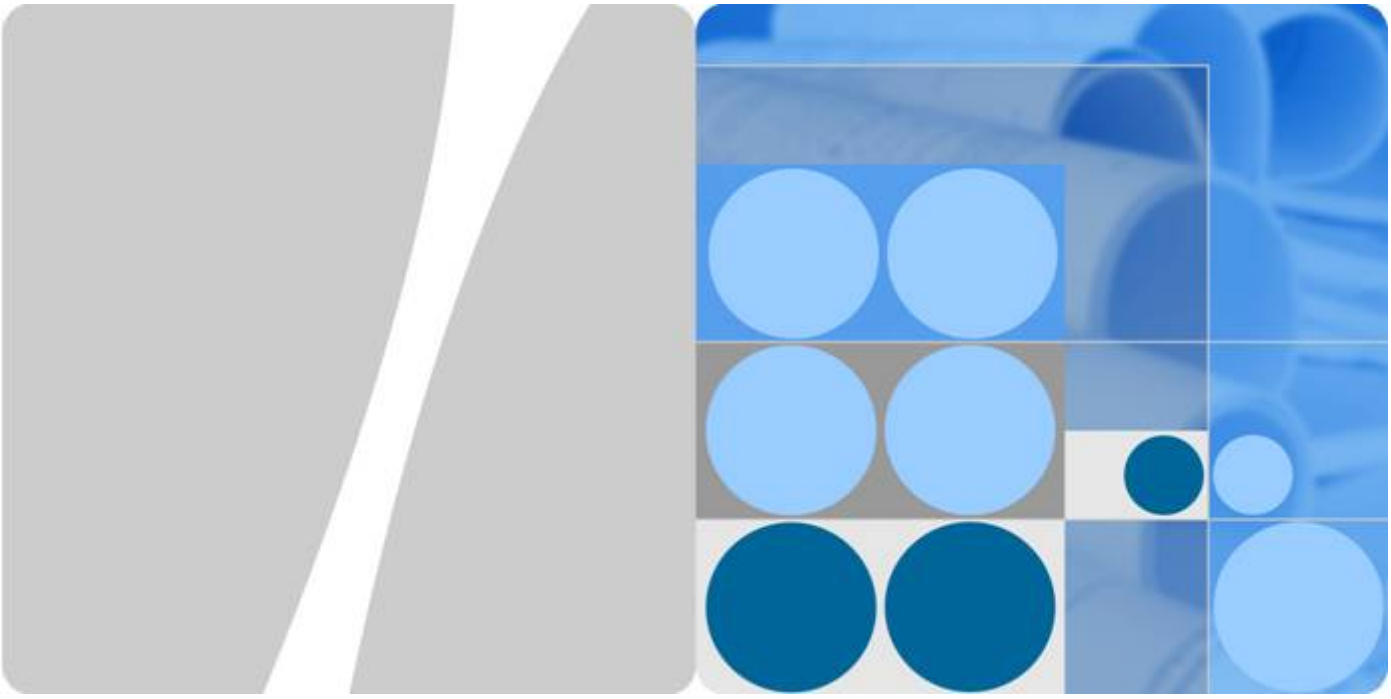

SUN2000-(100KTL, 110KTL, 125KTL) Series

User Manual

Issue 07

Date 2020-09-15

HUAWEI TECHNOLOGIES CO., LTD.

HUAWEI

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Huawei Technologies Co., Ltd.

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

Website: https://e.huawei.com

About This Document

Overview

This document describes the SUN2000-125KTL-M0, SUN2000-110KTL-M0, SUN2000-100KTL-M0, SUN2000-100KTL-M1 and SUN2000-100KTL-INM0 (SUN2000 for short) in terms of installation, electrical connection, commissioning, maintenance, and troubleshooting. Before installing and operating the solar inverter, ensure that you are familiar with the features, functions, and safety precautions provided in this document.

Intended Audience

This document is intended for photovoltaic (PV) plant operating personnel and qualified electricians.

Symbol Conventions

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

Symbol	Remarks
DANGER	Indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.
WARNING	Indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.
CAUTION	Indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.
NOTICE	Indicates a potentially hazardous situation which, if not avoided, could result in equipment damage, data loss, performance deterioration, or unanticipated results. NOTICE is used to address practices not related to personal injury.

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Symbol	Remarks
NOTE	Supplements the important information in the main text. NOTE is used to address information not related to personal injury, equipment damage, and environment deterioration.

Change History

Changes between document issues are cumulative. The latest document issue contains all the changes made in earlier issues.

Issue 07 (2020-09-15)

Updated **2.2 Overview**.

Updated **2.4.1 Product Appearance**.

Updated **6.2 Powering On the SUN2000**.

Updated **7.1 Operations with the App**.

Updated **8.3 Routine Maintenance**.

Updated **8.4 Troubleshooting**.

Issue 06 (2020-08-10)

Updated **4.3 Determining the Installation Position**.

Issue 05 (2020-03-30)

Updated **2.4.2 Indicator Status**.

Updated **10 Technical Specifications**.

Issue 04 (2020-02-07)

Updated **5.7 Connecting DC Input Power Cables**.

Issue 03 (2019-12-08)

Updated **3 Solar Inverter Storage**.

Updated **4.5 Installing a Solar Inverter**.

Updated **5.2 Preparing Cables**.

Updated **5.6 Connecting an AC Output Power Cable**.

Updated **5.7 Connecting DC Input Power Cables**.

Updated **5.8 Connecting the RS485 Communications Cable**.

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Updated App Introduction.

Added **8.2 Power-Off for Troubleshooting**.

Updated **10 Technical Specifications**.

Added **A Securing Y-Branch Connectors**.

Updated **B Grid Code**.

Added **C Domain Name List of Management Systems**.

Issue 02 (2019-08-09)

Added the SUN2000-110KTL-M0, SUN2000-100KTL-M0, SUN2000-100KTL-M1, and SUN2000-100KTL-INM0 models.

Issue 01 (2019-05-15)

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

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1 Maintenance and Replacement

DANGER

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

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

1.1 Safety Information

1.2 General Safety

Statement

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

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

Ensure that the equipment is used in environments that meet its design specifications. Otherwise, the equipment may become faulty, and the resulting

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equipment malfunction, component damage, personal injuries, or property damage are not covered under the warranty.

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

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

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

General Requirements

DANGER

Do not work with power on during installation.

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

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Personal Safety

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

1.3 Personnel Requirements

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

  NOTE

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

1.4 Electrical Safety

Grounding

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

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General Requirements

DANGER

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

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

AC and DC Power

DANGER

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

- Before making electrical connections, switch off the disconnector on the upstream device to cut off the power supply if people may contact energized components.
- Before connecting a power cable, check that the label on the power cable is correct.
- If the equipment has multiple inputs, disconnect all the inputs before operating the equipment.

Cabling

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

1.5 Installation Environment Requirements

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

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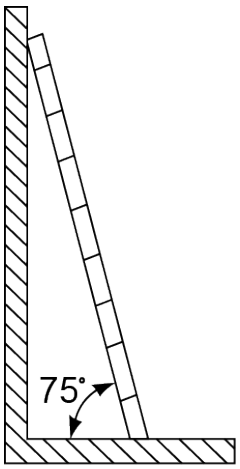
1.6 Commissioning

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

1.7 Mechanical Safety

Using Ladders

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



PI02SC0008

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

Drilling Holes

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

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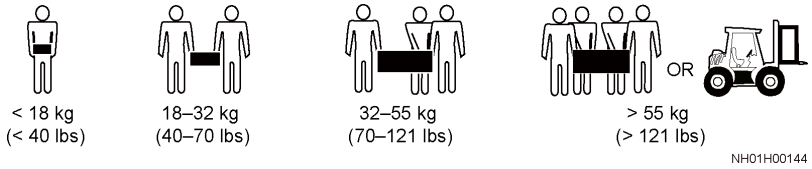
- Wear goggles and protective gloves when drilling holes.
- When drilling holes, protect the equipment from shavings. After drilling, clean up any shavings that have accumulated inside or outside the equipment.

Moving Heavy Objects

- Be cautious to avoid injury when moving heavy objects.



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

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2 Overview

2.1 Product Model

Model Description

NOTICE

The SUN2000-125KTL-M0, SUN2000-110KTL-M0, and SUN2000-100KTL-M0 are applicable only to the Chinese mainland. For other countries or regions, Huawei does not provide quality assurance.

This document covers the following product models:

- SUN2000-125KTL-M0
- SUN2000-110KTL-M0
- SUN2000-100KTL-M0
- SUN2000-100KTL-M1
- SUN2000-100KTL-INM0

Figure 2-1 Model

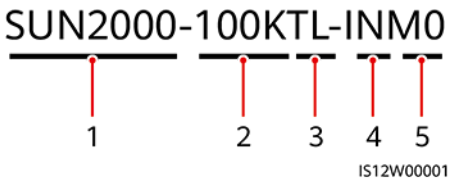

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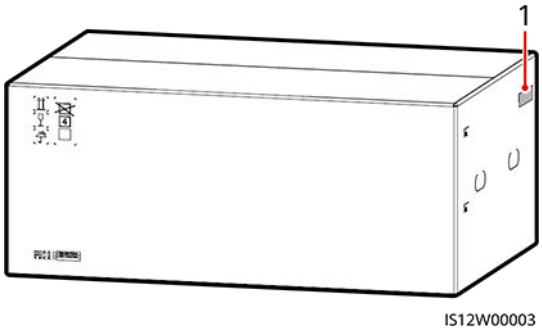
Table 2-1 Model description

No.	Description	Value
1	Series	SUN2000: grid-tied solar inverter
2	Power	• 125K: The power level is 125 kW. • 110K: The power level is 110 kW. • 100K: The power level is 100 kW.
3	Topology	TL: transformerless
4	Region	IN: India
5	Design code	M0 and M1: product series with an input voltage level of 1100 V DC

Model Identification

You can obtain the solar inverter model from the model label on the external package and the nameplate on the side of the enclosure.

Figure 2-2 Position of the model label on the external package



(1) Position of the model label

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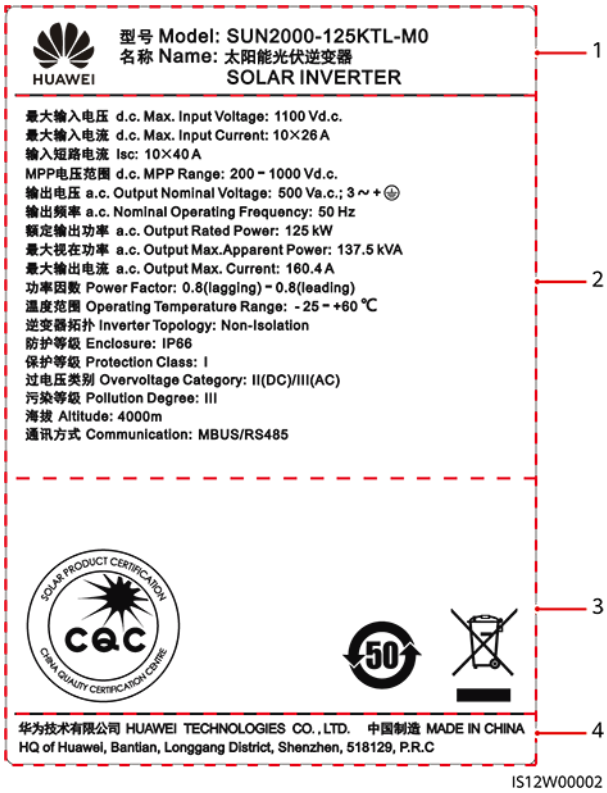
Figure 2-3 Nameplate



(1) Trademark and product model

(2) Key technical specifications

(3) Compliance symbols

(4) Company name and country of origin

NOTE

The nameplate figure is for reference only.

2.2 Overview

Description

SUN2000 solar inverters are grid-tied PV string inverters that convert the DC power generated by PV strings into AC power and feed the power into the power grid.

Characteristics

Smart

- Ten independent maximum power point tracking (MPPT) circuits and 20 PV string inputs. Flexible configuration of PV strings is supported.
- Smart PV module self-learning: Automatically detects PV module failures, helping rectify faults. Optimizes the working mode to obtain the optimal working mode of the system.
- Smart air cooling: Adjusts the fan speed based on the ambient temperature and load to ensure the service life of fans and avoid frequent maintenance.

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- MBUS networking: Uses the existing power line for communication and does not require additional communications cable, which reduces the construction and maintenance costs and improves 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 operation & maintenance (O&M) quality.

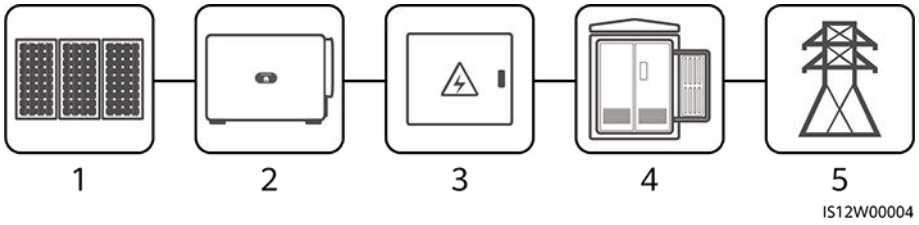
Safe

- Embedded DC and AC surge protection devices (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.

Networking

SUN2000 solar inverters apply to grid-tied systems of large-scale PV plants and commercial distributed grid-tied systems. Typically, a grid-tied PV system consists of the PV string, solar inverter, AC combiner box, and transformer station.

Figure 2-4 Networking



(1) PV string (2) SUN2000 (3) AC combiner box

(4) Transformer station (5) Power grid

NOTE

- The SUN2000-125KTL-M0 is powered by a dedicated power transformer instead of connecting to low-voltage overhead power lines.
- In a non-low-voltage grid-connected scenario, the SUN2000-100KTL-M1 and SUN2000-100KTL-INM0 need to connect to an isolation transformer and avoid overhead cabling.

Supported Power Grids

- SUN2000-110KTL-M0, SUN2000-100KTL-M0, SUN2000-100KTL-M1 and SUN2000-100KTL-INM0 solar inverters support the TN-S, TN-C, TN-C-S, TT, and IT power grids.
- The SUN2000-125KTL-M0 supports only the IT power grid.

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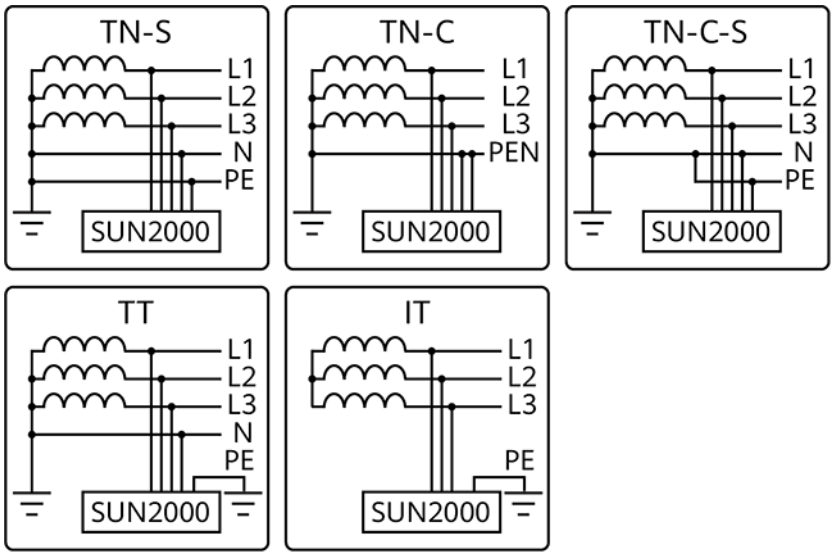
Figure 2-5 Supported Power Grids



2.3 Label Description

Symbol	Name	Meaning
	Running warning	Potential hazards exist after the inverter is powered on. Take protective measures when operating the inverter.
	Burn warning	Do not touch a running inverter, as the shell becomes hot during operation.
	Large current warning	Before powering on the inverter, ensure that the inverter is grounded because there is a large contact current after the inverter is powered on.
	Delayed discharge	• High voltage exists after the inverter is powered on. Only qualified and trained electrical technicians are allowed to perform operations on the inverter. • Residual voltage exists after the inverter is powered off. It takes 15 minutes for the inverter to discharge to the safe voltage.
	Refer to documentation	Reminds operators to refer to the documents shipped with the inverter.

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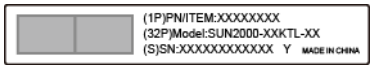
Symbol	Name	Meaning
	Grounding	Indicates the position for connecting the protective earthing (PE) cable.
	Operation warning	Do not remove the DC input connector when the inverter is running.
	Fan operation warning	High voltage exists after the inverter is powered on. Do not touch the fans when the inverter is working.
	Fan replacement warning	Before replacing a fan, disconnect its power connectors.
	Inverter ESN label	Indicates the inverter serial number.
	Weight label	The inverter needs to be carried by four persons or using a pallet truck.

2.4 Product Appearance

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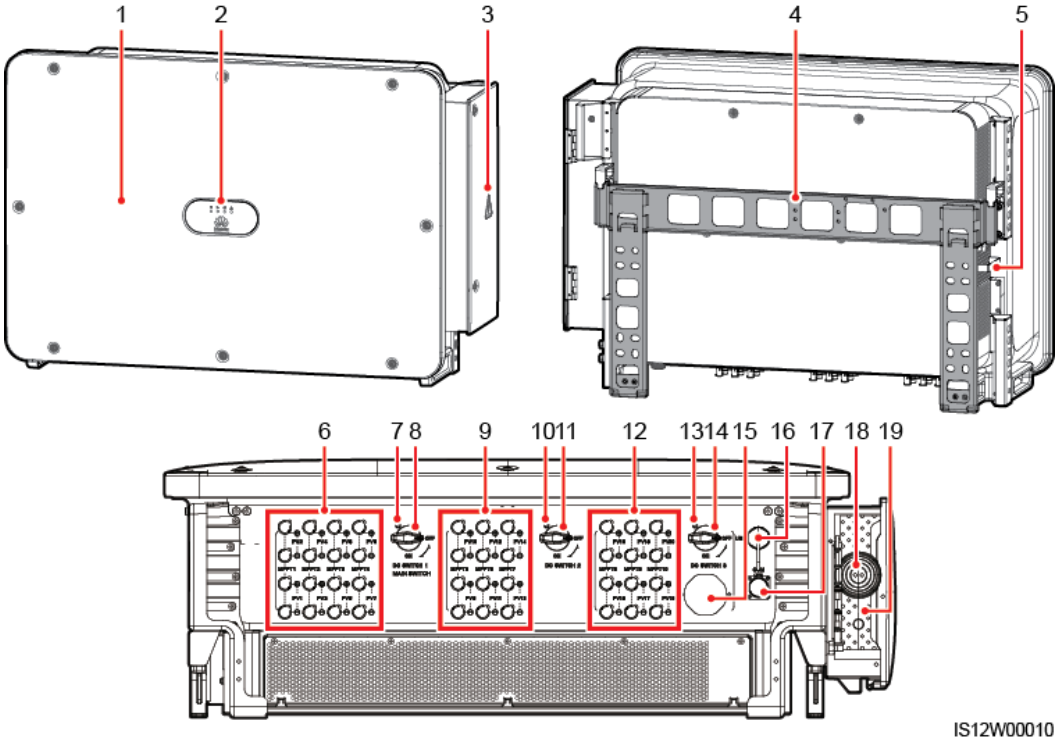
2.4.1 Product Appearance

Appearance

Figure 2-6 Appearance



(1) Panel	(2) LED indicators
(3) Maintenance compartment door	(4) Mounting bracket
(5) External fan tray	(6) DC input terminal group 1 (PV1–PV8, controlled by DC SWITCH 1)
(7) Screw hole for the DC switch 1	(8) DC switch 1 (DC SWITCH 1)
(9) DC input terminal group 2 (PV9–PV14, controlled by DC SWITCH 2)	(10) Screw hole for the DC switch 2
(11) DC switch 2 (DC SWITCH 2)	(12) DC input terminal group 3 (PV15–PV20, controlled by DC SWITCH 3)
(13) Screw hole for the DC switch 3	(14) DC switch 3 (DC SWITCH 3)
(17) Communications port (COM)	(18) Hole for the AC output power cable
(19) Hole for the tracking system power cable	-

NOTE

According to Australian standards, the screws for DC switches are delivered with SUN2000s. The screws are used to secure DC switches (DC SWITCH 1, DC SWITCH 2, and DC SWITCH 3) to prevent them from being turned on by mistake.

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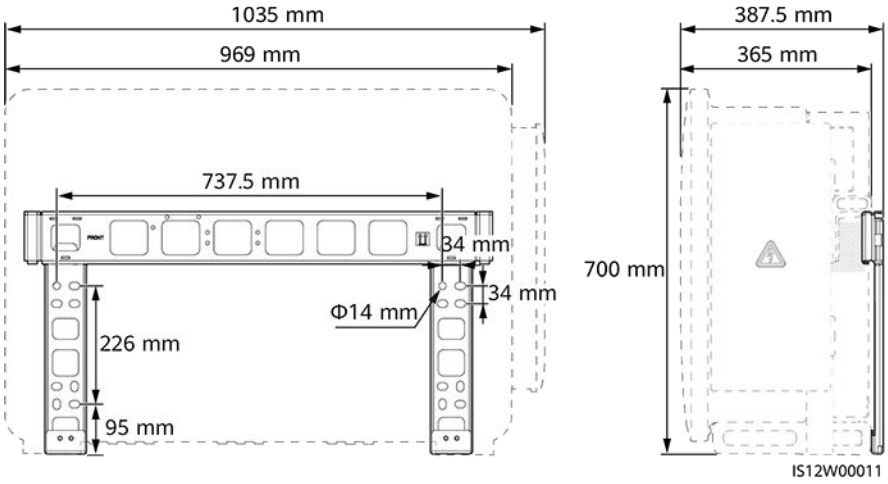
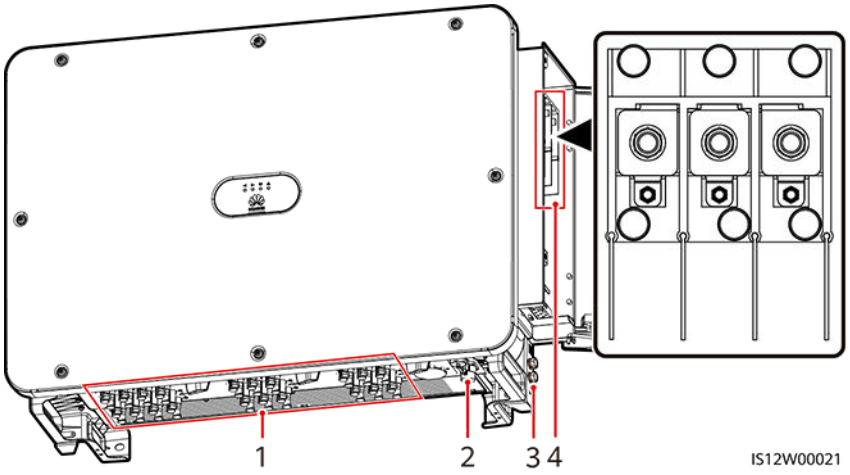
Dimensions

Figure 2-7 Dimensions



Wiring Area

Figure 2-8 Wiring port of a 3-pin model (SUN2000-125KTL-M0)



(1) DC input terminals

(2) RS485 port

(3) Ground point on the enclosure

(4) AC terminal block (3-pin)

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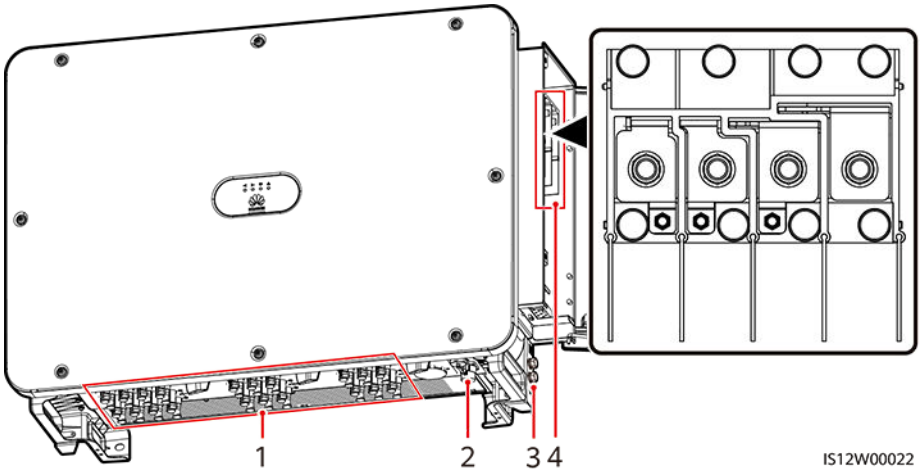
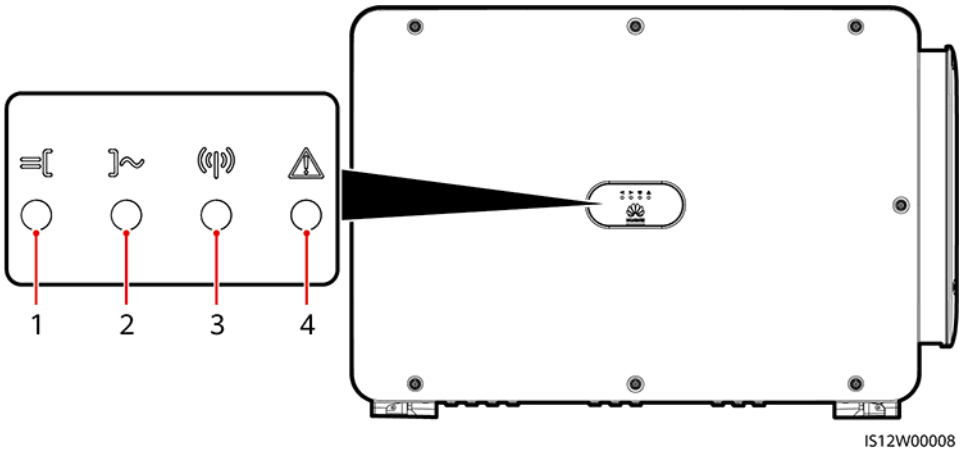
Figure 2-9 Wiring port of 4-pin models (SUN2000-110KTL-M0, SUN2000-100KTL-M0, SUN2000-100KTL-M1, and SUN2000-100KTL-INM0)



(1) DC input terminals
(2) RS485 port
(3) Ground point on the enclosure
(4) AC terminal block (4-pin)

2.4.2 Indicator Status

Figure 2-10 Indicator



No.	Indicator	Status (Blinking Fast: On for 0.2s and then Off for 0.2s; Blinking Slowly: On for 1s and then Off for 1s)	Description
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 at least 200 V.

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No.	Indicator	Status (Blinking Fast: On for 0.2s and then Off for 0.2s; Blinking Slowly: On for 1s and then Off for 1s)		Description
		Blinking green fast		If the alarm/maintenance indicator is red, an environmental fault at the DC side of the solar inverter is generated.
		Off		The solar inverter disconnects from all PV strings, or the DC input voltage of all MPPT circuits is less than 200 V.
2	Grid connection indicator	Steady green		The solar inverter is in grid-tied mode.
		Blinking green fast		If the alarm/maintenance indicator is red, an environmental fault at the AC side of the solar inverter is generated.
		Off		The solar inverter is not in grid-tied mode.
3	Communications indicator	Blinking green fast		The solar inverter receives communication data normally.
		Off		The solar inverter has not received communication data for 10 seconds.
4	Alarm/ Maintenance indicator	Alarm status	Steady red	A major alarm is generated. ● If the PV connection indicator or grid connection indicator is blinking green fast, troubleshoot DC or AC environmental faults as instructed by the SUN2000 app. ● If the PV connection indicator and grid connection indicator are both not blinking green fast, replace components or the solar inverter as instructed by the SUN2000 app.

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No.	Indicator	Status (Blinking Fast: On for 0.2s and then Off for 0.2s; Blinking Slowly: On for 1s and then Off for 1s)		Description
			Blinking red fast	A minor alarm is generated.
			Blinking red slowly	A warning alarm is generated.
		Local maintenance status	Steady green	Local maintenance succeeds.
			Blinking green fast	Local maintenance fails.
			Blinking green slowly	In local maintenance or shuts down over a command.

NOTE

- The PV connection indicator and the grid connection indicator preferentially indicate environmental faults.
- Local maintenance refers to operations performed after a USB flash drive, a WLAN module, a Bluetooth module, or a USB data cable is inserted into the USB port of the solar inverter. For example, local maintenance includes data import and export using a USB flash drive, and connecting to the SUN2000 app over a WLAN module, a Bluetooth module, or a USB data cable.
- If an alarm is generated during local maintenance, the alarm/maintenance indicator shows the local maintenance state first. After the USB flash drive, WLAN module, Bluetooth module, or USB data cable is removed, the indicator shows the alarm state.

2.5 Working Principles

2.5.1 Circuit Diagram

The solar inverter receives inputs from 20 PV strings. The inputs are grouped into 10 MPPT circuits inside the solar inverter 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.

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Figure 2-11 Schematic diagram of a 3-pin model

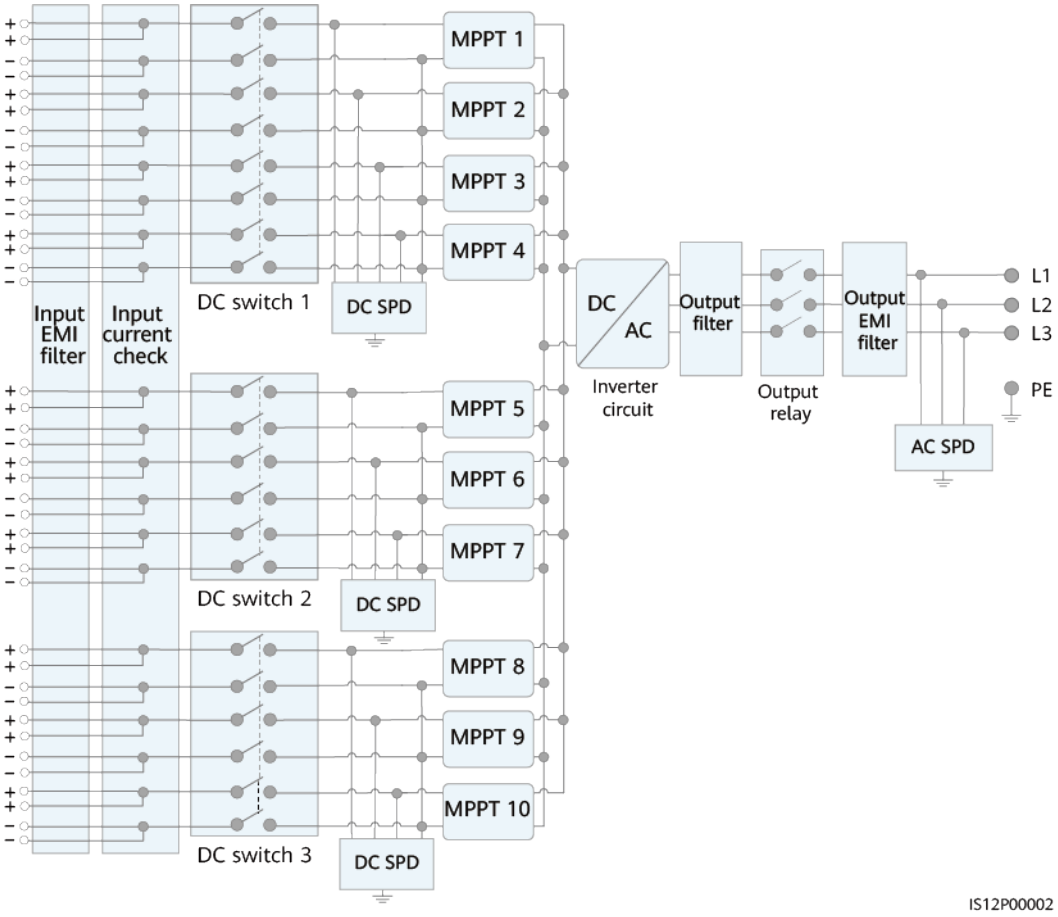

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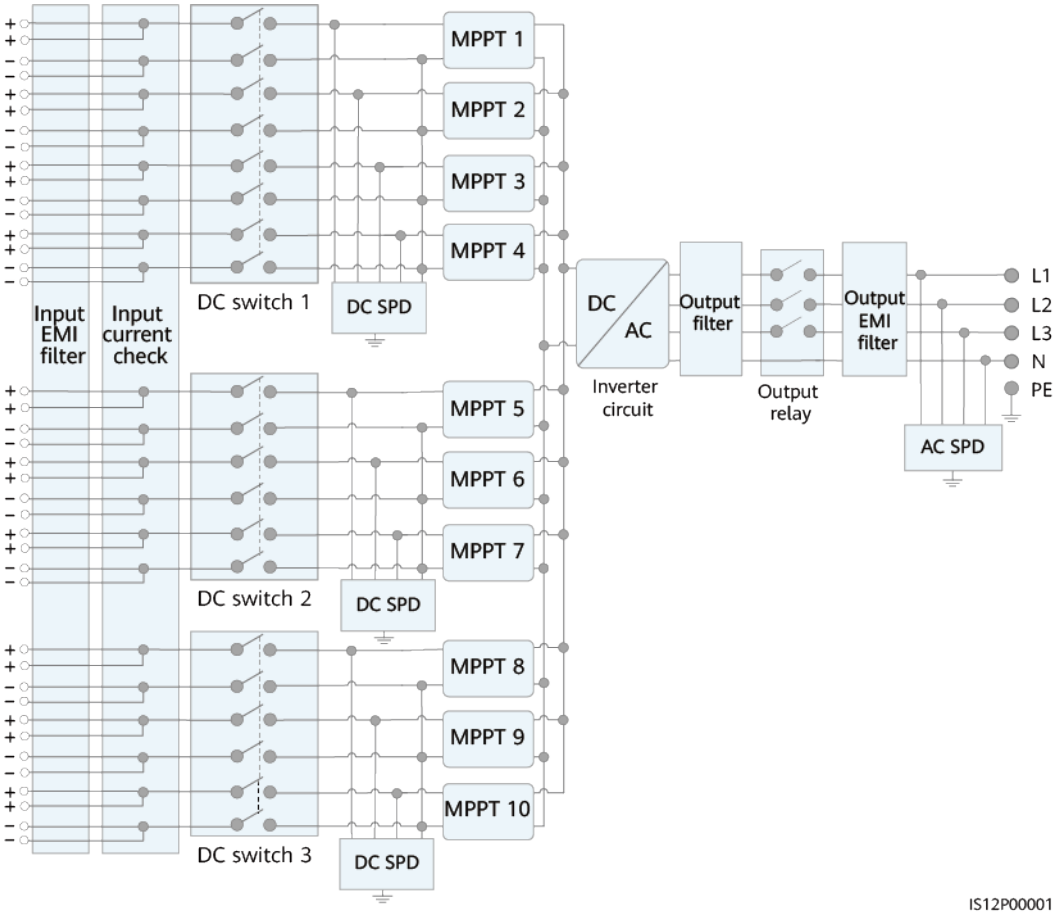
Figure 2-12 Schematic diagram of 4-pin models



2.5.2 Working Modes

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

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Figure 2-13 Working modes

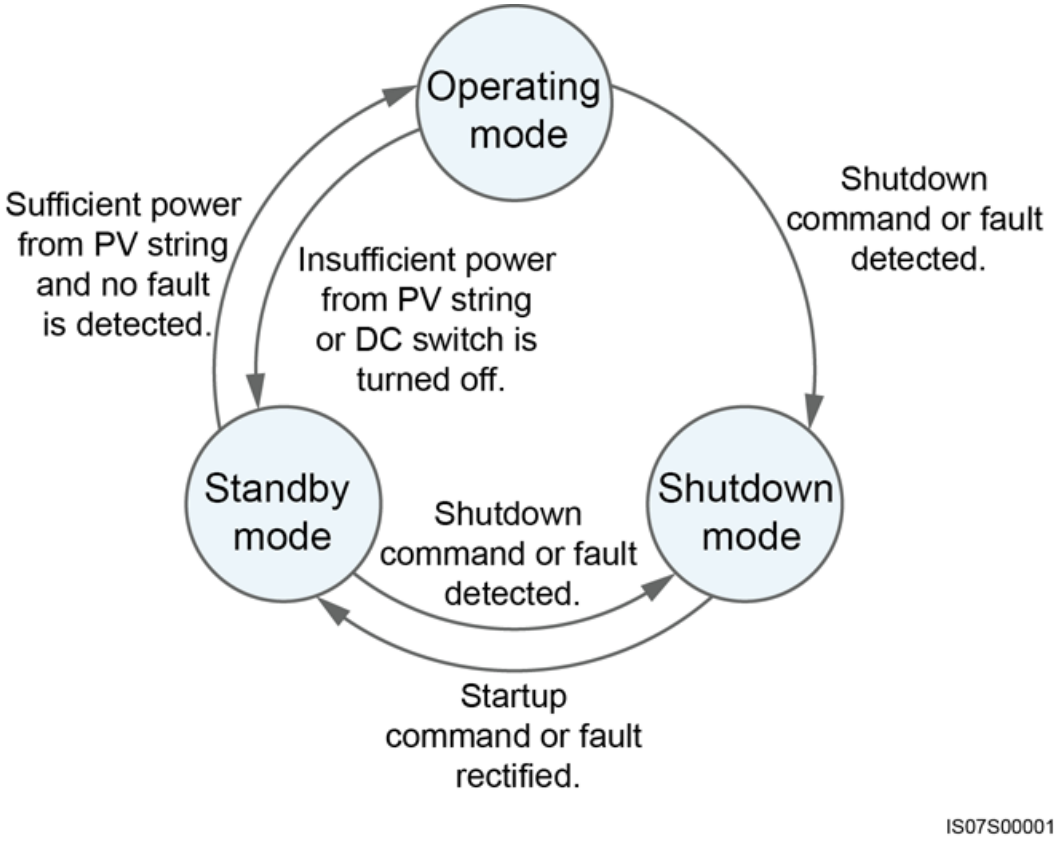

Table 2-2 Working mode description

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.

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Working Mode	Description
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.

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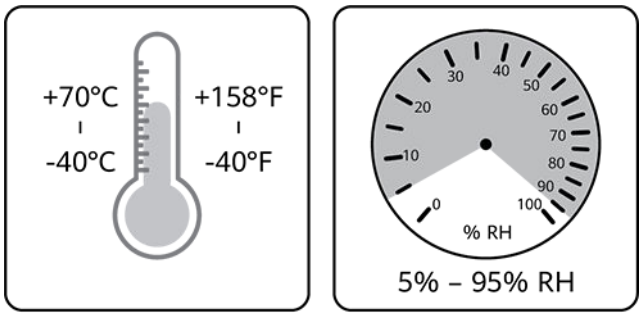
3 Solar Inverter Storage

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

- Do not remove the packing materials, and check the packing materials regularly (recommended: every three months). If any rodent bites are found, replace the packing materials immediately. If the solar inverter is unpacked but not put into use immediately, put it inside the original package with the desiccant bag, and seal it using tape.
- The ambient temperature and humidity should be suitable for the storage. The air must not contain corrosive or flammable gases.

Figure 3-1 Storage temperature and humidity



- The solar inverter should be stored in a clean and dry place and be protected from dust and water vapor corrosion. The solar inverter must be protected against rain and water.
- Do not tilt the package or place it upside down.
- To avoid personal injury or device damage, stack inverters with caution to prevent them from falling over.

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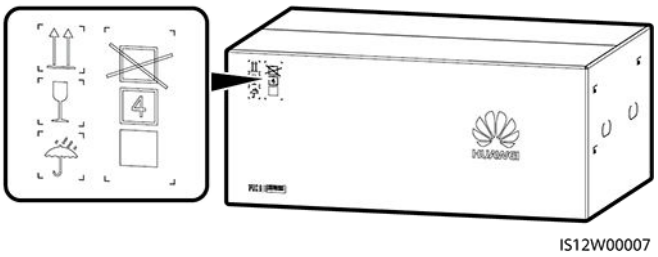
Figure 3-2 Maximum number of pile-up layers allowed



- If the solar inverter has been stored for more than two years, it must be checked and tested by professionals before being put into use.

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4 Installation

4.1 Check Before Installation

Checking Outer Packing Materials

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

NOTE

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

Checking Accessories

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

NOTE

For details about the number of accessories delivered with the solar inverter, see the *Packing List* in the packing case.

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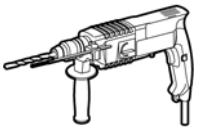
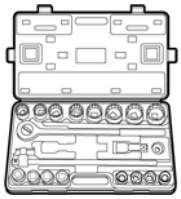
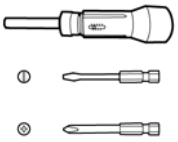
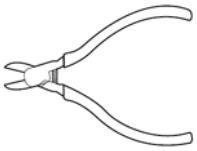
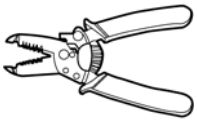
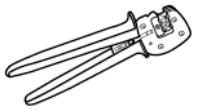
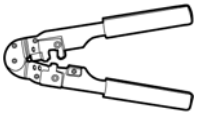
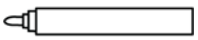
4.2 Tools

Category	Tool			
Installation tools	 Hammer drill (with Φ14 mm and Φ16 mm drill bits)	 Socket wrench set	Torque wrench	 Torque screwdriver (Phillips head: M3 and M4; flat head: M3 and M4)
	 Diagonal pliers	 Wire strippers	Flat-head screwdriver (head: M3)	Rubber mallet
	Utility knife	Cable cutter	 Crimping tool (model: PV-CZM-22100)	 RJ45 crimping tool
	Open-end wrench (model: PV-MS-HZ)	Vacuum cleaner	Multimeter (DC voltage measurement range ≥ 1100 V DC)	 Marker

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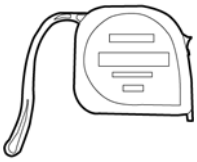
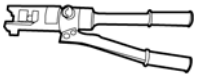
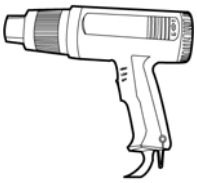
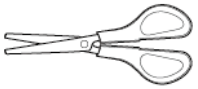
Category	Tool			
	 Measuring tape	Bubble or digital level	 Hydraulic pliers	Heat shrink tubing
	 Heat gun	Cable tie	 Scissors	N/A
Personal protective equipment (PPE)	Safety gloves	Safety goggles	Anti-dust respirator	Safety boots

4.3 Determining the Installation Position

Installation Environment Requirements

- Do not install the inverter in working or living areas.
- If the device is installed in public places (such as parking lots, stations, and factories) other than working and living areas, install a protective net outside the device, set up a safety warning sign to isolate the device, and prevent unauthorized personnel from approaching the inverter. This is to avoid personal injury or property loss caused by accidental contact or other reasons during device operation.
- Do not install the inverter in areas with flammable materials.
- Do not install the inverter in areas with explosive materials.
- Do not install the inveter in areas with corrosive materials.
- Do not install the inverter where its enclosure and heat sinks are easily accessible, because the voltage is high and these parts are hot during operation.
- Install the inverter in a well-ventilated environment for heat dissipation
- If the inverter is installed in an airtight environment, a heat dissipation device or ventilation device must be installed to ensure that the indoor ambient

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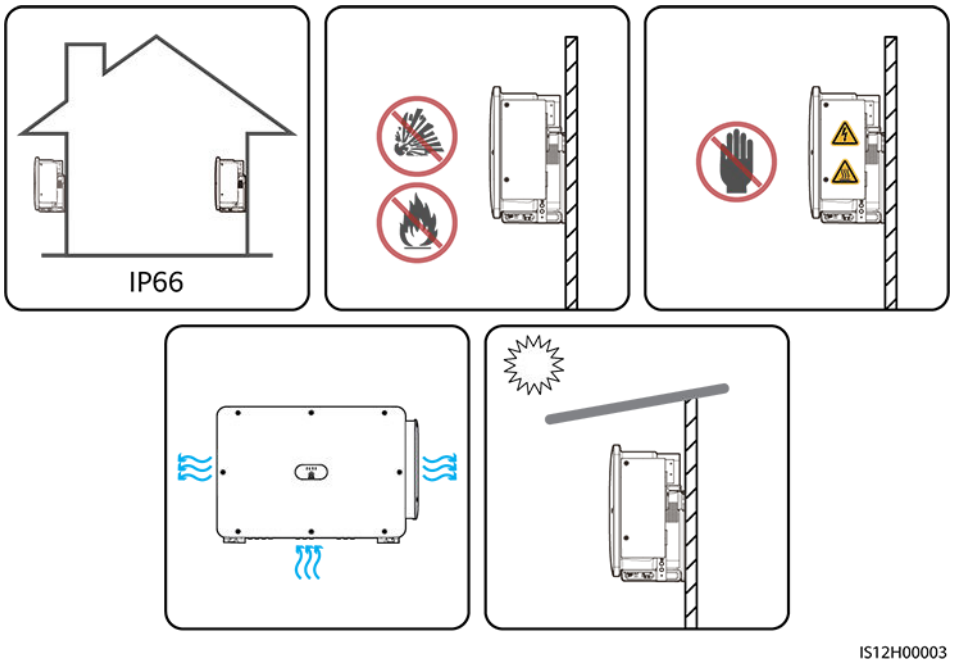
temperature is not higher than the external ambient temperature during operation.

- You are advised to install the inverter in a sheltered place or install an awning over it.
- The inverter will be corroded in salt areas. Before installing the inverter outdoors in salt areas, consult Huawei. A salt area refers to the region within 500 meters from the coast or prone to sea breeze. The regions prone to sea breeze vary with weather conditions (such as typhoons and monsoons) or terrains (such as dams and hills).

NOTE

The SUN2000-125KTL-M0 should be physically separated from third-party wirelesscommunication facilities and residential environments by distance greater than 30 m.

Figure 4-1 Installation environment



Mounting Structure Requirements

- The mounting structure where the solar inverter is installed must be fire resistant. Do not install the solar inverter on flammable building materials.
- Ensure that the installation surface is solid enough to bear the solar inverter.
- In residential areas, do not install the solar inverter on drywalls or walls made of similar materials with a weak sound insulation performance because the noise generated by the solar inverter may interfere with residents.

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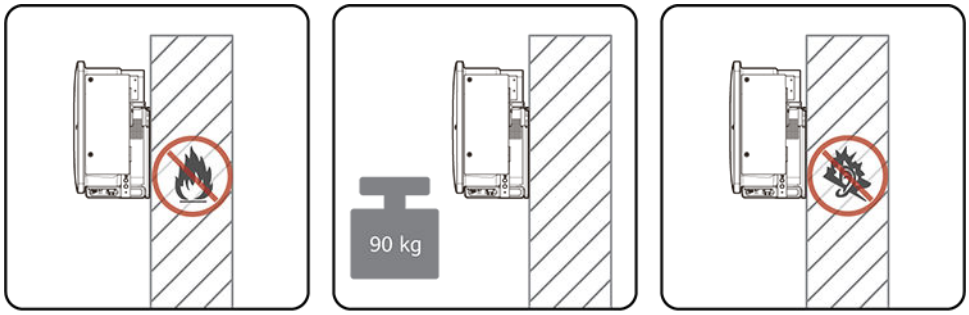
Figure 4-2 Mounting structure

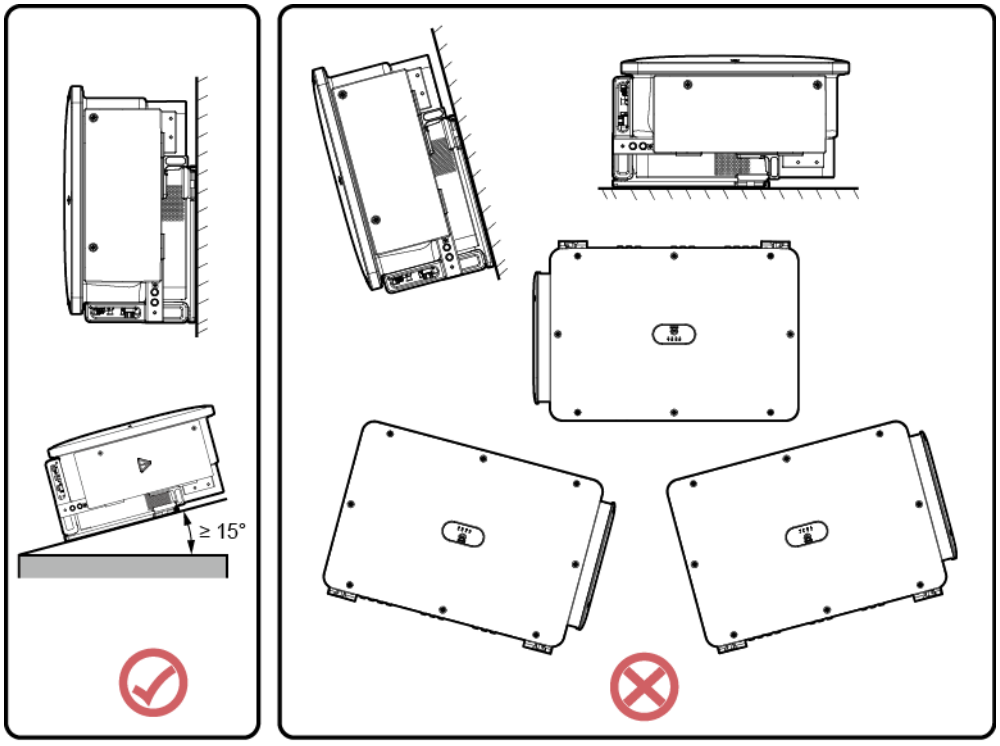


Installation Angle Requirements

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

- Install the solar inverter vertically or at a maximum back tilt of 75 degrees to facilitate heat dissipation.
- Do not install the solar inverter at forward tilted, excessive back tilted, side tilted, horizontal, or upside down positions.

Figure 4-3 Angle



Installation Dimensions Requirements

Reserve enough space around the solar inverter for installation and heat dissipation.

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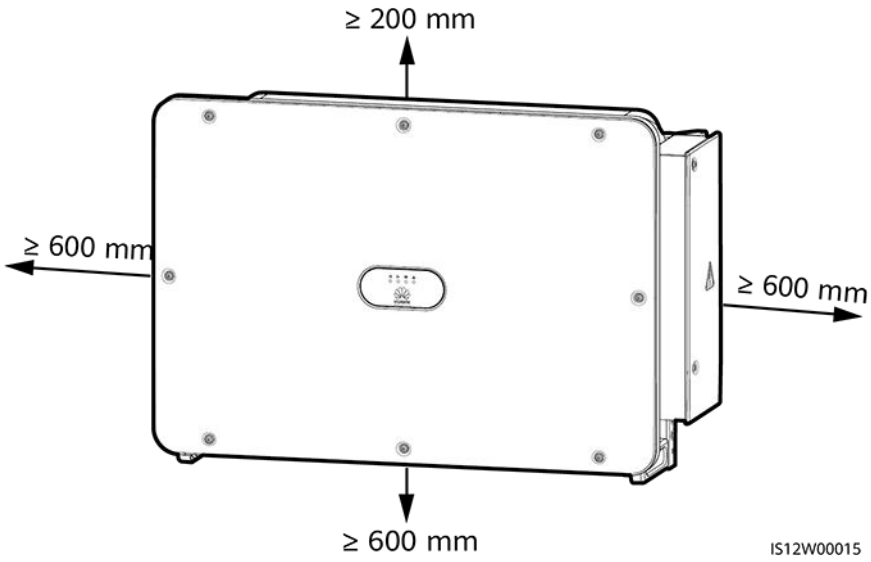
Figure 4-4 Installation dimensions



NOTE

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

When installing multiple solar inverters, install them in horizontal mode if sufficient space is available and install them in triangle mode if no sufficient space is available. Stacked installation is not recommended.

Figure 4-5 Horizontal installation mode (recommended)

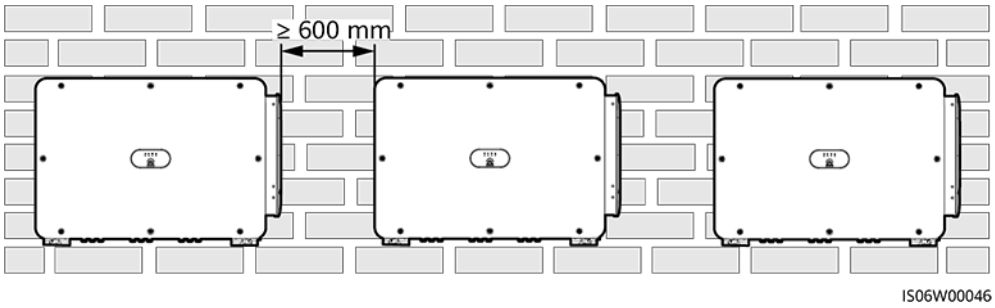


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Figure 4-6 Triangle installation mode (recommended)

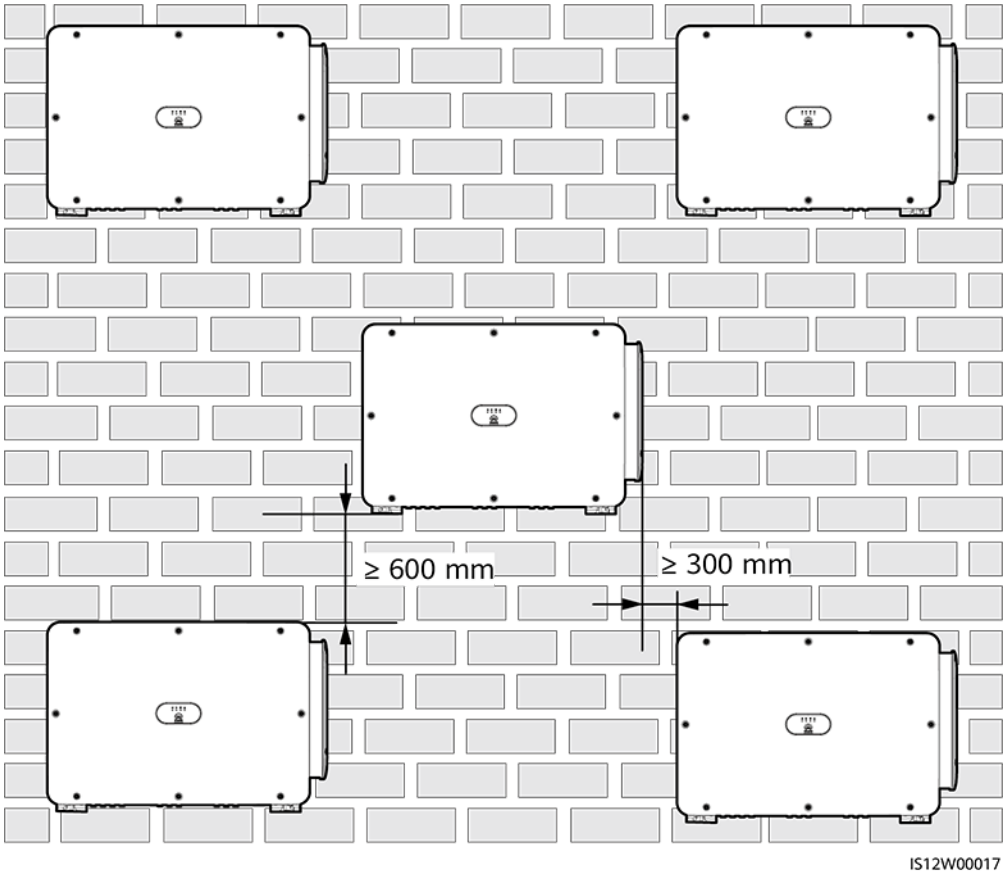
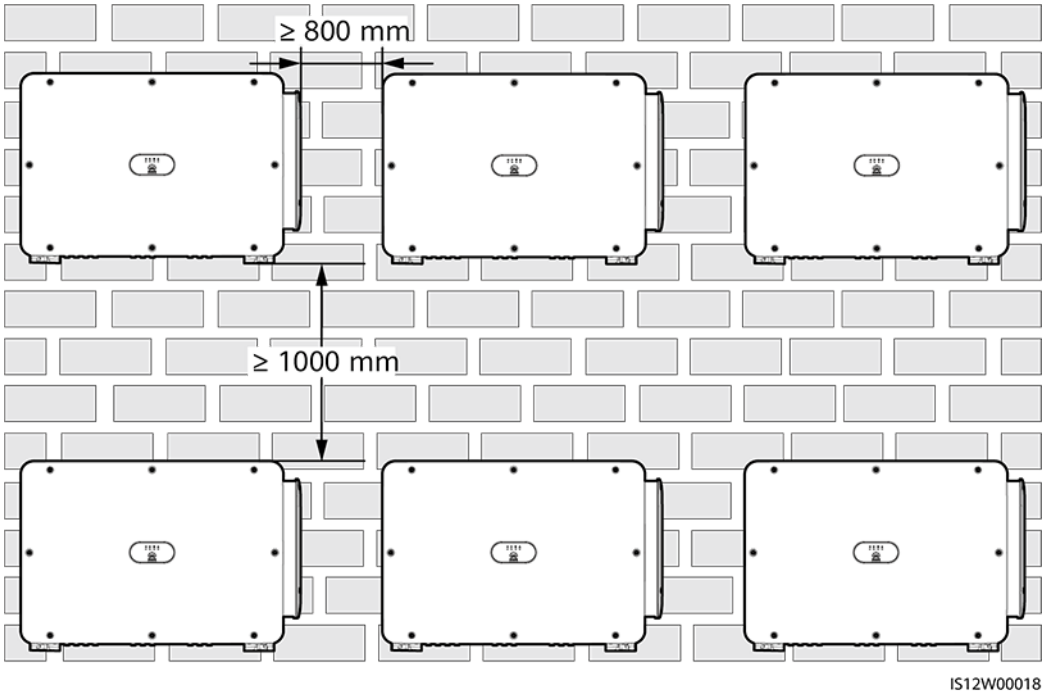


Figure 4-7 Stacked installation mode (not recommended)



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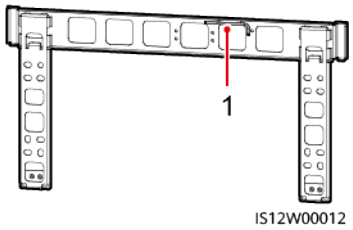
4.4 Installing the Mounting Bracket

Before installing the mounting bracket, remove the security Torx wrench and keep it for later use.

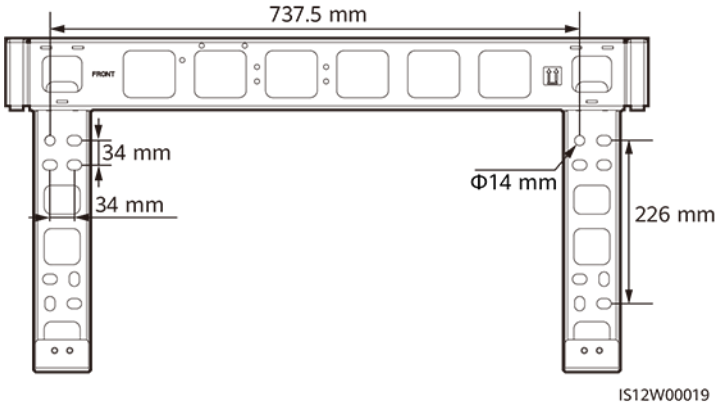
Figure 4-8 Position for binding the security Torx wrench



(1) Security Torx wrench

The mounting bracket of the solar inverter 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. The two round holes are recommended.

Figure 4-9 Hole dimensions



4.4.1 Support-mounted Installation

Prerequisites

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

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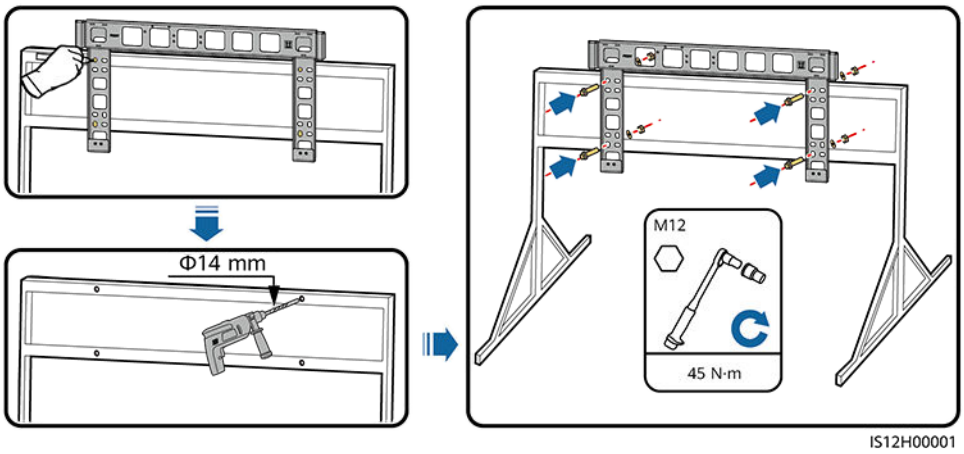
Step 2 Drill holes using a hammer drill. It is recommended that anti-rust measures be taken on the positions for drilling holes.

Step 3 Secure the mounting bracket.

Figure 4-10 Installing the mounting bracket



----End

4.4.2 Wall-mounted Installation

Prerequisites

You have prepared expansion bolts. M12x60 stainless steel 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 position of the wall with water pipes and power cables buried inside.

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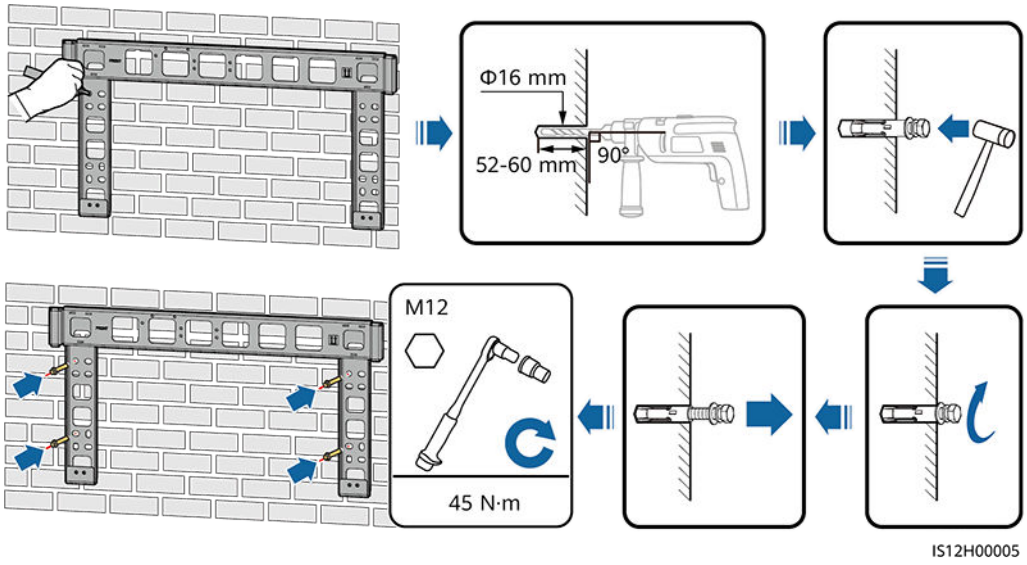
NOTICE

- 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 wall.

Step 3 Secure the mounting bracket.

Figure 4-11 Installing the mounting bracket



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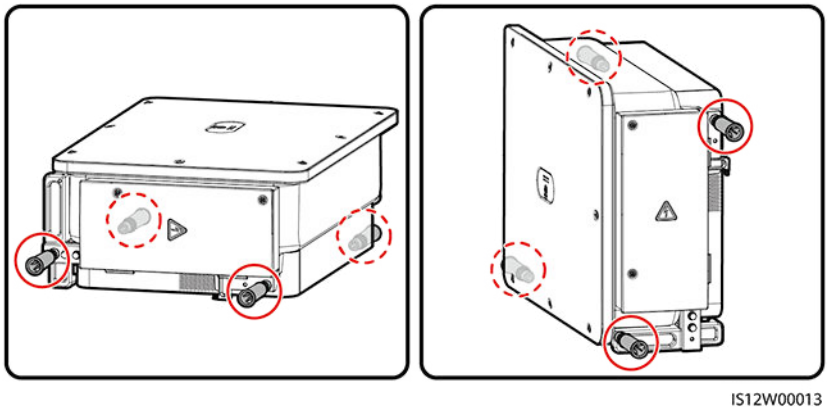
4.5 Installing a Solar Inverter

Context

NOTICE

- Move the solar inverter with care to prevent device damage and personal injury.
- It takes multiple persons or a pallet truck to move the solar inverter.
- Do not use the ports and wiring terminals at the bottom to support any weight of the solar inverter.
- When you need to temporally place the solar inverter on the ground, use foam, paper, or other protection material to prevent damage to its cover.
- Use the handles to facilitate installation. Handles are optional and delivered separately. Ensure that the handles are securely installed. After the installation is complete, remove the handles and keep them properly.
- To avoid damage to the equipment, do not lift or hoist a solar inverter with an improper hold as shown in **Figure 4-13**.

Figure 4-12 Positions for installing the handles



(A) Transportation scenario (B) Installation scenario

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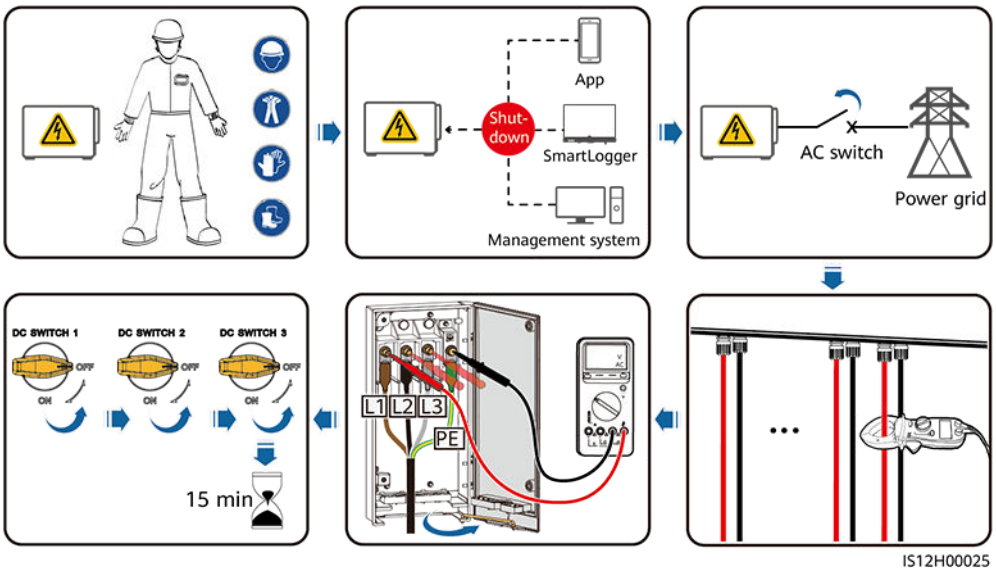
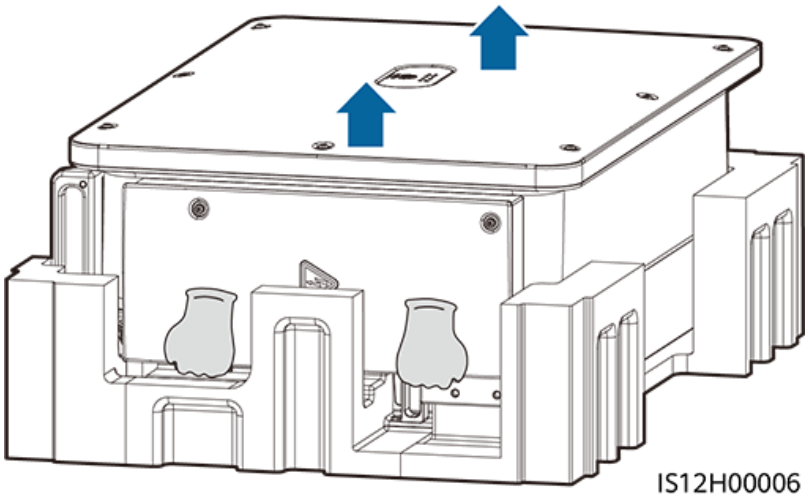
Figure 4-13 Lifting positions



Procedure

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

Figure 4-14 Taking out the solar inverter



Step 2 (Optional) Install screws for locking DC switches.

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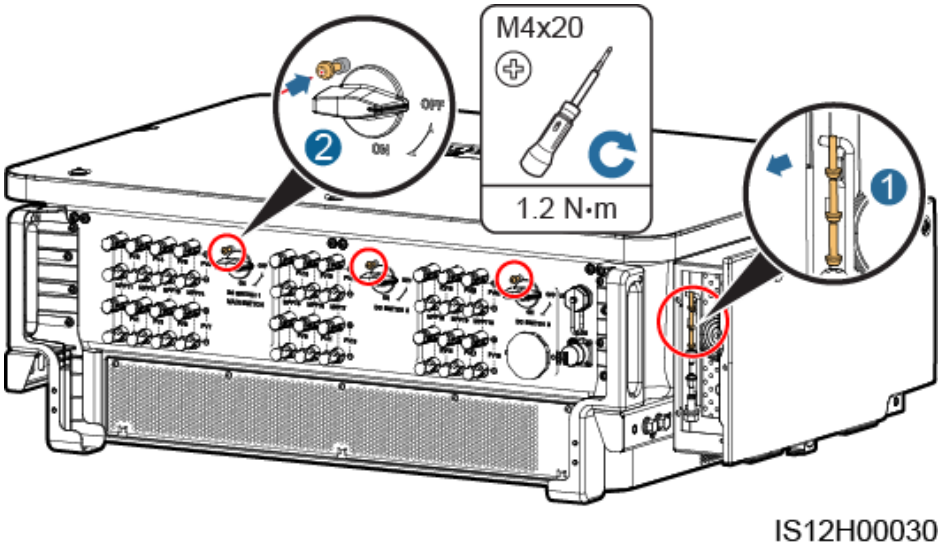
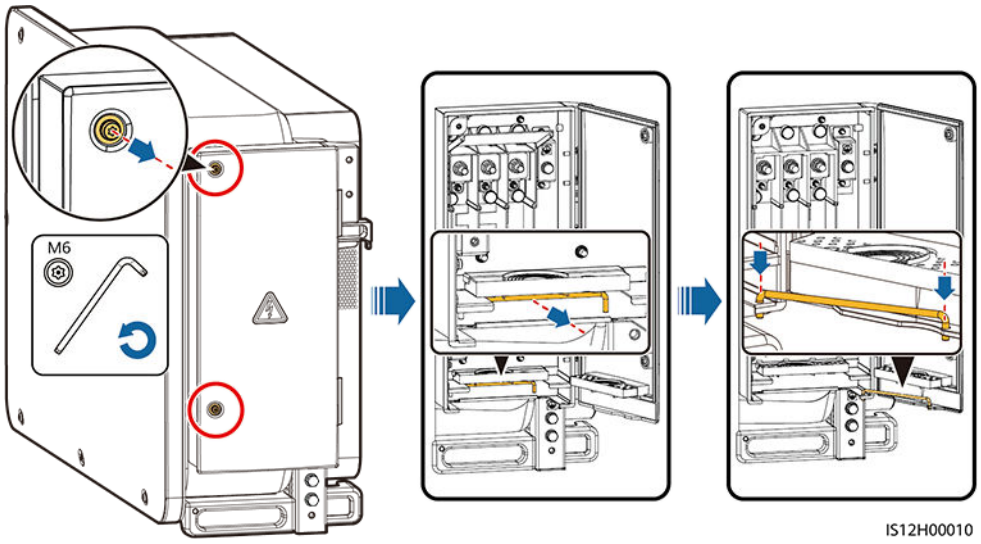
Figure 4-15 Install screws for locking DC switches



Step 3 Lift the solar inverter and keep it upright.

Figure 4-16 Lifting the solar inverter and keeping it upright



Step 4 If the installation position is too high to install the solar inverter on the mounting bracket, run a rope that is strong enough to bear the solar inverter through the two lifting eyes, and hoist the solar inverter.

NOTICE

Hoist the solar inverter with care to protect it from colliding with the wall or other objects.

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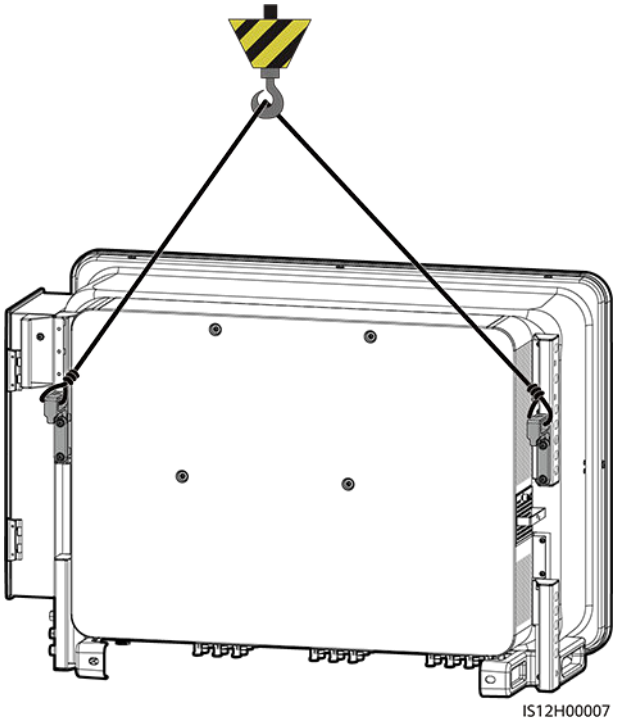
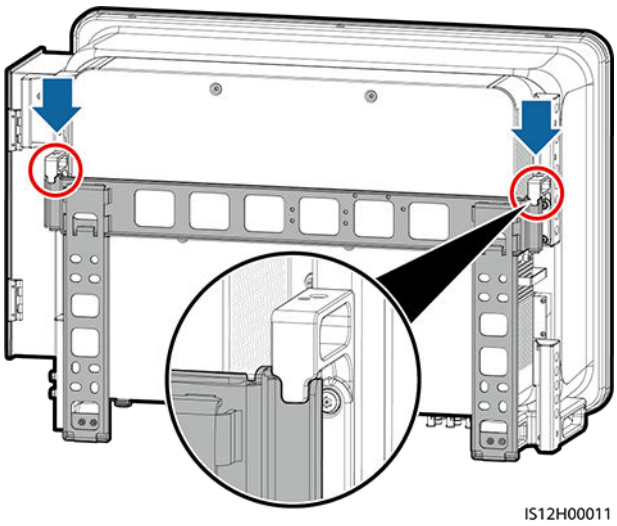
Figure 4-17 Hoisting the solar inverter



Step 5 Install the solar inverter on the mounting bracket and align the solar inverter enclosure with the mounting bracket.

Figure 4-18 Mounting the solar inverter



Step 6 Secure the solar inverter.

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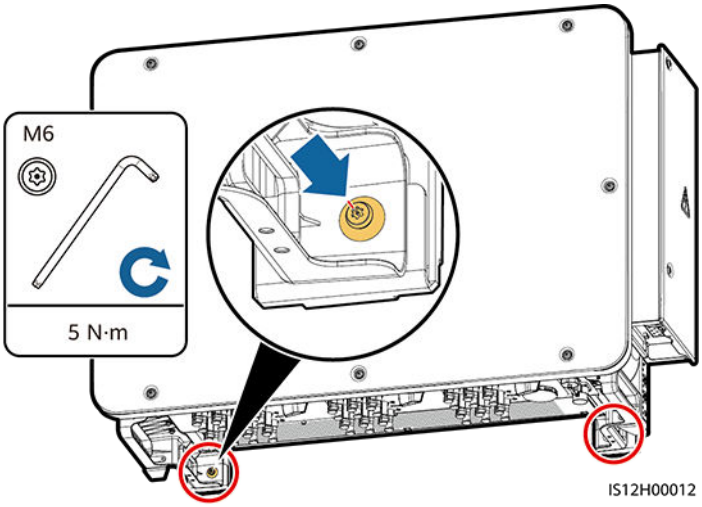
Figure 4-19 Tightening security Torx screws



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5 Electrical Connections

5.1 Precautions

DANGER

After the PV array receives solar irradiance, it transmits the DC voltage to the solar inverter. Before connecting cables, ensure that the three DC switches on the solar inverter are set to OFF. Otherwise, the high voltage of the solar inverter may result in electric shocks.

WARNING

- The device damage caused by incorrect cable connections is beyond the warranty scope.
- Only qualified technicians can perform operations about electrical connection.
- Wear proper PPE at all time when connecting cables.
- To prevent poor cable connection due to overstress, leave enough slack before connecting the cables to the appropriate ports.

NOTE

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

5.2 Preparing Cables

SUN2000 solar inverters support RS485 communication and MBUS communication.

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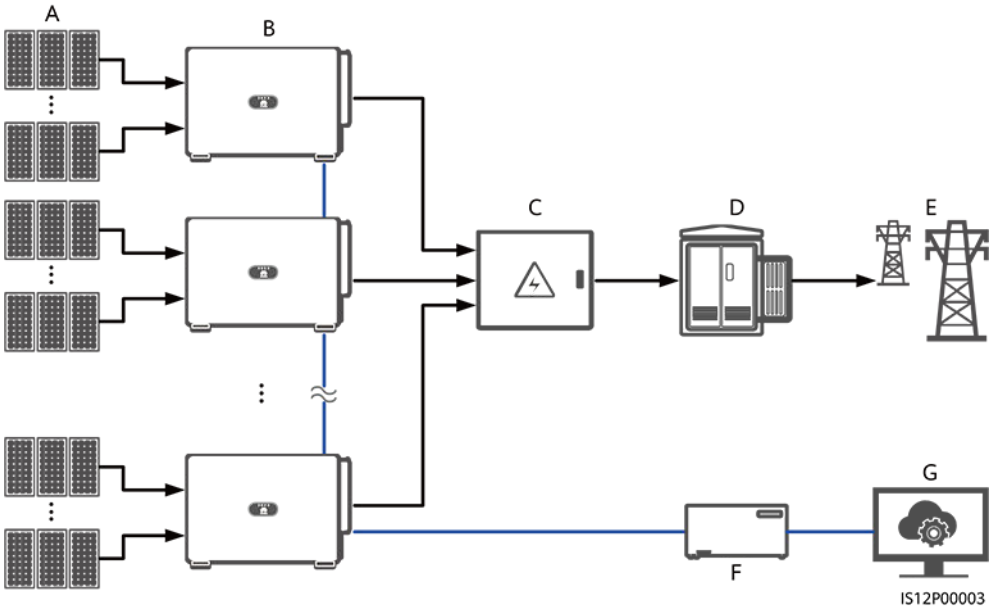
NOTICE

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

NOTE

In the networking diagram, — indicates the power cable, → indicates the power flow direction, and — and ⋀⋀⋀ indicate the signal flow.

Figure 5-1 RS485 networking (SmartLogger)



(A) PV string
(B) SUN2000
(C) AC combiner box
(D) Transformer station
(E) Power grid
(F) SmartLogger
(G) Management system

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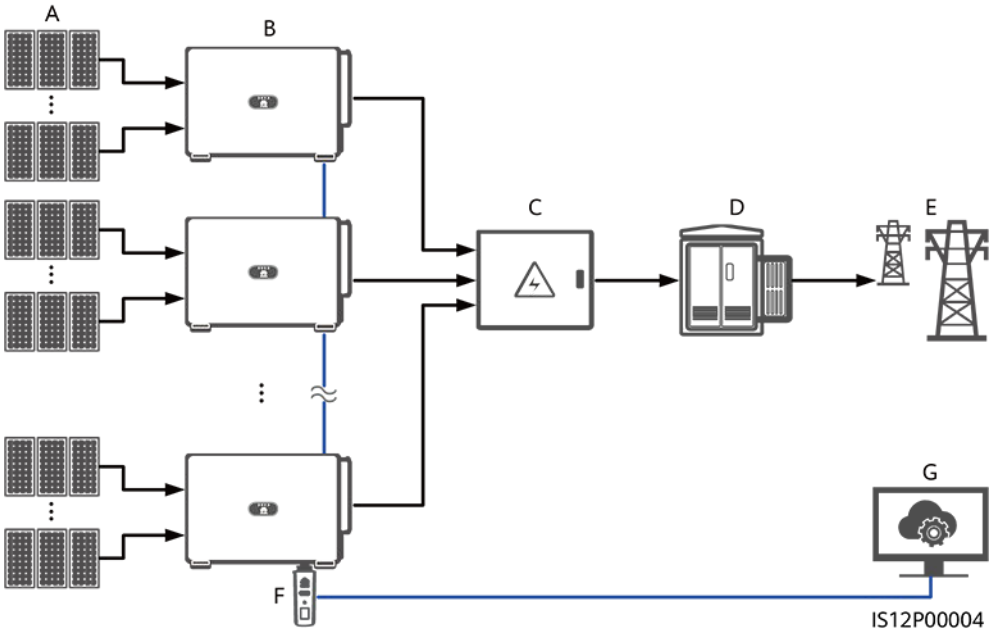
Figure 5-2 RS485 networking (SDongle)

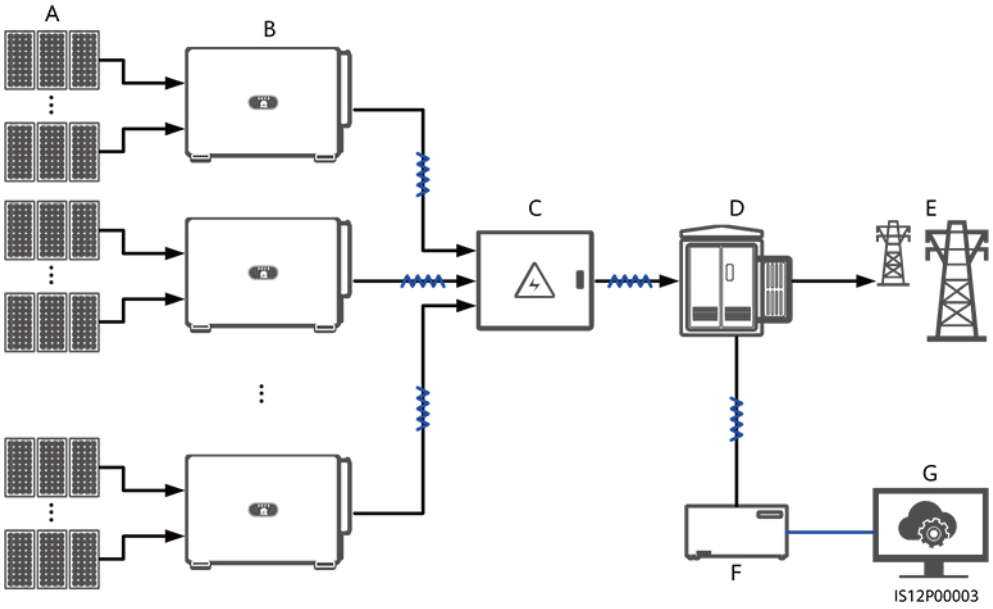


(A) PV string (B) SUN2000 (C) AC combiner box

(D) Transformer station (E) Power grid (F) SDongle

(G) Management system

Figure 5-3 MBUS networking (SmartLogger)



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

(D) Transformer station (E) Power grid (F) SmartLogger

(G) Management system

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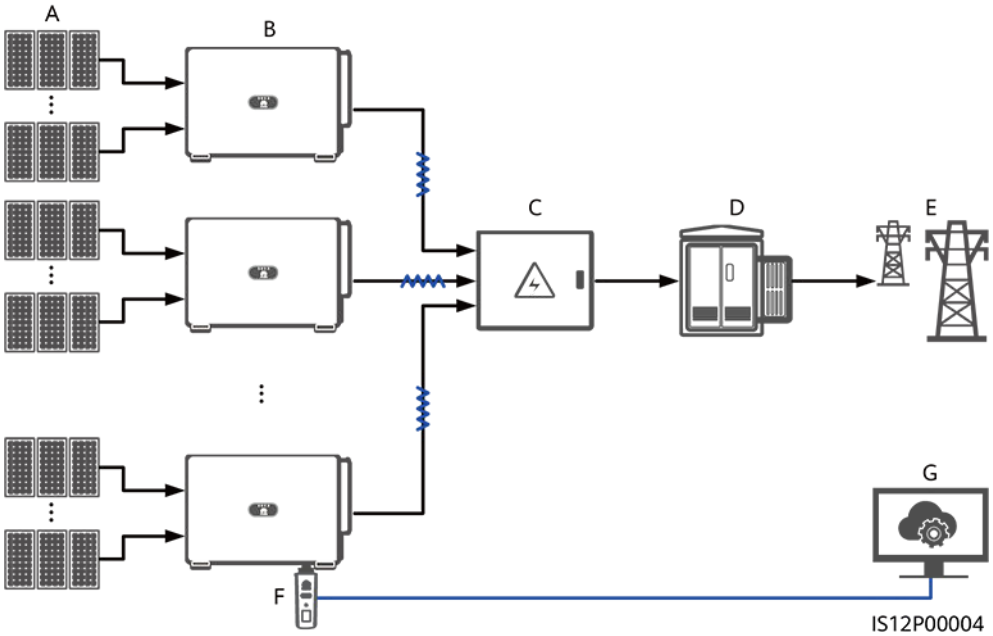
Figure 5-4 MBUS networking (SDongle)



(A) PV string
(B) SUN2000
(C) AC combiner box
(D) Transformer station
(E) Power grid
(F) SDongle
(G) Management system

NOTICE

- To ensure the system response speed, it is recommended that less than 30 solar inverters be connected to each COM port on the SmartLogger and that less than 10 solar inverters be cascaded over the SDongle.
- The RS485 communication distance between the last solar inverter and the SmartLogger cannot exceed 1000 m.

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Figure 5-5 Cable connections (configure the components in the dotted box as required)

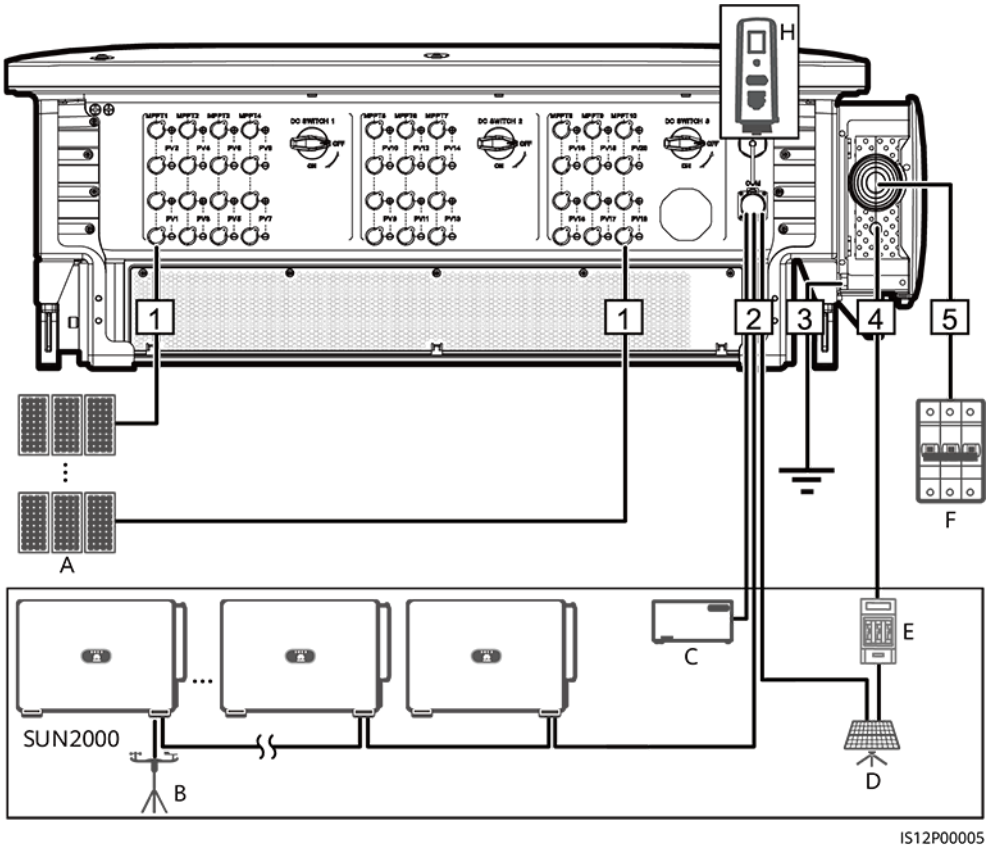

Table 5-1 Components

No.	Component	Description	Source
A	PV string	• PV strings consist of PV modules in series. • A solar inverter supports 20 PV string inputs.	Prepared by the customer
B	Environmental monitoring instrument (EMI)	• When the SmartLogger is used, the EMI can be directly connected to the SmartLogger or connected to the last solar inverter cascaded over RS485. • When the SDongle is used, the EMI is a cascaded device that needs to be connected to the solar inverter where the SDongle is installed.	Prepared by the customer
C	SmartLogger	The solar inverter communicates with the management system through the SmartLogger.	Purchased from Huawei

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No.	Component	Description	Source
D	Power Meter	Implements power control at the grid-tied point in low voltage scenarios using a power meter.	Prepared by the customer
E	Support tracking system	Adjusts the angle of the supports.	Prepared by the customer
F	Fuse/Circuit breaker	The tracking system should be equipped with an overcurrent protection device or component. The power cable between the device or component and the wiring terminal should be no longer than 2.5 m. Therefore, a fuse or a circuit breaker is recommended. • Installed between the solar inverter and tracking control box • Fuse specifications: rated voltage ≥ 500 V; rated current: 16 A; protection: gG • Circuit breaker specifications: rated voltage ≥ 500 V; rated current: 16 A; tripping: C	Prepared by the customer
G	AC switch	• Installed in the AC combiner box • Recommended: a three-phase AC circuit breaker with a rated voltage greater than or equal to 500 V AC and a rated current of 250 A	Prepared by the customer
H	SDongle	The solar inverter communicates with the management system through the SDongle.	Purchased from Huawei

NOTICE

The solar inverter 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 solar inverter from the power grid.

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Table 5-2 Cable description of a 3-pin model (S: cross-sectional area of the AC cable conductor; S_p: cross-sectional area of the protective earthing cable conductor)

No.	Cable	Category	Conductor Cross-Sectional Area Range	Outer Diameter	Source
1	DC input power cable	PV cable that meets the 1100 V standard	4–6 mm^2	5.5–9 mm	Prepared by the customer
2	RS485 communications cable	Outdoor shielded twisted pair that meets the local standard	0.25–1 mm^2	• One or two communications cables: 4–11 mm • Three communications cables: 4–8 mm	Prepared by the customer
3	Protective earthing (PE) cable	Single-core outdoor copper cable and M10 OT/DT terminals **NOTICE** You are advised to choose the ground point on the enclosure. The ground point in the maintenance compartment is used for connecting to the PE cable contained in the multi-core AC power cable.	$S_p \geq S/2$	N/A	Prepared by the customer
4	Tracking system power cable	Three-core outdoor copper cable with dual-layer protection	10 mm^2	15–18 mm	Prepared by the customer

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No.	Cable	Category	Conductor Cross-Sectional Area Range	Outer Diameter	Source
5	AC output power cable (multi-core)	• If you connect a PE cable to the ground point on the enclosure, you are advised to use a three-core (L1, L2, and L3) outdoor cable and M12 OT/DT terminals (L1, L2, and L3). • If you connect a PE cable to the ground point in the maintenance compartment, you are advised to use a four-core (L1, L2, L3, and PE) outdoor cable, M12 OT/DT terminals (L1, L2, and L3), and M10 OT/DT terminals (PE). You do not need to prepare a PE cable.	• Copper cable: – S: 70–240 mm^2 – $S_p \geq S/2$ • Aluminum alloy cable or copper-clad aluminum cable: – S: 95–240 mm^2 – $S_p \geq S/2$	24–66 mm	Prepared by the customer
	AC output power cable (single-core)	You are advised to use a single-core outdoor cable and M12 OT/DT terminals.	• Copper cable: – S: 70–240 mm^2 • Aluminum alloy cable or copper-clad aluminum cable: – S: 95–240 mm^2	14–32 mm	Prepared by the customer

- The value of S_p is valid only if the conductors of the PE cable and AC power cable use the same material. If the materials are different, ensure that the conductor of the PE cable with a proper cross-sectional area produces a conductance equivalent to that of the cable specified in the table.
- The specifications of the PE cable are subject to this table or calculated according to IEC 60364-5-54.
- The cable diameter must comply with local cable standards.
- The factors that affect cable selection include the rated current, cable type, routing mode, ambient temperature, and maximum expected line loss.

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Table 5-3 Cable description of 4-pin models (S: cross-sectional area of the AC cable conductor; S_p: cross-sectional area of the PE cable conductor)

No.	Cable	Category	Conductor Cross-Sectional Area Range	Outer Diameter	Source
1	DC input power cable	PV cable that meets the 1100 V standard	4–6 mm^2	5.5–9 mm	Prepared by the customer
2	RS485 communications cable	Outdoor shielded twisted pair that meets the local standard	0.25–1 mm^2	• One or two communications cables: 4–11 mm • Three communications cables: 4–8 mm	Prepared by the customer
3	PE cable	Single-core outdoor copper cable and M10 OT/DT terminals **NOTICE** You are advised to choose the ground point on the enclosure. The ground point in the maintenance compartment is used for connecting to the PE cable contained in the multi-core AC power cable.	$S_p \geq S/2$	N/A	Prepared by the customer
4	Tracking system power cable	Three-core outdoor copper cable with dual-layer protection	10 mm^2	15–18 mm	Prepared by the customer

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No.	Cable	Category	Conductor Cross-Sectional Area Range	Outer Diameter	Source
5	AC output power cable (multi-core)	• If you connect a PE cable to the ground point on the enclosure and the neutral wire is not used, you are advised to use a three-core (L1, L2, and L3) outdoor cable and M12 OT/DT terminals (L1, L2, and L3). • If you connect a PE cable to the ground point in the maintenance compartment and the neutral wire is not used, you are advised to use a four-core (L1, L2, L3, and PE) outdoor cable, M12 OT/DT terminals (L1, L2, and L3), and M10 OT/DT terminals (PE). • If you connect a PE cable to the ground point on the enclosure and the neutral wire is used, you are advised to use a four-core (L1, L2, L3, and N) outdoor cable and M12 OT/DT terminals (L1, L2, L3, and N). • If you connect a PE cable to the ground point in the maintenance compartment and the neutral wire is used, you are advised to use a five-core (L1, L2, L3, N, and PE) outdoor cable, M12 OT/DT terminals (L1, L2, L3, and N), and M10 OT/DT terminals (PE).	• Copper cable: – S: 70–240 mm^2 – $S_p \geq S/2$ • Aluminum alloy cable or copper-clad aluminum cable: – S: 95–240 mm^2 – $S_p \geq S/2$	24–66 mm	Prepared by the customer

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No.	Cable	Category	Conductor Cross-Sectional Area Range	Outer Diameter	Source
	AC output power cable (single-core)	You are advised to use a single-core outdoor cable and M12 OT/DT terminals.	• Copper cable: – S: 70–240 mm^2 • Aluminum alloy cable or copper-clad aluminum cable: – S: 95–240 mm^2	14–32 mm	Prepared by the customer

- The value of S_p is valid only if the conductors of the PE cable and AC power cable use the same material. If the materials are different, ensure that the conductor of the PE cable with a proper cross-sectional area produces a conductance equivalent to that of the cable specified in the table.
- The specifications of the PE cable are subject to this table or calculated according to IEC 60364-5-54.
- The cable diameter must comply with local cable standards.
- The factors that affect cable selection include the rated current, cable type, routing mode, ambient temperature, and maximum expected line loss.

5.3 Connecting the PE 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 cables, and communications cable, connect the PE cable to the PE point.
- It is recommended that the PE cable of the solar inverter be connected to a nearby ground point. Connect the PE points of all solar inverters in the same array to ensure equipotential connections to PE cables.

Procedure

Step 1 Connect the PE cable to the PE point.

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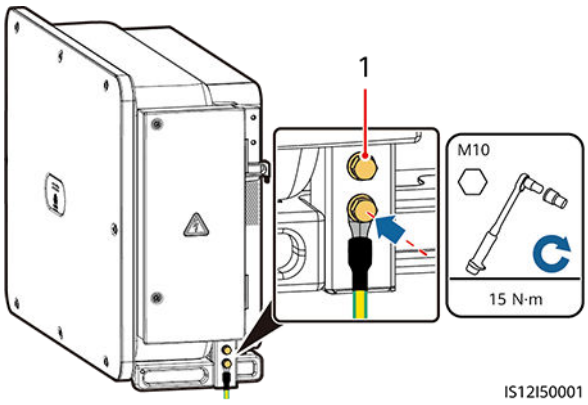
Figure 5-6 Connecting the PE cable to the PE point (on the enclosure)



(1) Reserved PE point

----End

Follow-up Procedure

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

5.4 Opening the Maintenance Compartment Door

Precautions

CAUTION

- Do not open the panel cover of the solar inverter.
- Before opening the maintenance compartment door, ensure that no electrical connections are made for the solar inverter 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 from 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.

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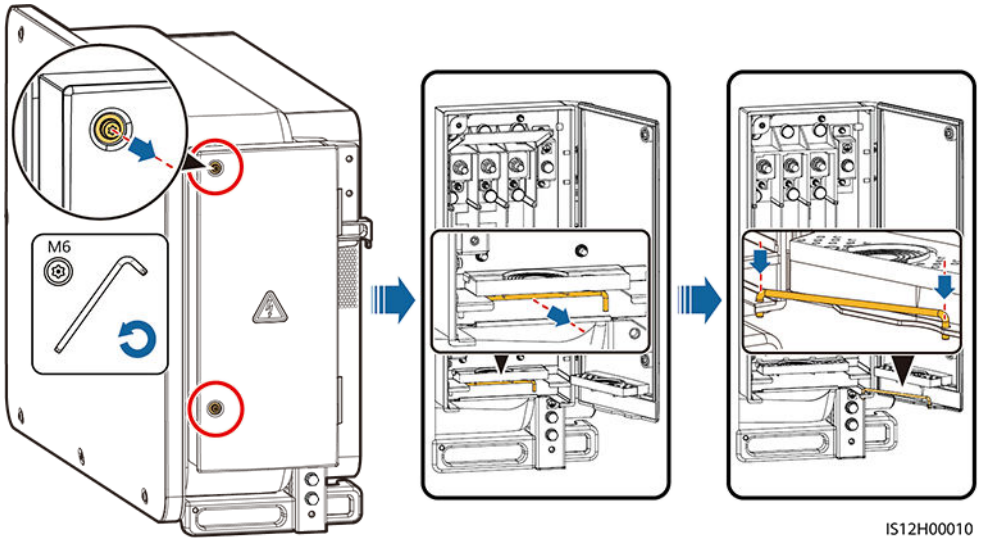
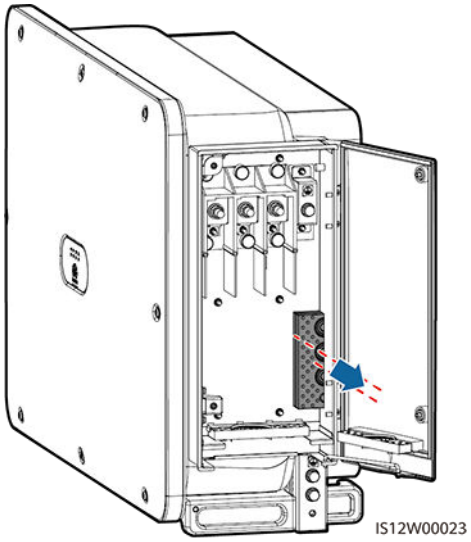
Figure 5-7 Opening the maintenance compartment door



Step 2 Remove the accessories and keep them properly.

Figure 5-8 Removing the accessories



Step 3 Select a crimping module according to the type of the AC output power cable.

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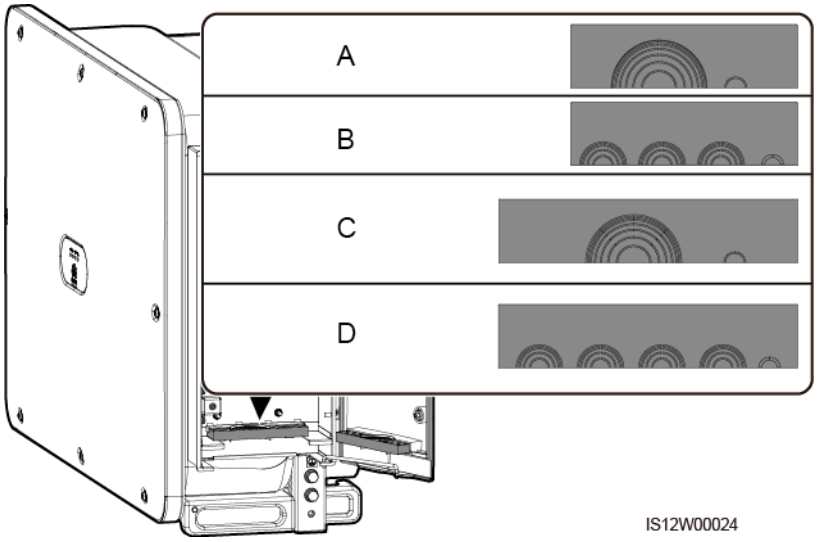
Figure 5-9 Select the crimping module



(A) Crimping module for multi-core cables of a 3-pin model

(B) Crimping module for single-core cables of a 3-pin model

(C) Crimping module for multi-core cables of 4-pin models

(D) Crimping module for single-core cables of 4-pin models

----End

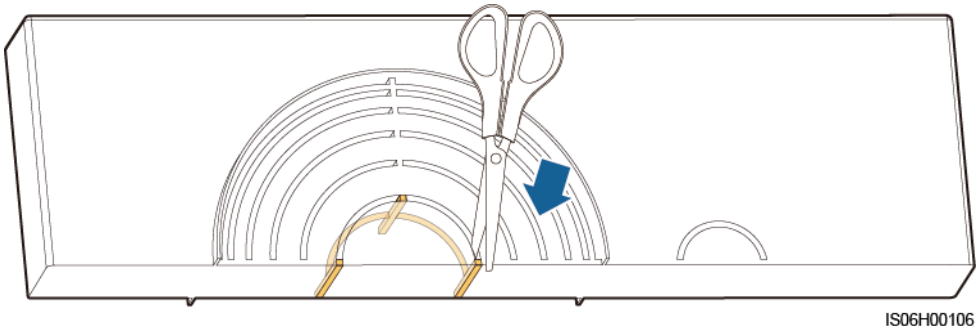
Follow-up Procedure

Use scissors to cut off the joints of the rubber rings to remove them. All rubber rings are removed in the same way.

NOTICE

Remove the corresponding rubber rings in strict accordance with the cable diameter, and ensure that the crimping module is not damaged. Otherwise the protection level of the solar inverter will be affected.

Figure 5-10 Remove the rubber ring



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5.5 (Optional) Installing the Power Cable of the Tracking System

Precautions

WARNING

- The tracking system obtains power from the AC three-phase power grid. The rated voltage of the power supply is the rated output voltage of the solar inverter.
- Keep inflammable materials away from the power cable.
- The power cable must be protected with a conduit to prevent short circuits caused by insulation layer damage.
- Connect the power cable of the tracking system before the AC output power cable. Otherwise, reworking will be caused.

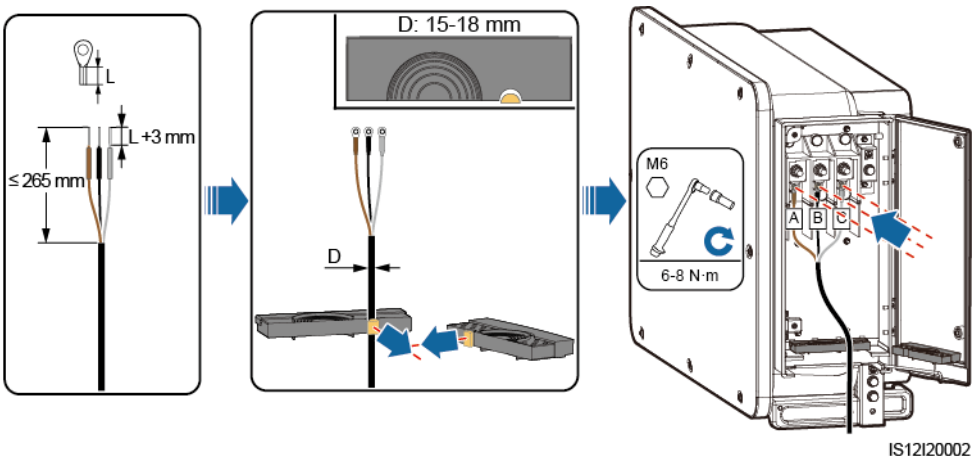
Procedure

Step 1 Prepare a cable.

Step 2 Remove the corresponding rubber rings.

Step 3 Connect the power cable of the tracking system.

Figure 5-11 Connecting the power cable of the tracking system



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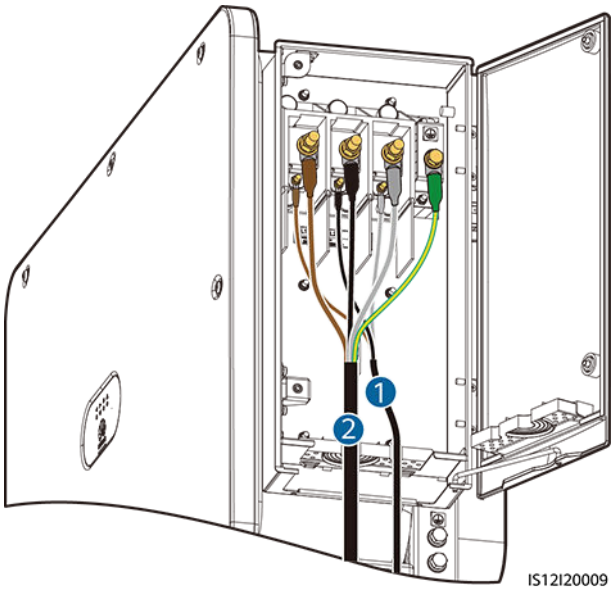
5.6 Connecting an AC Output Power Cable

Prerequisites

- A three-phase AC switch should be installed on the AC side of the solar inverter. To ensure that the solar inverter 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.
- Connect the power cable of the tracking system before the AC output power cable. Otherwise, reworking will be caused.

Figure 5-12 Cable connection sequence



(1) Power cable of the tracking system (2) AC output power cable

WARNING

Do not connect loads between the solar inverter and the AC switch.

Requirements for the OT/DT Terminal

- If a copper cable is used, use copper wiring terminals.
- If a copper-clad aluminum cable is used, use copper wiring terminals.
- If an aluminum alloy cable is used, use copper-aluminum transition wiring terminals, or aluminum wiring terminals along with copper-aluminum transition spacers.

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NOTICE

- Do not connect aluminum wiring terminals to the AC terminal block. Otherwise the electrochemical corrosion will occur and affect the reliability of cable connections.
- Comply with the IEC61238-1 requirements when using copper-aluminum transition wiring terminals, or aluminum wiring terminals along with copper-aluminum transition spacers.
- If copper-aluminum transition spacers are used, pay attention to the front and rear sides. Ensure that the aluminum sides of spacers are in contact with aluminum wiring terminals, and copper sides of spacers are in contact with the AC terminal block.

Figure 5-13 Requirements for the OT/DT terminal

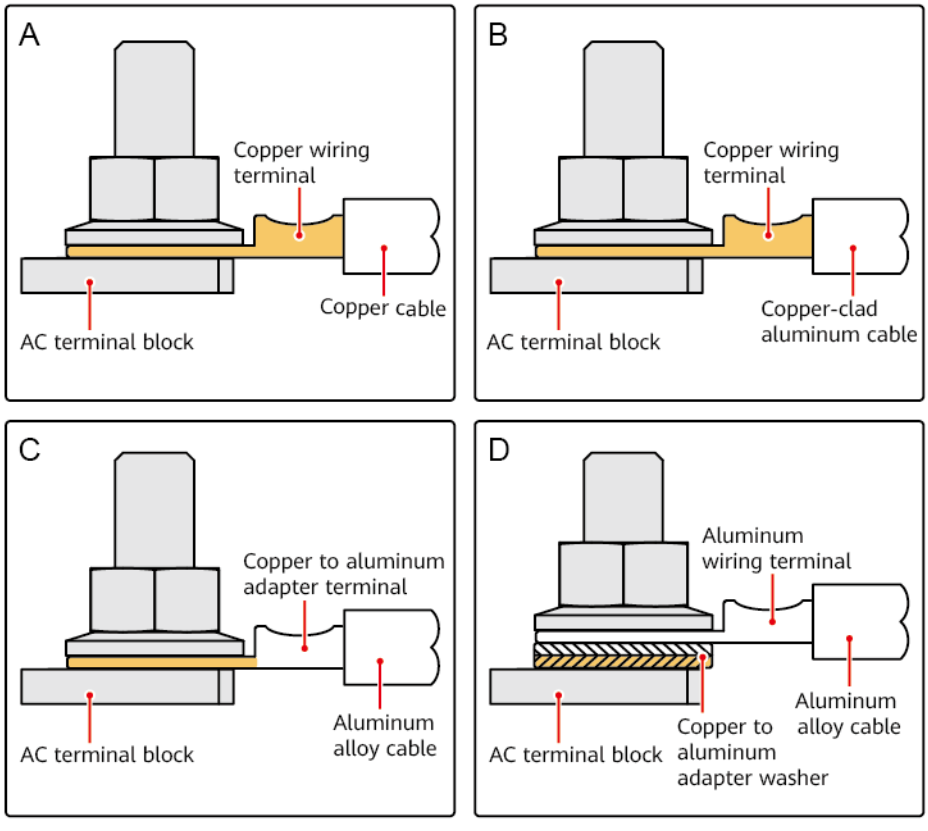

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Figure 5-14 AC terminal block dimensions of a 3-pin model

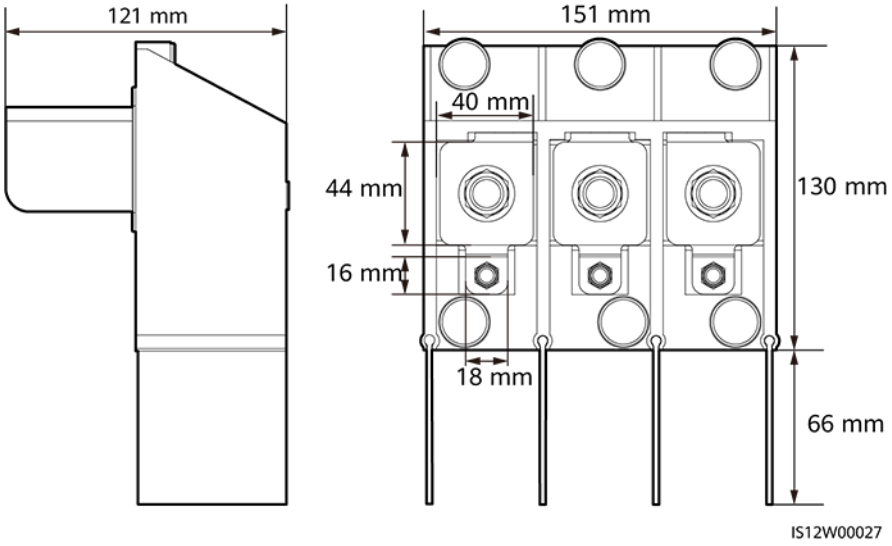
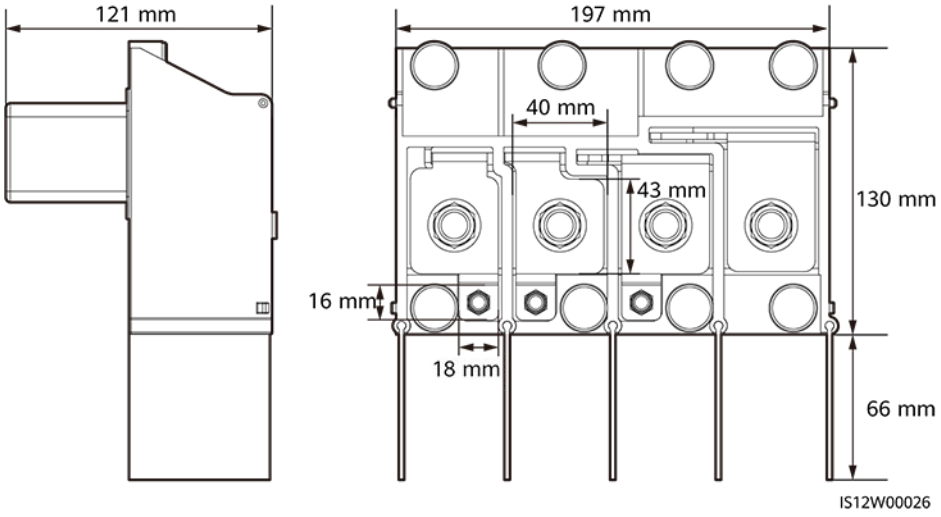


Figure 5-15 AC terminal block dimensions of 4-pin models



NOTE

This section describes how to install an AC output power cable for the 3-pin model.

Procedure

Step 1 Prepare a cable.

Step 2 Remove rubber rings according to the cable diameter range.

Step 3 Secure the AC output power cable and PE cable.

Step 4 Install the support bar.

Step 5 Close the maintenance compartment door and tighten the two screws on the door.

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NOTICE

- Sufficient slack should be provided in the PE cable to ensure that the last cable bearing the force is the PE cable when the AC output power cable bears pulling force due to force majeure.
- The cable outer diameter can be measured using the ruler sticker in the maintenance compartment.
- Ensure that the cable jacket is in the maintenance compartment.
- Ensure that the AC output power cable is secured. Failing to do so may cause the solar inverter to malfunction or damage to its terminal block by issues such as overheating.
- Before closing the maintenance compartment door, check that the cables are connected correctly and securely, and clean up the foreign matter from the maintenance compartment.
- If a screw on the maintenance compartment door is lost, obtain the spare screw from the fitting bag tied at the bottom of the maintenance compartment.

Figure 5-16 Multi-core cable connections

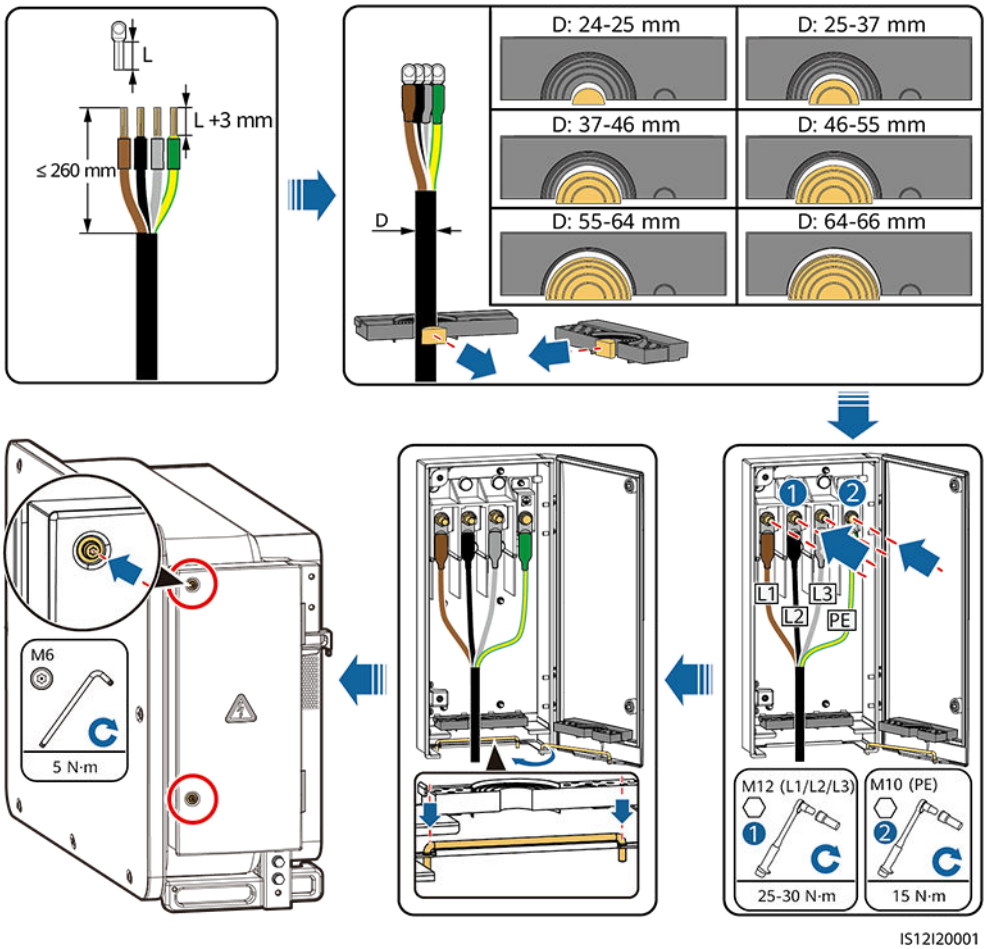

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Figure 5-17 Single-core cable connections

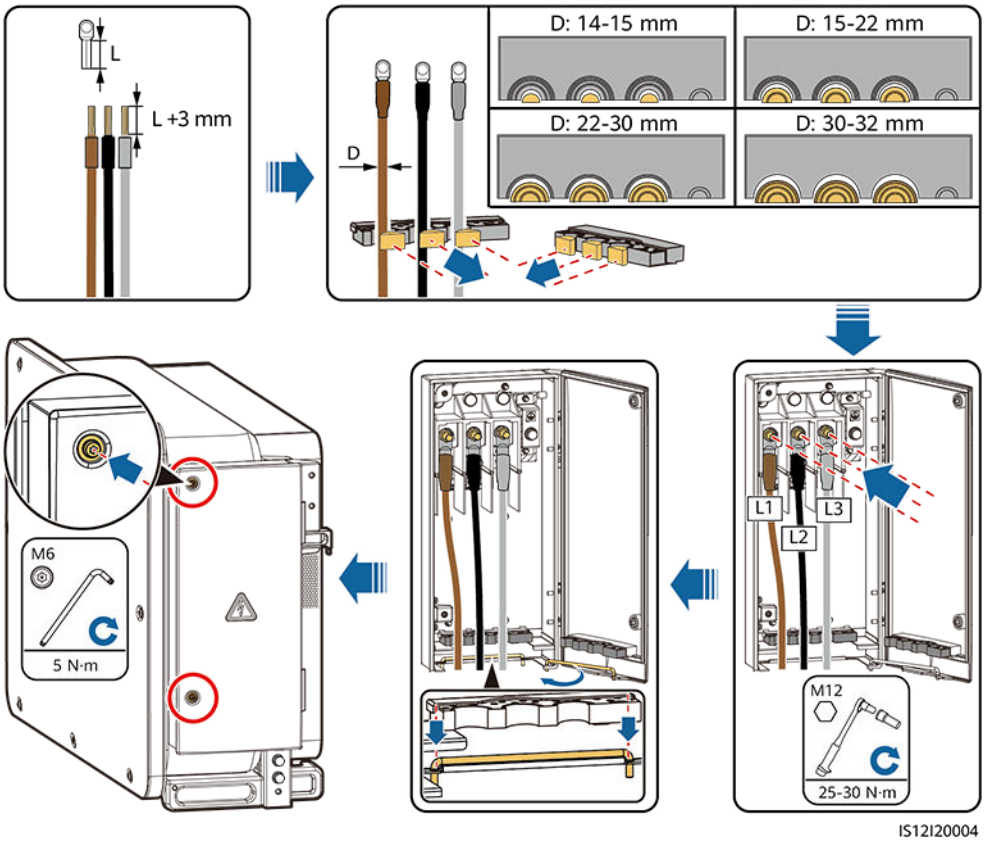
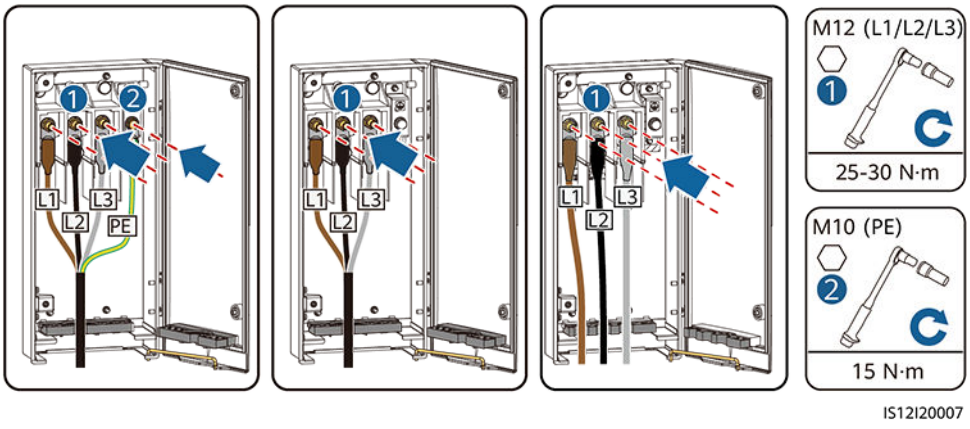


Figure 5-18 3-pin model (125KTL) cable connections



(A) Four-core cable (B) Three-core cable (C) Single-core cable

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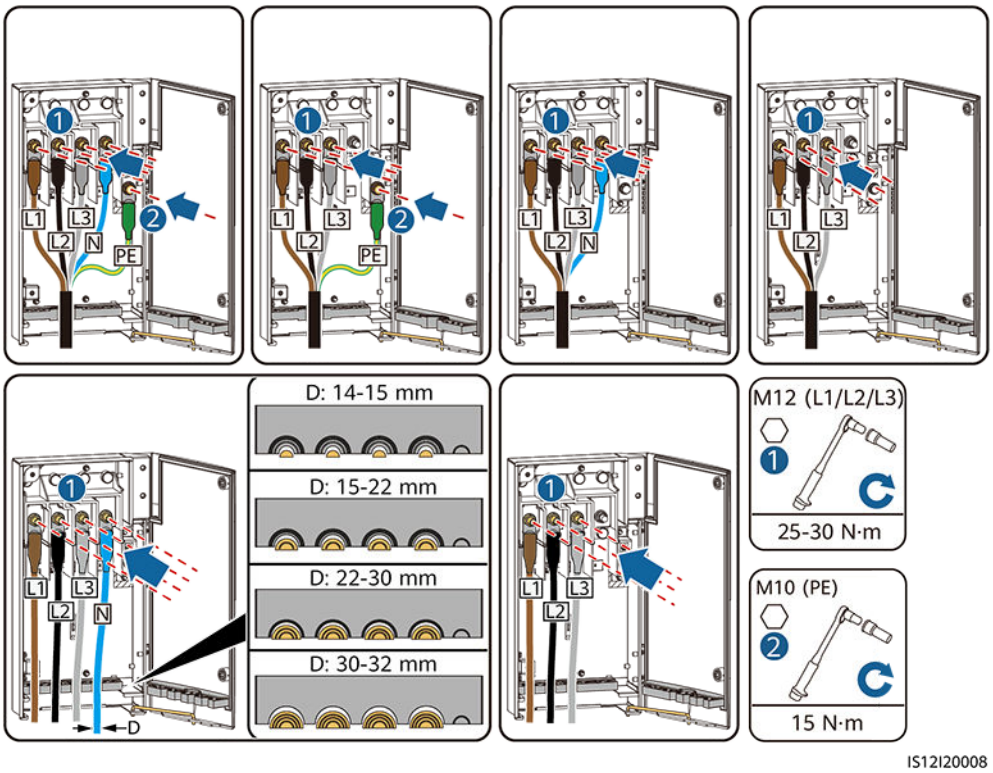
Figure 5-19 4-pin model (100KTL/110KTL) cable connections



(A) Five-core cable (B) Four-core cable (including the PE cable) (C) Four-core cable (including the neutral wire)

(D) Three-core cable (E) Single-core cable (including the neutral wire) (F) Single-core cable (excluding the neutral wire)

NOTE

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

----End

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5.7 Connecting DC Input Power Cables

Precautions

DANGER

- Before connecting the DC input power cable, ensure that the DC voltage is within the safe range (lower than 60 V DC) and that the three DC switches on the solar inverter are set to OFF. Failing to do so may result in electric shocks.
- If you turn a DC SWITCH to ON by mistake when connecting or disconnecting DC input power cables, do not remove or insert DC input terminals. If you need to remove or insert a DC input terminal, perform the operations provided in **8.2 Power-Off for Troubleshooting**.
- When the solar inverter operates in grid-tied mode, do not perform maintenance or operations on the DC circuit, such as connecting or disconnecting a PV string or a PV module in the PV string. Failing to do so may cause electric shocks or arcing, which may also cause fire.

WARNING

Ensure that the following conditions are met. Otherwise, the solar inverter may be damaged, or even a fire could happen.

- The open-circuit voltage of each PV string must be 1100 V DC or lower under any circumstances.
- The polarities of electric connections are correct on the DC input side. The positive and negative terminals of a PV module connect to corresponding positive and negative DC input terminals of the solar inverter.

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.
- The solar inverter does not support full parallel connection for PV strings (full parallel connection: PV strings connect to one another in parallel outside the solar inverter and then connect to the solar inverter separately).
- During the installation of PV strings and the solar inverter, the positive or negative terminals of PV strings may be short-circuited to ground if the power cable is not properly installed or routed. In this case, an AC or DC short circuit may occur and damage the solar inverter. The caused device damage is not covered under any warranty.

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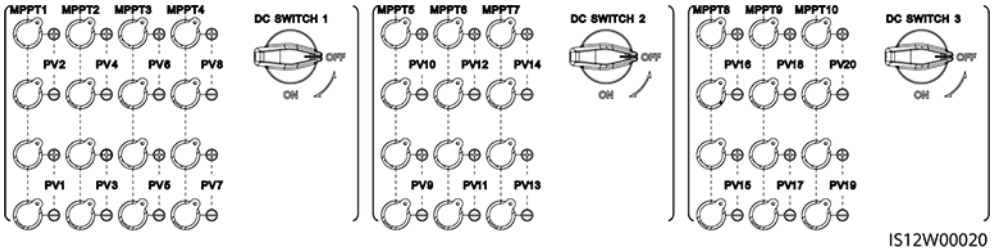
Terminal Description

The solar inverter has 20 DC input terminals. DC SWITCH 1 controls PV1–PV8 (MPPT1–MPPT4), DC SWITCH 2 controls PV9–PV14 (MPPT5–MPPT7), and DC SWITCH 3 controls PV15–PV20 (MPPT8–MPPT10).

Figure 5-20 DC terminals



When the DC input is not fully configured, the DC input terminals must meet the following requirements:

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

For example, if the number of input routes is 1–19, the DC input terminals are selected as follows.

Number of PV Strings	Terminal Selection	Number of PV Strings	Terminal Selection
1	Any even-numbered route	2	PV2 and PV10
3	PV2, PV10, and PV18	4	PV2, PV6, PV10, and PV18
5	PV2, PV6, PV10, PV14, and PV18	6	PV2, PV4, PV6, PV10, PV14, and PV18
7	PV2, PV4, PV6, PV10, PV14, PV18, and PV20	8	PV2, PV4, PV6, PV8, PV10, PV14, PV18, and PV20
9	PV2, PV4, PV6, PV8, PV10, PV14, PV16, PV18, and PV20	10	PV2, PV4, PV6, PV8, PV10, PV12, PV14, PV16, PV18, and PV20
11	PV1, PV2, PV4, PV6, PV8, PV10, PV12, PV14, PV16, PV18, and PV20	12	PV1, PV2, PV4, PV6, PV8, PV10, PV12, PV14, PV16, and PV18–PV20
13	PV1–PV4, PV6, PV8, PV10, PV12, PV14, PV16, and PV18–PV20	14	PV1–PV4, PV6, PV8, PV10, PV12, PV14, and PV16–PV20
15	PV1–PV6, PV8, PV10, PV12, PV14, and PV16–PV20	16	PV1–PV6, PV8, PV10, PV12, and PV14–PV20

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Number of PV Strings	Terminal Selection	Number of PV Strings	Terminal Selection
17	PV1–PV8, PV10, PV12, and PV14–PV20	18	PV1–PV8, PV10, and PV12–PV20
19	PV1–PV10 and PV12–PV20	N/A	N/A

Wiring Description of Y-branch Connectors

NOTICE

- Y-branch connectors can be purchased from Huawei or the manufacturers based on the following recommended models: If the rated current of the fuse of the Y-branch connector is 15 A, the recommended model is 904095944 (Luxshare) or A040959443039 (Comlink); if the rated current of the fuse of the Y-branch connector is 20 A, the recommended model is 904095945 (Luxshare) or A040959453039 (Comlink).
- Do not use Y-branch connectors that are not recommended.
- When connecting cables to recommended Y-branch connectors, ensure that the connectors to be paired match each other and are from the same manufacturer. Otherwise, the contact resistance of the connectors may exceed the allowed value. In this case, the connectors may be heated and oxidized, which may cause faults.
- When the Y-branch connector is used with the MC4 EVO2 contacts, you are advised to use the 32.6020-22100-HZ (Staubli) crimping tool. You can also use the PV-CZM-22100 (Staubli) crimping tool. When choosing PV-CZM-22100 (Staubli), do not use the locator. Otherwise, the metal contacts would be damaged.
- Ensure that the locking nuts of all connectors are tightened.
- Do not bind more than three fuse enclosures together. Otherwise, the fuses and their enclosures may be damaged due to overheating. It is recommended that a clearance of 10 mm or more be reserved between fuse enclosures. You are advised not to bind the fuse enclosures with other heat emitting conductors.
- Do not place the Y-branch connector harness on the ground. A safe distance must be reserved between the Y-branch connector harness and the ground to avoid impact caused by water on the ground to the harness.
- It is recommended that Y-branch connectors be connected from the PV string side or connected to the solar inverter with a safe distance of at least 4 m and bound to the PV support.
- The DC input terminals of the solar inverter are prone to damage under stress. When Y-branch connectors are connected to the solar inverter, bind and secure the connectors to prevent the DC input terminals from bearing stress. For details, see **A Securing Y-Branch Connectors**.

Cable connection rules:

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1. A maximum of one set of Y-branch connectors can be used for each MPPT.
2. The PV+ on the solar inverter side must be connected to the PV+ on the PV string side, and the PV– on the solar inverter side must be connected to the PV– on the PV string side.
3. Preferentially and evenly connect the Y-branch connectors to the MPPTs controlled by DC SWITCH 2 or DC SWITCH 3.

Number of Y-branch Connector Sets	Recommended MPPT to Be Connected	Number of Y-branch Connector Sets	Recommended MPPT to Be Connected
1	MPPT9	2	MPPT7 and MPPT9
3	MPPT5, MPPT7 and MPPT9	4	MPPT5, MPPT7, MPPT9, and MPPT10
5	MPPT5, MPPT7, MPPT8, MPPT9, and MPPT10	6	MPPT5, MPPT6, MPPT7, MPPT8, MPPT9, and MPPT10
7	MPPT1, MPPT5, MPPT6, MPPT7, MPPT8, MPPT9, and MPPT10	8	MPPT1, MPPT3, MPPT5, MPPT6, MPPT7, MPPT8, MPPT9, and MPPT10
9	MPPT1, MPPT2, MPPT3, MPPT5, MPPT6, MPPT7, MPPT8, MPPT9, and MPPT10	10	MPPT1, MPPT2, MPPT3, MPPT4, MPPT5, MPPT6, MPPT7, MPPT8, MPPT9, and MPPT10

Figure 5-21 Connecting Y-branch connectors to the PV strings (recommended)

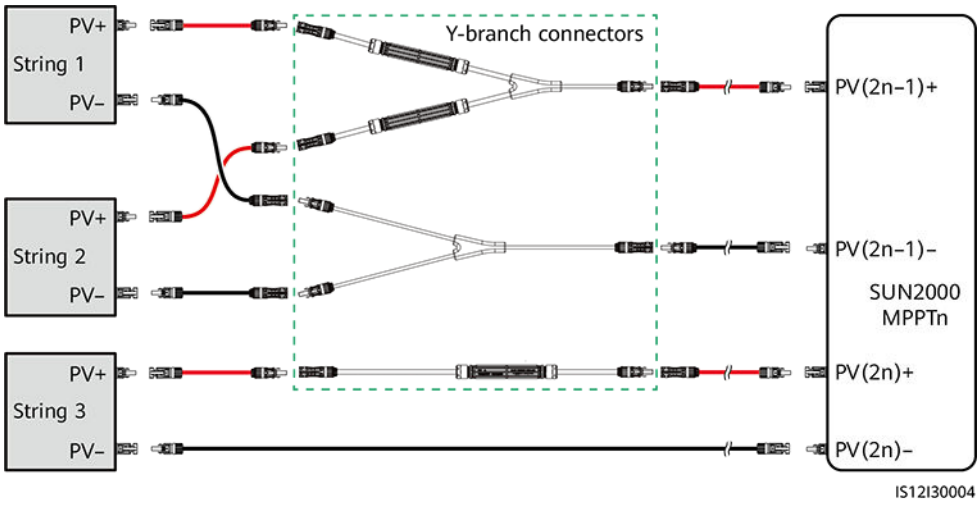

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Figure 5-22 Connecting Y-branch connectors to the solar inverter with a safe distance (recommended)

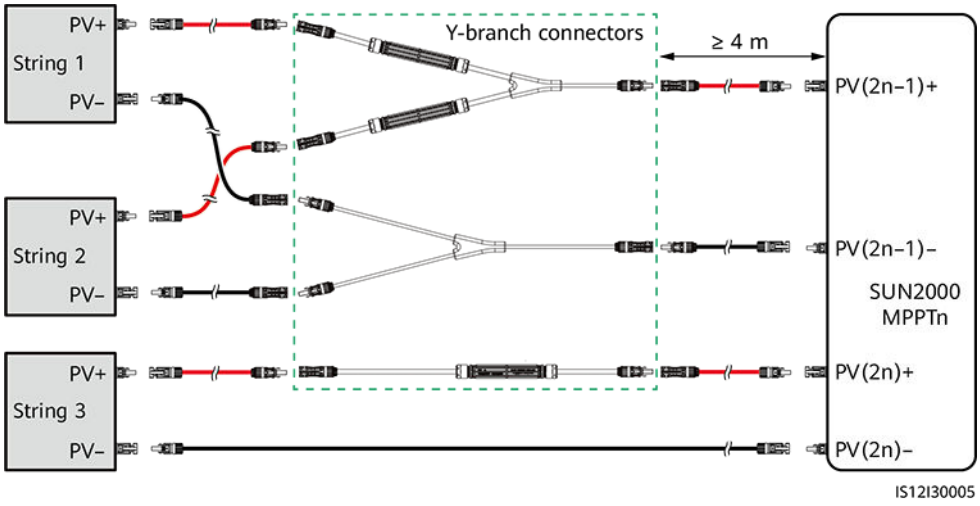
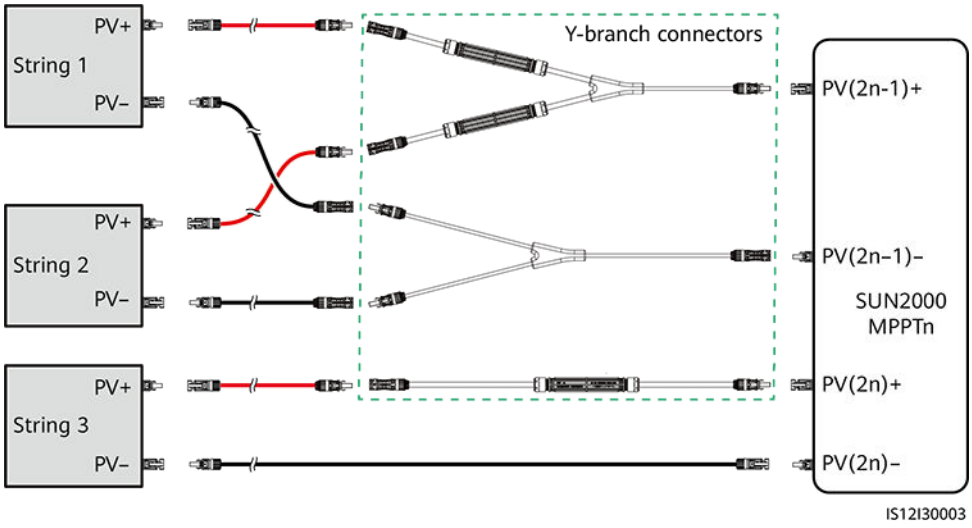


Figure 5-23 Connecting Y-branch connectors to the solar inverter



Specification Requirements

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

CAUTION

Use the Staubli MC4 connectors delivered with the solar inverter. If the PV connectors are lost or damaged, purchase the connectors of the same model. The device damage caused by incompatible PV connectors is beyond the warranty scope.

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Procedure

Step 1 Prepare the DC input power cables.

Step 2 Crimp positive and negative metal contacts.

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

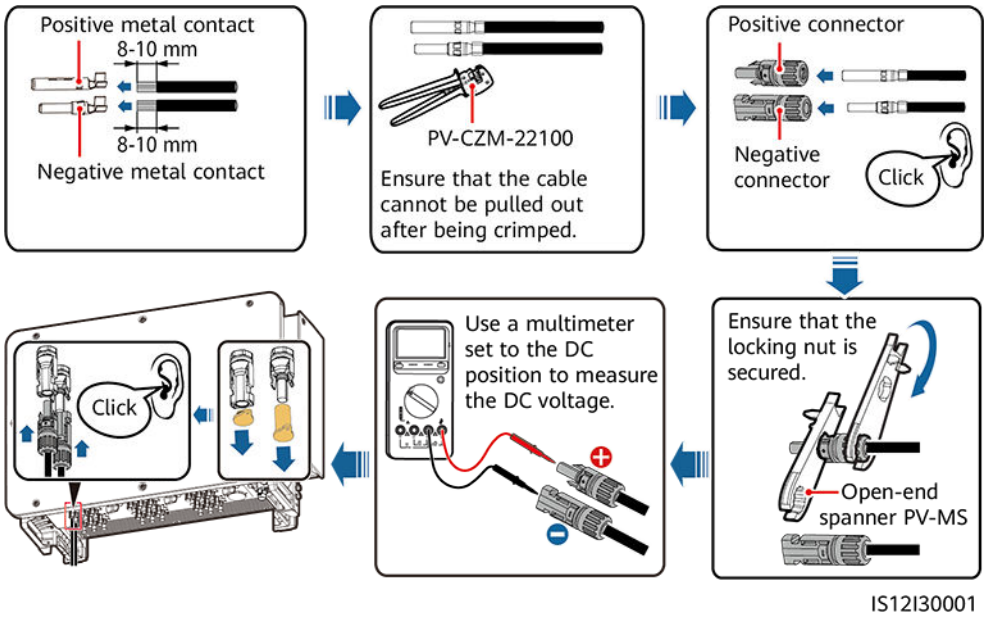
Step 4 Tighten the lock nuts on the positive and negative connectors.

Step 5 Use a multimeter to measure the voltage between the positive and negative terminals of the PV string (measurement range no less than 1100 V).

- If the voltage is a negative value, the DC input polarity is incorrect and needs correction.
- If the voltage is greater than 1100 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 solar inverter.

Figure 5-24 Connecting DC input power cables



NOTICE

If the DC input power cable is reversely connected and DC switches are set to 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 not covered under any warranty. Wait until the solar irradiance declines at night and the PV string current reduces to below 0.5 A. Then, turn off the three DC switches, remove the positive and negative connectors, and rectify the connection of the DC input power cable.

----End

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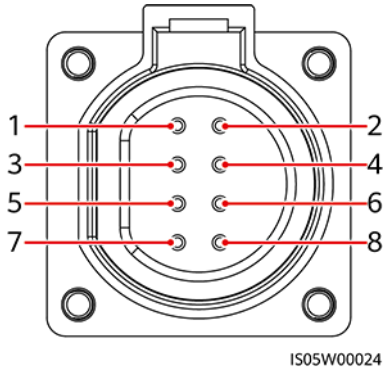
5.8 Connecting the RS485 Communications Cable

Pin Definitions of the Communications Port

Figure 5-25 Communications port



Port	Pin	Definition	Pin	Definition	Description
RS485-1	1	RS485A IN, RS485 differential signal+	2	RS485A OUT, RS485 differential signal+	Used for cascading solar inverters or connecting to devices such as the SmartLogger.
	3	RS485B IN, RS485 differential signal–	4	RS485B OUT, RS485 differential signal–	
Protection ground	5	PE, shielding ground	6	PE, shielding ground	N/A

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Port	Pin	Definition	Pin	Definition	Description
RS485-2	7	RS485A, RS485 differential signal+	8	RS485B, RS485 differential signal–	Used for connecting to an RS485 slave device. • In the scenario of SDongle networking or a single solar inverter, the RS485-2 port is connected to a power meter to collect information about power at the grid-tied point for grid-tied point power control. • In the scenario of intelligent support tracking control, the RS485-2 port is connected to the support tracking system to collect support information.

Connecting the RS485 Communications Cable

When routing the communications cable, separate it from power cables to prevent communication from being affected. Connect the shield layer to the PE point. This section describes how to connect three communications cables.

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Figure 5-26 Connecting RS485 communications cables (4–8 mm four-hole rubber plug)

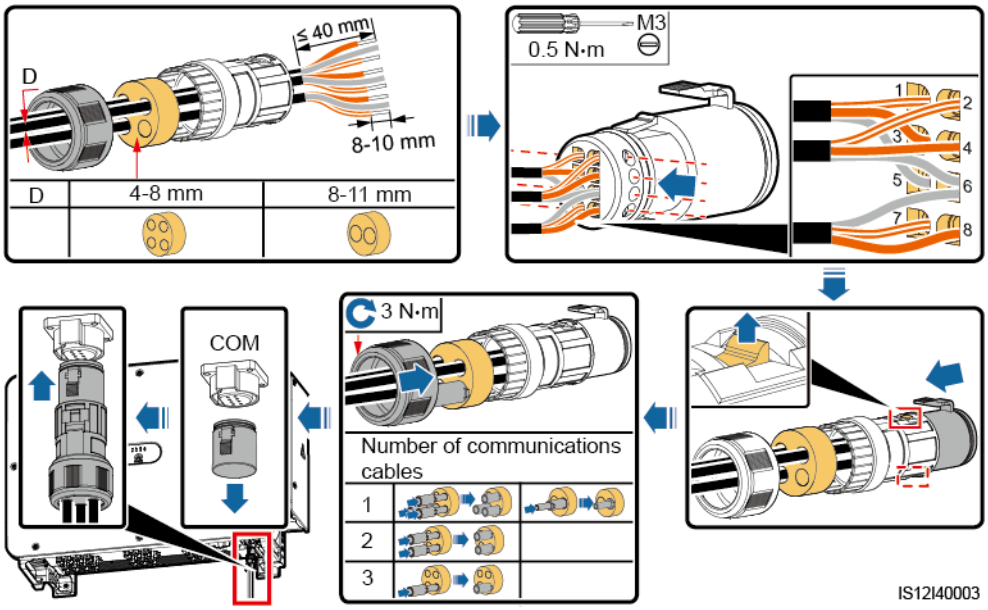
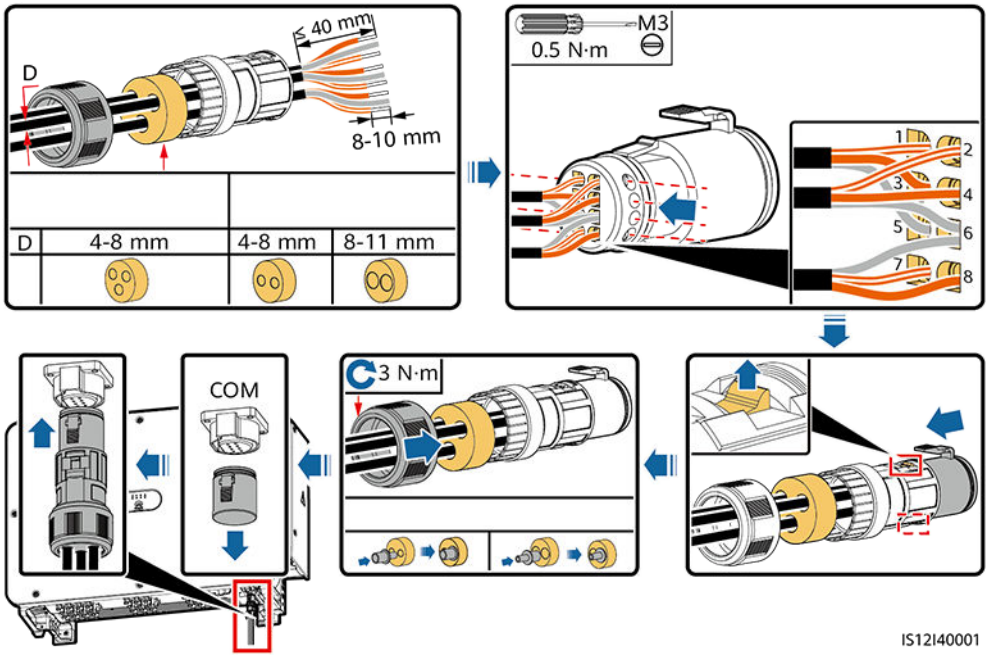


Figure 5-27 Connecting RS485 communications cables (4–8 mm two-hole or three-hole rubber plug)



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6 Commissioning

6.1 Check Before Power-on

No.	Acceptance Criteria
1	The solar inverter is installed correctly and securely.
2	The DC switches and the downstream AC switch are OFF.
3	All cables are connected correctly and securely.
4	Unused terminals and ports are locked by waterproof caps.
5	The installation space is proper, and the installation environment is clean and tidy.
6	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.
- If the solar inverter has been stored for more than two years, it must be checked and tested by professionals before being put into use.

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Procedure

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

NOTICE

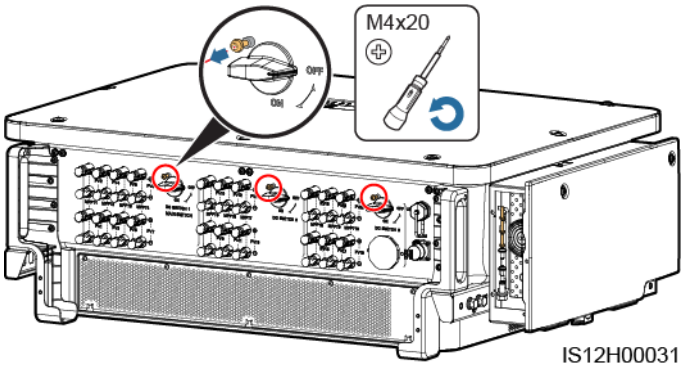
If you perform **Step 3** before **Step 1**, the SUN2000 reports a fault about abnormal shutdown. You can start the SUN2000 only after the fault is automatically rectified.

Step 2 (Optional) Remove the screws that secure DC SWITCH 1, DC SWITCH 2, and DC SWITCH 3. Store the screws properly for future power-off maintenance.

NOTE

For the model used in Australia, perform this step based on the local standards.

Figure 6-1 Remove the screws



Step 3 Set DC SWITCH 1 (MAIN SWITCH) at the bottom of the solar inverter chassis to ON.

Step 4 1Check the status of the PV connection indicator. If it is steady green, set DC SWITCH 2 and DC SWITCH 3 to ON.

Step 5 Perform quick settings on the SUN2000 app. For details, see **7.1 Operations with the App**.

----End

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7 Man-Machine Interactions

7.1 Operations with the App

7.1.1 App Introduction

Functions

- The FusionSolar app is recommended when the SUN2000 is connected to the FusionSolar hosting cloud. The SUN2000 app is recommended when the SUN2000 is connected to other management systems.
- The SUN2000 or FusionSolar app (app for short) is a mobile phone app that communicates with the SUN2000 over a WLAN/Bluetooth module or a USB data cable to allow for querying alarms, setting parameters, and performing routine maintenance as an easy-to-use maintenance platform.

Connection Mode

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

NOTICE

- Over a WLAN module: The USB-Adapter2000-C WLAN module is supported.
- Over a Bluetooth module: The USB-Adapter2000-B Bluetooth module is supported.
- Over a USB data cable: The USB 2.0 port is supported. Use the USB data cable delivered with the mobile phone.
- Mobile phone operating system: Android 4.0 or later.
- Recommended phone brands: Huawei and Samsung.

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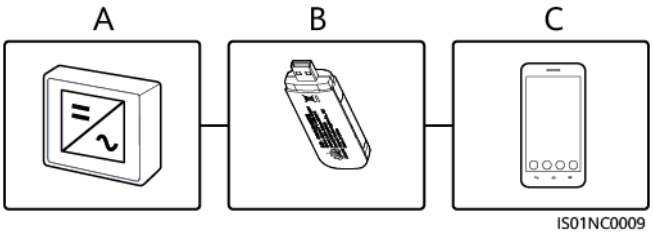
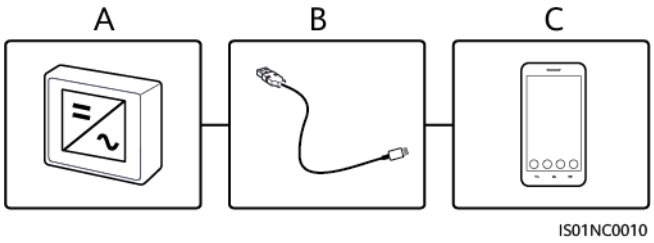
Figure 7-1 Connection over a WLAN module or a Bluetooth module



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

Figure 7-2 Connection over a USB data cable



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

Disclaimer

NOTICE

- The configurable parameters of the SUN2000 vary with the device model and grid code.
- If you change the grid code, some parameters may be restored to factory defaults. After the grid code is changed, check whether the previously set parameters are affected.
- Delivering a reset, factory reset, shutdown, or upgrade command to the solar inverters may cause power grid connection failure, which affects the energy yield.
- Only professionals are allowed to set the grid parameters, protection parameters, feature parameters, and power adjustment parameters of the solar inverters. If the grid parameters, protection parameters, and feature parameters are incorrectly set, the solar inverters may not connect to the power grid. If the power adjustment parameters are incorrectly set, the solar inverters may not connect to the power grid as required. In these cases, the energy yield will be affected.
- The parameter names, value ranges, and default values are subject to change.

7.1.2 Downloading and Installing the App

- FusionSolar app: Log in to Google Play, search for **FusionSolar**, and download the app installation package. You can also scan the QR code to download the installation package.

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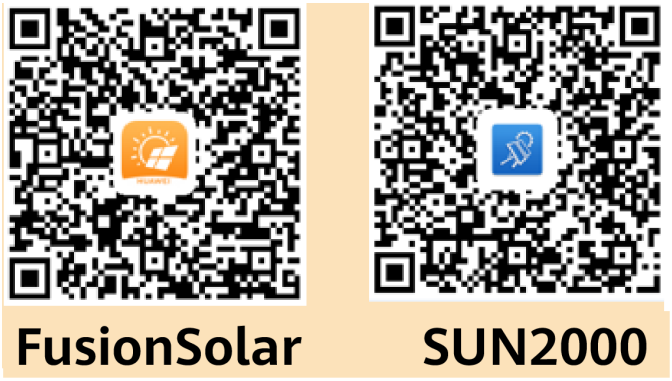
- SUN2000 app: Log in to Huawei AppGallery (https://appstore.huawei.com), search for **SUN2000**, and download the app installation package. You can also scan the QR code (https://solar.huawei.com/~/media/Solar/APP/SUN2000.apk) to download the installation package.

QR code:



7.1.3 Logging In to the App

Prerequisites

- The DC or AC side of the SUN2000 has been energized.
- Connection over a WLAN module or a Bluetooth module:
  a. The WLAN module or Bluetooth module is connected to the **USB** port at the bottom of the SUN2000.
  b. The WLAN or 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 port on the mobile phone.
  b. If the USB data cable is successfully connected, the message **Connected to USB Accessory** will pop up on the phone. Otherwise, the cable is not connected.

Procedure

Step 1 Run the app and select a connection mode.

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NOTE

- The screenshots in this document correspond to the SUN2000 app 3.2.00.003 (Android) and FusionSolar app 2.5.7 (Android).
- When the WLAN connection is used, scan the QR code of the WLAN module to access the login screen.
- When the WLAN connection is used, the initial name of the WLAN hotspot is **Adapter-WLAN module SN**, and the initial password is **Changeme**. Use the initial password upon first power-on and change it immediately after login. To ensure account security, change the password periodically and keep the new password in mind. Not changing the initial password may cause password disclosure. A password left unchanged for a long period of time may be stolen or cracked. If a password is lost, devices cannot be accessed. In these cases, the user is liable for any loss caused to the PV plant.
- When the Bluetooth connection is used, the connected Bluetooth device is named after **last 8 digits of the SN barcode+HWAPP**.
- After you select **Use by default for this USB accessory**, a message that asks you to confirm the USB access will not appear if you log in to the app again without removing the USB data cable.

1. (Scenario in which the SUN2000 is connected to the FusionSolar hosting cloud) Run the FusionSolar app and access the **Device Commissioning** screen.

Figure 7-3 Selecting a connection mode (with network access)

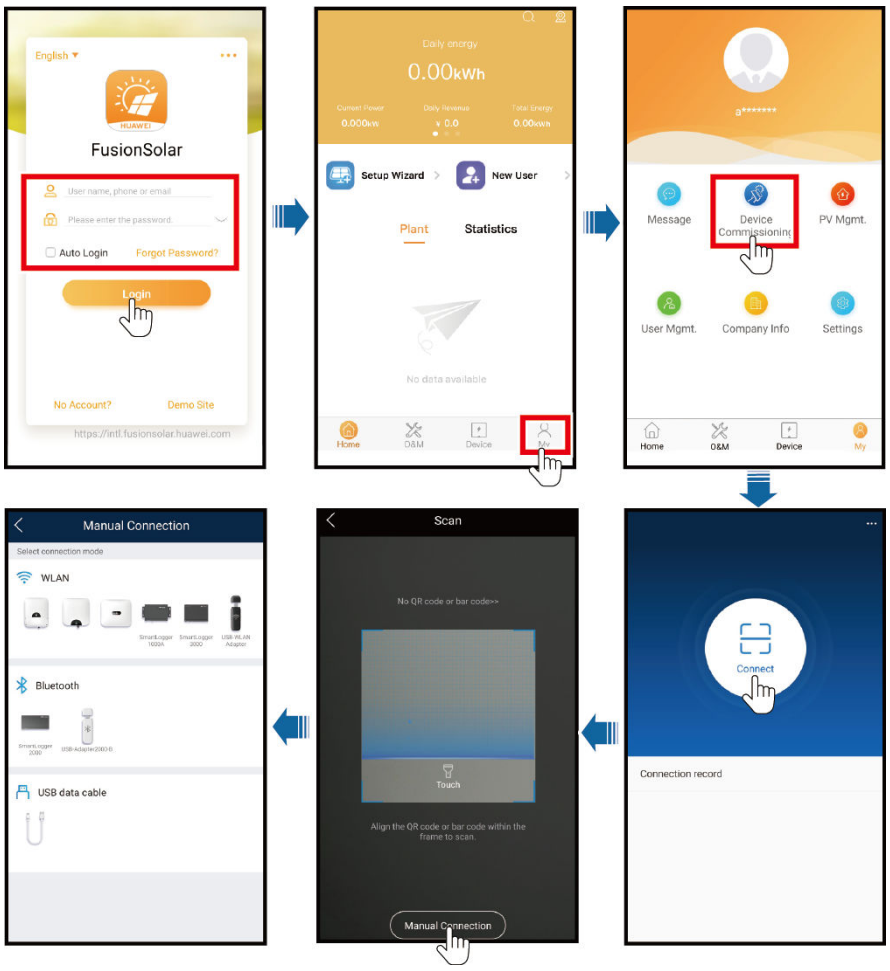

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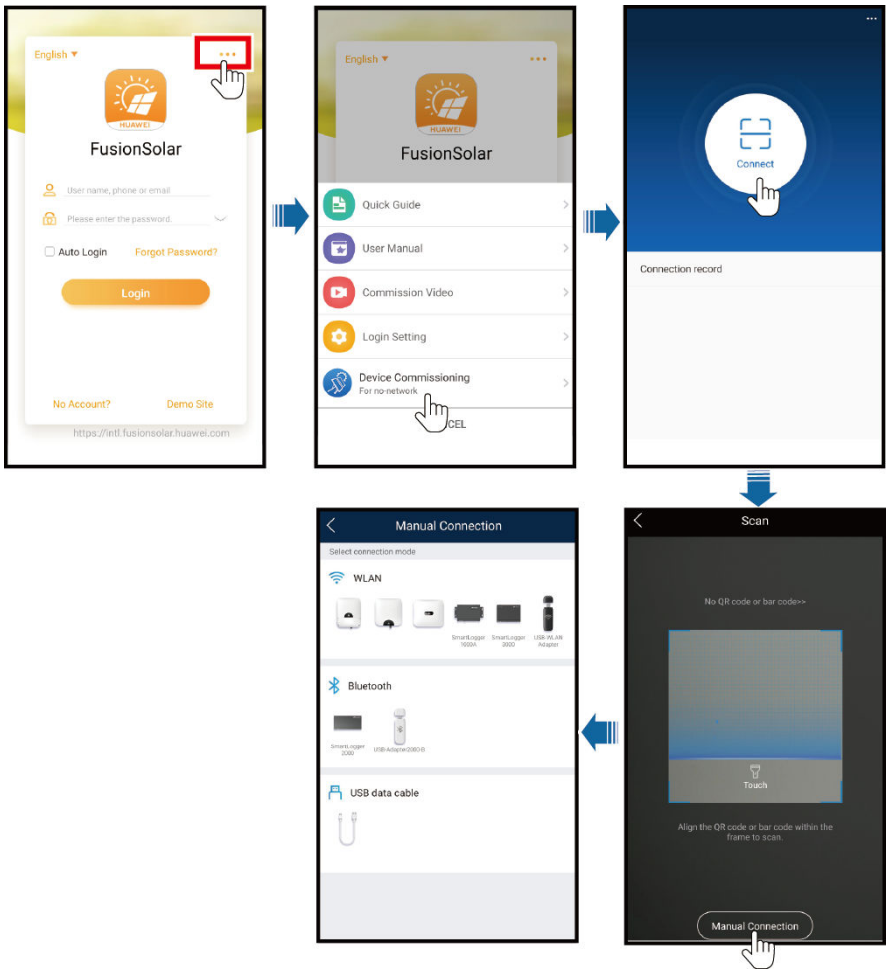
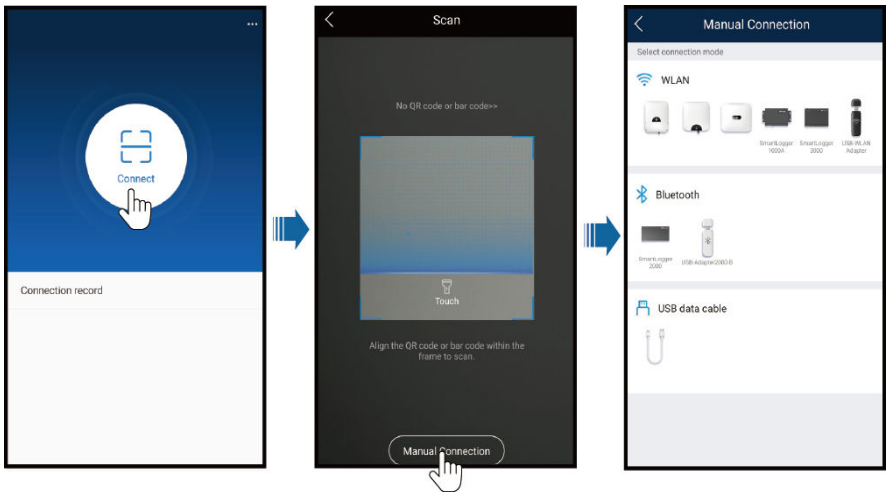
Figure 7-4 Selecting a connection mode (without network access)



2. (Scenario in which the SUN2000 is connected to other management systems) Run the SUN2000 app and access the operation screen.

Figure 7-5 Selecting a connection method



Step 2 Select a login user and enter the login password to access the quick settings screen or the main menu screen.

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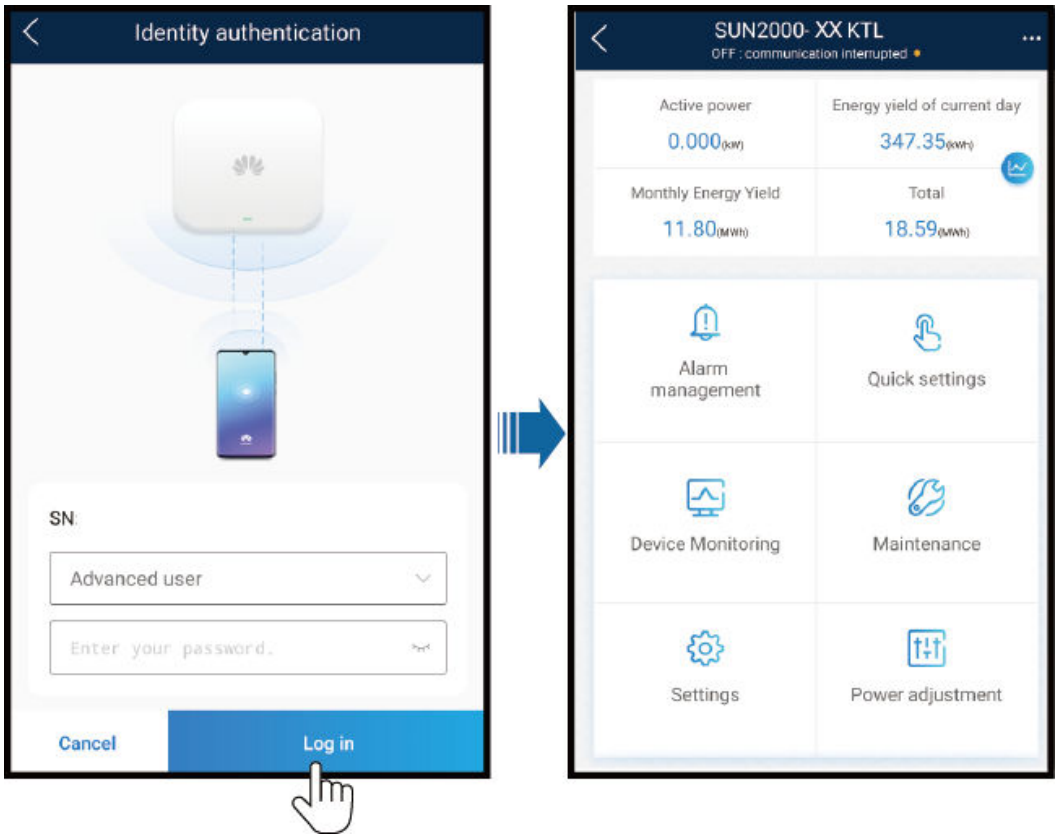
NOTICE

- 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 initial passwords for **Common User**, **Advanced User**, and **Special User** are all **00000a**.
- Use the initial password upon first power-on and change it immediately after login. To ensure account security, change the password periodically and keep the new password in mind. Not changing the initial password may cause password disclosure. A password left unchanged for a long period of time may be stolen or cracked. If a password is lost, devices cannot be accessed. In these cases, the user is liable for any loss caused to the PV plant.
- During the login, if five consecutive invalid password entries are made (the interval between two consecutive entries is less than 2 minutes), the account will be locked for 10 minutes. The password should consist of six characters.
- 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 SUN2000 basic parameters on the quick settings screen, switch to **Advanced User**. If you log in as **Common User** or **Special User**, enter the password of the advanced user to access the **Quick Settings** screen.

Figure 7-6 Login



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NOTE

Set the correct grid code based on the application area and scenario of the SUN2000. 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.

----End

7.1.4 Operations Related to the Advanced User

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

7.1.4.1 Setting Grid Parameters

Procedure

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

Figure 7-7 Grid parameters

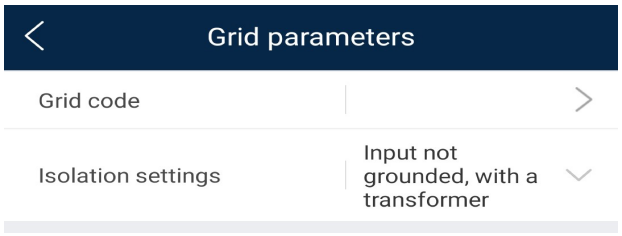

Table 7-1 Grid parameters

Parameter	Description
Grid Code	Set this parameter based on the grid code of the country or region where the inverter is used and the inverter application scenario.
Isolation settings	Set the working mode of the inverter based on the grounding status at DC side and the connection to the power grid.

----End

7.1.4.2 Setting Protection Parameters

Procedure

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

Figure 7-8 Protection parameters

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Table 7-2 Protection parameters

Parameter	Description
Insulation resistance protection threshold (MΩ)	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.

----End

7.1.4.3 Setting Feature Parameters

Procedure

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

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Figure 7-9 Feature parameters

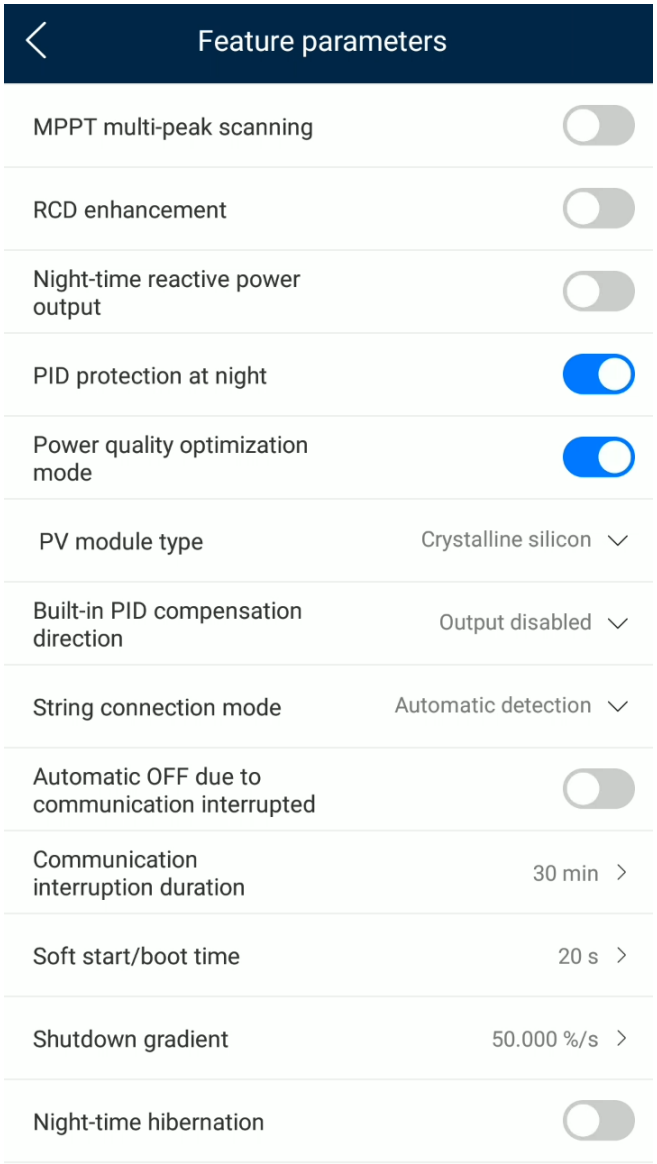

Table 7-3 Feature parameters

Parameter	Description
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**.
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**.

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Parameter	Description
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.
Night-time reactive power output	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**.
PID protection at night	• When **PID protection at night** is set to **Enable**, the solar inverter will shut down automatically if it detects abnormality of the voltage compensation of the anti-PID module during the reactive power compensation at night. • When **PID protection at night** is set to **Disable**, the solar inverter will operate in grid-tied mode if it detects abnormality of the voltage compensation of the anti-PID module during the reactive power compensation at night.
Power quality optimization mode	If **Power quality optimization mode** is set to **Enable**, the inverter output current harmonics will be optimized.
PV module type	This parameter is used to set different types of PV modules and the shutdown time of the concentration PV module. If the concentration PV modules are shaded, the power drops drastically to 0 and the solar inverter shuts down. The energy yield would be affected since it takes too long for the power to resume and solar inverter to restart. The parameter does not need to be set for crystalline silicon and filmy PV modules. • When **PV module type** is set to **Crystalline silicon** or **Film**, the solar inverter automatically detects the PV module power when the PV module is shaded. If the power is insufficient, the solar inverter shuts down automatically. • When concentration PV modules are used: – When **PV module type** is set to **CPV 1**, the solar inverter can quickly restart in 60 minutes if the input power of PV modules drops drastically due to shading. – When **PV module type** is set to **CPV 2**, the solar inverter can quickly restart in 10 minutes if the input power of PV modules drops drastically due to shading.

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Parameter	Description
Built-in PID compensation direction	When the solar inverter generates reactive power at night, an external PID compensation device (such as the anti-PID module) is required to perform PID compensation for the system. In addition, this parameter must be correctly set for the solar inverter. The solar inverter can generate reactive power at night only when it detects that the value of this parameter is the same as the compensation direction of the external PID compensation device. ● If no PID compensation device exists in the system, set this parameter to **Output disabled**. ● When the system uses the PID compensation device to increase the voltage of PV– with respect to ground to a value greater than 0 V, set this parameter to **PV- positive offset**. ● When the system uses the PID compensation device to decrease the voltage of PV+ with respect to ground to a value less than 0 V, set this parameter to **PV+ positive offset**.
String connection mode	Specifies the connection mode of PV strings. ● When PV strings connect to the solar inverter separately (fully separate connection), you do not need to set this parameter. The solar inverter can automatically detect the connection mode of the PV strings. ● When PV strings connect to one another in parallel outside the solar inverter and then connect to it independently (fully parallel connection), set this parameter to **All PV strings connected**.
Automatic OFF due to communication interrupted	The standards of certain countries and regions require that the inverter must shut down after the communication is interrupted for a certain time. If **Automatic OFF due to communication interrupted** is set to **Enable** and the inverter communication is interrupted for a specified time (set by **Communication interruption duration**), the inverter will automatically shut down.
Automatic ON due to communication resumed	If this parameter is set to **Enable**, the inverter automatically starts after communication recovers. If this parameter is set to **Disable**, the inverter needs to be started manually after communication recovers. This parameter is displayed when **Automatic OFF due to communication interrupted** is set to **Enable**.
Communication interruption duration (min)	Specifies the duration for determining communication interruption. Used for automatic shutdown for protection in case of communication interruption.

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Parameter	Description
Soft start/boot time (s)	Specifies the duration for the power to gradually increase when the SUN2000 starts.
Shutdown gradient (%/s)	Specifies the power change speed when the inverter shuts down.
Night-time hibernation	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.
MBUS communication	For solar inverters that support RS485 communication and MBUS communication, you are advised to set this parameter to **Disable** to reduce power consumption.
Delay upgrade	**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 solar inverter starts to upgrade, when **Upgrade delay** is set to **Enable**, the upgrade package is loaded first. After the PV power supply resumes and the activation conditions are met, the solar inverter automatically activates the upgrade.
RS485-2 communication	If this parameter is set to **Enable**, the RS485-2 port can be used. If the port is not used, you are advised to set this parameter to **Disable** to reduce power consumption.
Duration for determining short-time grid disconnection (ms)	The standards of certain countries and regions require that the inverter should not disconnect from the power grid if the power grid experiences a short-time failure. After the fault is rectified, the inverter output power needs to be quickly restored.
AFCI	The North American standard requires that the inverter should have DC arc detection function.

----End

7.1.4.4 Built-in PID Recovery

NOTICE

Ensure that the inverter ground cable is securely connected. Otherwise, the built-in PID repair function will be affected and electric shocks may occur.

Working Principle

When the SUN2000 is disconnected from the network, the built-in PID can repair the PV– positive offset. (PV– positive offset refers to raising the voltage between

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PV– and the ground to above 0 V through voltage compensation.) When designing a PV plant, confirm with the PV module manufacturer that the anti-PID voltage compensation direction of the PV module is the PV– positive offset. Otherwise, PV modules may be damaged.

Procedure

Step 1 Choose**Settings** > **Feature Parameters**. The parameter setting screen is displayed.

Figure 7-10 Built-in PID Recovery

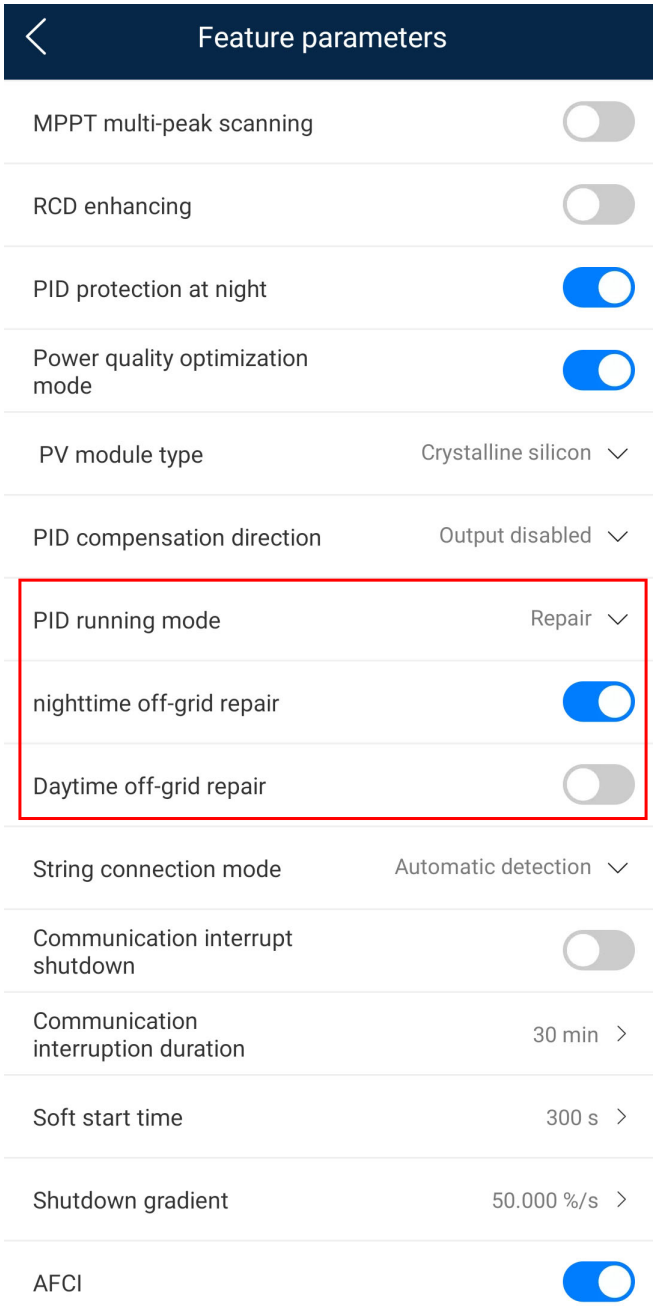

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Table 7-4 Parameters settings

Parameter	Description
PID running mode	Specifies the operation mode of the inverter built-in PID. If **PID running mode** is not set to **Disable**, the parameter can be set.
nighttime off-grid repair	Specifies whether to enable the PID nighttime off-grid repair.
Daytime off-grid repair	Specifies whether to enable the PID daytime off-grid repair.

----End

7.1.4.5 AFCI

Function

If PV modules or cables are not properly connected or damaged, electric arcs may occur, which may cause fire. Huawei SUN2000s provide unique arc detection in compliance with UL 1699B-2018 to ensure the safety of users' lives and property.

This function is enabled by default. The SUN2000 automatically detects arc faults. To disable this function, log in to the FusionSolar app, enter the **Device Commissioning** screen, choose **Settings** > **Feature parameters**, and disable **AFCI**.

For details about how to enter the **Device Commissioning** screen, see Device Commissioning.

Clearing Alarms

The AFCI function involves the **DC arc fault** alarm.

The SUN2000 has the AFCI alarm automatic clearance mechanism. If an alarm is triggered for less than five times within 24 hours, the SUN2000 automatically clears the alarm. If the alarm is triggered for five times or more within 24 hours, the SUN2000 locks for protection. You need to manually clear the alarm on the SUN2000 so that it can work properly.

You can manually clear the alarm as follows:

- **Method 1**: FusionSolar App

  Log in to the FusionSolar app and choose **My** > **Device Commissioning**. On the **Device Commissioning** screen, connect and log in to the SUN2000 that generates the AFCI alarm, tap **Alarm management**, and tap **Delete** on the right of the **DC arc fault** alarm to clear the alarm.

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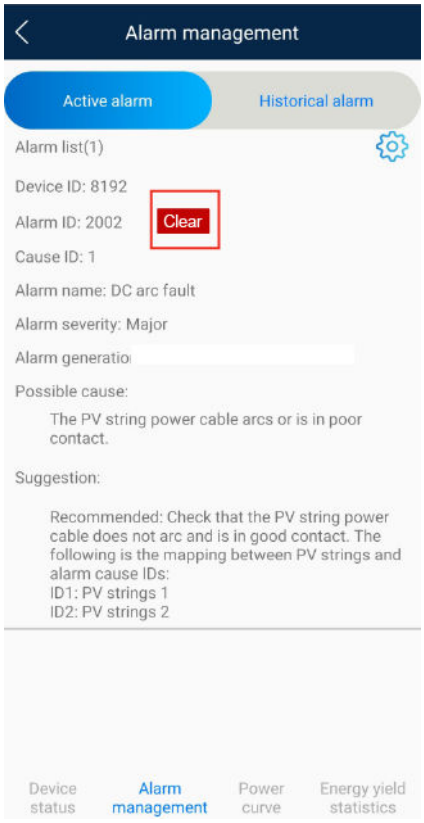
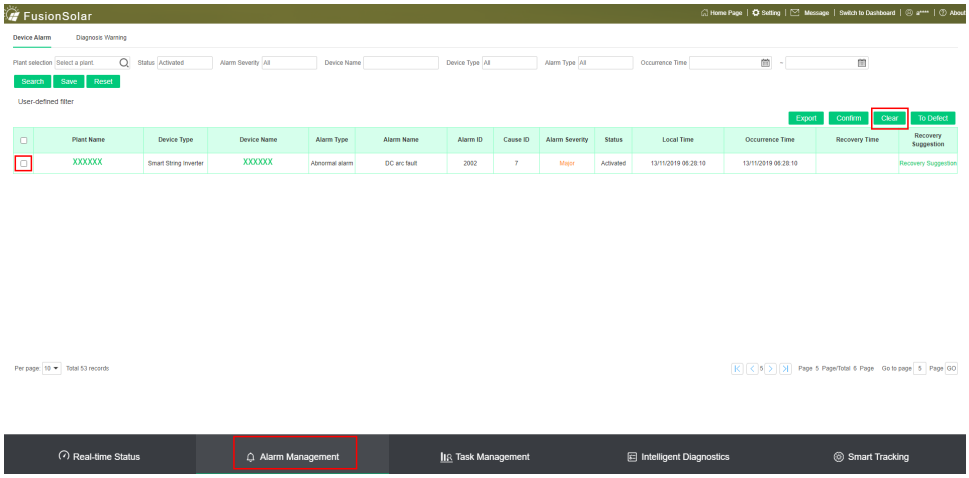
Figure 7-11 Alarm management



- **Method 2**: FusionSolar Smart PV Management System

  Log in to the FusionSolar Smart PV Management System using a non-owner account, choose **Intelligent O&M** > **Alarm Management**, select the **DC arc fault** alarm, and click **Clear** to clear the alarm.

Figure 7-12 Clearing alarms



Switch to the owner account with PV plant management rights. On the home page, click the PV plant name to go to the PV plant page, and click **OK** as prompted to clear the alarm.

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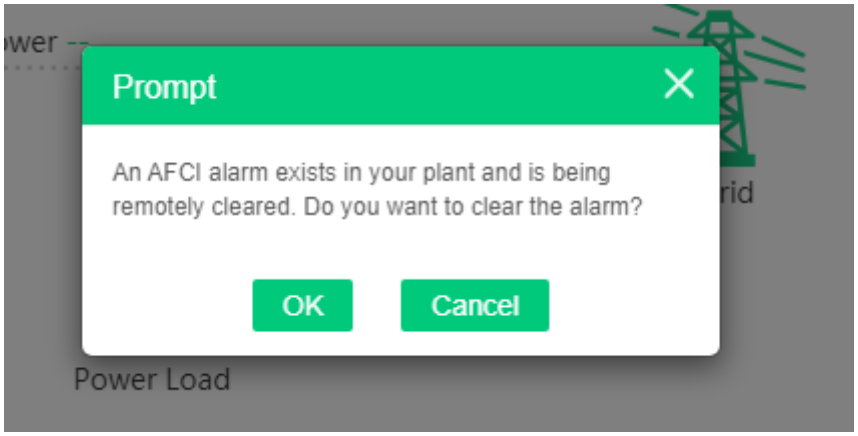
Figure 7-13 Owner confirmation



7.1.5 Operations Related to the Special User

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

7.1.5.1 Setting Grid Parameters

Procedure

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

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Figure 7-14 Grid parameters

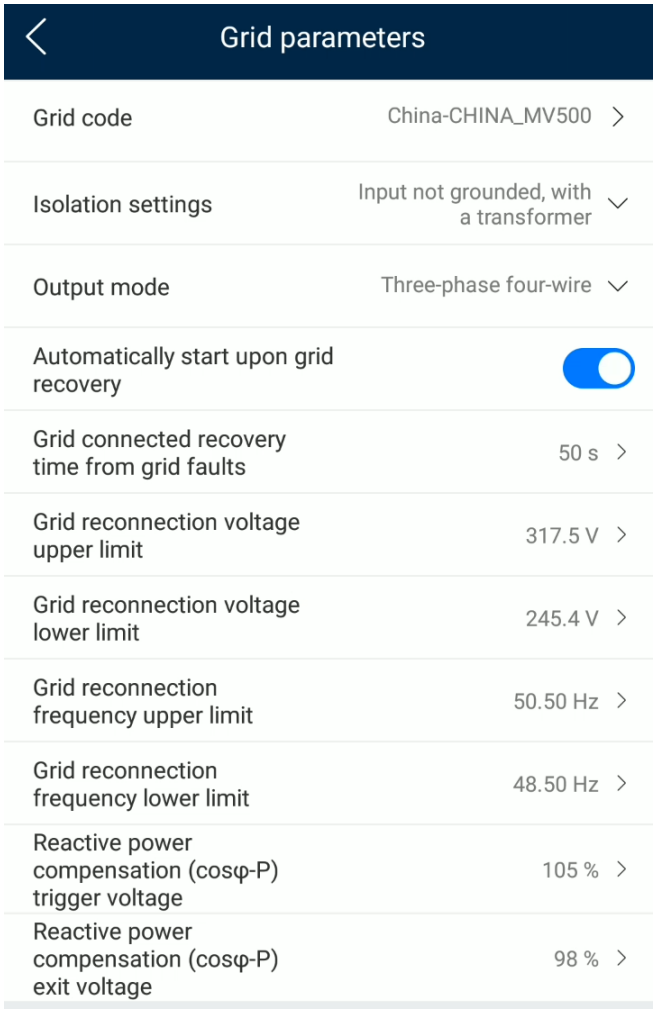

Table 7-5 Grid parameters

Parameter	Description
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 settings	Specifies the working mode of the SUN2000 according to the grounding status at the DC side and the connection status to the grid.
Output mode	Specifies whether the inverter output has a neutral wire based on the application scenario.
Automatically start upon grid recovery	Specifies whether to allow the SUN2000 to automatically start after the power grid recovers.
Grid connected recovery time from grid faults (s)	Specifies the waiting time for SUN2000 restart after the power grid recovers.

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Parameter	Description
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.
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.
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.
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.
Reactive power compensation (cosφ-P) trigger voltage (%)	Specifies the voltage threshold for triggering reactive power compensation based on the cosφ-P curve.
Reactive power compensation (cosφ-P) exit voltage (%)	Specifies the voltage threshold for exiting reactive power compensation based on the cosφ-P curve.

----End

7.1.5.2 Setting Protection Parameters

Procedure

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

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Figure 7-15 Protection parameters

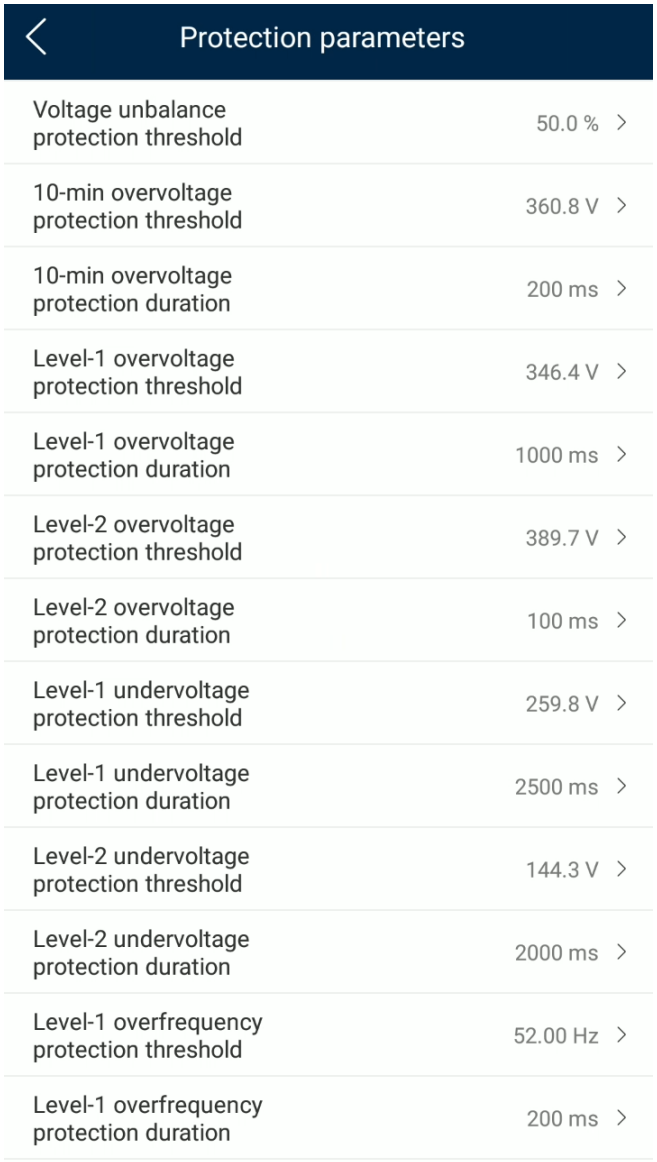

Table 7-6 Protection parameters

Parameter	Description
Voltage unbalance protection threshold (%)	Specifies the solar inverter protection threshold when the power grid voltage is unbalanced.
10-min overvoltage protection threshold (V)	Specifies the 10-minute overvoltage protection threshold.
10-min overvoltage protection duration (ms)	Specifies the 10-minute overvoltage protection duration.

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Parameter	Description
Level-N overvoltage protection threshod (V)	Specifies the level-N grid overvoltage protection threshold. **NOTE** • N can be 1, 2, 3, 4, 5, or 6. • When **HVRT** is set to **Enable**, and the value of **Level-1 overvoltage protection threshod** is larger than that of **HVRT threshold**, the solar inverter may repeatedly start and shut down if the power grid voltage is between the two values.
Level-N overvoltage protection duration (ms)	Specifies the level-N grid overvoltage protection duration. **NOTE** N can be 1, 2, 3, 4, 5, or 6.
Level-N undervoltage protection threshod (V)	Specifies the level-N grid undervoltage protection threshold. **NOTE** • N can be 1, 2, 3, 4, 5, or 6. • When **LVRT** is set to **Enable**, and the value of **Level-1 undervoltage protection thresho** is less than that of **LVRT threshold**, the solar inverter may repeatedly start and shut down if the power grid voltage is between the two values.
Level-N undervoltage protection duration (ms)	Specifies the level-N grid undervoltage protection duration. **NOTE** N can be 1, 2, 3, 4, 5, or 6.
Level-N overfrequency protection threshold (Hz)	Specifies the level-N grid overfrequency protection threshold. **NOTE** N can be 1, 2, 3, 4, 5, or 6.
Level-N overfrequency protection duration (ms)	Specifies the level-N grid overfrequency protection duration. **NOTE** N can be 1, 2, 3, 4, 5, or 6.
Level-N underfrequency protection threshold (Hz)	Specifies the level-N grid underfrequency protection threshold. **NOTE** N can be 1, 2, 3, 4, 5, or 6.
Level-N underfrequency protection duration (ms)	Specifies the level-N grid underfrequency protection duration. **NOTE** N can be 1, 2, 3, 4, or 5.

----End

7.1.5.3 Setting Feature Parameters

Procedure

Step 1 Choose **Function Menu** > **Settings** > **Feature Parameters**, and set feature parameter

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Figure 7-16 Feature parameters

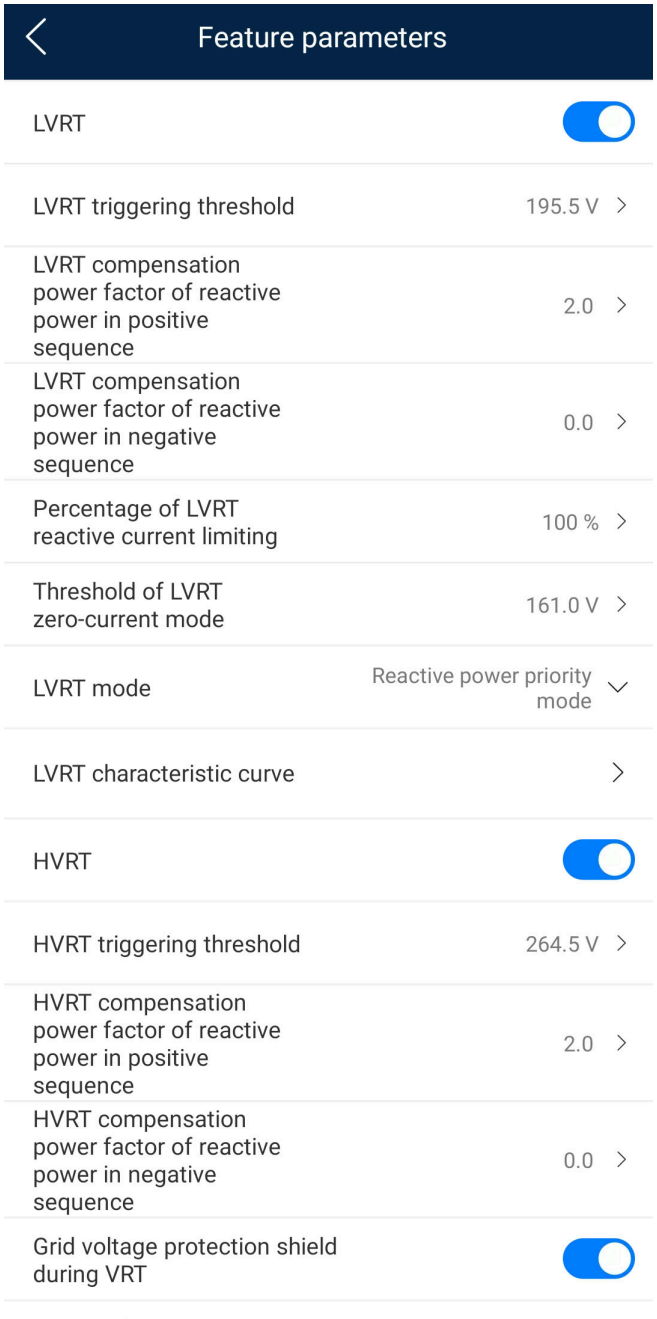

Table 7-7 Feature parameters

Parameter	Description
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.
LVRT triggering threshold (V)	Specifies the threshold for triggering LVRT.

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Parameter	Description
LVRT compensation power factor of reactive power in positive sequence	During LVRT, the solar inverter needs to generate positive-sequence reactive power to support the power grid. This parameter is used to set the positive-sequence reactive power generated by the solar inverter. For example, if you set **LVRT compensation power factor of reactive power in positive sequence** to **2**, the positive-sequence reactive current generated by the solar inverter is 20% of the rated current when the AC voltage decreases by 10% during LVRT.
LVRT compensation power factor of reactive power in negative sequence	During LVRT, the solar inverter needs to generate negative-sequence reactive power to support the power grid. This parameter is used to set the negative-sequence reactive power generated by the solar inverter. For example, if you set **LVRT compensation power factor of reactive power in negative sequence** to **2**, the negative-sequence reactive current generated by the solar inverter is 20% of the rated current when the AC voltage decreases by 10% during LVRT.
Percentage of LVRT reactive current limiting	During LVRT, the solar inverter needs to limit the reactive current. For example, if you set **Percentage of LVRT reactive current limiting** to **50**, the reactive current upper limit of the solar inverter is 50% of the rated current during LVRT.
Threshold of LVRT zero-current mode	When **Zero current due to power grid fault** is enabled, if the power grid voltage is less than the value of **Threshold of LVRT zero-current mode** during LVRT, the zero current mode is used. Otherwise, the mode configured in **LVRT mode** is used.
LVRT mode	Sets LVRT mode. The options are **Zero-current mode**, **Constant current mode**, **Reactive power priority mode**, and **Active power priority mode**.
LVRT characteristic curve	Specifies the low voltage ride-through capability of the inverter.
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).
HVRT triggering threshold (V)	Specifies the threshold for triggering HVRT. The threshold settings should meet the local grid standard.

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Parameter	Description
HVRT compensation power factor of reactive power in positive sequence	During HVRT, the solar inverter needs to generate positive-sequence reactive power to support the power grid. This parameter is used to set the positive-sequence reactive power generated by the solar inverter. For example, if you set **HVRT compensation power factor of reactive power in positive sequence** to **2**, the positive-sequence reactive current generated by the solar inverter is 20% of the rated current when the AC voltage increases by 10% during HVRT.
HVRT compensation power factor of reactive power in negative sequence	During HVRT, the solar inverter needs to generate negative-sequence reactive power to support the power grid. This parameter is used to set the negative-sequence reactive power generated by the solar inverter. For example, if you set **HVRT compensation power factor of reactive power in negative sequence** to **2**, the negative-sequence reactive current generated by the solar inverter is 20% of the rated current when the AC voltage increases by 10% during HVRT.
Grid voltage protection shield during VRT	Specifies whether to shield the undervoltage protection function during LVRT or HVRT.
VRT exit hysteresis threshold	Specifies the LVRT/HVRT recovery threshold. ● This parameter is displayed when **LVRT** is set to **Enable**. ● For example, if this parameter is set to **2**, the reactive power generated by the inverter is 20% of the rated power when the AC voltage drops by 10% during LVRT.
Zero current due to power grid fault	Certain countries and regions have requirements on the output current during high/low voltage ride-through. In this case, set this parameter to **Enable**. After this parameter is set to **Enable**, the output current is less than 10% of the rated current during high/low voltage ride-through. This parameter is displayed when **LVRT** or **HVRT** is set to **Enable**.
Active islanding protection	Specifies whether to enable the active islanding protection function.
Voltage rise suppression	The standards of certain countries and regions require that when the output voltage exceeds a certain value, the inverter must suppress voltage rise by outputting reactive power and reducing active power.
Communication interruption duration (min)	Specifies the duration for determining communication interruption. Used for automatic shutdown for protection in case of communication interruption.
Soft start time (s)	Specifies whether to enable the active islanding protection function.

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Parameter	Description
Soft start time after grid failure (s)	Specifies the time for the power to gradually increase when the solar inverter restarts after the power grid recovers.
TCP heartbeat interval (s)	Specifies the TCP link timeout period for the solar inverter to connect to the management system.
TCP frame length	Specifies the maximum length of the TCP frame sent by the northbound device to the solar inverter.
Heartbeat period at application layer (min)	Specifies the timeout period for the solar inverter to connect to the management system.
Parallel communication mode	Sets the communication mode between the master and slave servers in SDongle scenarios.

----End

7.1.5.4 Setting Power Adjustment Parameters

Procedure

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

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Figure 7-17 Power adjustment parameters

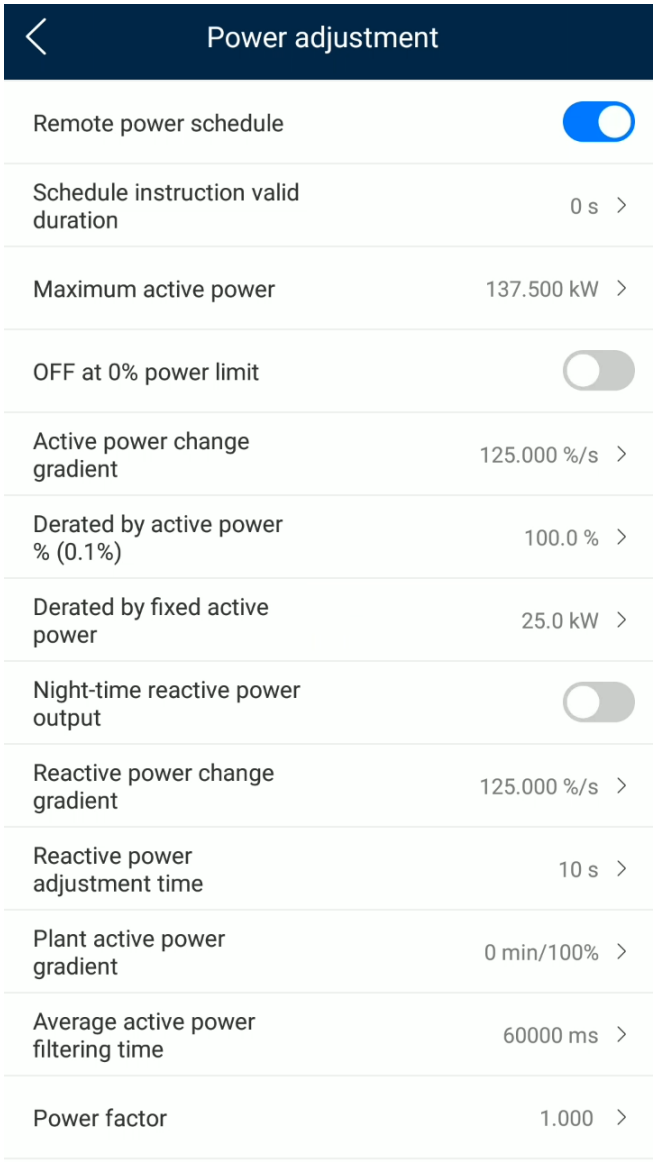

Table 7-8 Power adjustment parameters

Parameter	Description
Remote power schedule	If this parameter is set to **Enable**, the solar inverter responds to the remote power scheduling command. If it is set to **Disable**, the solar inverter does not respond to the command.
Schedule instruction valid duration (s)	Adjusts the time for maintaining the scheduling command.
Maximum active power (kW)	Specifies the output upper threshold for the maximum active power to adapt to different market requirements.

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Parameter	Description
OFF at 0% power limit	If this parameter is set to **Enable**, the solar inverter shuts down after receiving the 0% power limit command. If this parameter is set to **Disable**, the solar inverter does not shut down after receiving the 0% power limit command.
Active power change gradient (%/s)	Adjusts the change speed of the active power of the solar inverter.
Derated by active power % (%)	Adjusts the active power output of the inverter by percentage. This parameter is displayed if **Remote power schedule** is set to **Enable**. If this parameter is set to **100**, the inverter outputs based on the maximum output power.
Derated by fixed active power (kW)	Adjusts the active power output f the solar inverter by fixed value. This parameter is displayed if **Remote power schedule** is set to **Enable**.
Night-time reactive power output	In some specific application scenarios, a power grid company requires that the inverter can perform reactive power compensation at night to ensure that the power factor of the local power grid meets requirements.
Reactive power change gradient (%/s)	Specifies the change speed of the inverter reactive power.
Reactive power adjustment time (s)	Specifies the adjustment time for the reactive power to reach the target value during reactive power adjustment.
Plant active power gradient (min/100%)	Specifies the rate of active power rise due to sunlight changes.
Average active power filtering time (ms)	Specifies the period of active power rise due to sunlight changes. This parameter is used with **Plant active power gradient**.
Power factor	Specifies the power factor of the inverter.
Reactive power compensation (Q/S)	Specifies the reactive power output by the inverter.
Overfrequency derating	If this parameter is set to **Enable**, the active power of the inverter will be derated according to a certain slope when the grid frequency exceeds the frequency that triggers overfrequency derating.
PF (U) voltage detection filter time (s)	Specifies the time for filtering the grid voltage in the PF-U curve.
Apparent power baseline (kVA)	Adjust the apparent output baseline of the inverter.
Active power baseline (kW)	Adjusts the active output baseline of the inverter.

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Parameter	Description
Communication disconnection fail-safe	In the inverter export limitation scenario, if this parameter is set to **Enable**, the inverter will perform active power derating by percentage when the communication between the inverter and the SmartLogger or Smart Dongle is disconnected for more than the time specified by **Communication disconnection detection time**.
Closed-loop controller	Specifies the grid-tied power controller. Before setting the parameter, confirm the controller type. Incorrect setting will result in abnormal power output of the solar inverter. **Solar inverter** applies only to the scenario where a single solar inverter is used or where a single inverter is used with a Smart Dongle.
Limit value for minimum PF of Q-U characteristic curve	Limits the current PF value to restrict the Q-U curve output reactive power.
Power percentage for triggering Q-U scheduling	Specifies the reference apparent power, in percentage. When the actual apparent power of the inverter is greater than the value of this parameter, the Q-U characteristic curve scheduling function is enabled.
Q-U characteristic curve	The inverter adjusts Q/S (the ratio of the output reactive power to apparent power) in real time based on U/Un(%) (the ratio of the actual power grid voltage to the rated power grid voltage).
Cosϕ-P/Pn characteristic curve	The inverter adjusts the output power factor cosϕ in real time based on P/Pn(%).

----End

7.2 (Optional) Installing a Smart Dongle

Communication parameters have been set for the solar inverter.

Step 1 Install the SIM card.

NOTE

- If the Smart Dongle is configured with a SIM card, you do not need to perform this step.
- If the Smart Dongle is not configured with a SIM card, you need to prepare a standard SIM card (size: 25 mm x 15 mm; capacity: ≥ 64 KB).
- When installing the SIM card, determine its installation direction based on the silk screen and arrow on the card slot.
- Press the SIM card in place to lock it. In this case, the SIM card is correctly installed.
- When removing the SIM card, push it inward to eject it.
- When reinstalling the cover of the Smart Dongle, ensure that the buckle springs back in place.

Step 2 Secure the Smart Dongle.

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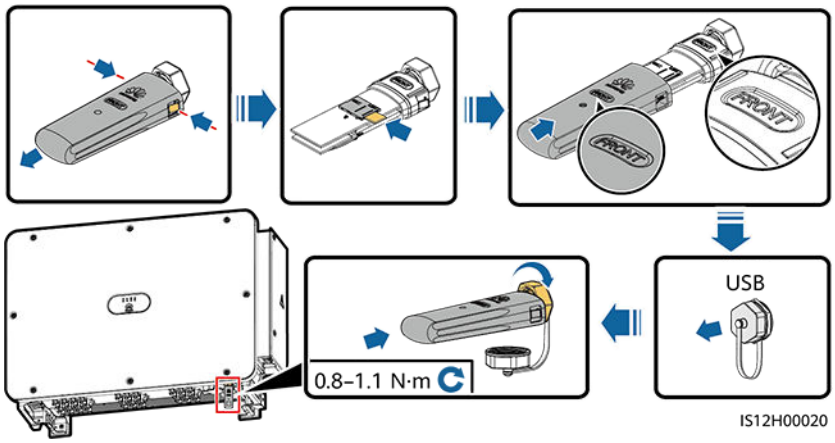
Figure 7-18 Installing the Smart Dongle



----End

7.3 Operations with a USB Flash Drive

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

NOTE

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

7.3.1 Exporting Configurations

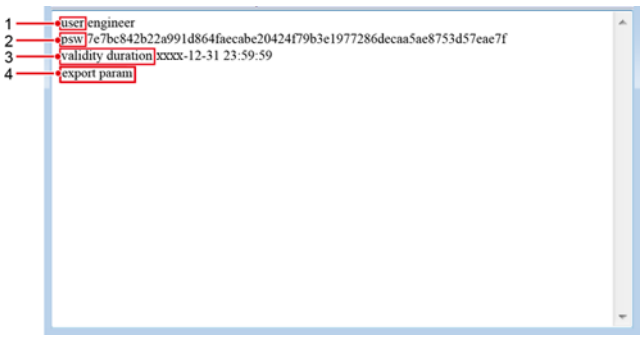
Procedure

Step 1 Click **Local maintenance script** on the SUN2000 app to generate a boot script file, see the *FusionSolar APP and SUN2000 APP User Manual*.

Step 2 Import the boot script file to a PC.

(Optional) The boot script file can be opened as a .txt file, as shown in **Figure 7-19**.

Figure 7-19 Boot script file



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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 7-9 LED indicator description

LED Indicator	Status	Meaning
	Green off	There is no operation with a USB flash drive.
	Blinking green slowly	There is an operation with a USB flash drive.
	Blinking green fast	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.

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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

7.3.2 Importing Configurations

Prerequisites

A complete configuration file has been exported.

Procedure

Step 1 Click **Local maintenance script** on the SUN2000 app to generate a boot script file, see the *FusionSolar APP and SUN2000 APP User Manual*.

Step 2 Import the boot script file to a PC.

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

NOTICE

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

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

NOTICE

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

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Table 7-10 LED indicator description

LED Indicator	Status	Meaning
	Green off	There is no operation with a USB flash drive.
	Blinking green slowly	There is an operation with a USB flash drive.
	Blinking green fast	An operation with a USB flash drive has failed.
	Steady green	An operation with a USB flash drive is successful.

----End

7.3.3 Exporting Data

Procedure

Step 1 Click **Local maintenance script** on the SUN2000 app to generate a boot script file, see the *FusionSolar APP and SUN2000 APP User Manual*.

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

Step 3 Connect the USB flash drive to the USB port. The system automatically identifies the USB flash drive and executes all commands specified in the boot script file. View the LED indicator to determine the operating status.

NOTICE

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

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Table 7-11 LED indicator description

LED Indicator	Status	Meaning
	Green off	There is no operation with a USB flash drive.
	Blinking green slowly	There is an operation with a USB flash drive.
	Blinking green fast	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

7.3.4 Upgrading

Procedure

Step 1 Download the required software upgrade package from the technical support website.

Step 2 Decompress the upgrade package.

NOTICE

- When the login password of the SUN2000 app is the initial password, 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 **Local maintenance script** on the SUN2000 app to generate a boot script file, see the *FusionSolar APP and SUN2000 APP User Manual*.

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.

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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 slowly	There is an operation with a USB flash drive.
	Blinking green fast	An operation with a USB flash drive has failed.
	Steady green	An operation with a USB flash drive is successful.

Step 8 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 slowly for 1 minute and then it becomes steady green, which indicates that the upgrade is successful.

----End

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8 Maintenance

8.1 Shutdown and Power-Off

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 Man-Machine Interactions**, or the SmartLogger or NMS user manual.

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

Step 3 Set all DC switches to OFF.

NOTE

For the SUN2000-90KTL-H2, lock the DC switch using the saved screw after turning on it.

Step 4 (Optional) Install screws for locking DC switches.

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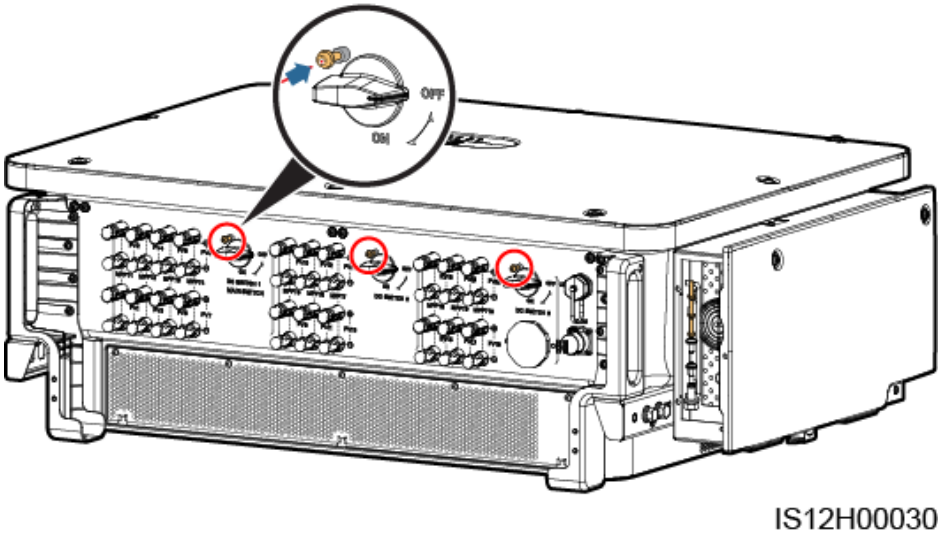
Figure 8-1 Install screws for locking DC switches



----End

8.2 Power-Off for Troubleshooting

Context

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

CAUTION

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

Procedure

Step 1 Wear proper personal protective equipment (PPE).

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

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

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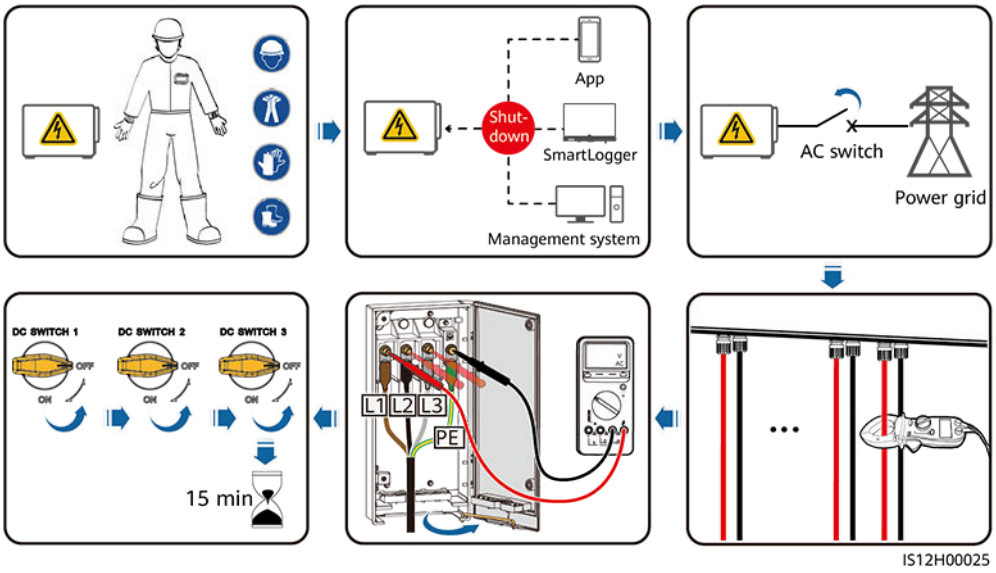
Step 4 Measure the DC current of each PV input string using a clamp meter that is set to the DC position.

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

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

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

Figure 8-2 Power-off for maintenance



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

WARNING

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

----End

8.3 Routine Maintenance

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

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CAUTION

- Before cleaning the system, connecting cables, and maintaining the grounding reliability, power off the system and ensure that the all DC switches on the solar inverter are OFF.
- If you need to open the maintenance compartment door in rainy or snowy days, take protective measures to prevent rain or snow from entering the maintenance compartment. If unavoidable, do not open the maintenance compartment door.

Table 8-1 Maintenance list

Check Item	Check Method	Maintenance Interval
Cleanness of air intake and exhaust vents, and fans	• Check whether there is dust on the air intake and exhaust vents. If necessary, remove the baffle of the air intake vent and clean the dust. • Check whether the fans produce abnormal sounds during operation.	Once every 6 to 12 months
System running status	• The solar inverter is not damaged or deformed. • The solar inverter operates with no abnormal sound. • All solar inverter parameters are correctly set. Perform this check when the solar inverter is running.	Once every 6 months
Cables connections	• Cables are securely connected. • Cables are intact, and in particular, the parts touching the metallic surface are not scratched. • Check whether the sealing caps of idle DC input terminals fall off. • Unused terminals and ports are locked by watertight caps.	The first inspection is 6 months after the initial commissioning. From then on, the interval can be 6 to 12 months.
Grounding reliability	Ground cables are securely connected.	The first inspection is 6 months after the initial commissioning. From then on, the interval can be 6 to 12 months.

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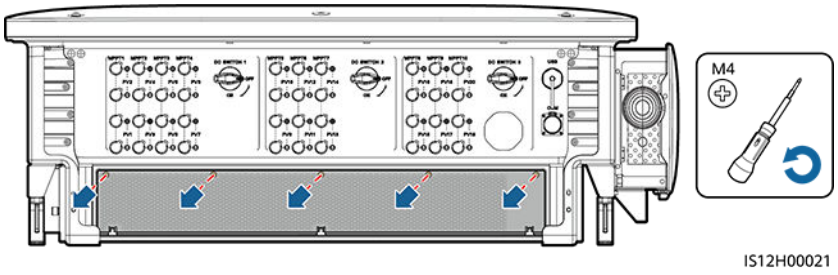
Figure 8-3 Removing the baffle of the air intake vent



NOTICE

After the cleaning is complete, reinstall the baffle plate. Tighten the screws with a torque of 1.2 N·m.

8.4 Troubleshooting

Alarm severities are defined as follows:

- Major: The solar inverter is faulty. As a result, the output power decreases or the grid-tied power generation is stopped.
- Minor: Some components are faulty without affecting the grid-tied power generation.
- Warning: The solar inverter works properly. The output power decreases or some authorization functions fail due to external factors.

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Table 8-2 Common alarms and troubleshooting measures

Alarm ID	Alarm Name	Alarm Severity	Possible Causes	Suggestions
2001	High String Input Voltage	Major	• Cause ID = 1: PV1 and PV2 • Cause ID = 2: PV3 and PV4 • Cause ID = 3: PV5 and PV6 • Cause ID = 4: PV7 and PV8 • Cause ID = 5: PV9 and PV10 • Cause ID = 6: PV11 and PV12 • Cause ID = 7: PV13 and PV14 • Cause ID = 8: PV15 and PV16 • Cause ID = 9: PV17 and PV18 • Cause ID = 10: PV19 and PV20 The PV array is not properly configured. Excessive PV modules are connected in series to a PV string, and therefore the PV string open-circuit voltage exceeds the maximum operating voltage of the solar inverter.	Reduce the number of PV modules connected in series in the PV string until the PV string open-circuit voltage is not greater than the maximum operating voltage of the solar inverter. After the PV array configuration is corrected, the alarm disappears.
2002	DC arc fault	Major	• Cause ID = 1: PV1 and PV2 • Cause ID = 2: PV3 and PV4 • Cause ID = 3: PV5 and PV6 • Cause ID = 4: PV7 and PV8 • Cause ID = 5: PV9 and PV10 • Cause ID = 6: PV11 and PV12 • Cause ID = 7: PV13 and PV14 • Cause ID = 8: PV15 and PV16 • Cause ID = 9: PV17 and PV18 • Cause ID = 10: PV19 and PV20 The PV string power cables arc or are in poor contact.	Check whether the PV string cables arc or are in poor contact.
2011	String Reverse Connection	Major	Cause ID = 1–20: PV1–PV20 The PV string is reversely connected.	Check whether the PV string is reversely connected to the solar inverter. If yes, wait until the solar irradiance declines at night and the PV string current drops below 0.5 A. Then, turn off the DC switches and correct the PV string connection.

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Alarm ID	Alarm Name	Alarm Severity	Possible Causes	Suggestions
2012	String Current Backfeed	Warning	Cause ID = 1–20: PV1–PV20 Only a few PV modules are connected in series in the PV string. Therefore, the terminal voltage is lower than that of other PV strings.	1. Check whether the number of PV modules connected in series in the PV string is less than that in other PV strings connected in parallel. If yes, wait until the solar irradiance declines at night and the PV string current drops below 0.5 A. Then, turn off the DC switches and add more PV modules. 2. Check whether the PV string is shaded. 3. Check whether the open-circuit voltage of the PV string is normal.

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Alarm ID	Alarm Name	Alarm Severity	Possible Causes	Suggestions
2014	High Input String Voltage to Ground	Major	Cause ID = 1 The voltage between the input PV string and the ground is abnormal, and there is a risk of power attenuation.	1. If no PID compensation device exists in the system, disable the PID protection function at night. Note: If the PID protection function is disabled but reactive power compensation at night is enabled, PV modules may attenuate. 2. If there is a PID compensation device in the system, check whether it is faulty. If yes, rectify the fault. 3. Check whether the settings of compensation direction for the solar inverter and the PID device are consistent. If not, set them to be consistent based on the PV module model. (Note: If the PV– is set to positive offset, the voltage between the solar inverter PV– and the ground should be greater than 0 V to clear the alarms; if the PV+ is set to negative offset, the voltage between the solar inverter PV+ and the ground should be less than 0 V to clear the alarms.) 4. If the alarm persists, contact Huawei technical support.
2015	PV String Loss	Warning	Cause ID = 1–20 This alarm is generated when the PV string status is abnormal due to the following conditions: a single PV string is lost; both 2-in-1 PV strings are lost; one of the 2-in-1 PV strings is lost.	1. Check whether the solar inverter terminals are properly connected. 2. Check whether the PV string terminals are properly connected. 3. If a 2-in-1 terminal is used, check whether it is normal.

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Alarm ID	Alarm Name	Alarm Severity	Possible Causes	Suggestions
2021	AFCI self-check failure	Major	Cause ID = 1, 2 The AFCI self-check fails.	Turn off the AC output switch and DC input switch, and then turn them on after 5 minutes. If the alarm persists, contact Huawei technical support.
2031	Phase Wire Short-Circuited to PE	Major	Cause ID = 1 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	Cause ID = 1 1. The power grid experiences an outage. 2. The AC circuit is disconnected or the AC switch is off.	1. Check the AC voltage. 2. Check whether the AC circuit is disconnected or the AC switch is off.
2033	Grid Undervoltage	Major	Cause ID = 1 The grid voltage is below the lower threshold or the undervoltage duration exceeds the time that triggers low voltage ride-through (LVRT).	1. If the alarm occurs occasionally, the power grid may be abnormal temporarily. The solar inverter automatically recovers after detecting that the power grid becomes normal. 2. If the alarm occurs frequently, check whether the power grid voltage is within the acceptable range. If not, contact the local power operator. If yes, log in to the mobile app, SmartLogger, or network management system (NMS) to modify the 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.

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Alarm ID	Alarm Name	Alarm Severity	Possible Causes	Suggestions
2034	Grid Overvoltage	Major	Cause ID = 1 The grid voltage exceeds the upper threshold or the overvoltage duration exceeds the time that triggers high voltage ride-through (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 have obtained the consent of the local power operator, modify the overvoltage protection threshold. 3. Check whether the peak grid voltage exceeds the upper threshold.
2035	Grid Volt. Imbalance	Major	Cause ID = 1 The difference between grid phase voltages exceeds the upper threshold.	1. Check that the grid voltage is within the normal range. 2. Check that the AC output power cable is correctly connected. If the AC output power cable is correctly connected, yet the alarm persists and affects the energy yield of the PV plant, contact the local power operator.

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Alarm ID	Alarm Name	Alarm Severity	Possible Causes	Suggestions
2036	Grid Overfrequency	Major	Cause ID = 1 Power grid exception: The actual power grid frequency is higher than the standard requirement for the local power grid.	1. If the alarm occurs occasionally, the power grid may be abnormal temporarily. The solar inverter automatically recovers after detecting that the power grid becomes normal. 2. If the alarm occurs frequently, check whether the power grid frequency is within the acceptable range. If not, contact the local power operator. If yes, log in to the mobile phone app, SmartLogger, or NMS to modify the power grid overfrequency protection threshold with the consent of the local power operator.
2037	Grid Underfrequency	Major	Cause ID = 1 Power grid exception: The actual power grid frequency is lower than the standard requirement for the local power grid.	1. If the alarm occurs occasionally, the power grid may be abnormal temporarily. The solar inverter automatically recovers after detecting that the power grid becomes normal. 2. If the alarm occurs frequently, check whether the power grid frequency is within the acceptable range. If not, contact the local power operator. If yes, log in to the mobile phone app, SmartLogger, or NMS to modify the power grid underfrequency protection threshold with the consent of the local power operator.

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Alarm ID	Alarm Name	Alarm Severity	Possible Causes	Suggestions
2038	Unstable Grid Frequency	Major	Cause ID = 1 Power grid exception: The actual grid frequency change rate does not comply with the local power grid standard.	1. If the alarm occurs occasionally, the power grid may be abnormal temporarily. The solar inverter 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 not, contact the local power operator.
2039	Output Overcurrent	Major	Cause ID = 1 The power grid voltage drops dramatically or the power grid is short-circuited. As a result, the solar inverter transient output current exceeds the upper threshold and therefore the solar inverter protection is triggered.	1. The solar inverter detects its external working conditions in real time. After the fault is rectified, the solar inverter automatically recovers. 2. If the alarm occurs frequently and affects the energy yield of the PV plant, check whether the output is short-circuited. If the fault cannot be rectified, contact your dealer or Huawei technical support.
2040	Output DC Component Overhigh	Major	Cause ID = 1 The DC component of the solar inverter output current exceeds the specified upper threshold.	1. If the exception is caused by an external fault, the solar inverter automatically recovers after the fault is rectified. 2. If the alarm occurs frequently, contact your dealer or Huawei technical support.

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Alarm ID	Alarm Name	Alarm Severity	Possible Causes	Suggestions
2051	Abnormal Residual Current	Major	Cause ID = 1 The insulation impedance of the input side to PE decreases when the solar inverter is operating.	1. If the alarm occurs occasionally, the external circuit may be abnormal temporarily. The solar inverter automatically recovers after the fault is rectified. 2. If the alarm occurs frequently or persists, check whether the impedance between the PV string and the ground is too low.
2061	Abnormal Grounding	Major	Cause ID = 1 The neutral wire or PE wire is not connected when **Output mode** of the solar inverter is set to **Three-phase four-wire**.	1. Check that the neutral wire and PE wire of the solar inverter are properly connected. 2. Check whether the voltage between the neutral wire and the ground exceeds 30 V. If yes, set **Output mode** to **Three-phase three-wire** on the mobile app, SmartLogger, or NMS after obtaining the consent of the local power operator.
2062	Low Insulation Resistance	Major	Cause ID = 1 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 circuit is not well insulated to ground.	1. Check the impedance of the PV string to PE. If a short circuit occurs or the insulation is insufficient, rectify it. 2. Check that the PE cable of the solar inverter 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**.

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Alarm ID	Alarm Name	Alarm Severity	Possible Causes	Suggestions
2063	Cabinet Overtemperature	Minor	Cause ID = 1 1. The solar inverter is installed in a place with poor ventilation. 2. The ambient temperature is too high. 3. The solar inverter is not working properly.	1. Check the ventilation and whether the ambient temperature of the solar inverter exceeds the upper limit. If the ventilation is poor or the ambient temperature is too high, improve ventilation. 2. If both the ventilation and ambient temperature meet requirements yet the fault persists, contact your dealer or Huawei technical support.
2064	Device Fault	Major	Cause ID = 1–15 An unrecoverable fault has occurred on a circuit inside the solar inverter.	Turn off the AC output switch and DC input switch, and then turn them on after 5 minutes. If the fault persists, contact your dealer or Huawei technical support. **NOTICE** Cause ID = 1: Perform the preceding operations when the PV string current is less than 1 A.
2065	Upgrade Failed or Software Version Unmatch	Minor	Cause ID = 1–4 The upgrade does not complete normally.	1. Perform an upgrade again. 2. If the upgrade fails for multiple times, contact your dealer or Huawei technical support.
2066	License Expired	Warning	Cause ID = 1 1. The privilege license has entered the grace period. 2. The privilege feature will be invalid soon.	1. Apply for a new license. 2. Load a new license.

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Alarm ID	Alarm Name	Alarm Severity	Possible Causes	Suggestions
2067	Faulty Power Collector	Major	Cause ID = 1 The power meter is disconnected.	1. Check whether the configured power meter model is the same as the actual model. 2. Check whether the communications parameters of the power meter are the same as the RS485 configurations of the solar inverter. 3. Check whether the power meter is powered on and whether the RS485 communications cable is connected.
2085	Built-in PID operation abnormal	Minor	Cause ID = 1, 2 ● The output resistance of PV arrays to ground is low. ● The system insulation resistance is low.	● Cause ID = 1 1. Turn off the AC output switch and DC input switch, wait for a period of time (for details about the wait time, see the description on the device safety warning label), and then turn on the DC input switch and AC output switch. 2. If the alarm persists, contact your dealer or Huawei technical support. ● Cause ID = 2 1. Check the impedance between the PV array output and the ground. If a short circuit occurs or the insulation is insufficient, rectify the fault. 2. If the alarm persists, contact your dealer or Huawei technical support.

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Alarm ID	Alarm Name	Alarm Severity	Possible Causes	Suggestions
2086	External Fan Abnormal	Major	Cause ID = 1–3: FAN 1–3 The external fan is short-circuited, the power supply is insufficient, or the air channel is blocked.	1. Shut down the fan, turn off the DC switch, check whether the fan blades are damaged, and clear the foreign matter around the fan. 2. Reinstall the fan, turn on the DC switch, and wait for the solar inverter to start. If the fault persists after 15 minutes, replace the external fan.
2087	Internal Fan Abnormal	Major	Cause ID = 1 The internal fan is short-circuited, the power supply is insufficient, or the fan is damaged.	Turn off the AC output switch and then the DC input switch. Turn them on after 5 minutes and wait for the solar inverter to connect to the power grid. If the fault persists, contact your dealer or Huawei technical support.
2088	Abnormal DC Protection Unit	Major	Cause ID = 1 The fuse is not in position or is blown. Cause ID = 2 The two relays on the breaking board are open-circuited.	Turn off the AC output switch and then the DC input switch. Turn them on after 5 minutes and wait for the solar inverter to connect to the power grid. If the fault persists, contact your dealer or Huawei technical support.
61440	Faulty Monitoring Unit	Minor	Cause ID = 1 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 your dealer or Huawei technical support.

NOTE

If you cannot rectify faults with the measures listed in the **Suggestions** column, contact your dealer or Huawei technical support.

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8.5 Replacing a Fan

CAUTION

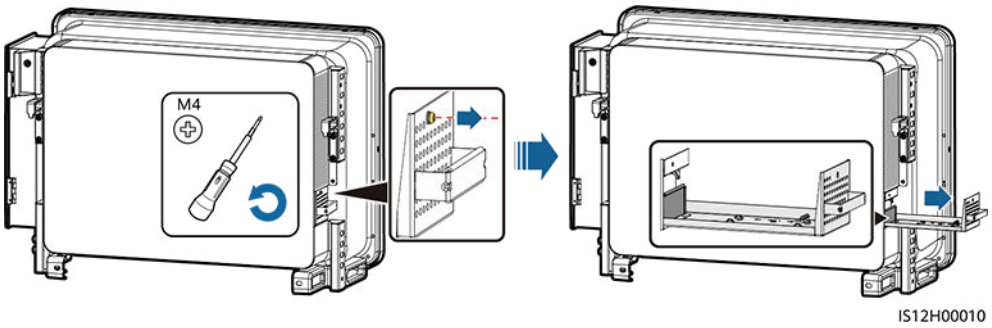
- Before replacing a fan, power off the inverter.
- When replacing a fan, use insulation tools and wear personal protective devices.

NOTE

If the fan tray gets stuck when being pulled or pushed, slightly lift it.

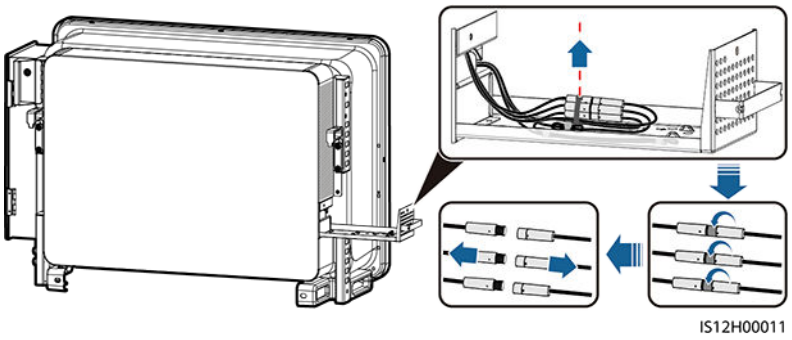
Step 1 Remove the screw on the fan tray and save it. Pull out the fan tray until the fan baffle plate aligns with the inverter chassis.

Figure 8-4 Pulling out fan tray (1)



Step 2 Remove the cable ties shared by the cables, unscrew the connectors, and disconnect the cables.

Figure 8-5 Disconnecting cables



Step 3 Pull out the fan tray.

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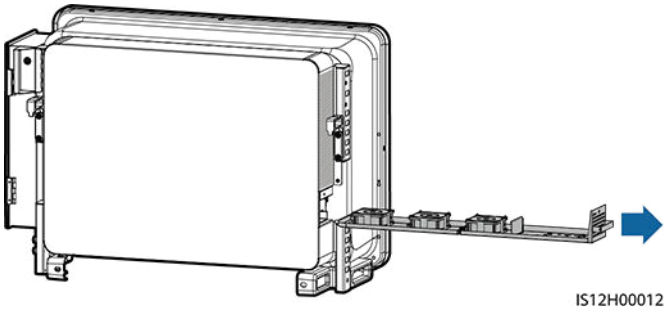
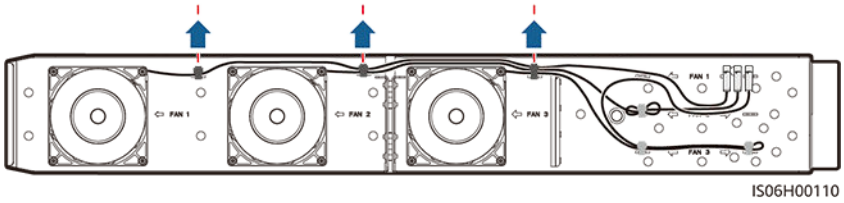
Figure 8-6 Pulling out fan tray (2)



Step 4 Remove cable ties from the faulty fan.

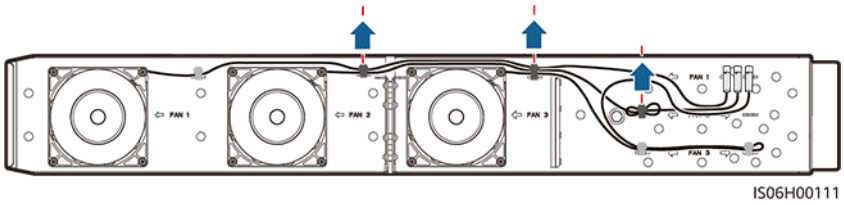
- FAN 1 Faulty

  Figure 8-7 Removing the FAN 1 cable ties



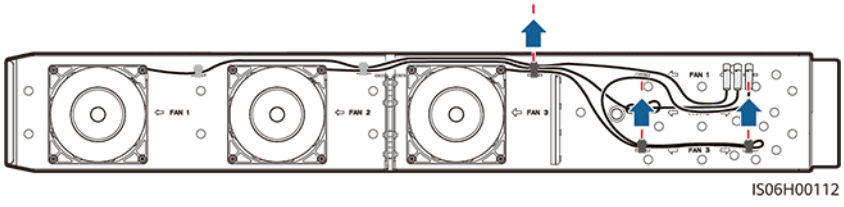
- FAN 2 Faulty

  Figure 8-8 Removing the FAN 2 cable ties



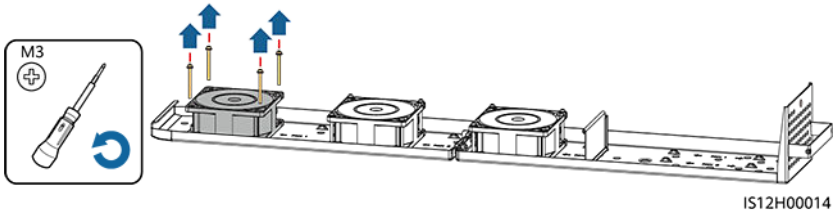
- FAN 3 Faulty

  Figure 8-9 Removing the FAN 3 cable ties



Step 5 Remove the faulty fan (FAN 1 is used as an example).

Figure 8-10 Removing the fan



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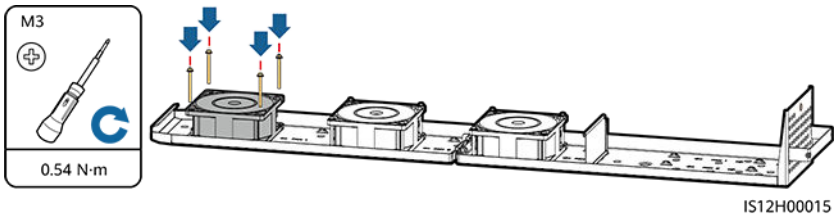
Step 6 Install the new fan (FAN 1 is used as an example).

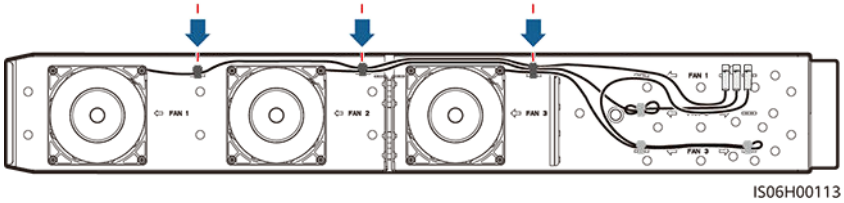
Figure 8-11 Installing a new fan



Step 7 Bind the fan cables.

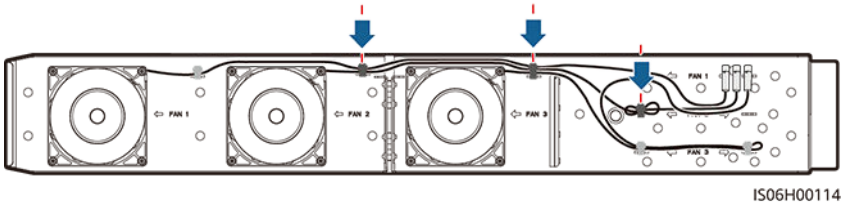
- Binding positions for fan 1

  Figure 8-12 Binding the FAN 1 cables



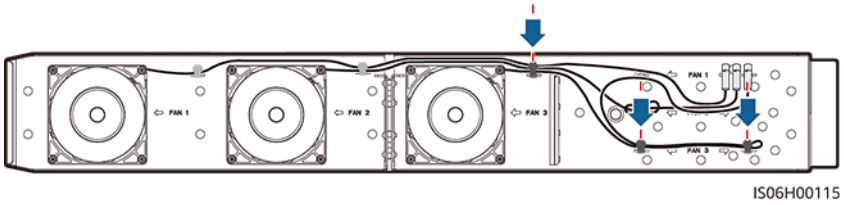
- Binding positions for fan 2

  Figure 8-13 Binding the FAN 2 cables



- Binding positions for fan 3

  Figure 8-14 Binding the FAN 3 cables



Step 8 Push the fan tray into the slot until the fan baffle plate aligns with the inverter chassis.

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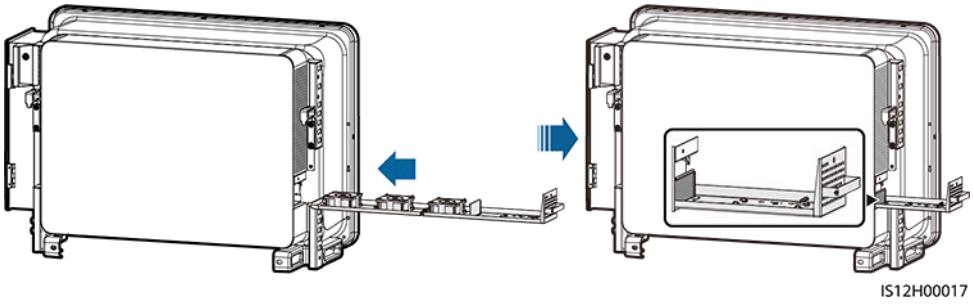
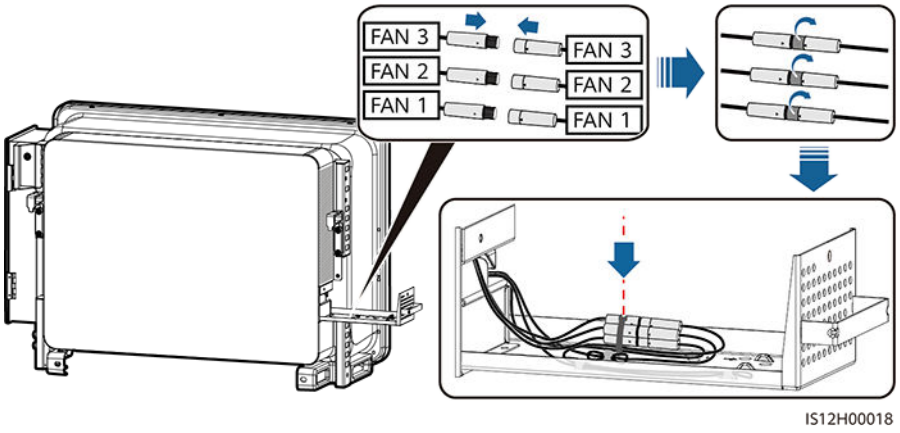
Figure 8-15 Pushing the fan tray in



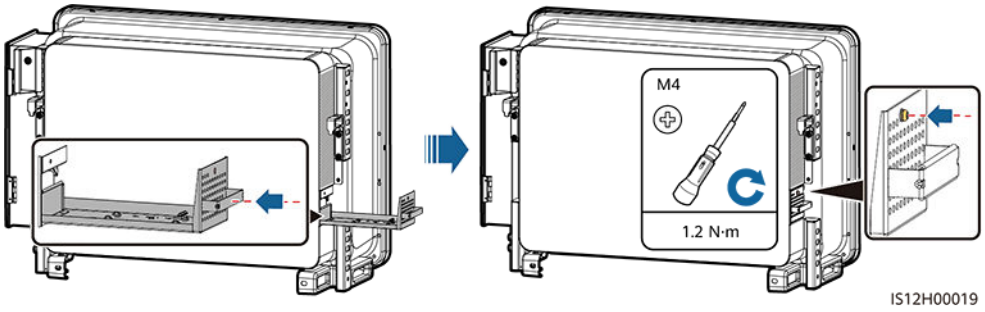
Step 9 Connect the cables correctly according to the cable labels and bind the cables.

Figure 8-16 Reconnecting and binding the cables



Step 10 Push the fan tray into the slot and tighten the screw.

Figure 8-17 Reinstalling the fan tray



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9 Handling the Inverter

9.1 Removing the SUN2000

NOTICE

Before removing the SUN2000, disconnect both AC and DC connections.

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.

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10 Technical Specifications

Efficiency

Item	SUN2000-125KTL-M0	SUN2000-110KTL-M0	SUN2000-100KTL-M0	SUN2000-100KTL-M1	SUN2000-100KTL-INM0
Maximum efficiency	≥ 99.0%	≥ 98.6%	≥ 98.6%	≥ 98.6% (380 V/400 V) and ≥ 98.8% (480 V)	≥ 98.6% (415 V) and ≥ 98.8% (480 V)
Chinese efficiency	≥ 98.4%	≥ 98.2%	≥ 98.2%	-	-
European efficiency	-	-	-	≥ 98.4% (380 V/400 V) and ≥ 98.6% (480 V)	≥ 98.4% (415 V) and ≥ 98.6% (480 V)

Input

Item	SUN2000-125KTL-M0	SUN2000-110KTL-M0	SUN2000-100KTL-M0	SUN2000-100KTL-M1	SUN2000-100KTL-INM0
Maximum input voltage[a]	1100 V				
Operating voltage range[b]	200–1000 V				
Minimum startup voltage	200 V				

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Item	SUN2000-125KTL-M0	SUN2000-110KTL-M0	SUN2000-100KTL-M0	SUN2000-100KTL-M1	SUN2000-100KTL-INM0
Full-load MPPT voltage range	625–850 V	540–800 V	540–800 V	540–800 V (380 V/400 V) and 625–850 V (480 V)	540–800 V (415 V) 625–850 V (480 V)
Rated input voltage	750 V	600 V	600 V	570 V (380 V), 600 V (400 V), and 720 V (480 V)	620 V (415 V) and 720 V (480 V)
Maximum short-circuit current (per MPPT)	40 A				
Maximum backfeed current to the PV array	0 A				
Number of inputs	20				
Number of MPP trackers	10				

- Note a: The maximum input voltage is the upper threshold of the DC voltage. If the input voltage exceeds the threshold, the solar inverter may be damaged.
- Note b: If the input voltage is beyond the operating voltage range, the solar inverter cannot work properly.

Output

Item	SUN2000-125KTL-M0	SUN2000-110KTL-M0	SUN2000-100KTL-M0	SUN2000-100KTL-M1	SUN2000-100KTL-INM0
Rated active power	125 kW	110 kW	100 kW	100 kW	100 kW
Maximum apparent power	137.5 kVA	121 kVA	110 kVA	110 kVA	110 kVA
Maximum active power (cosϕ = 1)	137.5 kW	121 kW	110 kW	110 kW	110 kW

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Item	SUN2000-125KTL-M0	SUN2000-110KTL-M0	SUN2000-100KTL-M0	SUN2000-100KTL-M1	SUN2000-100KTL-INM0
Rated output voltage[a] (phase voltage/line voltage)	288 V/500 V, 3W + PE	220 V/380 V and 230 V/400 V, 3W + (N)[b] + PE	220 V/380 V and 230 V/400 V, 3W + (N)[b] + PE	220 V/380 V, 230 V/400 V, and 277 V/480 V, 3W + (N)[b] + PE	240 V/415 V and 277 V/480 V, 3W + (N)[b] + PE
Rated output current	144.4 A	167.2 A (380 V) and 158.8 A (400 V)	152.0 A (380 V) and 144.4 A (400 V)	152.0 A (380 V), 144.4 A (400 V), and 120.3 A (480 V)	139.2 A (415 V) and 120.3 A (480 V)
Adapted power grid frequency	50 Hz	50 Hz/60 Hz	50 Hz/60 Hz	50 Hz/60 Hz	50 Hz/60 Hz
Maximum output current	160.4 A	185.7 A (380 V) and 176.4 A (400 V)	168.8 A (380 V) and 160.4 A (400 V)	168.8 A (380 V), 160.4 A (400 V), and 133.7 A (480 V)	154.6 A (415 V), 133.7 A (480 V)
Power factor	0.8 leading and 0.8 lagging				
Maximum total harmonic distortion (rated power)	< 3%				

Note a: The rated output voltage is determined by **Grid code**, which can be set on the SUN2000 app, SmartLogger, or NMS.

Note b: You can determine whether to connect the neutral wire to the SUN2000-110KTL-M0, SUN2000-100KTL-M0, SUN2000-100KTL-M1, or SUN2000-100KTL-INM0 based on the application scenario. If no neutral wire is used, set **Output mode** to **Three-phase three-wire**. If the neutral wire is used, set the **Output mode** to **Three-phase four-wire**.

Protection

Item	SUN2000-125KTL-M0	SUN2000-110KTL-M0	SUN2000-100KTL-M0	SUN2000-100KTL-M1	SUN2000-100KTL-INM0
AFCI	-			Optional	-
PID recovery	-			Optional	-
Input DC switch	Supported				

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Item	SUN2000-125KTL-M0	SUN2000-110KTL-M0	SUN2000-100KTL-M0	SUN2000-100KTL-M1	SUN2000-100KTL-INM0
Anti-islanding protection	Supported				
Output overcurrent protection	Supported				
Input reverse connection protection	Supported				
PV string fault detection	Supported				
DC surge protection	Supported				
AC surge protection	Supported				
Insulation resistance detection	Supported				
Residue current monitoring unit (RCMU)	Supported				
Overvoltage category	PV II/AC III				

Display and Communication

Item	SUN2000-125KTL-M0	SUN2000-110KTL-M0	SUN2000-100KTL-M0	SUN2000-100KTL-M1	SUN2000-100KTL-INM0
Display	LED indicators, WLAN module + app, Bluetooth module + app, USB data cable + app				
Communication	MBUS/RS485				

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Common Parameters

Item	SUN2000-125KTL-M0	SUN2000-110KTL-M0	SUN2000-100KTL-M0	SUN2000-100KTL-M1	SUN2000-100KTL-INM0
Dimensions (W x H x D)	1035 mm x 700 mm x 365 mm				
Net weight	≤ 81 kg	≤ 90 kg			
Operating temperature	–25°C to +60°C				
Cooling mode	Intelligent air cooling				
Highest operating altitude	4000 m				
Relative humidity	0%–100% RH				
Input terminal	Staubli MC4				
Output terminal	Crimping module + OT/DT terminal				
IP rating	IP66				
Topology	Transformerless				

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A Securing Y-Branch Connectors

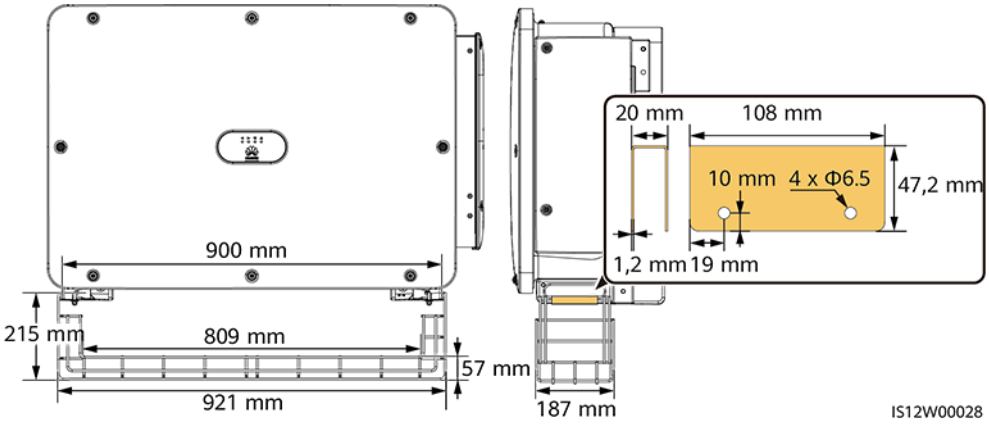
The DC input terminals of the solar inverter are prone to damage under stress. When Y-branch connectors are connected to the solar inverter, bind and secure the connectors to prevent the DC input terminals from bearing stress. You are advised to install a tray or beam to secure the Y-branch connectors.

Method 1: Using a Tray

Prepare a tray based on the base size of the solar inverter and the cabling of the Y-branch connectors.

- Material: outdoor corrosion-resistant material
- Bearing capacity: ≥ 10 kg

Figure A-1 Recommended dimensions



Step 1 Install a tray.

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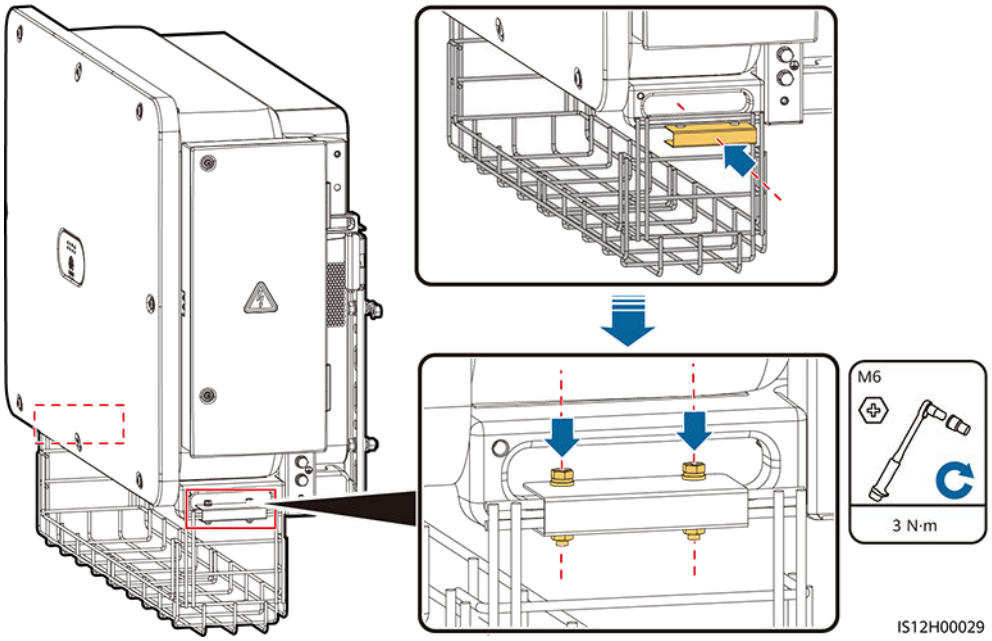
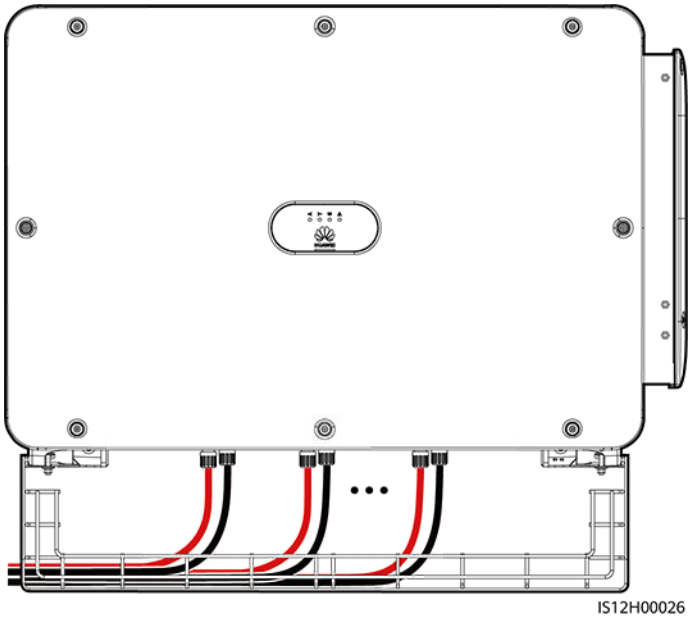
Figure A-2 Installing a tray



Step 2 Place the Y-branch connectors on the tray.

Figure A-3 Placing Y-branch connectors



----End

Method 2: Using a Beam

Prepare a beam based on the base size of the solar inverter and the cabling of the Y-branch connectors.

- Material: outdoor corrosion-resistant material
- Bearing capacity: ≥ 10 kg

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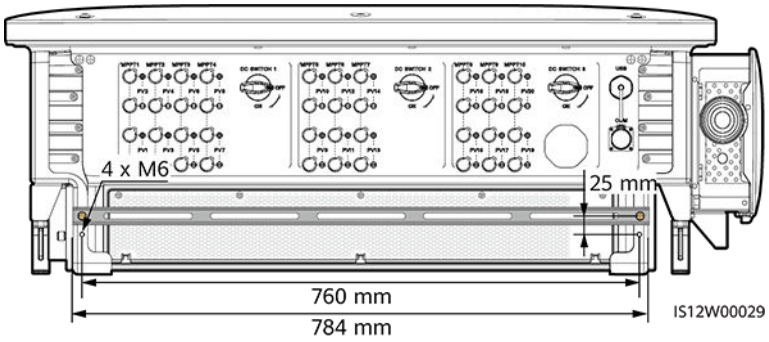
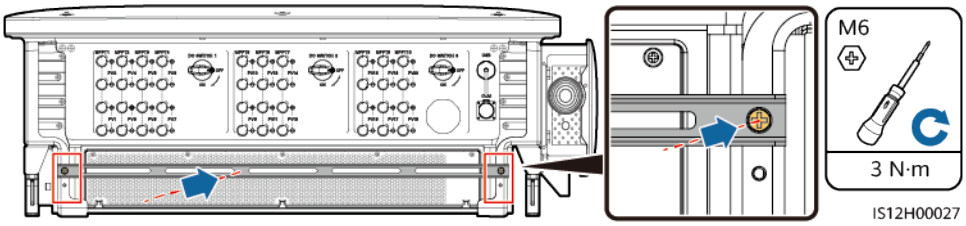
Figure A-4 Recommended dimensions



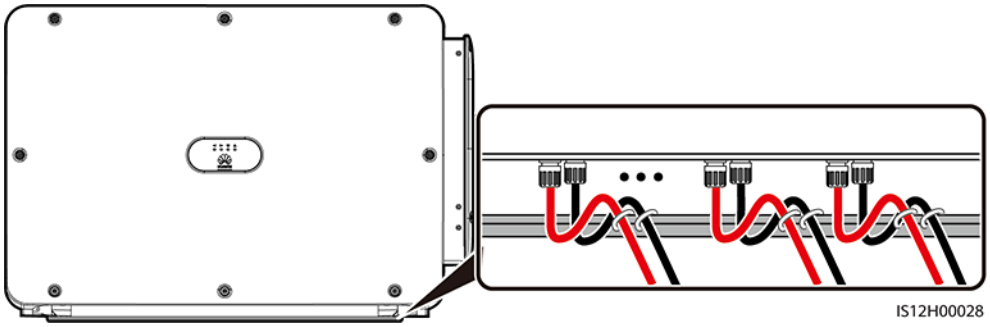
Step 1 Install a beam.

Figure A-5 Installing a beam



Step 2 Bind the Y-branch connectors on the beam.

Figure A-6 Binding Y-branch connectors



----End

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B Grid Code

NOTE

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

Set the correct grid code based on the application area and scenario of the solar inverter.

Grid Code	Description (Country/ Region/ Standard/ Other)	SUN2000-125KTL-M0	SUN2000-110KTL-M0	SUN2000-100KTL-M0	SUN2000-100KTL-M1	SUN2000-100KTL-INM0
VDE-AR-N-4105	Germany LV	-	-	-	Supported	-
NB/T 32004	China Golden Sun LV	-	Supported	Supported	-	-
UTE C 15-712-1(A)	France continent	-	-	-	Supported	-
UTE C 15-712-1(B)	France islands	-	-	-	Supported	-
UTE C 15-712-1(C)	France islands	-	-	-	Supported	-
VDE 0126-1-1-BU	Bulgaria	-	-	-	Supported	-
VDE 0126-1-1-GR(A)	Greece continent	-	-	-	Supported	-
VDE 0126-1-1-GR(B)	Greece islands	-	-	-	Supported	-

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Grid Code	Description (Country/ Region/ Standard/ Other)	SUN2000-125KTL-M0	SUN2000-110KTL-M0	SUN2000-100KTL-M0	SUN2000-100KTL-M1	SUN2000-100KTL-INM0
BDEW-MV	Germany MV	-	-	-	Supported	-
G59-England	England 230 V (I > 16 A)	-	-	-	Supported	-
G59-Scotland	Scotland 240 V (I > 16 A)	-	-	-	Supported	-
G83-England	England 230 V (I < 16 A)	-	-	-	Supported	-
G83-Scotland	Scotland 240 V (I < 16 A)	-	-	-	Supported	-
CEI0-21	Italy	-	-	-	Supported	-
EN50438-CZ	Czech Republic	-	-	-	Supported	-
RD1699/661	Spain LV	-	-	-	Supported	-
RD1699/661-MV480	Spain MV	-	-	-	Supported	-
EN50438-NL	Netherlands	-	-	-	Supported	-
C10/11	Belgium	-	-	-	Supported	-
AS4777	Australia	-	-	-	Supported	-
IEC61727	IEC 61727 LV (50 Hz)	-	-	-	Supported	Supported
Custom (50 Hz)	Reserved	-	Supported	Supported	Supported	Supported
Custom (60 Hz)	Reserved	-	Supported	Supported	Supported	Supported
CEI0-16	Italy	-	-	-	Supported	-
CHINA-MV	China MV	-	Supported	Supported	-	-
TAI-PEA	Thailand PEA	-	-	-	Supported	-
TAI-MEA	Thailand MEA	-	-	-	Supported	-
BDEW-MV480	Germany MV	-	-	-	Supported	-

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Grid Code	Description (Country/ Region/ Standard/ Other)	SUN2000-125KTL-M0	SUN2000-110KTL-M0	SUN2000-100KTL-M0	SUN2000-100KTL-M1	SUN2000-100KTL-INM0
Custom MV480 (50 Hz)	Reserved	Supported	-	-	Supported	-
Custom MV480 (60 Hz)	Reserved	Supported	-	-	Supported	-
G59-England-MV480	UK 480 V MV (I > 16 A)	-	-	-	Supported	-
IEC61727-MV480	IEC 61727 MV (50 Hz)	-	-	-	Supported	Supported
UTE C 15-712-1-MV480	France islands	-	-	-	Supported	-
TAI-PEA-MV480	Thailand MV PEA	-	-	-	Supported	-
TAI-MEA-MV480	Thailand MV MEA	-	-	-	Supported	-
EN50438-DK-MV480	Denmark MV	-	-	-	Supported	-
C11/C10-MV480	Belgium MV	-	-	-	Supported	-
Philippines	Philippines LV	-	-	-	Supported	-
Philippines-MV480	Philippines MV	-	-	-	Supported	-
AS4777-MV480	Australia MV	-	-	-	Supported	-
KOREA	South Korea	-	-	-	Supported	-
IEC61727-60 Hz	IEC 61727 LV (60 Hz)	-	-	-	Supported	Supported
IEC61727-60 Hz-MV480	IEC 61727 MV (60 Hz)	-	-	-	Supported	Supported
CHINA_MV500	China MV	Supported	-	-	-	-
ANRE	Romania LV	-	-	-	Supported	-

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Grid Code	Description (Country/ Region/ Standard/ Other)	SUN2000-125KTL-M0	SUN2000-110KTL-M0	SUN2000-100KTL-M0	SUN2000-100KTL-M1	SUN2000-100KTL-INM0
ANRE-MV480	Romania MV	-	-	-	Supported	-
PO12.3-MV480	Spain MV	-	-	-	Supported	-
EN50438_IE-MV480	Ireland MV	-	-	-	Supported	-
EN50438_IE	Ireland LV	-	-	-	Supported	-
IEC61727-50 Hz-MV500	India 500 V MV	-	-	-	-	Supported
CEI0-16-MV480	Italy MV	-	-	-	Supported	-
PO12.3	Spain LV	-	-	-	Supported	-
CEI0-21-MV480	Italy MV	-	-	-	Supported	-
KOREA-MV480	South Korea MV	-	-	-	Supported	-
EN50549-LV	Ireland	-	-	-	Supported	-
EN50549-MV480	Ireland MV	-	-	-	Supported	-
ABNT NBR 16149	Brazil	-	-	-	Supported	-
ABNT NBR 16149-MV480	Brazil MV	-	-	-	Supported	-
INDIA	India LV	-	-	-	-	Supported
INDIA-MV500	India MV	-	-	-	-	Supported
Malaysian	Malaysia LV	-	-	-	Supported	-
Malaysian-MV480	Malaysia MV	-	-	-	Supported	-
Northern Ireland	Northern Ireland LV	-	-	-	Supported	-

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Grid Code	Description (Country/ Region/ Standard/ Other)	SUN2000-125KTL-M0	SUN2000-110KTL-M0	SUN2000-100KTL-M0	SUN2000-100KTL-M1	SUN2000-100KTL-INM0
Northern Ireland-MV480	Northern Ireland MV	-	-	-	Supported	-
VDE-AR-N4120_HV	VDE4120	-	-	-	Supported	Supported
VDE-AR-N4120_HV480	VDE4120	-	-	-	Supported	Supported
Vietnam	Vietnam	-	-	-	Supported	-
Vietnam-MV480	Vietnam	-	-	-	Supported	-
TAIPOWER	Taiwan LV	-	-	-	Supported	-
TAIPOWER-MV480	Taiwan MV	-	-	-	Supported	-
BANGLADESH	Bangladesh LV	-	-	-	Supported	-
BANGLADESH-MV480	Bangladesh MV	-	-	-	Supported	-
EN50438-NL-MV480	Netherlands MV	-	-	-	Supported	-
Fuel_Engine_Grid	DG-grid hybrid	-	-	-	Supported	Supported
Fuel-Engine-Grid-60Hz	DG-grid hybrid	-	-	-	Supported	Supported
EN50438-SE	Sweden LV	-	-	-	Supported	-
Pakistan	Pakistan	-	-	-	Supported	-
Pakistan-MV480	Pakistan MV	-	-	-	Supported	-
G99-TYPEA-LV	UK G99_TypeA_LV	-	-	-	Supported	-
G99-TYPEB-LV	UK G99_TypeB_LV	-	-	-	Supported	-

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Grid Code	Description (Country/ Region/ Standard/ Other)	SUN2000-125KTL-M0	SUN2000-110KTL-M0	SUN2000-100KTL-M0	SUN2000-100KTL-M1	SUN2000-100KTL-INM0
G99-TYPEB-HV	UK G99_TypeB_HV	-	-	-	Supported	-
G99-TYPEB-HV-MV480	UK G99_TypeB_HV MV	-	-	-	Supported	-
EN50549-MV400	Ireland	-	-	-	Supported	-
VDE-AR-N4110	Germany 230 V MV	-	-	-	Supported	Supported
VDE-AR-N4110-MV480	Germany MV	-	-	-	Supported	Supported

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C Domain Name List of Management Systems

NOTE

The list is subject to change.

Table C-1 Domain names of management systems

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

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D Acronyms and Abbreviations

C	
CEC	California Energy Commission
CPV	Concentrated Photovoltaics technology
L	
LED	light emitting diode
M	
MBUS	monitoring bus
MPP	maximum power point
MPPT	maximum power point tracking
P	
PID	potential induced degradation
PV	photovoltaic

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R

RCMU	residual current monitoring unit

W

WEEE	waste electrical and electronic equipment

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