

SUN2000-(25KTL, 30KTL)-US

User Manual

Issue Draft A

Date 2015-08-28



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About This Document

Purpose

This document describes the SUN2000-(25KTL, 30KTL)-US (SUN2000 for short) inverter in terms of its installation, electrical connections, commissioning, maintenance, and troubleshooting. Readers should be familiar with the SUN2000 features and functions and safety precautions provided in this document before installing and operating the SUN2000.

This document is subject to update and revision. You can log in to http://support.huawei.com/carrier, search for **SUN2000** or browse SUN2000 documents, and download the latest version.

Intended Audience

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

Symbol Conventions

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

Symbol	Description
DANGER	Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
WARNING	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
CAUTION	Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.
⚠ NOTICE	Indicates a potentially hazardous situation which, if not avoided, could result in equipment damage, data loss, performance deterioration, or unanticipated results.
	NOTICE is used to address practices not related to personal injury.
NOTE	Calls attention to important information, best practices and

Symbol	Description
	tips. NOTE is used to address information not related to personal injury, equipment damage, and environment deterioration.

Change History

Changes between document issues are cumulative. Therefore, the latest document issue contains all updates made in previous issues.

Issue Draft A (2015-08-28)

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

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Safety Precautions

Strictly follow all the safety precautions in this document to prevent personal injury or death.

Important Safety Instructions

SAVE THESE INSTRUCTIONS: This manual contains important instructions for the model SUN2000-(25KTL, 30KTL)-US that shall be followed during installation and maintenance of the inverter.

Personnel Requirements

- Only qualified and trained electrical technicians are allowed to install and operate the SUN2000.
- Operators should understand the components and functioning of a grid-tied PV power system, and they should be familiar with relevant local standards.

Label Protection

- Do not tamper with any warning signs on the SUN2000 enclosure because these signs contain important information about safe operation.
- Do not remove or damage the nameplate on the SUN2000 enclosure because it contains important product information.
- Do not remove the anti-dismantle label on the SUN2000 enclosure. Otherwise, product warranty will be forfeited.

Installation



NOTICE

Read this document before installation. Huawei shall not be liable for any consequence caused by violation of the regulations specified in this document.

- Ensure that the SUN2000 is not connected to a power supply and is not powered on before starting installation.
- Ensure that there are no objects within 200 mm (7.87 in.) of both sides of the SUN2000, and no objects within 500 mm (19.69 in.), 600 mm (23.62 in.), and 1000 mm (39.37 in.)

- of the top, bottom, and front, respectively. This is to allow sufficient space for installation and heat dissipation.
- Install the SUN2000 in an environment with good ventilation to ensure efficient and long-term system performance.
- Ensure that the SUN2000 heat sinks are free from blockage.
- Open the maintenance compartment door on the lower side of the chassis before cable connection. Do not perform any operation on other components inside the chassis when connecting AC power cables and communications cables.

Electrical Connection



DANGER

Before connecting cables to the SUN2000, ensure that the SUN2000 is securely positioned and not damaged in any way. Otherwise, electrical shock or fire may occur.

- Shield the PV modules with opaque cloth before connecting cables to the SUN2000.
- Ensure that all electrical connections comply with local electrical standards.
- Obtain approval from the local power supply department before using the SUN2000 to generate electricity in grid-tied mode.
- Ensure that the cables to the solar power system are properly connected and insulated and meet specifications.

Operation



DANGER

High voltages may cause electrical shocks and serious injuries during inverter operation. Strictly comply with the safety precautions in this document and associated documents to operate the inverter.

- Do not touch parts of the SUN2000 because the heat sinks are extremely hot when the SUN2000 is in operation and touching these parts can cause severe burns and personal injury.
- Follow local laws and regulations when operating the SUN2000.

Maintenance and Replacement

- Before performing maintenance tasks, power off the SUN2000 by referring to 6.2 Powering Off the SUN2000. Then wait for at least 5 minutes before performing operations on the SUN2000.
- Place temporary warning signs or erect fences to prevent unauthorized access to the maintenance site.
- Rectify any faults that may compromise the SUN2000 security performance before restarting the SUN2000.

- Maintain the SUN2000 with sufficient knowledge of this document and proper tools and testing equipment.
- When maintaining the SUN2000, observe ESD precautions.
- For personal safety, wear insulation gloves and protective shoes.

2 Overview

This chapter introduces the SUN2000 and describes its appearance, label conventions, monitoring panel, and functioning.

2.1 Introduction

This section describes the functions, models, and network application of the SUN2000.

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 shows a model number of the SUN2000, using SUN2000-25KTL-US as an example.

Figure 2-1 Model number description

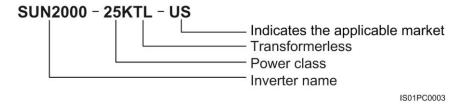


Table 2-1 lists all models of the SUN2000 and their rated output power.

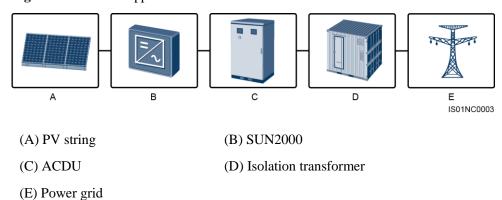
Table 2-1 SUN2000 models and rated output power

Model	Rated Output Power
SUN2000-25KTL-US	25 kW
SUN2000-30KTL-US	30 kW

Network Application

SUN2000 applies to grid-tied PV power systems for commercial rooftops and large power stations. Typically, a grid-tied PV power system consists of PV strings, grid-tied inverters, AC distribution units (ACDUs), and isolation transformer, as shown in Figure 2-2.

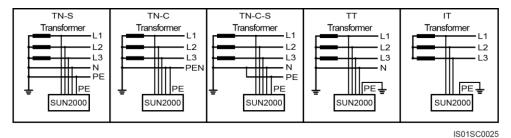
Figure 2-2 Network Application



Supported Power Grids

Power grid types supported by the SUN2000 include TN-S, TN-C, TN-C-S, TT, and IT, as shown in Figure 2-3.

Figure 2-3 Supported Power Grids



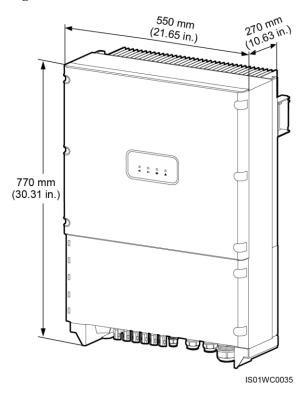
2.2 Appearance

This section describes the appearance and specifications of the SUN2000.

Dimensions

Figure 2-4 shows the SUN2000 dimensions.

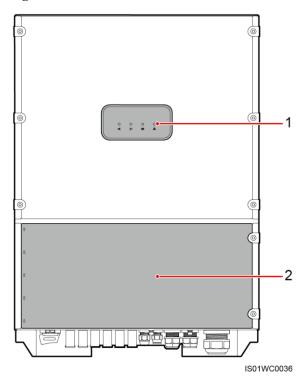
Figure 2-4 Dimensions



SUN2000 front view

Figure 2-5 shows the SUN2000 front view.

Figure 2-5 SUN2000 front view



(1) Indicators

(2) Maintenance compartment door

Table 2-2 describes the indicators.

Table 2-2 Description of indicators from left to right

Indicator	Status	Meaning
PV connection indicator	Steady green	At least one PV string is properly connected, and the DC voltage exceeds 200 V.
	Off	The SUN2000 is disconnected from all PV strings.
Grid-tie indicator	Steady green	The SUN2000 is grid-tied.
	Off	The SUN2000 is not grid-tied.
Communication indicator	Blinking green (on for 0.5s and off for 0.5s)	The SUN2000 is communicating properly.
03 30	Off	The SUN2000 has failed to communicate.

Indicator	Status		Meaning
Alarm/Maintenance indicator	Alarm state	Blinking red slowly (on for 1s and then off for 4s)	The SUN2000 has generated a warning.
		Blinking red fast (on for 0.5s and then off for 0.5s)	The SUN2000 has generated a minor alarm.
		Steady red	The SUN2000 has generated a critical alarm.
	Local maintenance state	Blinking green slowly (on for 1s and then off for 1s)	Local maintenance is in progress.
		Blinking green fast (on for 0.125s and off for 0.125s)	Local maintenance has failed.
		Steady green	Local maintenance is successful.

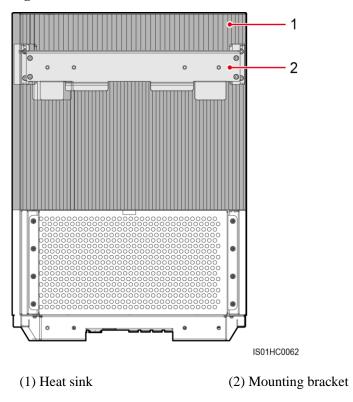
\square NOTE

- Local maintenance refers to operations performed after a USB flash drive or a USB cable is inserted
 into the USB port of the inverter. For example, local maintenance includes data import and export
 using a USB flash drive, and maintenance operations on the SUN2000 APP installed on a device
 connected to the inverter by a USB cable.
- If alarming and local maintenance happen concurrently, the alarm/maintenance indicator shows the local maintenance state first. After the USB flash drive or a USB cable is removed, the indicator shows the alarm state.

Rear View

Figure 2-6 shows the SUN2000 rear view.

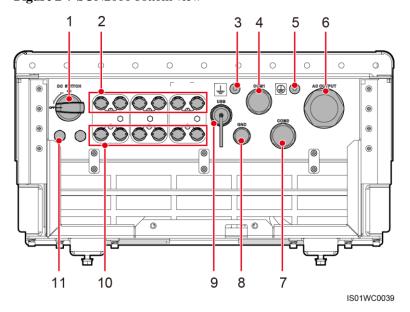
Figure 2-6 SUN2000 rear view



SUN2000 Bottom View

Figure 2-7 shows the SUN2000 bottom view.

Figure 2-7 SUN2000 bottom view



No.	Component Name (Silk Screen)	Description
1	DC switch (DC SWITCH)	N/A
2	Positive DC input terminal (+)	Six routes
3	Function ground points	N/A
4	RS485 port (COM1)	N/A
5	Protection ground points	N/A
6	AC output port (AC OUTPUT)	N/A
7	RS485 port (COM2)	N/A
8	Function ground cable outlet (GND)	N/A
9	USB port (USB)	N/A
10	Negative DC input terminal (-)	Six routes
11	Vent valve	2 PCS

2.3 Label Conventions

This section describes the warning signs, labels, and nameplate on the SUN2000.

Warning Signs

Warning signs are available on the SUN2000 side, as described in Table 2-3.

Table 2-3 Warning signs

Symbol	Name	Meaning
	Electric shock	Lethal voltages 1000 V DC. Keep out.
		 No user serviceable parts inside. Only trained service personnel are allowed access.
		Both AC and DC voltage sources are terminated inside this equipment. Each circuit must be disconnected before servicing.
		 When the photovoltaic array is exposed to light, it supplies DC voltage to this equipment.
		The DC conductors of this photovoltaic system are ungrounded and may be energized.

Symbol	Name	Meaning
		The DC conductors of this photovoltaic system are normally ungrounded but will become intermittently grounded without indication when the inverter measures the PV array isolation.
	Burn	Hot surfaces. To reduce the risk of burns do not touch heatsink nor the sides of the inverter.
5 mins	Delay discharge	 Risk of electric shock from energy stored in capacitors. Wait 5 minutes after disconnecting all sources of power to remove cover.
*	Transformerless inverter	Transformerless inverter.

Symbols

Table 2-4 describes all symbols on the SUN2000.

Table 2-4 Symbols

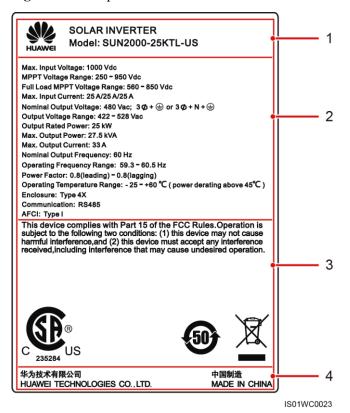
Symbol	Label	Meaning
i	Refer to documentation	Remind operators to refer to the documentation shipped with the SUN2000.
	Protection ground label	Indicates the position for connecting the protection ground cable.
	Equipotential grounding label	Indicates the position for connecting the PV side ground cable and the RS485 communications cable shield layer.
Do not disconnect under load! Ne pas débrancher en cours de chargement!	Operation warning	The DC input connector must not be removed when the SUN2000 is in operation.

Symbol	Label	Meaning
WARRANTY VOID IF SEAL IS BROKEN	Anti-demolition	The door on the upper side of the SUN2000 must not be opened.
*******	SUN2000 ESN label	SUN2000 manufacture information.

Nameplate

The SUN2000 is labeled with a nameplate that contains the model information, technical specifications, and compliance symbols, as shown in Figure 2-8. (SUN2000-25KTL-US is used as an example.)

Figure 2-8 Nameplate



- (1) Trademark, product name, and model number
- (2) Important technical specifications
- (3) Compliance symbols

(4) Company name and country of manufacture

Table 2-5 describes the compliance symbols.

Table 2-5 Compliance symbols

Symbol	Name	Meaning
This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.	Compliance with American FCC Part 15 certification	This product complies with FCC Part 15 certification standards.
C 235284 US	Compliance with CSA certification of America and Canada	This product complies with CSA certification standards.
50	Environmentally friendly use period (EFUP)	The SUN2000 is environmentally friendly for at least 50 years.
	EU WEEE mark	The SUN2000 must not be disposed of as domestic waste. For details about how to dispose of the SUN2000, see 9 SUN2000 Handling.

2.4 Working Process

This topic describes the SUN2000 working principles for you to have an in-depth understanding of the SUN2000 inverter.

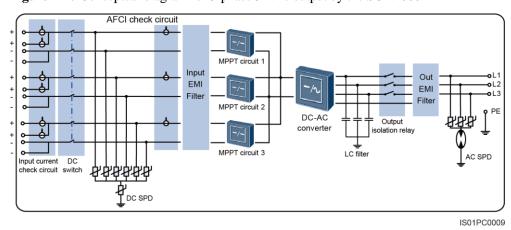
Circuit Diagrams

The SUN2000 receives inputs from six PV strings. Then the inputs are grouped into three 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 a converter circuit. Surge protection is supported on both the DC and AC sides. The SUN2000 supports both three phase four wire (L1, L2, L3, N) and three phase three wire (L1, L2, L3) outputs, as shown in Figure 2-9 and Figure 2-10.

AFCI check circuit MPPT circuit Input EMI EMI Filter MPPT circuit DC-AC Output isolation relay converter LC filter MPPT circuit 3 Input current DC check circuit switch AC SPD DC SPD IS01PC0008

Figure 2-9 Conceptual diagram for 3-phase 4-wire output by the SUN2000

Figure 2-10 Conceptual diagram for 3-phase 3-wire output by the SUN2000



Working Modes

Figure 2-11 shows the conditions for the SUN2000 to switch between working modes.

Standby mode Insufficient power Startup command or from PV strings or fault rectified. DC switch is turned, off. Shutdown Sufficient power command or from PV strings and fault detected. no fault is detected. Operating Shutdown mode mode Shutdown command or fault detected. IS01SC0007

Figure 2-11 Working mode description

Table 2-6 describes the working modes shown in Figure 2-11.

Table 2-6 Working mode description

Working Mode	Description
Standby	The SUN2000 enters the standby mode when the external environment does not meet the SUN2000 operation requirements. In standby mode, the SUN2000 continuously performs self-check and enters the operating mode once the operation requirements are met.
	The SUN2000 switches from standby mode to shutdown mode if it detects a shutdown command or a fault.
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 if detecting a fault or a shutdown command, and enters the standby mode if detecting that the PV string output power does not meet the requirements for grid-tied electricity generation.
Shutdown	The SUN2000 switches from standby or operating mode to shutdown mode if detecting a fault or a shutdown command. The SUN2000 switches from shutdown mode to standby mode if receiving a startup command or detecting that a fault is rectified.

3 SUN2000 Storage

This chapter describes SUN2000 storage requirements.

The following storage instructions apply if the SUN2000 will not be deployed immediately:

- Do not unpack the SUN2000.
- Store the SUN2000 at a temperature range of -40 $^{\circ}$ C to +70 $^{\circ}$ C (-40 $^{\circ}$ F to +158 $^{\circ}$ F) and with the relative humidity of 5% to 100%.
- The SUN2000 should be stored in a clean and dry place and be protected from dust and water vapor corrosion.
- A maximum of four layers of inverters can be stacked.
- Conduct periodic inspection during storage. Replace the packing materials immediately if any rodent bites are found.
- Ensure that qualified personnel inspect and test the SUN2000 before use if it has been stored for a long time.

4 Installation

This chapter describes how to install the SUN2000.

Context



DANGER

- Do not install the SUN2000 on flammable building materials.
- Do not install the SUN2000 in an area that stores flammable or explosive materials.



WARNING

Do not install the SUN2000 in a place where personnel are likely to come into contact with its enclosure and heat sinks. These parts are extremely hot during operation.

4.1 Checking Before Installation

Checking the Outer Packing

Before unpacking the SUN2000, examine the outer packing for damage such as holes and cracks. If any such damage is found, do not unpack the SUN2000 and contact the dealer immediately.

MOTE

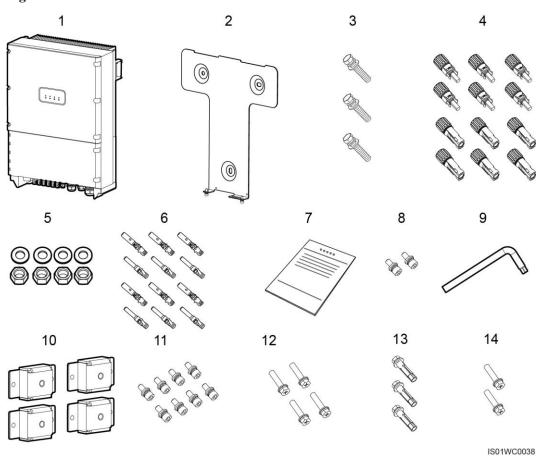
Remove the outer packing only 24 hours before installation.

Checking the Product and Accessories

After unpacking the SUN2000, check the product and accessories. If any damage is found or any component is missing, contact the dealer.

Figure 4-1 shows the product and accessories included in the delivery.

Figure 4-1 Product and accessories



No.	Name	Quantity	Description
1	SUN2000	1 PCS	N/A
2	Rear panel	1 PCS	N/A
3	Screw assembly (flat washer, spring washer, and M12x40 bolts)	3 groups	Used together with a stainless nut and flat washer to secure an installation backplane to the support.
4	DC input connector	12 PCS (six positive connectors and six negative connectors)	Connects to a DC input power cable.
5	M12 stainless nut and flat	4 groups	Used together with a screw assembly to secure an installation backplane to the

No.	Name	Quantity	Description
	washer		support.
6	Metal terminal	12 PCS (six positive metal terminals and six negative metal terminals)	It is the AC input power cable crimp terminal. NOTICE Positive and negative metal terminals are packed with positive and negative connectors respectively. After unpacking, keep the positive and negative ones separate to avoid confusion.
7	Documentation	1 PCS	Includes the quick installation guide in paper copies.
8	Spare M6x16 hexagon screw assemblies for cabinet doors	2 groups	N/A
9	5# hex key	1 PCS	N/A
10	Tilted support mounting kit	4 PCS	N/A
11	M6x16 hexagon screw	8 groups	Used to secure the tilted support mounting kit to the inverter.
12	M8x30 screw	4 groups	Used to secure the inverter to the tilted support.
13	M12x60 expansion bolt	3 groups	Secures the rear panel to a wall.
14	M6x25 screw	2 groups	Tightens the auxiliary points at the bottom of the tilted support.

MOTE

Items 1-7 and 10-14 are placed in the packing case, and items 8 and 9 are bound to the reinforcing rib for the inverter base.

4.2 Tools

Prepare tools required for installation and electrical connections.

Tool	Model	Function
Hammer drill	With a drill bit of Φ14 mm (Φ0.55 in.)	Drills holes on the wall or a support.
U H		

Tool	Model	Function
Adjustable wrench	With an open end ≥ 32 mm (1.26 in.)	Tightens expansion bolts.
Torque screwdriver	 Hexagon socket head: 5 mm (0.20 in.) Flat head: M6 Phillips head: M4 and M6 	Secures screws to mechanical parts.
Socket wrench	Open end: 10 mm (0.39 in.) (applicable to M6) or 13 mm (0.51 in.) (applicable to M8) Height: 100 mm (3.94 in.) (adapted to the height distance between terminals and the cabinet frame) Wrench handle length (horizontal): < 200 mm (7.87 in.) Torque: 0–8 N m	Tightens bolts.
Diagonal pliers	N/A	Cuts cable ties.
Wire stripper	N/A	Peels off cable jackets.

Tool	Model	Function
Rubber mallet	N/A	Hammers expansion bolts into holes.
Guarded blade utility knife	N/A	Removes packing materials.
O O O O O O O O O O O O O O O O O O O		
Cable cutter	N/A	Cuts power cables.
Crimping tool	H4TC0001 Manufacturer: AMPHENOL	Crimps metal terminals during DC input cable preparation.
RJ45 crimping tool	N/A	Prepares RJ45 connectors for communications cables.
Removal tool	H4TW0001 Manufacturer: AMPHENOL	Removes DC connectors from the SUN2000.

Tool	Model	Function
Vacuum cleaner	N/A	Cleans up dusts after drilling holes.
Multimeter	N/A	Measures cable voltages.
Marker	Diameter: ≤ 10 mm (0.39 in.)	Marks signs.
₫		
Measuring tape	N/A	Measures distances.
Level	N/A	Checks the levelness of the rear panel.
ESD gloves	N/A	Protects operators during installation.

Tool	Model	Function
Safety goggles	N/A	Protect operators when drilling holes.
Anti-dust respirator	N/A	Protects operators from dust inhalation when drilling holes.
Hydraulic pliers	N/A	Crimp OT terminals.
Heat shrink tubing	• Withstand voltage: ≥ 600 V	Insulates electrical devices.
	• Thickness: ≥ 0.8 mm (0.03 in.)	
Heat gun	N/A	Heat-shrinks a tube.
Socket wrench	• Diagonal size: 10 mm (0.39 in.) (applicable to M6)	Secures AC output terminals.
	Height: 100 mm (3.94 in.) (adapted to the height distance between terminals and the cabinet frame)	
	• Wrench handle length (horizontal): < 200 mm (7.87 in.)	
	• Torque: 0–8 N m	

Tool	Model	Function
Torque wrench	Open end: 18 mm (0.71 in.), 33 mm (1.30 in.), and 52 mm (2.05 in.)	Tightens the locking caps and expansion bolts at the waterproof cable connectors.
£		

4.3 Wall-mounting the SUN2000

4.3.1 Determining the Installation Position

Determine an appropriate position for installing the SUN2000.

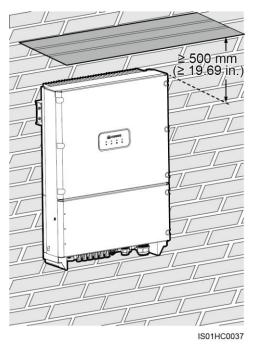
Basic Requirements

- The SUN2000 is protected to Type 4X and can be installed indoors or outdoors.
- The installation method and position must be appropriate for the weight and dimensions of the SUN2000. For details, see 10 Technical Specifications.
- Do not install the SUN2000 in a place where personnel are likely to come into contact with its enclosure and heat sinks because these parts are extremely hot during operation.
- Do not install the SUN2000 in an area that stores flammable or explosive materials.

Installation Environment Requirements

- The ambient temperature must be below 50 °C (122 °F) which ensures optimal SUN2000 operation and extends the SUN2000's service life.
- The SUN2000 must be installed in a well ventilated environment to ensure good heat dissipation.
- The SUN2000 must be free from direct exposure to sunlight, rain, and snow to extend its service life. It is recommended that the SUN2000 be installed in a sheltered place. If no shelter is available, build an awning, as shown in Figure 4-2.

Figure 4-2 Shelter



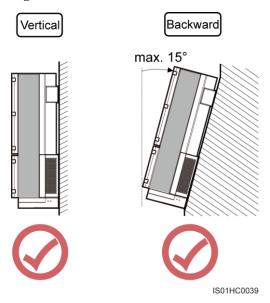
Carrier Requirements

- The carrier where the SUN2000 is installed must be fire-proof.
- Do not install the SUN2000 on flammable building materials.
- The wall must be solid enough to bear the weight of the SUN2000.
- Do not install the SUN2000 on a wall made of gypsum boards or similar materials with weak sound insulation to avoid noise disturbance in a residential area.

Installation Mode Requirements

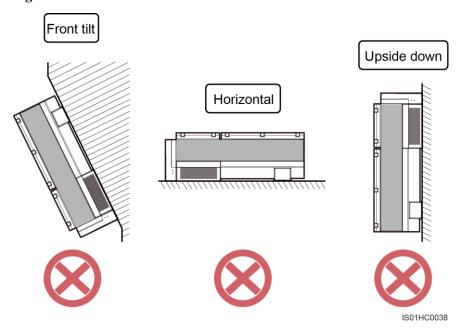
• Install the SUN2000 upright or at a maximum back tilt of 15 degrees to facilitate heat dissipation.

Figure 4-3 Correct installation modes



• Do not install the SUN2000 at a front tilt, excessive back tilt, or side tilt, horizontally, or upside down.

Figure 4-4 Incorrect installation modes



Installation Space Requirements

- It is recommended that the SUN2000 be installed at eye level to facilitate operation and maintenance.
- Reserve enough clearance around the SUN2000 to ensure sufficient space for installation and heat dissipation, as shown in Figure 4-5.

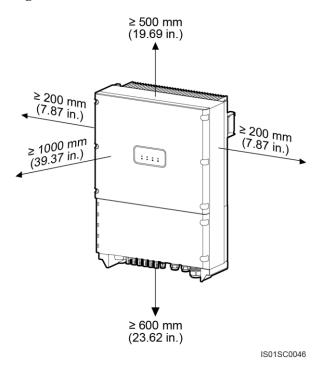
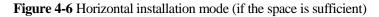
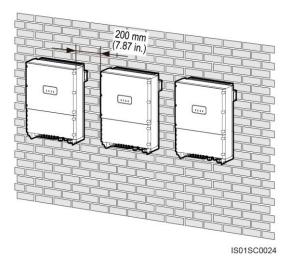


Figure 4-5 Minimum installation clearance

• When installing multiple SUN2000s, install them along the same line (as shown in Figure 4-6) if sufficient space is available, and install them in triangle mode (as shown in Figure 4-7) or in stacked mode (as shown in Figure 4-8) if no sufficient space is available. The installation modes ensure sufficient space for installation and heat dissipation.





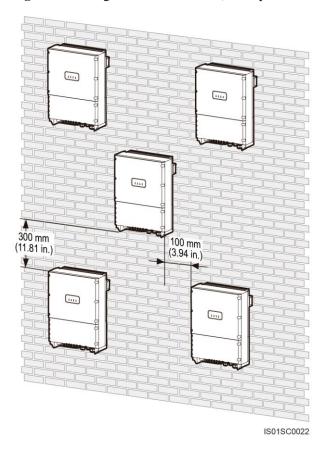


Figure 4-7 Triangle installation mode (if the space is insufficient)

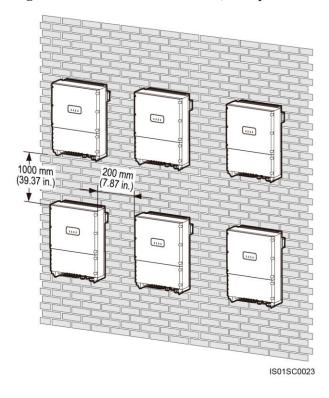


Figure 4-8 Stacked installation mode (if the space is insufficient)



NOTICE

The clearance between multiple SUN2000s must be increased to ensure proper heat dissipation when they are installed in a hot area.

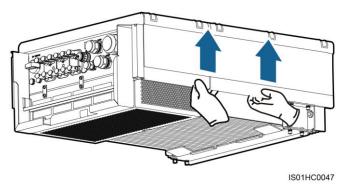
4.3.2 Moving the SUN2000

Move the SUN2000 to the installation position horizontally.

Procedure

Step 1 Arrange two people to hold the handles on both sides of the SUN2000, as shown in Figure 4-9.

Figure 4-9 Moving the SUN2000



Step 2 Carry the SUN2000 out of the packing case and move it to the installation position.



CAUTION

- To prevent device damage and personal injury, keep balance when moving the SUN2000 which is heavy.
- Do not place the SUN2000 with its wiring terminals contacting the floor because the power ports and signal ports at the bottom of the device are not designed to support the weight of the SUN2000. Place the SUN2000 horizontally.
- When placing the SUN2000 on the floor, put foam or paper under the SUN2000 to protect its enclosure.

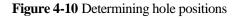
----End

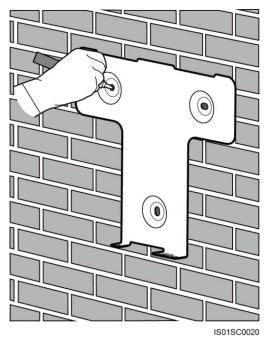
4.3.3 Installing a Rear Panel

Before installing the SUN2000, secure the shipped rear panel to a wall.

Procedure

Step 1 Determine the positions for drilling holes (as shown in Figure 4-10) using the rear panel available in the packing case, level the hole positions using a level, and mark the hole positions using a marker.





Step 2 Drill holes using a hammer drill and install expansion bolts, as shown in Figure 4-12. An expansion bolt is composed of four parts, as shown in Figure 4-11.

Figure 4-11 Expansion bolt composition

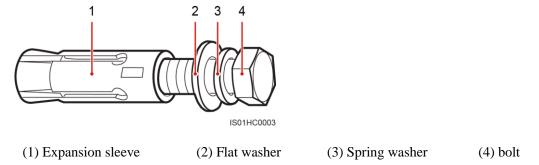
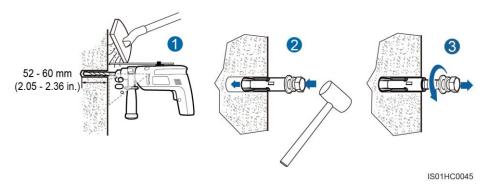


Figure 4-12 Drilling a hole and installing an expansion bolt





- To prevent dust inhalation or contact with eyes, wear safety goggles and an anti-dust respirator when drilling holes.
- Vacuum any dust in or around the holes using a vacuum cleaner and measure the hole distance. If the holes are inaccurately positioned, drill holes again.
- 1. Drill a hole in a marked position to a depth of 52–60 mm (2.05–2.36 in.) using a hammer drill with a Φ 14 mm (Φ 0.55 in.) bit.
- 2. Partially tighten an expansion bolt, vertically insert it into the hole, and knock the expansion bolt completely into the hole using a rubber mallet.
- 3. Remove the bolt, spring washer, and flat washer by rotating them counterclockwise.



NOTICE

Level the top of the expansion sleeve with the concrete wall after removing the bolt, spring washer, and flat washer. Otherwise, the rear panel will not be securely installed on the wall.

Step 3 Align the rear panel with the holes, insert expansion bolts into the holes through the real panel, and tighten the expansion bolts to a torque of 45 N m using a torque wrench with an 18 mm (0.71 in.) open end, as shown in Figure 4-13.

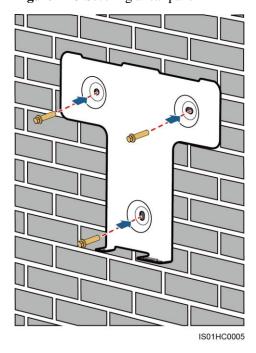


Figure 4-13 Securing a rear panel

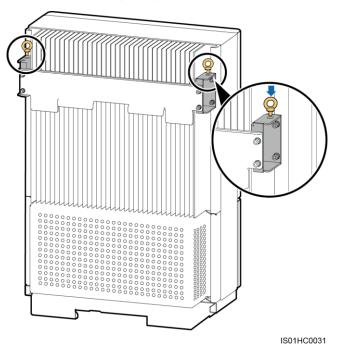
----End

4.3.4 Installing the SUN2000

Procedure

- **Step 1** If the installation position is low and you can mount the SUN2000 on the rear panel, go to Step 6 after performing Step 4.
- **Step 2** If the installation position is high and you cannot mount the SUN2000 on the rear panel, perform Step 3 to Step 7.
- **Step 3** Mount the M10 screw lifting eyes (provided by the customer) into the lifting holes and tighten the lifting eyes, as shown in Figure 4-14.

Figure 4-14 Installing lifting eyes



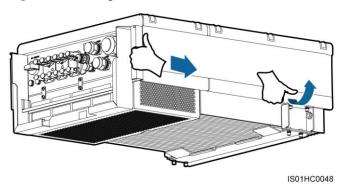
Step 4 Arrange two people to hold the handle at the bottom of the SUN2000 with one hand and hold the handle near the top of the SUN2000 with the other hand, and then stand the SUN2000, as shown in Figure 4-15.



CAUTION

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

Figure 4-15 Lifting the SUN2000

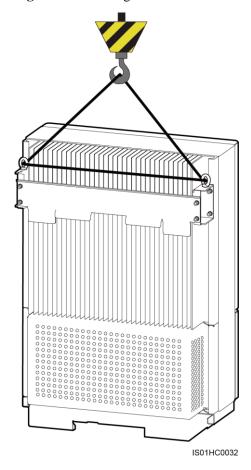


Step 5 Route a rope that is able to bear the SUN2000 through the lifting eyes and hoist the SUN2000, as shown in Figure 4-16.



When hoisting the SUN2000, keep balance to protect the SUN2000 from colliding with the wall or other objects.

Figure 4-16 Hoisting the SUN2000



Step 6 Mount the SUN2000 on the rear panel and keep them aligned with each other, as shown in Figure 4-17.

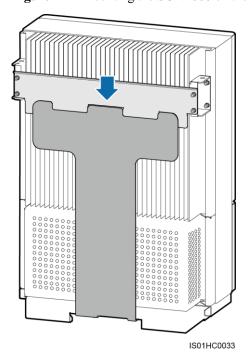
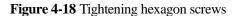
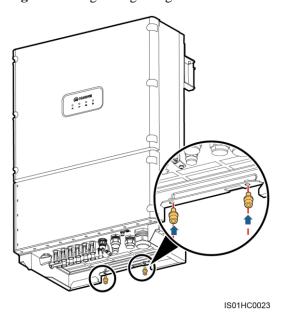


Figure 4-17 Mounting the SUN2000 on the rear panel

Step 7 Tighten the two hexagon screws at the bottom of the SUN2000 to a torque of 5 N m, as shown in Figure 4-18.





Step 8 (Optional) Install an antitheft lock, as shown in Figure 4-19.

The antitheft lock secures the SUN2000 to the rear panel to prevent theft.

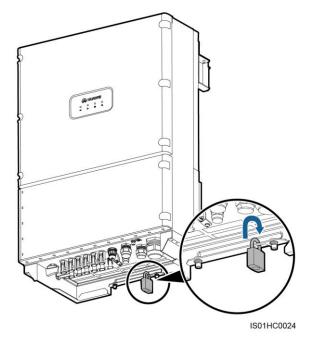


Figure 4-19 Installing an antitheft lock

----End

4.4 Installing a Vertical Support

4.4.1 Determining the Installation Position

This section uses a vertical support as an example to describe how to determine the installation position.

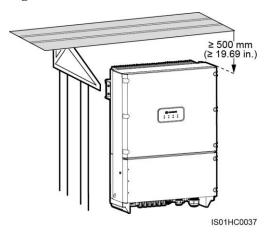
Basic Requirements

- The SUN2000 is protected to Type 4X and can be installed indoors or outdoors.
- The installation method and position must be appropriate for the weight and dimensions of the SUN2000. For details, see 10 Technical Specifications.
- Do not install the SUN2000 in a place where personnel are likely to come into contact with its enclosure and heat sinks because these parts are extremely hot during operation.
- Do not install the SUN2000 in an area that stores flammable or explosive materials.

Installation Environment Requirements

- The ambient temperature must be below 50 ℃ (122 ℉) which ensures optimal SUN2000 operation and extends the SUN2000's service life.
- The SUN2000 must be installed in a well ventilated environment to ensure good heat dissipation.
- The SUN2000 must be free from direct exposure to sunlight, rain, and snow to extend its service life. It is recommended that the SUN2000 be installed in a sheltered place. If no shelter is available, build an awning, as shown in Figure 4-20.

Figure 4-20 Shelter



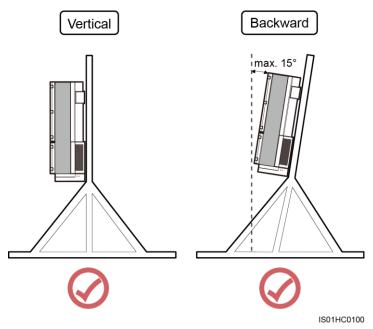
Carrier Requirements

- The carrier where the SUN2000 is installed must be fire-proof.
- Do not install the SUN2000 on flammable building materials.
- The wall must be solid enough to bear the weight of the SUN2000.

Installation Mode Requirements

• Install the SUN2000 upright or at a maximum front or back tilt of 15 degrees to facilitate heat dissipation.

Figure 4-21 Correct installation modes



 Do not install the SUN2000 at an excessive front or back tilt, at a side tilt, horizontally, or upside down.

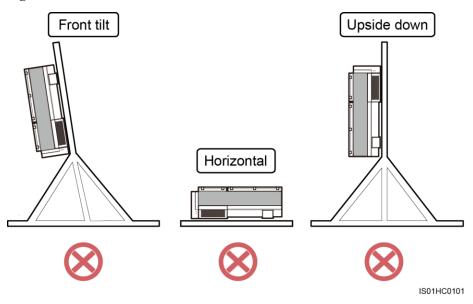


Figure 4-22 Incorrect installation modes

Installation Space Requirements

- It is recommended that the SUN2000 be installed at eye level to facilitate operation and maintenance.
- Reserve enough clearance around the SUN2000 to ensure sufficient space for installation and heat dissipation, as shown in Figure 4-23.

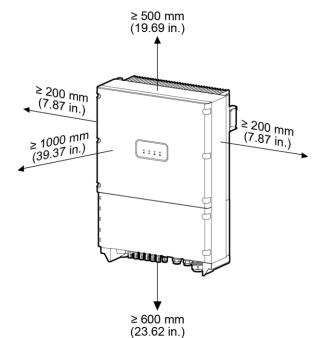


Figure 4-23 Minimum installation clearance

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4.4.2 Moving the SUN2000

For details about how to move an inverter, see 4.3.2 Moving the SUN2000.

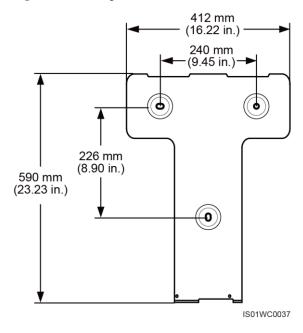
4.4.3 Installing a Rear Panel

Before installing the SUN2000, secure the shipped rear panel to a support.

Prerequisites

Figure 4-24 shows the dimensions of the rear panel.

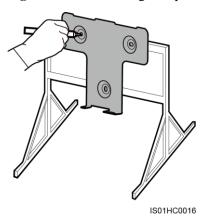
Figure 4-24 Rear panel dimensions



Procedure

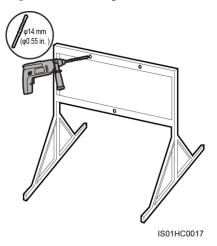
Step 1 Determine the positions for drilling holes (as shown in Figure 4-25) using the rear panel available in the packing case, level the hole positions using a level, and mark the hole positions using a marker.

Figure 4-25 Determining hole positions



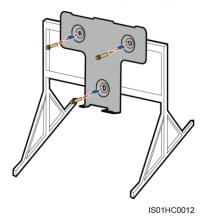
Step 2 Drill holes using a hammer drill, as shown in Figure 4-26.

Figure 4-26 Drilling holes



Step 3 Align the rear panel with the hole positions, insert the screw assembly (flat washer, spring washer, and M12x40 bolts) into the holes through the rear panel, secure them using the shipped stainless steel nuts and flat washers, and tighten the bolts to a torque of 45 N m using a torque wrench, as shown in Figure 4-27.

Figure 4-27 Securing a rear panel



----End

4.4.4 Installing the SUN2000

For details about how to install an inverter, see 4.3.4 Installing the SUN2000.

4.5 Installing a Tilted Support

4.5.1 Determining the Installation Position

This section uses a tilted support as an example to describe how to determine the installation position.

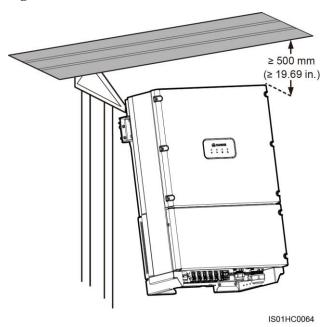
Basic Requirements

- The SUN2000 is protected to Type 4X and can be installed indoors or outdoors.
- The installation method and position must be appropriate for the weight and dimensions of the SUN2000. For details, see 10 Technical Specifications.
- Do not install the SUN2000 in a place where personnel are likely to come into contact with its enclosure and heat sinks because these parts are extremely hot during operation.
- Do not install the SUN2000 in an area that stores flammable or explosive materials.

Installation Environment Requirements

- The ambient temperature must be below 50 °C (122 °F) which ensures optimal SUN2000 operation and extends the SUN2000's service life.
- The SUN2000 must be installed in a well ventilated environment to ensure good heat dissipation.
- The SUN2000 must be free from direct exposure to sunlight, rain, and snow to extend its service life. It is recommended that the SUN2000 be installed in a sheltered place. If no shelter is available, build an awning, as shown in Figure 4-28.

Figure 4-28 Shelter



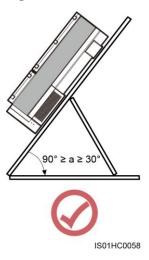
Carrier Requirements

- The carrier where the SUN2000 is installed must be fire-proof.
- Do not install the SUN2000 on flammable building materials.
- The wall must be solid enough to bear the weight of the SUN2000.

Installation Mode Requirements

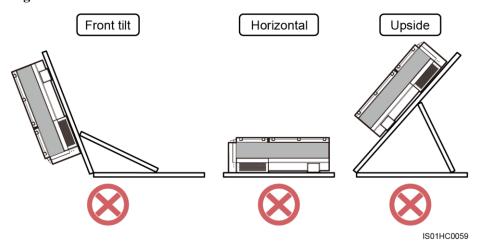
• The angle between the inverter and the horizontal plane must be in the range from 30 $^{\circ}$ to 90 $^{\circ}$.

Figure 4-29 Correct installation modes



• Do not install the inverter at a front tilt, excessive back tilt, side tilt, horizontally, or upside down.

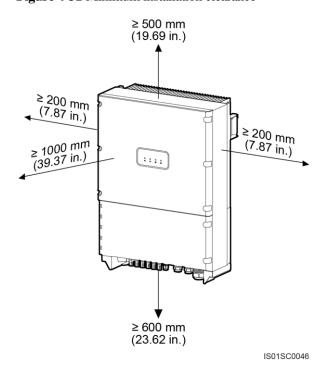
Figure 4-30 Incorrect installation modes



Installation Space Requirements

- It is recommended that the SUN2000 be installed at eye level to facilitate operation and maintenance.
- Reserve enough clearance around the SUN2000 to ensure sufficient space for installation and heat dissipation, as shown in Figure 4-31.

Figure 4-31 Minimum installation clearance



4.5.2 Moving the SUN2000

For details about how to move an inverter, see 4.3.2 Moving the SUN2000.

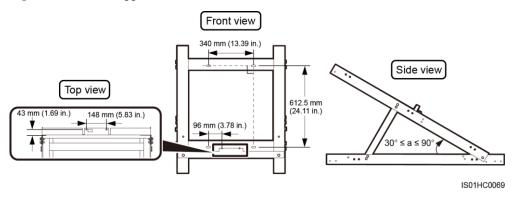
4.5.3 Installing the SUN2000

Install the SUN2000 as described in this section.

Procedure

Step 1 Prepare a tilted support, as shown in Figure 4-32.

Figure 4-32 Tilted support



M NOTE

- The hole dimensions of the bottom auxiliary tightening point in the top view are OB-13 mm x 8 mm (OB-0.51 in. x 0.31 in.).
- The hole dimensions of the backplane tightening point in the front view are OB-32 mm x 12 mm (OB-1.26 in. x 0.47 in.).
- The bottom auxiliary tightening point is 5 mm (0.20 in.) away from the backplane tightening point below.

Step 2 Secure the tilted support installation kit to the inverter using the M6x16 hex socket screws delivered with the product, and tighten the screws to a torque of 4 N m, as shown in Figure 4-33.

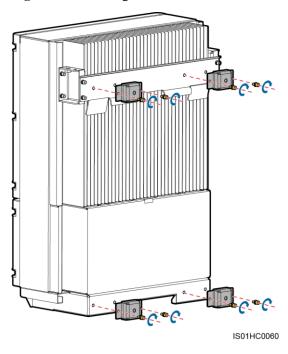
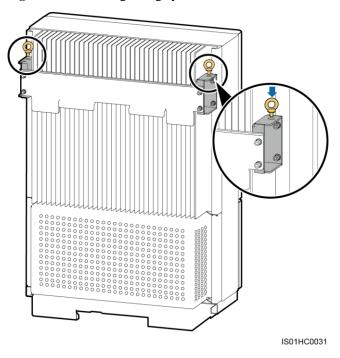


Figure 4-33 Securing the installation kit

- **Step 3** If the installation position is low and you can mount the inverter on the tilted support, perform Step 6 and then go to Step 8.
- **Step 4** If the installation position is high and you cannot mount the inverter on the tilted support, perform Step 5 to Step 9.
- **Step 5** Mount the M10 screw lifting eyes (provided by the customer) into the lifting holes and tighten the lifting eyes, as shown in Figure 4-34.

Figure 4-34 Installing lifting eyes



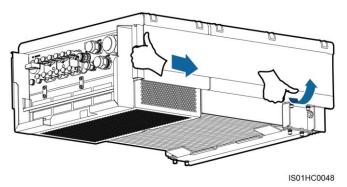
Step 6 Arrange two people to hold the handle at the bottom of the SUN2000 with one hand and hold the handle near the top of the SUN2000 with the other hand, and then stand the SUN2000, as shown in Figure 4-35.



CAUTION

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

Figure 4-35 Lifting the SUN2000

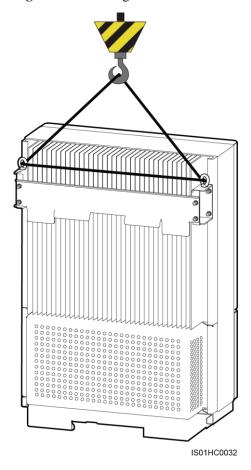


Step 7 Route a rope that is able to bear the SUN2000 through the lifting eyes and hoist the SUN2000, as shown in Figure 4-36.



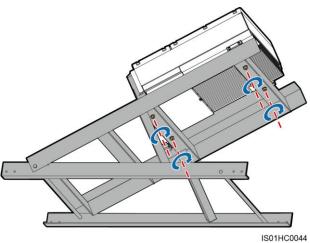
When hoisting the SUN2000, keep balance to protect the SUN2000 from colliding with the wall or other objects.

Figure 4-36 Hoisting the SUN2000



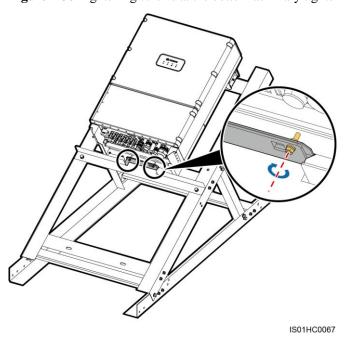
Step 8 Align the screw holes on the tilted support mounting kit with the marked holes on the tilted support, and secure the inverter to the tilted support using M8x30 screws to a torque of 8 N m, as shown in Figure 4-37.

Figure 4-37 Installing the inverter on a tilted support



Step 9 (Optional) Tighten the screws at the bottom auxiliary tightening points to a torque of 4 N m, as shown in Figure 4-38.

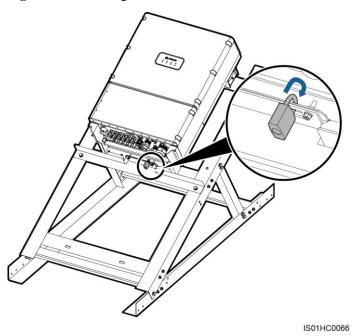
Figure 4-38 Tightening screws at the bottom auxiliary tightening points



Step 10 (Optional) Install an antitheft lock, as shown in Figure 4-39.

The function of an antitheft lock is to secure the SUN2000 to the support and protect it from stealing.

Figure 4-39 Installing an antitheft lock



----End

5 Electrical Connections

This chapter describes the SUN2000 electrical connections. Read this chapter before connecting protection ground (PGND) cables, PV side ground cables, DC input power cables, AC output power cables, and communications cables for the SUN2000.

Context



DANGER

Before performing any electrical connection, ensure that the **DC SWITCH** is **OFF**. Otherwise, the high voltage can result in fatal injury.



NOTICE

- Electrical connections must meet local installation regulatory requirements.
- The cable colors shown in the electrical connection drawings provided in this chapter are for reference only. Select cables in accordance with local cable specifications (yellow-green wires are only used for grounding).

5.1 Opening the Maintenance Compartment Door

Prerequisites

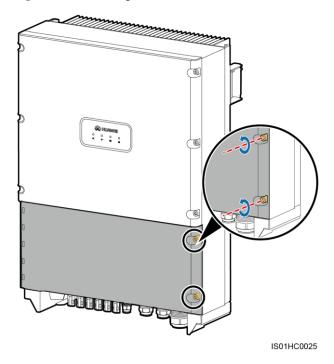


- Do not open the host panel of the inverter.
- Before opening the maintenance compartment door, switch off the upstream DC input circuit breaker and downstream AC output circuit breaker.
- Do not leave unused screws in the chassis.

Procedure

Step 1 Loosen the two screws on the maintenance compartment door, as shown in Figure 5-1. Set the screws aside for future use.

Figure 5-1 Removing screws



☐ NOTE

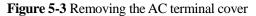
If the two screws on the maintenance compartment door are lost, use the standby M6 hexagon screw assemblies available in the fitting bag that is bound to the chassis base.

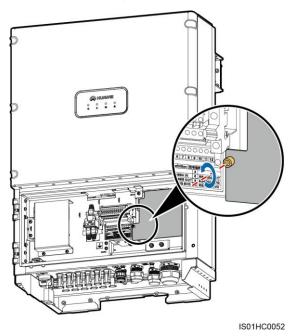
Step 2 Open the door and adjust a support bar, as shown in Figure 5-2.

ISO1HC0051

Figure 5-2 Adjusting a support bar

Step 3 Remove the AC terminal cover and set it aside, as shown in Figure 5-3.





Ⅲ NOTE

To highlight the involved area, the figures do not show the open door.

----End

5.2 Connecting Ground Cables

Connect the SUN2000 to a ground bar using ground cables for grounding purposes.

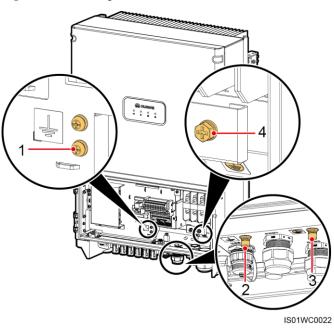
Prerequisites

The ground cable and OT terminals are prepared.

- Recommended ground cable: 8 AWG outdoor copper-core cables.
- OT terminal: The screw specification is M4 and M6. The specification of the cable that can be connected is 8 AWG.

Context

Figure 5-4 Ground points



Grou nd Point	Meaning	Ground Point Screw Model	Tightening Torque	Connection
1	PV side ground points	M4	1.2 N m	Connect either of the
2		M6	5 N m	two ground points for PV side grounding.
3	Protection ground points	M6	5 N m	Connect either of the
4				two ground points for protective grounding.

\square NOTE

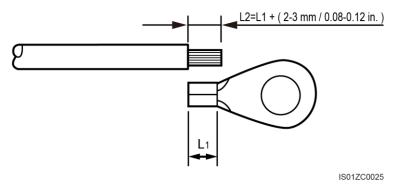
Good grounding for the SUN2000 helps resist the impact of surge voltage and improve the EMI
performance. Connect the ground cables before connecting the AC power cables, DC power cables,
and communications cables.

- Select ground points for PV side grounding and protective grounding based on the principle of easy
 operation.
- For the system with multiple SUN2000s, connect the ground cables of each SUN2000 to a ground bar in equipotential mode.

Procedure

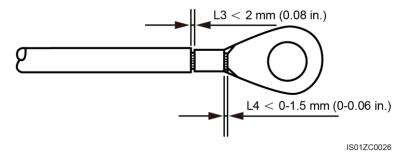
Step 1 Remove an appropriate length of the insulation layer from the ground cables using a wire stripper, as shown in Figure 5-5.

Figure 5-5 Stripped length



Step 2 Insert the exposed core wires into the conductor crimp area of the OT terminal and crimp them using hydraulic pliers, as shown in Figure 5-6.

Figure 5-6 Crimping a cable



NOTE

The crimping must result in full containment of the cable conductors and complete contact between the cable conductors and the terminal.

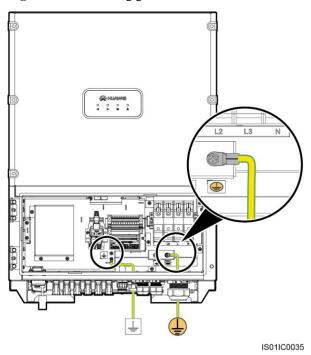
Step 3 Remove the ground screws from the ground points.

The following uses ground points 1 and 4 as examples to describe how to connect the ground cables.

- **Step 4** Remove the locking caps at the **GND** and **AC OUTPUT** waterproof cable connectors at the bottom of the SUN2000.
- **Step 5** Remove the plugs from the locking caps and route the ground cables into the locking caps.
- **Step 6** Put the PV side and protection ground cables into the **GND** and **AC OUTPUT** connectors at the bottom of the SUN2000, respectively.

Step 7 Secure the ground cables using the screws removed from the ground points, and tighten the screws using a torque screwdriver, as shown in Figure 5-7.

Figure 5-7 Connecting ground cables



M NOTE

To prevent corrosion, apply silica gel or paint to the PE terminal after connecting the ground cables.

Step 8 Tighten the GND and AC OUTPUT locking caps.

----End

5.3 Installing AC Output Power Cables

Connect the SUN2000 to the AC power distribution frame (PDF) or power grid using AC output power cables. Ensure that the cable connections meet the requirements of the local power grid operator.

Prerequisites

An independent three-phase circuit breaker must be installed on the AC side of each SUN2000 to ensure that the SUN2000s can be safely disconnected from the power grid. See 10 Technical Specifications to select the circuit breaker of the appropriate specifications.



WARNING

- Do not install a single circuit breaker for several SUN2000s.
- Do not connect loads between the SUN2000 and circuit breaker.

Context

• UL1015 copper-core cables that can withstand 105 ℃ (221 ℉) are recommended. Soft cables are recommended to facilitate installation. Table 5-1 lists the specifications.

Table 5-1 AC output power cable specifications

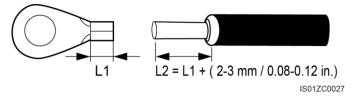
Cable Type	Cable Quantity	Cable Specifications		Cable Outer Diameter	
		Range	Recomme nded Value	Range	Recommend ed Value
A single cable	Four (L1, L2, L3, and N)	6–8 AWG	6 AWG	8.3–9.2 mm (0.33–0.36 in.)	9.2 mm (0.36 in.)

- OT terminals need to be prepared by the customer. The OT terminal screw hole specifications are M6. The maximum specifications of cables that can be connected are 6 AWG.
- It is recommended that the AC output cable be routed through a pipe for protection. The maximum pipe outer diameter allowed is 40.5 mm (1.59 in.).

Procedure

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

Figure 5-8 Stripping the AC output cable



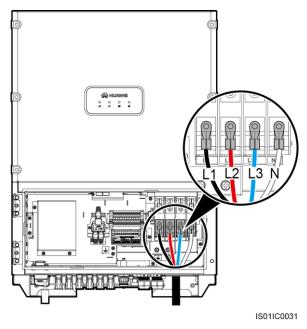
- **Step 2** Insert the exposed core wires into the crimp area of the OT terminal and crimp them using hydraulic pliers.
- **Step 3** Wrap the wire crimp area with heat shrink tubing or PVC insulation tape.
 - If heat shrink tubing is used, put it through the power cable and then crimp the OT terminal.
- Step 4 Remove the AC OUTPUT waterproof cable connector.

- **Step 5** Route the prepared AC output power cable through the cable routing pipe.
- Step 6 Route the AC output cable and the cable routing pipe through the AC OUTPUT hole.
- **Step 7** Connect the wires of the AC output cable for the SUN2000 to L1, L2, L3, and N on the AC terminal block, as shown in Figure 5-9. The required torque is 5 N m.



- AC output terminals must be parallel.
- The AC output power cable must be secured to a torque that does not exceed 6 N m. Otherwise, the AC terminal block may be damaged.
- Ensure that the AC output power cable is securely connected. Otherwise, the inverter may fail to run or the terminal block may be damaged after the inverter operates.

Figure 5-9 Connecting AC output cables



Step 8 Secure the cable routing pipe.

----End

5.4 Connecting DC Input Power Cables

Connect the SUN2000 to PV strings over DC input power cables.

Prerequisites



DANGER

- PV modules generate electric energy when exposed to sunlight and can create an electrical shock hazard. Therefore, when connecting DC input power cables, shield the PV modules with opaque cloth.
- Before connecting DC input power cables, ensure that the voltage on the DC side is within
 the safe range (lower than 60 V DC) and that the DC SWITCH on the SUN2000 is OFF.
 Otherwise, high voltage may result in electric shock.



WARNING

Ensure that the following requirements are met to prevent fire accidents:

- PV modules connected in series in each PV string must be of the same specifications.
- The maximum open-circuit voltage of each PV string must be always lower than or equal to 1000 V DC.
- The maximum short-circuit current of each MPPT string must not exceed 33 A.
- The positive and negative terminals of PV modules must be connected to the positive and negative DC input terminals of the SUN2000 respectively.



NOTICE

- If the SUN2000 is directly connected to the power grid with the neutral wire connected to the PGND cable (for example, a low-voltage power grid or a power grid with the neutral wire grounded), do not ground the positive and negative terminals of PV strings. Otherwise, the SUN2000 will fail to work.
- During PV string and SUN2000 installation, the positive or negative terminals of PV strings may be grounded if power cables are not properly installed or routed. In this case, an AC or DC short circuit may occur and damage the SUN2000.



NOTICE

The PV strings must meet the following requirements if they need to be grounded:

- Connect a three-phase isolation transformer on the inverter output side, and ensure that the neutral wire of the isolation transformer is separated from the ground cable.
- One isolation transformer must be installed only for one SUN2000. Do not connect two or more SUN2000s to the same isolation transformer. Otherwise, the SUN2000s may fail to work due to the loop current generated between them.
- Set **Isolation** to **Input Grounded, With TF** on the SUN2000 APP, SmartLogger, or EMS.

Context

DC terminal selection

Figure 5-10 shows the DC terminals at the bottom of the SUN2000. Table 5-2 describes the requirements for DC terminal selection.

Figure 5-10 DC terminals

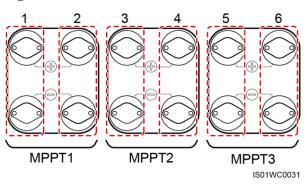


Table 5-2 DC terminal selection requirements

Number of Inputs	SUN2000
1	Connected to any one route
2	Connected to routes 1 and 3
3	Connected to routes 1, 3, and 5
4	Connected to routes 1, 2, 3, and 5
5	Connected to routes 1, 2, 3, 4, and 5
6	Connected to routes 1, 2, 3, 4, 5, and 6

• DC input cable specifications

Table 5-3 lists the recommended specifications of DC input cables.

Table 5-3 DC input cable specifications

	Cable Specifications		Cable Outer Diameter	
Cable Type	Range	Recommende d Value	Range	Recommende d Value

	Cable Specifications		Cable Outer Diameter	
Cable Type	Range	Recommende d Value	Range	Recommende d Value
Common PV cable	10–12 AWG	12 AWG	4.5–7.8 mm (0.18–0.31 in.)	4.5 mm (0.18 in.)

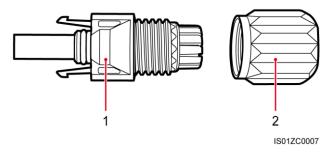


Highly rigid cables, such as armored cables, are not recommended because bending may cause poor contact.

• Positive and negative connectors

Positive and negative DC input connectors are used, as shown in Figure 5-11 and Figure 5-12

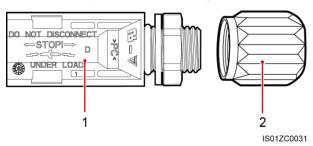
Figure 5-11 Positive connector composition



(1) Insulation housing

(2) Locking nut

Figure 5-12 Negative connector composition



(1) Insulation housing

(2) Locking nut

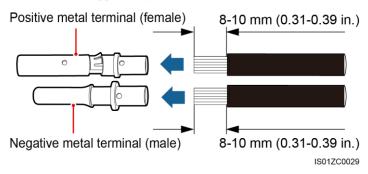


Positive and negative metal terminals are packed with positive and negative connectors respectively. After unpacking, keep the positive and negative ones separate to avoid confusion.

Procedure

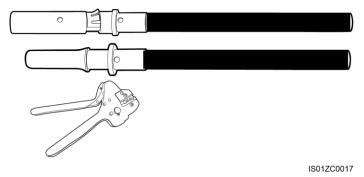
Step 1 Remove an appropriate length of the insulation layer from the positive and negative power cables using a wire stripper, as shown in Figure 5-13.

Figure 5-13 Stripped length



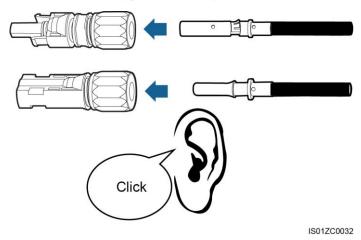
Step 2 Insert the exposed area of the positive and negative power cables into the metal terminals of the positive and negative connectors respectively and crimp them using a crimping tool, as shown in Figure 5-14. Ensure that the cables are crimped tightly such that they cannot be pulled out by a force less than 400 N.

Figure 5-14 Crimping a metal terminal



Step 3 Insert the crimped positive and negative power cables into the corresponding positive and negative connectors until a **click** sound is heard.

Figure 5-15 Inserting positive and negative connectors



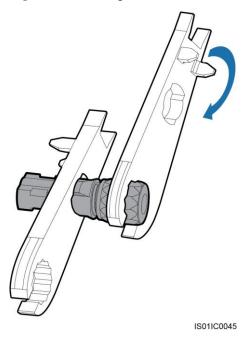


After inserting the crimped positive and negative power cables into the corresponding insulation housings, ensure that the cables are in position by checking for resistance when a slight pull is applied.

Step 4 Tighten the locking nuts on the positive and negative connectors.

Secure the nuts using a removal wrench, as shown in Figure 5-16.

Figure 5-16 Locking a nut



Step 5 Pull out the blue dustproof plugs from the ends of the DC input connectors.

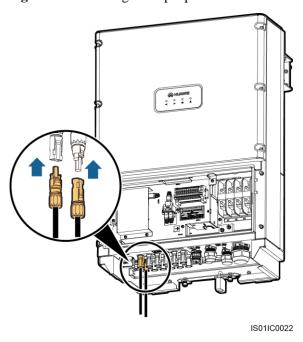


Before performing Step 6, measure the voltage of the connector using a multimeter. Ensure that the voltage of each string is within the specified range (the voltage range varies depending on the actual situation) and check that the polarities of the DC input power cables are correct.

Before performing Step 6, ensure that the DC SWITCH is OFF.

Step 6 Insert the positive and negative connectors into the corresponding DC input terminals of the SUN2000 until a **click** sound is heard, as shown in Figure 5-17.

Figure 5-17 Installing DC input power cables





NOTICE

After the positive and negative connectors are in position, the clearance between the DC terminals and connectors should be less than or equal to 0.8 mm (0.03 in.) and the DC input cables cannot be pulled out.

----End

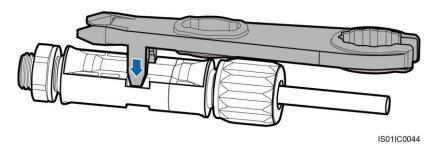
Follow-up Procedure

To remove the positive and negative connectors from the SUN2000, insert a removal wrench into the bayonet and press the wrench with an appropriate force, as shown in Figure 5-18.



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

Figure 5-18 Removing a DC input connector



5.5 Connecting Communications Cables

5.5.1 Communication Mode Description

RS485

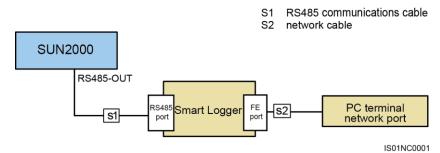
The SUN2000 sends alarm information, operating status, and data such as energy yield to a PC that runs network management software such as NetEco or a local data collection and display device such as SmartLogger through RS485.

RS485 communication is implemented by connecting the SUN2000 according to the following guidelines:

Connect the SUN2000 to the SmartLogger to implement data collection and monitoring, or connect it to the PC over the SmartLogger to implement communication.

• Figure 5-19 shows how a single SUN2000 connects to the SmartLogger and PC.

Figure 5-19 RS485 communication mode for a single SUN2000

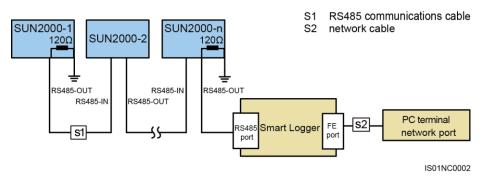


• Figure 5-20 shows how multiple SUN2000s connect to the SmartLogger and PC.

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

Set **Match Resistance** in **Comm. Param.** to **Connect** for the SUN2000 at the end of the daisy chain, and ensure that the inverter enclosure is grounded.

Figure 5-20 RS485 communication mode for multiple SUN2000s



M NOTE

- The communications cable should be shorter than 1000 m (3280.84 ft.).
- If multiple SUN2000s need to communicate with one another and are connected to the SmartLogger, a maximum of three daisy chains can be configured to support up to 80 devices. It is recommended that the number of devices on each daisy chain be less than 30.

5.5.2 Connecting RS485 Communications Cables

Connect the SUN2000 to communications equipment (such as the data collector and PC) using RS485 communications cables.

Context

- RS485 communications cable specifications
 - RS485 communications cables can be connected in two ways:
 - Terminal block connection
 - You are advised to use the DJYP2VP2-22 2*2*1 network cable or a communications cable with a cross-sectional area of 1 mm² and outer diameter of 14-18 mm (0.55–0.71 in.).
 - RJ45 network port connection
 - You are advised to use a CAT 5E outdoor shielded network cable with a diameter less than 9 mm (0.35 in.) and internal resistance no greater than 1.5 ohm/10 m (1.5 ohms/393.70 in.).



Select either connection mode during installation. Connecting to a terminal block is recommended.

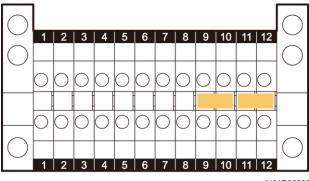


NOTICE

When routing communications cables, ensure that they are separated from power cables and away from interference sources to prevent communication interruptions.

• RS485 terminal block definitions

Figure 5-21 Terminal block



IU01ZC0006

Table 5-4 defines the RS485 terminal block.

Table 5-4 RS485 terminal block definitions

No.	Function	No.	Function
1	DI+	2	DI-
3	N/A	4	N/A
5	RS 485A IN	6	RS 485A OUT
7	RS 485B IN	8	RS 485B OUT
9	RS485 A-SVG	10	RS485 A-SVG
11	RS485 B-SVG	12	RS485 B-SVG

• RJ45 connector pin definitions

Figure 5-22 RJ45 connector

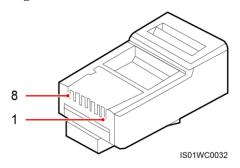


Table 5-5 RJ45 connector pin definitions

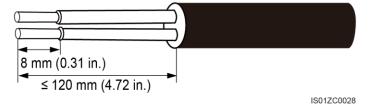
Pin	Function	
1	RS485A, RS485 differential signal +	
2	RS485B, RS485 differential signal -	
3	NC	
4	RS485A, RS485 differential signal +	
5	RS485B, RS485 differential signal -	
6	NC	
7	NC	
8	NC	

• It is recommended that the RS485 communications cable be routed through a pipe for protection. The maximum pipe outer diameter allowed is 25.5 mm (1.00 in.).

Procedure

- Method 1: Connecting to the Terminal Block (Recommended)
 - a. Remove the insulation layer from the cable using a wire stripper, as shown in Figure 5-23.

Figure 5-23 Stripping an RS485 communications cable



- b. Remove the **COM1** and **COM2** waterproof cable connectors.
- c. Route the cable into the cable routing pipe.
- d. Route the cable and cable routing pipe to the **COM1** and **COM2** holes at the bottom of the SUN2000.
- e. Connect the input end to terminals 5 and 7 on the terminal block, and connect the output end to terminals 6 and 8 on the terminal block. Connect the insulation layer to the ground point, as shown in Figure 5-24.

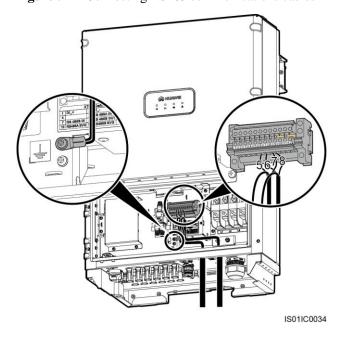
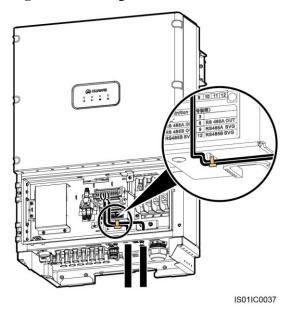


Figure 5-24 Connecting RS485 communications cables

f. Bind the communications cables after connecting them, as shown in Figure 5-25.

Figure 5-25 Binding communications cables



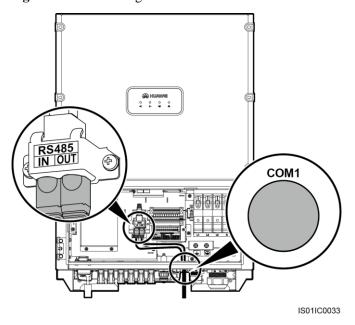
- g. Secure the cable routing pipe.
- Method 2: Connecting to RJ45 Ports
 - a. Insert the wires of the network cable to the RJ45 connector in sequence, as shown in Figure 5-26.

brown 8
White-brown 7
green 6
White-blue 5
blue 4
White-green 3
orange 2
white-orange 1

Figure 5-26 Connecting wires to an RJ45 connector

- b. Crimp the connector using a crimping tool.
- c. Remove the **COM1** waterproof cable connector.
- d. Route the crimped network cable into the cable routing pipe.
- e. Route the cable and cable routing pipe to the **COM1** hole at the bottom of the SUN2000.
- f. Connect the RJ45 connectors to the **RS485 IN** and **RS485 OUT** ports in the SUN2000 maintenance area, as shown in Figure 5-27.

Figure 5-27 Connecting RS485 communications cables



M NOTE

Block the unused COM2 waterproof cable connector with waterproof plugs.

g. Bind the communications cables after connecting them, as shown in Figure 5-28.

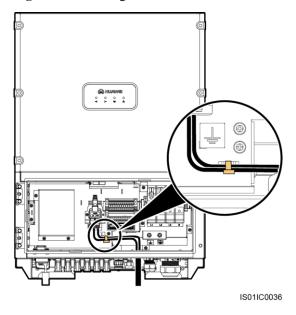


Figure 5-28 Binding communications cables

h. Secure the cable routing pipe.

----End

5.6 Installation Verification

To ensure that the SUN2000 runs normally, check the SUN2000 after installation.

Check the following items after the SUN2000 is installed:

- 1. The SUN2000 is installed correctly and securely.
- 2. All screws, especially the screws used for electrical connections, are tightened.
- 3. Ground cables are connected correctly and securely, with no open circuit or short-circuit.
- 4. AC output power cables are connected correctly and securely, with no open circuit or short-circuit.
- 5. DC input power cables are connected correctly and securely, with no open circuit or short-circuit.
- 6. The DC input voltage is not higher than 1000 V and meets the local voltage range requirements.
- 7. RS485 communications cables are connected correctly and securely, with no open circuit or short-circuit.
- 8. Idle DC input terminals are sealed.
- 9. Idle USB and RS485 ports and waterproof connectors are plugged with waterproof plugs.

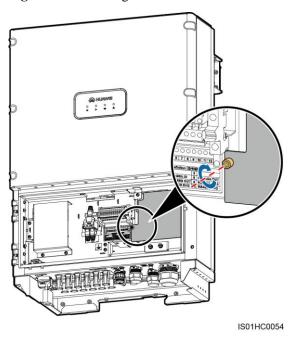
5.7 Closing the Maintenance Compartment Door

Close the maintenance compartment door as described in this section.

Procedure

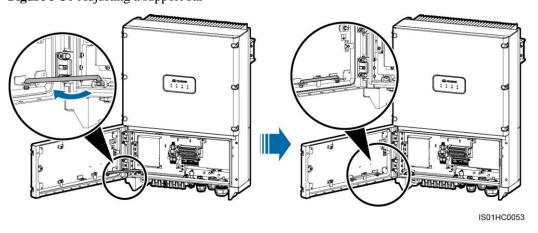
Step 1 Install the AC terminal cover, as shown in Figure 5-29.

Figure 5-29 Installing the AC terminal cover



Step 2 Adjust the support bar, as shown in Figure 5-30.

Figure 5-30 Adjusting a support bar



Step 3 Close the maintenance compartment door and tighten the two screws on the maintenance compartment door, as shown in Figure 5-31. The required torque is 4 N m.

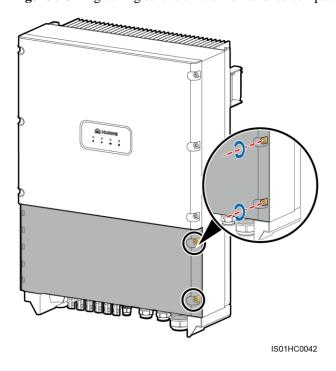


Figure 5-31 Tightening screws on the maintenance compartment door

■ NOTE

If the two screws on the maintenance compartment door are lost, use the standby M6 hexagon screw assemblies available in the fitting bag that is bound to the chassis base.

----End

6 System Operation

This chapter describes how to check the SUN2000 before powering it on and how to power on and power off the SUN2000.

6.1 Powering On the SUN2000

Power on the SUN2000 after electrical connections are completed.

Procedure

Step 1 Switch on the AC circuit breaker between the SUN2000 and the power grid.



NOTICE

If you perform Step 2 before Step 1, the SUN2000 reports a fault about abnormal shutdown. You can start the SUN2000 only after the fault is automatically rectified. The default clearance time is 1 minute. You can modify the time over the network management software running on a PC connected to the SUN2000.

- Step 2 Press DC SWITCH at the bottom of the inverter and rotate it to the ON position.
- **Step 3** (Optional) To check whether the DC terminal is securely connected, after the SUN2000 works for some time, measure the temperature at the DC terminal connection point using a point-test thermometer.

After the inverter has been running for a period, measure the temperatures at the joints between DC terminals and connectors to check that the DC terminals are in good contact.

----End

6.2 Powering Off the SUN2000

Comply with the safety precautions and operation procedure specified in this section when powering off the SUN2000.

Context



WARNING

After the SUN2000 powers off, the remaining electricity and heat may still cause electrical shock and body burns. Therefore, only begin servicing the SUN2000 five minutes after the power-off.

Procedure

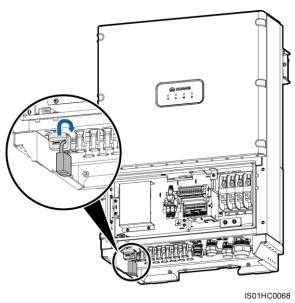
Step 1 Run a shutdown command on the SUN2000 APP, SmartLogger, or NMS.

For details, see SUN2000 APP User Manual, SmartLogger1000 User Manual, or NetEco1000S V100R001C00 User Manual.

- **Step 2** Switch off the circuit breaker between the SUN2000 and the power grid.
- **Step 3** Set the DC SWITCH to OFF.
- **Step 4** (Optional) Lock the DC switch using a padlock, as shown in Figure 6-1.
 - \square NOTE

If **DC SWITCH** is switch to **OFF** on the DC side, it is recommended that you lock the DC switch to avoid switching it on by mistake.

Figure 6-1 Padlock



----End

7 User Interface

The man-machine interaction can be performed through the USB, SmartLogger, NMS, and SUN2000 APP.

7.1 Operations with a USB Flash Drive

The SUN2000 communicates with a USB flash drive over the USB port to import and export configurations, export data, and upgrade software.

7.1.1 Exporting Configurations

Export the inverter configurations through a USB flash drive.

Context

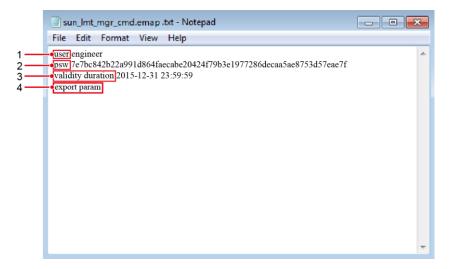
USB flash drives of SanDisk, Kingston, and Netacare recommended. Other brands may be incompatible.

Procedure

- **Step 1** On the SUN2000 APP, click **Inverter Command Settings** to generate a boot script file. For details, see *SUN2000 APP User Manual*.
- **Step 2** Import the boot script file to a computer.

(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	The script validity period varies depending on the script export time.	
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. Otherwise, after you insert the USB flash drive for five consecutive times, the user account will be locked for 10 minutes.

Table 7-1 Indicator status

Indicator	Status	Meaning
	Off	There is no operation with a USB flash drive.
	Blinking green slowly (on for 1s and then off for 1s)	There is an operation with a USB flash drive.
	Blinking green fast (on for 0.125s and 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.



When the configuration export is completed, there are three files in the root directory of the USB flash drive: one boot script file and two exported files.

----End

7.1.2 Importing Configurations

Import the inverter configurations through a USB flash drive.

Prerequisites

You have exported configurations, and the exported files are complete.

Context

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

Procedure

- **Step 1** On the SUN2000 APP, click **Inverter Command Settings** to generate a boot script file. For details, see *SUN2000 APP User Manual*.
- **Step 2** Import the boot script file to a computer.
- **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 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. Otherwise, after you insert the USB flash drive for five consecutive times, the user account will be locked for 10 minutes.

Table 7-2 Indicator status

Indicator	Status	Meaning
	Off	There is no operation with a USB flash drive.
	Blinking green slowly (on for 1s and then off for 1s)	There is an operation with a USB flash drive.
	Blinking green fast (on for 0.125s and 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

Export the inverter data through a USB flash drive.

Context

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

Procedure

- **Step 1** On the SUN2000 APP, click **Inverter Command Settings** to generate a boot script file. For details, see *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. Otherwise, after you insert the USB flash drive for five consecutive times, the user account will be locked for 10 minutes.

Table 7-3 Indicator status

Indicator	Status	Meaning
	Off	There is no operation with a USB flash drive.
	Blinking green slowly (on for 1s and then off for 1s)	There is an operation with a USB flash drive.
	Blinking green fast (on for 0.125s and 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

7.1.4 Upgrading

Upgrade inverter through a USB flash drive.

Context

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

Procedure

- Step 1 Log in to http://support.huawei.com/carrier/ and browse or search for SUN2000 on the **Product Support** tab page. Download the required upgrade package (for example, SUN2000 V200R001C02SPCXXX) on the **Software** tab page.
- **Step 2** Decompress the upgrade package.

After obtaining the upgrade package SUN2000V200R001C02SPCxxx_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:

- SUN2000.bin
- SUN2000_CPLD.bin
- SUN2000 Master Release.bin
- SUN2000_Slave_Release.bin
- SUN2000_Flt_Release.bin
- sun_lmt_mgr_cmd.emap

NOTE

This is a boot script file.

- config.txt
- 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 5.
- **Step 3** On the SUN2000 APP, click **Inverter Command Settings** to generate a boot script file. For details, see *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.

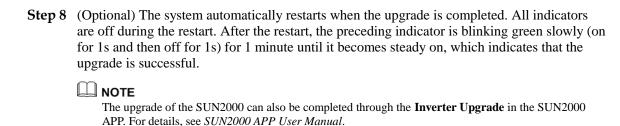


NOTICE

Verify that the ciphertext in the boot script file matches the login password of the SUN2000 APP; otherwise, after you insert the USB flash drive for five consecutive times, the user account will be locked for 10 minutes.

Table 7-4 Indicator status

Indicator	Status	Meaning
	Off	There is no operation with a USB flash drive.
	Blinking green slowly (on for 1s and then off for 1s)	There is an operation with a USB flash drive.
	Blinking green fast (on for 0.125s and 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

7.2 Operations with a SmartLogger

For operations with a SmartLogger, see SmartLogger1000 User Manual.

7.3 Operations with the NMS

For operations with the NMS, see NetEco 1000S User Manual.

7.4 Operations with the SUN2000 APP

For operations with the SUN2000 APP, see SUN2000 APP User Manual.

8 Maintenance

This chapter describes routine maintenance and troubleshooting practices that ensure optimal performance of the SUN2000.

8.1 Routine Maintenance

This section describes the maintenance routine and intervals for the SUN2000.

Table 8-1 Maintenance checklist

Check Item	Check Method	Maintenance Interval
System cleaning	 Check periodically that the heat sink is free from dust and blockage. Turn off the DC switch and then turn it on at night to clean the oxide off the switch. 	Semiannually to annually.
System running status	 Check that the SUN2000 is not damaged or deformed. Check for normal sound emitted during operation of the SUN2000. Check that all SUN2000 parameter settings are correctly set during operation. 	Semiannually.
Electrical Connections	 Check that cables are securely connected. Check that cables are intact and the parts in contact with a metallic surface are not scratched. Check that the idle RS485 and USB ports are covered by waterproof caps. 	Half a year after the initial commissioning, and semiannually to annually afterwards.
Grounding reliability	Check that PGND cables are securely connected.	Half a year after the initial commissioning, and semiannually to annually afterwards.



NOTICE

- Before wiping the heat sink clean, switch off the circuit breaker between the SUN2000 and the power grid, set the DC SWITCH to OFF, and wait at least 5 minutes after the SUN2000 is powered off.
- If **DC SWITCH** is switch to **OFF** on the DC side, it is recommended that you lock the DC switch to avoid switching it on by mistake.

8.2 Troubleshooting

This section describes the troubleshooting measures for common fault alarms in the SUN2000.

The alarm severity is defined as follows:

- Major: The SUN2000 enters the shutdown mode and stops feeding electricity to the power grid due to a fault.
- Minor: Some components are faulty but the SUN2000 can still feed electricity to the power grid.
- Warning: The SUN2000 output power decreases due to external factors.

Table 8-2 describes the common fault alarms of the SUN2000 and troubleshooting measures.

Table 8-2 Troubleshooting

Alarm ID	Alarm Name	Alarm Severit y	Causes	Measures
103	DC Over Voltage	Major	Too many PV modules connected in series lead to excessively high output voltage of PV strings, making the open circuit voltage of the PV strings greater than the maximum input voltage of the SUN2000.	Check whether a large number of PV modules connected in series makes the open circuit voltage of the PV strings greater than the maximum input voltage of the SUN2000. If yes, adjust the number of PV modules connected in series to decrease the output voltage of PV strings to meet the voltage requirements for the SUN2000. After the adjustment, ensure that the SUN2000 works properly. If no, contact Huawei technical support.
106 to 111	String 1-6 Abnormal	Warning	 PV strings have been shielded for a long time. PV strings are deteriorating. 	 Check whether the output current of a PV string is obviously less than the output current of other PV strings. If yes, check whether the PV string is shielded. If the PV string is clean and not shielded, check whether the PV modules are faulty.

Alarm ID	Alarm Name	Alarm Severit y	Causes	Measures
120 to 125	String 1-6 Reverse	Warning	The cables of PV strings are connected reversely during SUN2000 installation.	Check whether the cables of PV strings are correctly connected. If they are connected reversely, reconnect the cables.
200	DC Bus Voltage Fault	Major	Abnormal external conditions have triggered the protection for the DC circuits inside the SUN2000. The possible causes are as follows: • Reason ID = 3 The SUN2000 input is suddenly disconnected, or the PV strings shielded result in a sharp change in output power. • Reason ID = 9 or 11 The input energy of the SUN2000 cannot be vented quickly due to the sharp change of grid voltage. As a result, the internal voltage increases. • Reason ID = 10 The internal control circuit of the SUN2000 has failed to keep pace with changes due to grid phase imbalance.	 The SUN2000 monitors its external working conditions in real time and automatically recovers to the normal operating status after the fault is rectified. If the alarm occurs repeatedly, contact Huawei technical support.

Alarm ID	Alarm Name	Alarm Severit y	Causes	Measures
202	Invert Module Fault	Major	Abnormal external conditions have triggered the protection for the converter circuit inside the SUN2000. The possible causes are as follows: • Reason ID = 4 The grid voltage sharply drops or short-circuits, resulting in high output current of the SUN2000. • Reason ID = 13 The grid voltage sharply drops or short-circuits, resulting in a fault in the voltage check circuit of the SUN2000. • Reason ID = 14 The grid voltage sharply drops or short-circuits, resulting in instantaneous high output current of the SUN2000. • Reason ID = 16 The DC current of grid current exceeds the allowable range. • Reason ID = 17 The grid voltage or frequency is abnormal. • Reason ID = 20 The SUN2000 output short-circuit leads to a sharp increase in output current.	 Reason ID = 4, 13, 14, 16, or 17 The SUN2000 monitors its external working conditions in real time and automatically recovers to the normal operating status after the fault is rectified. If the alarm occurs repeatedly, contact Huawei technical support. Reason ID = 20 Check whether the SUN2000 output cables are short-circuited. Rectify any fault. If the alarm occurs repeatedly, contact Huawei technical support.

Alarm ID	Alarm Name	Alarm Severit y	Causes	Measures
301	Grid Voltage Abnormal	Major	The grid voltage is beyond the allowable range. The possible causes are as follows: Reason ID = 1 to 6 The grid A, B, or C phase voltage is less than the allowable range. Reason ID = 13 to 18 The grid A, B, or C phase voltage is higher than the allowable range. Reason ID = 26 The grid voltage is higher than the allowable range. Reason ID = 27 or 28 The grid voltage difference of the three phases is large. Reason ID = 29 The grid has a power outage, or the AC line or the AC circuit breaker is disconnected.	 Reason ID = 1 to 6 If the alarm occurs accidentally, possibly the power grid is abnormal accidentally. The SUN2000 automatically recovers to the normal operating status after the fault is rectified. If the alarm occurs repeatedly, check whether the grid voltage is within the allowable range. If no, contact the local power operator. If yes, change the grid overvoltage and undervoltage protection points on the SUN2000 APP, data collector, or NMS after obtaining approval from the local power operator. If the alarm persists for a long time, check the AC circuit breaker and output cables of the SUN2000. Reason ID = 13 to 18, or 26 Check whether the grid-tie point voltage is too high. If it is, contact your local power operator. If the grid-tie point voltage is higher than the allowable range, change the overvoltage and undervoltage protection points after obtaining approval from the local power operator. Check whether the grid voltage peak is too high. Reason ID = 27 or 28 The SUN2000 monitors its external working conditions in real time and automatically recovers to the normal operating status after the fault is rectified. If the alarm occurs repeatedly and affects the normal power generation of the power station, contact the local power operator. Reason ID = 29 Check whether the AC line or circuit breaker is disconnected.

Alarm ID	Alarm Name	Alarm Severit y	Causes	Measures
305	Frequency Abnormal	Major	The actual frequency of the grid is higher than or less than the required value for the local grid.	 If the alarm occurs accidentally, possibly the power grid is abnormal accidentally. The SUN2000 automatically recovers to the normal operating status after the fault is rectified. If the alarm occurs repeatedly, check whether the grid frequency is within the allowable range. If no, contact the local power operator. If yes, change the grid overfrequency and underfrequency protection points on the SUN2000 APP, data collector, or NMS after obtaining approval from the local power operator.
313	Low Array Insulation Resistance	Major	The insulation resistance against the ground for PV strings is less than the minimum value. The possible causes are as follows: • A short circuit exists between PV strings and protection ground. • PV strings are installed in a permanently moist environment.	 Check the insulation resistance against the ground for the PV strings. If a short circuit has occurred, rectify the fault. If the insulation resistance against the ground is less than the default value in a rainy environment, set Insulation resistance protection on the SUN2000 APP, data collector, or NMS.
318	Residual Current Abnormal	Major	The insulation resistance against the ground at the input side decreases during SUN2000 operation, which causes excessively high residual current.	 If the alarm occurs accidentally, possibly the external circuits are abnormal accidentally. The SUN2000 automatically recovers to the normal operating status after the fault is rectified. If the alarm occurs repeatedly or lasts a long time, check whether the insulation resistance against the ground of PC strings is too low.
321	Cabinet Over-Temp	Major	 The SUN2000 is installed in a place with poor ventilation. The ambient temperature is too high. The internal fan is not working. 	Check whether the ambient temperature of the SUN2000 exceeds the upper limit. If yes, improve ventilation to decrease the temperature.

Alarm ID	Alarm Name	Alarm Severit y	Causes	Measures
326	Electrical Grounding Fault	Major	 The neutral wire or PGND cable is not connected to the SUN2000. The isolation transformer is not connected to the SUN2000 at the output side if the PV strings are grounded. 	 Check that the neutral wire and PGND cable are properly connected. Check that an isolation transformer is connected to the SUN2000 at the output side if the PV strings are grounded.
400	System Fault	Major	An unrecoverable fault has occurred on a circuit inside the SUN2000.	Flip the DC SWITCH on the SUN2000 to OFF, wait 5 minutes, and flip the DC SWITCH to ON. Check whether the fault is rectified. If the fault persists, contact Huawei technical support.
411	AFCI Self-Check Failure	Major	The power distribution cables are in poor contact or the detection circuit components are faulty.	 Manually clear the alarm and wait for the SUN2000 to perform a self-check and startup. If the alarm occurs repeatedly, check whether the power distribution cables are connected properly. If the fault persists, contact Huawei technical support.
412	AFCI Abnormal	Major	PV cables are in poor contact or short-circuited, causing electric arcs.	Check whether the string cables are in an open circuit or in poor contact.
502	Internal Communica tion Fault	Minor	 The communication circuit of the SUN2000 is disturbed. The communication circuit is damaged. The internal communication address is incorrectly set. 	 If the fault is caused by a short circuit of the communication circuit inside the SUN2000, the SUN2000 automatically recovers to the normal operating status after the fault is rectified. If the fault persists for a long time, contact Huawei technical support.
504	Version Mismatch	Minor	During SUN2000 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	Firmware Upgrade Failed	Major	Upgrade is not properly completed.	Upgrade again.
61440	Flash Fault	Minor	 The flash space is insufficient. The flash drive has bad blocks or is faulty. 	 Replace the monitoring board. If the monitoring device is equipped with a monitoring board, replace the monitoring device.

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If a fault cannot be rectified by the measures listed in Table 8-2, contact Huawei technical support.

9 SUN2000 Handling

This chapter describes how to remove, pack, and dispose of the SUN2000.

9.1 Removing the SUN2000

This section describes how to remove the SUN2000.

Installed on the Wall or a Vertical Support

The sequence for removing the SUN2000 varies depending on the installation mode.

Perform the following operations to remove the SUN2000:

- 1. Power off the SUN2000. For details, see 6.2 Powering Off the SUN2000.
- 2. Disconnect all cables from the SUN2000, including RS485 communications cables, DC input power cables, AC output power cables, PGND cables, and PV side ground cables.
- 3. (Optional) Open the anti-theft lock at the bottom of the SUN2000.
- 4. Remove the SUN2000 from the rear panel.
- 5. Remove the rear panel.

Installed on a Tilted Support

Perform the following operations to remove the SUN2000:

- 1. Power off the SUN2000. For details, see 6.2 Powering Off the SUN2000.
- Disconnect all cables from the SUN2000, including RS485 communications cables, DC input power cables, AC output power cables, PGND cables, and PV side ground cables.
- 3. (Optional) Open the anti-theft lock at the bottom of the SUN2000.
- 4. (Optional) Remove the screws at the auxiliary tightening points at the bottom of the SUN2000.
- 5. Remove the SUN2000 from the support.
- 6. Remove the tilted support mounting kit.

9.2 SUN2000 Packing

This section describes how to pack the SUN2000.

- If the original packing case is available, place the SUN2000 inside the packing case and seal it with adhesive tape.
- If the original packing case is unavailable, place the SUN2000 inside a suitable hard carton and seal it properly.

9.3 SUN2000 Disposal

This section describes how to dispose of the SUN2000.

If the SUN2000 service life has expired, dispose of the SUN2000 in accordance with local rules for disposal of electrical equipment waste, or return the SUN2000 to Huawei.

10 Technical Specifications

This chapter lists the technical specifications for all SUN2000 models.

Efficiency

Technical Specifications	SUN2000-25KTL-US	SUN2000-30KTL-US
Maximum efficiency	98.6%	
CEC efficiency	98.0%	

Input

Technical Specifications	SUN2000-25KTL-US	SUN2000-30KTL-US	
Maximum DC power $(\cos \varphi = 1)$	25,800 W	30,800 W	
Maximum input voltage	1000 V		
Minimum operating voltage	250 V		
Range of input operating voltage	250 V DC to 950 V DC		
Range of MPPT input operating voltage with full power	560 V DC to 850 V DC		
Rated input voltage	730 V		
Minimum starting voltage	200 V		
Maximum input current (DC)	99 A (33 A per MPPT)		

Technical Specifications	SUN2000-25KTL-US	SUN2000-30KTL-US
Maximum input current (DC)	45 A (25 A per MPPT)	54 A (25 A per MPPT)
Maximum input source backfeed current to input source	0 A	
Maximum input string	6 (2 per MPPT)	
Number of MPPT	3	

Output

Technical Specifications		SUN2000-25KTL -US	SUN2000-30KTL-U S	
Rated power		25,000 W	30,000 W	
Maximum apparent	power	27,500 VA	33,000 VA	
Maximum AC outpu	at power ($\cos \varphi = 1$)	25,000 W	30,000 W	
Maximum continuou	is output power	25 kW (27.5 kVA)	30 kW (33 kVA)	
Output power factor	rating	> 0.99 (adj. ±0.8)		
Operating voltage ra	nge (AC) (L-L)	422 V AC to 528 V	AC	
Number of Phases		3 Ø		
Operating frequency frequency	range or single	59.3 Hz to 60.5 Hz		
Maximum output far	ult current (AC) and	185.6Apk, 76.4 ms		
duration		37.56Arms@1 cycle		
		39.68Arms@3 cycles		
Maximum output ov (AC)	ercurrent protection	48 A	50 A	
Utility interconnection frequency trip limits		See Voltage and frequency limits for utility Interaction		
Trip limit and trip	Voltage	±1% V (L-L)		
time accuracy	Frequency	±0.01 Hz		
	Time	1%, but not less than 120 ms		
Rated output voltage	Rated output voltage (AC)		480 V AC	
Rated output frequen	Rated output frequency		60 Hz	
Maximum continuous output current (AC)		33 A	40 A	

Technical Specifications	SUN2000-25KTL -US	SUN2000-30KTL-U S
Maximum total harmonic distortion	< 3%	

Protection

Technical Specifications	SUN2000-25KTL-US	SUN2000-30KTL-US	
Input DC switch	Yes		
Anti-islanding protection	Yes		
Output over current protection	Yes		
Input over current protection	Yes		
Input reverse-connection protection	Yes		
PV string fault detection	Yes		
DC surge protection	Category C		
AC surge protection	Category C		
Insulation resistance detection	Yes		
Residual current detection	Yes		
AFCI	UL 1699B		

Display and Communication

Technical Specifications	SUN2000-25KTL-US	SUN2000-30KTL-US
RS485 Yes		
USB Yes		

General Data

Technical Specifications	SUN2000-25KTL-US	SUN2000-30KTL-US
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Technical Specifications	SUN2000-25KTL-US	SUN2000-30KTL-US	
Dimensions (H x W x D)	770 mm (30.31 in.) x 550 mm (21.65 in.) x 270 mm (10.63 in.)		
Weight	55 kg (121.25 lb.)		
Operating temperature range	-25 ℃ to +60 ℃ (-13 ℉ to +140 ℉)		
Output power temperature derating and maximum full power operating ambient	See Operating power envelope as a function of ambient temperature		
Cooling	Natural convection		
Operating altitude	4000 m (13123.36 ft.)		
Relative humidity (non-condensing)	0-100%		
DC connector	Amphenol H4		
AC connector	Screw Terminal		
Protection level	Type 4X		
Protective class	Class I		
Self-consumption at night	< 1 W		
Topology	Transformerless		

Standards Compliance

Technical Specifications	SUN2000-25KTL-US	SUN2000-30KTL-US
Safety/EMC	UL 1741, UL 1699B, IEEE 1547, CSA C22.2 #107.1-01, FCC Part 15, IEEE Std C37.90.2, IEEE Std C62.41.2, IEEE Std C37.90.1	
Grid code	IEEE 1547, IEEE 1547.1	

Voltage and frequency limits for utility Interaction

6 114	Simulated utility sour	ce	Maximum time at 60 Hz before cessation of current to the simulated utility	
Condition	Voltage (V)	Frequency		
A	< 50% V	Rated (60 Hz)	0.16s	

6 114	Simulated utility sour	ce	Maximum time at 60 Hz before cessation of current to the simulated utility	
Condition	Voltage (V)	Frequency		
В	50% V ≤ V < 88% V	Rated (60 Hz)	0.16–2s	
С	110% V < V < 120% V	Rated (60 Hz)	0.16–1s	
D	120% V ≤ V	Rated (60 Hz)	0.16s	
Е	Rated	> 60.5 Hz	0.16s	
F	Rated	< 59.3 Hz	0.16s	

Operating power envelope as a function of ambient temperature

Model	MPPT Input	-25° C	45°C	53°C	60°C
SUN2000-25K TL-US	560 V DC	25 kW	25 kW	25 kW	25 kW
	850 V DC	25 kW	25 kW	24.8 kW	19.5 kW
SUN2000-30K TL-US	560 V DC	30 kW	30 kW	28.9 kW	27.8 kW
	850 V DC	30 kW	30 kW	24.8 kW	19.5 kW

A Power Grid Codes

Set the power grid code that applies to the country or region where the power station is located.

Table A-1 Power grid codes

No.	Power Grid Code	Description
1	IEEE 1547-MV480	US medium-voltage power grid

■ NOTE

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

B Acronyms and Abbreviations

A

AFCI Arc-Fault Circuit-Interrupter

C

CEC California Energy Commission

L

LCD Liquid Crystal Display

LED light emitting diode

M

MPP Maximum Power Point

MPPT Maximum Power Point Tracking

P

PV Photovoltaic

PGND Protection ground

PDF Power distribution frame