SUN2000-(12K-25K)-M5 Series

User Manual

Issue	15
Date	2025-09-30



HUAWEI

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About This Document

Purpose

This document describes the SUN2000-12KTL-M5, SUN2000-15KTL-M5, SUN2000-17KTL-M5, SUN2000-20KTL-M5, SUN2000-25KTL-M5, SUN2000-15KTL-ZHM5, SUN2000-17KTL-ZHM5, SUN2000-20KTL-ZHM5, and SUN2000-25KTL-ZHM5 (also referred to as SUN2000) in terms of their installation, electrical connections, commissioning, maintenance, and troubleshooting. Before installing and operating the SUN2000, ensure that you are familiar with the safety precautions as well as features and functions of the SUN2000 provided in this document.

Intended Audience

This document is intended for:

- Installers
- Users

Symbol Conventions

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

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

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

Change History

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

Issue 15 (2025-09-30)

Changed "Energy Management Assistant" to "SmartAssistant" throughout the document.

Updated **2.1 Product Introduction**.

Issue 14 (2025-07-25)

Updated **5.2 Preparing Cables**.

Updated **10 Technical Specifications**.

Issue 13 (2025-03-31)

Added **7.2 Setting Functions and Features Through Device Commissioning**.

Updated **10 Technical Specifications**.

Added **B Connecting to the Inverter on the App**.

Added **C Connecting to the SmartAssistant on the App**.

Updated **H Initial Certificate Risk Disclaimer**.

Issue 12 (2024-07-27)

Updated **2.2 Appearance**.

Updated **5.2 Preparing Cables**.

Updated **8.4 Replacing a Fan**.

Issue 11 (2024-06-30)

Updated **A Grid Codes**.

Issue 10 (2024-05-14)

Updated **F Rapid Shutdown**.

Issue 09 (2024-03-30)

Updated **5.5 Installing AC Output Power Cables and Signal Cables**.

Updated **8.4 Replacing a Fan**.

Updated **A Grid Codes**.

Issue 08 (2024-01-15)

Updated **5.2 Preparing Cables**.

Updated **5.4 Installing DC Input Power Cables**.

Issue 07 (2023-11-02)

Updated **5.3 Connecting a PE Cable**.

Issue 06 (2023-09-06)

Updated **A Grid Codes**.

Issue 05 (2023-07-31)

Updated **A Grid Codes**.

Issue 04 (2023-04-12)

Updated **A Grid Codes**.

Updated **G NS Protection**.

Issue 03 (2023-02-15)

Updated **1 Safety Information**.

Updated **2.1 Product Introduction**.

Updated **5.2 Preparing Cables**.

Updated **5.5 Installing AC Output Power Cables and Signal Cables**.

Updated **A Grid Codes**.

Updated **G NS Protection**.

Issue 02 (2022-10-20)

Updated **4.6 (Optional) Installing a Junction Box**.

Updated **5.2 Preparing Cables**.

Updated **5.5 Installing AC Output Power Cables and Signal Cables**.

Updated **7.2.1.1 Grid-tied Point Control**.

Updated **8.3 Troubleshooting**.

Updated **10.1 SUN2000-(15KTL-25KTL)-ZHM5 Technical Specifications**.

Updated **10.2 SUN2000-(12KTL-25KTL)-M5 Technical Specifications**.

Updated **F Rapid Shutdown**.

Issue 01 (2022-06-15)

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

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1 Safety Information

Statement

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

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

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

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

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

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

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

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

1.1 Personal Safety

DANGER

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

DANGER

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

DANGER

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

DANGER

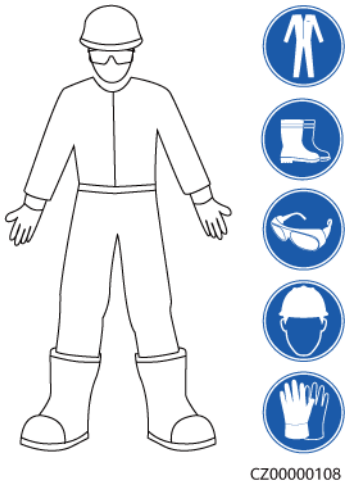
During operations, use dedicated insulated tools to prevent electric shocks or short circuits. The dielectric withstanding voltage level must comply with local laws, regulations, standards, and specifications.

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WARNING

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

Figure 1-1 Personal protective equipment



General Requirements

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

Personnel Requirements

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

  - 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.

WARNING

For the equipment that needs to be grounded, install the ground cable first when installing the equipment and remove the ground cable last when removing the equipment.

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WARNING

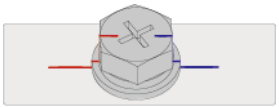
During the installation of PV strings and the inverter, the positive or negative terminals of PV strings may be short-circuited to ground if the power cables are not properly installed or routed. In this case, an AC or DC short circuit may occur and damage the inverter. The resulting device damage is not covered under any warranty.

CAUTION

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

General Requirements

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



- If the equipment has multiple inputs, disconnect all the inputs and wait until the equipment is completely powered off before performing operations on the equipment.
- Before maintaining a downstream electrical or power distribution device, turn off the output switch on the power supply equipment.

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- 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.

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1.3 Environment Requirements

DANGER

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

DANGER

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

DANGER

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

WARNING

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

WARNING

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

General Requirements

- 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.

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- 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.
- 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 installation, operation, and maintenance, clean up any water, ice, snow, or other foreign objects on the top of the equipment.
- When installing the equipment, ensure that the installation surface is solid enough to bear the weight of the equipment.
- After installing the equipment, remove the packing materials such as cartons, foam, plastics, and cable ties from the equipment area.

1.4 Mechanical Safety

⚠ WARNING

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

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WARNING

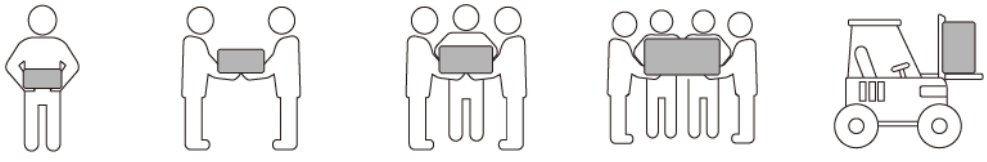
Do not drill holes into the equipment. Doing so may affect the sealing performance and electromagnetic containment of the equipment and damage components or cables inside. Metal shavings from drilling may short-circuit boards inside the equipment.

General Requirements

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

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- 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.

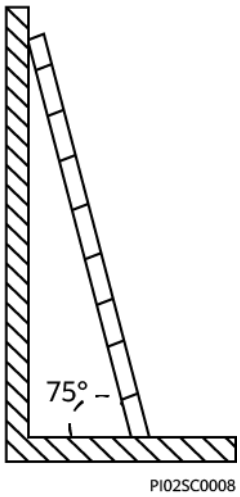
Using Ladders

- 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.

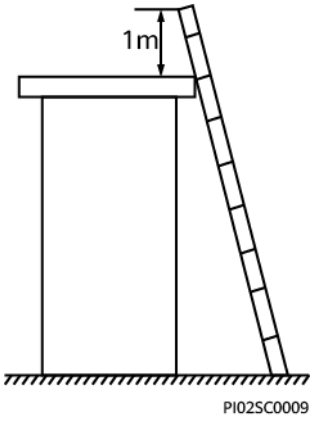


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- When climbing up the ladder, keep your body stable and your center of gravity between the side rails, and do not overreach to the sides.
- When a step ladder is used, ensure that the pull ropes are secured.
- If a single ladder is used, the recommended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

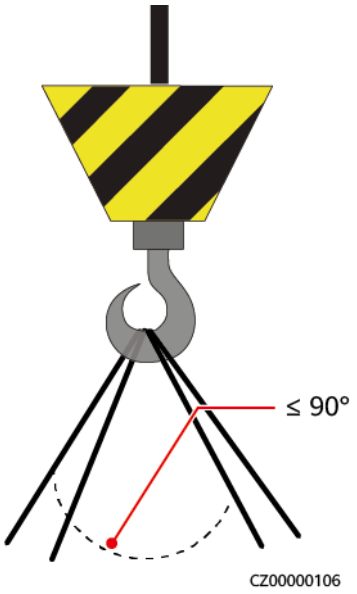


- If a single ladder is used, ensure that the wider end of the ladder is at the bottom, and take protective measures to prevent the ladder from sliding.
- If a single ladder is used, do not climb higher than the fourth rung of the ladder from the top.
- If you use a single ladder to climb up to a platform, 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 load-bearing requirements.
- Before hoisting objects, ensure that hoisting tools are firmly secured onto a fixed object or wall that meets the load-bearing requirements.
- During hoisting, do not stand or walk under the crane or the hoisted objects.
- Do not drag steel ropes and hoisting tools or bump the hoisted objects against hard objects during hoisting.
- Ensure that the angle between two hoisting ropes is no more than 90 degrees, as shown in the following figure.



Drilling Holes

- Obtain consent from the customer and contractor before drilling holes.
- Wear protective equipment such as safety goggles and protective gloves when drilling holes.
- To avoid short circuits or other risks, do not drill holes into buried pipes or cables.
- When drilling holes, protect the equipment from shavings. After drilling, clean up any shavings.

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2 Overview

2.1 Product Introduction

Function

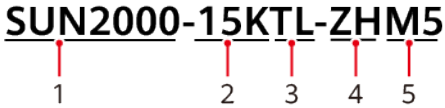
The SUN2000 is a three-phase grid-tied PV string inverter that converts the DC power generated by PV strings into AC power and feeds the power into the power grid.

Models

This document involves the following product models:

- SUN2000-12KTL-M5
- SUN2000-15KTL-M5
- SUN2000-17KTL-M5
- SUN2000-20KTL-M5
- SUN2000-25KTL-M5
- SUN2000-15KTL-ZHM5
- SUN2000-17KTL-ZHM5
- SUN2000-20KTL-ZHM5
- SUN2000-25KTL-ZHM5

Figure 2-1 Model description (SUN2000-15KTL-ZHM5 is used as an example)



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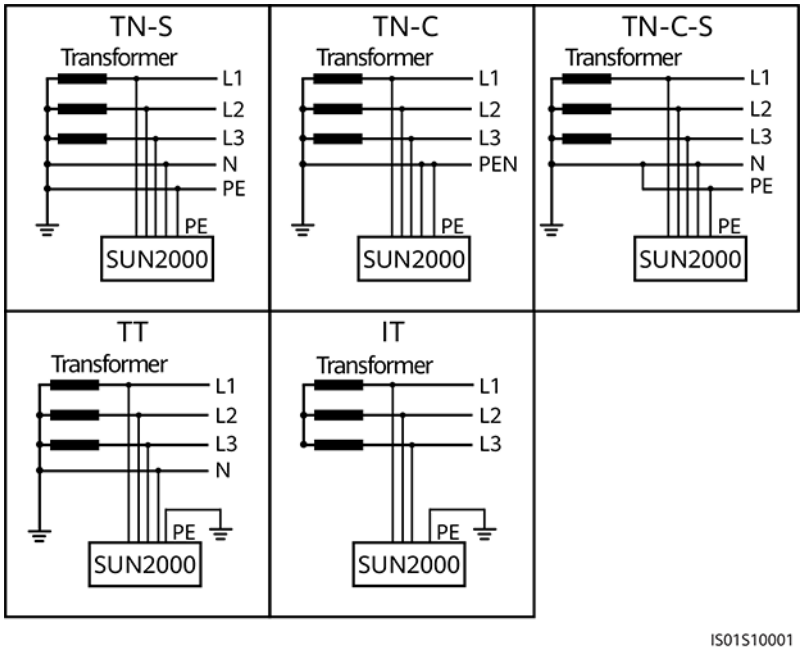
Table 2-1 Model description

No.	Meaning	Value
1	Series name	SUN2000: three-phase grid-tied PV string inverter
2	Power level	• 12K: The rated power is 12 kW. • 15K: The rated power is 15 kW. • 17K: The rated power is 17 kW. • 20K: The rated power is 20 kW. • 25K: The rated power is 25 kW.
3	Topology	TL: transformerless
4	Sales region	ZH: China
5	Product code	M5: product series with an input voltage level of 1100 V DC

Earthing Systems

The inverter supports the TN-S, TN-C, TN-C-S, TT, and IT earthing systems.

Figure 2-2 Supported earthing systems



NOTE

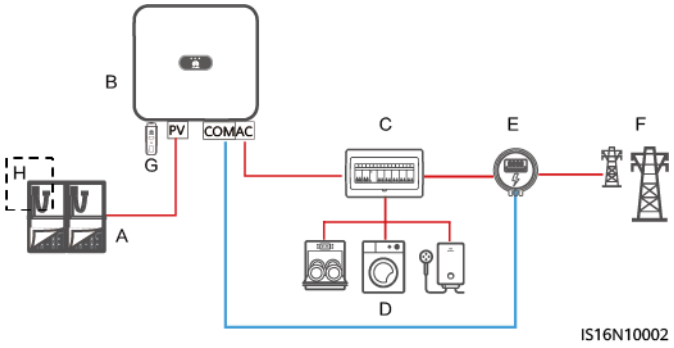
- In a TT power grid, the N-PE voltage should be lower than 30 V.
- In an IT power grid, you need to set **isolation settings** to **input not grounded, with a transformer.**

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Networking Application

The SUN2000 applies to residential rooftop grid-tied systems and small-sized ground grid-tied PV plants. Typically, a grid-tied system consists of PV strings, grid-tied inverters, AC switches, and power distribution units.

Figure 2-3 Networking application (single inverter)



(A) PV string
(B) SUN2000
(C) AC power distribution unit
(D) Load
(E) Power meter
(F) Power grid
(G) Smart Dongle
(H) Optimizer

NOTE

For detailed operations on devices in the network, see the following guides:

SUN2000-(600W-P, 450W-P2) Smart PV Optimizer Quick Guide

SUN2000 Smart PV Optimizer User Manual

MERC-(1300W, 1100W)-P Smart PV Optimizer Quick Guide

MERC Smart PV Optimizer User Manual

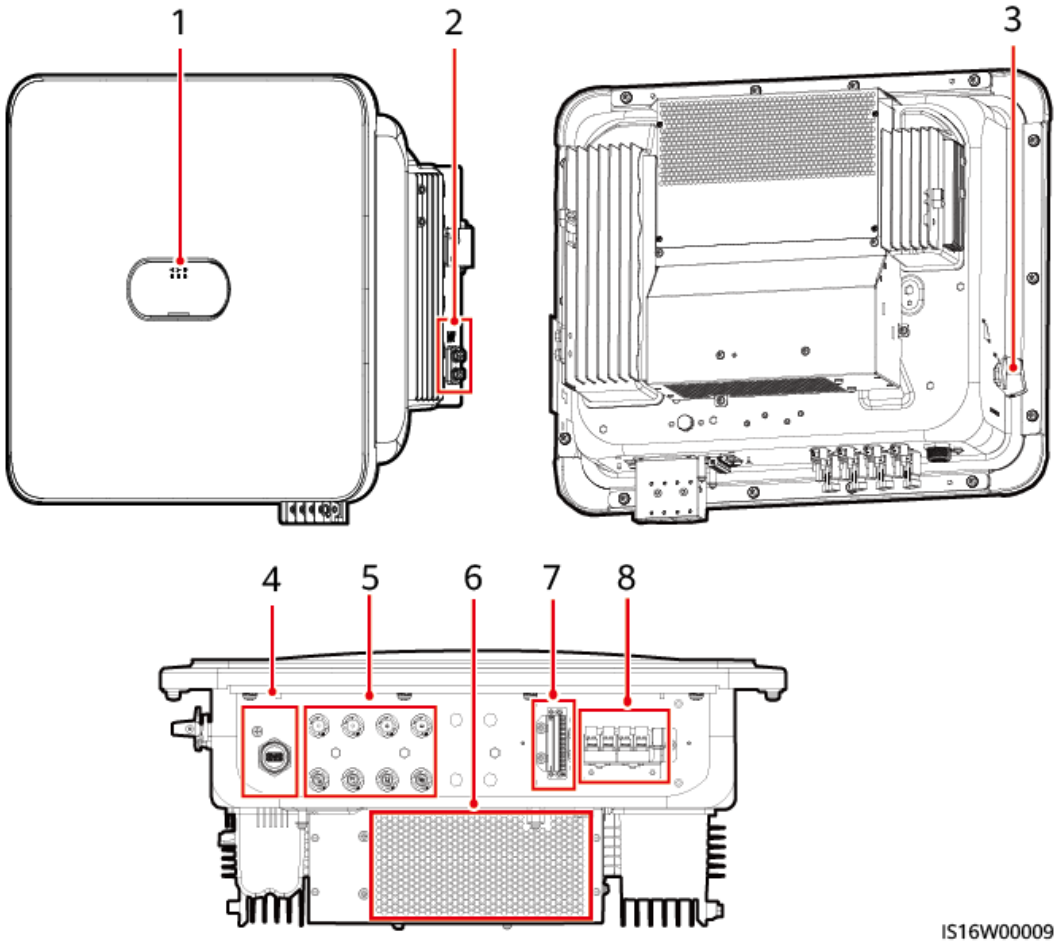
NOTE

- For two PV strings connected in parallel to the same MPPT circuit, the model, quantity, orientation, and tilt angle of PV modules in the PV strings must be the same.
- The MPPT voltage must be greater than the lower threshold of the full-load MPPT range specified in the inverter technical data sheet. Otherwise, the inverter will be derated, causing the system yield loss.

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2.2 Appearance

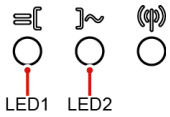
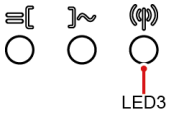
Figure 2-4 Appearance



(1) LED indicators
(2) Ground screws
(3) DC switch (DC SWITCH)
(4) Smart Dongle port (4G/WLAN-FE)
(5) DC input terminals (PV1–PV4)
(6) Fan
(7) Communication port (COM)
(8) AC output ports (AC)

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Table 2-2 LED indicator description

Category	Status		Meaning
Running indication 	**LED1**	**LED2**	N/A
	Steady green	Steady green	The SUN2000 is operating in grid-tied mode.
	Blinking green at long intervals (on for 1s and then off for 1s)	Off	The DC is on and the AC is off.
	Blinking green at long intervals (on for 1s and then off for 1s)	Blinking green at long intervals (on for 1s and then off for 1s)	The DC is on, the AC is on, and the SUN2000 is not exporting power to the power grid.
	Off	Blinking green at long intervals (on for 1s and then off for 1s)	The DC is off and the AC is on.
	Off	Off	Both the DC and AC are off.
	Blinking red at short intervals (on for 0.2s and then off for 0.2s)	N/A	There is a DC environmental alarm, such as an alarm indicating that High String Input Voltage, String Reverse Connection, or Low Insulation Resistance.
	N/A	Blinking red at short intervals (on for 0.2s and then off for 0.2s)	There is an AC environmental alarm, such as an alarm indicating Grid Undervoltage, Grid Overvoltage, Grid Overfrequency, or Grid Underfrequency.
	Steady red	Steady red	Fault
Communication indication 	**LED3**		N/A
	Blinking green at short intervals (on for 0.2s and then off for 0.2s)		Communication is in progress. (When a mobile phone is connected to the SUN2000, the indicator first indicates that the phone is connected to the SUN2000: blinks green at long intervals.)
	Blinking green at long intervals (on for 1s and then off for 1s)		The mobile phone is connected to the SUN2000.
	Off		There is no communication.

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Category	Status			Meaning
Device replacement indication	**LED1**	**LED2**	**LED3**	N/A
	Steady red	Steady red	Steady red	The SUN2000 hardware is faulty. The SUN2000 needs to be replaced.

2.3 Label Description

Symbol	Name	Meaning
	Grounding label	Indicates the position for connecting the protective earthing (PE) cable.
	Inverter serial number (SN) label	Indicates the product SN.
	QR code label for inverter Wi-Fi connection	Scan the QR code to connect to the SUN2000 inverter Wi-Fi.

2.4 Working Principles

2.4.1 Working Modes

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

Figure 2-5 Working modes

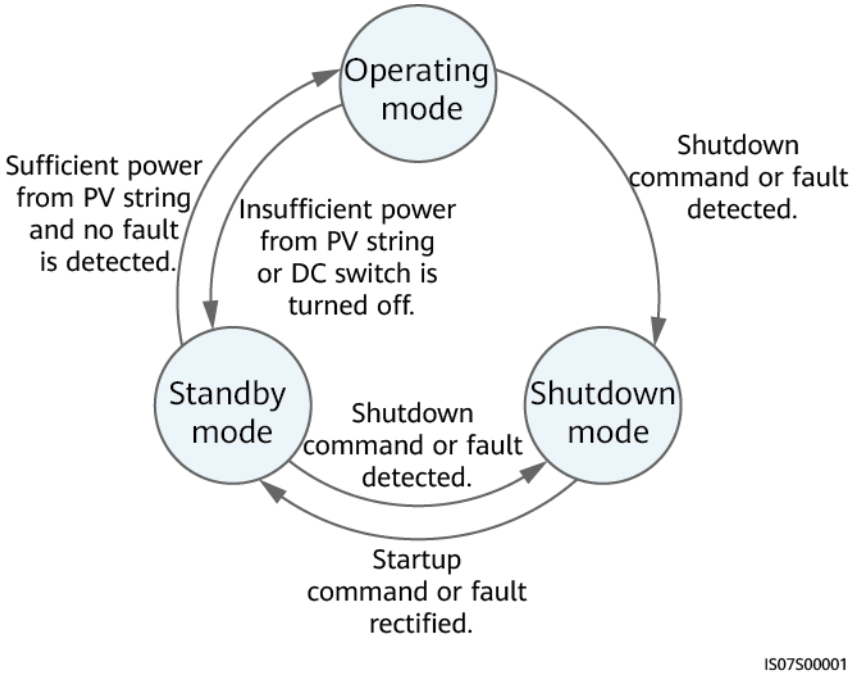


Table 2-3 Working mode description

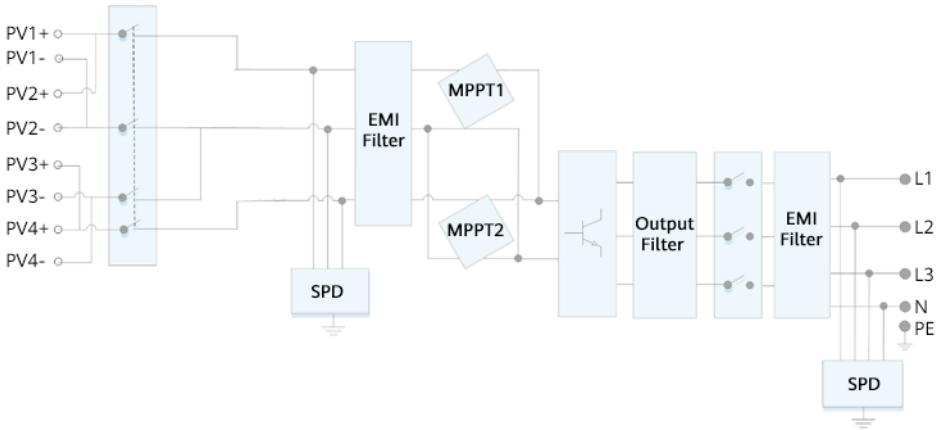
Working Mode	Description
Standby	The SUN2000 enters Standby mode when the external environment does not meet the operating requirements. In Standby mode: • The SUN2000 continuously performs status check and enters the Operating mode once the operating requirements are met. • The SUN2000 enters Shutdown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

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2.4.2 Circuit Diagram

The inverter connects to four PV strings and tracks the maximum power point of the PV strings through two maximum power point tracking (MPPT) circuits. It also converts DC power into three-phase AC power through an inverter circuit. Surge protection is supported on both the DC and AC sides.

Figure 2-6 Conceptual diagram



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3 Inverter Storage

NOTICE

- Store devices according to the storage requirements. Device damage caused by unqualified storage conditions is not covered under the warranty.
- Do not store the devices without outer packaging.
- Do not tilt a packing case or place it upside down.

The following requirements shall be met if inverters are not put into use immediately:

- If an inverter is unpacked but will not be used immediately, put it back to the original packaging and seal it 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.
- Keep the storage temperature at –40°C to +70°C and the humidity at 5%–95% RH.
- The air must not contain corrosive or flammable gases.
- When temporarily storing inverters outdoors, do not stack them on a pallet as the ground may be uneven. 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.
- Inverters can be stacked in a maximum of six layers. To avoid personal injury or device damage, stack inverters with caution to prevent them from falling over.
- Do not remove the outer packaging. Check the packaging regularly (recommended: once every three months). Replace any packaging that is damaged during storage.
- 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.

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- 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.

4 Installation

4.1 Checking Before Installation

Outer Packing Materials

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

NOTE

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

Package Contents

NOTICE

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

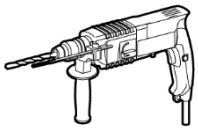
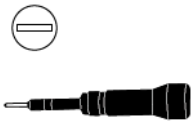
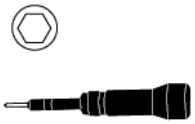
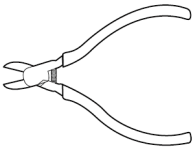
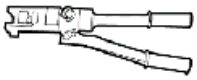
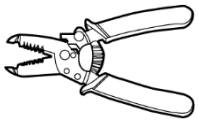
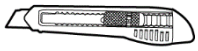
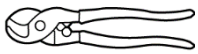
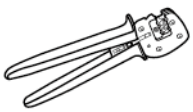
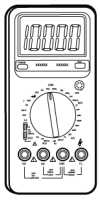
After unpacking the inverter, check that the contents are intact and complete. If any damage is found or any component is missing, contact your supplier.

NOTE

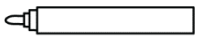
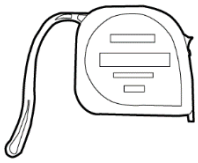
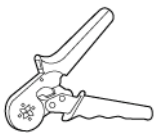
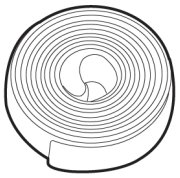
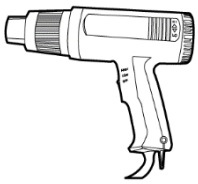
For details about the number of contents, see the *Packing List* in the packing case.

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4.2 Tools

Type	Tool			
Installation Tools	 Hammer drill Drill bit: Φ8 mm and Φ6 mm	 Flat-head insulated torque screwdriver	 Phillips insulated torque screwdriver	 Hex insulated torque screwdriver
	 Insulated torque socket wrench	 Diagonal pliers	 Hydraulic pliers	 Wire stripper
	 Cable tie	 Removal wrench Model: PV-MS-HZ Open-end Wrench; manufacturer: Staubli	 Rubber mallet	 Utility knife
	 Cable cutter	 Crimping tool Model: PV-CZM-22100/19100; manufacturer: Staubli	 Multimeter DC voltage measurement range ≥ 1100 V DC	 Vacuum cleaner

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Type	Tool			
	 Marker	 Measuring tape	 Bubble or digital level	 Cord end terminal crimper
	 Heat shrink tubing	 Heat gun	-	-
PPE	 Insulated gloves	 Protective gloves	 Dust mask	 Safety shoes
	 Safety goggles	-	-	-

4.3 Determining the Installation Position

4.3.1 Environment Requirements

Basic Requirements

- The inverter is protected to IP66 and can be installed indoors or outdoors.
- Do not install the inverter in an easily accessible place because its enclosure and heat sinks generate high temperature during operation.
- Do not install the inverter in noise-sensitive areas.
- Do not install the inverter in areas with flammable or explosive materials.
- Do not install the inverter in a place within children's reach.

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- Do not install the inverter outdoors in salt areas because it will be corroded there and may cause fire. A salt 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 inverter should be installed in a well-ventilated environment to ensure good heat dissipation.
- You are advised to install the inverter in a sheltered area, or with an awning over it.

Mounting Structure Requirements

- The mounting structure where the inverter is installed must be fireproof.
- Do not install the inverter on flammable building materials.
- The inverter is heavy. Ensure that the installation surface is solid enough to bear the weight.
- In residential areas, do not install the inverter on drywalls or walls made of similar materials which have a weak sound insulation performance because the noise generated by the inverter is noticeable.

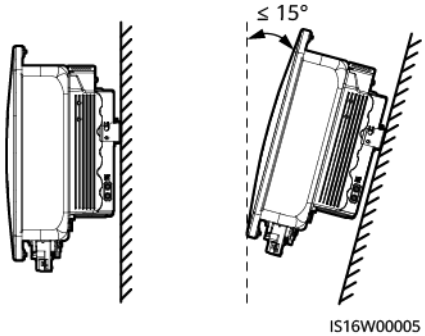
4.3.2 Clearance Requirements

Installation Angle

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

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

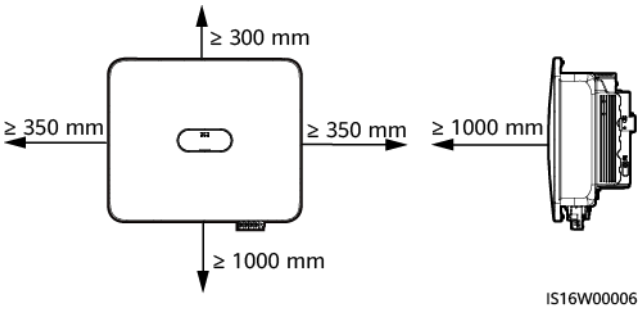
Figure 4-1 Installation angle



Installation Clearances

- Reserve enough clearances around the inverter to ensure sufficient space for installation and heat dissipation.

Figure 4-2 Clearances



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

Figure 4-3 Horizontal installation mode (recommended)

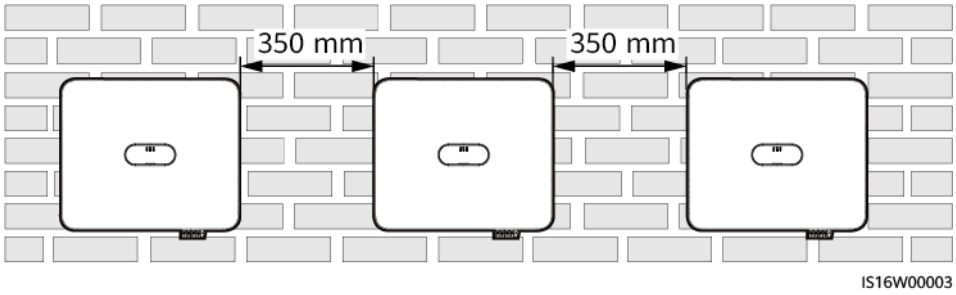
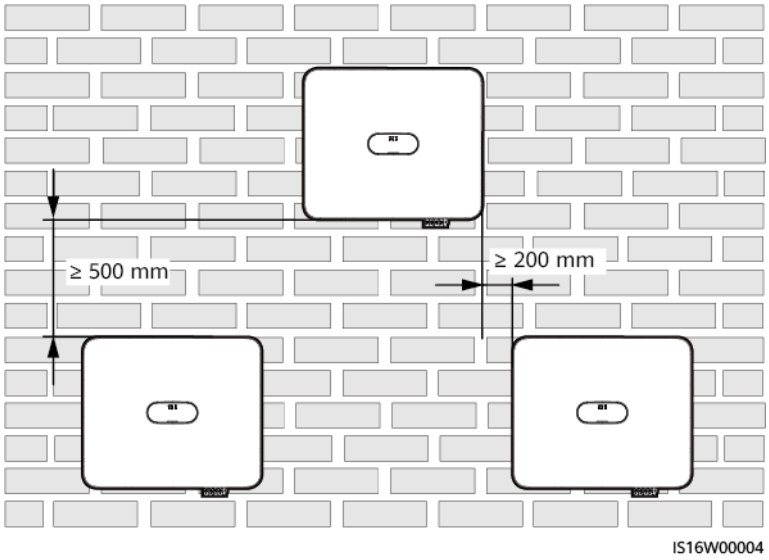


Figure 4-4 Triangle installation mode (recommended)



4.4 Moving an Inverter

Procedure

Step 1 Two persons are required to move the inverter with one person on both sides. Lift the inverter from the packing case and move it to the specified installation position.

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CAUTION

- Move the inverter with care to prevent device damage and personal injury.
- Do not hold the wiring terminals and ports at the bottom. Do not place the inverter with the wiring terminals and ports touching the ground or other supporting surface.
- When you need to temporally place the inverter on the ground, use protection material such as foam and paper underneath to prevent damage to its enclosure.

----End

4.5 Installing an Inverter

Installation Precautions

DANGER

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

NOTICE

- To avoid inhaling dust and to prevent dust from falling into your eyes, ensure that safety goggles and a dust mask are worn when drilling holes.
- Use a vacuum cleaner to clean up dust in and around the holes, and measure the spacing. If the holes are inaccurately positioned, drill the holes again.
- Level the top of the expansion sleeve with the concrete wall after removing the bolt, spring washer, and flat washer. Otherwise, the mounting bracket will not be securely installed on the concrete wall.
- Loosen the nuts, flat washers, and spring washers of the two expansion bolts below.

NOTE

- M6x60 expansion bolts are delivered with the inverter. If the length and quantity of the bolts do not meet installation requirements, prepare M6 stainless steel expansion bolts by yourself.
- The expansion bolts delivered with the inverter are mainly used for solid concrete walls. For other types of walls, prepare bolts by yourself and ensure that the wall meets the load bearing requirements of the inverter.
- For support-mounting, prepare M6 stainless bolt assemblies (including flat washers, spring washers, and M6 bolts) with appropriate lengths as well as corresponding flat washers and nuts based on the support specifications.

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Figure 4-5 Mounting bracket dimensions

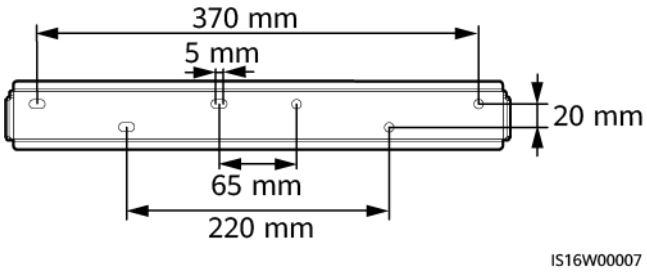
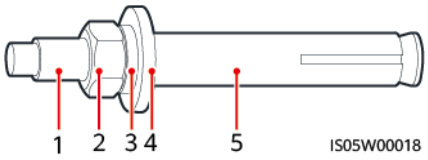


Table 4-1 Installation modes

Installation Mode	Screw Specifications	Description
Wall-mounting	M6x60 stainless steel expansion bolt	Delivered with the product
Support-mounting	M6 bolt assembly	Prepared by the customer

Figure 4-6 Expansion bolt composition



(1) Bolt (2) Nut (3) Spring washer

(4) Flat washer (5) Expansion sleeve

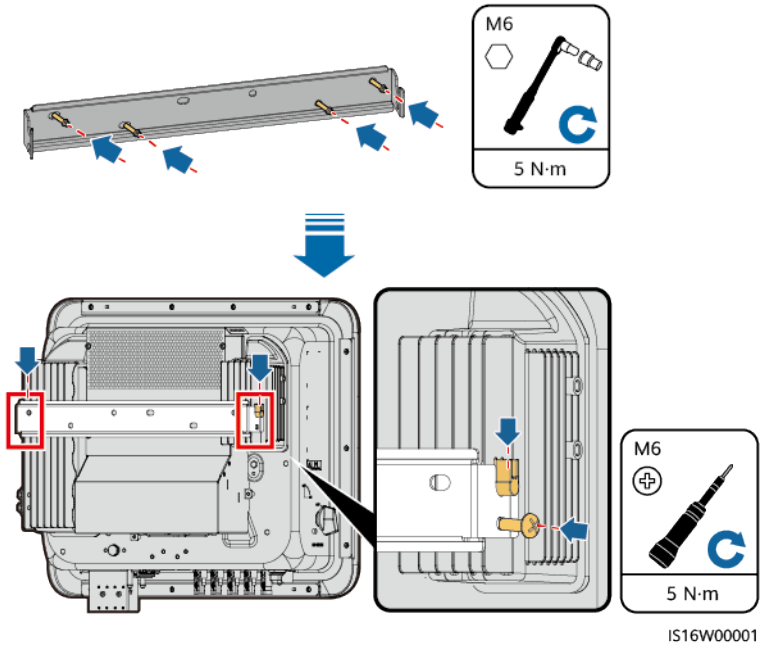
Procedure

Step 1 Install the mounting bracket.

Step 2 Mount the inverter on the mounting bracket and install screws.

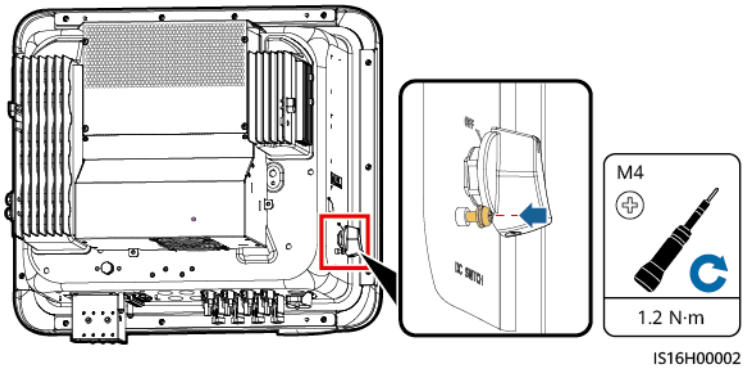
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Figure 4-7 Installing an Inverter



Step 3 (Optional) Install the locking screw for the DC switch.

Figure 4-8 Installing the locking screw for the DC switch



----End

4.6 (Optional) Installing a Junction Box

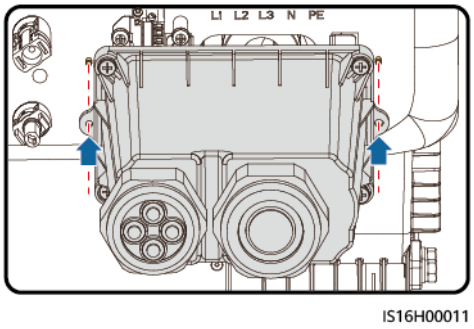
NOTICE

If you do not connect cables immediately after securing the inverter, install a junction box. Otherwise, the protection level of the inverter will be affected.

Step 1 Align the pin holes at both ends of the junction box with the positioning pins on the inverter enclosure to ensure that the screw holes on the junction box are aligned.

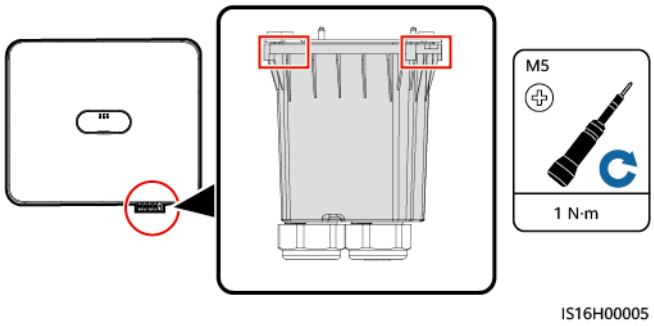
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Figure 4-9 Aligning positioning pins



Step 2 Install the junction box.

Figure 4-10 Installing a junction box



----End

5 Electrical Connections

5.1 Precautions

DANGER

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

DANGER

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

WARNING

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

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CAUTION

- Stay away from the equipment when preparing cables to prevent cable scraps from entering the equipment. Cable scraps may cause sparks and result in personal injury and equipment damage.

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).

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5.2 Preparing Cables

Figure 5-1 SUN2000 cable connections (Components in the dashed boxes are optional.)

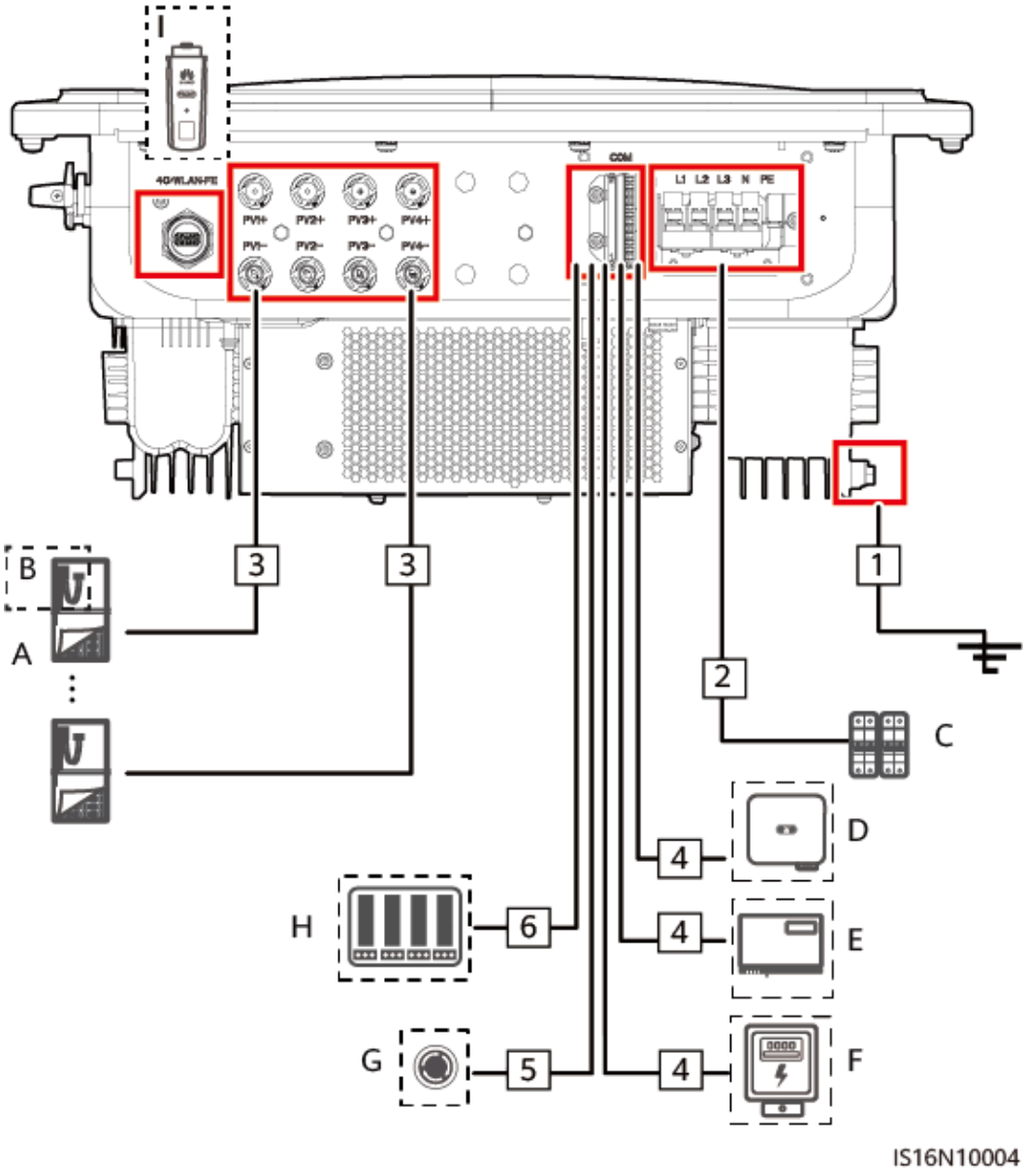


Table 5-1 Component description

No.	Component	Description	Source
A	PV module	• A PV string consists of PV modules connected in series. • The inverter supports the input from four PV strings.	Prepared by the customer

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No.	Component	Description	Source
B	Smart PV optimizer	The SUN2000-(600W-P, 450W-P2) and MERC-(1300W, 1100W)-P are supported.[3]	Purchased from the Company
C	AC switch	To ensure that the inverter can be safely disconnected from the power grid when an exception occurs, connect an AC switch to the AC side of the inverter. Select an appropriate AC switch in accordance with local industry standards and regulations. Huawei recommends the following switch specifications: Recommended: three-phase AC circuit breaker, rated voltage ≥ 415 V AC, rated current: • 12KTL–20KTL: 40 A • 25KTL: 50 A or 63 A	Prepared by the customer
D	SUN2000	Select a proper model as required.	Purchased from the Company
E	SmartLogger	Select a proper model as required.	Purchased from the Company
F	Power meter[1]	Recommended models: DTSU666-H and YDS60-C24, DTSU71 and DHSU1079-CT[4]	Purchased from the Company
G	Rapid shutdown switch	Select a proper model as required.	Prepared by the customer
H	Power grid scheduling device	Select the devices that meet the power grid scheduling requirements.	Provided by the local power grid company
I	Smart Dongle[2]	Supported models: • WLAN-FE Smart Dongle: SDongleA-05 • 4G Smart Dongle: SDongleA-03, SDongleB-06	Purchased from the Company

No.	Component	Description	Source
Note [1]: For details about meter operations, see ***DTSU666-H 100 A and 250 A Smart Power Sensor User Manual***, **DTSU71 Smart Power Sensor Quick Guide**, **DHSU1079-CT Smart Power Sensor Quick Guide**, or **YDS60-C24 Smart Power Sensor Quick Guide**. Note [2]: For details about how to use the WLAN-FE Smart Dongle SDongleA-05, see ***SDongleA-05 Smart Dongle Quick Guide (WLAN-FE)***. For details about how to use the 4G Smart Dongle SDongleA-03, see ***SDongleA-03 Quick Guide (4G)***. For details about how to use the Smart Dongle SDongleB-06, see ***SDongleB-06 Smart Dongle Quick Guide (4G)***. You can obtain the quick guides at **https://support.huawei.com/enterprise** by searching for the Smart Dongle model. Note [3]: The SUN2000-(600W-P, 450W-P2) cannot be used together with the MERC-(1300W, 1100W)-P. Note [4]: • SUN2000MB V200R022C10SPC101(B044) and later versions can connect to the YDS60-C24 meters. • SUN2000MB V200R023C10SPC200 and later versions can connect to the DTSU71 and DHSU1079-CT meters. • Ensure that the baud rates of the DTSU666-H, YDS60-C24, DTSU71 and DHSU1079-CT meters are set to the default values. If they are changed, meters may go offline, generate alarms, or affect the inverter output power.			

Table 5-2 Cable description

No.	Name	Type	Conductor Cross-Sectional Area	Outer Diameter
1	PE cable	Single-core outdoor copper cable	12KTL: ≥ 6 mm^2 15KTL–25KTL: ≥ 10 mm^2	-
2	AC output power cable	Outdoor copper cable	12KTL: 6–16 mm^2 15KTL–25KTL: 10–16 mm^2	11–26 mm
3	DC input power cable	Common outdoor PV cable	4–6 mm^2	5.5–9 mm
4	(Optional) RS485 communications cable	Two-core outdoor shielded twisted pair cable	0.2–1 mm^2 (recommended: 0.5 mm^2)	4–11 mm

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No.	Name	Type	Conductor Cross-Sectional Area	Outer Diameter
5	(Optional) Signal cable to the rapid shutdown switch			
6	(Optional) Grid scheduling signal cable	Five-core outdoor cable		

NOTE

- The minimum cable diameter must meet local standards.
- The factors that affect cable selection include the rated current, cable type, routing mode, ambient temperature, and maximum expected line loss.

5.3 Connecting a PE Cable

Precautions

DANGER

- Ensure that the PE cable is securely connected. Otherwise, electric shocks may occur.
- Do not connect the neutral wire to the enclosure as a PE cable. Otherwise, electric shocks may occur.

NOTE

- The PE point at the AC output port is used only as a PE equipotential point, and cannot substitute for the PE point on the enclosure.
- It is recommended that silicone grease or paint be applied around the ground terminal after the PE cable is connected.
- When the phase wire is short-circuited to the PE point, you can set the phase-to-PE short-circuit protection switch on the app (choose **Settings > Feature parameters > Phase-to-ground short-circuit protection**). If the switch is disabled, only inverter alarm detection is performed, and the inverter can connect to the power grid and generate power normally. (This feature is applicable to SUN2000-15KTL-ZHM5, SUN2000-17KTL-ZHM5, SUN2000-20KTL-ZHM5, and SUN2000-25KTL-ZHM5.)

Additional Information

The inverter provides the grounding detection function. This function is used to check whether the inverter is properly grounded before the inverter starts, or check whether the ground cable is disconnected when the inverter is running. This function is only available under limited conditions. To ensure the safe operation of

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the inverter, properly ground the inverter according to the connection requirements of the PE cable. For some power grid types, if the output side of the inverter is connected to an isolation transformer, ensure that the inverter is properly grounded and set **Phase-to-ground short-circuit protection** to **Disable** so that the inverter can run properly.

- According to IEC 62109, to ensure the safe operation of the inverter in the case of PE cable damage or disconnection, properly connect the PE cable of the inverter and ensure that it meets at least one of the following requirements before the grounding detection function becomes invalid.
  - If the PE terminal of the AC connector is not connected, the PE cable on the enclosure must be a single-core outdoor copper cable with a cross-sectional area of at least 10 mm^2.
  - Use cables with the same diameter as the AC output power cable and ground the PE terminal on the AC connector and the ground screws on the enclosure.
- In some countries and regions, the inverter must have additional ground cables. In this case, use cables with the same diameter as the AC output power cable to ground the PE terminal of the AC connector and the ground screws of the enclosure, respectively.

Procedure

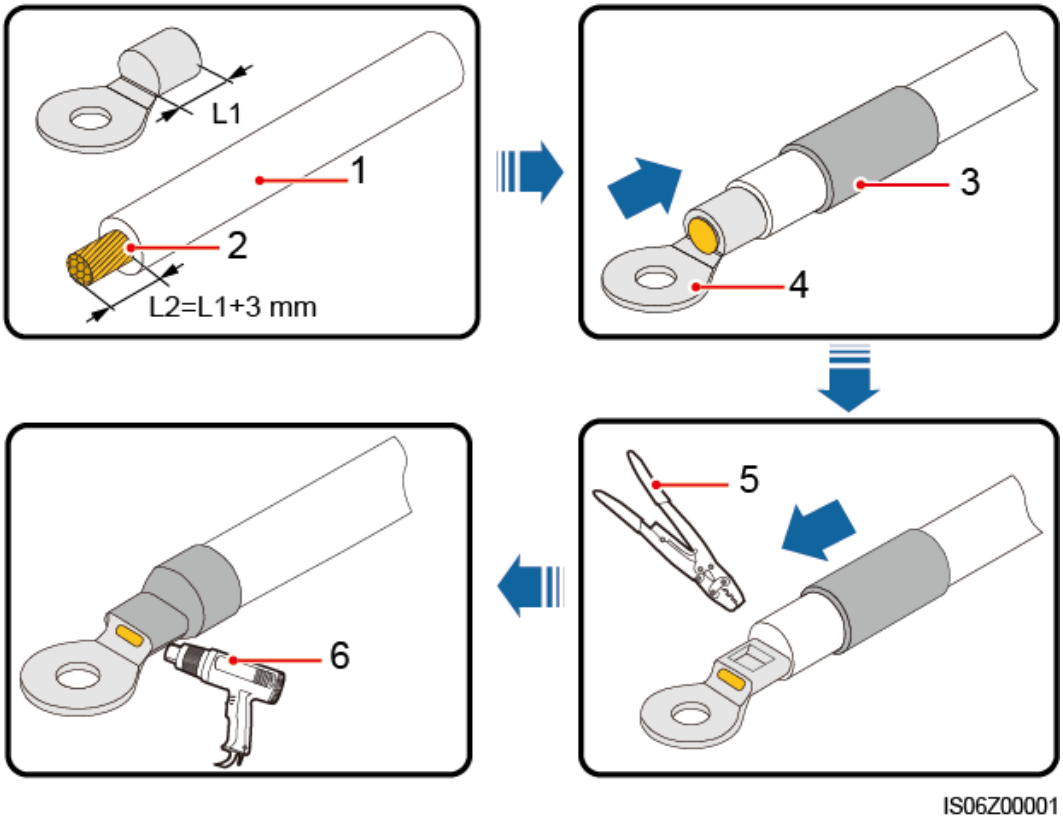
Step 1 Crimp an OT terminal.

NOTICE

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

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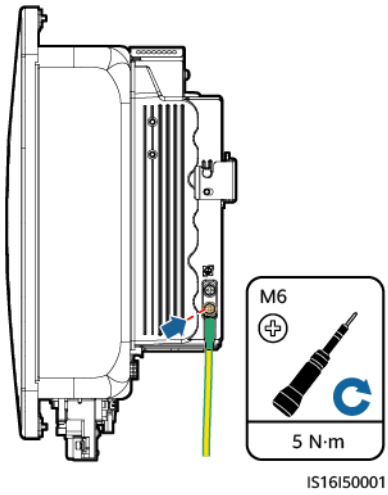
Figure 5-2 Crimping an OT terminal



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

Step 2 Connect the PE cable.

Figure 5-3 Connecting a PE cable



----End

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5.4 Installing DC Input Power Cables

Precautions

DANGER

- Before connecting the DC input power cable, ensure that the DC voltage is within the safe range (lower than 60 V DC) and that the inverter DC SWITCH is OFF. Failing to do so may result in electric shocks.
- When the inverter is operating, it is not allowed to work on the DC input power cables, such as connecting or disconnecting a PV string or a PV module in a PV string. Otherwise, electric shocks may occur.
- If no PV string connects to a DC input terminal of the inverter, do not remove the watertight cap from the DC input terminals. Otherwise, the protection level of the inverter will be affected.

WARNING

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

- PV modules connected in series in each PV string are of the same specifications.
- The maximum open-circuit voltage of each PV string must be less than or equal to 1100 V DC.
- The maximum short-circuit current of each PV string must be less than or equal to 20 A.
- PV strings must be connected in the correct polarity. The positive and negative terminals of a PV string connect to the corresponding positive and negative DC input terminals of the inverter, respectively.
- If the DC input power cables are reversely connected, do not operate DC SWITCH or the positive and negative connectors immediately. Wait until the night when solar irradiance declines and the PV string current drops to below 0.5 A. Then set DC SWITCH to OFF, remove the positive and negative connectors, and connect the DC input power cables correctly.

WARNING

If power cables are not properly installed or routed during the installation of PV strings and the inverter, the positive or negative terminals of PV strings may be short-circuited to ground. 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.

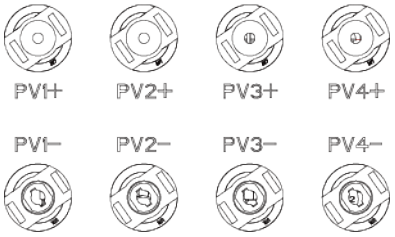
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NOTICE

- The output of the PV strings connected to the inverter cannot be grounded. Ensure that the PV output is well insulated to ground.
- PV modules and optimizers in the PV strings connecting to the same MPPT must be of the same model and quantity.

Terminal Description

Figure 5-4 DC input terminals



Procedure

WARNING

Before inserting the positive and negative connectors into the positive and negative DC input terminals of the inverter, ensure that DC SWITCH is set to OFF.

NOTICE

- Cables with high rigidity, such as armored cables, are not recommended as DC input power cables, because poor contact may be caused by the bending of the cables.
- Before assembling DC connectors, label the cable polarity correctly to ensure correct cable connections.
- After crimping the positive and negative metal terminals, pull back the DC input power cables to ensure that they are connected securely.
- Insert the crimped metal terminals of the positive and negative power cables into the appropriate positive and negative connectors. Then pull back the DC input power cables to ensure that they are connected securely.
- If a DC input power cable is reversely connected and DC SWITCH is set to ON, do not operate on DC SWITCH or the positive and negative connectors immediately. Otherwise, the device may be damaged. The resulting device damage is not covered under any warranty. Wait until the night when solar irradiance declines and the PV string current drops to below 0.5 A. Then set DC SWITCH to OFF, remove the positive and negative connectors, and connect DC input power cable correctly.

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NOTE

- The DC voltage measurement range of the multimeter must be at least 1100 V. If the voltage is a negative value, the DC input polarity is incorrect. Correct the cable connection. If the voltage is greater than 1100 V DC, too many PV modules are connected in the same string. Re-configure the PV modules.
- If PV strings are configured with optimizers, check the cable polarity by referring to the *Smart PV Optimizer Quick Guide*.

Step 1 Install the DC input power cables.

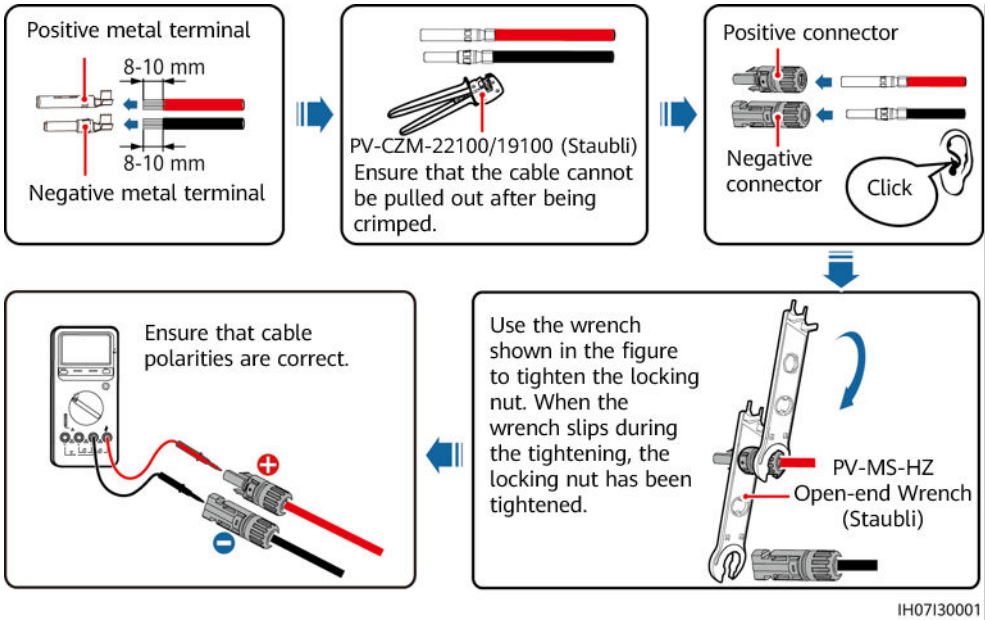
CAUTION

Use the Staubli MC4 positive and negative metal terminals and DC connectors delivered with the inverter. Using incompatible positive and negative metal terminals and DC connectors may result in serious consequences. The resulting device damage is not covered under any warranty.

NOTICE

During DC input power cabling, leave at least 50 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.

Figure 5-5 Assembling DC connectors



----End

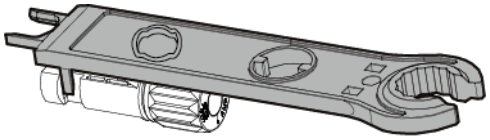
Removing DC Connectors

WARNING

Before removing the positive and negative connectors, ensure that DC SWITCH is set to OFF and that the current is less than 0.5 A.

To remove the positive and negative connectors from the inverter, insert an open-end wrench into the bayonet and press the wrench with force. Then remove the DC connectors with caution.

Figure 5-6 Removing a DC Connector



IH07H00019

5.5 Installing AC Output Power Cables and Signal Cables

Precautions

It is recommended that a three-phase AC switch be installed on the AC side of the inverter. To ensure that the inverter can safely disconnect itself from the power grid when an exception occurs, select a proper overcurrent protection device in compliance with local power distribution regulations.

WARNING

- Do not connect loads between an inverter and an AC switch that directly connects to the inverter. Otherwise, the switch may trip by mistake.
- If an AC switch is used with specifications beyond local standards, regulations, or the Company's recommendations, the switch may fail to turn off in a timely manner in case of exceptions, causing serious faults.

CAUTION

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

The inverter is installed with an integrated residual current monitoring unit. When the inverter detects that residual current exceeds the permitted value, it disconnects from the power grid quickly.

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NOTICE

- If the external AC switch provides the leakage protection function, the rated residual operating current must be greater than or equal to 300 mA.
- If multiple inverters are connected to the master leakage protection device through their external AC switches, the rated residual operating current of the device must be greater than or equal to the number of inverters x 300 mA.
- The AC switch cannot be a knife switch.

Communications Port Pin Definitions

NOTICE

- When laying out a signal cable, separate it from power cables and keep it away from strong interference sources to prevent communication interruption.
- Ensure that the signal cable jacket is inside the connector and surplus core wires are cut off flush with the edge of the cable jacket. Insert the exposed core wires completely into the conductor insertion points. Ensure that the cable is connected securely.

Figure 5-7 Pin definitions

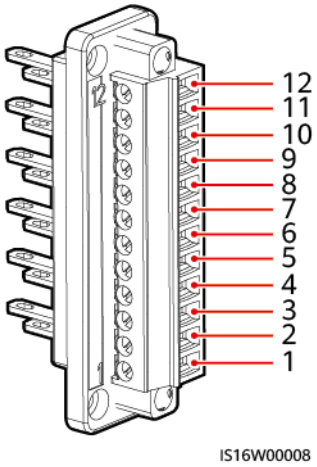


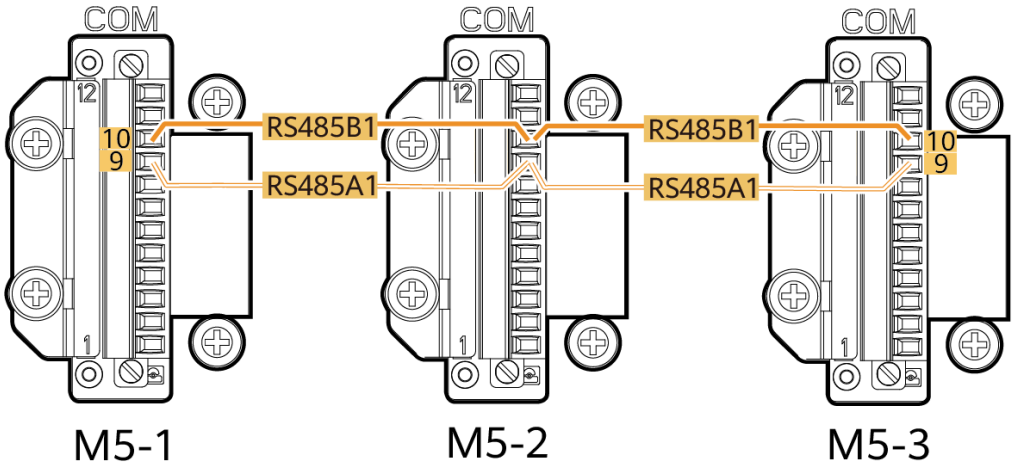
Table 5-3 Pin definitions

Pin	Definition	Function	Description
1	GND	Ripple Control	Used for connecting to GND of DIN1–DIN5
2	DIN1		Dry contact for grid scheduling
3	DIN2		
4	DIN3		

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Pin	Definition	Function	Description
5	DIN4		
6	DIN5	Rapid shutdown signal +	Used for the rapid shutdown DI signal or connecting to the signal cable of an NS protection device
7	GND	GND	-
8	-	-	-
9	485A1	RS485A1 differential signal +	Used for inverter cascading or connecting to the RS485 signal port of a SmartLogger
10	485B1	RS485B1 differential signal –	
11	485A2	RS485A2 differential signal +	Used for connecting to the RS485 signal port of the power meter.
12	485B2	RS485B2 differential signal –	

Figure 5-8 Cascading diagram



IS16W00013

Procedure

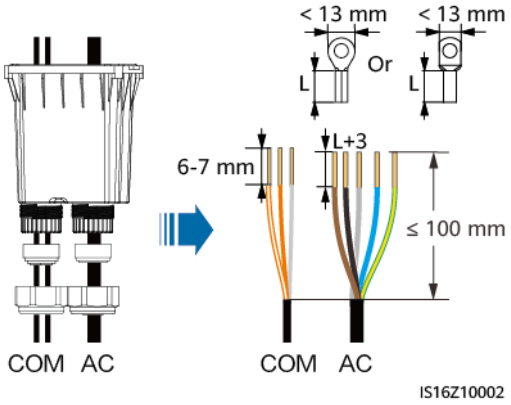
Step 1 Route the cables through the connection box and prepare cable terminals.

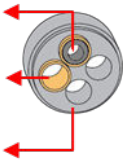
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NOTICE

- Before routing cables, check that the sealing strips of the connection box are intact. Otherwise, the sealing and waterproof performance of the device may be affected.
- The cable stripping length must meet the requirements. Otherwise, the sealing and waterproof performance of the device may be affected.
- The OT terminal size must match the cross-sectional area of the AC output power cable and the M5 screw specifications.

Figure 5-9 Routing cables

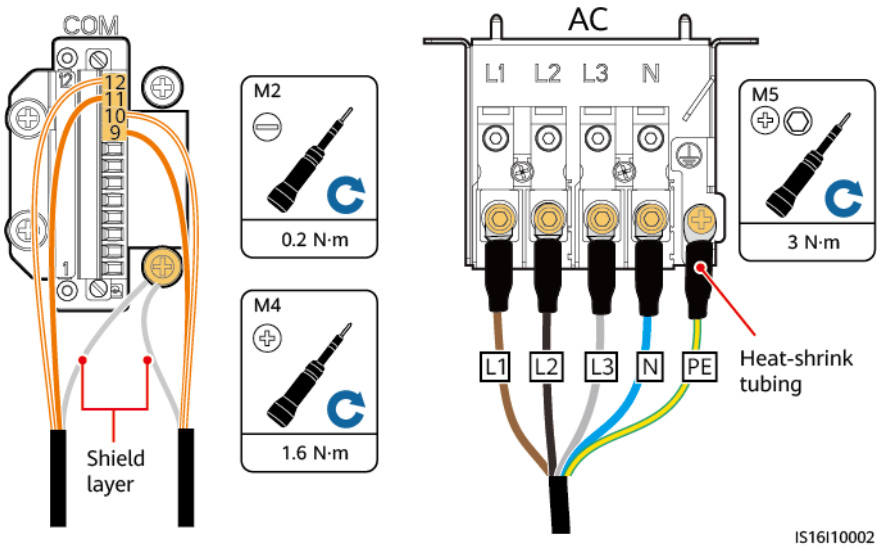


Inner Diameter	Rubber Plug
15 mm	
22 mm	
26 mm	
6 mm	
8.6 mm	
11 mm	

Step 2 Install AC output power cables and signal cables. (The following uses the RS485 signal cables as an example. For details about other signal cables, see the communications port pin definitions.)

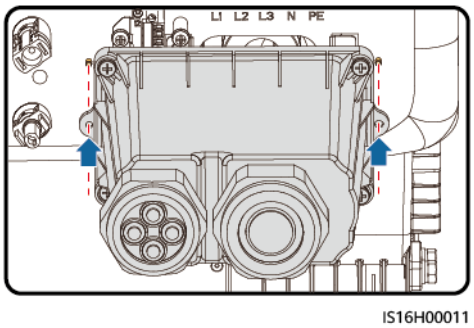
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Figure 5-10 Installing AC output power cables and signal cables



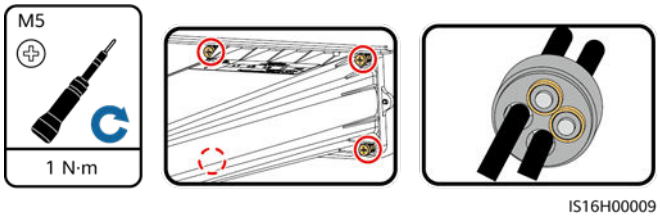
Step 3 Align the pin holes at both ends of the connection box with the positioning pins on the inverter enclosure. Ensure that the screw holes on the connection box are aligned.

Figure 5-11 Aligning the positioning pins



Step 4 Install the connection box, seal the unused cable holes in the rubber plugs with waterproof plugs, and tighten the locking caps.

Figure 5-12 Installing the connection box



----End

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5.6 (Optional) Installing the Smart Dongle and Anti-theft Components

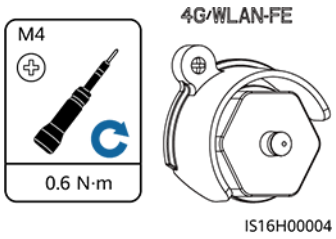
NOTE

If the Smart Dongle is used, you need to install anti-theft components after installing the Smart Dongle.

Step 1 Install the Smart Dongle. For details, see the *Smart Dongle Quick Guide*.

Step 2 Install the anti-theft components.

Figure 5-13 Installing the Smart Dongle anti-theft components



----End

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6 Commissioning

DANGER

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

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.

6.1 Check Before Power-On

Table 6-1 Installation checklist

No.	Check Item	Acceptance Criteria
1	Inverter installation	The inverter is installed correctly, securely, and reliably.
2	Smart Dongle	The Smart Dongle is installed correctly and securely.
3	Cable layout	Cables are routed properly as required by the customer.
4	Cable tie	Cable ties are secured evenly and no burr exists.
5	Grounding	The ground cable is connected correctly, securely, and reliably.

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No.	Check Item	Acceptance Criteria
6	Turn off the switches	The **DC SWITCH** and all the switches connected to the inverter are set to **OFF**.
7	Cable connections	The AC output power cable, DC input power cable, and signal cable are connected correctly, securely, and reliably.
8	Unused terminals and ports	Unused terminals and ports are locked by watertight caps.
9	Installation environment	The installation space is proper, and the installation environment is clean and tidy, without foreign matter.

6.2 Powering On the System

Precautions

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.
- If the DC power supply is connected but the AC power supply is disconnected, the inverter will report a **Grid Failure** alarm. The inverter can start properly only after the power grid recovers.

Procedure

Step 1 At the AC switch between the inverter and the power grid, use a multimeter to measure the grid voltage and ensure that the voltage is within the allowed operating voltage range of the inverter. If the voltage is not in the allowed range, check the circuits.

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

Step 3 Turn on the DC switch (if any) between the PV strings and the inverter.

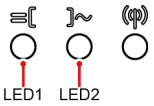
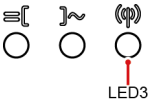
Step 4 (Optional) Remove the locking screw next to the DC SWITCH on the inverter.

Step 5 Set the DC SWITCH to ON.

Step 6 Observe the LED indicators to check the status of the inverter.

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Table 6-2 Indicator description

Category	Status		Description
Running indication 	**LED1**	**LED2**	-
	Steady green	Steady green	The inverter is operating in grid-tied mode.
	Blinking green slowly (on for 1s and off for 1s)	Off	The DC is on and the AC is off.
	Blinking green slowly (on for 1s and off for 1s)	Blinking green slowly (on for 1s and off for 1s)	Both the DC and AC are on, but the inverter is yet to connect to the power grid.
	Off	Blinking green slowly (on for 1s and off for 1s)	The DC is off and the AC is on.
	Off	Off	Both the DC and AC are off.
	Blinking red fast (on for 0.2s and off for 0.2s)	-	DC environment alarm For example, the input voltage of the PV string is high, the PV string is reversely connected, or the insulation resistance is low.
	-	Blinking red fast (on for 0.2s and off for 0.2s)	AC environment alarm For example, grid undervoltage/overvoltage or grid overfrequency/ underfrequency occurred.
	Steady red	Steady red	Faulty
Communication indication 	**LED3**		-
	Blinking green fast (on for 0.2s and off for 0.2s)		Communication is in progress. (When a mobile phone is connected to the inverter, the indicator blinks green slowly, indicating that the phone is connected to the inverter.)

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Category	Status			Description
	Blinking green slowly (on for 1s and off for 1s)			Mobile phone access
	Off			No communication
Device replacement indicator	**LED1**	**LED2**	**LED3**	–
	Steady red	Steady red	Steady red	The inverter hardware is faulty. The inverter needs to be replaced.

Step 7 (Optional) Observe the Smart Dongle LED indicator to check the status of the Smart Dongle.

- WLAN-FE Smart Dongle

Figure 6-1 WLAN-FE Smart Dongle

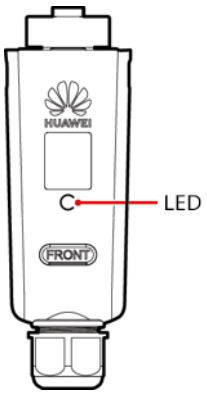


Table 6-3 Indicator description

LED Indicator	Status	Remarks	Description
-	Off	Normal	The Smart Dongle is not secured or not powered on.
Yellow (blinking green and red simultaneously)	Steady on		The Smart Dongle is secured and powered on.
Red	Blinking fast (on for 0.2s and off for 0.2s)		The parameters for connecting to the router are to be set.
Red	Steady on	Abnormal	The Smart Dongle is faulty and needs to be replaced.

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LED Indicator	Status	Remarks	Description
Blinking red and green alternately	Blinking slowly (on for 1s and off for 1s)	Abnormal	No communication with the inverter: – Remove and then insert the Smart Dongle. – Check whether the inverter matches the Smart Dongle. – Connect the Smart Dongle to another inverter. Check whether the Smart Dongle is faulty or the USB port of the inverter is faulty.
Green	Blinking slowly (on for 0.5s and off for 0.5s)	Normal	Connecting to the router
Green	Steady on		The management system is successfully connected.
Green	Blinking fast (on for 0.2s and off for 0.2s)		The inverter is communicating with the management system through the Smart Dongle.

- 4G Smart Dongle

Table 6-4 Indicator description

LED Indicator	Status	Remarks	Description
-	Off	Normal	The Smart Dongle is not secured or not powered on.
Yellow (blinking green and red simultaneously)	Steady on	Normal	The Smart Dongle is secured and powered on.
Green	The blinking interval is 2s. The indicator is on for 0.1s and off for 1.9s.	Normal	Dialing (lasts for less than 1 minute)
		Abnormal	If the duration is longer than 1 minute, the 4G parameter settings are incorrect. Re-configure the parameters.

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LED Indicator	Status	Remarks	Description
	Blinking slowly (on for 1s and off for 1s)	Normal	The dialup is successful (lasts for less than 30s).
		Abnormal	If the duration is longer than 30s, the management system parameters are incorrectly set. Re-configure the parameters.
	Steady on	Normal	The management system is successfully connected.
	Blinking fast (on for 0.2s and off for 0.2s)		The inverter is communicating with the management system through the Smart Dongle.
Red	Steady on	Abnormal	The Smart Dongle is faulty and needs to be replaced.
	Blinking fast (on for 0.2s and off for 0.2s)		The Smart Dongle has no SIM card or the SIM card is in poor contact. Check whether the SIM card has been installed or is in good contact. If not, install a SIM card or remove and re-insert the SIM card.
	Blinking slowly (on for 1s and off for 1s)		The Smart Dongle fails to be connected to a management system because the SIM card has poor or no reception, or has run out of mobile data. If the Smart Dongle is reliably connected, check the SIM card connectivity through the app. If you have poor or no reception, contact the carrier. Check whether the tariff and mobile data plan of the SIM card are adequate. If not, ensure sufficient balance in the SIM card or purchase a data package.

LED Indicator	Status	Remarks	Description
Blinking red and green alternately	Blinking slowly (on for 1s and off for 1s)		No communication with the inverter: – Remove and then insert the Smart Dongle. – Check whether the inverter matches the Smart Dongle. – Connect the Smart Dongle to another inverter. Check whether the Smart Dongle is faulty or the USB port of the inverter is faulty.

----End

7 Man-Machine Interactions

7.1 Creating a Plant

7.1.1 Deploying a New Plant

Smart Dongle Networking

Figure 7-1 Deploying a new plant

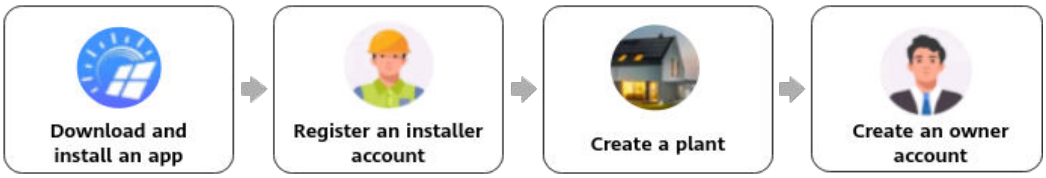


Table 7-1 Plant deployment description

No.	Task	Description
1	Downloading and installing an app	Download and install the FusionSolar app.
2	Registering an installer account	Register an installer account required for deployment and commissioning.
3	Creating a plant	Access the **Setup wizard** screen, scan the QR code to create a plant, commission devices according to the quick setting process, and connect devices to the plant.
4	Creating an owner account	Create an owner account that can be used to remotely monitor and manage devices.

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For details, see **FusionSolar App Quick Guide**. Scan the QR code of the inverter to create a plant.

SmartAssistant Networking

Figure 7-2 Deploying a new plant

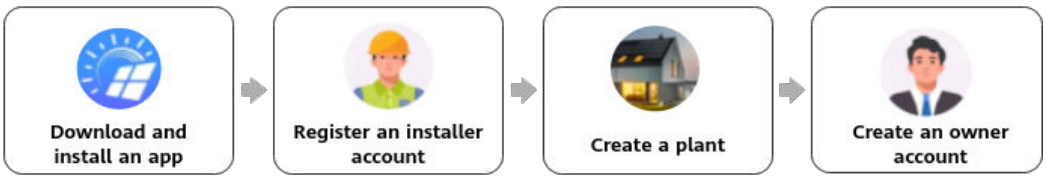


Table 7-2 Plant deployment description

No.	Task	Description
1	Downloading and installing an app	Download and install the FusionSolar app.
2	Registering an installer account	Register an installer account required for deployment and commissioning.
3	Creating a plant	Access the **Setup wizard** screen, scan the QR code to create a plant, commission devices according to the quick setting process, and connect devices to the plant.
4	Creating an owner account	Create an owner account that can be used to remotely monitor and manage devices.

- SmartAssistant networking: For details, see **FusionSolar App Quick Guide (SmartAssistant)**. Scan the QR code of the SmartAssistant to create a plant.

NOTE

If the charger connects to the router through WLAN, you need to log in to the charger to set the WLAN information before deployment using the SmartAssistant.

1. Connect to the local commissioning screen of the charger.
2. Choose **O&M** > **Route Management** and select **WLAN**.

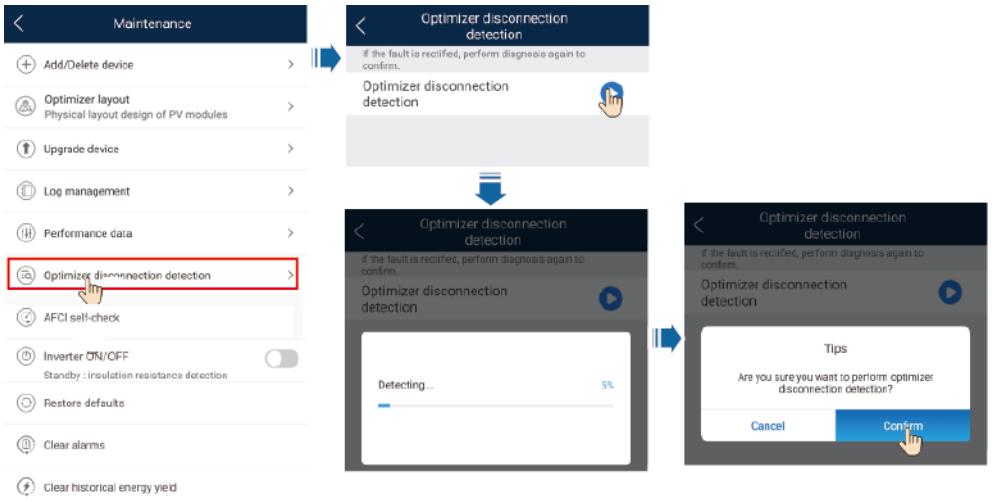
7.1.2 (Optional) Setting the Physical Layout of the Smart PV Optimizers

For details about the optimizer physical layout, see ***FusionSolar App Quick Guide*** or online help of the management system.

7.1.3 Detecting Optimizer Disconnection

Log in to the FusionSolar app, choose **Device Commissioning** > **Maintenance** > **Optimizer disconnection detection**, tap the detection button to detect the optimizer disconnection, and rectify the fault based on the detection result.

Figure 7-3 Detect optimizer disconnection



7.2 Setting Functions and Features Through Device Commissioning

NOTICE

- The grid-connection voltage and frequency of inverters in China are set before delivery according to NB/T 32004 or the latest Chinese standard. If the inverter fails to connect to the power grid because the power grid voltage is close to or higher than the voltage required by Chinese laws and regulations, you can select other voltage level after obtaining permission from the local power operator.
- If the power grid voltage exceeds the upper threshold, the service life of loads on the grid side may be affected, or energy yield loss may occur. In this case, the Company will not be liable for any consequences.

Choose **Commission Device** and set related device parameters.

- For details about the commissioning portal when the Smart Dongle networking is used, see **B Connecting to the Inverter on the App**.
- For details about the commissioning portal when the SmartAssistant networking is used, see **C Connecting to the SmartAssistant on the App**.

7.2.1 Energy Control

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7.2.1.1 Grid-tied Point Control

- Smart Dongle networking: For details, see section "Parameter Settings" in the **Residential Smart PV Solution User Manual (Smart Dongle Networking & Inverter Direct Connection)**.
- SmartAssistant networking: For details, see section "Parameter Settings" in the **Residential Smart PV Solution User Manual (SmartAssistant Networking and SmartGuard Networking)**.

7.2.1.2 Apparent Power Control on the Inverter Output Side

On the home screen, tap **Settings** > **Power adjustment** to set inverter parameters.

Table 7-3 Apparent power

Parameter	Description	Value Range
Maximum apparent power (kVA)	Specifies the output upper threshold for the maximum apparent power to adapt to the capacity requirements of standard and customized inverters.	[Maximum active power, S_{max}]
Maximum active power (kW)	Specifies the output upper threshold for the maximum active power to adapt to different market requirements.	[0.1, P_{max}]

NOTE

The lower threshold for the maximum apparent power is the maximum active power. To lower the maximum apparent power, lower the maximum active power first.

7.2.2 AFCI

Function

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

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

NOTE

The AFCI function works only with Huawei optimizers or ordinary PV modules, but does not support third-party optimizers or intelligent PV modules.

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Clearing Alarms

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

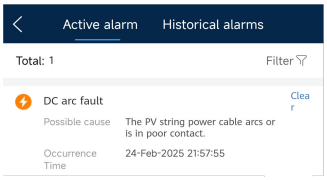
The inverter has the AFCI alarm automatic clearance mechanism. If an alarm is triggered for less than five times within 24 hours, the inverter automatically clears the alarm. If the alarm is triggered for five times or more within 24 hours, the inverter locks for protection. You need to manually clear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

You can manually clear the alarm as follows:

- **Method 1**: FusionSolar App

  Log in to the FusionSolar App and choose **Services** > **Device commissioning**. On the **Device commissioning** screen, connect and log in to the inverter that generates the AFCI alarm, tap **Alarm management**, and tap **Clear** on the right of the **DC arc fault** alarm to clear the alarm.

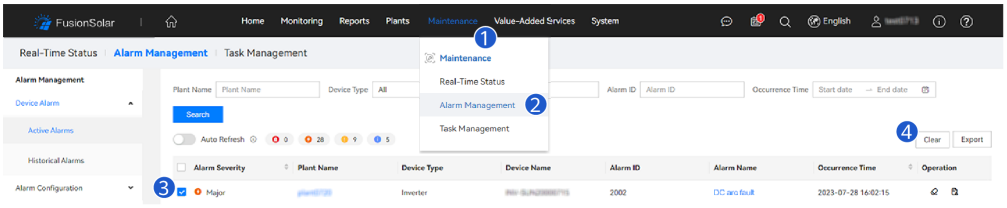
  Figure 7-4 Alarm management

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

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

  Figure 7-5 Clearing alarms

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

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8 Maintenance

DANGER

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

WARNING

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

8.1 Powering Off the System

Precautions

WARNING

- After the system is powered off, the inverter is still energized and hot, which may cause electric shocks or burns. Therefore, wait for 5 minutes after power-off and then put on insulated gloves to operate the inverter.
- Power off the system before maintaining optimizers and PV strings. Otherwise, electric shocks may occur when the PV strings are energized.

Procedure

Step 1 Send a shutdown command on the app.

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

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

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Step 4 (Optional) Install the locking screw next to **DC SWITCH**.

Step 5 Turn off the DC switch between the inverter and PV strings.

----End

8.2 Routine Maintenance

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

CAUTION

Power off the system before cleaning the system, connecting cables, and checking grounding reliability.

Table 8-1 Maintenance checklist

Check Item	Check Method	Maintenance Interval
System cleanliness	Check periodically whether the heat sinks are blocked or dirty.	Once every 6 to 12 months
Cleanness of air intake and exhaust vents	Check periodically whether there is dust or foreign objects at the air intake and exhaust vents.	Power off the inverter and remove dust and foreign objects. If necessary, remove the baffle plates from the air intake and exhaust vents 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 fan generates 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

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Check Item	Check Method	Maintenance Interval
System running status	• Check whether the inverter is damaged or deformed. • Check whether the inverter generates abnormal sound during operation. • Check whether all inverter parameters are correctly set during operation.	Once every 6 months
Electrical connection	• Check whether cables are disconnected or loose. • Check whether cables are damaged, especially whether the cable sheath that contacts a metal surface is damaged.	6 months after the first commissioning and once every 6 to 12 months after that
Grounding reliability	Check whether the PE cable is securely connected.	6 months after the first commissioning and once every 6 to 12 months after that
Sealing	Check whether all terminals and ports are properly sealed.	Once a year

8.3 Troubleshooting

For details about alarms, see the **Inverter Alarm Reference**.

8.4 Replacing a Fan

CAUTION

- Before replacing a fan, power off the inverter.
- When replacing a fan, use insulated tools and wear PPE.
- Currently, there are two types of fans. Select either one based on the site requirements.

Procedure

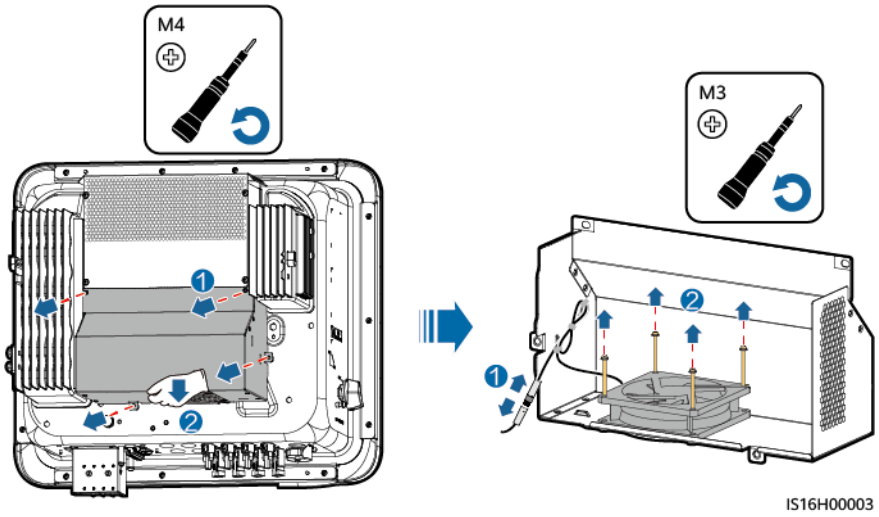
Type 1:

Step 1 Remove the inverter from the mounting bracket.

Step 2 Remove the fan cover, disconnect fan cables, and remove the faulty fan.

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Figure 8-1 Removing the faulty fan



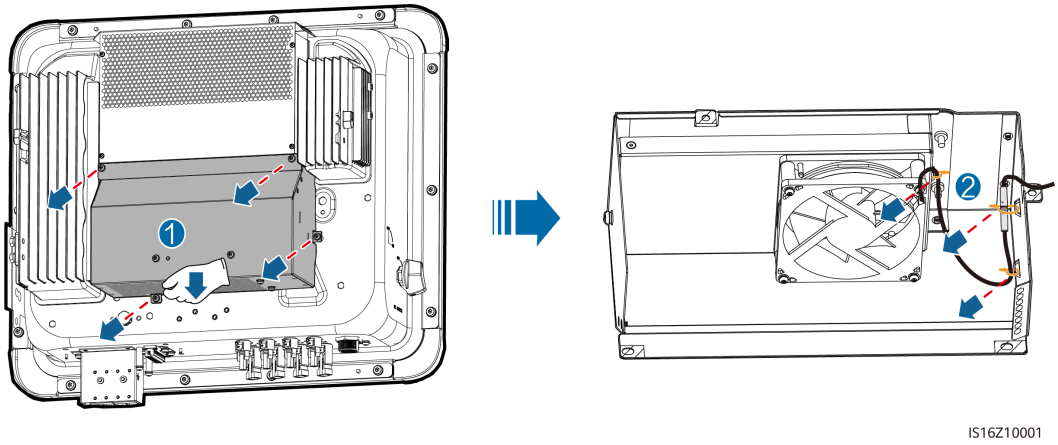
Step 3 Install a new fan, connect and bind the cables, and install the fan cover.

----End

Type 2:

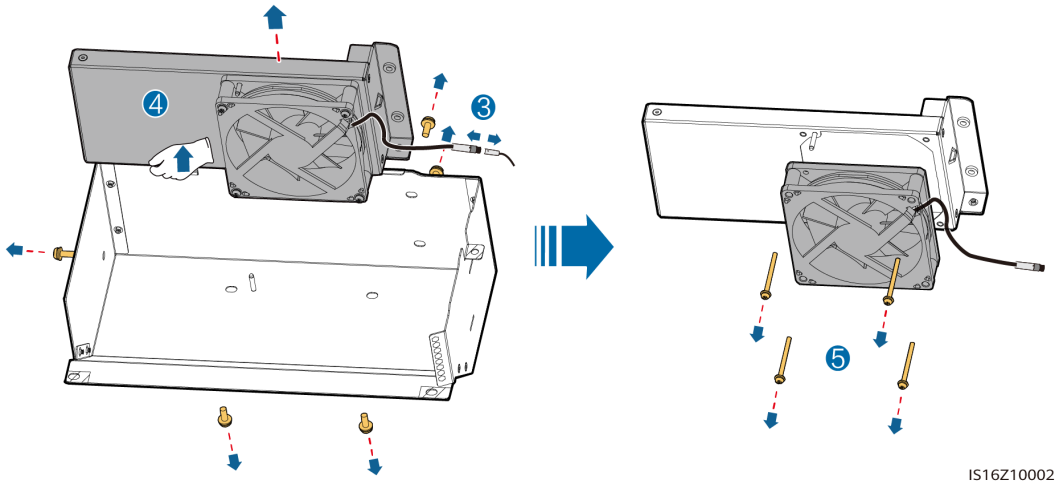
Step 1 Remove the inverter from the mounting bracket.

Step 2 Remove the fan cover and fan cable ties.



Step 3 Disconnect the fan cable, take out the fan bracket, and remove the faulty fan.

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Step 4 Install a new fan, install the fan bracket, bind the cable, and install the fan cover.

----End

CAUTION

After the fan is installed, cut off the excess cable ties.

9 Handling the Inverter

9.1 Removing the SUN2000

NOTICE

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

Perform the following operations to remove the SUN2000:

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

9.2 Packing the SUN2000

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

9.3 Disposing of the SUN2000

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

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10 Technical Specifications

10.1 SUN2000-(15KTL-25KTL)-ZHM5 Technical Specifications

Efficiency

Item	SUN2000-15 KTL-ZHM5	SUN2000-17 KTL-ZHM5	SUN2000-20 KTL-ZHM5	SUN2000-25 KTL-ZHM5
Maximum efficiency	98.5%	98.5%	98.5%	98.5%
Chinese efficiency	97.4%	97.4%	97.6%	98.0%

Input

Item	SUN2000-15 KTL-ZHM5	SUN2000-17 KTL-ZHM5	SUN2000-20 KTL-ZHM5	SUN2000-25 KTL-ZHM5
Recommended maximum input DC power	22500 W	25500 W	30000 W	37500 W
Maximum input voltage[a]	1100 V			
Maximum input current per MPPT	20 A (one PV string)/30 A (one MPPT)			

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Item	SUN2000-15 KTL-ZHM5	SUN2000-17 KTL-ZHM5	SUN2000-20 KTL-ZHM5	SUN2000-25 KTL-ZHM5
Maximum short-circuit current per MPPT	40 A			
Minimum startup voltage	200 V			
MPPT voltage range[c]	200–1000 V			
Full-load MPPT voltage range	410–800 V	440–800 V	480–800 V	530–800 V
Rated input voltage	600 V			
Maximum number of inputs	4			
Number of MPPTs[b]	2			
Note a: The maximum input voltage is the maximum DC input voltage that the inverter can withstand. If the input voltage exceeds this value, the inverter may be damaged. Note b: The maximum input power of an MPPT circuit is 21.6 kW. If the input power exceeds this value, the inverter may limit the output power of PV modules. Note c: If the input voltage is beyond the MPPT voltage range, the inverter cannot work properly.				

Output

Item	SUN2000-15 KTL-ZHM5	SUN2000-17 KTL-ZHM5	SUN2000-20 KTL-ZHM5	SUN2000-25 KTL-ZHM5
Rated output power	15000 W	17000 W	20000 W	25000 W
Maximum apparent power	16500 VA	18700 VA	22000 VA	27500 VA
Maximum active power (cosϕ = 1)	16500 W	18700 W	22000 W	27500 W

Item	SUN2000-15 KTL-ZHM5	SUN2000-17 KTL-ZHM5	SUN2000-20 KTL-ZHM5	SUN2000-25 KTL-ZHM5
Rated output voltage	220 V/380 V, 3W/N+PE 230 V/400 V, 3W/N+PE 239.6 V/415 V, 3W/N+PE			
Maximum output voltage at long-term operation	See standards about the local power grid.			
Rated output current	22.8 A/380 V 21.7 A/400 V 20.9 A/415 V	25.8 A/380 V 24.5 A/400 V 23.7 A/415 V	30.4 A/380 V 28.9 A/400 V 27.8 A/415 V	38.0 A/380 V 36.1 A/400 V 34.8 A/415 V
Maximum output current	25.2 A/380 V 23.9 A/400 V 23.1 A/415 V	28.6 A/380 V 27.1 A/400 V 26.1 A/415 V	33.6 A/380 V 31.9 A/400 V 30.8 A/415 V	42.0 A/380 V 39.9 A/400 V 38.5 A/415 V
Output voltage frequency	50 Hz/60 Hz			
Power factor	0.8 leading... 0.8 lagging			
Output DC component DCI	< 0.25% of the rated output			
Maximum total harmonic distortion AC THDI	< 3% under rated conditions. Single-order harmonic meets the VDE4105 requirements.			

Protection

Item	SUN2000-15 KTL-ZHM5	SUN2000-17 KTL-ZHM5	SUN2000-20 KTL-ZHM5	SUN2000-25 KTL-ZHM5
Overvoltage category	PV II/AC III			
Input DC switch	Supported			
Anti-islanding protection	Supported			

Item	SUN2000-15 KTL-ZHM5	SUN2000-17 KTL-ZHM5	SUN2000-20 KTL-ZHM5	SUN2000-25 KTL-ZHM5
Output overcurrent protection	Supported			
Input reverse connection protection	Supported			
DC surge protection	TYPE II			
AC surge protection	CLASS II			
Insulation resistance detection	Supported			
Residual current monitoring unit (RCMU)	Supported			

Display and Communication

Item	SUN2000-15 KTL-ZHM5	SUN2000-17 KTL-ZHM5	SUN2000-20 KTL-ZHM5	SUN2000-25 KTL-ZHM5
Display	LED indicators; WLAN+app			
WLAN/FE Dongle	Supported			
4G Dongle	Supported			
RS485 communication	Supported			
Built-in WLAN	Supported			
DC MBUS	Supported			
AFCI	Supported			
PID recovery	Supported			

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General

Item	SUN2000-15 KTL-ZHM5	SUN2000-17 KTL-ZHM5	SUN2000-20 KTL-ZHM5	SUN2000-25 KTL-ZHM5
Dimensions (H x W x D)	460 mm x 546 mm x 228 mm			
Net weight	21 kg			
Operating temperature	–25°C to +60°C			
Relative humidity	0–100%			
Cooling mode	Smart air cooling			
Maximum operating altitude	4000 m (derated when the altitude is greater than 2000 m)			
Storage temperature	–40°C to +70°C			
IP rating	IP66			
Topology	Transformerless			

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Wireless Communication Parameters

Specifications	Inverter Built-in WiFi	WLAN-FE Smart Dongle	4G Smart Dongle
Frequency	2400–2483.5 MHz	SDongleA-05: 2400–2483.5 MHz	SDongleA-03-CN: • Supports LTE-FDD: B1/B3/B8. • Supports LTE-TDD: B38/B39/B40/B41. • Supports DC-HSPA+/HSPA+/ HSPA/UMTS: B1/B5/B8/B9. • Supports TD-SCDMA: B34/B39. • Supports GSM/GPRS/EDGE: 900 MHz/1800 MHz. SDongleB-03-CN: • Supports LTE-FDD: B1/B3/B5/B8. • Supports LTE-TDD: B34/B38/B39/B40/B41. • Supports GSM/GPRS/EDGE: 900 MHz/1800 MHz. SDongleB-06-CN (WiFi): 2400–2483.5 MHz SDongleB-06-CN (4G): • Supports LTE-FDD: B1/B3/B5/B8. • Supports LTE-TDD: B34/B38/B39/B40/B41. • Supports GSM/GPRS/EDGE: 900 MHz/1800 MHz.

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Specifications	Inverter Built-in WiFi	WLAN-FE Smart Dongle	4G Smart Dongle
Protocol standard	WLAN 802.11b/g/n	SDongleA-05: WLAN 802.11b/g/n	SDongleA-03-CN: • Supports LTE-FDD (with receive diversity): B1/B3/B5/B8. • Supports LTE-TDD (with receive diversity): B34/B38/B39/B40/B41. • Supports WCDMA: B1/B5/B8. • Supports GSM: 900 MHz/1800 MHz. • Supports digital audio. SDongleB-03-CN: • Supports LTE-FDD (with receive diversity): B1/B3/B5/B8. • Supports LTE-TDD (with receive diversity): B34/B38/B39/B40/B41. • Supports GSM: 900 MHz/1800 MHz. • Supports digital audio. SDongleB-06-CN (WiFi): WLAN 802.11b/g/n SDongleB-06-CN (4G): • Supports LTE-FDD (with receive diversity): B1/B3/B5/B8. • Supports LTE-TDD (with receive diversity): B34/B38/B39/B40/B41. • Supports GSM: 900 MHz/1800 MHz. • Supports digital audio.

Specifications	Inverter Built-in WiFi	WLAN-FE Smart Dongle	4G Smart Dongle
Bandwidth	20 MHz/40 MHz (optional)	20 MHz/40 MHz (optional)	LTE features: • Supports a maximum of 3GPP R8 non-CA Cat 4 FDD and TDD. • Supports 1.4 MHz/3 MHz/5 MHz/10 MHz/15 MHz/20 MHz RF bandwidth. • Supports MIMO in the downlink. • LTE-FDD: maximum downlink rate of 150 Mbit/s and maximum uplink rate of 50 Mbit/s • LTE-TDD: maximum downlink rate of 130 Mbit/s and maximum uplink rate of 30 Mbit/s UMTS features: • Supports 3GPP R7 HSDPA+, HSDPA, HSUPA, and WCDMA. • Supports QPSK and 16QAM modulation. • HSDPA+: maximum downlink rate of 21 Mbit/s • HSUPA: maximum uplink rate of 5.76 Mbit/s • WCDMA: maximum downlink rate of 384 kbit/s and maximum uplink rate of 384 kbit/s GSM features: GPRS: • Supports GPRS multislot class 12. • Coding schemes: CS-1, CS-2, CS-3, and CS-4 • Maximum downlink rate: 85.6 kbit/s; maximum uplink rate: 85.6 kbit/s EDGE: • Supports EDGE multislot class 12.

Specifications	Inverter Built-in WiFi	WLAN-FE Smart Dongle	4G Smart Dongle
			• Supports GMSK and 8-PSK modulation and coding schemes. • Downlink coding format: MCS 1–9 • Uplink coding format: MCS 1–9 • Maximum downlink rate: 236.8 kbit/s; maximum uplink rate: 236.8 kbit/s SDongleB-06-CN (WiFi): 20 MHz/40 MHz (optional)
Maximum transmit power	≤ 20 dBm EIRP	≤ 20 dBm EIRP	• Class 4 (33 dBm±2 dB), EGSM900 frequency band • Class 1 (30 dBm±2 dB), DCS1800 frequency band • Class E2 (27 dBm±3 dB), EGSM900 8-PSK • Class E2 (26 dBm±3 dB), DCS1800 8-PSK • Class 3 (24 dBm+1/–3 dB), WCDMA frequency band • Class 3 (23 dBm±2 dB), LTE-FDD frequency band • Class 3 (23 dBm±2 dB), LTE-TDD frequency band SDongleB-06-CN (WiFi): ≤ 20 dBm EIRP

10.2 SUN2000-(12KTL-25KTL)-M5 Technical Specifications

Efficiency

Item	SUN2000-12KTL-M5	SUN2000-15KTL-M5	SUN2000-17KTL-M5	SUN2000-20KTL-M5	SUN2000-25KTL-M5
Maximum efficiency	98.4%	98.4%	98.4%	98.4%	98.4%

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Item	SUN2000-12KTL-M5	SUN2000-15KTL-M5	SUN2000-17KTL-M5	SUN2000-20KTL-M5	SUN2000-25KTL-M5
European efficiency	97.9%	98.0%	98.1%	98.1%	98.2%

Input

Item	SUN2000-12KTL-M5	SUN2000-15KTL-M5	SUN2000-17KTL-M5	SUN2000-20KTL-M5	SUN2000-25KTL-M5
Recommended maximum input DC power	18000 W	22500 W	25500 W	30000 W	37500 W
Maximum input voltage[a]	1100 V				
Maximum input current per MPPT	20 A (one PV string)/30 A (one MPPT)				
Maximum short-circuit current per MPPT	40 A				
Minimum startup voltage	200 V				
MPPT voltage range[c]	200–1000 V				
Full-load MPPT voltage range	370–800 V	410–800 V	440–800 V	480–800 V	530–800 V
Rated input voltage	600 V				
Maximum number of inputs	4				

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Item	SUN2000-12KTL-M5	SUN2000-15KTL-M5	SUN2000-17KTL-M5	SUN2000-20KTL-M5	SUN2000-25KTL-M5
Number of MPPTs[b]	2				
Note a: The maximum input voltage is the maximum DC input voltage that the inverter can withstand. If the input voltage exceeds this value, the inverter may be damaged. Note b: The maximum input power of an MPPT circuit is 21.6 kW. If the input power exceeds this value, the inverter may limit the output power of PV modules. Note c: If the input voltage is beyond the MPPT voltage range, the inverter cannot work properly.					

Output

Item	SUN2000-12KTL-M5	SUN2000-15KTL-M5	SUN2000-17KTL-M5	SUN2000-20KTL-M5	SUN2000-25KTL-M5
Rated output power	12000 W	15000 W	17000 W	20000 W	25000 W
Maximum apparent power	13200 VA	16500 VA	18700 VA	22000 VA	27500 VA
Maximum active power (cosϕ = 1)	13200 W	16500 W	18700 W	22000 W	27500 W
Rated output voltage	220 V/380 V, 3W/N+PE 230 V/400 V, 3W/N+PE 239.6 V/415 V, 3W/N+PE				
Maximum output voltage at long-term operation	See standards about the local power grid.				
Rated output current	18.2 A/380 V 17.3 A/400 V 16.7 A/415 V	22.8 A/380 V 21.7 A/400 V 20.9 A/415 V	25.8 A/380 V 24.5 A/400 V 23.7 A/415 V	30.4 A/380 V 28.9 A/400 V 27.8 A/415 V	38.0 A/380 V 36.1 A/400 V 34.8 A/415 V

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Item	SUN2000-12KTL-M5	SUN2000-15KTL-M5	SUN2000-17KTL-M5	SUN2000-20KTL-M5	SUN2000-25KTL-M5
Maximum output current	20.2 A/380 V 19.1 A/400 V 18.5 A/415 V	25.2 A/380 V 23.9 A/400 V 23.1 A/415 V	28.6 A/380 V 27.1 A/400 V 26.1 A/415 V	33.6 A/380 V 31.9 A/400 V 30.8 A/415 V	42.0 A/380 V 39.9 A/400 V 38.5 A/415 V
Output voltage frequency	50 Hz/60 Hz				
Power factor	0.8 leading ... 0.8 lagging				
Output DC component DCI	< 0.25% of the rated output				
Maximum total harmonic distortion AC THDI	< 3% under rated conditions. Single-order harmonic meets the VDE4105 requirements.				

Protection

Item	SUN2000-12KTL-M5	SUN2000-15KTL-M5	SUN2000-17KTL-M5	SUN2000-20KTL-M5	SUN2000-25KTL-M5
Overvoltage category	PV II/AC III				
Input DC switch	Supported				
Anti-islanding protection	Supported				
Output overcurrent protection	Supported				
Input reverse connection protection	Supported				
DC surge protection	TYPE II				

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Item	SUN2000-12KTL-M5	SUN2000-15KTL-M5	SUN2000-17KTL-M5	SUN2000-20KTL-M5	SUN2000-25KTL-M5
AC surge protection	CLASS II				
Insulation resistance detection	Supported				
Residual current monitoring unit (RCMU)	Supported				

Display and Communication

Item	SUN2000-12KTL-M5	SUN2000-15KTL-M5	SUN2000-17KTL-M5	SUN2000-20KTL-M5	SUN2000-25KTL-M5
Display	LED indicators; WLAN+app				
WLAN/FE Dongle	Supported				
4G Dongle	Optional				
RS485 communication	Supported				
Built-in WLAN	Supported				
DC MBUS	Supported				
AFCI	Supported				
PID recovery	Supported				

General

Item	SUN2000-12KTL-M5	SUN2000-15KTL-M5	SUN2000-17KTL-M5	SUN2000-20KTL-M5	SUN2000-25KTL-M5
Dimensions (H x W x D)	460 mm x 546 mm x 228 mm				
Net weight	21 kg				

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Item	SUN2000-12KTL-M5	SUN2000-15KTL-M5	SUN2000-17KTL-M5	SUN2000-20KTL-M5	SUN2000-25KTL-M5
Operating temperature	–25°C to +60°C				
Relative humidity	0–100%				
Cooling mode	Smart air cooling				
Maximum operating altitude	4000 m (derated when the altitude is greater than 2000 m)				
Storage temperature	–40°C to +70°C				
IP rating	IP66				
Topology	Transformerless				

Wireless Communication Parameters

Specifications	Inverter Built-in WiFi	WLAN-FE Smart Dongle	4G Smart Dongle
Frequency	2400–2483.5 MHz	SDongleA-05: 2400–2483.5 MHz	SDongleA-03-EU: • Supports LTE-FDD: B1/B3/B7/B8/B20. • Supports LTE-TDD: B38/B40. • Supports WCDMA/HSDPA/HSUPA/HSPA+: B1/B8. • Supports GSM/GPRS/EDGE: 900 MHz/1800 MHz. SDongleB-06-EU (WiFi): 2400–2483.5 MHz SDongleB-06-EU (4G): • Supports LTE-FDD: B1/B3/B5/B8. • Supports LTE-TDD: B7/B20/B28/B38/B40/B41. • Supports GSM/GPRS/EDGE: 900 MHz/1800 MHz.

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Specifications	Inverter Built-in WiFi	WLAN-FE Smart Dongle	4G Smart Dongle
Protocol standard	WLAN 802.11b/g/n	SDongleA-05: WLAN 802.11b/g/n	SDongleA-03-EU: • Supports LTE-FDD (with receive diversity): B1/B3/B7/B8/B20/B28. • Supports LTE-FDD (with receive diversity): B38/B40/B41. • Supports WCDMA: B1/B8. • Supports GSM: 900 MHz/1800 MHz. • Supports digital audio. SDongleB-06-EU (WiFi): WLAN 802.11b/g/n SDongleB-06-EU (4G): • Supports LTE FDD (with receive diversity): B1/B3/B5/B8. • Supports LTE-TDD (with receive diversity): B7/B20/B28/B38/B40/B41. • Supports GSM: 900 MHz/1800 MHz. • Supports digital audio.

Specifications	Inverter Built-in WiFi	WLAN-FE Smart Dongle	4G Smart Dongle
Bandwidth	20 MHz/40 MHz (optional)	20 MHz/40 MHz (optional)	LTE features: • Supports a maximum of 3GPP R8 non-CA Cat 4 FDD and TDD. • Supports 1.4 MHz/3 MHz/5 MHz/10 MHz/15 MHz/20 MHz RF bandwidth. • Supports MIMO in the downlink. • LTE-FDD: maximum downlink rate of 150 Mbit/s and maximum uplink rate of 50 Mbit/s • LTE-TDD: maximum downlink rate of 130 Mbit/s and maximum uplink rate of 30 Mbit/s UMTS features: • Supports 3GPP R7 HSDPA+, HSDPA, HSUPA, and WCDMA. • Supports QPSK and 16QAM modulation. • HSDPA+: maximum downlink rate of 21 Mbit/s • HSUPA: maximum uplink rate of 5.76 Mbit/s • WCDMA: maximum downlink rate of 384 kbit/s and maximum uplink rate of 384 kbit/s GSM features: GPRS: • Supports GPRS multislot class 12. • Coding schemes: CS-1, CS-2, CS-3, and CS-4 • Maximum downlink rate: 85.6 kbit/s; maximum uplink rate: 85.6 kbit/s EDGE: • Supports EDGE multislot class 12.

Specifications	Inverter Built-in WiFi	WLAN-FE Smart Dongle	4G Smart Dongle
			• Supports GMSK and 8-PSK modulation and coding schemes. • Downlink coding format: MCS 1–9 • Uplink coding format: MCS 1–9 • Maximum downlink rate: 236.8 kbit/s; maximum uplink rate: 236.8 kbit/s SDongleB-06-EU (WiFi): 20 MHz/40 MHz (optional)
Maximum transmit power	≤ 20 dBm EIRP	≤ 20 dBm EIRP	• Class 4 (33 dBm±2 dB), EGSM900 frequency band • Class 1 (30 dBm±2 dB), DCS1800 frequency band • Class E2 (27 dBm±3 dB), EGSM900 8-PSK • Class E2 (26 dBm±3 dB), DCS1800 8-PSK • Class 3 (24 dBm+1/–3 dB), WCDMA frequency band • Class 3 (23 dBm±2 dB), LTE-FDD frequency band • Class 3 (23 dBm±2 dB), LTE-TDD frequency band SDongleB-06-EU (WiFi): ≤ 20 dBm EIRP

A Grid Codes

NOTE

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

Table A-1 SUN2000-(15KTL-25KTL)-ZHM5 grid codes

No.	Grid Code	Description	SUN2000-15KTL-ZHM5	SUN2000-17KTL-ZHM5	SUN2000-20KTL-ZHM5	SUN2000-25KTL-ZHM5
1	NB/T 32004	China Golden Sun low-voltage power grid	Supported	Supported	Supported	Supported
2	CHINA-LV220/380	China low-voltage power grid	Supported	Supported	Supported	Supported

Table A-2 SUN2000-(12KTL-25KTL)-M5 grid codes

No.	Grid Code	Description	SUN2000-12KTL-M5	SUN2000-15KTL-M5	SUN2000-17KTL-M5	SUN2000-20KTL-M5	SUN2000-25KTL-M5
1	TAIPOWER	Taiwan Power low-voltage power grid	Supported	Supported	Supported	Supported	Supported
2	OMAN	Oman low-voltage power grid	Supported	Supported	Supported	Supported	Supported

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No.	Grid Code	Description	SUN2000-12KTL-M5	SUN2000-15KTL-M5	SUN2000-17KTL-M5	SUN2000-20KTL-M5	SUN2000-25KTL-M5
3	Pakistan	Pakistan power grid	Supported	Supported	Supported	Supported	Supported
4	SINGAPORE	Singapore low-voltage power grid	Supported	Supported	Supported	Supported	Supported
5	HONGKONG	Hong Kong low-voltage power grid	Supported	Supported	Supported	Supported	Supported
6	SWITZERLAND-NA/ EEA:2020-LV230	Switzerland power grid	Supported	Supported	Supported	Supported	Supported
7	NA_CODE	Default country code	Supported	Supported	Supported	Supported	Supported
8	UTE C 15-712-1 (A)	Mainland France 230 V power grid	Supported	Supported	Supported	Supported	Supported
9	UTE C 15-712-1 (B)	French island 230 V power grid	Supported	Supported	Supported	Supported	Supported
10	UTE C 15-712-1 (C)	French island 230 V power grid	Supported	Supported	Supported	Supported	Supported
11	IEC61727	IEC 61727 low-voltage grid-connection (50 Hz)	Supported	Supported	Supported	Supported	Supported
12	Custom (50 Hz)	Reserved	Supported	Supported	Supported	Supported	Supported
13	Custom (60 Hz)	Reserved	Supported	Supported	Supported	Supported	Supported
14	TAI-PEA	Thailand grid-connection standard	Supported	Supported	Supported	Supported	Supported

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No.	Grid Code	Description	SUN2000-12KTL-M5	SUN2000-15KTL-M5	SUN2000-17KTL-M5	SUN2000-20KTL-M5	SUN2000-25KTL-M5
15	TAI-MEA	Thailand grid-connection standard	Supported	Supported	Supported	Supported	Supported
16	Philippines	Philippines low-voltage power grid	Supported	Supported	Supported	Supported	Supported
17	NRS-097-2-1	South Africa power grid	Supported	Supported	Supported	Supported	Supported
18	IEC61727-60Hz	IEC 61727 low-voltage grid-connection (60 Hz)	Supported	Supported	Supported	Supported	Supported
19	EN50549-LV	Ireland power grid	Supported	Supported	Supported	Supported	Supported
20	Jordan-Transmission	Jordan low-voltage power grid	Supported	Supported	Supported	Supported	Supported
21	ABNT NBR 16149	Brazil power grid	Supported	Supported	Supported	Supported	Supported
22	Jordan-Distribution	Jordan power distribution network low-voltage power grid	Supported	Supported	Supported	Supported	Supported
23	G99-TYPEA-LV	UK G99 power grid	Supported	Supported	Supported	Supported	Supported
24	G99-TYPEB-LV	UK G99 power grid	Supported	Supported	Supported	Supported	Supported
25	EN50549-SE	Sweden low-voltage power grid	Supported	Supported	Supported	Supported	Supported
26	DANMARK-EN50549-DK1-LV230	Denmark low-voltage power grid	Supported	Supported	Supported	Supported	Supported

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No.	Grid Code	Description	SUN2000-12KTL-M5	SUN2000-15KTL-M5	SUN2000-17KTL-M5	SUN2000-20KTL-M5	SUN2000-25KTL-M5
27	DANMARK-EN50549-DK2-LV230	Denmark low-voltage power grid	Supported	Supported	Supported	Supported	Supported
28	CZECH-EN50549-LV230	Czech Republic power grid	Supported	Supported	Supported	Supported	Supported
29	FINLAND-EN50549-LV230	Finland power grid	Supported	Supported	Supported	Supported	Supported
30	DUBAI	Dubai low-voltage power grid	Supported	Supported	Supported	Supported	Supported
31	Israel	Israel power grid	Supported	Supported	Supported	Supported	Supported
32	NTS	Spain power grid	Supported	Supported	Supported	Supported	Supported
33	CEI0-21	Italy power grid	Supported	Supported	Supported	Supported	Supported
34	ANRE	Romania low-voltage power grid	Supported	Supported	Supported	Supported	Supported

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B Connecting to the Inverter on the App

NOTICE

- When directly connecting your phone to a device, ensure that your phone is within the WLAN coverage of the device.
- When connecting the device to the router over WLAN, ensure that the device is within the WLAN coverage of the router and the signal is stable and good.
- The router supports WLAN (IEEE 802.11 b/g/n, 2.4 GHz) and the WLAN signal reaches the inverter.
- The WPA, WPA2, or WPA/WPA2 encryption mode is recommended for routers. The Enterprise mode is not supported (such as airport WLAN and other public hotspots that require authentication). WEP and WPA TKIP are not recommended because they have serious security vulnerabilities. If the access fails in WEP mode, log in to the router and change the encryption mode of the router to WPA2 or WPA/WPA2.

Step 1 Start device commissioning.

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Figure B-1 Method 1: mobile phone connected to the Internet

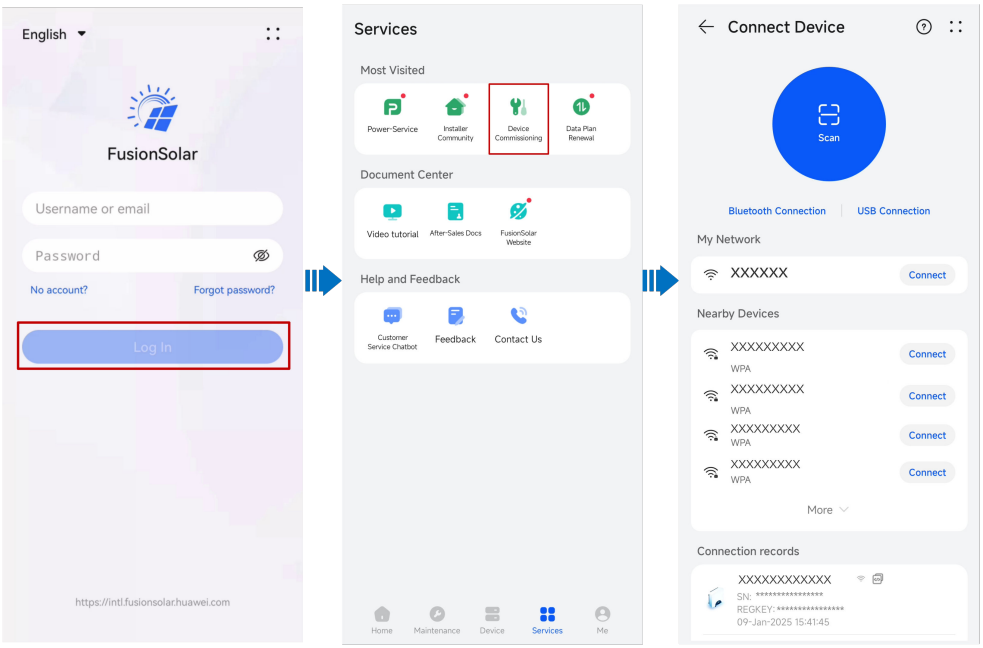
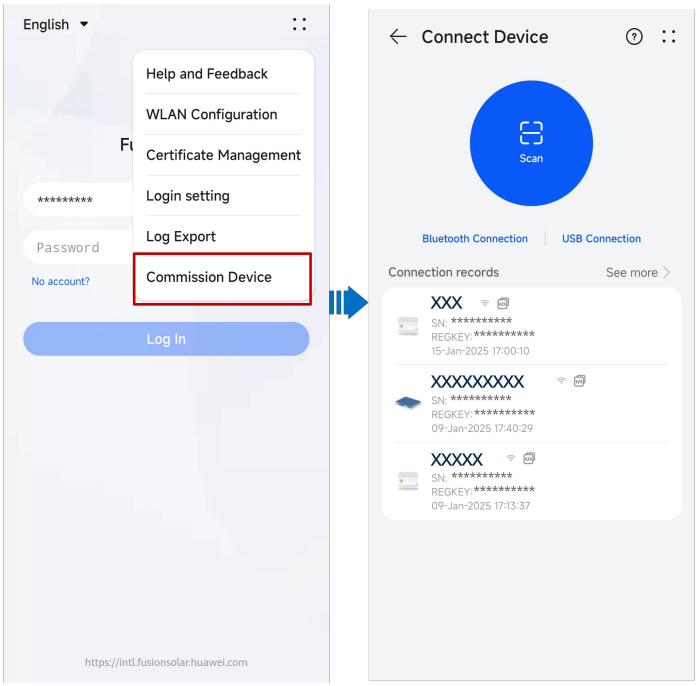


Figure B-2 Method 2: mobile phone not connected to the Internet



NOTE

Method 2 can be used only when no Internet access is available. You are advised to log in to the FusionSolar app to commission devices using method 1.

Step 2 Connect to the inverter WLAN.

Tap **Scan**. On the QR code scanning screen, align the QR code with the scanning box to automatically scan and connect to the WLAN of the inverter.

NOTE

- The WLAN name of a product consists of "Device name-Product SN." (The last six digits of the WLAN name of some products are the same as the last six digits of the product SN.)
- Use the initial password for the first connection. You can obtain the initial WLAN password from the label on the device.
- Ensure account security by changing the password periodically. Your password might be stolen or cracked if it is left unchanged for extended periods. If a password is lost, the device cannot be accessed. In these cases, the Company shall not be liable for any loss.
- If the login screen is not displayed after you scan the QR code, check whether your phone is correctly connected to the device WLAN. If not, manually select and connect to the WLAN.
- If the message **This WLAN network has no Internet access. Connect anyway?** is displayed when you connect to the built-in WLAN, tap **CONNECT**. Otherwise, you cannot log in to the system. The actual UI and messages may vary with mobile phones.

Step 3 Log in to the device commissioning screen as **Installer**.

NOTICE

- After completing the deployment settings, the installer should remind the owner to access the local commissioning screen of the device and set the login password of the owner account as prompted.
- Ensure account security by changing the password periodically. Your password might be stolen or cracked if it is left unchanged for extended periods. If a password is lost, the device cannot be accessed. In these cases, the Company shall not be liable for any loss.

----End

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C Connecting to the SmartAssistant on the App

NOTICE

- When directly connecting your phone to a device, ensure that your phone is within the WLAN coverage of the device.
- When connecting the device to the router over WLAN, ensure that the device is within the WLAN coverage of the router and the signal is stable and good.
- The router supports WLAN (IEEE 802.11 b/g/n, 2.4 GHz) and the WLAN signal reaches the inverter.
- The WPA, WPA2, or WPA/WPA2 encryption mode is recommended for routers. The Enterprise mode is not supported (such as airport WLAN and other public hotspots that require authentication). WEP and WPA TKIP are not recommended because they have serious security vulnerabilities. If the access fails in WEP mode, log in to the router and change the encryption mode of the router to WPA2 or WPA/WPA2.

Step 1 Start device commissioning.

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Figure C-1 Method 1: mobile phone connected to the Internet

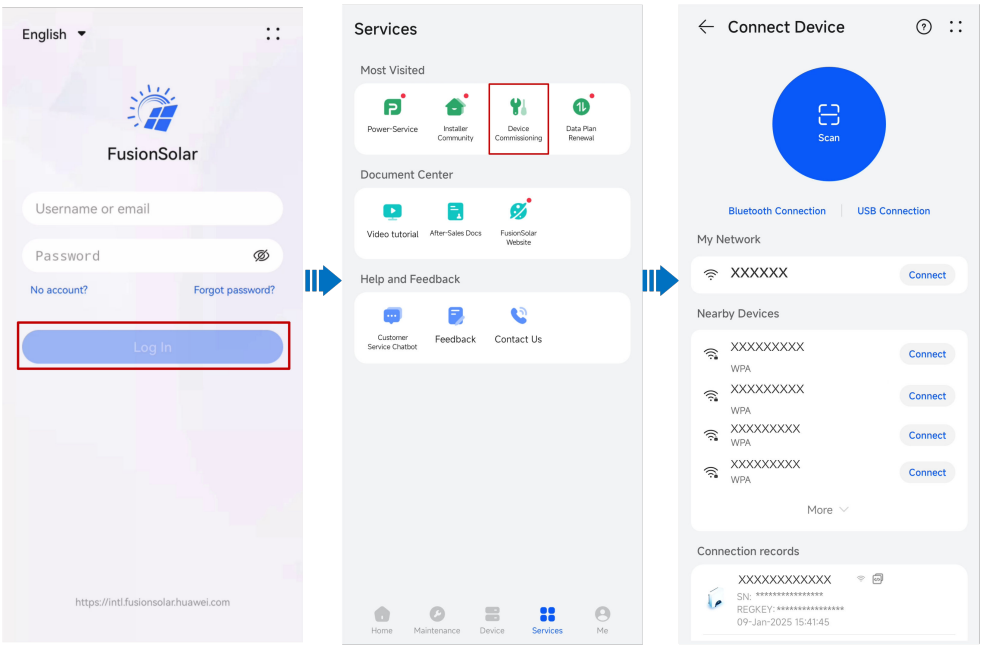
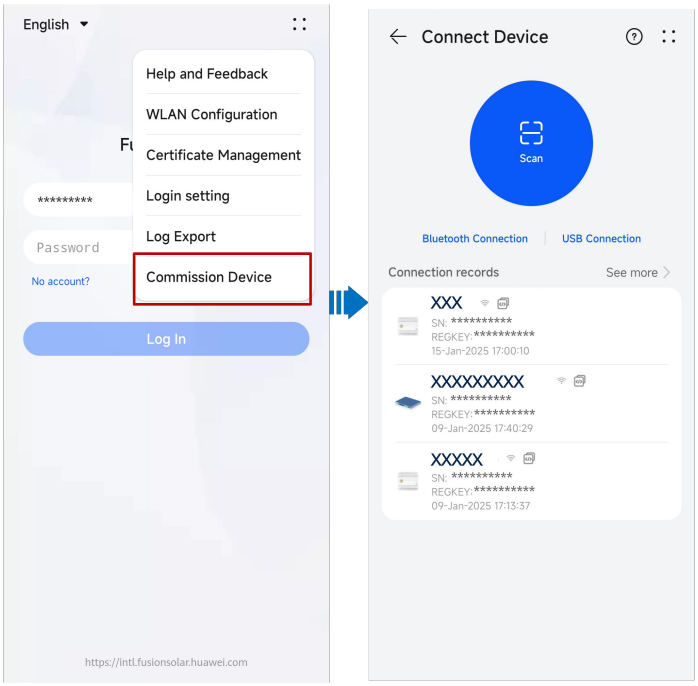


Figure C-2 Method 2: mobile phone not connected to the Internet



NOTE

Method 2 can be used only when no Internet access is available. You are advised to log in to the FusionSolar app to commission devices using method 1.

Step 2 Connect to the WLAN of the SmartAssistant.

Tap **Scan**. On the QR code scanning screen, align the QR code with the scanning box to automatically scan and connect to the WLAN of the SmartAssistant.

NOTE

- SmartAssistant networking: Scan the WLAN QR code of the SmartAssistant.
- SmartGuard networking: Scan the WLAN QR code of the SmartGuard or SmartAssistant.

NOTE

- The WLAN name of a product consists of "Device name-Product SN." (The last six digits of the WLAN name of some products are the same as the last six digits of the product SN.)
- For the first connection, log in with the initial password. You can obtain the initial WLAN password from the label on the device.
- Ensure account security by changing the password periodically. Your password might be stolen or cracked if it is left unchanged for extended periods. If a password is lost, the device cannot be accessed. In these cases, the Company shall not be liable for any loss.
- If the login screen is not displayed after you scan the QR code, check whether your phone is correctly connected to the device WLAN. If not, manually select and connect to the WLAN.
- If the message **This WLAN network has no Internet access. Connect anyway?** is displayed when you connect to the built-in WLAN, tap **CONNECT**. Otherwise, you cannot log in to the system. The actual UI and messages may vary with mobile phones.

Step 3 Log in to the device commissioning screen as **Installer**.

NOTICE

- After completing the deployment settings, the installer shall remind the owner to access the local commissioning screen of the device and set the login password of the owner account as prompted.
- To ensure account security, protect the password by changing it periodically, and keep it secure. Your password might be stolen or cracked if it is left unchanged for extended periods. If a password is lost, devices cannot be accessed. In these cases, the Company shall not be liable for any loss.

----End

D Resetting the Login Password on the Hardware

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 indicators on the inverter panel turn off.

Step 3 Complete the following operations within 4 minutes:

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

Step 4 Wait until the three green LEDs on the inverter panel blink fast and then the three red LEDs blink fast, which indicates that the password is restored.

Step 5 Reset the password within 10 minutes. (If no operation is performed within 10 minutes, all parameters of the inverter remain unchanged.)

1. Wait until the indicator blinks.
2. Connect to the app using the initial WLAN hotspot name (SSID) and initial password (PSW), which can be obtained from the label on the side of the inverter.
3. On the login page, set a new password and log in to the app.

Step 6 Set router and management system parameters to implement remote management.

----End

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NOTICE

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

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E Locating Insulation Resistance Faults

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

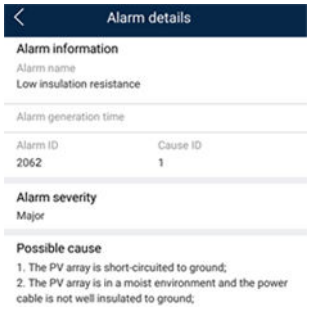
The possible causes are as follows:

- A short circuit has occurred 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 reported by the inverter, insulation resistance fault location is automatically triggered. 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**, select **Low insulation resistance** to enter the **Alarm details** screen.

Figure E-1 Alarm details

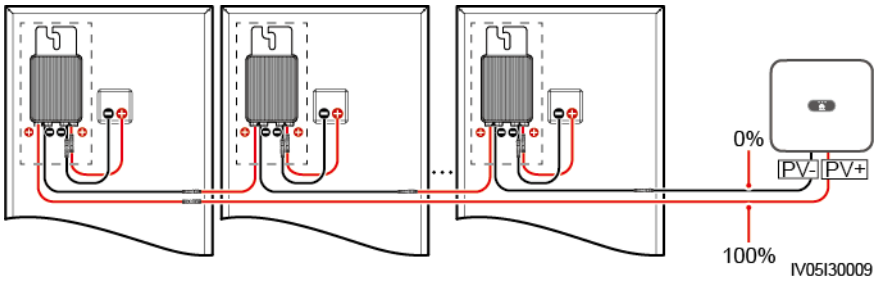


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NOTE

- The positive and negative terminals of a PV string are respectively connected to the PV+ and PV– terminals of the inverter. The PV– terminal represents a possibility of 0% for the short-circuit position and the PV+ terminal represents a possibility of 100% for the short-circuit position. 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 previous and the next PV modules and the cables. The inverter has a detection precision of ±1 PV module.
- The possible faulty PV string MPPT1 corresponds to PV1 and PV2, and the possible faulty PV string MPPT2 corresponds to PV3 and PV4. 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 inverter 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 E-2 Percentage of short-circuit positions



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 inverter one by one to locate the fault. If the system is not configured with any optimizer, skip the corresponding optimizer operations.

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 **DC SWITCH** to **OFF**.

Step 2 Connect one PV string to the inverter, and set **DC SWITCH** to **ON**. If the inverter status is **Shutdown: Command**, log in to the app, 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.

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- 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 **DC SWITCH** to **OFF**. Go to **Step 2** and check rest of the 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 possible faulty PV module based on the percentage. Then go to **Step 4**.

Step 4 Log in to the app, choose **Maintenance** > **Inverter ON/OFF** on the home screen, and send a shutdown command. Set **DC SWITCH** to **OFF**. Check whether the connectors or DC power cables between the optimizer and PV module, between adjacent PV modules, or between adjacent optimizers on the possible fault position are damaged.

- If yes, replace the damaged connectors or DC power cables, and then set **DC SWITCH** to **ON**. If the inverter status is **Shutdown: Command**, choose **Maintenance** > **Inverter ON/OFF**, 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, troubleshoot the insulation resistance fault of the PV string. Log in to the app, choose **Maintenance** > **Inverter ON/OFF** on the home screen, and send a shutdown command. Set **DC SWITCH** to **OFF**. Go to **Step 2** and check rest of the PV strings one by one. Then, go to **Step 8**.
  - If the DC side is powered on 1 minute later, the **Low insulation resistance** alarm is still reported. Log in to the app, choose **Maintenance** > **Inverter ON/OFF** on the home screen, and send a shutdown command. Set **DC SWITCH** to **OFF** and go to **Step 5**.
- If no, go to **Step 5**.

Step 5 Disconnect the possible faulty PV module and the paired optimizer from the PV string, and use a DC extension cable with an MC4 connector to connect the PV module or optimizer adjacent to the possible faulty PV module. Set **DC SWITCH** to **ON**. If the inverter 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 and optimizer. Choose **Maintenance** > **Inverter ON/OFF**, send a shutdown command, and set **DC SWITCH** to **OFF**. Go to **Step 7**.
- If the **Low insulation resistance** alarm is reported 1 minute after the DC side is powered on, the fault did not occur on the disconnected PV module and optimizer. Go to **Step 6**.

Step 6 Log in to the app, choose **Maintenance** > **Inverter ON/OFF** on the home screen, and send a shutdown command. Set **DC SWITCH** to **OFF**, reconnect the disconnected PV module and optimizer, and repeat **Step 5** to check the PV modules and optimizers adjacent to the possible fault location.

Step 7 Determine the position of the ground insulation fault:

- Disconnect the possible faulty PV module from the optimizer.

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- Connect the possible faulty optimizer to the PV string.
- Set **DC SWITCH** to **ON**. If the inverter status is **Shutdown: Command**, choose **Maintenance** > **Inverter ON/OFF**, 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 is on the possible faulty PV module.
  - If the **Low insulation resistance** alarm is reported 1 minute after the DC side is powered on, the fault is on the possible faulty optimizer.
- Log in to the app, choose **Maintenance** > **Inverter ON/OFF** on the home screen, and send a shutdown command. Set **DC SWITCH** to **OFF**, replace the faulty component, and complete troubleshooting the insulation resistance fault. Go to **Step 2** and check rest of the PV strings one by one. Then, go to **Step 8**.

Step 8 Set **DC SWITCH** to **ON**. If the inverter status is **Shutdown: Command**, choose **Maintenance** > **Inverter ON/OFF**, and send a startup command.

----End

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F Rapid Shutdown

NOTE

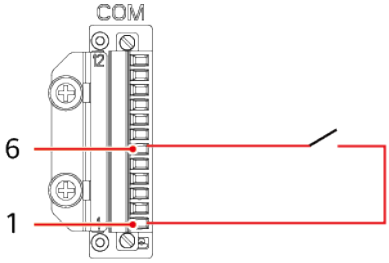
- If method 3 is selected for rapid shutdown, log in to the FusionSolar app as an **installer** user to perform local commissioning, choose **Settings > Feature parameters > Dry contact function**, and set **Dry contact function** to **DI rapid shutdown**.
- The rapid shutdown function is supported only if optimizers are configured for all PV modules.

If optimizers are configured for all PV modules, the PV system can perform a rapid shutdown to decrease the output voltage to below 30 V within 30s.

Perform the following steps to trigger a rapid shutdown:

- Method 1: Turn off the AC switch between the inverter and the power grid (disconnect the voltages of all PV strings connected to the inverter under the AC switch).
- Method 2: Set **DC SWITCH** to **OFF** to trigger a rapid shutdown. The inverter shuts down several minutes later. (Turning off all external switches on the DC side of the inverter can trigger a rapid shutdown, and only the PV strings connected to the inverter is de-energized. Turning off only some external switches cannot trigger a rapid shutdown, and the PV strings may be energized.)
- Method 3: To enable the DI rapid shutdown function, connect a switch to pins DI and GND of the inverter communications terminal. The switch is turned on by default. Turn off the switch to trigger a rapid shutdown. The distance between the switch and the furthest inverter must be less than or equal to 10 m.

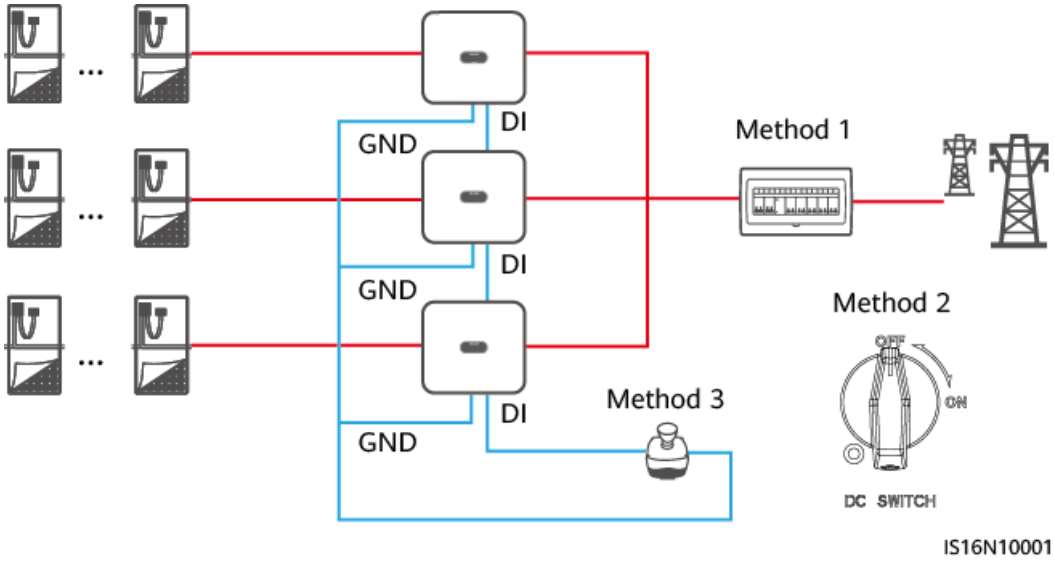
Figure F-1 Connecting cables to a rapid shutdown switch



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- Method 4: If **AFCI** is enabled, the inverter automatically performs arc fault detection and triggers a rapid shutdown when AFCI lock protection is implemented.

Figure F-2 Methods of triggering a rapid shutdown



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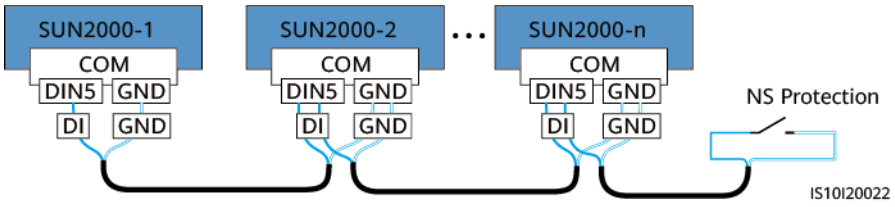
G NS Protection

Connecting the Inverter to the NS Protection Signal Cable

NOTE

- The NS protection function is applicable to grid code **VDE-AR-N-4105**, **SWITZERLAND-NA/EEA:2020-LV230**, or **FINLAND-EN50549-LV230**.
- The NS protection switch is connected to GND (pin 1) at one end and to DIN5 (pin 6) at the other end. The switch is turned off by default. When the switch is turned on, NS protection is triggered. Rapid shutdown and NS protection use the same pins, which are GND (pin 1) and DIN5 (pin 6). Therefore, you can use only one of the functions.
- The NS protection switch connection is the same for a single inverter and for cascaded inverters.
- Log in to the FusionSolar app as an installer, choose **Me** > **Device commissioning**, and connect to the WLAN hotspot of the inverter. Log in to the local commissioning system as an installer, choose **Settings** > **Feature parameters** > **Dry contact function**, and set **Dry contact function** to **NS protection**.

Figure G-1 Connecting cascaded inverters to the NS protection switch



H Initial Certificate Risk Disclaimer

Huawei's initial certificates are mandatory identity credentials for Huawei devices before delivery. The disclaimer statements for using the certificates are as follows:

1. Initial Huawei-issued certificates are used only in the deployment phase, for establishing initial security channels between devices and the customer's network. Huawei does not promise or guarantee the security of initial certificates.
2. The customer shall bear consequences of all security risks and security incidents involved in using initial Huawei-issued certificates as service certificates.
3. An initial Huawei-issued certificate is valid until October 11, 2041 starting from the manufacturing date.
4. Services using an initial Huawei-issued certificate will be interrupted when the certificate expires.
5. It is recommended that customers deploy a PKI system to issue certificates for devices and software on the live network and manage the lifecycle of the certificates. To ensure security, certificates with short validity periods are recommended.

NOTE

You can view the validity period of an initial certificate on the network management system.

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I Acronym and Abbreviation

A	
AFCI	arc-fault circuit interrupter
L	
LED	light emitting diode
M	
MPP	maximum power point
MPPT	maximum power point tracking
P	
PE	protective earthing
PID	potential induced degradation
PV	photovoltaic

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