SmartACU2000D-D-(08-11) Series Smart Array Controller

User Manual

Issue	03
Date	2025-03-30

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About This Document

Purpose

This document describes the installation, electrical connections, and maintenance of the SmartACU2000D Smart Array Controller (also referred to as SACU), which is applicable to indoor or outdoor use. Before installing and operating an SACU, read this document carefully to get familiar with the safety information, functions, and features.

Intended Audience

This document is intended for:

- Technical support engineers
- Hardware installation engineers
- Commissioning engineers
- Maintenance engineers

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.

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

Change History

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

Issue 03 (2025-03-30)

Updated **2.4 Electrical Schematics**.

Updated **2.5 Networking Application**.

Updated **5.4.3 Installing the Opto-Electronic Ethernet Switch**.

Updated **6.3 Connecting Optical Fiber Communications Cables (SmartLogger/Network Switch)**.

Issue 02 (2024-12-30)

Updated **5.3.1 Installing the Cabinet (Without SmartPID2000)**.

Updated **5.3.2.1 Installing the Mounting Bracket**.

Updated **6.5 Connecting Three-Phase AC Power Cables**.

Updated **9.3.9 Replacing a SmartPID2000**.

Issue 01 (2024-04-20)

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

Contents

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.

- 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.

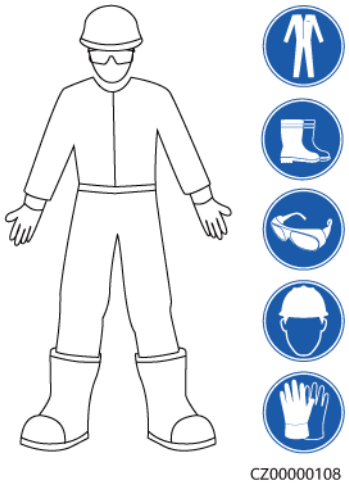
DANGER

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.

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

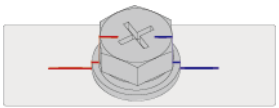
For the equipment that needs to be grounded, install the ground cable first when installing the equipment and remove the ground cable last when removing the equipment.

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.)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- 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.
- 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.
- 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.
- For the equipment that uses a three-pin socket, ensure that the ground terminal in the socket is connected to the protective ground point.

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.
- When cable connection is completed or paused for a short period of time, seal the cable holes with sealing putty immediately to prevent small animals or moisture from entering.
- 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 the temperature is low, violent impact or vibration may damage the plastic cable sheathing. To ensure safety, comply with the following requirements:
  - Cables can be laid or installed only when the temperature is higher than 0°C. Handle cables with caution, especially at a low temperature.
  - Cables stored at below 0°C must be stored at room temperature for more than 24 hours before they are laid out.

- Do not perform any improper operations, for example, dropping cables directly from a vehicle. Otherwise, the cable performance may deteriorate due to cable damage, which affects the current-carrying capacity and temperature rise.

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.

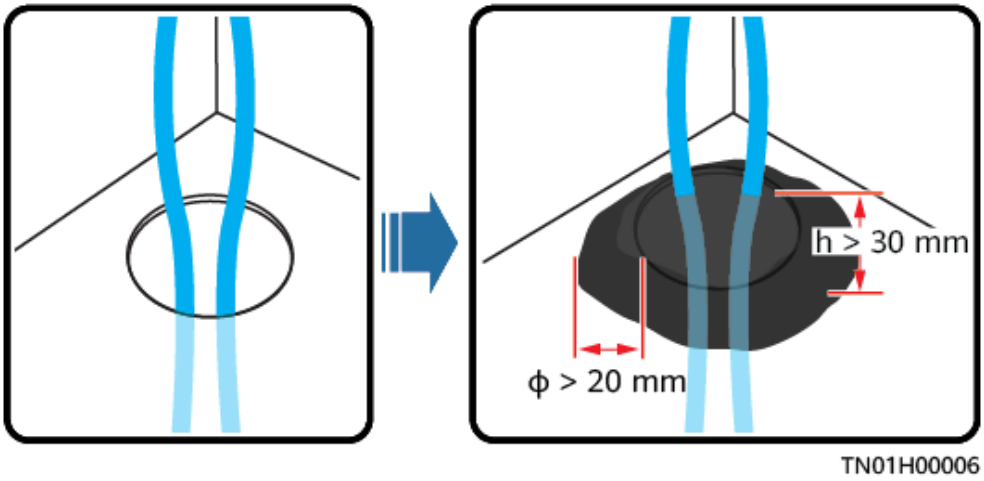
WARNING

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

- Ensure that the equipment is stored in a clean, dry, and well ventilated area with proper temperature and humidity and is protected from dust and condensation.
- Keep the installation and operating environments of the equipment within the allowed ranges. Otherwise, its performance and safety will be compromised.

- Do not install, use, or operate outdoor equipment and cables (including but not limited to moving equipment, operating equipment and cables, inserting connectors to or removing connectors from signal ports connected to outdoor facilities, working at heights, performing outdoor installation, and opening doors) in harsh weather conditions such as lightning, rain, snow, and level 6 or stronger wind.
- Do not install the equipment in an environment with dust, smoke, volatile or corrosive gases, infrared and other radiations, organic solvents, or salty air.
- Do not install the equipment in an environment with conductive metal or magnetic dust.
- Do not install the equipment in an area conducive to the growth of microorganisms such as fungus or mildew.
- Do not install the equipment in an area with strong vibration, noise, or electromagnetic interference. The equipment shall be installed in an environment with a magnetic field strength less than 4 Gauss. If the magnetic field strength is greater than or equal to 4 Gauss, the equipment may fail to work properly. If the magnetic field strength is high, for example, in a smeltery, you are advised to use a gauss meter to measure the magnetic field strength of the equipment installation position when the smelting equipment is running normally.
- Ensure that the site complies with local laws, regulations, and related standards.
- Ensure that the ground in the installation environment is solid, free from spongy or soft soil, and not prone to subsidence. The site must not be located in a low-lying land prone to water or snow accumulation, and the horizontal level of the site must be above the highest water level of that area in history.
- Do not install the equipment in a position that may be submerged in water.
- If the equipment is installed in a place with abundant vegetation, in addition to routine weeding, harden the ground underneath the equipment using cement or gravel.
- Do not install the equipment outdoors in salt-affected areas because it may be corroded. A salt-affected area refers to the region within 500 m of the coast or prone to sea breeze. Regions prone to sea breeze vary with weather conditions (such as typhoons and monsoons) or terrains (such as dams and hills).
- Before opening doors during the installation, operation, and maintenance of the equipment, clean up any water, ice, snow, or other foreign objects on the top of the equipment to prevent foreign objects from falling into the equipment.
- When installing the equipment, ensure that the installation surface is solid enough to bear the weight of the equipment.
- Ensure that the equipment room provides good heat insulation, and that the walls and floor are dampproof.
- Install protective devices at the door of the equipment room to prevent rodents and insects from entering the room.
- All cable holes must be sealed. Seal the used cable holes with sealing putty. Seal the unused cable holes with the caps delivered with the equipment. The following figure shows the criteria for correct sealing with sealing putty.



- After installing the equipment, remove the packing materials such as cartons, foam, plastics, and cable ties from the equipment area.

1.4 Mechanical Safety

⚠ WARNING

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

⚠ WARNING

Before installing equipment in a cabinet, ensure that the cabinet is securely fastened with a balanced center of gravity. Otherwise, tipping or falling cabinets may cause bodily injury and equipment damage.

⚠ WARNING

When pulling equipment out of a cabinet, be aware of unstable or heavy objects in the cabinet to prevent injury.

⚠ WARNING

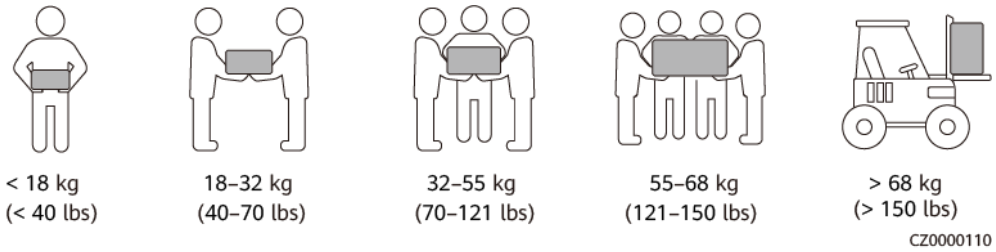
Do not drill holes into the equipment. Doing so may affect the sealing performance and electromagnetic containment of the equipment and damage components or cables inside. Metal shavings from drilling may short-circuit boards inside the equipment.

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.

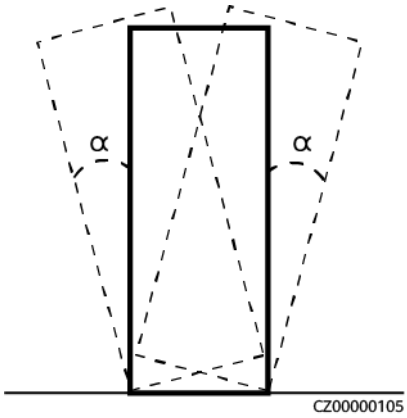
Moving Heavy Objects

- 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.
- Move or lift the equipment by holding its handles or lower edges. Do not hold the handles of modules that are installed in the equipment.
- Do not quickly lift a heavy object above your waist. Place the object on a workbench that is half-waist high or any other appropriate place, adjust the positions of your palms, and then lift it.
- Move a heavy object stably with balanced force at an even and low speed. Put down the object stably and slowly to prevent any collision or drop from scratching the surface of the equipment or damaging the components and cables.
- When moving a heavy object, be aware of the workbench, slope, staircase, and slippery places. When moving a heavy object through a door, ensure that the door is wide enough to move the object and avoid bumping or injury.
- When transferring a heavy object, move your feet instead of turning your waist around. When lifting and transferring a heavy object, ensure that your feet point to the target direction of movement.

- When transporting the equipment using a pallet truck or forklift, ensure that the tynes are properly positioned so that the equipment does not topple. Before moving the equipment, secure it to the pallet truck or forklift using ropes. When moving the equipment, assign dedicated personnel to take care of it.
- Choose sea or roads in good conditions for transportation. Do not transport the equipment by railway or air. Avoid tilt or jolt during transportation.
- Ensure that tilt angle of the cabinet meets the requirements shown in the figure. The tilt angle α of a cabinet with packaging must be less than or equal to 15°. After the cabinet is unpacked, its tilt angle α must be less than or equal to 10°.



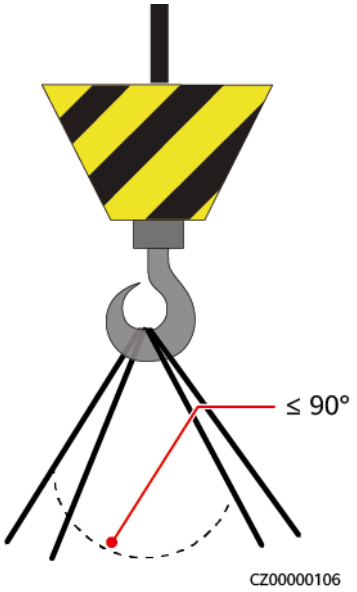
Using Ladders

- Use wooden or insulated ladders when you need to perform live-line working at heights.
- Platform ladders with protective rails are preferred. Do not use single ladders.
- 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.

- 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.

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.

2 Overview

2.1 Model

Model Description

This document involves the following product models:

- SmartACU2000D-D-08
- SmartACU2000D-D-09
- SmartACU2000D-D-10
- SmartACU2000D-D-11

Figure 2-1 Model

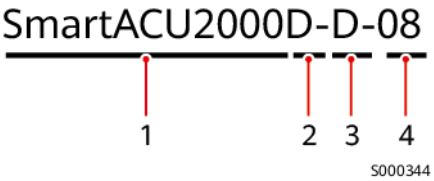


Table 2-1 Model description

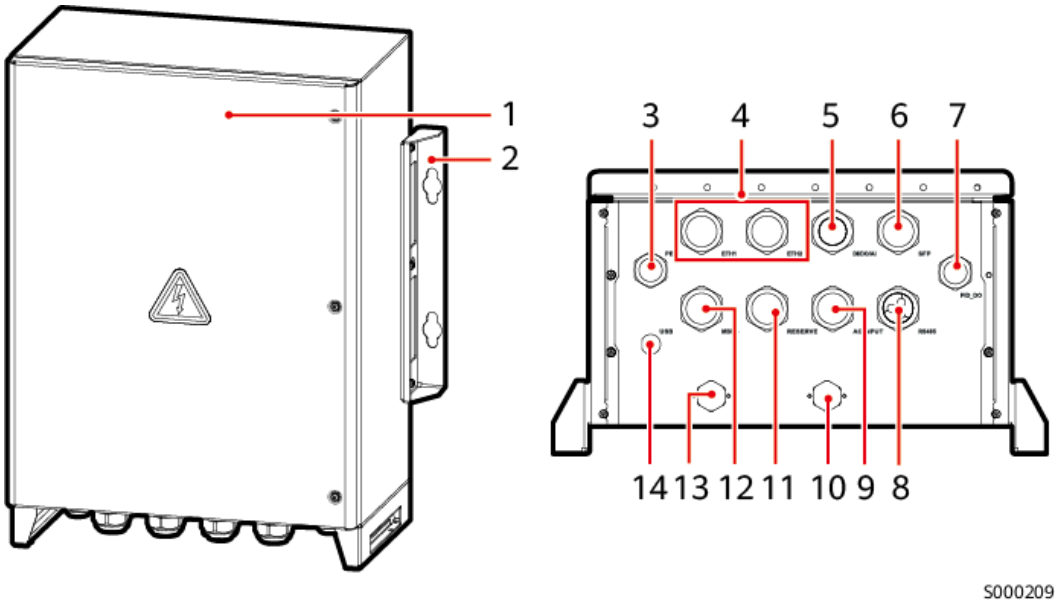
No.	Meaning	Description
1	Product family	SmartACU2000: Smart Array Controller
2	Hardware identifier	D: version D
3	Voltage level	D: ≤ 800 V three-phase AC input

No.	Meaning	Description
4	Feature identifier	• 08: one MBUS route • 09: one MBUS route, including one SmartPID2000 • 10: two MBUS routes, including two SmartPID2000s and one SmartMBUS CCO01B • 11: two MBUS routes, including two SmartPID2000s, one SmartMBUS CCO01B, and two opto-electronic Ethernet switches

2.2 Exterior

Appearance

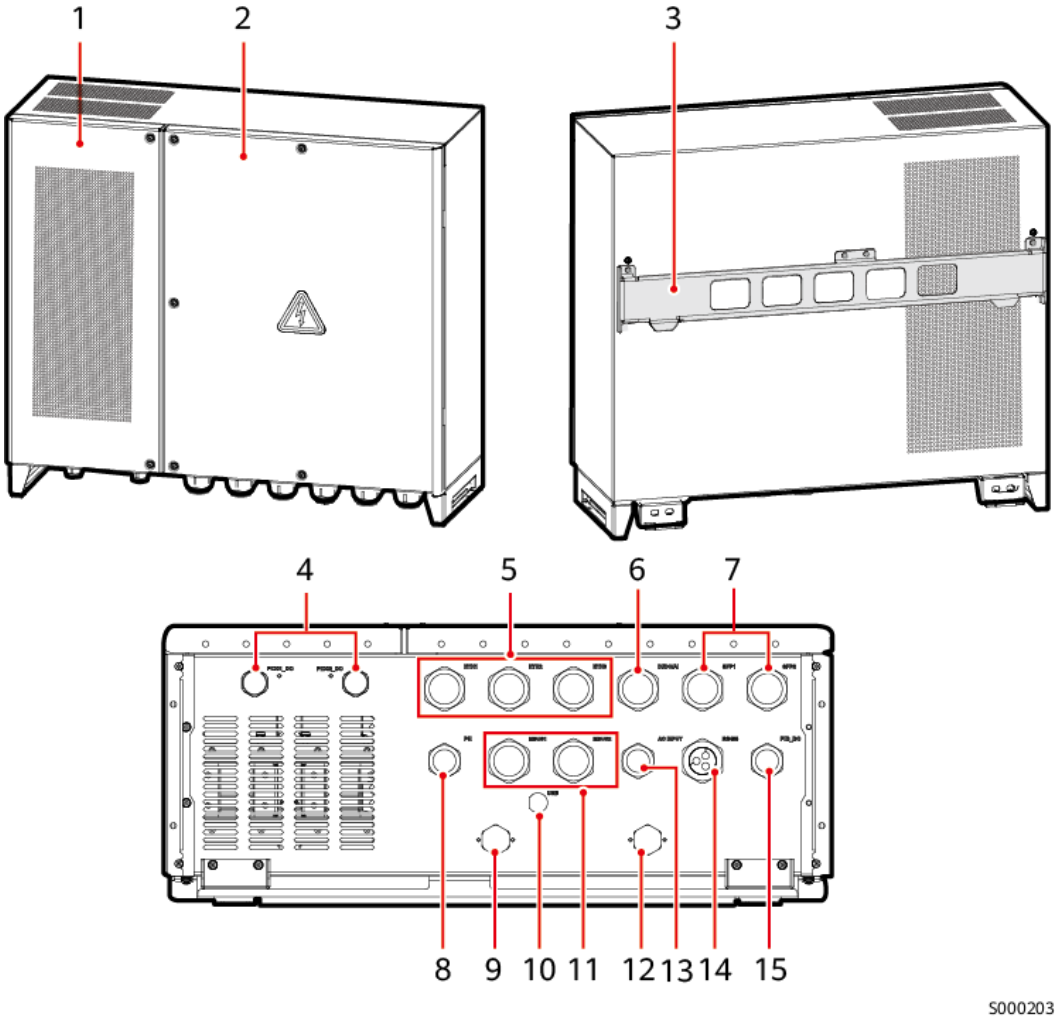
Figure 2-2 Appearance (without SmartPID2000)



No.	Component	Description
1	Cabinet door	-
2	Mounting bracket	-
3	Waterproof connector for the protective earthing cable (PE)	• Specifications: 1 in. • Inner diameter: 18–25 mm (0.71–0.98 in.)

No.	Component	Description
4	Waterproof connectors for network cables (ETH1 and ETH2)	• Specifications: 5/4 in. • Inner diameter: 22–32 mm (0.87–1.26 in.)
5	Waterproof connector for the DI/DO/AI signal cable (DI/DO/AI)	• Specifications: 5/4 in. • Inner diameter: 22–32 mm (0.87–1.26 in.)
6	Waterproof connector for the optical fiber cable (SFP)	• Specifications: 5/4 in. • Inner diameter: 22–32 mm (0.87–1.26 in.)
7	Waterproof connector for the alarm beacon signal cable (PID_DO)	• Specifications: 1 in. • Inner diameter: 18–25 mm (0.71–0.98 in.)
8	Waterproof connector for the RS485 communications cable (RS485)	• Specifications: 5/4 in. • Inner diameter: 22–32 mm (0.87–1.26 in.)
9	Waterproof connector for the single-phase AC power cable (AC INPUT)	• Specifications: 5/4 in. • Inner diameter: 22–32 mm (0.87–1.26 in.)
10	Ventilation valve	-
11	Reserved port (RESERVE)	• Specifications: 5/4 in. • Inner diameter: 22–32 mm (0.87–1.26 in.)
12	Waterproof connector for the three-phase AC power cable (MBUS)	• Specifications: 5/4 in. • Inner diameter: 22–32 mm (0.87–1.26 in.)
13	Ventilation valve	-
14	USB port (USB)	The USB port is used only for maintenance (such as upgrade and data export). Ensure that the USB cover is tightened when the port is not used.

Figure 2-3 Appearance (with SmartPID2000)



No.	Component	Description
1	SmartPID2000 cabinet door	Only the SmartPID2000 can be installed in this cabinet. Do not install third-party devices in the cabinet.
2	Main cabinet door	-
3	Mounting bracket	-
4	Waterproof connectors for the PID DO signal cables (PID01_DO and PID02_DO)	• Specifications: 3/4 in. • Inner diameter: 13–18 mm (0.51–0.71 in.)
5	Waterproof connectors for network cables (ETH)	• Specifications: 5/4 in. • Inner diameter: 22–32 mm (0.87–1.26 in.)

No.	Component	Description
6	Waterproof connector for the DI/DO/AI signal cable (DI/DO/AI)	• Specifications: 5/4 in. • Inner diameter: 22–32 mm (0.87–1.26 in.)
7	Waterproof connectors for optical fiber cables (SFP1 and SFP2)	• Specifications: 5/4 in. • Inner diameter: 22–32 mm (0.87–1.26 in.)
8	Waterproof connector for the protective earthing cable (PE)	• Specifications: 1 in. • Inner diameter: 18–25 mm (0.71–0.98 in.)
9	Ventilation valve	-
10	USB port (USB)	• The USB port is used only for maintenance (such as upgrade and data export). Ensure that the USB cover is tightened when the port is not used.
11	Waterproof connectors for three-phase AC power cables (MBUS01 and MBUS02)	• Specifications: 5/4 in. • Inner diameter: 22–32 mm (0.87–1.26 in.)
12	Ventilation valve	-
13	Waterproof connector for the single-phase AC power cable (AC INPUT)	• Specifications: 1 in. • Inner diameter: 22–32 mm (0.87–1.26 in.)
14	Waterproof connector for the RS485 communications cable (RS485)	• Specifications: 5/4 in. • Inner diameter: 22–32 mm (0.87–1.26 in.)
15	Waterproof connector for the alarm beacon signal cable (PID_DO)	• Specifications: 1 in. • Inner diameter: 18–25 mm (0.71–0.98 in.)

Dimensions

Figure 2-4 Cabinet dimensions (without SmartPID2000)

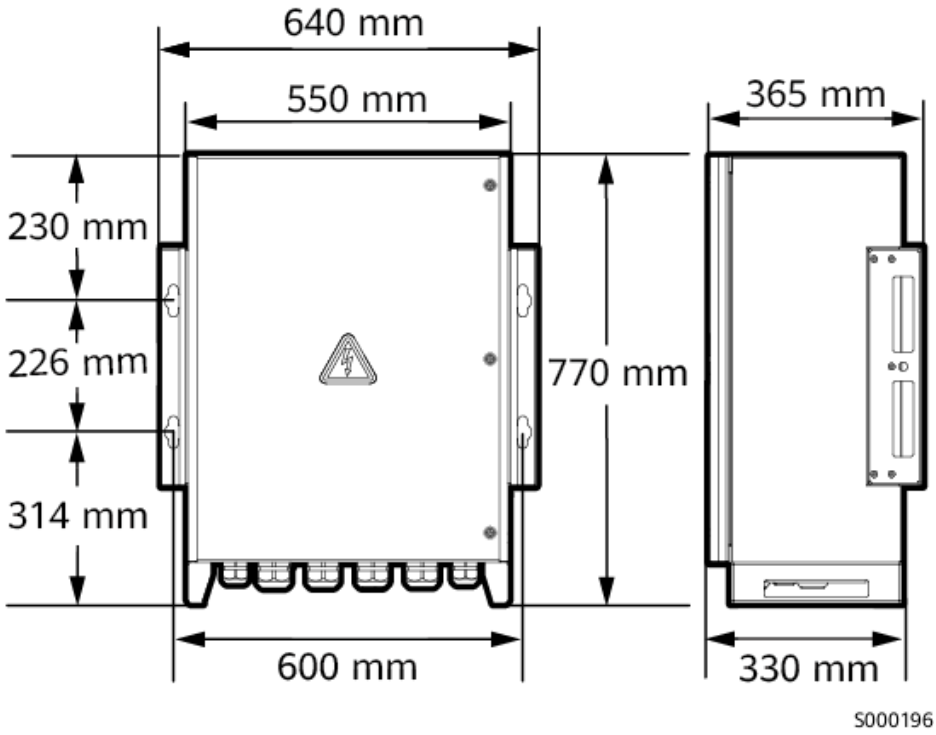
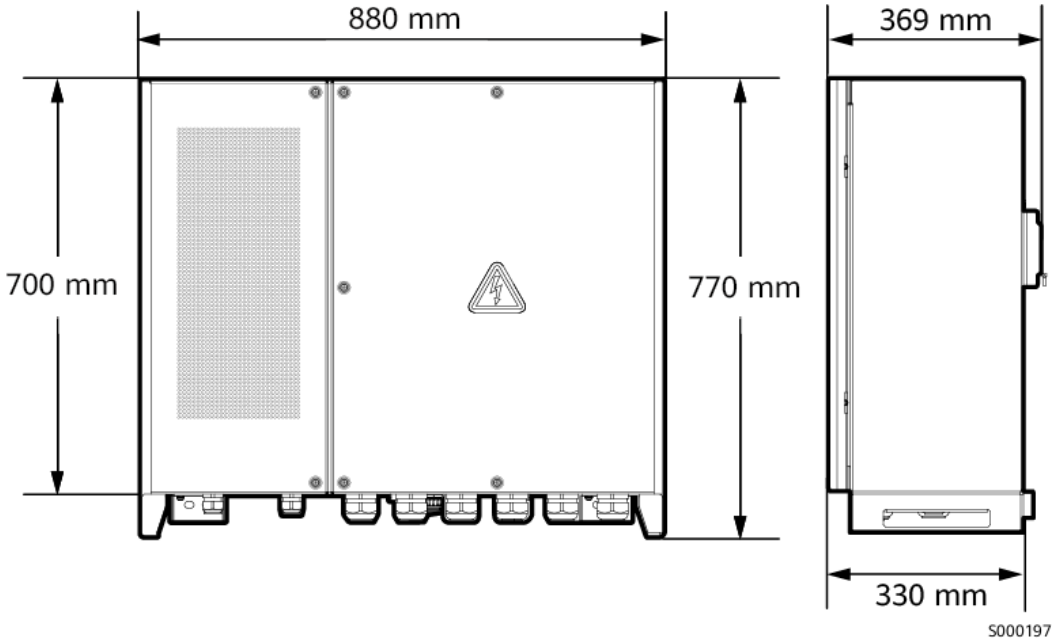


Figure 2-5 Cabinet dimensions (with SmartPID2000)



2.3 Components

NOTE

For simplicity purposes, the following figure shows only the components that you need to operate and the reserved installation positions.

SmartACU2000D-D-08 Components

Figure 2-6 Components

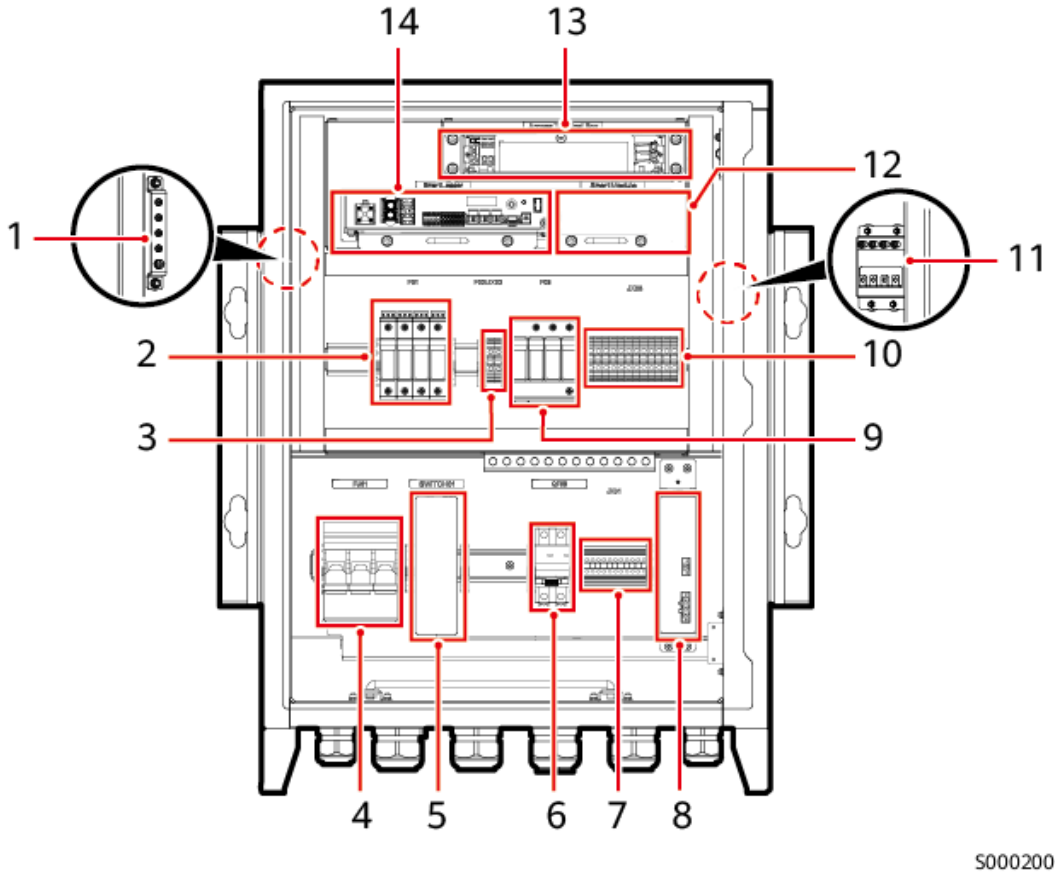


Table 2-2 Components and reserved installation positions

No.	Name	Specifications	Quantity
1	Protective earthing bar (PE)	-	1
2	Three-phase SPD (F01)	Uc = 680 V AC, 20 kA/40 kA, 8/20 µs, 1P	1
3	AC input terminal of the 24 V power module (JX02)	Supports the wires with a cross-sectional area of 0.2–10 mm^2 (or 24–8 AWG).	1

No.	Name	Specifications	Quantity
4	Three-phase input switch 1 (FU01)	25 A/3P	1
5	Reserved installation position for the opto-electronic Ethernet switch (SWITCH01)	-	1 (optional)
6	Single-phase input switch (QF03)	32 A/2P	1
7	RS485 communications terminal (JX01)	Supports the wires with a cross-sectional area of 1.5–2.5 mm^2 (or 16–14 AWG).	1
8	12 V DC power module (U01)	-	1
9	Single-phase SPD (F03)	Uc = 385 V AC; 20 kA/40 kA; 8/20 µs; 4P	1
10	12 V DC power terminal (JX03)	Supports the wires with a cross-sectional area of 0.2–10 mm^2 (or 24–8 AWG).	1
11	Optical fiber cable binding point	-	1
12	Reserved installation position for the SmartModule1000A 01 (SmartModule)	See **SmartLogger3000 User Manual**.	1 (optional)
13	ATB (Access Terminal Box)	6 ports	1
14	SmartLogger3000 (SmartLogger)	See **SmartLogger3000 User Manual**.	1

SmartACU2000D-D-09 Components

Figure 2-7 Components

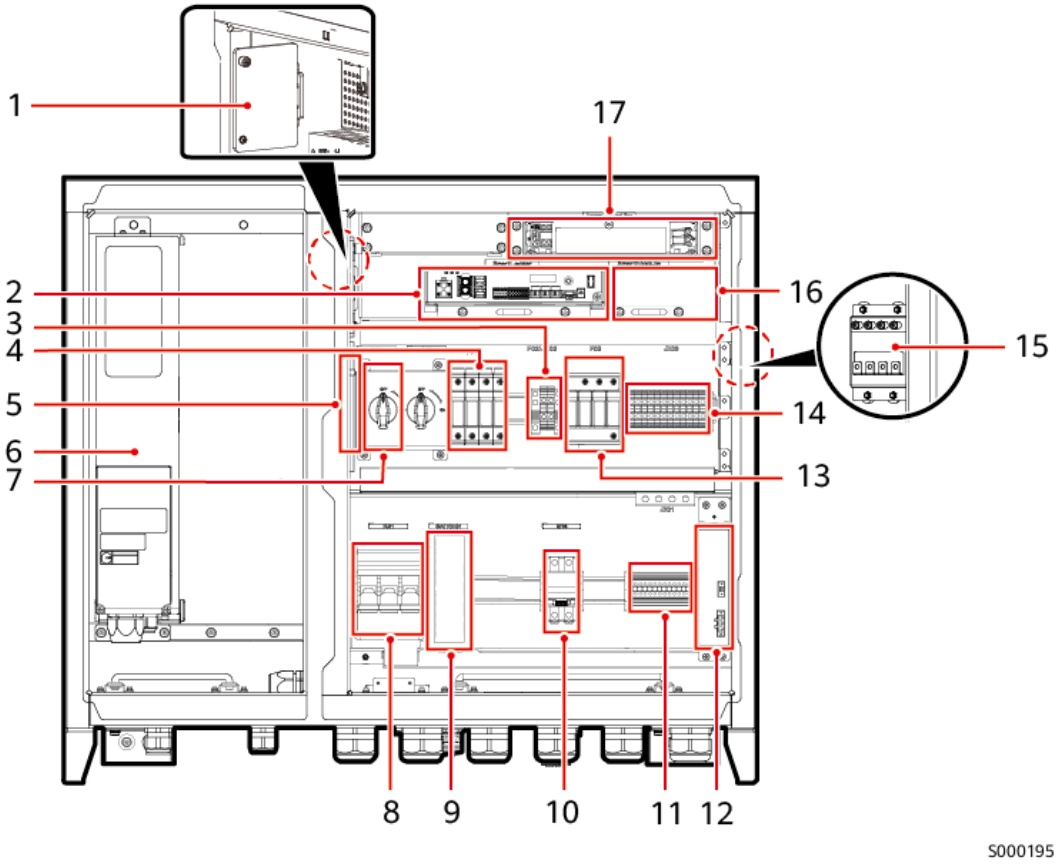


Table 2-3 Components and reserved installation positions

No.	Name	Specifications	Quantity
1	SmartPID2000 functional earthing bar (FE01)	-	1
2	SmartLogger3000 (SmartLogger)	See **SmartLogger3000 User Manual**.	1
3	AC input terminal of the 24 V power module (JX02)	Supports the wires with a cross-sectional area of 0.2–10 mm^2 (or 24–8 AWG).	1
4	Three-phase SPD (F01)	Uc = 680 V AC, 20 kA/40 kA, 8/20 µs, 1P	1
5	Protective earthing bar (PE)	-	1

No.	Name	Specifications	Quantity
6	SmartPID2000 (PID01)	See **SmartPID2000 User Manual**.	1
7	PID01 input switch (QF01)	AC: 1 A/3P	1
8	Three-phase input switch 1 (FU01)	25 A/3P	1
9	Reserved installation position for the opto-electronic Ethernet switch (SWITCH01)	-	1 (optional)
10	Single-phase input switch (QF03)	32 A/2P	1
11	RS485 communications terminal (JX01)	Supports the wires with a cross-sectional area of 1.5–2.5 mm^2 (or 16–14 AWG).	1
12	12 V DC power module (U01)	-	1
13	Single-phase SPD (F03)	Uc = 385 V AC; 20 kA/40 kA; 8/20 μs; 4P	1
14	PID_DO/12 V DC power terminal (JX03)	Supports the wires with a cross-sectional area of 0.2–10 mm^2 (or 24–8 AWG).	1
15	Optical fiber cable binding point	-	1
16	Reserved installation position for the SmartModule1000A 01 (SmartModule)	See **SmartLogger3000 User Manual**.	1 (optional)
17	ATB (Access Terminal Box)	6 ports	1

SmartACU2000D-D-10 Components

Figure 2-8 Components

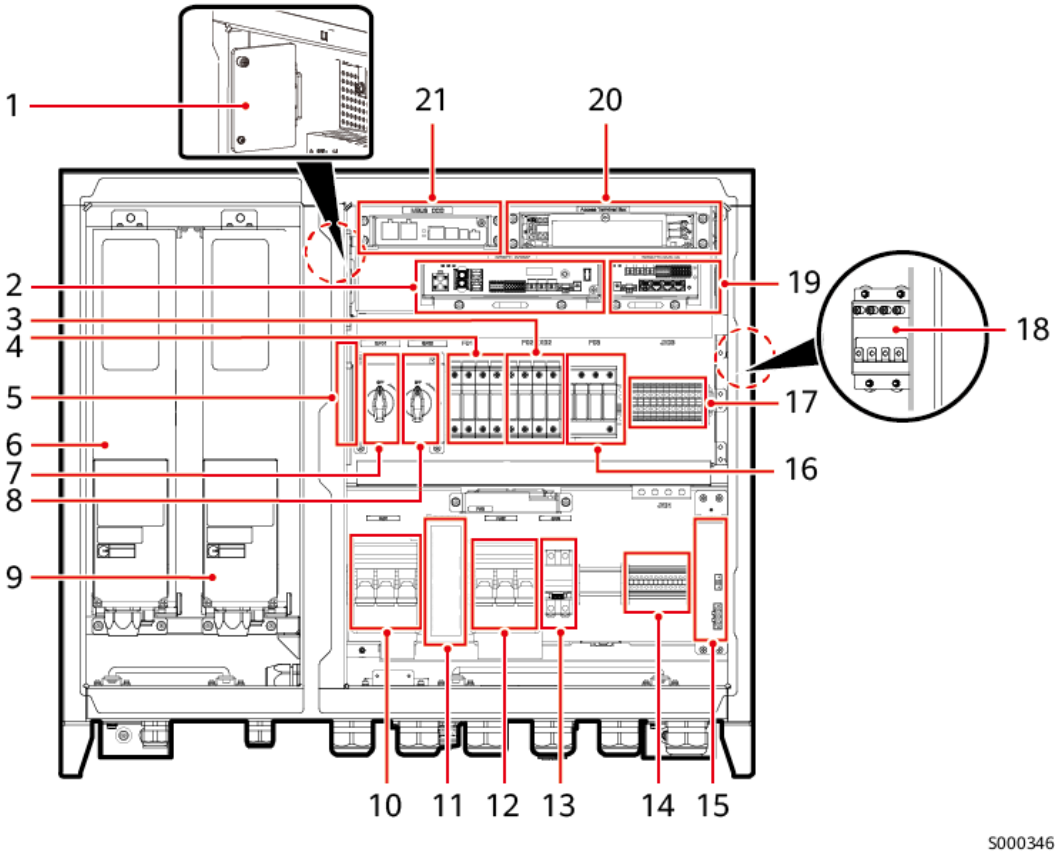


Table 2-4 Components and reserved installation positions

No.	Name	Specifications	Quantity
1	SmartPID2000 functional earthing bar (FE01 and FE02)	-	1
2	SmartLogger3000 (SmartLogger)	See **SmartLogger3000 User Manual**.	1
3	Three-phase SPD (F02)	Uc = 680 V AC, 20 kA/40 kA, 8/20 µs, 1P	1
4	Three-phase SPD (F01)	Uc = 680 V AC, 20 kA/40 kA, 8/20 µs, 1P	1
5	Protective earthing bar (PE)	-	1
6	SmartPID2000 (PID01)	See **SmartPID2000 User Manual**.	1

No.	Name	Specifications	Quantity
7	PID01 input switch (QF01)	AC: 1 A/3P	1
8	PID02 input switch (QF02)	AC: 1 A/3P	1
9	SmartPID2000 (PID02)	See **SmartPID2000 User Manual**.	1
10	Three-phase input switch 1 (FU01)	25 A/3P	1
11	Reserved installation position for the opto-electronic Ethernet switch (SWITCH01)	-	1 (optional)
12	Three-phase input switch 2 (FU02)	25 A/3P	1
13	Single-phase input switch (QF03)	32 A/2P	1
14	RS485 communications terminal (JX01)	Supports the wires with a cross-sectional area of 1.5–2.5 mm^2 (or 16–14 AWG).	1
15	12 V DC power module (U01)	-	1
16	Single-phase SPD (F03)	Uc = 385 V AC; 20 kA/40 kA; 8/20 μs; 4P	1
17	PID_DO/12 V DC power terminal (JX03)	Supports the wires with a cross-sectional area of 0.2–10 mm^2 (or 24–8 AWG).	1
18	Optical fiber cable binding point	-	1
19	SmartModule1000A01 (SmartModule)	See **SmartLogger3000 User Manual**.	1
20	ATB (Access Terminal Box)	6 ports	1
21	SmartMBUS CCO01B (MBUS CCO)	See **SmartMBUS CCO01B User Manual**.	1

SmartACU2000D-D-11 Components

Figure 2-9 Components

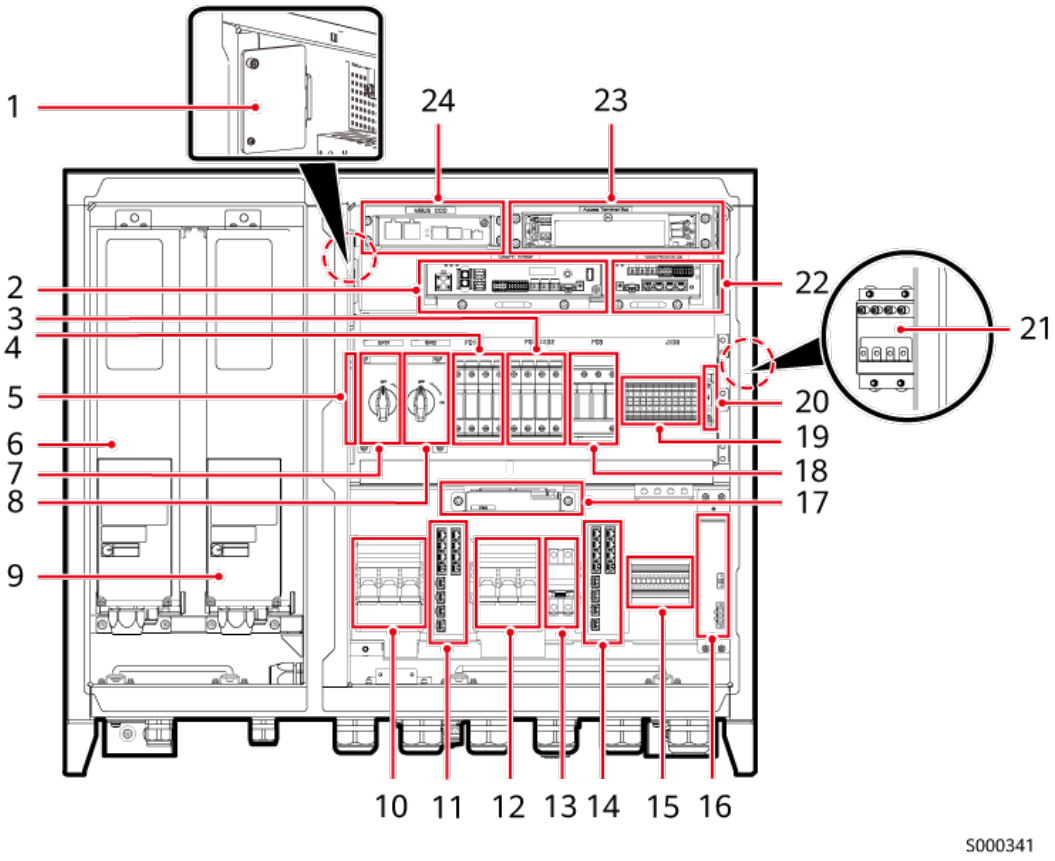


Table 2-5 Component description

No.	Name	Specifications	Quantity
1	SmartPID2000 functional earthing bar (FE01 and FE02)	-	1
2	SmartLogger3000 (SmartLogger)	See **SmartLogger3000 User Manual**.	1
3	Three-phase SPD (F02)	Uc = 680 V AC, 20 kA/40 kA, 8/20 µs, 1P	1
4	Three-phase SPD (F01)	Uc = 680 V AC, 20 kA/40 kA, 8/20 µs, 1P	1
5	Protective earthing bar (PE)	-	1
6	SmartPID2000 (PID01)	See **SmartPID2000 User Manual**.	1

No.	Name	Specifications	Quantity
7	PID01 input switch (QF01)	AC: 1 A/3P	1
8	PID02 input switch (QF02)	AC: 1 A/3P	1
9	SmartPID2000 (PID02)	See **SmartPID2000 User Manual**.	1
10	Three-phase input switch 1 (FU01)	25 A/3P	1
11	Opto-electronic Ethernet switch (SWITCH01)	-	1
12	Three-phase input switch 2 (FU02)	25 A/3P	1
13	Single-phase input switch (QF03)	32 A/2P	1
14	Opto-electronic Ethernet switch (SWITCH02)	-	1
15	RS485 communications terminal (JX01)	Supports the wires with a cross-sectional area of 1.5–2.5 mm^2 (or 16–14 AWG).	1
16	12 V DC power module (U01)	-	1
17	Mixed-flow fan (FAN)	-	1
18	Single-phase SPD (F03)	Uc = 385 V AC; 20 kA/40 kA; 8/20 µs; 4P	1
19	PID_DO/12 V DC power terminal (JX03: 1–13)	Supports the wires with a cross-sectional area of 0.2–10 mm^2 (or 24–8 AWG).	1
20	Fuse terminal block (JX03: 14)	Supports the wires with a cross-sectional area of 0.5–6 mm^2 (or 20–10 AWG).	1
21	Optical fiber cable binding point	-	1
22	SmartModule1000A01 (SmartModule)	See **SmartLogger3000 User Manual**.	1

No.	Name	Specifications	Quantity
23	ATB (Access Terminal Box)	8 ports	1
24	SmartMBUS CCO01B (MBUS CCO)	See **SmartMBUS CCO01B User Manual**.	1

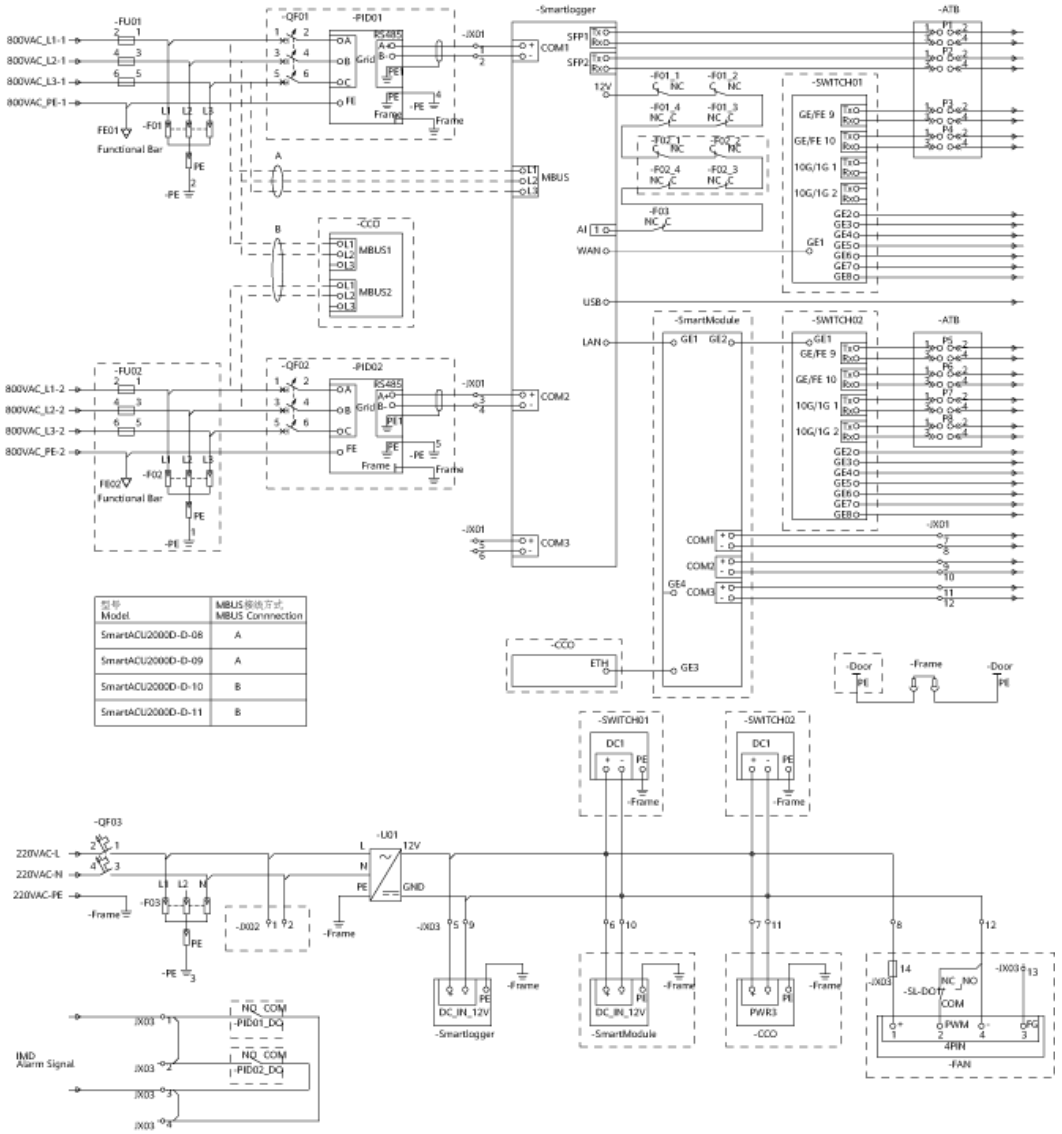
NOTICE

The SmartLogger3000 and SmartPID2000 in the cabinet contain lithium coin cell batteries.

- Do not swallow batteries to avoid chemical burns.
- Do not disassemble or modify batteries, insert foreign objects into batteries, or immerse batteries in liquid to avoid battery leakage, overheat, fire, or explosion.
- Do not throw batteries into fire to avoid fire or explosion.
- Do not replace batteries by yourself to avoid causing damage to the batteries or the equipment.
- Dispose of batteries in accordance with local laws and regulations. Do not dispose of batteries as household waste.

2.4 Electrical Schematics

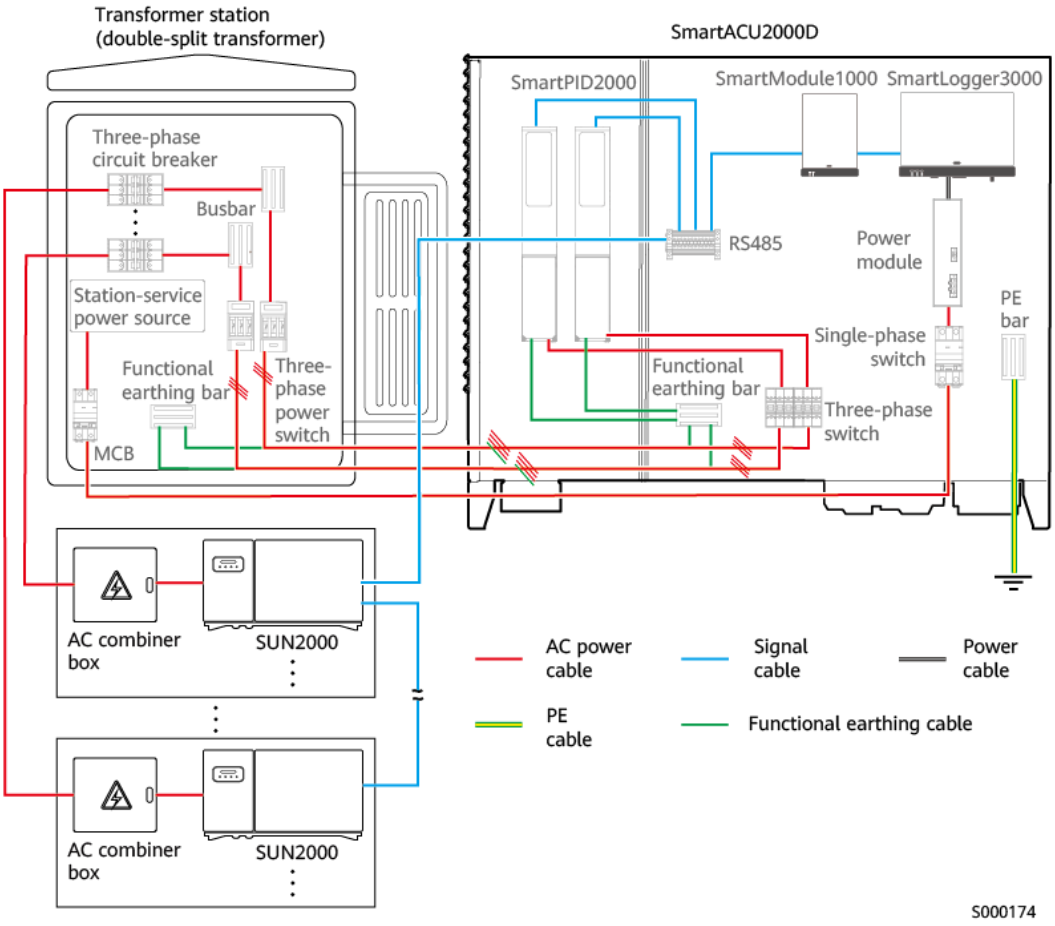
Figure 2-10 Electrical schematic diagram (The components in dotted boxes are optional.)



The SACU communicates with devices in an array over RS485, MBUS, or Ethernet.

RS485 Communication

Figure 2-11 RS485 communication

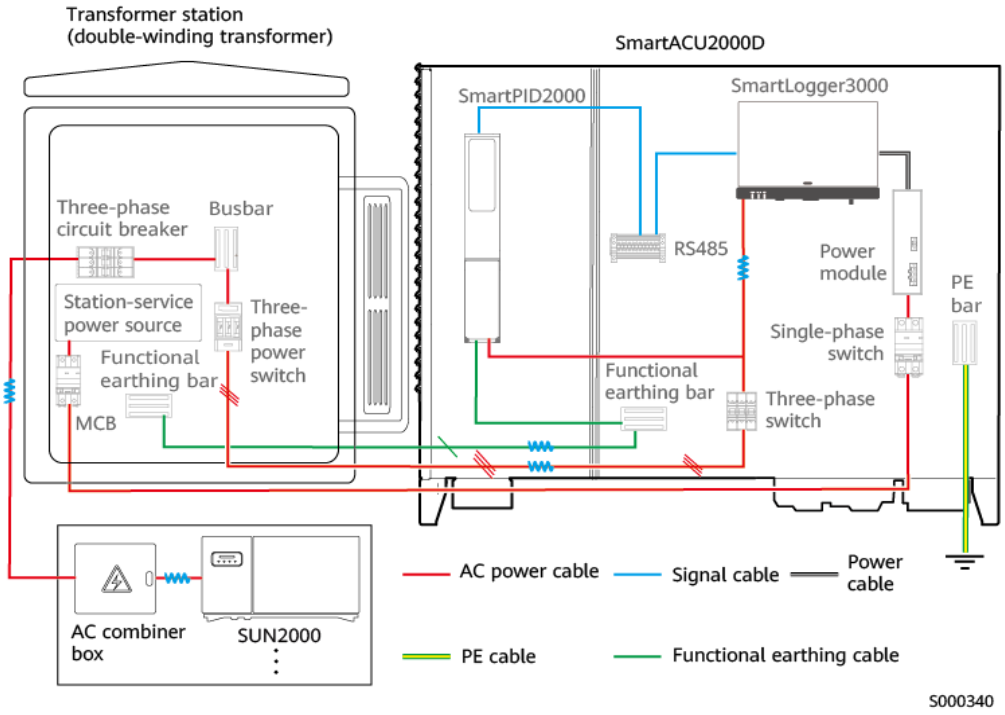


- All SACU models support RS485 communication.
- The SmartLogger connects to the transformer station, power meter, inverter, SmartPID2000, and other devices that support RS485 communication over COM ports.

MBUS Communication

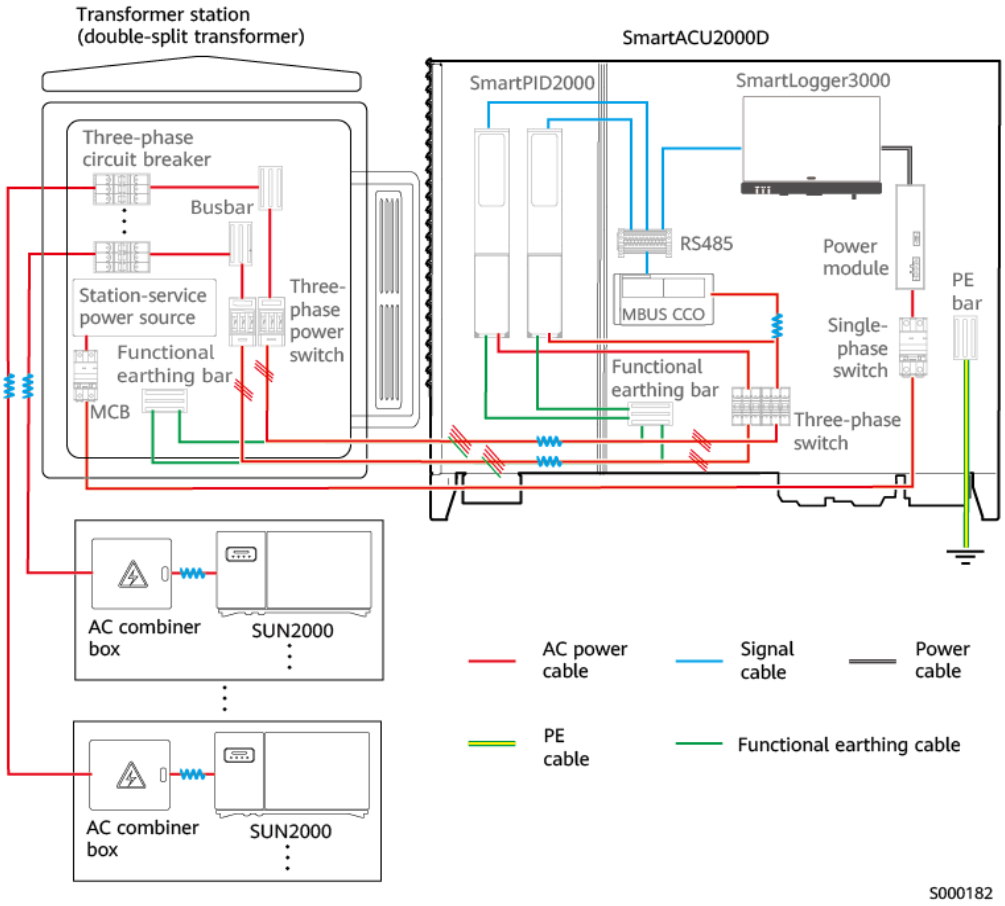
- If a double-winding transformer is used, use the SACU that supports the access of one MBUS route.

Figure 2-12 MBUS communication mode (double-winding transformer)



- If a double-split transformer is used, use the SACU that supports the access of two MBUS routes or install the SmartMBUS CCO01B on the transformer station side.

Figure 2-13 MBUS communication mode (double-split transformer)



- Inverters that support MBUS communication are connected through three-phase AC power cables.
- When the SACU communicates with the inverter over MBUS, log in to the SmartLogger3000 WebUI, choose **Monitoring** > **MBUS** > **Network Settings**, and set **Networking** to **Enable** (default value). When the SACU communicates with the inverters over RS485, set **Networking** to **Disable**. For details, see **SmartLogger3000 User Manual**.

Ethernet Communication

- All SACU models support Ethernet communication. The installation position for the opto-electronic Ethernet switch is reserved in the cabinet or the opto-electronic Ethernet switch has been installed.
- The SmartLogger has one 10/100/1000 Mbit/s Ethernet electrical port (WAN), and the SmartLogger connecting to an Ethernet switch has seven 10/100/1000 Mbit/s Ethernet electrical ports.

Fiber Ring Network Communication

The SACU communicates with the plant monitoring system over a fiber ring network.

- All SACU models support the communication over a fiber ring network.
- The SmartLogger connects to the plant monitoring system by optical fibers through an ATB.

2.5 Networking Application

NOTE

- Components listed in the table need to be installed onsite.
- Models of the components inside the transformer station are specified by the transformer station vendor.

SmartACU2000D-D-08 Networking Application

The SmartACU2000D-D-08 can be used in the PV-only scenario. For details about the application scenario, see the related solution manual.

Figure 2-14 Networking diagram

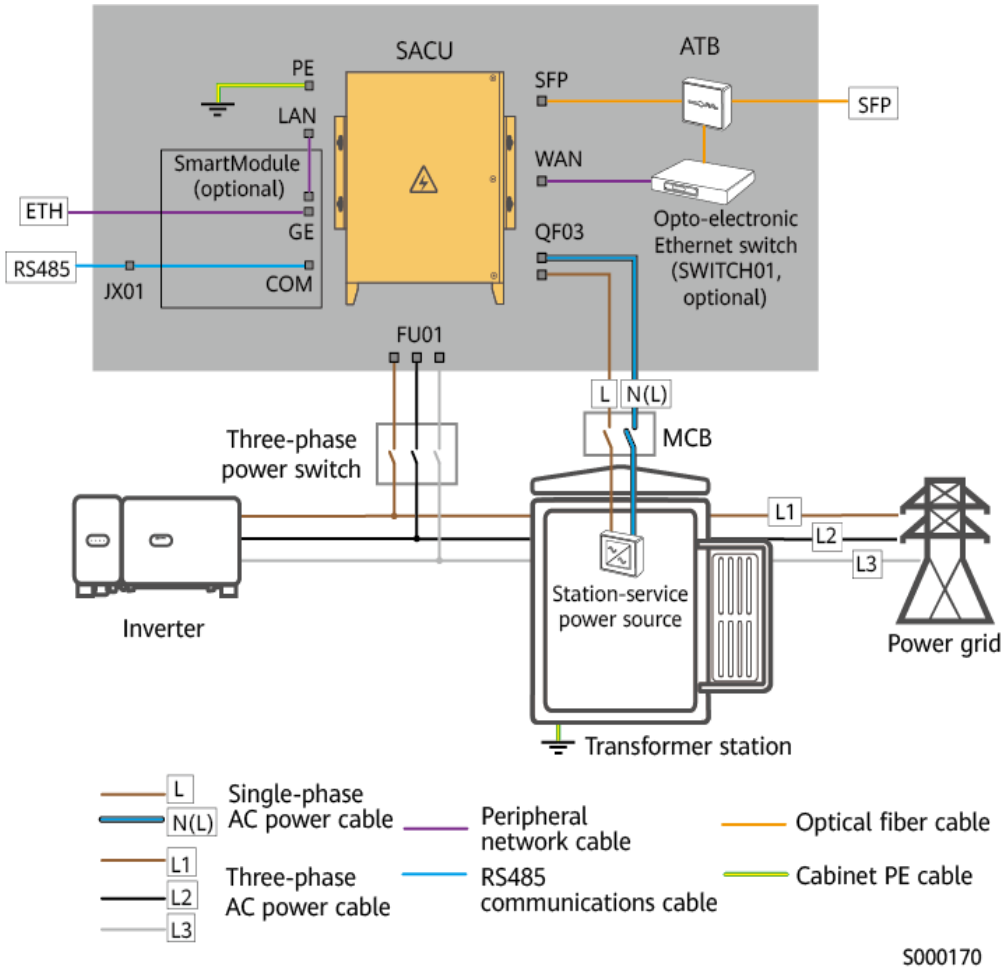


Table 2-6 Components required in the fiber ring network scenario

Position	Component		Recommended Model/ Specifications	Source	Quantity
SACU	SmartModule (optional)		SmartModule1000A01	Purchased from the Company	1
	Opto-electronic Ethernet switch (optional)		-		1
	Fitting bag for fiber ring switching (optional)	Optical module	1000 Mbit/s		To be determined
		Optical fiber jumper	-		To be determined
	Optical fiber cable assembly (optional)		-		To be determined
Transformer station	Miniature circuit breaker (MCB)		Recommended rated current: 32 A; number of poles: 2	Prepared by the customer	1
	Three-phase power switch	Three-phase input switch	• When the rated AC voltage on the low-voltage (LV) side of the transformer station is less than or equal to 500 V, the rated voltage of the three-phase input switch shall be greater than or equal to 600 V. • When the rated AC voltage on the LV side of the transformer station is greater than 500 V and less than or equal to 800 V, the rated voltage of the three-phase input switch shall be greater than or equal to 800 V. • Recommended rated current of the fuse: 32 A; rated current of the three-phase input switch: ≥ 32 A; number of poles: 3 (three fuses for each three-phase input switch)		Scenario with a double-winding transformer: 1

SmartACU2000D-D-09 Networking Application

The SmartACU2000D-D-09 can be used in the PV-only, ESS-only, and PV+ESS low-voltage coupling scenarios. For details about the application scenarios, see the related solution manual.

- Connects to the inverter in the PV-only scenario.
- Connects to the Smart Power Control System (PCS) and Smart String Energy Storage System (ESS) in the ESS-only scenario.
- Connects to the inverter, PCS, and ESS in the PV+ESS LV coupling scenario.

Figure 2-15 Networking diagram

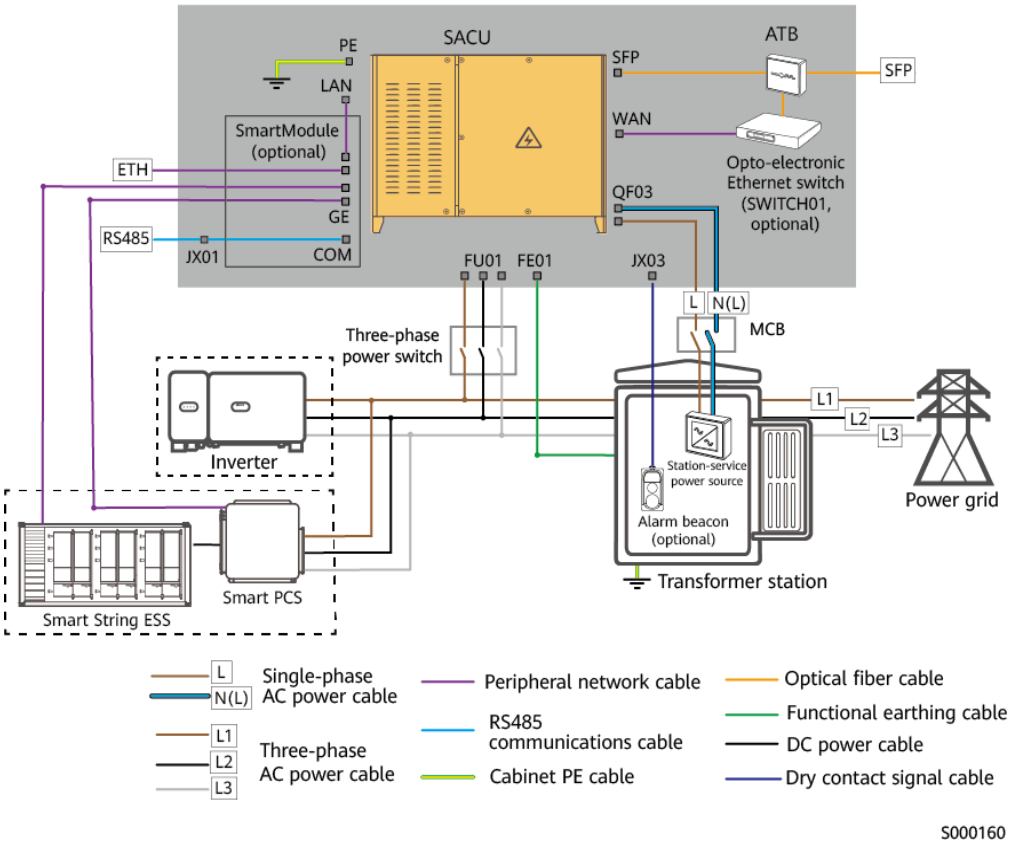


Table 2-7 Components required in the fiber ring network scenario

Position	Component	Recommended Model/ Specifications	Source	Quantity
SACU	SmartModule (optional)	SmartModule1000A01	Purchased from the Company	1
	Opto-electronic Ethernet switch (optional)	-		1

Position	Component		Recommended Model/ Specifications	Source	Quantity
	Fitting bag for fiber ring switching (optional)	Optical module	1000 Mbit/s		To be determined
		Optical fiber jumper	-		To be determined
	Optical fiber cable assembly (optional)		-		To be determined
Transformer station	MCB		Recommended rated current: 32 A; number of poles: 2	Prepared by the customer	1
	Three-phase power switch	Three-phase input switch	• When the rated AC voltage on the LV side of the transformer station is less than or equal to 500 V, the rated voltage of the three-phase input switch shall be greater than or equal to 600 V. • When the rated AC voltage on the LV side of the transformer station is greater than 500 V and less than or equal to 800 V, the rated voltage of the three-phase input switch shall be greater than or equal to 800 V. • Recommended rated current of the fuse: 32 A; rated current of the three-phase input switch: ≥ 32 A; number of poles: 3 (three fuses for each three-phase input switch)		Scenario with a double-winding transformer: 1

SmartACU2000D-D-10 Networking Application

The SmartACU2000D-D-10 can be used in the PV-only scenario. For details about the application scenario, see the related solution manual.

Figure 2-16 Networking diagram

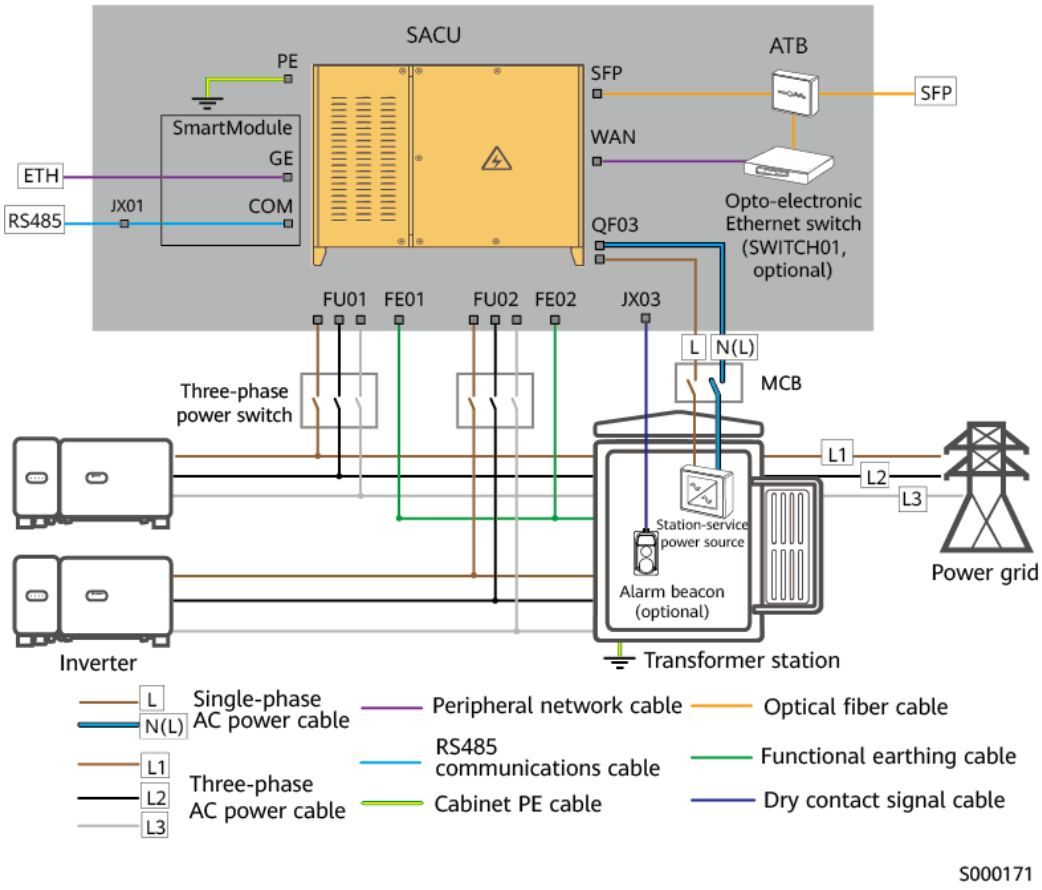


Table 2-8 Components required in the fiber ring network scenario

Position	Component		Recommended Model/ Specifications	Source	Quantity
SACU	SmartModule		SmartModule1000A01	Purchased from the Company	1
	Opto-electronic Ethernet switch (optional)		-		1
	Fitting bag for fiber ring switching (optional)	Optical module	1000 Mbit/s		To be determined
		Optical fiber jumper	-		To be determined
	Optical fiber cable assembly (optional)		-		To be determined
Transformer station	MCB		Recommended rated current: 32 A; number of poles: 2	Prepared by the customer	1

Position	Component		Recommended Model/ Specifications	Source	Quantity
	Three-phase power switch	Three-phase input switch	• When the rated AC voltage on the LV side of the transformer station is less than or equal to 500 V, the rated voltage of the three-phase input switch shall be greater than or equal to 600 V. • When the rated AC voltage on the LV side of the transformer station is greater than 500 V and less than or equal to 800 V, the rated voltage of the three-phase input switch shall be greater than or equal to 800 V. • Recommended rated current of the fuse: 32 A; rated current of the three-phase input switch: ≥ 32 A; number of poles: 3 (three fuses for each three-phase input switch)		Scenario with a double-split transformer: 2

SmartACU2000D-D-11 Networking Application

The SmartACU2000D-D-11 can be used in the PV-only, ESS-only, and PV+ESS low-voltage coupling scenarios. For details about the application scenarios, see the related solution manual.

- Connects to the inverter in the PV-only scenario.
- Connects to the Smart Power Control System (PCS) and Smart String Energy Storage System (ESS) in the ESS-only scenario.
- Connects to the inverter, PCS, and ESS in the PV+ESS LV coupling scenario.

Figure 2-17 Networking diagram

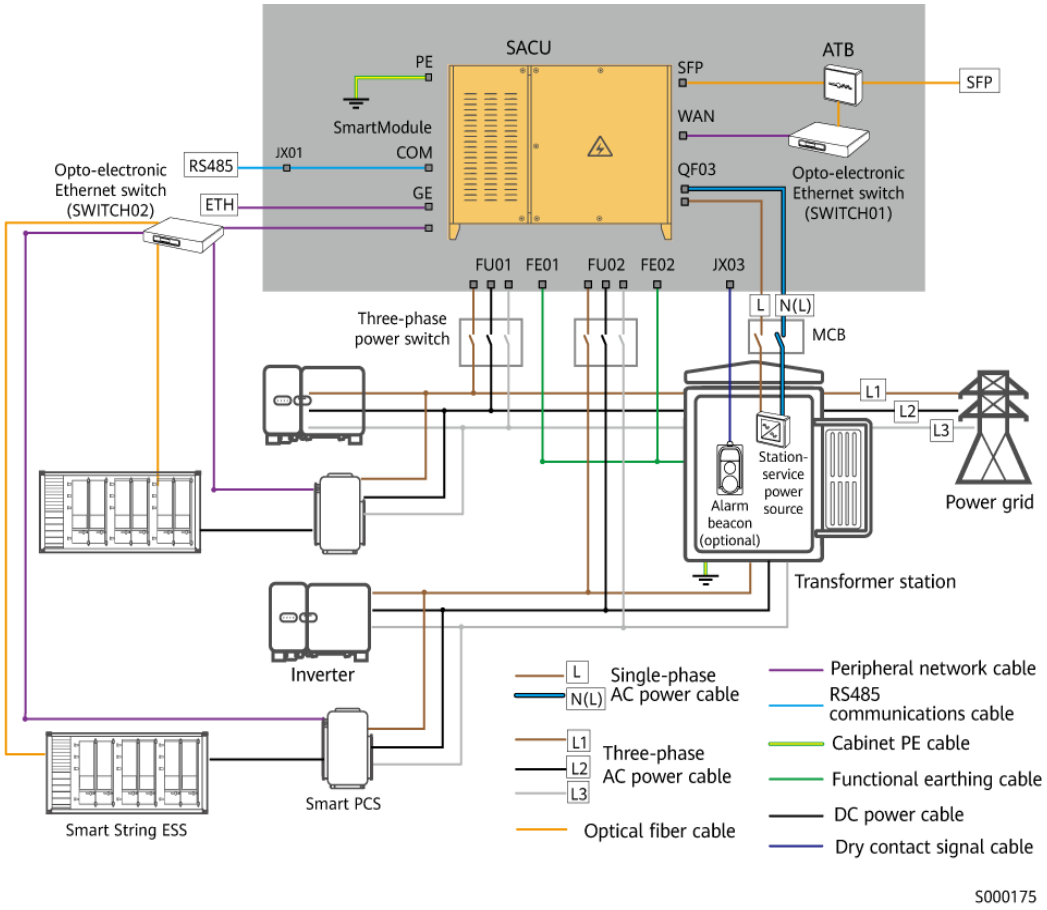


Table 2-9 Components required in the fiber ring network scenario

Position	Component		Recommended Model/ Specifications	Source	Quantity
SACU	SmartModule		SmartModule1000A01	Purchased from the Company	1
	Opto-electronic Ethernet switch		S5731I-L8T2S2XN; S5735I-S8T4SN-V2		2
	Fitting bag for fiber ring switching (optional)	Optical module	1000 Mbit/s		To be determined
		Optical fiber jumper	-		To be determined
	Optical fiber cable assembly (optional)		-		To be determined
Transformer station	MCB		Recommended rated current: 32 A; number of poles: 2	Prepared by the customer	1

Position	Component		Recommended Model/ Specifications	Source	Quantity
	Three-phase power switch	Three-phase input switch	• When the rated AC voltage on the LV side of the transformer station is less than or equal to 500 V, the rated voltage of the three-phase input switch shall be greater than or equal to 600 V. • When the rated AC voltage on the LV side of the transformer station is greater than 500 V and less than or equal to 800 V, the rated voltage of the three-phase input switch shall be greater than or equal to 800 V. • Recommended rated current of the fuse: 32 A; rated current of the three-phase input switch: ≥ 32 A; number of poles: 3 (three fuses for each three-phase input switch)		Scenario with a double-split transformer: 2

3 Storage Requirements

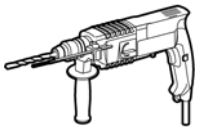
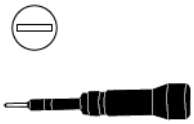
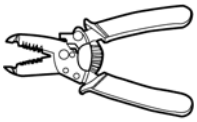
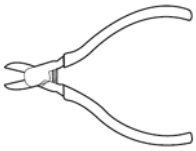
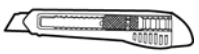
If an SACU will not be used immediately, store it according to the following requirements:

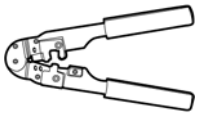
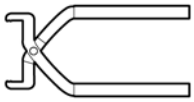
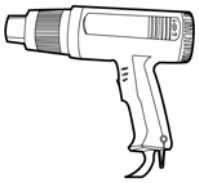
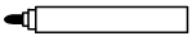
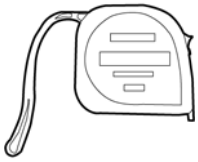
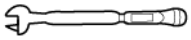
- Do not unpack the SACU. Check its packaging periodically. Replace any packaging that is damaged during storage.
- Store the SACU in a place with appropriate temperature and humidity and protect it from dust and moisture.
- The SACUs can be stacked in a maximum of four layers. To avoid personal injury or equipment damage, stack the SACUs neatly to prevent them from falling over.
- If the SACU has been stored for a long time, it must be checked and tested by professionals before use.

Equipment damage due to improper storage is not covered by the product warranty.

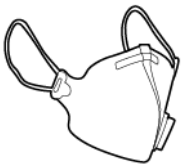
4 Tools

Installation Tools

 Hammer drill	 Drill bit (Φ14 mm and Φ16 mm)	 Flat-head insulated torque screwdriver (M2 and M3)	 Phillips insulated torque screwdriver (M3, M4, M5, and M6)
 Adjustable wrench Open end: 32 mm	 Insulated torque socket wrench	 Wire stripper	 Diagonal pliers
 Rubber mallet	 Crimping tool	 Cable cutter	 Utility knife

 RJ45 crimping tool	 Network cable tester	 Multimeter	 SPD extracting tool
 Heat shrink tubing	 Heat gun	 Vacuum cleaner	 Marker
 Steel measuring tape	 Level	 Cable tie	 Adjustable torque wrench

Personal Protective Equipment (PPE)

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

5 Installation

5.1 Pre-installation Check

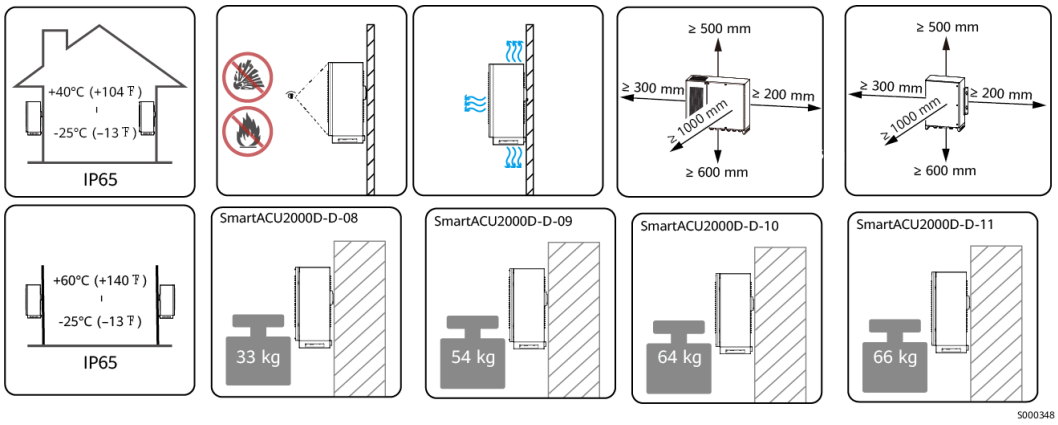
Item	Criteria
Outer packaging	The outer packaging is intact and tidy. If it is damaged or abnormal, do not unpack it, and contact your vendor.
Exterior	The exterior is intact. If any damage is found, do not use the equipment, and contact your vendor as soon as possible.
Deliverables	Check the quantity of deliverables against the *Packing List* in the packing case. If any deliverables are missing or damaged, contact your vendor.

NOTICE

- To prevent the equipment from falling over, secure it to a pallet truck or forklift using ropes before moving it. Move the equipment with caution to avoid bumping or falling, which may damage the equipment.
- After placing the equipment in the installation position, unpack it with care to prevent scratches. Keep the equipment stable during unpacking.

5.2 Installation Requirements

Figure 5-1 Installation requirements

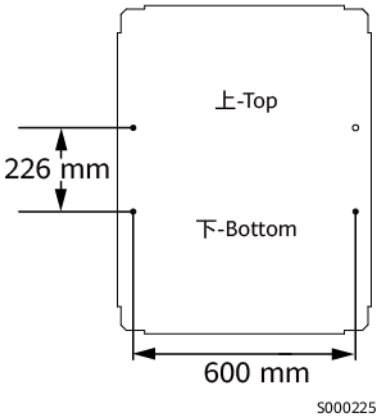


5.3 Installing the Cabinet

5.3.1 Installing the Cabinet (Without SmartPID2000)

When installing a cabinet on a wall or support, determine the positions for drilling holes based on the delivered marking-off template. Level the marking-off template using a level, and mark mounting holes using a marker.

Figure 5-2 Marking-off template



Wall Mounting

To install the cabinet on a wall, prepare expansion bolts by yourself. You are advised to use M12x60 stainless expansion anchor bolts.

Step 1 Determine the mounting holes, drill holes using a hammer drill, and install expansion bolts.

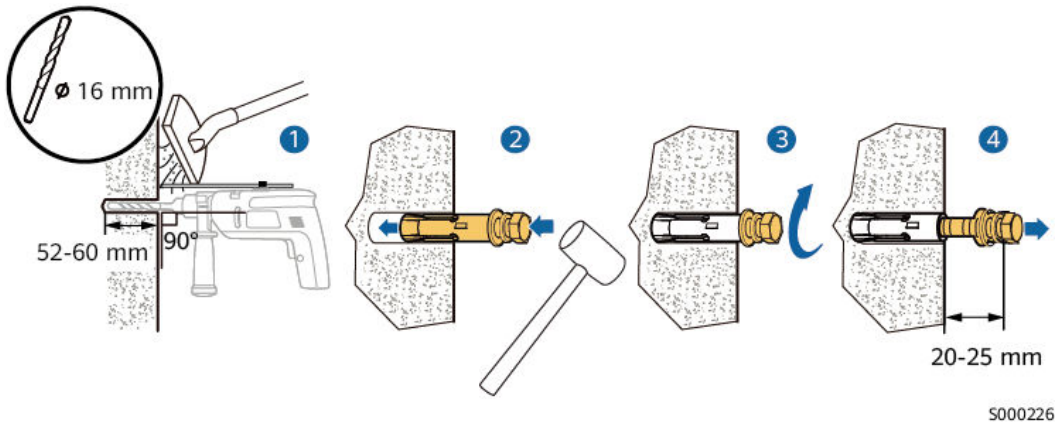
WARNING

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

NOTICE

- To avoid inhaling dust and to prevent dust from falling into your eyes, wear safety goggles and a dust mask 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 in correct positions.
- After removing the bolt, spring washer, and flat washer, level the top of the expansion sleeve with the concrete wall so that the sleeve does not protrude from the wall. Otherwise, the mounting bracket will not be evenly installed on the concrete wall.

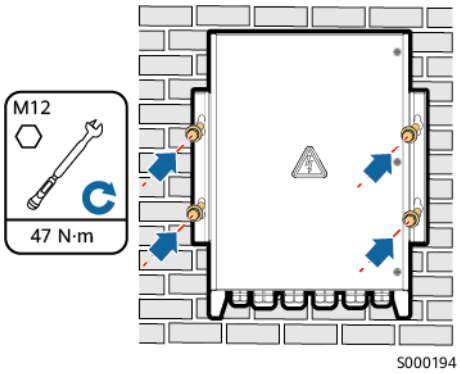
Figure 5-3 Drilling a hole and installing an expansion bolt



Step 2 Lift the cabinet and mount it on the expansion bolts.

Step 3 Tighten the expansion bolts using a torque wrench.

Figure 5-4 Installing a cabinet



----End

Support Mounting

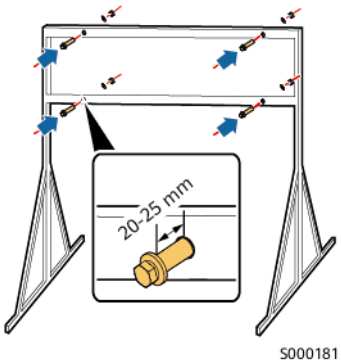
To install the cabinet on a support, prepare the support by yourself based on the dimensions of the SACU.

Step 1 Determine the mounting holes and drill holes using a hammer drill. The support needs to be prepared by yourself.

Figure 5-5 Drilling holes

Step 2 Insert the delivered M12x40 bolt assemblies into the holes, and secure them using the delivered nuts and flat washers. Do not fully tighten the bolts.

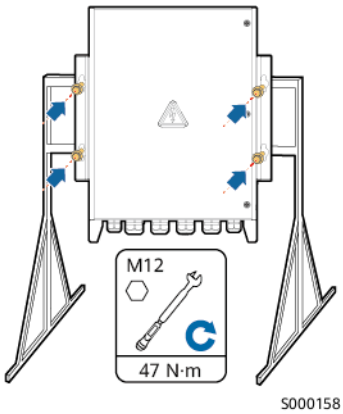
Figure 5-6 Tightening bolts



Step 3 Lift the cabinet and mount it on the bolts.

Step 4 Tighten the bolts using a torque wrench.

Figure 5-7 Installing a cabinet



----End

Pole Mounting

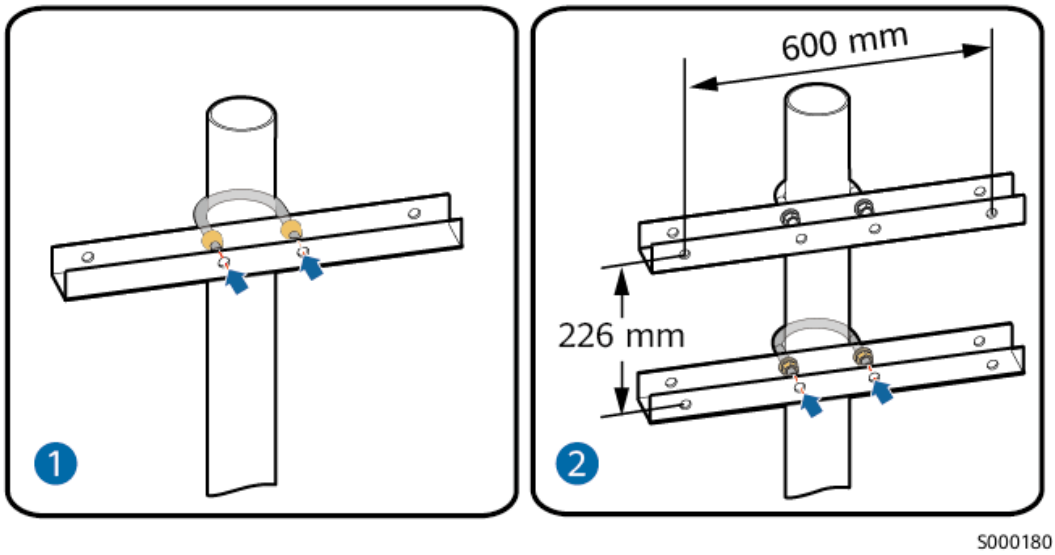
To install the cabinet on a pole, prepare the pole-mounting brackets by yourself based on the dimensions of the SACU. You are advised to use M12 U-shaped bolts to secure the pole-mounting brackets.

NOTE

Figures provided in this section are for reference only. The actual poles and pole-mounting brackets may vary. A pole with a diameter of 125–300 mm is recommended.

Step 1 Secure the pole-mounting brackets to the pole and tighten the bolts using a torque wrench.

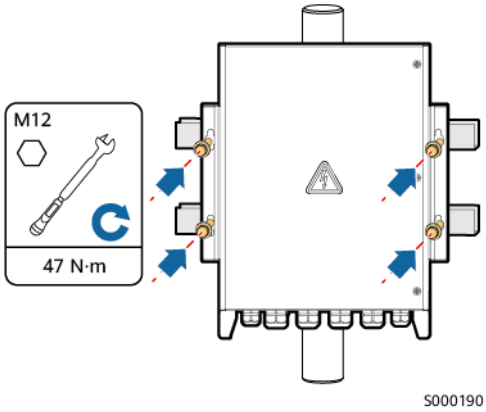
Figure 5-8 Securing pole-mounting brackets



Step 2 Lift the cabinet and mount it on the pole-mounting brackets.

Step 3 Tighten the bolts using a torque wrench.

Figure 5-9 Securing a cabinet



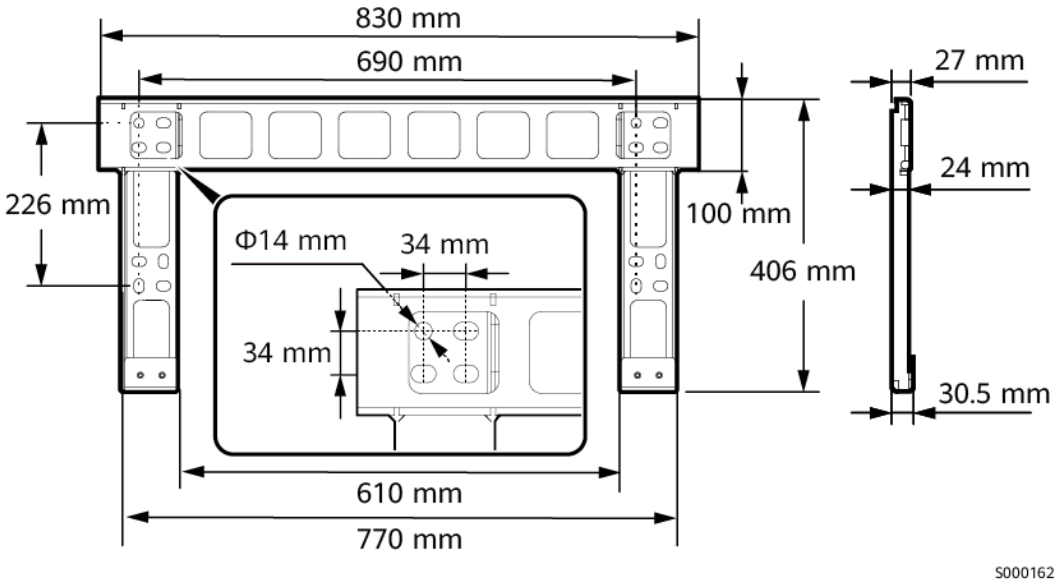
----End

5.3.2 Installing the Cabinet (with SmartPID2000)

5.3.2.1 Installing the Mounting Bracket

The delivered mounting bracket has four groups of tapped holes, each group containing four tapped holes. Mark any hole in each group based on site requirements and mark four holes in total. You are advised to use two round holes to secure the mounting bracket.

Figure 5-10 Mounting bracket dimensions



Wall Mounting

To install the cabinet on a wall, prepare expansion bolts by yourself. You are advised to use M12x60 stainless expansion anchor bolts.

WARNING

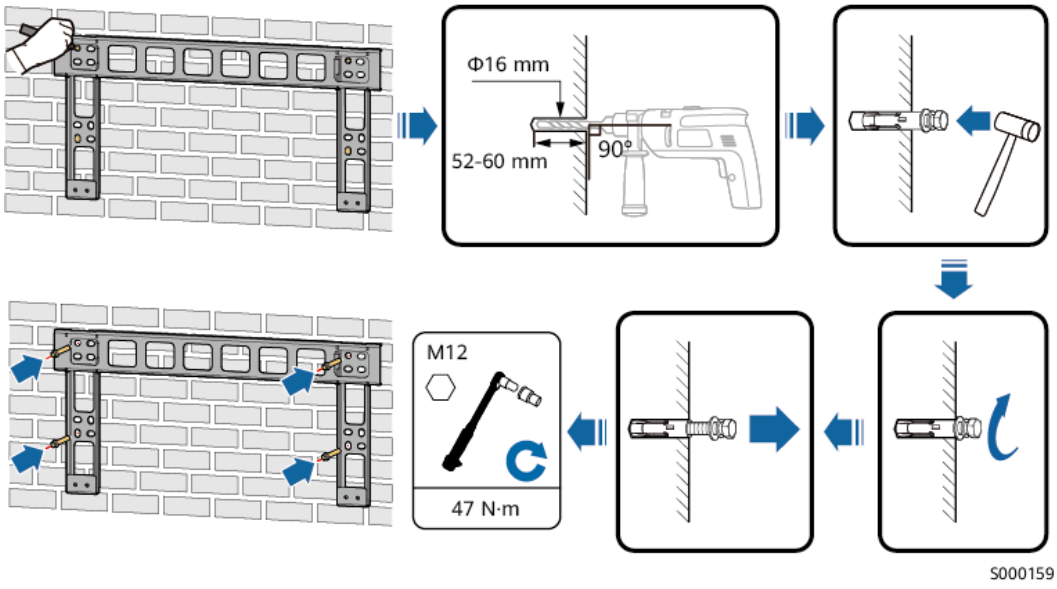
Avoid drilling holes into the water pipes and power cables buried in the wall.

NOTICE

- To avoid inhaling dust and to prevent dust from falling into your eyes, wear safety goggles and a dust mask 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 in correct positions.
- After removing the bolt, spring washer, and flat washer, level the top of the expansion sleeve with the concrete wall so that the sleeve does not protrude from the wall. Otherwise, the mounting bracket will not be evenly installed on the concrete wall.
- When determining the positions for drilling holes, level the hole positions using a level, and mark the positions using a marker.

Install the mounting bracket.

Figure 5-11 Installing the mounting bracket



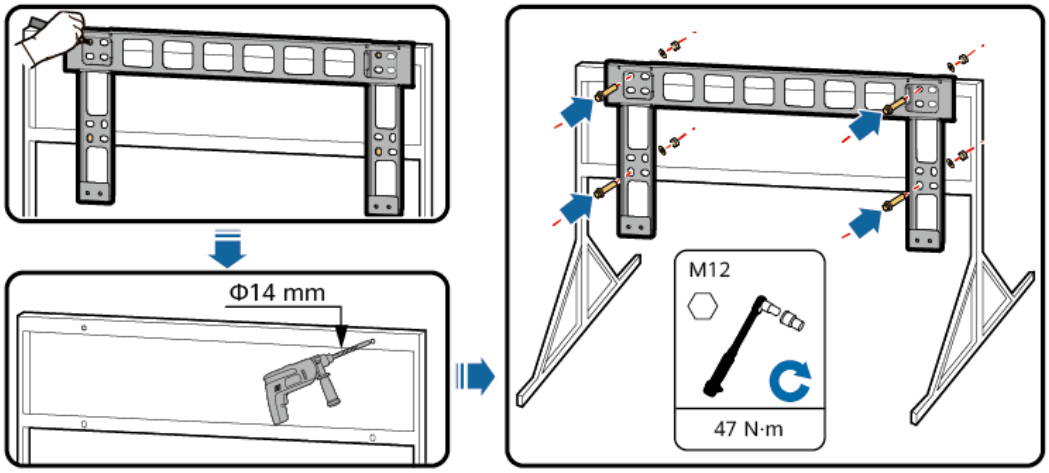
Support Mounting

To install the cabinet on a support, prepare the support by yourself based on the dimensions of the mounting bracket and the SACU.

Step 1 Obtain the M12x40 bolt assemblies from the packing case. (If the length does not meet the installation requirements, prepare M12 bolt assemblies by yourself and use them together with the delivered M12 nuts.)

Step 2 Install the mounting bracket.

Figure 5-12 Installing the mounting bracket



NOTE

When determining the positions for drilling holes, level the hole positions using a level, and mark the positions using a marker.

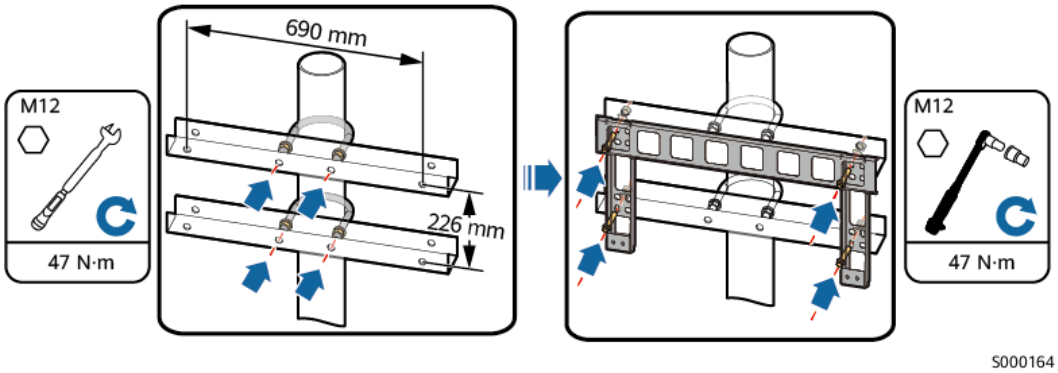
----End

Pole Mounting

To install the cabinet on a pole, prepare the pole-mounting brackets by yourself based on the dimensions of the SACU. You are advised to use M12 U-shaped bolts to secure the pole-mounting brackets.

Install the mounting bracket.

Figure 5-13 Installing the mounting bracket



NOTE

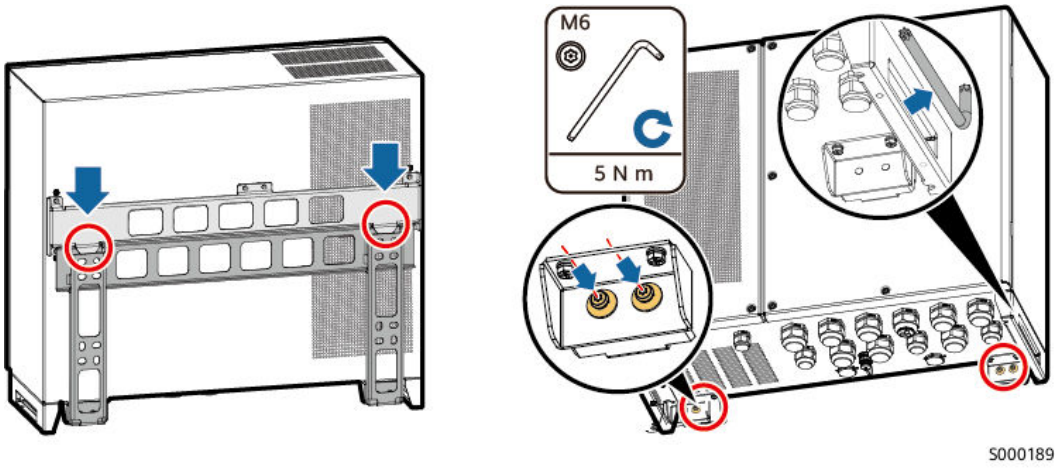
Figures provided in this section are for reference only. The actual poles and pole-mounting brackets may vary. A pole with a diameter of 125–300 mm is recommended.

5.3.2.2 Mounting the Cabinet

Step 1 Lift the cabinet and mount it on the bolts.

Step 2 Secure the cabinet.

Figure 5-14 Mounting the cabinet



----End

5.4 Installing Components

5.4.1 Opening the Cabinet Door

NOTICE

- Before opening the cabinet door, turn off all upstream switches for the SACU to power off the SACU. After that, wait at least three minutes and then operate the SACU. If you need to operate energized equipment, wear insulated gloves and take protective measures.
- If you need to open the cabinet door on rainy or snowy days, take protective measures to prevent rain or snow from entering the cabinet. If protective measures are unavailable, do not open the cabinet door on rainy or snowy days.
- Do not leave unused screws in the cabinet.

Loosen the screws on the cabinet door, open the cabinet door, and adjust the support bar.

Figure 5-15 Opening the cabinet door (without SmartPID2000)

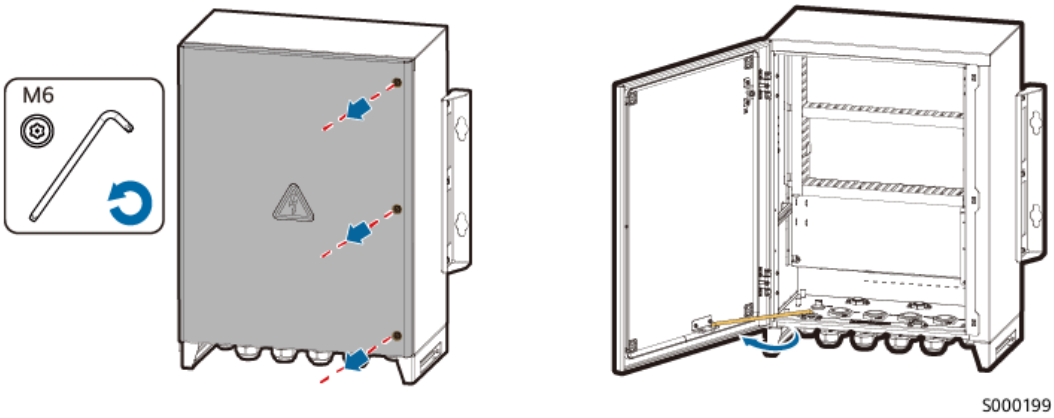
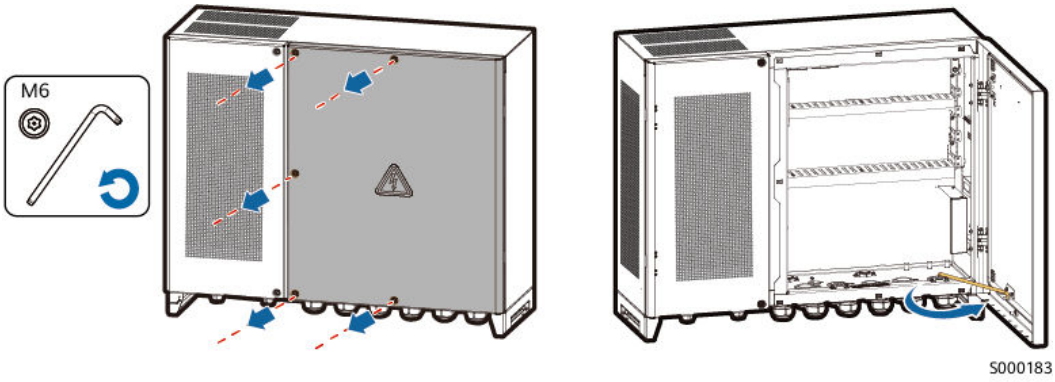


Figure 5-16 Opening the main cabinet door (with SmartPID2000)



5.4.2 Installing the SmartModule

NOTE

If the SmartModule is configured, install it onsite.

Step 1 Remove the mounting brackets from the SmartModule.

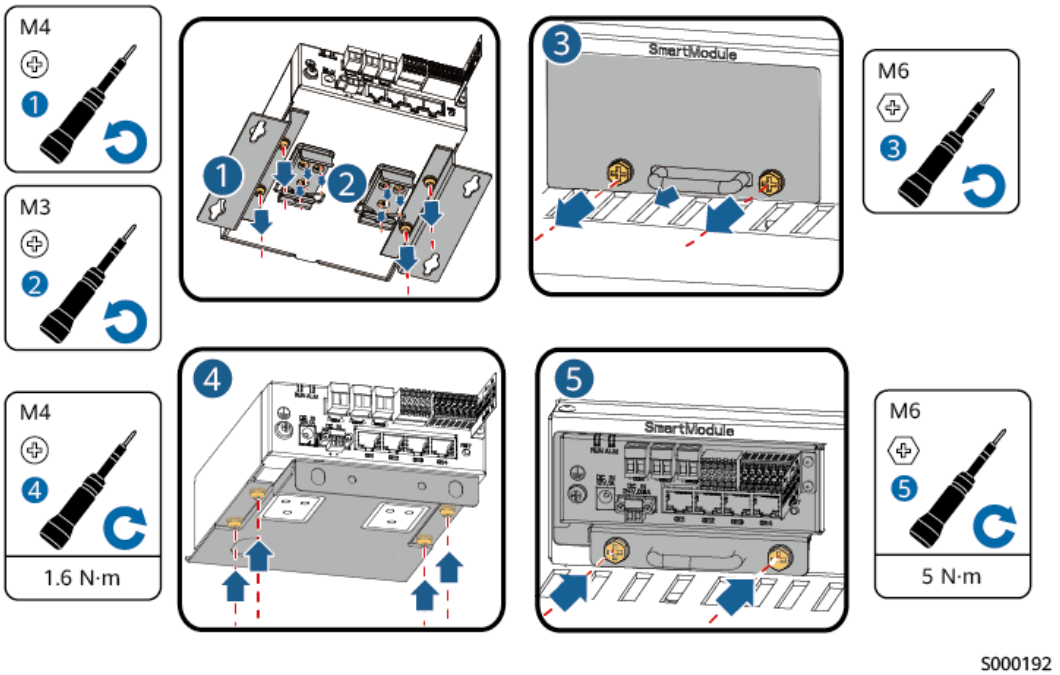
Step 2 Remove the guide rail–mounting brackets from the SmartModule.

Step 3 Remove the panel at the position where the SmartModule is to be installed from the cabinet and take out the mounting kit.

Step 4 Secure the mounting kit to the SmartModule.

Step 5 Install the SmartModule.

Figure 5-17 Installing the SmartModule



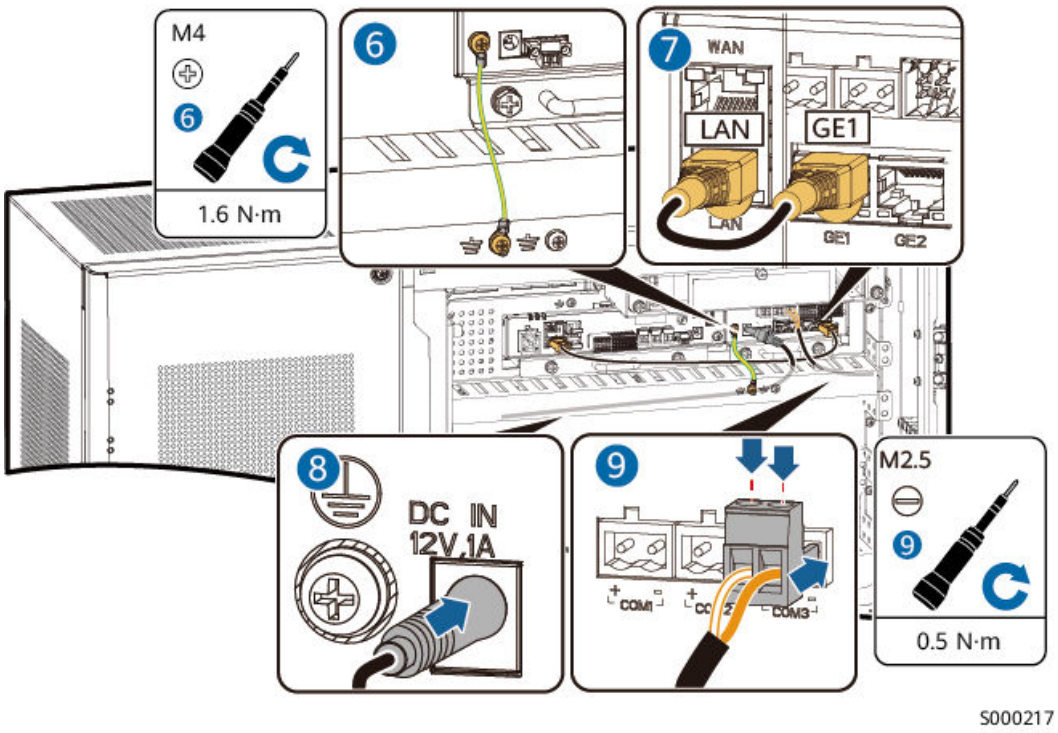
Step 6 Connect the PE cable for the SmartModule based on the label. You can obtain the PE cable from the fitting bag of the SACU.

Step 7 Connect one end of the network cable delivered with the SmartModule to the **LAN** port on the SmartLogger and the other end to the **GE1** port on the SmartModule.

Step 8 Connect the preinstalled power cable to the **12V 1A** port on the SmartModule based on the label.

Step 9 Connect the preinstalled RS485 cable to the COM port on the SmartModule based on the label.

Figure 5-18 Connecting cables



----End

5.4.3 Installing the Opto-Electronic Ethernet Switch

NOTE

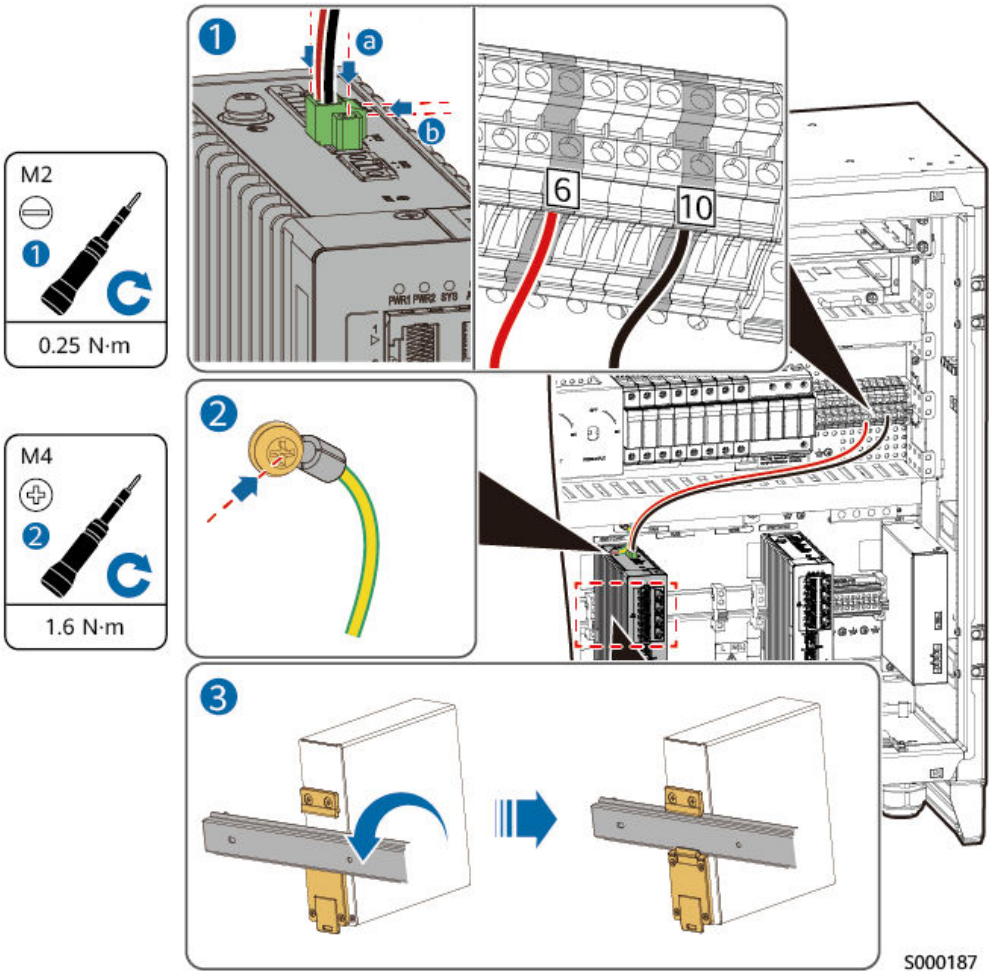
If the Ethernet switch is configured, install it onsite. Before installing the Ethernet switch, connect the power cables and PE cable.

Step 1 Connect the preinstalled power cables to the power port on the Ethernet switch based on the labels.

Step 2 Connect the PE cable for the Ethernet switch based on the label. You can obtain the PE cable from the fitting bag of the SACU.

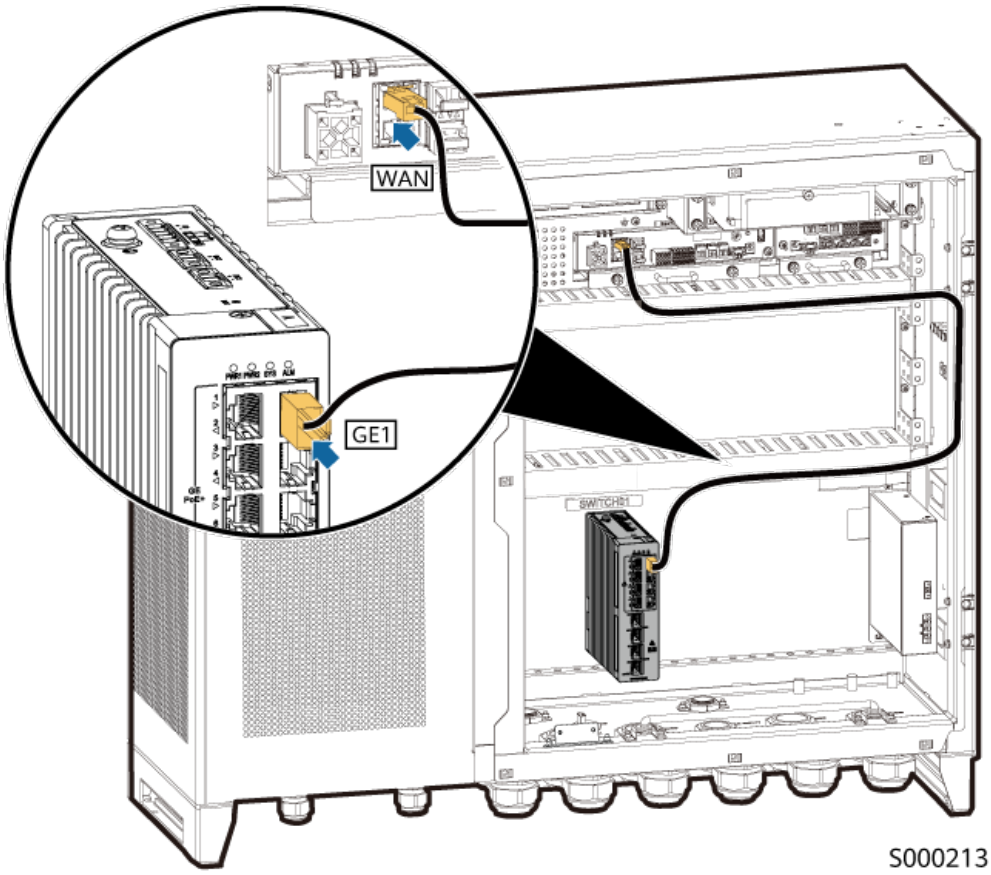
Step 3 Install the Ethernet switch.

Figure 5-19 Installing the Ethernet switch



Step 4 Connect one end of the network cable delivered with the Ethernet switch to the **GE1** port on the Ethernet switch and the other end to the **WAN** port on the SmartLogger.

Figure 5-20 Connecting the Ethernet switch cable



----End

6 Electrical Connections

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.

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.

NOTICE

- Only professional electrical technicians are allowed to perform electrical connection operations.
- Before connecting cables to ports, leave enough slack to reduce the tension on the cables and prevent poor cable connections.
- Connect cables in strict accordance with the operation description and precautions provided in the document and on the product. Do not connect signal cables, single-phase AC power cables, and three-phase AC power cables reversely or mix them up. Otherwise, the resulting equipment damage is not covered under warranty.
- For simplicity purposes, cables described in this section are those to be connected onsite, rather than preinstalled cables. The cable routes are for reference only.
- 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 used only for protective earthing).

Table 6-1 Preparing cables

No.	Cable	Recommended Model/ Specifications	Cross-sectional Area Range (Recommended)	Source
1	Single-phase AC power cable	• Common connection: two-core outdoor armored copper cable • Connection through a pipe: single-core outdoor copper cable • Operating voltage to the ground ≥ 300 V	• 4–6 mm^2 (4 mm^2) • 12–10 AWG (12 AWG)	Prepared by the customer
2	Three-phase AC power cable	• SmartACU2000D-D-08: three-core (L1, L2, and L3) outdoor armored copper cable • SmartACU2000D-D-(09-11): four-core (L1, L2, L3, and FE) outdoor armored copper cable and OT-M4 terminal (FE) • When the rated AC voltage on the LV side of the transformer station is less than or equal to 500 V, the operating voltage between the three-phase AC power cable and the ground shall be greater than or equal to 600 V. • When the rated AC voltage on the LV side of the transformer station is greater than 500 V and less than or equal to 800 V, the operating voltage between the three-phase AC power cable and the ground shall be greater than or equal to 1000 V.	• 4–10 mm^2 (10 mm^2) • 12–8 AWG (8 AWG)	Prepared by the customer

3	Peripheral network cable	CAT 5E outdoor shielded network cable with an outer diameter of less than 9 mm (0.35 in.) and internal resistance of less than or equal to 1.5 ohms/10 m (1.5 ohms/393.70 in.), and shielded RJ45 connector	-	Prepared by the customer
4	Peripheral RS485 communications cable	Computer cable (DJYP2VP2-22 2x2x1) that can be used outdoors or armored shielded twisted pair cable, and OT-M4 terminal	• 1.5–2.5 mm^2 (1.5 mm^2) • 16–14 AWG (16 AWG)	Prepared by the customer
5	Optical fiber cable	Four-core or eight-core single-mode armored optical fiber cable with a transmission wavelength of 1310 nm and an outer diameter less than or equal to 18 mm	-	Prepared by the customer
6	Optical fiber jumper	-	-	Fitting bag for fiber ring switching (optional)
7	PE cable	Outdoor copper cable and OT-M6 terminal	• 6–16 mm^2 (16 mm^2) • 10–6 AWG (6 AWG)	Prepared by the customer
8	Alarm beacon signal cable	Two-core outdoor armored cable	• 0.2–10 mm^2 (1 mm^2) • 24–8 AWG (18 AWG)	Prepared by the customer or delivered with the transformer station

For different SACU models, cables are connected in the same way. This section uses the SmartACU2000D-D-11 as an example.

6.1 Cable Connection Methods

You can connect a peripheral cable to the SACU in common mode or through a pipe based on site requirements.

NOTICE

- To prevent poor cable connection due to overstress caused by ground subsidence, it is recommended that the cable be bent inside the cabinet for a slack of 20–30 mm (0.79–1.18 in.) before connected to the appropriate port.
- If a cable has a jacket, ensure that the jacket is in the cabinet.
- This section uses the ETH waterproof connector as an example to describe how to connect a cable in common mode and through a pipe. The procedure for other waterproof connectors is similar.

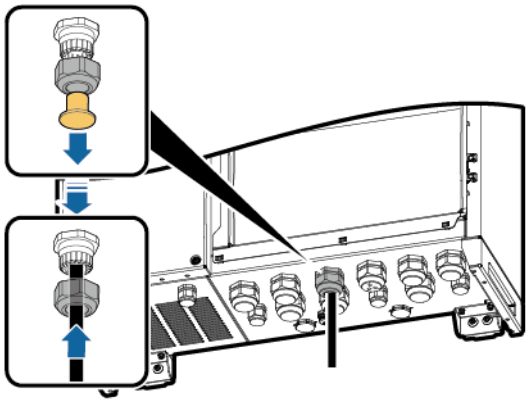
Common Connection

If you choose common connection, ensure that an appropriate cable is available.

Step 1 Remove the locking cap and plug from the waterproof connector.

Step 2 Route the cable through the locking cap and then the waterproof connector.

Figure 6-1 Routing a cable



Step 3 Connect the cable and tighten the locking cap.

Step 4 Check that the cable is connected correctly and securely. Seal the waterproof connector and cable hole using the delivered sealing putty.

Step 5 Clear foreign matter from the cabinet.

----End

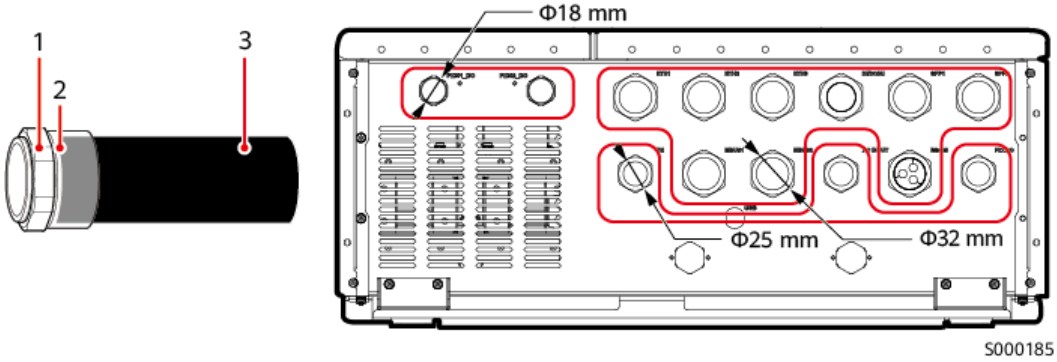
Connection Through a Pipe

If you choose connection through a pipe, ensure that an appropriate cable and a pipe are available.

NOTE

- Prepare an appropriate pipe based on the diameter of the cable holes at the bottom. It is recommended that the pipe specifications comply with the waterproof connector specifications. For example, for a 3/4 in. waterproof connector, a 3/4 in. pipe is recommended.
- The pipe appearance is for reference only. The actual pipe may vary. This is applicable to all other similar figures.

Figure 6-2 Pipe and diameter of cable holes at the bottom

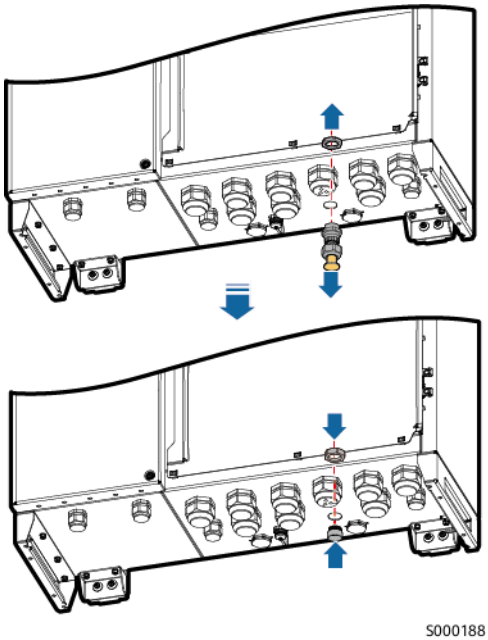


(1) Nut (2) Fitting (3) Conduit

Step 1 Remove the locking cap and plug from the waterproof connector.

Step 2 Secure the pipe fitting using the nut delivered with the pipe.

Figure 6-3 Installing a pipe fitting



Step 3 Route the cable through the pipe conduit and then the fitting, and connect the cable.

Step 4 Secure the pipe fitting to the conduit.

Step 5 Check that the cable is connected correctly and securely. Then take appropriate measures to ensure that the pipe conduit and fitting are secured reliably, and seal the cable hole using delivered sealing putty.

Step 6 Clear foreign matter from the cabinet.

----End

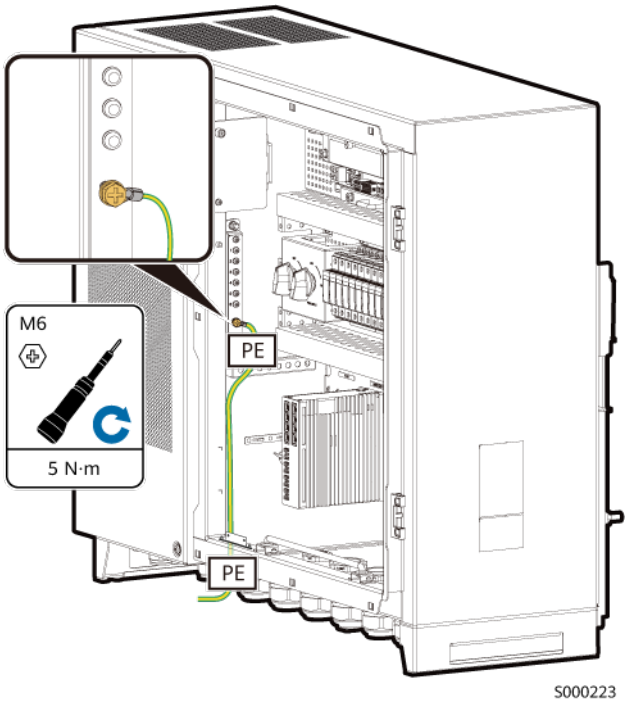
6.2 Connecting the PE Cable

NOTICE

- Connect the PE cable to the nearest ground point or the ground bar in the transformer station.
- To enhance the corrosion resistance of a ground terminal, you are advised to apply silicone grease or paint on it after connecting the PE cable.

Model	Waterproof Connector
SmartACU2000D-D-(08-11)	PE

Figure 6-4 Connecting the PE cable



6.3 Connecting Optical Fiber Communications Cables (SmartLogger/Network Switch)

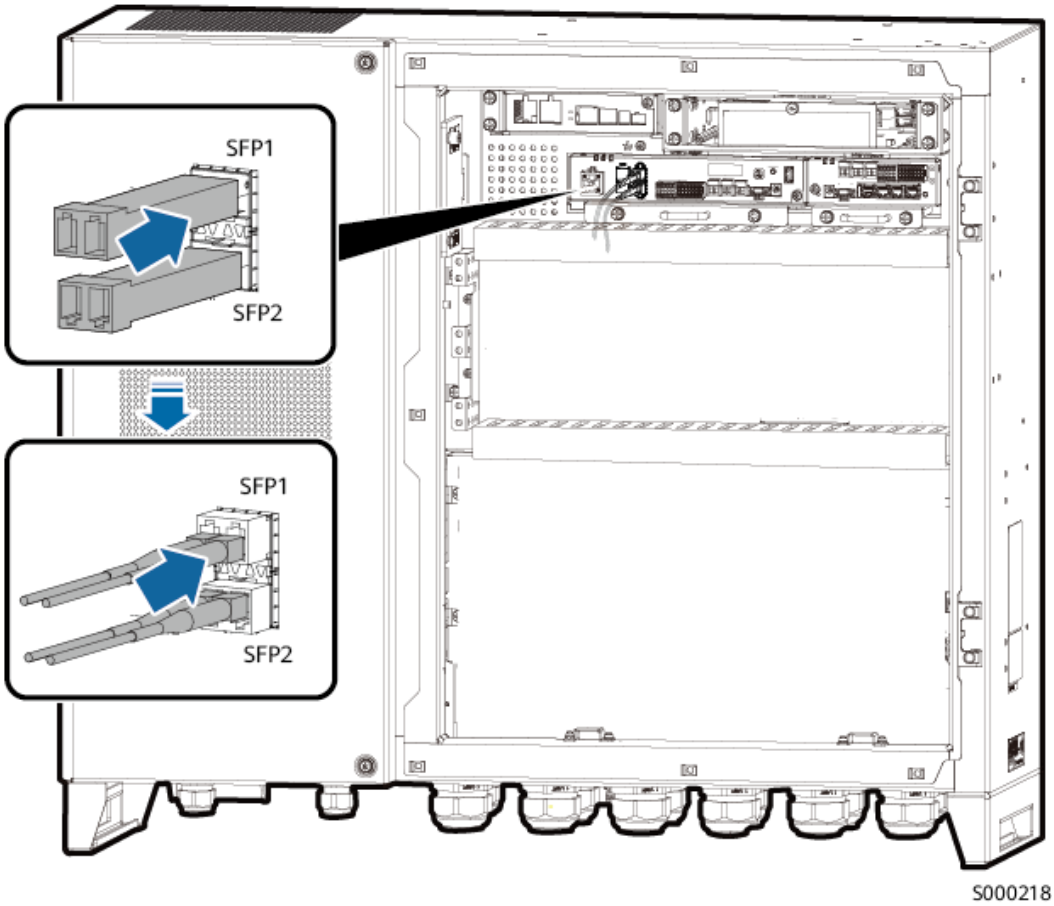
Step 1 Prepare optical modules by yourself or obtain them from the fitting bag for optical ring switching.

Step 2 Insert optical modules into the SFP1 and SFP2 ports of the SmartLogger.

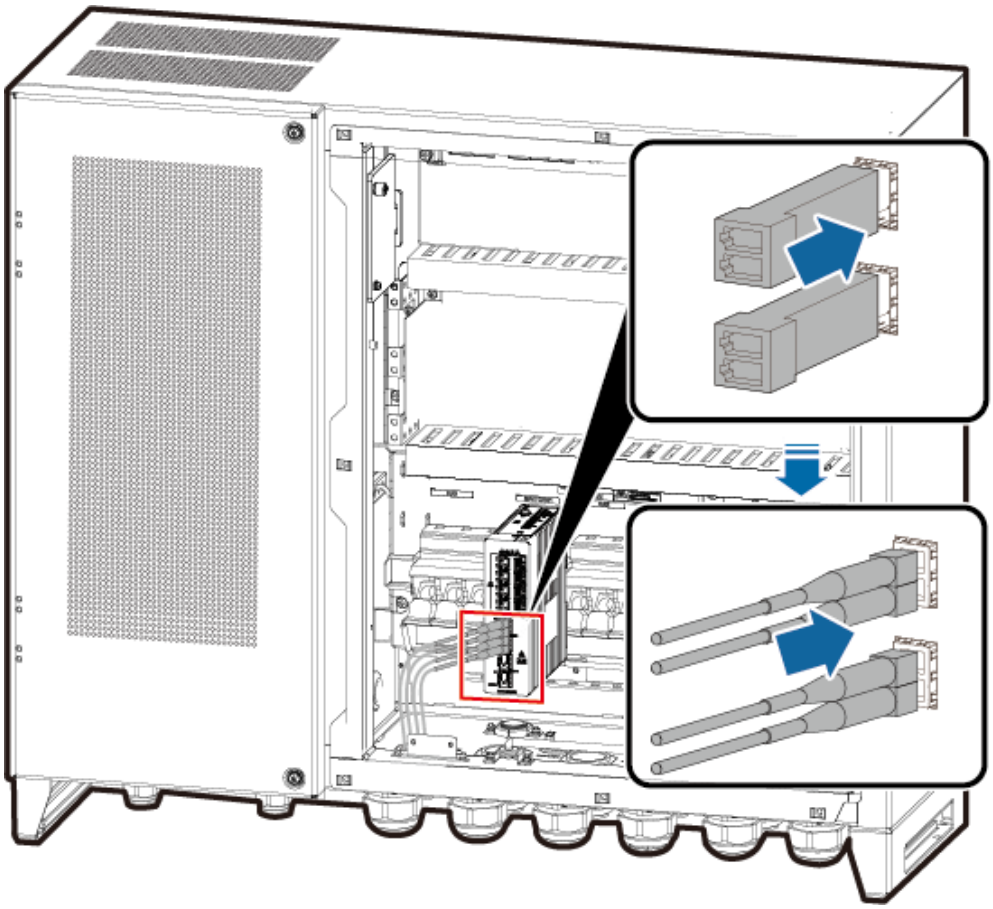
NOTICE

- Pay attention to the directions of the optical modules. The label of the optical module on the SFP1 port faces upward, whereas the label of the optical module on the SFP2 port faces downward.
- If you hear a **click** when inserting the optical module, the optical module snaps into place. Then try to pull it back to check that it is secure.
- The GE/FE optical ports of the S5731I-L8T2S2XN network switch are applicable to only 100 Mbit/s and 1000 Mbit/s optical modules, and the 10G/1G optical ports are applicable to only 1000 Mbit/s and 10 Gbit/s optical modules.
- Optical ports of the S5735I-S8T4SN-V2 network switch are applicable to only 1000 Mbit/s optical modules.

Step 3 Insert the optional optical fiber cable assemblies or the optical fiber jumpers reserved in the cabinet into the ports on the optical modules.



Step 4 Insert the optical fiber cable assemblies or optical fiber jumpers into optical module ports on the opto-electronic Ethernet switch in the same way.



----End

Connecting the Cables to the ATB

Perform this step only when the external optical fiber cable needs to be connected to the optical fiber jumper reserved in the cabinet. Skip this step if the optical fiber cable assemblies are configured.

DANGER

When installing or maintaining optical fiber cables, do not approach or look into an optical port without eye protection.

NOTICE

- Because the hardness of the optical fiber cables is high, you need to route the optical fiber cables into the cabinet after the optical fiber cables are prepared.
- Only qualified technicians are allowed to splice optical fibers. Ensure that the optical fibers are spliced according to the onsite requirements and local regulations.

Step 1 Open the front cover of the ATB and pull out the fiber splice tray.

Figure 6-5 Opening the front cover of the ATB

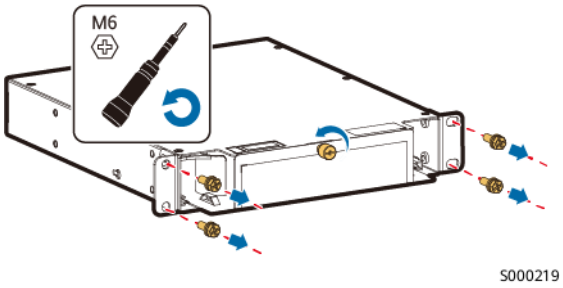
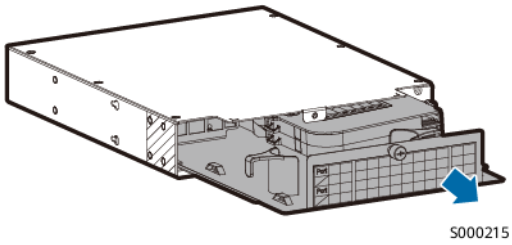
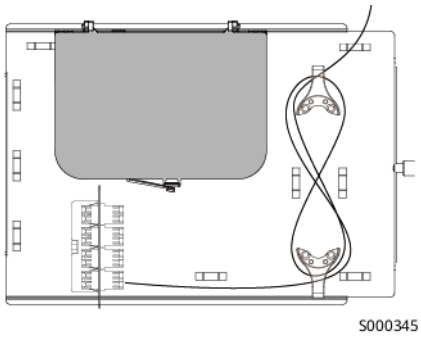


Figure 6-6 Pulling out the fiber splice tray



Step 2 Connect the optical fiber jumper.

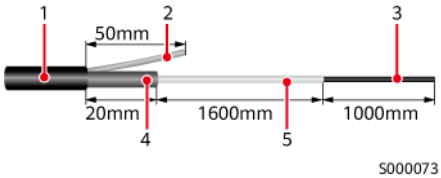
- Connect the optical fiber jumper reserved in the cabinet to the optical fiber adapter.



- Fiber splicing is required only when the external optical fiber cable needs to be connected to the optical fiber jumper reserved in the cabinet.

  a. Strip the optical fiber cable.

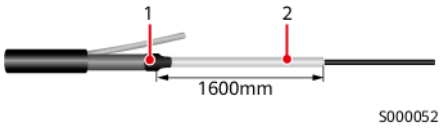
Figure 6-7 Stripping the optical fiber cable



(1) Optical fiber cable	(2) Strength member	(3) Bare fiber
(4) Metal armor layer	(5) Loose tube	-

b. Cover the stripped optical fiber cable (loose tube) with a protection tube (1600 mm), and secure the protection tube and metal armor layer using insulation tape.

Figure 6-8 Installing the protection tube

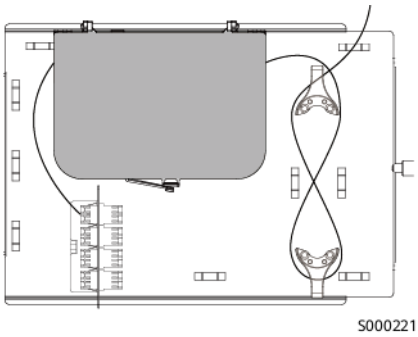


(1) Insulation tape (2) Protection tube

NOTE

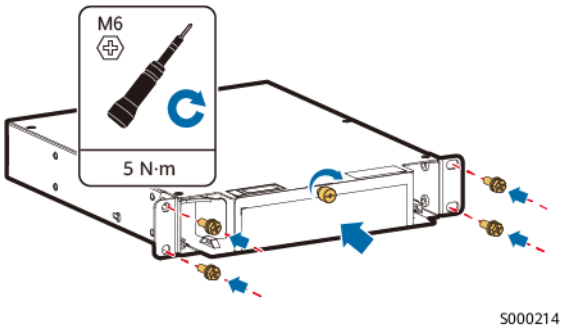
The protection tube is delivered with the ATB or network switch.

c. Route the prepared optical fiber cable through the cable hole and then through the cable hole on the side of the ATB. Splice the optical fiber cable with the optical fiber jumper. Connect the other end of the optical fiber jumper to the optical fiber adapter, and wrap the cable around the fiber spool of the ATB.



Step 3 Retract the fiber splice tray and tighten the screws on the front cover of the ATB.

Figure 6-9 Closing the ATB cover

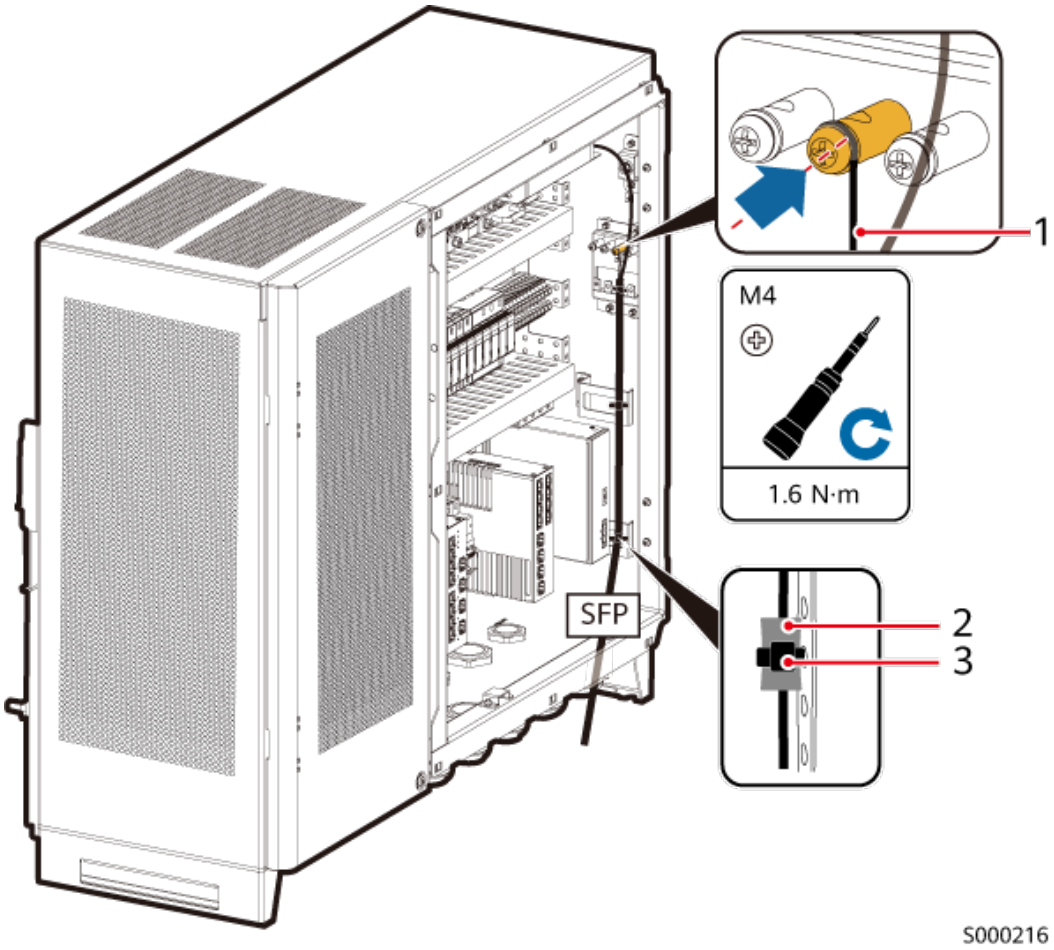


Step 4 Bind and secure the optical fiber cable.

Model	Waterproof Connector
SmartACU2000D-D-08	SFP

SmartACU2000D-D-(09-11)	SFP1, SFP2

Figure 6-10 Securing the optical fiber cable



(1) Strength member
(2) Hook-and-loop fastener
(3) Cable tie
-

NOTICE

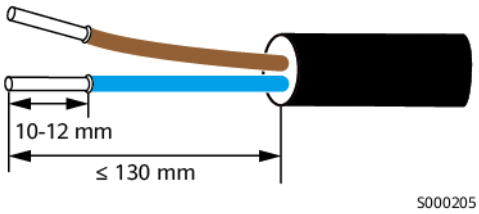
Use the hook-and-loop fastener delivered with the ATB to bind the stripped optical fiber cable, and then use the cable tie to secure the hook-and-loop fastener. Do not pull or bind it too tightly.

----End

6.4 Connecting the Single-Phase AC Power Cable

Step 1 Prepare the cable.

Figure 6-11 Stripping length



Step 2 Connect the cable to the single-phase input switch.

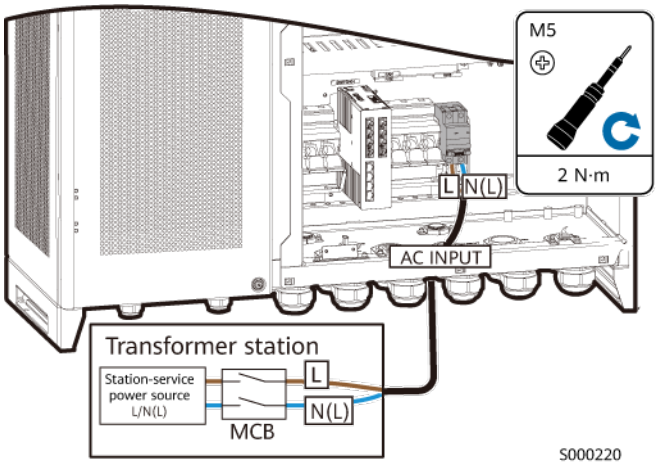
NOTICE

Connect the L and N (L) wires to the L and N (L) terminals of the station-service power source for the transformer station through an MCB.

Step 3 Bind the cable.

Model	Waterproof Connector
SmartACU2000D-D-(08-11)	AC INPUT

Figure 6-12 Connecting the cable



----End

6.5 Connecting Three-Phase AC Power Cables

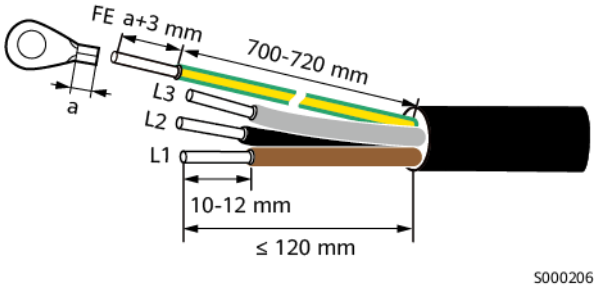
The three-phase AC power cable connections vary according to the quantity of the SmartPID2000s in the SACU. Connect the three-phase AC power cable of the first route to the **FU01** switch, and the corresponding FE cable to the **FE01** port on the FE bar. Connect the three-phase AC power cable of the second route to the **FU02** switch, and the corresponding FE cable to the **FE02** port on the FE bar.

Model	Switch Connected to the Three-Phase AC Power Cable	FE Bar Connected to the FE Wire
SmartACU2000D-D-08	FU01	-
SmartACU2000D-D-09	FU01	FE01
SmartACU2000D-D-(10-11)	FU01, FU02	FE01, FE02

This section describes how to connect three-phase AC power cables for the SACU with two SmartPID2000s. For the SACU with one SmartPID2000, refer to the way of connecting the first route of three-phase AC power cable.

Step 1 Prepare cables.

Figure 6-13 Stripping length



Step 2 **Crimp an OT terminal**.

Step 3 Connect the L1, L2, and L3 wires to the three-phase input switch, and the FE wire to the FE bar (the SmartACU2000D-D-08 does not have an FE wire).

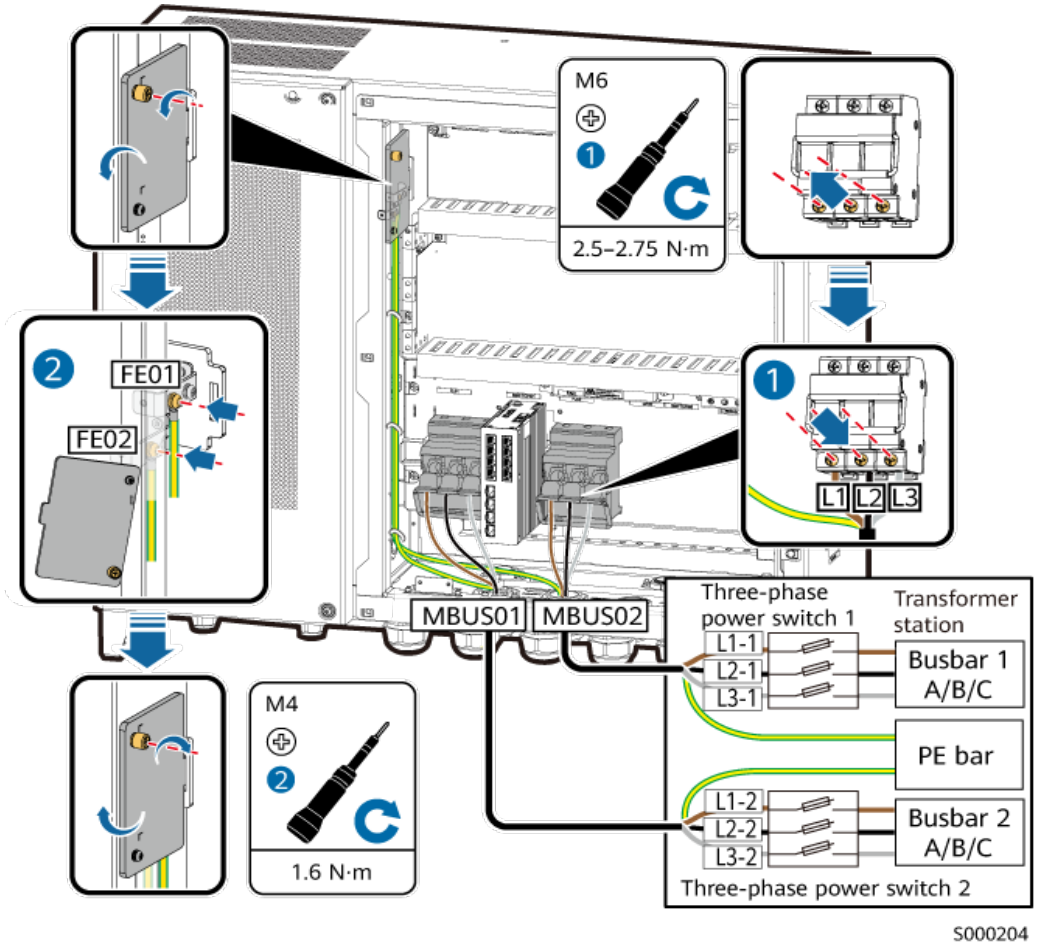
NOTICE

- Connect the L1-1, L2-1, and L3-1 wires from the **FU01** switch respectively to ports A, B, and C on the transformer station busbar 1 over a three-phase power switch.
- Connect the L1-2, L2-2, and L3-2 wires from the **FU02** switch respectively to ports A, B, and C on the transformer station busbar 2 over a three-phase power switch.
- Connect the FE wire for the SmartPID2000 to the ground bar in the transformer station.
- Ensure that the L1, L2, and L3 wires are connected in correct phase sequence.
- Do not mix up the wire to the **FE01** port with the wire to the **FE02** port.

Step 4 Bind the cables.

Model	Waterproof Connector
SmartACU2000D-D-08	MBUS
SmartACU2000D-D-(09-11)	MBUS01, MBUS02

Figure 6-14 Binding cables



----End

NOTICE

The total rated power of the PV system connected to the MBUS port must be greater than 75 kW. The distance between the device and the residential area must be greater than 30 m. Overhead cabling is prohibited.

6.6 Connecting RS485 Communications Cables

Connect peripheral RS485 communications cables to the JX01 terminal block. All RS485 communications cables are connected in the same way. This section describes how to connect two RS485 communications cables.

Table 6-2 Port definition of the JX01 terminal block

No.	Port on the JX01 Terminal Block	Definition
1	RS485-1 (+)	RS485A, RS485 differential signal+
2	RS485-1 (–)	RS485B, RS485 differential signal–
3	RS485-2 (+)	RS485A, RS485 differential signal+
4	RS485-2 (–)	RS485B, RS485 differential signal–
5	RS485-3 (+)	RS485A, RS485 differential signal+
6	RS485-3 (–)	RS485B, RS485 differential signal–
7	RS485-4 (+)	RS485A, RS485 differential signal+
8	RS485-4 (–)	RS485B, RS485 differential signal–
9	RS485-5 (+)	RS485A, RS485 differential signal+
10	RS485-5 (–)	RS485B, RS485 differential signal–
11	RS485-6 (+)	RS485A, RS485 differential signal+
12	RS485-6 (–)	RS485B, RS485 differential signal–

Table 6-3 Ports on the JX01 terminal block that can connect to peripheral RS485 communications cables

Model	Port on the JX01 Terminal Block	Remarks
SmartACU2000D-D-08	RS485-1 (+) RS485-1 (–) RS485-2 (+) RS485-2 (–) RS485-3 (+) RS485-3 (–)	JX01 ports 1–6

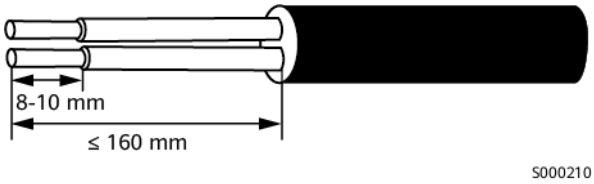
Model	Port on the JX01 Terminal Block	Remarks
SmartACU2000D-D-09	RS485-2 (+) RS485-2 (–) RS485-3 (+) RS485-3 (–)	JX01 ports 3–6
SmartACU2000D-D-10 SmartACU2000D-D-11	RS485-3 (+) RS485-3 (–) RS485-4 (+) RS485-4 (–) RS485-5 (+) RS485-5 (–) RS485-6 (+) RS485-6 (–)	JX01 ports 5–12

NOTICE

Connect the RS485 communications cables to JX01 ports 7–12 only after installing the SmartModule for the SmartACU2000D-D-(08-09).

Step 1 Prepare communications cables.

Figure 6-15 Stripping length



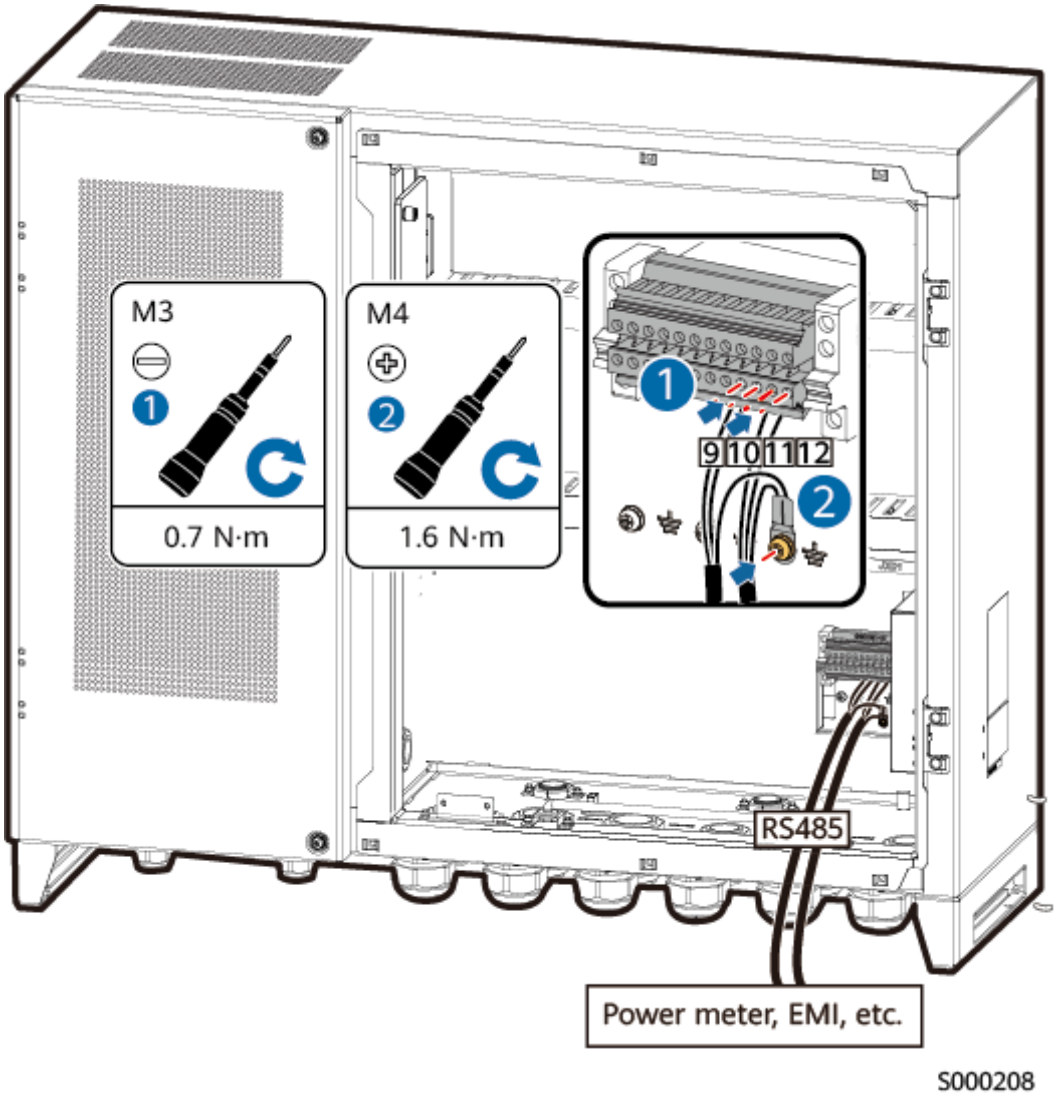
Step 2 Connect the communications cables to the JX01 terminal block.

Step 3 Crimp the OT terminal for the shield layers, and connect the shield layers to the cabinet ground point.

Step 4 Bind the communications cables. The following uses JX01 ports 9, 10, 11, and 12 as an example.

Model	Waterproof Connector
SmartACU2000D-D-(08-11)	RS485

Figure 6-16 Connecting RS485 communications cables



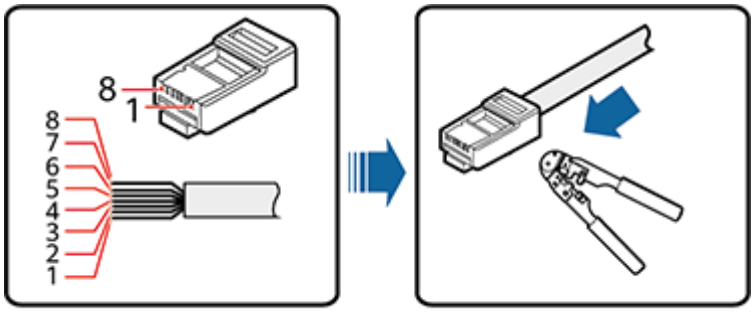
----End

6.7 Connecting Peripheral Network Cables

Connect peripheral network cables to ports **GE2** to **GE8** on the Ethernet switch. All network cables can be connected in the same way. This section uses one network cable as an example.

Step 1 Prepare the network cable.

Figure 6-17 RJ45 connector wiring



(1) White-and-orange (2) Orange (3) White-and-green (4) Blue

(5) White-and-blue (6) Green (7) White-and-brown (8) Brown

NOTE

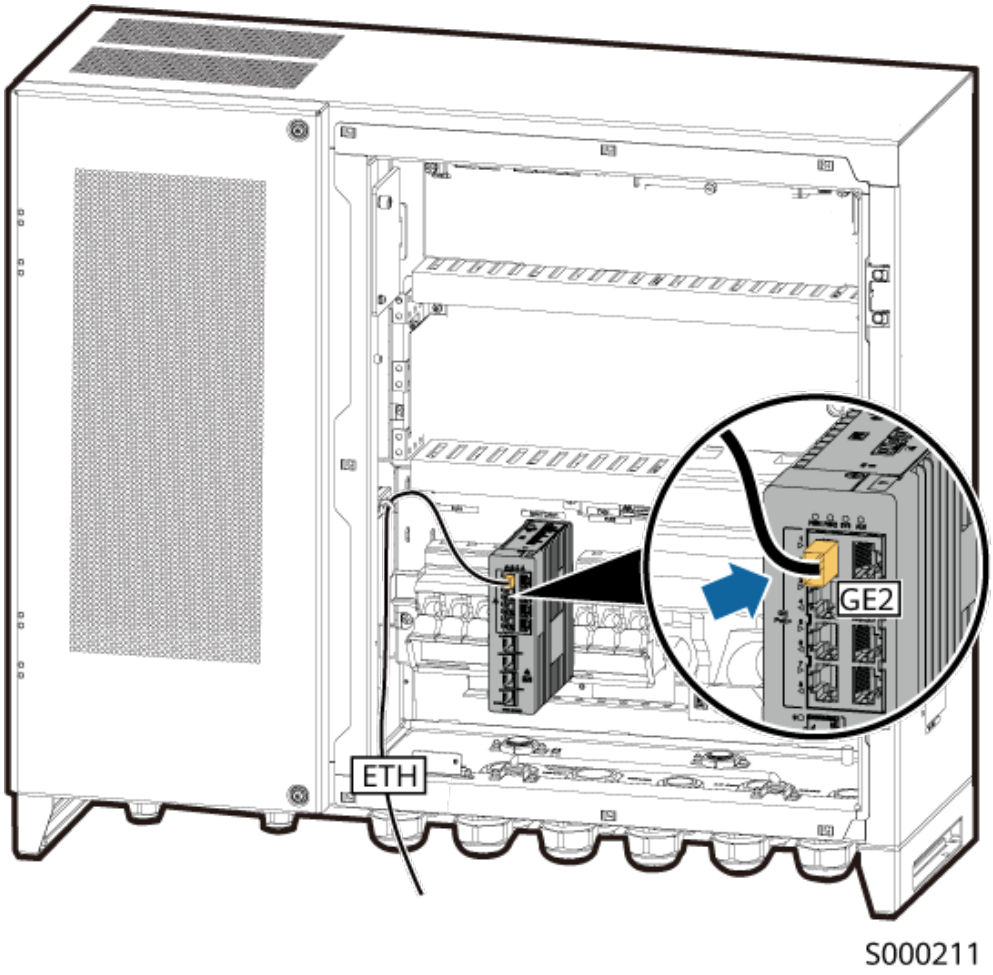
Verify that the network cable functions properly using a network cable tester.

Step 2 Connect the peripheral network cable to the **GE2** port on the Ethernet switch.

Step 3 Bind the network cable.

Model	Waterproof Connector
SmartACU2000D-D-(08-11)	ETH

Figure 6-18 Connecting the network cable



----End

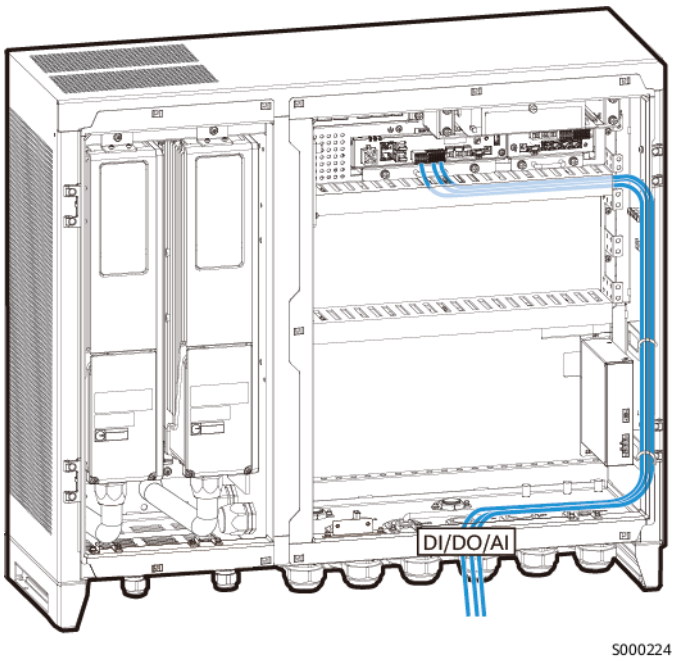
6.8 Connecting DO/DI/AI Cables

The SACU reserves DI/DO/AI waterproof connectors for routing signal cables.

For details about how to prepare and connect the cables, see **SmartLogger3000 User Manual**.

Model	Waterproof Connector
SmartACU2000D-D-(08-11)	DO/DI/AI

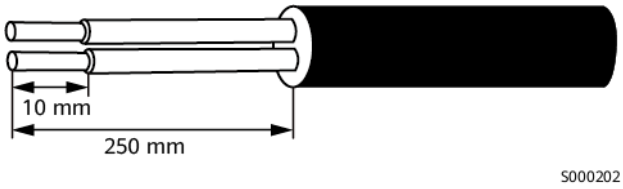
Figure 6-19 Cable routes



6.9 Connecting the Cable for the SmartPID2000 Alarm Beacon

Step 1 Prepare the cable.

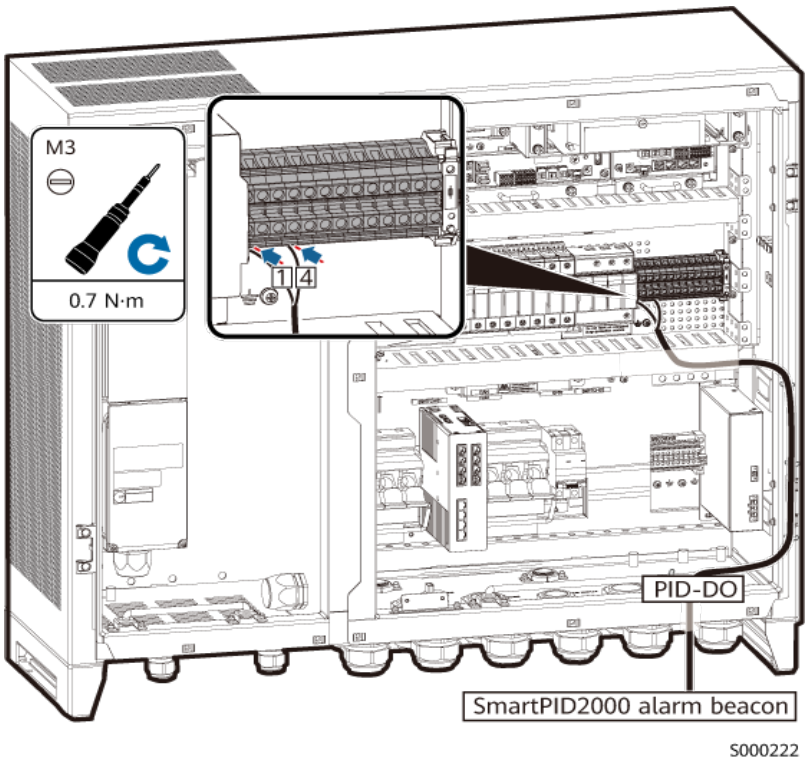
Figure 6-20 Stripping length



Step 2 Connect the cable to the JX03 terminal block.

Model	Waterproof Connector
SmartACU2000D-D-(08-11)	PID_DO

Figure 6-21 Connecting the cable



----End

7 Power-On

7.1 Check Before Power-On

No.	Acceptance Criteria
1	The cabinet and all components are installed properly.
2	All upstream switches for the cabinet and all switches inside the cabinet are off.
3	All cables are connected correctly and securely, without exposed metal.
4	Cables are bound neatly, and cable ties are spaced evenly, secured properly, and face the same direction.
5	Power cables and signal cables are routed according to the requirements for routing electrical and ELV cables and in compliance with the cable routing plan.
6	The locking caps of the used waterproof connectors are tightened and sealed. Unused waterproof connectors are plugged and the locking caps are tightened.
7	The cabinet interior is clean, without dust, dirt, or foreign matter.
8	The paint on the cabinet exterior is intact. Immediately repaint the part where paint flakes off to prevent corrosion. The paint color code of the cabinet is RAL 9003.

7.2 System Power-On

DANGER

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

NOTE

An S5735I-S8T4SN-V2 network switch will communicate properly after power-on, which takes about 5 minutes for it to start up.

Prerequisites

- The check before power-on has been completed.
- Ensure that the power voltage of the SACU is within the operating voltage range, and the three-phase input voltage is within the operating voltage range of the SmartMBUS and SmartPID2000.

Procedure

Step 1 Turn on the single-phase power switch that controls the power supply from the remote transformer station to the SACU.

Step 2 Turn on the three-phase power switch that controls the power supply from the remote transformer station to the SACU.

- If the SACU has one SmartPID2000, turn on the corresponding three-phase power switch.
- If the SACU has two SmartPID2000s, turn on the corresponding three-phase power switches.

Step 3 Check that the input voltages of all switches of the SACU are within the operating voltage ranges using a multimeter.

Step 4 Turn on the single-phase input switch **QF03** of the SACU.

Step 5 Turn on the three-phase input switch of the SACU.

- SmartACU2000D-D-(08-09): Turn on the three-phase input switch **FU01**.
- SmartACU2000D-D-(10-11): Turn on the three-phase input switches **FU01** and **FU02**.

Step 6 Turn on the SmartPID2000 switch of the SACU.

- SmartACU2000D-D-09: Turn on the SmartPID2000 switch **QF01**.
- SmartACU2000D-D-(10-11): Turn on the SmartPID2000 switches **QF01** and **QF02**.

----End

7.3 Closing a Cabinet Door

Retract the support bar, close the cabinet door, and tighten the screws.

Figure 7-1 Closing the cabinet door (Without SmartPID2000)

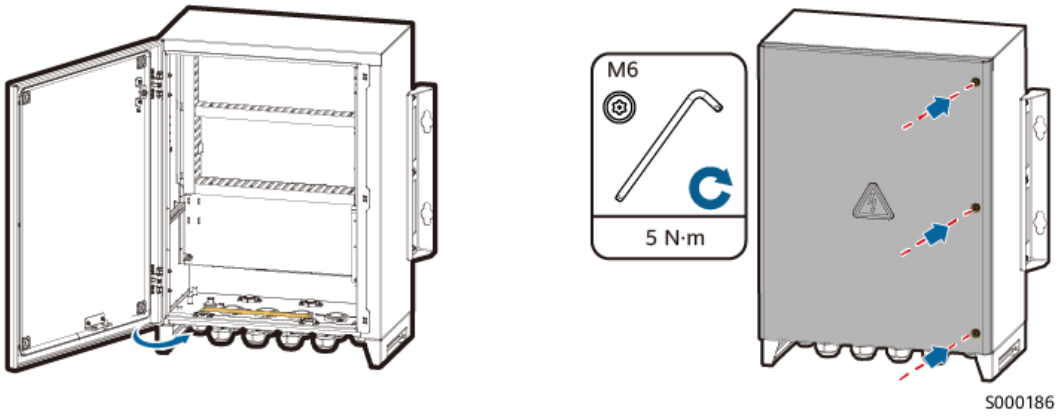
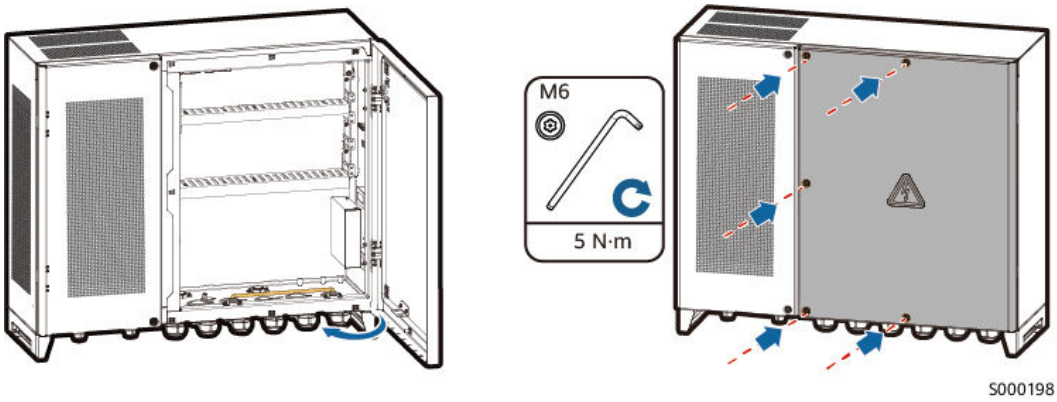


Figure 7-2 Closing the main cabinet door (With SmartPID2000)



8 System Power-Off

Step 1 Turn off the single-phase power switch that controls the power supply from the remote transformer station to the SACU.

Step 2 Turn off the three-phase power switch that controls the power supply from the remote transformer station to the SACU.

Step 3 Turn off the single-phase input switch **QF03** of the SACU.

Step 4 Turn off the SmartPID2000 switch of the SACU.

- SmartACU2000D-D-09: Turn off the SmartPID2000 switch **QF01**.
- SmartACU2000D-D-(10-11): Turn off the SmartPID2000 switches **QF01** and **QF02**.

Step 5 Turn off the three-phase input switch of the SACU.

- SmartACU2000D-D-(08-09): Turn off the three-phase input switch **FU01**.
- SmartACU2000D-D-(10-11): Turn off the three-phase input switches **FU01** and **FU02**.

----End

9 Maintenance

9.1 Routine Maintenance

DANGER

- Wear personal protective equipment and use dedicated insulated tools to avoid electric shocks or short circuits.
- If you need to open the cabinet door on rainy or snowy days, take protective measures to prevent rain or snow from entering the cabinet. If protective measures are unavailable, do not open the cabinet door on rainy or snowy days.

WARNING

- Prior to maintenance, power off the equipment.

Table 9-1 Maintenance checklist

Item	Check Method	Maintenance Interval
Cabinet	• Check that the SACU exterior is not damaged or deformed. • Check that there is no dust or dirt in the SACU.	Once a year
System status	• Check that all devices in the SACU work properly. • Check that the SPD works properly.	Once every 6 months

Item	Check Method	Maintenance Interval
Electrical connection	• Check that cables are securely connected. • Check that cables are intact, especially that the cable sheath that contacts a metal surface is not damaged. • Check that unused waterproof connectors are plugged and the locking caps are tightened. • Check that the cover on the USB port is tightened.	Once a year
Grounding reliability	Check that all ground cables are reliably connected.	Once a year

9.2 Troubleshooting

Fault	Possible Cause	Suggestion
The three-phase input switch of the SACU is not powered on.	1. The power supply to the upstream transformer station of the three-phase input switch is abnormal. 2. The three-phase input switch is faulty.	1. Use a multimeter to check whether the power supply to the upstream transformer station of the three-phase input switch is normal. 2. Replace the three-phase input switch.
The SmartPID2000 input switch (**QF01** or **QF02**) is not powered on.	1. The SmartPID2000 input switch is faulty. 2. The cable between the three-phase input switch and the SmartPID2000 input switch is loose or disconnected.	1. Replace the SmartPID2000 input switch. 2. Check the cable between the three-phase input switch and the SmartPID2000 input switch. If the cable is loose or disconnected, secure it.
The SmartPID2000 is not powered on.	1. The cable to the grid three-phase input port of the SmartPID2000 is loose or disconnected. 2. The power grid fails. 3. The SmartPID2000 is faulty.	1. Check the cable connection. If the cable is loose or disconnected, reconnect it securely. 2. Check whether power is available from the power grid. 3. Contact your vendor.

Fault	Possible Cause	Suggestion
The single-phase input switch of the SACU is not powered on.	1. The power supply to the upstream transformer station of the single-phase input switch is abnormal. 2. The single-phase input switch is faulty.	1. Use a multimeter to check whether the power supply to the upstream transformer station of the single-phase input switch is normal. 2. Replace the single-phase input switch.
The SmartLogger in the SACU is not powered on.	1. The DC output power cable for the power adapter is not connected to the **12V IN** port of the SmartLogger. 2. The power cable is not connected to the AC power input port of the power adapter. 3. The AC input power cable is not connected to the AC socket. 4. The power adapter is faulty. 5. The SmartLogger is faulty.	1. Check the power adapter and connect the DC output power cable for the power adapter to the **12V IN** port of the SmartLogger. 2. Check whether the power cable is connected to the AC power input port of the power adapter. 3. Check whether the power cable is connected to the AC socket. 4. Replace the power adapter. 5. Contact your vendor.

Fault	Possible Cause	Suggestion
The SmartLogger does not communicate with the opto-electronic Ethernet switches.	1. The network cables between the SmartLogger and the opto-electronic Ethernet switches are not properly connected. 2. The IP address of the SmartLogger is not configured or is not in the LAN.	1. Check whether the network port indicators on the SmartLogger and opto-electronic Ethernet switches blink properly. If not, connect the network cables to other GE ports on the opto-electronic Ethernet switches or replace the network cables and try again. 2. On the SUN2000 app, check whether the IP address of the SmartLogger is correctly set. If not, set the IP address again. 3. Log in to the SmartLogger WebUI via the LAN port (default IP address of the LAN port: 192.168.8.10) and check whether the IP address of the SmartLogger is correct. If not, set the IP address again. 4. Connect the PC to the opto-electronic Ethernet switches and ping the IP address of the SmartLogger. If the communication is abnormal, replace the network cables and try again.

Fault	Possible Cause	Suggestion
The SmartLogger does not communicate with the SmartModule.	1. The network cable between the SmartLogger and the SmartModule is not properly connected. 2. The communication certificate has expired.	1. Check whether the network port indicators on the SmartLogger and SmartModule blink properly. If no, connect the network cable to another GE port on the SmartModule or replace the network cable and try again. 2. Log in to the SmartLogger WebUI or SUN2000 app and check whether a communication certificate expiration alarm is generated. If yes, reload the certificate. 3. Contact your vendor.

9.3 Replacing Components

DANGER

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

NOTICE

- Do not perform operations with power on because high voltage exists when the equipment is running.
- Before replacing a component, ensure that a spare component of the same model is available and functional.
- Prior to maintenance, power off the equipment.
- Before replacing a component, power off the SACU. Wait at least 3 minutes after the power-off to ensure that the SACU is de-energized.
- After replacing a component, check the SACU before powering it on to ensure that the new component works properly.
- Dispose of faulty components in accordance with the local disposal act for waste electrical equipment.

NOTE

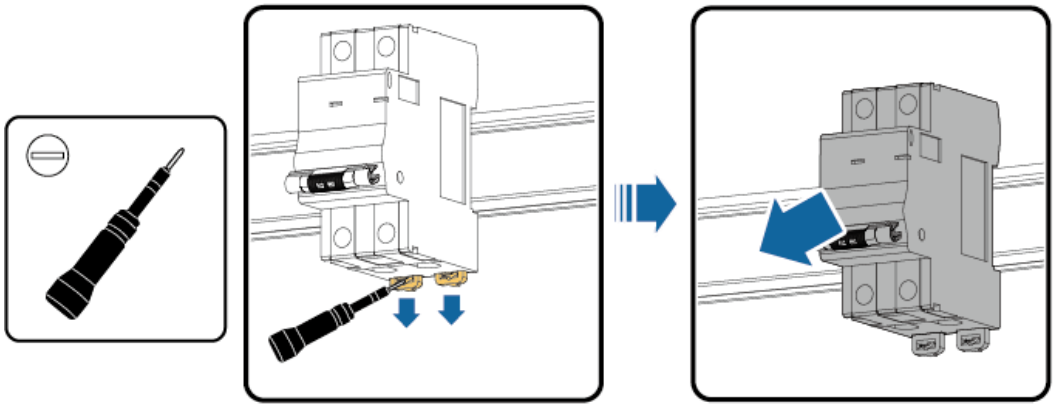
After the components are replaced and the equipment is powered on, set parameters according to **SmartLogger3000 User Manual**.

9.3.1 Replacing a Single-Phase Input Switch

Step 1 Disconnect cables from the single-phase input switch and label the cables.

Step 2 Remove the faulty single-phase input switch.

Figure 9-1 Removing the faulty single-phase input switch



Step 3 Install a new single-phase input switch.

Step 4 Connect the cables based on the labels.

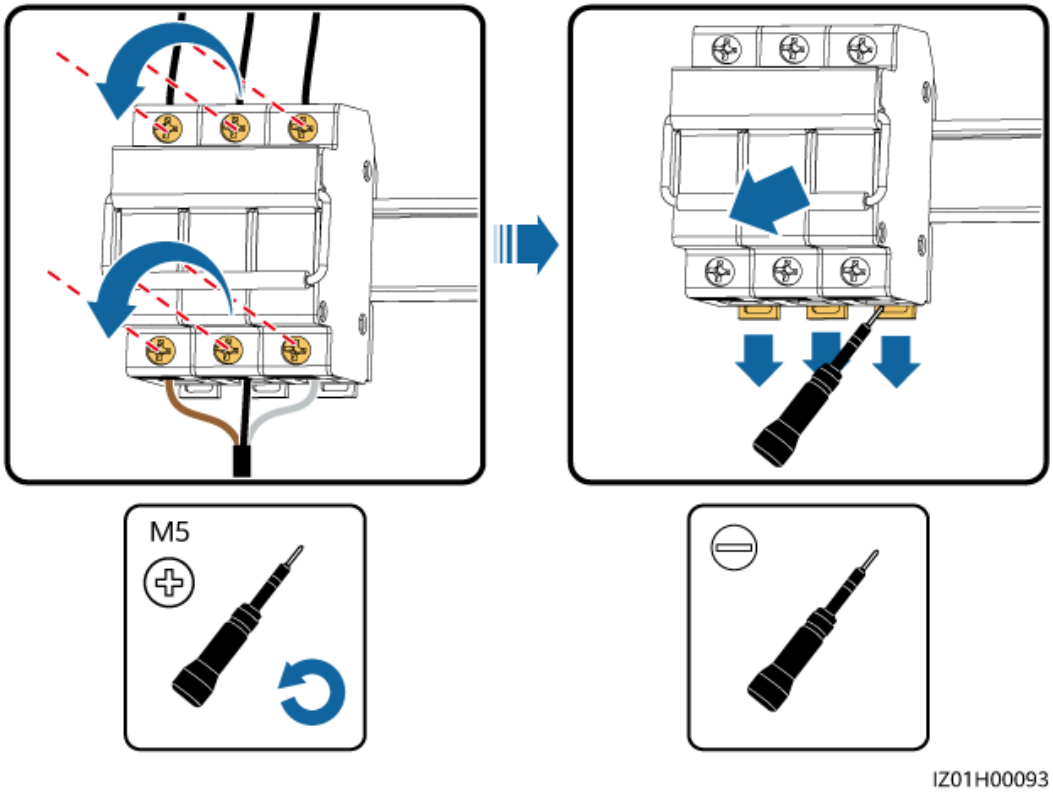
----End

9.3.2 Replacing a Three-Phase Input Switch

Step 1 Disconnect cables from the three-phase input switch and label the cables.

Step 2 Remove the faulty three-phase input switch.

Figure 9-2 Removing the faulty three-phase input switch



Step 3 Install a new three-phase input switch.

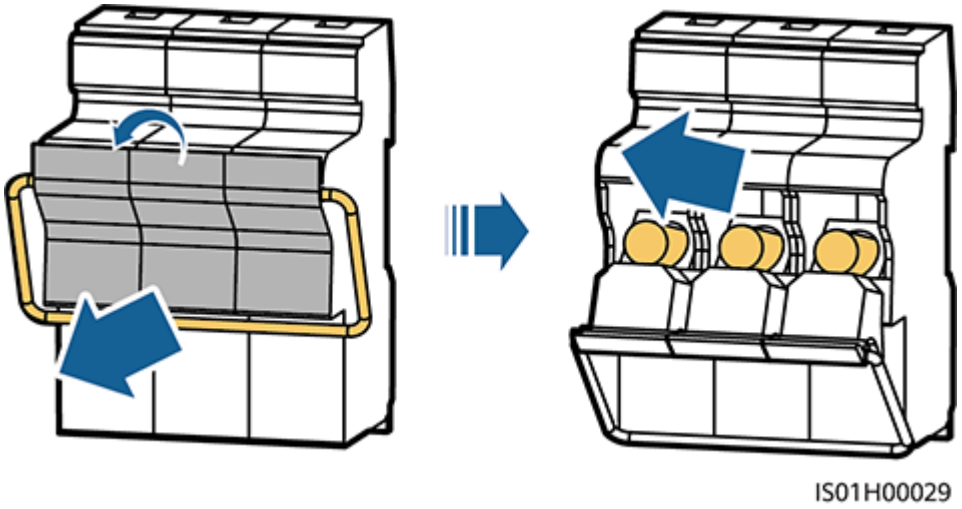
Step 4 Connect the cables based on the labels.

----End

9.3.3 Replacing a Fuse of a Three-Phase Input Switch

Step 1 Open the three-phase input switch box and remove the faulty fuse.

Figure 9-3 Removing the faulty fuse



Step 2 Install a new fuse and close the three-phase input switch box.

NOTICE

The new fuse must be of the same model and rated value (1000 V-25 A-14 x 51 mm).

----End

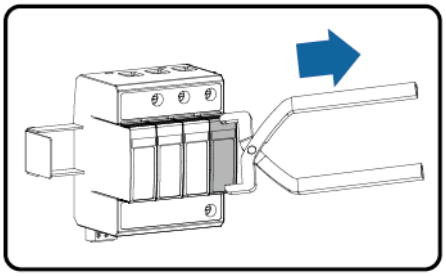
9.3.4 Replacing a Single/Three-Phase SPD

NOTE

- An SPD consists of surge protection modules and a base.
- If an SPD is damaged or its indication window is displayed in red, replace the SPD.
- A single-phase SPD is replaced in the same way as a three-phase SPD. This section describes how to replace a single-phase SPD.

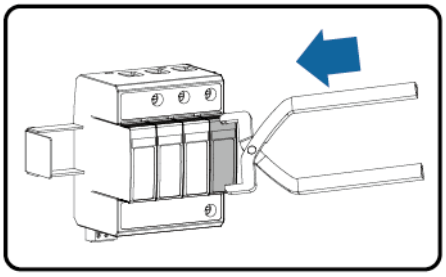
Step 1 Remove the faulty surge protection module from the SPD.

Figure 9-4 Removing the faulty surge protection module



Step 2 Install a new surge protection module.

Figure 9-5 Installing a new surge protection module



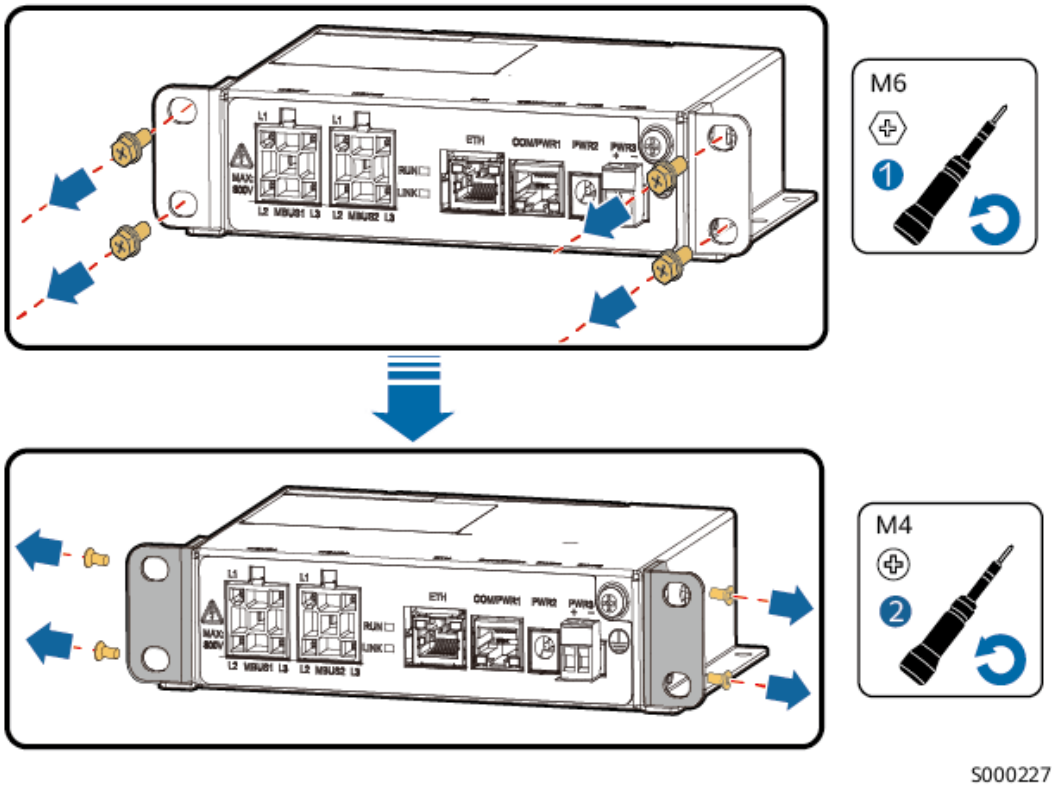
----End

9.3.5 Replacing a SmartMBUS CCO

Step 1 Disconnect cables from the SmartMBUS CCO and label the cables.

Step 2 Remove the faulty SmartMBUS CCO and its mounting brackets.

Figure 9-6 Removing the faulty SmartMBUS CCO



Step 3 Install the mounting brackets on a new SmartMBUS CCO.

Step 4 Install the new SmartMBUS CCO.

Step 5 Connect the cables based on the labels.

NOTE

After the SmartMBUS CCO is powered on, set parameters according to **SmartMBUS CCO01B User Manual**.

----End

9.3.6 Replacing a SmartLogger

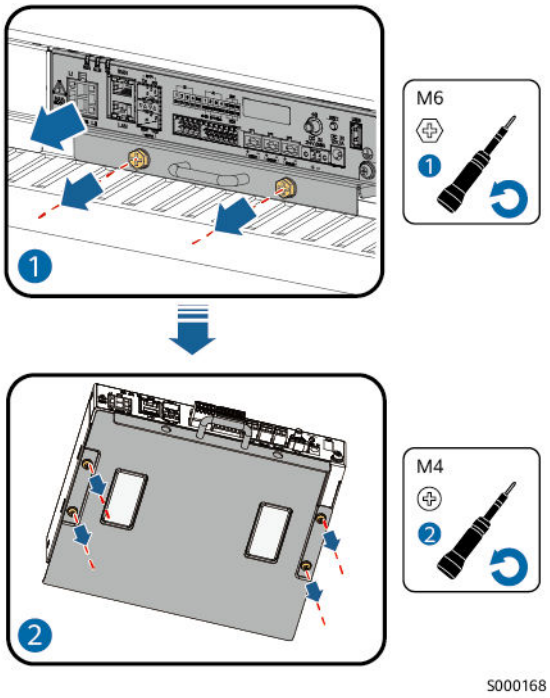
NOTE

Before and after replacing the SmartLogger, perform operations such as data backup, import, or export as required by referring to **SmartLogger3000 User Manual**.

Step 1 Disconnect cables from the SmartLogger and label the cables.

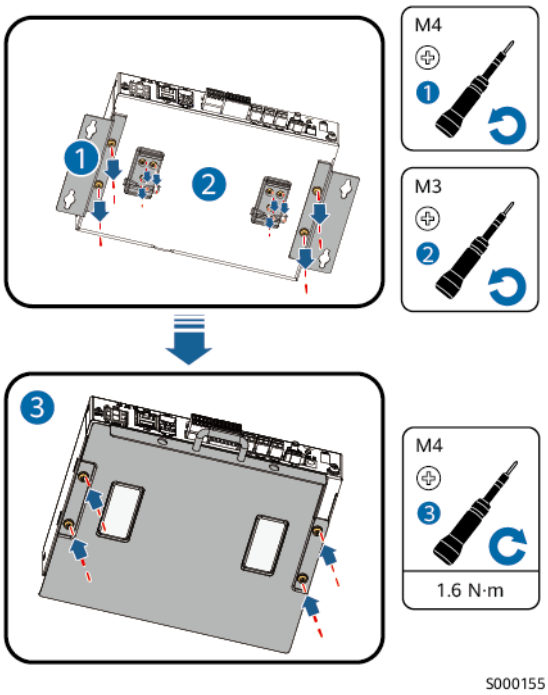
Step 2 Remove the faulty SmartLogger and its cabinet-mounting bracket.

Figure 9-7 Removing the faulty SmartLogger



Step 3 Remove the mounting brackets and guide rail–mounting brackets from a new SmartLogger, and install the cabinet-mounting bracket.

Figure 9-8 Replacing the SmartLogger



Step 4 Install the new SmartLogger in the cabinet.

Step 5 Connect the cables based on the labels.

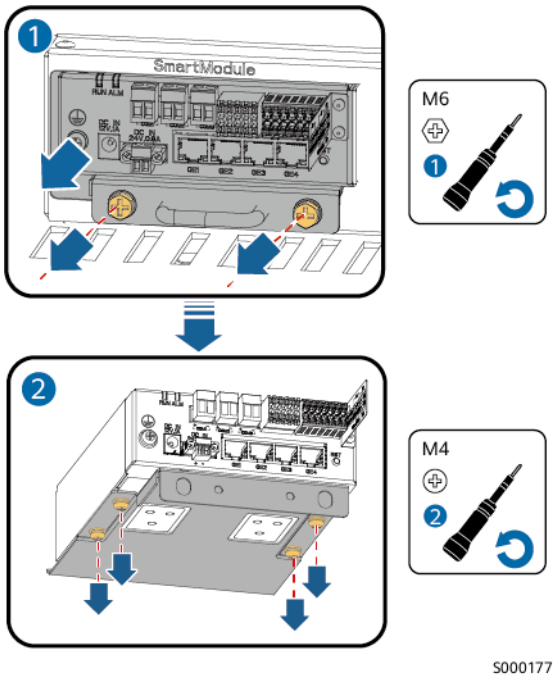
----End

9.3.7 Replacing a SmartModule

Step 1 Disconnect cables from the SmartModule and label the cables.

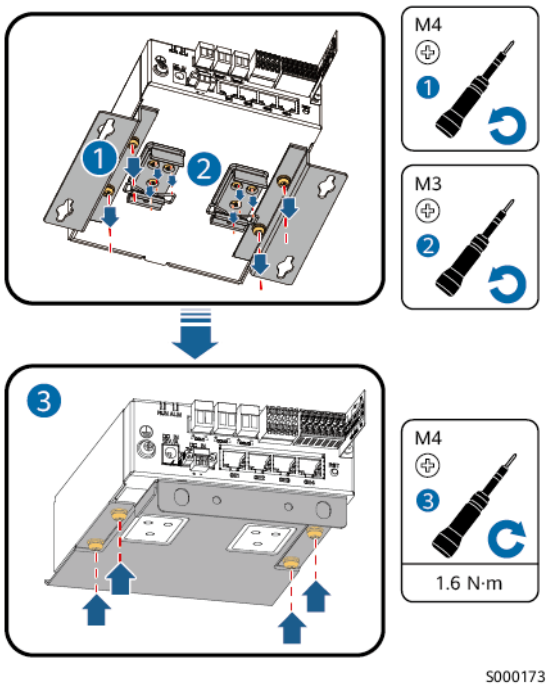
Step 2 Remove the faulty SmartModule and its cabinet-mounting bracket.

Figure 9-9 Removing the faulty SmartModule



Step 3 Remove the mounting brackets and guide rail–mounting brackets from a new SmartModule, and install the cabinet-mounting bracket.

Figure 9-10 Replacing the SmartModule



Step 4 Install the new SmartModule in the cabinet.

Step 5 Connect the cables based on the labels.

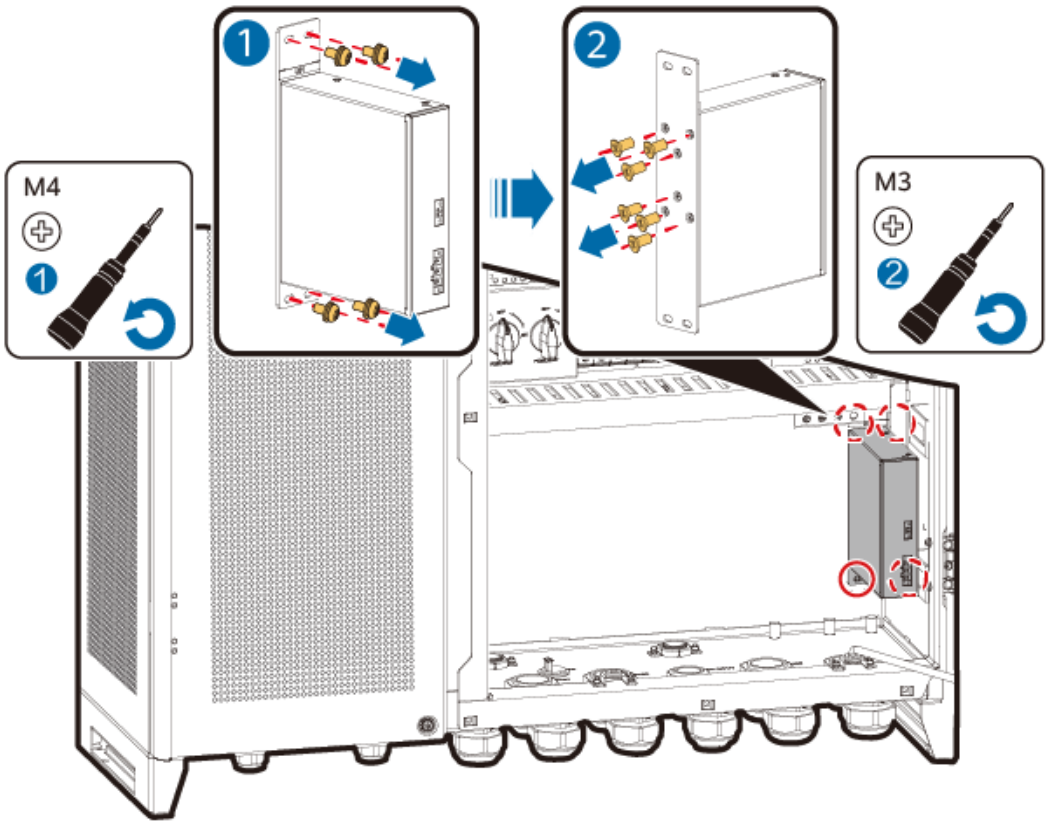
----End

9.3.8 Replacing a Power Adapter

Step 1 Disconnect cables from the power adapter and label the cables.

Step 2 Remove the faulty power adapter.

Figure 9-11 Removing the faulty power adapter



Step 3 Install a new power adapter.

Step 4 Connect the cables based on the labels.

----End

9.3.9 Replacing a SmartPID2000

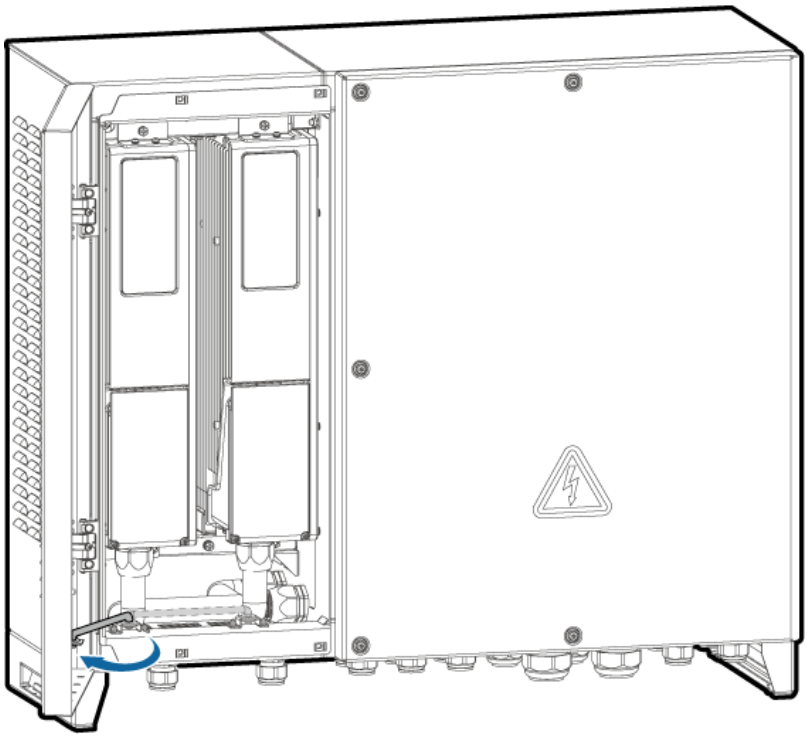
NOTE

This section uses the SACU with two SmartPID2000s as an example. The two SmartPID2000s are replaced in the same way.

Step 1 (Optional) Revoke the SmartPID2000 license. Choose **Maintenance** > **License Management** > **License revocation**, select the faulty SmartPID2000, and click **Revoke License**. If a license has been applied and loaded for the faulty SmartPID2000, perform this step. Otherwise, skip this step.

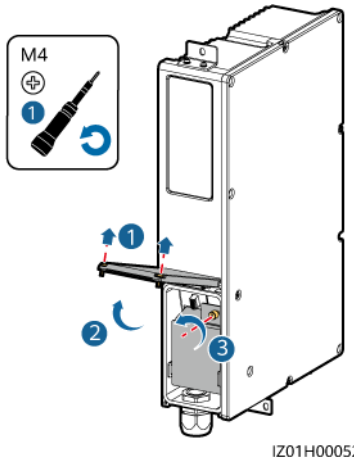
Step 2 Open the SmartPID2000 cabinet door of the SACU and adjust the support bar.

Figure 9-12 Adjusting the support bar



Step 3 Open the maintenance compartment door of the SmartPID2000, and remove the cover from the connection box.

Figure 9-13 Removing the cover from the connection box

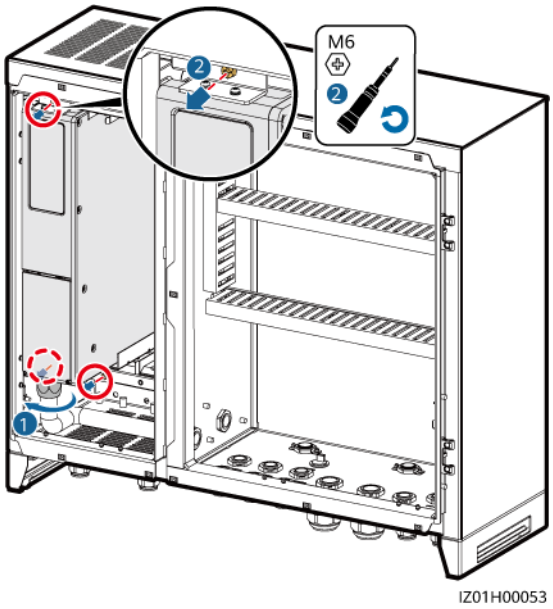


Step 4 Disconnect cables from the faulty SmartPID2000 and label the cables.

Step 5 Remove the cable routing pipe connector from the faulty SmartPID2000.

Step 6 Remove the faulty SmartPID2000.

Figure 9-14 Removing the faulty SmartPID2000



Step 7 Install a new SmartPID2000.

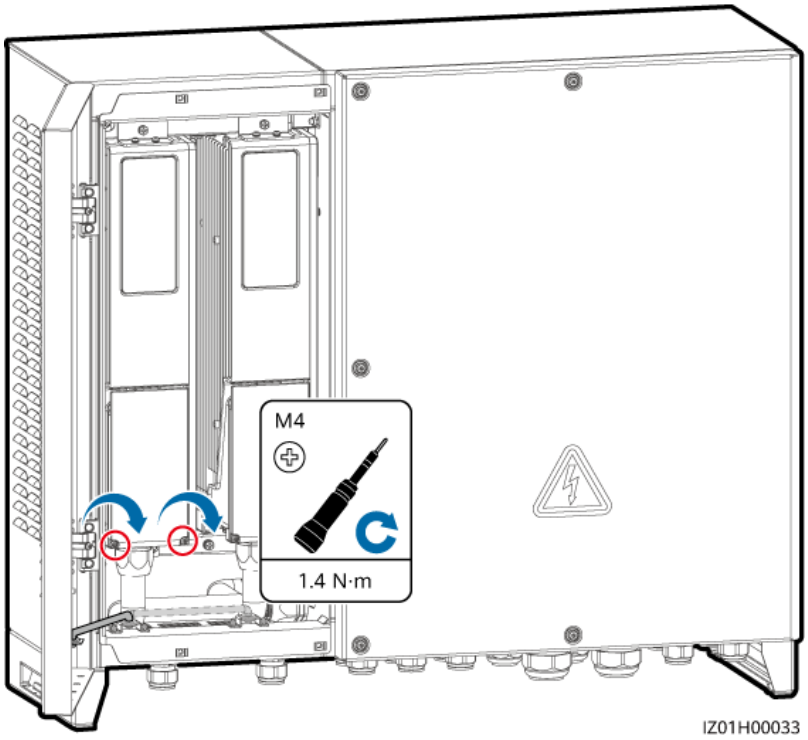
Step 8 Open the maintenance compartment door of the SmartPID2000, and remove the cover from the connection box.

Step 9 Connect the removed cables to the new SmartPID2000 based on the cable labels.

Step 10 Secure the cable routing pipe connector to the SmartPID2000.

Step 11 Install the connection box cover and close the maintenance compartment door of the SmartPID2000.

Figure 9-15 Tightening the screws on the maintenance compartment door



CAUTION

Tighten the screws on the maintenance compartment door to prevent the components in the cabinet from being corroded in a salt air environment.

Step 12 Retract the support bar and close the SmartPID2000 cabinet door.

NOTE

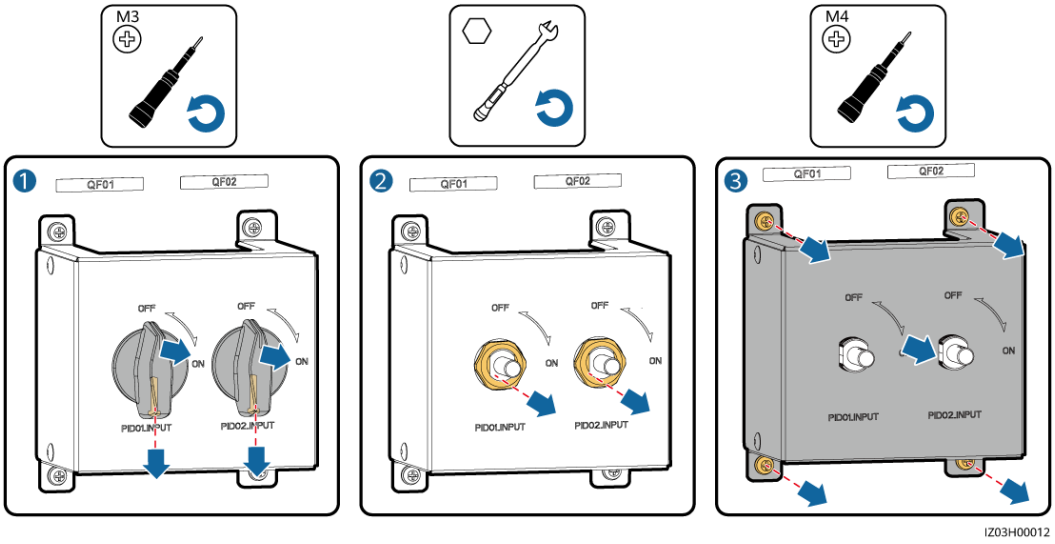
Check that the SmartPID2000 is powered on properly, and then set parameters by referring to the *SmartLogger3000 User Manual*.

----End

9.3.10 Replacing a SmartPID2000 Switch

Step 1 Remove the faulty switch of the SmartPID2000.

Figure 9-16 Removing the faulty switch of the SmartPID2000



Step 2 Disconnect cables from the faulty switch of the SmartPID2000, and label the cables.

Step 3 Connect the cables to the new switch of the SmartPID2000 based on the labels.

Step 4 Install the new switch of the SmartPID2000.

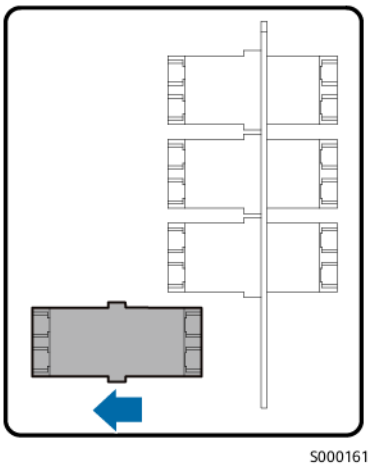
----End

9.3.11 Replacing an Optical Fiber Adapter

Step 1 Disconnect cables from the optical fiber adapter and label the cables.

Step 2 Remove the faulty optical fiber adapter.

Figure 9-17 Removing the optical fiber adapter



Step 3 Install a new optical fiber adapter.

Step 4 Connect the cables based on their labels.

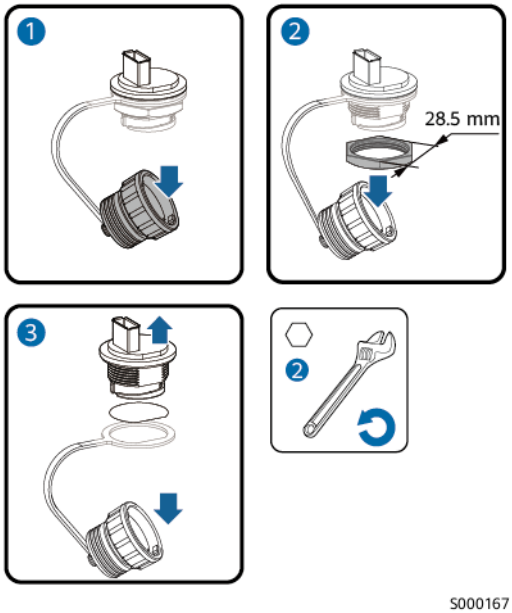
----End

9.3.12 Replacing a USB Port

Step 1 Disconnect the cable from the USB port and label the cable.

Step 2 Remove the faulty USB port.

Figure 9-18 Removing the USB port



Step 3 Install a new USB port. Ensure that the rubber ring is on the inner side of the cabinet.

Step 4 Connect the cables based on their labels.

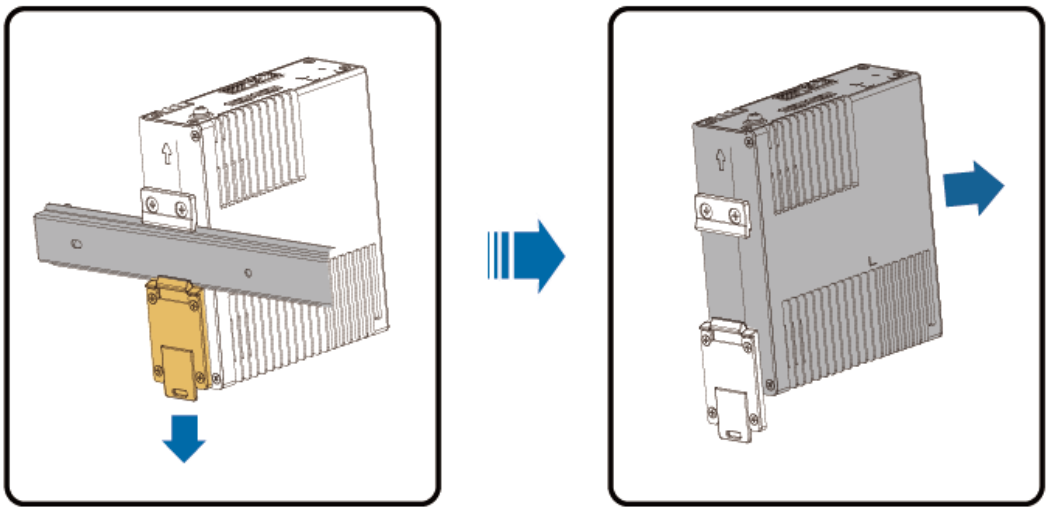
----End

9.3.13 Replacing an Opto-Electronic Ethernet Switch

Step 1 Remove cables from the Ethernet switch and label the cables.

Step 2 Remove the faulty Ethernet switch.

Figure 9-19 Removing the Ethernet switch



Step 3 Install a new Ethernet switch.

Step 4 Reinstall the cables.

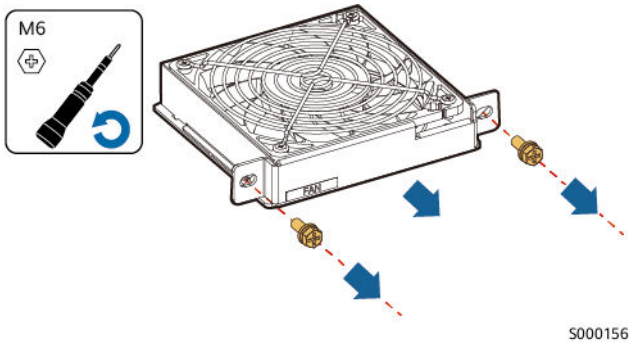
----End

9.3.14 Replacing a Fan

Step 1 Remove cables from the fan and label the cables.

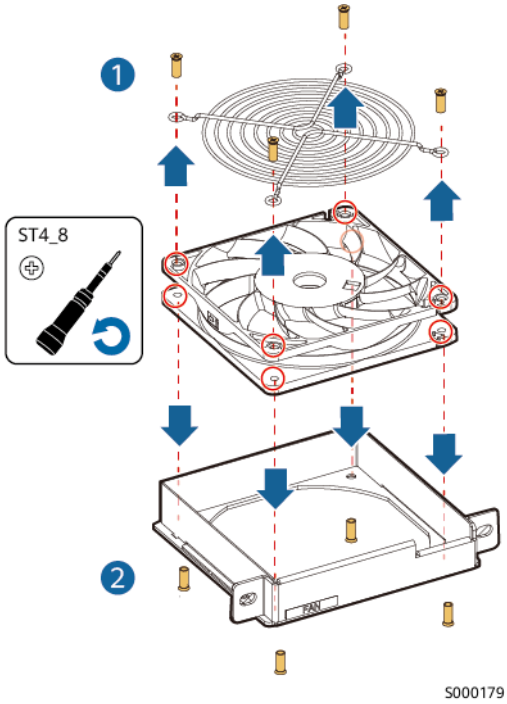
Step 2 Remove the screws that secure the fan tray to the cabinet and keep the screws aside.

Figure 9-20 Removing screws



Step 3 Remove the fan guard and fan tray, and take out the faulty fan.

Figure 9-21 Removing the faulty fan

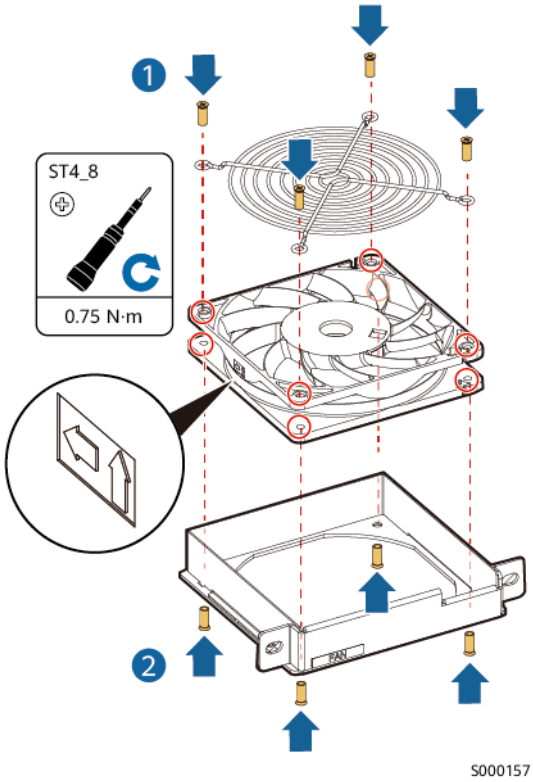


Step 4 Assemble the new fan with the fan guard and fan tray.

CAUTION

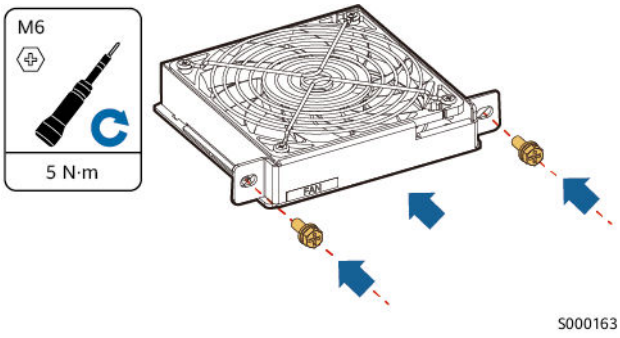
Assemble the fan by strictly following the directions shown in the figure.

Figure 9-22 Assembling the new fan



Step 5 Use the removed screws to secure the fan tray to the cabinet.

Figure 9-23 Securing the fan tray



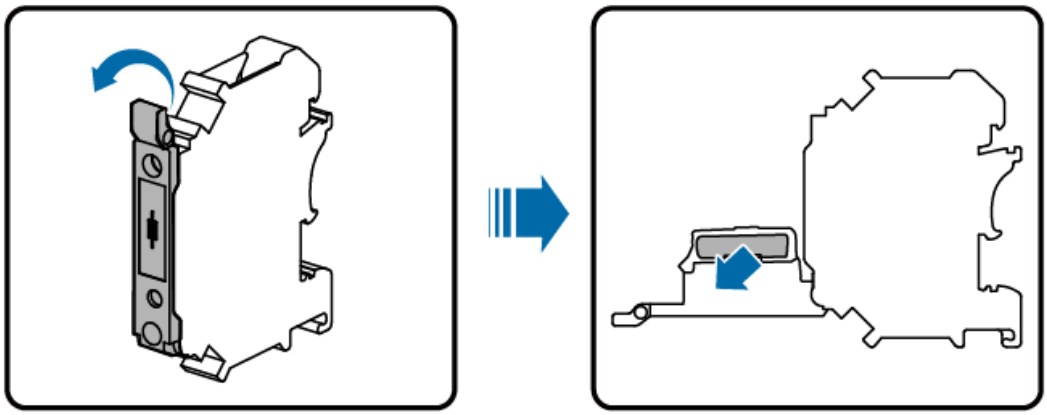
Step 6 Reinstall the cables.

----End

9.3.15 Replacing a Fuse for the Fan Loop

Step 1 Open the terminal block cover and remove the faulty fuse.

Figure 9-24 Removing the fuse for the fan loop



Step 2 Install a new fuse and close the terminal block cover.

NOTICE

The new fuse must be of the same model and rated specifications (400 V, 1 A, 5 x 20 mm).

----End

10 Technical Specifications

Item	SmartACU2000D-D-08	SmartACU2000D-D-09	SmartACU2000D-D-10	SmartACU2000D-D-11
Communications mode	SFP/ETH/MBUS/RS485			
Quantity of MBUS routes	1	1	2	2
MBUS input voltage	380–800 V AC			
Quantity of SmartPID2000 routes	0	1	2	
SmartPID2000 input voltage	-	380–800 V AC		
Single-phase input power	60 W (maximum)			
Three-phase input power	5 W (maximum)	480 W (maximum)	2 x 330 W (maximum)	
Single-phase input operating voltage	100–240 V AC			
Three-phase input operating voltage	380–800 V AC			
Frequency	50 Hz/60 Hz			
Cabling mode	Routed in and out from the bottom			
Operation and maintenance mode	Operated and maintained from the front			

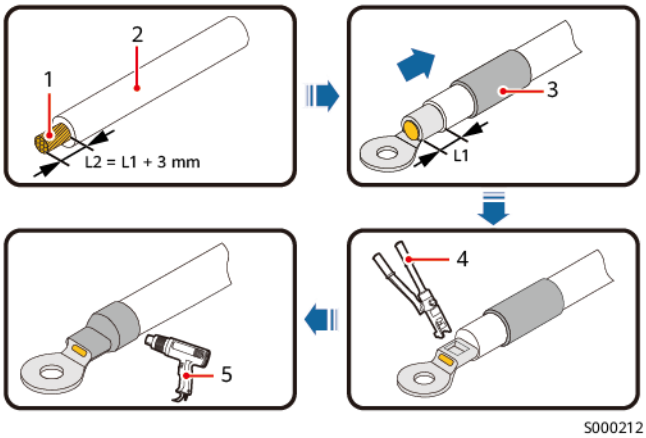
Item	SmartACU2000D-D-08	SmartACU2000D-D-09	SmartACU2000D-D-10	SmartACU2000D-D-11
Application environment	Indoor and outdoor			
Maximum operating altitude	4000 m			
Installation mode	Installed on a wall, support, or pole			
Dimensions (W x H x D, including the mounting bracket)	640 mm x 770 mm x 365 mm	880 mm x 770 mm x 369 mm		
Weight (including sealing putty, screws, and the mounting bracket)	About 33 kg	About 54 kg	About 64 kg	About 66 kg
Enclosure ingress protection (IP) rating	IP65			
Protection level	Class I			
Operating relative humidity	0–100% RH			
Operating temperature (without an awning)[1]	–40°C to +40°C			
Operating temperature (with an awning)[1]	–40°C to +60°C			
Storage temperature	–40°C to +70°C			
Note [1]: The data applies when the altitude is 1800 mm. The temperature decreases by 1°C for every 220 m increase in altitude. The maximum altitude is 4000 m.				

A Crimping 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 cold or 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.

Figure A-1 Crimping an OT terminal



(1) Core wire (2) Insulation layer (3) Heat shrink tubing

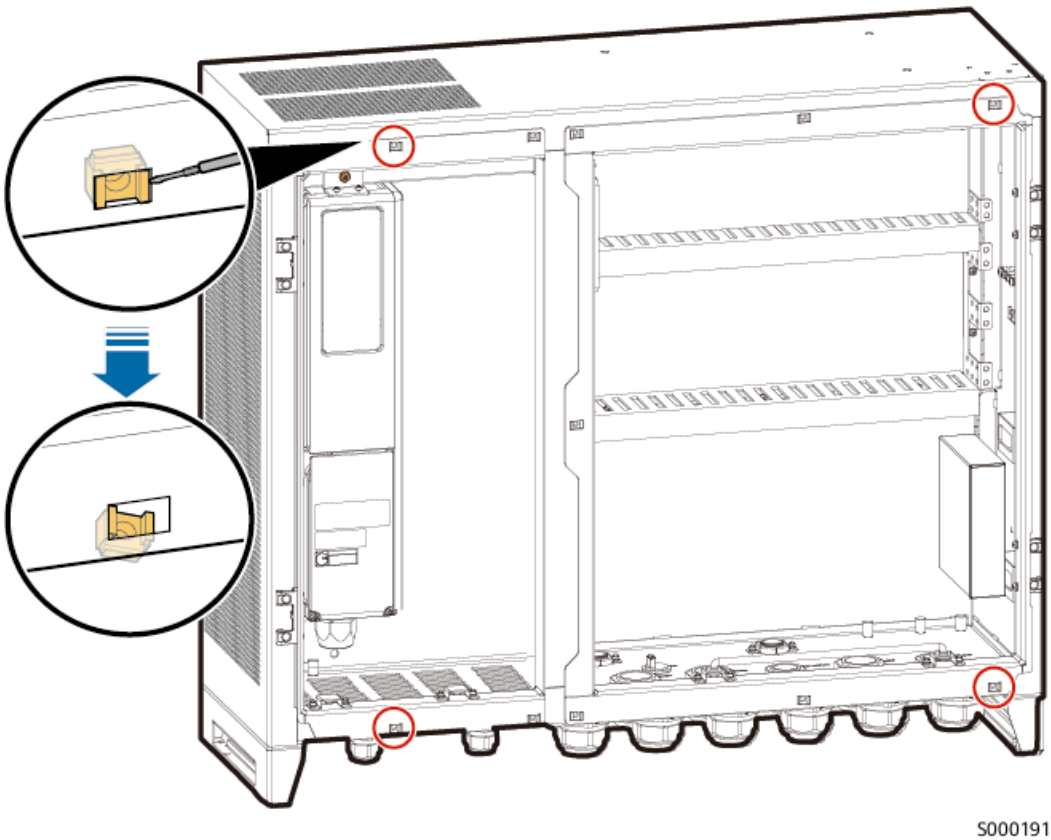
(4) Crimping tool (5) Heat gun -

B Removing Spare Floating Nuts

NOTE

- SmartACU2000D-D-08: If a floating nut used for securing the cabinet door is lost, use a spare floating nut in the fitting bag.
- SmartACU2000D-D-(09-11): If a floating nut used for securing the cabinet door is lost, use a spare floating nut on the cabinet.

Figure B-1 Removing spare floating nuts



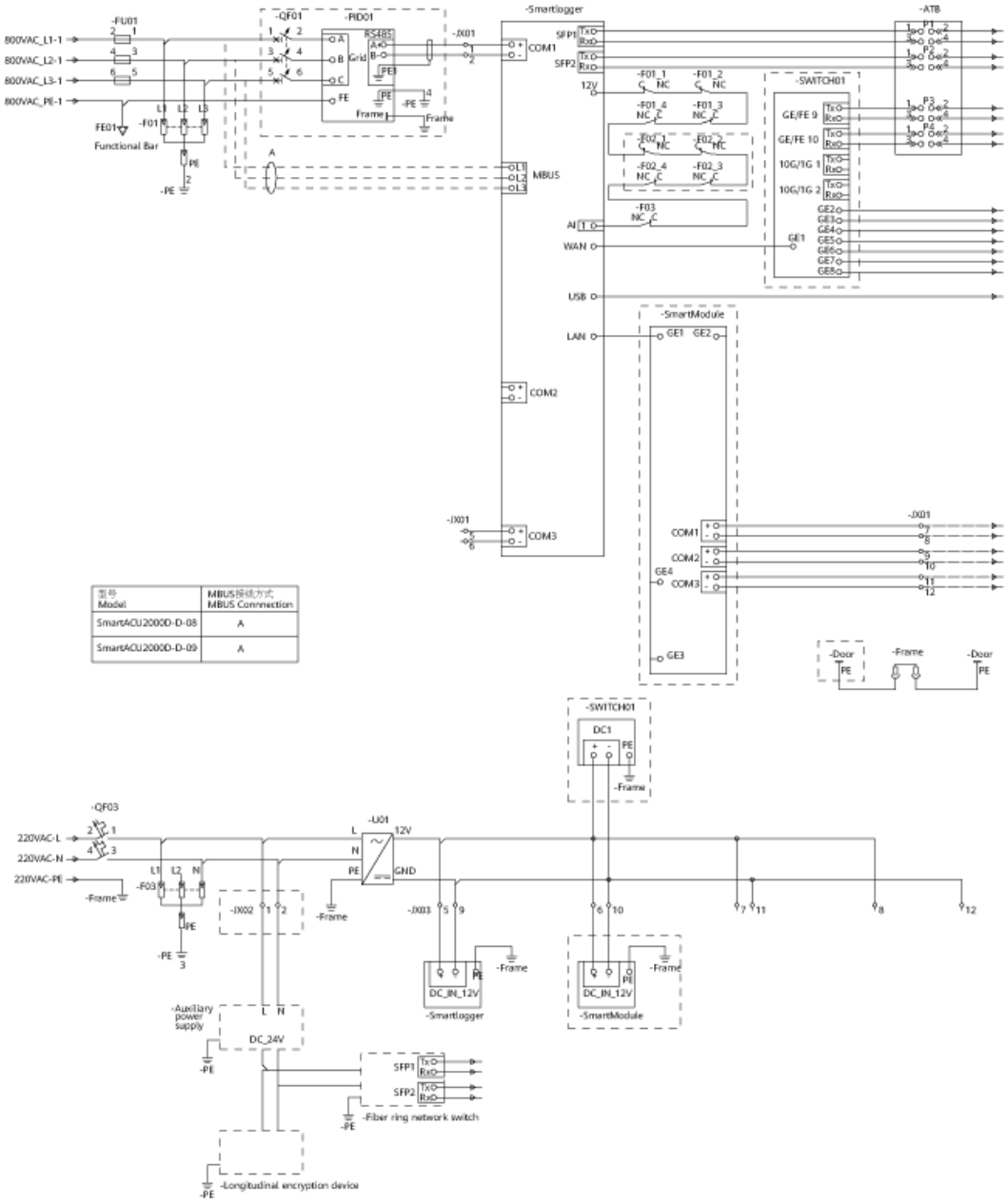
C Scenario Where a Longitudinal Encryption Device Is Used

- The SmartACU2000D-D-08 and SmartACU2000D-D-09 provide only the installation positions for a longitudinal encryption device, fiber ring network switch, and auxiliary power supply, which can be installed on guide rails.
- The longitudinal encryption device, fiber ring network switch, and auxiliary power supply are prepared by the customer based on actual requirements. Device faults caused by any of the three components are not covered by the warranty.
- For details about the installation method and cable specifications, see the installation guide of the components. You are advised to route cables through the cable slots or multiple tie plates in the SACU.
- The reserved installation dimensions (W x H x D) are 50 mm x 185 mm x 135 mm for the longitudinal encryption device, 65 mm x 185 mm x 135 mm for the fiber ring network switch, and 36 mm x 130 mm x 125 mm for the auxiliary power supply.

Schematic Diagram

The schematic diagram is as follows. Components marked by the dashed lines are optional in the following figure. The auxiliary power supply, longitudinal encryption device, and fiber ring network switch are prepared by the customer.

Figure C-1 Schematic diagram (using a longitudinal encryption device)



型号 Model	MBUS接线方式 MBUS Connnection
SmartACU2000D-D-08	A
SmartACU2000D-D-09	A

Installation Position and Cable Routing

- The FE communications cable of the longitudinal encryption device can be connected to the WAN port of the SmartLogger3000 (SmartLogger).
- The optical fiber jumper of the fiber ring network switch can be connected to the optical fiber adapter of the ATB. The adapter specification is 2LC/PC-2LC/PC-4. The optical fiber cable can be connected to the ATB.
- The power cable of the auxiliary power supply can be connected to the AC input terminal of the 24 V power module (JX02). The JX02 supports the connection of 0.2–10 mm^2 (or 24–8 AWG) cables. The ground cables can be connected to the nearest ground points using M4 screws.

- For details about the communications cable connection mode and cable specifications between the fiber ring network switch and the longitudinal encryption device, see the installation guide of the purchased components.

NOTE

This document provides only the recommended cable routing solution for the longitudinal encryption device, fiber ring network switch, and auxiliary power supply. For details about the cable specifications, see the installation guide of the purchased components.

Figure C-2 SmartACU2000D-D-08 installation position and cable routing

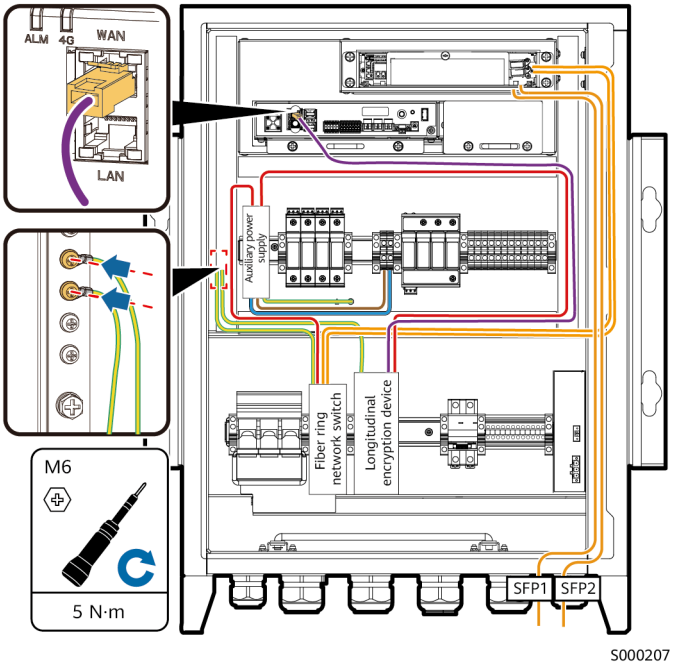
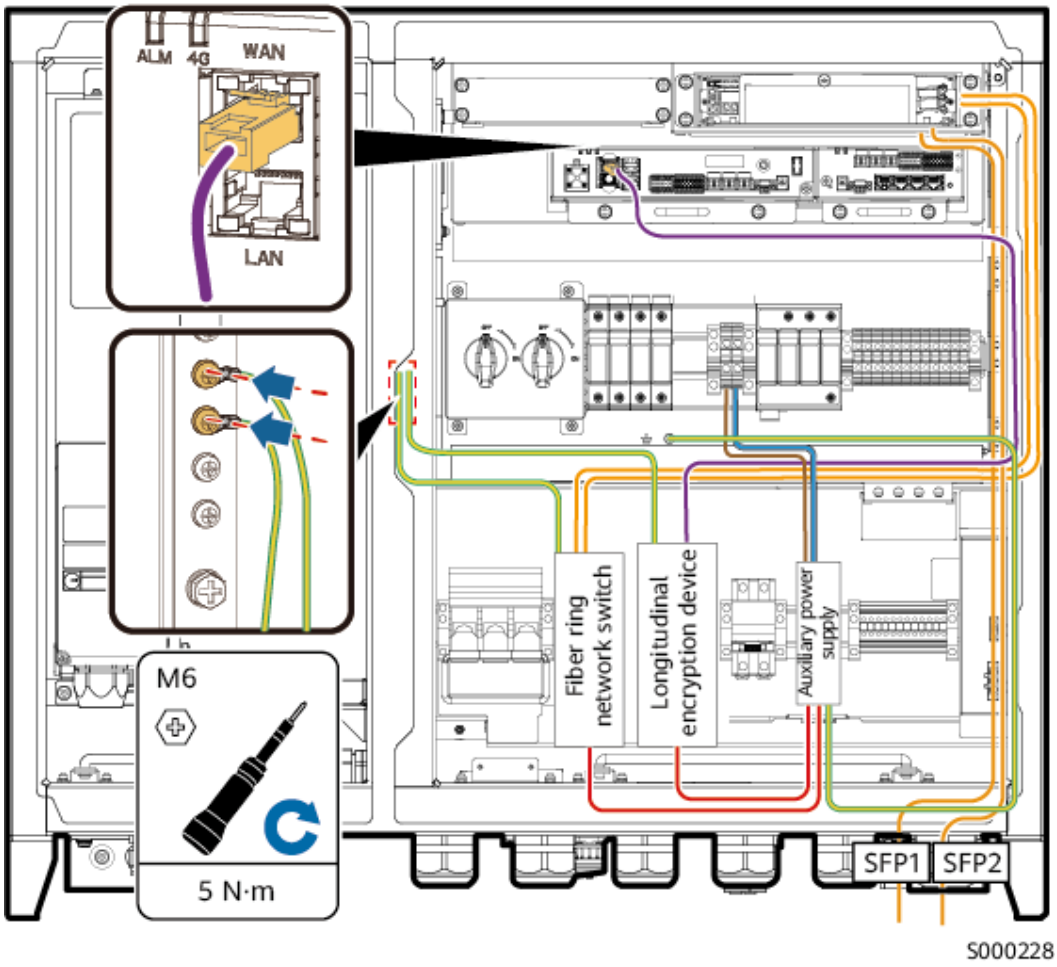


Figure C-3 SmartACU2000D-D-09 installation position and cable routing



D Certificate Management and Maintenance

D.1 Preconfigured Certificate Risk Disclaimer

The certificates issued by the Company and preconfigured on the Company's devices during manufacturing are mandatory identity credentials for the Company's devices. The disclaimer statements for using the certificates are as follows:

1. Preconfigured certificates issued by the Company are used only in the deployment phase, for establishing initial security channels between devices and the customer's network. The Company does not promise or guarantee the security of preconfigured certificates.

2. The customer shall bear consequences of all security risks and incidents arising from using preconfigured certificates issued by the Company as service certificates.

3. A preconfigured certificate issued by the Company is valid from the manufacturing date until May 2041.

4. Services using a preconfigured certificate issued by the Company 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.

D.2 Application Scenarios of Preconfigured Certificates

File Path and Name	Scenario	Replacement
/mnt/log/smodule_ca.crt	Authenticates the validity of the peer extension module for communication with the TLS extension module.	For details about how to replace a certificate, contact technical support engineers to obtain the corresponding security maintenance manual.
/mnt/log/smodule_server.crt		
/mnt/home/cert/web/server.crt	Authenticates the validity of the peer web module to be connected.	
/mnt/log/ca_1.crt	Authenticates the validity of the peer NMS for communication through Modbus-TCP.	
/mnt/log/client_1.crt		
/mnt/log/ca_2.crt		
/mnt/log/client_2.crt		
/mnt/log/client2_ca.crt		
/mnt/log/client2.crt		
/mnt/log/ca_new.crt		
/mnt/log/client_new.crt		
/mnt/log/tcpmb_server_cert/ca.crt	Authenticates the validity of the peer mobile app for communication through Modbus-TCP.	Certificate replacement is not supported.
/mnt/log/tcpmb_server_cert/tomcat_client.crt		
/mnt/log/cmu_ca.crt	Authenticates the validity of the peer CMU for communication through Modbus-TCP.	For details about how to replace a certificate, contact technical support engineers to obtain the corresponding security maintenance manual.
/mnt/log/cmu_client.crt		
/mnt/log/ca_new.crt	Authenticates the validity of the peer STS, PCS, or inverter for communication through Modbus-TCP.	
/mnt/log/client_new.crt		
/mnt/log/ppc_client.crt	Authenticates the validity of the peer SPPC to be connected.	For details about how to replace a certificate, contact technical support engineers to obtain the corresponding security maintenance manual.
/mnt/log/ppc_ca.crt		

E Contact Information

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

https://digitalpower.huawei.com

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

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

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

NOTE

EU Representative Information: Huawei Technologies Hungary Kft.
Add.: HU-1133 Budapest, Váci út 116-118., 1. Building, 6. floor.
Email: hungary.reception@huawei.com

F Digital Power Customer Service

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

G Acronyms and Abbreviations

A	
AC	alternating current
AI	analog input
App	application
ATB	access terminal box
C	
CAT 5E	category 5 enhanced
CCO	central controller
CPE	customer-premises equipment
D	
DC	direct current
DI	digital input
DO	digital output
E	
EMI	environmental monitoring instrument
ETH	Ethernet
M	
MBUS	monitoring bus
P	
PE	protective earthing
PID	potential induced degradation

R	
RH	relative humidity
S	
SFP	small form-factor pluggable
SPD	surge protective device
W	
WEEE	waste electrical and electronic equipment

