Vorderer Weinberg 26 • D-71522 Backnang • Tel.:+49 (0)7191 3560-0 (Fax.:-19)

Sinewave Inverter

1U 19” Rack-mount Model

PSW1000

PSW2000-1U

PSW3000-1U

User’s manual

1 Warranty

RIPEnergy is not manufacturer of these units. All technical information's, data's and dimension's rely on information's given by the manufacturer. Therefore RIPEnergy AG is not responsible for the data's provided in this manual. Should work take place, which is not in accordance with guidelines, local rules, instruction's or specification's, damage may occur. All of these matters will lead to loss of warranty. RIPEnergy AG can not accept any liability for damages or costs arising due to the use of these inverters.

2 Distributor's address

www.u-s-v.de

YOUR CONNECTION TO SAFETY

Thiele KG • D-71522 Backnang • Vorderer Weinberg 26
fon +49 (0) 7191 3560-0 • fax +49 (0) 7191 3560-19
www.thiele-electronic.de • info@thiele-electronic.de

3 Retail dealer's address / Date of purchase

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Contents

4 General Information

Thank you for choosing a product supplied by RIPEnergy AG. The product you have bought is manufactured to meet the highest quality standards. Our manufacturers have a very long experience in manufacturing of high end electronic equipment.

5 Use of this manual

This user's manual contains the information you need to install and operate this inverter correctly. Check that you have the correct manual for your unit.

It is valid for the following units :

Sinewave Inverter PSW

1000-12-230 and 1000-24-230 and 1000-48-230 (1U Version)
2000-12-230 and 2000-24-230 and 2000-48-230 (1U Version)
3000-12-230 and 3000-24-230 and 3000-48-230 (1U Version)

Read the manual carefully before installing or operating the inverter. If you do not understand or are uncertain about any operation or information, please contact your dealer. He will be able to help you with an explanation or will demonstrate the operation.

The user must always have access to the user's manual.

These inverters must be only installed by qualified, authorized and trained personnel familiar with the locally applicable standards and taking into consideration all relevant safety guidelines and measures!
Never remove the type number plate. Important technical information required for service or delivery of spare parts can be derived from the type number plate.

Modifications or breaking the warranty label without a written permission from RIPEnergy AG means that warranty is lost immediately!
Always contact your dealer first if you have any problems.

6 Limitation of liability

RIPEnergy AG is not responsible or liable for any loss, damage or costs arising from operating these inverters.

The products supplied by RIPEnergy AG are not for application's in any medical equipment intended for use as a component of any life support system. If products are used in such systems, a specific written agreement between the manufacturer, RIPEnergy AG and the installer/manufacturer of the system is needed. In addition, the manufacturer of the system must agree to indemnify RIPEnergy AG from any claims arising from use of products supplied by RIPEnergy AG in the life support equipment.

7 Warranty specifications (short form)

The inverters are built for RIPEnergy AG in according to the legally applicable standards. During production, and prior to delivery, all products are tested and inspected. RIPEnergy AG is looking to find the best available products on the market. Good quality parts and the latest technology of the units will ensure a long lasting and trouble free operation of these units.

If any problem occurs during warranty period, please contact your dealer first. He is able to serve you with instructions and explains you how to send the unit to the nearest service center, if necessary.

Warranty can only be guaranteed if you enclose a document (Invoice or delivery documents) to the defective units.

Damage attributable to normal wear and tear, overload or improper handling or installation is not covered by the warranty.

Modifications or breaking the warranty label without a written permission from RIPEnergy AG means that the warranty is lost immediately!

Always return the units in it's original package and completely assembled. A short description of the failure/problem will help us to serve you better.

RIPEnergy AG is not paying for costs arising for transport of the unit or damage that arise during the time the unit is unserviceable. The general terms of delivery and terms of sale of RIPEnergy AG are valid.

Do not return units before authorized by RIPEnergy AG.
RIPEnergy AG will provide instructions and RMA number.

8 Unpacking

After unpacking, carefully check the inverter for possible damage. If any damage due to transport is visible immediately contact your dealer for further instructions.

Keep the original packing in case you need it to transport the inverter later.

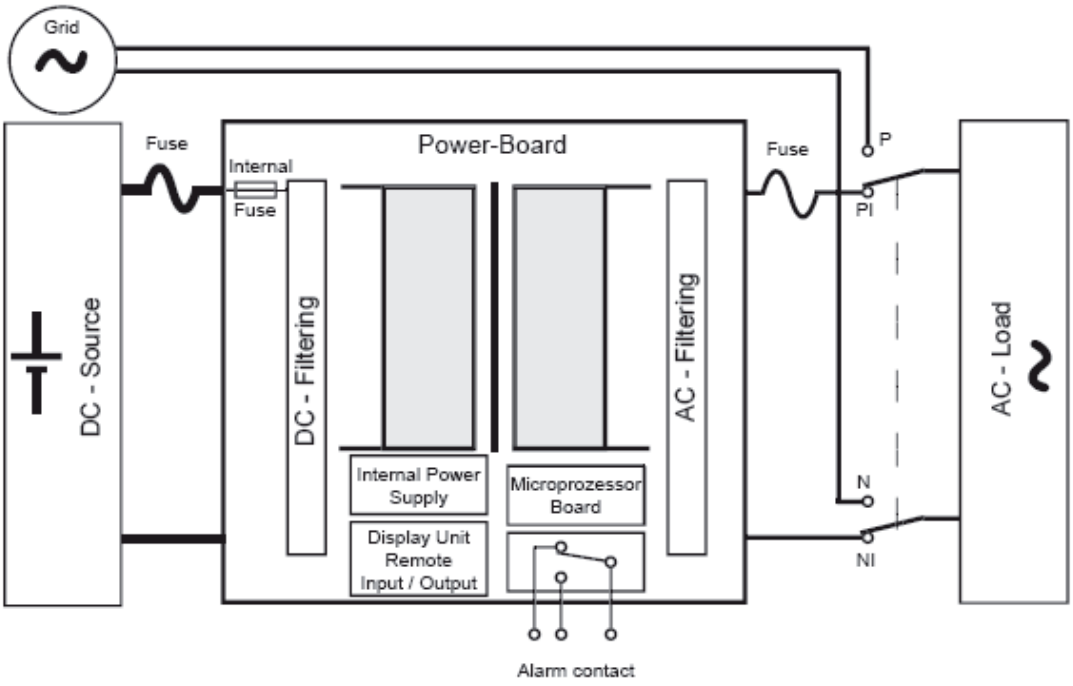
9 Environmental protection

RIPEnergy AG continually commits a considerable part of its resources towards minimizing the environmental impact of its products. The inverter is manufactured with valuable materials and easy to recycle.

10 Description of the inverter

The model PSW1000, PSW2000-1U and PSW3000-1U pure sinewave inverter supplies a 230VAC output voltage either from a 12V, 24V or 48VDC power source. The shape of the output voltage is pure sinewave - clean power as from the grid.
The inverter design is based on state of the art high frequency technology. All functions are controlled by a microprocessor. Extra input and output filtering to reduce EMI to extremely low levels. Reliability features include an input fuse, thermal shutdown, current limiting and output short circuit shutdown with automatic recovery.
The input and output is fully isolated. The superb overload capability supplies short time peak power to start heavy equipment such as pumps and compressors.

11 Block Diagram



12 Safety Information

12.1 General information

Read the manual carefully before installing or operating the inverter. If you do not understand or are uncertain about any operation or information please contact your dealer. Before installation you must be aware of local standards and rules applicable to use such equipment. For installation and use of the inverter pay attention to local applicable standards, all relevant safety guidelines and measures. These rules may be different to the information's provided in this manual.

High voltages up to 1200V inside the inverter! Never open the enclosure. High voltage may harm or even kill persons or animals. Never touch wires or blank connectors. Do not operate the inverter with damaged or substandard wiring.

Warning! While sleep mode is active the inverter AC-Output is active and high voltage is present at the AC-Output. To detect a load the inverter is sending 230VAC-Pulses to the AC-Output.

Check local standards for lightning protection of inverter systems.

No other inverter output, AC-Generator or other AC-Source may be connected to the inverters AC-Output. The inverter will be destroyed immediately!

The enclosure may heat up to 80°C! Never obstruct louvers nor place other items on the inverters enclosure. If ventilation is not sufficient the unit may overheat and an automatic shut off may occur.

Even if DC-Wiring is not longer connected to the batteries, inbuilt large capacitors may hold Dc-Voltage for an extended period of time. The inverter may only be opened by skilled and authorized personnel.

Modifications without a written permission from RIPEnergy AG means that warranty is lost immediately!

The inverter contains components which can produce arks and sparks. To prevent fire or explosion, do not install or operate in compartments containing batteries or flammable materials. Never use or operate the unit where there is danger of gas- or dust explosion.

After automatic shut down of the inverter because of any failure the inverter may switch ON automatic again. The OFF period is depending on what causes the shut down and may vary from only seconds to several minutes.

12.2 Working with batteries

Using batteries in a wrong way may result in danger for personnel, animals or the environment. Check information from battery manufacturer for safe installation and operation.

If battery acid contacts skin or clothing, wash immediately with soap and water. If acid contacts eyes, immediately flush with running cold water for at least 20 minutes and get medical attention as soon as possible.

Never smoke or allow a spark or flame in vicinity of batteries.

Do not drop metal tools on batteries. The resulting spark or short circuit may cause an explosion.

Remove personal metal items such as rings, bracelets, necklaces and watches when working with batteries.

13 Planning and mounting the inverter

This section will provide you information's about configuring and installing your inverter. Make sure that you are aware of local rules and safety measurements.

13.1 Required power draw

Before connecting your appliances to the inverter, always check the power draw required. The inverter is affordable to supply surge power for a short time, so as to start up electrical equipment such as pumps, motors, etc. Some equipment needs more power while starting up.

The inverter is protected against overload and will switch off automatically when overload is applied. As ambient temperature is above 20°C the inverters nominal power may be smaller due to reduced cooling.

Using the inverter in high altitudes may also reduce nominal power of the inverter because of less heat discharge. As a rule of thumb, the reduction of nominal power is approximately 1.5% per 100m elevation.

13.2 Installation

These units must be only installed by qualified, authorized and trained personnel familiar with the locally applicable standards and taking into consideration all relevant safety guidelines and measures!

Before installing the unit check for correct DC-Voltage and power level of the inverter.

The Inverter may be installed in any position. Install the inverter in a dry, well ventilated and dust free location. It must be installed out of reach for unauthorized personnel especially children's. Do not install the inverter in the same compartment as the batteries.

Never use or install the inverter in locations where there is gas or explosive danger!

For proper cooling of the Inverter ensure that the airflow is not obstructed and keep a clearance distance of 2.5cm to other units. If the inverter is installed in a closed compartment the nominal power may be reduced.

In order to keep the battery cables as short as possible (max. 3m) locate the inverter close to the DC-Distribution or Battery. Be aware that during charging of batteries an explosive gas can be generated.

13.3 DC-Wiring

Position of the switch on the front panel must be OFF.
Caution! First connect the assembled DC-Cables with the inverter and in a second step connect it with the battery! Always connect first the neutral wire with the battery!

A high power fuse must be installed direct to the battery to protect the DC-Wiring. DC – current according to the table below.
Not installing a fuse may result in melting or even burning DC-Cables in case of excessive overload or failure of the inverter.

The way of wiring has influence on the EMC behaviour of the system. Most problems using inverter are because of unprofessional wiring. Lay the cables in a metal duct. If this is not possible the cables should be twisted and lay parallel to a metal bar.

To thin cable or loose connections can cause dangerous overheating of cables or terminals. Always use DC cables of the correct size to avoid fire and other damage.

You may use the following recommendations for best performance of inverter:

Inverter	DC-Cable AWG / mm2	Inline fuse (A)
1000-12-230	#2 / 35	150
1000-24-230	#4 / 25	80
1000-48-230	#6 / 15	40
2000-12-230	#3/0 / 75	250
2000-24-230	#0 / 50	125
2000-48-230	#4 / 25	70
3000-12-230	#5/0 / 120	400
3000-24-230	#3/0 / 75	200
3000-48-230	#0 / 50	100

Assemble DC-Cables and connect the cables to the terminals of the inverter.
Torque to tighten the terminal screws is 12-13 Nm.

Connect the other end of assembled DC-Cables with care to the battery/inline fuse. If possible use coloured cables. Red colour means battery positive (+), while black is used for battery negative (-). Reversing positive and negative will cause major damage to the inverter and is not covered by warranty.

Note: Large capacitors in the units may hold DC-Voltage for a long period of time. Also a spark may occur while connecting the DC-cables or inserting the DC-Fuse after installation. This is normal.

If you connect other consumers to the battery contact your dealer.

13.4 AC-Wiring

Use the included AC-Connector to assemble AC-Cables to connect the AC-Load to the output of inverter.

Even the inverter is protected against overload and short circuit, we recommend to use an AC-Circuit breaker of correct size.

For safe operation it is necessary to connect earth (PE) and neutral (N) of the inverter output to central ground of the inverter.
Even more safe is to use a 15mA or 30mA earth leakage switch in the AC-Installation.

13.5 Grounding

The earth wire protection is only possible if the inverter enclosure is also connected to earth. Use a . 8-10mm2 cable (AWG 8) and connect it to the earth terminal of the inverter. This is also important for lighting protection.
Do not operate the power inverter without connecting it to Ground.
Electrical shock hazard may result.

14 Remote control unit

The optional available remote control unit enables remote control of the inverter. The remote control unit must be connected to the remote port (RS-232 connector) located on the rear side of the inverter. Before using the remote control unit the main switch of the inverter must be in the “ON” position.

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15 Configure the inverter prior to operation

15.1 Frequency setting

The AC-Frequency may be selected by DIP-Switch S1 on the front panel as follows.

AC-Frequency (Hz)	S1
50	0
60	1

To activate the new selected value, the inverter must be turned ON and OFF (Reset) .

15.2 Optional PC RS 232 connection

Baud Rate	S2	S3
2400	0	0
4800	0	1
9600	1	0
19200	1	1

To activate the new selected value, the inverter must be turned ON and OFF (Reset) .

15.3 Output Voltage

Output Voltage VAC	S4	S5
200	0	0
220	0	1
230	1	0
240	1	1

To activate the new selected value, the inverter must be turned ON and OFF (Reset) .

Caution! If the inverter is detecting a load it takes 15 to 18 seconds before the output power is available (delayed). Be careful when working with machinery (we recommend to disable the sleep mode).

16 Operation

The Inverter is controlled by a ON / OFF switch located on the front panel of the inverter.

Engaging
Set the power switch to the ON position; you will hear three beep. At the same time, the display is showed the word “HELLO” for two times. After that, you will hear the continuous sound from internal alarm. Then, the AC voltage shows on the display. The Inverter is ready to use.

Power down
Switch to „OFF-Position“. All LED’s are dark. The inverter output is OFF.

Remark
Even if the inverter is switched to off, it is not disconnected from the battery. It still draws very little power from the battery. If you don’t need the inverter for an extended period disconnect it from the battery to avoid low discharge of battery.

17 Display

Select Key
When sequentially push Select Key", it will display various status on the screen, such as VAC, AMP, WATT… and so on.
When malfunction is occurred, its display will be flashed on the screen.

17.1 Output Voltage Indicator
LED displays light on VAC as show as output voltage value

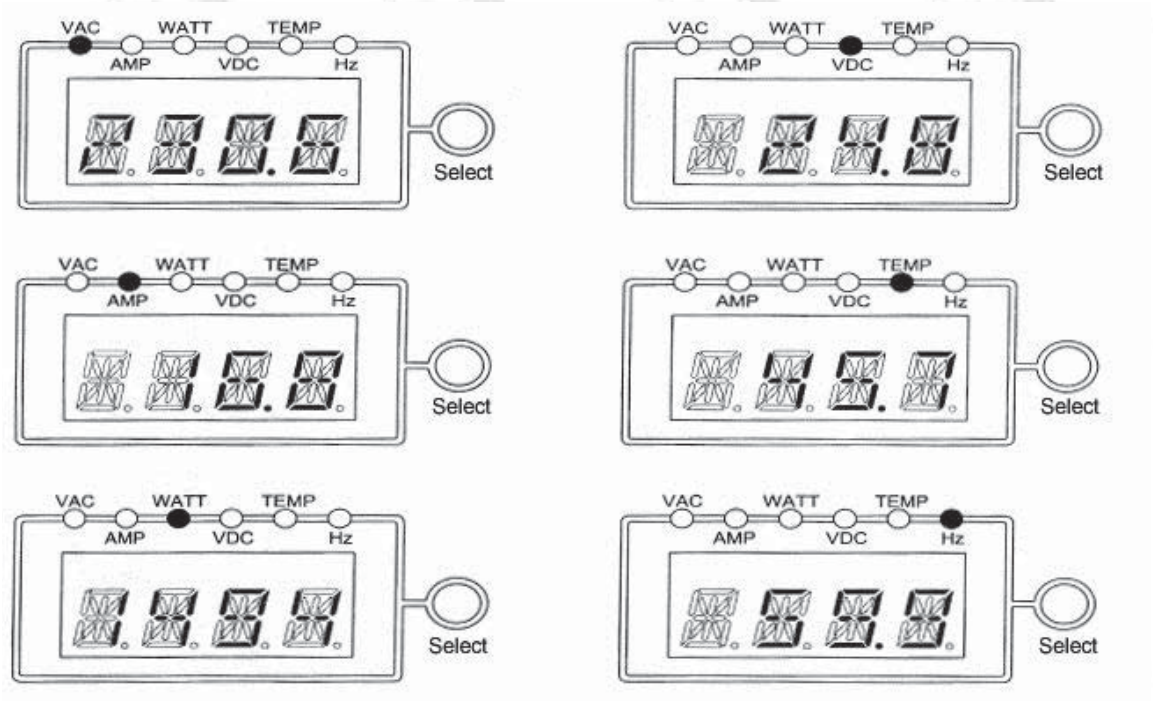
17.2 Output Current Indicator
LED displays light on AMP as show as output current value

17.3 Output Watts Indicator
LED displays light on WATT as show as output watts value

17.4 Input DC Voltage Indicator
LED displays light on VDC as show as input DC voltage value

17.5 Temperature Indicator
LED displays light on TEMP as show as internal operating temperature value

17.6 Output Frequency DC Indicator
LED displays light on Hz as show as output frequency value



Select	VAC		AMP	WATT	VDC			TEMP	Hz	
Range	100-120	200-240	0-10	0-2KW/3KW	10-16	20-32	42-62	0-120°C	50	60

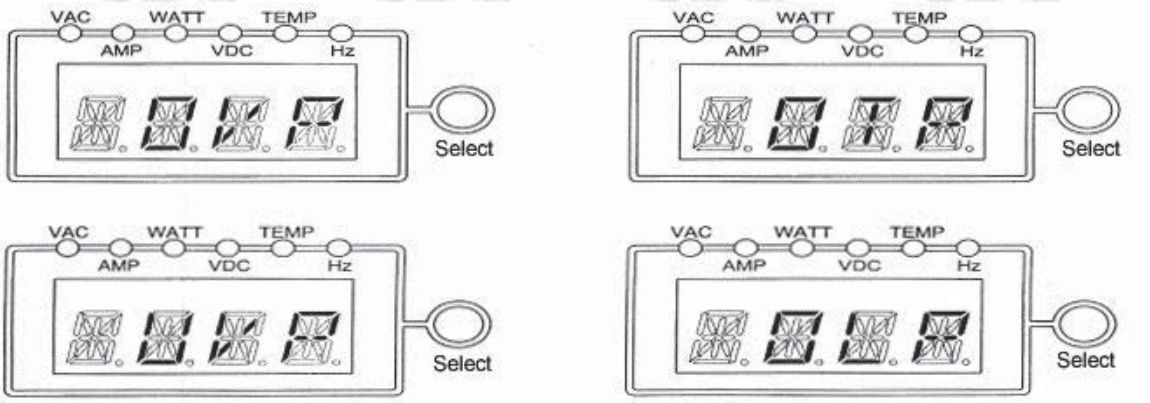
Indicated figures are approximately only.

17.7 Over voltage protection indicator: (OVP)
The over voltage indicator indicates that the power inverter has shut itself down because its input voltage exceeded the maximum input voltage.

17.8 Under voltage protection indicator: (UVP)
The under voltage indicator indicates that the power inverter has shut itself down because its input voltage fell below minimum input voltage.

17.9 Over temp protection indicator: (OTP)
The over temp indicator indicates that the power inverter has shut itself down because its temp has become overheated. The power inverter may overheat because it has been operated at power levels above its rating, or because it has been installed in a location which does not allow it to dissipate heat properly. The power inverter will automatically back up, once it has cooled off.

17.10 Overload protection indicator: (OLP)
The overload indicator indicates that the power inverter has shut itself down. When output voltage over continue power, then must return to operate manually.



Model	DC Input over voltage shutdown	DC Input over voltage alarm	DC Input under voltage alarm	DC Input under voltage shutdown
PSW1000/2000/3000 12V	16.0 VDC	15.5 VDC	10.5 VDC	10.0 VDC
PSW1000/2000/3000 24V	32.0 VDC	31.0 VDC	21.0 VDC	20.0 VDC
PSW1000/2000/3000 48V	62.0 VDC	61.0 VDC	43.0 VDC	42.0 VDC

18 Operating Status

18.1 Inverter Mode (Online UPS)
This mode is usually in use, when grid is very unstable or if a very high quality AC-source is required for sensitive equipment. To operate the system in this mode it requires to charge the batteries all the time in order to have enough power available.
In this mode, the load is connected to inverter. In case of inverter failure (low battery, overload, etc.), the AC-Output switches to grid/mains power. Switch over time is less than 6ms.
If inverter is operating again the load is switched back to inverter power.

	Inverter OK Grid OK	**Inverter OK Grid failure**	**Inverter failure Grid OK**
ONLINE LED	1	0	1
BYPASS LED	0	0	1

19 Technical data

PSW1000

Electrical (output)

Nominal VAC	200 - 220 - 230 - 240 (selectable) +/- 3%
Output Frequency	50Hz - 60Hz (selectable) +/- 0.05%
Nominal power	850W (1000VA) continous
Power for 1 min.	900W
Power for 3 sec.	950W
Power for 1 sec.	1000W
Output Waveform	Pure Sinewave <3% THD (R Load)

Environmental Specifications

Operating Temp. Range	-30° to +60°C @ maximum output > 50°C derating 2% per °C Thermal Shutdown @ +90°C
Humidity	0 - 95% Relative Humidity (non-condensing)
Audible Noise	NONE, 0db @ 1m (Fan OFF)
Fan	Load and temperature controlled
Isolation	Input-Output 1100VDC, Input-Case 1100VDC Output-Case 500VDC
Indicators/Display	VDC, VAC, AMP, WATT, Hz (selectable)
Alarm Indicators	OVP, UVP, OTP, OLP
Protection	Short circuit, Overload, Overtemperature, Overvoltage, Low voltage

Electrical (input)

Nominal voltage (VDC)	12	24	48
Voltage range (VDC)	10 - 16	20 - 32	42 - 62
Amps @ Pnom (A)	95	46	22.5
Idle current 230V ON (A)	0.7	0.35	0.25
Efficiency max. **Efficiency @full load**	91% 87%	93% 90%	95% 92%
Bypass AC Input (VAC)	180 - 260		
Bypass Frequency (Hz)	50 - 60		
Bypass Amps (A)	10		
Bypass (ms)	4 - 6		
Interface Control Port	RS-232C With Baud Rate 2400,4800, 9600, 19200 (Switch Selectable)		

Mechanical Specifications

Length	45 cm
Width	19"
Height	1U (4.4 cm)
Finish	Black Anodize / Powder Epoxy Coat
Weight	7.3 Kg
Connections	DC-clamps, AC-connector IEC60320-1 (Connector supplied with Inverter)
Warranty	2 years
Standards	Approval to CE

PSW2000-1U

Electrical (output)

Nominal VAC	200 - 220 - 230 - 240 (selectable) +/- 3%
Output Frequency	50Hz - 60Hz (selectable) +/- 0.05%
Nominal power	1700W (2000VA) continous
Power for 1 min.	1870W
Power for 20 sec.	2040W
Output Waveform	Pure Sinewave <3% THD (R Load)

Environmental Specifications

Operating Temp. Range	-30° to +60°C @ maximum output > 50°C derating 2% per °C Thermal Shutdown @ +90°C
Humidity	0 - 95% Relative Humidity (non-condensing)
Audible Noise	NONE, 0db @ 1m (Fan OFF)
Fan	Load and temperature controlled
Isolation	Input-Output 1100VDC, Input-Case 1100VDC Output-Case 500VDC
Indicators/Display	VDC, VAC, AMP, WATT, Hz (selectable)
Alarm Indicators	OVP, UVP, OTP, OLP
Protection	Short circuit, Overload, Overtemperature, Overvoltage, Low voltage

Electrical (input)

Nominal voltage (VDC)	12	24	48
Voltage range (VDC)	10 - 16	20 - 32	42 - 64
Amps @ Pnom (A)	188	92	46
Idle current 230V ON (A)	1.47	0.8	0.47
Efficiency max. **Efficiency @full load**	91% 87%	93% 90%	95% 92%
Bypass AC Input (VAC)	180 - 260		
Bypass Frequency (Hz)	50 - 60		
Bypass Amps (A)	15		
Bypass (ms)	4 - 6		
Interface Control Port	RS-232C With Baud Rate 2400,4800, 9600, 19200 (Switch Selectable)		

Mechanical Specifications

Length	45 cm
Width	19"
Height	1U (4.4 cm)
Finish	Black Anodize / Powder Epoxy Coat
Weight	7.5 Kg
Connections	DC-clamps, AC-connector IEC60320-1 (Connector supplied with Inverter)
Warranty	2 years
Standards	Approval to CE

PSW3000-1U

Electrical (output)

Nominal VAC	200 - 220 - 230 - 240 (selectable) +/- 3%
Output Frequency	50Hz - 60Hz (selectable) +/- 0.05%
Nominal power	2550W (3000VA) continous
Power for 1 min.	3060W
Power for 20 sec.	3260W
Output Waveform	Pure Sinewave <3% THD (R Load)

Environmental Specifications

Operating Temp. Range	-30° to +60°C @ maximum output > 50°C derating 2% per °C Thermal Shutdown @ +90°C
Humidity	0 - 95% Relative Humidity (non-condensing)
Audible Noise	NONE, 0db @ 1m (Fan OFF)
Fan	Load and temperature controlled
Isolation	Input-Output 1100VDC, Input-Case 1100VDC Output-Case 500VDC
Indicators/Display	VDC, VAC, AMP, WATT, Hz, TEMP, HZ, KVA. PF (selectable)
Alarm Indicators	OVP, UVP, OTP, OLP
Protection	Short circuit, Overload, Overtemperature, Overvoltage, Low voltage

Electrical (input)

Nominal voltage (VDC)	12	24	48
Voltage range (VDC)	10 - 16	20 - 32	42 - 64
Amps @ Pnom (A)	287	142	69
Idle current 230V ON (A)	1.6	1.1	0.58
Efficiency max. **Efficiency @full load**	89% 85%	91% 88%	93% 90%
Bypass AC Input (VAC)	180 - 260		
Bypass Frequency (Hz)	50 - 60		
Bypass Amps (A)	20		
Bypass (ms)	4 - 6		
Interface Control Port	RS485, RS-232C With Baud Rate 2400,4800, 9600, 19200 (Switch Selectable)		

Mechanical Specifications

Length	45 cm
Width	19“
Height	1U (4.4 cm)
Finish	Black Anodize / Powder Epoxy Coat
Weight	10.5 Kg
Connections	DC-clamps, AC-connector IEC60320-2
Warranty	2 years
Standards	Approval to CE

RoHS Compliant
Directive 2002/95/EC

20 Trouble shooting

Warning – Never remove the cover of the inverter! Do not self repair the inverter, no serviceable parts are inside the unit.

No function	Check LED-Display to identify the reason. According the failure indicated by the display see sections below to solve the problem. Check wiring for correct size, damage or loose screws. Check batteries, battery fuse or fuse installed on AC-output.
DC-Low voltage	The battery voltage dropped below 1.75V/Cell. Check battery fuse. Charge the battery – if charging is not solving the problem maybe the battery is defect. The wiring may be too thin or check installation for loose connections. Note: If battery voltage rises above 2.1V/Cell, the inverter restarts automatically.
DC-Over voltage	The battery voltage is above 2.55V/Cell. Remove the battery charger and stop charging the battery. Note: If battery voltage is dropping below 2.5V/Cell the inverter restarts automatically.
Over temperature	If load is smaller than nominal power of inverter – check if ventilation of the inverter is blocked. Maybe the ambient temperature is too high. If load is exceeding nominal power of inverter – reduce the load. Note: The inverter will switch on automatically if temperature of the inverter is within normal operating temperature range.
Overload	Reduce load. Remove unnecessary consumers. Reset the inverter with the front panel switch OFF than ON.
Other failures	Check system for correct grounding or contact your dealer.

V/Cell: The nominal voltage using lead acid batteries is 2VDC/Cell. Example: A 12V-Battery contains 6 single cells, a 24V-Battery contains 12 single cells etc.

21 Maintenance

Only little maintenance is required to keep your inverter and system operating reliable. The inverter must be switched off during maintenance and/or repair activities. It also must be secured against unexpected and unintentional switching on. Therefore switch off the connection between batteries and inverter and be sure that third parties cannot reverse the measures taken.
The following Steps must be undertaken at least once a year. Check cable and wires for damage and if they are still firmly connected. Defects such as loose connections ore damaged cables etc. must be corrected immediately. Keep the inverter dry, clean it from dust in order to ensure good heat discharge.

22 Further assistance and sending the unit for repair

In the rare case the unit is not working contact your dealer providing him some details as:

1. Check Battery voltage, wiring and display for possible failures.
2. Note: Type of unit and serial number.
3. Now call your dealer or nearest service center. They will help you with further instructions.
4. If he recommends sending the unit back for repair, use the original packing.
5. Include a copy of the invoice (Warranty repair is only possible with a copy of invoice or certificate showing date of purchase) and a short notice about your system and the failure observed.
6. In case you have to send the unit over state borders please make sure to fill the correct papers needed for customs. To reduce time and save money, contact the consignee how to declare the delivery. Arising costs for customs have to be paid by the sender.
7. Transport costs to send the unit back to RIPEnergy AG are not covered from Warranty.

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