

SmartACU2000B Smart Array Controller Quick Guide (with PID Modules, 800 V AC)

Issue: 06

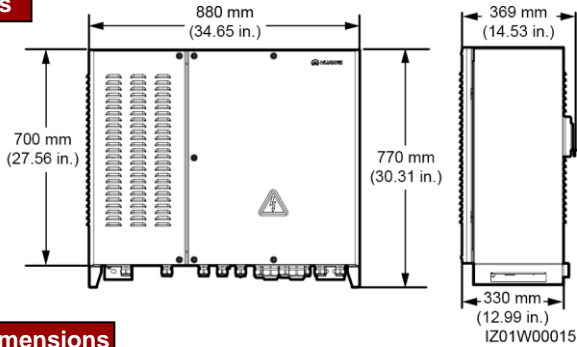
Part Number: 31509273

Date: 2019-06-20

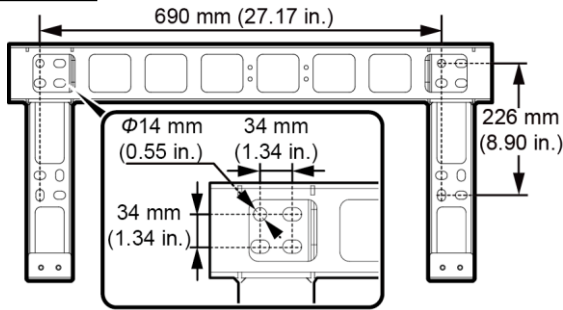
HUAWEI TECHNOLOGIES CO., LTD.



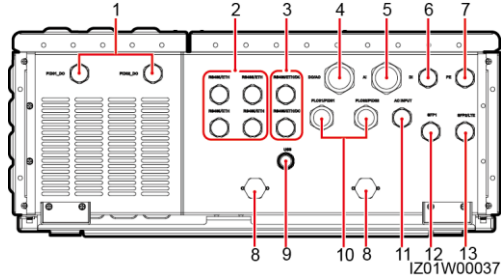
Cabinet Dimensions



Mounting Bracket Dimensions



Port Description



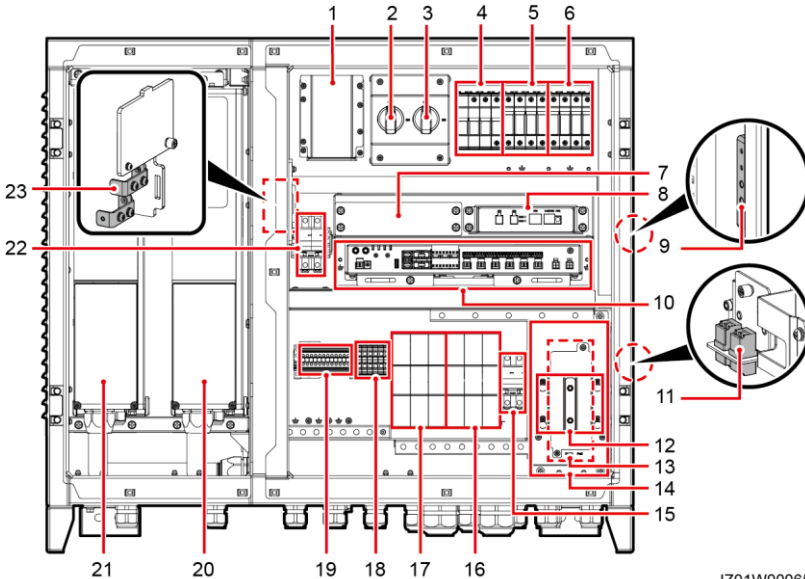
- (1) PID DO signal cable waterproof connector (PID01_DO, PID02_DO, 3/4 in.)
- (2) Waterproof connectors for the RS485 communications cable and network cable (RS485/ETH, 3/4 in.)
- (3) Waterproof connectors for the RS485 communications cable, network cable, and DC input and output power cables (RS485/ETH/DC, 3/4 in.)
- (4) DO/AO signal cable waterproof connector (DO/AO, 5/4 in.)
- (5) AI signal cable waterproof connector (AI, 5/4 in.)
- (6) DI signal cable waterproof connector (DI, 3/4 in.)
- (7) Protective earthing (PE) cable waterproof connector (PE, 3/4 in.)
- (8) Ventilation valve
- (9) USB port (USB)
- (10) Waterproof connectors for the three-phase AC power cable (including the functional earthing cable) (PLC01/PID01, PLC02/PID02, 1 in.)
- (11) Waterproof connector for the single-phase AC power cable (AC INPUT, 3/4 in.)
- (12) Optical cable waterproof connector (SFP1, 3/4 in.)
- (13) Waterproof connector for the optical cable and network cable (SFP2/LTE, 3/4 in.)

Component Positions

NOTE

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

- Component 1 of the SmartACU2000B-D-PID/PLC is the power adapter. This model does not include components 3, 6, 8, 16, 18, 20, and 22.
- Component 1 of the SmartACU2000B-D-2PID/2PLC is the power adapter. This model does not include components 18 and 22.
- Component 1 of the SmartACU2000B-D-PID/PLC-24V is the 24 V DC power module. This model does not include components 3, 6, 8, 16, and 20.
- Component 1 of the SmartACU2000B-D-2PID/2PLC-24V is the 24 V DC power module.

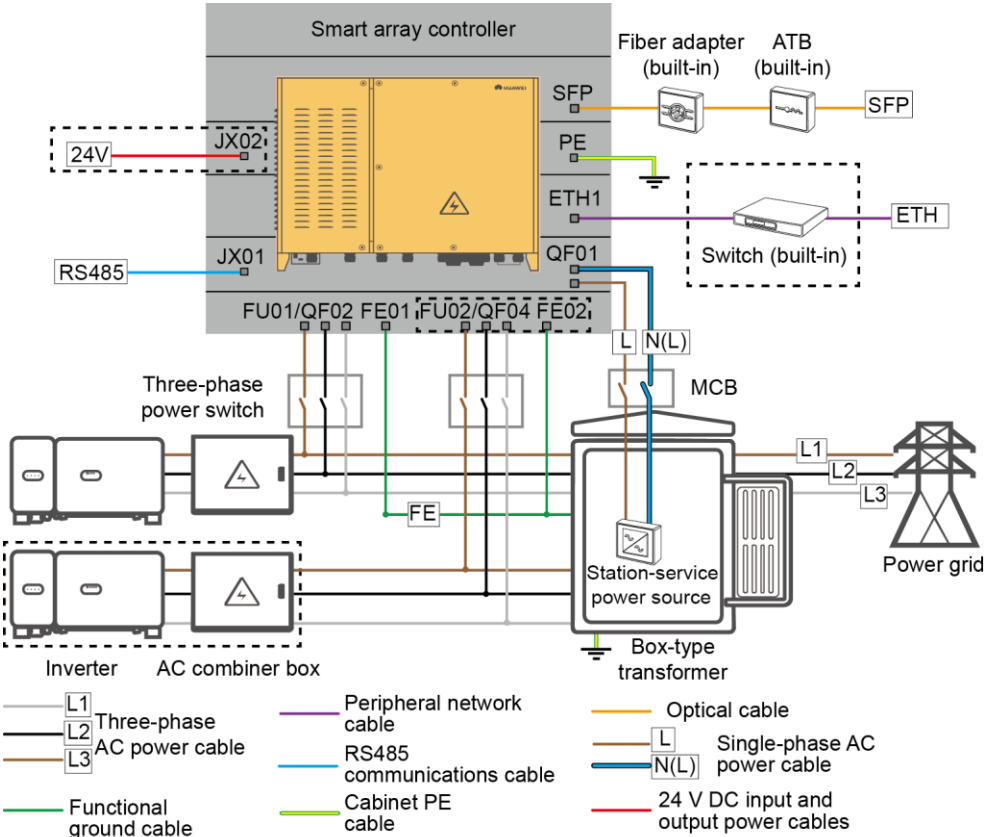


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|--|--|
| (1) Power adapter or 24 V DC power module (U01) | (3) PID01 input switch (QF03) |
| (4) PID02 input switch (QF05) | (4) Single-phase surge protective device (SPD) (F03) |
| (5) Three-phase SPD 1 (F01) | (6) Three-phase SPD 2 (F02) |
| (7) Position for the local area network (LAN) switch (SWITCH) | (8) PLC CCO |
| (9) PE bar | (10) SmartLogger2000 (SmartLogger) |
| (11) Fiber adapter (OFA01, OFA02) | (12) Position for the power over Ethernet (POE) SPD |
| (13) Position for the POE module (POE) | (14) Access terminal box (ATB) |
| (15) Single-phase input switch (QF01) | (16) Three-phase input switch 2 (Knife fuse switch FU02 or circuit breaker QF04) |
| (17) Three-phase input switch 1 (Knife fuse switch FU01 or circuit breaker QF02) | (18) 24 V DC input and output terminals (JX02) |
| (19) RS485 communications terminal (JX01) | (20) PID02 |
| (21) PID01 | (22) 24 V DC input and output switches (Output: QF06, Input: QF07) |
| (23) Functional earthing (FE) bar (FE01, FE02) | |

2 Configurations in Typical Scenarios

Fiber Ring Network




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

Location	Component		Recommended Model or Specifications	Component Source	Quantity
Smart array controller	LAN switch (optional)		UT-H605 or ES1000	Can be purchased from Huawei	1
	Fitting bag for optical ring switching	Low-speed optical module	FTLF1323P1BTR-HW		2
		Optical jumper	PLCLC5S-ST3P302-HW, LC-LC-S2-L2, 3ECA1031LCLC002-01-F, or LP-LP-2S-P-SM-002		8
Box-type transformer	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 (solution 1)	<ul style="list-style-type: none"> 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 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 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 \geq 32 A; number of poles: 3 (3 fuses for each knife fuse switch box) 		<ul style="list-style-type: none"> Scenario with a double-column transformer: 1 Scenario with a dual-split transformer: 2
MCCB (solution 2)		<ul style="list-style-type: none"> 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 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 rated voltage of the MCCB should be greater than or equal to 800 V. Let-through energy $\leq 1.26 \times 10^6$ A²s Recommended rated current: 32 A; number of poles: 3 			

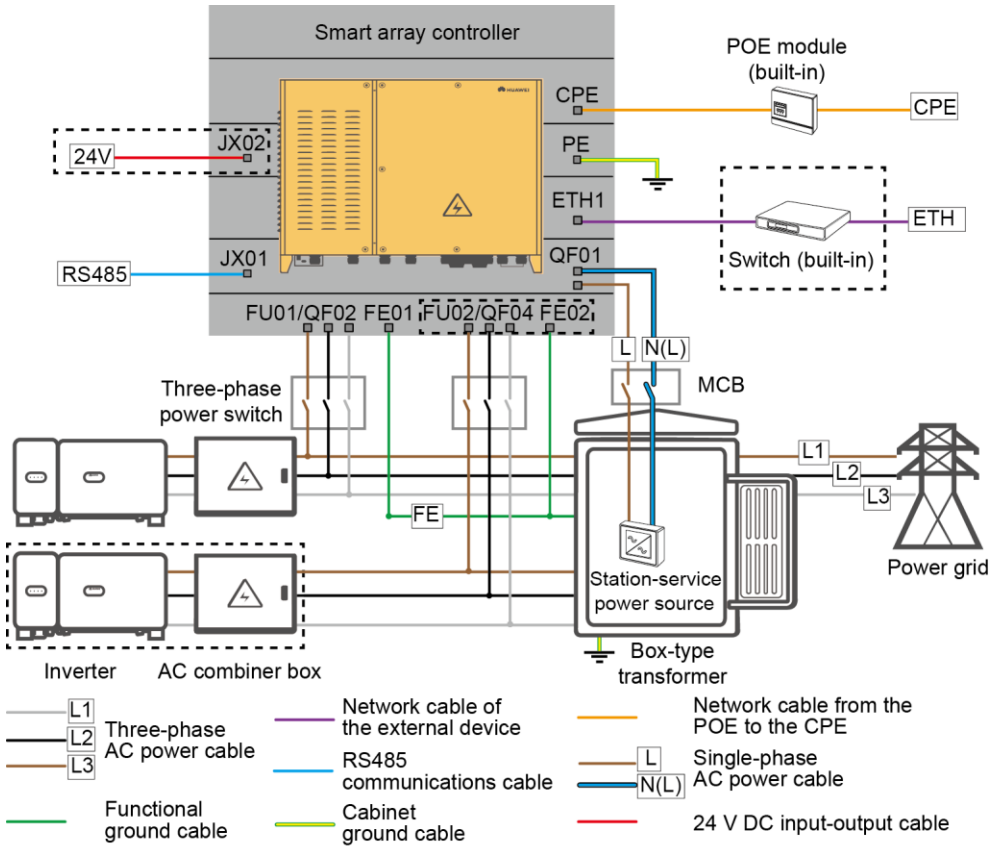
 **NOTE**

- 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 box-type transformer.
- Models of the components inside the box-type transformer are specified by the box-type transformer vendor.

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

No.	Cable	Recommended Model or Specifications	Cross-sectional Area Range of the Cable (Recommended)
1	Three-phase AC power cable	<ul style="list-style-type: none"> • Four-core (L1, L2, L3, and functional earthing) outdoor copper armored cable with three OT-M6 terminals (L1, L2, and L3) and one OT-M4 terminal (functional earthing) • 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. 	<ul style="list-style-type: none"> • 8–10 mm² (10 mm²) • 8 AWG
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
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	<ul style="list-style-type: none"> • 0.5–1 mm² (1 mm²) • 20–18 AWG (18 AWG)
4	Cabinet PE cable	Outdoor copper cable with an OT-M6 terminal	<ul style="list-style-type: none"> • 6–16 mm² (16 mm²) • 10–6 AWG (6 AWG)
5	Optical cable	Four-core or eight-core single-mode armored optical cable with a transmission wavelength of 1310 nm and an outer diameter less than or equal to 18 mm (0.71 in.)	N/A
6	Single-phase AC power cable	<ul style="list-style-type: none"> • Common connection: one two-core outdoor copper armored cable • Connection through a tube: two single-core outdoor copper cables • Operating voltage to the ground \geq 300 V 	<ul style="list-style-type: none"> • 4–6 mm² (4 mm²) • 12–10 AWG (12 AWG)
7	24 V DC input and output power cables	<ul style="list-style-type: none"> • Common connection: one two-core outdoor copper armored cable • Connection through a tube: two single-core outdoor copper cables • Operating voltage to the ground \geq 300 V 	<ul style="list-style-type: none"> • 2.5–4 mm² (2.5 mm²) • 14–12 AWG (14 AWG)

4G LTE Network



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

Location	Component		Recommended Model or Specifications	Component Source	Quantity
Smart array controller	LAN switch (optional)		UT-H605 or ES1000	Can be purchased from Huawei	1
	Fitting bags for the POE module and customer-premises equipment (CPE)	POE module	N/A		1
Outside the smart array controller and box-type transformer	CPE		N/A		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)	<ul style="list-style-type: none"> 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 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 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) 		<ul style="list-style-type: none"> Scenario with a double-column transformer: 1 Scenario with a dual-split transformer: 2
MCCB (solution 2)		<ul style="list-style-type: none"> 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 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 rated voltage of the MCCB should be greater than or equal to 800 V. Let-through energy $\leq 1.26 \times 10^6$ A²s Recommended rated current: 32 A; number of poles: 3 			



NOTE

- 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 box-type transformer.
- Models of the components inside the box-type transformer are specified by the box-type transformer vendor.

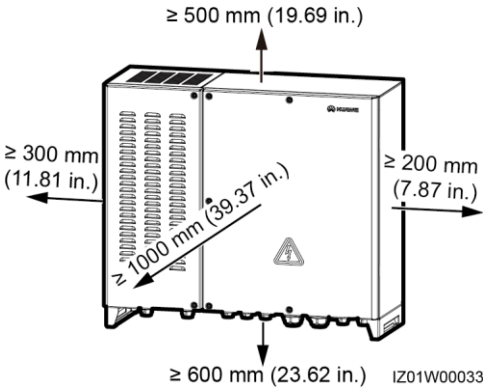
The following table describes the cables to be prepared by yourself in the 4G LTE scenario.

No.	Cable	Recommended Model or Specifications	Cross-sectional Area Range of the Cable (Recommended)
1	Three-phase AC power cable	<ul style="list-style-type: none"> • Four-core (L1, L2, L3, and functional earthing) outdoor copper armored cable with three OT-M6 terminals (L1, L2, and L3) and one OT-M4 terminal (functional earthing) • 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. 	<ul style="list-style-type: none"> • 8–10 mm² (10 mm²) • 8 AWG
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
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	<ul style="list-style-type: none"> • 0.5–1 mm² (1 mm²) • 20–18 AWG (18 AWG)
4	Cabinet PE cable	Outdoor copper armored cable with an OT-M6 terminal	<ul style="list-style-type: none"> • 6–16 mm² (16 mm²) • 10–6 AWG (6 AWG)
5	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
6	Single-phase AC power cable	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • 4–6 mm² (4 mm²) • 12–10 AWG (12 AWG)
7	24 V DC input and output power cables	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • 2.5–4 mm² (2.5 mm²) • 14–12 AWG (14 AWG)

3 Installing the Cabinet

3.1 Preparations

Installation Space



Bolts

NOTE

- When the cabinet is installed on a wall, you need to prepare M12 x 60 stainless steel exploded expansion bolts.
- If the cabinet is installed on a support or a pole, use the M12 x 40 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

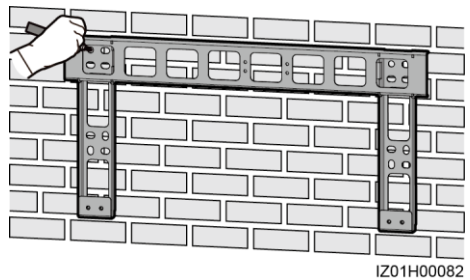
⚠ DANGER

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

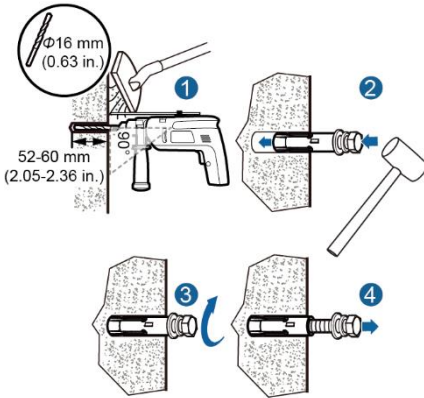
NOTICE

- 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 hole distances. If the holes are inaccurately positioned, drill holes again.
- Level the head of the expansion sleeve with the concrete wall after removing the bolt, spring washer, and flat washer. Otherwise, the mounting bracket will not be securely installed on the concrete wall.

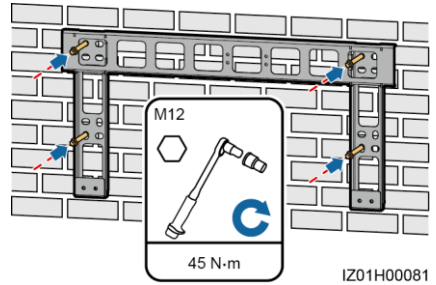
1. Mark hole positions.



2. Install expansion bolts.



3. Secure the mounting bracket.



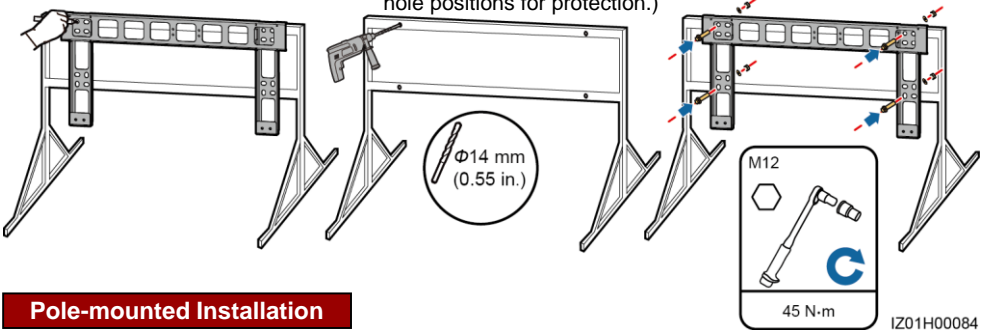
Support-mounted Installation

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1. Mark hole positions.

2. Drill holes. (You are advised to apply anti-rust paint on the hole positions for protection.)

3. Secure the mounting bracket.



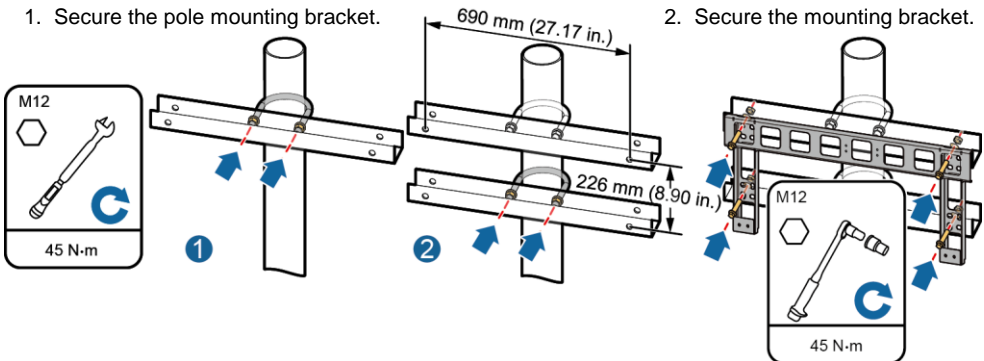
Pole-mounted Installation

NOTE

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

1. Secure the pole mounting bracket.

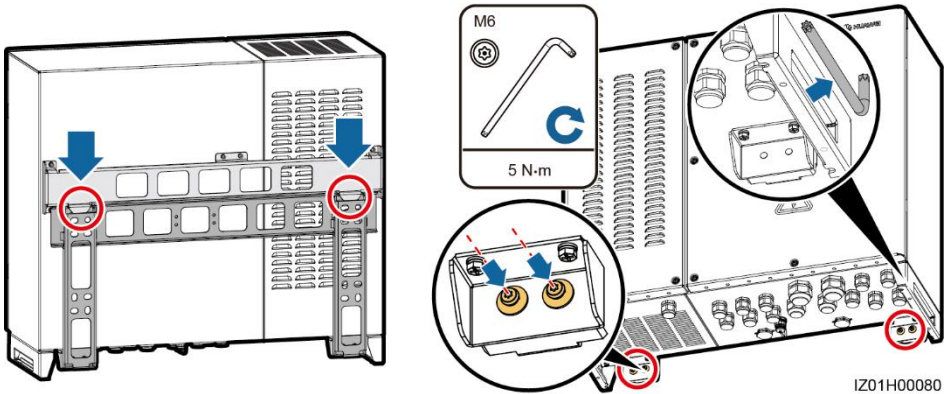
2. Secure the mounting bracket.



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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.

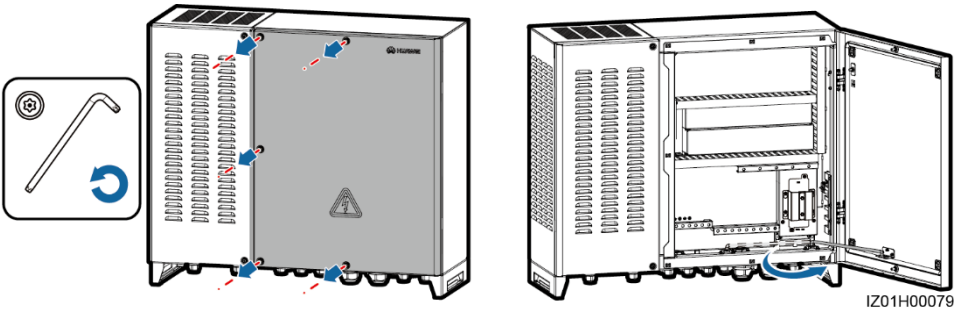


4 Opening the Main Cabinet Door

⚠ WARNING

- Before opening the main cabinet door, turn off all upstream switches for the smart array controller to power off the smart array 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 door.
2. Open the main cabinet door and install the support bar.



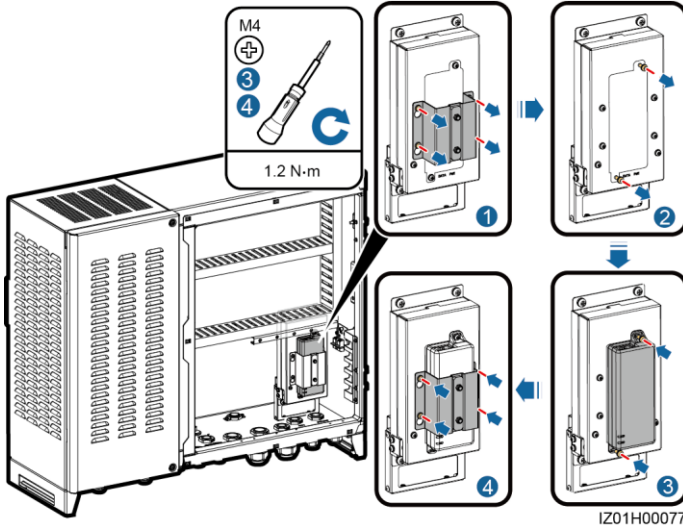
5 Installing Components

📖 NOTE

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

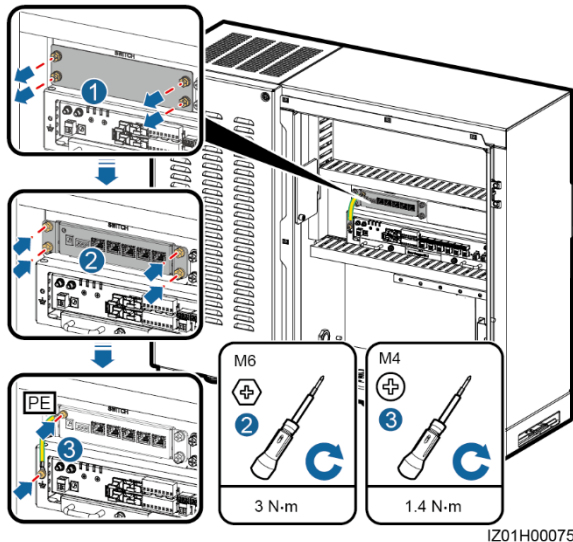
5.1 Installing the POE Module

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 Installing the LAN Switch

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



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.

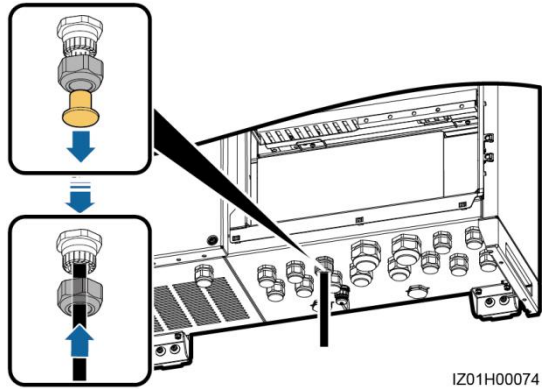
NOTE

- To prevent poor cable connection due to overstress caused by ground subsidence, it is recommended that the cable be bent 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.
- 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, ensure that the appropriate cable is available.

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

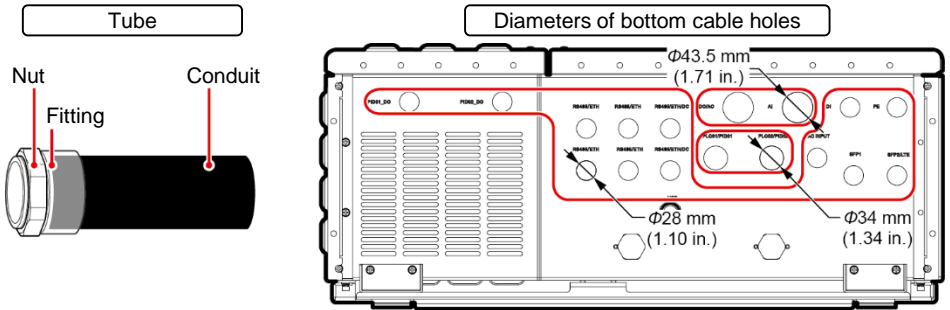


Connection Through a Tube

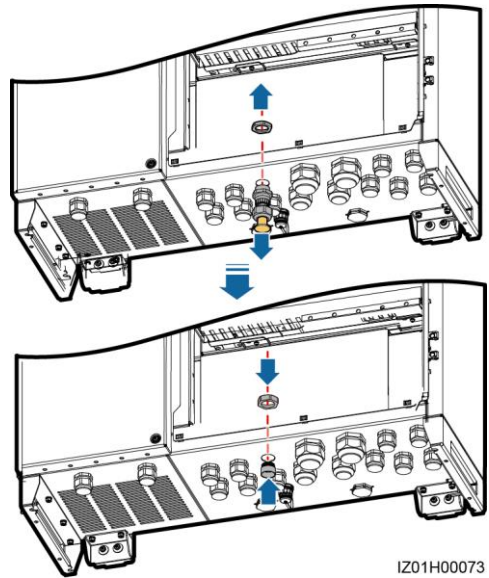
If you choose connection through a tube, ensure that the appropriate cable and tube are available.

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.



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 delivered with the tube.
3. Route the cable through the tube conduit and then 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.



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6.2 Preparing Cables

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

NOTICE

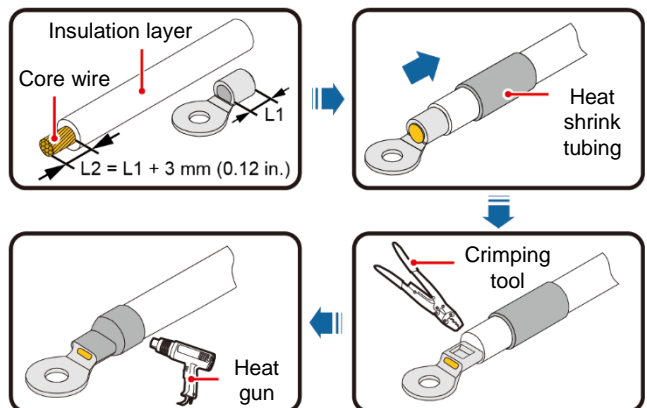
You can connect a peripheral cable to the smart array controller in common mode or through a tube.

- 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 shrink tubing or PVC insulation tape. The right figure uses heat shrink tubing as an example.
- When using the heat gun, protect devices from being scorched.



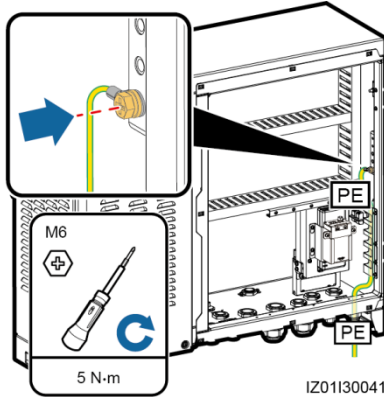
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6.4 Connecting the PE Cable

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 box-type transformer.
- 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.



6.5 Connecting Communications Cables for the Fiber Ring Network

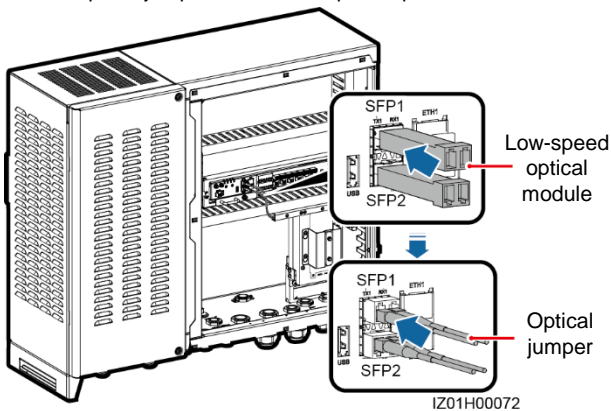
Prepare the fitting bag for optical ring switching which contains the low-speed optical module and optical jumper.

1. Insert the low-speed 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.

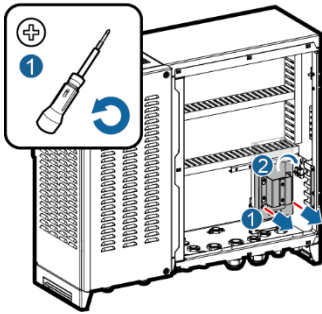
NOTICE

Pay attention to the directions of the 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.

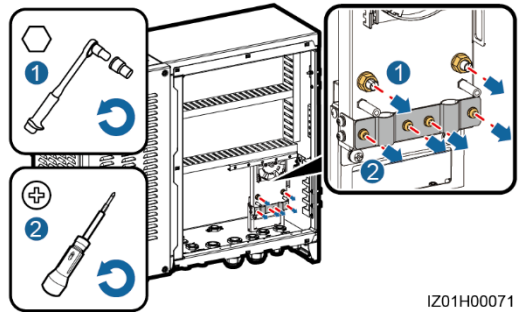
2. Connect factory-installed optical jumpers to the low-speed optical modules.



3. Remove the ATB cover.



4. Remove the optical cable fastener.

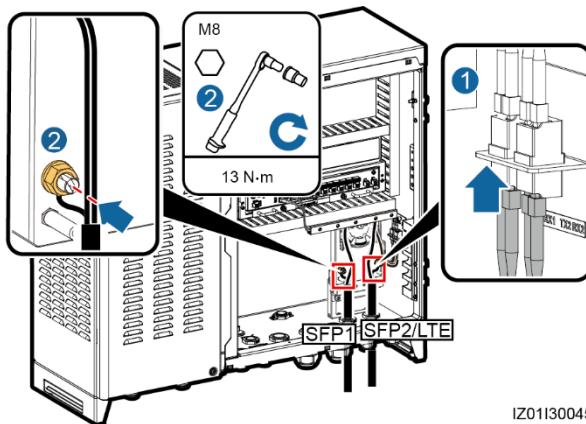


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NOTICE

- 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.

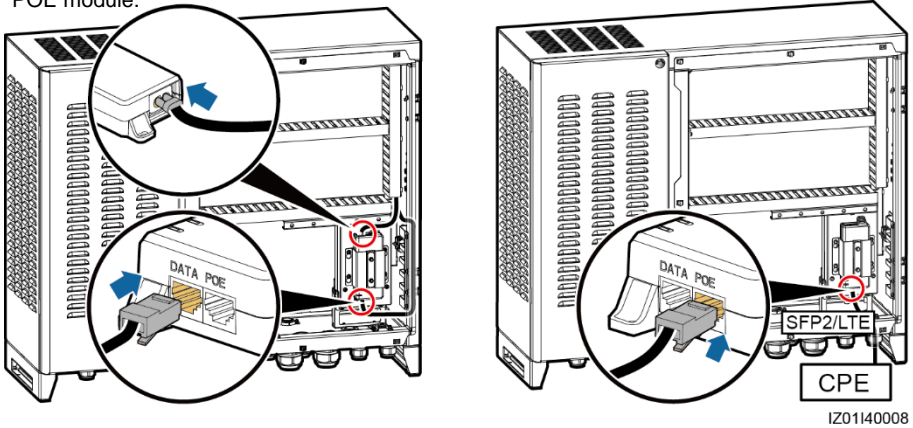
5. Connect one end of the optical jumper to the fiber adapter.
6. Route the other end of the optical jumper through the cable hole on the side of the ATB, and then connect the cable to the ATB.
7. Connect the peripheral optical cable to the ATB, splice the optical cable and the optical jumper, and then 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.



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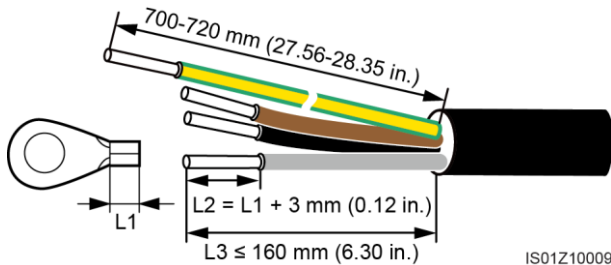
6.6 Connecting the 4G LTE Cable

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.



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

- For the smart array controller that houses one PID module, connect the three-phase AC power cable to the QF02 switch, and the functional earthing cable to the FE01 port on the functional earthing bar.
 - For the smart array controller that houses two PID modules, connect the three-phase AC power cable of the first route to the QF02 switch, and the corresponding functional earthing cable to the FE01 port on the functional earthing bar. Connect the three-phase AC power cable of the second route to the QF04 switch, and the corresponding functional earthing cable to the FE02 port on the functional earthing bar.
 - This section describes how to connect three-phase AC power cables for the smart array controller that houses two PID modules. For details about how to connect a three-phase AC power cable for the smart array controller that houses one PID module, refer to the way of connecting the three-phase AC power cable of the first route.
1. Prepare a cable.

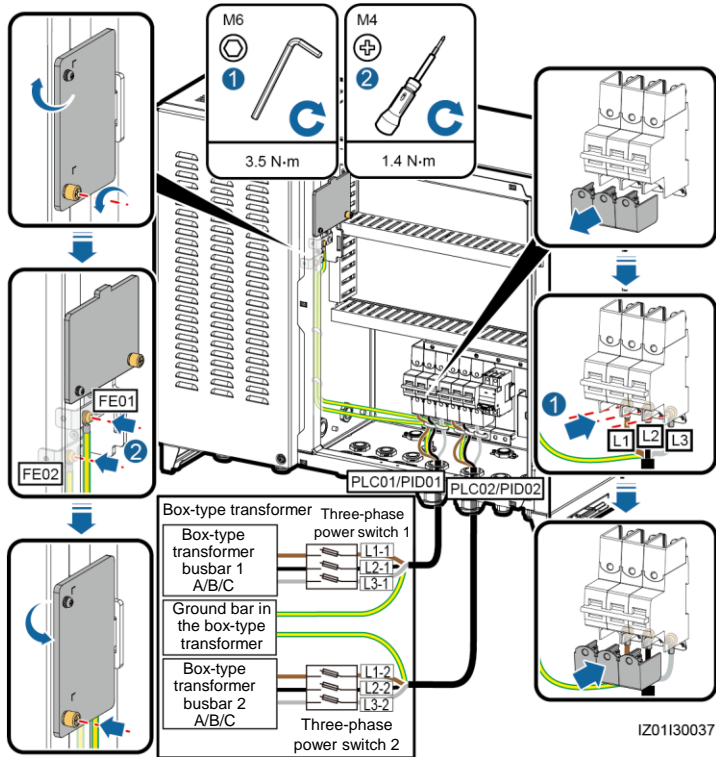


2. Crimp an OT terminal.
3. Connect the L1, L2, and L3 cables to the three-phase input switch. Connect the functional earthing cable to the functional earthing bar.

NOTICE

- Connect the L1-1, L2-1, and L3-1 cables from the QF02 switch respectively to ports A, B, and C on the 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 the box-type transformer busbar 2 over a three-phase power switch.
- Connect the functional earthing cable for the PID module to the ground bar in the box-type transformer.
- Ensure that the L1, L2, and L3 cables are connected in correct phase sequence.
- Do not mix up the cable to the FE01 port with the cable to the FE02 port.

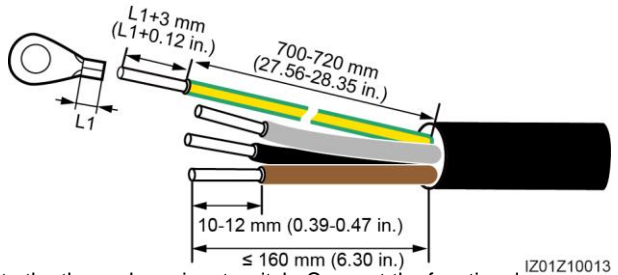
4. Bind the cable.



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

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

1. Prepare a cable.



2. Crimp an OT terminal.

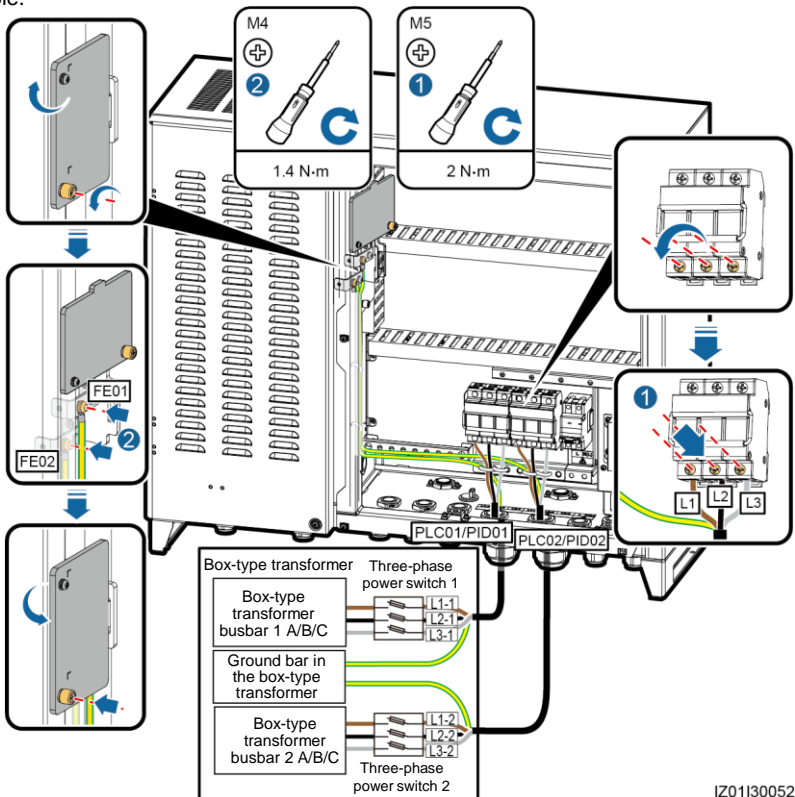
3. Connect the L1, L2, and L3 cables to the three-phase input switch. Connect the functional earthing cable to the functional earthing bar.

IZ01Z10013

NOTICE

- Connect the L1-1, L2-1, and L3-1 cables from the FU01 switch respectively to ports A, B, and C on the box-type transformer busbar 1 over a three-phase power switch.
- Connect the L1-2, L2-2, and L3-2 cables from the FU02 switch respectively to ports A, B, and C on the box-type transformer busbar 2 over a three-phase power switch.
- Connect the functional earthing cable for the PID module to the ground bar in the box-type transformer.
- Ensure that the L1, L2, and L3 cables 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.



IZ0130052

6.9 Connecting the Peripheral RS485 Communications Cable

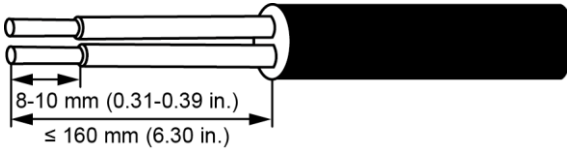
Connect peripheral RS485 communications cables to JX01. All RS485 communications cables are connected in the same way. This section describes how to connect two RS485 communications cables.

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

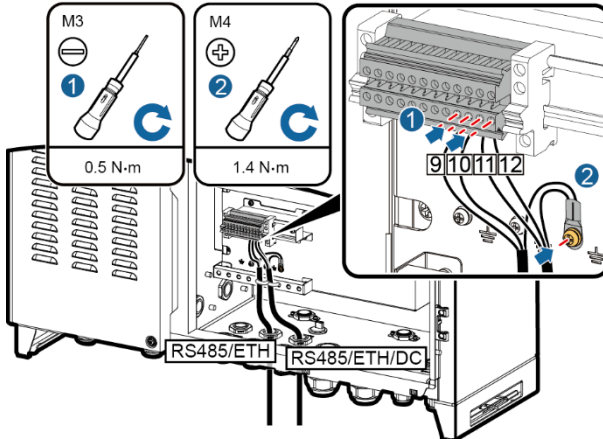
- Do not connect a peripheral RS485 communications cable to the RS485-1 port (ports 1 and 2 on the JX01), because the PID module communications cable has connected to this port.
- For the smart array controller that supports the access of two PLC routes, do not connect a peripheral RS485 communications 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.

1. Prepare a communications cable.



IZ01Z10003

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



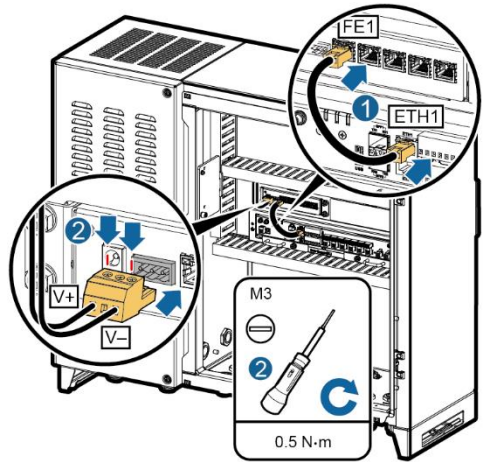
IZ01I30039

6.10 Connecting the LAN Switch Cable

1. Connect the FE1 port on the LAN switch to the ETH1 port on the SmartLogger using the network cable delivered with the LAN switch.
2. Connect the factory-installed power cable to the LAN switch using the wiring terminal delivered with 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.

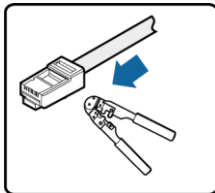
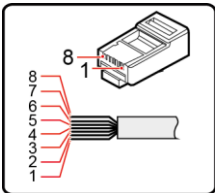


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6.11 Connecting the Peripheral Network Cable

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.

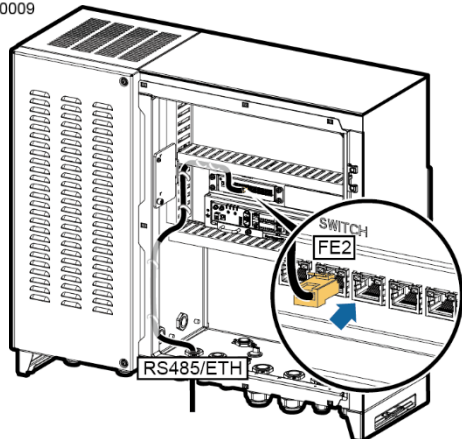
1. Prepare a network cable.



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

IS01Z00009

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 LAN switch.
4. Bind the network cable.

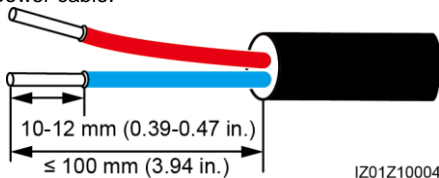


IZ01I30042

6.12 Connecting the 24 V DC Output Power Cable

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 DC output power cable.

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



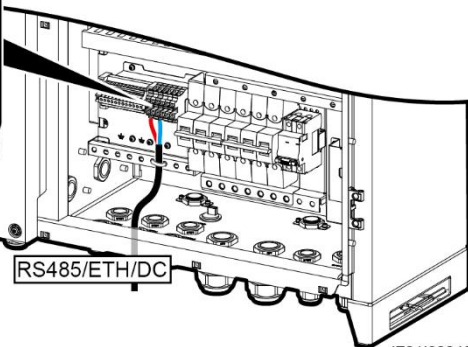
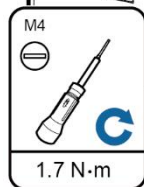
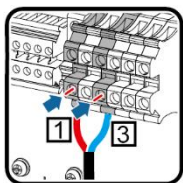
IZ01Z10004

1. Prepare a cable.
2. Connect the 24 V DC output power cable to the JX02 terminal block.

NOTICE

Do not connect the cable reversely.

3. Bind the cable.

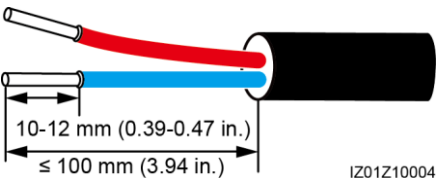


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6.13 Connecting the 24 V DC Input Power Cable

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

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



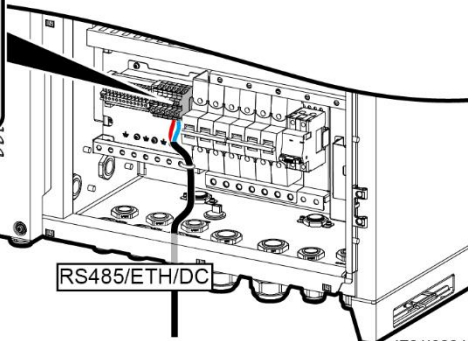
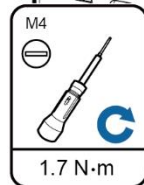
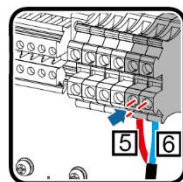
IZ01Z10004

1. Prepare a cable.
2. Connect the 24 V DC input power cable to the JX02 terminal block.

NOTICE

Do not connect the cable reversely.

3. Bind the cable.



IZ01I30049

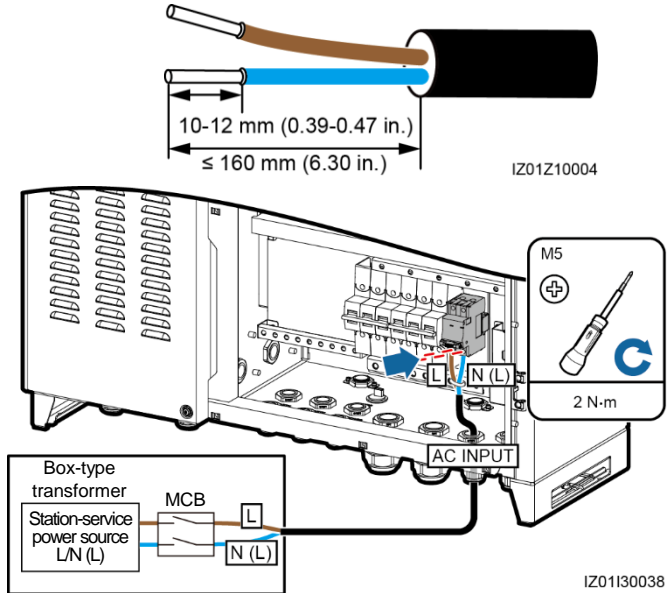
6.14 Connecting the Single-Phase AC Power Cable

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

NOTICE

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

3. Bind the cable.



7 Verifying the Installation

1. The cabinet and all components are installed properly.	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>
2. All upstream switches for the cabinet and all switches inside the cabinet are OFF.	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>
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.	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>
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.	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>
5. The locking caps on all waterproof connectors in use at the bottom of the cabinet are tightened, or the tubes (if used) are secured to the cabinet. All waterproof connectors or tubes 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 <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>
6. The cover on the USB port is tightened, and the USB cable inside the cabinet is secure.	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>
7. The cabinet interior is clean, without dust, dirt, or foreign matter.	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>
8. The paint on the cabinet exterior is intact. Repaint immediately the part where paint has fallen off to prevent corrosion.	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>

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 PLC/PID module operating voltage range.

1. Turn on the single-phase power switch that controls the power supply from the remote box-type transformer to the smart array controller.
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 houses one PID module, turn on the appropriate three-phase power switch.
 - If the smart array controller houses two PID modules, turn on the appropriate two 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 QF01 single-phase input switch on the smart array controller.
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.
6. Turn on the PID switch on the smart array controller.
 - If the smart array controller houses one PID module, turn on the QF03 PID switch.
 - If the smart array controller houses two PID modules, turn on the QF03 and QF05 PID switches.
7. Turn on the three-phase input switch on the smart array controller.
 - If the smart array controller houses one PID module, turn on the QF02 (or FU01) three-phase input switch.
 - If the smart array controller houses two PID modules, turn on the QF02 and QF04 (or FU01 and FU02) three-phase input switches.



NOTE

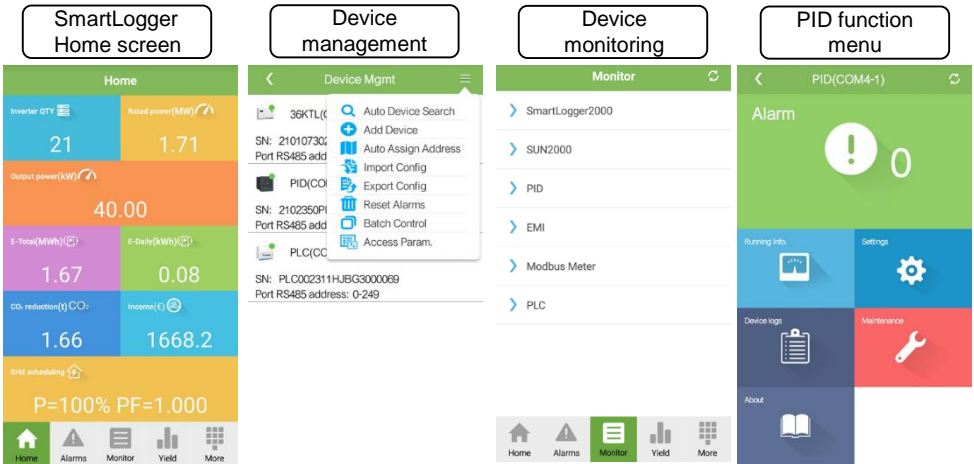
- Commission the PID module after powering it on. For the detailed commissioning procedure, see chapter 9 "Commissioning the SmartPID2000."
- For details about the status of the energized SmartLogger2000 and PLC CCO as well as the commissioning procedure, see the *SmartLogger2000 User Manual*. When the smart array controller communicates with the inverter over PLC, log in to the embedded WebUI of the SmartLogger2000, choose **Monitoring > MBUS (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**. (The WebUI screenshots for SmartLogger V200R002C20SPC119 are used as an example.)
- The LAN switch can be directly put into use without commissioning after power-on.

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 chapter describes how to commission the SmartPID2000 by connecting the SUN2000 app to the SmartLogger. For other commissioning methods, see the *SmartPID2000 User Manual*.

- The app has connected to the SmartLogger over Bluetooth. Log in as **Advanced User** and access the **Home** screen of the SmartLogger. For detailed operations, see the appropriate *SmartLogger2000 Quick Guide*.
- The following uses SUN2000 app V200R001C20SPC010 and SmartPID2000 V100R001C00 as an example.
- 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.



The figure displays four screenshots of the SmartLogger WebUI interface:

- SmartLogger Home screen:** Shows various power and energy metrics. Inverter Qty: 21, Invert power (MW): 1.71, Output power (kW): 40.00, E-total (MWh): 1.67, E-daily (kWh): 0.08, CO₂ reduction (t CO₂): 1.66, Income (C): 1668.2, and P=100% PF=1.000.
- Device management:** Shows a list of devices with details for 36KTL (SN: 21010730, Port RS485 add) and PID(CO) (SN: 2102359PI, Port RS485 add). A menu is open showing options: Auto Device Search, Add Device, Auto Assign Address, Import Config, Export Config, Reset Alarms, Batch Control, and Access Param.
- Device monitoring:** Shows a list of monitored devices: SmartLogger2000, SUN2000, PID, EMI, Modbus Meter, and PLC.
- PID function menu:** Shows the PID(COM4-1) configuration screen with an Alarm indicator (0) and buttons for Running Info, Settings, Device logs, Maintenance, and About.

Running parameter descriptions

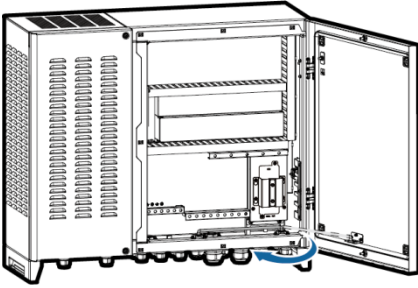
Parameter	Function	Value	Description
PV module compensation voltage direction	Specifies the offset direction of the PID module.	PV– positive offset	<ul style="list-style-type: none"> • PV– positive offset refers to raising the voltage between PV– and ground to above 0 V through voltage compensation. • 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	<ul style="list-style-type: none"> • PV+ negative offset refers to lowering the voltage between PV+ and 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. <p>(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.)</p>
Maximum system DC-to-ground withstand voltage	Specifies the voltages between the PV side and the ground and between the AC side and the ground in normal mode.	500–1500 V	Specifies the lower threshold of the maximum voltage range between the SUN2000 DC side (including the SUN2000, PV module, cable, SPD, and switch) and the ground. (The default value is 1000 V. For the 1500 V SUN2000, the recommended value is 1500 V.)
Maximum output voltage	Specifies the highest step-up voltage of the PID module in normal or commissioning mode.	0–800 V	<ul style="list-style-type: none"> • For the 1000 V/1100 V SUN2000, the value ranges from 0 V to 550 V. The parameter value indicates the maximum DC step-up voltage between PV and the ground. • For the 1500 V SUN2000, the value ranges from 0 V to 800 V. The parameter value indicates the maximum DC step-up voltage between PV and the ground. <p>(The default value is 500 V. For the 1500 V SUN2000, the recommended value is 800 V.)</p>

NOTE

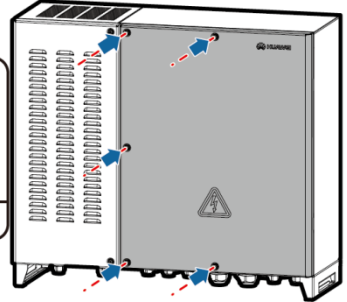
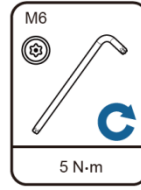
If a smart array controller with two PID modules is used in the scenario with a dual-split transformer and the SUN2000s connecting to one PID module have the same configurations as the SUN2000s connecting to the other PID module, you are advised to set the operating parameters of both PID modules to the same.

10 Closing the Cabinet Door

1. Install the support bar.



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



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NOTE

- If the screws used for securing the cabinet door are lost, use the security torx screws in the fitting bag.
- If the floating nuts used for securing the cabinet door are lost, use the idle floating nuts on the cabinet.

11 FAQ

11.1 How Should I Power Off the System Before Maintenance?

⚠ DANGER

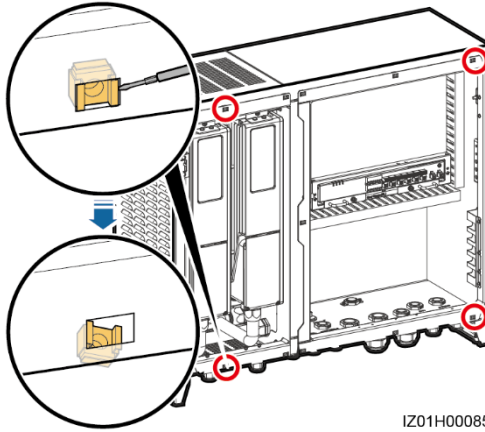
Put on insulation gloves before powering off the system.

1. Turn off the single-phase power switch that controls the power supply from the remote box-type transformer to the smart array controller.
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 houses one PID module, turn off the appropriate three-phase power switch.
 - If the smart array controller houses two PID modules, turn off the appropriate two three-phase power switches.
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.
4. Turn off the QF01 single-phase input switch on 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 QF02 (or FU01) three-phase input switch.
 - If the smart array controller houses two PID modules, turn off the QF02 and QF04 (or FU01 and FU02) three-phase input switches.
6. Turn off the PID switch on the smart array controller.
 - If the smart array controller houses one PID module, turn off the QF03 PID switch.
 - If the smart array controller houses two PID modules, turn off the QF03 and QF05 PID switches.

11.2 How Should 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 Should I Obtain Spare Floating Nuts?



IZ01H00085

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