

Specifications

ITEM	
Input voltage range (12V/24V)	10~15VDC/ 20~30VDC
Input under voltage activation (12V/24V)	10.6VDC/ 21VDC
Input under voltage protection (12V/24V)	10VDC/20VDC
Input over voltage protection (12V/24V)	15VDC/30VDC
Output voltage	220V~240VAC $\pm 10\%$
Output frequency	50 ± 1 Hz
Output waveform	Modified sine wave
Efficiency	90%
Overload protection	Yes
Short circuit protection	Yes
Thermal protection	65°C ± 5 °C
Indication	Double LED indication
Working temperature	0°C~45°C
Storage temperature	-20°C~60°C

1. BRIEF

The unit is one of the most advanced tools of power conversion, and it can supply you with AC power converted from DC power source. It's able to be used in cars and vessels and it also can be used in emergency when power fails.

In order to use the inverter efficiently and safely, please read the instruction carefully before install and use the appliance. Especially, pay attention to the **"WARNING"** and **"NOTICE"** in the manual.

2. WARNINGS AND SAFETY

- Read the manual before use the unit and keep it for future reference.
- Do not expose the inverter under the sun. Keep it away from direct heat sources, liquid and moisture.
- The inverter housing will be calorific when use. Please avoid touching the materials that can not stand high temperature, such as clothes, sleeping bag and carpet.
- Don't use it together with the anode ground electrical system! Our power inverter is designed to be used in the cathode ground electrical system. (In most current vehicles and boats , cathode ground is used.)
- Do not disassemble the inverter, or electric shock or fire will result.
- Keep it away from children and do not let them play with the unit.
- Please treat the output sockets as carefully as your household AC sockets and do not put any other things into the output terminal except for the plug of electrical appliance. It will bring danger or fire if it is used in a wrong way.
- Keep alert during operation. Do not operate the appliance alone and make sure that there is someone else can help you when you need help.
- Disconnect the inverter and battery when they are not in use. Deal with the wires and joints of the battery carefully to avoid the direct short circuit.

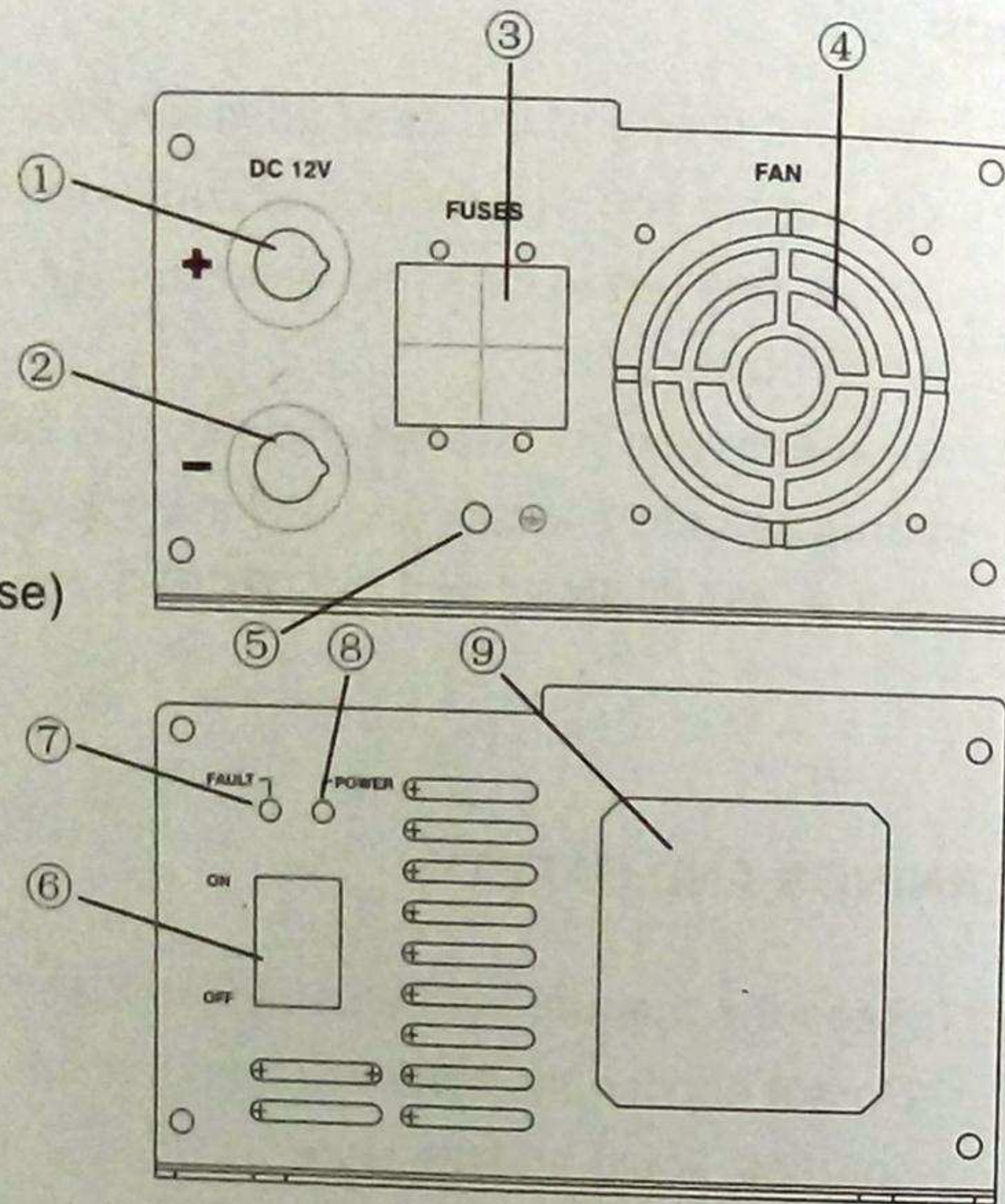
3. PARTS LIST

1 Back panel

- 1) Input terminal :
positive (red)
- 2) Input terminal :
negative (black)
- 3) Car fuse
(PC8-1000TB is internal fuse)
- 4) Cooling fan
- 5) Grounding terminal

2 Front panel

- 6) Power switch
- 7) Fault indicator
- 8) Power indicator
- 9) Output socket



4 INSTALLATION

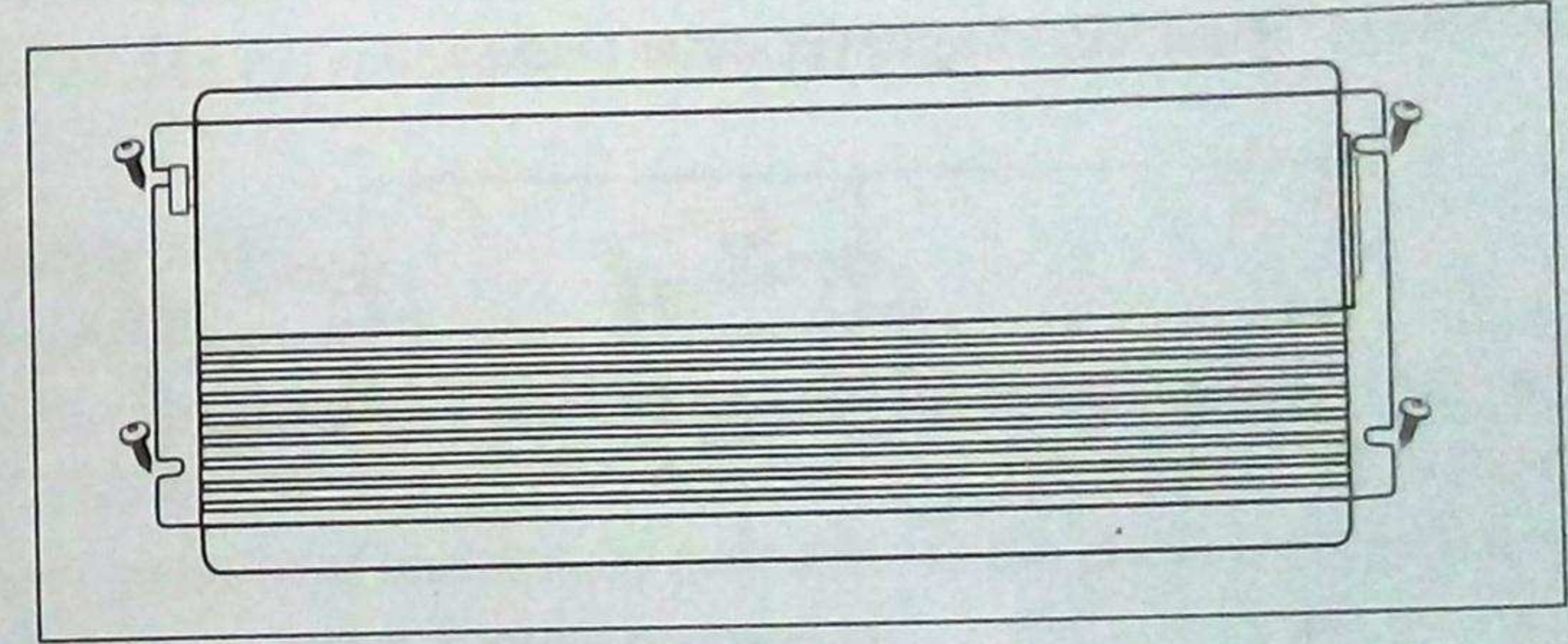
1 Location

First, make sure that there is enough space for the installation of the inverter and the location should accord with the following requirements:

- 1) Dryness: never drop water or other liquid on the inverter
- 2) Coolness: the ambient temperature should be 0~40°C, and the perfect temperature is 10°C~25°C. The lower the better in this range of the ambient temperature.
- 3) Ventilation: there should be a certain distance between the unit and the surrounding appliance. Do not obstruct the vent.
- 4) Cleanness: don't install the unit in the place with dusty, timbering residue or particles which may be brought into the product when the cooling fan works and may influence the normal operation.
- 5) Do not put the combustible materials, such as gasoline and alcohol, in the work environment because it will produce arc or spark when the unit connects with the battery.

2 Installation

For large power inverter, since it is heavy, please put it in a stable complanate place, such as the floor, table or fixed support. The support should be firm enough and fixed by four screws to avoid sliding.



5 BATTERY

1 Voltage and current of the battery

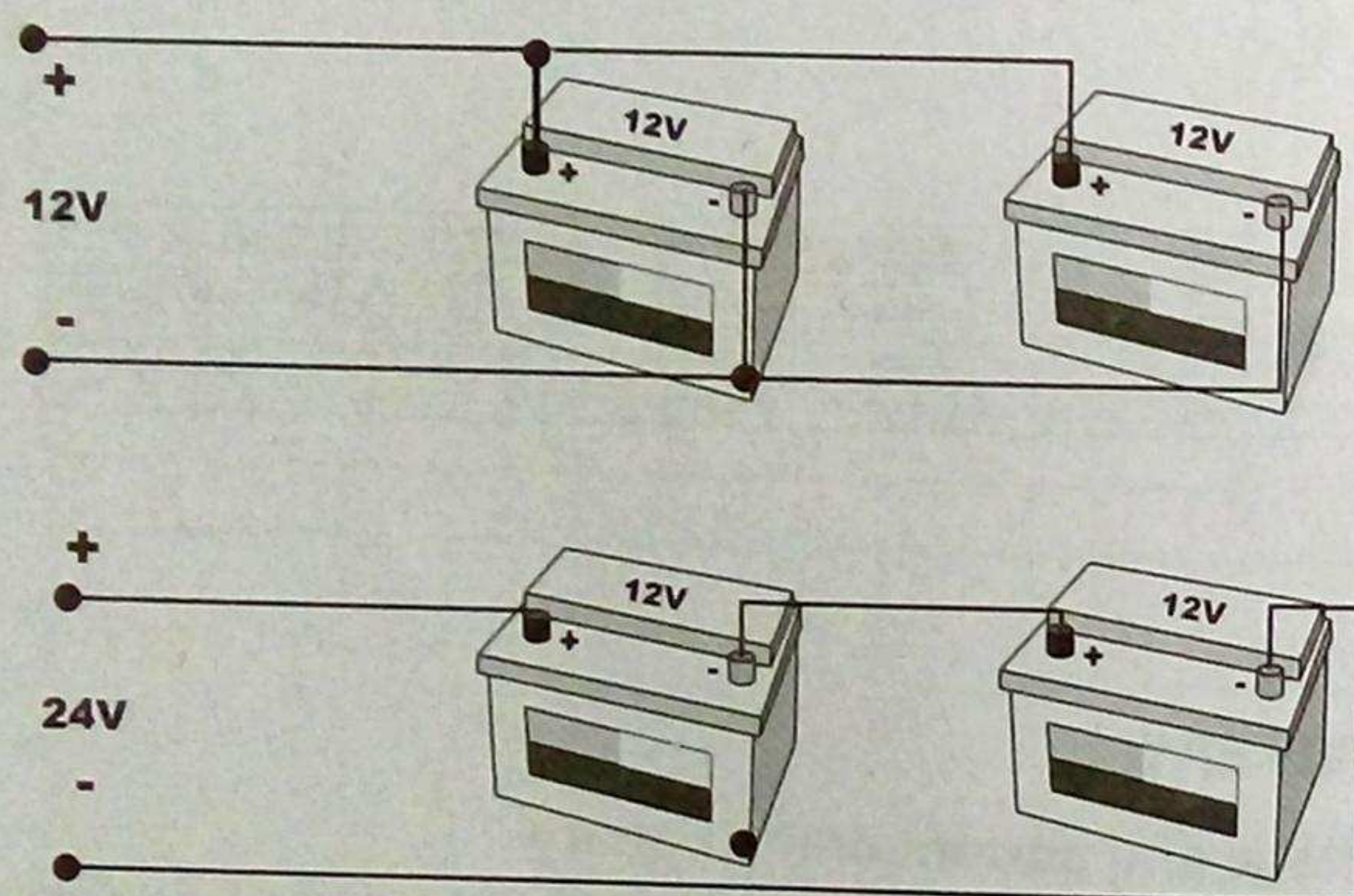
The battery is designed to supply the unit with DC input voltage and the rating voltage should be in accordance with the rating input voltage of the inverter. Any voltage exceeds the range of the input voltage of the inverter will cause over voltage or under voltage protection.

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 $1000W \div 12V \times 110\% = 91.6A$.

2 Parallel and series of the battery

The battery usually supplies the power for large power inverter through the way of the group battery, which is formed by parallel battery and series battery. The purpose of parallel is to enlarge the total capacity of the battery to supply larger output current or prolong working hours and the purpose of series is to enlarge the total voltage. The circuit diagram is under below.



Warnings:

- 1) The same type of battery is preferred.
- 2) Please ask the professional person to do the connection because the short circuit of output terminal or reverse connection will cause large current and spark.
- 3) Please refer to the warnings and notice in part 6.

3 Battery operating time

Battery operating time depends on battery capacity and current, and the calculation method of operating time is: battery capacity divided by current, that is, battery capacity divided by the value of 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 $2000W \div (1000 \div 12 \times 110\%) \approx 21.8$ Hours.

Note:

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

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 to the boat's grounding systems. In a fixed location, connect the ground terminal to earth.

Warnings:

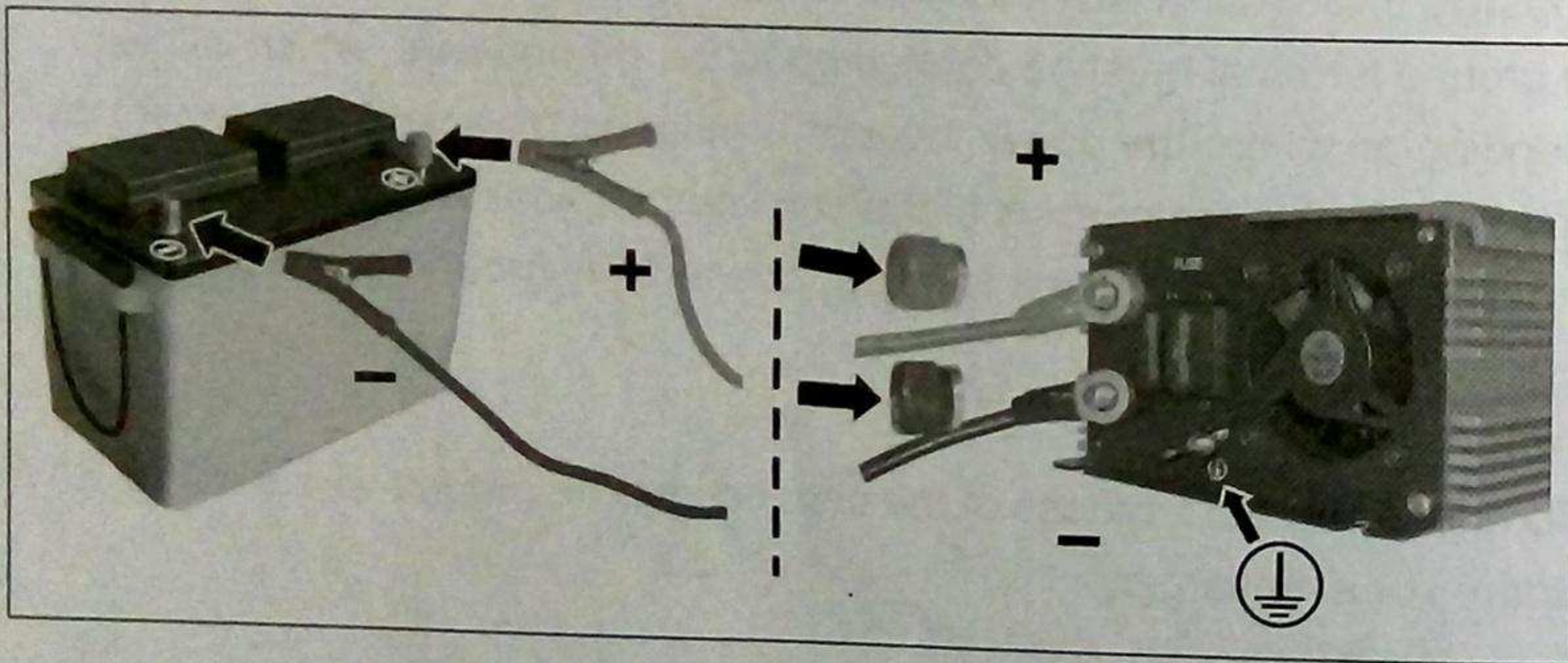
- To make sure the firmness of the connection. The ground wire must be 8AWG (8mm²) or even larger.
- Do not operate the power inverter without connecting to ground. Electric shock hazard may result.

2. Connect to the lead acid 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 bear enough current. Depending on the below table, please select the input DC wire or larger one.

Notice:

- 1 The above table is only for your reference. In practice, the thick wire can be replaced by two thin parallel wires and the only if 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 1~2m.
- 3) Connect cathode lead of the battery to the cathode terminal(black) on the back panel of inverter and then connect the anode lead of the battery to the anode terminal(red) on the inverter, and fix them.

**Warnings:**

- 1) Please wear eyepatch 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 spray to your eyes accidentally, clean it by cold water immediately and then see a doctor.
- 3) Do not put any combustible material in the location of installation for spark will result when the unit 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 result the broken of fuse or the permanence damage of the internal elements of inverter.
- 7) Take away the metal accouterment, such as ring or watch, when installation, avoiding 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.

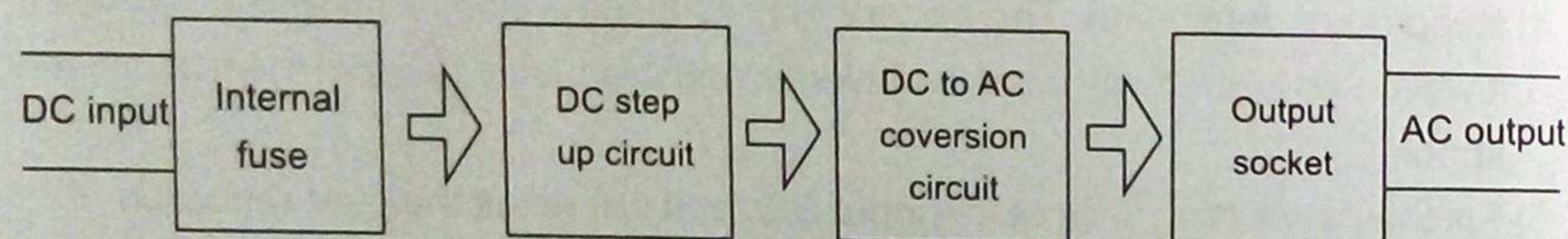
Warnings:

- 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 PRINCIPLES

The unit converts DC power to AC power by two steps. Step One, the inverter raises the low voltage DC input up to a high DC voltage. The second step, configured with a whole-bridge technique, the unit converts the high voltage DC current to AC current.

The conversion circuit uses advanced high power conversion technique and frequency device. Comparing with the traditional power frequency transformer, it is small, light and high conversion efficiency.

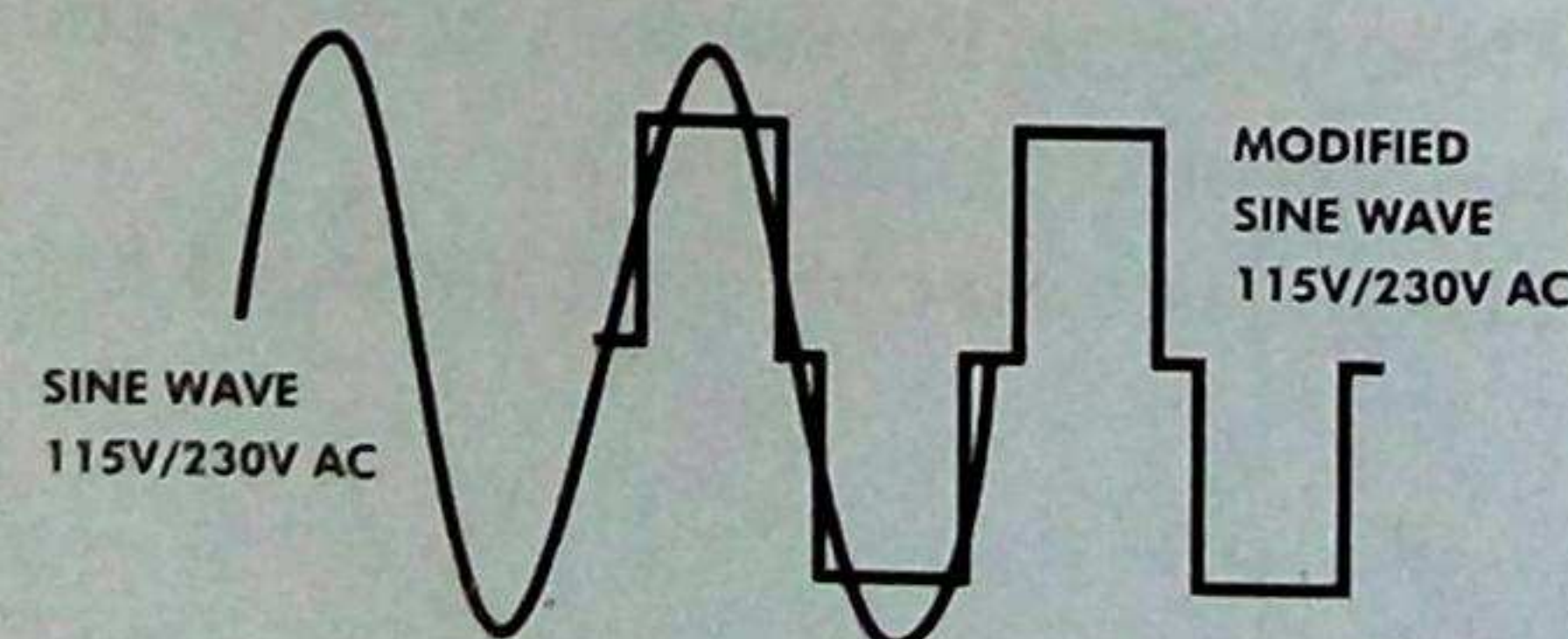


8 OUTPUT VOLTAGE AND WAVEFORM

The output waveform of the inverter is "quasi-sine-wave" or "modified sine wave", which has the similar waveform of the sine utility power: staircase waveform. This kind of waveform is suitable for most electrical appliances, including linear and switching power in electronic equipment, transformers, motor etc.

Since the output waveform of inverter is different from sine AC power, the general simulating or digital RMS meter cannot measure the true output effective value of inverter correctly. Please choose digital RMS meter to measure, such as model FLUKEZ177/179.

Modified Sine Wave and Sine Wave Comparison



9 SOFT START TECHNOLOGY

The unit has the latest soft start technology, that is, the output voltage gradually increases to the normal value from low value after turn on the inverter. There are several advantages:

1. It can reduce the transient large current attack and help to start the hard start load.
2. Cold start large power load, the inverter may cut the output because of the over large transient current. At this time, it is unnecessary to turn off the load, and the inverter will turn to soft start automatically.

For large power inductive load, such as electrical motor, adopts soft start. Please turn on the switch of load, then the switch of inverter.

10 OPERATION

- 1 Put the inverter ON/OFF switch and the electrical appliance switch to "OFF" position.
- 2 Connect the ground wire battery and electrical appliance. See part 6
- 3 Turn on the switch of power inverter, and the green indicator is on. Then turn on the switch of appliance, it will work normally.
- 4 When stop using the inverter, put the inverter switch to OFF position and cut off the connection between inverter power and lead acid battery.

Notice:

- 1 Generally, the electrical appliance will note the rating power, so take care that do not exceed it.
- 2 The most suitable load is pure resistive load, such as incandescent lamp. For inductive load, such as electro-motor, TV etc, initial power is usually 2 to 6 times to the normal operating power. The only way to determine whether it can drive some special load is experiment.
- 3 There are some factors to limit the use of the unit, such as input voltage, load power, temperature and so on. See part 11.

Warning:

In the extra-moisture environment, for example, the humidity is over 90%, please do not use it and please use it after it is in the normal condition or use it after dried by air blower.

11 PROTECTIVE FEATURES

1 Under voltage alarm: when the DC input is lower than 10.6V (21V*), the buzzer will whistle intermittently to remind the user that the inverter will go into the under voltage protection. Pay attention to save the data if you are using the equipment, such as computer.

2 Under voltage protection: The inverter will automatically shut down when the input DC voltage is lower than 10V (20V*). The buzzer will whistle continuously and the red indicator is on when the green indicator is off. Please turn off the inverter and recharge the battery as soon as possible.

3 Over voltage protection: The inverter will automatically shut down when the input DC voltage is higher than 15V (30V*). The buzzer will whistle continuously and the red indicator is on while the green indicator is off. 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 power is higher than the rating power. The buzzer will whistle continuously and the the red indicator is on while the green indicator is off. After 3 to 5 seconds, the unit will restart automatically and it can resume to normal operation after take away the redundant load.

5 Short circuit protection: When the load is short-circuit, the inverter will turn off automatically. The buzzer will whistle continuously and the red indicator is on while the green indicator is off. After 3 to 5 seconds, the unit will restart automatically and it can resume to normal operation after take away the redundant load.

6 Thermal protection: The unit will be calorific during operation. The inverter will automatically shut down when the temperature exceeds 65°C. Then the buzzer will whistle continuously and the red indicator is on while the green indicator is off. Wait until the unit is back to normal temperature, it will work normally. Please turn off the inverter, and continue using it when the temperature goes back to normal temperature naturally. Meanwhile find the factors caused the fault, such as ventilation, ambient temperature, vent, load power and so on. It can avoid the similar things happen after check it.

Note: The parameter on the above bracket is for the unit with input voltage 24V.

12. Troubleshooting tips

Fault/Display	Cause	Solution
No output voltage, buzzer sounds continuously and the red indicator is on while the green indicator is off	Low input DC voltage	Recharge or replace the battery.
	High input DC voltage	Do not use it when the battery is charging. Exam the rating voltage of the battery and make sure that it is in the allowable range of the input voltage.
The unit stops outputting, and resets at 3~5 seconds intervals.	Overload or short circuit.	Reduce the load power. Eliminate short circuit.
No output voltage. The green indicator is off and the red indicator is on. The cover is too hot.	Over temperature	Cut the load and keep it cool naturally for 10 to 30minutes.Restart it after it resume to normal temperature. The load power is too large and reduce the total load power to the range of rating power. Avoid the obstruction of the vent and improve the ventilation condition. Reduce the ambient temperature.
No output voltage	Do not turn on the switch. The battery lead doesn't connect wel	Turn on the power switch. Check the joint and screw it.
Incorrect output voltage	Not measured by untrue RMS meter. The input voltage is too high or too low.	Use the true RMS meter to measure, such as the model FLUKE177/179. Try to keep the input voltage approximate to the rating voltage.
Cannot drive the load.	Load power is too large, or the actual power of the appliance exceeds nominal power. The acreage of the lead section is not enough or the joint is loose. The starting power is larger than rating power.	Reduce the load power. Use proper wire and check the joints, see part 6. Use soft start to start it or change to other load.
Snowflake Noise	Disturbance.	Separate the inverter and antenna. Use screened antenna.

If the unit still doesn't work after using all the above methods, it maybe the inner fault of the circuit. Please return it to the supplier for maintenance.

13. WARRANTY

We take the guarantee of one year from the purchasing day. During the guarantee period, any malfunction due to our product quality occurred, our company will fix the unit free of charge. But any one of the following conditions is beyond our guarantee terms.

- The box distorted, damaged or changed, and interior parts damaged because of exterior hit or drop.
- Connect the DC power adversely,
- Dismantled or repaired the unit by un-granted person.
- The unit was damaged by uncorrect installation or operation method.