

SUN2000-(36KTL,42KTL)

User Manual

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About This Document

Purpose






This document describes the SUN2000-36KTL/42KTL (SUN2000 for short) in terms of its installation, electrical connections, commissioning, maintenance, and troubleshooting. Understand the safety information and get familiar with the SUN2000 functions and features before installing and operating the SUN2000.

Intended Audience

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

Symbol Conventions

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

Symbol	Description
 DANGER	Indicates an imminently hazardous situation which, if not avoided, will result in serious injury or death.
 WARNING	Indicates a potentially hazardous situation which, if not avoided, could result in serious injury or death.
 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 tips. NOTE is used to address information not related to personal injury, equipment damage, and environment deterioration.

Change History

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

Issue 01 (2016-07-30)

This issue is the first official release.

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1 Safety Precautions

Personnel Requirements

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



NOTICE

Read this document thoroughly before operations. Huawei shall not be liable for any consequence caused by violation of the storage, transportation, installation, and operation regulations specified in this document.

Sign Protection

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

Installation

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

- Open the maintenance compartment door of the chassis before connecting cables. Do not perform any operation on other components inside the chassis except connecting AC power cables and communications cables.

Cable Connections



DANGER

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

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

Operation



DANGER

High voltages may cause electric shocks and serious injuries during inverter operating. Strictly comply with the safety precautions in this document and associated documents when operating the inverter.

- Do not touch an operating inverter because the heat sinks may have a temperature of greater than 60 °C and may cause burns when the inverter is operating.
- Follow local laws and regulations when operating the equipment.

Maintenance and Replacement



DANGER

High voltages may cause electric shocks and serious injuries during inverter operating. Therefore, before maintenance, power off the inverter and strictly comply with the safety precautions in this document and associated documents to operate the inverter.

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

- Observe ESD precautions during the maintenance.
- For personal safety, wear insulation gloves and protective shoes.

2 Overview

2.1 Introduction

Function

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

Model

Figure 2-1 shows a model number of the SUN2000, using SUN2000-36KTL as an example.

Figure 2-1 Model number description

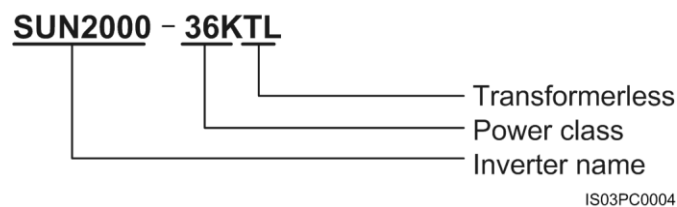


Table 2-1 shows the rated output power.

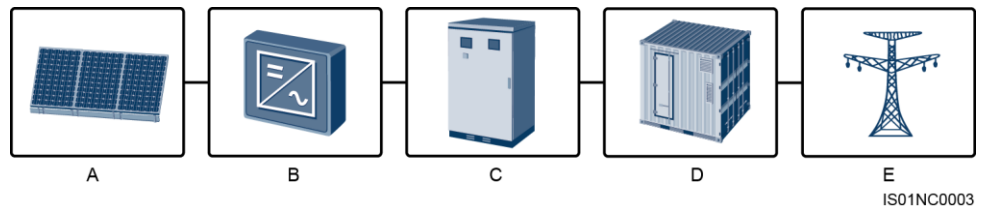
Table 2-1 SUN2000 models and corresponding rated output power and voltage

Model	Rated Output Power
SUN2000-36KTL	36 kW
SUN2000-42KTL	42 kW

Network Application

The 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

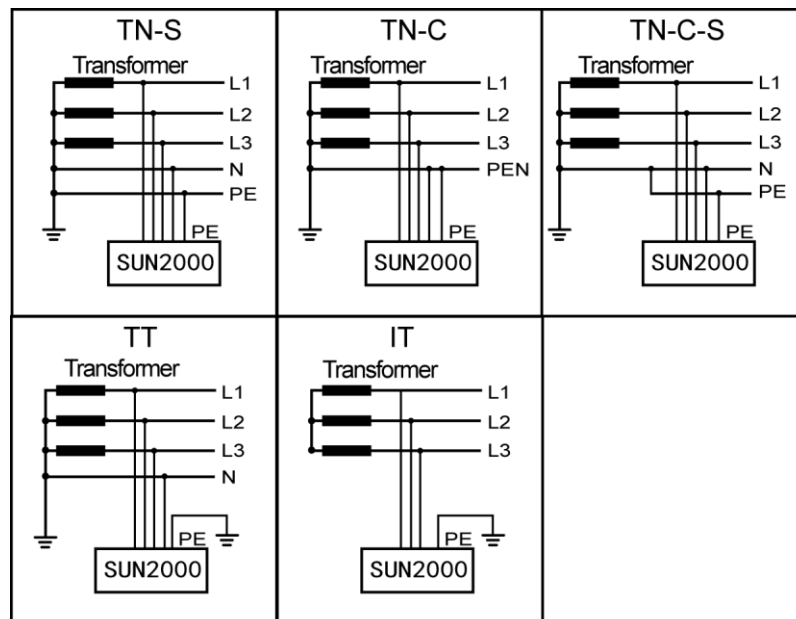


- (A) PV string
- (B) SUN2000
- (C) ACDCU
- (D) Isolation transformer
- (E) Power grid

Supported Power Grids

The SUN2000-36KTL supports the following power grid modes: TN-S, TN-C, TN-C-S, TT, and IT. The SUN2000-42KTL supports only IT grid mode.

Figure 2-3 Power grid modes



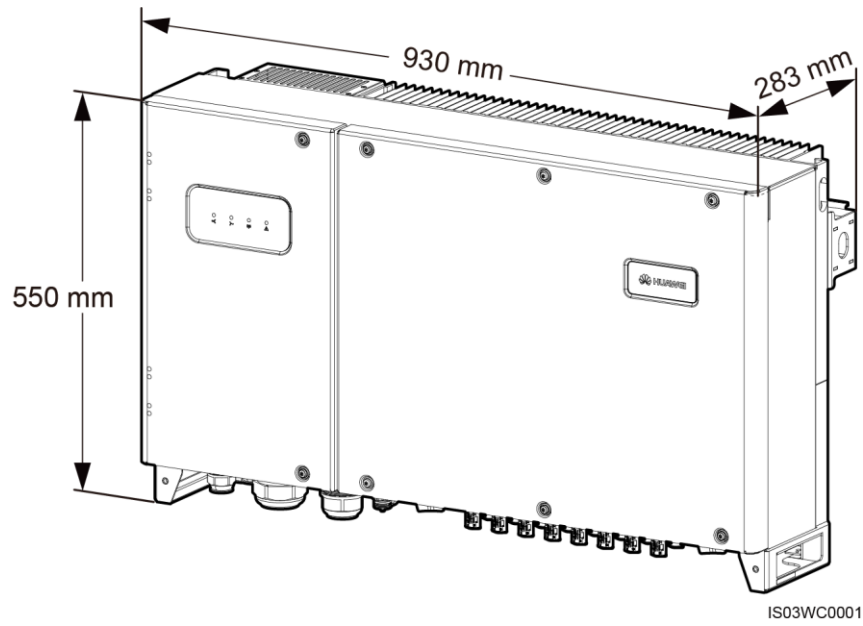
IS01S10001

2.2 Appearance

SUN2000 Dimensions

Figure 2-4 shows the SUN2000 dimensions.

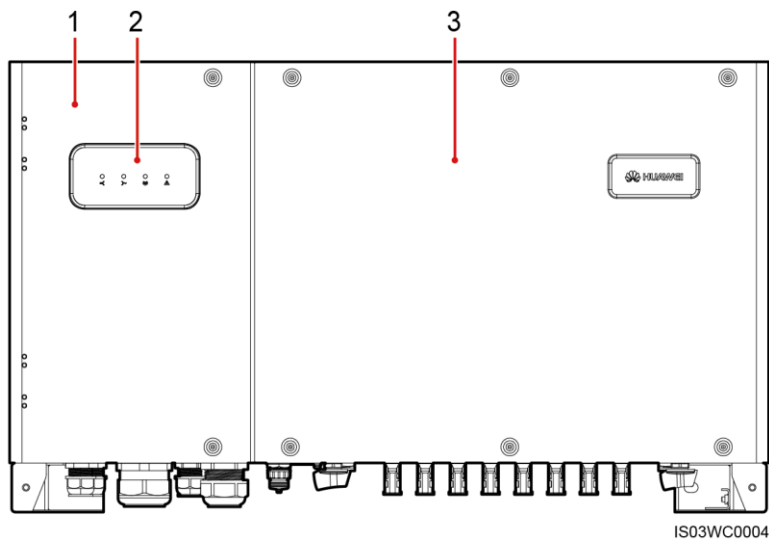
Figure 2-4 SUN2000 dimensions (including the mounting bracket)



Front View

Figure 2-5 shows the SUN2000 front view.

Figure 2-5 SUN2000 front view







(1) Maintenance compartment door

(2) LED indicator

(3) Host panel

Table 2-2 describes the LED indicators.

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

Indicator	Status	Meaning	
PV connection indicator 	Green on	At least one PV string is properly connected, and the DC input voltage of the corresponding MPPT circuit is higher than or equal to 200 V.	
	Green off	The inverter disconnects from all PV strings, or the DC input voltage of each MPPT circuit is less than 200 V.	
Grid-tied indicator 	Green on	The SUN2000 connects to the power grid.	
	Green off	The SUN2000 does not connect to the power grid.	
Communications indicator 	Blinking green at short intervals (on for 0.5s and then off for 0.5s)	The inverter receives data over RS485/PLC/FE communication.	
	Green off	The inverter has not received data over RS485/PLC/FE communication for 10 seconds.	
Alarm/Maintenance indicator 	Alarm status	Blinking red at long intervals (on for 1s and then off for 4s)	A warning alarm is generated.
		Blinking red at short intervals (on for 0.5s and then off for 0.5s)	A minor alarm is generated.
		Steady red	A critical alarm is generated.
	Local maintenance status	Blinking green at long intervals (on for 1s and then off for 1s)	Local maintenance is in progress.
		Blinking green at short intervals (on for 0.125s and then off for 0.125s)	Local maintenance fails.
		Steady green	Local maintenance succeeds.

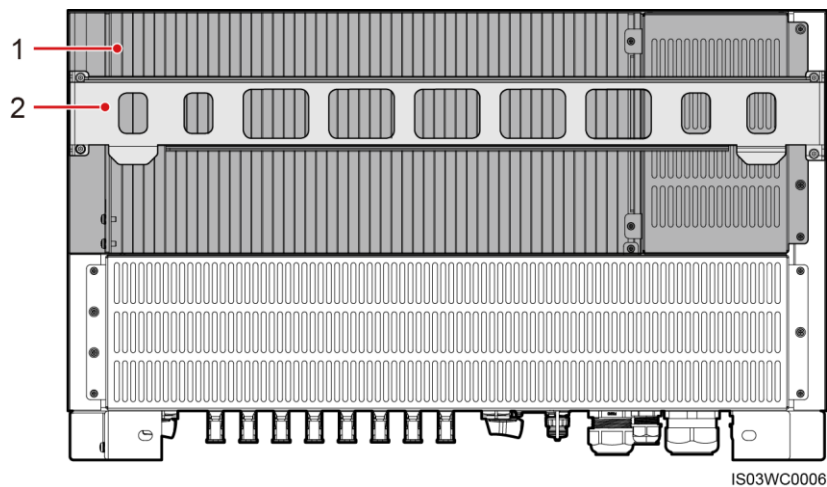
 **NOTE**

- Local maintenance refers to operations performed after a universal serial bus (USB) flash drive, Bluetooth module, or USB data cable is inserted into the USB port of the SUN2000. For example, local maintenance includes data import and export using a USB flash drive and connecting to the SUN2000 APP over a Bluetooth module or USB data cable.
- If alarming and local maintenance happen concurrently, the alarm/maintenance indicator shows the local maintenance state first. After the USB flash drive, Bluetooth module, or USB data cable is removed, the indicator shows the alarm state.

SUN2000 Rear View

Figure 2-6 shows the SUN2000 rear view.

Figure 2-6 SUN2000 rear view



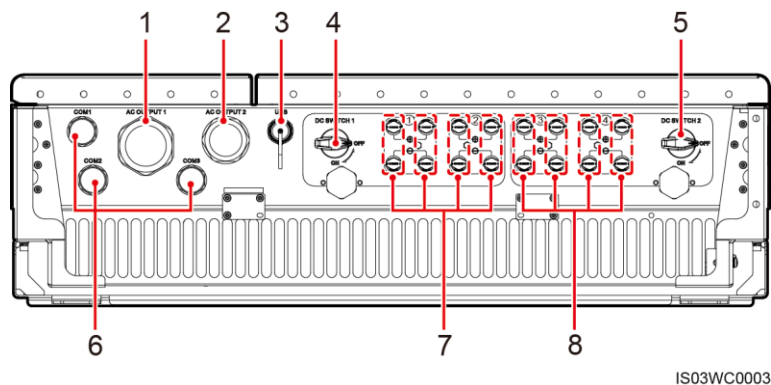
(1) Heat sink

(2) Mounting bracket

SUN2000 Bottom View

Figure 2-7 shows the SUN2000 bottom view.

Figure 2-7 SUN2000 bottom view



No.	Component	Silk Screen
1	Waterproof cable connector (inner diameter: 37–44 mm)	AC OUTPUT 1
2	Waterproof cable connector (inner diameter: 24–32 mm)	AC OUTPUT 2
3	USB port	USB
4	DC switch 1	DC SWITCH 1
5	DC switch 2	DC SWITCH 2
6	Waterproof cable connector (inner diameter: 14–18 mm)	COM1, COM2, COM3
7	DC input terminal (controlled by DC SWITCH 1)	+/-
8	DC input terminal (controlled by DC SWITCH 2)	+/-



NOTE



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




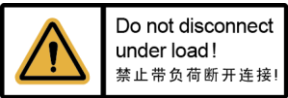



2.3 Label Description

Symbols

Table 2-3 describes the labels on the SUN2000 enclosure and their meanings.

Table 2-3 Label description

Symbol	Name	Meaning
	Running warning	Potential hazards exist after the SUN2000 is powered on. Take protective measures when operating the SUN2000.
	Burn warning	Do not touch a running SUN2000 because it generates high temperatures on the shell.

Symbol	Name	Meaning
	Delay discharge	<ul style="list-style-type: none"> High voltage exists after the SUN2000 is powered on. Only qualified and trained electrical technicians are allowed to perform operations on the SUN2000. Residual voltage exists after the SUN2000 is powered off. It takes 5 minutes for the SUN2000 to discharge to the safe voltage.
	Refer to documentation	Remind operators to refer to the documents shipped with the SUN2000.
	Grounding	Indicates the position for connecting the protection ground cable.
	Operation warning	Do not remove the DC input connector when the SUN2000 is running.
	DC terminal operation warning ^a	<p>High voltage exists after the SUN2000 is powered on. To avoid electric shocks, perform the following system power-off operations before plugging or unplugging DC input connectors of the SUN2000:</p> <ol style="list-style-type: none"> 1. Send a shutdown command. 2. Turn off the downstream AC switch. 3. Turn off the two DC switches at the bottom.
	Warranty label	Never open the host panel of the SUN2000.
	SUN2000 serial number label	Indicates the SUN2000 serial number.


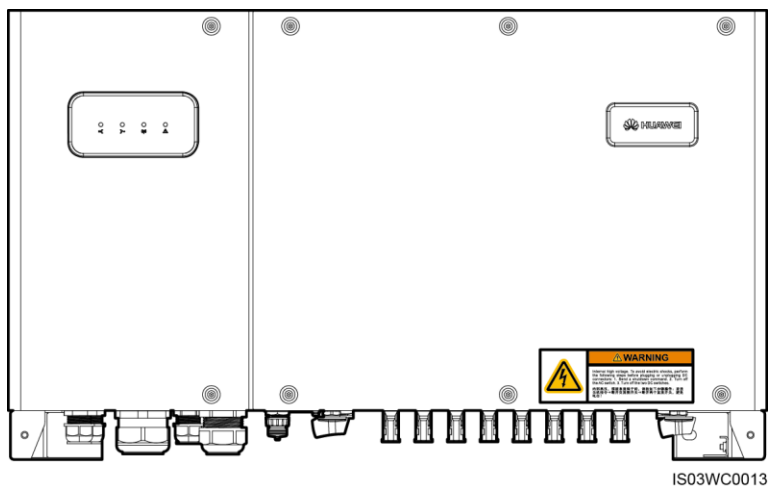
Symbol	Name	Meaning
	Weight label	The SUN2000 is heavy and needs to be carried by multiple persons.
<p>Note a: Fittings delivered with the SUN2000 contain the label of DC terminal operation warning. You are advised to attach the label at the bottom of the SUN2000 front side, as shown in Figure 2-8. You can also select an appropriate place for attaching the label based on site requirements.</p>		

Figure 2-8 Place for attaching



Nameplate

The SUN2000 is labeled with a nameplate on the side that contains the model information, technical specifications, and compliance symbols, as shown in [Figure 2-9](#).





Figure 2-9 Nameplate of the SUN2000-42KTL





- (1) Trademark and product model
- (2) Important technical specifications
- (3) Compliance symbols
- (4) Company name and country of manufacture

Table 2-4 describes the compliance symbols.

Table 2-4 Compliance symbols

Symbol	Name	Meaning
	CQC certification mark	The SUN2000 has been awarded the NB/T 32004 certification by China Quality Certification Center (CQC).
	RCM certification mark	The SUN2000 complies with RCM certification standards.
	TÜVRheinland certification mark	The SUN2000 complies with TÜVRheinland certification standards.
	CE certification mark	The SUN2000 complies with Conformité Européenne (CE)

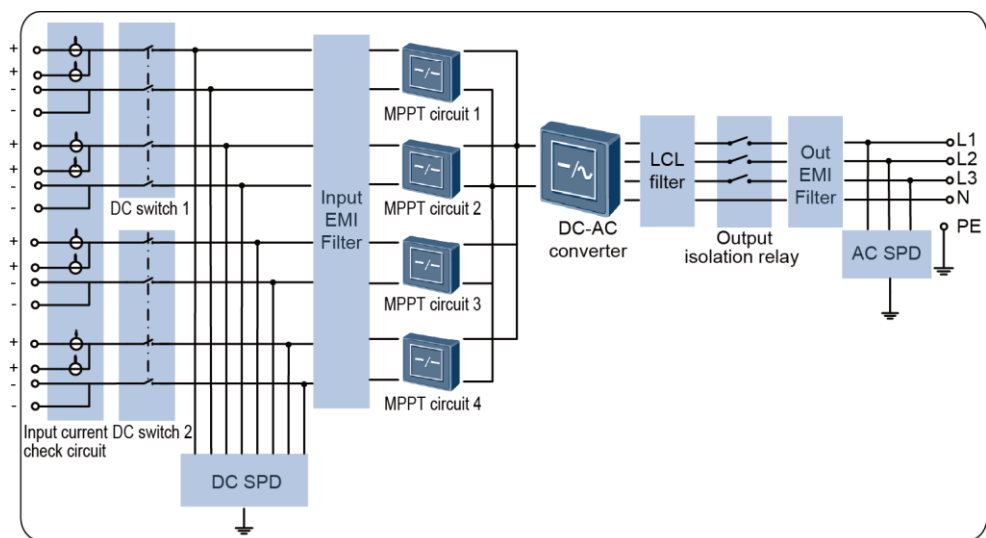
Symbol	Name	Meaning
		certification standards.
	Environmentally friendly use period (EFUP) label	The SUN2000 does not pollute the environment during the specified period.
	EU waste electrical and electronic equipment (WEEE) label	Do not dispose of the SUN2000 as household garbage.

2.4 Working Principle

Conceptual Diagram

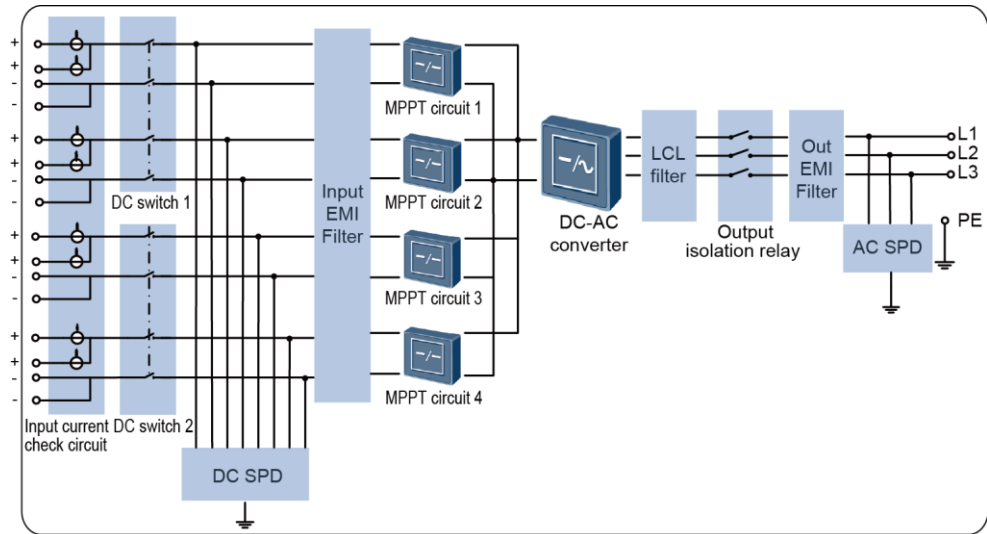
The SUN2000 receives inputs from eight PV strings. Then the inputs are grouped into four MPPT routes inside the SUN2000 to track the maximum power point of the PV strings. The DC power is then converted into three-phase AC power through an inverter circuit. Surge protection is supported on both the DC and AC sides. [Figure 2-10](#) shows the conceptual diagram for the SUN2000-36KTL. [Figure 2-11](#) shows the conceptual diagram for the SUN2000-42KTL.

Figure 2-10 Conceptual diagram for the SUN2000-36KTL



IS03PC0005

Figure 2-11 Conceptual diagram for the SUN2000-42KTL

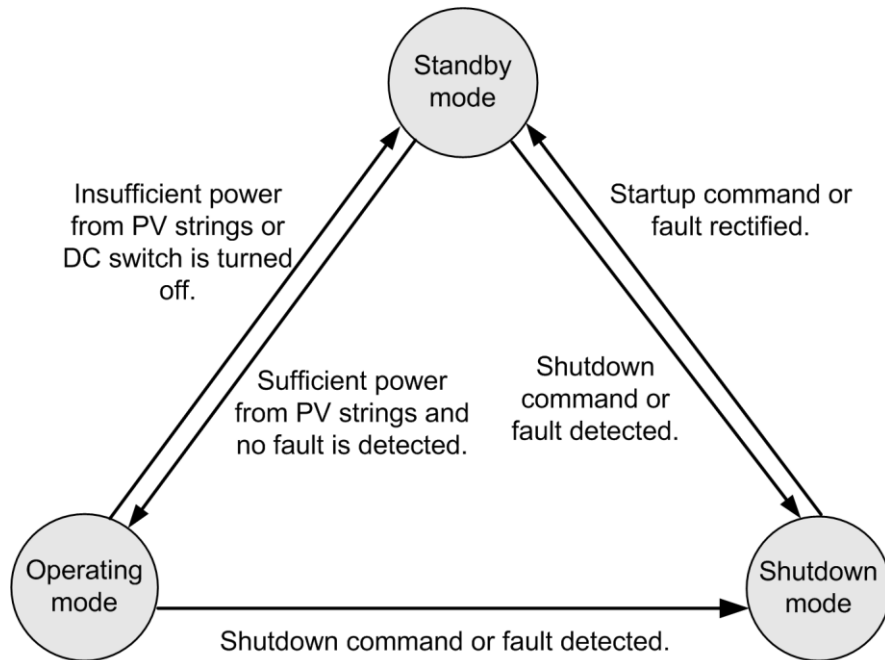


IS03PC0002

Working Modes

The SUN2000 can work in standby, operating, or shutdown mode. Figure 2-12 shows the relationship between the three working modes.

Figure 2-12 SUN2000 working modes



IS01SC0007

Table 2-5 describes the three working modes shown in Figure 2-12.

Table 2-5 Working mode description

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

3 Inverter Storage

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

- Do not unpack the inverter.
- Keep the storage temperature at $-40\text{ }^{\circ}\text{C}$ to $+70\text{ }^{\circ}\text{C}$ and the humidity at 5%–100% RH.
- The inverter should be stored in a clean and dry place and be protected from dust and water vapor corrosion.
- A maximum of five inverters can be stacked.
- Periodic inspections are required during the storage. If any rodent bites are found, replace the packing materials immediately.
- If the inverter has been long-term stored, inspections and tests should be conducted by qualified personnel before it is put into use.

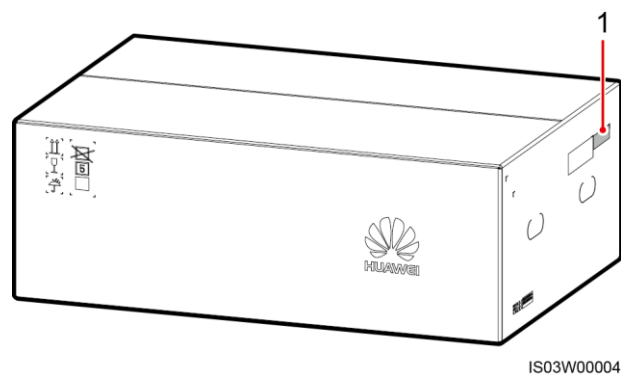
4 System Installation

4.1 Checking Before Installation

Outer Packing Materials

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

Figure 4-1 Position of the inverter model label



(1) Position of the model label



NOTE

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

Deliverables

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

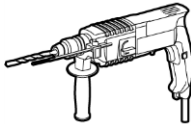

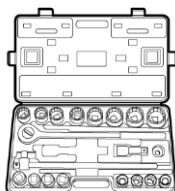
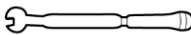
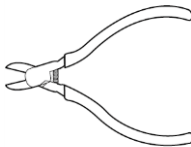
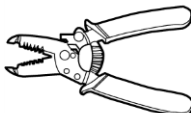




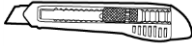

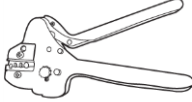
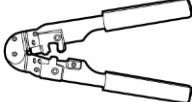
NOTE

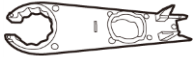



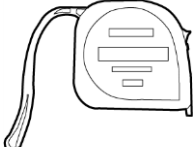

For details about the number of deliverables, see the *Packing List* in the packing case.




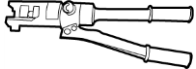
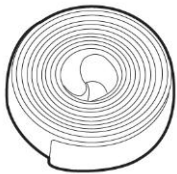
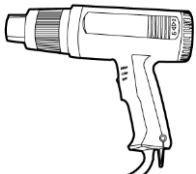
4.2 Tools


Prepare tools required for installation and cable connections.

Tool	Model	Function
 <p>Hammer drill</p>	<p>Drill bit: Φ14 mm and Φ16 mm</p>	<ul style="list-style-type: none"> • Drill bit: Φ14 mm, used for drilling holes in the support. • Drill bit: Φ16 mm, used for drilling holes in the wall.
 <p>Adjustable wrench</p>	<ul style="list-style-type: none"> • With a length of 200 mm • With an open end of 24 mm 	<p>Secures bolts.</p>
 <p>Socket wrench</p>	<p>N/A</p>	<p>Secures bolts and AC output terminals.</p>
 <p>Torque wrench</p>	<p>With an open end of 16 mm, 18 mm, 33 mm, or 52 mm</p>	<p>Secures bolts and locking caps.</p>
 <p>Diagonal pliers</p>	<p>N/A</p>	<p>Cut cable ties.</p>
 <p>Wire stripper</p>	<p>N/A</p>	<p>Peels cable jackets.</p>

Tool	Model	Function
Flat-head screwdriver 	Blade: 0.6 mm x 3.5 mm	Connects cables to a terminal base.
Rubber mallet 	N/A	Hammers expansion bolts into holes.
Utility knife 	N/A	Removes packages.
Cable cutter 	N/A	Cuts power cables.
Crimping tool 	H4TC0001 Manufacturer: AMPHENOL	Crimps metal terminals when preparing DC input power cables.
RJ45 crimping tool 	N/A	Prepares RJ45 connectors for communications cables.

Tool	Model	Function
Removal tool 	H4TW0001 Manufacturer: AMPHENOL	Removes DC connectors from the SUN2000.
Vacuum cleaner 	N/A	Cleans up dust after drilling holes.
Multimeter 	N/A	Measures voltages.
Marker 	Diameter: ≤ 10 mm	Marks signs.
Measuring tape 	N/A	Measures distances.
Level 	N/A	Levels hole positions.

Tool	Model	Function
Protective gloves 	N/A	Protect your hands during installation.
Safety goggles 	N/A	Protect your eyes during hole drilling.
Anti-dust respirator 	N/A	Protects you from dust during hole drilling.
Hydraulic pliers 	N/A	Crimp OT terminals.
Heat shrink tubing 	N/A	Wraps the cable crimping area of an OT terminal.
Heat gun 	N/A	Heat-shrinks a tube.

Tool	Model	Function
Cable tie 	N/A	Binds cables.

4.3 Wall-mounting the SUN2000

4.3.1 Determining the Installation Position

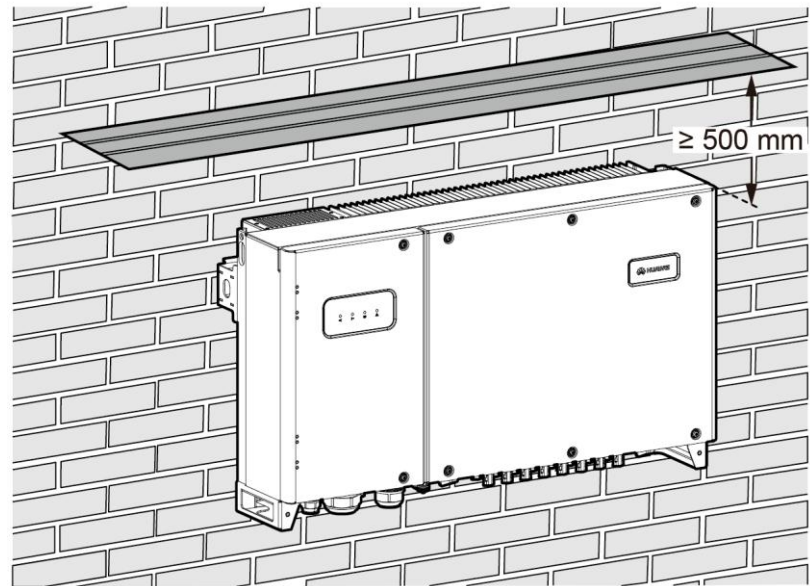
Basic Requirements

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

Installation Environment Requirements

- The ambient temperature is recommended to be below 50 °C to ensure optimal SUN2000 operating status.
- 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. You can determine whether to build an awning based on the actual installation environment. See [Figure 4-2](#).

Figure 4-2 Awning



IS03HC0010

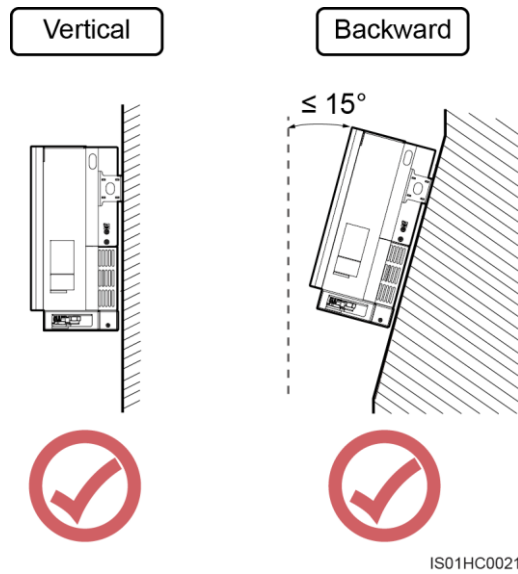
Carrier Requirements

- The carrier where the SUN2000 is installed must be fireproof.
- Do not install the SUN2000 on flammable building materials.
- The SUN2000 weighs 55 kg. Ensure that installation surface is solid enough to bear the SUN2000.
- In residential areas, do not install the SUN2000 on gypsum boards or walls made of similar materials which have weak sound insulation performance because the noises generated by the SUN2000 disturb residents.

Installation Angle Requirements

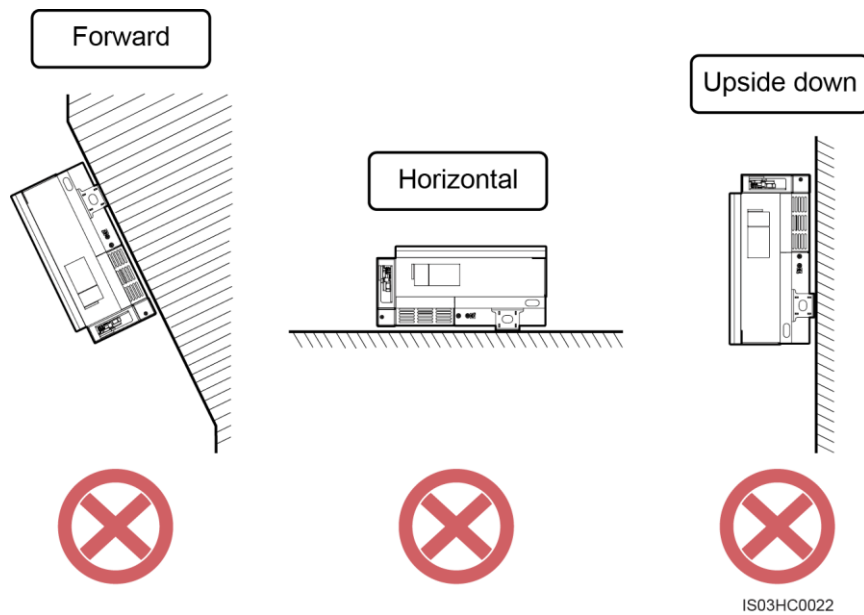
- Install the SUN2000 vertically or at a maximum back tilt of 15 degrees to facilitate heat dissipation.

Figure 4-3 Correct installation angles



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

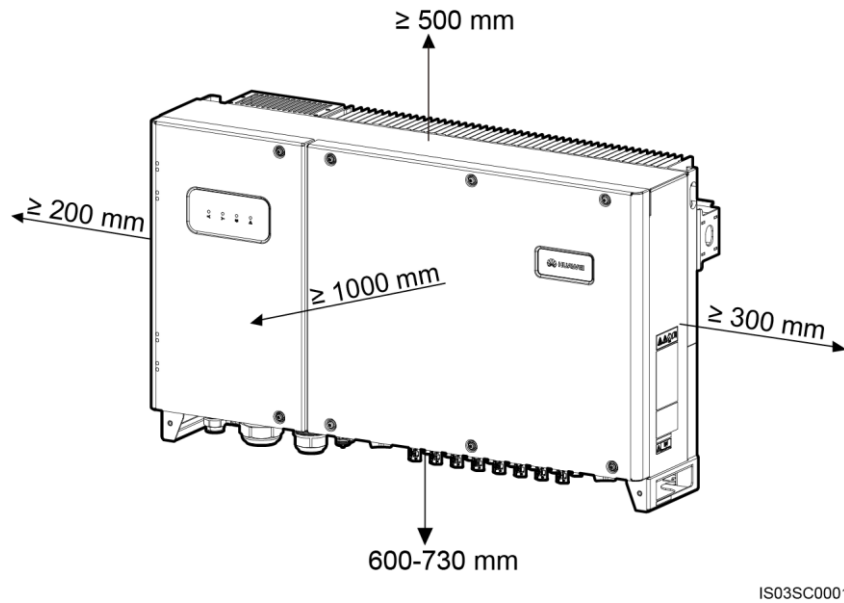
Figure 4-4 Incorrect installation angles



Installation Space Requirements

- The SUN2000 dimensions (W x H x D, including the mounting bracket) are 930 mm x 550 mm x 283 mm. Reserve enough clearance around the SUN2000 to ensure sufficient space for installation and heat dissipation, as shown in [Figure 4-5](#).

Figure 4-5 Installation space



NOTE

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

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

Figure 4-6 Horizontal installation mode (recommended)

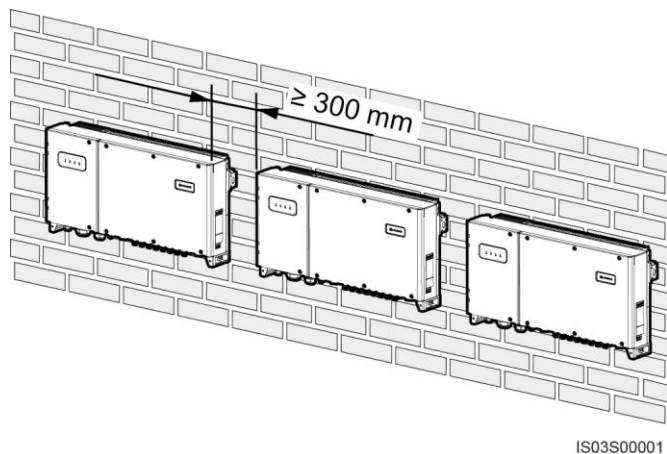


Figure 4-7 Triangle installation mode (recommended)

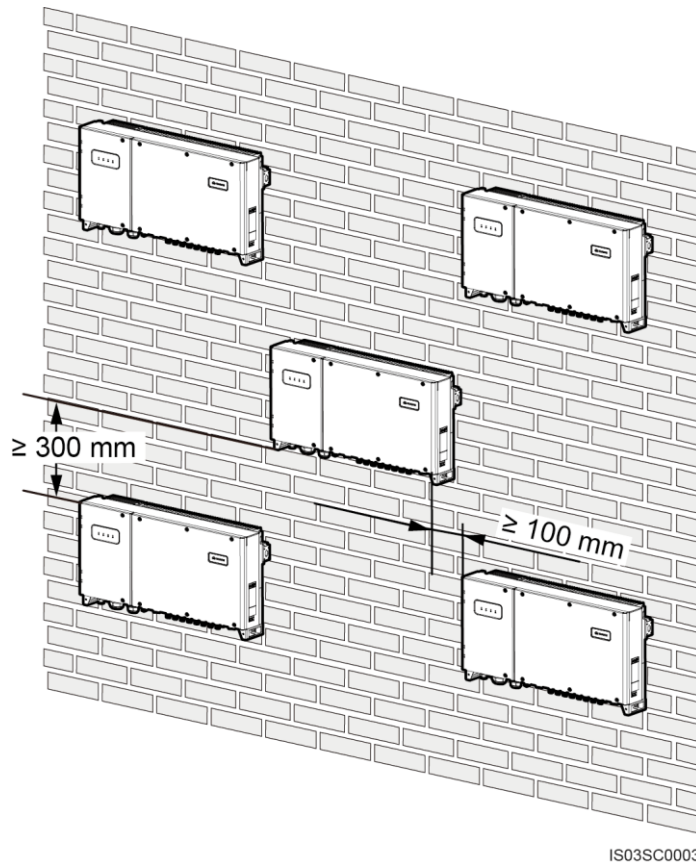
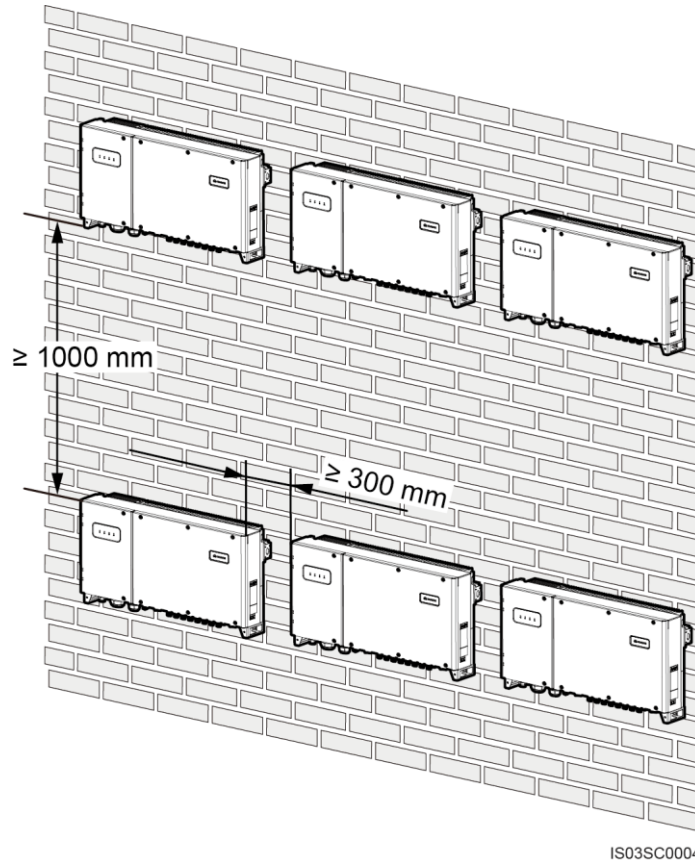


Figure 4-8 Stacked installation mode (not recommended)



4.3.2 Moving the Inverter

Context



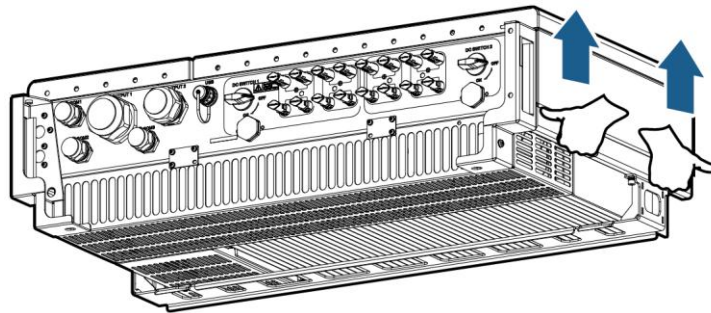
CAUTION

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

Procedure

- Step 1** Arrange two persons to hold the handles on both sides of the SUN2000.

Figure 4-9 Moving the SUN2000



IS03HC0013

Step 2 Lift the SUN2000 from the packing case and move it to the installation position.

----End

4.3.3 Installing the Mounting Bracket

Prerequisites



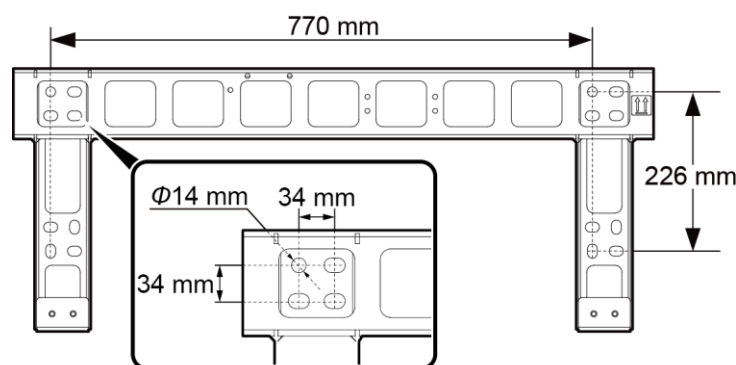
NOTE

- When installing the SUN2000-36KTL, you can use the expansion bolts delivered with the SUN2000 to install the mounting bracket.
- When installing the SUN2000-42KTL, you need to prepare the expansion bolts. M12x60 stainless expansion bolts are recommended.

Context

[Figure 4-10](#) shows the SUN2000 mounting bracket dimensions.

Figure 4-10 Mounting bracket dimensions



IS03W00006



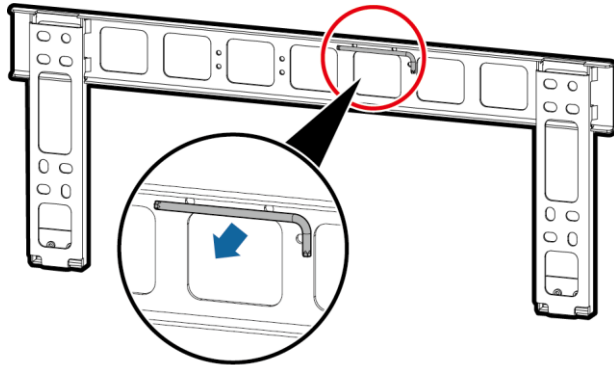
NOTE

The SUN2000 mounting bracket has 16 tapped holes in four groups. Mark any hole in each group based on site requirements and mark four holes in total. Two round holes are preferred.

Procedure

Step 1 Remove the security torx wrench from the mounting bracket and set it aside.

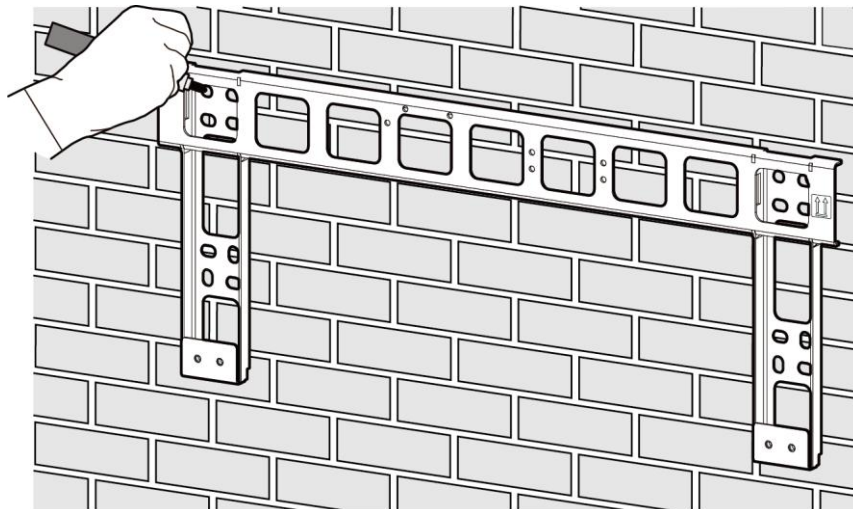
Figure 4-11 Removing a security torx wrench



IS03H00013

Step 2 Determine the positions for drilling holes using the mounting bracket available in the packing case, as shown in [Figure 4-12](#). Level the hole positions using a level, and mark the hole positions using a marker.

Figure 4-12 Determining hole positions

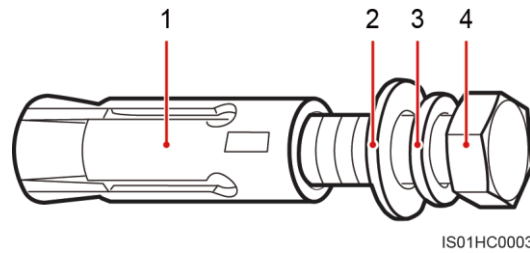


IS03SC0002

Step 3 Drill holes using a hammer drill and install expansion bolts.

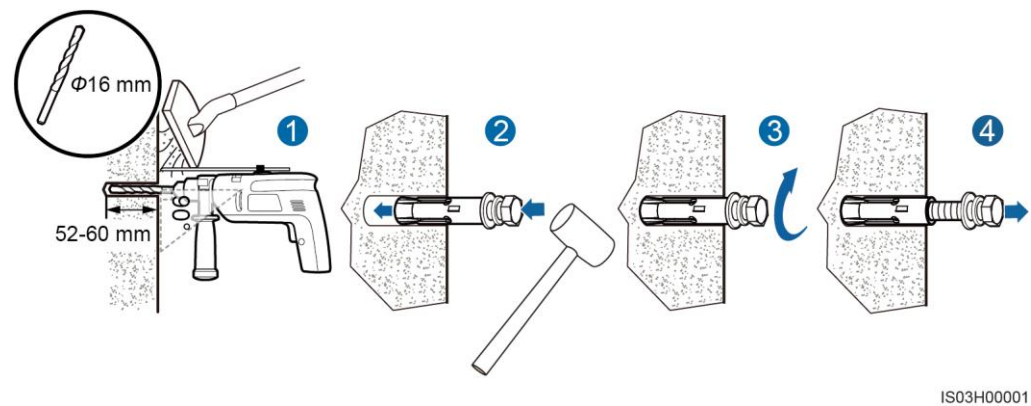
An expansion bolt contains four parts, as shown in [Figure 4-13](#).

Figure 4-13 Expansion bolt composition



- (1) Expansion sleeve (2) Flat washer (3) Spring washer (4) Bolt

Figure 4-14 Drilling a hole and installing an expansion bolt



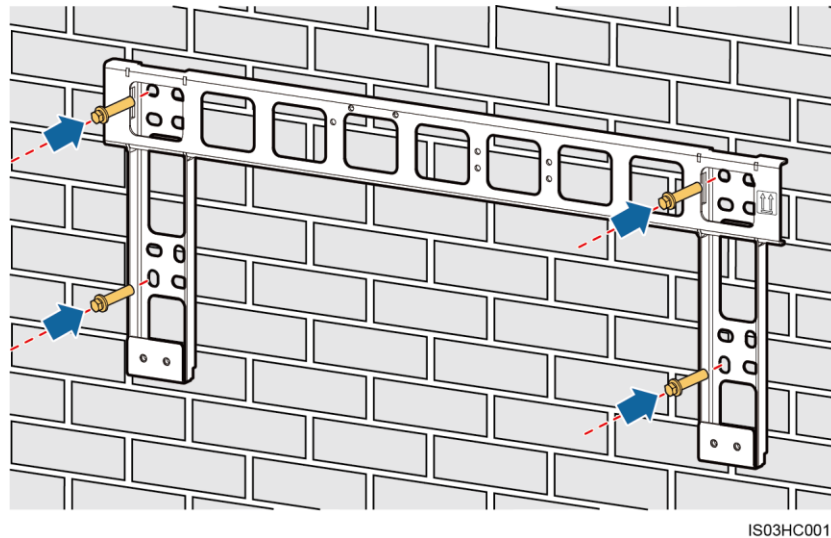
NOTICE

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

1. Put a hammer drill with a $\Phi 16$ mm drill bit on a marked hole position perpendicularly against the wall and drill holes to a depth of 52–60 mm.
2. Vertically insert an expansion bolt into a hole, and knock the expansion bolt completely into the hole by using a rubber mallet.
3. Partially tighten the expansion bolt.
4. Remove the bolt, spring washer, and flat washer by rotating them counterclockwise.

Step 4 Align the mounting bracket with the holes, insert expansion bolts into the holes through the mounting bracket, and tighten the expansion bolts to a torque of 45 N·m using an 18 mm socket wrench.

Figure 4-15 Securing a mounting bracket



----End

4.3.4 Installing the SUN2000

Procedure

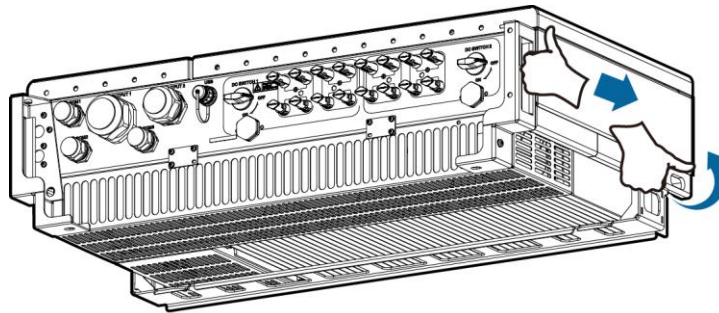
- Step 1** If the installation position is low and you can mount the SUN2000 onto the mounting bracket, go to [Step 3](#) and then [Step 5](#).
- Step 2** If the installation position is high and you cannot mount the SUN2000 onto the mounting bracket, perform [Step 3](#) to [Step 6](#).
- Step 3** Ensure that two people lift the SUN2000 and turn it upright. Lift the SUN2000 by grasping the handle at the bottom of the SUN2000 with one hand and the handle at the top with the other.



CAUTION

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

Figure 4-16 Lifting a SUN2000



IS03HC0014

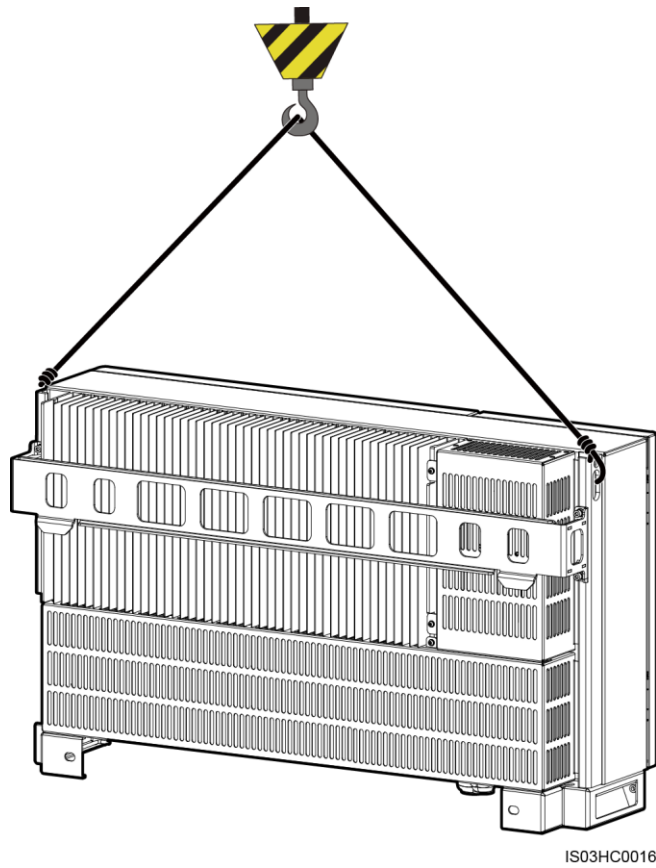
- Step 4** Run a rope that is strong enough to bear the SUN2000 through the lifting eyes and hoist the SUN2000.



NOTICE

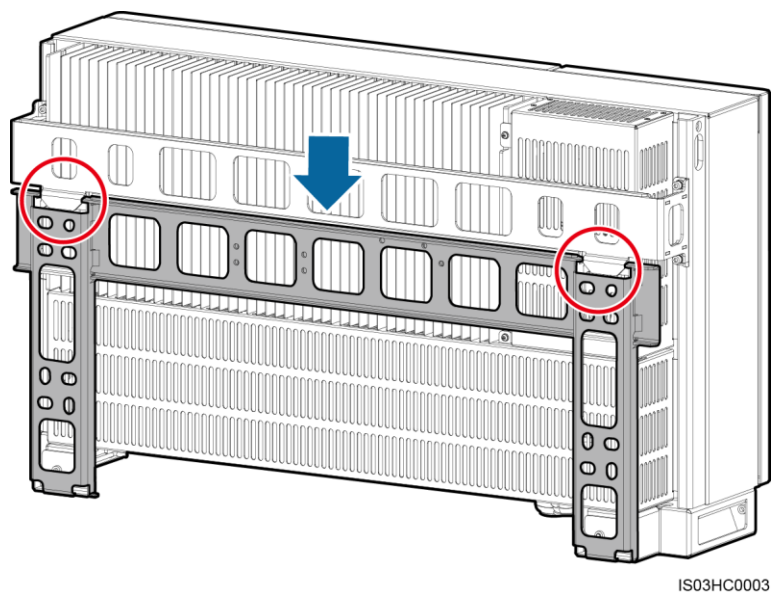
When hoisting the SUN2000, keep balance to protect the SUN2000 from colliding with the wall or other objects.

Figure 4-17 Hoisting a SUN2000



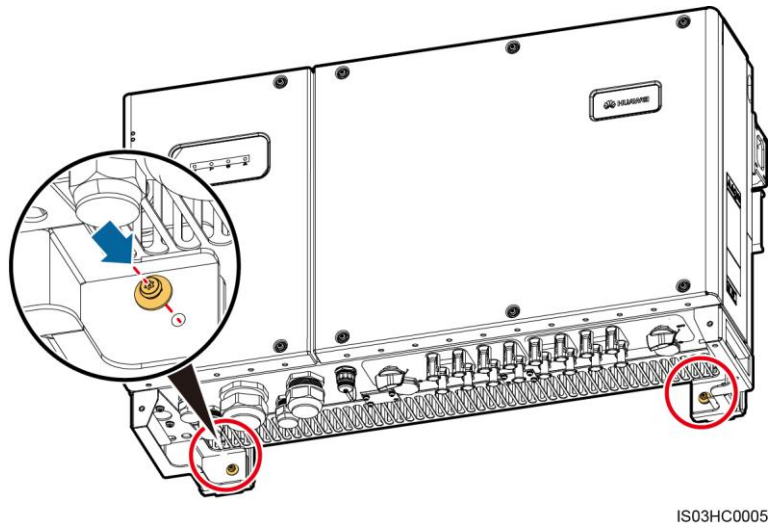
Step 5 Install the SUN2000 on the mounting bracket and level the SUN2000 chassis with the mounting bracket.

Figure 4-18 Mounting the SUN2000 onto the mounting bracket



Step 6 Tighten the two security torx screws using a security torx wrench to a torque of 5 N·m.

Figure 4-19 Tightening security torx screws



----End

4.4 Support-mounting the SUN2000

4.4.1 Determining the Installation Position

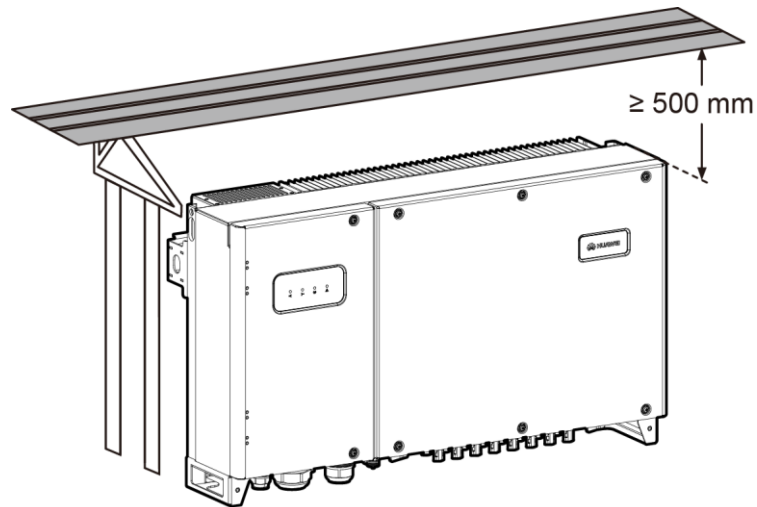
Basic Requirements

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

Installation Environment Requirements

- The ambient temperature is recommended to be below 50 °C to ensure optimal inverter operating status.
- The inverter must be installed in a well ventilated environment to ensure good heat dissipation.
- The inverter must be free from direct exposure to sunlight, rain, and snow to extend its service life. You can determine whether to build an awning based on the actual installation environment. See [Figure 4-20](#).

Figure 4-20 Awning



IS03HC0020

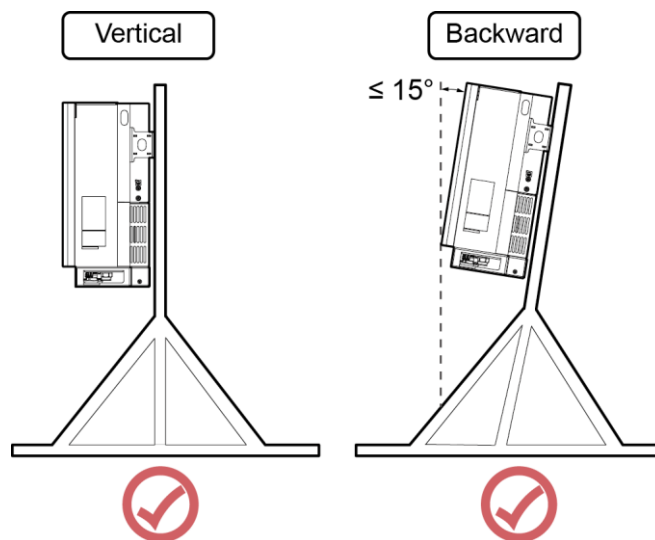
Carrier Requirements

- The carrier where the inverter is installed must be fire-proof.
- Do not install the inverter on flammable building materials.
- The inverter weighs 55 kg. Ensure that installation surface is solid enough to bear the inverter.

Installation Angle Requirements

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

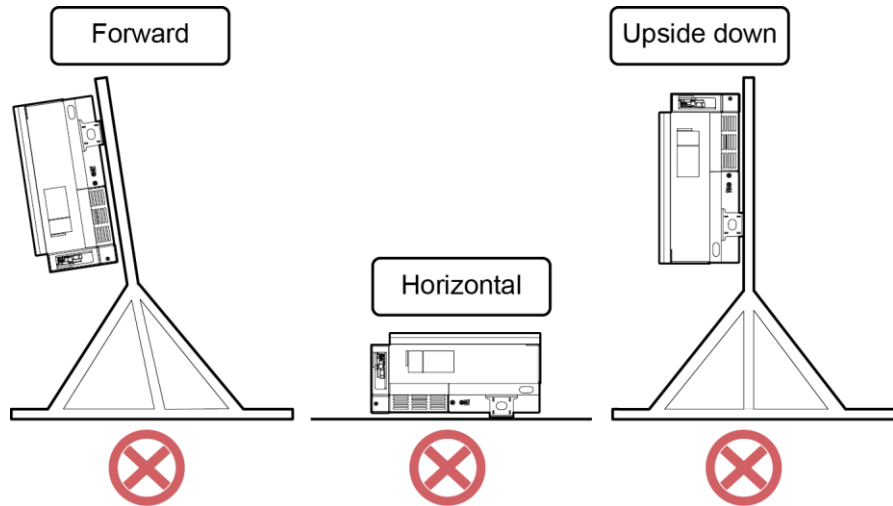
Figure 4-21 Correct installation angles



IS03HC0011

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

Figure 4-22 Incorrect installation angles

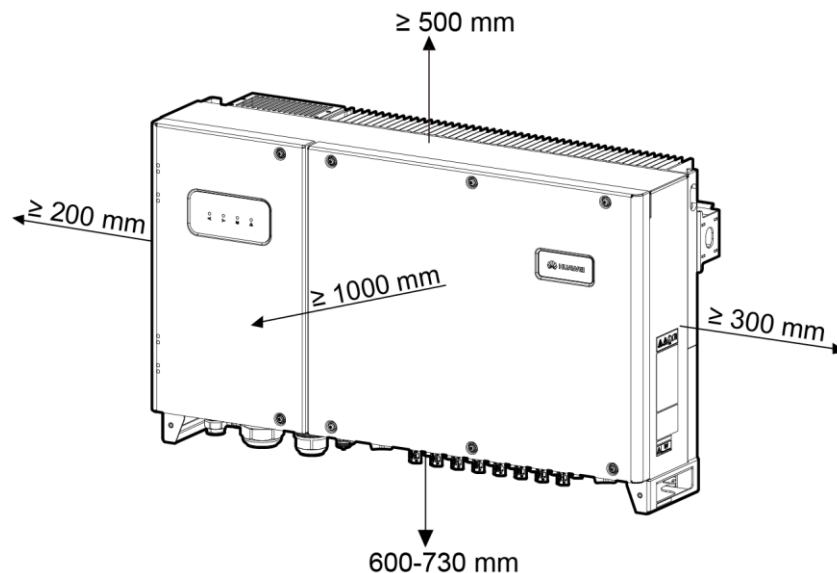


IS03HC0012

Installation Space Requirements

The SUN2000 dimensions (W x H x D, including the mounting bracket) are 930 mm x 550 mm x 283 mm. Reserve enough clearance around the SUN2000 to ensure sufficient space for installation and heat dissipation, as shown in [Figure 4-23](#).

Figure 4-23 Installation space



IS03SC0001



NOTE

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

4.4.2 Moving the Inverter

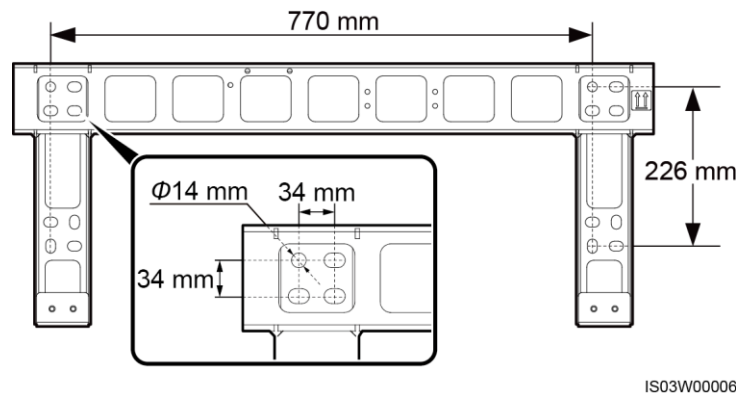
For details, see [4.3.2 Moving the Inverter](#).

4.4.3 Installing the Mounting Bracket

Context

Figure 4-24 shows the SUN2000 mounting bracket dimensions.

Figure 4-24 Mounting bracket dimensions



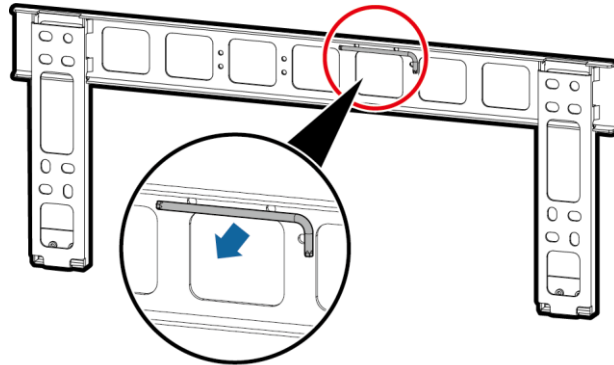
NOTE

The SUN2000 mounting bracket has 16 tapped holes in four groups. Mark any hole in each group based on site requirements and mark four holes in total. Two round holes are preferred.

Procedure

Step 1 Remove the security torx wrench from the mounting bracket and set it aside.

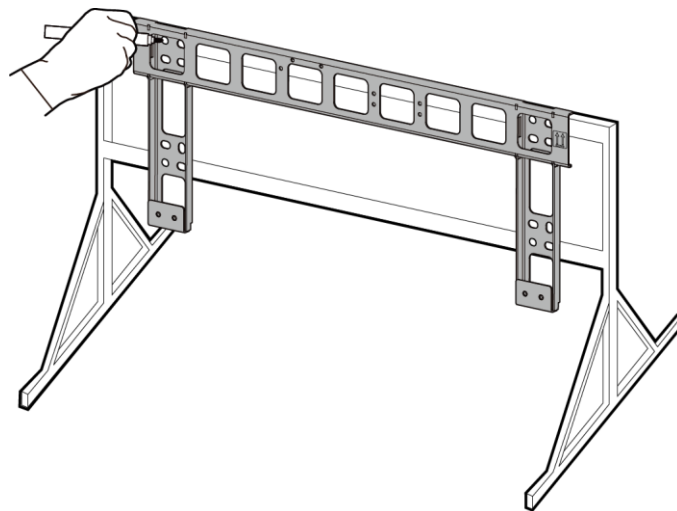
Figure 4-25 Removing a security torx wrench



IS03H00013

Step 2 Determine the positions for drilling holes using the mounting bracket. Level the hole positions using a level, and mark the hole positions using a marker.

Figure 4-26 Determining hole positions



IS03HC0006

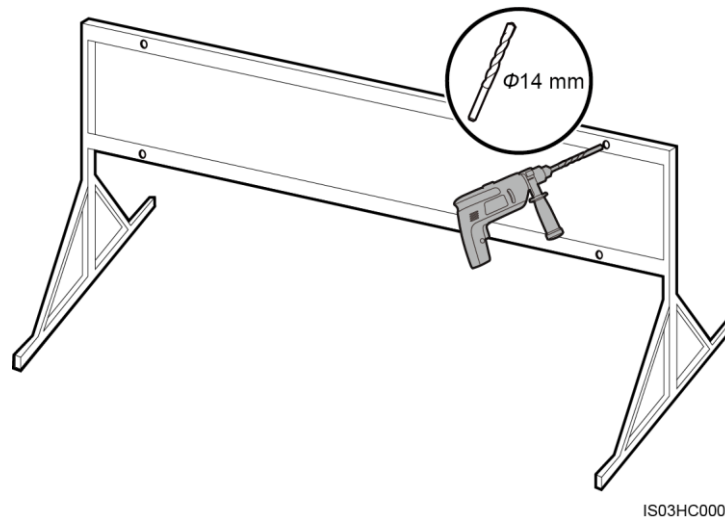
Step 3 Drill holes using a hammer drill.



NOTE

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

Figure 4-27 Drilling holes



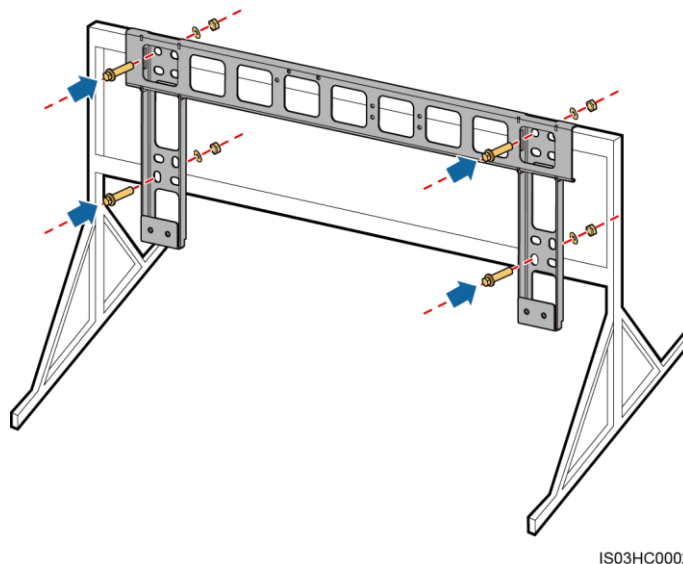
Step 4 Align the mounting bracket with the hole positions, insert bolt assemblies (flat washers, spring washers, and M12x40 bolts) into the holes through the mounting bracket, secure them using the shipped stainless steel nuts and flat washers, and tighten the bolts to a torque of 45 N m using an 18 mm socket wrench.



NOTE

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

Figure 4-28 Securing a mounting bracket



----End

4.4.4 Installing the SUN2000

For details, see [4.3.4 Installing the SUN2000](#).

5 Connecting Cables

5.1 Precautions



DANGER

Before connecting cables, ensure that **DC SWITCH** on the inverter is **OFF**. Otherwise, the high voltage of the inverter may result in electric shocks.



NOTE

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).

5.2 Opening the Maintenance Compartment Door

Prerequisites



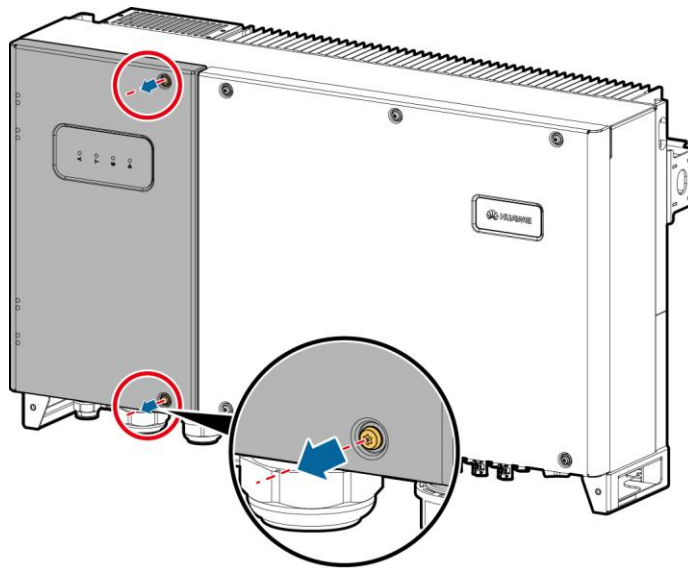
CAUTION

- Never open the host panel of the SUN2000.
- Before opening the maintenance compartment door, disconnect the AC and DC power supplies. For processes of disconnecting the power supplies, see [6.3 Powering Off the SUN2000](#). After powering off the SUN2000, wait at least 5 minutes before performing operations on it.
- If you need to open the maintenance compartment door in rainy or snowy days, take protective measures to prevent rain and snow entering the maintenance compartment. If it is impossible to take protective measures, do not open the maintenance compartment door in rainy or snowy days.
- Do not leave unused screws in the maintenance compartment.

Procedure

- Step 1** Remove the two screws from the maintenance compartment door using a security torx wrench and set them aside.

Figure 5-1 Removing screws



IS03HC0009

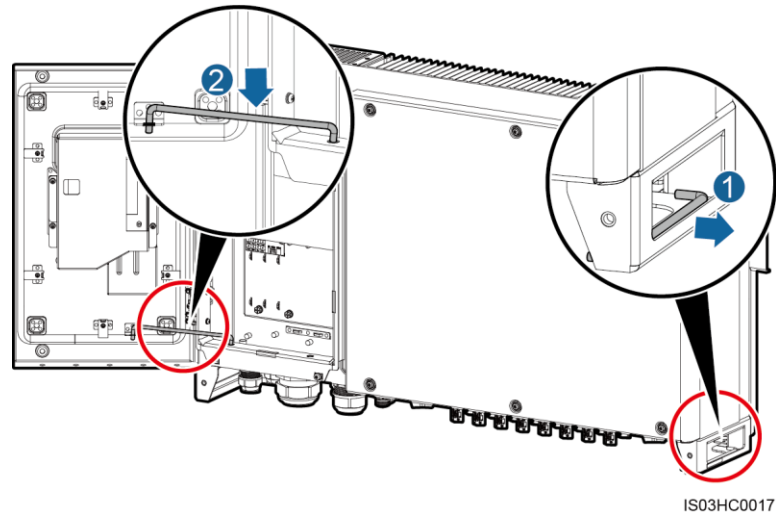
- Step 2** Open the maintenance compartment door and install a support bar.



NOTE

The support bar is bound to the chassis base.

Figure 5-2 Installing a support bar



----End

5.3 Connecting the Ground Cable (PE)

Prerequisites

The ground cable and OT terminals are available.

- Ground cable: Use an outdoor copper-core cable with a cross-sectional area of 16 mm² or more.
- OT terminal: M6

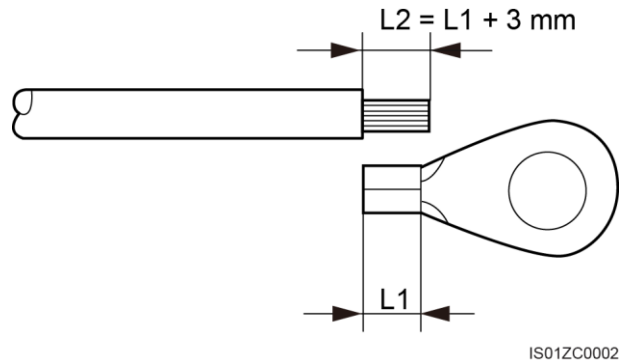
Context

- Both the shell and maintenance compartment of the inverter provide a ground point. Select either for connecting the ground cable.
- There are two ground points on the chassis shell and one of them is standby.
- It is recommended that the ground cable be connected to a nearby ground point. For a system with multiple SUN2000s connected in parallel, connect the ground points of all SUN2000s to ensure equipotential connections to ground cables.

Procedure

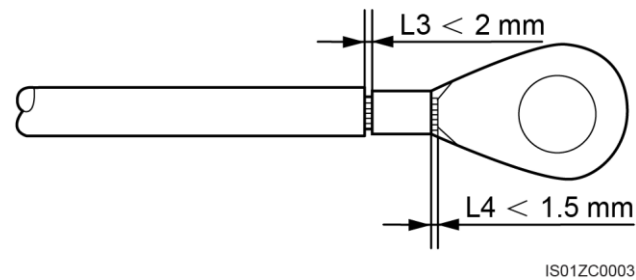
- Step 1** Strip an appropriate length of the insulation layer using a wire stripper, as shown in [Figure 5-3](#).

Figure 5-3 Stripped length



Step 2 Insert the exposed core wires into the crimping area of the OT terminal and crimp them using hydraulic pliers, as shown in [Figure 5-4](#).

Figure 5-4 Crimping a cable



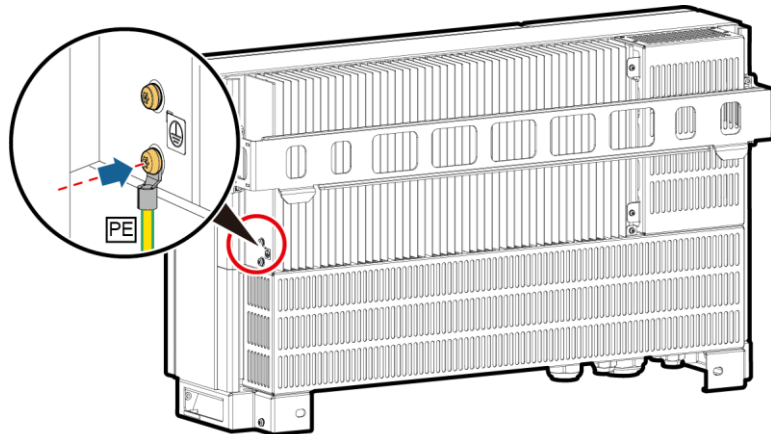
NOTE

The cavity formed after the conductor crimp strip is crimped must wrap the core wires completely. The core wires must contact the terminal closely.

Step 3 Remove the ground screws from the ground points.

Step 4 Secure the ground cable using the ground screw and tighten the screw to a torque of 5 N·m using a security torx wrench.

Figure 5-5 Connecting a ground cable



IS03IC4001



NOTE

To enhance the corrosion resistance of the ground terminal, apply silica gel or paint on the ground terminal after connecting the ground cable.

----End

5.4 Connecting AC Output Power Cables

Prerequisites

An AC switch must be installed on the AC side of the SUN2000 to ensure that the SUN2000 can be safely disconnected from the power grid. See [10 Technical Specifications](#) to select AC switches of the appropriate specifications.



WARNING

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

Context

- If you connect a ground cable to the ground point on the chassis shell in a scenario without a neutral wire, you are advised to use a three-core (L1, L2, and L3) outdoor cable as the AC output power cable for the SUN2000-36KTL.
- If you connect a ground cable to the ground point in the maintenance compartment in a scenario without a neutral wire, you are advised to use a four-core (L1, L2, L3, and PE) outdoor cable as the AC output power cable for the SUN2000-36KTL.
- If you connect a ground cable to the ground point on the chassis shell in a scenario with a neutral wire, you are advised to use a four-core (L1, L2, L3, and N) outdoor cable as the AC output power cable for the SUN2000-36KTL.

- If you connect a ground cable to the ground point in the maintenance compartment in a scenario with a neutral wire, you are advised to use a five-core (L1, L2, L3, N, and PE) outdoor cable as the AC output power cable for the SUN2000-36KTL.
- If you connect a ground cable to the ground point on the chassis shell, you are advised to use a three-core (L1, L2, and L3) outdoor cable as the AC output power cable for the SUN2000-42KTL.
- If you connect a ground cable to the ground point in the maintenance compartment, you are advised to use a four-core (L1, L2, L3, and PE) outdoor cable as the AC output power cable for the SUN2000-42KTL.

Table 5-1 describes the cable specifications.

Table 5-1 Cable specifications

Cable Specifications		Copper-Core Cable	Copper-Clad Aluminum Cable or Aluminum Alloy Cable
Conductor cross-sectional area (mm ²)	Value range	16–70	25–70
	Recommended value	25	35
Cable outer diameter supported by AC OUTPUT 1 connector (mm)	Value range	37–44	
	Recommended value	40	
Cable outer diameter supported by AC OUTPUT 2 connector (mm)	Value range	24–32	
	Recommended value	28	



NOTE

Select an appropriate AC OUTPUT connector based on the cable outer diameter. This document uses the AC OUTPUT 2 connector as an example to describe how to connect a cable.

- You need to prepare M8 OT terminals by yourself.



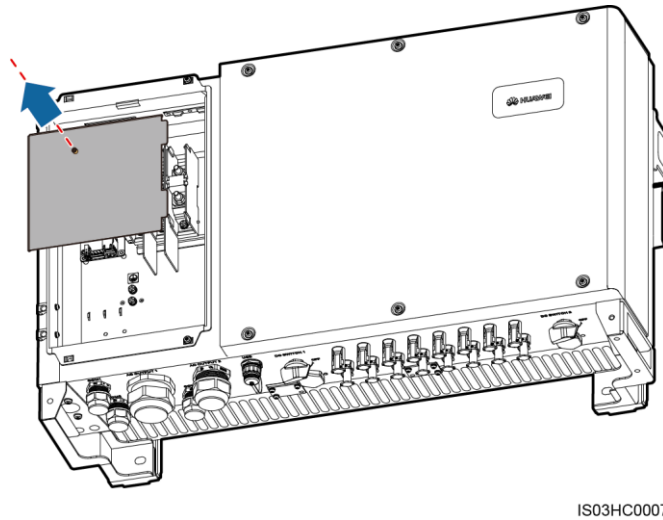
NOTE

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

Procedure

- Step 1** Remove the AC terminal cover, as shown in [Figure 5-6](#).

Figure 5-6 Removing the AC terminal cover



 **NOTE**

To highlight the involved area, the figure does not show the open door.

Step 2 Remove an appropriate length of the jacket and insulation layer from the AC output power cable using a wire stripper.



NOTICE

Ensure that the jacket is in the maintenance compartment.

Figure 5-7 Three-core cable (excluding the ground cable or neutral wire)

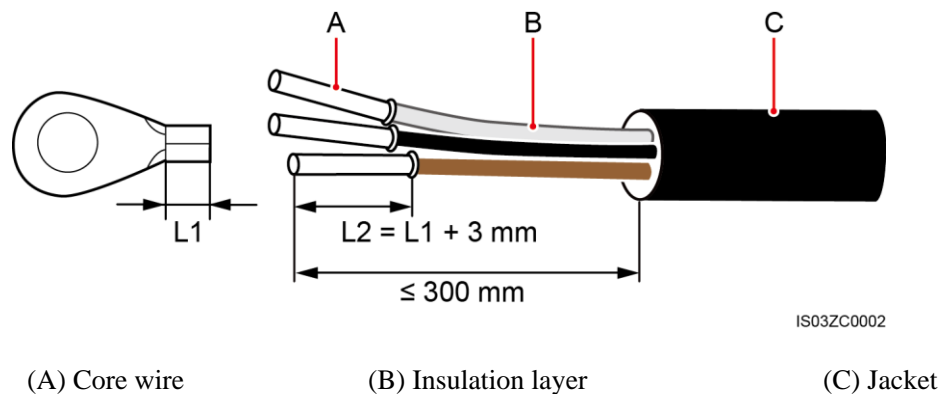


Figure 5-8 Four-core cable (including the ground cable but excluding the neutral wire)

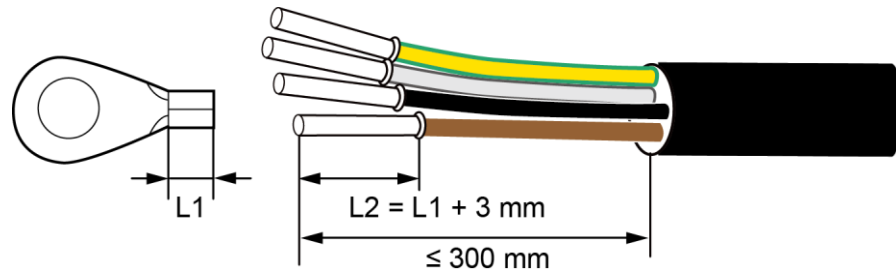


Figure 5-9 Four-core cable (excluding the ground cable but including the neutral wire)

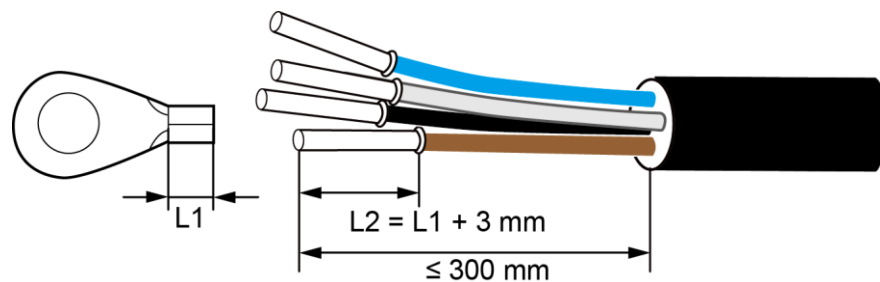
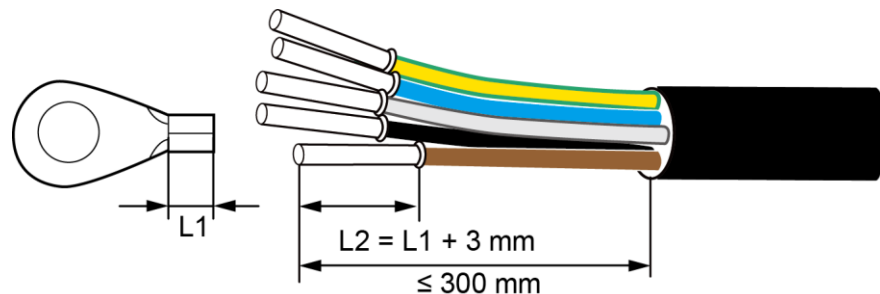


Figure 5-10 Five-core cable (including the ground cable and neutral wire)



Step 3 Insert the exposed core wires into the crimping area of the OT terminal and crimp them using hydraulic pliers.



NOTE

One core wire connects to one OT terminal.

Step 4 Wrap the wire crimping area with heat shrink tubing or PVC insulation tape.



NOTE

If heat shrink tubing is used, put it through the power cable and then crimp the OT terminal.

Step 5 Remove the locking cap from the AC OUTPUT 2 waterproof cable connector at the inverter bottom and remove the plug from the locking cap.

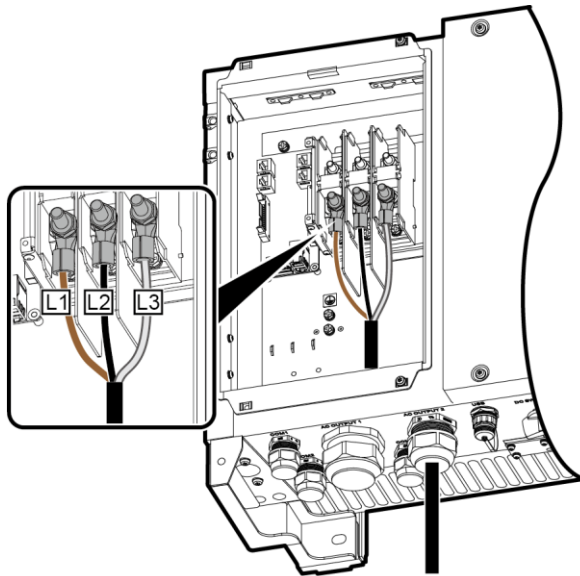
- Step 6** Route the AC output power cable through the locking cap and then the AC OUTPUT 2 connector at the inverter bottom.
- Step 7** Connect the AC output power cable to the AC terminal block, and then tighten the nut using a 13 mm socket wrench that has an extension rod to a torque of 8 N·m. If you connect a ground cable to the ground point in the maintenance compartment, tighten the ground screw using a 10 mm socket wrench with an extension rod to a torque of 5 N·m.



NOTICE

Verify that the AC output power cables are connected securely. Otherwise, the inverter may fail to operate or experience any fault that will cause the damage of the terminal block. For example, the inverter may generate heat during operating due to unreliable connection.

Figure 5-11 SUN2000-42KTL (excluding the ground cable)



IS03IC1001

Figure 5-12 SUN2000-42KTL (including the ground cable)

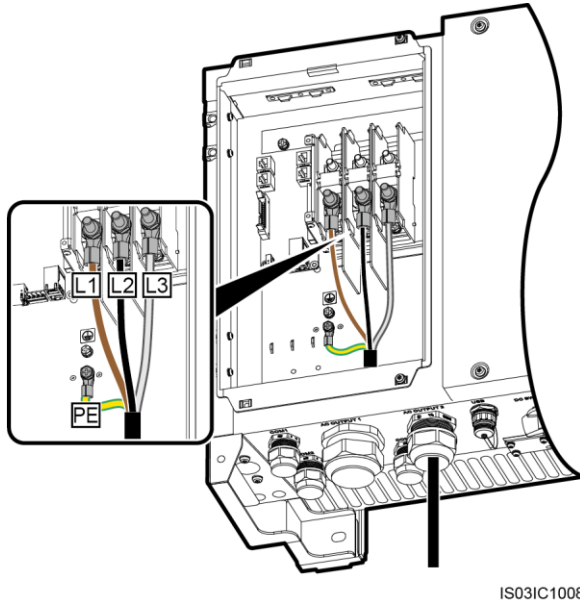


Figure 5-13 SUN2000-36KTL (excluding the ground cable or neutral wire)

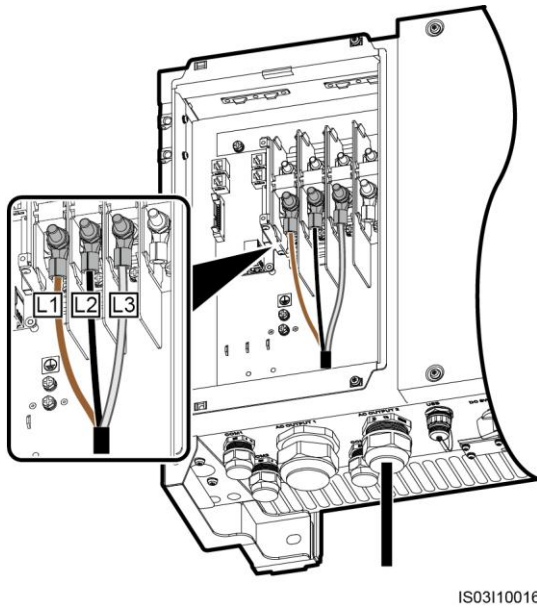
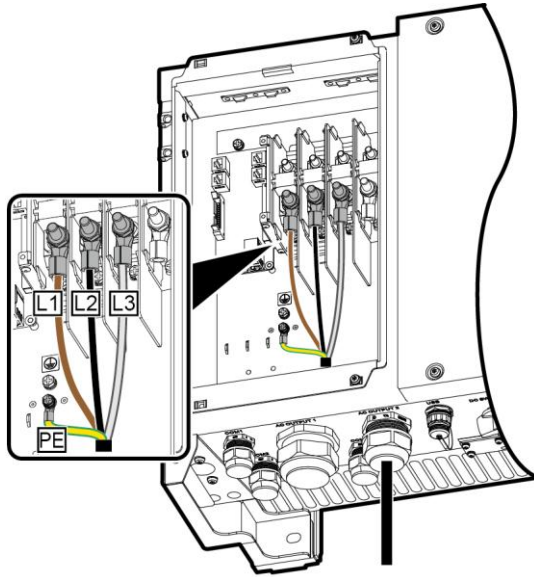
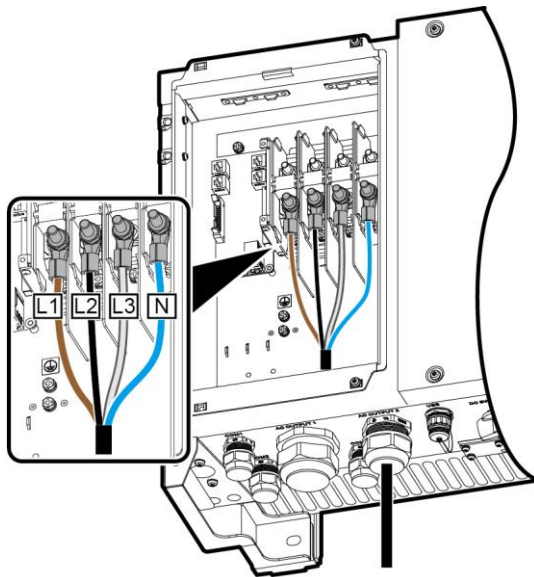


Figure 5-14 SUN2000-36KTL (including the ground cable but excluding the neutral wire)



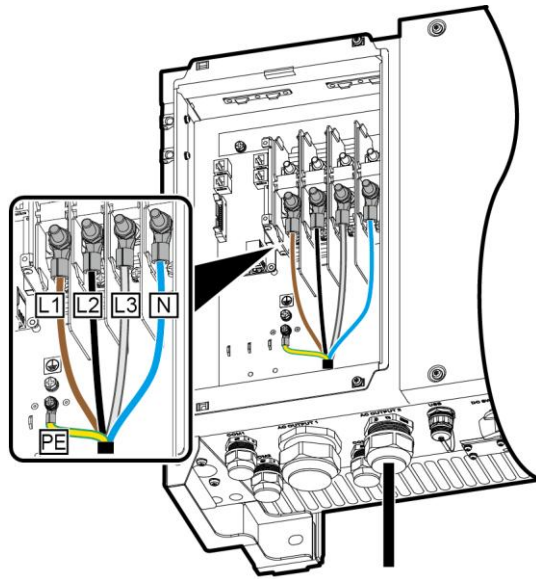
IS03110014

Figure 5-15 SUN2000-36KTL (excluding the ground cable but including the neutral wire)



IS03110015

Figure 5-16 SUN2000-36KTL (including the ground cable and neutral wire)



 **NOTE**

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

Step 8 Use a torque wrench with an open end of 52 mm to tighten the locking caps to a torque of 7.5 N m.

----End

Follow-up Procedure

Check that the cables are connected correctly and securely, and then seal the cable holes with firestop putty.

5.5 Connecting DC Input Power Cables

Prerequisites



DANGER

- Before connecting DC input power cables, ensure that the DC voltage is within the safe range (lower than 60 V DC) and that the two DC switches on the SUN2000 are OFF. Otherwise, the high voltage may result in electric shocks.
- When the SUN2000 is grid-tied, it is not allowed to maintain DC input power cables, such as connect or disconnect a string or a module in a string. Otherwise, electric shocks may occur.



WARNING

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

- The open-circuit voltage of each PV string is always lower than or equal to 1100 V DC.
- The positive and negative terminals of a PV module connect to the positive and negative DC input terminals of the SUN2000 respectively.



NOTICE

- Ensure that the PV string is well insulated to the ground. 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 may be damaged. The caused equipment damage is beyond the warranty scope.
- During the installation of PV strings and SUN2000, 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. The caused equipment damage is beyond the warranty scope.



NOTE

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

- A three-phase isolation transformer is installed on the output side.
- 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 NMS.

Context

- DC terminal selection

[Figure 5-17](#) shows the DC terminals at the bottom of the SUN2000. [Table 5-2](#) describes the requirements for DC terminal selection.



NOTE

The SUN2000 provides two DC switches, namely, DC SWITCH 1 and DC SWITCH 2. DC SWITCH 1 controls the first to the fourth routes of DC input terminals, while DC SWITCH 2 controls the fifth to the eighth routes of DC input terminals.

Figure 5-17 DC terminals

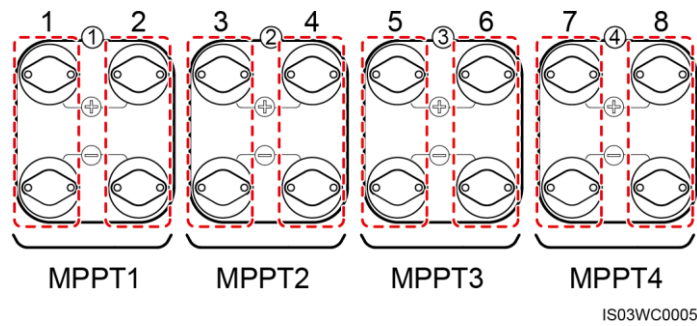


Table 5-2 DC terminal selection requirements

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

- DC input power cable specifications
[Table 5-3](#) lists the recommended DC input power cable specifications.

Table 5-3 Recommended DC input power cable specifications

Cable Type	Conductor Cross-Sectional Area (mm ²)		Cable Outer Diameter (mm)
	Range	Recommended Value	
Common PV cables in the industry (model: PV1-F)	4.0–6.0 (or 12–10 AWG)	4.0 (or 12 AWG)	4.5–7.8

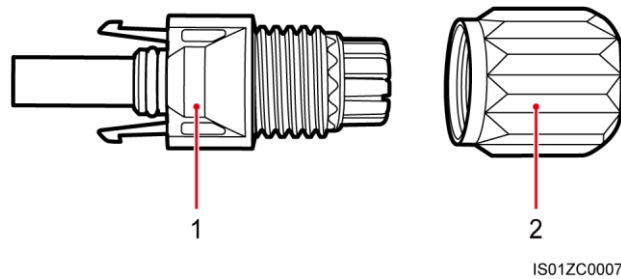


NOTICE

Rigid cables, such as armored cables, are not recommended, because poor contact may be caused by the bending of the cables.

- Positive and negative connectors
DC input connectors are categorized into positive and negative connectors, as shown in [Figure 5-18](#) and [Figure 5-19](#).

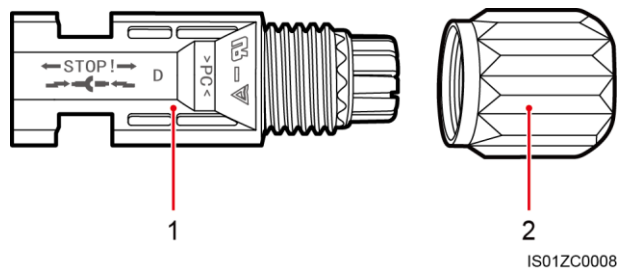
Figure 5-18 Positive connector



(1) Insulation shell

(2) Locking nut

Figure 5-19 Negative connector



(1) Insulation shell

(2) Locking nut



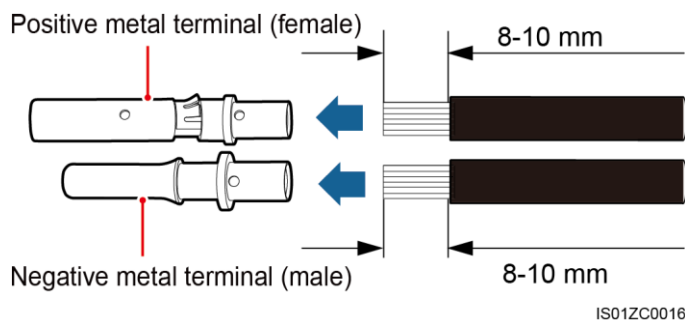
CAUTION

- Use the Amphenol HH4 DC input terminals delivered with the SUN2000. If the terminals are lost or damaged, prepare Amphenol HH4, Amphenol H4, or MC4 DC input terminals by yourself. You can also purchase Amphenol HH4 DC input terminals from Huawei.
- DC input terminals not of the previous models may be incompatible with the SUN2000, which may cause serious consequences. The caused equipment damage is beyond the warranty scope.

Procedure

- Step 1** Remove the insulation layers with an appropriate length from the positive and negative power cables using a wire stripper, as shown in [Figure 5-20](#).

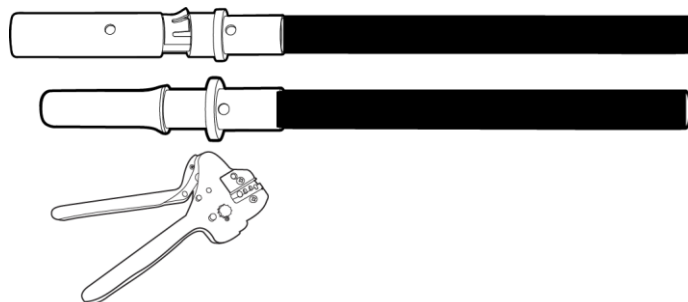
Figure 5-20 Stripped length



IS01ZC0016

- 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 5-21](#). Ensure that the cables are crimped tightly such that they cannot be pulled out by a force less than 400 N.

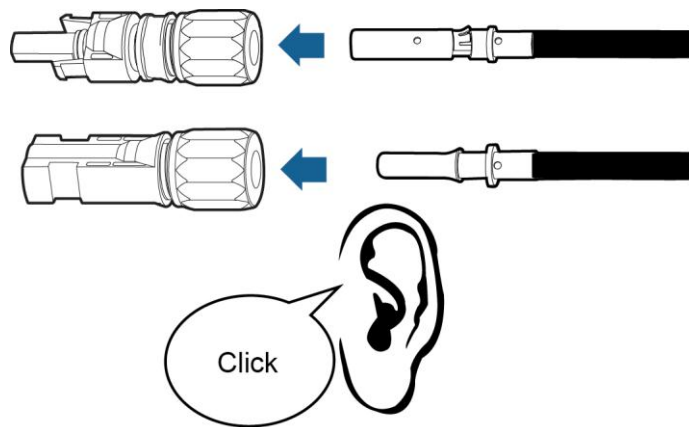
Figure 5-21 Crimping a metal terminal



IS01ZC0017

- Step 3** Insert the crimped positive and negative power cables into the corresponding positive and negative connectors until they snap into place.

Figure 5-22 Inserting positive and negative connectors



IS01ZC0018

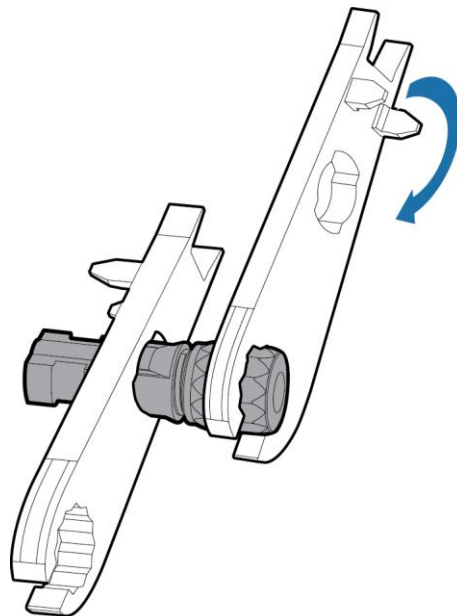


NOTICE

Check that the cables are in position by slightly pulling them back.

- Step 4** Tighten the locking nuts on the positive and negative connectors.
Secure the nuts using a removal wrench, as shown in [Figure 5-23](#).

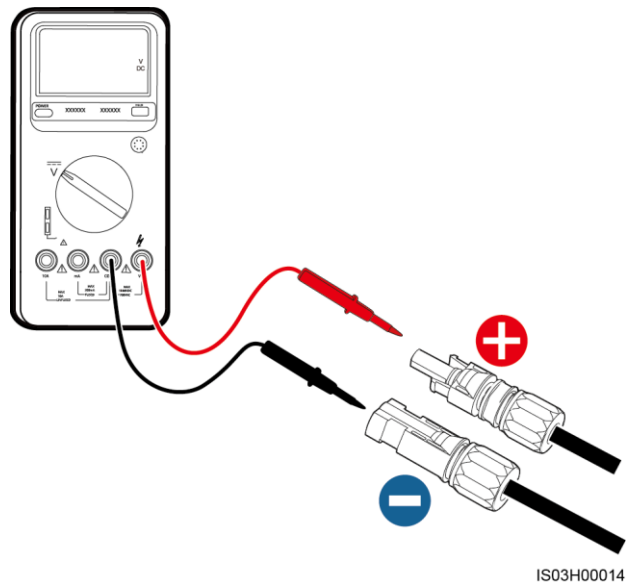
Figure 5-23 Tightening a locking nut



IS011C0016

- Step 5** Pull out the blue dustproof plugs from the ends of the DC input connectors.
- Step 6** Ensure that the DC input voltage of each PV string does not exceed 1100 V DC using a multimeter and check that the polarities of the DC input power cables are correct.

Figure 5-24 Measuring the DC input voltage



WARNING

Before performing [Step 7](#), ensure that the two DC switches are OFF. Measure the voltage of the DC input strings using a multimeter.

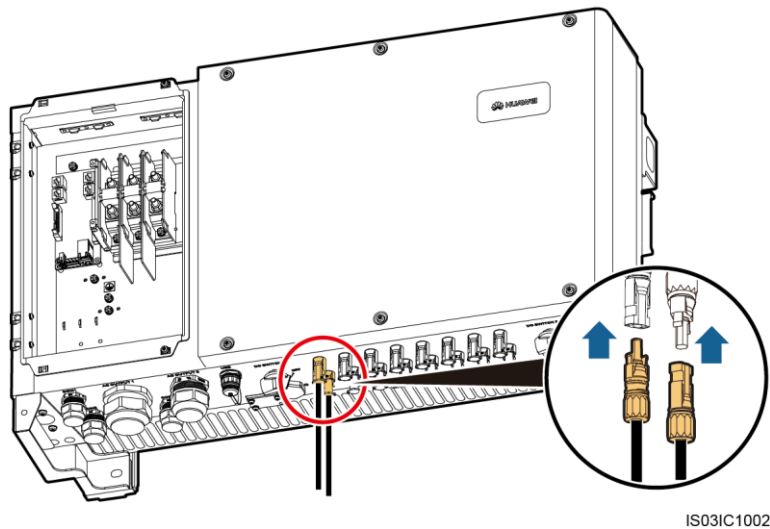
- Step 7** Insert the positive and negative connectors into the corresponding positive and negative DC input terminals of the SUN2000 until they snap into place, as shown in [Figure 5-25](#).



NOTICE

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

Figure 5-25 Connecting DC input power cables



NOTICE

If the DC input power cable is reversely connected and the DC switches are ON, do not turn off the DC switches immediately. Otherwise, the inverter may be damaged. The damage caused by reverse connection of the DC input power cable is beyond the warranty scope. Wait until the PV string voltage reduces to the safe range (below 60 V DC). Then, turn off the two DC switches, remove the positive and negative connectors, and rectify the connection.

----End

Follow-up Procedure

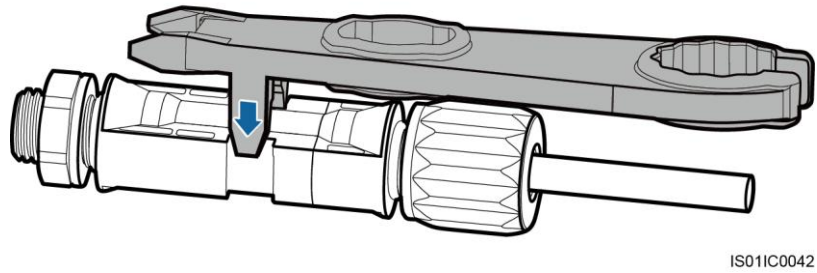


WARNING

Before removing the positive and negative connectors, ensure that the two DC switches are OFF.

To remove the positive and negative connectors from the SUN2000, insert a removal wrench into the notch and press the wrench with an appropriate force, as shown in [Figure 5-26](#).

Figure 5-26 Removing a DC input connector



5.6 Connecting Communications Cables

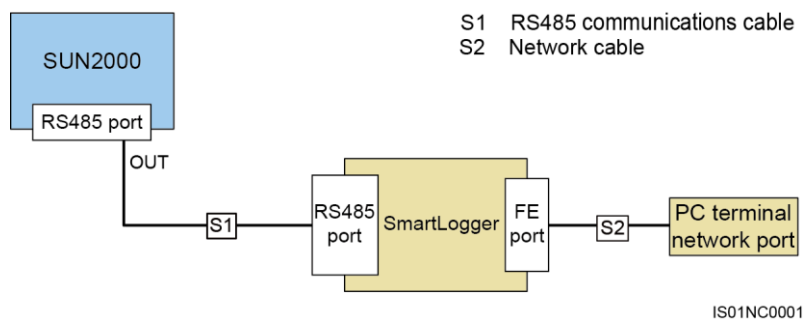
5.6.1 Communication Mode Description

RS485 Communication

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

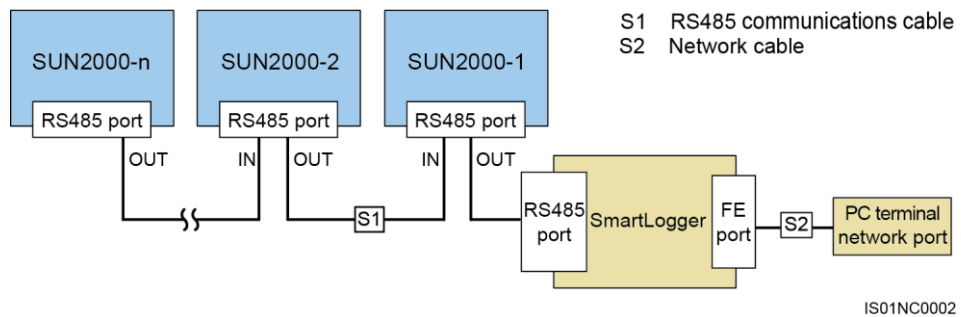
- [Figure 5-27](#) shows the communication mode for a single SUN2000.

Figure 5-27 Communication mode for a single SUN2000



- [Figure 5-28](#) shows the communication mode for multiple SUN2000s.
If multiple SUN2000s are used, connect all the SUN2000s in daisy chain mode over an RS485 communications cable.

Figure 5-28 Communication mode for multiple SUN2000s



NOTE

- The RS485 communication distance between the SUN2000 at the end of the daisy chain and the SmartLogger cannot exceed 1000 meters.
- If multiple SUN2000s need to communicate with one another and are connected to a PC over the SmartLogger1000, 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.
- If multiple SUN2000s need to communicate with one another and are connected to a PC over the SmartLogger2000, a maximum of six daisy chains can be configured to support up to 200 devices. It is recommended that the number of devices on each daisy chain be less than 30. Each SmartLogger2000 can connect to a maximum of 80 SUN2000s.

PLC Communication

The PLC communication board loads communication signals onto power cables for transmission. For details about how to install the PLC, see the *PLC CCO01A User Manual* or *SmartLogger2000 User Manual*.

NOTE

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

FE (Optional)

FE communication is mainly used in distributed rooftop scenarios with a small number of inverters. The inverter can directly connect to the PC over the Ethernet to implement monitoring networking.

NOTE

- FE communication is optional for the SUN2000-36KTL. To use FE communication, contact local technical support.
- If the SUN2000-36KTL adopts FE communications mode, it supports only RS485 and FE communications modes, and does not support PLC communications mode.
- If FE communication is used, a maximum of 10 SUN2000s can be connected. In addition, the NetEco needs to be installed on the PC for monitoring networking.

Selecting a Communication Mode

The RS485 and PLC communication modes are mutually exclusive.

- When selecting the PLC communication mode, do not connect the RS485 communications cable. In addition, you need to set **PLC Communication** to **Enable** on the SUN2000 APP.

- If RS485 is used, do not connect the PLC CCO module to the AC power cable. In addition, you need to set **PLC Communication** to **Disable** on the SUN2000 APP.



NOTE

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

5.6.2 Connecting RS485 Communications Cables

Note

An RS485 communications cable can be connected in two ways:

- Terminal block connection

You are recommended to use a DJYP2VP2-22 2x2x1 network cable or a communications cable with a conductor cross-sectional area of 1 mm² and cable outer diameter of 14–18 mm.

- RJ45 network port connection

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



NOTE

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



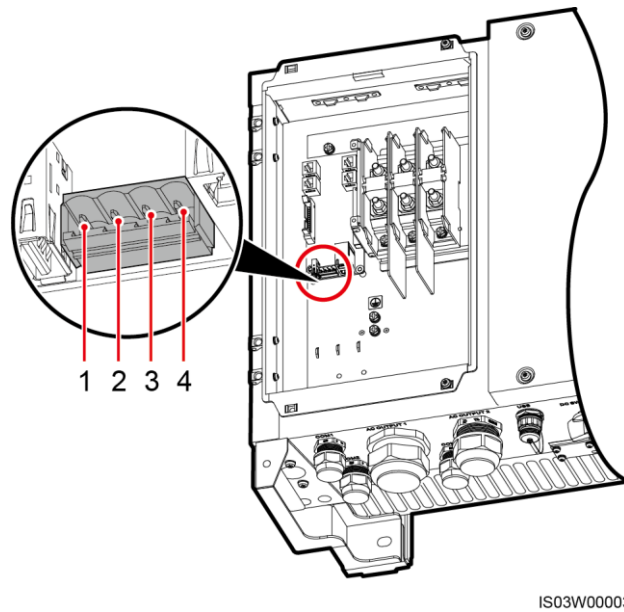
NOTICE

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

Terminal Block Functions

Figure 5-29 shows an RS485 terminal block.

Figure 5-29 Terminal block



IS03W00003

Table 5-4 describes functions of the RS485 terminal block.

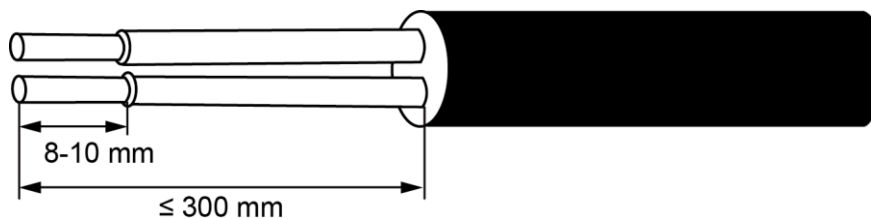
Table 5-4 Functions of the RS485 terminal block

No.	Port Definition	Description
1	RS485A IN	RS485A, RS485 differential signal +
2	RS485A OUT	RS485A, RS485 differential signal +
3	RS485B IN	RS485B, RS485 differential signal -
4	RS485B OUT	RS485B, RS485 differential signal -

Connecting Cables to the Terminal Block

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

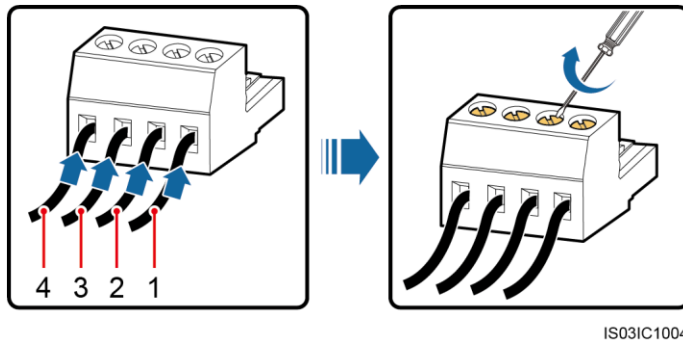
Figure 5-30 Stripping an RS485 communications cable



IS03ZC0001

- Step 2** Remove the locking caps from the COM1 and COM2 waterproof cable connectors at the SUN2000 bottom and remove the plugs from the locking caps.
- Step 3** Route the communications cable through the locking caps, and then the COM1 (RS485 IN) and COM2 (RS485 OUT) connectors at the SUN2000 bottom.
- Step 4** Remove the terminal base from the terminal block.
- Step 5** Connect communications cables to the terminal base.

Figure 5-31 Connecting cables to a terminal base



- (1) RS485A IN
- (3) RS485B IN

- (2) RS485A OUT
- (4) RS485B OUT

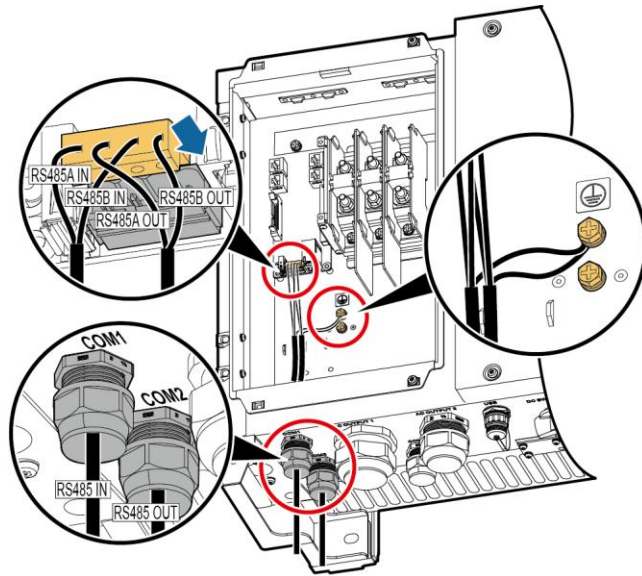
- Step 6** Install the terminal base on the terminal block, and connect the shield layers to the ground point.



NOTE

When connecting the shielded cables, choose whether to crimp the OT terminal based on site requirements.

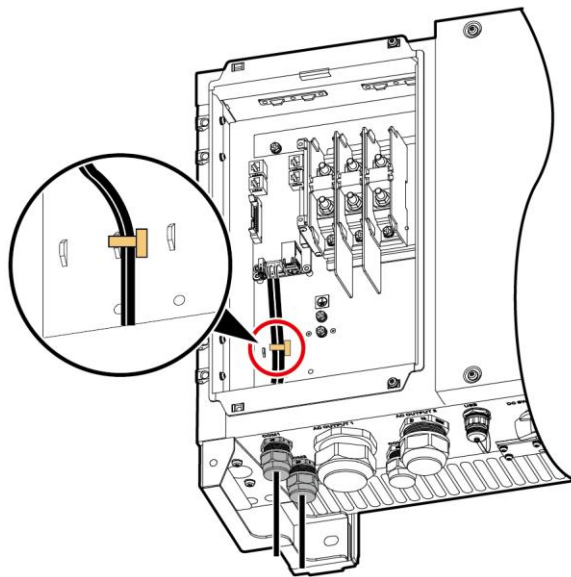
Figure 5-32 Connecting communications cables



IS03IC1003

Step 7 Bind communications cables after connecting them.

Figure 5-33 Binding communications cables



IS03IC1007

Step 8 Use a torque wrench with an open end of 33 mm to tighten the locking caps to a torque of 7.5 N m.

----End

RJ45 Connector Pin Definitions

Figure 5-34 shows an RJ45 connector.

Figure 5-34 RJ45 connector

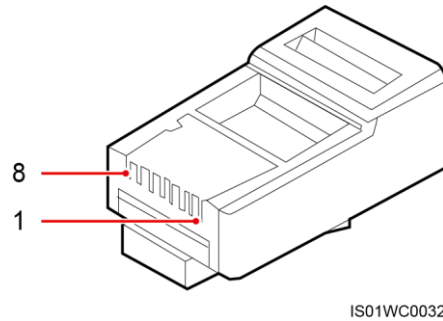


Table 5-5 lists the RJ45 connector pin definitions.

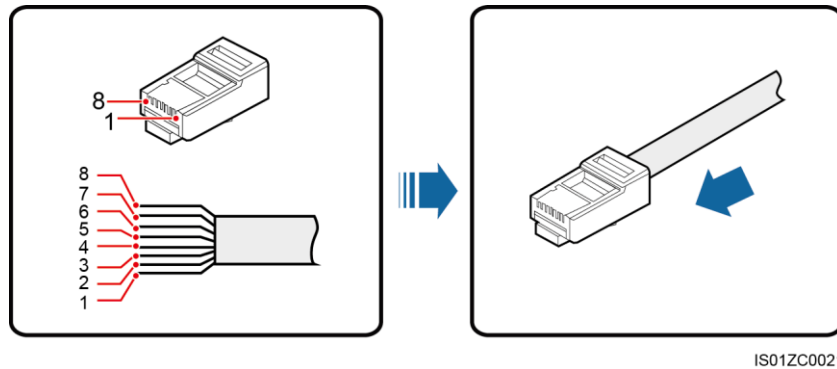
Table 5-5 RJ45 connector pin definitions

Pin	Color	Pin Definition
1	White-and-orange	RS485A, RS485 differential signal +
2	Orange	RS485B, RS485 differential signal –
3	White-and-green	N/A
4	Blue	RS485A, RS485 differential signal +
5	White and blue	RS485B, RS485 differential signal –
6	Green	N/A
7	White-and-brown	N/A
8	Brown	N/A

Connecting a Cable to the RJ45 Network Port

Step 1 Insert the wires of the network cable to the RJ45 connector in sequence, as shown in Figure 5-35.

Figure 5-35 Connecting wires to an RJ45 connector



- | | | | |
|----------------------|------------|---------------------|-----------|
| (1) White-and-orange | (2) Orange | (3) White-and-green | (4) Blue |
| (5) White-and-blue | (6) Green | (7) White-and-brown | (8) Brown |

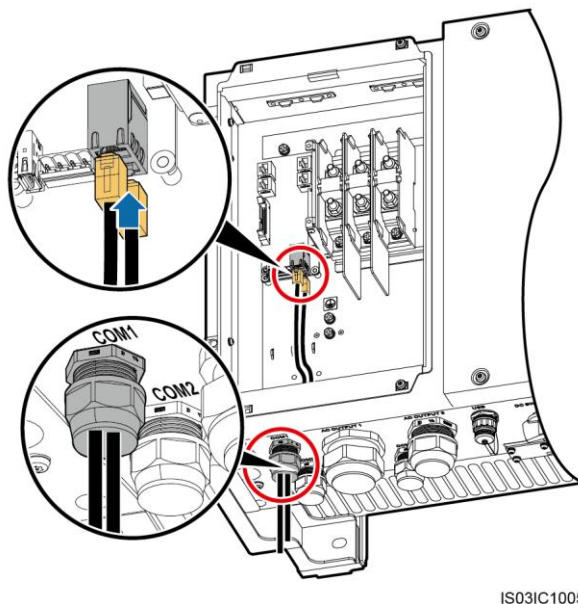
Step 2 Crimp the RJ45 connector using a crimping tool.

Step 3 Remove the locking cap from the COM1 waterproof cable connector at the SUN2000 bottom and remove the plug from the locking cap.

Step 4 Route the cables through the locking caps and then the COM1 port at the SUN2000 bottom.

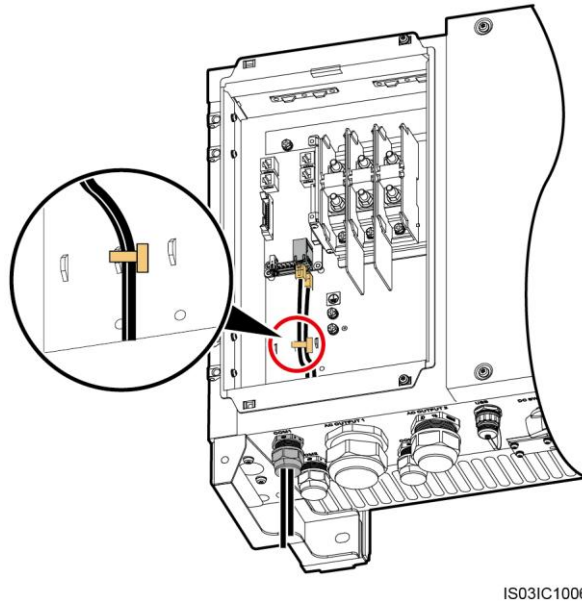
Step 5 Insert the RJ45 connector into the RJ45 network port in the SUN2000 maintenance compartment.

Figure 5-36 Connecting communications cables



Step 6 Bind communications cables after connecting them.

Figure 5-37 Binding communications cables



IS03IC1006

Step 7 Use a torque wrench with an open end of 33 mm to tighten the locking cap to a torque of 7.5 N m.

----End

Follow-up Procedure

Check that the cables are connected correctly and securely, and then seal the cable holes with firestop putty.

5.6.3 (Optional) Connecting FE Communications Cables

Description

FE communication is mainly used in distributed rooftop scenarios with a small number of inverters. The inverter can directly connect to the PC over the Ethernet to implement monitoring networking.

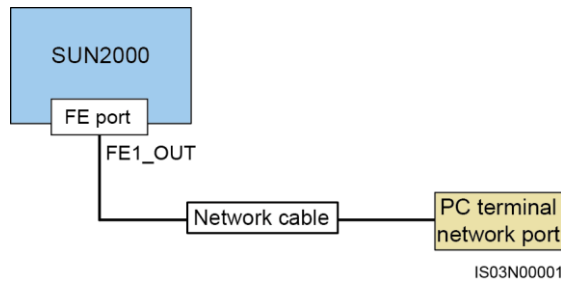


NOTE

FE communication is optional for the SUN2000-36KTL. To use FE communication, contact local technical support.

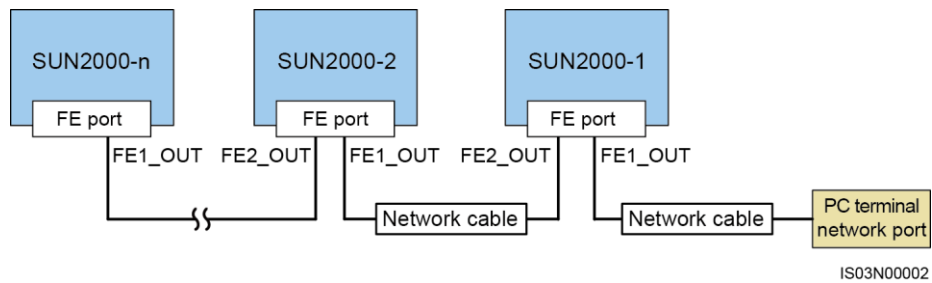
- [Figure 5-38](#) shows the communication mode for a single SUN2000.

Figure 5-38 FE communication mode for a single SUN2000



- **Figure 5-39** shows the communication mode for multiple SUN2000s. If multiple SUN2000s are used, connect all the SUN2000s in daisy chain mode over a network cable.

Figure 5-39 FE communication mode for multiple SUN2000s



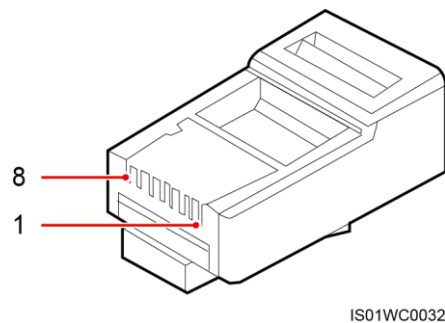
 **NOTE**

- The FE communication distance between two adjacent SUN2000s on the daisy chain cannot exceed 100 meters.
- A daisy chain supports a maximum of 10 SUN2000s to be connected for communication.

RJ45 Connector Pin Definitions

Figure 5-40 shows an RJ45 connector.

Figure 5-40 RJ45 connector



The FE communications cable is connected over standard network cables. A standard network cable can be 568A or 568B. The network cables used in the same PV grid-tied power

generation system should be prepared according to the same standard. [Table 5-6](#) lists the 568A wire sequence standard. [Table 5-7](#) lists the 568B wire sequence standard.

Table 5-6 568A standard

Pin	Color
1	White and green
2	Green
3	White and orange
4	Blue
5	White and blue
6	Orange
7	White and brown
8	Brown

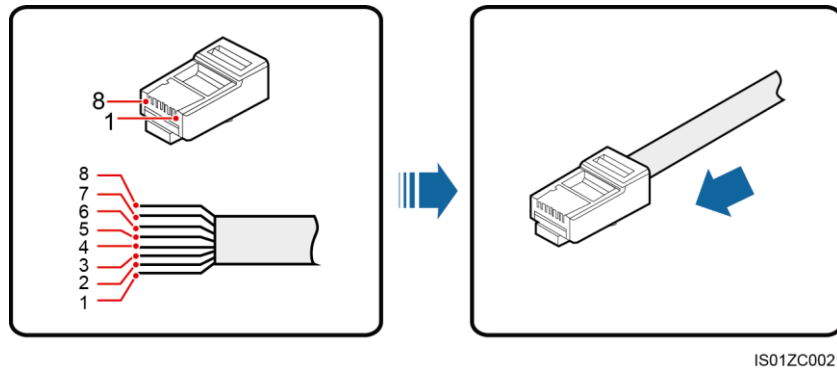
Table 5-7 568B standard

Pin	Color
1	White and orange
2	Orange
3	White and green
4	Blue
5	White and blue
6	Green
7	White and brown
8	Brown

Connecting a Cable to the FE Network Port

- Step 1** Insert the wires of the network cable to the RJ45 connector in sequence, as shown in [Figure 5-41](#).

Figure 5-41 Connecting wires to an RJ45 connector



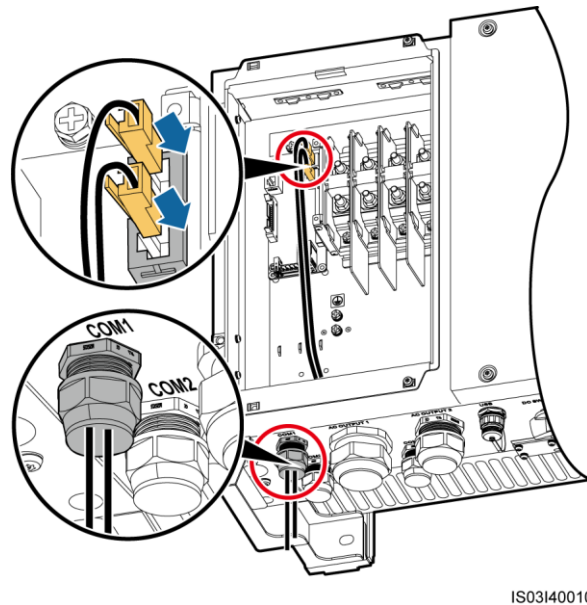
Step 2 Crimp the RJ45 connector using a crimping tool.

Step 3 Remove the locking cap from the **COM1** waterproof cable connector at the SUN2000 bottom and remove the plug from the locking cap.

Step 4 Route the cables through the locking caps and then the **COM1** port at the SUN2000 bottom.

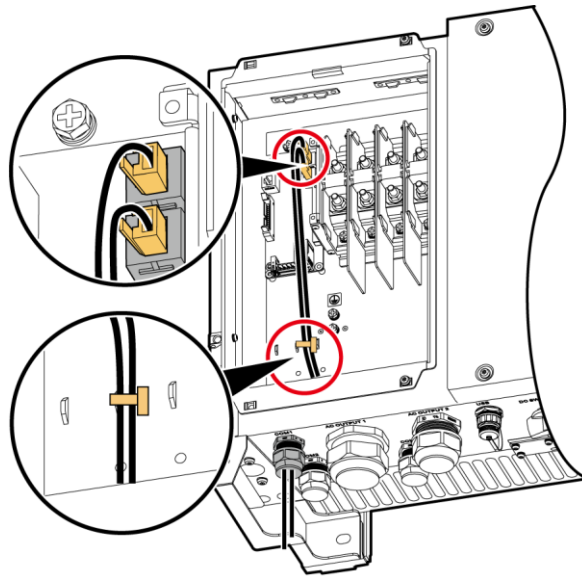
Step 5 Insert the RJ45 connector into the FE1_OUT and FE2_OUT ports in the SUN2000 maintenance compartment.

Figure 5-42 Connecting communications cables



Step 6 Bind communications cables after connecting them.

Figure 5-43 Binding communications cables



IS03I40011

Step 7 Use a torque wrench with an open end of 33 mm to tighten the locking caps to a torque of 7.5 N m.

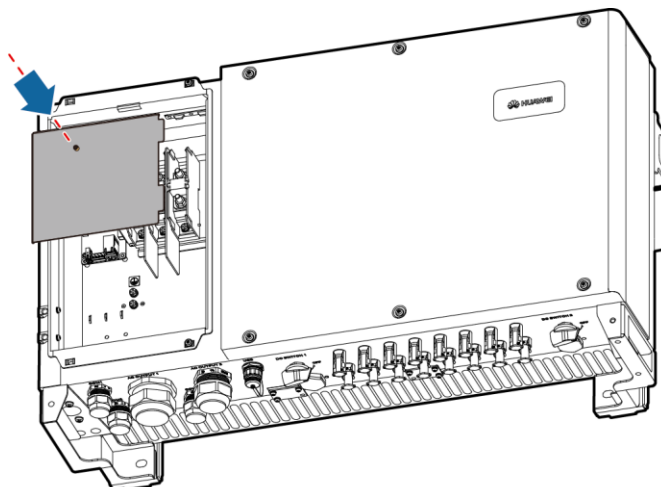
----End

5.7 Closing the Maintenance Compartment Door

Procedure

Step 1 Install the AC terminal cover.

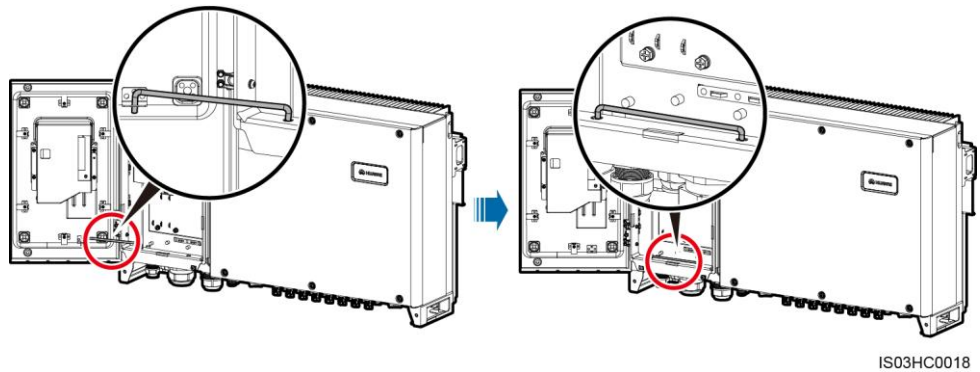
Figure 5-44 Installing a cover



IS03HC0022

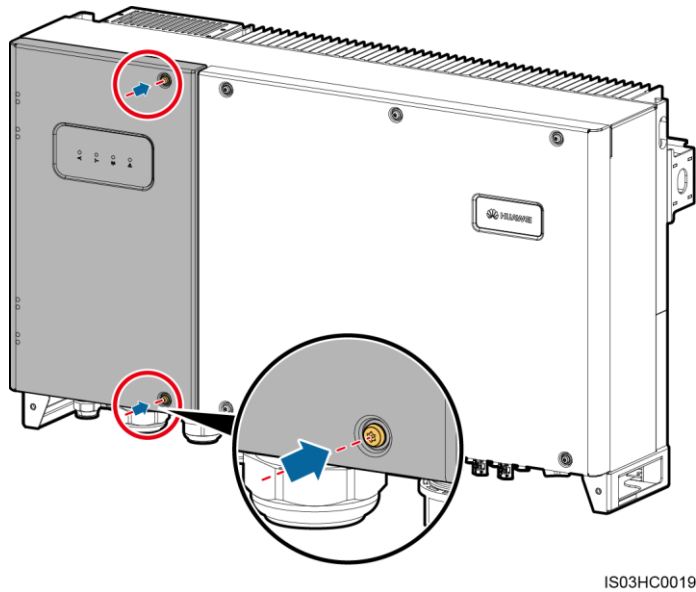
Step 2 Adjust the support bar.

Figure 5-45 Adjusting a support bar



Step 3 Close the maintenance compartment door. Tighten the two screws on the maintenance compartment door using a security torx wrench to a torque of 4 N·m.

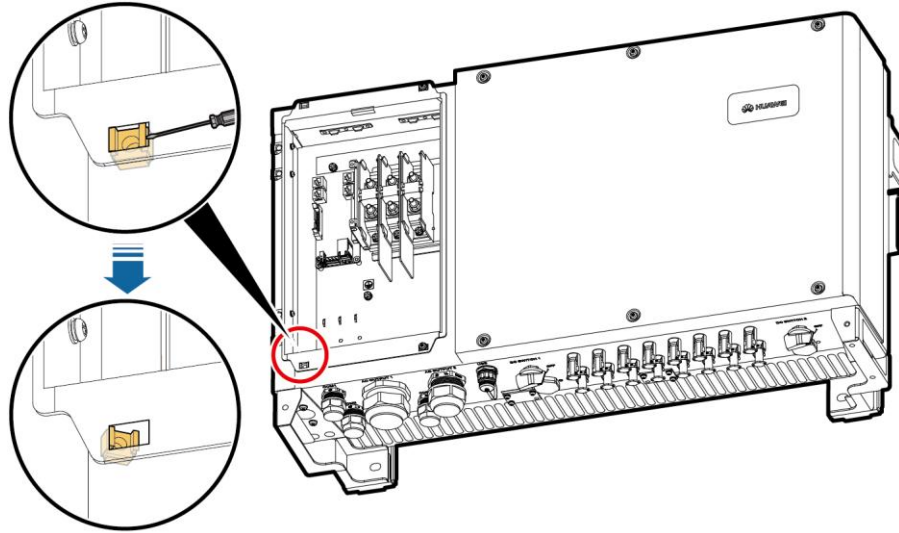
Figure 5-46 Tightening screws on the maintenance compartment door



NOTE

- If a screw on the maintenance compartment door is missing, use the unused ground screw on the chassis shell as a standby screw.
- If the floating nut used for securing the maintenance compartment door is missing, use the standby floating nut shown in [Figure 5-47](#).

Figure 5-47 Removing a standby floating nut



IS03H00016

----End

6 System Commissioning

6.1 Checking Before Power-On

1. The inverter is installed correctly and securely.
2. Check that the DC switches and downstream AC output switch are OFF.
3. Ground cables are connected securely, without open circuits or short circuits.
4. AC output power cables are connected correctly and securely, without open circuits or short circuits.
5. DC input power cables are connected correctly and securely, without open circuits or short circuits.
6. The communications cables are connected correctly and securely.
7. All used connectors at the chassis bottom are applied with firestop putty.
8. The AC terminal cover is reinstalled.
9. The maintenance compartment door is closed and the door screws are tightened.
10. Idle DC input terminals are sealed.
11. The idle USB port is plugged with a waterproof plug.
12. Idle AC OUTPUT and COM connectors are plugged and the locking caps are tightened.

6.2 Powering On the SUN2000

Prerequisites

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

Procedure

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

 **NOTICE**

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

Step 2 Turn on the DC switches at the bottom of the inverter chassis.

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

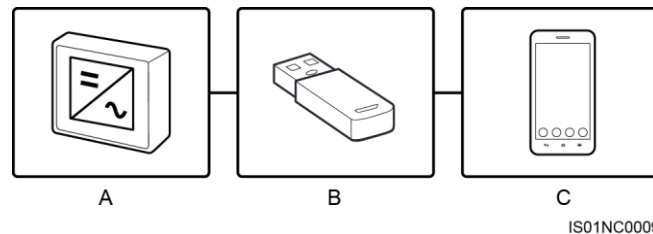
To check that the DC terminals are in good contact, check that the temperatures at the joints between DC terminals and connectors do not exceed 85 °C after the inverter has been running for a period of time.

Step 4 Connect the inverter to the mobile phone that runs SUN2000 APP (app for short) through a Bluetooth module or USB data cable.

 **NOTICE**

- When you use a Bluetooth module to set up the connection, ensure that the mobile phone and inverter are at most 10 meters away from each other. Otherwise, the communication quality between them will deteriorate.
- The screen snapshots in this document correspond to app V200R001C00SPC020.

Figure 6-1 Bluetooth module connection mode

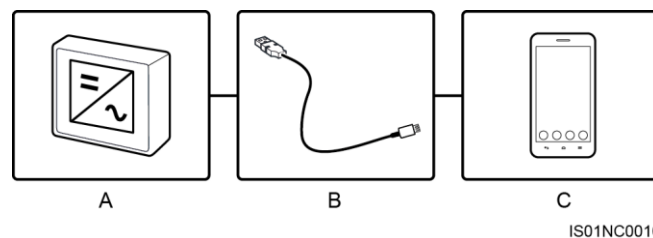


(A) Inverter

(B) Bluetooth module

(C) Mobile phone

Figure 6-2 Data cable connection mode



(A) Inverter

(B) USB data cable

(C) Mobile phone

Figure 6-3 Login screen

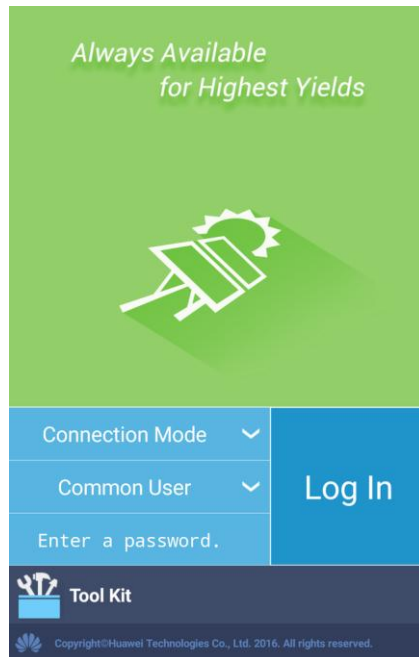


Figure 6-4 Selecting a connection mode

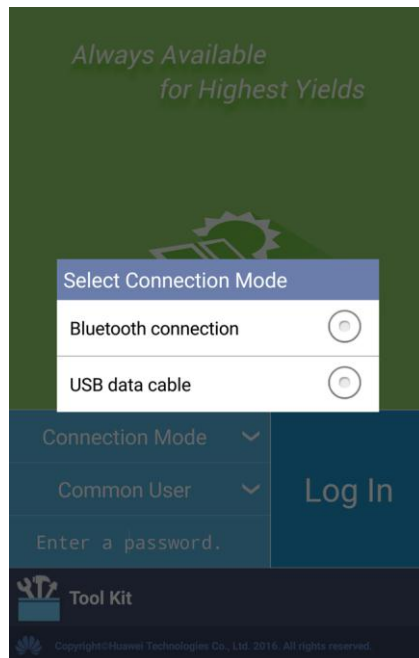


Figure 6-5 Bluetooth connection

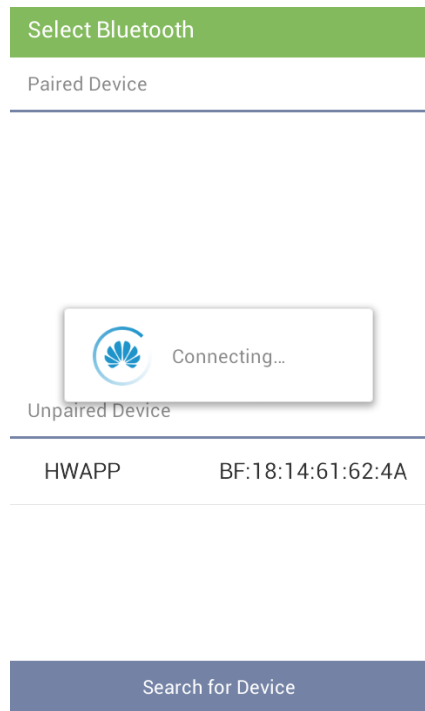
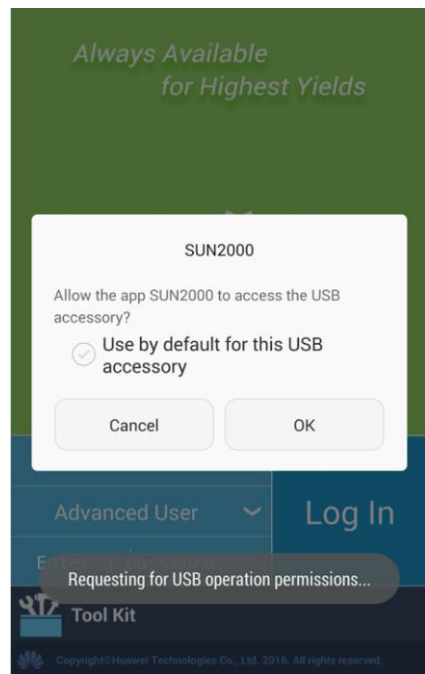


Figure 6-6 Data cable connection

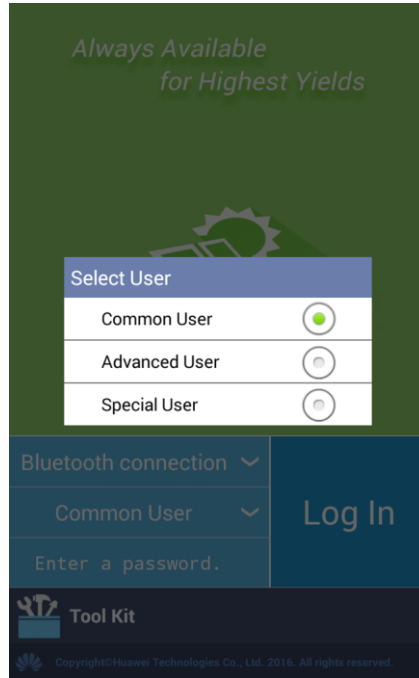


NOTE

After you select **Use by default for this USB accessory**, the message will not appear if you connect the app to the inverter again without removing the USB data cable.

Step 5 Switch the user type (common user, advanced user, and special user) by tapping the user name bar.

Figure 6-7 Switching between users



NOTE

- The login password is the same as that for the inverter connected to the app and is used only when the inverter connects to the app.
- The initial password for **Common User**, **Advanced User**, and **Special User** is **00000a**. Use the preset password upon initial login. To ensure account security, change the password immediately after login.
- During the login, if an incorrect password is entered for five consecutive times (the interval between two consecutive invalid password entries is less than 2 minutes), the account will be locked for 10 minutes. The password consists of six digits.

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

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

NOTE

- If you log in to the app after the device connects to the app for the first time or factory defaults are restored, the Quick Settings screen will be displayed on which you can set basic parameters. After the settings take effect, you can enter the main menu screen and modify the parameters on the **Settings** screen. By default, the inverter can be grid-tied and you do not have to set parameters.
- You are advised to log in to the **Quick Settings** screen as an advanced user for parameter settings.

Figure 6-8 Quick Settings screen (logging in as an advanced user)

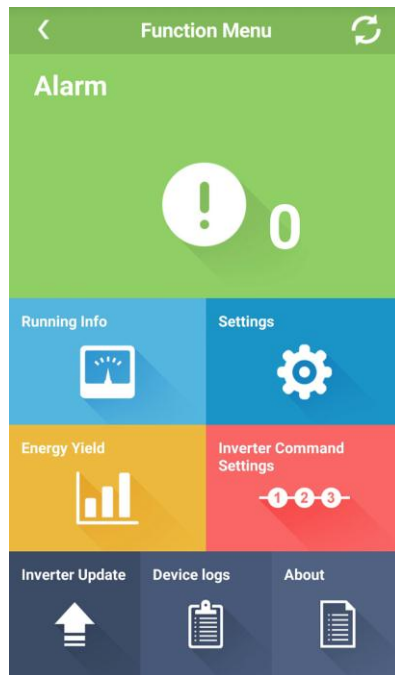
The screenshot shows a mobile application interface titled "Quick Settings" with a back arrow on the left and "OK" on the right. The settings are organized into sections: "Feature Param." with "Grid code" set to "BDEW-MV480"; "User Param." with "Date" set to "2016-07-26", "Time" set to "10:55:12", "Currency" set to "EUR", and "Currency factor" set to "1"; and "Comm. Param." with "Baud rate(bps)" set to "9600", "Protocol" set to "MODBUS RTU", and "Address" set to "2". Each setting has a dropdown arrow on the right.



NOTE

- Set the power grid code that applies to the country or region where the power station is located and the inverter model.
- Set user parameters based on the current date and time.
- Set **Baud rate**, **Protocol**, and **Address** based on site requirements. **Baud rate** can be set to **4800**, **9600**, or **19200**. **Protocol** can be set to **MODBUS RTU**, and **Address** can be set to any value in the range of 1 to 247.
- When multiple inverters communicate with the SmartLogger1000 or SmartLogger2000 over RS485, the addresses for all the inverters on each RS485 route must be within the address range set on the SmartLogger and cannot be duplicate. Otherwise, the communication will fail. In addition, the baud rates of all the inverters on each RS485 route must be consistent with the SmartLogger baud rate.

Figure 6-9 Function Menu screen



----End

6.3 Powering Off the SUN2000

Context



WARNING

- If two SUN2000s share the same AC switch on the AC side, power off the two SUN2000s.
- After the SUN2000 powers off, the remaining electricity and heat may still cause electric shocks and body burns. Therefore, put on protective gloves and begin servicing the SUN2000 five minutes after the power-off.

Procedure

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

For details, see the *SUN2000 APP User Manual*, *SmartLogger1000 User Manual*, *SmartLogger2000 User Manual*, or *iManager NetEco 1000S User Manual*.

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

Step 3 Set the two DC switches to OFF.

----End

7 Man-Machine Interactions

7.1 Operations with a USB Flash Drive

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

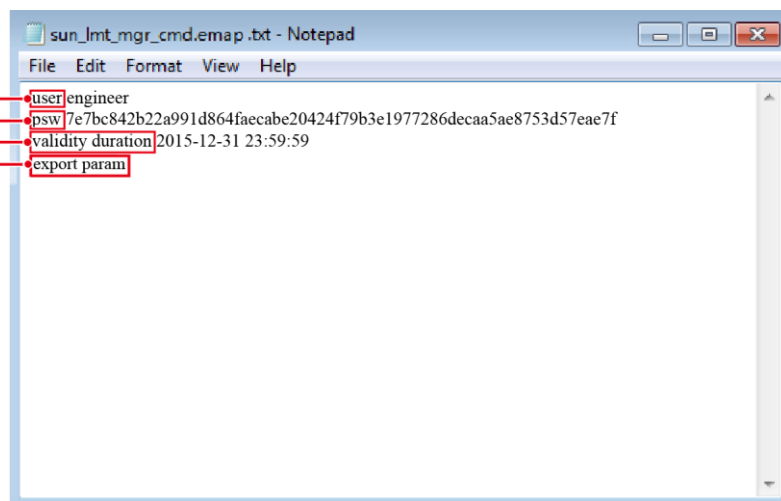
7.1.1 Exporting Configurations

Procedure

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

No.	Meaning	Remarks
		<ul style="list-style-type: none"> 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. <ul style="list-style-type: none"> Configuration export command: export param. Configuration import command: import param. Data export command: export log. Upgrade command: upgrade.

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

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



NOTICE

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

Table 7-1 LED indicator description

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

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



NOTE

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

----End

7.1.2 Importing Configurations

Prerequisites

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

Procedure

- Step 1** On the SUN2000 APP, tap **Inverter Command Settings** to generate a boot script file. For details, see the *SUN2000 APP User Manual*.
- Step 2** Import the boot script file to a 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 only and keep the exported files.

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



NOTICE

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

Table 7-2 LED indicator description

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

----End

7.1.3 Exporting Data

Procedure

- Step 1** On the SUN2000 APP, tap **Inverter Command Settings** to generate a boot script file. For details, see the *SUN2000 APP User Manual*.
- Step 2** Import the boot script file to the root directory of a USB flash drive.
- Step 3** Connect the USB flash drive to the USB port. The system automatically identifies the USB flash drive and executes all commands specified in the boot script file. View the LED indicator to determine the operating status.



NOTICE

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

Table 7-3 LED indicator description

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

- Step 4** Insert the USB flash drive into a computer and check the exported data.



NOTE

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

----End

7.1.4 Upgrading

Procedure

Step 1 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 V200R002C00SPCXXX) from the **Software** tab page.

Step 2 Decompress the upgrade package.

After obtaining the upgrade package **SUN2000V200R002C00SPCXXX_package.zip**, decompress the package and copy the extracted files to the root directory of the USB flash drive. Ensure that the extracted files include:

- config.txt
- config_arm9.txt
- sun_lmt_mgr_cmd.emap (This is a boot script file.)
- SUN2000.bin
- SUN2000_CPLD.bin
- SUN2000_FE.bin
- SUN2000_Master_Release.bin
- SUN2000_Slave_Release.bin
- update.sh
- vercfg.xml



NOTICE

- When the login password of the SUN2000 APP is the initial password (**00000a**), there is no need to perform [Step 3–Step 5](#).
- When the login password of the SUN2000 APP is not the initial password, perform [Step 3–Step 7](#).

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

Step 4 Import the boot script file to a computer.

Step 5 Replace the boot script file in the upgrade package with the one generated by the SUN2000 APP.

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

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



NOTICE

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

Table 7-4 LED indicator description

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

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



NOTE

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

----End

7.2 Operations with a SmartLogger

For operations with a SmartLogger, see the *SmartLogger1000 User Manual* or *SmartLogger2000 User Manual*.

7.3 Operations with the NMS

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

7.4 Operations with the SUN2000 APP

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

8 Maintenance

8.1 Routine Maintenance



CAUTION

- Before cleaning the system, and maintaining the cable connections and grounding reliability, power off the system (see [6.3 Powering Off the SUN2000](#)) and ensure that the two DC switches on the inverter are OFF.
- If you need to open the maintenance compartment door in rainy or snowy days, take protective measures to prevent rain and snow entering the maintenance compartment. If it is impossible to take protective measures, do not open the maintenance compartment door in rainy or snowy days.

Table 8-1 Maintenance list

Item	Check Method	Maintenance Interval
System cleanliness	<ul style="list-style-type: none">• Check periodically that the heat sinks are free from obstacles or dust.• Maintain the DC switches at night. Turn on the DC switches and then turn them off. In this way, oxide on the switches is removed.	Once six months to a year
System running status	<ul style="list-style-type: none">• Check that the inverter is not damaged or deformed.• Check that the running sound of the inverter is normal.• When the inverter is running, check that all inverter parameters are correctly set.	Once six months
Cable connections	<ul style="list-style-type: none">• Check that cables are securely connected.• Check that cables are intact, in particular, the parts touching the	The first inspection is half a year after the initial commissioning. From then on, perform the inspection once six

Item	Check Method	Maintenance Interval
	metallic surface are not scratched. <ul style="list-style-type: none">• Check that the idle COM, USB, and AC OUTPUT ports are locked by waterproof caps.	months to a year.
Grounding reliability	Check that ground cables are securely connected.	The first inspection is half a year after the initial commissioning. From then on, perform the inspection once six months to a year.

8.2 Troubleshooting

Alarm severities are defined as follows:

- Major: The inverter enters the shutdown mode and disconnects from the power grid to stop generating electricity after a fault occurs.
- Minor: Some components are faulty but the inverter can still generate electricity.
- Warning: The inverter output power decreases due to external factors.

Table 8-2 Common alarms and troubleshooting measures

Alarm ID	Alarm Name	Alarm Severity	Possible Cause	Suggestion
103	High DC Input Voltage	Major	<ul style="list-style-type: none"> • Cause ID = 1 The PV array is not properly configured. Excessive PV modules are connected in series to PV strings 1 and 2, and therefore the PV string open-circuit voltage exceeds the inverter maximum power point (MPP) voltage. • Cause ID = 2 The PV array is not properly configured. Excessive PV modules are connected in series to PV strings 3 and 4, and therefore the PV string open-circuit voltage exceeds the inverter MPP voltage. • Cause ID = 3 The PV array is not properly configured. Excessive PV modules are connected in series to PV strings 5 and 6, and therefore the PV string open-circuit voltage exceeds the inverter MPP voltage. • Cause ID = 4 The PV array is not properly configured. Excessive PV modules are connected in series to PV strings 7 and 8, and therefore the PV string open-circuit voltage exceeds the inverter MPP voltage. 	<ul style="list-style-type: none"> • Cause ID = 1 Reduce the number of PV modules connected in series to PV strings 1 and 2 until the open-circuit voltage is less than or equal to the maximum inverter input voltage. After the PV array configuration is corrected, the inverter alarm disappears. • Cause ID = 2 Reduce the number of PV modules connected in series to PV strings 3 and 4 until the open-circuit voltage is less than or equal to the maximum inverter input voltage. After the PV array configuration is corrected, the inverter alarm disappears. • Cause ID = 3 Reduce the number of PV modules connected in series to PV strings 5 and 6 until the open-circuit voltage is less than or equal to the maximum inverter input voltage. After the PV array configuration is corrected, the inverter alarm disappears. • Cause ID = 4 Reduce the number of PV modules connected in series to PV strings 7 and 8 until the open-circuit voltage is less than or equal to the maximum inverter input voltage. After the PV array configuration is corrected, the inverter alarm disappears.

Alarm ID	Alarm Name	Alarm Severity	Possible Cause	Suggestion
106-1 13	Abnormal String 1-8	Warning	Cause ID = 1 <ul style="list-style-type: none"> The PV string is shielded from sunlight for a long time. The PV string deteriorates or is damaged. 	<ol style="list-style-type: none"> Check whether the PV string current is obviously lower than the currents of other PV strings. If yes, check whether the PV string is shielded from sunlight. If the PV string is clean and not shielded from sunlight, check whether any PV module is faulty.
120-1 27	String 1-8 Reversed	Cause ID = 1: Major Cause ID = 2: Warning	<ul style="list-style-type: none"> Cause ID = 1 The PV string is reversely connected. Cause ID = 2 Only a few PV modules are connected in series to the PV string, and therefore the end voltage is lower than that of other PV strings. 	<ul style="list-style-type: none"> Cause ID = 1 Check whether the PV string is reversely connected to the inverter. If yes, turn off the two DC switches after the PV string voltage drops within the safe voltage range (lower than 60 V DC), and then correct the PV string connection. Cause ID = 2 Check whether the number of PV modules connected in series to the inverter is small. If yes, increase the number.

Alarm ID	Alarm Name	Alarm Severity	Possible Cause	Suggestion
200	Abnormal DC Circuit	Major	<p>Abnormal external conditions trigger the protection for the DC circuit inside the inverter. The possible causes are as follows:</p> <ul style="list-style-type: none"> • Cause ID = 3 The inverter input is disconnected accidentally, or the PV string output power changes sharply because the PV string is shielded from sunlight. • Cause ID = 10 The three phases of the power grid are seriously unbalanced, which triggers the protection for the internal control circuit of the inverter. • Cause ID = 11 The power grid voltage changes sharply and the inverter input power fails to discharge in a short time, which increases the internal voltage and triggers overvoltage protection. • Cause ID = 12/15 An unrecoverable fault occurs on a circuit inside the inverter. 	<p>Cause ID = 3/10/11</p> <ol style="list-style-type: none"> 1. The inverter detects its external working conditions in real time. After the fault is rectified, the inverter automatically recovers. 2. If the alarm occurs repeatedly, contact Huawei technical support. <p>Cause ID = 12/15</p> <p>Turn off the AC output switch and DC input switch. Then turn on the AC output switch and DC input switch after 5 minutes. If the fault persists, contact Huawei technical support.</p>

Alarm ID	Alarm Name	Alarm Severity	Possible Cause	Suggestion
202	Abnormal Invert Circuit	Major	<p>Abnormal external conditions trigger the protection for the inverter circuit inside the inverter. The possible causes are as follows:</p> <ul style="list-style-type: none"> • Cause ID = 13 The power grid voltage drops dramatically or the power grid is short-circuited, which damages the internal voltage detection circuit in the inverter. • Cause ID = 14 The power grid voltage drops dramatically or the power grid is short-circuited. As a result, the inverter transient output current exceeds the upper threshold and therefore the inverter protection is triggered. • Cause ID = 16 The DC current in the power grid exceeds the upper threshold. • Cause ID = 20 The inverter output is short-circuited. As a result, the output current surges to a value above the upper limit, and the inverter protection is triggered. 	<p>Cause ID = 13/14/16</p> <ol style="list-style-type: none"> 1. The inverter detects its external working conditions in real time. After the fault is rectified, the inverter automatically recovers. 2. If the alarm occurs repeatedly, contact Huawei technical support. <p>Cause ID = 20</p> <ol style="list-style-type: none"> 1. Check the inverter output cable for short-circuits. 2. If the alarm occurs repeatedly, contact Huawei technical support.

Alarm ID	Alarm Name	Alarm Severity	Possible Cause	Suggestion
301	Abnormal Grid Voltage	Major	<p>The power grid voltage is beyond the acceptable range. The possible causes are as follows:</p> <ul style="list-style-type: none"> • Cause ID = 4 The power grid voltage is below the specified lower threshold. • Cause ID = 16 The power grid voltage exceeds the specified upper threshold. • Cause ID = 19 The power grid voltage has exceeded the specified upper threshold for 10 minutes. • Cause ID = 26 The power grid voltage exceeds the specified upper threshold. • Cause ID = 28 The three phases of the power grid differ greatly in voltage. • Cause ID = 29 <ol style="list-style-type: none"> 1. The power grid experiences an outage. 2. The AC circuit is disconnected or AC circuit breaker is off. • Cause ID = 31–33 The impedance of the output phase wire A/B/C to the PE is low or short-circuited. 	<p>Cause ID = 4</p> <ol style="list-style-type: none"> 1. If the alarm occurs accidentally, the power grid may be abnormal temporarily. The inverter automatically recovers after detecting that the power grid becomes normal. 2. If the alarm occurs frequently, check whether the power grid voltage is within the acceptable range. If no, contact the local power operator. If yes, log in to the SUN2000 APP, SmartLogger, or the NetEco to modify the power grid overvoltage and undervoltage protection thresholds with the consent of the local power operator. 3. If the fault persists for a long time, check the AC circuit breaker and AC output power cable. <p>Cause ID = 16/19/26</p> <ol style="list-style-type: none"> 1. Check whether the grid-tied voltage exceeds the upper threshold. If yes, contact the local power operator. 2. If you have confirmed that the grid-tied voltage exceeds the upper threshold and obtained the consent of the local power operator, modify the overvoltage and undervoltage protection thresholds. 3. Check whether the peak power grid voltage exceeds the upper threshold. <p>Cause ID = 28</p> <ol style="list-style-type: none"> 1. If the exception is caused by an external fault, the inverter automatically recovers after the fault is rectified. 2. If the alarm persists and affects the energy yield of the power station, contact the local power operator. <p>Cause ID = 29</p> <ol style="list-style-type: none"> 1. Check the AC voltage. 2. Check that the AC power cable is securely connected and that the circuit breaker is ON. <p>Cause ID = 31–33</p> <p>Check the impedance of output phase wire A/B/C to the PE and locate the position with lower impedance and resolve the issue.</p>

Alarm ID	Alarm Name	Alarm Severity	Possible Cause	Suggestion
305	Abnormal Grid Frequency	Major	<ul style="list-style-type: none"> • Cause ID = 2 The actual power grid frequency is higher than the standard requirement for the local power grid. • Cause ID = 4 The actual power grid frequency is lower than the standard requirement for the local power grid. • Cause ID = 5 The actual change rate of the power grid frequency does not meet the standard requirement for the local power grid. 	<p>Cause ID = 2/4</p> <ol style="list-style-type: none"> 1. If the alarm occurs accidentally, the power grid may be abnormal temporarily. The inverter automatically recovers after detecting that the power grid becomes normal. 2. If the alarm occurs frequently, check whether the power grid frequency is within the acceptable range. If no, contact the local power operator. If yes, log in to the SUN2000 APP, SmartLogger, or the NetEco to modify the power grid overfrequency and underfrequency protection thresholds with the consent of the local power operator. <p>Cause ID = 5</p> <ol style="list-style-type: none"> 1. If the alarm occurs accidentally, the power grid may be abnormal temporarily. The inverter automatically recovers after detecting that the power grid becomes normal. 2. If the alarm occurs frequently, check whether the power grid frequency is within the acceptable range. If no, contact the local power operator.
313	Low Insulation Resistance	Major	<p>Cause ID = 1</p> <ul style="list-style-type: none"> • A short circuit occurs between the PV string and the PGND cable. • The PV string is installed in a moist environment for a long time. 	<ol style="list-style-type: none"> 1. Check the impedance between the PV string and the PGND cable. If a short circuit occurs, rectify the fault. 2. If you are sure that the impedance is less than the default value in a cloudy or rainy environment, log in to the SUN2000 APP, SmartLogger, or NetEco and set Insulation resistance protection.
318	Abnormal Residual Current	Major	<p>Cause ID = 1</p> <p>The insulation resistance against the PGND cable at the input side decreases when the inverter is running, which causes an excessively high residual current.</p>	<ol style="list-style-type: none"> 1. If the alarm occurs accidentally, the external circuit may be abnormal temporarily. The inverter automatically recovers after fault is rectified. 2. If the alarm occurs repeatedly or persists, check whether the impedance between the PV string and the ground is excessively low.

Alarm ID	Alarm Name	Alarm Severity	Possible Cause	Suggestion
321	Cabinet Overtemperature	Major	Cause ID = 1 <ul style="list-style-type: none"> The inverter is installed in a place with poor ventilation. The ambient temperature exceeds the upper threshold. The internal fan works abnormally. 	<ol style="list-style-type: none"> Check the ventilation and ambient temperature of the inverter installation position. If the ventilation is poor or the ambient temperature exceeds the upper threshold, improve the ventilation and heat dissipation. If the ventilation and ambient temperature both meet requirements, contact Huawei technical support.
322	Abnormal SPI Communication	Major	Cause ID = 1 An unrecoverable fault occurs on a circuit inside the inverter.	Turn off the AC output switch and DC input switch. Then turn on the AC output switch and DC input switch after 5 minutes. If the fault persists, contact Huawei technical support.
326	Abnormal Grounding	Major	Cause ID = 1 <ul style="list-style-type: none"> The neutral wire or PGND cable does not connect to the inverter. When you are grounding the PV string, you do not connect an isolation transformer to the inverter output. 	<ol style="list-style-type: none"> Check that the neutral wire or PGND cable properly connects to the inverter. If the PV string is grounded, check whether the inverter output needs to connect to an isolation transformer. If yes, connect the transformer to the inverter.
400	System Fault	Major	Cause ID = 1/3/21/23/27 An unrecoverable fault occurs on a circuit inside the inverter.	Turn off the AC output switch and DC input switch. Then turn on the AC output switch and DC input switch after 5 minutes. If the fault persists, contact Huawei technical support.
410	Abnormal Auxiliary Power	Major	Cause ID = 4 The sampling control board has an abnormal voltage, which may be caused by the following: <ul style="list-style-type: none"> The internal power chip of the sampling control board is faulty. The detection circuit becomes faulty. 	<ol style="list-style-type: none"> When the alarm is generated, the inverter shuts down automatically. When the fault is rectified, the inverter starts automatically. If the alarm occurs repeatedly, contact Huawei technical support.
504	Software Version Unmatch	Minor	Cause ID = 1/2/3 During inverter software upgrade, the version of the software loaded is incorrect.	Check whether you have performed a software upgrade recently. If yes, upgrade the software to the correct version again.

Alarm ID	Alarm Name	Alarm Severity	Possible Cause	Suggestion
505	Upgrade Failed	Major	Cause ID = 1 The upgrade does not end normally.	Perform the upgrade again.
61440	Flash Fault	Minor	Cause ID = 1 <ul style="list-style-type: none">The flash memory is insufficient.The flash memory has bad sectors.	<ol style="list-style-type: none">Replace the monitoring board.If the monitoring board is built into the monitoring device, replace the monitoring device.



NOTE

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

9 Handling the SUN2000

9.1 Removing the SUN2000



NOTICE

Before removing the SUN2000, disconnect both the AC and DC power supplies. For processes of disconnecting the power supplies, see [6.3 Powering Off the SUN2000](#). After powering off the SUN2000, wait at least 5 minutes before performing operations on it.

Perform the following operations to remove the SUN2000:

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

9.2 Packing the SUN2000

- If the original packing materials are available, put the SUN2000 inside them and then seal them by using adhesive tape.
- If the original packing materials are unavailable, put the SUN2000 inside a suitable hard carton and seal it properly.

9.3 Disposing of the SUN2000

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

10 Technical Specifications

Efficiency

Item	SUN2000-36KTL	SUN2000-42KTL
Maximum conversion efficiency	98.8%	98.8%
European efficiency	98.6%	98.6%

Input

Item	SUN2000-36KTL	SUN2000-42KTL
Maximum input power (cos $\varphi = 1$)	40,800 W	47,900 W
Maximum input voltage	1100 V	
Maximum input current (per MPPT)	22 A	
Maximum inverter backfeed current to the PV array	0 A	
Minimum startup voltage	250 V	
MPP voltage range	200–1000 V	
Full load MPP voltage range	480–850 V/580–850 V ^a	580–850 V
Rated input voltage	620 V/720 V ^b	720 V
Number of inputs	8	
Number of MPPTs	4	
Note a: If the rated output voltage of the SUN2000-36KTL is 380 V AC or 400 V AC, the MPP voltage range at full load is 480–850 V. If the rated output voltage is 480 V, the MPP voltage range at full load is 580–850 V.		

Item	SUN2000-36KTL	SUN2000-42KTL
Note b: If the rated output voltage of the SUN2000-36KTL is 380 V AC or 400 V AC, the rated input voltage is 620 V. If the rated output voltage is 480 V, the rated input voltage is 720 V.		

Output

Item	SUN2000-36KTL	SUN2000-42KTL
Rated output power	36,000 W	42,000 W
Maximum apparent power	40,000 VA	47,000 VA
Maximum AC output power ^a (cos φ = 1)	40,000 W (can be set to 36,000 W)	47,000 W (can be set to 42,000 W)
Rated output voltage ^b	220 V AC/380 V AC, 230 V AC/400 V AC, 3W+(N) ^c +PE; 277 V AC/480 V AC, 3W+PE	277 V/480 V, 3W+PE
Adapted power grid frequency	50 Hz/60 Hz	
Maximum output current	60.8 A (380 V AC)/57.8 A (400 V AC)/48.2 A (480 V AC)	56.6 A (480 V AC)
Power factor	0.8 leading ... 0.8 lagging	
Total harmonic distortion (THD)	< 3%	
<p>Note a: The maximum AC output power depends on PQ mode, which can be set on the SUN2000 APP, SmartLogger, or NetEco. If PQ mode 1 is selected, the maximum AC output power equals the maximum apparent power. If PQ mode 2 is selected, the maximum AC output power equals the rated output power.</p> <p>Note b: The rated output voltage depends on Grid code, which can be set on the SUN2000 APP, SmartLogger, or NetEco.</p> <p>Note c: Choose whether to connect the neutral wire to the SUN2000-36KTL based on the application scenario. When the SUN2000-36KTL is used in a low-voltage scenario without the neutral wire, set Output mode to Three-phase, three-wire without N line on the SUN2000 APP, SmartLogger, or NetEco.</p>		

Protection

Item	SUN2000-36KTL	SUN2000-42KTL
Input DC switch	Supported	
Standalone operating detection (anti-islanding)	Supported	

Item	SUN2000-36KTL	SUN2000-42KTL
protection)		
Output overcurrent protection	Supported	
Input reverse connection protection	Supported	
PV string fault detection	Supported	
DC surge protection	Type II	
AC surge protection	Type II	
Insulation resistance detection	Supported	
Residual current device (RCD) detection	Supported	

Communication

Item	SUN2000-36KTL	SUN2000-42KTL
Display	LED indicator, Bluetooth module + APP, USB data cable + APP	
RS485	Supported	
USB	Supported	
PLC	Supported	
FE	Optional ^a	Not supported
Note a: If the SUN2000-36KTL adopts the FE communication mode, it supports only the RS485 and FE communication modes, and does not support the PLC communication mode.		

Common Parameters

Item	SUN2000-36KTL	SUN2000-42KTL
Dimensions (W x H x D)	930 mm x 550 mm x 260 mm	
Weight	55 kg	
Operating temperature	-25 °C to +60 °C	
Cooling mode	Natural convection	
Altitude	5000 m (derated when the altitude is greater than 4000 m)	
Humidity	0%–100% RH	

Item	SUN2000-36KTL	SUN2000-42KTL
Input terminal	Amphenol HH4	
Output terminal	Waterproof PG connector + OT terminal	
Protection level	IP65	
Topology	Transformerless	

Standards Compliance

Item	SUN2000-36KTL	SUN2000-42KTL
Criterion	EN/IEC 61000-1, EN/IEC 61000-2, EN/IEC 61000-3, EN/IEC 61000-4, EN/IEC 62109-1, EN/IEC 62109-2	

A Power Grid Standard Code

 **NOTE**

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

[Table A-1](#) lists the power grid standard codes which the SUN2000-36KTL supports.

Table A-1 Power grid codes (SUN2000-36KTL)

No.	Power Grid Code	Country and Condition	Power Grid Voltage
1	VDE-AR-N-4105	Germany low-voltage power grid	230 V/400 V
2	NB/T 32004	China low-voltage power grid	220 V/380 V
3	UTE C 15-712-1(A)	France mainland low-voltage power grid	230 V/400 V
4	UTE C 15-712-1(B)	France islands 230 V 50 Hz	230 V/400 V
5	UTE C 15-712-1(C)	France islands 230 V 60 Hz	230 V/400 V
6	BDEW-MV	Germany medium-voltage power grid	230 V/400 V
7	G59-England	England 230 V power grid (I > 16 A)	230 V/400 V
8	G59-Scotland	Scotland 240 V power grid (I > 16 A)	240 V/415 V
9	CEI0-21	Italy low-voltage power grid	230 V/400 V
10	EN50438-CZ	Czech Republic low-voltage power grid	240 V/415 V
11	RD1699/661	Spain low-voltage power grid	230 V/400 V
12	RD1699/661-MV480	Spain medium-voltage power grid	277 V/480 V
13	C10/11	Belgium low-voltage power grid	230 V/400 V
14	AS4777	Australia low-voltage power grid	230 V/400 V

No.	Power Grid Code	Country and Condition	Power Grid Voltage
15	IEC61727	IEC low-voltage power grid (50 Hz)	230 V/400 V
16	CEI0-16	Italy low-voltage power grid	230 V/400 V
17	TAI-MEA	Thailand low-voltage power grid (MEA)	230 V/400 V
18	TAI-PEA	Thailand low-voltage power grid (PEA)	220 V/380 V
19	BDEW-MV480	Germany medium-voltage power grid	277 V/480 V
20	G59-England-MV480	England medium-voltage (I > 16 A)	220 V/380 V
21	IEC61727-MV480	IEC medium-voltage power grid (50 Hz)	230 V/400 V
22	UTE C 15-712-1-MV480	France medium-voltage power grid	277 V/480 V
23	TAI-PEA-MV480	Thailand medium-voltage power grid (PEA)	277 V/480 V
24	TAI-MEA-MV480	Thailand medium-voltage power grid (MEA)	277 V/480 V
25	EN50438-DK-MV480	Denmark medium-voltage power grid	277 V/480 V
26	EN50438-TR-MV480	Turkey medium-voltage power grid	277 V/480 V
27	EN50438-TR	Turkey low-voltage power grid	230 V/400 V
28	C11/C10-MV480	Belgium medium-voltage power grid	277 V/480 V
29	Philippines	Philippines low-voltage power grid	220 V/380 V
30	Philippines-MV480	Philippines medium-voltage power grid	277 V/480 V
31	AS4777-MV480	Australia medium-voltage power grid	277 V/480 V
32	NRS-097-2-1	South Africa low-voltage power grid	230 V/400 V
33	NRS-097-2-1-MV480	South Africa medium-voltage power grid	277 V/480 V
34	KOREA	South Korea low-voltage power grid	220 V/380 V

No.	Power Grid Code	Country and Condition	Power Grid Voltage
35	IEC61727-60 Hz	IEC low-voltage power grid (60 Hz)	230 V/400 V
36	IEC61727-60 Hz-MV480	IEC medium-voltage power grid (60 Hz)	277 V/480 V
37	ANRE	Romania low-voltage power grid	230 V/400 V
38	ANRE-MV480	Romania medium-voltage power grid	277 V/480 V
39	PO12.3-MV480	Spain medium-voltage power grid	277 V/480 V
40	EN50438_IE-MV480	Ireland medium-voltage power grid	277 V/480 V
41	EN50438_IE	Ireland low-voltage power grid	277 V/480 V
42	VDE-AR-N-4105-MV480	Germany medium-voltage power grid	277 V/480 V
43	CEI0-16-MV480	Italy medium-voltage power grid	277 V/480 V
44	Custom(50 Hz)	Reserved	230 V/400 V
45	Custom(60 Hz)	Reserved	230 V/400 V
46	Custom-MV480(50 Hz)	Reserved	277 V/480 V
47	Custom-MV480(60 Hz)	Reserved	277 V/480 V

Table A-2 lists the power grid standard codes which the SUN2000-42KTL supports.

Table A-2 Power grid codes (SUN2000-42KTL)

No.	Power Grid Code	Country and Condition	Rated Power Grid Voltage
1	RD1699/661-MV480	Spain medium-voltage power grid	277 V/480 V
2	BDEW-MV480	Germany medium-voltage power grid	277 V/480 V
3	G59-England-MV480	England medium-voltage (I > 16 A)	277 V/480 V
4	IEC61727-MV480	IEC medium-voltage power grid (50 Hz)	277 V/480 V
5	UTE C 15-712-1-MV480	France island medium-voltage power grid	277 V/480 V
6	TAI-PEA-MV480	Thailand medium-voltage power	277 V/480 V

No.	Power Grid Code	Country and Condition	Rated Power Grid Voltage
		grid (PEA)	
7	TAI-MEA-MV480	Thailand medium-voltage power grid (MEA)	277 V/480 V
8	EN50438-DK-MV480	Denmark medium-voltage power grid	277 V/480 V
9	EN50438-TR-MV480	Turkey medium-voltage power grid	277 V/480 V
10	Philippines-MV480	Philippines medium-voltage power grid	277 V/480 V
11	NRS-097-2-1-MV480	South Africa medium-voltage power grid	277 V/480 V
12	IEC61727-60 Hz-MV480	IEC medium-voltage power grid (60 Hz)	277 V/480 V
13	PO12.3-MV480	Spain medium-voltage power grid	277 V/480 V
14	EN50438_IE-MV480	Ireland medium-voltage power grid	277 V/480 V
15	VDE-AR-N-4105-MV480	Germany medium-voltage power grid	277 V/480 V
16	CEI0-16-MV480	Italy medium-voltage power grid	277 V/480 V
17	Custom-MV480(50 Hz)	Reserved	277 V/480 V
18	Custom-MV480(60 Hz)	Reserved	277 V/480 V

B Acronyms and Abbreviations

A

ACDU AC distribution unit

C

CCO central controller

E

EFUP environmentally friendly use period

L

LED light emitting diode

M

MPP maximum power point

MPPT maximum power point tracking

N

NMS network management system

P

PID potential induced degradation

PLC power line communication

PV photovoltaic

R

RCD

residual current device

T

THD

total harmonic distortion

W

WEEE

waste electrical and electronic equipment