SUN2000-(175KTL-H0, 185KTL-INH0, 185KTL-H1)

User Manual

HUAWEI TECHNOLOGIES CO., LTD.

Huawei Technologies Co., Ltd.

About This Document

Overview

This document describes the SUN2000-175KTL-H0, SUN2000-185KTL-INH0, and SUN2000-185KTL-H1 (SUN2000 for short) in terms of their installation, electrical connections, commissioning, maintenance, and troubleshooting. Before installing and operating the inverter, ensure that you are familiar with the features, functions, and safety precautions provided in this document.

Intended Audience

This document is intended for photovoltaic (PV) plant operating personnel and qualified electricians.

Symbol Conventions

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

Symbol	Description
⚠ **DANGER**	Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
⚠ **WARNING**	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury
⚠ **CAUTION**	Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.
NOTICE	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.

Symbol	Description
NOTE	Calls attention to important information, best practices and tips.
	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 updates made in previous issues.

Issue 03 (2019-09-10)

Updated 5.7 Installing the DC Input Power Cable.

Updated 8.4 Troubleshooting.

Added A String Access Detection.

Issue 02 (2019-06-05)

Updated 2.2 Appearance.

Issue 01 (2019-05-15)

This issue is used for first office application (FOA).

Issue 03 (2019-09-10)
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Contents

1 Safety Precautions

General Safety

Before performing any operation, read the precautions and instructions in this manual and strictly follow the precautions and special safety instructions provided by Huawei to avoid accidents.

The installation, operation, and maintenance of the equipment must comply with local laws and regulations. The NOTICE, WARNING, and DANGER items in this document do not cover all the safety cautions and are only supplementary to the laws and regulations. Huawei assumes no responsibility for violation of general safety operation requirements or design, production, and equipment safety standards.

Ensure that the equipment is used in environments that meet its design specifications. Otherwise, the equipment may become faulty, and the resulting equipment malfunction, component damage, personal injuries, or property damage are not covered under the warranty.

Statement

Huawei will not be liable for any consequences of the following circumstances:

- Damage during the transportation by the customer
- Storage conditions that do not meet the requirements specified in this document
- Installation or use in environments which are not specified in related international standards
- Failure to follow the operation instructions and safety precautions in this document
- Operation of the product beyond specified parameter ranges
- Unauthorized modifications to the product or software code or removal of the product
- Device damage due to abnormal natural factors (force majeure, such as earthquake, fire, and storm)

Personnel Requirements

Only qualified and trained electrical technicians are allowed to operate the device. Operators need to meet the following requirements.

- Be properly trained.
- Read through this manual and master related safety precautions.
- Get familiar with the safety specifications about the electrical system.

- Understand the components and functioning of a grid-tied PV power system and relevant local standards.

Personal Safety

- Wear personal protective equipment, including but not limited to safety shoes, protective goggles, and safety gloves.
- Before using a device, remove any conductors such as jewelry or watches to avoid electric shock or burns.
- Use tools in correct methods to avoid hurting people or damaging devices.
- If there is a probability of personal injury or equipment damage during the operation of the device, immediately stop operations on the equipment, report the case to the project owner, and take feasible protective measures.
- In the case of a fire, immediately leave the building or the equipment area, and turn on the fire alarm bell or make an emergency call. Do not enter the building on fire in any case.

Protection Label

Do not scrawl, damage, or block any warning label on the device.

System Installation

⚠ DANGER

Never work with power-on during installation.

- Ensure that the devices are not connected to a power supply or powered on before finishing installation.
- Do not install the device under bad weather conditions such as thunderstorms, raining, snowing, or strong winds.
- Ensure that the device is installed in a well ventilated environment.
- Ensure that the heat dissipation system of the device is not blocked.
- Do not open the host panel of the device.
- Tighten the screws using tools when installing the device.
- After installation, remove the packing materials from the equipment area.

Grounding

- When installing the device, always make the ground connection first and disconnect it in the end.
- Do not damage the ground conductor.
- Do not operate the device in the absence of a properly installed ground conductor.
- The device must be connected permanently to the protective ground. Before operating the device, check the electrical connection of it to ensure that it is securely grounded.

Electrical Connections

⚠ DANGER

Before connecting cables, ensure that the device is not damaged. Otherwise, electric shocks or fire may occur.

- Ensure that all electrical connections comply with local electrical standards.
- Obtain approval from the country or local utility company before using the inverter in grid-tied mode.
- Ensure that the cables used in a grid-tied PV power system are properly connected and insulated and meet specifications.
- Before connecting a power cable, check that the label on the power cable is correct.
- Before making electrical connections, switch off the disconnector on the upstream device to cut the power supply if people may contact energized components.
- When routing cables, ensure that a sufficient distance exists between the cables and heat emitting equipment to prevent damage to the insulation layers of cables.
- Signal cables and power cables should be bound separately.
- Ensure that the cables you prepared meet local regulations.

Operations

⚠ DANGER

High voltage generated by the device during operation may cause an electric shock, which could result in death, serious injury, or serious property damage. Perform operations in strict accordance with safety precautions specified in this document and other relevant documents.

- Do not disconnect DC or AC power cables when the device is running.
- Do not touch an energized device, as the enclosure is hot.
- When the device is running, ensure that the heat dissipation system is not blocked to prevent high temperature alarms and fire from damaging the device.

Commissioning

When the device is powered on for the first time, professional personnel is required to set parameters correctly. Incorrect settings may result in inconsistency between the device and the certification of the country or region where the device is located, affecting the normal operation of the device.

Maintenance and Replacement

⚠ DANGER

High voltage generated by the device during operation may cause an electric shock, which could result in death, serious injury, or serious property damage. Prior to maintenance, power off the devices and strictly comply with the safety precautions in this document and associated documents to operate the devices.

- Only qualified professionals are allowed to remove safety facilities and inspect the device.
- Only personnel certified or authorized by Huawei are allowed to replace the device or components (including software).
- Any fault or error that might cause safety problems must be reported immediately to a supervisor.
- Maintain the device after you get familiar with this document and prepare the tools and testing equipment.
- Before maintaining the device, power it off and follow the instructions on the delayed discharge label to ensure that the device is powered off.
- The device has multiple inputs. Switch off all inputs before maintenance.
- Temporary warning signs or fences must be placed to prevent unauthorized person from entering the site.
- If the device is faulty, contact your dealer.
- The device can be powered on only after all faults are rectified. Failing to do so may escalate faults or damage the device.

2 Overview

2.1 Product Overview

Function

The SUN2000 inverter is a three-phase grid-tied PV string inverter that converts the DC power generated by PV strings into AC power and feeds the power into the power grid.

Model

This document involves the following product models:

- SUN2000-175KTL-H0
- SUN2000-185KTL-INH0
- SUN2000-185KTL-H1

Figure 2-1 Model description (SUN2000-185KTL-INH0 is used as an example)
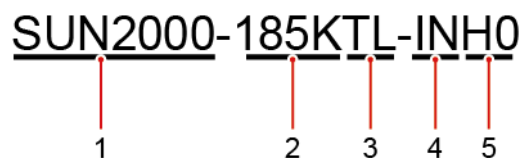
Table 2-1 Model description

Tag	Meaning	Value
1	Series	SUN2000: three-phase grid-tied PV string inverter
2	Power class	175K: The rated output power is 175 kW. 185K: The maximum active power is 185 kW.
3	Topology	TL: transformerless

Tag	Meaning	Value
4	Region	IN: India
5	Product code	H0/H1: product series with the 1500 V DC input voltage

Network Application

The inverter applies to grid-tied PV systems for commercial rooftop PV plants and large PV plants. Typically, a grid-tied PV system consists of the PV string, inverter, AC power distribution unit, and step-up transformer.

Figure 2-2 Network application
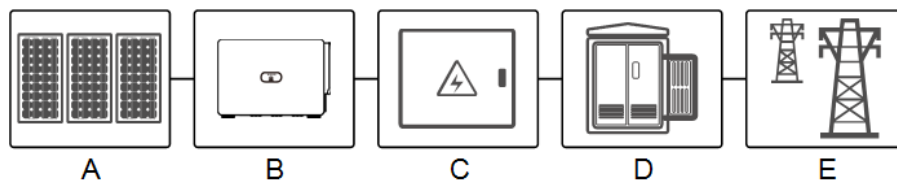
(A) PV string	(B) Inverter	(C) AC distribution unit (ACDU)
(D) Step-up transformer	(E) Power grid	

📖 **NOTE**

The SUN2000 is powered by a dedicated power transformer instead of connecting to low voltage overhead power lines.

Supported Power Grid

The inverter supports the IT power grid.

Figure 2-3 Supported power grid
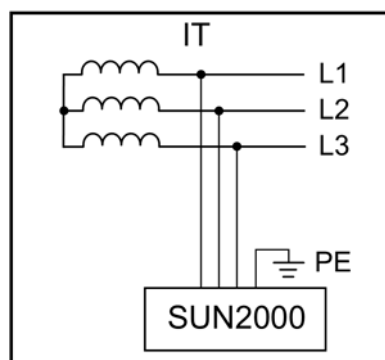
☐ NOTE

The SUN2000 can also apply to the AC power system with the neutral point grounding of the step-up transformer. The SUN2000 itself does not connect to any neutral wire.

Figure 2-4 AC power system with the neutral point grounding
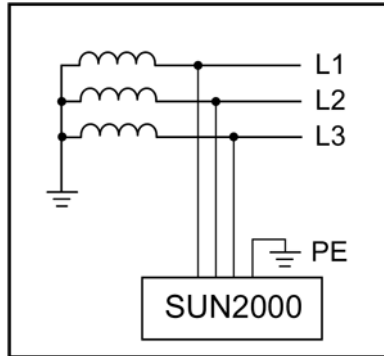
2.2 Appearance

Dimensions

Front View

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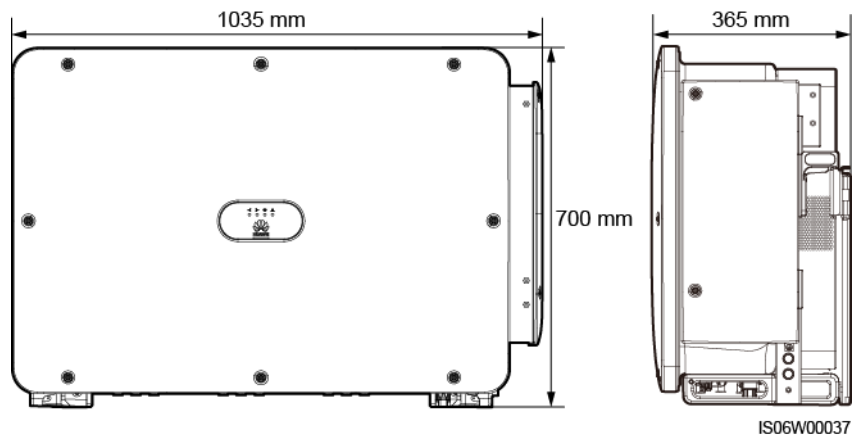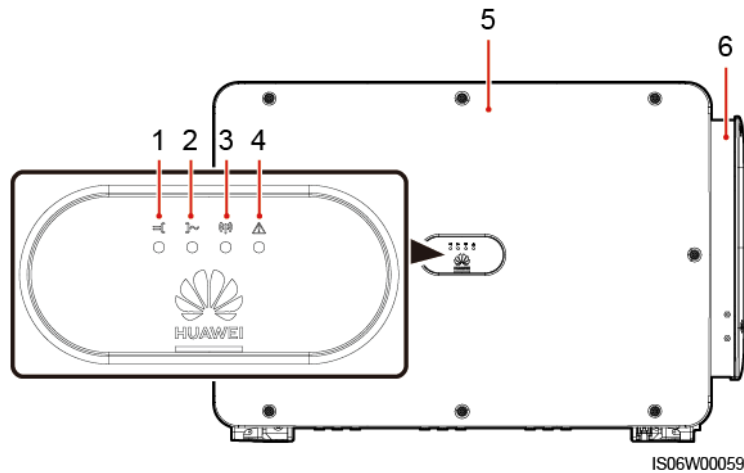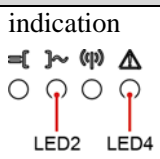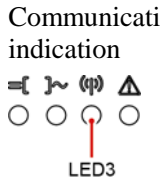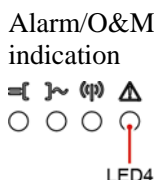
(1) PV connection indicator   (2) Grid-tied indicator   (3) Communication indicator

(4) Alarm/Maintenance indicator   (5) Host panel   (6) Maintenance compartment

Table 2-2 LED description

Display Category	Indicator Status		Meaning
PV indication	LED1	LED4	-
	Steady green	-	At least one PV string is properly connected, and the DC input voltage of the corresponding MPPT circuit is at least 500 V.
	Blinking green at long intervals	-	The test on the cable connection of PV strings is complete, cables are correctly connected, and the buzzer does not buzz.
	Blinking red at long intervals	-	The test on the cable connection of PV strings is in progress and the buzzer does not buzz.
	Steady red	-	The test on the cable connection of PV strings is complete, cables are incorrectly connected, and the buzzer buzzes.
	Blinking green at short intervals	Red	An environmental fault occurs at DC side.
	Off	-	The inverter disconnects from all PV strings, or the DC input voltage of all MPPT circuits is less than 500 V.
Grid-tied	LED2	LED4	NA

Display Category	Indicator Status		Meaning
indication ≡[ ]∿ (ɯ) ⚠ ○ ○ ○ ○ LED2 LED4	Steady green	-	The inverter is in grid-tied mode.
	Blinking green at short intervals	Red	An environmental fault occurs at AC side.
	Off	-	The inverter is not in grid-tied mode.
Communications indication ≡[ ]∿ (ɯ) ⚠ ○ ○ ○ ○ LED3	LED3		-
	Blinking green at short intervals		The inverter receives data over RS485 or MBUS communication.
	Off		The inverter has not received data over RS485 or MBUS communication for 10 seconds.
Alarm/O&M indication ≡[ ]∿ (ɯ) ⚠ ○ ○ ○ ○ LED4	LED4		-
	Steady red		A major alarm is generated.
	Blinking red at short intervals		A minor alarm is generated.
	Blinking red at long intervals		A warning alarm is generated.
	Steady green		Local maintenance succeeds.
	Blinking green at long intervals		In local maintenance or shuts down over a command.
	Blinking green at short intervals		Local maintenance fails.
	Off		No alarm is generated, and no local maintenance operations are performed.

☐ NOTE

- Local maintenance refers to operations performed after a universal serial bus (USB) flash drive, Bluetooth module, WLAN module, or USB data cable is inserted into the USB port of the inverter. For example, local maintenance includes configuration import and export using a USB flash drive, and connecting to the SUN2000 app over a Bluetooth module, WLAN module, or USB data cable.

- If the alarming and the local maintenance happen concurrently, the alarm/maintenance indicator shows the local maintenance state first. After the USB flash drive, Bluetooth module, WLAN module, or USB data cable is removed, the indicator shows the alarm state.

Bottom View

IS06W00057
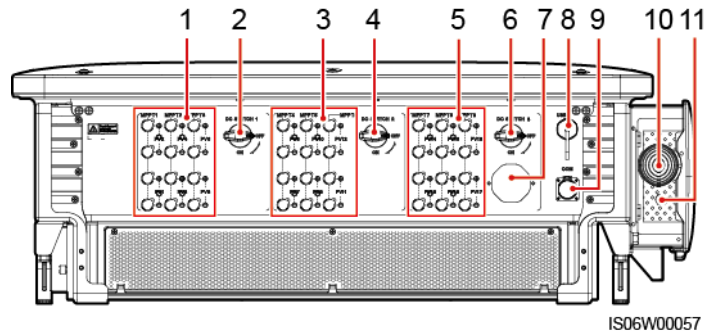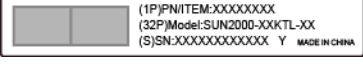
(1) DC input terminals (controlled by DC SWITCH 1)	(2) DC switch 1 (DC SWITCH 1)
(3) DC input terminals (controlled by DC SWITCH 2)	(4) DC switch 2 (DC SWITCH 2)
(5) DC input terminals (controlled by DC SWITCH 3)	(6) DC switch 3 (DC SWITCH 3)
(7) Ventilation valve	(8) USB port (USB)
(9) Communications port (COM)	(10) AC output cable port
(11) Power cable port for the tracking system	

2.3 Label Description

2.3.1 Label Description

Symbol	Name	Meaning
	Running warning	Potential hazards exist after the inverter is powered on. Take protective measures when operating the inverter.
	Burn warning	Do not touch a running inverter, as the shell becomes hot during operation.
	Large current warning	Before powering on the inverter, ensure that the inverter is grounded because there is a large contact current after the inverter is powered on.

Symbol	Name	Meaning
15 mins	Delayed discharge	• High voltage exists after the inverter is powered on. Only qualified and trained electrical technicians are allowed to perform operations on the inverter. • Residual voltage exists after the inverter is powered off. It takes 15 minutes for the inverter to discharge to the safe voltage.
[i]	Refer to documentation	Reminds operators to refer to the documents shipped with the inverter.
(grounding symbol)	Grounding	Indicates the position for connecting the protective earthing (PE) cable.
Do not disconnect under load! 禁止带负荷断开连接!	Operation warning	Do not remove the DC input connector when the inverter is running.
(warning symbols)	Fan operation warning	High voltage exists after the inverter is powered on. Do not touch the fans when the inverter is working.
⚠ CAUTION Before replacing the fan, disconnect the FAN-POWER cable and then the fan cable. 更换风扇前，必须先拔除风扇电源线，再拔除风扇线。	Fan replacement warning	Before replacing a fan, disconnect its power connectors.
(1P)PN/ITEM:XXXXXXXX (32P)Model:SUN2000-XXKTL-XX (S)SN:XXXXXXXXXXXX Y MADE IN CHINA	Inverter ESN label	Indicates the inverter serial number.
> 55 kg (121 lbs) OR	Weight label	The inverter needs to be carried by four persons or using a pallet truck.

2.3.2 Product Nameplate

Figure 2-5 Nameplate (SUN2000-175KTL-H0 is used as an example)
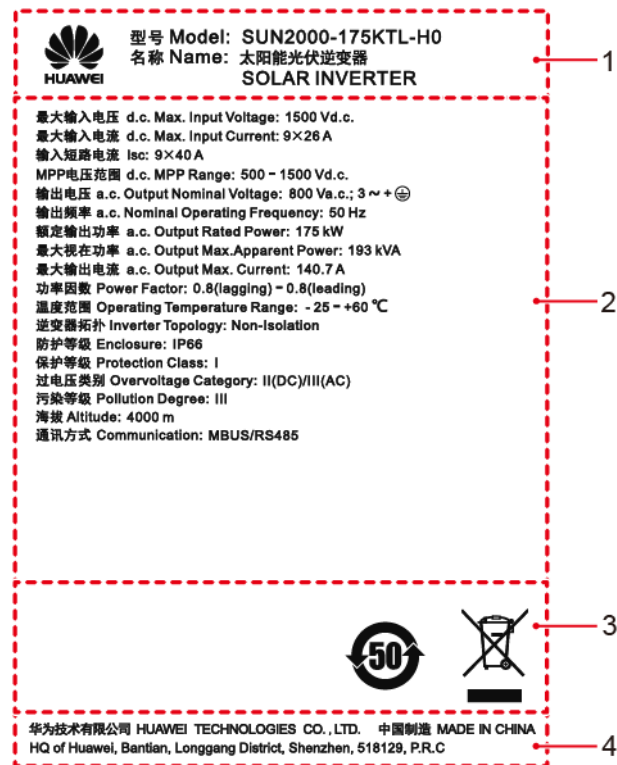
(1) Trademark and product model   (2) Important technical specifications

(3) Compliance symbols   (4) Company name and country of manufacture

📖 **NOTE**

The nameplate figure is for reference only.

Icon	Name	Description
	Environmentally friendly use period (EFUP) mark	The product does not pollute the environment during the specified period.
	EU waste electrical and electronic equipment (WEEE) mark	Do not dispose of the product as household garbage.

2.4 Working Principles

2.4.1 Circuit Diagram

The inverter receives inputs from 18 PV strings. Then the inputs are grouped into nine MPPT circuits inside the inverter to track the maximum power point of the PV strings. The DC power is then converted into three-phase AC power through an inverter circuit. Surge protection is supported on both the DC and AC sides.

Figure 2-6 Inverter conceptual diagram
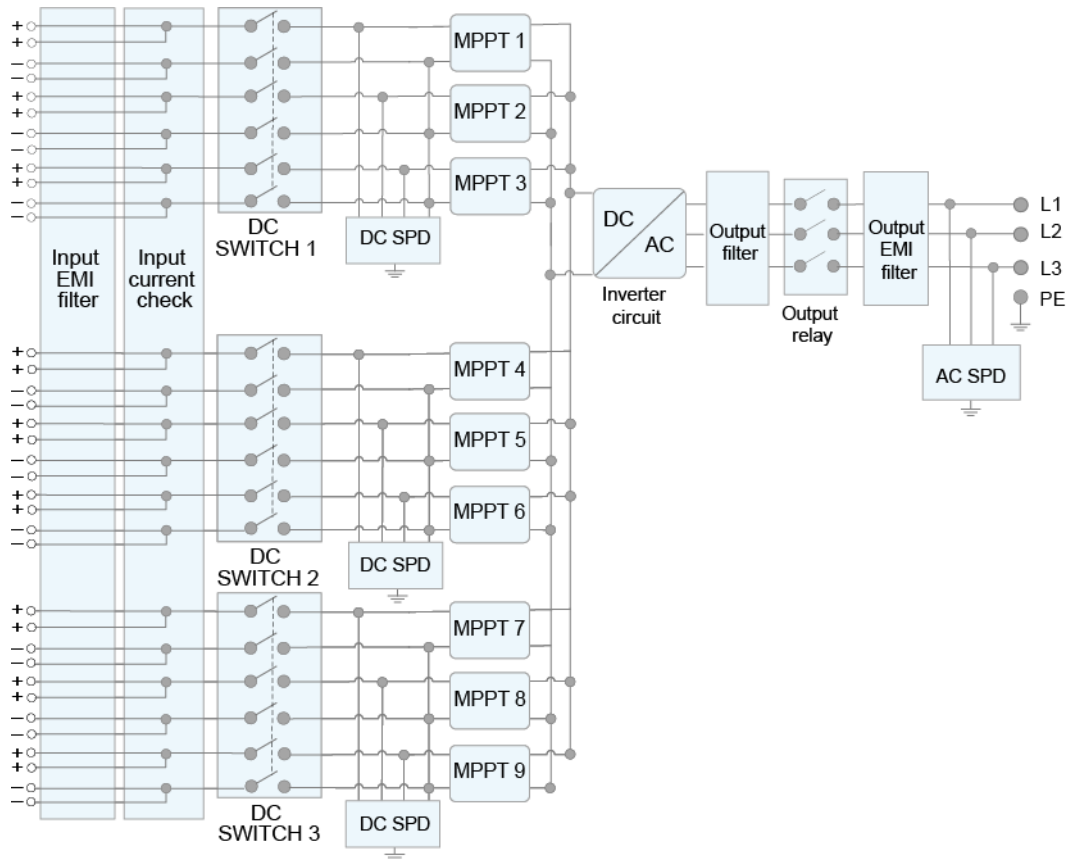
IS06P00001

2.4.2 Working Modes

The SUN2000 can work in Standby, Operating, or Shutdown mode.

Figure 2-7 Working modes
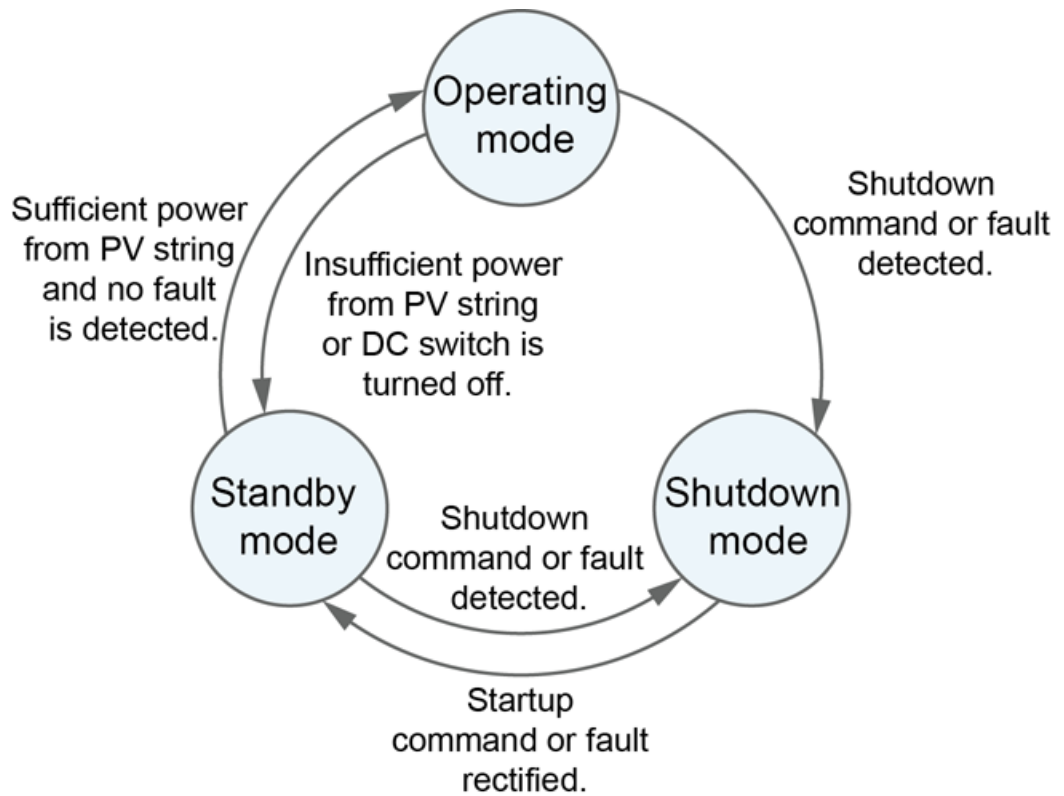
IS07S00001

Table 2-3 Working mode description

Working Mode	Description
Standby	The SUN2000 enters Standby mode when the external environment does not meet the operating requirements. In Standby mode: - The SUN2000 continuously performs status check and enters the Operating mode once the operating requirements are met. - The SUN2000 enters Shutdown mode after detecting a shutdown command or a fault after startup.
Operating	In Operating mode: - The SUN2000 converts DC power from PV strings into AC power and feeds the power to the power grid. - The SUN2000 tracks the maximum power point to maximize the PV string output. - If the SUN2000 detects a fault or a shutdown command, it enters the Shutdown mode. - The SUN2000 enters Standby mode after detecting that the PV string output power is not suitable for connecting to the power grid for generating power.

Working Mode	Description
Shutdown	• In Standby or Operating mode, the SUN2000 enters Shutdown mode after detecting a fault or shutdown command. • In Shutdown mode, the SUN2000 enters Standby mode after detecting a startup command or that the fault is rectified.

3 Inverter Storage

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

- Put the inverter in the original package. Keep the desiccant and seal it using the adhesive tape.
- Proper storage temperature and humidity are required.
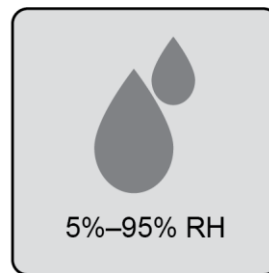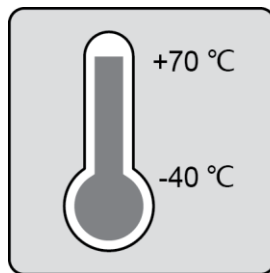
- The inverter should be stored in a clean and dry place and be protected from dust and water vapor corrosion.
- A maximum of four inverters can be stacked.
- Regular inspection is required during the storage. Replace the packing materials as necessary.
- If the inverter has been stored for a long time, inspections and tests should be conducted by qualified personnel before it is put into use.

4 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.

Figure 4-1 Position of the inverter model label
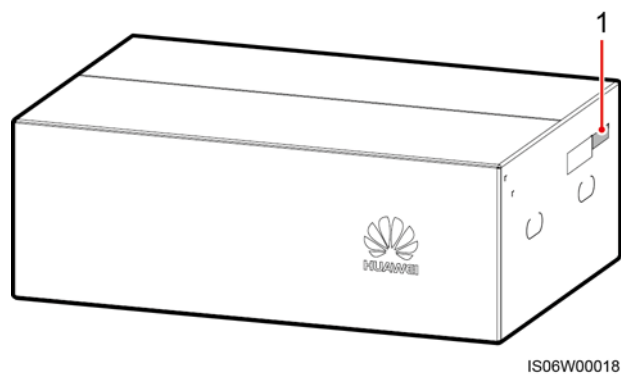
(1) Position of the model label

☐ NOTE

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

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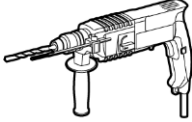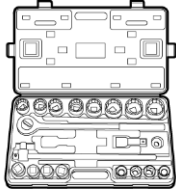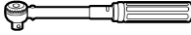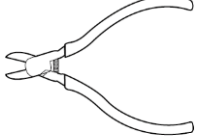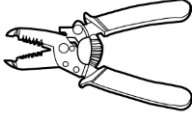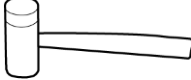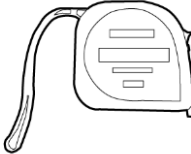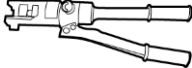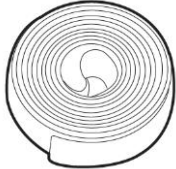
After unpacking the inverter, check that the contents are intact and complete. If any damage is found or any component is missing, contact your supplier.
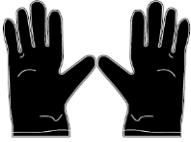
☐ NOTE

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

4.2 Preparing Tools

Type	Tool			
Installation tools	Hammer drill Drill bit: Φ14 mm and Φ16 mm	Socket wrench set	Torque wrench	Diagonal pliers
	Wire stripper	Flat-head screwdriver Head: 0.6 mm x 3.5 mm	Rubber mallet	Utility knife
	Cable cutter	Crimping tool Model: 32.6020-22100-HZ; manufacturer: Staubli	Removal wrench Model: 13001462; manufacturer: Staubli	Vacuum cleaner
	Multimeter DC voltage measurement range ≥ 1500 V DC	Marker	Measuring tape	Bubble or digital level
	Hydraulic pliers	Heat shrink tubing	Heat gun	Binding strap

Type	Tool			
Personal protective equipment (PPE)	Safety gloves	Safety goggles	Anti-dust respirator	Safety boots

4.3 Determining the Installation Position

4.3.1 Environment Requirements

Basic Requirements

- The inverter 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 sinks, 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).
- Install the inverter in a well-ventilated environment for heat dissipation
- You are advised to install the inverter in a sheltered place or install an awning over it.
- The SUN2000 should be physically separated from third-party wireless communication facilities and residential environments by distance greater than 30 m.

Figure 4-2 Installation environment

IS06H00105
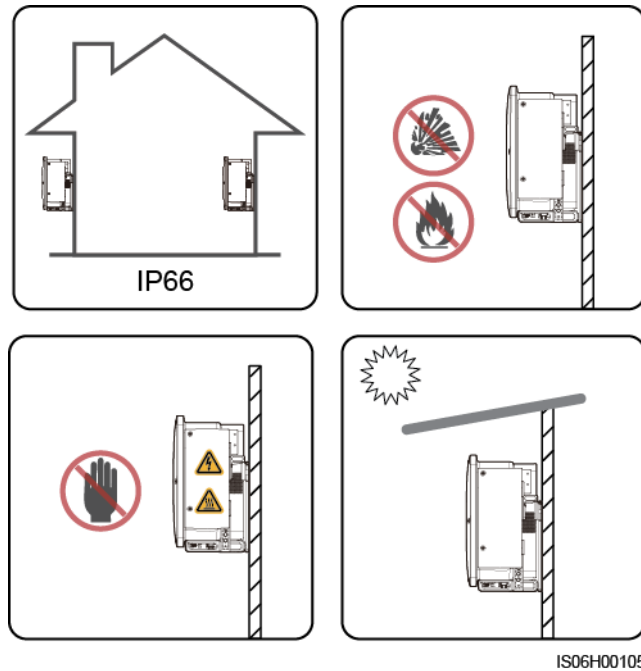
Mounting Structure Requirements

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

Figure 4-3 Mounting structure

84±1 kg

IS06H00104
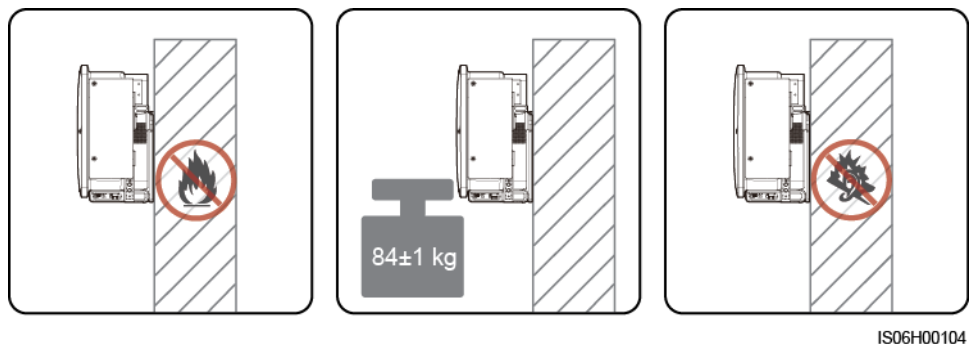
4.3.2 Space Requirements

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

Figure 4-4 Installation space
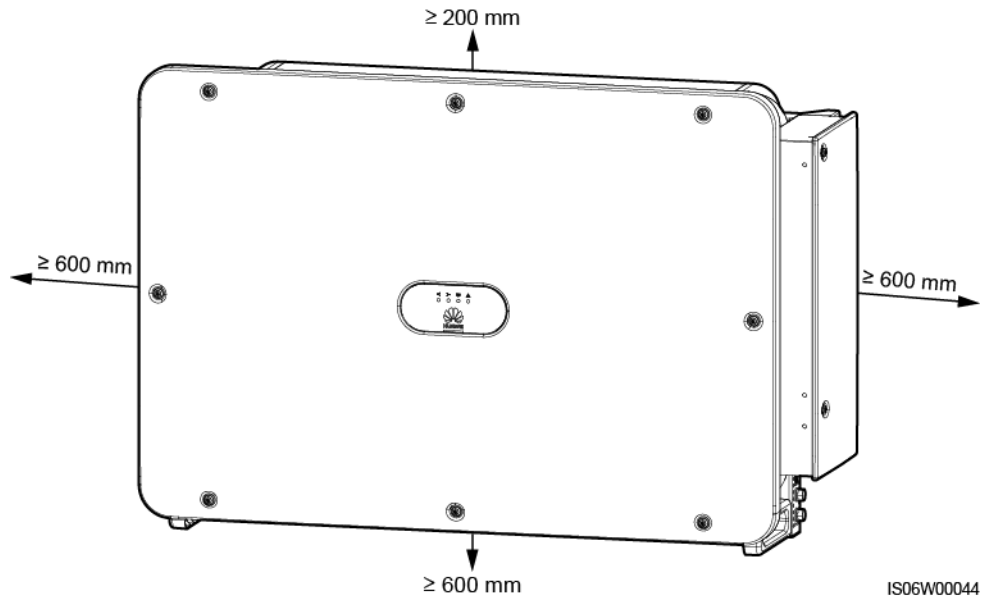
NOTE

For ease of installing the inverter on the mounting bracket, connecting cables to the bottom of the inverter, and maintaining the inverter in future, it is recommended that the bottom clearance be between 600 mm and 730 mm. If you have any question about the clearance, consult the local technical support engineers.

Figure 4-5 Installation angle
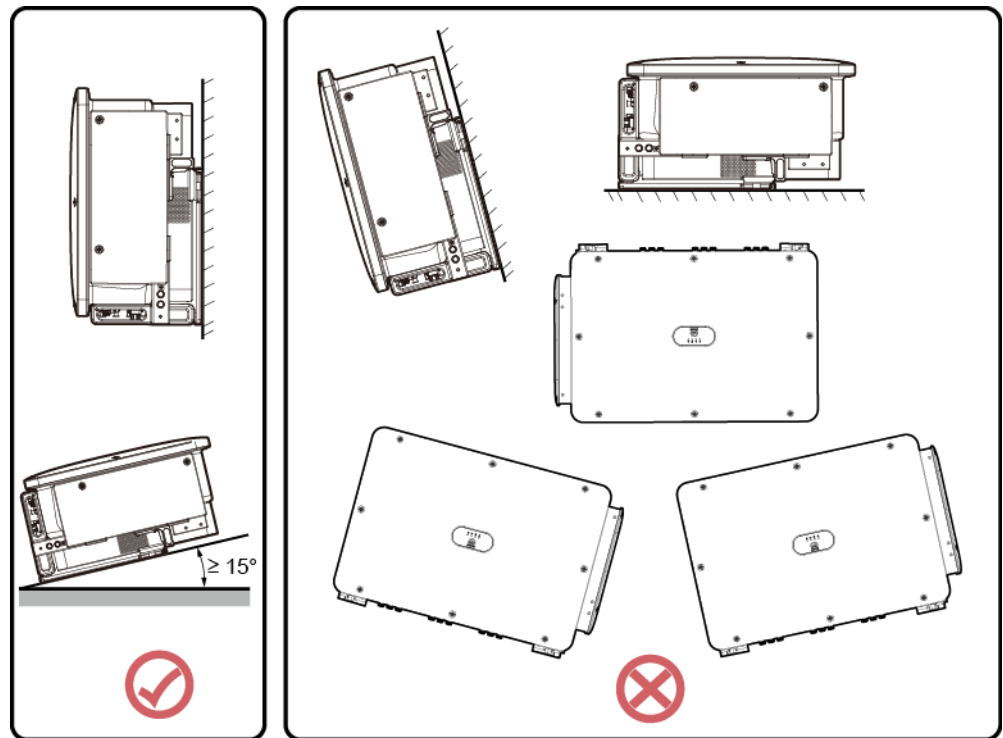
- When installing multiple inverters, install them in horizontal mode if sufficient space is available and install them in triangle mode if no sufficient space is available. Stacked installation is not recommended.

Figure 4-6 Horizontal installation mode (recommended)
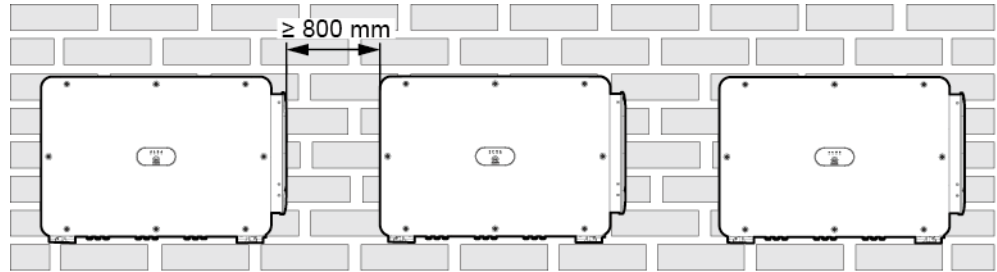
Figure 4-7 Triangle installation mode (recommended)
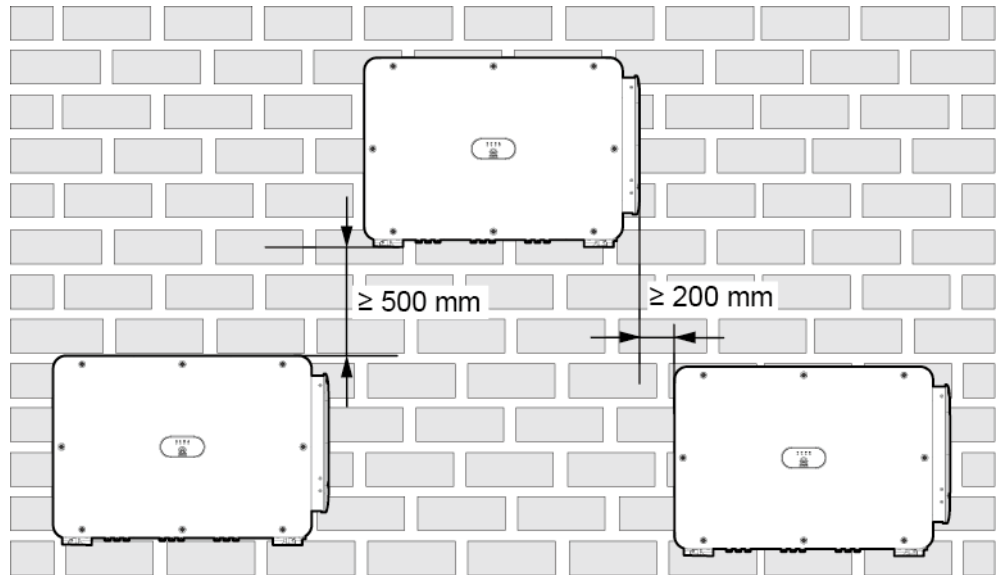
Figure 4-8 Stacked installation mode (not recommended)
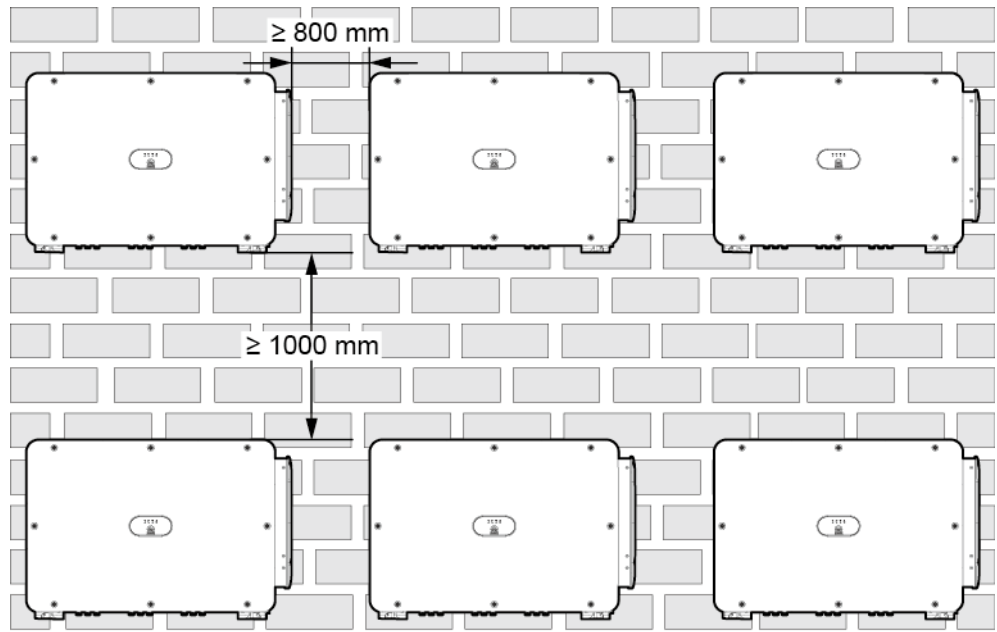
4.4 Installing the Mounting Bracket

Installation Precautions

shows the inverter mounting bracket dimensions.

Figure 4-9 Mounting bracket dimensions
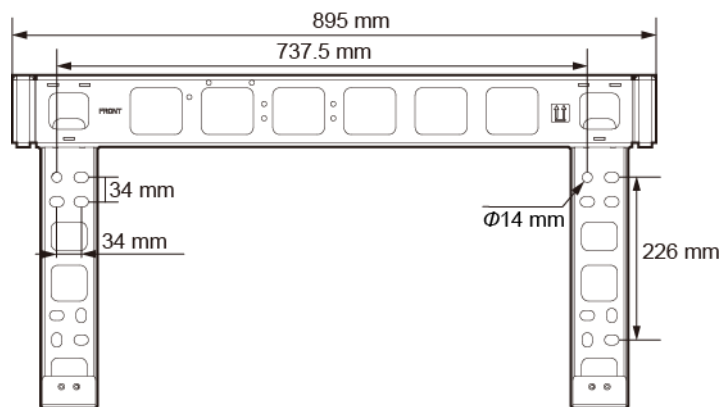
◻ **NOTE**

The inverter mounting bracket has four groups of tapped holes, each group containing four tapped holes. Mark any hole in each group based on site requirements and mark four holes in total. The two round holes are recommended.

Before installing the mounting bracket, remove the security torx wrench from the mounting bracket and set it aside.

Figure 4-10 Removing a security torx wrench
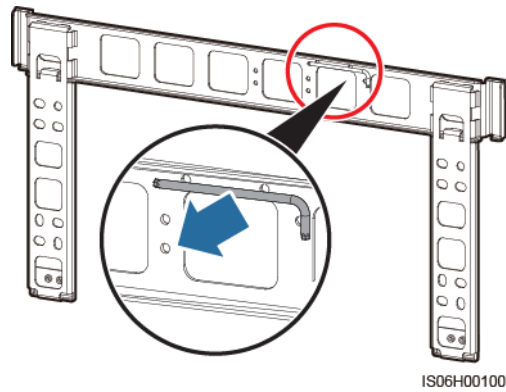
4.4.1 Support-mounted Installation

Support-mounted Installation

Step 1 Install the mounting bracket.

Figure 4-11 Installing the mounting bracket
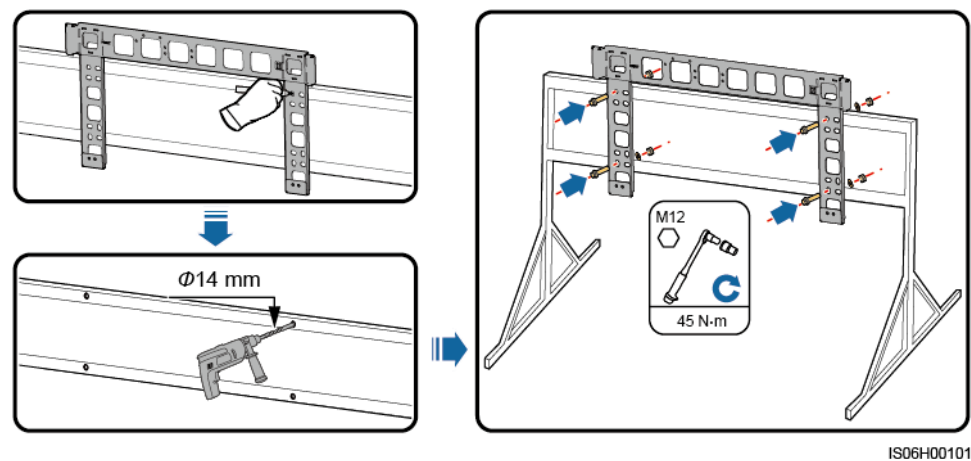
----End

4.4.2 Wall-mounted Installation

Wall-mounted Installation

Step 1 Install the mounting bracket.

⚠ WARNING

Avoid drilling holes in the water pipes and power cables buried in the wall.

NOTICE

- To prevent dust inhalation or contact with eyes, wear safety goggles and an anti-dust respirator when drilling holes.
- Clean up any dust in and around the holes using a vacuum cleaner and measure the distance between holes. If the holes are inaccurately positioned, drill a new set of holes.
- Level the head of the expansion sleeve with the concrete wall after removing the bolt, spring washer, and flat washer. Otherwise, the mounting bracket will not be securely installed on the wall.

Figure 4-12 Securing the mounting bracket
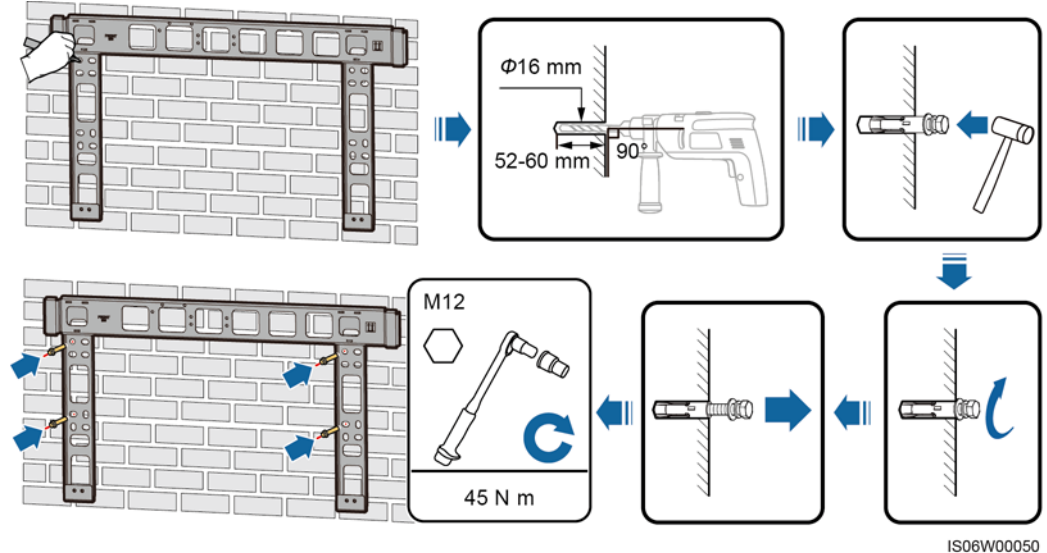
----**End**

4.5 Installing the Inverter

Preparing for the Installation

Before installing the inverter, take it out from the packing case and move it to the installation position.

📖 NOTE

Handles are packed in a fitting bag and are not delivered with the inverter.

Figure 4-13 Taking out and moving the inverter

IS06H00103
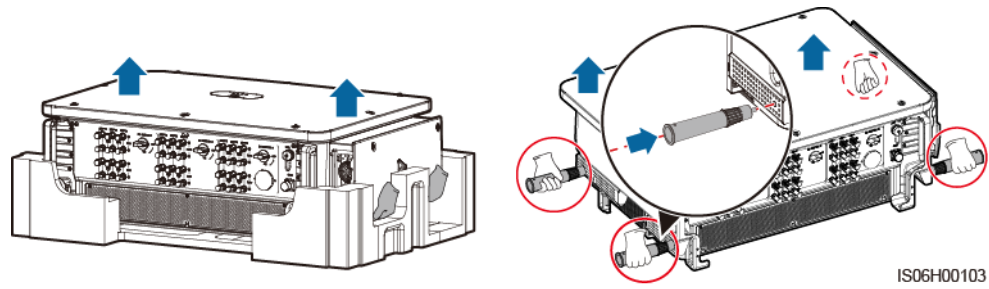
> **NOTICE**
>
> - Move the inverter with the help of other three persons or using an appropriate transportation tool.
> - Do not place the inverter with its wiring terminals at the bottom contacting the floor or any other objects because the terminals are not designed to bear the weight of the inverter.
> - When you need to temporally place the inverter on the ground, use foam, paper, or other protection material to prevent damage to its cover.
> - Do not lift or hoist the inverter using the bottom holes of the handles to prevent the handles from cracking.

Figure 4-14 Lifting positions

IS06H00117
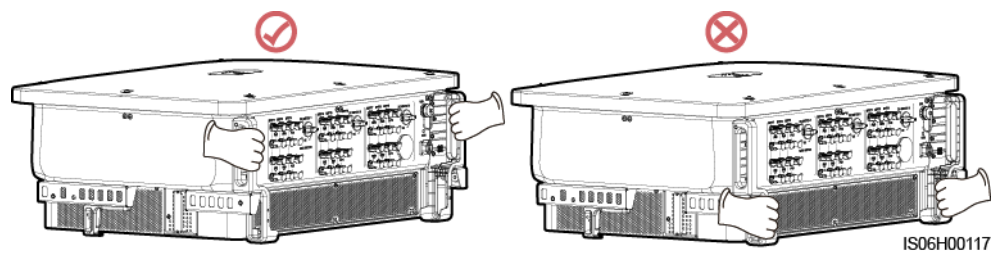
Installing the Inverter

Step 1 Mount the inverter on the mounting bracket.

Step 2 Tighten the two screws at the bottom of the inverter.

Figure 4-15 Installation
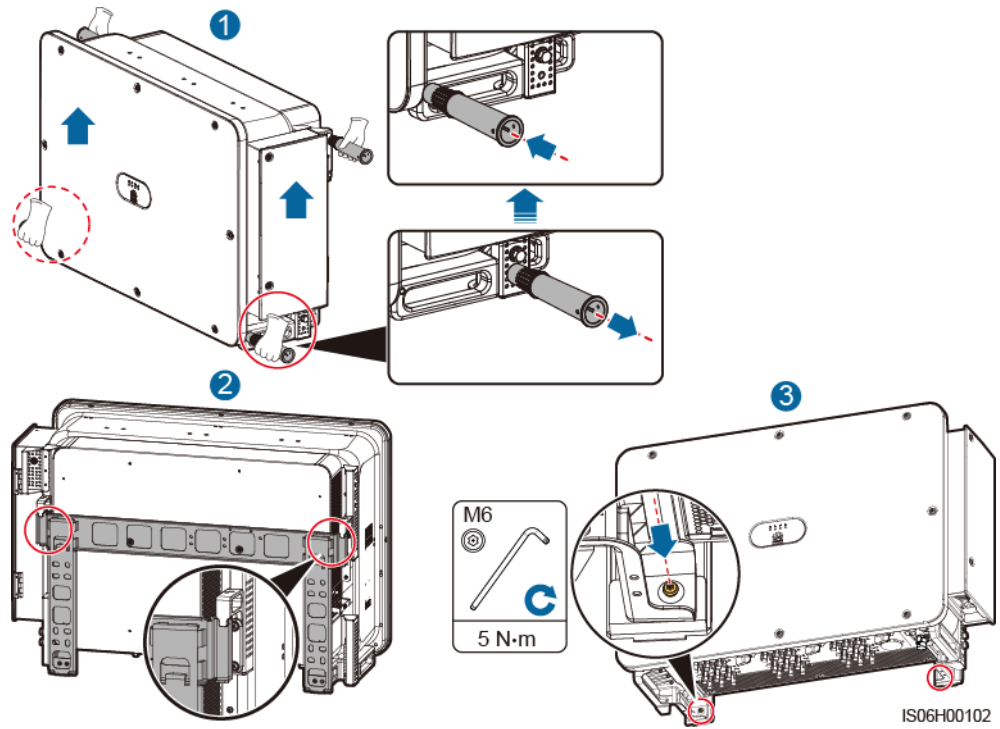
----End

Supplementary Notes

If the inverter is installed in a high position, you can hoist it.

Figure 4-16 Hoisting the inverter

IS06W00052
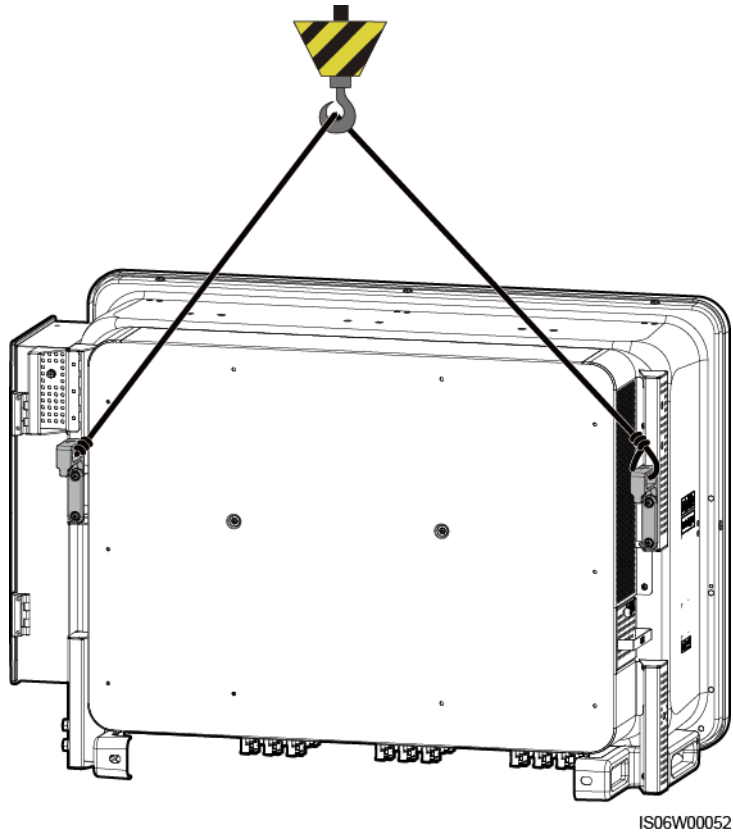
5 Electrical Connections

5.1 Precautions

> **⚠ DANGER**
>
> Before connecting cables, ensure that all DC switches on the inverter are OFF. Otherwise, the high voltage of the inverter may result in electric shocks.

> **⚠ WARNING**
>
> - The device damage caused by incorrect cable connections is beyond the warranty scope.
> - Only qualified technicians can perform operations about electrical connection.
> - Wear proper PPE at all time when connecting cables.

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

5.2 Crimping an OT or DT Terminal

Requirements for the OT or DT Terminal

- If a copper cable is used, use a copper wiring terminal.
- If a copper-clad aluminum cable is used, use copper wiring terminals.
- If an aluminum alloy cable is used, use copper to aluminum adapter wiring terminals, or aluminum wiring terminals along with copper.

Crimping an OT or DT Terminal

NOTICE

- Pay attention not to scratch the core wire when stripping a cable.
- The cavity formed after the conductor crimp strip of the OT or DT terminal is crimped must wrap the core wires completely. The core wires must contact the OT or DT terminal closely.
- Wrap the wire crimping area with a heat shrink tubing or PVC insulation tape. The heat shrink tubing is used as an example.
- When using a heat gun, protect devices from being scorched.

Figure 5-1 Crimping an OT terminal
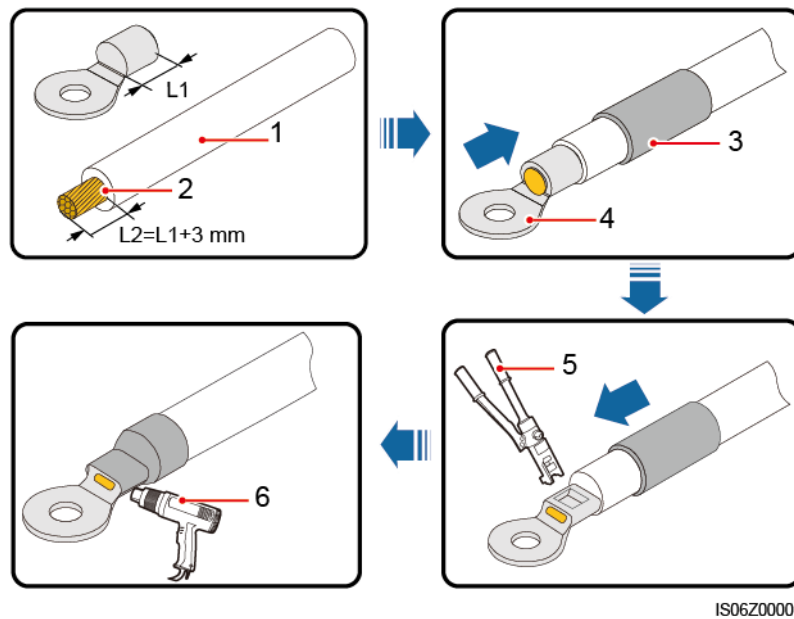
(1) Cable	(2) Core	(3) Heat shrink tubing
(4) OT terminal	(5) Hydraulic pliers	(6) Heat gun

Figure 5-2 Crimping a DT terminal
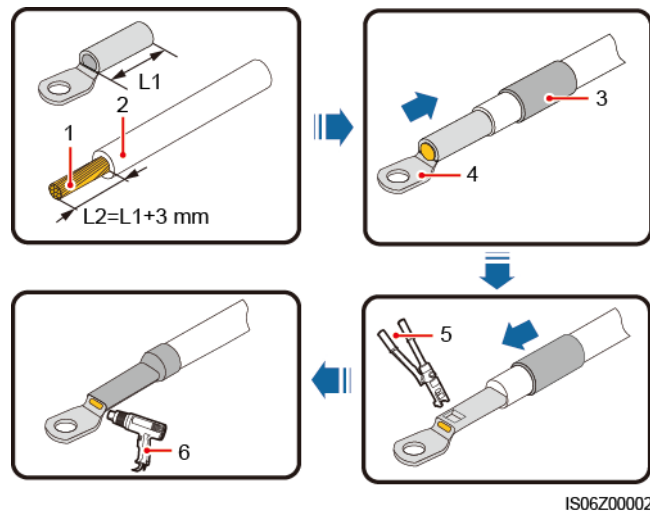
(1) Cable	(2) Core	(3) Heat shrink tubing
(4) DT terminal	(5) Hydraulic pliers	(6) Heat gun

5.3 Opening the Maintenance Compartment Door

Precautions

NOTICE

- Do not open the host panel cover of the inverter.
- Before opening the maintenance compartment door, ensure that no electrical connections are made for the inverter on the AC or DC side.
- If you need to open the maintenance compartment door in rainy or snowy days, take protective measures to prevent rain or snow entering the maintenance compartment. If unavoidable, do not open the maintenance compartment door.
- Do not leave unused screws in the maintenance compartment.

Procedure

Step 1 Partially loosen the two screws on the maintenance compartment door.

Step 2 Open the maintenance compartment door and install a support bar.

Figure 5-3 Opening the maintenance compartment door

IS06I20040
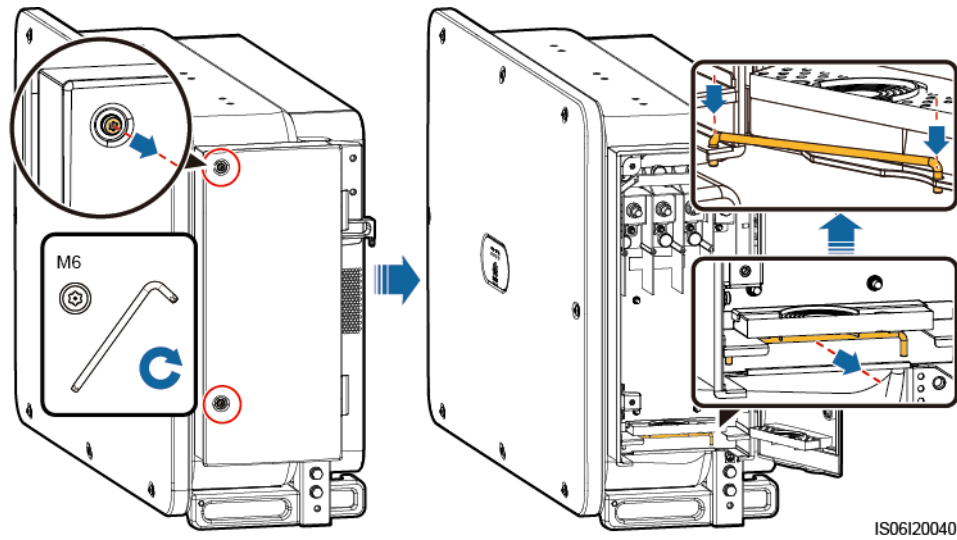
Step 3 Remove the crimping modules and three-hole rubber plug that are bound in the maintenance compartment for future use.

Figure 5-4 Removing the accessories from the maintenance compartment

IS06W00063
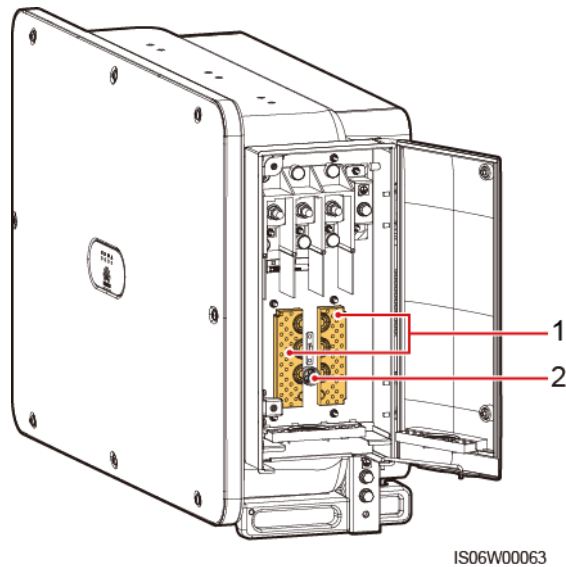
(1) Crimping modules   (2) Three-hole rubber plug

----End

5.4 (Optional) Replacing the Crimping Module

Procedure

📖 **NOTE**

If the AC output power cable has a single core, replace the crimping module.

Step 1 Replace the crimping module.

Figure 5-5 Replacing the crimping module
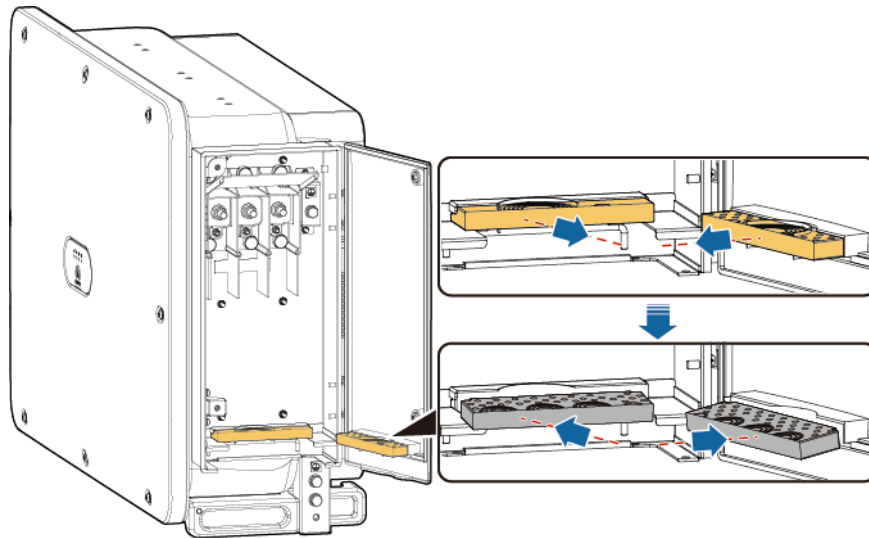
IS06I20047

----End

5.5 (Optional) Installing the Power Cable of the Tracking System

Precautions

NOTICE

- A switch-disconnector-fuse or fuse-switch-disconnector with a voltage of no less than 800 V, current of 16 A, and protection type of gM needs to be installed between the inverter and the tracker controller for protection.
- The cable between the wiring terminal on the power cable and the switch-disconnector-fuse or fuse-switch-disconnector should be less than or equal to 2.5 m.

Cable Specifications

Recommended: dual-layer three-core outdoor copper cable with a conductor cross-sectional area of 10 mm^2

Procedure

Step 1 Connect the power cable of the tracking system to the terminal block.

Figure 5-6 Cable connection
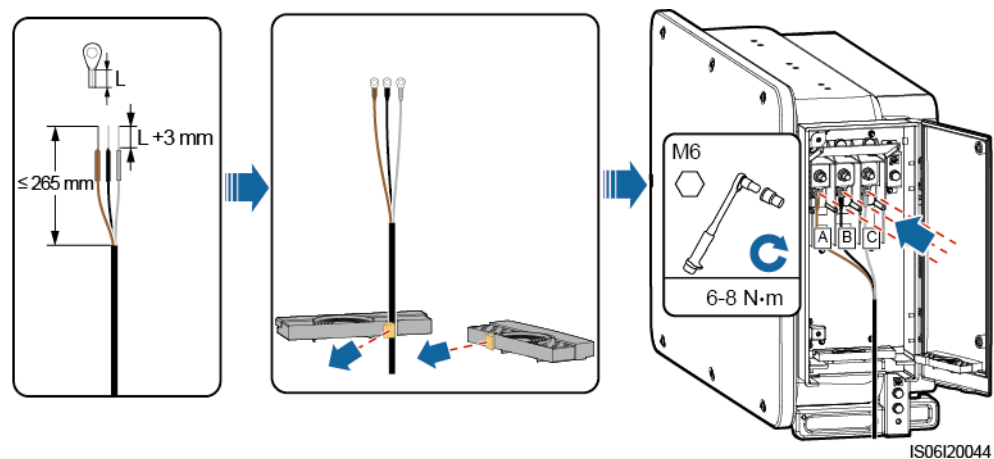
----End

5.6 Connecting the AC Output Power Cable

Precautions

A three-phase AC switch should be installed on the AC side of the inverter. To ensure that the inverter can safely disconnect itself from the power grid when an exception occurs, select a proper overcurrent protection device in compliance with local power distribution regulations.

⚠ **WARNING**

Do not connect loads between the inverter and the AC switch.

The inverter is integrated with a comprehensive residual current detection unit to distinguish fault current from residual current. Upon detecting that the residual current exceeds the threshold, the inverter immediately disconnects from the power grid.

Cable Connection Precautions

- The ground point on the enclosure is preferred to connect to the PE cable for the inverter.
- The PE point in the maintenance compartment is used for connecting to the PE cable included in the multi-core AC power cable.
- There are two ground points on the chassis shell and you only need either of them.
- It is recommended that the PE cable of the inverter be connected to a nearby ground point. For a system with multiple inverters connected in parallel, connect the ground points of all inverters to ensure equipotential connections to ground cables.

Cable Specifications

- If you connect a ground cable to the ground point on the chassis shell, you are advised to use a three-core (L1, L2, and L3) outdoor cable or three single-core outdoor cables.
- If you connect a ground cable to the ground point in the maintenance compartment, you are advised to use a four-core (L1, L2, L3, and PE) outdoor cable.
- You need to prepare the OT or DT terminal that matches the cable.

Table 5-1 AC power cable specifications

Cable Type	Conductor Cross-Sectional Area	Cable Outer Diameter
Copper-core cable	50–185 mm^2	- Multi-core cable: 24–66 mm - Single-core cable: 14–35 mm
Copper-clad aluminum cable and aluminum alloy cable	- Multi-core cable: 70–185 mm^2 - Single-core cable: 70–240 mm^2	

Table 5-2 PE cable specifications

Conductor Cross-Sectional Area S of the AC Power Cable (Unit: mm²)	Conductor Cross-Sectional Area S_P of the PE Cable (Unit: mm²)
S > 35	$S_P \geq S/2$
The specifications are valid only if the conductors of the PE cable and AC power cable use the same material. If the materials are different, ensure that the conductor cross-sectional area of the PE cable produces a conductance equivalent to that of the cable specified in this table.	

Connecting the PE Cable

Step 1 Secure the PE cable using the ground screw.

Figure 5-7 Cable connection
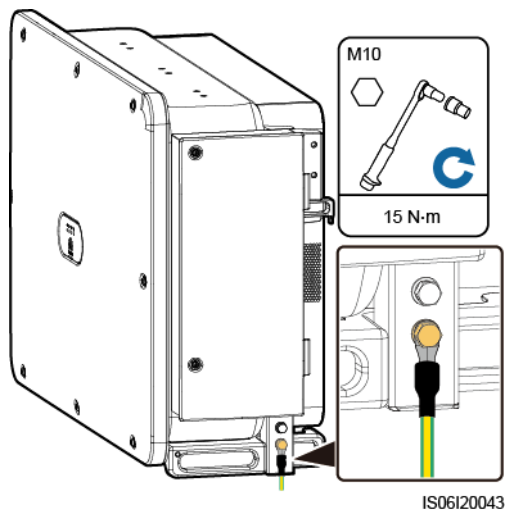
IS06I20043

Step 2 (Optional) Apply silica gel or paint on the ground terminal to protect it against corrosion.

----End

Connecting the AC Output Power Cable (Multi-core)

Step 1 Connect the AC cable to the terminal block.

Figure 5-8 Cable connection

----End
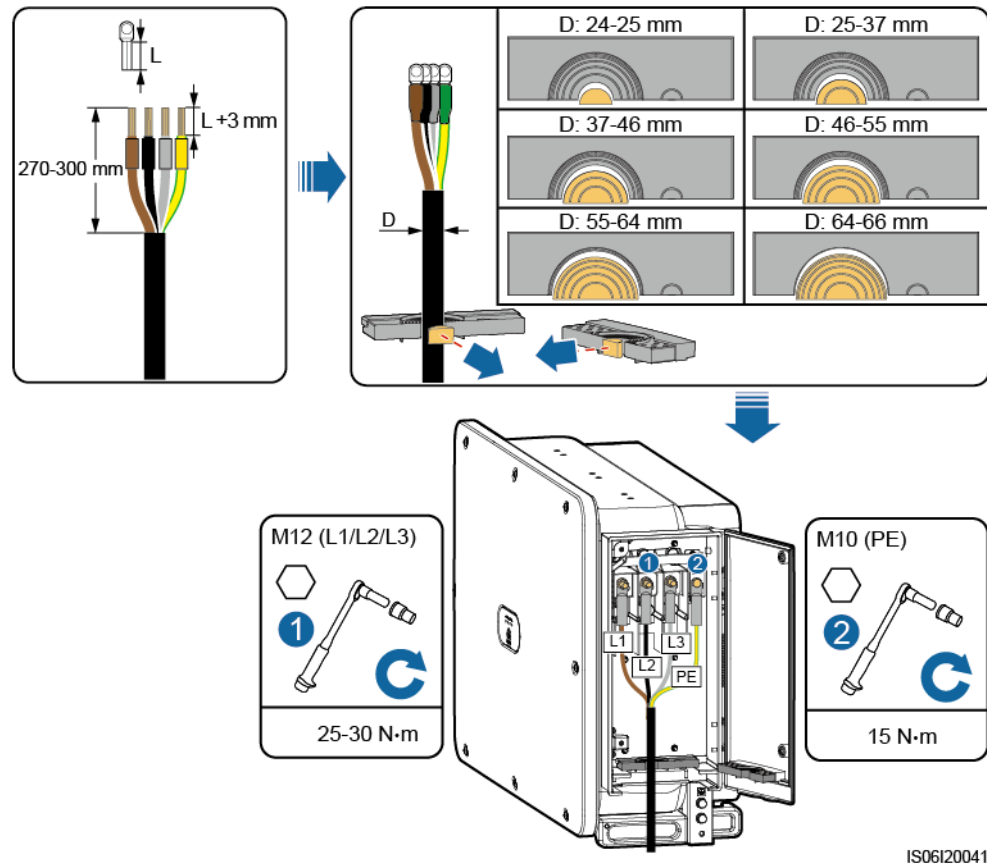
Connecting the AC Output Power Cable (Single-core)

Step 1 Connect the AC cable to the terminal block.

Figure 5-9 Cable connection

IS06I20046
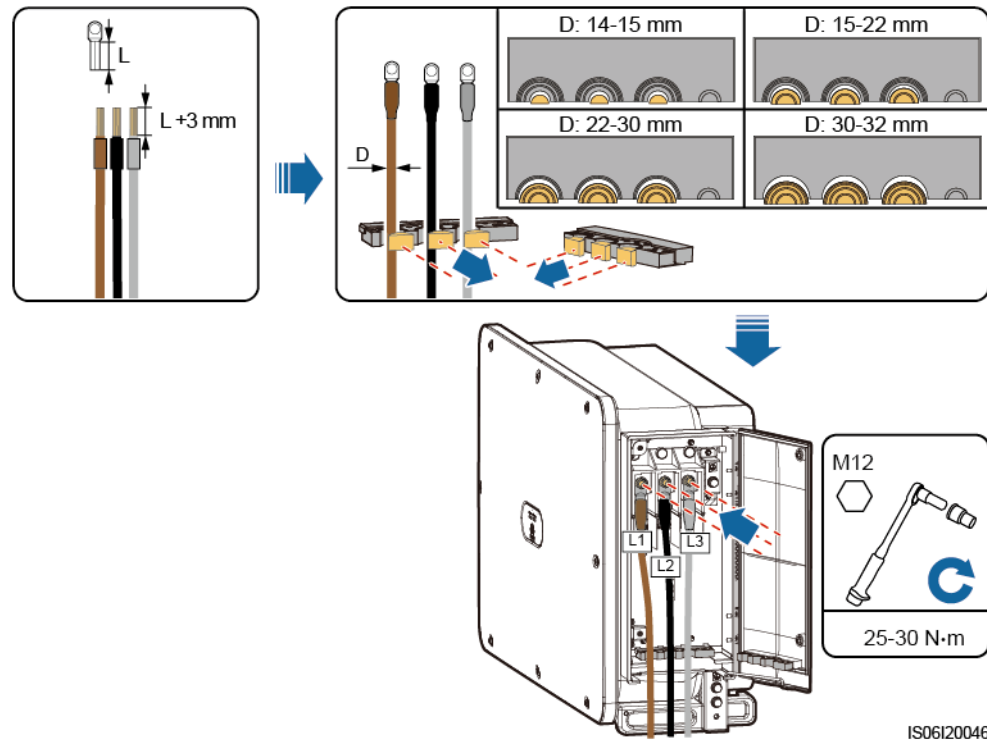
----**End**

5.7 Installing the DC Input Power Cable

Precautions

⚠ **DANGER**

● Before connecting the DC input power cable, ensure that the DC voltage is within the safe range (lower than 60 V DC) and that the three DC switches on the inverter are set to OFF. Failure to do so may result in electric shocks.

● When the inverter operates in grid-tied mode, do not perform maintenance or operations on the DC circuit, such as connecting or disconnecting a PV string or a PV module in the PV string. Failure to do so may cause electric shocks or arcing, which may also cause fire.

⚠ **WARNING**

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

- The open-circuit voltage of each PV string must always be 1500 V DC or lower.
- The polarities of electric connections are correct on the DC input side. The positive and negative terminals of a PV module connect to corresponding positive and negative DC input terminals of the inverter.

NOTICE

- Ensure that the PV module output is well insulated to ground.
- The PV strings connecting to the same MPPT circuit should contain the same number of identical PV modules.
- 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.

Terminal Description

The inverter provides 18 DC input terminals, which are controlled by its three DC switches. DC SWITCH 1 controls DC input terminals 1–6, DC SWITCH 2 controls DC input terminals 7–12, and DC SWITCH 3 controls DC input terminals 13–18.

Figure 5-10 DC terminals
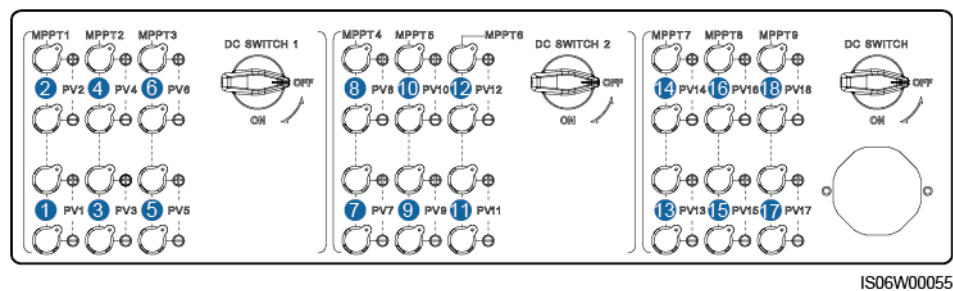
Requirements for selecting DC input terminals:

1. Evenly distribute the DC input power cables on the DC input terminals controlled by the three DC switches.
2. Maximize the number of connected MPPT circuits.
3. When the DC input is not fully configured, give preference to even-numbered DC input terminals.

Wiring Description of Y-branch Connectors

NOTICE

● When connecting cables using Y-branch connectors, ensure that all connectors are of the same model provided by the same vendor.

● If connectors of different vendors are connected to each other or different types of connectors of the same vendor are connected to each other without permission, the contact resistance of the connectors will exceed the allowed value. As a result, the connectors will be heated and oxidized continuously, which is prone to faults.

Wiring rules:

1. A maximum of one set of Y-branch connectors can be used for each MPPT.

2. The PV+ on the inverter side must be connected to the PV+ on the PV string side, and the PV– on the inverter side must be connected to the PV– on the string side.

Figure 5-11 Wiring diagram (with Y-branch connectors connected to the inverter)
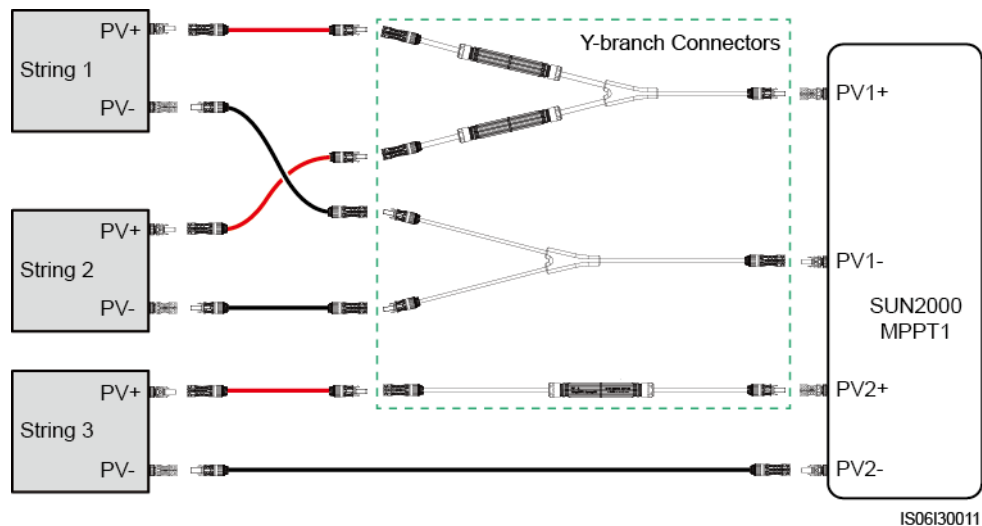
Figure 5-12 Wiring diagram (with Y-branch connectors connected to the PV modules)
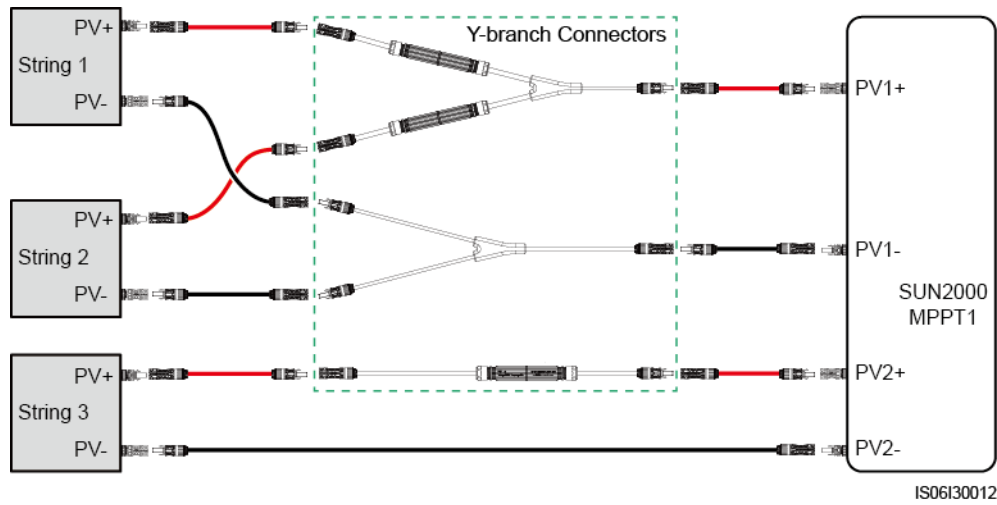
Cable Specifications

Cable Type	Conductor Cross-sectional Area (Unit: mm²)	Cable Outer Diameter (Unit: mm)
PV cable that meets the 1500 V standard	4–6	4.7–6.4

NOTICE

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

Procedure

NOTICE

Use the MC4 EVO2 PV connectors delivered with the inverter. If the PV connectors are lost or damaged, purchase the connectors of the same model. The device damage caused by incompatible PV connectors is beyond the warranty scope.

Step 1 Install the DC input power cable.

> **NOTICE**
>
> - The DC voltage measurement range of the multimeter must be at least 1500 V.
> - If the voltage is a negative value, the DC input polarity is incorrect and needs correction.
> - If the voltage is greater than 1500 V, too many PV modules configured to the same string. Remove some PV modules.

Figure 5-13 Cable connection
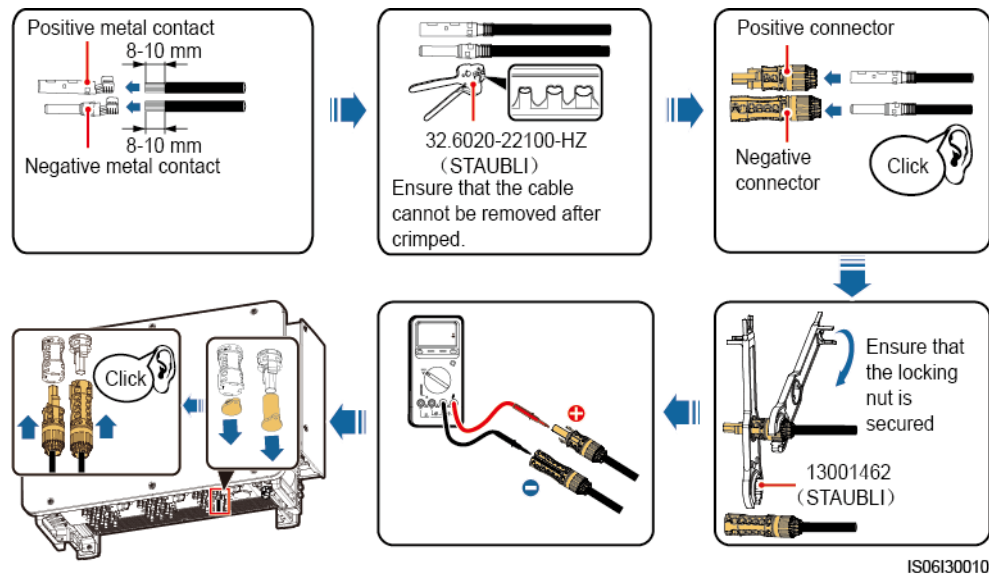
----**End**

5.8 Installing the Communications Cable

Precautions

1. The RS485 and MBUS communication modes are mutually exclusive.
2. When routing communications cables, separate communications cables from power cables to prevent communication from being affected.

Pin Definitions of Communications Ports

Figure 5-14 Communications ports

IS05W00024
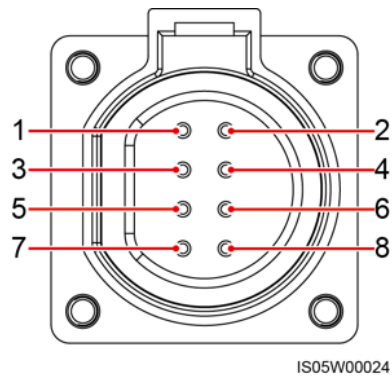
Port	Pin	Definition	Pin	Definition	Description
RS485-1	1	RS485A IN, RS485 differential signal+	2	RS485A OUT, RS485 differential signal+	Used for cascading inverters or connecting to devices such as the SmartLogger.
	3	RS485B IN, RS485 differential signal–	4	RS485B OUT, RS485 differential signal–	
PE	5	PE, shielding ground	6	PE, shielding ground	-
RS485-2	7	RS485A, RS485 differential signal+	8	RS485B, RS485 differential signal–	Used for connecting to RS485 slave devices.

Procedure

Step 1 Install the communications cable.

Figure 5-15 Cable connection

IS06I20047
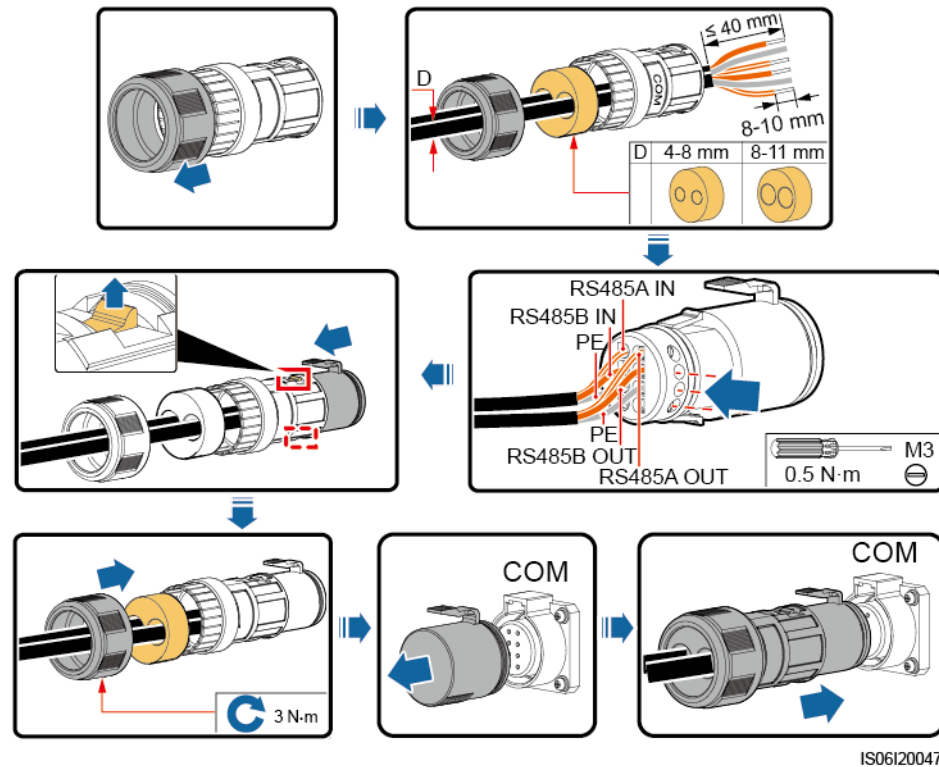
📖 **NOTE**

If three communications cables are to be connected, use the three-hole rubber plug that is bound in the maintenance compartment.

----End

5.9 Closing the Maintenance Compartment Door

Procedure

Step 1   Adjust the support bar, close the maintenance compartment door and tighten the two screws on the door.

Figure 5-16 Closing the door
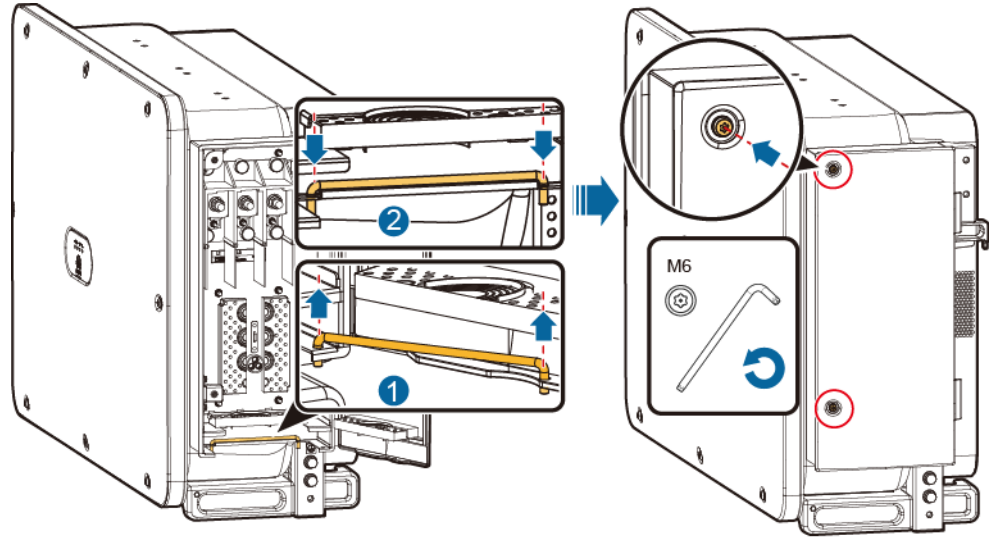
IS06I20048

----**End**

6 System Commissioning

6.1 Check Before Power-on

1. The inverter is installed correctly and securely.
2. Check that the DC switches and downstream AC output switch are OFF.
3. Check that all ground cables are connected securely and reliably.
4. All AC output power cables are connected correctly and securely, without open circuits or short circuits.
5. All DC input power cables are connected correctly and securely, without open circuits or short circuits.
6. The communications cable is connected correctly and securely.
7. Check that the maintenance compartment interior is clean and tidy, without foreign matter.
8. The maintenance compartment door is closed and the door screws are tightened.
9. Idle DC input terminals are sealed.
10. Idle USB ports are plugged with waterproof plugs.

6.2 System Power-On

Precautions

NOTICE

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

Procedure

Step 1 Turn on the AC switch between the inverter and the grid.

NOTICE

If you perform Step 2 before Step 1, the inverter reports a fault about abnormal shutdown. The inverter can start normally after the fault is automatically cleared.

Step 2 Turn the DC switches at the bottom of the inverter to ON.

Step 3 Connect a mobile phone that runs the SUN2000 app to the inverter using a Bluetooth module, a WLAN module, or a USB data cable.

Figure 6-1 Connection mode
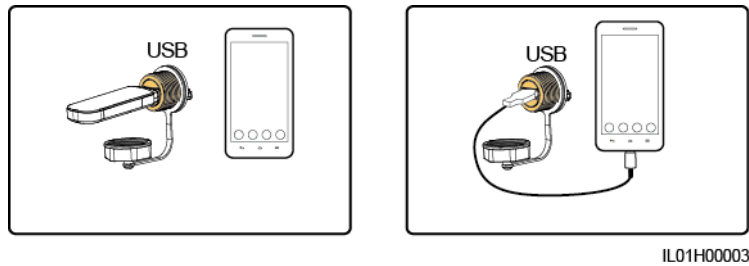
□ NOTE

- Purchase a Bluetooth module or a WLAN module bundled with the inverter. A Bluetooth module or a WLAN module purchased from any other source may not support communication between the inverter and the SUN2000 app.

- Use the USB data cable delivered with the mobile phone. The port type is USB 2.0.

Figure 6-2 Login screen
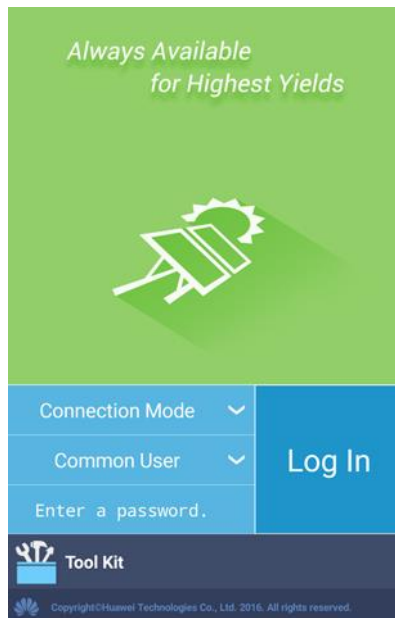
Figure 6-3 Selecting a connection method
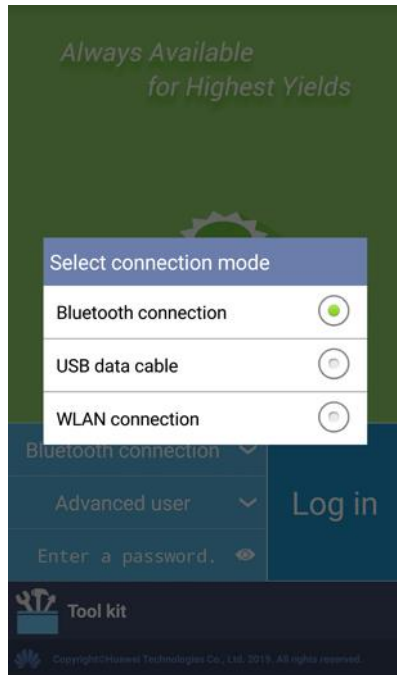
Step 4 Tap the user name area to switch among **Common User**, **Advanced User**, and **Special User**.

Figure 6-4 Switching the user
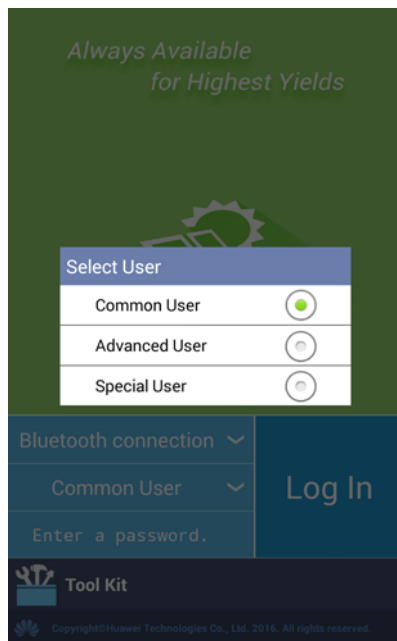
📖 **NOTE**

- The login password is for the inverter that connects to the SUN2000 app and is used only when the inverter connects to the app.

- When the WLAN connection is used, the initial name of the WLAN hotspot is **Adapter-WLAN module SN**, and the initial password is **Changeme**.

- The initial passwords for **Common User**, **Advanced User**, and **Special User** are all **00000a**.

- Use the initial password upon first power-on and change it immediately after 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.

- During the login, if five consecutive invalid password entries are made (the interval between two consecutive entries is less than 2 minutes), the account will be locked for 10 minutes. The password should consist of six digits.

Step 5 Enter the password and tap **Log In**.

Step 6 After successful login, the quick settings screen or main menu screen is displayed.

▣ NOTE

- If you log in to the SUN2000 app after the device connects to the app for the first time or factory defaults are restored, the quick settings screen will be displayed, on which you can set basic parameters. After the settings take effect, you can enter the main menu screen and modify the parameters on the **Settings** screen. If the AC switch between the inverter and the power grid is turned on but the three DC switches on the inverter are not in the ON position, **Grid code** is not displayed on the quick settings screen.

- You are advised to log in to the quick settings screen as **Advanced User** for parameter settings.

- Set the correct grid code based on the application area and scenario of the inverter.

Figure 6-5 Quick settings (advanced user)
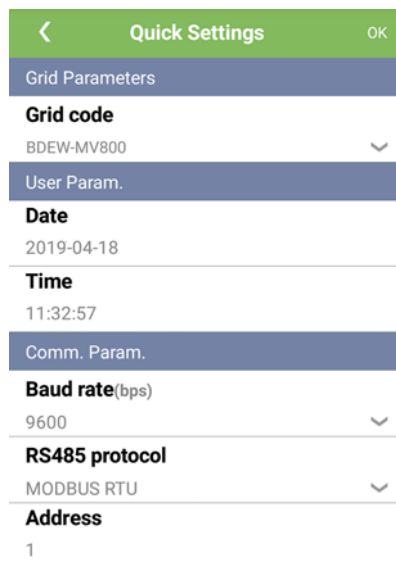
▣ NOTE

- Set the power grid code that applies to the country or region where the PV plant is located and the inverter model.

- Set user parameters based on the current date and time.

- Set **Baud rate**, **RS485 protocol**, and **Address** based on site requirements. **Baud rate** can be set to **4800**, **9600**, or **19200**. **RS485 protocol** can be set to **MODBUS RTU**, and **Address** can be set to any value in the range of 1 to 247.

- When multiple inverters communicate with the SmartLogger over RS485, **RS485 address** for all the inverters on each RS485 route must be within the address range set on the SmartLogger and cannot be duplicate. Otherwise, the communication will fail. In addition, **Baud rate** of all the inverters on each RS485 route must be consistent with the SmartLogger baud rate.

Figure 6-6 Function menu screen
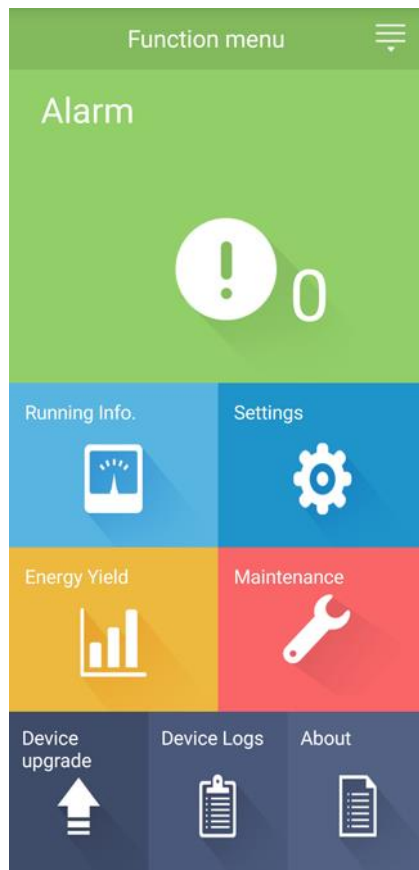
----End

7 Man-Machine Interactions

7.1 Operations with a USB Flash Drive

USB flash drives of SanDisk, Netac, and Kingston are recommended. Other brands may be incompatible.

7.1.1 Exporting Configurations

Procedure

Step 1 Choose **Inverter Command Settings** on the SUN2000 app to generate a boot script file for exporting configuration (boot script file for short).

Step 2 Import the boot script file to a PC.

(Optional) The boot script file can be opened as a .txt file.

Figure 7-1 Boot script file
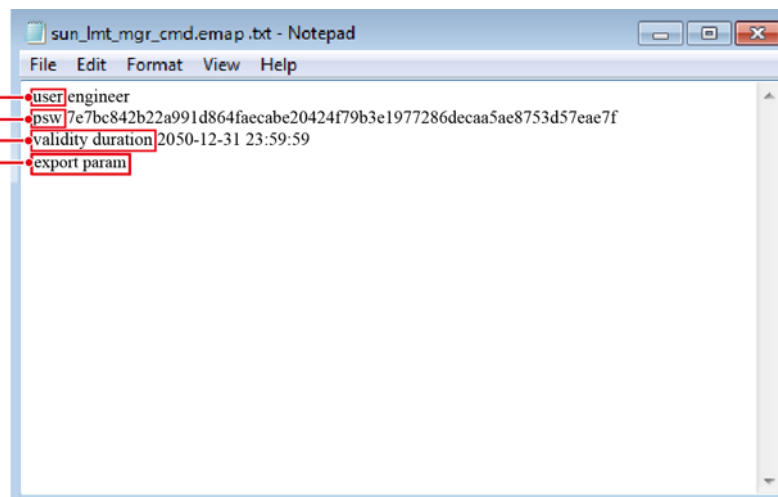
No.	Meaning	Remarks
1	User name	• Advanced user: engineer • Special user: admin
2	Ciphertext	The ciphertext varies depending on the login password of the SUN2000 app.
3	Script validity period	-
4	Command	Different command settings can produce different commands. • Configuration export command: export param. • Configuration import command: import param. • Data export command: export log. • Upgrade command: upgrade.

Step 3 Import the boot script file to the root directory of a USB flash drive.

Step 4 Connect the USB flash drive to the USB port. The system automatically identifies the USB flash drive and executes all commands specified in the boot script file. View the LED indicator to determine the operating status.

> **NOTICE**
>
> Verify that the ciphertext in the boot script file matches the login password of the SUN2000 app. If they do not match and you insert the USB flash drive for five consecutive times, the user account will be locked for 10 minutes.

Step 5 Insert the USB flash drive into a computer and check the exported data.

> **NOTE**
>
> When the configuration export is complete, the boot script file and exported file are in the root directory of the USB flash drive.

----End

7.1.2 Importing Configuration

Prerequisites

A complete configuration file has been exported.

Procedure

Step 1 Choose **Inverter Command Settings** on the SUN2000 app to generate a boot script file for importing configuration.

Step 2   Import boot script file for importing configuration to a PC.

Step 3   Replace the boot script file for exporting configuration in the root directory of the USB flash drive with the one for importing configuration.

> **NOTICE**
>
> Replace the boot script file only and keep the exported file.

Step 4   Connect the USB flash drive to the USB port. The system automatically identifies the USB flash drive and executes all commands specified in the boot script file. View the LED indicator to determine the operating status.

> **NOTICE**
>
> Verify that the ciphertext in the boot script file matches the login password of the SUN2000 app. If they do not match and you insert the USB flash drive for five consecutive times, the user account will be locked for 10 minutes.

----End

7.1.3 Exporting Data

Procedure

Step 1   Choose **Inverter Command Settings** on the SUN2000 app to generate a boot script file for exporting data.

Step 2   Import the boot script file to a PC.

Step 3   Import the boot script file to the root directory of a USB flash drive.

Step 4   Connect the USB flash drive to the USB port. The system automatically identifies the USB flash drive and executes all commands specified in the boot script file. View the LED indicator to determine the operating status.

> **NOTICE**
>
> Verify that the ciphertext in the boot script file matches the login password of the SUN2000 app. If they do not match and you insert the USB flash drive for five consecutive times, the user account will be locked for 10 minutes.

Step 5   Insert the USB flash drive into a PC and check the exported data.

> **NOTE**
>
> After the data is exported, the boot script file and exported data file are saved in the root directory of the USB flash drive.

----End

7.1.4 Upgrading

Procedure

Step 1 Obtain the software upgrade package from the technical support website.

Step 2 Decompress the upgrade package.

> **NOTICE**
>
> - When the login password of the SUN2000 app is the initial password (**00000a**), there is no need to perform Step 3-Step 5.
> - When the login password of the SUN2000 app is not the initial password, performStep 3-Step 7.

Step 3 Choose **Inverter Command Settings** on the SUN2000 app to generate a boot script file for upgrading.

Step 4 Import the boot script file to a PC.

Step 5 Replace the boot script file in the upgrade package (sun_lmt_mgr_cmd.emap) with the one generated by the SUN2000 app.

Step 6 Copy the extracted files to the root directory of the USB flash drive.

Step 7 Connect the USB flash drive to the USB port. The system automatically identifies the USB flash drive and executes all commands specified in the boot script file. View the LED indicator to determine the operating status.

> **NOTICE**
>
> Verify that the ciphertext in the boot script file matches the login password of the SUN2000 app. If they do not match and you insert the USB flash drive for five consecutive times, the user account will be locked for 10 minutes.

Step 8 (Optional) The system automatically restarts when the upgrade is completed. All LED indicators are off during the restart. After the restart, the preceding indicator is blinking green slowly for 1 minute until becoming steady on, which indicates that the upgrade is successful.

> **NOTE**
>
> The SUN2000 can also be locally upgraded through the **Device Upgrade** on the SUN2000 app. For details, see the *SUN2000 APP User Manual*.

----End

7.2 Operations of the SUN2000 App

NOTICE

When you use the SUN2000 app to set parameters for the inverter, setting items on certain parameter setting screens are not displayed if the AC switch between the inverter and the power grid is turned on but the three DC switches on the inverter are not in the ON position. Switch the three DC switches to the ON position and then reset relevant parameters.

📖 NOTE

- Configurable parameters vary depending on the grid code. The actual screen prevails.
- Changing the grid code will restore some parameters to factory defaults. After the grid code is changed, check whether the previously set parameters are affected.
- The parameter names, value ranges, and default values are subject to change. The actual display prevails.

7.2.1 Operations Related to the Advanced User

If you log in to the app as **Advanced User**, you can set grid parameters, protection parameters, and feature parameters for the SUN2000.

7.2.1.1 Setting Grid Parameters

Procedure

Step 1 Choose **Function Menu** > **Settings** > **Grid Parameters** to access the parameters setting screen.

Figure 7-2 Grid parameters (advanced user)
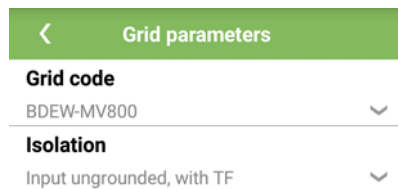
----End

Parameters

No.	Parameter	Description
1	Grid Code	Set this parameter based on the grid code of the country or region where the inverter is used and the inverter application scenario.
2	Isolation	Set the working mode of the inverter based on the grounding status at DC side and the connection to the power grid.

7.2.1.2 Setting Protection Parameters

Procedure

Step 1 Choose **Function Menu** > **Settings** > **Protect Parameters** to go to the parameter setting screen.

Figure 7-3 Protection parameters (advanced user)

----End

Parameter

No.	Parameter	Description
1	Insulation resistance protection (MΩ)	To ensure device safety, the inverter detects the insulation resistance of the input side with respect to ground when it starts a self-check. If the detected value is less than the preset value, the inverter does not connect to the grid.

7.2.1.3 Setting Feature Parameters

Procedure

Step 1 Choose **Function Menu** > **Settings** > **Feature Parameters** to access the settings screen.

Figure 7-4 Feature parameters (advanced user)

----End

Parameters

No.	Parameter	Description	Remarks
1	MPPT multi-peak scanning	When the inverter is used in scenarios where PV strings are greatly shaded, set this parameter to **Enable**, and then the inverter will perform MPPT scanning at regular intervals to locate the maximum power.	-
2	MPPT scanning interval (min)	Specifies the MPPT scanning interval.	This parameter is displayed when **MPPT multi-peak scanning** is set to **Enable**.
3	RCD enhancing	RCD refers to the residual current of the inverter to the ground. To ensure device and personal safety, RCD should be limited to the specified value in the standard. If an AC switch with a residual current detection function is installed outside the inverter, this function should be enabled to reduce the residual current generated when the inverter is running, thereby preventing the AC switch from misoperations.	-

No.	Parameter	Description	Remarks
4	Reactive power output at night	In some specific application scenarios, a power grid company requires that the inverter can perform reactive power compensation at night to ensure that the power factor of the local power grid meets requirements.	This parameter is displayed when **Isolation** is set to **Input ungrounded, with TF**.
5	PID protection at night	When the inverter outputs reactive power at night and this parameter is set to **Enable**, the inverter will shut down automatically if it detects abnormal status of the PID compensation.	-
6	Power quality optimization mode	If this parameter is set to **Enable**, the inverter output current harmonics will be optimized.	-
7	PV module type	This parameter is used to set different types of PV modules and the shutdown time of the concentration PV module. If the concentration PV modules are shaded, the power drops drastically to 0 and the inverter shuts down. The energy yield would be affected since it takes too long for the power to resume and inverter to restart. The parameter does not need to be set for crystalline silicon and filmy PV modules.	- If this parameter is set to **Crystalline silicon** or **Film**, the inverter automatically detects the power of PV modules when they are shaded and shuts down if the power is too low. - When concentration PV modules are used: - If this parameter is set to **CPV 1**, the inverter can quickly restart in 60 minutes if the input power of PV modules drops drastically due to shading. - If this parameter is set to **CPV 2**, the inverter can quickly restart in 10 minutes if the input power of PV modules drops drastically due to shading.
8	PID compensation direction	When the external PID module compensates the PID voltage for the PV system, set **PID compensation direction** to the actual compensation direction of the PID module so that the inverter can output reactive power at night.	-

No.	Parameter	Description	Remarks
9	String connection mode	Specifies the connection mode of PV strings.	• When PV strings connect to the inverter separately (All PV strings separated), there is no need to set this parameter. The inverter can automatically detect the connection mode of the PV strings. • When PV strings connect to one another in parallel outside the inverter and then connect to it independently (All PV strings connected), set this parameter to **All PV strings connected**.
10	Communication interrupt shutdown	The standards of certain countries and regions require that the inverter must shut down after the communication is interrupted for a certain time.	If **Communication interrupt shutdown** is set to **Enable** and the inverter communication is interrupted for a specified time (set by **Communication interruption duration**), the inverter will automatically shut down.
11	Communication resumed startup	If this parameter is set to **Enable**, the inverter automatically starts after communication recovers. If this parameter is set to **Disable**, the inverter needs to be started manually after communication recovers.	This parameter is displayed when **Communication interrupt shutdown** is set to **Enable**.
12	Communication interruption duration (min)	Specifies the duration for determining communication interruption. Used for automatic shutdown for protection in case of communication interruption.	-
13	Soft start time (s)	Specifies the duration for the power to gradually increase when the inverter starts.	-
14	Hibernate at night	The inverter monitors PV strings at night. If this parameter is set to **Enable**, the monitoring function of the inverter will hibernate at night to reduce power consumption.	-
15	MBUS communication	For inverters that support RS485 communication and MBUS communication, you are advised to set this parameter to **Disable** to reduce power consumption.	-

No.	Parameter	Description	Remarks
16	Upgrade delay	**Upgrade delay** is mainly used in the upgrade scenarios where the PV power supply is disconnected at night due to no sunlight or unstable at dawn or dusk due to poor sunlight.	After the inverter starts to upgrade, if **Upgrade delay** is set to **Enable**, the upgrade package is loaded first. After the PV power supply recovers and the activation conditions are met, the inverter automatically activates the upgrade.
17	RS485-2 communication	If this parameter is set to **Enable**, the RS485-2 port can be used. If the port is not used, you are advised to set this parameter to **Disable** to reduce power consumption.	-
18	String monitor	The inverter monitors PV strings in real time. If any PV string is abnormal (such as the PV string is shaded or the electric energy yield decreases), the inverter generates an alarm to remind maintenance personnel to maintain the PV string in a timely manner.	If PV strings are often shaded, you are advised to set **String monitor** to **Disable** to prevent false alarms.
19	String detection reference asymmetric coefficient	Specifies the threshold for determining PV string exception. The false alarms caused by fixed shadow shading can be controlled by changing this parameter.	This parameter is displayed when **String monitor** is set to **Enable**.
20	String detection starting power percentage (%)	Specifies the threshold for starting PV string exception detection. The false alarms caused by fixed shadow shading can be controlled by changing this parameter.	
21	Duration for determining short-time grid disconnection (ms)	The standards of certain countries and regions require that the inverter should not disconnect from the power grid if the power grid experiences a short-time failure. After the fault is rectified, the inverter output power needs to be quickly restored.	-

7.2.2 Operations Related to the Special User

If you log in to the app as **Special User**, you can set grid parameters, protection parameters, feature parameters, and power adjustment parameters for the SUN2000.

7.2.2.1 Setting Grid Parameters

Procedure

Step 1 Choose **Function Menu** > **Settings** > **Grid Parameters** to access the parameters setting screen.

Figure 7-5 Power grid parameters (special user)

----End

Parameters

No.	Parameter	Description
1	Grid Code	Set this parameter based on the grid code of the country or region where the inverter is used and the inverter application scenario.
2	Auto start upon grid recovery	Specifies whether to allow the inverter to automatically start after the power grid recovers.
3	Grid connection duration after grid recovery (s)	Specifies the time after which the inverter begins restarting after the power grid recovers.
4	Grid reconnection voltage upper limit (V)	The standards of certain countries and regions require that after the inverter shuts down for protection due to a fault, if the power grid voltage is higher than **Grid reconnection voltage upper limit**, the inverter is not allowed to reconnect to the grid.

No.	Parameter	Description
5	Grid reconnection voltage lower limit (V)	The standards of certain countries and regions require that after the inverter shuts down for protection due to a fault, if the power grid voltage is lower than **Grid reconnection voltage lower limit**, the inverter is not allowed to reconnect to the grid.
6	Grid reconnection frequency upper limit (Hz)	The standards of certain countries and regions require that after the inverter shuts down for protection due to a fault, if the power grid frequency is higher than **Grid reconnection frequency upper limit**, the inverter is not allowed to reconnect to the grid.
7	Grid reconnection frequency lower limit (Hz)	The standards of certain countries and regions require that after the inverter shuts down for protection due to a fault, if the power grid frequency is lower than **Grid reconnection frequency lower limit**, the inverter is not allowed to reconnect to the grid.
8	Reactive power compensation (cosφ-P) trigger voltage (%)	Specifies the voltage threshold for triggering reactive power compensation based on the cosφ-P curve.
9	Reactive power compensation (cosφ-P) exit voltage (%)	Specifies the voltage threshold for exiting reactive power compensation based on the cosφ-P curve.

7.2.2.2 Setting Protection Parameters

Procedure

Step 1 Choose **Function Menu** > **Settings** > **Protect Parameters** to go to the parameter setting screen.

Figure 7-6 Protection parameters (special user)

----End

Parameters

No.	Parameter	Description
1	Unbalance voltage protection (%)	Specifies the inverter protection threshold when the power grid voltage is unbalanced.
2	Phase angle offset protection	The standards of certain countries and regions require that the inverter needs to be protected when the phase angle offset of the power grid three phases exceeds a certain value.
3	10 minute OV protection (V)	Specifies the 10-minute overvoltage protection threshold.
4	10 minute OV protection time (ms)	Specifies the 10-minute overvoltage protection duration.
5	Level-1 OV protection (V)	Specifies the level-1 overvoltage protection threshold.
6	Level-1 OV protection time (ms)	Specifies the level-1 overvoltage protection duration.
7	Level-2 OV protection (V)	Specifies the level-2 overvoltage protection threshold.

No.	Parameter	Description
8	Level-2 OV protection time (ms)	Specifies the level-2 overvoltage protection duration.
9	Level-1 UV protection (V)	Specifies the level-1 undervoltage protection threshold.
10	Level-1 OF protection time (ms)	Specifies the level-1 undervoltage protection duration.
11	Level-2 UV protection (V)	Specifies the level-2 undervoltage protection threshold.
12	Level-2 UV protection time (ms)	Specifies the level-2 undervoltage protection duration.
13	Level-1 OF protection (Hz)	Specifies the level-1 overfrequency protection threshold.
14	Level-1 OF protection time (ms)	Specifies the level-1 overfrequency protection duration.
15	Level-1 UF protection (Hz)	Specifies the level-1 underfrequency protection threshold.
16	Level-1 UF protection time (ms)	Specifies the level-1 underfrequency protection duration.
17	Level-2 UF protection (Hz)	Specifies the level-2 underfrequency protection threshold.
18	Level-2 UF protection time (ms)	Specifies the level-2 underfrequency protection duration.

7.2.2.3 Setting Feature Parameters

Procedure

Step 1 Choose **Function Menu** > **Settings** > **Feature Parameters** to access the settings screen.

Figure 7-7 Feature parameters (special user)

----End
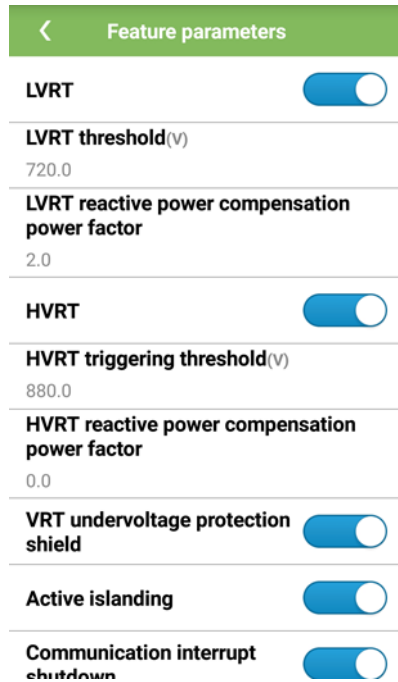
Parameters

No.	Parameter	Description	Remarks
1	LVRT	LVRT is short for low voltage ride-through. When the grid voltage is abnormally low for a short time, the inverter cannot disconnect from the power grid immediately and has to work for some time.	-
2	LVRT threshold (V)	Specifies the threshold for triggering LVRT. The threshold settings should meet the local grid standard.	This parameter is displayed when **LVRT** is set to **Enable**.

No.	Parameter	Description	Remarks
3	LVRT reactive power compensation power factor	During LVRT, the inverter needs to generate reactive power to support the power grid. This parameter is used to set the reactive power generated by the inverter.	• This parameter is displayed when **LVRT** is set to **Enable**. • For example, if this parameter is set to **2**, the reactive power generated by the inverter is 20% of the rated power when the AC voltage drops by 10% during LVRT.
4	LVRT	HVRT is short for high voltage ride-through. When the grid voltage is abnormally high for a short time, the inverter cannot disconnect from the power grid immediately and has to work for some time.	-
5	HVRT triggering threshold (V)	Specifies the threshold for triggering HVRT. The threshold settings should meet the local grid standard.	This parameter is displayed when **HVRT** is set to **Enable**.
6	HVRT reactive power compensation factor	During HVRT, the inverter needs to generate reactive power to support the power grid. This parameter is used to set the reactive power generated by the inverter.	
7	VRT grid voltage protect shield	Specifies whether to shield the undervoltage protection function during LVRT or HVRT.	This parameter is displayed when **LVRT** or **HVRT** is set to **Enable**.
8	Active islanding	Specifies whether to enable the active islanding protection function.	-
9	Voltage rise suppression	The standards of certain countries and regions require that when the output voltage exceeds a certain value, the inverter must suppress voltage rise by outputting reactive power and reducing active power.	-
10	Voltage rise suppression reactive adjustment point (%)	The standards of certain countries and regions require that the inverter generate a certain amount of reactive power when the output voltage exceeds a certain value.	• This parameter is displayed when **Voltage rise suppression** is set to **Enable**.

No.	Parameter	Description	Remarks
11	Voltage rise suppression active derating point(%)	The standards of certain countries and regions require that the active power of the inverter be derated according to a certain slope when the output voltage exceeds a certain value.	• The value of **Voltage rise suppression active derating point** must be greater than that of **Voltage rise suppression reactive adjustment point**.
12	Soft start time after grid failure (s)	Specifies the time for the power to gradually increase when the inverter restarts after the power grid recovers.	-

7.2.2.4 Setting Power Adjustment Parameters

Procedure

Step 1 Choose **Function Menu** > **Settings** > **Power Adjustment** to go to the parameter setting screen.

Figure 7-8 Power adjustment parameters (special user)

----End

Parameters

No.	Parameter	Description	Remarks
1	Remote power schedule	If this parameter is set to **Enable**, the inverter responds to the scheduling instruction from the remote port. If this parameter is set to **Disable**, the inverter does not respond to the scheduling instruction from the remote port.	-
2	Schedule instruction valid duration (s)	Specifies the time for maintaining the scheduling instruction.	When this parameter is set to 0, the scheduling instruction takes effect permanently.
3	Maximum active power (kW)	Specifies the output upper threshold for the maximum active power to adapt to different market requirements.	-
4	Shutdown at 0% power limit	If this parameter is set to **Enable**, the inverter shuts down after receiving the 0% power limit command. If this parameter is set to **Disable**, the inverter does not shut down after receiving the 0% power limit command.	-
5	Active power change gradient (%/s)	Specifies the change speed of the inverter active power.	-
6	Fixed active power derating (kW)	Adjusts the active power output of the inverter by fixed value.	-
7	Active power percentage derating (%)	Adjusts the active power output of the inverter by percentage.	If this parameter is set to **100**, the inverter outputs based on the maximum output power.
8	Reactive power output at night	In some specific application scenarios, a power grid company requires that the inverter can perform reactive power compensation at night to ensure that the power factor of the local power grid meets requirements.	-
9	Enable reactive power parameters at night	When this parameter is set to **Enable**, the inverter outputs reactive power based on the setting of **Reactive power compensation at night**. Otherwise, the inverter executes the remote scheduling command.	This parameter is displayed when **Reactive power output at night** is set to **Enable**.
10	Reactive power compensation at night (kVar)	During the reactive power compensation at night, the reactive power is scheduled by fixed value.	This parameter is displayed when **Reactive power output at night** and **Enable reactive power parameters at night** are set to **Enable**.

No.	Parameter	Description	Remarks
11	Reactive power change gradient (%/s)	Specifies the change speed of the inverter reactive power.	-
12	Plant active power gradient (min/100%)	Specifies the rate of active power rise due to sunlight changes.	-
13	Filter duration for average active power (ms)	Specifies the period of active power rise due to sunlight changes. This parameter is used with **Plant active power gradient**.	-
14	Power factor	Specifies the power factor of the inverter.	-
15	Reactive power compensation (Q/S)	Specifies the reactive power output by the inverter.	-
16	Overfrequency derating	If this parameter is set to **Enable**, the active power of the inverter will be derated according to a certain slope when the grid frequency exceeds the frequency that triggers overfrequency derating.	-
17	Trigger frequency of over frequency derating (Hz)	The standards of certain countries and regions require that the output active power of inverters be derated when the power grid frequency exceeds a certain value.	• This parameter is displayed when **Overfrequency derating** is set to **Enable**. • When setting this parameter, ensure that the following condition is met: **Quit frequency of over frequency derating** ≤ **Trigger frequency of over frequency derating** < **Cutoff frequency of overfrequency derating**.
18	Quit frequency of over frequency derating (Hz)	Specifies the frequency threshold for exiting overfrequency derating.	
19	Cutoff frequency of overfrequency derating (Hz)	Specifies the frequency threshold for cutting off overfrequency derating.	
20	Cutoff power of overfrequency derating (%)	Specifies the power threshold for cutting off overfrequency derating.	
21	Power recovery gradient of overfrequency derating (%/min)	Specifies the recovery rate of the overfrequency derating power.	
22	PF (U) voltage detection filter time (s)	Specifies the time for filtering the grid voltage in the PF-U curve.	-
23	Apparent power baseline (kVA)	Adjust the apparent output baseline of the inverter.	-

No.	Parameter	Description	Remarks
24	Active power baseline (kW)	Adjusts the active output baseline of the inverter.	-

8 Maintenance

8.1 System Power-Off

Precautions

⚠ **WARNING**

- If two inverters share the same AC switch on the AC side, power off the two inverters.
- After the inverter powers off, the remaining electricity and heat may still cause electric shocks and body burns. Therefore, put on personal protective equipment (PPE) and begin servicing the inverter fifteen minutes after power-off.

Procedure

Step 1 Run a shutdown command on the SUN2000 app, SmartLogger, or network management system (NMS).

For details, see the user manual of the corresponding product.

Step 2 Turn off the AC switch between the inverter and the power grid.

Step 3 Set the three DC switches to OFF.

----End

8.2 Routine Maintenance

Maintenance Item

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 system, connecting cables, and maintaining the grounding reliability, power off the system and ensure that the three DC switches on the inverter are OFF.
- If you need to open the maintenance compartment door in rainy or snowy days, take protective measures to prevent rain or snow entering the maintenance compartment. If unavoidable, do not open the maintenance compartment door.

Maintenance list

Item	Check Method	Maintenance Interval
• Cleanness of air intake and exhaust vents • Fans	• Check whether there is dust on the air intake and exhaust vents. If necessary, remove the baffle of the air intake vent. • Check whether the fans produce abnormal sounds during operation.	Once every 6 to 12 months
System running status	• The inverter is not damaged or deformed. • The inverter operates with no abnormal sound. • When the inverter is running, check whether all inverter parameters are correctly set.	Once every 6 months
Electrical connections	• Cables are securely connected. • Cables are intact, and in particular, the parts touching the metallic surface are not scratched. • Check that the idle COM and USB ports are locked by waterproof caps.	The first inspection is 6 months after the initial commissioning. From then on, the interval can be 6 or 12 months.
Grounding reliability	Ground cables are securely connected.	The first inspection is 6 months after the initial commissioning. From then on, the interval can be 6 or 12 months.

Removing the baffle of the air intake vent

Figure 8-1 Removing the baffle
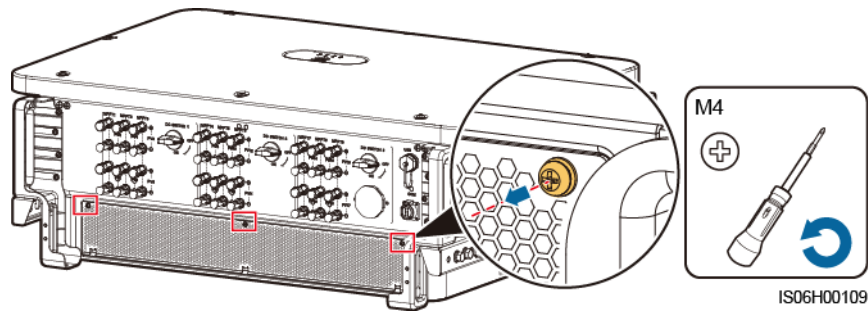
8.3 Replacing a Fan

⚠ CAUTION

- Before replacing a fan, power off the inverter.
- When replacing a fan, use insulation tools and wear personal protective devices.

📖 NOTE

If the fan tray gets stuck when being pulled or pushed, slightly lift it.

Step 1 Remove the screw on the fan tray and save it. Pull out the fan tray until the fan baffle plate aligns with the inverter chassis.

Figure 8-2 Pulling out fan tray (1)
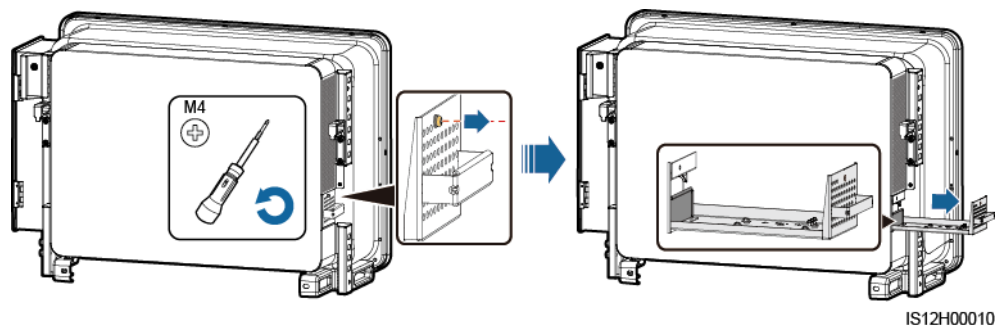
Step 2 Remove the cable ties shared by the cables, unscrew the connectors, and disconnect the cables.

Figure 8-3 Disconnecting cables
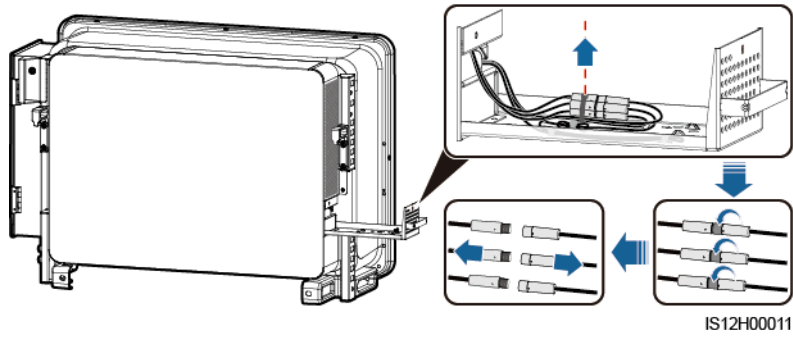
Step 3 Pull out the fan tray.

Figure 8-4 Pulling out fan tray (2)
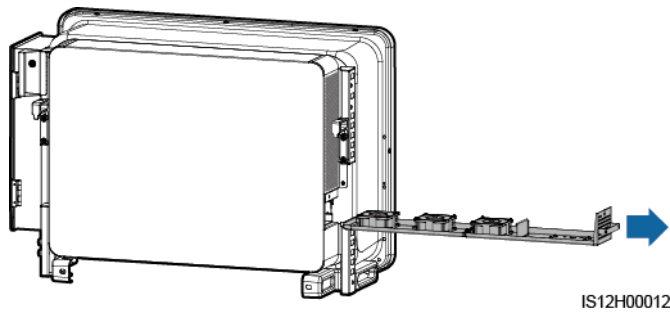
Step 4 Remove cable ties from the faulty fan.

- FAN 1 Faulty

Figure 8-5 Removing the FAN 1 cable ties
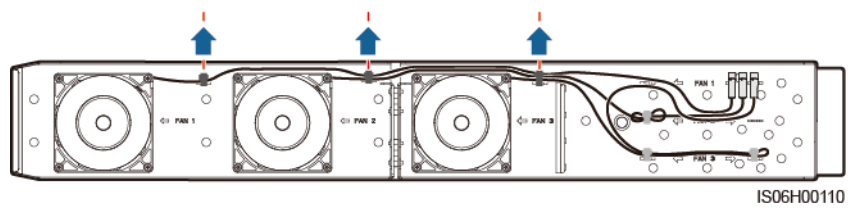
- FAN 2 Faulty

Figure 8-6 Removing the FAN 2 cable ties
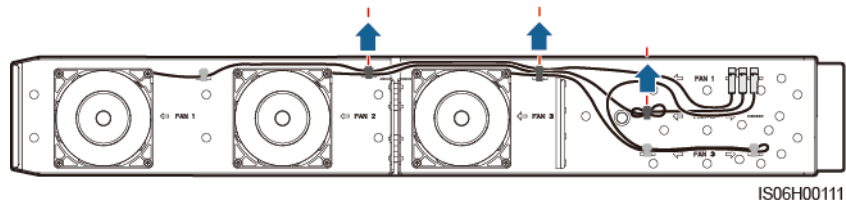
- FAN 3 Faulty

Figure 8-7 Removing the FAN 3 cable ties
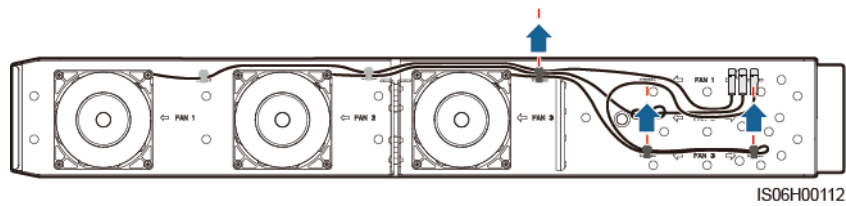
Step 5 Remove the faulty fan (FAN 1 is used as an example).

Figure 8-8 Removing the fan
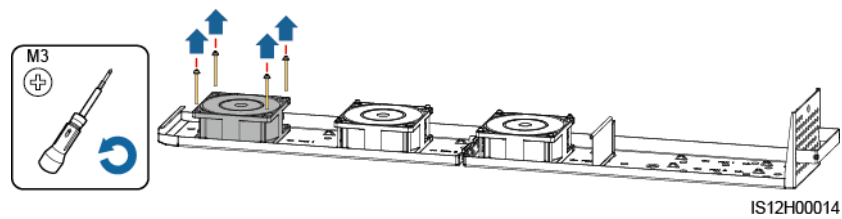
Step 6 Install the new fan (FAN 1 is used as an example).

Figure 8-9 Installing a new fan
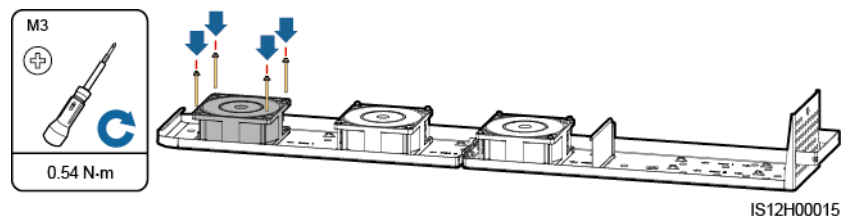
Step 7 Bind the fan cables.

- Binding positions for fan 1

Figure 8-10 Binding the FAN 1 cables
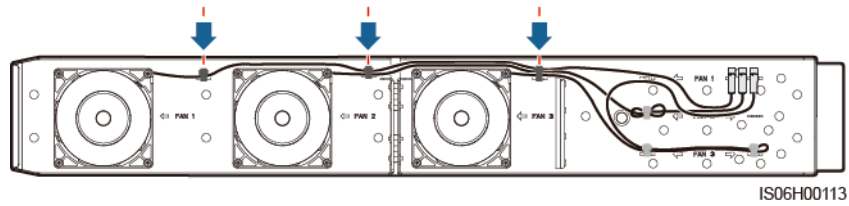
- Binding positions for fan 2

Figure 8-11 Binding the FAN 2 cables
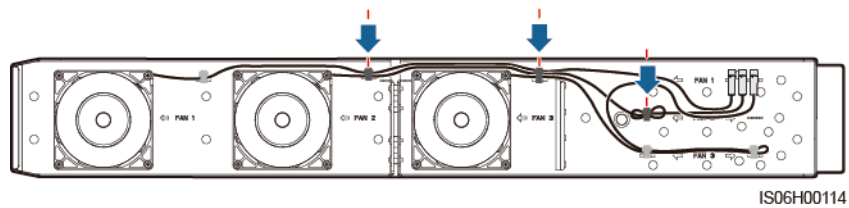
- Binding positions for fan 3

Figure 8-12 Binding the FAN 3 cables
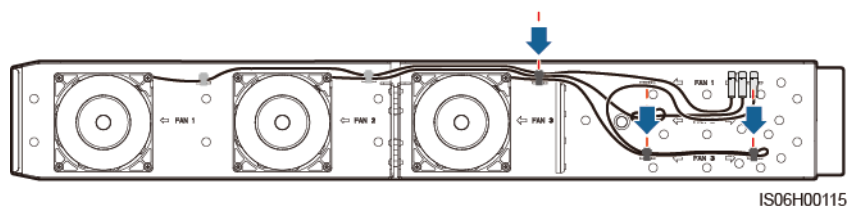
Step 8 Push the fan tray into the slot until the fan baffle plate aligns with the inverter chassis.

Figure 8-13 Pushing the fan tray in
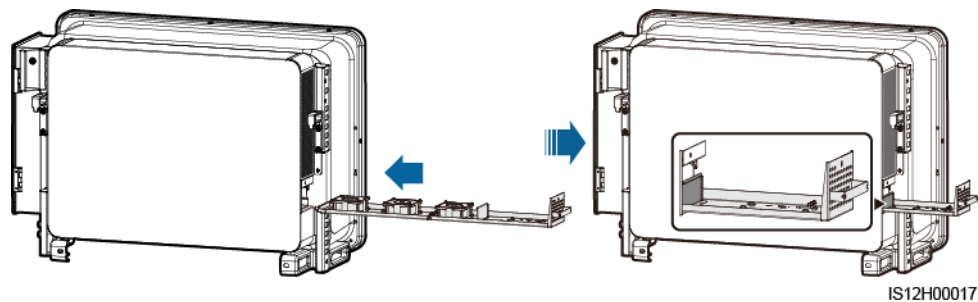
Step 9 Connect the cables correctly according to the cable labels and bind the cables.

Figure 8-14 Reconnecting and binding the cables
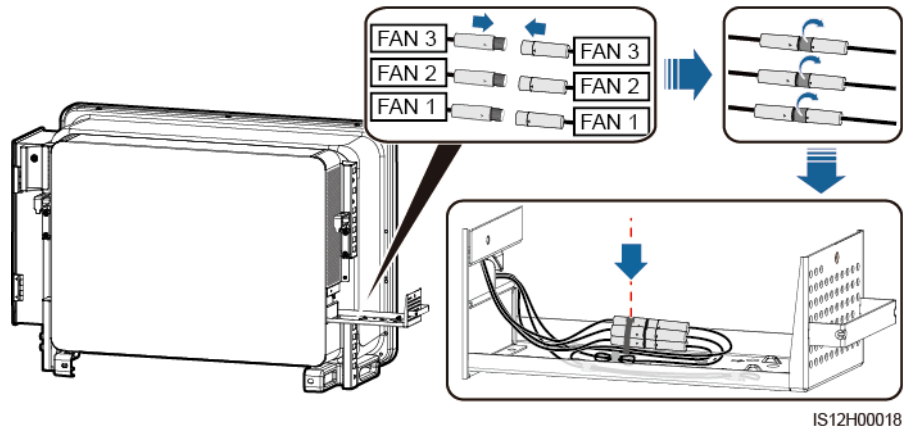
Step 10 Push the fan tray into the slot and tighten the screw.

Figure 8-15 Reinstalling the fan tray
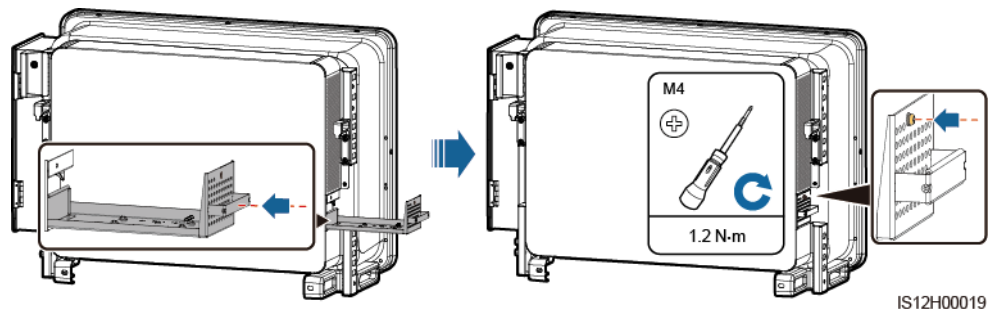
----End

8.4 Troubleshooting

Alarm severities are defined as follows:

- Major: The inverter is faulty. As a result, the output power decreases or the grid-tied power generation is stopped.
- Minor: Some components are faulty without affecting the grid-tied power generation.
- Warning: The inverter works properly. The output power decreases or some authorization functions fail due to external factors.

Table 8-1 Common alarms and troubleshooting measures

Alarm ID	Alarm Name	Alarm Severity	Cause	Troubleshooting Suggestions
2001	High String Input Voltage	Major	The PV array is not properly configured. Excessive PV modules are connected in series to a PV string, and therefore the PV string open-circuit voltage exceeds the maximum operating voltage of the inverter. • Cause ID 1: PV strings 1 and 2 • Cause ID 2: PV strings 3 and 4 • Cause ID 3: PV strings 5 and 6 • Cause ID 4: PV strings 7 and 8 • Cause ID 5: PV strings 9 and 10 • Cause ID 6: PV strings 11 and 12 • Cause ID 7: PV strings 13 and 14 • Cause ID 8: PV strings 15 and 16 • Cause ID 9: PV strings 17 and 18	Reduce the number of PV modules connected in series in the PV string until 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.
2011	String Reverse Connection	Major	The PV string is reversely connected. Cause ID 1–18: PV strings 1–18	Check whether the PV string is reversely connected to the inverter. If yes, wait until the PV string current drops below 0.5 A. Then, set all DC switches to OFF and correct the PV string connection.

Alarm ID	Alarm Name	Alarm Severity	Cause	Troubleshooting Suggestions
2012	String Current Backfeed	Warning	1. Only a few PV modules are connected in series in the PV string. Therefore, the end voltage is lower than that of other PV strings. 2. The PV string is shaded. Cause ID 1–18: PV strings 1–18	1. Check whether the number of PV modules connected in series in the PV string is less than that in other PV strings connected in parallel with this PV string. If yes, wait until the PV string current drops below 0.5 A, set all DC switches to OFF, and adjust the number of PV modules in the PV string. 2. Check whether the open-circuit voltage of the PV string is normal. 3. Check whether the PV string is shaded.
2013	Abnormal String Power	Warning	1. The PV string is shaded from sunlight for a long time. 2. The PV string has aged abnormally. Cause ID 1–18: PV strings 1–18	1. Check whether the current of the abnormal PV string is lower than that of other PV strings. If it is, check whether the abnormal PV string is shaded and the actual number of PV strings is the same as the configured number. 2. If the abnormal PV string is clean and not shaded, check whether the PV string is damaged.
2015	PV String Loss	Warning	This alarm is generated when the PV string status is abnormal in the following conditions: • A single PV string is lost. • Both 2-in-1 PV strings are lost. • Either of the 2-in-1 PV strings is lost. Cause ID 1–8: PV strings 1–18	1. If the PV string access type is manually set, check whether it is consistent with the actual access status. 2. Check whether the inverter terminals are properly connected. 3. Check whether the PV string terminals are properly connected. 4. If a 2-in-1 terminal is used, check whether it is normal.
2031	Phase Wire Short-Circuited to PE	Major	Cause ID=1 The impedance of the output phase wire to PE is low or the output phase wire is short-circuited to PE.	Check the impedance of the output phase wire to PE, locate the position with lower impedance, and rectify the fault.

Alarm ID	Alarm Name	Alarm Severity	Cause	Troubleshooting Suggestions
2032	Grid Loss	Major	Cause ID=1 1. The power grid experiences an outage. 2. The AC circuit is disconnected or the AC switch is off.	1. The alarm is automatically cleared after the power grid is restored. 2. Check whether the AC circuit is disconnected or the AC switch is off.
2033	Grid Undervoltage	Major	Cause ID=1 The grid voltage is below the lower threshold or the undervoltage duration has exceeded the time that triggers LVRT.	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. 2. If the alarm occurs frequently, check whether the power grid voltage is within the acceptable range. If not, contact the local power operator. If yes, modify the grid undervoltage protection threshold through the mobile app, SmartLogger, or network management system (NMS) with the consent of the local power operator. 3. If the fault persists for a long time, check the AC circuit breaker and AC output power cable.
2034	Grid Overvoltage	Major	Cause ID=1 The grid voltage is beyond the upper threshold or the overvoltage duration has exceeded the time that triggers HVRT.	1. Check whether the grid connection voltage exceeds the upper threshold. If yes, contact the local power operator. 2. If you have confirmed that the grid-tied voltage exceeds the upper threshold and have obtained the consent of the local power operator, modify the overvoltage protection threshold through the mobile app, SmartLogger, or NMS. 3. Check whether the peak grid voltage exceeds the upper threshold.

Alarm ID	Alarm Name	Alarm Severity	Cause	Troubleshooting Suggestions
2035	Grid Voltage Imbalance	Major	Cause ID=1 The difference between grid phase voltages exceeds the upper threshold.	1. Check that the grid voltage is within the normal range. 2. Check that the AC output power cable is correctly connected. If the AC output power cable is correctly connected, yet the alarm persists and affects the energy yield of the power plant, contact the local power operator.
2036	Grid Overfrequency	Major	Cause ID=1 Power grid exception: The actual power grid frequency is higher than the standard requirement for the local power grid.	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. 2. If the alarm occurs frequently, check whether the power grid frequency is within the acceptable range. If not, contact the local power operator. If yes, modify the grid overfrequency protection threshold through the mobile app, SmartLogger, or NMS with the consent of the local power operator.
2037	Grid Underfrequency	Major	Cause ID=1 Power grid exception: The actual power grid frequency is lower than the standard requirement for the local power grid.	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. 2. If the alarm occurs frequently, check whether the power grid frequency is within the acceptable range. If not, contact the local power operator. If yes, modify the grid underfrequency protection threshold through the mobile app, SmartLogger, or NMS with the consent of the local power operator.

Alarm ID	Alarm Name	Alarm Severity	Cause	Troubleshooting Suggestions
2038	Unstable Grid Frequency	Major	Cause ID=1 Power grid exception: The actual grid frequency change rate does not comply with the local power grid standard.	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. 2. If the alarm occurs frequently, check whether the power grid frequency is within the acceptable range. If not, contact the local power operator.
2039	Output Overcurrent	Major	Cause ID=1 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.	1. The inverter detects its external working conditions in real time. After the fault is rectified, the inverter automatically recovers. 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 cannot be rectified, contact your dealer or Huawei technical support.
2040	Output DC Component Overhigh	Major	Cause ID=1 The DC component of the inverter output current exceeds the specified upper threshold.	1. If the exception is caused by an external fault, the inverter automatically recovers after the fault is rectified. 2. If this alarm occurs frequently and affects the energy yield of the PV plant, contact your dealer or Huawei technical support.
2051	Abnormal Residual Current	Major	Cause ID=1 The insulation impedance of the input side to PE decreases when the inverter is operating.	1. If the alarm occurs occasionally, the external circuit may be abnormal temporarily. The inverter automatically recovers after the fault is rectified. 2. If the alarm occurs frequently or persists, check whether the impedance between the PV string and the ground is too low.

Alarm ID	Alarm Name	Alarm Severity	Cause	Troubleshooting Suggestions
2062	Low Insulation Resistance	Major	Cause ID=1 1. The PV string is short-circuited to the PE cable. 2. The PV string has been in a moist environment for a long time and the circuit is not well insulated to ground.	1. Check the impedance of the PV string to PE. If a short circuit occurs, rectify it. 2. Check that the ground cable of the inverter is correctly connected. 3. If you are sure that the impedance is less than the preset value in a cloudy or rainy environment, reset **Insulation resistance protection**.
2063	Cabinet Overtemperature	Minor	Cause ID=1 1. The inverter is installed in a place with poor ventilation. 2. The ambient temperature is too high. 3. The inverter is not working properly.	1. Check the ventilation and whether the ambient temperature of the inverter exceeds the upper limit. If the ventilation is poor or the ambient temperature is too high, improve ventilation. 2. If both the ventilation and ambient temperature meet requirements yet the fault persists, contact your dealer or Huawei technical support.
2064	Device Fault	Major	Cause ID=1 An unrecoverable fault has occurred on a circuit inside the inverter.	Turn off the AC output switch and DC input switch, and then turn them on after 15 minutes. If the fault persists, contact your dealer or Huawei technical support.
2065	Upgrade Failed or Software Version Unmatch	Minor	Cause ID=1 The upgrade does not complete normally.	1. Perform an upgrade again. 2. If the upgrade fails several times, contact your dealer.
2066	License Expired	Warning	Cause ID=1 1. The privilege license has entered the grace period. 2. The privilege feature will be invalid soon.	1. Apply for a new license. 2. Load a new license.
2086	External fan abnormal	Major	External fan short-circuited, power supply insufficient, or air channel blocked Cause ID 1–3: fans 1–3	1. Shut down the fan, turn off the DC switch, check whether the fan blades are damaged, and clear the foreign matter around the fan. 2. Reinstall the fan, turn on the DC switch, and wait for the inverter to start. If the fault persists after 15 minutes, replace the external fan.

Alarm ID	Alarm Name	Alarm Severity	Cause	Troubleshooting Suggestions
2087	Internal fan abnormal	Major	Cause ID=1 The internal fan is short-circuited, the power supply is insufficient, or the fan is damaged.	Turn off the AC output switch and then the DC input switch. Turn them on after 5 minutes and wait for the inverter to connect to the power grid. If the fault persists, contact your dealer or Huawei technical support.
61440	Faulty Monitoring Unit	Minor	Cause ID=1 1. The flash memory is insufficient. 2. The flash memory has bad sectors.	Turn off the AC output switch and DC input switch, and then turn them on after 15 minutes. If the fault persists, replace the monitoring board or contact your dealer or Huawei technical support.

NOTE

If you cannot rectify faults with the measures listed in troubleshooting suggestions, contact your dealer or Huawei technical support.

9 Handling the Inverter

9.1 Removing the SUN2000

> **NOTICE**
>
> Before removing the SUN2000, disconnect both AC and DC connections.

Perform the following operations to remove the SUN2000:

1. Disconnect all cables from the SUN2000, including RS485 communications cables, DC input power cables, AC output power cables, and PGND cables.
2. Remove the SUN2000 from the mounting bracket.
3. Remove the mounting bracket.

9.2 Packing the SUN2000

- If the original packing materials are available, put the SUN2000 inside them and then seal them by using adhesive tape.
- If the original packing materials are not available, put the SUN2000 inside a suitable cardboard box and seal it properly.

9.3 Disposing of the SUN2000

If the SUN2000 service life expires, dispose of it according to the local disposal rules for electrical equipment waste.

10 Technical Data

Efficiency

Technical Specifications	SUN2000-175KTL-H0	SUN2000-185KTL-INH0	SUN2000-185KTL-H1
Maximum efficiency	≥ 99.0%	≥ 99.0%	≥ 99.0%
Chinese efficiency	≥ 98.4%	-	-
European efficiency	-	≥ 98.6%	≥ 98.6%

Input

Technical Specifications	SUN2000-175KTL-H0	SUN2000-185KTL-INH0	SUN2000-185KTL-H1
Maximum input power	197 kW	188 kW	188 kW
Maximum input voltage	1500 V		
Maximum input current (per MPPT)	26 A		
Maximum short-circuit current (per MPPT)	40 A		
Maximum backfeed current to the PV array	0 A		
Lowest operating/startup voltage	500 V/550 V		

Technical Specifications	SUN2000-175KTL-H0	SUN2000-185KTL-INH0	SUN2000-185KTL-H1
Operating voltage range	500–1500 V		
Full-load MPPT voltage range	880–1300 V		
Rated input voltage	1080 V		
Number of inputs	18		
Number of MPP trackers	9		

Output

Technical Specifications	SUN2000-175KTL-H0	SUN2000-185KTL-INH0	SUN2000-185KTL-H1
Rated active power	175 kW	160 kW@50°C 175 kW@40°C	150 kW@50°C 168 kW@45°C 175 kW@40°C
Maximum apparent power	193 kVA	185 kVA	185 kVA
Maximum active power ($\cos\varphi = 1$)	193 kW	185 kW	185 kW
Rated output voltage	800 V AC, 3W+PE		
Rated output current	126.3 A	115.5 A (160 kW) 126.3 A (175 kW)	108.3 A (150 kW) 121.3 A (168 kW) 126.3 A (175 kW)
Adapted power grid frequency	50 Hz	50 Hz/60 Hz	50 Hz/60 Hz
Maximum output current	140.7 A	134.9 A	134.9 A
Power factor	0.8 leading and 0.8 lagging		
Maximum total harmonic distortion (rated power)	< 3%		

Protection

Technical Specifications	SUN2000-175KTL-H0	SUN2000-185KTL-INH0	SUN2000-185KTL-H1
Input DC switch	Supported		
Anti-islanding protection	Supported		
Output overcurrent protection	Supported		
Input reverse connection protection	Supported		
PV string fault detection	Supported		
DC surge protection	Type II		
AC surge protection	Type II		
Insulation resistance detection	Supported		
Residue current monitoring (RCMU)	Supported		
Overvoltage category	PV II/AC III		

Display and Communication

Technical Specifications	SUN2000-175KTL-H0	SUN2000-185KTL-INH0	SUN2000-185KTL-H1
Display	LED indicator, Bluetooth module+app, USB data cable+app, and WLAN module+app		
RS485	Supported		
MBUS	Supported		
USB	Supported		

Common Parameters

Technical Specifications	SUN2000-175KTL-H0	SUN2000-185KTL-INH0	SUN2000-185KTL-H1
Dimensions (W x H x D)	1035 mm x 700 mm x 365 mm		
Net weight	84 kg±1 kg		
Operating temperature	–25°C to +60°C		
Cooling mode	Intelligent air cooling		
Highest operating altitude	5000 m (derated when the altitude is greater than 4000 m)		
Humidity	0%–100% RH		
Input terminal	MC4 EVO2		
Output terminal	Waterproof terminal+OT/DT terminal		
IP rating	IP66		
Topology	Transformerless		

A String Access Detection

Function Description

- Applies to large-scale commercial ground PV plants with PV strings facing the same direction.
- In AC or DC power limiting scenarios:
  - If the PV string access type is not identified, the value of **String access type** will keep being displayed as **Not connected**. The PV string access type can be identified only when the inverters restore to the non-power limiting state and the current of all connected PV strings reaches the startup current.
  - If the PV string access type has been identified, when some PV strings connected to the 2-in-1 terminals are lost, no alarm will be generated. If some PV strings connected to the 2-in-1 terminals are restored, the access type cannot be identified. It can be determined whether all the 2-in-1 PV strings are restored only when the string current reaches **Startup current for 2 in 1 detection**.

Procedure

Step 1 Log in to the SUN2000 app as **Advanced User**. The initial password is **00000a**.

📖 NOTE

Use the initial password upon first power-on and change it immediately after 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.

Step 2 Choose **Function Menu** > **Maintenance** > **String Access Detection** to go to the parameter setting screen.

Figure A-1 String Access Detection

----End

Parameters

N o.	Parameter	Description	Remark s
1	String Access Detection	The default value is **Disable**. After the inverter is connected to the power grid, you can set **String Access Detection** to **Enable**.	-
2	Startup current	When the current of all connected PV strings reaches the preset value, the PV string connection detection function is enabled. **NOTE** Startup current setting rules: • Startup current = I_{sc} (S_{tc}) × 0.6 (rounded up). For details about I_{sc} (S_{tc}), see the PV module nameplate. • Default startup current (5 A): applicable to the scenarios where the short-circuit current I_{sc} (S_{tc}) is greater than 8 A for the monocrystalline and polycrystalline PV modules.	This parameter is displayed only when **String Access Detection** is set to **Enable**.
3	Startup current for 2 in 1 detection	When the current of a PV string reaches **Startup current for 2 in 1 detection**, the PV string is automatically identified as **2 in 1**. You are advised to use the default value.	

N o.	Parameter	Description	Remark s
4	PV string N access type **NOTE** *N* is the DC input terminal number of the inverter.	Set this parameter based on the type of the PV string connected to DC input terminal *N* of the inverter. Currently, the options are as follows: **Automatic identification** (default value), **Disconnection**, **Single PV string**, and **2 in 1**. You are advised to retain the default value. If the value is incorrectly set, the PV string access type may be incorrectly identified and alarms may be generated by mistake for the PV string connection status.	

B Grid Code

No.	Grid Code	Description	SUN2000-175KTL-H0	SUN2000-185KTL-INH0	SUN2000-185KTL-H1
1	CHINA_MV800	China medium-voltage power grid	Supported	-	-
2	G59-England-MV800	G59 medium-voltage power grid	-	-	Supported
3	AS4777-MV800	Australia medium-voltage power grid	-	-	Supported
4	INDIA-MV800	India medium-voltage power grid	-	Supported	-
5	IEC61727-MV800	IEC61727 medium-voltage power grid (50 Hz)	-	Supported	Supported
6	BDEW-MV800	Germany medium-voltage power grid	-	-	Supported
7	ABNT NBR 16149-MV800	Brazil medium-voltage power grid	-	-	Supported
8	UTE C 15-712-1-MV800	France medium-voltage power grid	-	-	Supported
9	Chile-MV800	Chile medium-voltage power grid	-	-	Supported
10	EN50438-TR-MV800	Turkey medium-voltage power grid	-	-	Supported
11	TAI-PEA-MV800	Thailand PEA medium-voltage power grid	-	-	Supported
12	Philippines-MV800	Philippines medium-voltage power grid	-	-	Supported
13	Malaysian-MV800	Malaysia medium-voltage power grid	-	-	Supported
14	NRS-097-2-1-MV800	South Africa medium-voltage power grid	-	-	Supported

No.	Grid Code	Description	SUN2000-175KTL-H0	SUN2000-185KTL-INH0	SUN2000-185KTL-H1
15	SA_RPPs-MV800	South Africa RPPs medium-voltage power grid	-	-	Supported
16	Jordan-Transmission-MV800	Jordan power transmission network medium-voltage power grid	-	-	Supported
17	Jordan-Distribution-MV800	Jordan power distribution network medium-voltage power grid	-	-	Supported
18	Egypt ETEC-MV800	Egypt medium-voltage power grid	-	-	Supported
19	DUBAI-MV800	Dubai medium-voltage power grid	-	-	Supported
20	SAUDI-MV800	Saudi Arabia medium-voltage power grid	-	-	Supported
21	EN50438_IE-MV800	Ireland medium-voltage power grid	-	-	Supported
22	CLC/TS50549_IE-MV800	Ireland medium-voltage power grid (CLC/TS50549)	-	-	Supported
23	Northern Ireland-MV800	Northern Ireland medium-voltage power grid	-	-	Supported
24	CEI0-21-MV800	Italy medium-voltage power grid (CEI0-21)	-	-	Supported
25	IEC 61727-MV800-60HZ	General medium-voltage power grid	-	Supported	Supported
26	Pakistan-MV800	Pakistan medium-voltage power grid	-	-	Supported
27	BRASIL-ANEEL-MV800	Brazil medium-voltage power grid	-	-	Supported
28	Israel-MV800	Israel medium-voltage power grid	-	-	Supported
29	CEI0-16-MV800	Italy medium-voltage power grid	-	-	Supported
30	ZAMBIA-MV800	Zambia medium-voltage power grid	-	-	Supported
31	KENYA_ETHIOPIA_MV800	Kenya low-voltage and Ethiopia medium-voltage power grid	-	-	Supported
32	NAMIBIA_MV800	Namibia medium-voltage power grid	-	-	Supported

No.	Grid Code	Description	SUN2000-175KTL-H0	SUN2000-185KTL-INH0	SUN2000-185KTL-H1
33	Cameroon-MV800	Cameroon medium-voltage power grid	-	-	Supported
34	NIGERIA-MV800	Nigeria medium-voltage power grid	-	-	Supported
35	ABUDHABI-MV800	Abu Dhabi medium-voltage power grid	-	-	Supported
36	LEBANON-MV800	Lebanon medium-voltage power grid	-	-	Supported
37	ARGENTINA-MV800	Argentina medium-voltage power grid	-	-	Supported
38	Jordan-Transmission-HV800	Jordan high-voltage and medium-voltage power grid	-	-	Supported
39	TUNISIA-MV800	Tunisia medium-voltage power grid	-	-	Supported
40	AUSTRALIA-NER-MV800	Australia NER standard medium-voltage power grid	-	-	Supported
41	VDE-AR-N4120_HV800	VDE4120 standard medium-voltage power grid	-	-	Supported
42	Nicaragua-MV800	Nicaragua medium-voltage power grid	-	-	Supported
43	Custom-MV800-50Hz	Reserved	-	-	Supported
44	RD1699/661-MV800	Spain medium-voltage power grid	-	-	Supported
45	PO12.3-MV800	Spain medium-voltage power grid	-	-	Supported
46	Vietnam-MV800	Vietnam medium-voltage power grid	-	-	Supported
47	CHILE-PMGD-MV800	Chile PMGD medium-voltage power grid (800 V)	-	-	Supported
48	GHANA-MV800	Ghana medium-voltage power grid (800 V)	-	-	Supported
49	TAIPOWER-MV800	Taiwan power medium-voltage power grid (800 V)	-	-	Supported
50	OMAN-MV800	Oman medium-voltage power grid	-	-	Supported
51	KUWAIT-MV800	Kuwait medium-voltage power grid	-	-	Supported
52	BANGLADESH-MV800	Bangladesh medium-voltage power grid	-	-	Supported

No.	Grid Code	Description	SUN2000-175KTL-H0	SUN2000-185KTL-INH0	SUN2000-185KTL-H1
53	BAHRAIN-MV800	Bahrain medium-voltage power grid	-	-	Supported
54	KAZAKHSTAN-MV800	Kazakhstan medium-voltage power grid	-	-	Supported
55	Oman-PDO-MV800	Oman PDO medium-voltage power grid	-	-	Supported
56	TAI-MEA-MV800	Thailand medium-voltage power grid	-	-	Supported

☐ NOTE

The grid codes are subject to change. The listed codes are for your reference only.