

User Manual

Three-phase HV Off-grid Inverter
Isuna 10000TO-20000TO



Shenzhen Sinexcel Isuna
Energy Technology Co.,LTD

Catalogue

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1. Overview

This document describes the product information, installation, electrical connection, configuration and commissioning, troubleshooting and maintenance, and technical specifications of the three-phase off-grid 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 | Rate output power | Rated output voltage |
|---------------|-------------------|-----------------------------------|
| Isuna 10000TO | 10000W | 3L/N/PE,220/380Vac, 230/400Vac |
| Isuna 12000TO | 12000W | |
| Isuna 15000TO | 15000W | |
| Isuna 18000TO | 18000W | |
| Isuna 20000TO | 20000W | |

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





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 three-phase off-grid 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.

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|---|
|  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. |
|  Attention |
| 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.

| |
|--|
|  Attention |
| <ul style="list-style-type: none">➤ 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

| |
|---|
|  Attention |
| <ul style="list-style-type: none">➤ 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



- 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.



- 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



- 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.

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








Attention

- 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 three-phase off-grid 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 deliverables are correct and whether the appearance is damaged. If damaged, please contact your dealer.


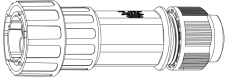


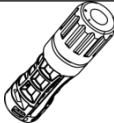


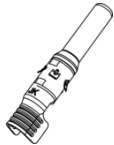
3.2 Packing List

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


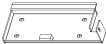
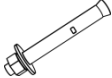


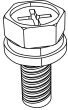

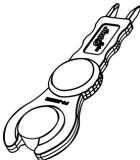

Table 3-1 Components and mechanical parts to be delivered

| No. | photos | descriptions | quantity |
|-----|---|--|----------|
| 1 |  | Inverter | 1 PCS |
| 2 |  | WIFI dongle (optional) | 1 PCS |
| 3 |  | User manual | 1 PCS |
| 4 |  | Certificate, Quality assurance card | 1 PCS |
| 5 |  | Delivery inspection report | 1 PCS |
| 6 |  | AC load terminal | 1 PCS |


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| | | | |
|----|---|--|-------|
| 7 |  | Black 6.0mm ² cable lugs (for load side wiring) | 5 PCS |
| 8 |  | AC grid terminal | 1 PCS |
| 9 |  | Red 10mm ² cable lugs (for power grid side wiring) | 5 PCS |
| 10 |  | BAT+ wire end input terminal plastic case | 2 PCS |
| 11 |  | BAT- wire end input terminal plastic case | 2 PCS |
| 12 |  | PV+ wire end input terminal plastic case | 4 PCS |
| 13 |  | PV- wire end input terminal plastic case | 4 PCS |
| 14 |  | PV-&BAT-wire end input terminal metal core | 6 PCS |

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| | | | |
|----|---|--|-------|
| 15 |  | PV+ & BAT+ wire end input terminal metal core | 6 PCS |
| 16 |  | Wall-mounted rear cover | 1 PCS |
| 17 |  | M8*80 expansion bolt | 4 PCS |
| 18 |  | Waterproof cover | 1 PCS |
| 19 |  | Cross recessed hexagon head combination screw M4*10 | 4 PCS |
| 20 |  | Cross recessed hexagon head combination screw M6*16 | 2 PCS |
| 21 |  | BMS communication line | 2 PCS |
| 22 |  | PV & BAT Disassembly wrench | 1 PCS |
| 23 |  | 6mm hex wrench | 1 PCS |

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| | | | |
|----|---|-----------|-------|
| 24 |  | Desiccant | 1 PCS |
|----|---|-----------|-------|

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

Three-phase off-grid 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, three-phase off-grid 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 $\leq 0.7 \times$ rated output power of inverter.

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4.3 Appearance Description

4.3.1 Appearance Description

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

| | | | |
|----|----------------------------------|----|--------------------------------|
| 1 | PV DC input port (PV+/-) | 2 | PV DC input switch |
| 3 | Waterproof and breathable device | 4 | Battery DC input port (BAT+/-) |
| 5 | Communication module interface | 6 | WiFi/4G interface |
| 7 | Off-grid AC wiring port | 8 | Grid-connected AC wiring port |
| 9 | Fan assembly | 10 | Protective ground terminal |
| 11 | Inductive cooling box | | |

Table 4-1 Appearance of the inverter

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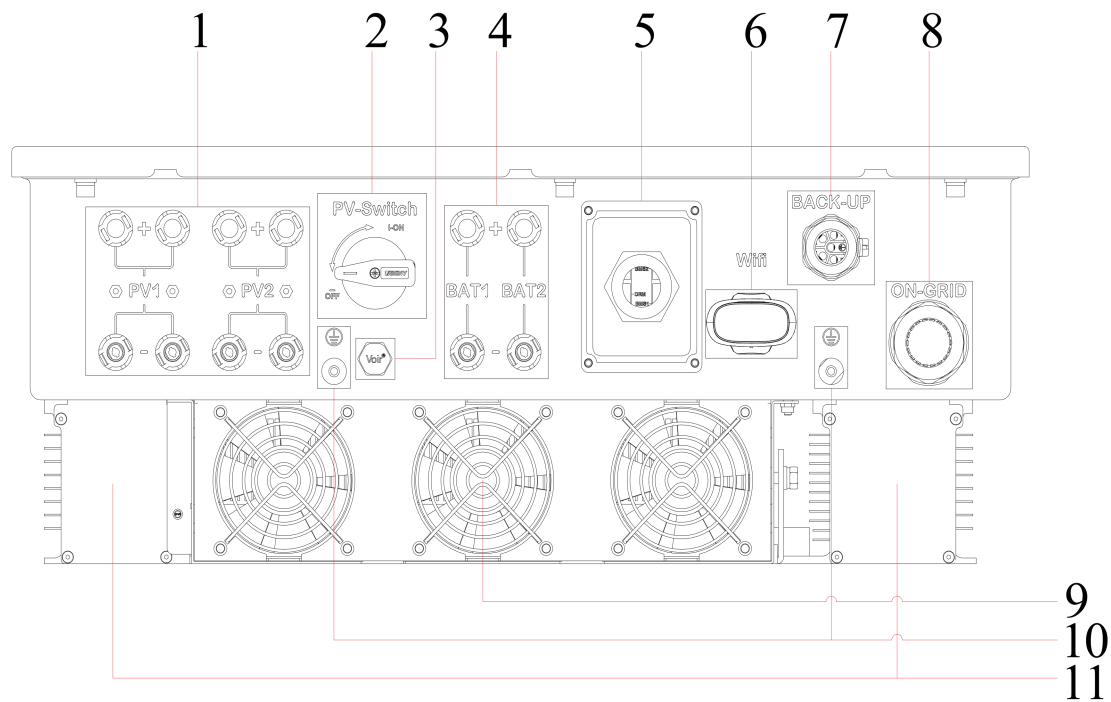


Figure 4.1 Illustration of the appearance of the inverter

4.3.2 Size Description

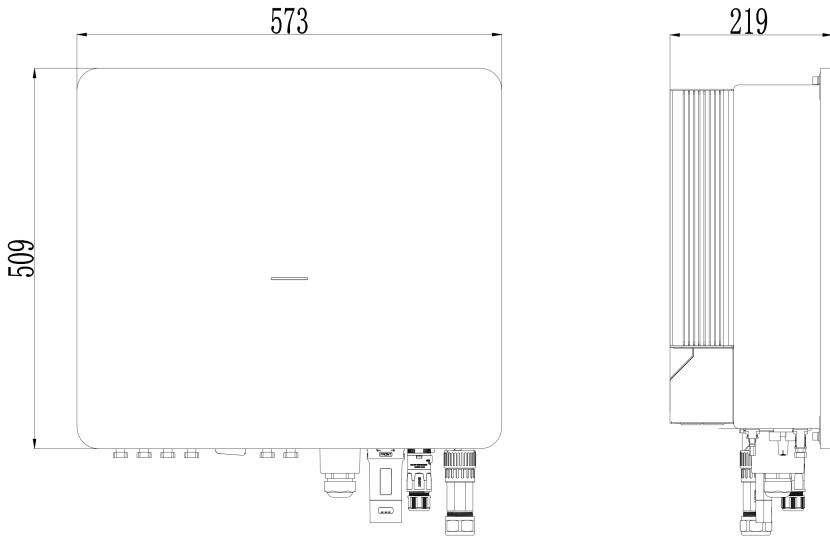


Figure 4.2 Overall size of inverter

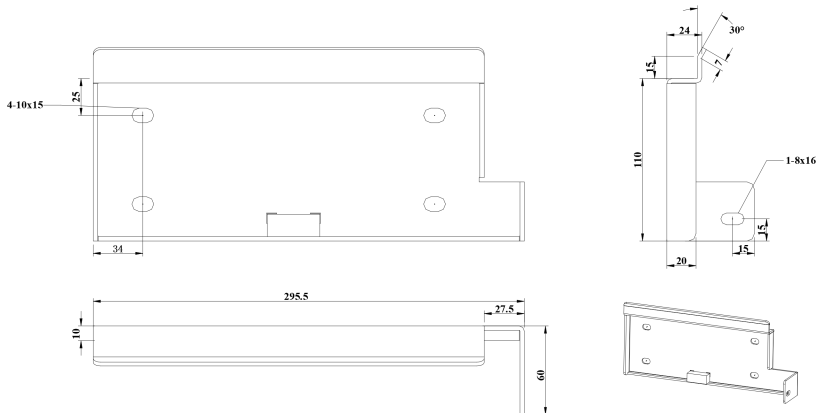


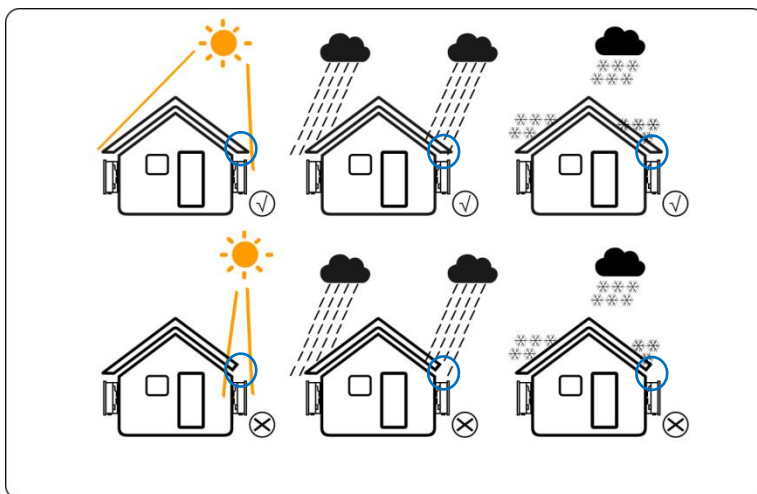
Figure 4.3 Dimensions of wall mount

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.



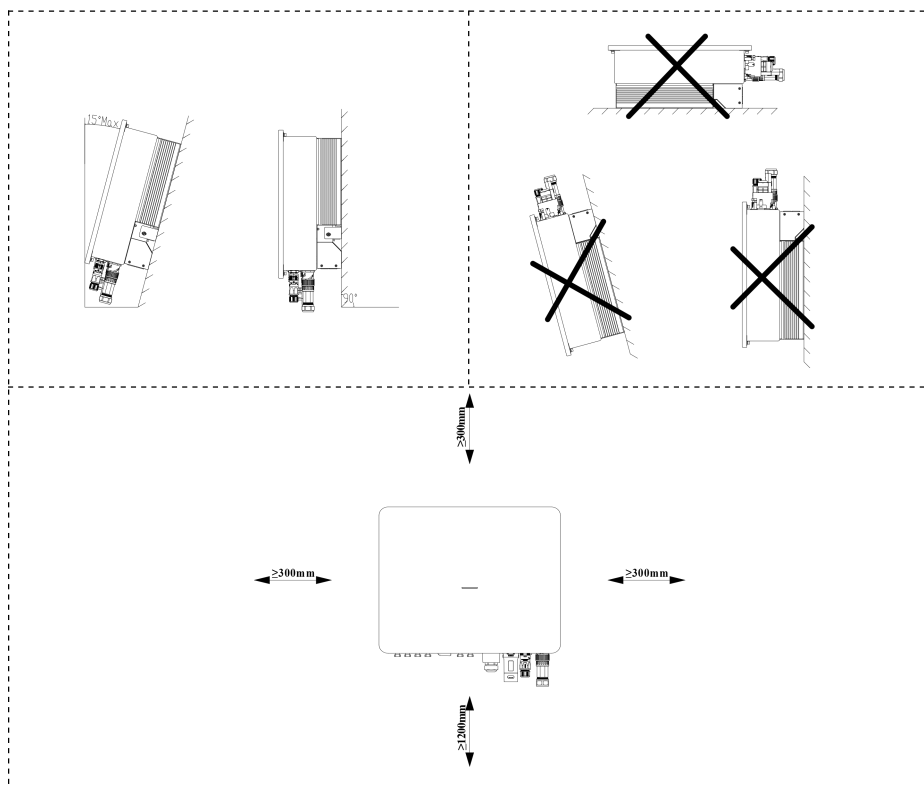
5.1.2 Mounting Carrier Requirements

- 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

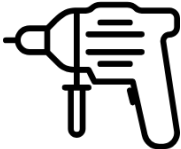


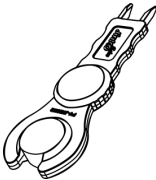

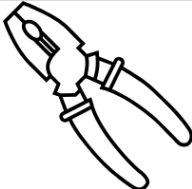
- 1) Recommended inverter installation Angle: vertical or backward $\leq 15^\circ$.
- 2) Do not invert, tilt forward, tilt back beyond the Angle, horizontal installation.
- 3) At least 1.2m from the ground below the inverter, about at least 300mm.

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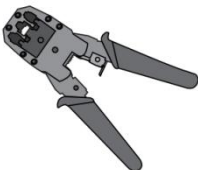




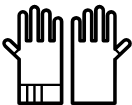




5.2 Mounting Tools

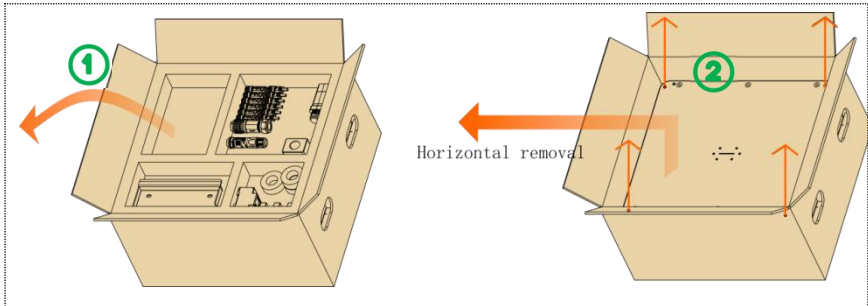
Table 5-1 List of installation tools

| Series No. | Tools | Description | Function |
|------------|---|--|---|
| 1 |  | Percussion drill Recommended 8mm 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 |

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| | | | |
|----|---|-------------------|--|
| 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



Caution

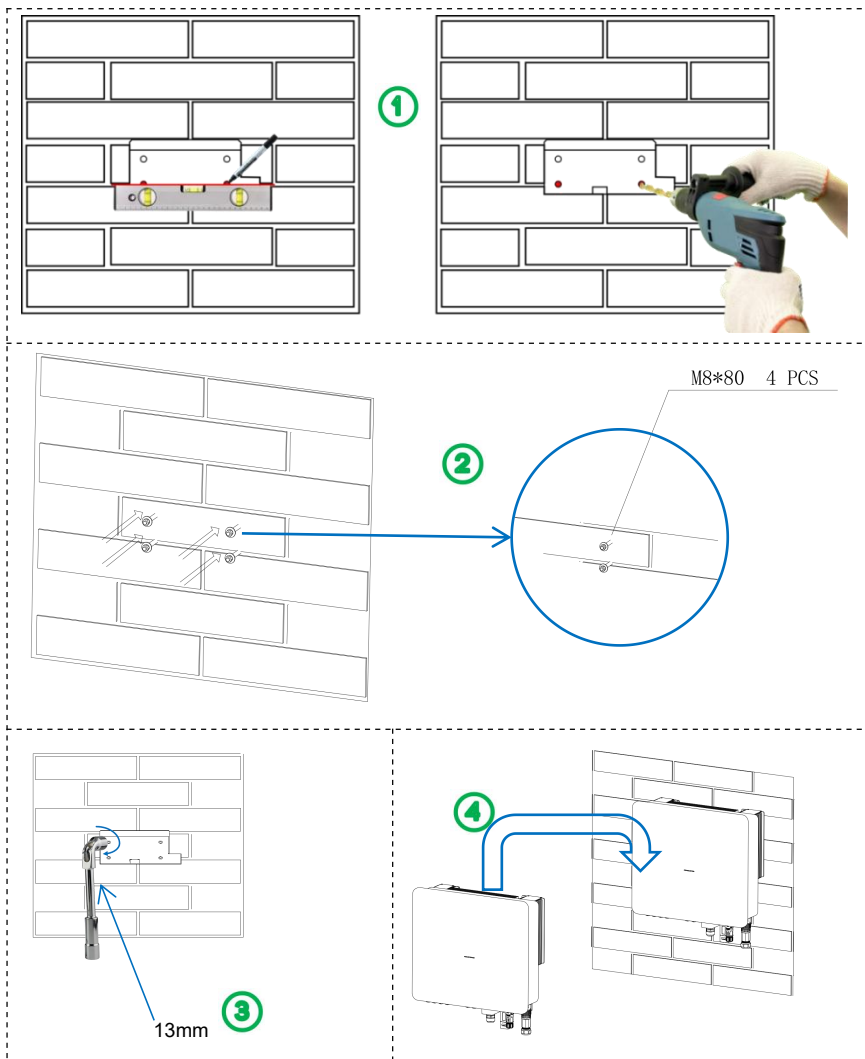
- When carrying out the transportation, turnover, and installation, you must comply with the laws, regulations and related standards of the country or region where you are located.
- The inverter is heavy. Please keep it balanced during handling to prevent the inverter from falling and injuring the operator.
- 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.

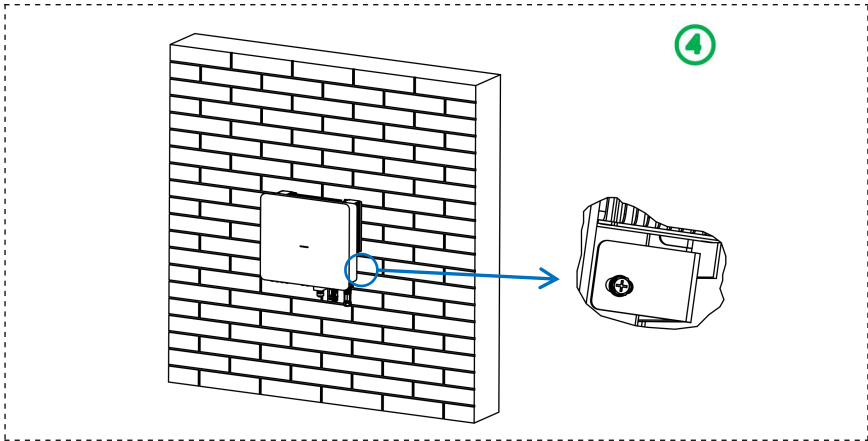
5.4 Wall Mounting

Attention

- 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.

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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. Three-phase off-grid inverters are used in battery energy storage photovoltaic systems. Equipment can be damaged if not used as intended.

6.1 Electrical System Connection Diagram



Attention

- Connect the N and PE cables to the ON-GRID and BACK-UP ports of the inverters in different regions according to local regulations. For details, see local regulations.
- If the BACK-UP 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 ON-GRID and BACK-UP AC ports have built-in relays. When the inverter is in off-grid state, the built-in ON-GRID relay is in disconnected state; When the inverter is in the on-grid state, the built-in ON-GRID relay is in the closed state.

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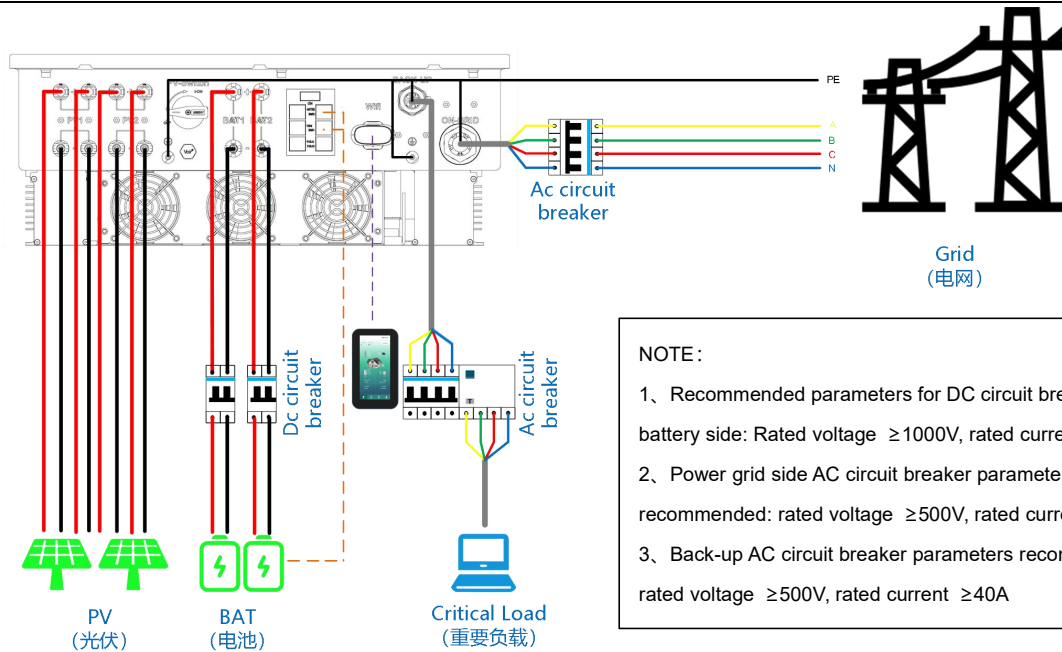
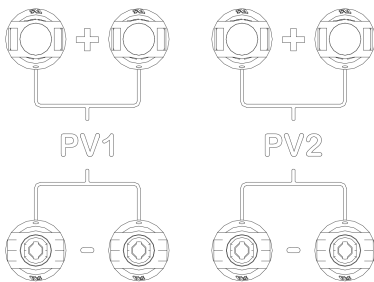
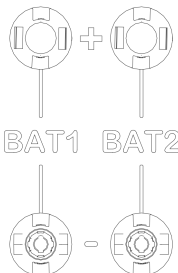
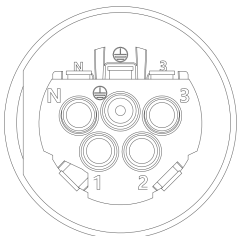


Figure 6.1 Electrical connection diagram

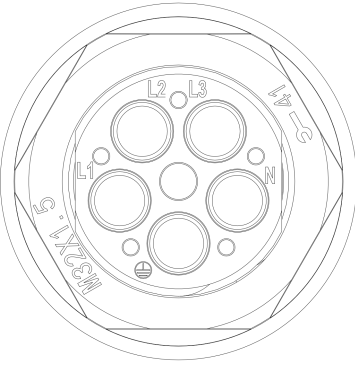
Note: During final installation, circuit breakers for external connections to the inverter shall comply with IEC 60947-1 and IEC 60947-2 certification requirements.

6.2 External Port Wiring Instructions

Table 6-1 Cable Model and Specification Descriptions

| Port | Definition | Cable type | Cable specification | |
|--|-------------------------------------|---------------------------------|---|--|
|  | +: Connect to PV positive pole | Outdoor Multi-Core Copper Cable | Recommended 6mm ² cross-sectional area of conductor, maximum current through the wire is 30A | |
| | -: Connect to PV negative pole | | | |
|  | +: Connect to battery positive pole | Outdoor Multi-Core Copper Cable | Recommended 6mm ² cross-sectional area of conductor, the maximum current through the wire shall be 30A | |
| | -: Connect to battery negative pole | | | |
| <div>BACK-UP</div>  | AC load port | L1 | Outdoor Multi-Core Copper Cable | Recommended 6mm ² cross-sectional area of conductor, maximum current through the leading wire |
| | | L2 | | |
| | | L3 | | |
| | | N | | |

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| | | | | |
|--|--------------------|----|--|---|
| | | PE | | is 30A, grounding cable specifications are the same as the phase conductor |
| <div>ON-GRID</div>  | AC grid port | L1 | Outdoor Multi-Core Copper Cable | Recommended 10mm ² cross-sectional area of conductor, maximum current through the wire is 60A, grounding cable specifications are the same as the phase conductor |
| | | L2 | | |
| | | L3 | | |
| | | N | | |
| | | PE | | |

6.3 Connecting the Ground Cable (PE)



Attention

- 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.

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For yellow-green outdoor cables, use a wire stripper to strip the insulation layer of the ground cable to an appropriate length. Insert the wire core stripped of the insulation layer into the conductor crimping area of the OT terminal, and press it tightly with wire crimping pliers.

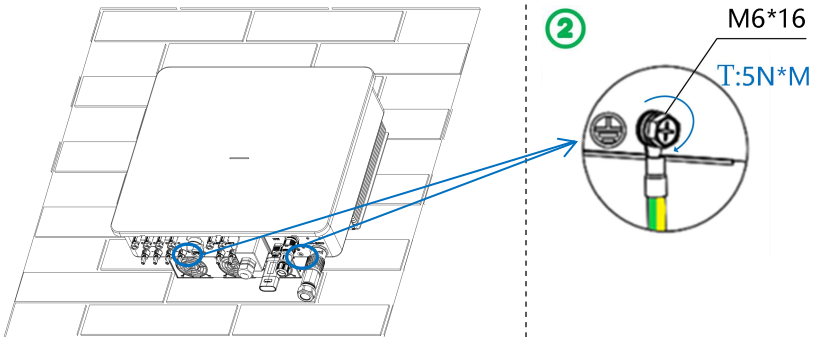
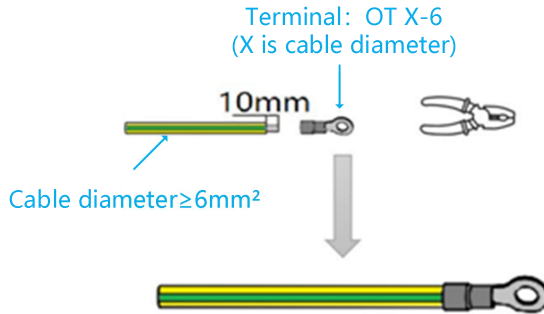


Figure 6.2 Schematic diagram of protection grounding

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.

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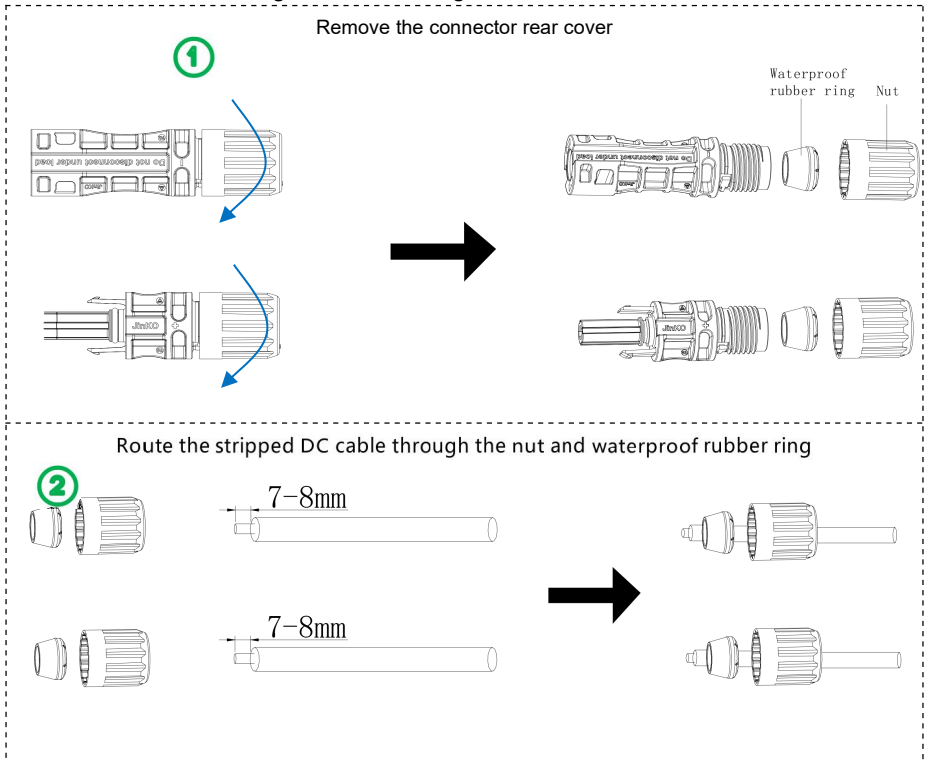
- Ensure that the cables are securely connected. Otherwise, the terminal may overheat and damage the device.

NOTE:

1.Before crimping the PV and BAT cables, ensure that the PV knob switch is set to OFF and the battery is powered off.

2.The photovoltaic module used to connect to the inverter should meet the IEC 61730 certification of grade A standard requirements, each photovoltaic series and battery input from the external circuit breaker allowed through the maximum current should be more than or equal to 30A.

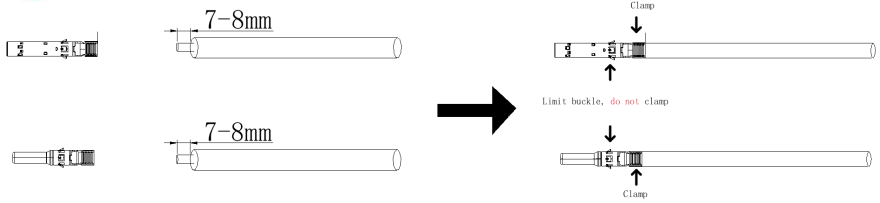
Figure 6.3 Connecting PV&BAT cables



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Part of the DC cable conductor is connected to the metal DC terminal and pressed by crimping pliers

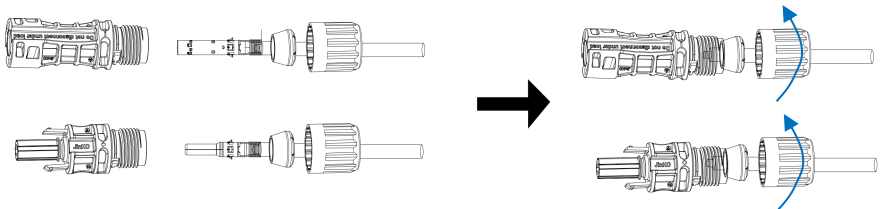
③



Insert the DC cable into the DC terminal, insert the waterproof rubber ring into the DC terminal, and

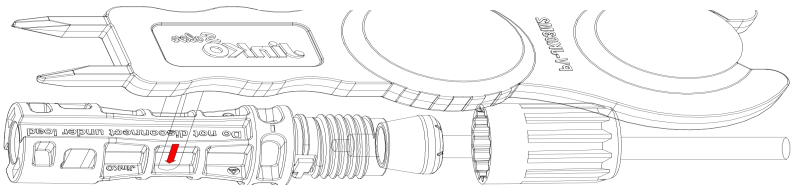
④

tighten the nut



After hearing a click sound, gently pull the cable to check whether it is fastened

After clamping, pull out the terminal



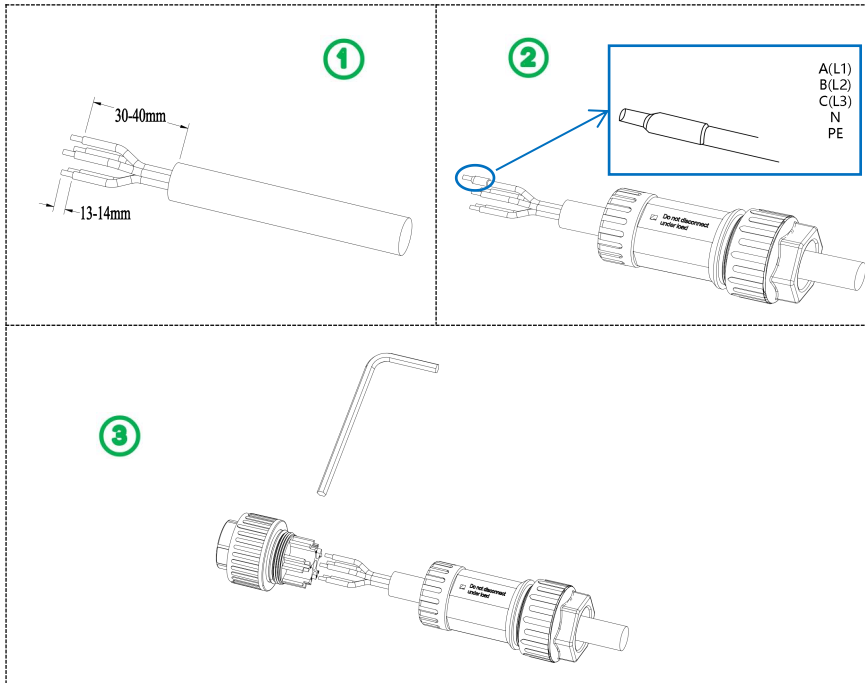
6.5 Connecting the AC Grid-Connected Cable



Warning

- Ensure that the AC cable matches the L1, L2, 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.



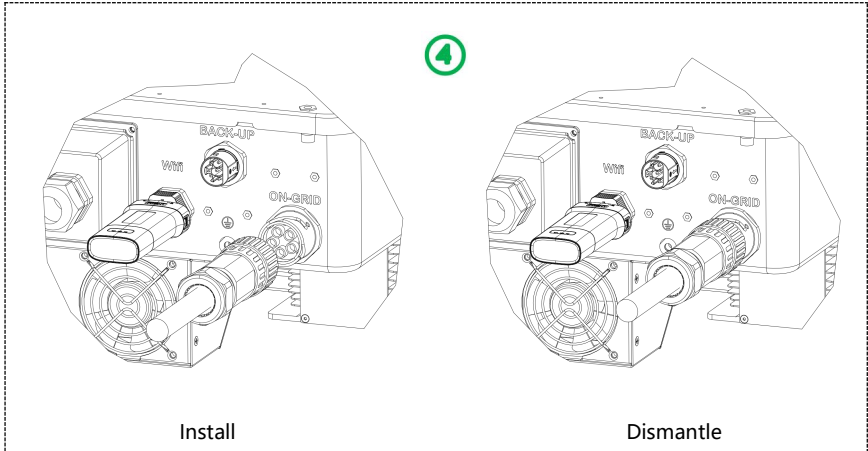
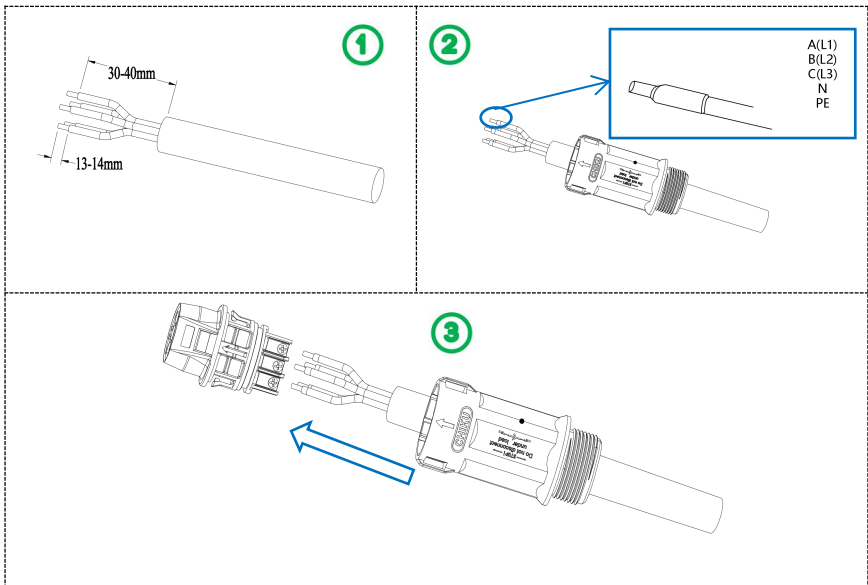


Figure 6.4 Connecting AC grid-connected cables

The maximum current allowed to pass through the circuit breaker used for the power grid should be greater than or equal to 60A.

6.6 Connect AC Load Cable



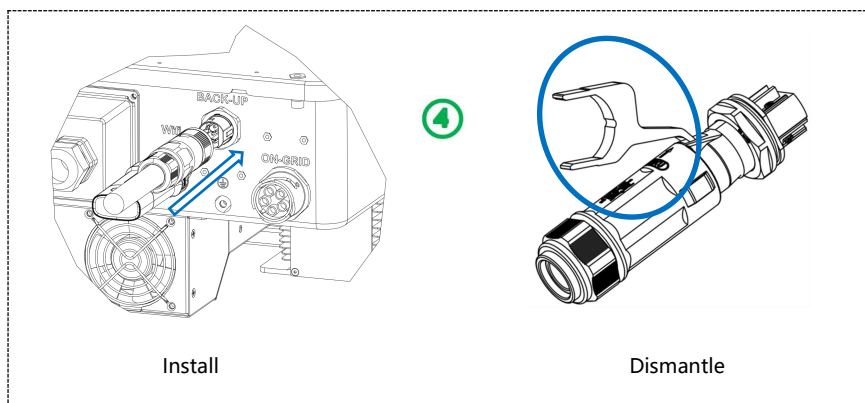


Figure 6.5 Connecting AC load cables

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.

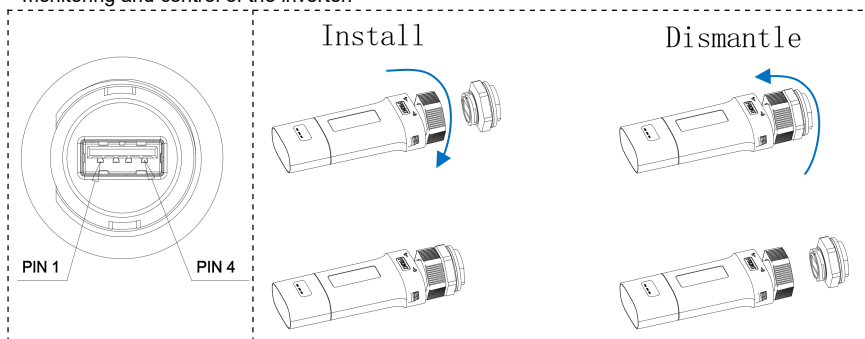


Figure 6.6 Communication interface and installation and disassembly diagram

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 |

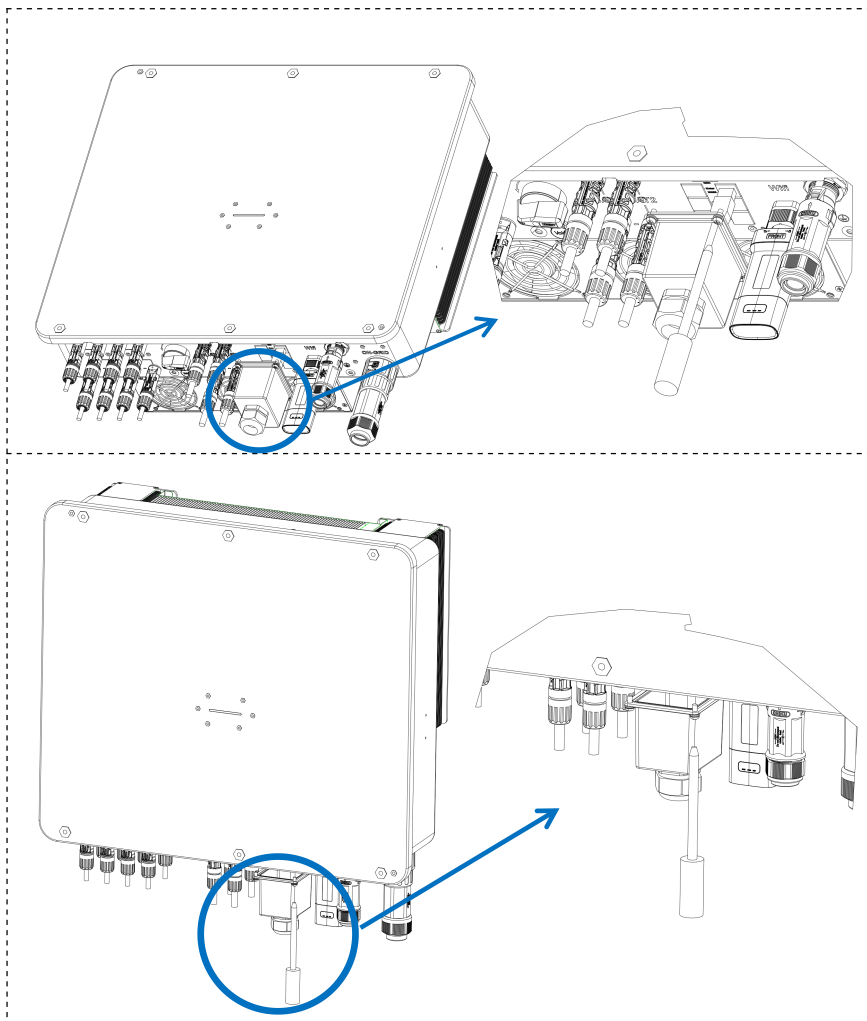
6.8 Connecting the Communication Port

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

Step 1: Route the communication cables through the waterproof cover and waterproof plug of the signal port, and connect the cables to the communication port on the corresponding device.

Step 2: Fasten the waterproof cover with screws and tighten the waterproof nut.

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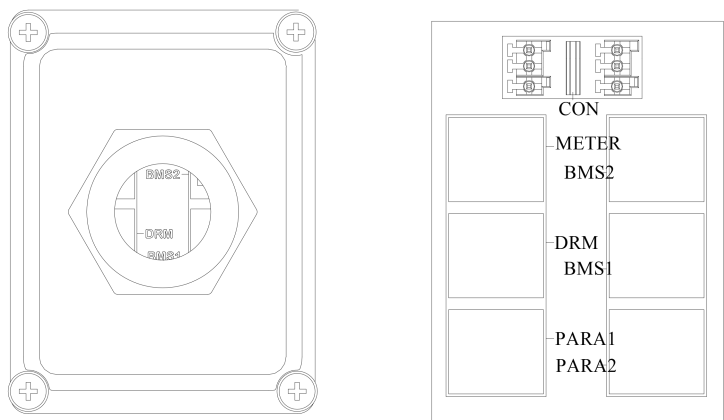


Figure 6.7 Interface diagram

| PIN | Definition |
|-------|--|
| CON | Function of heat pump/diesel generator multiplexed DO interface |
| METER | Electric meter communication interface |
| BMS1 | BMS1 CAN port &EMS RS485 multiplex port |
| BMS2 | BMS2 CAN port &EMS RS485 multiplex port |
| DRM | DRMs/ diesel generator/lead-acid battery temperature sampling function multiplex interface |
| PARA1 | Parallel communication interface |
| PARA2 | Parallel communication interface |

Table 6-4 Port description

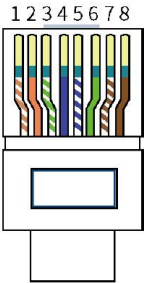


Figure 6.8 Sequence of RJ45 crystal terminals

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

Table 6-5 RJ45 cable sequence colors

6.8.1 BMS Communication Connection

Table 6-6 Description of BMS1 ports

| PIN | Color | Definition | Function | Note |
|-----|----------------|--------------|------------------------------|--|
| 1 | Orange & White | RS485-A1-BMS | RS485 differential signal A1 | BMS1 CAN port & EMS RS485 multiplex port |
| 2 | Orange | RS485-B1-BMS | RS485 differential signal B1 | |
| 3 | / | / | / | |
| 4 | Blue | CANA-H1-BMS | CAN high level data | |
| 5 | Blue & White | CANA-L1-BMS | CAN low level data | |
| 6-8 | / | / | / | / |

Table 6-7 Description of BMS2 ports

| PIN | Color | Definition | Function | Note |
|-----|----------------|--------------|------------------------------|--|
| 1 | Orange & White | RS485-A2-BMS | RS485 differential signal A2 | BMS2 CAN port & EMS RS485 multiplex port |
| 2 | Orange | RS485-B2-BMS | RS485 differential signal B2 | |
| 3 | / | / | / | |
| 4 | Blue | CANA-H2-BMS | CAN high level data | |
| 5 | Blue & White | CANA-L2-BMS | CAN low level data | |
| 6-8 | / | / | / | / |

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

6.8.2 DRMS/DI Connection

Table 6-8 Description of DRM ports

| PIN | Color | Definition | Function | Note |
|-----|----------------|------------|--|--|
| 1 | Orange & White | DRM1/5 | ① The DRMS interface is applicable to the Australian AS-NZS-4777.2 (some European requirements) safety standard ② Chai hair function DI input ③ Lead-acid battery temperature sampling | DRMs/diesel generator/lead-acid temperature sampling function multiplexed port |
| 2 | Orange | DRM2/6 | | |
| 3 | Green & White | DRM3/7 | | |
| 4 | Blue | DRM4/8 | | |
| 5 | Blue & White | REF GEN | | |
| 6 | Green | COM LOAD | | |
| 7 | Brown & White | / | / | / |

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| | | | | |
|---|-------|---|---|---|
| 8 | Brown | / | / | / |
|---|-------|---|---|---|

NTC connection for lead acid battery:

- ① Cut one end of the standard network cable
- ② Strip the green, green&white, and blue wires at the fracture by 5mm
- ③ Weld it together with the NTC pin as shown in the following figure (After confirming that the welding is solid, wrap the welding place with insulation tape respectively, pay attention to avoid contact with bare metal, prevent short circuit, and affect normal use)
- ④ Insert the finished NTC crystal head into the DRMS connector, and attach the NTC to the outside of the lead battery

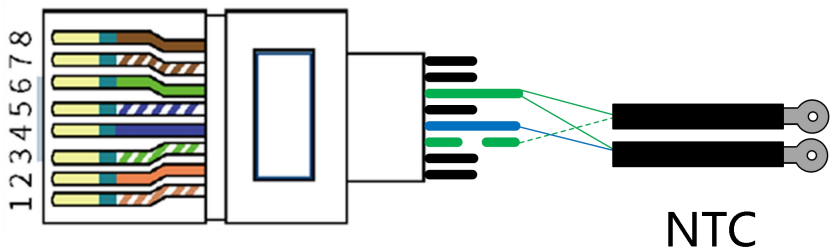


Table 6-9 Description of dry contact ports

| | PIN | Definition | Note |
|------|-----|------------|---------------------------|
| DO 1 | 2 | OP1_NO | External dry contact port |
| | 4 | OP1_COM | |
| DO 2 | 1 | OP2_NO | |
| | 3 | OP2_COM | |
| / | 5-6 | / | / |

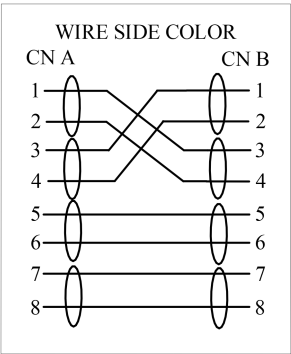
6.8.3 Paralleling

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 6-10 describes the signal of the network cable. Figure 6.8 shows the sequence of the network cable connection.

Table 6-10 Description of parallel ports

| PIN | Colour | PARA 1 | PARA 2 | Note |
|-----|----------------|-----------|-----------|---------------------|
| 1 | Orange & White | CON1_AO | CON2_AO | Parallel signal |
| 2 | Orange | CON1_BO | CON2_BO | |
| 3 | Green & White | CON1_AI | CON2_AI | |
| 4 | Blue | CON1_BI | CON2_BI | |
| 5-6 | / | / | / | / |
| 7 | Brown & White | CON_SyncH | CON_SyncH | Simultaneous signal |
| 8 | Brown | CON_SyncL | CON_SyncL | |

Figure 6.8 Parallel communication line sequence diagram



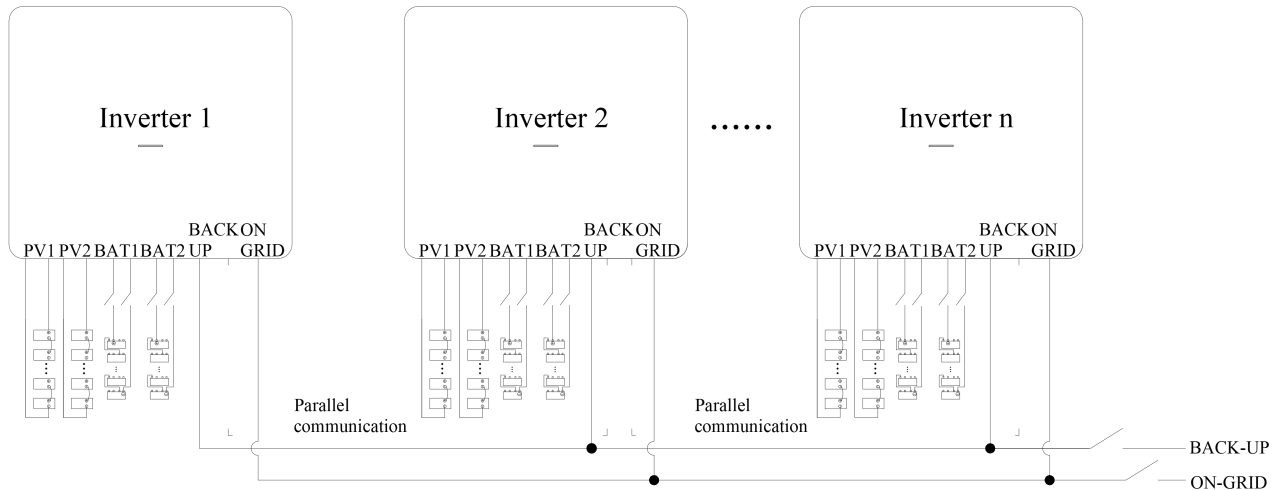
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Application note:

- 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 the same to ensure loop impedance;

Parallel standard wiring is shown in the following figure, detailed operation see parallel system operation manual.

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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

7.3.1 Self-use Mode (default mode)

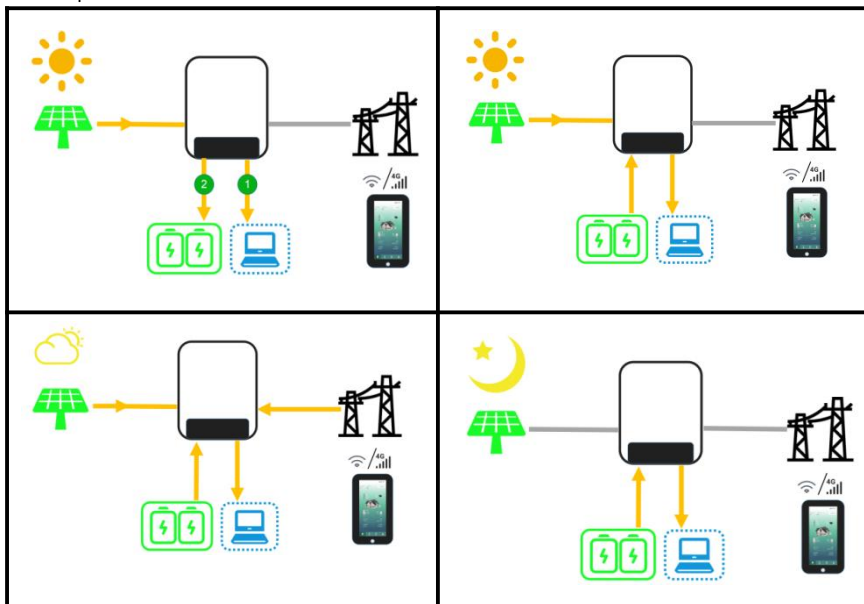
Function:

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

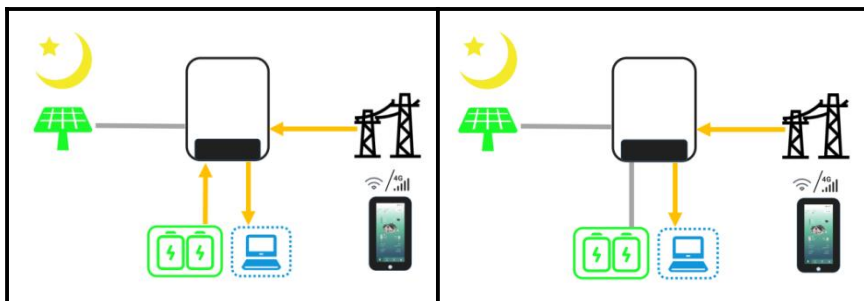
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Specific working mode:

- 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.



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7.3.2 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.

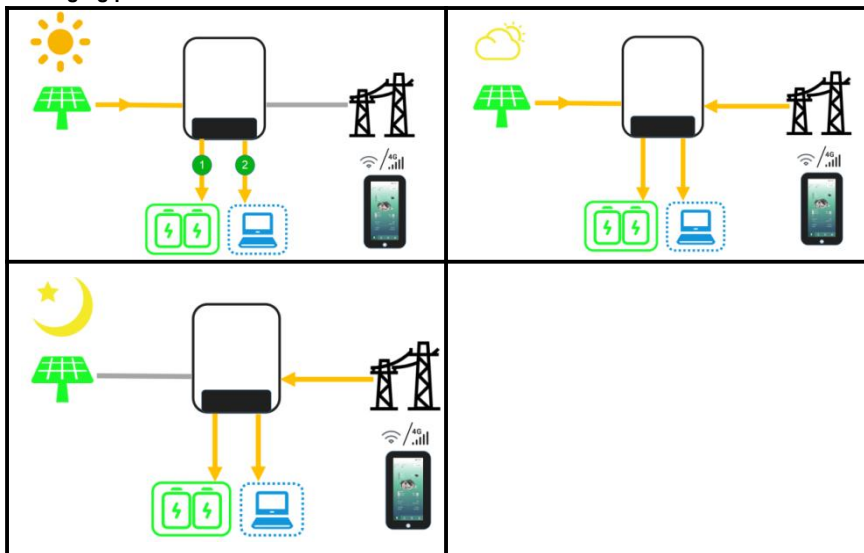
Specific working mode:

Charging period:

- When there is enough PV, the PV charges the battery, and the remaining power supplies the load.
- When there is insufficient PV, 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.

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:



7.3.3 Backup Mode/Disaster Recovery Mode

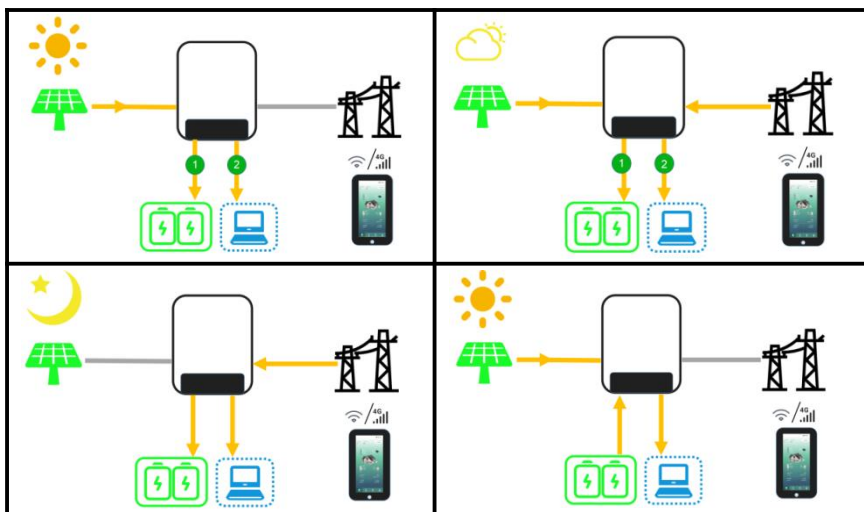
Function:

Always keep the battery fully charged to cope with sudden power grid outages or other emergencies, so that users can use the battery power to supply power to the load after an emergency occurs.

Specific working mode:

- When the PV is sufficient, the PV charges the battery and then supplies power to the load.
- When PV is insufficient, the PV and the power grid charge the battery first, then supplies power to the load.
- When PV is not working, the grid charges the battery and supplies power to the load.
- When the power grid is unavailable, the PV and battery supply power to the load.

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7.4 Operation Mode

7.4.1 Operation Mode Description

Table 7-1 Inverter operating modes

| Series No. | Mode | Description |
|------------|-----------------|--|
| 1 | Standby | Waiting phase after the inverter is powered on. Enter the self-check state when the conditions are met. If a fault occurs, the inverter enters the fault state. |
| 2 | Self-check mode | Before the inverter starts, continue to self-check and initialize. If the conditions are met, the inverter enters the grid-connected state and starts grid-connected operation (without the feed function). If no power grid is detected, the inverter enters the off-grid state and runs off the grid. If the self-check fails, the system enters the fault state. |
| 3 | On-grid mode | The inverter is connected to the grid normally (without the feed function). |


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| | | |
|---|---------------|--|
| | | <p>If it is detected that the power grid does not exist or the conditions do not meet the requirements for grid connection, it enters the off-grid working state.</p> <p>If a fault is detected, the system enters the fault state.</p> <p>If the power grid conditions do not meet the grid-connection requirements and the off-grid output function is not enabled, the system enters the waiting state.</p> <p>If after switching off the grid, it is detected that the grid conditions meet the grid-connected requirements, and the grid-connected function is enabled, it enters the grid-connected state (without the feed function).</p> |
| 4 | Off-grid mode | <p>When the power grid is powered off or the grid conditions do not meet the grid-connected requirements, the inverter switches to the off-grid state and continues to supply power to the loads.</p> <p>If the grid conditions meet the grid-connected requirements, the system enters the grid-connected state (without the feed function).</p> <p>Before running, the inverter works off the network when the working mode is set to off-network mode.</p> <p>If a fault is detected, the device enters the fault state.</p> |
| 5 | Fault mode | <p>If a fault is detected, the inverter enters the fault state. After the fault is rectified, the inverter recovers to its original running state.</p> |



7.4.2 Indicator Light Description

The bar indicator in the middle of the device panel indicates the inverter status in red, green, and blue colors.

Table 7-2 Indicator status description

| Display item | Indicator light status | Corresponding status description | Notes |
|--|------------------------|--|---|
| <div style="text-align: center;">Green</div>  | Always on | Grid connection | Indicates that the inverter is currently working in a grid connected state and can exchange energy with the power grid. The load can be powered on for operation. |
| | Flashing 1s/time | Be ready | Indicates that the inverter is in the power-on state and needs to wait until the power-on is completed before the load can be powered on and run. |
| | Flashing 0.1s/time | The inverter has just been powered on and the program is initialized/Code online upgrade | Indicates that the inverter has just been powered on and the program initialization will flash for 10s; Indicates that the |

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| | | | |
|--|------------------------|--------------|---|
| | | | current working status is in shutdown state, and it can be turned on and used normally after the code upgrade is completed. |
| <p style="text-align: center;">Blue</p>  | Always on | Off-grid | Indicates that the inverter is currently working in an off-grid state and cannot exchange energy with the power grid. the load can be powered on and run. |
| <p style="text-align: center;">Red</p>  | Always on | System error | Indicates that the inverter is currently in shutdown state, a serious alarm occurs on the inverter, and the load cannot be powered on and run. |
| | Flashing for 0.5s/time | System error | Indicates that the inverter is currently in shutdown state, a relatively serious alarm has occurred on the inverter, and the load cannot be powered on. |

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| | | | |
|--|--------------------|--------------|---|
| | Flashes 2s/time | System error | Indicates that the inverter is currently in shutdown state, an alarm occurs on the inverter, and the load cannot be powered on. |
|--|--------------------|--------------|---|

8 App Introduction

Users need to choose WiFi dongle or 4G dongle.

ESS LINK Operation and use Please contact the manufacturer and check the ESS LINK operation and use manual.

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

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



Android apk



Google play



iOS

9. Troubleshooting and Maintenance

This section will help you determine the cause of the problem you may be experiencing.

9.1 Alarm and Processing

Faults not mentioned in the following table still exist after being powered on. Contact your dealer or after-sales service center.

| Sequence number | Fault name | Note | Solutions |
|-----------------|---------------------------|--------|--|
| PV | | | |
| | PV 1/2 is not connected | Remind | ➤ Check whether the photovoltaic 1/2 is correctly connected and whether the photovoltaic DC circuit breaker of the inverter is closed. |
| | PV 1/2 overvoltage | Fault | ➤ Check whether the PV series voltage is higher than the maximum input voltage of the inverter. If so, adjust the number of series 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 the normal state. |
| | PV 1/2 overload time out | Alarm | ➤ Check whether the inverter is in the overload state. The alarm is automatically cleared 10 minutes after the inverter is normal or the command is sent to clear the fault. |
| | PV 1/2 reverse connection | Fault | ➤ Check whether the PV 1/2 positive and negative terminals are reversed, and then power on again. |

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| | | | |
|---------|--|--------|--|
| | PV connection mode is incorrect | Alarm | ➤ Check whether the PV connection mode set on the APP host is consistent with the actual PV connection mode. |
| | PV1/2 power tube is faulty | Fault | ➤ Disconnect all AC and DC circuit breakers and close the disconnected circuit breakers after 5 minutes. If the fault persists, contact your dealer or after-sales service center. |
| | PV 1/2 soft start failure | Alarm | |
| Battery | | | |
| | Battery 1/2 is not connected | Remind | ➤ Check whether the battery overvoltage is inconsistent with the battery specifications. ➤ Check whether the battery is correctly connected or the voltage is abnormal. If yes, the alarm is automatically cleared or the fault clearing command is sent. |
| | Battery 1/2 overvoltage | Remind | |
| | Battery 1/2 undervoltage | Remind | |
| | Battery 1/2 power is insufficient | Remind | ➤ Check whether the battery SOC is too high or too low. The fault is automatically rectified after the SOC returns to normal after the battery is discharged or charged. |
| | Battery 1/2 do not charge | Alarm | |
| | Do not discharge battery 1/2 | Alarm | |
| | Battery 1/2 discharge terminates | Alarm | |
| | Battery is 1/2 full | Remind | |
| | Battery 1/2 reverse connection | Fault | ➤ Check whether the positive and negative battery 1/2 cables are reversed. |
| | Temperature of the lead-acid battery is abnormal | Alarm | ➤ Use the thermal imager to check whether the temperature of the lead-acid battery is too high. The fault will be automatically rectified |

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| | | | |
|--------|--|-------|--|
| | | | <p>when the temperature of the lead-acid battery is reduced to normal temperature.</p> <p>➤ Check whether the wiring sequence between the NTC and the network cable is correct. Reinsert the network cable from the communication port.</p> |
| | Battery connection mode is incorrect | Alarm | <p>➤ Check whether the battery connection mode configured on the APP host is consistent with the actual battery connection mode.</p> |
| | Battery 1/2 overload timeout | Alarm | <p>➤ Please check whether the maximum battery charging current and maximum battery discharge current are set too high in the battery Settings of the APP, and reduce the values appropriately.</p> |
| | Battery 1/2 power tube is faulty | Fault | <p>➤ Disconnect all AC and DC circuit breakers and close the disconnected circuit breakers after 5 minutes. If the fault persists, contact your dealer or after-sales service center.</p> |
| | Battery 1/2 soft startup fails. Procedure | Alarm | |
| Others | | | |
| | Grid voltage anomaly | Alarm | <p>➤ If the alarm is occasionally reported, the power grid may be abnormal for a short time. The inverter will resume normal operation after detecting that the power grid is normal, and no manual intervention is required.</p> <p>➤ If the alarm is generated frequently, check whether the power grid voltage frequency is within the allowable range. If yes, check whether the AC circuit breaker and AC cable</p> |
| | Network frequency anomaly | Alarm | |

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| | | | <p>connections of the inverter are correct, and whether the power grid is powered off.</p> <p>➤ If the power grid voltage/frequency is not within the acceptable range, the AC connection is correct, but the alarm is repeated, please contact technical support to change the power grid overvoltage and underfrequency protection value.</p> |
| | Power grid voltage reverse sequence | Alarm | <p>➤ Check the phase sequence, voltage, and wiring of the power grid.</p> |
| | Grid voltage is out of phase | Alarm | |
| | Neutral wire anomaly | Fault | |
| | Heat sink temperature is too high | Fault | <p>➤ Ensure that the inverter is installed in a place that is out of direct sunlight, and restart the inverter after the heat sink cools down to 60°C for 5 minutes.</p> <p>➤ If the fault persists, contact your dealer or after-sales service center.</p> |
| | Ambient temperature is too high | Alarm | |
| | The inverter is overheated. Procedure | Alarm | |
| | Insulation fault | Fault | <p>➤ Check the impedance of the photovoltaic string to the protected area. If the resistance value is greater than 33 kΩ, it is normal. If the resistance value is less than 33 kΩ, check the short circuit point and rectify the fault. Check whether the PGND cable of the inverter is correctly connected. If no alarm is generated, the system automatically clears the fault or</p> |

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| | | | <p>sends a command to clear the fault.</p> <p>➤ If it is confirmed that the impedance is indeed lower than the default value in a cloudy and rainy environment, reset the insulation impedance protection point.</p> |
| | Leakage protection failure | Fault | <p>➤ Please check whether the inverter is connected properly.</p> <p>➤ Disconnect all AC and DC circuit breakers and close the disconnected circuit breakers after 5 minutes. If the fault persists, contact your dealer or after-sales service center.</p> |
| | Fan failure | Fault | <p>➤ Check whether the external fan is blocked.</p> <p>➤ Disconnect all AC and DC circuit breakers and close the disconnected circuit breakers after 5 minutes. If the fault persists, contact your dealer or after-sales service center.</p> |
| | Model capacity fault | Fault | <p>➤ Please contact your distributor or after-sales service center to check whether the model capacity is set incorrectly in the APP.</p> |
| | Islanding protection | Alarm | <p>➤ Turn off the AC circuit breaker on the power grid and check whether the power grid quality is poor or abnormal.</p> <p>➤ Disconnect all AC and DC circuit breakers and close the disconnected circuit breakers after 5 minutes. If the fault persists, contact your dealer or after-sales service center.</p> |
| | Dc bus undervoltage | Fault | <p>➤ Check whether the battery is exhausted or the power of the inverter is too large.</p> <p>➤ Disconnect all AC and DC circuit breakers and</p> |

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| | | | close the disconnected circuit breakers after 5 minutes. If the fault persists, contact your dealer or after-sales service center. |
| | Bad earth | Fault | ➤ Check whether the ground cable connected to the inverter is damaged or the connection screws are not tightened, resulting in poor contact. |
| | Parallel communication alarm | Alarm | ➤ Only in the case of parallel display, check the parallel communication line sequence is correct; If the sequence is correct, remove and reinsert the network cable from the communication port to prevent poor contact. |
| | The system runs derated | Alarm | ➤ Check whether the external fan of the inverter is blocked. ➤ Whether the ambient temperature is too high. |
| | The number of parallel modules is abnormal | Fault | ➤ Display only in parallel situations. Check whether the parameters related to parallel Settings in the App are set correctly. |
| | The parallel module number is repeated | Alarm | |
| | Parameters of parallel modules conflict | Alarm | |
| | The meter is reversed | Fault | ➤ Check that the meter is connected correctly. |
| | The electricity meter is connected abnormally | Alarm | |

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| | The DSP1/2 parameter Settings are faulty | Fault | ➤ Please contact your distributor or after-sales service center to check whether the parameters in the APP are set correctly or the software version is upgraded |
| | The DSP/CPLD version is incompatible. Procedure | Fault | |
| | The communication between the DSP and CPLD is faulty | Fault | |

Table 9-1 Alarm list and troubleshooting measures

9.2 Regular maintenance


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|  Warning |
| <ul style="list-style-type: none"> ➤ Make sure that the inverter is disconnected from power. ➤ Wear personal protective equipment when operating the inverter. |

Table 9-2 Maintenance Instructions

| Maintenance content | Maintenance methods | Maintenance period |
|-----------------------|--|------------------------------|
| System cleaning | Check the heat sink, air inlet/outlet for foreign objects and dust. | 1 time/half year~1 time/year |
| DC Switch | Turn the DC switch on and off 10 times continuously to ensure proper DC switch function. | 1 time/year |
| Electrical connection | Check whether the electrical connection is loose, whether the cable appearance is broken, and whether there is copper leakage. | 1 time/half year~1 time/year |

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10. Technical Parameters

Table 10 Technical Parameters Description

| Product model | Isuna 10000TO | Isuna 12000TO | Isuna 15000TO | Isuna 18000TO | Isuna 20000TO |
|--|-----------------------------------|---------------|---------------|---------------|---------------|
| Battery parameter | | | | | |
| Number of battery input channels | 2 | | | | |
| Battery type | Lithium battery/Lead-acid battery | | | | |
| Battery voltage range | 125~800V | | | | |
| Full load battery voltage range | 200V-800V | 240V~800V | 300V~800V | 360V~800V | 400V~800V |
| Maximum charge and discharge current | 25A/25A | | | | |
| Peak charge/discharge current&duration | 35A/35A (60s) | | | | |
| Nominal charge/discharge power | 10000W | 12000W | 15000W | 18000W | 20000W |
| Communication Interface | RS485/CAN | | | | |
| PV input parameters | | | | | |

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|--|----------------------------|----------------------------|-----------------------------------|-----------------------------------|-----------------------------------|
| Number of PV input channels | 2 | | | | |
| Maximum input power | 15000WP (7500WP/7500WP) | 18000WP (9000WP/9000WP) | 22500WP (11250WP/11250WP)) | 27000WP (13500WP/13500WP)) | 30000WP (15000WP/15000WP)) |
| Maximum input voltage | 1000V | | | | |
| MPPT voltage range | 130~960V | | | | |
| MPPT full load voltage range | 250V~850V | 290V~850V | 350V~850V | 410V~850V | 450~850V |
| Starting voltage | 130V | | | | |
| Rated input voltage | 600V | | | | |
| Maximum input current per MPPT | 25A/25A | | | | |
| Maximum short-circuit current per MPPT | 30A/30A | | | | |
| MPPT quantity | 2 | | | | |
| Maximum input strings per MPPT | 2 | | | | |

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|--------------------------------------|-----------------------------------|-------------|-------------|-------------|-----------|
| Backfeed current | 0A | | | | |
| Parallel input and output parameters | | | | | |
| Maximum grid input power | 20kVA | 24kVA | 30kVA | 36kVA | 40kVA |
| Maximum grid input current | 29A | 35A | 44A | 52A | 58A |
| Nominal voltage | 3L/N/PE, 220V/380Vac, 230V/400Vac | | | | |
| Grid voltage range | 184~276V | | | | |
| Rated grid frequency | 50/60Hz | | | | |
| Nominal Grid frequency | 45Hz~55Hz/55Hz~65Hz | | | | |
| Power factor | -0.8~0.8 | | | | |
| THdI(@ Nominal power) | <3% | | | | |
| Off-grid output parameters | | | | | |
| Nominal output power | 10000W | 12000W | 15000W | 18000W | 20000W |
| Maximum output power | 11kVA~60s | 13.2kVA~60s | 16.5kVA~60s | 19.8kVA~60s | 22kVA~60s |
| Nominal output current | 15/14.5A | 18/17.4A | 22.7/21.7A | 27/26A | 30/29A |
| Maximum output current | 16A~60s | 20A~60s | 24A~60s | 29A~60s | 32A~60s |
| Nominal output voltage | 3/N/PE, 220V/380Vac, 230/400Vac | | | | |
| Nominal output frequency | 50/60Hz | | | | |

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|---|----------------|
| Thdu(@ linear load) | <3% |
| On/off-grid switch-over time | <10ms |
| Efficiency | |
| European efficiency | 97.70% |
| Maximum efficiency | 98.20% |
| Maximum battery charge/discharge efficiency | 97.80% |
| Protection | |
| DC Switch | Available |
| Input reverse | Available |
| Output overvoltage, overcurrent, short circuit | Available |
| Anti-islanding | Available |
| Residual current detection | Available |
| Insulation resistance detection | Available |
| Overvoltage Category | DC:II ; AC:III |

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|---|----------------|
| Surge protection level | DC:II ; AC:III |
| Battery input reverse connection protection | Available |
| Routine parameters | |
| Weight | 35kg |
| Noise | <45dB |
| Topology | No isolation |
| Working altitude | <4000m |
| Derating Temperature | >40℃ |
| Ambient Temperature | -25℃~60℃ |
| Ambient Humidity | 5%~95% |
| Cooling method | Air cooling |
| IP Degrees | IP65 |
| Dimensions | 573*509*219mm |
| Standby loss | <15W |
| Features | |
| DC terminal | MC4 |

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|-------------------------------------|--|
| AC output terminal | 5P connector |
| interface | RS485/CAN/DRED/DO/Parallel port |
| Human-computer interaction mode | H5/LED/APP/WIFI/4G/Bluetooth |
| Scalability in Parallel function | Support |
| Standard Warranty | 5 years |
| Certification | |
| Safety regulations | IEC 62109-1, IEC 62109-2, EN 62109-1, EN 62109-2, IEC62477-1 |
| EMC | EN61000-6-1, EN61000-6-2, EN61000-6-3, EN61000-6-4,EN 62920 |