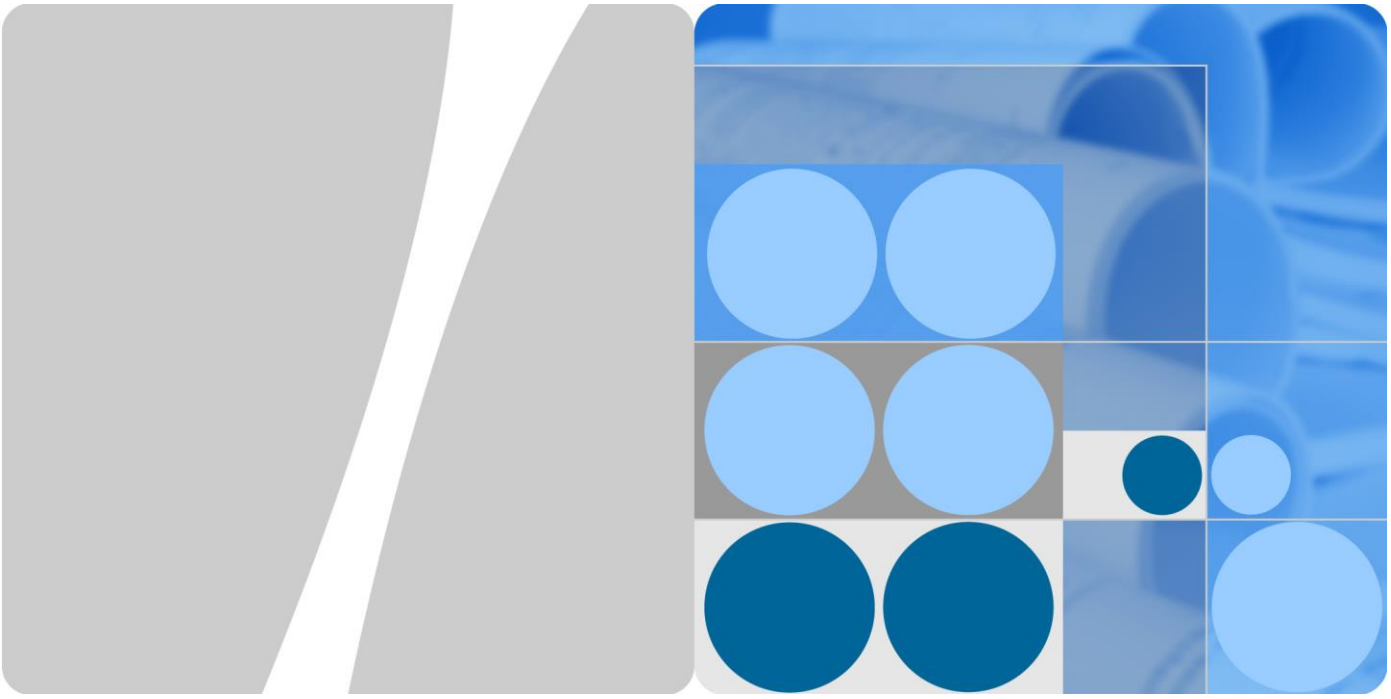

SmartACU2000B Smart Array Controller

User Manual (with no PID Module, 800 V AC)

Issue 04

Date 2017-10-30

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About This Document

Purpose

This document describes the SmartACU2000B smart array controller (smart array controller for short), which is an outdoor cabinet, in terms of its installation, electrical connections, commissioning, and maintenance. Before installing and operating the device, 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 operation personnel and qualified electrical technicians.

Symbol Conventions

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

Symbol	Description
 DANGER	Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
 WARNING	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
 CAUTION	Indicates a potentially hazardous situation which, if not avoided, may 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	Calls attention to important information, best practices and tips. NOTE is used to address information not related to personal injury, equipment damage, and environment deterioration.

Change History

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

Issue 04 (2017-10-30)

Added the description about the smart array controllers with the knife fuse switch as the three-phase input switch.

Issue 03 (2017-09-15)

Added the description about the SmartACU2000B-D-PLC-24V and SmartACU2000B-D-2PLC-24V smart array controllers.

Issue 02 (2017-08-10)

- Added the description about the SmartACU2000B-D-PLC smart array controller.
- Updated the figures about parts replacement in 7 System Maintenance.

Issue 01 (2017-02-05)

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

Contents

1 Precautions

General Safety

Personnel who plan to install or maintain Huawei equipment must receive a thorough training, understand all necessary safety precautions, and be able to correctly perform all operations.

- Only trained and qualified personnel are allowed to install, operate, and maintain Huawei equipment.
- Only trained and qualified personnel are allowed to remove safety facilities and inspect the devices.
- Only personnel certified or authorized by Huawei are allowed to replace devices or components (including software).
- Installation personnel must report faults or errors that might cause serious safety issues to related owners.

The safety precautions given in this document do not cover all the safety precautions. Huawei will not be liable for any consequence caused by the violation of the safety operation regulations and design, production, and usage standards.

Local Safety Regulations

Follow local laws and regulations when operating the device. The safety instructions in this document are only supplementary to the local laws and regulations.

Grounding

Equipment to be grounded must meet the following requirements:

- When installing a device, install the ground cable first. When uninstalling a device, remove the ground cable at the very end.
- Do not damage the ground conductor.
- Do not operate the device in the absence of a properly installed ground conductor.
- The device must be connected permanently to the protection ground before any operation.
- Before operating the device, check the electrical connection of the device to ensure that it is securely grounded.

Personal Safety

- Before any operations, take off conductive objects such as jewelry and watches to avoid electric shocks or burns.
- For personal safety, wear insulation gloves and safety shoes during operation and maintenance (O&M).
- Use tools in correct methods to avoid hurting people or damaging devices.
- In the case of fire, immediately leave the building or the equipment room, and turn on the fire alarm bell or make an emergency call. Do not enter a building that is on fire.
- When the operation is performed in a damp environment, ensure that the device is dry. When water is found in the rack or the rack is damp, switch off the power supply immediately.

Equipment Safety

- The device must be secured on the floor or to other immovable objects such as walls and mounting supports before operation.
- Tighten the screws by using a tool when installing components.
- After the installation, remove packing materials from the equipment area.

High Voltage

DANGER

- The high voltage power supply provides power for the device operation. Direct or indirect contact (especially with a damp object) with the high voltage power supply may result in fatal injury.
- Non-standard and improper high voltage operations may result in fire and electric shocks.

- Personnel who install AC facilities must be qualified to perform high voltage and AC operations.
- You must abide by the local rules and regulations when bridging and routing AC cables.
- Follow the local laws and regulations when installing AC power facilities.
- Use dedicated tools when performing high voltage and AC operations.
- Put on insulation gloves before powering on or off cabinets.

Power Cables

DANGER

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

- Before connecting or disconnecting a power cable, turn off the upstream power switch, and use a multimeter to check that the AC and DC voltages of the input port are zero.

- Before connecting a power cable, check that the label on the power cable is correct.
- Do not mix up the single-phase AC power cable with the three-phase AC power cable when connecting cables. Otherwise, the device may be damaged.

Components

To ensure that a device runs safely, replace a failed device component with a component of the same model and specifications.

2 Overview

2.1 Product Introduction

Features

The smart array controller is an outdoor cabinet that houses the SmartLogger2000 (SmartLogger for short), power line communication (PLC) central controller (CCO, in the dual-split transformer scenario), local area network (LAN) switch, access terminal box (ATB), power over Ethernet (POE) module, POE surge protective device (SPD), and so on.

The SmartLogger installed in the cabinet collects data from PV devices and reports the data to the plant monitoring system over a fiber ring network or 4G LTE network to control the communication between the PV plant and the monitoring system. The SmartLogger that has the embedded PLC function can connect to a SUN2000 integrated with the PLC function. In the scenario with a dual-split transformer, use a smart array controller that supports the access of two PLC routes, that is, the smart array controller that is factory-installed with an independent PLC CCO module and a SmartLogger with the built-in PLC function.

NOTE

PV devices include the SUN2000, box-type transformer, video surveillance device, and environmental monitoring instrument (EMI), and so on.

The smart array controller can be installed on a wall, support, or pole. The front door can be opened for maintenance, which facilitates installation, cable connection, and future maintenance.

Model

This document involves the following product models:

- SmartACU2000B-D-PLC
- SmartACU2000B-D-2PLC
- SmartACU2000B-D-PLC-24V
- SmartACU2000B-D-2PLC-24V

NOTE

Considering that the smart array controllers of various types have the same appearance, this document focuses on the SmartACU2000B-D-2PLC-24V.

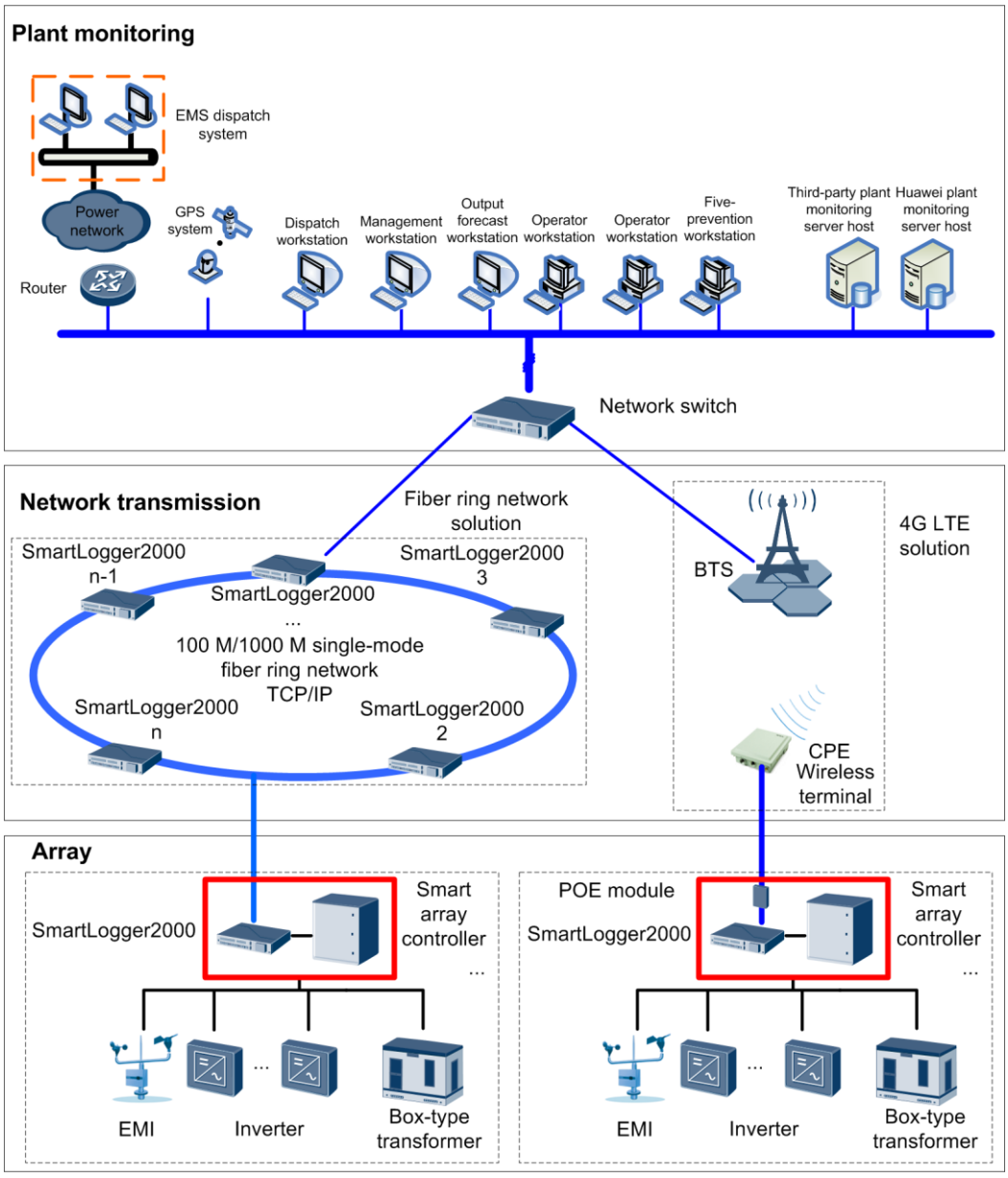
Figure 2-1 Designation explanation of the SmartACU2000B-D-2PLC-24V

Table 2-1 Designation explanation

No.	Meaning	Description
1	Product identifier	SmartACU2000: smart array controller
2	Version	B: version B
3	Voltage grade	D: ≤ 800 V three-phase AC input
4	Configuration	• PLC: supporting the access of one PLC route, no PID module, no 24 V DC input or output • 2PLC: supporting the access of two PLC routes, no PID module, no 24 V DC input or output • PLC-24V: supporting the access of one PLC route, no PID module, with 24 V DC input and output • 2PLC-24V: supporting the access of two PLC routes, no PID module, with 24 V DC input and output

Networking

Figure 2-2 Position of a smart array controller in a PV solution



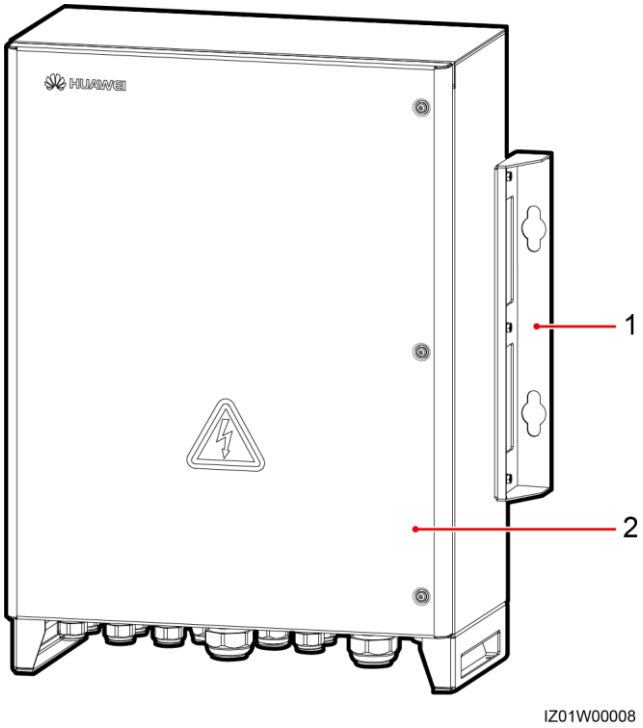
NOTE

- The SmartLogger and POE module are installed inside the smart array controller.
- Up to 16 SmartLoggers can be connected to form a fiber ring network.
- A base station can communicate with multiple pieces of customer premises equipment (CPE).
- The EMI position shown in the figure is for reference only.

2.2 Appearance

Cabinet Appearance

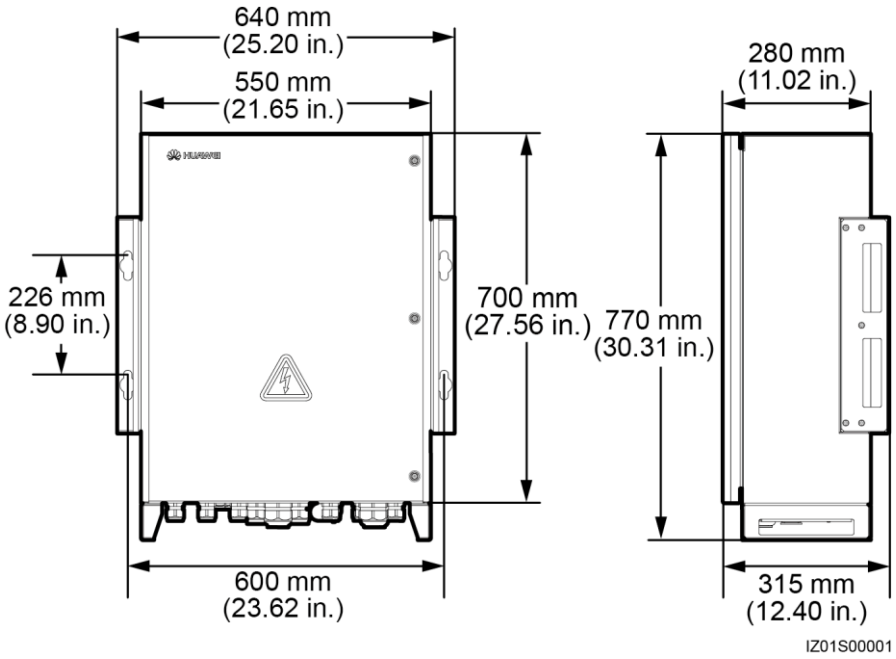
Figure 2-3 Front view



(1) Mounting plate (2) Cabinet door

Cabinet Dimensions

Figure 2-4 Cabinet dimensions



Cabinet Bottom

Figure 2-5 Bottom view

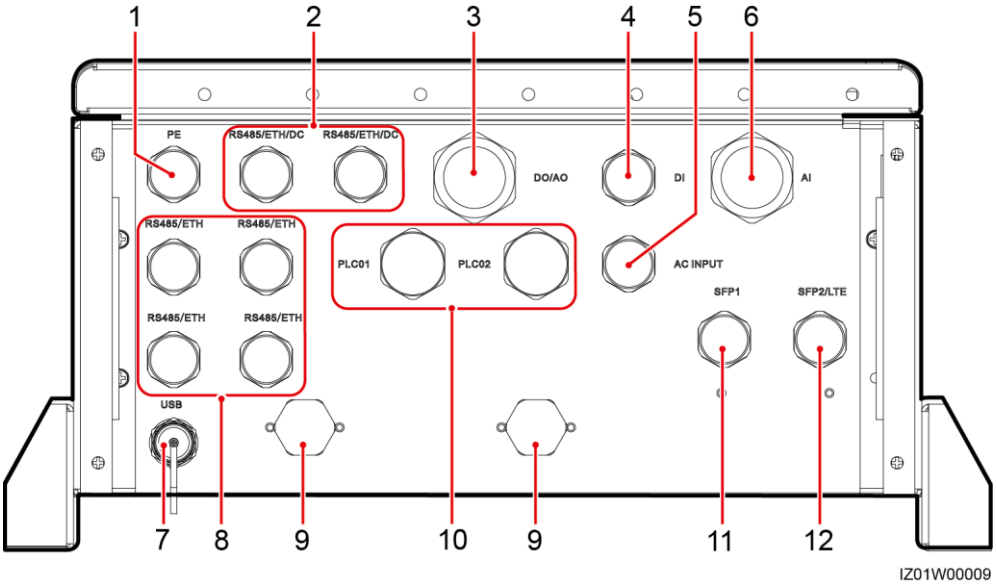


Table 2-2 Bottom description

No.	Silk Screen	Description	Waterproof Cable Connector Specifications	Waterproof Cable Connector Diameter Range
1	PE	Hole for the protective earthing (PE) cable	3/4 in.	13–18 mm (0.51–0.71 in.)
2	RS485/ETH/DC	Hole for the RS485 communications cable, network cable, or DC input and output power cables	3/4 in.	13–18 mm (0.51–0.71 in.)
3	DO/AO	DO/AO signal cable hole	5/4 in.	20–32 mm (0.79–1.26 in.)
4	DI	DI signal cable hole	3/4 in.	13–18 mm (0.51–0.71 in.)
5	AC INPUT	Hole for the single-phase AC power cable	3/4 in.	13–18 mm (0.51–0.71 in.)
6	AI	AI signal cable hole	5/4 in.	20–32 mm (0.79–1.26 in.)
7	USB	USB port	N/A	N/A
8	RS485/ETH	Hole for the RS485 communications cable or network cable	3/4 in.	13–18 mm (0.51–0.71 in.)
9	N/A	Ventilation valve	N/A	N/A
10	PLC01, PLC02	Hole for the three-phase AC power cable	1 in.	18–25 mm (0.71–0.98 in.)
11	SFP1	Optical cable hole	3/4 in.	13–18 mm (0.51–0.71 in.)
12	SFP2/LTE	Hole for the optical cable or network cable	3/4 in.	13–18 mm (0.51–0.71 in.)

NOTE

- Waterproof cable connector is abbreviated as waterproof connector in the following text.

- Use the USB port only during maintenance (such as power-on setting, upgrade, and data export). Ensure that the USB cover is tightened when the USB port is not in use.

2.3 Label Conventions

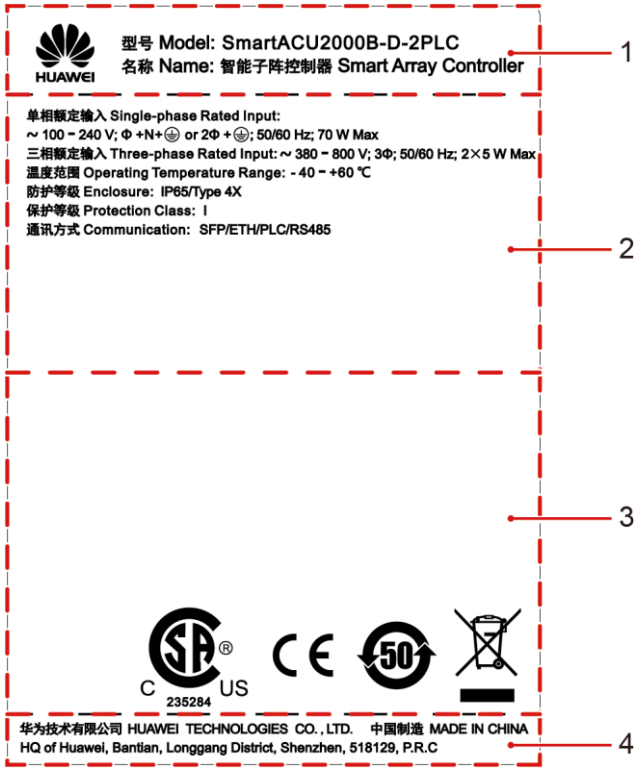
Labels

Symbol	Name	Meaning
	Electric shock warning label	High voltage exists after the device is powered on. Only qualified and trained electrical technicians are allowed to install and operate the device.
	Multi-power warning label	This device has more than one power input. Before maintenance, ensure that the upstream switch is OFF.
	Connection warning label	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.
	SPD module operation warning label	Do not remove or install an energized SPD module.
	Weight label	The device is heavy and needs to be carried by at least two persons.

Nameplate

The smart array controller is labeled with a nameplate that contains the model information, key technical specifications, and compliance symbols.

Figure 2-6 Nameplate



(1) Trademark and product model (2) Important technical specifications

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

NOTE

The nameplate figure is for reference only.

Table 2-3 Compliance symbols

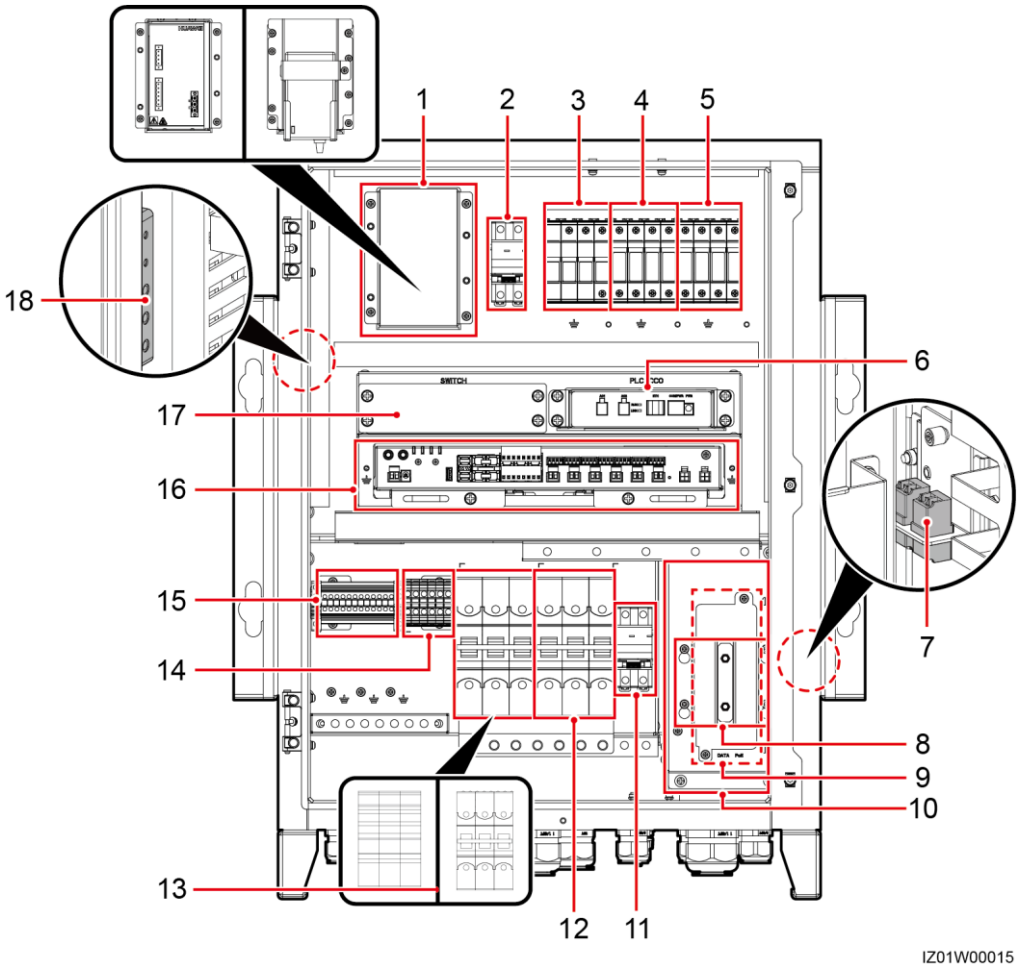
Symbol	Name	Meaning
C US 235284	CSA certification of America and Canada	The device complies with CSA certification standards.
CE	CE certification mark	The device complies with Conformité Européenne (CE) certification standards.
50	Environmentally friendly use period (EFUP)	The device is environmentally friendly for the specified period.

Symbol	Name	Meaning
	EU WEEE mark	The device must not be disposed of as domestic waste.

2.4 Product Composition

Figure 2-7 shows the installation positions for the components of the smart array controller, and Table 2-4 describes the components.

Figure 2-7 Component installation positions



NOTE

To highlight the involved area, the figure does not show the open door.

Table 2-4 Components and reserved installation positions

No.	Name	Specifications	Quantity	Label	Description
1	24 V DC power module (left figure)	• AC input: 100–240 V, 50 Hz/60 Hz • DC output: 12 V DC, 60 W (maximum); 24 V DC, 30 W (Maximum)	1	U01	Configured on the smart array controller that supports 24 V DC input and output **NOTE** If an external 24–28 V DC input is used, the DC output voltage ranges from 21.5 V to 25.2 V.
	Power adapter (right figure)	• AC input: 100–240 V, 50 Hz/60 Hz • DC output: 12 V/2 A			Configured on the smart array controller that does not support 24 V DC input or output
2	24 V DC input and output switches	10 A/1 P	2	• Output: QF06 • Input: QF07	Configured on the smart array controller that supports 24 V DC input and output
3	Single-phase SPD	Uc = 385 V AC 30 kA/60 kA, 8/20 μs 4 P	1	F03	Configured on all models of smart array controllers **NOTE** The single-phase SPD on the specific model of smart array controller has three poles.
4	Three-phase SPD 1	Uc = 680 V AC 20 kA/40 kA, 8/20 μs 1 P	4	F01	Configured on all models of smart array controllers
5	Three-phase SPD 2	Uc = 680 V AC 20 kA/40 kA, 8/20 μs 1 P	4	F02	Configured on the smart array controller that supports two PLC routes
6	PLC CCO	PLC CCO01A	1	PLC CCO	Configured on the smart array controller that supports two PLC routes

No.	Name	Specifications	Quantity	Label	Description
7	Fiber adapter	2LC/PC-2LC/PC-4	2	• OFA01: TX1 RX1 • OFA02: TX2 RX2	Configured on all models of smart array controllers
8	Position for the POE SPD	N/A	1	N/A	Reserved on all models of smart array controllers.
9	Position for the POE module	N/A	1	POE	Reserved on all models of smart array controllers.
10	ATB	N/A	1	ATB	Configured on all models of smart array controllers
11	Single-phase input switch	32 A/2 P	1	QF01	Configured on all models of smart array controllers
12	Three-phase input switch 2	32 A/3 P	1	QF04	Configured on the smart array controller that supports two PLC routes
13	Three-phase input switch 1 (left figure: knife fuse switch)	25 A/3 P	1	FU01	Configured on the SmartACU2000B-D-PLC installed with the knife fuse switch
	Three-phase input switch 1 (right figure: circuit breaker)	32 A/3 P	1	QF02	Configured on all the models installed with the circuit breaker
14	24 V DC input and output terminals	6 P/supporting 0.2–10 mm^2 (or 24–8 AWG) cable connection	1	JX02	Configured on the smart array controller that supports 24 V DC input and output
15	RS485 communications terminal	12 P/supporting 1–2.5 mm^2 (or 18–14 AWG) cable connection	1	JX01	Configured on all models of smart array controllers
16	SmartLogger	SmartLogger2000	1	SmartLogger (SL)	SmartLogger2000-10-C configured on the smart array controller that supports PLC communication

No.	Name	Specifications	Quantity	Label	Description
17	Position for the LAN switch	N/A	1	SWITCH	Reserved on all models of smart array controllers.
18	PE bar	N/A	1	N/A	Configured on all models of smart array controllers

NOTE

- For simplicity purposes, the preceding table lists only the components that you need to operate and reserved installation positions.
- The SmartLogger communicates with the SUN2000 app over the embedded Bluetooth module. For details, see the *SmartLogger2000 User Manual* and *SUN2000 APP User Manual*. When the SmartLogger is communicating with the SUN2000 app, keep the SUN2000 app less than 1 m (39.37 in.) away from the front of the cabinet to ensure proper communication.

2.5 Working Principles

Figure 2-8 shows the electrical conceptual diagram for the smart array controller that does not support 24 V DC input or output.

Figure 2-8 Electrical conceptual diagram (for the smart array controller not supporting 24 V DC input or output with QF02 and QF04 circuit breakers)

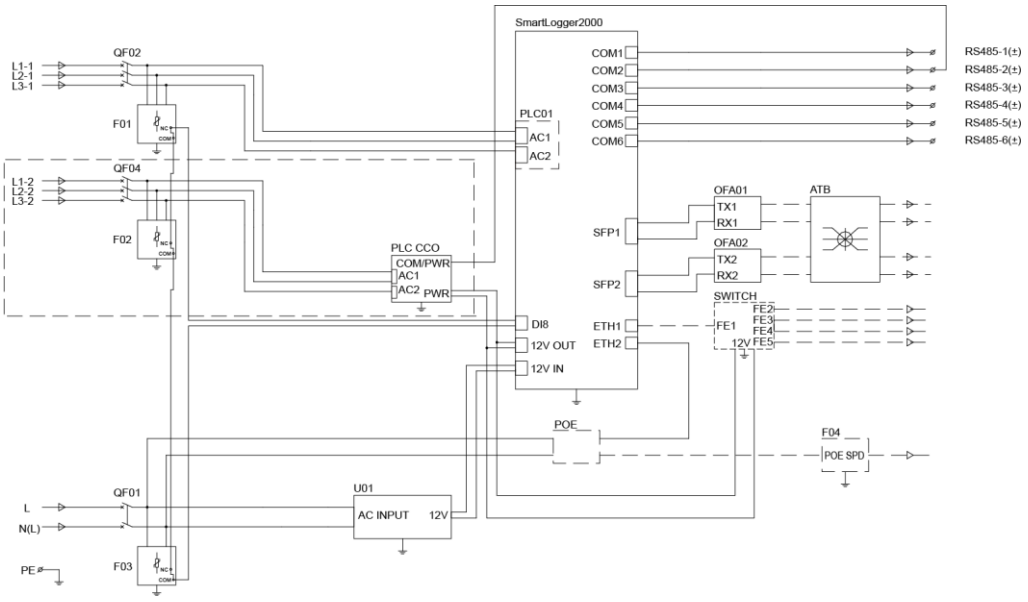
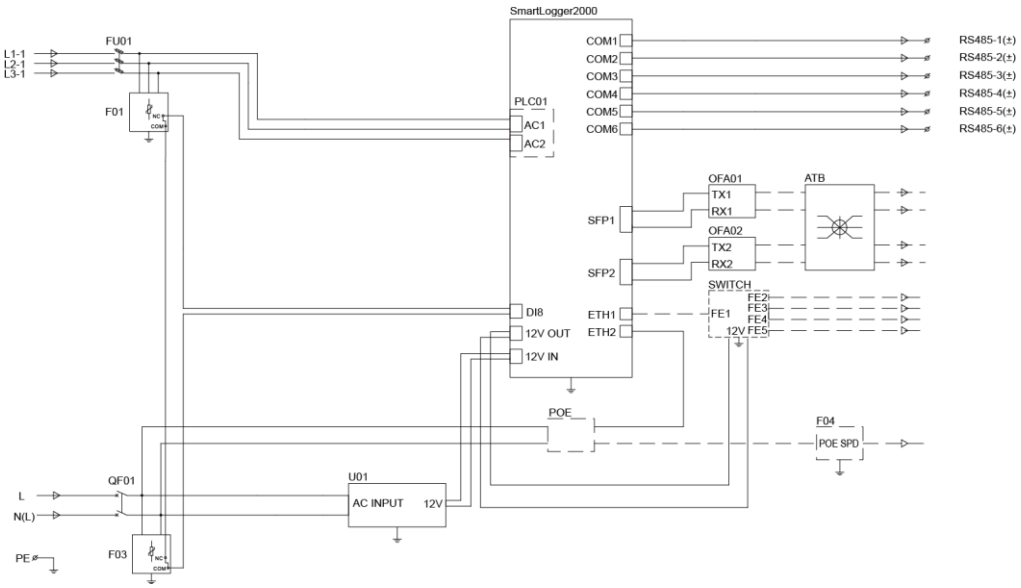


Figure 2-9 Electrical conceptual diagram (for the smart array controller not supporting 24 V DC input or output with FU01 knife switch)

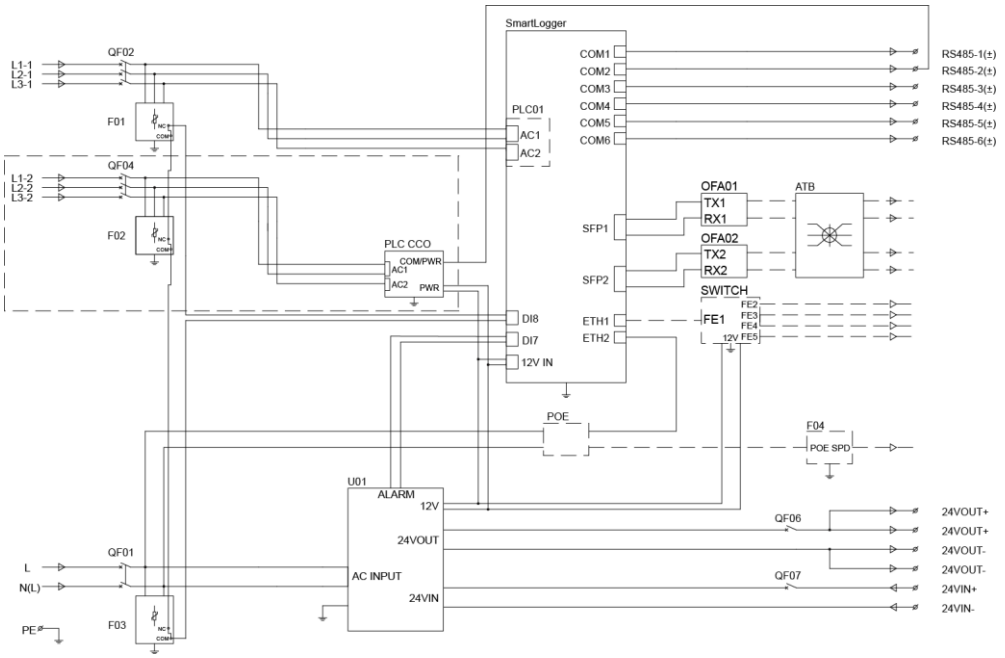


NOTE

Components in dashed-line boxes are optional.

Figure 2-10 shows the electrical conceptual diagram for the smart array controller that supports 24 V DC input and output.

Figure 2-10 Electrical conceptual diagram (for the smart array controller supporting 24 V DC input and output)



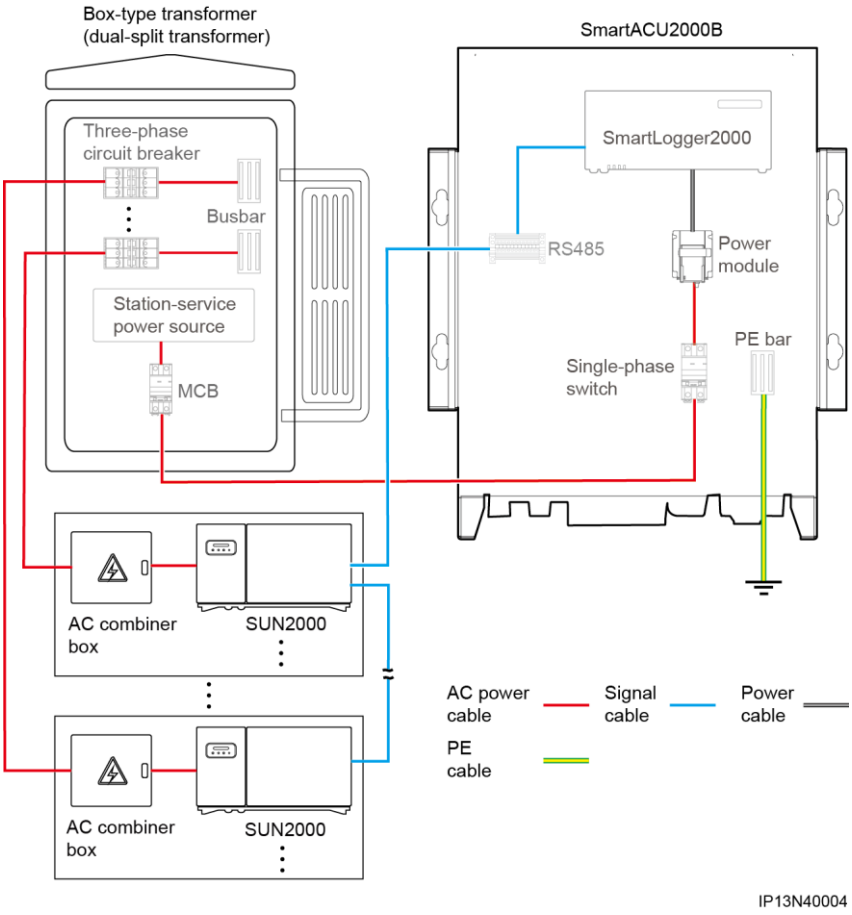
NOTE
Components in dashed-line boxes are optional.

The smart array controller communicates with PV devices over RS485, PLC, or Ethernet.

NOTE
When the smart array controller communicates with the inverter over PLC, log in to the embedded WebUI of the SmartLogger2000, choose **Monitoring** > **PLC** > **Networking Settings**, and set **Networking** to **Enable** (default value). When the smart array controller communicates with the inverter only over RS485, set **Networking** to **Disable**. For details, see the *SmartLogger2000 User Manual*. (The WebUI screenshots for SmartLogger V200R001C30SPC106 are used as an example.)

- RS485 communication mode
  - All models of smart array controllers support the RS485 communication mode.
  - The SmartLogger connects to the box-type transformer, power meter, inverter, PLC CCO module, and other devices that support RS485 communication over COM ports.

Figure 2-11 RS485 communication mode

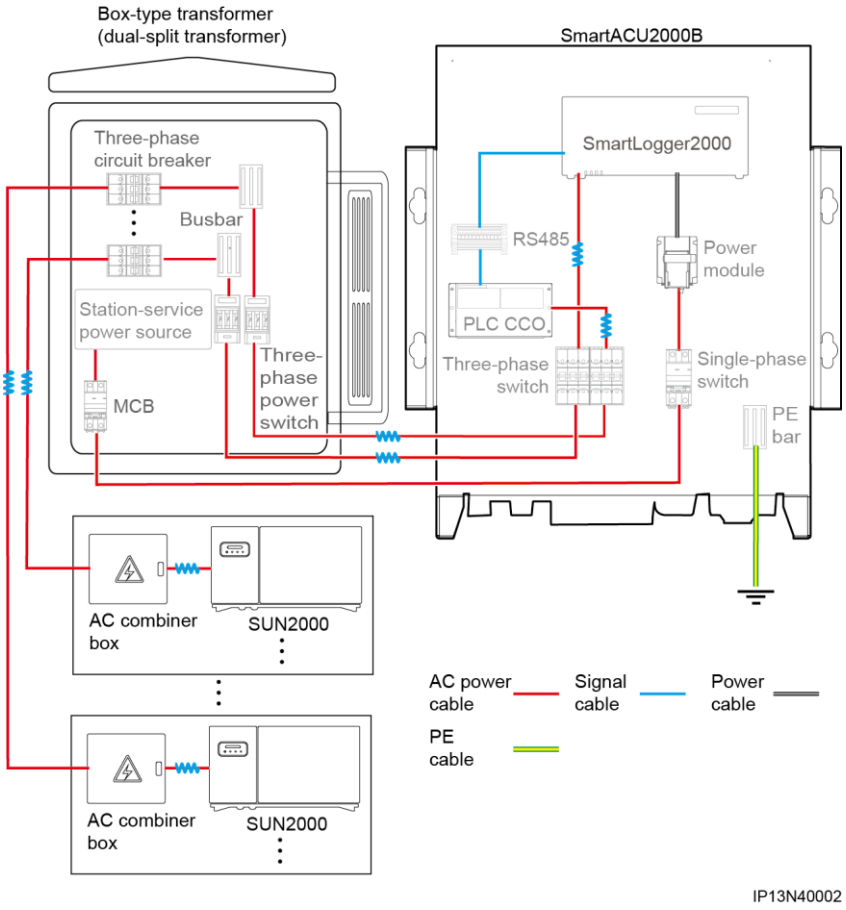


NOTE
The figure displays only major components and cables and is for reference only.

- PLC communication mode
  - If a dual-split transformer is used, use the smart array controller that supports the access of two PLC routes.

- The SmartLogger has embedded PLC function, which connects to the inverter that supports PLC communication over a three-phase AC power cable.
- The PLC CCO module connects to the inverter that supports PLC communication over a three-phase AC power cable.

Figure 2-12 PLC communication mode



NOTE

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

- Ethernet communication mode
  - All models of smart array controllers support the Ethernet communication mode. The cabinet reserves a position for installing a LAN switch.
  - The SmartLogger provides two 10/100M Ethernet electrical ports itself and provides five 10/100M Ethernet electrical ports by connecting to a LAN switch.
  - The SmartLogger connects to the box-type transformer, power meter, and other devices that support Ethernet communication over Ethernet electrical ports.

The smart array controller communicates with the plant monitoring system over a fiber ring network or 4G LTE network.

- Over a fiber ring network
  - All models of smart array controllers support a fiber ring network.

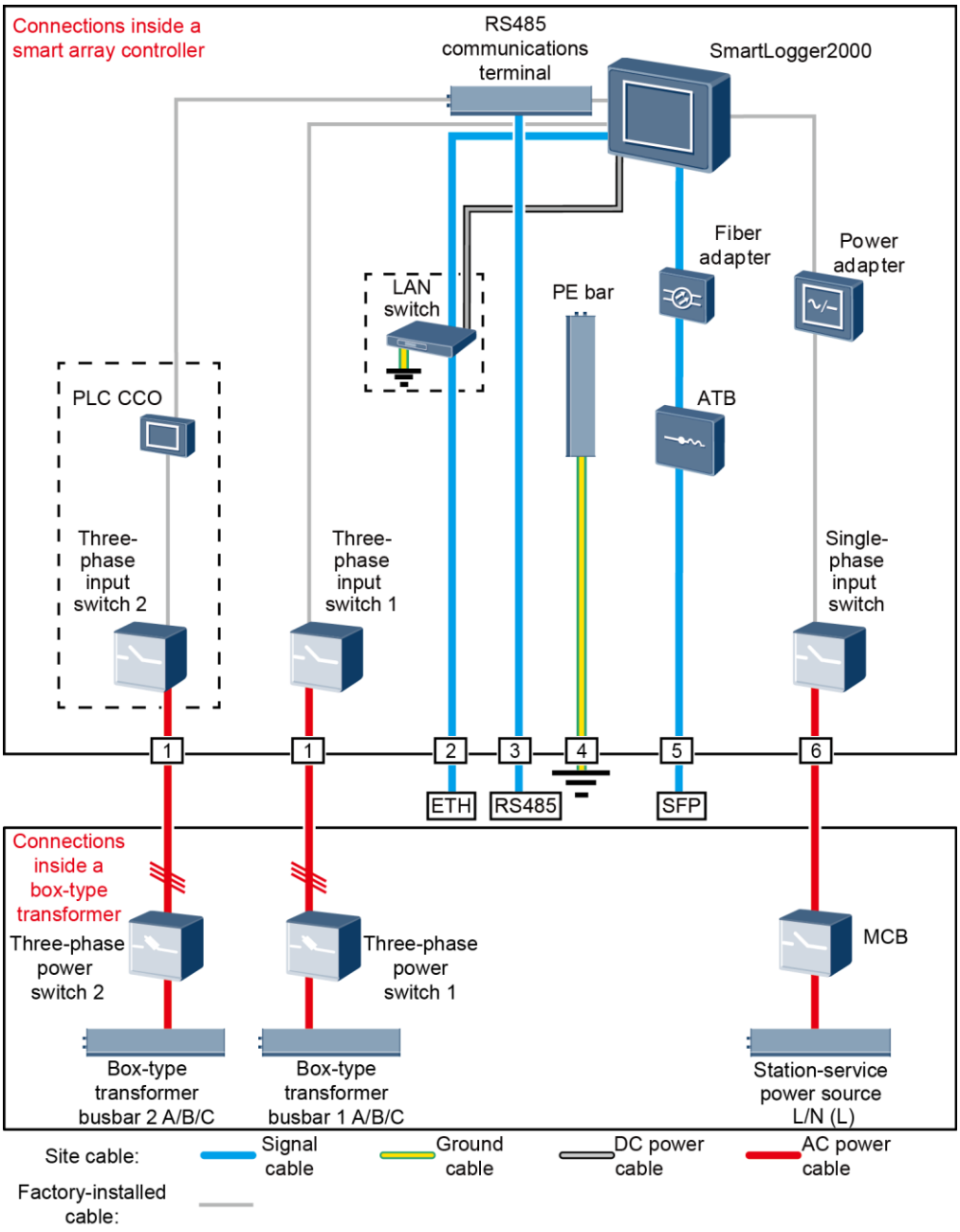
  - The SmartLogger connects to the plant monitoring system by optical fibers through an ATB.
- Over a 4G LTE network
  - All models of smart array controllers support the 4G LTE communication mode. The cabinet reserves positions for installing the POE module and POE SPD.
  - The SmartLogger connects to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

2.6 Configuration Scenario

2.6.1 Fiber Ring Network

Figure 2-13 shows the connections among the components of the smart array controller that does not support 24 V DC input or output.

Figure 2-13 Component connections (for the smart array controller not supporting 24 V DC input or output)

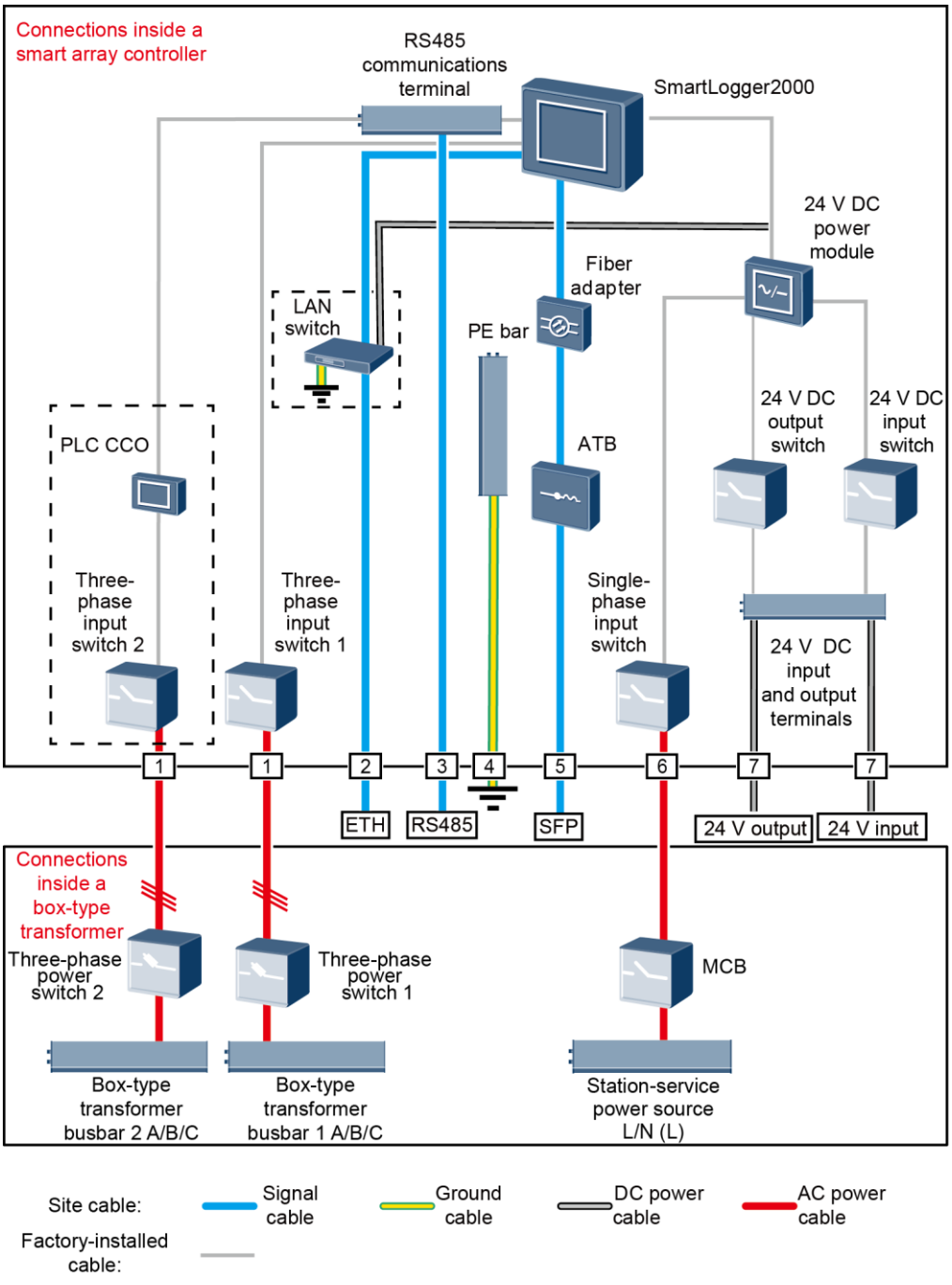


NOTE

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

Figure 2-14 shows the connections among the components of the smart array controller that supports 24 V DC input and output.

Figure 2-14 Component connections (for the smart array controller supporting 24 V DC input and output)



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 2-5 Components required in the fiber ring network scenario

Location	Component		Recommended Model or Specifications	Source of Component	Quantity
Smart array controller	LAN switch (optional)		UT-H605 or ES1000	Can be purchased from Huawei	1
	Fitting bag for fiber ring switching	Low-speed optical module	FTLF1323P1BTR-HW	Can be purchased from Huawei	2
		Optical jumper	PLCLC5S-ST3P302-HW, LC-LC-S2-L2, 3ECA1031LCLC002-01-F, or LP-LP-2S-P-SM-002		8
Box-type transformer	MCB		Recommended rated current: 32 A; number of poles: 2	Prepared by the customer	1
	Three-phase power switch	Knife fuse switch (solution 1)	• When the rated AC voltage on the low-voltage side of the box-type transformer is less than or equal to 500 V, the rated voltage of the knife fuse switch should be greater than or equal to 500 V. • When the rated AC voltage on the low-voltage side of the box-type transformer is greater than 500 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 (3 fuses for each knife fuse switch box)	Prepared by the customer	• Scenario with a double-column transformer: 1 • Scenario with a dual-split transformer: 2

Location	Component		Recommended Model or Specifications	Source of Component	Quantity
		MCCB (solution 2)	• When the rated AC voltage on the low-voltage side of the box-type transformer is less than or equal to 500 V, the rated voltage of the molded case circuit breaker (MCCB) should be greater than or equal to 500 V. • When the rated AC voltage on the low-voltage side of the box-type transformer is greater than 500 V and less than or equal to 800 V, the rated voltage of the MCCB should be greater than or equal to 800 V. • Let-through energy ≤ 1.26×10^6 A^2s • Recommended rated current: 32 A; number of poles: 3	Prepared by the customer	

NOTICE

- Components listed in the table need to be installed onsite.
- Select either an MCCB or a knife fuse switch as the three-phase power switch. If you select an MCCB, ensure that the let-through energy of the MCCB meets requirements. The breaking capacity depends on the limited short-circuit current on the low voltage side of the transformer.
- Models of the components inside the box-type transformer are specified by the box-type transformer vendor.

Table 2-6 Cables to be prepared in the fiber ring network scenario

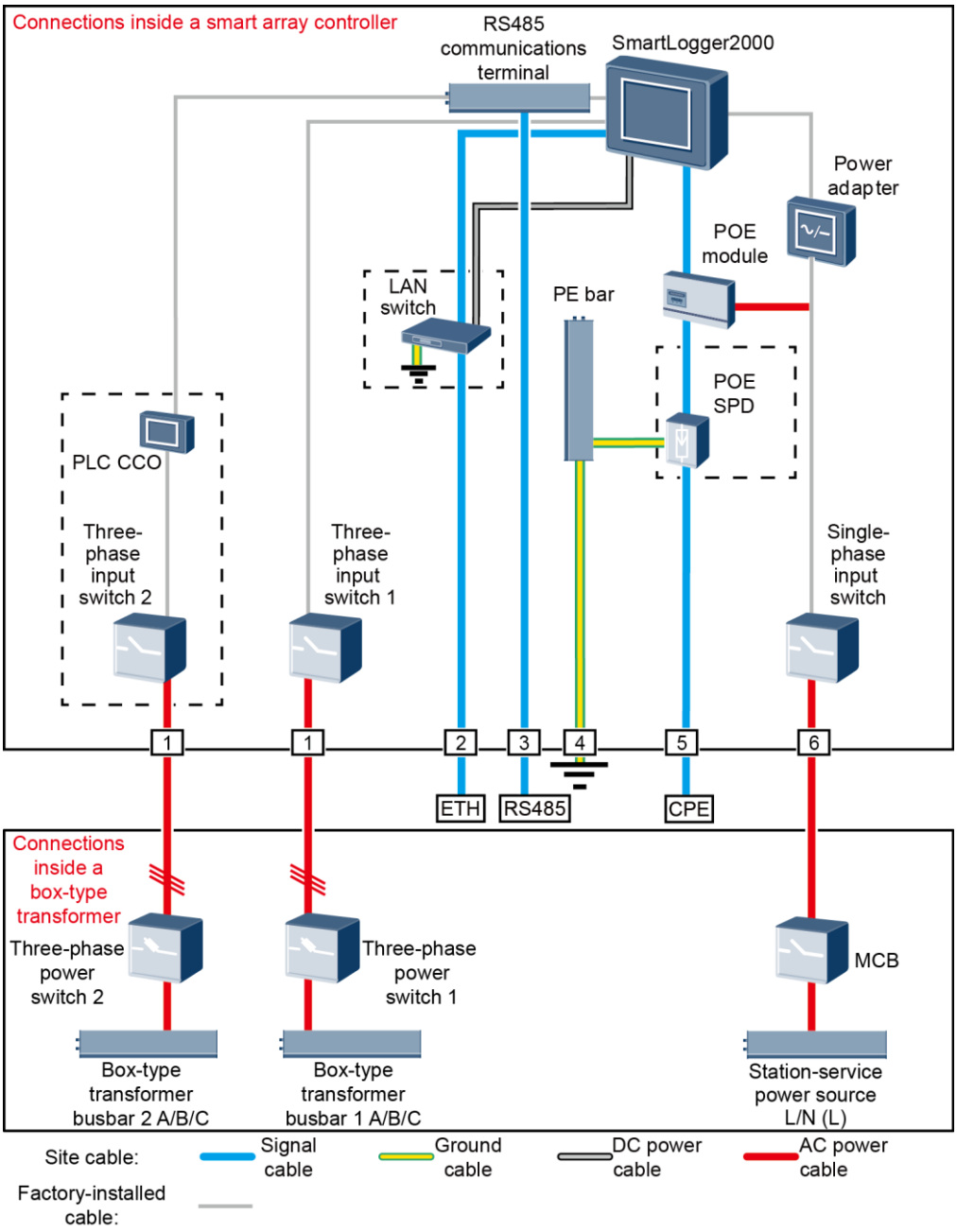
No.	Cable	Cable Name/Specifications	Cross-sectional Area Range of the Cable (Recommended)	Source of Cable
1	Three-phase AC power cable	• Three-core (L1, L2, and L3) outdoor copper armored cable with three OT-M6 terminals (L1, L2, and L3) • When the rated AC voltage on the low-voltage side of the box-type transformer is less than or equal to 500 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 low-voltage side of the box-type transformer 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 should be greater than or equal to 1000 V.	• 8–10 mm^2 (10 mm^2) • 8 AWG	Prepared by the customer
2	Peripheral network cable	CAT 5E outdoor shielded network cable with an outer diameter less than 9 mm (0.35 in.) and internal resistance not greater than 1.5 ohms/10 m (1.5 ohms/32.81 ft), as well as a shielded RJ45 connector	N/A	Prepared by the customer
3	Peripheral RS485 communications cable	A computer cable (DJYP2VP2-22 2x2x1) or armored shielded twisted pair that can be used outdoors and OT-M4 terminals	• 0.5–1 mm^2 (1 mm^2) • 20–18 AWG (18 AWG)	Prepared by the customer
4	Cabinet PE cable	Outdoor copper cable with an OT-M6 terminal	• 6–16 mm^2 (16 mm^2) • 10–6 AWG (6 AWG)	Prepared by the customer

No.	Cable	Cable Name/Specifications	Cross-sectional Area Range of the Cable (Recommended)	Source of Cable
5	Optical cable	Four-core or eight-core single-mode armored optical cable with a transmission wavelength of 1310 nm and an outer diameter less than or equal to 18 mm (0.71 in.)	N/A	Prepared by the customer
6	Single-phase AC power cable	• Common connection: one two-core outdoor copper armored cable • Connection through a tube: two single-core outdoor copper cables • Operating voltage to the ground ≥ 300 V	• 4–6 mm^2 (4 mm^2) • 12–10 AWG (12 AWG)	Prepared by the customer
7	24 V DC input and output power cables	• Common connection: one two-core outdoor copper armored cable • Connection through a tube: two single-core outdoor copper cables • Operating voltage to the ground ≥ 300 V	• 2.5–4 mm^2 (2.5 mm^2) • 14–12 AWG (14 AWG)	Prepared by the customer

2.6.2 4G LTE Network

Figure 2-15 shows the connections among the components of the smart array controller that does not support 24 V DC input or output.

Figure 2-15 Component connections (for the smart array controller not supporting 24 V DC input or output)

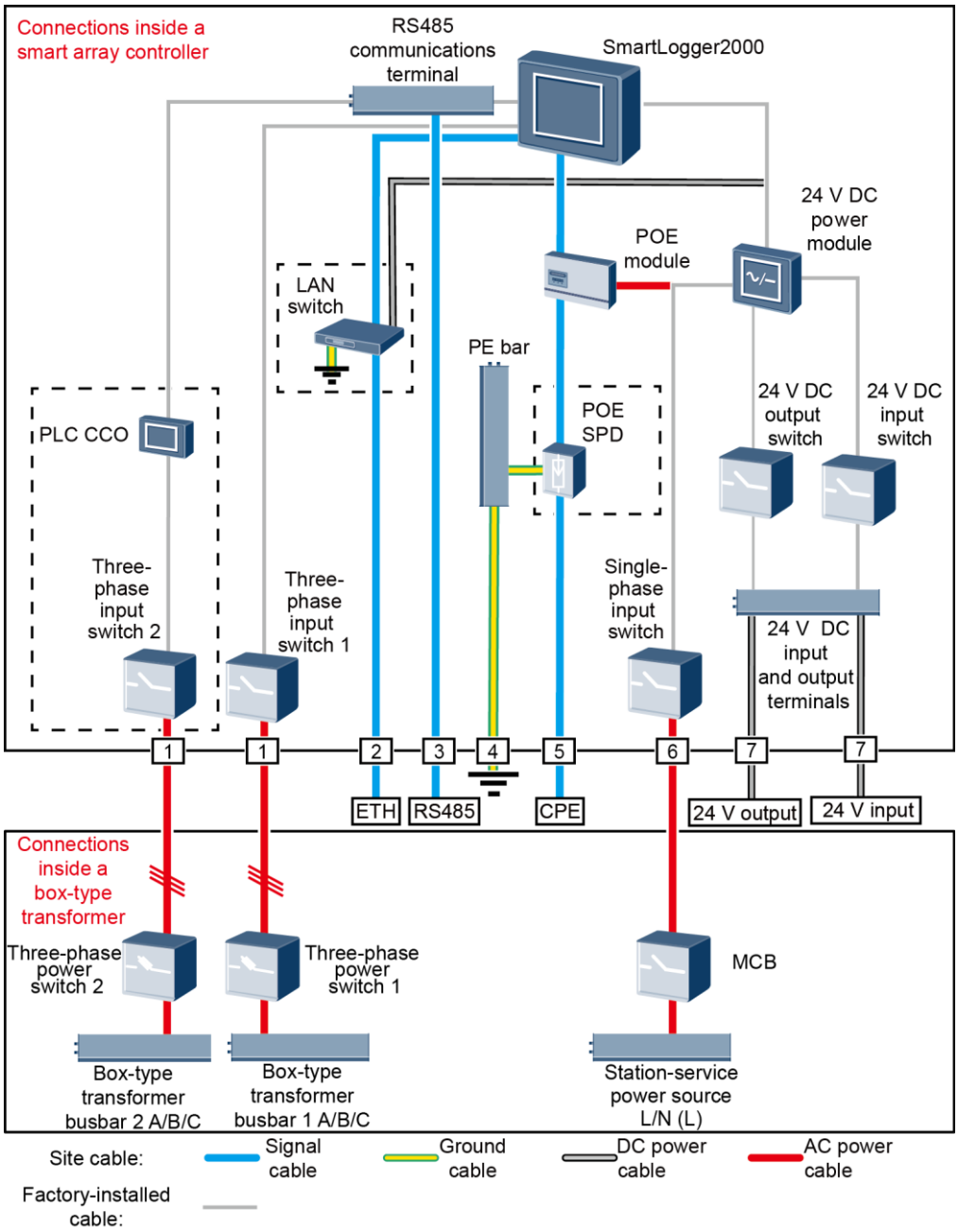


NOTE

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

Figure 2-16 shows the connections among the components of the smart array controller that supports 24 V DC input or output.

Figure 2-16 Component connections (for the smart array controller supporting 24 V DC input or output)



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 2-7 Components required in the 4G LTE network scenario

Location	Component		Recommended Model or Specifications	Source of Component	Quantity
Smart array controller	LAN switch (optional)		UT-H605 or ES1000	Can be purchased from Huawei	1
	POE and CPE fitting bags	POE module	N/A	Can be purchased from Huawei	1
		POE SPD[a]	N/A	Can be purchased from Huawei	1
Outside the smart array controller and box-type transformer		CPE	N/A	Can be purchased from Huawei	1
Box-type transformer	MCB		Recommended rated current: 32 A; number of poles: 2	Prepared by the customer	1
	Three-phase power switch	Knife fuse switch (solution 1)	• When the rated AC voltage on the low-voltage side of the box-type transformer is less than or equal to 500 V, the rated voltage of the knife fuse switch should be greater than or equal to 500 V. • When the rated AC voltage on the low-voltage side of the box-type transformer is greater than 500 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 (3 fuses for each knife fuse switch box)	Prepared by the customer	• Scenario with a double-column transformer: 1 • Scenario with a dual-split transformer: 2

Location	Component		Recommended Model or Specifications	Source of Component	Quantity
		MCCB (solution 2)	• When the rated AC voltage on the low-voltage side of the box-type transformer is less than or equal to 500 V, the rated voltage of the molded case circuit breaker (MCCB) should be greater than or equal to 500 V. • When the rated AC voltage on the low-voltage side of the box-type transformer is greater than 500 V and less than or equal to 800 V, the rated voltage of the MCCB should be greater than or equal to 800 V. • Let-through energy ≤ 1.26×10^6 A^2s • Recommended rated current: 32 A; number of poles: 3	Prepared by the customer	

NOTICE

- Components listed in the table need to be installed onsite.
- Select either an MCCB or a knife fuse switch as the three-phase power switch. If you select an MCCB, ensure that the let-through energy of the MCCB meets requirements. The breaking capacity depends on the limited short-circuit current on the low voltage side of the transformer.
- Models of the components inside the box-type transformer are specified by the box-type transformer vendor.
- Note a: If the CPE model is EG860, configure a POE SPD.

Table 2-8 Cables to be prepared in the 4G LTE network scenario

No.	Cable	Cable Name/Specifications	Cross-sectional Area Range of the Cable (Recommended)	Source of Cable
1	Three-phase AC power cable	• Three-core (L1, L2, and L3) outdoor copper armored cable with three OT-M6 terminals (L1, L2, and L3) • When the rated AC voltage on the low-voltage side of the box-type transformer is less than or equal to 500 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 low-voltage side of the box-type transformer 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 should be greater than or equal to 1000 V.	• 8–10 mm^2 (10 mm^2) • 8 AWG	Prepared by the customer
2	Peripheral network cable	CAT 5E outdoor shielded network cable with an outer diameter less than 9 mm (0.35 in.) and internal resistance not greater than 1.5 ohms/10 m (1.5 ohms/32.81 ft), as well as a shielded RJ45 connector	N/A	Prepared by the customer
3	Peripheral RS485 communications cable	A computer cable (DJYP2VP2-22 2x2x1) or armored shielded twisted pair that can be used outdoors and OT-M4 terminals	• 0.5–1 mm^2 (1 mm^2) • 20–18 AWG (18 AWG)	Prepared by the customer
4	Cabinet PE cable	Outdoor copper cable with an OT-M6 terminal	• 6–16 mm^2 (16 mm^2) • 10–6 AWG (6 AWG)	Prepared by the customer

No.	Cable	Cable Name/Specifications	Cross-sectional Area Range of the Cable (Recommended)	Source of Cable
5	Network cable from the POE module or POE SPD to the CPE	A 20 m (65.62 ft) long network cable delivered with Huawei CPE **NOTE** If the length is insufficient, prepare a cable with the same specifications as a peripheral network cable.	N/A	Prepared by the customer
6	Single-phase AC power cable	• Common connection: one two-core outdoor copper armored cable • Connection through a tube: two single-core outdoor copper cables • Operating voltage to the ground ≥ 300 V	• 4–6 mm^2 (4 mm^2) • 12–10 AWG (12 AWG)	Prepared by the customer
7	24 V DC input and output power cables	• Common connection: one two-core outdoor copper armored cable • Connection through a tube: two single-core outdoor copper cables • Operating voltage to the ground ≥ 300 V	• 2.5–4 mm^2 (2.5 mm^2) • 14–12 AWG (14 AWG)	Prepared by the customer

3 Storage

The following requirements should be met when the smart array controller needs to be stored prior to installation:

- Do not unpack the smart array controller.
- Keep the storage temperature at –40 ℃ to +70 ℃ (–40 ℉ to +158 ℉) and the humidity at 5%–95% RH.
- Store the cabinet in a clean and dry place and protect it from dust and water vapor corrosion.
- A maximum of six smart array controllers can be stacked. Stack them neatly so that they will not fall over.
- Perform periodic inspections during the storage. If any rodent bites are found, replace the packing materials immediately.
- If the smart array controller has been long-term stored, inspections and tests should be conducted by professionals before it is put into use.

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

4 Installation

4.1 Checking Before Installation

Checking the Outer Packaging

Before unpacking the smart array controller, check the outer packaging for damage, such as holes and cracks, and check the models of the smart array controller and its components. If any damage is found or the model is not what you require, do not unpack the package but contact the dealer as soon as possible.

NOTE

You are advised to remove the outer packaging within 24 hours before installing the smart array controller and its components.

Checking the Appearance

After unpacking, check the smart array controller and its components for damage. If any damage is found, do not use the damaged component but contact the dealer as soon as possible.

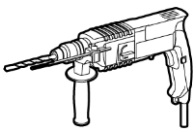
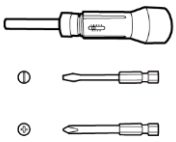
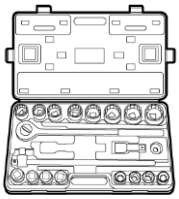
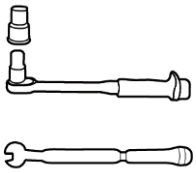
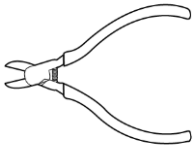
Checking the Cabinet and Fittings

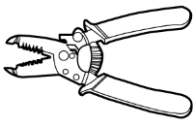
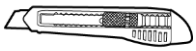
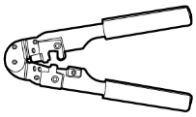
After unpacking the smart array controller, check whether the cabinet and fittings are intact and complete. If any damage is found or any component is missing, contact the dealer.

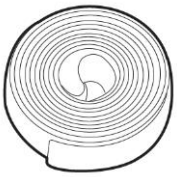
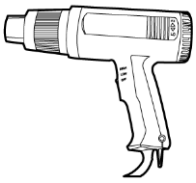
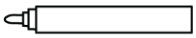
NOTE

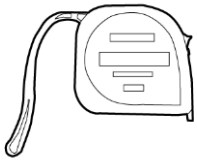
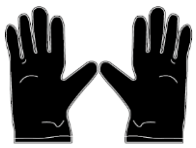
For the number of delivered fittings, see the packing list in the packing case.

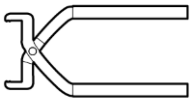
4.2 Tools

Tool	Model	Function
Hammer drill 	Drill bit: Φ14 mm (0.55 in.) and Φ16 mm (0.63 in.)	• Φ14 mm (0.55 in.) drill bit: Drill holes in supports. • Φ16 mm (0.63 in.) drill bit: Drills holes in walls.
Torque screwdriver 	• Flat head: M3 • Phillips head: M3, M4, and M6	• Connects cables to the terminal block. • Tightens ground bolts. • Installs components.
Socket wrench 	Work with a torque wrench.	• Tightens bolts. • Tightens nuts.
Adjustable wrench 	Open end: 32 mm	Tightens bolts.
Torque wrench 	N/A	• Tightens bolts. • Tightens nuts.
Diagonal pliers 	N/A	Cuts cable ties.

Tool	Model	Function
Wire stripper 	N/A	Peels cable jackets.
Rubber mallet 	N/A	Hammers expansion bolts into holes.
Utility knife 	N/A	Removes packaging.
Cable cutter 	N/A	Cuts power cables.
Crimping tool 	N/A	Crimps cables.
RJ45 crimping tool 	N/A	Crimps RJ45 connectors.

Tool	Model	Function
Network cable tester 	N/A	Tests the network cable connection.
Heat shrink tubing 	N/A	Wraps the cable crimping area of an OT terminal.
Heat gun 	N/A	Blows a heat shrink tubing.
Vacuum cleaner 	N/A	Cleans up dust after holes are drilling in a wall.
Multimeter 	N/A	Measures voltages.
Marker 	N/A	Marks positions.

Tool	Model	Function
Measuring tape 	N/A	Measures distances.
Level 	N/A	Levels hole positions.
Protective gloves 	N/A	Protects your hands during installation.
Insulation gloves 	Operating voltage ≥ 2000 V	Protects you from electric shocks.
Safety goggles 	N/A	Protects your eyes during drilling.
Anti-dust respirator 	N/A	Protects you from dust during hole drilling.

Tool	Model	Function
Cable tie 	N/A	Binds cables.
Flat-head screwdriver 	3 mm x 150 mm (0.12 in. x 5.91 in.)	Installs and removes components.
SPD module extracting unit 	N/A	Removes the SPD module.

4.3 Determining the Installation Position

Basic Requirements

- The smart array controller is protected to IP65/Type 4X and can be installed outdoors.
- The installation method and position must match the dimensions of the smart array controller. For details about the dimensions, see 2.2 Appearance.
- Do not install the smart array controller in an area where flammable or explosive materials are stored.

Installation Environment Requirements

The smart array controller should be installed in a well ventilated environment to ensure good heat dissipation. The smart array controller should operate in a temperature range of –40 ℃ to +60 ℃ (–40 ℉ to +140 ℉).

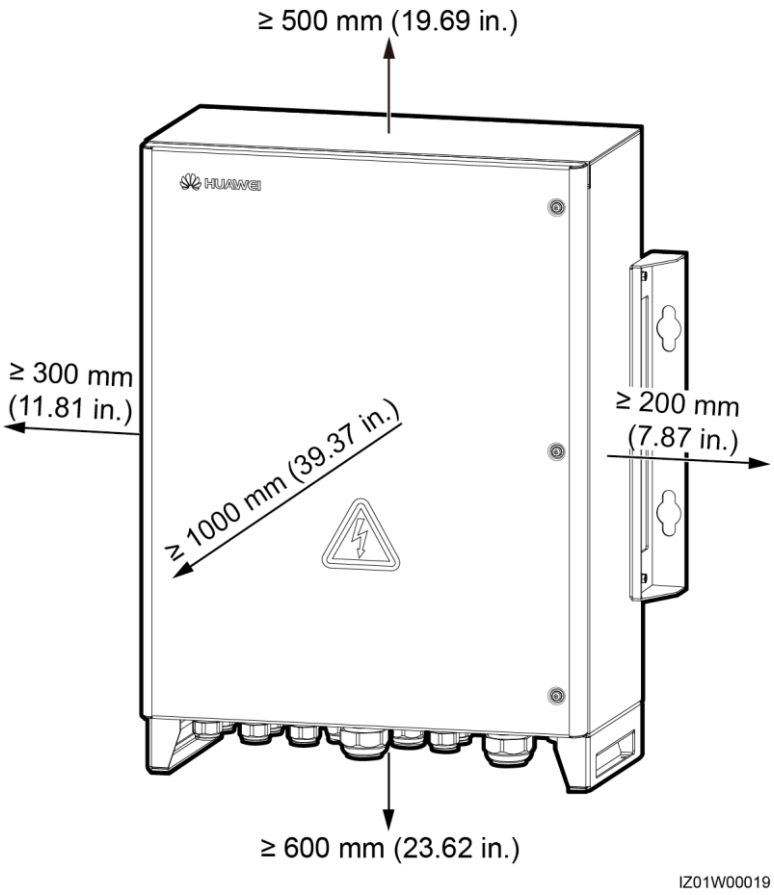
Carrier Requirements

- The carrier where the smart array controller is installed must be fireproof.
- Do not install the smart array controller on flammable building materials.
- Ensure that the installation surface is solid enough to bear the smart array controller. For the weight details about the smart array controller, see 8 Technical Specifications.

Installation Space Requirements

- When installing the smart array controller on a wall, support, or pole, you are advised to install it in a position at eye level to facilitate O&M.
- Reserve sufficient clearance around the smart array controller for installation and heat dissipation.

Figure 4-1 Installation space



4.4 Installing the Cabinet

4.4.1 Wall-mounted Installation

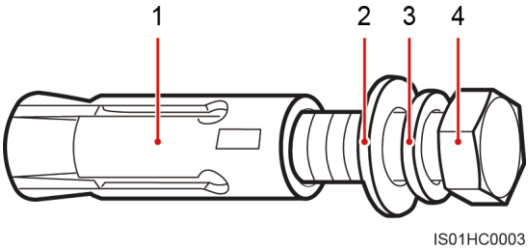
Prerequisites

The smart array controller has been moved to the specified installation position.

Context

An expansion bolt contains four parts.

Figure 4-2 Expansion bolt

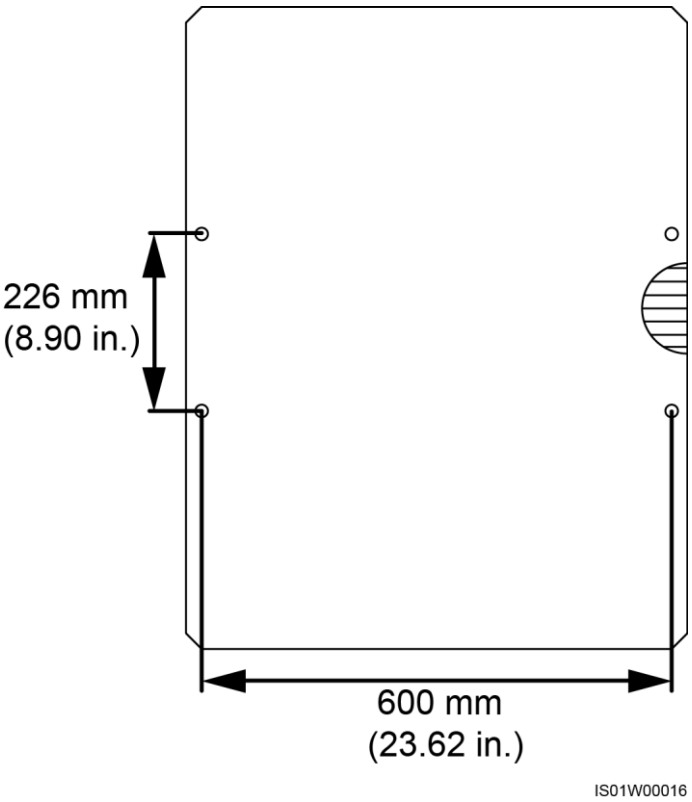


(1) Expansion sleeve (2) Flat washer (3) Spring washer (4) M12x60 bolt

Procedure

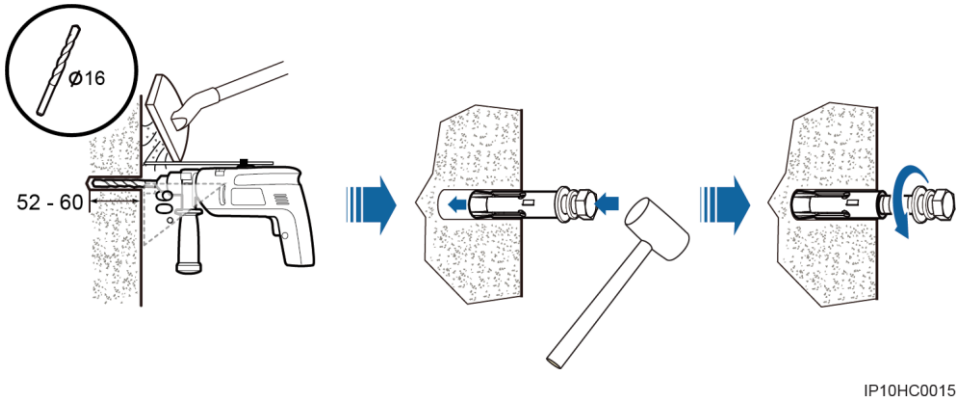
Step 1 Determine the positions for drilling holes into the wall based on the delivered marking-off template. Level the marking-off template using a level, and mark mounting holes using a marker.

Figure 4-3 Marking-off template



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

Figure 4-4 Drilling a hole and installing an expansion bolt



NOTICE

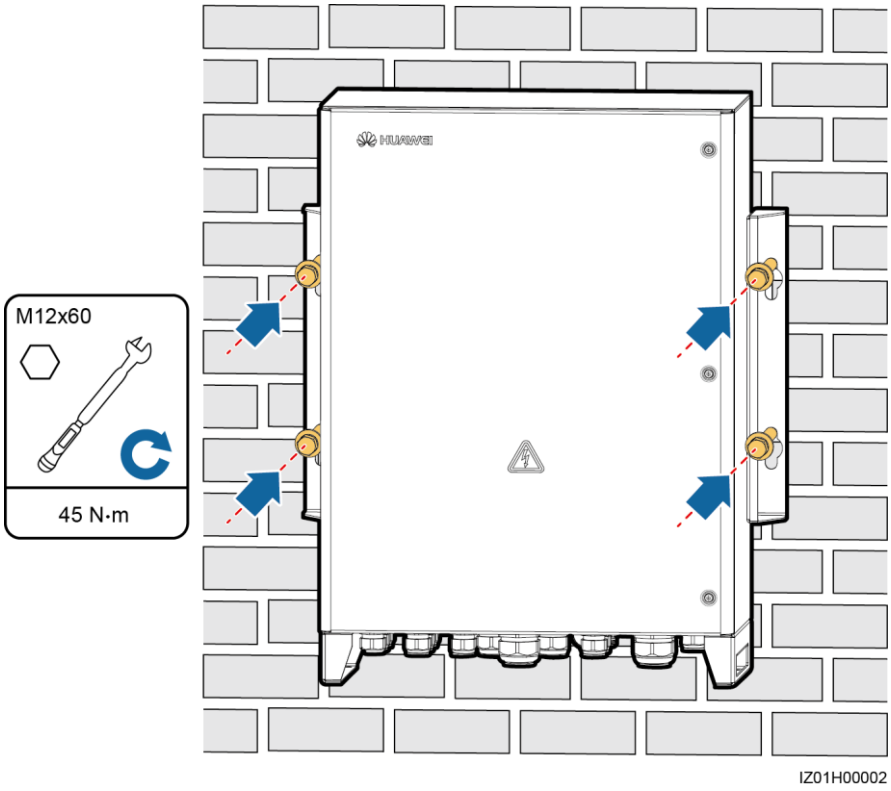
- To prevent dust inhalation or contact with eyes, wear safety goggles and an anti-dust respirator when drilling holes.
- Wipe away any dust in or around the holes and measure the hole distances. If the holes are inaccurately positioned, position again and drill new holes.
- Verify that the front of the expansion sleeve is flush with the wall. Otherwise, the mounting bracket will not be securely installed on the wall.

1. Put a hammer drill with an appropriate drill bit on the marked hole positions perpendicularly against the wall and drill holes.
2. Slightly tighten an expansion bolt, place it vertically into the hole, and use a rubber mallet to knock it until the expansion sleeve completely enters the hole.
3. Partially tighten the expansion bolt.
4. Loosen the M12x60 bolt.

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

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

Figure 4-5 Installing a cabinet



----End

4.4.2 Support-mounted Installation

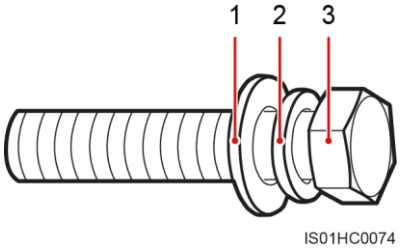
Prerequisites

The smart array controller has been moved to the specified installation position.

Context

NOTE
The bolt used for securing the mounting ear and support is an expansion bolt with only a flat washer and a spring washer.

Figure 4-6 Securing bolts

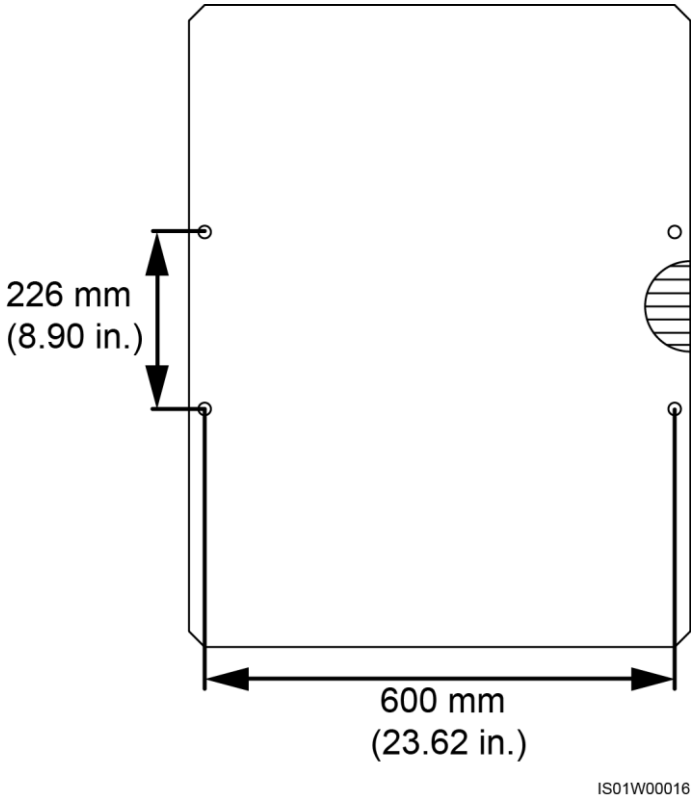


(1) Flat washer (2) Spring washer (3) M12x60 bolt

Procedure

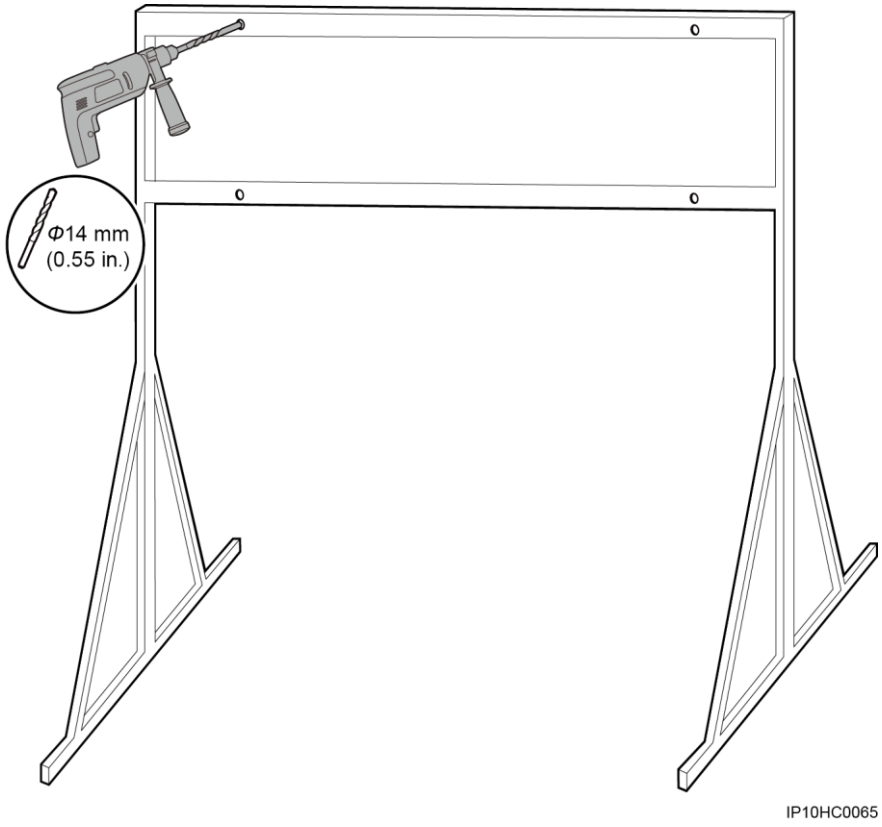
Step 1 Determine the positions for drilling holes into the support based on the delivered marking-off template. Level the marking-off template using a level, and mark mounting holes using a marker.

Figure 4-7 Marking-off template



Step 2 Drill holes using a hammer drill.

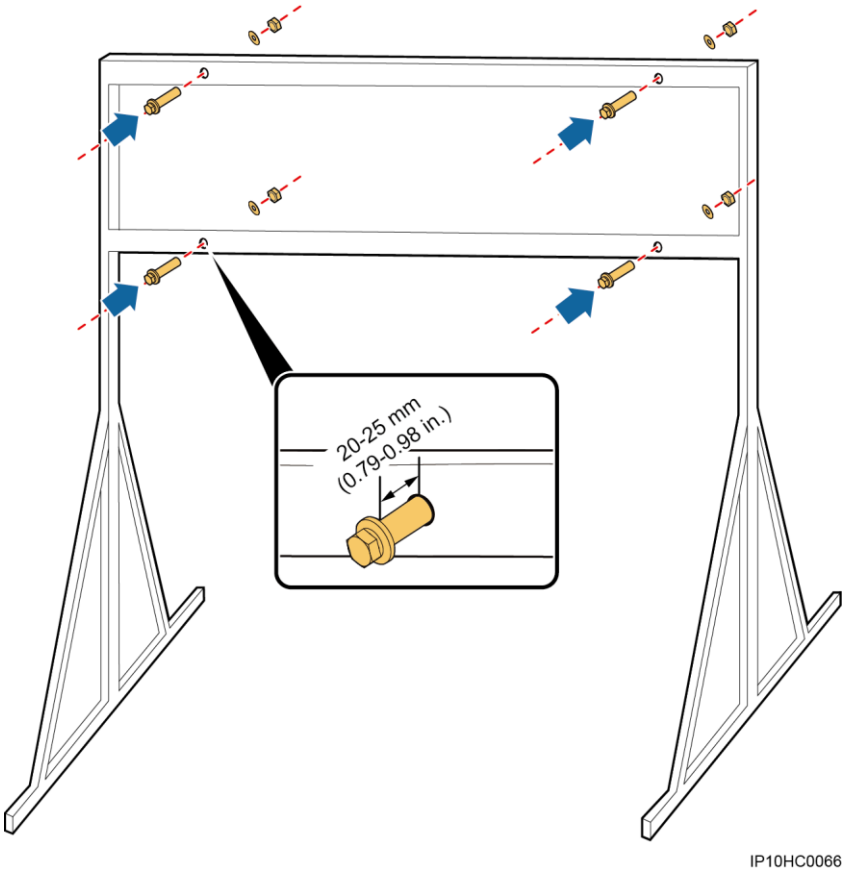
Figure 4-8 Drilling a hole



Step 3 Insert M12x60 bolts (expansion sleeves removed from the bolts) into the holes, and secure them using the supplied nuts and flat washers.

NOTE
Do not fully tighten the bolts.

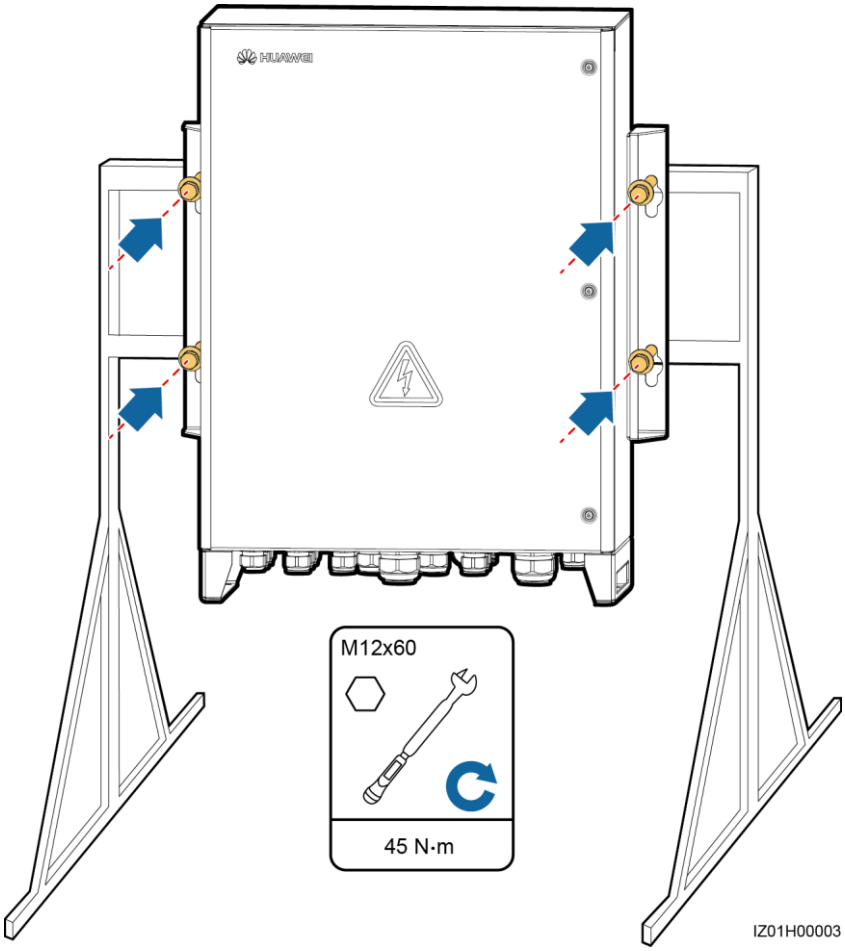
Figure 4-9 Securing bolts



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

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

Figure 4-10 Installing a cabinet



----End

4.4.3 Pole-mounted Installation

Prerequisites

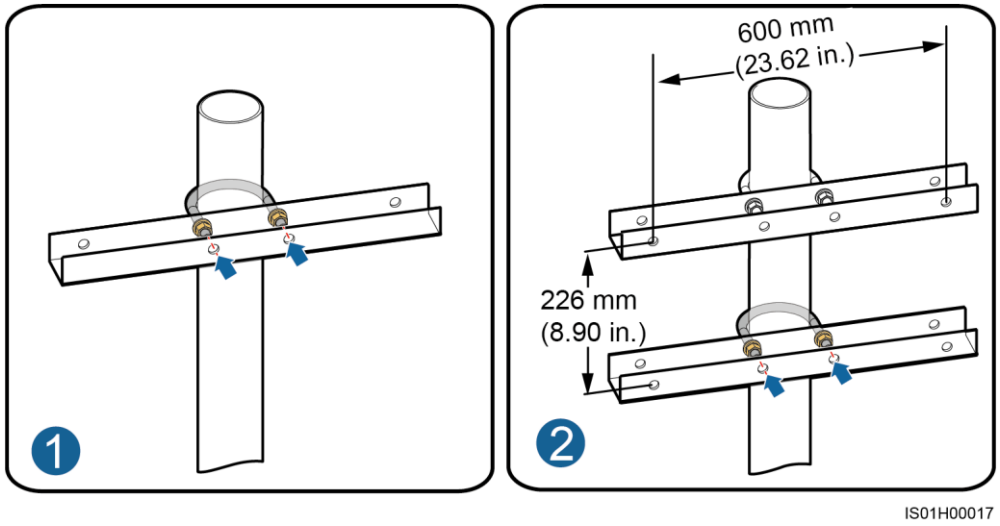
- The smart array controller has been moved to the specified installation position.
- To pole-mount the smart array controller, you need to prepare pole-mounting brackets by yourself based on the controller dimensions. For details about the dimensions, see 2.2 Appearance.
- You are advised to use M12 U-shaped bolts to secure the pole-mounting brackets.

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

Procedure

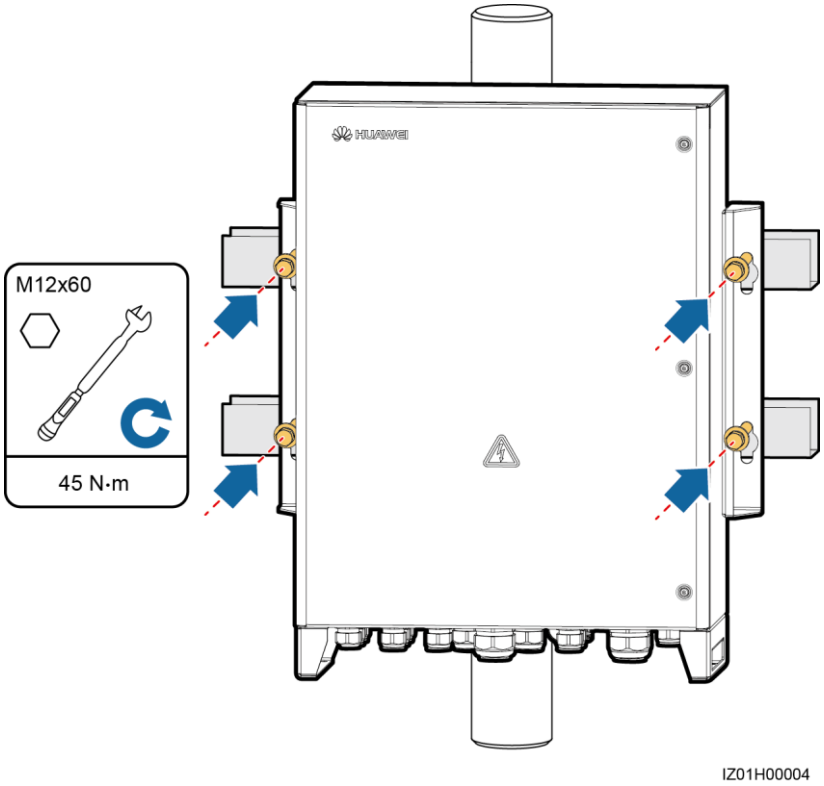
Step 1 Secure pole-mounting brackets to the pole and tighten U-shaped bolts to a torque of 45 N·m using a torque wrench with an open end of 18 mm (0.71 in.).

Figure 4-11 Securing pole-mounting brackets



Step 2 Secure the smart array controller to the pole-mounting brackets. For details, see 4.4.2 Support-mounted Installation.

Figure 4-12 Securing a cabinet



----End

4.5 Opening the Cabinet Door

Prerequisites

CAUTION

- Before opening the cabinet door, turn off all upstream switches for the smart array controller to power off the controller. After that, wait at least 3 minutes and then operate the smart array controller. If you have to operate an energized smart array controller, wear insulation 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 impossible, do not open the cabinet door on rainy or snowy days.
- Do not leave unused screws in the cabinet.

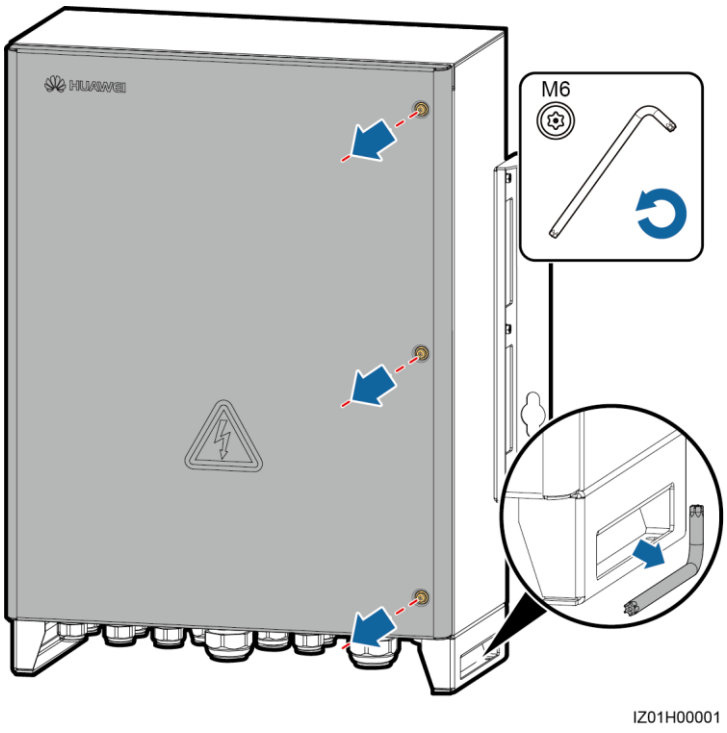
Procedure

Step 1 Loosen the screws on the cabinet.

NOTE

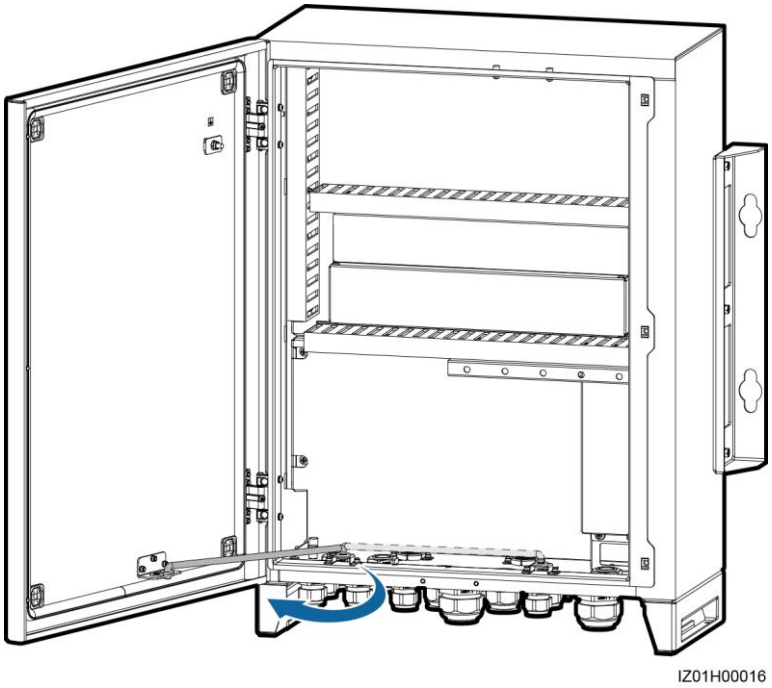
The security torx wrench is bound to the cabinet base.

Figure 4-13 Loosening screws



Step 2 Open the cabinet door and use the support bar to stabilize the door.

Figure 4-14 Using a support bar to stabilize a door



NOTE

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

----End

4.6 Installing Components

Install components by following the instructions in 2.6 Configuration Scenario.

4.6.1 Installing a POE module

Procedure

Step 1 Loosen screws and remove the mounting board.

NOTE

Do not remove the screws.

Step 2 Remove screws from the POE module installation position.

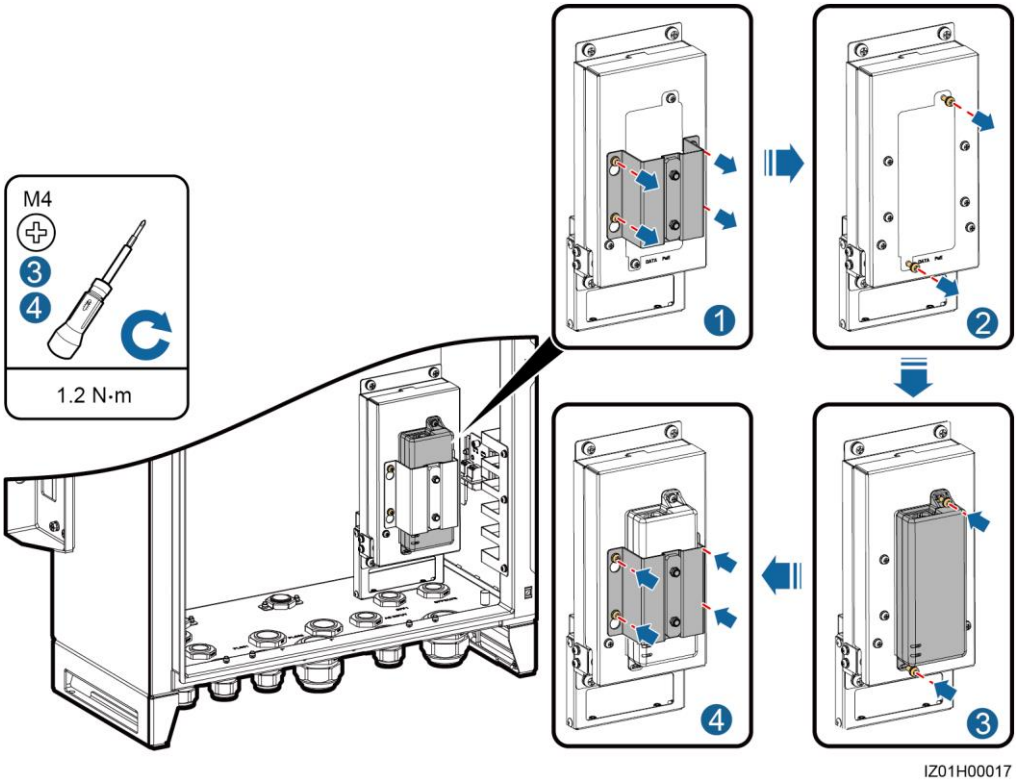
Step 3 Place the POE module at the installation position and align the mounting holes. Then secure the POE module.

NOTE

Indicators should be in the lower left corner.

Step 4 Secure the mounting board.

Figure 4-15 Installing a POE module



----End

4.6.2 (Optional) Installing the POE SPD

Procedure

Step 1 Loosen the nuts on the POE SPD mounting board.

NOTE
Do not remove the nuts.

Step 2 Replace and secure the POE SPD mounting bracket.

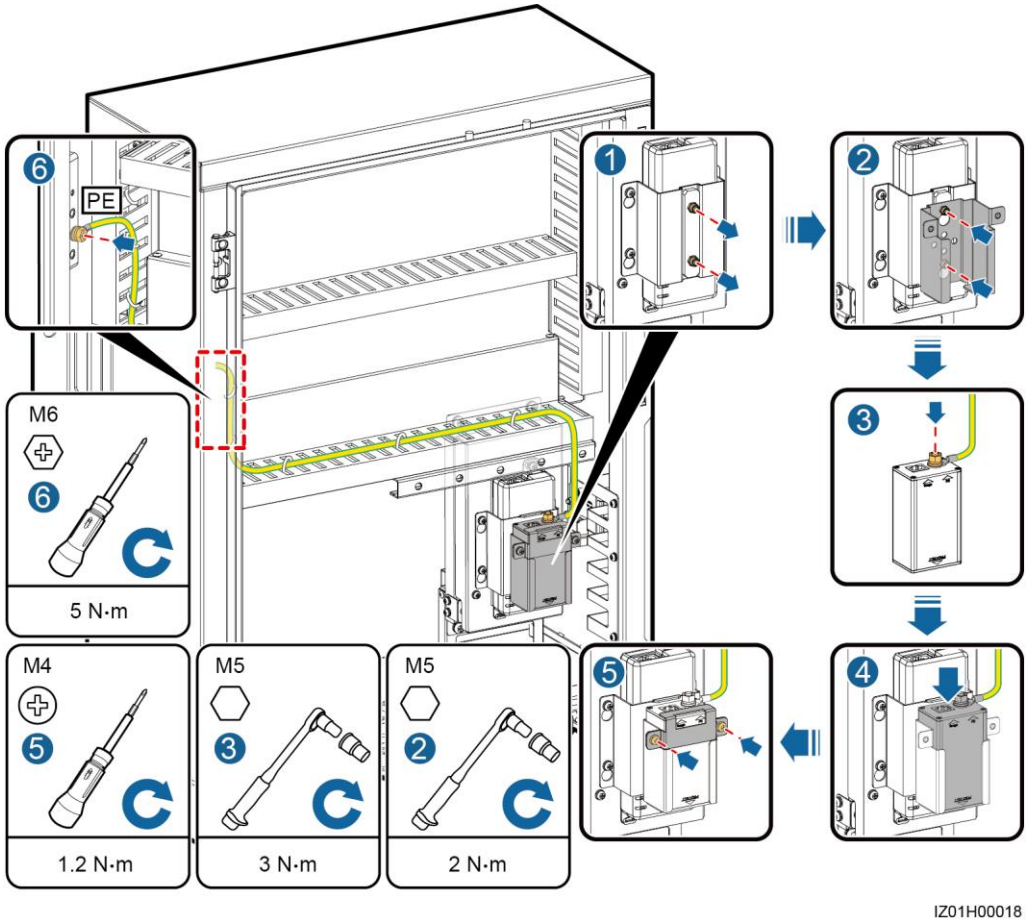
Step 3 Connect one end of a ground cable to the PE point on the POE SPD, and secure the ground nut.

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 4-16 Installing a POE SPD



----End

4.6.3 (Optional) Installing the LAN Switch

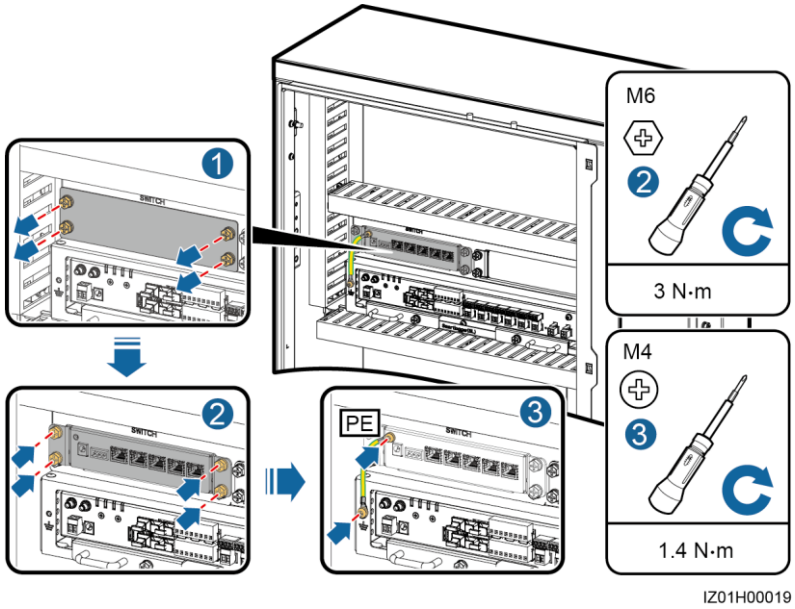
Procedure

Step 1 Take off the panel behind which a LAN switch will be installed.

Step 2 Secure the LAN switch.

Step 3 Connect the LAN switch PE cable.

Figure 4-17 Installing a LAN switch



----End

5 Electrical Connections

NOTICE

- The cable colors shown in the cable connection schematic diagrams in this chapter are for reference only. Select cables according to local cable specifications.
- Cable routes provided in this chapter are for reference only.
- For simplicity purposes, cables described in this chapter are those to be connected onsite, rather than factory-installed cables.
- 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.

5.1 Selecting a Connection Method

You can connect a peripheral cable to the smart array controller in common mode or through a tube 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 and reserved 20–30 mm (0.79–1.18 in.) inside the cabinet and then connected 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 reference for connecting peripheral cables to other waterproof connectors.

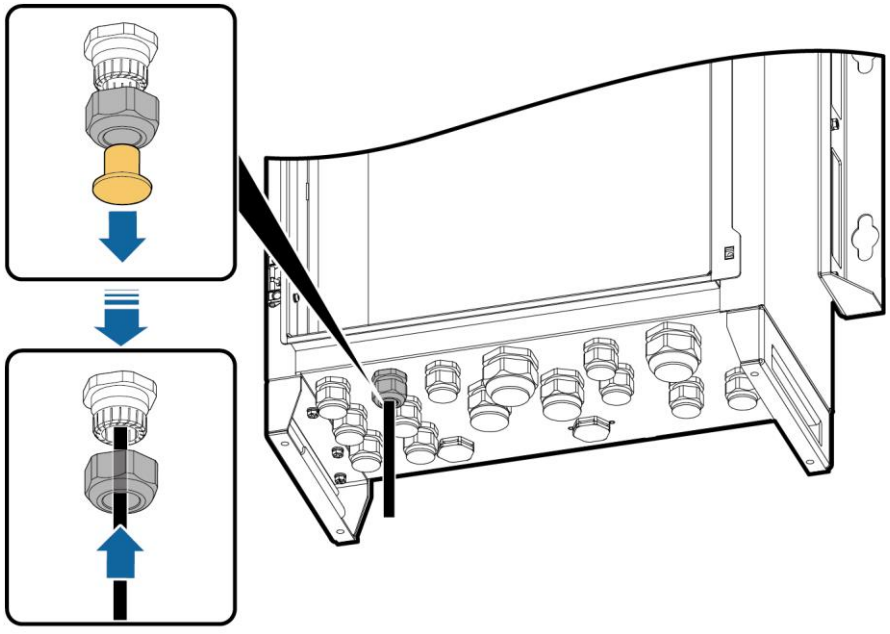
Procedure (Common Connection)

If you choose common connection, ensure that the 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 cables



Step 3 Connect the cable.

Step 4 Tighten the locking cap.

Step 5 Check that the cable is connected correctly and securely. Seal the waterproof connector and cable hole using the supplied firestop putty.

Step 6 Clear foreign matter from the cabinet.

----End

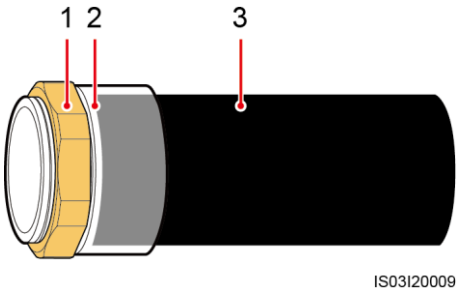
Procedure (Connection Through a Tube)

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

NOTE

Prepare appropriate tubes based on the diameters of bottom cable holes. 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.

Figure 5-2 Tube

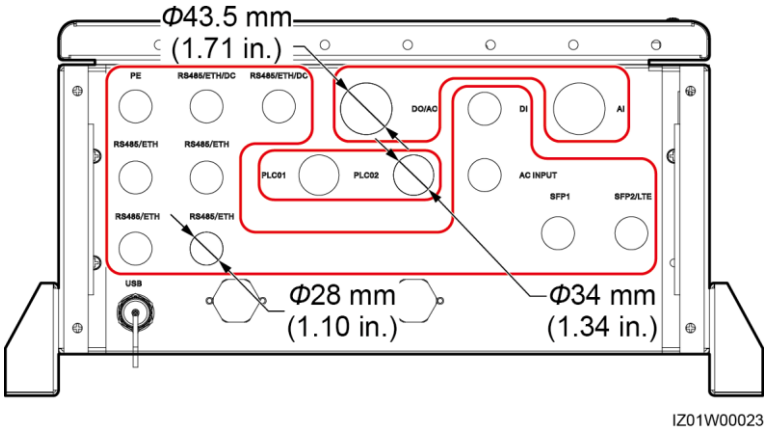


(1) Nut (2) Fitting (3) Conduit

NOTE

The tube appearance is for reference only. The actual tube prevails. This is applicable to all other similar figures.

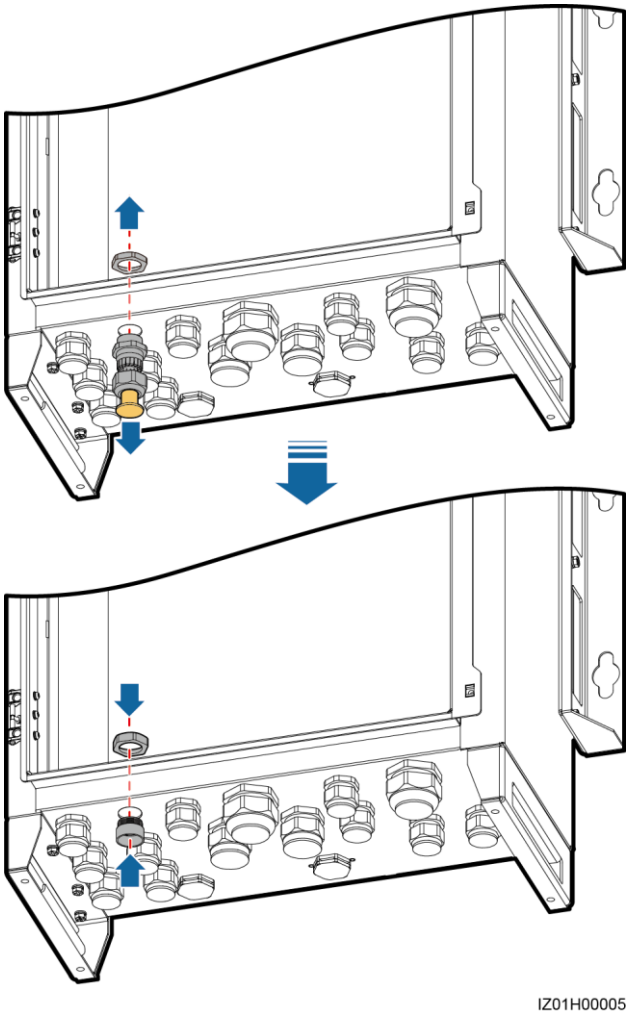
Figure 5-3 Diameters of bottom cable holes



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

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

Figure 5-4 Installing tube fitting



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

Step 4 Connect the cable.

Step 5 Secure the fitting to the conduit.

Step 6 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 7 Clear foreign matter from the cabinet.

----End

5.2 Preparing Cables

The cables used for the smart array controller need to be prepared by yourself. Prepare cables by following the instructions in 2.6 Configuration Scenario.

NOTICE

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

- The way of handling the bottom waterproof connector varies depending on the connection method. For details, see 5.1 Selecting a Connection Method.
- Cables to the cabinet interior are connected in the same way irrespective of which connection method is used. The following uses common connection as an example.

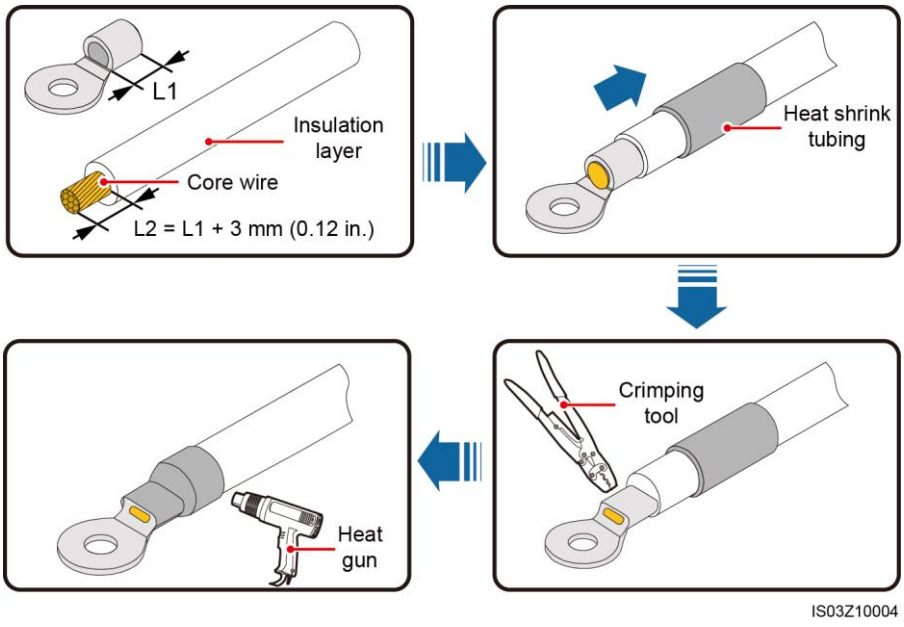
5.3 Crimping the OT Terminal

Figure 5-5 shows how to crimp an OT terminal.

NOTICE

- Avoid scratching the core wire when stripping a cable.
- The cavity formed after the conductor crimp strip of the OT terminal is crimped must wrap the core wires completely. The core wires must contact the OT terminal closely.
- Wrap the wire crimping area with heat shrink tubing or PVC insulation tape. The following figure uses heat shrink tubing as an example.
- When using the heat gun, protect devices from being scorched.

Figure 5-5 Crimping an OT terminal



5.4 Connecting the Cabinet PE Cable

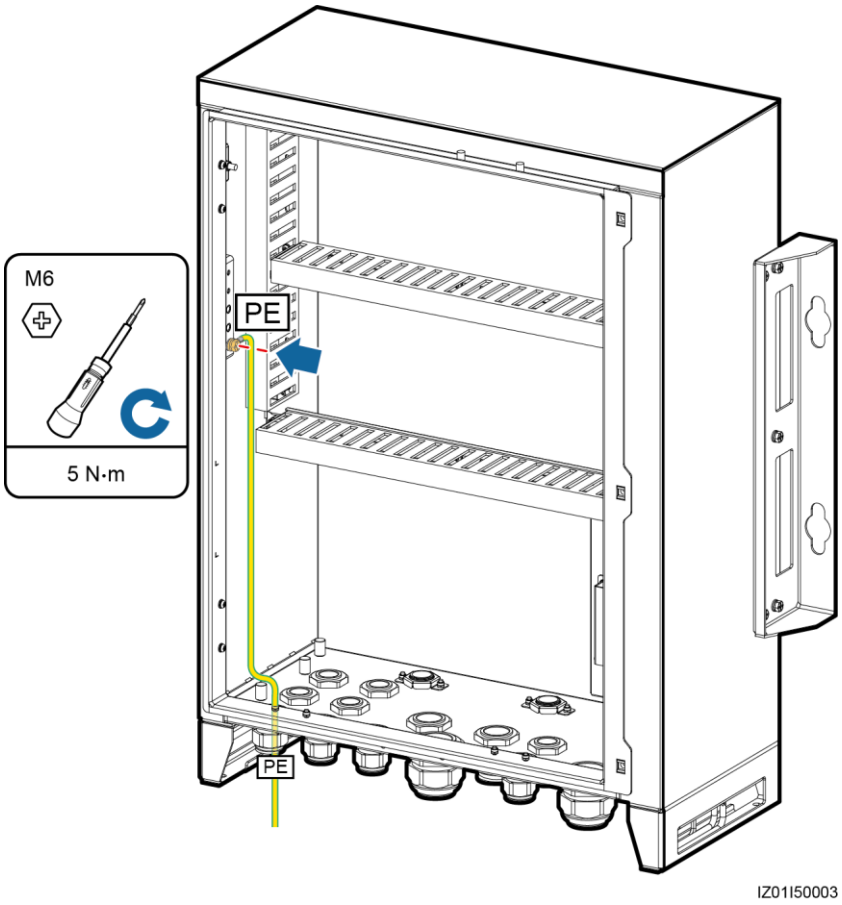
Procedure

Step 1 Crimp an OT terminal.

Step 2 Secure the PE cable.

NOTE
Connect the PE cable to the nearest ground point or the ground bar in the box-type transformer.

Figure 5-6 Connecting a PGND cable



----End

Follow-up Procedure

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.

5.5 Connecting Communications Cables for the Fiber Ring Network

5.5.1 Connecting the Optical Jumper from the SmartLogger to the Fiber Adapter

Prerequisites

Obtain the low-speed optical module from the fitting bag for optical ring switching.

The optical jumper from the SmartLogger to the fiber adapter has been installed before delivery. You only have to connect the other end of the optical jumper to the SmartLogger.

Procedure

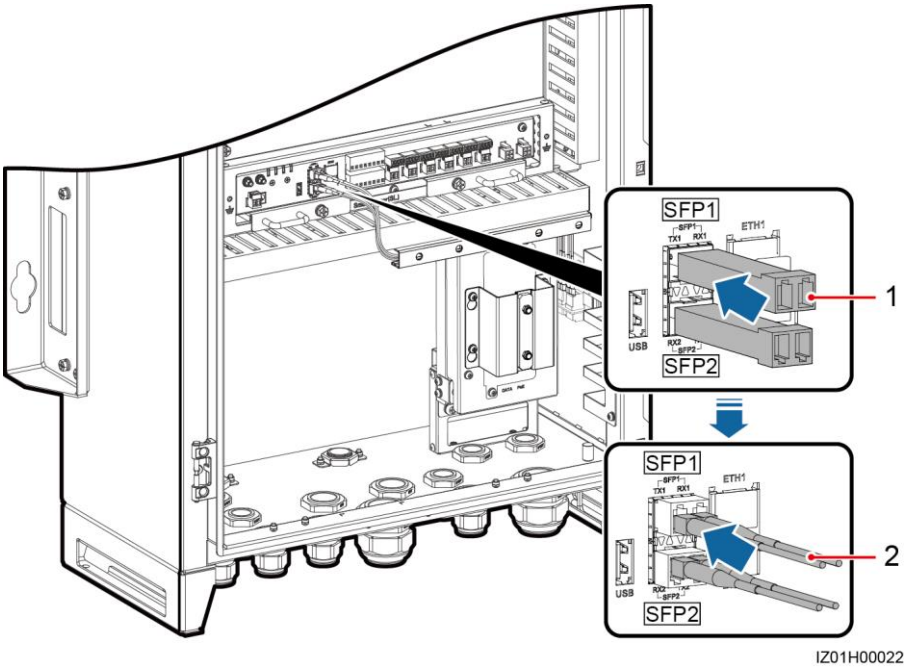
Step 1 Insert the low-speed optical modules respectively into the SFP1 and SFP2 ports of the SmartLogger until they snap into place. After a low-speed optical module snaps into space, pull it back to ensure that it is secure.

NOTICE

Pay attention to the directions of the low-speed optical modules. The label of the low-speed optical module on the SFP1 port faces upwards, whereas the label of the low-speed optical module on the SFP2 port faces downwards.

Step 2 Connect factory-installed optical jumpers to the low-speed optical modules.

Figure 5-7 Connecting an optical jumper



(1) Low-speed optical module (2) Optical jumper

----End

5.5.2 Connecting Cables to the ATB

Prerequisites

Obtain the optical jumper from the fitting bag for optical ring switching.

Context

NOTICE

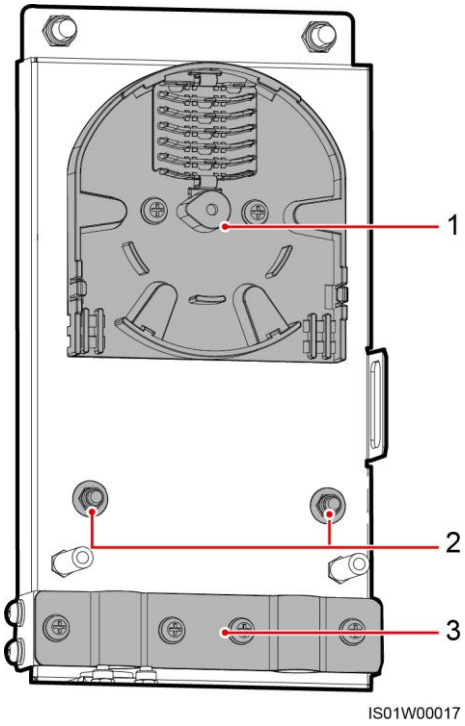
- As optical cables are hard, prepare optical cables before routing them into the smart array controller.
- Only professionals are allowed to connect optical cables.

NOTE

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

Figure 5-8 shows the ATB interior.

Figure 5-8 ATB interior

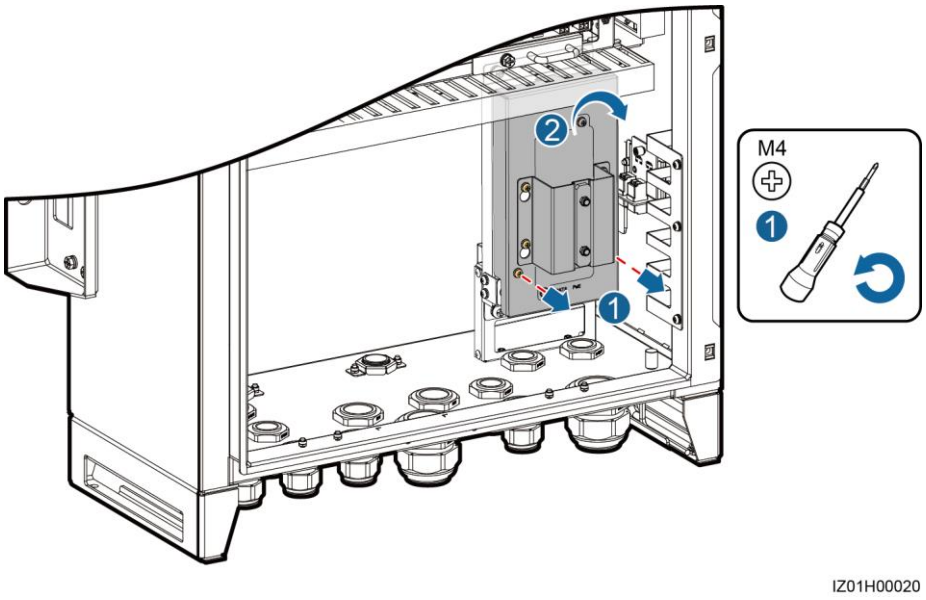


(1) Fiber spool (2) Fixing points for internal steel wires of optical cables (3) Cable clip

Procedure

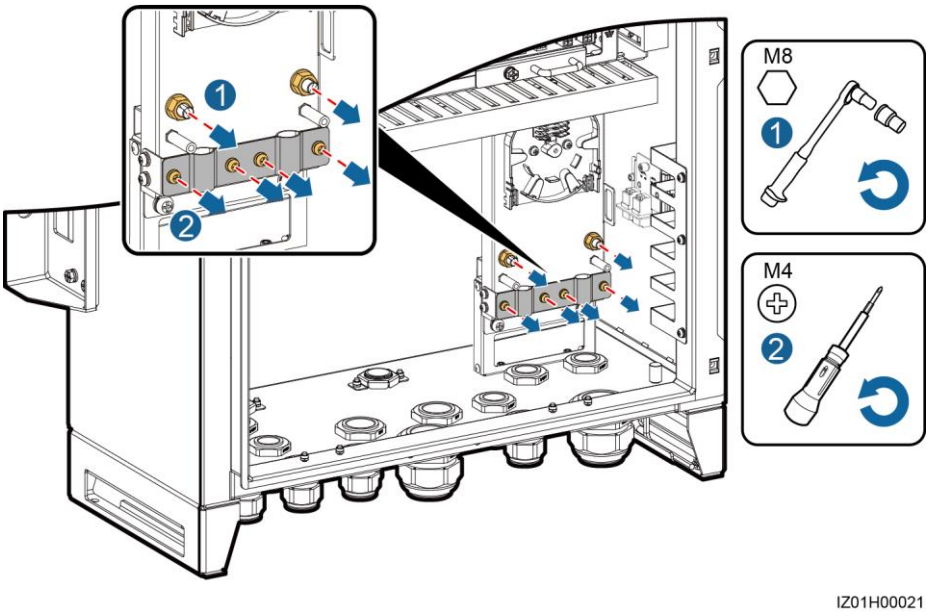
Step 1 Remove the ATB cover.

Figure 5-9 Removing a cover



Step 2 Remove the optical cable fastener.

Figure 5-10 Removing a fastener



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

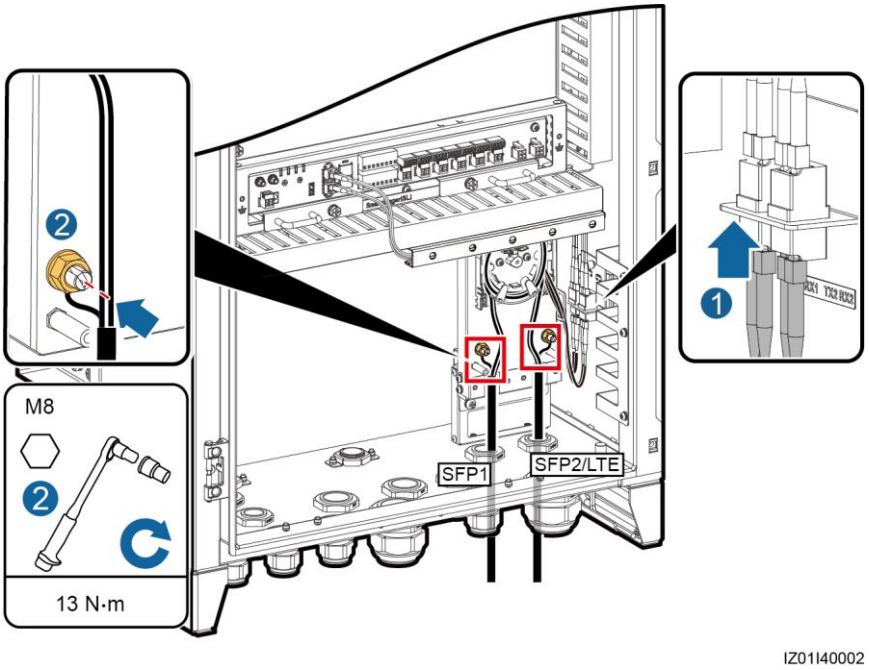
Step 4 Route the other end of the optical jumper through the cable hole on the side of the ATB, and then connect the cable to the ATB.

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

NOTICE

Only professionals are allowed to splice fibers.

Figure 5-11 Connecting optical cables



Step 6 Check that the cables are connected correctly and securely. Then reinstall the optical cable fastener and ATB cover.

----End

5.6 Connecting the 4G LTE Cable (with the POE SPD)

Prerequisites

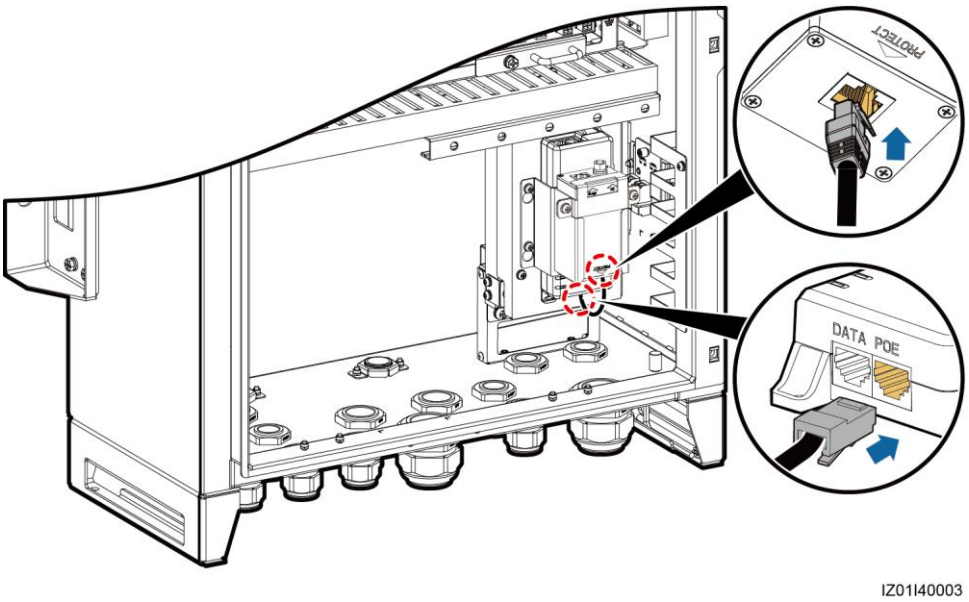
The network cable from the POE module to the POE SPD has been shipped with the POE SPD.

The network cable from the SmartLogger to the POE module and the power cable of the POE module have been factory-installed. You only have to connect the other end of each factory-installed cable to the POE module.

Procedure

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.

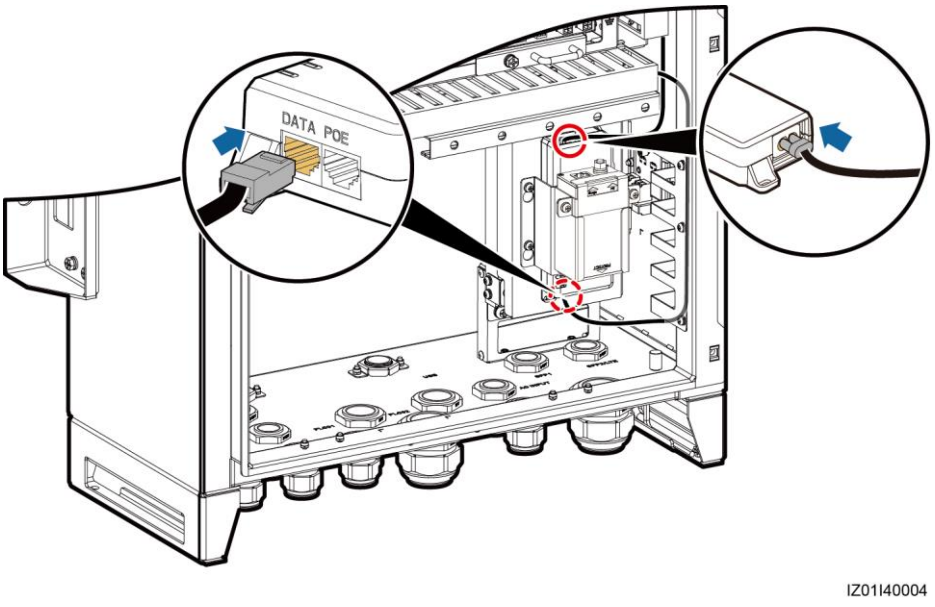
Figure 5-12 Connecting a POE module to a POE SPD



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

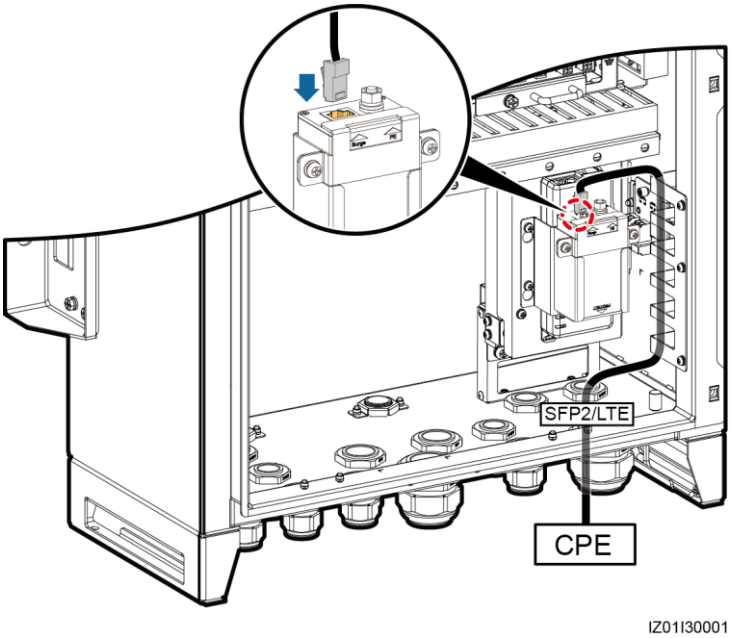
Step 3 Connect the factory-installed power cable to the POE module.

Figure 5-13 Connecting cables



Step 4 Connect the CPE network cable to the Surge port on the POE SPD.

Figure 5-14 Connecting the CPE network cable



----End

5.7 Connecting the 4G LTE Cable (with no POE SPD)

Prerequisites

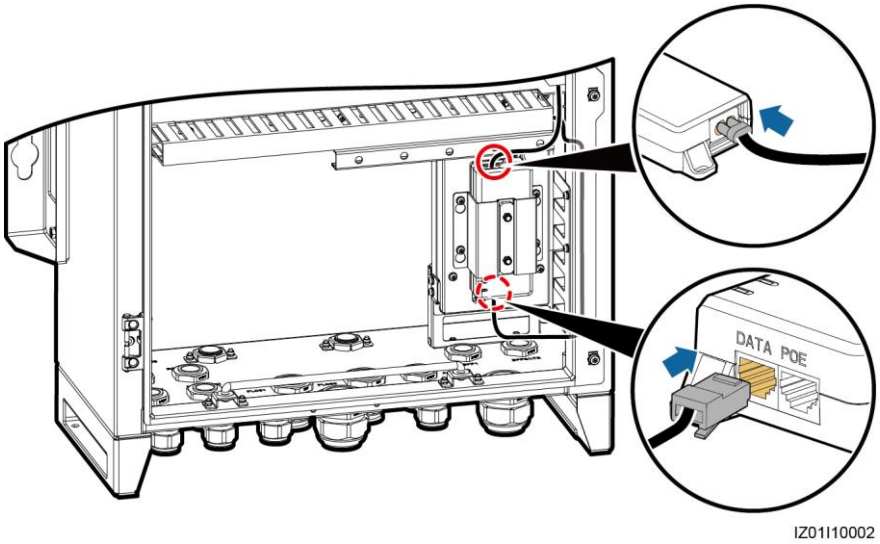
The network cable from the SmartLogger to the POE module and the power cable of the POE module have been factory-installed. You only have to connect the other end of each factory-installed cable to the POE module.

Procedure

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

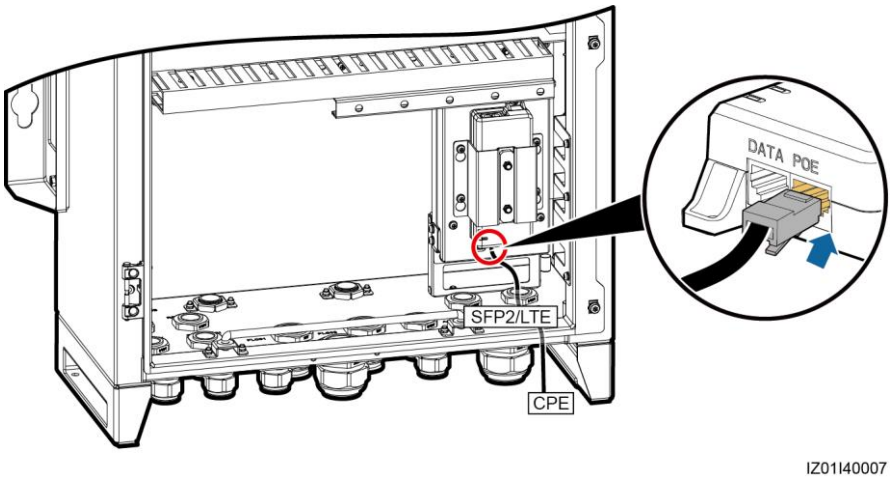
Step 2 Connect the factory-installed power cable to the POE module.

Figure 5-15 Connecting the POE module cable



Step 3 Connect the CPE network cable to the POE port on the POE module.

Figure 5-16 Connecting the CPE network cable



----End

5.8 Connecting the Three-phase AC Power Cable (a Circuit Breaker as the Three-Phase Input Switch)

Context

- For the smart array controller that supports the access of one PLC route, connect the three-phase AC power cable to the QF02 switch.

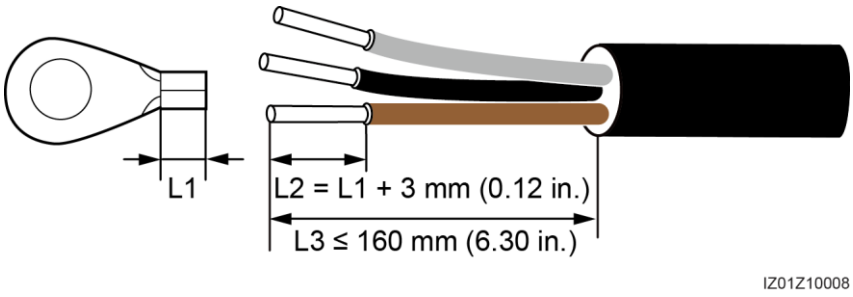
- For the smart array controller that supports the access of two PLC routes, connect the three-phase AC power cable of the first route to the QF02 switch, and the three-phase AC power cable of the second route to the QF04 switch.

This section describes how to connect the three-phase AC power cable for the smart array controller that supports the access of two PLC routes. For details about how to connect the three-phase AC power cable for the smart array controller that supports the access of one PLC route, refer to the way of connecting the first route of three-phase AC power cable.

Procedure

Step 1 Prepare a cable.

Figure 5-17 Stripped cable length



Step 2 Crimp an OT terminal.

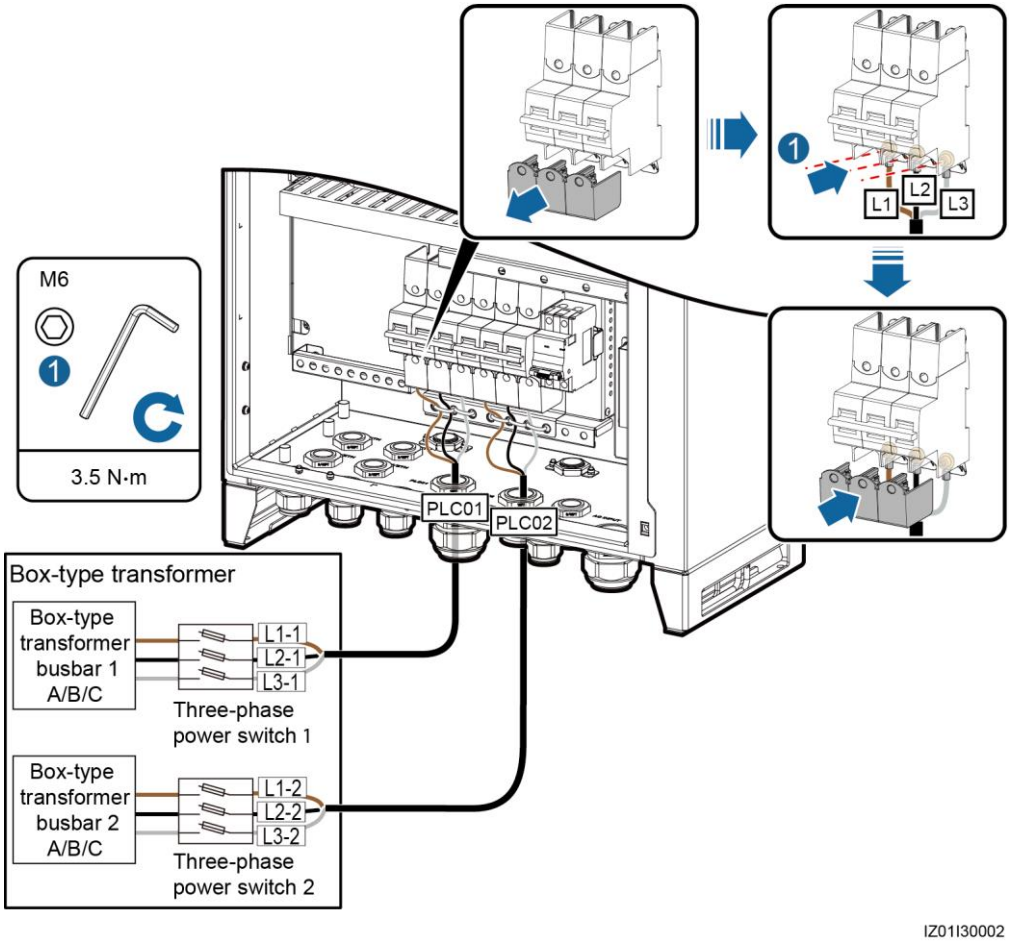
Step 3 Connect the L1, L2, and L3 cables to the three-phase input switch, as shown in Figure 5-18.

NOTICE

- Connect the L1-1, L2-1, and L3-1 cables from the QF02 switch respectively to ports A, B, and C on box-type transformer busbar 1 over a three-phase power switch.
- Connect the L1-2, L2-2, and L3-2 cables from the QF04 switch respectively to ports A, B, and C on box-type transformer busbar 2 over a three-phase power switch.
- Ensure that the L1, L2, and L3 cables are connected in correct phase sequence.

Step 4 Bundle the cables.

Figure 5-18 Connecting cables



----End

5.9 Connecting the Three-phase AC Power Cable (a Knife Fuse Switch as the Three-Phase Input Switch)

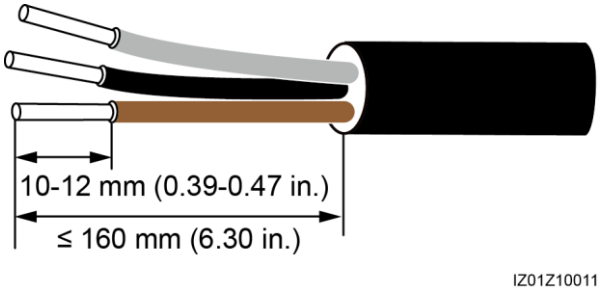
Context

For the smart array controller that supports the access of one PLC route, connect the three-phase AC power cable to the FU01 switch.

Procedure

Step 1 Prepare a cable.

Figure 5-19 Stripped cable length



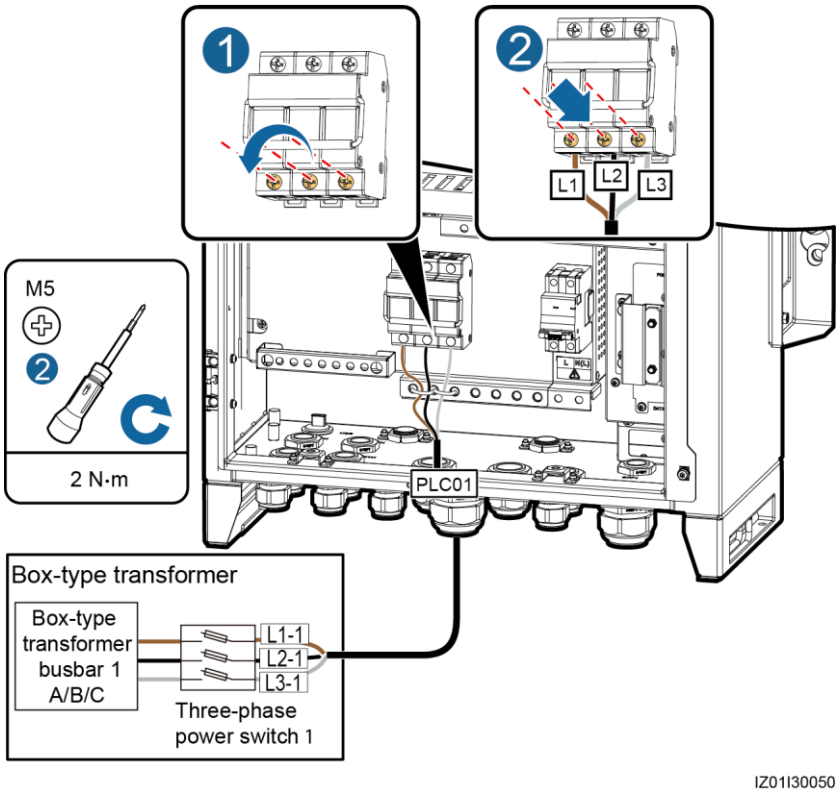
Step 2 Connect the L1, L2, and L3 cables to the three-phase input switch, as shown in Figure 5-20.

NOTICE

- Connect the L1-1, L2-1, and L3-1 cables from the FU01 switch respectively to ports A, B, and C on box-type transformer busbar 1 over a three-phase power switch.
- Ensure that the L1, L2, and L3 cables are connected in correct phase sequence.

Step 3 Bundle the cables.

Figure 5-20 Connecting cables



----End

5.10 Connecting Peripheral RS485 Communications Cables

Context

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

Table 5-1 Mapping

No.	Port on the JX01 Terminal Block	Definition
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–

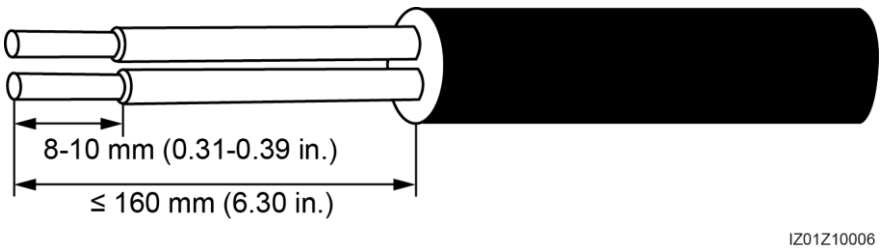
NOTICE

For the smart array controller that supports the access of two PLC routes, do not connect a peripheral RS485 communications cable to the RS485-2 port (ports 3 and 4 on the JX01), because the PLC CCO module communications cable has connected to this port.

Procedure

Step 1 Prepare communications cables.

Figure 5-21 Stripped length

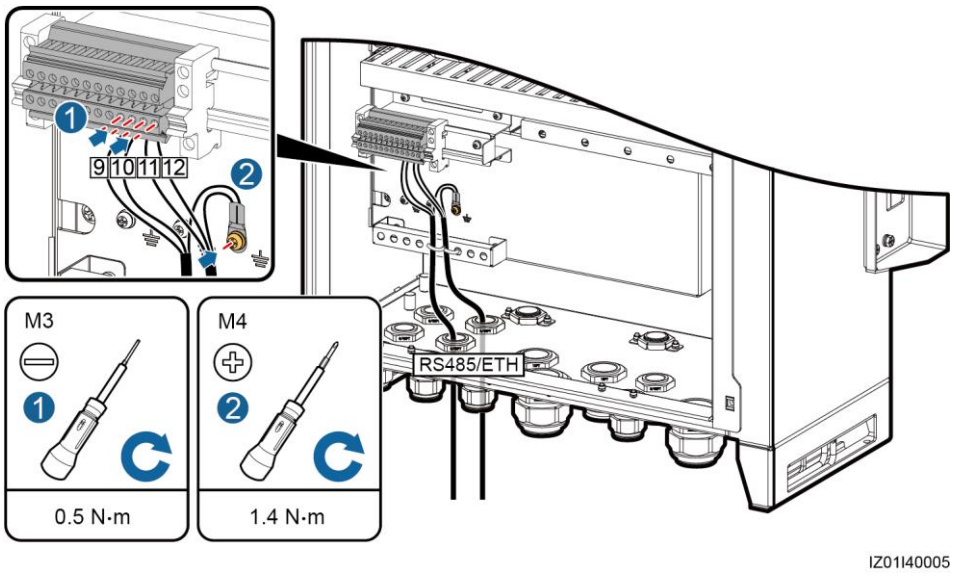


Step 2 Connect the communications cables to the JX01 terminal block.

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

Step 4 Bind the communications cables.

Figure 5-22 Connecting RS485 communications cables



----End

5.11 Connecting the LAN Switch Cable

Prerequisites

Obtain the connector of the LAN switch power cable and a network cable from the fittings delivered with the LAN switch. The power cable has been factory-installed. You only have to connect the other end of the power cable to the LAN switch.

Procedure

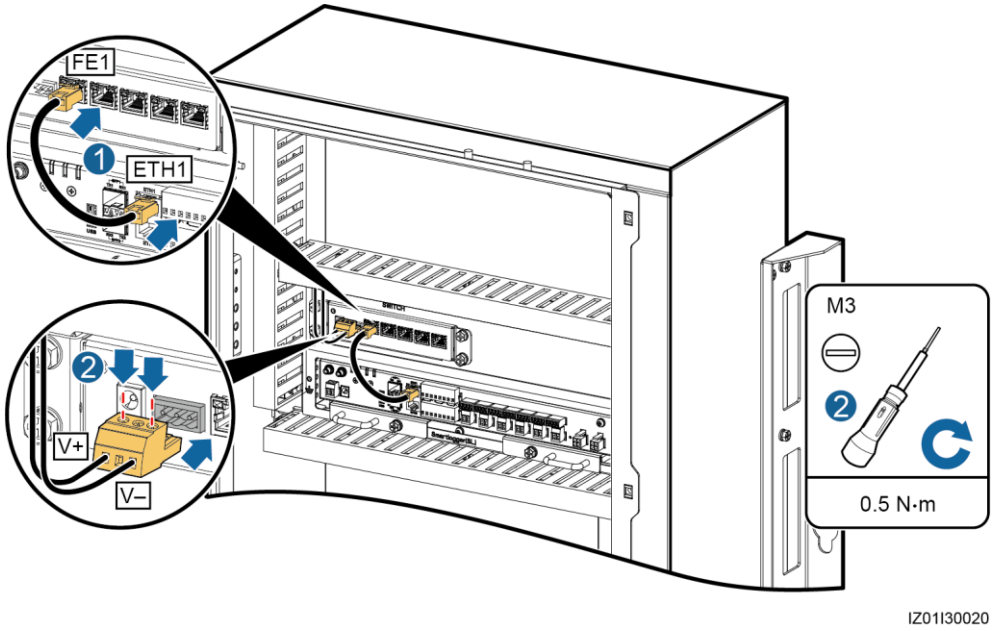
Step 1 Connect the FE1 port on the LAN switch to the ETH1 port on the SmartLogger using a network cable.

Step 2 Connect the factory-installed power cable to the LAN switch.

NOTICE

Connect the SWITCH-12V+ cable to the V+ power port on the LAN switch, and the SWITCH-12V– cable to the V– power port on the LAN switch.

Figure 5-23 Connecting LAN switch cables



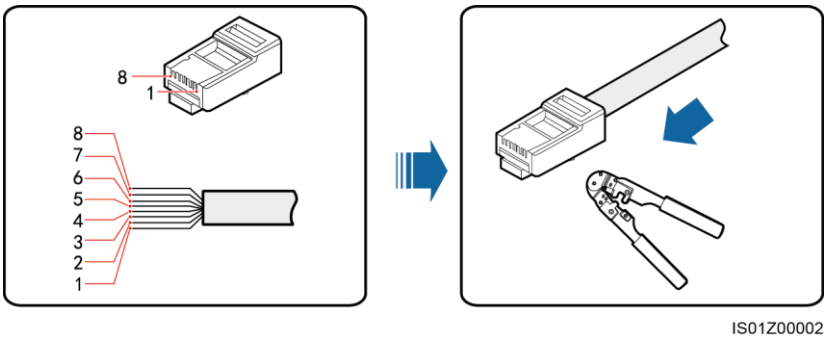
----End

5.12 Connecting the Peripheral Network Cable

Prerequisites

Prepare a network cable, as shown in Figure 5-24.

Figure 5-24 Connecting wires to 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

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

Context

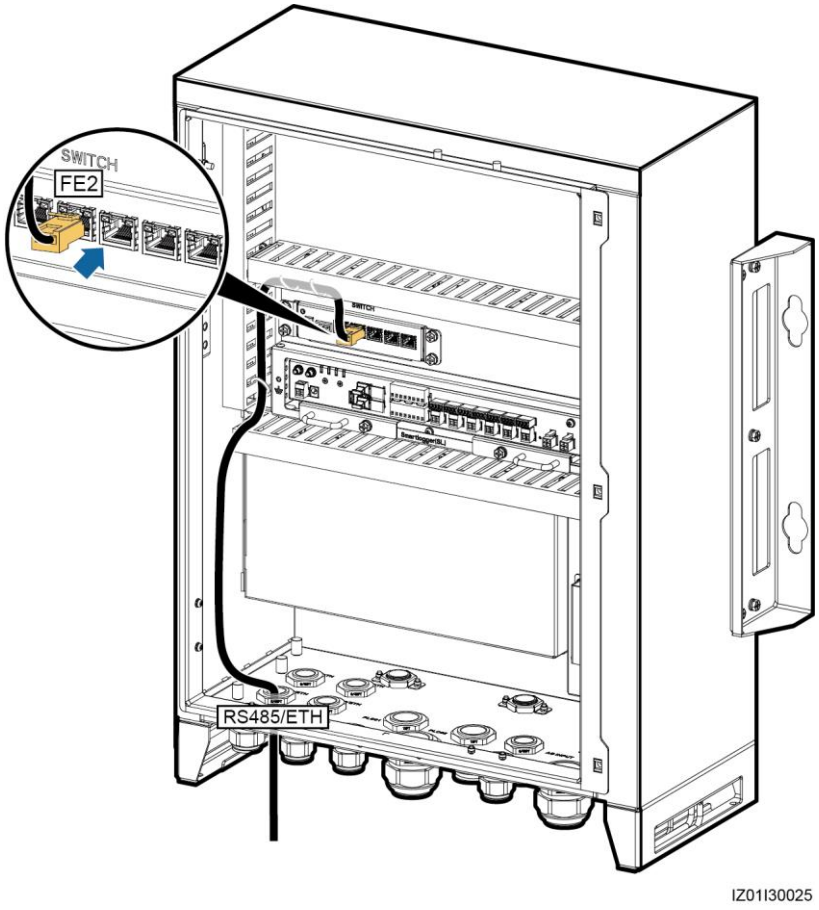
Connect peripheral network cables to ports FE2–FE5 on the LAN switch. All network cables are connected in the same way. This section describes how to connect one network cable.

Procedure

Step 1 Connect the peripheral network cable to the FE2 port on the LAN switch.

Step 2 Bind the network cable.

Figure 5-25 Connecting a network cable



----End

5.13 Connecting the 24 V DC Output Power Cable

Context

You can connect one or two 24 V DC output power cables to the smart array controller that supports 24 V DC input and output. DC output power cables are connected in the same manner. This section describes how to connect one route of DC output power cable.

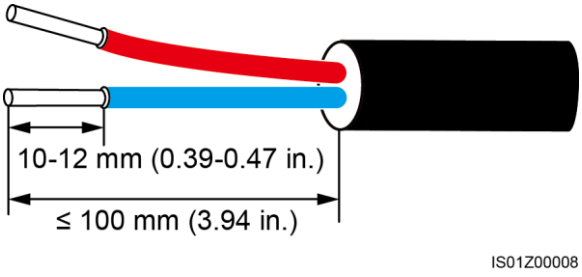
Table 5-2 Mapping

No.	Port on the JX02 Terminal Block	Definition
1 and 2	24VOUT+	Positive terminal of the 24 V DC output power cable
3 and 4	24VOUT–	Negative terminal of the 24 V DC output power cable

Procedure

Step 1 Prepare cables.

Figure 5-26 Stripped cable length



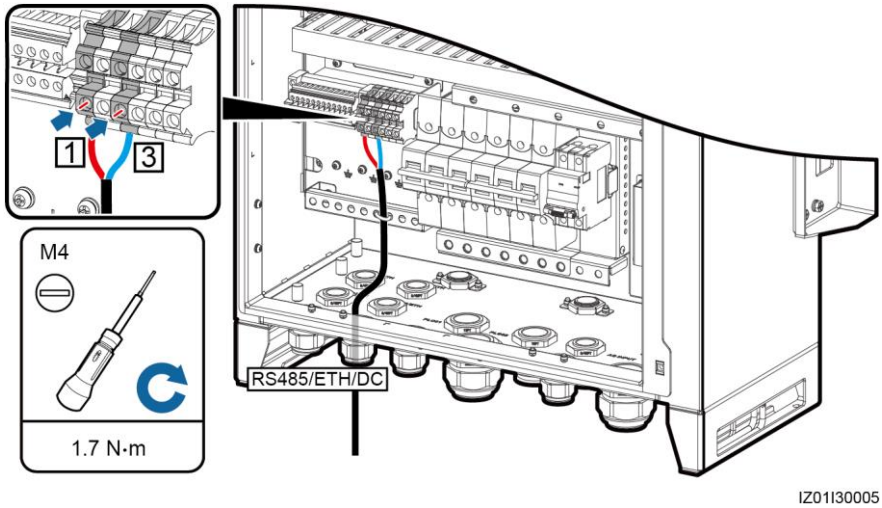
Step 2 Connect the 24 V DC output power cable to the JX02 terminal block.

NOTICE

Do not connect the DC output power cable reversely.

Step 3 Bind cables.

Figure 5-27 Connecting cables



----End

5.14 Connecting the 24 V DC Input Power Cable

Context

You can connect one 24 V DC input power cable to the smart array controller that supports 24 V DC input and output.

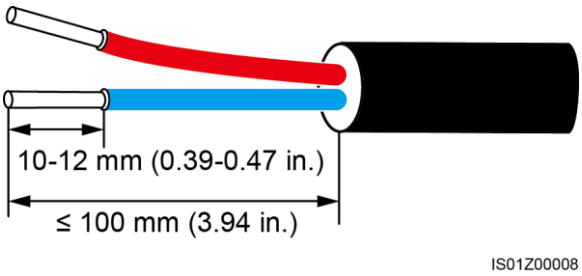
Table 5-3 Mapping

No.	Port on the JX02 Terminal Block	Definition
5	24VIN+	Positive terminal of the 24 V DC input power cable
6	24VIN–	Negative terminal of the 24 V DC input power cable

Procedure

Step 1 Prepare cables.

Figure 5-28 Stripped cable length



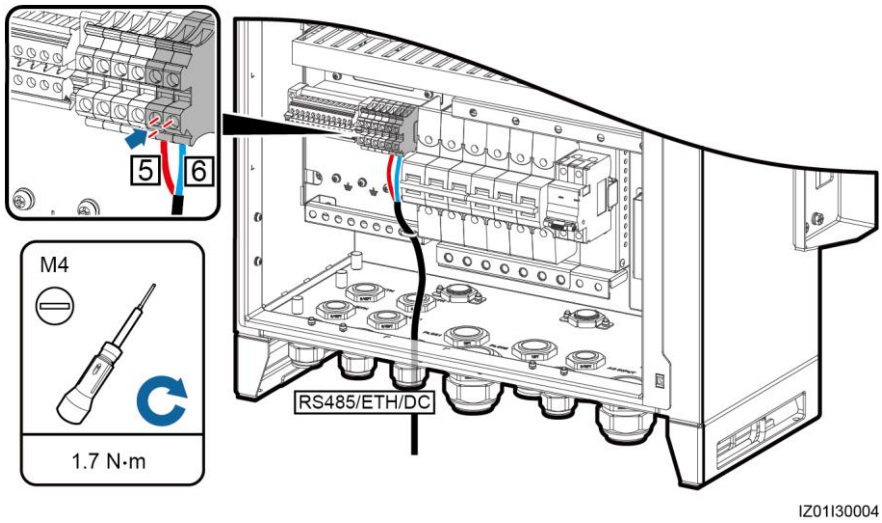
Step 2 Connect the 24 V DC input power cable to the JX02 terminal block.

NOTICE

Do not connect the DC input power cable reversely.

Step 3 Bind cables.

Figure 5-29 Connecting cables



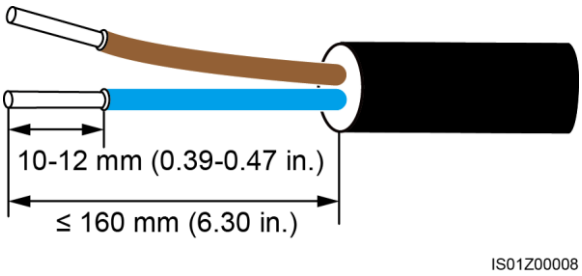
----End

5.15 Connecting the Single-Phase AC Power Cable

Procedure

Step 1 Prepare a cable.

Figure 5-30 Stripped cable length



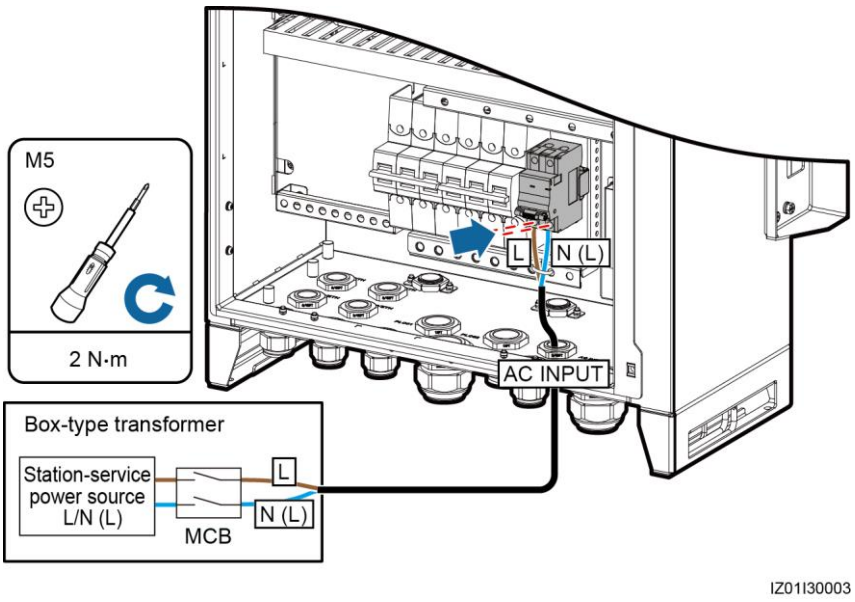
Step 2 Connect the cable to the single-phase input switch.

NOTICE

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

Step 3 Bind the cable.

Figure 5-31 Connecting a cable



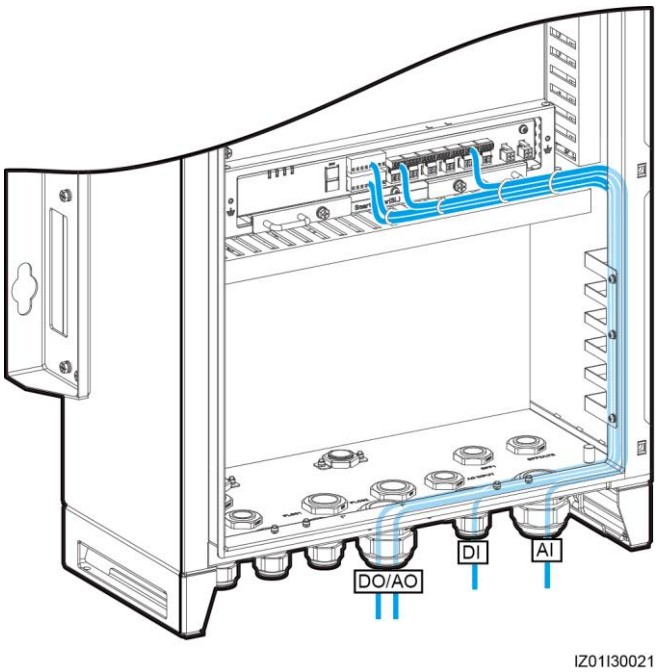
----End

5.16 Connecting the DO/AO/DI/AI Signal Cable

The smart array controller reserves the DO, AO, DI, and AI waterproof connectors for appropriate signal cables.

For details about how to prepare and connect the cables, see the *SmartLogger2000 User Manual*.

Figure 5-32 Cable routes



6 System Commissioning

6.1 Checking Before Power-On

Before powering on the smart array controller, check that:

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. Cables are bound neatly, and cable ties are secured evenly and properly in the same direction. Extra parts of cable ties are neatly cut. There is no unnecessary adhesive tape or cable tie on cables.
4. Routing for power cables and signal cables meets the requirements for routing strong-current and weak-current cables and complies with the cable routing plan.
5. The locking caps on all waterproof connectors in use at the bottom of the cabinet are tightened, or the cable routing pipes (if used) are secured to the cabinet. All waterproof connectors or cable routing pipes in use are applied with firestop putty. Idle waterproof connectors at the bottom of the cabinet are plugged and the locking caps are tightened.
6. The cover on the USB port is tightened, and the USB cable inside the cabinet is secure.
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

Prerequisites

- You have completed the power-on check.
- You have put on insulation gloves.
- The smart array controller cabinet is reliably grounded.
- The power voltage of the smart array controller is within the operating voltage range, and the three-phase input voltage is within the PLC module operating voltage.
- All upstream switches for the smart array controller and all switches inside the cabinet are OFF.

Procedure

Step 1 Turn on the single-phase power switch that controls the power supply from the remote box-type transformer to the smart array controller.

Step 2 Turn on the three-phase power switch that controls the power supply from the remote box-type transformer to the smart array controller.

- If the smart array controller supports the access of one PLC route, turn on the appropriate three-phase power switch.
- If the smart array controller supports the access of two PLC routes, turn on the appropriate two three-phase power switches.

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

Step 4 Turn on the QF01 single-phase input switch on the smart array controller.

Step 5 Turn on the DC input and output switches on the smart array controller.

- If 24 V DC input and output are not used, skip this step.
- If 24 V DC input is used, turn on the QF07 DC input switch.
- If 24 V DC output is used, turn on the QF06 DC output switch.

Step 6 Turn on the three-phase input switch on the smart array controller.

- If the smart array controller supports the access of one PLC route, turn on the QF02 three-phase input switch.
- If the smart array controller supports the access of two PLC routes, turn on the QF02 and QF04 three-phase input switches.

----End

Follow-up Procedure

- For details about the status of the energized SmartLogger2000 and PLC CCO as well as the commissioning procedure, see the *SmartLogger2000 User Manual*.
- The LAN switch can be directly put into use without commissioning after power-on.

6.3 Closing the Cabinet Door

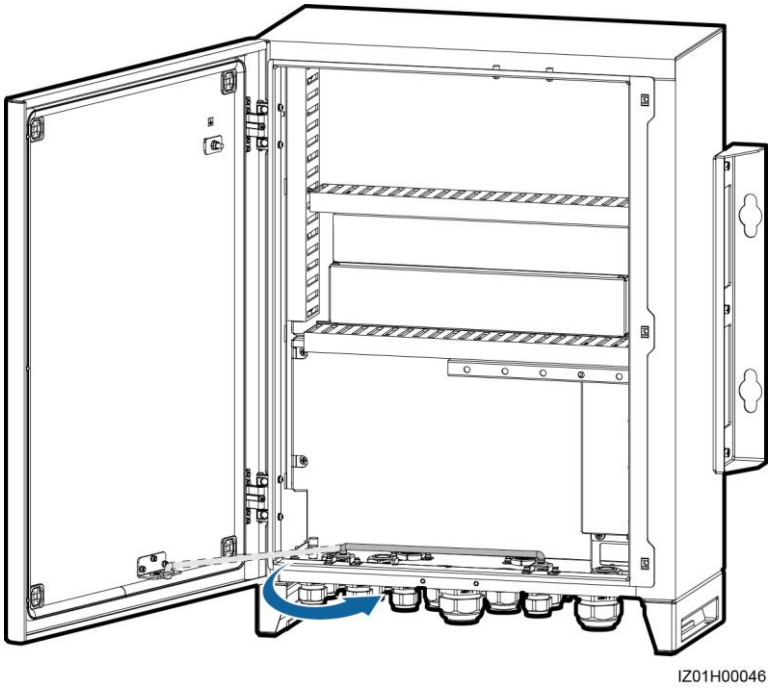
Prerequisites

All components are running properly.

Procedure

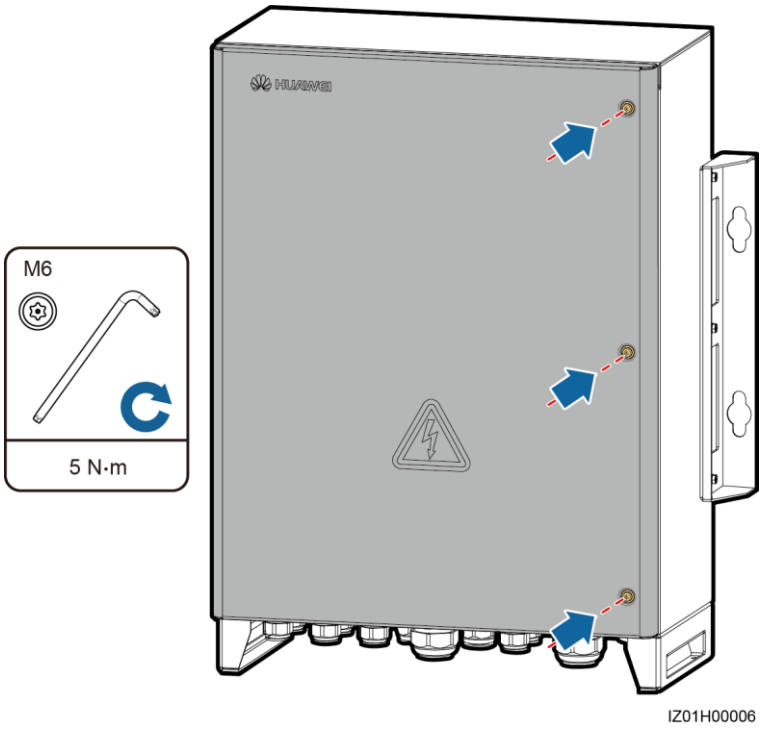
Step 1 Install the support bar.

Figure 6-1 Installing a support bar



Step 2 Close the cabinet door and tighten the screws.

Figure 6-2 Tightening screws



NOTE
If the screws used for securing the cabinet door are lost, use the security torx screws in the fitting bag.

----End

6.4 Powering Off the System

Prerequisites

You have put on insulation gloves.

Procedure

Step 1 Turn off the single-phase power switch that controls the power supply from the remote box-type transformer to the smart array controller.

Step 2 Turn off the three-phase power switch that controls the power supply from the remote box-type transformer to the smart array controller.

- If the smart array controller supports the access of one PLC route, turn off the appropriate three-phase power switch.
- If the smart array controller supports the access of two PLC routes, turn off the appropriate two three-phase power switches.

Step 3 Turn off the DC input and output switches on the smart array controller.

- If the smart array controller does not support 24 V DC input or output, skip this step.
- If the smart array controller supports 24 V DC input and output, turn off the QF06 DC output switch and QF07 DC input switch.

Step 4 Turn off the QF01 single-phase input switch on the smart array controller.

Step 5 Turn off the three-phase input switch on the smart array controller.

- If the smart array controller supports the access of one PLC route, turn off the QF02 three-phase input switch.
- If the smart array controller supports the access of two PLC routes, turn off the QF02 and QF04 three-phase input 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 (see 6.4 Powering Off the System for details) to ensure that the smart array controller 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 impossible, do not open the cabinet door on rainy or snowy days.

Table 7-1 Maintenance checklist

Check Item	Check That	Maintenance Interval
Cabinet	• The exterior of the smart array controller is not damaged or deformed. • There is no dust or dirt in the smart array controller.	Once 12 months
System running status	• All components in the smart array controller operate properly. • The SPD works properly.	Once 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 12 months

Check Item	Check That	Maintenance Interval
Grounding reliability	All ground cables are reliably connected.	Once 12 months

7.2 Component Replacement

- Before replacing a component, power off the smart array controller by following the instructions in 6.4 Powering Off the System to ensure that the smart array controller is de-energized and will not cause personal injury.
- After disconnecting the power supply, wait at least 3 minutes and then replace a component.
- After replacing a component, check the smart array controller by following the instructions in 6.1 Checking Before Power-On, and then power on the smart array controller by following the instructions in 6.2 Powering On the System. After that, check that the replacement component works properly.
- For the component positions, see 2.4 Product Composition.
- Dispose of faulty components in accordance with the local disposal act for waste electrical equipment.

7.2.1 Replacing the Single/Three-Phase SPD

Prerequisites

- The SPD is faulty.
- A spare SPD of the same model is available and functional.

NOTE
If an SPD is damaged or its indication window is displayed in red, the SPD is deemed unavailable and needs to be replaced.

Context

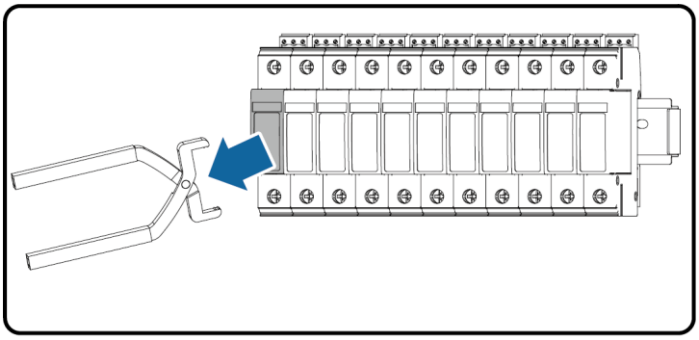
NOTE
A single-phase SPD is replaced in the same way as a three-phase SPD. The following describes how to replace a single-phase SPD.

An SPD consists of a surge protection module and a base.

Procedure

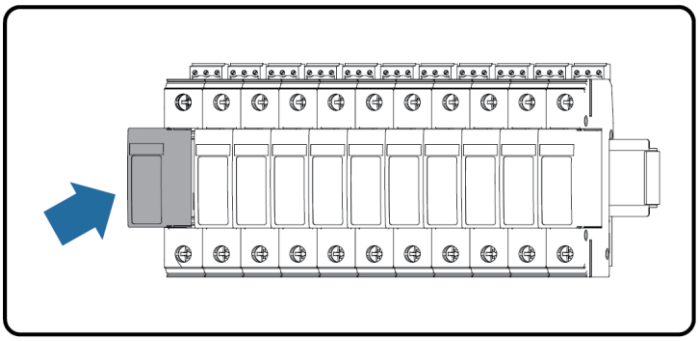
Step 1 Remove the faulty surge protection module from the SPD.

Figure 7-1 Removing a faulty surge protection module



Step 2 Install the new surge protection module.

Figure 7-2 Installing a surge protection module



----End

7.2.2 Replacing the Three-Phase Input Switch (Circuit Breaker)

Prerequisites

- The three-phase input switch is faulty.
- A spare three-phase input switch of the same model is available and functional.

Procedure

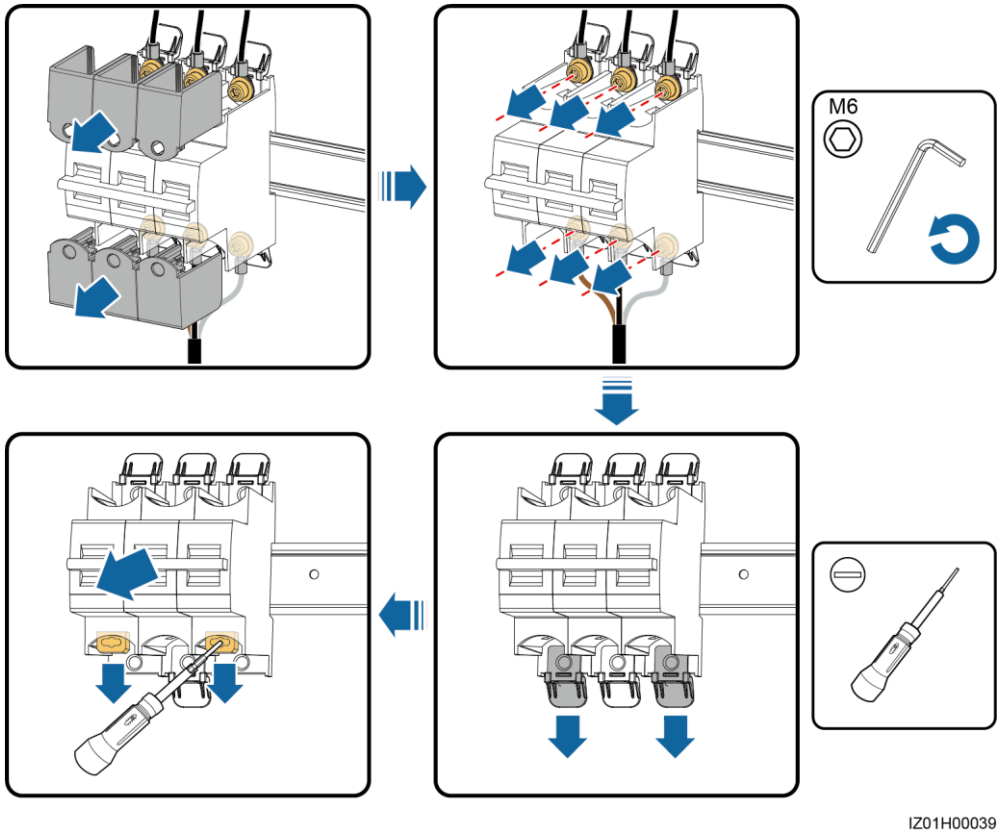
Step 1 Remove the protective cover from the wiring terminals on the faulty three-phase input switch.

Step 2 Disconnect cables from the faulty three-phase input switch, and label the cables.

Step 3 Remove the wiring nuts from both sides at the bottom.

Step 4 Push the buckle downwards and remove the faulty three-phase input switch.

Figure 7-3 Removing a faulty three-phase input switch



Step 5 Remove the protective cover from the wiring terminals on the new three-phase input switch.

Step 6 Remove the wiring nuts from both sides at the bottom of the new three-phase input switch.

Step 7 Install the new three-phase input switch.

Step 8 Reinstall the wiring nuts on both sides at the bottom.

Step 9 Connect the cables to the new three-phase input switch based on the cable labels.

Step 10 Reinstall the protective cover on the wiring terminals.

----End

7.2.3 Replacing the Three-Phase Input Switch (Knife Fuse Switch)

Prerequisites

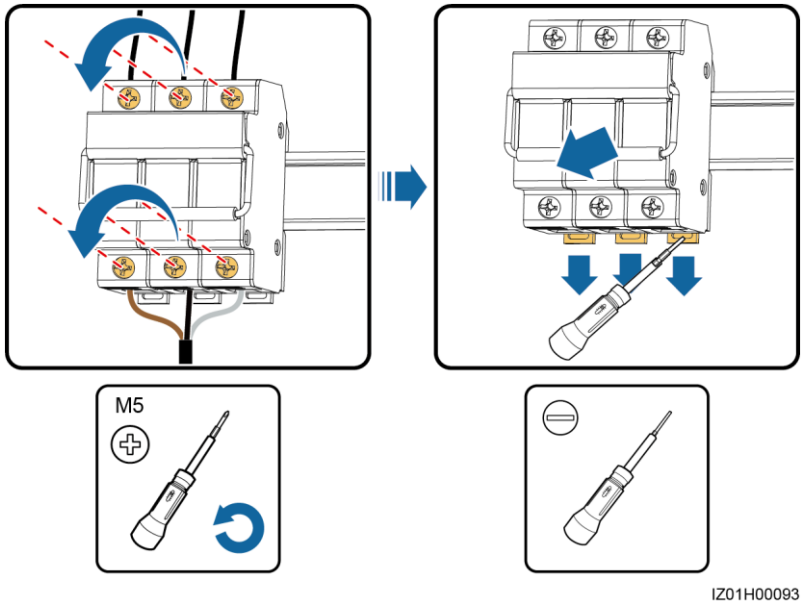
- The three-phase input switch is faulty.
- A spare three-phase input switch of the same model is available and functional.

Procedure

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

Step 2 Push the buckle downwards and remove the faulty three-phase input switch.

Figure 7-4 Removing a faulty three-phase input switch



Step 3 Install the new three-phase input switch.

Step 4 Connect the cables to the new three-phase input switch based on the cable labels.

----End

7.2.4 Replacing the Fuse of the Knife Fuse Switch

Prerequisites

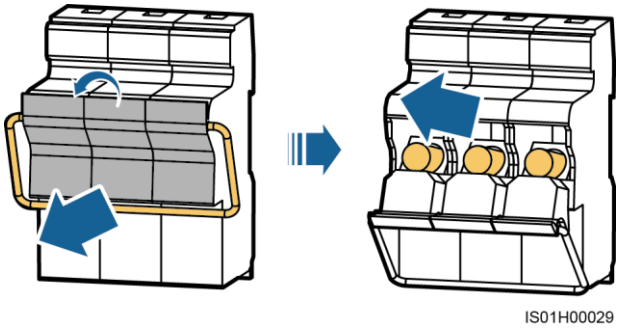
- The fuse is faulty.
- There is a spare fuse provided by the knife fuse switch manufacturer.

Procedure

Step 1 Open the knife fuse switch box.

Step 2 Remove the faulty fuse.

Figure 7-5 Removing a faulty fuse



Step 3 Install the new fuse and close the knife fuse switch box.

----End

7.2.5 Replacing the Single-Phase Input Switch

Prerequisites

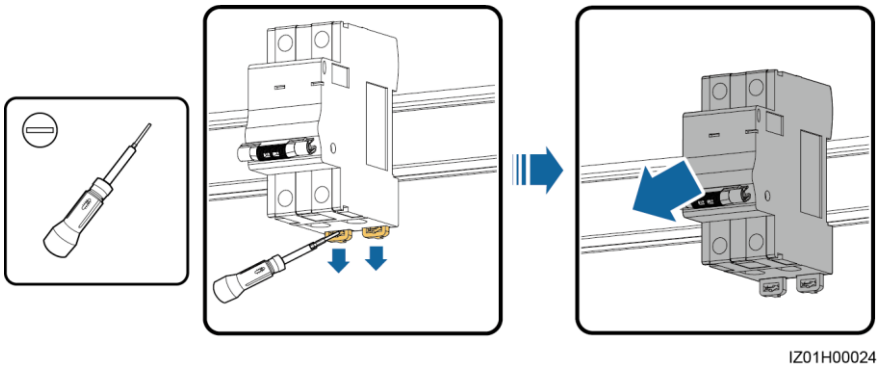
- The single-phase input switch is faulty.
- A spare single-phase input switch of the same model is available and functional.

Procedure

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

Step 2 Remove the faulty single-phase input switch.

Figure 7-6 Removing a faulty single-phase input switch



Step 3 Install the new single-phase input switch.

Step 4 Connect the cables to the new single-phase input switch based on the cable labels.

----End

7.2.6 Replacing the PLC CCO Module

Prerequisites

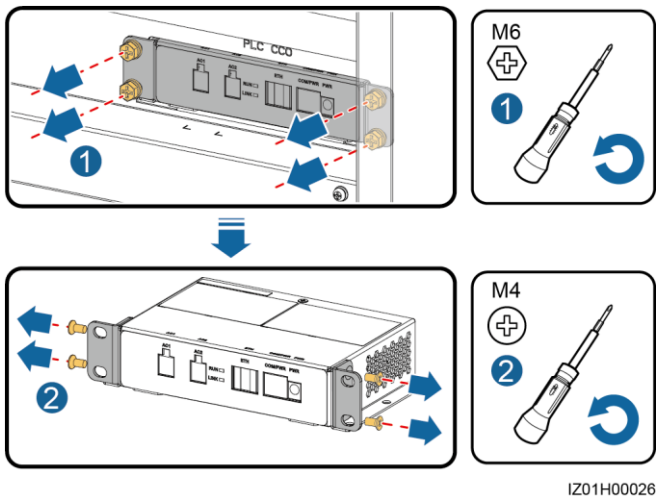
- The PLC CCO module is faulty.
- A spare PLC CCO module of the same model is available and functional.

Procedure

Step 1 Disconnect cables from the faulty PLC CCO module, and label the cables.

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

Figure 7-7 Removing a faulty PLC CCO module



Step 3 Install the mounting ears on the new PLC CCO module.

Step 4 Install the new PLC CCO module.

Step 5 Connect the cables to the new PLC CCO module based on the cable labels.

----End

7.2.7 Replacing the SmartLogger2000

Prerequisites

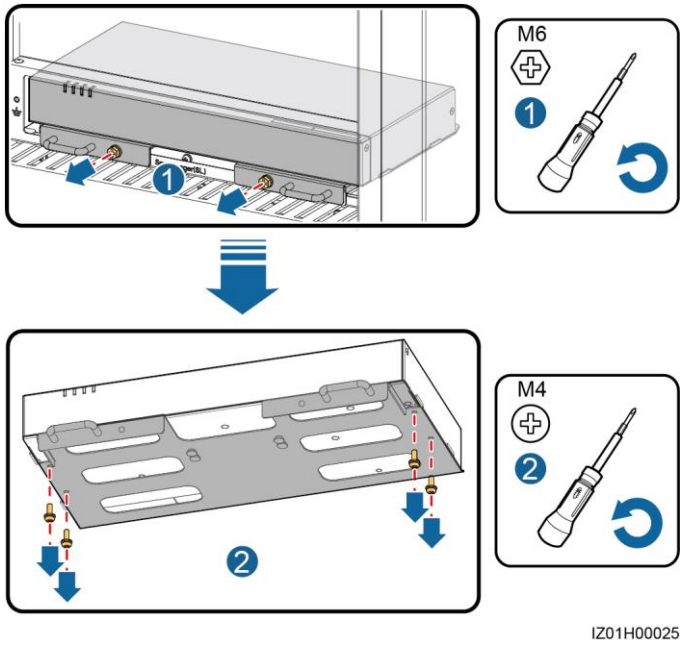
- The SmartLogger2000 is faulty.
- A spare SmartLogger2000 of the same model is available and functional.

Procedure

Step 1 Disconnect cables from the faulty SmartLogger2000, and label the cables.

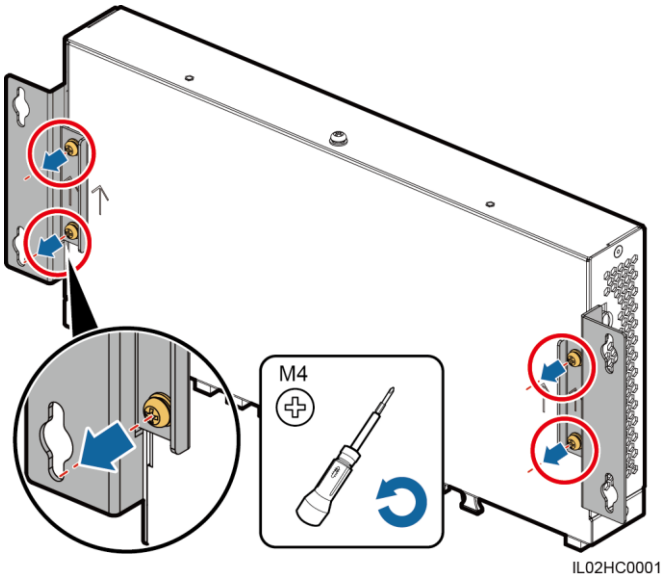
Step 2 Remove the tray from the faulty SmartLogger2000.

Figure 7-8 Removing a tray



Step 3 Remove mounting ears from the new SmartLogger2000.

Figure 7-9 Removing mounting ears



Step 4 Install the tray on the new SmartLogger2000.

Step 5 Install the new SmartLogger2000.

Step 6 Connect the cables to the new SmartLogger2000 based on the cable labels.

----End

Follow-up Procedure

After the SmartLogger2000 works properly, log in to the WebUI and configure the DI7 port, DI8 port, and COM2 port of the new SmartLogger2000 by referring to A Configuring the DI7 and DI8 Ports and B Configuring the COM2 Port.

NOTE
Set other parameters as required. For details, see the appropriate *SmartLogger2000 User Manual*.

7.2.8 Replacing the Power Adapter

Prerequisites

- The power adapter is faulty.
- A spare power adapter of the same model is available and functional.

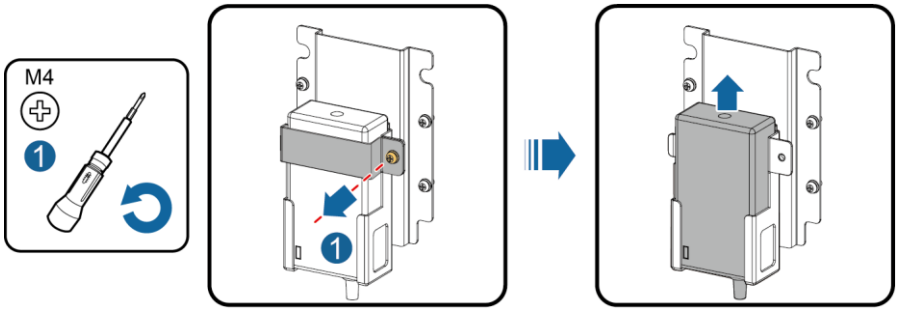
Procedure

Step 1 Disconnect the input power cable from the faulty power adapter.

Step 2 Disconnect the cable from the power input port on the SmartLogger2000.

Step 3 Remove the faulty power adapter.

Figure 7-10 Removing a faulty power adapter



Step 4 Install the new power adapter.

NOTE
Indicators should be in the lower left corner.

Step 5 Connect the input power cable to the new power adapter.

Step 6 Connect the output power cable for the power adapter to the power input port on the SmartLogger2000.

----End

7.2.9 Replacing the 24 V DC Power Module

Prerequisites

- The 24 V DC power module is faulty.

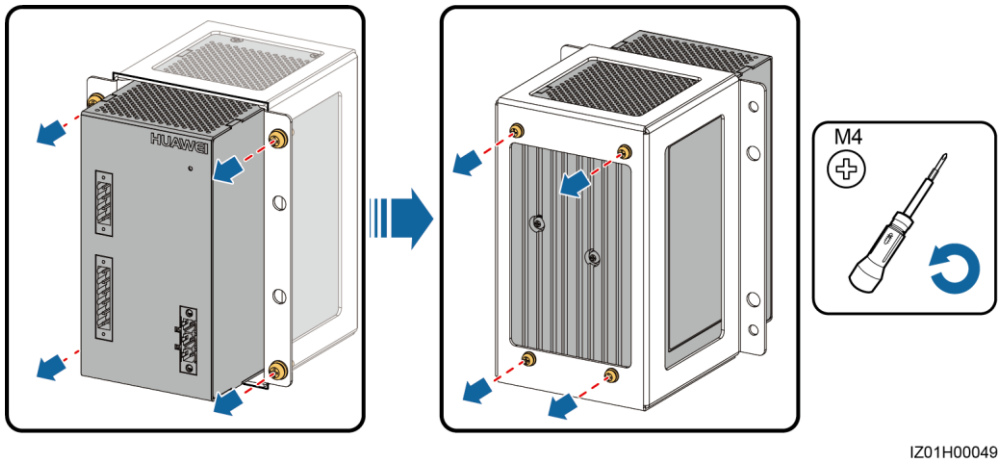
- A spare 24 V DC power module of the same model is available and functional.

Procedure

Step 1 Disconnect cables from the faulty 24 V DC power module, and label the cables.

Step 2 Remove the faulty 24 V DC power module and its fastener.

Figure 7-11 Removing a fastener



Step 3 Install the fastener on the new 24 V DC power module.

Step 4 Install the new 24 V DC power module.

Step 5 Connect the cables to the new 24 V DC power module based on the cable labels.

----End

7.2.10 Replacing the Fiber Adapter

Prerequisites

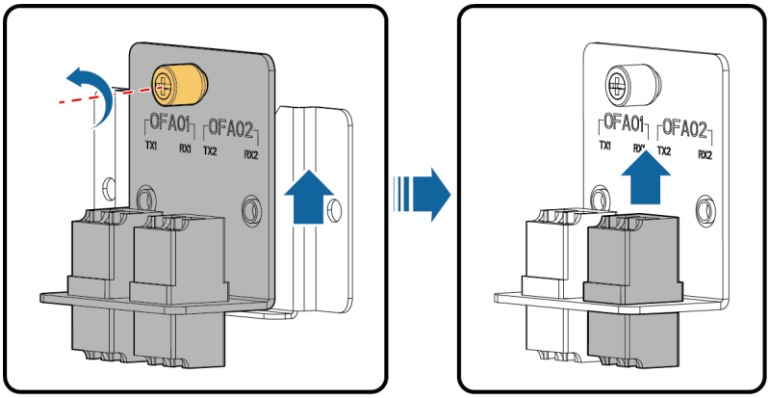
- The fiber adapter is faulty.
- A spare fiber adapter of the same model is available and functional.

Procedure

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

Step 2 Remove the fastener of the faulty fiber adapter, and then remove the faulty fiber adapter.

Figure 7-12 Removing a fiber adapter



Step 3 Install the new fiber adapter on the fastener.

Step 4 Install the fiber adapter fastener.

Step 5 Connect the cables to the new fiber adapter based on the cable labels.

----End

7.2.11 Replacing the USB Port

Prerequisites

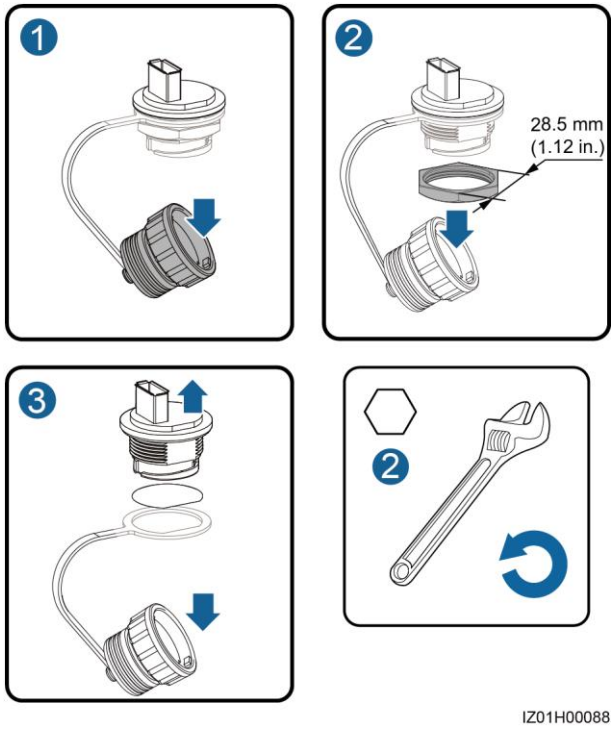
- The USB port is faulty.
- A spare USB port of the same model is available and functional.

Procedure

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

Step 2 Remove the faulty USB port.

Figure 7-13 Removing a USB port

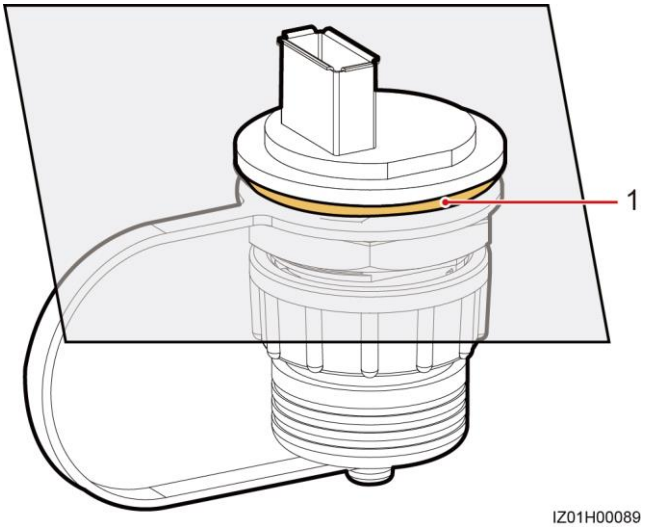


Step 3 Install the new USB port.

NOTE

Place the sealing ring on the inner side of the cabinet when installing the new USB port.

Figure 7-14 Sealing ring position



(1) sealing ring

Step 4 Connect the cable to the new USB port based on the cable labels.

----End

7.2.12 Replacing the 24 V DC Input and Output Switches

Prerequisites

- The 24 V DC input or output switch is faulty.
- A spare 24 V DC input or output switch of the same model is available and functional.

Context

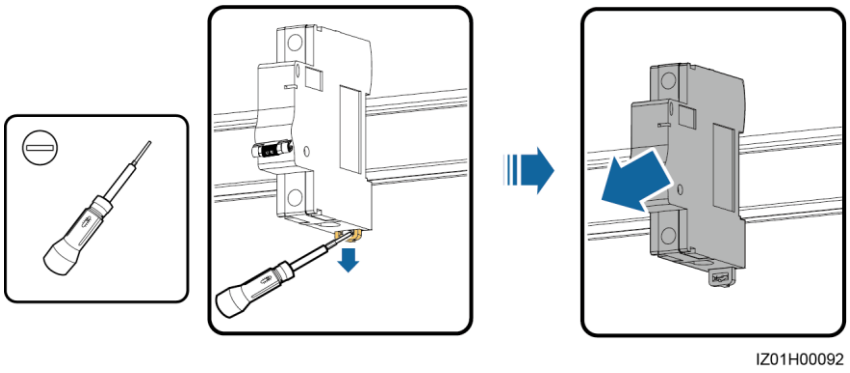
The 24 V DC input and output switches are replaced in the same manner. This section describes how to replace a 24 V DC input switch.

Procedure

Step 1 Disconnect cables from the faulty 24 V DC input switch, and label the cables.

Step 2 Remove the faulty 24 V DC input switch.

Figure 7-15 Removing a faulty 24 V DC input switch



Step 3 Install the new 24 V DC input switch.

Step 4 Connect the cables to the new 24 V DC input switch based on the cable labels.

----End

8 Technical Specifications

Item	SmartACU2000B-D-PLC	SmartACU2000B-D-2PLC	SmartACU2000B-D-PLC-24V	SmartACU2000B-D-2PLC-24V
Communication mode	SFP/ETH/RS485/PLC	SFP/ETH/RS485/PLC	SFP/ETH/RS485/PLC	SFP/ETH/RS485/PLC
Number of PLC routes	1	2	1	2
PLC input (AC)	380–800 V; three-phase	380–800 V; three-phase	380–800 V; three-phase	380–800 V; three-phase
Three-phase input power	5 W (maximum)	2 ×5W Max	5 W (maximum)	2 x 5 W (maximum)
Single-phase operating voltage	AC input: 100–240 V	AC input: 100–240 V	AC input: 100–240 V (supporting 24 V DC output)	AC input: 100–240 V (supporting 24 V DC output)
Single-phase input power	70 W (maximum)	70 W (maximum)	110 W (maximum)	110 W (maximum)
DC input[b]	N/A	N/A	24–28 V DC, 70 W (maximum)	24–28 V DC, 70 W (maximum)
DC output	N/A	N/A	24 V DC, 30 W (maximum)	24 V DC, 30 W (maximum)
Frequency	50 Hz/60 Hz			
Cable routing	Routed in and out from the bottom			
O&M 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			

Item	SmartACU2000B-D-PLC	SmartACU2000B-D-2PLC	SmartACU2000B-D-PLC-24V	SmartACU2000B-D-2PLC-24V
Dimensions (W x H x D, including the mounting plate)	640 mm x 770 mm x 315 mm (25.20 in. x 30.31 in. x 12.40 in.)			
Weight (including firestop putty, screws, and the mounting plate)	About 29 kg (63.93 lb)	About 32 kg (70.55 lb)	About 31 kg (68.34 lb)	About 33 kg (72.75 lb)
Ingress Protection Rating	IP65/Type 4X			
Operating humidity	4%–100% RH			
Operating temperature	–40 ℃ to +60 ℃ (–40 ℉ to +140 ℉)			
Storage temperature	–40 ℃ to +70 ℃ (–40 ℉ to +158 ℉)			
Note b: For the smart array controller that supports 24 V DC input or output, the input range is between 100 V AC and 240 V AC or between 24 V DC and 28 V DC.				

A Configuring the DI7 and DI8 Ports

Procedure

Step 1 Enter **https://XX.XX.XX.XX** in the address box of the browser to enter the WebUI login page. Because of permission restriction, log in as **Special User**.

NOTE

- XX.XX.XX.XX indicates the IP address for the SmartLogger2000. The default IP address is 192.168.0.10.
- If web pages cannot be opened, specify security settings for the browser. For details, see the appropriate *SmartLogger2000 User Manual*.
- The initial password is **Changeme**.
- You are advised to change the password immediately after the first login to ensure the account security.

Step 2 Choose **Settings** > **DI** to enter the page for configuring the DI7 and DI8 ports.

Table A-1 DI7 port parameter settings

Parameter	Value	Parameter	Value
Activation Status	Activated	Alarm Severity	Major
Alarm Generation	Enable	Alarm Name	24V power failure

Table A-2 DI8 port parameter settings

Parameter	Value	Parameter	Value
Activation Status	Activated	Alarm Severity	Major
Alarm Generation	Enable	Alarm Name	AC SPD fault

----End

B Configuring the COM2 Port

Procedure

Step 1 Enter **https://XX.XX.XX.XX** in the address box of the browser to enter the WebUI login page. Because of permission restriction, log in as **Advanced User**.

NOTE

- **XX.XX.XX.XX** indicates the IP address for the SmartLogger2000. The default IP address is 192.168.0.10.
- If web pages cannot be opened, specify security settings for the browser. For details, see the appropriate *SmartLogger2000 User Manual*.
- The initial password is **Changeme**.
- After the first login, it is recommended that you change the initial password immediately to ensure account security.

Step 2 Choose **Settings** > **RS485**, and set the baud rate of the RS485-2 port to **115200**.

NOTICE

Ensure that the start address of each port from RS485-0 to RS485-6 is 1, and the end address of the each port is 247.

----End

C Acronyms and Abbreviations

A	
AC	alternating current
AI	analog input
AO	analog output
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

P	
PE	protective earthing
PID	potential induced degradation
PLC	power line communication
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