User Manual
Rittal PMC UPS 1-3kVA

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1. Introduction

The Rittal PMC UPS 1-3kVA Series is a rack-mount uninterruptible power supply incorporating double-converter technology. It provides perfect protection specifically for Novell, Windows NT and UNIX servers.

The double-converter principle eliminates all mains power disturbances. A rectifier converts the alternating current from the socket outlet to direct current. This direct current charges the batteries and powers the inverter. On the basis of this DC voltage, the inverter generates a sinusoidal AC voltage which permanently supplies the loads.

Computers and periphery are thus powered entirely independently of the mains voltage. In the event of power failure, the maintenance-free batteries power the inverter. This means an end to the switchover times from mains to battery operation which cannot be avoided on other systems.

2. Safety Instructions

PLEASE READ THROUGH AND FOLLOW THE USER MANUAL AND THE SAFETY INSTRUCTIONS BEFORE INSTALLING THE UNIT AND STARTING IT UP!

Transport

- Please transport the UPS system only in the original packaging (to protect against shock and impact).

Set-up

- The UPS is designed for indoor use.
- Condensation may occur if the UPS system is moved directly from a cold to a warm environment. The UPS system must be absolutely dry before being installed. Please allow an acclimatisation time of at least two hours.
- Do not install the UPS system near water or in damp environments.
- Do not install the UPS system where it would be exposed to direct sunlight or near heat.
- Do not block off ventilation openings in the UPS system's housing.

Installation

- Connect the UPS system only to a socket outlet with earthing contact (Schuko-socket outlet).
- Connect maximum two battery cabinets type batt. ext. for PMC 1000 and PMC 1500 to the UPS and five battery cabinets type batt. ext. for PMC 2000/3000 to the UPS.
- The building wiring socket outlet (Schuko-socket outlet) must be easily accessible and close to the UPS system.
- Please use only VDE-approved, CE-power mains cable (e.g. the power cable of your computer) to connect the UPS system to the building wiring socket outlet (Schuko-socket outlet).

- Please use only VDE-approved, CE-marked power cables to connect the loads to the UPS system.
- Do not connect domestic appliances such as hair dryers to UPS output sockets.
- Do not connect appliances or items of equipment which would overload the UPS system (e.g. laser printers) to the UPS output sockets.
- Place cables in such a way that no one can step on or trip over them.
- The sum of all earth fault currents of the loads connected to the UPS must not exceed 3,5 mA.

Operation

- Do not disconnect the mains cable on the UPS system or the building wiring socket outlet (Schuko-socket outlet) during operation since this would cancel the protective earthing of the UPS system and of all connected loads.
- The UPS system features its own, internal current source (batteries). The UPS output sockets may be electrically live even if the UPS system is not connected to the building wiring socket outlet.
- In order to fully disconnect the UPS system, first press the Standby button then disconnect the mains lead.
- Ensure that no fluids or other foreign objects can enter the UPS system.

Maintenance, servicing and faults

- The UPS system operates with hazardous voltages. Repairs may be carried out only by qualified maintenance personnel.
- **Caution** - risk of electric shock. Even after the unit is disconnected from the mains power supply (building wiring socket outlet), components inside the UPS system are still connected to the battery and are still electrically live and dangerous. Before carrying out any kind of servicing and/or maintenance, disconnect the batteries and verify that no current is present.
- Only persons adequately familiar with batteries and with the required precautionary measures may exchange batteries and supervise operations. Unauthorised persons must be kept well away from the batteries.

- **Caution** - risk of electric shock. The battery circuit is not isolated from the input voltage. Hazardous voltages may occur between the battery terminals and the ground. Before touching, please verify that no voltage is present!
- Batteries may cause electric shock and have a high short-circuit current. Please take the precautionary measures specified below and any other measures necessary when working with batteries:
    - remove wristwatches, rings and other metal objects
    - use only tools with insulated grips and handles.
- When changing batteries, install the same number and same type of batteries.
- Do not attempt to dispose of batteries by burning them. This could cause battery explosion.
- Do not open or destroy batteries. Escaping electrolyte can cause injury to the skin and eyes. It may be toxic.
- Please replace the fuse only by a fuse of the same type and of the same amperage in order to avoid fire hazards.
- Do not dismantle the UPS system.
- Exhausted batteries should be given to a recycling company.

3. Indicators and Operating Controls

3.1 Front Panel

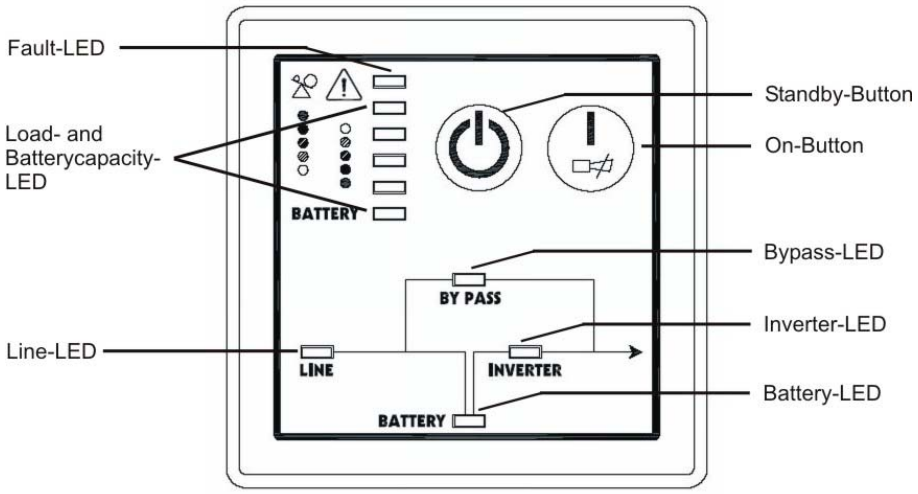

Figure 1: Operating and display panel

Button	*Function*
ON-button	1. Turn on UPS system: By pressing the ON-button „I“ the UPS system is turned on. 2. Deactivate acoustic alarm: By pressing this button an acoustic alarm can be deactivated.
Standby-button	The UPS system switches to Standby mode when the Standby-button „⏻“ is pressed. It is then switched to Bypass and the

	inverter is off. The output sockets are supplied with voltage via the bypass if the mains power supply is available.

Display	***Function***
LINE-LED	1. The green LINE-LED lights up if mains voltage is applied to the UPS input. 2. LINE-LED blinks when the phase and neutral conductor have been reversed at the input of the UPS system. 3. If LINE-LED and BATTERY-LED light up, the mains power supply is out of tolerance.
BATTERY-LED	The orange-coloured BATTERY-LED lights up when the mains power supply has failed and the inverter is being powered by the batteries.
BYPASS-LED	The orange-coloured BYPASS-LED lights up when the UPS system is supplying voltage provided by the mains power supply system via the bypass.
INVERTER-LED	The green INVERTER-LED lights up if the inverter is operating and powering the UPS output.
FAULT-LED	1. The red FAULT-LED lights up and an acoustic warning signal is issued every second when the UPS system is overloaded. 2. The red FAULT LED lights up and an acoustic warning signal is issued when the UPS system is in fault condition. Press the Standby-button in order to turn off the warning tone.

Load and battery capacity LEDs	1. These LEDs signal the UPS system load if the mains power is available (normal operation): 1st LED 1-35 % 2nd LED 35-55 % 3rd LED 55-75 % 4th LED 75-95 % 5th LED 95-105 %. 2. In the case of battery operation, the LEDs indicate the capacity of the batteries: 1st LED 1-35 % 2nd LED 35-55 % 3rd LED 55-75 % 4th LED 75-95 % 5th LED 95-100 %.

3.2 Back Panel

Slide buttons on the back panel allow selection of the outgoing voltage of the UPS system. This must be changed only when the UPS system is switched off.

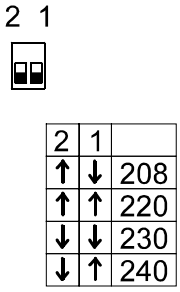

Figure 2: Slide buttons to select output voltage.

4. Installation and Start Up

4.1 UPS

1) Inspect the packaging carton and its contents for damage. Please inform the transport agency immediately should you find signs of damage. Please keep the packaging in a safe place for future use.

2) Verify that UPS voltage corresponds to your computer's voltage (normally 230 V). Output voltage on the UPS system can be regulated with the slide buttons on the back panel.

3) Build the UPS into the 19"-rack. The use of special add-ons might be necessary. Please consult the manufacturer of the 19"-rack.

4) Connect the UPS system to a Schuko-socket outlet of the building wiring using a VDE-approved and CE-marked mains lead.

Caution!
The UPS outlet sockets are now powered. This is indicated by the LINE- and BYPASS-LEDs.

5) Fully charge the batteries of the UPS system by leaving the UPS system connected to the mains for 1-2 hours. You can also use the UPS system directly without charging it but the stored energy time may then be shorter than the nominal value specified.

Caution!
Do not connect appliances or items of equipment which would overload the UPS system (e.g. laser printers) to the UPS outlet sockets. Do not connect domestic appliances to the UPS system!

6) Press the ON-button “I” on the front panel.

   *Note:*Load capacity LEDs first light up simultaneously, then one after the other. After a few seconds the INVERTER-LED lights up and the BYPASS-LED turns off. The UPS is now functioning normally.

7) Test the function of the UPS system by disconnecting the voltage from the input of the UPS system by disconnecting the building wiring fuse.

Caution!
The output sockets of the UPS system may still be electrically live even if the mains supply has been disconnected or the mains cable has been disconnected.

4.2 Battery Extension

External battery extensions are available for the UPS systems RITTAL PMC UPS 1KVA,
RITTAL PMC UPS 1,5KVA, RITTAL PMC UPS 2KVA, and RITTAL PMC UPS 3KVA. In order to connect them to the UPS system, proceed as shown below:

1. Disconnect the UPS system from the mains power supply and the load from the UPS system.
2. Verify that the security switch on the back side of the battery extension is in the “OFF” position.
3. Connect the battery extensions to the UPS system with the included cables according to the following instructions:

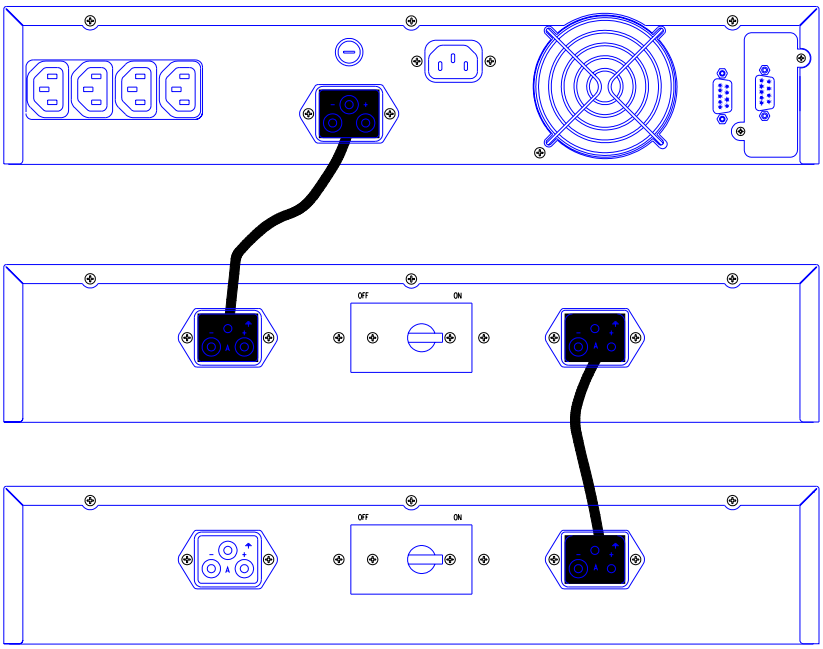

Figure 3: Connection of battery extensions to RITTAL PMC UPS 1KVA and RITTAL PMC UPS 1,5KVA.

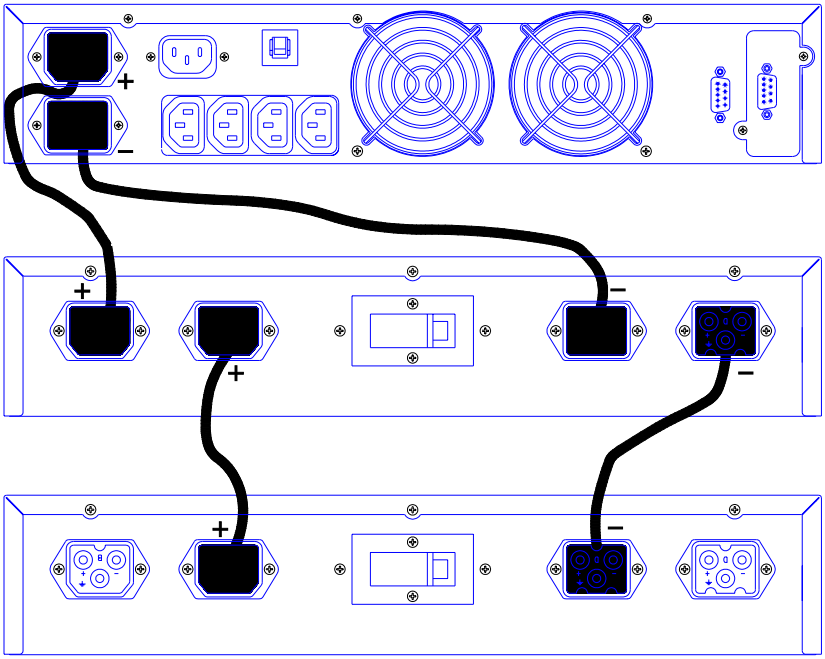

Figure 4: Connection of battery extensions to RITTAL PMC UPS 2KVA and RITTAL PMC UPS 3KVA.

4. Switch the safety button on the back of the battery extensions to “ON”.
5. The UPS system can now operate normally.

Note:
Operating the system with external batteries prolongs charging time to 24 hours after total discharge.

5. Troubleshooting

If the UPS system does not operate correctly, please attempt to solve the problem using the table below.

Problem	***Possible cause***	***Remedy***
No indication, no warning tone even though system is connected to mains power supply	No input voltage	Check building wiring socket outlet, check input cable
	Fuse has blown	Replace fuse
	RITTAL PMC UPS 1,5KVA, RITTAL PMC UPS 2KVA, RITTAL PMC UPS 3KVA: Input protection switch has disconnected.	Reset input protection switch
LINE-LED blinks	Phase and neutral conductor at input of UPS system are reversed	Turn mains power socket by 180°
LINE-LED blinks and BATTERY-LED lights up	Input voltage and/or frequency are out of tolerance	Check input power source and inform dealer if necessary
LINE- and BYPASS-LED light up even though the power supply is available	Inverter not switched on	Press ON-button “I”

INVERTER-LED lights up, warning tone at intervals (every 1 or 4 seconds)	Mains power supply has failed	Not necessary, battery operation; warning tone at intervals of 1 second means battery is almost empty
INVERTER-LED lights up, warning tone in intervals (1 to 4 seconds), mains power supply available	RITTAL PMC UPS 1KVA: Fuse has blown	Replace fuse (RITTAL PMC UPS 1KVA: 6,3A, 250 V~/T). If the problem persists, please inform your dealer.
	RITTAL PMC UPS 1,5KVA, RITTAL PMC UPS 2KVA, RITTAL PMC UPS 3KVA: Input protection switch disconnected	Reset input protection switch. If the problem persists, please inform your dealer.
FAULT-LED lights, warning tone once a second	Overload	Reduce load at UPS output
FAULT-LED lights up, permanent warning tone	UPS-mistake	Notify dealer!
Battery backup time shorter than nominal value	Batteries not fully charged / batteries defective	Charge the batteries for at least 1-2 hours. Check capacity. If the problem still persists, consult your dealer.

Please have the following information at hand before calling the After-Sales Service Department:

1. Model number, serial number
2. Date on which the problem occurred
3. Detailed description of the problem

6. Maintenance

6.1 Operation

The UPS system contains no user-serviceable parts.

If the battery service life (3 - 5 years at 25 °C ambient temperature) has been exceeded, the batteries must be exchanged. In this case please contact your dealer.

6.2 Storage

If the batteries are to be stored in temperate climatic zones, they should be charged every three months for 1-2 hours (see Chapter "Installation and Start Up"). You should shorten the charging intervals to two months at locations subject to high temperatures.

7. Technical Data

7.1 Electrical Specifications

Model number	RITTAL PMC UPS 1KVA	RITTAL PMC UPS 1,5KVA	RITTAL PMC UPS 2KVA	RITTAL PMC UPS 3KVA
INPUT				
Voltage	230 VAC (160 - 276 VAC) ± 3%			
Frequency	50/60 Hz ± 5 % automatic detection			
Maximum current	4,0 A	5,7 A	7,7 A	12 A
OUTPUT				
Power rating	1000 VA 700 W	1500 VA 1050 W	2000 VA 1400 W	3000 VA 2100 W
Voltage	208/220/230/240 VAC ± 3 %			
Frequency	50 Hz ± 0,5 % synchronized			
Wave form	Sinusoidal			
BATTERIES				
Number and type	3 x 12V7Ah	4 x 12V7Ah	**)	**)

Remarks for models RITTAL PMC UPS 2KVA and RITTAL PMC UPS 3KVA:
*) If input voltage is < 184 V, load has to be less than 90% of nominal power, otherwise UPS system will switch to batteries.
**) At least one external battery pack is necessary to operate the UPS.

The units bear the CE mark and comply with the following standards (limit value class B):

EN 60950 (1992.8),
EN 50091-1 (1994.4), prEN 50091-3 (1994.4),
EN 50081-1 (1992.2),
EN 50082-1 (1992.2),
IEC 801-2 Level 4, IEC 801-3 Level 3,
IEC 801-4 Level 4, IEC 801-5 Level 2.

7.2 Typical Backup Time (Battery mode)

Typical values at 25°C in minutes:

Model	*100 % Load*	*50 % Load*
RITTAL PMC UPS 1KVA	7	16
RITTAL PMC UPS 1KVA + 1 battery extension	35	76
RITTAL PMC UPS 1KVA + 2 battery extensions	53	122
RITTAL PMC UPS 1,5KVA	5	14
RITTAL PMC UPS 1,5KVA + 1 battery extension	26	67
RITTAL PMC UPS 1,5KVA + 2 battery extensions	46	125
RITTAL PMC UPS 2KVA + 1 battery extension	10	22
RITTAL PMC UPS 2KVA + 2 battery extensions	24	55
RITTAL PMC UPS 2KVA + 3 battery extensions	45	102
RITTAL PMC UPS 2KVA + 4 battery extensions	58	141
RITTAL PMC UPS 2KVA + 5 battery extensions	80	178
RITTAL PMC UPS 3KVA + 1 battery extension	6	15
RITTAL PMC UPS 3KVA + 2 battery extensions	13	34
RITTAL PMC UPS 3KVA + 3 battery extensions	25	63
RITTAL PMC UPS 3KVA + 4 battery extensions	36	86
RITTAL PMC UPS 3KVA + 5 battery extensions	52	124

7.3 Dimensions and Weights

Model	*Dimensions W x H x D (mm)*	*Net Weight, kg*	*Gross Weight, kg*
RITTAL PMC UPS 1KVA	19" x 2HE x 410	17	19
Battery extension for RITTAL PMC UPS 1KVA	19" x 2HE x 460	23	25
RITTAL PMC UPS 1,5KVA	19" x 2HE x 493	20	22
Battery extension for RITTAL PMC UPS 1,5KVA	19" x 2HE x 460	29	31
RITTAL PMC UPS 2KVA	19" x 2HE x 410	8	10
Battery extension for RITTAL PMC UPS 2KVA	19" x 2HE x 460	29	31
RITTAL PMC UPS 3KVA	19" x 2HE x 460	11	13
Battery extension for RITTAL PMC UPS 3KVA	19" x 2HE x 460	29	31

7.4 Operating Environment

Temperature: 10 °C to 40 °C, Installation height < 1500 m
0 °C to 35 °C, Installation height 1500 m to 3000 m
Relative humidity: 20 to 90 %, no condensation

7.5 Port Connectors

A computer can be connected to the port connectors RS232 interface on the back panel of the UPS system.

This allows

- the UPS system to be monitored,

- the mains system to be monitored,
- data to be backed up,
- the computer to be switched off and
- the UPS system to be switched off.

There are various software packages for implementing these functions. Please consult your dealer for further details.

7.5.1 RS232 Interface

The 9-pin Sub-D connector (socket) makes an RS232 interface available.

Description of the PIN assignment:

Pin		
2	RXD	received data
3	TXD	transmitted data
5	GND	ground

7.5.2 Relay Interface (Relay Control)

The 9-pin Sub-D connector (socket) makes a relay interface available.

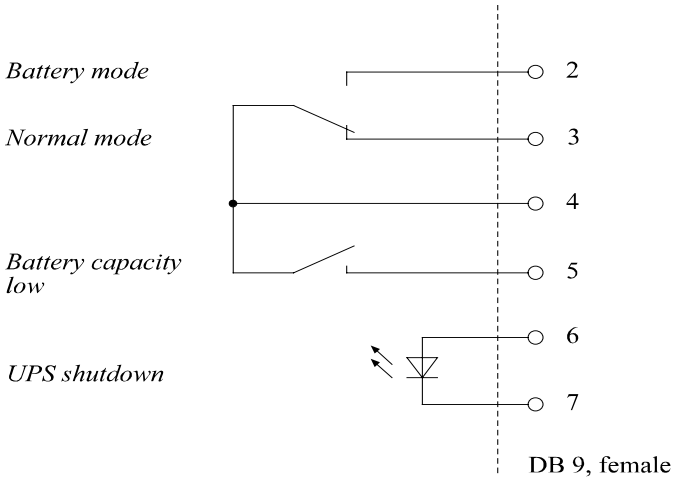

Figure 5: Circuit diagram of relay interface

Description of the PIN assignment:

	Pin No.		
Battery mode	2	normally open	PIN 2 is shorted to PIN 4 (ground) if the mains power supply fails or is out of tolerance.
Normal mode	3	normally closed	The connection between PIN 3 and PIN 4 (ground) is opened if the mains power supply fails or is out of tolerance.
Battery capacity low	5	normally open	PIN 5 is shorted to PIN 4 (ground) if batteries have become discharged to such an extent that the remaining backup time at full load is less than 2 minutes.
UPS shut-down in case of battery operation	6, 7		If, in the case of battery operation, a positive signal level (+5 V to + 12 VDC) is applied for 500 ms,

			the UPS system shuts down.

8. Appendix

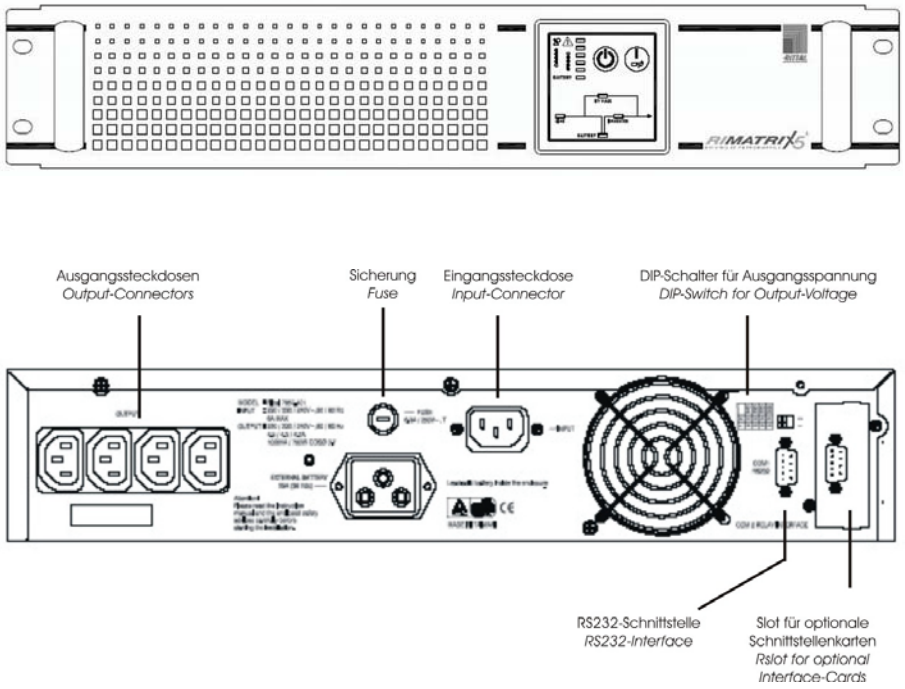

Figure 6: Front and back view of RITTAL PMC UPS 1KVA

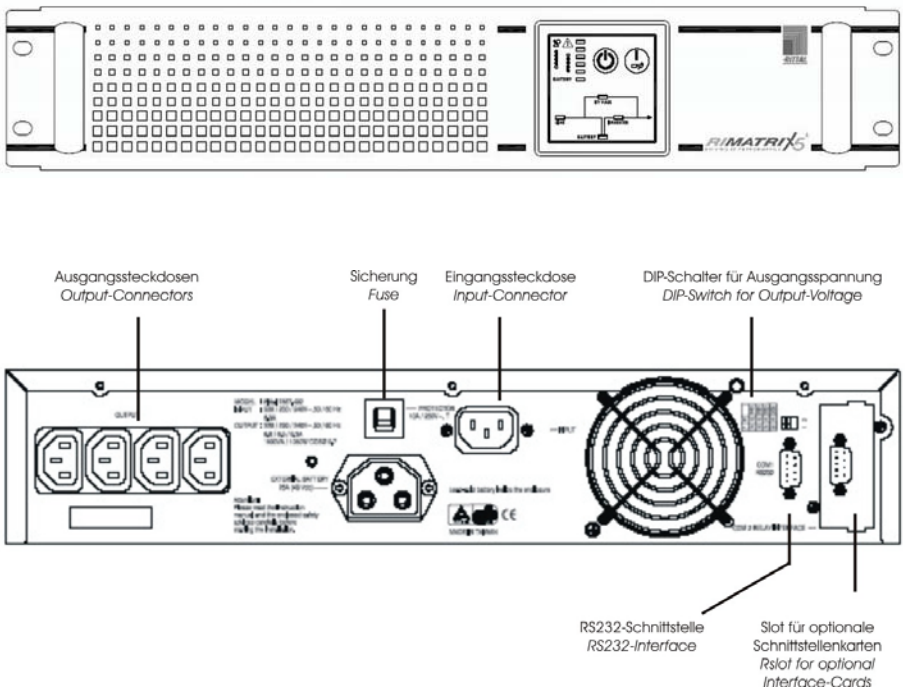

Figure 7: Front and back view of RITTAL PMC UPS 1,5KVA

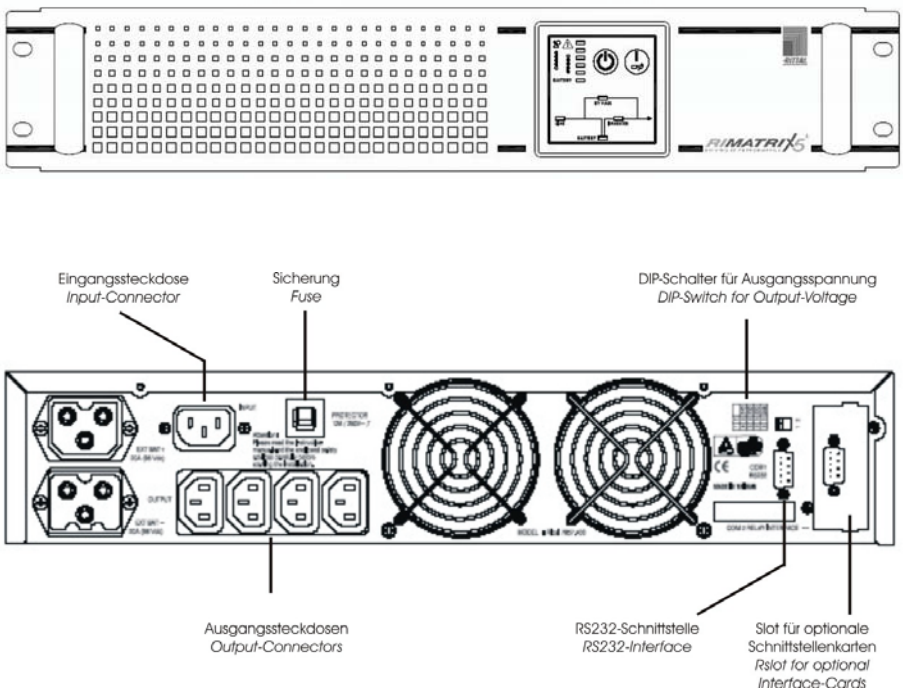

Figure 8: Front and back view of RITTAL PMC UPS 2KVA

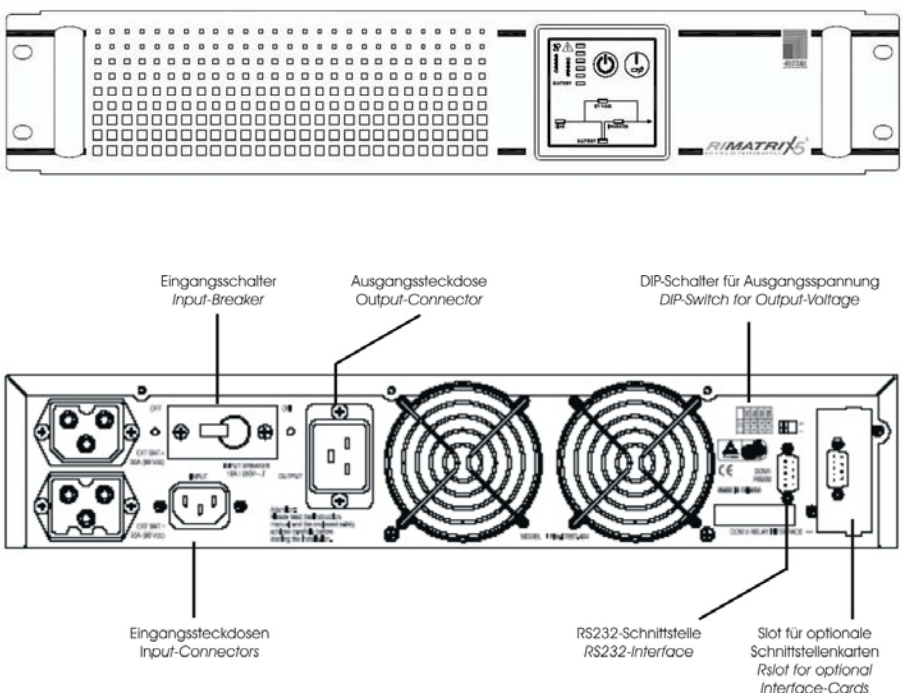

Figure 9: Front and back view of RITTAL PMC UPS 3KVA

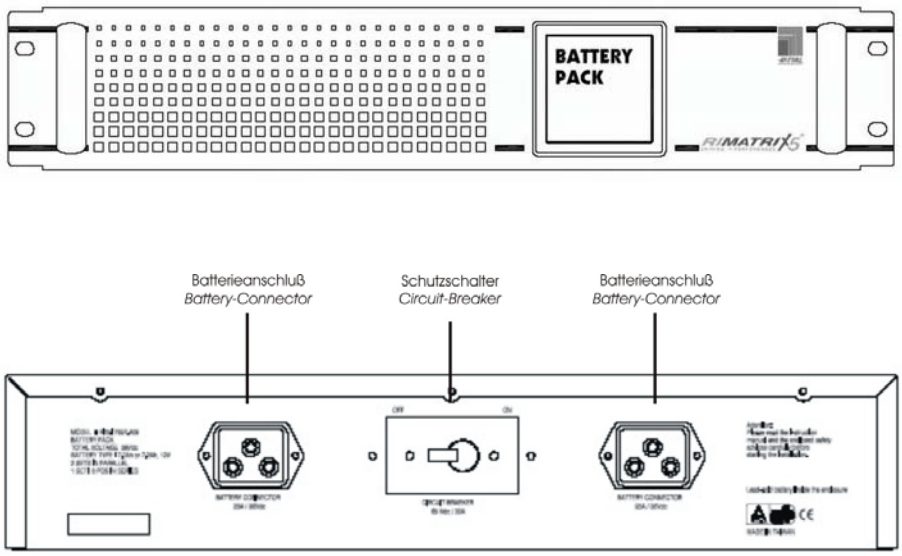

Figure 10: Front and back view of battery extension for RITTAL PMC UPS 1KVA

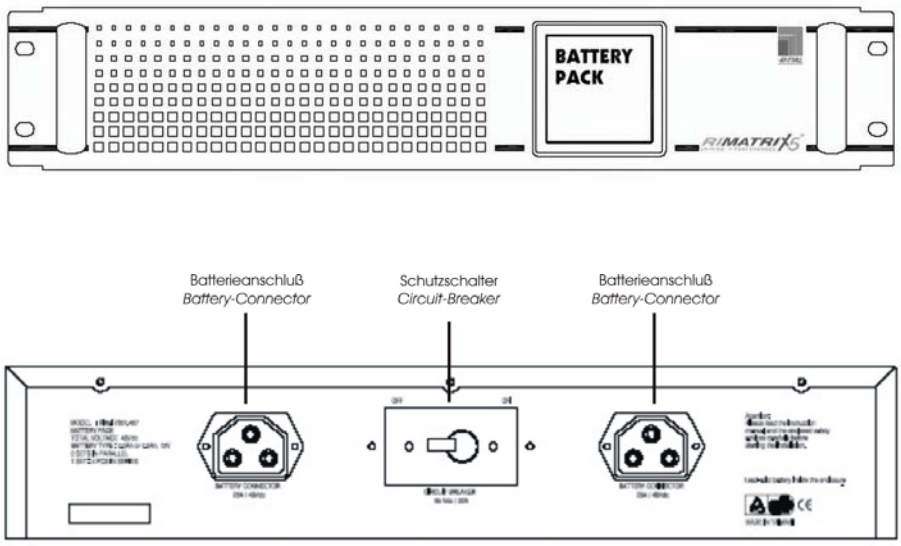

Figure 11: Front and back view of battery extension for RITTAL PMC UPS 1,5KVA

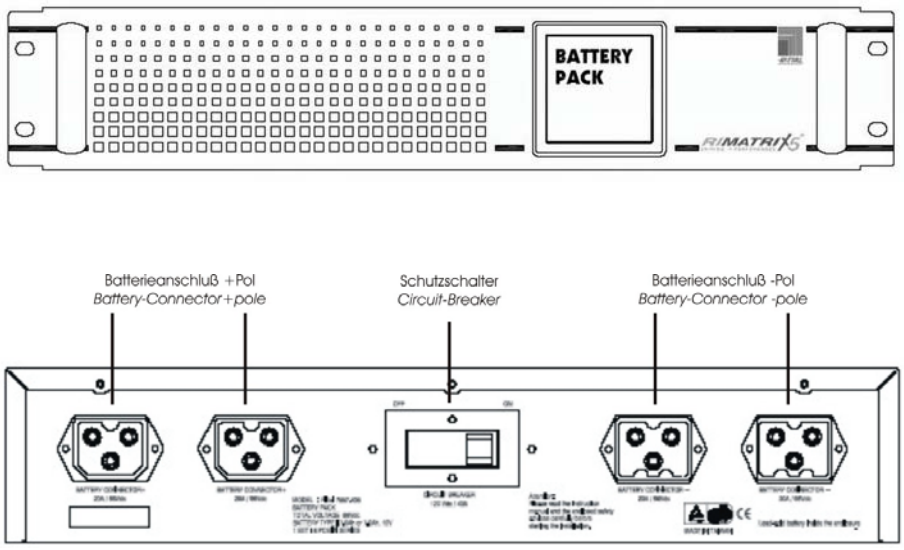

Figure 12: Front and back view of battery extension for RITTAL PMC UPS 2KVA and RITTAL PMC UPS 3KVA