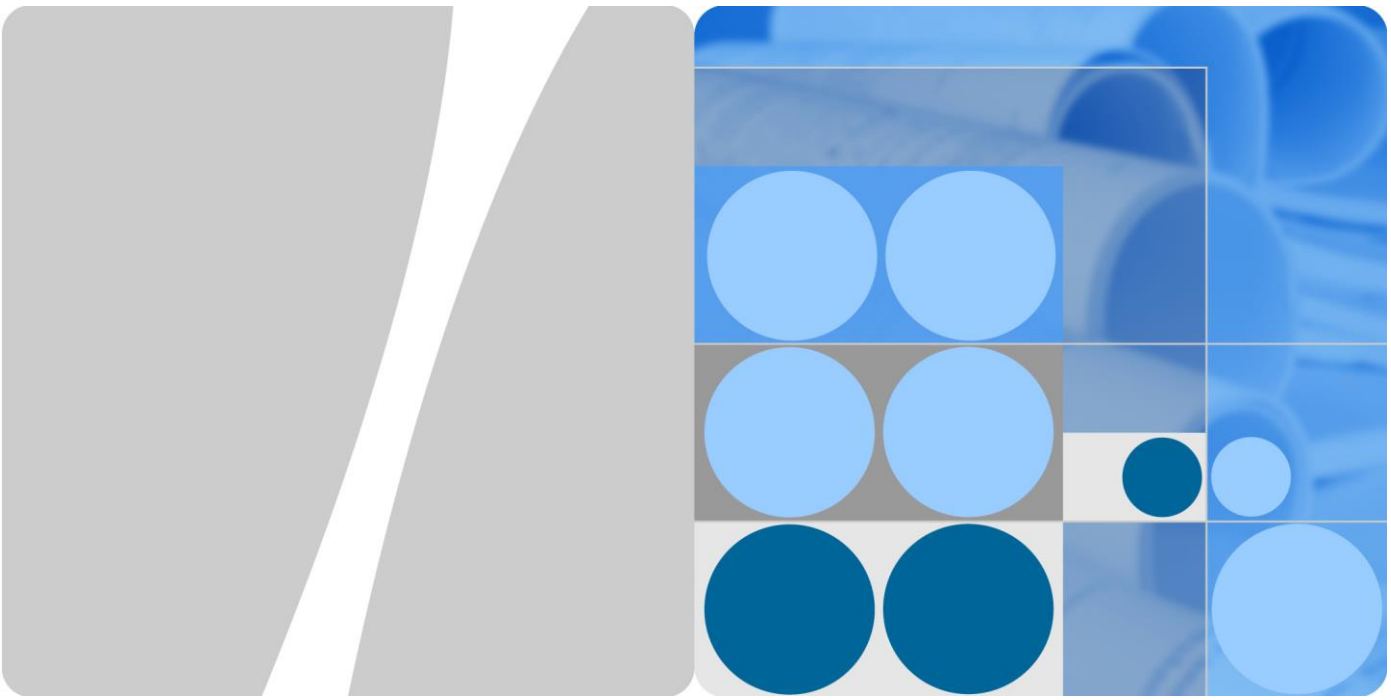

SUN2000-100KTL-USH0

User Manual

Issue 02

Date 2018-06-01

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About This Document

Purpose

This document describes the SUN2000-100KTL-USH0 (abbreviated as SUN2000) in terms of its installation, electrical connection, commissioning, maintenance, and troubleshooting. Before installing and operating the SUN2000, ensure that you are familiar with the features, functions, and safety precautions provided in this document.

Key Safety Notes

Save These Instructions: This manual contains important instructions that shall be followed during installation and maintenance of the SUN2000.

Note: Changes or modifications not expressly approved by the party responsible for compliance may void the user's authority to operate the equipment.

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
	Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
	Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

Symbol	Description
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 02 (2018-06-01)

Changed **Supported Power Grids** in 2.2 Introduction to **Supported Power Grid Earthing Systems**. Added three power grid earthing systems supported by the SUN2000. Deleted the description that "The SUN2000 only supports the IT power grid mode" and that "The SUN2000 is mainly used for medium-voltage power grids. It delivers three-phase, three-wire output, which is then fed to a medium-voltage power grid through a step-up transformer."

Updated 8.2 Routine Maintenance.

Issue 01 (2018-02-08)

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

Contents

1 Safety Precautions

General Safety

NOTICE

- Before performing operations, read through this manual and follow all the precautions to prevent accidents. The "DANGER", "WARNING", "CAUTION", and "NOTICE" marks in this document do not represent all the safety instructions. They are only supplements to the safety instructions.
- The personnel responsible for installing, connecting cables for, commissioning, maintaining, and troubleshooting Huawei products should be qualified and trained to master the correct operation methods and the knowledge of safety precautions.

When operating Huawei equipment, in addition to following the general precautions in this document, follow the specific safety instructions given by Huawei. The safety precautions provided in this document do not cover all the safety precautions. Huawei shall not be liable for any consequence caused by the violation of the safety operation regulations and design, production, and usage standards.

Disclaimer

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

- Transportation damage
- Violation of the storage requirements specified in this document
- Incorrect storage, installation, or use
- Installation or use by unqualified personnel
- Failure to obey the operation instructions and safety precautions in this document
- Operation in extreme environments which are not covered in this document
- Operation beyond specified ranges
- Unauthorized modifications to the product or software code or removal of the product
- Device damage due to force majeure (such as lightning, earthquake, fire, and storm)
- The warranty expires and the warranty service is not extended.

- Installation or use in environments which are not specified in related international standards

Personnel Requirements

Only certified electricians are allowed to install, connect cables for, commission, maintain, troubleshoot, and replace the SUN2000. Operation personnel must meet the following requirements:

- Receive professional training.
- Read through this document and follow all the precautions.
- Be familiar with the safety specifications about the electrical system.
- Understand the components and functioning of a grid-tied PV system, and be familiar with relevant local standards.
- Wear proper personal protective equipment (PPE) during any operation on the SUN2000.

Protect Labels

- Do not scrawl, damage, or block the labels on the SUN2000 enclosure.
- Do not scrawl, damage, or block the nameplate on the side of the SUN2000 enclosure.

Installation

DANGER

Never work under power during installation.

- Ensure that the SUN2000 is not connected to a power supply or powered on before finishing installation.
- Ensure that the SUN2000 is installed in a well-ventilated environment.
- Ensure that the SUN2000 heat sinks are free from blockage.
- Never open the host panel cover of the SUN2000.

Electrical Connections

DANGER

Before connecting cables to the SUN2000, ensure that the SUN2000 is secured in position and not damaged in any way. Otherwise, electric shocks or fire may occur.

- All the electrical installations must comply with the local standards, including the American National Electrical Code ANSI/NFPA 70 and Canadian Electrical Code CSA C22.1.
- Before connecting the inverter to the utility grid, contact local grid operator. The electrical connection of the inverter must be carried out by qualified persons only.

- Obtain approval from the local electric utility before using the SUN2000 to generate electricity in grid-tied mode.
- Ensure that the cables used in a grid-tied PV system are properly connected and insulated and meet all specification requirements.

Operation

DANGER

High voltage may cause an electric shock, which results in serious injury, death or serious property damage from the SUN2000 in operation. Strictly comply with the safety precautions in this document and associated documents to operate the SUN2000.

- Do not touch an energized SUN2000 because the heat sink has a high temperature.
- Follow local laws and regulations when operating the SUN2000.

Maintenance and Replacement

DANGER

High voltage may cause an electric shock, which results in serious injury, death or serious property damage from the SUN2000 in operation. Prior to maintenance, power off the SUN2000 and strictly comply with the safety precautions in this document and associated documents to operate the SUN2000.

- Maintain the SUN2000 with sufficient knowledge of this document, proper tools, and testing equipment.
- Before performing maintenance tasks, power off the SUN2000 and wait for at least 15 minutes.
- Temporary warning labels or fences must be placed to prevent unauthorized people entering the site.
- Rectify any faults that may compromise the SUN2000 security performance before powering on the SUN2000 again.
- Observe ESD precautions during maintenance.

2 Overview

2.1 Product Model

Model Number Description

Figure 2-1 Model number

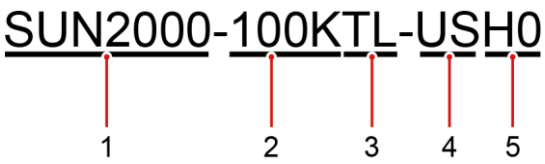


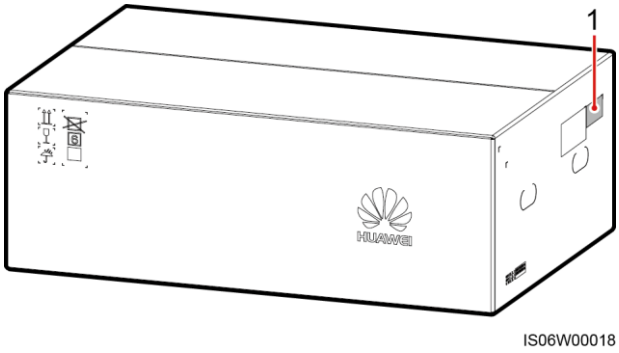
Table 2-1 Model number description

No.	Meaning	Value
1	Series name	SUN2000: grid-tied PV inverter
2	Power	100K: 100 kW
3	Topology	TL: transformerless
4	Region	US: North America
5	Design code	H0: the product series with the 1500 V DC input voltage

Model Identification

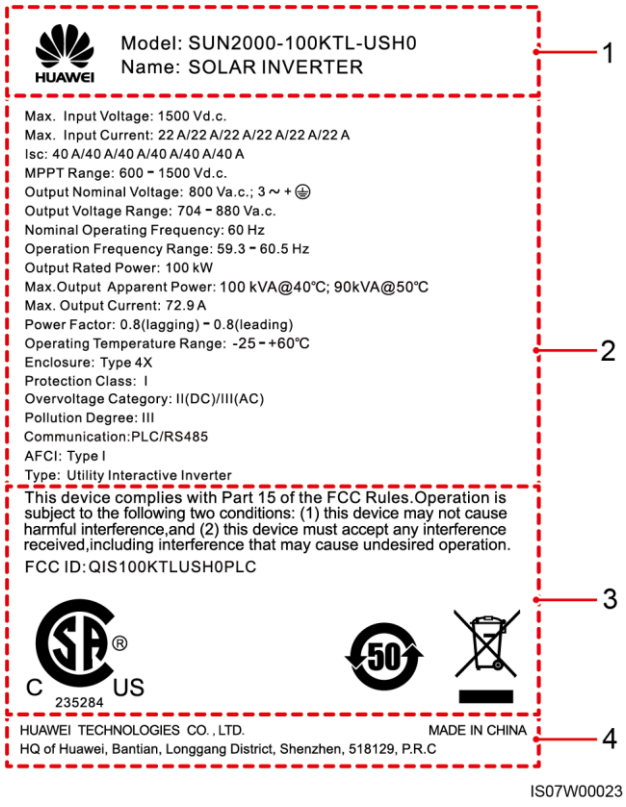
You can query the SUN2000 number by the model label on the external package and the nameplate on the side of the enclosure.

Figure 2-2 Label position on the external package



(1) Position of the model label

Figure 2-3 Nameplate



(1) Trademark and model

(2) Important technical specifications

(3) Compliance symbols

(4) Company name and country of manufacture

NOTE

The nameplate figure is for reference only.

Table 2-2 Compliance symbols

Symbol	Name	Meaning
This device complies with Part 15 of the FCC Rules.Operation is subject to the following two conditions: (1) this device may not cause harmful interference,and (2) this device must accept any interference received,including interference that may cause undesired operation.	American FCC Part 15B certification	The SUN2000 complies with FCC Part 15B certification standards.
FCC ID:QIS100KTLUSH0PLC	American FCC Part 15G certification	The SUN2000 complies with FCC Part 15G certification standards.
C US 235284	CSA certification of America and Canada	The SUN2000 complies with CSA certification standards.
50	Environment friendly use period (EFUP) mark	The product does not pollute the environment during the specified period.
	EU waste electrical and electronic equipment (WEEE) mark	Do not dispose of the product as household garbage.

2.2 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 to the power grid.

Features

Intelligent

- 6 independent maximum power point tracking (MPPT) circuits and 12 PV string inputs: Support the flexible configuration of 2+2+2+2+2+2 strings.
- 12 routes of high-precision smart PV string monitoring: Help identify and rectify exceptions in a timely manner.
- Power line communication (PLC) networking: Uses the existing power line for communication and does not require an additional communications cable, which reduces the construction and maintenance costs and improving communication reliability and efficiency.
- Smart I-V curve diagnosis: Implements I-V scanning and health diagnosis for PV strings. In this way, potential risks and faults can be detected in time, improving the plant O&M quality.

Efficient

- Peak efficiency: 99%

- CEC efficiency: 98.5%

Safe

- Arc fault protection (AFCI: arc fault circuit interrupter): UL 1699B Type I
- Embedded DC and AC SPDs: all-dimensional surge protection
- Embedded residual current monitoring unit: Immediately disconnects from the power grid upon detecting that the residual current exceeds the threshold.

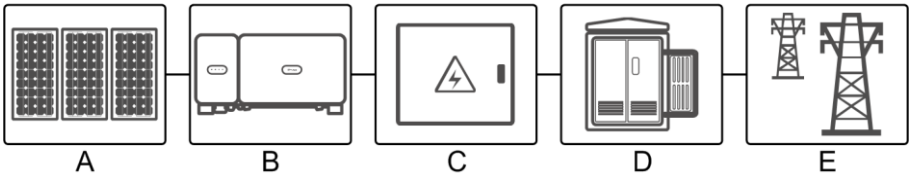
Reliable

- Natural cooling
- No-fuse design
- Protected to Type 4X
- Effective design for ground subsidence: The AC terminal block can be pulled down by up to 50 mm (1.97 in.) due to cable overstress.

Networking Application

The SUN2000 applies to distributed grid-tied commercial PV systems and large-scale grid-tied PV plants. Typically, a grid-tied PV system consists of the PV string, SUN2000, AC combiner box, and step-up transformer.

Figure 2-4 Networking application



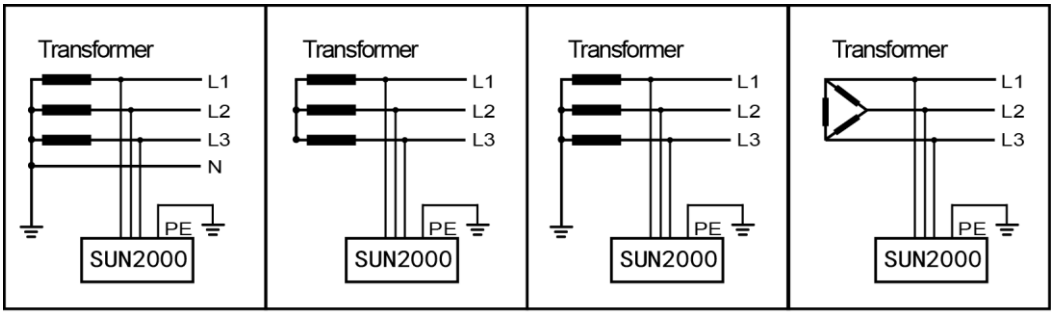
(A) PV string (B) SUN2000 (C) AC combiner box

(D) Step-up transformer (E) Power grid

Supported Power Grid Earthing Systems

The following figure shows the power grid earthing systems supported by the SUN2000.

Figure 2-5 Power Grid Earthing System



NOTE

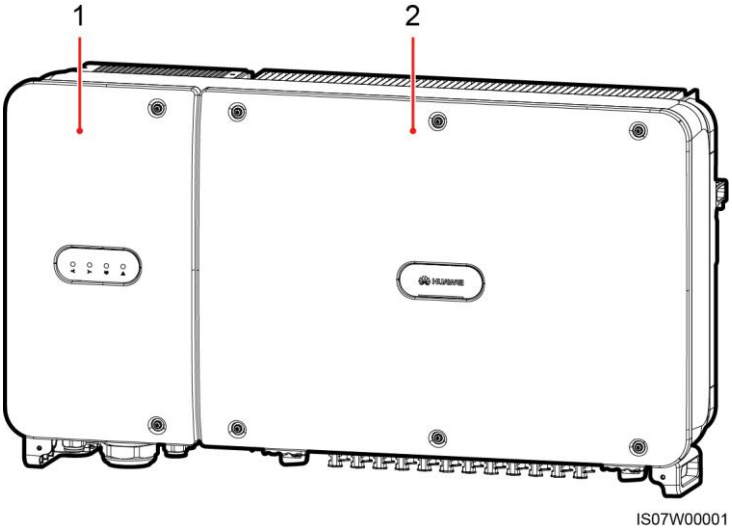
The SUN2000 can be installed in common transformer secondary winding configuration such as neutral grounded Y, neutral ungrounded Y, delta (floating). For any other transformer configuration, please contact Huawei.

2.3 Product Appearance

2.3.1 Appearance

Front View

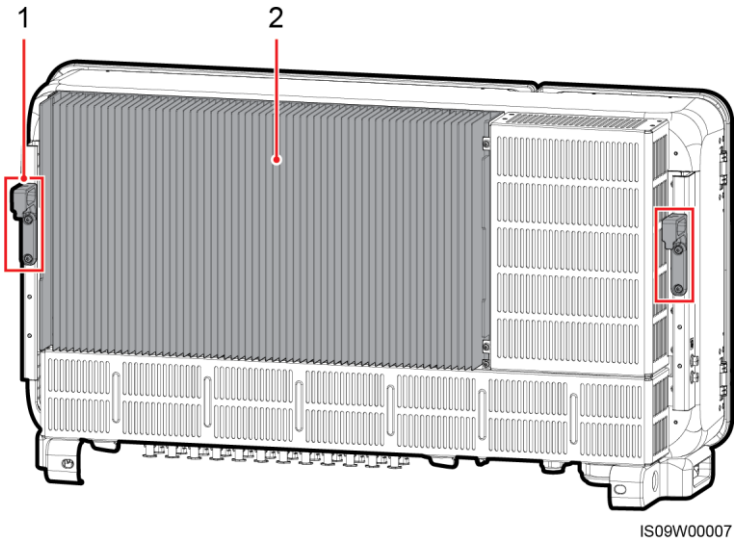
Figure 2-6 Front view



(1) Maintenance compartment door (2) Host panel

Rear View

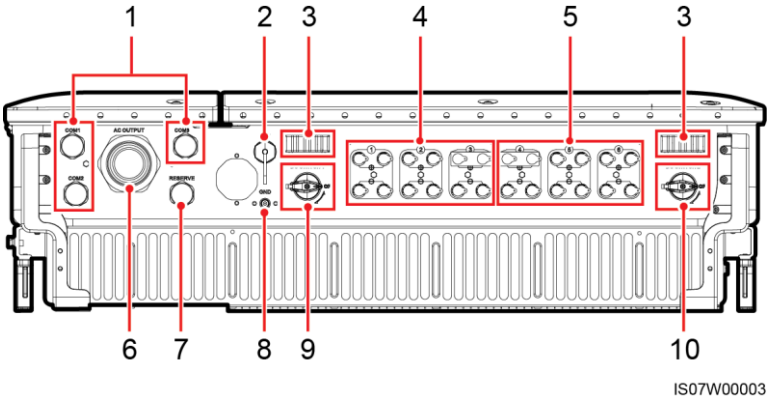
Figure 2-7 Rear view



(1) Mounting plate (2) Heat sink

Bottom View

Figure 2-8 Bottom view



No.	Component	Silk Screen	Description
1	3/4 in. cable gland	COM1, COM2, and COM3	Inner diameter: 14–18 mm (0.55–0.71 in.)
2	USB port	USB	Use the USB port only during maintenance (such as power-on and setting, upgrade, and data export). Ensure that the USB cover is tightened when the USB port is not

No.	Component	Silk Screen	Description
			in use.
3	Handler	N/A	N/A
4	DC input terminals	+/–	Controlled by DC SWITCH 1
5	DC input terminals	+/–	Controlled by DC SWITCH 2
6	2-1/2 in. cable gland	AC OUTPUT	Inner diameter: 30–57 mm (1.18–2.24 in.)
7	3/4 in. cable gland	RESERVE	Inner diameter: 14–18 mm (0.55–0.71 in.)
8	PV side ground point	GND	N/A
9	DC switch 1	DC SWITCH 1	N/A
10	DC switch 2	DC SWITCH 2	N/A

Dimensions

Figure 2-9 Dimensions

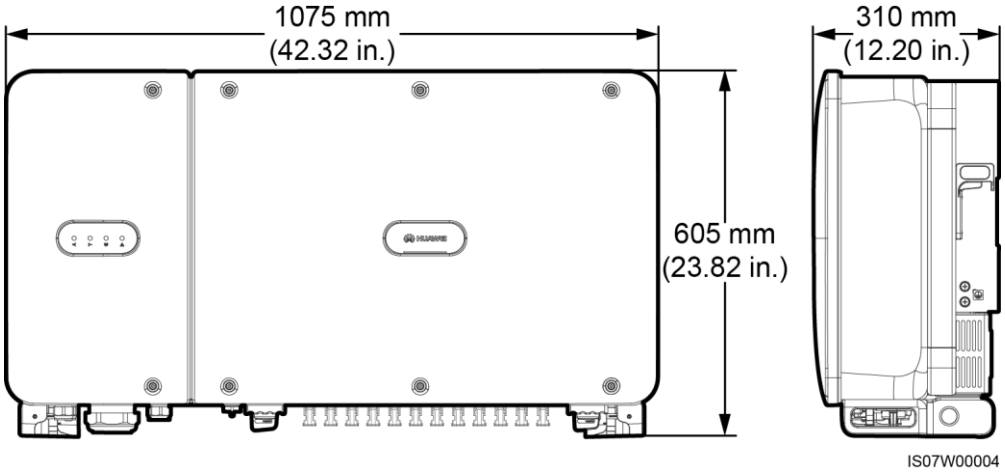


Figure 2-10 Mounting bracket dimensions

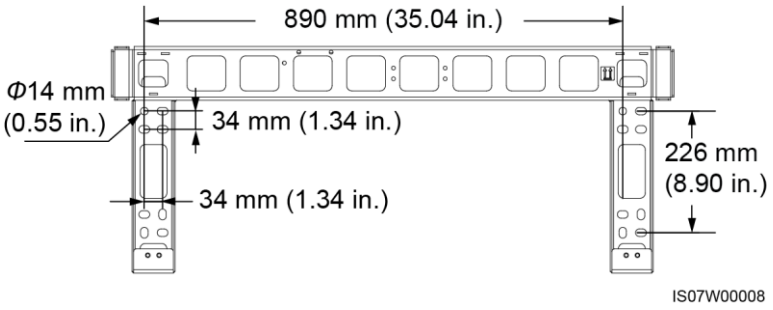
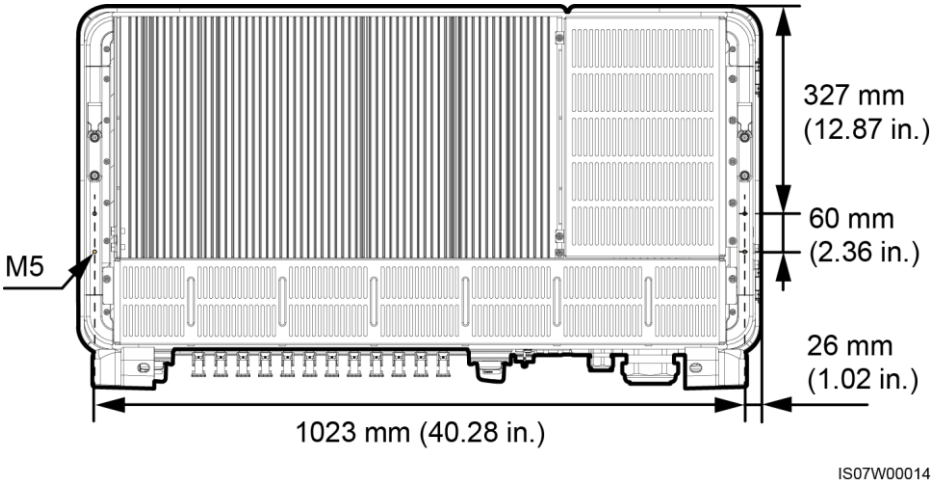


Figure 2-11 Dimensions of reserved holes on the rear

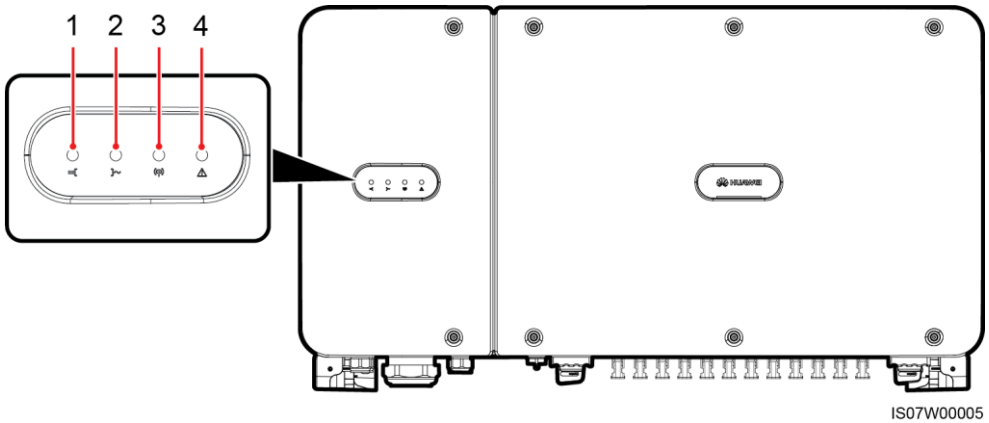


NOTE

Four M5 tapped holes are reserved on the rear of the SUN2000 for installing an awning.

2.3.2 Indicator Status

Figure 2-12 Indicators



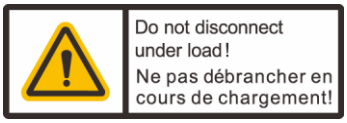
No.	Indicator	Status		Meaning
1	PV connection indicator 	Steady green		At least one PV string is properly connected, and the DC input voltage of the corresponding MPPT circuit is higher than or equal to 600 V.
		Off		The SUN2000 disconnects from all PV strings, or the DC input voltage of each MPPT circuit is less than 600 V.
2	Grid-tied indicator 	Steady green		The SUN2000 is in grid-tied mode.
		Off		The SUN2000 is not in grid-tied mode.
3	Communication indicator 	Blinking green		The SUN2000 is receiving data over RS485 or PLC.
		Off		The SUN2000 has not received data over RS485 or PLC for 10 seconds.
4	Alarm/Maintenance indicator 	Alarm state	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 major alarm is generated.
		Local maintenance state	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 the alarming and the local maintenance happen concurrently, the alarm/maintenance indicator shows the local maintenance state first. After the USB flash drive, Bluetooth module, or USB data cable is removed, the indicator shows the alarm state.

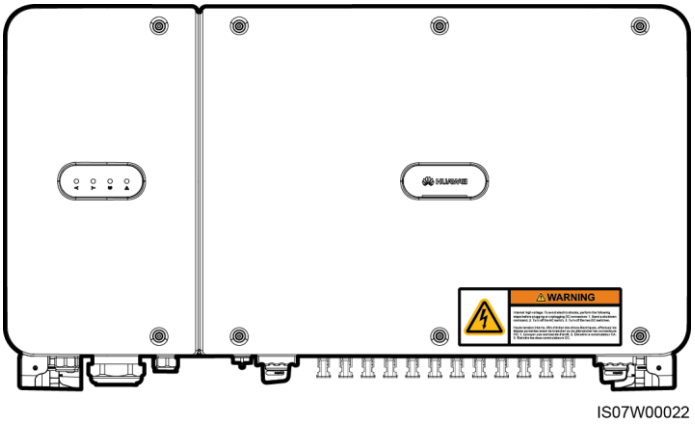
2.3.3 Enclosure Labels

Label	Name	Meaning
	Electric shock	• Lethal voltages 1500 V DC. Keep out. • No user serviceable parts inside. Only trained service personnel are allowed access. • Both AC and DC voltage sources are terminated inside this equipment. Each circuit must be disconnected before servicing. • When the photovoltaic array is exposed to light, it supplies DC voltage to this equipment. • The DC conductors of this photovoltaic system are ungrounded and may be energized. • The DC conductors of this photovoltaic system are normally ungrounded but will become intermittently grounded without indication when the SUN2000 measures the PV array isolation. • High voltage exists after the SUN2000 is powered on. To avoid electric shocks, perform the following system power-off operations before plugging or unplugging DC input connectors of the SUN2000: 1. Send a shutdown command.

Label	Name	Meaning
		2. Turn off the downstream AC switch. 3. Turn off the two DC switches at the bottom.
	Running warning	Potential hazards exist after the SUN2000 is powered on. Take protective measures when operating the SUN2000.
	Burn warning	Do not touch a running SUN2000 because it generates high temperatures on the shell.
	Delay discharge	• High voltage exists after the SUN2000 is powered on. Only certified electricians are allowed to perform operations on the SUN2000. • Residual voltage exists after the SUN2000 is powered off. It takes 15 minutes for the SUN2000 to discharge to the safe voltage.
	Refer to documentation	Reminds operators to refer to the documents provided with the SUN2000.
	Transformerless inverter	The SUN2000 output does not pass through an isolation transformer.
	Grounding	Indicates the position for connecting the PE cable.
	Operation warning	Do not remove the DC input connector when the SUN2000 is running.
	DC terminal operation warning[a]	High voltage exists after the SUN2000 is powered on. To avoid electric shocks, perform the following system power-off operations before plugging or unplugging DC input connectors of the

Label	Name	Meaning
		SUN2000: 1. Send a shutdown command. 2. Turn off the downstream AC switch. 3. Turn off the two DC switches at the bottom.
	SUN2000 serial number (SN) label	Indicates the SUN2000 SN.
	Weight label	The SUN2000 needs to be carried by more than one person or using a pallet truck.
Note a: The 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. Or you can select a position for attaching the label based on site requirements.		

Figure 2-13 Position for attaching the DC terminal operation warning

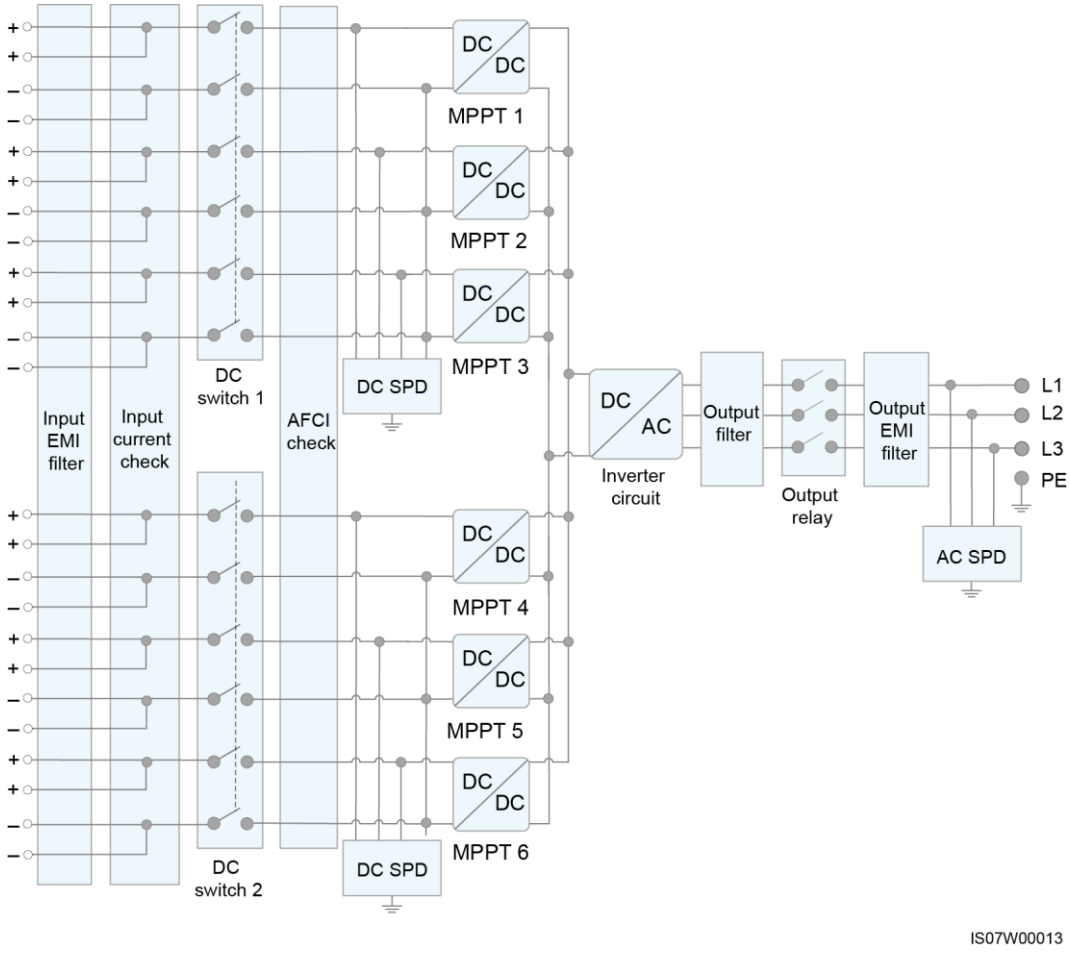


2.4 Working Principles

2.4.1 Conceptual Diagram

The SUN2000 receives inputs from 12 PV strings. The inputs are grouped into 6 MPPT circuits 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 2-14 Conceptual diagram



2.4.2 Working Modes

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

Figure 2-15 Working modes

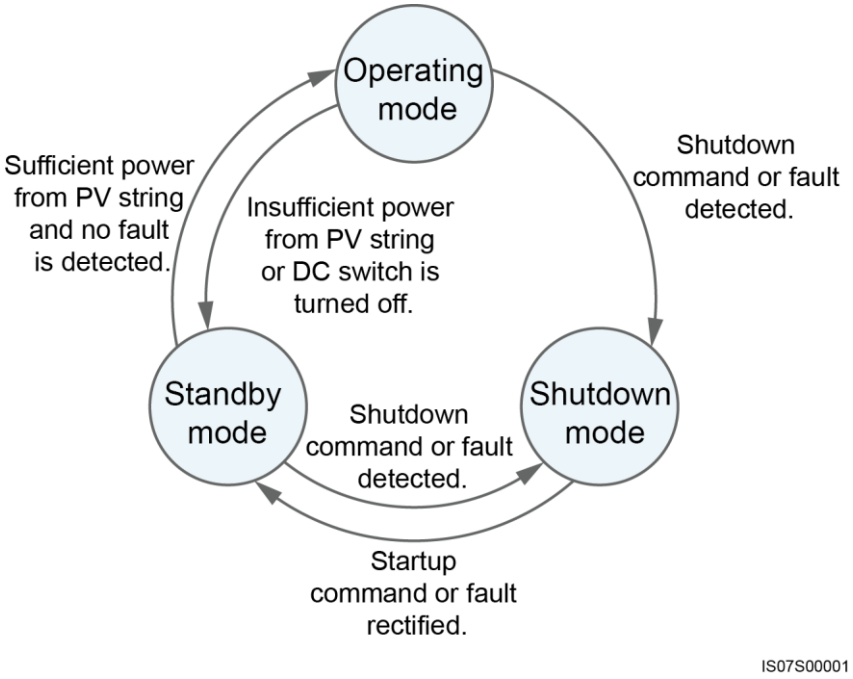


Table 2-3 Working mode description

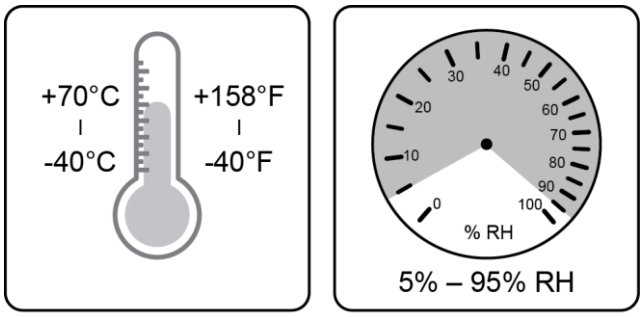
Working Mode	Description
Standby	The SUN2000 enters Standby mode when the external environment does not meet the operating requirements. In Standby mode: • The SUN2000 continuously performs status check and enters the Operating mode once the operating requirements are met. • The SUN2000 enters Shutdown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

3 Storage

The following requirements should be met when the SUN2000 needs to be stored prior to installation:

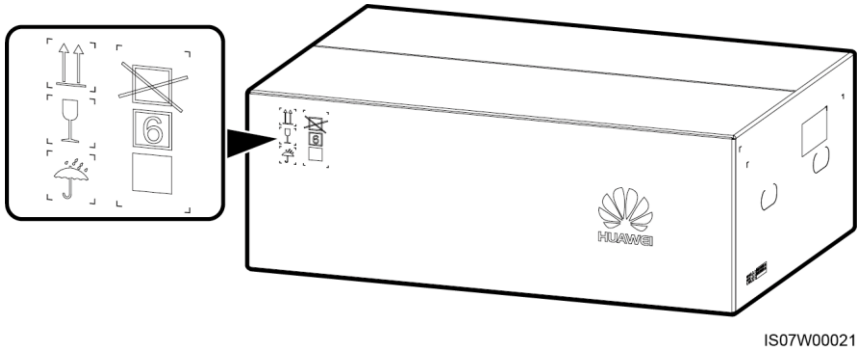
- Do not unpack the SUN2000 and check it periodically. Replace the packing materials as necessary. If the SUN2000 is unpacked but not put into use immediately, put it inside the original package with the dessicant bag, and seal it using tape.
- The ambient temperature and humidity are suitable for the storage.

Figure 3-1 Storage temperature and humidity



- The SUN2000 should be stored in a clean and dry place and be protected from dust and water vapor corrosion.
- To avoid personal injury or device damage, stack SUN2000s with caution to prevent them from falling over.

Figure 3-2 Maximum number of pile-up layers allowed



- After long-term storage, an inspection and test conducted by qualified persons are necessary before the SUN2000 is put into use.

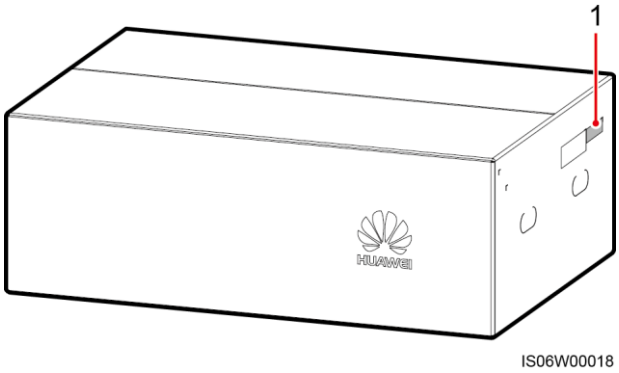
4 Installation

4.1 Checking Before Installation

Outer Packing Materials

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

Figure 4-1 Position of the inverter model label



(1) Position of the model label

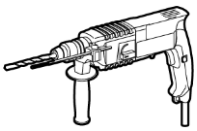
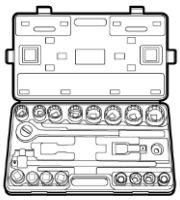
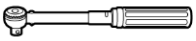
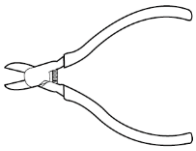
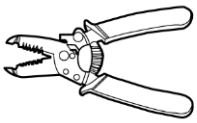
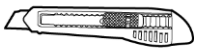
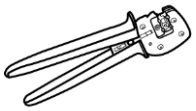
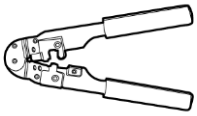
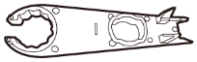
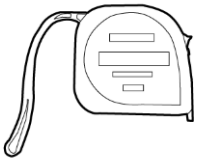
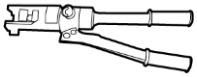
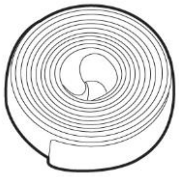
NOTE
You are advised to remove the packing materials within 24 hours before installing the inverter.

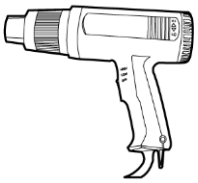
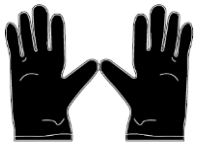
Package Contents

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

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

4.2 Tools

Type	Tool			
Installation	 Hammer drill (with Φ14 mm and Φ16 mm drill bits)	 Socket wrench	 Torque wrench	 Torque screwdriver (Phillips head: M4; flat head: M4)
	 Diagonal pliers	 Wire stripper	 Flat-head screwdriver (head: 0.6 mm x 3.5 mm)	 Rubber mallet
	 Utility knife	 Cable cutter	 MC4 crimping tool (model: PV-CZM-22100)	 RJ45 crimping tool
	 MC4 open-end wrench (model: PV-MS open-end wrench)	 Vacuum cleaner	 Multimeter (DC voltage measurement range ≥ 1500 V DC)	 Marker
	 Measuring tape	Digital or bubble level	 Hydraulic pliers	 Heat shrink tubing

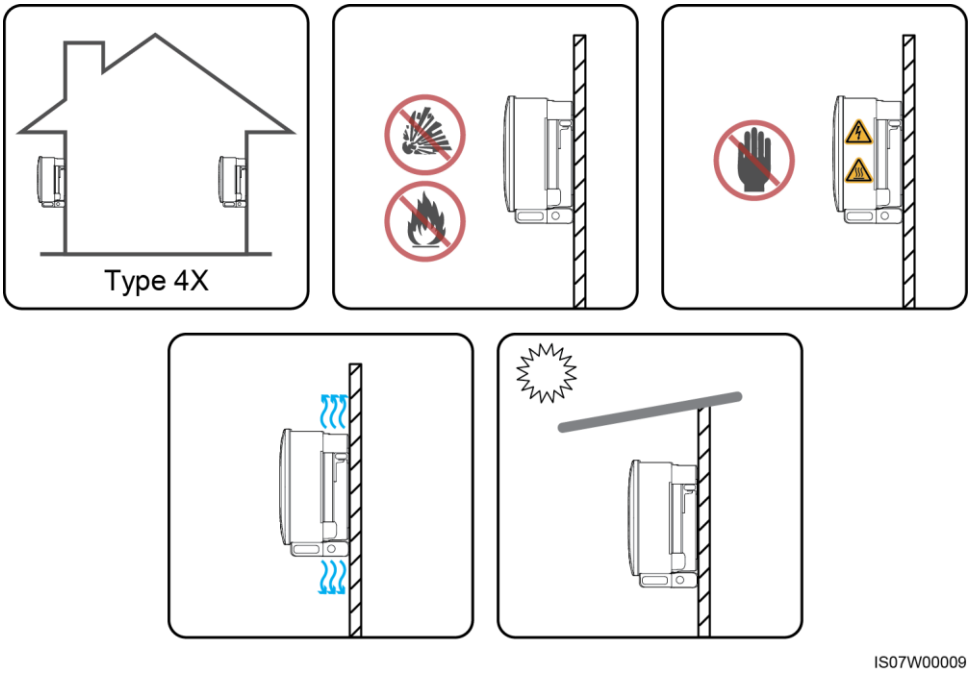
Type	Tool			
	 Heat gun	 Cable tie	-	-
PPE	 Safety gloves	 Safety goggles	 Anti-dust respirator	 Safety shoes

4.3 Determining the Installation Position

Installation Environment Requirements

- The SUN2000 can be installed indoors or outdoors.
- Do not install the SUN2000 in a place where personnel are easy to come into contact with its enclosure and heat sinks, because the voltage is high and these parts are extremely hot during operation.
- Do not install the SUN2000 in areas with flammable or explosive materials.
- The SUN2000 must be installed in a well-ventilated environment to ensure good heat dissipation.
- If the SUN2000 is installed under direct sunlight, its power may decrease due to additional temperature rise. You are advised to install it in a sheltered place or install an awning over the SUN2000.

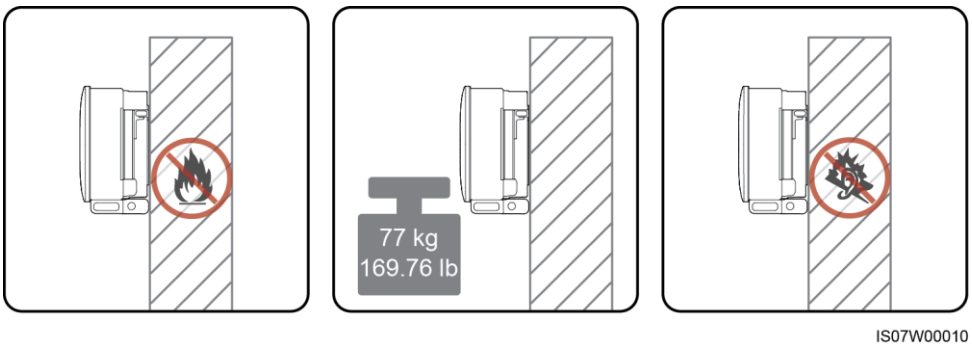
Figure 4-2 Installation environment



Mounting Structure Requirements

- The mounting structure where the SUN2000 is installed must be fire-resistant. Do not install the SUN2000 on flammable building materials.
- Ensure that the installation surface is solid enough to bear the weight load.
- In residential areas, do not install the SUN2000 on dry wall or walls made of similar materials which have a weak sound insulation performance because the noises generated by the SUN2000 are noticeable.

Figure 4-3 Mounting structure

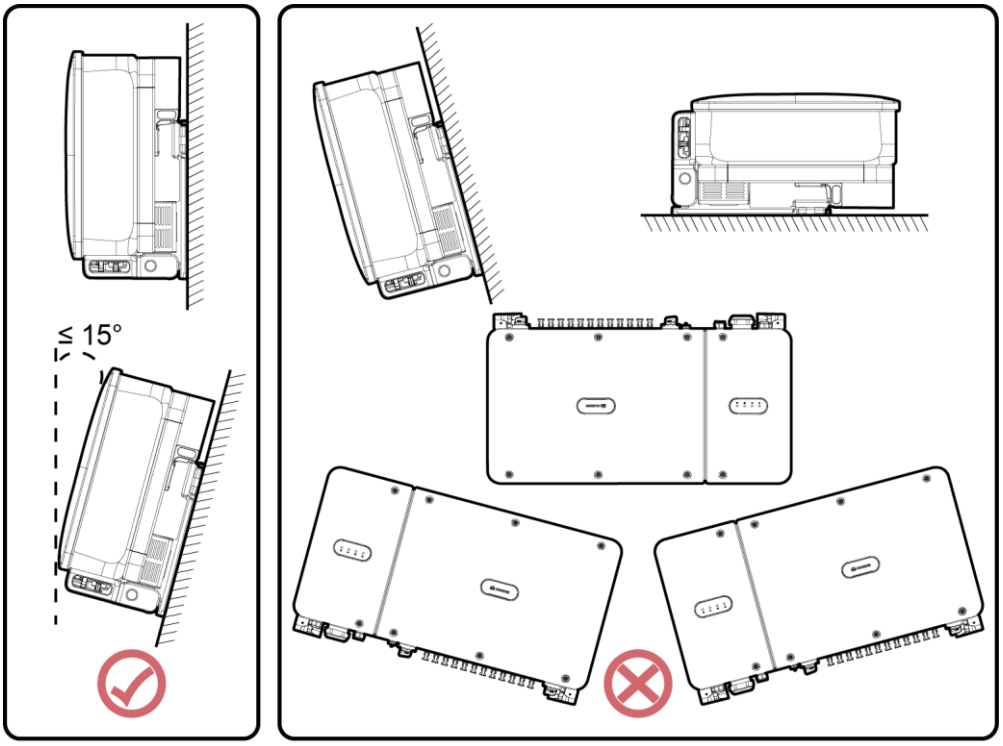


Installation Angle Requirements

The SUN2000 can be support-mounted or wall-mounted. The installation angle requirements are as follows:

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

Figure 4-4 Installation tilts



Installation Space Requirements

Reserve enough clearances around the SUN2000 for installation and heat dissipation.

Figure 4-5 Installation space requirements (non-back-to-back installation)

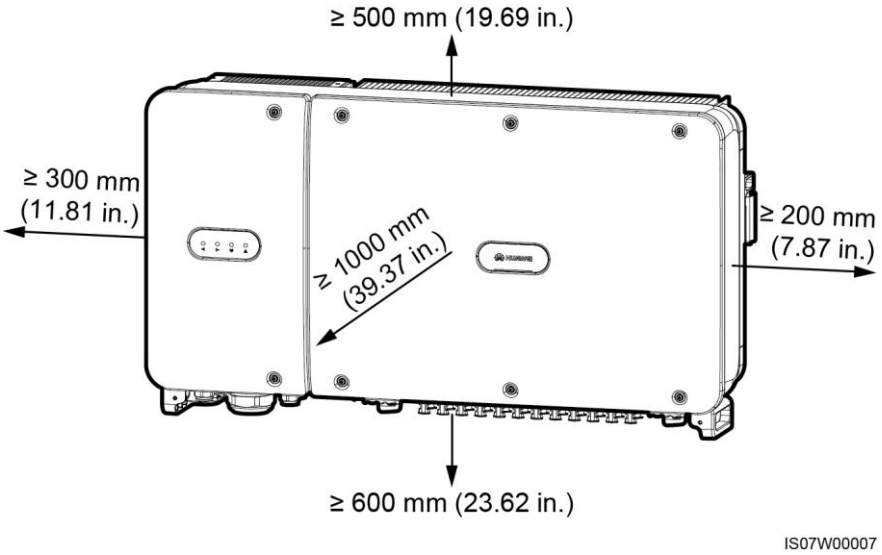
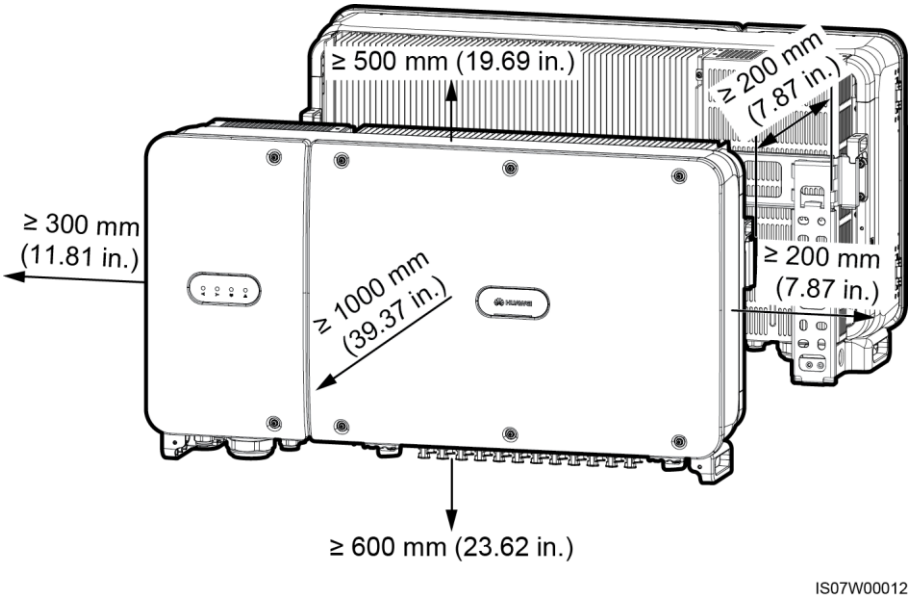


Figure 4-6 Installation space requirements (back-to-back installation)



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 from 600 mm (23.62 in.) to 730 mm (28.74 in.). If you have any questions about the clearances, consult the local technical support engineers.

When installing multiple SUN2000s, install them in a line if sufficient space is available and install them in a triangle if sufficient space is unavailable. Stacked installation is not recommended.

Figure 4-7 Horizontal installation mode (recommended)

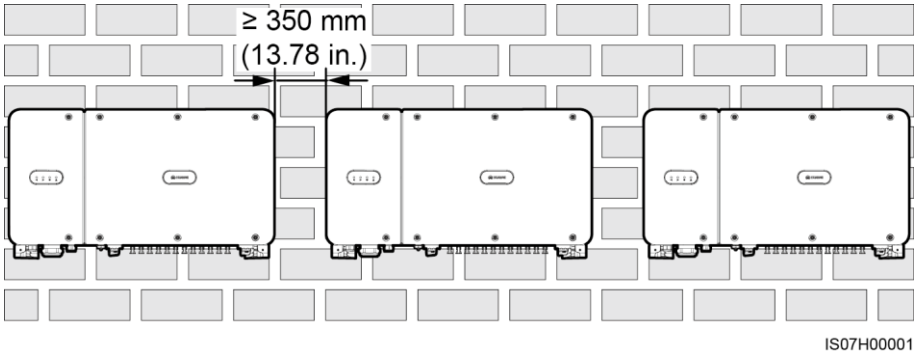


Figure 4-8 Triangle installation mode (recommended)

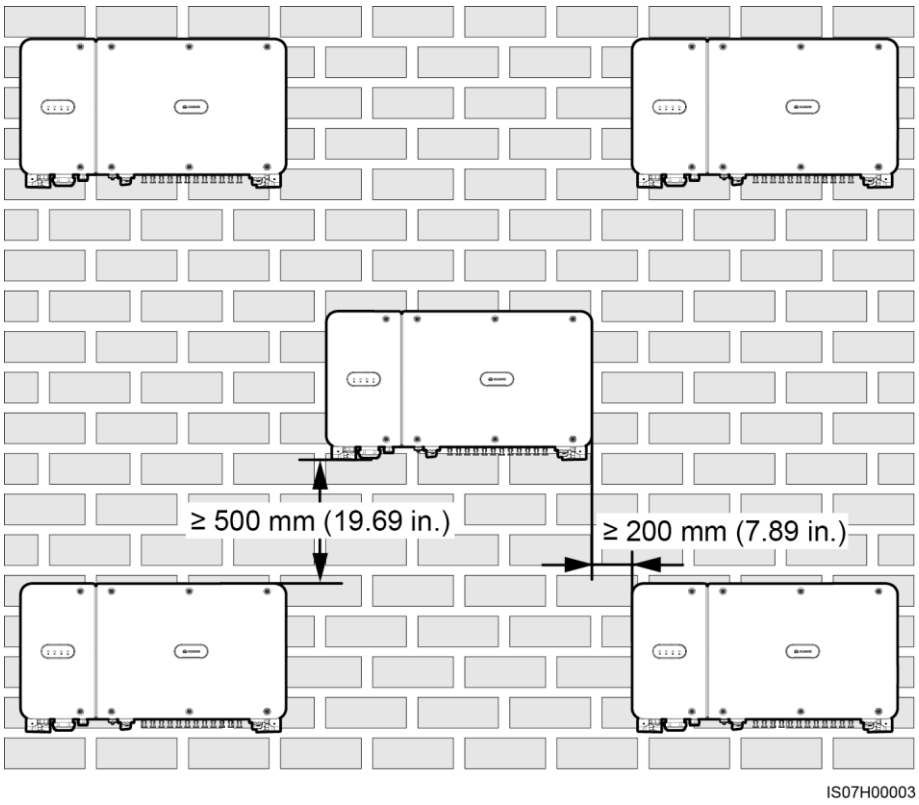
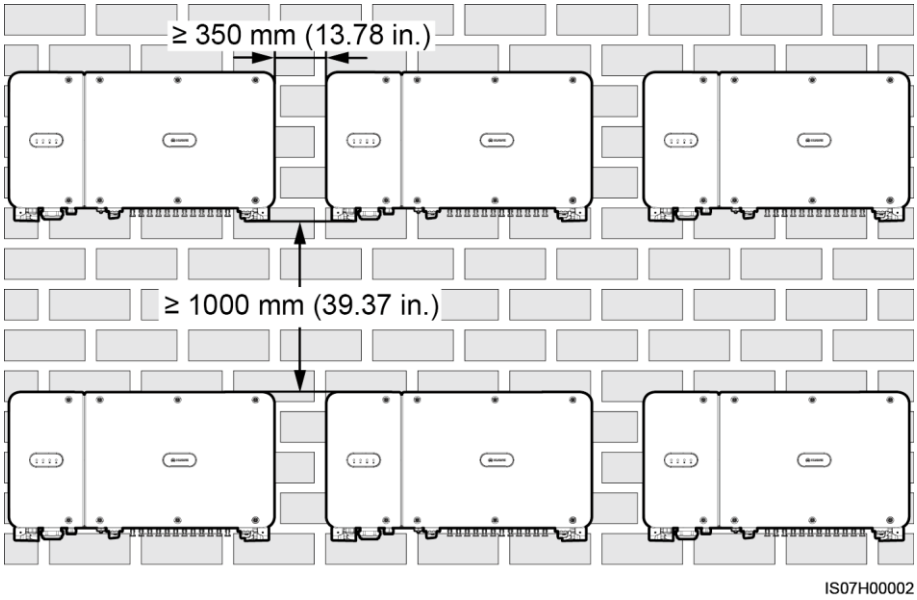


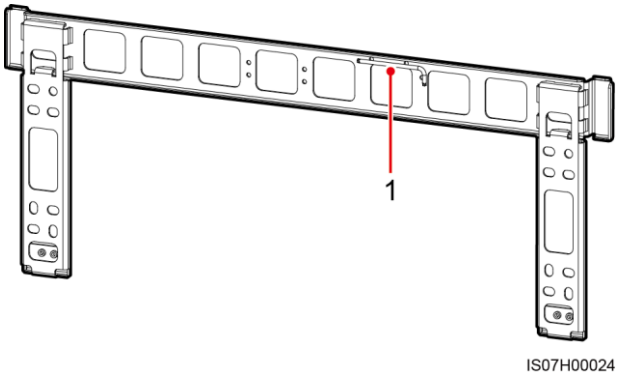
Figure 4-9 Stacked installation mode (not recommended)



4.4 Installing the Mounting Bracket

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

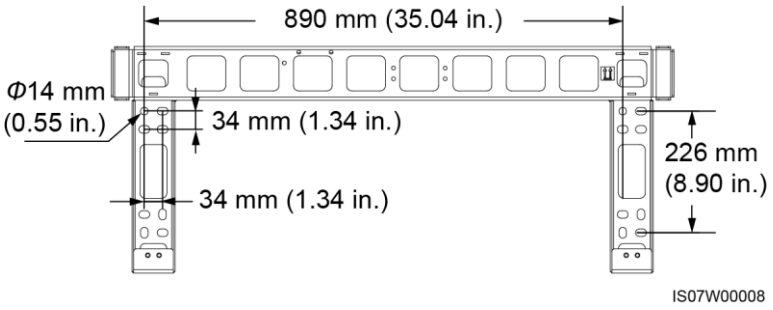
Figure 4-10 Position for binding the security torx wrench



(1) Position for binding the security torx wrench

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

Figure 4-11 Hole dimensions



4.4.1 Support-mounted Installation

Prerequisites

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

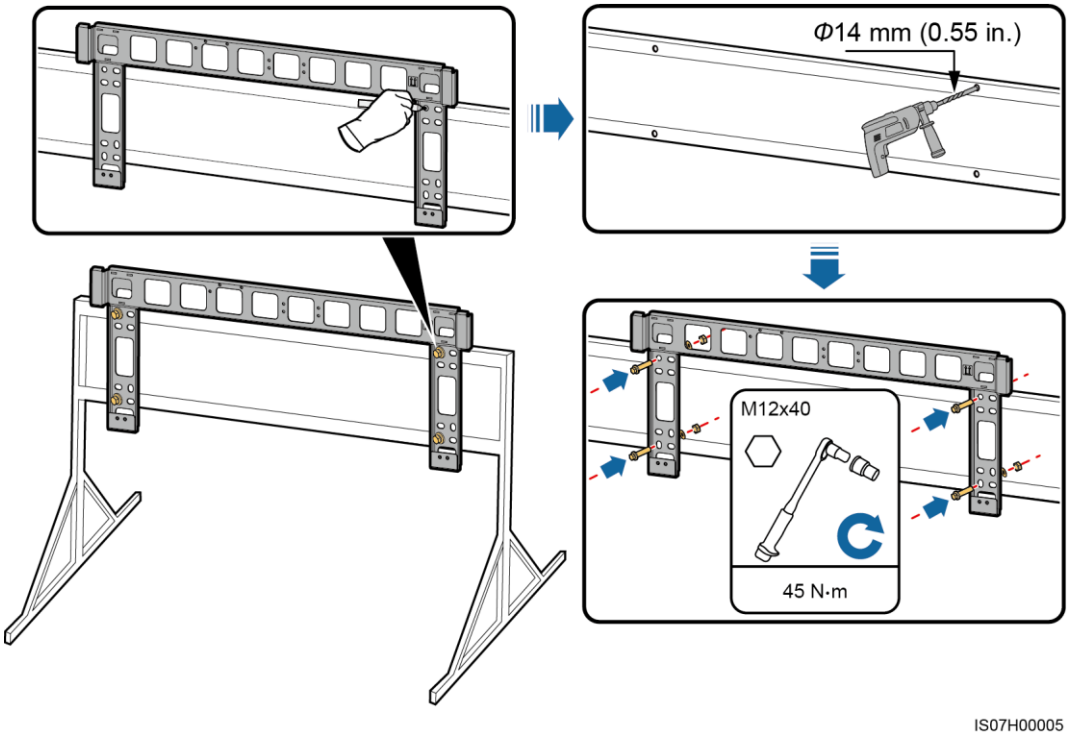
Procedure

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

Step 2 Drill holes using a hammer drill. You are advised to apply anti-rust paint on the hole positions for protection.

Step 3 Secure the mounting bracket.

Figure 4-12 Installing a mounting bracket



----End

4.4.2 Wall-mounted Installation

Prerequisites

You have prepared the expansion bolts. M12x60 stainless expansion bolts are recommended.

Procedure

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

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

WARNING

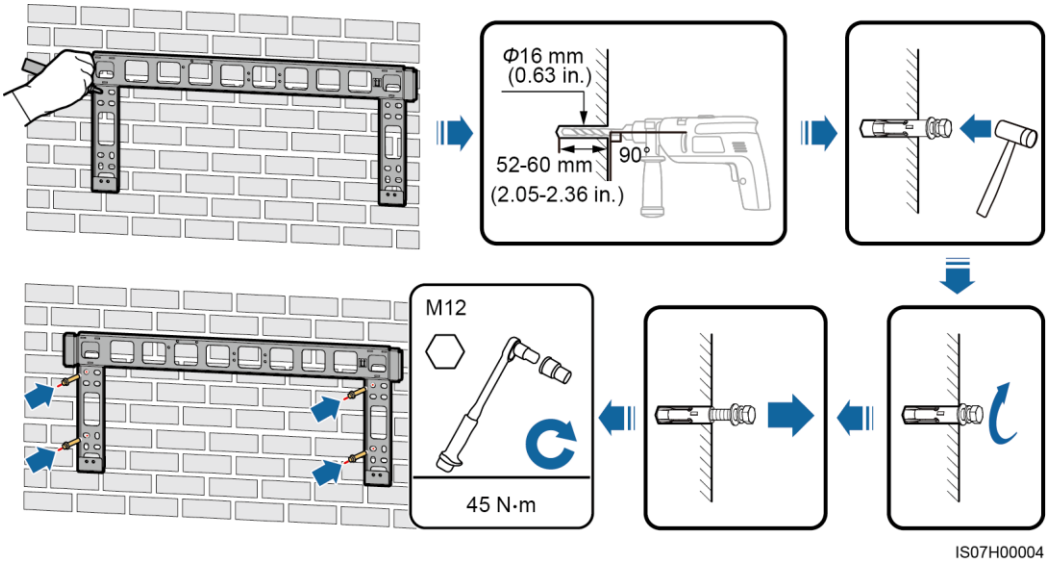
Avoid drilling holes in the water pipes and power cables buried in the wall.

NOTICE

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

Step 3 Secure the mounting bracket.

Figure 4-13 Installing a mounting bracket



----End

4.5 Installing a SUN2000

Context

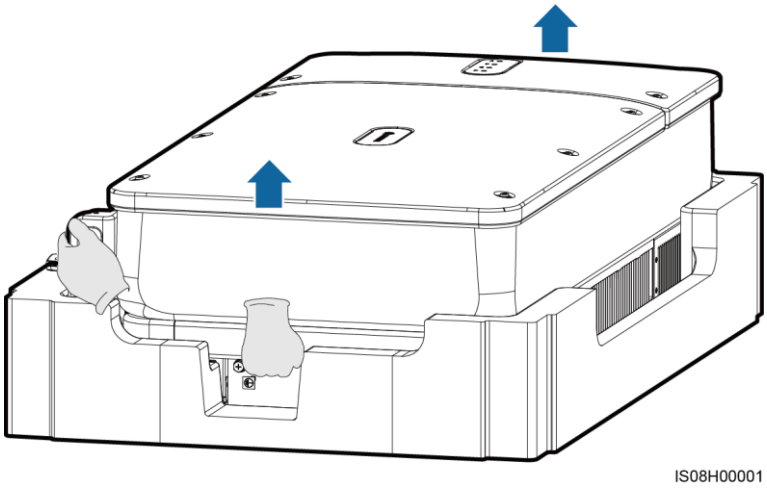
NOTICE

- To prevent device damage and personal injury, keep balance when moving the SUN2000.
- It should take multiple persons or a pallet truck to move the SUN2000.
- Do not place the SUN2000 with its wiring terminals at the bottom contacting the floor or any other objects because the terminals are not designed to support the weight of the SUN2000.
- To place the SUN2000 on the ground, use foam or cardboards underneath to prevent damage to its shell.

Procedure

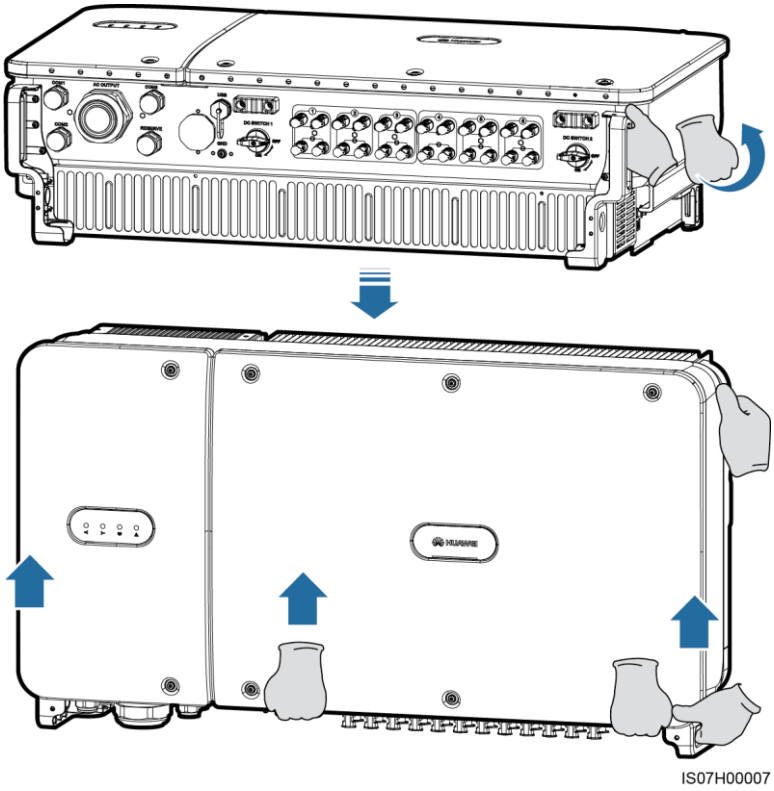
Step 1 Lift the SUN2000 from the packing case and move it to the installation position.

Figure 4-14 Taking out a SUN2000



Step 2 Lift the SUN2000 and keep it upright.

Figure 4-15 Lifting a SUN2000 and keeping it upright

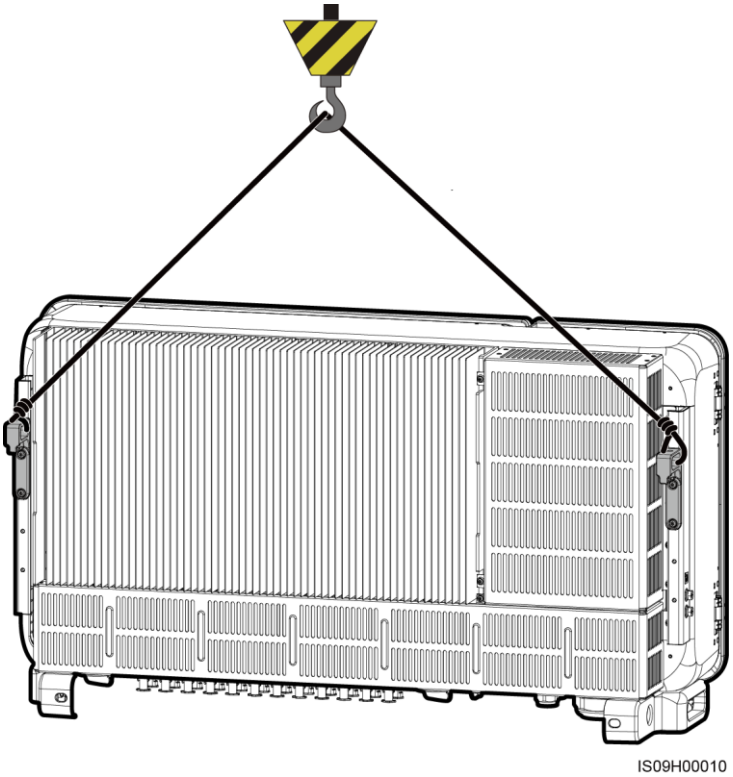


Step 3 (Optional) If the installation position is too high to install the SUN2000 on the mounting bracket, run a rope that is strong enough to bear the SUN2000 through the two lifting eyes, and hoist the SUN2000.

NOTICE

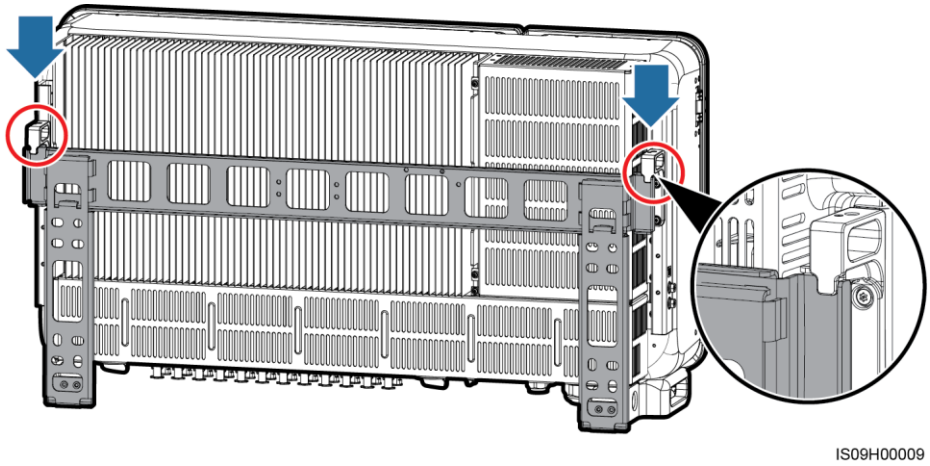
When hoisting the SUN2000, keep balance to protect the SUN2000 from colliding with the wall or other objects.

Figure 4-16 Hoisting a SUN2000



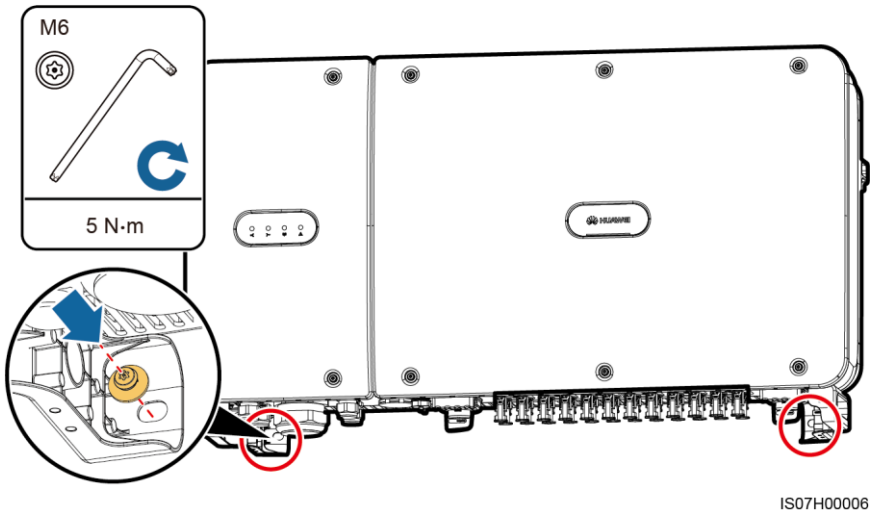
Step 4 Install the SUN2000 on the mounting bracket and align the SUN2000 enclosure with the mounting bracket.

Figure 4-17 Mounting a SUN2000



Step 5 Secure the SUN2000.

Figure 4-18 Tightening security torx screws



----End

5 Electrical Connections

5.1 Precautions

DANGER

When exposed to sunlight, the PV arrays supplies DC voltage to the SUN2000. Before connecting cables, ensure that the two DC switches on the SUN2000 are OFF. Otherwise, the high voltage of the SUN2000 may result in electric shocks.

WARNING

- The equipment damage caused by incorrect cable connections is beyond the warranty scope.
- Only certified electrician can perform electrical terminations.
- Wear proper PPE at all time when terminating cables.
- To prevent poor cable contact due to overstress caused by ground subsidence, it is recommended that the cable be bent and reserved and then connected to the appropriate port.

NOTE

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

5.2 Selecting a Connection Mode

Cables of external devices can be connected to the SUN2000 maintenance compartment through a cable gland or through a pipe. Select a connection mode based on site requirements.

NOTICE

- If a cable has a jacket, ensure that the jacket is in the maintenance compartment.
- The following describes how to route cables through a cable gland and through a tube, using the AC OUTPUT cable gland as an example. The process for connecting cables through other cable glands is similar.

NOTE

Following are the reference torque values for the cable gland and pipe. Observe the requirements of the specific manufacturer, if any.

- AC OUTPUT: 15 N·m (plastic)
- COM port and RESERVE port: 7.5 N·m (plastic)

Connection Through a Cable Gland

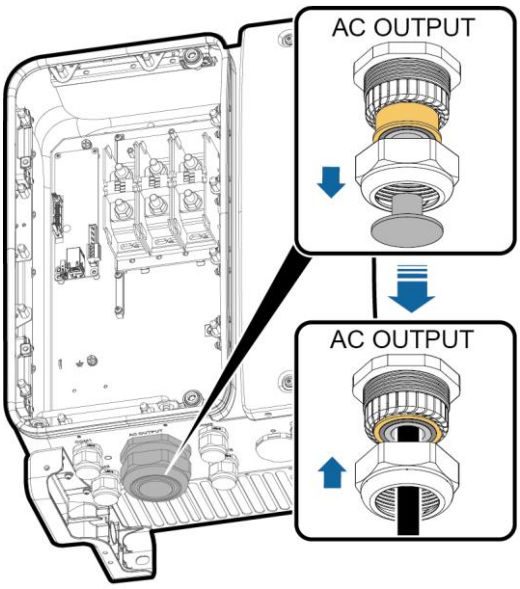
If you choose the cable gland connection, prepare appropriate cables by yourself.

NOTE

Proper rubber liner is required for the AC OUTPUT cable gland only.

Step 1 Route the cable through the cable gland.

Figure 5-1 Routing a cable



Step 2 Connect the cable.

Step 3 Tighten the locking cap.

Step 4 Check that the cable is connected correctly and securely. Then seal the cable gland.

Step 5 Clear foreign matter from the maintenance compartment.

----End

Connection Through a Pipe

If you choose the pipe connection, prepare appropriate cables and pipe conduits by yourself.

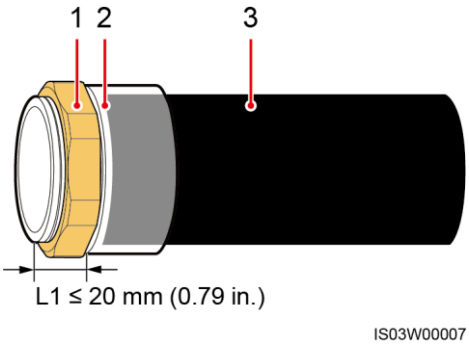
NOTICE

Prepare appropriate pipe conduits based on the diameters of the bottom cable holes. The pipe conduit specifications should comply with the cable gland specifications. For example, for a 2-1/2-inch AC OUTPUT cable gland, prepare a 2-1/2-inch pipe conduit; for a 3/4-inch COM cable gland, prepare a 3/4-inch pipe conduit.

NOTE

Rubber liner operations are required only for the AC OUTPUT cable gland instead of the other cable glands.

Figure 5-2 Pipe conduit

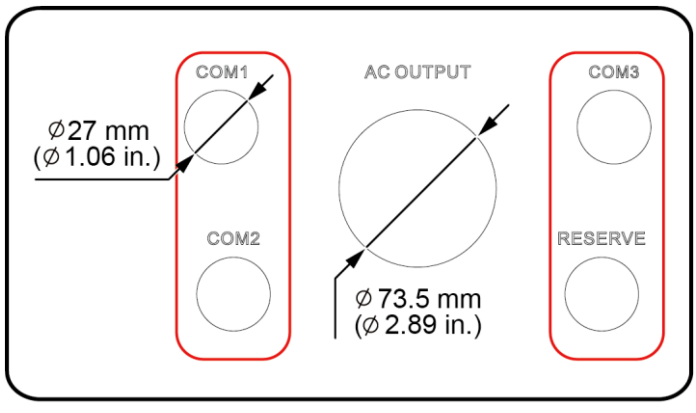


(1) Nut (2) Fitting (3) Conduit

NOTE

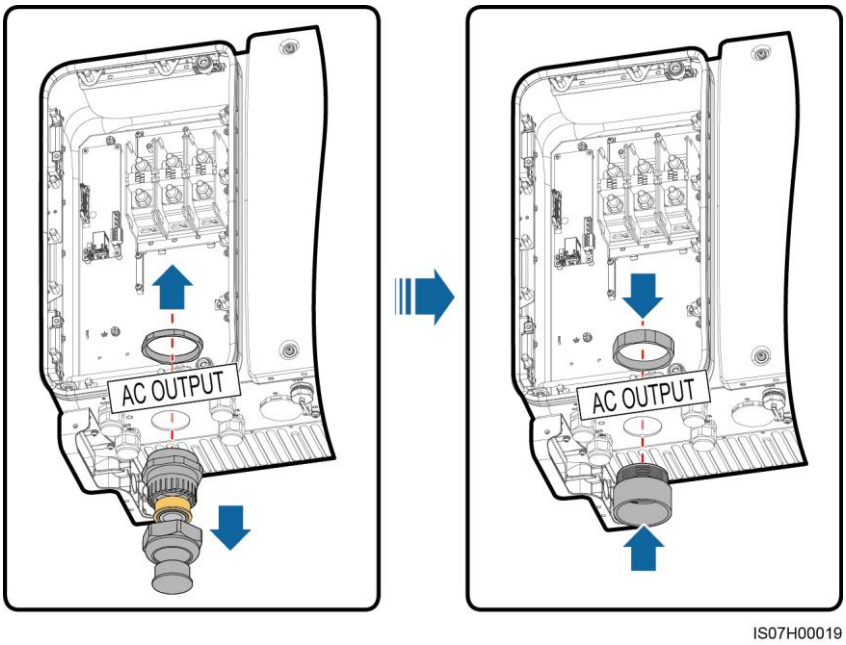
The pipe conduit appearance is for reference only.

Figure 5-3 Diameters of the bottom cable holes



Step 1 Install the pipe conduit fittings.

Figure 5-4 Installing the pipe conduit fittings



Step 2 Route the cable through the conduit and fittings of the pipe.

Step 3 Connect the cable.

Step 4 Connect the conduit and fittings of the pipe.

Step 5 Check that the cable is connected correctly and securely. Then take proper measures to ensure that the pipe conduit and fittings are secured, and seal the cable holes.

Step 6 Clear foreign matter from the maintenance compartment.

----End

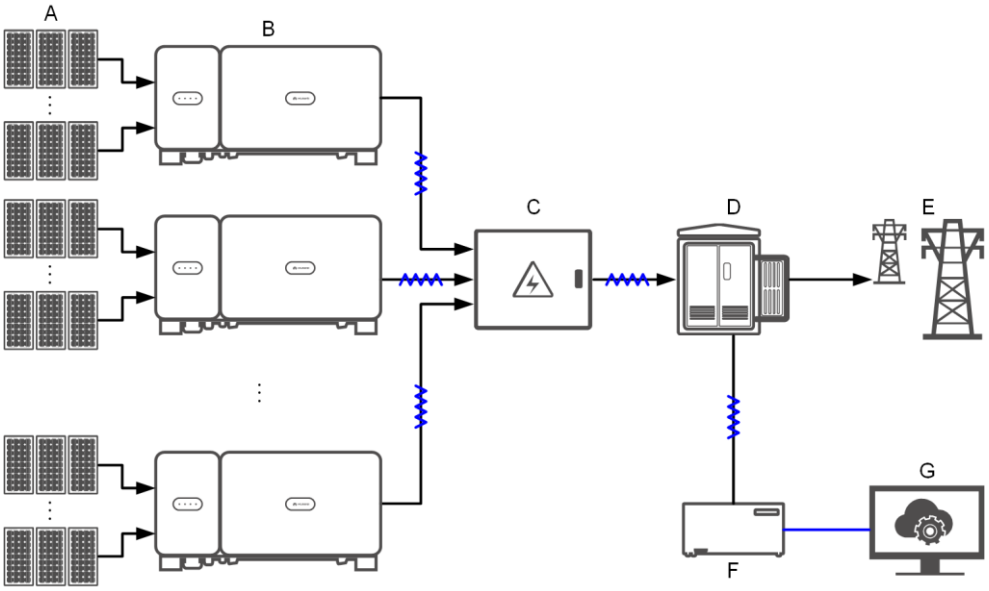
5.3 Preparing Cables

The SUN2000 supports PLC and RS485 communication modes, but you can choose only one of them.

5.3.1 PLC

- The PLC communication mode is applicable to medium-voltage grid connection scenarios and non-low-voltage public grid connection scenarios (industrial environment).
- If PLC is selected, no RS485 communications cable is required to connect to the SUN2000, but the AC power cable needs to connect to a SmartLogger2000 that supports PLC. For detailed operations, see *SmartLogger2000 User Manual*.
- When RS485 is selected, do not connect the AC power cable to the SmartLogger2000.

Figure 5-5 Network diagram



NOTE

indicates a power cable; indicates the power flow direction; indicates a signal cable; indicates the signal flow.

(A) PV string (B) SUN2000 (C) AC combiner box

(D) Step-up transformer (E) Power grid (F) SmartLogger2000

(G) Management system

Figure 5-6 SUN2000 cable connection

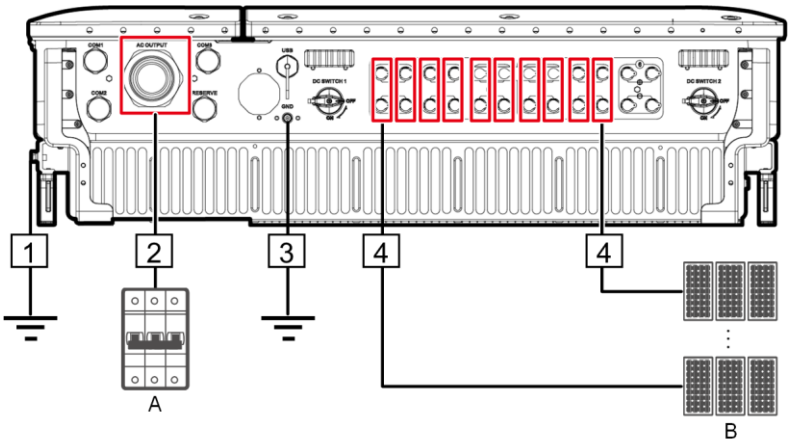


Table 5-1 Component description

No.	Component	Description	Source
A	AC switch	• Installed in the AC combiner box • Recommended: a three-phase AC circuit breaker with a rated voltage greater than or equal to 800 V AC and a rated current of 100 A	Prepared by the customer
B	PV string	• A PV string is composed of PV modules connected in series. • The SUN2000 supports the input from 12 PV strings.	Prepared by the customer

NOTICE

The SUN2000 has an RCMU inside. Its external AC switch should be a three-phase circuit breaker or other AC load circuit breakers to safely disconnect the SUN2000 from the power grid.

Table 5-2 Cable description

No.	Cable	Type	Conductor Cross-Sectional Area Range	Outer Diameter	Source
1	PE cable	Single-core outdoor copper cable and M8 OT terminal **NOTICE** Preferred to connect to the ground point on the enclosure. The ground point in the maintenance compartment is used for connecting to the ground cable included in the multi-core AC power cable.	≥ 6 AWG	N/A	Prepared by the customer
2	AC output power cable	Use a cable that can withstand 90°C (194°F) or 105°C (221°F). To facilitate the installation, you are advised to use cords. • Connection through a cable gland: – If you connect a ground cable to the ground point on the enclosure, you are advised to use a three-core (L1, L2, and L3) outdoor copper cable. – If you connect a ground cable to the ground point in	3–3/0 AWG	• Connection through a cable gland: 30 mm–57 mm (1.18 in.–2.24 in.) • Connection through a pipe: 11.5 mm–16.6 mm (0.45 in.–0.65 in.)	Prepared by the customer

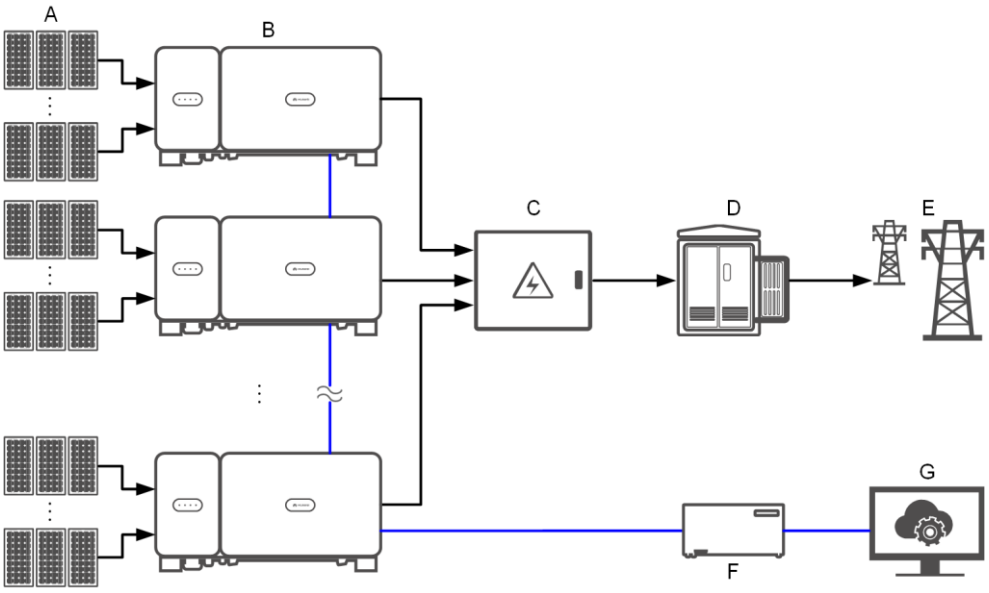
No.	Cable	Type	Conductor Cross-Sectional Area Range	Outer Diameter	Source
		the maintenance compartment, you are advised to use a four-core (L1, L2, L3, and PE) outdoor copper cable and M8 OT terminals (PE). You do not need to prepare a PE cable. • Connection through a pipe: – If you connect a ground cable to the ground point on the enclosure, you are advised to use three single-core outdoor copper cables (L1, L2, and L3). – If you connect a ground cable to the ground point in the maintenance compartment, you are advised to use four single-core outdoor copper cables (L1, L2, L3, and PE) and M8 OT terminals (PE). You do not need to prepare a PE cable.			
3	PV side ground cable	Single-core outdoor copper cable and M6 OT terminal	≥ 6 AWG	N/A	Prepared by the customer
4	DC input power cable	PV cable that meets the 1500 V standard	8 AWG	6.05–8.56 mm (0.24–0.34 in.)	Prepared by the customer

NOTICE

- The AC output power cable can be an aluminum alloy cable with a conductor cross-sectional area of 1 AWG to 3/0 AWG.
- The MC4 terminals delivered with the SUN2000 only support the 8 AWG DC input power cable. Using cables of other specifications may result in serious consequences. The caused device damage is not covered under any warranty or service agreement.
- The DC input power cable can be a 10 AWG cable. MC4 terminals should be prepared by the customer (male connector: PV-KBT4/6II-UR; female connector: PV-KST4/6II-UR). Using other terminals may result in serious consequences. The caused device damage is not covered by any warrant.

5.3.2 RS485 Communication

Figure 5-7 Network diagram



NOTE

indicates a power cable; → indicates the power flow direction; indicates a signal cable.

(A) PV string (B) SUN2000 (C) AC combiner box

(D) Step-up transformer (E) Power grid (F) SmartLogger2000

(G) Management system

NOTICE

- To ensure the system response speed, you are advised to connect less than 30 cascading SUN2000s on each COM port of the SmartLogger.
- The RS485 communication distance between the SUN2000 at the end and the SmartLogger cannot exceed 1000 m (3280.84 feet).

Figure 5-8 SUN2000 cable connection

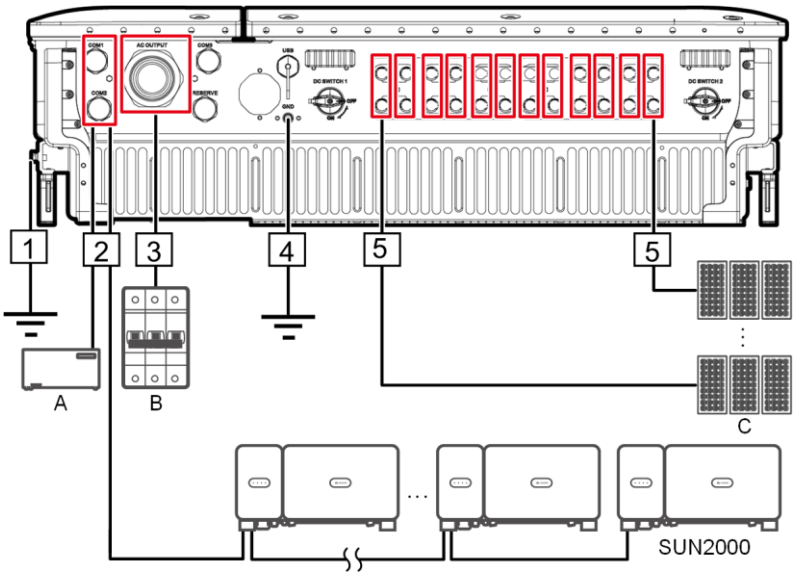


Table 5-3 Component description

No.	Component	Description	Source
A	SmartLogger	The SUN2000 can connect to the SmartLogger2000 to implement RS485 communication.	Purchased from Huawei
B	AC switch	• Installed in the AC combiner box • Recommended: a three-phase AC circuit breaker with a rated voltage greater than or equal to 800 V AC and a rated current of 100 A	Prepared by the customer
C	PV string	• A PV string is composed of PV modules connected in series. • The SUN2000 supports the input from 12 PV strings.	Prepared by the customer

NOTICE

The SUN2000 has an RCMU inside. Its external AC switch should be a three-phase circuit breaker or other AC load circuit breakers to safely disconnect the SUN2000 from the power grid.

Table 5-4 Cable description

No.	Cable	Type	Conductor Cross-Sectional Area Range	Outer Diameter	Source
1	PE cable	Single-core outdoor copper cable and M8 OT terminal **NOTICE** Preferred to connect to the ground point on the enclosure. The ground point in the maintenance compartment is used for connecting to the ground cable included in the multi-core AC power cable.	≥ 6 AWG	N/A	Prepared by the customer
2	RS485 communications cable (connected to a terminal block; recommended)	Recommended: a multi-paired, individually foil shielded cable that complies with UL2919, CM/CMG (NEC type), or CMH (CSA type), and M6 OT terminals	• 0.25–2 mm^2 • 24–14 AWG	14–18 mm (0.55–0.71 in.)	Prepared by the customer
	RS485 communications cable (connected to a network port)	Recommended: a CAT 5E outdoor shielded network cable with internal resistance ≤ 1.5 ohms/10 m (1.5 ohms/393.70 in.), as well as a shielded RJ45 connector	N/A	7–9 mm (0.28–0.35 in.)	Prepared by the customer
3	AC output power cable	Use a cable that can withstand 90°C (194°F) or 105°C (221°F). To facilitate the installation, you are advised to use cords. • Connection through a cable gland: – If you connect a ground cable to the ground point on the enclosure, you are advised to use a three-core (L1, L2, and L3) outdoor copper cable. – If you connect a	3–3/0 AWG	• Connection through a cable gland: 30 mm–57 mm (1.18 in.–2.24 in.) • Connection through a pipe: 11.5 mm–16.6 mm (0.45 in.–0.65 in.)	Prepared by the customer

No.	Cable	Type	Conductor Cross-Sectional Area Range	Outer Diameter	Source
		ground cable to the ground point in the maintenance compartment, you are advised to use a four-core (L1, L2, L3, and PE) outdoor copper cable and M8 OT terminals (PE). You do not need to prepare a PE cable. • Connection through a pipe: – If you connect a ground cable to the ground point on the enclosure, you are advised to use three single-core outdoor copper cables (L1, L2, and L3). – If you connect a ground cable to the ground point in the maintenance compartment, you are advised to use four single-core outdoor copper cables (L1, L2, L3, and PE) and M8 OT terminals (PE). You do not need to prepare a PE cable.			
4	PV side ground cable	Single-core outdoor copper cable and M6 OT terminal	≥ 6 AWG	N/A	Prepared by the customer
5	DC input power cable	PV cable that meets the 1500 V standard	8 AWG	6.05–8.56 mm (0.24–0.34 in.)	Prepared by the customer

NOTICE

- The AC output power cable can be an aluminum alloy cable with a conductor cross-sectional area of 1–3/0 AWG.
- The MC4 terminals delivered with the SUN2000 only support the 8 AWG DC input power cable. Using cables of other specifications may result in serious consequences. The caused device damage is not covered under any warranty or service agreement.
- The DC input power cable can be a 10 AWG cable. MC4 terminals should be prepared by the customer (male connector: PV-KBT4/6II-UR; female connector: PV-KST4/6II-UR). Using other terminals may result in serious consequences. The caused device damage is not covered by any warranty.

5.4 Connecting a ground cable

Context

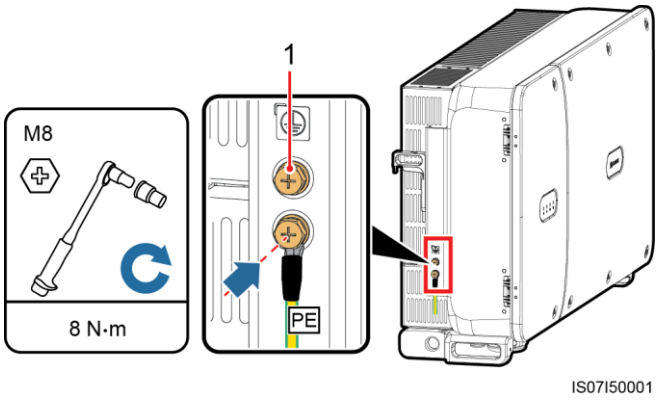
NOTICE

- Proper grounding is helpful for resisting the impact of surge voltage and improving the electromagnetic interference (EMI) performance. Before connecting the AC power cable, DC power cable, and communications cable, connect ground cables to the grounding point and PV side ground point.
- It is recommended that the SUN2000 ground cable be connected to a nearby ground point. Connect the grounding points of all SUN2000s in the same array to ensure equipotential connections to ground cables.

Procedure

Step 1 Connect the ground cable to the grounding point (on the chassis shell).

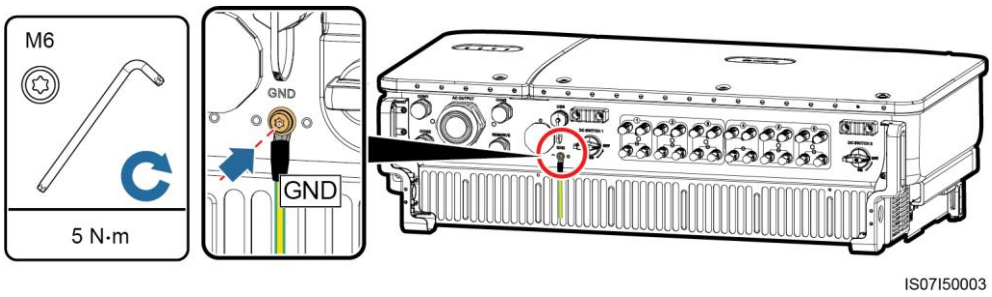
Figure 5-9 Connecting the ground cable to the grounding point



(1) Reserved grounding point

Step 2 Connect the ground cable to the PV side grounding point.

Figure 5-10 Connecting the ground cable to the PV side grounding point



----End

Follow-up Procedure

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

5.5 Opening the Maintenance Compartment Door

Precautions

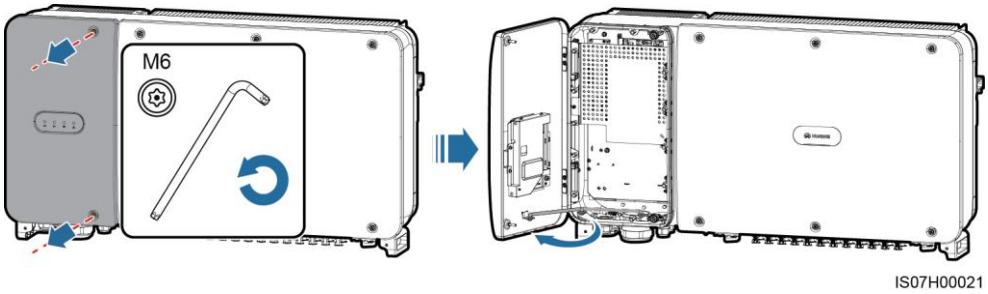
CAUTION

- Never open the host panel of the SUN2000.
- Before opening the maintenance compartment door, ensure that no electrical connections are made for the SUN2000 on the AC or DC side.
- If you need to open the maintenance compartment door in rainy or snowy days, take protective measures to prevent rain or snow entering the maintenance compartment. If unavoidable, do not open the maintenance compartment door.
- Do not leave unused screws in the maintenance compartment.

Procedure

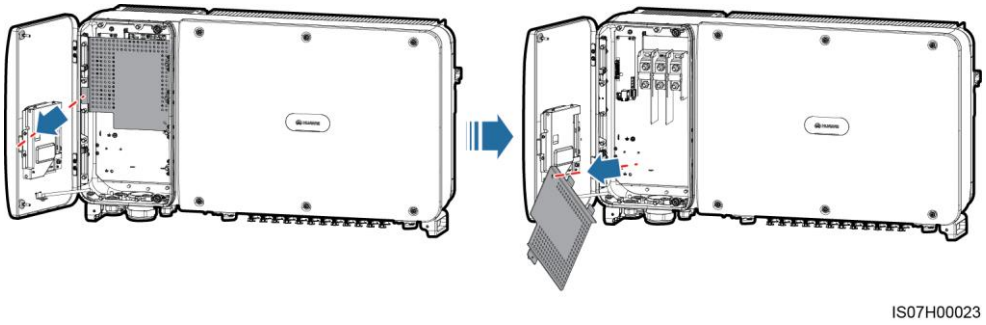
Step 1 Open the maintenance compartment door and install the support bar.

Figure 5-11 Opening the maintenance compartment door



Step 2 Remove the cover and hang it on the hook of the door.

Figure 5-12 Removing a cover



----End

5.6 Connecting the AC Output Power Cable

Context

- A three-phase AC switch must be installed on the AC side of the SUN2000. To ensure that the SUN2000 can safely disconnect itself from the power grid when an exception occurs, select a proper overcurrent protection device in compliance with local power distribution regulations.
- Connect the AC output power cable according to the requirements specified by local power grid operators.
- The AC output power cable can be connected in a common way or through a tube. The common way is used as an example here.

WARNING

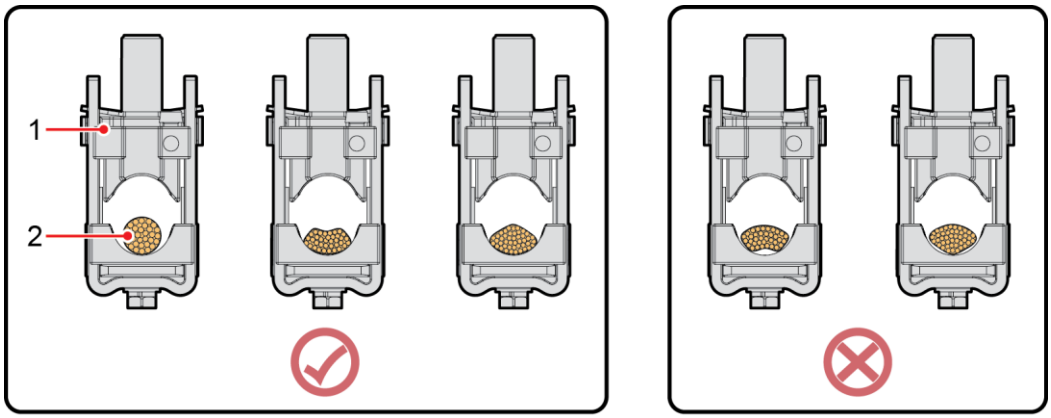
Do not connect loads between the SUN2000 and the AC switch.

NOTICE

- If the AC output power cables are subject to a pulling force because the inverter is not installed stably, ensure that the last cable that bears the stress is the PE cable.
- If the cable outer diameter does not match the rubber liner, the IP rating of the device may be affected.
- Do not route the cable with a crimped OT terminal directly through the rubber liner in case it damages the liner.
- Ensure that AC terminations are secured. Failure to do so may cause the SUN2000 to malfunction or damage to its terminal block by issues such as overheating.
- Ensure that the jacket is in the maintenance compartment.
- Ensure that the jacket is in the maintenance compartment.
- If the AC output cable is made of aluminum alloy, ensure that the oxidation layer on the surface is removed.

Ensure that the AC output power cable and cable connector are in good contact.

Figure 5-13 Installation requirements for the AC output power cable



(1) Cable connector	(2) AC output power cable

Procedure

Step 1 Remove the locking cap and rubber liner from the cable gland.

Step 2 Select an appropriate rubber liner based on the cable outer diameter.

Step 3 Make the cable and crimp the grounding OT terminal.

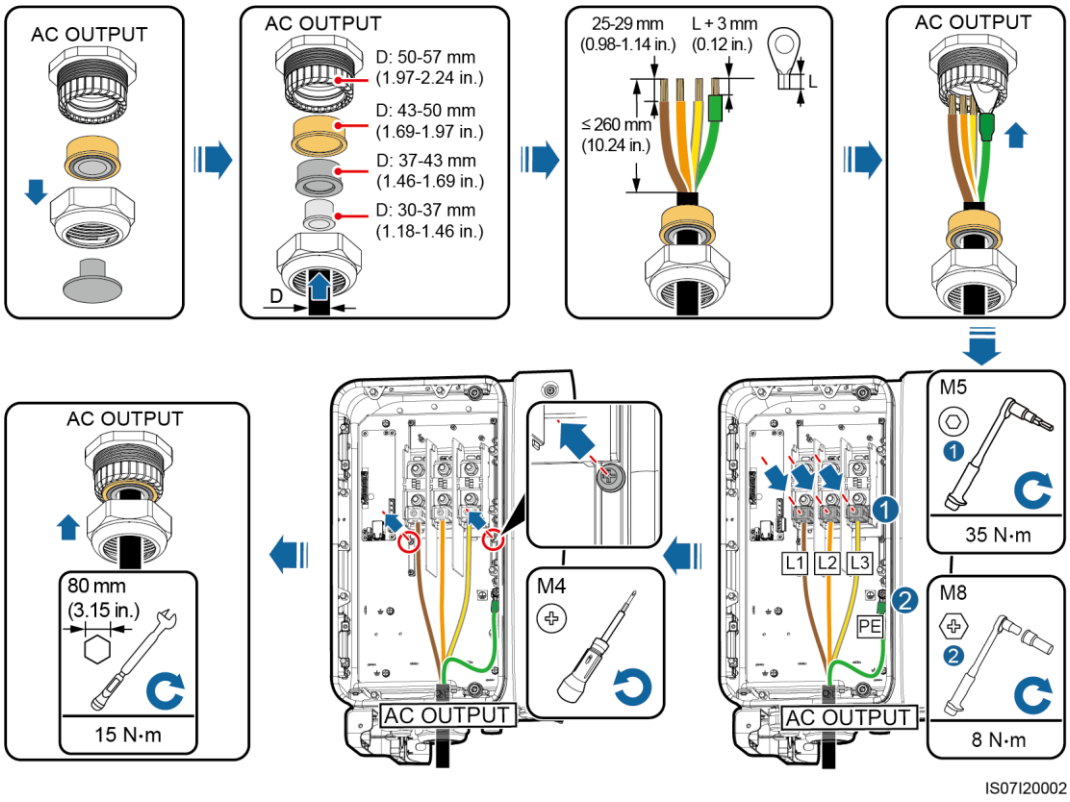
Step 4 Route the cable through the cable gland.

Step 5 Secure the AC output power cable and ground cable.

Step 6 Remove the anti-ground subsidence screws.

Step 7 Tighten the cable gland.

Figure 5-14 Connecting an AC output power cable



NOTICE

- Ensure that AC terminations are secured. Failure to do so may cause the SUN2000 to malfunctioning or cause damage to its terminal block from issues such as overheating.
- The cable colors shown in the figures are for reference only. Select an appropriate cable according to the local standards.

----End

Follow-up Procedure

Check that the cable is connected correctly and securely. Then seal the cable gland. Clear foreign matter from the maintenance compartment.

5.7 Connecting a DC Input Power Cable

Precautions

DANGER

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

WARNING

Ensure that the following conditions are met to avoid damaging the SUN2000 or creating fire hazards.

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

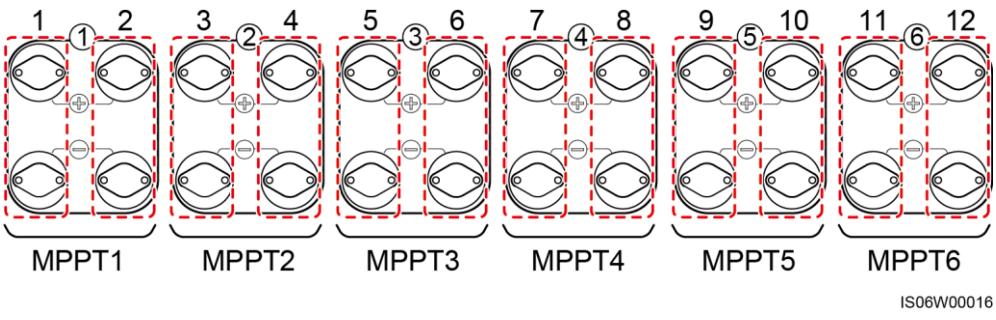
NOTICE

- Ensure that the PV module output is well insulated to ground.
- The PV strings connecting to the same MPPT circuit should contain the same number of identical PV modules.
- During the installation of PV strings and SUN2000, the positive or negative terminals of PV strings may be short-circuited to ground if power cables are not properly installed or routed. In this case, an AC or DC short circuit may occur and damage the SUN2000. Resulting equipment damage is beyond the scope of the warranty.

Terminal Description

The SUN2000 provides 12 DC input terminals, among which terminals 1 to 6 are controlled by DC switch 1 and terminals 7 to 12 are controlled by DC switch 2.

Figure 5-15 DC terminal



Requirements for selecting DC input terminals

1. Evenly distribute DC input power cables on the DC input terminals controlled by the two DC switches.
2. Maximize the number of connected MPPT circuits.

Specifications

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

CAUTION

- If an 8 AWG DC input power cable is selected, use the Staubli MC4 positive and negative metal terminals and DC connectors supplied with the SUN2000.
- If a 10 AWG DC input power cable is selected, use the recommended MC4 positive and negative metal terminals and DC connectors.
- Using other positive and negative metal terminals and DC connectors may result in serious consequences. The caused device damage is not covered by any warranty.

Procedure

Step 1 Remove the insulation layer of the DC input power cable by an appropriate length using a wire stripper.

Step 2 Crimp the positive and negative metal terminals.

Step 3 Insert the terminals into the corresponding positive and negative connectors.

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

Step 5 Use a multimeter set to the DC position to measure the voltage between the positive and negative ends of the PV string (measurement range no less than 1500 V).

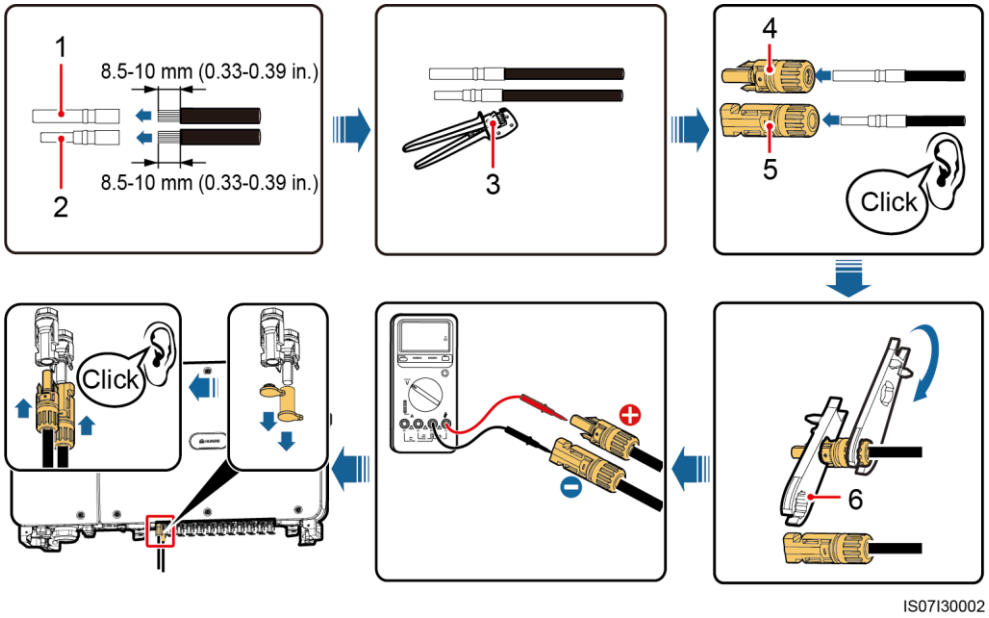
- If the voltage is a negative value, the DC input polarity is incorrect and needs correction.
- If the voltage is greater than 1500 V, too many PV modules configured to the same string. Remove some PV modules.

Step 6 Insert the positive and negative connectors into the corresponding DC positive and negative input terminals of the SUN2000.

NOTE

The figure shows how to connect the 8 AWG DC input power cable. For the connection of the 10 AWG cable, see the documents supplied with the corresponding DC terminals.

Figure 5-16 Connecting a DC input power cable



(1) Positive metal terminal (female)
(2) Negative metal terminal (male)
(3) PV-CZM-22100
(4) Positive connector
(5) Negative connector
(6) PV-MS open-end wrench

NOTICE

If the DC input power cable is reversely connected and the two DC switches are ON, do not immediately turn off the DC switches or reconnect the positive and negative connectors. Otherwise, the device may be damaged. The caused device damage is beyond the warranty scope. Wait until the solar irradiance declines and the PV string current reduces to below 0.5 A. Then turn the two DC switches to OFF, remove the positive and negative connectors, and rectify the connection of the DC input power cable.

----End

5.8 Connecting the Communications Cable

- The communications cable can be connected in a common way or through a pipe. This document describes the common way of connection as an example.
- When routing communications cables, separate communications cables from power cables and connect the shield layer to the ground point to prevent communication from being affected by signal interference.

Connecting to a Terminal Block (Recommended)

Figure 5-17 Connecting a communications cable (to a terminal block)

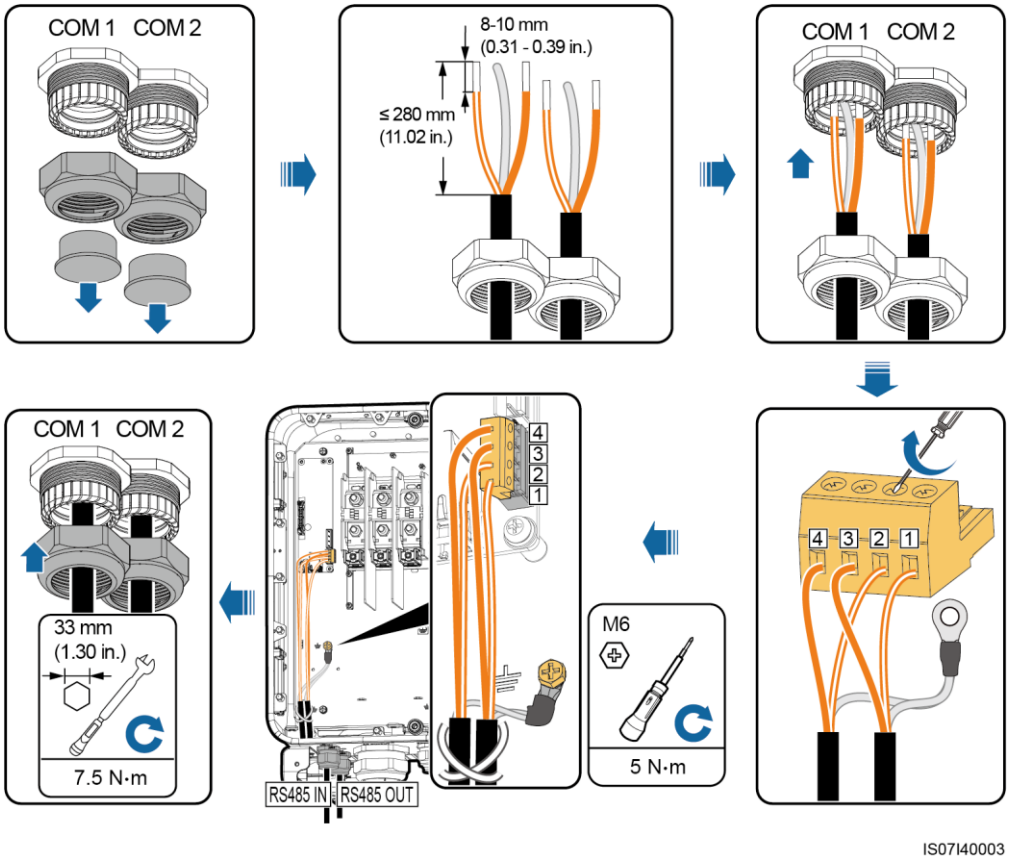


Table 5-5 Terminal block description

No.	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 to an RJ45 Network Port

Figure 5-18 Connecting a communications cable (to an RJ45 network port)

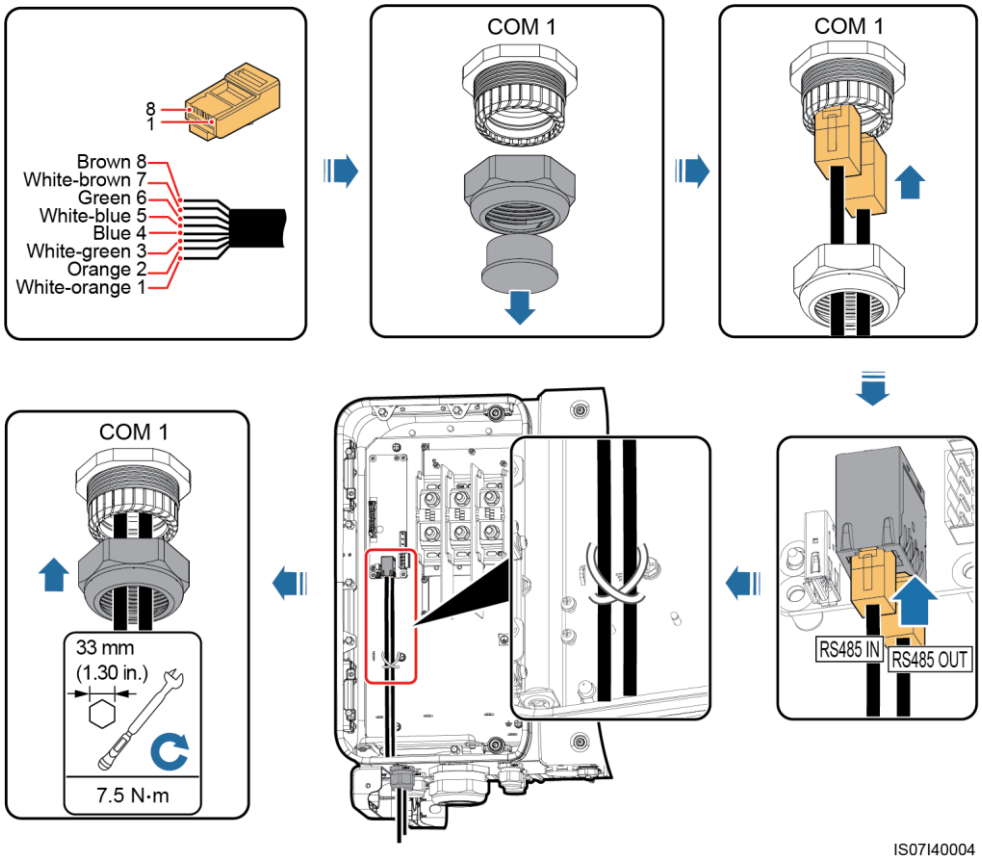


Table 5-6 RJ45 network port description

No.	Description	No.	Description
1, 4	RS485A, RS485 differential signal+	2, 5	RS485B, RS485 differential signal–

Follow-up Procedure

Check that the cable is connected correctly and securely. Then apply firestop putty to the cable gland and cable holes. Clear foreign matter from the maintenance compartment.

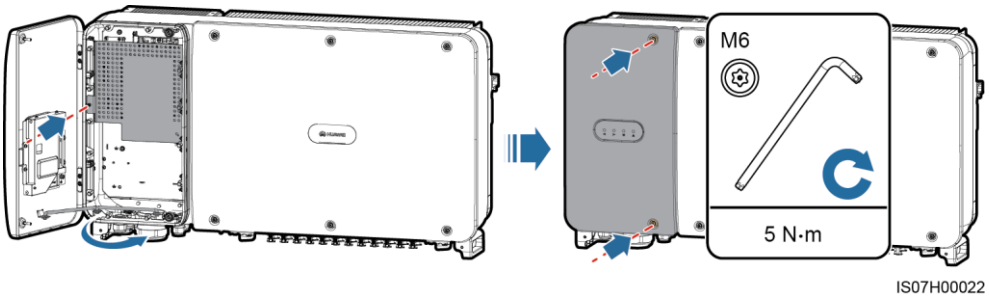
5.9 Closing the Maintenance Compartment Door

Procedure

Step 1 Install the AC terminal cover and then install the support bar.

Step 2 Close the maintenance compartment door and tighten the two screws on the door.

Figure 5-19 Closing the maintenance compartment door



NOTE

If the screws on the door are lost, use the spare screws in the fitting bag at the bottom of the enclosure.

----End

6 Commissioning

6.1 Checking Before Power-On

No.	Acceptance Criteria
1	The SUN2000 is installed correctly and securely.
2	DC switches and the downstream AC switch are OFF.
3	All cables are connected correctly and securely.
4	Used cable glands are sealed and locking caps are tightened.
5	Unused terminals and ports are locked by watertight caps.
6	The installation space is proper, and the installation environment is clean and tidy, without foreign matter.
7	The AC terminal cover is reinstalled.
8	The maintenance compartment door is closed and the door screws are tightened.

6.2 Powering On the SUN2000

Precautions

NOTICE

Before turning on the AC switch between the SUN2000 and the power grid, use a multimeter set to the AC position to check that the AC voltage is within the specified range.

Procedure

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

NOTICE

If you perform Step 2 before Step 1, the SUN2000 reports a fault about abnormal shutdown. You can start the SUN2000 only after the fault is automatically rectified.

Step 2 Turn on the DC switches at the bottom of the SUN2000.

Step 3 Perform quick settings on the SUN2000 app. For details, see 7.1 Operations with the SUN2000 App.

----End

7 Man-Machine Interactions

7.1 Operations with the SUN2000 App

7.1.1 App Introduction

Functions

The SUN2000 app (app for short) is a mobile phone app that communicates with the SUN2000 over Bluetooth or USB data cable to allow for querying alarms, configuring parameters, and performing routine maintenance.

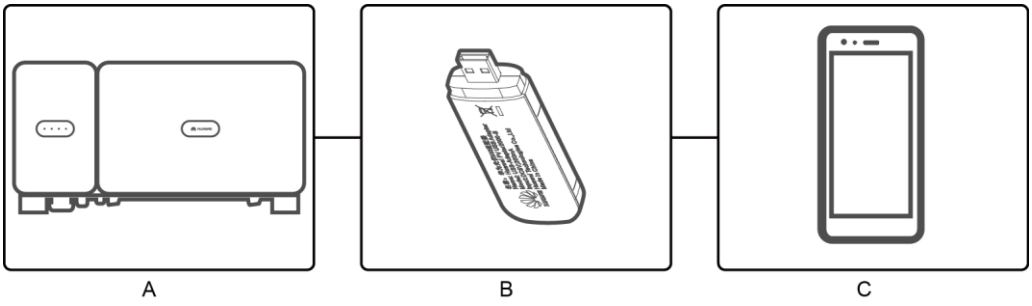
Connection Mode

After the DC or AC side of the SUN2000 is powered on, you can connect the app to it through Bluetooth or a USB data cable.

NOTICE

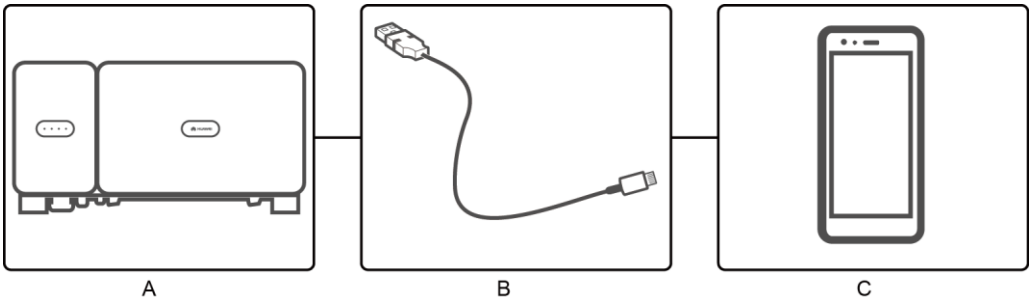
- The SUN2000 connects to the app over a Bluetooth module with the model of **USB-Adapter2000-B** (Android and iOS) or **BF4030** (Android).
- The port type of the USB data cable connecting to the SUN2000 is USB 2.0. Use the USB data cable delivered with the mobile phone.
- Mobile phone operating system: Android 4.0 or later, iOS 7.0 or later.
- Recommended phone brands: Huawei, Samsung, and iPhone

Figure 7-1 Connection over a Bluetooth module (Android and iOS)



(A) SUN2000 (B) Bluetooth module (C) Mobile phone

Figure 7-2 Connection over a USB data cable (Android)



(A) SUN2000 (B) USB data cable (C) Mobile phone

Disclaimer

The UI snapshots provided in this section correspond to the SUN2000APP 2.2.00.020 version. The figure is for reference only.

NOTICE

- The configurable parameters of the SUN2000 vary with the device model and grid code.
- The parameter names, value ranges, and default values are subject to change.
- The document describes the operation method on the Android UI as an example. The iOS system has the same operation method but a slightly different UI.

User Operation Permissions

The user accounts that can log in to the app are classified into common users, advanced users, and special users based on the responsibilities of PV plant operation personnel.

- Common user: Has the permissions of viewing SUN2000 data and setting user parameters.
- Advanced user: Has the permissions of viewing SUN2000 data, setting functional parameters, and maintaining devices.
- Special user: Has the permissions of viewing SUN2000 data, setting grid related parameters, and maintaining devices (including starting and shutting down the SUN2000, restoring factory defaults, and upgrading devices).

NOTE

File save path is displayed on the Android UI only.

Figure 7-3 Operation permissions of common users

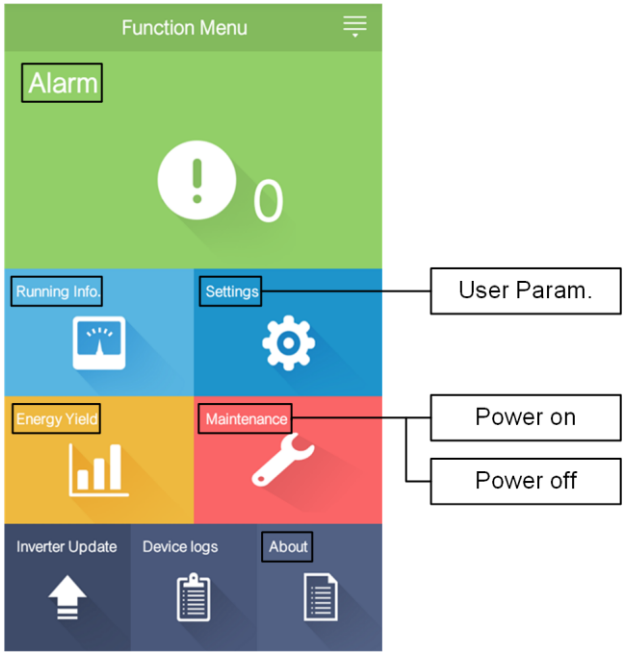


Figure 7-4 Operation permissions of advanced users

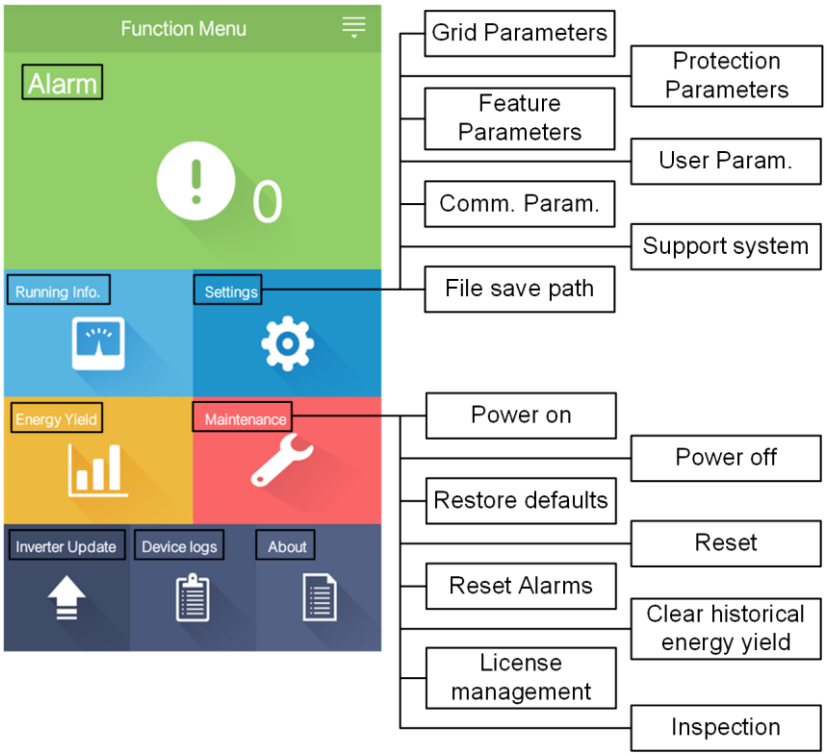
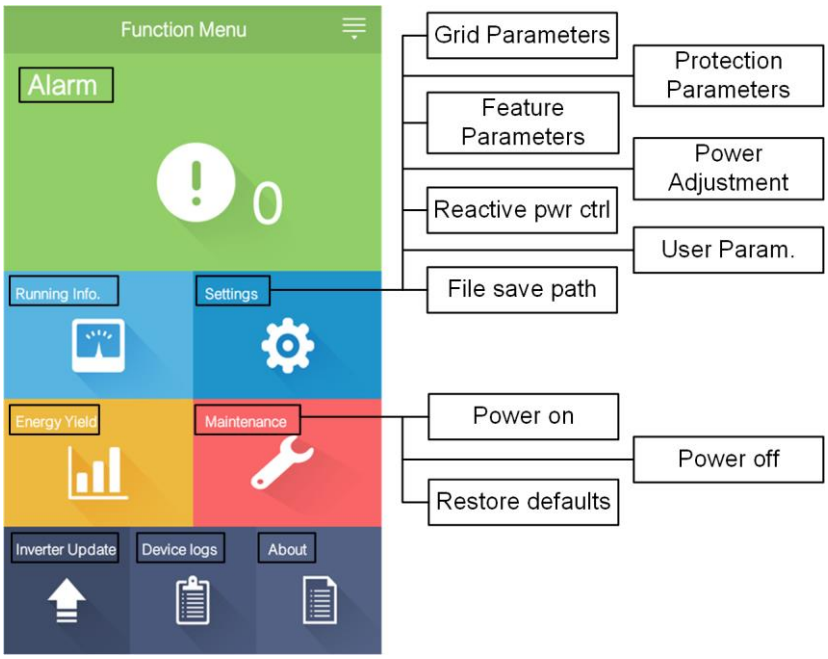


Figure 7-5 Operation permissions of special users



7.1.2 Downloading and Installing the App

Search **SUN2000** on the following app stores, download the app installation package, and complete the installation by following the operation guide.

- Huawei App Store (Android)
- Google Play (Android)
- APP Store (iOS)

After the app is installed, the **SUN2000** symbol will be displayed as below:

7.1.3 Logging in to the app

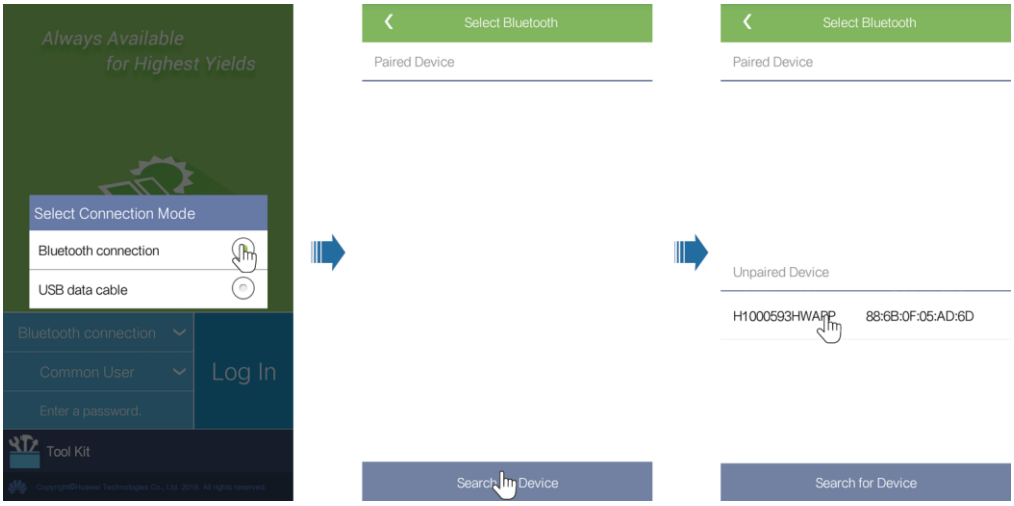
Prerequisites

- The DC or AC side of the SUN2000 has been energized.
- Connection over a Bluetooth module:
  a. The Bluetooth module is connected to the **USB** port at the bottom of the SUN2000.
  b. The Bluetooth function is enabled.
  c. Keep the mobile phone within 5 m from the SUN2000. Otherwise, the communication between them would be affected.
- Connection over a USB cable:
  a. The USB data cable is connected from the USB port at the bottom of the SUN2000 to the USB port on the mobile phone.
  b. The USB data cable has been successfully connected and **Connected to USB Accessory** is displayed on the screen. Otherwise, the connection is invalid.

Procedure

Step 1 Start the app. The login screen is displayed. Select **Connection Mode** to connect to the SUN2000.

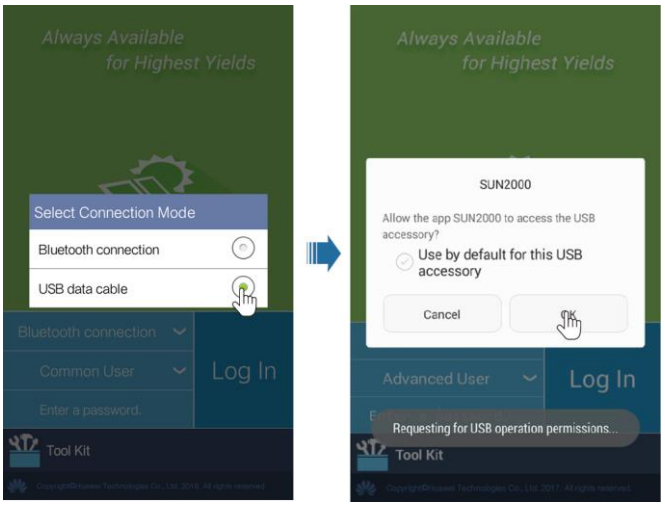
Figure 7-6 Connection over a Bluetooth module (Android and iOS)



NOTE

If the Bluetooth module is USB-Adapter2000-B, the connected Bluetooth device is named after *last 8 digits of the SN bar code*+**HWAPP**. The SN bar code can be obtained from the silk screen on the USB-Adapter2000-B.

Figure 7-7 Connection over a USB Data Cable (for Android)



NOTE

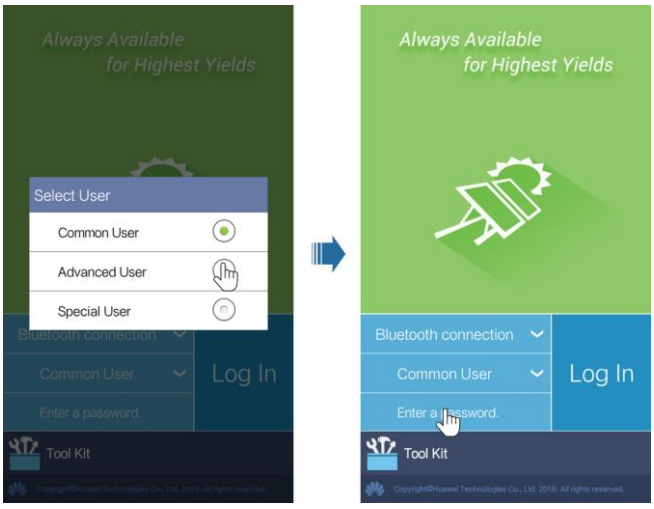
After you select **Use by default for this USB accessory**, the message will not appear if you log in to the app again without reconnecting the USB data cable.

Step 2 Select a login user and enter the password.

NOTICE

- The login password is the same as that for the SUN2000 connected to the app and is used only when the SUN2000 connects to the app.
- The preset password for a 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 and update the password regularly after a period of use.
- During login, if five consecutive invalid password attempts are made (the interval between two consecutive attempts is less than 2 minutes), the account will be locked for 10 minutes. The password should consist of 6 characters.

Figure 7-8 Selecting a login user

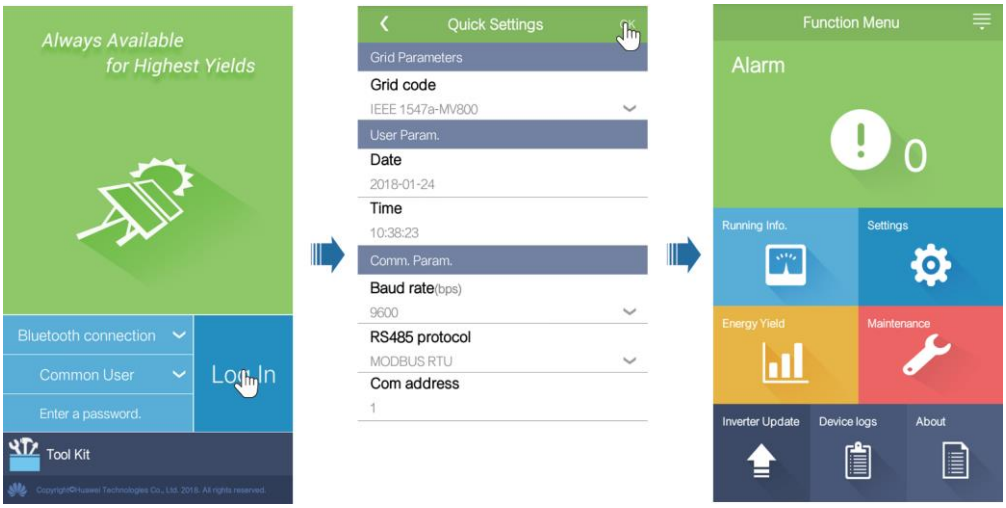


Step 3 After successful login, the quick settings screen or main menu screen is displayed.

NOTICE

- If you log in to the SUN2000 app after the device connects to the app for the first time or factory defaults are restored, the quick settings screen will be displayed. If you do not set SUN2000 basic parameters on the quick settings screen, the screen is still displayed when you log in to the app next time.
- To set parameters on the **Quick settings** screen, you need to login as **Advanced User**. If you log in as **Common User** or **Special User**, enter the password of the advanced user in the diaglog box, and you can access the **Quick settings** screen.

Figure 7-9 Logging in to the app



NOTE

On the quick settings screen, you can set basic parameters. After settings, you can modify the parameters by tapping **Settings** on the main menu screen.

- Set the grid code that applies to the country or region where the PV plant is located and the SUN2000 model.
- Set the user parameters based on the current date and time.
- Set the baud rate, protocol, and address based on site requirements. The baud rate (bps) can be set to **4800**, **9600**, or **19200**. The protocol can be set to **MODBUS RTU**, and the address can be set to any value in the range of 1 to 247.
- When multiple SUN2000s communicate with the SmartLogger over RS485, the RS485 addresses of all the SUN2000s on each RS485 route must be within the address range set on the SmartLogger and cannot be duplicate. Otherwise, communication will fail. In addition, the baud rates of all the SUN2000s on each RS485 route must be consistent with the SmartLogger baud rate.

----End

7.1.4 Operations Related to the Common User

7.1.4.1 Setting User Parameters

Procedure

Step 1 Choose **Function Menu** > **Settings** > **User Param.** to set user parameters.

Figure 7-10 Setting user parameters

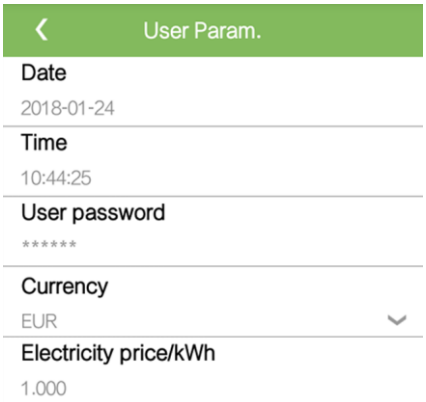


Table 7-1 User parameters

Item	Description	Value Range
Date	Set the system date.	[2000-01-01, 2068-12-31]
Time	Set the system time.	[00:00:00, 23:59:59]
User password	Set the login password. The initial password is **00000a**. Change the password on a regular basis to ensure the account safety.	• Contains six characters. • Contains at least two types of lowercase letters, uppercase letters, and digits. • Differ from the original password in at least one character.
Currency	Set the SUN2000 revenue currency.	• EUR • GBP • USD • CNY • JPY
Electricity price/kWh	Set the SUN2000 revenue per kWh. The revenue/kWh indicates the local electricity price, which is used to calculate the conversion revenue of the energy yield.	[0, 999.999]

----End

7.1.4.2 Starting and Shutting Down the SUN2000

Procedure

Step 1 Choose **Function Menu** > **Maintenance**. The maintenance screen will be displayed.

Step 2 Tap ▶ behind **Power on** or **Power off**, enter the login password, and tap **OK**.

----End

7.1.5 Operations Related to the Advanced User

7.1.5.1 Parameter Settings

Ensure that the DC side of the SUN2000 is energized before setting grid parameters, protection parameters, and feature parameters.

7.1.5.1.1 Setting Grid Parameters

Procedure

Step 1 Choose **Function Menu** > **Settings** > **Grid Parameters** to set grid parameters.

Figure 7-11 Grid parameters

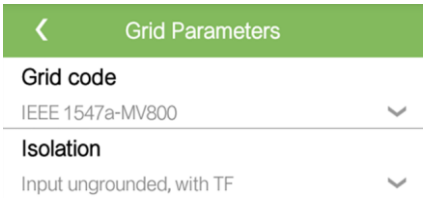


Table 7-2 Grid parameters

Parameter	Description	Value Range
Grid code	Set this parameter based on the grid code of the country or region where the SUN2000 is used and the SUN2000 application scenario.	-
Isolation	Specifies the working mode of the SUN2000 according to the grounding status at the DC side and the connection status to the grid.	• Input grounded, with TF • Input ungrounded, without TF • Input ungrounded, with TF

----End

7.1.5.1.2 Setting Protection Parameters

Procedure

Step 1 Choose **Function Menu** > **Settings** > **Protection Parameters** to set protection parameters.

Figure 7-12 Protection parameters

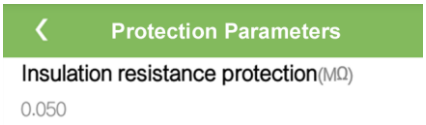


Table 7-3 Protection parameters

Parameter	Description	Value Range
Insulation resistance protection (Mohm)	To ensure device safety, the SUN2000 detects the insulation resistance between the input side and the ground when it starts a self-check. If the detected value is less than the preset value, the SUN2000 does not export power to the power grid.	[0.05, 1.5]

----End

7.1.5.1.3 Setting Feature Parameters

Procedure

Step 1 Choose **Function Menu** > **Settings** > **Feature Parameters** to set feature parameters.

Figure 7-13 Feature parameters

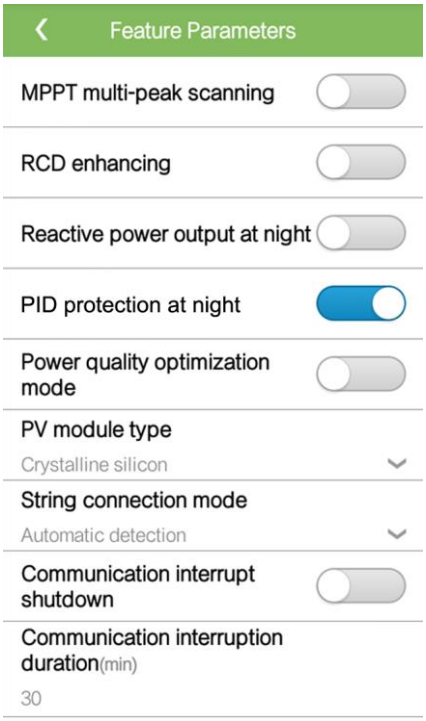


Table 7-4 Feature parameters

Parameter	Description	Value Range
MPPT multi-peak scanning	When the SUN2000 is used in scenarios where PV strings are obviously shaded, enable this function. Then the SUN2000 will perform MPPT scanning at regular intervals to locate the maximum power. The scanning interval is set by **MPPT multi-peak scanning interval**.	• Disable • Enable
MPPT multi-peak scanning interval (min)	Specifies the MPPT multi-peak scanning interval. This parameter is displayed only when **MPPT multi-peak scanning** is set to **Enable**.	[5, 30]
RCD enhancing	RCD refers to the residual current of the SUN2000 to the ground. To ensure device security and personal safety, RCD should comply with the standard. If an AC switch with a residual current detection function is installed outside the SUN2000, this function should be enabled to reduce the residual current generated during SUN2000 running, thereby preventing the AC switch from misoperations.	• Disable • Enable

Parameter	Description	Value Range
Reactive power output at night	In some specific application scenarios, a power grid company requires that the SUN2000 can perform reactive power compensation at night to ensure that the power factor of the local power grid meets requirements. This parameter is configurable only when **Isolation** is set to **Input ungrounded, with a transformer**.	• Disable • Enable
PID protection at night	• When **PID protection at night** is set to **Enable**, the SUN2000 will shut down automatically if it detects abnormality in PID voltage compensation during the reactive power compensation at night. • When **PID protection at night** is set to **Disable**, the SUN2000 will operate in grid-tied mode if it detects abnormality in PID voltage compensation during the reactive power compensation at night.	• Disable • Enable
Power quality optimization mode	If **Power quality optimization mode** is set to **Enable**, the inverter output current harmonics will be optimized.	• Disable • Enable
PV module type	This parameter is used to set different types of PV modules and the shutdown time of the concentration PV modules. If the concentration PV modules are shaded, the power drops drastically to 0 and the SUN2000 shuts down. The energy yield would be affected since it takes too long for the power to resume and SUN2000 to restart. The parameter does not need to be set for crystalline silicon and filmy PV modules. • If **PV module type** is set to **Crystalline silicon** or **Film**, the SUN2000 automatically detects the power of PV modules when they are shaded and shuts down if the power is too low. • When the concentration PV modules are used: – If **PV module type** is set to **CPV 1**, the inverter can quickly restart in 60 minutes when the input power of PV modules drops drastically due to shading. – If **PV module type** is set to **CPV 2**, the inverter can quickly restart in 10 minutes when the input power of PV modules drops drastically due to shading.	• Crystalline silicon • Film • CPV 1 • CPV 2

Parameter	Description	Value Range
String connection mode	Specifies the connection mode of PV strings. • When the PV strings connect to the inverter separately (fully separate connection), there is no need to set this parameter. The inverter can automatically detect the connection mode of the PV strings. • When the PV strings connect to one another in parallel outside the inverter and then connect to the inverter independently (fully parallel connection), set this parameter to **All PV strings connected**.	• Automatic detection • All PV strings separated • All PV strings connected
Communication interrupt shutdown	The standards of certain countries and regions require that the SUN2000 must shut down after the communication is interrupted for a certain time. If **Communication interrupt shutdown** is set to **Enable** and the SUN2000 communication has been interrupted for a specified time (set by **Communication interruption duration**), the SUN2000 will automatically shut down.	• Disable • Enable
Communication interruption duration (min)	Specifies the duration for determining communication interruption, and is used for automatic shutdown for protection in case of communication interruption.	[1, 120]
Communication resumed startup	If this parameter is enabled, the SUN2000 automatically starts after communication recovers. If this parameter is disabled, the SUN2000 needs to be started manually after communication recovers.	• Disable • Enable
Soft start time (s)	Specifies the duration for the power to gradually increase when the SUN2000 starts.	[20, 1800]
AFCI	The North American standard requires the SUN2000 to provide the DC arc detection function.	• Disable • Enable
AFCI detection adaptive mode	Adjusts the sensitivity of arc detection. This parameter is displayed only when **AFCI** is set to **Enable**.	• High • Moderate • Low
Hibernate at night	The SUN2000 monitors PV strings at night. If **Hibernate at night** is set to **Enable**, the monitoring function of the SUN2000 will hibernate at night, reducing power consumption.	• Disable • Enable

Parameter	Description	Value Range
PLC communication	For SUN2000 models that support both RS485 and PLC communication, when RS485 communication is used, you are advised to set **PLC communication** to **Disable** to reduce power consumption.	• Disable • Enable
Upgrade delay	**Upgrade delay** is mainly used in the upgrade scenarios where the PV power supply is disconnected at night due to no sunlight or unstable at dawn or dusk due to poor sunlight. After the SUN2000 upgrade starts, if **Upgrade delay** is set to **Enable**, the upgrade package is loaded first. After the PV power supply recovers and the activation conditions are met, the SUN2000 automatically activates the upgrade.	• Disable • Enable
RS485-2 communication	If this parameter is set to **Enable**, the RS485-2 port can be used. If the port is not used, it is recommended that this parameter be set to **Disable** to reduce power consumption.	• Disable • Enable
String monitor	The SUN2000 monitors PV strings in real time. If any PV string is abnormal (such as the PV string is shaded or the energy yield decreases), the SUN2000 generates an alarm to remind maintenance personnel to maintain the PV string in a timely manner. If PV strings are easily shaded, you are advised to set **String monitor** to **Disable** to prevent false alarms.	• Disable • Enable
String detection reference asymmetric coefficient	Specifies the threshold for determining PV string exception. The false alarms caused by fixed shadow shading can be controlled by changing this parameter. This parameter is displayed when **String monitor** is set to **Enable**.	[5, 100]
String detection starting power percentage (%)	Specifies the threshold for starting PV string exception detection. The false alarms caused by fixed shadow shading can be controlled by changing this parameter. This parameter is displayed when **String monitor** is set to **Enable**.	[1, 100]
Tracking system controller	Selects a controller vendor.	-

----End

7.1.5.1.4 Setting User Parameters

Procedure

Step 1 Choose **Function Menu** > **Settings** > **User Param.** to set user parameters.

Figure 7-14 Setting user parameters

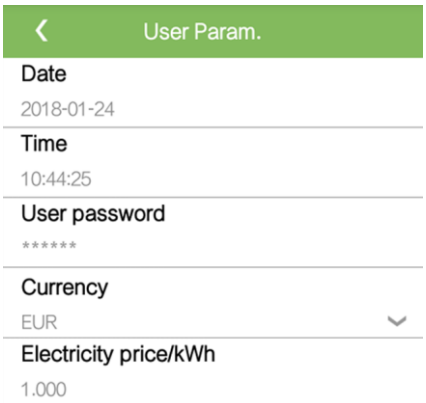


Table 7-5 User parameters

Item	Description	Value Range
Date	Set the system date.	[2000-01-01, 2068-12-31]
Time	Set the system time.	[00:00:00, 23:59:59]
User password	Set the login password. The initial password is **00000a**. Change the password on a regular basis to ensure the account safety.	• Contains six characters. • Contains at least two types of lowercase letters, uppercase letters, and digits. • Differ from the original password in at least one character.
Currency	Set the SUN2000 revenue currency.	• EUR • GBP • USD • CNY • JPY
Electricity price/kWh	Set the SUN2000 revenue per kWh. The revenue/kWh indicates the local electricity price, which is used to calculate the conversion revenue of the energy yield.	[0, 999.999]

----End

7.1.5.1.5 Setting Communications Parameters

Procedure

Step 1 Choose **Function Menu** > **Settings** > **Comm. Param.**. Set the communications parameters according to the communications mode the SUN2000 adopts.

Figure 7-15 RS485 communications parameters

NOTE

This section introduces the method of setting **RS485-1** communications parameters, which is the same as that of setting **RS485-2** communications parameters.

Table 7-6 RS485 communications parameters

Item	Description	Value Range
Baud rate (bps)	Set the RS485 baud rate to be consistent with the baud rate of the devices on the same bus.	• 4800 • 9600 • 19200
RS485 protocol	• The SUN2000 can connect to the upper-level management unit over MODBUS RTU, Sunspec, or AVM. • The SUN2000 can only connect to the solar tracker over MODBUS RTU. • If the SUN2000 does not adopt the RS485, you can select an invalid protocol.	• Invalid protocol • MODBUS RTU • Sunspec • AVM
Parity	Set the check mode of RS485 communication to be consistent with that of the SmartLogger2000.	• None • Odd parity • Even parity
Com address	Set the communications address of the SUN2000 when it connects to the upper-level management unit, which should not conflict with the addresses of other devices on the same bus.	[1, 247]

Figure 7-16 PLC communications parameters

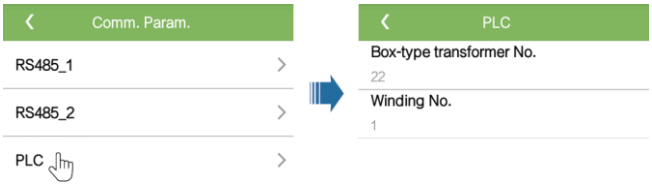


Table 7-7 PLC communications parameters

Item	Description	Value Range
Box-type transformer No.	Set the number of the box-type transformer connecting to the SUN2000.	[0, 511]
Winding No.	Set the number of the winding connecting to the SUN2000.	[0, 7]

----End

7.1.5.1.6 Setting the Support System

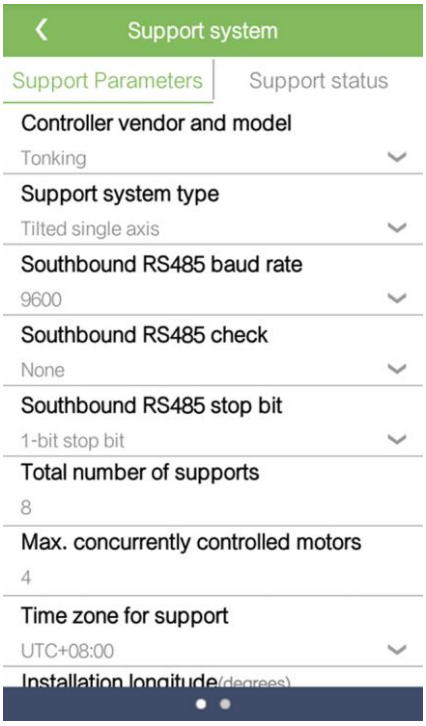
Context

Parameter settings of the support system may vary depending on the vendor.

Procedure

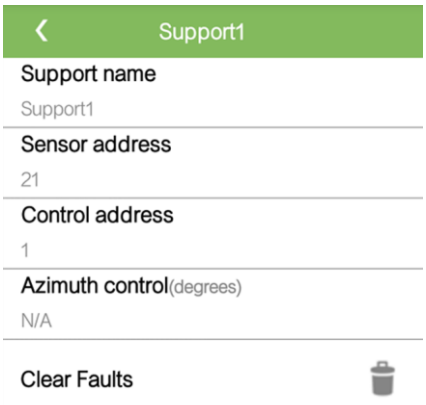
Step 1 Choose **Function Menu** > **Settings** > **Support system** to set support parameters.

Figure 7-17 Support parameters



Step 2 Swipe left on the screen, tap a support, and set parameters for the support.

Figure 7-18 Setting parameters of a single support



----End

7.1.5.1.7 Setting a File Save Path

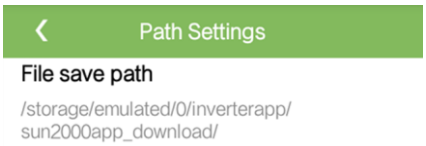
Context

In the Android system, you can modify the save path for user operation logs and SUN2000 logs and export logs from the path subsequently.

Procedure

Step 1 Choose **Function Menu** > **Settings** > **File save path** to set the file save path.

Figure 7-19 Setting the path



----End

7.1.5.2 System Maintenance

7.1.5.2.1 Starting and Shutting Down the SUN2000

Procedure

Step 1 Choose **Function Menu** > **Maintenance**. The maintenance screen will be displayed.

Step 2 Tap ▶ behind **Power on** or **Power off**, enter the login password, and tap **OK**.

----End

7.1.5.2.2 Restoring Factory Settings

Context

NOTICE

Perform this operation with caution because all configured parameters except the current date, time, baud rate, and address will be restored to their factory default values. This operation will not affect operating information, alarm records, or system logs.

Procedure

Step 1 Choose **Function Menu** > **Maintenance**. The maintenance screen will be displayed.

Step 2 Tap ▶ behind **Restore defaults**, enter the app login password, and tap **OK**.

----End

7.1.5.2.3 Performing an AFCI Self-Test

Procedure

Step 1 Choose **Function Menu** > **Maintenance**. The maintenance screen will be displayed.

Step 2 Tap  behind AFCI self-test and tap **OK** in the displayed dialog box to perform the test.

----End

7.1.5.2.4 Resetting the SUN2000

Context

Reset the SUN2000, and it will automatically shut down and restart.

Procedure

Step 1 Choose **Function Menu** > **Maintenance**. The maintenance screen will be displayed.

Step 2 Tap  behind **Reset**, enter the app login password, and tap **OK**.

----End

7.1.5.2.5 Resetting Alarms

Context

Reset alarms, and all the active and historical alarms of the SUN2000s will be cleared.

Procedure

Step 1 Choose **Function Menu** > **Maintenance**. The maintenance screen will be displayed.

Step 2 Tap  behind **Reset Alarms**, enter the login password, and tap **OK**.

----End

7.1.5.2.6 Clearing Historical Energy Yield Data

Context

Clear historical energy yield data, and all the historical energy yield data of the SUN2000 connecting to the app will be cleared.

Procedure

Step 1 Choose **Function Menu** > **Maintenance**. The maintenance screen will be displayed.

Step 2 Tap  behind **Clear historical energy yield**, enter the login password, and tap **OK**.

----End

7.1.5.2.7 Managing the License

Context

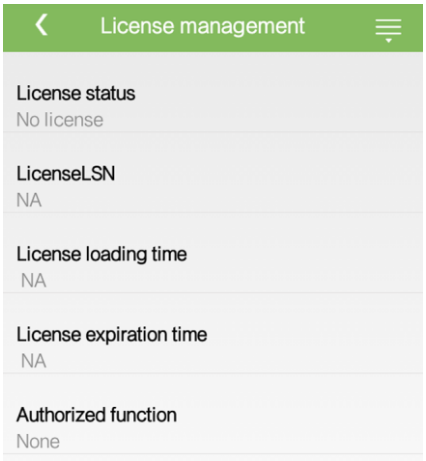
You can view the SUN2000 license information and obtain the license status through the license management. Before a device is replaced, the current device license needs to be revoked so that the revocation code can be generated and used for applying for a new device license.

Procedure

Step 1 Choose **Function Menu** > **Maintenance** > **License management**. The **License management** screen is displayed.

- When **License status** is **Normal**, revoke the license by tapping .
- When **License status** is **Deregistered**, export and view the license revocation code by tapping .
- When **License status** is **No license**, load the license by tapping .

Figure 7-20 License management



----End

7.1.5.2.8 Device inspection

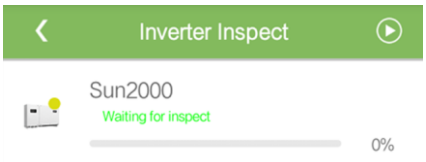
Context

After a SUN2000 is put into use, it should be inspected periodically to detect any potential risks and problems.

Procedure

Step 1 Choose **Function Menu** > **Maintenance** > **Inspection**, and tap to start the SUN2000 inspection.

Figure 7-21 Device inspection



----End

7.1.5.3 SUN2000 Upgrade

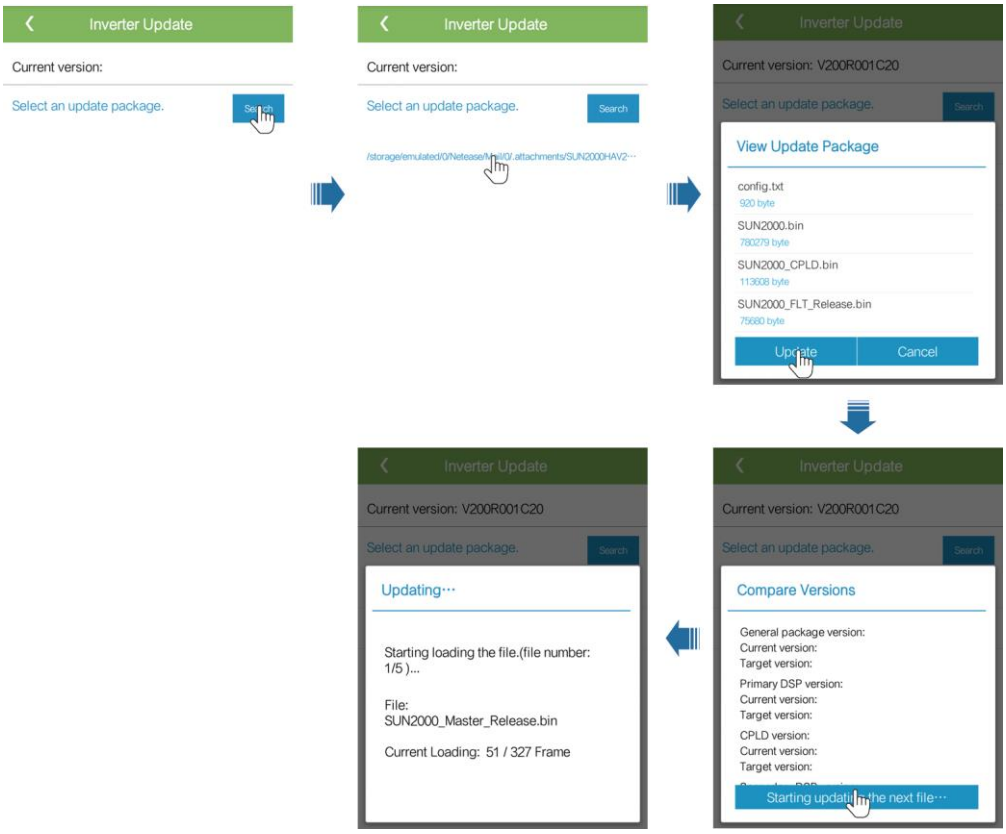
Prerequisites

- You have obtained the upgrade package with the help of the supplier or Huawei engineers.
- In the Android system, you have copied the upgrade package to the mobile phone. The package is a **.zip** file, which can be saved flexibly and searched. To reduce the time for searching the package, you are advised to save it under the root directory of the memory or SD card of the mobile phone.
- In the iOS system, you have imported the upgrade package to the app by emails. The package is a **.zip** file and cannot be searched.

Procedure

Step 1 Choose **Function Menu** > **Inverter Update** and complete the upgrade by following the operation guide.

Figure 7-22 SUN2000 upgrade



----End

7.1.5.4 Device Logs

Context

Tap **Device logs** to export operation logs, as well as alarm records and energy yield information of the SUN2000 from the mobile phone.

Procedure

Step 1 Choose **Function Menu** > **Device logs**. The device log screen is displayed.

- Select **Phone Log** to export and send logs by emails on the mobile phone.
- Select **Inverter Log** to export and send alarms and performance data logs by emails.

NOTE

- In the Android system, logs are saved in the **storage/emulated/0/sun2000app_download** file by default. You can modify the saving path by choosing **Function Menu** > **Settings** > **File save path**.
- In the iOS system, you can query the logs by choosing **Tool Kit** > **File Manager** > **Device Log**.

Figure 7-23 Device logs

----End

7.1.6 Operations Related to the Special User

7.1.6.1 Parameter Settings

Ensure that the DC side of the SUN2000 is energized before setting grid parameters, protection parameters, feature parameters, and grid adjustment parameters.

7.1.6.1.1 Setting Grid Parameters

Procedure

Step 1 Choose **Function Menu** > **Settings** > **Grid Parameters** to set grid parameters.

Figure 7-24 Grid parameters

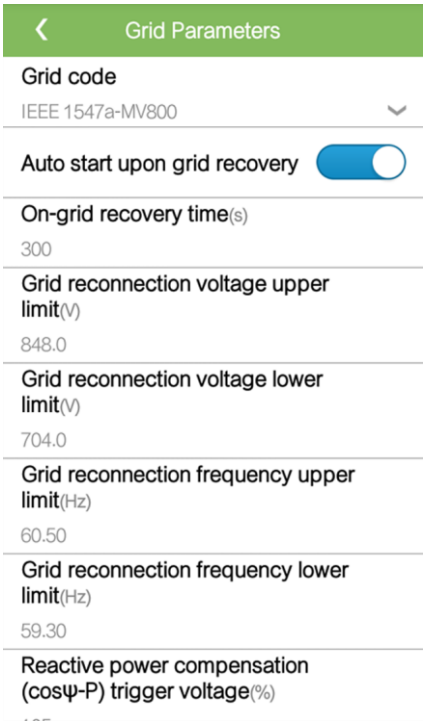


Table 7-8 Grid parameters

Parameter	Description	Value Range (Vn represents the rated voltage.)
Grid code	Set this parameter based on the grid code of the country or region where the SUN2000 is used and the SUN2000 application scenario.	-
Auto start upon grid recovery	Specifies whether to allow the SUN2000 to automatically start after the power grid recovers.	• Disable • Enable
Grid connection duration after power grid recovery (s)	Specifies the waiting time for SUN2000 restart after the power grid recovers.	[0, 900]
Grid reconnection voltage upper limit (V)	The standards of certain countries and regions require that the SUN2000 must not export power to the power grid again when the grid voltage exceeds the value of **Grid reconnection voltage upper limit** after the SUN2000 shuts down due to a fault.	[100%Vn, 136%Vn]
Grid reconnection voltage lower limit (V)	The standards of certain countries and regions require that the SUN2000 must not export power to the power grid again when the grid voltage is below the value of **Grid reconnection voltage lower limit** after the SUN2000 shuts down due to a fault.	[45%Vn, 95%Vn]
Grid reconnection frequency upper limit (Hz)	The standards of certain countries and regions require that the SUN2000 must not export power to the power grid again when the grid frequency exceeds the value of **Grid reconnection frequency upper limit** after the SUN2000 shuts down due to a fault.	[100%Fn, 112%Fn]
Grid reconnection frequency lower limit (Hz)	The standards of certain countries and regions require that the SUN2000 must not export power to the power grid again when the grid frequency is below the value of **Grid reconnection frequency lower limit** after the SUN2000 shuts down due to a fault.	[85%Fn, 100%Fn]
Reactive power compensation (cosφ-P) trigger voltage (V)	Specifies the voltage threshold for triggering reactive power compensation based on the cosφ-P curve.	[100, 110]
Reactive power compensation (cosφ-P) exit voltage (V)	Specifies the voltage threshold for exiting reactive power compensation based on the cosφ-P curve.	[90, 100]

----End

7.1.6.1.2 Setting Protection Parameters

Procedure

Step 1 Choose **Function Menu** > **Settings** > **Protection Parameters** to set protection parameters.

Figure 7-25 Protection parameters

Table 7-9 Protection parameters

Parameter	Description	Value Range (Vn represents the rated voltage.)
Unbalance voltage protection (%)	Specifies the SUN2000 protection threshold in the case of unbalanced power grid voltage.	[0.0, 50.0]
Phase angle offset protection	The standards of certain countries and regions require that the SUN2000 needs to be protected when the three-phase angle offset of the power grid exceeds a certain value.	• Enable • Disable
10 minute OV protection (V)	Specifies the 10-minute overvoltage protection threshold.	[1 x Vn, 1.25 x Vn]
10 minute OV protection time (ms)	Specifies the 10-minute overvoltage protection duration.	[50, 7200000]

Parameter	Description	Value Range (Vn represents the rated voltage.)
Level-N OV protection (V)	Specifies the level-N overvoltage protection threshold. **NOTE** N can be 1 or 2.	• Level 1 overvoltage protection threshold: [1 x Vn, 1.25 x Vn] • Level 2 overvoltage protection threshold: [1 x Vn, 1.36 x Vn]
Level-N OV protection time (ms)	Specifies the level-N overvoltage protection duration. **NOTE** N can be 1 or 2.	[50, 7200000]
Level-N UV protection (V)	Specifies the level-N undervoltage protection threshold. **NOTE** N can be 1, 2, or 3.	[0.15 x Vn, 1 x Vn]
Level-N UV protection time (ms)	Specifies the level-N undervoltage protection duration. **NOTE** N can be 1, 2, or 3.	[50, 7200000]
Level-N OF protection (Hz)	Specifies the level-N overfrequency protection threshold. **NOTE** N can be 1 or 2.	[1 x Fn, 1.15 x Fn]
Level-N OF protection time (ms)	Specifies the level-N overfrequency protection duration. **NOTE** N can be 1 or 2.	[50, 7200000]
Level-N UF protection (Hz)	Specifies the level-N underfrequency protection threshold. **NOTE** N can be 1 or 2.	[0.85 x Fn, 1 x Fn]
Level-N UF protection time (ms)	Specifies the level-N underfrequency protection duration. **NOTE** N can be 1 or 2.	[50, 7200000]

----End

7.1.6.1.3 Setting Feature Parameters

Procedure

Step 1 Choose **Function Menu** > **Settings** > **Feature Parameters** to set feature parameters.

Figure 7-26 Feature parameters

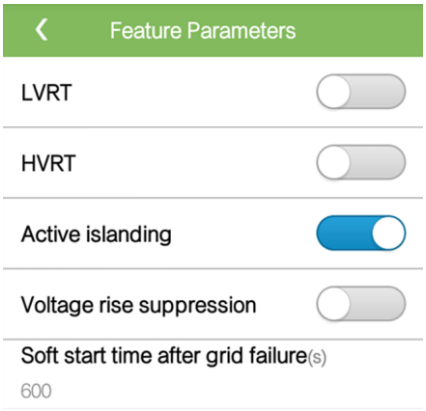


Table 7-10 Feature parameters

Parameter	Description	Value Range (Vn: rated voltage)
LVRT	When the power grid voltage is abnormally low for a short time, the SUN2000 cannot disconnect from the power grid immediately and has to work for some time. This is called LVRT.	• Disable • Enable
LVRT threshold (V)	Specifies the threshold for triggering LVRT.	[50%Vn, 92%Vn]
LVRT undervoltage protection shield	Specifies whether to shield the undervoltage protection function during LVRT.	• Disable • Enable
LVRT reactive power compensation power factor	During LVRT, the SUN2000 needs to generate reactive power to support the power grid. This parameter is used to set the reactive power generated by the SUN2000. For example, if you set **LVRT reactive power compensation power factor** to **2**, the reactive current generated by the SUN2000 is 20% of the rated current when the AC voltage drops by 10% during LVRT.	[0, 10]
HVRT	When the power grid voltage is abnormally high for a short time, the SUN2000 cannot disconnect from the power grid immediately and has to work for some time. This is called high voltage ride-through (HVRT).	• Disable • Enable
HVRT triggering threshold (V)	Specifies the threshold for triggering the HVRT. The threshold settings should meet the local grid standard.	[105%Vn, 130%Vn]
Active islanding	Specifies whether to enable the active islanding protection function.	• Disable • Enable

Parameter	Description	Value Range (Vn: rated voltage)
Voltage rise suppression	The standards of certain countries and regions require that the SUN2000 should prevent the grid voltage from rising by delivering reactive power and decreasing active power when the output voltage exceeds a certain value.	• Disable • Enable
Voltage rise suppression reactive adjustment point (%)	The standards of certain countries and regions require that the SUN2000 must generate a certain amount of reactive power when the output voltage exceeds a certain value. This parameter is displayed when **Voltage rise suppression** is set to **Enable**.	[100, 115)
Voltage rise suppression active derating point (%)	The standards of certain countries and regions require that the SUN2000 must generate a certain amount of reactive power when the output voltage exceeds a certain value. • This parameter is displayed when **Voltage rise suppression** is set to **Enable**. • The value of **Voltage rise suppression active derating point** must be greater than that of **Voltage rise suppression reactive adjustment point**.	(100, 115]
Soft start time after grid failure (s)	Specifies the time for the power to gradually increase when the SUN2000 restarts after the power grid recovers.	[20, 800]

----End

7.1.6.1.4 Setting Power Adjustment Parameters

Procedure

Step 1 Choose **Function Menu** > **Settings** > **Power Adjustment** to set power adjustment parameters.

Figure 7-27 Power adjustment parameters

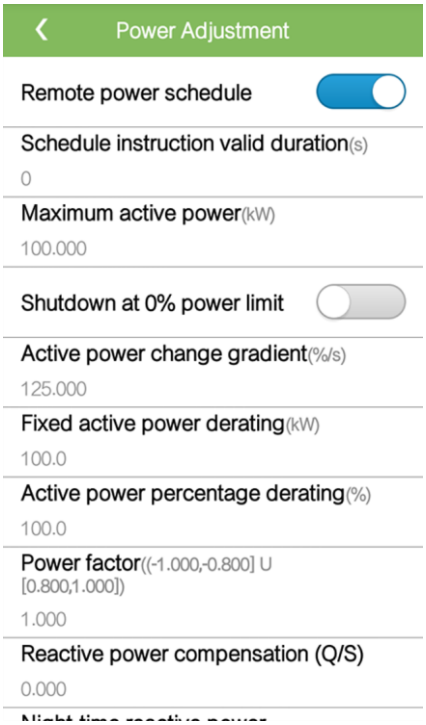


Table 7-11 Power adjustment parameters

Parameter	Description	Value Range (Smax_limit: upper limit of the maximum apparent power, Pmax_limit: upper limit of the maximum active power, Fn: rated frequency)
Remote power schedule	If this parameter is set to **Enable**, the SUN2000 responds to the remote power schedule command. If it is set to **Disable**, the SUN2000 does not respond to the command.	• Disable • Enable
Schedule instruction valid duration (s)	Adjusts the duration within which the scheduling instruction is valid.	[0, 86400]
Maximum apparent power (kVA)	Specifies the output upper threshold for the maximum apparent power to adapt to the capacity requirements for standard and customized SUN2000s.	[Maximum active power, Smax_limit]
Maximum active power (kW)	Specifies the output upper threshold for the maximum active power to adapt to various market requirements.	[0.1, Pmax_limit]

Parameter	Description	Value Range (Smax_limit: upper limit of the maximum apparent power, Pmax_limit: upper limit of the maximum active power, Fn: rated frequency)
Shutdown at 0% power limit	If this parameter is set to **Enable**, the SUN2000 shuts down after receiving the 0% power limit instruction. If this parameter is set to **Disable**, the SUN2000 does not shut down after receiving the 0% power limit instruction.	• Disable • Enable
Active power change gradient (%/s)	Adjusts the change speed of the SUN2000 active power.	[0.1, 1000]
Fixed active power derating (kW)	Adjusts the active power output of the SUN2000 to a fixed value.	[0, Pmax_limit]
Active power percentage derating (%)	Adjusts the active power output of the SUN2000 to a percentage. If this parameter is set to **100**, the SUN2000 outputs with the maximum output power.	[0, 100]
Reactive power change gradient (%/s)	Adjusts the change speed of the SUN2000 reactive power.	[0.1, 1000]
Power factor	Adjusts the SUN2000 power factor.	(–1.000, –0.800]U[0.800, 1.000]
Reactive power compensation (Q/S)	Adjusts the SUN2000 output reactive power.	(-1.000, 1.000]
Night-time reactive power compensation (Q/S)	If **Reactive power output at night** is enabled, no PV input exists, and no remote scheduling instruction is delivered, the SUN2000 responds to this command.	(-1.000, 1.000]
Overfrequency derating	If this parameter is enabled, the active power of the inverter will be derated according to a certain slope when the grid frequency exceeds the value that triggers overfrequency derating.	• Disable • Enable
Trigger frequency of over frequency derating (Hz)	The standards of certain countries and regions require that the output active power of the SUN2000 be derated when the grid frequency exceeds a certain value.	[Fn-5, Fn+5)
Quit frequency of over frequency derating (Hz)	Specifies the frequency threshold for exiting overfrequency derating.	[Fn-5, Fn+5)
Cutoff frequency of overfrequency derating (Hz)	Specifies the frequency threshold for cutting off overfrequency derating.	(Fn-5, Fn+5]

Parameter	Description	Value Range (Smax_limit: upper limit of the maximum apparent power, Pmax_limit: upper limit of the maximum active power, Fn: rated frequency)
Cutoff power of overfrequency derating (%)	Specifies the power threshold for cutting off overfrequency derating.	[0, 100]
Power recovery gradient of over frequency derating (%/min)	Specifies the power recovery gradient for overfrequency derating.	[1, 6000]

----End

7.1.6.1.5 Setting User Parameters

Procedure

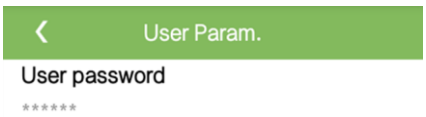
Step 1 Choose **Function Menu** > **Settings** > **User Param.** to set user parameters.

NOTE

The password should meet the following requirements:

- Contains six characters.
- Contains at least two types of lowercase letters, uppercase letters, and digits.
- Differ from the original password in at least one character.

Figure 7-28 User parameters



----End

7.1.6.1.6 Setting a File Save Path

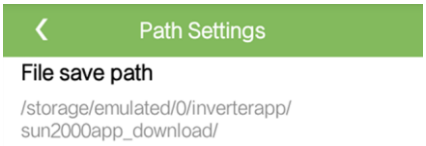
Context

In the Android system, you can modify the save path for user operation logs and SUN2000 logs and export logs from the path subsequently.

Procedure

Step 1 Choose **Function Menu** > **Settings** > **File save path** to set the file save path.

Figure 7-29 Setting the path



----End

7.1.6.2 System Maintenance

7.1.6.2.1 Starting and Shutting Down the SUN2000

Procedure

Step 1 Choose **Function Menu** > **Maintenance**. The maintenance screen will be displayed.

Step 2 Tap ▶ behind **Power on** or **Power off**, enter the login password, and tap **OK**.

----End

7.1.6.2.2 Restoring Factory Settings

Context

NOTICE

Perform this operation with caution because all configured parameters except the current date, time, baud rate, and address will be restored to their factory default values. This operation will not affect operating information, alarm records, or system logs.

Procedure

Step 1 Choose **Function Menu** > **Maintenance**. The maintenance screen will be displayed.

Step 2 Tap ▶ behind **Restore defaults**, enter the app login password, and tap **OK**.

----End

7.1.6.3 SUN2000 Upgrade

Prerequisites

- You have obtained the upgrade package with the help of the supplier or Huawei engineers.
- In the Android system, you have copied the upgrade package to the mobile phone. The package is a **.zip** file, which can be saved flexibly and searched. To reduce the time for

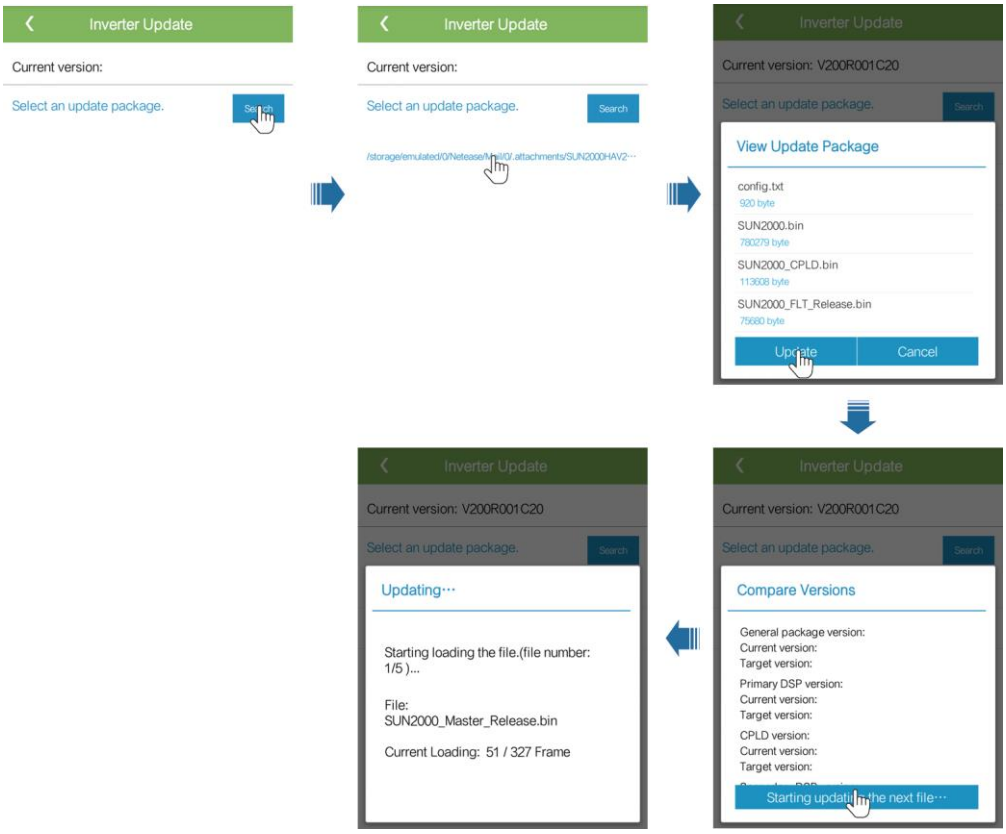
searching the package, you are advised to save it under the root directory of the memory or SD card of the mobile phone.

- In the iOS system, you have imported the upgrade package to the app by emails. The package is a **.zip** file and cannot be searched.

Procedure

Step 1 Choose **Function Menu** > **Inverter Update** and complete the upgrade by following the operation guide.

Figure 7-30 SUN2000 upgrade



----End

7.1.6.4 Device Logs

Context

Tap **Device logs** to export operation logs, as well as alarm records and energy yield information of the SUN2000 from the mobile phone.

Procedure

Step 1 Choose **Function Menu** > **Device logs**. The device log screen is displayed.

- Select **Phone Log** to export and send logs by emails on the mobile phone.

- Select **Inverter Log** to export and send alarms and performance data logs by emails.

NOTE

- In the Android system, logs are saved in the **storage/emulated/0/sun2000app_download** file by default. You can modify the saving path by choosing **Function Menu** > **Settings** > **File save path**.
- In the iOS system, you can query the logs by choosing **Tool Kit** > **File Manager** > **Device Log**.

Figure 7-31 Device logs

----End

7.1.7 Querying the Status

7.1.7.1 Querying Alarm Records

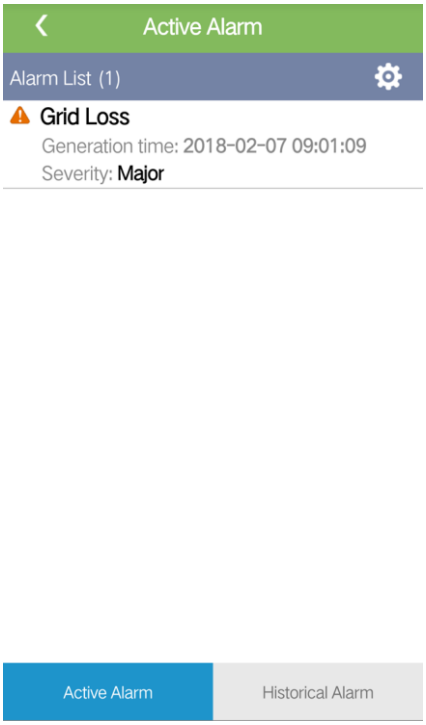
Procedure

Step 1 Choose **Function Menu** > **Alarm**, and tap an alarm record to view the details.

NOTE

- Tap  to set the alarm sorting mode for active alarms or historical alarms.
- Tap  to set a time criterion. The historical alarms generated within the time segment are displayed.
- After the **AFCI Self-Check Failure** and **DC Arc Fault** alarms have been handled, they need to be manually cleared from the active alarm list. On the **Active Alarm** screen, hold down an alarm you want to clear and tap **Clear**. Alarms that have been manually cleared can be viewed on the **Historical Alarm** screen.

Figure 7-32 Alarm screen



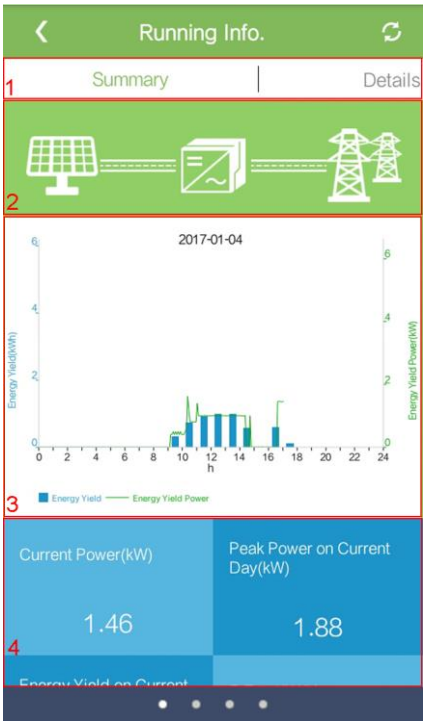
----End

7.1.7.2 Querying SUN2000 Running Information

Procedure

Step 1 Choose **Function Menu** > **Running Info.** to query the running information.

Figure 7-33 Running info



No.	Name	Description
1	Running information tabs	The **Summary**, **Details**, **Support**, and **Insulation Resistance** tab pages display relevant information about the SUN2000.
2	Power flow diagram	• Connection from PV strings to the SUN2000 • Connection from the SUN2000 to the power grid • If the SUN2000 has generated an alarm,  is displayed on the screen. Tap  to access the alarm screen and view the alarm.
3	Energy yield-Energy yield power histogram	Energy yield and energy yield power for each hour of the current day
4	Yield power, energy yield, and revenue data	Power, energy yield, and revenue of the current day

----End

7.1.7.3 Querying Energy Yield Data

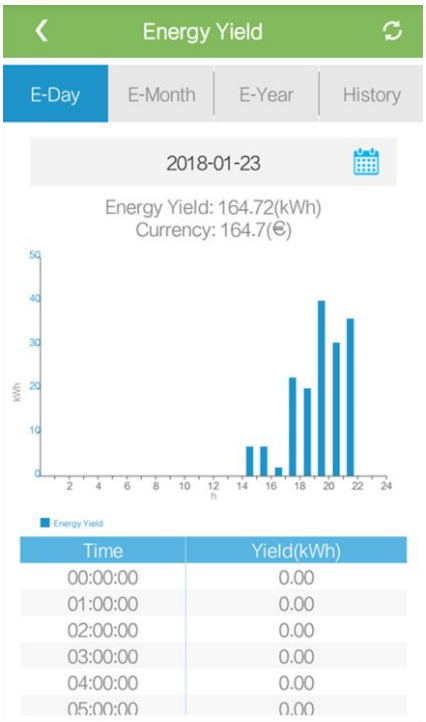
Procedure

Step 1 Choose **Function Menu** > **Energy Yield** to query the energy yield information.

NOTE

Tap to display the energy yield data based on day, month, or year, or display historical data.

Figure 7-34 Querying energy yield data



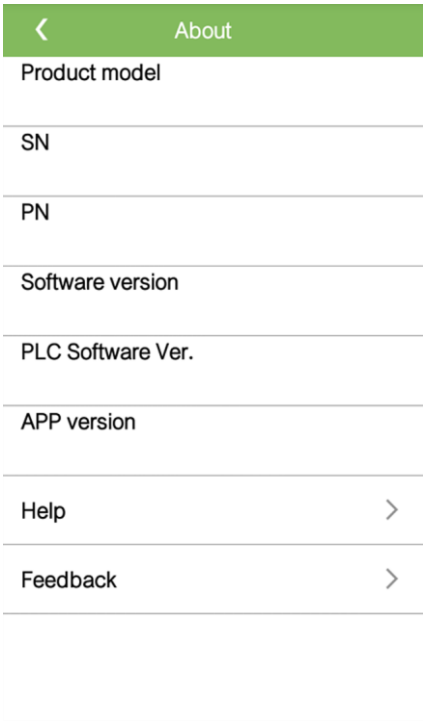
----End

7.1.7.4 Viewing System Version Information

Procedure

Step 1 Choose **Function Menu** > **About** to query the version information.

Figure 7-35 About



----End

7.1.8 Tool Kit

7.1.8.1 Scanning SN Bar Codes

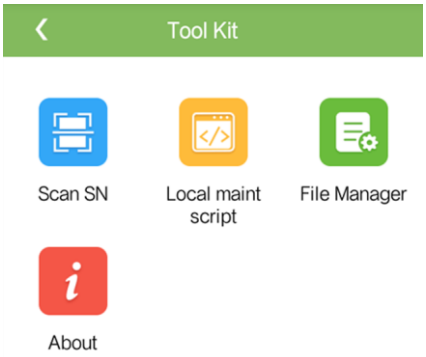
Context

The SUN2000 SN bar codes are obtained in centralized mode. These bar codes help set up mapping between SUN2000 names and SN bar codes on the SmartLogger and assist the SmartLogger to communicate with SUN2000s and commission SUN2000s.

Procedure

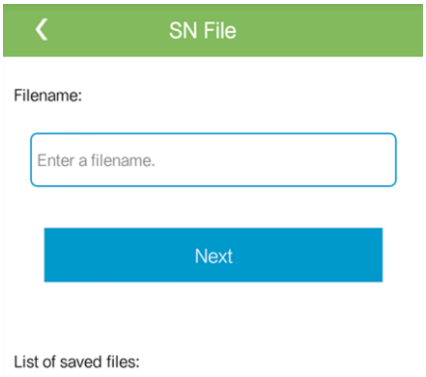
Step 1 Tap **Tool Kit** on the app login screen.

Figure 7-36 Tool kit



Step 2 Tap **Scan SN**, enter a file name on the **SN File** screen, and tap **Next**.

Figure 7-37 SN file



NOTE
If the SN file already exists, open and scan the file.

Step 3 On the **SN List** screen, tap **Scan** or **Manual input** to record the SN bar code and SUN2000 name.

- Method 1: Scan
  a. Tap **Scan** to start scanning and ensure that the camera is about 15 cm away from the SN label or QR codes, and the red midline cuts the bar code horizontally.
  b. After scanning, enter the device number at the back of the scanned label on the **SN Details** screen.
- Method 2: Manual input
  a. Tap **Manual input**. On the **SN Details** screen, enter the SN bar code and the SUN2000 name at the back of the label.
  b. Tap **OK** to save the SN information.

----End

Follow-up Procedure

Upload the scanned information file to the PC and rename the file as **DeviceInfo.csv**, which provides information when changing the device name and device address on the SmartLogger. For detailed operations, see the *SmartLogger2000 User Manual*.

7.1.8.2 SUN2000 Maintenance Script

Context

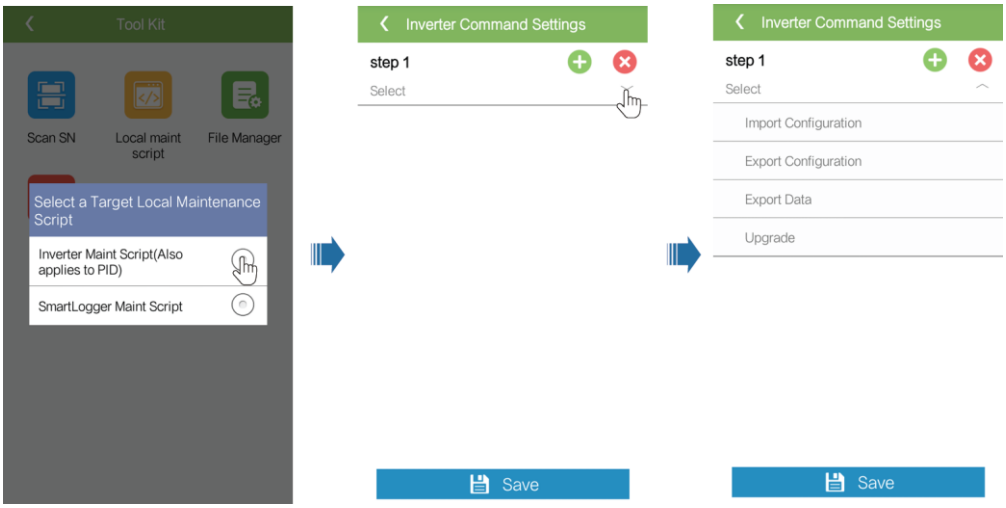
The SUN2000 maintenance script is used to set SUN2000 commands. After the script file is copied to the USB flash drive, the SUN2000 executes the maintenance script to import or export configuration, export data, and upgrade devices.

Procedure

Step 1 On the app login screen, choose **Tool Kit** > **Local maint script** > **Inverter Maint Script (Also applies to PID)**. The **Inverter Command Settings** screen will be displayed.

- Tap and select an operation as required.
- Tap  to add steps.

Figure 7-38 Selecting the target local maintenance script



Step 2 Tap **Save**, enter the user name and password for logging in to the app, and then tap **OK** to save the maintenance script on the mobile phone.

----End

7.1.8.3 File Manager

Context

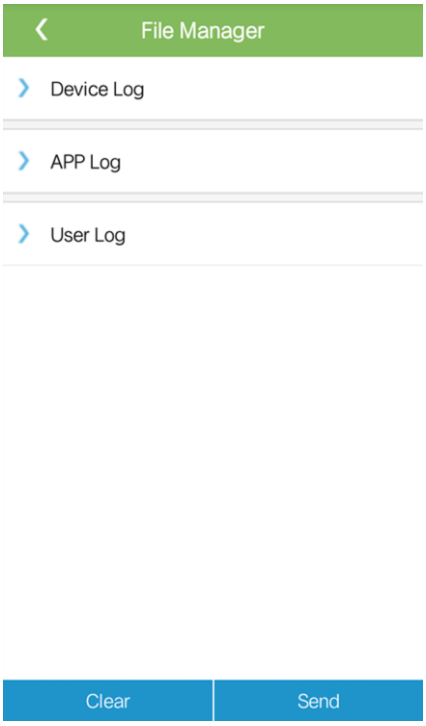
The file manager manages app operation logs, device logs, and generated script files and configuration files. You can delete the logs and files, send them to your mailbox.

Procedure

Step 1 On the app login screen, tap **Tool Kit** > **File Manager** to enter the **File Manager** screen.

- To delete log files, select one or more files and then tap **Clear**.
- To send files to your mailbox, select one or more files and tap **Send**.

Figure 7-39 File manager



----End

7.1.8.4 About

Context

This screen allows you to query the app version, privacy policy, and open source software policy, and to submit your advice and suggestions through text, pictures, or files.

NOTE

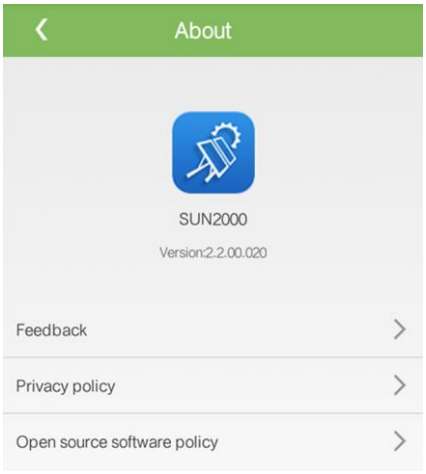
When the app starts for the first time after being downloaded or updated, the privacy policy is displayed. You can use the app only after agreeing to the privacy policy, and the privacy policy will no longer appear. If you do not agree to the privacy policy, the app exits, and the privacy policy is still displayed when you start the app next time until you agree to the privacy policy.

Procedure

Step 1 On the app login screen, choose **Tool Kit** > **About** to access the **About** screen.

- Tap **Feedback** to provide feedback in app use.
- Tap **Privacy policy** to view the privacy policy.
- Tap **Open source software policy** to view the open source software policy.

Figure 7-40 About



----End

7.1.9 Troubleshooting the SUN2000 App

No.	Symptom	Possible Cause	Solution
1	The app fails to be installed.	• The version of the mobile phone operating system is earlier than the required version. • **Allow Installation of apps from unknown sources** is not selected.	• Upgrade the version of the mobile phone operating system. • Choose **Settings** > **Security** and select **Allow Installation of apps from unknown sources**.
2	The message **Program error. Reboot the program.** is displayed.	The program is abnormal.	Exit the app and log in again.
3	Communication failed.	1. When the mobile phone is more than 5 m away from the devices, the Bluetooth	1. Keep the mobile phone within 5 m away from the devices and reconnect the Bluetooth module.

No.	Symptom	Possible Cause	Solution
		module is disconnected. 2. The USB data cable is incorrectly connected.	2. Reconnect the USB data cable.
4	The message **Bluetooth invalid or in use.** is displayed.	• The Bluetooth module is abnormal. • The Bluetooth module is used.	• Verify that the Bluetooth module works properly. • Verify that the Bluetooth module is not used.
5	The message **Bluetooth is off. Turn on Bluetooth.** is displayed.	The Bluetooth function is not enabled.	Enable the Bluetooth function.
6	Data failed to be obtained during operations.	1. The Bluetooth module is abnormal. 2. The USB data cable is incorrectly connected.	1. Reseat the Bluetooth module. 2. Reconnect the USB data cable.
7	The SN scanning function cannot be used.	The app does not have the permission to use the camera.	Enable the app to use the camera.
8	The label information cannot be identified when the SN scanning function is being used.	• The scan position is incorrect, or the camera is too far away from the bar code. • The light is insufficient. • The label is blocked.	• Adjust the scan position and ensure that the camera is 15 cm away from the label. • Move the label to a place with sufficient light. • Remove the blockage from the label.
9	No upgrade package is available for an upgrade.	No upgrade package is saved in the mobile phone.	Save the upgrade package in the mobile phone.
10	The battery reserve of the mobile phone is too low.	N/A	Charge the mobile phone.

7.2 Operations with a USB Flash Drive

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

7.2.1 Exporting Configurations

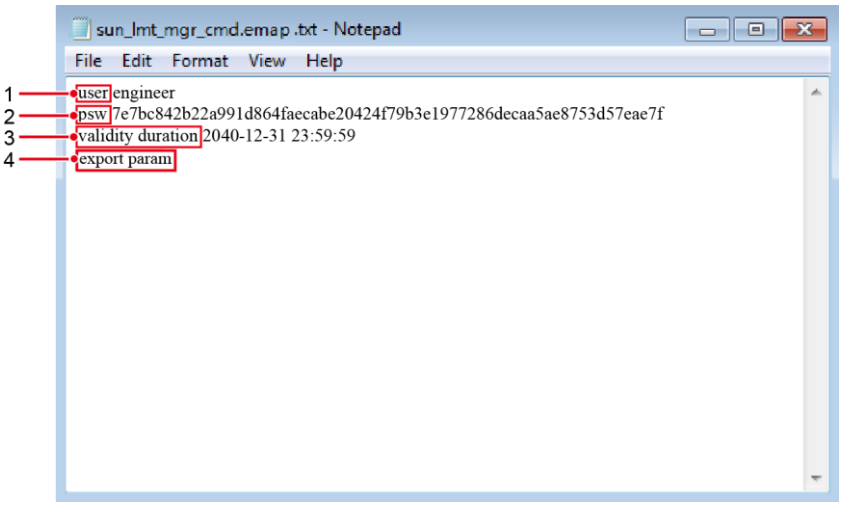
Procedure

Step 1 Click **Inverter Command Settings** on the SUN2000 app to generate a boot script file, as shown in 7.1.8.2 SUN2000 Maintenance Script.

Step 2 Import the boot script file to a PC.

(Optional) The boot script file can be opened as a .txt file, as shown in Figure 7-41.

Figure 7-41 Boot script file



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

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

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

NOTICE

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

Table 7-12 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

7.2.2 Importing Configurations

Prerequisites

A complete configuration file has been exported.

Procedure

Step 1 Click **Inverter Command Settings** on the SUN2000 app to generate a boot script file, as shown in 7.1.8.2 SUN2000 Maintenance Script.

Step 2 Import the boot script file to a PC.

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

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

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

NOTICE

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

Table 7-13 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

7.2.3 Exporting Data

Procedure

Step 1 Click **Inverter Command Settings** on the SUN2000 app to generate a boot script file, as shown in 7.1.8.2 SUN2000 Maintenance Script.

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 7-14 LED indicator description

LED Indicator	Status	Meaning
	Green off	There is no operation with

LED Indicator	Status	Meaning
		a USB flash drive.
	Blinking green at long intervals (on for 1s and then off for 1s)	There is an operation with a USB flash drive.
	Blinking green at short intervals (on for 0.125s and then off for 0.125s)	An operation with a USB flash drive has failed.
	Steady green	An operation with a USB flash drive is successful.

Step 4 Insert the USB flash drive into a PC and check the exported data.

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

----End

7.2.4 Upgrading

Procedure

Step 1 Download the required software upgrade package from the technical support website. SUN2000HA V200R001C00SPC*XXX* is used as an example here.

Step 2 Decompress the upgrade package.

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

Step 3 Click **Inverter Command Settings** on the SUN2000 app to generate a boot script file, as shown in 7.1.8.2 SUN2000 Maintenance Script.

Step 4 Import the boot script file to a PC.

Step 5 Replace the boot script file (sun_lmt_mgr_cmd.emap) 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 7-15 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 are off during the restart. After the restart, the indicator is blinking green at long intervals (on for 1s and then off for 1s) for 1 minute and then it becomes steady green, which indicates that the upgrade is successful.

----End

8 Maintenance

8.1 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 15 minutes after the power-off.

Procedure

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

For details, see 7.1 Operations with the SUN2000 App, *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

8.2 Routine Maintenance

To ensure that the SUN2000 can operate properly for a long term, you are advised to perform routine maintenance on it as described in this chapter.

CAUTION

- Before cleaning the system, and maintaining the cable connections and grounding reliability, power off the system (see 8.1 Powering Off the SUN2000) and ensure that the two DC switches on the inverter are OFF.
- If you need to open the maintenance compartment door in rainy or snowy days, take protective measures to prevent rain and snow entering the maintenance compartment. If it is impossible to take protective measures, do not open the maintenance compartment door in rainy or snowy days.

Table 8-1 Maintenance list

Item	Check Method	Maintenance Interval
System cleanliness	Check the heat sink for foreign matter or the overall health of the SUN2000.	Annual or every time an abnormality is detected
System running status	Check the SUN2000 for damage or deformation.	Annual
Cable connections	• Check that cables are securely connected. • Check that cables are intact, in particular, the parts touching the metallic surface are not scratched. • Check that the idle COM, USB, and AC OUTPUT ports are locked by waterproof caps.	The first inspection is half a year after the initial commissioning. From then on, perform the inspection once six months to a year.
Grounding reliability	Check whether the ground terminal and ground cable are securely connected.	Annual
Sealing	Check whether all cable glands are properly sealed.	Annual

8.3 Troubleshooting the SUN2000

Alarm severities are defined as follows:

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

Table 8-2 Common alarms and troubleshooting measures

Alarm ID	Alarm Name	Alarm Severity	Cause	Measures
2001	High string input voltage	Major	The PV array is incorrectly configured. Excessive PV modules are connected in series to the PV string, and hence the PV string open-circuit voltage exceeds the maximum operating voltage of the SUN2000. • Cause ID 1 corresponds to PV strings 1 and 2. • Cause ID 2 corresponds to PV strings 3 and 4. • Cause ID 3 corresponds to PV strings 5 and 6. • Cause ID 4 corresponds to PV strings 7 and 8. • Cause ID 5 corresponds to PV strings 9 and 10. • Cause ID 6 corresponds to PV strings 11 and 12.	Reduce the number of PV modules connected in series to the PV string until the PV string open-circuit voltage is less than or equal to the maximum operating voltage of the SUN2000. After the PV array configuration is corrected, the alarm stops.
2002	DC Arc Fault	Major	The PV string power cables arc or are in poor contact. • Cause ID 1 corresponds to PV strings 1 and 2. • Cause ID 2 corresponds to PV strings 3 and 4. • Cause ID 3 corresponds to PV strings 5 and 6. • Cause ID 4 corresponds to PV strings 7 and 8. • Cause ID 5 corresponds to PV strings 9 and 10. • Cause ID 6 corresponds to PV strings 11 and 12.	Check whether the string cables arc or are in poor contact.
2011	String Reverse Connection	Major	The PV string is reversely connected. Cause IDs 1 to 12 respectively correspond to PV strings 1 to 12.	Check whether the PV string is reversely connected to the SUN2000. If yes, wait until the solar irradiance declines at night and the PV string current reduces to below 0.5 A. Then, turn off the two DC switches and correct the PV string connection.
2012	String current backfeed	Warning	1. Only a few PV modules are connected in series to the PV string, and hence the end	1. Check whether the number of PV modules connected in series to this PV string is

Alarm ID	Alarm Name	Alarm Severity	Cause	Measures
			voltage is lower than that of other PV strings. 2. The PV string is shaded. Cause IDs 1 to 12 respectively correspond to PV strings 1 to 12.	less than the number of PV modules connected in series to the other PV strings. If yes, connect more PV modules in series to this PV string. 2. Check the open-circuit voltage of the PV string. 3. Check that the PV string is not shaded.
2013	Abnormal String Power	Warning	1. The PV string has been shaded for a long time. 2. The PV string deteriorates abnormally. Cause IDs 1 to 12 respectively correspond to PV strings 1 to 12.	1. Check whether the current of the abnormal PV string is lower than the current of other PV strings. If yes, check that the abnormal PV string is not shaded and the actual number of PV strings is the same as the configured number. 2. If the abnormal PV string is clean and not shaded, check whether the PV string is damaged.
2021	AFCI Self-Check Failure	Major	The AFCI self-check fails.	Turn off the AC output switch and DC input switch, and then turn them on after all indicators are off. If the fault persists, contact Huawei technical support.
2031	Phase Wire Short-Circuited to PE	Major	The impedance of the output phase wire to PE is low or the output phase wire is short-circuited to PE.	Check the impedance of the output phase wire to PE, locate the position with lower impedance, and rectify the fault.
2032	Grid Loss	Major	1. The power grid experiences an outage. 2. The AC circuit is disconnected or AC switch is off.	1. The alarm disappears automatically after the power grid recovers. 2. Check that the AC power cable is connected and that the AC switch is ON.
2033	Grid Undervoltage	Major	The grid voltage is below the lower threshold or the low voltage duration has lasted for more than the value specified by LVRT.	1. If the alarm occurs accidentally, the power grid may be abnormal temporarily. The SUN2000 automatically recovers after detecting that the power grid becomes normal. 2. If the alarm occurs

Alarm ID	Alarm Name	Alarm Severity	Cause	Measures
				frequently, check whether the power grid voltage is within the acceptable range. If no, contact the local power operator. If yes, modify the power grid undervoltage protection threshold with the consent of the local power operator. 3. If the fault persists for a long time, check the AC circuit breaker and AC output power cable.
2034	Grid Overvoltage	Major	The grid voltage exceeds the higher threshold or the high voltage duration has lasted for more than the value specified by HVRT.	1. Check whether the grid connection voltage exceeds the upper threshold. If yes, contact the local power operator. 2. If you have confirmed that the grid connection voltage exceeds the upper threshold and obtained the consent of the local power operator, modify the undervoltage protection threshold. 3. Check that the peak grid voltage does not exceed the upper threshold.
2035	Grid Voltage Imbalance	Major	The difference between grid phase voltages exceeds the upper threshold.	1. Check that the grid voltage is within the normal range. 2. Check the connection of the AC output power cable. If the cable connection is proper but the alarm occurs frequently and affects the power production of the PV plant, contact the local power operator.
2036	Grid Overfrequency	Major	Power grid exception: The actual grid frequency is higher than the requirement of the local power grid standard.	1. If the alarm occurs accidentally, the power grid may be abnormal temporarily. The SUN2000 automatically recovers after detecting that the power grid becomes normal. 2. If the alarm occurs frequently, check whether

Alarm ID	Alarm Name	Alarm Severity	Cause	Measures
				the grid frequency is within the acceptable range. If no, contact the local power operator. If yes, modify the power grid overfrequency protection threshold with the consent of the local power operator.
2037	Grid Underfrequency	Major	Power grid exception: The actual power grid frequency is lower than the standard requirement for the local power grid.	1. If the alarm occurs accidentally, the power grid may be abnormal temporarily. The SUN2000 automatically recovers after detecting that the power grid becomes normal. 2. If the alarm occurs frequently, check whether the grid frequency is within the acceptable range. If no, contact the local power operator. If yes, modify the power grid underfrequency protection threshold with the consent of the local power operator.
2038	Unstable Grid Frequency	Major	Power grid exception: The actual grid frequency change rate does not comply with the local power grid standard.	1. If the alarm occurs accidentally, the power grid may be abnormal temporarily. The SUN2000 automatically recovers after detecting that the power grid becomes normal. 2. If the alarm occurs frequently, check whether the grid frequency is within the acceptable range. If no, contact the local power operator.
2039	Output Overcurrent	Major	The power grid voltage drops dramatically or the power grid is short-circuited. As a result, the inverter transient output current exceeds the upper threshold and therefore the inverter protection is triggered.	1. The inverter detects its external working conditions in real time. After the fault is rectified, the inverter automatically recovers. 2. If the alarm occurs frequently and affects the power production of the PV plant, check whether the output is

Alarm ID	Alarm Name	Alarm Severity	Cause	Measures
				short-circuited. If the fault persists, contact Huawei technical support.
2040	Output DC Component Overhigh	Major	The DC component of the SUN2000 output current exceeds the specified upper threshold.	1. If the exception is caused by an external fault, the SUN2000 automatically recovers after the fault is rectified. 2. If the alarm occurs frequently and affects the power production of the PV plant, contact Huawei technical support.
2051	Abnormal Residual Current	Major	The insulation impedance of the input side to PE decreases when the SUN2000 is operating.	1. If the alarm occurs accidentally, the external power cable may be abnormal temporarily. The SUN2000 automatically recovers after the fault is rectified. 2. If the alarm occurs frequently or persists, check that the impedance between the PV string and ground is not below the lower threshold.
2061	Abnormal Grounding	Major	1. The PE cable for the SUN2000 is not connected. 2. The SUN2000 output side does not connect to an isolation transformer when the PV string output is grounded.	1. Check that the PE cable for the SUN2000 is connected properly. 2. If the PV string output is grounded, check that the SUN2000 output side connects to an isolation transformer.
2062	Low Insulation Resistance	Major	1. The PV string is short-circuited to PE. 2. The PV string has been in a moist environment for a long time and the power cable is not well insulated to ground.	1. Check the impedance between the PV string and the PE cable. If a short circuit occurs, rectify the fault. 2. Check that the PE cable for the SUN2000 is correctly connected. 3. If you are sure that the impedance is less than the default value in a cloudy or rainy environment, reset **Insulation resistance protection**.
2063	Cabinet	Major	1. The SUN2000 is installed in a	1. Check the ventilation and

Alarm ID	Alarm Name	Alarm Severity	Cause	Measures
	Overtemperature		place with poor ventilation. 2. The ambient temperature exceeds the upper threshold. 3. The SUN2000 is not working properly.	ambient temperature at the SUN2000 installation position. If the ventilation is poor or the ambient temperature exceeds the upper threshold, improve the ventilation and heat dissipation. 2. If the ventilation and ambient temperature both meet requirements, contact Huawei technical support.
2064	Device Fault	Major	An unrecoverable fault occurs on a circuit inside the SUN2000.	Turn off the AC output switch and DC input switch, and then turn them on after 15 minutes. If the fault persists, contact Huawei technical support.
2065	Upgrade Failed	Minor	The upgrade ends abnormally.	1. Perform an upgrade again. 2. If the upgrade fails several times, contact your dealer.
2066	License Expired	Warning	1. The privilege certificate has entered the grace period. 2. The privilege feature will be invalid soon.	1. Apply for a new certificate. 2. Load the new certificate.
61440	Faulty Monitoring Unit	Minor	1. The flash memory is insufficient. 2. The flash memory has bad sectors.	Turn off the AC output switch and DC input switch, and then turn them on after 15 minutes. If the fault persists, replace the monitoring board or contact Huawei technical support.

NOTE

Contact Huawei technical support if all failure analysis procedures listed above are completed and the fault still exists.

9 Handling the Inverter

9.1 Removing the SUN2000

NOTICE

Before removing the SUN2000, disconnect both AC and DC connections. For processes of disconnecting, see 8.1 Powering Off the SUN2000.

Perform the following operations to remove the SUN2000:

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

9.2 Packing the SUN2000

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

9.3 Disposing of the SUN2000

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

10 Technical Specifications

Efficiency

Item	Specifications
Maximum efficiency	99.00%
CEC efficiency	98.50%

Input

Item	Specifications
Maximum input power	102,000 W
Maximum input voltage	1500 V
Maximum input current (per MPPT)	22 A
Maximum short-circuit current (per MPPT)	40 A
Maximum SUN2000 backfeed current to the PV array	0 A
Lowest operating/startup voltage	600 V/650 V
Operating voltage range	600–1500 V
Full power MPPT voltage range	880–1300 V
Rated input voltage	1080 V
Number of inputs	12
Number of MPP trackers	6

Output

Item	Specifications
Rated active power	100 kW
Maximum apparent power	100 kVA @40ºC; 90 kVA @50ºC
Maximum active power (cosφ = 1)	100 kW
Rated output voltage	800 V AC, 3 W+PE
Rated output current	72.9 A
Adapted grid frequency	60 Hz
Maximum output current	72.9 A
Power factor	0.8 leading ... 0.8 lagging
Maximum total harmonic distortion (rated power)	< 3%

Protection

Item	Specifications
Input DC switch	Supported
Anti-islanding protection	Supported
Output overcurrent protection	Supported
Input reverse polarity protection	Supported
PV string fault detection	Supported
DC surge protection	Type II
AC surge protection	Type II
Insulation resistance detection	Supported
Residual current monitoring unit (RCMU)	Supported

Display and Communication

Item	Specifications
Display	LED, Bluetooth module+app, USB data cable+app
RS485	Supported
PLC	Supported

Common Parameters

Item	Specifications
Dimensions (W x H x D)	1075 mm x 605 mm x 310 mm (42.32 in. x 23.82 in. x 12.20 in.)
Weight	About 77 kg (169.76 lb)
Operating temperature	–25°C to +60°C (-13°F to +140°F)
Cooling mode	Natural convection
Maximum operating altitude	4000 m (13123 ft)
Humidity	0%–100% RH
Input terminal	Staubli MC4
Output terminal	Cable gland + cable connector
Overvoltage level	II(DC)/III(AC)
IP rating	Type 4X
Protection level	I
Pollution degree	III

A Grid Codes

Set the grid code that applies to the country or region where the PV plant is located.

Table A-1 Grid codes

No.	Grid Code	Description
1	IEEE 1547-MV800	US medium-voltage power grid (IEEE 1547)
2	IEEE 1547a-MV800	US medium-voltage power grid (IEEE 1547a)
3	ELECTRIC RULE NO.21-MV800	US California medium-voltage power grid
4	HECO-MV800	US Hawaii medium-voltage power grid
5	PRC_024_Eastern-MV800	Eastern US medium-voltage power grid
6	PRC_024_Western-MV800	Western US medium-voltage power grid
7	PRC_024_Quebec-MV800	Canada Quebec medium-voltage power grid
8	PRC_024_ERCOT-MV800	US Texas medium-voltage power grid

NOTE

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

B Contact Information

If you need to consult any technical problem, dial the Huawei technical assistance center (TAC) hotline. Please provide the following information to receive better service.

- Customer Name
- Contact Info
- Project Name and Location
- Project Scale
- Project Grid-connection Time
- Fault Occurrence Time
- Quantity of Faulty Inverters
- Inverter Model
- SN
- Inverter Firmware Version
- Warranty Info
- Problem Description
- SmartLogger Model
- SmartLogger Firmware Version
- SmartLogger Networking Scenarios (Such as Optical Fiber + RS485/PLC Networking)
- RMA Shipping Address

HUAWEI TECHNOLOGIES USA INC.

5700 Tennyson Pkwy, Plano, TX 75024

TAC Line: 877-948-2934

Emai: na_inverter_support@huawei.com

C Acronyms and Abbreviations

A	
ACDU	AC distribution unit
AFCI	arc-fault circuit interrupter
C	
CCO	central controller
CEC	California Energy Commission
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	
RCMU	residual current monitoring unit
T	
THD	total harmonic distortion
W	
WEEE	waste electrical and electronic equipment