14. WARRANTY

This product is designed using the most modern digital technology and under very strict quality control and testing guidelines. If, however, you feel this product is not performing as it should, please contact us: **usvoltworks@gmail.com**

We will do our best to resolve your concerns. If the product needs repair or replacement, make sure to keep your receipt/invoice, as that will need to be sent back along with the package and prepaid to VOLTWORKS. You have a full 18 months warranty from date of purchase.

The following situations will void warranty:

1. The box is distorted, damaged or changed, and interior parts damaged because of an exterior hit or drop not reported at time of delivery.
2. Connect the DC power incorrectly reversing the polarity.
3. Dismantled or repaired the unit by an unauthorized person.
4. The unit was damaged by incorrect installation or operating method.

To find out where to buy any of our products, you may also e-mail:
Customer Service Contact: **usvoltworks@gmail.com**

VOLTWORKS

1000W Pure Sine Wave Power Inverter

User's Manual

MODEL: ☐ VS-1000PB
☐ VS-1000PBR

Warning:This manual contains important safety and operating instruction. Please read it carefully before use the unit.

SPECIFICATIONS

Model	VS-1000PB	VS-1000PBR (With remote control function)
Continuous Power	1000W	
Peak Power	2000W	
Rated input Voltage	12VDC	24VDC
Input Voltage Range	9.5~16VDC	19~32VDC
Over Voltage Shutdown	16VDC	32VDC
Low Voltage Shutdown	9.5VDC	19VDC
Low Voltage Alarm	9.8VDC	19.6VDC
Output Voltage	110~120V / 220V ~240V ±10% (Be subjected to the rating)	
Frequency	50Hz / 60Hz ±1Hz (Refer to label)	
Wave form	Pure Sine Wave	
Efficiency	About 90%	
Over heat Protection	65±5℃	
Over load protection	1000~1200W	
Short Circuit protection	YES	
Display	LCD	
USB	5VDC，Max2.4A×2	
No load current	0.5A	0.7A
Cooling fan	The cooling fan on the product will not run when start up the inverter, it will start running only when temperature reach 104° F or load over 340W	
Operating temperature	0 ~ 40℃	
Storage temperature	-10 ~ 45℃	
Size (L×W×H)	31.5×15.2×8.4cm	
Weight	2.55Kg	

1. INSTRUCTION

The VOLTWORKS pure sine power inverter product line is used for back-up power. The pure sine product line is ideal for sensitive equipment and provides clean power, which is more efficient for back-up power applications. The power inverter transforms DC (direct current) electricity into AC (alternating current) power that can be used for running a wide variety of tools and appliances. This inverter is perfect for providing mobile power in cars, boats and work trucks. The inverter can also be utilized as a back-up source of electricity in the event of an electrical failure or for several off-grid applications such as camping or in your RV.

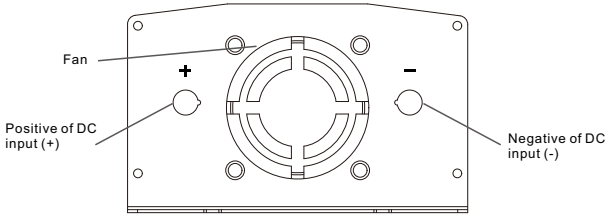
Please read this instruction manual carefully and make sure your inverter is installed properly before using.

2. WARNING AND SAFETY

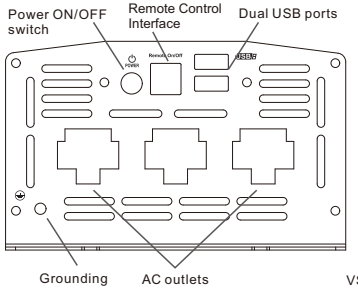
1) Read the manual before connecting this inverter and keep it for future reference.
2) While opening the product package, please check the integrity of the product and accessories. If there is any problem, please do not use it.
3) While connecting and using for the first time, if there is smoke or explosion sound in the product, please stop using immediately and disconnect the product from the battery and electrical appliances. This may be caused by damage during the transportation or due to moisture during storage in the warehouse before delivery. Please contact your seller in time.
4) During daily use, if there is smoke or explosion sound in the product, please don't worry, this is due to the internal fuse protection of the product . Please do not disassemble it by yourself. Please stop using the product immediately. Disconnect the product from the battery and electrical appliances. Contact the seller in time and only with seller's agreement a hired professional personnel can disassemble the product . Otherwise, it may cause electric shock, fire and serious personal injury
5) Do not put the inverter under direct sun light or near a heating source.
6) The case of inverter will get hot during using. Do not allow flammable materials such as clothing, sleeping bags, carpet or any other flammable materials to touch the inverter. The heat from the inverter can damage these items.
7) The power inverter is designed to be used with a negative ground electrical system! Don't use with positive ground electrical systems (the majority of modern automobiles, RVs, trucks and boats are negative ground).
8) Do not disassemble the unit randomly: it may cause fire or electric shock.
9) This device should only be serviced by a qualified technician. This item does not have any serviceable parts.
10) Prevent body contact with grounded surfaces such as pipes, radiators, ranges, and refrigerator enclosures during installation.
11) Do not operate the inverter if under the influence of alcohol or drugs. Read warning labels on prescriptions to determine if your judgement or reflexes are impaired while taking drugs. If there is any doubt, do not operate the inverter.
12) People with pacemakers should consult their physician(s) before using this product. Electromagnetic fields in close proximity to a pacemaker could cause interference to or failure of the pacemaker.
13) Keep the inverter well-ventilated. Do not place any objects on top of or next to the inverter or allow anything to cover the cooling fans; inverter will bel overheating, causing a potential fire hazard and/or damage to the inverter. Leave adequate ventilation space underneath the inverter as well; thick carpets or rugs can obstruct air flow, causing the inverter to overheat.
14) Avoid unintentional starting. Be sure the switch is in the OFF position when not in use and before plugging in any appliance.
15) Keep inverter away from children. Don't install the inverter where it is accessible to children.
16) The power inverter will output the same AC power as utility power, please treat the AC outlets as carefully as you would your home AC outlets. Do not put anything other than an electrical appliance into the output terminal. It may cause shock or fire.
17) This product cannot be used for medical and life support equipment.

3. PARTS LIST

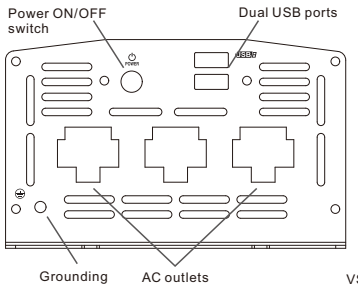
1) DC Input Side



2. AC Output side

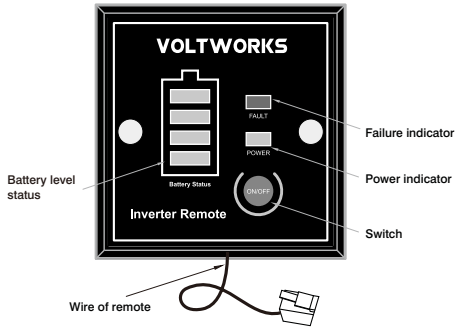


VS-1000PBR



VS-1000PB

3. Remote controller box

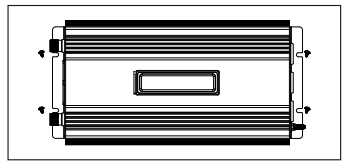


4. INVERTER INSTALLATION

1) Ensure there is enough space for the installation, and the location should be meet the following requirements:
   (1) Do not drip water or other liquids on the inverter.
   (2) The normal working ambient temperature the product was 0-40 ℃, the ideal temperature is 10-25 ℃, a temperature as low as possible within this range.
   (3) Ventilation: Products and surrounding objects should be a certain distance, to avoid blocking the vents of the product.
   (4) Do not install the inverter in an environment with high dust, saw dust residue or other particles that may get sucked into the inverter increasing internal temperature
   (5) Inverters and batteries when connected, will produce arcs or sparks, so there should not be around flammable objects such as gasoline, alcohol , etc.

2) INSTALL THE INVERTER

For this high-power inverter, due to its heavy weight, it is best to install it on a stable platform, such as a floor, a desktop or a fixed bracket. The supporting platform must have enough capacity to bear the weight of the product, and fix the product with four screws to prevent the product from slipping off.



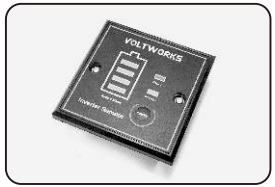
3) Installation of the remote control box (only for VS-1000PBR, VS-1000PB does not have this part)

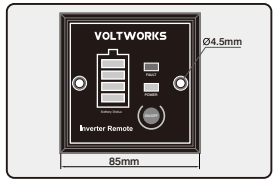
1) Fix the remote box on flat surface where a hole should be made, and use 2 screws to fix it through the two mounting holes on the remote controller.

2) Or fix the remote on a standard 86X86mm(3.39x3.39 inch) power socket;

3) Connect the inverter and remote controller by wire before mounting.

Remark: Without remote controller, you can turn on the inverter by the switch on the inverter too.





5. BATTERY

1). Voltage and current of the battery

The battery is designed to supply the unit with DC input voltage and the rated voltage should be in accordance with the rated input voltage of the inverter. Any voltage exceeds the range of the input voltage of the inverter will cause over voltage or under voltage protection.

In the meantime, the battery should supply sufficient current. The small capacity battery cannot drive the large power electrical appliance. In this case, the battery will be in under voltage protection because of the over-discharge of the battery. The simple calculation method of battery current is: load power divided by battery voltage. Due to the consumption of the inverter itself, the actual current will be about 10% larger. For example, the voltage of lead acid battery is 12VDC, and load power is 1000W, therefore, the actual current of the battery is about 1000W÷12V×110%≈91.6A.

2). Battery operating time

Battery operating time depends on battery capacity and current, and the calculation formula of operating time is: battery capacity divided by current, that is, battery capacity divided by the value of the load power divided by battery voltage times 110%. For example, battery specification is 12V, 2000Ah, load power is 1000W, so the total discharging time is 2000Ah÷ (1000÷12×110%) ≈21.8 hours.

Notice: The result of formula above is on the basic of discharging rate of 20 hours of the battery, that is, the result is from the discharging current of 2000Ah battery not exceed 100A. When the charging current exceeds this value, the discharging period will reduce.

And the quantity of the electricity of the battery may also influence the result. See the specification of the battery manufacturer.

6. CONNECTION

1) Grounding

The power inverter has a terminal on the rear panel marked " Grounding "or " ⏚ ". This is used to connect the chassis of the power inverter to the ground. The ground terminal has already connected to the ground wire of AC output receptacle through the internal connecting wire.

The ground terminal must be connected to the ground wire, which will vary depending on where the power inverter is installed. In a vehicle, connect the ground terminal to the chassis of the vehicle. In a boat, connect it to the boat's grounding systems. In a fixed

location, connect the ground terminal to earth.

Warnings:

- To make sure the firmness of the connection. The ground wire must be 14AWG (2.08 mm^2) or even larger.
- Do not operate the power inverter without connecting to the ground. Electric shock may result.

2) Connect to the lead acid battery

(1) Please do all the safety precautions before connection, and then check whether the battery voltage is in accordance with the input voltage of the inverter. Only the voltage of the battery accords with the requirements can be allowed to connect with the inverter.

(2) The connecting wire must bear enough current. Depending on the table below, please choose the input DC wire or larger one.

Rated voltage of inverter	Current max. load power	Max. current of wire	Specification of wire length≤1m	Specification of wire length1-2m	Specification of wire length≤N m
12V	1200W	100A	6AWG (13.3mm^2)	3AWG (26.67mm^2)	N×6AWG (N×13.3mm^2)
	1500W	150A	4AWG (21.15mm^2)	1AWG (42.41mm^2)	N×4AWG (N×21.15mm^2)
	2000W	200A	3AWG (26.67mm^2)	0AWG (53.49mm^2)	N×3AWG (N×26.67mm^2)
	2500W	250A	2AWG (33.62mm^2)	00AWG (67.43mm^2)	N×2AWG (N×33.62mm^2)
	3000W	300A	1AWG (42.41mm^2)	000AWG (85.01mm^2)	N×1AWG (N×42.41mm^2)
24V	1200W	50A	9AWG (6.63mm^2)	6AWG (13.3mm^2)	N×9AWG (N×6.63mm^2)
	1500W	75A	7AWG (10.55mm^2)	4AWG (21.15mm^2)	N×7AWG (N×10.55mm^2)
	2000W	100A	6AWG (13.3mm^2)	3AWG (26.67mm^2)	N×6AWG (N×13.3mm^2)
	2500W	125A	5AWG (16.77mm^2)	2AWG (33.62mm^2)	N×5AWG (N×16.77mm^2)
	3000W	150A	4AWG (21.15mm^2)	1AWG (42.41mm^2)	N×4AWG (N×21.15mm^2)

Notice:

1) The table above is only for your reference. In practice, the thick wire can be replaced by two thin parallel wires if only the total cross-sectional area of the wire meets the requirements.

2) In high current, the input DC wire may produce voltage drop, therefore, the operating voltage should be subject to the value on the terminals. If the voltage drop is too large, you can increase the cross-sectional area or reduce the length of the lead.

3) Connect cathode wire of the battery to the cathode terminal (black) on the rear panel of inverter and then connect the anode wire of the battery to the anode terminal (red) on the inverter, and fix them.

Warnings:

1) Please wear eye patch and work clothes when working around the battery to avoid the acid and corrosive objects harm your eyes and skin.
2) Prepare enough water and soap. In case the acid materials contact eyes or skin, clean it by soap and water as soon as possible. If the acid materials spay to your eyes accidentally, clean it by cold water immediately and then sent to hospital.
3) Do not put any combustible material in the location of installation for spark will result when it is connected to the battery.
4) Keep good ventilation. The battery may produce a little inflammable gas when it works, so keep away from the inverter and it is better to install them in different space.
5) Fix the connecting wire of the input DC, or it will result the over-reduction of the voltage or over-temperature of the wire.
6) Reverse connection of the polarities or the short circuit will burn the fuse or result the permanence damage of the internal elements of inverter.
7) Take away the metal accouterment, such as ring or watch, when installation to avoid the short circuit.
8) Although there is over-voltage protection, it may also cause damage of the inverter if the input voltage is too high.

3) Connection of the AC appliance

Put the power plug of the AC appliance load into the output AC receptacle of the inverter directly.

Warnings:

(1) Make sure that the switches of the inverter and appliance power are in OFF position before connection.
(2) Check the power cord. If it is damaged, it should be connected after replacement.

7. USAGE

①. How to use inverter

1) Check the output voltage and capacity of the battery to make sure it is in accord with the requirements of the product.
2) Connect the battery and the DC cable of the inverter to ensure that the polarities are not connected reversely and in tight connection.
3) Long press the switch or the remoter of inverter for over 0.5s and then stop, if the indicator light on the inverter or on the remote control box is on, it means that the inverter starts to work normally. This opening method can avoid turning on the unit by mistakes due to the interference or any factors.
4) Switch off electrical appliances and put its plug to the AC output socket of inverter. Then switch on electrical appliance.
5) The cooling fans inside the inverter do not work until the case temperature rises up to about 40℃ or the load power is more than 40% of rated power.
6) Switch off inverter and remoter to stop working. At that time, the indicator lights in. Both inverter and remoter are off. The inverter does not consume current of the battery when it is switched off.

② How to use USB power supply

This model with USB output, can provide stable voltage 5V DC, maximum current 2.4A directly for the portable device with USB port.

Notice: Before using the USB power supply, please make sure the device can be charged by USB and the maximum working current is no more than 2.4A.

8. ABOUT SOFT START TECHNOLOGY

The output voltage rises up from low to normal when the inverter is turned on. This can reduce attack of high startup currents, which can make startup easier of large inductive loads.

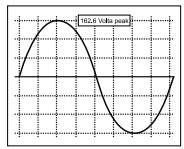
As for the large inductive loads, such as electric tools and the capacitive loads, suggest turning on the switch of the appliance firstly and later the inverter's. The soft start works.

9. THE OUTPUT WAVE FORM

The output wave form of this inverter is Pure Sine Wave, which is much like the one from utility-supplied AC electricity, even more purer; pure sine wave is applicable in most of loads, including electrical equipments, such as Linear Adaptor, switching power supply, transformer, and motor and so on.

Comparing with Modified wave form, for inductive loads such as refrigerator and electric fans, pure sine wave form can improve its power factor and the battery's efficiency and reduce working noises effectively from appliances. For capacitive loads such as adapter of lap-top, pure sine wave can lower the rush current at work and reduce interferences to increase reliability and prolong the life of the product.

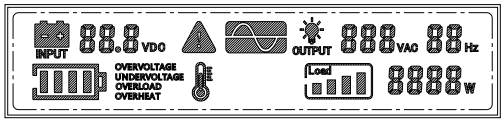
Pure Sine Wave Output
(120 VAC Model)



10. WORK INSTRUCTIONS

When the product is working, the LCD displays the current battery power, pure sine wave symbol, input voltage and output voltage, output frequency, load power and power percentage. When the product enters the protection state, the LCD will display the warning symbol and the current protection state, as follows Shown:

1. When the warning icon and "UNDERVOLTAGE" are displayed, it indicates that the inverter is in "UNDERVOLTAGE" protection.
2. When the warning icon and "OVERVOLTAGE" are displayed, it indicates that the inverter is in "OVERVOLTAGE" protection.
3. When the warning icon and "OVERLOAD" are displayed, it indicates that the inverter is in OVERLOAD or short circuit protection.
4. When the warning icon, thermometer icon and "OVERHEAT" are displayed, it indicates that the inverter is in OVERHEAT protection.



11. PROTECTIONS IN THE INVERTER

1. Input under-voltage alarm: When the input DC voltage is lower than 9.8V (19.6V),the buzzer will whistle intermittently to remind that the inverter will go into the under voltage protection. If you are operating a computer or other equipment, you should pay attention to the timely preservation of data
2. Input undervoltage protection: When the input DC voltage is lower than 9.5V/19V, the inverter will automatically shut down. The buzzer beeps for a long time,and the LCD on the inverter displays "UNDERVOLTAGE".The user should turn off the inverter power switch and recharge the battery in time before using it.
3. Input overvoltage protection: When the input DC voltage is higher than 16V/32V, the inverter will automatically shut down.The buzzer beeps for a long time,and the LCD on the inverter displays "OVERVOLTAGE".The user should turn off the inverter power switch and adjust the input voltage to the allowable range before using it.
4. Short circuit protection:When the output is short circuit, the inverter will automatically close the AC output and the LCD will display "OVERLOAD", and the AC output will be automatically restored after the short circuit fault is removed.
5. Short-circuit protection: The AC output will be automatically shut down when short circuited. It will automatically reset after the problem is solved.
6. Temperature protection: The product will heat up during use. If the temperature exceeds 65°C, the inverter will automatically shut down. At this time, the buzzer will beep and the LCD on the inverter will display "OVERHEAT". The user should turn off the power switch of the inverter and continue to use it when the inverter is naturally cooled to normal temperature. The user should also check the reasons for the temperature protection, such as whether the ventilation conditions are good, whether the ambient temperature is too high, whether the vent is blocked, whether the load power is too large, etc., solve the above problems to avoid recurring temperature protection. power etc. It can avoid similar things from happening again.

12. QUICK KNOWLEDGE ABOUT INVERTER

! Ensure Your Battery Size Is Big Enough And Voltage Is Correct.

A. CORRECTLY CONNECTING THE INVERTER FOR FIRST USE.

1) Secure the provided Negative (black) DC cable connect to the Negative (-) bolt on the inverter, and the other end to the Negative (-) post on the battery.
2) Secure the provided Positive (Red) DC cable to the Positive (+) bolt on the inverter, and the other end to the Positive (+) post on the battery.
3) The nuts of the connection posts must be tightened to ensure well connected.
4) Press the power switch for one second, because it is a long press type switch.

WARNING: REVERSE CONNECTED THE CABLES WILL DAMAGE THE INVERTER AND AVOID YOUR WARRANTY!

B. TROUBLESHOOTING TIPS

Problem	Reason	Solutions
No output voltage, buzzer whistles continuously	Low Input DC Voltage	Low Input DC Voltage
	High Input DC Voltage	● Do not use it when the battery is charging ● Check the rated voltage of the battery and make sure that it is in the allowable range of the input voltage.
	Overload	Reduce the load power
	Over temperature	● Cut off the load and let it cool naturally for 10 to 30 minutes. ● Restart it after it resumes to normal temperature. Reduce the load. avoid blocking the vent and improve the ventilation condition.
No AC output voltage?	1.The power switch is off. 2.Poor contact with battery.	● Press the power switch for 1-2 second to turn it on. it is a long press type switch ●Check the cables and make sure they are tightly connected.
Output voltage below 100 V AC?	"True RMS"voltage meter is required to properly measure output voltage of modified wave inverter	● Test output voltage with a True RMS meter ● Try to maintain the input voltage in the range of rated power ● Change the battery of the meter then test again.
Cannot drive the load?	1.Load power is too large. Or the actual power of the appliance exceeds nominal power. 2.The starting power is larger than rated power (especially for appliances with motor) 3.Battery is too small.	● Reduce the load power, or turn on the appliance first, then turn on the inverter. ● Choose a bigger inverter ● Change a bigger battery and ensure fully charged.
Tester indicated "Open Ground"?	This is because it is not connected to a"true Earth ground ", meaning it is not connected to a metal rod stuck in the Earth. it would be impossible to do so in a boat or car while moving. The power inverter DOES NOT and cannot create a true Earth ground on its own.	● Don't need the tester to do the Grounding Test. ● Refer to the manual to do the Grounding
Starting alarm ?	The main reason is that ths instantaneous current is too large, which leads to the detection of low voltage and trigger under-voltage alarm.	Please restart the inverter several times.
Got 40V or so while testing inverter's ground wire and zero line?	This valtage has no meaning, zero line can be ground.	This is normal, there is no current leakage.

If the unit still doesn't work normally after using all the methods above, it maybe the internal faults of the circuit. Please contact us: usvoltworks@gmail.com