SINEXCEL
iSUNA

User Manual

Single phase LV Off-grid Inverter

Isuna 8000SO-12000SO

V1.7

Shenzhen Sinexcel Isuna
Energy Technology Co.,LTD.

Catalogue

1.Overview

This Manual mainly introduces the product information, installation, electrical connection, configuration commissioning, troubleshooting and maintenance, and technical parameters of Residential energy storage single phase off-grid inverter. Before installing and using this product, please read this Manual carefully to understand the safety information and be familiar with the functions and features of the product. The Manual is subject to update. Please obtain the latest version from the official website to get more product information.

1.1 Scope of Application

This document applies to the inverters of the following models:

Model	Rated output power	Rated output voltage
Isuna 8000SO	8000W	220V，L/N/PE
Isuna 10000SO	10000W	
Isuna 12000SO	12000W	

1.2 Intended Users

This Manual is only suitable for professional technicians who are familiar with local regulations, standards and electrical systems, have received professional training, and are familiar with the relevant knowledge of this product.

1.3 Symbols Used in This Manual

In order to ensure the user's personal and property safety when using the PV inverter, and to use the product efficiently, relevant safety operation information is provided in this Manual and highlighted with corresponding symbols. Please fully understand and strictly abide by below emphasized information to avoid personal injury and property damage. The symbols used in this manual are listed below.

⚠ Danger
Indicates a highly hazardous situation which, if not avoided, will result in death or serious injury.
⚠ Warning
Indicates a hazard with a medium level of risk that could result in death or serious injury if not avoided.
⚠ Caution
Indicates a hazard with a low level of potential that, if not avoided, could result in moderate or minor injury.

Attenion
Indicates a potentially hazardous situation that, if not avoided, may cause equipment failure or property damage.

2. Safety Precautions

The safety precautions contained in this document must be followed when operating the inverter.

Attenion
➢ The inverter has been designed in strict accordance with safety regulations and has passed the tests. However, as an electrical device, you must comply with relevant safety instructions before performing any operation on the device. Improper operation may result in serious injury or property damage.

2.1 Operation Safety

Attenion
➢ Read this manual carefully before installing the device to understand the products and precautions. ➢ All operations on the equipment must be carried out by professional electrical technicians who are familiar with the local standards and safety regulations. ➢ When operating inverters, use insulation tools and wear personal protective equipment. Wear ESD gloves, an ESD wrist strap, and an ESD suit when touching electronic components to prevent damage caused by static electricity. ➢ The manufacturer shall not be liable for inverter damage or personal injury caused by failure to install, use, or configure the equipment in accordance with the requirements of this manual.

2.2 PV String Safety

Danger
➢ Use the DC wiring terminal delivered with the chassis to connect the DC cables of the inverter. Use of other types of DC terminals may cause serious consequences. Therefore, the manufacturer is not responsible for the damage to the device.
Warning

- Ensure that the assembly frame is properly grounded to the support system.
- After connecting DC cables, ensure that the cables are securely connected.
- Use a multimeter to check whether the positive and negative DC wiring terminals of the battery are connected correctly and the voltage is within the allowable range.
- Do not connect the same PV series to multiple inverters; otherwise, the inverters will be damaged.

2.3 Battery Safety

⚠ Warning

- Read the battery safety contents in the user manual carefully before installing the device, and strictly follow the instructions in the user manual.
- The battery current may be affected by external environment, such as temperature and humidity, which may cause battery current limiting and affect battery on-load performance.
- If the battery does not start, contact the after-sales service center as soon as possible. Otherwise, the battery may be permanently damaged.
- Use a multimeter to check whether the positive and negative DC wiring terminals of the battery are connected properly and the voltage is within the allowable range.
- Do not connect the same battery string to multiple inverters. Otherwise, the inverters may be damaged.
- The inverter manufacturer will not assume any responsibility due to battery explosion, burning and other accidents and related personnel and property losses.

2.4 Inverter Safety

⚠ Warning

- Ensure that the voltage and frequency of the grid-connected access point comply with the inverter grid-connected specifications.
- A protection device, such as a circuit breaker or fuse, is recommended for the AC side of the inverter. Ensure that the protection device is greater than 1.25 times the maximum AC output current of the inverter.
- The GND cable for the inverters must be securely connected. When multiple inverters are combined, ensure that the protection ground points on all inverters' chassis shells are equipotential connected.
- If the battery is not configured in the photovoltaic system, it is not recommended to use the off-grid function, and the resulting system electricity risk will not be covered by the equipment manufacturer's warranty.

2.5 Personnel Requirements

⚠ Attenion

- When the inverter is running, some components may be charged or hot. Improper use, incorrect installation, or operation may result in serious injury to person or property. Transportation, loading, unloading, installation, starting and maintenance operations must be performed by qualified electrical engineers.

2.6 Description of Symbols

There are some safety-related labels on the single -phase hybrid inverter. Please read and fully understand these labels before installing the product.

Symbol	Symbol name	Symbol meaning
	It indicates the danger of residual voltage in the inverter.	Please wait for 5 minutes until the capacitor is completely discharged after the DC side of the inverter has been disconnected with power for a period of time.
	It indicates the danger of high voltage.	High voltage exists during inverter operation. If you need to operate the inverter, please make sure the inverter is disconnected.
	It indicates to be careful of high temperature	The temperature of inverter housing is high during operation, so do not touch it, otherwise it may cause burns.

	surface.	
	It indicates grounding terminal.	Connect the inverter to ground for grounding protection purpose.
	It indicates reading the manual.	Please read and understand this manual carefully before installing the inverter.

3.Equipment Inspection and Storage

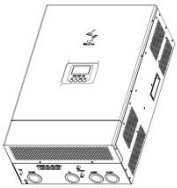
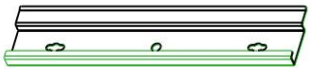
3.1 Pre-signing Inspection

Before signing for the product, please check the following:

- Check the outer packing for holes, distortions, cracks, or other signs that may cause damage to the equipment in the packing case. If so, do not open the packing and contact your distributor.
- Check whether the inverter type is correct. If not, do not open the package and contact your dealer.
- Check whether the type and quantity of the delivered package are correct and whether the appearance is damaged. If damaged, please contact your dealer.

3.2 Packing List

After the inverter is unpacked, check whether the delivered package are complete. If any components are found missing or incomplete, contact the dealer in time.

No.	Picture	Description	Quantity
1		Inverter	1PC
2		Wall hanging	2PCS

3		Bubble level	1PC
4		Wifi dongle	1PC
5		M8 hex wrench	1PC
6		M4 hex wrench	1PC
7		BMS communication line	1PC
8		Screw M5*10	8PCS
9		Expansion anchor bolts M8*80	4pcs
10		User Manual	1PC

11		Warranty Card	1PC

3.3 Equipment Storage

If the inverter is not put into use immediately, store it according to the following requirements:

- Ensure that the outer packing case is not removed and the desiccant is not lost.
- Ensure that the storage environment is clean and within appropriate temperature and humidity ranges.
- Ensure that inverters are placed in the height and direction according to the labels on the packing cases.
- Ensure that there is no tilt and fall risk after inverters are stacked.
- After the inverter is stored for a long time, check and confirm the inverter before it can be used.

4.2 Application Scenario

Warning

- The photovoltaic system is not suitable for devices that rely on stable power supply, such as life-sustaining medical devices. Ensure that no personal injury is caused when the system is powered off.
- Do not use a load with a high starting current in the photovoltaic system. Otherwise, the off-grid output may fail due to excessive instantaneous power.
- When the inverter overload protection occurs for a single time, the inverter can automatically restart; If it happens several times, the inverter will stop, and after the fault is rectified, the inverter can be restarted immediately through the App.
- If the load capacity exceeds the rated power of the inverter during power failure, the off-grid function of the inverter automatically shuts down. To start, turn off the large load and ensure that the load power is smaller than the rated power of the inverter.
- When the inverter is in off-grid mode, it can be used normally for ordinary household load.
- Inductive load: 1.5P non-variable frequency air conditioners are supported. The standby mode may be unstable if two or more non-variable frequency air conditioners are connected.
- Capacitive load: total power ≤0.7 x rated output power of inverter.

4.3 Appearance Description

4.3.1 Appearance Description

Please carefully inspect the packaging and accessories of the product before installation.

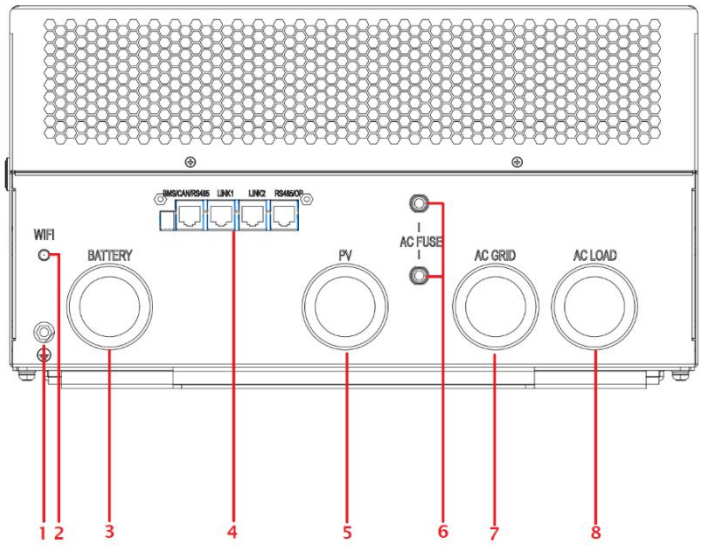
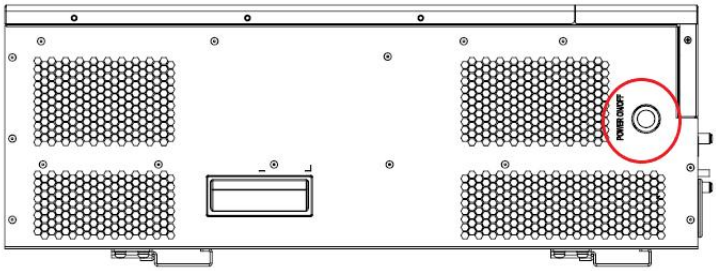


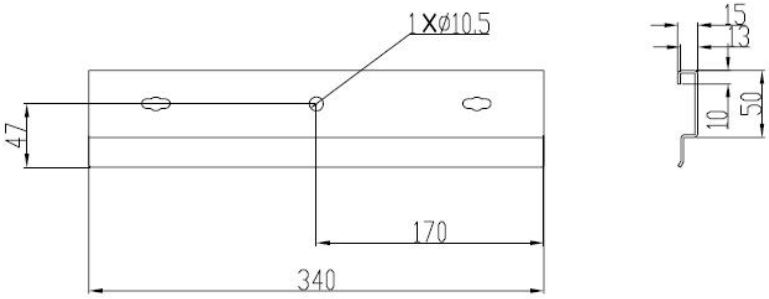
Table 4-1 Appearance of the inverter

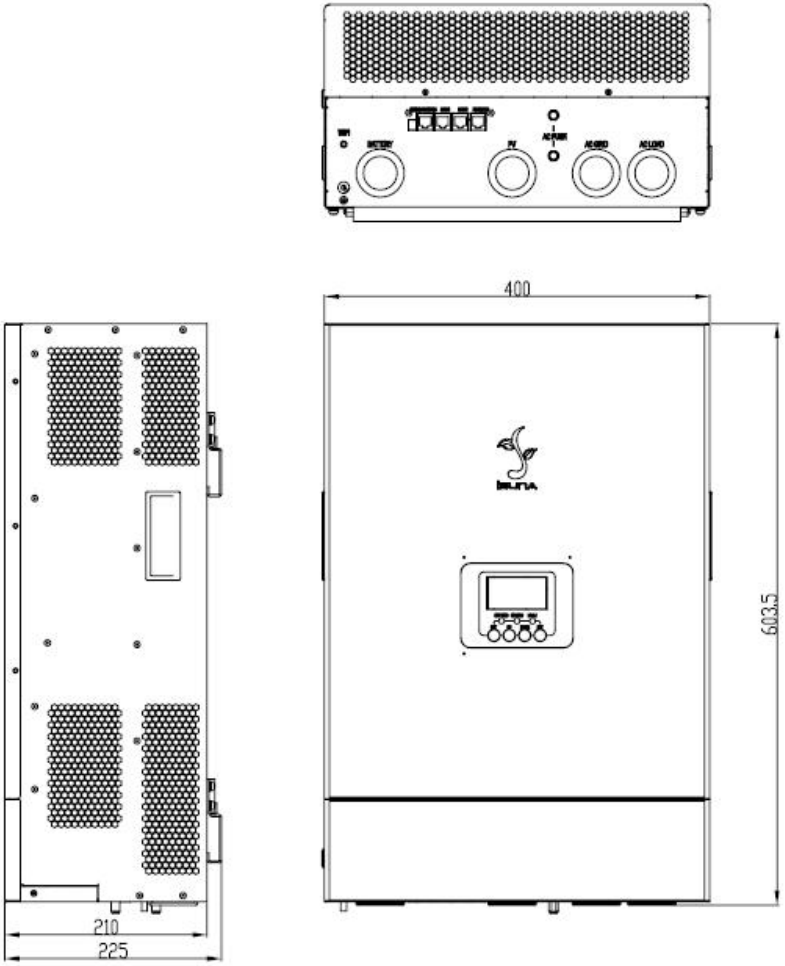
1	PE grounding	5	PV DC input port (PV+/-)
2	WiFi antenna	6	Overload reset button
3	Battery DC input port (BAT+/-)	7	Grid AC wiring port
4	Multifunctional communication interface	8	Load wiring port



Battery power button

4.3.2 Size Description




400
603.5
210
225

5 Installation

5.1 Installation Requirements

5.1.1 Installation Environment Requirements

1) The equipment must not be installed in flammable, explosive, corrosive and other environments.

2) The installation position should be away from water pipes and cables in the wall to avoid danger during drilling.

3) The installation position should be out of the reach of children, and avoid installation in a position that is easy to touch. There may be high temperature on the surface of the equipment during operation to prevent burns.

4) The inverter should avoid the installation environment such as sun, rain, snow, etc. It is recommended to install it in a sheltered installation position. If necessary, an awning can be built.

5) The installation space must meet the requirements of ventilation, heat dissipation and operation space.

6) The protection level of the equipment complies with the requirements for indoor and outdoor installation, and the installation environment temperature and humidity must be within the appropriate range.

7) Make sure that the inverter indicator light and all labels are easy to view and that the terminal is easy to operate.

8) The inverter installation altitude should lower than the maximum working altitude 4000m.

9) Stay away from strong magnetic field environment to avoid electromagnetic interference. If a radio station or a wireless communication device below 30MHz is located near the installation location, install the device according to the following requirements:

- Add a ferrite core with multi-turn winding at the inverter DC input line or AC output line, or add a low-pass EMI filter.
- The distance between the inverter and the wireless electromagnetic interference device exceeds 30m.

5.1.2 Mounting Carrier Requirements

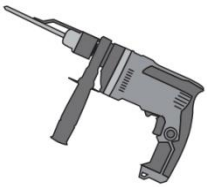
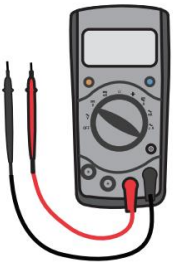
1) The installation carrier must not be flammable material and must have fire resistance.

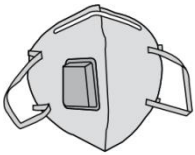
2) Please ensure that the installation carrier is solid and reliable, and can carry the weight of the inverter.

3) When the equipment is running, it will make noise. Do not install it on the carrier with poor sound insulation, so as to avoid the noise emitted by the equipment when it is working, which will cause trouble to residents in the living area.

5.2 Mounting Tools

Table 5-1 List of installation tools

Series No.	Tools	Description	Function
1		Percussion drill Recommended 10mm drill	Wall drilling
2		8mm hex wrench	Remove and install terminal screws
3		4mm hex wrench	Remove and install terminal screws
4		Wire strippers	Stripping wire
5		Multimeter	Check whether the cable wiring is correct, the positive and negative battery terminals are correct and voltage, and grounding is reliable

6		Marking pen	Drilling mark
7		Tape	Measurement distance
8		horizontal ruler	Keep inverter horizontal
9		Protective gloves	Wear when setting up the inverter
10		Goggles	Wear when drilling holes
11		Dust mask	Wear when drilling holes

5.3 Inverter Transportation

Remove the inverter from the outer packaging and carry it horizontally to the designated mounting position. Open the outer packaging box and the two operators need carry the inverter out of the outer packaging box and carry it to the designated mounting position.

⚠ Caution

- When carrying out the transportation, turnover, and installation, you must comply with the laws, regulations and related standards of the country or region where you are located.
- The inverter is heavy. Please keep it balanced during handling to prevent the inverter from falling and injuring the operator.
- The power cable and signal cable ports at the bottom of the inverter cannot bear any weight. Do not touch wiring terminals directly. Place the inverter horizontally.
- When the inverter is placed on the ground, put foam or paper under it to avoid damage to the shell.

5.4 Wall Mounted

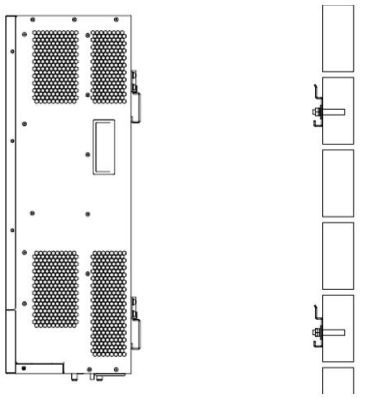
⚠ Attenion

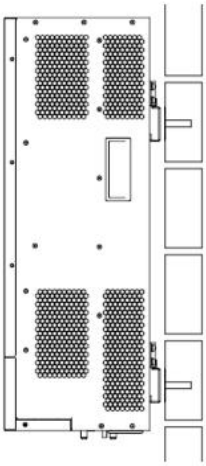
- When drilling holes, ensure that the holes are drilled away from water pipes and cables in the wall to avoid dangers.
- When drilling holes, wear goggles and a dust mask to prevent dust from inhaling into the respiratory tract or falling into the eyes.

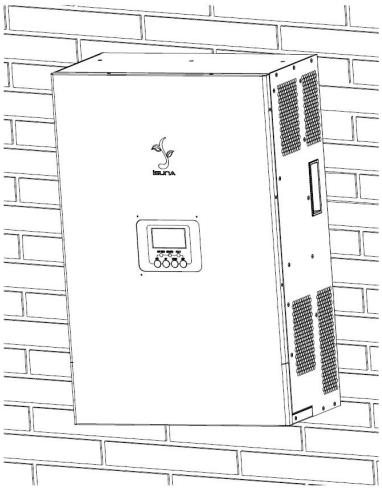
Step 1: Please choose a wall with sufficient load-bearing capacity, according to the wall bracket on the level will be wall bracket level to the installation wall, with a marker pen on the wall to mark the fixed wall bracket to be drilled position, and then use the impact drill to drill holes in the wall, drilling to keep the impact drill perpendicular to the wall, do not shake, so as to avoid damage to the wall, if the holes drilling error is large need to be re-positioned;

Step 2: Insert the M8*80 expansion screws vertically into the holes, pay attention to the depth of the expansion bolts should not be too shallow;

Step 3: Place the wall bracket against the hole, and fix the wall bracket on the wall with the nut;







6. Electrical Connection

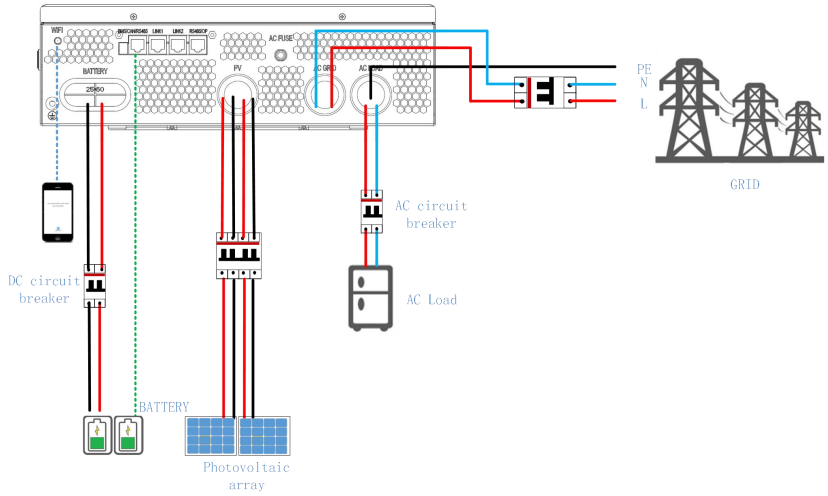
Before installation and maintenance, ensure that the AC/DC side is not powered on. The capacitors are still powered on for a period of time after the inverter is powered off. Therefore, wait at least five minutes to ensure that the capacitors are fully discharged. single -phase hybrid inverters are used in battery energy storage photovoltaic systems. Equipment can be damaged if not used as intended.

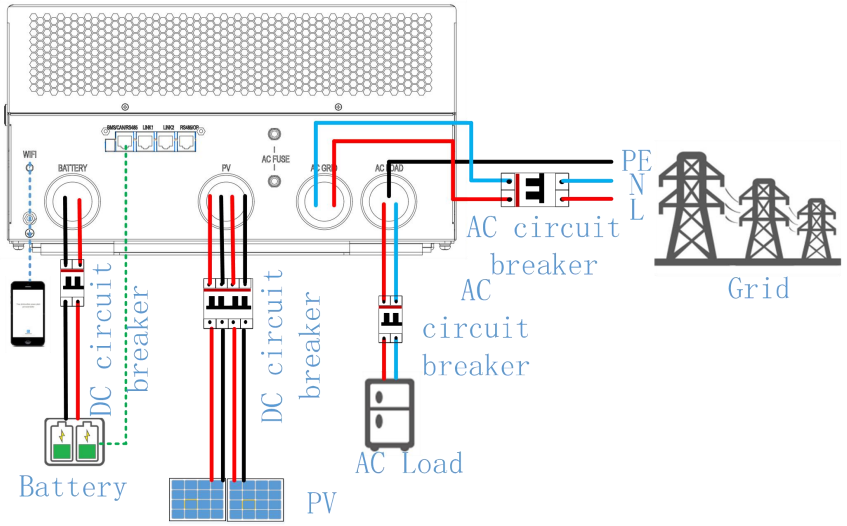
6.1 Electrical System Connection Diagram

Attenion

- Connect the N and PE cables to the AC GRID and AC LOAD ports of the inverters in different regions according to local regulations. For details, see local regulations.
- If the AC LOAD AC port is powered on after the inverter is started, power off the inverter to maintain the backup load. Otherwise, electric shocks may occur.
- Inverter AC GRID and AC LOAD AC ports have built-in relays. When the inverter is in off-grid state, the built-in AC GRID relay is in disconnected state; When the inverter is in the AC GRID state, the built-in AC GRID relay is in the closed state.

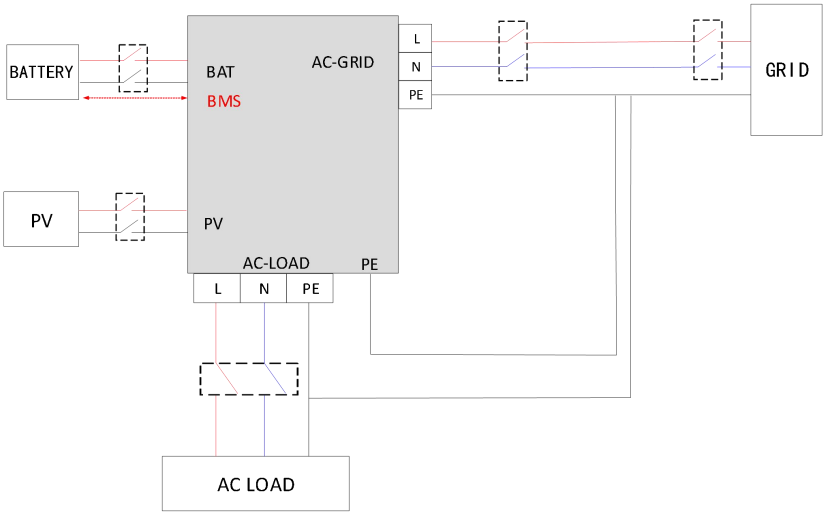
single phase off-grid inverter wiring system as following page: (structure schematic, non-electrical wiring standard).





Recommended circuit breaker specifications: DC circuit breaker 250A; AC circuit breaker: 120A.

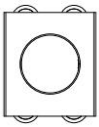
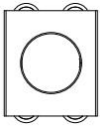
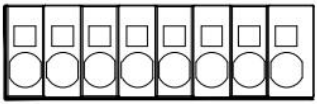
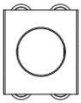
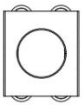
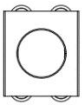
System electrical connection

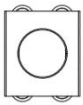


6.2 External Port Wiring Instructions

Select the cable size applicable to the parameters of the inverter according to its model.

Table 6-1 Cable Model and Specification Descriptions

Port	Definition		Cable type	Cable specification
	+: Connect to battery positive pole		Outdoor Multi-Core Copper Cable	Wire cross sectional area: 16mm²~25mm²
	-: Connect to battery negative pole			
	+: Connect to PV positive pole		Outdoor Multi-Core Copper Cable	Wire cross sectional area: 4mm²~6mm²
	-: Connect to PV negative pole			
	AC load port	L	Outdoor Multi-Core Copper Cable	Wire cross sectional area: 6mm²~10mm²
		N		
	AC grid port	L	Outdoor Multi-Core Copper	Wire cross sectional area: 6mm²~10mm²

		N	Cable	
	PE		Outdoor Multi-Core Copper Cable	Wire cross sectional area: <2.5mm²

6.3 Connecting the Battery Cable

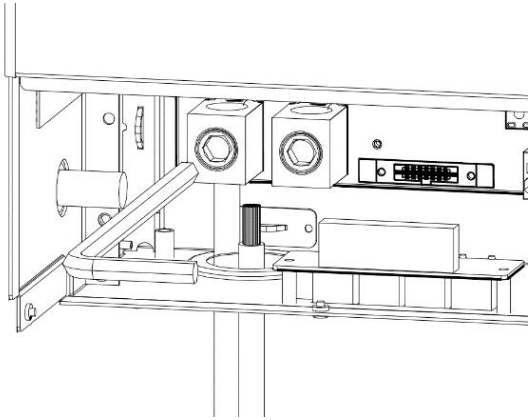
	➢ Battery short circuit may cause personal injury, and the instantaneous high current caused by the short circuit may release a large amount of energy, which may cause a fire. ➢ Before connecting the battery cable, please confirm that the inverter and the battery are powered off, and the front and rear switches of the equipment are disconnected. ➢ When the inverter is running, it is forbidden to connect or disconnect the battery cable, or the operation may cause electric shock. ➢ Do not connect the same battery pack to multiple inverters, or the inverter may be damaged. ➢ Do not connect loads between the inverter and the battery. ➢ When connecting the battery cable, please use insulated tools to prevent accidental electric shock or short circuit of the battery. ➢ Please ensure that the open circuit voltage of the battery is within the allowable range of the inverter.

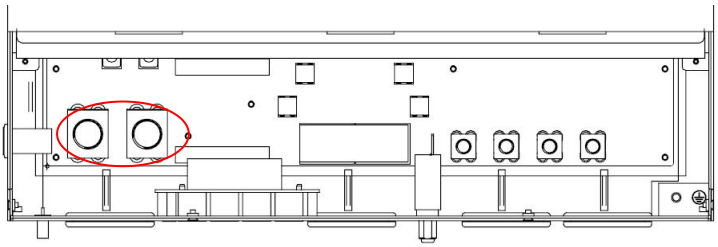
Warning	➢ When wiring, the battery cable should match the "BAT+" and "BAT-" of the battery terminal completely. If the cable is connected incorrectly, the equipment will be damaged. ➢ Please make sure that the wire core is completely inserted into the terminal wiring hole without being exposed. ➢ Make sure the cable connection is tight, or the terminal may be overheated and the equipment may be damaged when it is running.

Step 1: According to the cable model and specification in Table 6-1, select the appropriate cable type and specification, and strip the cable insulation layer;

Step 2: In Insert the stripped insulation core into the conductor crimping area of the copper post terminal, and press with M6 hexagonal screw, locking torque 30kgf•cm. Make sure the connection is secure.

Step 3: Use a multimeter to check the positive and negative poles to ensure that the open circuit voltage is less than 60V;



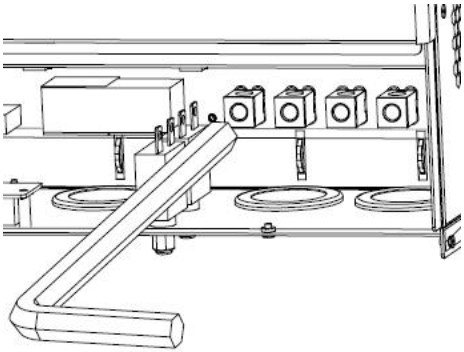


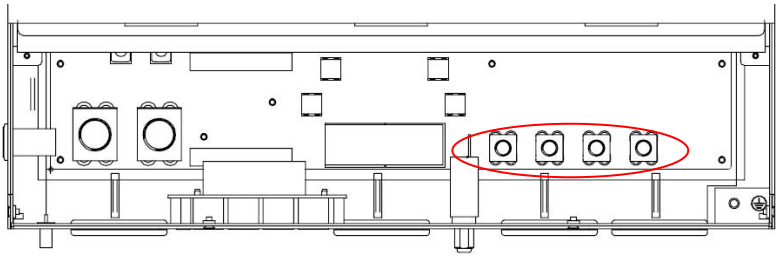
6.4 Connecting AC LOAD、AC GRID

- When wiring, the AC wire should fully match the "L", "N" and grounding ports of the AC terminal. If the cable is connected incorrectly, it will cause equipment damage.
- Please make sure that the wire core is completely inserted into the terminal wiring hole without being exposed.
- Please ensure that the insulating plate at the AC terminal is clamped tightly without loosening.
- Make sure the cable connection is tight, or the terminal may be overheated and the equipment may be damaged when it is running.

Step 1: According to the cable model and specification in Table 6-1, cable with appropriate type and specification, then strip the cable insulation layer.

Step 2: In Insert the stripped insulation core into the conductor crimping area of the copper post terminal, and press with M4 hexagonal screw(The installation method is the same as the battery terminal), locking torque 13kgf • cm. Make sure the connection is secure.





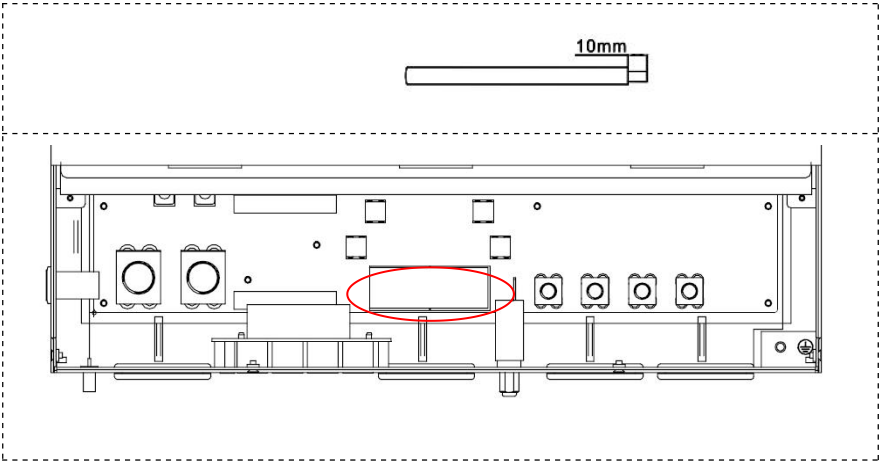
6.5 Connecting PV

- Do not connect the same PV string to multiple inverters, or the inverter may be damaged.
- Before connecting the PV strings to the inverter, please confirm the following information, or it may cause permanent damage to the inverter, and even cause a fire and result in personal and property losses.
- Please ensure that the maximum short-circuit current and maximum input voltage of each PV are within the allowable range of the inverter.
- Please ensure that the positive pole of the PV string is connected to the PV+ of the inverter, and the negative pole of the PV string is connected to the PV- of the inverter.

- The PV string output does not support grounding. Before connecting the PV string to the inverter, ensure that the minimum insulation resistance of the PV string to ground meets the minimum insulation resistance requirements.
- Please make sure that the wire core is completely inserted into the terminal wiring hole without being exposed.
- Please ensure that the insulating plate at the AC terminal is clamped tightly without loosening.
- Make sure the cable connection is tight, or the terminal may be overheated and the equipment may be damaged when it is running.

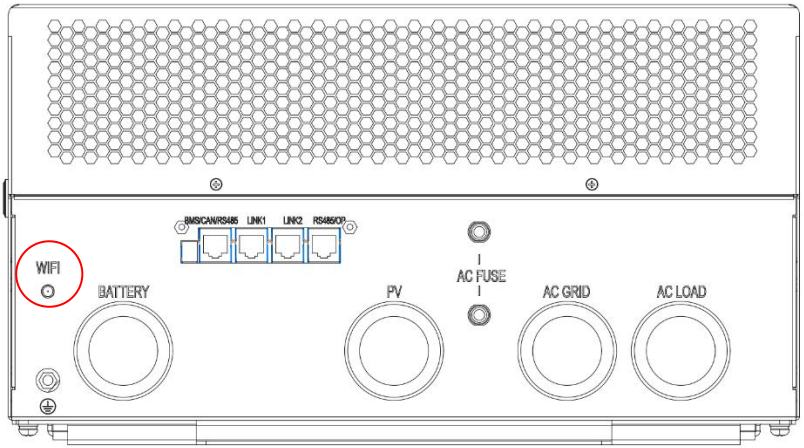
Step 1: According to the cable model and specification in Table 6-1, cable with appropriate type and specification, then strip the cable insulation layer.

Step 2: Open the button in the conductor crimp area of the PV terminal, insert the stripped insulation core into the conductor crimp area of the PV terminal and press the button. Make sure the connection is secure.



6.6 Installing WIFI antenna

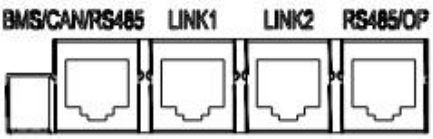
Tighten the WIFI antenna alignment knob.



6.7Connecting Communication Cables

Multi-function communication port, including BMS communication, RS485 communication and parallel communication.

Connect the cable to the communication port on the device.



The pin assignment of the RJ45 socket of the communication cable is as follows:

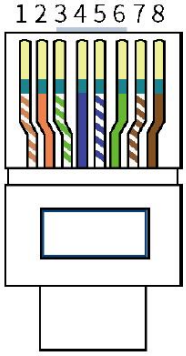


Figure 6.4 RJ45Sequence of RJ45 crystal terminals:

1	2	3	4	5	6	7	8
Orange& White	Orange	Green& White	Blue	Blue& White	Green	Brown& White	Brown

BMS/CAN/RS485 Communication Connection

PIN	Definition	Fuction	Note
1	TEMP_BAT	TEMP_BAT	
2	/	NC	
3	/	NC	
4	CAN_A_H	CANH data	
5	CAN_A_L	CANL data	
6	GND_SELV	Grounding	
7	RS485_A_BMS	RS485A	
8	RS485_B_BMS	RS485B	

Note：① Communication with lithium batteries requires attention to the communication port order and pin definition of the battery;

② Pay attention to whether the port of the battery has prohibited wiring requirements;

RS485 接口

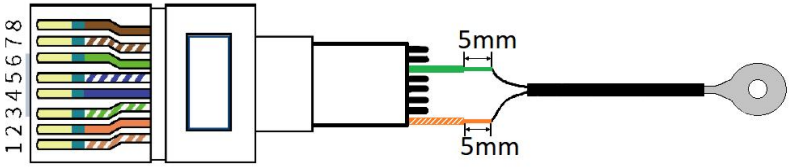
PIN	Definition	Fuction	Note
1	OP2+	OP2+	
2	OP2-	OP2-	
3	OP1+	OP1+	
4	OP1-	OP1-	
5	/	NC	
6	GND_SELV	Grounding	
7	RS485_A_BMS	RS485A	
8	RS485_B_BMS	RS485B	

6.7.1 NTC connection for lead acid battery

①NTC connection for lead acid battery:

Prepare a standard network cable, cut the cable, the break in the green and orange&white wire stripping 5mm, and NTC pins welded together, as follows, to confirm that the weld is firm after using insulating tape to the two welded places were wrapped around the bandage, pay attention to avoid contact with exposed metal, to prevent short-circuiting affect the normal use.

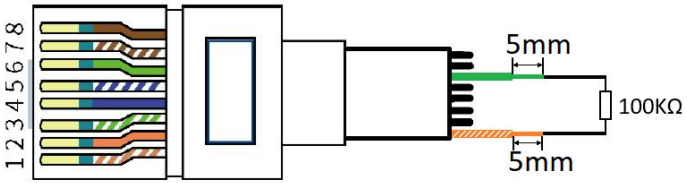
When using the lead battery, insert the completed NTC crystal head into the DRMS interface, and stick the NTC outside the lead battery.



②Do not use NTC connection

If the temperature sampling function is not needed when using the lead battery, users need to access a 100KΩ resistor according to the following method to ensure that the inverter can work properly:

Prepare a standard network cable and a 100KΩ resistor, cut the network cable, the break in the green and orange&white wire stripping 5mm, and 100KΩ resistor pins welded together, as shown below, to confirm that the weld is solid, use insulating tape to the two welds were wrapped around the wrap, pay attention to avoid contact with exposed metal, to prevent short-circuiting, which will affect the normal use. When using the lead battery, insert the completed 100KΩ resistor crystal head into the DRMS interface.



7. Inverter Operation

7.1 Pre-power-on Inspection

Serial	Check the entry
1	The inverter is firmly fixed to the mounting bracket on the wall.
2	Cables are bundled according to cable routing requirements, properly distributed, and without damage.
3	PV+/PV-, BAT+/BAT- cables are firmly connected, the polarity is correct, and the voltage is within the accessible range.
4	The DC switch is properly connected between the battery and the inverter, and the DC switch is off.
5	The AC circuit breaker is correctly connected between the inverter port and the power grid, and the circuit breaker is disconnected.
6	The AC circuit breaker is correctly connected between the inverter load port and the power grid, and the circuit breaker is disconnected.
7	For lithium batteries, ensure that the communication cables are properly connected.

7.2 Initial Power-on

Follow these steps to turn on the inverter

1) Ensure that the inverter is not working;
2) Close the AC circuit breaker between the inverter On Grid port and the Grid;
3) Turn on the PV DC switch on the inverter (when connected to PV);
4) Turn on the battery and close the DC switch between the battery and the inverter;
5) The inverter starts to run after the self-test is successful;
6) Close the AC circuit breaker between the inverter Back up port and the load.

7.3 Working Mode

Note 1: Anti-reverse current function is enabled by default.

Note 2: APP set the minimum SOC range of the battery to 10%-80%

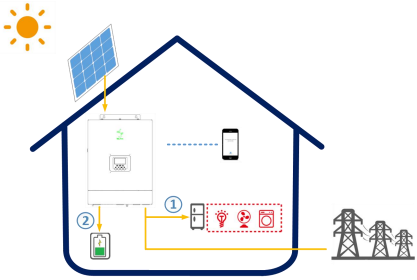
7.3.1 Self-use Mode (default mode)

Function:

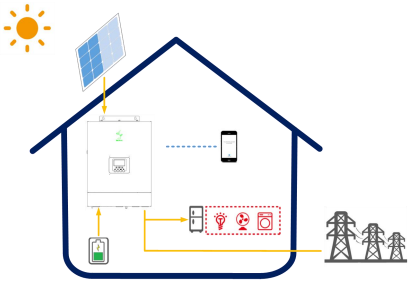
Give priority to the use of photovoltaic and battery energy, as far as possible not to use the energy of the grid.

Specific working mode:

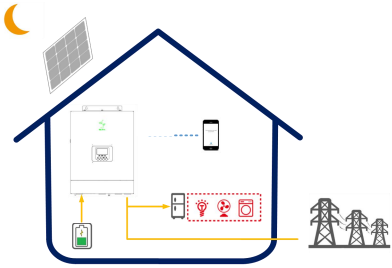
- When the PV is sufficient, the PV priority for supplies power to the load, and excess power charges the battery.



- If the PV is insufficient and the battery SOC is more than the minimum SOC, the load is powered by the PV and the battery.

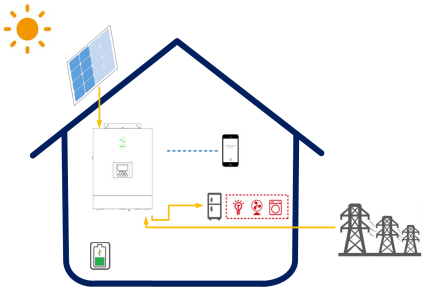


- If the PV is not working and the battery SOC is more than the minimum SOC, the battery supplies power to the load.



- If the PV is insufficient and the battery SOC is less than the minimum SOC, then the PV

and the grid supply power to the load and the battery standby.



- If the PV is not working and the battery SOC is less than the minimum SOC, the grid supplies power to the load and the battery standby.

7.3.2 Timed Charge Mode

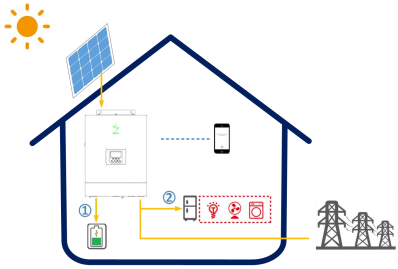
Function:

Users can set the time perio ɔr battery charging by themselves through the APP, and the charging power refers to the battery power.

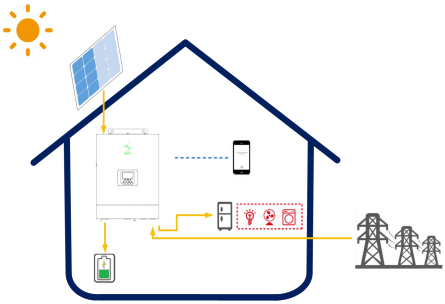
Specific working mode:

Charging period::

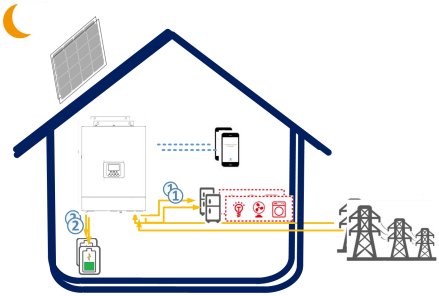
- When PV is sufficient, PV supplies power to loads and battery.



- When the PV is not sufficient, the PV and the grid supply power to the loads and battery.



- When the PV is not working, the grid supplies power to the load and battery.



- out of charge time period: self-use mode.

Note: The charging power is defined as the power of the inverter to charge the battery, and the discharge power is defined as the power of the inverter output.

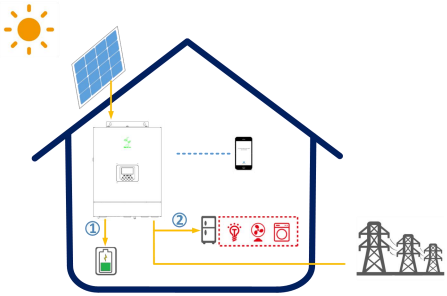
7.3.3 Backup mode/disaster recovery mode

Function:

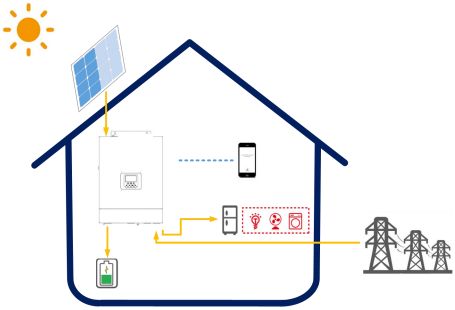
According to the user's needs, the battery can be set up for power reserve. User's can charge the battery fully in advance for use by the load in case of a power outage. Battery charging power in this mode is 5kw by default.

Specific working mode:

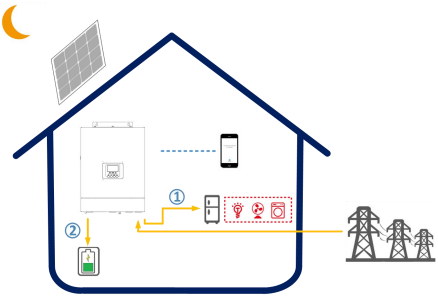
- When PV is sufficient, PV supplies power to loads and battery.



- When the PV is not sufficient, the PV and the grid supply power to the loads and battery.



- When the PV is not working, the grid supplies power to the load and battery.



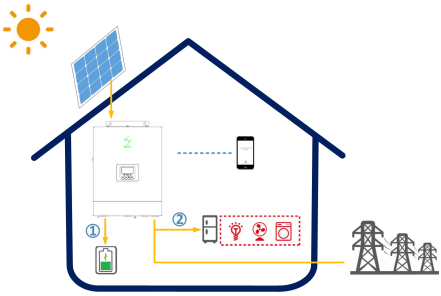
7.3.4 PV priority charging mode

Function:

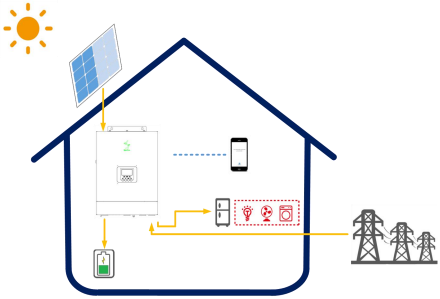
The PV energy charges the battery priority according to the user's needs.

Specific working mode:

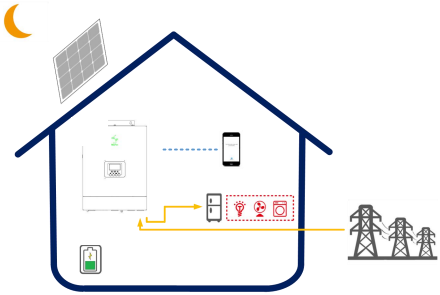
- When PV is sufficient, PV supplies power to loads and battery.



- When the PV is insufficient, the PV supplies power to the battery and the grid supplies power to the loads



- When the PV is not working, the grid supplies power to the load and the battery standby.



7.4 Operating mode

Table 7-1 Explanation of Inverter Operation Modes

NO.	Operating mode	Description
1	Waiting	➢ Waiting phase after the inverter is powered on. ➢ When the conditions are met, enter the self check state. ➢ If there is a malfunction, the inverter enters a fault state.
2	Self Test	➢ Before starting the inverter, perform continuous self checks, initialization, etc. ➢ If the conditions are met, the inverter enters the grid connected state and starts grid connected operation. ➢ If the power grid is not detected, it will enter an off grid state and the inverter will operate off grid. ➢ If the self-test fails, it will enter a fault state.
3	AC GRID	➢ The inverter is running normally on the grid.If it is detected that the power grid does not exist or the conditions do not meet the grid connection requirements, it will enter the off grid working state. ➢ If a fault is detected, it will enter a fault state. ➢ If it is detected that the grid conditions do not meet the grid connection requirements and the off grid output function is not enabled, it will enter a waiting state. ➢ If the grid conditions meet the grid connection requirements and the grid connection function is

		enabled after switching off the grid, the system will enter the grid connection state.
4	Off-grid	➢ When the power grid is cut off or the grid conditions do not meet the grid connection requirements, the inverter switches to an off grid state and continues to supply power to the load. ➢ If it is detected that the grid conditions meet the grid connection requirements, it will enter the grid connection state. ➢ When the working mode is set to off grid mode before operation, the inverter works off grid. ➢ If a fault is detected, it will enter a fault state.
5	Fault	➢ If a fault is detected, the inverter enters a fault state and waits for the fault to be cleared to restore its previous operating state.

8.System testing introduction

8.1 Functions of the display and control system

Users can use the screen to view or set up the inverter.

Table 8-1 LCD displays the parameter list

page number	Screen left parameters	Screen intermediate parameter	Screen right parameters
1	Battery 1 voltage	Function number	Battery 1 voltage output power
2	Battery temperature		load power
3	PV voltage 1		PV power 1
4	PV voltage 2		PV power 2
5	PV voltage 3		PV power 3
6	PV voltage 4		PV power 4
7	Active power of phase A of the grid		Load voltage frequency
8	Grid voltage frequency		Load phase A current

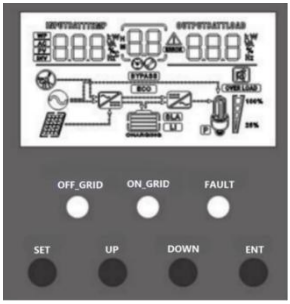
9	Power grid phase A voltage		Load phase A voltage
10	Reservation		Load A looks at each other in power
11	Battery 1 Running status		Model input frequency class
12	Reservation		Device address

Table 8-2 Parameter setting table

Parameter number	Parameter name	Option setting	Description
01	Maximum charging current	100A default	48V Set range: 0~100A;
02	Maximum discharge current	100A default	48V Set range: 0~100A;
03	Type of battery	0 Lithium battery 1 Super capacitor 2 Lead acid cell	Set range: 0~10
04	Floating charge voltage	54V default	Floating charge voltage Set range: 52V~56V
05	Equalizing voltage	56.4V default	Set range: 54V~59V
06	Equalizing the charge is enabled	default 0	Set range: 0,1
07	Capacity of battery	100A	1~999A
08	Discharge cut-off voltage	42V default	Set range: 38V~44V
09	Select Networking Function	default 0	Set range: 0,1
10	back-up function	default 0	Set range: 0,1

8.2 Description of display and control system

LCD display control system includes LCD display, keys and indicators, schematic diagram and physical diagram as shown in the following figure.



8.3 Operating instructions

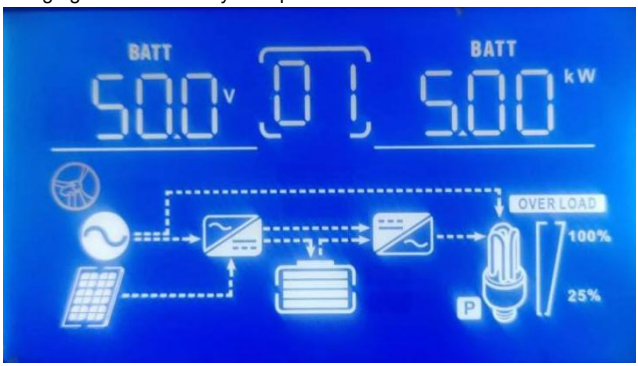
8.3.1 System Parameters

There are 10 system parameters:

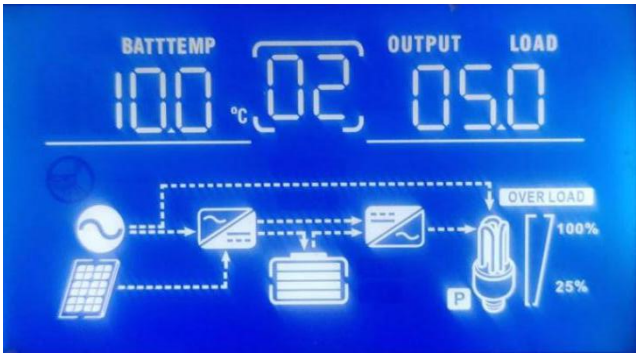
Step 1: Press the up or down key.

Step 2: View the ten parameters in sequence.

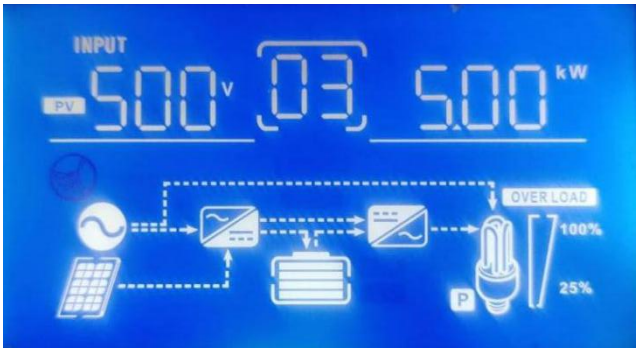
The following figure shows the system parameter interface.



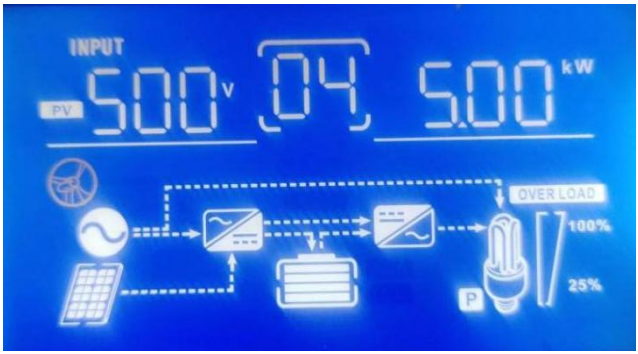
Battery voltage 1---- Battery power 1 Display diagram



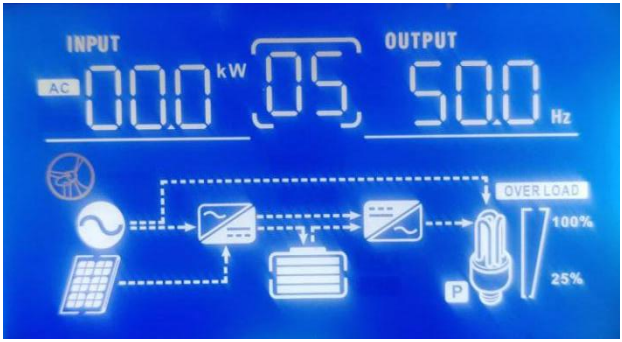
Battery temperature ---- load power display diagram



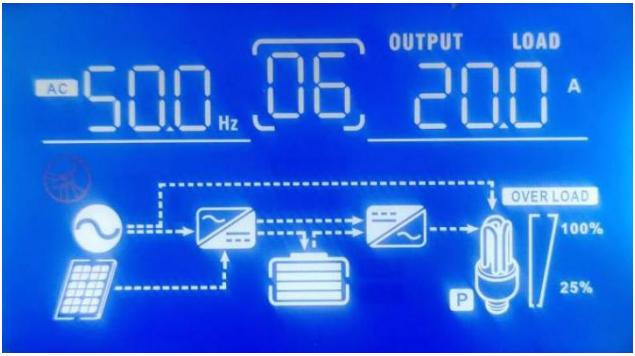
PV voltage 1---- photovoltaic power 1



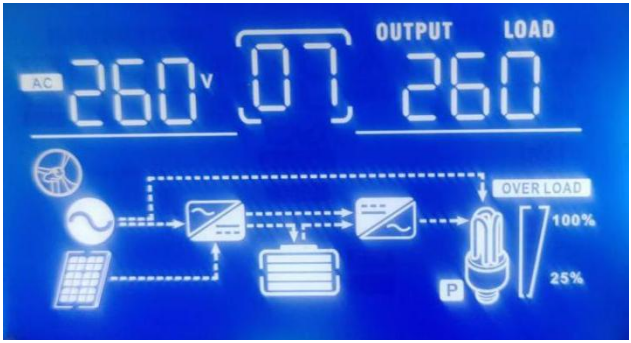
PV voltage 2---- photovoltaic power 2



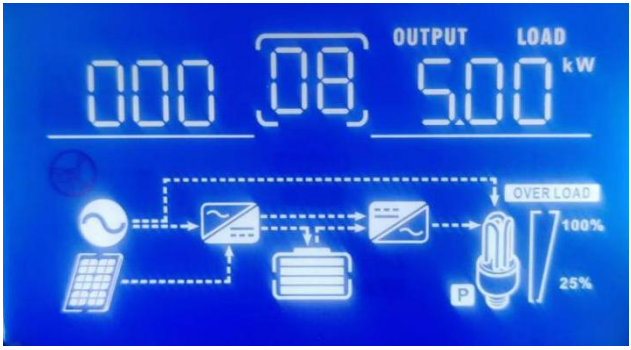
Grid A phase active power - load voltage frequency display diagram



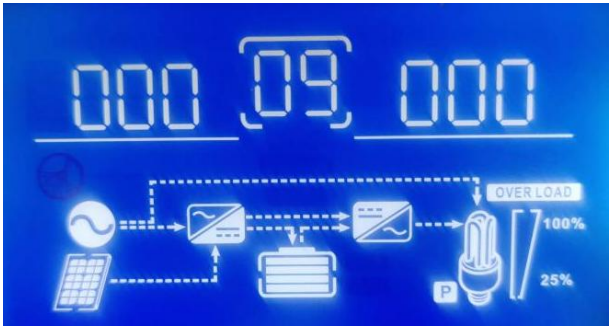
Grid Voltage Frequency - Load A Phase Current RMS Display Diagrams



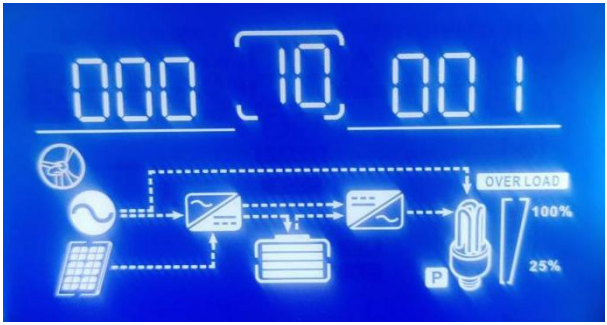
Grid Phase A Voltage - Load Phase A Voltage Display Diagram



Reserve - Load A Phase Apparent Power Display Diagrams



Battery 1 Running status -- Model input frequency level display diagram



Reserve - Device Address Display Diagrams

8.3.1 Set system parameters

Step 1: Press the SET to enter the setting item, and the setting icon appears in the middle.

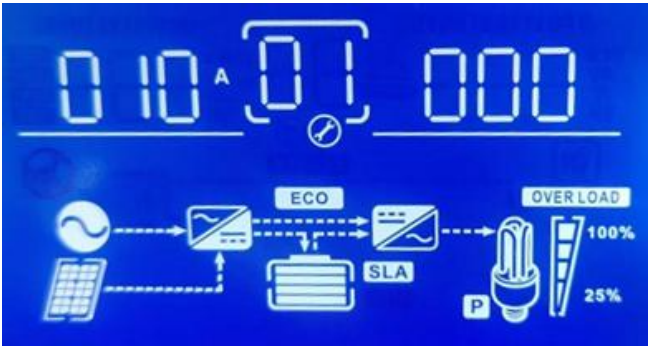
Step 2: Press the UP or DOWN and select the parameter to be set.

Step 3: Press ENT to confirm the change, and the left screen flashes.

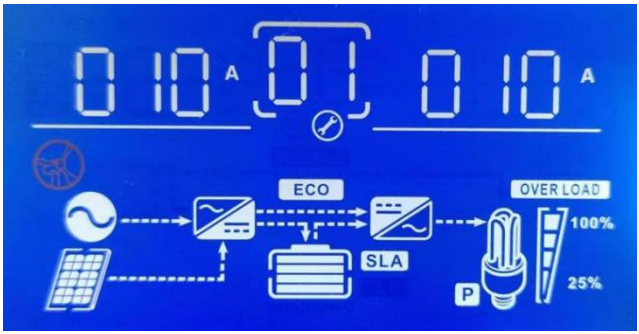
Step 4: Press UP or DOWN to change the parameter and press ENT again to save the changed parameter.

Step 5: Press the SET to quit.

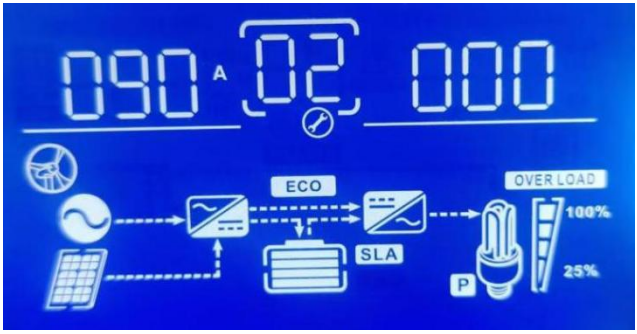
The system can set 10 parameters totally. The following picture shows the parameter viewing and setting interface.



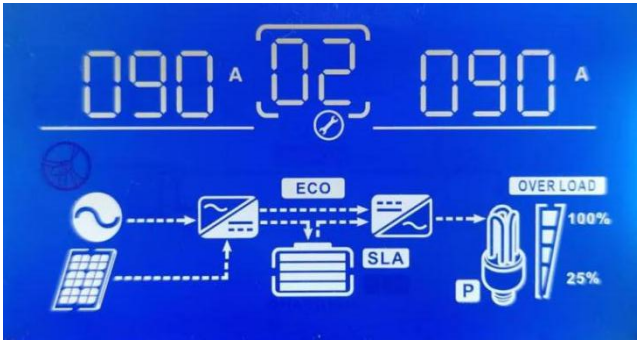
Maximum charging current setting display diagram



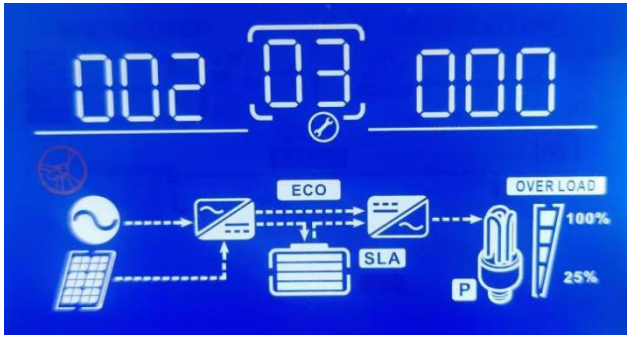
The maximum charging current setting is successfully displayed



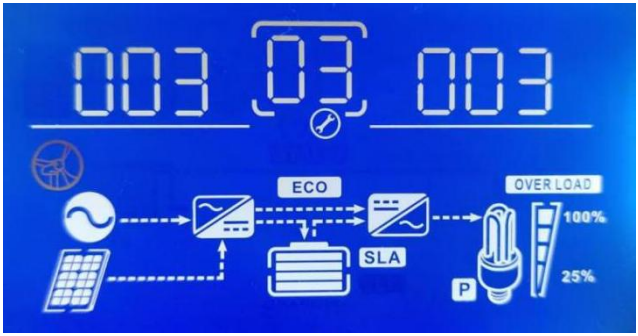
Maximum discharge current setting display diagram



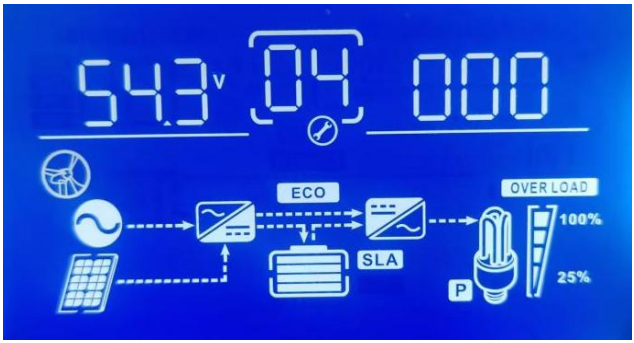
Maximum Discharge Current Setting Successful Display Diagram



Battery type Settings display diagram

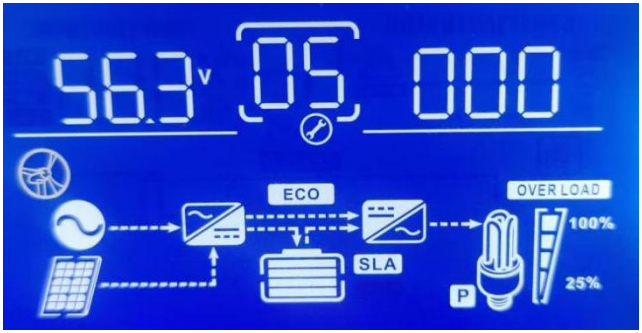


Battery Type Setting Successful Display Diagram



Lead battery float voltage setting display diagram

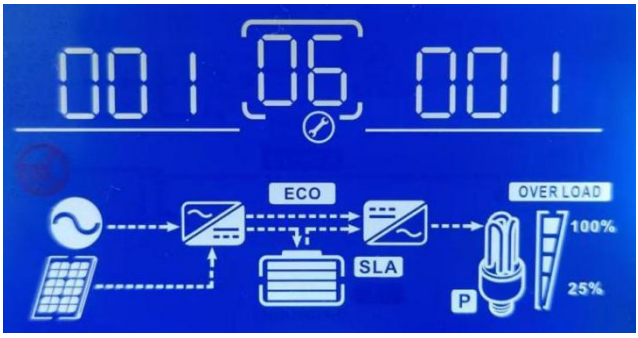
Lead battery float voltage setting successful diagram



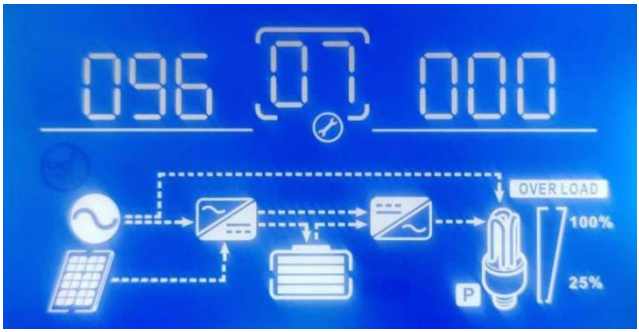
Lead battery average charging voltage setting display diagram

Lead battery average charging voltage setting success diagram

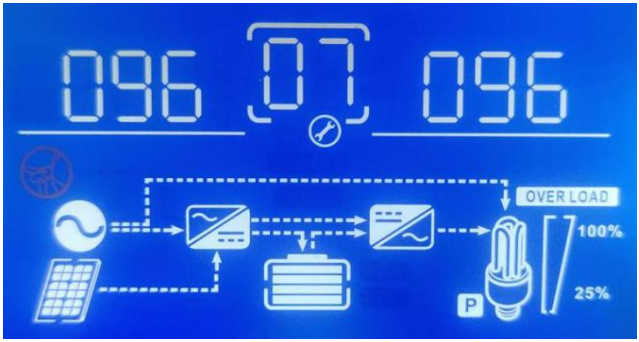
Lead battery average charging enable setting display diagram



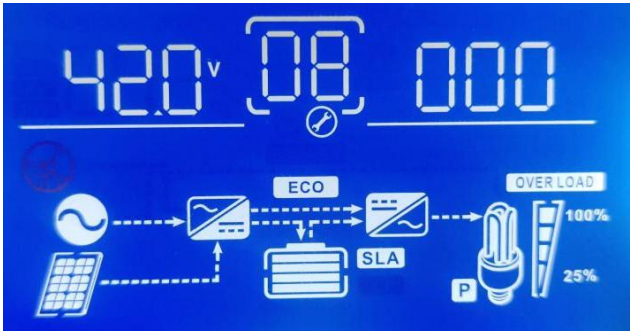
Lead battery average charging enable setting success display diagram



Battery 1 Capacity Setting Display Diagram



Battery 1 Capacity Setting Successful Display



Lead battery discharge under voltage setting display diagram

Lead battery discharge under voltage setting success display diagram

Note: After the system is successfully set, press the leftmost button to exit the setting screen. In this case, the screen icon is the same as that on the setting screen.

8.4 LED indicator status

Note: Input and output relative to product.

Table 8-3 Indicator status list

State	Indicator light			Judge the working condition	
	Green	Yellow	Red		
Standby	Flicker 1s/Once			Inverter standby	
Grid-connected -PV	Always on			The grid-connected PV operates without batteries	
Grid-connected -BAT	Always on			The grid-connected BAT operates without PV	
Grid-connected -BAT/PV	Always on			All three	
Off-grid -PV		Always on		No such condition	
Off-grid -BAT		Always on		Off-grid state BAT runs without PV	
Off- grid -BAT/PV		Always on		Off- grid state BAT runs without PV	
Alarm (no shutdown or power reduction)			Slow flicker 2s/Once	PV under voltage does not flicker	Alarm bit
Recoverable failures (DCDC or INV downtime)			Fast flicker 0.5s/Once		
Unrecoverable failure (DCDC or INV downtime)			Always on		

Table 8-4 Alarm classification table

No.	Alarm/fault name	Type	Note
1	Grid voltage abnormal	Recoverable fault	
2	Network frequency anomaly	Recoverable fault	
3	Power grid voltage reverse sequence	Recoverable fault	
4	The grid voltage is out of phase	Recoverable fault	
5	Output voltage anomaly	Recoverable fault	
6	Output frequency anomaly	Recoverable fault	
7	Zero line anomaly	Recoverable fault	
8	Ambient temperature is too high	Recoverable fault	
9	Heat sink temperature is too high	Recoverable fault	
10	Insulation fault	Unrecoverable fault	
11	Leakage protection failure	Unrecoverable fault	
12	Auxiliary power failure	Recoverable fault	
13	Fan error	Recoverable fault	
14	Model capacity fault	Recoverable fault	
15	The surge arrester is abnormal	Recoverable fault	
16	Islanding protection	Recoverable fault	
17	Battery 1 is not connected	Recoverable fault	
18	Battery 1 overvoltages	Recoverable fault	
19	Battery 1 undervoltage	Recoverable fault	
20	Battery 1 Discharge terminates	Recoverable fault	
21	Battery 1 is reversed	Recoverable fault	
22	Battery 2 is not connected	Recoverable fault	
23	Battery 2 overvoltages	Recoverable fault	
24	Battery 2 undervoltage	Recoverable fault	

25	Battery 2 Discharge terminates	Recoverable fault	
26	Battery 2 is reversed	Recoverable fault	
27	PV 1 is not connected	Recoverable fault	
28	PV 1 Overvoltage	Recoverable fault	
29	PV 1 current equalization anomaly	Recoverable fault	
30	PV 2 is not connected	Recoverable fault	
31	PV 2 Overvoltage	Recoverable fault	
32	PV 2 uniform flow anomaly	Recoverable fault	
30	PV 3 is not connected	Recoverable fault	
31	PV 3 Overvoltage	Recoverable fault	
32	PV 3 uniform flow anomaly	Recoverable fault	
30	PV 4is not connected	Recoverable fault	
31	PV4 Overvoltage	Recoverable fault	
32	PV4 uniform flow anomaly	Recoverable fault	
39	DC bus overvoltage	Unrecoverable fault	Several locks
40	DC bus undervoltage	Recoverable fault	
41	DC bus voltage imbalance	Recoverable fault	
42	The PV 1 power tube is faulty	Recoverable fault	
43	The PV 2 power tube is faulty	Recoverable fault	
44	The PV 3 power tube is faulty	Recoverable fault	
45	The PV 4 power tube is faulty	Recoverable fault	
46	Battery 1 power tube is faulty	Recoverable fault	
47	Battery 2 power tube is faulty	Recoverable fault	
48	The inverter power tube is faulty	Recoverable fault	
49	System output overload	Recoverable fault	
50	Inverter overload	Unrecoverable fault	
51	The inverter is overloaded and	Recoverable fault	

	times out		
52	Battery 1 is overloaded and times out	Unrecoverable fault	Several locks
53	Battery 2 is overloaded and times out	Unrecoverable fault	Several locks
54	The soft startup of the inverter fails. Procedure	Recoverable fault	
55	Battery 1 Soft startup failed. Procedure	Recoverable fault	
56	The soft startup of battery 2 fails. Procedure	Recoverable fault	
57	The DSP1 parameter Settings are faulty	Recoverable fault	
58	The DSP2 parameter Settings are faulty	Recoverable fault	
59	The DSP version is incompatible	Recoverable fault	
60	The CPLD version is incompatible	Recoverable fault	
61	The CPLD communication is faulty	Recoverable fault	
62	DSP communication failure	Recoverable fault	
63	Output voltage direct current exceeds the limit	Recoverable fault	
64	Direct output current exceeds the limit	Recoverable fault	
65	Relay self-test failed	Unrecoverable fault	
66	Inverter exception	Recoverable fault	
67	Imperfect earth	Recoverable fault	
68	PV 1 Soft start fails	Recoverable fault	
69	PV 2 Soft start fails	Recoverable fault	

70	PV 3 Soft start fails	Recoverable fault	
71	PV 4 Soft start fails	Recoverable fault	
72	Balance circuit overload and timeout	Recoverable fault	
73	PV1 overload timeout	Recoverable fault	
74	PV 2 overload timeout	Recoverable fault	
75	PV 3 overload timeout	Recoverable fault	
76	PV 4 overload timeout	Recoverable fault	
77	PCB overtemperature	Recoverable fault	
78	DC converter overtemperature	Recoverable fault	
79	Bus slow overvoltage	Recoverable fault	
80	The off-network output voltage is abnormal	Recoverable fault	
81	Hardware bus overvoltage	Unrecoverable fault	
82	Hardware overcurrent	Unrecoverable fault	
83	DC converter overvoltage	Recoverable fault	
84	DC converter hardware overvoltage	Recoverable fault	
85	DC converter overcurrent	Recoverable fault	
86	DC converter hardware overcurrent	Unrecoverable fault	Several locks
87	DC converter cavity overcurrent	Unrecoverable fault	Several locks
88	PV 1 reverse connection	Recoverable fault	
89	PV 2 reverse connection	Recoverable fault	
90	PV 3 reverse connection	Recoverable fault	
91	PV 4 reverse connection	Recoverable fault	
92	Battery 1 is low	Recoverable fault	
93	Battery 2 is low	Recoverable fault	
94	Lithium battery 1 Do not	Recoverable fault	

	charge		
95	Lithium battery 1 Do not discharge	Recoverable fault	
96	Lithium battery 2 Do not charge	Recoverable fault	
97	Lithium battery 2 Do not discharge	Recoverable fault	
98	Lithium battery 1 full	Recoverable fault	
99	Lithium battery 1 Discharge termination	Recoverable fault	
100	Lithium battery 2 is full	Recoverable fault	
101	Lithium battery 2 Discharge terminates	Recoverable fault	
102	Load power overload	Unrecoverable fault	
103	The leakage self-test is abnormal	Unrecoverable fault	
104	The inverter overtemperature alarm is generated	Give an alarm	
105	The inverter is overheated	Recoverable fault	
106	DC converter overtemperature alarm	Give an alarm	
107	Parallel communication alarm	Give an alarm	
108	The system runs derated	Give an alarm	
109	Open inverter relay	Recoverable fault	
110	Inverter relay short circuit	Recoverable fault	
111	The PV access mode is incorrect	Give an alarm	
112	The parallel module is missing	Recoverable fault	
113	The parallel module number is repeated	Recoverable fault	
114	Parameters of parallel	Recoverable fault	

	modules conflict		
115	Reserved 4	/	
116	Reserved 5	/	
117	Inverter seal pulse	Recoverable fault	

9 Troubleshooting and Maintenance

This section will help users identify the possible causes of malfunction issues.

9.1 Alarm and solution

NO.	Error	Solution
1	High ambient temperature	● Please ensure that the inverter is installed in a place without direct sunlight. ● Make sure the inverter is installed in a cool/well-ventilated place. ● Please ensure that the inverter is installed vertically and the ambient temperature is lower than the upper temperature limit of the inverter. ● If the still exists, please refer your dealer or after-sales service center for help.
2	High radiator temperature	
3	Insulation fault	● Check the impedance of the PV string to the protective ground; if the resistance is greater than 16.67kΩ, it is normal; if the resistance is less than 16.67kΩ, please check the short circuit point and rectify it; check Whether or not the protective ground wire of the inverter is connected correctly. If power-on detection completed successfully, the alarm will be cleared automatically or a fault clearing command will be sent.
4	Battery 1 not connected	● Check whether or not the battery overvoltage setting is consistent with the battery specification. ● Please check whether the battery 1 is connected correctly or whether the voltage is abnormal. Once confirmed it is correct, the alarm will be automatically cleared or a fault clearing command will be sent.
5	Battery 1 over voltage	
6	Battery 1 under voltage	
7	Battery 1 discharge termination	

8	PV1 not connected	● 请检查光伏 1 是否连接正确或者电压是否异常，确认无误后，告警自动清除或者发送故障清除命令。
9	PV1 over-voltage	● Please check whether the connection of PV1 is correct or whether the voltage is abnormal. Once confirmed it is correct, the alarm will be automatically cleared or a fault clearing command will be sent.
10	PV1 current sharing abnormal	
11	PV2 not connected	● Check whether the PV series voltage is higher than the maximum input voltage of the inverter. If yes, adjust the number of PV modules and reduce the PV string voltage to fit the input voltage range of the inverter. After correction, the inverter will automatically return to normal state.
12	PV2 over-voltage	● Please check whether the connection of PV2 is correct or whether the voltage is abnormal. Once confirmed it is correct, the alarm will be automatically cleared or a fault clearing command will be sent.
13	PV2 current sharing abnormal	
14	PV3 not connected	● Please check whether the connection of PV1 is correct or whether the voltage is abnormal. Once confirmed it is correct, the alarm will be automatically cleared or a fault clearing command will be sent.
15	PV3 over-voltage	● Check whether the PV series voltage is higher than the maximum input voltage of the inverter. If yes, adjust the number of PV modules and reduce the PV string voltage to fit the input voltage range of the inverter. After correction, the inverter will automatically return to normal state.
16	PV3 current sharing abnormal	
17	PV4 not connected	● Please check whether the connection of PV2 is

		correct or whether the voltage is abnormal. Once confirmed it is correct, the alarm will be automatically cleared or a fault clearing command will be sent.
18	PV4 over-voltage	● Check whether the PV series voltage is higher than the maximum input voltage of the inverter. If yes, adjust the number of PV modules in and reduce the PV string voltage to fit the input voltage range of the inverter. After correction, the inverter will automatically return to normal state.
19	PV4 current sharing abnormal	
20	DC bus over-voltage	● Turn off the switch in AC output side and DC input side, and turn off the switch in AC output side and DC input side after 5 minutes. ● If the fault still exists, please contact your dealer or after-sales service center for help.
21	DC bus under-voltage	
22	Inverter overload	● Please check whether the inverter is working in the overload state. Once confirmed that it is normal, the alarm will be automatically cleared within 10 minutes or a fault clearing command will be sent.
23	Inverter overload timeout	
24	overload timeout	
25	PV1 overload timeout	
26	PV2 overload timeout	
27	PV3 overload timeout	
28	PV4 overload timeout	
29	Inverter soft start failed	● Inverter internal fault, turn off the inverter, wait for 5 minutes and then turn on the inverter, send fault clear command for soft start. ● If the fault still exists, please contact your dealer or after-sales service center for help.
30	Battery 1 soft start failed	
31	DSP1 parameter setting failure	● Check whether the parameter Settings are correct , the alarm will be automatically cleared once the parameter setting is correct.
32	DSP2 parameter setting failure	
33	DSP communication	● The alarm is cleared automatically after the SPI

	failure	communication is normal.
34	Inverter abnormal	● This alarm will be automatically cleared after other faults are cleared.
35	PV1 soft start failure	● Inverter internal failure, turn off the inverter, wait for 5 minutes and then turn on the inverter, send the fault clear command for soft start
36	PV2 soft start failure	
37	PV3 soft start failure	
38	PV4 soft start failure	

9.2 Regular maintenance

⚠ Warning
➢ Make sure that the inverter is disconnected from power. ➢ Wear personal protective equipment when operating the inverter.

Maintain content	Maintenance methods	Maintenance Cycle
System cleaning	Check for foreign objects and dust on the heat sink and air inlet/outlet.	Once/Half a year~Once/Year
Electrical connection	Check whether the cable connection is loose or detached, whether the appearance of the cable is damaged, and whether there is copper leakage.	Once/Half a year~Once/Year

10 Technical Parameter

Model	Isuna 8000SO	Isuna 10000SO	Isuna 12000SO
Battery parameters			
Battery input number	1		
Battery type	Lithium/lead-acid		
Rated battery voltage	48V		
Battery voltage range	42V-58V		
Max voltage	58V		
Rated charging and discharging power	8kW	10kW	12kW
Max charging and discharging current	200A		
Interface	RS485/CAN		
PV input			
PV input number	4		
Max input power①	14000W	18000W	18000W
Max input voltage	500V		
Starting voltage	120V		
Input Voltage range	100~500V		

Rated input voltage	360V
MPPT number	4
MPPT string	1
MPPT Max input current	18A/18A
MPPT max short circuit current	22A/22A
Grid Input parameter	
Max input current	100A
Rated grid voltage	220Vac
grid voltage range	176-264V
Rated grid frequency	50/60Hz
THDi	<3%

Off grid parameter			
Max output power	8kVA	10kVA	12kVA
Rated output current	36.4A	45.4A	54.4A
Rated outputvoltage	220Vac		
Output voltage range	220Vac±10%		
Rated output frequency	50/60Hz		
Peaking power&time	12KVA(10S)	15KVA(10S)	15KVA(10S)

efficiency			
European efficiency	97.2%	97.3%	97.3%
Maximum efficiency	97.4%	97.5%	97.5%
Maximum battery charging/discharging efficiency	94%		
Protection			
Insulation impedance testing	Integration		
Residual current monitoring	Integration		
Input reverse protection	Integration		
Anti islanding protection	Integration		
Overvoltage and overload protection	Integration		
AC short circuit protection	Integration		
General Parameters			
Installation method	Wall mounted		
Size	400mm*620mm*210mm		
Weight	28kg		
Noise	<45dB（A）		

Standby power loss	≤10W
Temperature range	-25℃~+60℃
Humidity range	<95%
Allowable altitude	<4000m
Cooling method	Air cooling
IP Grade	IP20
Monitoring	LCD /LED/APP/WIFI/Bluetooth
Communication port	RS485/CAN
Performance and Certification	
Warranty	5 years
CE-LVD	EN 62109-2:2011 EN 62109-1:2010
CE-EMC	EN61000-6-1, EN61000-6-2