

## Replacing SUN2000-(15KTL-50KTL) Series with SUN2000-(15KTL-50KTL)-M3 Series

# User Manual

Issue 01  
Date 2021-04-05

HUAWEI TECHNOLOGIES CO., LTD.



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# About this Document

## Abstract

This document describes the SUN2000-(15KTL-50KTL)-M3 series inverters (SUN2000 for short) in terms of installation, electrical connection, commissioning, maintenance, and troubleshooting, in the scenarios where the SUN2000 V100R001, SUN2000 V200R001, and SUN2000 V200R002 are replaced. Before installing and operating the SUN2000, ensure that you are familiar with the features, functions, and safety precautions provided in this document.

## Intended Audience

This document is applicable to:

- Installers
- Users

## Symbol Conventions

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

Symbol	Remarks
	Indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.
	Indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.
	Indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.
	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.
	Supplements the important information in the main text.

Symbol	Remarks
	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

#### Issue 01 (2021-04-05)

This issue is the first official release.

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# 1 Safety Information

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## 1.1 General Safety

### Statement

Before installing, operating, and maintaining the equipment, read this document and observe all the safety instructions on the equipment and in this document.

The "NOTICE", "CAUTION", "WARNING", and "DANGER" statements in this document do not cover all the safety instructions. They are only supplements to the safety instructions. Huawei will not be liable for any consequence caused by the violation of general safety requirements or design, production, and usage safety standards.

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

Follow local laws and regulations when installing, operating, or maintaining the equipment. The safety instructions in this document are only supplements to local laws and regulations.

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

- Operation beyond the conditions specified in this document
- Installation or use in environments which are not specified in relevant international or national standards
- Unauthorized modifications to the product or software code or removal of the product
- Failure to follow the operation instructions and safety precautions on the product and in this document
- Equipment damage due to force majeure, such as earthquakes, fire, and storms
- Damage caused during transportation by the customer
- Storage conditions that do not meet the requirements specified in this document

### General Requirements



Do not work with power on during installation.

- Do not install, use, or operate outdoor equipment and cables (including but not limited to moving equipment, operating equipment and cables, inserting connectors to or removing connectors from signal ports connected to outdoor facilities, working at heights, and performing outdoor installation) in harsh weather conditions such as lightning, rain, snow, and level 6 or stronger wind.
- After installing the equipment, remove idle packing materials such as cartons, foam, plastics, and cable ties from the equipment area.
- In the case of a fire, immediately leave the building or the equipment area, and turn on the fire alarm bell or make an emergency call. Do not enter the building on fire in any case.
- Do not scrawl, damage, or block any warning label on the equipment.
- Tighten the screws to the specified torque using tools when installing the equipment.
- Understand the components and functioning of a grid-tied PV power system and relevant local standards.
- Repaint any paint scratches caused during equipment transportation or installation in a timely manner. Equipment with scratches cannot be exposed to an outdoor environment for a long period of time.
- Do not open the host panel of the equipment.

## Personal Safety

- If there is a probability of personal injury or equipment damage during operations on the equipment, immediately stop the operations, report the case to the supervisor, and take feasible protective measures.
- Use tools correctly to avoid hurting people or damaging the equipment.
- Do not touch the energized equipment, as the enclosure is hot.

## 1.2 Personnel Requirements

- Personnel who plan to install or maintain Huawei equipment must receive thorough training, understand all necessary safety precautions, and be able to correctly perform all operations.
- Only qualified professionals or trained personnel are allowed to install, operate, and maintain the equipment.
- Only qualified professionals are allowed to remove safety facilities and inspect the equipment.
- Personnel who will operate the equipment, including operators, trained personnel, and professionals, should possess the local national required qualifications in special operations such as high-voltage operations, working at heights, and operations of special equipment.
- Only professionals or authorized personnel are allowed to replace the equipment or components (including software).

#### NOTE

- Professionals: personnel who are trained or experienced in equipment operations and are clear of the sources and degree of various potential hazards in equipment installation, operation, and maintenance
- Trained personnel: personnel who are technically trained, have required experience, are aware of possible hazards on themselves in certain operations, and are able to take protective measures to minimize the hazards on themselves and other people
- Operators: operation personnel who may come in contact with the equipment, except trained personnel and professionals

## 1.3 Electrical Safety

### Grounding

- For the equipment that needs to be grounded, install the ground cable first when installing the equipment and remove the ground cable last when removing the equipment.
- Do not damage the ground conductor.
- Do not operate the equipment in the absence of a properly installed ground conductor.
- Ensure that the equipment is connected permanently to the protective ground. Before operating the equipment, check its electrical connection to ensure that it is securely grounded.

### General Requirements



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

- Ensure that all electrical connections comply with local electrical standards.
- Obtain approval from the local electric utility company before using the equipment in grid-tied mode.
- Ensure that the cables you prepared meet local regulations.
- Use dedicated insulated tools when performing high-voltage operations.

### AC and DC Power



Do not connect or disconnect power cables with power on. Transient contact between the core of the power cable and the conductor will generate electric arcs or sparks, which may cause fire or personal injury.

- Before making electrical connections, switch off the disconnecter on the upstream device to cut off the power supply if people may contact energized components.

- Before connecting a power cable, check that the label on the power cable is correct.
- If the equipment has multiple inputs, disconnect all the inputs before operating the equipment.

## Cabling

- When routing cables, ensure that a distance of at least 30 mm exists between the cables and heat-generating components or areas. This prevents damage to the insulation layer of the cables.
- Bind cables of the same type together. When routing cables of different types, ensure that they are at least 30 mm away from each other.
- Ensure that the cables used in a grid-tied PV power system are properly connected and insulated and meet specifications.

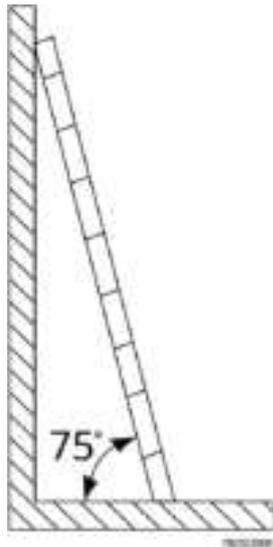
## 1.4 Installation Environment Requirements

- Ensure that the equipment is installed in a well ventilated environment.
- To prevent fire due to high temperature, ensure that the ventilation vents or heat dissipation system are not blocked when the equipment is running.
- Do not expose the equipment to flammable or explosive gas or smoke. Do not perform any operation on the equipment in such environments.

## 1.5 Mechanical Safety

### Using Ladders

- Use wooden or fiberglass ladders when you need to perform live working at heights.
- When a step ladder is used, ensure that the pull ropes are secured and the ladder is held firm.
- Before using a ladder, check that it is intact and confirm its load bearing capacity. Do not overload it.
- Ensure that the wider end of the ladder is at the bottom, or protective measures have been taken at the bottom to prevent the ladder from sliding.
- Ensure that the ladder is securely positioned. The recommended angle for a ladder against the floor is 75 degrees, as shown in the following figure. An angle rule can be used to measure the angle.



- When climbing a ladder, take the following precautions to reduce risks and ensure safety:
  - Keep your body steady.
  - Do not climb higher than the fourth rung of the ladder from the top.
  - Ensure that your body's center of gravity does not shift outside the legs of the ladder.

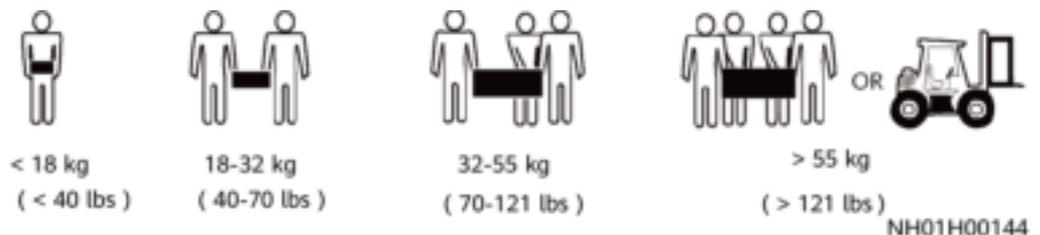
## Drilling Holes

When drilling holes into a wall or floor, observe the following safety precautions:

- Wear goggles and protective gloves when drilling holes.
- When drilling holes, protect the equipment from shavings. After drilling, clean up any shavings that have accumulated inside or outside the equipment.

## Moving Heavy Objects

- Be cautious to avoid injury when moving heavy objects.



- When moving the equipment by hand, wear protective gloves to prevent injuries.

## 1.6 Commissioning

When the equipment is powered on for the first time, ensure that professional personnel set parameters correctly. Incorrect settings may result in inconsistency with local certification and affect the normal operation of the equipment.

## 1.7 Maintenance and Replacement



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

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- Maintain the equipment with sufficient knowledge of this document and using proper tools and testing equipment.
- Before maintaining the equipment, power it off and follow the instructions on the delayed discharge label to ensure that the equipment is powered off.
- Place temporary warning signs or erect fences to prevent unauthorized access to the maintenance site.
- If the equipment is faulty, contact your dealer.
- The equipment can be powered on only after all faults are rectified. Failing to do so may escalate faults or damage the equipment.

# 2 Overview

## 2.1 Overview

### Function

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

### Model

**Table 2-1** Model Replacement Relationship

Original Version	Original Model	Number of PV Strings	Replacement Model
	SUN2000-15KTL	6	SUN2000-15KTL-M3
	SUN2000-17KTL	6	SUN2000-17KTL-M3
	SUN2000-20KTL	6	SUN2000-20KTL-M3
	SUN2000-23KTL	6	SUN2000-23KTL-M3
	SUN2000-28KTL	6	SUN2000-28KTL-M3
	SUN2000-33KTL	6	SUN2000-30KTL-M3
	SUN2000-33KTL-E001	6	
	SUN2000-30KL-A	6	
	SUN2000-40KTL	6	SUN2000-36KTL-M3
	SUN2000-25KTL-US	6	SUN2000-25KTL-NAM 3
	SUN2000-30KTL-US	6	SUN2000-30KTL-NAM 3
SUN2000 V200R002	SUN2000-29.9KTL	8	SUN2000-29.9KTL-M3

Original Version	Original Model	Number of PV Strings	Replacement Model
	SUN2000-33KTL-A	8	SUN2000-30KTL-M3
	SUN2000-36KTL	8	SUN2000-36KTL-M3
	SUN2000-42KTL	8	SUN2000-42KTL-M3
	SUN2000-43KTL-IN-C1	8	SUN2000-43KTL-INM3
	SUN2000-50KTL, SUN2000-50KTL-C1	8	SUN2000-50KTL-M3
	SUN2000-33KTL-US	8	SUN2000-33KTL-NAM3
	SUN2000-36KTL-US	8	SUN2000-36KTL-NAM3
	SUN2000-40KTL-US	8	SUN2000-40KTL-NAM3

Figure 2-1 Model description (using the SUN2000-43KTL-INM3 as an example)

**SUN2000-43KTL-INM3**

1                      2      3      4      5

Table 2-2 Model description

No.	Description	Value
1	Series name	SUN2000: three-phase grid-tied PV string inverter
2	Power level	<ul style="list-style-type: none"> <li>• 15K: rated power of 15 kW</li> <li>• 17K: rated power of 17 kW</li> <li>• 20K: rated power of 20 kW</li> <li>• 23K: rated power of 23 kW</li> <li>• 24.5K: rated power of 24.5 kW</li> <li>• 25K: rated power of 25 kW</li> <li>• 28K: rated power of 27.5 kW</li> <li>• 29.9K: rated power of 29.9 kW</li> <li>• 30K: rated power of 30 kW</li> <li>• 33K: rated power of 33.3kW</li> <li>• 36K: rated power of 36 kW</li> <li>• 40K: rated power of 40 kW</li> <li>• 42K: rated power of 42 kW</li> </ul>

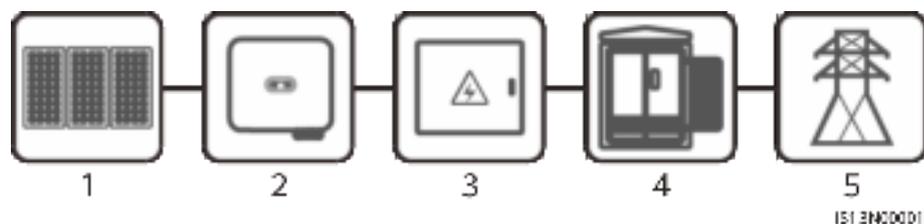
No.	Description	Value
		<ul style="list-style-type: none"> <li>43K: rated power of 43 kW</li> <li>50K: rated power of 46 kW (480 V AC)/47.5 kW (500 V AC)</li> </ul>
3	Topology	TL: transformerless
4	Region	IN: India NA: North America
5	Product ID	M3: product series with an input voltage level of 1100 V <sup>a</sup>

Note a: The maximum DC input voltage of some models is 1000 V. For details, see 11 Technical Specifications.

## Networking Application

The SUN2000 applies to the grid-tied systems of industrial and commercial rooftops and small ground PV plants. Typically, a grid-tied system consists of PV strings, grid-tied inverters, AC switches, and power distribution units.

**Figure 2-2** Networking application – single inverter scenario



(1) PV string

(2) SUN2000

(3) AC power distribution unit

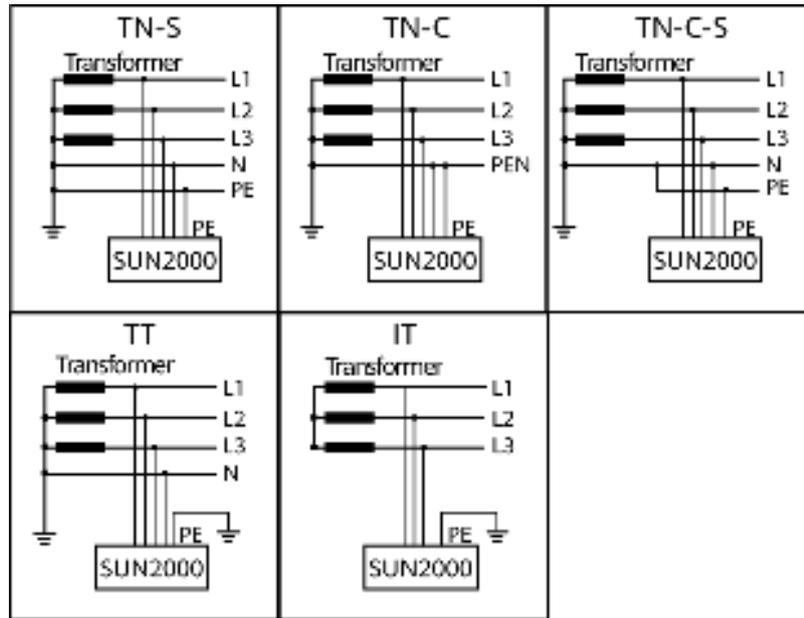
(4) Isolation transformer

(5) Power grid

## Supported Power Grids

The SUN2000 supports TN-S, TN-C, TN-C-S, TT, and IT power grids.

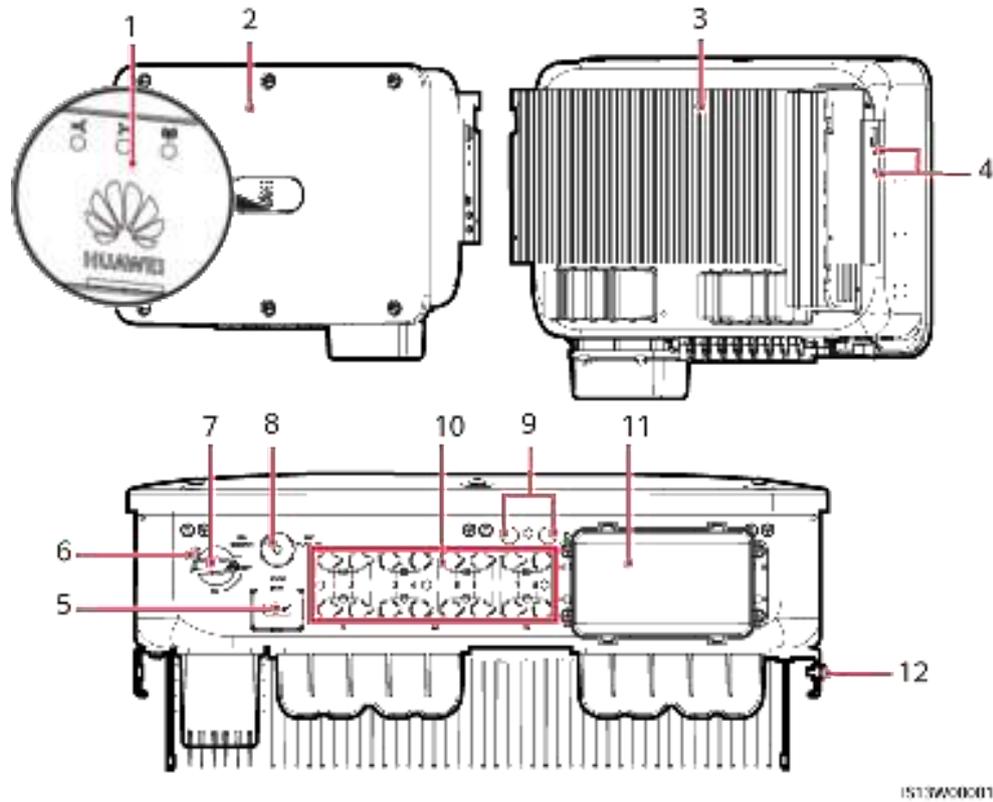
Figure 2-3 Power grid type



19015101001

## 2.2 Appearance

Figure 2-4 Appearance

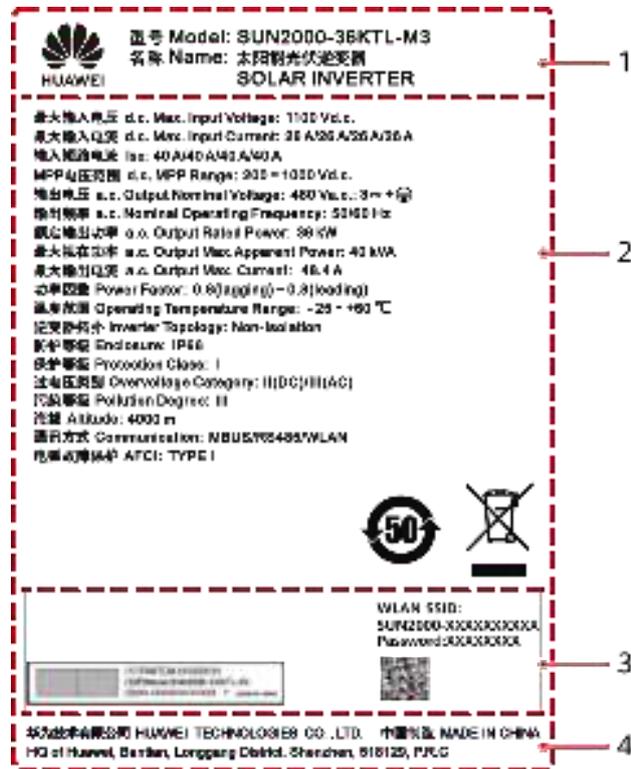


- |                               |  |
|-------------------------------|--|
| (1) LED indicator             | (2) Front panel                          |
| (3) Heat sink                 | (4) Screws for fixing the awning         |
| (5) Communications port (COM) | (6) Hole for the DC switch locking screw |
| (7) DC switch (DC SWITCH)     | (8) Smart Dongle port (4G/WLAN-FE)       |
| (9) Ventilation valve         | (10) DC input terminals (PV1–PV8)        |
| (11) AC output port           | (12) Ground point                        |

## 2.3 Label Description

### Nameplate

Figure 2-5 Nameplate



(1) Trademark and product model

(2) Key technical parameters

(3) Label information

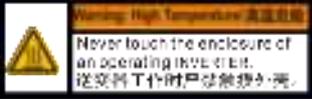
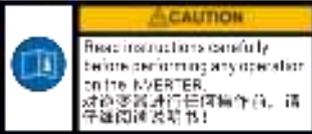
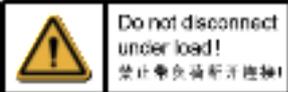
(4) Company name and country of origin

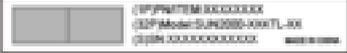
#### NOTE

The nameplate figure is for reference only.

### Enclosure Labels

Symbol	Name	Description
	<p><b>Danger-High Voltage 高压危险</b></p> <p>Start maintaining the INVERTER at least 5 minutes after the INVERTER disconnects from all external power supplies.</p> <p>启动维护逆变器至少5分钟，才可进行检修。</p>	<p>Delayed discharge</p> <p>Residual voltage exists after the SUN2000 is powered off. It takes 5 minutes for the SUN2000 to discharge to the safe voltage.</p>

Symbol	Name	Description
	Burn warning	Do not touch a running SUN2000 because it generates high temperatures on the shell.
	Electric shock warning	<ul style="list-style-type: none"> <li>High voltage exists after the SUN2000 is powered on. Only qualified and trained electrical technicians are allowed to perform operations on the SUN2000.</li> <li>High touch current exists after the SUN2000 is powered on. Before powering on the SUN2000, ensure that the SUN2000 is properly grounded.</li> </ul>
	Refer to documentations	Reminds operators to refer to the documentations delivered with the SUN2000.
	Grounding	Indicates the position for connecting the PE cable.
	Operation warning	Do not remove the DC input connector or AC output connector with power on.
	Weight label	The SUN2000 is heavy and needs to be carried by three persons.
	SUN2000 handle burn warning	Do not touch the handle within 10 minutes after the SUN2000 shuts down.

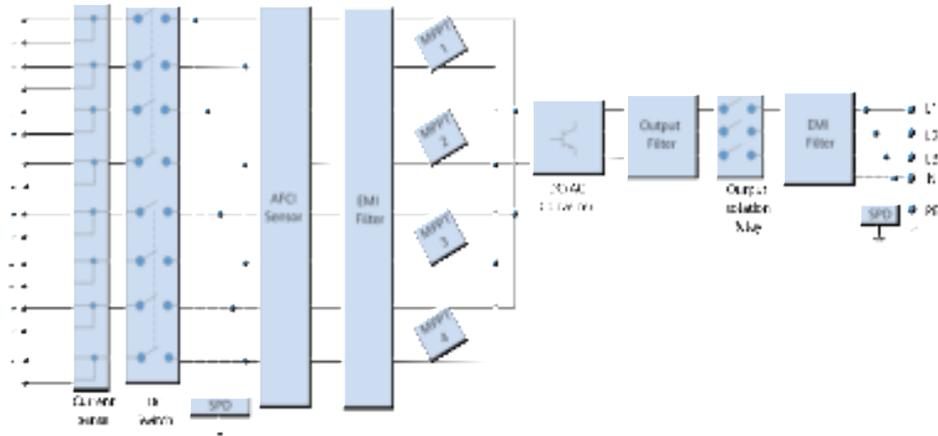
Symbol	Name	Description
	Indicator	Indicates the SUN2000 operating information.
	SUN2000 serial number	Indicates the serial number.
<p><b>WLAN SSID:</b> SUN2000-XXXXXXXXXX <b>Password:</b>XXXXXXXXXX</p> 	SUN2000 WiFi login QR code	Scan the QR code to connect to the Huawei SUN2000 WiFi network.

## 2.4 Working Principles

### 2.4.1 Circuit Diagram

A SUN2000 can connect to a maximum of eight PV strings and has four MPPT circuits inside. Each MPPT circuit tracks the maximum power point of two PV strings. The SUN2000 converts DC power into single-phase AC power through an inverter circuit. Surge protection is supported on both the DC and AC sides.

**Figure 2-6** Schematic diagram



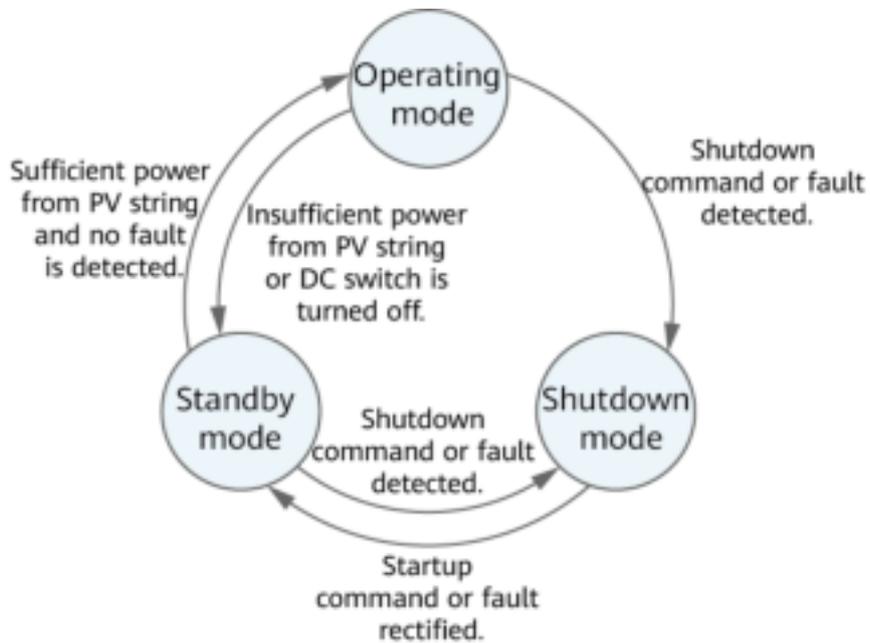
**NOTICE**

In the SUN2000 V100R001 and SUN2000 V200R001 replacement scenarios, only six PV strings can be connected to the SUN2000. Therefore, you are advised not to use PV7 and PV8.

## 2.4.2 Working Modes

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

**Figure 2-7** Working modes



1507500001

**Table 2-3** Working mode description

<b>Working Mode</b>	<b>Description</b>
Standby	<p>The SUN2000 enters Standby mode when the external environment does not meet the operating requirements. In Standby mode:</p> <ul style="list-style-type: none"><li>• The SUN2000 continuously performs status check and enters the Operating mode once the operating requirements are met.</li><li>• The SUN2000 enters Shutdown mode after detecting a shutdown command or a fault after startup.</li></ul>
Operating	<p>In Operating mode:</p> <ul style="list-style-type: none"><li>• The SUN2000 converts DC power from PV strings into AC power and feeds the power to the power grid.</li><li>• The SUN2000 tracks the maximum power point to maximize the PV string output.</li><li>• If the SUN2000 detects a fault or a shutdown command, it enters the Shutdown mode.</li><li>• The SUN2000 enters Standby mode after detecting that the PV string output power is not suitable for connecting to the power grid for generating power.</li></ul>
Shutdown	<ul style="list-style-type: none"><li>• In Standby or Operating mode, the SUN2000 enters Shutdown mode after detecting a fault or shutdown command.</li><li>• In Shutdown mode, the SUN2000 enters Standby mode after detecting a startup command or that the fault is rectified.</li></ul>

# 3 SUN2000 Storage

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

- Do not unpack the SUN2000.
- Keep the storage temperature at  $-40^{\circ}\text{C}$  to  $+70^{\circ}\text{C}$  and the humidity at 5%–95% RH.
- Store the SUN2000 in a clean and dry place and protect it from dust and water vapor corrosion.
- A maximum of six SUN2000s can be stacked. To avoid personal injury or device damage, stack SUN2000s with caution to prevent them from falling over.
- During the storage period, check the SUN2000 periodically (recommended: every three months). If any rodent bites are found on the packing materials, replace the packing materials immediately.
- If the SUN2000 has been stored for more than two years, it must be checked and tested by professionals before being put into use.

# 4 Removing the Original SUN2000

## DANGER

- Before removing the original SUN2000, ensure that the DC switch on the SUN2000 and all the switches connected to the SUN2000 are set to OFF. Otherwise, the high voltage of the SUN2000 may result in electric shocks.
- After the SUN2000 is powered off, the remaining electricity and heat may still cause electric shocks and body burns. Therefore, put on protective gloves and begin operating the SUN2000 five minutes after the power-off.

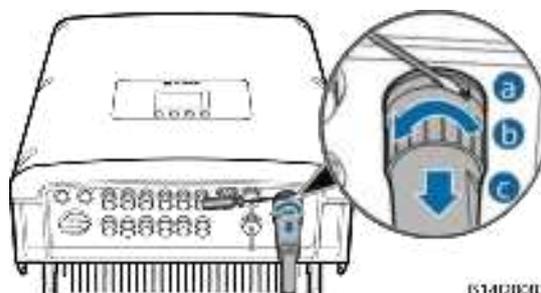
## 4.1 Removing the SUN2000 V100R001

**Step 1** Power off the SUN2000 to be replaced.

**Step 2** Remove the AC connector.

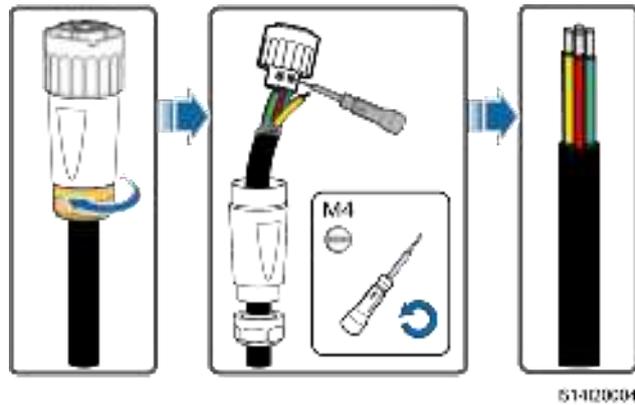
1. Press the locking plate on the AC output wiring terminal with a screwdriver.
2. Rotate the AC output connector counterclockwise.
3. Remove the AC output connector.

**Figure 4-1** Removing the AC connector



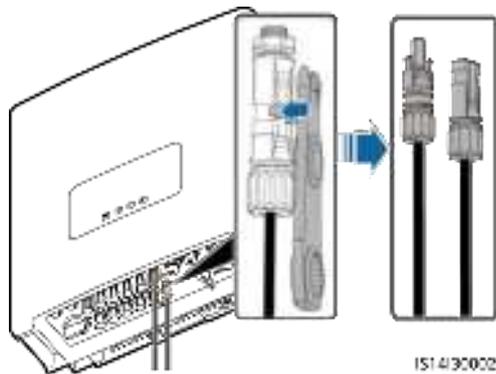
**Step 3** Remove the AC output cable from the matching socket for future use.

**Figure 4-2** Removing the AC output cable



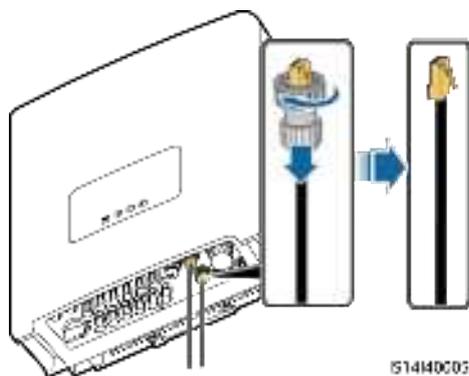
**Step 4** Remove the DC connectors.

**Figure 4-3** Removing DC connectors



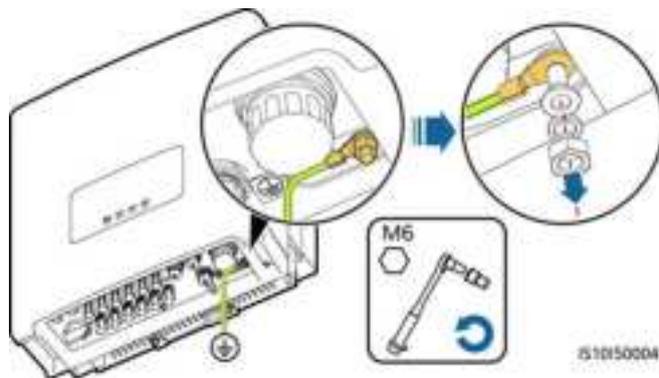
**Step 5** Remove the RS485 communications cable.

**Figure 4-4** Removing the RS485 communications cable



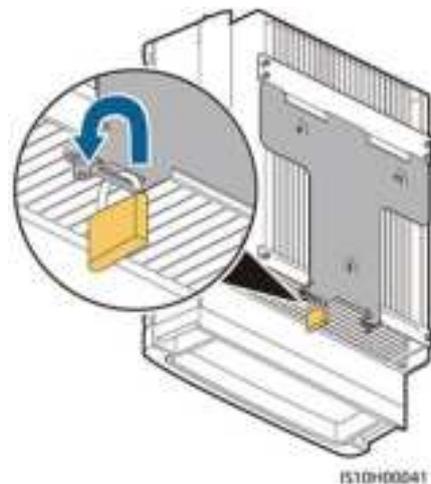
**Step 6** Remove the PE cable.

**Figure 4-5** Removing the PE cable



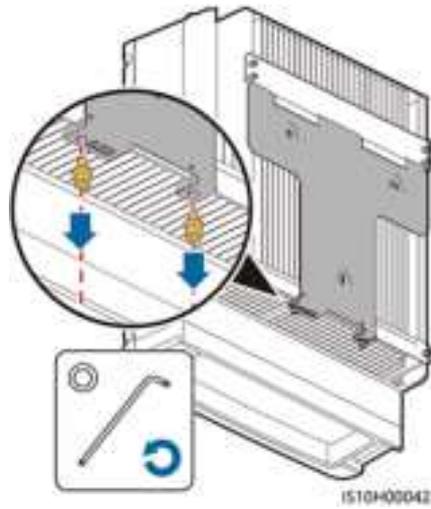
**Step 7** (Optional) Open the anti-theft lock.

**Figure 4-6** Opening the anti-theft lock



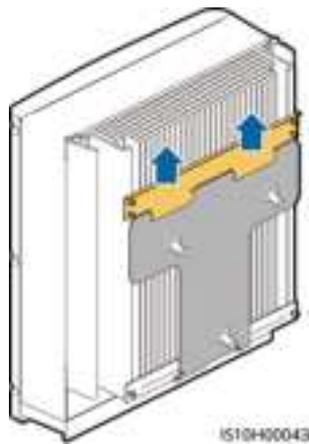
**Step 8** Remove the two hexagonal screws.

**Figure 4-7** Removing screws



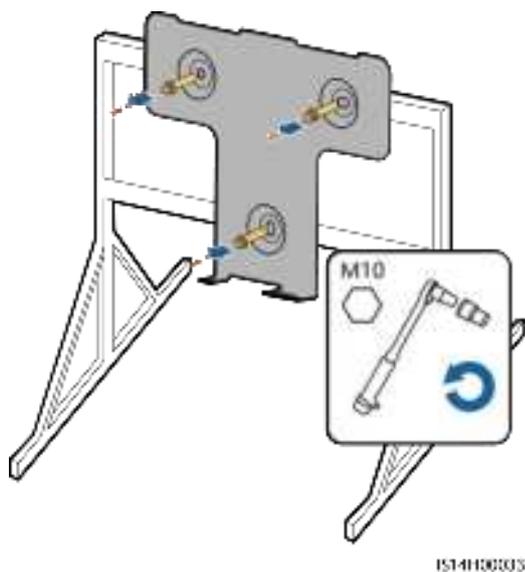
**Step 9** Remove the SUN2000 from the back panel.

**Figure 4-8** Removing the SUN2000



**Step 10** Remove the nuts, spring washers, and flat washers, and then remove the back panel.

**Figure 4-9** Removing the back panel



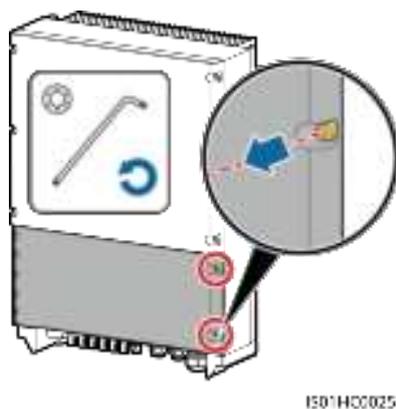
----End

## 4.2 Removing the SUN2000 V200R001

**Step 1** Power off the SUN2000 to be replaced.

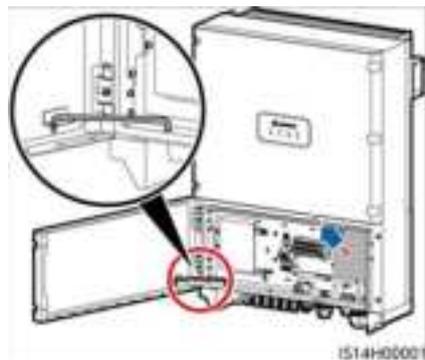
**Step 2** Open the maintenance compartment door.

**Figure 4-10** Opening the maintenance compartment door



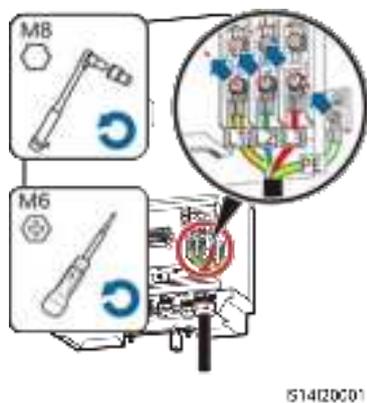
**Step 3** Install the support bar and remove the AC terminal cover.

**Figure 4-11** Removing the AC terminal cover



**Step 4** Remove the AC power cable. The SUN2000-40KTL is used as an example.

**Figure 4-12** Removing the AC power cable

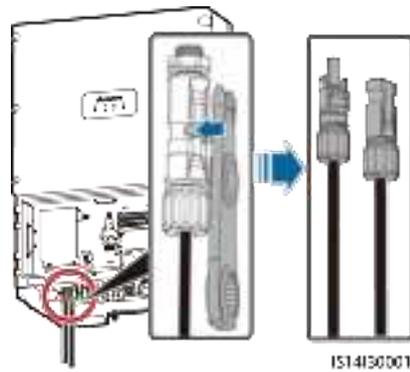


**NOTE**

- If the AC terminal of the original inverter is a 3-pin terminal, use an M8 torque wrench to remove the terminal.
- If the AC terminal of the original inverter is a 4-pin terminal, use an M6 torque wrench to remove the terminal.

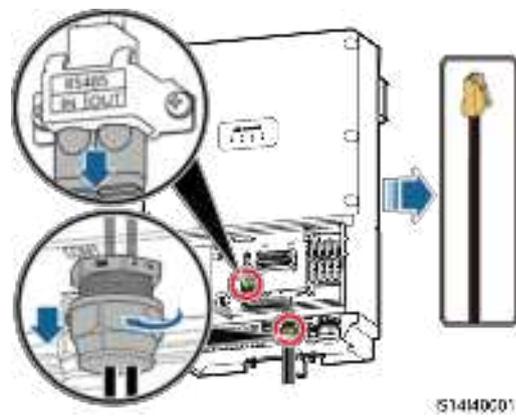
**Step 5** Remove the DC connectors.

**Figure 4-13** Removing DC power cables

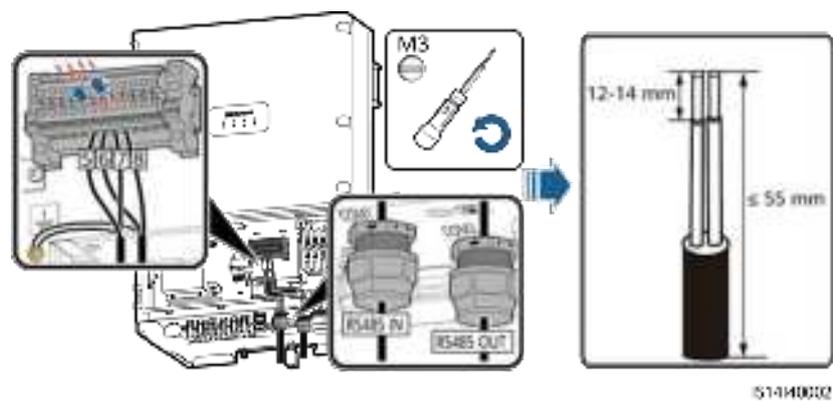


**Step 6** Remove the signal cables.

**Figure 4-14** RJ45 network port

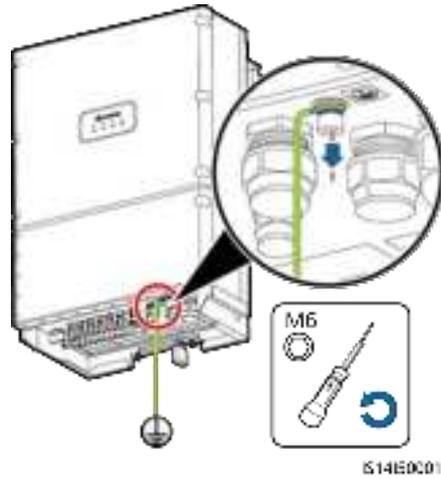


**Figure 4-15** Terminal block



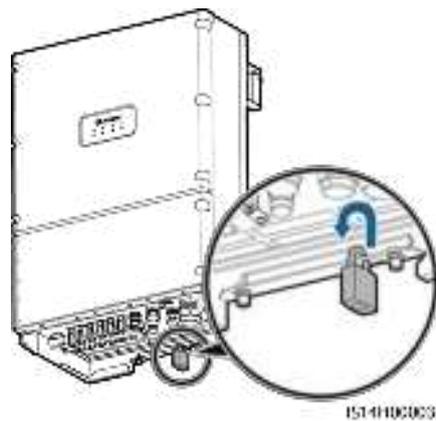
**Step 7** Remove the PE cable.

**Figure 4-16** Removing the PE cable



**Step 8** (Optional) Open the anti-theft lock.

**Figure 4-17** Opening the anti-theft lock



**Step 9** Remove the two hexagonal screws.

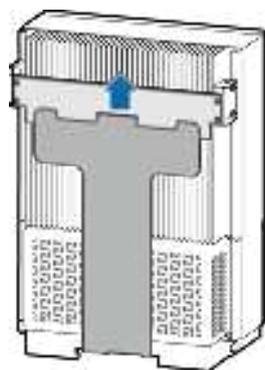
**Figure 4-18** Removing screws



IS14HC0002

**Step 10** Remove the SUN2000 from the back panel.

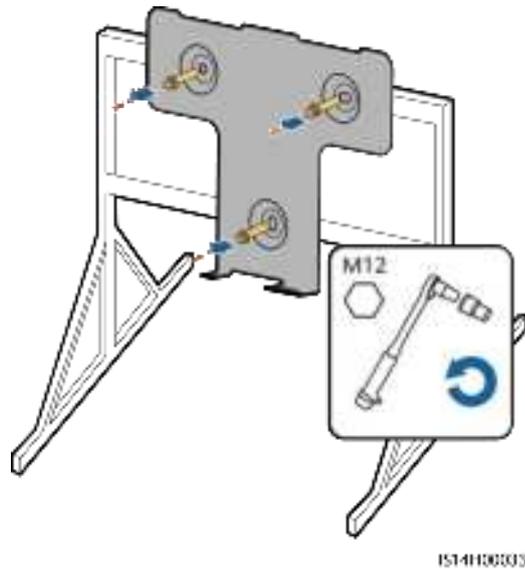
**Figure 4-19** Removing the SUN2000



IS14HC0004

**Step 11** Remove the nuts, spring washers, and flat washers, and then remove the back panel.

**Figure 4-20** Removing the back panel



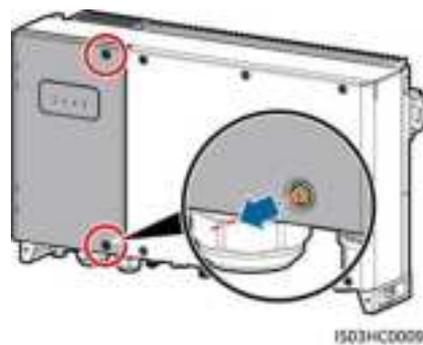
----End

### 4.3 Removing the SUN2000 V200R002

**Step 1** Power off the SUN2000 to be replaced.

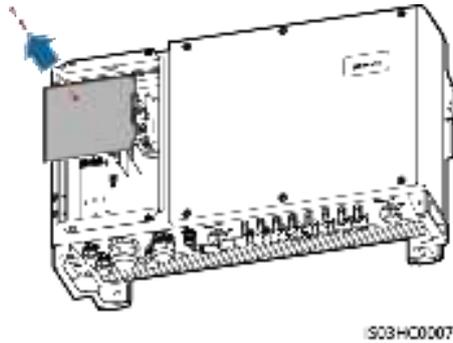
**Step 2** Remove the two security Torx screws from the maintenance compartment door using a security Torx wrench, and open the maintenance compartment door.

**Figure 4-21** Opening the maintenance compartment door



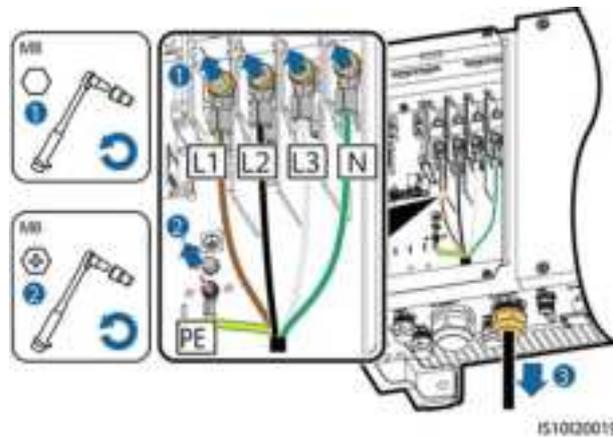
**Step 3** Remove the AC terminal cover.

**Figure 4-22** Removing the AC terminal cover



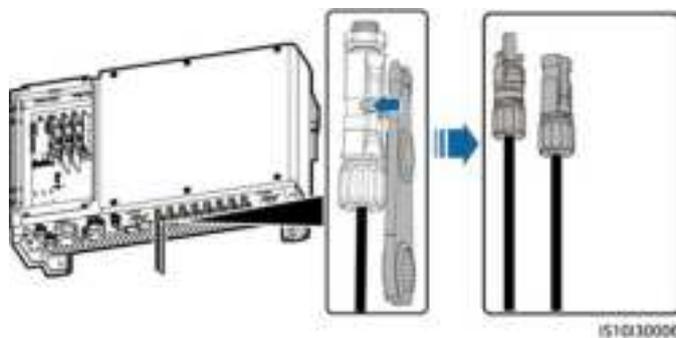
**Step 4** Remove the AC output power cable (using a five-core cable for the SUN2000-29.9KTL/33KTL-A/36KTL as an example).

**Figure 4-23** Removing the AC power cable



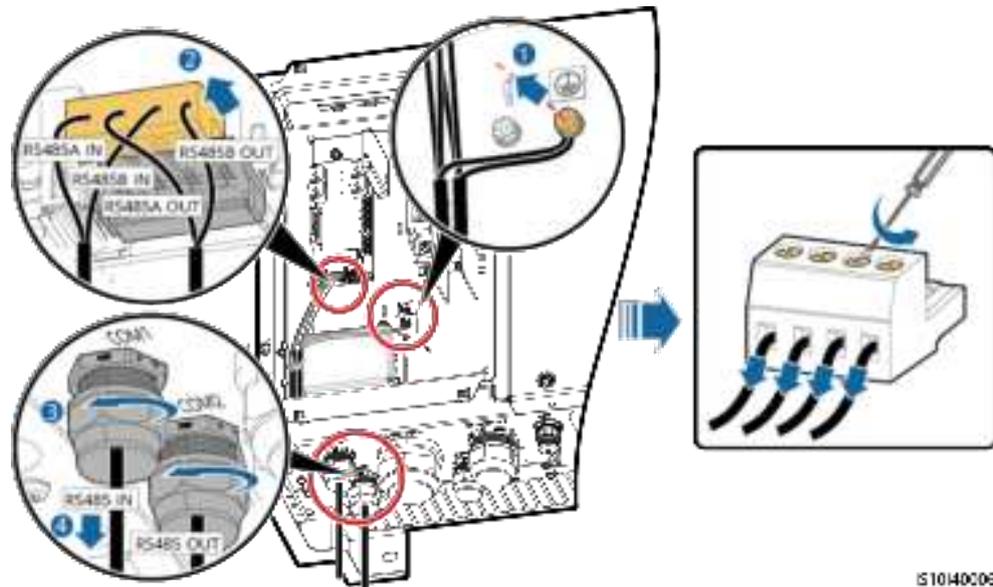
**Step 5** Remove the DC connectors.

**Figure 4-24** Removing DC power cables

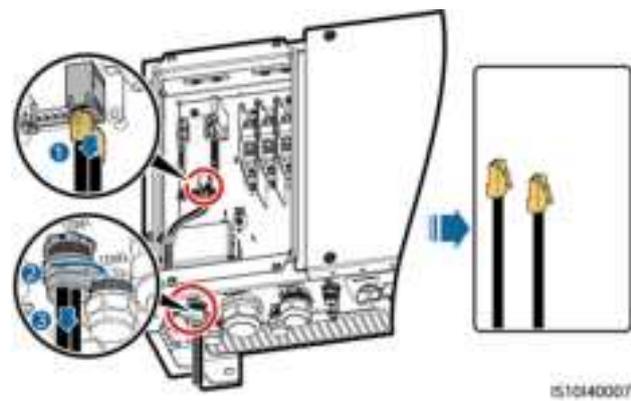


**Step 6** Remove the signal cables.

**Figure 4-25** Connecting cables to the terminal block

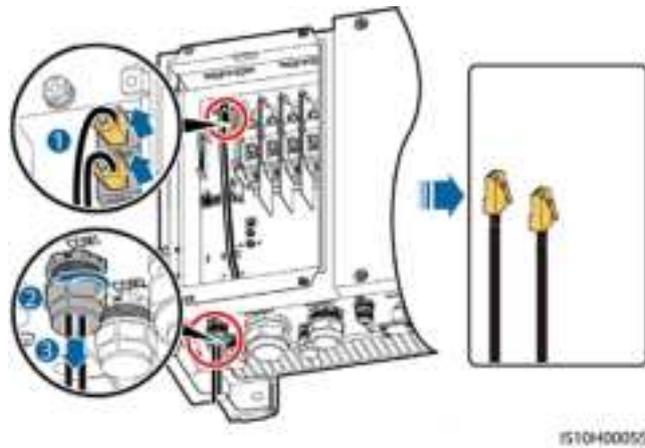


**Figure 4-26** Connecting cables to the RJ45 network port



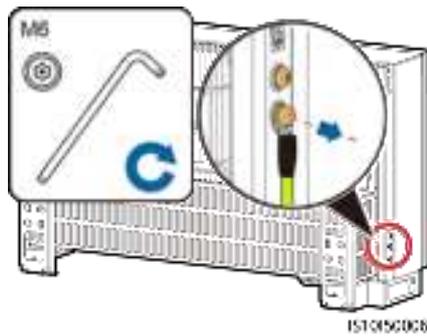
**Step 7** (Optional) Remove the FE communications cable.

**Figure 4-27** Removing the FE communications cable



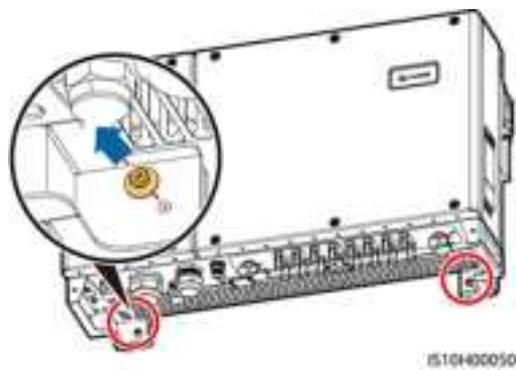
**Step 8** Remove the PE cable and remove the crimped OT terminal. Set the cable aside for future use.

**Figure 4-28** Removing the PE cable



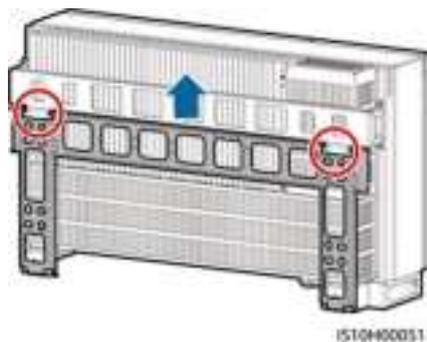
**Step 9** Remove the two security Torx screws.

**Figure 4-29** Removing security Torx screws



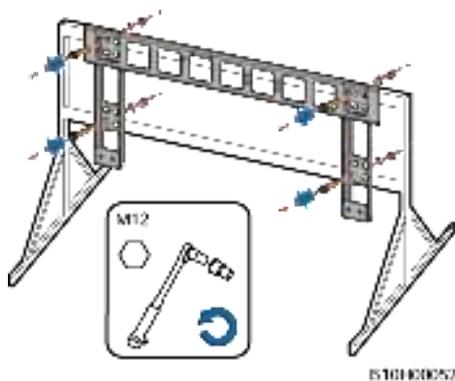
**Step 10** Remove the SUN2000 from the mounting bracket.

**Figure 4-30** Removing the SUN2000



**Step 11** Remove the mounting bracket.

**Figure 4-31** Removing the mounting bracket



----End

# 5 Installation

## 5.1 Checking Before Installation

### Outer Packing Materials

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

**NOTE**

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

### Package Contents

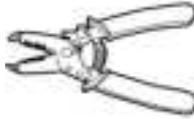
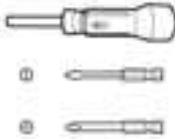
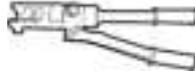
After unpacking the inverter, check that the contents are intact and complete. If any damage is found or any component is missing, contact your supplier.

**NOTE**

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

## 5.2 Tool Preparation

Type	Tools and Instruments		
Installation	 Hammer drill (with a $\Phi 14$ mm drill bit and a $\Phi 16$ mm drill bit)	 Torque socket and wrench	 Torque wrench

Type	Tools and Instruments		
	 Diagonal pliers	 Wire stripper	 Torque screwdriver
	 Rubber mallet	 Utility knife	 Cable cutter
	 Crimping tool (model: PV-CZM-22100)	 Open-end wrench (model: PV-MS-HZ or PV-MS open-end wrench)	 Cable tie
	 Vacuum cleaner	 Multimeter (DC voltage measurement range $\geq 1100$ V DC)	 Marker
	 Steel measuring tape	 Level	 Hydraulic pliers
	 Heat shrink tubing	 Heat gun	-

Type	Tools and Instruments		
Personal protective equipment (PPE)	 Safety gloves	 Safety goggles	 Anti-dust mask
	 Safety boots	-	-

## 5.3 Selecting an Installation Position

### Basic Requirements

- The SUN2000 is IP66-rated and can be installed indoors or outdoors.
- Do not install the SUN2000 in a place where a person can easily be exposed to its enclosure and heat sinks, because these parts are extremely hot during operation.
- Do not install the SUN2000 in areas with flammable or explosive materials.
- Do not install the SUN2000 in a place within children's reach.
- The SUN2000 will be corroded in salt areas, and the salt corrosion may cause fire. Do not install the SUN2000 outdoors in salt areas. A salt area refers to the region within 500 m from the coast or prone to sea breeze. The effect from sea breeze depends on weather conditions (such as typhoon and season wind) or terrains (such as dams and hills).

### Site Requirements

- The SUN2000 should be installed in a well-ventilated environment to ensure good heat dissipation.
- If the SUN2000 is installed in a place exposed to direct sunlight, the power may decrease as the temperature rises.
- You are advised to install the SUN2000 in a sheltered place or install an awning over it.

### Mounting Structure Requirements

- The mounting structure where the SUN2000 is installed must be fire resistant.
- Do not install the SUN2000 on flammable building materials.
- The SUN2000 is heavy. Ensure that the installation surface is solid enough to bear the weight load.

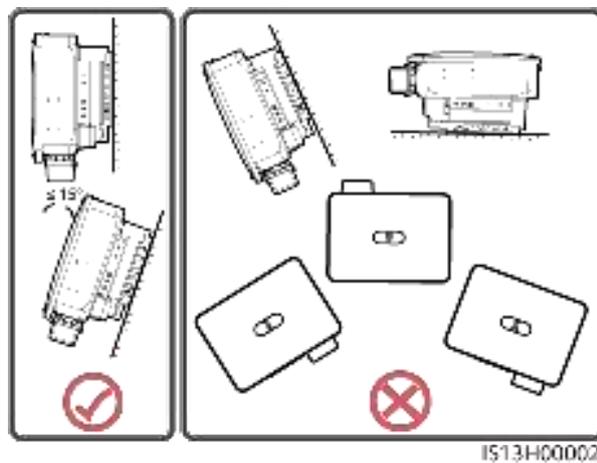
- In residential areas, do not install the SUN2000 on drywalls or walls made of similar materials which have a weak sound insulation performance because the noise generated by the SUN2000 is noticeable.

## Installation Angle Requirements

The SUN2000 can be wall-mounted or support-mounted. Requirements for the installation angle:

- Install the SUN2000 vertically or at a maximum back tilt of 15 degrees to facilitate heat dissipation.
- Do not install the SUN2000 with a front tilt, excessive back tilt, side tilt, horizontally, or upside down.

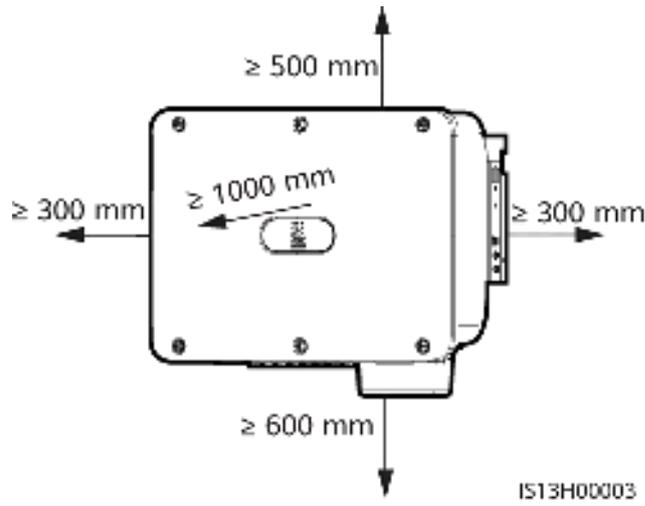
**Figure 5-1** Installation angle



## Installation Space Requirements

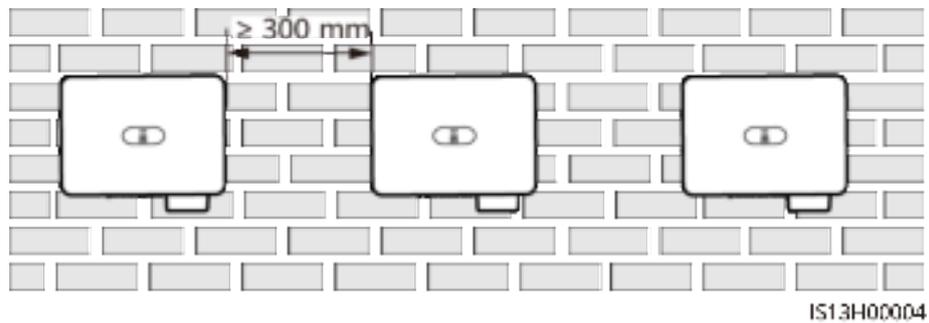
- Reserve enough clearance around the SUN2000 to ensure sufficient space for installation and heat dissipation.

**Figure 5-2** Installation space

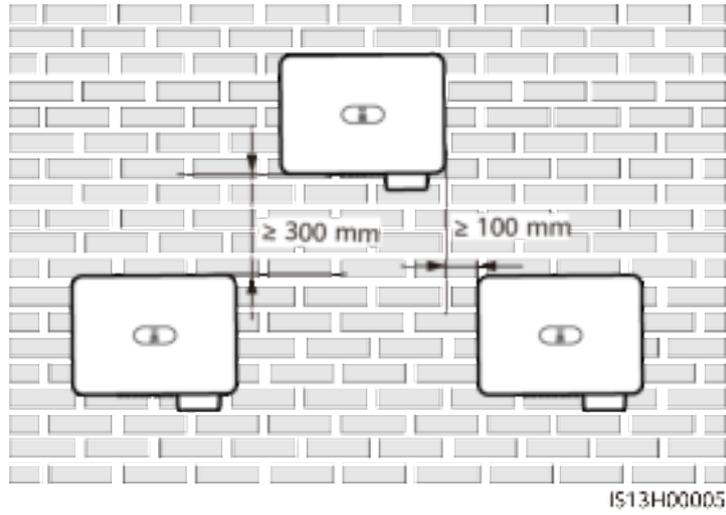


- When installing multiple SUN2000s, install them in horizontal mode if ample space is available and install them in triangle mode if no ample space is available. Stacked installation is not recommended.

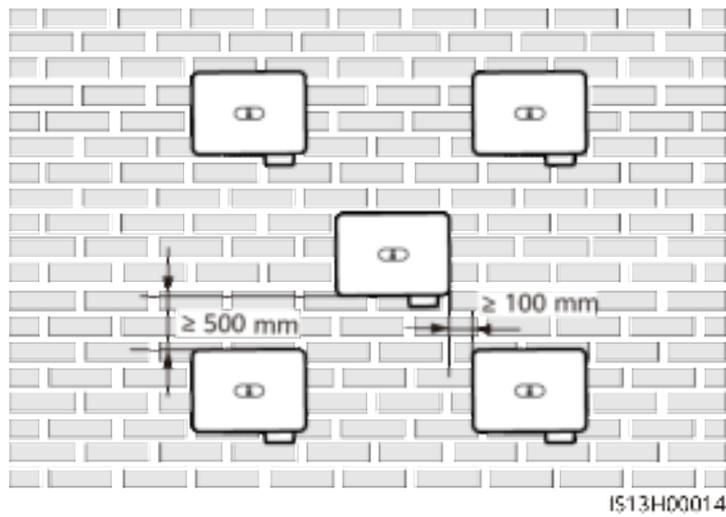
**Figure 5-3** Horizontal installation (recommended)



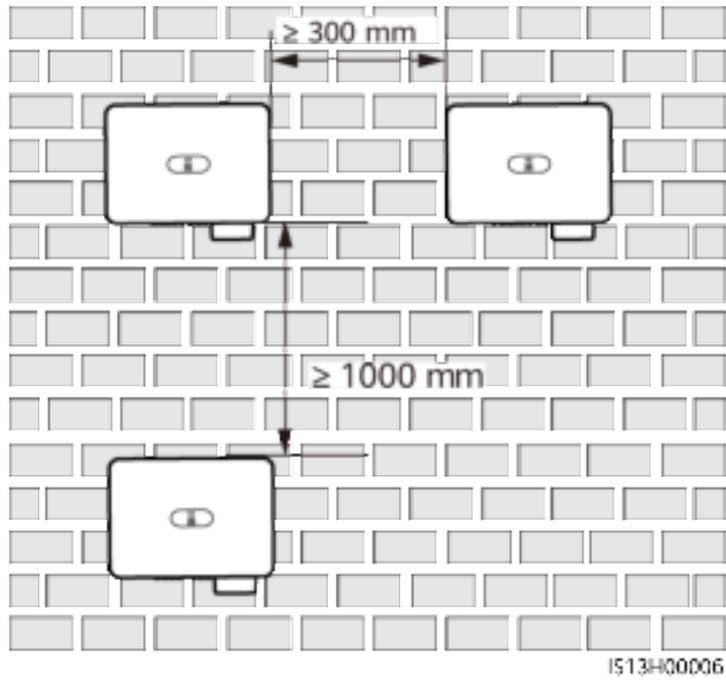
**Figure 5-4** Two-layer triangle installation (recommended)



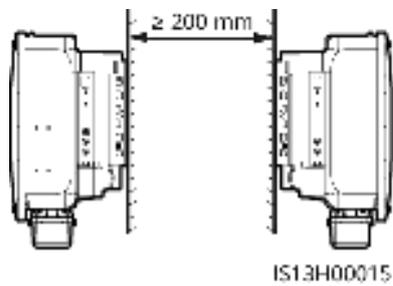
**Figure 5-5** Three-layer triangle installation (not recommended)



**Figure 5-6** Stacked installation (not recommended)



**Figure 5-7** Back-to-back installation (not recommended)



**NOTE**

The installation diagrams are for reference only and are irrelevant to the SUN2000 cascading scenario.

## 5.4 Moving the SUN2000

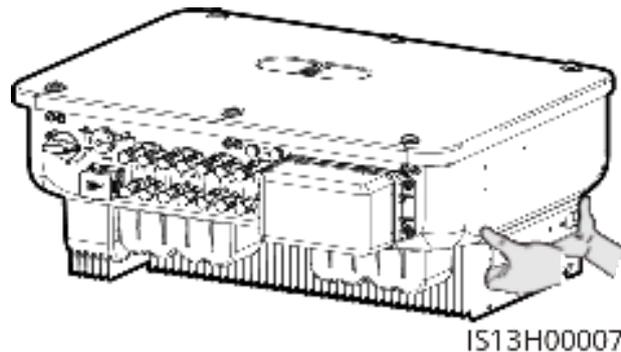
### Procedure

**Step 1** Lift the SUN2000 from the packing case and move it to the specified installation position.

**CAUTION**

- Move the SUN2000 with care to prevent device damage and personal injury.
- Do not use the wiring terminals and ports at the bottom to support any weight of the SUN2000.
- Place a foam pad or cardboard under the SUN2000 to protect the SUN2000 enclosure from damage.

**Figure 5-8** Moving the SUN2000



----End

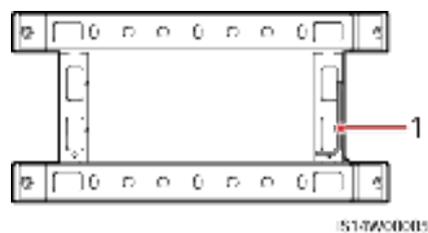
## 5.5 Installing the SUN2000

### 5.5.1 SUN2000 V100R001&V200R001 Replacement Scenario

#### Installation Precautions

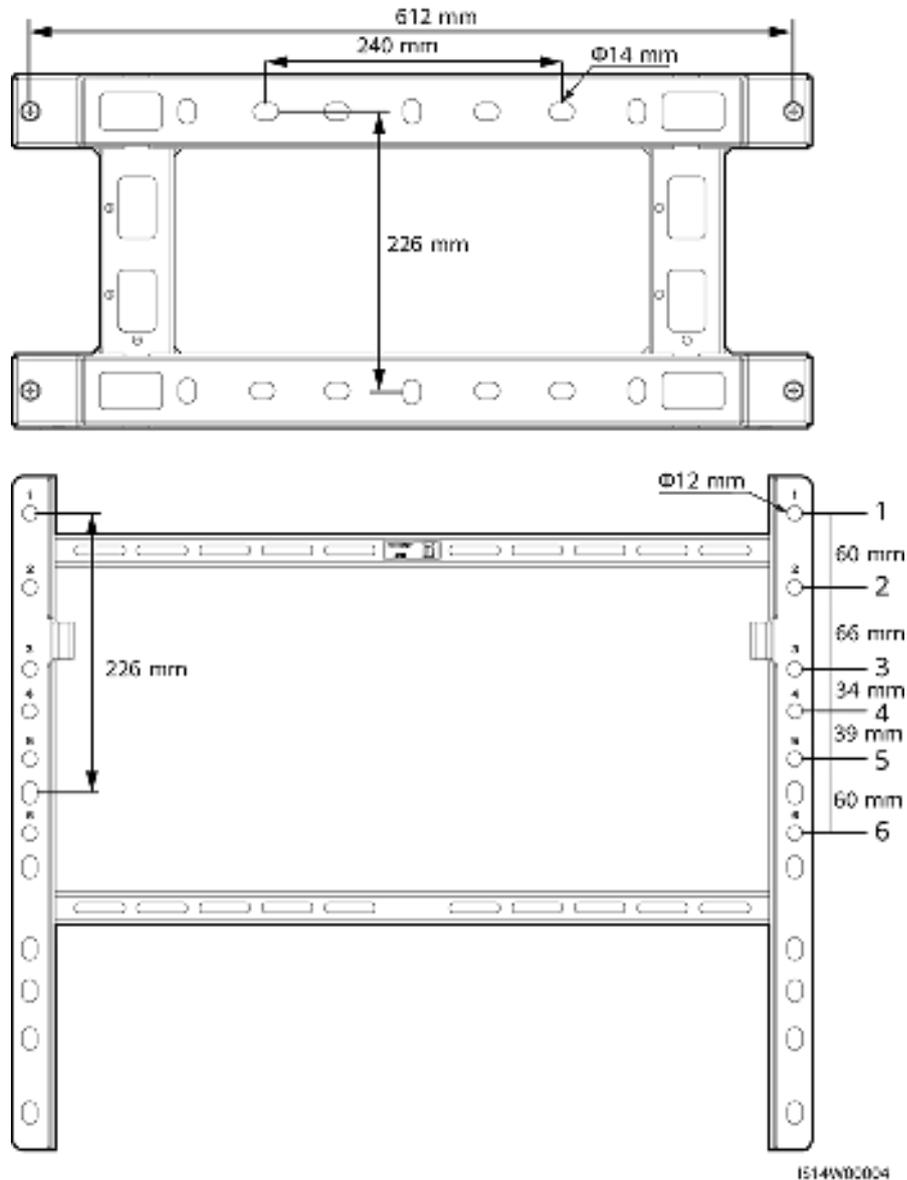
The security Torx wrench is bound to the rear of the mounting bracket. Before installing the mounting bracket, remove the security Torx wrench and set it aside.

**Figure 5-9** Position for binding the security Torx wrench



(1) Security Torx wrench

**Figure 5-10** Mounting bracket dimensions



**NOTE**

- The mounting bracket has six groups of mounting holes, which are used to adjust the installation height of the SUN2000.
- In the SUN2000 V100R001 replacement scenario, it is recommended that the mounting bracket be secured at hole 2. If it is difficult to connect cables at this height, select holes based on the original cable length. The AC power cable length requirements should be preferentially met.
- In the SUN2000 V200R001 replacement scenario, it is recommended that the mounting bracket be secured at hole 5. If it is difficult to connect cables at this height, select holes based on the original cable length. The AC power cable length requirements should be preferentially met.

## Procedure

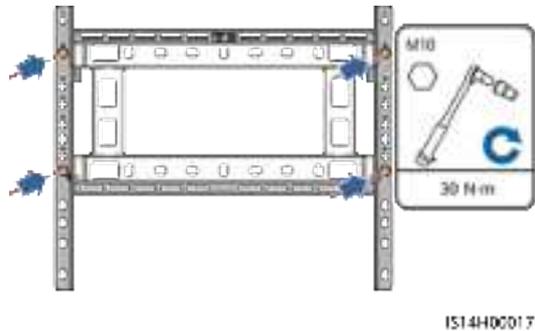
**Step 1** Install the new mounting brackets.

**NOTE**

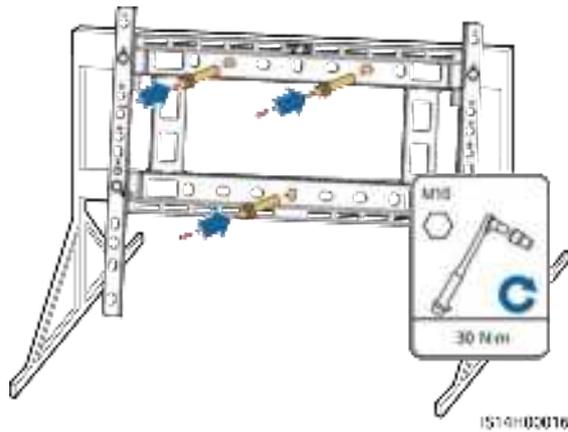
The mounting holes of the engineering mounting kits must be identical to the original one. The mounting holes can be directly aligned with those on the support. However, if you install the mounting bracket on a wall, you need to make new holes.

- SUN2000 V100R001 replacement

**Figure 5-11** Installing two mounting brackets together

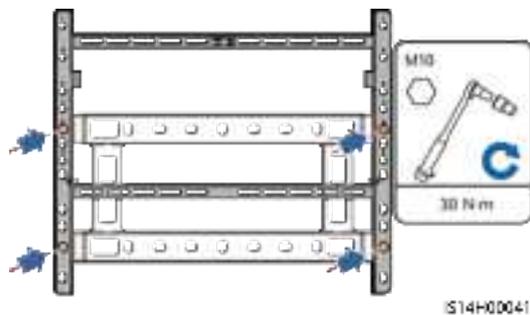


**Figure 5-12** Installing the mounting brackets

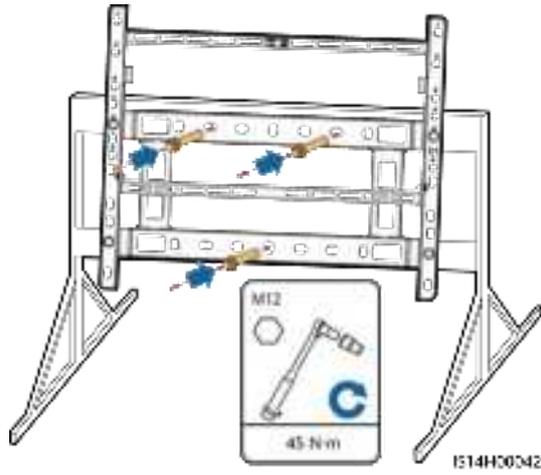


- SUN2000 V100R001 replacement

**Figure 5-13** Installing two mounting brackets together

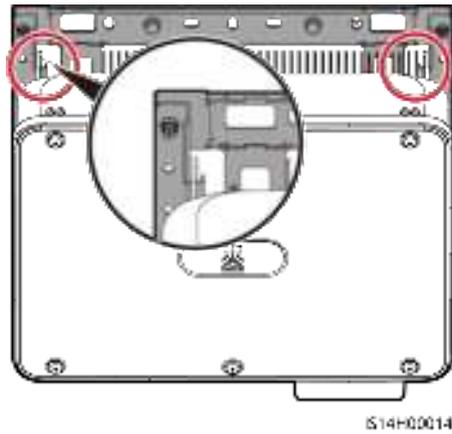


**Figure 5-14** Installing the mounting brackets



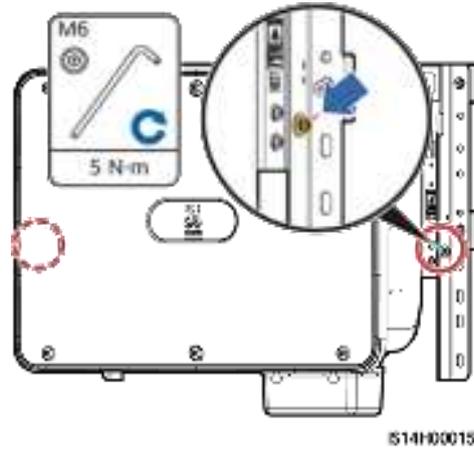
**Step 2** Install the SUN2000 onto the mounting bracket.

**Figure 5-15** Installing the SUN2000



**Step 3** Tighten the screws on both sides of the SUN2000.

**Figure 5-16** Tightening screws on the SUN2000



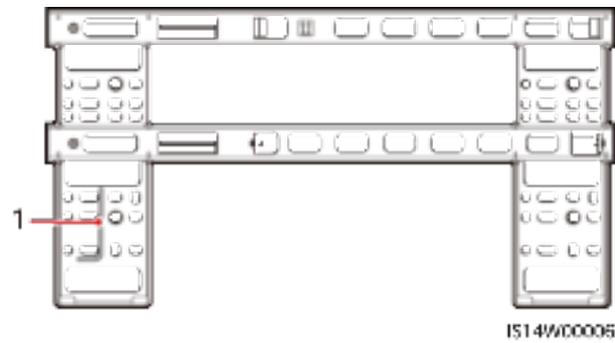
----End

## 5.5.2 SUN2000 V200R002 Replacement Scenario

### Installation Precautions

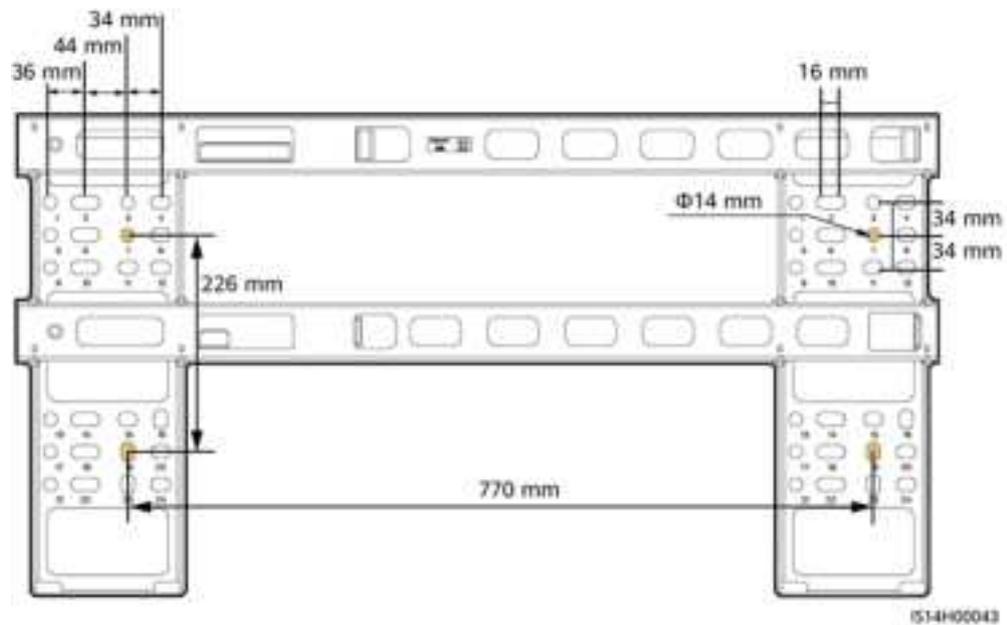
Before installing the mounting bracket, remove the security Torx wrench and set it aside.

**Figure 5-17** Position for binding the security Torx wrench



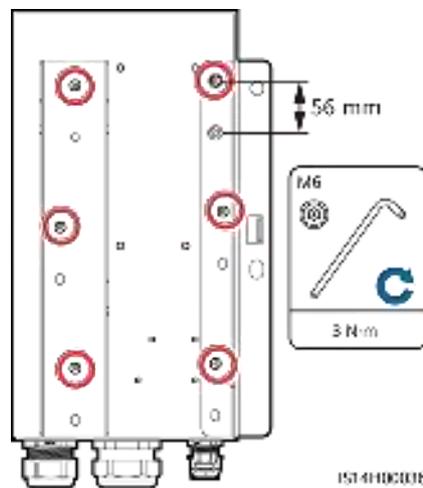
(1) Security Torx wrench

**Figure 5-18** Mounting bracket dimensions



The height of the guide rail on the back of the AC adapter box is adjustable. Ensure that the six screws are all securely installed.

**Figure 5-19** Adjusting the height of the AC adapter box



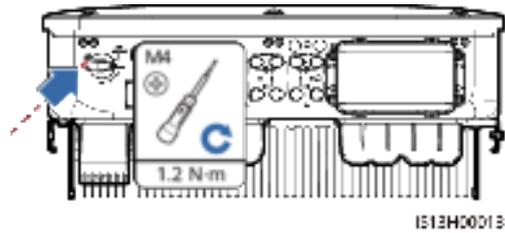
## Procedure

**Step 1** (Optional) Install the locking screw for the DC switch.

### NOTE

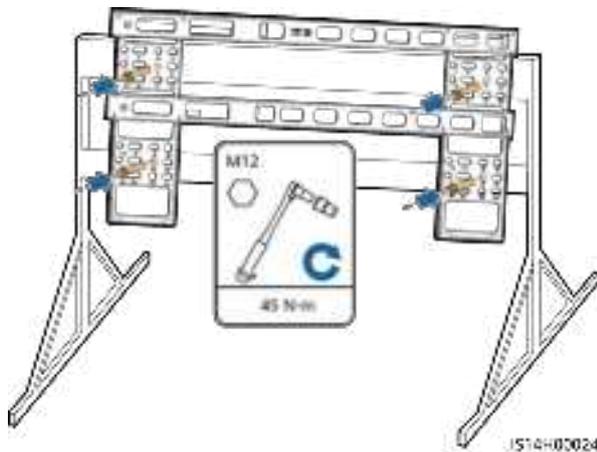
- The DC switch locking screw is used to lock the DC switch to prevent the switch from rotating.
- For models used in Australia, install the DC switch locking screw according to local standards. The DC switch locking screw is delivered with the SUN2000.

**Figure 5-20** Installing the locking screw for the DC switch



**Step 2** Align the mounting holes and install the mounting bracket.

**Figure 5-21** Installing the mounting bracket



**NOTE**

- When installing the mounting bracket, select mounting holes based on the original cable length to adjust the mounting bracket height. The AC power cable length requirements should be preferentially met.
- The mounting bracket and AC adapter box are not delivered with the SUN2000.
- The mounting holes of the engineering mounting kits must be identical to the original one. The mounting holes can be directly aligned with those on the support. However, if you install the mounting bracket on a wall, you need to make new holes.

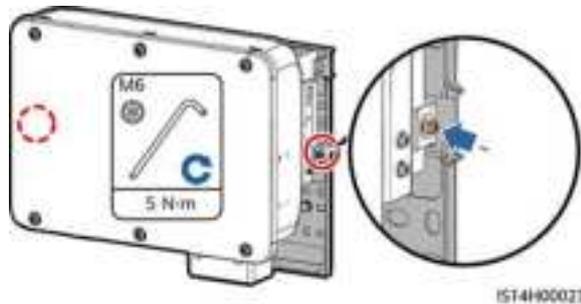
**Step 3** Install the SUN2000 onto the mounting bracket.

**Figure 5-22** Installing the SUN2000



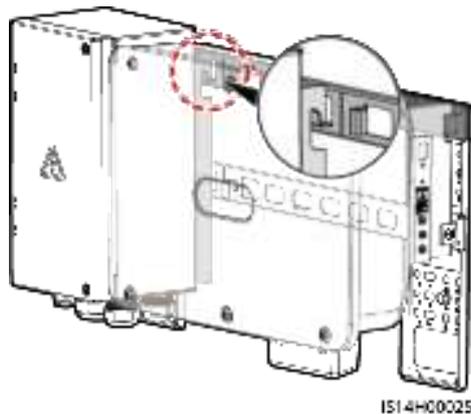
**Step 4** Tighten the security Torx screws on both sides of the SUN2000.

**Figure 5-23** Securing the SUN2000



**Step 5** (Optional) Install the AC adapter box on the mounting bracket.

**Figure 5-24** Installing the AC adapter box



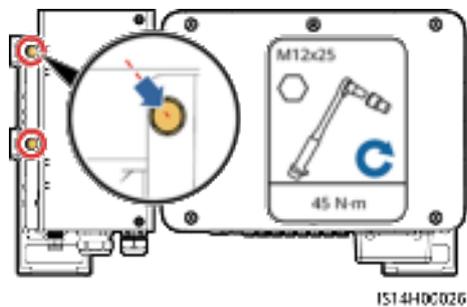
**NOTE**

- If the original AC output power cable and signal cables are long enough to connect to the AC port on the SUN2000, you do not need to install an AC adapter box.
- Secure the SUN2000 before installing the AC adapter box.

- When installing the AC adapter box, align the mounting holes on the left to locate the mounting position.

**Step 6** Tighten the two screws on the left of the AC adapter box.

**Figure 5-25** Securing the AC adapter box



----End

# 6 Electrical Connections

## 6.1 Precautions

### DANGER

When exposed to sunlight, the PV arrays supply DC voltage to the SUN2000. 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.
- To prevent poor cable connection due to overstress, it is recommended that the cables be bent and reserved, and then connected to the appropriate ports.

### 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).

## 6.2 SUN2000 V100R001&V200R001 Replacement Scenario

### 6.2.1 Connecting the PE Cable

**DANGER**

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

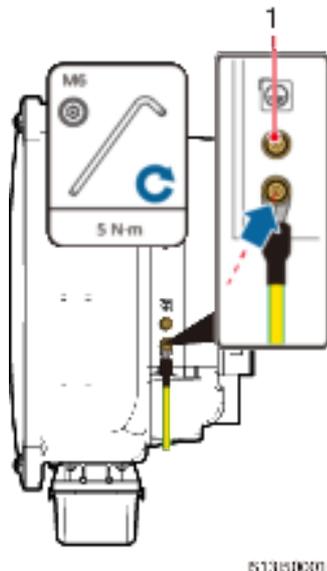
**NOTE**

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

## Procedure

**Step 1** Connect the PE cable.

**Figure 6-1** Connecting the PE Cable



(1) Standby protection ground point

----End

## 6.2.2 Installing the AC Output Power Cable

### Precautions

An AC switch must be installed on the AC side of the SUN2000 to ensure that the SUN2000 can be safely disconnected from the power grid.



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

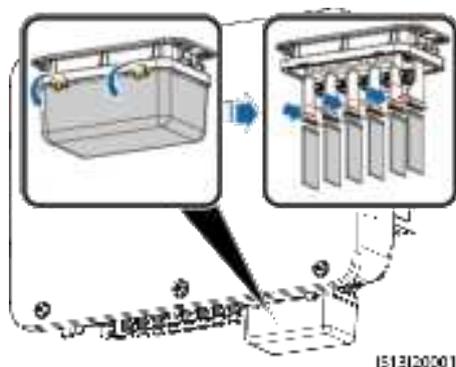
#### NOTICE

- Use a socket wrench and extension rod to connect the AC power cable. The extension rod must be longer than 100 mm.
- Do not install third-party devices in the AC connection box.

## Procedure

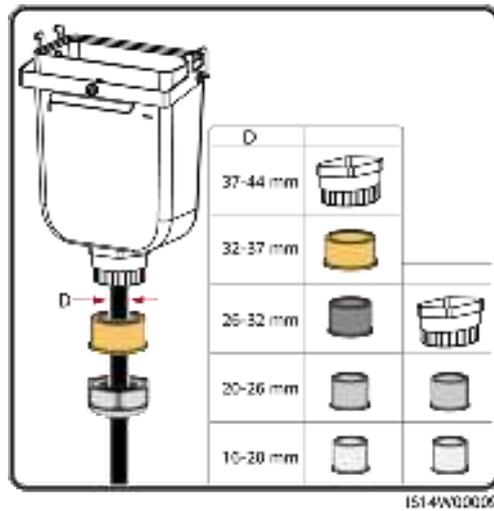
**Step 1** Remove the AC terminal box and install partition boards.

**Figure 6-2** Removing the AC terminal box



**Step 2** Route the AC power cable through the AC connection box.

**Figure 6-3** Routing the AC power cable

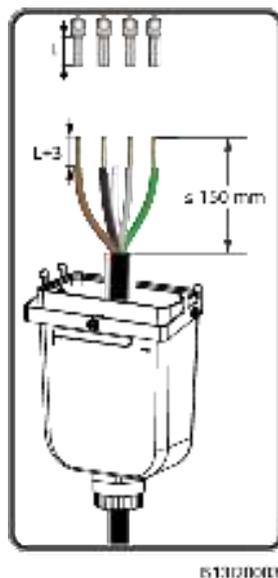


**NOTE**

- OT terminals are shipped with the SUN2000 package. The delivered OT terminals apply only to cables of 8 mm<sup>2</sup>/10.0 mm<sup>2</sup> (7 AWG/8 AWG). For other types of cables, you need to prepare OT terminals.
- In the SUN2000 V100R001 replacement scenario, you need to crimp OT terminals.
- In the SUN2000 V200R001 replacement scenario, if the original AC power cable uses M6 OT terminals, replace the terminals with the M8 OT terminals delivered in the package.
- In the SUN2000 V200R001 replacement scenario, two types of AC wiring terminals are supported (one long, one short). You can select a type based on the cable diameter.

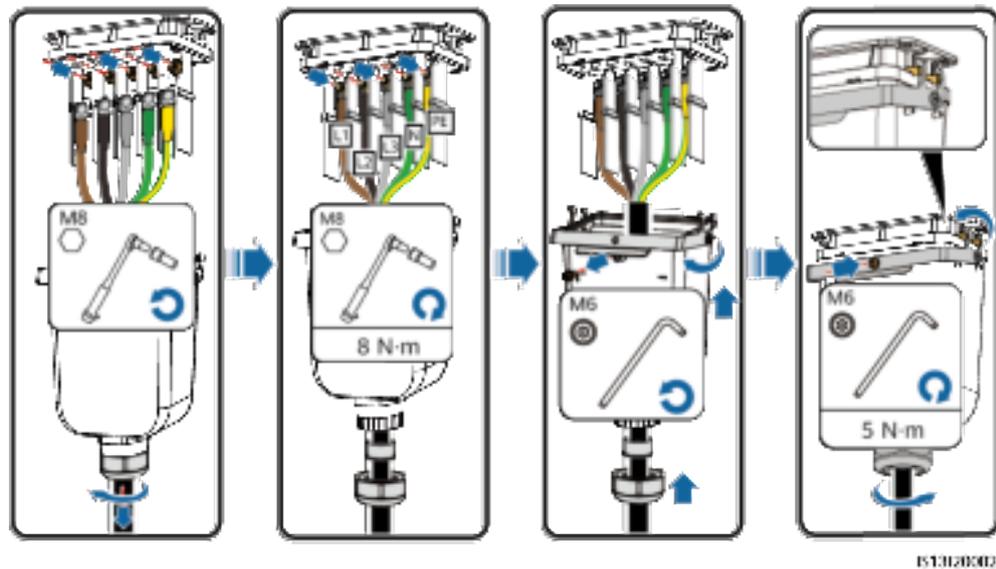
**Step 3** (Optional) Crimp OT terminals.

**Figure 6-4** Stripping the AC power cable



**Step 4** Connect the AC output power cable (using a five-core cable as an example).

**Figure 6-5** Connecting the AC power cable



----End

## 6.2.3 Installing DC Input Power Cables

### Precautions

#### DANGER

- Before connecting the DC input power cables, ensure that the DC voltage is within the safe range (lower than 60 V DC) and that the DC switch on the SUN2000 is OFF. Failing to do so may result in electric shocks.
- When the SUN2000 is running, it is not allowed to work on the DC input power cables, such as connecting or disconnecting a PV string or a PV module in a PV string. Failing to do so may cause electric shocks.
- If no PV string connects to a DC input terminal of the SUN2000, do not remove the watertight cap from the DC input terminals. Otherwise, the IP rating of the SUN2000 will be affected.

#### WARNING

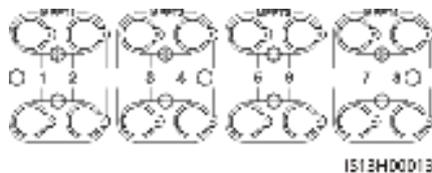
Ensure that the following conditions are met. Otherwise, the SUN2000 may be damaged, or even a fire may occur.

- PV modules connected in series in each PV string are of the same specifications.
- The DC input voltage of the SUN2000 shall not exceed 1100 V DC under any circumstance.
- The polarities of electric connections are correct on the DC input side. The positive and negative terminals of a PV string connect to the corresponding positive and negative DC input terminals of the SUN2000, respectively.
- If the DC input power cables are reversely connected, do not operate the DC switch as well as positive and negative connectors immediately. Wait until the solar irradiance declines at night and the PV string current reduces to below 0.5 A, and then turn off the DC switch and remove the positive and negative connectors. Correct the PV string polarity before reconnecting the PV string to the SUN2000.

#### NOTICE

- The SUN2000 does not support power supplies other than PV strings. Since the output of the PV string connected to the SUN2000 cannot be grounded, ensure that the PV module output is well insulated to ground.
- During the installation of PV strings and the SUN2000, the positive or negative terminals of PV strings may be short-circuited to ground if the 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 device damage is not covered under any warranty.
- In the spare part replacement scenario, the DC input power cables can be connected only to PV1–PV6. If the DC input power cables are connected to PV7 or PV8, the inverter data cannot be transmitted to the northbound device.

**Figure 6-6** DC input terminals



Number of PV Strings	Terminal Selection	Number of PV Strings	Terminal Selection
1	PV1–PV6	2	PV1, PV3
3	PV1, PV3, PV5	4	PV1, PV2, PV3, PV5
5	PV1, PV2, PV3, PV4, PV5	6	PV1, PV2, PV3, PV4, PV5, PV6

## Procedure

### NOTICE

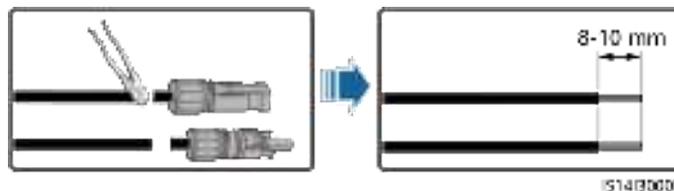
- Before connecting DC input power cables, ensure that the original DC terminals have been cut off. If the original DC connector is directly connected to the SUN2000-(15KTL-50KTL)-M3 series, the inverter may be burnt.
- You are advised to use the PV-CZM-22100 (Staubli) crimping tool and do not use it with the positioning block. Otherwise, the metal terminals may be damaged.
- The PV-MS (Staubli) or PV-MS-HZ (Staubli) open-end wrench is recommended.
- Cables with high rigidity, such as armored cables, are not recommended as DC input power cables, because poor contact may be caused by the bending of the cables.
- Before assembling DC connectors, label the cable polarities correctly to ensure correct cable connections.
- After the positive and negative connectors snap into place, pull the DC input power cables back to ensure that they are connected securely.

### CAUTION

Use the positive and negative Staubli MC4 metal terminals and DC connectors delivered with the SUN2000. Using incompatible positive and negative metal terminals and DC connectors may result in serious consequences. The caused device damage is not covered under any warranty or service agreement.

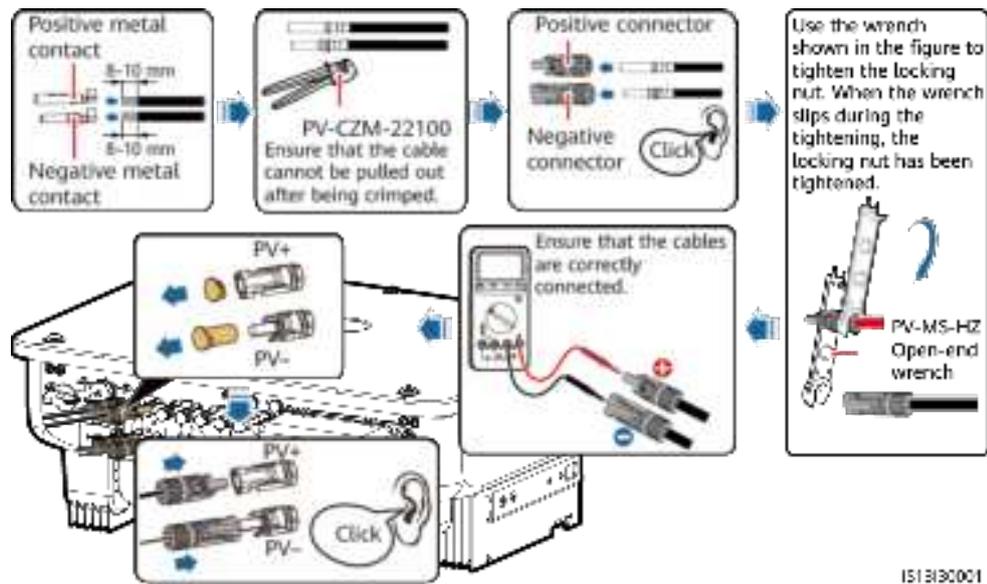
**Step 1** Cut off the original DC terminals.

**Figure 6-7** Cut off the original DC terminals



**Step 2** Connect the DC power cables.

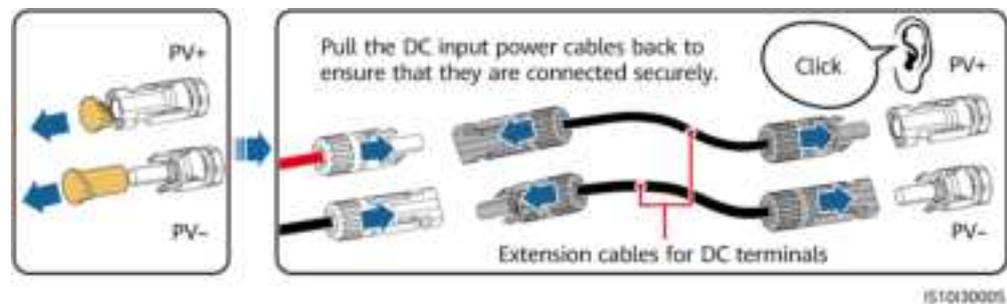
**Figure 6-8** Connecting DC power cables



**NOTE**

If the original DC input power cables are not long enough, use the DC input extension cables delivered with the package.

**Figure 6-9** Connecting the DC input extension cable



----End

## 6.2.4 Connecting the Signal Cables

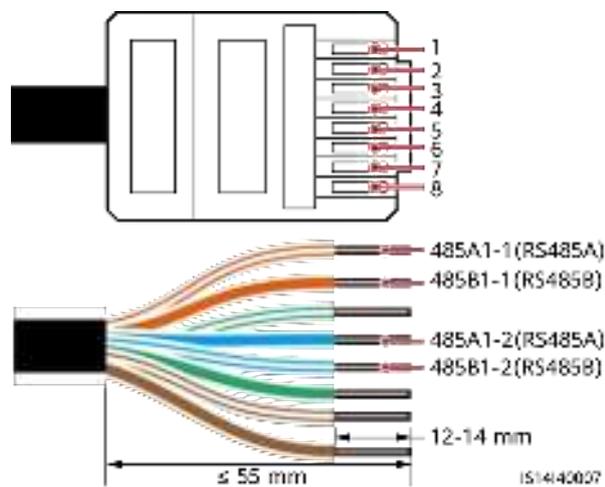
### COM Port Pin Definitions

**NOTICE**

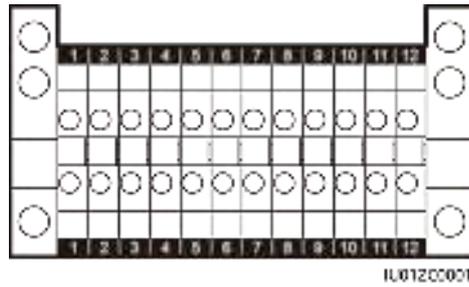
Ensure that the protection layers of the cables are inside the connector, that excess core wires are cut off from the protection layer, that the exposed core wires are totally inserted into the cable hole, and that the cable is connected securely.

Before Replacement-RJ45 Network Port			Before Replacement-Terminal Block		SUN2000-(15KTL-50KTL)-M3 Series (COM Port)		Function
No.	Color	Function	No.	Function	No.	Definition	
1	White and orange	RS485A	5	RS485A IN	1	485A1-1	RS485 differential signal +
4	Blue	RS485A	6	RS485A OUT	2	485A1-2	RS485 differential signal +
2	Orange	RS485B	7	RS485B IN	3	485B1-1	RS485 differential signal -
5	White and blue	RS485B	8	RS485B OUT	4	485B1-2	RS485 differential signal -
-	-	-	-	-	5	PE	Shield layer grounding
-	-	-	-	-	6	PE	Shield layer grounding

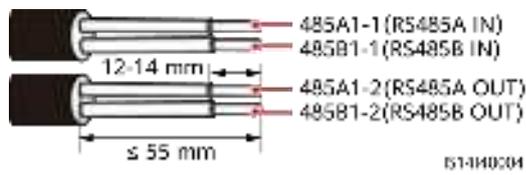
Figure 6-10 Network port signal definition



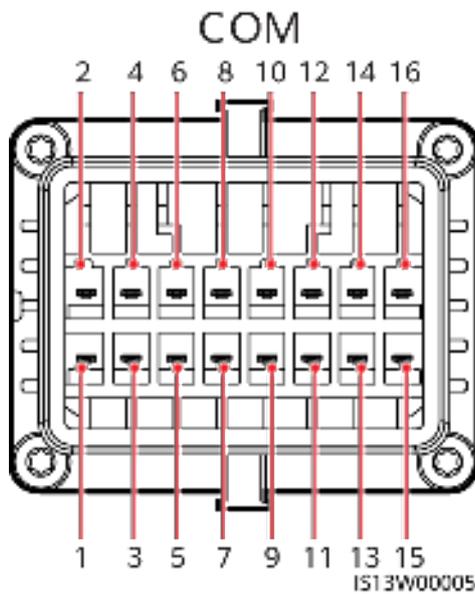
**Figure 6-11** Terminal block



**Figure 6-12** Signal cable definitions of the terminal block



**Figure 6-13** COM port

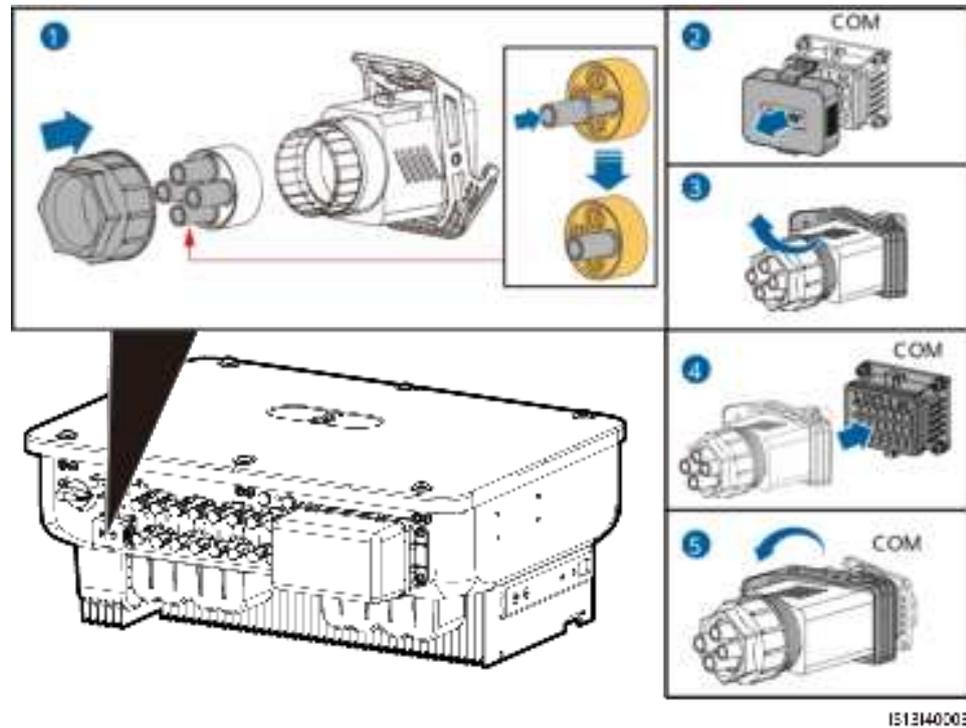


## Scenario Where No Signal Cable Is Connected

**NOTICE**

If no signal cable is connected to the SUN2000, use a waterproof plug to block the cable hole of the signal cable connector and connect the signal cable connector to the communications port on the SUN2000 to improve the waterproof performance.

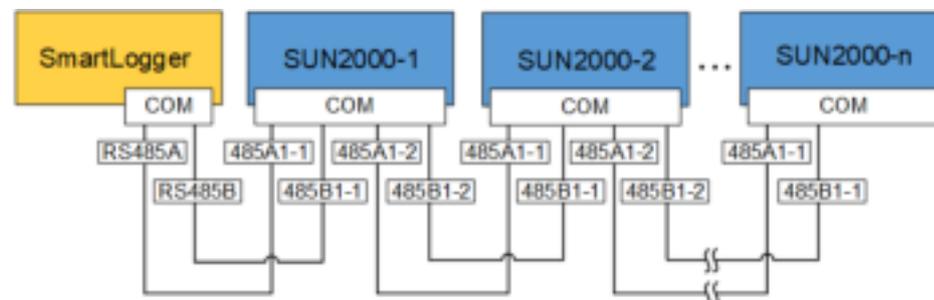
**Figure 6-14** Connecting the signal cable connector



### 6.2.4.1 Communication Modes

#### RS485 Communication

**Figure 6-15** SmartLogger networking



**NOTE**

It is recommended that the number of SUN2000s connected to each RS485 route be less than 30.

## MBUS Communication

The MBUS is a communication mode in which communication signals are loaded to power cables through the communications board for transmission.

### NOTE

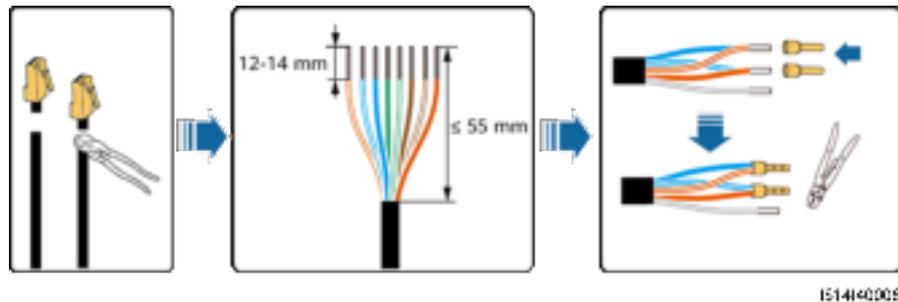
- The built-in MBUS module in the SUN2000 does not need to be connected to cables.
- The spare parts of SUN2000 V100R001 do not support MBUS communication.

## 6.2.4.2 (Optional) Connecting the RS485 Communications Cable to the SUN2000

### Procedure

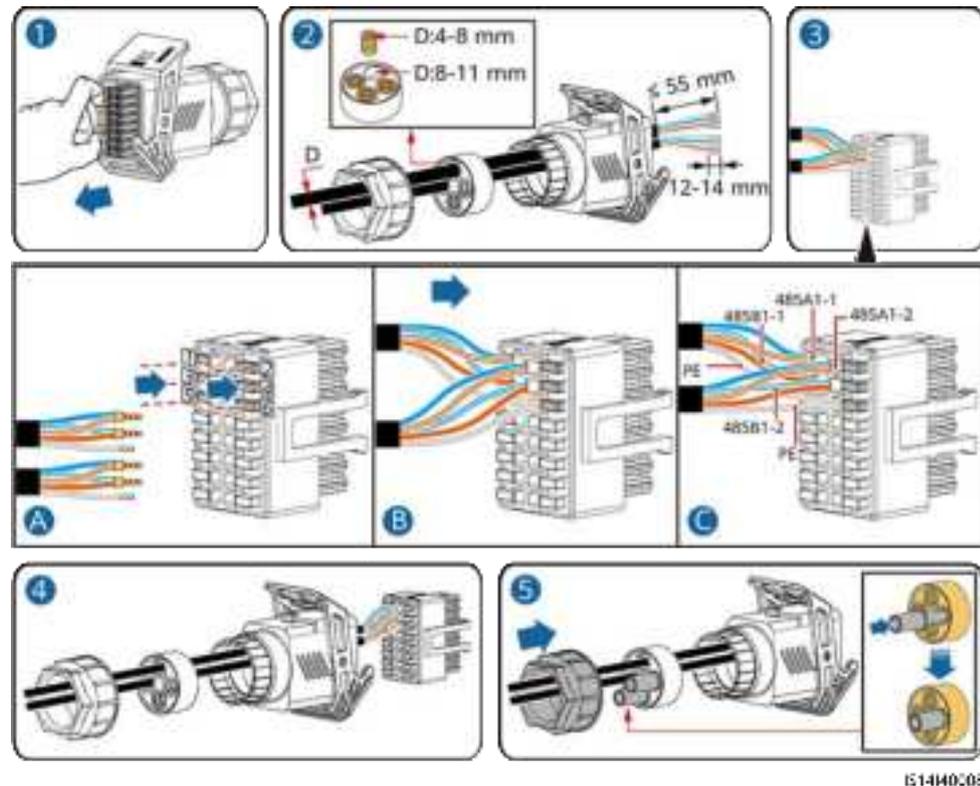
- Step 1** If the original signal cable is connected through RJ45 network ports, cut off the RJ45 connectors.

**Figure 6-16** Cut off the RJ45 connectors



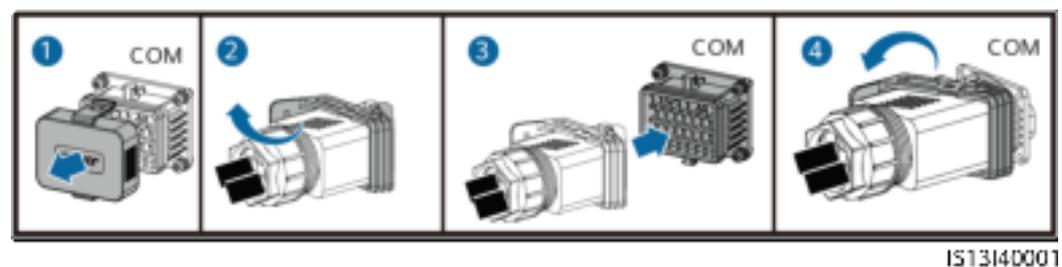
- Step 2** Connect the signal cable to the signal cable connector.

**Figure 6-17** Connecting the cable



**Step 3** Connect the signal cable connector to the COM port.

**Figure 6-18** Securing the signal cable connector



----End

## 6.3 SUN2000 V200R002 Replacement Scenario

### 6.3.1 Connecting the PE Cable

**DANGER**

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

**NOTE**

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

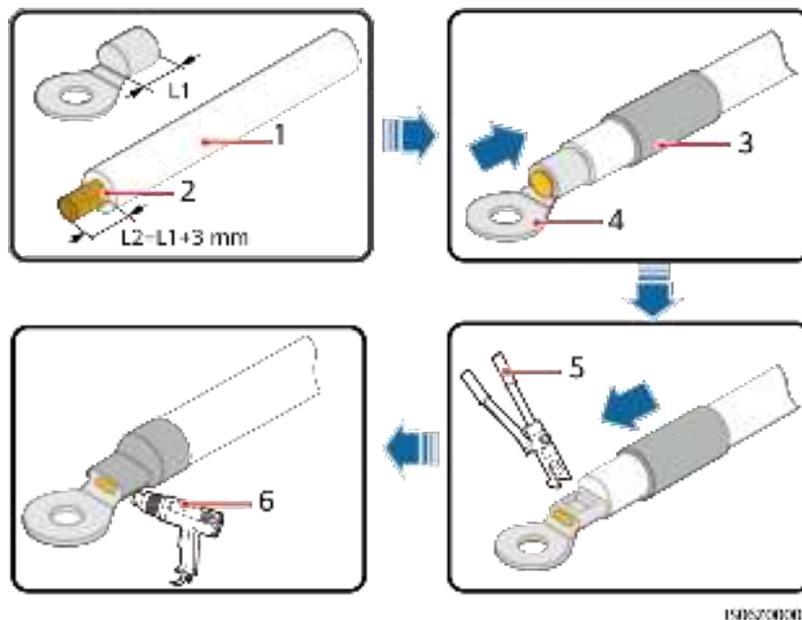
## Procedure

### Step 1 Crimp an OT terminal.

**NOTICE**

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

**Figure 6-19** Crimping an OT terminal



(1) Cable

(2) Core

(3) Heat shrink tubing

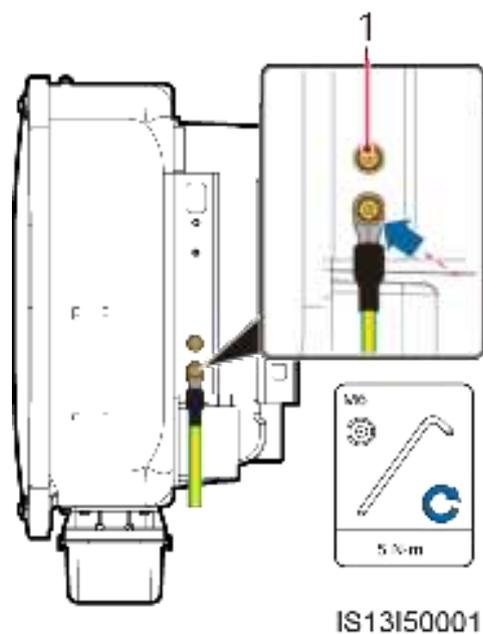
(4) OT terminal

(5) Crimping tool

(6) Heat gun

**Step 2** Install the PE cable.

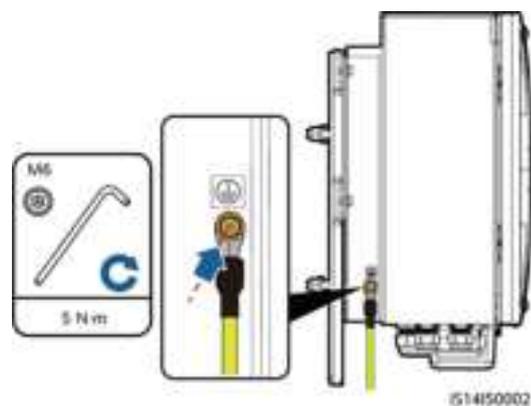
**Figure 6-20** Installing the PE cable



(1) Standby protection ground point

**Step 3** (Optional) If an AC adapter box is installed, connect the PE cable to the AC adapter box.

**Figure 6-21** Connecting the PE cable to the AC adapter box



----End

## 6.3.2 Connecting the Signal Cables

### COM Port Pin Definitions

#### NOTICE

Ensure that the protection layers of the cables are inside the connector, that excess core wires are cut off from the protection layer, that the exposed core wires are totally inserted into the cable hole, and that the cable is connected securely.

Before Replacement-RJ45 Network Port			Before Replacement-Terminator Block		SUN2000-(15KTL-50KTL)-M3 Series (COM Port)		
No.	Color	Function	No.	Function	No.	Definition	Function
1	White and orange	RS485A	1	RS485A IN	1	485A1-1	RS485 differential signal +
4	Blue	RS485A	2	RS485A OUT	2	485A1-2	RS485 differential signal +
2	Orange	RS485B	3	RS485B IN	3	485B1-1	RS485 differential signal -
5	White and blue	RS485B	4	RS485B OUT	4	485B1-2	RS485 differential signal -
-	-	-	-	-	5	PE	Shield layer grounding
-	-	-	-	-	6	PE	Shield layer grounding
-	-	-	-	-	7	485A2	RS485 differential signal +
-	-	-	-	-	9	485B2	RS485 differential signal -
-	-	-	-	-	8	DIN1	Dry contact for power grid scheduling
-	-	-	-	-	10	DIN2	
-	-	-	-	-	12	DIN3	
-	-	-	-	-	14	DIN4	
-	-	-	-	-	16	GND	