



HYBRID 5000/6000 1 Phase

# User Manual

**IS-HYB-5000-1PH, IS-HYB-6000-1PH**

Issue            01  
Date             2023/30/08



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# About This Document

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## Purpose

This document describes the smart solar inverter in terms of its installation, electrical connection, commissioning, maintenance, and troubleshooting. Before installing and operating the smart solar inverter, ensure that you are familiar with the features, functions, and safety precautions provided in this document.

## Intended Audience

This document is Applicable to:

- Installers
- Users

## Symbol Conventions

The symbols that may be found in this document are defined as follows.

Symbol	Description
 <b>DANGER</b>	Indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.
 <b>WARNING</b>	Indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.
 <b>CAUTION</b>	Indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.
 <b>NOTICE</b>	Indicates a potentially hazardous situation which, if not avoided, could result in equipment damage, data loss, performance deterioration, or unanticipated results. NOTICE is used to address practices not related to personal injury.
 <b>NOTE</b>	Supplements the important information in the main text. NOTE is used to address information not related to personal injury, equipment damage, and environment deterioration.

## Change History

Changes between document issues are cumulative. The latest document issue contains all the changes made in earlier issues.

### **Issue 01 (2023-07-30)**

This issue is the first official release.

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# Contents

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<b>About This Document.....</b>	<b>2</b>
<b>1 Safety Information.....</b>	<b>6</b>
1.1 Personal Safety.....	7
1.2 Electrical Safety.....	9
1.3 Environment Requirements.....	11
1.4 Mechanical Safety.....	13
<b>2 Product Introduction.....</b>	<b>17</b>
2.1 Overview.....	17
2.2 Component Description.....	20
2.3 Working Principles.....	20
<b>3 Inverter Storage.....</b>	<b>23</b>
<b>4 System Installation.....</b>	<b>24</b>
4.1 Checking Before Installation.....	24
4.2 Preparing Tools and Instruments.....	25
4.3 Determining the Installation Position.....	26
4.4 Moving a inverter.....	29
4.5 Installing a inverter.....	30
4.5.1 Wall-Mounted Installation.....	31
4.5.2 Support-Mounted Installation.....	33
<b>5 Electrical Connection.....</b>	<b>37</b>
5.1 Precautions.....	37
5.2 Preparing Cables.....	38
5.3 Connecting PE Cables.....	41
5.4 (Optional) Installing a Smart Dongle.....	43
5.5 Installing a WLAN Antenna.....	44
5.6 Connecting an AC Output Power Cable.....	45
5.7 Connecting DC Input Power Cables.....	49
5.8 (Optional) Connecting Battery Cables.....	53
5.9 (Optional) Connecting Signal Cables.....	54
<b>6 System Commissioning.....</b>	<b>61</b>
6.1 Verification Before Power-On.....	61
6.2 System Power-On.....	62
<b>7 Man-Machine Interaction.....</b>	<b>65</b>

7.1 App Commissioning.....	65
7.1.1 Downloading the HiSolar App.....	65
7.1.2 Connecting to the Inverter.....	65
7.1.3 Quick Settings.....	66
7.1.4 What Should I Do If the Device Is Disconnected from the App When I Switch the Local Commissioning Screen to the Background?.....	66
7.2 Parameters Settings.....	67
7.2.1 Energy Control.....	67
7.2.1.1 Grid-tied Point Control.....	67
7.2.1.2 Apparent Power Control on the Inverter Output Side.....	71
7.2.1.3 Battery Control.....	72
7.2.1.4 Peak Shaving.....	74
7.2.2 AFCI.....	75
7.2.3 DRM.....	76
<b>8 System Maintenance.....</b>	<b>78</b>
8.1 System Power-Off.....	78
8.2 Routine Maintenance.....	79
8.3 Troubleshooting.....	80
<b>9 Inverter Disposal.....</b>	<b>89</b>
9.1 Removing a Inverter.....	89
9.2 Packing a Inverter.....	89
9.3 Disposing a Inverter.....	89
<b>10 Technical Parameters.....</b>	<b>90</b>
<b>A Grid Code.....</b>	<b>95</b>
<b>B Device Commissioning.....</b>	<b>99</b>
<b>C Setting Power Adjustment Parameters.....</b>	<b>100</b>
<b>D Resetting Password.....</b>	<b>103</b>
<b>E Rapid Shutdown.....</b>	<b>105</b>
<b>F Locating Insulation Resistance Faults.....</b>	<b>106</b>
<b>G Acronyms and Abbreviations.....</b>	<b>109</b>

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# 1 Safety Information

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## Statement

**Before transporting, storing, installing, operating, using, and/or maintaining the equipment, read this document, strictly follow the instructions provided herein, and follow all the safety instructions on the equipment and in this document.** In this document, "equipment" refers to the products, software, components, spare parts, and/or services related to this document; "the Company" refers to the manufacturer (producer), seller, and/or service provider of the equipment; "you" refers to the entity that transports, stores, installs, operates, uses, and/or maintains the equipment.

The **Danger, Warning, Caution, and Notice** statements described in this document do not cover all the safety precautions. You also need to comply with relevant international, national, or regional standards and industry practices. **The Company shall not be liable for any consequences that may arise due to violations of safety requirements or safety standards concerning the design, production, and usage of the equipment.**

The equipment shall be used in an environment that meets the design specifications. Otherwise, the equipment may be faulty, malfunctioning, or damaged, which is not covered under the warranty. The Company shall not be liable for any property loss, personal injury, or even death caused thereby.

Comply with applicable laws, regulations, standards, and specifications during transportation, storage, installation, operation, use, and maintenance.

Do not perform reverse engineering, decompilation, disassembly, adaptation, implantation, or other derivative operations on the equipment software. Do not study the internal implementation logic of the equipment, obtain the source code of the equipment software, violate intellectual property rights, or disclose any of the performance test results of the equipment software.

**The Company shall not be liable for any of the following circumstances or their consequences:**

- The equipment is damaged due to force majeure such as earthquakes, floods, volcanic eruptions, debris flows, lightning strikes, fires, wars, armed conflicts, typhoons, hurricanes, tornadoes, and other extreme weather conditions.
- The equipment is operated beyond the conditions specified in this document.
- The equipment is installed or used in environments that do not comply with international, national, or regional standards.
- The equipment is installed or used by unqualified personnel.

- You fail to follow the operation instructions and safety precautions on the product and in the document.
- You remove or modify the product or modify the software code without authorization.
- You or a third party authorized by you cause the equipment damage during transportation.
- The equipment is damaged due to storage conditions that do not meet the requirements specified in the product document.
- You fail to prepare materials and tools that comply with local laws, regulations, and related standards.
- The equipment is damaged due to your or a third party's negligence, intentional breach, gross negligence, or improper operations, or other reasons not related to the Company.

## 1.1 Personal Safety

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 **DANGER**

Ensure that power is off during installation. Do not install or remove a cable with power on. Transient contact between the core of the cable and the conductor will generate electric arcs or sparks, which may cause a fire or personal injury.

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 **DANGER**

Non-standard and improper operations on the energized equipment may cause fire, electric shocks, or explosion, resulting in property damage, personal injury, or even death.

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 **DANGER**

Before operations, remove conductive objects such as watches, bracelets, bangles, rings, and necklaces to prevent electric shocks.

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 **DANGER**

During operations, use dedicated insulated tools to prevent electric shocks or short circuits. The dielectric withstanding voltage level must comply with local laws, regulations, standards, and specifications.

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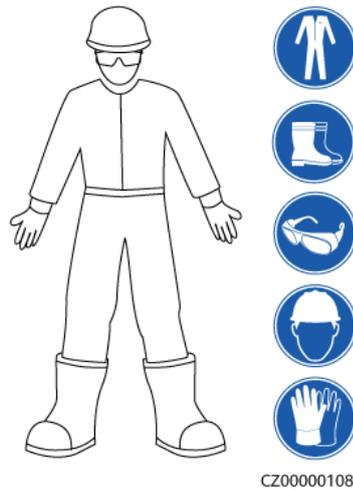
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 **WARNING**

During operations, wear personal protective equipment such as protective clothing, insulated shoes, goggles, safety helmets, and insulated gloves.

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**Figure 1-1** Personal protective equipment



## General Requirements

- Do not stop protective devices. Pay attention to the warnings, cautions, and related precautionary measures in this document and on the equipment.
- If there is a likelihood of personal injury or equipment damage during operations, immediately stop, report the case to the supervisor, and take feasible protective measures.
- Do not power on the equipment before it is installed or confirmed by professionals.
- Do not touch the power supply equipment directly or with conductors such as damp objects. Before touching any conductor surface or terminal, measure the voltage at the contact point to ensure that there is no risk of electric shock.
- Do not touch operating equipment because the enclosure is hot.
- Do not touch a running fan with your hands, components, screws, tools, or boards. Otherwise, personal injury or equipment damage may occur.
- In the case of a fire, immediately leave the building or the equipment area and activate the fire alarm or call emergency services. Do not enter the affected building or equipment area under any circumstances.

## Personnel Requirements

- Only professionals and trained personnel are allowed to operate the equipment.
  - Professionals: personnel who are familiar with the working principles and structure of the equipment, trained or experienced in equipment operations and are clear of the sources and degree of various potential hazards in equipment installation, operation, maintenance
  - Trained personnel: personnel who are trained in technology and safety, have required experience, are aware of possible hazards on themselves in certain operations, and are able to take protective measures to minimize the hazards on themselves and other people
- Personnel who plan to install or maintain the equipment must receive adequate training, be able to correctly perform all operations, and understand all necessary safety precautions and local relevant standards.

- Only qualified professionals or trained personnel are allowed to install, operate, and maintain the equipment.
- Only qualified professionals are allowed to remove safety facilities and inspect the equipment.
- Personnel who will perform special tasks such as electrical operations, working at heights, and operations of special equipment must possess the required local qualifications.
- Only authorized professionals are allowed to replace the equipment or components (including software).
- Only personnel who need to work on the equipment are allowed to access the equipment.

## 1.2 Electrical Safety

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 **DANGER**

Before connecting cables, ensure that the equipment is intact. Otherwise, electric shocks or fire may occur.

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 **DANGER**

Non-standard and improper operations may result in fire or electric shocks.

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 **DANGER**

Prevent foreign matter from entering the equipment during operations. Otherwise, equipment damage, load power derating, power failure, or personal injury may occur.

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 **WARNING**

For the equipment that needs to be grounded, install the ground cable first when installing the equipment and remove the ground cable last when removing the equipment.

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 **CAUTION**

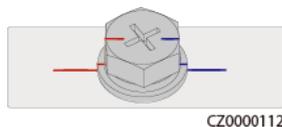
Do not route cables near the air intake or exhaust vents of the equipment.

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## General Requirements

- Follow the procedures described in the document for installation, operation, and maintenance. Do not reconstruct or alter the equipment, add components, or change the installation sequence without permission.

- Obtain approval from the national or local electric utility company before connecting the equipment to the grid.
- Observe the power plant safety regulations, such as the operation and work ticket mechanisms.
- Install temporary fences or warning ropes and hang "No Entry" signs around the operation area to keep unauthorized personnel away from the area.
- Before installing or removing power cables, turn off the switches of the equipment and its upstream and downstream switches.
- Before performing operations on the equipment, check that all tools meet the requirements and record the tools. After the operations are complete, collect all of the tools to prevent them from being left inside the equipment.
- Before installing power cables, check that cable labels are correct and cable terminals are insulated.
- When installing the equipment, use a torque tool of a proper measurement range to tighten the screws. When using a wrench to tighten the screws, ensure that the wrench does not tilt and the torque error does not exceed 10% of the specified value.
- Ensure that bolts are tightened with a torque tool and marked in red and blue after double-check. Installation personnel mark tightened bolts in blue. Quality inspection personnel confirm that the bolts are tightened and then mark them in red. (The marks must cross the edges of the bolts.)



- If the equipment has multiple inputs, disconnect all the inputs before operating the equipment.
- Before maintaining a downstream electrical or power distribution device, turn off the output switch on the power supply equipment.
- During equipment maintenance, attach "Do not switch on" labels near the upstream and downstream switches or circuit breakers as well as warning signs to prevent accidental connection. The equipment can be powered on only after troubleshooting is complete.
- Do not open equipment panels.
- Check equipment connections periodically, ensuring that all screws are securely tightened.
- Only qualified professionals can replace a damaged cable.
- Do not scrawl, damage, or block any labels or nameplates on the equipment. Promptly replace labels that have worn out.
- Do not use solvents such as water, alcohol, or oil to clean electrical components inside or outside of the equipment.

## Grounding

- Ensure that the grounding impedance of the equipment complies with local electrical standards.
- Ensure that the equipment is connected permanently to the protective ground. Before operating the equipment, check its electrical connection to ensure that it is reliably grounded.
- Do not work on the equipment in the absence of a properly installed ground conductor.
- Do not damage the ground conductor.

## Cabling Requirements

- When selecting, installing, and routing cables, follow local safety regulations and rules.
- When routing power cables, ensure that there is no coiling or twisting. Do not join or weld power cables. If necessary, use a longer cable.
- Ensure that all cables are properly connected and insulated, and meet specifications.
- Ensure that the slots and holes for routing cables are free from sharp edges, and that the positions where cables are routed through pipes or cable holes are equipped with cushion materials to prevent the cables from being damaged by sharp edges or burrs.
- Ensure that cables of the same type are bound together neatly and straight and that the cable sheath is intact. When routing cables of different types, ensure that they are away from each other without entanglement and overlapping.
- Secure buried cables using cable supports and cable clips. Ensure that the cables in the backfill area are in close contact with the ground to prevent cable deformation or damage during backfilling.
- If the external conditions (such as the cable layout or ambient temperature) change, verify the cable usage in accordance with the IEC-60364-5-52 or local laws and regulations. For example, check that the current-carrying capacity meets requirements.
- When routing cables, reserve at least 30 mm clearance between the cables and heat-generating components or areas. This prevents deterioration or damage to the cable insulation layer.

## 1.3 Environment Requirements

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 **DANGER**

Do not expose the equipment to flammable or explosive gas or smoke. Do not perform any operation on the equipment in such environments.

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 **DANGER**

Do not store any flammable or explosive materials in the equipment area.

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 **DANGER**

Do not place the equipment near heat sources or fire sources, such as smoke, candles, heaters, or other heating devices. Overheat may damage the equipment or cause a fire.

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 **WARNING**

Install the equipment in an area far away from liquids. Do not install it under areas prone to condensation, such as under water pipes and air exhaust vents, or areas prone to water leakage, such as air conditioner vents, ventilation vents, or feeder windows of the equipment room. Ensure that no liquid enters the equipment to prevent faults or short circuits.

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 **WARNING**

To prevent damage or fire due to high temperature, ensure that the ventilation vents or heat dissipation systems are not obstructed or covered by other objects while the equipment is running.

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## General Requirements

- Ensure that the equipment is stored in a clean, dry, and well ventilated area with proper temperature and humidity and is protected from dust and condensation.
- Keep the installation and operating environments of the equipment within the allowed ranges. Otherwise, its performance and safety will be compromised.
- Do not install, use, or operate outdoor equipment and cables (including but not limited to moving equipment, operating equipment and cables, inserting connectors to or removing connectors from signal ports connected to outdoor facilities, working at heights, performing outdoor installation, and opening doors) in harsh weather conditions such as lightning, rain, snow, and level 6 or stronger wind.
- Do not install the equipment in an environment with dust, smoke, volatile or corrosive gases, infrared and other radiations, organic solvents, or salty air.
- Do not install the equipment in an environment with conductive metal or magnetic dust.
- Do not install the equipment in an area conducive to the growth of microorganisms such as fungus or mildew.
- Do not install the equipment in an area with strong vibration, noise, or electromagnetic interference.
- Ensure that the site complies with local laws, regulations, and related standards.
- Ensure that the ground in the installation environment is solid, free from spongy or soft soil, and not prone to subsidence. The site must not be located in a low-lying land prone to water or snow accumulation, and the horizontal level of the site must be above the highest water level of that area in history.
- Do not install the equipment in a position that may be submerged in water.
- If the equipment is installed in a place with abundant vegetation, in addition to routine weeding, harden the ground underneath the equipment using cement or gravel (recommended area: 3 m x 2.5 m).
- Do not install the equipment outdoors in salt-affected areas because it may be corroded. A salt-affected area refers to the region within 500 m of the coast or prone to sea breeze. Regions prone to sea breeze vary with weather conditions (such as typhoons and monsoons) or terrains (such as dams and hills).
- Before opening doors during the installation, operation, and maintenance of the equipment, clean up any water, ice, snow, or other foreign objects on the top of the equipment to prevent foreign objects from falling into the equipment.

- When installing the equipment, ensure that the installation surface is solid enough to bear the weight of the equipment.
- After installing the equipment, remove the packing materials such as cartons, foam, plastics, and cable ties from the equipment area.

## 1.4 Mechanical Safety

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 **WARNING**

Ensure that all necessary tools are ready and inspected by a professional organization. Do not use tools that have signs of scratches or fail to pass the inspection or whose inspection validity period has expired. Ensure that the tools are secure and not overloaded.

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 **WARNING**

Do not drill holes into the equipment. Doing so may affect the sealing performance and electromagnetic containment of the equipment and damage components or cables inside. Metal shavings from drilling may short-circuit boards inside the equipment.

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### General Requirements

- Repaint any paint scratches caused during equipment transportation or installation in a timely manner. Equipment with scratches must not be exposed for an extended period of time.
- Do not perform operations such as arc welding and cutting on the equipment without evaluation by the Company.
- Do not install other devices on the top of the equipment without evaluation by the Company.
- When performing operations over the top of the equipment, take measures to protect the equipment against damage.
- Use correct tools and operate them in the correct way.

### Moving Heavy Objects

- Be cautious to prevent injury when moving heavy objects.



< 18 kg  
(< 40 lbs)



18–32 kg  
(40–70 lbs)



32–55 kg  
(70–121 lbs)



55–68 kg  
(121–150 lbs)



> 68 kg  
(> 150 lbs)

CZ0000110

- If multiple persons need to move a heavy object together, determine the manpower and work division with consideration of height and other conditions to ensure that the weight is equally distributed.

- If two persons or more move a heavy object together, ensure that the object is lifted and landed simultaneously and moved at a uniform pace under the supervision of one person.
- Wear personal protective gears such as protective gloves and shoes when manually moving the equipment.
- To move an object by hand, approach to the object, squat down, and then lift the object gently and stably by the force of the legs instead of your back. Do not lift it suddenly or turn your body around.
- Do not quickly lift a heavy object above your waist. Place the object on a workbench that is half-waist high or any other appropriate place, adjust the positions of your palms, and then lift it.
- Move a heavy object stably with balanced force at an even and low speed. Put down the object stably and slowly to prevent any collision or drop from scratching the surface of the equipment or damaging the components and cables.
- When moving a heavy object, be aware of the workbench, slope, staircase, and slippery places. When moving a heavy object through a door, ensure that the door is wide enough to move the object and avoid bumping or injury.
- When transferring a heavy object, move your feet instead of turning your waist around. When lifting and transferring a heavy object, ensure that your feet point to the target direction of movement.
- When transporting the equipment using a pallet truck or forklift, ensure that the tynes are properly positioned so that the equipment does not topple. Before moving the equipment, secure it to the pallet truck or forklift using ropes. When moving the equipment, assign dedicated personnel to take care of it.
- Choose sea or roads in good conditions for transportation as transportation by railway or air is not supported. Avoid tilt or jolt during transportation.

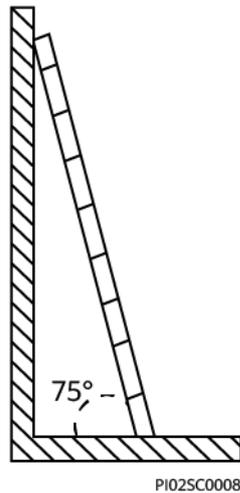
## Using Ladders

- Use wooden or insulated ladders when you need to perform live-line working at heights.
- Platform ladders with protective rails are preferred. Single ladders are not recommended.
- Before using a ladder, check that it is intact and confirm its load bearing capacity. Do not overload it.
- Ensure that the ladder is securely positioned and held firm.

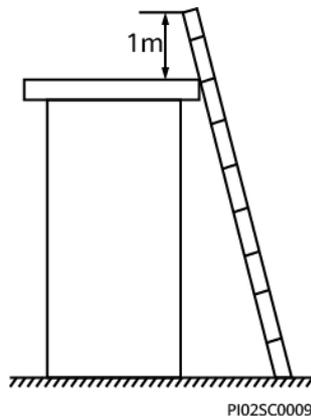


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- When climbing up the ladder, keep your body stable and your center of gravity between the side rails, and do not overreach to the sides.
- When a step ladder is used, ensure that the pull ropes are secured.
- If a single ladder is used, the recommended angle for the ladder against the floor is 75 degrees, as shown in the following figure. A square can be used to measure the angle.

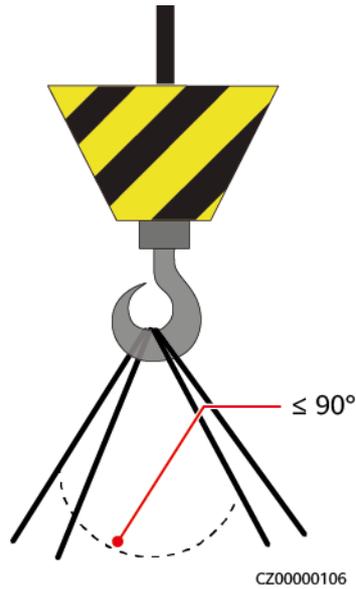


- If a single ladder is used, ensure that the wider end of the ladder is at the bottom, and take protective measures to prevent the ladder from sliding.
- If a single ladder is used, do not climb higher than the fourth rung of the ladder from the top.
- If you use a single ladder to climb up to a platform, ensure that the ladder is at least 1 m higher than the platform.



## Hoisting

- Only trained and qualified personnel are allowed to perform hoisting operations.
- Install temporary warning signs or fences to isolate the hoisting area.
- Ensure that the foundation where hoisting is performed on meets the load-bearing requirements.
- Before hoisting objects, ensure that hoisting tools are firmly secured onto a fixed object or wall that meets the load-bearing requirements.
- During hoisting, do not stand or walk under the crane or the hoisted objects.
- Do not drag steel ropes and hoisting tools or bump the hoisted objects against hard objects during hoisting.
- Ensure that the angle between two hoisting ropes is no more than 90 degrees, as shown in the following figure.



## Drilling Holes

- Obtain consent from the customer and contractor before drilling holes.
- Wear protective equipment such as safety goggles and protective gloves when drilling holes.
- To avoid short circuits or other risks, do not drill holes into buried pipes or cables.
- When drilling holes, protect the equipment from shavings. After drilling, clean up any shavings.

# 2 Product Introduction

## 2.1 Overview

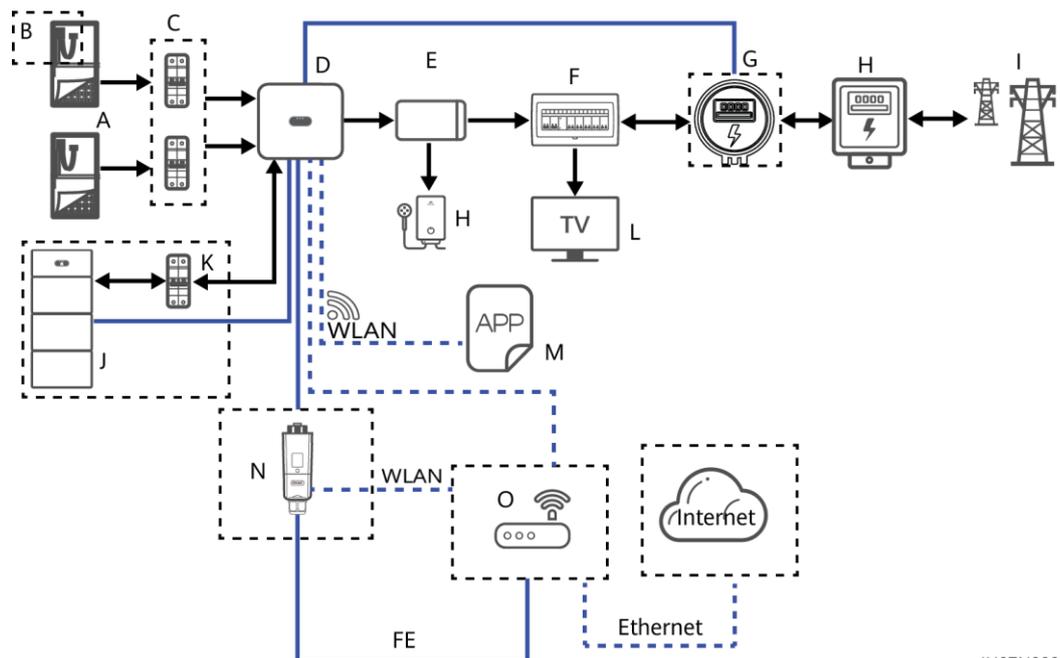
### Function

The smart solar inverter is a single-phase grid-tied string inverter that converts the DC power generated by PV strings into AC power and feeds the electricity into the power grid.

### Networking Application

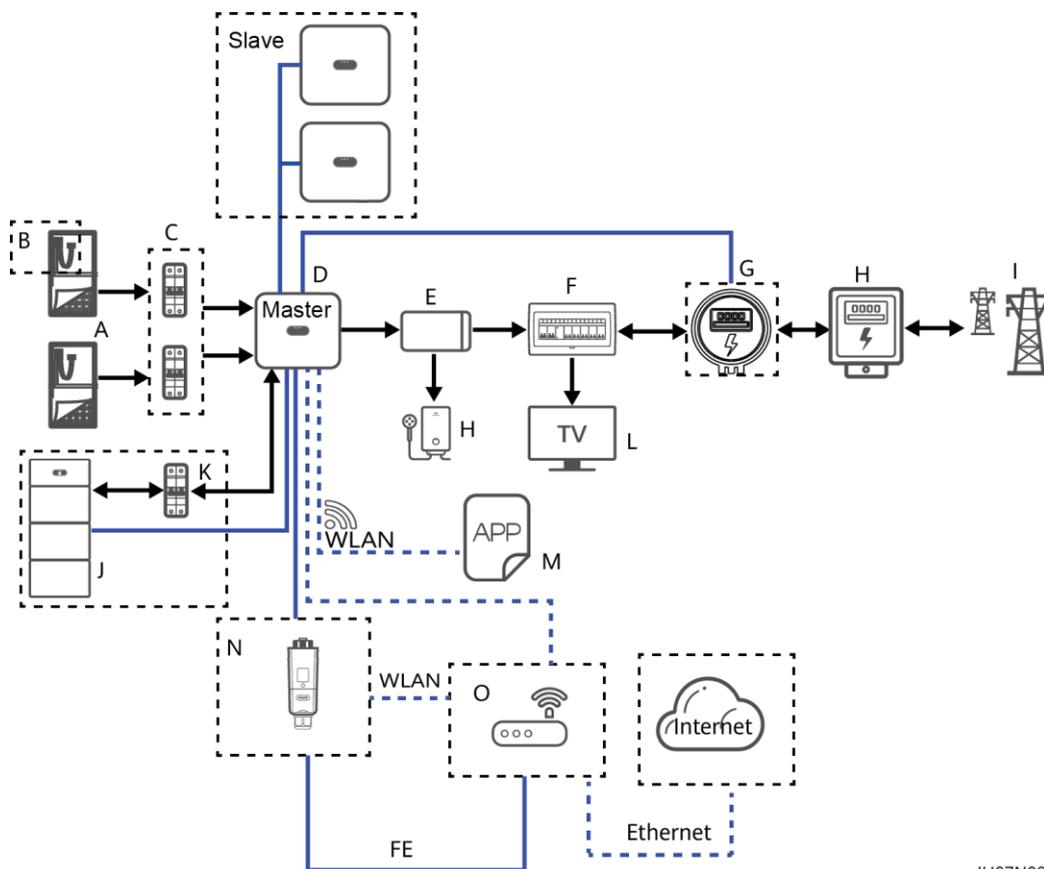
The smart solar inverter applies to residential rooftop grid-tied systems. The system consists of PV strings, grid-tied solar inverters, AC switches, and power distribution units (PDUs).

**Figure 2-1** Single smart solar inverter scenario (dashed boxes indicate optional configuration)



IH07N00001

**Figure 2-2** Smart solar inverter cascading scenario (dashed boxes indicate optional configuration)



IH07N00002

**NOTE**

- ➔ indicates the power flow direction, — indicates the signal line, and ..... indicates the wireless communication.
- In the smart solar inverter cascading scenario, the master and slave solar inverters are both IS-HYB-5000-1PH or IS-HYB-6000-1PH, and a maximum of three inverters can be cascaded.
- In the smart solar inverter cascading scenario, only one smart power sensor (G in the figure) can be connected to the master inverter.
- In the smart solar inverter cascading scenario, the inverters connected to the power grid must meet the local power grid requirements.
- Contact your dealer for list of compatible 3rd party Optimizers.

(A) PV string	(B) Smart PV optimizer	(C) DC switch
(D) Smart Solar Inverter	(E) Backup	(F) Residential PDU
(G) Smart Power Sensor	(H) Important Load	(I) Power grid
(J) Battery	(K) Battery switch	(L) Household load
(M) HiSolar App	(N) WLAN-FE Smart Dongle	(O) Router

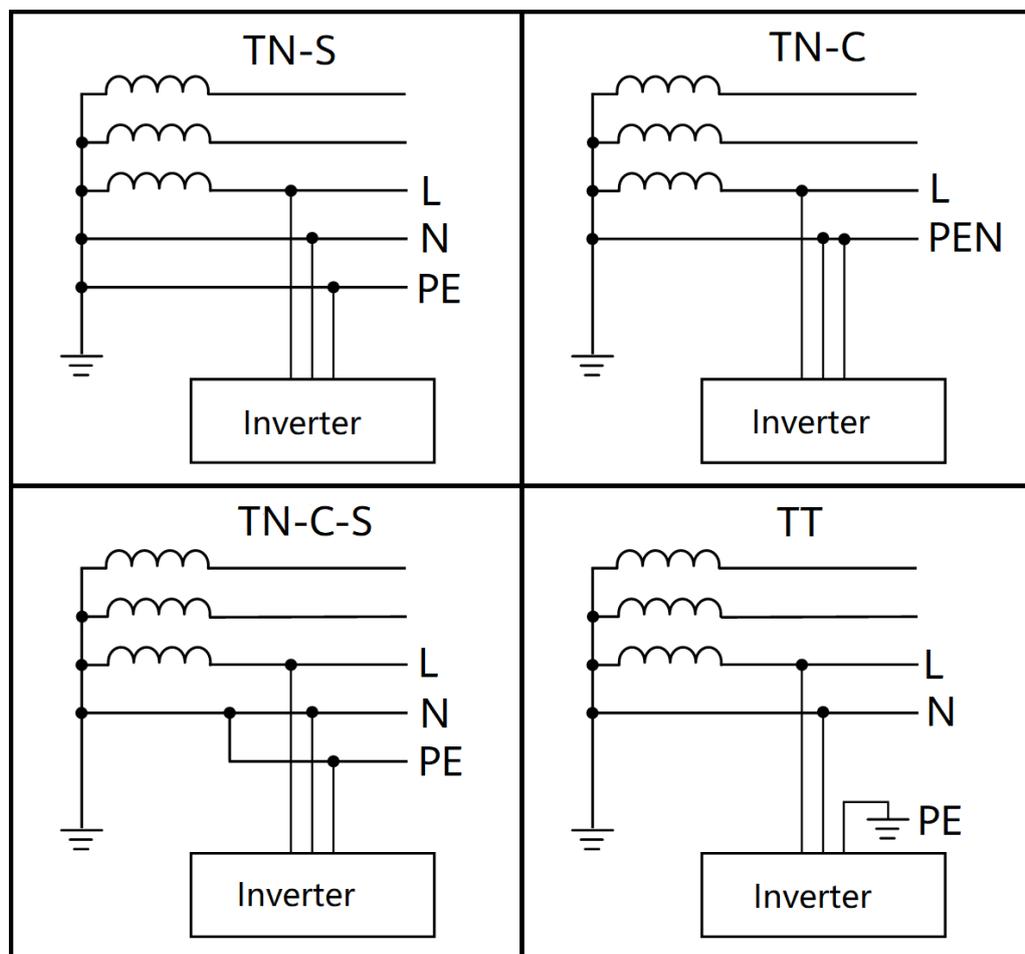
**⚠ CAUTION**

- The off-grid load output port of the Backup Box cannot be directly connected to the power grid. Otherwise, the Backup Box will be shut down due to overload.
- Off-grid electric motor loads are not supported. The startup power of an electric motor is several times of its rated power, which may exceed the load capacity of the inverter, resulting in startup failure.

### Supported Power Grid Types

The smart solar inverter supports the following power grid types: TN-S, TN-C, TN-C-S, and TT. In the TT power grid, the N-to-PE voltage must be less than 30 V.

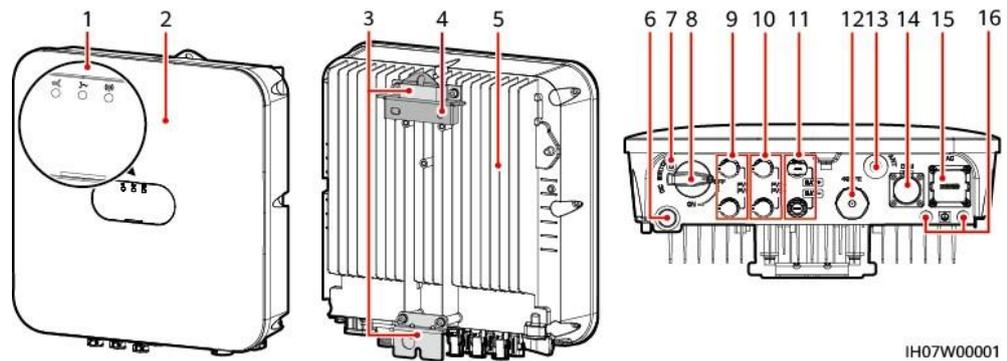
**Figure 2-3** Power grid types



## 2.2 Component Description

### Appearance

Figure 2-4 Appearance



- |   |  |
|---|--|
| (1) LED indicators                            | (2) Front panel                        |
| (3) Hanging kit                               | (4) Mounting bracket                   |
| (5) Heat sink                                 | (6) Ventilation valve                  |
| (7) DC switch locking screw hole <sup>a</sup> | (8) DC switch <sup>b</sup> (DC SWITCH) |
| (9) DC input terminals (PV1+/PV1-)            | (10) DC input terminals (PV2+/PV2-)    |
| (11) Battery terminals (BAT+/BAT-)            | (12) Smart Dongle port (WLAN-FE)       |
| (13) Antenna port (ANT)                       | (14) Communications port (COM)         |
| (15) AC output port (AC)                      | (16) Ground point                      |

#### NOTE

- Note a: The DC switch locking screw is used to lock the DC switch to prevent accidental startup. It is delivered with the inverter.
- Note b: DC input terminals PV1 and PV2 are controlled by the DC switch.

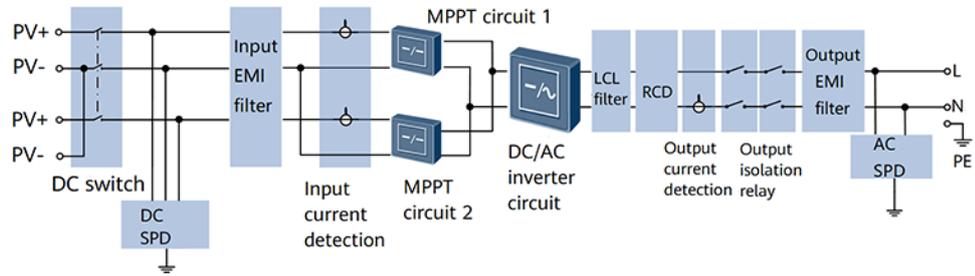
## 2.3 Working Principles

### Schematic Diagram

The inverter receives inputs from up to two PV strings. Then the inputs are grouped into two MPPT routes inside the inverter to track the maximum power point of the PV strings. The DC power is then converted into single-phase AC power through an inverter circuit. Surge protection is supported on both the DC and AC sides.

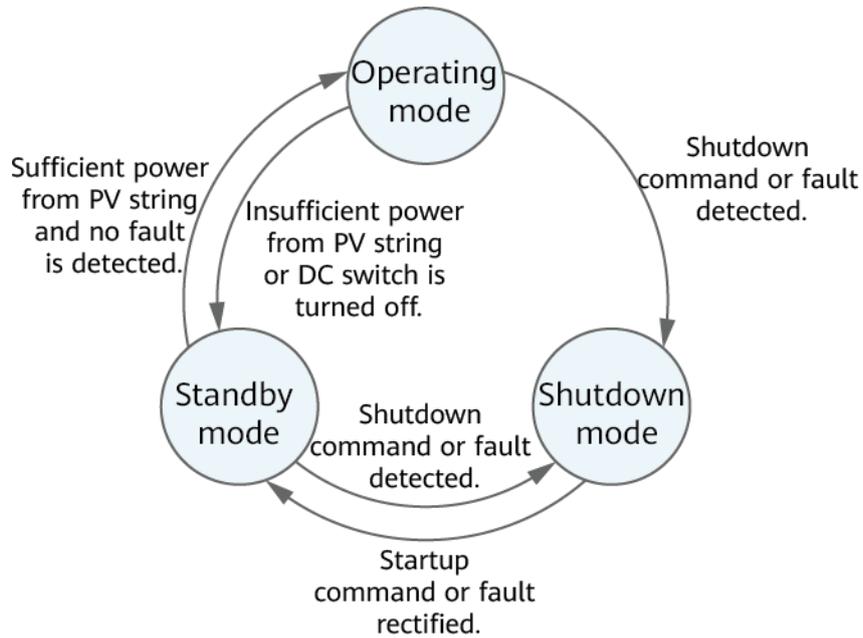
The inverter uses a reserved battery port for energy storage expansion. Battery performs charging and discharging operations according to the battery working mode.

**Figure 2-5** Schematic diagram



## Working Mode

**Figure 2-6** Working modes



IS07500001

**Table 2-1** Working mode description

Working mode	Description
Standby mode	The inverter enters Standby mode when the external environment does not meet the requirements for starting the inverter. In Standby mode: <ul style="list-style-type: none"> <li>• The inverter continuously detects its operation status. Once the operating conditions are met, the inverter enters Operating mode.</li> <li>• If the inverter detects a shutdown command or a fault after startup, it enters Shutdown mode.</li> </ul>
Operating mode	In Operating mode: <ul style="list-style-type: none"> <li>• The inverter converts DC power from PV strings into AC power and feeds</li> </ul>

<b>Working mode</b>	<b>Description</b>
	<p>the power to the power grid.</p> <ul style="list-style-type: none"><li>• The inverter tracks the maximum power point to maximize the PV string output power.</li><li>• If the inverter detects a shutdown command or a fault, it enters Shutdown mode.</li><li>• If the inverter detects that the output power of PV strings does not meet the requirements for grid-tied power generation, it enters Standby mode.</li></ul>
Shutdown mode	<ul style="list-style-type: none"><li>• In Standby or Operating mode, if the inverter detects a shutdown command or a fault, it enters Shutdown mode.</li><li>• In Shutdown mode, if the inverter detects that the fault is rectified or the startup command is executed, the inverter enters Standby mode.</li></ul>

# 3 Inverter Storage

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The following requirements should be met if the inverter is not put into use directly:

- Do not unpack the inverter.
- Keep the storage temperature at  $-40^{\circ}\text{C}$  to  $+70^{\circ}\text{C}$  and the humidity at 5%–95% RH.
- The product should be stored in a clean and dry place and be protected from dust and water vapor corrosion.
- A maximum of eight inverters can be stacked. To avoid personal injury or device damage, stack inverters with caution to prevent them from falling over.
- During the storage period, check the inverter periodically. (It is recommended that the check is performed every three months.) Replace the packing materials that are damaged by insects or rodents in a timely manner.
- If the inverter has been stored for more than two years, it must be checked and tested by professionals before being put into use.

# 4 System Installation

## 4.1 Checking Before Installation

### Outer Packing Materials

Before unpacking the inverter, check the outer packing materials for damage, such as holes and cracks, and check the inverter model. If any damage is found or the inverter model is not what you requested, do not unpack the package and contact your supplier as soon as possible.

 **NOTE**

You are advised to remove the packing materials within 24 hours before installing the inverter.

### Package Contents

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**NOTICE**

- After placing the equipment in the installation position, unpack it with care to prevent scratches. Keep the equipment stable during unpacking.

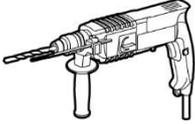
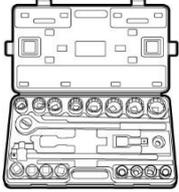
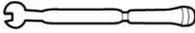
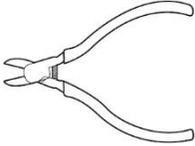
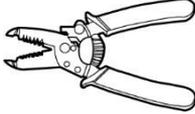
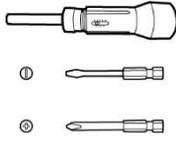
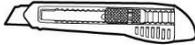
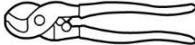
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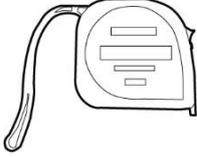
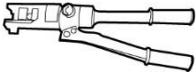
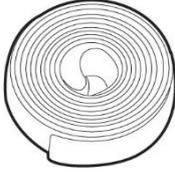
After unpacking the inverter, check that the contents are intact and complete. If any damage is found or any component is missing, contact your supplier.

 **NOTE**

For details about the number of contents, see the *Packing List* in the packing case.

## 4.2 Preparing Tools and Instruments

Type	Tools and Instruments		
Installation	 Hammer drill (with a drill bit of 8 mm)	 Torque socket wrench	 Torque wrench
	 Diagonal pliers	 Wire strippers	 Torque screwdriver
	 Rubber mallet	 Utility knife	 Cable cutter
	 Crimping tool (model: PV-CZM-22100/19100)	 Cord end terminal crimper	 Disassembly and Assembly Tool (model: PV-MS-HZ open-end wrench)
	 Cable tie	 Vacuum cleaner	 Multimeter (DC voltage measurement range $\geq 600$ V DC)

Type	Tools and Instruments		
	 Marker	 Steel measuring tape	 Level
	 Hydraulic pliers	 Heat-shrink tubing	 Heat gun
Personal protective equipment (PPE)	 Insulated gloves	 Protective gloves	 Dust mask
	 Safety boots	 Safety goggles	-

## 4.3 Determining the Installation Position

### Basic Requirements

- The inverter is protected to IP65 and can be installed indoors or outdoors.
- Do not install the inverter in a place where personnel are easy to come into contact with its enclosure and heat sink, because these parts are extremely hot during operation.
- Do not install the inverter near flammable or explosive materials.
- Do not install the inverter at a place within children's reach.
- The inverter will be corroded in salt areas, and the salt corrosion may cause fire. Do not install the inverter outdoors in salt areas. A salt area refers to the region within 500 meters from the coast or prone to sea breeze. The regions prone to sea breeze vary with weather conditions (such as typhoons and monsoons) or terrains (such as dams and hills).

## Installation Environment Requirements

- The inverter must be installed in a well-ventilated environment to ensure good heat dissipation.
- When the inverter is installed under direct sunlight, the power may be derated due to the temperature rise.
- You are advised to install the inverter in a sheltered place or install an awning over it.

## Mounting Structure Requirements

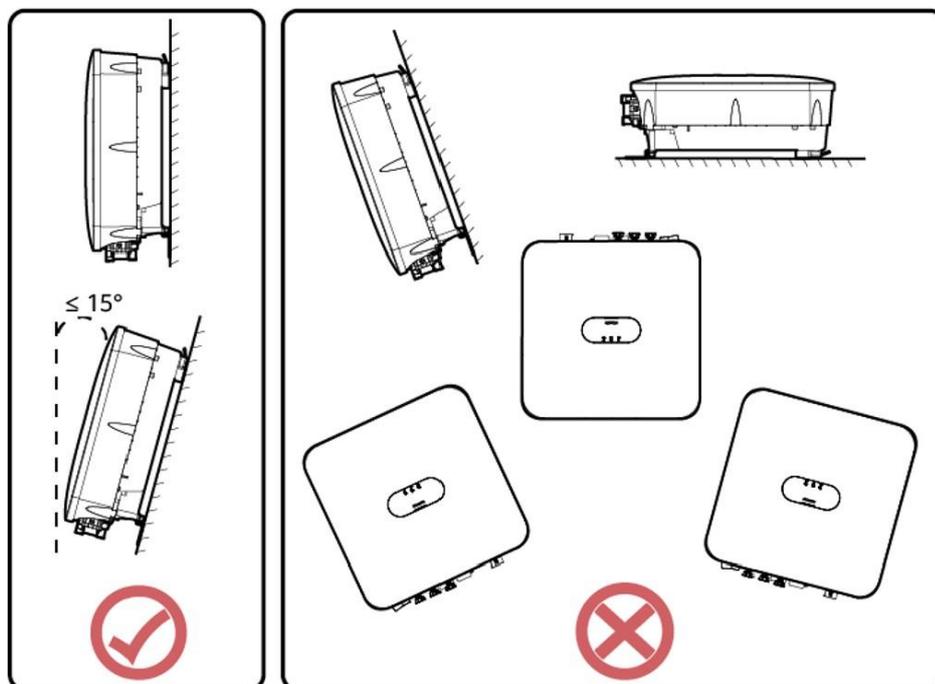
- The mounting structure where the inverter is installed must be fire resistant.
- Do not install the inverter on flammable building materials.
- Ensure that the installation surface is solid enough to bear the weight of the inverter.
- In residential areas, do not install the inverter on plaster board walls or walls made of similar materials with a weak sound insulation performance because the noise generated by the inverter may interfere with residents.

## Installation Angle Requirements

The inverter can be wall-mounted or pole-mounted. The installation angle requirements are as follows:

- Install the inverter vertically or at a maximum back tilt of 15 degrees to facilitate heat dissipation.
- Do not install the inverter at forward tilted, excessive back tilted, side tilted, horizontal, or upside down positions.

**Figure 4-1** Installation angle

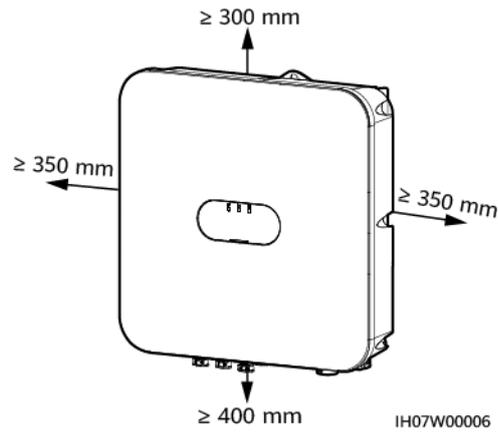


IH07H00004

## Installation Space Requirements

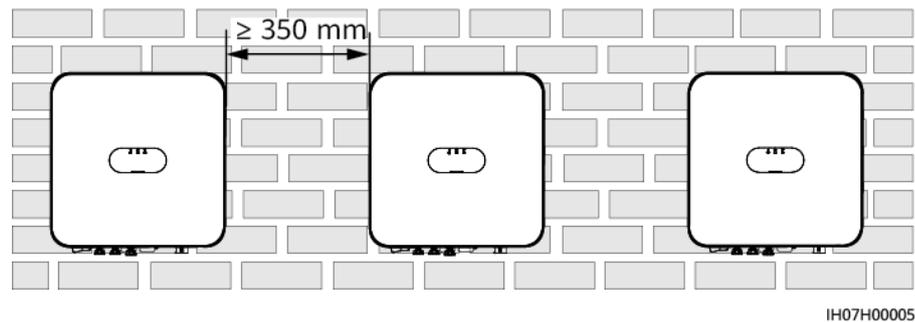
- Reserve enough clearance around the inverter to ensure sufficient space for installation and heat dissipation.

**Figure 4-2** Installation space

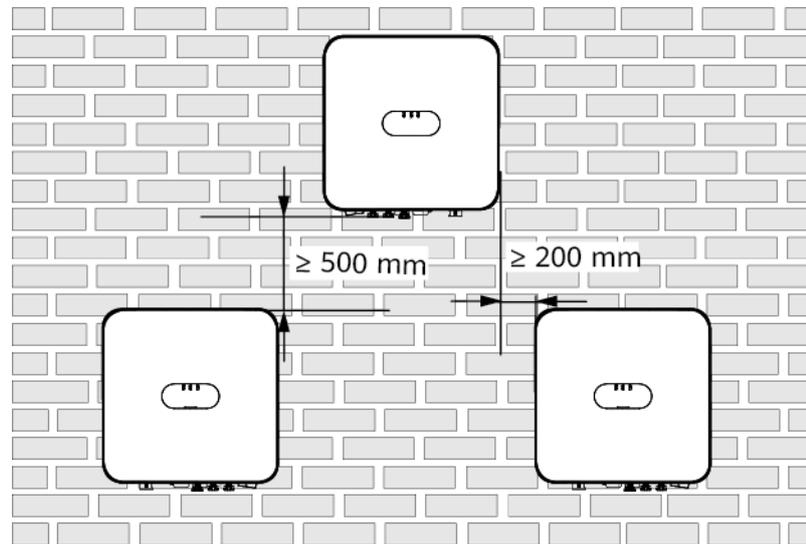


- When installing multiple inverters, install them in horizontal mode if sufficient space is available and install them in triangle mode if no sufficient space is available. Stacked installation is not recommended.

**Figure 4-3** Horizontal installation mode (recommended)

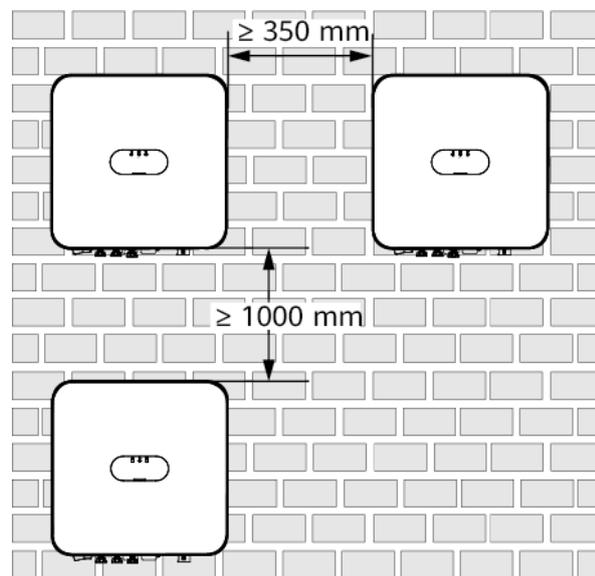


**Figure 4-4** Triangle installation mode (recommended)



IH07H00006

**Figure 4-5** Stacked installation mode (not recommended)



IH07H00007

**NOTE**

The installation figures are for reference only and are irrelevant to the inverter cascading scenario.

## 4.4 Moving a inverter

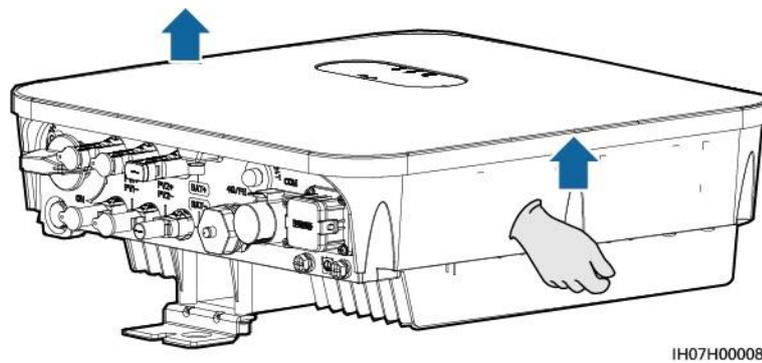
### Procedure

- Step 1** Hold the handles on both sides of the inverter, lift the inverter from the packing case, and transport it to the installation position.

**⚠ CAUTION**

- Move the inverter with care to prevent device damage and personal injury.
- Do not use the wiring terminals and ports at the bottom to support any weight of the inverter.
- When you need to temporarily place the inverter on the ground, use foam, paper, or other protection material to prevent damage to its enclosure.

**Figure 4-6** Moving a inverter



IH07H00008

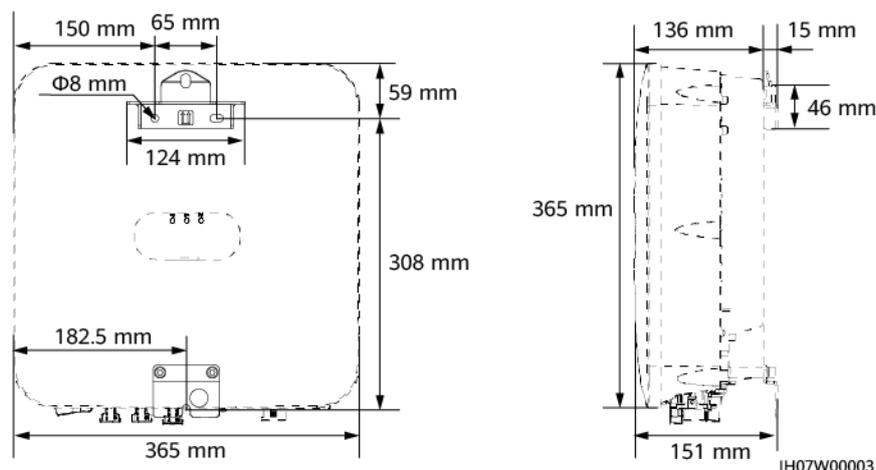
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## 4.5 Installing a inverter

### Installation Precautions

Figure 4-7 shows the dimensions of mounting holes for the inverter.

**Figure 4-7** Mounting bracket dimensions



IH07W00003

## 4.5.1 Wall-Mounted Installation

### Procedure

- Step 1** Determine the positions for drilling holes using the marking-off template. Level the positions of mounting holes using a level, and mark the positions with a marker.
- Step 2** Secure the mounting bracket.

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**⚠ DANGER**

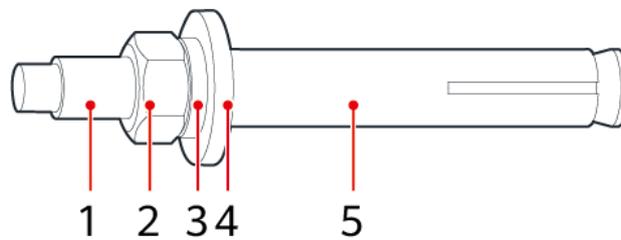
When drilling holes, avoid the water pipes and power cables buried in the wall.

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**📖 NOTE**

- M6x60 expansion bolts are delivered with the inverter. If the length and amount of the bolts do not meet installation requirements, prepare M6 stainless steel expansion bolts by yourself.
- The expansion bolts delivered with the inverter are used for solid concrete walls. For other types of walls, prepare bolts by yourself and ensure that the wall meets the load bearing requirements of the inverter.

**Figure 4-8** Expansion bolt composition



IS05W00018

(1) Bolt

(2) Nut

(3) Spring washer

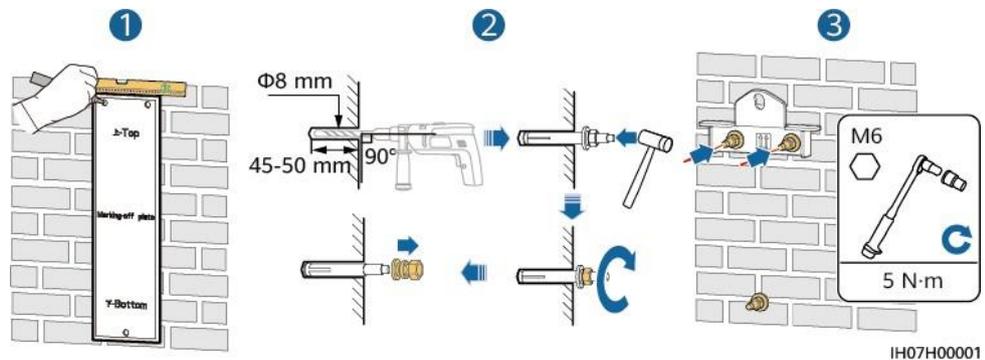
(4) Flat washer

(5) Expansion sleeve

**NOTICE**

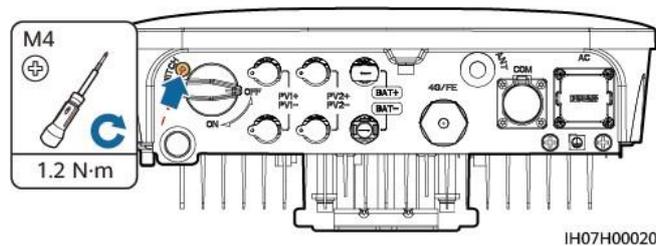
- To prevent dust inhalation or contact with eyes, wear safety goggles and a dust mask when drilling holes.
- Wipe away any dust in or around the holes and measure the hole distances. If the holes are inaccurately positioned, drill holes again.
- Level the head of the expansion sleeve with the concrete wall after removing the nut, spring washer, and flat washer. Otherwise, the mounting bracket will not be securely installed on the wall.
- Loosen the nut, spring washer, and flat washer of the expansion bolt at the bottom.

**Figure 4-9** Installing expansion bolts



**Step 3** (Optional) Install the locking screw for the DC switch.

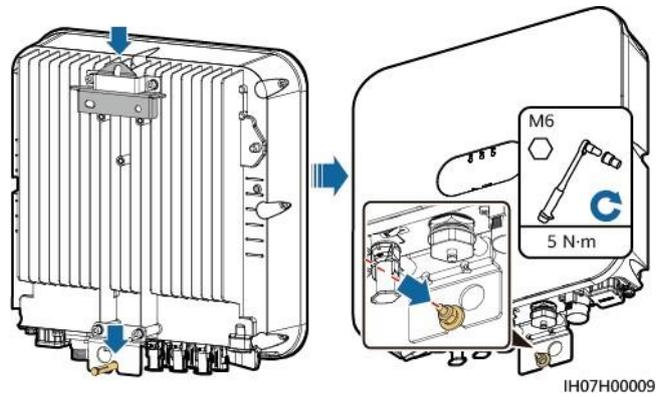
**Figure 4-10** Installing a locking screw for the DC switch



**Step 4** Install the inverter on the mounting bracket.

**Step 5** Tighten the nuts.

**Figure 4-11** Tightening nuts

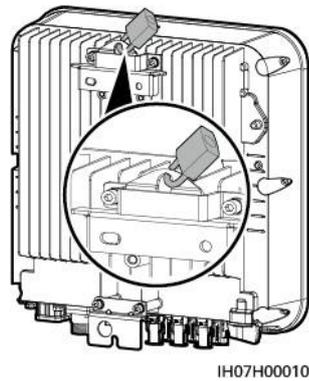


**Step 6** (Optional) Install an anti-theft lock.

**NOTICE**

- Prepare an anti-theft lock suitable for the lock hole diameter ( $\Phi 10$  mm).
- An outdoor waterproof lock is recommended.
- Keep the key to the anti-theft lock.

**Figure 4-12** Installing an anti-theft lock



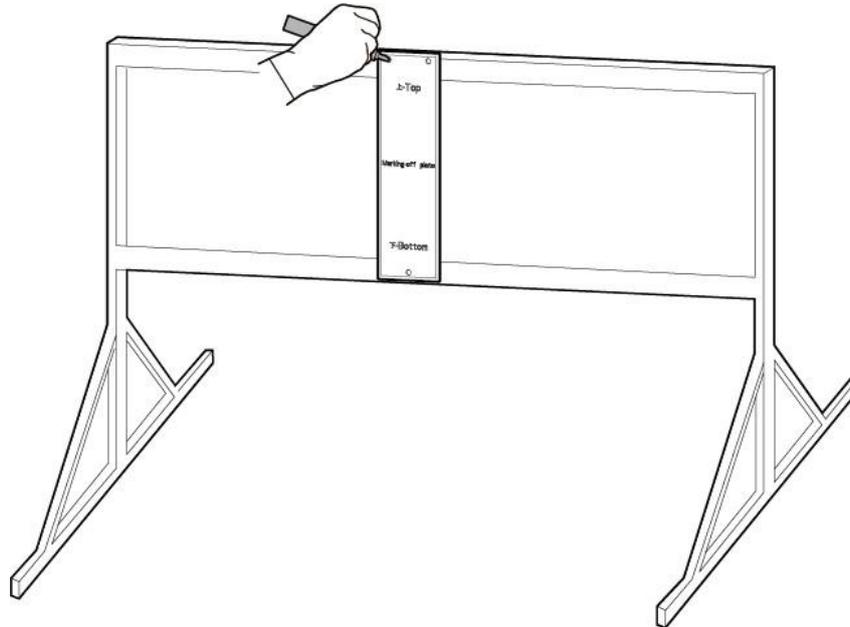
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## 4.5.2 Support-Mounted Installation

### Procedure

- Step 1** Determine the positions for drilling holes using the marking-off template, and then mark the positions with a marker.

**Figure 4-13** Determining hole positions



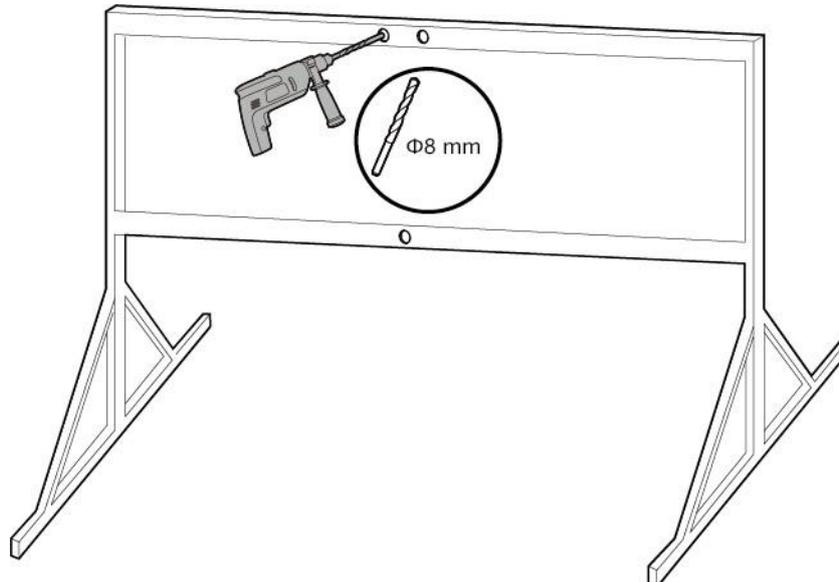
IH07H00011

**Step 2** Drill holes using a hammer drill.

**NOTE**

You are advised to apply anti-rust paint on the hole positions for protection.

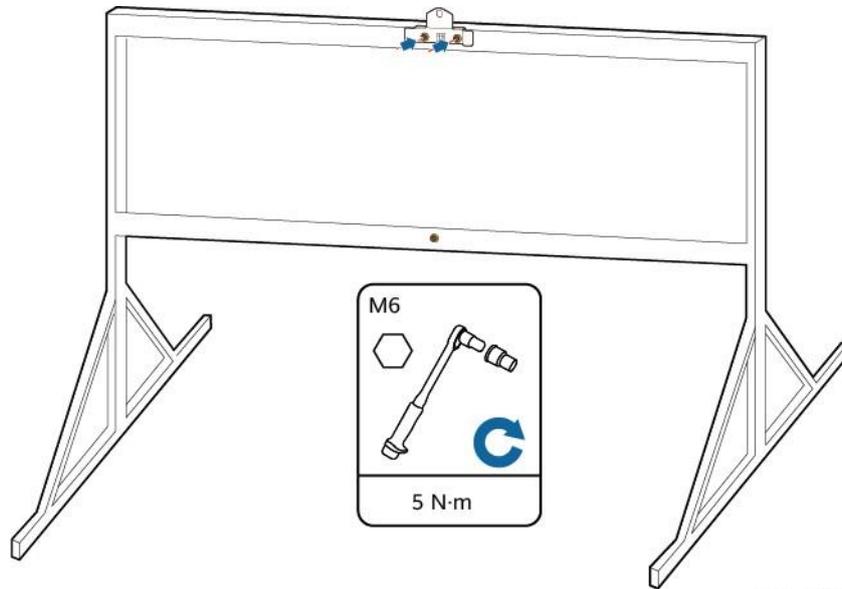
**Figure 4-14** Drilling holes



IH07H00012

**Step 3** Secure the mounting bracket.

**Figure 4-15** Secure the mounting bracket



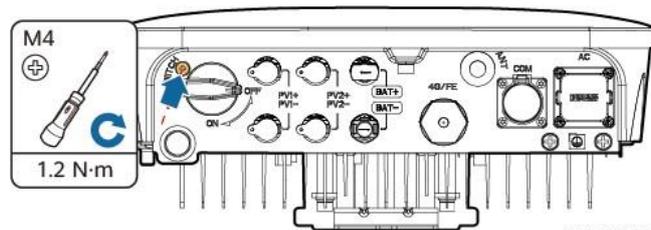
IH07H00013

**NOTE**

Prepare bolt assemblies based on the hole diameter of the mounting bracket.

**Step 4** (Optional) Install the locking screw for the DC switch.

**Figure 4-16** Installing a locking screw for the DC switch

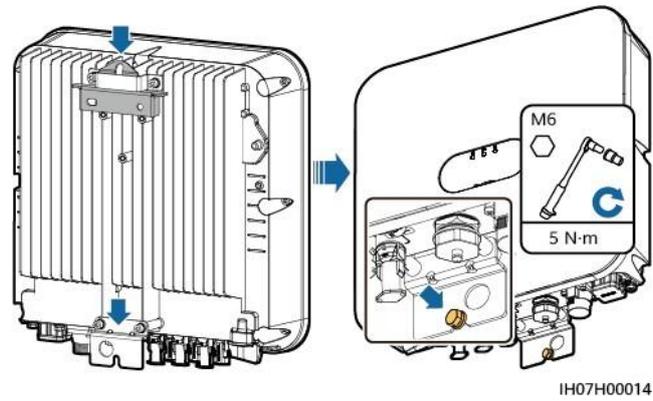


IH07H00020

**Step 5** Install the inverter on the mounting bracket.

**Step 6** Tighten the bolt assemblies.

**Figure 4-17** Tightening bolt assemblies

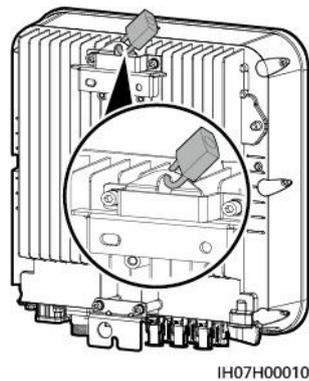


**Step 7** (Optional) Install an anti-theft lock.

**NOTICE**

- Prepare an anti-theft lock suitable for the lock hole diameter ( $\Phi 10$  mm).
- An outdoor waterproof lock is recommended.
- Keep the key to the anti-theft lock.

**Figure 4-18** Installing an anti-theft lock



----End

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# 5 Electrical Connection

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## 5.1 Precautions

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 **DANGER**

When exposed to sunlight, the PV arrays supply DC voltage to the inverter. Before connecting cables, ensure that all **DC SWITCH** on the inverter are OFF. Otherwise, the high voltage of the inverter may result in electric shocks.

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 **DANGER**

- The site must be equipped with qualified fire fighting facilities, such as fire sand and carbon dioxide fire extinguishers.
  - Wear personal protective equipment and use dedicated insulated tools to avoid electric shocks or short circuits.
- 

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 **WARNING**

- The equipment damage caused by incorrect cable connections is beyond the warranty scope.
  - Only certified electrician can perform electrical terminations.
  - Operation personnel must wear PPE when connecting cables.
  - Before connecting cables to ports, leave enough slack to reduce the tension on the cables and prevent poor cable connections.
-

**CAUTION**

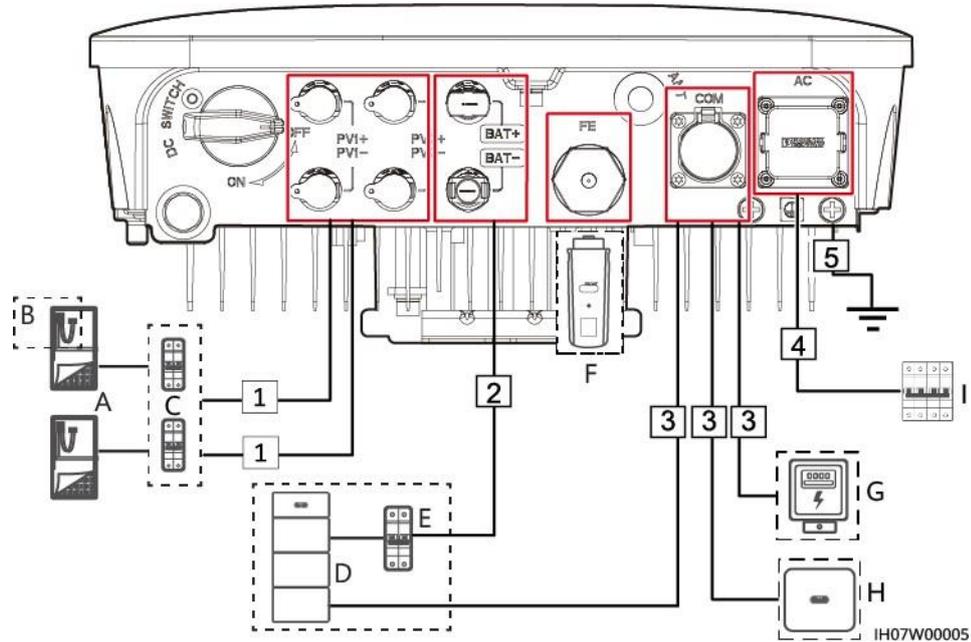
- Stay away from the equipment when preparing cables to prevent cable scraps from entering the equipment. Cable scraps may cause sparks and result in personal injury and equipment damage.
- When routing PV cables, it is recommended that the positive and negative PV string cables be routed in different pipes to prevent cable damage and short circuits caused by improper operations during construction.

**NOTE**

The cable colors shown in the electrical connection diagrams provided in this section are for reference only. Select cables in accordance with local cable specifications (green-and-yellow cables are only used for protective earthing).

## 5.2 Preparing Cables

**Figure 5-1** inverter cable connections (dashed boxes indicate optional configuration)



**Table 5-1** Component description

No.	Component	Description	Source
A	PV string	<ul style="list-style-type: none"> <li>• A PV string is composed of the PV modules connected in series.</li> <li>• The inverter supports the input from two PV strings.</li> </ul>	Prepared by the customer
B	PV optimizer	The inverter supports compatible 3 <sup>rd</sup> party PV	Prepared by the

No.	Component	Description	Source
		optimizer. Please consult with your dealer or <b>istore</b> for compatible models.	customer
C	DC switch	Recommended: a DC circuit breaker with a rated voltage greater than or equal to 600 V DC and a rated current of 20 A	Prepared by the customer
D	Battery	The inverter can connect to batteries.	Purchased from provider
E	Battery switch	Recommended: a DC circuit breaker with a rated voltage greater than or equal to 600 V DC and a rated current of 20 A	Prepared by the customer
F	Smart Dongle	Supported models: WLAN-FE Smart Dongle	Purchased from provider
G	Smart Power Sensor	The inverter can connect to the YDS70-C16, and DDSU666-H smart power sensors.	Prepared by the customer
H	Inverter	Select a proper model as required.	Purchased from provider
I	AC switch	To ensure that the inverter can be safely disconnected from the power grid when an exception occurs, connect an AC switch to the AC side of the inverter. Select an appropriate AC switch in accordance with local industry standards and regulations. The following switch specifications are recommended:  Recommended: a single-phase AC circuit breaker with a rated voltage greater than or equal to 250 V AC and a rated current of: 32 A	Prepared by the customer

**Table 5-2** Cable description

No	Cable	Type	Recommended Specifications	Source
1	DC input power cable	Common outdoor PV cable in the industry	<ul style="list-style-type: none"> <li>• Conductor cross-sectional area: 4–6 mm<sup>2</sup></li> <li>• Cable outer diameter: 5.5–9 mm</li> </ul>	Prepared by the customer
2	(Optional) Battery cable	Common outdoor PV cable in the industry	<ul style="list-style-type: none"> <li>• Conductor cross-sectional area: 4–6 mm<sup>2</sup></li> <li>• Cable outer diameter: 5.5–9 mm</li> </ul>	Prepared by the customer
3	(Optional) Signal cable	Outdoor shielded twisted pair cable	<ul style="list-style-type: none"> <li>• Conductor cross-sectional area:                             <ul style="list-style-type: none"> <li>– Combined crimping of cables on the port: 0.20–0.35 mm<sup>2</sup></li> <li>– Crimping the cables on the port without combining them: 0.20–1 mm<sup>2</sup></li> </ul> </li> <li>• Cable outer diameter:                             <ul style="list-style-type: none"> <li>– 4-hole rubber plug: 4–8 mm</li> <li>– 2-hole rubber plug: 8–11 mm</li> </ul> </li> </ul>	Prepared by the customer
4	AC output power cable <sup>a</sup>	<ul style="list-style-type: none"> <li>• Not using the PE equipotential point at the AC output port: two-core (L and N) outdoor copper cable</li> <li>• Using the PE equipotential point at the AC output port: three-core (L, N, and PE) outdoor copper cable</li> </ul>	<ul style="list-style-type: none"> <li>• Conductor cross-sectional area: 4–6 mm<sup>2</sup></li> <li>• Cable outer diameter: 10–21 mm</li> </ul>	Prepared by the customer
5	PE cable	Single-core outdoor copper cable and M6 OT terminal	4–10 mm <sup>2</sup>	Prepared by the customer
<p>Note a: The minimum cross-sectional area of the cable should be selected based on the rated value of the AC fuse.</p>				

 **NOTE**

- The minimum cable diameter must comply with local cable standards.
- The factors that affect cable selection include the rated current, cable type, routing mode, ambient temperature, and maximum expected line loss.

## 5.3 Connecting PE Cables

### Precautions

 **DANGER**

- Ensure that the PE cable is securely connected. Otherwise, electric shocks may occur.
- Do not connect the neutral wire to the enclosure as a PE cable. Otherwise, electric shocks may occur.

 **NOTE**

- The PE point at the AC output port is used only as a PE equipotential point, and cannot substitute for the PE point on the enclosure.
- It is recommended that silica gel or paint be used around the ground terminal after the PE cable is connected.

### Additional Information

The inverter provides the grounding detection function. This function is used to check whether the inverter is properly grounded before the inverter starts, or check whether the ground cable is disconnected when the inverter is running. This function is only available under limited conditions. To ensure the safe operation of the inverter, properly ground the inverter according to the connection requirements of the ground cable. For some power grid types, if the output side of the inverter is connected to an isolation transformer, ensure that the inverter is properly grounded and set **Grounding inspection** to **Disable** to enable the inverter to run properly. If you are not sure whether the inverter is connected to such a type of power grid, contact your dealer or technical support for confirmation.

- According to IEC 62109, to ensure the safe operation of the inverter in the case of ground cable damage or disconnection, properly connect the ground cable of the inverter and ensure that it meets at least one of the following requirements before the grounding detection function becomes invalid:
  - If the PE terminal is not connected to the AC connector, use a single-core outdoor copper cable with a conductor cross-sectional area of at least 10 mm<sup>2</sup> as the PE cable on the chassis.
  - Use cables with the same diameter as the AC output power cable and ground the PE terminal on the AC connector and the ground screws on the chassis.
- In some countries and regions, the inverter must have additional ground cables. Use cables with the same diameter as the AC output power cable and ground the PE terminal on the AC connector and the ground screws on the chassis.

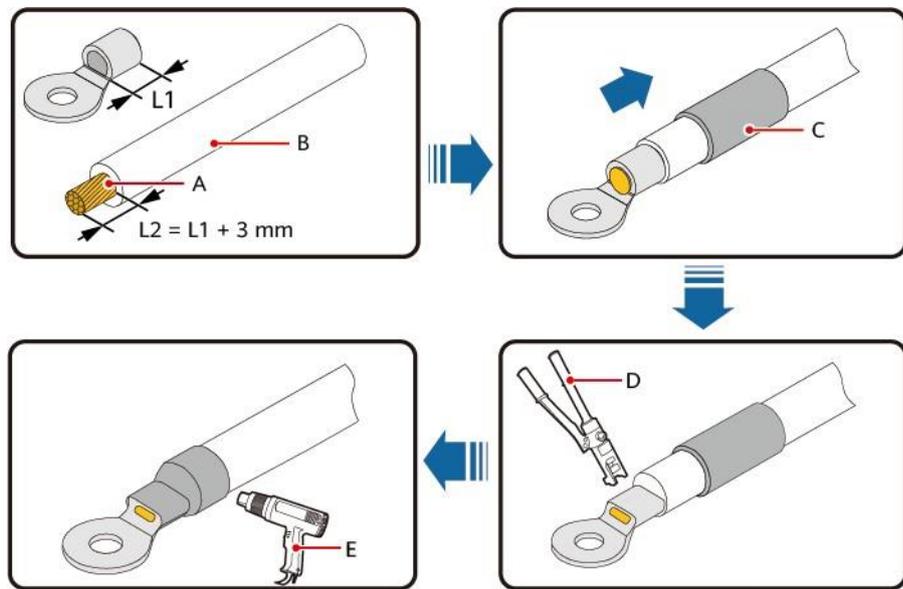
### Procedure

- Step 1** Crimp an OT terminal.

**NOTICE**

- Avoid scratching the core wire when stripping a cable.
- The cavity formed after the conductor crimp strip of the OT terminal is crimped must wrap the core wires completely. The core wires must contact the OT terminal closely.
- Wrap the wire crimping area with heat shrink tubing. The heat shrink tubing is used as an example.
- When using a heat gun, protect the equipment from being scorched.

**Figure 5-2** Crimping an OT terminal



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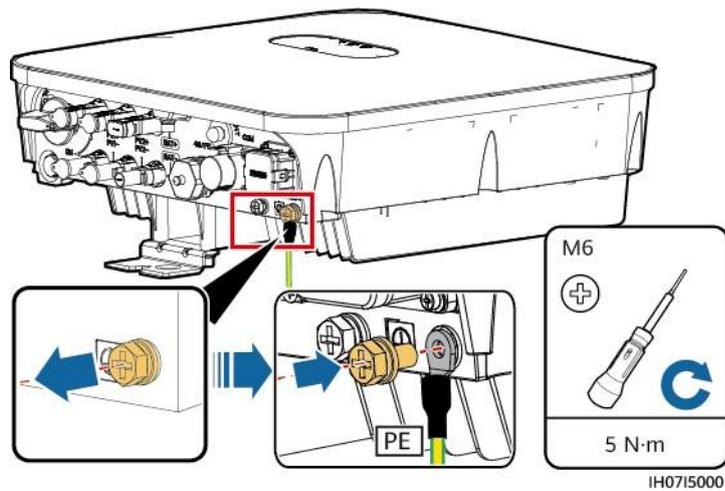
- (A) Core wire                      (B) Insulation layer                      (C) Heat shrink tubing  
(D) Hydraulic pliers                      (E) Heat gun

**Step 2** Connect the PE cable.

**NOTICE**

- Ensure that the PE cable is connected securely.
- You are advised to use the right ground point and reserve the other ground point for future use.

**Figure 5-3** Connecting a PE cable



----End

## 5.4 (Optional) Installing a Smart Dongle

### Procedure

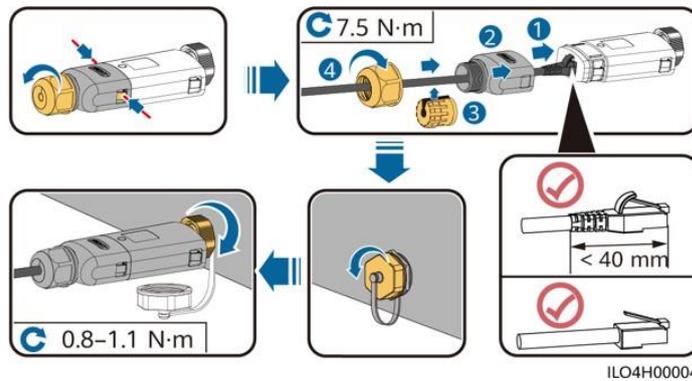
**NOTE**

- You are advised to install the Smart Dongle before installing the WLAN antenna.
- When reinstalling the cover of the Smart Dongle, ensure that the buckles spring back in place with a click sound.

WLAN-FE Smart Dongle (FE Communication)

You are advised to use a CAT 5E outdoor shielded network cable (outer diameter < 9 mm; internal resistance ≤ 1.5 ohms/10 m) and shielded RJ45 connectors.

**Figure 5-4** Installing a WLAN-FE Smart Dongle (FE communication)



## 5.5 Installing a WLAN Antenna

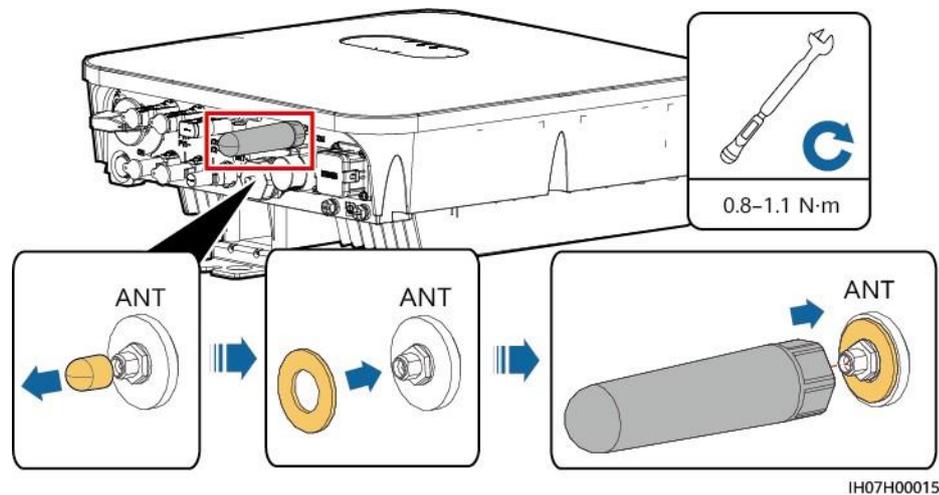
### Procedure

- Step 1** Remove the watertight cap from the ANT port.
- Step 2** Install the washer to the ANT port on the chassis.
- Step 3** Install the WLAN antenna.

#### NOTICE

Ensure that the WLAN antenna is installed securely.

**Figure 5-5** Installing a WLAN antenna



----End

## 5.6 Connecting an AC Output Power Cable

### Precautions

An AC switch must be installed on the AC side of the inverter to ensure that the inverter can be safely disconnected from the power grid.

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#### WARNING

- Do not connect loads between the inverter and the AC switch that directly connects to the inverter. Otherwise, the switch may trip by mistake.
  - If an AC switch is used with specifications beyond local standards, regulations, or recommendations, the switch may fail to turn off in a timely manner in case of exceptions, causing serious faults.
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#### CAUTION

Each inverter must be equipped with an AC output switch. Multiple inverters cannot connect to the same AC output switch.

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The inverter is integrated with a comprehensive residual current monitoring unit. Once detecting that the residual current exceeds the threshold, the inverter immediately disconnects itself from the power grid.

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#### NOTICE

- If the external AC switch can perform earth leakage protection, the rated leakage action current should be greater than or equal to 100 mA.
  - If multiple inverters connect to the general residual current device (RCD) through their respective external AC switches, the rated leakage action current of the general RCD should be greater than or equal to the number of inverters multiplied by 100 mA.  
(Type A RCD rating 100mA is recommended)
  - A knife switch cannot be used as an AC switch.
- 

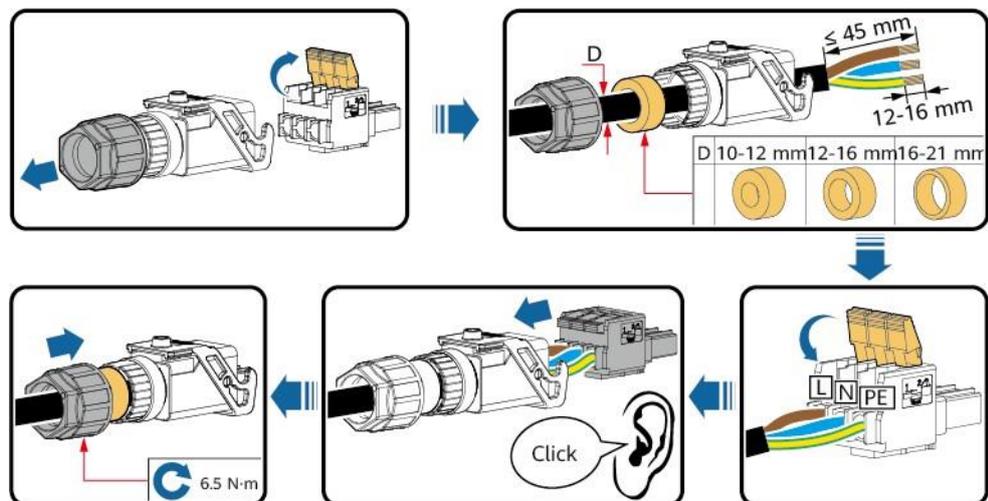
### Procedure

- Step 1** Connect the AC output power cable to the AC connector.

**NOTICE**

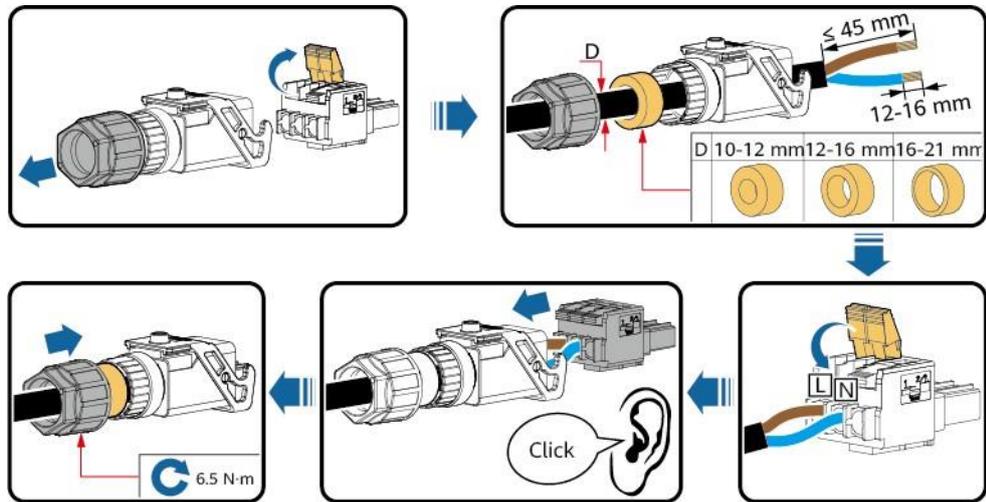
- The PE point at the AC output port is used only as a PE equipotential point, and cannot substitute for the PE point on the enclosure.
- Keep the AC output power cable and the PE cable close to each other.
- Keep the AC output power cable and the DC input power cable close to each other.
- Ensure that the cable jacket is inside the connector.
- Ensure that the exposed core is totally inserted into the cable hole.
- Ensure that AC output cable is secured. Failing to do so may cause inverter malfunction or damage to its AC connector.
- Ensure that the cable is not twisted.

**Figure 5-6** Assembling an AC connector (three-core wire)



IH0120002

**Figure 5-7** Assembling an AC connector (two-core wire)

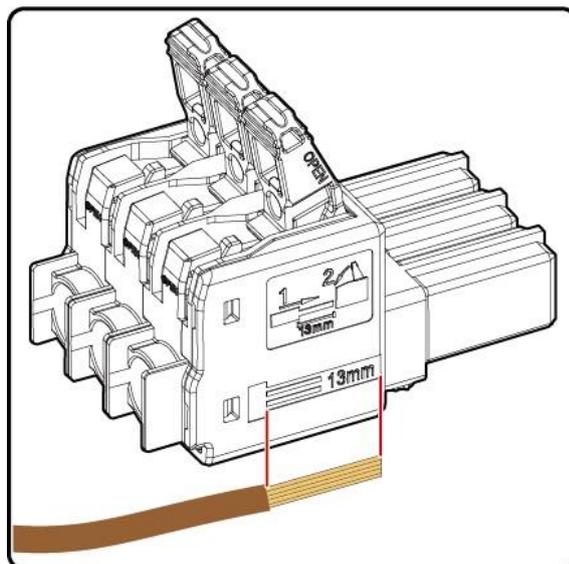


IH01120001

**NOTE**

- The cable colors shown in the figures are for reference only. Select an appropriate cable according to the local standards.
- For the core installation method and the length for cable stripping, see the instructions on the side of the plug insert.

**Figure 5-8** Length for cable stripping



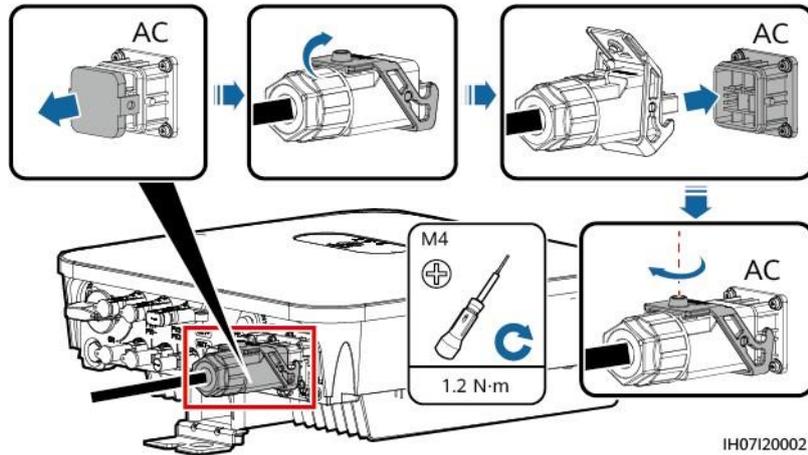
IS05W00036

**Step 2** Connect the AC connector to the AC output port.

**NOTICE**

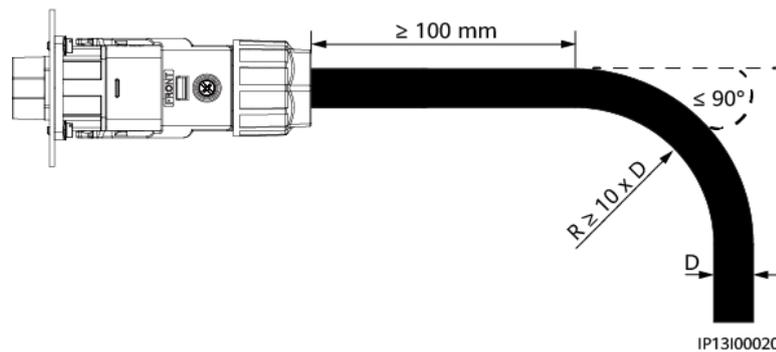
Ensure that the AC connector is connected securely.

**Figure 5-9** Securing an AC connector



**Step 3** Check the route of the AC output power cable.

**Figure 5-10** Cabling requirements



----End

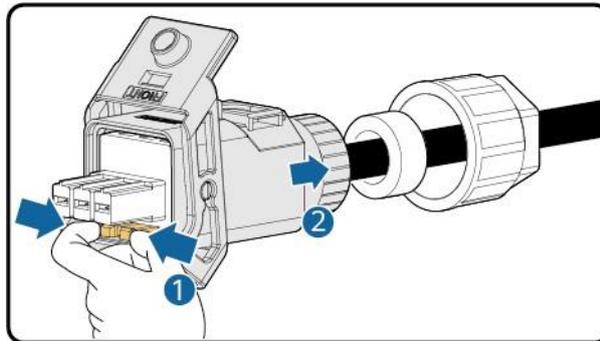
## Follow-up Procedure

**WARNING**

Before removing the AC connector, ensure that the DC switch at the bottom of the inverter and all the switches connected to the inverter are OFF.

To remove the AC connector from the inverter, perform the operations in reverse order.

**Figure 5-11** Removing a plug insert



IS05H00031

## 5.7 Connecting DC Input Power Cables

### Precautions

---

**⚠ DANGER**

- Before connecting the DC input power cables, ensure that the DC voltage is within the safe range (lower than 60 V DC) and that the DC switch on the inverter is OFF. Failing to do so may result in electric shocks.
  - When the inverter is running, it is not allowed to work on the DC input power cables, such as connecting or disconnecting a PV string or a PV module in a PV string. Failing to do so may cause electric shocks.
  - If no PV string connects to a DC input terminal of the inverter, do not remove the watertight cap from the DC input terminals. Otherwise, the IP rating of the inverter will be affected.
- 

---

**⚠ WARNING**

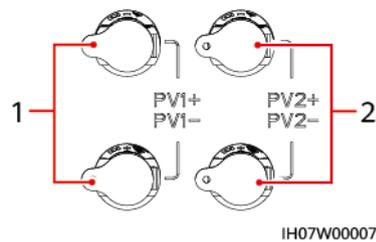
Ensure that the following conditions are met. Otherwise, the inverter may be damaged, or even a fire could happen.

- The DC input voltage of the inverter shall not exceed maximum input voltage under any circumstance.
  - The polarities of electric connections are correct on the DC input side. The positive and negative terminals of a PV string connect to corresponding positive and negative DC input terminals of the inverter.
  - If the DC input power cables are reversely connected, do not operate the DC switch as well as positive and negative connectors immediately. Wait until the night when solar irradiance declines and the PV string current drops to below 0.5 A. Then set the DC switch to the OFF position, remove the positive and negative connectors, and correct the polarities of the DC input power cables.
-

**NOTICE**

- Since the output of the PV string connected to the inverter cannot be grounded, ensure that the PV module output is well insulated to ground.
- During the installation of PV strings and the inverter, the positive or negative terminals of PV strings may be short-circuited to ground if the power cable is not properly installed or routed. In this case, an AC or DC short circuit may occur and damage the inverter. The caused device damage is not covered under any warranty or service agreement.

**Figure 5-12** DC input terminals



(1) Terminals of DC input 1

(2) Terminals of DC input 2

## Procedure

**Step 1** Assemble a DC connector.

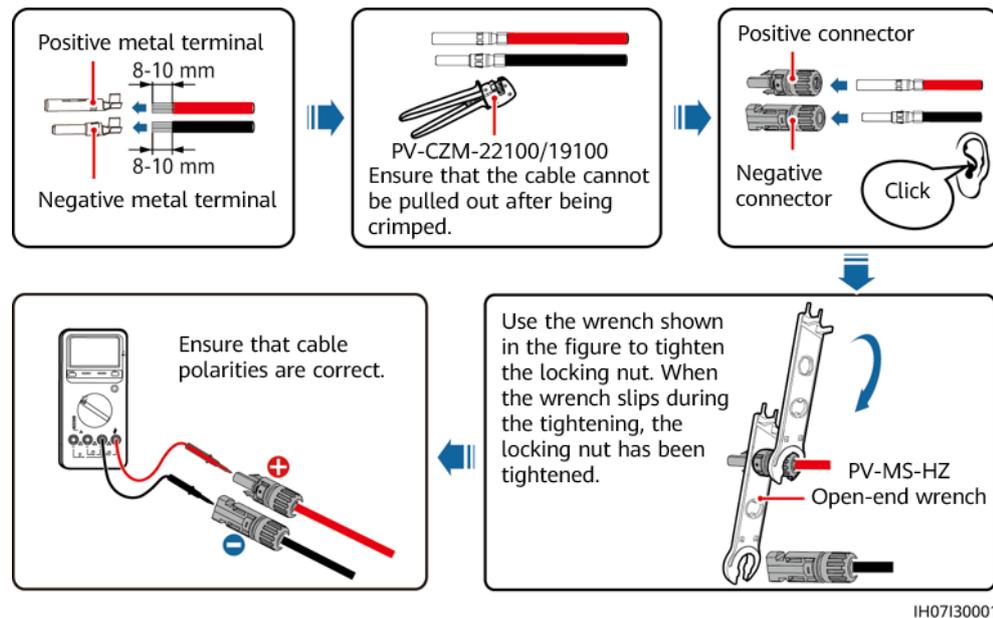
**CAUTION**

Use the Staubli MC4 positive and negative metal terminals and DC connectors delivered with the inverter. Using incompatible positive and negative metal terminals and DC connectors may result in serious consequences. The caused device damage is not covered under any warranty or service agreement.

**NOTICE**

- Keep the DC input PV+ cable and PV– cable close to each other.
- Cables with high rigidity, such as armored cables, are not recommended as DC input power cables, because poor contact may be caused by the bending of the cables.
- Before assembling DC connectors, label the cable polarities correctly to ensure correct cable connections.
- After crimping the positive and negative metal terminals, pull the DC input power cables back to ensure that they are connected securely.
- Insert the crimped metal terminals of the positive and negative power cables into the appropriate positive and negative connectors. Then pull back the DC input power cables to ensure that they are connected securely.

**Figure 5-13** Assembling a DC connector



**NOTE**

- If the PV string is not configured with an optimizer, use a multimeter to measure the voltage at the DC position. The multimeter must have a DC voltage range of at least 600 V. If the voltage is a negative value, the DC input polarity is incorrect and needs correction. If the voltage is greater than 600 V, too many PV modules are configured to the same string. Remove some PV modules.
- If the PV string is configured with an optimizer, check the cable polarity by referring to the documentation provided by the PV optimizer supplier.

**WARNING**

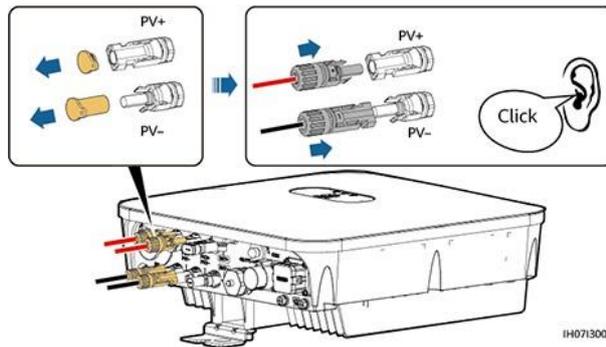
Before performing [Step 2](#), ensure that the DC switch is set to OFF.

**Step 2** Insert the positive and negative connectors into corresponding DC input terminals on the inverter.

**NOTICE**

After the positive and negative connectors snap into place, pull the DC input power cables back to ensure that they are connected securely.

**Figure 5-14** Connecting DC input power cables



**NOTICE**

If the DC input power cable is reversely connected and the DC switch is set to ON, do not immediately turn off the DC switch or reconnect the positive and negative connectors. Otherwise, the device may be damaged. The caused device damage is not covered under any warranty or service agreement. Wait until the night when solar irradiance declines and the PV string current drops to below 0.5 A. Then set the DC switch to the OFF position, remove the positive and negative connectors, and correct the polarities of the DC input power cables.

----End

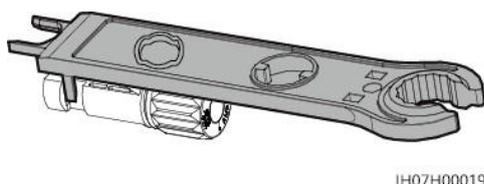
## Follow-up Procedure

**WARNING**

Before removing the positive and negative connectors, ensure that the DC switch is OFF.

To remove the positive and negative connectors from the inverter, insert a disassembly tool into the notch and press the tool with an appropriate force.

**Figure 5-15** Removing a DC connector



## 5.8 (Optional) Connecting Battery Cables

### Prerequisites

---

** DANGER**

- Battery short circuits may cause personal injury. The high transient current generated by a short circuit may release a surge of power and cause fire.
- Do not connect or disconnect the battery cable when the inverter is running. Failing to do so may cause electric shocks.
- Before connecting the battery cables, ensure that the DC switch on the inverter and all the switches connecting to the inverter are OFF, and the inverter has no residual electricity. Otherwise, the high voltage of the inverter and battery may result in electric shocks.
- If no battery connects to the inverter, do not remove the watertight cap from the battery terminal. Otherwise, the IP rating of the inverter will be affected. If a battery connects to the inverter, set aside the watertight cap. Reinstall the watertight cap immediately after removing the connector. The high voltage of the battery terminal may result in electric shocks.

---

A battery switch can be configured between the inverter and the battery to ensure that the inverter can be safely disconnected from the battery.

---

** WARNING**

- Do not connect loads between the inverter and the battery.
- The battery cables should be connected correctly. That is, the positive and negative terminals of the battery connect to the positive and negative battery terminals on the inverter respectively. Otherwise, the inverter may be damaged, or even a fire could happen.

---

**NOTICE**

- During the installation of the inverter and battery, the positive or negative terminal of the battery will be short-circuited to ground if power cables are not installed or routed as required. In this case, an AC or DC short circuit may occur and damage the inverter. The caused device damage is not covered under any warranty or service agreement.
  - The cabling distance between the battery and the inverter should be less than or equal to 10 meters, and within 5 meters is recommended.
- 

### Procedure

- Step 1** Assemble the positive and negative connectors by referring to [5.7 Connecting DC Input Power Cables](#).

**⚠ DANGER**

- The battery voltage will result in serious injury. Use dedicated insulation tools to connect cables.
- Ensure that cables are correctly connected between the battery terminal and the battery switch, and between the battery switch and the inverter battery terminal.

**NOTICE**

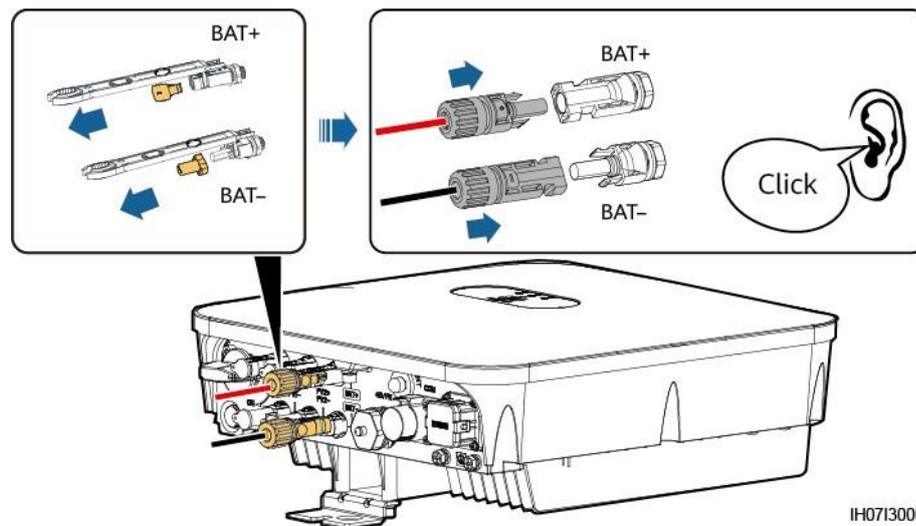
Cables with high rigidity, such as armored cables, are not recommended as battery cables, because poor contact may be caused by the bending of the cables.

**Step 2** Insert the positive and negative connectors into corresponding battery terminals on the inverter.

**NOTICE**

After the positive and negative connectors snap into place, pull the battery cables back to ensure that they are connected securely.

**Figure 5-16** Connecting battery cables



**Step 3** Please follow **Section 5.9** to connect signal cables between inverter and battery & power meter, which is mandatory before the commissioning.

----End

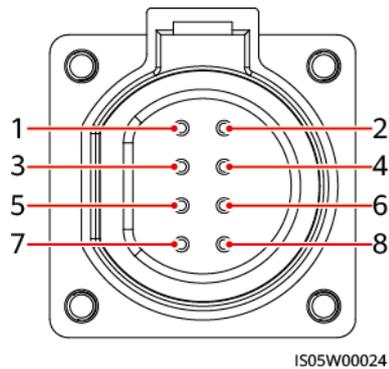
## 5.9 (Optional) Connecting Signal Cables

### Context

**NOTICE**

When laying out signal cables, separate them from power cables and keep them away from strong interference sources to prevent communication interruption.

**Figure 5-17** Signal cable ports



**Table 5-3** COM port definition

No.	Label	Definition	Single inverter Scenario	inverter Cascading Scenario
1	485B1	RS485B, RS485 differential signal-	-	Used for connecting to the solar inverters.
2	485A1	RS485A, RS485 differential signal+		
3	485B2	RS485B, RS485 differential signal-	Used for connecting to the RS485 signal ports of the battery and smart power sensor. When both battery and power meter are configured, they need be crimped to the 485B2 and 485A2 ports.	Used for connecting to the RS485 signal ports of the battery and smart power sensor. When both battery and smart power sensor are configured, they need be crimped to the 485B2 and 485A2 ports.
4	485A2	RS485A, RS485 differential signal+		
5	GND	GND of the enable signal/12V/DI1/DI2	Used for connecting to GND of the enable signal/12V/DI1/DI2.	
6	EN+	Enable signal+/12V+	Used for connecting to the enable signal of the battery and the 12V positive signal.	
7	DI1	Digital input signal 1+	Used for connecting to the DI1 positive signal. It can be used for connecting to the DRM0 scheduling signal or reserved for the rapid	

No.	Label	Definition	Single inverter Scenario	inverter Cascading Scenario
			shutdown signal.	
8	DI2	Digital input signal 2+	Used for connecting to the DI2 positive signal. It can be reserved for the feedback signal of the Backup device.	

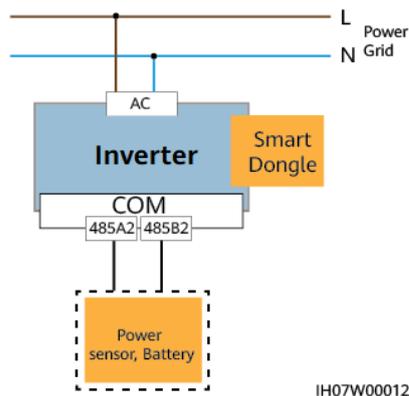
## Communication Networking Mode

**NOTE**

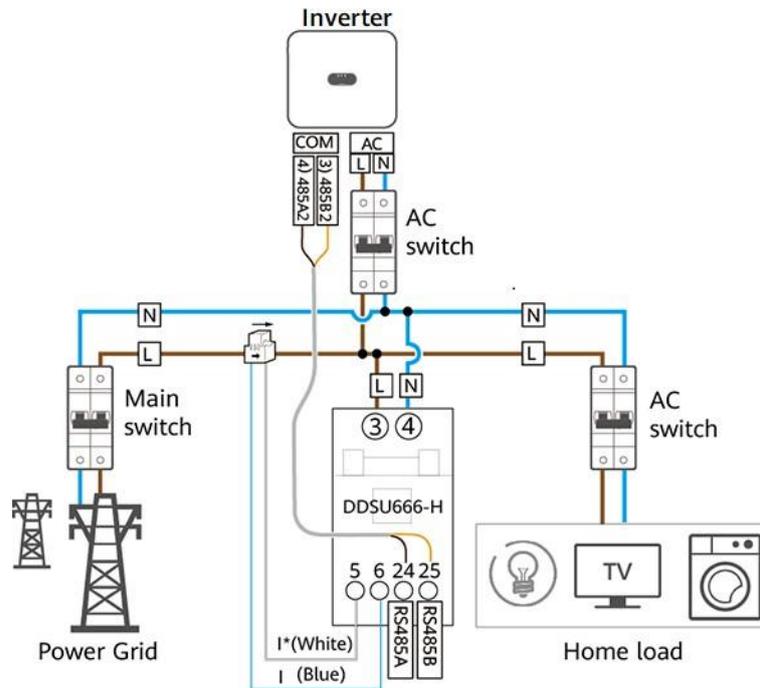
The smart power sensor and Smart Dongle must be connected to the same inverter.

- Single inverter scenarios

**Figure 5-18** Single inverter

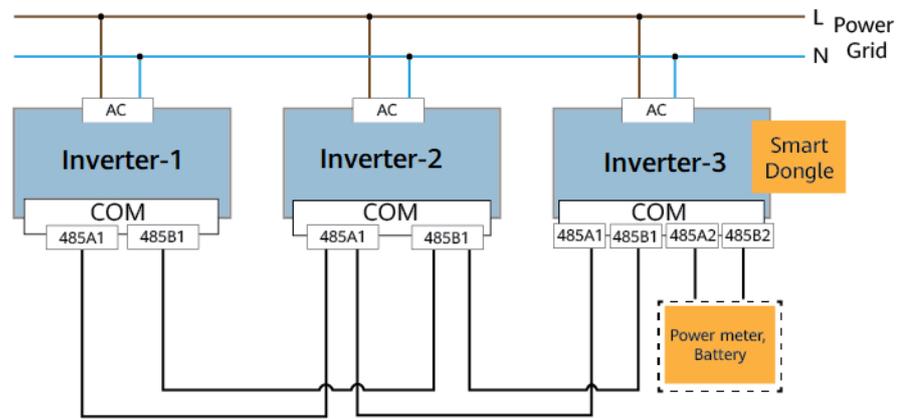


**Figure 5-19** Connecting cables to the smart power sensor (single inverter)



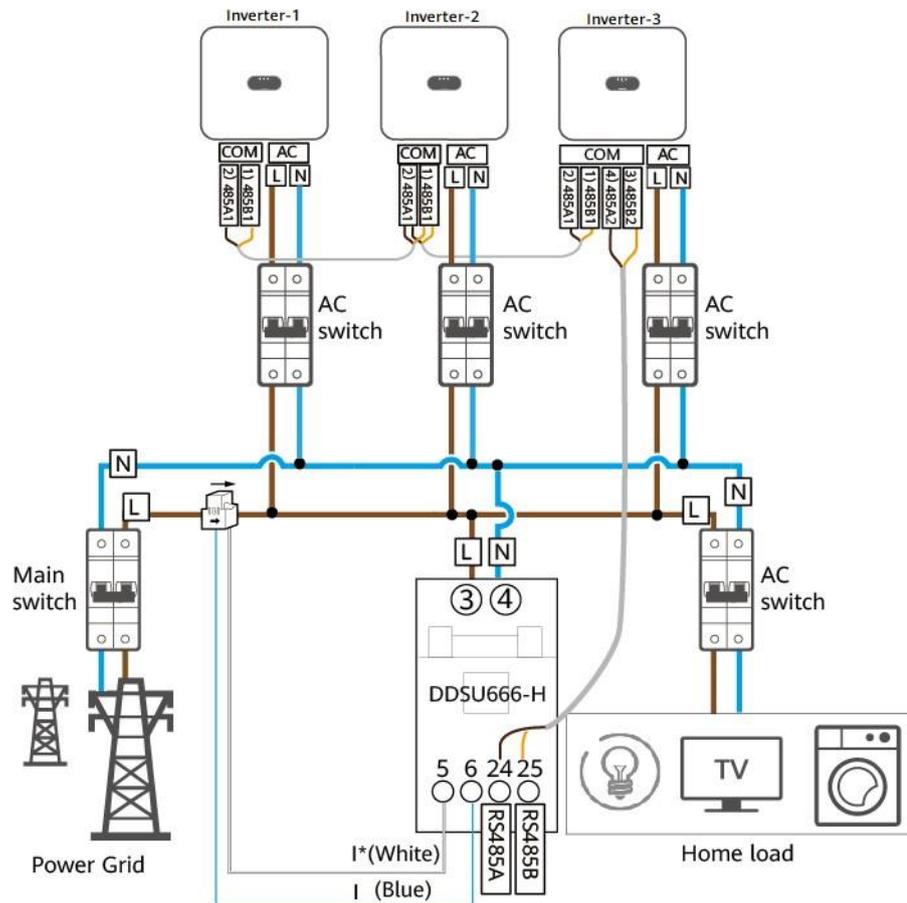
- inverter cascading scenarios
  - In-phase grid connection

**Figure 5-20** In-phase grid connection



IH07W00010

**Figure 5-21** Connecting cables to the smart power sensor (in-phase grid connection)



**NOTE**

- Ensure that the baud rates of the DDSU666-H and YDS70-C16 meters are set to the default values. If they are changed, meters may go offline, generate alarms, or affect the inverter output power.
- The preceding networking uses DDSU666-H as an example. Cable connections for other meter models may vary.
- In cascading scenarios, the inverters are required to connect to the management system through a Smart Dongle.
- In the preceding networking, the inverters are cascaded and support the grid-tied point control function to achieve zero export.
- If the inverters require the grid-tied point control function, they need to be connected to a smart power sensor.
- A single-phase power meter is recommended for the networking with only single-phase inverters.
- If the inverters are cascaded with three-phase inverters, they must be connected to the grid in the same phase.
- Inverters were not tested to AS/NZS 4777.2:2020 Section 5 (Appendix K) for multiple inverter combinations. Please consult the supplier for the relevant applications.

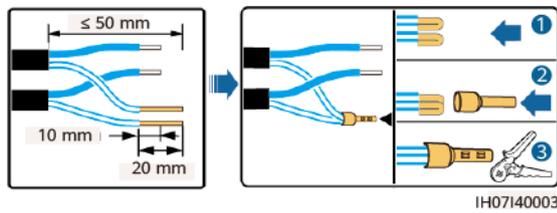
**Procedure**

**Step 1** Connect signal cables to corresponding signal connectors.

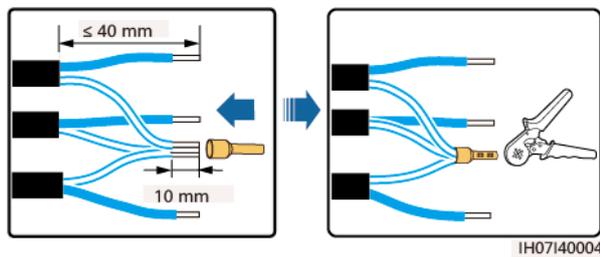
**NOTICE**

- Ensure that the protection layer of the cable is in the connector. The surplus core should be cut off from the protection layer.
- Ensure that the exposed core is totally inserted into the cable hole.
- Ensure that the signal cables are connected securely.
- Ensure that the cables are not twisted.
- If multiple signal cables need to be connected to a single connector, ensure that the outer diameters of the signal cables are the same.

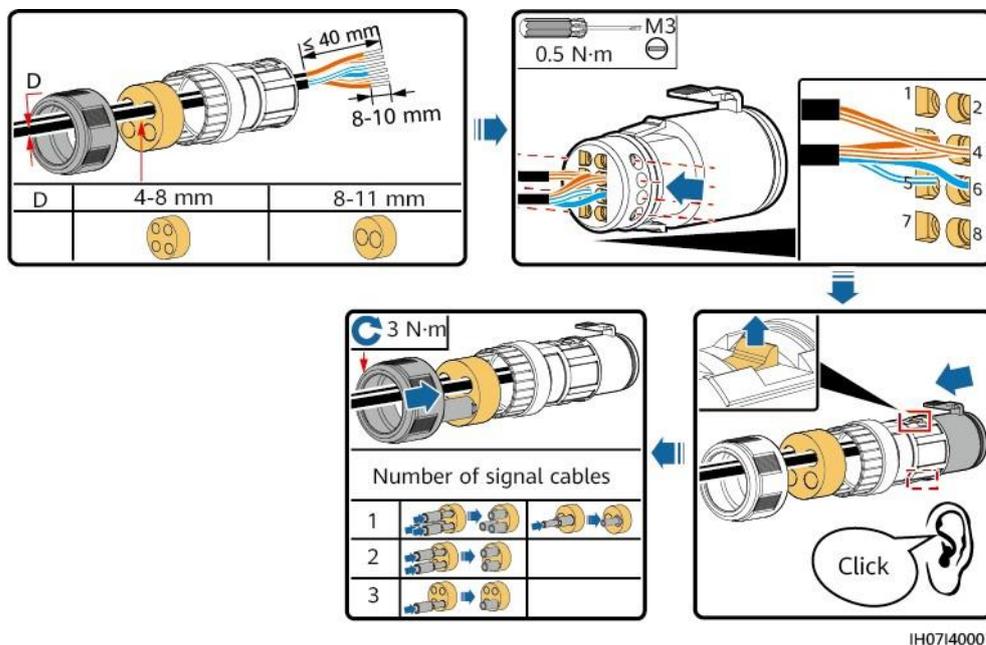
**Figure 5-22** Crimping two signal cables



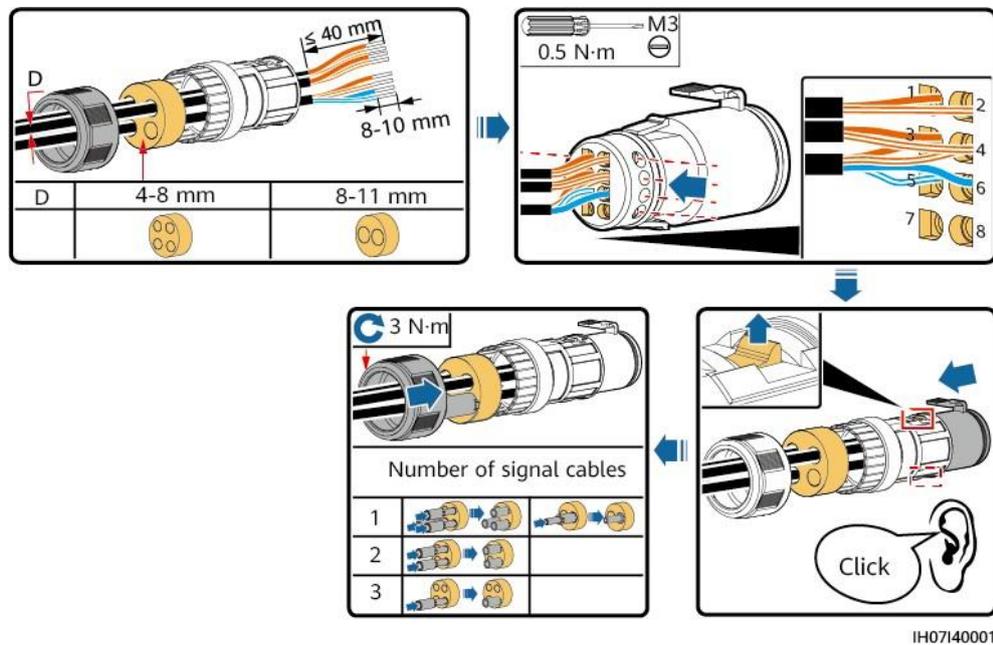
**Figure 5-23** Crimping three signal cables



**Figure 5-24** Assembling a signal connector (single inverter)



**Figure 5-25** Assembling a signal connector (inverter cascading)

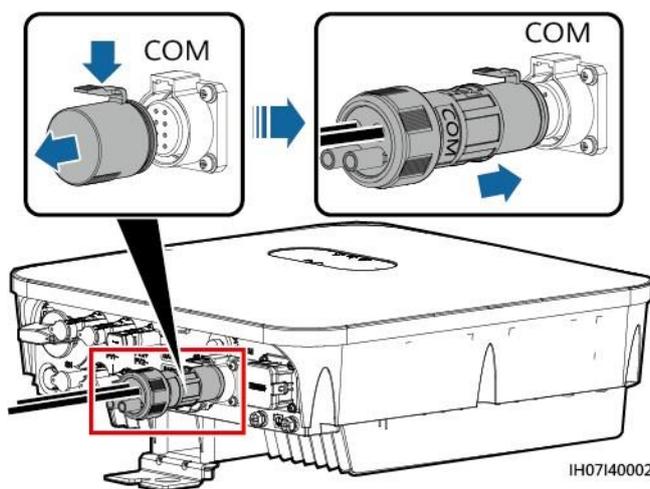


**Step 2** Connect the signal connector to the corresponding port.

**NOTICE**

Ensure that the signal connector is connected securely.

**Figure 5-26** Securing a signal connector



----End

# 6 System Commissioning

 **DANGER**

- Wear personal protective equipment and use dedicated insulated tools to avoid electric shocks or short circuits.

## 6.1 Verification Before Power-On

**Table 6-1** Check items and acceptance criteria

No.	Check Item	Acceptance Criteria
1	Inverter	The inverter is installed correctly and securely.
2	WLAN antenna	The WLAN antenna is installed correctly and securely.
3	Cables routing	Cables are routed properly as required by the customer.
4	Cable tie	Cable ties are evenly distributed and no burr exists.
5	Grounding	The PE cable is connected correctly, securely, and reliably.
6	Switch	The DC switch and all the switches connecting to the inverter are OFF.
7	Cable connection	The AC output power cable, DC input power cable, battery cable, and signal cable are connected correctly, securely, and reliably.
8	Unused terminal and port	Unused terminals and ports are locked by watertight caps.
9	Installation environment	The installation space is proper, and the installation environment is clean and tidy.

## 6.2 System Power-On

### Prerequisites

Before turning on the AC switch between the inverter and the power grid, use a multimeter to check that the AC voltage is within the allowed range.

#### NOTICE

Before the equipment is put into operation for the first time, ensure that the parameters are set correctly by professional personnel. Incorrect parameter settings may result in noncompliance with local grid connection requirements and affect the normal operations of the equipment.

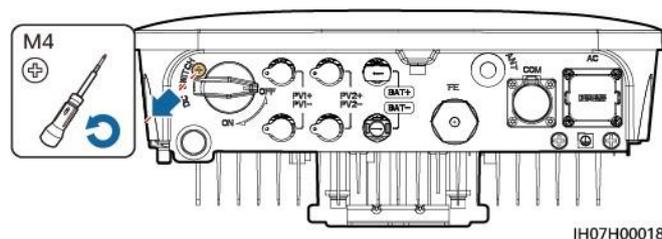
#### NOTICE

- If the DC power supply is connected but the AC power supply is disconnected, the inverter will report a **Grid Loss** alarm. The inverter can start properly only after the power grid recovers.
- If the AC power supply is connected but the battery is not connected, the inverter reports a **Battery Abnormal** alarm.
- If the inverter is connected to batteries, turn on the DC switch within 1 minute after the AC switch is turned on. Otherwise, the inverter, connected to the power grid, will shut down and start again.

### Procedure

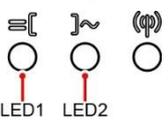
- Step 1** If the battery port of the inverter is connected to a battery, turn on the auxiliary power switch of the battery and then the battery switch.
- Step 2** Turn on the AC switch between the inverter and the power grid.
- Step 3** (Optional) Remove the locking screw from the DC switch.

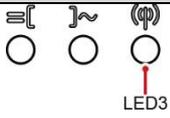
**Figure 6-1** Removing the locking screw from a DC switch



- Step 4** Turn on the DC switch between the PV string and the inverter if there is any.
- Step 5** Turn on the DC switch at the bottom of the inverter.
- Step 6** Observe the LEDs to check the inverter operating status.

**Table 6-2** LED indicators 1

Category	Status	Description	
Running indicator 	<b>LED1</b>	<b>LED2</b>	
	Steady green	Steady green	–
	Blinking green at long intervals (on for 1s and then off for 1s)	Off	The inverter is operating in grid-tied mode.
	Blinking green at long intervals (on for 1s and then off for 1s)	Blinking green at long intervals (on for 1s and then off for 1s)	The DC is on and the AC is off.
	Off	Blinking green at long intervals (on for 1s and then off for 1s)	Both the DC and AC are on, and the inverter is not exporting power to the power grid.
	Steady orange	Steady orange	The DC is off and the AC is on.
	Blinking orange slowly	Off	The inverter is operating in the off-grid mode.
	Blinking orange slowly	Blinking orange slowly	The DC is on, and the inverter has no output in the off-grid mode.
	Off	Off	The inverter is operating in the overload in backup mode.
	Blinking red at short intervals (on for 0.2s and then off for 0.2s)	–	Both the DC and AC are off.
	–	Blinking red at short intervals (on for 0.2s and then off for 0.2s)	There is a DC environmental alarm, such as an alarm indicating that High String Input Voltage, String Reverse Connection, or Low Insulation Resistance.
Steady red	Steady red	There is an AC environmental alarm, such as an alarm indicating Grid Undervoltage, Grid Overvoltage, Grid Overfrequency, or Grid Underfrequency.	
Communication indicator	<b>LED3</b>	–	
	Blinking green at short intervals (on for 0.2s and then	Communication is in	

Category	Status	Description
	off for 0.2s)	progress.
	Blinking green at long intervals (on for 1s and then off for 1s)	The mobile phone is connected to the inverter.
	Off	There is no communication.

**NOTE**

If the off-grid load is overloaded, indicators LED1 and LED2 on the inverter blink orange slowly. Reduce the off-grid load power and manually clear the alarm or until the inverter is recovered. The inverter attempts to restart at an interval of 5 minutes. If the inverter fails to restart for three times, the interval changes to 2 hours. If the inverter is standby in off-grid mode, check the inverter alarms and rectify the fault.

**Table 6-3** LED indicators 2

Category	Status			Description
Device replacement indication	<b>LED1</b>	<b>LED2</b>	<b>LED3</b>	–
	Steady red	Steady red	Steady red	The inverter hardware is faulty. The inverter needs to be replaced.

**Step 8** Installer needs to follow the Section 7 with the proper commissioning before inverter starts to operate. The correct grid code must be selected by referencing Appendix A Grid Code.

----End

# 7 Man-Machine Interaction

## 7.1 App Commissioning

You can use the app to perform local maintenance operations, such as device commissioning, parameter setting, log export, and software upgrade.

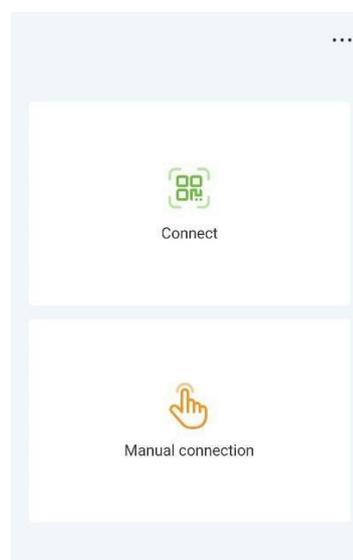
### 7.1.1 Downloading the HiSolar App

Search for **HiSolar** on Google Play and download the latest installation package.

### 7.1.2 Connecting to the Inverter

**Step 1** You can connect to the inverter by scanning the QR code or choosing manual connection on the app.

- Scanning the QR code: Tap **Connect** and scan the QR code of the inverter to automatically connect to the inverter.
- Manual connection: Tap **Manual connection**, select **WLAN connection**, and connect to the corresponding WLAN hotspot in the WLAN list on the app. The initial name of the WLAN hotspot is the inverter SN, and the initial password is **Changeme**.



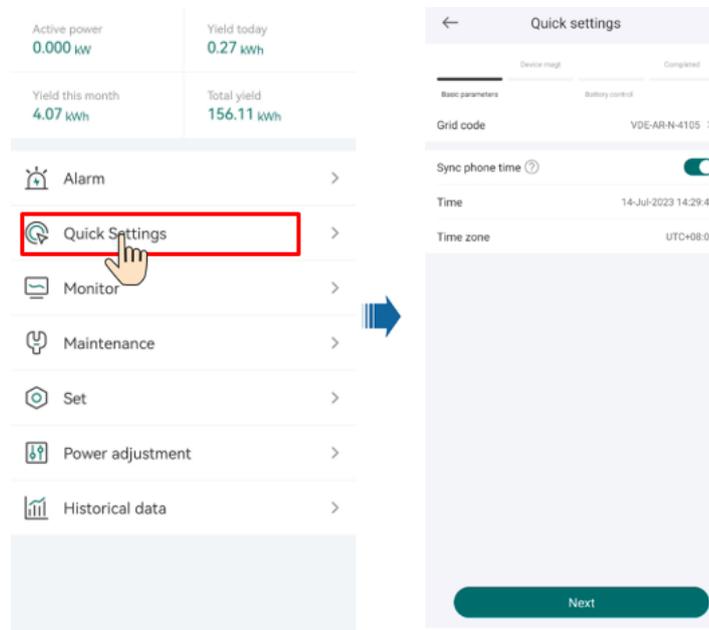
**Step 2** Log in as an **Installer**. Set the login password upon the first login.

**NOTICE**

To ensure account security, protect the password by changing it periodically, and keep it secure.

### 7.1.3 Quick Settings

Set parameters as prompted on the **Quick settings** screen.



**NOTE**

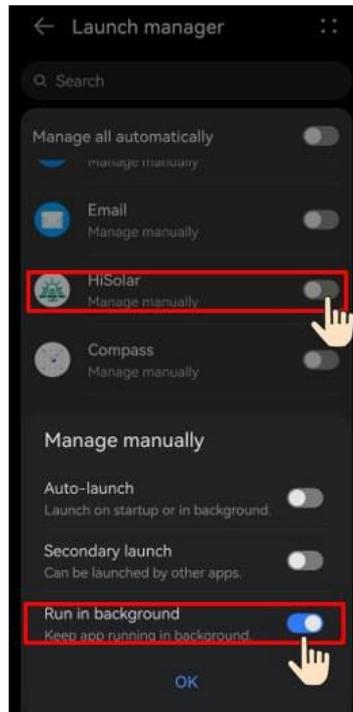
The user interface (UI) varies with associated devices. The preceding UI screenshots are for reference only.

### 7.1.4 What Should I Do If the Device Is Disconnected from the App When I Switch the Local Commissioning Screen to the Background?

During local commissioning, you may need to switch the app to the background (for example, uploading an upgrade package, uploading a photo, or scanning a QR code for WLAN connection). When you switch back to the app screen, a message is displayed, indicating that the device is disconnected from the app and you need to log in again.

#### Solution

- Step 1** Disable **WLAN+** if available on your mobile phone.
- Step 2** Tap **Settings > Apps & services**, and choose **Launch manager**.
- Step 3** Tap **Manage manually > Run in background** for the HiSolar app.



 **NOTE**

The menu name may vary according to the mobile phone brand.

## 7.2 Parameters Settings

Set inverter parameters. For details about entering the device commissioning screen, see [B Device Commissioning](#).

### 7.2.1 Energy Control

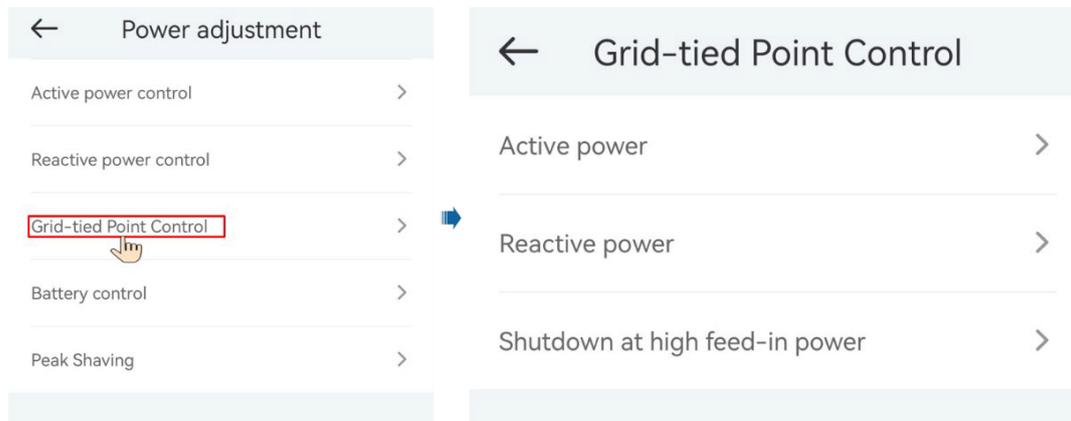
#### 7.2.1.1 Grid-tied Point Control

##### Function

Limits or reduces the output power of the PV power system to ensure that the output power is within the power deviation limit.

##### Procedure

**Step 1** On the home screen, choose **Power adjustment > Grid-tied point control**.



**Table 7-1** Grid-tied point control

Parameter Name			Description
Active power	Unlimited	-	If this parameter is set to <b>Unlimited</b> , the output power of the inverter is not limited and the inverter can connect to the power grid at the rated power.
	Grid connected with zero power	Closed-loop controller	<ul style="list-style-type: none"> <li>If multiple inverters are cascaded, set this parameter to <b>SDongle</b>.</li> <li>If there is only one inverter, set this parameter to <b>Inverter</b>.</li> </ul>
		Limitation mode	<b>Total power</b> indicates export limitation of the total power at the grid-tied point.
		Power adjustment interval	Specifies the shortest interval for a single anti-backfeeding adjustment.
		Power raising threshold	Specifies the dead zone for adjusting the inverter output power. If the power fluctuation is within the power control hysteresis, the power is not adjusted.
		Communication disconnection fail-safe	In the inverter anti-backfeeding scenario, if this parameter is set to <b>Enable</b> , the inverter will derate according to the active power derating percentage when the communication between the inverter and the Smart Dongle is disconnected for a period longer than <b>Communication disconnection detection time</b> .
		Communication disconnection detection time	Specifies the time for determining the communication disconnection between the inverter and the Dongle.  This parameter is displayed when <b>Communication disconnection fail-safe</b> is set to <b>Enable</b> .
		Active power threshold when communication	Specifies the derating value of the inverter active power by percentage. If

Parameter Name		Description
		fails the Smart Dongle does not detect any meter data or the communication between the Smart Dongle and the inverter is disconnected, the Smart Dongle delivers the derating value of the inverter active power by percentage.
Limited feed-in (kW)	Closed-loop controller	<ul style="list-style-type: none"> <li>If multiple inverters are cascaded, set this parameter to <b>SDongle</b>.</li> <li>If there is only one inverter, set this parameter to <b>Inverter</b>.</li> </ul>
	Limitation mode	<b>Total power</b> indicates export limitation of the total power at the grid-tied point.
	Maximum grid feed-in power	Specifies the maximum active power transmitted from the grid-tied point to the power grid.
	Power adjustment interval	Specifies the shortest interval for a single anti-backfeeding adjustment.
	Power raising threshold	Specifies the dead zone for adjusting the inverter output power. If the power fluctuation is within the power control hysteresis, the power is not adjusted.
	Communication disconnection fail-safe	In the inverter anti-backfeeding scenario, if this parameter is set to <b>Enable</b> , the inverter will derate according to the active power derating percentage when the communication between the inverter and the Smart Dongle is disconnected for a period longer than <b>Communication disconnection detection time</b> .
	Communication disconnection detection time	Specifies the time for determining the communication disconnection between the inverter and the Dongle. This parameter is displayed when <b>Communication disconnection fail-safe</b> is set to <b>Enable</b> .
	Active power threshold when communication fails	Specifies the derating value of the inverter active power by percentage. If the Smart Dongle does not detect any meter data or the communication between the Smart Dongle and the inverter is disconnected, the Smart Dongle delivers the derating value of the inverter active power by percentage.
Power-limited grid connected (%)	Closed-loop controller <ul style="list-style-type: none"> <li>If multiple inverters are cascaded, set this parameter to <b>SDongle</b>.</li> <li>If there is only one inverter, set this</li> </ul>	

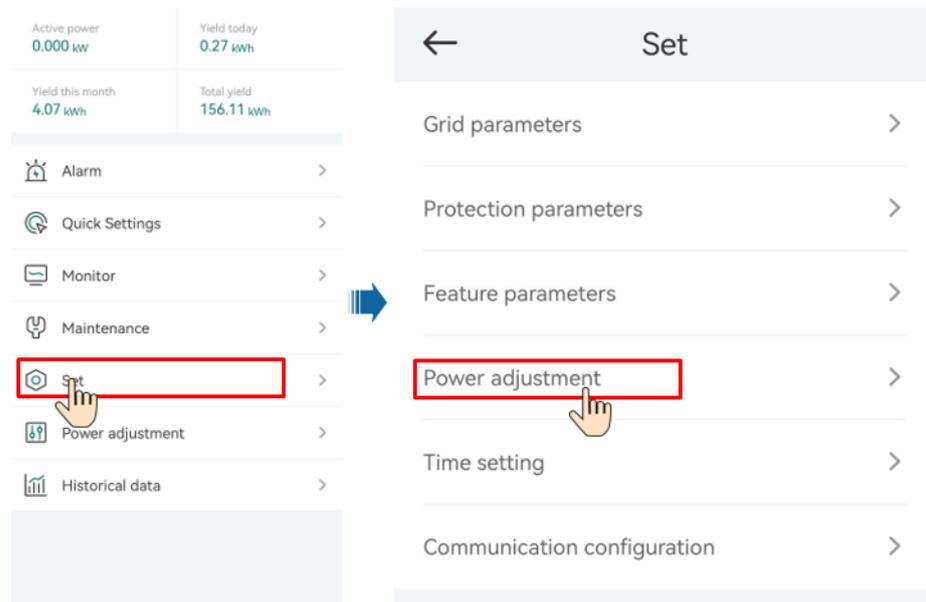
Parameter Name		Description
		parameter to <b>Inverter</b> .
	Limitation mode	<b>Total power</b> indicates export limitation of the total power at the grid-tied point.
	PV plant capacity	Specifies the total maximum active power in the inverter cascading scenario.
	Maximum grid feed-in power	Specifies the percentage of the maximum active power of the grid-tied point to the PV plant capacity.
	Power adjustment interval	Specifies the shortest interval for a single anti-backfeeding adjustment.
	Power raising threshold	Specifies the dead zone for adjusting the inverter output power. If the power fluctuation is within the power control hysteresis, the power is not adjusted.
	Communication disconnection fail-safe	In the inverter anti-backfeeding scenario, if this parameter is set to <b>Enable</b> , the inverter will derate according to the active power derating percentage when the communication between the inverter and the Smart Dongle is disconnected for a period longer than <b>Communication disconnection detection time</b> .
	Communication disconnection detection time	Specifies the time for determining the communication disconnection between the inverter and the Dongle. This parameter is displayed when <b>Communication disconnection fail-safe</b> is set to <b>Enable</b> .
	Active power threshold when communication fails	Specifies the derating value of the inverter active power by percentage. If the Smart Dongle does not detect any meter data or the communication between the Smart Dongle and the inverter is disconnected, the Smart Dongle delivers the derating value of the inverter active power by percentage.
Shutdown at high feed-in power <sup>a</sup>	Shutdown at high feed-in power	<ul style="list-style-type: none"> <li>The default value is <b>Disable</b>.</li> <li>If this parameter is set to <b>Enable</b>, the inverter shuts down for protection when the grid-connection point power exceeds the threshold and remains in this condition for the specified time threshold.</li> </ul>
	Upper feed-in power threshold for inverter shutdown (kW)	<ul style="list-style-type: none"> <li>The default value is <b>0</b>. This parameter specifies the power threshold of the</li> </ul>

Parameter Name		Description
		grid-connection point for triggering inverter shutdown.
	High feed-in power duration threshold for triggering inverter shutdown (s)	<p>The default value is <b>20</b>. This parameter specifies the duration threshold of high feed-in power for triggering inverter shutdown.</p> <ul style="list-style-type: none"> <li>• When <b>High feed-in power duration threshold for triggering inverter shutdown</b> is set to 5, <b>Shutdown at high feed-in power</b> takes precedence.</li> <li>• When <b>High feed-in power duration threshold for triggering inverter shutdown</b> is set to 20, <b>Grid connection with limited power</b> takes precedence (when <b>Active power control</b> is set to <b>Grid connection with limited power</b>).</li> </ul>
<p>Note a: This parameter is supported only for the AS4777 grid code.</p>		

----End

### 7.2.1.2 Apparent Power Control on the Inverter Output Side

On the home screen, tap **Set > Power adjustment** to set inverter parameters.



Parameter	Description	Value Range
Maximum apparent power (kVA)	Specifies the output upper threshold for the maximum apparent power to adapt to the capacity requirements of standard and customized inverters.	[Maximum active power, $S_{max}$ ]
Maximum active power (kW)	Specifies the output upper threshold for the maximum active power to adapt to different market requirements.	[0.1, $P_{max}$ ]

 **NOTE**

The lower threshold for the maximum apparent power is the maximum active power. To lower the maximum apparent power, lower the maximum active power first.

### 7.2.1.3 Battery Control

#### Prerequisites

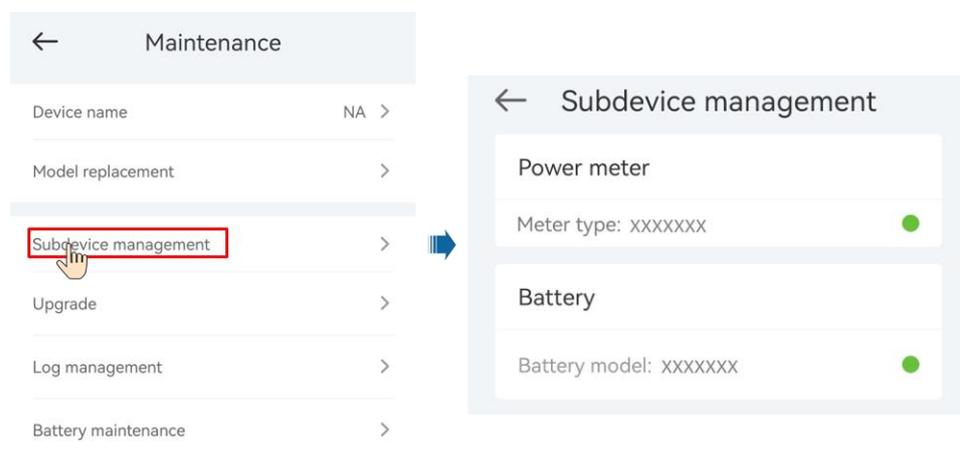
The screenshots in this chapter are taken in the Hisolar 1.0.0.4 App. The App is being updated. The actual screens may vary.

#### Function

When the inverter connects to a battery, add the battery and set battery parameters.

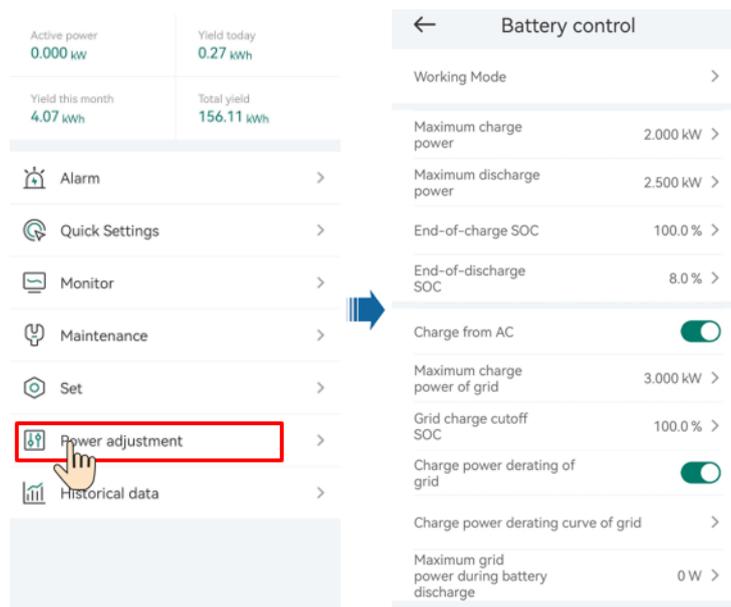
#### Adding a Battery

To add a battery, choose **Maintenance** > **Subdevice management** on the home screen.



#### Parameters Settings

On the home screen, choose **Power adjustment** > **Battery control**, and set the battery parameters and working mode.



Parameter	Description	Value Range
Working mode	For details, see the description on the App screen.	<ul style="list-style-type: none"> <li>Maximum self-consumption</li> <li>TOU</li> <li>Fully fed to grid</li> </ul>
Maximum charge power (kW)	Retain this parameter to the maximum charge power. Additional configuration is not required.	<ul style="list-style-type: none"> <li>Charge: [0, Maximum charge power]</li> </ul>
Maximum discharge power (kW)	Retain this parameter to the maximum discharge power. Additional configuration is not required.	<ul style="list-style-type: none"> <li>Discharge: [0, Maximum discharge power]</li> </ul>
End-of-charge SOC	Set the charge cutoff capacity.	90%–100%
End-of-discharge SOC	Set the discharge cutoff capacity.	0%–20% (When no PV module is configured or the PV modules have no voltage for 24 hours, the minimum value is 15%.)
Charge from AC	If <b>Charge from AC</b> function is disabled by default, comply with the grid charge requirements stipulated in local laws and regulations when this function is enabled.	<ul style="list-style-type: none"> <li>Disable</li> <li>Enable</li> </ul>
Grid charge cutoff SOC	Set the grid charge cutoff SOC.	[20%, 100%]

### 7.2.1.4 Peak Shaving

#### Prerequisites

The screenshots in this section are captured from the HiSolar app 1.0.0.4. The actual screens may vary with app updates.

#### Description

If the inverter connects to an ESS and the ESS working mode is set to **Maximum self-consumption** or **TOU**, you can set capacity control parameters.

Table 7-2 Application Scenario

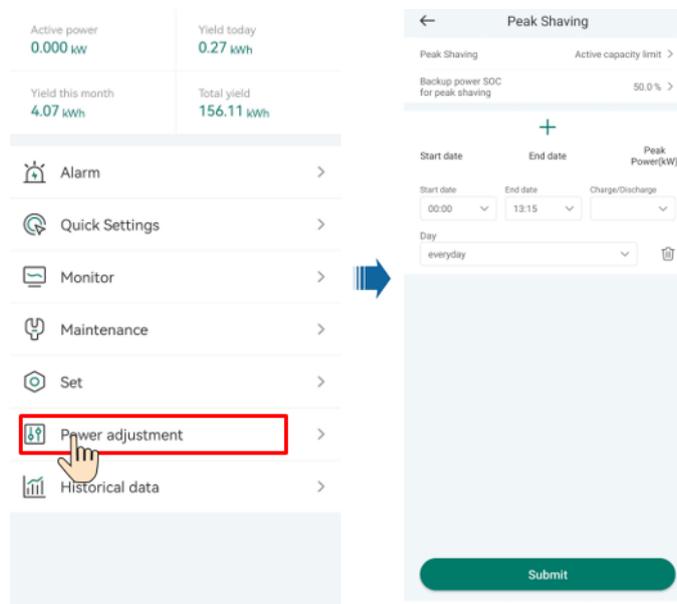
Applicable Model	Application Scenario
Single inverter	Single inverter + Energy storage
	Single inverter + Smart Dongle (WLAN-FE) + Energy storage

#### Parameter Settings

On the home screen, choose **Power adjustment > Peak Shaving** and set peak shaving parameters.

**NOTE**

- The peak shaving function is unavailable when the energy storage working mode is set to **Fully fed to grid**.
- When peak shaving has been enabled, you must first disable peak shaving and then set the energy storage working mode to **Fully fed to grid**.



Parameter	Description	Range
Peak Shaving	<ol style="list-style-type: none"> <li>1. Before enabling <b>Peak Shaving</b>, set <b>Charge from AC</b> to <b>Enable</b>.</li> <li>2. Before disabling <b>Charge from AC</b>, set <b>Peak Shaving</b> to <b>Disable</b>.</li> </ol>	<ul style="list-style-type: none"> <li>• Disable</li> <li>• Active capacity limit</li> </ul>
Backup power SOC for peak shaving	The value of this parameter affects the peak shaving capability. A larger value indicates stronger peak shaving capability.	(8.0, 100.0] Backup power SOC for peak shaving > Backup power SOC (when BackUp is enabled) > End-of-discharge SOC
Start date	<ul style="list-style-type: none"> <li>• Set the peak power range based on the start time and end time. The peak power is configured based on electricity prices in different time segments. You are advised to set the peak power to a low value when the electricity price is high.</li> <li>• A maximum of 14 time segments are allowed.</li> </ul>	-
End date		
Peak power (kW)		[0.000, 1000.000]

## 7.2.2 AFCI

### Function

If PV modules or cables are not properly connected or damaged, electric arcs may occur, which may cause fire. Inverters provide unique arc detection in compliance with UL 1699B-2018 to ensure the safety of users' lives and property.

This function is enabled by default. The inverter automatically detects arc faults. To disable this function, log in to the HiSolar App, on the home screen, choose **Set > Feature parameters**, and disable **AFCI**.

#### NOTE

The AFCI function works only with ordinary PV modules, but does not support intelligent PV modules.

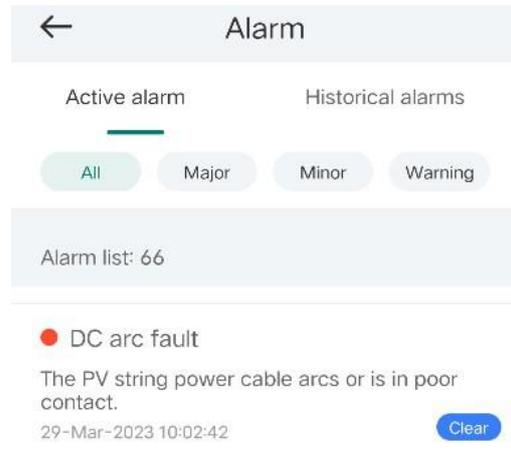
### Clearing Alarms

The AFCI function involves the **DC arc fault** alarm.

The inverter has the AFCI alarm automatic clearance mechanism. If an alarm is triggered for less than five times within 24 hours, the inverter automatically clears the alarm. If the alarm is triggered for five times or more within 24 hours, the inverter locks for protection. You need to manually clear the alarm on the inverter so that it can work properly.

You can manually clear the alarm as follows:

Log in to the HiSolar App and on the home screen, connect and log in to the inverter that generates the AFCI alarm, tap **Alarm**, and tap **Clear** on the right of the **DC arc fault** alarm to clear the alarm.

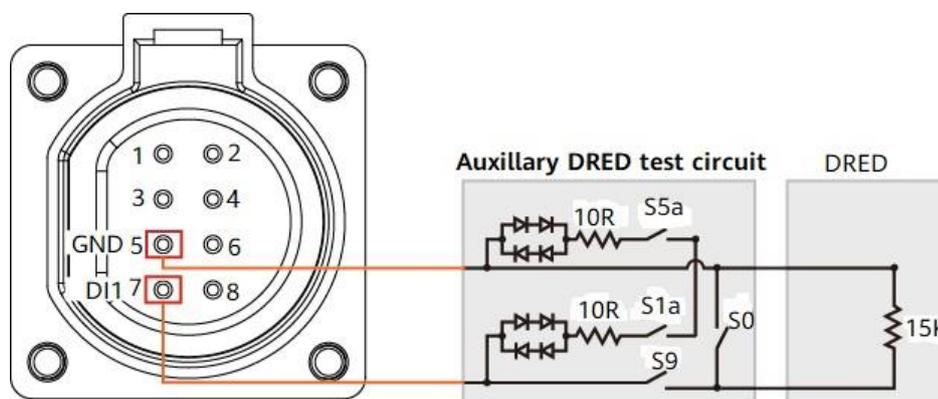


## 7.2.3 DRM

### Function

According to AS/NZS 4777.2:2020+A1:2021, solar inverters need to support the function of demand response mode (DRM), and DRM0 is a mandatory requirement.

This function is disabled by default.



#### NOTE

The demand response enabling device (DRED) is a power grid dispatch device.

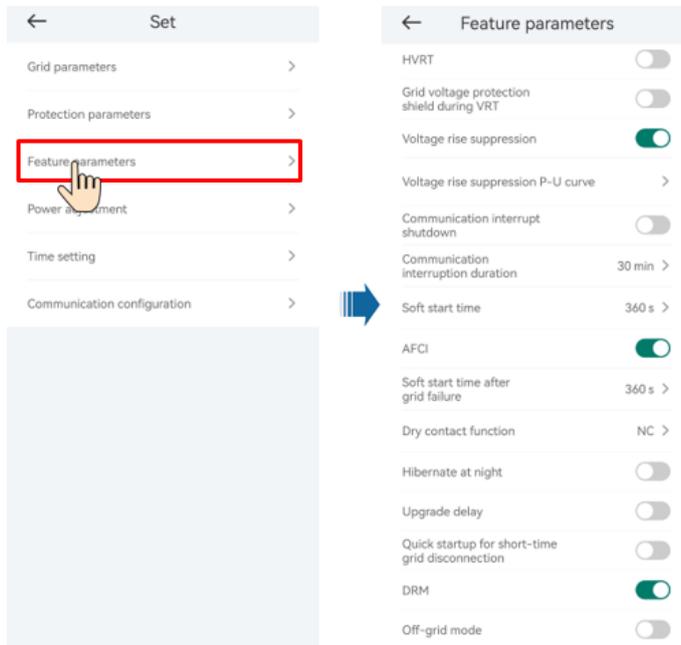
**Table 7-3** DRM requirements

Mode	Port on the inverter	Requirements
DRM0	DI1 and GND of the COM port	<ul style="list-style-type: none"> <li>When switches S0 and S9 are switched on, the solar inverter should be turned off.</li> <li>When switch S0 is switched off, and switch S9 is switched on, the solar inverter should be grid-tied.</li> </ul>

### Procedure

**Step 1** On the home page, choose **Set > Feature parameters**.

Step 2 Set **DRM** to .



----End

# 8 System Maintenance

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## DANGER

- Wear personal protective equipment and use dedicated insulated tools to avoid electric shocks or short circuits.
- 

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## WARNING

- Before performing maintenance, power off the equipment, follow the instructions on the delayed discharge label, and wait for a period of time as specified to ensure that the equipment is not energized.
- 

## 8.1 System Power-Off

### Precautions

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## WARNING

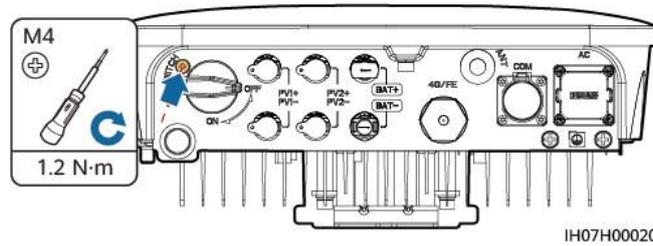
After the inverter powers off, the remaining electricity and heat may still cause electric shocks and body burns. Therefore, put on insulated gloves and begin operating the inverter five minutes after the power-off.

---

### Procedure

- Step 1** Send a shutdown command on the App.
- Step 2** Turn off the AC switch between the inverter and the power grid.
- Step 3** Turn off the DC switch at the bottom of the inverter.
- Step 4** (Optional) Install the locking screw for the DC switch.

**Figure 8-1** Installing a locking screw for the DC switch



**Step 5** Turn off the DC switch between the inverter and PV strings.

**Step 6** (Optional) Turn off the battery switch between the inverter and batteries.

----End

## 8.2 Routine Maintenance

To ensure that the inverter can operate properly for a long term, you are advised to perform routine maintenance on it as described in this chapter.

**⚠ CAUTION**

Before cleaning the inverter, connecting cables, and maintaining the grounding reliability, power off the inverter (see [8.1 System Power-Off](#) for details).

**Table 8-1** Maintenance checklist

Check Item	Check Method	Maintenance Interval
System cleanliness	Check periodically that the heat sinks are free from obstacles and dust.	Once every 6 to 12 months
System running status	<ul style="list-style-type: none"> <li>• Check that the inverter is not damaged or deformed.</li> <li>• Check that the inverter operates with no abnormal sound.</li> <li>• Check that all inverter parameters are correctly set during operation.</li> </ul>	Once every six months
Electrical connection	<ul style="list-style-type: none"> <li>• Check that cables are secured.</li> <li>• Check that cables are intact, and that in particular, the parts touching the metallic surface are not scratched.</li> <li>• Check that unused DC input terminals, battery terminals, COM ports, ANT ports, and Smart Dongle waterproof covers are locked.</li> </ul>	The first inspection is 6 months after the initial commissioning. From then on, the interval can be 6 to 12 months.
Grounding	Check that ground cables are securely	The first inspection is 6

Check Item	Check Method	Maintenance Interval
reliability	connected.	months after the initial commissioning. From then on, the interval can be 6 to 12 months.

### 8.3 Troubleshooting

Alarm severities are defined as follows:

- Major: The inverter enters the shutdown mode or functions abnormally after a fault occurs.
- Minor: Some components are faulty but the inverter can still connect to the power grid and generate power.
- Warning: The inverter functions normally, but its output power decreases due to external factors.

**Table 8-2** Common alarms and troubleshooting measures

Alarm ID	Alarm Name	Alarm Severity	Possible Causes	Troubleshooting
2001	High String Input Voltage	Major	The PV array is not properly configured. Excessive PV modules are connected in series to the PV string, and therefore the open-circuit voltage exceeds the maximum inverter operating voltage. Cause ID = 1, 2 <ul style="list-style-type: none"> <li>• 1: The PV1 input voltage is high.</li> <li>• 2: The PV2 input voltage is high.</li> </ul>	Check the serial connection configuration of the PV string and ensure that the PV string open-circuit voltage is not greater than the maximum operating voltage of the inverter. After the PV array configuration is corrected, the alarm disappears.
2002	DC Arc Fault	Major	The PV string power cables arc or are in poor contact. Cause ID = 1, 2 <ul style="list-style-type: none"> <li>• 1: PV1 DC arc fault</li> <li>• 2: PV2 DC arc fault</li> </ul>	Check whether the string cables arc or are in poor contact.
2003	DC arc fault	Major	The PV string power cables arc or are in poor contact. <ul style="list-style-type: none"> <li>• Cause ID 1 = PV1</li> <li>• Cause ID 2 = PV2</li> <li>• Cause ID 3 = PV3</li> <li>• .....</li> </ul>	Check whether the PV string cables arc or are in poor contact.

Alarm ID	Alarm Name	Alarm Severity	Possible Causes	Troubleshooting
2011	String Reversed	Major	<p>The PV string is reversely connected.</p> <p>Cause ID = 1, 2</p> <ul style="list-style-type: none"> <li>• 1: PV1 is reversely connected.</li> <li>• 2: PV2 is reversely connected.</li> </ul>	<p>Check whether the PV string is reversely connected to the inverter. If yes, wait until the PV string current decreases below 0.5 A, set DC switch to OFF, and adjust the PV string polarity.</p>
2021	AFCI Check Failure	Major	<p>The AFCI check fails.</p> <p>Cause ID = 1, 2</p> <ul style="list-style-type: none"> <li>• 1: The AFCI check circuit is abnormal.</li> <li>• 2: The AFCI circuit is faulty.</li> </ul>	<p>Turn off the AC output switch and DC input switch, and then turn them on after 5 minutes. If the fault persists, contact your dealer or technical support.</p>
2032	Grid Failure	Major	<p>Cause ID = 1</p> <ul style="list-style-type: none"> <li>• The power grid experiences an outage.</li> <li>• The AC circuit is disconnected or the AC circuit breaker is OFF.</li> </ul>	<ol style="list-style-type: none"> <li>1. Check the AC voltage.</li> <li>2. Check whether the AC circuit is disconnected or the AC circuit breaker is OFF.</li> </ol>
2033	Grid Undervoltage	Major	<p>Cause ID = 1</p> <p>The grid voltage is below the lower threshold or the low voltage duration has lasted for more than the value specified by low voltage ride-through (LVRT).</p>	<ol style="list-style-type: none"> <li>1. If the alarm occurs occasionally, the power grid may be abnormal temporarily. The inverter automatically recovers after detecting that the power grid becomes normal.</li> <li>2. If the alarm occurs frequently, check whether the power grid voltage is within the allowed range. If no, contact the local power operator. If yes, modify the grid undervoltage protection threshold through the mobile App with the consent of the local power operator.</li> <li>3. If the fault persists for a long time, check the connection between the AC switch and the output power cable.</li> </ol>
2034	Grid Overvoltage	Major	<p>Cause ID = 1</p> <p>The grid voltage exceeds the</p>	<ol style="list-style-type: none"> <li>1. If the alarm occurs occasionally, the power</li> </ol>

Alarm ID	Alarm Name	Alarm Severity	Possible Causes	Troubleshooting
			<p>higher threshold or the high voltage has lasted for more than the value specified by high voltage ride-through (HVRT).</p>	<p>grid may be abnormal temporarily. The inverter automatically recovers after detecting that the power grid becomes normal.</p> <ol style="list-style-type: none"> <li>2. If the alarm occurs frequently, check whether the power grid voltage is within the allowed range. If no, contact the local power operator. If yes, modify the grid overvoltage protection threshold through the mobile App with the consent of the local power operator.</li> <li>3. Check whether the peak voltage of the power grid is too high. If the fault persists and cannot be rectified for a long time, contact the power operator.</li> </ol>
2036	Grid Overfrequency	Major	<p>Cause ID = 1 Power grid exception: The actual power grid frequency is higher than the standard requirement for the local power grid.</p>	<ol style="list-style-type: none"> <li>1. If the alarm occurs occasionally, the power grid may be abnormal temporarily. The inverter automatically recovers after detecting that the power grid becomes normal.</li> <li>2. If the alarm occurs frequently, check whether the power grid frequency is within the allowed range. If no, contact the local power operator. If yes, modify the grid overfrequency protection threshold through the mobile App with the consent of the local power operator.</li> </ol>
2037	Grid Underfrequency	Major	<p>Cause ID = 1 Power grid exception: The actual power grid frequency is lower than the standard requirement for the local power grid.</p>	<ol style="list-style-type: none"> <li>1. If the alarm occurs occasionally, the power grid may be abnormal temporarily. The inverter automatically recovers after detecting that the power grid becomes</li> </ol>

Alarm ID	Alarm Name	Alarm Severity	Possible Causes	Troubleshooting
				<p>normal.</p> <p>2. If the alarm occurs frequently, check whether the power grid frequency is within the allowed range. If no, contact the local power operator. If yes, modify the grid underfrequency protection threshold through the mobile App with the consent of the local power operator.</p>
2038	Unstable Grid Frequency	Major	<p>Cause ID = 1</p> <p>Power grid exception: The actual grid frequency change rate does not comply with the local power grid standard.</p>	<p>1. If the alarm occurs occasionally, the power grid may be abnormal temporarily. The inverter automatically recovers after detecting that the power grid becomes normal.</p> <p>2. If the alarm occurs frequently, check whether the power grid frequency is within the allowed range. If no, contact the local power operator.</p>
2039	Output Overcurrent	Major	<p>Cause ID = 1</p> <p>The power grid voltage drops dramatically or the power grid is short-circuited. As a result, the inverter transient output current exceeds the upper threshold and therefore the inverter protection is triggered.</p>	<p>1. The inverter detects its external working conditions in real time. After the fault is rectified, the inverter automatically recovers.</p> <p>2. If the alarm occurs frequently and affects the energy yield of the power plant, check whether the output is short-circuited. If the fault persists, contact your dealer or technical support.</p>
2040	Output DC Component Overhigh	Major	<p>Cause ID = 1</p> <p>The DC component of the inverter output current exceeds the specified upper threshold.</p>	<p>1. The inverter detects its external working conditions in real time. After the fault is rectified, the inverter automatically recovers.</p> <p>2. If the alarm occurs frequently, contact your dealer or technical support.</p>

Alarm ID	Alarm Name	Alarm Severity	Possible Causes	Troubleshooting
2051	Abnormal Residual Current	Major	<p>Cause ID = 1</p> <p>The insulation impedance of the input side to PE decreases when the inverter is operating.</p>	<ol style="list-style-type: none"> <li>1. If the alarm occurs occasionally, the external circuit may be abnormal temporarily. The inverter automatically recovers after the fault is rectified.</li> <li>2. If the alarm occurs frequently or persists, check whether the impedance between the PV string and the ground is too low.</li> </ol>
2062	Low Insulation Resistance	Major	<p>Cause ID = 1</p> <ul style="list-style-type: none"> <li>• A short circuit occurs between the PV array and the ground.</li> <li>• The ambient air of the PV array is damp and the insulation between the PV array and the ground is poor.</li> </ul>	<ol style="list-style-type: none"> <li>1. Check the output impedance of the PV array to ground. If there is a short circuit or lack of insulation, rectify it.</li> <li>2. Check that the PE cable of the inverter is correctly connected.</li> <li>3. If the impedance is lower than the specified protection threshold in rainy and cloudy days, set <b>Insulation resistance protection</b> using the mobile App. Current insulation resistance: x MΩ, possible short circuit position: x%. The short circuit position is valid for a single PV string. If there are multiple PV strings, check the PV strings one by one. For details, see <a href="#">E Locating Insulation Resistance Faults</a>.</li> </ol>
2063	Overtemperature	Minor	<p>Cause ID = 1</p> <ul style="list-style-type: none"> <li>• The inverter is installed in a place with poor ventilation.</li> <li>• The ambient temperature is higher than the upper threshold.</li> <li>• The inverter is not working properly.</li> </ul>	<ul style="list-style-type: none"> <li>• Check the ventilation and ambient temperature of the inverter installation position.</li> <li>• If the ventilation is poor or the ambient temperature exceeds the upper threshold, improve the ventilation and heat dissipation.</li> <li>• If the ventilation and ambient temperature both meet requirements, contact your dealer or technical</li> </ul>

Alarm ID	Alarm Name	Alarm Severity	Possible Causes	Troubleshooting
				support.
2064	Device Fault	Major	<p>An unrecoverable fault has occurred on a circuit inside the inverter.</p> <p>Cause ID = 1–12</p> <ul style="list-style-type: none"> <li>• 1: The Boost input is short-circuited.</li> <li>• 2: The Boost input experiences overcurrent.</li> <li>• 3: The control circuit is faulty.</li> <li>• 4: The inverter circuit is abnormal.</li> <li>• 5: The residual current sensor is faulty.</li> <li>• 6: The temperature detection fails.</li> <li>• 7: EEPROM read/write fails.</li> <li>• 8: The auxiliary power supply is abnormal.</li> <li>• 9: The grid-tied relay is abnormal.</li> <li>• 10: The DC bus experiences overvoltage.</li> <li>• 11: The DC bus experiences undervoltage.</li> <li>• 12: The DC bus experiences voltage imbalance.</li> </ul>	<p>Turn off the AC output switch and DC input switch, and then turn them on after 5 minutes. If the fault persists, contact your dealer or technical support.</p>
2065	Upgrade Failed or Version Mismatch	Minor	<p>The upgrade does not complete normally.</p> <p>Cause ID = 1–4, 7</p> <ul style="list-style-type: none"> <li>• 1. The software and hardware of the main controller do not match.</li> <li>• 2: The main and auxiliary controller software versions do not match.</li> <li>• 3: The monitoring and power controller software versions do not match.</li> <li>• 4: The upgrade fails.</li> </ul>	<ol style="list-style-type: none"> <li>1. Perform an upgrade again.</li> <li>2. If the upgrade fails for multiple times, contact your dealer or technical support.</li> </ol>

Alarm ID	Alarm Name	Alarm Severity	Possible Causes	Troubleshooting
61440	Monitoring Unit Faulty	Minor	Cause ID = 1 <ul style="list-style-type: none"> <li>The flash memory is insufficient.</li> <li>The flash memory has bad sectors.</li> </ul>	Turn off the AC output switch and DC input switch, and then turn them on after 5 minutes. If the fault persists, replace the monitoring board or contact your dealer technical support.
2067	Faulty Power Collector	Major	Cause ID = 1 The smart power sensor is disconnected.	<ol style="list-style-type: none"> <li>Check that the configured power meter model is the same as the actual model.</li> <li>Check that the communications parameters for the smart power sensors are the same as the inverter RS485 configurations.</li> <li>Check whether the smart power sensor is powered on and whether the RS485 communications cable is connected.</li> </ol>
2068	Battery Abnormal	Minor	The battery is faulty, disconnected, or the battery circuit breaker is OFF when the battery is running. Cause ID = 1–4 <ul style="list-style-type: none"> <li>1: The battery communication is abnormal.</li> <li>2: The battery port experiences overcurrent.</li> <li>3: The battery enabling cable is not properly connected.</li> <li>4: The battery port voltage is abnormal.</li> </ul>	<ol style="list-style-type: none"> <li>If the battery fault indicator is steady on or blinking, contact the battery supplier.</li> <li>Check that the battery enabling/power/communications cable is correctly installed, and that the communications parameters are the same as the inverter RS485 configurations.</li> <li>Check that the auxiliary power switch on the battery is set to ON.</li> <li>Send a shutdown command on the App. Turn off the AC output switch, DC input switch, and battery switch. Then turn on the battery switch, AC output switch, and DC input switch in sequence after 5 minutes.</li> <li>If the fault persists, contact your dealer or technical support.</li> </ol>
2070	Active Islanding	Major	Cause ID = 1 When the power grid	Check that the grid connection voltage of the inverter is

Alarm ID	Alarm Name	Alarm Severity	Possible Causes	Troubleshooting
			experiences an AC power outage, the inverter detects islanding proactively.	normal.
2077	Off-grid output overload	Major	Cause ID = 1/2 The output is overloaded or short-circuited.	<ol style="list-style-type: none"> <li>1. Check whether the device output is short-circuited.</li> <li>2. Check whether the device load configuration exceeds the rated value.</li> </ol>
2080	Abnormal PV Module Configuration	Major	<p>PV module configuration does not meet requirements, or the PV module output is reversely connected or short-circuited.</p> <p>Cause ID = 2, 3, 6, 7, 8, 9</p> <ul style="list-style-type: none"> <li>• 2: The PV string power or the number of 3<sup>rd</sup> party optimizers connected in series in a PV string exceeds the upper threshold.</li> <li>• 3: The number of 3<sup>rd</sup> party optimizers connected in series in a PV string is less than the lower threshold, the PV string output is reversely connected, or the output of some optimizers in the PV string is reversely connected.</li> <li>• 6: Under the same MPPT, the number of 3<sup>rd</sup> party optimizers connected in series in PV strings connected in parallel is different, or the output of some optimizers in PV strings is reversely connected.</li> <li>• 7: The 3<sup>rd</sup> party optimizers installation position is changed, or PV strings are combined or exchanged.</li> <li>• 8: The sunlight is weak or changes abnormally.</li> <li>• 9: In partial configuration scenarios, the PV string voltage exceeds the inverter input voltage specifications.</li> </ul>	<p>Check whether the total number of PV modules, number of PV modules in a string, and number of PV strings meet requirements and whether the PV module output is reversely connected.</p> <ul style="list-style-type: none"> <li>• ID2: Check whether the PV string power or the number of PV modules connected in series in the PV string exceeds the upper threshold.</li> <li>• ID3: <ol style="list-style-type: none"> <li>1. Check whether the number of 3<sup>rd</sup> party optimizers connected in series in the PV string is below the lower threshold.</li> <li>2. Check whether the PV string output is reversely connected.</li> <li>3. Check whether the PV string output is disconnected.</li> <li>4. Check whether the 3<sup>rd</sup> party optimizers output extension cable is correct (positive connector at one end and negative connector at the other).</li> </ol> </li> <li>• ID6: <ol style="list-style-type: none"> <li>1. Check whether the number of 3<sup>rd</sup> party optimizers connected in series in the PV strings connected in parallel under the same MPPT is the same.</li> <li>2. Check whether the 3<sup>rd</sup> party optimizers output</li> </ol> </li> </ul>

Alarm ID	Alarm Name	Alarm Severity	Possible Causes	Troubleshooting
				<p>extension cable is correct (positive connector at one end and negative connector at the other).</p> <ul style="list-style-type: none"> <li>• ID7: When the sunlight is normal, perform the optimizer search function again.</li> <li>• ID8: When the sunlight is normal, perform the optimizer search function again (if applicable).</li> <li>• ID9: Calculate the PV string voltage based on the number of PV modules in the PV string and check whether the PV string voltage exceeds the upper threshold of the inverter input voltage.</li> </ul>
2081	3 <sup>rd</sup> party optimizers Fault	Warning	<p>Cause ID = 1 An optimizer is faulty.</p>	<p>Selective compatible 3<sup>rd</sup> party optimizer with Inverter are able to report fault codes. Go to the optimizer information screen to view the fault details.</p>
2082	Grid-tied/Off-grid Controller Abnormal	Major	<p>Cause ID = 1 The inverter fails to communicate with the Smart Backup Box. Cause ID = 2 An unrecoverable fault occurs on a circuit inside the Smart Backup Box.</p>	<ol style="list-style-type: none"> <li>1. Send a shutdown command on the App. Turn off the AC output switch, DC input switch, and battery switch.</li> <li>2. Check whether the power cable and RS485 cable between the Smart Backup Box and the inverter are normal.</li> <li>3. After 5 minutes, turn on the battery switch, AC output side, AC output switch, and DC input switch.</li> <li>4. If the alarm persists, contact your dealer or technical support.</li> </ol>

 **NOTE**

Contact your dealer if all failure analysis procedures listed above are completed and the fault still exists.  
Contact your dealer for list of compatible 3<sup>rd</sup> party Optimizers.

# 9 Inverter Disposal

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## 9.1 Removing a Inverter

### Procedure

- Step 1** Power off the inverter. For details, see [8.1 System Power-Off](#).
- Step 2** Disconnect all cables from the inverter, including signal cables, DC input power cables, battery cables, AC output power cables, and PE cables.
- Step 3** Remove the WLAN antenna or the Smart Dongle from the inverter.
- Step 4** Remove the inverter from the mounting bracket.
- Step 5** Remove the mounting bracket.

----End

## 9.2 Packing a Inverter

- If the original packaging is available, put the inverter inside it and then seal it using adhesive tape.
- If the original packaging is unavailable, put the inverter inside a suitable hard carton and seal it properly.

## 9.3 Disposing a Inverter

If the inverter service life expires, dispose the inverter according to the local disposal rules for electrical equipment and electronic component waste.

# 10 Technical Parameters

## Efficiency

Technical Specification	IS-HYB-5000-1PH	IS-HYB-6000-1PH
Maximum efficiency	98.4%	98.4%
European weighted efficiency	97.8%	97.8%

## Input

Technical Specifications	IS-HYB-5000-1PH	IS-HYB-6000-1PH
Maximum input voltage <sup>a</sup>	600 V	
Maximum input current (per MPPT)	12.5 A	
Maximum short-circuit current (per MPPT)	18 A	
Backfeed short-circuit current	N/A	
Operating voltage range	80–600 V	
Startup voltage	100 V	
MPPT voltage range	90–560 V	
Rated input voltage	360 V	
Power supply	2	
Number of MPPTs	2	

Technical Specifications	IS-HYB-5000-1PH	IS-HYB-6000-1PH
Battery normal voltage	450 Vdc	
Battery voltage range	350-600 Vdc	
Battery maximum current	15 A	
Battery Port Isc rating	32A (built-in fuse protection on battery output end)	
Battery type	Li-ion	
Note a: The maximum input voltage includes the PV input voltage and battery input voltage.		

## Output (On grid)

Technical Specifications	IS-HYB-5000-1PH	IS-HYB-6000-1PH
Rated output power	5000 W <sup>a</sup>	6000 W
Maximum apparent power	5000 VA <sup>b</sup>	6000 VA
Rated output voltage	220 V /230 V /240 V	220 V /230 V /240 V
Rated power grid frequency	50 Hz/60 Hz	
Maximum output current	21.7 A	27.3 A
Rated output current	22.7 A /21.7 A /20.8 A	27.3 A /26.1 A /25.0 A
Rated apparent power	5 kVA	6 kVA
Inrush current	25 A	27.3 A
Max output fault current	75.3 A	90.37 A
Max output overcurrent protection	30 A	32.76 A
Power factor	0.8 leading and 0.8 lagging	
Maximum total harmonic distortion (rated power)	≤ 3%	
Note a: The rated output power is 5000 W for the AS4777 grid code.		

Technical Specifications	IS-HYB-5000-1PH	IS-HYB-6000-1PH
Note b: The maximum apparent power is 5000 VA for the AS4777 grid code.		

## Output (Off grid<sup>a</sup>)

Technical Specifications	IS-HYB-5000-1PH	IS-HYB-6000-1PH
Maximum apparent power	5000 VA	5000 VA
Peak apparent power	110%, 10 s	

## Protection

Technical Specifications	IS-HYB-5000-1PH	IS-HYB-6000-1PH
Anti-islanding protection	Supported	
DC reverse polarity protection	Supported	
Insulation resistance detection	Supported	
Residual current monitoring unit (RCMU)	Supported	
AC short-circuit protection	Supported	
AC overcurrent protection	Supported	
Overtemperature protection	Supported	
DC surge protection	Supported	
AC surge protection	Supported	
AC overvoltage protection	Supported	
Arc fault protection	Supported	
AFCI	Supported	
Active anti-islanding	AFD	

Technical Specifications	IS-HYB-5000-1PH	IS-HYB-6000-1PH
method		
Protection class	I	
Overvoltage category	II(DC)/III(AC)	
PV and AC port	DVCC	
Communication port	DVCA	

## Communications

Technical Specifications	IS-HYB-5000-1PH	IS-HYB-6000-1PH
Display	LED indicators; WLAN+App	
WLAN	Supported	
RS485	Supported	
Maximum RS485 communication distance	1000 m	
Communications expansion module	WLAN-FE (optional)	

## Common Parameters

Technical Specification	IS-HYB-5000-1PH	IS-HYB-6000-1PH
Topology	Non-Isolation	
IP rating	IP65	
Cooling mode	Natural cooling	
Dimensions (H x W x D)	365 mm x 365 mm x 156 mm (including the mounting bracket)	
Weight	12 kg	
Operating temperature	-25°C to +60°C (derated when the temperature is higher than +45°C)	-25°C to +60°C (derated when the temperature is higher than +40°C)
Humidity	0–100% RH	
Operating altitude	0–4000 m (derated above 2000 m)	
Pollution degree classification	PD 3 (Internal reduced to PD2)	

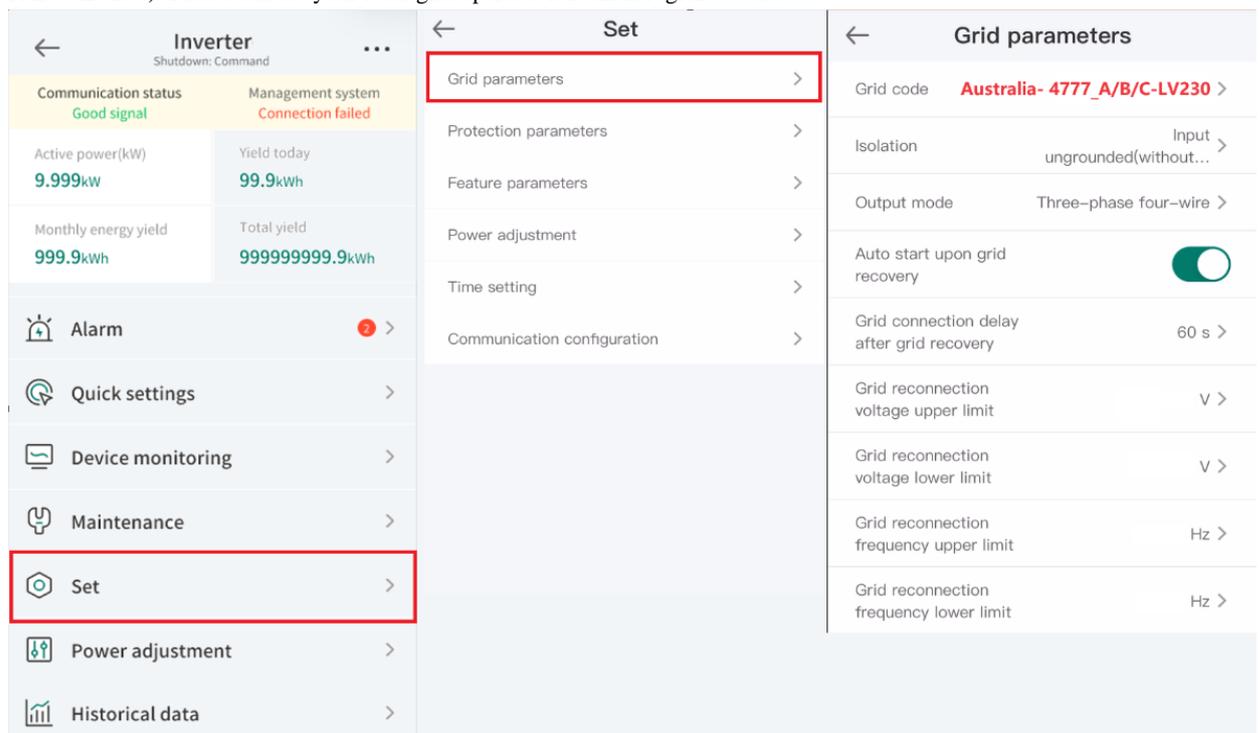
## Wireless Communication Parameters

Specifications	Inverter Built-in Wi-Fi	WLAN-FE Smart Dongle
Frequency	2400–2483.5 MHz	2400–2483.5 MHz
Protocol standard	WLAN 802.11b/g/n	WLAN 802.11b/g/n
Bandwidth	20 MHz/40 MHz (optional)	20 MHz/40 MHz (optional)
Maximum transmit power	$\leq 20$ dBm EIRP	$\leq 20$ dBm EIRP

# A Grid Code

**NOTE**

The grid codes are subject to change. The listed codes are for reference only.  
For Australian market, to comply with AS/NZS 4777.2:2020 please select from Region A/B/C (AUSTRALIA-AS4777-A/B/C-LV230). Please contact your local grid operator for which region to select.



**Table A-1** Grid Code

National/ Regional Grid Code	Description	IS-HYB-5000-1PH	IS-HYB-6000-1PH
VDE-AR-N- 4105	Germany LV power grid	-	-
UTE C 15- 712-1(A)	France mainland power grid	Supported	Supported
UTE C 15- 712-1(B)	France island power grid	Supported	Supported

National/ Regional Grid Code	Description	IS-HYB-5000-1PH	IS-HYB-6000-1PH
UTE C 15- 712-1(C)	France island power grid	Supported	Supported
CEI0-21	Italy power grid	Supported	Supported
RD1699/661	Spain LV power grid	Supported	Supported
C10/11	Belgium power grid	Supported	-
IEC61727	IEC 61727 LV (50 Hz)	Supported	Supported
IEC61727- 60Hz	IEC 61727 LV (60 Hz)	Supported	Supported
TAI-PEA	Thailand grid-tied standard power grid	Supported	-
TAI-MEA	Thailand grid-tied standard power grid	Supported	-
EN50549-LV	Ireland power grid	Supported	Supported
EN50549-SE	Sweden LV	Supported	Supported
ABNT NBR 16149	Brazil power grid	Supported	Supported
Fuel-Engine- Grid	Diesel generator hybrid power grid	Supported	Supported
Fuel-Engine- Grid-60Hz	Diesel generator hybrid power grid	Supported	Supported
Austria	Austrian power grid	-	-

National/ Regional Grid Code	Description	IS-HYB-5000-1PH	IS-HYB-6000-1PH
G98	UK G98 power grid	-	-
G99- TYPEA-LV	UK G99_TypeA_ LV power grid	Supported	Supported
NRS-097-2-1	South Africa Power Grid	Supported	Supported
SWITZERL AND- NA/EEA:202 0-LV230	Switzerland	Supported	Supported
SINGAPOR E	Singapore LV power grid	Supported	Supported
HONGKON G	Hong Kong LV power grid	Supported	Supported
DUBAI	DUBAI LV power grid	Supported	Supported
Island-Grid	Off-grid grid code	Supported	Supported
DENMARK- EN50549- DK1-LV230	Denmark power grid	Supported	Supported
DENMARK- EN50549- DK2-LV230	Denmark power grid	Supported	Supported
AUSTRALI A- AS4777_A- LV230	Australia power grid	Supported	Supported
AUSTRALI A- AS4777_B- LV230	Australia power grid	Supported	Supported
AUSTRALI A- AS4777_C- LV230	Australia power grid	Supported	Supported
AUSTRALI A- AS4777_NZ- LV230	New Zealand power grid	Supported	Supported
OMAN	Oman low- voltage power grid	Supported	Supported

ANRE	Romania low-voltage power grid	Supported	Supported
FINLAND- EN50549- LV230	Finland power grid	Supported	Supported

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# B Device Commissioning

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**Step 1** Connect to the solar inverter WLAN and log in to the device commissioning screen as the **installer** user.

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## NOTICE

- If the mobile phone is directly connected to the inverter, the visible distance between the inverter and the mobile phone must be less than 3 m when a built-in antenna is used and less than 50 m when an external antenna is used to ensure the communication quality between the App and the inverter. The distances are for reference only and may vary with mobile phones and shielding conditions.
- When connecting the inverter to the WLAN over a router, ensure that the mobile phone and inverter are in the WLAN coverage of the router and the inverter is connected to the router.
- The router supports WLAN (IEEE 802.11 b/g/n, 2.4 GHz) and the WLAN signal reaches the inverter.
- The WPA, WPA2, or WPA/WPA2 encryption mode is recommended for routers. Enterprise-level encryption is not supported (for example, public hotspots requiring authentication such as airport WLAN). WEP and WPA TKIP are not recommended because these two encryption modes have serious security defects. If the access fails in WEP mode, log in to the router and change the encryption mode of the router to WPA2 or WPA/WPA2.

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## NOTE

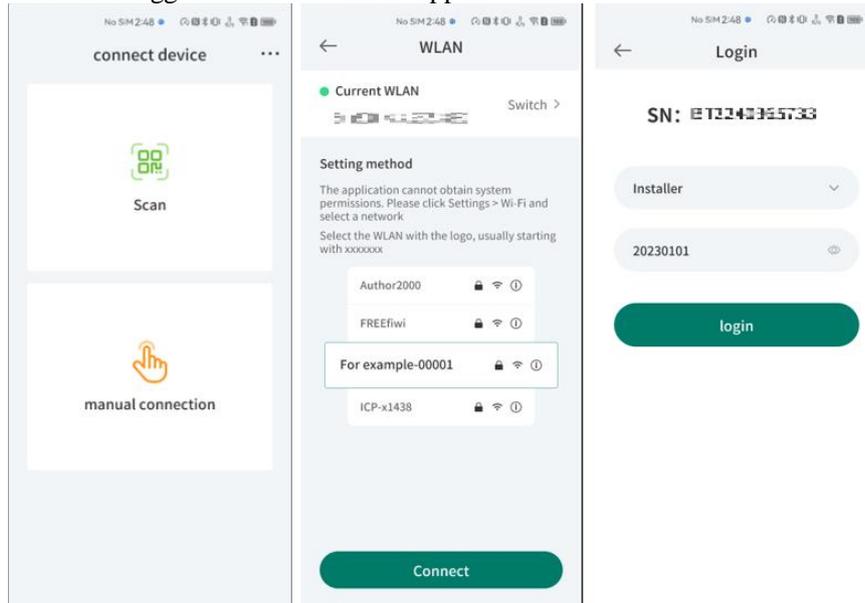
- Obtain the initial password for connecting to the solar inverter WLAN from the label on the side of the solar inverter.
- Set the password at the first login. To ensure account security, change the password periodically and keep the new password in mind. Not changing the initial password may cause password disclosure. A password left unchanged for a long period of time may be stolen or cracked. If a password is lost, devices cannot be accessed. In these cases, the user is liable for any loss caused to the PV plant.
- When you access the **device commission** screen of the inverter for the first time, you need to manually set the login password because the inverter does not have an initial login password.

----End

# C Setting Power Adjustment Parameters

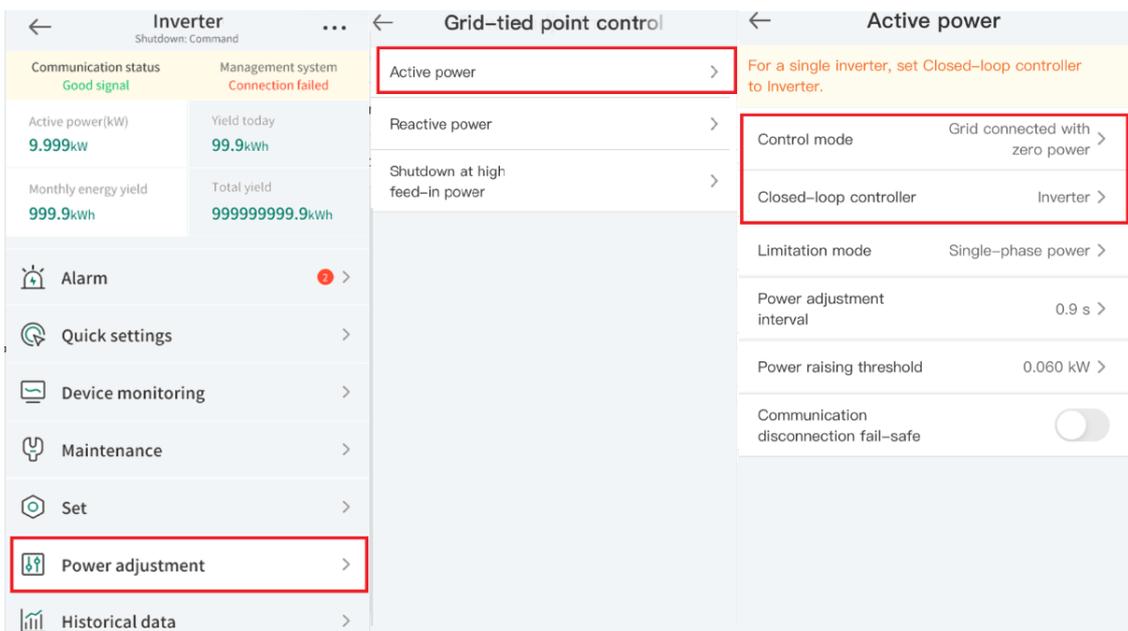
## Prerequisites

You have logged in to the HiSolar app as **installer**.



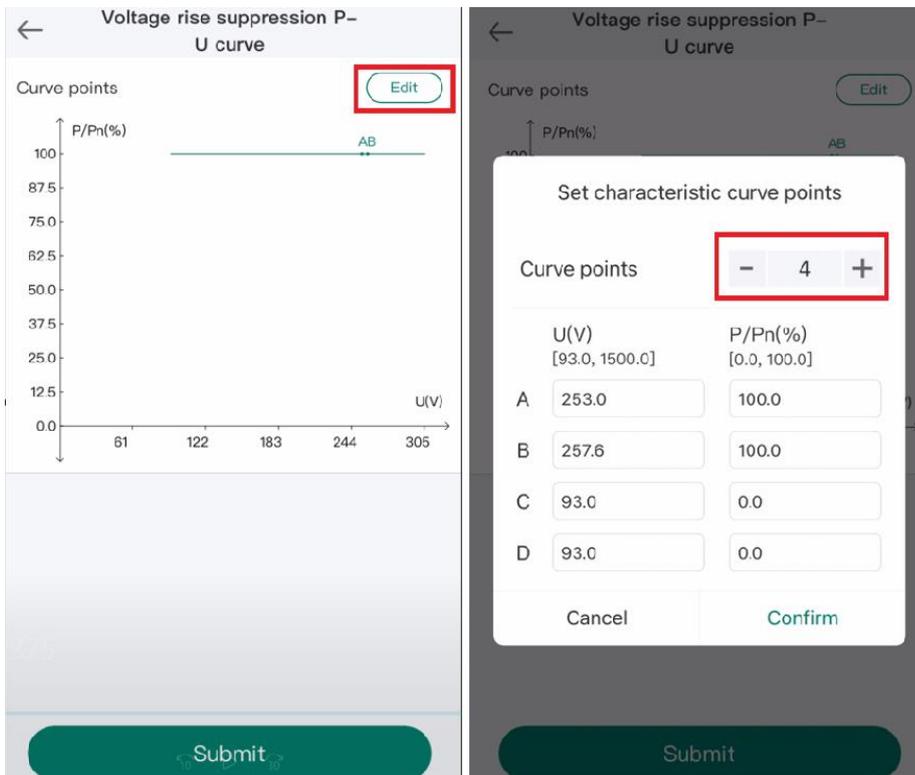
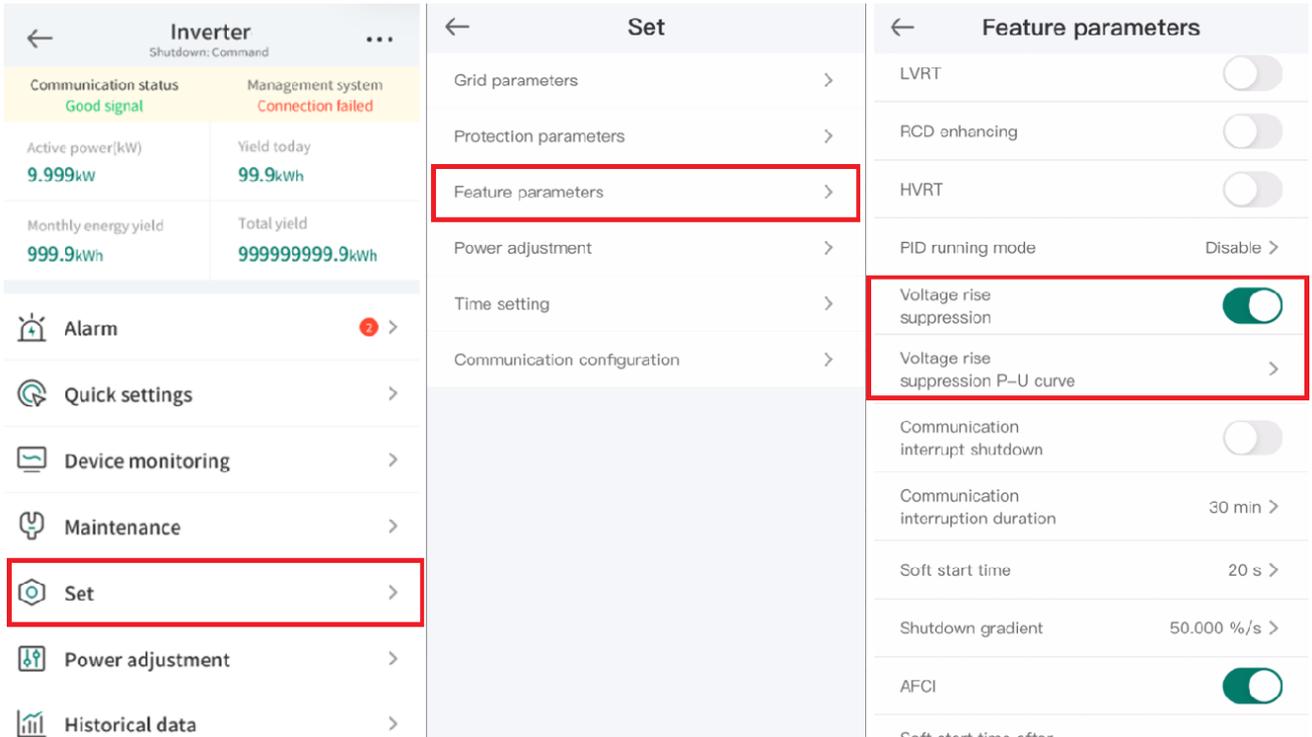
## Export Limit

From Main Page, Select Power adjustment → Feature parameters → Grid-tied point control → Active Power Set the export limit as required



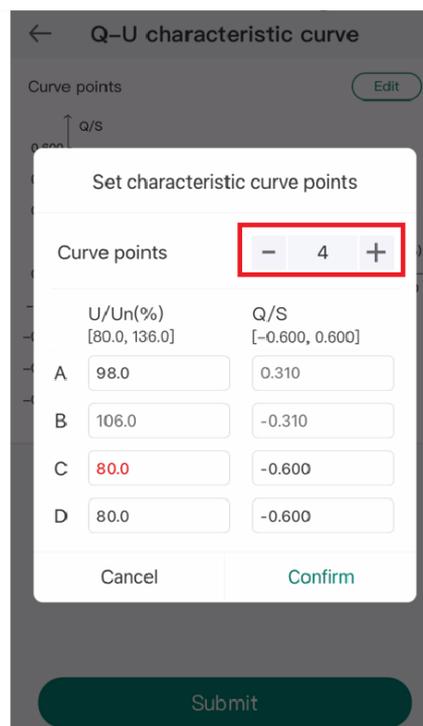
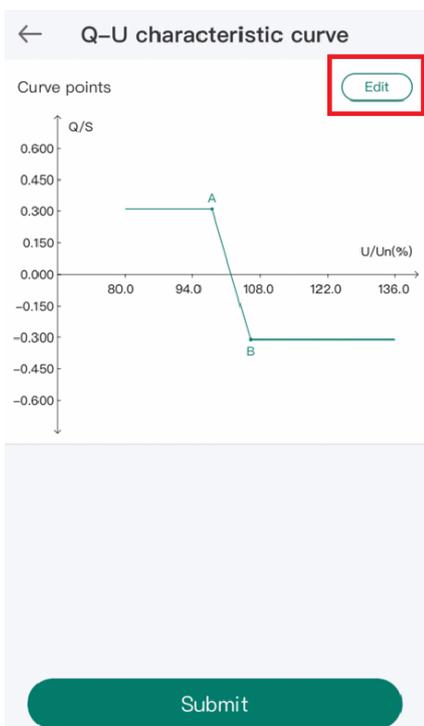
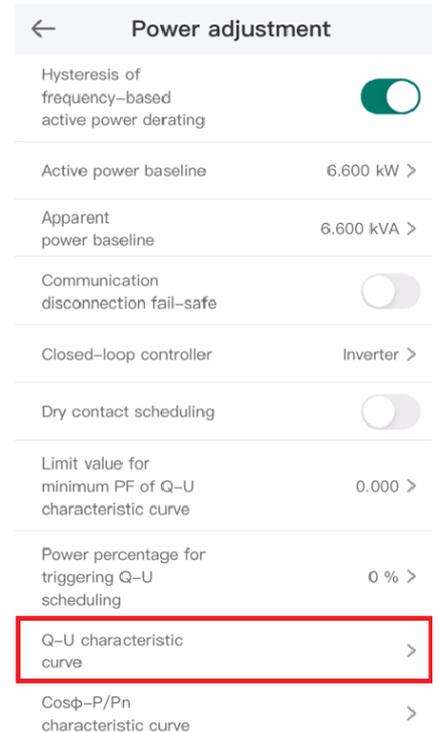
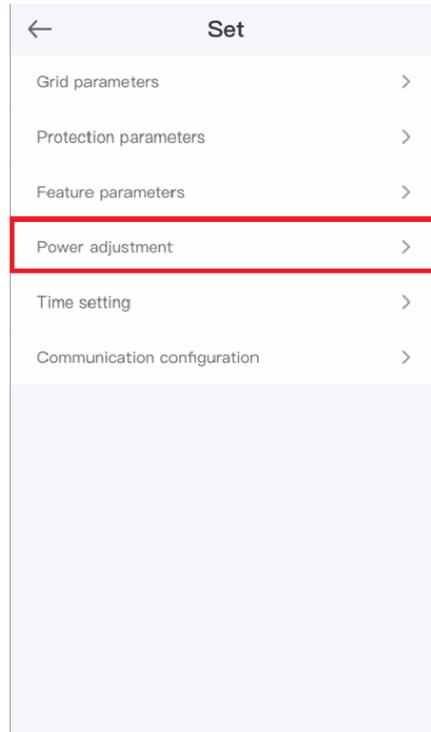
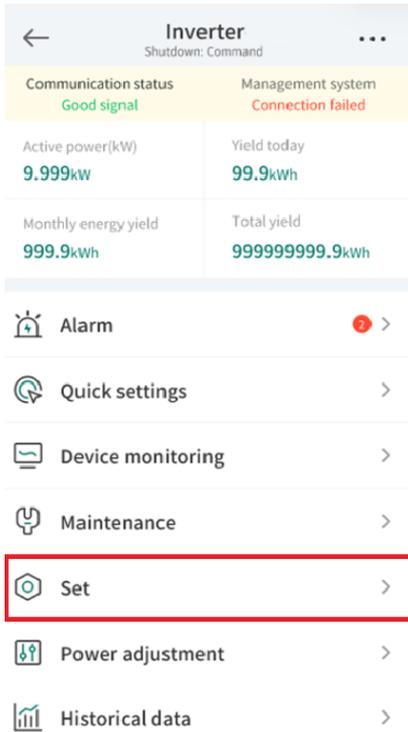
## P-U Setting

From Main Page, Select Set → Feature parameters → enable ‘Voltage rise suppression’ → Set the Curve points → set the value U and P/Pn accordingly with the value provided by grid operator and **Submit**:



## Q-U Setting

From Main Page, Select Set → Power adjustment → select ‘Q-U characteristic curve’ → Set the Curve points → set the value U and Q/S accordingly with the value provided by grid operator and **Submit**:



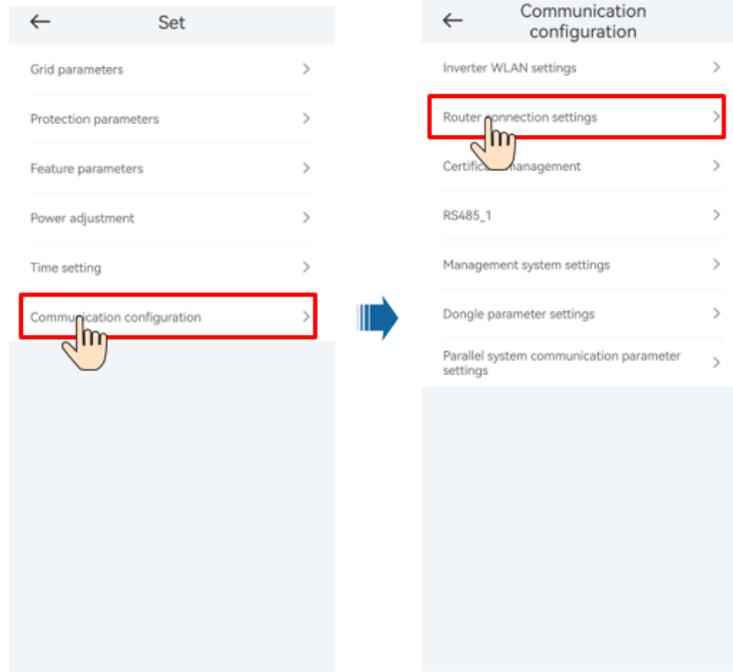
----End

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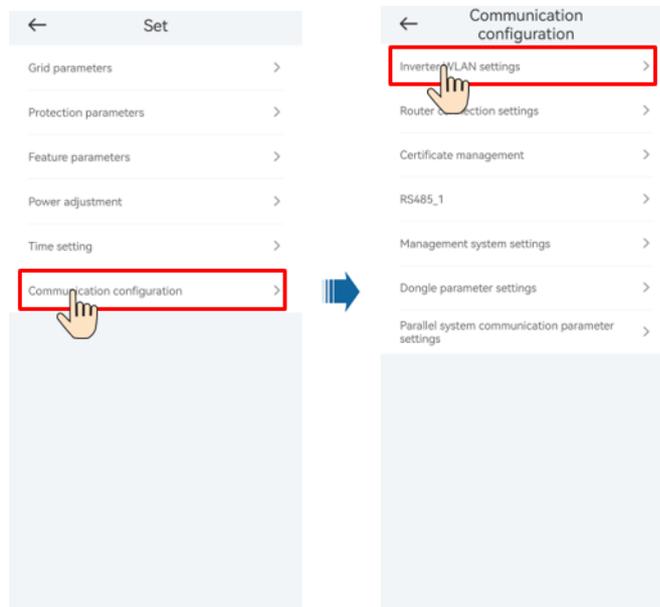
# D Resetting Password

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- Step 1** Ensure that the inverter connects to the AC and DC power supplies at the same time. Indicators  and  are steady green or blink at long intervals for more than 3 minutes.
- Step 2** Perform the following operations within 4 minutes:
1. Turn off the AC switch and set the DC switch at the bottom of the inverter to OFF. If the inverter connects to batteries, turn off the battery switch. Wait until all the LED indicators on the inverter panel turn off.
  2. Turn on the AC switch, set the DC switch to ON, and wait for about 90s. Ensure that the indicator  is blinking green slowly.
  3. Turn off the AC switch and set the DC switch to OFF. Wait until all LED indicators on the inverter panel are off.
  4. Turn on the AC switch and set the DC switch to ON. Wait until all indicators on the solar inverter panel blink and turn off 30 seconds later.
- Step 3** Reset the password within 10 minutes. (If no operation is performed within 10 minutes, all inverter parameters remain unchanged.)
1. Wait until the indicator  blinks green at long intervals.
  2. Obtain the initial WLAN hotspot name (SSID) and initial password (PSW) from the label on the side of the inverter and connect to the App.
  3. On the login screen, set a new login password and log in to the App.
- Step 4** Set router parameters.
- Setting router parameters
- Log in to the HiSolar App, choose **Set > Communication configuration > Router connection settings**, and set router parameters.



- (Optional) Resetting the WLAN password  
Log in to the HiSolar App, choose **Set > Communication configuration > Inverter WLAN settings**, and reset the WLAN password.



----End

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# E Rapid Shutdown

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When all PV modules connected to the solar inverter are configured with compatible 3<sup>rd</sup> party optimizers approved by istore, the PV system shuts down quickly and reduces the output voltage of the PV string to below 30 V within 30 seconds. If the 3<sup>rd</sup> party optimizers are configured for some PV modules, the rapid shutdown function is not supported.

Perform the following step to trigger rapid shutdown:

- Method 1: Use the rapid shutdown function. Set **Dry contact function** to **DI Rapid Shutdown**. Connect the access switch to pins 7 and 5 of the inverter communications terminal. The switch is turned off by default. When the switch is turned on, rapid shutdown is triggered.
- Method 2: Turn off the AC switch between the solar inverter and the power grid. (If the inverter supports and enables the off-grid function, the rapid shutdown function is not supported.)
- Method 3: Turn off the DC switch at the bottom of the inverter. (If an extra DC switch is connected to the input side of the inverter, turning off this DC switch will not trigger rapid shutdown.)
- Method 4: If **AFCI** is enabled, the inverter automatically detects arc faults, triggering a rapid shutdown.

 **NOTE**

Contact your dealer for list of compatible 3<sup>rd</sup> party Optimizers.

# F Locating Insulation Resistance Faults

If the ground resistance of a PV string connected to a solar inverter is too low, the solar inverter generates a **Low Insulation Resistance** alarm.

The possible causes are as follows:

- A short circuit occurs between the PV array and the ground.
- The ambient air of the PV array is damp and the insulation between the PV array and the ground is poor.

To locate the fault, connect each PV string to a solar inverter, power on and check the solar inverter, and locate the fault based on the alarm information reported by the HiSolar App. If a system is not configured with any optimizer, skip the corresponding operations. Perform the following steps to locate an insulation resistance fault.

## NOTICE

If two or more ground insulation faults occur in a single PV string, the following method cannot locate the fault. You need to check the PV modules one by one.

- Step 1** The AC power supply is connected, and set the DC switch at the bottom of the solar inverter to OFF. If the solar inverter connects to batteries, wait for 1 minute, and turn off the battery switch and then the auxiliary power switch of the battery.
- Step 2** Connect each PV string to the solar inverter and set the DC switch to ON. If the solar inverter status is **Shutdown: Command**, choose **Maintenance > Inverter ON/OFF** on the App and send a startup command.
- Step 3** Log in to the HiSolar App and on the device commissioning screen, connect and log in to the solar inverter, and access the **Alarm** screen. Check whether the **Low Insulation Resistance** alarm is reported.
  - If the **Low Insulation Resistance** alarm is not reported one minute after the DC is supplied, choose **Maintenance > Inverter ON/OFF** on the App and send a shutdown command. Set the DC switch to OFF and go to [Step 2](#) to connect another PV string to the solar inverter for a check.
  - If a **Low Insulation Resistance** alarm is still reported one minute after the DC is supplied, check the percentage for possible short-circuit positions on the **Alarm details** page and go to [Step 4](#).

←
Alarm details

Alarm name	Low Insulation Resistance
Severity	Major
Occurrence Time	29-Mar-2023 10:02:42
Alarm ID	2062
Cause ID	1

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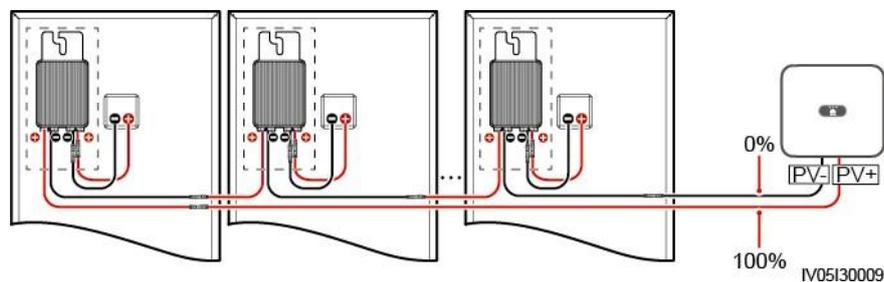
Possible cause

1. A short circuit has occurred between the PV array and the ground.
2. The ambient air of the PV array is damp and the insulation between the PV array and the ground is poor.

**NOTE**

- The positive and negative terminals of a PV string are connected to the PV+ and PV– terminals of the solar inverter. The PV– terminal represents a possibility of 0% for the short-circuit position and the PV+ terminal represents a possibility of 100% for the short-circuit position. Other percentages indicate that the fault occurs on a PV module or cable in the PV string.
- Possible fault position = Total number of PV modules in a PV string x Percentage of possible short-circuit positions. For example, if a PV string consists of 14 PV modules and the percentage of the possible short-circuit position is 34%, the possible fault position is 4.76 (14 x 34%), indicating that the fault is located near PV module 4, including the previous and the next PV modules and the cables of PV module 4. The solar inverter has a detection precision of ±1 PV module.

**Figure E-1** Definition of the percentage of the short-circuit position



**Step 4** Set the DC switch to OFF and check whether the connector or DC cable between the possible faulty PV modules and the corresponding optimizers, or those between the adjacent PV modules and the corresponding optimizers are damaged.

- If yes, replace the damaged connector or DC cable, set the DC switch to ON, and view the alarm information.
  - If the **Low Insulation Resistance** alarm is not reported one minute after the DC is supplied, the inspection on the PV string is complete. Choose **Maintenance > Inverter ON/OFF** on the App and send a shutdown command. Set the DC switch to OFF. Go to [Step 2](#) to check other PV strings. Then go to [Step 8](#).
  - If the **Low Insulation Resistance** alarm is still reported one minute after the DC is supplied, go to [Step 5](#).
- If not, go to [Step 5](#).

**Step 5** Set the DC switch to OFF, disconnect the possible faulty PV modules and corresponding optimizers from the PV string, and connect a DC extension cable with an MC4 connector to the adjacent PV modules or optimizers. Set the DC switch to ON and view the alarm information.

- If the **Low Insulation Resistance** alarm is not reported one minute after the DC is supplied, the fault occurs on the disconnected PV module and optimizer. Choose **Maintenance > Inverter ON/OFF** on the App and send a shutdown command. Go to [Step 7](#).
- If the **Low Insulation Resistance** alarm is still reported one minute after the DC is supplied, the fault does not occur on the disconnected PV module or optimizer. Go to [Step 6](#).

**Step 6** Set the DC switch to OFF, reconnect the removed PV module and optimizer, and repeat [Step 5](#) to check the adjacent PV modules and optimizers.

**Step 7** Determine the position of the ground insulation fault.

1. Disconnect the possible faulty PV module from the optimizer.
2. Set the DC switch to OFF.
3. Connect the possible faulty optimizer to the PV string.
4. Set the DC switch to ON. If the solar inverter status is **Shutdown: Command**, choose **Maintenance > Inverter ON/OFF** on the App and send a startup command. Check whether the **Low Insulation Resistance** alarm is reported.
  - If the **Low Insulation Resistance** alarm is not reported one minute after the solar inverter is powered on, the PV module is faulty. Choose **Maintenance > Inverter ON/OFF** on the App and send a shutdown command.
  - If the **Low Insulation Resistance** alarm is still reported one minute after the solar inverter is powered on, the optimizer is faulty.
5. Set the DC switch to OFF. Replace the faulty component to rectify the insulation resistance fault. Go to [Step 2](#) to check other PV strings. Then go to [Step 8](#).

**Step 8** If the solar inverter connects to batteries, turn on the auxiliary power switch of the battery and then the battery switch. Set the DC switch to ON. If the solar inverter status is **Shutdown: Command**, choose **Maintenance > Inverter ON/OFF** on the App and send a startup command.

----End

# **G** Acronyms and Abbreviations

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## **A**

**AC** alternating current

## **D**

**DC** direct current

**DCI** direct current identification

## **F**

**FRT** fault ride through

## **H**

**HVRT** high voltage ride-through

## **I**

**ID** identifier

## **L**

**LED** light emitting diode

**LVRT** low voltage ride-through

## **M**

**MAC** Media Access Control

**MPPT** maximum power point tracking

**P**

**PE**

protective earthing

**PV**

photovoltaic

**R**

**RCMU**

residual current monitoring unit

**RH**

relative humidity

**S**

**SN**

serial number