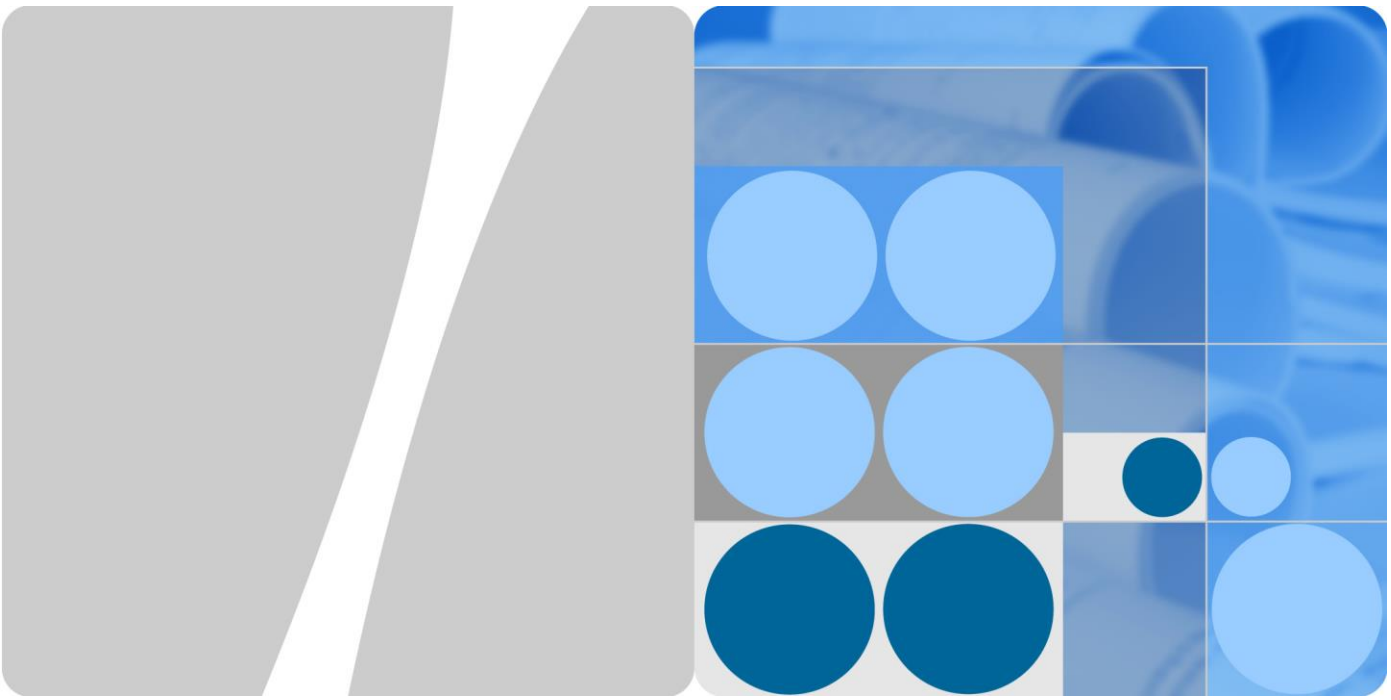

SmartACU2000D Smart Array Controller

User Manual (with No PID Module)

Issue 01

Date 2020-02-14

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About This Document

Purpose

This document describes the SmartACU2000D smart array controller (SACU for short), which is an outdoor cabinet, in terms of its installation, electrical connections, commissioning, and maintenance. Before installing and operating an SACU, closely read this manual to get familiar with the functions and features of the device as well as the precautions.

Figures used in this document are for reference only.

Intended Audience

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

Symbol Conventions

The symbols that may be found in this guide 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.
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

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

Issue 01 (2020-02-14)

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

Contents

1 Safety Precautions

1.1 General Safety

Statement

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

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

Ensure that the equipment is used in environments that meet its design specifications. Otherwise, the equipment may become faulty, and the resulting equipment malfunction, component damage, personal injuries, or property damage are not covered under the warranty.

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

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

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

General Requirements

DANGER

Do not work with power on during installation.

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

Personal Safety

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

1.2 Personnel Requirements

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

NOTE

- Professionals: personnel who are trained or experienced in equipment operations and are clear of the sources and degree of various potential hazards in equipment installation, operation, and maintenance

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

1.3 Electrical Safety

Grounding

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

General Requirements

DANGER

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

- Ensure that all electrical connections comply with local electrical standards.
- Ensure that the cables you prepared meet local regulations.
- Use dedicated insulated tools when performing high-voltage operations.

AC and DC Power

DANGER

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

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

Cabling

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

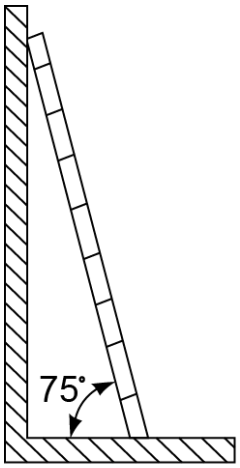
1.4 Installation Environment Requirements

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

1.5 Mechanical Safety

Using Ladders

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



PI02SC0008

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

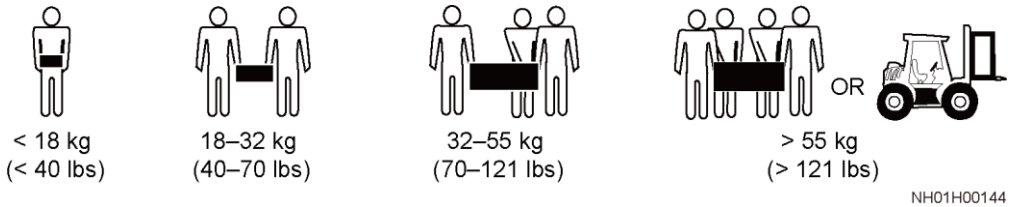
Drilling Holes

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

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

Moving Heavy Objects

- Be cautious to avoid injury when moving heavy objects.



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

1.6 Commissioning

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

1.7 Maintenance and Replacement

DANGER

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

- Maintain the equipment with sufficient knowledge of this document and using proper tools and testing equipment.
- Prior to maintenance, power off the equipment.
- Place temporary warning signs or erect fences to prevent unauthorized access to the maintenance site.

- If the equipment is faulty, contact your dealer.
- The equipment can be powered on only after all faults are rectified. Failing to do so may escalate faults or damage the equipment.

2 Overview

2.1 Model

Model Description

This document covers the following product models:

- SmartACU2000D-D-00
- SmartACU2000D-D-02
- SmartACU2000D-D-05CN

Figure 2-1 Model identifiers

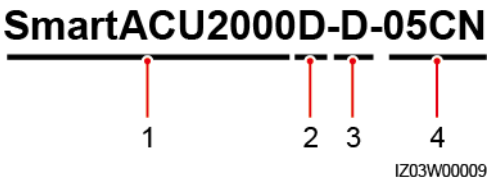


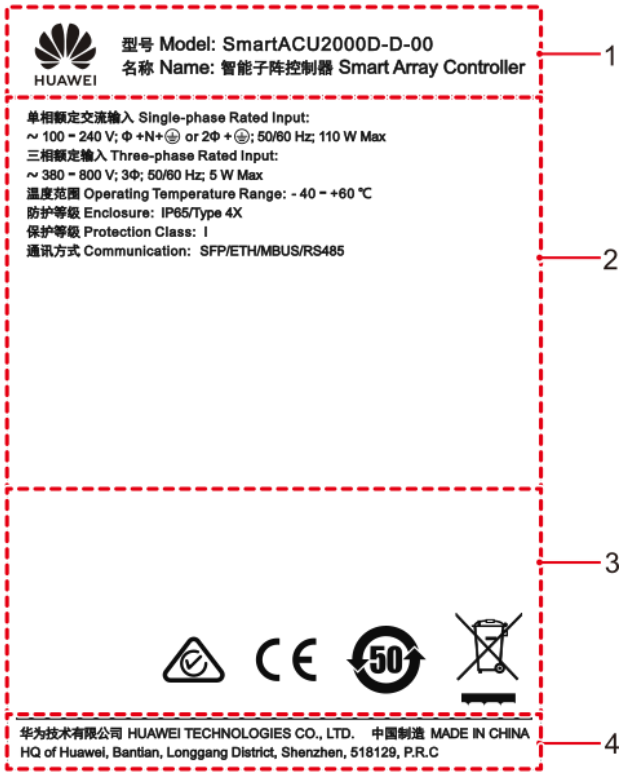
Table 2-1 Model description

No.	Meaning	Description
1	Series	SmartACU2000: smart array controller
2	Hardware	D: version D
3	Voltage level	D: ≤ 800 V three-phase AC input
4	Configuration	• 00: one MBUS route • 02: two MBUS routes • 05CN: one MBUS route and 4G antenna

Model Identification

You can view the SACU model on its nameplate.

Figure 2-2 Nameplate (SmartACU2000D-D-00 as an example)



(1) Trademark and model (2) Key technical specifications

(3) Compliance symbols (4) Company name and country of origin

NOTE

The nameplate figure is for reference only.

2.2 Product Introduction

Functions

The SACU is an outdoor cabinet that houses the SmartLogger3000 (SmartLogger for short), 4G antenna, SmartModule1000, Ethernet switch, access terminal box (ATB), and power over Ethernet (PoE) module.

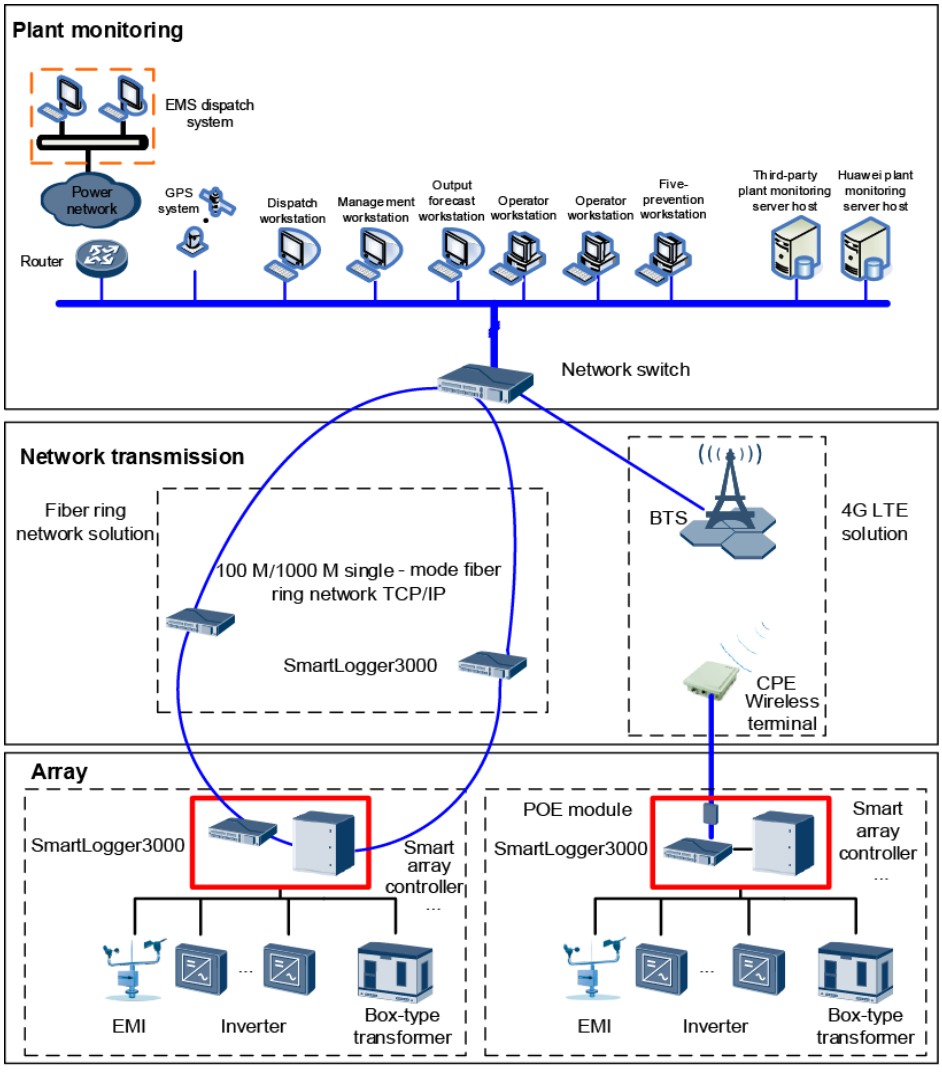
- The SmartLogger monitors and manages PV power systems. It converges ports, converts protocols, and centrally monitors and maintains the equipment in PV power systems.
- The SmartMBUS CCO module connects to the SUN2000 solar inverters that support the monitoring bus (MBUS) function to transmit data over power cables, implementing MBUS networking.

Features

- Intelligent and flexible: Connects to a maximum of 150 solar inverters and supports one-click commissioning.
- Easy to use: Supports wizard-based settings, facilitating parameter settings and device connection.
- Stable and reliable: Has a built-in surge protection module. The industrial application is secure and reliable.

Networking

Figure 2-3 Networking of the SmartACU2000D-D-00 or SmartACU2000D-D-02



- Wired network: fiber ring network solution

NOTE

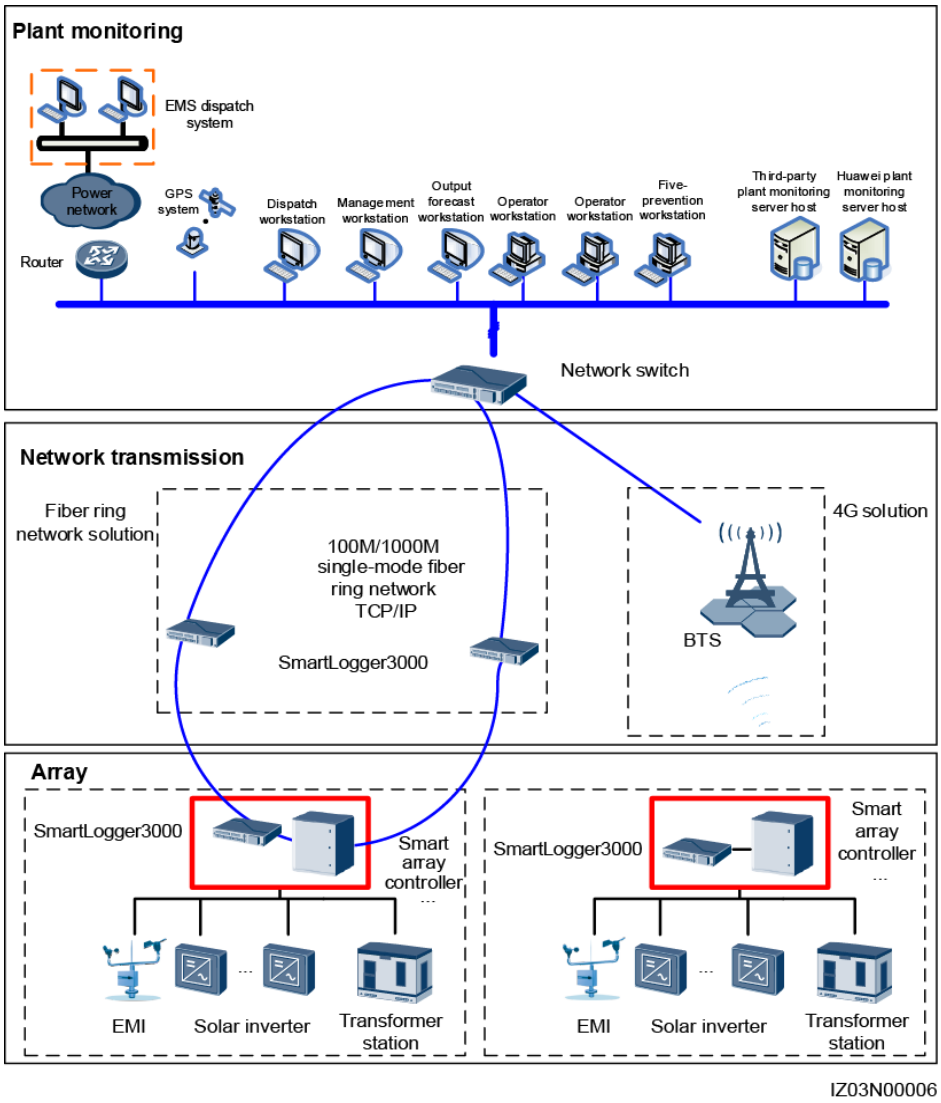
- A maximum of 15 SmartLoggers can be connected to form an optical fiber ring network. Each SmartLogger can connect to devices such as solar inverters, environmental monitoring instruments (EMIs), and power meters.
- Multiple optical fiber ring networks can be connected to the management system over an Ethernet switch.

- Wireless network: 4G LTE solution

NOTE

The IP address of the SmartLogger and that of the customer-premises equipment (CPE) must be on the same network segment.

Figure 2-4 Networking of the SmartACU2000D-D-05CN



- Wired network: fiber ring network solution

NOTE

- A maximum of 15 SmartLoggers can be connected to form an optical fiber ring network. Each SmartLogger can connect to devices such as solar inverters, environmental monitoring instruments (EMIs), and power meters.
- Multiple optical fiber ring networks can be connected to the management system over an Ethernet switch.

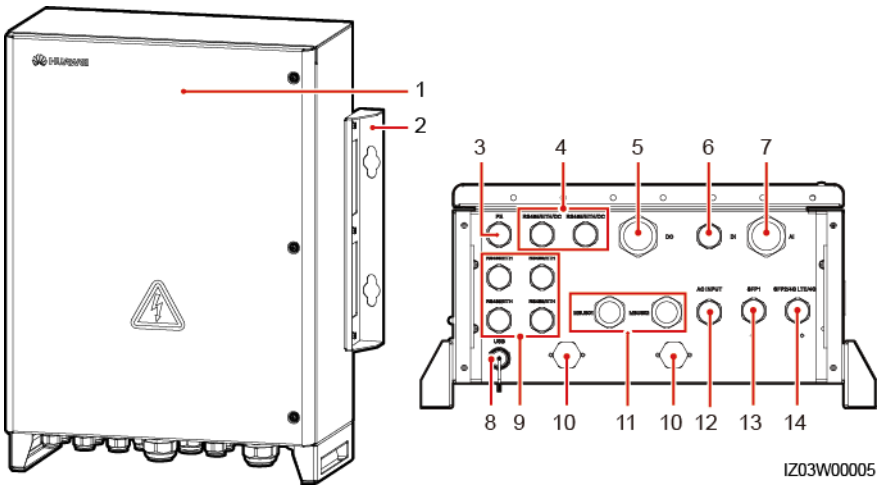
- Wireless network: 4G solution

2.3 Appearance

2.3.1 Product Appearance

Appearance

Figure 2-5 Appearance

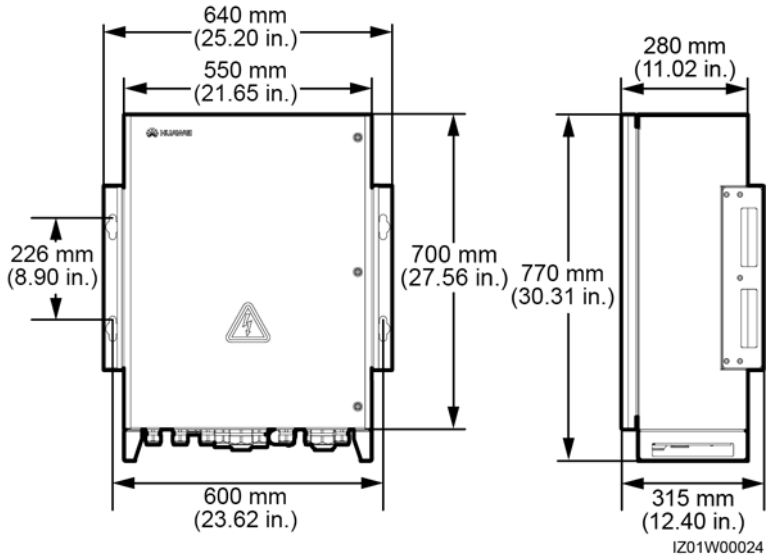


No.	Component	Description
1	Cabinet door	-
2	Mounting plate	-
3	Waterproof connector for the protective earthing cable (PE)	• Specifications: 3/4 in. • Inner diameter: 13–18 mm (0.51–0.71 in.)
4	Waterproof connectors for the RS485 communications cable, network cable, or DC input and output power cable (RS485/ETH/DC)	• Specifications: 3/4 in. • Inner diameter: 13–18 mm (0.51–0.71 in.)

No.	Component	Description
5	Waterproof connector for the DO signal cable (DO)	• Specifications: 5/4 in. • Inner diameter: 20–32 mm (0.79–1.26 in.)
6	Waterproof connector for the DI signal cable (DI)	• Specifications: 3/4 in. • Inner diameter: 13–18 mm (0.51–0.71 in.)
7	Waterproof connector for the AI signal cable (AI)	• Specifications: 5/4 in. • Inner diameter: 20–32 mm (0.79–1.26 in.)
8	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 idle.
9	Waterproof connectors for the RS485 communications cable or network cable (RS485/ETH)	• Specifications: 3/4 in. • Inner diameter: 13–18 mm (0.51–0.71 in.)
10	Ventilation valve	-
11	Waterproof connector for the single-phase AC power cable (AC INPUT)	• Specifications: 3/4 in. • Inner diameter: 13–18 mm (0.51–0.71 in.)
12	Waterproof connectors for the three-phase AC power cable (MBUS01, MBUS02)	• Specifications: 1 in. • Inner diameter: 18–25 mm (0.71–0.98 in.)
13	Waterproof connector for the optical cable (SFP1)	• Specifications: 3/4 in. • Inner diameter: 13–18 mm (0.51–0.71 in.)
14	Waterproof connector for the optical cable, network cable, or 4G antenna (SFP2/4G LTE/4G)	• Specifications: 3/4 in. • Inner diameter: 13–18 mm

Dimensions

Figure 2-6 Cabinet dimensions



2.3.2 Enclosure Signs

Symbol	Name	Meaning
	Warning symbol for electric shocks	High voltage exists after the device is powered on. Only qualified and trained electrical technicians are allowed to install and operate the device.
	Warning label for multiple power inputs	This device has more than one power input. Before maintenance, ensure that the upstream switch is OFF.
	Warning label for cable connection	Do not connect a three-phase input power cable to a single-phase input switch. Do not connect a single-phase input power cable to a three-phase input switch. Otherwise, the device will be damaged.
	Warning label for surge protection module operation	Do not remove or install an energized surge protection module.

Symbol	Name	Meaning
	Weight label	The SACU is heavy and needs to be moved with auxiliary tools or by more than one person.

2.4 Product Composition

NOTE

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

Figure 2-7 SmartACU2000D-D-02 Components

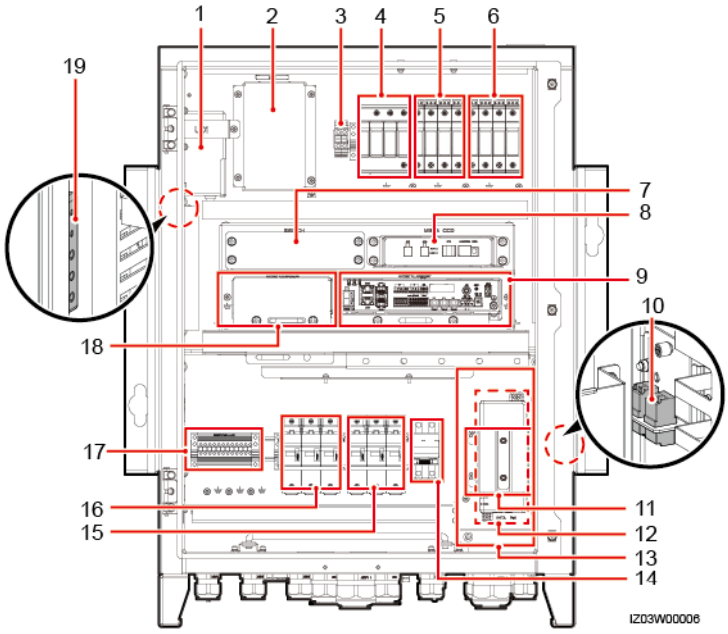


Table 2-2 Components and reserved installation positions

No.	Name	Specifications	Quantity
1	Power adapter of the SmartLogger (U01)	• AC input: 100–240 V, 50 Hz/60 Hz • DC output: 12 V/2 A	1

No.	Name	Specifications	Quantity
2	Position for the 24 V DC power module (U02)	• AC input: 100–240 V, 50 Hz/60 Hz • DC output: 12 V DC, 60 W (maximum); 24 V DC, 30 W (maximum) **NOTE** • If an external 24–28 V DC input is used, the DC output voltage ranges from 21.5 V to 25.2 V. • The 24 V DC power module is optional. Its installation position is reserved in the cabinet.	1
3	AC input terminal of the 24 V power module (JX02)	220 V/2P, supports the wires with a cross-sectional area ranging from 0.2 mm^2 to 10 mm^2 (or 24–8 AWG)	1
4	Single-phase surge protective device (SPD) (F03)	Uc=385 V AC, 20 kA/40 kA, 8/20 μs, 4P	1
5	Three-phase SPD 1 (F01)	U_c = 680 V AC; 20 kA/40 kA; 8/20 μs; 1P	4
6	Three-phase SPD 2 (F02)	U_c = 680 V AC; 20 kA/40 kA; 8/20 μs; 1P	4
7	Position for the Ethernet switch (SWITCH)	-	1
8	SmartMBUS CCO (MBUS CCO)	SmartMBUS CCO01A	1
9	SmartLogger3000 (SmartLogger)	SmartLogger3000	1
10	Fiber adapter (OFA01: TX1 RX1; OFA02: TX2 RX2)	2LC/PC-2LC/PC-4	2
11	Position for the SPD of the power over Ethernet (PoE) module	-	1
12	Position for the PoE module (POE)	-	1
13	ATB (Access Terminal Box)	-	1
14	Single-phase input switch (QF03)	32 A/2P	1
15	Three-phase input switch 2 (FU02)	25 A/3P	1
16	Three-phase input switch 1 (FU01)	25 A/3P	1
17	RS485 communications terminal (JX01)	12P; supports the wires with a cross-sectional area ranging from 1 mm^2 to 2.5 mm^2 (or 18–14 AWG)	1
18	Position for the SmartModule1000A01 (SmartModule)	-	1

No.	Name	Specifications	Quantity
19	Protective earthing (PE) bar	-	1

Figure 2-8 SmartACU2000D-D-00 and SmartACU2000D-D-05CN Components

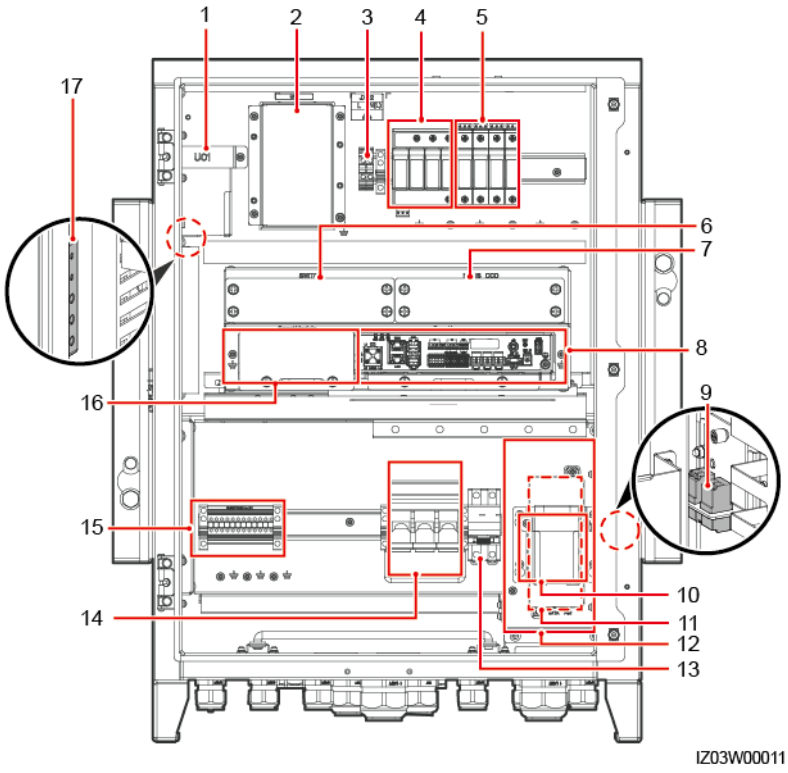


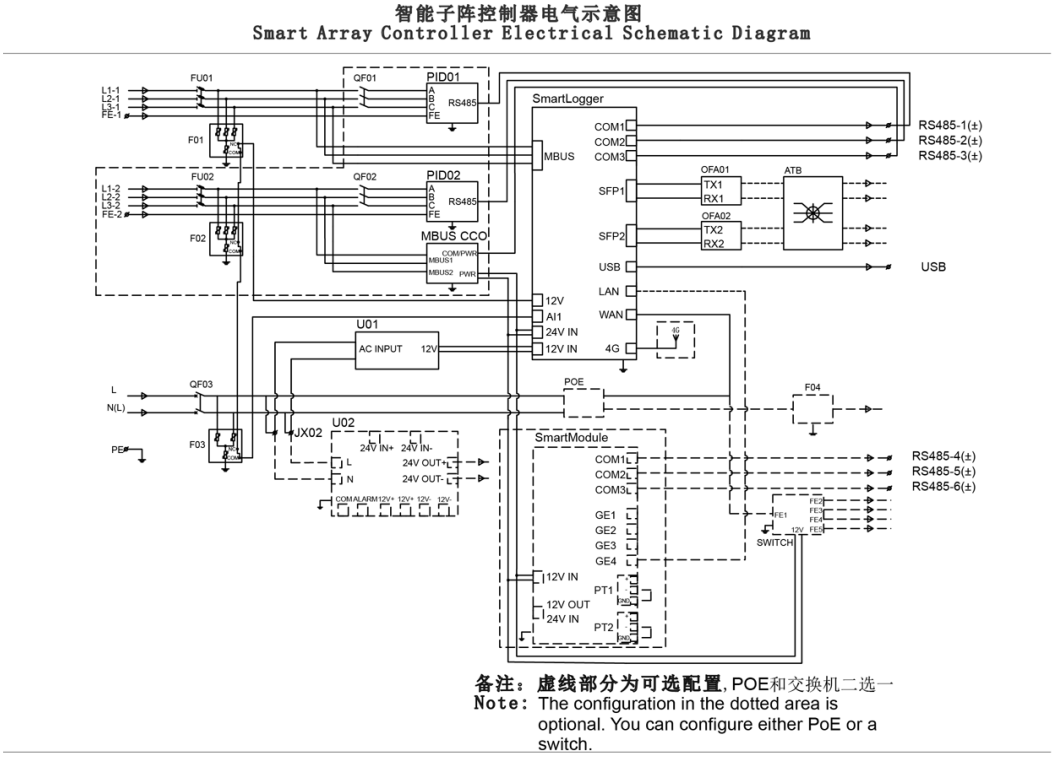
Table 2-3 Components and reserved installation positions

No.	Name	Specifications	Quantity
1	Power adapter of the SmartLogger (U01)	• AC input: 100–240 V, 50 Hz/60 Hz • DC output: 12 V/2 A	1
2	Position for the 24 V DC power module (U02)	• AC input: 100–240 V, 50 Hz/60 Hz • DC output: 12 V DC, 60 W (maximum); 24 V DC, 30 W (maximum) **NOTE** • If an external 24–28 V DC input is used, the DC output voltage ranges from 21.5 V to 25.2 V. • The 24 V DC power module is optional. Its installation position is reserved in the cabinet.	1
3	AC input terminal of the 24 V power module (JX02)	220 V/2P, supports the wires with a cross-sectional area ranging from 0.2 mm^2 to 10 mm^2 (or 24–8 AWG)	1

No.	Name	Specifications	Quantity
4	Single-phase surge protective device (SPD) (F03)	U_c = 385 V AC; 20 kA/40 kA; 8/20 μs; 4P	1
5	Three-phase SPD (F01)	U_c = 680 V AC; 20 kA/40 kA; 8/20 μs; 1P	4
6	Position for the Ethernet switch (SWITCH)	-	1
7	Position for the SmartMBUS CCO (MBUS CCO)	-	-
8	SmartLogger3000 (SmartLogger)	SmartLogger3000	1
9	Fiber adapter (OFA01: TX1 RX1; OFA02: TX2 RX2)	2LC/PC-2LC/PC-4	2
10	Position for the SPD of the power over Ethernet (PoE) module	-	1
11	Position for the PoE module (POE)	-	1
12	ATB (Access Terminal Box)	-	1
13	Single-phase input switch (QF03)	32 A/2P	1
14	Three-phase input switch (FU01)	25 A/3P	1
15	RS485 communications terminal (JX01)	12P; supports the wires with a cross-sectional area ranging from 1 mm^2 to 2.5 mm^2 (or 18–14 AWG)	1
16	Position for the SmartModule1000A01 (SmartModule)	-	1
17	Protective earthing (PE) bar	-	1

2.5 Working Principles

Figure 2-9 Electrical conceptual diagram



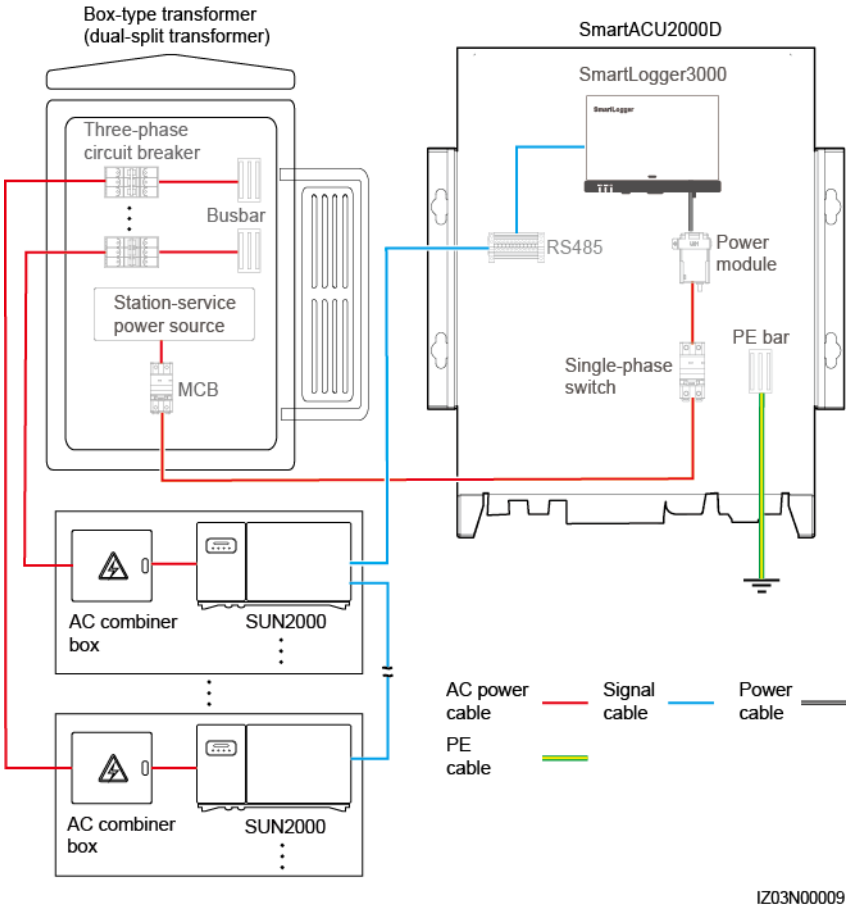
The SACU communicates with devices in a PV array over RS485, MBUS, or Ethernet.

NOTE

When the SACU communicates with solar inverters over MBUS, log in to the embedded WebUI of the SmartLogger3000, choose **Monitoring** > **MBUS** > **Networking Settings**, and set **Networking** to **Enable** (default value). When the SACU communicates with the solar inverters over RS485, set **Networking** to **Disable**. For details, see the *SmartLogger3000 User Manual*.

- RS485 communication mode

Figure 2-10 RS485 communication mode



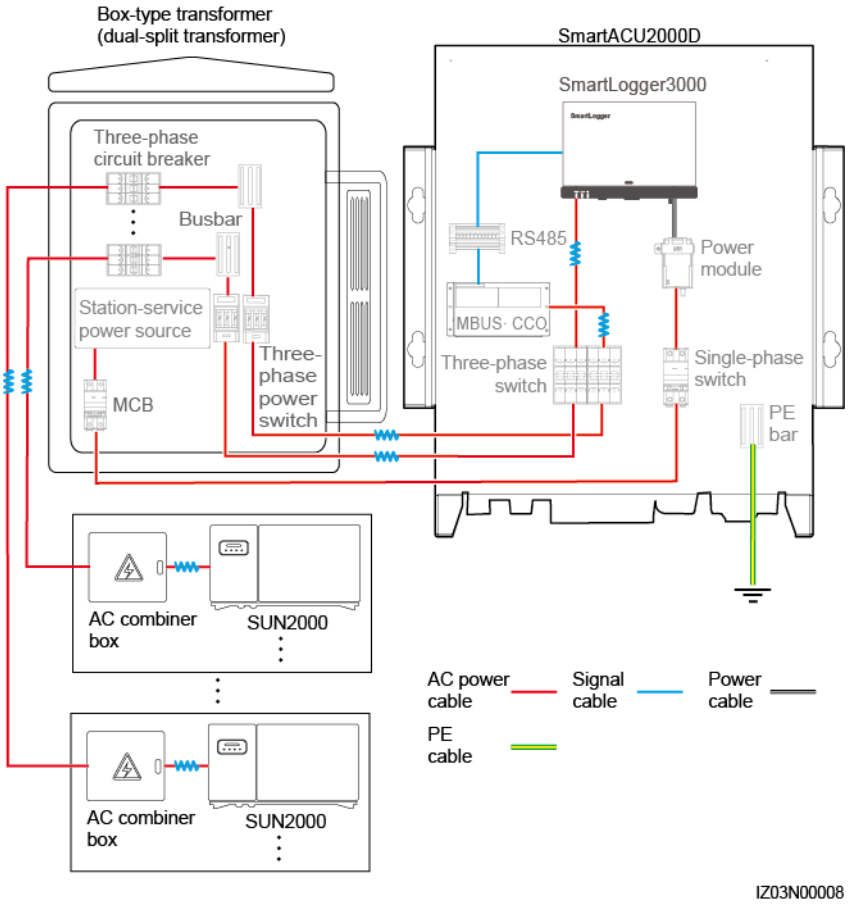
- All SACU models support the RS485 communication mode.
- The SmartLogger connects to the transformer station, power meter, solar inverter, MBUS CCO module, and other devices that support RS485 communication over COM ports.

NOTE

The figure displays only major components and cables and is for reference only.

- MBUS communication mode

Figure 2-11 MBUS communication mode



- If a double-column transformer is used, use the SACU that supports the access of one MBUS route.
- If a dual-split transformer is used, use the SACU that supports the access of two MBUS routes.
- The SmartLogger has embedded MBUS. It connects to the solar inverters that support MBUS communication over the three-phase AC power cable.
- In the SACU that supports the access of two MBUS routes, the MBUS CCO module connects to the solar inverters that support MBUS communication over the three-phase AC power cable.

NOTE

- The MBUS CCO module is available only for the SmartACU2000D-D-02.
- The figure displays only major components and cables and is for reference only.

- Ethernet communication mode
  - All SACU models support the Ethernet communication mode. The cabinet reserves a position for installing an Ethernet switch.
  - The SmartLogger has a 10M/100M/1000M Ethernet electrical port (WAN), and the SmartLogger connecting to an Ethernet switch has five 10M/100M/1000M Ethernet electrical ports.

The SACU communicates with the plant monitoring system over a fiber ring network, 4G LTE, or 4G network.

- Over a fiber ring network
  - All SACU models support a fiber ring network.
  - The SmartLogger connects to the plant monitoring system by optical fibers through an ATB.
- Over a 4G LTE network
  - All SACU models support the 4G LTE communication mode. The cabinet reserves positions for installing the PoE module and PoE SPD.
  - The SmartLogger connects to the plant monitoring system by 4G LTE through CPE.
- 4G communication mode

  The SmartLogger communicates with the cloud server over a 4G wireless network.

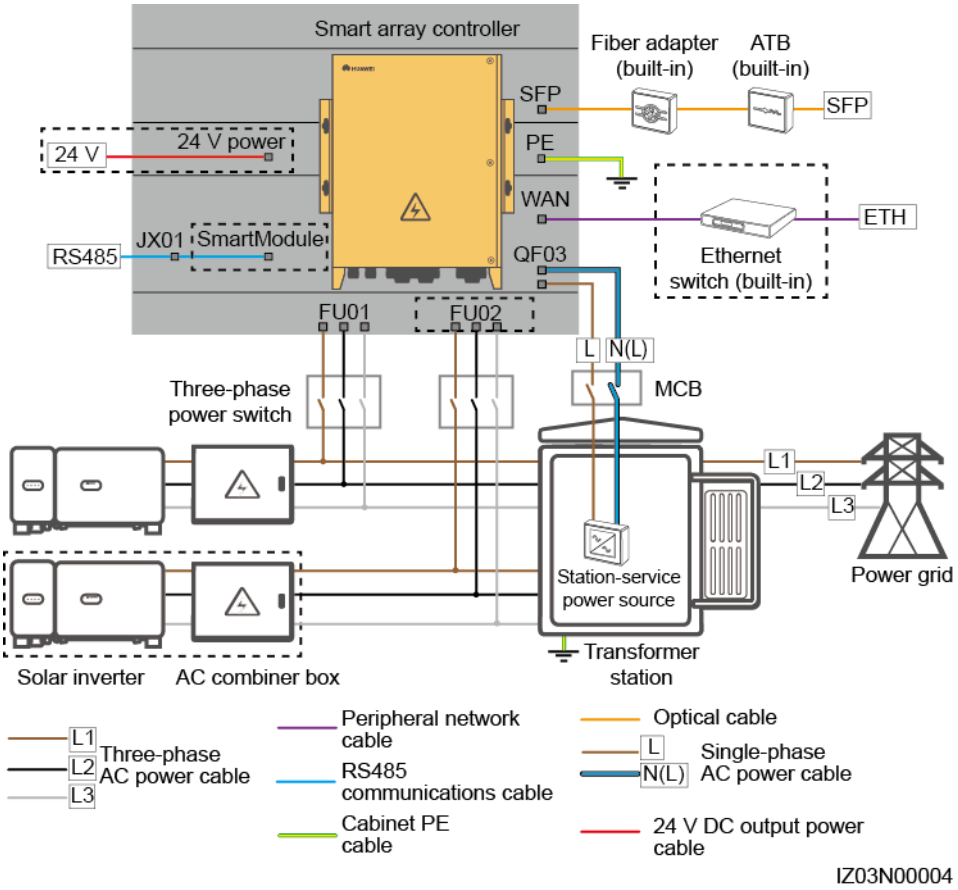
2.6 Configuration in Different Scenarios

2.6.1 Fiber Ring Network

NOTE

Only the SmartACU2000D-D-00 and SmartACU2000D-D-02 are applicable to this scenario.

Figure 2-12 Networking diagram



NOTE

Components in dashed-line boxes are optional. To highlight the involved area, the figure does not show all factory-installed components and cables.

Table 2-4 Components required in the fiber ring network scenario

Position	Component		Recommended Model or Specifications	Component Source	Quantity
SACU	(Optional) SmartModule		SmartModule1000A01	Purchased from Huawei	1
	(Optional) Ethernet switch		UT-H605 or ES1000		1
	(Optional) 24 V power supply		-		1
	Fitting bag for optical ring switching[a]	Optical module	-		2
		Optical jumper	-		8

<table>
<tr><th>Position</th><th colspan="2">Component</th><th>Recommended Model or Specifications</th><th>Component Source</th><th>Quantity</th></tr>
<tr><td rowspan="2">Transformer station</td><td colspan="2">Miniature circuit breaker (MCB)</td><td>Recommended rated current: 32 A; number of poles: 2</td><td rowspan="2">Prepared by the customer</td><td>1</td></tr>
<tr><td>Three-phase power switch</td><td>Knife fuse switch</td><td>• When the rated AC voltage on the LV side of the transformer station is less than or equal to 600 V, the rated voltage of the knife fuse switch should be greater than or equal to 600 V.
• When the rated AC voltage on the LV side of the transformer station is greater than 600 V and less than or equal to 800 V, the rated voltage of the knife fuse switch should be greater than or equal to 800 V.
• Recommended rated current of the fuse: 32 A; rated current of the knife fuse switch box: ≥ 32 A; number of poles: 3 (three fuses for each knife fuse switch box)</td><td>• Scenario with a double-column transformer: 1
• Scenario with a dual-split transformer: 2</td></tr>
<tr><td colspan="6">Note a: There are two types of fitting bags for fiber ring switching: with 100M optical modules or with 1000M optical modules. You can purchase a fitting bag based on the specifications of the optical modules used on the fiber channel (FC) switch.</td></tr>
</table>

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.

Table 2-5 Cables to be prepared in the fiber ring network scenario

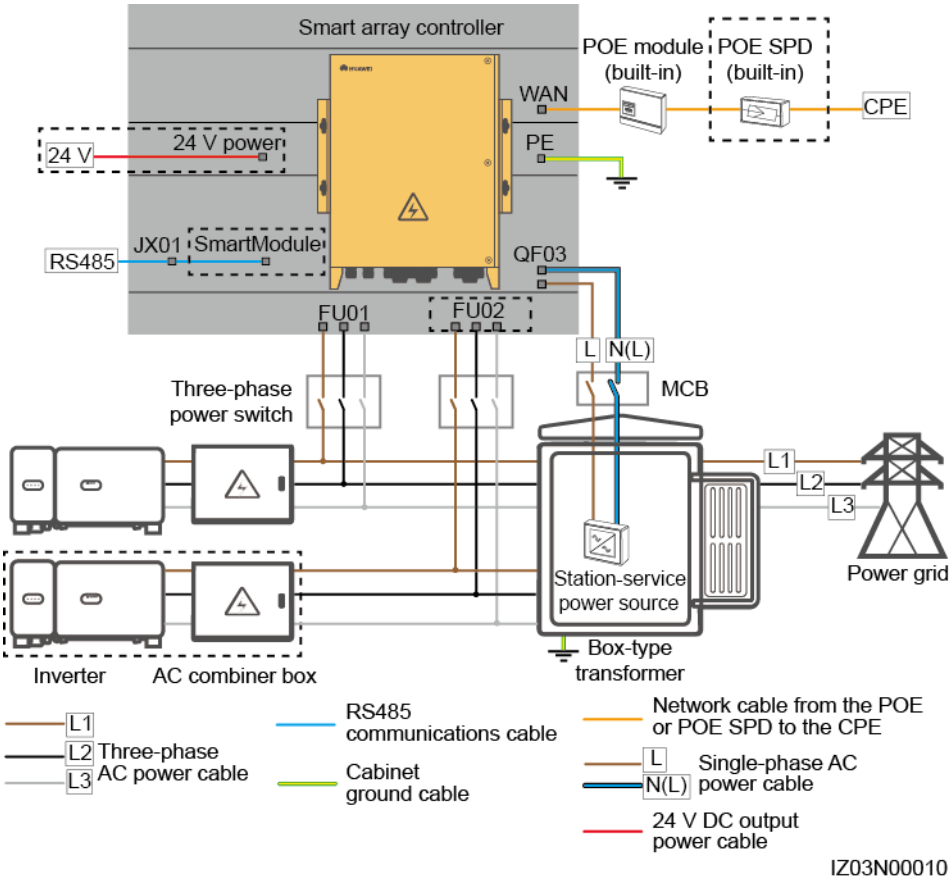
No.	Cable	Recommended Model or Specifications	Cross-sectional Area Range of the Cable (Recommended Value)
1	Three-phase AC power cable	• Three-core (L1, L2, and L3) outdoor armored copper cable • When the rated AC voltage on the LV side of the transformer station is less than or equal to 600 V, the operating voltage between the three-phase AC power cable and the ground should be greater than or equal to 600 V. • When the rated AC voltage on the LV side of the transformer station is greater than 600 V and less than or equal to 800 V, the operating voltage between the three-phase AC power cable and the ground should be greater than or equal to 1000 V.	• 8–10 mm^2 (10 mm^2) • 8 AWG
2	(Optional) 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/32.81 ft), as well as shielded RJ45 connectors	-
3	Peripheral RS485 communications cable	Computer cable (DJYP2VP2-22 2x2x1) or armored shielded twisted pair that can be used outdoors, as well as OT-M4 terminals	• 0.5–1 mm^2 (1 mm^2) • 20–18 AWG (18 AWG)
4	Cabinet PE cable	Outdoor copper cable and OT-M6 terminals	• 6–16 mm^2 (16 mm^2) • 10–6 AWG (6 AWG)
5	Optical cable	Four-core or eight-core single-mode armored optical cable with a transmission wavelength of 1310 nm and an outer diameter of less than or equal to 18 mm (0.71 in.)	-
6	Single-phase AC power cable	• Standard connection: two-core outdoor armored copper cable • Connection through a tube: single-core outdoor copper cable • Operating voltage to the ground ≥ 300 V	• 4–6 mm^2 (4 mm^2) • 12–10 AWG (12 AWG)
7	(Optional) 24 V DC output power cable	• Standard connection: two-core outdoor armored copper cable • Connection through a tube: single-core outdoor copper cable • Operating voltage to the ground ≥ 300 V	• 2.5–4 mm^2 (2.5 mm^2) • 14–12 AWG (14 AWG)

2.6.2 4G LTE

NOTE

Only the SmartACU2000D-D-00 and SmartACU2000D-D-02 are applicable to this scenario.

Figure 2-13 Networking diagram



NOTE

Components in dashed-line boxes are optional. To highlight the involved area, the figure does not show all factory-installed components and cables.

Table 2-6 Components required in the 4G LTE network scenario

Position	Component		Recommended Model or Specifications	Component Source	Quantity
SACU	(Optional) SmartModule		SmartModule1000A01	Purchased from Huawei	1
	(Optional) 24 V power supply		-		1
	Fitting bags for the PoE module and	PoE module	-		1
		PoE SPD[a]	-		1

Position	Component		Recommended Model or Specifications	Component Source	Quantity
Outside the SACU and transformer station	CPE	CPE	-		1
Transformer station	MCB		Recommended rated current: 32 A; number of poles: 2	Prepared by the customer	1
	Three-phase power switch	Knife fuse switch	• When the rated AC voltage on the LV side of the transformer station is less than or equal to 600 V, the rated voltage of the knife fuse switch should be greater than or equal to 600 V. • When the rated AC voltage on the LV side of the transformer station is greater than 600 V and less than or equal to 800 V, the rated voltage of the knife fuse switch should be greater than or equal to 800 V. • Recommended rated current of the fuse: 32 A; rated current of the knife fuse switch box: ≥ 32 A; number of poles: 3 (three fuses for each knife fuse switch box)		• Scenario with a double-column transformer: 1 • Scenario with a dual-split transformer: 2
Note a: If the CPE model is EG860, a PoE SPD is required.					

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.

Table 2-7 Cables to be prepared in the 4G LTE network scenario

No.	Cable	Recommended Model or Specifications	Cross-sectional Area Range of the Cable (Recommended Value)
1	Three-phase AC power cable	• Three-core (L1, L2, and L3) outdoor armored copper cable • When the rated AC voltage on the LV side of the transformer station is less than or equal to 600 V, the operating voltage between the three-phase AC power cable and the ground should be greater than or equal to 600 V. • When the rated AC voltage on the LV side of the transformer station is greater than 600 V and less than or equal to 800 V, the operating voltage between the three-phase AC power cable and the ground should be greater than or equal to 1000 V.	• 8–10 mm^2 (10 mm^2) • 8 AWG
2	Peripheral RS485 communications cable	Computer cable (DJYP2VP2-22 2x2x1) or armored shielded twisted pair that can be used outdoors, as well as OT-M4 terminals	• 0.5–1 mm^2 (1 mm^2) • 20–18 AWG (18 AWG)
3	Cabinet PE cable	Outdoor copper cable and OT-M6 terminals	• 6–16 mm^2 (16 mm^2) • 10–6 AWG (6 AWG)
4	Network cable from the PoE module or PoE SPD to the CPE	20 m (65.62 ft) long network cable delivered with the Huawei CPE (If the cable is not long enough, prepare a 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/32.81 ft), as well as shielded RJ45 connectors.)	-
5	Single-phase AC power cable	• Standard connection: two-core outdoor armored copper cable • Connection through a tube: single-core outdoor copper cable • Operating voltage to the ground ≥ 300 V	• 4–6 mm^2 (4 mm^2) • 12–10 AWG (12 AWG)
6	(Optional) 24 V DC output power cable	• Standard connection: two-core outdoor armored copper cable • Connection through a tube: single-core outdoor copper cable • Operating voltage to the ground ≥ 300 V	• 2.5–4 mm^2 (2.5 mm^2) • 14–12 AWG (14 AWG)

2.6.3 4G

NOTE

Only the SmartACU2000D-D-05CN is applicable to this scenario.

Figure 2-14 Networking diagram

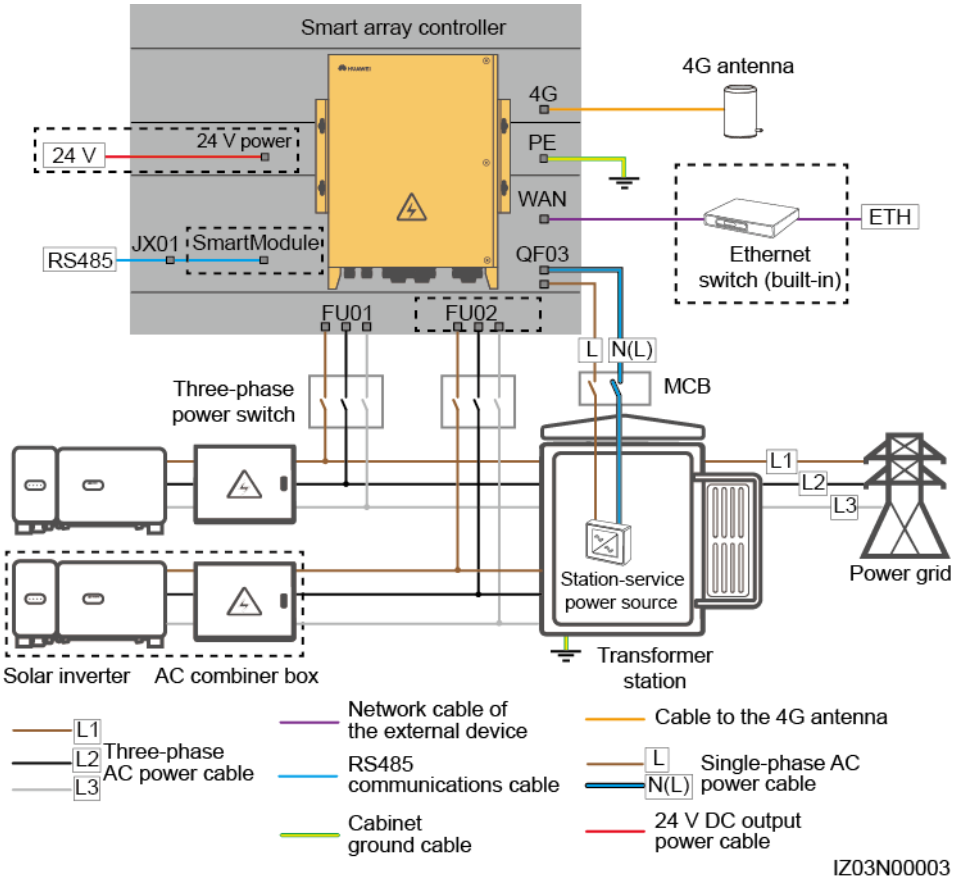


Table 2-8 Components required in the 4G network scenario

Position	Component	Recommended Model or Specifications	Component Source	Quantity
SACU	(Optional) Ethernet switch	UT-H605 or ES1000	Purchased from Huawei	1
	(Optional) SmartModule	SmartModule1000A01		1
	(Optional) 24 V power supply	-		1
	SIM Card	Standard SIM card of a local carrier (size: 25 mm x 15 mm)	Prepared by the customer	1

Position	Component		Recommended Model or Specifications	Component Source	Quantity
	4G antenna		-	Delivered with the product	1
Transformer station	MCB		Recommended rated current: 32 A; number of poles: 2	Prepared by the customer	1
	Three-phase power switch	Knife fuse switch	• When the rated AC voltage on the LV side of the transformer station is less than or equal to 600 V, the rated voltage of the knife fuse switch should be greater than or equal to 600 V. • When the rated AC voltage on the LV side of the transformer station is greater than 600 V and less than or equal to 800 V, the rated voltage of the knife fuse switch should be greater than or equal to 800 V. • Recommended rated current of the fuse: 32 A; rated current of the knife fuse switch box: ≥ 32 A; number of poles: 3 (three fuses for each knife fuse switch box)		• Scenario with a double-column transformer: 1 • Scenario with a dual-split transformer: 2

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.

Table 2-9 Cables to be prepared in the 4G network scenario

No.	Cable	Recommended Model or Specifications	Cross-sectional Area Range of the Cable (Recommended Value)
1	Three-phase AC power cable	• Three-core (L1, L2, and L3) outdoor armored copper cable • When the rated AC voltage on the LV side of the transformer station is less than or equal to 600 V, the operating voltage between the three-phase AC power cable and the ground should be greater than or equal to 600 V. • When the rated AC voltage on the LV side of the transformer station is greater than 600 V and less than or equal to 800 V, the operating voltage between the three-phase AC power cable and the ground should be greater than or equal to 1000 V.	• 8–10 mm^2 (10 mm^2) • 8 AWG
2	(Optional) 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/32.81 ft), as well as shielded RJ45 connectors	-
3	Peripheral RS485 communications cable	Computer cable (DJYP2VP2-22 2x2x1) or armored shielded twisted pair that can be used outdoors, as well as OT-M4 terminals	• 0.5–1 mm^2 (1 mm^2) • 20–18 AWG (18 AWG)
4	Cabinet PE cable	Outdoor copper cable and OT-M6 terminals	• 6–16 mm^2 (16 mm^2) • 10–6 AWG (6 AWG)
5	Single-phase AC power cable	• Standard connection: two-core outdoor armored copper cable • Connection through a tube: single-core outdoor copper cable • Operating voltage to the ground ≥ 300 V	• 4–6 mm^2 (4 mm^2) • 12–10 AWG (12 AWG)
6	(Optional) 24 V DC output power cable	• Standard connection: two-core outdoor armored copper cable • Connection through a tube: single-core outdoor copper cable • Operating voltage to the ground ≥ 300 V	• 2.5–4 mm^2 (2.5 mm^2) • 14–12 AWG (14 AWG)

3 Storage Requirements

The following requirements should be met when the SACU needs to be stored prior to installation:

- Do not unpack the SACU. Check the packing materials periodically. If any rodent bites are found, replace the packing materials immediately.
- Store the SACU in a place with appropriate temperature and humidity to protect the SACU from dust and water vapor corrosion.
- To avoid personal injury or device damage, stack SACUs neatly so that they will not fall over.
- If the SACU has been stored for a long time, it needs to be inspected by professionals before it is put into use.

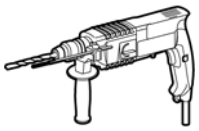
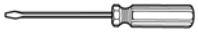
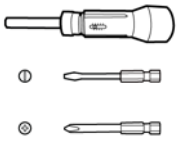
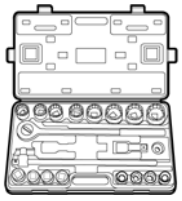
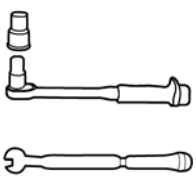
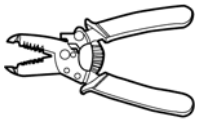
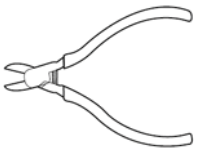
Huawei shall not be liable for any consequence caused by violation of the storage requirements specified in this document.

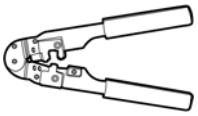
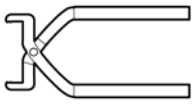
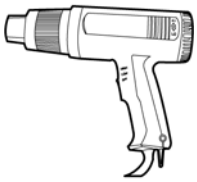
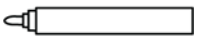
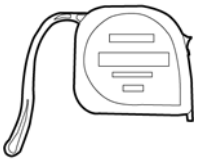
4 System Installation

4.1 Checking Before Installation

Item	Acceptance Criteria
Outer package	The outer package is intact and tidy. If it is damaged or abnormal, do not unpack it, and contact your dealer.
Exterior	The exterior is intact. If any damage is found, do not use the device, and contact your dealer as soon as possible.
Deliverables	Check the number of deliverables against the packing list in the packing case. If any deliverables are missing or damaged, contact your dealer.

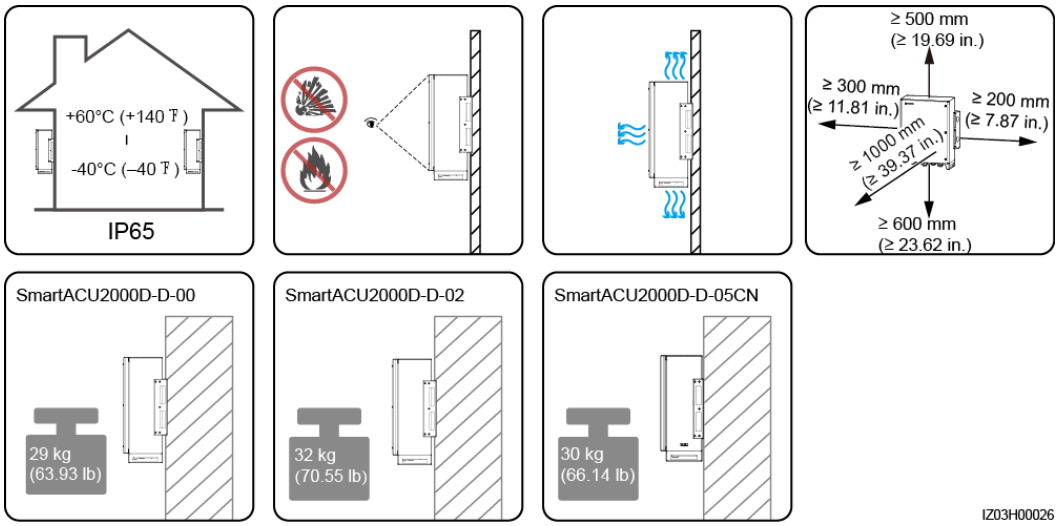
4.2 Tools

Category	Tool			
Installation	 Hammer drill. Drill bit: Φ14 mm (0.55 in.) and Φ16 mm (0.63 in.)	 Adjustable wrench. Open end: 32 mm (12.59 in.)	 Flat-head screwdriver. Head: 3 mm x 150 mm (0.12 in. x 5.91 in.)	 Torque screwdriver. (Flat head: M3; cross-shaped head: M3, M4, and M6)
	 Socket wrench set	 Torque wrench	 Wire strippers	 Diagonal pliers

Category	Tool			
	 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
	 Measuring tape	 Level	 Cable tie	-
Personal protective equipment (PPE)	 Safety gloves	 Safety goggles	 Anti-dust respirator	 Safety boots

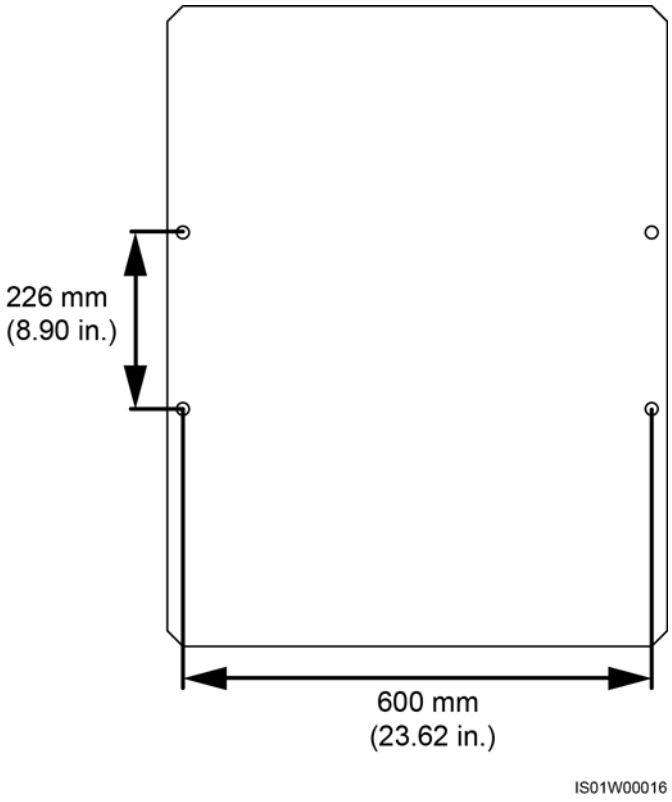
4.3 Installation Requirements

Figure 4-1 Installation requirements



4.4 Installing the Cabinet

Figure 4-2 Marking-off template



4.4.1 Wall-mounted Installation

Step 1 Determine the positions for drilling holes into the wall based on the delivered marking-off template. For details, see Figure 4-2. Level the marking-off template using a level, and mark mounting holes using a marker.

Step 2 Drill holes using a hammer drill and install expansion bolts.

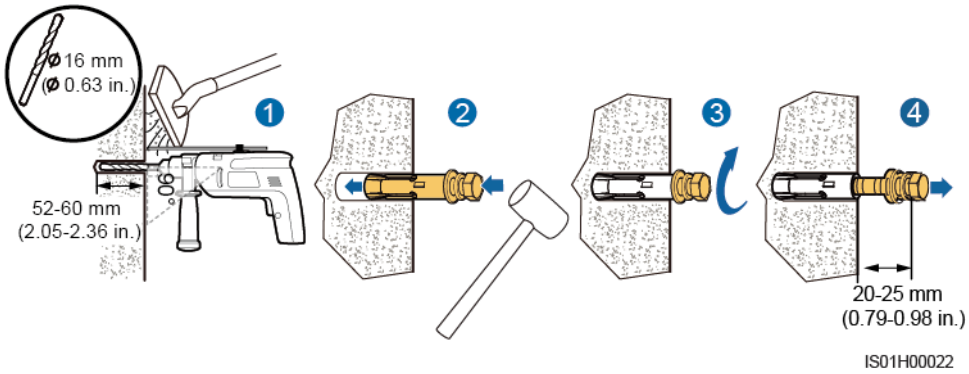
WARNING

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

NOTICE

- To prevent dust inhalation or contact with eyes, wear safety goggles and an anti-dust respirator when drilling holes.
- Wipe away any dust in or around the holes and measure the hole distances. If the holes are inaccurately positioned, drill holes again.
- Level the head of the expansion sleeve with the concrete wall after removing the bolt, spring washer, and flat washer. Otherwise, the mounting bracket will not be securely installed on the wall.

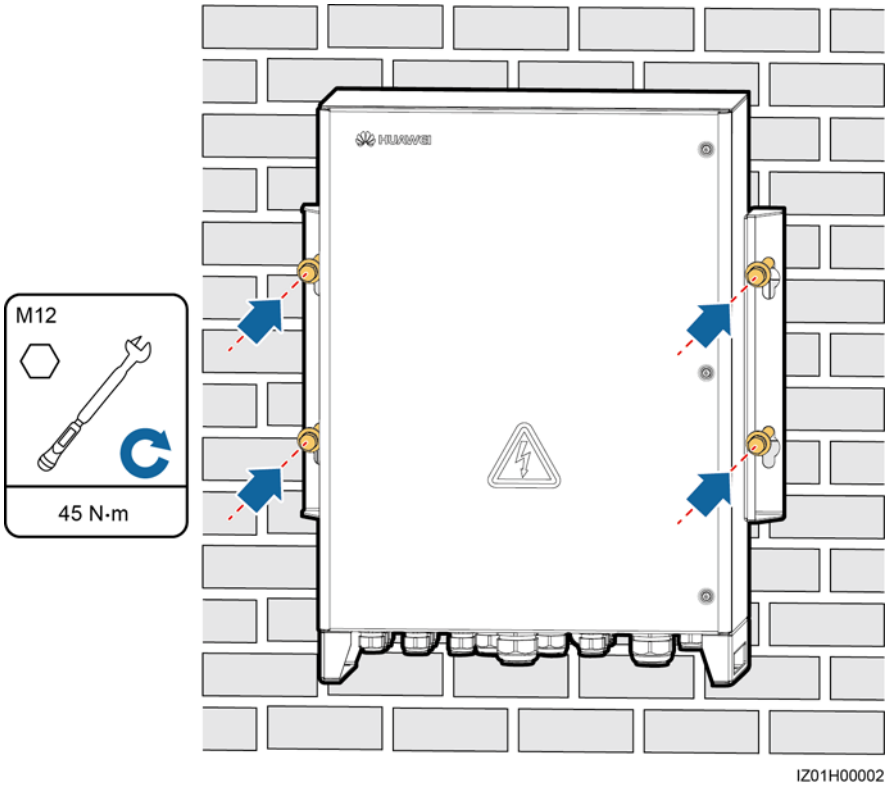
Figure 4-3 Drilling holes and installing expansion bolts



Step 3 Assign two persons to lift the cabinet and mount it on the bolts, and assign another person to assist.

Step 4 Tighten the bolts using a torque wrench with the open end of 18 mm (0.71 in.).

Figure 4-4 Installing a cabinet



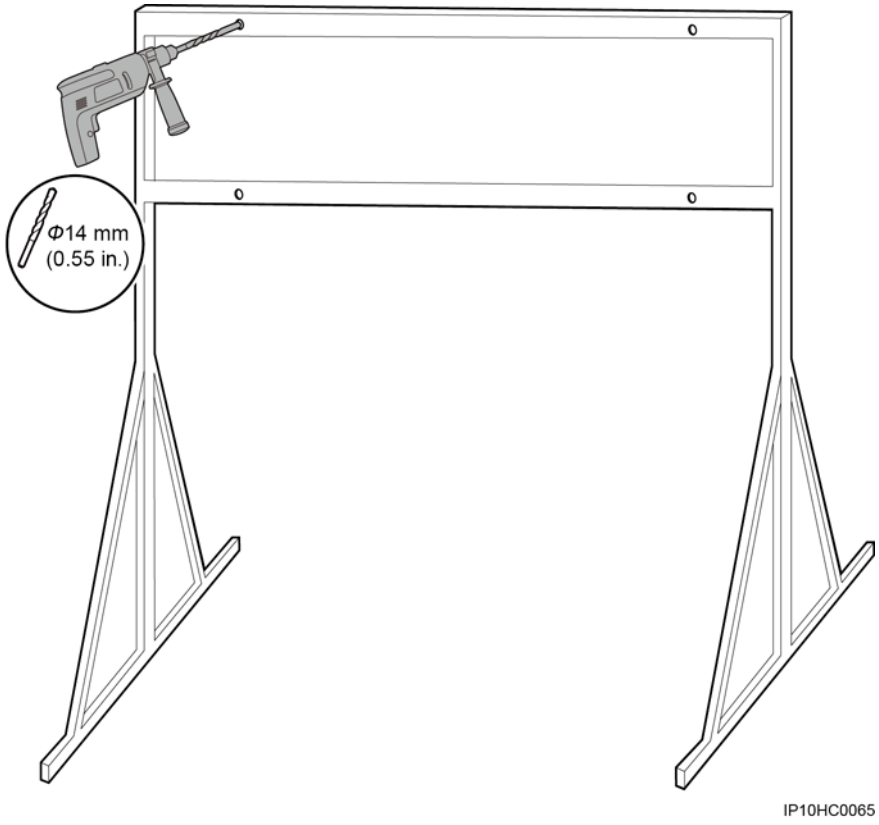
----End

4.4.2 Support-mounted Installation

Step 1 Determine the positions for drilling holes into the support based on the delivered marking-off template. For details, see Figure 4-2. Level the marking-off template using a level, and mark mounting holes using a marker.

Step 2 Drill holes using a hammer drill.

Figure 4-5 Drilling a hole

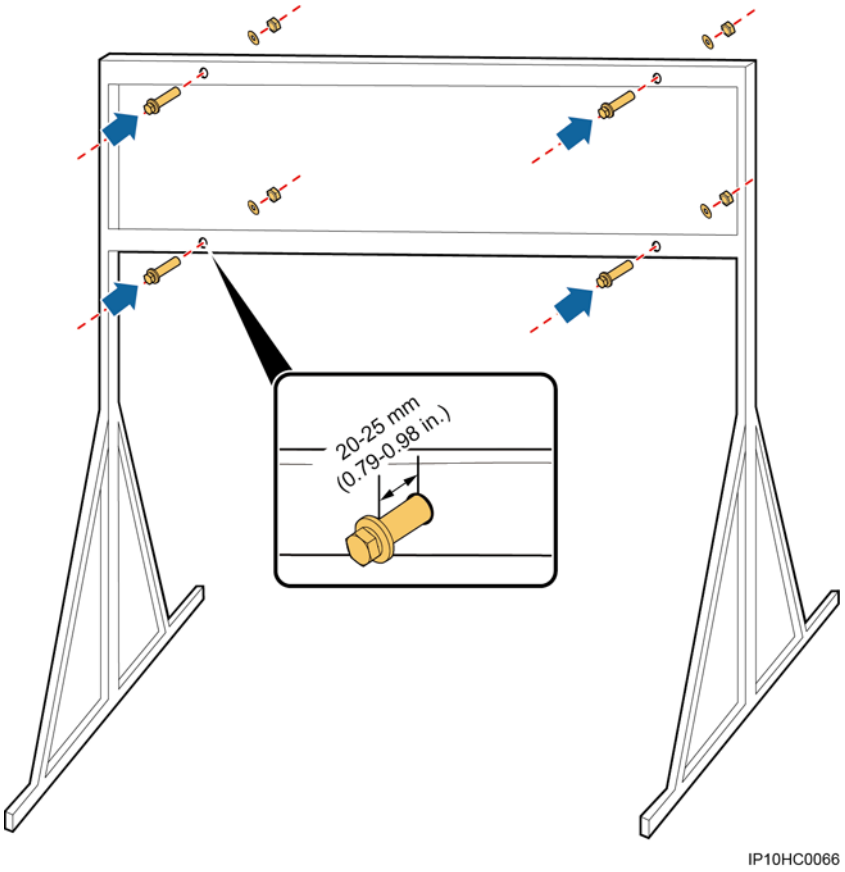


Step 3 Insert the M12x40 bolt assemblies delivered with the cabinet into the holes, and secure them using the supplied nuts and flat washers.

NOTE

Do not fully tighten the bolts.

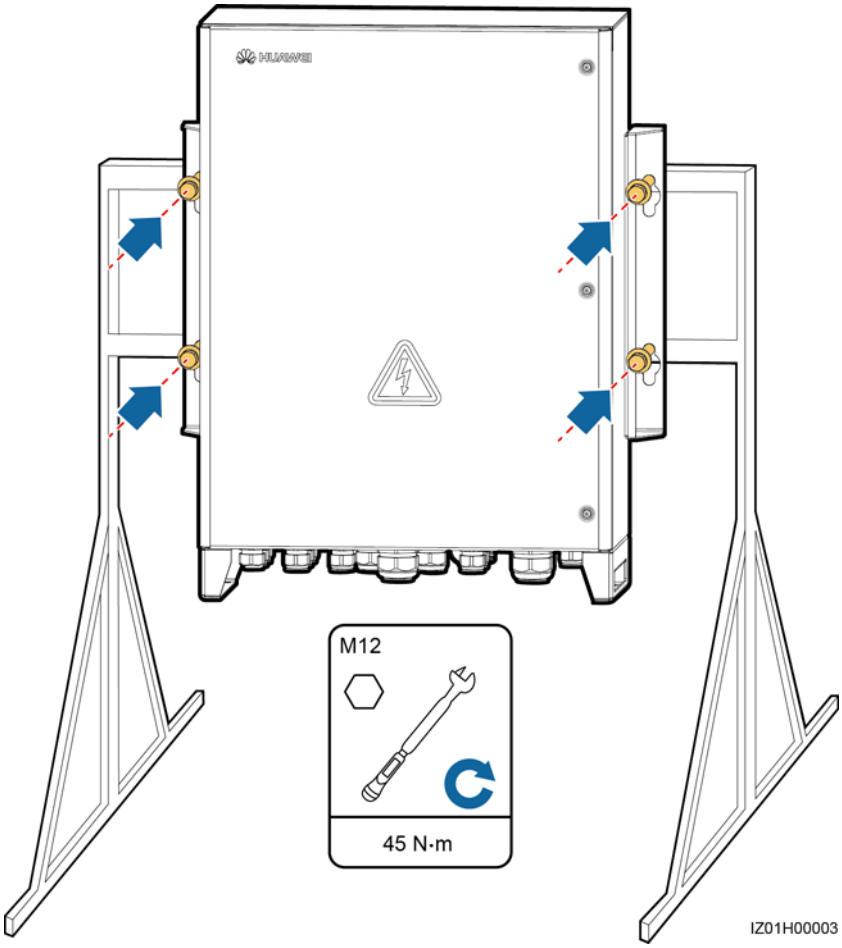
Figure 4-6 Fixing bolts



Step 4 Assign two persons to lift the cabinet and mount it on the bolts, and assign another person to assist.

Step 5 Tighten the bolts using a torque wrench with the open end of 18 mm (0.71 in.).

Figure 4-7 Installing a cabinet



----End

4.4.3 Pole-mounted Installation

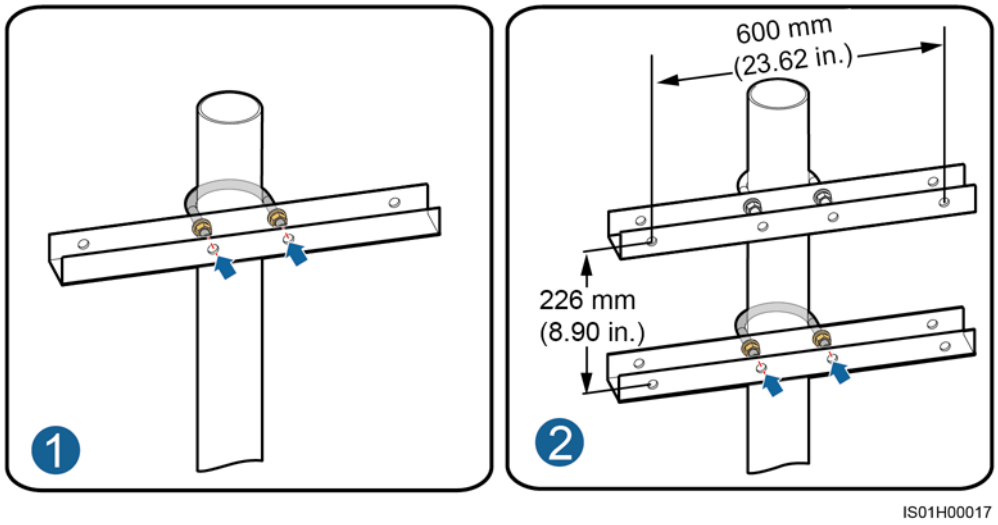
- If you need to pole-mount the SACU, prepare pole mounting brackets based on the dimensions of the SACU. For details about the dimensions, see Dimensions.
- You are advised to use M12 U-shaped bolts to secure the pole-mounting brackets.

NOTE

Figures provided in this section are for reference only. The actual poles and pole-mounting brackets prevail.

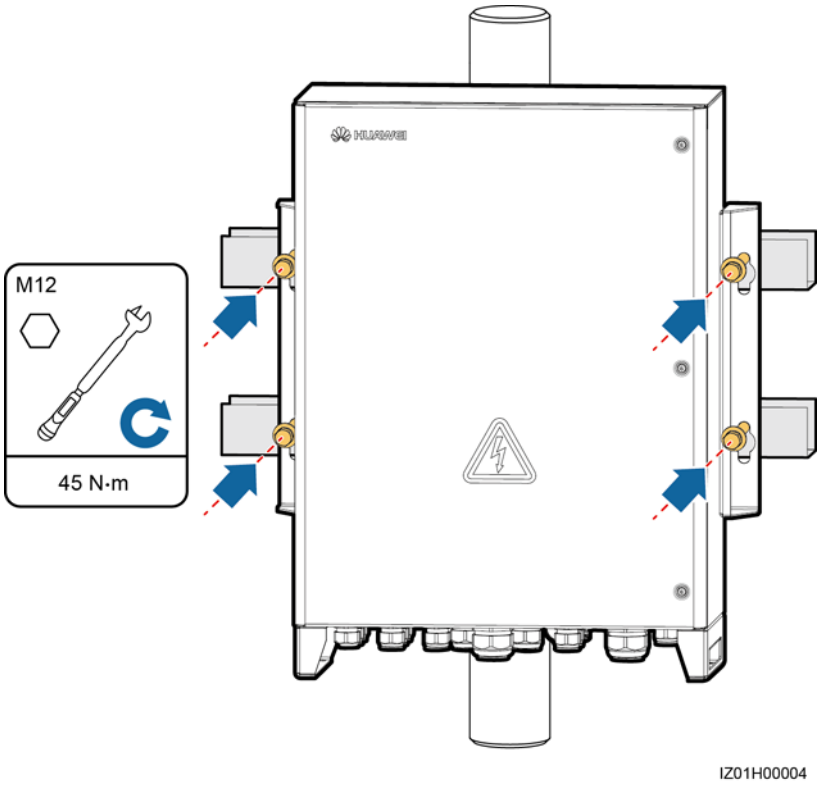
Step 1 Secure the pole-mounting brackets to the pole and tighten the U-shaped bolts to a torque of 45 N·m using a torque wrench with the open end of 18 mm (0.71 in.).

Figure 4-8 Securing pole-mounting brackets



Step 2 Secure the SACU to the pole-mounting brackets. For detailed operations, see 4.4.2 Support-mounted Installation.

Figure 4-9 Securing a cabinet



----End

4.5 Installing the Components

Install the components based on 2.6 Configuration in Different Scenarios.

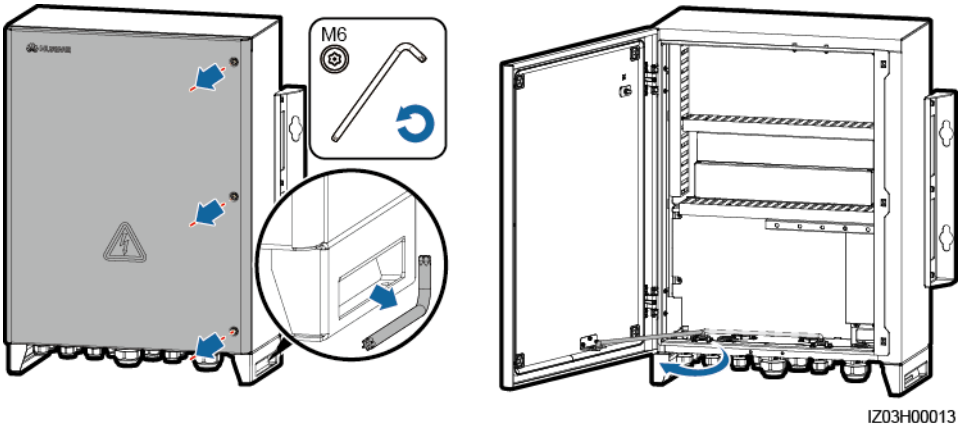
4.5.1 Opening the Main Cabinet Door

NOTICE

- Before opening the main cabinet door, turn off all upstream switches for the SACU to power off the SACU. After that, wait at least 3 minutes and operate the SACU. If you have to operate an energized SACU, wear insulation gloves and take preventive measures.
- If you need to open the main cabinet door on rainy or snowy days, take protective measures to prevent rain or snow from entering the cabinet. If it is impossible to take protective measures, do not open the main cabinet door on rainy or snowy days.
- Do not leave unused screws in the cabinet.

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

Figure 4-10 Opening a cabinet door



NOTE

To highlight the involved area, the figure does not show certain components. This is applicable to all other similar figures.

4.5.2 (Optional) Installing the SmartModule

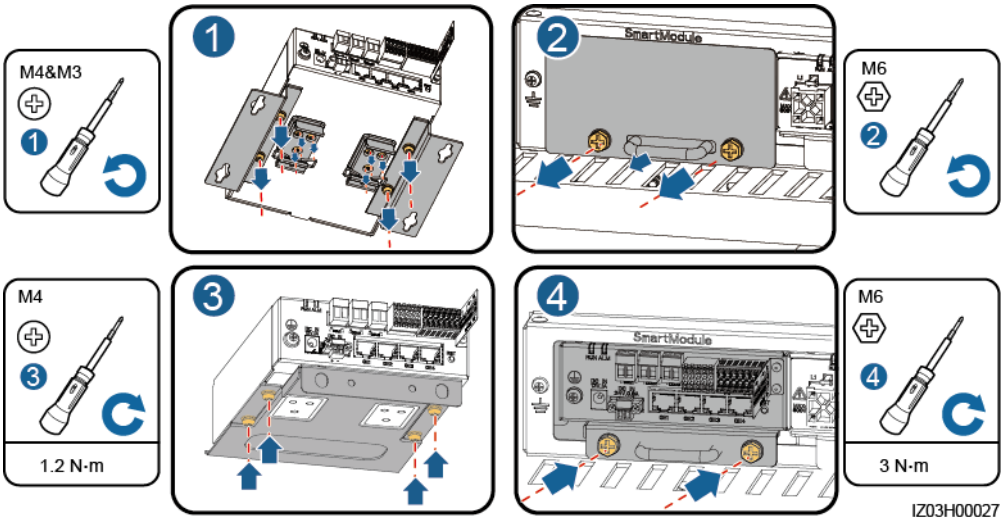
Step 1 Remove the mounting ears and guide rail–mounting kit from the SmartModule.

Step 2 Remove the panel at the position where the SmartModule is to be installed from the cabinet and take out the mounting kit.

Step 3 Secure the mounting bracket to the SmartModule.

Step 4 Install the SmartModule.

Figure 4-11 Installing a SmartModule

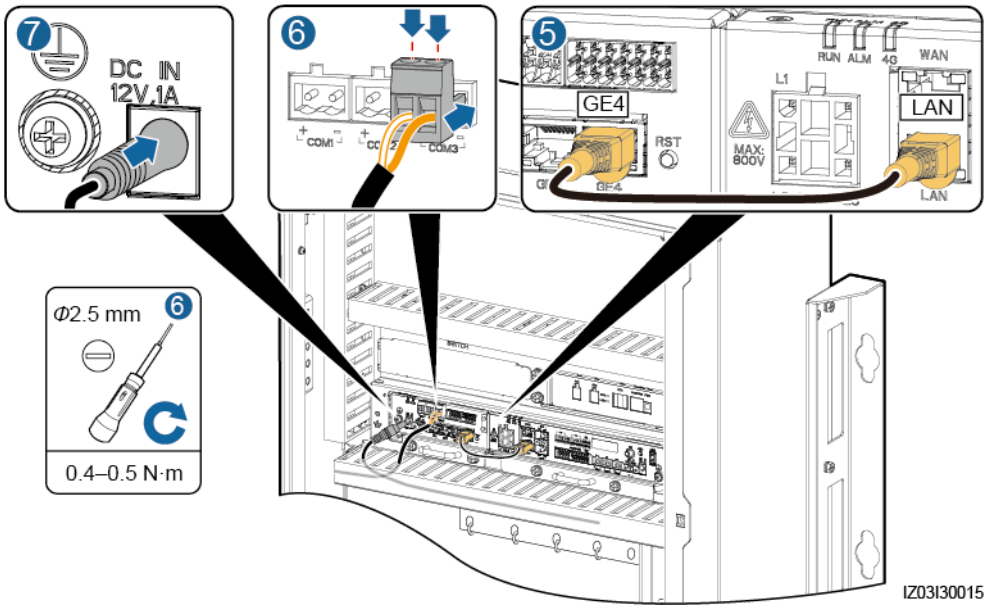


Step 5 Connect the GE4 port on the SmartModule to the LAN port on the SmartLogger using the network cable delivered with the SmartModule.

Step 6 Connect the preinstalled RS485 cable to the COM port on the SmartLogger based on the label.

Step 7 Connect the preinstalled power cable to the 12V 1A port on the SmartModule based on the cable label.

Figure 4-12 Connecting a cable



----End

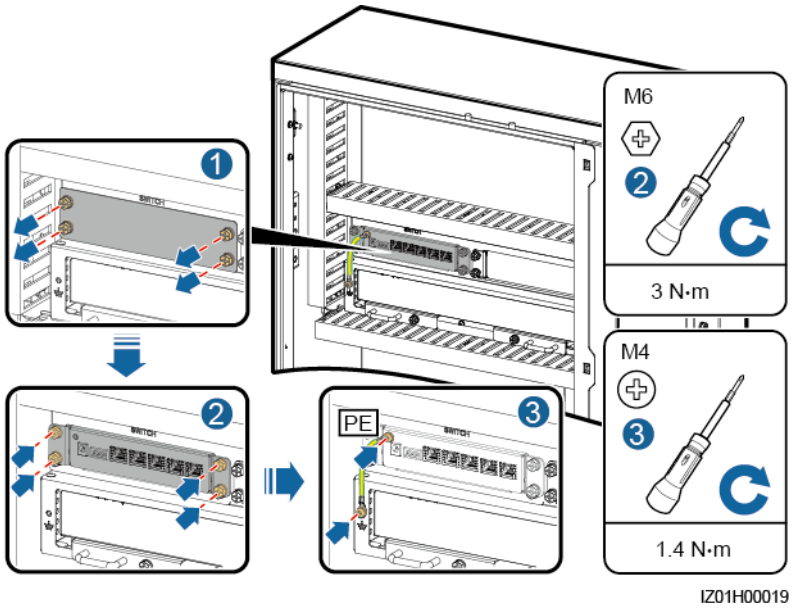
4.5.3 (Optional) Installing the Ethernet Switch

Step 1 Remove the panel behind which an Ethernet switch will be installed.

Step 2 Secure the Ethernet switch.

Step 3 Connect a PE cable to the Ethernet switch.

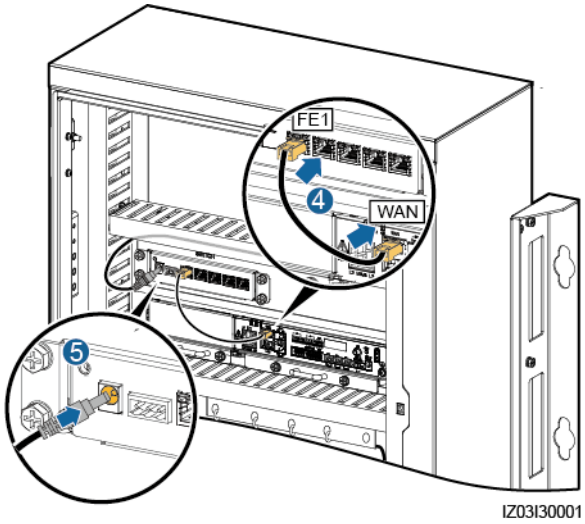
Figure 4-13 Installing an Ethernet switch



Step 4 Connect the FE1 port on the Ethernet switch to the WAN port on the SmartLogger using the network cable delivered with the Ethernet switch.

Step 5 Connect the preinstalled power cable to the power port on the Ethernet switch based on the label.

Figure 4-14 Connecting an Ethernet switch cable



----End

4.5.4 (Optional) Installing the 24 V Power Module

Step 1 Remove the mounting bracket of the 24 V power module from the cabinet.

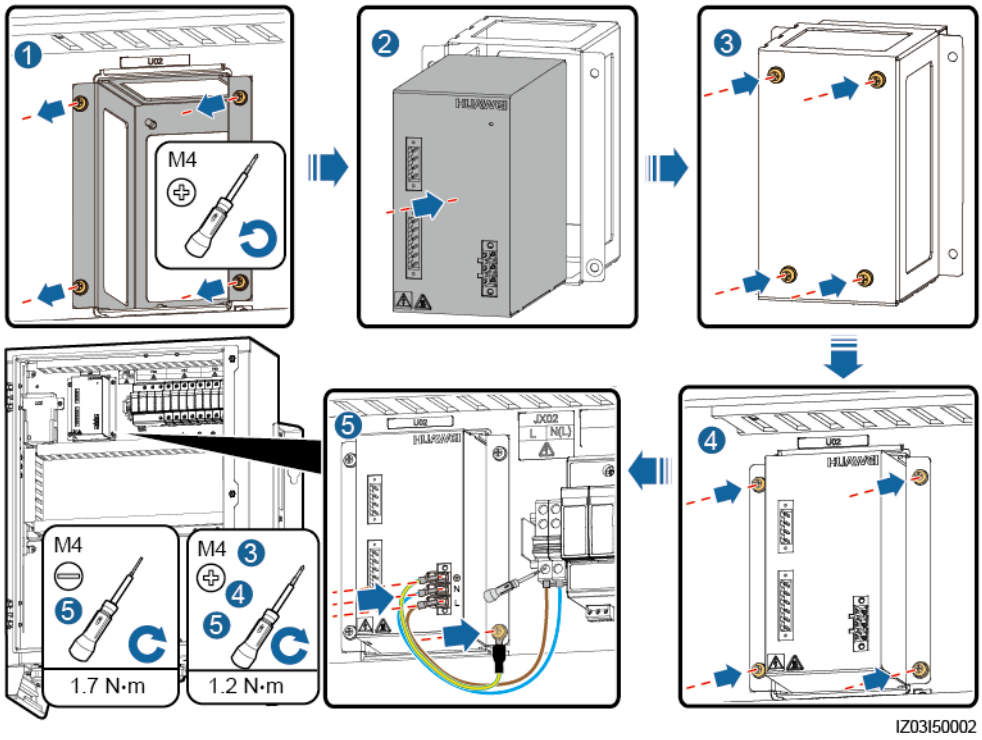
Step 2 Install the 24 V power module in the mounting bracket.

Step 3 Secure the 24 V power module to the mounting bracket using the screws (delivered with the 24 V power module).

Step 4 Install the 24 V power module in the cabinet.

Step 5 Connect the AC input power cable (delivered with the SACU) to the 24 V power module based on the cable label.

Figure 4-15 Installing a 24 V power module



----End

4.5.5 Installing the PoE Module

Step 1 Loosen screws (do not remove the screws) and remove the mounting board.

Step 2 Remove screws from the PoE module installation position.

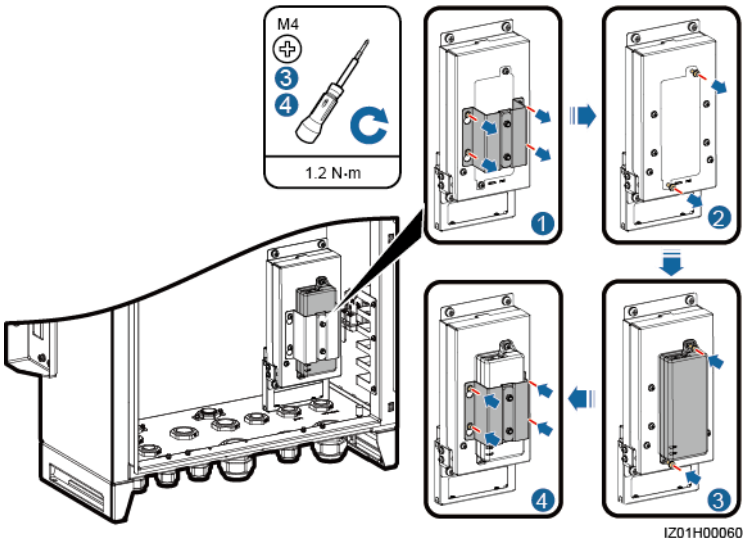
Step 3 Place the PoE module at the installation position and align the mounting holes. Then secure the PoE module.

NOTE

Indicators should be in the lower left corner.

Step 4 Secure the mounting board.

Figure 4-16 Installing a PoE module



----End

4.5.6 (Optional) Installing the PoE SPD

Step 1 Loosen the nuts on the PoE SPD mounting board. (Do not remove the nuts.)

Step 2 Replace and secure the PoE SPD mounting bracket.

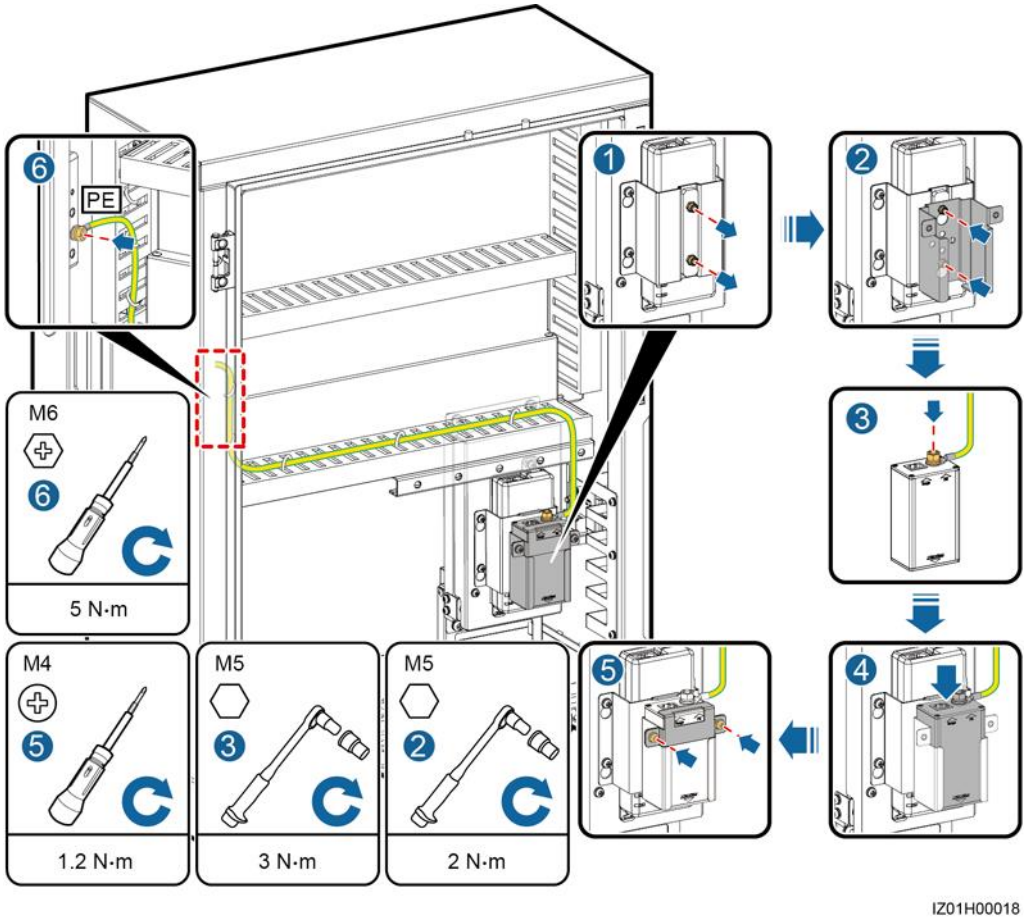
Step 3 Connect one end of the ground cable to the PE point on the PoE SPD, and secure the ground nut.

Step 4 Place the PoE SPD in the mounting bracket. Ensure that the PE point faces upwards and the surface marked PE faces outwards.

Step 5 Secure the PoE SPD fastener.

Step 6 Connect the other end of the ground cable to the PE bar.

Figure 4-17 Installing a PoE SPD



----End

4.5.7 Installing the SIM Card and 4G Antenna

Installing the SIM Card

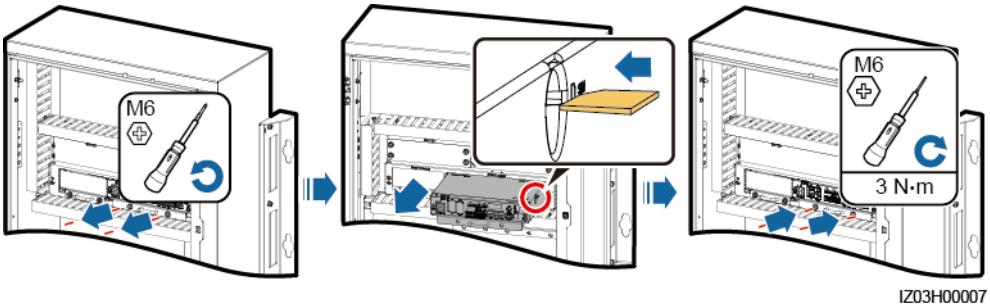
Step 1 Remove the cables preinstalled on the SmartLogger and label the cables.

Step 2 Take the SmartLogger out of the installation position.

Step 3 Install the SIM card, reinstall the SmartLogger, and secure the SmartLogger.

Step 4 Reconnect the cables based on the labels.

Figure 4-18 Installing a SIM card



----End

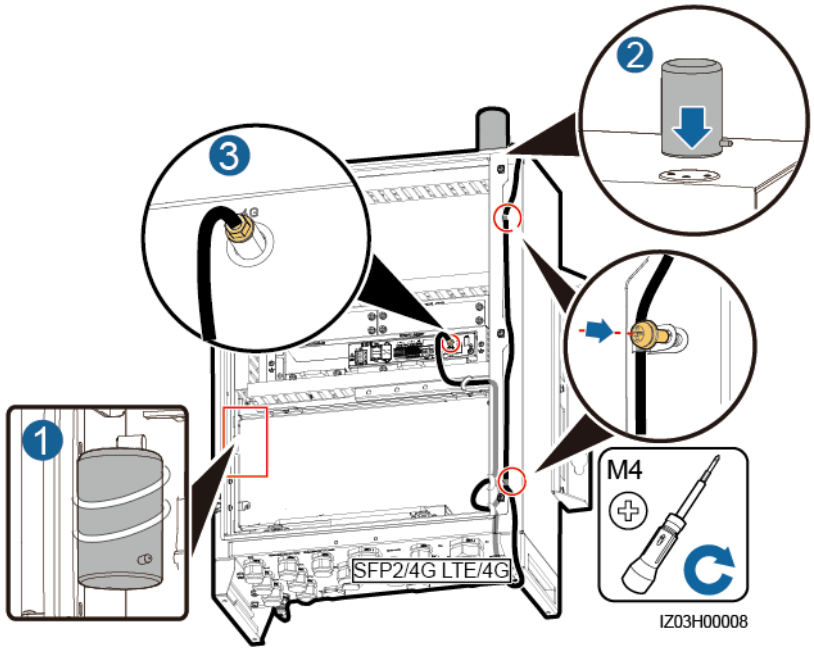
Installing the 4G Antenna

Step 1 Remove the 4G antenna bound inside the cabinet.

Step 2 Install the 4G antenna on the cabinet.

Step 3 Connect the cable to the 4G port on the SmartLogger.

Figure 4-19 Installing a 4G antenna



----End

5 Electrical Connections

NOTICE

- Only certified electricians are allowed to connect cables.
- Wear proper PPE at all time when connecting cables.
- 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. Do not connect signal cables, single-phase AC power cables, and three-phase AC power cables reversely or mix them up. Otherwise, the caused equipment damage is not covered under any warranty or service agreement.
- For simplicity purposes, cables described in this chapter are those to be connected onsite, rather than factory-installed cables. The cabling routes are for reference only.
- The cable colors shown in the electrical connection diagrams provided in this chapter are for reference only. Select cables in accordance with local cable specifications (green-and-yellow cables are only used for protective earthing).

5.1 Selecting a Connection Mode

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

NOTICE

- To prevent poor cable connection due to overstress caused by ground subsidence, you are advised to bend the cable inside the cabinet for a slack of 20–30 mm (0.79–1.18 in.) before connecting the cable to the appropriate port.
- If a cable has a jacket, ensure that the jacket is in the cabinet.
- This section describes how to connect a peripheral cable to the RS485/ETH/DC waterproof connector in common mode and through a tube, and provides a reference for connecting peripheral cables to other waterproof connectors.

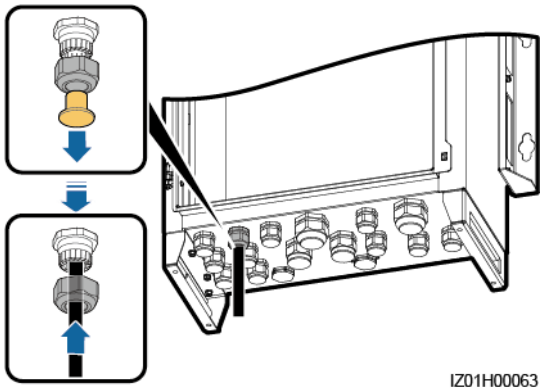
5.1.1 Common Connection

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 5-1 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 supplied firestop putty.

Step 5 Clear foreign matter from the cabinet.

----End

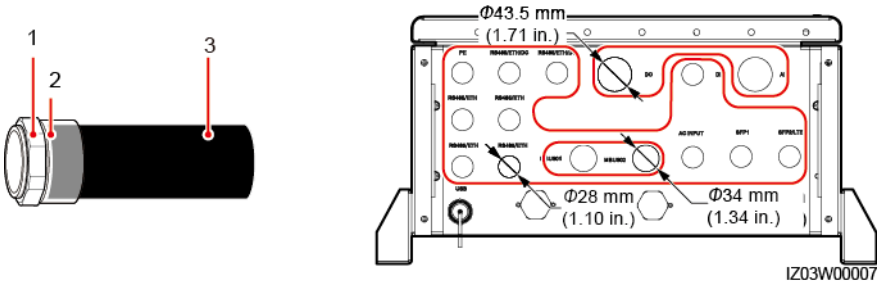
5.1.2 Connection Through a Tube

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

NOTE

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

Figure 5-2 Tube and the diameter of cable holes at the bottom

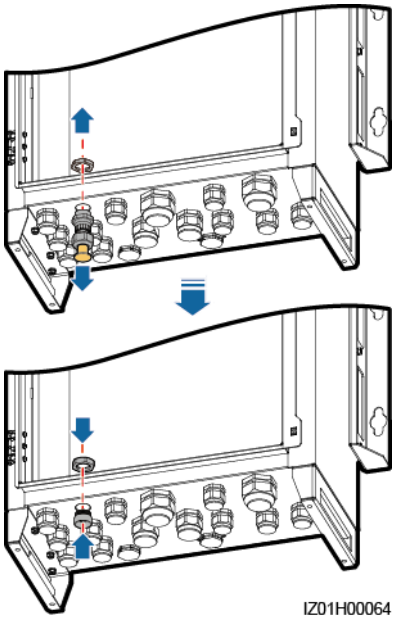


(1) Nut (2) Fitting (3) Conduit

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

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

Figure 5-3 Installing a tube fitting



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

Step 4 Secure the fitting to the conduit.

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

Step 6 Clear foreign matter from the cabinet.

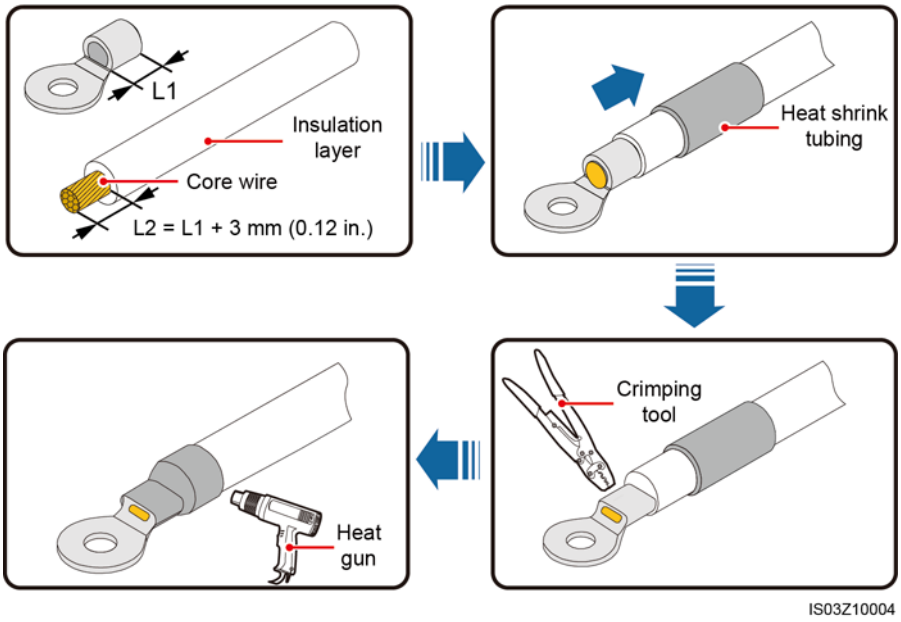
----End

5.2 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 wires completely. The core wires must contact the OT terminal closely.
- Wrap the wire crimping area with heat shrinkable tubing or PVC insulation tape. The heat shrink tubing is used as an example.
- When using a heat gun, protect the devices from being scorched.

Figure 5-4 Crimping an OT terminal

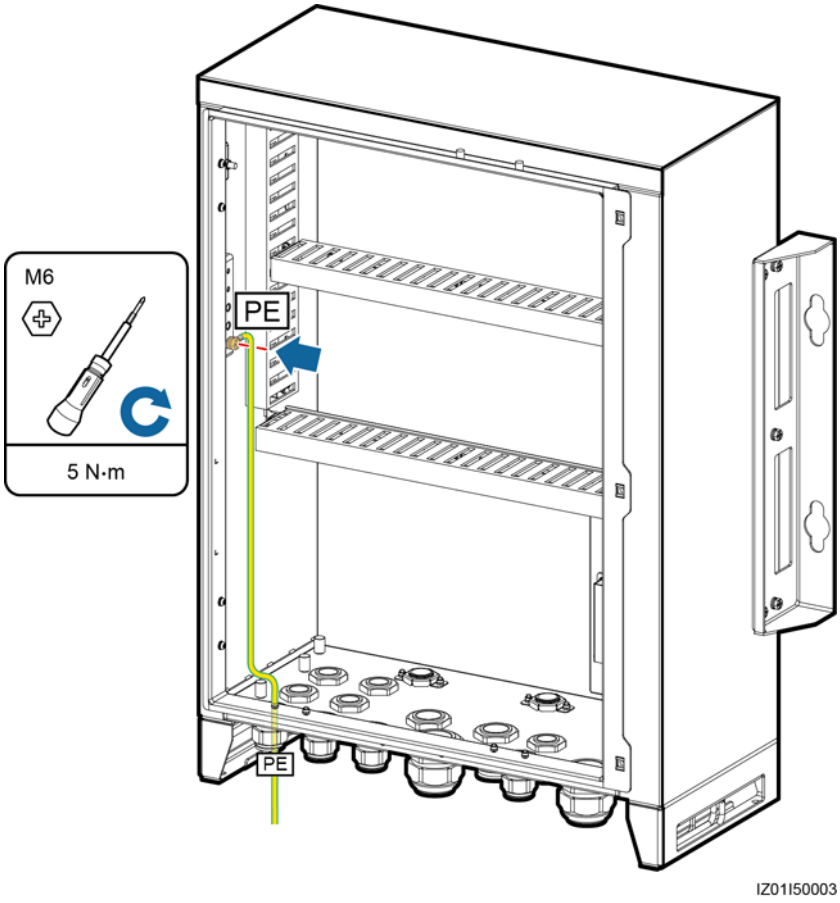


5.3 Connecting the PE Cable

NOTICE

- Connect a 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 silica gel or paint on it after connecting the ground cable.

Figure 5-5 Connecting a PE cable



5.4 Connecting the Communications Cables for the Fiber Ring Network

Connecting the Optical Jumpers

Step 1 Obtain optical modules from the fitting bag for optical ring switching.

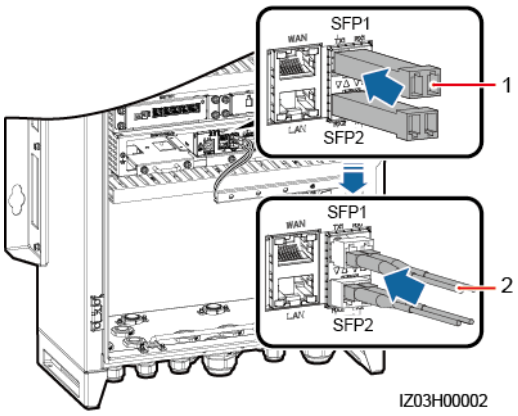
Step 2 Insert an optical module into the SFP1 or SFP2 port. If there are two modules, insert one into each port.

NOTICE

- Pay attention to the directions of the optical modules. When inserting an optical module into the SFP1 port, ensure that the side with a label faces upward. When inserting an optical module into the SFP2 port, ensure that the side with a label faces downward.
- Snap the optical module into place. Then pull it back to ensure that it is secure.

Step 3 Connect the optical jumpers delivered with the optical modules to the ports on the optical modules.

Figure 5-6 Connecting optical jumpers



(1) Optical module (2) Optical jumper

----End

Connecting the Cables to the ATB

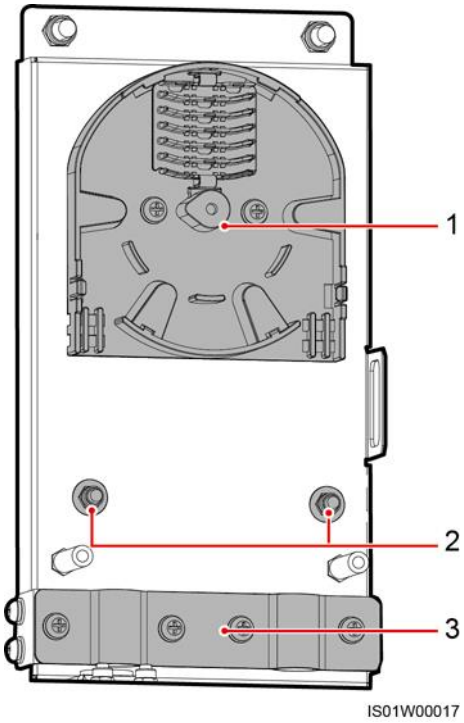
NOTICE

- As optical cables are hard, prepare optical cables before routing them into the SACU.
- Only professionals are allowed to connect optical cables.

NOTE

Connect two optical cables in a ring optical network, and connect one optical cable in a star optical network.

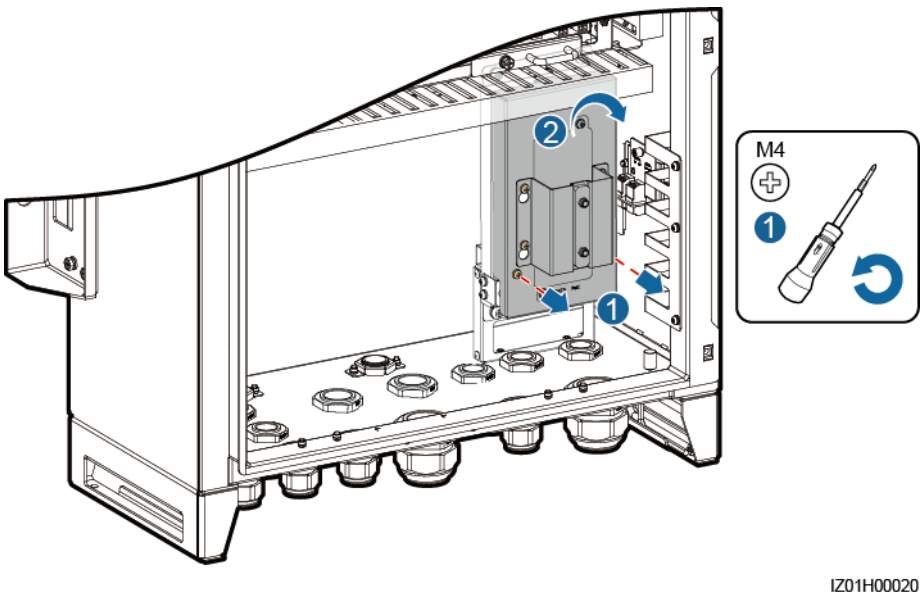
Figure 5-7 ATB interior



(1) Fiber spool (2) Fixing points for internal steel wires of optical cables (3) Cable clip

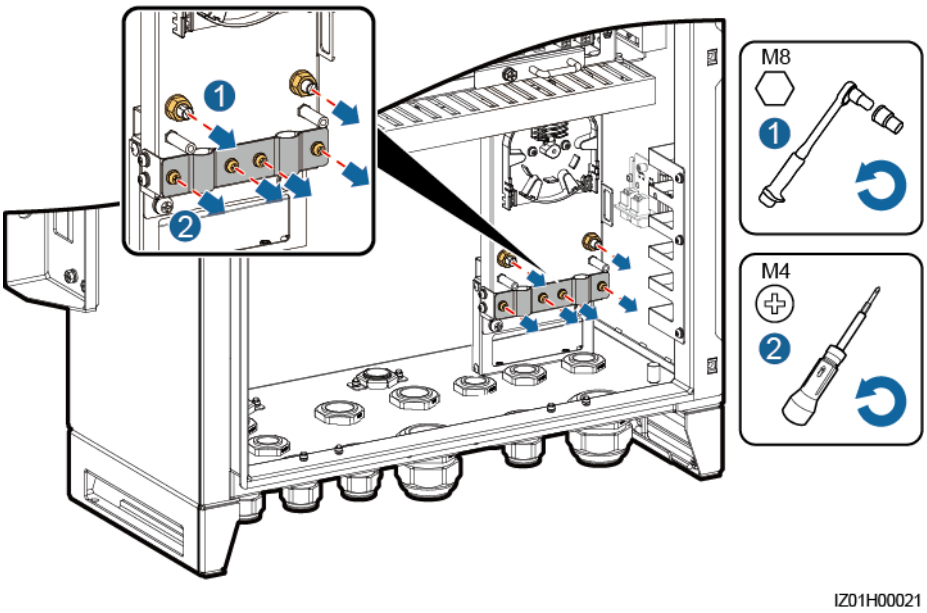
Step 1 Remove the external mechanical parts from the ATB.

Figure 5-8 Removing external mechanical parts



Step 2 Remove the optical cable fastener.

Figure 5-9 Removing a fastener



Step 3 Connect one end of the optical jumper to the fiber adapter.

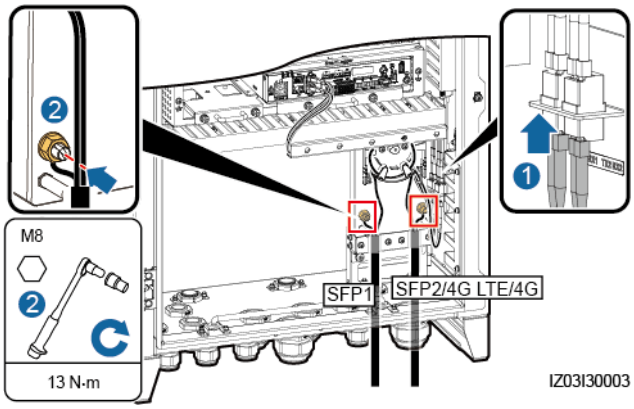
Step 4 Route the other end of the optical jumper through the cable hole on the side of the ATB, and connect the cable to the ATB.

Step 5 Connect the peripheral optical cable to the ATB, splice the optical cable and the optical jumper, and wind the spliced cable around the fiber spool on the ATB.

NOTICE

Only professionals are allowed to splice fibers.

Figure 5-10 Connecting optical cables



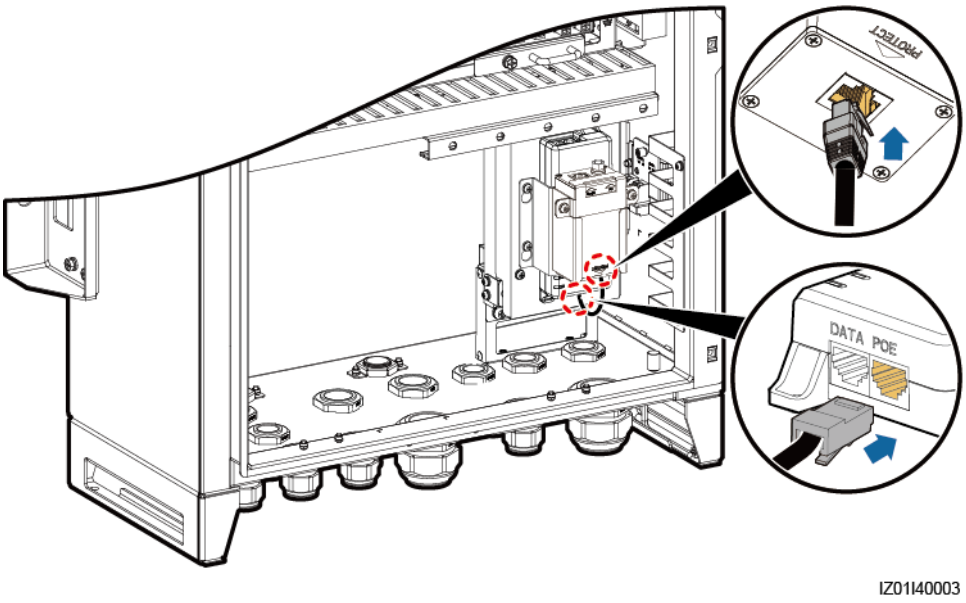
Step 6 Check that the cables are connected correctly and securely. Then reinstall the optical cable fastener and external mechanical parts.

----End

5.5 Connecting the 4G LTE Cable (with a PoE SPD)

Step 1 Connect the POE port on the PoE module to the PROTECT port on the PoE SPD using the network cable delivered with the PoE SPD.

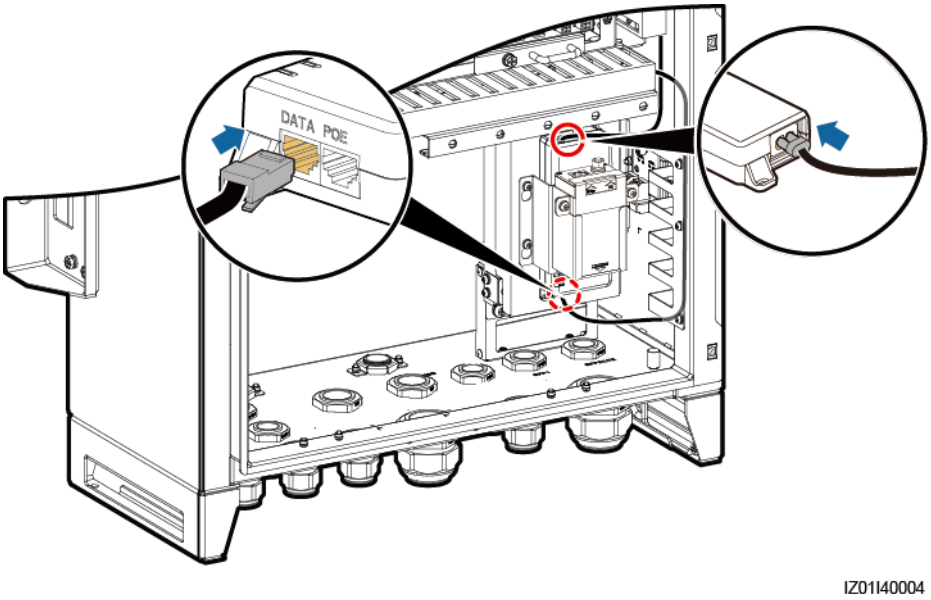
Figure 5-11 Connecting a PoE module to a PoE SPD



Step 2 Connect the factory-installed network cable on the SmartLogger to the DATA port on the PoE module.

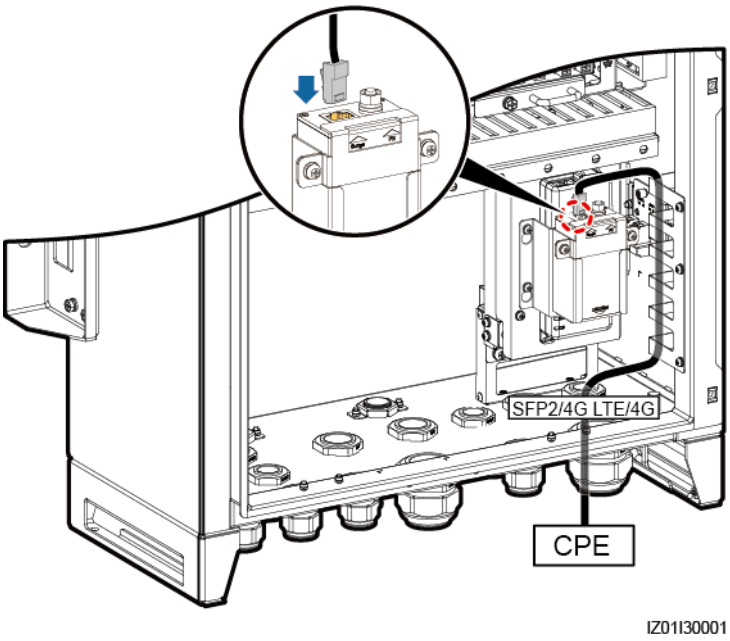
Step 3 Connect the factory-installed power cable on the SmartLogger to the PoE module.

Figure 5-12 Connecting cables to the PoE module



Step 4 Connect the network cable delivered with the CPE to the Surge port on the PoE SPD.

Figure 5-13 Connecting a CPE network cable



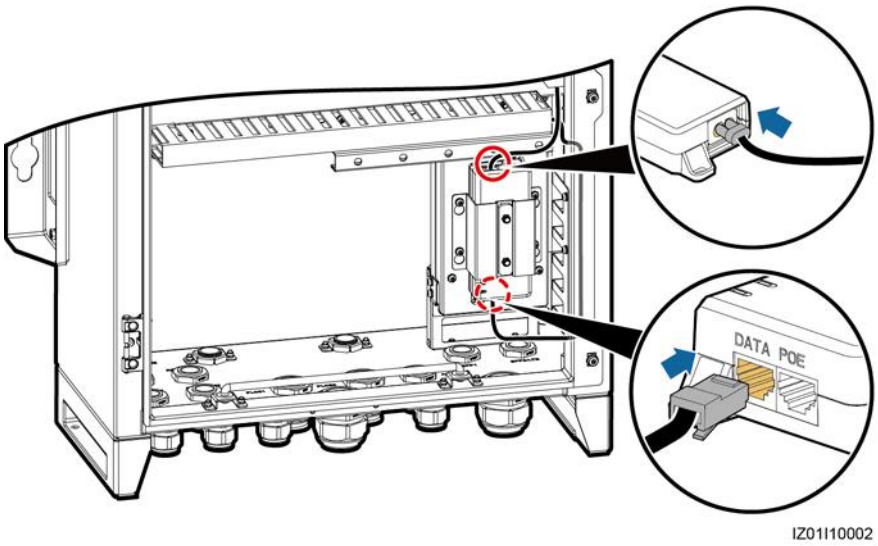
----End

5.6 Connecting the 4G LTE Cable (Without a PoE SPD)

Step 1 Connect the factory-installed network cable on the SmartLogger to the DATA port on the PoE module.

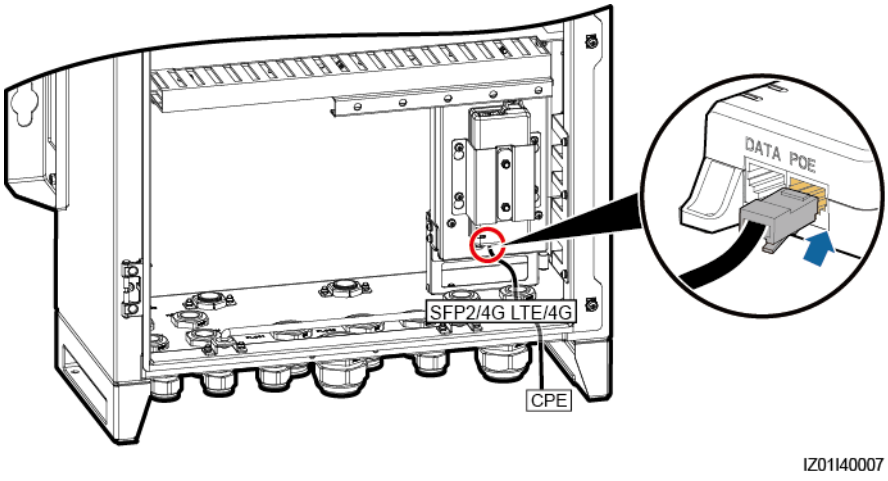
Step 2 Connect the factory-installed power cable on the SmartLogger to the PoE module.

Figure 5-14 Connecting cables to the PoE module



Step 3 Connect the network cable delivered with the CPE to the PoE port on the PoE module.

Figure 5-15 Connecting a CPE network cable



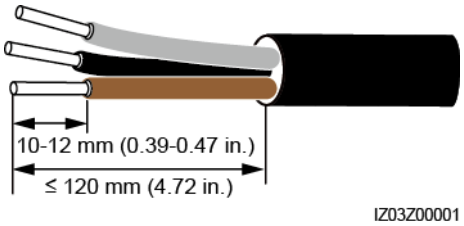
----End

5.7 Connecting the Three-Phase AC Power Cable

- For the SACU that supports the access of one MBUS route, connect the three-phase AC power cable to the FU01 switch.
- For the SACU that supports the access of two MBUS routes, connect the three-phase AC power cable of the first route to the FU01 switch. Connect the three-phase AC power cable of the second route to the FU02 switch.
- This section describes how to connect the three-phase AC power cable for the SACU that supports the access of two MBUS routes. For details about the single MBUS route situation, refer to the way of connecting the first route of three-phase AC power cable.

Step 1 Prepare a cable.

Figure 5-16 Length for cable stripping



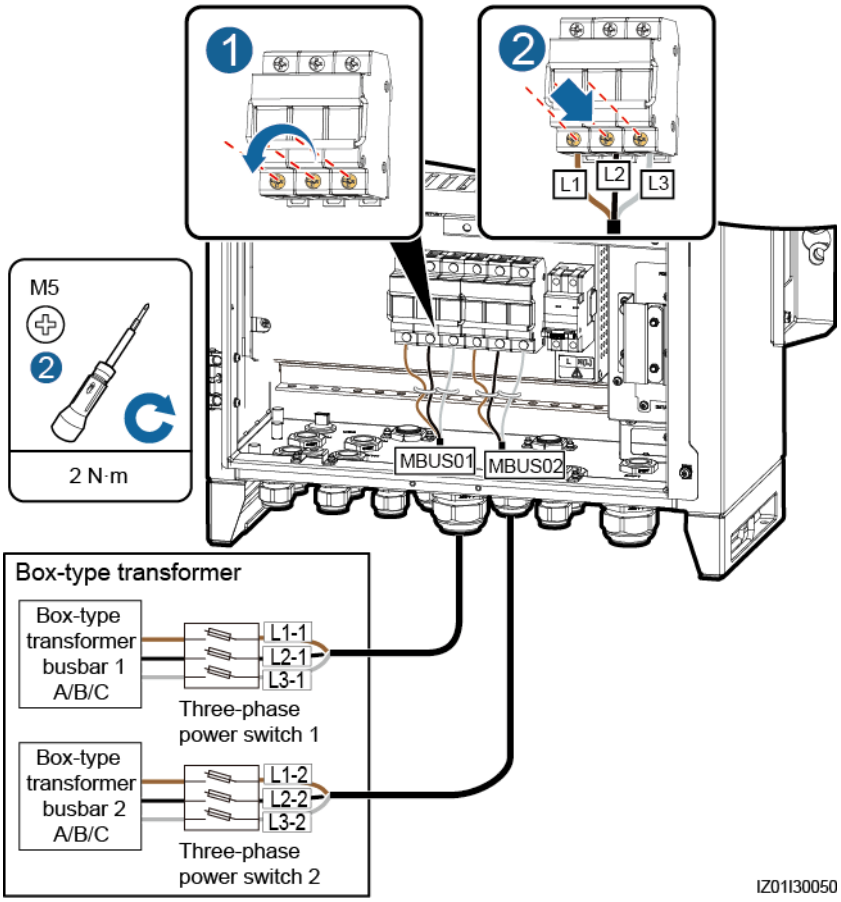
Step 2 Connect the L1, L2, and L3 wires to the three-phase input switch.

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.
- Ensure that the L1, L2, and L3 wires are connected in correct phase sequence.

Step 3 Bind the cable.

Figure 5-17 Connecting a cable



----End

5.8 Connecting the Peripheral 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 5-1 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–

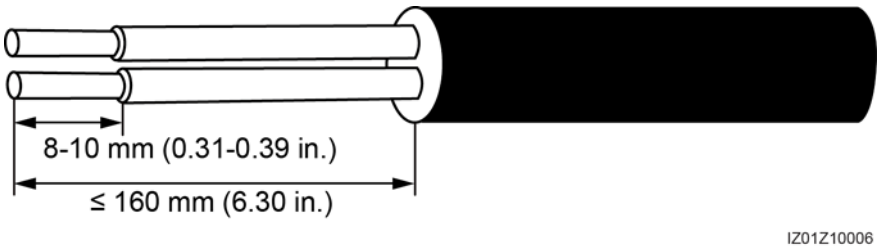
No.	Port on the JX01 Terminal Block	Definition
5	RS485-3 (+)	RS485A, RS485 differential signal+
6	RS485-3 (–)	RS485B, RS485 differential signal–
7	RS485-4 (+)	RS485A, RS485 differential signal+
8	RS485-4 (–)	RS485B, RS485 differential signal–
9	RS485-5 (+)	RS485A, RS485 differential signal+
10	RS485-5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

NOTICE

- For the SACU that supports the access of two MBUS routes, do not connect a peripheral RS485 communications cable to the RS485-3 port (ports 5 and 6 on the JX01 terminal block) because the communications cable of the MBUS CCO module has been connected to this port.
- JX01 ports 7, 8, 9, 10, 11, and 12 can be connected to the RS485 cable only after the SmartModule is installed.

Step 1 Prepare the communications cable.

Figure 5-18 Length for cable stripping

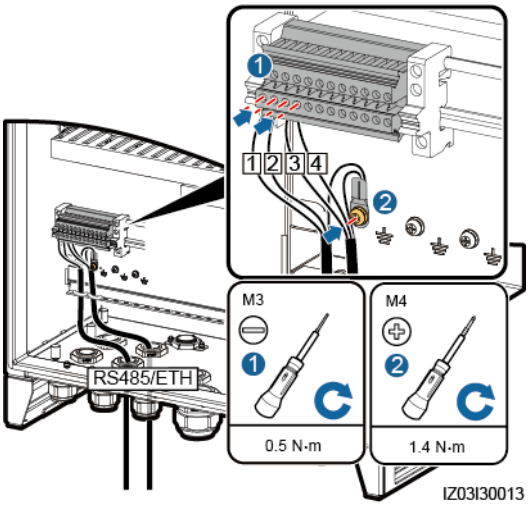


Step 2 Connect the communications cable to the JX01 terminal block.

Step 3 Crimp an OT terminal on the shield layer, and connect the shield layer to the cabinet ground point.

Step 4 Bind the communications cable.

Figure 5-19 Connecting RS485 communications cables



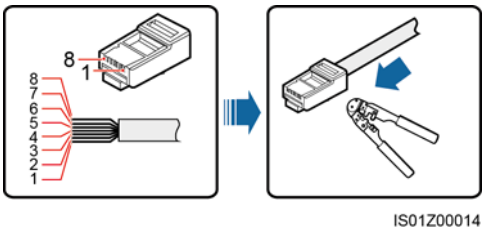
----End

5.9 (Optional) Connecting the Peripheral Network Cable

Connect peripheral network cables to ports FE2 to FE5 on the Ethernet switch. All network cables can be connected in the same way.

Step 1 Prepare a network cable.

Figure 5-20 Wiring sequence of an RJ45 connector



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

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

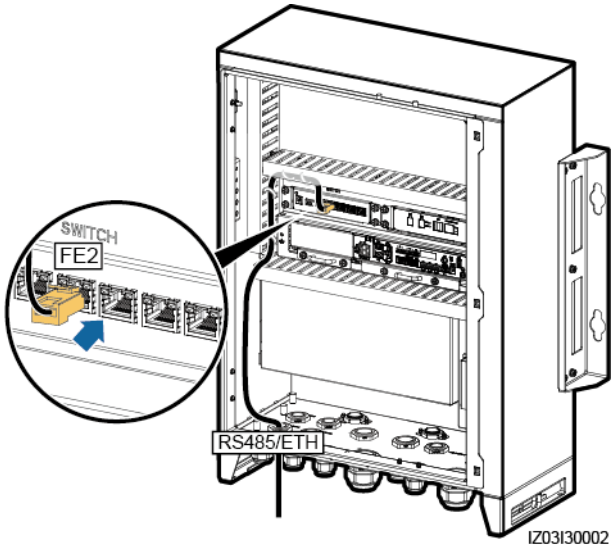
NOTE

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

Step 2 Connect the peripheral network cable to the FE2 port on the Ethernet switch.

Step 3 Bind the network cable.

Figure 5-21 Connecting a network cable

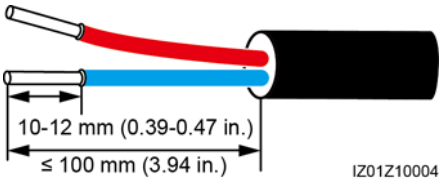


----End

5.10 (Optional) Connecting the DC Output Power Cable to the 24 V Power Module

Step 1 Prepare a cable.

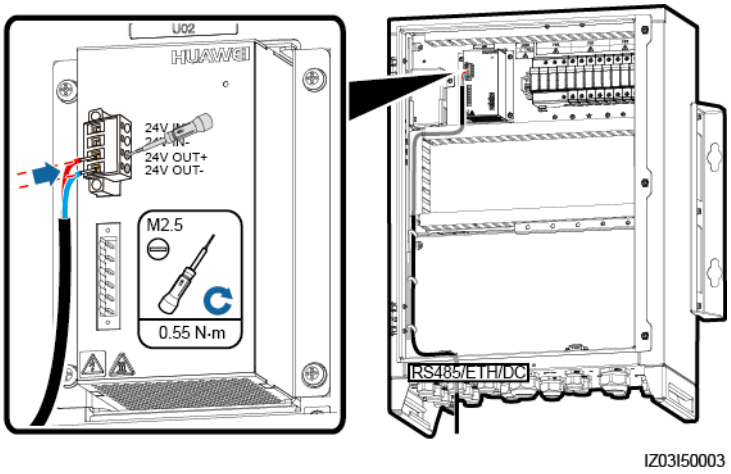
Figure 5-22 Length for cable stripping



Step 2 Connect the cable to the 24V OUT+ and 24V OUT- ports on the power module.

Step 3 Bind the cable.

Figure 5-23 Connecting a DC output power cable to the 24 V power module

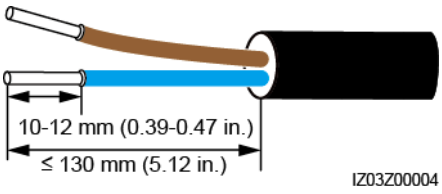


----End

5.11 Connecting the Single-Phase Power Cable

Step 1 Prepare a cable.

Figure 5-24 Length for cable stripping



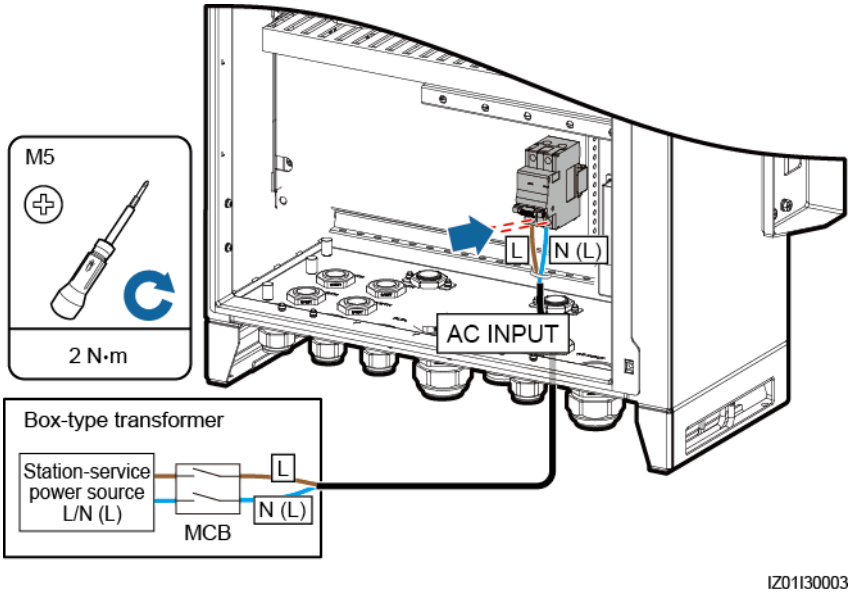
Step 2 Connect the cable to the single-phase input switch.

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.

Figure 5-25 Connecting a cable



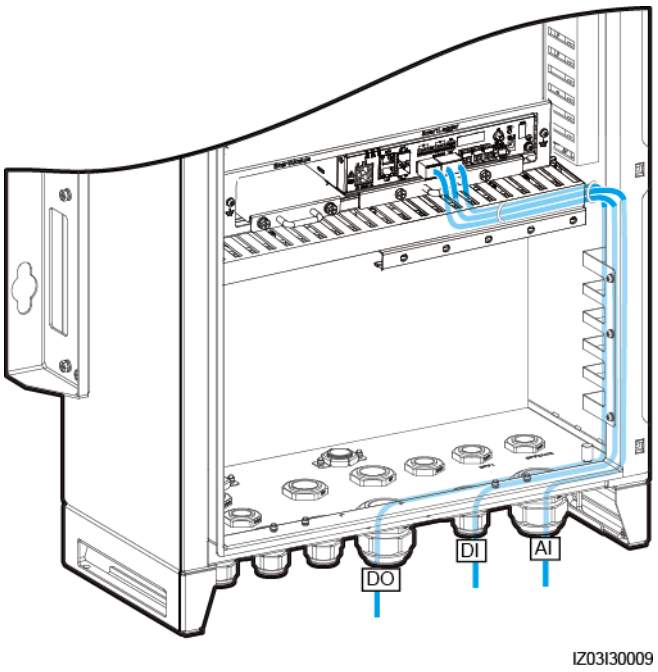
----End

5.12 Connecting DO/DI/AI Cables

The SACU reserves the waterproof connectors for the, DO, DI, and AI cables. Cabling routes are provided for the signal cables.

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

Figure 5-26 Cabling routes



6 System Commissioning

6.1 Checking 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 secured evenly and properly in the same direction.
5	Routing for the power cables and signal cables meets the requirements for routing strong-current and weak-current cables and complies with the cable routing plan.
6	The locking caps of the used waterproof connectors are tightened and sealed. Idle 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. If paint flakes off, repaint that area to prevent corrosion.

6.2 Powering On the System

- You have completed the power-on check.
- You have put on proper PPE.
- 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 MBUS CCO.

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 supports the access of one MBUS route, turn on the corresponding three-phase power switch.
- If the SACU supports the access of two MBUS routes, turn on the corresponding three-phase power switches.

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

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

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

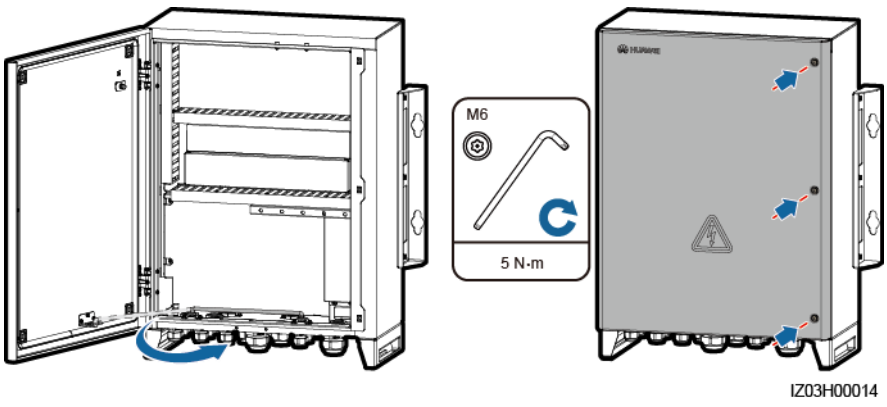
- If the SACU supports the access of one MBUS route, turn on the FU01 switch.
- If the SACU supports the access of two MBUS routes, turn on the FU01 and FU02 switches.

----End

6.3 Closing the Cabinet Door

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

Figure 6-1 Closing the main cabinet door



NOTE

If a screw used for securing the cabinet door is lost, use the security torx screw in the fitting bag.

6.4 Powering Off the System

DANGER

Put on insulation gloves before powering off the system.

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.

- If the SACU supports the access of one MBUS route, turn off the corresponding three-phase power switch.
- If the SACU supports the access of two MBUS routes, turn off the corresponding three-phase power switches.

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

Step 4 Turn off the three-phase input switch in the SACU.

- If the SACU supports the access of one MBUS route, turn off the FU01 switch.
- If the SACU supports the access of two MBUS routes, turn off the FU01 and FU02 switches.

----End

7 System Maintenance

7.1 Routine Maintenance

DANGER

- Before cleaning the system, connecting cables, and maintaining the grounding reliability, power off the system to ensure that the SACU is de-energized and will not cause personal injury.
- 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 it is impossible to take protective measures, do not open the cabinet door on rainy or snowy days.

Table 7-1 Maintenance checklist

Check Item	Check That	Maintenance Interval
Cabinet	• The SACU exterior is not damaged or deformed. • There is no dust or dirt in the SACU.	Once every twelve months
System running status	• All devices in the SACU operate properly. • The SPD works properly.	Once every six months
Electrical connections	• Cables are secured. • Cables are intact and especially the parts touching the metallic surface are not scratched. • Idle waterproof connectors are plugged and the locking caps are tightened. • The cover on the USB port is tightened.	Once every twelve months
Grounding reliability	All ground cables are reliably connected.	Once every twelve months

7.2 Troubleshooting

Symptom	Cause	Troubleshooting
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 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 PoE module is not powered on.	The power cable of the PoE module is loose or disconnected.	If the cable is loose or disconnected, secure it.
The power adapter or 24 V DC power module fails to supply power.	1. The input and output power cables of the 24 V DC power module are loose or disconnected. 2. The power adapter or 24 V DC power module is faulty.	1. If the cable is loose or disconnected, secure it. 2. Replace the power adapter or 24 V DC power module.
The SmartLogger in the SACU is not powered on.	1. The DC output power cable for the power adapter does not connect to the 12V IN port on the SmartLogger. 2. The power cable is not connected to the AC power receiving port on 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 on the SmartLogger. 2. Check whether the power cable is connected to the AC power receiving port on the power adapter. 3. Check whether the power cable is connected to the AC socket. 4. Replace the power adapter. 5. Contact the dealer or Huawei technical support.

Symptom	Cause	Troubleshooting
No communication between the SmartLogger and the Ethernet switch	1. The network cable between the SmartLogger and the Ethernet switch is 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 Ethernet switch blink properly. If not, connect the network cable to another FE port on the Ethernet switch or replace the network cable 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 over 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 Ethernet switch and ping the IP address of the SmartLogger. If the communication is abnormal, replace the network cable and try again.
No communication between the SmartLogger and 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 not, 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 the dealer or Huawei technical support.

7.3 Component Replacement

NOTICE

- Do not perform operations with power on because high voltage exists during the running of the device.
- Before replacing a component, ensure that a spare component of the same model is available and functional.
- 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.

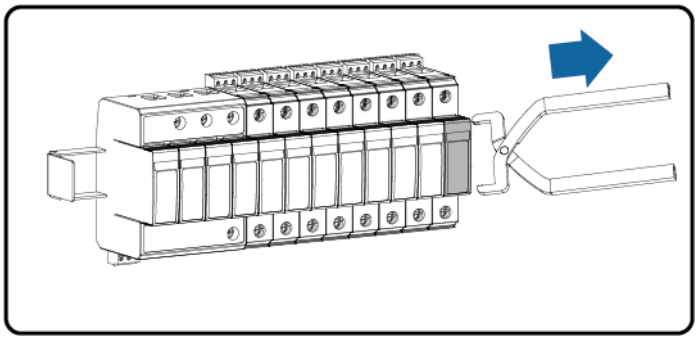
7.3.1 Replacing the Single/Three-Phase SPD

NOTE

- An SPD consists of a surge protection module and a base.
- If an SPD is damaged or its indication window is displayed in red, the SPD is deemed unavailable and needs to be replaced.
- 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.

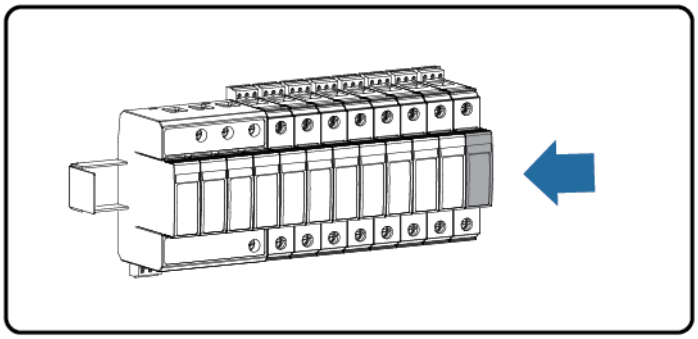
Step 1 Remove the faulty surge protection module from the SPD.

Figure 7-1 Removing a faulty surge protection module



Step 2 Install a new surge protection module.

Figure 7-2 Installing a new surge protection module



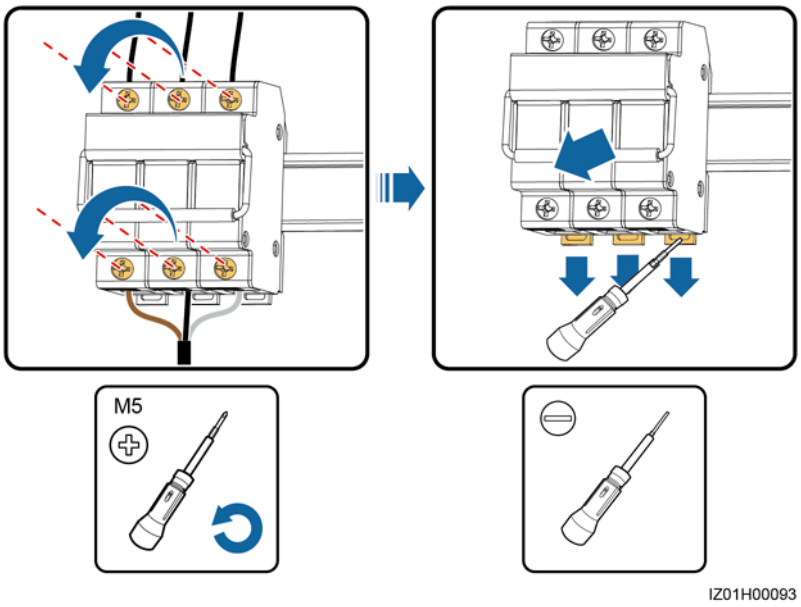
----End

7.3.2 Replacing the Knife Fuse Switch

Step 1 Disconnect the cables from the knife fuse switch and label the cables.

Step 2 Remove the faulty knife fuse switch.

Figure 7-3 Removing a faulty knife fuse switch



Step 3 Install a new knife fuse switch.

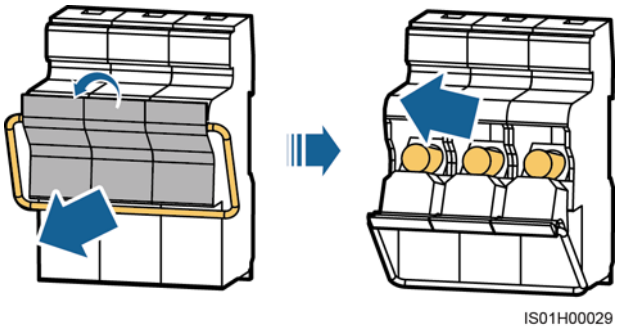
Step 4 Connect the cables based on their labels.

----End

7.3.3 Replacing the Fuse of a Knife Fuse Switch

Step 1 Open the knife fuse switch box and remove the faulty fuse.

Figure 7-4 Removing a faulty fuse



Step 2 Install a new fuse and close the knife fuse switch box.

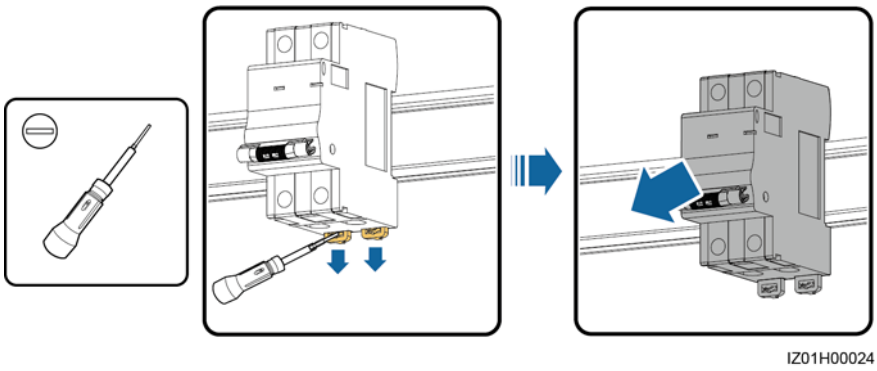
----End

7.3.4 Replacing the Single-Phase Input Switch

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

Step 2 Remove the faulty single-phase input switch.

Figure 7-5 Removing a faulty single-phase input switch



Step 3 Install a new single-phase input switch.

Step 4 Connect the cables based on their labels.

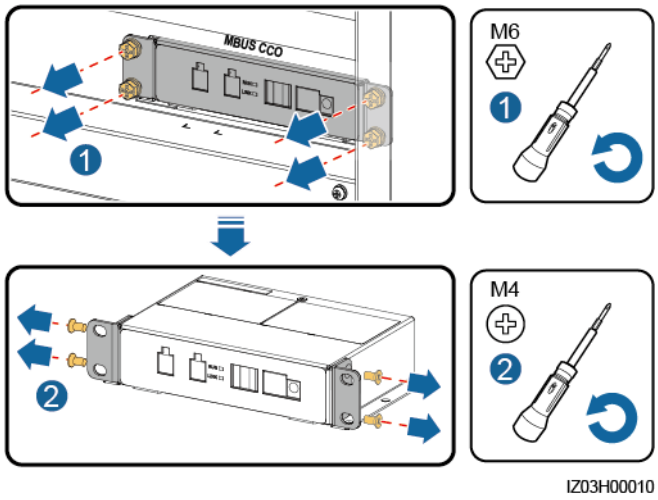
----End

7.3.5 Replacing the SmartMBUS CCO Module

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

Step 2 Remove the faulty SmartMBUS CCO module and its mounting ears.

Figure 7-6 Replacing a faulty SmartMBUS CCO module



Step 3 Install the mounting ears on a new SmartMBUS CCO module.

Step 4 Installing a new SmartMBUS CCO module

Step 5 Connect the cables based on their labels.

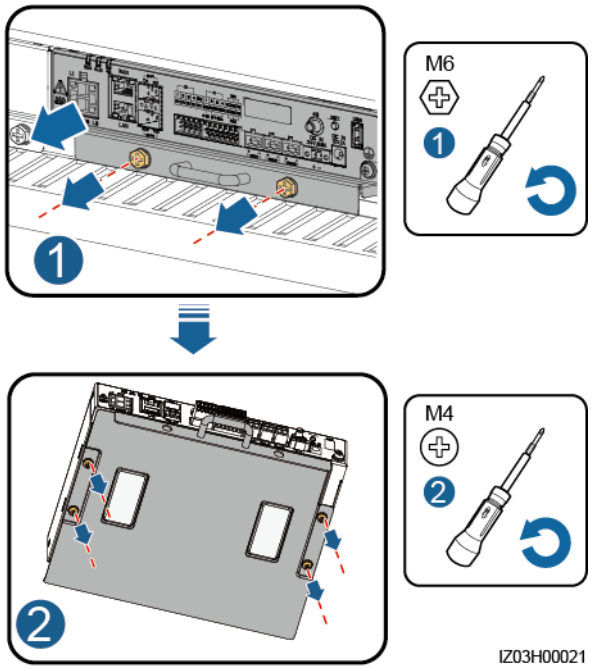
----End

7.3.6 Replacing the SmartLogger

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

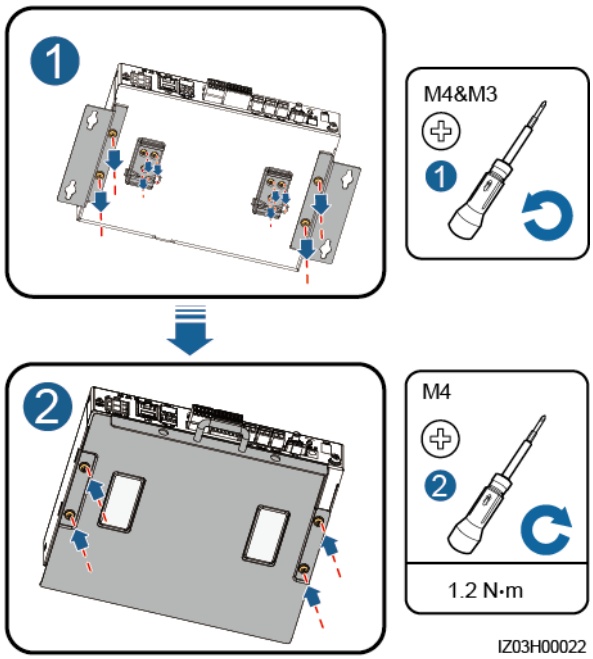
Step 2 Remove the faulty SmartLogger and its cabinet-mounting kit.

Figure 7-7 Removing a faulty SmartLogger



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

Figure 7-8 Replacing a SmartLogger



Step 4 Install the new SmartLogger in the cabinet.

Step 5 Connect the cables based on their labels.

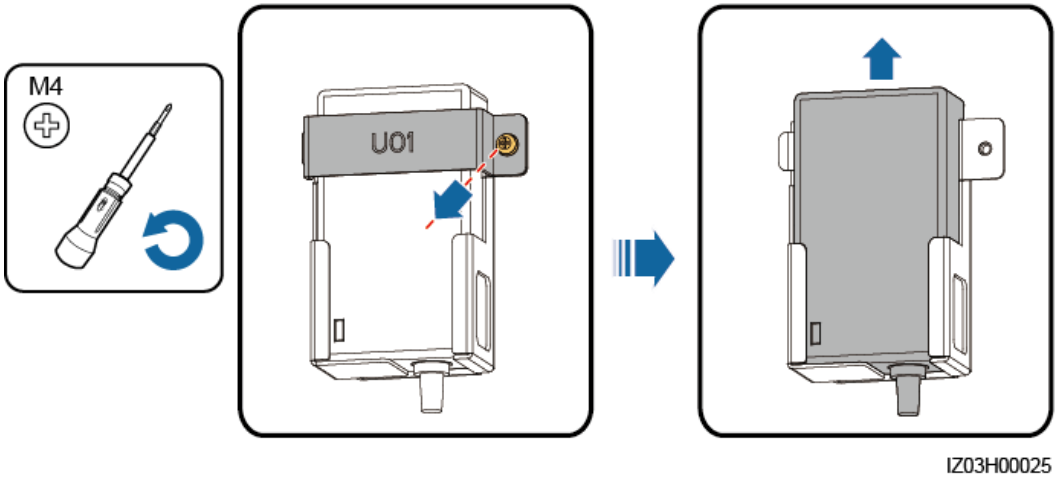
----End

7.3.7 Replacing the Power Adapter

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

Step 2 Remove the faulty power adapter.

Figure 7-9 Removing a faulty power adapter



Step 3 Install a new power adapter.

Step 4 Connect the cables based on their labels.

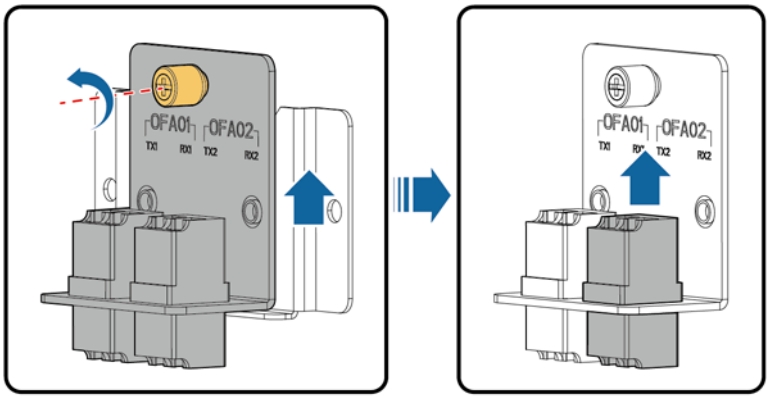
----End

7.3.8 Replacing the Fiber Adapter

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

Step 2 Remove the faulty fiber adapter.

Figure 7-10 Removing a fiber adapter



Step 3 Install a new fiber adapter.

Step 4 Connect the cables based on their labels.

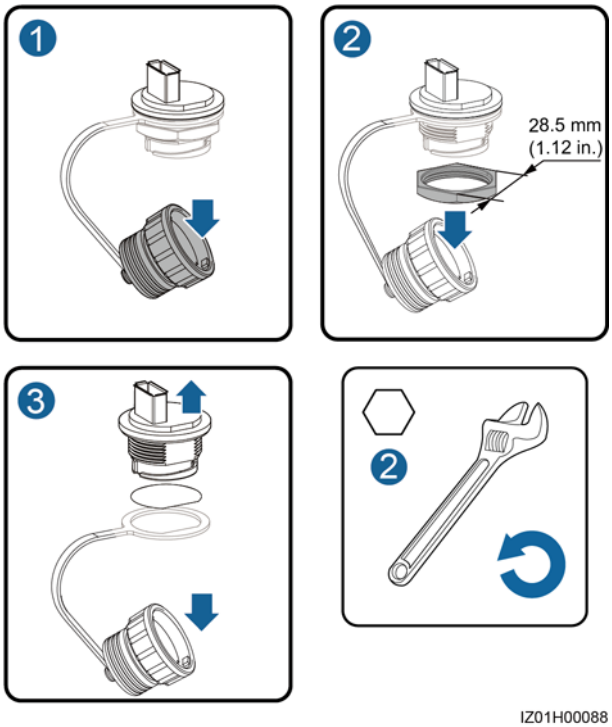
----End

7.3.9 Replacing the USB Port

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

Step 2 Remove the faulty USB port.

Figure 7-11 Removing a USB port



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

Step 4 Connect the cables based on their labels.

----End

8 Technical Specifications

Item	SmartACU2000D-D-05CN	SmartACU2000D-D-00	SmartACU2000D-D-02
Communications mode	ETH/MBUS/RS485/4G	SFP/ETH/RS485/MBUS	
Number of MBUS routes	1	1	2
MBUS input (AC)	380–800 V; three-phase		
Three-phase input power	5 W (maximum)	5 W (maximum)	2 x 5 W (maximum)
Single-phase operating voltage[a]	AC input: 100–240 V		
Single-phase input power	110 W (maximum)		
Frequency	50 Hz/60 Hz		
Cable routing mode	Routed in and out from the bottom		
Operation and maintenance mode	Operated and maintained from the front		
Operating environment	Indoor and outdoor		
Maximum operating altitude	4000 m (13123.36 ft)		
Installation mode	Installed on a support, pole, or wall		
Dimensions (H x W x D, including the mounting plate)	770 mm x 640 mm x 315 mm (30.31 in. x 25.20 in. x 12.40 in.)		

Item	SmartACU2000D-D-05CN	SmartACU2000D-D-00	SmartACU2000D-D-02
Net weight (including firestop putty, screws, and the mounting plate)	About 30 kg (66.14 lb)	About 29 kg (63.93 lb)	About 32 kg (70.55 lb)
Enclosure ingress protection (IP) rating	IP65	IP65/Type 4X	
Operating humidity	4%–100% RH		
Operating temperature	–40°C to +60°C (–40°F to +140°F)		
Storage temperature	–40°C to +70°C (–40°F to +158°F)		
Note a: Supports a 24 V power system. DC input and output: 24–28 V DC; 70 W (maximum)			

A 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
L	
LTE	Long Term Evolution
M	

MBUS	monitoring bus
P	
PE	protective earthing
PoE	power over Ethernet
R	
RH	relative humidity
S	
SFP	small form-factor pluggable
SPD	surge protective device
W	
WEEE	waste electrical and electronic equipment

