SINEXCEL
iSUNA

User Manual

Single-phase LV hybrid inverter

Isuna 3000S-6000S

Shenzhen Sinexcel Isuna
Energy Technology Co.,LTD

Catalogue

1.Overview

This document describes the product information, installation, electrical connection, configuration and commissioning, troubleshooting and maintenance, and technical specifications of the single-phase hybrid inverter. Before installing and using the product, read this manual carefully to familiarize yourself with the safety information and functions and features of the product. Manuals may be updated from time to time, please obtain the latest version from the official website for more product information.

1.1 Scope of Application

This manual is applicable to the following inverters:

Model	Rated output power	Rated output Voltage
Isuna 3000S	3000W	220V/230V/240V，L/N/PE
Isuna 3600S	3600W	
Isuna 4000S	4000W	
Isuna 4600S	4600W	
Isuna 5000S	5000W	
Isuna 6000S	6000W	

Note: Since the product will be overload protected at an ambient temperature above 40 ℃, the high temperature mode test in the Italian Grid Specification certification will be carried out at an ambient temperature of 40 ℃.

1.2 Applicable Personnel

This document is intended for only professional and technical personnel who are familiar with local regulations, standards, and electrical systems, and have professional training and knowledge about this product.

1.3 Symbol Definition

In order to ensure the personal and property safety of users when using single-phase hybrid inverters, as well as the efficient use of this product, the manual provides relevant safe operation information and uses corresponding symbols to highlight. To avoid personal injury and property damage, please fully understand and absolutely

comply with these stressed information. 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 device.

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 surface.	The temperature of inverter housing is high during operation, so do not touch it, otherwise it may cause burns.
	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.

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.Product Description

4.1 Product Overview

single -phase hybrid inverter is a photovoltaic grid-connected inverter and battery energy storage as one, with a variety of built-in working modes to suit the diversified needs of users. In the period of rising energy costs such as oil and coal, the continuous decline of energy subsidies for photovoltaic grid-connected systems, mountain areas or base stations without grid, uninterrupted power supply and emergency power supply needs, single -phase hybrid inverters can provide a complete solution.

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.
- The inverter has not been tested to AS/NZS 4777.2 standard for multiple inverter generation control

4.3 Appearance Description

4.3.1 Appearance Description

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

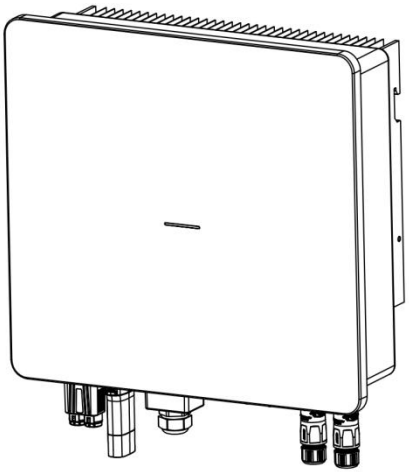


Figure 4.1 Appearance of the inverter

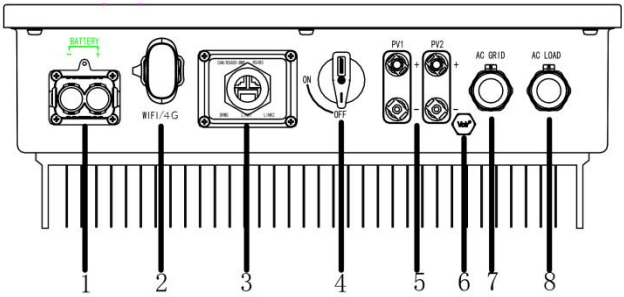


Table 4-1 Appearance of the inverter

1	Battery DC input port (BAT+/-)	5	PV DC input port (PV+/-)
2	WIFI/4G/Bluetooth	6	Explosion proof relief valve
3	Communication module interface	7	Grid-connected AC wiring port
4	PV DC input switch	8	Off-grid AC wiring port

4.3.2 Size Description

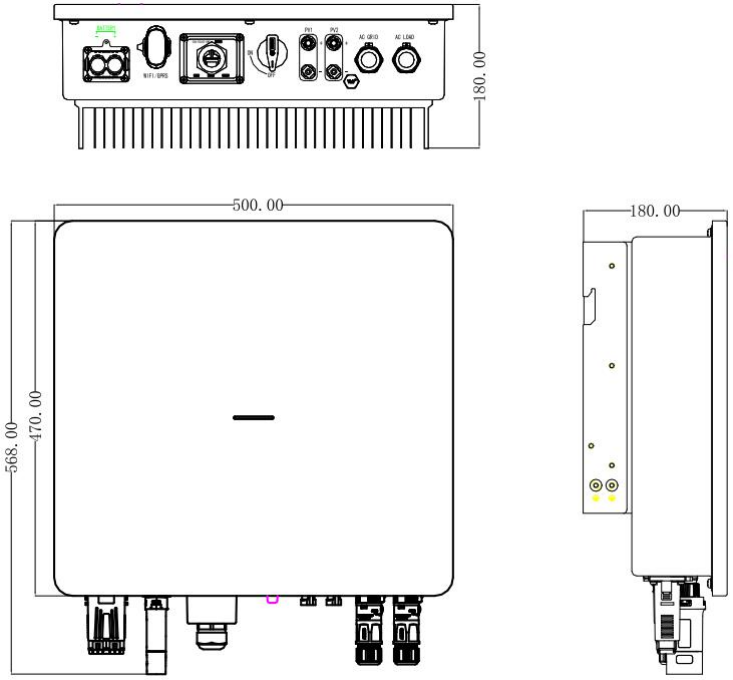


Figure 4.2 Overall size of inverter

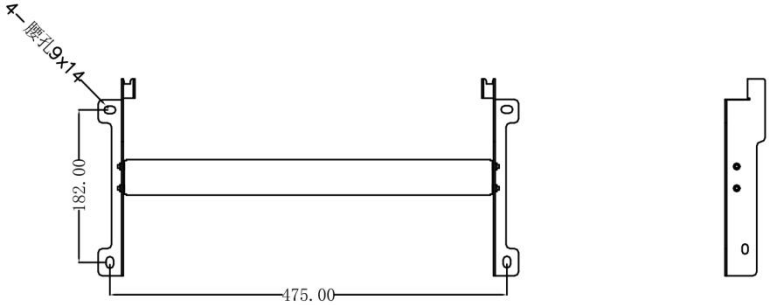


Figure 4.3 Dimensions of wall mount

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.

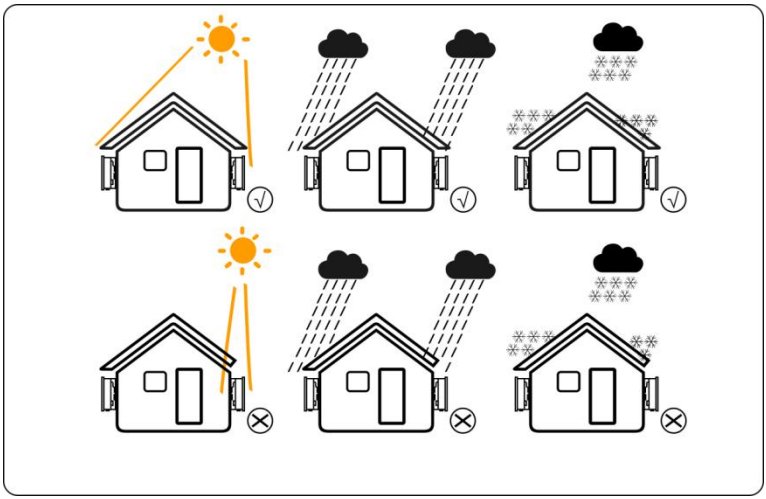
6) The protection level of the equipment complies with the requirements for indoor and outdoor installation, and the installation environment temperature and humidity must be within the appropriate range.

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.

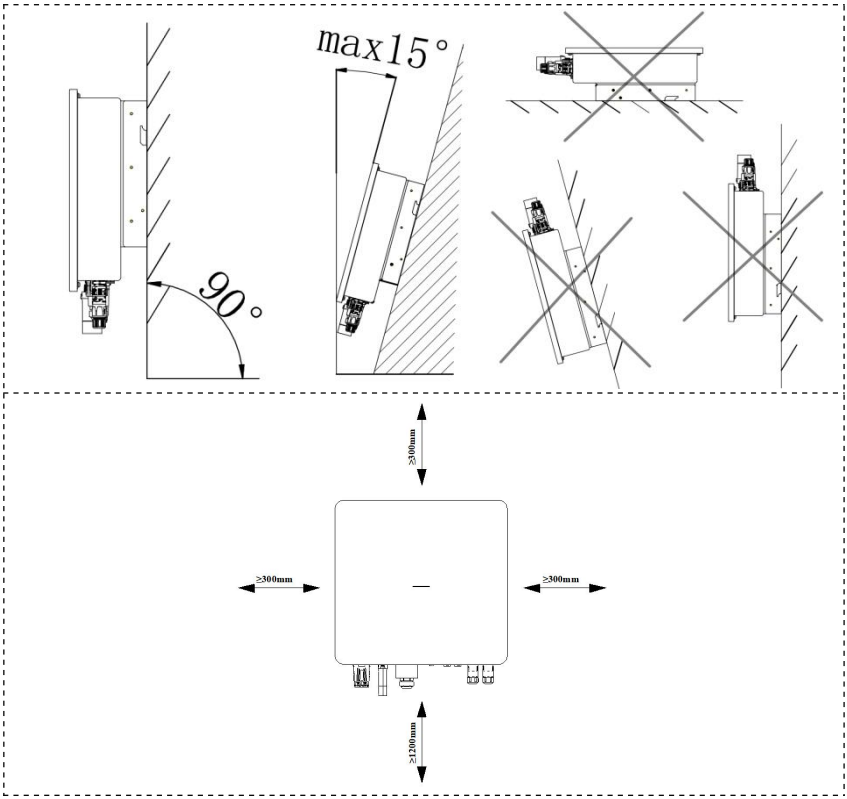
3) When the equipment is running, it will make noise. Do not install it on the carrier with poor sound insulation, so as to avoid the noise emitted by the equipment when it is working, which will cause trouble to residents in the living area.

5.1.3 Mounting Angle Requirements

1) Recommended inverter installation Angle: vertical or backward ≤15°.

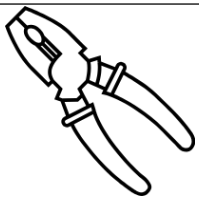
2) Do not invert, tilt forward, tilt back beyond the Angle, horizontal installation.

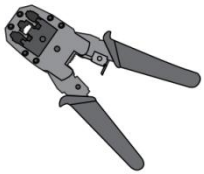
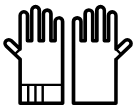
3) At least 1.2m from the ground below the inverter, about at least 300mm on sides and top of the inverter.


max15°
90°
≥300mm
≥300mm
≥300mm
≥1200mm

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		6mm cross-head screwdriver	Removing, installing screws and wiring
3		4mm cross-head screwdriver	Removing and installing load terminal screws
4		Removal tool	Removal of PV, BAT line end terminals
5		Wire strippers	Stripping wire
6		Crimping pliers	Crimping PV and BAT cables

7		Crimping pliers	Pressure welding grid, load end cable
8		6mm hex wrench	Fasten the grid terminal to the cable
9		Multimeter	Check whether the cable wiring is correct, the positive and negative battery terminals are correct and voltage, and grounding is reliable
10		Marking pen	Drilling mark
11		Tape	Measurement distance
12		Protective gloves	Wear when setting up the inverter
13		Goggles	Wear when drilling holes
14		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;

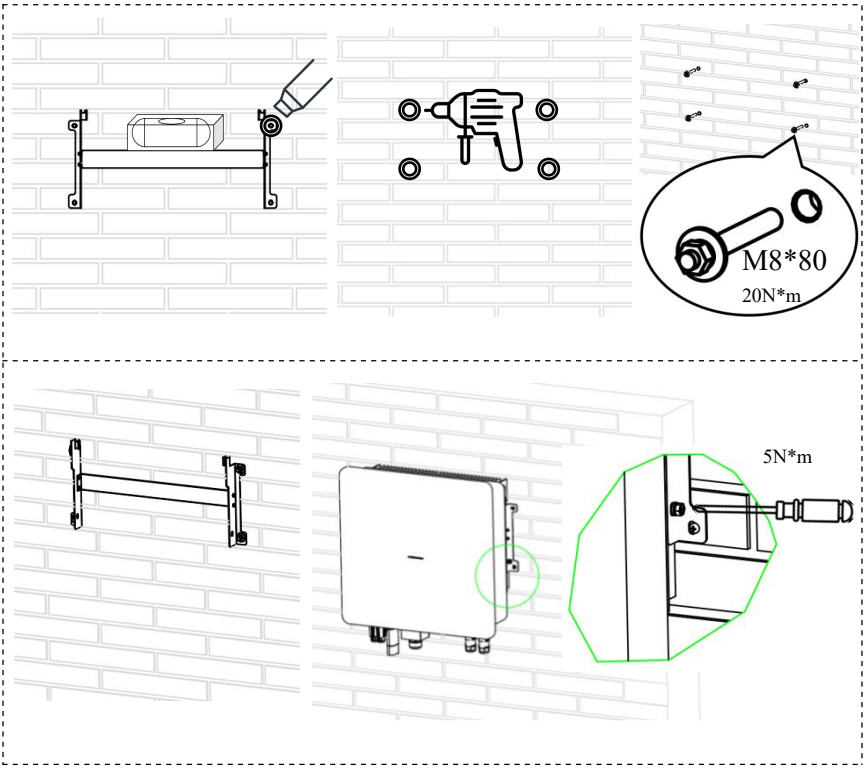


Figure 5.1 Illustrative diagram for installation of wall hangings

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 hybrid inverter wiring system as following page: (structure schematic, non-electrical wiring standard).

NOTE：

1、Recommended parameters for DC circuit breakers on the battery side: Rated voltage ≥ 100V, rated current ≥120A

2、Power grid side AC circuit breaker parameters recommended: rated voltage ≥500V, rated current ≥40A；leak current≥30mA

3、Back-up AC circuit breaker parameters recommended: rated voltage ≥500V, rated current ≥40A；leak current≥30mA

Note: During final installation, circuit breakers for external connections to the inverter shall comply with IEC 60947-1 and IEC 60947-2 certification requirements.

The maintenance bypass electrical connection diagram is shown below.

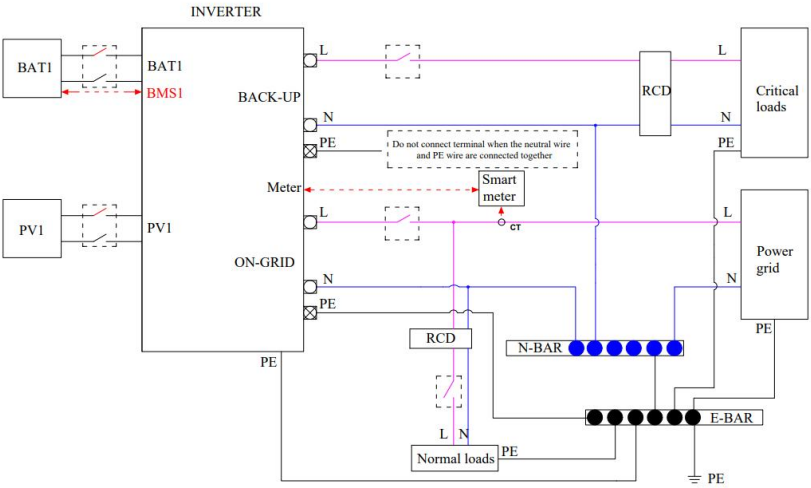


Figure 6.1 Electrical connection diagram

Note: Earth-leakage Sensitivity: ⩾30mA

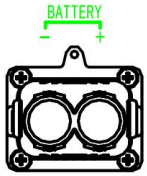
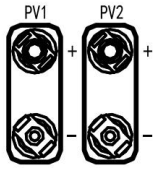
Earth-leakage Protection Class:Type A

Note: The AC Load cannot be connected to the grid and the inverter at the same time.

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 -: Connect to battery negative pole		Outdoor Multi-Core Copper Cable	Wire cross sectional area: 16mm²~25mm²
	+: Connect to PV positive pole -: Connect to PV negative pole		Outdoor Multi-Core Copper Cable	Wire cross sectional area: 4mm²~6mm²
	AC load port	L3 N PE	Outdoor Multi-Core Copper Cable	Wire cross sectional area: 6mm²~10mm²
	AC grid port	L3 N PE	Outdoor Multi-Core Copper Cable	Wire cross sectional area: 6mm²~10mm²

6.3 Connecting the Ground Cable (PE)

Attenion

- Since the inverter is a transformer-free type, it is required that the positive and negative electrodes of the photovoltaic array cannot be grounded, otherwise the inverter will fail. In the photovoltaic power generation system, all non-current-carrying metal components (such as brackets, distribution cabinet enclosures, inverter enclosures, etc.) should be connected to the ground.

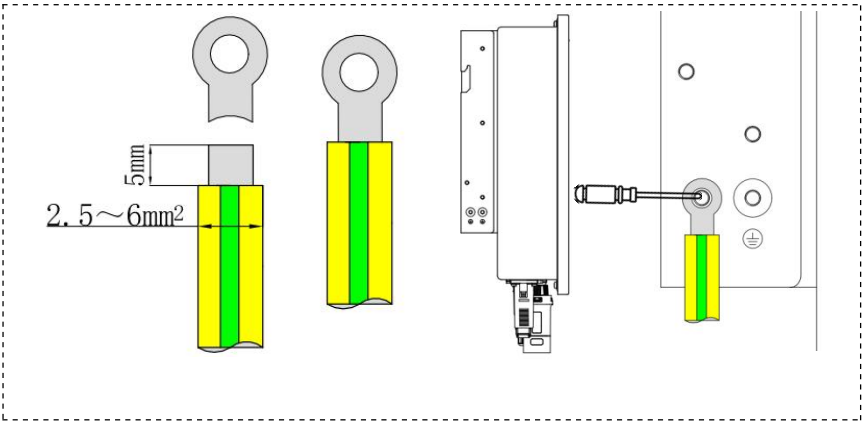


Figure 6.2 Schematic diagram of protection grounding

6.4 Connecting the PV Cable and the Battery Cable

Danger

PV series connection:

- Do not connect the same PV series to multiple inverters. Otherwise, the inverters may be damaged.
- Before connecting the PV series to the inverter, confirm the following information. Otherwise, the inverter may be permanently damaged or fire may occur, which may cause personal and property loss.
- Ensure that the maximum short circuit current and maximum input voltage of each PV are within the allowable range of the inverter.
- Ensure that the positive terminal of the PV string is connected to the PV+ of the inverter, and the negative terminal of the PV string is connected to the PV- of the inverter.

Battery cable connection:

- A battery short circuit may cause personal injury. However, a short circuit may release a large amount of energy, which may cause fire.
- Before connecting the battery cable, ensure that the inverter and battery are powered off, and the front and rear switches of the device are off.
- Do not connect or disconnect battery cables when the inverter is running. Improper

operations may result in electric shock.

- Do not connect the same battery string to multiple inverters. Otherwise, the inverters may be damaged.
- Do not connect loads between the inverter and the battery.
- When connecting battery cables, use insulation tools to prevent accidental electric shock or battery short circuit.
- Ensure that the open circuit battery voltage is within the allowable range of the inverter.

⚠ Warning

PV series connection:

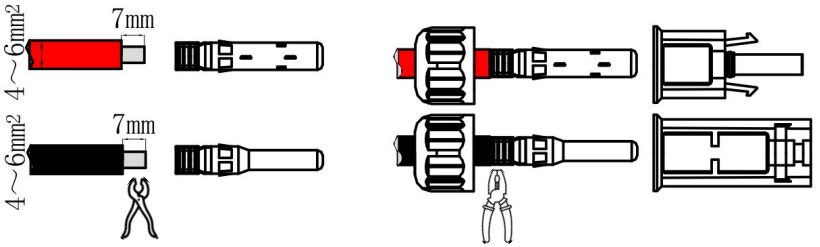
- The PV string output does not support grounding. Before connecting the PV string to the inverter, ensure that the minimum insulation resistance to the ground of the PV string meets the minimum insulation impedance requirement.

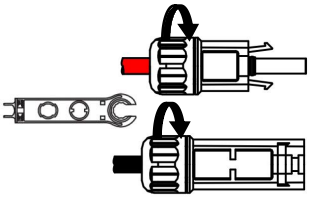
Battery cable connection:

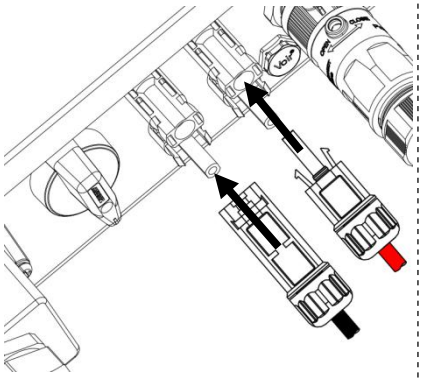
- When connecting cables, the battery cable matches BAT+ and BAT- on the battery terminal.
- Ensure that the cable core is fully connected into the wiring hole of the terminal.
- Ensure that the cables are securely connected. Otherwise, the terminal may overheat and damage the device.

Note: Before crimping the PV and BAT cables, check and make sure that the PV knob switch is set to the 'OFF' position and that the battery is disconnected.

PV Connection:





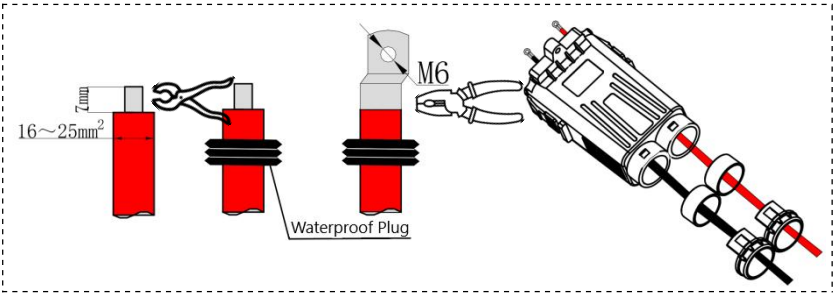


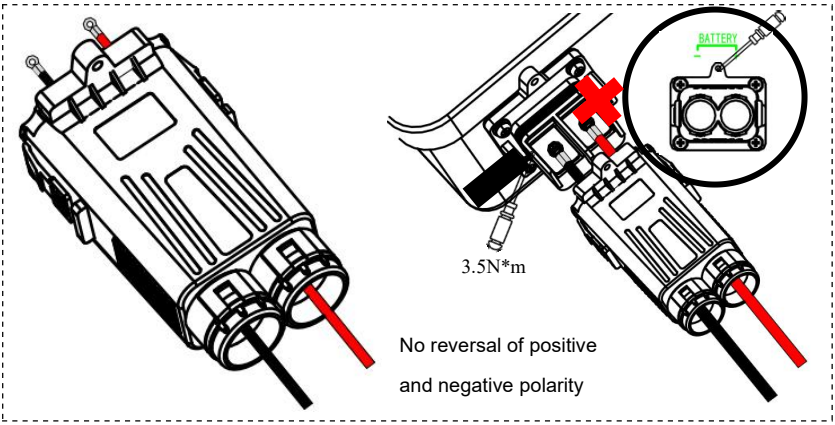
Remove the PV terminal:

Unplug the PV terminal after jamming

The PV modules used to connect to this inverter shall comply with the requirements of the IEC 61730 certified Class A standard, and the maximum permissible current through the external circuit breaker for each PV string and battery input over shall be greater than or equal to 30A.

Battery connection:

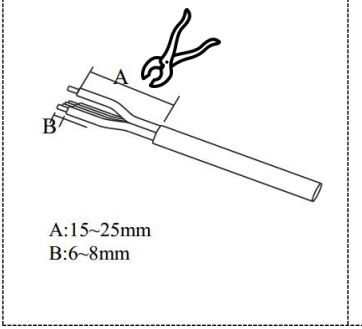


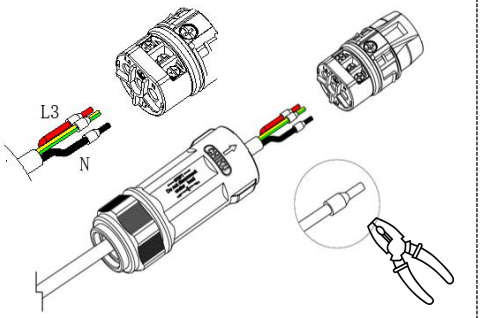


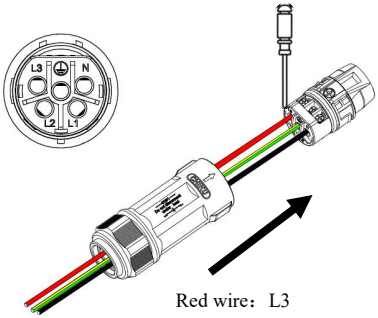
Note: Before crimping the PV and BAT cables, please check and make sure that the PV knob switch is set to the 'OFF' position and that the battery is disconnected!

6.5 Connecting the AC Grid-Connected Cable

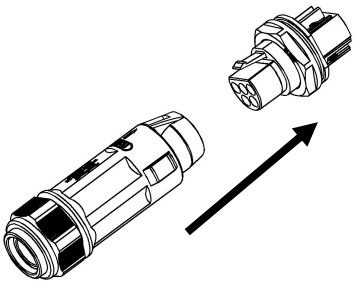
⚠ Warning
➢ Ensure that the AC cable matches the L3, N, and ground ports of the AC terminal properly. Incorrect connection may cause device damage. ➢ Ensure that the cable core is fully connected into the wiring hole of the terminal. ➢ Ensure that the insulation board at the AC terminal is tightly fastened. Ensure that the cables are securely connected. Otherwise, the terminal may overheat and damage the device.

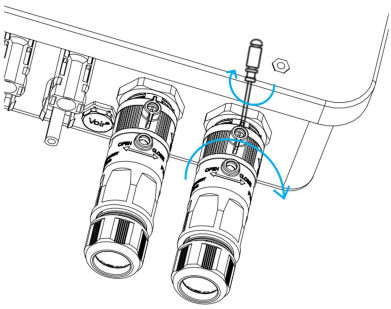




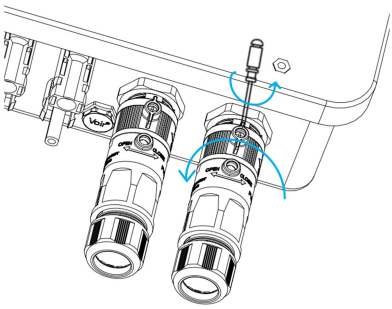


Red wire：L3
Black wire：N
Yellow&green wire：PE





Install



Dismantle

Dismantle

Install：Insert the terminals vertically into the pedestal,Use the screwdriver to lock

Dismantle：Use the screwdriver to unlock the lock,Pull out the terminals vertically into the pedestal

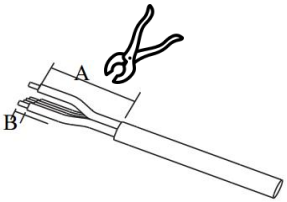
6.6 Connecting the AC Load-Connected Cable

Warning

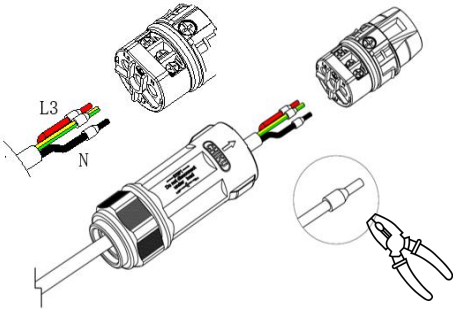
- Ensure that the AC cable matches the L3, N, and ground ports of the AC terminal properly. Incorrect connection may cause device damage.
- Ensure that the cable core is fully connected into the wiring hole of the terminal.

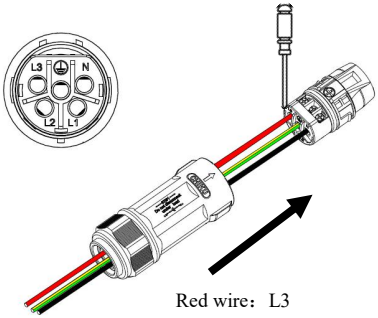
➢ Ensure that the insulation board at the AC terminal is tightly fastened.

Ensure that the cables are securely connected. Otherwise, the terminal may overheat and damage the device.

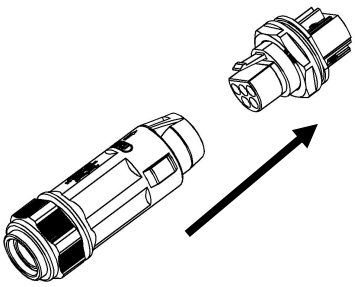


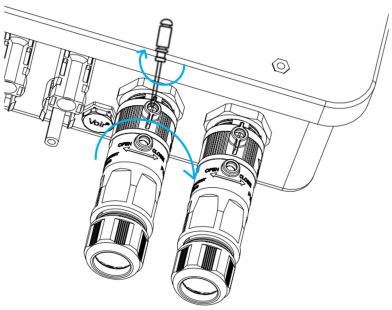
A:15~25mm
B:6~8mm



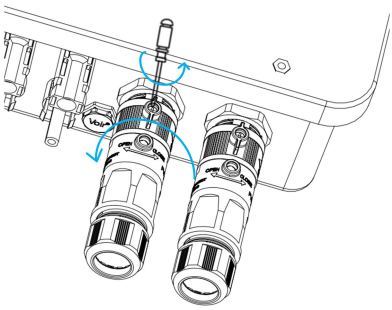


Red wire：L3
Black wire：N
Yellow&green wire：PE





Install



Dismantle

Dismantle

Install：Insert the terminals vertically into the pedestal,Use the screwdriver to lock

Dismantle：Use the screwdriver to unlock the lock,Pull out the terminals vertically into the pedestal

The maximum current allowed through the circuit breaker for off-grid load to the external connection should be greater than or equal to 30A.

6.7 Installation of Communication Dongle

The communication collector is an external component that you need to select by yourself.

The collector is connected. The default WIFI/ Bluetooth module is used for remote monitoring and control of the inverter.

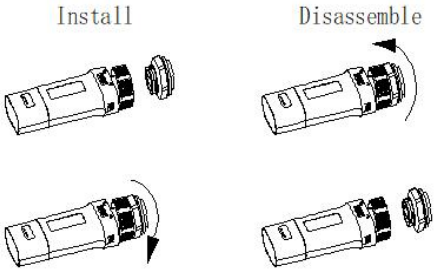


Figure 6.2 Communication interface and installation and disassembly diagram

Table 6-2 Indicators on the AGN8 WIFI Dongle

LED	state	Specific meanings
RUN&COM&NET	Alternating flashing (cycle 1500ms, each light flashes for 500ms in sequence)	Self test mode
	Flashing together (cycle 1 second, off 900ms, on 100ms)	Dongle is currently upgrading (including Bluetooth App upgrade)
	Illuminate together for 5 seconds	Dongle upgrade failed
RUN	Slow flashing (on for 1 second and off for 1 second)	Dongle is running normally
	Light off	Dongle running abnormally
	Twice flashing (on (off) 100ms, off (on) 100ms, twice）	Dongle sends Bluetooth data to the app
COM	Flash (on for 200ms, off for 200ms)	Dongle time not synchronized (scanning will not start)
	Light off	Abnormal southbound communication
	Flashing once (on (off) 100ms, off (on) 100ms, once)	Normal southbound communication
NET	Flash	Connecting to WiFi
	Light off	Connecting to MQTT
	Slow flashing	Connecting to platform
	Always on	Successfully connected to the platform
	Twice flashing	Dongle sends platform data

Table 6-3 Meaning of AGN9 4G Dongle indicator light

LED	state	Specific meanings

RUN&COM&NET	/	/
RUN	Always on	The process from power on to initialization
	Flash (with an interval of 100ms)	Gateway initialization completed, flashing for 5 seconds
	Twice flashing (on (off) 100ms, off (on) 100ms, twice）	Slow flashing (with an interval of 1 second)
COM	/	/
NET	Always on	Looking for the internet or on a call
	Flash (interval 200ms)	Data connection established or network registered
	Slow flashing (with an interval of 800ms)	2G/3G network registered
	Light off	Shutdown or module sleep

6.8 Connecting the Communication Port

Multifunctional communication port, including meter communication, BMS communication, DRMS, parallel communication and external dry contact signal.

Step 1: Thread the cable through the waterproof housing of the signal interface and its respective waterproof plug, and crimp the RJ45 terminals in the order of the pins.

Step 2: Insert the cable into the communication port on the device side.

Step 3: Fasten the waterproof cover with screws.

Step 4: Tighten the waterproof nut.

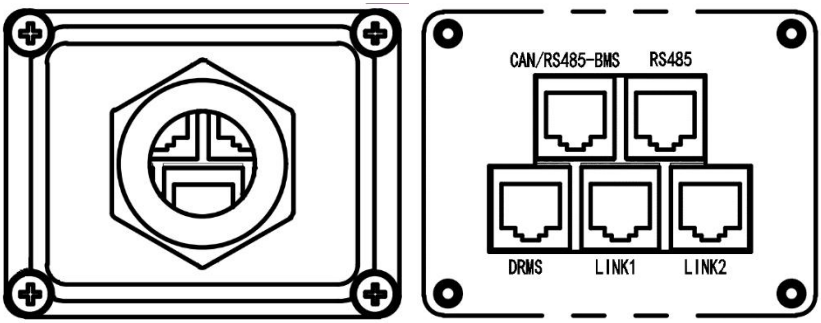


Figure 6.3 Interface diagram

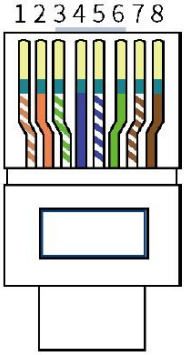


Figure 6.4 RJ45Sequence of RJ45 crystal terminals

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

6.8.1 meter and dry contact connection

Acrel ADL200N-CT

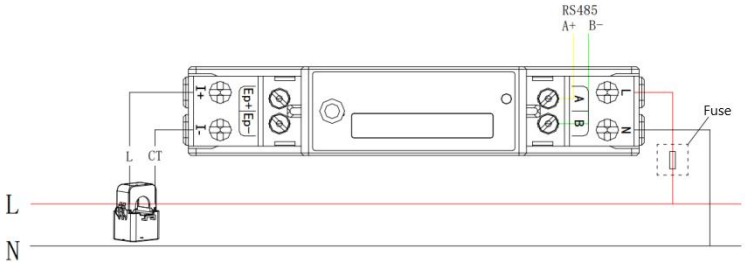


Figure 6.5 Smart Meter Terminal Wiring Description Diagram

Direction of the current wire is shown in Figure 6.6, with the arrow pointing towards the grid。

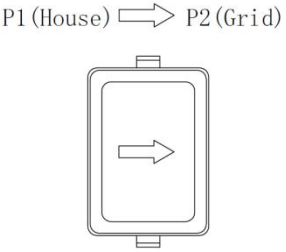


Figure 6.6 CT direction

Table 6-4 Description of dry contact ports

PIN	Definition	Fuction	Note
1	OP-	DO1	External dry contact port
2	OP+		

3	OP1-	DO2	
4	OP1+		
5	GND_SELV	Grounding	Meter communication
6	GND_SELV		
7	RS485_A_EEM	RS485A	
8	RS485_B_EEM	RS485B	

6.8.2 BMS Communication Connection

Table 6-5 Description of BMS ports

PIN	PIN	Definition	Fuction
1	GND_SELV	Grounding	Communication with Li-ion battery BMS, CAN and RS485 communication for Li-ion battery can be adapted.
2	GND_SELV	Grounding	
3	/	NC	
4	CAN_A_H	CANH data	
5	CAN_A_L	CANL data	
6	/	NC	
7	RS485_A_BMS	RS485A	
8	RS485_B_BMS	RS485B	

Note: Communication with lithium batteries requires attention to the battery's communication port sequence and pin definition.

6.8.3 DRMS/DI connection

Table 6-6 Description of DRM ports

PIN	Definition	Function	Color	Note
1	DRM1/5	① The DRMS interface is applicable to the Australian AS-NZS-4777.2 (some European requirements) safety standard	Orange &White	DRMs/diesel generator sampling function multiplexed port
2	DRM2/6		Orange	
3	DRM3/7		Green& White	
4	DRM4/8		Blue	

5	REF GEN	②diesel generator function DI input	Blue& White	
6	COM LOAD		Green	
7	/	NC	Brown& White	NC
8	/	NC	Brown	

6.8.4 Paralleling

If multiple inverters are used, connect the terminal of the network cable to Pa1 of the first inverter, connect the other end to Pa2 of the second inverter, and so on. Table 6-7 describes the signal of the network cable , Figure 6.7 shows the sequence of the network cable connection.

Table 6-7 Description of parallel ports

PIN	LINK1	LINK2	Note
1	CON2_AO	CON1_AO	Parallel signal
2	CON2_BO	CON1_BO	
3	CON2_AI	CON1_AI	
4	CON2_BI	CON1_BI	
5-6	/	/	
7	CON_SyncH	CON_SyncH	
8	CON_SyncL	CON_SyncL	

LINK1 port wiring: LINK2 port wiring:

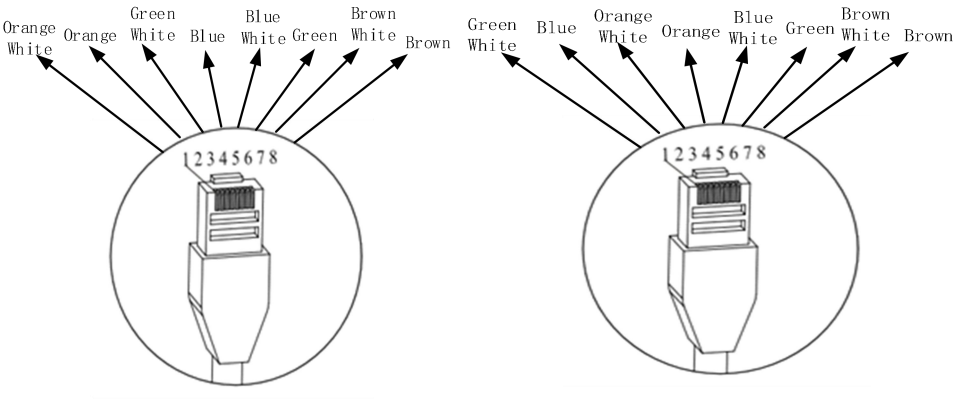


Figure 6.7 Parallel communication wiring diagram

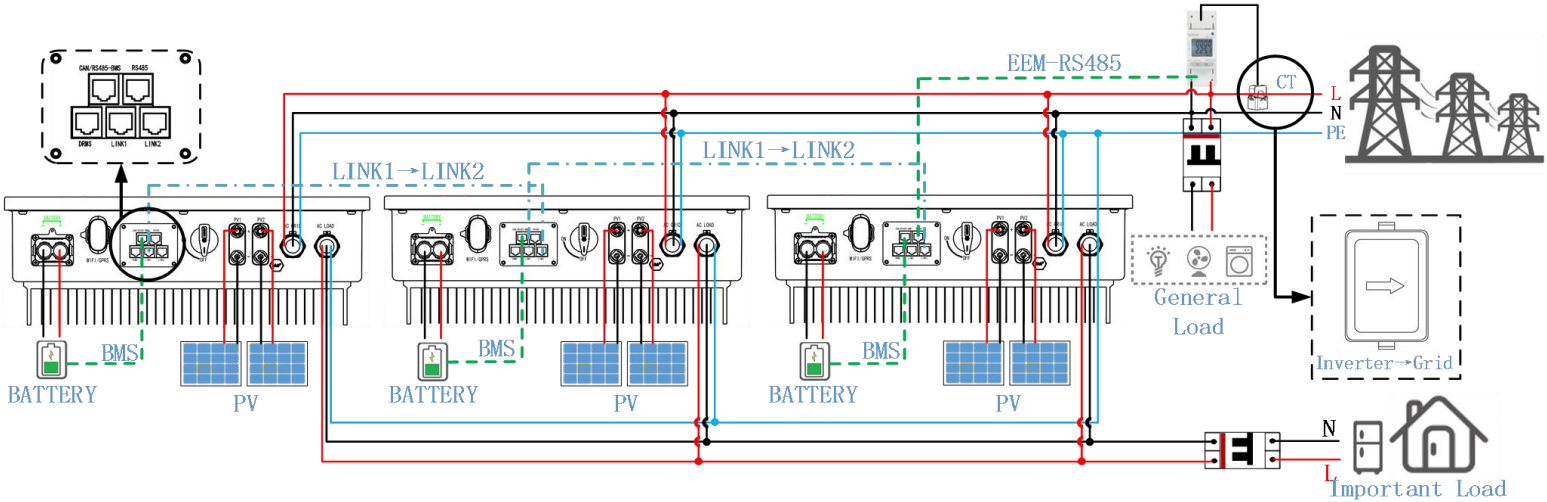
Application note:

- Supports a maximum of 6 three-phase off-grid inverters in parallel;
- Ensure that the inverters are connected to parallel lines;
- Ensure that the load power is less than the maximum parallel power.
- The length of the cable connecting the load end of the inverter to the BACK-UP end of each device must be consistent to ensure that the loop impedance is consistent and the load current is approximately equal to the current distributed to each inverter.

The selection of parallel electric meter is shown in the table below, and the standard connection is shown in the figure below. For detailed operation, see the operation manual of the parallel system.

P	Meter type
P≤80Kw	ADL400N-CT/D16--120A
80Kw≤P≤150Kw	ADL400N-CT/D24--200A
150Kw≤P≤240Kw	ADL400N-CT/D36--300A
240Kw<P	ADL400+Supporting transformer (selected according to actual power)
Note: 1.parallel inverter (host & slave) model must be consistent 2.P= inverter power + total load power	

Parallel standard wiring as shown below (structure schematic, non-electrical wiring standard, need to connect the circuit breaker correctly according to the electrical wiring diagram)



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 Power off

Follow these steps to turn off the inverter

1) Disconnect the AC circuit breaker between the inverter On Grid port and the Grid;
2) Turn off the PV DC switch on the inverter;
3) Turn off the battery and Disconnect the DC switch between the battery and the inverter;

4) Disconnect the AC circuit breaker between the inverter Back up port and the load.

7.4 Working Mode

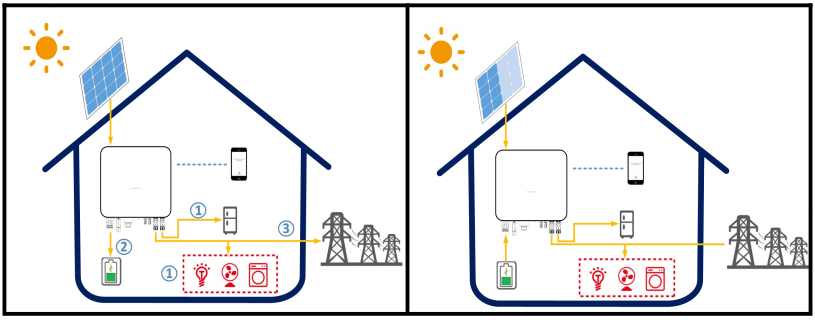
7.4.1 Self-use Mode (default mode)

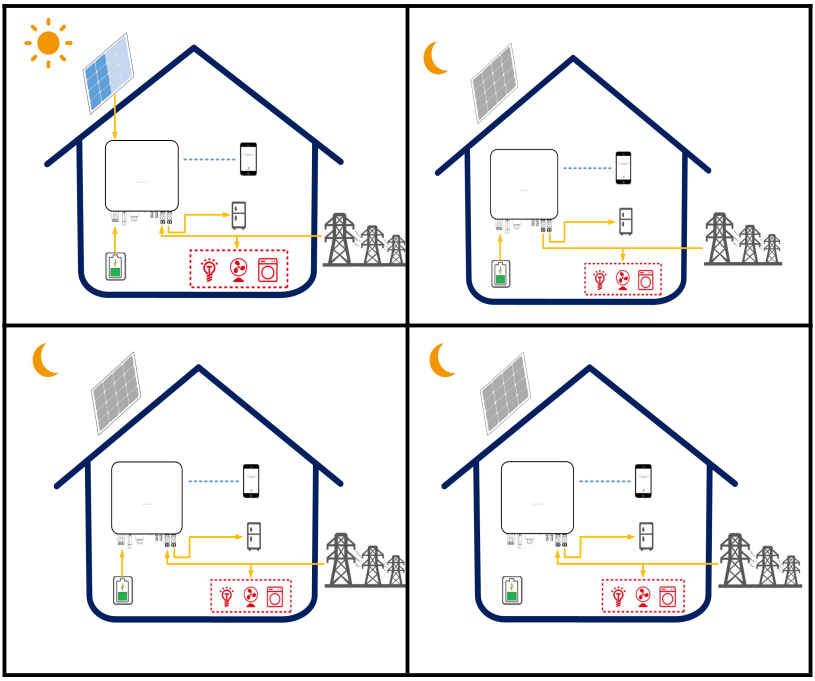
Function:

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.
- When the PV is insufficient, the PV and battery supply power to the load.
- When the PV and battery are insufficient, the PV, battery, and power grid work together to supply power to the load.
- When the PV is not working and the battery is sufficient, the battery supplies power to the load.
- When the PV is not working and the battery is insufficient, the battery and the grid work together to supply power to the load.
- When the PV and battery are not working, the power grid supplies power to the load, forming a bypass output.
- When the power grid is unable to supply power, the photovoltaic and battery jointly power the load.





7.4.2 Timed Charge Mode

Function:

Set the charging period according to the user's own requirements. For example, when the electricity price is high during the day, the battery and photovoltaic power are used to power the load, and when the electricity price is low at night, the battery is charged with the electricity of the grid, so as to achieve the role of peak cutting and valley filling. Non-charge and non-discharge inverters operate in self-actuating mode.

Specific working mode:

Charging period:

- When there is enough PV, the PV charges the battery, and the remaining power supplies the load.
- When PV is insufficient, the PV and the grid work together to charge the battery and power the load.

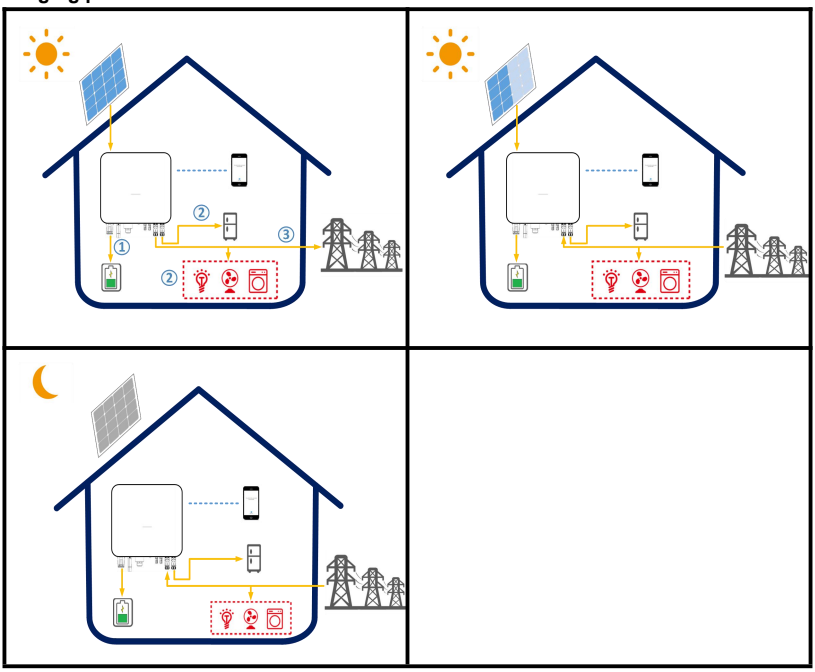
- When PV is not working, the grid charges the battery and powers the load.

Discharging period:

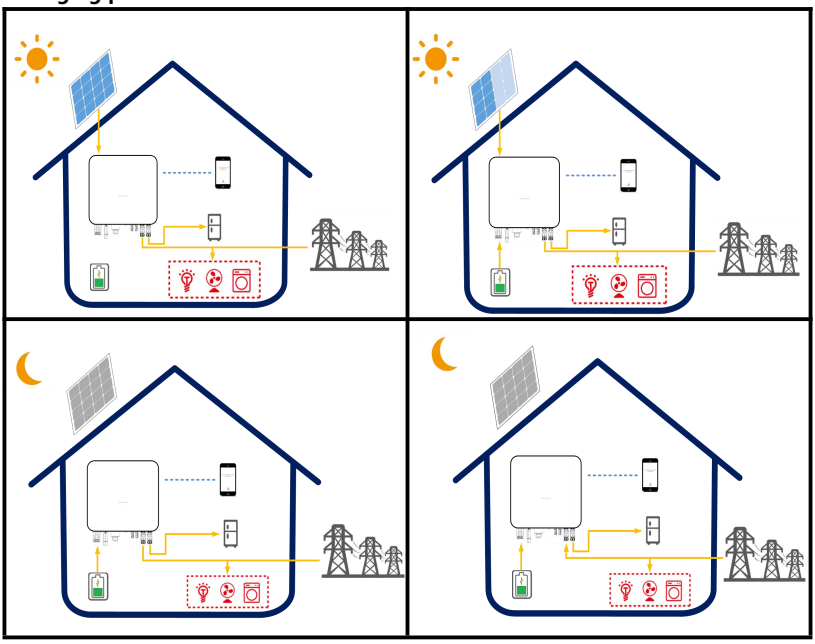
- When PV is enough，PV supplies power to load.
- When PV is insufficient，PV and battery supplies power to load together.
- When PV is not working，and the battery is sufficient, the battery supplies power to the load.
- When PV is not working，and the battery is insufficient，battery and grid supplies power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

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.

Charging period:



Disharging period:



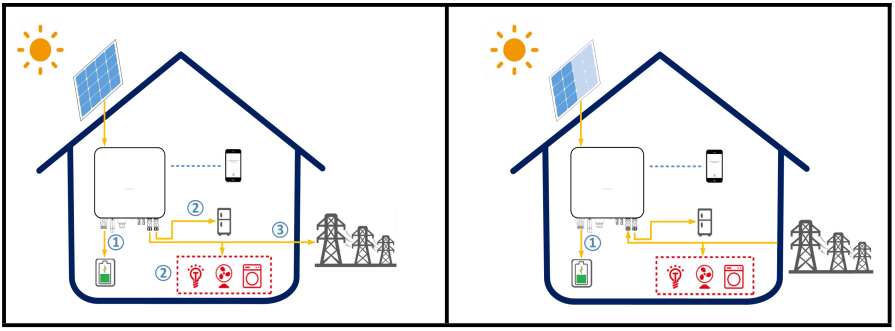
7.4.3 Backup mode/disaster recovery mode

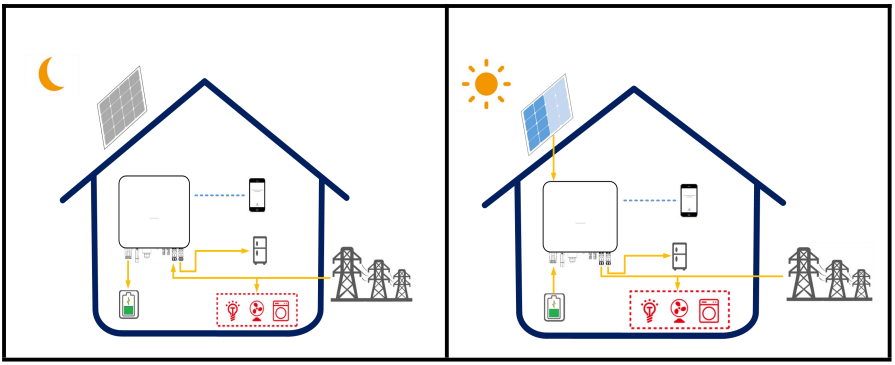
Function:

Always keep the battery fully charged to cope with sudden power outages or other emergency situations, ensuring that users can use the battery's power reserve to supply power to the load in case of emergencies.

Specific working mode:

- When the PV is sufficient, the PV first charges the battery and then supplies power to the load, and the remaining power can be fed back to the grid.
- When PV is insufficient, PV and the power grid give priority to charging the battery, while the power grid supplies power to the load.
- When the PV is not working, the power grid charges the battery and supplies power to the load.
- When the power grid is unable to supply power, PV and batteries jointly supply power to the load.





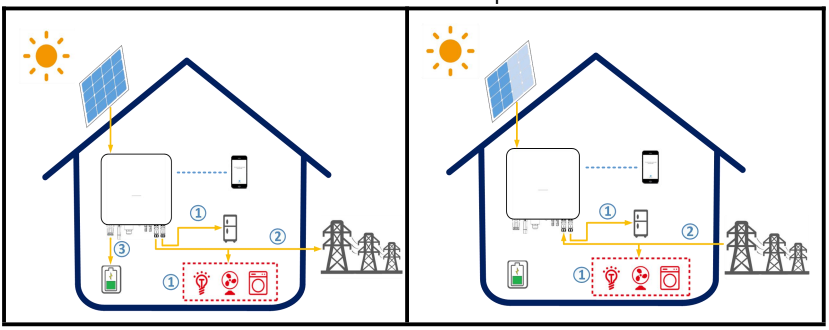
7.4.4 Priority mode for selling electricity

Function:

After meeting the demand for electricity, excess PV power generation is prioritized for sale to the grid.

Specific working mode:

- When the PV is sufficient, it prioritizes supplying power to the load before feeding the grid, and the remaining power can be used to charge the battery.
- When the PV is insufficient and the battery is insufficient, the PV and the grid supply power to the load together.
- The rest of the situation is the same as the spontaneous self use mode.



7.5 Operating mode

7.5.1 Operation mode description

Table 7-1 Explanation of Inverter Operation Modes

NO.	Operating mode	Description
1	Waiting	➢ Waiting phase after the machine 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.

7.5.2Indicator light description

The strip indicator light is located in the middle of the equipment panel and represents the inverter status through three colors: red, green, and blue.

Table 7-2 Description of Indicator Light Status

Display color	Indicator light status	Corresponding status description	Remark
Green	Light	AC GRID	Means the machine is currently operating in a grid connected state, capable of exchanging energy with the power grid, and the load can be powered on for operation.

	Flashing for 1 second/time	be ready	Means the machine is in the power on state and needs to wait until the power on is complete before the load can be powered on and run.
Blue 	Light	off-grid	The machine is currently operating in an off grid state and cannot exchange energy with the grid. The load can be powered on for operation.
Red 	Light	system failure	Means the machine is currently in a shutdown state, with a serious alarm and the load unable to power on for operation.

8.App introduce

8.1 APP Download

Users need to choose between a WiFi dongle or a 4G dongle when using the app.

ESS LINK: Please contact the manufacturer for operation and use, and refer to the ESS LINK operation and user manual.

Android：Please scan the QR code below to obtain it.

IOS：Please scan the QR code below or go to the App Store to search for ESS LINK download.

Android apk

Google play

IOS

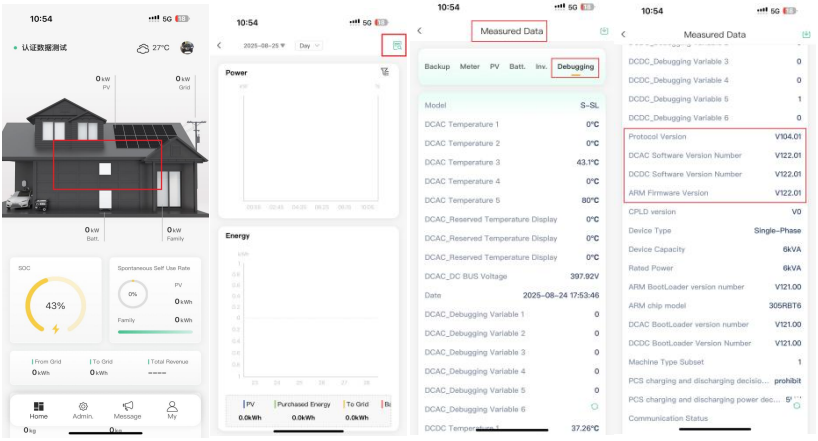
8.2 APP debugging（Parameter Settings[Advanced]）

The monitoring and debugging interface（Advanced） is open only to inverter manufacturers, operation and maintenance providers. The inverter parameters have been set before delivery. End-User(People who buy inverters) cannot perform operations on the inverter.

8.3 Commissioning inverter

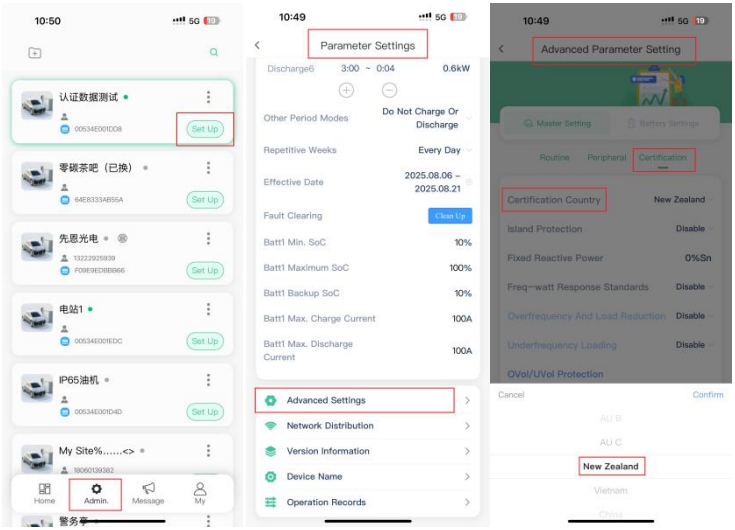
- Check the firmware

Home→Measured Data→Debugging→Software Version Number



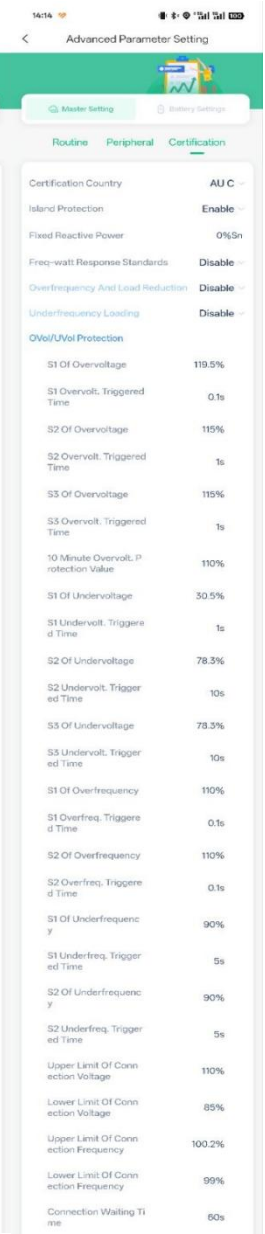
- grid protection settings

Admin→Set Up→Parameter Settings→Advanced Settings→Certification




Advanced Parameter Setting
Master Setting
Battery Settings
Routine
Peripheral
Certification
Certification Country AU A
Island Protection Disable
Fixed Reactive Power 0%Sn
Freq-watt Response Standards Disable
Overfrequency And Load Reduction Disable
Underfrequency Loading Disable
OVol/UVol Protection
S1 Of Overvoltage 119.5%
S1 Overvolt. Triggered Time 0.1s
S2 Of Overvoltage 115%
S2 Overvolt. Triggered Time 1s
S3 Of Overvoltage 115%
S3 Overvolt. Triggered Time 1s
10 Minute Overvolt. Protection Value 110%
S1 Of Undervoltage 30.5%
S1 Undervolt. Triggered Time 1s
S2 Of Undervoltage 78.3%
S2 Undervolt. Triggered Time 10s
S3 Of Undervoltage 78.3%
S3 Undervolt. Triggered Time 10s
S1 Of Overfrequency 104%
S1 Overfreq. Triggered Time 0.1s
S2 Of Overfrequency 104%
S2 Overfreq. Triggered Time 0.1s
S1 Of Underfrequency 94%
S1 Underfreq. Triggered Time 1s
S2 Of Underfrequency 94%
S2 Underfreq. Triggered Time 1s
Upper Limit Of Connection Voltage 110%
Lower Limit Of Connection Voltage 85%
Upper Limit Of Connection Frequency 100.2%
Lower Limit Of Connection Frequency 99%
Connection Waiting Time 60s


Advanced Parameter Setting
Master Setting
Battery Settings
Routine
Peripheral
Certification
Certification Country AU B
Island Protection Disable
Fixed Reactive Power 0%Sn
Freq-watt Response Standards Disable
Overfrequency And Load Reduction Disable
Underfrequency Loading Disable
OVol/UVol Protection
S1 Of Overvoltage 119.5%
S1 Overvolt. Triggered Time 0.1s
S2 Of Overvoltage 115%
S2 Overvolt. Triggered Time 1s
S3 Of Overvoltage 115%
S3 Overvolt. Triggered Time 1s
10 Minute Overvolt. Protection Value 110%
S1 Of Undervoltage 30.5%
S1 Undervolt. Triggered Time 1s
S2 Of Undervoltage 78.3%
S2 Undervolt. Triggered Time 10s
S3 Of Undervoltage 78.3%
S3 Undervolt. Triggered Time 10s
S1 Of Overfrequency 104%
S1 Overfreq. Triggered Time 0.1s
S2 Of Overfrequency 104%
S2 Overfreq. Triggered Time 0.1s
S1 Of Underfrequency 94%
S1 Underfreq. Triggered Time 1s
S2 Of Underfrequency 94%
S2 Underfreq. Triggered Time 1s
Upper Limit Of Connection Voltage 110%
Lower Limit Of Connection Voltage 85%
Upper Limit Of Connection Frequency 100.2%
Lower Limit Of Connection Frequency 99%
Connection Waiting Time 60s

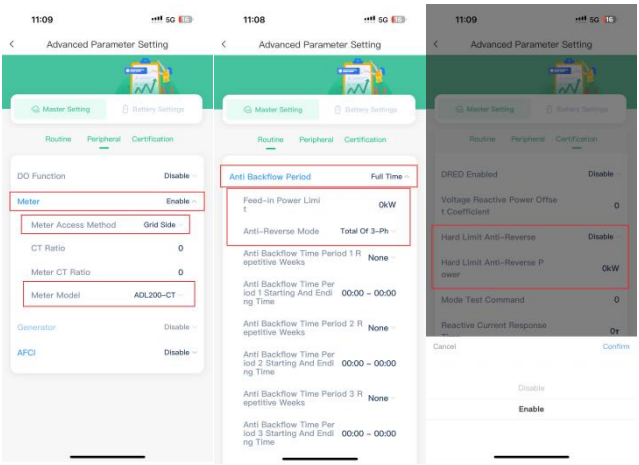

Advanced Parameter Setting
Master Setting
Battery Settings
Routine
Peripheral
Certification
Certification Country AU C
Island Protection Enable
Fixed Reactive Power 0%Sn
Freq-watt Response Standards Disable
Overfrequency And Load Reduction Disable
Underfrequency Loading Disable
OVol/UVol Protection
S1 Of Overvoltage 119.5%
S1 Overvolt. Triggered Time 0.1s
S2 Of Overvoltage 115%
S2 Overvolt. Triggered Time 1s
S3 Of Overvoltage 115%
S3 Overvolt. Triggered Time 1s
10 Minute Overvolt. Protection Value 110%
S1 Of Undervoltage 30.5%
S1 Undervolt. Triggered Time 1s
S2 Of Undervoltage 78.3%
S2 Undervolt. Triggered Time 10s
S3 Of Undervoltage 78.3%
S3 Undervolt. Triggered Time 10s
S1 Of Overfrequency 110%
S1 Overfreq. Triggered Time 0.1s
S2 Of Overfrequency 110%
S2 Overfreq. Triggered Time 0.1s
S1 Of Underfrequency 90%
S1 Underfreq. Triggered Time 5s
S2 Of Underfrequency 90%
S2 Underfreq. Triggered Time 5s
Upper Limit Of Connection Voltage 110%
Lower Limit Of Connection Voltage 85%
Upper Limit Of Connection Frequency 100.2%
Lower Limit Of Connection Frequency 99%
Connection Waiting Time 60s


10:42
Advanced Parameter Setting
Master Setting
Battery Settings
Routine
Peripheral
Certification
Certification Country
New Zealand
Island Protection
Disable
Fixed Reactive Power
0%Sn
Freq-watt Response Standards
Disable
Overfrequency And Load Reduction
Disable
Underfrequency Loading
Disable
OVol/UVol Protection
S1 Of Overvoltage
119.5%
S1 Overvolt. Triggered Time
0.1s
S2 Of Overvoltage
115%
S2 Overvolt. Triggered Time
1s
S3 Of Overvoltage
115%
S3 Overvolt. Triggered Time
1s
10 Minute Overvolt. Protection Value
110%
S1 Of Undervoltage
30.5%
S1 Undervolt. Triggered Time
1s
S2 Of Undervoltage
78.3%
S2 Undervolt. Triggered Time
10s
S3 Of Undervoltage
78.3%
S3 Undervolt. Triggered Time
10s
S1 Of Overfrequency
110%
S1 Overfreq. Triggered Time
0.1s
S2 Of Overfrequency
110%
S2 Overfreq. Triggered Time
0.1s
S1 Of Underfrequency
90%
S1 Underfreq. Triggered Time
1s
S2 Of Underfrequency
90%
S2 Underfreq. Triggered Time
1s
Upper Limit Of Connection Voltage
110%
Lower Limit Of Connection Voltage
85%
Upper Limit Of Connection Frequency
100.2%
Lower Limit Of Connection Frequency
99%
Connection Waiting Time
60s

8.4 Generation Limit and Export Limit Control settings

- meter settings/Soft limits/hard limits

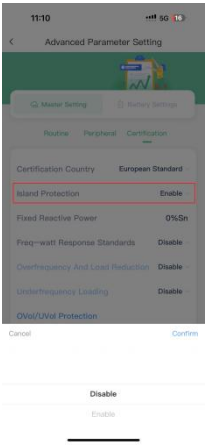
Admin→Set Up→Parameter Settings→Advanced Settings→Peripheral/Routine



Meter Soft limits hard limits

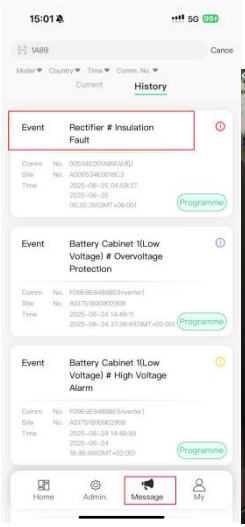
8.5 Anti-islanding

Admin→Set Up→Parameter Settings→Advanced Settings→Certification



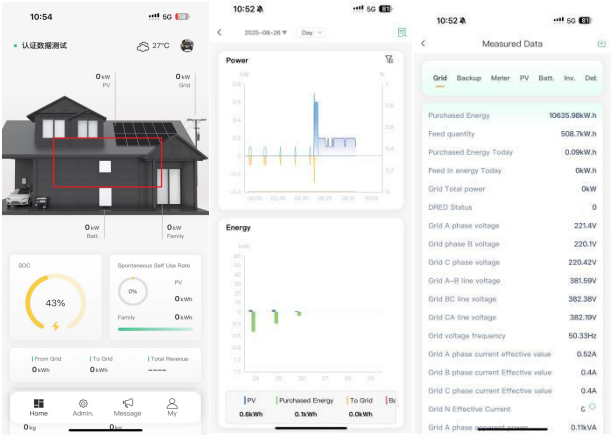
8.6 Insulation Fault

APP:Home → Message(This function does not need to be set, and the inverter is automatically detected when it is turned on)



8.7 inverter monitoring

Home→Measured Data



9.Troubleshooting and Maintenance

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

9.1Alarm and solution

Table 9-1 Alarm Information List and Solutions

NO.	Error	Solution
1	Abnormal voltage in the power grid	● If there is occasional alarm, it may be a short-term abnormality in the power grid. After the power grid returns to normal, the inverter will automatically resume normal operation. If the alarm is frequent, check if the grid voltage/frequency is within an acceptable range. If so, please check the AC circuit breaker and AC wiring of the inverter. ● If the voltage/frequency of the power grid is not within an acceptable range and the AC wiring is correct, but there are multiple alarms, please contact technical support to change the overvoltage and undervoltage and underfrequency protection values of the power grid.
2	Abnormal power grid frequency	
3	The ambient temperature is too high	● Please ensure that the inverter is installed in a place without direct sunlight. ● Please ensure that the inverter is installed in a cool/well ventilated area. ● Please ensure that the inverter is installed vertically and the ambient temperature is below the upper temperature limit of the inverter. ● If the fault persists, please contact your dealer
4	The temperature of the radiator is too high	

		or after-sales service center.
5	Insulation fault	● Check the impedance of the photovoltaic string to the protective ground. If the resistance value is greater than 20k Ω, it is normal. If the resistance value is less than 20k Ω, please investigate the short-circuit point and rectify it; Check if the protective grounding wire of the inverter is connected correctly. If there are no abnormal alarms during the power on test, it will automatically clear or send a fault clearing command. ● If it is confirmed that the impedance is indeed lower than the default value in cloudy and rainy weather, please reset the "insulation impedance protection point".
6	Leakage protection fault	● Check if there are any problems with the machine or wiring, and send a fault clearing command to retest if there are no issues。
7	Island protection	● Confirm if the power grid is lost. ● Contact your dealer or after-sales service center.
8	Battery 1 is not connected	● Check if the battery overvoltage setting is inconsistent with the battery specifications. ● Please check if Battery 1 is connected correctly or if the voltage is abnormal. Once confirmed, the warning will automatically clear or a fault clearing command will be sent.
9	Battery 1 overvoltage	
10	Battery 1 undervoltage	
11	Battery 1 discharge terminated	

12	PV 1 not connected	● Please check if PV 1 is connected correctly or if the voltage is abnormal. Once confirmed, the alarm will automatically clear or a fault clearing command will be sent.
13	PV 1 overvoltage	● Check if the PV series voltage is higher than the maximum input voltage of the inverter. If so, adjust the number of PV modules in series and reduce the PV string voltage to adapt to the input voltage range of the inverter. After calibration, the inverter will automatically return to its normal state.
14	Pv1 current uniformity abnormality	
15	PV 2 not connected	● Please check if PV 2 is connected correctly or if the voltage is abnormal. Once confirmed, the alarm will automatically clear or a fault clearing command will be sent.
16	PV 2 overvoltage	● Check if the PV series voltage is higher than the maximum input voltage of the inverter. If so, adjust the number of PV modules in series and reduce the PV string voltage to adapt to the input voltage range of the inverter. After calibration, the inverter will automatically return to its normal state.
17	PV 2 current sharing abnormality	
18	DC bus overvoltage	● Disconnect the AC output side switch and DC input side switch, and after 5 minutes, close the AC output side switch and DC input side switch.If the fault persists, please contact your dealer or after-sales service center.
19	DC bus undervoltage	
20	DC bus voltage imbalance	● The voltage fluctuation remains within the allowable range for 2 seconds before

		automatically clearing.
21	Inverter overload	● Please check if the inverter is working in overload state. After confirming normal operation, the alarm will automatically clear or send a fault clearing command within 10 minutes.
22	Inverter overload timeout	
23	Battery 1 overload timeout	
24	PV 1 overload timeout	
25	PV 2 overload timeout	
26	Inverter soft start failure	● Internal fault in the inverter, turn off the inverter, wait for 5 minutes, then turn on the inverter and send a fault clearing command to restart the soft start.
27	Battery 1 soft start failed	
28	DSP1 Parameter setting malfunction	● The alarm will be automatically cleared if the parameter settings are correct.
29	DSP2 Parameter setting malfunction	
30	DSP Communication Failure	● SPI after communication is normal, the alarm will be automatically cleared.
31	Relay self-test failed	● Send a fault clearing command to retest.
32	Inverter abnormality	● After clearing other faults, the alarm will be automatically cleared.
33	PV 1 soft start failure	● Inverter internal fault, turn off the inverter, wait for 5 minutes to turn on the inverter, send

34	PV 2 soft start failure	a fault clearing command to restart the soft start

9.2Regular maintenance

Warning

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

Table 9-2 Maintenance Instructions

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
DC switch	Continuously turn on and off the DC switch 10 times to ensure that the DC switch functions properly.	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

Table 10.1 Technical Parameter Description

Model	Isuna 3000S	Isuna 3600S	Isuna 4000S	Isuna 4600S	Isuna 5000S	Isuna 6000S
Battery parameters						
Battery input number	1					
Battery type	Lithium					
Rated battery voltage	51.2V					
Battery voltage range	42V-58V					
Max voltage	60V					
Rated charging and discharging power	3kW	3.6kW	4kW	4.6kW	5kW	5kW
Max charging and discharging current	75A	85A	85A	100A	100A	100A
Interface	RS485/CAN					
PV input						
PV input number	2					
Max input power①	6000Wp	7200Wp		8000Wp		9000Wp
Max inout voltage	600V					

Starting voltage	95V
MPPT Voltage range	80~550V
MPPT Full load voltage range	350~500V
Rated voltage	360V
MPPT number	2
MPPT string	1
MPPT Max input current	18A/18A
MPPT max short circuit current	22A/22A
Backfeed current	0A

Remark①: Recommend two MPPT input independently, per MPPT max power no more than 4500W

Grid parameters						
Rated output power	3000W	3600W	4000W	4600W	5000W	6000W
Max input power of grid	3600VA	5000VA	5000VA	6000VA	6000VA	6000VA
Max output current	13.6A	16.4A	18.2A	20.8A	22.7A	27.2A
Max input current of grid	16.4A	22.7A	22.7A	27.2A	27.2A	27.2A
Rated grid connected	220V/230V/240V					

voltage						
Voltage range of grid	184-276V					
Rated grid frequency	50Hz					
Grid frequency range	45Hz~65Hz					
Power factor	~1(0.8speed-up-0.8lag)					
THDi(@rated power)	<3%					
Off grid parameters						
Rated output power	3kVA	3.6kVA	4kVA	4.6kVA	5kVA	6kVA
Max output power	3kVA	3.6kVA	4kVA	4.6kVA	5kVA	6kVA
Max output current	13.6A	16.4A	18.2A	20.8A	22.7A	27.2A
Rated output voltage	230V					
Rated output frequency	50Hz					
THDu (@Linear Load)	<2%					
On/off grid switching time	<20ms					
Efficiency						
Efficiency in Europe	97.2%	97.2%	97.3%	97.3%	97.5%	97.5%
Maximum efficiency	97.5%	97.5%	97.8%	97.8%	98%	98%

Maximum battery charging and discharging efficiency	95.2%
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
AC overvoltage level	III
Battery and PV overvoltage level	II
Surge protection	Integration
Lightning Protection	Integration
General Parameters	
Installation method	Wall mounted

Isuna 3000S-6000S

Size	500mm*470mm*180mm
Weight	21kg
Standby power loss	≤10W
Temperature range	-25℃~+60℃（>40℃，Power reduced operation）
Humidity range	0~100%
Noise	<25dB（A）
Allowable altitude	<4000m （≤3000m full load，Reduce power by 5% for every 100m increase）
Cooling method	Natural cooling
IP Grade	IP65
Monitoring	LED/APP/WIFI/4G/Bluetooth（Optional）
Communication port	RS485/CAN/DRED/Dry contact/Parallel
Performance and Certification	
Parallel	Max 6 units in parallel
multiple phase	NO
Warranty	5 years
CE-LVD	IEC 62109-1, IEC 62109-2, EN 62109-1, EN 62109-2，IEC62477-1
CE-EMC	EN61000-6-1, EN61000-6-2, EN61000-6-3, EN61000-6-4,EN 62920

Grid	VDE-AR-N 4105,C10-11,G98/99,CEI 0-21,EN50549,NRS 097-2-1,R25,UNE217002, NTS 2.1,PEA,MEA,IEC 61727,IEC62116,NC RfG,AS/NZS 4777.1

NOTE:the inverter has not been tested to AS/NZS 4777.2:2020 for multiple inverter combinations and/or multiple phase inverter combinations so combinations should not be used or external devices should be used in accordance with the requirements of AS/NZS 4777.1.