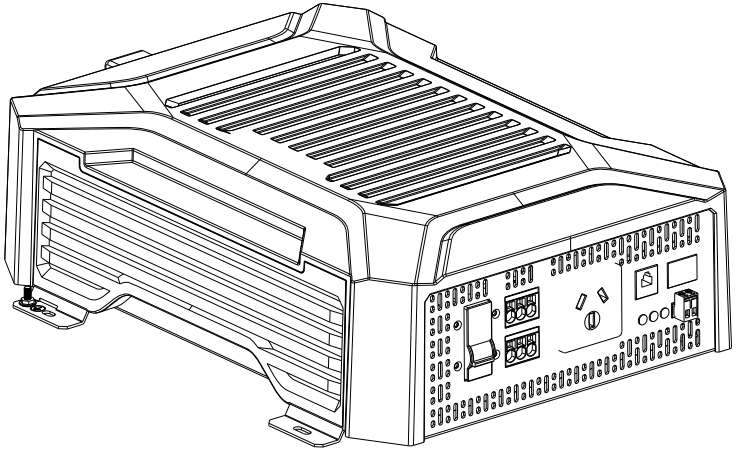
IBC12-3KW Pure Sine Wave Inverter
(High Frequency)
User Manual



Code:114044

Manual version: V1.04 Subject to change without notice

Dear user:

Thank you very much for choosing our product!

Important safety instructions

Please keep this manual for future reference

This manual contains all safety, installation and operating instructions for the IBC Series pure sine wave inverter (high frequency) (hereinafter referred to as "the Inverter"). Please read all instructions and precautions in the manual carefully before installation and use.

- 1. Non-safety voltage exists inside the inverter. To avoid personal injury, users shall not disassemble the inverter themselves. Please contact our professional maintenance personnel for repair.
- 2. Do not place the inverter within the reach of children.
- 3. Do not install the inverter in harsh environments such as moist, oily, flammable or explosive, or heavily dusty areas.
- 4. The AC output of the inverter is high voltage, so please do not touch the wiring terminals.
- 5. The housing of the inverter is super hot when it is working. Do not touch it and keep away from materials or equipment affected by high temperature.
- 6. Do not open the terminal protective cover when the inverter is working.
- 7. Make sure to disconnect the fuse or circuit breaker near the terminals of the battery and AC output before installing and adjusting the wiring of the inverter.
- 8. After installation, check whether all wiring is tightly connected to avoid the danger of heat accumulation due to loose connection.
- 9. The inverter is off-grid. It is necessary to confirm that it is the only input device for load, and it is forbidden to use it in parallel with other input AC power to avoid damage.
- 10. In order to ensure that users can protect their personal and property safety while using this product, relevant information is highlighted in the manual with following symbols. The following symbols in the manual indicate that you should read the relevant words carefully.

Warning: Electric shock that may damage devices or electrocution/injury if it is not avoided.

Caution: Potential dangers that may damage devices if they are not avoided.

Note: Important notices in operation that may trigger the device fault alarm if they are not performed.

Contents

1.Introduction

1.1 Product overview

IBC series pure sine wave high frequency inverter, the product integrates pure sine wave inverter, mains bypass load. Adopts full digital intelligent control Technology, voltage and current double closed-loop control algorithm, with the characteristics of fast dynamic response, high conversion efficiency, low harmonic components, reliable and stable operation.This series of products has idle mode, normal mode and energy-saving mode to choose from, which can be selected according to application scenarios and requirements to maximize energy saving.Save battery energy;

This series of products uses key components with high power density and long life, can output full power continuously for a long time, and has a full range of electronic protection function, ensuring the whole system is safer and more stable;

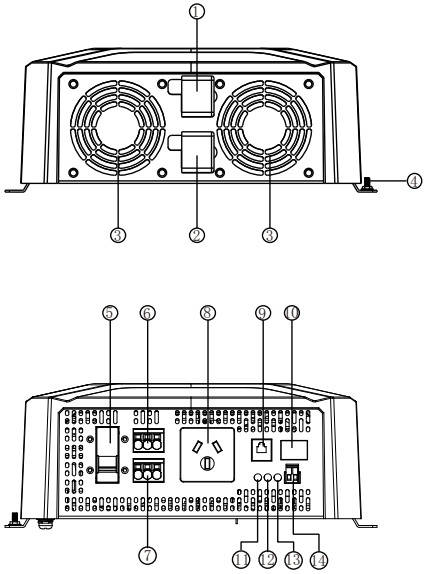
This series of products is suitable for various off-grid systems that need to convert DC power into AC power, such as RV power systems, vehicle-mounted systems, monitoring systems,emergency lighting systems, household power systems, small on-site power supplies and other occasions with high requirements on power quality.

1.2 Product features

- Full digital voltage-current double closed-loop control, in high response speed and reliability.
- Advanced SPWM technology for pure sine wave.
- DC input surge protection design, suitable for lithium battery power supply system.
- Advanced wave-filter and current-limiting technology, with impact load such as large capacitive and inductive available.
- Various output sockets to satisfy customers in different countries and regions.
- It has mains bypass, inverter output, automatic uninterrupted switching of power supply, and UPS function.
- It has NG grounding protection function in inverter mode.
- Selection of high power density, long life devices to ensure product stability.
- Output power factor up to 1, long term operation at full load power.
- High power density and long-life devices for product reliability.
- Output power factor up to 1, with full load power for long-term operation.
- Low no-load loss and standby loss, low total harmonic distortion (THD), and high conversion efficiency.
- Input under-voltage/overvoltage protection, input overload/short-circuit protection, device over-temperature protection, fan fault protection, etc.
- Intelligent air cooling control system for detecting the output of fan blocked control.
- Output voltage: 220/230/240 VAC, output frequency: 50/60 Hz (settable).
- Excellent Electromagnetic Compatibility (EMC) for locations with high power quality requirements.
- The AC output RCD leakage protection switch design ensures the safe and reliable operation of the product.
- RS485 communication interface for various components.
- Electron Coupled Oscillator (ECO) for maximum electric power saving.
- Transistor-Transistor Logic (TTL) communication interface for external Bluetooth or display screen connection and interaction.
- External switch contact for remote control of the inverter via external mechanical switches or relays.
- Supported Bluetooth and available mobile APP to check the operation condition/real-time data and fault condition.

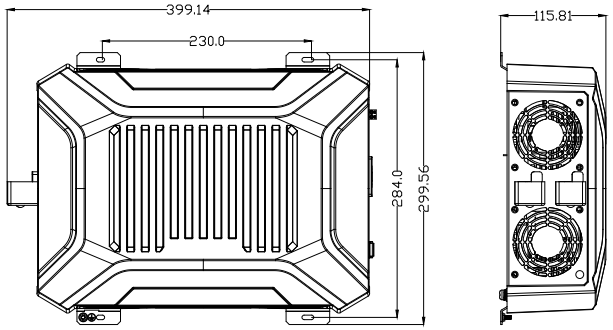
- Optional Controller Area Network (CAN) communication of RV-C.
- When the output leakage current is greater than 30mA, the inverter automatically detects and disconnects the circuit breaker.

1.3 Appearance and interface description



S/N	Name	S/N	Name
①	Battery input positive terminal	⑨	RS485 communication interface
②	Battery input negative pole	⑩	ON/OFF/ECO mode switch
③	Cooling fans	⑪	Nverter indicator light
④	Input ground terminal	⑫	Bypass indicator light
⑤	Output AC RCD leakage protection switch	⑬	Fault indicator
⑥	AC input terminals	⑭	External switch contact interface
⑦	AC output terminal 1		
⑧	AC output terminal 2 (Australian Standards, can be customized according to the standards of different countries)		

1.4 Dimension drawing



Product dimension：400*300*116mm
Mounting hole spacing：230*284mm
Fixed hole position：φ5mm

2. Technical parameters

Product Model	IBC12-3KW
Inverter Mode:	
Rated output power	3000W
CAN withstand instantaneous impact power	6000W
Output power factor	1.0
Output voltage	220VAC/230VAC(default)/240VAC (±2%)
Output frequency	50HZ(default)/60HZ(±0.1%)
output waveform	Pure sine wave
Output harmonic component	THDV＜4%(pure resistive load)
Rated input voltage	12VDC
Input voltage range	10.8~16.0VDC
Rated output efficiency	＞87.0%
Maximum output power	＞92.0%
No-load loss	＜16W
ECO loss	＜3W
ECO starting power	＜30W，30～100W adjustable
ECO interval time	1min，30s～30min adjustable
NG ground	supported, enabled by default
Bypass mode:	
AC input voltage	Single phase 180-265VAC
AC input frequency	45～65HZ
Acin rated input current	16A
Acin maximum input current	0-16A adjustable
Acout1 rated load current	15A
Acout2 rated load current	16A
Acout Output Priority	Mains priority (default)-connect to the mains to enter bypass mode; inverter priority-when the battery voltage is greater than a certain value, the mains will be connected to inverter mode; when the battery voltage is less than a certain value, it will switch to mains bypass mode
Inverter priority switching voltage	Battery voltage＜13.2V (12.0-14.0V adjustable)
Inverter priority switching back conditions	Battery voltage＞14.2V maintained for 3min
UPS switching time	＜10ms
RCD switch	240V/16A_30mA leakage current protection
Communication function	Bluetooth, RS485, - standard
	CAN(RV-C)-Optional
Remote power on/off	Support
Remote ON/OFF interface	Support
RTC real-time clock	Support
Indicator light	Green-Inverter indication; Yellow-Bypass indication; Red-Fault indication
Protection function	DC input overvoltage/overdischarge protection, AC output overload/short circuit protection, AC input overvoltage /undervoltage protection, equipment overtemperature protection, fan stall protection
Operating ambient temperature	-20℃~60℃
Storage ambient temperature	-35℃~80℃
Relative humidity	≤95%
Protection grade	IP20
Heat-dissipating method	Natural heat dissipation+intelligent air cooling
Noise	≤60dB
Product dimension	400*300*116mm
Installation dimension	230*284*φ5mm
Net weight	8.0kg

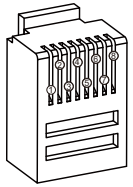
3.Description of interface function

3.1 RS485 communication

(1) Default baud rate: 9,600 bps, check bit: none, data bit: 8 bit, stop bit: 1 bit

(2) Interface type: RJ45, communication power supply output specification: 5VDC/200mA

(3) The RS485 communication line sequence is defined as follows, with interface integrating remote switch interface (SW1/SW2) and CAN communication interface. When the switch interface (SW1/SW2) is floating and open circuit = OFF mode; when the switch interface (SW1/SW2) is short-circuited = ON mode.



S/N	Definition
①	CANL
②	CANH
③	SW2
④	SW1
⑤	Power ground
⑥	D-
⑦	D+
⑧	Positive terminal 5.0 VDC

3.2 Inverter working mode switch

With a 3rd position boat switch, the inverter has 3 operating modes including OFF, ON, and ECO when the external switch contact is closed.

Switch position	Definition of mode	Description of mode
OFF	Idle mode, no AC output	Device is in standby idle state, indicator, communication function, USB output and other functions are normal, no AC output
ON	Normal mode with AC output	Device is in normal working state with AC output
ECO	Energy-saving mode with Intermittent AC output	Device with the detected output load power lower than the ECO starting power (default 30W) will automatically close the AC output, enter idle mode, and re-start the AC output after ECO interval time (default 1min). And the AC will continuously output if the load power is larger than the ECO starting power (+10 W);
Remark: When using an APP or other communication devices to switch the working mode, the current actual working mode will be inconsistent with the boat switch position. The working mode of the inverter is based on the last adjusted position at the APP or communication device or the boat switch.		

3.3 LED indicator/buzzer

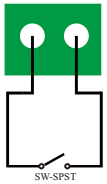
(1) Inverter indicator light-green; bypass indicator light-yellow; fault indicator light-red;

(2) Indicator/buzzer are defined as follows:

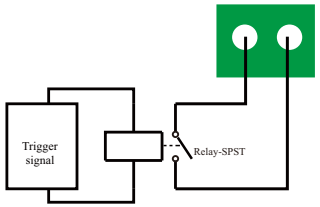
Functional mode	①Inverter indicator lamp INV-Green	②Bypass indicator light Bypass-Yellow	③Fault indicator light Fault-Red	Buzzer
Idle mode	Single flash	OFF	OFF	No sound
ON mode	Steady on	OFF	OFF	No sound
ECO mode	Slow flash	OFF	OFF	No sound
Battery overdischarge	OFF	Steady on/OFF	Slow flash	1HZ beep
Battery overpressure	OFF	OFF	Fast flash	1HZ beep
Equipment over-temperature protection	OFF	OFF	Double flash	1HZ beep
Load overload operation	Steady on	OFF	Single flash	1HZ beep
Load overload protection	OFF	OFF	Single flash	1HZ beep
Load short circuit protection	OFF	OFF	Steady on	1HZ beep
Other faults (bus over current/over current Protection/abnormal output voltage, etc.)	OFF	OFF	Steady on	1HZ beep
Fan failure-when there is output	Slow flash	OFF	Slow flash	No sound
Fan failure-when there is no output	OFF	OFF	Single flash	1HZ beep
Model identification error	Fast flash	Fast flash	Fast flash	1HZ beep
AC output low voltage protection	OFF	OFF	Steady on	1HZ beep
AC output high voltage	OFF	OFF	Steady on	1HZ beep
protection bypass load mode	OFF	Steady on	OFF	No sound
AC input high voltage protection	/	OFF	Steady on	1HZ beep
AC input low voltage protection	/	OFF	Steady on	1HZ beep
OTA Update	Three indicator lights			No sound
Power-on	The three lights will flow once, then flash once at the same time, and then indicate normally			No sound
Definition of indicator flashing:				
Slow flash	1s ON, 1s OFF in 2s			
Single flash	0.1s ON, 1.9s OFF in 2s			
Double flash	0.1s ON, 0.1s OFF, 0.1s ON and 1.7s OFF in period 2s			
Fast flash	1s ON, 0.1s OFF in 0.2s			

3.4 External switch contact interface

2P switch interface: Inverter can work when the interface is short-circuited; Inverter fails to work when the interface is open. The interface can be connected to a mechanical switch or relay to control the inverter to start/stop (this application requires keeping the mode switch in the ON or ECO mode position) in practical application.



Application drawing 1: external mechanical switch



Application drawing 2: external relay switch

3.5 Bluetooth Communication

Built-in Bluetooth communication function, real-time monitoring of inverter operation data, fault status, and adjustment of inverter operation through mobile phone APP Line parameters, etc.
You can scan the following QR code to download the APP:

3.6 CAN communication (optional)

Optional built-in CAN communication function, RV-C protocol, real-time monitoring of inverter operation data, fault status, and adjustment the operating parameters of the inverter are set.
The pin definition of the CAN communication interface is shown in 3.1.

4. Installation instructions

4.1 Installation precautions

Please read this manual carefully before installation to be familiar with the installation steps.

- Be careful when installing battery. Wear safety goggles when installing a lead-acid liquid battery. Once coming into contact with the battery acid, rinse with clean water timely.
- Keep away from metal objects to prevent short-circuit of battery.
- The battery may produce acid gas when charging. Make sure that the ambient environment is well-ventilated.
- When installing the cabinet, there must be enough space around the inverter for heat dissipation; Do not install the inverter and lead-acid battery in the same cabinet to avoid corrosion by acid gas generated during battery operation.
- As false connections and corroded cables may cause extreme heat to melt the cable insulation, burn surrounding materials and even cause a fire, it is necessary to ensure that the connections are tightened, and the cables are fixed with ties to avoid loose connections due to shaking of cable on the move.
- The system connection cables selected shall have a current density ≤5A/mm2.
- During outdoor installation, direct sunlight and rainwater infiltration shall be avoided.
- After the power switch is turned off, there is still high voltage inside the inverter. Do not turn on or touch the internal devices. Carry out relevant operations after the capacitor is discharged.
- Do not install the inverter in harsh environments such as moist, oily, flammable or explosive, or heavily dusty areas.
- Polarity at the battery input terminal of this product shall not be reversed. Otherwise, it may damage the device or cause unpredictable danger.
- The AC output is a high voltage, so please do not touch the wiring.
- Do not touch the working fan to prevent injury.
- It is necessary to confirm that the inverter is the only input device for load, and it is forbidden to use it in parallel with other input AC power to avoid damage.

4.2 Wiring specifications and circuit breaker selection

Wiring and installation must comply with national and local electrical codes.

- Battery input wiring specifications and circuit breaker selection

Model	Rated input current	Battery input wiring specifications	Circuit breaker selection
IBC12-3KW	291A	60mm²/(2AWG*2)	DC-2P-315A

- AC output wiring specifications and circuit breaker selection

Model	Rated output current	AC output wiring specifications	Circuit breaker selection
IBC12-3KW	13A	26mm²/12AWG	AC-2P-20A

- AC input wiring specifications and circuit breaker selection

Model	Rated input current	AC output wiring specifications	Circuit breaker selection
IBC12-3KW	16A	5mm²/10AWG	AC-2P-32A

- The above are reference specifications. Please select the appropriate specification and model according to actual situations.
- The wiring diameter is for reference only. If the distance between the inverter and the battery is relatively long, using a thicker wire can reduce the voltage drop to improve system performance.
- The above are only recommended wiring diameter and circuit breaker. Please select the appropriate wiring diameter and circuit breaker according to actual situations.

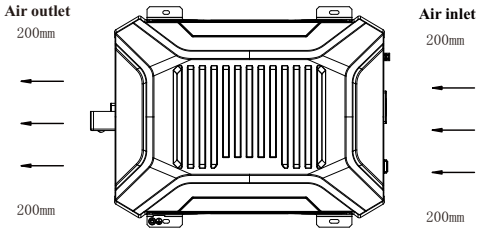
4.3 Installation and wiring

Installation steps:

Step 1: Please read the user manual carefully.

Step 2: Determine the installation position and the space for heat dissipation.

Determine the installation position (wall-mounted or horizontal installation method can be adopted): when installing the inverter, confirm that there is enough space of at least 200m reserved between the air outlet and air inlet of the inverter to facilitate air circulation.

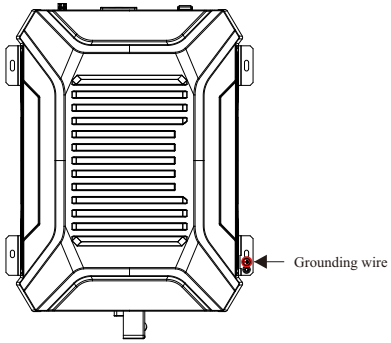


⚠ If the device is installed in a closed box, ensure that heat dissipation is allowed through the container. Otherwise, derate to use the device.

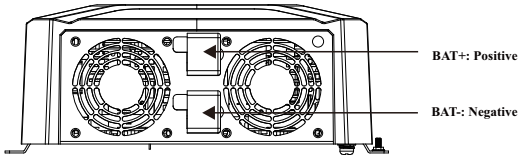
⚡	◆ The AC device shall be determined based on the inverter's continuous output power. The impact power of the AC device cannot be higher than the inverter's instantaneous impact power. Otherwise, the inverter may be damaged.
⚠	◆ Before wiring, switch the inverter to the OFF. ◆ Do not close the circuit breaker or fuse during wiring, and check if the electrode leads of each component are properly connected. ◆ The battery terminal shall be equipped with a fuse selected according to 2-2.5 times of the rated input current of the inverter, and the fuse must be at least 150 mm away from the battery terminal. ◆ There is no reverse connection protection for the input, check if the Positive and Negative are connected correctly before connecting.

Wiring sequence:

3.1 Ground wire



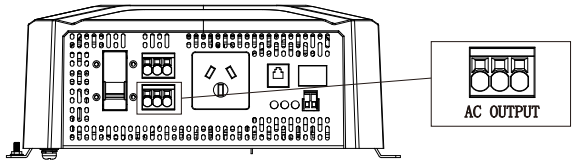
3.2 Positive/Negative wires of storage battery



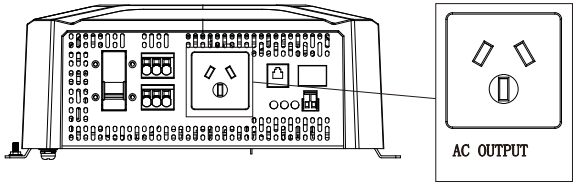
⚠ There is no reverse connection protection for the input, check if the Positive and Negative are connected correctly before connecting, or the inverter may be damaged!

3.3 AC equipment

1) The equipment has two AC output interfaces. If the current of a single load device is greater than 15A, the load device needs to be connected to the following 3P terminal (AC OUTPUT), which is defined as follows:

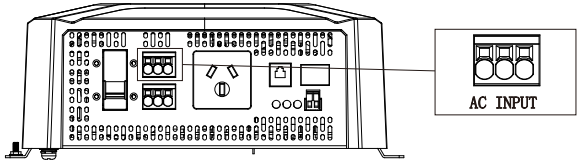


2) The inverter is equipped with a standard AC output terminal, as shown in the figure below. The maximum current carrying capacity of the terminal is 15A.



3.4 AC input Connect

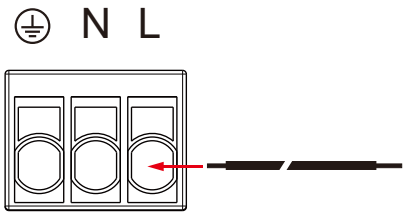
The AC input line to the 3P terminal block (AC INPUT) as shown below.



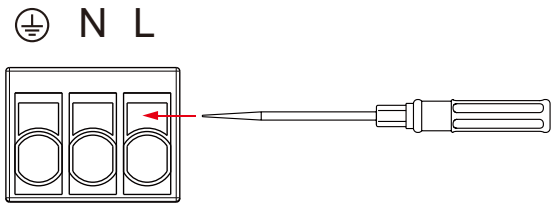
◆ It is recommended to use a single-strand copper wire with a wire diameter no greater than 4mm²;

◆ If you choose multi-strand wires, you need to add solder to the connecting wires to make them one piece and insert them into the corresponding holes;

◆ Please connect the ground wire first, then the live wire L and the neutral wire N.



◆ When removing the wiring, stop the inverter first, then use a sharp tool to insert the small hole above the interface and pull out the connection wire forcefully.



Step 4: Start the inverter

4.1 Close the circuit breaker at the DC input end of the inverter or the fuse at the battery end;

4.2 Short-circuit the external switch contact interface of the inverter (the factory default is short-circuited);

4.3 Set the inverter mode switch to ON position to start the inverter output: the running indicator light is green and the inverter outputs AC power normally;

4.4 Close the circuit breaker on the AC load line, turn on the AC loads one by one, and check the operating status of the inverter and loads;

4.5 If the fault indicator turns red and the buzzer sounds after starting the inverter, please turn o ffthe load and inverter and refer to refer to "Common Problems and Solutions" for troubleshooting. After troubleshooting, follow the above steps again.

5.Protection function

5.1 DC input overvoltage protection

When the battery voltage is greater than the input overvoltage protection voltage, turn o ffthe AC output, fault indicator lamp and buzzer; When the battery voltage is less than the input overvoltage protection voltage of -1V, AC output will be restored.

⚠ Although the inverter has the function of DC input overvoltage protection, the input voltage of 12V system should not be higher than 20V.

5.2 DC input low voltage protection

When the battery voltage is less than the input low-voltage protection voltage, turn o ffthe AC output, fault indicator and buzzer; When the battery voltage is greater than the input low-voltage protection recovery voltage, AC output is restored.

5.3 Output of overload protection

When the AC load is greater than the rated output power, corresponding protection shall be made according to different overload levels, as follows:

Load power	Possible duration
102%≤Po≤120%	1min
120% < Po≤150%	30s
Po > 150%	10s

⚠ When the inverter has overload protection, the AC output has three automatic recovery functions (the first delay is 5s, the second delay is 10s, and the third delay is 15s). It will not recover automatically for the fourth time. Check the equipment and restart the inverter after troubleshooting to recover the AC output.

5.4 AC output short circuit protection

When the AC output L/N is short-circuited, the inverter automatically turns o ffthe AC output, and the fault indicator lamp and buzzer prompt.

⚠ When the inverter is short-circuit protected, the AC output has three automatic recovery functions (the first delay of 5s, the second delay of 10s and the third delay of 15s). It won't recover automatically for the fourth time, and the AC output can only be recovered after restarting the inverter after troubleshooting.

5.5 AC input overcurrent protection

When the AC input current of ACin is greater than 16A, the inverter will automatically disconnect the AC input, fault indicator light and buzzer.

⚠ When the inverter has AC input overcurrent protection, the AC output has three automatic recovery functions (the first delay is 5s, the second delay is 10s, and the third delay is 15s). It will not recover automatically for the fourth time. Check the equipment and restart the inverter after troubleshooting to recover the AC output.

5.6 AC input overvoltage protection

When the ACin input voltage is greater than 265VAC, the ACin input will be automatically disconnected.

5.7 AC input undervoltage protection

When the ACin input voltage is less than 180VAC, the ACin input will be automatically disconnected.

5.8 Inverter N-G grounding protection

When the ACin input voltage is less than 180VAC, the ACin input will be automatically disconnected.

In the inverter mode, the relay inside the inverter controls the zero line to be connected with the ground line, and the zero line of the analog mains transformer is grounded. At this time, the external leakage protection can work normally and play a protective role in case of leakage.

When the mains bypass is loaded, the neutral line controlled by the relay inside the inverter is not connected with the ground line. Because the neutral line on the mains transformer side has been grounded, the leakage protection can work normally at this time, which plays a protective role in case of leakage. If the customer connects the zero line to the ground without authorization, it will cause the leakage protection to accidentally trigger the cut-o ffcircuit.

⚠ It is forbidden for customers to connect the neutral wire and the ground wire by themselves, which may lead to misoperation, danger and equipment damage.

5.9 Equipment over-temperature protection

Multi-channel temperature detection is provided inside the equipment, and any temperature greater than the over-temperature protection value of the equipment will automatically turn o ffthe AC output, and the fault indicator lamp and buzzer will prompt; When the temperature is less than the recovery value of equipment overtemperature protection, the AC output will be automatically restored.

In order to ensure that the inverter can run reliably and stably at full power for a long time, please ensure a good ventilation environment.

5.10 Fan Fault Protection

When the fan is blocked or other reasons cause the fan not to run, the AC output power of the inverter can only work within 30% of the rated power, and the AC output will be turned o ffwhen the load power is greater than 30% of the rated power.

When the load power is greater than 30% of the rated power, the AC output will be turned off, and the AC output has the function of automatic recovery for three times (each delay is 60s). It will not recover automatically for the fourth time. Check the equipment and restart the inverter after troubleshooting to recover the AC output.

In order to ensure that the inverter can run reliably and stably at full power for a long time, please ensure a good installation environment, avoid oil stains, wires and other blocking fans, and check whether the fans are running regularly.

6. Common problems and solutions

S/N	Phenomenon	Cause	Possible cause	Solutions
1	Red light flashes slowly, green light/yellow light is off, buzzer sounds, no AC output	Over-low battery input voltage	1. Excessive voltage drop due to over-small battery wiring diameter 2. Low battery power.	1. Choose the suitable wires; 2. Timely charge the battery until the low voltage recovery voltage can self-restore the output.
2	Red light flashes quickly, green light/yellow light is off, buzzer sounds, no AC output	Over-high battery input voltage	1. Mismatch between battery voltage and device system voltage	Measure the positive and negative terminal voltage of the device with a voltmeter to determine whether they are higher than the over-voltage protection voltage, and recover by adjusting the input voltage
3	Red light flashes once, green light is always on, yellow light is off, buzzer sounds, AC output is available	Overload	Power of load device higher than rated output power	Check whether the AC load is within the rated power range of the inverter;
4	Red light flashes once，green light/yellow light is off, buzzer sounds, no AC output	Overload	Power of load device higher than rated output power	Check whether the AC load is within the rated power range of the inverter; Eliminate the load overload fault and restart the inverter to restore normal operation.
5	Red light always on, green light/yellow light is off, the buzzer rings and there is no AC output	Load short-circuited	1. AC output of the inverter short-circuited 2. AC device L/N short-circuited	Check whether the AC load wiring is short-circuited; Eliminate the load short-circuit fault and restart the inverter to restore normal operation.
6	Red light is always on, the yellow light is not on, and there is mains access and AC output	AC input overvoltage /undervoltage	The connected AC voltage exceeds the maximum input voltage of the equipment by 265V; The connected AC voltage is lower than the minimum input voltage of the equipment by 180V.	Check that the AC access voltage is within the range of 180-265V
7	Red light flashes, the yellow light/green light does not light up, the buzzer rings, and there is no AC output	Over-high device temperature	Internal temperature of device higher than the set over-temperature protection	Improve the quality of ventilation, clear the vent, reduce the temperature around the inverter, and restart the device after the temperature is reduced. Please derate the amount if troubleshooting fails.
8	Red light flashes, the yellow light/green light does not light up, the buzzer rings, and there is no AC output.	Fan fault	Fan blocked by any object	Check whether the fan works properly

7. System maintenance

In order to maintain the best long-term performance, it is recommended to conduct following checks twice a year.

- Make sure that the airflow around the inverter is smooth and remove any dirt or debris from the heat sink.
- Check whether all exposed wires are damaged by exposure to sunlight, friction with other objects around them, dryness, bite by insects or rodents, etc. The wires shall be repaired or replaced if necessary.
- Verify for the consistency of indicator and display with the operation of the device. Please pay attention to any faults or errors, and take corrective actions if necessary.
- Check all wiring terminals for corrosion, insulation damage, signs of high temperature or burning/ discoloration, and tighten the screws.
- Check for dirt, nesting insects and corrosion, and clean up as required.
- The arrester failed shall be replaced in time against lightning damage to the inverter or even other device of the user.

Danger of electric shock! Make sure that the inverter power is disconnected and the power in the capacitor is discharged before carrying out the corresponding checks or operations!

The Company does not assume any liability for damage caused by:

- Improper use or use in improper site.
- Current, voltage and power of the load exceeding the limit of the inverter.
- Temperature in the operating environment exceeding the limited operating temperature range.
- Arcing, fire and explosion caused by failure to follow inverter markings or manual instructions.
- Disassemble and repair the inverter without permission.
- Force majeure.
- Damage that occurs in transportation or handling of the inverter
- Damage to the machine caused by using the product outside the parameters.