

AC Rack

ACR INV222-9.0 LV

USER MANUAL



Notes to this manual

ATTENTION! Read this manual very carefully before installing and commissioning the AC rack. This manual is a part of the delivered AC rack. Familiarity with the contents of this manual is required for installing and operating the AC 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 AC rack 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 2004-108-EG (electromagnetic compatibility) if the installation and operation instructions are followed.

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AC Rack
ACR INV222-9.0 LV

User Manual
Page 3 (20)

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Revision	Description of change	Writer	Date
00	First edition.	RTH	2008-04-23
01	Connection tables reworked according to the labelling on the (as from now) serial plexiglass cover.	RTH	2008-06-06
1.0	Section "Optional Equipment" completed, new revision status numbering (X.X) introduced.	RTH	2009-01-21

Table of Contents

1. SAFETY INSTRUCTIONS	6
2. WASTE DISPOSAL RULES.....	6
3. GENERAL INFORMATION	7
3.1 Block Diagram	7
3.2 Possible Configurations.....	8
3.3 Perspective View	9
3.4 Optional Equipment:.....	9
3.5 Cooling/ Air Flow Direction	10
4. HANDLING	11
4.1 Storage	11
4.2 Commissioning.....	11
4.2.1 Rack Assembling.....	11
4.2.2 Module Assembling.....	11
4.2.3 Communication Interface	12
4.2.4 Termination.....	12
4.2.5 CAN-BUS Addresses	13
4.2.6 Rear View/Electrical Connectors.....	14
4.2.7 Connection Tables.....	14
4.2.8 Schematic Diagram (Example of Use)	16
5. MAINTENANCE.....	17
6. TECHNICAL SPECIFICATIONS	18
6.1 Dimensional Drawings.....	19

Index of Figures

<i>Figure 1. Block diagram</i>	7
<i>Figure 2. AC rack fully equipped with four inverters INV222</i>	9
<i>Figure 3. Sub rack air flow</i>	10
<i>Figure 4. View into the empty rack</i>	11
<i>Figure 5. Rear view of the rack</i>	12
<i>Figure 6. Detail 1: Jumper</i>	12
<i>Figure 7. Detail 2: Hex-switch</i>	12
<i>Figure 8. Rear side connectors</i>	14
<i>Figure 9. Detail: Connector X24</i>	14
<i>Figure 10. Schematic diagram (example of use)</i>	16
<i>Figure 11. Rack dimensions</i>	19

1. Safety Instructions



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 the module 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.

2. Waste Disposal Rules

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 INDUSTRIAL partner.

3. General Information

The AC rack is a connection unit ready for integration in system cabinets with a standard 19" frame. The unit can be equipped with a maximum of 4 inverters of type INV222 (INV215) and delivers an output power up to 9.0kVA (6.0kVA with INV215). After connecting the battery and AC distribution, the unit is ready for operation. In combination with a static transfer switch STS114, a maximum of two racks can be connected in parallel to increase the system output power.

3.1 Block Diagram

ACR INV222-9.0 LV

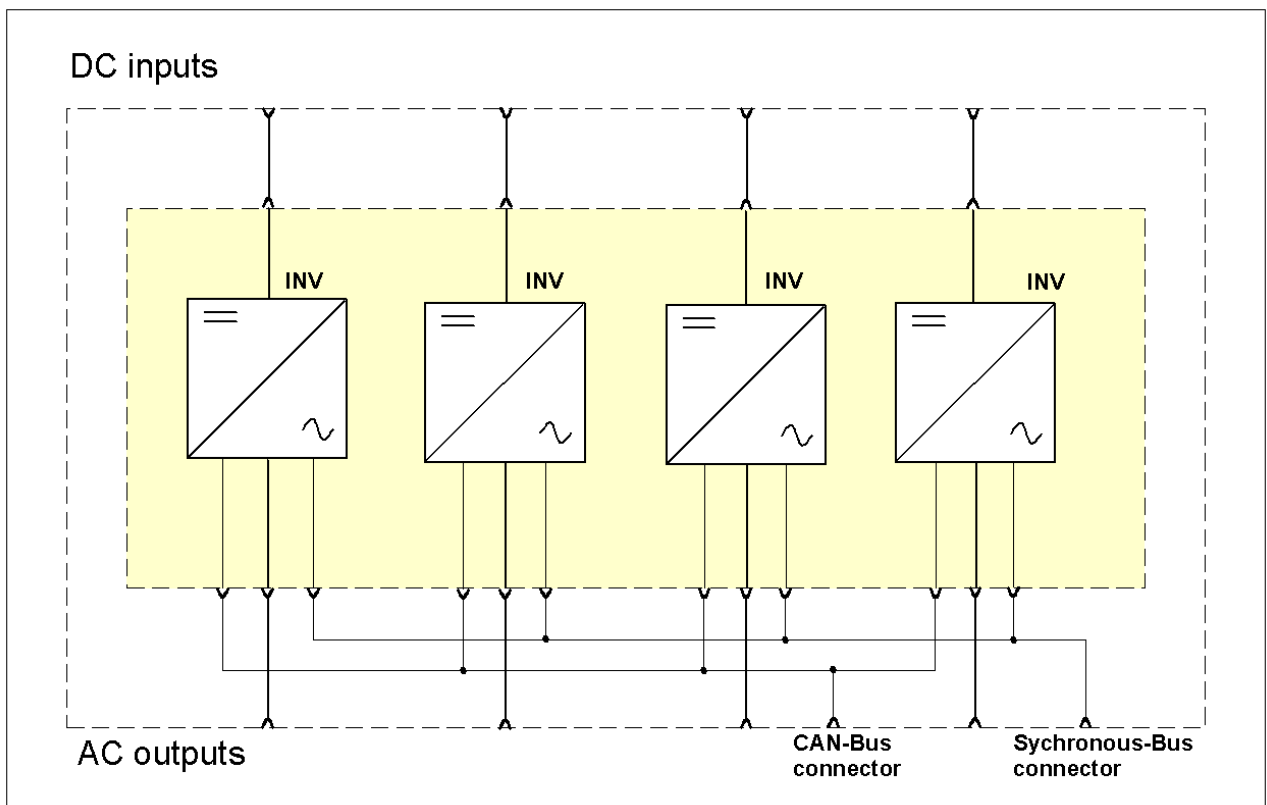


Figure 1. Block diagram

3.2 Possible Configurations

Up to four INV222 (INV215) with DC input voltages according to the table below can be integrated into one rack.

Designation of the rack	Article code	For inverter/ input voltage	Output voltage
ACR INV222-9.0 LV	502-222-405.LV	INV215/24V _{DC}	230V _{AC} , 50Hz
		INV222/48V _{DC}	
		INV222/60V _{DC}	

Output power (@ cos phi= 0.8) of the rack, equipped with INV215:

Number of installed inverters (INV215)	Output power (without redundancy)	Output power (n + 1)	Output power (n + 2)
1	1500VA	---	---
2	3000VA	1500VA	---
3	4500VA	3000VA	1500VA
4	6000VA	4500VA	3000VA

Output power (@ cos phi= 0.8) of the rack, equipped with INV222:

Number of installed inverters (INV222)	Output power (without redundancy)	Output power (n + 1)	Output power (n + 2)
1	2250VA	---	---
2	4500VA	2250VA	---
3	6750VA	4500VA	2250VA
4	9000VA	6750VA	4500VA

3.3 Perspective View

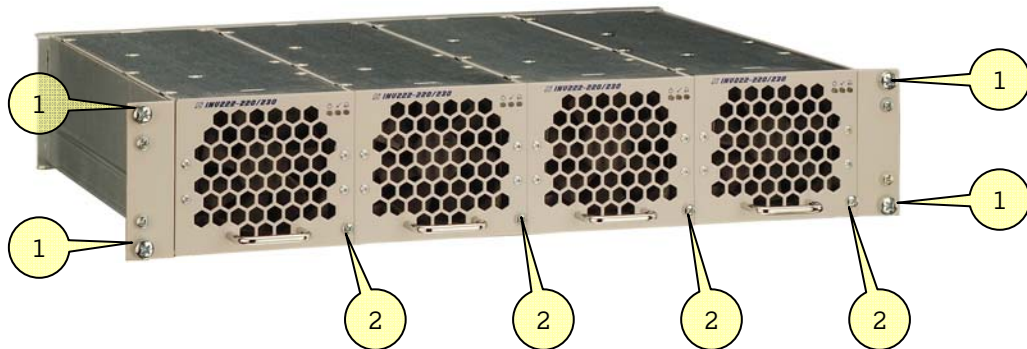


Figure 2. AC rack fully equipped with four inverters INV222

1	Four screws M6 to fix the sub rack to the frame of the system cabinet	Included in delivery of the sub rack
2	One captive screw per module to fix it to the sub rack	Component parts of the modules

3.4 Optional Equipment:

Optional equipment according to the following table is available:

Description	Article Code
Cover plate (with handle), necessary to cover empty slots, 1/4 x 19", 2U, colour RAL 7035	881-MEC-BPL.02.21.B
Ribbon cable, 10-pole, length 0.3m; necessary to connect the synchronous busses of two racks which are connected in parallel.	This cable is included in delivery of the sub rack! Spare parts no.: 880-KAB-FBK.03
Ribbon cable, 10-pole, length 0.8m	880-KAB-FBK.08
Synchronous bus adapter; it is to be used to connect the wiring of the synchronous busses of the rack(s) to a static transfer switch of type UNB.	880-300-ADP.3.3

3.5 Cooling/ Air Flow Direction

The INV222 (INV215) modules 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 item "A" in figure 3.) 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.

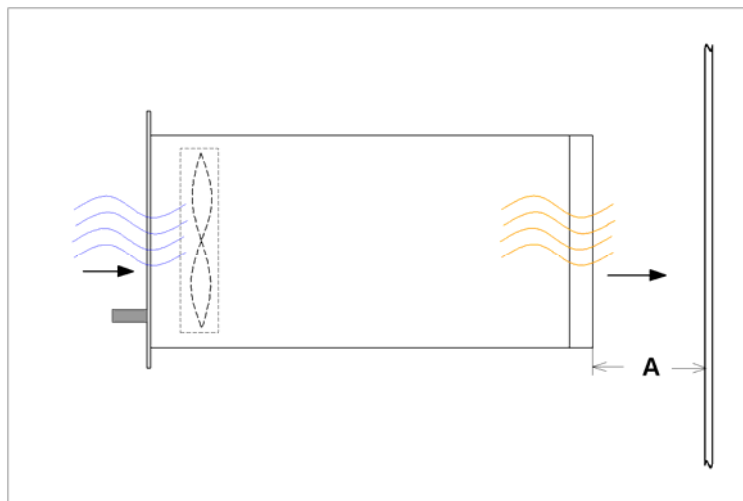


Figure 3. Sub rack air flow

4. Handling

4.1 Storage

AC racks must be stored in a dry, dust free environment with a storage temperature in accordance with the specific technical data ([see Section 6](#)).

4.2 Commissioning

4.2.1 Rack Assembling

1. Carefully unpack the unit.
2. Integrate it in your power supply cabinet with 4 screws M6 (1) at the front side.

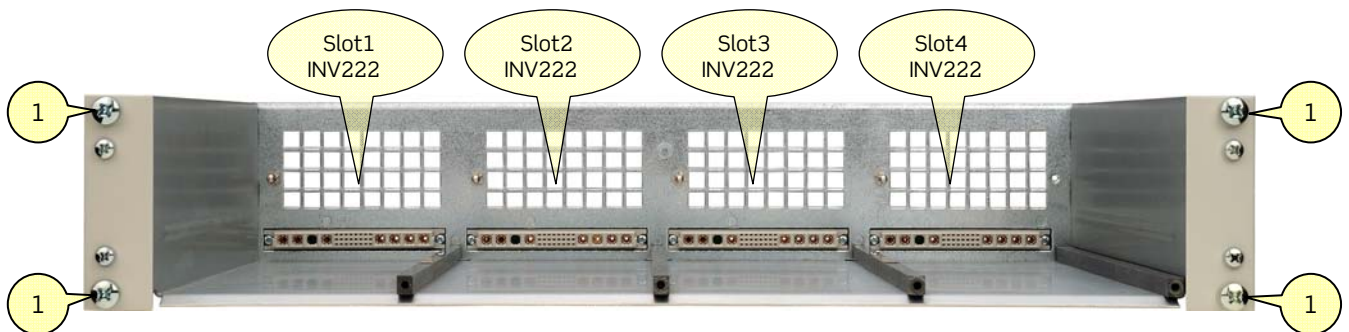


Figure 4. View into the empty rack

4.2.2 Module Assembling

1. Assemble the modules into the slots of the sub rack.
2. Fill the rack beginning with the left slot.
3. Fix the modules with the captive screws.
4. Not used slots must be covered with cover plates ([see section "Optional Equipment"](#)).

4.2.3 Communication Interface

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

Several 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 (X21= CAN 1; X22= CAN 2) are located on the rear of the sub rack (see figure 5.).

Figure 5. Rear view of the rack

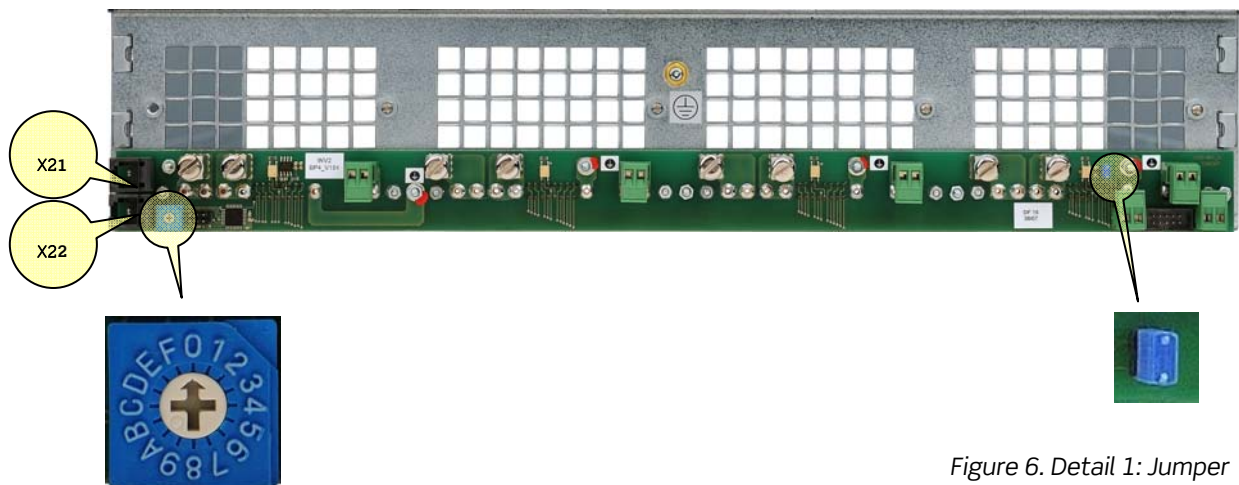


Figure 7. Detail 2: Hex-switch

Figure 6. Detail 1: Jumper

4.2.4 Termination

The CAN-Bus must be terminated at both ends.

- If no other rack and/or module is connected (CAN 2 not used), the CAN-Bus termination resistor must be activated with the plugged jumper at the rear of the backplane of the AC rack (see figure 6.).
- If CAN 2 is connected, the CAN-Bus termination resistor must be deactivated (the jumper must be removed).
- Not more than two termination resistors should be activated on one bus and these should be located at both ends of the bus.

ATTENTION: Missing terminations or too many terminations within the system can disturb the CAN-Bus communication.

4.2.5 CAN-BUS Addresses

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

Hex-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 address 1 (Hex-switch position “0” according to the table above).

A second used rack must be addressed with address 2 (Hex-switch position “1”) etc.

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

4.2.6 Rear View/Electrical Connectors

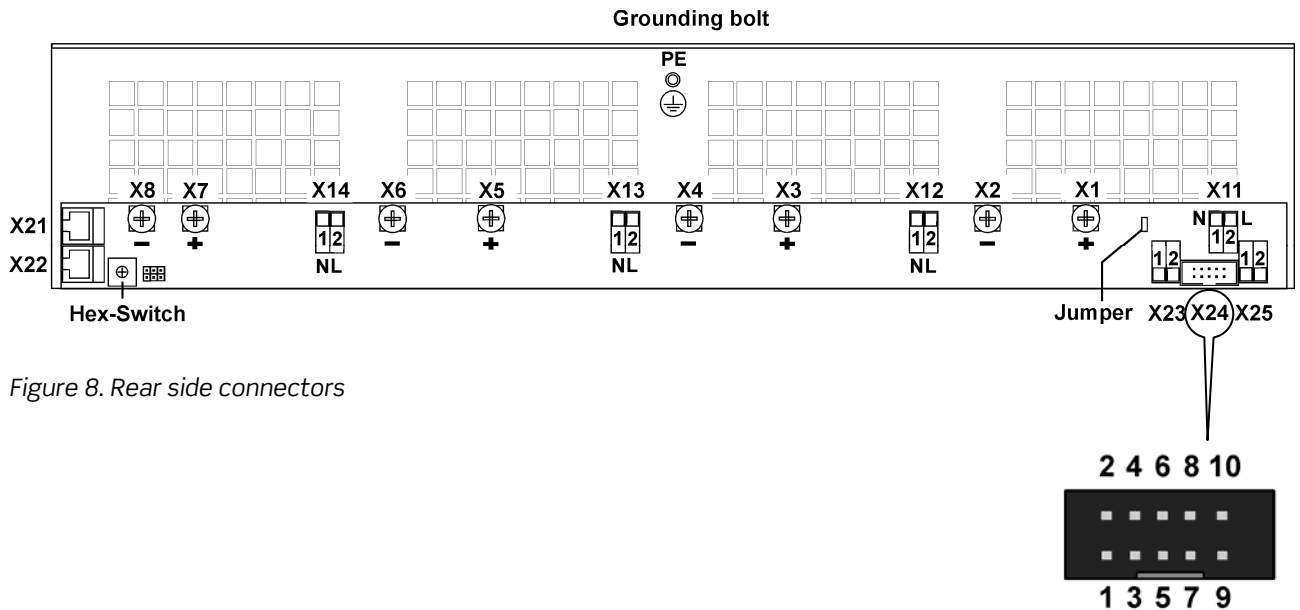


Figure 8. Rear side connectors

Figure 9. Detail: Connector X24

Connect the terminals according to the connection tables below.

REMARK: The rack itself must be grounded with the cabinet frame (common PE of the system) on the special grounding bolt “PE” (screw thread M5).

4.2.7 Connection Tables

Connector assignment of the rear side connectors according to figure 8):

Connector	Function	DC input voltage of the inverters 24, 48, 60V_{DC}	
		Recommended external fuse	Recommended wire cross section
X1	(+) DC input inverter 1	63A	16mm ²
X2	(-) DC input inverter 1		
X3	(+) DC input inverter 2	63A	16mm ²
X4	(-) DC input inverter 2		
X5	(+) DC input inverter 3	63A	16mm ²
X6	(-) DC input inverter 3		
X7	(+) DC input inverter 4	63A	16mm ²
X8	(-) DC input inverter 4		

AC Rack

ACR INV222-9.0 LV

User Manual
Page 15 (20)

Connector	Function	Recommended external fuse	Recommended wire cross section
X11	AC output of inverter 1		
1	Neutral	10A	1.5 mm ²
2	Line output		1.5 mm ²
X12	AC output of inverter 2		
1	Neutral	10A	1.5 mm ²
2	Line output		1.5 mm ²
X13	AC output of inverter 3		
1	Neutral	10A	1.5 mm ²
2	Line output		1.5 mm ²
X14	AC output of inverter 4		
1	Neutral	10A	1.5 mm ²
2	Line output		1.5 mm ²
X23	Not used		
X24	Synchronous-bus connector (see figure 9)		Ribbon cable, 10-pole, see section „Optional Equipment“.
1 - 4	Not used	No	
5 + 6	SYNC-SIG	No	0.5 mm ²
7 + 8	SYNC-STAT	No	0.5 mm ²
9 + 10	SYNC-GND	No	0.5 mm ²
X25	Inverter “Collective Alarm”		
1	Relay output (COM, NC)	No	0.5 mm ²
2	Relay output (COM, NC)	No	0.5 mm ²

X21	CAN 1 (RJ11, 6-pole)	Cord Set
X22	CAN 2 (RJ11, 6-pole)	Cord Set

4.2.8 Schematic Diagram (Example of Use)

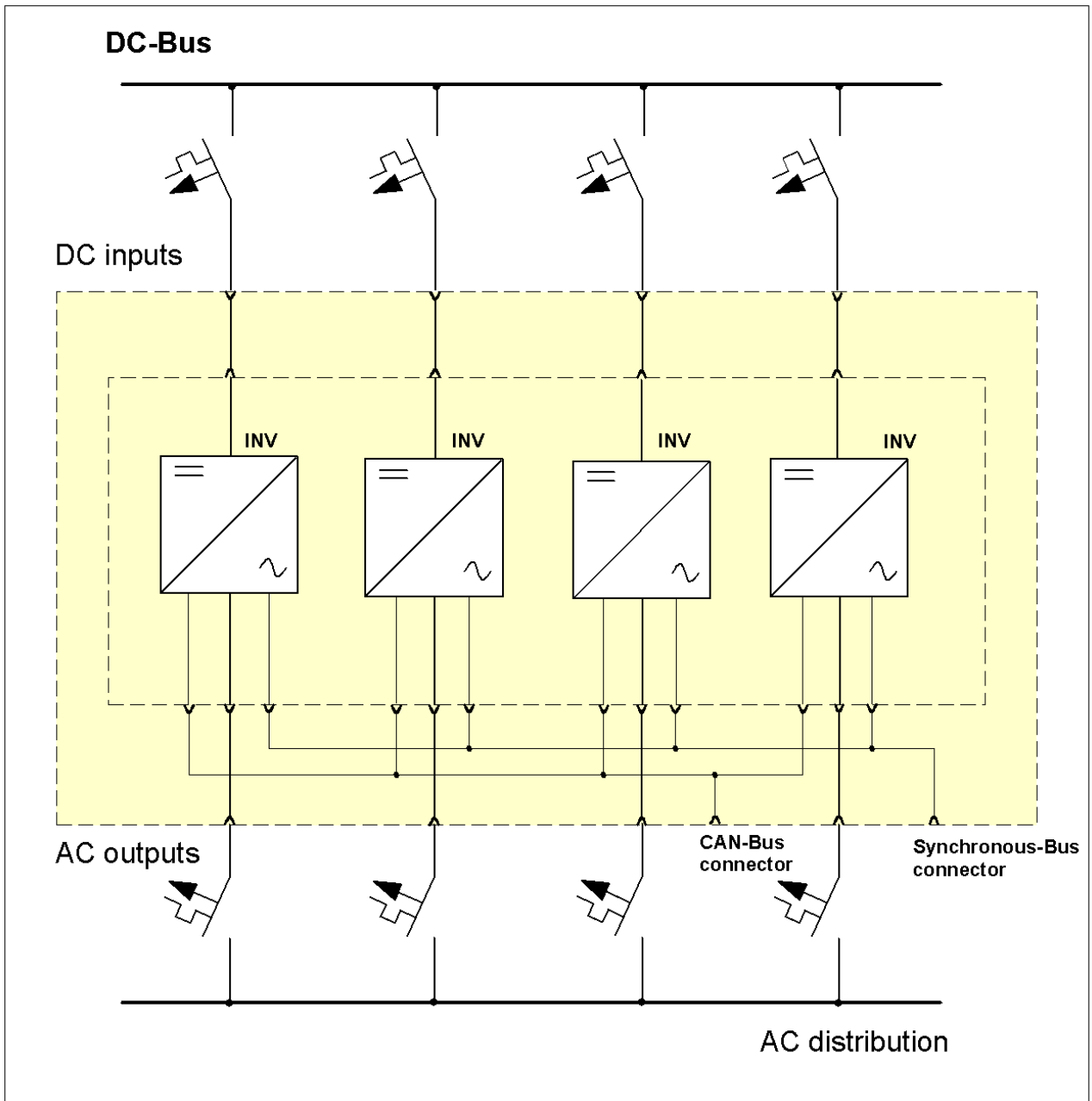


Figure 10. Schematic diagram (example of use)



We recommend an individual fuse for each input!
With this fuse you can switch ON/OFF each module individually.

Recommended input and output fuses: See tables above.

5. Maintenance

In general, the system is maintenance-free.
A yearly inspection with following checks is recommended:

- Correct fan operation (modules)
- 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 the ambient conditions of the installed system.

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

6. Technical Specifications

Type designation	ACR INV222-9.0 LV
Article code	502-222-405.LV
Main Data:	
Modules	Designed for the use of 1 up to max. 4 DC/AC inverters of series INV215 ($V_i = 24V_{DC}$) or INV222 ($V_i = 48; 60V_{DC}$)
Input voltage	24, 48, 60V _{DC} , depending on the used inverters
Internal input fuses	There are no internal fuses, we recommend an individual fuse for each input.
Internal output fuses	There are no internal fuses, we recommend an individual fuse for each output.
Output voltage	230V _{AC}
Output power	INV215: 1.5 up to 6.0kVA @ $\cos \phi = 0,8$; INV222: 2.25 up to 9.0kVA @ $\cos \phi = 0,8$
Electric connectors:	
DC input	4 x input (1 for each module), screw thread M5
AC outputs of inverters	4 x (screw terminals)
PE bolt	screw thread M5
Communication interfaces	2 x isolated CAN-Bus connectors (RJ11, 6-pole)
Synchronous-Bus	1 x 10-pole double-row multi-pin connector, spacing 2.54mm
Relais output	Collective Alarm; COM, NC; max. contact load: 60V/0,1A
Environmental:	
Max. installation altitude	≤ 1500 m
Ambient temperature	operation: $-20^{\circ}\text{C} \dots +55^{\circ}\text{C}$; storage: $-40^{\circ}\text{C} \dots +85^{\circ}\text{C}$
Audible noise	$\leq 45\text{dB(A)}$ at 1m distance
Mechanical:	
Type of construction	Sub rack, 19", 2U
Cooling	The modules 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	483/88.5/350mm (19", 2U)
Minimum installation depth	400mm
Weight	approx. 4.9 kg (excluding INV 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

6.1 Dimensional Drawings

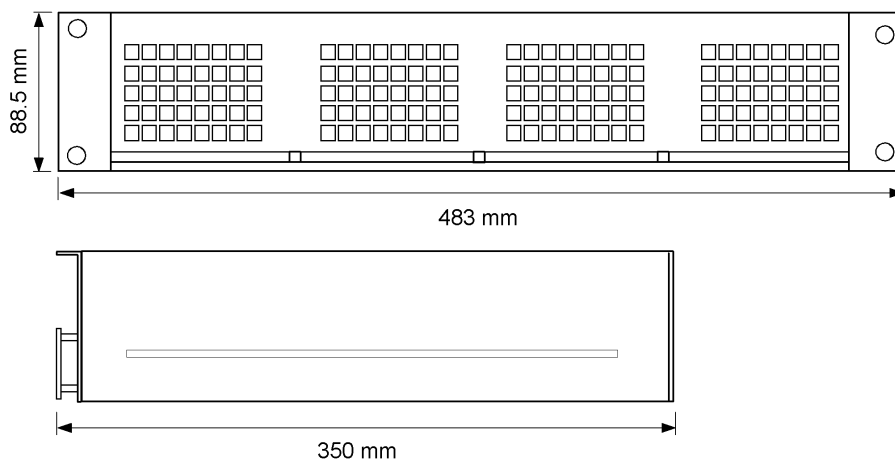


Figure 11. Rack dimensions



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