SUN2000-(250KTL, 280KTL, 300KTL, 330KTL) Series

User Manual

Issue	08
Date	2023-08-20



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About This Document

Purpose

This document describes the installation, commissioning, maintenance, and troubleshooting of the SUN2000-250KTL-H1, SUN2000-250KTL-H3, SUN2000-280KTL-H0, SUN2000-300KTL-H0, SUN2000-330KTL-H1, and SUN2000-330KTL-H2 (also referred to as SUN2000). Before installing and operating the SUN2000, ensure that you are familiar with the features, functions, and safety precautions provided in this document.

Figures provided in this document are for reference only.

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	Description
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	Description
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 08 (2023-08-20)

Updated **4.2.1 Site Selection Requirements**.

Updated **10 Technical Specifications**.

Issue 07 (2023-06-30)

Updated **4.3 Preparing Tools**.

Updated **5.6 Connecting DC Input Power Cables**.

Updated **7 Power-On and Commissioning**.

Updated **8.1 Routine Maintenance**.

Added **8.7 Locating Insulation Resistance Faults**.

Updated **9 Alarm Reference**.

Adjusted the document structure.

Issue 06 (2023-05-12)

Updated **5.2 Preparing Cables**.

Added **5.5 Requirements for AC Power Cable Stripping Outside the Compartment**.

Issue 05 (2023-05-09)

Updated **2.2 Networking Application**.

Updated **5.2 Preparing Cables**.

Updated **5.6 Connecting DC Input Power Cables**.

Updated **8.3 Power-Off for Maintenance**.

Updated **9 Alarm Reference**.

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Issue 04 (2023-03-30)

Updated **2.2 Networking Application**.

Updated **5.4 Connecting an AC Output Power Cable**.

Updated **5.6 Connecting DC Input Power Cables**.

Issue 03 (2023-02-10)

Updated **2.2 Networking Application**.

Updated **4.2 Installation Requirements**.

Updated **5.2 Preparing Cables**.

Updated **5.4 Connecting an AC Output Power Cable**.

Updated **7.1 Powering On the SUN2000**.

Updated **9 Alarm Reference**.

Updated **F Acronyms and Abbreviations**.

Issue 02 (2022-12-20)

Added the SUN2000-250KTL-H1, SUN2000-250KTL-H3, SUN2000-330KTL-H1, and SUN2000-330KTL-H2 models.

Updated **2.1 Model Number Description**.

Updated **4.2 Installation Requirements**.

Updated **5.2 Preparing Cables**.

Updated **7 Power-On and Commissioning**.

Updated **9 Alarm Reference**.

Updated **10 Technical Specifications**.

Updated **C Grid Codes**.

Updated **E Contact Information**.

Issue 01 (2022-10-09)

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

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1 Safety Information

Statement

Before transporting, storing, installing, operating, using, and/or maintaining the equipment, read this document, strictly follow the instructions provided herein, and follow all the safety instructions on the equipment and in this document. In this document, "equipment" refers to the products, software, components, spare parts, and/or services related to this document; "the Company" refers to the manufacturer (producer), seller, and/or service provider of the equipment; "you" refers to the entity that transports, stores, installs, operates, uses, and/or maintains the equipment.

The **Danger**, **Warning**, **Caution**, and **Notice** statements described in this document do not cover all the safety precautions. You also need to comply with relevant international, national, or regional standards and industry practices. **The Company shall not be liable for any consequences that may arise due to violations of safety requirements or safety standards concerning the design, production, and usage of the equipment.**

The equipment shall be used in an environment that meets the design specifications. Otherwise, the equipment may be faulty, malfunctioning, or damaged, which is not covered under the warranty. The Company shall not be liable for any property loss, personal injury, or even death caused thereby.

Comply with applicable laws, regulations, standards, and specifications during transportation, storage, installation, operation, use, and maintenance.

Do not perform reverse engineering, decompilation, disassembly, adaptation, implantation, or other derivative operations on the equipment software. Do not study the internal implementation logic of the equipment, obtain the source code of the equipment software, violate intellectual property rights, or disclose any of the performance test results of the equipment software.

The Company shall not be liable for any of the following circumstances or their consequences:

- The equipment is damaged due to force majeure such as earthquakes, floods, volcanic eruptions, debris flows, lightning strikes, fires, wars, armed conflicts, typhoons, hurricanes, tornadoes, and other extreme weather conditions.
- The equipment is operated beyond the conditions specified in this document.

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- The equipment is installed or used in environments that do not comply with international, national, or regional standards.
- The equipment is installed or used by unqualified personnel.
- You fail to follow the operation instructions and safety precautions on the product and in the document.
- You remove or modify the product or modify the software code without authorization.
- You or a third party authorized by you cause the equipment damage during transportation.
- The equipment is damaged due to storage conditions that do not meet the requirements specified in the product document.
- You fail to prepare materials and tools that comply with local laws, regulations, and related standards.
- The equipment is damaged due to your or a third party's negligence, intentional breach, gross negligence, or improper operations, or other reasons not related to the Company.

1.1 Personal Safety

DANGER

Ensure that power is off during installation. Do not install or remove a cable with power on. Transient contact between the core of the cable and the conductor will generate electric arcs or sparks, which may cause a fire or personal injury.

DANGER

Non-standard and improper operations on the energized equipment may cause fire, electric shocks, or explosion, resulting in property damage, personal injury, or even death.

DANGER

Before operations, remove conductive objects such as watches, bracelets, bangles, rings, and necklaces to prevent electric shocks.

DANGER

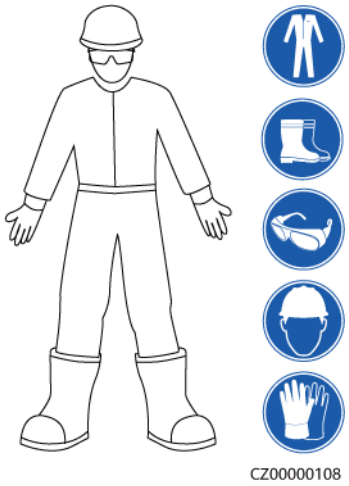
During operations, use dedicated insulated tools to prevent electric shocks or short circuits. The dielectric withstanding voltage level must comply with local laws, regulations, standards, and specifications.

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WARNING

During operations, wear personal protective equipment such as protective clothing, insulated shoes, goggles, safety helmets, and insulated gloves.

Figure 1-1 Personal protective equipment



General Requirements

- Do not stop protective devices. Pay attention to the warnings, cautions, and related precautionary measures in this document and on the equipment.
- If there is a likelihood of personal injury or equipment damage during operations, immediately stop, report the case to the supervisor, and take feasible protective measures.
- Do not power on the equipment before it is installed or confirmed by professionals.
- Do not touch the power supply equipment directly or with conductors such as damp objects. Before touching any conductor surface or terminal, measure the voltage at the contact point to ensure that there is no risk of electric shock.
- Do not touch operating equipment because the enclosure is hot.
- Do not touch a running fan with your hands, components, screws, tools, or boards. Otherwise, personal injury or equipment damage may occur.
- In the case of a fire, immediately leave the building or the equipment area and activate the fire alarm or call emergency services. Do not enter the affected building or equipment area under any circumstances.

Personnel Requirements

- Only professionals and trained personnel are allowed to operate the equipment.
  - Professionals: personnel who are familiar with the working principles and structure of the equipment, trained or experienced in equipment operations and are clear of the sources and degree of various potential hazards in equipment installation, operation, maintenance

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  - Trained personnel: personnel who are trained in technology and safety, 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
- Personnel who plan to install or maintain the equipment must receive adequate training, be able to correctly perform all operations, and understand all necessary safety precautions and local relevant standards.
- 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 perform special tasks such as electrical operations, working at heights, and operations of special equipment must possess the required local qualifications.
- Only authorized professionals are allowed to replace the equipment or components (including software).
- Only personnel who need to work on the equipment are allowed to access the equipment.

1.2 Electrical Safety

DANGER

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

DANGER

Non-standard and improper operations may result in fire or electric shocks.

DANGER

Prevent foreign matter from entering the equipment during operations. Otherwise, equipment damage, load power derating, power failure, or personal injury may occur.

WARNING

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.

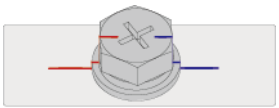
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CAUTION

Do not route cables near the air intake or exhaust vents of the equipment.

General Requirements

- Follow the procedures described in the document for installation, operation, and maintenance. Do not reconstruct or alter the equipment, add components, or change the installation sequence without permission.
- Obtain approval from the national or local electric utility company before connecting the equipment to the grid.
- Observe the power plant safety regulations, such as the operation and work ticket mechanisms.
- Install temporary fences or warning ropes and hang "No Entry" signs around the operation area to keep unauthorized personnel away from the area.
- Before installing or removing power cables, turn off the switches of the equipment and its upstream and downstream switches.
- Before performing operations on the equipment, check that all tools meet the requirements and record the tools. After the operations are complete, collect all of the tools to prevent them from being left inside the equipment.
- Before installing power cables, check that cable labels are correct and cable terminals are insulated.
- When installing the equipment, use a torque tool of a proper measurement range to tighten the screws. When using a wrench to tighten the screws, ensure that the wrench does not tilt and the torque error does not exceed 10% of the specified value.
- Ensure that bolts are tightened with a torque tool and marked in red and blue after double-check. Installation personnel mark tightened bolts in blue. Quality inspection personnel confirm that the bolts are tightened and then mark them in red. (The marks must cross the edges of the bolts.)



- If the equipment has multiple inputs, disconnect all the inputs before operating the equipment.
- Before maintaining a downstream electrical or power distribution device, turn off the output switch on the power supply equipment.
- During equipment maintenance, attach "Do not switch on" labels near the upstream and downstream switches or circuit breakers as well as warning signs to prevent accidental connection. The equipment can be powered on only after troubleshooting is complete.
- Do not open equipment panels.
- Check equipment connections periodically, ensuring that all screws are securely tightened.
- Only qualified professionals can replace a damaged cable.
- Do not scrawl, damage, or block any labels or nameplates on the equipment. Promptly replace labels that have worn out.

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- Do not use solvents such as water, alcohol, or oil to clean electrical components inside or outside of the equipment.

Grounding

- Ensure that the grounding impedance of the equipment complies with local electrical standards.
- Ensure that the equipment is connected permanently to the protective ground. Before operating the equipment, check its electrical connection to ensure that it is reliably grounded.
- Do not work on the equipment in the absence of a properly installed ground conductor.
- Do not damage the ground conductor.

Cabling Requirements

- When selecting, installing, and routing cables, follow local safety regulations and rules.
- When routing power cables, ensure that there is no coiling or twisting. Do not join or weld power cables. If necessary, use a longer cable.
- Ensure that all cables are properly connected and insulated, and meet specifications.
- Ensure that the slots and holes for routing cables are free from sharp edges, and that the positions where cables are routed through pipes or cable holes are equipped with cushion materials to prevent the cables from being damaged by sharp edges or burrs.
- Ensure that cables of the same type are bound together neatly and straight and that the cable sheath is intact. When routing cables of different types, ensure that they are away from each other without entanglement and overlapping.
- Secure buried cables using cable supports and cable clips. Ensure that the cables in the backfill area are in close contact with the ground to prevent cable deformation or damage during backfilling.
- If the external conditions (such as the cable layout or ambient temperature) change, verify the cable usage in accordance with the IEC-60364-5-52 or local laws and regulations. For example, check that the current-carrying capacity meets requirements.
- When routing cables, reserve at least 30 mm clearance between the cables and heat-generating components or areas. This prevents deterioration or damage to the cable insulation layer.

1.3 Environment Requirements

DANGER

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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DANGER

Do not store any flammable or explosive materials in the equipment area.

DANGER

Do not place the equipment near heat sources or fire sources, such as smoke, candles, heaters, or other heating devices. Overheat may damage the equipment or cause a fire.

WARNING

Install the equipment in an area far away from liquids. Do not install it under areas prone to condensation, such as under water pipes and air exhaust vents, or areas prone to water leakage, such as air conditioner vents, ventilation vents, or feeder windows of the equipment room. Ensure that no liquid enters the equipment to prevent faults or short circuits.

WARNING

To prevent damage or fire due to high temperature, ensure that the ventilation vents or heat dissipation systems are not obstructed or covered by other objects while the equipment is running.

General Requirements

- Ensure that the equipment is stored in a clean, dry, and well ventilated area with proper temperature and humidity and is protected from dust and condensation.
- Keep the installation and operating environments of the equipment within the allowed ranges. Otherwise, its performance and safety will be compromised.
- 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, performing outdoor installation, and opening doors) in harsh weather conditions such as lightning, rain, snow, and level 6 or stronger wind.
- Do not install the equipment in an environment with dust, smoke, volatile or corrosive gases, infrared and other radiations, organic solvents, or salty air.
- Do not install the equipment in an environment with conductive metal or magnetic dust.
- Do not install the equipment in an area conducive to the growth of microorganisms such as fungus or mildew.
- Do not install the equipment in an area with strong vibration, noise, or electromagnetic interference.

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- Ensure that the site complies with local laws, regulations, and related standards.
- Ensure that the ground in the installation environment is solid, free from spongy or soft soil, and not prone to subsidence. The site must not be located in a low-lying land prone to water or snow accumulation, and the horizontal level of the site must be above the highest water level of that area in history.
- Do not install the equipment in a position that may be submerged in water.
- If the equipment is installed in a place with abundant vegetation, in addition to routine weeding, harden the ground underneath the equipment using cement or gravel (recommended area: 3 m x 2.5 m).
- Do not install the equipment outdoors in salt-affected areas because it may be corroded. A salt-affected area refers to the region within 500 m of the coast or prone to sea breeze. Regions prone to sea breeze vary with weather conditions (such as typhoons and monsoons) or terrains (such as dams and hills).
- Before installation, operation, and maintenance, clean up any water, ice, snow, or other foreign objects on the top of the equipment.
- When installing the equipment, ensure that the installation surface is solid enough to bear the weight of the equipment.
- After installing the equipment, remove the packing materials such as cartons, foam, plastics, and cable ties from the equipment area.

1.4 Mechanical Safety

⚠ WARNING

Ensure that all necessary tools are ready and inspected by a professional organization. Do not use tools that have signs of scratches or fail to pass the inspection or whose inspection validity period has expired. Ensure that the tools are secure and not overloaded.

⚠ WARNING

Do not drill holes into the equipment. Doing so may affect the sealing performance and electromagnetic containment of the equipment and damage components or cables inside. Metal shavings from drilling may short-circuit boards inside the equipment.

General Requirements

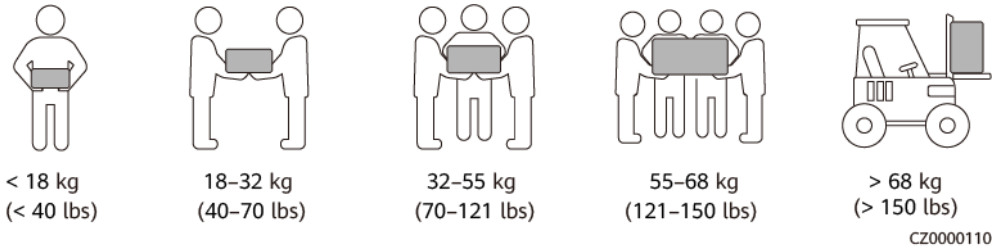
- Repaint any paint scratches caused during equipment transportation or installation in a timely manner. Equipment with scratches must not be exposed for an extended period of time.
- Do not perform operations such as arc welding and cutting on the equipment without evaluation by the Company.

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- Do not install other devices on the top of the equipment without evaluation by the Company.
- When performing operations over the top of the equipment, take measures to protect the equipment against damage.
- Use correct tools and operate them in the correct way.

Moving Heavy Objects

- Be cautious to prevent injury when moving heavy objects.



- If multiple persons need to move a heavy object together, determine the manpower and work division with consideration of height and other conditions to ensure that the weight is equally distributed.
- If two persons or more move a heavy object together, ensure that the object is lifted and landed simultaneously and moved at a uniform pace under the supervision of one person.
- Wear personal protective gears such as protective gloves and shoes when manually moving the equipment.
- To move an object by hand, approach to the object, squat down, and then lift the object gently and stably by the force of the legs instead of your back. Do not lift it suddenly or turn your body around.
- Do not quickly lift a heavy object above your waist. Place the object on a workbench that is half-waist high or any other appropriate place, adjust the positions of your palms, and then lift it.
- Move a heavy object stably with balanced force at an even and low speed. Put down the object stably and slowly to prevent any collision or drop from scratching the surface of the equipment or damaging the components and cables.
- When moving a heavy object, be aware of the workbench, slope, staircase, and slippery places. When moving a heavy object through a door, ensure that the door is wide enough to move the object and avoid bumping or injury.
- When transferring a heavy object, move your feet instead of turning your waist around. When lifting and transferring a heavy object, ensure that your feet point to the target direction of movement.
- When transporting the equipment using a pallet truck or forklift, ensure that the tynes are properly positioned so that the equipment does not topple. Before moving the equipment, secure it to the pallet truck or forklift using ropes. When moving the equipment, assign dedicated personnel to take care of it.
- Choose sea, roads in good conditions, or airplanes for transportation. Do not transport the equipment by railway. Avoid tilt or jolt during transportation.

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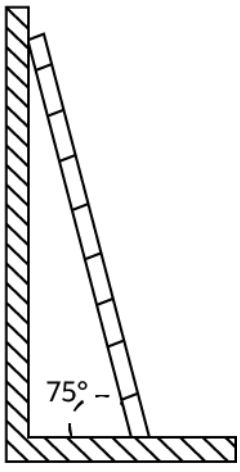
Using Ladders

- Use wooden or insulated ladders when you need to perform live-line working at heights.
- Platform ladders with protective rails are preferred. Single ladders are not recommended.
- Before using a ladder, check that it is intact and confirm its load bearing capacity. Do not overload it.
- Ensure that the ladder is securely positioned and held firm.



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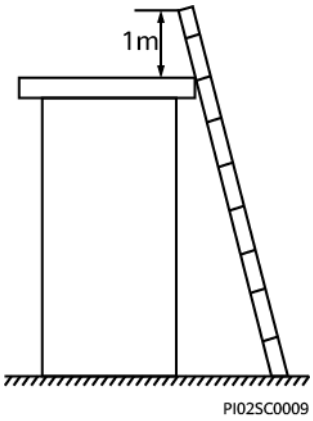
- When climbing up the ladder, keep your body stable and your center of gravity between the side rails, and do not overreach to the sides.
- When a step ladder is used, ensure that the pull ropes are secured.
- If a single ladder is used, the recommended angle for the ladder against the floor is 75 degrees, as shown in the following figure. A square can be used to measure the angle.



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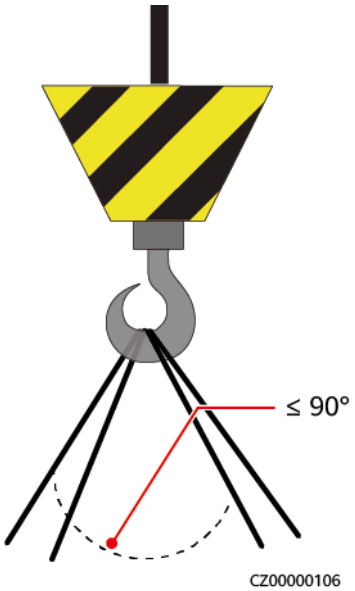
- If a single ladder is used, ensure that the wider end of the ladder is at the bottom, and take protective measures to prevent the ladder from sliding.
- If a single ladder is used, do not climb higher than the fourth rung of the ladder from the top.
- If you use a single ladder to climb up to a platform, ensure that the ladder is at least 1 m higher than the platform.

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Hoisting

- Only trained and qualified personnel are allowed to perform hoisting operations.
- Install temporary warning signs or fences to isolate the hoisting area.
- Ensure that the foundation where hoisting is performed on meets the load-bearing requirements.
- Before hoisting objects, ensure that hoisting tools are firmly secured onto a fixed object or wall that meets the load-bearing requirements.
- During hoisting, do not stand or walk under the crane or the hoisted objects.
- Do not drag steel ropes and hoisting tools or bump the hoisted objects against hard objects during hoisting.
- Ensure that the angle between two hoisting ropes is no more than 90 degrees, as shown in the following figure.



Drilling Holes

- Obtain consent from the customer and contractor before drilling holes.
- Wear protective equipment such as safety goggles and protective gloves when drilling holes.

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- To avoid short circuits or other risks, do not drill holes into buried pipes or cables.
- When drilling holes, protect the equipment from shavings. After drilling, clean up any shavings.

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2 Overview

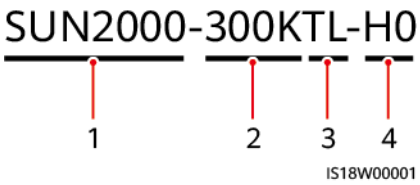
The SUN2000 is a three-phase grid-tied PV string inverter that converts the DC power generated by PV strings into AC power and feeds the power into the power grid.

2.1 Model Number Description

This document involves the following product models:

- SUN2000-250KTL-H1
- SUN2000-250KTL-H3
- SUN2000-280KTL-H0
- SUN2000-300KTL-H0
- SUN2000-330KTL-H1
- SUN2000-330KTL-H2

Figure 2-1 Model number



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No.	Item	Description
1	Series name	SUN2000: grid-tied solar inverter
2	Power	250K/280K/300K/330K: power level
3	Topology	TL: transformerless
4	Design code	HX: product series with an input voltage level of 1500 V DC • 250KTL-H1: a rated power of 250 kW • 250KTL-H3: a rated power of 250 kW • 280KTL-H0: a rated power of 280 kW • 300KTL-H0: a rated power of 300 kW • 330KTL-H1: a rated power of 300 kW • 330KTL-H2: a rated power of 275 kW

2.2 Networking Application

Typical Networking

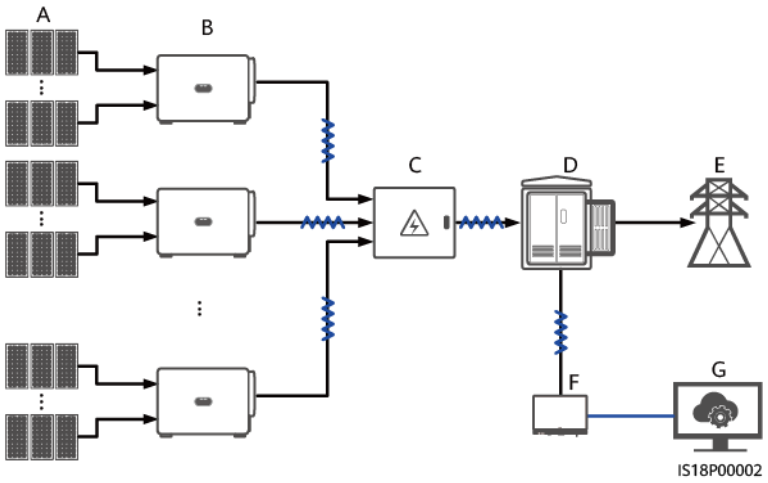
The SUN2000 supports RS485 communication and MBUS communication. In the networking diagram, — indicates the power cable, → indicates the power flow direction, and ⩙ and — indicate the signal flow.

NOTICE

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

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Figure 2-2 MBUS networking application (without a SmartMBUS CCO)

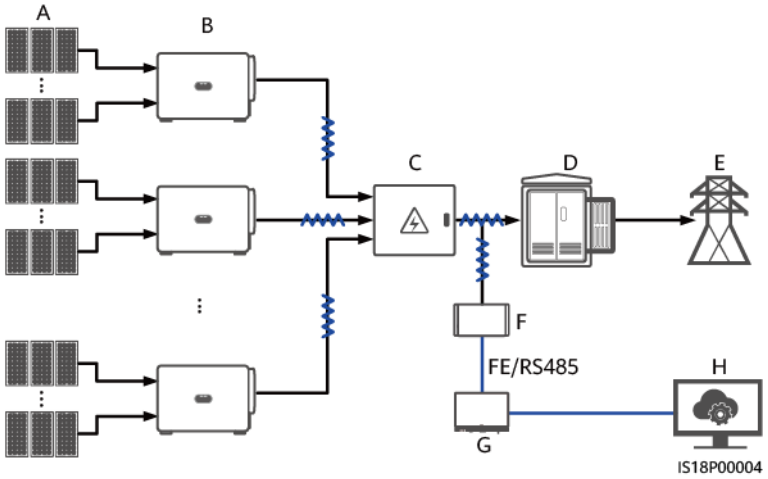


(A) PV strings (B) SUN2000s (C) AC combiner box

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

(G) Management system - -

Figure 2-3 MBUS networking application (double-winding transformer +SmartMBUS CCO)



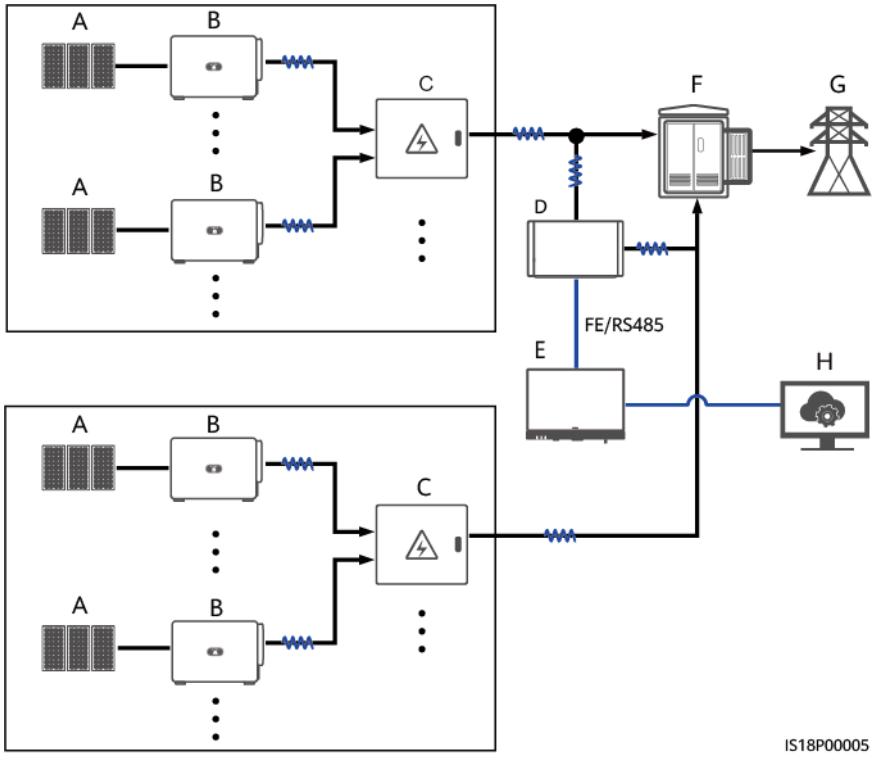
(A) PV strings (B) SUN2000s (C) AC combiner box

(D) Transformer station (E) Power grid (F) SmartMBUS CCO01B

(G) SmartLogger (H) Management system -

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Figure 2-4 MBUS networking application (double-split transformer+SmartMBUS CCO)

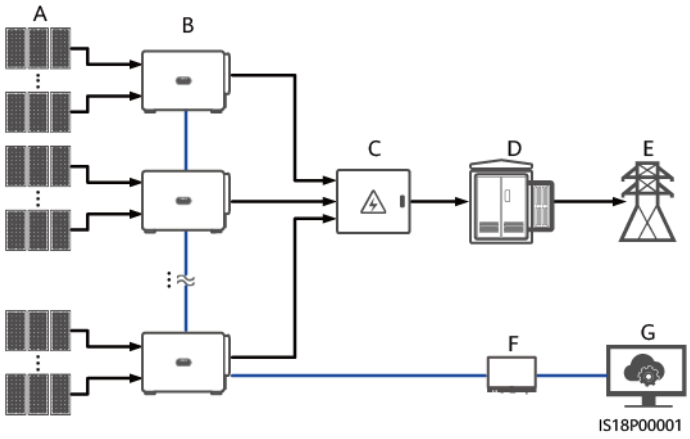


(A) PV strings (B) SUN2000s (C) AC combiner box

(D) SmartMBUS CCO01B (E) SmartLogger (F) Transformer station

(G) Power grid (H) Management system -

Figure 2-5 RS485 networking application



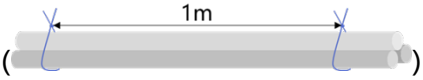
(A) PV strings (B) SUN2000s (C) AC combiner box

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

(G) Management system - -

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NOTICE

- To ensure the system response speed, you are advised to connect less than 30 cascaded SUN2000s on each COM port of the SmartLogger.
- If RS485 communication is used, the RS485 communication distance between the SUN2000 at the end and the SmartLogger cannot exceed 1000 m.
- If MBUS communication is used, multi-core cables are recommended and the maximum communication distance is 1000 m. If single-core cables are used, the three-phase cables must be bound at an interval of 1 m (

) and the maximum communication distance is 400 m. (When the SmartMBUS CCO01B is configured, the maximum single-core cable communication distance is 750 m, and the distance between the CCO and the busbar sampling cable of the transformer station cannot exceed 3 m.)
- You are advised not to upgrade the software or export logs in fast scheduling scenarios.

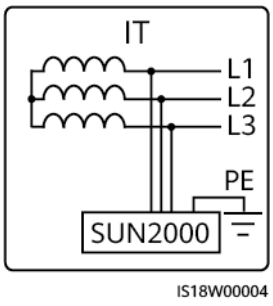
NOTE

- The SUN2000 must be connected to a dedicated power transformer and cannot be connected to a low-voltage overhead power cable.
- The SUN2000-250KTL-H1, SUN2000-250KTL-H3, SUN2000-280KTL-H0, SUN2000-300KTL-H0, SUN2000-330KTL-H1, and SUN2000-330KTL-H2 inverters described in this document must not be connected to a winding (of the transformer station) that has other models of inverters connected to it.

Earthing System

The SUN2000 supports the IT earthing system.

Figure 2-6 Earthing system



NOTE

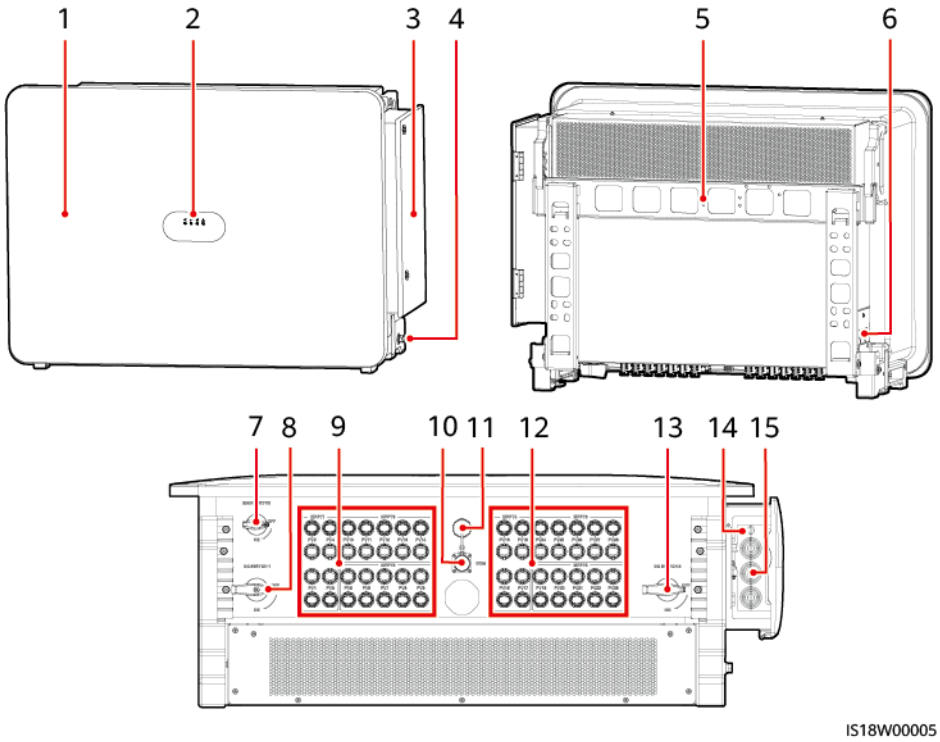
The SUN2000 supports the IT earthing system in PV-only scenarios. The use of the SUN2000 in other types of earthing systems, such as TT, TN-C, and TN-C-S, is not recommended. (If such an earthing system is encountered, contact the Company's engineers.)

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2.3 Appearance

Appearance and Ports

Figure 2-7 Appearance



(1) Panel	(2) LED indicators
(3) Maintenance compartment door	(4) Ground point on the enclosure
(5) Mounting bracket	(6) Fan tray
(7) Auxiliary switch (AUX. SWITCH)[1]	(8) DC switch 1 (DC SWITCH 1)
(9) DC input terminal group 1 (PV1–PV14, controlled by DC SWITCH 1)	(10) RS485 communications port (COM)
(11) USB port (USB)	(12) DC input terminal group 2 (PV15–PV28, controlled by DC SWITCH 2)
(13) DC switch 2 (DC SWITCH 2)	(14) Tracking system power cable hole
(15) AC output power cable holes	-

NOTE

Note [1]: The silkscreen on some models is MAIN SWITCH. The actual product silkscreen may vary.

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Indicator Description

Indicator	Status (Blinking Fast: On for 0.2s and Off for 0.2s; Blinking Slowly: On for 1s and Off for 1s)		Meaning
PV connection indicator 	Steady green		At least one PV string is properly connected, and the DC input voltage of the corresponding MPPT circuit is higher than or equal to 500 V.
	Blinking green fast		If the alarm/maintenance indicator is red, an environmental fault at the DC side of the SUN2000 was generated.
	Off		The SUN2000 disconnects from all PV strings, or the DC input voltages of all MPPT circuits are less than 500 V.
Grid connection indicator 	Steady green		The SUN2000 is in grid-tied mode.
	Blinking green fast		If the alarm/maintenance indicator is red, an environmental fault at the AC side of the SUN2000 was generated.
	Off		The SUN2000 is not in grid-tied mode.
Communication indicator 	Blinking green fast		The SUN2000 receives communication data normally.
	Off		The SUN2000 has not received communication data for 10 seconds.
Alarm/Maintenance indicator 	Alarm state	Steady red	A major alarm was generated. • If the PV connection indicator or grid connection indicator is blinking green fast, troubleshoot DC or AC environmental faults as instructed by the app. • If the PV connection indicator and grid connection indicator are both not blinking green fast, replace components or the device as instructed by the app. (Upon the first power-on, after you turn on the **AUX. SWITCH**, the PV connection indicator is steady green and the alarm indicator is steady red. This is normal and no alarm needs to be handled.)
		Blinking red fast	A minor alarm was generated.

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Indicator	Status (Blinking Fast: On for 0.2s and Off for 0.2s; Blinking Slowly: On for 1s and Off for 1s)		Meaning
		Blinking red slowly	A warning alarm was generated.
	Local maintenance state	Steady green	The local maintenance is successful.
		Blinking green fast	The local maintenance failed.
		Blinking green slowly	The device is under local maintenance or shut down after receiving 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, WLAN module, or USB data cable is inserted into the USB port of the SUN2000. For example, import and export data using a USB flash drive, or connect to the app using a WLAN module or USB data cable.
- If the alarming and the local maintenance happen concurrently, the alarm/maintenance indicator shows the local maintenance state first. After the USB flash drive, WLAN module, or USB data cable is removed, the indicator shows the alarm state.

DC SWITCH

DANGER

- The DC SWITCH automatically turns off when the inverter reports the **String Reverse Connection** or **String Current Backfeed** alarm. Check the fault type on the mobile app. After the fault is rectified, wait for at least 3 minutes, turn the switch handle to **OFF** to complete the reset, and then turn it on. For details, see **Resetting and Turning On the DC SWITCH**.
- The DC SWITCH automatically turns off if a fault occurs in the inverter. In this case, the alarm/maintenance indicator is steady red, and the two DC SWITCH automatically turn off. Then, contact technical support and do not turn on the DC SWITCH by yourself.

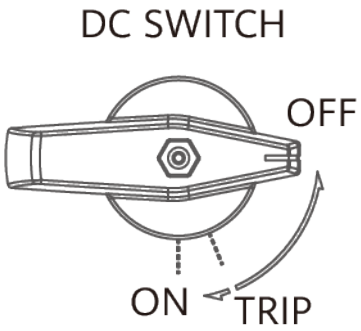
Table 2-1 DC SWITCH description

Switch	Description	
DC SWITCH	**ON**	The DC SWITCH is on and can turn off for protection.
	TRIP	The DC SWITCH is automatically turned off. (The switch handle is between **ON** and **OFF**.)

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Switch	Description	
	OFF	The DC SWITCH is off.

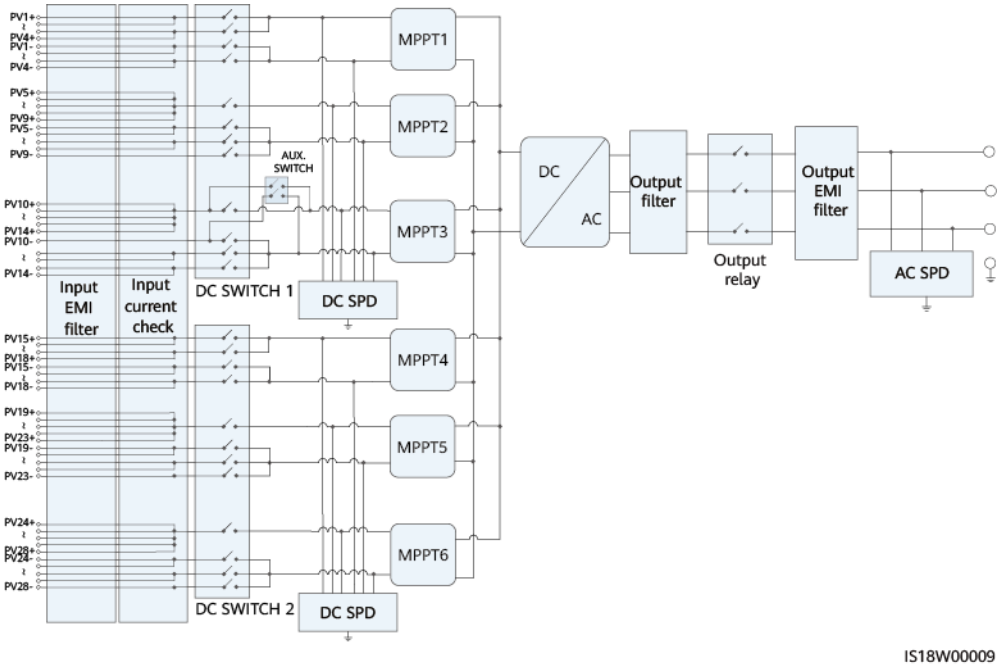
Figure 2-8 DC SWITCH



2.4 Circuit Diagram

The SUN2000 receives inputs from 28 PV strings. The inputs are grouped into 6 MPPT circuits inside the SUN2000 to track the maximum power point of the PV strings. The DC power is converted into three-phase AC power through an inverter circuit. Surge protection is supported on both the DC and AC sides.

Figure 2-9 Circuit diagram



2.5 Working Modes

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

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Figure 2-10 Working modes

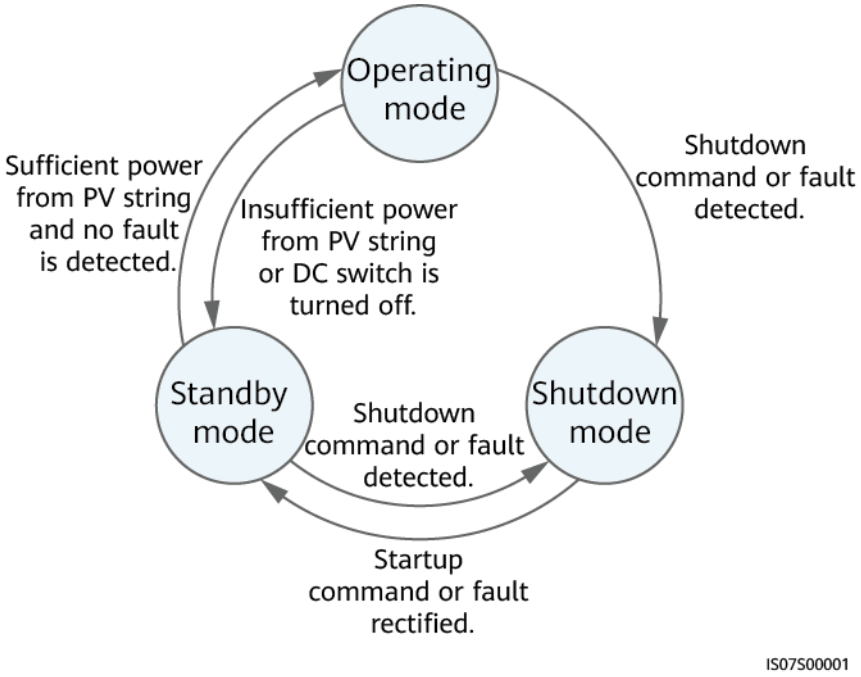


Table 2-2 Working mode description

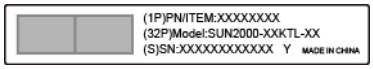
Working Mode	Description
Standby	The SUN2000 enters Standby mode when the external environment does not meet the operating requirements. In Standby mode: • The SUN2000 continuously performs status check and enters the Operating mode once the operating requirements are met. • The SUN2000 enters Shutdown 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.
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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2.6 Label Description

Symbol	Name	Meaning
	Operation warning	Potential hazards exist after the SUN2000 is powered on. Take protective measures when operating the SUN2000.
	Burn warning	Do not touch the SUN2000 when it is running because its enclosure is hot.
	Large current warning	Before powering on the SUN2000, ensure that the SUN2000 is grounded because there is a large contact current after the SUN2000 is powered on.
	Delayed discharge	• High voltage exists after the SUN2000 is powered on. Only qualified and trained electrical technicians are allowed to perform operations on the SUN2000. • Residual voltage exists after the SUN2000 is powered off. It takes 15 minutes for the SUN2000 to discharge to the safe voltage.
	Refer to documentation	Reminds operators to refer to the documents delivered with the SUN2000.
	Grounding	Indicates the position for connecting the ground cable.
	Operation warning	Do not remove the DC input connector when the SUN2000 is running.
	Fan operation warning	High voltage exists after the SUN2000 is powered on. Do not touch the fans when the SUN2000 is working.
	Fan replacement warning	The power connector of the fan must be disconnected before fan replacement.

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Symbol	Name	Meaning
	SUN2000 ESN label	Indicates the SUN2000 serial number.
	Weight label	The SUN2000 needs to be carried by four persons or using a forklift.

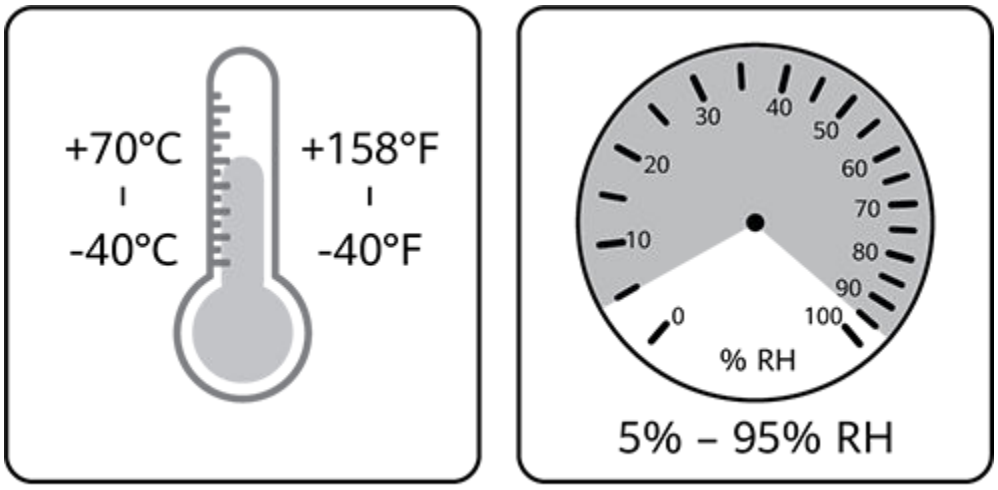
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3 Storage Requirements

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.

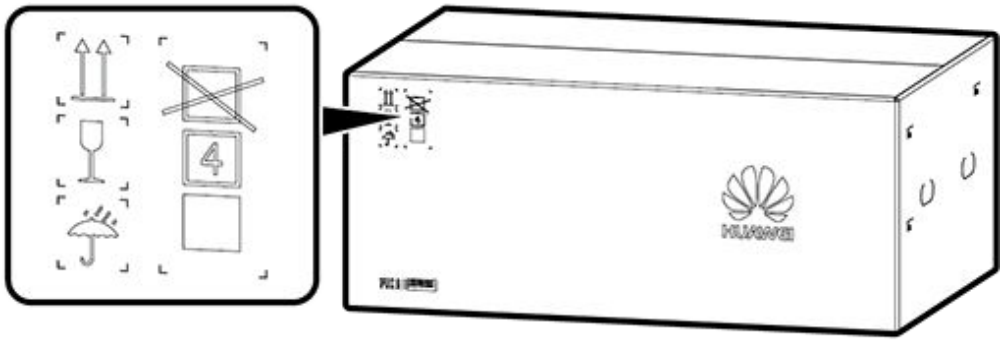
Figure 3-1 Storage temperature and humidity



- 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 Installation Modes

The SUN2000 can be installed on a support or pole clamp.

Table 4-1 Installation modes

Installation Mode	Screw Specifications	Description
Support mounting	M12x40 bolt assembly	Delivered with the product
Pole-clamp mounting	Depending on the pole clamp	Prepared by the customer

4.2 Installation Requirements

4.2.1 Site Selection Requirements

Installation Environment Requirements

- Do not install the inverter in working or living areas.
- Do not install the inverter in noise-sensitive areas, such as residential areas, office areas, and schools.
- If the inverter 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 and set up a safety warning sign to isolate the device. This is to avoid personal injury or property loss caused by accidental contact by non-professionals or other reasons during device operation.
- If the inverter is installed in a place with abundant vegetation, in addition to routine weeding, harden the ground underneath the inverter using cement or gravel (recommended area: 3 m x 2.5 m).

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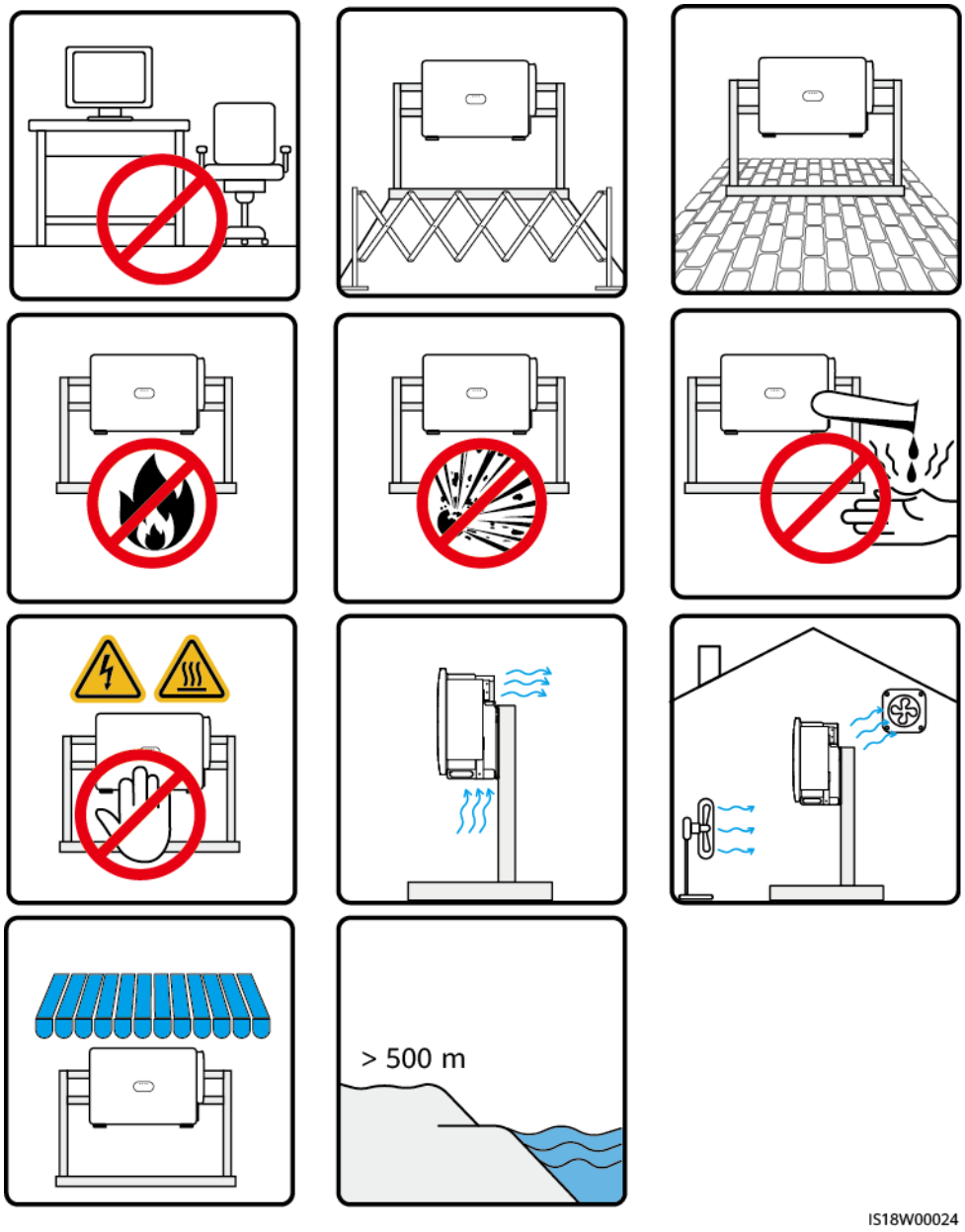
- Do not install the inverter in areas with flammable materials.
- Do not install the inverter in areas with explosive materials.
- Do not install the inverter in areas with corrosive materials.
- Do not install the inverter where its enclosure and heat sink are easily accessible, because the voltage is high and these parts are hot during operation.
- Install the inverter in a well-ventilated environment to ensure good heat dissipation.
- Install the inverter in an environment with a magnetic field strength less than 4 Gauss. If the magnetic field strength is high, for example, in a smeltery, you are advised to use a gauss meter to measure the magnetic field strength of the inverter installation position when the smelting equipment is running normally.
- If the inverter is installed in an enclosed environment, a heat dissipation device or ventilation device shall be installed. The indoor ambient temperature must not be higher than the outdoor ambient temperature.
- You are advised to install the inverter in a sheltered area or install an awning over it.
- If you need to install the inverter outdoors in salt-affected areas that may cause corrosion, contact technical support. A salt-affected area refers to a region within 500 m of the coast or prone to sea breeze. Regions prone to sea breeze vary with weather conditions (such as typhoons and monsoons) or terrains (such as dams and hills).

NOTE

The inverter shall be physically isolated from third-party wireless communications facilities and residential environments at a distance greater than 30 m.

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Figure 4-1 Installation environment requirements



Mounting Structure Requirements

- The mounting structure where the inverter is installed must be fire resistant. Do not install the inverter on flammable building materials.
- Do not install the inverter on a mounting structure that may generate resonance.
- Ensure that the installation surface is solid enough to bear the weight of the inverter.

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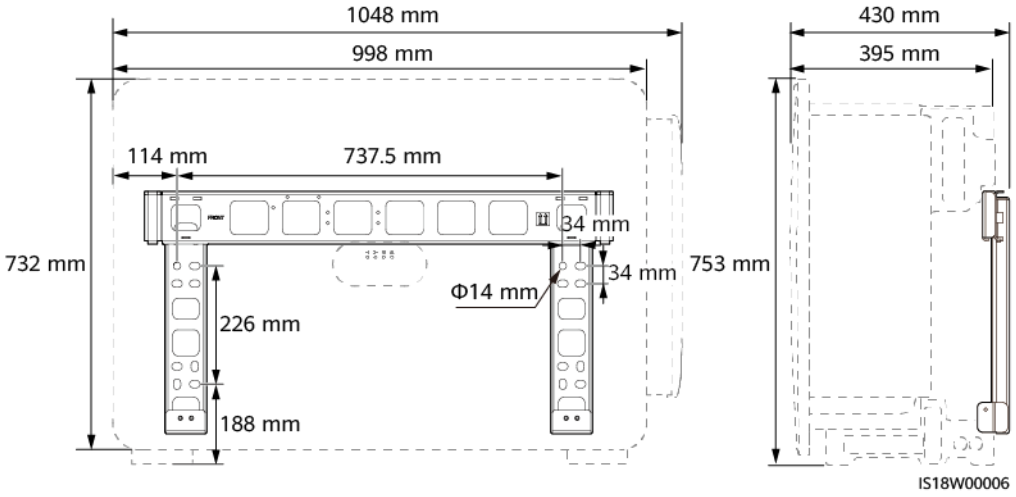
Figure 4-2 Mounting structure requirements



4.2.2 Clearance Requirements

Dimensions

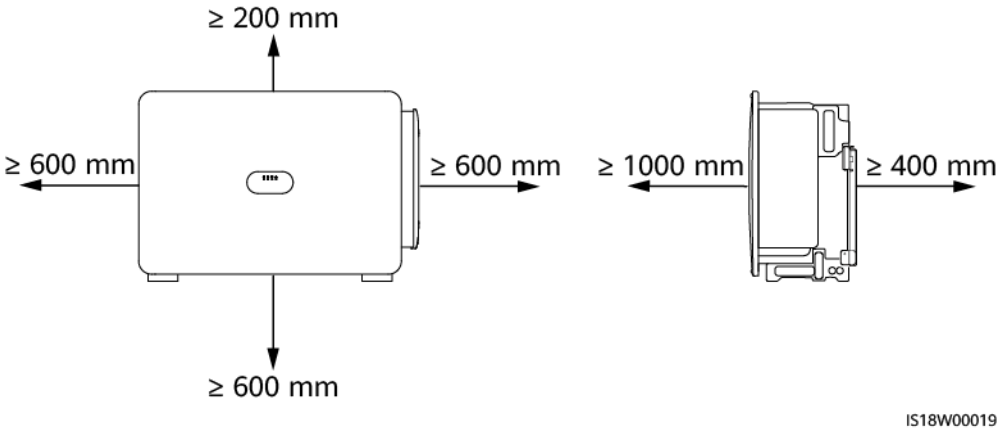
Figure 4-3 Dimensions



Installation Clearance Requirements

Reserve sufficient clearance around the SUN2000 for installation and heat dissipation.

Figure 4-4 Clearance



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NOTE

- For ease of the SUN2000 installation on the mounting bracket, cable connecting at the bottom, and future maintenance, it is recommended that the clearance from the bottom be between 600 mm and 730 mm. For further questions regarding clearance, consult local technical support engineers.
- The clearance from the bottom must meet the requirements on the bending radius of the AC output power cables.

If multiple SUN2000s need to be installed and the clearance is sufficient, install them in horizontal mode. The triangle, back-to-back, and close-to-wall installation modes are not recommended. For triangle, back-to-back, and close-to-wall installation modes, you need to prepare air baffles to isolate air intake from air exhaust.

Figure 4-5 Horizontal installation mode (recommended)

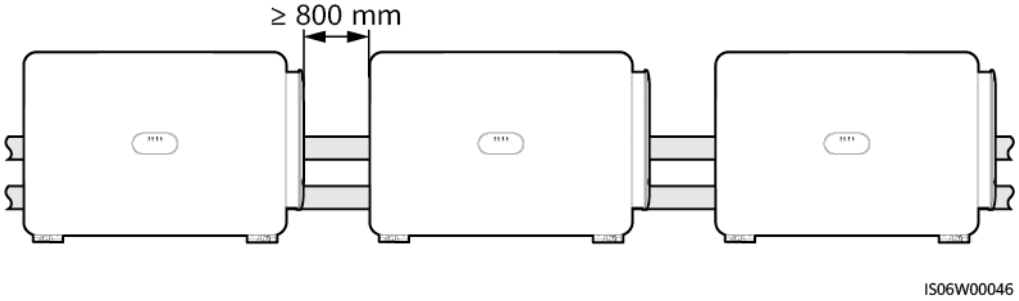
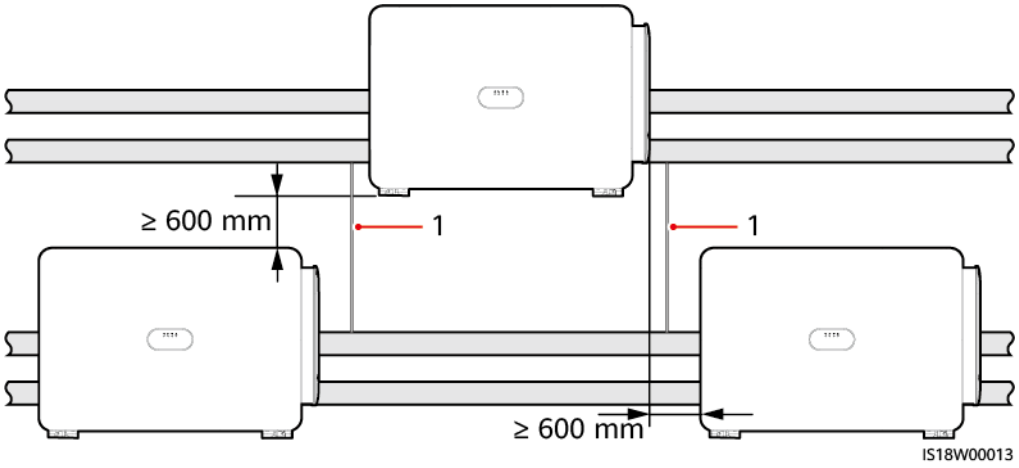


Figure 4-6 Triangle installation mode (not recommended)



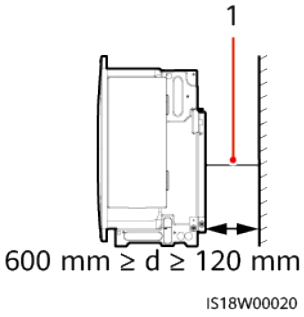
(1) Air baffle

NOTE

Stacked installation is not allowed.

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Figure 4-7 Close-to-wall installation mode (not recommended)



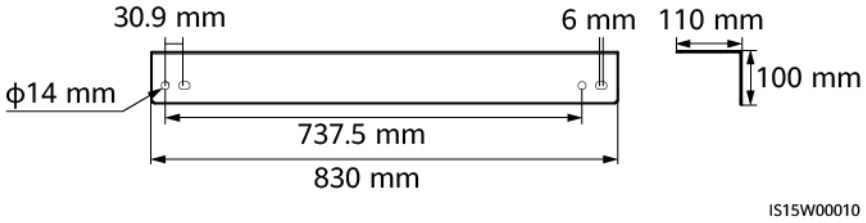
(1) L-shaped air baffle

NOTE

- In close-to-wall installation mode, reserve space for the air channel and install an L-shaped air baffle to prevent air intake and exhaust from forming return flow. If the distance between the mounting bracket and the wall is greater than 600 mm, the air baffle is not required.
- It is recommended that an L-shaped air baffle be made of aluminum plates with a thickness greater than or equal to 2 mm and a recommended width of d–10 mm (d indicates the distance between the mounting bracket and the wall).

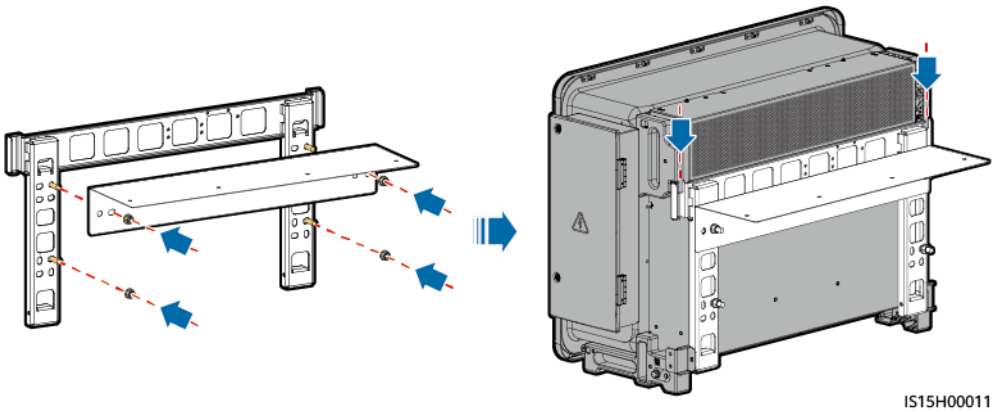
When the distance between the mounting bracket and the wall is 120 mm, the recommended dimensions of an air baffle are as follows:

Figure 4-8 Recommended air baffle dimensions



Preinstall the air baffle on the mounting bracket and then install the mounting bracket with the air baffle on the wall support.

Figure 4-9 Installing an air baffle



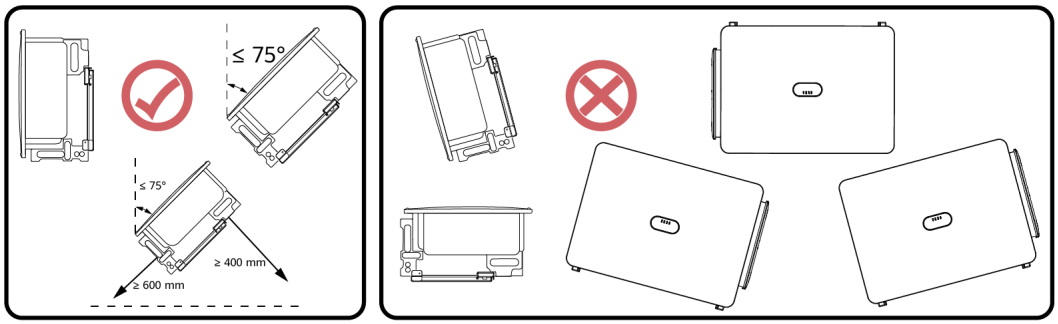
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4.2.3 Angle Requirements

The SUN2000 can be installed on a support. The installation angle requirements are as follows:

- Install the SUN2000 vertically or at a maximum back tilt of 75 degrees to facilitate heat dissipation.
- Do not install the SUN2000 at forward tilted, excessive back tilted, side tilted, horizontal, or upside down positions.

Figure 4-10 Installation angle



4.3 Preparing Tools

Table 4-2 Personal protective equipment (PPE)

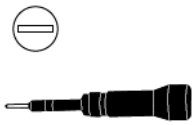
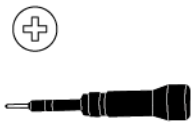
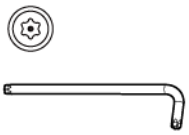
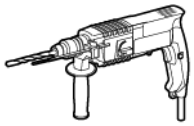
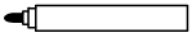
 Safety helmet	 Goggles	 Protective shoes	 Reflective vest
 Insulated gloves	 Protective gloves	 Dust mask	 Insulated shoes

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Table 4-3 Hoisting and transporting tools

 Crane	 Pallet truck	 Lifting rope	-

Table 4-4 Hardware installation tools

 Flat-head insulated torque screwdriver (M3)	 Phillips insulated torque screwdriver (M3/M4)	 Insulated torque socket wrench (M4/M10/M12, including an extended socket)	 Torx key
 Hammer drill	 Hammer drill bit (Φ14 mm)	 Utility knife	 Marker
 Insulated ladder	-	-	-

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Table 4-5 Cable installation tools

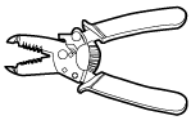
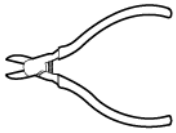
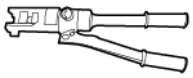
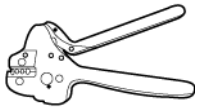
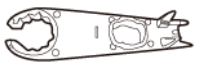
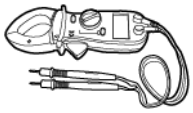
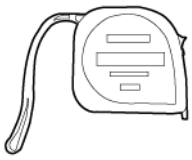
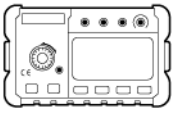
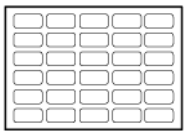
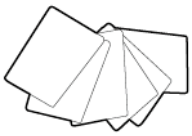
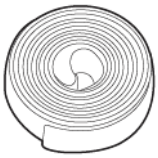
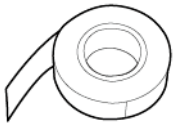
 Cable cutter	 Wire strippers	 Diagonal pliers	 Hydraulic pliers
 Heat gun	 Crimping tool H4STC0001 (AMPHENOL) or CT75A-FJB10 (AVIC JONHON)	 Removal wrench H4TW0001 (AMPHENOL) or CT75A-FJB7 (AVIC JONHON)	-

Table 4-6 Measurement instruments

 Clamp meter	 Steel measuring tape	 Level	 Multimeter DC voltage measurement range ≥ 1500 V DC
 Insulation resistance tester (output voltage > 1500 V)	-	-	-

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Table 4-7 Auxiliary materials and other tools

 Label	 Cable tie	 Cotton cloth	 Sandpaper
 Heat-shrink tubing	 Insulation tape	 Brush	 Vacuum cleaner

4.4 Checking Before Installation

Outer Packing Materials

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

NOTE

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

Package Contents

NOTICE

- After placing the equipment in the installation position, unpack it with care to prevent scratches. Keep the equipment stable during unpacking.

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

NOTE

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

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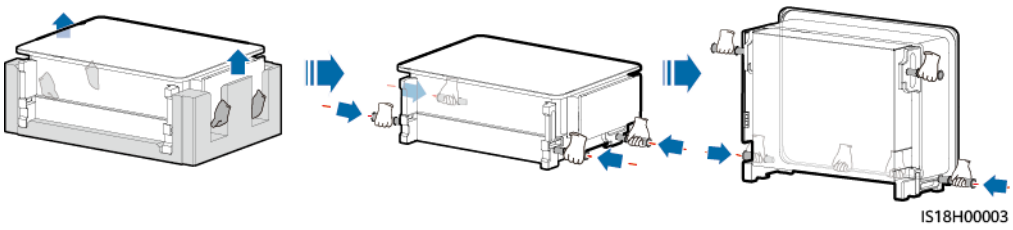
4.5 Moving the SUN2000

Step 1 Take the SUN2000 out of the packing case and move it to the installation position.

NOTICE

- After placing the equipment in the installation position, unpack it with care to prevent scratches. Keep the equipment stable during unpacking.
- Handles are packed in a fitting bag and are not delivered with the SUN2000.
- Four persons or appropriate transportation tools are required to move the SUN2000.
- Do not use the ports or wiring terminals at the bottom to support any weight of the SUN2000.
- When you need to temporally place the SUN2000 on the ground, use foam, cardboard, or other protection material to prevent damage to its enclosure.

Figure 4-11 Moving the SUN2000

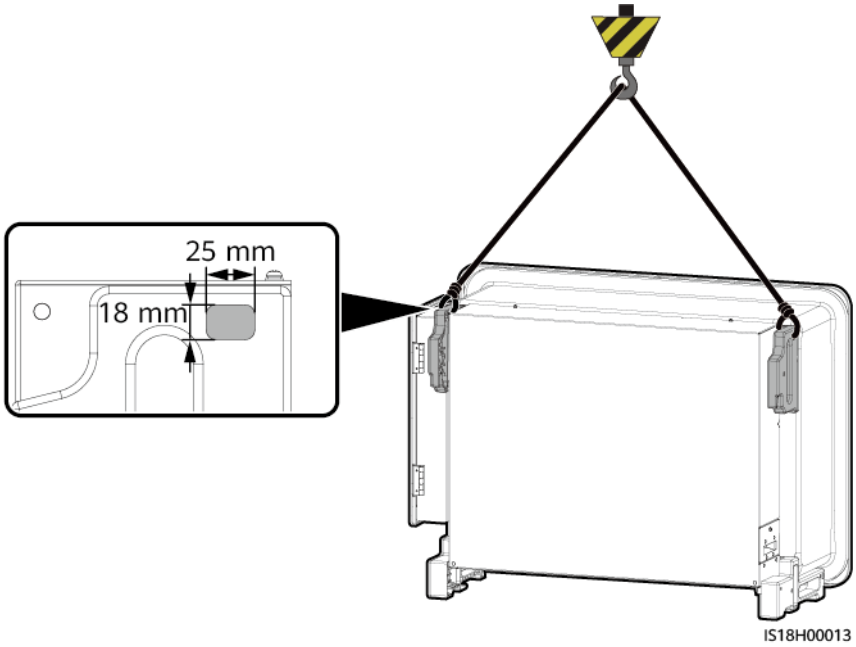


NOTE

If the installation position is high, you can hoist the SUN2000.

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Figure 4-12 Hoisting

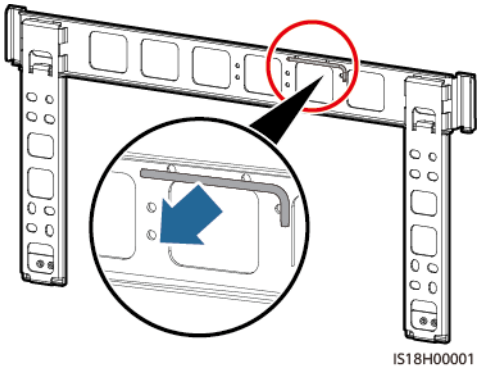


----End

4.6 Installing the SUN2000 on a Support

Step 1 Remove the torx key and store it properly.

Figure 4-13 Removing the torx key



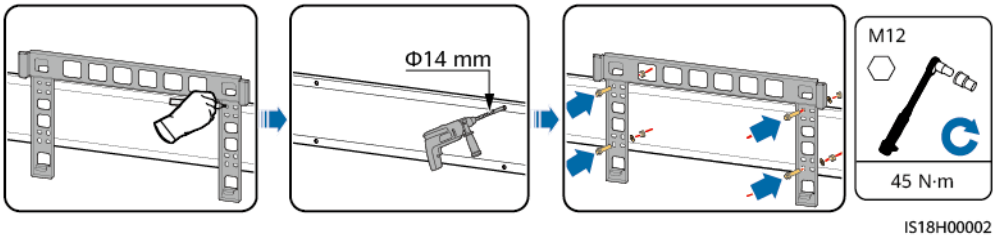
Step 2 Secure the mounting bracket.

NOTE

- The mounting bracket of the SUN2000 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.
- M12x40 bolt assemblies are delivered with the SUN2000 and bound to 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 delivered M12 nuts.

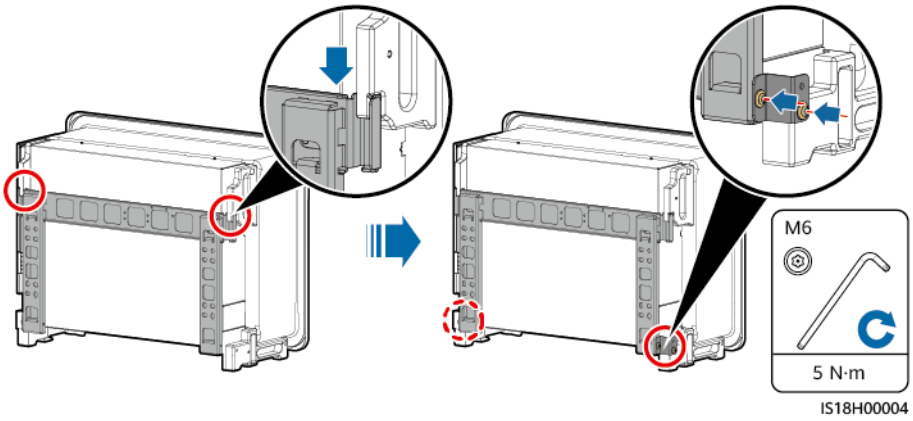
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Figure 4-14 Installing the mounting bracket



Step 3 Secure the SUN2000.

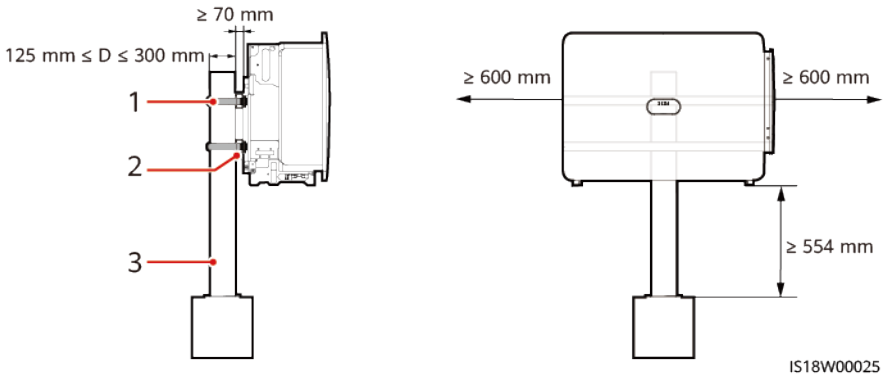
Figure 4-15 Securing the SUN2000



----End

4.7 Installing the SUN2000 on a Pole Clamp

Figure 4-16 Pole-clamp installation



(1) Square bolt clamp (2) Inverter mounting beam (3) Vertical pole

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5 Electrical Connections

5.1 Precautions

DANGER

When exposed to sunlight, the PV arrays supply DC voltage to the inverter. Before connecting cables, ensure that all **DC SWITCH** on the inverter are OFF. Otherwise, the high voltage of the inverter may result in electric shocks.

DANGER

- The site must be equipped with qualified fire fighting facilities, such as fire sand and carbon dioxide fire extinguishers.
- Wear personal protective equipment and use dedicated insulated tools to avoid electric shocks or short circuits.

WARNING

- The equipment damage caused by incorrect cable connections is beyond the warranty scope.
- Only certified electrician can perform electrical terminations.
- Operation personnel must wear PPE when connecting cables.
- Before connecting cables to ports, leave enough slack to reduce the tension on the cables and prevent poor cable connections.

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CAUTION

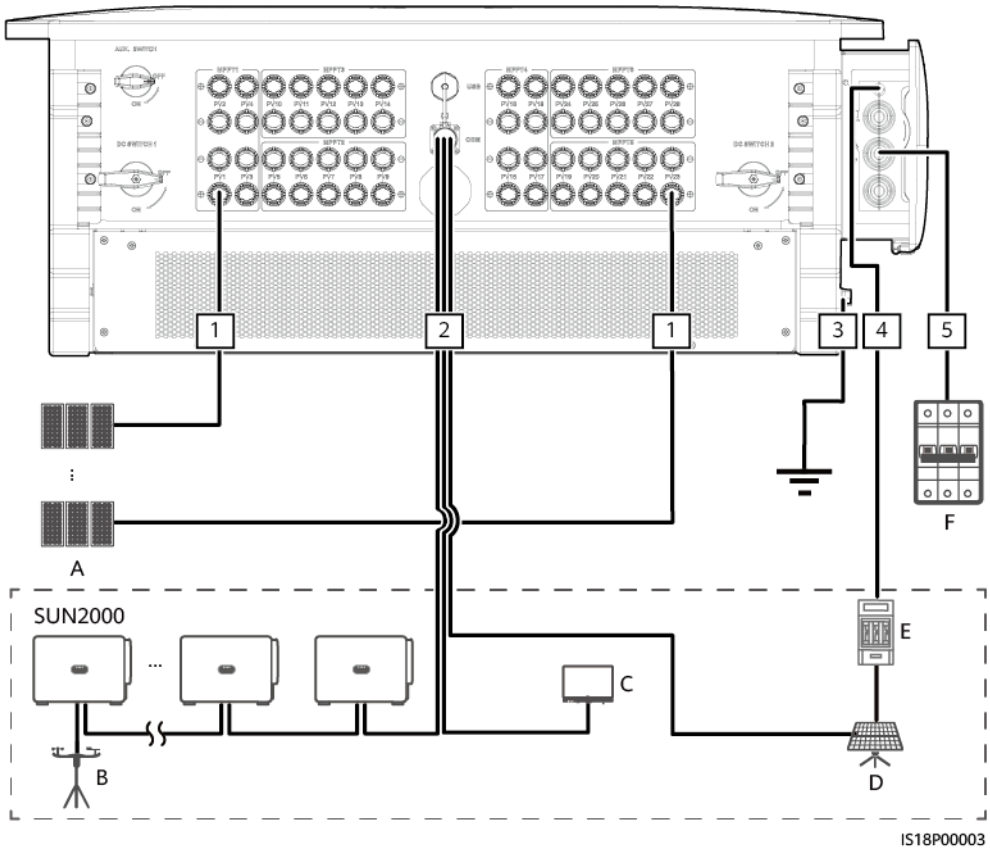
- Stay away from the equipment when preparing cables to prevent cable scraps from entering the equipment. Cable scraps may cause sparks and result in personal injury and equipment damage.
- When routing PV cables, it is recommended that the positive and negative PV string cables be routed in different pipes to prevent cable damage and short circuits caused by improper operations during construction.

NOTE

The cable colors shown in the electrical connection diagrams provided in this section 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

Figure 5-1 Cable connections (configure the components in the dotted box as required)



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Table 5-1 Component description

No.	Component	Description	Source
A	PV string	• A PV string consists of PV modules connected in series. • The SUN2000 supports 28 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 SUN2000 cascaded over RS485.	Prepared by the customer
C	SmartLogger	The SUN2000 communicates with the management system through the SmartLogger.	Purchased from the Company
D	Tracking system	The angle of trackers can be adjusted.	Prepared by the customer
E	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 shorter than or equal to 2.5 m. A fuse or a circuit breaker is recommended. • Installed between the SUN2000 and tracking control box • Fuse specifications: rated voltage ≥ 800 V; rated current: 16 A; protection: gG • Circuit breaker specifications: rated voltage ≥ 800 V; rated current: 16 A; tripping: C	Prepared by the customer
F	AC switch	To ensure that the SUN2000 can be safely disconnected from the power grid when an exception occurs, connect an AC switch to the AC side of the SUN2000. Select an appropriate AC switch in accordance with local industry standards and regulations. • Installed in the AC combiner box • Recommended: a three-phase AC circuit breaker with a rated voltage greater than or equal to 800 V AC and a rated current of 400 A	Prepared by the customer

NOTICE

The SUN2000 has an internal residual current monitoring unit (RCMU). Its external AC switch should be a three-phase circuit breaker or any other AC load circuit breaker to safely disconnect the SUN2000 from the power grid.

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NOTE

- 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.

Table 5-2 Cable description (S indicates the conductor cross-sectional area of the AC output cable, and S_p indicates the conductor cross-sectional area of the PE cable)

No.	Cable	Type	Conductor Cross-Sectional Area	Outer Diameter	Source
1	DC input power cable	PV cable that meets the 1500 V standard	4–6 mm^2	5–7.8 mm	Prepared by the customer
2	RS485 communications cable	Outdoor shielded twisted pair cable 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 terminal	$S_p \geq S/2$	-	Prepared by the customer
4	Tracking system power cable	Three-core outdoor copper cable with two layers of protection and M4 OT terminal	10 mm^2	15–18 mm	Prepared by the customer
5	AC output power cable (single-core)	(Recommended) Single-core outdoor cable and M12 OT/DT terminal	• Copper cable: – S: 120–150 mm^2 – $S_p \geq S/2$ • Aluminum alloy cable or copper-clad aluminum cable: – S: 150–400 mm^2 – $S_p \geq S/2$	14–40 mm	Prepared by the customer

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No.	Cable	Type	Conductor Cross-Sectional Area	Outer Diameter	Source
	AC output power cable (multi-core)	• If the ground point on the enclosure is used, three-core (L1, L2, and L3) outdoor cables and M12 OT/DT terminals (L1, L2, and L3) are recommended. • If the ground point in the maintenance compartment is used, four-core (L1, L2, L3, and PE) outdoor cables, M12 OT/DT terminals (L1, L2, and L3), and M10 OT/DT terminals (PE) are recommended. You do not need to prepare a PE cable.	• Copper cable: – S: 120–150 mm^2 – $S_p \geq S/2$ • Aluminum alloy cable or copper-clad aluminum cable: – S: 150–240 mm^2 (cable stripping inside the compartment); S: 300–400 mm^2 (cable stripping outside the compartment supported when protection is added) – $S_p \geq S/2$	24–66 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 cross-sectional area of the PE cable produces a conductance equivalent to that specified in this table. The specifications of the PE cable are subject to this table or calculated according to IEC 60364-5-54.
- For details about the installation procedure and precautions for cable stripping outside the compartment, see **5.5 Requirements for AC Power Cable Stripping Outside the Compartment**.

5.3 Connecting a PE Cable

Precautions

- Preferentially connect the PE cable for the SUN2000 to the ground point on the enclosure. The ground point in the maintenance compartment is used for connecting to the PE wire of a multi-core AC power cable.

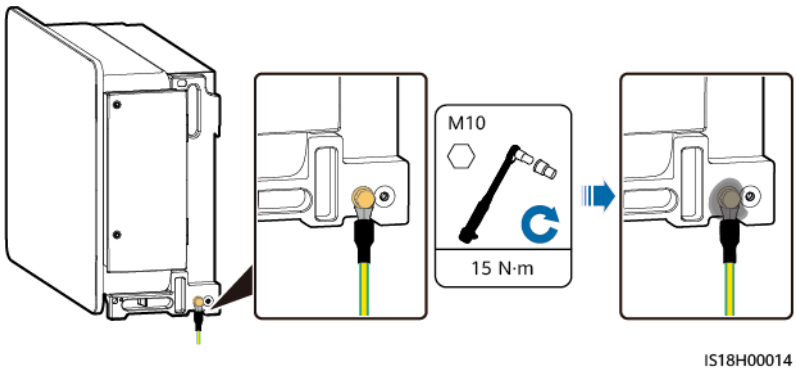
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- It is recommended that the SUN2000 be connected to a nearby ground point. For a system with multiple SUN2000s connected in parallel, connect the ground points of all SUN2000s to ensure equipotential connections to PE cables.

Procedure

Step 1 Connect the PE cable to the ground point. To enhance the corrosion resistance of a ground terminal, apply silicone grease or paint on it after connecting the PE cable.

Figure 5-2 Connecting a PE cable to the ground point (on the enclosure)



----End

5.4 Connecting an AC Output Power Cable

Precautions

- A three-phase AC switch should be installed on the AC side of the SUN2000. To ensure that the SUN2000 can safely disconnect itself from the power grid when an exception occurs, select a proper overcurrent protection device in compliance with local power distribution regulations.
- The SUN2000 is integrated with a comprehensive residual current detection unit to distinguish fault current from residual current. Upon detecting that the residual current exceeds the threshold, the SUN2000 immediately disconnects from the power grid.

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WARNING

- Do not connect loads between an inverter and an AC switch that directly connects to the inverter. Otherwise, the switch may trip by mistake.
- If an AC switch is used with specifications beyond local standards, regulations, or the Company's recommendations, the switch may fail to turn off in a timely manner in case of exceptions, causing serious faults.
- Do not open the panel of the SUN2000.
- Before opening the maintenance compartment door, ensure that no electrical connections are made for the SUN2000 on the AC or DC side.
- Do not open the maintenance compartment door on rainy or snowy days. If you need to, take protective measures to prevent rain or snow from entering the maintenance compartment. If protective measures cannot be taken, do not open the maintenance compartment door.
- Do not leave unused screws in the maintenance compartment.

CAUTION

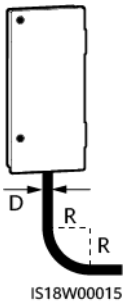
Each inverter shall be equipped with an AC output switch. Multiple inverters shall not connect to the same AC switch.

NOTICE

- The distance between each SUN2000 and the AC combiner box or the low-voltage cabinet of the transformer station must be at least 10 m, or the total distance between two adjacent SUN2000s and the AC combiner box or the low-voltage cabinet of the transformer station must be at least 20 m.
- 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 cables are connected securely and insulated properly (using three-way breakout boots and cold/heat shrink tubing). Otherwise, the SUN2000 may fail to operate, or become overheated during operation due to an unreliable connection, which will damage the terminal block. The resulting device damage is not covered by the warranty.
- In the quick scheduling scenario with MBUS communication networking, connect AC power cables in the maintenance compartment from left to right in the sequence of L1, L2, and L3.

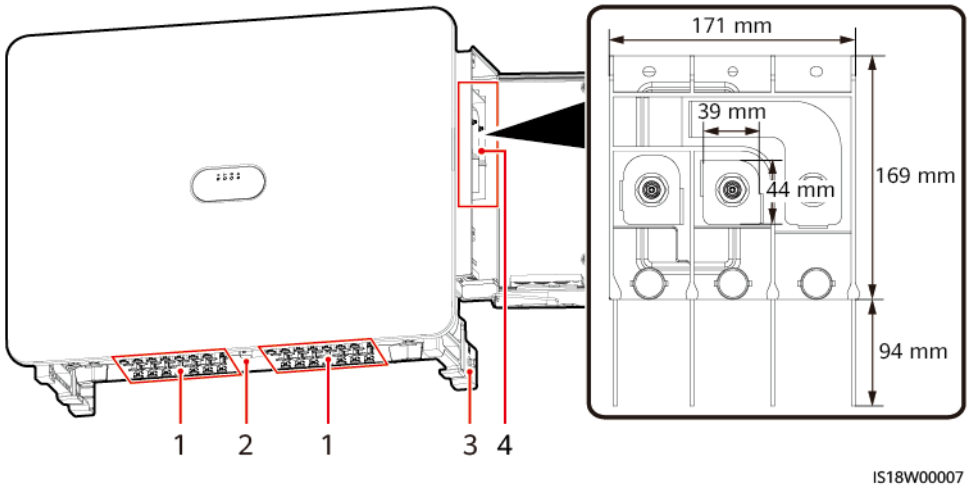
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Table 5-3 Bending radius requirements for AC power cables

Picture	Single-core Cable		Three-core or Four-core Cable	
	Unarmored	Armored	Unarmored	Armored
	R ≥ 20D	R ≥ 15D	R ≥ 15D	R ≥ 12D
	R indicates the bending radius, and D indicates the outer diameter of the cable. **NOTE** The AC power cable must be routed vertically into the maintenance compartment.			

Wiring Area

Figure 5-3 Wiring ports



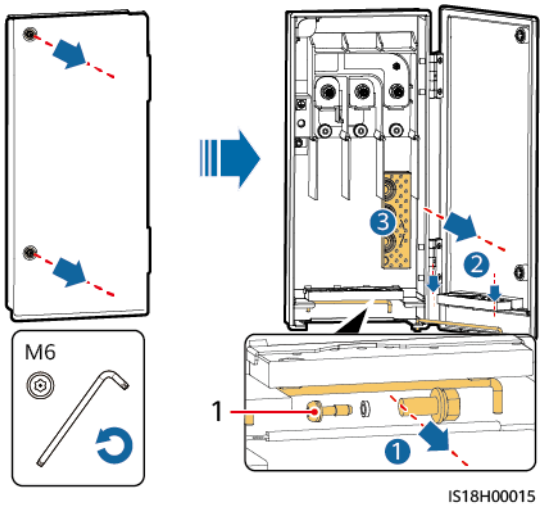
(1) DC input terminals
(2) RS485 communications port
(3) Ground point on the enclosure
(4) AC terminal block

Procedure

Step 1 Open the maintenance compartment door and install the support strut. Remove the accessories and set them aside.

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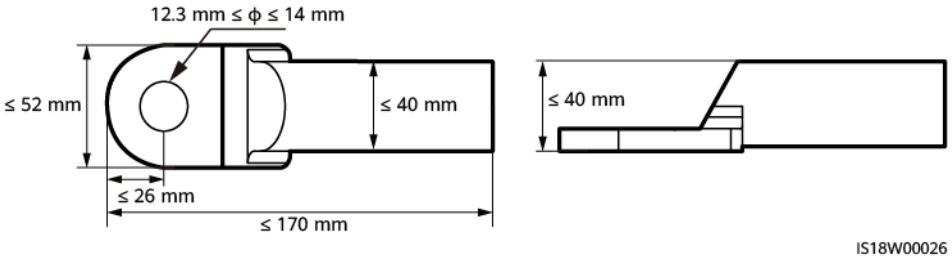
Figure 5-4 Opening a maintenance compartment door



(1) Position for binding the ground screw

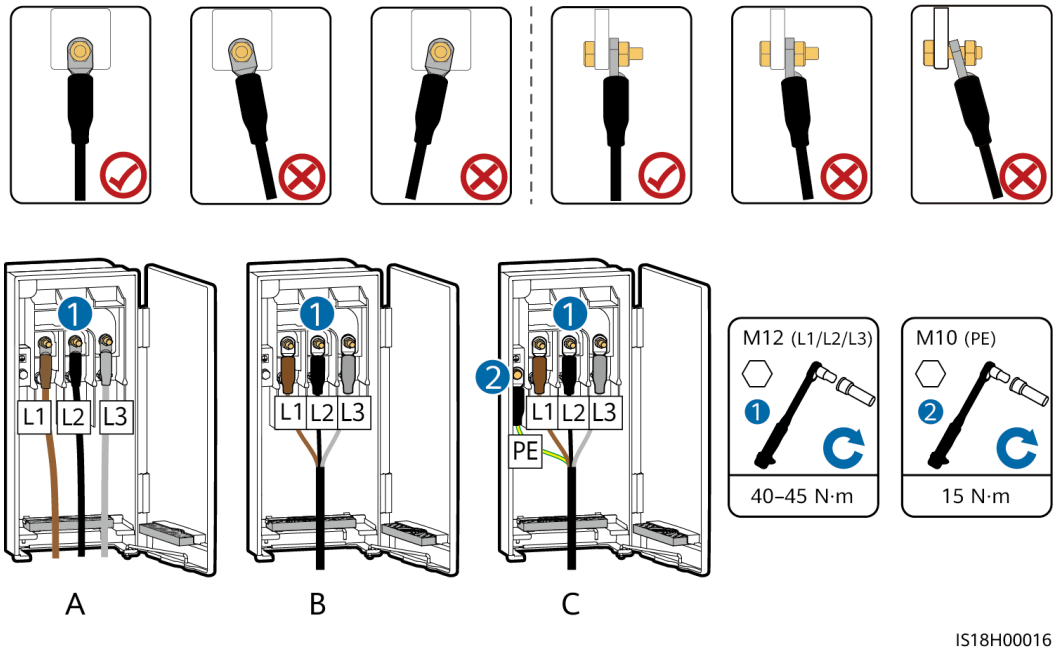
Step 2 Connect the AC output power cables based on the cable type.

Figure 5-5 Specifications of the crimped OT/DT terminal



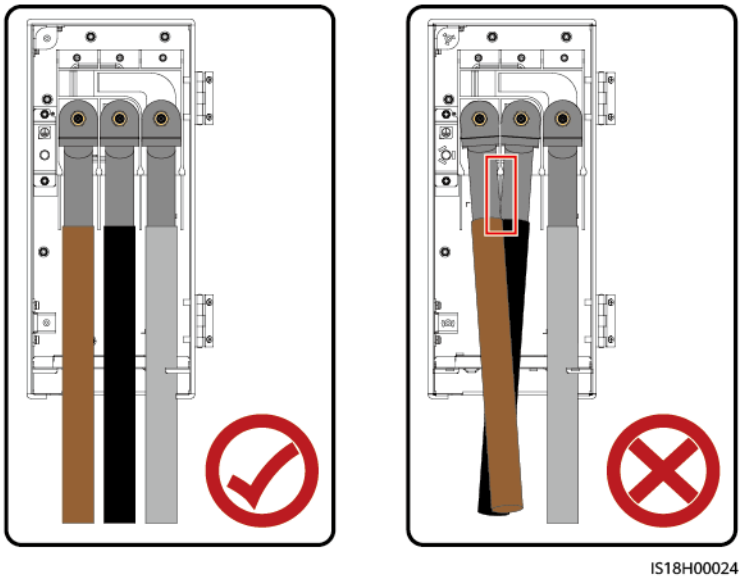
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Figure 5-6 Cable connection 1



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

Figure 5-7 Cable connection 2

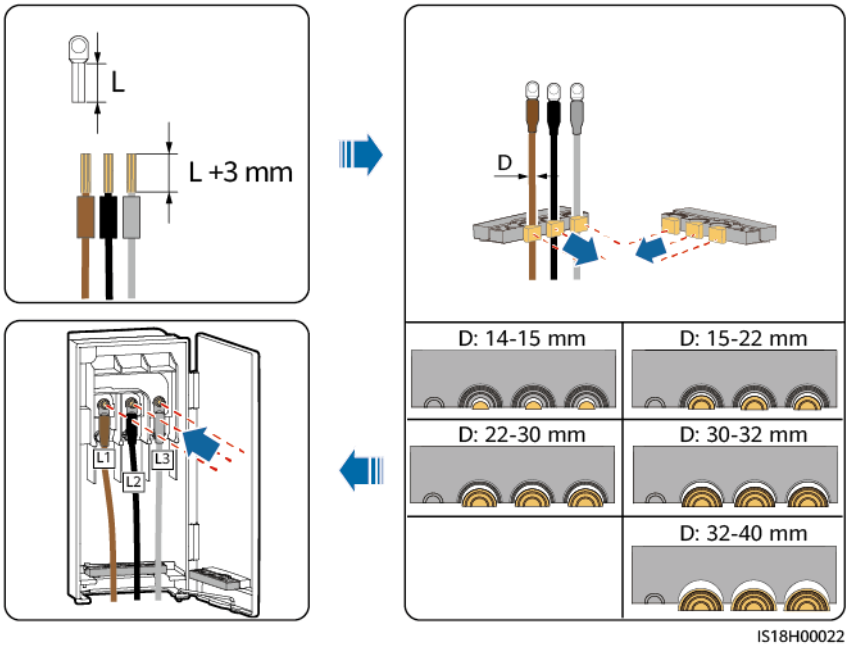


NOTICE

- Reserve sufficient slack for the PE cable to ensure that the last cable bearing the force is the PE cable when the AC output power cable is subject to a pulling force due to force majeure.
- After cables are connected, prevent them from contacting the inter-phase baffle plates.

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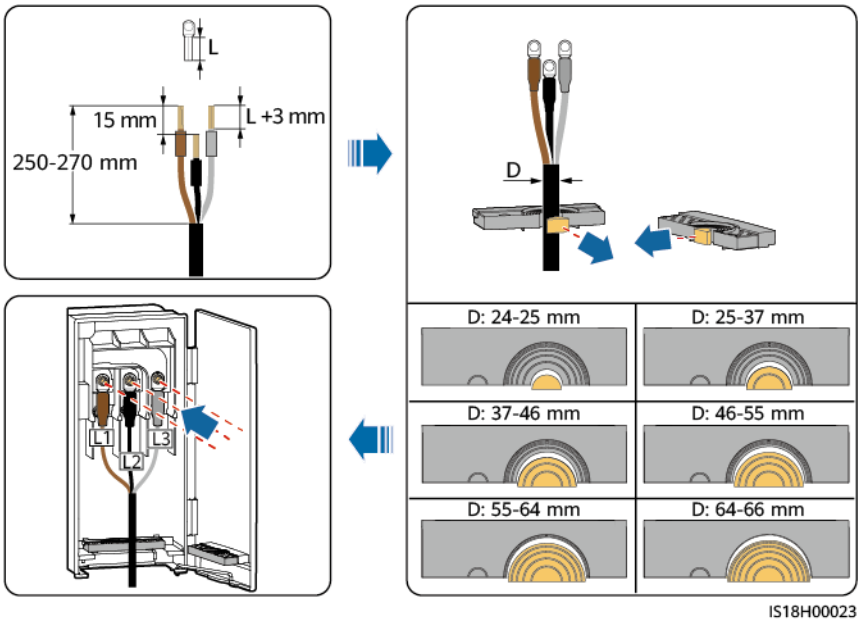
Figure 5-8 Single-core cable connection



NOTICE

If a multi-core cable is used, it is recommended that the stripping length of the L2 wire be 15 mm shorter than those of the L1 and L3 wires.

Figure 5-9 Multi-core cable connection (using a three-core cable as an example)



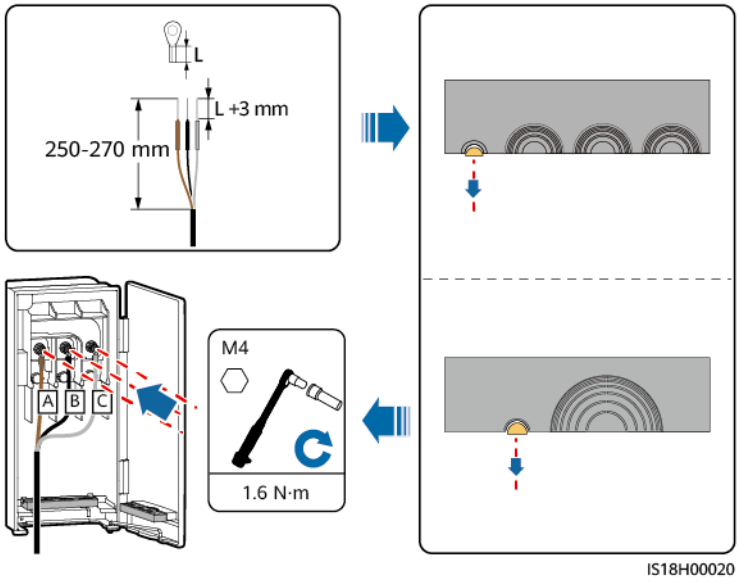
Step 3 If the system is configured with a tracking system, connect the power cable of the tracking system.

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WARNING

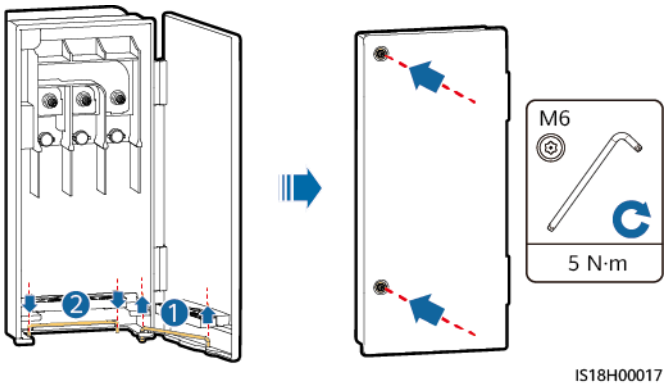
- The tracking system obtains power from the AC three-phase power grid. The rated voltage of the power supply is the rated output voltage of the SUN2000.
- Keep flammable materials away from cables.
- Cables must be protected with a conduit to prevent short circuits caused by insulation layer damage.

Figure 5-10 Connecting a power cable of the tracking system



Step 4 Clear foreign matter from the maintenance compartment, close the maintenance compartment door, and check that the cable holes at the bottom of the maintenance compartment are sealed.

Figure 5-11 Closing a door



----End

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5.5 Requirements for AC Power Cable Stripping Outside the Compartment

Materials

Material	Specifications	Source
Cold/Heat shrink tubing	Matches the cable and has anti-ultraviolet radiation performance.	Prepared by the customer
Three-way breakout boot	Matches the cable.	Prepared by the customer
Electrical conduit	• Inner diameter ≥ 1.5 x Cable outer diameter • Material: stainless steel pipe or PVC pipe. Steel pipes cannot be used in corrosive environments. • Anti-ultraviolet radiation	Prepared by the customer
Sealing putty	-	Prepared by the customer

Procedure

Step 1 Strip the AC power cable. The distance between the cable stripping end and the ground must be greater than or equal to 300 mm.

Step 2 Ensure that the cable stripping end is even, wrap it with the insulation tape, and then install the three-way breakout boot and cold/heat shrink tubing.

Step 3 Crimp OT/DT terminals.

Step 4 Cut the electrical conduit to a proper length based on the actual installation height and design requirements. Ensure that the lower end of the electrical conduit is greater than or equal to 300 mm above the ground. Route the AC power cable through the electrical conduit.

Step 5 Adjust the cable and electrical conduit to be vertical. Seal the bottom of the electrical conduit with waterproofing materials. After the waterproofing measure is complete, backfill and compact the ground.

Step 6 Connect the AC power cable.

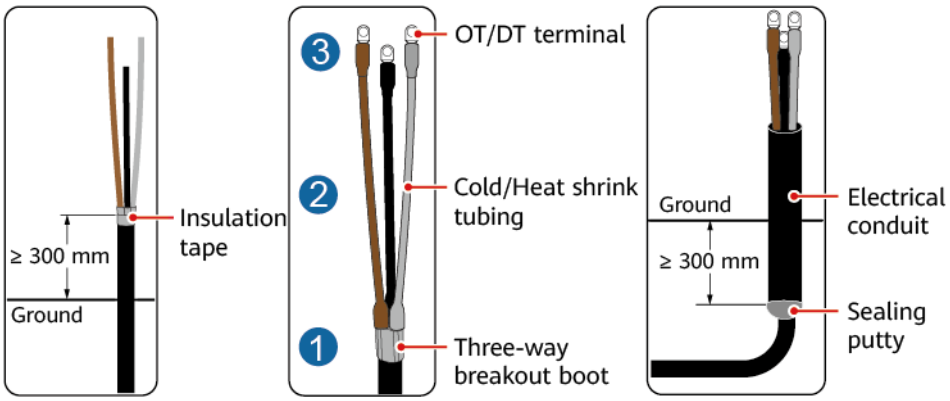
Step 7 Close the maintenance compartment door, and seal the cable inlet of the maintenance compartment and cable top outlet of the electrical conduit with fireproofing materials.

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NOTICE

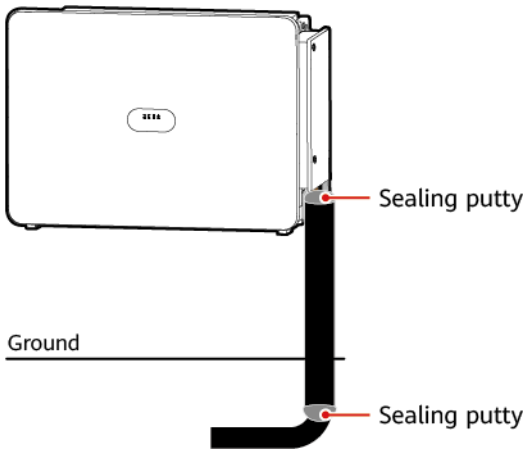
- Waterproofing measures must be taken at the bottom of the electrical conduit. The electrical conduit and cable must be vertical. Ensure that the upper end is vertically routed into the maintenance compartment and the lower end is vertically routed into the ground.
- After the electrical conduit is routed into the ground, the underground cable must meet the bending radius requirements of the AC power cable.
- The bottom of the electrical conduit must be sealed with waterproofing materials to prevent water or moisture from entering the electrical conduit and reducing the cable insulation performance.
- Prevent stress on the inverter wiring terminals from the cable during backfilling.
- After stripping the jacket off the three-core cable, route the wires into the inverter maintenance compartment as three single-core cables. Take fireproofing and waterproofing measures at the cable inlet of the maintenance compartment to prevent water or moisture from entering the electrical conduit and reducing the cable insulation performance.
- The armored layer of the cable must be grounded according to the design requirements.
- Wires between the maintenance compartment and electrical conduit must not be exposed to the air. Protective measures must be taken.

Figure 5-12 Cable protection



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Figure 5-13 Installation completed



----End

5.6 Connecting DC Input Power Cables

Precautions

DANGER

- Before connecting DC input power cables, ensure that the DC voltage is within the safe range (lower than 60 V DC) and that the **AUX. SWITCH** and all **DC SWITCH** of the SUN2000 are **OFF**. Otherwise, the high voltage may result in electric shocks.
- When the SUN2000 operates in grid-tied mode, do not perform maintenance or operations on the DC input power cables, such as connecting or disconnecting a PV string or a PV module in the PV string. Otherwise, electric shocks or arcing (which may cause fire) may occur.
- For details about how to remove and insert DC input connectors, see **8.3 Power-Off for Maintenance**.

WARNING

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

- The open-circuit voltage of each PV string must be lower than or equal to 1500 V DC under any circumstances.
- The polarities of electric connections must be correct on the DC input side. The positive and negative terminals of a PV string must be connected to corresponding positive and negative DC input terminals of the SUN2000.

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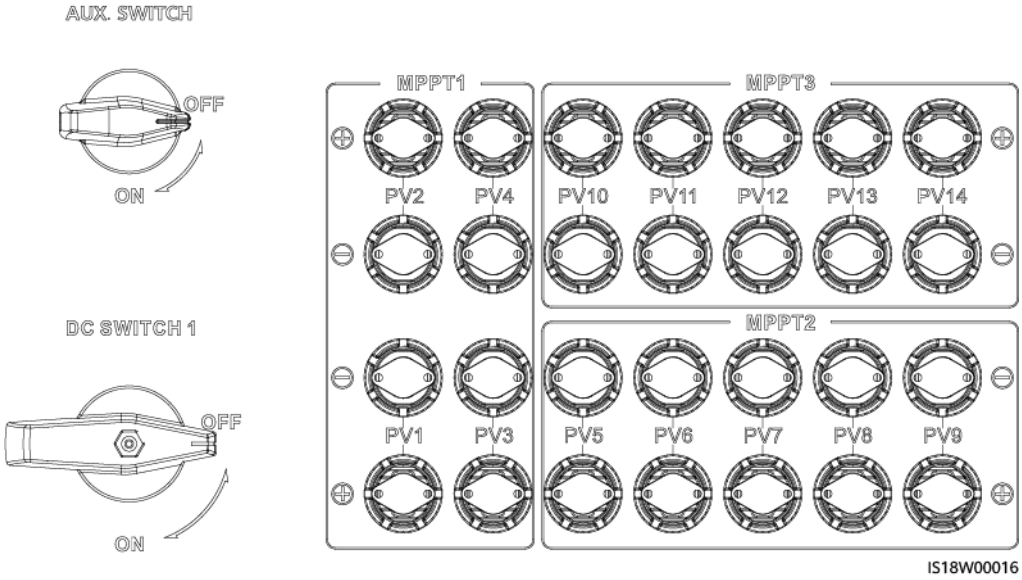
NOTICE

- Ensure that the PV module output is well insulated to ground.
- The PV strings connecting to the same MPPT circuit should use the same model and quantity of PV modules.
- The SUN2000 does not support full parallel connection for PV strings (full parallel connection: PV strings connect to one another in parallel outside the SUN2000 and then connect to it separately).
- The SUN2000 does not support Y-branch PV connectors.
- During the installation of PV strings and the SUN2000, the positive or negative terminals of PV strings may be short-circuited to ground if the power cables are not properly installed or routed. In this case, an AC or DC short circuit may occur and damage the SUN2000. The resulting device damage is not covered under any warranty.

Terminal Description

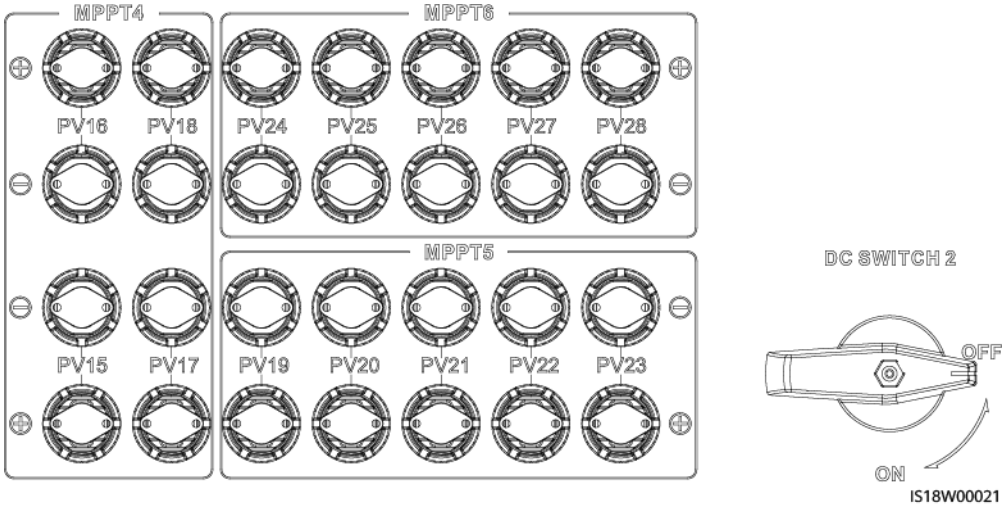
The SUN2000 provides 28 DC input terminals, which are controlled by its two DC switches. DC SWITCH 1 controls the DC input terminals PV1–PV14 and DC SWITCH 2 controls the DC input terminals PV15–PV28.

Figure 5-14 DC terminals controlled by DC SWITCH 1



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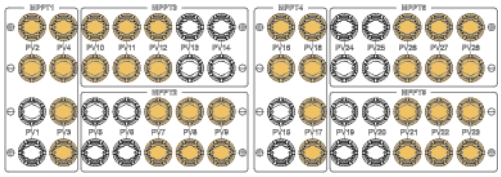
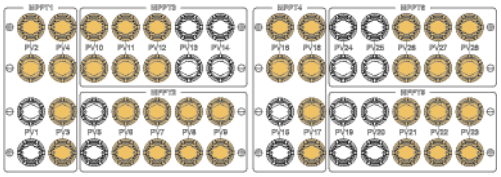
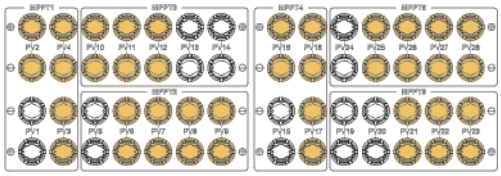
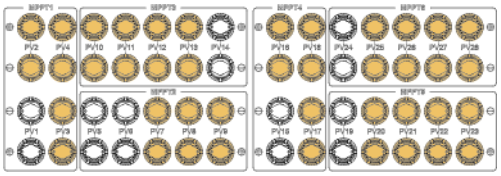
Figure 5-15 DC terminals controlled by DC SWITCH 2



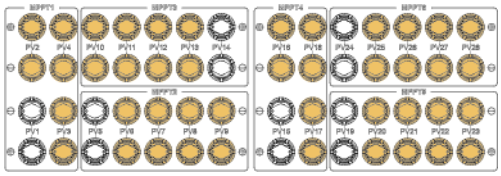
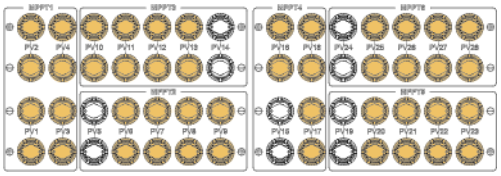
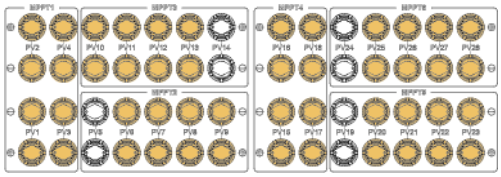
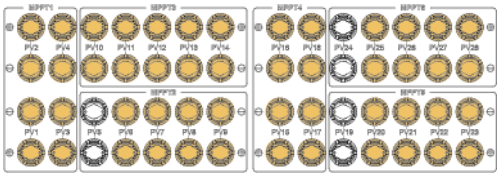
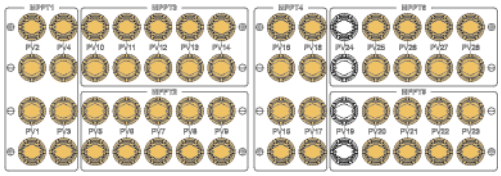
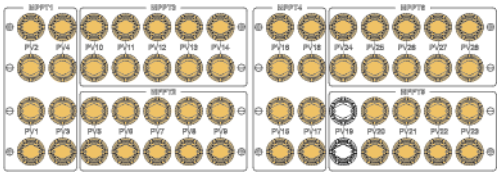
Requirements for selecting DC input terminals:

1. DC input terminal PV10 must be connected to a PV string.
2. At least one PV string is connected to the DC input terminals PV1–PV9.
3. It is recommended that DC input terminals be evenly distributed on MPPTs.
4. If 210 mm PV modules are used, a maximum of four PV strings can be connected to each MPPT.

For example, if there are 18 to 27 PV strings, you are advised to connect DC input terminals as follows:

Number of PV Strings	Terminal Selection	Number of PV Strings	Terminal Selection
18	Connect to PV2–PV4, PV7–PV12, PV16–PV18, PV21–PV23, and PV26–PV28. 	19	Connect to PV2–PV4, PV6–PV12, PV16–PV18, PV21–PV23, and PV26–PV28. 
20	Connect to PV2–PV4, PV6–PV12, PV16–PV18, PV21–PV23, and PV25–PV28. 	21	Connect to PV2–PV4, PV7–PV13, PV16–PV18, PV20–PV23, and PV25–PV28. 

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Number of PV Strings	Terminal Selection	Number of PV Strings	Terminal Selection
22	Connect to PV2–PV4, PV6–PV13, PV16–PV18, PV20–PV23, and PV25–PV28. 	23	Connect to PV1–PV4, PV6–PV13, PV16–PV18, PV20–PV23, and PV25–PV28. 
24	Connect to PV1–PV4, PV6–PV13, PV15–PV18, PV20–PV23, and PV25–PV28. 	25	Connect to PV1–PV4, PV6–PV18, PV20–PV23, and PV25–PV28. 
26	Connect to PV1–PV18, PV20–PV23, and PV25–PV28. 	27	Connect to PV1–PV18 and PV20–PV28. 

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Procedure

NOTICE

- For the SUN2000-250KTL-H3/280KTL-H0/300KTL-H0, use the CT75A-1T-34/CT75A-1T-35 (AVIC JONHON) PV connectors delivered with the SUN2000. If the PV connectors are lost or damaged, purchase the connectors of the same model. The device damage caused by incompatible PV connectors is not covered under any warranty.
- For the SUN2000-330KTL-H1/330KTL-H2/250KTL-H1, use the HH4SFD4TMS/HH4SMD4TMS (AMPHENOL) PV connectors delivered with the SUN2000. If the PV connectors are lost or damaged, purchase the connectors of the same model. The device damage caused by incompatible PV connectors is not covered under any warranty.
- AVIC JONHON and AMPHENOL PV connectors cannot be used together.
- The DC voltage measurement range of the multimeter must be at least 1500 V.
- If the voltage is a negative value, the DC input polarity is incorrect. Rectify the connection.
- If the voltage is greater than 1500 V, too many PV modules are connected to the same string. Remove some PV modules.
- Connect the connectors on the PV strings to the connectors on the inverter, and pull back the connectors on the PV strings along the axial direction to check whether the connectors are securely installed.
- Ensure that the connectors are properly connected. Any connector damage due to improper connection is not covered by the warranty.

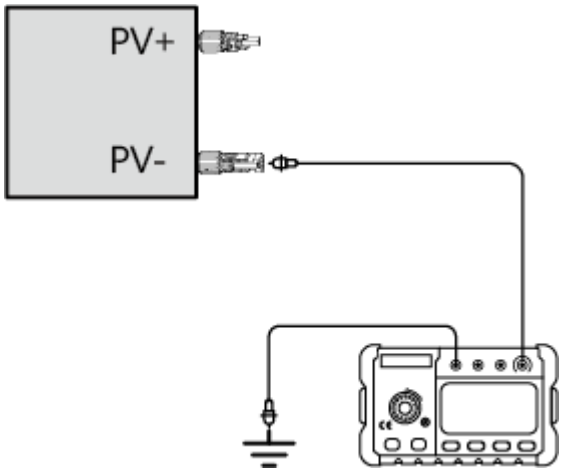
Step 1 Before connecting PV strings to the SUN2000, ensure that the insulation resistance of each PV string to the ground is normal.

Test method: Use an insulation resistance tester to test the insulation resistance of the PV– cable to the ground. Add a DC voltage of more than 1500 V between the PV– cable and the ground and check the insulation resistance.

- If the insulation resistance is greater than or equal to 1 MΩ, the insulation resistance is normal.
- If the insulation resistance is less than 1 MΩ, troubleshoot the insulation fault of the cable or PV string.

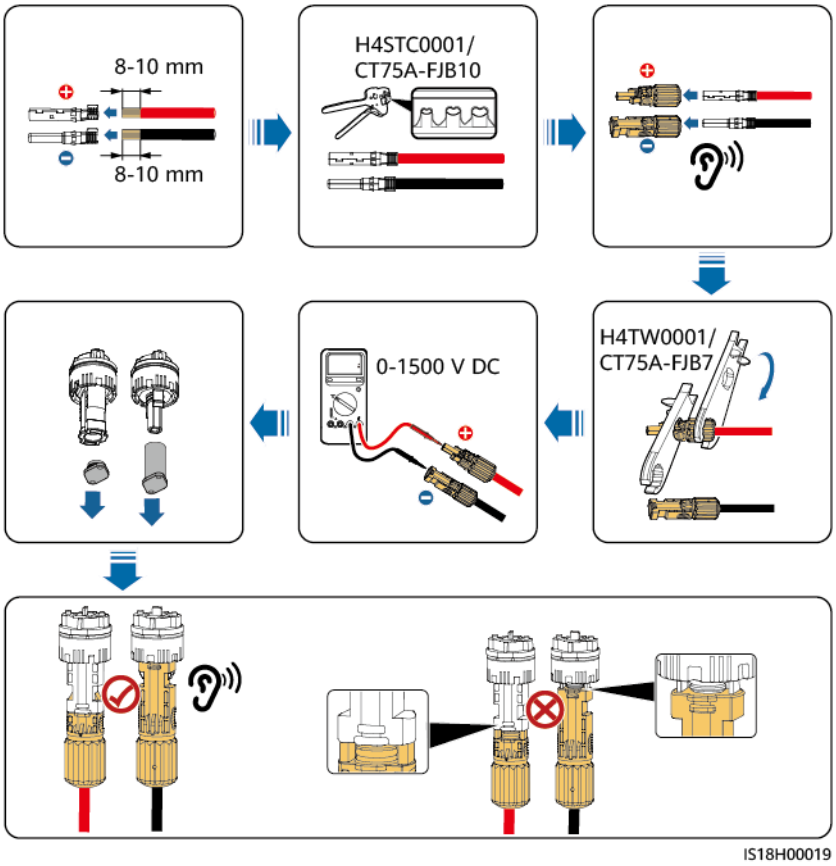
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Figure 5-16 Testing the insulation resistance



Step 2 Connect DC input power cables.

Figure 5-17 Connecting DC input power cables



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NOTICE

When installing DC input power cables, leave at least 150 mm of slack. The axial tension on PV connectors must not exceed 80 N. Radial stress or torque must not be generated on PV connectors.

----End

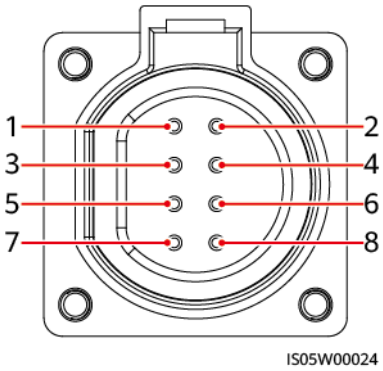
5.7 Connecting Signal Cables

Precautions

When routing communications cables, separate communications cables from power cables to prevent communication from being affected.

COM Port Pin Definitions

Figure 5-18 Communications port



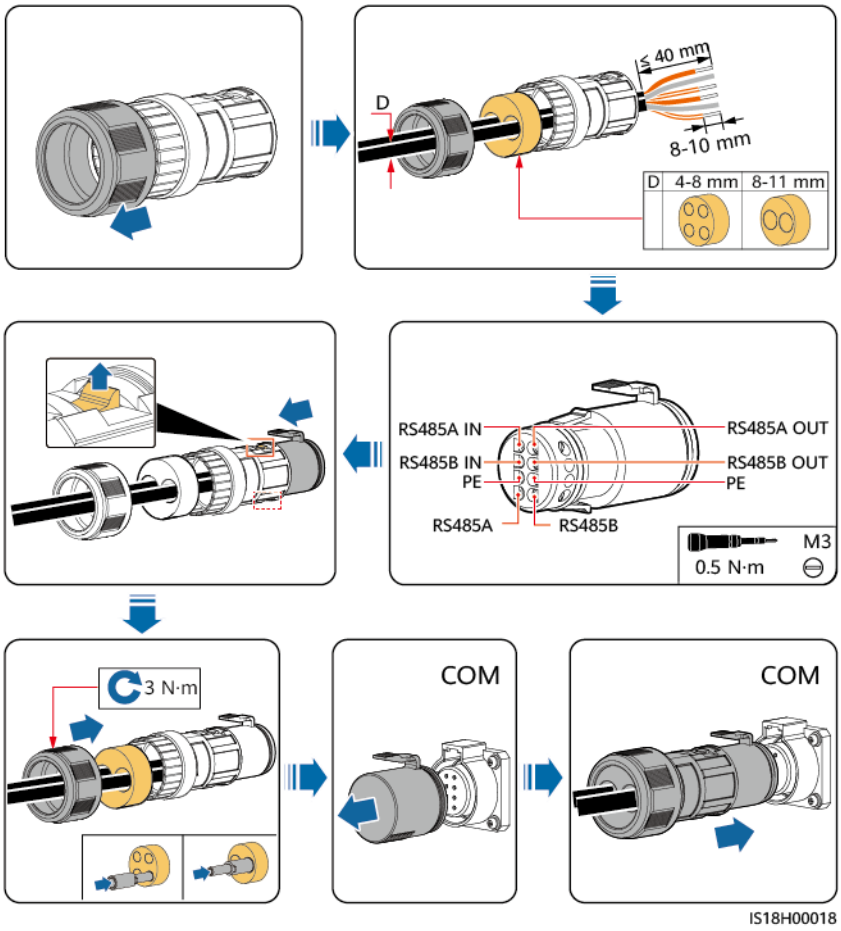
Port	Pin	Definition	Pin	Definition	Description
RS485-1	1	RS485A IN, RS485 differential signal+	2	RS485A OUT, RS485 differential signal+	Used to cascade SUN2000s or connect devices such as the SmartLogger.
	3	RS485B IN, RS485 differential signal–	4	RS485B OUT, RS485 differential signal–	
PE	5	PE, shield layer grounding	6	PE, shield layer grounding	-
RS485-2	7	RS485A, RS485 differential signal+	8	RS485B, RS485 differential signal–	Used to connect an RS485 slave device.

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Procedure

Step 1 Connect the RS485 communications cables.

Figure 5-19 Connecting communications cables



NOTICE

Use a plug to block the unused cable hole with the waterproof rubber ring, and then tighten the locking cap.

----End

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6 Check Before Power-On

No.	Check Item	Acceptance Criteria
1	Overall installation	• The SUN2000 is installed correctly and securely. • The installation space is proper, and the installation environment is clean and tidy.
2	Appearance	• The SUN2000 exterior is intact without deviation, deformation, peeling paint, or rust. • Cables are intact and routed neatly.
3	Switch	The **AUX. SWITCH**, **DC SWITCH**, and downstream AC output switch are **OFF**.
4	PE cable	• The PE cable is connected correctly, securely, and reliably. • The resistance of a bond is less than 0.1 ohms.
5	AC power cable	AC power cables are connected correctly and securely.
6	Maintenance compartment	• The maintenance compartment interior is clean and tidy without foreign matter • After the check, ensure that the maintenance compartment door is closed and the screws on the door are tightened.
7	DC power cable	DC power cables are connected correctly and securely.
8	Unused port	• Unused DC terminals are sealed with sealing plugs. • Unused COM and USB ports are plugged with waterproof plugs.

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7 Power-On and Commissioning

7.1 Powering On the SUN2000

DANGER

- Wear personal protective equipment and use dedicated insulated tools to avoid electric shocks or short circuits.

WARNING

When the grid connection indicator is steady green (the SUN2000 is connected to the power grid), do not turn on the DC switch. Otherwise, the SUN2000 may be damaged because insulation resistance detection is not performed.

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NOTICE

- Before the equipment is put into operation for the first time, ensure that the parameters are set correctly by professional personnel. Incorrect parameter settings may result in noncompliance with local grid connection requirements and affect the normal operations of the equipment.
- Before turning on the AC switch between the SUN2000 and the power grid, check that the AC voltage is within the specified range using a multimeter.
- If a SUN2000 has not been running for more than half a year after being mounted, it must be checked and tested by professionals before being put into operation.
- Upon the first power-on, ensure that the **AUX. SWITCH** is turned on first. After the PV connection indicator is steady green and the alarm indicator is steady red, turn on **DC SWITCH 1** and **DC SWITCH 2**. After the system is successfully connected to the power grid, turn off the **AUX. SWITCH**. The Company shall not be liable for any device damage caused by operations performed in wrong sequence.
- The DC switches implement automatic disconnection. If cables are reversely connected or PV modules are not properly configured, the DC switches automatically turn off for protection. In this case, clear the alarm on the app and turn on the DC switches only after confirming that the alarm is cleared. Device damage caused by forcible switch-on after the DC switches turn off is not covered by the warranty.
- When the system is powered on or running, ensure that there are no obstacles in path of travel of the DC switch handles (for example, the handle is not stuck by cables or mistakenly held by hands) to ensure that the handles can move freely. Otherwise, the DC switches cannot automatically turn off.
- If you perform **Step 3** before **Step 2**, the SUN2000 reports a fault about unexpected shutdown. You can start the SUN2000 only after the fault is automatically rectified.

Step 1 Wear proper personal protective equipment (PPE).

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

Step 3 Set the **AUX. SWITCH** at the bottom of the SUN2000 to **ON**. When you hear a click, the switch is completely turned on. Observe the LED indicators.

Step 4 If the PV connection indicator is steady green and the alarm indicator is steady red, set **DC SWITCH 1** and **DC SWITCH 2** to **ON**. Observe the LED indicators to check the operating status of the SUN2000.

If the PV connection indicator is off 1 minute after the SUN2000 is powered on, do not turn on the **DC SWITCH**. Turn off the **AUX. SWITCH** immediately and check whether the input power cables are reversely connected or whether the input voltage meets the startup voltage requirements. After the fault is rectified, perform step **Step 3** again. If the PV connection indicator is off, turn off the **AUX. SWITCH** and contact technical support engineers.

Step 5 If the SUN2000 is running properly, turn off the **AUX. SWITCH**.

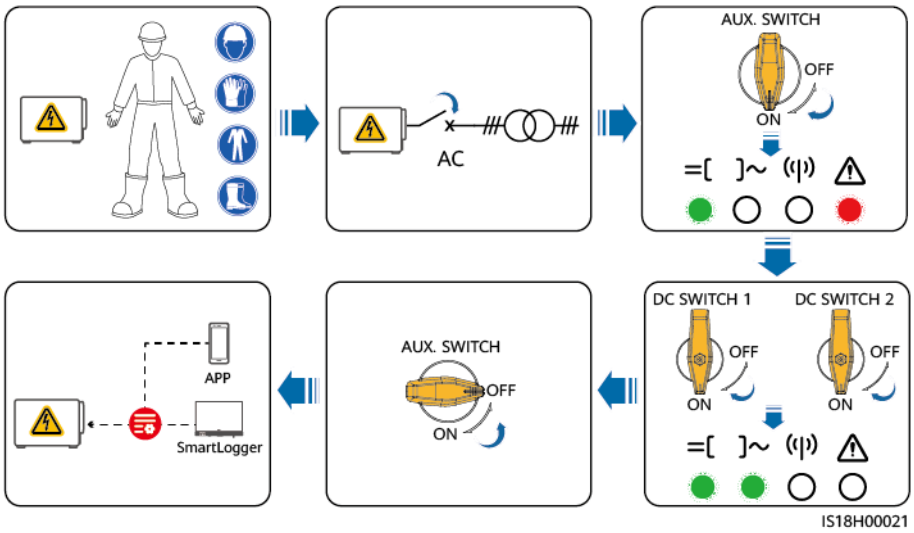
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NOTICE

The **AUX. SWITCH** needs to be turned on only when the system is powered on for the first time and needs to be turned off during subsequent operation.

Step 6 Set the parameters on the app or SmartLogger. For details, see **7.3 Commissioning the SUN2000 (Using the SmartLogger)** or the *SmartLogger User Manual*.

Figure 7-1 Power-on



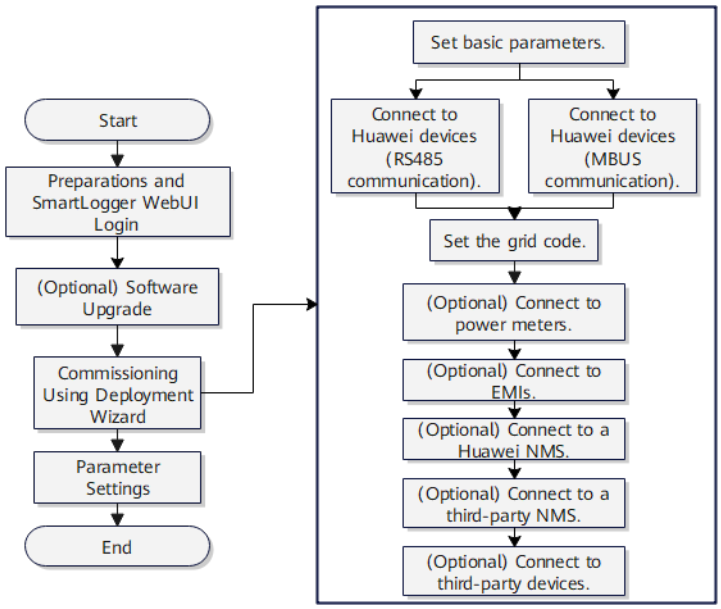
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7.2 Commissioning Methods and Process

The SUN2000 can be commissioned on the SmartLogger WebUI or FusionSolar app. You are advised to use the SmartLogger WebUI for deployment commissioning and use the app for password resetting and alarm viewing.

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Figure 7-2 Commissioning process using the SmartLogger



7.3 Commissioning the SUN2000 (Using the SmartLogger)

7.3.1 Preparations and SmartLogger WebUI Login

For details about preparations and WebUI login, see **SmartLogger3000 User Manual**.

7.3.2 Software Upgrade

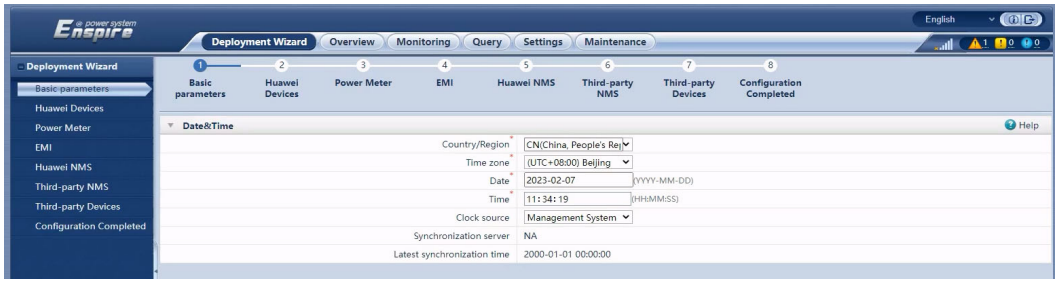
For details about software upgrade, see the **SmartLogger3000 User Manual**.

7.3.3 Commissioning Using Deployment Wizard

Procedure

Step 1 Set basic parameters.

Figure 7-3 Setting basic parameters

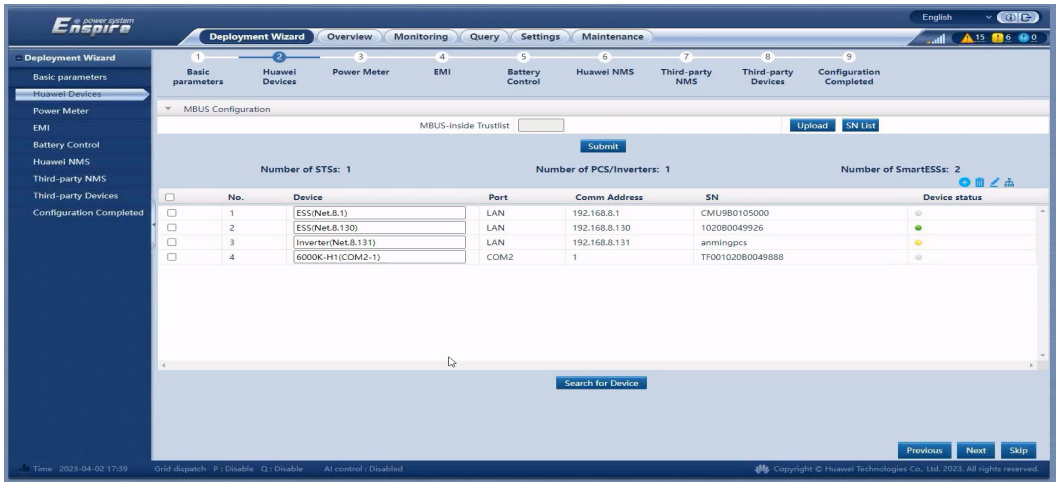


Step 2 Connect to Huawei devices.

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- For RS485 communication, click **Search for Device**. The address is automatically allocated.

Figure 7-4 RS485 communication



- For MBUS communication, choose **Monitoring** > **MBUS** > **Networking Settings** > **SN List** > **Template** to download the SN list template. Return to the deployment wizard, click **Upload**, and upload the configured template file.

Figure 7-5 Downloading the SN list template

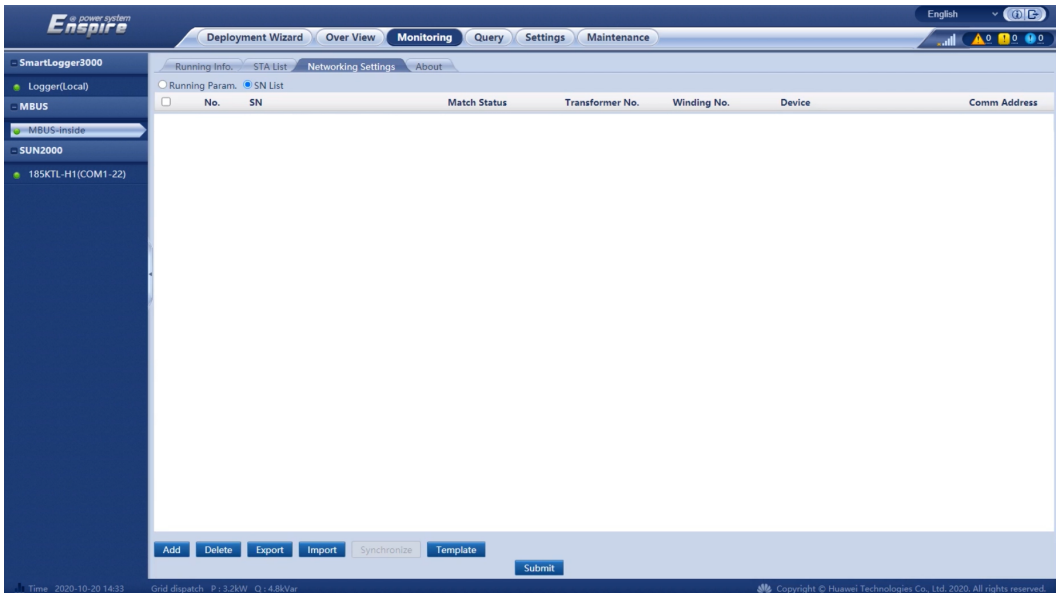
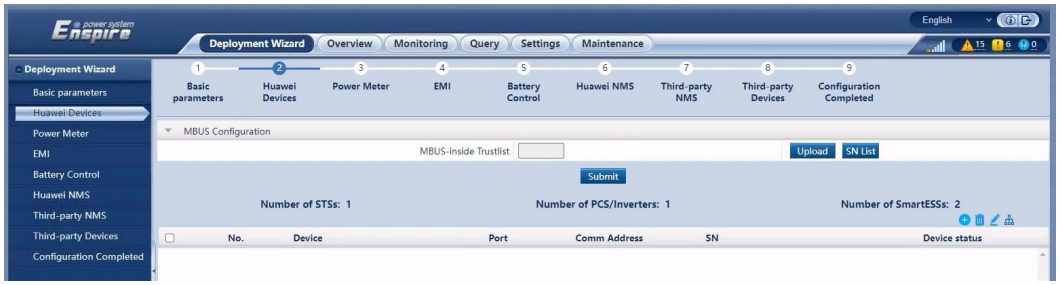


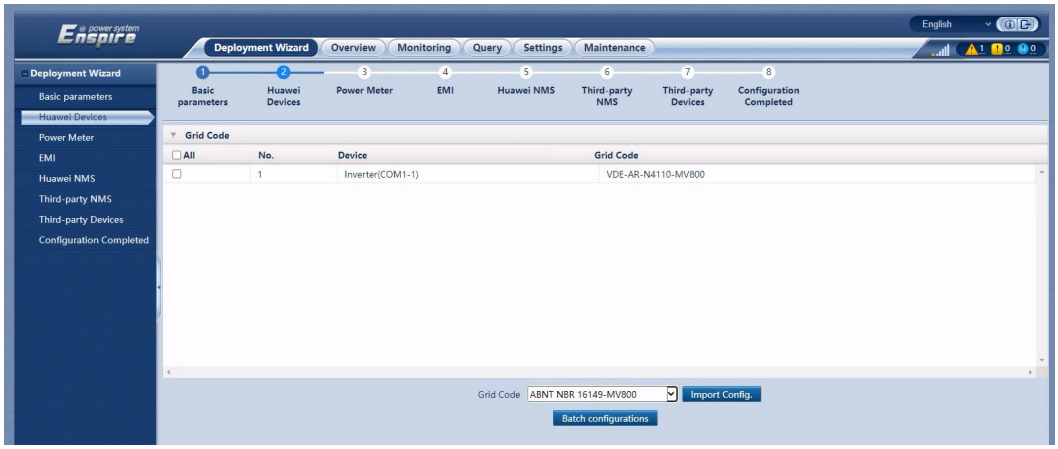
Figure 7-6 Uploading the SN list



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Step 3 After the device is connected, set the grid code based on the site requirements.

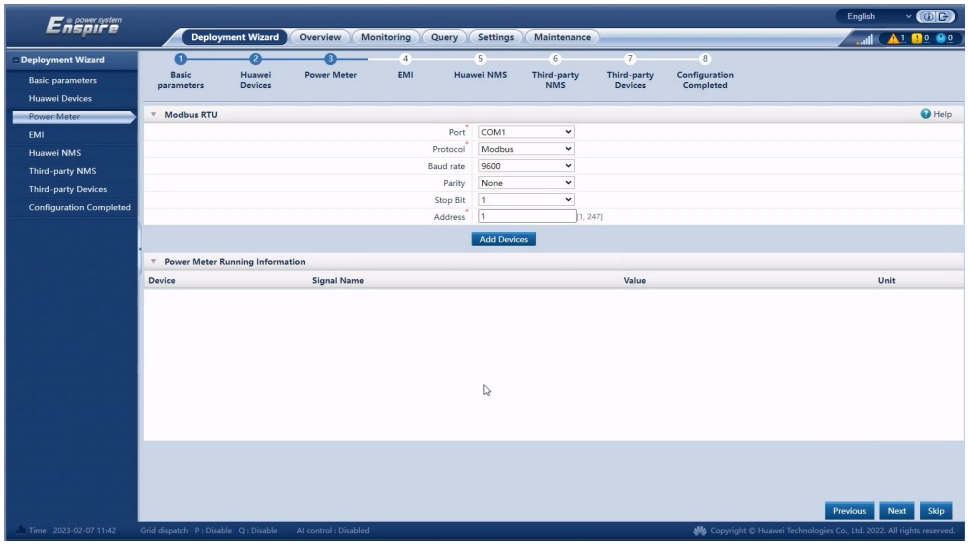
Figure 7-7 Setting the grid code



Step 4 Connect to power meters.

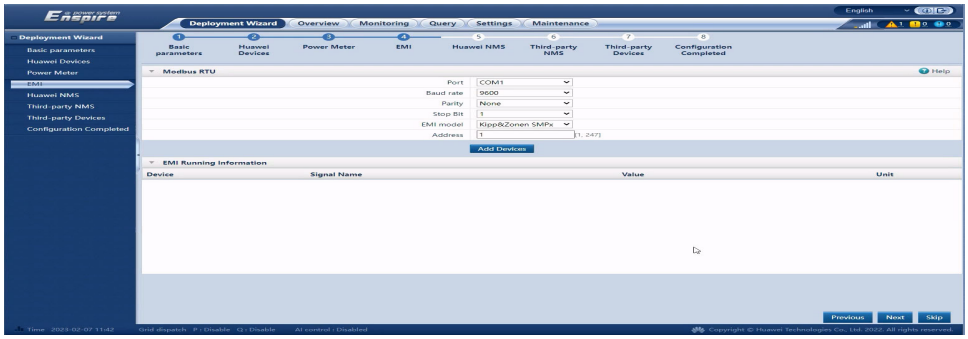
Set related parameters by referring to "**Setting Meter Parameters**" in the *SmartLogger3000 User Manual*.

Figure 7-8 Connecting to power meters



Step 5 Connect to EMIs.

Figure 7-9 Connecting to EMIs

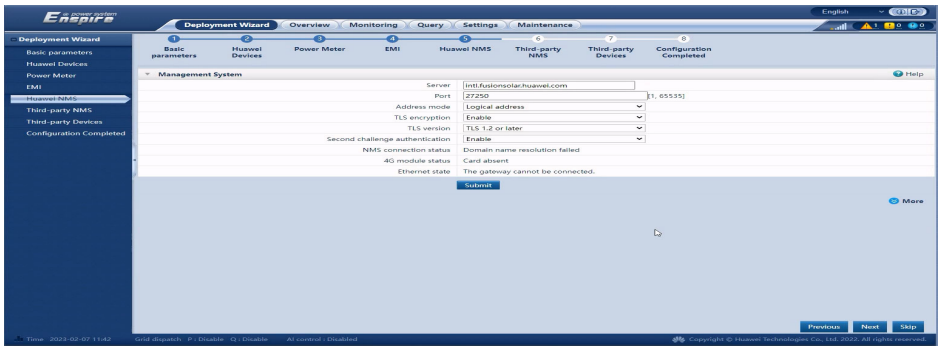


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Step 6 Connect to a Huawei network management system (NMS).

Set related parameters by referring to "**Setting Parameters for Connecting to the Management System**" (content related to a Huawei NMS) in the *SmartLogger3000 User Manual*.

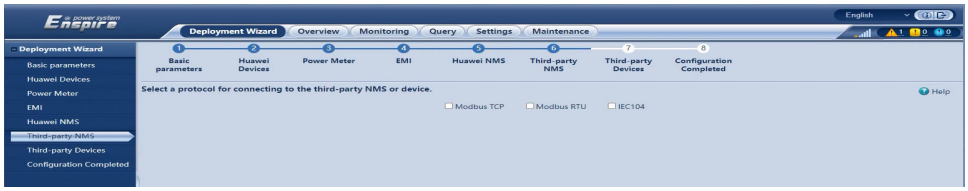
Figure 7-10 Connecting to a Huawei NMS



Step 7 Connect to a third-party NMS.

Set related parameters by referring to "**Setting Parameters for Connecting to the Management System**" (content related to a third-party NMS) in the *SmartLogger3000 User Manual*.

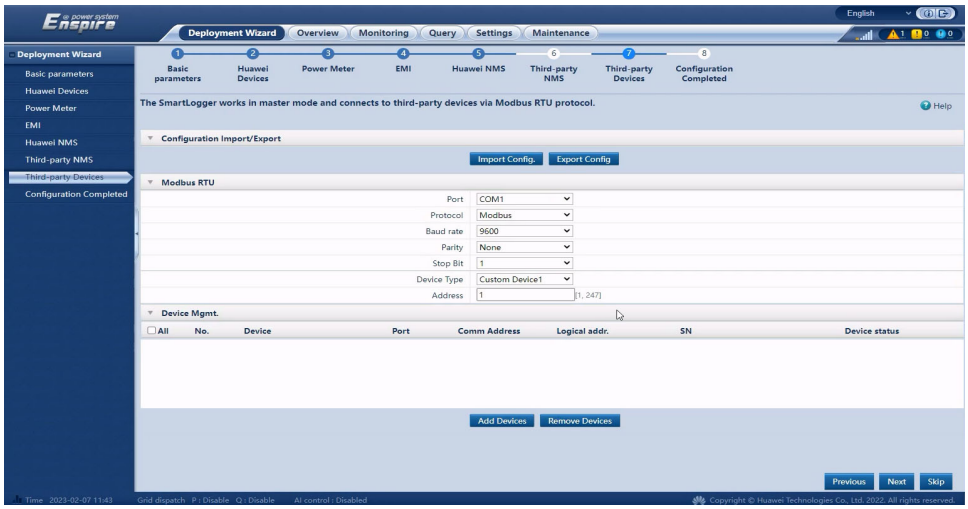
Figure 7-11 Connecting to a third-party NMS



Step 8 Connect to third-party devices.

Set related parameters by referring to "**Setting Custom Device Parameters**" in the *SmartLogger3000 User Manual*.

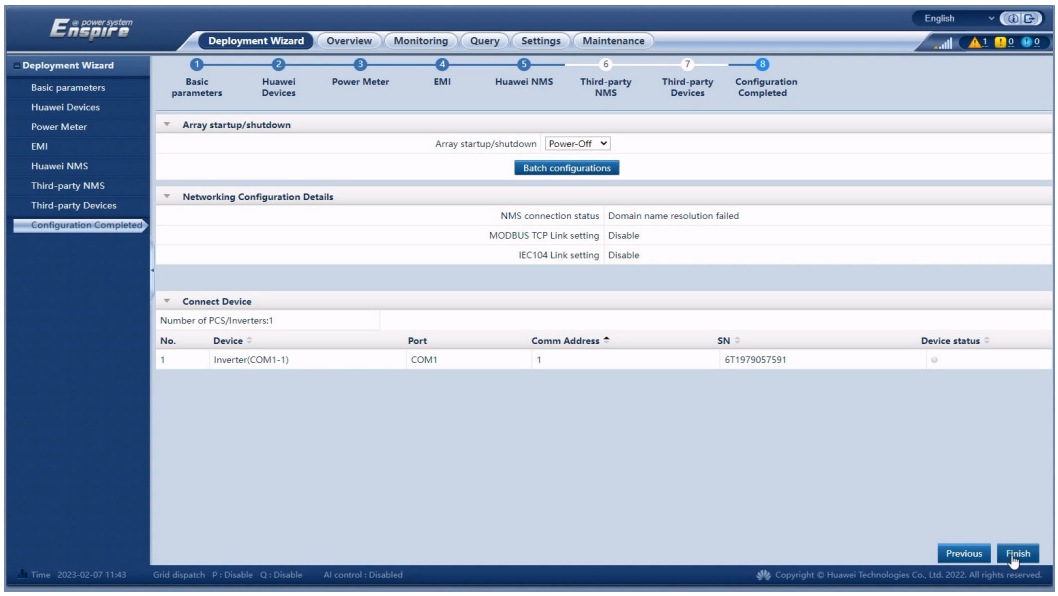
Figure 7-12 Connecting to third-party devices



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Step 9 Click **Finish**.

Figure 7-13 Completing the configuration

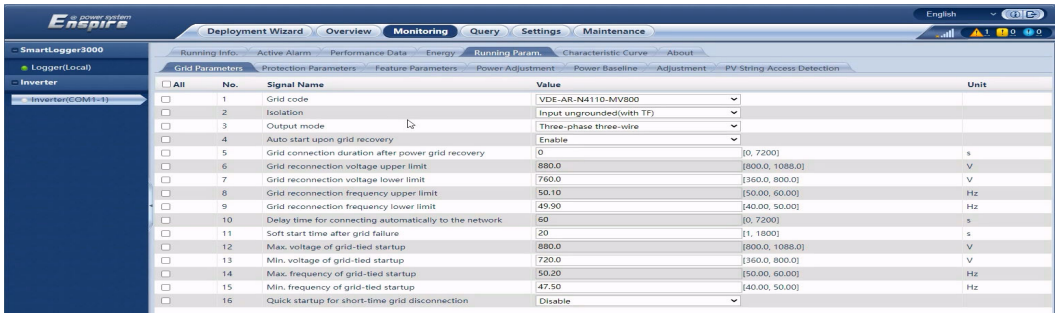


----End

7.3.4 Parameters Settings

Choose **Monitoring > Inverter > Running Param.**, set running parameters, and click **Submit**.

Figure 7-14 Setting running parameters



For details about the parameter settings, see the **SmartLogger3000 User Manual**.

7.4 Commissioning the SUN2000 (Using the App)

You can reset the password and view alarms on the app. For details about how to reset the password on the app, see the **FusionSolar App User Manual**.

- For details about how to reset a password, see **D Resetting Password**.
- To view alarms, log in to the FusionSolar app, choose **Alarm** > **Active alarm**, and rectify the fault based on the alarm handling suggestions.

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7.5 Upgrading the SUN2000 Using 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.

Procedure

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

Step 2 Decompress the upgrade package and copy all files to the root directory of the USB flash drive.

NOTICE

Do not modify the content in the upgrade package because the files involve RSA signature verification. If you modify the content, the upgrade will fail.

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.

Table 7-1 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 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 System Maintenance

DANGER

- Wear personal protective equipment and use dedicated insulated tools to avoid electric shocks or short circuits.

WARNING

- Before performing maintenance, power off the equipment, follow the instructions on the delayed discharge label, and wait for a period of time as specified to ensure that the equipment is not energized.

8.1 Routine Maintenance

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

CAUTION

- Before cleaning the SUN2000, connecting cables, and checking the grounding reliability, power off the SUN2000 and ensure that the **AUX. SWITCH** and all **DC SWITCH** of the SUN2000 are **OFF**.
- Do not open the maintenance compartment door on rainy or snowy days. If you need to, take protective measures to prevent rain or snow from entering the maintenance compartment. If protective measures cannot be taken, do not open the maintenance compartment door.

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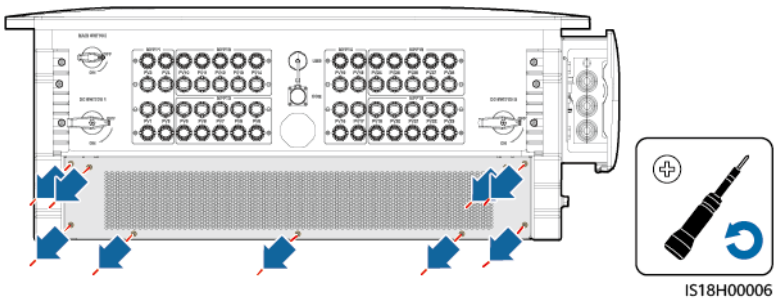
Table 8-1 Maintenance checklist

Check Item	Check Method	Maintenance Method	Maintenance Interval
Alarm	Check alarms on the app, SmartLogger, or management system.	For details, see **9 Alarm Reference**. For details about the alarm ID 2062, see **8.7 Locating Insulation Resistance Faults**.	Routine maintenance
Cleanness of air inlet and outlet	Periodically check whether there is dust or foreign objects at the air intake and exhaust vents.	Power off the SUN2000 and remove dust and foreign objects. If necessary, remove the baffle plate from the air intake vent for cleaning.	Once every 6 to 12 months (or once every 3 to 6 months based on the actual dust conditions in the environment)
Fan	Check whether the fans generate abnormal noise during operation.	Remove foreign objects from the fan. If the abnormal noise persists, replace the fan. For details, see **8.4 Replacing a Fan**.	Once every 6 to 12 months
System running status	• Check whether the SUN2000 is damaged or deformed. • Check whether the SUN2000 generates abnormal sounds during operation. • Check whether all SUN2000 parameters are correctly set during operation.	Contact the Company's service engineers.	Once every 6 months

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Check Item	Check Method	Maintenance Method	Maintenance Interval
Electrical connection	• Check whether cables are disconnected or loose. • Check whether cables are damaged, especially whether the cable sheath that contacts a metal surface is damaged. • Check whether the sealing plugs of unused DC input terminals fall off. • Check whether the unused COM and USB ports are locked by waterproof caps.	• Power off the SUN2000 and secure loose or disconnected cables. • Power off the SUN2000 and replace the damaged cables. • Install sealing plugs on unused DC input terminals. • Tighten the waterproof caps on the unused COM and USB ports.	6 months after the first commissioning and once every 6 to 12 months after that
Grounding reliability	Check whether the ground cables are securely grounded. Use a multimeter to check whether the ground resistance at the SUN2000 ground screws is less than or equal to 4 Ω.	Tighten the screws on both sides of the ground cable and ensure that the resistance meets the requirements.	6 months after the first commissioning and once every 6 to 12 months after that
Vegetation around the SUN2000	Check whether there are weeds around the SUN2000.	• Perform inspection and weeding as required. • Clean the site promptly after weeding.	Based on the local wilting season

Figure 8-1 Removing the baffle plate of the air intake vent



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NOTICE

After the cleaning is complete, reinstall the baffle plate. Tighten the M4 screws with a torque of 1.2 N·m.

8.2 Shutdown and Power-Off

⚠ WARNING

After the system is powered off, the SUN2000 is still energized and hot, which may cause electric shocks or burns. Therefore, wait for at least 15 minutes and wear PPE before working on the SUN2000.

Step 1 Send a shutdown command on the app, SmartLogger, or management system.

For details, see the user manual of the corresponding product.

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

Step 3 Set the two **DC SWITCH** to **OFF**.

----End

8.3 Power-Off for Maintenance

Precautions

To prevent personal injury and device damage, use the DC current scale of a clamp meter to measure the PV string current (even if the DC switches have been turned off) before removing PV connectors when troubleshooting or replacing the SUN2000 or PV strings. Ensure that the PV strings have no current, and quickly remove and insert connectors for adjustment.

⚠ CAUTION

- If the SUN2000 is faulty, do not stand in front of it if possible.
- If the LED1 indicator on the SUN2000 is off and the DC switches are **OFF**, do not operate the DC switches. For details, see **Step 4**.
- Do not operate the DC switches on the SUN2000 before you perform steps **Step 3** to **Step 5**.
- When the SUN2000 detects a fault, it triggers automatic DC disconnection protection. Do not turn on the DC switches before the fault is rectified.
- If the AC switch between the SUN2000 and the power grid has been turned off automatically, do not turn it on before the fault is rectified.
- Before power-off for maintenance, do not touch the energized components of the SUN2000. Otherwise, electric shocks or arcs may occur.

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Procedure

Step 1 Wear proper PPE.

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

Step 3 Turn off the AC switch between the SUN2000 and the power grid.

Step 4 Use a clamp meter to measure the DC current of each PV string input to the SUN2000.

- If PV strings have no current, go to the next step.
- If a PV string has current, wait until the solar irradiance decreases and the PV string has no current at night, and then go to the next step.

Step 5 Open the maintenance compartment door, install a support strut, and use a multimeter to check the voltage between the AC terminal block and the ground. Ensure that the AC side of the SUN2000 is powered off.

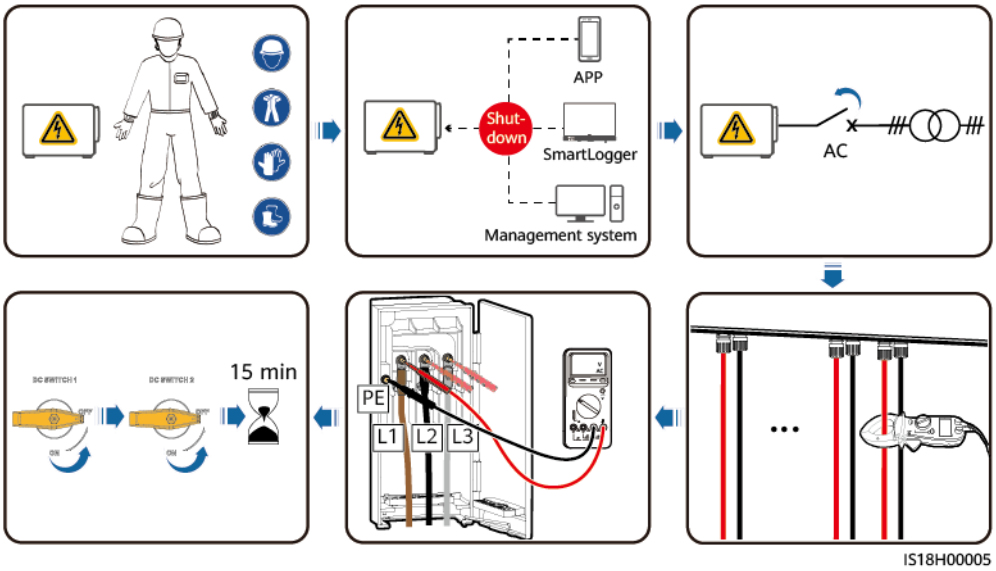
Step 6 Turn off all DC input switches of the SUN2000 and ensure that all switches are **OFF**. If the DC switches are automatically turned off, go to the next step.

Step 7 Wait for 15 minutes and troubleshoot or repair the SUN2000.

WARNING

- Do not open the panel for maintenance if the SUN2000 is emitting abnormal smell or smoke, or has obvious exceptions.
- If the SUN2000 does not emit abnormal smell or smoke and is intact, repair or restart it based on the alarm handling suggestions. Do not stand in front of the SUN2000 during the restart.

Figure 8-2 Power-off for maintenance



----End

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8.4 Replacing a Fan

CAUTION

- Before replacing a fan, power off the SUN2000.
- When replacing a fan, use insulated tools and wear PPE.

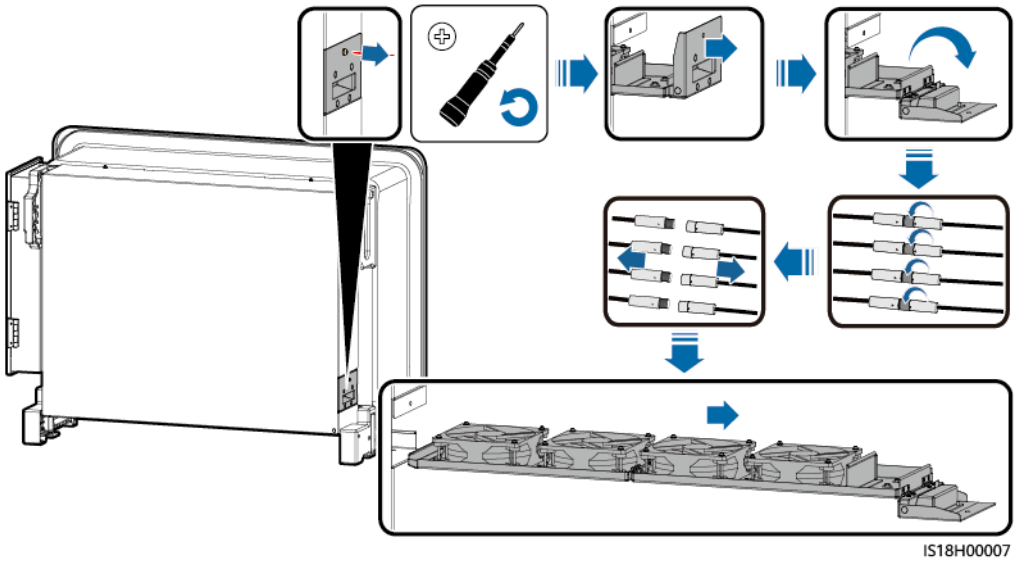
NOTE

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

Step 1 Remove the fan tray.

1. Remove the screws from the fan tray and store them properly.
2. Pull out the fan tray until the fan baffle plate is flush with the SUN2000 enclosure.
3. Place down the handle.
4. Unscrew the connectors.
5. Disconnect the cables.
6. Pull out the fan tray.

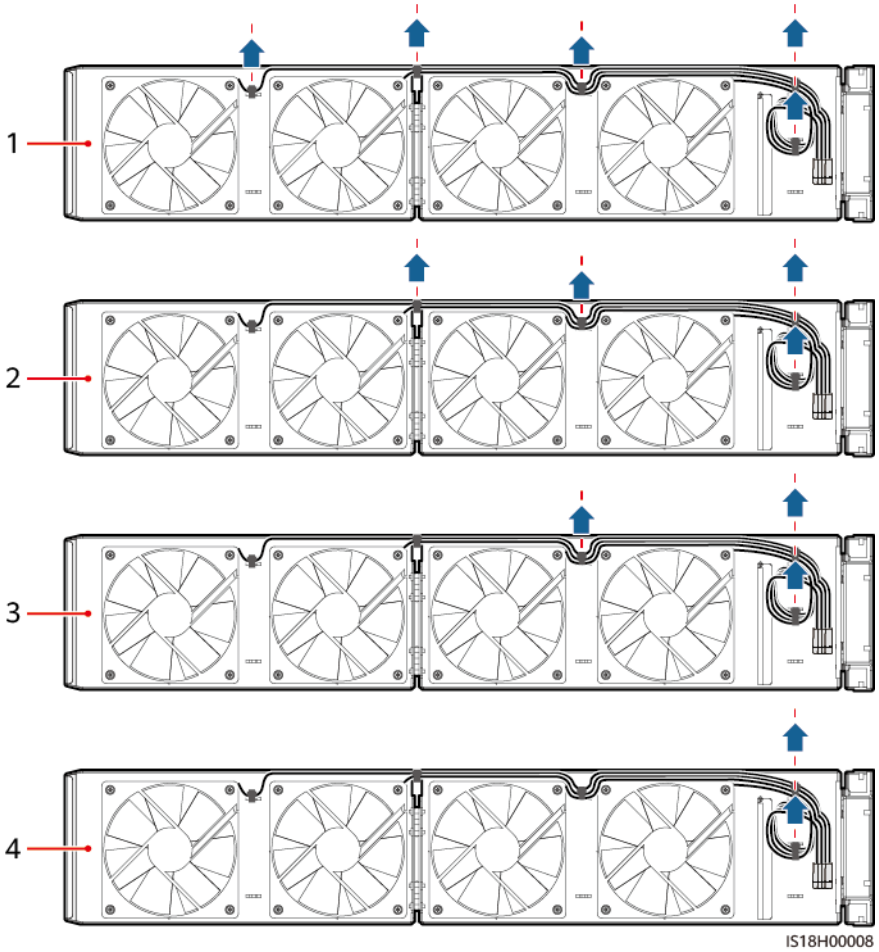
Figure 8-3 Pulling out the fan tray



Step 2 Remove the cable ties from the faulty fan.

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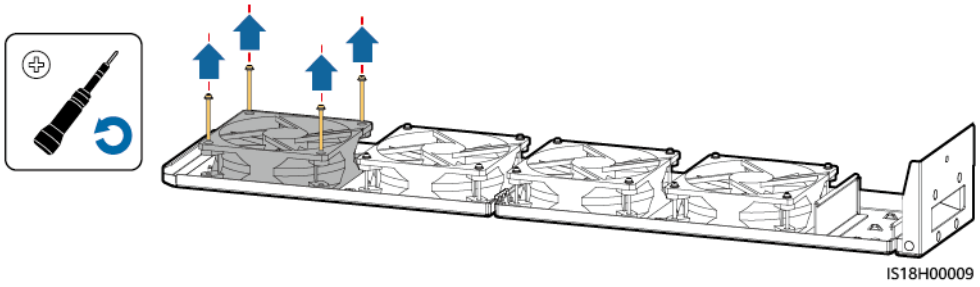
Figure 8-4 Removing cable ties



(1) Remove the cable ties from FAN 1.
(2) Remove the cable ties from FAN 2.
(3) Remove the cable ties from FAN 3.
(4) Remove the cable ties from FAN 4.

Step 3 Remove the faulty fan.

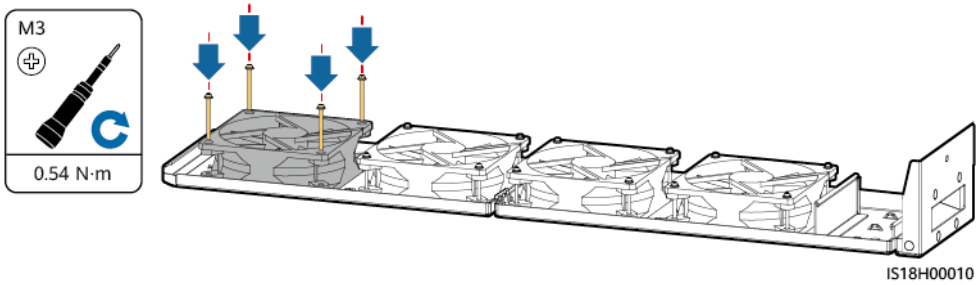
Figure 8-5 Removing a fan (using FAN 1 as an example)



Step 4 Install a new fan.

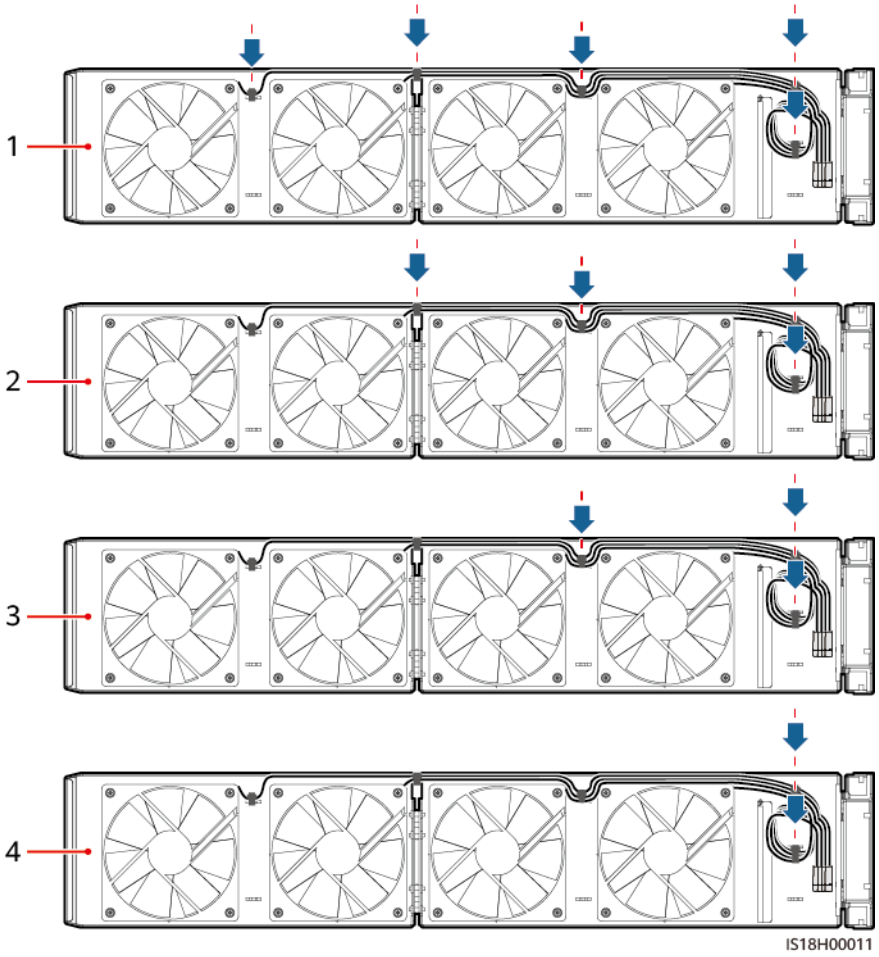
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Figure 8-6 Installing a fan (using FAN 1 as an example)



Step 5 Bind the fan cables.

Figure 8-7 Binding cables



(1) Bind the cables of FAN 1.
(2) Bind the cables of FAN 2.
(3) Bind the cables of FAN 3.
(4) Bind the cables of FAN 4.

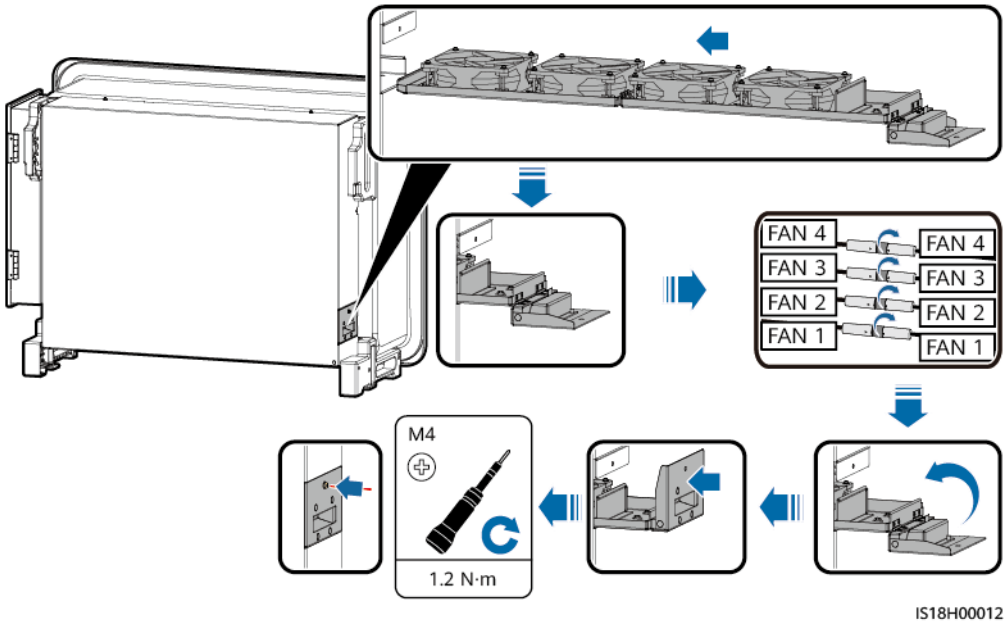
Step 6 Install the fan tray.

1. Clean the fan tray and ensure that no foreign matter is left. Align the fan tray with the installation position.
2. Push in the fan tray until the fan baffle plate is flush with the SUN2000 enclosure.

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3. Connect the cables correctly according to the cable labels.
4. Rotate the handle.
5. Push the fan tray completely in place.
6. Tighten the screws on the fan tray.

Figure 8-8 Installing a fan tray



----End

8.5 Replacing the SUN2000

NOTICE

Before removing the SUN2000, disconnect both the AC and DC power supplies.

Step 1 Remove the SUN2000.

1. Disconnect all cables from the SUN2000, including RS485 communications cables, DC input power cables, AC output power cables, and protective earthing (PE) cables.
2. Remove the SUN2000 from the mounting bracket.
3. Remove the mounting bracket.

Step 2 Pack the SUN2000.

- If the original packaging is available, put the SUN2000 inside it and then seal it using adhesive tape.
- If the original packaging is unavailable, put the SUN2000 inside a suitable hard cardboard box and seal it properly.

Step 3 Dispose of the SUN2000.

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NOTE

If the SUN2000 reaches the end of its service life, dispose of it according to local regulations for the disposal of electrical equipment.

Step 4 Install a new SUN2000. For details, see **4 Installation** and **5 Electrical Connections**.

----End

8.6 Resetting and Turning On the DC SWITCH

Prerequisites

If string backfeed, string connection in reverse polarity, or internal inverter fault is displayed on the mobile app or remote monitoring system and the DC SWITCH is in the **TRIP** position, the DC SWITCH has been automatically turned off. In this case, rectify the fault based on the alarm handling suggestions before turning on the DC SWITCH.

Procedure

Step 1 Set the DC SWITCH to OFF.

Step 2 Set the DC SWITCH to ON.

----End

8.7 Locating Insulation Resistance Faults

If the ground resistance of a PV string connected to the SUN2000 is too low, the SUN2000 generates a **Low insulation resistance** alarm.

The possible causes are as follows:

- A short circuit occurs between the PV array and the ground.
- The ambient air of the PV array is damp and the insulation between the PV array and the ground is poor.

After the **Low insulation resistance** alarm is generated, the SUN2000 automatically triggers insulation resistance fault location. If the fault location is successful, the location information is displayed on the **Alarm details** screen of the **Low insulation resistance** alarm on the FusionSolar app.

Log in to the FusionSolar app, choose **Alarm** > **Active alarm**, and choose **Low insulation resistance** to enter the **Alarm details** screen.

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NOTE

- The positive and negative terminals of a PV string are connected to the PV+ and PV– terminals of the SUN2000, respectively. The 0% position corresponds to the PV– terminal, and the 100% position corresponds to the PV+ terminal. Other percentages indicate that the fault occurs on a PV module or cable in the PV string.
- Possible fault position = Total number of PV modules in a PV string x Percentage of possible short-circuit positions. For example, if a PV string consists of 14 PV modules and the percentage of the possible short-circuit position is 34%, the possible fault position is 4.76 (14 x 34%), indicating that the fault is located near PV module 4, including the adjacent PV modules and their cables. The SUN2000 has a detection precision of ±1 PV module.
- For details about the PV strings corresponding to the MPPT that may be faulty, see Table 8-2. The fault can be located only to the MPPT level. Perform the following steps to connect the PV strings corresponding to the faulty MPPT to the SUN2000 one by one to further locate and rectify the fault.
- When a non-short-circuit fault occurs, the possible short-circuit percentage is not displayed. If the insulation resistance is greater than 0.001 MΩ, the fault is not related to short circuit. Check all PV modules in the faulty PV string one by one to locate and rectify the fault.

Figure 8-9 Definition of the percentage of the short-circuit position

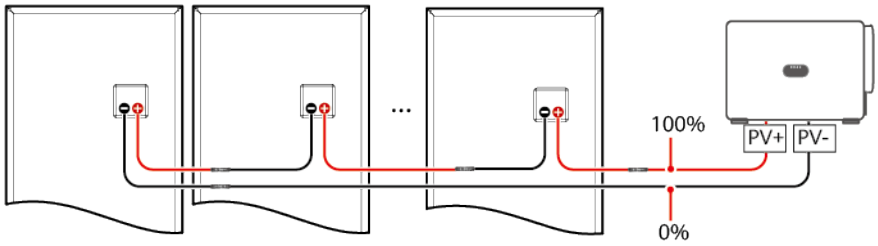


Table 8-2 Mapping between MPPTs and PV strings

MPPTn	PV String	MPPTn	PV String
MPPT1	PV1–PV4	MPPT2	PV5–PV9
MPPT3	PV10–PV14	MPPT4	PV15–PV18
MPPT5	PV19–PV23	MPPT6	PV24–PV28

Procedure

NOTICE

If the irradiance or the PV string voltage is too high, the insulation resistance fault location may fail. In this case, the fault location status on the **Alarm details** screen is **Conditions not met**. Perform the following steps to connect PV strings to the SUN2000 one by one to locate the fault.

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Step 1 Ensure that the AC connections are normal. Log in to the FusionSolar app, choose **Maintenance** > **Inverter ON/OFF** on the home screen, and send a shutdown command. Set the **DC SWITCH** of the SUN2000 to **OFF**.

Step 2 Connect a PV string to the SUN2000 and set the **DC SWITCH** to **ON**. If the SUN2000 status is **Shutdown: Command**, choose **Maintenance** > **Inverter ON/OFF** on the home screen and send a startup command.

Step 3 Choose **Alarm** on the home screen, enter the **Active alarm** screen, and check whether a **Low insulation resistance** alarm is reported.

- If no **Low insulation resistance** alarm is reported 1 minute after the DC side is powered on, choose **Maintenance** > **Inverter ON/OFF** on the home screen and send a shutdown command. Set the **DC SWITCH** to **OFF**. Go to **Step 2** and check the other PV strings one by one.
- If a **Low insulation resistance** alarm is reported 1 minute after the DC side is powered on, check the percentage of possible short-circuit positions on the **Alarm details** screen and calculate the location of the possibly faulty PV module based on the percentage. Then go to **Step 4**.

Step 4 Choose **Maintenance** > **Inverter ON/OFF** on the home screen and send a shutdown command. Set the **DC SWITCH** to **OFF**. Check whether the connectors or DC power cables between the possibly faulty PV modules and adjacent PV modules are damaged.

- If yes, replace the damaged connectors or DC power cables and then set the **DC SWITCH** to **ON**. If the SUN2000 status is **Shutdown: Command**, choose **Maintenance** > **Inverter ON/OFF** on the home screen and send a startup command. View alarm information.
  - If no **Low insulation resistance** alarm is reported 1 minute after the DC side is powered on, the insulation resistance fault location of the PV string is complete. Choose **Maintenance** > **Inverter ON/OFF** on the home screen and send a shutdown command. Set the **DC SWITCH** to **OFF**. Go to **Step 2** and check the other PV strings one by one. Then, go to **Step 7**.
  - If the **Low insulation resistance** alarm is still reported 1 minute after the the DC side is powered on, choose **Maintenance** > **Inverter ON/OFF** on the home screen and send a shutdown command. Set the **DC SWITCH** to **OFF** and go to **Step 5**.
- If no, go to **Step 5**.

Step 5 Disconnect the possibly faulty PV module from the PV string, and use a DC extension cable with MC4 connectors to connect the adjacent PV modules. Set the **DC SWITCH** to **ON**. If the SUN2000 status is **Shutdown: Command**, choose **Maintenance** > **Inverter ON/OFF** on the home screen and send a startup command. View alarm information.

- If no **Low insulation resistance** alarm is reported 1 minute after the DC side is powered on, the fault occurred on the disconnected PV module. Choose **Maintenance** > **Inverter ON/OFF** on the home screen, send a shutdown command, and set the **DC SWITCH** to **OFF**. Go to **Step 7**.
- If the **Low insulation resistance** alarm is still reported 1 minute after the DC side is powered on, the fault did not occur on the disconnected PV module. Go to **Step 6**.

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Step 6 Choose **Maintenance** > **Inverter ON/OFF** on the home screen and send a shutdown command. Set the **DC SWITCH** to **OFF**, reconnect the disconnected PV module, and repeat **Step 5** to check the adjacent PV modules at the possible fault position.

Step 7 Set the **DC SWITCH** to **ON**. If the SUN2000 status is **Shutdown: Command**, choose **Maintenance** > **Inverter ON/OFF** on the home screen and send a startup command.

----End

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9 Alarm Reference

Alarm severities are defined as follows:

- Major: The inverter is faulty or the external environment is abnormal. As a result, the output power decreases or the inverter stops feeding power into the grid.
- Minor alarm: Some components of the inverter are faulty but the inverter can still connect to the grid and generate power.
- Warning: The inverter works properly. The output power decreases or some authorization functions fail due to external factors.

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Table 9-1 Common alarms and troubleshooting measures

Alarm ID	Alarm Name	Alarm Severity	Possible Cause	Suggestion
2001	High String Voltage	Major	The PV array is not properly configured. Excessive PV modules are connected in series in the PV string, and therefore the PV string open-circuit voltage exceeds the maximum operating voltage of the device. • Cause ID = 1: PV1, PV2, PV3, and PV4. • Cause ID = 2: PV5, PV6, PV7, PV8, and PV9. • Cause ID = 3: PV10, PV11, PV12, PV13, and PV14. • Cause ID = 4: PV15, PV16, PV17, and PV18. • Cause ID = 5: PV19, PV20, PV21, PV22, and PV23. • Cause ID = 6: PV24, PV25, PV26, PV27, and PV28. Cause ID = 13–18 Too many PV modules are connected in series in MPPT*n* PV string, and the open-circuit voltage exceeds the limit at the current altitude.	Cause ID = 1–6 Check the serial connection configuration of the PV strings in the array and ensure that the PV string open-circuit voltage is not greater than the maximum operating voltage of the device. After the PV array configuration is corrected, the alarm will be automatically cleared. Cause ID = 13–18 1. Check the number of PV modules connected in series in MPPT*n* PV string by referring to the user manual. Ensure that the open-circuit voltage of the PV string is less than or equal to the maximum operating voltage allowed for the equipment at the current altitude. After the PV array configuration is corrected, the alarm will be automatically cleared. 2. Check whether the altitude is correctly configured.

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Alarm ID	Alarm Name	Alarm Severity	Possible Cause	Suggestion
2010	Abnormal DC Input	Major	Cause ID = 1 1. DC switch 1 is OFF. 2. PV strings 1 to 9 are not connected. Cause ID = 2 The DC SWITCH is OFF.	Cause ID = 1 1. Turn on DC switch 1. 2. If the alarm persists, check that at least one of PV strings 1 to 9 is connected. Cause ID = 2 1. Manually turn on the AUX. SWITCH. 2. Turn on all DC SWITCH manually. 3. Manually turn off the AUX. SWITCH. 4. If the fault persists, contact your dealer or technical support.
2011	String Reverse Connection	Major	Cause ID = 1–28, corresponding to PV1–PV28 respectively. The PV string is reversely connected.	1. Check whether the PV string is connected to the device in reverse polarity. If yes, wait until the PV string current decreases to below 0.5 A, set **DC SWITCH** to **OFF**, and adjust the PV string polarity. 2. If the fault persists, reset the device on the local maintenance app or WebUI of the upper-layer controller. Alternatively, you can turn off the AC and DC switches, wait for 5 minutes, and then turn on the AC and DC switches.
2012	String Current Backfeed	Warning	Cause ID = 1–28, corresponding to PV1–PV28 respectively. 1. 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. 2. Reverse polarity occurs in the string.	1. Check whether the number of PV modules connected in series in this PV string is less than the number of PV modules connected in series in the other PV strings connected in parallel with this PV string. If yes, wait until the PV string current drops to below 0.5 A, set **DC SWITCH** to **OFF**, and adjust the number of PV modules in the PV string. 2. Check whether the PV string is shaded. 3. Check whether the open-circuit voltage of the PV string is normal. 4. Check whether PV modules in the PV string are connected in reverse polarity.

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Alarm ID	Alarm Name	Alarm Severity	Possible Cause	Suggestion
2013	Abnormal String Power	Warning	Cause ID = 1–28, corresponding to PV1–PV28 respectively. • The PV string is shaded for a long time. • The PV string has aged abnormally.	1. Check whether the PV string current is obviously lower than the currents of other PV strings. 2. If yes, check whether the PV string is shaded. 3. If the PV string is clean and not shaded, check whether any PV module is faulty.
2014	High String Voltage to Ground	Major	Cause ID = 1 The string-to-ground voltage is abnormal, which may cause power degradation risks.	1. If no PID compensation device is deployed in the system, disable the PID protection function. Note: If the PID protection function is disabled but the nighttime reactive power compensation is enabled, PV module degradation may occur. 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 device and PID compensation device have consistent compensation direction settings. If not, adjust the settings based on the PV module model. (Note: If the PV– is set to positive offset, the voltage between the PV– of the device and the ground should be greater than 0 V to clear the alarm; if the PV+ is set to negative offset, the voltage between the PV+ of the device and the ground should be less than 0 V to clear the alarm.) 4. If the alarm occurs repeatedly, contact your dealer or technical support.

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Alarm ID	Alarm Name	Alarm Severity	Possible Cause	Suggestion
2015	PV String Loss	Warning	Cause ID = 1–28, corresponding to PV1–PV28 respectively. • A single string is lost. • Both 2-in-1 PV strings are lost. • Either of the 2-in-1 PV strings is lost.	1. Check whether cables are properly connected to the inverter terminals. 2. Check whether cables are properly connected to the PV string terminals. 3. If a 2-in-1 terminal is used, check whether it is normal. 4. If the string connection status is manually configured, check whether the configured status is consistent with the actual connection status.
2031	Phase Wire Short-Circuited to PE	Major	Cause ID = 1 The phase wire is short-circuited to PE or its impedance to PE is low.	Check the impedance of the phase wire to PE, locate the position with low impedance, and rectify the fault.
2032	Grid Loss	Major	Cause ID = 1 • The power grid experiences an outage. • The AC circuit is disconnected or the AC circuit breaker is OFF.	1. Check whether the AC voltage is normal. 2. Check whether the AC circuit is disconnected or the AC circuit breaker 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 device 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 allowed range. If no, contact the local power operator. If yes, modify the power grid undervoltage protection threshold after obtaining the consent of the local power operator. 3. If the fault persists for a long time, check the connection between the AC switch and power cables.

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Alarm ID	Alarm Name	Alarm Severity	Possible Cause	Suggestion
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. If the alarm occurs occasionally, the power grid may be abnormal temporarily. The device 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 allowed range. If no, contact the local power operator. If yes, modify the power grid overvoltage protection threshold after obtaining the consent of the local power operator. 3. Check whether the peak voltage of the power grid is too high. If the fault occurs frequently and persists for a long time, contact the local power operator.
2035	Grid Voltage Imbalance	Major	Cause ID = 1 The difference between grid phase voltages exceeds the upper threshold.	1. If the alarm occurs occasionally, the power grid may be abnormal temporarily. The device 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 normal range. If no, contact the local power operator. 3. If the fault persists for a long time, check the connection of the AC cables. 4. If the AC cables are correctly connected and the alarm persists and affects the operation of the plant, contact the local power operator.

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Alarm ID	Alarm Name	Alarm Severity	Possible Cause	Suggestion
2036	Grid Overfrequency	Major	Cause ID = 1 Power grid exception: The power grid frequency is higher than the frequency required in the local standard.	1. If the alarm occurs occasionally, the power grid may be abnormal temporarily. The device 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 allowed range. If not, contact the local power operator. If yes, modify the power grid overfrequency protection threshold after obtaining 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 device 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 allowed range. If not, contact the local power operator. If yes, modify the power grid underfrequency protection threshold after obtaining the consent of the local power operator.
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 device 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 allowed range. If not, contact the local power operator.

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Alarm ID	Alarm Name	Alarm Severity	Possible Cause	Suggestion
2039	AC Overcurrent	Major	Cause ID = 1 The grid experiences a dramatic voltage drop or is short-circuited. As a result, the transient AC current of the device exceeds the upper threshold and triggers protection.	1. The device detects its external working conditions in real time. After the fault is rectified, the device automatically recovers. 2. If the alarm occurs frequently and affects the operation of the power plant, check whether AC short circuit exists. If the fault persists, contact your dealer or technical support.
2040	DC Component Overhigh	Major	Cause ID = 1 The DC component in the AC current exceeds the upper threshold.	1. The device detects its external working conditions in real time. After the fault is rectified, the device automatically recovers. 2. If the alarm occurs frequently, contact your dealer or technical support.
2051	Abnormal Residual Current	Major	Cause ID = 1 The ground insulation resistance decreases during device operation.	1. If the alarm occurs occasionally, the external circuit may be abnormal temporarily. The device will automatically recover after the fault is rectified. 2. If the alarm occurs frequently or persists, check whether the DC-to-ground impedance is too low.
2062	Low Insulation Resistance	Major	Cause ID = 1 • A short circuit occurs between the PV array and the ground. • The ambient air of the PV array is damp and the insulation between the PV array and the ground is poor.	1. Set **Insulation resistance protection** to the minimum value and restart the inverter. 2. Check that the PE cable of the device is correctly connected. 3. Check the output impedance of the PV array to ground. If there is a short circuit or lack of insulation, rectify it.

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Alarm ID	Alarm Name	Alarm Severity	Possible Cause	Suggestion
2063	Overtemperature	Minor	Cause ID = 1 • The device is installed in a place with poor ventilation. • The ambient temperature is higher than the upper threshold. • The device is faulty.	1. Check the ventilation and ambient temperature of the device installation position. 2. If the ventilation is poor or the ambient temperature exceeds the upper threshold, improve the ventilation and heat dissipation. 3. If the ventilation and ambient temperature meet requirements, contact your dealer or technical support.
2064	Device Fault	Major	Cause ID = 1–12, 20 A major fault has occurred on a circuit inside the device.	Cause ID = 1–12 Turn off the AC and DC switches, wait for 5 minutes, and then turn on the AC and DC switches. If the fault persists, contact your dealer or technical support. Cause ID = 20 Do not turn off the AC output switch or DC input switch. Contact your dealer or technical support.
2065	Upgrade Failed or Version Mismatch	Minor	Cause ID = 1–4, 7 The upgrade ends abnormally.	1. Perform an upgrade again. 2. If the upgrade fails for multiple times, contact your dealer or technical support.
2066	License Expired	Warning	Cause ID = 1 1. The license has entered the grace period. 2. The license is about to expire.	1. Apply for a new license. 2. Load the new license.
2086	Abnormal External Fan	Major	Cause ID = 1–4, corresponding to external fans FAN1–FAN4. The external fan is short-circuited, the power supply is insufficient, or the air channel is blocked.	1. Turn off the AC and DC switches, check whether the fan blades are damaged, and clear the foreign matter around the fan. 2. Reinstall the fan and turn on the AC and DC switches. If the fault persists after the device runs for 15 minutes, replace the external fan.

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Alarm ID	Alarm Name	Alarm Severity	Possible Cause	Suggestion
2087	Abnormal Internal Fan	Major	Cause ID = 1 and 2, corresponding to internal fans FAN1 and FAN2. The internal fan is short-circuited, the power supply is insufficient, or the fan is damaged.	Turn off the AC and DC switches, wait for 5 minutes, and then turn on the AC and DC switches. If the fault persists after the device runs for 5 minutes, contact your dealer or technical support to replace the device.
2088	Abnormal DC Protection Unit	Major	Cause ID = 3 The contact points of the DC switches are stuck.	1. If the DC indicator on the panel is off, contact your dealer or technical support to replace the device. 2. If the DC indicator on the panel is on, wait until the PV string current decreases to below 0.5 A, turn off the AC switch and DC switch, wait for 5 minutes, and then turn on the AC switch and DC switch. If the fault persists after the device runs for 5 minutes, contact your dealer or technical support.
2093	Abnormal DC Switches	Minor	Cause ID = 1 The DC switch is not in the **ON** position, or the DC switch reset button is not pressed down to the bottom.	Check whether all DC switches are in the **ON** position. If not, turn the switches to the **ON** position (you can rotate the switches with force to ensure that they are in position). If the switches still cannot be turned to the **ON** position, press the reset buttons of all DC switches inwards until they cannot go further, and then turn on the DC switches again.
2099	Local Access Certificate Invalid	Warning	Cause ID = 1 The digital signature certificate is invalid.	Check the time or replace the digital signature certificate.
2100	Local Access Certificate About to Expire	Warning	Cause ID = 1 The digital signature certificate is about to expire.	Replace the digital signature certificate in time.
2101	Local Access Certificate Expired	Major	Cause ID = 1 The digital signature certificate has expired.	Replace the digital signature certificate immediately.

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Alarm ID	Alarm Name	Alarm Severity	Possible Cause	Suggestion
2102	Protection upon Communication Failure	Warning	Cause ID = 1 When the communication disconnection duration exceeds the specified threshold, the device starts the protection function.	1. If the fault occurs occasionally, the device recovers to the normal state after receiving a scheduling command. No manual intervention is required. 2. Manually deliver a power scheduling command. 3. If the **Protection upon Communication Failure** function is not required, disable it.
2103	AC Terminal Temperature Abnormal	Major	Cause ID = 1 1. The AC power cable is not of the recommended specifications or is oxidized. 2. The OT/DT terminal of the AC power cable is not crimped as required. 3. The fastening torque of the AC terminal does not meet the requirement.	Power off the devices connected to the same DC bus (issue a shutdown command, turn off the AC and DC switches, and wait for the period specified on the device safety warning label), and then perform the following steps: 1. Check whether the cables meet the requirements. 2. Check whether the OT/DT terminals are crimped as required. 3. Check that the fastening torque of wiring terminals meets the requirement. 4. Turn on the AC switch and DC switch, and restart the inverter. If the fault persists, contact the vendor or technical support.

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Alarm ID	Alarm Name	Alarm Severity	Possible Cause	Suggestion
2104	DC Terminal Temperature Abnormal	Major	Cause ID = 2–7, corresponding to MPPT1–MPPT6 The temperature of the DC terminal on the MPPT is abnormal.	Power off the device (turn off the AC and DC switches, and wait for a period specified on the device safety warning label), and check the cable connection to the DC terminal of the MPPT as follows: 1. Check whether the cables meet the requirements. 2. Check whether the PV terminal cores are crimped properly. 3. Check whether the PV terminal models are correct. 4. Check whether PV terminals are loosely connected. 5. If the preceding items are normal, turn on the AC switch and DC switch, and restart the device. If the fault persists, contact your dealer or technical support.
61440	Monitoring Unit Faulty	Minor	Cause ID = 1 • The flash memory is insufficient. • The flash memory has bad sectors.	Turn off the AC and DC switches, wait for 5 minutes, and then turn on the AC and DC switches. If the fault persists, replace the monitoring board or contact your dealer or technical support.

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10 Technical Specifications

Efficiency

Item	SUN2000-250KTL-H3	SUN2000-280KTL-H0	SUN2000-300KTL-H0	SUN2000-330KTL-H1	SUN2000-330KTL-H2	SUN2000-250KTL-H1
Maximum efficiency	99.01%	99.01%	99.01%	99.01%	99.01%	99.01%
Chinese efficiency	98.52%	98.52%	98.52%	-	-	-
European efficiency	-	-	-	98.8%	98.8%	98.8%

Input

Item	SUN2000-250KTL-H3	SUN2000-280KTL-H0	SUN2000-300KTL-H0	SUN2000-330KTL-H1	SUN2000-330KTL-H2	SUN2000-250KTL-H1
Maximum input voltage	1500 V					
Maximum input current (per MPPT)	65 A					

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Item	SUN2000-250KTL-H3	SUN2000-280KTL-H0	SUN2000-300KTL-H0	SUN2000-330KTL-H1	SUN2000-330KTL-H2	SUN2000-250KTL-H1
Maximum short-circuit current (per MPPT)	115 A					
Minimum operating voltage/ startup voltage	500 V/550 V					
MPP voltage range	500–1500 V					
Rated input voltage	1080 V					
Number of inputs	28					
Number of MPPTs	6					

Output

Item	SUN2000-250KTL-H3	SUN2000-280KTL-H0	SUN2000-300KTL-H0	SUN2000-330KTL-H1	SUN2000-330KTL-H2	SUN2000-250KTL-H1
Rated output power	250 kW	280 kW	300 kW	300 kW	275 kW	250 kW
Maximum apparent power	275 kVA	308 kVA	330 kVA	330 kVA	330 kVA	275 kVA
Maximum active power (cosϕ = 1)	275 kW	308 kW	330 kW	330 kW	330 kW	275 kW

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Item	SUN2000-250KTL-H3	SUN2000-280KTL-H0	SUN2000-300KTL-H0	SUN2000-330KTL-H1	SUN2000-330KTL-H2	SUN2000-250KTL-H1
Rated output voltage	800 V AC, 3W+PE					
Rated output current	180.5 A	202.1 A	216.6 A	216.6 A	198.5 A	180.5 A
Adapted power grid frequency	50 Hz			50 Hz/60 Hz		
Maximum output current	198.5 A	222.3 A	238.2 A	238.2 A	238.2 A	198.5 A
Power factor	0.8 leading and 0.8 lagging					
Maximum total harmonic distortion (rated power)	< 1%					

Protection

Item	SUN2000-250KTL-H3	SUN2000-280KTL-H0	SUN2000-300KTL-H0	SUN2000-330KTL-H1	SUN2000-330KTL-H2	SUN2000-250KTL-H1
Input DC switch	Supported					
Anti-islanding protection	Supported					
Output overcurrent protection	Supported					

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Item	SUN2000-250KTL-H3	SUN2000-280KTL-H0	SUN2000-300KTL-H0	SUN2000-330KTL-H1	SUN2000-330KTL-H2	SUN2000-250KTL-H1
Input reverse connection protection	Supported					
PV string fault detection	Supported					
DC surge protection	Type II					
AC surge protection	Type II					
Insulation resistance detection	Supported					
Residual current monitoring unit (RCMU)	Supported					

Display and Communication

Item	SUN2000-250KTL-H3	SUN2000-280KTL-H0	SUN2000-300KTL-H0	SUN2000-330KTL-H1	SUN2000-330KTL-H2	SUN2000-250KTL-H1
Display	LED indicators					
RS485	Supported					
MBUS	Supported					
USB	Supported					
WLAN+App	Supported					

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General Specifications

Item	SUN2000-250KTL-H3	SUN2000-280KTL-H0	SUN2000-300KTL-H0	SUN2000-330KTL-H1	SUN2000-330KTL-H2	SUN2000-250KTL-H1
Dimensions (W x H x D)	1048 mm x 732 mm x 395 mm					
Net weight	112 kg					
Operating temperature	–30°C to +60°C			–25°C to +60°C		
Cooling mode	Smart air cooling					
Maximum operating altitude	5000 m (derated when the altitude is greater than 4000 m)					
Relative humidity	0%–100% RH					
Input terminal	CT75A-1T-34/CT75A-1T-35 (AVIC JONHON)			HH4SFD4TMS/HH4SMD4TMS		
Output terminal	Waterproof terminal+OT/DT terminal					
IP rating	IP66					
Self-consumption at night (sleep mode)	4.8 W					

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A Crimping an OT or DT Terminal

Requirements on an OT or DT Terminal

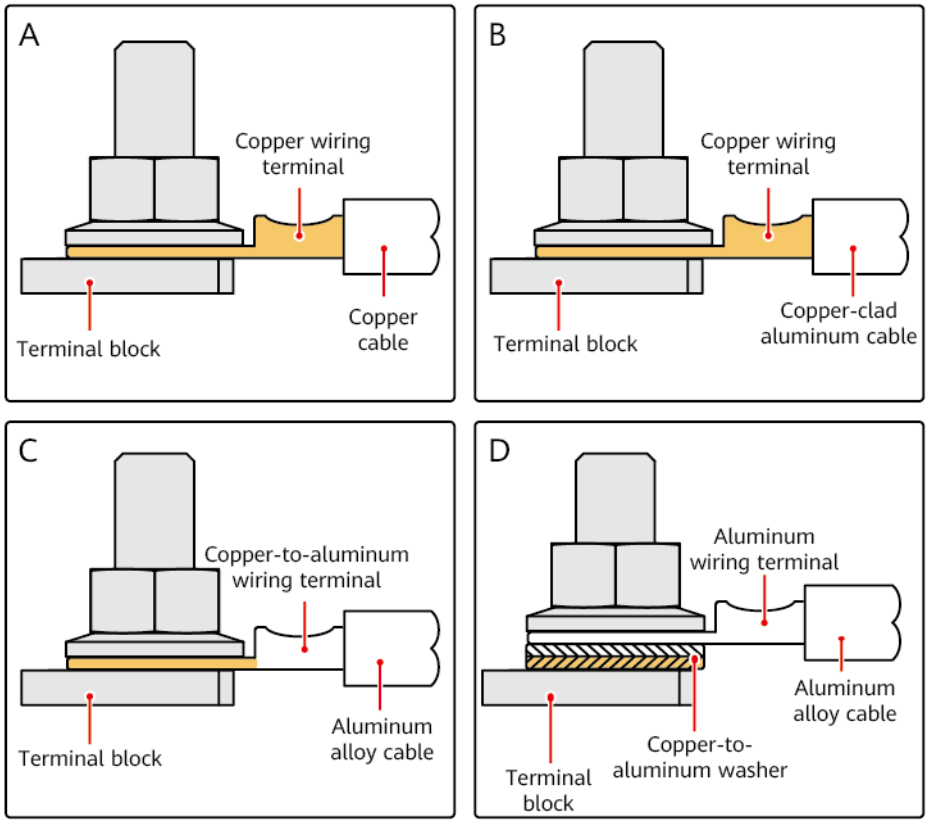
- If a copper cable is used, use copper wiring terminals.
- If a copper-clad aluminum cable is used, use copper wiring terminals.
- If an aluminum alloy cable is used, use copper-to-aluminum wiring terminals, or aluminum wiring terminals along with copper-to-aluminum washers.

NOTICE

- Do not connect aluminum wiring terminals to the terminal block. Otherwise electrochemical corrosion may occur, affecting the reliability of cable connections.
- Comply with the IEC 61238-1 requirements when using copper-to-aluminum wiring terminals, or aluminum wiring terminals along with copper-to-aluminum washers.
- Do not mix up the aluminum and copper sides of a copper-to-aluminum washer. Ensure that the aluminum side of the washer contacts the aluminum wiring terminal, and that the copper side contacts the terminal block.

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Figure A-1 Requirements on an OT or DT terminal



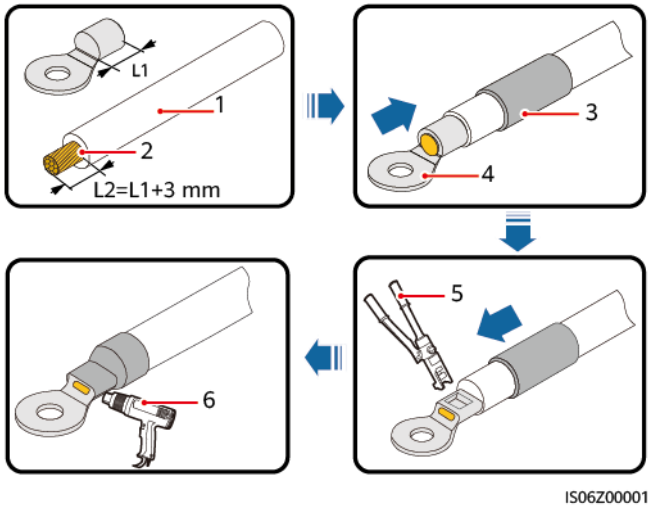
Crimping an OT or DT Terminal

NOTICE

- Avoid scratching the core wire when stripping a cable.
- The cavity formed after the conductor crimp strip of the OT or DT terminal has been crimped must wrap around the core wire completely. The core wire must make close contact with the OT or DT terminal.
- Wrap the wire crimping area with heat shrink tubing or insulation tape. The heat shrink tubing is used as an example.
- Use a heat gun carefully to avoid heat damage to the equipment.

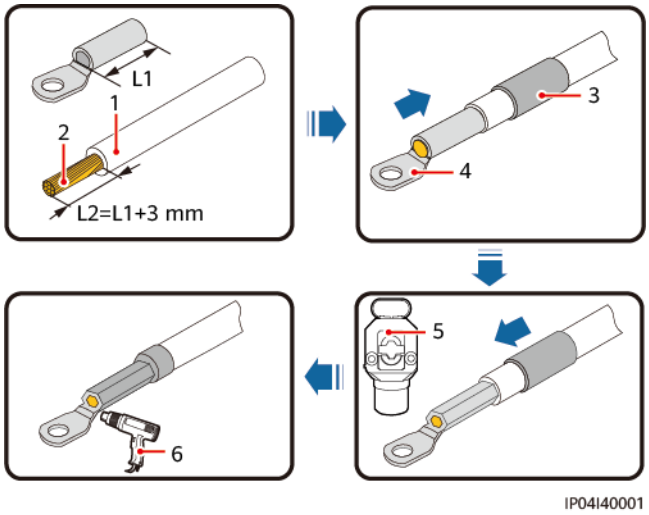
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Figure A-2 Crimping an OT terminal



(1) Cable
(2) Core wire
(3) Heat shrink tubing
(4) OT terminal
(5) Hydraulic pliers
(6) Heat gun

Figure A-3 Crimping a DT terminal



(1) Cable
(2) Core wire
(3) Heat shrink tubing
(4) DT terminal
(5) Hydraulic pliers
(6) Heat gun

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B Domain Name List of Management Systems

NOTE

The list is subject to change.

Table B-1 Domain names of management systems

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

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C Grid Codes

No.	Grid Code	Description	SUN2000-250KTL-H3	SUN2000-280KTL-H0	SUN2000-300KTL-H0	SUN2000-330KTL-H1	SUN2000-330KTL-H2	SUN2000-250KTL-H1
1	CHINA-MV800	China medium-voltage power grid	Supported	Supported	Supported	-	-	-
2	CHINA-CUSTOM-MV800	China power grid	Supported	Supported	Supported	-	-	-
3	ABNT NBR 16149-MV800	Brazil medium-voltage power grid	-	-	-	-	-	Supported
4	BRASIL-ANEEL-MV800	Brazil power grid	-	-	-	-	-	Supported
5	KOREA-MV800	South Korea power grid	-	-	-	Supported	-	-
6	TAIPOWER-MV800	Taiwan Power medium-voltage power grid	-	-	-	Supported	-	-

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No.	Grid Code	Description	SUN2000-250KTL-H3	SUN2000-280KTL-H0	SUN2000-300KTL-H0	SUN2000-330KTL-H1	SUN2000-330KTL-H2	SUN2000-250KTL-H1
7	SINGAPORE-MV800	Singapore medium-voltage power grid	-	-	-	Supported	-	-
8	AS4777-MV800	Australia medium-voltage power grid	-	-	-	Supported	-	-
9	AUSTRALIA-AS4777_A-MV800	Australia power grid	-	-	-	Supported	-	-
10	Philippines-MV800	Philippines power grid	-	-	-	Supported	-	-
11	TAI-PEA-MV800	Thailand power grid	-	-	-	Supported	-	-
12	TAI-MEA-MV800	Thailand power grid	-	-	-	Supported	-	-
13	Malaysian-MV800	Malaysia power grid	-	-	-	Supported	-	-
14	Bangladesh-MV800	Bangladesh power grid	-	-	-	Supported	-	-
15	Vietnam-MV800	Vietnam medium-voltage power grid	-	-	-	Supported	-	-
16	Cambodia-MV800	Cambodia power grid	-	-	-	Supported	-	-

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No.	Grid Code	Description	SUN2000-250KTL-H3	SUN2000-280KTL-H0	SUN2000-300KTL-H0	SUN2000-330KTL-H1	SUN2000-330KTL-H2	SUN2000-250KTL-H1
17	VDE-AR-N4110-MV800	Europe power grid	-	-	-	Supported	-	-
18	CEI0-21-MV800	Italy power grid	-	-	-	Supported	-	-
19	CEI0-16-MV800	Italy medium-voltage power grid	-	-	-	Supported	-	-
20	UTE C 15-712-1-MV800	France power grid	-	-	-	Supported	-	-
21	RD1699/661-MV800	Spain medium-voltage power grid	-	-	-	Supported	-	-
22	PO12.3-MV800	Spain medium-voltage power grid	-	-	-	Supported	-	-
23	NTS-MV800	Spain power grid	-	-	-	Supported	-	-
24	EN50438_IE-MV800	Ireland power grid	-	-	-	Supported	-	-
25	EN50549-MV800	Ireland power grid	-	-	-	Supported	-	-
26	IRELAND-EN50549-MV800	Ireland power grid	-	-	-	Supported	-	-
27	Northern Ireland-MV800	Northern Ireland power grid	-	-	-	Supported	-	-

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No.	Grid Code	Description	SUN2000-250KTL-H3	SUN2000-280KTL-H0	SUN2000-300KTL-H0	SUN2000-330KTL-H1	SUN2000-330KTL-H2	SUN2000-250KTL-H1
28	DENMARK-EN50549-MV800	Denmark power grid	-	-	-	Supported	-	-
29	C10/11-MV800	Belgium power grid	-	-	-	Supported	-	-
30	PORTUGAL-MV800	Portugal power grid	-	-	-	Supported	-	-
31	ANRE-MV800	Romania power grid	-	-	-	Supported	-	-
32	AUSTRIA-MV800	Austria power grid	-	-	-	Supported	-	-
33	AUSTRIA-HV800	Austria power grid	-	-	-	Supported	-	-
34	Israel-MV800	Israel power grid	-	-	-	Supported	-	-
35	Israel-HV800	Israel power grid	-	-	-	Supported	-	-
36	POLAND-EN50549-MV800	Poland power grid	-	-	-	Supported	-	-
37	CZECH-EN50549-MV800	Czech Republic power grid	-	-	-	Supported	-	-
38	EN50438-TR-MV800	Turkey power grid	-	-	-	Supported	-	-
39	Macedonia-MV800	Republic of North Macedonia power grid	-	-	-	Supported	-	-

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No.	Grid Code	Description	SUN2000-250KTL-H3	SUN2000-280KTL-H0	SUN2000-300KTL-H0	SUN2000-330KTL-H1	SUN2000-330KTL-H2	SUN2000-250KTL-H1
40	Mexico-MV800	Mexico power grid	-	-	-	Supported	-	-
41	ABNT NBR 16149-MV800	Brazil medium-voltage power grid	-	-	-	Supported	-	-
42	BRASIL-ANEEL-MV800	Brazil power grid	-	-	-	Supported	-	-
43	Chile-MV800	Chile power grid	-	-	-	Supported	-	-
44	GREG060-MV800	Colombia power grid	-	-	-	Supported	-	-
45	ARGENTINA-MV800	Argentina medium-voltage power grid	-	-	-	Supported	-	-
46	Nicaragua-MV800	Nicaragua power grid	-	-	-	Supported	-	-
47	Panama-MV800	Panama power grid	-	-	-	Supported	-	-
48	SAUDI-MV800	Saudi Arabia power grid	-	-	-	-	Supported	-
49	LEBANON-MV800	Lebanon medium-voltage power grid	-	-	-	-	Supported	-

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No.	Grid Code	Description	SUN2000-250KTL-H3	SUN2000-280KTL-H0	SUN2000-300KTL-H0	SUN2000-330KTL-H1	SUN2000-330KTL-H2	SUN2000-250KTL-H1
50	Pakistan-MV800	Pakistan power grid	-	-	-	-	Supported	-
51	Oman-MV800	Oman power grid	-	-	-	-	Supported	-
52	Oman-PDO-MV800	Oman power grid	-	-	-	-	Supported	-
53	Bahrain-MV800	Bahrain power grid	-	-	-	-	Supported	-
54	Kuwait-MV800	Kuwait power grid	-	-	-	-	Supported	-
55	Jordan-Transmission-MV800	Jordan power grid	-	-	-	-	Supported	-
56	Jordan-Distribution-MV800	Jordan power grid	-	-	-	-	Supported	-
57	Jordan-Transmission-HV800	Jordan high-voltage power grid	-	-	-	-	Supported	-
58	Egypt ETEC-MV800	Egypt power grid	-	-	-	-	Supported	-
59	KENYA_ETHIOPIA-MV800	Kenya low-voltage power grid and Ethiopia medium-voltage power grid	-	-	-	-	Supported	-

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No.	Grid Code	Description	SUN2000-250KTL-H3	SUN2000-280KTL-H0	SUN2000-300KTL-H0	SUN2000-330KTL-H1	SUN2000-330KTL-H2	SUN2000-250KTL-H1
60	TUNISIA-MV800	Tunisia medium-voltage power grid	-	-	-	-	Supported	-
61	NRS-097-2-1-MV800	South Africa power grid	-	-	-	-	Supported	-
62	SA_RPPs-MV800	South Africa power grid	-	-	-	-	Supported	-
63	ZAMBIA-MV800	Zambia medium-voltage power grid	-	-	-	-	Supported	-
64	KENYA_ETHIOPIA-MV800	Kenya low-voltage power grid and Ethiopia medium-voltage power grid	-	-	-	-	Supported	-
65	NAMIBIA_MV800	Namibia power grid	-	-	-	-	Supported	-
66	Cameroon-MV800	Cameroon medium-voltage power grid	-	-	-	-	Supported	-
67	Ghana-MV800	Ghana medium-voltage power grid	-	-	-	-	Supported	-

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No.	Grid Code	Description	SUN2000-250KTL-H3	SUN2000-280KTL-H0	SUN2000-300KTL-H0	SUN2000-330KTL-H1	SUN2000-330KTL-H2	SUN2000-250KTL-H1
68	NIGERIA-MV800	Nigeria medium-voltage power grid	-	-	-	-	Supported	-
69	UZBEKISTAN-MV800	Uzbekistan power grid	-	-	-	-	Supported	-
70	KAZAKHSTAN-MV800	Kazakhstan power grid	-	-	-	-	Supported	-
71	Mauritius-MV800	Mauritius power grid	-	-	-	-	Supported	-

NOTE

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

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D Resetting Password

Step 1 Check that the AC and DC sides of the inverter are both powered on, and indicators and are steady green or blinking slowly for more than 3 minutes.

Step 2 Turn off the AC switch, set the DC SWITCH at the bottom of the inverter to OFF, and wait until all LED indicators on the inverter panel turn off.

Step 3 Complete the following operations within 4 minutes:

1. Turn on the AC switch and wait for about 90s or until the inverter indicator blinks.
2. Turn off the AC switch and wait about 30s or until all LED indicators on the inverter panel turn off.
3. Turn on the AC switch and wait for about 90s or until the inverter indicator blinks.

Step 4 Log in to the app and reset the password within 10 minutes. (If no operation is performed within 10 minutes, all parameters of the inverter remain unchanged.)

----End

NOTICE

You are advised to reset the password in the morning or at night when the solar irradiance is low.

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E Contact Information

If you have any questions about this product, please contact us.

https://digitalpower.huawei.com

Path: **About Us** > **Contact Us** > **Service Hotlines**

To ensure faster and better services, we kindly request your assistance in providing the following information:

- Model
- Serial number (SN)
- Software version
- Alarm ID or name
- Brief description of the fault symptom

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NOTE

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Email: hungary.reception@huawei.com

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F Acronyms and Abbreviations

A	
AUX.	Auxiliary
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
R	
RCMU	residual current monitoring unit

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