True Sine Wave Inverter USER'S MANUAL

DC-AC Off-grid Single-phase Power Inverter

Special Feature:

- with LCD display:Battery capacity rate,Battery voltage,AC voltage,AC power
- Can be used to resistance, inductive and capacitive load,such as air conditioner,fridge,pump, motor, electric welder, incandescent lamp, energy saving light...
- Input & output fully isolation
- Soft Start
- Two multiple controlled DC fans: Temperature and Load:
  Temperature>55°C±5°C,cooling fan start working
  Temperature<50°C±5°C,cooling fan stop working
  Load rate≥35% rated power, cooling fan start working
  Load rate≤15% rated power, cooling fan stop working
- Extensive electronic protection: Low voltage alarm, Low voltage cutoff, Over voltage, Over temperature, AC Overload, AC Output short circuit, Reverse polarity
- 12V/24V/48Vdc input
- 110V/120V/220V/230/240Vac output
- Pure sine wave output
- Frequency:50Hz/60Hz
- CE and RoHS Approved
- 24 months warranty
- ODM/OEM available

Before using the inverter, you need to read and save the safety instructions.

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The information presented in this document does not form part of any quotation or contract, is believed to be accurate and reliable and may be changed without notice.

1. Introduction

1.1 Brief Introduction:

This product is a pure sine wave inverter which can convert 12/24/48Vdc to 110/230Vac 50/60Hz based on full digital and intelligent design. It features high reliability, high efficiency, full protection functions, easy installation and operation. The inverter can be applied in many fields, such as household appliances, electric tools and industrial devices etc, especially for solar photovoltaic power system.

1.2 Features:

- LCD display for battery capacity, battery voltage, AC voltage, AC power
- Complete isolation-type inverter technology
- Continuous operation at full power
- Wide DC input voltage range
- Wide working temperature range
- Low output harmonic distortion(THD≤3%)
- Adoption of advanced SPWM technology, pure sine wave output
- Extensive protections: Under/over input voltage, Short-circuit, Overload, Reverse polarity, Over-temperature, and inverter's inner fault identification protections.

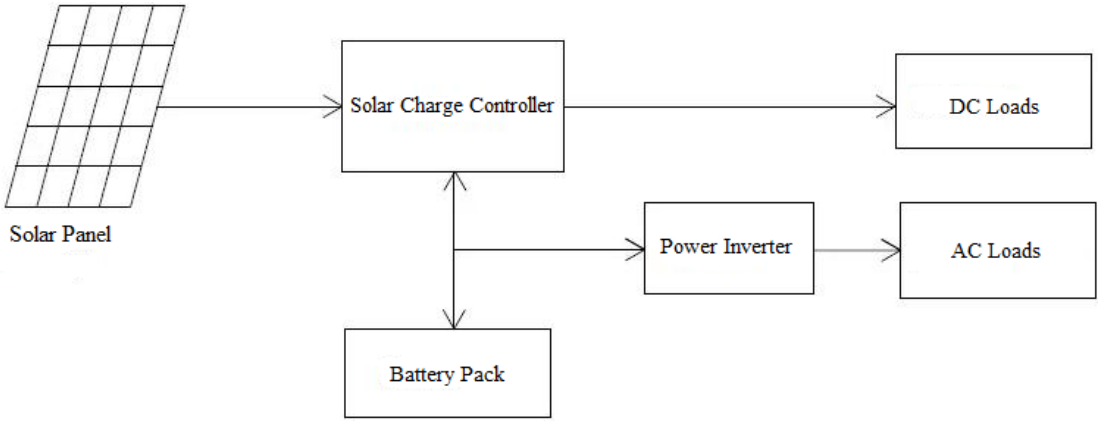
1.3 Inverter Operation:

Connect the input and output terminals accurately. Turn on the power using the ON/OFF switch on the front panel. In order to avoid the protections resulted from the surge power, please turn on AC loads one by one after the output of the inverter is normal. Please check it as below:

- Ensure that the ON/OFF switch on the Inverter is in the OFF position. If the power source is a DC power supply, switch it OFF as well.

- Connect inverter to power source.
- Connect the DC cables to the DC battery terminals on the rear panel of the inverter. The red terminal is positive (+) and the black terminal is negative (-).

Connect inverter to appliances. Make sure the load power within the rated power of inverter and the start power should not exceed the peak power of the inverter. When having the inverter connected with appliances and a power supply, switch on the inverter and appliances. If you are operating several loads from the power inverter, turn them on separately after the inverter has been turned on. This will ensure that the power inverter does not have to deliver the starting currents for all the loads at once.



2. Important Safety Instructions

As an AC power supply equipment, the inverter's output voltage is with the same level as that of household power plug. Mind the AC output terminals, or you may get an electric shock and result in life danger!

Attentions:

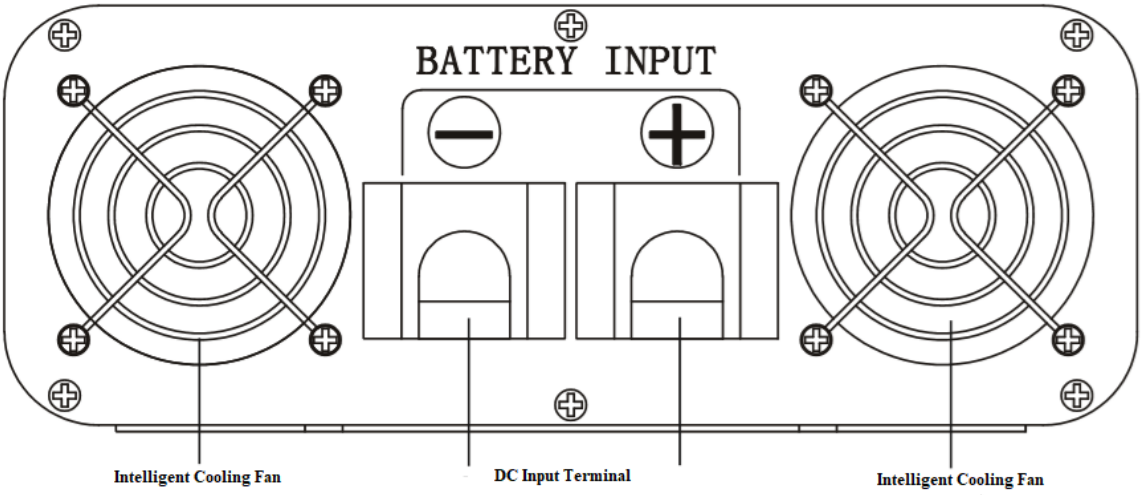
- Do not attempt to connect the any other power source, including any AC power source.
- Make sure the opening to the ventilation fan and vent holes are not blocked.
- To avoid electrical hazard, be sure to unplug the inverter from its external power source before inserting the AC plug.
- For indoor use only. Avoid exposure to external heat sources; direct, prolonged sunlight; dust; corrosive chemicals; and moisture.
- It is normal for inverters to become warm during use. Avoid touching the device during use. Avoid placing in direct sunlight or near heat-sensitive materials.
- Always with the supplied cables and connectors as shown. Use of cables, connectors, or accessories not supplied with this product constitutes misuse and may result in injury or damage.
- Keep the inverter out of children touch.
- Avoid pulling on the cords and cables. Always grip plugs firmly when unplugging from power source and when disconnecting cables.
- Disconnect all AC and DC side connections before working on any circuits associated with the inverter. Turning the ON/OFF switch on the inverter to off position may not entirely remove dangerous voltage.

- It’s an off-grid inverter, if connect to the grid, the inverter may be damaged.
- This inverter can only be used singly, parallel connection or in series will damage it.
- Do not attempt to repair the fault inverter yourself, otherwise it may lead to a serious accident. Please contact the manufacture’s engineer.

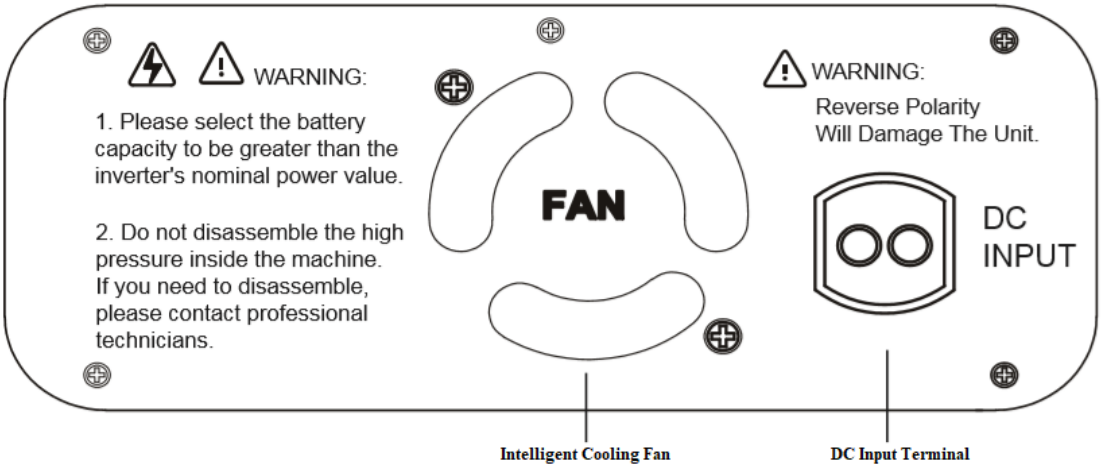
3. Functions

This pure sine wave inverter have two versions: LCD display, LED Display

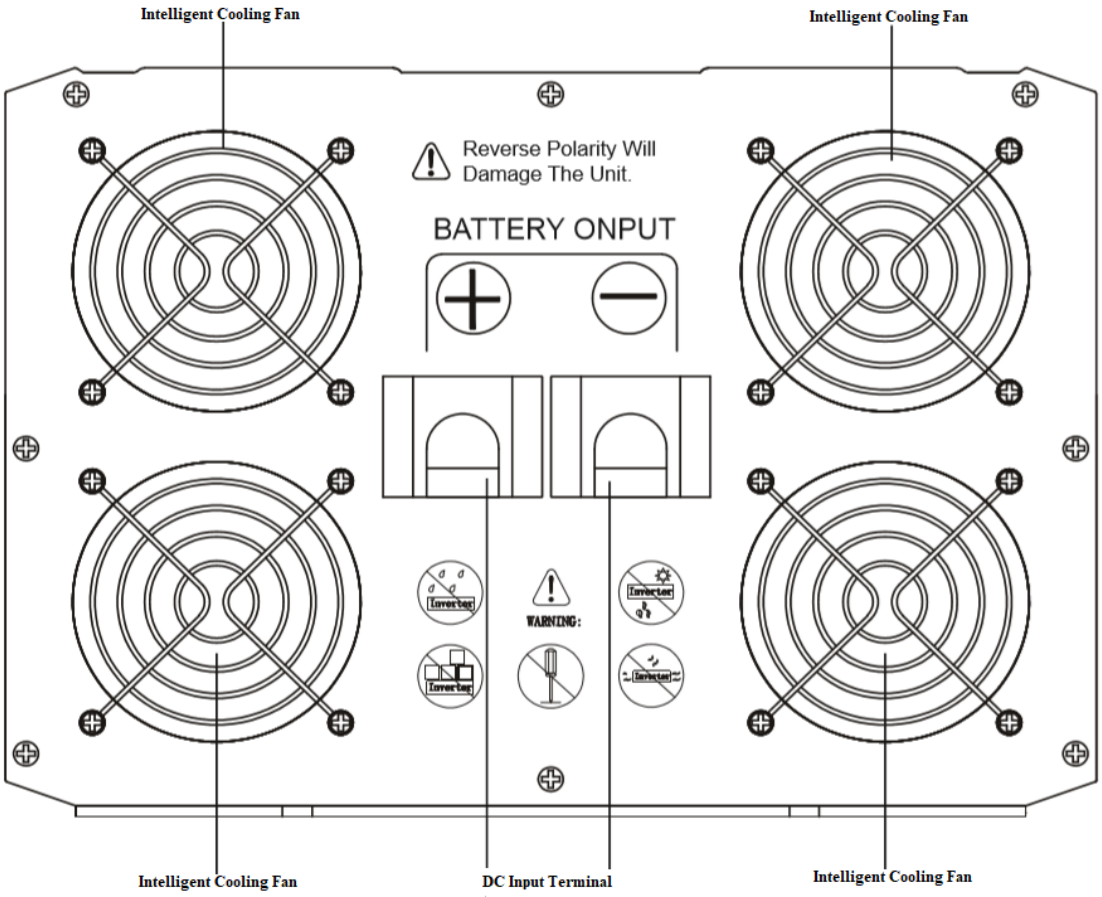
3.1 DC Input Panel



Intelligent Cooling Fan DC Input Terminal

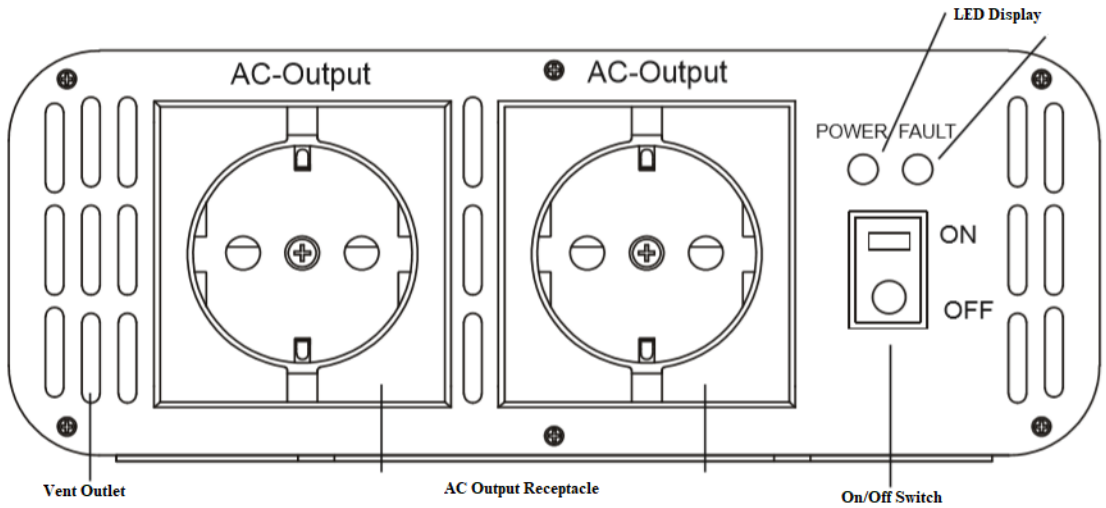


Intelligent Cooling Fan DC Input Terminal

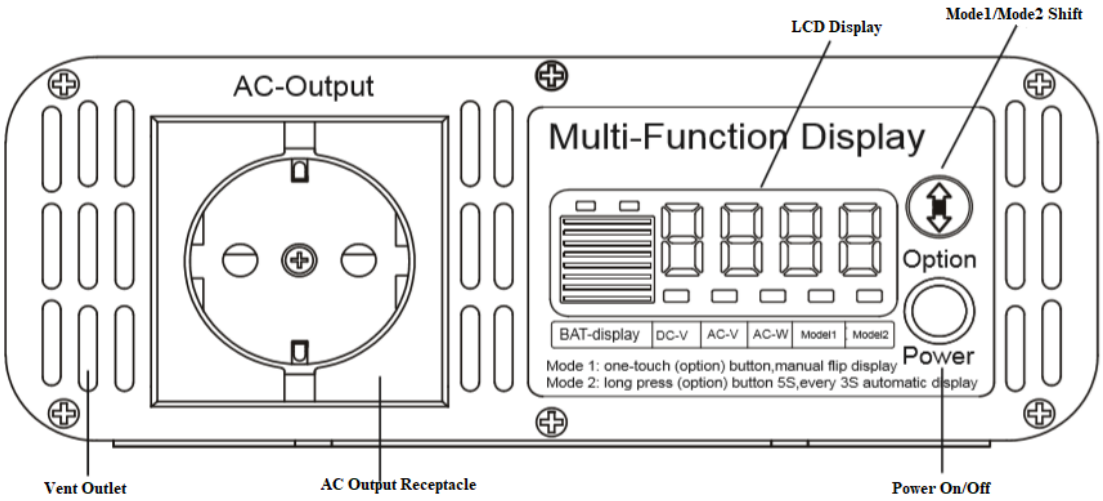


Intelligent Cooling Fan DC Input Terminal

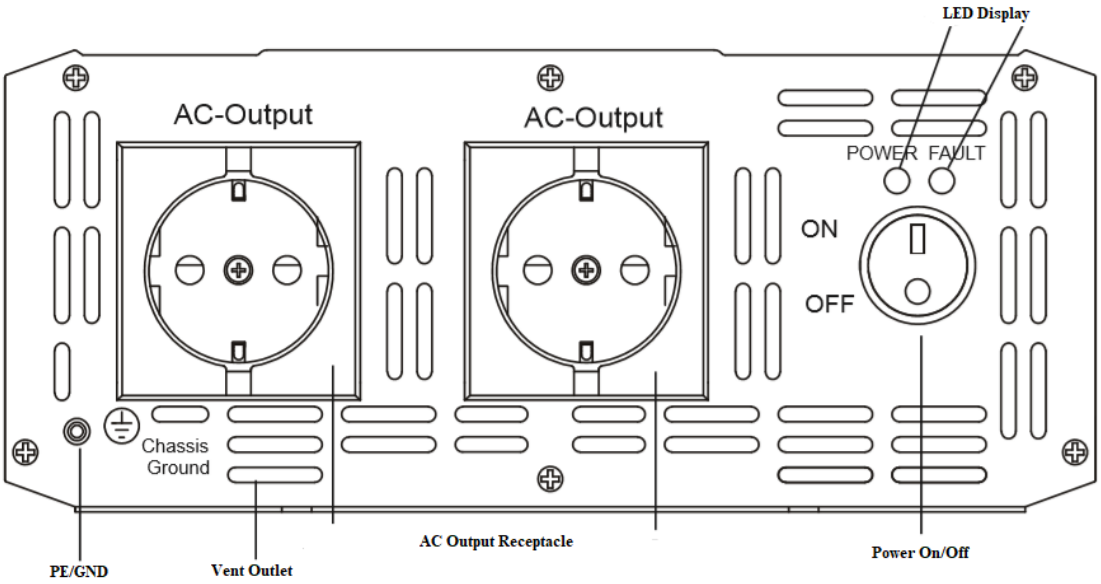
3.2 AC Output Panel



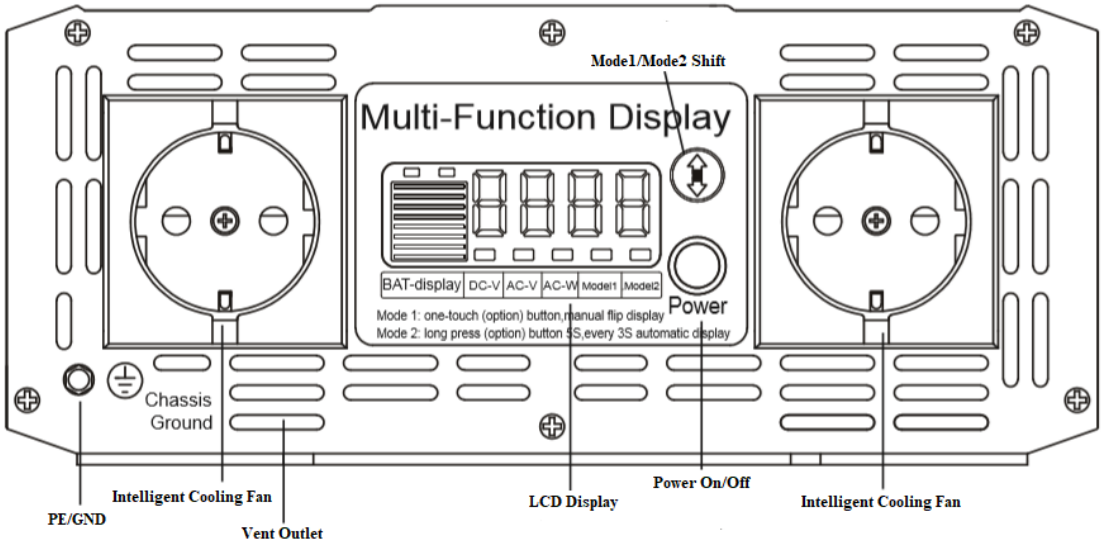
Vent Outlet AC Output Receptacle LED Display On/Off Switch



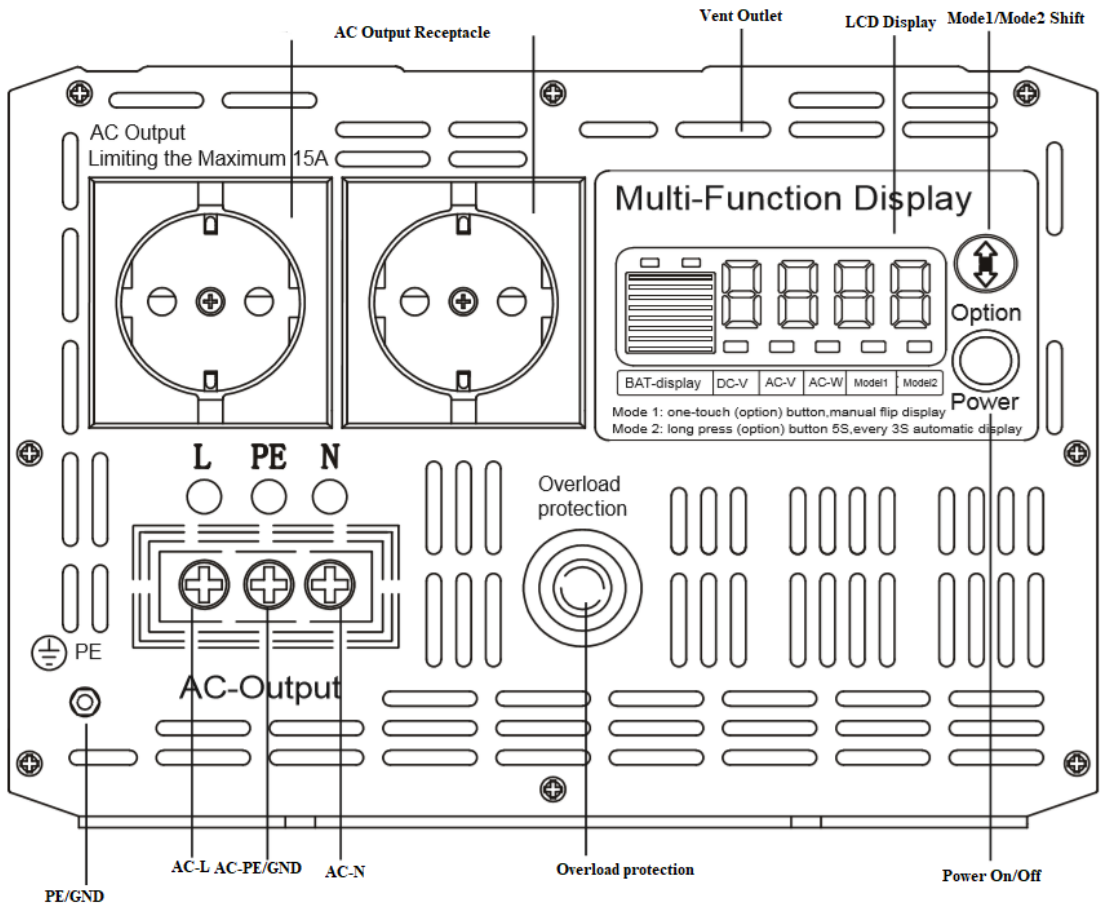
Vent Outlet AC Output Receptacle LED Display Power On/Off Mode1/Mode2 Shift



PE/GND Vent Outlet AC Output Receptacle LED Display Power On/Off



PE/GND Vent Outlet AC Output Receptacle(Intelligent Cooling Fan 是标注错误) LCD Display Power On/Off Mode1/Mode2 Shift

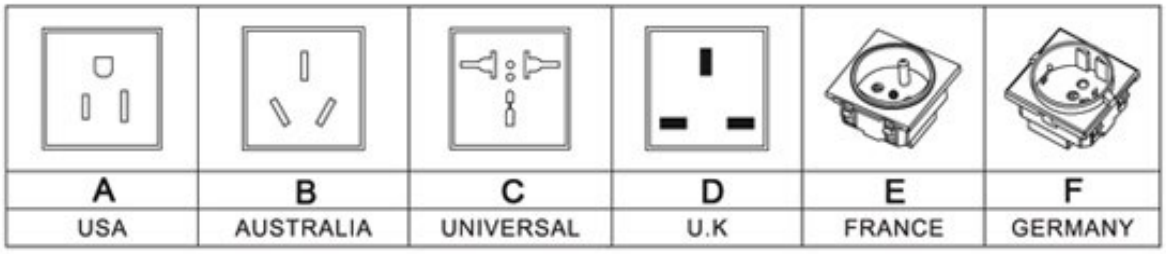


PE/GND AC-L AC-PE/GND Vent Outlet AC Output Receptacle Overload Protection LCD Display Power On/Off Mode1/Mode2 Shift

P.S.:

※**AC Output Receptacle:**For application demands of different geographic areas all over the world, there are many different kinds of optional AC

receptacle to choose from.



A	B	C	D	E	F
USA	AUSTRALIA	UNIVERSAL	U.K	FRANCE	GERMANY

※**Automatic/Manual turn page:**
Mode1(Manual turn page):Press “Option”button one time, manual flip display
Mode2(Automatic turn page):Long press and hold for 5s,every 3s automatic display
※**LCD display:**Battery capacity, DC volt, AC volt, AC output power.
※Max current for AC output receptacle is 15A.
AC output receptacle over 15A(3300W),the “Overload protection” will be disconnected.
AC-L/AC-N terminal is used for high power electrical appliances.

4.How to use inverter

4.1 Load consideration:

When an appliance with a motor starts, it requires a momentary surge of power. This surge of power is the “starting load” or “peak load”. Once started, the appliance requires less power to continue to operate. This is known as the “continuous load”. It is important to know the starting loads and the continuous loads of the appliances that are to be powered by the inverter.
Appliance power is rated in watts. This information is usually stamped or printed on most appliances and equipment. In some cases, a tool will be rated in amperes. To convert from amps to watts, multiply: **Amps*AC voltage = Watts**
This formula yields an approximation of the continuous wattage load of that appliance.
The startup load of an appliance is a major factor of whether this inverter can power it.
Startup load is momentary. With many appliances, it is approximately twice the continuous load, but some appliance startup loads can be as high as eight times the continuous load.
To determine if an appliance or tool will operate with this inverter, run a test. This inverter will automatically shut down in the event of an output overload, so there is no danger of damaging either the inverter or the equipment.

4.2 Working time:

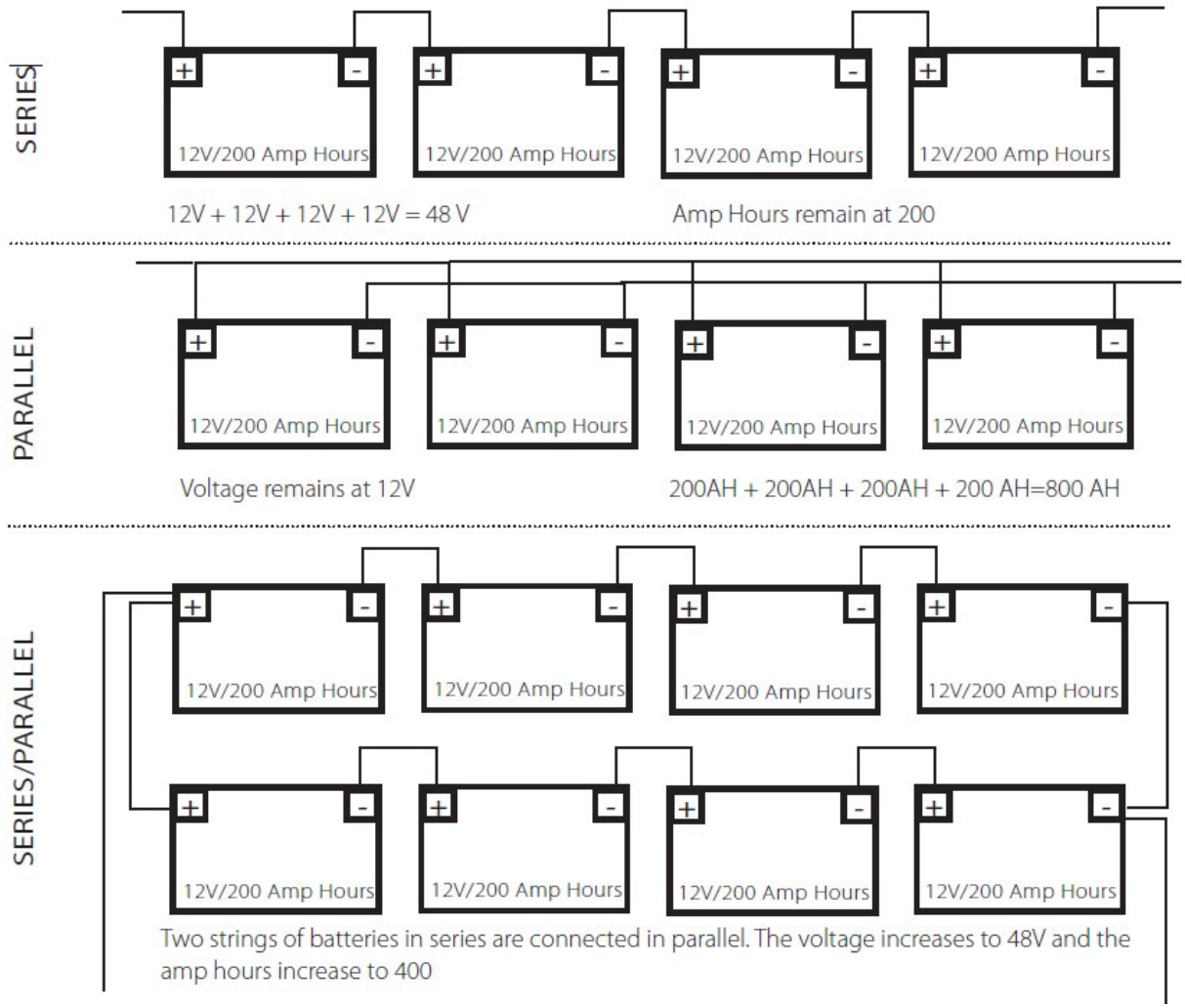
The battery working time in hours can be calculated using following formula:
Working hours(H)=Battery capacity(AH)*Battery volt(V)*0.8*0.9/Load in Watts
P.S: Because the battery can’t be fully discharged, usually 20% can’t discharge, so the maximum power to multiply 0.8, This is the actual power of the battery can work, the inverter also has the conversion efficiency, for pure sine in general efficiency about 90%, so here selected 0.9:
For example: a 12V/60Ah Battery, a 220v/100w filament lamp,
Working Time=12(V)*60(AH)*0.8*0.9/100(W)=5.18(Hour),
There are additional factors that determine actual run time. These include:
•AC appliance load and time in use (basic AH).
• Cable gauge and length (cable losses).
• Charge level of the batteries (between use, chargers have to be able to fully charge the batteries).

• Temperature of the batteries (colder batteries provide fewer amps).
• Age and condition of the batteries (older batteries lose AH capacity).
• Compliance with turning off unnecessary AC loads.
• Use of DC appliances and compliance with turning off unnecessary DC loads.

4.3 Battery Wiring Examples

In renewable energy systems, batteries are connected to each other in one of three ways:

- Series (voltage increases, amperage stays the same as a single battery)
- Parallel (voltage stays the same as a single battery, amperage increases)
- Series/Parallel (both voltage and amperage increase)



5.Protection

Inverter is equipped with numerous protection features to ensure safe operation.

Input Low Voltage Protection:

When input voltage is below 10V±4%(12V)/20V±4% (24V input)/40V±4% (48V), AC output will be automatically shut off.

LED display:Buzzer sound 3 times and red light blinking.

LCD display:Buzzer sound 3 times, “AC-V” zero, “Battery Display” flashing in red.

Input Over Voltage Protection:

When input voltage reach 15.5V±4%(12V)/31V±4%(24V)/62V±4%(48V), AC output will

be shut off automatically.

LED display:Buzzer sound 4 times and red light blinking.

LCD display: Buzzer sound 4 times, “AC-V” zero.

Short Circuit Protection:

When short circuits occur, no damage to the unit, automatically recovery.

Overload Protection:

a.120%-145% rated power, Beep sound lasted about 10seconds and AC output shut off

b.Over 145% rated power, Beep sound lasted 2seconds and AC output shut off.

Reverse polarity protection: Fuse

When battery terminals are reverse connected, fuse will be burned to protect

Over Temperature Protection:

When inner temperature exceeds 75ºC, **Buzzer sound 5 times**, AC output will automatically shut off.

6.Troubleshooting

SYMPTOM	POSSIBLE CAUSE	SOLUTIONS
ON/OFF switch is switched on, LED does not light,Buzzer is off.,no AC voltage	There is no voltage at the DC input Terminals	1.Check the continuity of the battery input circuit 2.Check that the battery fuse is intact. Replace if blown 3. Check that all connections in the battery input circuit are tight
	Polarity of the input voltage has been reversed that has blown the fuses.	Correct the polarity of the input connections and replace the fuse. If the unit does not work after replacing the fuse, the unit has been permanently damaged.
Buzzer sound 1 time. There is no AC voltage.	1.AC output connections loose 2.Short-circuit of AC Output wiring.	1.Tighten AC output connections 2.Check AC wiring for short circuit.
Buzzer sound 3times	DC input volt lower than 10V±4% (12V version) 20V±4% (24V version) 40V±4%(48V version)	1.Check that the battery is fully charged. Recharge, if low. 2.Check that the battery cables are thick enough to carry the required current over the required length. Use thicker cables, if required 3.Tighten connections of the battery input circuit.
Buzzer sound 4 times	Higher input DC volt than 15.5V±4% (12V version), 31V±4%(24V version), 62V±4% (48V version)	1.Check that the voltage at the DC input terminals is more than 15.5V/31V/62V DC. 2.Ensure that the max charging voltage of the battery charger/alternator/solar charge controller is below 15.5V/31V/62VDC 3.Ensure that an un-regulated solar panel or wind turbine is not used to charge a battery
	System overheating	1.Check that the fan is working. If not, the fan /

Buzzer sound 5 times		fan control circuit may be defective. 2.If the fan is working, check that the ventilation slots on the suction side and the openings on the discharge side of the fan are not obstructed 3.Reduce the load to reduce the heating effect 4.After the cause of overheating is removed and the unit cools down, it will reset automatically
1.Beep sound lasted 10s **2.Beep sound lasted 2s**	Over-load protection	1.Disconnect the load 2.Reduce the load 3.Cool the unit.

7.Specifications

Item		**Model**					
		VST300	VST500	VST600	VST1000	VST1200	VST1500
OUTPUT	Rated Power	300W	500W	600W	1000W	1200W	1500W
	Peak Power	600W	1000W	1200W	2000W	2400W	3000W
	AC Voltage	100V/110V/115V/120Vac or 220V/230V/240Vac					
		AC output regulation:±3.0%					
		Frequency:50Hz±0.5Hz,60Hz±0.5Hz					
	Waveform	Pure Sine Wave(THD<3%) at rated input voltage					
	Protection	AC short circuit, Overload, Over temperature					
INPUT	Bat. Voltage Range	11V-15.5V(12V version) 22V-31V(24V version) 44V-62V(48V version)					
	Efficiency	More than 90%					
	Protection	Battery Low Alarm, Battery Low Shutdown, Battery Polarity Reverse by Fuse					
	Battery Types	Open & sealed lead acid battery					
Dimension((L*W*H)cm		26*13*5.3	26*13*5.3	21*15*7	33*18*7	33*18*7	37*18*7
Packing	PCS/CTN	12	12	12	4	4	4
	KGS/CTN(KGS)	13.5.5	16.5	16.5	12.5	12.5	15
	MEAS(L*W*H)cm	56*37*31	56*37*31	56*37*31	46*40*24.5	46*40*24.5	47*46*24.5
Item		**Model**					
		VST2000	VST2500	VST3000	VST4000	VST5000	VST6000
OUTPUT	Rated Power	2000W	2500W	3000W	4000W	5000W	6000W
	Peak Power	4000W	5000W	6000W	8000W	10000W	12000W
	AC Voltage	100V/110V/115V/120Vac or 220V/230V/240Vac					
		AC output regulation:±3.0%					
		Frequency:50Hz±0.5Hz,60Hz±0.5Hz					
	Waveform	Pure Sine Wave(THD<3%) at rated input voltage					
	Protection	AC short circuit, Overload, Over temperature					
INP	Bat. Voltage Range	11V-15.5V(12V version) 22V-31V(24V version) 44V-62V(48V version)					
	Efficiency	More than 90%					
	Protection	Battery Low Alarm, Battery Low Shutdown, Battery Polarity Reverse by Fuse					

UT	Battery Types	Open & sealed lead acid battery					
Dimension((L*W*H)cm		38*22*9	38*22*9	48*22*9.2	45*22*15.5	48*22*15.5	48*22*15.5
Packing	PCS/CTN	2	2	2	1	1	1
	KGS/CTN(KGS)	12	12	16	10	11	12
	MEAS(L*W*H)cm	44*30*38.5	44*30*38.5	53*30*38.5	55*29*25	55*29*25	55*29*25
AC Out Receptacle		USA, UK, Germany, France, Australia, Brazil, Italy, South Africa, Japan,etc.					
Cooling		Temperature and Load Controlled					
Environment	Operating Temp.	-15 ° C to 40° C					
	Storage Temp.	-30° C to 70°C					
	Relative Humidity	20% ~ 90% RH non-condensing					

Note: The specifications are subject to change without prior notice for further improvement of products.

8. Maintenance and Warranty

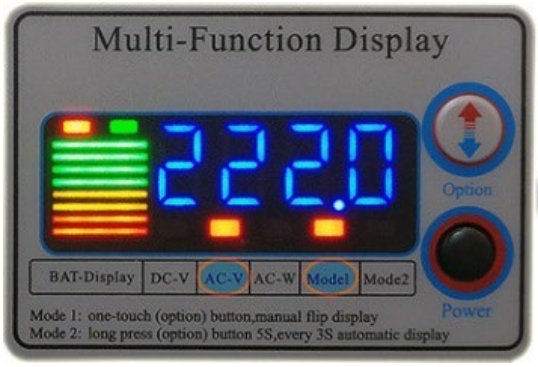
The casing of the inverters may be cleaned regularly with a damp cloth (not wet) to prevent accumulation of dust and dirt. The screws on the DC input terminals must be tightened.

The warranty period of the inverter is 2 year since the date of original shipping. Within the period, we will repair the product or replace the defective product for free. Return the defective with shipping cost prepaid. And provide proof of purchasing date. We will pay the return shipping charges within warranty period. The warranty doesn’t apply under the following conditions:

1. Damaged by accident, negligence, abuse, improper use
2. Input voltage exceed the nominal input voltage of inverter
3. Unauthorized modification or attempted repair

Appendix I:Manual/Automatic Turn Page

Mode1----Manual Turn Page



Press "Open" Button

1)Display Battery Capacity rate
2)Display AC Voltage
3)Light over "AC-V" lighting
4)Light over"Mode1" lighting

Status display:Battery capacity(%),AC Voltage

Press "Option" Button

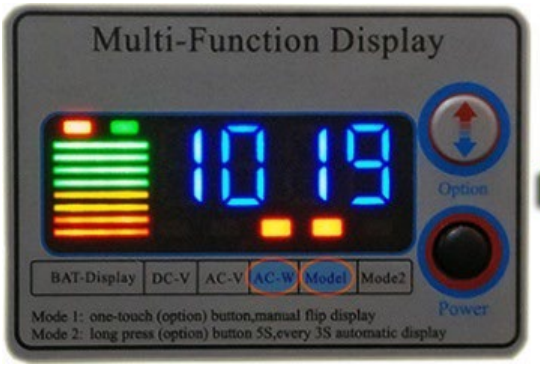
1)Display Battery Capacity rate

2)Display AC Voltage

3)Light over "AC-V" lighting

4)Light over "Mode1" lighting

Status display:Battery capacity(%),AC Voltage



One Touch"Option" Button

1)Display Battery Capacity rate
2)AC Output Power
3)Light over"AC-W" lighting
4)Light over"Mode1" lighting

Status display:Battery Capacity(%),AC Output power(Loads power)

One Touch "Option" Button

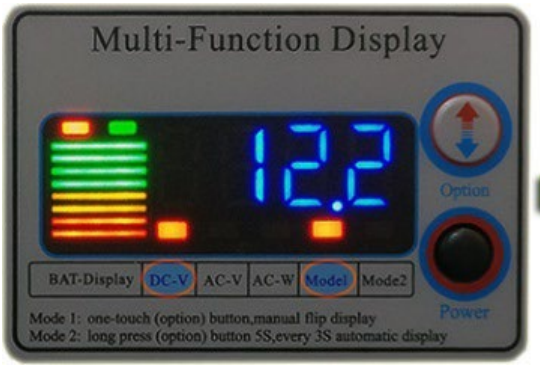
1)Display Battery Capacity rate

2)Display AC Output Power

3)Light over "AC-W" lighting

4)Light over "Mode1" lighting

Status display:Battery capacity(%),AC Output Power(Loads power)



Touch again"Opotion" Button

1)Display Battery Capacity rate
2)Display DC Voltage
3)Light over"DC-V" lighting
4)Light over"Mode1" lighting

Status display:Battery Capacity(%),DC Voltage

Touch again“Option” Button

1)Display Battery Capacity rate

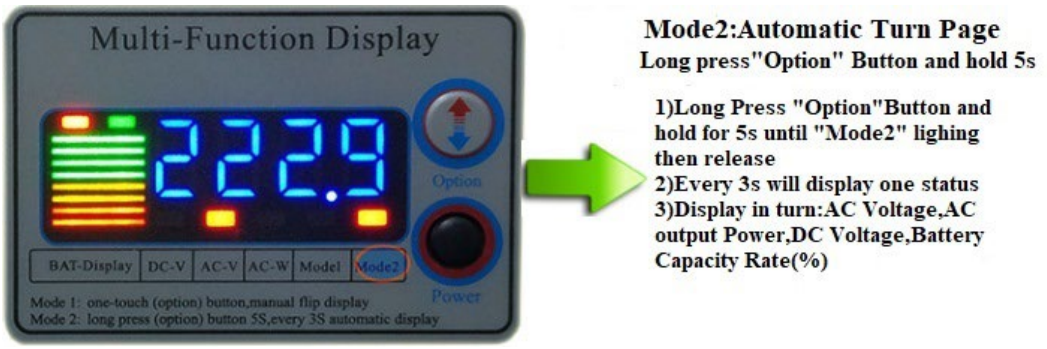
2)Display DC Voltage

3)Light over “DC-V” lighting

4)Light over “Mode1” lighting

Status display:Battery capacity(%),DC Voltage

Mode2----Automatic Turn Page



Mode2:Automatic Turn Page

Long press “Option” Button and hold 5s

1)Long press “Option” Button and hold for 5s until “Mode2” lighting then release

2)Every 3s will display one status

3)Display in turn:AC Voltage,AC Output Power,DC Voltage,Battery Capacity Rate(%)

Appendix II:Recommend

For correct operation, the battery voltage should be between 0.9xVnom and 1.29xVnom where Vnom is 12V,/24V/48V depending on model, and must be able to supply sufficient current to inverter. The following table displays the recommended (battery cable, Fuse, Battery Capacity) per inverter type :

Inverter type	Input Voltage	DC Battery Cable	Fuse	Battery Capacity
300W	12V	4mm² (1*Red/1*Black)	40A*1	≥50Ah
	24V	2.5mm² (1*Red/1*Black)	20A*1	≥25Ah
	48V	2.5mm² (1*Red/1*Black)	10A*1	≥12Ah
500W/600W	12V	6mm² (1*Red/1*Black)	40A*2	≥100Ah
	24V	4mm² (1*Red/1*Black)	40A*2	≥50Ah
	48V	2.5mm² (1*Red/1*Black)	10A*2	≥25Ah
1000W	12V	10mm² (1*Red/1*Black)	40A*4	≥160 Ah
	24V	6mm² (1*Red/1*Black)	20A*4	≥80Ah
	48V	4mm² (1*Red/1*Black)	10A*4	≥40Ah
1500W	12V	10mm² (2*Red/2*Black)	40A*6	≥250Ah
	24V	6mm² (2*Red/2*Black)	20A*6	≥125Ah
	48V	4mm² (2*Red/2*Black)	10A*6	≥60Ah

2000W	12V	16mm² (2*Red/2*Black)	40A*8	≥320Ah
	24V	10mm² (2*Red/2*Black)	20A*8	≥160Ah
	48V	6mm² (2*Red/2*Black)	10A*8	≥80Ah
2500W	12V	16mm² (2*Red/2*Black)	40A*8	≥400Ah
	24V	10mm² (2*Red/2*Black)	20A*8	≥200Ah
	48V	6mm² (2*Red/2*Black)	10A*8	≥100Ah
3000W	12V	16mm² (2*Red/2*Black)	40A*12	≥480Ah
	24V	10mm² (2*Red/2*Black)	20A*12	≥240Ah
	48V	6mm² (2*Red/2*Black)	10A*12	≥120Ah
4000W	12V	25mm² (2*Red/2*Black)	40A*12	≥640Ah
	24V	16mm² (2*Red/2*Black)	20A*12	≥320Ah
	48V	10mm² (2*Red/2*Black)	10A*12	≥160Ah
5000W	12V	35mm² (2*Red/2*Black)	40A*20	≥800Ah
	24V	25mm² (2*Red/2*Black)	20A*20	≥400Ah
	48V	16mm² (2*Red/2*Black)	10A*20	≥200Ah
6000W	12V	35mm² (2*Red/2*Black)	40A*20	≥960Ah
	24V	25mm² (2*Red/2*Black)	20A*20	≥480Ah
	48V	16mm² (2*Red/2*Black)	10A*20	≥240Ah

RoHS CE

Version No. : V1.0