

M. 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.

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

V0.20.12

VOLTWORKS

PURE SINE WAVE INVERTER

USER'S MANUAL

MODEL: VS-3000QBR

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

SPECIFICATIONS

Model	VS-3000QBR	
Rated input Voltage	12VDC	24VDC
Continuous Power	3000W	3000W
Peak Power	6000W	6000W
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	110V~120V AC±10% (Refer to label)	
Frequency	60Hz ±1Hz	
Wave form	Pure Sine Wave	
Efficiency	About 90%	
Over heat Protection	149°F±8 °F	
Over load protection	3000~3300W	
Short Circuit protection	yes	
Display	LCD	
USB	5VDC 0~2.4A 2 MAX 2.4A	
No load current	2A	1.2A
Cooling fan	Thermal controlled cooling fan. It won't work till inverter case reaches 104°F only.	
Operating Temperature (Automatic Recovery/ Shutdown)	32°F-113°F	
Storage temperature	14°F~ 113°F	
Size (L W H)	15 8 6.7 inch	
Weight	15.5lbs / 7.03Kgs	

Remark: Due to the continuous improvement of products, the technical parameters in this manual are subject to change without prior notice.

A. 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.

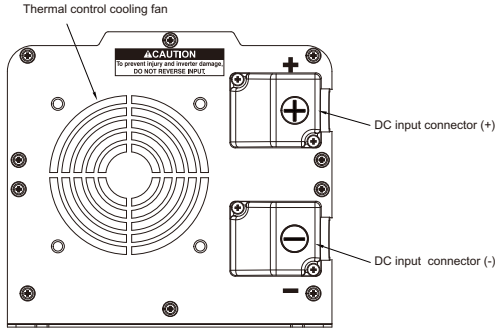
B. WARNING AND SAFETY

- 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 be 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.

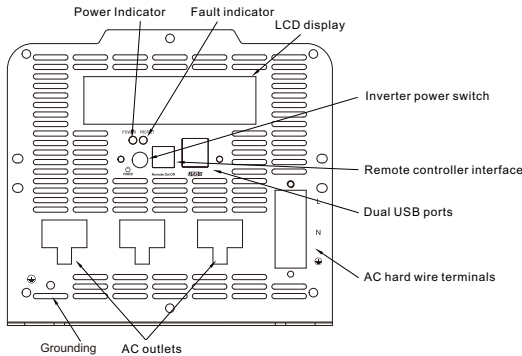
- 15) Keep inverter away from children. Don't install the inverter where it is accessible to children.
- 16) The power inverter will output the same AC power as utility power, please treat the AC outlets as carefully as you would your home AC outlets. Do not put anything other than an electrical appliance into the output terminal. It may cause shock or fire.
- 17) This product cannot be used for medical and life support equipment.

C. PARTS LIST

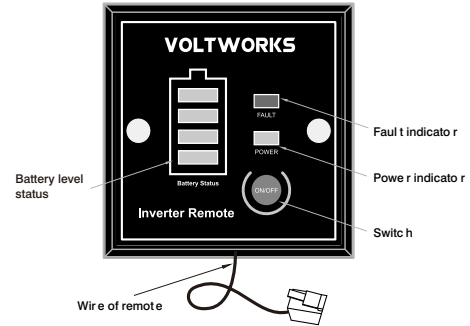
1. DC Input Side



2. AC Output side



3. Assemble the remote control box



D. INVERTER INSTALLATION

Ensure there is enough space for the installation, and the location should be meet the following requirements:

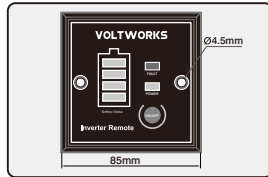
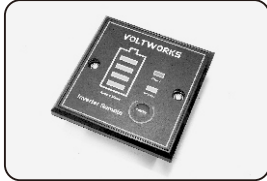
1. Water should not access the inverter.
2. The ambient temperature should be 32~104°F, and the preferred temperature is 50~77°F. The lower the better in this range of ambient temperature.
3. Do not mount the inverter upside down.
4. Allow 12 inches of space around the inverter to prevent objects from blocking the vents and to provide enough air to circulate.
5. 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.
6. There will be some electrical arcing or spark when the inverter connects with the battery. Combustible materials such as gasoline, alcohol, etc. should not be around the inverter.
7. We recommend mounting the inverter on something stable to prevent it from bouncing. Impact shock could result in damage to your unit. Be sure to use all four mounting screws for optimal stability. Mount in a location that can support the weight of the inverter.



E. REMOTE CONTROLLER INSTALLATION

- 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.



F. BATTERY

1. The battery is designed to supply the inverter with DC input voltage and the rated voltage should be in accordance with the rated input voltage of the inverter. Any voltage exceeding the range of the input voltage of the inverter will cause the inverter to go into overload and could possibly damage the inverter. The battery should supply enough current for the load. The load is the amp or watt rating of the equipment being powered by the inverter. A small capacity battery cannot provide enough power for a large electrical equipment. In this case, the battery will cause the inverter to go into under voltage protection because of the load put on the battery. A simple way to calculate the load or amps required from your battery is to divide watts of equipment by battery voltage.

Due to the consumption of the inverter itself, the actual current will be about 10%. For example, the voltage of lead acid battery is 12VDC, and load of the equipment is 1000W, therefore, the actual current needed from the battery is about $1000W / 12V = 83.3$ amps per hour. Add 10% for efficiency loss and you get $83.3 * 1.10\% = 91.6$ amp per hour needed. If you don't know the wattage of your equipment, you can figure the wattage by multiplying AC amps by AC voltage. For example, a refrigerator is 8 AC amps * 120 Volts AC = 960 watts. Remember, all equipment has a start-up requirement 3-5x its running wattage. In this example, $960 \text{ watts} * 3 = 2880$ watts needed from the inverter so don't size your inverter too small.

2. Battery operating time depends on battery capacity and load. The formula for operating time is: battery capacity divided by the value of the load divided by battery voltage times 1.10%. For example, using the numbers from above, the battery specification is 12V, 200Ah capacity and the load is 1000W. Take battery capacity $200Ah / 91.6 \text{ amps} = 2.18$ hours of run time if you fully deplete the battery. This is NOT recommended. Deep cycle batteries last longer when they are only depleted to 50% of capacity.

G. 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 ground. The ground terminal has already been connected to the ground wire of the AC output receptacle through the inverter.

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 ground system. In a fixed location, connect the ground terminal to earth.

The ground wire must be 14AWG(2.08mm²) or larger, and make sure the connections are well.

2. Battery Connection:

Before you connect the battery cables, make sure the power switch is in the off position. Connect Red (+) battery cable to Red (+) inverter terminal. Connect Black (-) battery cable to Black (-) inverter terminal. Connect Red (+) battery cable to Red (+) battery terminal. Connect Black (-) battery cable to Black (-) battery terminal. Alligator clamp cables may be used but only to connect to the battery. Do not use clamps on inverter terminals. Alligator clamps are not a permanent solution. You may see a spark during connection. **Do not reverse the polarity.** This may damage the inverter and void warranty.

Notice:

- 1) Please do all the safety precautions before connecting, and then check whether the battery voltage comply with the input voltage of the inverter.
- 2) The cables must be big enough to bear current, or else the inverter can not power up a big load because of voltage reduce caused by the small cross-sectional wire.

Refer to the below table to choose cables accordingly.

Inverter Input voltage	Rating power	Max current of cable	Specification of wire length≤1m	Specification of wire length≤1m	Specification of wire length≤1m
12V	1000W	100A	6AWG(13.30mm ²)	3AWG(26.67mm ²)	N×13.30mm ²
	1500W	150A	4AWG(21.15mm ²)	1AWG(42.41mm ²)	N×21.15mm ²
	2000W	200A	3AWG(26.67mm ²)	0AWG(53.49mm ²)	N×26.67mm ²
	2500W	250A	2AWG(33.62mm ²)	00AWG(67.43mm ²)	N×33.62mm ²
	3000W	300A	1AWG(42.41mm ²)	2×1AWG(84.82mm ²)	N×42.41mm ²
	4000W	400A	0AWG(53.49mm ²)	2×0AWG(107mm ²)	N×53.49mm ²
	5000W	500A	00AWG(67.43mm ²)	2×00AWG(135mm ²)	N×67.43mm ²
24V	1000W	50A	9AWG(6.63mm ²)	6AWG(13.3mm ²)	N×6.63mm ²
	1500W	75A	7AWG(10.55mm ²)	4AWG(21.15mm ²)	N×10.55mm ²
	2000W	100A	6AWG(13.3mm ²)	3AWG(26.67mm ²)	N×13.30mm ²
	2500W	125A	5AWG(16.77mm ²)	2AWG(33.62mm ²)	N×16.77mm ²
	3000W	150A	4AWG(21.15mm ²)	1AWG(42.41mm ²)	N×21.15mm ²
	4000W	200A	3AWG(26.67mm ²)	0AWG(53.49mm ²)	N×26.67mm ²
	5000W	250A	2AWG(33.62mm ²)	00AWG(67.43mm ²)	N×33.62mm ²

Notice:






1. The above table is only for your reference. In practice, the thick wire can be replaced by two thin parallel wires if only the total section acreage 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, it can increase the acreage of the section or reduce the length of the lead. The recommended length of lead is less than 1m.
3. Connect cathode wire of the battery to the cathode terminal (black) on the back 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.
3. Each outlet of the inverter has a given current rating of the manufacturer. It shall not exceed this value during use. Otherwise, the socket may be damaged by overheating and may cause an electric shock. The maximum output power of a single socket is shown in the following table:

Output socket	AC output voltage	Single socket max output current	Single socket max output power
	110~120VAC	15A	1500W
	220~240VAC	16A	3000W
	220~240VAC	13A	2500W
	220~240VAC	10A	2000W
	220~240VAC	13A	2500W

Connection of big load

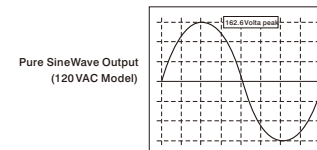
For the appliances with a load more than the limit of AC socket ,please connect to the Hard wire Terminals(if have) ,make sure the ground terminal of inverter connected with ground terminal (⏚) of appliance.

H. SOFT START TECHNOLOGY

The soft start technology built into this inverter protects the unit from delivering too much AC power at once by gradually increasing the AC voltage pushed out. To make sure that you are utilizing this feature, turn on the appliance being used before turning on the inverter. This is especially necessary for equipment that has an inductive load or electrical motor.

I. OUTPUT VOLTAGE & WAVEFORM

The electrical waveform output of this inverter is a pure sine wave, which has the same quality as utility and/or domestic power. This type of waveform is suitable for most electrical devices, appliances and tools. This pure sine wave unit provides more capabilities than modified sine wave inverters because it is a cleaner form of power. The pure sine wave also effectively reduces the noise produced while using appliances.

**J. LCD DISPLAY**

While inverter is working, the LCD display will show Battery Status Level, Pure Sine Wave Symbol, Input Voltage , Output Voltage, current etc . Once the inverter is on protection mode, the following codes will show:

- 1.LO: Low voltage protection
2. HI: High voltage protection
3. OL: Overload or short-circuit protection
4. OH: overheat protection.



K. 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.
2. Under voltage protection: The inverter will automatically shut down when the input DC voltage is lower than 9.5V(19V). The buzzer will whistle continuously and the green light is off, red light is on. Please turn off the inverter and use it after recharging the battery.
3. Over voltage protection: The inverter will automatically shut down when the input DC voltage is higher than 16V(32V). The buzzer will whistle continuously and the green light is off, red light is on. Please turn off the inverter and adjust the input voltage to the admissible range.
4. Overload protection: The inverter will automatically shut down when the load is higher than the rated power. The buzzer will whistle continuously. Turn off the inverter and resume to normal operation after taking away the excessive load.
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. Thermal protection: The unit will get hot during operation. If the temperature is higher than 149°F, the inverter will automatically shut down. Then the buzzer will whistle continuously and the green light is off, red light is on. Please turn off the inverter, and continue using it after the temperature goes back to normal naturally. Meanwhile find out the factors causing the fault, such as ventilation, ambient temperature, vent, load power etc. It can avoid similar things from happening again.

NOTE: The numbers in the parenthesis are for 24V models. In the case of over voltage, under voltage and thermal protection, the inverter will shut down. When the inverter is in the OFF position, the inverter doesn't consume battery current.

L. 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	<ul style="list-style-type: none"> ● 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	<ul style="list-style-type: none"> ● 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?	<ol style="list-style-type: none"> 1.The power switch is off. 2.Poor contact with battery. 	<ul style="list-style-type: none"> ● 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	<ul style="list-style-type: none"> ● 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?	<ol style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> ● 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.	<ul style="list-style-type: none"> ● 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 the 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 voltage 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