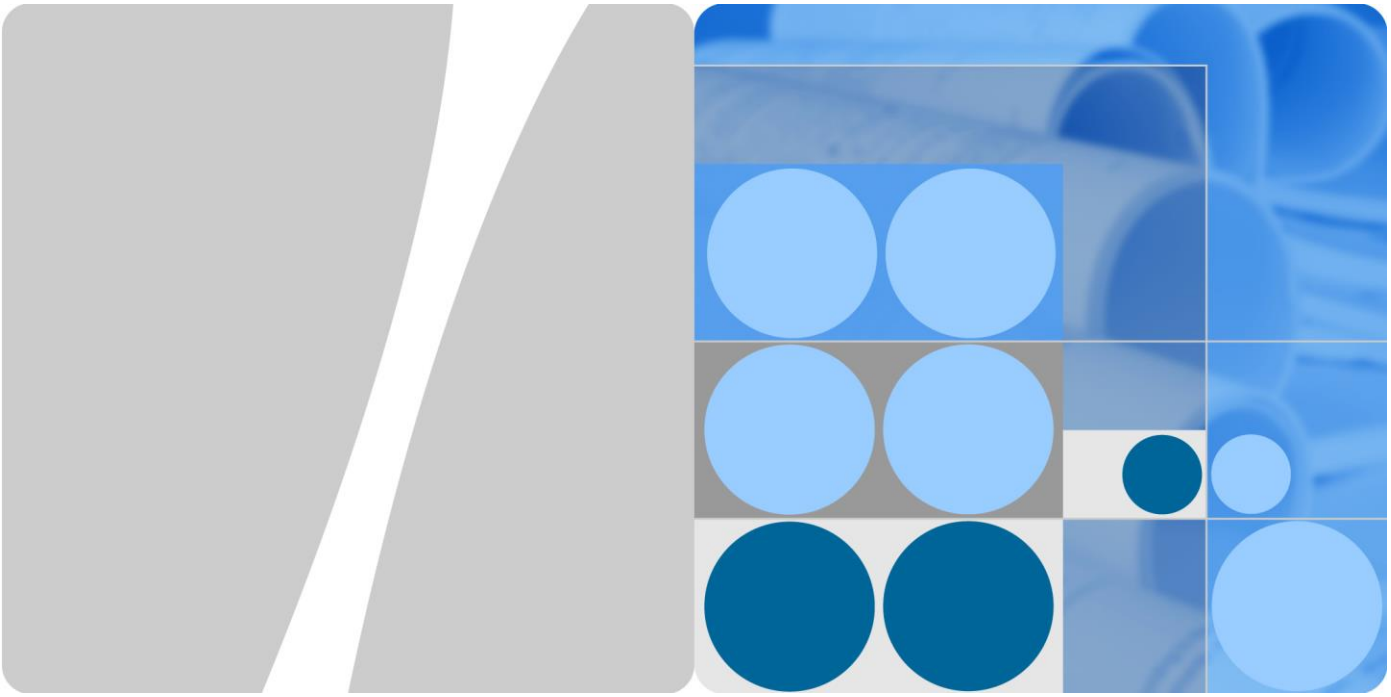

SUN2000-(55KTL, 60KTL) Series

User Manual

Issue 06

Date 2020-01-03

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Huawei Technologies Co., Ltd.

Address: Huawei Industrial Base
Bantian, Longgang
Shenzhen 518129
People's Republic of China

Website: https://e.huawei.com

About This Document

Purpose

This document describes the SUN2000-55KTL-HV-D1, SUN2000-55KTL-IN-HV-D1, SUN2000-55KTL-HV-D1-001, SUN2000-60KTL-HV-D1, and SUN2000-60KTL-HV-D1-001 (SUN2000 for short) in terms of their installation, electrical connections, commissioning, maintenance, and troubleshooting. Understand the safety information and get familiar with the SUN2000 functions and features before installing and operating the SUN2000.

Intended Audience

This document is intended for photovoltaic (PV) power plant personnel and qualified electrical technicians.

Symbol Conventions

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

Symbol	Description
DANGER	Indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.
WARNING	Indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.
CAUTION	Indicates a hazard with a low level of risk which, if not avoided, could 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.
NOTE	Supplements the important information in the main text. NOTE is used to address information not related to personal injury, equipment damage, and environment deterioration.

Change History

Changes between document issues are cumulative. The latest document issue contains all updates made in previous issues.

Issue 06 (2020-01-03)

Updated 3 Inverter Storage.

Added 6.5 Power-Off for Troubleshooting.

Issue 05 (2018-04-26)

Added description about the metal stamping forming contact.

Issue 04 (2018-01-15)

Added B Grid Codes.

Issue 03 (2017-10-30)

Updated 3 Inverter Storage.

Updated 5.2 Crimping the OT Terminal.

Issue 02 (2017-07-30)

Updated 5.3 Connecting a ground cable.

Updated 10 Technical Specifications.

Issue 01 (2017-06-15)

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

Contents

1 Safety Precautions

⚠ CAUTION

Before performing operations, read through this manual and follow all the precautions to prevent accidents. The safety precautions provided in this document do not cover all the safety precautions. Huawei shall not be liable for any consequence caused by the violation of the safety operation regulations and design, production, and usage standards.

Disclaimer

Huawei shall not be liable for any consequence caused by any of the following events.

- Transportation
- The storage conditions do not meet the requirements specified in this document.
- Violate the operation instructions and safety precautions in this document for installation, cable connecting, and maintenance.
- Operation in extreme environments which are not covered in this document
- Unauthorized modifications to the product or software code
- Installation or use in environments which are not specified in related international standards

Personnel Requirements

Only certified electricians are allowed to install and operate the SUN2000.

- Operation personnel should receive professional training.
- Operation personnel should read through this document and follow all the precautions.
- Operation personnel should be familiar with the safety specifications about the electrical system.
- Operation personnel should understand the composition and working principles of the grid-tied PV power system and local regulations.

Protect Labels

- Do not tamper with any warning labels on the inverter enclosure because these labels contain important information about safe operation.

- Do not tamper with the nameplate on the inverter enclosure because it contains important product information.

Installation

- Ensure that the inverter is not connected to a power supply and is not powered on before starting installation.
- Ensure that there are no objects within 200 mm, 300 mm, 500 mm, 600 mm, and 1000 mm of the left, right, top, bottom, and front of the inverter, respectively. This is to allow sufficient space for installation and heat dissipation. For ease of installation, ensure that the inverter bottom is at most 730 mm above the floor. If you have any questions about the distance, consult the local technical support engineers.
- Ensure that the inverter is installed in a well ventilated environment.
- Ensure that the inverter heat sinks are free from blockage.
- Open the maintenance compartment door of the chassis before connecting cables. Do not perform any operation on other components inside the chassis except connecting the PE cable, AC power cables and communications cables.

Cable Connections

DANGER

Before connecting cables, ensure that the inverter is secured in position and not damaged in any way. Otherwise, electric shocks or fire may occur.

- Ensure that all electrical connections comply with local electrical standards.
- Obtain approval from the local utility company before using the inverter to generate electricity in grid-tied mode.
- Ensure that the cables used in a grid-tied PV system are properly connected and insulated, meet all specification requirements.

Operation

DANGER

High voltages may cause electric shocks result in serious injury, death or serious property damage from inverter in operation. Strictly comply with the safety precautions in this document and associated documents when operating the inverter.

- Do not touch an energized inverter because the heat sink may be over 60ºC.
- Follow local laws and regulations when operating the equipment.

Maintenance and Replacement

DANGER

High voltages may cause electric shocks result in serious injury, death or serious property damage from inverter in operation. Prior to maintenance, power off the inverter and strictly comply with the safety precautions in this document and associated documents to operate the inverter.

- Maintain the inverter with sufficient knowledge of this document and proper tools and testing equipment.
- Before performing maintenance tasks, power off the inverter and wait at least 5 minutes.
- Place temporary warning signs or erect fences to prevent unauthorized access to the maintenance site.
- Rectify any faults that may compromise the inverter security performance before powering on the inverter again.
- Observe ESD precautions during the maintenance.
- For personal safety, wear insulation gloves and safety shoes.

2 Overview

2.1 Introduction

Function

The SUN2000 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.

Models

Figure 2-1 Model number description (SUN2000-55KTL-IN-HV-D1)

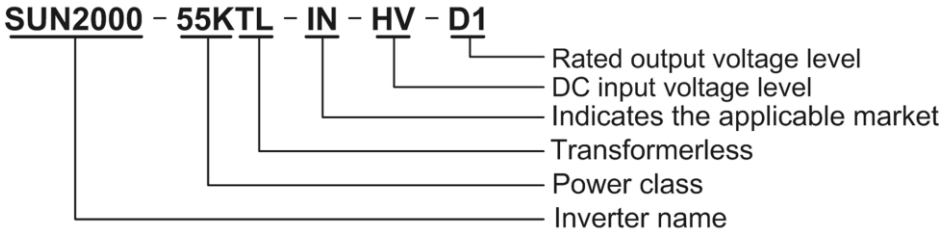
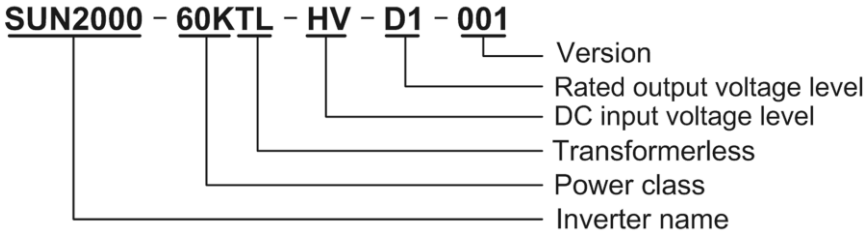


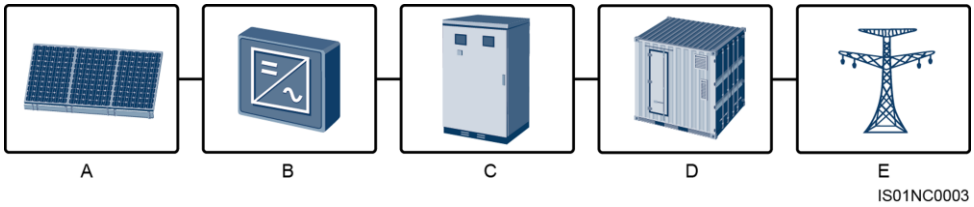
Figure 2-2 Model number description (SUN2000-60KTL-HV-D1-001)



Network Application

The SUN2000 applies to grid-tied PV systems for commercial rooftops and large plants. Typically, a grid-tied PV system consists of PV strings, grid-tied inverters, AC power distribution units, and step-up transformers.

Figure 2-3 Network application



(A) PV string

(B) SUN2000

(C) ACDU

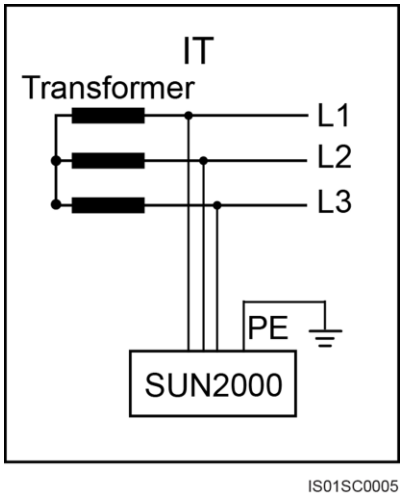
(D) Step-up transformer

(E) Power grid

Supported Power Grids

The SUN2000 only supports the IT power grid mode, as shown in Figure 2-4.

Figure 2-4 Power grid modes



NOTE

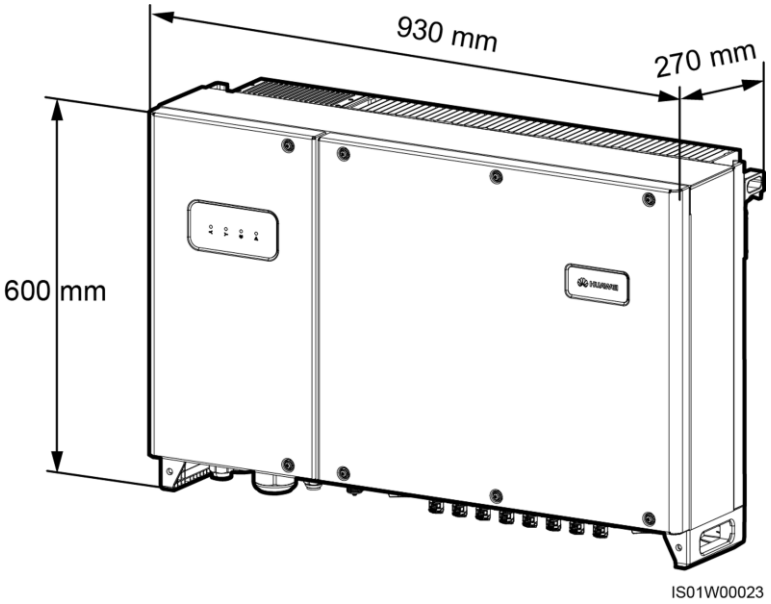
The SUN2000 applies to the AC power system with the neutral point grounding of the box-type transformer. The SUN2000 itself does not connect to any neutral wire.

2.2 Appearance

SUN2000 Dimensions

Figure 2-5 shows the SUN2000 dimensions.

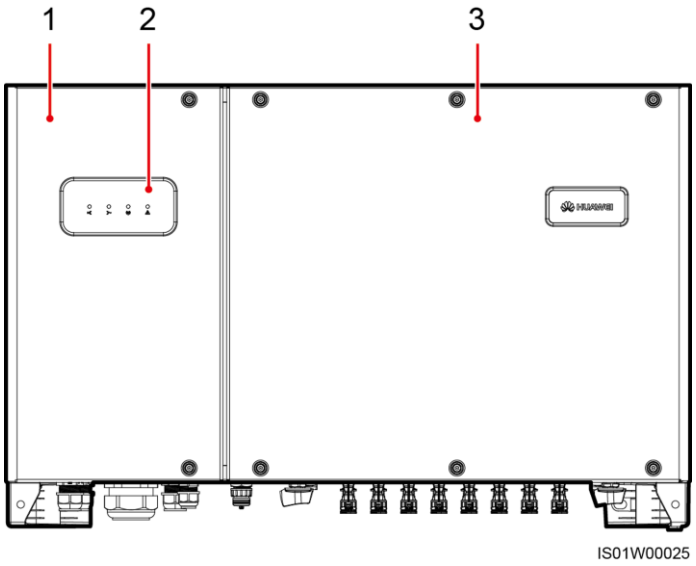
Figure 2-5 SUN2000 dimensions



Front view

2.2 Appearance shows the SUN2000 front view.

Figure 2-6 Front view



(1) Maintenance compartment door	(2) LED indicator	(3) Host panel

Table 2-1 describes the LED indicators.

Table 2-1 LED indicator description (from left to right)

Indicator	Status		Meaning
PV connection indicator 	DC input detection status	Blinking green	The DC input is normal.
		Blinking red	DC input detection is in progress.
		Steady red	The DC input is abnormal.
	PV string connection status	Steady green	At least one PV string is properly connected, and the DC input voltage of the corresponding maximum power point tracking (MPPT) circuit is higher than or equal to 600 V.
		Green off	The SUN2000 disconnects from all PV strings, or the DC input voltage of each MPPT circuit is less than 600 V.
Grid-tied indicator 	Steady green		The SUN2000 connects to the power grid.
	Green off		The SUN2000 does not connect to the power grid.
Communications indicator 	Blinking green		The SUN2000 receives communications data normally.
	Green off		The SUN2000 receives no communications data for 10s.
Alarm/Maintenance indicator 	Alarm status	Blinking red at long intervals (on for 1s and then off for 4s)	A warning alarm is generated.
		Blinking red at short intervals (on for 0.5s and then off for 0.5s)	A minor alarm is generated.
		Steady red	A critical alarm is generated.
	Local maintenance status	Blinking green at long intervals (on for 1s and then off for 1s)	Local maintenance is in progress.
		Blinking green at short intervals (on for 0.125s and then off for 0.125s)	Local maintenance fails.
		Steady green	Local maintenance succeeds.

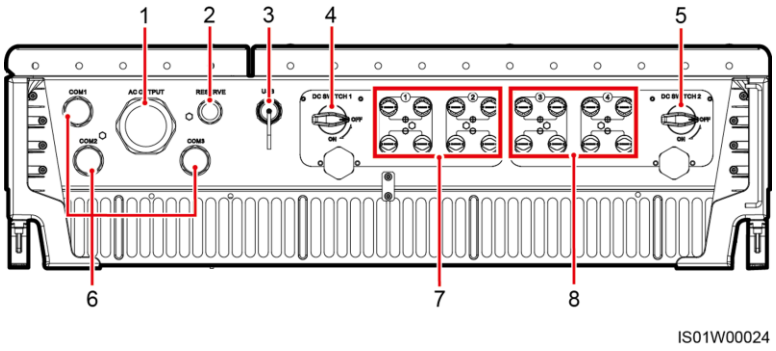
NOTE

- If both DC switches are OFF, the PV connection indicator indicates the DC input detection status. If one or two DC switches are ON, the PV connection indicator indicates the PV string connection status.
- Local maintenance refers to operations performed after a USB flash drive, Bluetooth module, WLAN module or USB data cable is inserted into the USB port of the SUN2000. For example, local maintenance includes configuration import and export using a USB flash drive, and maintenance operations on the SUN2000 app installed on a device connected to the SUN2000 by a Bluetooth module, WLAN module or USB data cable.
- If an alarm occurs during local maintenance, the Alarm/Maintenance LED shows the local maintenance status first. After the USB flash drive, Bluetooth module, WLAN module or USB data cable is removed, the LED shows the alarm status.

Bottom View

Figure 2-7 shows the SUN2000 bottom view.

Figure 2-7 Bottom view



No.	Component	Silk Screen
1	Waterproof cable connector (inner diameter: 37–44 mm)	AC OUTPUT
2	Waterproof cable connector (inner diameter: 10–15 mm)	RESERVE
3	USB port	USB
4	DC switch 1	DC SWITCH 1
5	DC switch 2	DC SWITCH 2
6	Waterproof cable connector (inner diameter: 14–18 mm)	COM1, COM2, COM3
7	DC input terminal (controlled by DC SWITCH 1)	+/–
8	DC input terminal (controlled by DC SWITCH 2)	+/–

NOTE

Waterproof cable connector is abbreviated as waterproof connector in the following text.

2.3 Label Description

Symbols

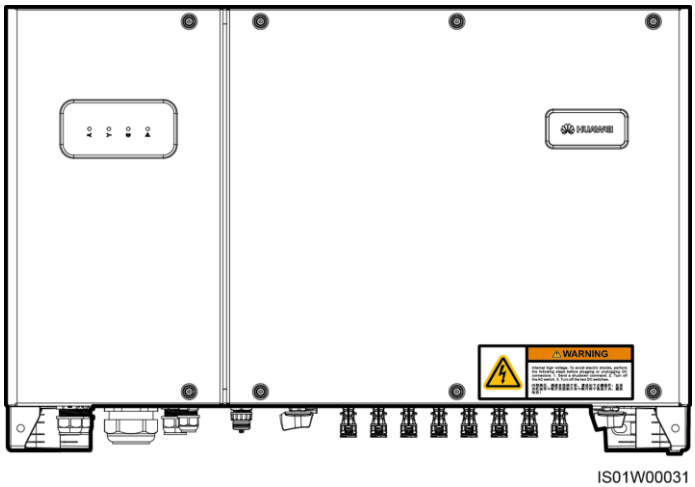
Table 2-2 describes the labels on the SUN2000 chassis and their meanings.

Table 2-2 Label description

Symbol	Name	Meaning
	Running warning	Potential hazards exist after the SUN2000 is powered on. Take protective measures when operating the SUN2000.
	Burn warning	Do not touch a running SUN2000 because it generates high temperatures on the shell.
	Delay discharge	• High voltage exists after the SUN2000 is powered on. Only qualified and trained electrical technicians are allowed to perform operations on the SUN2000. • Residual voltage exists after the SUN2000 is powered off. It takes 5 minutes for the SUN2000 to discharge to the safe voltage.
	Refer to documentation	Remind operators to refer to the documents shipped with the SUN2000.
	Grounding	Indicates the position for connecting the protection ground cable.
	Operation warning	Do not remove the DC input connector when the SUN2000 is running.

Symbol	Name	Meaning
	DC terminal operation warning[a]	High voltage exists after the SUN2000 is powered on. To avoid electric shocks, perform the following system power-off operations before plugging or unplugging DC input connectors of the SUN2000: 1. Send a shutdown command. 2. Turn off the downstream AC switch. 3. Turn off the two DC switches at the bottom.
	SUN2000 serial number label	Indicates the SUN2000 serial number.
	Weight label	The SUN2000 needs to be carried by more than one person or using a pallet truck.
Note a: Fittings delivered with the SUN2000 contain the label of DC terminal operation warning. You are advised to attach the label at the bottom of the SUN2000 front side, as shown in Figure 2-8. You can also select an appropriate place for attaching the label based on site requirements.		

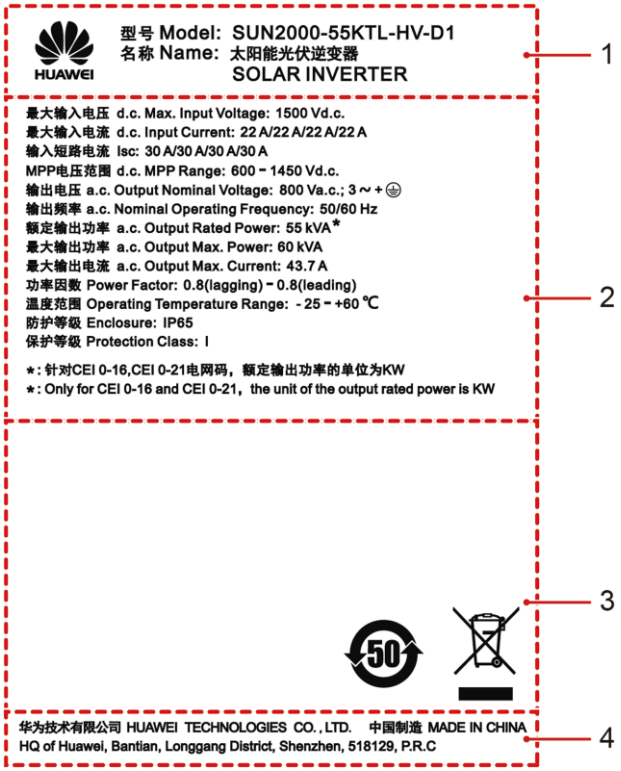
Figure 2-8 Place for attaching



Nameplate

The SUN2000 is labeled with a nameplate on the side that contains the model information, technical specifications, and compliance symbols, as shown in 2.3 Label Description (which uses SUN2000-55KTL-HV-D1 as an example).

Figure 2-9 Nameplate



(1) Trademark and product model

(2) Important technical specifications

(3) Compliance symbols

(4) Company name and country of manufacture

NOTE

The certification marks on the nameplate will be subject to the actual product.

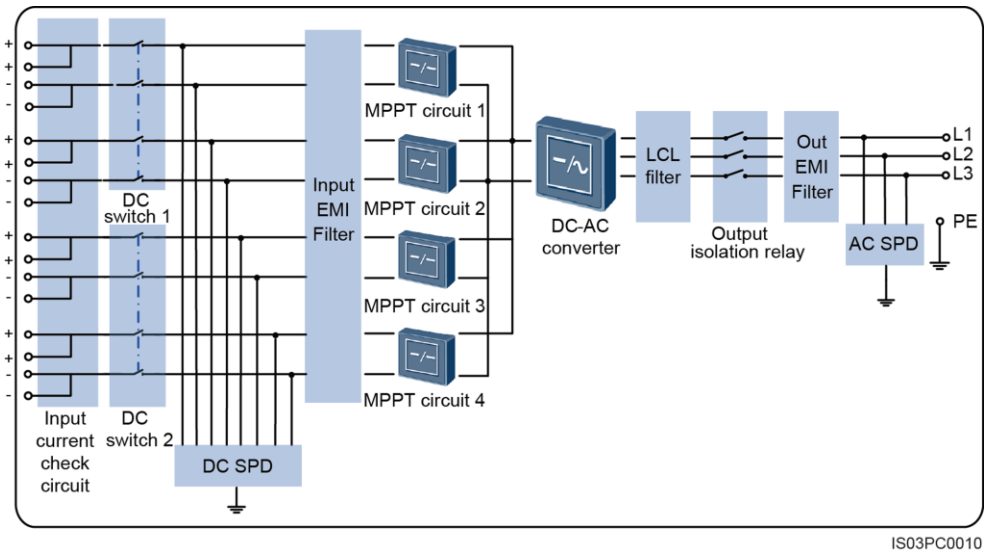
2.4 Working Principle

Conceptual Diagram

The SUN2000 receives inputs from eight PV strings. Then the inputs are grouped into four MPPT routes inside the SUN2000 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 2-10 shows the SUN2000 conceptual diagram.

Figure 2-10 SUN2000 conceptual diagram



Working Modes

The SUN2000 can work in standby, operating, or shutdown mode. Figure 2-11 shows the relationship between the three working modes.

Figure 2-11 SUN2000 working modes

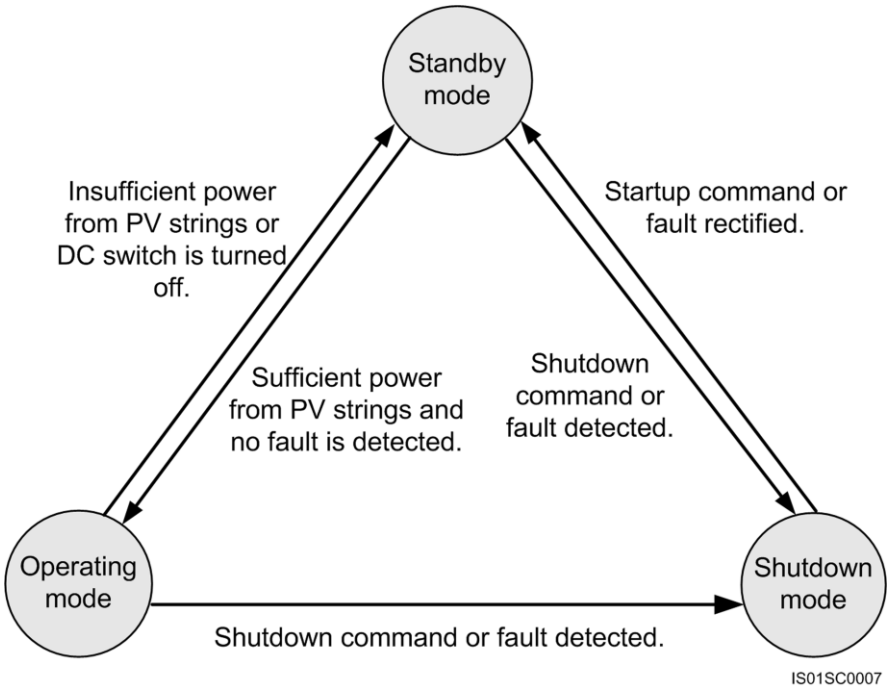


Table 2-3 describes the three working modes shown in Figure 2-11.

Table 2-3 Working mode description

Working Mode	Description
Standby	The SUN2000 enters the standby mode when the external environment does not meet the requirements for starting the SUN2000. In standby mode: • The SUN2000 continuously performs self-check and enters the operating mode once the operating requirements are met. • If the SUN2000 enters the 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. • The SUN2000 enters the shutdown mode after detecting a fault or a shutdown command, and enters the standby mode after detecting that the PV string output power does not meet the requirements for grid-tied electricity generation.
Shutdown	• In standby or operating mode, the SUN2000 enters the shutdown mode after detecting a fault or shutdown command. • In shutdown mode, the SUN2000 enters the standby mode after detecting a startup command or that a fault is rectified.

3 Inverter Storage

The following requirements should be met if the SUN2000 is not put into use directly:

- Do not remove the packing materials, and check the packing materials regularly (recommended: every three months). If any rodent bites are found, replace the packing materials immediately. If the solar inverter is unpacked but not put into use immediately, put it inside the original package with the desiccant bag, and seal it using tape.
- Keep the storage temperature at –40°C to +70°C and the humidity at 5%–95% RH. The air must not contain corrosive or flammable gases.
- The solar inverter should be stored in a clean and dry place and be protected from dust and water vapor corrosion. The solar inverter must be protected against rain and water.
- A maximum of five inverters can be stacked.
- Do not tilt the package or place it upside down.
- Periodic inspections are required during the storage. If any rodent bites are found, replace the packing materials immediately.
- If the solar inverter has been stored for more than two years, it must be checked and tested by professionals before being put into use.

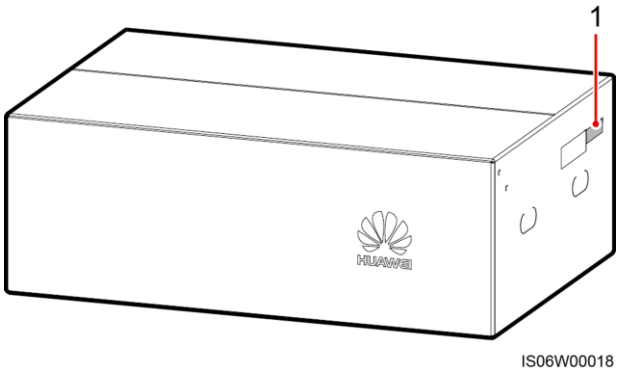
4 Installation

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.

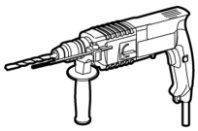
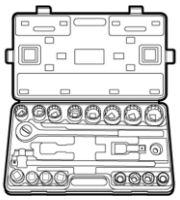
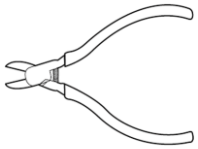
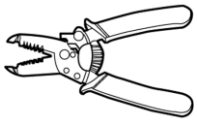
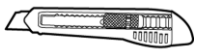
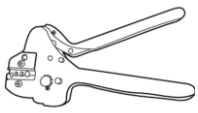
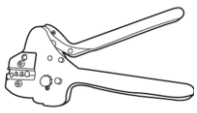
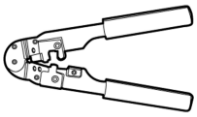
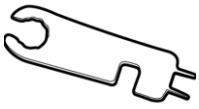
Package Contents

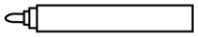
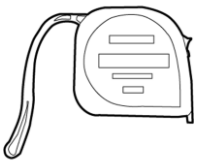
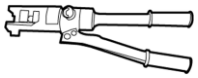
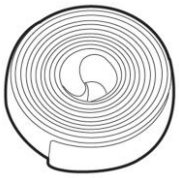
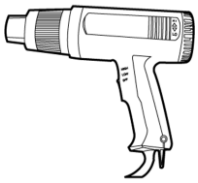
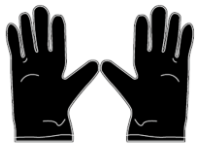
After unpacking the inverter, check that the contents are intact and complete. If any damage is found or any component is missing, contact your supplier.

NOTE

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

4.2 Materials

Category	Materials		
Installation tool	 Hammer drill Drill bit: Φ14 mm and Φ16 mm	 Socket wrench	 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 (used to crimp metal cold forming contacts) Model: UTXTC0001 or H4TC0001; manufacturer: Amphenol	 Crimping tool (used to crimp metal stamping forming contacts) Model: UTXTC0002; manufacturer: Amphenol	 RJ45 crimping tool
	 Removal wrench Model: UTXTWA001; manufacturer: Amphenol	 Removal wrench Model: H4TW0005; manufacturer: Amphenol	 Vacuum cleaner

Category	Materials		
	 Multimeter DC voltage measurement range ≥ 1500 V DC	 Marker	 Measuring tape
	 Bubble or digital level	 Hydraulic pliers	 Heat shrink tubing
	 Heat gun	 Cable tie	N/A
Personal protective equipment (PPE)	 Safety gloves	 Safety goggles	 Anti-dust respirator
	 Safety shoes	N/A	N/A

NOTE

Choose one from UTXTWA001 and H4TW0005.

4.3 Determining the Installation Position

Basic Requirements

- The SUN2000 is protected to IP65 and can be installed indoors or outdoors.
- Do not install the SUN2000 in a place where personnel are easy to come into contact with its chassis and heat sinks, because these parts are extremely hot during operation.
- Do not install the SUN2000 in areas with flammable or explosive materials.

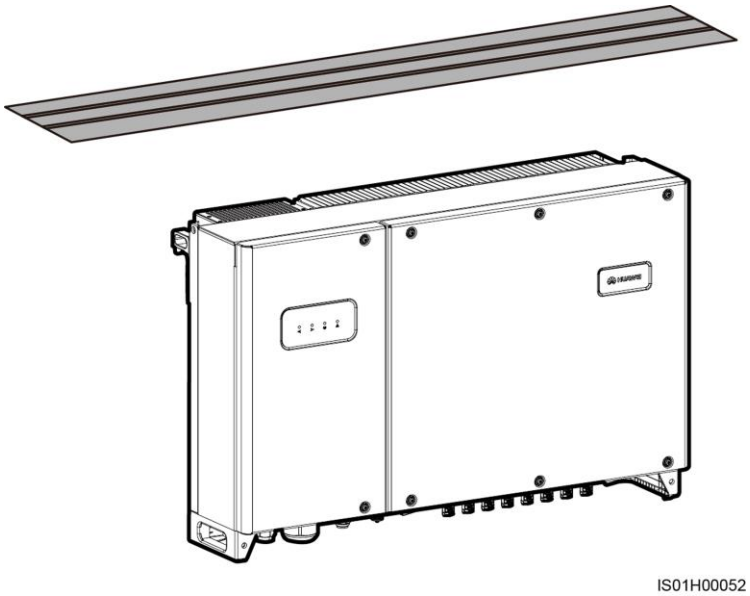
⚠ WARNING

If the equipment is installed in a public place or in an area of people activities, such as a parking lot, station, factory building, or residential area, install a protective net outside the equipment and erect a safety warning sign to isolate the equipment. The purpose is to avoid personal injury or property loss caused by contact with the equipment by nonprofessionals or other reasons during the operation of the equipment.

Environment Requirements

- The SUN2000 must be installed in a well-ventilated environment to ensure good heat dissipation.
- Recommended: Install the SUN2000 in a sheltered place or a place with an awning.

Figure 4-2 Awning



Carrier Requirements

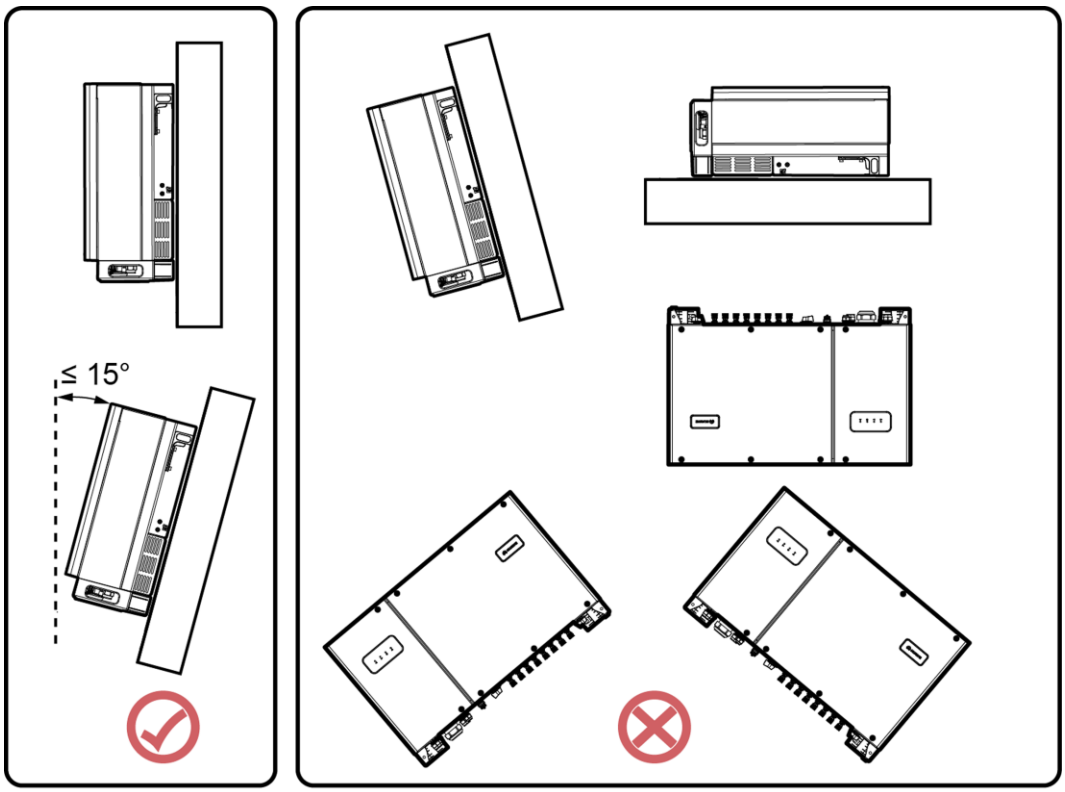
- The mounting structure where the SUN2000 is installed must be fire-resistant.
- Do not install the SUN2000 on flammable building materials.

- The SUN2000 weighs more than 60 kg. Ensure that the installation surface is solid enough to bear the weight load.
- In residential areas, do not install the SUN2000 on drywalls or walls made of similar materials which have a weak sound insulation performance because the noise generated by the SUN2000 is noticeable.

Installation Angle Requirements

- Install the SUN2000 vertically or at a maximum back tilted angle of 15 degrees to facilitate heat dissipation.
- Do not install the SUN2000 at forward tilted, excessive back tilted, side tilted, horizontal, or upside down positions.

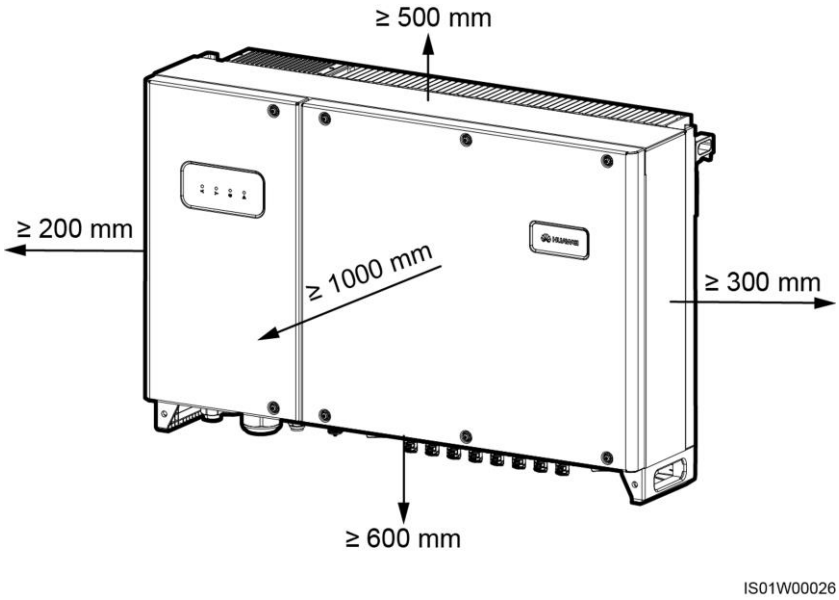
Figure 4-3 Installation angle



Installation Space Requirements

- The SUN2000 dimensions (W x H x D) are 930 mm x 600 mm x 270 mm. Reserve enough clearance around the SUN2000 to ensure sufficient space for installation and heat dissipation.

Figure 4-4 Installation space requirements



NOTE

For ease of installing the SUN2000 on the mounting bracket, connecting cables to the bottom of the SUN2000, and maintaining the SUN2000 in future, it is recommended that the bottom clearance be between 600 mm and 730 mm. If you have any questions about the distance, consult the local technical support engineers.

- When installing multiple SUN2000s, 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 4-5 Horizontal installation mode (recommended)

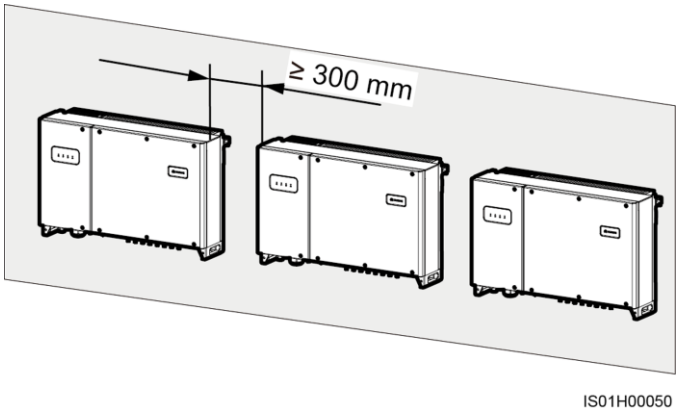


Figure 4-6 Triangle installation mode (recommended)

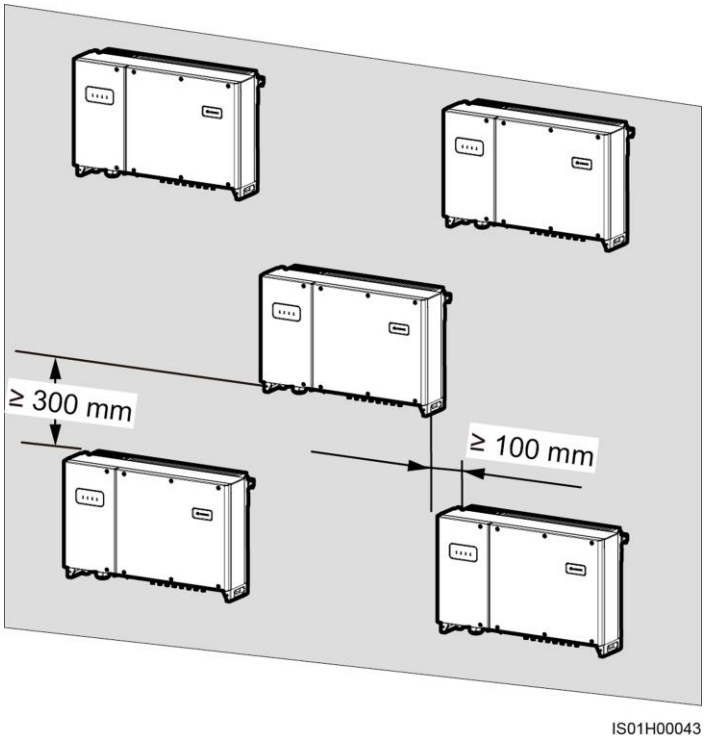
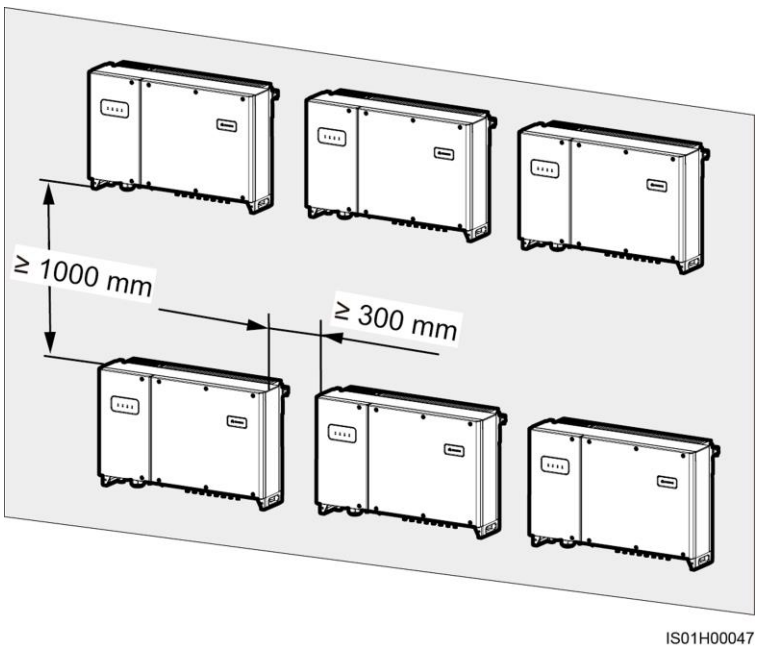


Figure 4-7 Stacked installation mode (not recommended)

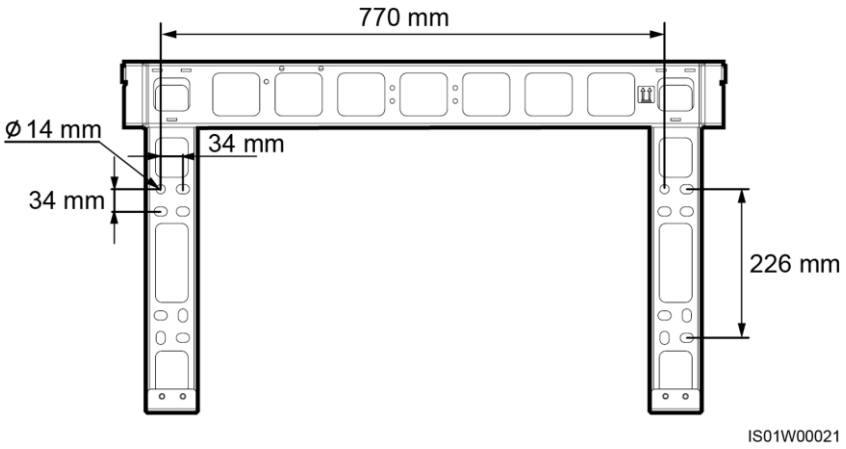


4.4 Installing the Mounting Bracket

Context

Figure 4-8 shows the SUN2000 mounting bracket dimensions.

Figure 4-8 Mounting bracket dimensions

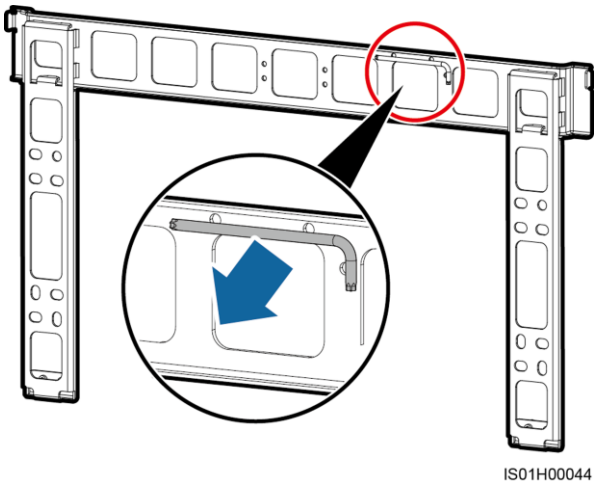


NOTE

The SUN2000 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. Two round holes are preferred.

Before installing the mounting bracket, remove the security torx wrench from the mounting bracket and save for later use.

Figure 4-9 Removing a security torx wrench



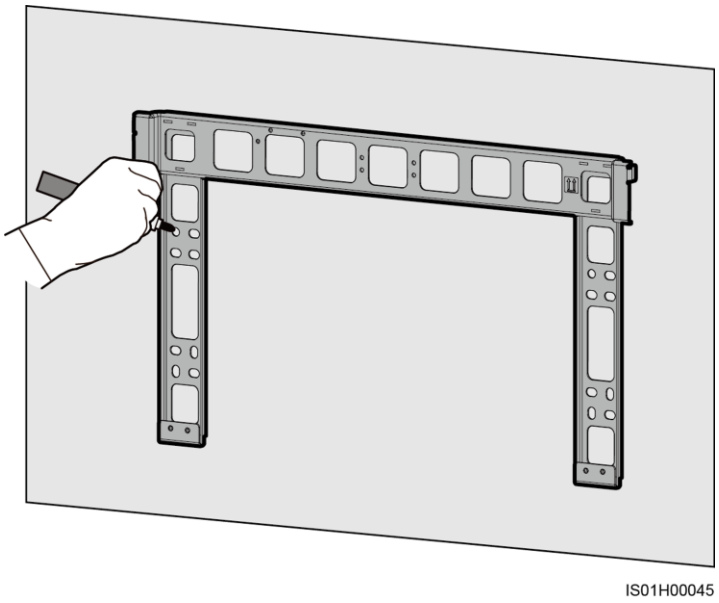
NOTICE

The bolts supplied with the SUN2000-60KTL-HV-D1 are M12x40 bolt assemblies. The bolts supplied with other models of SUN2000s are M12x60 expansion bolts and M12x40 bolt assemblies.

Wall-mounted Installation

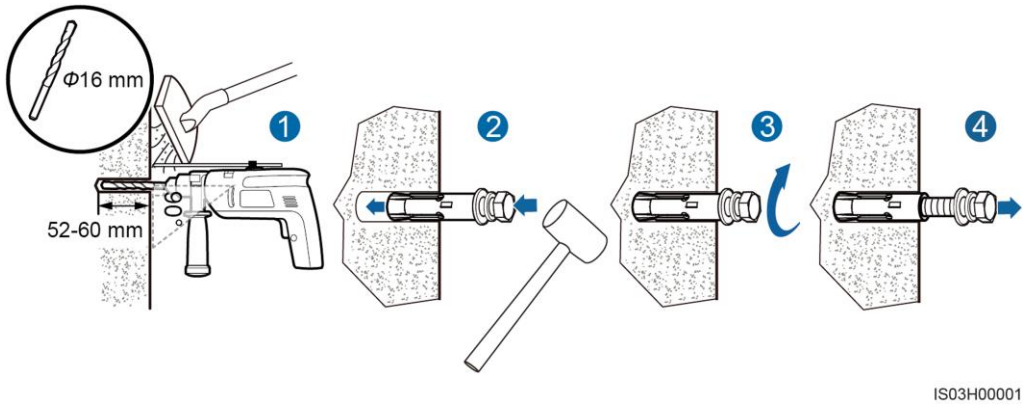
Step 1 Determine the positions for drilling holes using the mounting bracket. Level the positions of mounting holes using a bubble or digital level, and mark the positions with a marker.

Figure 4-10 Determining hole positions



Step 2 Drill holes using a hammer drill and install expansion bolts.

Figure 4-11 Drilling a hole and installing an expansion bolt



WARNING

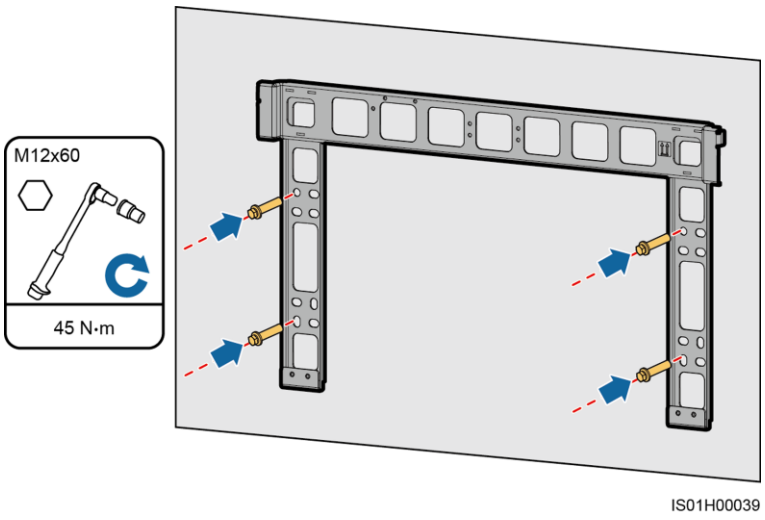
Avoid drilling holes in the utility pipes and/or cables attached to back of the wall.

NOTICE

- To prevent dust inhalation or contact with eyes, wear safety goggles and an anti-dust mask 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 new set of the 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 concrete wall.

Step 3 Align the mounting plate holes with the drilled holes, insert expansion bolts into the holes through the mounting plate, and then tighten the expansion bolts.

Figure 4-12 Securing a mounting bracket

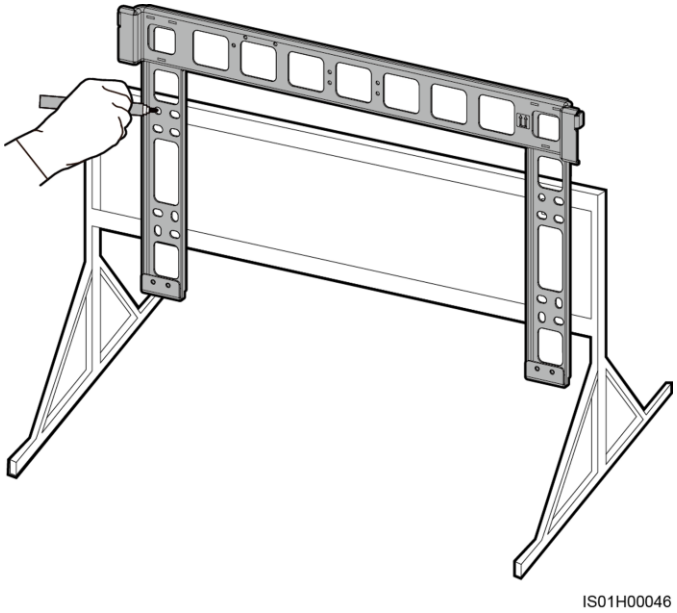


----End

Support-mounted Installation

Step 1 Determine the positions for drilling holes using the mounting bracket. Level the positions of mounting holes using a bubble or digital level, and mark the positions with a marker.

Figure 4-13 Determining hole positions

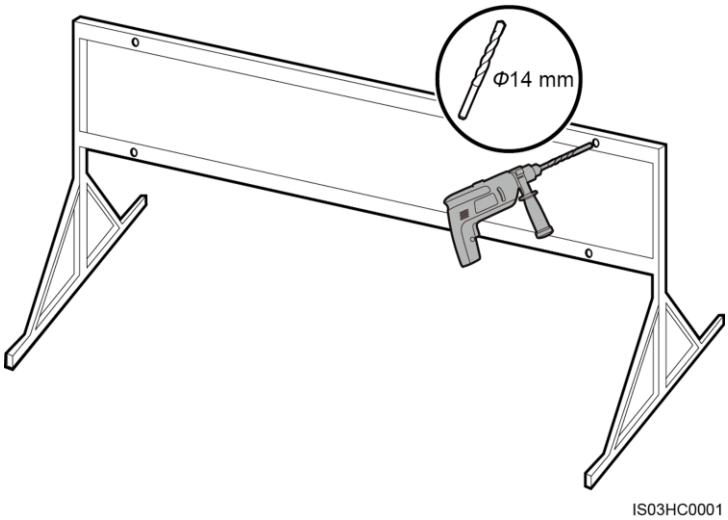


Step 2 Drill holes using a hammer drill.

NOTE

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

Figure 4-14 Drilling holes

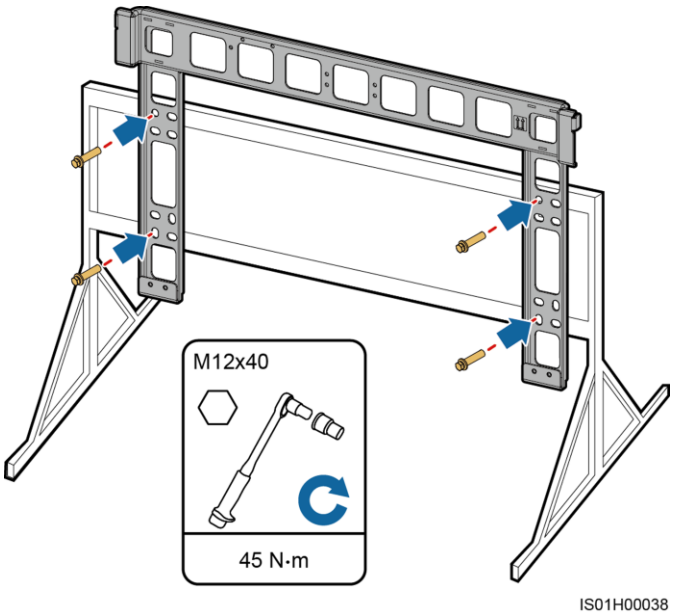


Step 3 Align the mounting plate holes with the drilled holes, insert bolt assemblies (flat washers, spring washers, and M12x40 bolts) into the holes through the mounting plate, and secure them using the shipped stainless steel nuts and flat washers.

NOTE

The SUN2000 is delivered with M12x40 bolt assemblies. If the bolt length does not meet the installation requirements, prepare M12 bolt assemblies by yourself and use them together with the delivered M12 nuts.

Figure 4-15 Securing a mounting bracket



----End

4.5 Installing the SUN2000

Prerequisites

Before installing the SUN2000, take it out from the packing case and move it to the installation position.

CAUTION

To prevent device damage and personal injury, keep balance when moving the SUN2000 because it is heavy.

NOTICE

- Move the SUN2000 by four people with an appropriate transportation tool.
- Do not use the wiring terminals at the bottom to support any weight of the SUN2000.
- When need to temporally place the SUN2000 on the ground, use foam, paper or other protection material to prevent damage to its cover.

Procedure

Step 1 If you can mount the SUN2000 onto the mounting bracket directly, go to Step 3 and then Step 5.

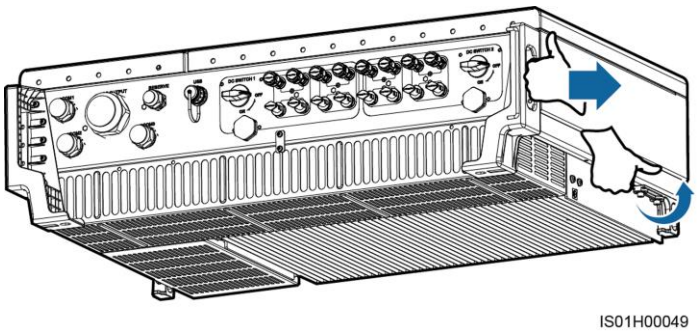
Step 2 If you cannot mount the SUN2000 onto the mounting bracket directly, go to Step 3 and then Step 6.

Step 3 Ensure that minimum of two people lift one SUN2000 and turn it upright. Move the SUN2000 with handles at the top and bottom.

⚠ CAUTION

To prevent device damage and personal injury, keep balance when lifting the SUN2000 because it is heavy.

Figure 4-16 Lifting a SUN2000

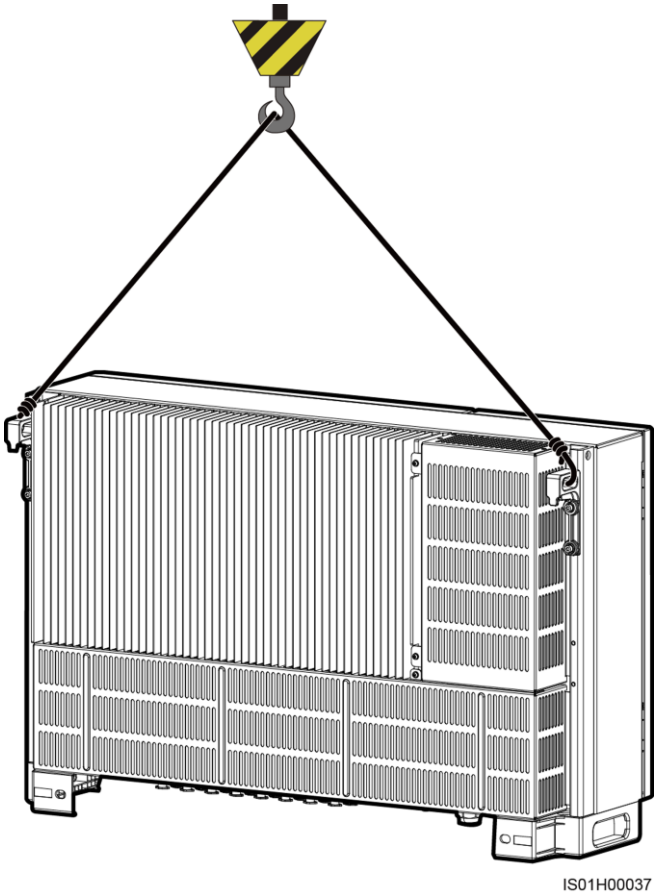


Step 4 Run a lifting sling through the lifting eyes of the SUN2000.

⚠ CAUTION

When lifting the SUN2000, keep balance to prevent the SUN2000 impacting with a wall or other objects.

Figure 4-17 Lifting a SUN2000

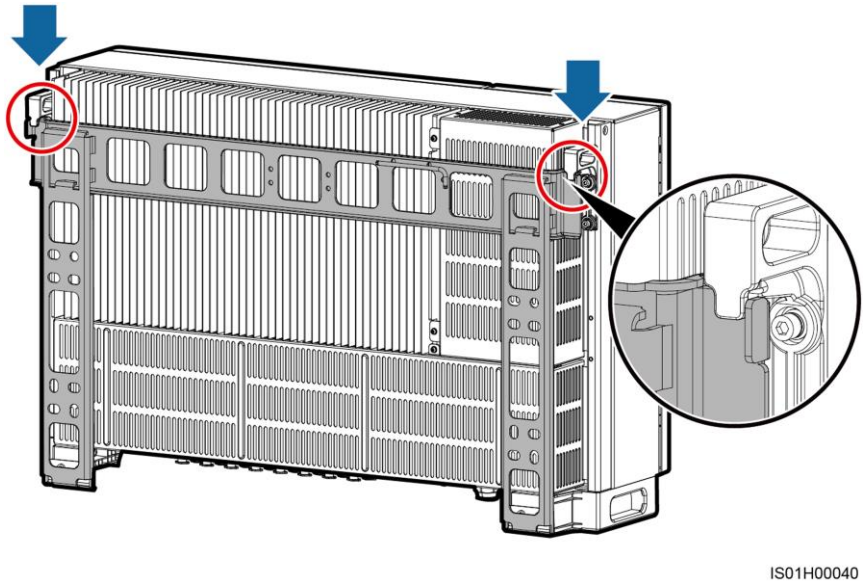


NOTE

The figure is for reference only.

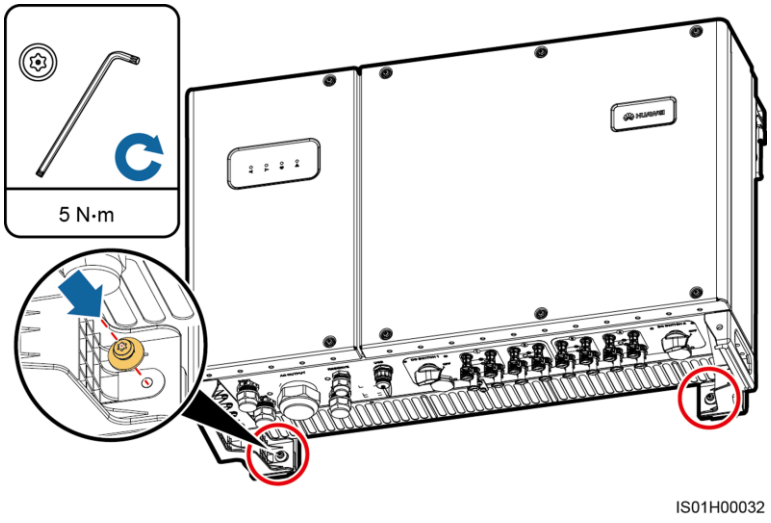
Step 5 Install the SUN2000 on the mounting bracket and align the SUN2000 chassis with the mounting bracket.

Figure 4-18 Mounting the SUN2000 onto a mounting bracket



Step 6 Tighten the two antitheft screws using a security torx wrench.

Figure 4-19 Tightening antitheft screws



----End

Precautions

⚠ CAUTION

- If the equipment is installed in a public place or in an area of people activities, such as a parking lot, station, factory building, or residential area, install a protective net outside the equipment and erect a safety warning sign to isolate the equipment. The purpose is to avoid personal injury or property loss caused by contact with the equipment by nonprofessionals or other reasons during the operation of the equipment.
- If the solar inverter has not been running for more than half a year after being mounted, it must be checked and tested by professionals before being put into operation.

5 Electrical Connections

5.1 Precautions

DANGER

Before connecting cables, ensure that the two DC switches on the SUN2000 are OFF. Otherwise, the high voltage of the SUN2000 may result in electric shocks.

WARNING

- The equipment damage caused by incorrect cable connections is beyond the warranty scope.
- Only certified electrician can perform electrical terminations.
- Wear proper PPE at all time when terminating 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 grounding).

5.2 Crimping the OT Terminal

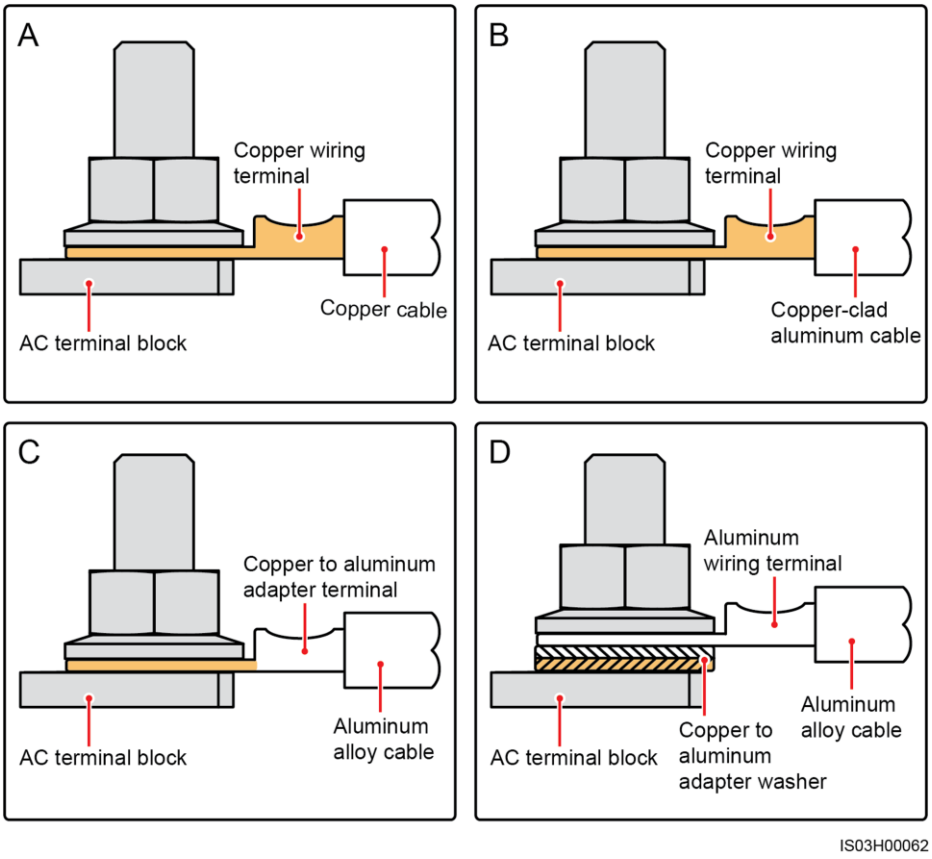
Requirements for the OT Terminal

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

NOTICE

- Directly connecting an aluminum wiring terminal to the AC terminal block will cause electro-chemical corrosion and weaken the cable connection reliability.
- The copper to aluminum adapter terminal or an aluminum wiring terminal with a copper to aluminum adapter washer must comply with IEC61238-1.
- Do not mix up the aluminum and copper sides of the copper to aluminum adapter washer. Ensure that the aluminum side of the washer contacts the aluminum wiring terminal, and the copper side contacts the AC terminal block.

Figure 5-1 Requirements for the OT terminal

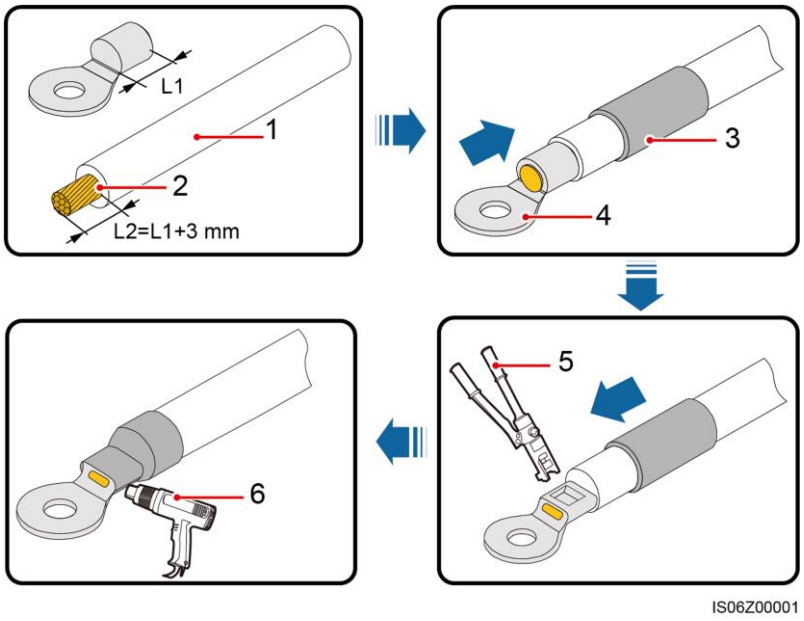


Crimping the OT terminal

NOTICE

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

Figure 5-2 Crimping the OT Terminal



(1) Cable (2) Core wire (3) Heat shrink tubing

(4) OT terminal (5) Hydraulic pliers (6) Heat gun

5.3 Connecting a ground cable

Prerequisites

The ground cable and OT terminal are available.

- Ground cable: You are advised to use an outdoor copper cable with a conductor cross-sectional area greater than or equal to 16 mm^2, and the conductor cross-sectional area should be greater than or equal to half of the conductor cross-sectional area of the AC power cable.
- OT terminal: M6 and matching the wire gauge of chosen

Context

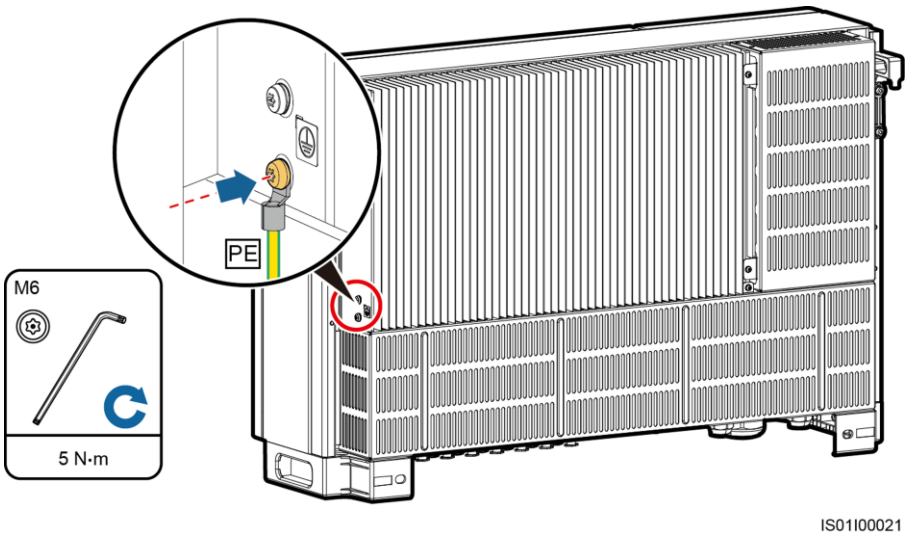
- The ground point on the enclosure is preferred to connect to the PE cable for the SUN2000.
- The ground point in the maintenance compartment is mainly used for connecting to the ground cable included in the multi-core AC power cable. For details, see section 5.5 Connecting AC Output Power Cables.
- There are two ground points on the chassis shell and you only need to use either of them.
- It is recommended that the ground cable be connected to a nearby ground point. For a system with multiple SUN2000s connected in parallel, connect the ground points of all SUN2000s to ensure equipotential connections to ground cables.

Procedure

Step 1 Crimp the OT terminal.

Step 2 Secure the ground cable using the ground screw.

Figure 5-3 Connecting a ground cable



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Follow-up Procedure

Recommendation: To enhance the corrosion resistance of a ground terminal, silica gel or paint might be needed.

5.4 Opening the Maintenance Compartment Door

Prerequisites

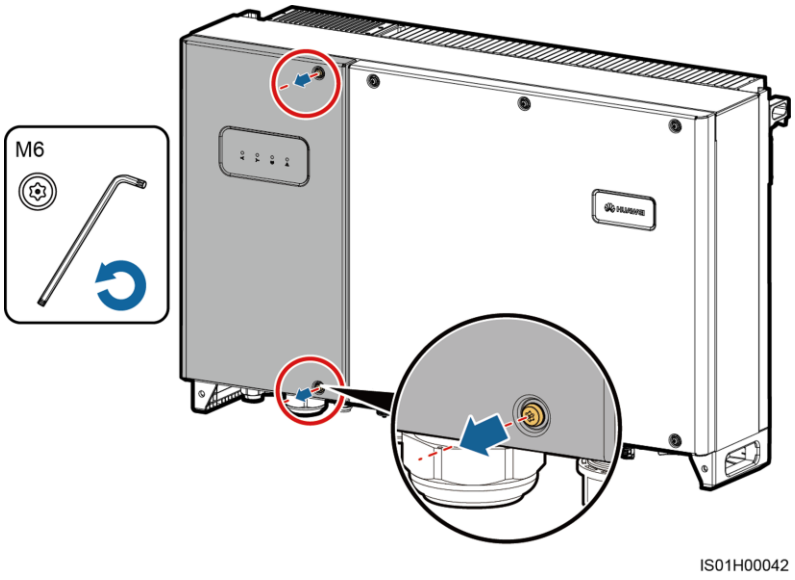
CAUTION

- Never open the Host panel cover of the SUN2000.
- Before opening the maintenance compartment door, disconnect the AC and DC power supplies. For processes of disconnecting the power supplies, see 6.4 Powering Off the SUN2000. After powering off the SUN2000, wait at least 5 minutes and then perform operations on the SUN2000.
- If you need to open the maintenance compartment door on rainy or snowy days, take protective measures to prevent rain or snow entering the maintenance compartment. If it is impossible to take protective measures, do not open the maintenance compartment door in rainy or snowy days.
- Do not leave extra hardware in the maintenance compartment.

Procedure

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

Figure 5-4 Loosening screws



NOTE

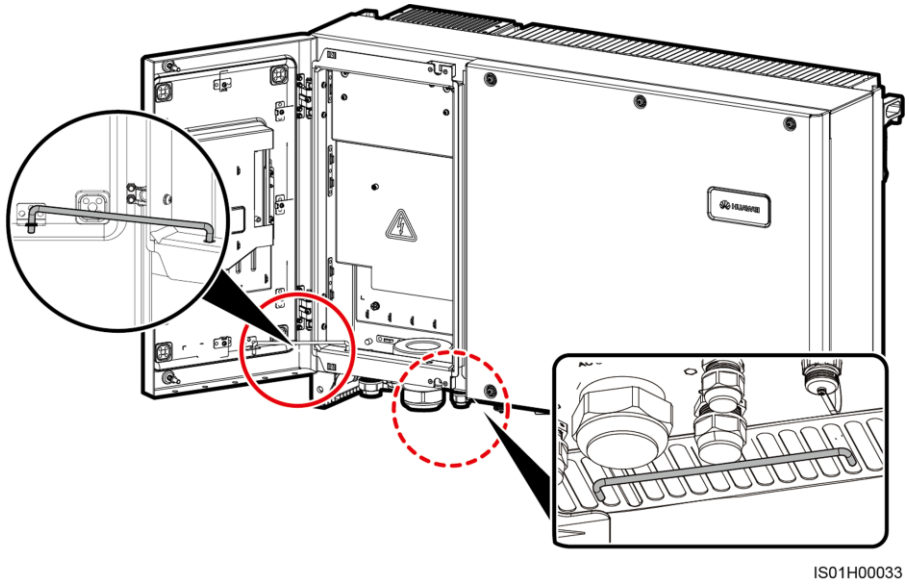
If the screws on the chassis door are lost, obtain spare screws from the fitting bag bound to the inductor cover at the bottom of the chassis.

Step 2 Open the maintenance compartment and use the support bar to stabilize the door.

NOTE

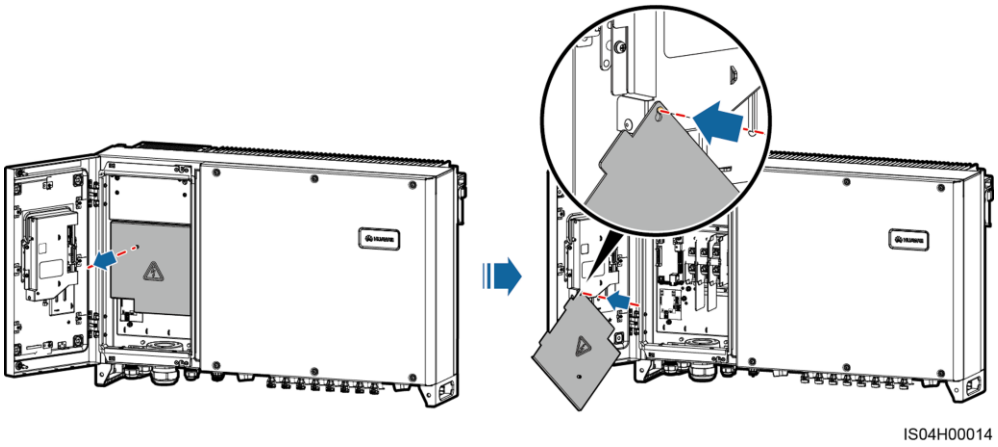
The support bar is bound to the inductor cover at the chassis base.

Figure 5-5 Stabilizing a door using a support bar



Step 3 Remove the cover and hang it on the hook of the chassis door.

Figure 5-6 Removing a cover



----End

5.5 Connecting AC Output Power Cables

Prerequisites

A three-phase AC switch needs to be configured outside the AC side of the SUN2000. To ensure that the SUN2000 can safely disconnect from the power grid under abnormal conditions, select an appropriate overcurrent protection device according to local power distribution regulations.

WARNING

Do not connect loads between the SUN2000 and the AC switch.

The SUN2000 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 SUN2000 immediately disconnects from the power grid.

NOTE

- If an AC switch that can detect residual current is installed outside the SUN2000-55KTL-HV-D1 the residual current value to trigger the switch should be greater than 600 mA.
- If an AC switch that can detect residual current is installed outside the SUN2000-60KTL-HV-D1, SUN2000-60KTL-HV-D1-001, SUN2000-55KTL-IN-HV-D1, or SUN2000-55KTL-HV-D1-001, the residual current value to trigger the switch should be greater than 660 mA.

Context

- 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.
- 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 M8 OT terminals by yourself.

Table 5-1 Cable specifications

Cable Specifications		Copper-Core Cable	Copper-Clad Aluminum Cable or Aluminum Alloy Cable
Conductor cross-sectional area (mm^2)	Range	16–70	25–70
	Recommended to use	25	35
Cable outer diameter (mm)	Range	37–44	
	Recommended to use	40	

NOTE

If you connect a ground cable to the ground point in the maintenance compartment, prepare an M6 OT terminal by yourself.

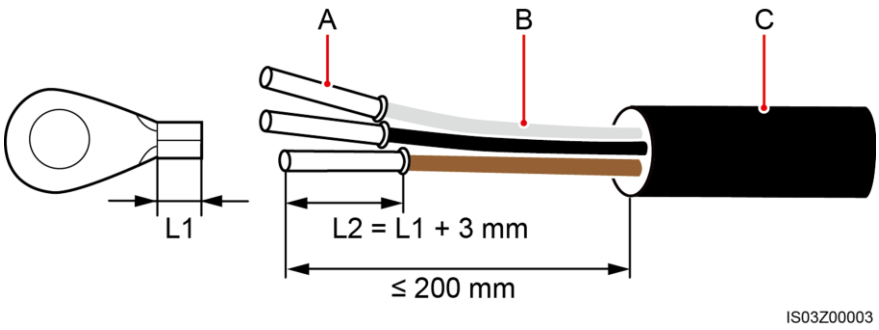
Procedure

Step 1 Remove an appropriate length of the jacket and insulation layer from the AC output power cable using a wire stripper.

NOTICE

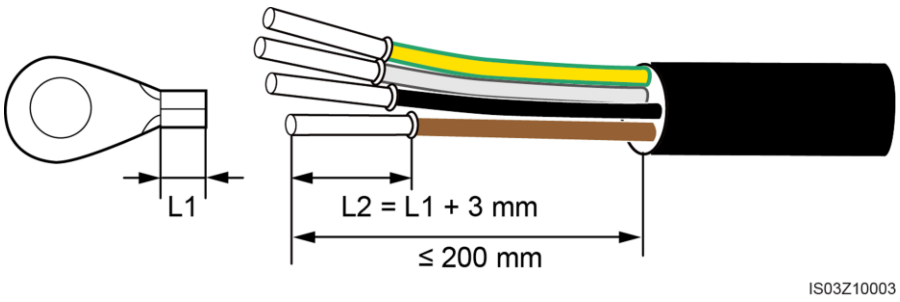
Ensure that the jacket is in the maintenance compartment.

Figure 5-7 Three-core cable



(A) Core wire (B) Insulation layer (C) Jacket

Figure 5-8 Four-core cable



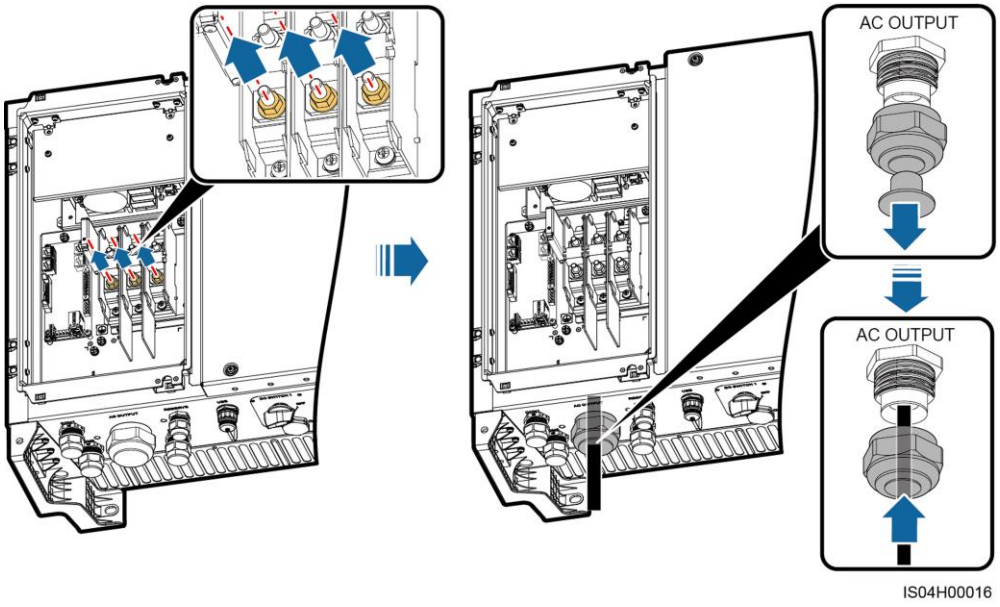
Step 2 Crimp the OT terminal.

Step 3 Route the cable through the waterproof connector.

NOTE

For ease of connecting the AC output power cable, you are advised to remove the nut assembly from the AC terminal and save it for later use, and then route the cable through the waterproof connector.

Figure 5-9 Routing cables



Step 4 Land the AC output power cable in the terminal block, and tighten the nuts with a torque wrench to achieve a proper torque value.

NOTICE

- Ensure that AC terminations provide firm and solid electrical connections. Failing to do so may cause SUN2000 malfunction and damage to its terminal block, even starting thermal events.
- If the AC output power cables are subject to a pulling force because the inverter is not installed stably, ensure that the last cable that bears the stress is the PE cable.

Figure 5-10 Connecting an AC output power cable (three-core cable)

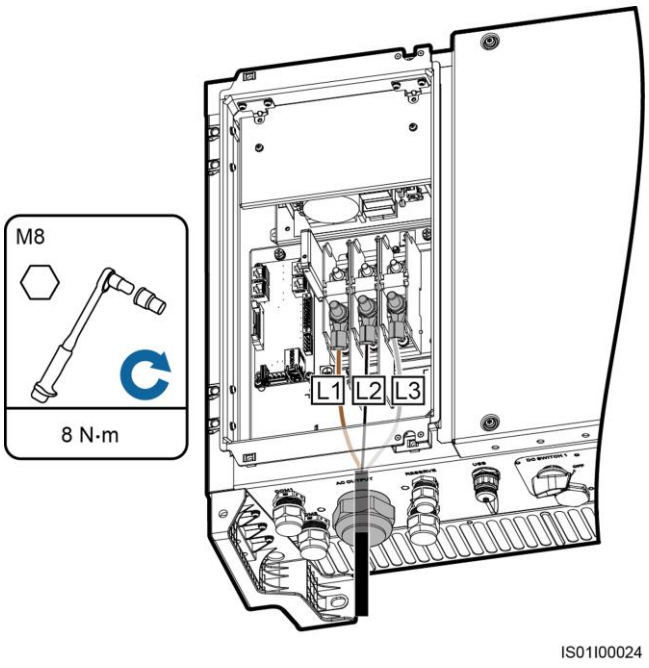
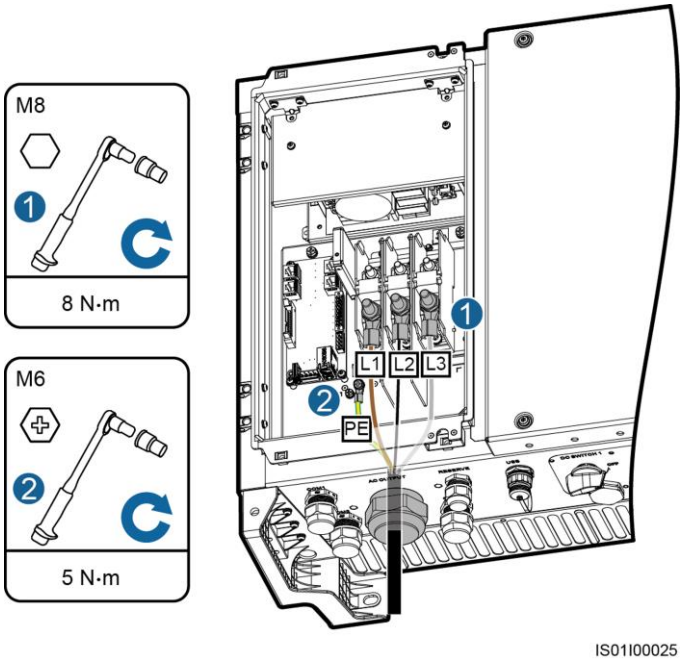


Figure 5-11 Connecting an AC output power cable (four-core cable)



NOTE

The cable colors shown in figures are for reference only. Select an appropriate cable according to the local standards.

Step 5 Tighten the sealing nut and seal the cable gland.

----End

5.6 Connecting DC input power cables

Prerequisites

DANGER

- Before connecting DC input power cables, ensure that the DC voltage is within the safe range (lower than 60 V DC) and that the two DC switches on the SUN2000 are OFF. Failing to do so may result in electric shocks.
- When the SUN2000 is grid-tied, it is not allowed to work on DC circuit, such as connecting or disconnecting a PV string or a PV module in a PV string. Failing to do so may cause electric shocks or arcing (which may further cause fire).

⚠ WARNING

Ensure that the following conditions are met. Otherwise, the SUN2000 will be damaged, or even become a fire hazard.

- The open-circuit voltage of each PV string is always lower than or equal to 1500 V DC.
- The positive and negative terminals of a PV module connect to corresponding positive and negative DC input terminals of the SUN2000.

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 SUN2000, the positive or negative terminals of PV strings may be short-circuited to ground if power cables are not properly installed or routed. In this case, an AC or DC short circuit may occur and damage the SUN2000. The caused equipment damage is beyond the warranty scope.

Context

- DC terminal selection

  Figure 5-12 shows the DC terminals at the bottom of the SUN2000. Table 5-2 shows the requirements for selecting DC terminals.

NOTE

The SUN2000 provides two DC switches, named as, DC SWITCH 1 and DC SWITCH 2. DC SWITCH 1 controls the first to fourth sets of DC input terminals, whereas DC SWITCH 2 controls the fifth to eighth sets of DC input terminals.

Figure 5-12 DC terminals

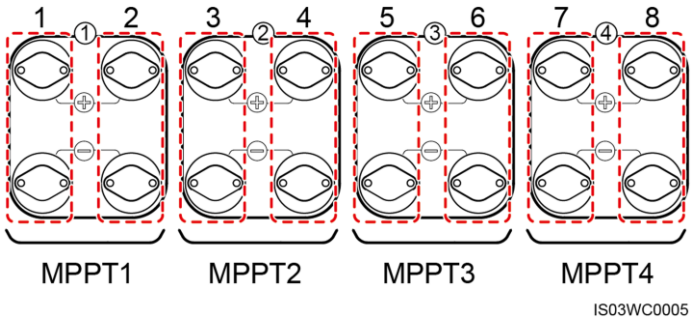


Table 5-2 Requirements for selecting DC terminals

Number of Inputs	SUN2000
1	Connects to set 1.
2	Connects to sets 1 and 5.

Number of Inputs	SUN2000
3	Connects to sets 1, 3, and 5.
4	Connects to sets 1, 3, 5, and 7.
5	Connects to sets 1, 2, 3, 5, and 7.
6	Connects to sets 1, 2, 3, 5, 6, and 7.
7	Connects to sets 1, 2, 3, 4, 5, 6, and 7.
8	Connects to sets 1, 2, 3, 4, 5, 6, 7, and 8.

- DC input power cable specifications

  Table 5-3 lists the recommended DC input power cable specifications.

Table 5-3 Recommended DC input power cable specifications

Cable Type	Conductor Cross-Sectional Area (mm²)		Cable Outer Diameter (mm)
	Range	Recommended value	
PV cable that meets the 1500 V standard	4.0–6.0 (12–10 AWG)	4.0（12 AWG）	4.5–7.8

NOTICE

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

Procedure

Step 1 Prepare the positive and negative connectors.

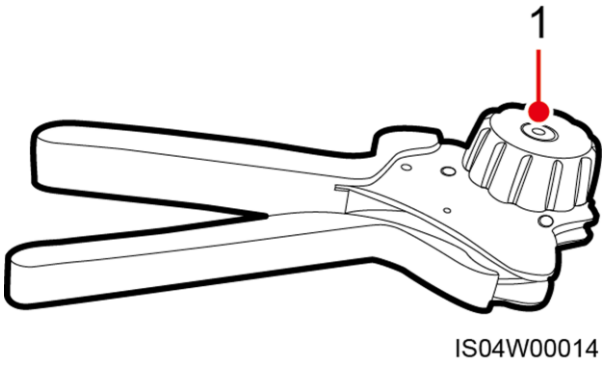
⚠ CAUTION

Use the Amphenol UTX PV connectors provided with the SUN2000. If the terminals are lost or damaged, purchase the PV connectors of the same model. The device damaged caused by incompatible PV connectors is not covered under any warranty or service agreement.

NOTICE

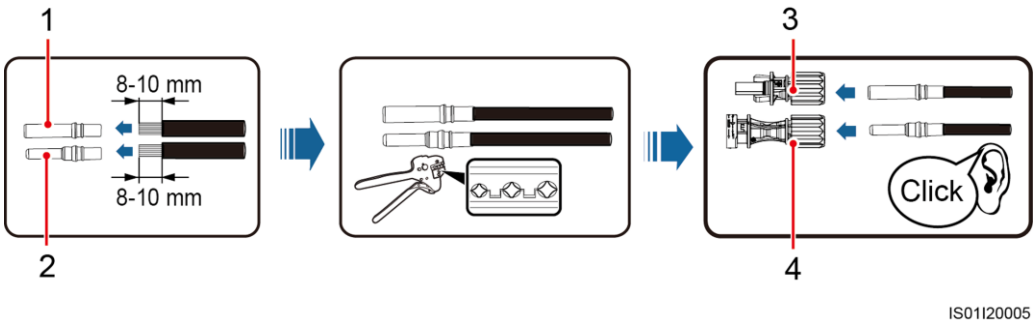
- The metal contacts supplied with the Amphenol Helios H4 PV connectors are either the cold forming contacts or stamping forming contacts. Choose the crimping tools that fit the metal contact types. Do not mix up the tools.
- Crimp the metal cold forming contacts using crimping tool UTXTC0001 (recommended) or H4TC0001. When choosing H4TC0001, do not use the locator.
- Crimp the metal stamping forming contacts using crimping tool UTXTC0002.

Figure 5-13 Locator



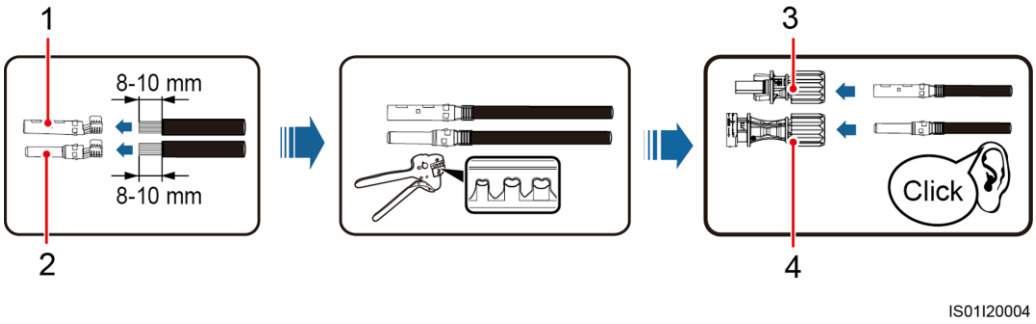
(1) Locator

Figure 5-14 Preparing positive and negative connectors (using metal cold forming contacts)



(1) Positive metal contact (cold forming)
(2) Negative metal contact (cold forming)
(3) Positive connector
(4) Negative connector

Figure 5-15 Preparing positive and negative connectors (using metal stamping forming contacts)



(1) Positive metal contact (stamping forming)

(2) Negative metal contact (stamping forming)

(3) Positive connector

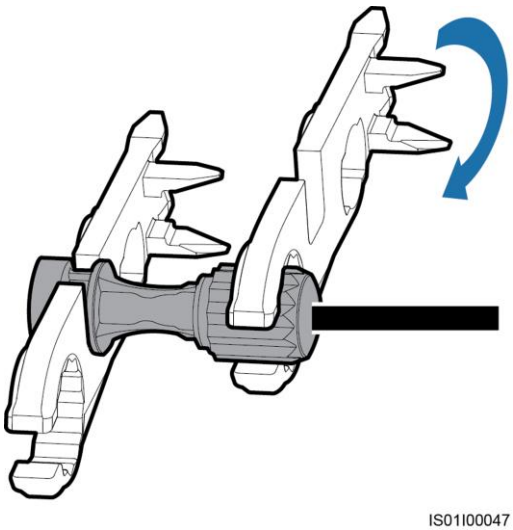
(4) Negative connector

NOTICE

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

Step 2 Tighten the locking nuts on the positive and negative connectors.

Figure 5-16 Locking a nut

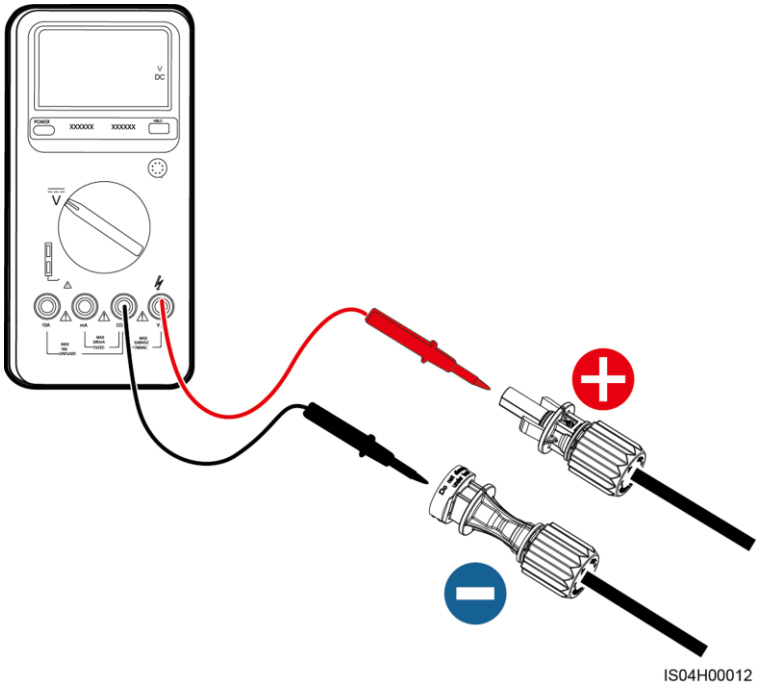


Step 3 Use a multimeter to measure the DC voltage between the positive and negative of the PV string and confirm the string polarity.

NOTICE

The DC voltage measurement range of the multimeter must be at least 1500 V.

Figure 5-17 Measuring voltage



NOTICE

- If the voltage is a negative value, the DC input polarity is incorrect. Correct the polarity.
- If the voltage is greater than 1500 V, too many PV modules configured to the same string. Remove some PV modules.

Step 4 Pull out the blue dustproof plugs from the ends of the DC input connectors.

WARNING

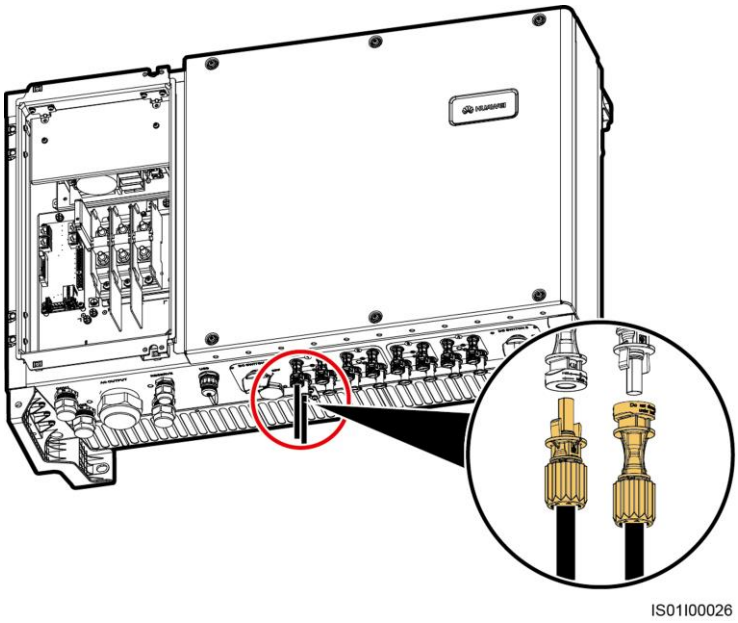
Before performing Step 5, ensure that the two DC switches are OFF.

Step 5 Insert the positive and negative connectors into the corresponding positive and negative DC input terminals of the SUN2000 until they snap into place.

NOTICE

1. After the positive and negative connectors snap into place, pull test to the DC input cables is recommended.
2. Only after at least one PV string correctly connects to the MPPT1 circuit, can the SUN2000 enable the DC input detection function. Therefore, you are required to connect DC input power cables to the MPPT1 circuit first.

Figure 5-18 Connecting DC input power cables



NOTICE

If polarity of the DC input power cable is reversed and the DC switch is ON, do not turn off the DC switch immediately or unplug positive and negative connectors. The device may be damaged if you do not follow the instruction. The caused equipment damage is beyond the warranty scope. Wait until the solar irradiance declines and the PV string current reduces to below 0.5 A, and then turn off the two DC switches and remove the positive and negative connectors. Correct the string polarity before reconnecting the string to the SUN2000.

----End

5.7 Connecting the Communications Cable

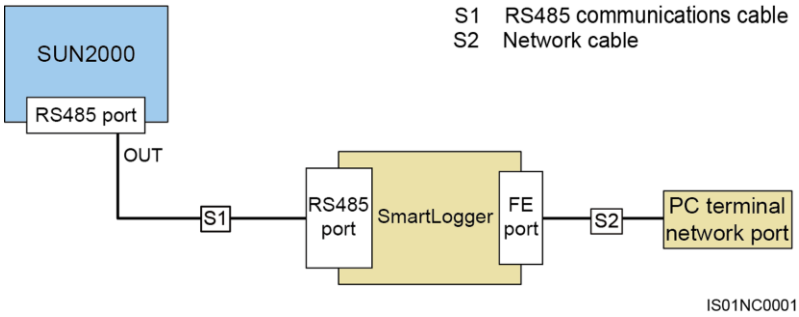
5.7.1 Communication Mode Description

RS485 Communication

The SUN2000 can connect to the SmartLogger over RS485 or to a PC through the SmartLogger to implement communication. You can use the SUN2000 app, SmartLogger, embedded WebUI, or the network management software (such as the NetEco) on the PC to query information about the SUN2000, such as energy yield, alarms, and running status.

- Figure 5-19 shows the communication mode for a single SUN2000.

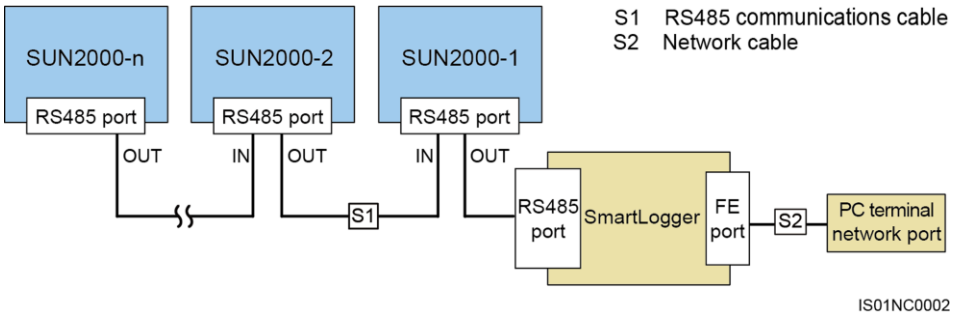
Figure 5-19 Communication mode for a single SUN2000



- Figure 5-20 shows the communication mode for multiple SUN2000s.

  If multiple SUN2000s are used, connect all the SUN2000s in daisy chain mode over an RS485 communications cable.

Figure 5-20 Communication mode for multiple SUN2000s



NOTE

- The RS485 communication distance between the SUN2000 at the end of the daisy chain and the SmartLogger cannot exceed 1000 meters.
- If multiple SUN2000s need to communicate with one another and are connected to a PC over the SmartLogger2000, a maximum of six daisy chains can be configured.
- To ensure the system response speed, it is recommended that the number of devices on each daisy chain be less than 30.

MBUS (PLC) Communication

The MBUS (PLC) communication board loads communication signals onto power cables for transmission.

NOTE

The built-in MBUS (PLC) module in the SUN2000 does not need to be connected with additional cables.

Selecting a Communication Mode

The RS485 and MBUS (PLC) communication modes are mutually exclusive.

- If the MBUS (PLC) communication mode is selected, do not connect the RS485 communications cable. In addition, you need to set **MBUS Communication** to **Enable** on the SUN2000 app.
- If the RS485 communication mode is selected, you are advised to set **MBUS Communication** to **Disable** on the SUN2000 app.

NOTE

MBUS Communication is set to **Enable** by default.

NOTICE

The MBUS (PLC) communication mode is only applicable to medium-voltage grid connection scenarios and non-low-voltage public grid connection scenarios (industrial environment).

5.7.2 Connecting the RS485 Communications Cable

Description

An RS485 communications cable can be connected in two ways:

- Terminal block connection

  You are advised to use a DJYP2VP2-22 2x2x1 PC cable or a communications cable with a conductor cross-sectional area of 1 mm^2 and cable outer diameter of 14–18 mm.
- RJ45 network port connection

  You are advised to use a CAT 5E outdoor shielded network cable with an outer diameter less than 9 mm and internal resistance not greater than 1.5 ohms/10 m, with a shielded RJ45 connector.

NOTE

Select either connection mode during installation. Terminal block connection is preferred.

NOTICE

When laying out communications cables, separate them from power cables and avoid large signal interference sources to protect communication from being affected.

Terminal Block Pin Definitions

Figure 5-21 shows an RS485 terminal block.

Figure 5-21 Terminal block

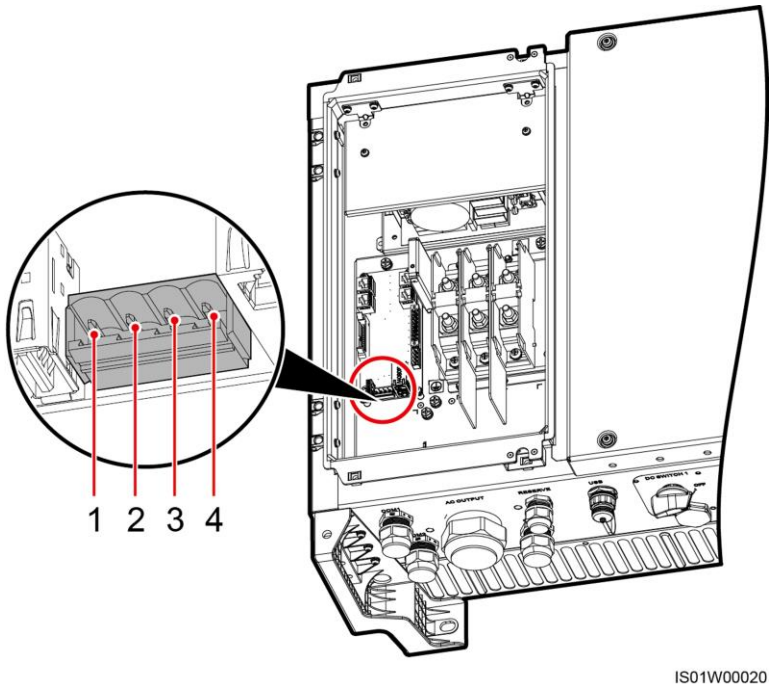


Table 5-4 describes pin definitions of the RS485 terminal block.

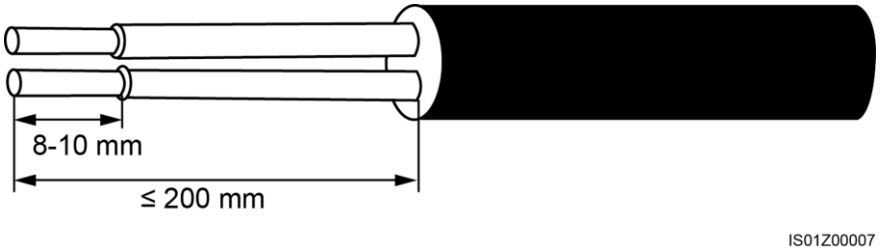
Table 5-4 Pin definitions of the RS485 terminal block

No.	Port Definition	Description
1	RS485A IN	RS485A, differential signal+
2	RS485A OUT	RS485A, differential signal+
3	RS485B IN	RS485B, differential signal–
4	RS485B OUT	RS485B, differential signal–

Connecting Cables to the Terminal Block

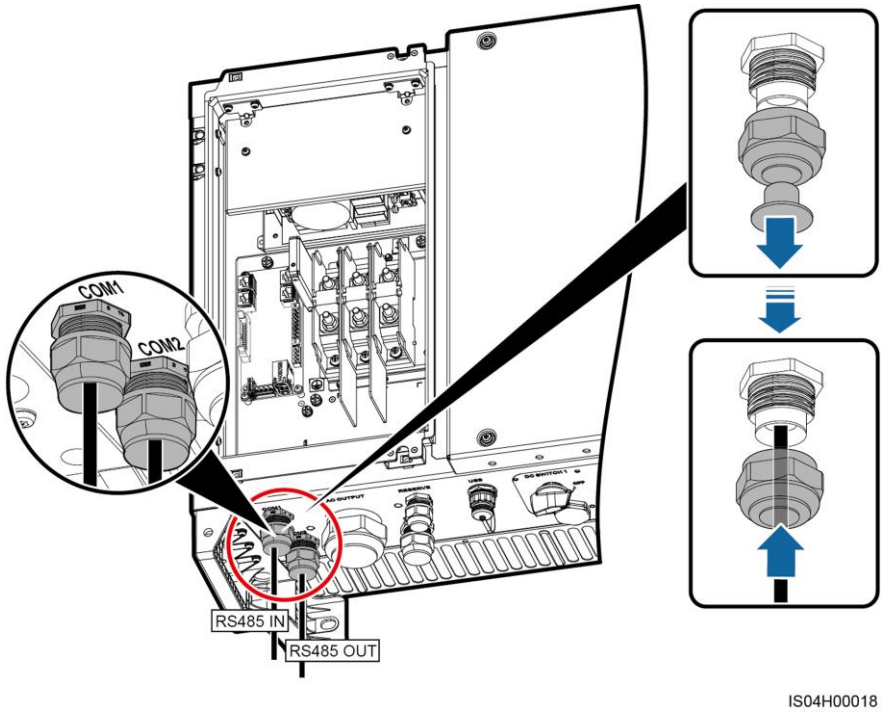
Step 1 Remove an appropriate length of the jacket and core wire insulation layer from the communications cable using a wire stripper.

Figure 5-22 Stripping an RS485 communications cable



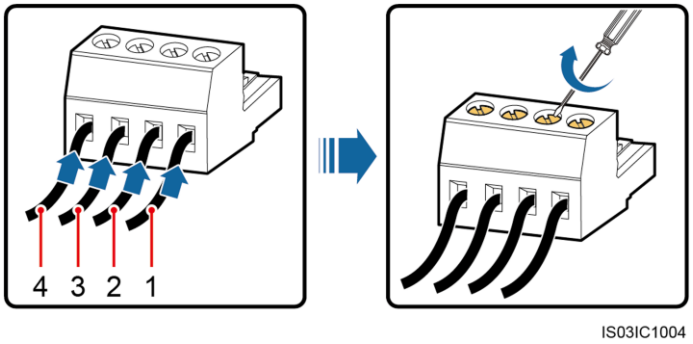
Step 2 Route the communications cable through the waterproof connector.

Figure 5-23 Routing cables



Step 3 Remove the cable terminal base from the terminal block. Connect the communications cable to the terminal base.

Figure 5-24 Connecting cables to a terminal base



(1) RS485A IN (2) RS485A OUT

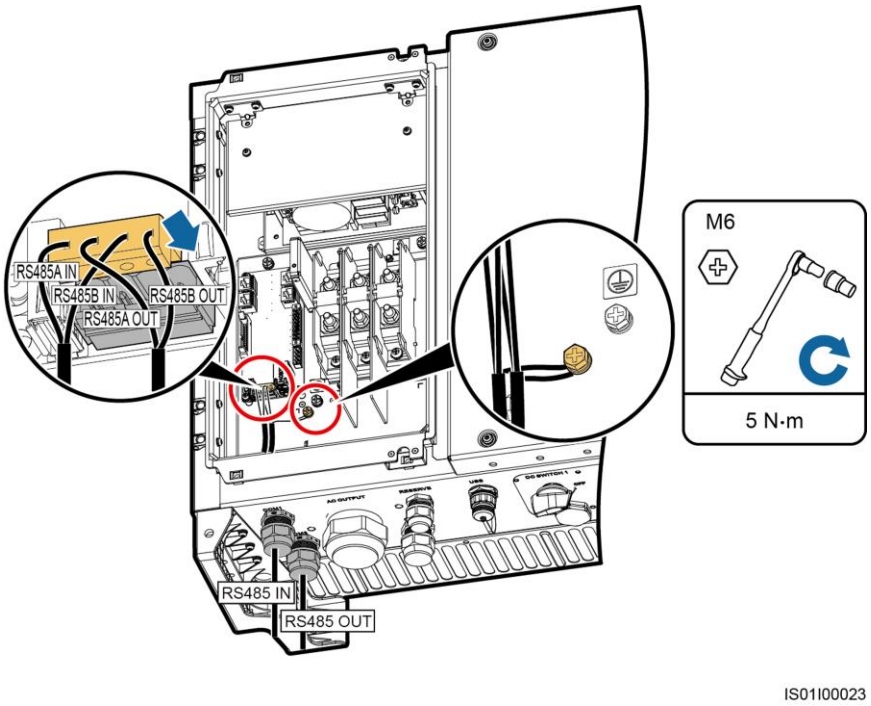
(3) RS485B IN (4) RS485B OUT

Step 4 Install the terminal base on the terminal block, and connect the shield layer to the ground point.

NOTE

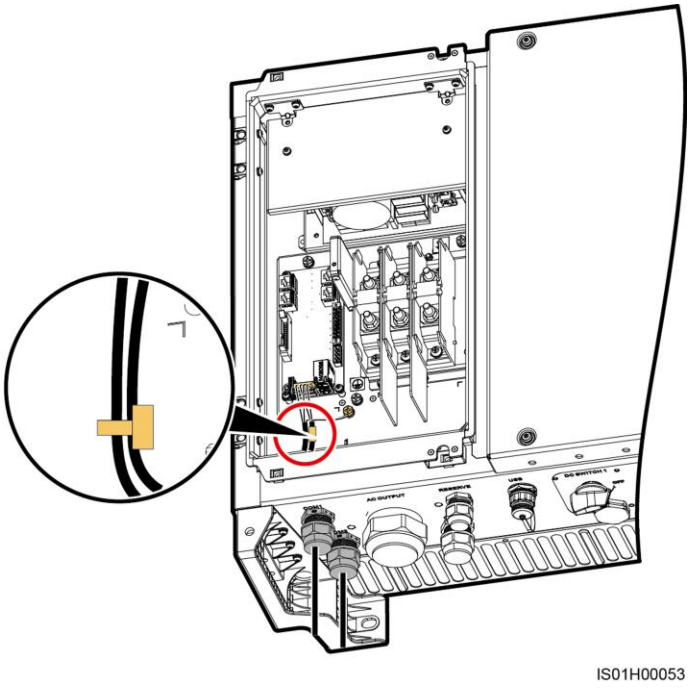
When connecting the shielded cable, crimp the OT terminal if required.

Figure 5-25 Connecting communications cables



Step 5 Bind communications cables after connecting them.

Figure 5-26 Binding communications cables



Step 6 Tighten the sealing nut and seal the cable gland.

----End

RJ45 Connector Pin Definitions

Figure 5-27 shows an RJ45 connector.

Figure 5-27 RJ45 connector

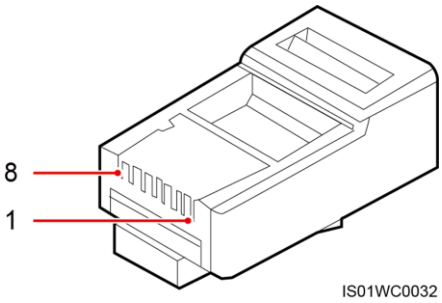


Table 5-5 lists the RJ45 connector pin definitions.

Table 5-5 RJ45 connector pin definitions

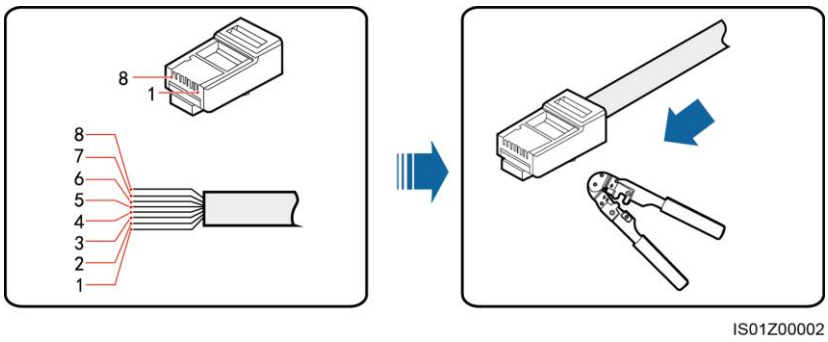
Pin	Color	Function
1	White-and-orange	RS485A, differential signal+

Pin	Color	Function
2	Orange	RS485B, differential signal–
3	White-and-green	N/A
4	Blue	RS485A, differential signal+
5	White-and-blue	RS485B, differential signal–
6	Green	N/A
7	White-and-brown	N/A
8	Brown	N/A

Connecting a Cable to the RJ45 Network Port

Step 1 Prepare an RJ45 connector.

Figure 5-28 Preparing an RJ45 connector

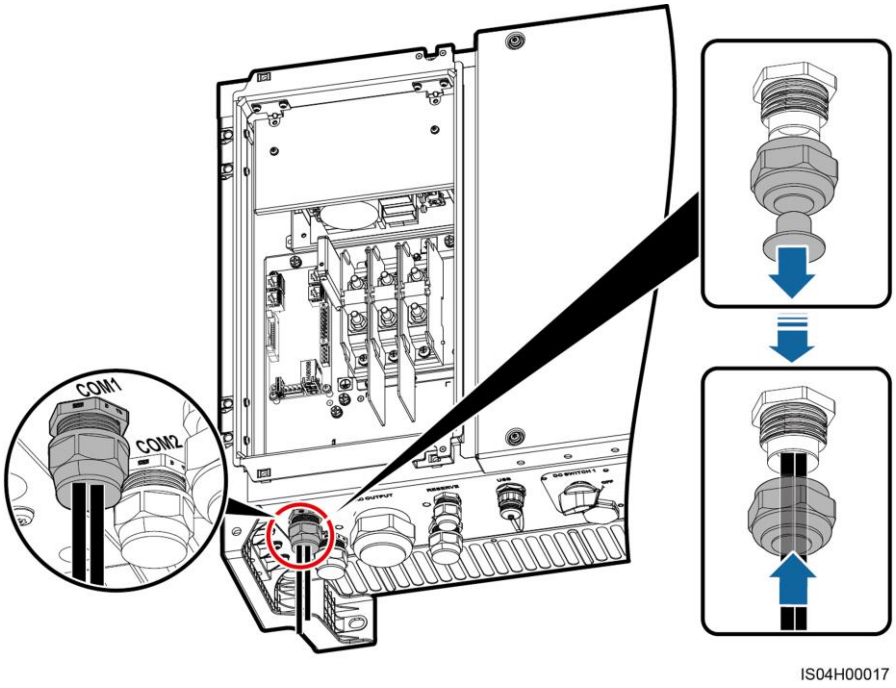


(1) White-and-orange (2) Orange (3) White-and-green (4) Blue

(5) White-and-blue (6) Green (7) White-and-brown (8) Brown

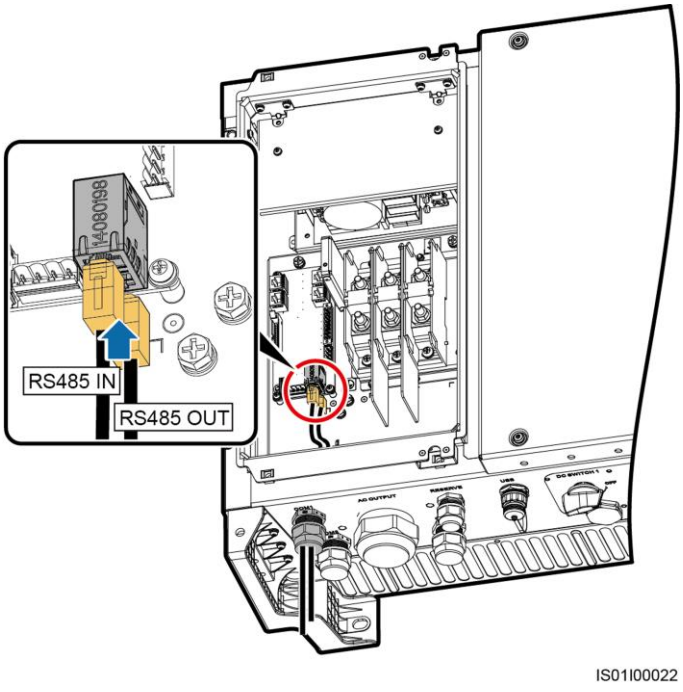
Step 2 Route the communications cable through the waterproof connector.

Figure 5-29 Routing cables



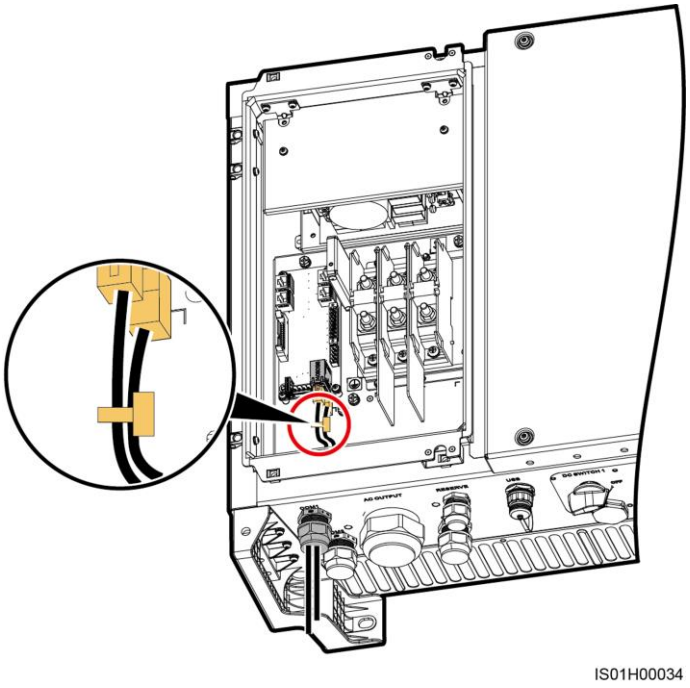
Step 3 Insert the RJ45 connector into the RJ45 network port in the SUN2000 maintenance compartment.

Figure 5-30 Connecting communications cables



Step 4 Bind communications cables after connecting them.

Figure 5-31 Binding communications cables



Step 5 Tighten the sealing nut and seal the cable gland.

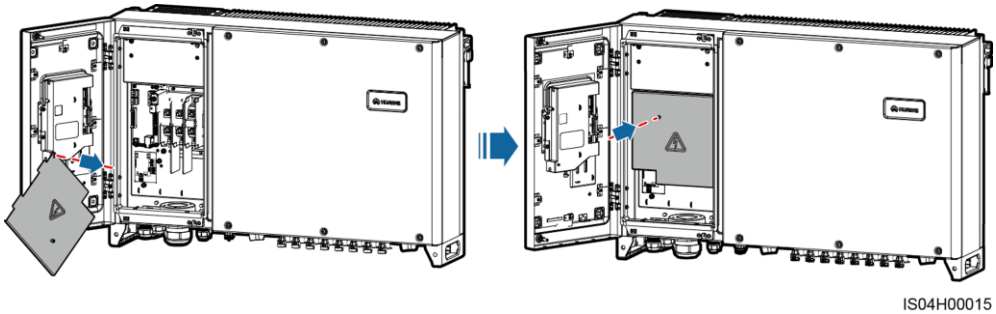
----End

5.8 Closing the Maintenance Compartment Door

Procedure

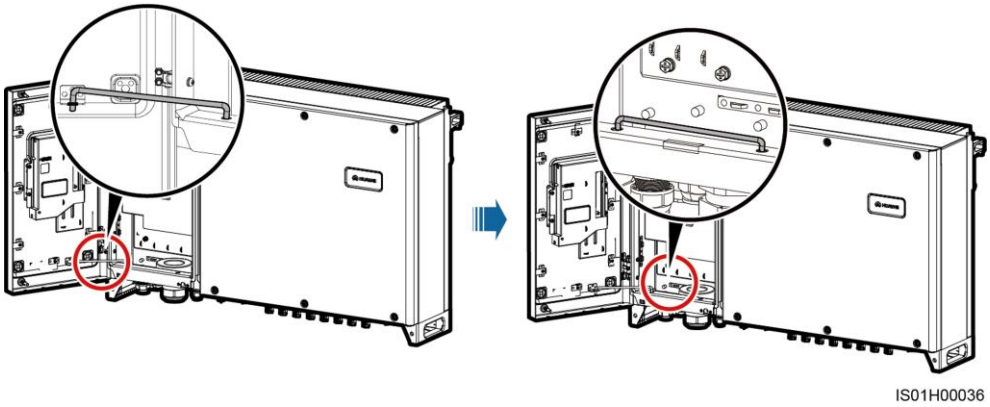
Step 1 Install the AC terminal cover.

Figure 5-32 Installing a cover



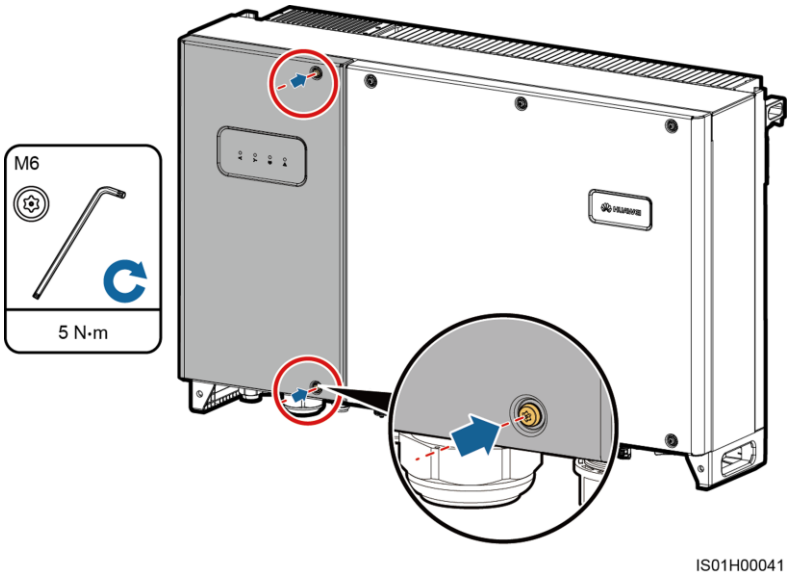
Step 2 Retrieve the support bar.

Figure 5-33 Retrieve the support bar



Step 3 Close the maintenance compartment door and tighten the two screws on the door.

Figure 5-34 Tightening screws on the maintenance compartment door



----End

6 System Commissioning

6.1 Checking Before Power-On

1. The SUN2000 is installed correctly and securely.
2. Check that the DC switch and downstream AC output switch are OFF.
3. All ground cables are connected securely.
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 all used waterproof connectors at the bottom of the enclosure are sealed, and that the thread-lock sealing nut is tightened.
8. The AC terminal cover is reinstalled.
9. The maintenance compartment door is closed and the door screws are tightened.
10. Unused DC input terminals are sealed.
11. Unused USB ports are plugged with waterproof plugs.
12. Unused waterproof connectors are plugged and the locking caps are tightened.

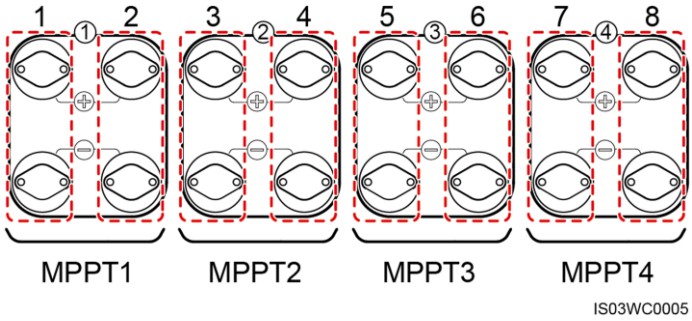
6.2 DC Input Detection

Function Description

When SUN2000 detects an abnormal DC input voltage from any PV string after DC cables are connected to the SUN2000, the SUN2000 generates an alarm through the LED indicator and buzzer. Attention from site personnel is required to check and clear the fault, to avoid damage to the SUN2000.

The SUN2000 provides four MPPT circuits with eight DC input terminals, as shown in Figure 6-1. After one PV string correctly connects to the MPPT1 circuit, the SUN2000 can start the DC input detection function. DC input detection can be performed automatically or manually.

Figure 6-1 DC terminals



NOTICE

- Only after at least one PV string correctly connects to the MPPT1 circuit, the SUN2000 enables the DC input detection function. Therefore, you are required to connect DC input power cables to the MPPT1 circuit first.
- The DC input detection function allows only independent access from each PV string to the inverter. That means, the PV strings cannot be connected in parallel and then to the inverter.

Table 6-1 describes the status of the LED indicators and buzzers.

Table 6-1 LED indicator and buzzer status description

PV Connection Indicator Status	Buzzer Status	Meaning
Blinking red	No sound	DC input detection is in progress.
Blinking green	No sound	The DC input is normal.
Steady red	Buzzing	The DC input is abnormal.

Automatic Detection

Following are the rules for starting automatic detection:

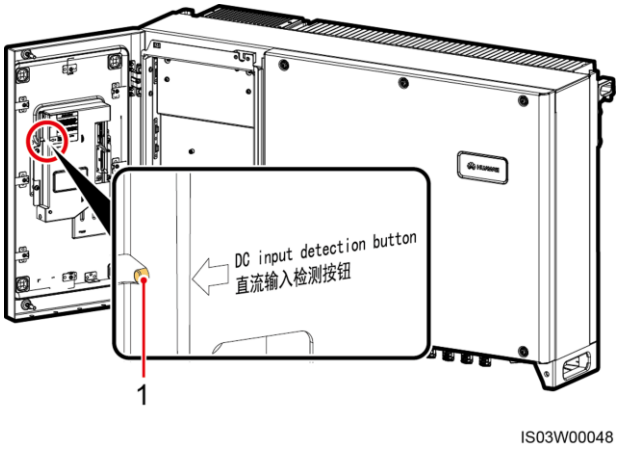
- Initial automatic detection is triggered 2 minutes after at least one PV string correctly connects to the MPPT1 circuit.
- Within three days after initial automatic detection is triggered, the SUN2000 performs automatic detection once every 10 minutes. From the fourth day, the SUN2000 performs automatic detection only when the PV string voltage equals the lowest operating voltage of the SUN2000.
- The DC input detection only functions when the two DC switches on the SUN2000 are OFF.

Manual Detection

Perform manual detection by pressing the DC voltage detection button once or using the SUN2000 app as showing below:

- Once the DC input detection is triggered, the detection process cannot be aborted or restarted until detection cycle completes.

Figure 6-2 DC input detection button



(1) DC input detection button

- The audible alarm can be manually turned off by pressing DC input detection button twice.
- The DC input detection only functions when the two DC switches on the SUN2000 are OFF.

6.3 Powering On the SUN2000

Prerequisites

NOTICE

- If the solar inverter has not been running for more than half a year after being mounted, it must be checked and tested by professionals before being put into operation.
- Before turning on the AC switch between the SUN2000 and the power grid, use a multimeter to check that the AC voltage is within the specified range.
- Before turning the DC switches of the SUN2000 to ON, ensure that the DC input is already checked and is normal.

Procedure

Step 1 Turn on the AC switch between the SUN2000 and the power grid.

NOTICE

If you perform Step 2 before Step 1, the SUN2000 reports a fault about abnormal shutdown. The SUN2000 can start normally after the fault is automatically rectified. The default fault rectification time is 1 minute. You can modify the time over the NMS software installed on the PC that connects to the SUN2000.

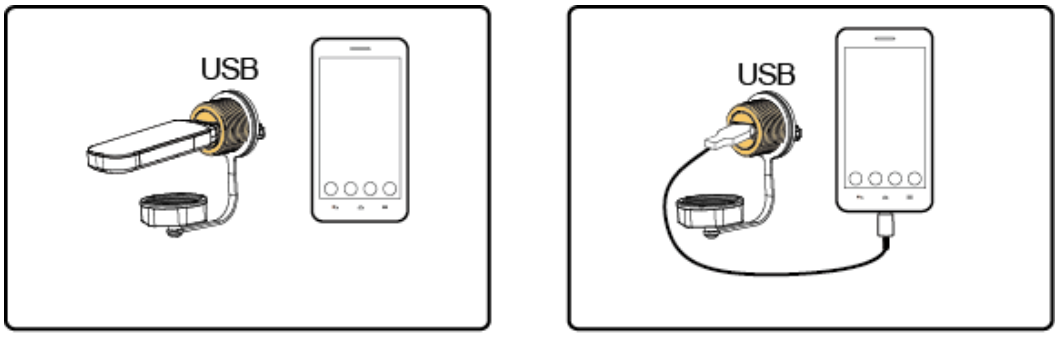
Step 2 Turn the DC switch at the bottom of the SUN2000 to ON.

Step 3 (Optional) Measure the temperatures at the joints between DC terminals and connectors using a point-test thermometer.

To ensure that the DC terminals are in good contact, check the temperatures at the joints between DC terminals and connectors after the SUN2000 has been running for a period of time. Ensure that the temperature rise does not exceed 40°C.

Step 4 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 6-3 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.
- The screen snapshots in this document correspond to app 3.2.00.001 (Android).

Figure 6-4 Login screen

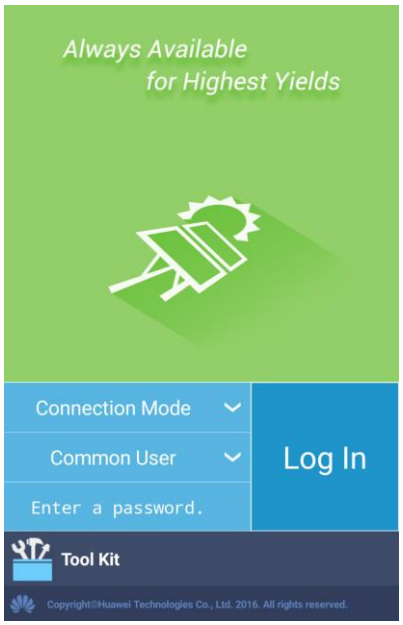
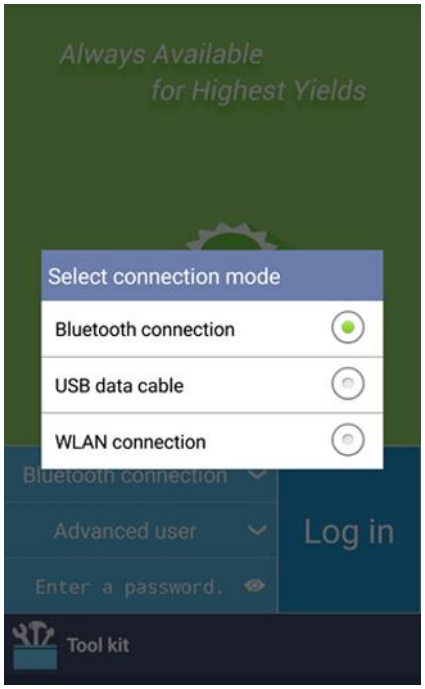
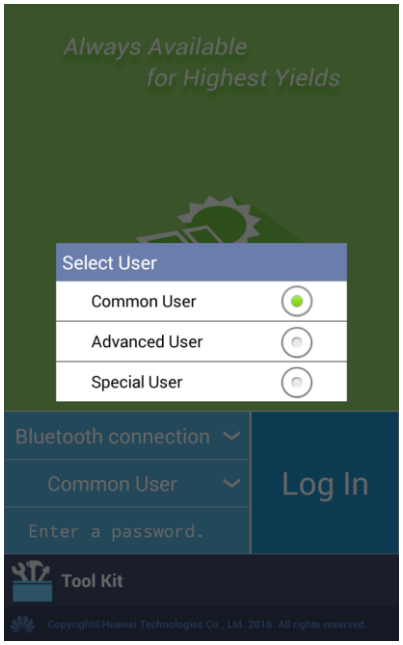


Figure 6-5 Selecting a connection mode



Step 5 Tap the user name area to switch between **Common User**, **Advanced User**, and **Special User**.

Figure 6-6 Switching between users



NOTE

- The login password is the same as that for the SUN2000 connected to the app and is used only when the SUN2000 connects to the app.
- The initial passwords for **Common User**, **Advanced User**, and **Special User** are all **00000a**. Use the initial password upon first login. To ensure account security, change the password immediately after login.
- 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 login, if five consecutive invalid password attempts are made (the interval between two consecutive attempts is less than 2 minutes), the account will be locked for 10 minutes. The password should consist of 6 characters.

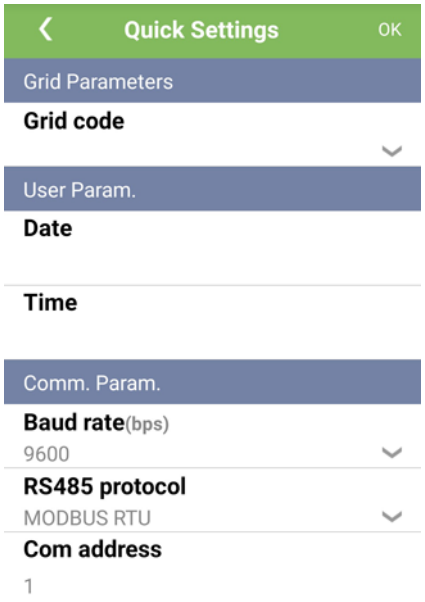
Step 6 Enter the password and tap **Log In**.

Step 7 After the successful login, the **Quick Settings** screen or **Function Menu** screen is displayed.

NOTE

- If you log in to the app after the SUN2000 connects to the app for the first time or factory defaults are restored, the **Quick Settings** screen is 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. Set the correct grid code based on the application region and scenario of the SUN2000.
- You are advised to log in to the **Quick Settings** screen as an advanced user for parameter settings.

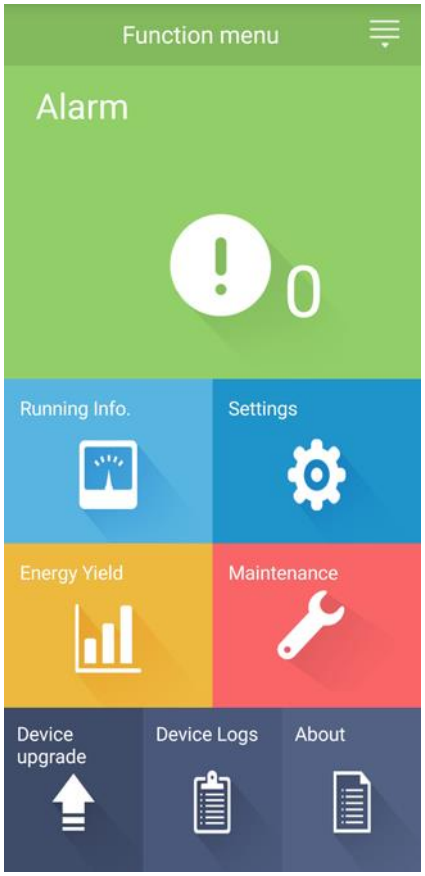
Figure 6-7 Quick Settings (advanced user)



NOTE

- Set the power grid code that applies to the country or region where the PV plant is located and the SUN2000 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 SUN2000s communicate with the SmartLogger over RS485, the RS485 addresses for all the SUN2000s 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, the baud rates of all the SUN2000s on each RS485 route must be consistent with the SmartLogger baud rate.

Figure 6-8 Function Menu



----End

6.4 Powering Off the SUN2000

Context

⚠ WARNING

- If two SUN2000s share the same AC switch on the AC side, power off the two SUN2000s.
- After the SUN2000 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 SUN2000 five minutes after the power-off.

Procedure

Step 1 Run a shutdown command on the SUN2000 APP, SmartLogger, or NMS.

For details, see the *SUN2000 APP User Manual* or *SmartLogger User Manual* or *iManager NetEco 1000S User Manual*.

Step 2 Turn off the AC switch between the SUN2000 and the power grid.

Step 3 Set the two DC switches to OFF.

----End

6.5 Power-Off for Troubleshooting

Context

To prevent personal injury and equipment damage, perform the following procedure to power off the solar inverter for troubleshooting or replacement.

⚠ CAUTION

- When a solar inverter is faulty, try to avoid standing in front of the solar inverter.
- Do not operate the DC switch on the solar inverter before you finish Step 3 to Step 5.
- If the AC switch between the solar inverter and the power grid has automatically disconnected, do not turn on the switch before the fault is rectified.
- Before power-off for troubleshooting, do not touch the energized components of the solar inverter. Otherwise, electric shocks or arcing may occur.

Procedure

Step 1 Wear proper personal protective equipment (PPE).

Step 2 If the solar inverter is not shut down due to a fault, send a shutdown command on the SUN2000 app, SmartLogger, or management system. If the solar inverter has shut down due to a fault, go to the next step.

Step 3 Turn off the AC switch between the solar inverter and the power grid.

Step 4 Measure the DC current of each PV input string using a clamp meter that is set to the DC position.

- If the current is less than or equal to 0.5 A, go to the next step.
- If the current is higher than 0.5 A, wait until the solar irradiance decreases and the PV string current decreases below 0.5 A at night, and then go to the next step.

Step 5 Open the maintenance compartment door, install a support bar, and use a multimeter to measure the voltage between the AC terminal block and the ground. Ensure that the AC side of the solar inverter is disconnected.

Step 6 Turn off all DC input switches of the solar inverter.

Step 7 Wait for 15 minutes and troubleshoot or repair the inverter.

----End

WARNING

- Do not open the host panel for maintenance if the solar inverter is emitting odor or smoke, or has obvious exceptions.
- If the solar inverter does not emit odor or smoke and is intact, repair or restart it based on the alarm handling suggestions. Do not stand in front of the solar inverter during the restart.

----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.

NOTE

Delete the script file immediately after use to reduce information disclosure risks.

7.1.1 Exporting Configurations

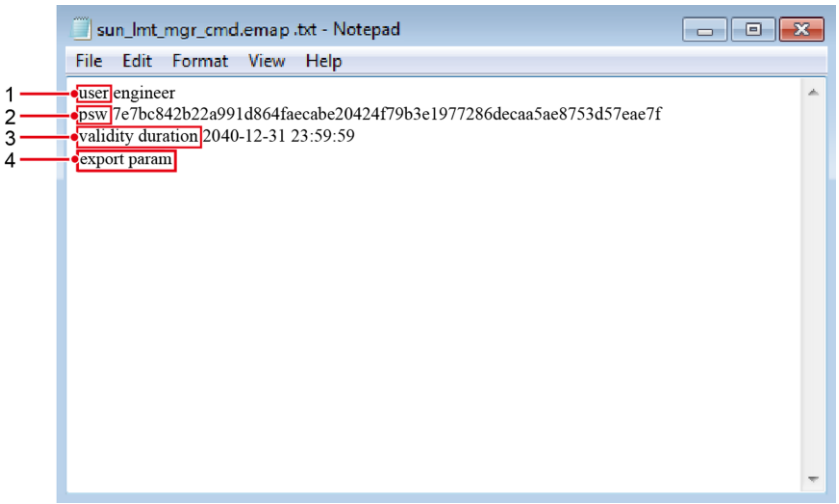
Procedure

Step 1 On the SUN2000 APP, tap **Inverter Command Settings** to generate a boot script file. For details, see the *SUN2000 APP User Manual*.

Step 2 Import the boot script file to a PC.

(Optional) The boot script file can be opened as a .txt file, as shown in Figure 7-1.

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.

Table 7-1 LED indicator description

LED Indicator	Status	Meaning
	Green off	There is no operation with a USB flash drive.
	Blinking green at long intervals (on for 1s and then off for 1s)	There is an operation with a USB flash drive.
	Blinking green at short intervals (on for 0.125s and then off for 0.125s)	An operation with a USB flash drive has failed.
	Steady green	An operation with a USB flash drive is successful.

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 Configurations

Prerequisites

A complete configuration file has been exported.

Procedure

Step 1 On the SUN2000 APP, tap **Inverter Command Settings** to generate a boot script file. For details, see the *SUN2000 APP User Manual*.

Step 2 Import the boot script file to a PC.

Step 3 Replace the exported boot script file in the root directory of the USB flash drive with the imported one.

NOTICE

Replace the boot script file only and keep the exported files.

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.

Table 7-2 LED indicator description

LED Indicator	Status	Meaning
	Green off	There is no operation with a USB flash drive.
	Blinking green at long intervals (on for 1s and then off for 1s)	There is an operation with a USB flash drive.
	Blinking green at short intervals (on for 0.125s and then off for 0.125s)	An operation with a USB flash drive has failed.
	Steady green	An operation with a USB flash drive is successful.

----End

7.1.3 Exporting Data

Procedure

Step 1 On the SUN2000 APP, tap **Inverter Command Settings** to generate a boot script file. For details, see the *SUN2000 APP User Manual*.

Step 2 Import the boot script file to the root directory of a USB flash drive.

Step 3 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.

Table 7-3 LED indicator description

LED Indicator	Status	Meaning
	Green off	There is no operation with a USB flash drive.
	Blinking green at long intervals (on for 1s and then off for 1s)	There is an operation with a USB flash drive.
	Blinking green at short intervals (on for 0.125s and then off for 0.125s)	An operation with a USB flash drive has failed.
	Steady green	An operation with a USB flash drive is successful.

Step 4 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 file are 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.

After obtaining the upgrade package **SUN2000HAV100R001C00SPCXXX_package.zip**, decompress the package and copy the extracted files to the root directory of the USB flash drive. Ensure that the extracted files include:

- config.txt
- sun_lmt_mgr_cmd.emap (This is a boot script file.)
- SUN2000.bin
- SUN2000_CPLD.bin
- SUN2000_FLT_Release.bin
- SUN2000_Master_Release.bin
- SUN2000_Slave_Release.bin
- vercfg.xml

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, perform Step 3–Step 7.

Step 3 On the SUN2000 APP, tap **Inverter Command Settings** to generate a boot script file. For details, see the *SUN2000 APP User Manual*.

Step 4 Import the boot script file to a computer.

Step 5 Replace the boot script file in the upgrade package 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.

Table 7-4 LED indicator description

LED Indicator	Status	Meaning
	Green off	There is no operation with a USB flash drive.
	Blinking green at long intervals (on for 1s and then off for 1s)	There is an operation with a USB flash drive.

LED Indicator	Status	Meaning
	Blinking green at short intervals (on for 0.125s and then off for 0.125s)	An operation with a USB flash drive has failed.
	Steady green	An operation with a USB flash drive is successful.

Step 8 (Optional) The system automatically restarts when the upgrade is completed. All LED indicators turn off during the restart. After the restart, the green indicator is blinking at long intervals (on for 1s and then off for 1s) for 1 minute until it becomes steady on, which indicates that the upgrade is successful.

NOTE

The SUN2000 can also be upgraded through the **Inverter Upgrade** in the SUN2000 APP. For details, see the *SUN2000 APP User Manual*.

----End

7.2 Operations with the SUN2000 App

Description

NOTICE

- The app screenshots in this chapter are for the SUN2000-60KTL-HV-D1-001.
- Configurable parameters vary with the device model and grid code. The actual screen prevails. The parameter list provided in this section includes all configurable parameters.
- The parameter names, value ranges, and default values are subject to change. The actual display prevails.
- If you change the grid code, some parameters may be restored to factory defaults. After the grid code is changed, check whether the previously set parameters are affected.
- Delivering a reset, shutdown, or upgrade command to the solar inverters may cause power grid connection failure, which affects the energy yield.
- Only professionals are allowed to set the grid parameters, protection parameters, feature parameters, and power adjustment parameters of the solar inverters. If the grid parameters, protection parameters, and feature parameters are incorrectly set, the solar inverters may not connect to the power grid. If the power adjustment parameters are incorrectly set, the solar inverters may not connect to the power grid as required. In these cases, the energy yield will be affected.

7.2.1 Operations Related to the Advanced User

Description

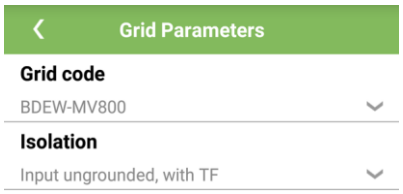
If you log in to the app as **Advanced User**, you can set the grid parameters, protection parameters, and feature parameters for the SUN2000.

7.2.1.1 Setting Grid Parameters

Procedure

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

Figure 7-2 Grid parameters (advanced user)



----End

Parameter List

No.	Parameter	Description	Default Value	Value Range
1	Grid code	Set this parameter based on the grid code of the country or region where the SUN2000 is used and the SUN2000 application scenario.	The default value varies with the model. The displayed value prevails.	N/A
2	Isolation	Specifies the working mode of the SUN2000 according to the grounding status at the DC side and the connection status to the grid.	The default value varies with the grid code. The displayed value prevails.	• Input grounded, with TF • Input ungrounded, without TF • Input ungrounded, with TF

7.2.1.2 Setting Protection Parameters

Procedure

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

Figure 7-3 Protection parameter (advanced user)

----End

Parameter List

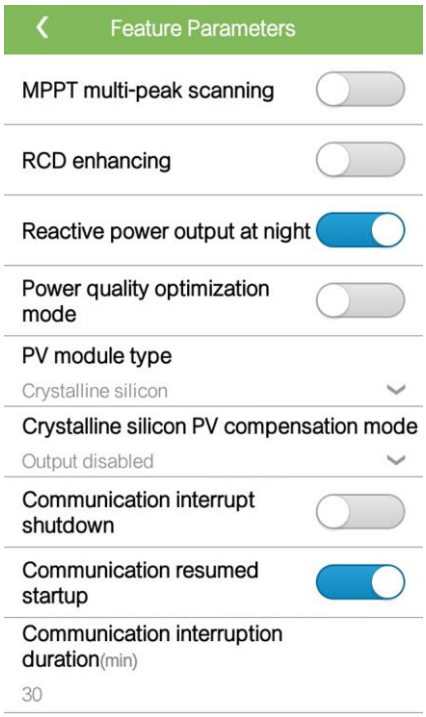
No.	Parameter	Description	Unit	Default Value	Value Range
1	Insulation resistance protection	To ensure device safety, the SUN2000 detects the insulation resistance between the input side and the ground when it starts a self-check. If the detected value is less than the preset value, the SUN2000 does not export power to the power grid.	MΩ	0.05	[0.033, 1.5]

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

Parameter List

No.	Parameter	Description	Unit	Default Value	Value Range	Remarks
1	MPPT multi-peak scanning	When the SUN2000 is used in scenarios where PV strings are obviously shaded, enable this function. Then the SUN2000 will perform MPPT scanning at regular intervals to locate the maximum power.	N/A	Disable	• Disable • Enable	The scanning interval is set by **MPPT multi-peak scanning interval**.
2	MPPT multi-peak scanning interval	Specifies the MPPT multi-peak scanning interval.	min	15	[5, 30]	This parameter is displayed only when **MPPT multi-peak scanning** is set to **Enable**.
3	RCD enhancing	RCD refers to the residual current of the SUN2000 to the ground. To ensure device security and personal safety, RCD should comply with the standard. If an AC switch with a residual current detection function is installed outside the SUN2000, this function should be enabled to reduce the residual current generated during SUN2000 running, thereby preventing the AC switch from misoperations.	N/A	Disable	• Disable • Enable	N/A
4	Reactive power output at night	In some specific application scenarios, a power grid company requires that the SUN2000 can perform reactive power compensation at night to ensure that the power factor of the local power grid meets requirements.	N/A	Disable	• Disable • Enable	This parameter is configurable only when **Isolation** is set to **Input ungrounded, with a transformer**.

No.	Parameter	Description	Unit	Default Value	Value Range	Remarks
5	Power quality optimization mode	If **Power quality optimization mode** is set to **Enable**, the inverter output current harmonics will be optimized.	N/A	Disable	• Disable • Enable	N/A
6	PV module type	This parameter is used to set different types of PV modules and the shutdown time of the concentration PV modules. If the concentration PV modules are shaded, the power drops drastically to 0 and the SUN2000 shuts down. The energy yield would be affected since it takes too long for the power to resume and SUN2000 to restart. The parameter does not need to be set for crystalline silicon and filmy PV modules.	N/A	Crystalline silicon	• Crystalline silicon • Film • CPV 1 • CPV 2	• If **PV module type** is set to **Crystalline silicon** or **Film**, the SUN2000 automatically detects the power of PV modules when they are shaded and shuts down if the power is too low. • When the concentration PV modules are used: – If **PV module type** is set to **CPV 1**, the inverter can quickly restart in 60 minutes when the input power of PV modules drops drastically due to shading. – If **PV module type** is set to **CPV 2**, the inverter can quickly restart in 10 minutes when the input power of PV modules drops drastically due to shading.

No.	Parameter	Description	Unit	Default Value	Value Range	Remarks
7	Crystalline silicon PV compensation mode	This parameter reduces the DC voltage of PV modules to the PE by reducing the impedance of the SUN2000 input side to the PE, thereby effectively reducing PID effect of PV modules.	N/A	Output disabled	• Output disabled • P-type output • N-type output	This parameter is displayed if **PV module type** is set to **Crystalline silicon**. Set this parameter to **P-type output** for P-type PV modules and **N-type output** for N-type PV modules.
8	Communication interrupt shutdown	The standards of certain countries and regions require that the SUN2000 must shut down after the communication is interrupted for a certain time.	N/A	Disable	• Disable • Enable	If **Communication interrupt shutdown** is set to **Enable** and the SUN2000 communication has been interrupted for a specified time (set by **Communication interruption duration**), the SUN2000 will automatically shut down.
9	Communication interruption duration	Specifies the duration for determining communication interruption, and is used for automatic shutdown for protection in case of communication interruption.	min	30	[1, 120]	N/A
10	Communication resumed startup	If this parameter is enabled, the SUN2000 automatically starts after communication recovers. If this parameter is disabled, the SUN2000 needs to be started manually after communication recovers.	N/A	Enable	• Disable • Enable	N/A

No.	Parameter	Description	Unit	Default Value	Value Range	Remarks
11	Soft start time	Specifies the duration for the power to gradually increase when the SUN2000 starts.	s	The default value varies depending on the grid code. The displayed value prevails.	[20, 1800]	N/A
12	Current error during scanning	When the IV curves of PV strings are being scanned, the current change of PV strings operating properly should be monitored to avoid inaccurate scanning caused by sunlight change. If the current exceeds the specified value, it is determined that the sunlight changes, and the IV curves should be scanned again.	A	0.20	[0.00, 2.00]	N/A
13	Hibernate at night	The SUN2000 monitors PV strings at night. If **Hibernate at night** is set to **Enable**, the monitoring function of the SUN2000 will hibernate at night, reducing power consumption.	N/A	Disable	• Disable • Enable	N/A
14	MBUS communication	For SUN2000 models that support both RS485 and MBUS (PLC) communication, when RS485 communication is used, you are advised to set **MBUS communication** to **Disable** to reduce power consumption.	N/A	Enable	• Disable • Enable	N/A

No.	Parameter	Description	Unit	Default Value	Value Range	Remarks
15	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.	N/A	Enable	• Disable • Enable	After the SUN2000 upgrade starts, 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 SUN2000 automatically activates the upgrade.
16	String monitor	The SUN2000 monitors PV strings in real time. If any PV string is abnormal (such as the PV string is shaded or the energy yield decreases), the SUN2000 generates an alarm to remind maintenance personnel to maintain the PV string in a timely manner.	N/A	Disable	• Disable • Enable	If PV strings are easily shaded, you are advised to set **String monitor** to **Disable** to prevent false alarms.
17	String detection low power delay	Specifies the delay time for generating abnormal string alarms when the SUN2000 detects that a PV string is working with low power. This parameter is mainly used in the scenario where PV strings are shaded for a long time in the morning and evening, and is used to prevent false alarms.	min	180	[2, 720]	This parameter is displayed when **String monitor** is set to **Enable**.
18	String detection high power delay	Specifies the delay time for generating abnormal string alarms when the SUN2000 detects that a PV string is working with high power.	min	30	[2, 720]	

No.	Parameter	Description	Unit	Default Value	Value Range	Remarks
19	String detection power segment division percentage	Specifies the thresholds for determining whether a PV string is working with high power or low power. This parameter is used to distinguish the working status of PV strings.	%	50	[1, 100]	
20	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.	N/A	20	[5, 100]	This parameter is displayed when **String monitor** is set to **Enable**.
21	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.	%	20	[1, 100]	
22	Shutdown at 0% power limit	If this parameter is set to **Enable**, the SUN2000 shuts down after receiving the 0% power limit command. If this parameter is set to **Disable**, the SUN2000 does not shut down after receiving the 0% power limit command.	N/A	Disable	• Disable • Enable	N/A
23	Maximum apparent power	Specifies the output upper threshold for the maximum apparent power to adapt to the capacity requirements for standard and customized transformers.	kW	Smax_limit	[Maximum active power, Smax_limit]	If the maximum active power equals Smax_limit, this parameter is not displayed.

No.	Parameter	Description	Unit	Default Value	Value Range	Remarks
24	Maximum active power	Specifies the output upper threshold for the maximum active power to adapt to various market requirements.	kW	Pmax_limit	[0.1, Pmax_limit]	N/A
25	Tracking system controller	Selects a controller vendor.	N/A	N/A	N/A	N/A
26	Duration for determining short-time grid disconnection	The standards of certain countries and regions require that the SUN2000 should not disconnect from the power grid if the power grid experiences a short-time failure. The SUN2000 output power should be recovered immediately after the fault is rectified.	ms	3000	[500, 20000]	N/A
27	Adjust total energy yield	Specifies the initial energy yield of the SUN2000. This parameter is used in SUN2000 replacement scenarios. Set the initial energy yield of the new SUN2000 to the total energy yield of the old SUN2000 to ensure continuous statistics of cumulative energy yield.	kWh	N/A	[0.00, 42949600.00]	N/A
28	DC input detection	If **DC input detection** is set to **Disable**, the SUN2000 does not perform automatic DC input detection or manual DC output detection.	N/A	Enable	• Disable • Enable	N/A

No.	Parameter	Description	Unit	Default Value	Value Range	Remarks
29	Commanded shutdown hold after power recovery	The standards of certain countries and regions require that the SUN2000 remains in the commanded shutdown state after being powered off by a command and experiencing a power failure and recovery.	N/A	The default value varies depending on the grid code. The displayed value prevails.	• Disable • Enable	N/A
30	Buzzer	If this parameter is set to **Enable**, the buzzer buzzes when a DC input cable connection error is detected. If this parameter is set to **Disable**, the buzzer does not buzz when a DC input cable connection error is detected.	N/A	Enable	• Disable • Enable	N/A

7.2.2 Operations Related to the Special User

Description

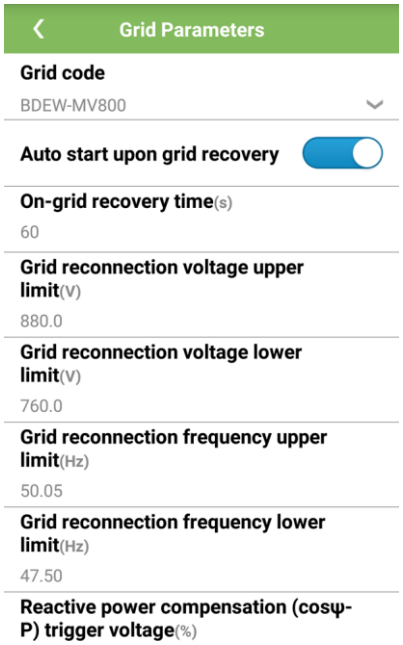
If you log in to the app as **Special User**, you can set the grid parameters, protection parameters, feature parameters, and grid adjustment parameters for the SUN2000.

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 Grid Parameters (special user)



----End

Parameter List

No.	Parameter	Description	Unit	Default Value	Value Range
1	Grid code	Set this parameter based on the grid code of the country or region where the SUN2000 is used and the SUN2000 application scenario.	N/A	The default value varies depending on the model. The displayed value prevails.	N/A
2	Auto start upon grid recovery	Specifies whether to allow the SUN2000 to automatically start after the power grid recovers.	N/A	The default value varies depending on the grid code. The displayed value prevails.	• Disable • Enable
3	Grid connection duration after power grid recovery	Specifies the waiting time for SUN2000 restart after the power grid recovers.	s		[0, 900]

No.	Parameter	Description	Unit	Default Value	Value Range
4	Grid reconnection voltage upper limit	The standards of certain countries and regions require that the SUN2000 must not export power to the power grid again when the grid voltage exceeds the value of **Grid reconnection voltage upper limit** after the SUN2000 shuts down due to a fault.	V	The default value varies depending on the grid code. The displayed value prevails.	[100%Vn, 136%Vn]
5	Grid reconnection voltage lower limit	The standards of certain countries and regions require that the SUN2000 must not export power to the power grid again when the grid voltage is below the value of **Grid reconnection voltage lower limit** after the SUN2000 shuts down due to a fault.	V		[45%Vn, 95%Vn]
6	Grid reconnection frequency upper limit	The standards of certain countries and regions require that the SUN2000 must not export power to the power grid again when the grid frequency exceeds the value of **Grid reconnection frequency upper limit** after the SUN2000 shuts down due to a fault.	Hz	The default value varies depending on the grid code. The displayed value prevails.	[100%Fn, 112%Fn]
7	Grid reconnection frequency lower limit	The standards of certain countries and regions require that the SUN2000 must not export power to the power grid again when the grid frequency is below the value of **Grid reconnection frequency lower limit** after the SUN2000 shuts down due to a fault.	Hz		[85%Fn, 100%Fn]
8	Reactive power compensation (cosφ-P) trigger voltage	Specifies the voltage threshold for triggering reactive power compensation based on the cosφ-P curve.	%	The default value varies depending on the grid code. The displayed value prevails.	[100, 110]

No.	Parameter	Description	Unit	Default Value	Value Range
9	Reactive power compensation (cosφ-P) exit voltage	Specifies the voltage threshold for exiting reactive power compensation based on the cosφ-P curve.	%		[90, 100]

NOTE

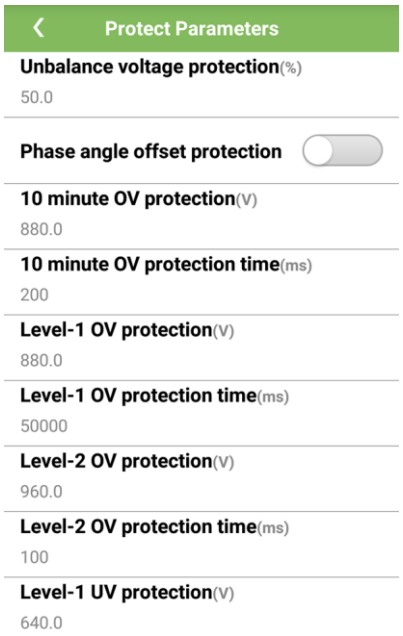
Vn represents the rated voltage and Fn represents the rated frequency.

7.2.2.2 Setting Protection Parameters

Procedure

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

Figure 7-6 Protection Parameters (special user)



----End

Parameter List

NOTE

- The default values in the following table vary depending on the grid code. The displayed values prevail.
- Vn represents the rated voltage and Fn represents the rated frequency.

No.	Parameter	Description	Unit	Value Range
1	Unbalance voltage protection	Specifies the SUN2000 protection threshold in the case of unbalanced power grid voltage.	%	[0.0, 50.0]
2	Phase angle offset protection	The standards of certain countries and regions require that the SUN2000 needs to be protected when the three-phase angle offset of the power grid exceeds a certain value.	N/A	• Disable • Enable
3	10 minute OV protection	Specifies the 10-minute overvoltage protection threshold.	V	[1 x Vn, 1.36 x Vn]
4	10 minute OV protection time	Specifies the 10-minute overvoltage protection duration.	ms	[50, 7200000]
5	Level-1 OV protection	Specifies the level-1 overvoltage protection threshold.	V	[1 x Vn, 1.36 x Vn]
6	Level-1 OV protection time	Specifies the level-1 overvoltage protection duration.	ms	[50, 7200000]
7	Level-2 OV protection	Specifies the level-2 overvoltage protection threshold.	V	[1 x Vn, 1.36 x Vn]
8	Level-2 OV protection time	Specifies the level-2 overvoltage protection duration.	ms	[50, 7200000]
9	Level-1 UV protection	Specifies the level-1 undervoltage protection threshold.	V	[0.15 x Vn, 1 x Vn]
10	Level-1 UV protection time	Specifies the level-1 undervoltage protection duration.	ms	[50, 7200000]
11	Level-2 UV protection	Specifies the level-2 undervoltage protection threshold.	V	[0.15 x Vn, 1 x Vn]
12	Level-2 UV protection time	Specifies the level-2 undervoltage protection duration.	ms	[50, 7200000]
13	Level-1 OF protection	Specifies the level-1 overfrequency protection threshold.	Hz	[1 x Fn, 1.15 x Fn]
14	Level-1 OF protection time	Specifies the level-1 overfrequency protection duration.	ms	[50, 7200000]
15	Level-2 OF protection	Specifies the level-2 overfrequency protection threshold.	Hz	[1 x Fn, 1.15 x Fn]
16	Level-2 OF protection time	Specifies the level-2 overfrequency protection duration.	ms	[50, 7200000]
17	Level-1 UF protection	Specifies the level-1 underfrequency protection threshold.	Hz	[0.85 x Fn, 1 x Fn]
18	Level-1 UF protection time	Specifies the level-1 underfrequency protection duration.	ms	[50, 7200000]

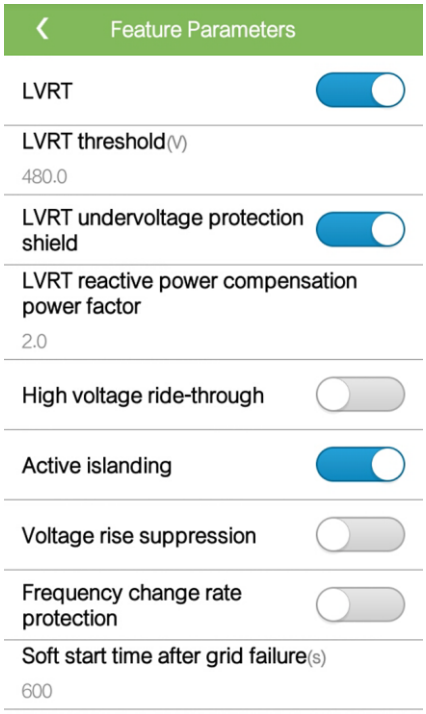
No.	Parameter	Description	Unit	Value Range
19	Level-2 UF protection	Specifies the level-2 underfrequency protection threshold.	Hz	[0.85 x Fn, 1 x Fn]
20	Level-2 UF protection time	Specifies the level-2 underfrequency protection duration.	ms	[50, 7200000]
21	Level-3 OV protection	Specifies the level-3 overvoltage protection threshold.	V	[1 x Vn, 1.36 x Vn]
22	Level-3 OV protection time	Specifies the level-3 overvoltage protection duration.	ms	[50, 7200000]
23	Level-4 OV protection	Specifies the level-4 overvoltage protection threshold.	V	[1 x Vn, 1.36 x Vn]
24	Level-4 OV protection time	Specifies the level-4 overvoltage protection duration.	ms	[50, 7200000]
25	Level-3 UV protection	Specifies the level-3 undervoltage protection threshold.	V	[0.15 x Vn, 1 x Vn]
26	Level-3 UV protection time	Specifies the level-3 undervoltage protection duration.	ms	[50, 7200000]
27	Level-4 UV protection	Specifies the level-4 undervoltage protection threshold.	V	[0.15 x Vn, 1 x Vn]
28	Level-4 UV protection time	Specifies the level-4 undervoltage protection duration.	ms	[50, 7200000]

7.2.2.3 Setting Feature Parameters

Procedure

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

Figure 7-7 Feature Parameters (special user)



----End

Parameter List

NOTE

The default values in the following table vary depending on the grid code. The displayed values prevail.

No.	Parameter	Description	Unit	Value Range	Remarks
1	LVRT	When the power grid voltage is abnormally low for a short time, the SUN2000 cannot disconnect from the power grid immediately and has to work for some time. This is called LVRT.	N/A	• Disable • Enable	N/A
2	LVRT threshold	Specifies the threshold for triggering LVRT.	V	[50%Vn, 92%Vn]	N/A
3	LVRT undervoltage protection shield	Specifies whether to shield the undervoltage protection function during LVRT.	N/A	• Disable • Enable	N/A

No.	Parameter	Description	Unit	Value Range	Remarks
4	LVRT reactive power compensation power factor	During LVRT, the SUN2000 needs to generate reactive power to support the power grid. This parameter is used to set the reactive power generated by the SUN2000.	N/A	[0, 3]	For example, if you set **LVRT reactive power compensation power factor** to **2**, the reactive power generated by the SUN2000 is 20% of the rated power when the AC voltage drops by 10% during LVRT.
5	High voltage ride-through	When the power grid voltage is abnormally high for a short time, the SUN2000 cannot disconnect from the power grid immediately and has to work for some time. This is called high voltage ride-through (HVRT).	N/A	• Disable • Enable	N/A
6	Active islanding	Specifies whether to enable the active islanding protection function.	N/A	• Disable • Enable	N/A
7	Voltage rise suppression	The standards of certain countries and regions require that the SUN2000 should prevent the grid voltage from rising by delivering reactive power and decreasing active power when the output voltage exceeds a certain value.	N/A	• Disable • Enable	N/A
8	Voltage rise suppression reactive adjustment point	The standards of certain countries and regions require that the SUN2000 must generate a certain amount of reactive power when the output voltage exceeds a certain value.	%	[100, 115]	• This parameter is displayed when **Voltage rise suppression** is set to **Enable**. • The value of **Voltage rise suppression active derating point** must be greater than that of **Voltage rise suppression reactive adjustment point**.
9	Voltage rise suppression active derating point	The standards of certain countries and regions require that the active power of the SUN2000 be derated according to a certain gradient when the output voltage exceeds a certain value.	%	[100, 115]	

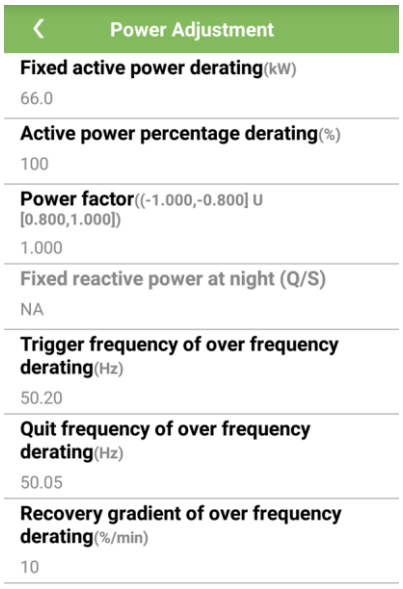
No.	Parameter	Description	Unit	Value Range	Remarks
10	Frequency change rate protection	The SUN2000 triggers protection when the power grid frequency changes too fast.	N/A	• Disable • Enable	N/A
11	Frequency change rate protection point	Specifies the frequency change rate protection threshold.	Hz/s	[0.1, 2.5]	This parameter is displayed if **Frequency change rate protection** is set to **Enable**.
12	Frequency change rate protection time	Specifies the frequency change rate protection duration.	s	[0.2, 20.0]	
13	Soft start time after grid failure	Specifies the time for the power to gradually increase when the SUN2000 restarts after the power grid recovers.	s	[20, 800]	N/A

7.2.2.4 Setting Power Adjustment Parameters

Procedure

Step 1 Choose **Function Menu** > **Settings** > **Power Adjustment** to access the parameters setting screen.

Figure 7-8 Power Adjustment (special user)



----End

Parameter List

No.	Parameter	Description	Unit	Default Value	Value Range	Remarks
1	Fixed active power derating	Adjusts the active power output of the SUN2000 to a fixed value.	kW	Pmax_limit	[0, Pmax_limit]	N/A
2	Active power percentage derating	Adjusts the active power output of the SUN2000 to a percentage.	%	100	[0, 100]	If this parameter is set to **100**, the SUN2000 delivers power output based on the maximum output power.
3	Power factor	Adjusts the SUN2000 power factor.	N/A	1.000	(–1.000, –0.800]U[0.800, 1.000]	N/A
4	Trigger frequency of over frequency derating	The standards of certain countries and regions require that the output active power of the SUN2000 be derated when the grid frequency exceeds a certain value.	Hz	The default value varies depending on the grid code. The displayed value prevails.	• When the output frequency is 50 Hz, the value range is 45.00–55.00 Hz. • When the output frequency is 60 Hz, the value range is 55.00–65.00 Hz.	N/A
5	Quit frequency of over frequency derating	Specifies the frequency threshold for exiting overfrequency derating.	Hz		• When the output frequency is 50 Hz, the value range is 45.00–55.00 Hz. • When the output frequency is 60 Hz, the value range is 55.00–65.00 Hz.	N/A

No.	Parameter	Description	Unit	Default Value	Value Range	Remarks
6	Recovery gradient of over frequency derating	Specifies the power recovery gradient for overfrequency derating.	%/min		[5, 20]	N/A

8 System Maintenance

8.1 Routine Maintenance

To ensure that the SUN2000 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, and maintaining the cable connections and grounding reliability, power off the system (see 6.4 Powering Off the SUN2000) and ensure that the two 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 and snow entering the maintenance compartment. If it is impossible to take protective measures, do not open the maintenance compartment door in rainy or snowy days.

Table 8-1 Maintenance list

Item	Check Method	Maintenance Interval
System cleanliness	Check periodically that the heat sinks are free from obstacles or dust.	Once six months to a year
System running status	• Check that the inverter is not damaged or deformed. • Check that the running sound of the inverter is normal. • When the inverter is running, check that all inverter parameters are correctly set.	Once six months

Item	Check Method	Maintenance Interval
Cable connections	• Check that cables are securely connected. • Check that cables are intact, in particular, the parts touching the metallic surface are not scratched. • Check that the idle COM, USB, and AC OUTPUT ports are locked by waterproof caps.	The first inspection is half a year after the initial commissioning. From then on, perform the inspection once six months to a year.
Grounding reliability	Check that ground cables are securely connected.	The first inspection is half a year after the initial commissioning. From then on, perform the inspection once six months to a year.

8.2 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 8-2 Common alarms and troubleshooting measures

Alarm ID	Alarm Name	Alarm Severity	Possible Cause	Suggestion
103	High DC Input Voltage	Major	• Cause ID = 1 The PV array is not properly configured. Excessive PV modules are connected in series to PV strings 1 and 2, and therefore the PV string open-circuit voltage exceeds the inverter maximum operating voltage. • Cause ID = 2 The PV array is not properly configured. Excessive PV modules are connected in series to PV strings 3 and 4, and therefore the PV string open-circuit voltage exceeds the inverter maximum operating voltage. • Cause ID = 3 The PV array is not properly configured. Excessive PV modules are connected in series to PV strings 5 and 6, and therefore the PV string open-circuit voltage exceeds the inverter maximum operating voltage. • Cause ID = 4 The PV array is not properly configured. Excessive PV modules are connected in series to PV strings 7 and 8, and therefore the PV string open-circuit voltage exceeds the inverter maximum operating voltage.	• Cause ID = 1 Reduce the number of PV modules connected in series to PV strings 1 and 2 until the open-circuit voltage is less than or equal to the maximum inverter operating voltage. After the PV array configuration is corrected, the inverter alarm disappears. • Cause ID = 2 Reduce the number of PV modules connected in series to PV strings 3 and 4 until the open-circuit voltage is less than or equal to the maximum inverter operating voltage. After the PV array configuration is corrected, the inverter alarm disappears. • Cause ID = 3 Reduce the number of PV modules connected in series to PV strings 5 and 6 until the open-circuit voltage is less than or equal to the maximum inverter operating voltage. After the PV array configuration is corrected, the inverter alarm disappears. • Cause ID = 4 Reduce the number of PV modules connected in series to PV strings 7 and 8 until the open-circuit voltage is less than or equal to the maximum inverter operating voltage. After the PV array configuration is corrected, the inverter alarm disappears.

Alarm ID	Alarm Name	Alarm Severity	Possible Cause	Suggestion
106–113	Abnormal String 1–8	Warning	Cause ID = 1 • The PV string is shielded from sunlight for a long time. • The PV string deteriorates or is damaged.	1. Check whether the PV string current is obviously lower than the currents of other PV strings. 2. If yes, check whether the PV string is shielded from sunlight. 3. If the PV string is clean and not shielded from sunlight, check whether any PV module is faulty.
120–127	String 1–8 Reversed	Cause ID = 1: Major Cause ID = 2: Warning	• Cause ID = 1 The PV string is reversely connected. • Cause ID = 2 Only a few PV modules are connected in series to the PV string, and therefore the end voltage is lower than that of other PV strings.	• Cause ID = 1 Check whether the PV string is reversely connected to the inverter. If yes, turn off the two DC switches after the PV string voltage drops within the safe voltage range (lower than 60 V DC), and then correct the PV string connection. • Cause ID = 2 Check whether the number of PV modules connected in series to the inverter is small. If yes, increase the number.

Alarm ID	Alarm Name	Alarm Severity	Possible Cause	Suggestion
200	Abnormal DC Circuit	Major	Abnormal external conditions trigger the protection for the DC circuit inside the inverter. The possible causes are as follows: • Cause ID = 3 The inverter input is disconnected accidentally, or the PV string output power changes sharply because the PV string is shielded from sunlight. • Cause ID = 10 The three phases of the power grid are seriously unbalanced, which triggers the protection for the internal control circuit of the inverter. • Cause ID = 11 The power grid voltage changes sharply and the inverter input power fails to discharge in a short time, which increases the internal voltage and triggers overvoltage protection. • Cause ID = 12/15 An unrecoverable fault occurs on a circuit inside the inverter.	Cause ID = 3/10/11 1. The inverter detects its external working conditions in real time. After the fault is rectified, the inverter automatically recovers. 2. If the alarm persists, contact Huawei technical support. Cause ID = 12/15 Turn off the AC output switch and DC input switch. Then turn on the AC output switch and DC input switch after 5 minutes. If the fault persists, contact Huawei technical support.

Alarm ID	Alarm Name	Alarm Severity	Possible Cause	Suggestion
202	Abnormal Invert Circuit	Major	Abnormal external conditions trigger the protection for the inverter circuit inside the inverter. The possible causes are as follows: • Cause ID = 13 The power grid voltage drops dramatically or the power grid is short-circuited, which damages the internal voltage detection circuit in the inverter. • Cause ID = 14 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. • Cause ID = 16 The DC current in the power grid exceeds the upper threshold. • Cause ID = 20 The inverter output is short-circuited. As a result, the output current surges to a value above the upper limit, and the inverter protection is triggered.	Cause ID = 13/14/16 1. The inverter detects its external working conditions in real time. After the fault is rectified, the inverter automatically recovers. 2. If the alarm persists, contact Huawei technical support. Cause ID = 20 1. Check the inverter output cable for short-circuits. 2. If the alarm persists, contact Huawei technical support.
301	Abnormal Grid Voltage	Major	The power grid voltage is beyond the acceptable range. The possible causes are as follows: • Cause ID = 4 The power grid voltage is below the specified lower threshold. • Cause ID = 16 The power grid voltage exceeds the specified upper threshold. • Cause ID = 19	Cause ID = 4 1. If the alarm occurs accidentally, 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 no, contact the local power operator. If yes, log in to the SUN2000 APP, SmartLogger, or the NetEco to modify the

Alarm ID	Alarm Name	Alarm Severity	Possible Cause	Suggestion
			The power grid voltage has exceeded the specified upper threshold for 10 minutes. • Cause ID = 26 The power grid voltage exceeds the specified upper threshold. • Cause ID = 28 The three phases of the power grid differ greatly in voltage. • Cause ID = 29 1. The power grid experiences an outage. 2. The AC circuit is disconnected or AC switch is off. • Cause ID = 31 The impedance of the output phase wire A to the PE cable is low or short-circuited. • Cause ID = 32 The impedance of the output phase wire B to the PE cable is low or short-circuited. • Cause ID = 33 The impedance of the output phase wire C to the PE cable is low or short-circuited.	power grid overvoltage and undervoltage protection thresholds with the consent of the local power operator. 3. If the fault persists for a long time, check the connection between the AC switch and the output power cable. Cause ID = 16/19/26 1. Check whether the grid-tied 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 obtained the consent of the local power operator, modify the overvoltage and undervoltage protection thresholds. 3. Check whether the peak power grid voltage exceeds the upper threshold. Cause ID = 28 1. If the exception is caused by an external fault, the inverter automatically recovers after the fault is rectified. 2. If the alarm persists and affects the energy yield of the power station, contact the local power operator. Cause ID = 29 1. Check the AC voltage. 2. Check that the AC power cable is connected and that the AC switch is ON. Cause ID = 31 Check the impedance of output phase wire A to the PE cable, locate the position with lower impedance, and resolve the issue. Cause ID = 32 Check the impedance of output phase wire B to the PE cable, locate the position with lower impedance, and resolve the issue.

Alarm ID	Alarm Name	Alarm Severity	Possible Cause	Suggestion
				Cause ID = 33 Check the impedance of output phase wire C to the PE cable, locate the position with lower impedance, and resolve the issue.
305	Abnormal Grid Frequency	Major	• Cause ID = 2 The actual power grid frequency is higher than the standard requirement for the local power grid. • Cause ID = 4 The actual power grid frequency is lower than the standard requirement for the local power grid. • Cause ID = 5 The actual change rate of the power grid frequency does not meet the standard requirement for the local power grid.	Cause ID = 2/4 1. If the alarm occurs accidentally, 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 no, contact the local power operator. If yes, log in to the SUN2000 app, SmartLogger, or NMS to modify the power grid overfrequency and underfrequency protection thresholds with the consent of the local power operator. Cause ID = 5 1. If the alarm occurs accidentally, 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 no, contact the local power operator.
313	Low Insulation Resistance	Major	Cause ID = 1 • A short circuit occurs between the PV string and the PGND cable. • The PV string is installed in a moist environment for a long time.	1. Check the impedance between the PV string and the PGND cable. If a short circuit occurs, rectify the fault. 2. If you are sure that the impedance is less than the default value in a cloudy or rainy environment, log in to the SUN2000 app, SmartLogger, or NMS and set **Insulation resistance protection**.

Alarm ID	Alarm Name	Alarm Severity	Possible Cause	Suggestion
318	Abnormal Residual Current	Major	Cause ID = 1 The insulation resistance against the PGND cable at the input side decreases when the inverter is running, which causes an excessively high residual current.	1. If the alarm occurs accidentally, the external circuit may be abnormal temporarily. The inverter automatically recovers after fault is rectified. 2. If the alarm occurs repeatedly or persists, check whether the impedance between the PV string and the ground is excessively low.
321	Cabinet Overtemperature	Major	Cause ID = 1 • The inverter is installed in a place with poor ventilation. • The ambient temperature exceeds the upper threshold. • The internal fan works abnormally.	1. Check the ventilation and ambient temperature of the inverter installation position. 2. If the ventilation is poor or the ambient temperature exceeds the upper threshold, improve the ventilation and heat dissipation. 3. If the ventilation and ambient temperature both meet requirements, contact Huawei technical support.
322	Abnormal SPI Communication	Major	Cause ID = 1 An unrecoverable fault occurs on a circuit inside the inverter.	Turn off the AC output switch and DC input switch. Then turn on the AC output switch and DC input switch after 5 minutes. If the fault persists, contact Huawei technical support.
326	Abnormal Grounding	Major	Cause ID = 1 • The PGND cable does not connect to the inverter. • The SUN2000 output side does not connect to an isolation transformer when the PV string output is grounded.	1. Check that the PGND cable properly connects to the inverter. 2. If the PV string output is grounded, check that the SUN2000 output side connects to an isolation transformer.
400	System Fault	Major	Cause ID = 1/3/21/23/27 An unrecoverable fault occurs on a circuit inside the inverter.	Turn off the AC output switch and DC input switch. Then turn on the AC output switch and DC input switch after 5 minutes. If the fault persists, contact Huawei technical support.

Alarm ID	Alarm Name	Alarm Severity	Possible Cause	Suggestion
410	Abnormal Auxiliary Power	Major	Cause ID = 4 The sampling control board has an abnormal voltage, which may be caused by the following: • The internal power chip of the sampling control board is faulty. • The detection circuit becomes faulty.	1. When the alarm is generated, the inverter shuts down automatically. When the fault is rectified, the inverter starts automatically. 2. If the alarm persists, contact Huawei technical support.
413	Abnormal PV String Connection	Major	Cause ID = 1 The PV string does not properly connect to the MPPT1 circuit. Cause ID = 2 The PV string does not properly connect to the MPPT2 circuit. Cause ID = 3 The PV string does not properly connect to the MPPT3 circuit. Cause ID = 4 The PV string does not properly connect to the MPPT4 circuit.	Check the PV string for reverse connection and cross connection.
504	Software Version Unmatch	Minor	Cause ID = 1/2/3 During inverter software upgrade, the version of the software loaded is incorrect.	Check whether you have performed a software upgrade recently. If yes, upgrade the software to the correct version again.
505	Upgrade Failed	Major	Cause ID = 1 The upgrade does not end normally.	Perform the upgrade again.
61440	Flash Fault	Minor	Cause ID = 1 • The flash memory is insufficient. • The flash memory has bad sectors.	1. Replace the monitoring board. 2. If the monitoring board is built into the monitoring device, replace the monitoring device.

NOTE

If you cannot rectify faults with the measures listed in the preceding table, contact Huawei technical support.

9 Handling the Inverter

9.1 Removing the SUN2000

NOTICE

Before removing the SUN2000, disconnect both AC and DC connections. For processes of disconnecting, see 6.4 Powering Off the SUN2000. After powering off the SUN2000, wait at least 5 minutes before performing operations on it.

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 Specifications

Efficiency

Item	SUN2000-60KTL-HV-D1	SUN2000-55KTL-HV-D1	SUN2000-55KTL-IN-HV-D1	SUN2000-55KTL-HV-D1-001	SUN2000-60KTL-HV-D1-001
Maximum efficiency	99.00%	99.00%			
Chinese efficiency	98.50%	N/A			
European efficiency	N/A	98.80%			

Input

Item	SUN2000-60KTL-HV-D1	SUN2000-55KTL-HV-D1	SUN2000-55KTL-IN-HV-D1	SUN2000-55KTL-HV-D1-001	SUN2000-60KTL-HV-D1-001
Maximum input voltage	1500 V				
Maximum input current (per MPPT)	22 A				
Maximum short-circuit current (per MPPT)	30 A				
Maximum inverter backfeed current to the PV array	0A				

Item	SUN2000-60KTL-HV-D1	SUN2000-55KTL-HV-D1	SUN2000-55KTL-IN-HV-D1	SUN2000-55KTL-HV-D1-001	SUN2000-60KTL-HV-D1-001
Minimumoperating/start up voltage	600 V/650 V				
Highest operating voltage	1500 V				
MPPT voltage range	600–1450 V				
Full power MPPT voltage range	880–1275 V				
Rated input voltage	1080 V				
Number of inputs	8				
Number of MPP trackers	4				

Output

Item	SUN2000-60KTL-HV-D1	SUN2000-55KTL-HV-D1	SUN2000-55KTL-IN-HV-D1	SUN2000-55KTL-HV-D1-001	SUN2000-60KTL-HV-D1-001
Rated active power	60,000 W	55,000 W	55,000 W	55,000 W	60,000 W
Maximum apparent power	66,000 VA	60,000 VA	66,000 VA	66,000 VA	66,000 VA
Maximum active power (cosφ = 1)	66,000 W	60,000 W	66,000 W	66,000 W	66,000 W
Rated output line voltage	800 V AC, 3W+PE				
Rated output current	43.3 A	39.7 A	39.7 A	39.7 A	43.3 A

Item	SUN2000-60KTL-HV-D1	SUN2000-55KTL-HV-D1	SUN2000-55KTL-IN-HV-D1	SUN2000-55KTL-HV-D1-001	SUN2000-60KTL-HV-D1-001
Adapted grid frequency	50 Hz/60 Hz				
Maximum output current	48 A	43.7 A	48 A	48 A	48 A
Power factor	0.8 leading ... 0.8 lagging				
Maximum total harmonic distortion (rated power)	< 3%				

Protection

Item	SUN2000-60KTL-HV-D1	SUN2000-55KTL-HV-D1	SUN2000-55KTL-IN-HV-D1	SUN2000-55KTL-HV-D1-001	SUN2000-60KTL-HV-D1-001
Input DC switch	Supported				
Islanding protection	Supported				
Output overcurrent protection	Supported				
Input reverse polarity protection	Supported				
PV string fault detection	Supported				
DC surge protection	Type II				
AC surge protection	Type II				
Insulation resistance detection	Supported				

Item	SUN2000-60KTL-HV-D1	SUN2000-55KTL-HV-D1	SUN2000-55KTL-IN-HV-D1	SUN2000-55KTL-HV-D1-001	SUN2000-60KTL-HV-D1-001
Residual current monitoring unit (RCMU)	Supported				

Display and Communication

Item	SUN2000-60KTL-HV-D1	SUN2000-55KTL-HV-D1	SUN2000-55KTL-IN-HV-D1	SUN2000-55KTL-HV-D1-001	SUN2000-60KTL-HV-D1-001
Display	LED, Bluetooth module+app, USB data cable+app, WLAN module+app				
RS485	Supported				
MBUS (PLC)	Supported				

Common Parameters

Item	SUN2000-60KTL-HV-D1	SUN2000-55KTL-HV-D1	SUN2000-55KTL-IN-HV-D1	SUN2000-55KTL-HV-D1-001	SUN2000-60KTL-HV-D1-001
Dimensions (W x H x D)	930 mm x 600 mm x 270 mm				
Weight	About 63 kg	About 62 kg			
Operating temperature	–25°C to +60°C				
Cooling mode	Natural convection				
Maximum operating altitude	4000 m				
Humidity	0%–100% RH				
Input terminal	Amphenol UTX				
Output terminal	Waterproof cable connector+OT terminal				
Ingress Protection Rating	IP65				

Item	SUN2000-60KTL-HV-D1	SUN2000-55KTL-HV-D1	SUN2000-55KTL-IN-HV-D1	SUN2000-55KTL-HV-D1-001	SUN2000-60KTL-HV-D1-001
Topology	Transformerless				

A Domain Name List of Management Systems

NOTE

The list is subject to change.

Table A-1 Domain names of management systems

Domain Name	Data Type	Scenario
intl.fusionsolar.huawei.com	Public IP address	FusionSolar hosting cloud **NOTE** The domain name is compatible with cn.fusionsolar.huawei.com (Chinese mainland).

B Grid Codes

NOTE

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

Table B-1 lists the grid codes that the SUN2000-60KTL-HV-D1 supports.

Table B-1 Grid codes (for the SUN2000-60KTL-HV-D1)

No.	Grid Code	Description
1	CHINA_MV800	China medium-voltage power grid
2	G59-England-MV800	G59 medium-voltage power grid
3	ABNT NBR 16149-MV800	Brazil medium-voltage power grid
4	UTE C 15-712-1-MV800	France power grid

Table B-2 lists the grid codes that the SUN2000-55KTL-HV-D1 supports.

Table B-2 Grid codes (for the SUN2000-55KTL-HV-D1)

No.	Grid Code	Description
1	G59-England-MV800	G59 medium-voltage power grid
2	AS4777-MV800	Australia medium-voltage power grid
3	IEC61727-MV800	IEC61727 medium-voltage power grid
4	BDEW-MV800	Germany medium-voltage power grid
5	ABNT NBR 16149-MV800	Brazil medium-voltage power grid
6	UTE C 15-712-1-MV800	France power grid
7	EN50438-TR-MV800	Turkey power grid
8	NRS-097-2-1-MV800	South Africa power grid
9	DUBAI-MV800	Dubai power grid

No.	Grid Code	Description
10	Northern Ireland-MV800	Northern Ireland power grid
11	CEI0-21-MV800	Italy power grid
12	IEC 61727-MV800-60Hz	General
13	Pakistan-MV800	Pakistan power grid
14	Israel-MV800	Israel power grid
15	CEI0-16-MV800	Italy medium-voltage power grid
16	AUSTRALIA-NER-MV800	Australia NER standard power grid
17	VDE-AR-N4120_HV800	VDE4120 standard power grid

Table B-3 lists the grid codes that the SUN2000-55KTL-IN-HV-D1 supports.

Table B-3 Grid codes (for the SUN2000-55KTL-IN-HV-D1)

No.	Grid Code	Description
1	G59-England-MV800	G59 medium-voltage power grid
2	AS4777-MV800	Australia medium-voltage power grid
3	INDIA-MV800	India medium-voltage power grid
4	IEC61727-MV800	IEC61727 medium-voltage power grid
5	BDEW-MV800	Germany medium-voltage power grid
6	ABNT NBR 16149-MV800	Brazil medium-voltage power grid
7	UTE C 15-712-1-MV800	France power grid
8	EN50438-TR-MV800	Turkey power grid
9	NRS-097-2-1-MV800	South Africa power grid
10	DUBAI-MV800	Dubai power grid
11	CEI0-21-MV800	Italy power grid
12	IEC 61727-MV800-60Hz	General
13	CEI0-16-MV800	Italy medium-voltage power grid
14	VDE-AR-N4120_HV800	VDE4120 standard power grid

Table B-4 lists the grid codes that the SUN2000-55KTL-HV-D1-001 supports.

Table B-4 Grid codes (for the SUN2000-55KTL-HV-D1-001)

No.	Grid Code	Description
1	G59-England-MV800	G59 medium-voltage power grid
2	AS4777-MV800	Australia medium-voltage power grid
3	IEC61727-MV800	IEC61727 medium-voltage power grid
4	BDEW-MV800	Germany medium-voltage power grid
5	ABNT NBR 16149-MV800	Brazil medium-voltage power grid
6	UTE C 15-712-1-MV800	France power grid
7	EN50438-TR-MV800	Turkey power grid
8	NRS-097-2-1-MV800	South Africa power grid
9	SA_RPPs-MV800	South Africa power grid
10	Jordan-Transmission-MV800	Jordan power grid
11	Jordan-Distribution-MV800	Jordan power grid
12	Egypt ETEC-MV800	Egypt power grid
13	DUBAI-MV800	Dubai power grid
14	SAUDI-MV800	Saudi Arabia power grid
15	CEI0-21-MV800	Italy power grid
16	IEC 61727-MV800-60Hz	General
17	Israel-MV800	Israel power grid
18	CEI0-16-MV800	Italy medium-voltage power grid
19	ZAMBIA-MV800	Zambia medium-voltage power grid
20	KENYA_ETHIOPIA_MV800	Kenya medium-voltage power grid and Ethiopia medium-voltage power grid
21	NAMIBIA_MV800	Namibia power grid
22	Cameroon-MV800	Cameroon medium-voltage power grid
23	NIGERIA-MV800	Nigeria medium-voltage power grid
24	ABUDHABI-MV800	Abu Dhabi medium-voltage power grid
25	LEBANON-MV800	Lebanon medium-voltage power grid
26	Jordan-Transmission-HV800	Jordan high-voltage power grid
27	TUNISIA-MV800	Tunisia medium-voltage power grid
28	VDE-AR-N4120_HV800	VDE4120 standard power grid
29	IEEE 1547-MV800	General

No.	Grid Code	Description
30	Nicaragua-MV800	Nicaragua power grid
31	Ghana-MV800	Ghana medium-voltage power grid

Table B-5 lists the grid codes that the SUN2000-60KTL-HV-D1-001 supports.

Table B-5 Grid codes (for the SUN2000-60KTL-HV-D1-001)

No.	Grid Code	Description
1	G59-England-MV800	G59 medium-voltage power grid
2	AS4777-MV800	Australia medium-voltage power grid
3	IEC61727-MV800	IEC61727 medium-voltage power grid
4	BDEW-MV800	Germany medium-voltage power grid
5	ABNT NBR 16149-MV800	Brazil medium-voltage power grid
6	UTE C 15-712-1-MV800	France power grid
7	Chile-MV800	Chile power grid
8	Mexico-MV800	Mexico power grid
9	EN50438-TR-MV800	Turkey power grid
10	TAI-PEA-MV800	Thailand power grid
11	Philippines-MV800	Philippines power grid
12	Malaysian-MV800	Malaysia power grid
13	NRS-097-2-1-MV800	South Africa power grid
14	DUBAI-MV800	Dubai power grid
15	EN50438_IE-MV800	Ireland power grid
16	CLC/TS50549-MV800	Ireland power grid
17	Northern Ireland-MV800	Northern Ireland power grid
18	CEI0-21-MV800	Italy power grid
19	IEC 61727-MV800-60Hz	General
20	BRASIL-ANEEL-MV800	Brazil power grid
21	CEI0-16-MV800	Italy medium-voltage power grid
22	ARGENTINA-MV800	Argentina medium-voltage power grid
23	JAMAICA-MV800	Jamaica medium-voltage power grid
24	VDE-AR-N4120_HV800	VDE4120 standard power grid

No.	Grid Code	Description
25	RD1699/661-MV800	Spain medium-voltage power grid
26	PO12.3-MV800	Spain medium-voltage power grid
27	Vietnam-MV800	Vietnam medium-voltage power grid
28	Chile-PMGD-MV800	Chile PMGD medium-voltage power grid
29	TAIPOWER-MV800	Taiwan power medium-voltage power grid

C Acronyms and Abbreviations

C	
CCO	central controller
L	
LED	light emitting diode
M	
MPP	maximum power point
MPPT	maximum power point tracking
P	
PID	potential induced degradation
PLC	power line communication
PV	photovoltaic
R	
RCD	residual current device
W	
WEEE	waste electrical and electronic equipment

