V0.21.04

VOLTWORKS

1100Watt Power Inverter with LCD display

User's Manual

MODEL: VK-1100HB

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

SPECIFICATIONS

Item	VK-1100HB	
Rated input Voltage	12VDC	24VDC
Input Voltage Range	9.5~16VDC	19~32VDC
Over Voltage Shutdown	16±0.5VDC	32±1VDC
Low Voltage Shutdown	9.5±0.5VDC	19±1VDC
Low Voltage Alarm	9.8±0.3VDC	19.6±0.5VDC
Continuous Power	1100W	
Output Voltage	110~120V AC±10% (Refer to label)	
Frequency	60Hz ± 1Hz (refer to label)	
Wave form	Modified wave	
Efficiency	Approximate 90%	
Over heat Protection	65 ± 5℃	
Over load protection	1300W	
Short Circuit protection	YES	
Display	LCD	
USB Output	5VDC, Max 2.4A×2	
No load current	0.9A	0.7A
Fuse (built in)	35A×4	35A×2
Cooling fan	The cooling fan won't work while turning on the inverter, till the temperature of inverter case reach 40 ℃	
Operating Temperature (Automatic Recovery/Shutdown)	0 ~45 ℃	
Storage temperature	-10 ~ 45 ℃	
Size (L×W×H)	285x182x74mm	
Weight	2.2Kg / 4.9lbs	

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

1. INSTRUCTION

The VOLTWORKS Power inverter product line is used for back-up power. It converts DC (direct current/car battery) power into AC (alternating current) power that can be used for running a wide variety of tools and appliances under rating power. 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.

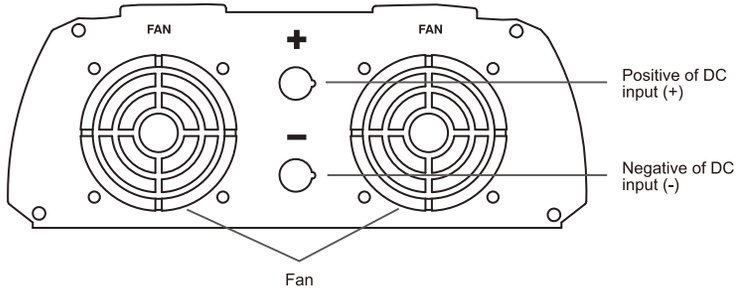
2. WARNING AND SAFETY

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.

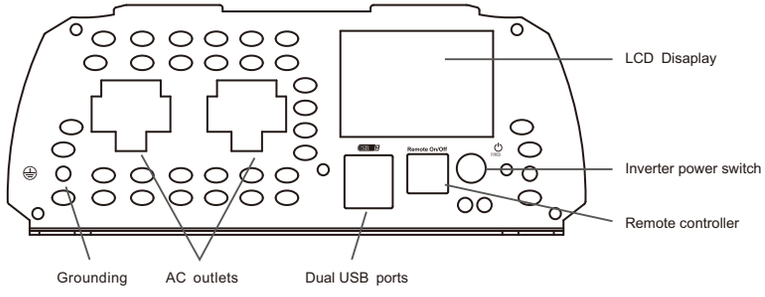
3) While connecting and using for the first time, if there is smoke or explosion sound in the product, please stop using immediately and disconnect the product from the battery and electrical appliances. This may be caused by damage during the transportation or due to moisture during storage in the warehouse 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) Do not connect the negative to car chassis when use in car.
10) This device should only be serviced by a qualified technician. This item does not have any serviceable parts.
11) Prevent body contact with grounded surfaces such as pipes, radiators, ranges, and refrigerator enclosures during installation.
12) 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.
13) 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.
14) 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.
15) Avoid unintentional starting. Be sure the switch is in the OFF position when not in use and before plugging in any appliance. Disconnect the battery and inverter when not in use for a long time.
16) Keep inverter away from children. Don't install the inverter where it is accessible to children.
17) 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.
18) This product cannot be used for medical and life support equipment.

3. PARTS LIST

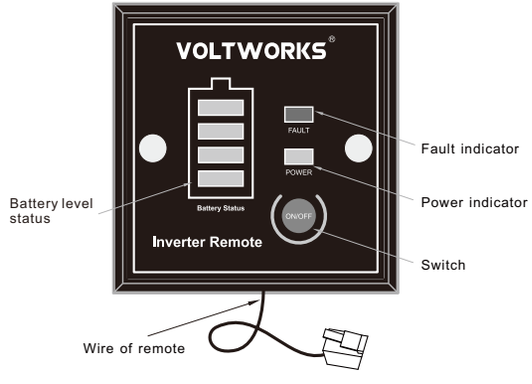
(1) DC Input Side



(2) AC Output side



(3) Remote controller box



4. ASSEMBLE

1) The position of Mounting

First ensure that there is enough space to install the inverter, while the installation location must meet the following requirements:

① Drying: Do not use water or other liquids dripping on the inverter

② Cool: a working environment temperature of the product is 0-40℃, preferably a temperature of 10-25℃, at a temperature as low as possible within this range

③ Ventilation: There should be a certain distance between inverter and other objects, to avoid blocking the products vents.

④ Clean: Do install the products in the dusty, wood chips or other particles , If cooling fan is turned on, the particles involved in the inside of the product, thus affecting the normal work.

⑤ While inverters and batteries connected, will produce arcs or sparks, so there should not be around flammable objects such as gasoline, alcohol, etc.

2) Assemble the inverter

For this big power inverter, because of the heavier weight, preferably mounted on a solid platform, such as floor, table or mounting bracket fine. In order to avoid falling off, platform for supporting the product should can bear the weight of sufficient capacity, and it is good with four screws to secure the product.

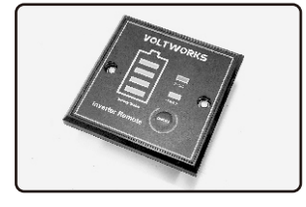
3) Installation of remote control box

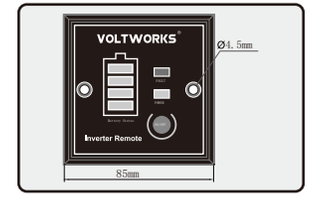
① Fixed on the plane with an opening, then fix two screws directly on the position of two installation holes of the remote control box.

② The remote control box can also be installed on the base of 86X86mm electrical socket.

③ Connect the connection between the remote control box and the inverter.

Note: This product can also be used as a common inverter without connecting the remote control box.





5. BATTERY

1) Current and voltage of battery

The battery is used to supply the DC input voltage required by the product, and its rated voltage must be in line with the rated input voltage of the inverter, beyond the input voltage range of the inverter, and the cross connection will cause the product to be under voltage or under voltage protection.

At the same time, the battery must provide enough current for inverter, a small capacity battery is not able to drive high power appliances, in this case, usually due to excessive current and battery discharge the battery terminal voltage low, under voltage protection products appear.

The simple formula for the battery current is the load power / the battery voltage. As the inverter itself will be part of the loss, so the actual current will be greater than this value of about 10%. For example: the battery voltage is 12VDC, the load power is 1000W, then the actual current size of the battery is about 1000W÷12V×110%=91.6A

2) Battery working time

The using time of battery depends on battery capacity (AH) and the power of the connected load (W), the calculating method is: Time (hours) =battery capacity (AH) x battery output voltage (V) x efficiency rate ÷ electrical power of using (W) such as the 12V DC input inverter uses the 12V battery, if the battery capacity is 2000AH and at this time the inverter is driving 1000W power load, the efficiency rate is 90% when the battery is full, according to the formula above, the battery use time =2000(AH) / (1000 / 12x110%) = 21.8 (Hour). This means the battery can be used for 21.8 hours.

Note: The above formula is the calculation result of the battery discharging rate in 20 hours, that is, when the discharging current of 2000 Ah battery does not exceed 100A, the discharging time will be shortened when the discharging current exceeds this value. This part can refer to the battery manufacturer's specifications, and whether the battery is fully charged will also affect this result.

6. CONNECTION

1) Grounding

The power inverter has a terminal on the back 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. On the ship, connect the ground terminal to the ship grounding system; In a fixed position, connect the ground terminal to the earth.

Warnings:

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

2) Connect to the battery

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

② The connecting wire must be big enough to bear current, or else the inverter can not support big load because of voltage reduce caused by the small cross-sectional wire. Depending on the below table, please select the input DC wire or larger one.

Inverter Input voltage	Rating power	Max current of cable	Specification of wire length≤1m (Cross section area)	Specification of wire length≤N m (Cross section area)
12V	1100W	110A	6AWG (13.3mm^2)	N×13.3mm^2
24V	1100W	55A	9AWG (6.63mm^2)	N×6.63mm^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.
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. Check the power cord. If it is damaged, it should be connected after replacement.
2. 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.

8 . USAGE OF INVERTER

1) How to use a inverter

① Check the output voltage and capacity of the battery to make sure it applicable to the requirement of the product use.

② Connect the battery and the DC cable of the inverter to ensure that the polarities do not be reversed and in good contact.

③ Long press the switch of inverter or of remoter for over 0.5s and later on let it go, if the indicator lighter on the inverter or on the remoter box is on, it means that the inverter start to work normally. This method can avoid effectively turning on the unit due to the interference or any mistakes.

④ Switch off electrical appliances and put electrical appliance plug to the AC output socket of inverter. And then switch on electrical appliance for using.

⑤ The cooling fans inside the inverter do not work when the unit power on. It doesn't run until the case temperature rise up to 40℃.

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 from battery when it switched off.

2) How to use USB outlet

The inverter provides two USB which offer stable 5V DC voltage; the maximum current is 2.4A each, which can directly provide power for the portable device with USB port.

Notice: Before use 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

9. SOFT START TECHNOLOGY

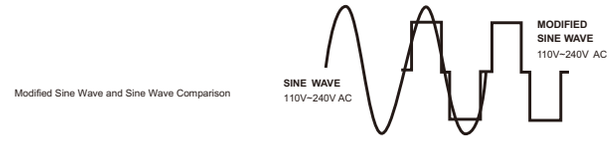
The soft start technology built into this inverter protects the unit from delivering too much AC power at once by gradually increasing the AC voltage pushed out.

10. OUTPUT VOLTAGE AND WAVE FORM

The output voltage waveform of the inverter is called "modified sine wave", it is a step waveform similar like household alternating current , this type of waveform is applicable to most of the load, including linear or switching power supply, transformer, electric motor etc.

Since the output voltage waveform of the inverter is different from AC, RMS with general analog or digital multimeter can not accurately measure the output of the inverter, please use the true RMS digital multimeter to measure, such as FLUKE 177/179 multimeter

Note: Modified sine wave inverters are not suitable for all electrical appliances. As far as we know, unusable appliances include induction cookers and some air-conditioning fans with capacitance voltage-reducing circuits.

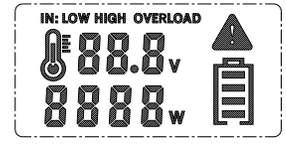


Modified Sine Wave and Sine Wave Comparison

11. WORKING INDICATORS

When the inverter works, the LCD displays the current battery power, input voltage and output voltage. When the inverter is in the protection, the LCD displays the warning sign and the current protective state, as follows:

1) When the LCD shows "LO", it indicates that it is currently under-voltage protection.
2) When the LCD shows "HI", it indicates that it is in the state of over-voltage protection.
3) When the LCD shows "OL", it indicates that it is in the state of output overload or short circuit protection.
4) When the LCD shows "OH", it indicates that it is in the state of overheating protection.



12. PROTECTION FEATURES

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. Pay attention to save the data if you are using computer.
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 LCD shows“LO”, 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 LCD shows“HI”. 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 and LCD shows“OL”. 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 and LCD shows “OL”. It will automatically reset after the problem is solved.
6. Thermal protection: The unit will get bot during operation. If the temperature is higher than 149°F, the inverter will automatically shut down. Then the buzzer will whistle continuously and LCD shows “OH”. 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 and so on. It can avoid similar things from happening again.

13. 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 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 after service.

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.

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:

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