SmartACU2000D Smart Array Controller

Quick Guide (with PID Modules)

Issue: 04
Part Number: 31500BWC
Date: 2023-05-09

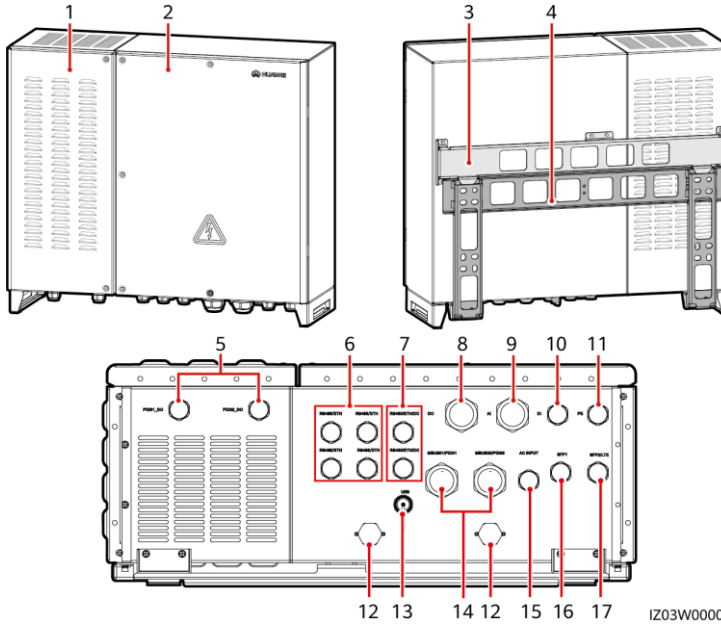
HUAWEI TECHNOLOGIES CO., LTD.

NOTICE

- **Before installing the equipment, read the user manual carefully to get familiar with product information and safety precautions. The product warranty does not cover equipment damage caused by failure to follow the storage, transportation, installation, and usage guidelines specified in this document and the user manual.** Log in to the technical support website (https://support.huawei.com/enterprise) to view the user manual and safety precautions.
- The information in this document is subject to change without notice. Every effort has been made in the preparation of this document to ensure accuracy of the contents, but all statements, information, and recommendations in this document do not constitute a warranty of any kind, express or implied.
- The Danger, Warning, Caution, and Notice statements described in this document do not cover all the safety precautions. You also need to comply with relevant international, national, or regional standards and industry practices.
- Only qualified professionals or trained personnel are allowed to perform operations on the equipment. Operation personnel should understand the system, its working principles, and relevant national/regional standards.
- During operations, use dedicated insulated tools and wear personal protective equipment, such as protective clothing, insulated shoes, goggles, safety helmets, and insulated gloves.
- Before installing the device, check that the package contents are intact and complete against the packing list. If any damage is found or any component is missing, contact your dealer.

1 Product Overview

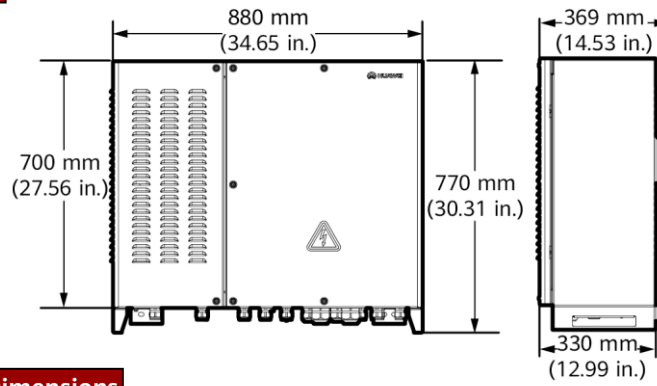
Name	Model	Voltage Level	Configuration
Smart array controller	SmartACU2000D-D-01	D: ≤ 800 V three-phase AC input	• 01: one MBUS route and one SmartPID2000 (referred to as PID module hereinafter) • 03: two MBUS routes and two PID modules
	SmartACU2000D-D-03		



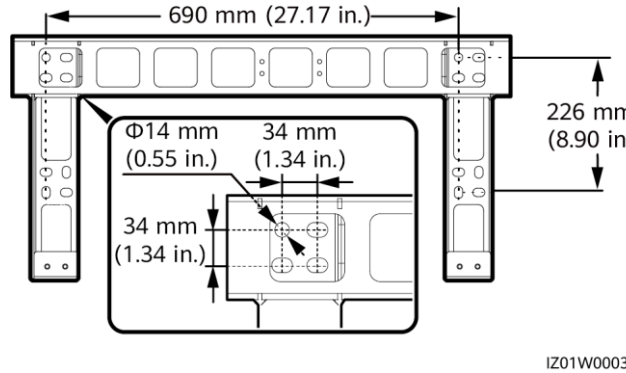
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(1) PID cabinet door
(2) Main cabinet door
(3) Mounting plate
(4) Mounting bracket
(5) Waterproof connectors for the PID DO signal cable (PID01_DO, PID02_DO, 3/4 in.)
(6) Waterproof connectors for the RS485 communications cable and network cable (RS485/ETH, 3/4 in.)
(7) Waterproof connectors for the RS485 communications cable, network cable, and DC power cables (RS485/ETH/DC, 3/4 in.)
(8) Waterproof connector for the DO signal cable (DO, 5/4 in.)
(9) Waterproof connector for the AI signal cable (AI, 5/4 in.)
(10) Waterproof connector for the DI signal cable (DI, 3/4 in.)
(11) Waterproof connector for the protective earthing cable (PE, 3/4 in.)
(12) Ventilation valve
(13) USB port (USB)
(14) Waterproof connectors for the three-phase AC power cable (including the functional earthing cable) (MBUS01/PID01, MBUS02/PID02, 1 in.)
(15) Waterproof connector for the single-phase AC power cable (AC INPUT, 3/4 in.)
(16) Waterproof connector for the optical cable (SFP1, 3/4 in.)
(17) Waterproof connector for the optical cable and network cable (SFP2/LTE, 3/4 in.)

Cabinet Dimensions



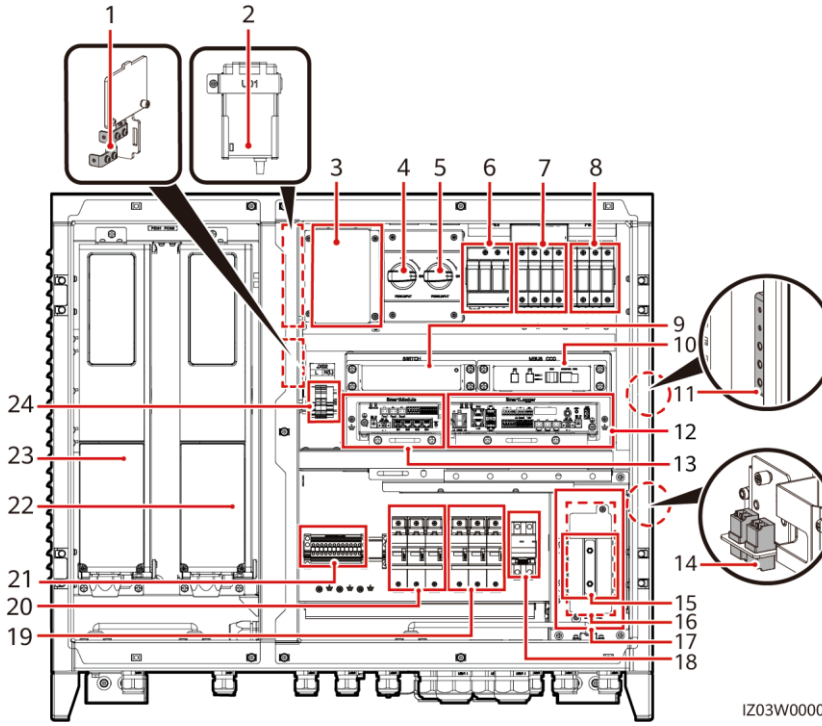
Mounting Bracket Dimensions



SmartACU2000D-D-03 Components

NOTE

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



(1) PID functional earthing (FE) bar (FE01, FE02)

(2) SmartLogger power adapter (U01)

(3) Position for the 24 V DC power module (U02)

(4) PID01 input switch (QF01)

(5) PID02 input switch (QF02)

(6) Single-phase surge protective device (SPD) (F03)

(7) Three-phase SPD 1 (F01)

(8) Three-phase SPD 2 (F02)

(9) Position for the Ethernet switch (SWITCH)

(10) SmartMBUS CCO (MBUS CCO)

(11) PE bar

(12) SmartLogger3000 (SmartLogger)

(13) SmartModule1000A01 (SmartModule)

(14) Fiber adapter (OFA01: TX1 RX1; OFA02: TX2 RX2)

(15) Position for the power over Ethernet (PoE) SPD

(16) Position for the PoE module (POE)

(17) ATB (Access Terminal Box)

(18) Single-phase input switch (QF03)

(19) Three-phase input switch 2 (FU02)

(20) Three-phase input switch 1 (FU01)

(21) RS485 communications terminal (JX01)

(22) SmartPID2000 (PID02)

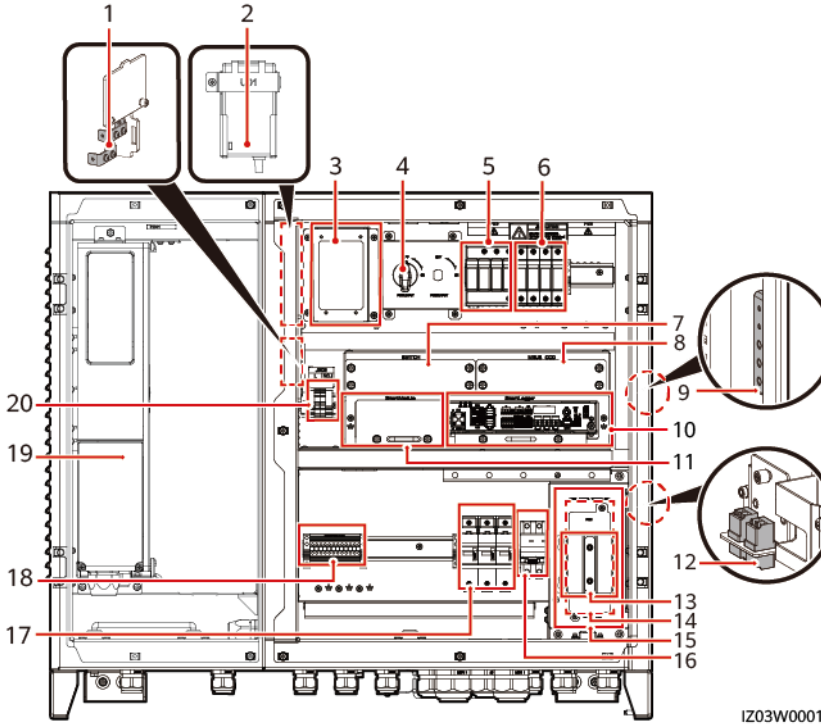
(23) SmartPID2000 (PID01)

(24) AC input terminal of the 24 V power module (JX02)

SmartACU2000D-D-01 Components

NOTE

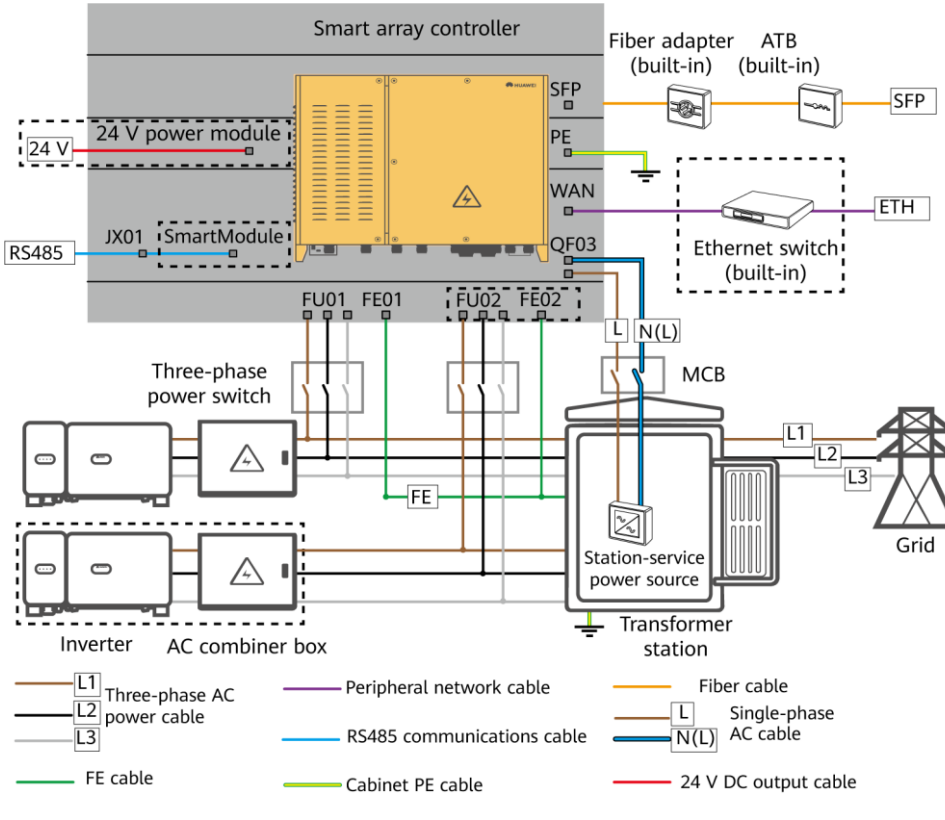
For simplicity purposes, the following figure shows only the components that you need to operate and reserved installation positions.



(1) PID FE bar (FE01, FE02)
(2) SmartLogger power adapter (U01)
(3) Position for the 24 V DC power module (U02)
(4) PID01 input switch (QF01)
(5) Single-phase SPD (F03)
(6) Three-phase SPD (F01)
(7) Position for the Ethernet switch (SWITCH)
(8) Position for the SmartMBUS CCO (MBUS CCO)
(9) PE bar
(10) SmartLogger3000 (SmartLogger)
(11) Position for the SmartModule1000A01 (SmartModule)
(12) Fiber adapter (OFA01: TX1, RX1; OFA02: TX2, RX2)
(13) Position for the PoE SPD
(14) Position for the PoE module (POE)
(15) ATB (Access Terminal Box)
(16) Single-phase input switch (QF03)
(17) Three-phase input switch (FU01)
(18) RS485 communications terminal (JX01)
(19) SmartPID2000 (PID01)
(20) AC input terminal of the 24 V power module (JX02)

2 Configurations in Typical Scenarios

Fiber Ring Network



IZ03N00001

NOTE

- Components in dashed-line boxes are optional. To highlight the involved area, the figure does not show all factory-installed components and cables.
- The SmartModule is installed on the SmartACU2000D-D-03 before delivery, and you do not need to perform any operations on the SmartModule. If RS485 ports are required for the SmartACU2000D-D-01, the SmartModule can be optionally installed.

The following table describes the components to be configured in the fiber ring network scenario.

Position	Component		Recommended Model or Specifications	Component Source	Quantity
Smart array controller	(Optional) SmartModule		SmartModule1000A01	Purchased from Huawei	1
	(Optional) Ethernet switch		UT-H605 or ES1000	Purchased from Huawei	1
	(Optional) 24 V power supply		N/A		1
	Fitting bag for optical ring switching[a]	Optical module	N/A		2
		Optical jumper	N/A		8
Transformer station	Miniature circuit breaker (MCB)		Recommended rated current: 32 A; number of poles: 2	Prepared by the customer	1
	Three-phase power switch	Knife fuse switch	• When the rated AC voltage on the low-voltage (LV) side of the transformer station is less than or equal to 500 V, the rated voltage of the knife fuse switch should be greater than or equal to 600 V. • When the rated AC voltage on the LV side of the transformer station is greater than 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 (three fuses for each knife fuse switch box)		• Scenario with a double-column transformer: 1 • Scenario with a dual-split transformer: 2
Note a: There are two types of fitting bags for fiber ring switching: with 100M optical modules or with 1000M optical modules. You can purchase a fitting bag based on the specifications of the optical modules used on the fiber channel (FC) switch.					

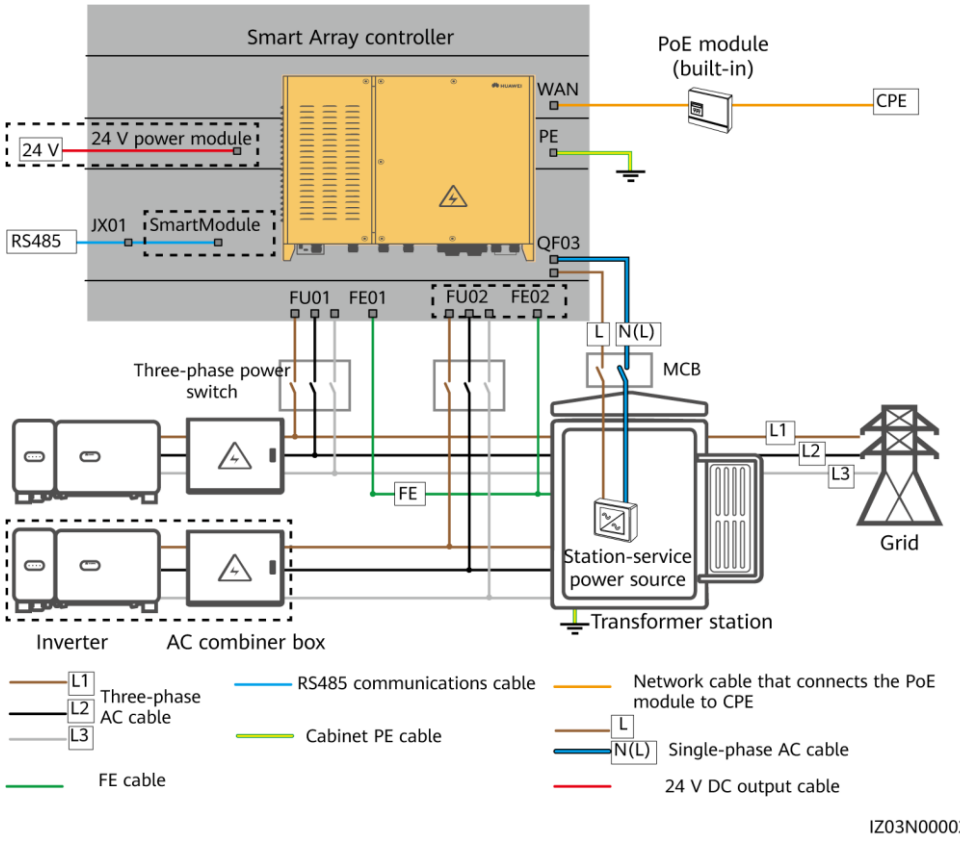
NOTE

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

The following table describes the cables to be prepared by yourself in the fiber ring network scenario.

No.	Cable	Recommended Model or Specifications	Cross-sectional Area Range of the Cable (Recommended Value)
1	Three-phase AC power cable	• Four-core (L1, L2, L3, and FE) outdoor armored copper cable and OT-M4 terminals (FE) • When the rated AC voltage on the LV side of the transformer station is less than or equal to 500 V, the operating voltage between the three-phase AC power cable and the ground should be greater than or equal to 600 V. • When the rated AC voltage on the LV side of the transformer station is greater than 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
2	(Optional) Peripheral network cable	CAT 5E outdoor shielded network cable with an outer diameter less than 9 mm (0.35 in.) and internal resistance less than or equal to 1.5 ohms/10 m (1.5 ohms/393.70 in.), as well as shielded RJ45 connectors	N/A
3	Peripheral RS485 communications cable	Computer cable (DJYP2VP2-22 2x2x1) or armored shielded twisted pair that can be used outdoors, as well as OT-M4 terminals	• 0.5–1 mm^2 (1 mm^2) • 20–18 AWG (18 AWG)
4	Cabinet PE cable	Outdoor copper cable and OT-M6 terminals	• 6–16 mm^2 (16 mm^2) • 10–6 AWG (6 AWG)
5	Optical fiber 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
6	Single-phase AC power cable	• Standard connection: two-core outdoor armored copper cable • Connection through a tube: single-core outdoor copper cable • Operating voltage to the ground ≥ 300 V	• 4–6 mm^2 (4 mm^2) • 12–10 AWG (12 AWG)
7	(Optional) 24 V DC output power cable	• Standard connection: two-core outdoor armored copper cable • Connection through a tube: single-core outdoor copper cable • Operating voltage to the ground ≥ 300 V	• 2.5–4 mm^2 (2.5 mm^2) • 14–12 AWG (14 AWG)

4G LTE Network



NOTE

- Components in dashed-line boxes are optional. To highlight the involved area, the figure does not show all factory-installed components and cables.
- The SmartModule is installed on the SmartACU2000D-D-03 before delivery, and you do not need to perform any operations on the SmartModule. If RS485 ports are required for the SmartACU2000D-D-01, the SmartModule can be optionally installed.

The following table describes the components to be configured in the 4G LTE network scenario.

Position	Component		Recommended Model or Specifications	Component Source	Quantity
Smart array controller	(Optional) SmartModule		SmartModule1000A01	Purchased from Huawei	1
	(Optional) 24 V power supply		N/A		1
	Fitting bags for the PoE module and customer-premises equipment (CPE)	PoE module	N/A		1
Outside the smart array controller and transformer station		CPE	N/A		1
Transformer station	MCB		Recommended rated current: 32 A; number of poles: 2	Prepared by the customer	1
	Three-phase power switch	Knife fuse switch	• When the rated AC voltage on the LV side of the transformer station is less than or equal to 500 V, the rated voltage of the knife fuse switch should be greater than or equal to 600 V. • When the rated AC voltage on the LV side of the transformer station is greater than 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 (three fuses for each knife fuse switch box)		• Scenario with a double-column transformer: 1 • Scenario with a dual-split transformer: 2

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

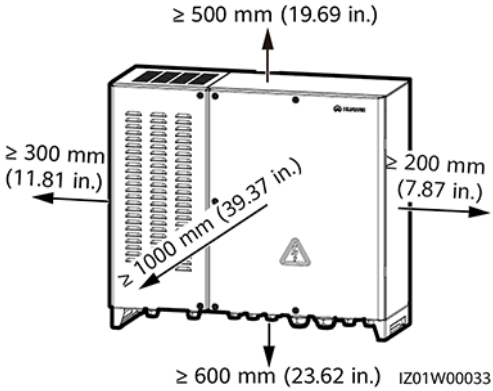
The following table describes the cables to be prepared by yourself in the 4G LTE network scenario.

No.	Cable	Recommended Model or Specifications	Cross-sectional Area Range of the Cable (Recommended Value)
1	Three-phase AC power cable	• Four-core (L1, L2, L3, and FE) outdoor armored copper cable and OT-M4 terminals (FE) • When the rated AC voltage on the LV side of the transformer station is less than or equal to 500 V, the operating voltage between the three-phase AC power cable and the ground should be greater than or equal to 600 V. • When the rated AC voltage on the LV side of the transformer station is greater than 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
2	Peripheral RS485 communications cable	Computer cable (DJYP2VP2-22 2x2x1) or armored shielded twisted pair that can be used outdoors, as well as OT-M4 terminals	• 0.5–1 mm^2 (1 mm^2) • 20–18 AWG (18 AWG)
3	Cabinet PE cable	Outdoor copper cable and OT-M6 terminals	• 6–16 mm^2 (16 mm^2) • 10–6 AWG (6 AWG)
4	Network cable from the PoE module to the CPE	A 20 m (65.62 ft) long network cable delivered with Huawei CPE (If the length is insufficient, prepare a cable with the same specifications as a peripheral network cable.)	N/A
5	Single-phase AC power cable	• Standard connection: two-core outdoor armored copper cable • Connection through a tube: single-core outdoor copper cable • Operating voltage to the ground ≥ 300 V	• 4–6 mm^2 (4 mm^2) • 12–10 AWG (12 AWG)
6	(Optional) 24 V DC output power cable	• Standard connection: two-core outdoor armored copper cable • Connection through a tube: single-core outdoor copper cable • Operating voltage to the ground ≥ 300 V	• 2.5–4 mm^2 (2.5 mm^2) • 14–12 AWG (14 AWG)

3 Installing the Cabinet

3.1 Preparations

Installation Dimensions



Bolts

NOTE

- When the cabinet is installed on a wall, you need to prepare M12x60 stainless steel exploded expansion bolts.
- When the cabinet is installed on a support or a pole, use the M12x40 bolt assemblies delivered with the cabinet.

3.2 Installing the Mounting Bracket

NOTE

The mounting bracket has four groups of tapped holes, each group containing four tapped holes. Mark any hole in each group based on site requirements and mark four holes in total. Two round holes are preferred.

Wall-mounted Installation

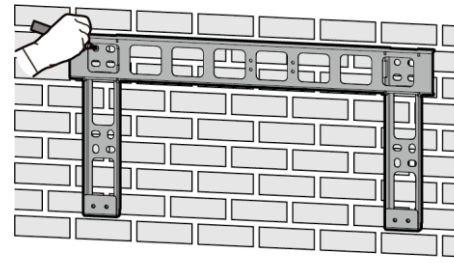
DANGER

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

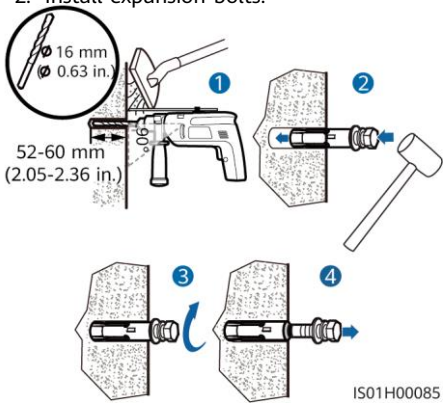
NOTICE

- To prevent dust inhalation or contact with eyes, wear safety goggles and an anti-dust mask when drilling holes.
- Clean up any dust in and around the holes using a vacuum cleaner and measure the distance between holes. If the holes are inaccurately positioned, drill holes again.
- Level the head of the expansion sleeve with the concrete wall after removing the bolt, spring washer, and flat washer. Otherwise, the mounting plate will not be securely installed on the concrete wall.

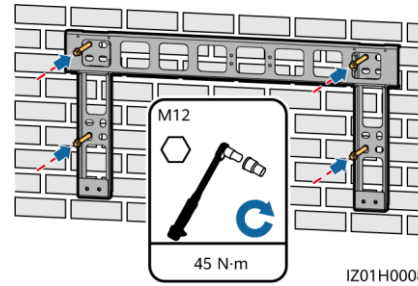
1. Mark hole positions.



2. Install expansion bolts.

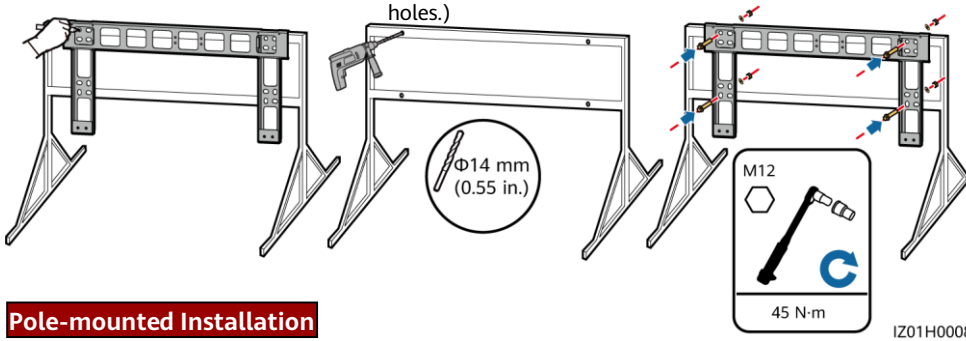


3. Secure the mounting bracket.



Support-mounted Installation

1. Mark hole positions.
2. Drill holes. (You are advised to apply anti-rust paint to the holes.)
3. Secure the mounting bracket.

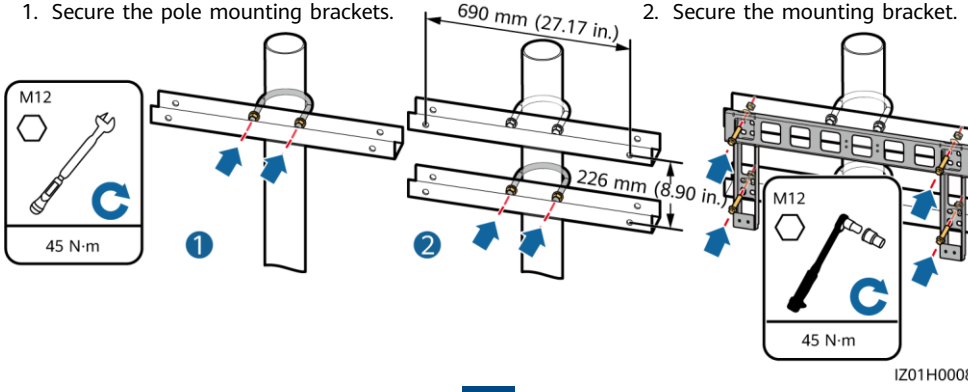


Pole-mounted Installation

NOTE

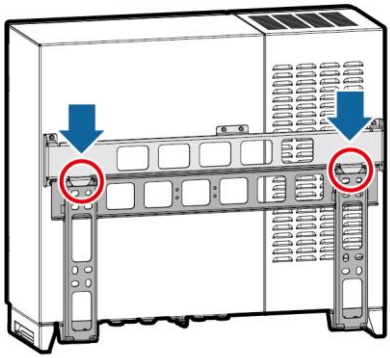
- If you need to pole-mount the smart array controller, prepare pole mounting brackets based on the dimensions of the smart array controller. You are advised to use M12 U-shaped bolts to secure the pole-mounting brackets.
- The figure is for reference only. The actual pole and pole mounting brackets prevail.

1. Secure the pole mounting brackets.
2. Secure the mounting bracket.

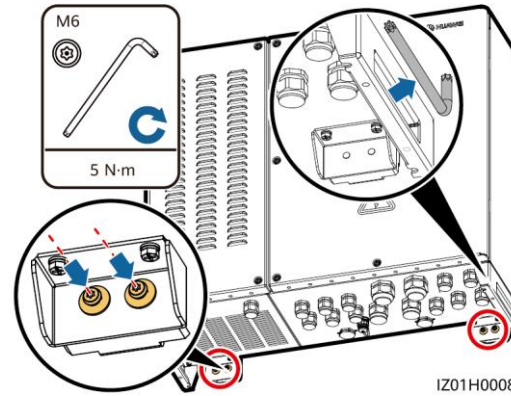


3.3 Securing the Cabinet

1. Install the cabinet on the mounting bracket.



2. Remove the security torx wrench bound to the cabinet base and use the wrench to tighten security torx screws.

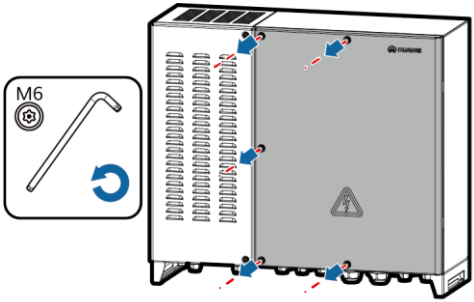


4 Opening the Main Cabinet Door

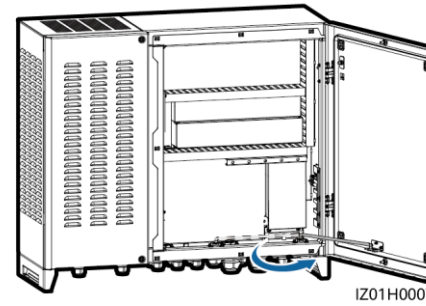
WARNING

- Before opening the main cabinet door, turn off all upstream switches for the smart array controller to power off the controller. If you have to operate an energized smart array controller, wear insulation gloves and take preventive measures.
- If you need to open the main cabinet door on rainy or snowy days, take protective measures to prevent rain or snow from entering the cabinet. If it is impossible to take protective measures, do not open the main cabinet door on rainy or snowy days.

1. Loosen the screws on the main cabinet.



2. Open the main cabinet door and install the support bar.



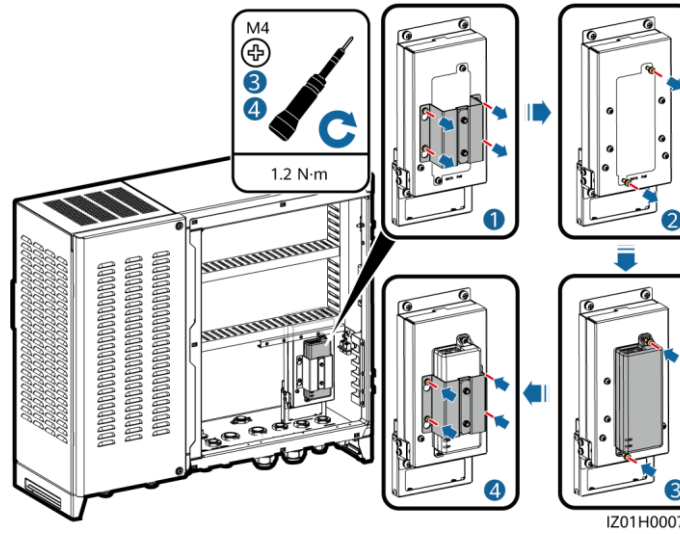
5 Installing Components

NOTE

Install components based on chapter 2 "Configurations in Typical Scenarios."

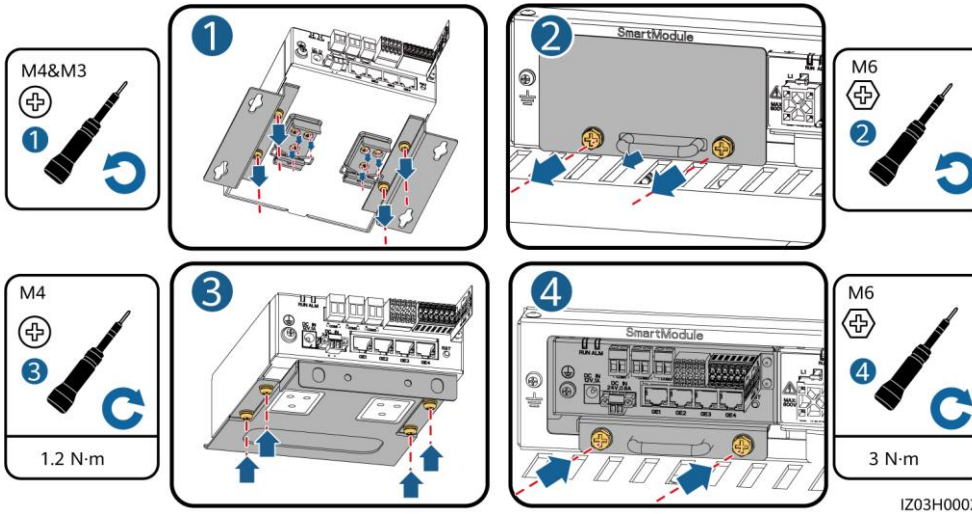
5.1 Installing the PoE Module

1. Loosen screws and remove the mounting board. Do not remove the screws.
2. Remove screws from the PoE module installation position.
3. Secure the PoE module. (The indicators should be in the lower left corner).
4. Secure the mounting board.

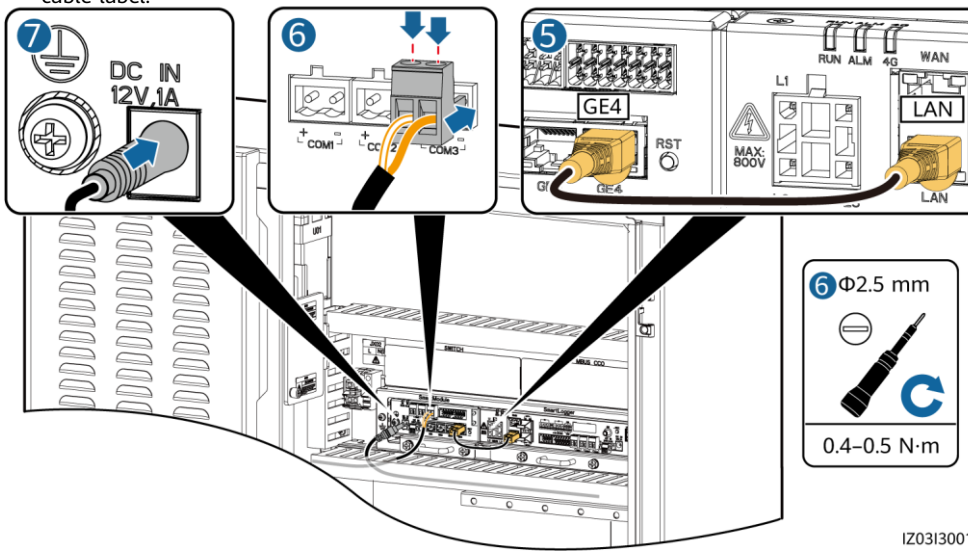


5.2 (Optional) Installing the SmartModule

1. Remove the mounting ears and guide rail–mounting kit from the SmartModule.
2. Remove the panel at the position where the SmartModule is to be installed from the cabinet and take out the mounting kit.
3. Secure the mounting bracket to the SmartModule.
4. Install the SmartModule.



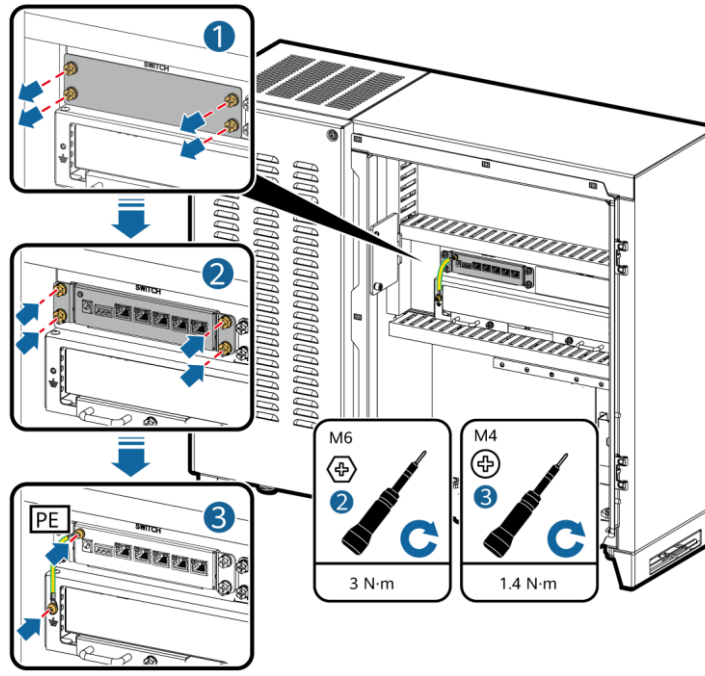
5. Connect the GE4 port on the SmartModule to the LAN port on the SmartLogger using the network cable delivered with the SmartModule.
6. Connect the preinstalled RS485 cable to the COM port on the SmartModule based on the label.
7. Connect the preinstalled power cable to the 12V 1A port on the SmartModule based on the cable label.



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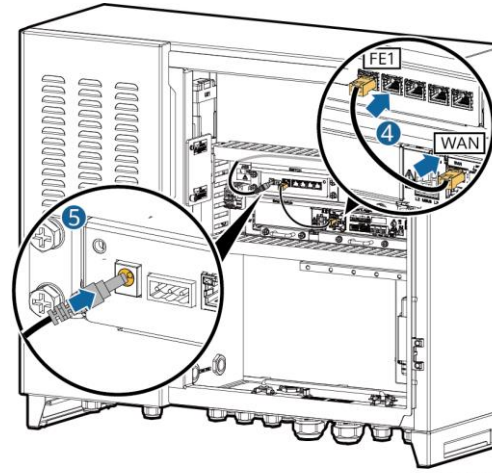
5.3 (Optional) Installing the Ethernet Switch

1. Remove the panel from the Ethernet switch installation position.
2. Secure the Ethernet switch.
3. Connect the PE cable for the Ethernet switch.



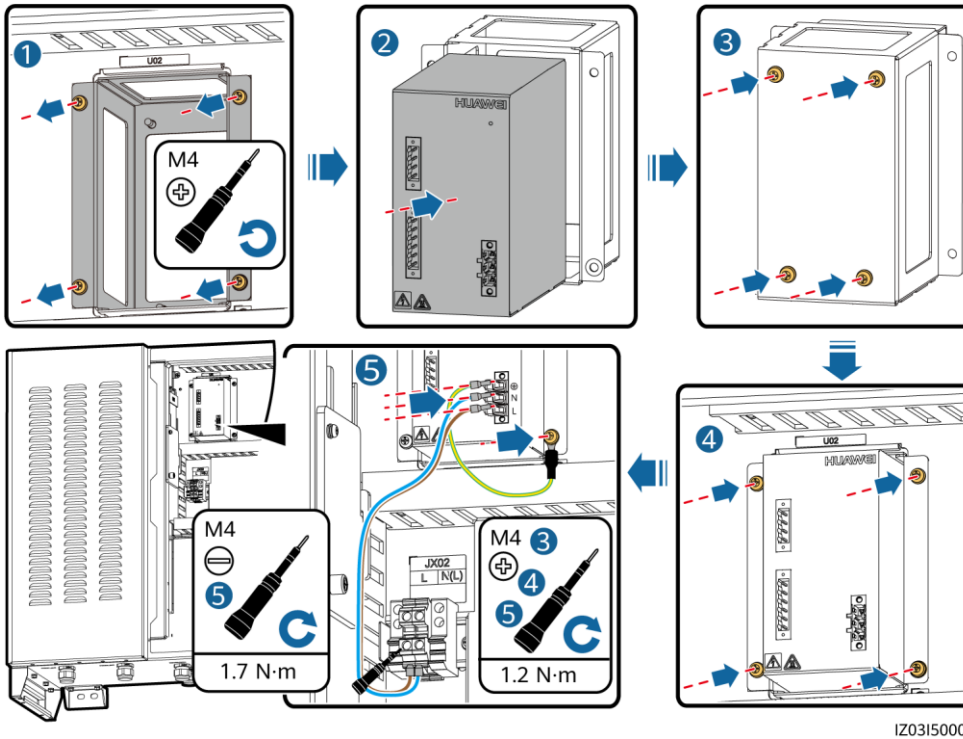
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4. Connect the FE1 port on the Ethernet switch to the WAN port on the SmartLogger using the network cable delivered with the Ethernet switch.
5. Connect the preinstalled power cable to the power port on the Ethernet switch based on the label.



5.4 (Optional) Installing the 24 V Power Module

1. Remove the mounting bracket of the 24 V power module from the cabinet.
2. Install the power module in the mounting bracket.
3. Secure the 24 V power module to the mounting bracket using the screws (delivered with the 24 V power module)
4. Install the power module in the cabinet.
5. Connect the AC input power cable (delivered with the SACU) to the 24 V power module based on the cable label.



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6 Connecting Cables

NOTICE

Connect cables in accordance with the installation laws and regulations of the country or region where the project is located.

6.1 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.

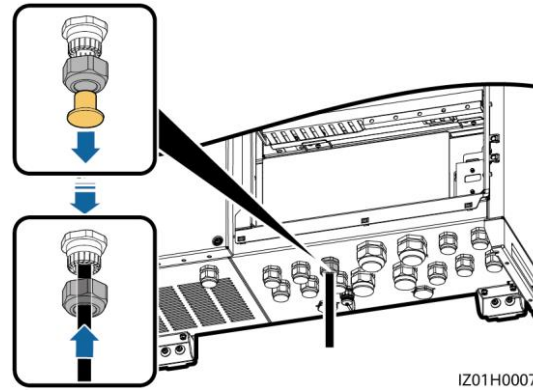
NOTE

- To prevent poor cable connection due to overstress caused by ground subsidence, it is recommended that the cable be bent inside the cabinet for a slack of 20–30 mm (0.79–1.18 in.) before connected to the appropriate port.
- If a cable has a jacket, ensure that the jacket is in the cabinet.
- The following 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.

Common Connection

If you choose common connection, prepare appropriate cables by yourself.

1. Remove the locking cap and plug from the cable gland.
2. Route the cable through the locking cap and then the cable gland.
3. Connect the cable.
4. Tighten the locking cap.
5. Check that the cable is connected correctly and securely. Seal the cable gland and cable hole using the supplied firestop putty.
6. Clear foreign matter from the cabinet.



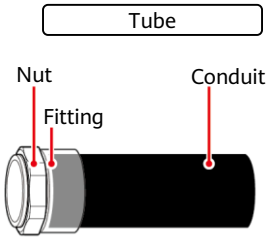
IZ01H00074

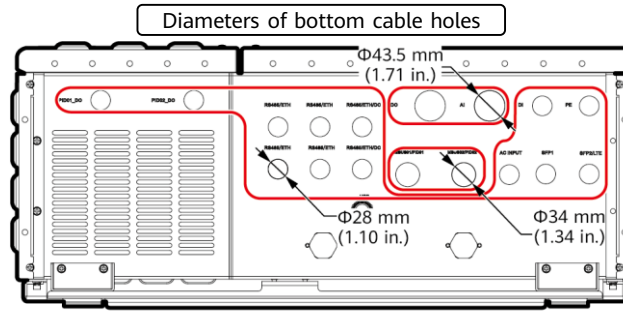
Connection Through a Tube

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

NOTE

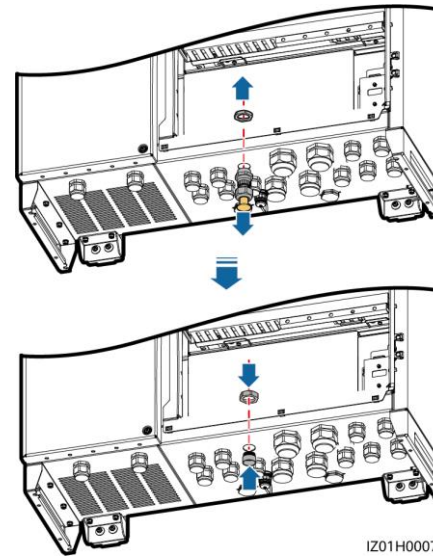
Prepare an appropriate tube based on the diameters of the cable holes at the bottom. It is recommended that the tube specifications comply with the waterproof connector specifications. For example, for a 3/4 in. waterproof connector, a 3/4 in. tube is recommended.





IZ03W00002

1. Remove the locking cap and plug from the waterproof connector, and then remove the waterproof connector.
2. Secure the tube fitting using the nut provided with the tube.
3. Route the cable through the conduit and then the fitting.
4. Connect the cable.
5. Secure the fitting to the conduit.
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.
7. Clear foreign matter from the cabinet.



IZ01H00073

6.2 Preparing Cables

Before connecting cables, prepare appropriate cables by referring to chapter 2 "Configurations in Typical Scenarios."

NOTICE

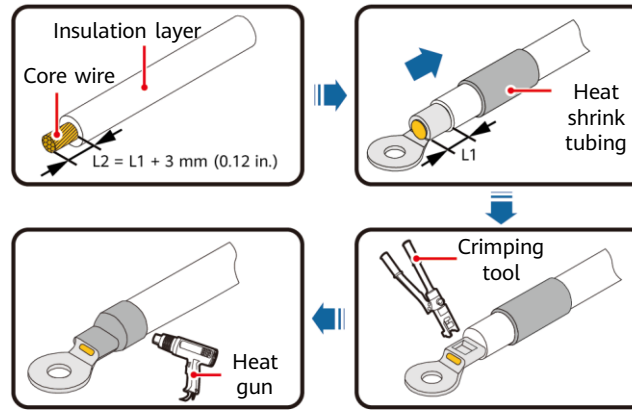
You can connect a peripheral cable to the smart array controller in common mode or through a tube.

- The way of handling the bottom waterproof connector varies depending on the connection method. For details, see section 6.1 "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.

6.3 Crimping an OT Terminal

NOTICE

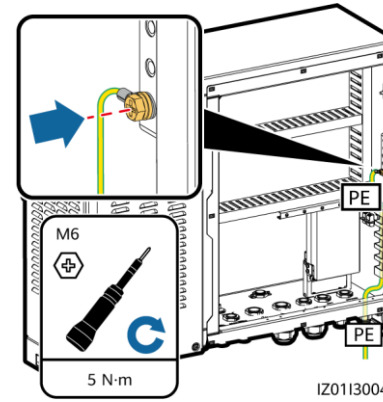
- Avoid scratching the core wire when stripping a cable.
- The cavity formed after the conductor crimp strip of the OT terminal is crimped must wrap the core wires completely. The core wires must contact the OT terminal closely.
- Wrap the wire crimping area with heat shrinkable tubing or PVC insulation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



IS01Z10002

6.4 Connecting the PE Cable

1. Crimp an OT terminal.
2. Secure the PE cable.



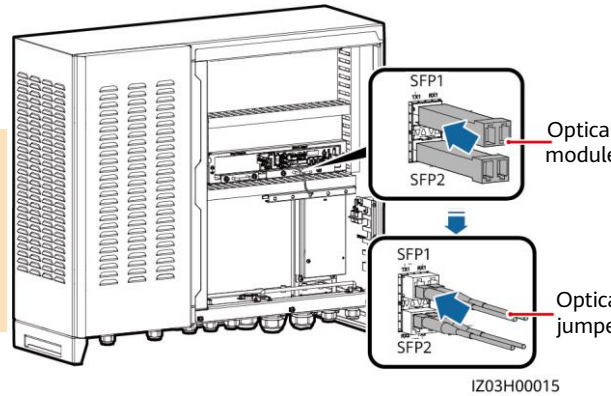
NOTE

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

6.5 Connecting Communications Cables for the Fiber Ring Network

Prepare the fitting bag for optical ring switching which contains the optical modules and optical jumpers.

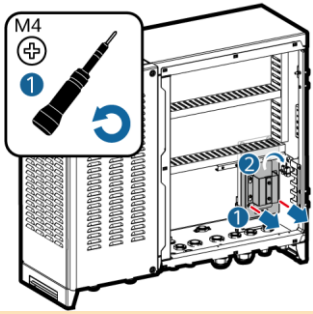
1. Insert the optical modules respectively into the SFP1 and SFP2 ports of the SmartLogger until they snap into place. Then pull the modules back to ensure that they are connected securely.



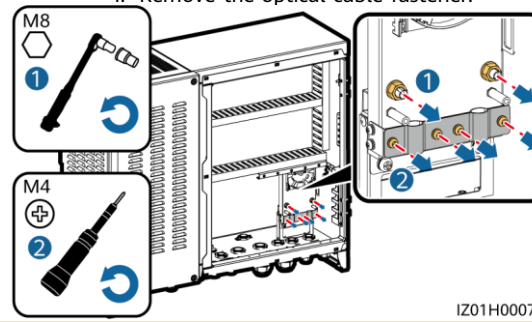
NOTICE

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

2. Connect factory-installed optical jumpers to the optical modules.
3. Remove the ATB cover.



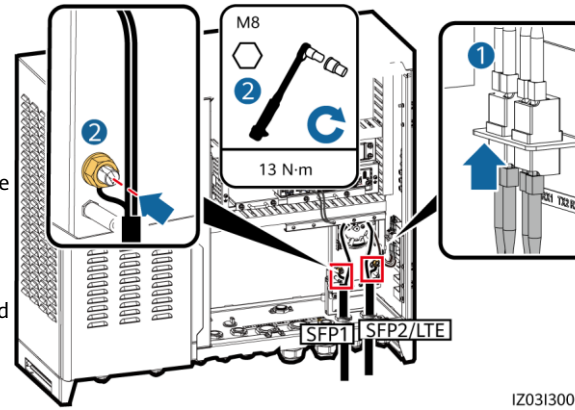
4. Remove the optical cable fastener.



NOTICE

- Connect two optical cables in a ring optical network, and connect one optical cable in a star optical network.
- As optical cables are hard, prepare optical cables before routing them into the cabinet.
- Only professionals are allowed to connect optical cables.

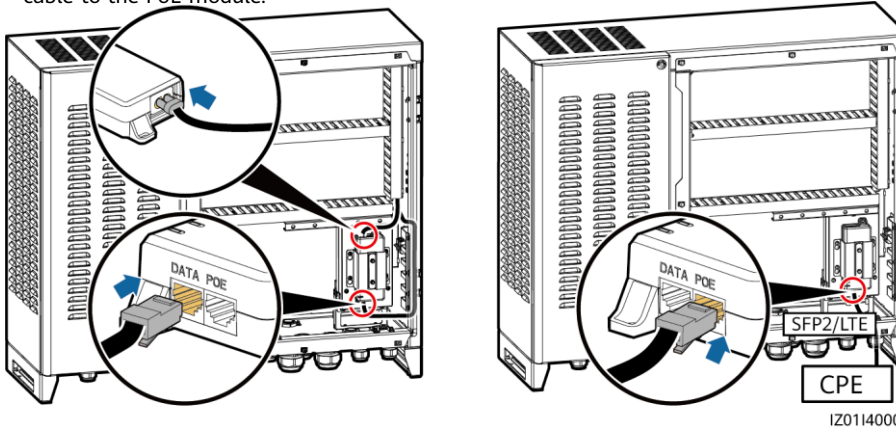
5. Connect one end of the optical jumper to the fiber adapter.
6. Route the other end of the optical jumper through the cable hole on the side of the ATB, and then connect the cable to the ATB.
7. Connect the peripheral optical cable to the ATB, splice the optical cable and the optical jumper, and then wind the spliced cable around the fiber spool on the ATB.
8. Check that the cables are connected correctly and securely. Then reinstall the optical cable fastener and ATB cover.



IZ03I30005

6.6 Connecting the 4G LTE Cable

1. Connect the factory-installed network cable to the DATA port on the PoE module, and the factory-installed power cable to the PoE module.
2. Connect the CPE network cable to the PoE port on the PoE module.

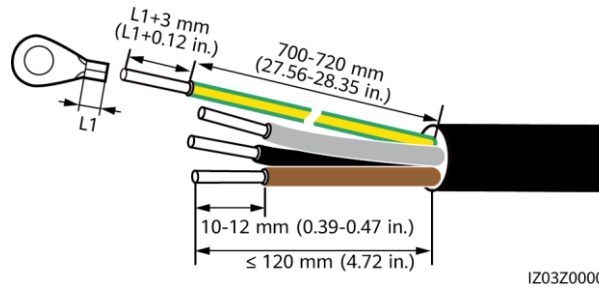


IZ01I40008

6.7 Connecting the Three-Phase AC Power Cable

- For the smart array controller that houses one PID module, connect the three-phase AC power cable to the FU01 switch, and the FE cable to the FE01 port on the FE bar.
- For the smart array controller that houses two PID modules, connect the three-phase AC power cable of the first route to the FU01 switch, and the corresponding FE cable to the FE01 port on the FE bar. Connect the three-phase AC power cable of the second route to the FU02 switch, and the corresponding FE cable to the FE02 port on the FE bar.
- This section describes how to connect three-phase AC power cables for the smart array controller with two PID modules. For details about the single PID module situation, refer to the way of connecting the first route of the three-phase AC power cable.

1. Prepare a cable.



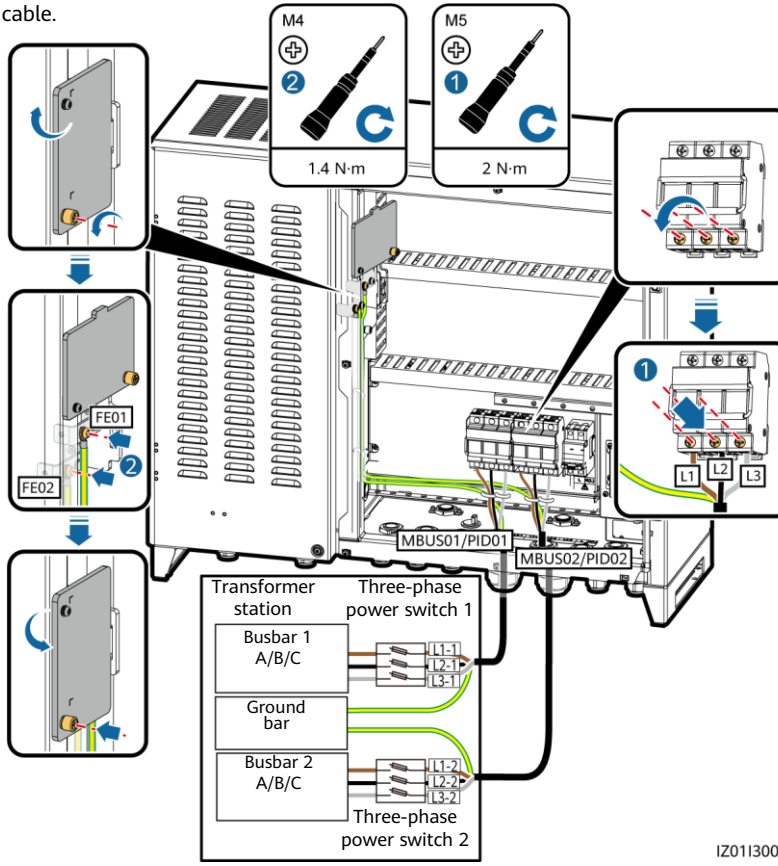
IZ03Z00003

2. Crimp an OT terminal.
3. Connect the L1, L2, and L3 wires to the three-phase input switch. Connect the FE cable to the FE bar.

NOTICE

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

4. Bind the cable.



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6.8 Connecting the Peripheral RS485 Communications Cable

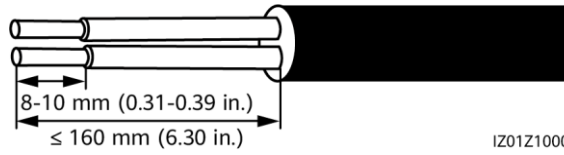
Connect peripheral RS485 communications cables to the JX01 terminal block. All RS485 communications cables are connected in the same way. This section describes how to connect two RS485 communications cables.

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–

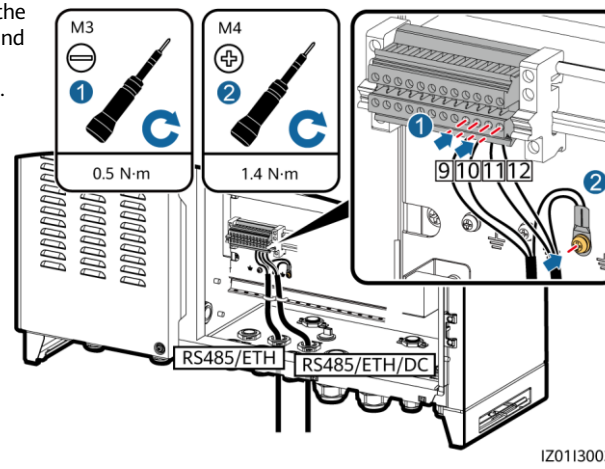
NOTICE

- For the SmartACU2000D-D-01, do not connect a peripheral RS485 communications cable to the RS485-1 port (ports 1 and 2 on the JX01 terminal block), because the PID01 communications cable has been connected to this port.
- For the SmartACU2000D-D-03, do not connect a peripheral RS485 communications cable to the RS485-1 and RS485-2 ports, because the PID01 communications cable has been connected to the RS485-1 port (ports 1 and 2 on the JX01 terminal block) and the PID02 communications cable has been connected to the RS485-2 port (ports 3 and 4 on the JX01 terminal block).
- For the SmartACU2000D-D-03, do not connect a peripheral RS485 communications cable to the RS485-3 port (ports 5 and 6 on the JX01 terminal block) because the communications cable of the MBUS CCO module has been connected to this port.
- JX01 ports 7, 8, 9, 10, 11, and 12 on the SmartACU2000D-D-03 can be connected to the RS485 cable.
- JX01 ports 7, 8, 9, 10, 11, and 12 on the SmartACU2000D-D-01 can be connected to the RS485 cable only after the SmartModule is installed.

1. Prepare a communications cable.



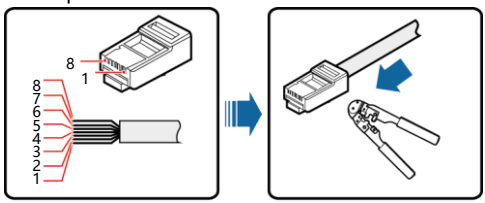
2. Connect the communications cable to the JX01 terminal block.
3. Crimp an OT terminal on the shield layer, and then connect the shield layer to the cabinet ground point.
4. Bind the communications cable.



6.9 (Optional) Connecting the Peripheral Network Cable

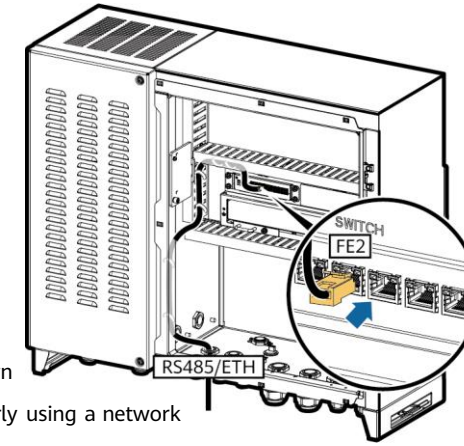
Connect peripheral network cables to ports FE2–FE5 on the Ethernet switch. All network cables are connected in the same way. This section describes how to connect one network cable.

1. Prepare a network cable.



IS01Z00009

(1) White-and-orange (2) Orange (3) White-and-green (4) Blue
(5) White-and-blue (6) Green (7) White-and-brown (8) Brown

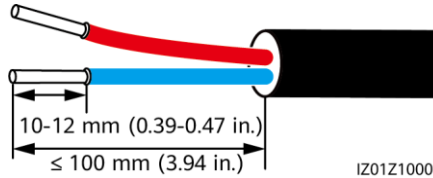


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2. Verify that the network cable functions properly using a network cable tester.
3. Connect the peripheral network cable to the FE2 port on the Ethernet switch.
4. Bind the network cable.

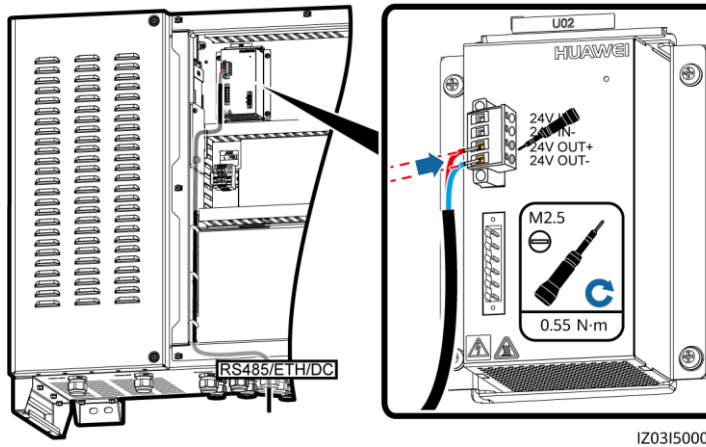
6.10 (Optional) Connecting the DC Output Power Cable to the 24 V Power Module

1. Prepare a cable.



IZ01Z10004

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



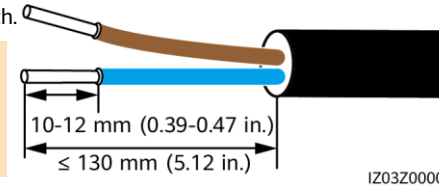
IZ03I50004

6.11 Connecting the Single-Phase AC Power Cable

1. Prepare a cable.
2. Connect the cable to the single-phase input switch.

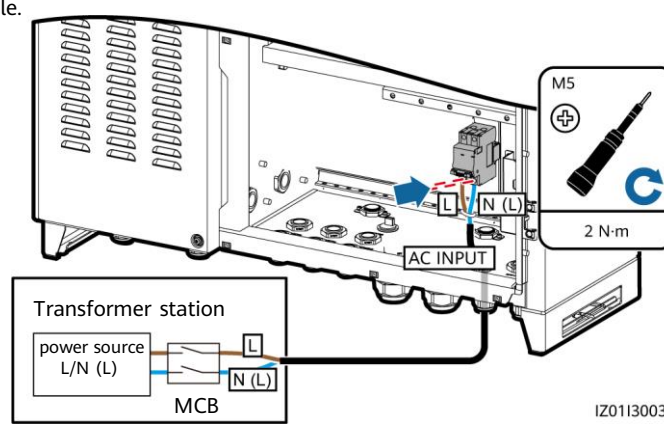
NOTICE

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



IZ03Z00004

3. Bind the cable.



IZ01I30038

7 Verifying the Installation

1. The cabinet and all components are installed properly.	Yes ☐ No ☐ N/A ☐
2. All upstream switches for the cabinet and all switches inside the cabinet are OFF.	Yes ☐ No ☐ N/A ☐
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. There are no sharp edges at the cutting positions. There are no sundries such as unnecessary adhesive tape or cable ties on cables.	Yes ☐ No ☐ N/A ☐
4. Routing for the power cables and signal cables meets the requirements for routing strong-current and weak-current cables and complies with the cable routing plan.	Yes ☐ No ☐ N/A ☐
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 cable holes at the bottom of the cabinet are plugged and the locking caps are tightened.	Yes ☐ No ☐ N/A ☐
6. The cover on the USB port is tightened, and the USB cable inside the cabinet is secure.	Yes ☐ No ☐ N/A ☐
7. The cabinet interior is clean, without dust, dirt, or foreign matter.	Yes ☐ No ☐ N/A ☐
8. The paint on the cabinet exterior is intact. Immediately repaint the part where paint has fallen off to prevent corrosion.	Yes ☐ No ☐ N/A ☐

8 Powering On the System

⚠ DANGER

Put on insulation gloves before powering on the system.

NOTICE

Ensure that the power voltage of the smart array controller is within the operating voltage range, and the three-phase input voltage is within the MBUS/PID module operating voltage range.

1. Turn on the single-phase power switch that controls the power supply from the remote transformer station to the smart array controller.
2. Turn on the three-phase power switch that controls the power supply from the remote transformer station to the smart array controller.
   - If the smart array controller houses one PID module, turn on the corresponding three-phase power switch.
   - If the smart array controller houses two PID modules, turn on the corresponding three-phase power switches.
3. Check that the input voltages of all switches of the smart array controller are within appropriate operating voltage ranges using a multimeter.
4. Turn on the QF03 single-phase input switch in the smart array controller.
6. Turn on the PID switch in the smart array controller.
   - If the smart array controller houses one PID module, turn on the QF01 PID switch.
   - If the smart array controller houses two PID modules, turn on the QF01 and QF02 PID switches.
7. Turn on the three-phase input switch in the smart array controller.
   - If the smart array controller houses one PID module, turn on the FU01 three-phase input switch.
   - If the smart array controller houses two PID modules, turn on the FU01 and FU02 three-phase input switches.

NOTE

- Commission the PID module after powering it on. For the detailed commissioning procedure, see chapter 9 "Commissioning the SmartPID2000."
- For details about the status of the energized SmartLogger and MBUS CCO module as well as the commissioning procedure, see the *SmartLogger3000 User Manual*. When the smart array controller communicates with the solar inverter over MBUS, log in to the embedded WebUI of the SmartLogger3000, choose **Monitoring** > **MBUS** > **Networking Settings**, and set **Networking** to **Enable** (default value). When the smart array controller communicates with the solar inverter only over RS485, set **Networking** to **Disable**.
- The Ethernet switch can be directly put into use without commissioning after power-on.

User Manual

9 Commissioning the SmartPID2000

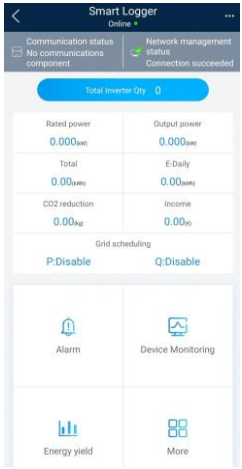
NOTE

The SmartPID2000 can be commissioned over the embedded WebUI of the SmartLogger, by connecting the SUN2000 app to the SmartLogger, or by connecting the SUN2000 app to the PID module. This section describes how to commission the SmartPID2000 by connecting the SUN2000 app to the SmartLogger.

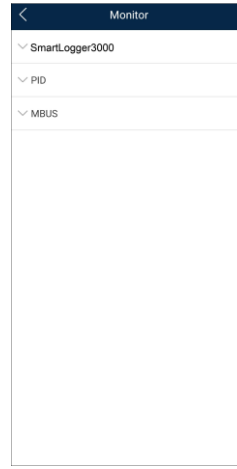
- The app has been connected to the SmartLogger over WLAN. Log in as **installer** and access the **Home** screen of the SmartLogger. For detailed operations, see the appropriate *SmartLogger3000 Quick Guide*.
- The following uses SUN2000 app 3.2.00.003 (Android) and SmartPID2000 V100R001C00SPC102 as examples.
- Use the initial password upon first power-on and change it immediately after login. To ensure account security, change the password periodically and keep the new password in mind. Not changing the initial password may cause password disclosure. A password left unchanged for a long period of time may be stolen or cracked. If a password is lost, devices cannot be accessed. In these cases, the user is liable for any loss caused to the PV plant.

Quick Guide

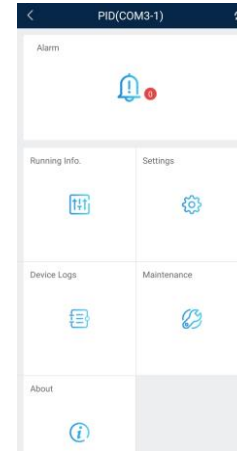
SmartLogger Home Screen



Device Monitoring



PID Function Menu



Running Parameter Descriptions

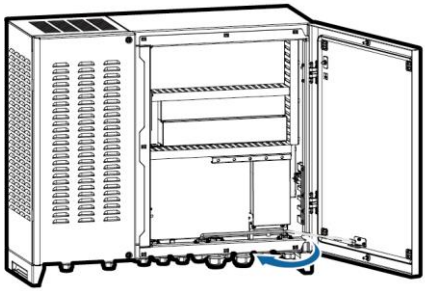
Parameter	Function	Value	Description
PV module compensation voltage direction	Specifies the offset direction of the PID module.	PV– positive offset	• **PV– positive offset** refers to raising the voltage between PV– and the ground to above 0 V through voltage compensation. • Select **PV– positive offset** for P-type PV modules or the N-type PV modules that comprise the solar cells whose positive and negative polarities are on different sides. For example, P-type PV modules, HIT, CIS, thin-film PV modules, and CdTe PV modules meet the requirement for PV– positive offset. • **PV+ negative offset** refers to lowering the voltage between PV+ and the ground to below 0 V through voltage compensation. • Select **PV+ negative offset** for the N-type PV modules that comprise the solar cells whose positive and negative polarities are on the same side. (When designing a PV plant, the design institute or user should ask the PV module vendor about the direction of voltage compensation for resisting the PID effect.)
		PV+ negative offset	
Maximum system DC-to-ground withstand voltage	Specifies the voltages between the PV/AC side and the ground.	500–1500 V	Specifies the lower threshold of the maximum voltage range between the solar inverter DC side (including the solar inverter, PV module, cable, SPD, and switch) and the ground. (The default value is 1000 V. For the 1500 V solar inverters, the recommended value is 1500 V.)
Maximum output voltage	Specifies the maximum step-up voltage of the PID module.	0–800 V	• For the 1000 V/1100 V solar inverters, the value ranges from 0 V to 550 V. The parameter value indicates the maximum DC step-up phase-ground voltage. • For the 1500 V solar inverters, the value ranges from 0 V to 800 V. The parameter value indicates the maximum DC step-up phase-ground voltage. (The default value is 500 V. For the 1500 V solar inverters, the recommended value is 800 V.)

NOTE

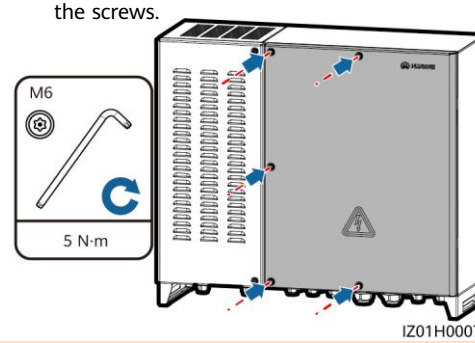
- To highlight the key points, only the parameters that need to be set are described.
- If a smart array controller with two PID modules is used in the scenario with a dual-split transformer and the solar inverter configurations are the same, you are advised to set the operating parameters of both PID modules to the same.

10 Closing the Cabinet Door

1. Retract the support bar.



2. Close the main cabinet door and tighten the screws.



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NOTE

- If a screw used for securing the cabinet door is lost, use the security torx screw in the fitting bag.
- If a floating nut used for securing the cabinet door is lost, use the idle floating nut on the cabinet.

11 FAQ

11.1 How Do I Power Off the System Before Maintenance?

DANGER

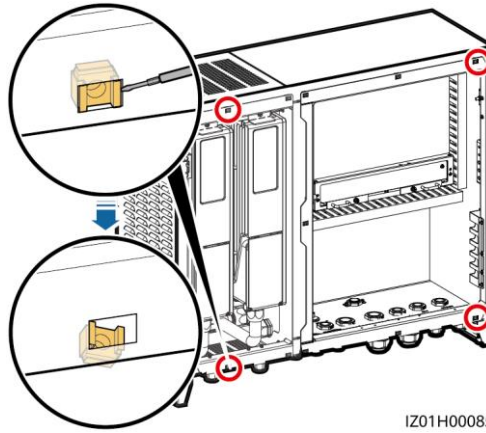
Put on insulation gloves before powering off the system.

1. Turn off the single-phase power switch that controls the power supply from the remote transformer station to the smart array controller.
2. Turn off the three-phase power switch that controls the power supply from the remote transformer station to the smart array controller.
   - If the smart array controller houses one PID module, turn off the corresponding three-phase power switch.
   - If the smart array controller houses two PID modules, turn off the corresponding three-phase power switches.
4. Turn off the QF03 single-phase input switch in the smart array controller.
5. Turn off the three-phase input switch on the smart array controller.
   - If the smart array controller houses one PID module, turn off the FU01 three-phase input switch.
   - If the smart array controller houses two PID modules, turn off the FU01 and FU02 three-phase input switches.
6. Turn off the PID switch in the smart array controller.
   - If the smart array controller houses one PID module, turn off the QF01 PID switch.
   - If the smart array controller houses two PID modules, turn off the QF01 and QF02 PID switches.

11.2 How Do I Determine an Unavailable Single-/Three-Phase SPD?

If an SPD is damaged or its indication window is red, the SPD is deemed unavailable.

11.3 How Do I Remove the Reserved Floating Nuts?

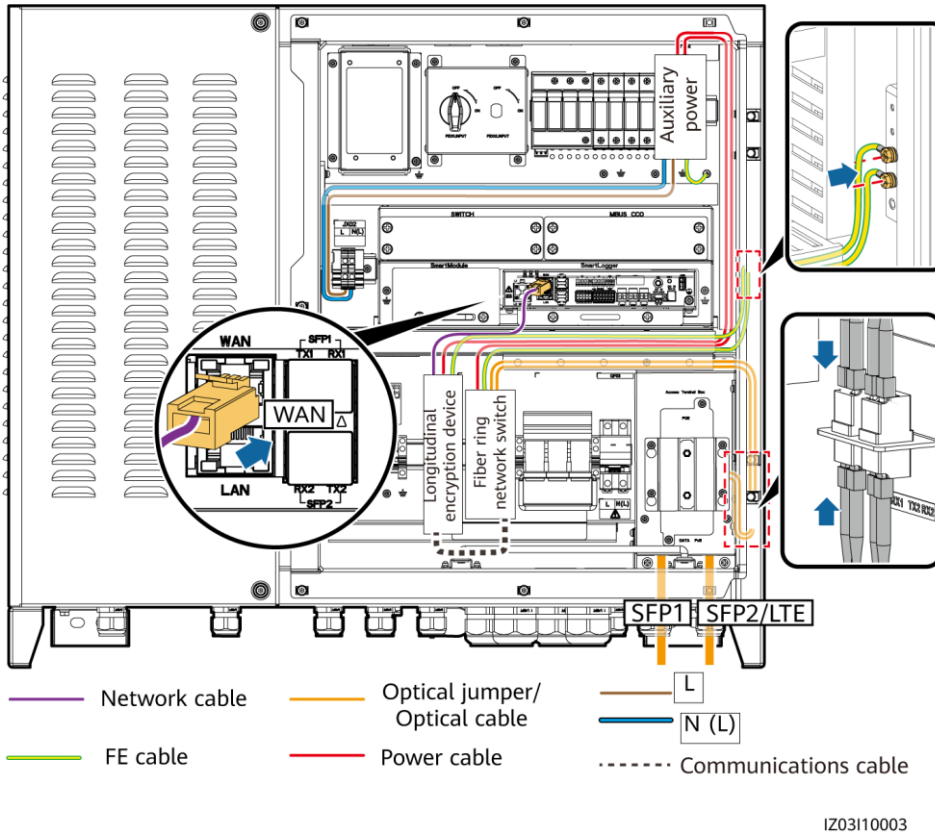


11.4 Scenario Where a Longitudinal Encryption Device Is Used

- The SmartACU2000D-D-01 provides only the installation positions for a longitudinal encryption device, fiber ring network switch, and auxiliary power supply, which can be installed on guide rails.
- The longitudinal encryption device, fiber ring network switch, and auxiliary power supply are prepared by the customer based on actual requirements. Huawei device faults caused by any of the three components are not covered by the warranty.
- For details about the installation method and cable specifications, see the installation guide of the components. You are advised to route cables through the cable trough or cable bridge in the SACU.
- The reserved installation dimensions (W x H x D) are 50 mm x 185 mm x 135 mm for the longitudinal encryption device, 65 mm x 185 mm x 135 mm for the fiber ring network switch, and 36 mm x 130 mm x 125 mm for the auxiliary power supply.
- The FE communications cable of the longitudinal encryption device can be connected to the WAN port of the SmartLogger3000 (SmartLogger).
- The optical jumper of the fiber ring switch can be connected to the fiber adapter (OFA01 or OFA02). The adapter specification is 2LC/PC-2LC/PC-4. The optical cable can be connected to the ATB.
- The power cable of the auxiliary power supply can be connected to the 24 V AC input terminal (JX02). The JX02 is 220 V/2P and supports the connection of 0.2–10 mm2 (or 24–8 AWG) cables. The ground cable can be connected to the nearest terminal using M4 screws.
- For details about the communications cable connection mode and cable specifications between the fiber ring network switch and the longitudinal encryption device, see the installation guide of the purchased components.

NOTE

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



Huawei Technologies Co., Ltd.
Huawei Industrial Base, Bantian, Longgang
Shenzhen 518129, People's Republic of China
e.huawei.com