-8.1 LV/HV**

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The current revision status of this user manual is the following:

Revision: 2.0

Date: 2009-06-05

Revision	Description of change	Writer	Date
00	Preliminary version	RTH	2008-02-01
01	First edition	RTH	2008-02-15
02	Minor addition in the section "rear side connection"	RTH	2008-02-28
03	"Recommended wire cross section" for the output inserted	RTH	2008-03-04
04	Index of figures inserted, minor text modifications, section "Can-Bus termination" reworked.	RTH	2008-06-03
1.0	Designation of the alarm relay outputs corrected, new revision status numbering (X.X) introduced.	RTH	2008-12-18
2.0	Section "Extensions" added.	RTH	2009-06-05

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## 1. Safety Instructions and Waste Disposal Rules



### Warning!

Because several components of operating electrical devices are charged by dangerous voltage, the improper handling of electrical devices may be the cause of accidents involving electrocution, injury, or material damages.

- Operation and maintenance of electrical devices must be performed by qualified skilled personnel such as electricians in accordance with EN 50110-1 or IEC 60950.
- Install the module only in areas with limited access to unskilled personnel.
- Before starting work, the electrical device must be disconnected from mains. Make sure that it is earthed.
- Do not touch connector pins as they can be charged with dangerous voltage up to 30 seconds after disconnection.
- Only spare parts approved by the manufacturer must be used.

All electric devices must be disposed of separate from domestic waste at collecting points that have been set up by the government or municipal authority.

“Separate collection is the precondition to ensure specific treatment and recycling of WEEE and is necessary to achieve the chosen level of protection of human health and the environment in the Community.”

The above statement from EU directive 2002/96/EC applies to all electric devices installed within EU countries.

In countries outside the EU, different rules may apply regarding waste disposal of electric devices.

For more information about waste disposal of your discarded equipment, contact your ELTEK VALERE DEUTSCHLAND partner.

## 2. General Information

The DC power rack is a connection unit ready for integration in system cabinets with standard 19" frame. A high voltage (HV) and low voltage (LV) version is available. The unit can be equipped with a maximum of three rectifiers of type PSR327 (PSR312) and one DC controller UPC3 and delivers an output power up to 8100W. After safe mechanical and electrical connecting, the unit is ready for operation.

The DC controller UPC3 is easy to configure by software and adapts the system to customer's applications and battery parameters.

### Extensions:

If more output power is required, the power supply system can be extended with racks of type DCR PSR327-10.8. This rack is designed to be fitted with four rectifiers PSR327 (PSR312). For more information about extensions see section 6. "[Extensions](#)".

### 2.1 Block Diagram

#### DCR PSR327-8.1 LV/HV

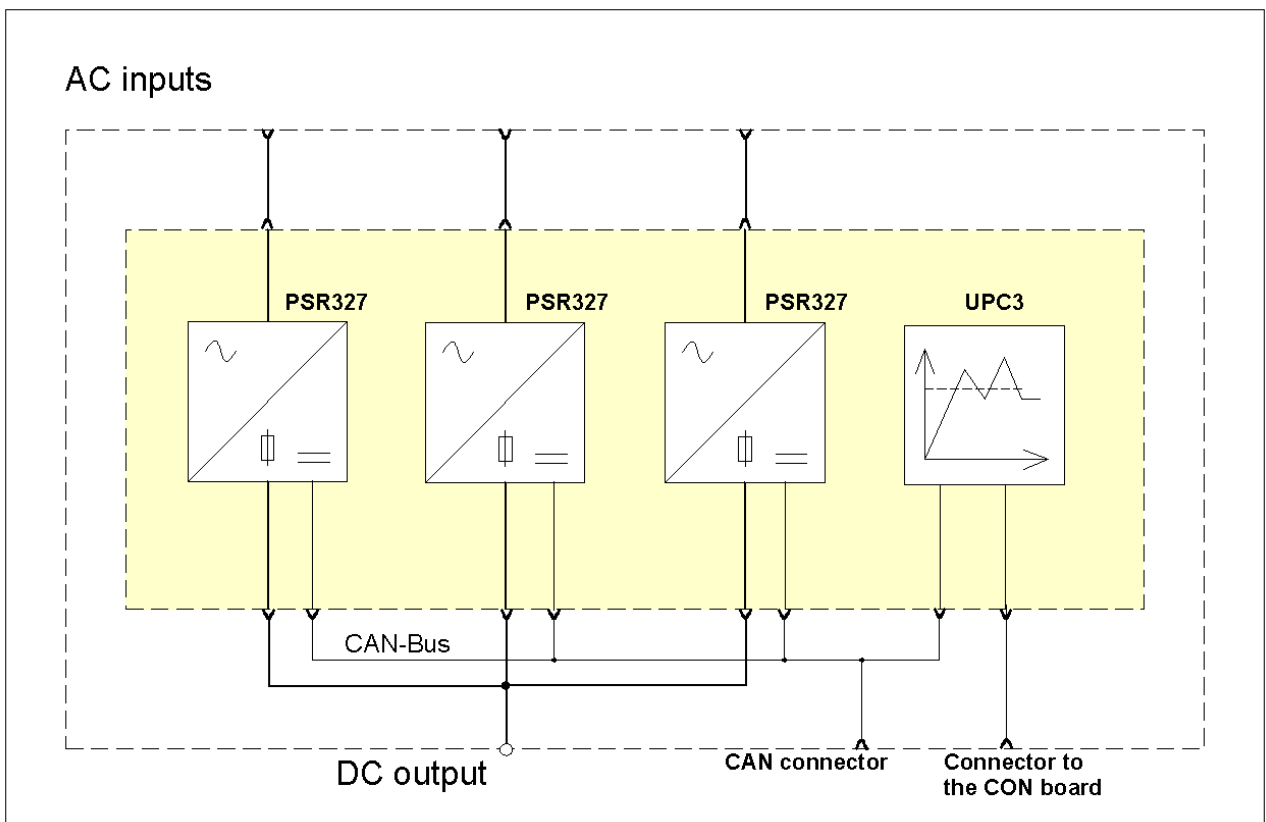


Figure 1) - Block diagram

## 2.2 Possible Configurations

One up to three rectifiers PSR327 (PSR312) with output voltages according to the table below, plus one DC controller UPC3 (obligatory) can be integrated into one rack.

Designation of the rack	Article code		For rectifier/ output voltage	Necessary type of DC controller UPC3//Article code
DCR PSR327-8.1 LV	102-327-318.LV01	Input voltage = 230V <sub>AC</sub>	PSR312/24V <sub>DC</sub>	UPC3-24V//301-003-498.02
			PSR327/48V <sub>DC</sub>	UPC3-48/60V//301-003-598.02
			PSR327/60V <sub>DC</sub>	
DCR PSR327-8.1 HV	102-327-318.HV01		PSR327/110V <sub>DC</sub>	UPC3-110V//301-003-798.02
			PSR327/220V <sub>DC</sub>	UPC3-220V//301-003-898.02

Output power of the rack, equipped with PSR312:

Number of installed Rectifiers (PSR312)	Output power (without redundancy)	Output power (n + 1)	Output power (n + 2)
1	1200W	---	---
2	2400W	1200W	---
3	3600W	2400W	1200W

Output power of the rack, equipped with PSR327:

Number of installed Rectifiers (PSR327)	Output power (without redundancy)	Output power (n + 1)	Output power (n + 2)
1	2700W	---	---
2	5400W	2700W	---
3	8100W	5400W	2700W



### 2.3 Perspective View

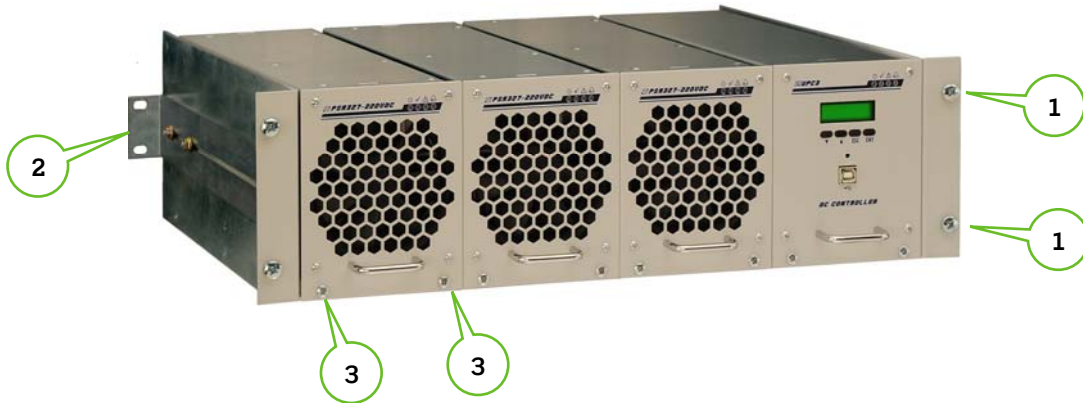




Figure 2) - DC power rack fully equipped with three rectifiers PSR327 and one DC controller UPC3.

Fastening elements according to figure 2)		Comment
1	Four screws M6 to fix the sub rack to the frame of the system cabinet	Component parts of the sub rack
2	Two adjustable assembly brackets (on the left and right side) to fix the sub rack to the rear frame of the system cabinet.	
3	Two captive screws are used for each module to secure it to the sub rack	Component parts of the modules

### 2.4 Available Options and required Equipment

Description	Article code
 <p>DCC-CB1; connection board (with MSTB screw terminals), required to connect all measuring, control and signalling wires over the backplane of the subrack to the DC controller UPC3, see section 3.2.8 "<a href="#">Connection Board</a>"</p>	302-DCC-CB1.00 (Included in delivery of the sub rack)
Cover plate (with handle) to cover empty slots, 1/4 x 19", 3U, colour RAL 7035	881-MEC-BPL.03.21.B
Temperature sensor KTY81-220 T092 with cable of 4m length	302-TMP-KTY.04
CAN-Bus connection cable, length 0.5m (other lengths available)	880-KAB-CAN.05
 <p>Extension rack DCR PSR327-10.8 for four rectifiers PSR327 (312), see section 6. "<a href="#">Extensions</a>".</p>	For 24-60V <sub>Dc</sub> : 102-327-408.LV01  For 110-220V <sub>Dc</sub> : 102-327-408.HV01

## 2.5 Cooling and Air Flow Direction

The PSR327 (312) units are cooled with internal fans. The airflow is from the front to rear side. The fans are monitored and speed-controlled dependent on module temperature. To provide sufficient air flow, a minimum space (see figure 3, item "A") of 50 mm is required between the backplane of the rack and the rear cabinet wall as well as an unobstructed supply of air to the front of the modules.

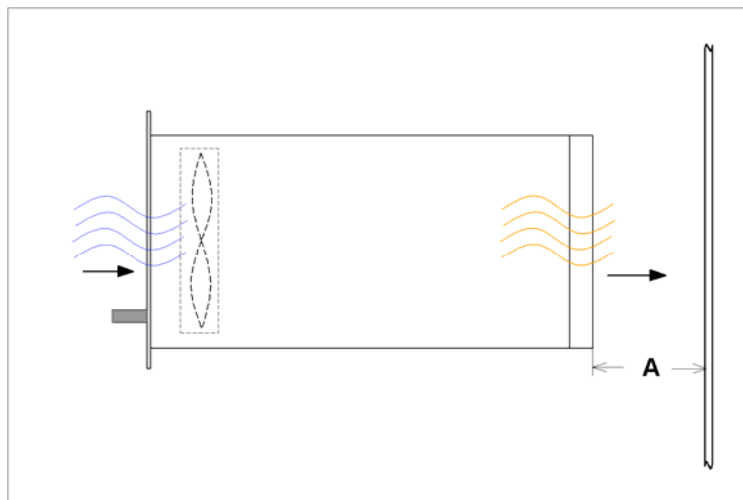


Figure 3) - Rack air flow

## 3. Handling

### 3.1 Storage

Power racks must be stored in a dry, dust free environment with a storage temperature in accordance with the specific technical data (see [section 5](#)).

### 3.2 Commissioning

1. Carefully unpack the unit and mount it on your power supply cabinet with 4 screws M6 (1) at the front side.
2. Adjust the assembling brackets (2) on the left and right side of the rack with the relevant nuts of the rear cabinet frame and tighten the brackets with 4 screws M6 (3) as shown in figure 4).



Figure 4) - Rack mounting points

**REMARK:** Before assembling the rectifier modules, the following settings must be done on the empty rack:

1. CAN-Bus termination
2. CAN address designation

For details, see the following sections.

Figure 5) - Front view of the empty rack

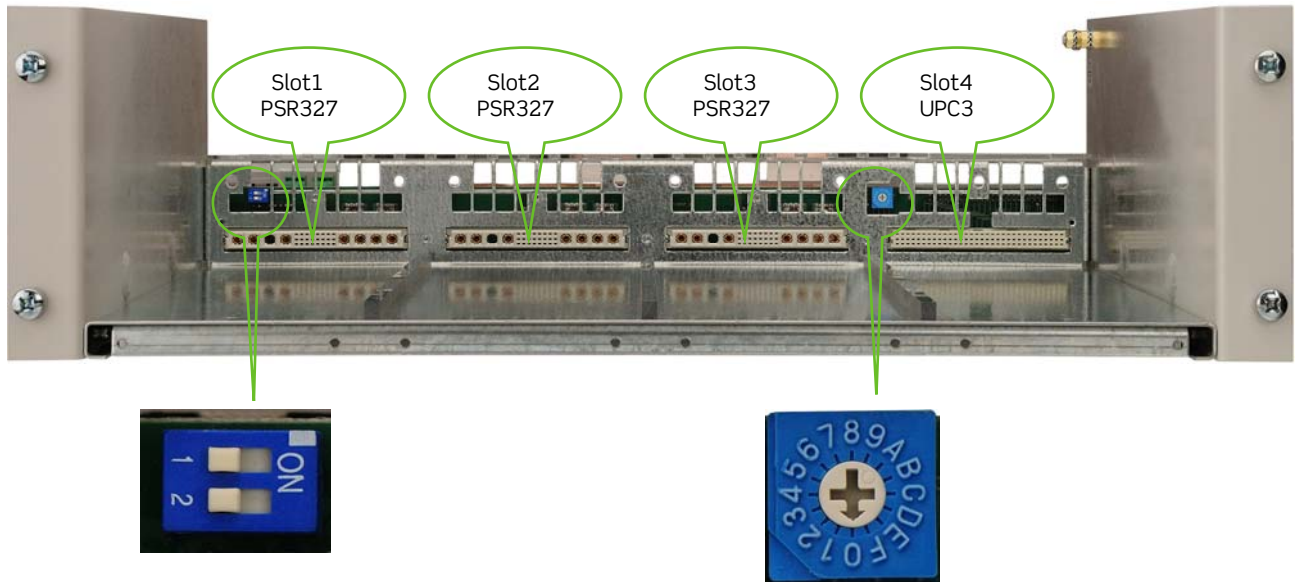


Figure 6) - CAN-Bus termination switches (For details see the section 3.2.2 "CAN-Bus Termination")

Figure 7) - Rotary switch= CAN address selector (For details see the section 3.2.3 "CAN Address Designation")

### 3.2.1 Communication Interface

The DCR PSR327 is equipped with a serial data interface in accordance with the Controller Area Network (CAN) specification.

Several power racks and/or modules in a system can be controlled and monitored through the CAN-Bus by a central DC controller unit UPC3.

Two CAN-Bus connectors (X6= CAN1; X7= CAN 2) are located on the rear of the sub rack (see figure 9).

### 3.2.2 Can-Bus Termination

The CAN-Bus must be terminated at both ends. If no other power rack and/or module is connected (CAN 2 not used), the CAN termination resistor must be enabled by setting the CAN termination switch 1, 2 or both (shown in figure 6) to "ON" position.

If CAN 2 is connected too, the CAN termination resistor must be disabled by setting the CAN termination switches 1 **and** 2 to "OFF" position. For switch functions in detail, see the table below.

Table "CAN-Bus termination switch functions"

Switch 1 position	Switch 2 position	CAN-Bus termination resistor:
ON	OFF	Enabled
OFF	ON	Enabled
ON	ON	Enabled
OFF	OFF	Disabled

ATTENTION: Missing terminations or too many terminations within the system can disturb the CAN-Bus communication. No more than two termination resistors should be activated on one bus and these should be located at both ends of the bus.

### 3.2.3 CAN Address Designation

All racks (modules) within a system must be addressed for a clear identification through the control unit.  
The specific address for each rack must be designated with the CAN address selector (rotary switch) shown in figure 7).

Rotary switch position	Rack address
0	1
1	2
2	3
3	4
4	5
5	6
6	7
7	8
8	9
9	10
A	11
B	12
C	13
D	14
E	15
F	16

If only one rack is used within the power supply system, the rack must be addressed with the rack address 1 (rotary switch position “0” according to the table above).

A second used rack must be addressed with the rack address 2 (rotary switch position “1” according to the table above), etc.

The CAN addresses of the installed PSR rectifiers are automatically designated by the rack.

### 3.2.4 Assembling

After you have completed the settings, assemble the modules into the slots of the sub rack. Fill the rack beginning with the left slot. The Slots 1 to 3 are provided for the rectifiers, slot 4 is provided for the controller unit UPC3 (see figure 5).  
Empty PSR slots must be covered with cover plates (see section 2.4 “[Available Options and required Equipment](#)”).

### 3.2.5 Rear View/Electrical Connectors

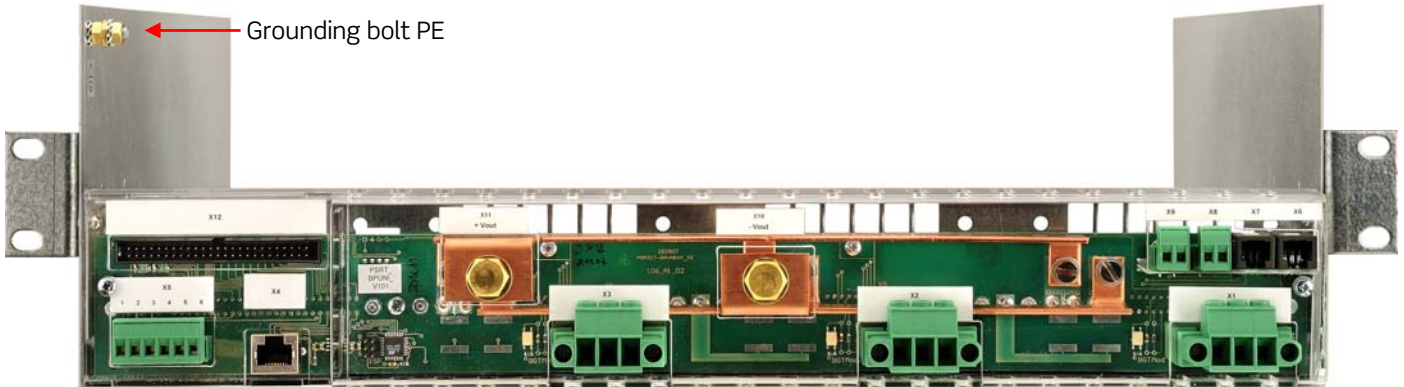


Figure 8) - Rear view

With the stickers affixed on the plexiglass guard, the connectors are labelled (X1 ... X12) for a clear identification.

Connect the input and output wires as well as the alarm wires to the rear connectors in accordance with the connection table below.

For the connection of the measuring, control and signalling lines of the system, an external connection board is necessary (see the section 3.2.8 "Connection Board"). For the connection of the connection board to the power rack (X12), a 50-pole ribbon cable is used.

To clarify: The drawing (see figure 9) shows the labelling of the terminal blocks.

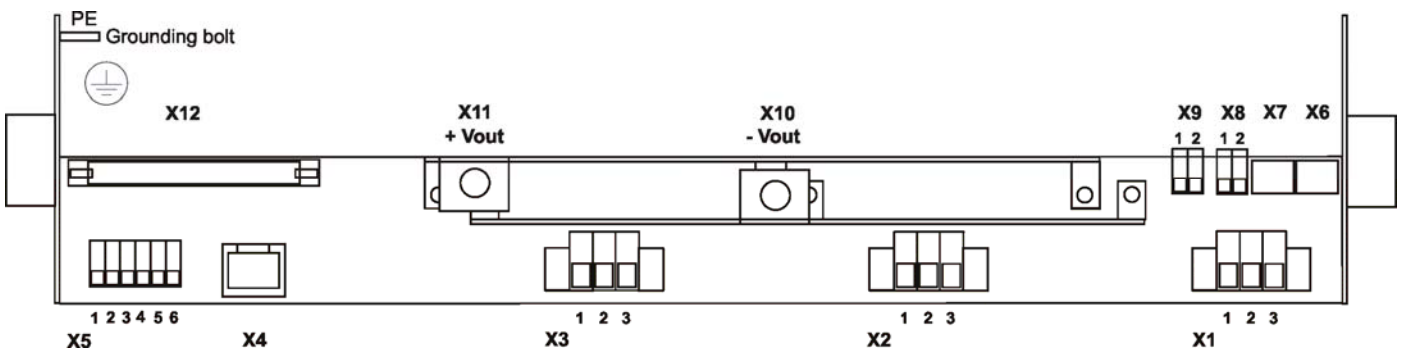



Figure 9) - Rear electrical connectors

**REMARK:** The special grounding bolt (PE) of the rack itself must be grounded with the cabinet frame (common PE of the system).

 **Because PE of the AC input connectors (X1.1, X2.1 and X3.1) are not connected with the grounding bolt (PE) of the rack, they must be connected with the common PE of the system.**

**REMARK:** The high voltage (HV) rack looks similar to the low voltage (LV) rack. The difference is, that the connector **X9** (sensor input for voltage drop compensation) is not connected for the HV rack!

### 3.2.6 Connection Table

Assignment of the rear side connectors according to figure 9).

Connector	Function	Recommended wire cross section				
<b>X1</b>	AC input 1					
1	PE	2.5 mm <sup>2</sup>				
2	N	2.5 mm <sup>2</sup>				
3	L1	2.5 mm <sup>2</sup>				
<b>X2</b>	AC input 2					
1	PE	2.5 mm <sup>2</sup>				
2	N	2.5 mm <sup>2</sup>				
3	L2	2.5 mm <sup>2</sup>				
<b>X3</b>	AC input 3					
1	PE	2.5 mm <sup>2</sup>				
2	N	2.5 mm <sup>2</sup>				
3	L3	2.5 mm <sup>2</sup>				
<b>X4</b>	Ethernet connector (RJ45)	Cord set				
<b>X5</b>	Measurement input					
1	+V1 (battery voltage*)	0.75mm <sup>2</sup>				
2	-V1	0.75mm <sup>2</sup>				
3	+V2 (system voltage*)	0.75mm <sup>2</sup>				
4	-V2	0.75mm <sup>2</sup>				
5	+V3 (tap voltage)	0.75mm <sup>2</sup>				
6	-V3	0.75mm <sup>2</sup>				
<b>X6</b>	CAN 1 (RJ11, 6-pole)	Cord set				
<b>X7</b>	CAN 2 (RJ11, 6-pole)	Cord set				
<b>X8</b>	Rectifier fault					
1	Relay output (COM, NC)	0.75mm <sup>2</sup>				
2	Relay output (COM, NC)	0.75mm <sup>2</sup>				
<b>X9**</b>	Sensor input for voltage drop compensation					
1	+ sense	0.75mm <sup>2</sup>				
2	- sense	0.75mm <sup>2</sup>				
		Recommended wire cross section, calculated for a fully equipped rack (3 rectifiers) @ output voltage				
		24V <sub>DC</sub>	48V <sub>DC</sub>	60V <sub>DC</sub>	110V <sub>DC</sub>	220V <sub>DC</sub>
<b>X10</b>	DC output (minus pole), connection with M8 bolt (brass)	70mm <sup>2</sup>	95mm <sup>2</sup>	70mm <sup>2</sup>	25mm <sup>2</sup>	10mm <sup>2</sup>
<b>X11</b>	DC output (plus pole), connection with M8 bolt (brass)	70mm <sup>2</sup>	95mm <sup>2</sup>	70mm <sup>2</sup>	25mm <sup>2</sup>	10mm <sup>2</sup>

\* It is necessary to connect the battery voltage or the system voltage, because the battery voltage or the system voltage is to be used for the power supply of the DC controller unit UPC3.

\*\*Not connected for the HV-rack!

Connector	Function	Recommended wire cross section
<b>X12</b>	Terminal block for connection to the external connection board	Cord set (ribbon cable, 50-pole)

### 3.2.7 Schematic Diagram (Example of use)

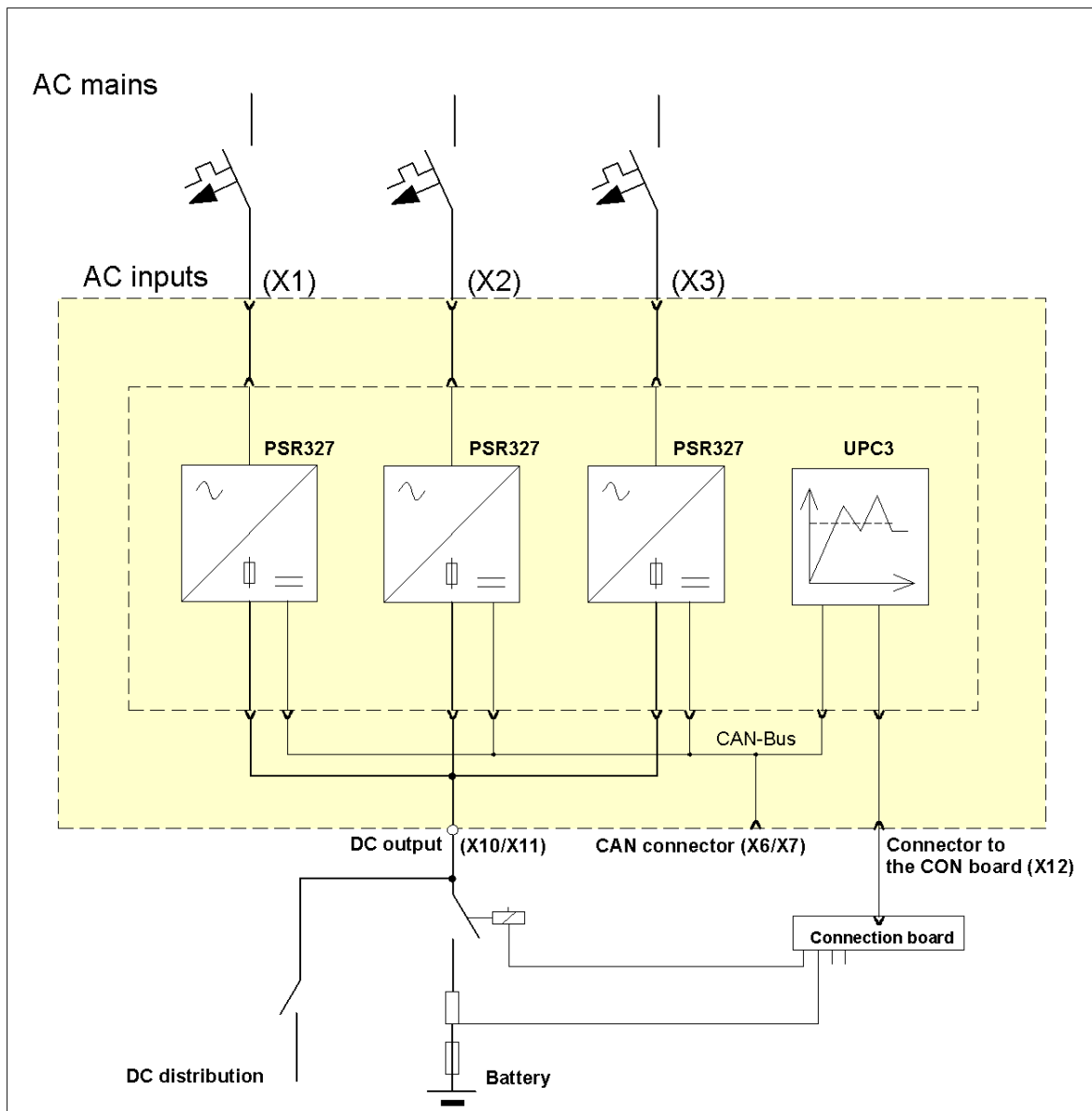


Figure 10) - Schematic diagram



An external separate fuse per each input is recommended!

With this fuse each module individually can be switched ON/OFF and therefore unused slots are isolated (higher safety level).

**Recommended input fuses:** 16A MCB, characteristic “B”



### 3.2.8 Connection Board

As noted above and indicated in the schematic diagram (see [figure 10](#)), it is necessary to use an external extension board (included in delivery of the DC power rack), to connect all measuring, control and signalling lines of the system over the relevant connector (X12) of the DC power rack to the DC controller unit UPC3.

All measuring, control and signalling lines can be directly connected to the connection board. For the connection of the connection board to the DC power rack, a 50-pole ribbon cable (included in delivery of the connection board) is used.

For the sake of completeness following a brief description of the connection board:

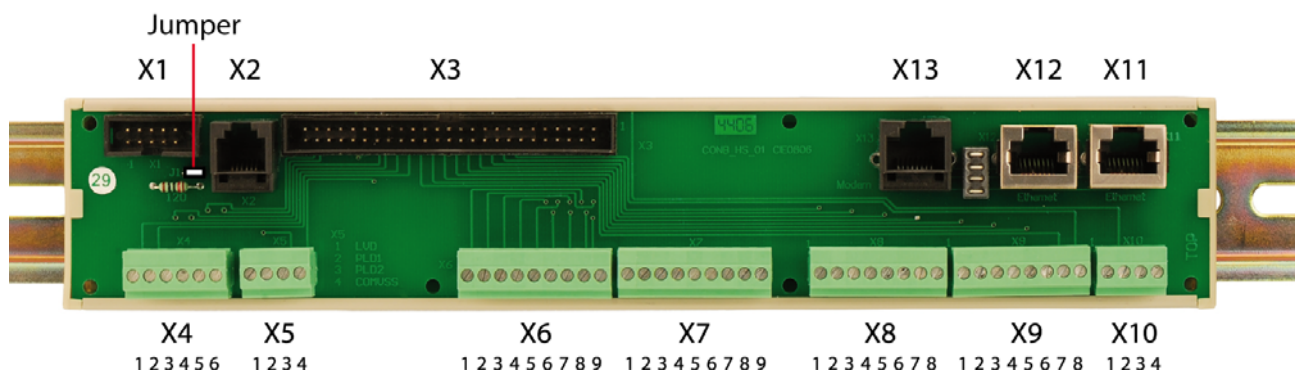


Figure 11) - Top view of the connection board

Overview of the possible connections according to figure 11).

Connector	Function
<b>X1</b>	Commonly not used
<b>X2</b>	RJ11, 6-pole CAN connector*
<b>X3</b>	Terminal block for ribbon cable (50-pole)
<b>X4</b>	Three current measuring inputs I1-I3, for shunts 60mV
1	+I1
2	-I1
3	+I2
4	-I2
5	+I3
6	-I3
<b>X5</b>	Control outputs for contactors LVD, PLD 1 + 2, optocoupler; max. 60V/20mA
1	LVD (OC)
2	PLD1 (OC)
3	PLD2 (OC)
4	COMVSS

\*If X2 is connected, the jumper must be removed.

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Connector	Function
<b>X6</b>	Three potential free relay outputs, contact load: max. 60V/max. 500mA
1	Relay K1, NO
2	Relay K1, COM
3	Relay K1, NC
4	Relay K2, NO
5	Relay K2, COM
6	Relay K2, NC
7	Relay K3, NO
8	Relay K3, COM
9	Relay K3, NC
<b>X7</b>	Three potential free relay outputs, contact load: max. 60V/max. 500mA
1	Relay K4, NO
2	Relay K4, COM
3	Relay K4, NC
4	Relay K5, NO
5	Relay K5, COM
6	Relay K5, NC
7	Relay K6, NO
8	Relay K6, COM
9	Relay K6, NC
<b>X8</b>	Four digital inputs Din1-Din4
1	Digital input 1
2	DGND
3	Digital input 2
4	DGND
5	Digital input 3
6	DGND
7	Digital input 4
8	DGND
<b>X9</b>	Four digital inputs Din5-Din8
1	Digital input 5
2	DGND
3	Digital input 6
4	DGND
5	Digital input 7
6	DGND
7	Digital input 8
8	DGND
<b>X10</b>	Two temperature measuring inputs for sensors of type KTY81
1	+Temp. sensor 1
2	GND
3	+Temp. sensor 2
4	GND
<b>X11 + X12</b>	RJ45 Ethernet connectors
<b>X13</b>	RJ45 ISDN connector

## 4. Maintenance

In general, the system is maintenance-free.

A yearly inspection with following checks is recommended checking the following:

- Correct fan operation (rectifiers)
- Mechanical inspection
- Removal of dust and dirt
- Check for internal dust or humidity

**ATTENTION!** Dust combined with moisture or water may influence or destroy the internal electronic circuits.

Dust inside the unit can be blown out with dry compressed air.

The interval between the checks depends on ambient conditions of the installed system.

For the exchange of defective fans in the rectifier modules, an additional instruction manual is available on request.

## 5. Technical Specifications

Type designation	DCR PSR327-8.1 LV	DCR PSR327-8.1 HV
Article code	102-327-318.LV01	102-327-318.HV01
<b>Main Data:</b>		
Modules	Designed for the use of 1 up to max. 3 rectifiers of series PSR312 (Vo= 24V <sub>DC</sub> ) or PSR327 (Vo= 48; 60V <sub>DC</sub> ) and 1 DC controller UPC3 (24; 48/60V version)	Designed for the use of 1 up to max. 3 rectifiers of series PSR327 (Vo= 110; 220V <sub>DC</sub> ) and 1 DC controller UPC3 (110; 220V version)
Input voltage	230V <sub>AC</sub>	←
Internal input fuses	There are no internal fuses, we recommend an individual fuse for each input	
Nominal output voltage	24, 48, 60V <sub>DC</sub> (single-output), depends on the used rectifiers	108, 216V <sub>DC</sub> (single-output), depends on the used rectifiers
Max. output current (rack fully equipped with 3 rectifiers)	150A <sub>DC</sub> @24V <sub>DC</sub> 168A <sub>DC</sub> @48V <sub>DC</sub> 135A <sub>DC</sub> @60V <sub>DC</sub>	75A <sub>DC</sub> @108V <sub>DC</sub> 37.5A <sub>DC</sub> @216V <sub>DC</sub>
Output power	PSR312: 1200 up to 3600W; PSR327: 2700 up to 8100W	2700 up to 8100W
<b>Electrical connectors:</b>		
AC input	3 x input (1 per each module)	←
DC output	1 x output (copper busbar)	←
Signalling contacts	Rectifier fault: 1 x potential free relay output COM, NC; max. switching capacity: 60V <sub>DC</sub> , 500mA	
Communication interfaces	2 x isolated CAN-Bus connectors (RJ11, 6-pole), 1 x Ethernet (RJ45)	
Measurement inputs	3 x (V1, V2, V3); for example: battery voltage, system voltage, tap voltage of the battery	
Sensor input	1 x for voltage drop compensation	<b>not connected</b>
External connection	1x 50-pole terminal block for the connection of all measuring, control and signalling lines of the system via the connection board to the control unit UPC3	

**Environmental:**

Max. installation altitude	≤1500 m	←
Ambient temperature	operation: -20°C...+55°C; storage: -40°C...+85°C	
Audible noise	≤ 45dB(A) at 1m distance	←

**Mechanical:**

Type of construction	Sub rack, 19", 3U	←
Cooling	The rectifiers are fan-cooled (front-to-rear airflow), temperature-regulated and monitored	
Surfaces	powder coating RAL 7035 (front only), constructive parts: anodized metal	
W/H/D	483/133/345mm, 388mm with rear connectors; (19", 3U)	
Minimum installation depth	438 mm	←
Weight	approx. 4.9 kg (excluding PSR and UPC3 modules)	

**Applicable standards:**

Mechanical construction	acc. to VDE 0160 edition 5.88 chapter 7.2.2	
Protection class	IP20	←
Climatic conditions	acc. to IEC 721-3-3 class 3K3/3Z1/3B1/3C2/3S2/3M2	
RFI suppression / immunity	CE-label, (EN50081-1, EN55011/55022 class „B“, EN50082-2, EN61000-4 part 2/3/4/5)	
Compliance to safety standards	acc. to EN60950-1, VDE0100 T410, VDE0110, EN60146	

## 5.1 Dimensional Drawings:

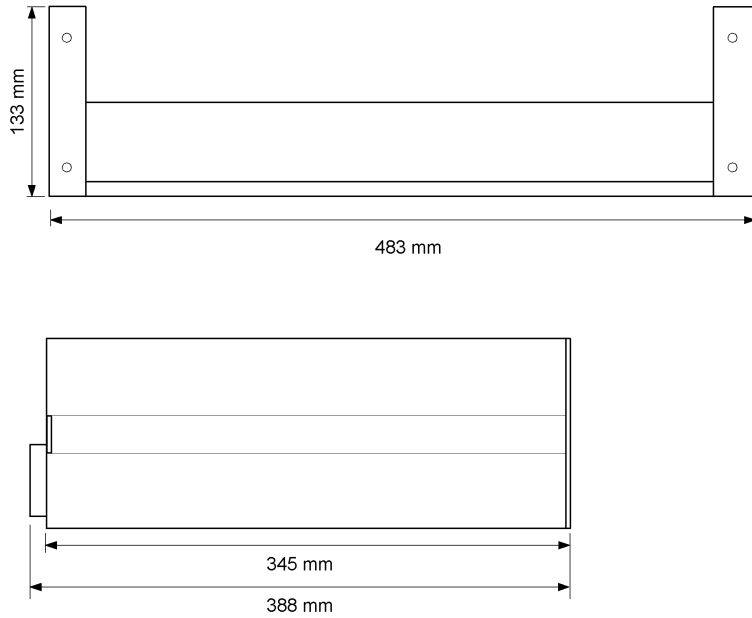


Figure 12) - Rack dimensions

## 6. Extensions

To extend the system output power, up to a maximum of 11 racks of type DCR PSR327-10.8 can be connected in parallel to the basis rack DCR PSR327-8.1 (see figure 13).



Rack 1) Basis rack DCR PSR327-8.1 (three rectifiers PSR327 plus DC controller UPC3).



Rack 2) Extension rack DCR PSR327-10.8 (for max. four rectifiers PSR327).

•  
•  
•

•  
•  
•



Rack 12) A total of 12 racks can be paralleled. Consequentially a maximum system output power of  $47 \times 2.7\text{kW} = \mathbf{126.9\text{kW}}$  can be achieved.

If the racks are fitted with PSR312 (output= 24V<sub>DC</sub>) the maximum system output power is  $47 \times 1.2\text{kW} = \mathbf{56.4\text{kW}}$ .

Abb. 13) System extension

For more information about the rack DCR PSR327-10.8 please read the specific user manual.

## 6.1 Schematic diagram DCR PSR327-8.1 and -10.8 connected in parallel

Figure 14) shows a simple example how to connect the racks DCR PSR327-10.8 and DCR PSR327-8.1 in parallel.

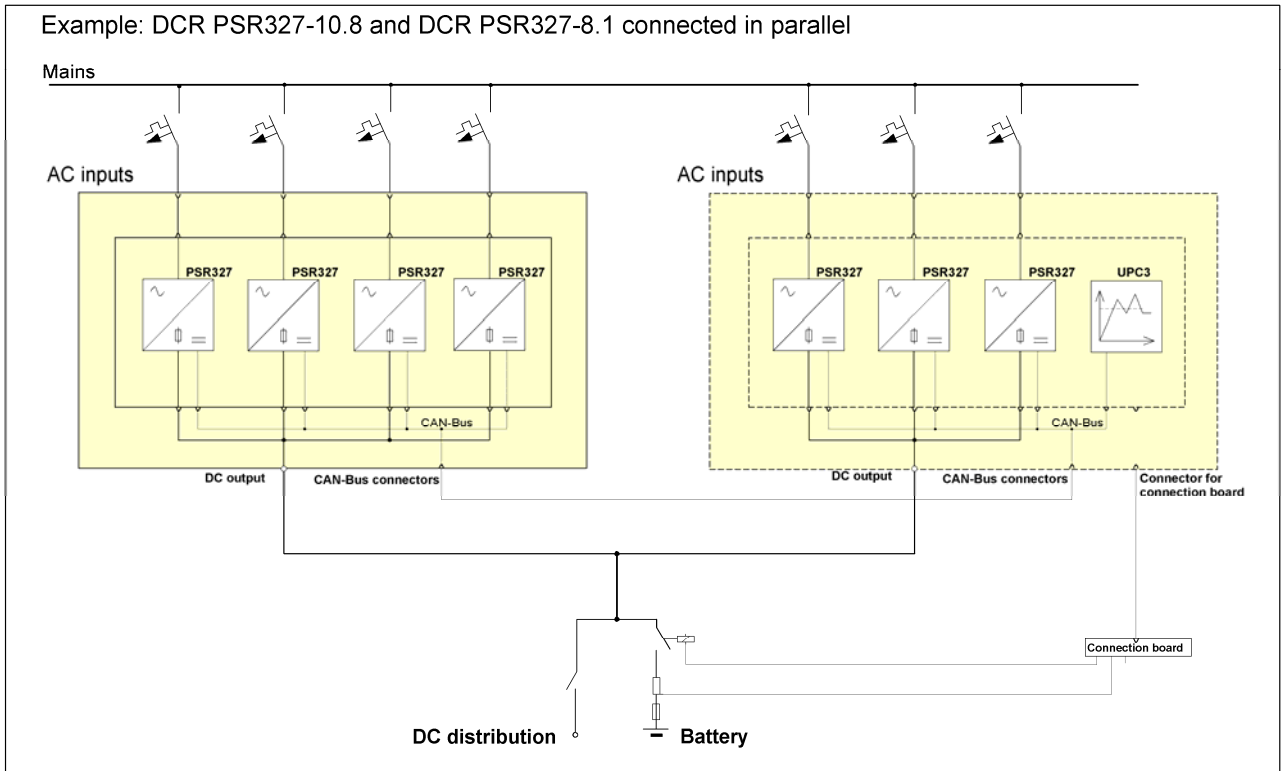


Figure 14) DCR PSR327-10.8 and DCR PSR327-8.1 connected in parallel











**Supplier:**

	ELTEK VALERE DEUTSCHLAND GmbH GB Industrial Schillerstraße 16 D-32052 Herford
	+ 49 (0) 5221 1708-210
FAX	+ 49 (0) 5221 1708-222
Email	<a href="mailto:Info.industrial@eltekvalere.com">Info.industrial@eltekvalere.com</a>
Internet	<a href="http://www.eltekvalere.com">http://www.eltekvalere.com</a>