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

User Manual

 Issue
 13

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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
	Indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.
	Indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.
	Indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.

Symbol	Description	
NOTICE	Indicates a potentially hazardous situation which, if not avoided, could result in equipment damage, data loss, performance deterioration, or unanticipated results. NOTICE is used to address practices not related to personal injury.	
C☐ 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 13 (2024-06-30)

Updated 7.1 Powering On the SUN2000.

Issue 12 (2024-03-20)

Updated 2.4 Circuit Diagram.

Updated 2.6 Label Description.

Updated 7.5 Upgrading the SUN2000 Using a USB Flash Drive.

Updated 8.7 Locating Insulation Resistance Faults.

Updated C Grid Codes.

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Updated 2.1 Model Number Description.

Updated 2.6 Label Description.

Updated **3 Storage Requirements**.

Updated 4.2.1 Site Selection Requirements.

Updated 4.2.2 Clearance Requirements.

Updated **5.2 Preparing Cables**.

Updated 5.4 Connecting an AC Output Power Cable.

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Updated 2.2 Networking Application.

Updated 2.3 Appearance.

Updated **5.2 Preparing Cables**.

Added 5.8 (Optional) Installing the Smart Dongle.

Updated 7.1 Powering On the SUN2000.

Updated 8.6 Resetting and Turning On the DC SWITCH.

Updated 9 Alarm Reference.

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Updated 4.2.1 Site Selection Requirements.

Updated 4.5 Moving the SUN2000.

Updated 5.1 Precautions.

Updated 5.3 Connecting a PE Cable.

Updated 5.6 Connecting DC Input Power Cables.

Updated 9 Alarm Reference.

Updated **D Resetting Passwords**.

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.

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Adjusted the document structure.

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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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Updated 2.2 Networking Application.

Updated 5.4 Connecting an AC Output Power Cable.

Updated 5.6 Connecting DC Input Power Cables.

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Updated 4.2 Installation Requirements.

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Updated 9 Alarm Reference.

Updated G 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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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.

- 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.

A 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.

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.

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

- 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 short-circuits or damage, load power derating, power failure, or personal injury may occur.

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.

During the installation of PV strings and the inverter, 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 inverter. The resulting device damage is not covered under any warranty.

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.
- 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

Do not expose the equipment to flammable or explosive gas or smoke. Do not perform any operation on the equipment in such environments.

A DANGER

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

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.

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.

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

- Store the equipment according to the storage requirements. Equipment damage caused by unqualified storage conditions is not covered under the warranty.
- Keep the installation and operating environments of the equipment within the allowed ranges. Otherwise, its performance and safety will be compromised.
- The operating temperature range provided in the equipment's technical specifications refers to the ambient temperatures in equipment's installation environment.

- 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. The equipment shall be installed in an environment with a magnetic field strength less than 4 Gauss. If the magnetic field strength is greater than or equal to 4 Gauss, the equipment may fail to work properly. 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 equipment installation position when the smelting equipment is running normally.
- 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 (the area shall be greater than or equal to 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 opening doors during the installation, operation, and maintenance of the equipment, clean up any water, ice, snow, or other foreign objects on the top of the equipment to prevent foreign objects from falling into 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

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.

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.
- 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.

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.



CZ00000107

• 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.



- 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.



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 loadbearing 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.
- 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.

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 SUN2000-300KTL-H0

2

3

4 IS18W00001

1

No.	ltem	Description	
1	Product family identifier	SUN2000: grid-tied solar inverter	
2	Power level identifier	250K/280K/300K/330K: power level	
3	Topology identifier	TL: transformerless	
4	Product series identifier	 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 A 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).



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





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



Figure 2-5 RS485 networking application (SmartLogger)





Figure 2-6 MBUS networking application (Smart Dongle)





NOTICE

1m

- 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

(When the SmartMBUS CCO01B is configured, the maximum singlecore 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.
- Software upgrade and log export are not supported when the app is connected to the Smart Dongle.

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 2-8 Earthing system



D 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.)

2 Overview

2.3 Appearance

Appearance and Ports



(15) AC output power cable holes

NOTE

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

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 red	If the alarm/maintenance indicator is steady red, an internal fault at the DC side of the SUN2000 is generated.
Õ	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 red	If the alarm/maintenance indicator is steady red, an internal fault at the AC side of the SUN2000 is generated.
	Steady green	The SUN2000 is in grid-tied mode.
0	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.

Indicator	Status (Blinking Fast: On for 0.2s and Off for 0.2s; Blinking Slowly: On for 1s and Off for 1s)		Meaning
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.
		Blinking red slowly	A warning alarm was generated.
	Local	Steady green	The local maintenance is successful.
	maintenanc e state	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, 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

A DANGER

- If the DC SWITCH automatically turns off and the inverter generates a **String Reverse Connection**, **String Current Backfeed**, or **String Voltage High** alarm, rectify the fault based on the alarm handling suggestions. 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 SUN2000. In this case, the alarm/maintenance indicator is steady red and at least one of the PV connection indicator and grid connection indicator is steady red. Then, contact technical support and do not turn on the DC SWITCH by yourself.

Table 2-1 DC SWITCH description

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

Figure 2-10 DC SWITCH 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.



2.5 Working Modes

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



Figure 2-12 Working modes

IS07S00001

Table 2-2 Working m	ode 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.

2.6 Label Description

Symbol	Name	Meaning
	Operation warning	Potential hazards exist after the inverter is powered on. Take protective measures when operating the inverter.
	High temperature hazard	Do not touch the inverter when it is running because its enclosure is hot.
	Electric shock hazard	Hazardous voltage exists after the device is powered on. Take protective measures during operation and maintenance (O&M).

Symbol	Name	Meaning
15 mins	Delayed discharge	 High voltage exists after the inverter is powered on. Only qualified and trained electrical technicians are allowed to perform operations on the inverter. Residual voltage exists after the inverter is powered off. It takes 15 minutes for the inverter to
		discharge to the safe voltage.
Ĩ	Refer to documentation	Reminds operators to refer to the documentation for the device. Losses caused by operations that do not comply with the requirements of site selection, storage, or mounting specified in the user manual are not covered under the warranty.
	Grounding	Indicates the position for connecting the ground cable.
Do not disconnect under load ! 禁止带负荷断开连接!	Operation warning	Do not remove the DC input connector when the inverter is running.
	Fan operation warning	High voltage exists after the inverter is powered on. Do not touch the fans when the inverter is working.
CAUTION Before replacing the fan, disconnect the FAN-POWER cable and then the fan cable. 更換风扇前, 必须先拨除风扇电源线, 再拔除风扇线。	Fan replacement warning	Before replacing the fan, disconnect its power connector.
(1P)PN/ITEM:XXXXXXXXX (32P)Model:SUX2003-XXKTL-XX (S)SN:XXXXXXXXXXXX (S)SN:XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	Inverter SN label	Indicates the inverter serial number.
CR (121 lbs)	Weight label	The inverter needs to be carried by four persons or using a forklift.
Control	DC switch operation warning	After a DC switch is automatically turned off, do not directly reset or turn on the DC switch. Instead, follow the instructions in the section "Resetting and Turning On the DC SWITCH" in the user manual, or contact after-sales service personnel.

Symbol	Name	Meaning
Comparison Comparison Comparison C	Warning for inserting or removing a DC terminal	Internal high voltage. To remove or insert a DC terminal, perform the following steps: Send a shutdown command. → Turn off the AC switch. → Turn off all DC switches. → Use a clamp meter to check that the PV strings have no current. → Remove or insert the DC terminal.

3 Storage Requirements

NOTICE

Store the device according to the storage requirements. Device damage caused by unqualified storage conditions is not covered under the warranty.

If inverters will not be put into use immediately, store them according to the requirements specified in this section. Device damage caused by unqualified storage conditions is not covered under the warranty.

- Do not store the device without outer packaging.
- Do not remove the outer packaging. Check the packaging regularly (recommended: once every three months). Replace any packaging that is damaged during storage. If the inverter is unpacked but will not be used immediately, put it back to the original packaging with the desiccant, and seal with tape.
- Inverters must be stored in a clean and dry environment with appropriate temperature and humidity. The air must not contain corrosive or flammable gases.





IS07W00011

- When temporarily storing inverters outdoors, do not stack them on a pallet. Take rainproof measures such as using tarpaulins to protect inverters from rain and water.
- Do not tilt a packing case or place it upside down.
- To avoid personal injury or device damage, stack inverters with caution to prevent them from falling over.





IS12W00007

• Do not store inverters for more than two years. If inverters have been stored for two years or longer, they must be checked and tested by professionals before being put into use.
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 to avoid personal injury or property loss caused by accidental contact by non-professionals or other reasons during device operation.
- Do not install the inverter in noise-sensitive areas (such as residential areas, office areas, and schools) to avoid complaints. If the preceding areas are unavoidable, the distance between the installation position and noise-sensitive areas must be greater than or equal to 40 m. Alternatively, use other low-noise models.
- 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 equipment is installed in a place with abundant vegetation, in addition to routine weeding, harden the ground underneath the equipment using cement or gravel (the area shall be greater than or equal to 3 m x 2.5 m).
- Do not install the inverter in areas containing flammable materials (such as sulfur, phosphorus, liquefied petroleum gas, marsh gas, flour, and cotton) to avoid personal injury or property loss caused by fire or other reasons.
- Do not install the inverter in areas containing explosives (such as blasting agents, display shells, fireworks, and firecrackers) to avoid personal injury or property loss caused by explosion or other reasons.
- Do not install the inverter in areas with corrosive substances (such as sulfuric acid, hydrochloric acid, nitric acid, hydrogen sulfide, and chlorine) to avoid inverter failure caused by corrosion, which is not covered under the warranty.
- Do not install the inverter in an easily accessible place, because the voltage is high and its enclosure and heat sink are hot during device operation. This is to avoid personal injury or property loss caused by accidental contact by non-professionals or other reasons during device operation.
- Install the inverter in a well-ventilated environment to ensure good heat dissipation. The inverter provides self-protection in high-temperature environments. If the inverter is installed in a poorly ventilated environment, its energy yield may decrease as the ambient temperature increases.
- Do not install the equipment in an area with strong vibration, noise, or electromagnetic interference. The equipment shall be installed in an environment with a magnetic field strength less than 4 Gauss. If the magnetic field strength is greater than or equal to 4 Gauss, the equipment may fail to work properly. 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 equipment 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. The inverter provides self-protection in high-temperature environments. Its energy yield may decrease as the ambient temperature increases.
- Install the inverter in a sheltered place to prevent exposure to direct sunlight. The inverter provides self-protection in high-temperature environments. If the inverter is installed in a place subject to direct sunlight, its energy yield may decrease as the temperature increases.
- 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).
- The distance between each inverter and the AC combiner box or the lowvoltage panel of the transformer station must be at least 10 m, or the total distances from two adjacent inverters to the AC combiner box or the lowvoltage panel of the transformer station must be at least 20 m. The inverter provides output resonance self-protection. Its energy yield may decrease if

protection against resonance is triggered as the length of the inverter output cables decreases.

- When routing PV cables whose pipe is less than 1.5 m long, the positive and negative PV string cables shall be routed in different pipes to prevent cable damage and short circuits caused by improper operations during construction. For details, see Figure 5-1.
- Take waterproof and insulation measures for unused DC power cables. High voltage may exist in unused DC power cables. Take measures to prevent personal injury or property damage caused by accidental contact with high voltage or other reasons.
- Cables must be vertically routed into combiner boxes and wiring terminals to avoid damage caused by horizontal stress on the terminals, which is not covered under the warranty.
- If an inverter has not been running for six months or longer after being mounted, it may have failed and must be checked and tested by professionals before being put into operation.
- To prevent the inverter from being corroded by moisture, PV terminals that will not be used for a long time must be sealed with dedicated PV terminal plugs. Inverter failure due to not using dedicated PV terminal plugs is not covered under the warranty.

D NOTE

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



Figure 4-1 Installation environment requirements

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Mounting Structure Requirements

- The mounting structure for the inverter must be fireproof. Do not install the inverter on flammable building materials to avoid personal injury or property loss caused by fire or other reasons.
- 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 to avoid personal injury or property loss caused by the collapse of the mounting structure or other reasons.

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. The SUN2000 provides self-protection in high-temperature environments. The impact of environment changes on the clearance for heat dissipation needs be considered during design. The clearance around the SUN2000 may become insufficient for reasons such as rotation axis change. The energy yield of the inverter may decrease if heat cannot be effectively dissipated.



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.









NOTE

Stacked installation is not allowed.





(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:



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



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

		Celle	
Safety helmet	Goggles	Protective shoes	Reflective vest
	2 min		
Insulated gloves	Protective gloves	Dust mask	Insulated shoes

Table 4-2 Personal protective equipment (PPE)

 Table 4-3 Hoisting and transporting tools



 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			

Table 4-5 Cable installation tools

Cable cutter	Wire strippers	Diagonal pliers	Hydraulic pliers
		<u> 107</u>	-
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

		<u>P=0</u>	
Clamp meter	Steel measuring tape	Level	Multimeter DC voltage measurement range ≥ 1500 V DC
Insulation resistance tester	-	-	-
(output voltage > 1500 V)			

 Table 4-7 Auxiliary materials and other tools

Label	Cable tie	Cotton cloth	Sandpaper
			A
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.

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.
- Secure the lifting handles (with the steel washers of the lifting handles closely fitted to the device).
- If the stud of a lifting handle is bent, replace the lifting handle in time.
- 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.



NOTE

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





----End

4.6 Installing the SUN2000 on a Support

Step 1 Remove the torx key and store it properly.

Tisheooot

Figure 4-13 Removing the torx key

4 Installation

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.

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



5 Electrical Connections

5.1 Precautions

1 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.

- 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.

- 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.
- The positive and negative DC PV string cables within 1.5 m of the inverter shall be routed in separate pipes to prevent cable damage and short circuits caused by improper operations during construction.

Figure 5-1 Cable routing in different pipes



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 5-2 Cable connections (configure the components in the dotted box as required)



Table 5-1	Component	description
	component	acscription

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
В	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
С	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

No.	Component	Description	Source
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.	Prepared by the customer
		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 	
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.	Prepared by the customer
		 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 	
G	Smart Dongle	SDongleB-06 is supported.	Purchased from the Company

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.

- 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	Туре	Conductor Cross-Sectional Area	Outer Diameter	Source
1	DC input power cable	1500 V copper multi- strand twisted PV cable ^{[1][2]}	4–6 mm ²	5–7.8 mm	Prepared by the customer
2	RS485 communicat ions cable	Outdoor shielded twisted pair cable that meets the local standard	0.25–1 mm ²	 One or two communi cations cables: 4– 11 mm Three communi cations cables: 4– 8 mm 	Prepared by the customer
3	PE cable ^[3]	Single-core outdoor copper cable and M10 OT/DT terminal	$S_p \ge S/2$	-	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: 120-400 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

No.	Cable	Туре	Conductor Cross-Sectional Area	Outer Diameter	Source
	AC output power cable (multi-core) [4]	 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: 120-240 mm ² - S _p \geq S/2 • Aluminum alloy cable or copper-clad aluminum cable: - S: 150-240 mm ² (cable stripping inside the compartme nt); S: 300- 400 mm ² (cable stripping outside the compartme nt); S: 300- 400 mm ² (cable stripping outside the compartme nt supported when protection is added) - S _p \geq S/2	24-66 mm	Prepared by the customer

- Note [1]: Do not connect aluminum or aluminum alloy DC power cables directly to the DC terminals of the inverter.
- Note [2]: The 1500 V PV cables must comply with IEC 62930 or EN 50618.
- Note [3]: 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.
- Note [4]: 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.
- 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 bonding between 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 to the ground point on the enclosure.

Figure 5-3 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.

- 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.

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

NOTICE

- 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.

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.				

Table 5-3 Bending radius requirements for AC power cables

Wiring Area



Procedure

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



Figure 5-5 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.







(A) Single-core cables

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

Figure 5-8 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.





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 5-10 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.

- 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.





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 5-12 Closing a door



----End

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.

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 5-13 Cable protection

Figure 5-14 Installation completed



5.6 Connecting DC Input Power Cables

Precautions

1 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**.

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.

MARNING

During the installation of PV strings and the inverter, 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 inverter. The resulting device damage is not covered under any warranty.

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.

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 5-15 DC terminals controlled by DC SWITCH 1

AUX. SWITCH



IS18W00016



Figure 5-16 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. Ensure that PV strings are evenly distributed on each MPPT. If there are 18 to 27 PV strings, connect them according to the following table.
- 4. If 210 mm PV modules are used, a maximum of four PV strings can be connected to each MPPT.
- 5. Install sealing plugs on the DC input terminals that are not connected to PV strings. For details, see **Figure 5-19**.

Numbe r of PV Strings	Terminal Selection	Numbe r 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.

Numbe r of PV Strings	Terminal Selection	Numbe r 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.

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 $M\Omega$, the insulation resistance is normal.
- If the insulation resistance is less than 1 MΩ, troubleshoot the insulation fault of the cable or PV string.

Figure 5-17 Testing the insulation resistance







Figure 5-18 Connecting DC input power cables

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.
Step 3 If there are DC input terminals that are not connected to PV strings, use sealing plugs with snap-fits (models: CT75A-FJB6/HY024-FHG-3 and CT75A-FJB5/HY024-FHG-4) to seal the terminals. Device damage caused by the absence of sealing plugs is not covered by warranty.

Figure 5-19 Sealing plugs with snap-fits



----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





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
	3 RS485B IN, RS485 4 differential signal-		4	RS485B OUT, RS485 differential signal–	as the SmartLogger.
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.

Procedure

Step 1 Connect the RS485 communications cables.





NOTICE

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

----End

5.8 (Optional) Installing the Smart Dongle

NOTICE

- If your Smart Dongle is not equipped with a SIM card, prepare a standard SIM card by yourself (size: 25 mm x 15 mm) with the capacity greater than or equal to 64 KB.
- When installing the SIM card, determine its installation direction based on the silk screen and arrow on the card slot.
- Press the SIM card in place to lock it, indicating that the SIM card is correctly installed.
- When removing the SIM card, push it inward to eject it.
- When reinstalling the enclosure of the Smart Dongle, ensure that the snap-fits click into place.



Figure 5-22 Installing the 4G Smart Dongle (SDongleB-06)

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.

7 Power-On and Commissioning

7.1 Powering On the SUN2000

1 DANGER

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

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.

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 six months or longer after being mounted, do not connect the DC input power cables to the SUN2000. Connect the DC input power cables only when the SUN2000 needs to connect to the power grid. In addition, the SUN2000 must be checked and tested by professionals before being put into operation. If the DC input power cables are connected to the SUN2000, turn on DC SWITCH 1 and DC SWITCH 2 by referring to Step 3 to Step 5. Seal unused PV connectors with sealing plugs. When the SUN2000 allows on-grid operation, if the PV connection indicator is steady green, turn on the AC switch between the SUN2000 and the power grid.
- 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, PV modules are not properly configured, or an internal fault occurs in the SUN2000, the DC switches automatically turn off for protection. In this case, rectify the fault as prompted on the app, check that the alarm is cleared, and then turn on the DC switches. If the alarm/maintenance indicator is steady red and at least one of the PV connection indicator and grid connection indicator is steady red, contact technical support after the DC switches automatically turn off and do not turn on the DC switches by yourself. 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 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**.

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.



----End

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.



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

Enspire	Deployr	nent Wizard	Overview	onitoring	Query Settings	Maintenance			English ~ (@]
Deployment Wizard	0	2	- 3		5	6	- 7		
Basic parameters	Basic	Huawei Devices	Power Meter	EMI	Huawei NMS	Third-party NMS	Third-party Devices	Configuration Completed	
Huawei Devices									
Power Meter	▼ Date&Time								😮 He
EMI				Count	y/Region CN(Chin	a, People's Rej 🛩			
Huawei NMS				1	ime zone (UTC+08	:00)Beijing 🖌			
Third-party NMS					Date 2023-02	07 07	YY-MM-DD)		
Third-party Devices					Time 11:34:1	9 (HH	:MM:SS)		
Configuration Completed				Clo	ck source Manager	ment System 👻			
configuration completion				Synchronizati	on server NA				
			Lat	est synchroniza	tion time 2000-01-	01 00:00:00			



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

Deployment Wizard	1			4		6	7		9		
Basic parameters	Basi		Huawei Power Meter Devices	EMI	Battery	Huawei NMS	Third-party NMS	Third-party Devices	Configuration Completed		
Huawei Devices	param	eters.	Devices		control		1111.5	Devices	compreted		
Power Meter	▼ MBU	IS Configuratio	on								
EMI				MBUS-inside Tr	ustlist			U	pload SN List		
Battery Control						Submit					
Huawei NMS											
Third-party NMS			Number of STSs: 1		Num	ber of PCS/Inverter	rs: 1		Number of	SmartESSs: 2	12
Third-party Devices		Ne.	Device		Port	Comm Address	SN			Device status	2 000
Configuration Completed		1	ESS(Net.8.1)		LAN	192.168.8.1	CMU9	B0105000		0	
		2	ESS(Net.8.130)	ĺ	LAN	192.168.8.130	1020B	0049926		•	
이 수 있는 것이 같이 같이 같이 같이 같이 않는 것이 같이 많이 했다.		3	Inverter(Net.8.131)		LAN	192.168.8.131	anmin	gpcs		•	
		4	6000K-H1(COM2-1)		COM2	1	TF001	02080049888		0	
				4							
				Lg							
						Search for Device					

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

Enspire									Enş	glish 🗸 🛈 🕞
	Deploy	yment Wizard Ov	er View Moni	toring Query	Settings Ma	intenance				II (<u>A</u> Q 🛄 🧶 🛄
SmartLogger3000	Running Info.	STA List Network	king Settings 🔪 🗛	bout						
Logger(Local)	ORunning Param.									
= MBUS	No.	SN		Match Status	Transfor	mer No.	Winding No.	Device		Comm Address
MBUS-inside										
SUN2000										
185KTL-H1(COM1-22)										
	1									
	•									
	Add Delete	Export Import	Synchronize	Template						
					Submit					
Time 2020-10-20 14:33	Grid dispatch P: 3.2	kW Q:4.8kVar						Sile Copyright D Hua	wei Technologies Co., Lto	d. 2020. All rights reserved.

Figure 7-6 Uploading the SN list

Enspire	Depi	oyment Wizard	Overview N	lonitoring Qu	ery Settings	Maintenance)			all C	🛕 15 🔛 6 🕚
Deployment Wizard	0	-0-	- 3			6	7		9		
Basic parameters	Basic parameters	Huawei Devices	Power Meter	EMI	Battery Control	Huawei NMS	Third-party NMS	Third-party Devices	Configuration Completed		
Huawei Devices											
Power Meter	 MBUS Conf 	iguration									
EMI				MBUS-inside Tr	ustlist			U	pload SN List		
Battery Control						Submit					
Huawei NMS		Number of	CTC 1			ber of PCS/Inverter			Munches	SmartESSs: 2	
Third-party NMS		Number of	5155: 1		Num	iber of PCS/Inverter	rs: I		Number of		0 @ ∠ ☆
Third-party Devices		lo. Devi	-		Port	Comm Address	SN			Device s	tatus

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

Figure 7-7 Setting the grid code

Enspire									Eng	ish	* (0E)
Enspire	Deplo	yment Wizard	Overview Mon	itoring	Query Settings	Maintenance				ul 🔼	1 10 00)
Deployment Wizard	0	-0	- 3	- 4 -	5	6	- 7				
Basic parameters Huawel Devices	Basic parameters	Huawei Devices	Power Meter	EMI	Huawei NMS	Third-party NMS	Third-party Devices	Configuration Completed			
Power Meter	▼ Grid Code										
EMI		No.	Device			Grid Code					
Huawei NMS		1	Inverter(COM1-1)			VDE-AR-N	4110-MV800				-
Third-party NMS											
Third-party Devices											
Configuration Completed											
노력적 관계에 많이 없다.											
December 19 marks	1										
방법에서 영제에서는	1										
											+
	4										P.
					Grid Code ABNT NE	R 16149-MV800	✓ Import	Config.			
					E	atch configurations					

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

Deployment Wizard	0	-0-			5					
Basic parameters Huawei Devices	Basic parameters	Huawei Devices	Power Meter	EMI Huar	wei NMS	Third-party NMS	Third-party Devices	Configuration Completed		
Power Meter	Modbus RTU									🕑 Hel
EMI				Port	COM1	~				
Huawei NMS				Protocol	Modbus	~				
Third-party NMS				Baud rate	9600	~				
Third-party Devices				Parity	None	~				
Configuration Completed				Stop Bit	1	~				
				Address	1		1, 247]			
	Device		stion Signal Name				Value		Un	
	Device		Signal Name				Value		Un	t
	Device						Value		Un	t
	Device						Value		Un	t
	Device						Value		Un	t
	Device				¢		Value		Un	t
	Device				¢		Value		Un	ŧ
	Device				¢		Value		Un	ť
	Device				¢		Value		Un	ť



Figure 7-9 Connecting to EMIs

Enspire									English	- (06)
Laspire	Deploys	ment Wizard	Overview Mo	nitoring Query	Settings	Maintenance)			🛕1 🛄0 🛞0 🕽
Deployment Wizard	0	-0		-0		6	2			
Basic parameters	Basic	Huawel	Power Meter	EMI Hur	wel NMS	Third-party NMS	Third-party Devices	Configuration		
Huawei Devices										
Power Meter	* Modbus RTU									🕑 Help
EMI				Port	COM1	~				
Huawei NMS				Baud rate	9600	~				
Third-party NMS				Parity	None	~				
Third-party Devices				Stop Bit	1	~				
Configuration Completed				EMI model Address	Kipp&Zo	onen SMPx 👻				
				Address						
					Add Devi	loen .				
	* EMI Running In	nformation								
	Device		Signal Name				Value		U	nit
								Ca		
									Previous	Next Skip
	Grid dispatch P : Disab	ile Q Disable	Al control : Disabled					👋 Copyright © Hue	awei Technologies Co., Ltd. 2022	All rights reserved.

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

Enspire										English	~ (CBE2)
Enspire	Deploy	ment Wizard		nitoring Query		Maintenance				🖉 line 🗸	<u>Al 🛄e 🛞e)</u>
Deployment Wizard	0	-0		-0	-0						
	Basic	Devices	Power Meter	EMI Hu	awel NMS	Third-party NMS	Third-party Devices	Configuration			
	* Management !	System									🕑 Help
				Server		isolar.huawei.com					
Huawel NMS				Port				[1, 65535]			
Third-party NMS				Address mode		ddress					
				TLS encryption TLS version							
Configuration Completed			Carried at	allenge authentication		riater					
				NMS connection status		ame resolution faile					
				4G module status							
				Ethernet state	The gates	ay cannot be conne	cted.				
					Submit						
											S More
											(3) More
								Cə			
								69			
										revious	Next Skip
It Time 2023-02-07 11:42	Grid dispatch P Disal	In a plantin	Al control : Dicabled					dia constante	Huawei Technologies		
-11 Time 2022-02-07 11/42	Grid dispatch P i Dical	ste Q i Dicable	At control : Dicabled					Se Copyright O	Huawer Technologies	c.o., Ltd. 2022. 1	All rights received.

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*.



Enspire									English	~ @E
L'hspire	Deploy	ment Wizard	Overview Mo	nitoring)	Query Settings	Maintenance)		 _atl 📿	<u>A1 🛄0 👀0</u>
Deployment Wizard	0	-0-		-0-	-0-	-0	- 7			
	Basic	Huawei Devices	Power Meter	EMI	Huawei NMS	Third-party NMS	Third-party Devices	Configuration		
Power Meter	Select a protocol	for connecting	to the third-party N	MS or device						🕑 Help
					Modbus TCP	Modbus RTU	IEC104			
Huawei NMS										
Third-party NMS										
Third-party Devices										
Configuration Completed										
	1									

Step 8 Connect to third-party devices.

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

Ensoire											
_nspn c	Deploy	ment Wizard	Overview Mor	nitoring Query	Settings	Maintenance	\mathbf{O}			.all (A1)	<u>10 (90</u>)
Deployment Wizard	0	-0-			-0			8			
Basic parameters	Basic parameters	Huawei Devices	Power Meter	EMI Hua	wei NMS	Third-party NMS	Third-party Devices	Configuration Completed			
Huawei Devices											
Power Meter	The SmartLogger v	works in maste	r mode and connects	s to third-party devic	es via Modb	us RTU protoco	4.				🕜 Help
EMI											
Huawei NMS	 Configuration 	Import/Export									
Third-party NMS					Import Con	nfig. Export C	onfig				
Third-party Devices	Modbus RTU										
Configuration Completed				Port	COM1	~					
	1			Protocol	Modbus	~					
				Baud rate	9600	~					
				Parity	None	~					
	1			Stop Bit	1	~					
				Device Type	Custom De						
				Address	1	[1, 2	47]				
그는 소리는 것을 하는 것이.	* Device Mgmt.						Da				
물건 명화 남은 다 다 물건.	All No.	Device		Port Co	mm Address	Logical a	addr.	SN	De	vice status	
동생은 영상을 받았는											
					Add Device	s Remove De	evices				
									Previo	_	Skip
Time 2023-02-07 11:43	Grid dispatch P : Disab	ile Q:Disable	Al control : Disabled					Sterright 🖇	Huawei Technologies Co., Lt	d. 2022. All rigi	its reserved.

Figure 7-12 Connecting to third-party devices

Step 9 Click Finish.

		eployment Wizard			uery Settings	Maintenance	2		
ployment Wizard	0-	0		-0		6			
Basic parameters	Basic paramete	rs Devices	Power Meter	EMI	Huawei NMS	Third-party NMS	Third-party Devices	Configuration Completed	
luawei Devices									
ower Meter	 Array s 	artup/shutdown							
мі				Array start	up/shutdown Pov	ver-Off 🖌			
Huawei NMS					Batch con	figurations			
hird-party NMS	- Notes	king Configuration D							
Third-party Devices	 Network 	King Configuration D	letails		NING STREET	a status - Danada	name resolution fa	11-4	
Configuration Complete	•						name resolution ta	iled	
		MODBUS TCP Link setting Disable							
					IEC104 Lini	k setting Disable			
	- Connec	t Device							
	Number of P	CS/Inverters:1							
	No.	Device 0		Port	Comm	Address 🕈	s	N 0	Device status 🌣
	1 1	nverter(COM1-1)		COM1	1			6T1979057591	0
									and the second

Figure 7-13 Completing the configuration

----End

7.3.4 Parameters Settings

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

Enspire		Devilor	ent Wizard Overview Monitoring Query	Settings Maintenance		English ~ 🔞 🛙
SmartLogger3000	Bunn	ing Info.		ng Param. Characteristic Curve About		
Logger(Local)	Grid P	arameters		r Adjustment Power Baseline Adjustmer	nt PV String Access Detection	
Inverter		No.	Signal Name	Value		Unit
 Inverter(COM1-1) 		1	Grid code	VDE-AR-N4110-MV800	~	
		2	Isolation	Input ungrounded(with TF)	~	
		3	Output mode	Three-phase three-wire	~	
		4	Auto start upon grid recovery	Enable	~	
		5	Grid connection duration after power grid recovery	0	[0, 7200]	5
		6	Grid reconnection voltage upper limit	880.0	[800.0, 1088.0]	V
		7	Grid reconnection voltage lower limit	760.0	[360.0, 800.0]	v
		8	Grid reconnection frequency upper limit	50.10	[50.00, 60.00]	Hz
	• •	9	Grid reconnection frequency lower limit	49.90	[40.00, 50.00]	Hz
		10	Delay time for connecting automatically to the network	< 60	[0, 7200]	5
		11	Soft start time after grid failure	20	[1, 1800]	s
		12	Max. voltage of grid-tied startup	880.0	[800.0, 1088.0]	v
		13	Min. voltage of grid-tied startup	720.0	[360.0, 800.0]	v
		14	Max. frequency of grid-tied startup	50.20	[50.00, 60.00]	Hz
		15	Min. frequency of grid-tied startup	47.50	[40.00, 50.00]	Hz
		16	Quick startup for short-time grid disconnection	Disable	~	

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 Passwords.
- To view alarms, log in to the FusionSolar app, choose **Alarm** > **Active alarm**, and rectify the fault based on the alarm handling suggestions.

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.

- Delete the script file immediately after use to reduce information disclosure risks.
- The file system of the USB flash drive must be FAT32.

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.

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

8 System Maintenance

A DANGER

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

• 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.

- 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.

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

 Table 8-1
 Maintenance checklist

Check Item	Check Method	Maintenance Method	Maintenance Interval
Electrical connectio n	 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
Groundin g 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
Vegetatio n 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



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

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.

- 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.

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.

- 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

8.4 Replacing a Fan

- 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.







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











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.

- 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.

D 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

1 DANGER

- If all the DC SWITCH are automatically turned off at the same time, the AC switch does not trip, and the indicators on the inverter displays the following status, do not turn on the DC SWITCH by yourself. Contact your vendor or technical support.
 - = $[,] \sim$, and \triangle indicators are steady red.
 - = and \triangle indicators are steady red.
- If all the DC SWITCH are automatically turned off at the same time and the AC switch trips, check that no short circuit occurs on the AC side between phases or between a phase and the ground, turn on the AC switch, export logs, and send the logs to your vendor or technical support. Rectify the fault after your vendor or technical support provides a solution. If there is any short circuit on the AC side between phases or between a phase and the ground, do not turn on the AC switch. Contact your vendor or technical support.
- If the DC SWITCH automatically turns off and the inverter generates a **String Reverse Connection**, **String Current Backfeed**, or **String Voltage High** alarm, rectify the fault based on the alarm handling suggestions. 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.
- Before turning on a switch, ensure that all alarms have been cleared.

Procedure

- **Step 1** Set the DC SWITCH to OFF.
- **Step 2** Set the DC SWITCH to ON.

----End

8.7 Locating Insulation Resistance Faults

NOTICE

The inverter supports insulation resistance detection:

- If reactive power output at night is enabled for the inverter, log in to the SmartLogger WebUI, choose Monitoring > Inverter > Running Param. > Power Adjustment and set Insulation resistance inspection during reactive power output at night to Enable. Then, the inverter will perform insulation resistance detection once a day. (This parameter can be set only for SUN2000HA V500R023C00SPC110, SmartLogger V300R023C10SPC550, and later versions.)
- If reactive power output at night is disabled, the inverter performs insulation resistance detection by default when it is started.

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.

NOTE

- The positive and negative terminals of a PV string are connected to the PV+ and PVterminals of the SUN2000, respectively. The 0% position corresponds to the PVterminal, 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.

- 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**.
- 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

9 Alarm Reference

For details about alarms, see Inverter Alarm Reference.

10 Technical Specifications

Efficiency

ltem	SUN200 0-250KT L-H3	SUN200 0-280KT L-H0	SUN200 0-300KT L-H0	SUN200 0-330KT L-H1	SUN200 0-330KT L-H2	SUN200 0-250KT L-H1
Maximu m 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

ltem	SUN200 0-250KT L-H3	SUN200 0-280KT L-H0	SUN200 0-300KT L-H0	SUN200 0-330KT L-H1	SUN200 0-330KT L-H2	SUN200 0-250KT L-H1
Maximu m input voltage	1500 V					
Maximu m input current (per MPPT)	65 A					

ltem	SUN200 0-250KT L-H3	SUN200 0-280KT L-H0	SUN200 0-300KT L-H0	SUN200 0-330KT L-H1	SUN200 0-330KT L-H2	SUN200 0-250KT L-H1
Maximu m short- circuit current (per MPPT)	115 A					
Minimu m 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

ltem	SUN200 0-250KT L-H3	SUN200 0-280KT L-H0	SUN200 0-300KT L-H0	SUN200 0-330KT L-H1	SUN200 0-330KT L-H2	SUN200 0-250KT L-H1
Rated output power	250 kW	280 kW	300 kW	300 kW	275 kW	250 kW
Maximu m apparent power	275 kVA	308 kVA	330 kVA	330 kVA	330 kVA	275 kVA
Maximu m active power (cosφ = 1)	275 kW	308 kW	330 kW	330 kW	330 kW	275 kW

ltem	SUN200 0-250KT L-H3	SUN200 0-280KT L-H0	SUN200 0-300KT L-H0	SUN200 0-330KT L-H1	SUN200 0-330KT L-H2	SUN200 0-250KT L-H1	
Rated output voltage	800 V AC,	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 frequenc y	50 Hz			50 Hz/60 Hz			
Maximu m 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	0.8 leading and 0.8 lagging					
Maximu m total harmonic distortion (rated power)	< 1%						

Protection

ltem	SUN200 0-250KT L-H3	SUN200 0-280KT L-H0	SUN200 0-300KT L-H0	SUN200 0-330KT L-H1	SUN200 0-330KT L-H2	SUN200 0-250KT L-H1
Input DC switch	Supported					
Anti- islanding protectio n	Supported					
Output overcurre nt protectio n	Supported					

ltem	SUN200 0-250KT L-H3	SUN200 0-280KT L-H0	SUN200 0-300KT L-H0	SUN200 0-330KT L-H1	SUN200 0-330KT L-H2	SUN200 0-250KT L-H1
Input reverse connecti on protectio n	Supported					
PV string fault detection	Supported					
DC surge protectio n	Туре II					
AC surge protectio n	Туре II					
Insulatio n resistanc e detection	Supported					
Residual current monitori ng unit (RCMU)	Supported					

Display and Communication

ltem	SUN200 0-250KT L-H3	SUN200 0-280KT L-H0	SUN200 0-300KT L-H0	SUN200 0-330KT L-H1	SUN200 0-330KT L-H2	SUN200 0-250KT L-H1
Display	LED indicators					
RS485	Supported					
MBUS	Supported					
USB	Supported					
WLAN +App	Supported					

General Specifications

ltem	SUN200 0-250KT L-H3	SUN200 0-280KT L-H0	SUN200 0-300KT L-H0	SUN200 0-330KT L-H1	SUN200 0-330KT L-H2	SUN200 0-250KT L-H1
Dimensio ns (W x H x D)	1048 mm x 732 mm x 395 mm					
Net weight	112 kg	112 kg				
Operatin g temperat ure	-30°C to +60°C -25°C to +60°C					
Cooling mode	Smart air cooling					
Maximu m 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 HH4SFD4TMS/HH4SMD4TMS JONHON)					
Output terminal	Waterproof terminal+OT/DT terminal					
IP rating	IP66					
Self- consump tion at night (sleep mode)	4.8 W					

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.



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.







(6) Heat gun

Figure A-3 Crimping a DT terminal



B Domain Name List of Management Systems

The list is subject to change.

Table B-1 Domain names of management systems

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

No.	Grid Code	Descript ion	SUN200 0-250KT L-H3	SUN200 0-280KT L-H0	SUN200 0-300KT L-H0	SUN200 0-330KT L-H1	SUN200 0-330KT L-H2	SUN200 0-250KT L-H1
1	CHINA- MV800	China medium -voltage power grid	Support ed	Support ed	Support ed	-	-	-
2	CHINA- CUSTOM- MV800	China power grid	Support ed	Support ed	Support ed	-	-	-
3	ABNT NBR 16149- MV800	Brazil medium -voltage power grid	-	-	-	-	-	Support ed
4	BRASIL- ANEEL- MV800	Brazil power grid	-	-	-	-	-	Support ed
5	KOREA- MV800	South Korea power grid	-	-	-	Support ed	-	-
6	TAIPOWER- MV800	Taiwan Power medium -voltage power grid	-	-	-	Support ed	-	-

No.	Grid Code	Descript ion	SUN200 0-250KT L-H3	SUN200 0-280KT L-H0	SUN200 0-300KT L-H0	SUN200 0-330KT L-H1	SUN200 0-330KT L-H2	SUN200 0-250KT L-H1
7	SINGAPORE- MV800	Singapor e medium -voltage power grid	-	-	-	Support ed	-	-
8	AS4777- MV800	Australia medium -voltage power grid	-	-	_	Support ed	-	-
9	AUSTRALIA- AS4777_A- MV800	Australia power grid	-	-	-	Support ed	-	-
10	Philippines- MV800	Philippin es power grid	-	-	-	Support ed	-	-
11	TAI-PEA- MV800	Thailand power grid	-	-	-	Support ed	-	-
12	TAI-MEA- MV800	Thailand power grid	-	-	-	Support ed	-	-
13	Malaysian- MV800	Malaysia power grid	-	-	-	Support ed	-	-
14	Bangladesh- MV800	Banglad esh power grid	-	-	-	Support ed	-	-
15	Vietnam- MV800	Vietnam medium -voltage power grid	-	-	-	Support ed	-	-
16	Cambodia- MV800	Cambodi a power grid	-	-	-	Support ed	-	-

No.	Grid Code	Descript ion	SUN200 0-250KT L-H3	SUN200 0-280KT L-H0	SUN200 0-300KT L-H0	SUN200 0-330KT L-H1	SUN200 0-330KT L-H2	SUN200 0-250KT L-H1
17	VDE-AR- N4110- MV800	Europe power grid	-	-	-	Support ed	-	-
18	CEI0-21- MV800	Italy power grid	-	-	-	Support ed	-	-
19	CEI0-16- MV800	Italy medium -voltage power grid	-	-	-	Support ed	-	-
20	UTE C 15-712-1- MV800	France power grid	-	-	-	Support ed	-	-
21	RD1699/661- MV800	Spain medium -voltage power grid	_	_	-	Support ed	_	-
22	PO12.3- MV800	Spain medium -voltage power grid	-	-	-	Support ed	-	-
23	NTS-MV800	Spain power grid	-	-	-	Support ed	-	-
24	EN50438_IE- MV800	Ireland power grid	-	-	-	Support ed	-	-
25	EN50549- MV800	Ireland power grid	-	-	-	Support ed	-	-
26	IRELAND- EN50549- MV800	Ireland power grid	-	-	-	Support ed	-	-
27	Northern Ireland- MV800	Norther n Ireland power grid	-	-	-	Support ed	-	-

No.	Grid Code	Descript ion	SUN200 0-250KT L-H3	SUN200 0-280KT L-H0	SUN200 0-300KT L-H0	SUN200 0-330KT L-H1	SUN200 0-330KT L-H2	SUN200 0-250KT L-H1
28	DENMARK- EN50549- MV800	Denmar k power grid	-	-	-	Support ed	-	-
29	C10/11- MV800	Belgium power grid	-	-	-	Support ed	-	-
30	PORTUGAL- MV800	Portugal power grid	-	-	-	Support ed	-	-
31	ANRE-MV800	Romania power grid	-	-	-	Support ed	-	-
32	AUSTRIA- MV800	Austria power grid	-	-	-	Support ed	-	-
33	AUSTRIA- HV800	Austria power grid	-	-	-	Support ed	-	-
34	Israel-MV800	lsrael power grid	-	-	-	Support ed	-	-
35	Israel-HV800	lsrael power grid	-	-	-	Support ed	-	-
36	POLAND- EN50549- MV800	Poland power grid	-	-	-	Support ed	-	-
37	CZECH- EN50549- MV800	Czech Republic power grid	-	-	-	Support ed	-	-
38	EN50438-TR- MV800	Türkiye power grid	-	-	-	Support ed	-	-
39	Macedonia- MV800	Republic of North Macedo nia power grid	-	_	_	Support ed	-	-

No.	Grid Code	Descript ion	SUN200 0-250KT L-H3	SUN200 0-280KT L-H0	SUN200 0-300KT L-H0	SUN200 0-330KT L-H1	SUN200 0-330KT L-H2	SUN200 0-250KT L-H1
40	Mexico- MV800	Mexico power grid	-	-	-	Support ed	-	-
41	ABNT NBR 16149- MV800	Brazil medium -voltage power grid	-	-	-	Support ed	-	-
42	BRASIL- ANEEL- MV800	Brazil power grid	-	-	-	Support ed	-	-
43	Chile-MV800	Chile power grid	-	-	-	Support ed	-	-
44	GREG060- MV800	Colombi a power grid	-	-	-	Support ed	-	-
45	ARGENTINA- MV800	Argentin a medium -voltage power grid	-	-	-	Support ed	-	-
46	Nicaragua- MV800	Nicarag ua power grid	-	-	-	Support ed	-	-
47	Panama- MV800	Panama power grid	-	-	-	Support ed	-	-
48	SAUDI- MV800	Saudi Arabia power grid	-	-	-	-	Support ed	-
49	LEBANON- MV800	Lebanon medium -voltage power grid	-	-	-	-	Support ed	-

No.	Grid Code	Descript ion	SUN200 0-250KT L-H3	SUN200 0-280KT L-H0	SUN200 0-300KT L-H0	SUN200 0-330KT L-H1	SUN200 0-330KT L-H2	SUN200 0-250KT L-H1
50	Pakistan- MV800	Pakistan power grid	-	-	-	-	Support ed	-
51	Oman- MV800	Oman power grid	-	-	-	-	Support ed	-
52	Oman-PDO- MV800	Oman power grid	-	-	-	-	Support ed	-
53	Bahrain- MV800	Bahrain power grid	-	-	-	-	Support ed	-
54	Kuwait- MV800	Kuwait power grid	-	-	-	-	Support ed	-
55	Jordan- Transmission- MV800	Jordan power grid	-	-	-	-	Support ed	-
56	Jordan- Distribution- MV800	Jordan power grid	-	-	-	-	Support ed	-
57	Jordan- Transmission- HV800	Jordan high- voltage power grid	-	-	-	-	Support ed	-
58	Egypt ETEC- MV800	Egypt power grid	-	-	-	-	Support ed	-
59	KENYA_ETHI OPIA-MV800	Kenya low- voltage power grid and Ethiopia medium -voltage power grid	-	-	-	-	Support ed	-

No.	Grid Code	Descript ion	SUN200 0-250KT L-H3	SUN200 0-280KT L-H0	SUN200 0-300KT L-H0	SUN200 0-330KT L-H1	SUN200 0-330KT L-H2	SUN200 0-250KT L-H1
60	TUNISIA- MV800	Tunisia medium -voltage power grid	-	-	-	-	Support ed	-
61	NRS-097-2-1- MV800	South Africa power grid	-	-	-	-	Support ed	-
62	SA_RPPs- MV800	South Africa power grid	-	-	-	-	Support ed	-
63	ZAMBIA- MV800	Zambia medium -voltage power grid	-	-	-	-	Support ed	-
64	KENYA_ETHI OPIA-MV800	Kenya low- voltage power grid and Ethiopia medium -voltage power grid	-	-	-	-	Support ed	-
65	NAMIBIA_MV 800	Namibia power grid	-	-	-	-	Support ed	-
66	Cameroon- MV800	Camero on medium -voltage power grid	-	-	-	-	Support ed	-
67	Ghana- MV800	Ghana medium -voltage power grid	-	-	-	-	Support ed	-

No.	Grid Code	Descript ion	SUN200 0-250KT L-H3	SUN200 0-280KT L-H0	SUN200 0-300KT L-H0	SUN200 0-330KT L-H1	SUN200 0-330KT L-H2	SUN200 0-250KT L-H1
68	NIGERIA- MV800	Nigeria medium -voltage power grid	-	-	-	-	Support ed	-
69	UZBEKISTAN- MV800	Uzbekist an power grid	-	-	-	-	Support ed	-
70	KAZAKHSTAN -MV800	Kazakhs tan power grid	-	-	-	-	Support ed	-
71	Mauritius- MV800	Mauritiu s power grid	-	-	-	-	Support ed	-
72	IRAQ-MV800	lraq power grid	-	-	-	-	Support ed	-
73	MOROCCO- MV800	Morocco power grid	-	-	-	-	Support ed	-
74	ALGERIA- MV800	Algeria power grid	-	-	-	-	Support ed	-
75	FRANCE-RTE- MV800	France power grid	-	-	-	Support ed	-	-
76	CHINA- GBT19964- MV800	China GB/T 19964 standard power grid	Support ed	Support ed	Support ed	-	-	-
77	CHINA- GBT29319- MV800	China GB/T 29319 standard power grid	Support ed	Support ed	Support ed	-	-	-

NOTE

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

D Resetting Passwords

Method 1: SUN2000 App

- **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** After the inverter is powered off, complete the following operations within 4 minutes:
 - 1. Turn on the AC switch and wait for about 90s or until the inverter indicator \mathbf{r} 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 \mathbf{r} 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

Method 2: SmartLogger3000 and SUN2000 App

- Step 1 On the Monitoring page of the SmartLogger, choose the inverter, choose Running Param. > Feature Parameters, and set Safe mode to Enter.
- **Step 2** Log in to the app and reset the password within 4 hours. (If the software restarts or no operation is performed within 4 hours, 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.



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



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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

NOTE

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Digital Power Customer Service



https://digitalpower.huawei.com/robotchat/

G Acronyms and Abbreviations

Α	
AUX.	Auxiliary
L	
LED	light emitting diode
Μ	
MBUS	monitoring bus
МРР	maximum power point
МРРТ	maximum power point tracking
Ρ	
PID	potential induced degradation
PV	photovoltaic
R	
RCMU	residual current monitoring unit