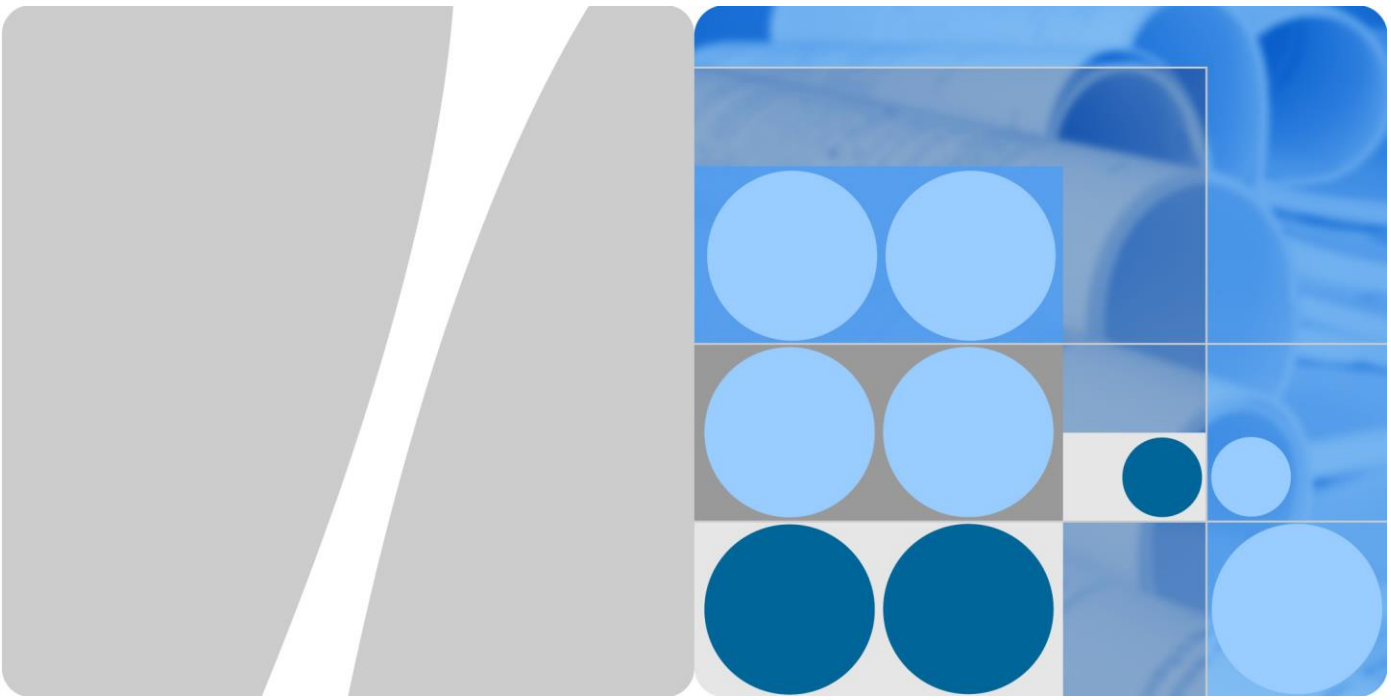
31010TFT



PID Module

User Manual

Issue 05

Date 2019-07-03

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About This Document

Purpose

This document describes the PID01 (hereafter called PID module) in terms of its installation, electrical connections, parameter settings, maintenance, and troubleshooting. Readers should be familiar with the PID module features, functions, and safety precautions provided in this document before installing and operating the PID module.

NOTE

If the PID module is used in Huawei SmartACU2000 Smart Array Controller (smart array controller for short), it has been installed and cables have been connected to it. For details, see the *SmartACU2000-C-A Smart Array Controller User Manual*. For other installation scenarios, see the descriptions in this manual.

Keep the hard copy of this document in good condition for future reference. You can also download the latest manual from http://e.huawei.com.

Figures provided in this document are for reference only.

Intended Audience

This document is intended for photovoltaic (PV) power station personnel and qualified electrical technicians.

Symbol Conventions

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

Symbol	Description
	Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

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Symbol	Description
	Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.
	Indicates a potentially hazardous situation which, if not avoided, could result in equipment damage, data loss, performance deterioration, or unanticipated results. **Notice** is used to address practices not related to personal injury.
	Calls attention to important information, best practices and tips. **NOTE** is used to address information not related to personal injury, equipment damage, or environment deterioration.

Change History

Changes between document issues are cumulative. Therefore, the latest document issue contains all updates made in previous issues.

Issue 05 (2019-07-03)

Updated A Changing the RS485 Address。

Issue 04 (2018-07-26)

This issue is the fourth official release.

Issue 03 (2017-11-10)

Updated 2.3 Networking.

Updated 6.3.1 Commissioning over the WebUI.

Updated 6.3.2 Commissioning over the LCD.

Added 6.3.3 Commissioning over the SUN2000 App.

Added A.3 Changing the RS485 Address over the SUN2000 App.

Added B Connecting the SmartLogger to the IMD.

Issue 02 (2016-09-30)

Updated 2.3 Networking.

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Updated 9 Technical Specifications.

Issue 01 (2016-06-03)

This issue is the first official release.

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Contents

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1 Safety Precautions

Personnel Requirements

- Only qualified and trained electrical technicians are allowed to install and operate the PID module.
- Operators should understand the components and functioning of a grid-tied PV power system, and they should be familiar with relevant local standards.

Label Protection

- Do not tamper with any signs on the PID module enclosure because these signs contain important information about safe operation.
- Do not remove or damage the nameplate on the PID module enclosure because it contains important product information.

Installation

NOTICE

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

- Ensure that the PID module is not connected to a power supply and not powered on before starting installation.
- Install the PID module in an environment with good ventilation to ensure efficient and long-term system performance.
- Ensure that the PID module heat sinks are free from blockage.
- Do not touch any component inside the enclosure except the wiring terminals at the bottom.

Operation

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NOTICE

Perform operations in strict accordance with safety precautions specified in this manual and other relevant documents.

Follow local laws and regulations when operating the device.

Maintenance and Replacement

DANGER

Before maintaining or replacing the PID module, ensure that:

- The circuit breaker on the PID module AC side is turned off in a SUN2000 scenario.
- The circuit breakers on the PID module DC and AC sides are turned off in a SUN8000 scenario.

- A faulty PID module requires overall maintenance. Contact the dealer if the PID module is faulty.
- Maintain the PID module with sufficient knowledge of this document, proper tools, and testing equipment.
- Wear electrostatic discharge (ESD) gloves and comply with ESD protection regulations during maintenance work.

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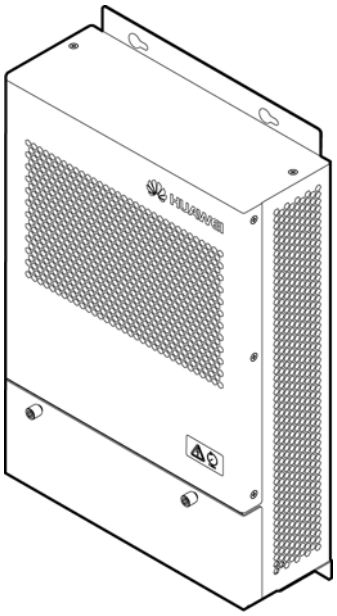
2 Overview

2.1 Introduction

Appearance

Figure 2-1 shows the PID module (model PID01) appearance.

Figure 2-1 PID module appearance



Functions

The PID module is used to prevent PV module output power degradation due to the potential induced degradation (PID) effect in a PV power system.

The PID module must work with Huawei inverters, the SmartLogger (data collector), PID inductor (inductor for short), and other devices. It can automatically switch the output mode based on the PV voltage and inverter status, and shut down for protection if a fault occurs.

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Benefits

The PID module features centralized compensation, easy installation and commissioning, automatic output control, and convenient maintenance.

- Centralized compensation

  The PID module can centrally manage up to 80 inverters and simultaneously compensate for all PV modules connected to these inverters.
- Easy installation and commissioning
  - The PID module can be easily installed and wired. The PID module in the communication box has been installed and wired.
  - A built-in commissioning mode facilitates onsite problem location.
- Automatic output control

  The PID module can automatically switch between N/PE and PV/PE compensation modes based on the inverter running status.
  - During daytime when inverters are feeding power to the power grid, the PID module switches to the grid virtual midpoint injection (N/PE compensation) mode to control the negative PV voltage to the ground and prevent the PID effect.
  - At night when inverters are standby, the PID module switches to the PV negative terminal injection (PV/PE compensation) mode to compensate for the negative PV voltage to the ground.

NOTE
The PV/PE compensation mode applies only to the SUN8000 scenario.

- Easy maintenance
  - On the built-in web user interface (WebUI) and liquid crystal display (LCD) of the Huawei SmartLogger, you can view the PID module running information, active alarms, and performance data, upgrade the PID module firmware, export data and logs, and configure PID module running parameters.
  - Using the USB interface of Huawei SmartLogger, you can upgrade the PID module firmware and export logs.
  - Using Huawei NetEco and FusionSolar, you can upgrade the PID module firmware and export data and logs.

2.2 Working Principle

The PID module is a component of a SUN2000 or SUN8000 PV array with the power of less than or equal to 2 MW. It is usually installed in a smart array controller, and can also be installed in other devices such as a box-type transformer when necessary.

The input and output ends of the PID module are respectively connected to the three-phase AC power (A, B, and C), inductor midpoint (N), and functional ground (PE).

SUN2000 Networking Scenario

A PV array that includes the SUN2000 (string inverter) can use the N/PE compensation mode to centrally compensate PV modules in the PV array.

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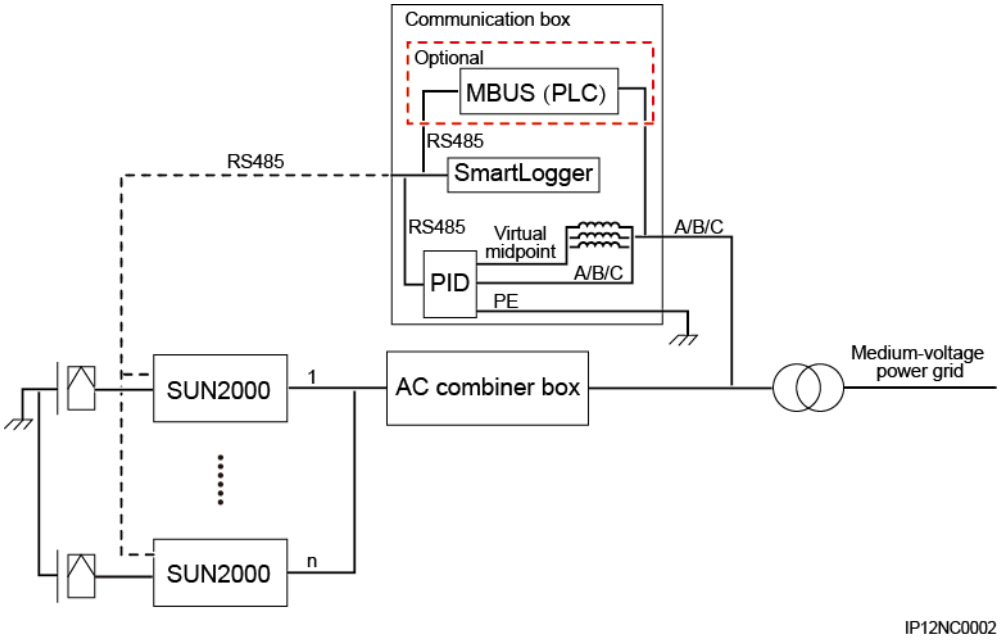
Figure 2-2 Working principle in the SUN2000 networking scenario



NOTE

In the SUN2000 network scenario, if the SUN2000 is equipped with a MBUS (PLC), the SmartLogger can communicate with the SUN2000 over RS485 or MBUS (PLC). If they communicate over RS485, no AC power cable is required. If they communicate over MBUS (PLC), no RS485 communications cable is required in between.

The details are as follows:

1. If the PID module is used in a SUN2000, the PV array system must be a three-phase, three-wire system. If the neutral wire is connected, there is a risk of high voltage. Therefore, the neutral wire must not be connected to the SUN2000, AC combiner box, or AC power distribution cabinet. If the low-voltage side of the isolation transformer uses star connection, the neutral wire must not be connected or grounded, and isolation protection measures should be taken.
2. The PID module used in a SUN2000 does not support the PV/PE compensation mode.

SUN8000 Networking Scenario

A PV array that includes the SUN8000 (central inverter) can use the N/PE and PV/PE compensation modes to centrally compensate PV modules in the PV array.

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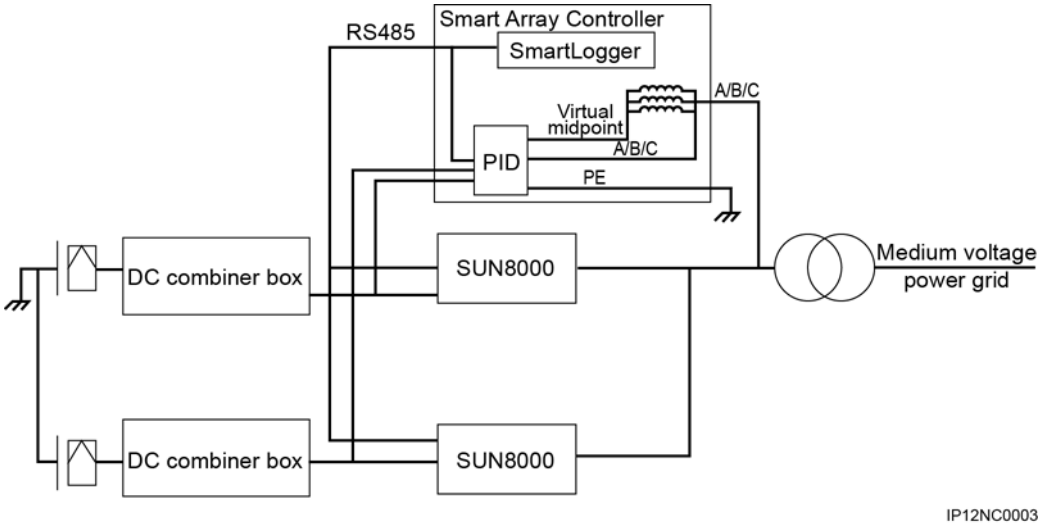
Figure 2-3 Working principle in the SUN8000 networking scenario



2.3 Networking

System Requirements

- System isolation requirement: The PID module must be used for system isolation. The AC and DC sides of the inverter are not grounded. Therefore, when the PID module is applied to a low-voltage power grid, an isolation transformer must be used for isolation.
- Array requirement: If the PID module is a component of a SUN2000 or SUN8000 PV array with the power of less than or equal to 2 MW, PV modules used in the array must be of the same type (P or N).
- Functional grounding requirement: The PID module output ground cable (functional grounding) connects to the ground bar on the low-voltage side of the box-type transformer for reliable grounding.
- DC power cable requirement: The DC power cable is dedicated for PV modules. The operating voltage to the ground is at least 1000 V DC. PV1-F cables are recommended.
- AC power cable requirement 1: The operating voltage of the AC power cable to the ground is at least 600 V AC. AC power cables include those from the inverter to the AC combiner box, to the box-type transformer, then to the smart array controller, those inside the AC combiner box, and those on the low-voltage side of the step-up transformer or the inverter side of the isolation transformer in the box-type transformer (low-voltage side of the box-type transformer for short).
- AC power cable requirement 2: The AC power cable from the low-voltage side of the box-type transformer to the smart array controller (or PID module) is at least 3 meters, and its cross-sectional area is 4 mm^2.
- AC power cable connection requirement: The PID module must be applied to a three-phase, three-wire SUN2000 system. If the neutral wire is connected, there is a danger of high voltages. Therefore, the neutral wire must not be connected to the inverter, AC combiner box, or AC PDC. If the low-voltage side of the isolation transformer uses star connection, the neutral wire must not be connected or grounded, and isolation protection measures should be taken.

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- AC combiner box SPD requirements: The continuous operating voltage from the SPD to the ground (L-PE) is greater than or equal to 750 V AC. No SPD with a gas discharge tube is allowed. The nominal discharge current (8/20μs) is greater than or equal to 20 kA. The maximum discharge current (8/20μs) is greater than or equal to 40 kA. If 3+0 cable connection is used, the SPD with the required specifications can be directly used, and the recommended SPD model is M3L850-40II-3. If 3+1 cable connection is used, the recommended SPD model is DG M TNS 385 FM.
- Requirements for the SPD on the low-voltage side of the box-type transformer: The continuous operating voltage from the SPD to the ground (L-PE) is greater than or equal to 750 V AC. No SPD with a gas discharge tube is allowed. The nominal discharge current (8/20μs) is greater than or equal to 30 kA. The maximum discharge current (8/20μs) is greater than or equal to 60 kA. If 3+0 cable connection is used, the SPD with the required specifications can be directly used. If 3+1 cable connection is used, the recommended SPD model is DS103S-750 or DBM 1 760 FM.
- Knife switch requirement: Reserve one knife switch for the busbar on the low-voltage side of the box-type transformer. This power branch connects to the smart array controller (or PID module) and delivers input voltage for it. This power branch must be connected to the busbar on the low-voltage side of the box-type transformer, and cannot be connected to the isolation transformer embedded in the box-type transformer.

NOTE

If the SmartLogger1000 is used as the data collector and the MBUS (PLC) mode is used, the MBUS (PLC) CCO module is required. If the SmartLogger2000 with an embedded MBUS (PLC) CCO is used as the data collector and the MBUS (PLC) mode is used, no MBUS (PLC) CCO module is required.

Figure 2-4 shows the cable connections to the PID module used in the smart array controller scenario.

NOTE

If the smart array controller is upgraded, see the *SmartACU2000-C-A Smart Array Controller User Manual*.

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Figure 2-4 Cable connections (in the smart array controller scenario)

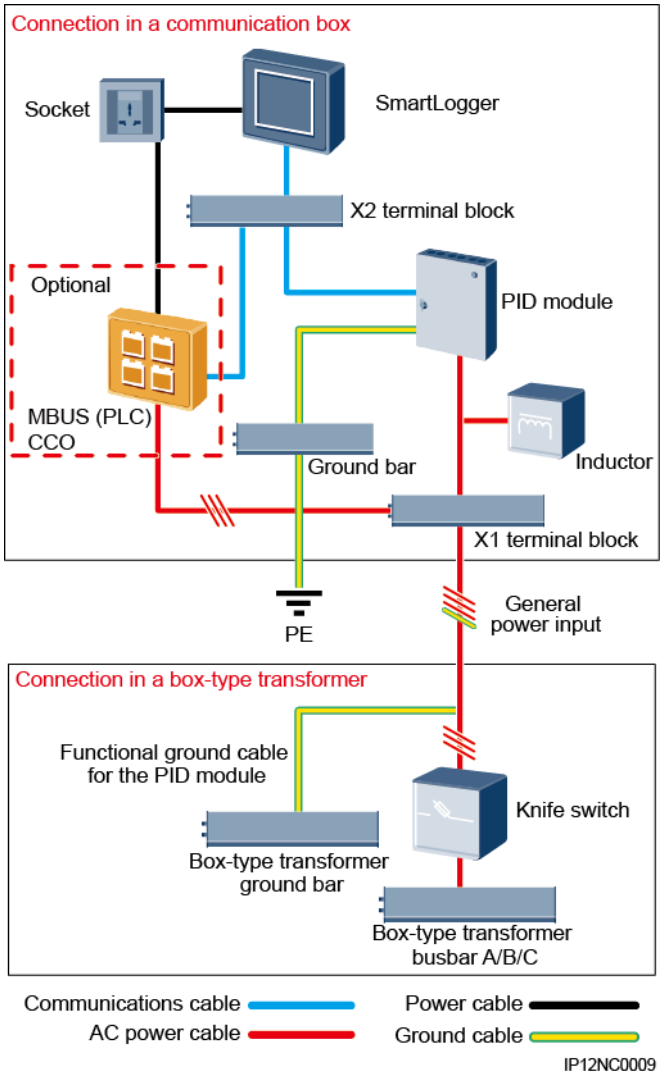

Table 2-1 describes the components to be configured in the smart array controller scenario.

Table 2-1 Components required in the smart array controller scenario

Component		Model or Specifications	Quantity
MBUS (PLC) CCO module (optional)		N/A	1 PCS
Data collector		SmartLogger2000	1 PCS
Knife switch	Fuse	Rated voltage ≥ 500 V; rated current: 6 A	3 PCS
	Knife switch box	Rated voltage ≥ 500 V; rated current ≥ 6 A; number of poles: 3P	1 PCS

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Figure 2-5 shows the cable connections to the PID module used in the non-smart array controller scenario.

Figure 2-5 Cable connections (in the non-smart array controller scenario)

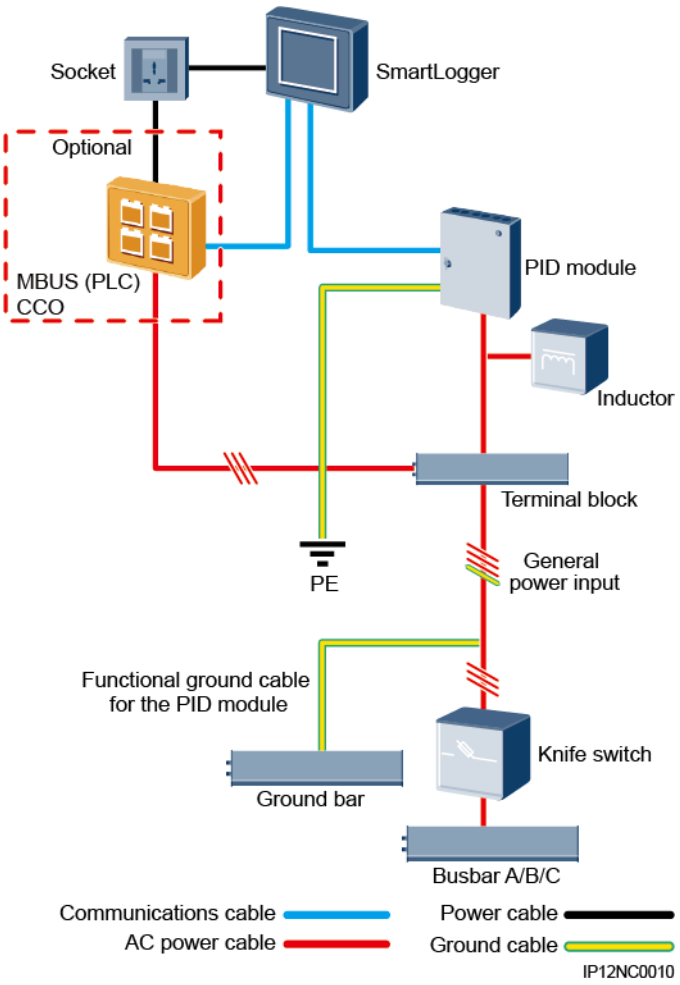

Table 2-2 describes the components to be configured in the non-smart array controller scenario.

Table 2-2 Components required in the non-smart array controller scenario

Component		Model or Specifications	Quantity
MBUS (PLC) CCO module (optional)		N/A	1 PCS
Data collector		SmartLogger	1 PCS
Knife switch	Fuse	Rated voltage ≥ 500 V; rated current: 6 A	3 PCS
	Knife switch box	Rated voltage ≥ 500 V; rated current ≥ 6 A; number of poles: 3P	1 PCS

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Component	Model or Specifications	Quantity
Socket	Matches the 220 V power adapter	2 PCS
Terminal block	Rated voltage ≥ 500 V; rated current ≥ 32 A; number of poles ≥ 10 **NOTE** The number of poles on the terminal block depends on the cable connections to the plant.	1 PCS

2.4 Label Conventions

Table 2-3 describes the label on the enclosure and its meaning.

Table 2-3 Label description

Label	Name	Meaning
	Delay discharge	• The PID module operates at high voltage. • Residual voltage in the PID module takes 1 minute to fully discharge after the AC input is disconnected.

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3 Equipment Installation

3.1 Checking Before Installation

Outer Packing Materials

Before unpacking the PID module, check the outer packing materials for damage, such as holes and cracks. If any damage is found, do not unpack the PID module and contact the dealer as soon as possible.

Deliverables

After unpacking the PID module, check whether the deliverables are intact and complete. If any damage is found or any component is missing, contact the dealer.

Figure 3-1 lists the product and accessories that need to be included in the packing case.

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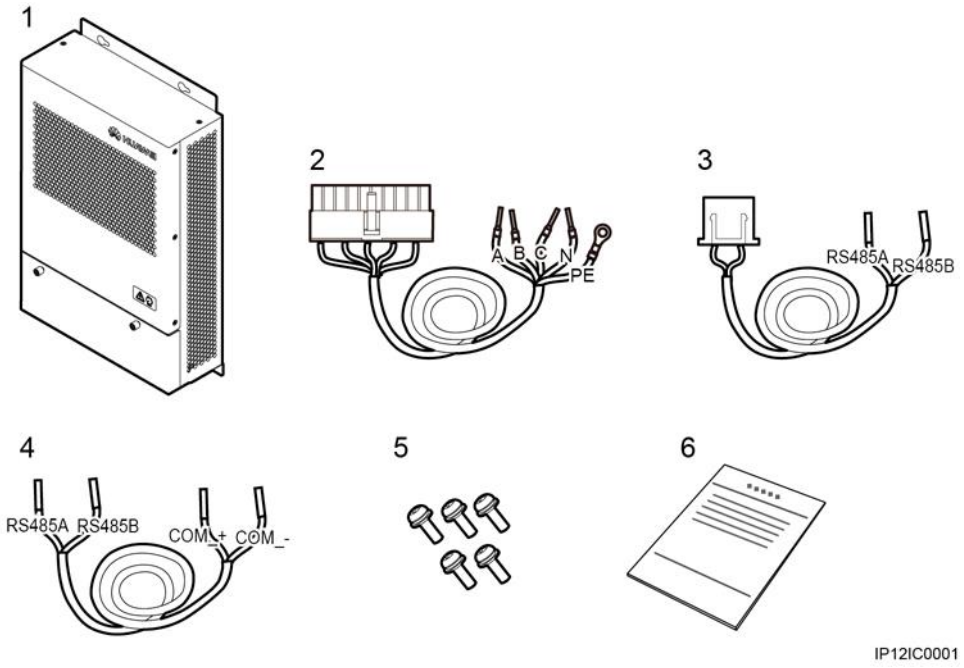
Figure 3-1 Product and accessories



No.	Name	Quantity	Remarks
1	PID module	1 PCS	N/A
2	PID module input and output power cables	1 PCS	The total length is 1.2 meters.
3	RS485 communications cable 1	1 PCS	The cable connects the PID module and the terminal block. The total length is 1.8 meters.
4	RS485 communications cable 2	1 PCS	The cable connects the terminal block and the SmartLogger. The total length is 1.8 meters.
5	M4x10 screw assembly	5 PCS	Reserved.
6	Documentation	1 PCS	User manual, delivery inspection report, packing list, and certificate of compliance.

NOTE

- The PID module must work with the inductor which is delivered separately.
- If you need to install a PID module on guide rails, purchase installation components in advance. Each PID module corresponds to one set of installation components. One set of installation components comprises four clips, one rear panel, 14 M4x10 screw assemblies, and four M4x20 screw assemblies.

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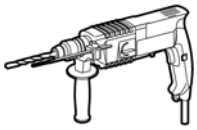
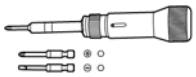
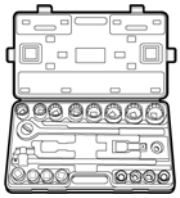
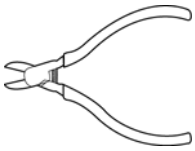
3.2 Tools

Prepare the tools required for installation and cable connections.

Tool	Model	Function
Hammer drill 	With a drill bit of Φ14 mm	Drills holes.
Adjustable wrench 	With an open end ≥ 32 mm	Tightens expansion bolts.
Torque screwdriver 	• Hexagon socket head: 5 mm • Flat head: M6	• Hexagon socket head: Secures screws to mechanical parts. • Flat head: Removes plastic screws from lifting holes.
Flat-head screwdriver 	3 x 100 • Head width: 3-3.5 mm • Pole length (excluding the handle): at least 100 mm • Large handle	• Tightens or loosens screws when installing AC power cables. • Removes AC connectors from the SUN2000.
Socket wrench 	With an open end of 10 mm	Tightens ground bolts.
Diagonal pliers 	N/A	Cut cable ties.

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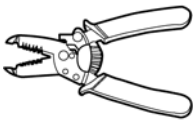
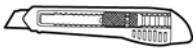
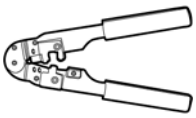
Tool	Model	Function
Wire stripper 	Applies to cables with cross-sectional areas of 4 mm^2, 6 mm^2, and 10 mm^2	Peels off cable jackets.
Rubber mallet 	N/A	Hammers expansion bolts into holes.
Guarded blade utility knife 	N/A	Removes packaging.
Cable cutter 	Applies to cables with cross-sectional areas of 4 mm^2, 6 mm^2, and 10 mm^2	Cuts power cables.
Crimping tools 	Model: UTXTC0005 or H4TC0003 Manufacturer: Amphenol	Crimps metal contacts when preparing DC input power cables. **NOTE** • UTXTC0005 (Amphenol) is used to crimp metal cold forming contacts. • H4TC0003 (Amphenol) is used to crimp metal stamping forming contacts.
RJ45 crimping tool 	N/A	Prepares RJ45 connectors for communications cables.

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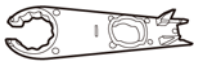
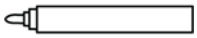
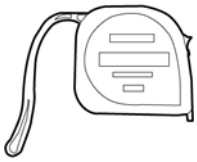
Tool	Model	Function
Removal tool 	H4TW0001 Manufacturer: Amphenol	Removes DC connectors from the SUN2000.
Vacuum cleaner 	N/A	Cleans up dust after drilling holes.
Multimeter 	N/A	Measures voltage.
Marker 	Diameter: maximum 10 mm	Marks signs.
Measuring tape 	N/A	Measures distances.
Level 	N/A	Checks the levelness of the rear panel.

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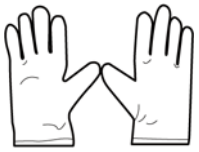
Tool	Model	Function
ESD gloves 	N/A	Protect operators when drilling holes.
Safety goggles 	N/A	Protect operators when drilling holes.
Anti-dust respirator 	N/A	Protects operators from dust inhalation when drilling holes.

3.3 Determining the Installation Position

The requirements described in this section apply to both wall mounting and support mounting. This section uses wall-mounting the SUN2000 as an example.

Comply with the following requirements when determining an appropriate position to install the SUN2000:

DANGER

- Do not install the SUN2000 on flammable building materials.
- Do not install the SUN2000 in an area that stores flammable or explosive materials.

CAUTION

Do not install the SUN2000 in a place where personnel are likely to come into contact with its enclosure and heat sinks. These parts are extremely hot during operation.

- The SUN2000 is protected to IP65 and can be installed indoors or outdoors.
- The installation method and position must be appropriate for the weight and dimensions of the SUN2000. For details, see Technical Specifications.

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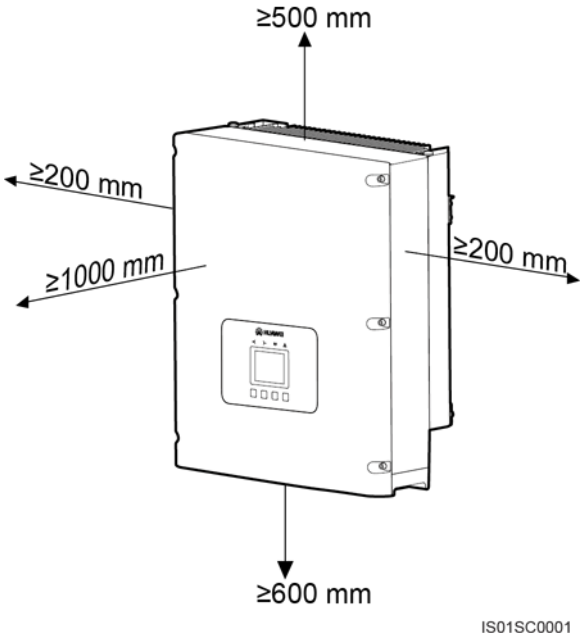
- The wall must be solid enough to support the weight of the SUN2000.
- The cable connection area must face downwards.
- Install the SUN2000 either vertically or with a backward lean of a maximum of 15 degrees.
- The SUN2000 must be installed at an appropriate height for ease of observation and operation of the monitoring panel.
- The SUN2000 must be installed in a well ventilated environment to ensure good heat dissipation. When installed under direct sunlight, performance de-rate may be initiated due to additional temperature rise.
- Do not install the SUN2000 on a wall made of gypsum boards or similar materials with weak sound insulation, to avoid noise disturbance in a residential area.
- Ensure that there are no objects within 200 mm of both sides of the SUN2000, and no objects within 500 mm, 600 mm, and 1000 mm of the top, bottom, and front, respectively (as shown in Figure 3-2). This is to ensure optimal heat dissipation and sufficient space for installation.

Figure 3-2 Minimum installation clearance



NOTICE

The minimum installation clearance shown in Figure 3-2 must be provided in any installation scenario, including wall-mounted and support-mounted scenarios.

- Multiple SUN2000s must be installed in a line if sufficient space is available. Otherwise, they must be installed in checkerboard mode as shown in Figure 3-3. The stacked installation mode shown in Figure 3-4 is not recommended. The clearance between SUN2000s must meet requirements shown in the following figures.

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Figure 3-3 Checkerboard installation mode (recommended)

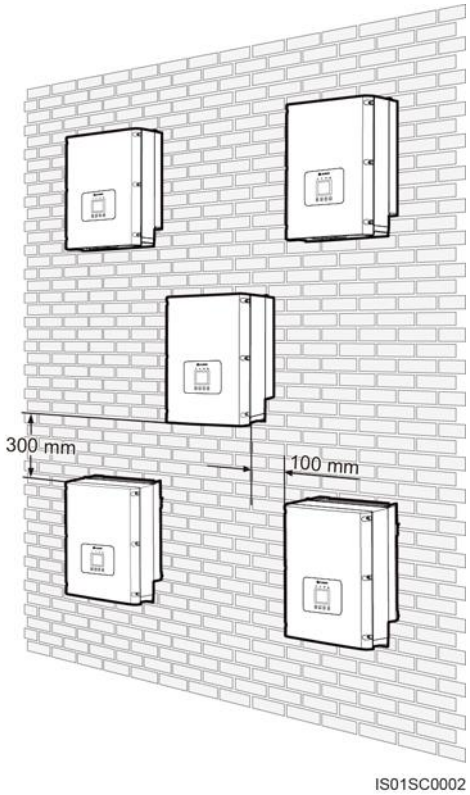

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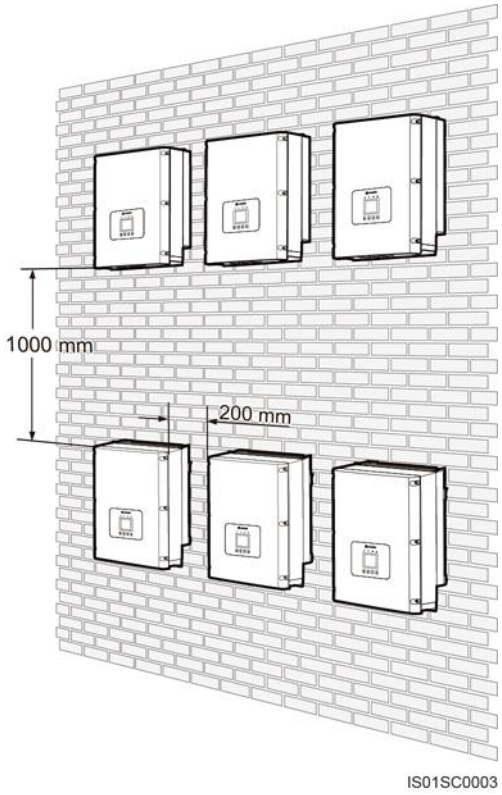
Figure 3-4 Stacked installation mode (not recommended)



NOTICE

The clearance between multiple SUN2000s must be increased to ensure proper heat dissipation when they are installed in a hot area.

3.4 Installing a PID Module

Prerequisites

If the inductor is used in the smart array controller scenario, the installation and cable connection are complete. If the inductor is used in the non-smart array controller scenario, the inductor is recommended to be installed on guide rails.

Before installing a PID module on guide rails, purchase installation components in advance. Each PID module corresponds to one set of installation components. One set of installation components comprises four clips, one rear panel, 14 M4x10 screw assemblies, and four M4x20 screw assemblies. The distance between upper and lower guide rails is 195–300 mm.

No guide rail is delivered with a PID module. If you need to install a PID module on guide rails, prepare two standard 35 mm wide guide rails. For details about the guide rail dimensions, see Figure 3-5.

NOTE

Ensure that the guide rail is long enough for securing the PID module. The recommended length is 260 mm or greater.

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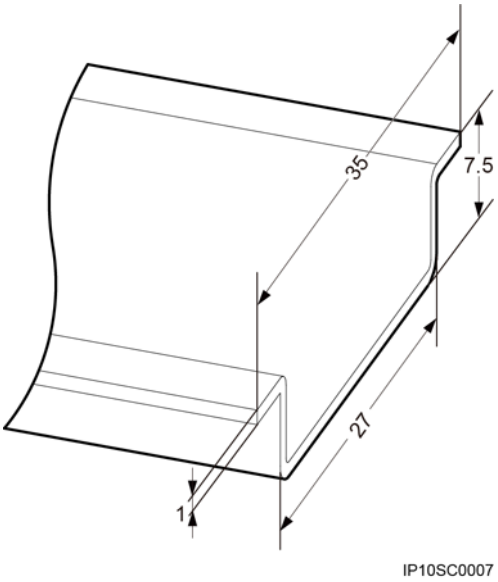
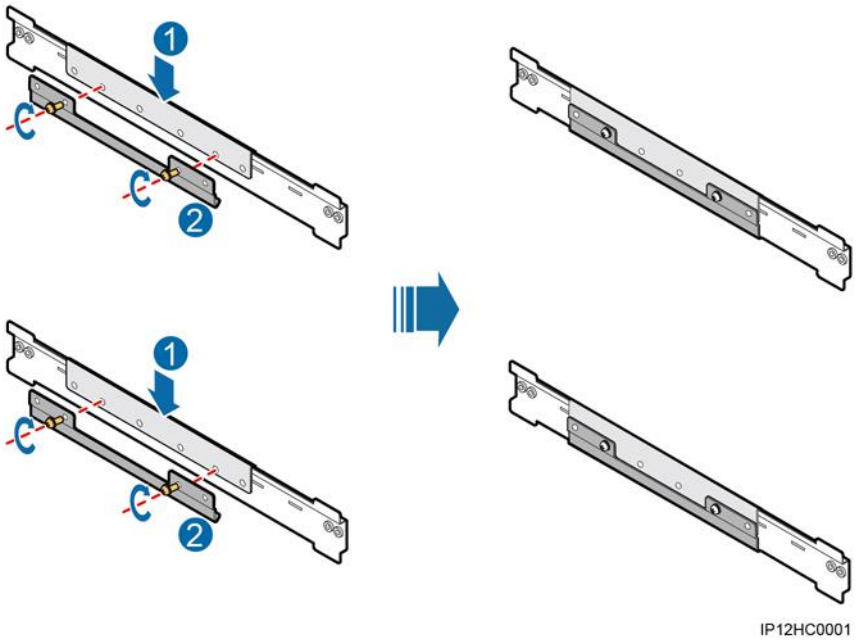
Figure 3-5 Guide rail dimensions (unit: mm)



Procedure

Step 1 Secure clips 1 and 2 respectively to the two upper and lower guide rails by tightening four M4x10 screw assemblies to a torque of 1.2 N•m, as shown in Figure 3-6.

Figure 3-6 Installing the clips



Step 2 Preinstall two M4x10 screw assemblies on the clip for the upper guide rail, and secure a rear panel by routing the screw assemblies through the cucurbit holes on the rear panel and tightening the screw assemblies to a torque of 1.2 N•m, as shown in Figure 3-7.

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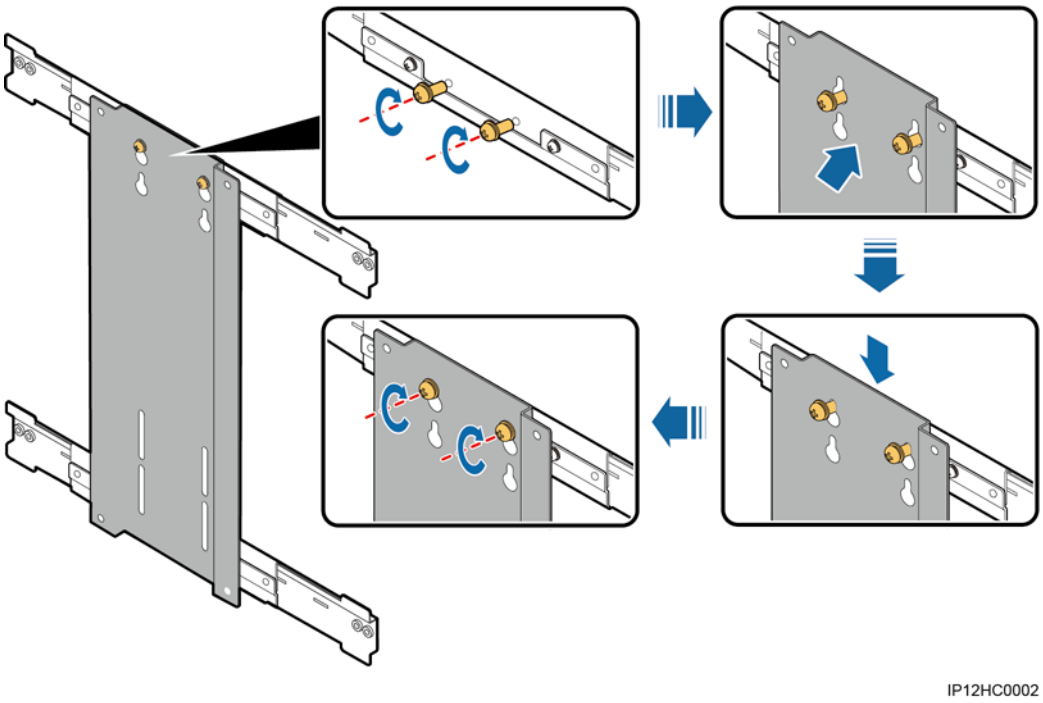
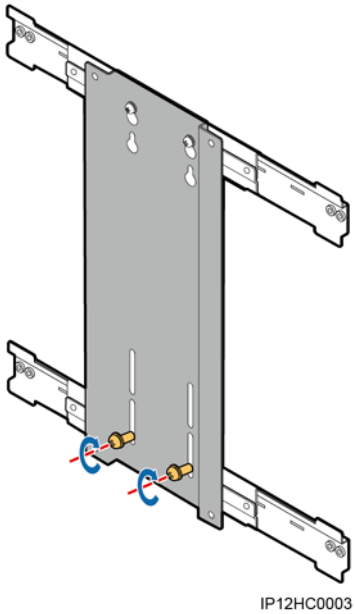
Figure 3-7 Mounting a rear panel



Step 3 Secure the rear panel to the clip for the lower guide rail by tightening two M4x10 screw assemblies to a torque of 1.2 N•m, as shown in Figure 3-8.

Figure 3-8 Securing a rear panel



Step 4 Preinstall two screw assemblies (M4x10) on the rear panel, as shown in Figure 3-9.

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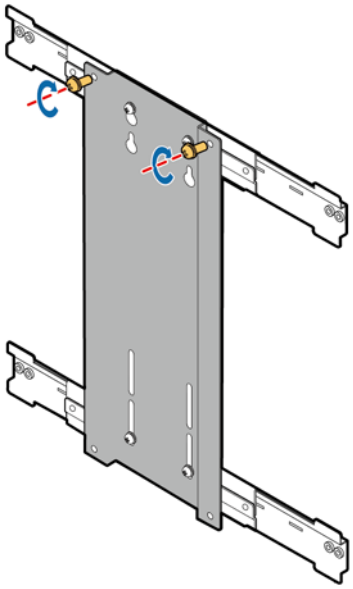
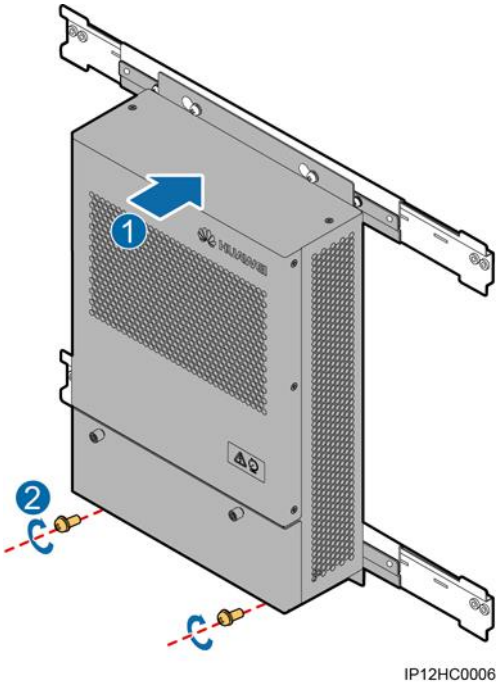
Figure 3-9 Preinstalling PID module screws



Step 5 Mount the PID module onto the screw assemblies on the upper guide rail through the cucurbit holes on the PID module, secure the PID module to the rear panel using two M4x10 screw assemblies, and tighten the two screw assemblies shown in Step 4. The tightening torque for the four screw assemblies is 1.2 N•m, as shown in Figure 3-10.

Figure 3-10 Mounting the PID module



Step 6 Tighten four M4x20 anti-slip screws to a torque of 1.2 N•m, as shown in Figure 3-11.

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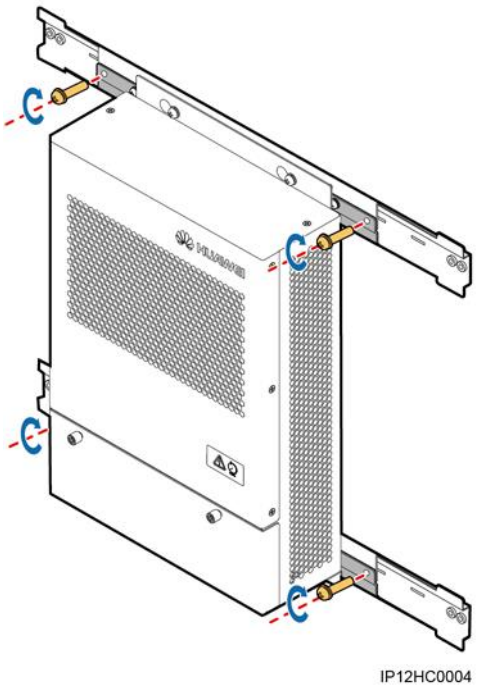
Figure 3-11 Tightening the anti-slip screws



----End

3.5 Installing a PID Inductor

Prerequisites

If the PID inductor is used in the smart array controller scenario, the installation and cable connection are complete. If the PID inductor is used in the non-smart array controller scenario, the inductor is recommended to be installed on a horizontal plane.

To install the PID inductor on a horizontal plane, prepare four M4x12 screw assemblies.

NOTICE

Ensure that the cabling distance between the PID inductor and the PID module is at most 1 meter.

Procedure

Step 1 Place the PID inductor on a horizontal plane.

Step 2 Secure the inductor by tightening four M4x12 screw assemblies to a torque of 1.2 N•m.

----End

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4 Electrical Connections

Context

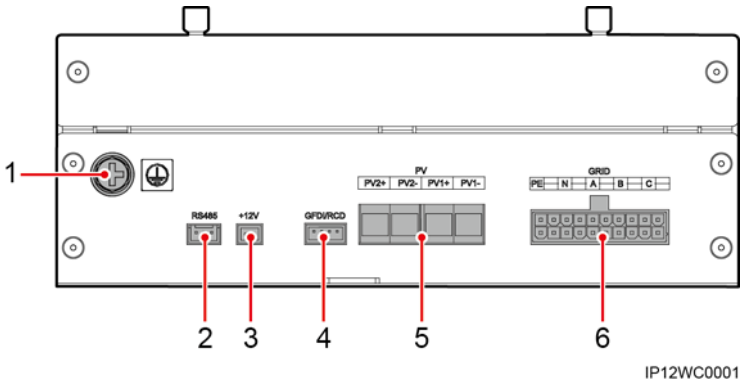
NOTICE

The cable colors shown in the electrical connection drawings provided in this chapter are for reference only. Select cables in accordance with local cable specifications (yellow-green wires are only used for grounding).

4.1 Port Description

Figure 4-1 shows the ports on the PID module.

Figure 4-1 Ports on the PID module



NOTE

The silk screens of ports 5 and 6 may be different from those in the figure because of the product change or upgrade.

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Table 4-1 PID module port description

No.	Port Name (Silk Screen)	Description
1	Protective earthing (PE) bolt	Provides ground protection.
2	RS485 port (RS485)	Communicates with the SmartLogger using the RS485 protocol. RS485A is on the right, and RS485B is on the left.
3	Reserved function port (+12V)	Reserved.
4	Reserved function port (GFDI/RCD)	Reserved.
5	PV port (PV2+, PV2–, PV1+, PV1–)	Increases the voltage of the PV module to the ground at night in the SUN8000 scenario.
6	Power grid input and PID output port (PE, N, A, B, C)	PE maps to the functional ground cable, N maps to the virtual midpoint, and A/B/C maps to the three-phase input of the power grid.

4.2 Cable Connection Description

4.2.1 Application in the SUN2000 Scenario

Figure 4-2 shows the cable connection for the PID module used in the SUN2000 scenario.

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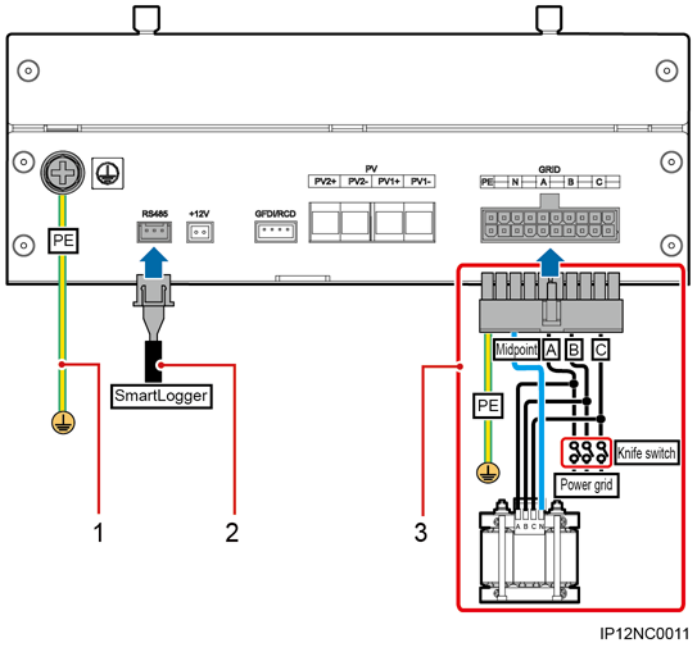
Figure 4-2 Cable connection for the SUN2000 Scenario



WARNING

The PE cable in cable 3 is the PID module output ground wire used for functional grounding. It must be connected to the ground bar on the low-voltage side of the box-type transformer for reliable grounding.

NOTICE

The inductor midpoint in cable 3 must not be connected to the N cable of the power grid or the ground.

NOTE

- The port silk screens may be different from those in Figure 4-2 because of the product change or upgrade.
- You can install a 6 A circuit breaker on the power grid where the PID module and inductor are located based on the actual power grid voltage.

Table 4-2 describes the cable specifications.

Table 4-2 Cable specifications

Cable No.	Cable Name	Cable specifications	Description
1	Ground cable	10 AWG (4 mm^2), yellow-green, meeting the UL1015 standard; OT: M6	Prepared by the customer. Ensure that the tightening torque is 4 N•m.
2	RS485 communications cable	22 AWG (0.3 mm^2), symmetrical twisted pair cable with two cores (brown and black)	Delivered with the PID module; total length: 1.8 m.

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Cable No.	Cable Name	Cable specifications	Description
3	PID module input and output cables	• A: 2 x 18 AWG (1 mm^2), yellow, meeting the UL1015 standard • B: 2 x 18 AWG (1 mm^2), green, meeting the UL1015 standard • C: 2 x 18 AWG (1 mm^2), red, meeting the UL1015 standard • N: 2 x 18 AWG (1 mm^2), blue, meeting the UL1015 standard • PE: 2 x 18 AWG (1 mm^2), yellow-green, meeting the UL1015 standard	Delivered with the PID module; total length: 1.2 m.

4.2.2 Application in the SUN8000 Scenario

Figure 4-3 shows the cable connection for the PID module used in the SUN8000 scenario.

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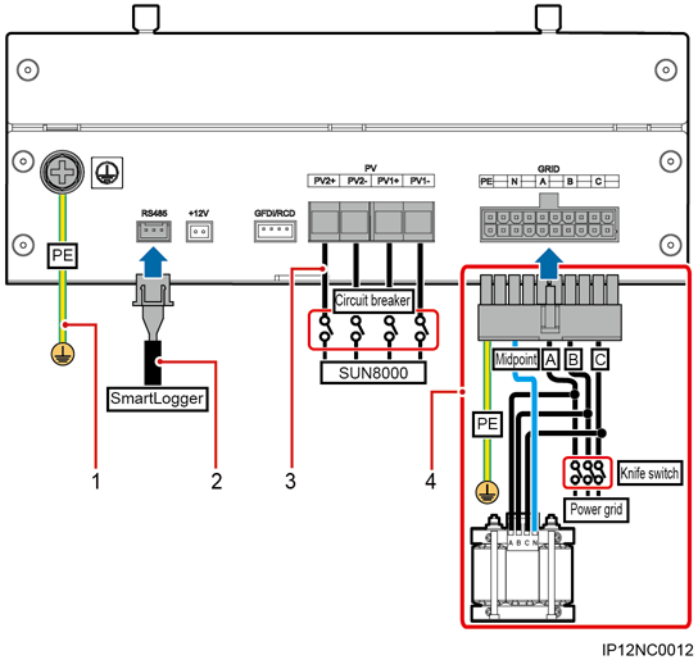
Figure 4-3 Cable connection for the SUN8000 scenario



WARNING

- A DC circuit breaker needs to be installed for cable 3 close to the PID module. It is recommended that the DC circuit breaker has a rated operating voltage of greater than or equal to 1000 V DC and rated operating current of greater than or equal to 1 A.
- The PE cable in cable 4 is the PID module output ground wire used for functional grounding. It must be connected to the ground bar on the low-voltage side of the box-type transformer for reliable grounding.

NOTICE

The inductor midpoint in cable 4 must not be connected to the N cable of the power grid or the ground.

NOTE

- The port silk screens may be different from those in Figure 4-3 because of the product change or upgrade.
- You can install a 6 A circuit breaker on the power grid where the PID module and inductor are located based on the actual power grid voltage.

Table 4-3 describes the cable specifications.

Table 4-3 Cable specifications

Cable No.	Cable Name	Cable Specifications	Description
1	Ground cable	10 AWG (4 mm^2), yellow-green, meeting the UL1015 standard; OT: M6	Prepared by the customer. Ensure that the tightening torque is 4 N·m.

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Cable No.	Cable Name	Cable Specifications	Description
2	RS485 communications cable	22 AWG (0.3 mm^2), symmetrical twisted pair cable with two cores (brown and black)	Delivered with the PID module; total length: 1.8 m.
3	PV1+/–, PV2+/–input cables	• PV1+: 10 AWG (4 mm^2), red, meeting the UL1015 standard • PV1–: 10 AWG (4 mm^2), blue, meeting the UL1015 standard • PV2+: 10 AWG (4 mm^2), red, meeting the UL1015 standard • PV2–: 10 AWG (4 mm^2), blue, meeting the UL1015 standard	Prepared by the customer.
4	PID module input and output cables	• A: 2 x 18 AWG (1 mm^2), yellow, meeting the UL1015 standard • B: 2 x 18 AWG (1 mm^2), green, meeting the UL1015 standard • C: 2 x 18 AWG (1 mm^2), red, meeting the UL1015 standard • N: 2 x 18 AWG (1 mm^2), blue, meeting the UL1015 standard • PE: 2 x 18 AWG (1 mm^2), yellow-green, meeting the UL1015 standard	Delivered with the PID module; total length: 1.2 m.

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5 Parameter Settings

5.1 Setting Communications Parameters

Communications parameters to be set for the PID module include the baud rate and build-out resistor.

Context

DANGER

Ensure that the circuit breaker on the PID module AC side is turned off before setting communications parameters.

In the PID module, communications parameters are set using DIP switches.

Figure 5-1 shows the DIP switches.

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Figure 5-1 DIP switches

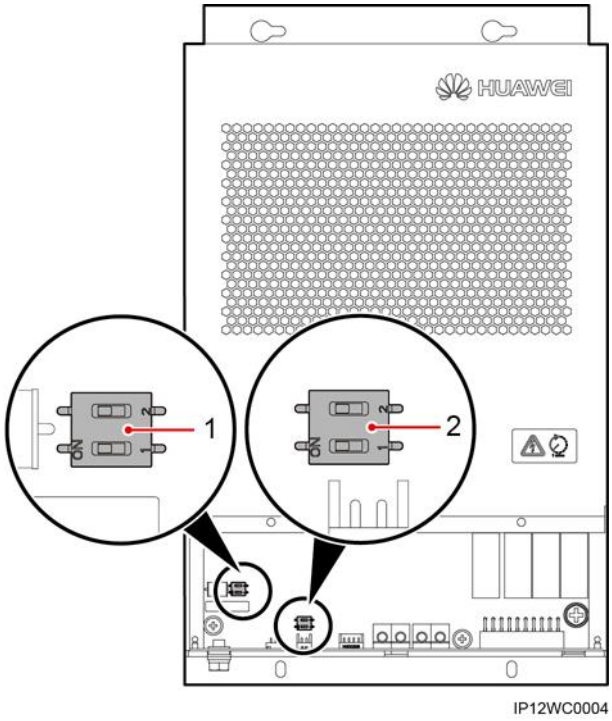

Table 5-1 DIP switch description

No.	Component	Description
1	DIP switch S1	Specifies the connection status of the RS485 build-out resistor which is disconnected by default before delivery. For details, see Step 2.
2	DIP switch S2	Specifies the RS485 baud rate which is set to 9600 bps by default before delivery. For details, see Step 3.

Procedure

Step 1 Loosen the two captive screws on the PID module and remove the front panel, as shown in Figure 5-2.

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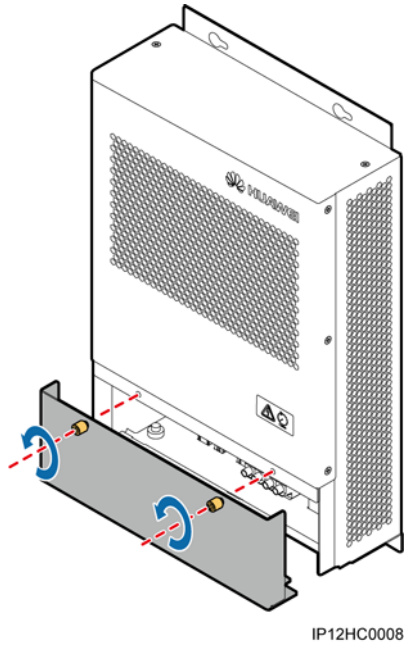
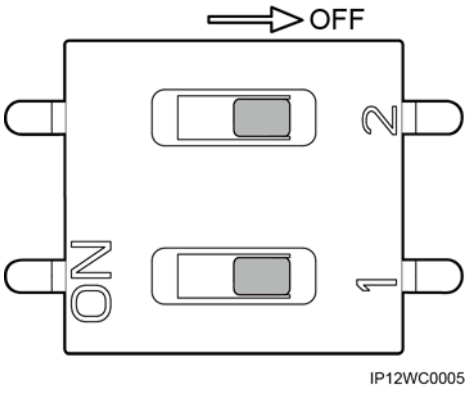
Figure 5-2 Removing the front panel



Step 2 Configure the connection status of the RS485 build-out resistor using DIP switches, as shown in Figure 5-3.

The connection status of the RS485 built-out resistor can be set to **Connect** or **Disconnect**. This parameter is set to **Disconnect** by default. If signals are distorted or the communication is of poor quality because of a lengthy communications cable, set the parameter to **Connect**.

Figure 5-3 DIP switch S1



NOTE

In Figure 5-3, the RS485 build-out resistor is set to the default status, that is, disconnected.

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Table 5-2 Connection status of the RS485 Build-out Resistor

Connection Status of RS485 Built-out Resistor	DIP1	DIP2
Connect	ON	ON
Disconnect (default)	OFF	OFF

NOTE

- If the PID module is connected to the COM port on the SmartLogger, and the COM port is not connected to other devices such as inverters, as shown in Figure 5-4, set the connection status of the RS485 build-out resistor to connected.
- If the PID module is connected to the COM port on the SmartLogger, and the COM port is connected to other devices such as inverters, as shown in Figure 5-5, set the connection status of the RS485 build-out resistor to disconnected.

Figure 5-4 Connection method 1

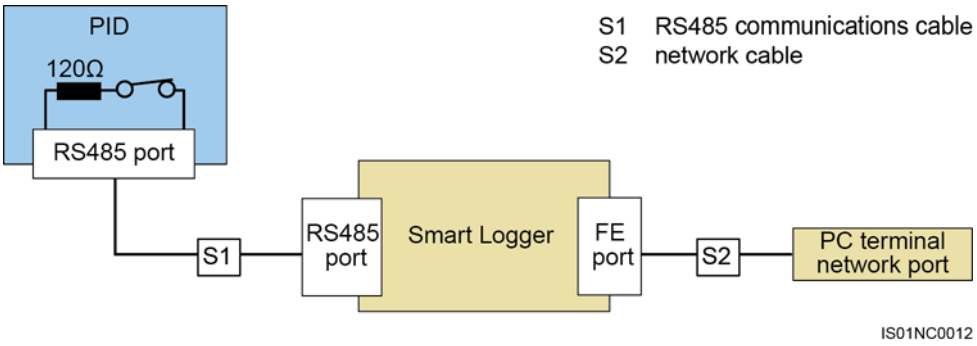
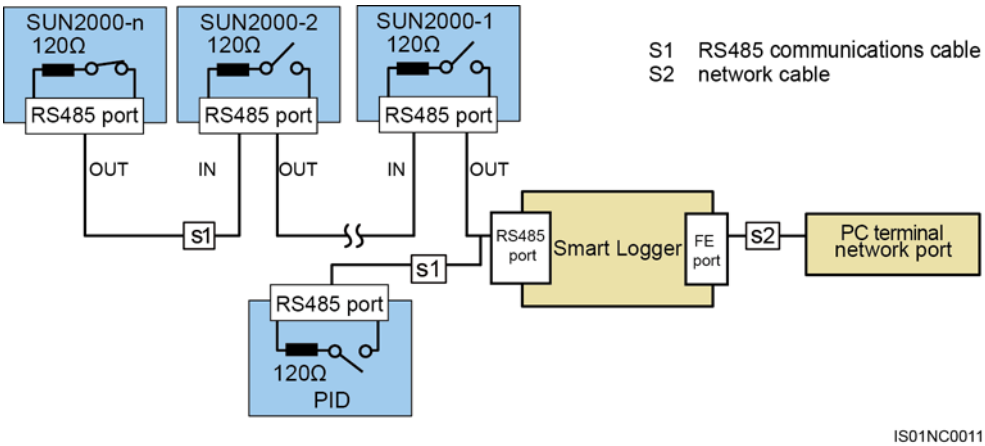


Figure 5-5 Connection method 2



Step 3 Set the RS485 baud rate using DIP switches, as shown in Figure 5-6.

The available baud rates include 4800 bps, 9600 bps, 19200 bps, and 115200 bps.

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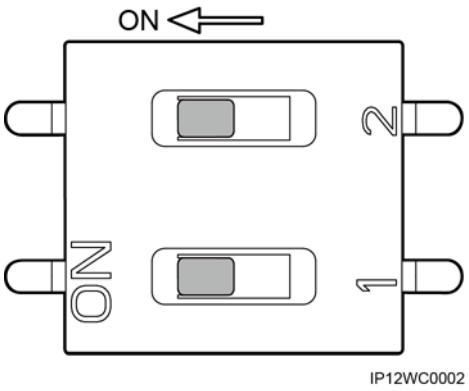
Figure 5-6 DIP switch S2



NOTE

In Figure 5-6, the RS485 baud rate is set to the default value 9600 bps.

Table 5-3 RS485 baud rate

RS485 Baud Rate	DIP1	DIP2
9600 (default)	ON	ON
4800	OFF	ON
19200	ON	OFF
115200	OFF	OFF

Step 4 Reinstall the front panel.

----End

5.2 Setting the PV Module Type

Context

DANGER

Before setting the PV module type, ensure that:

- The circuit breaker on the PID module AC side is turned off in a SUN2000 scenario.
- The circuit breakers on the PID module DC and AC sides are turned off in a SUN8000 scenario.

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NOTICE

If the PID module is a component of a SUN2000 power station array with the power of less than or equal to 2 MW, PV modules used in the array must be of the same type (P or N). Ensure that the PID module type setting is consistent with the PV module type. Otherwise, the effect of using the PID module is affected.

The PV module type is set using jumper terminals in the PID module.

Figure 5-7 describes the jumper terminal ports.

Figure 5-7 Jumper terminal ports

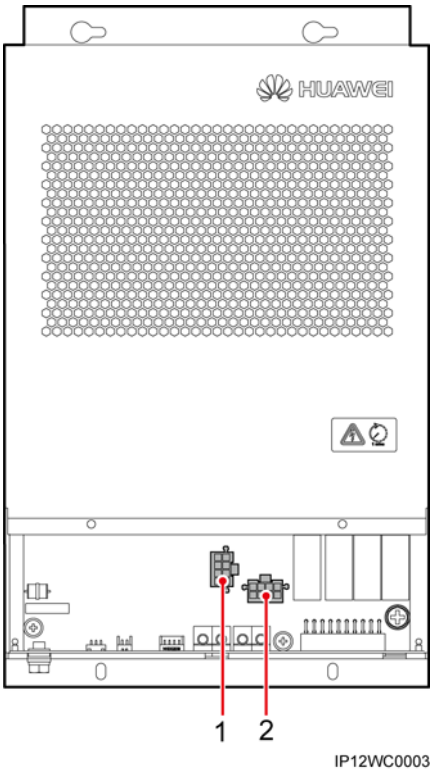

Table 5-4 Jumper terminal port description

No.	Component	Description
1	Jumper terminal J61 port	Used for a power station using P-type PV module. The jumper is inserted in the J61 port by default before delivery.
2	Jumper terminal J62 port	Used for a power station using N-type PV module.

NOTE

For details about the PV module type, consult the manufacturer.

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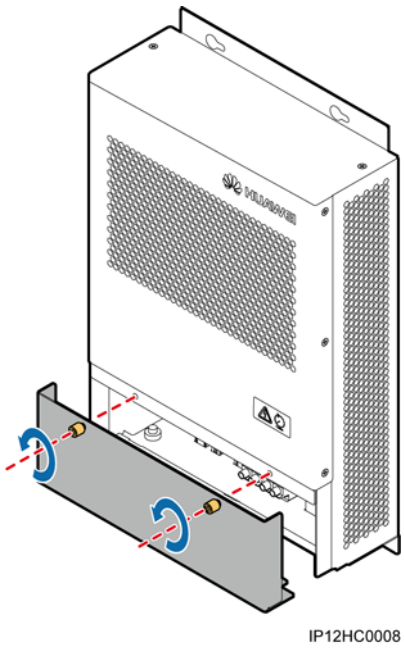
Procedure

Step 1 Loosen the two captive screws on the PID module and remove the front panel, as shown in Figure 5-8.

Figure 5-8 Removing the front panel



Step 2 Insert the jumper in the corresponding port based on the type of PV modules used in a power station.

- If a power station uses PV modules of the P type, insert the jumper in the J61 port, as shown by (1) in Figure 5-7.
- If a power station uses PV modules of the N type, insert the jumper in the J62 port, as shown by (2) in Figure 5-7.

Step 3 Reinstall the front panel.

----End

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6 System Operation

6.1 Checking Before Power-On

To ensure normal operation of the PID module, check the PID module before powering it on.

Before powering on the PID module, check that:

1. The PID module is installed correctly and securely.
2. The ground cable is securely connected.
3. The input and output cables of the PID module are securely connected.
4. The RS485 communications cable is securely connected.
5. Communications parameters are correctly set. For details, see 5.1 Setting Communications Parameters.
6. The PV type is correctly set. For details, see 5.2 Setting the PV Module Type.

6.2 System Power-On

Prerequisites

You have completed the power-on check.

Procedure

Step 1 Turn on the knife switch for the busbar on the low-voltage side of the box-type transformer.

Step 2 If the PID module is installed in the smart array controller, switch on the **AC INPUT** circuit breaker in the smart array controller.

Step 3 Turn on the PID switch or the **PID INPUT** circuit breaker in the smart array controller.

----End

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6.3 System Commissioning

Choose the method of setting the PID module parameters according to the SmartLogger version.

- If it is SmartLogger1000, set the parameters over the WebUI or LCD.
- If it is SmartLogger2000, set the parameters over the WebUI or SUN2000 app.

NOTE

For updates of the SmartLogger or SUN2000 app, see *SmartLogger User Manual* or *SUN2000 APP User Manual*.

6.3.1 Commissioning over the WebUI

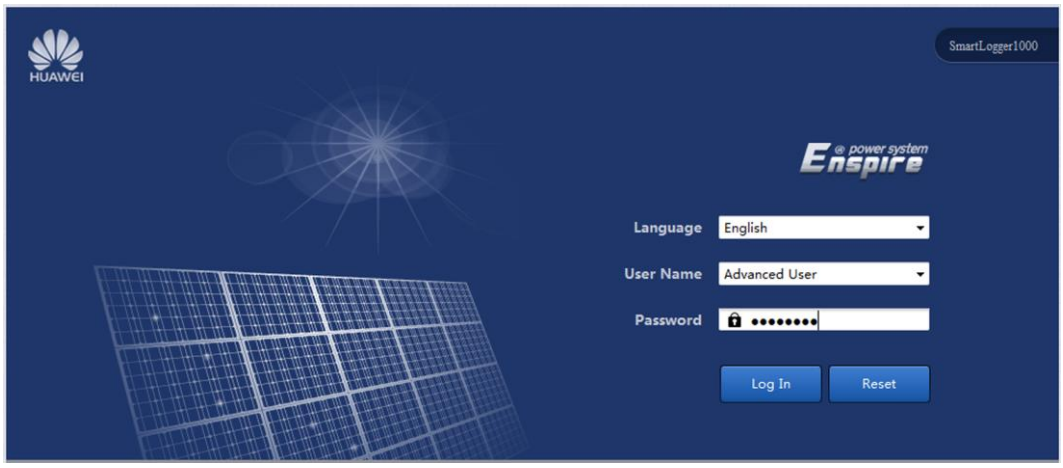
Prerequisites

You have connected the SmartLogger to a PC.

Procedure

Step 1 Enter **https://XX.XX.XX.XX** in the address box of the browser, and press **Enter**. The login page is displayed, as shown in Figure 6-1. Specify **Language**, **User Name**, and **Password**, and click **Log In** to display the main menu.

Figure 6-1 Login page of the WebUI



NOTE

- XX.XX.XX.XX is the IP address for the SmartLogger. The default IP address is **192.168.0.10**.
- Because of the permission restriction, log in as **Advanced User** or **Special User**.
- If web pages cannot be opened, specify security settings for the browser. For details, see **Preparations for Login** in the *SmartLogger User Manual*.
- If the SmartLogger software version is SUN2000 V100R001C95SPC010 or earlier, the initial password is **000001**. If the SmartLogger software version is SUN2000 V100R001C95SPC020 or later or SmartLogger V100R001C00SPC010 or later, the initial password is **Changeme**.

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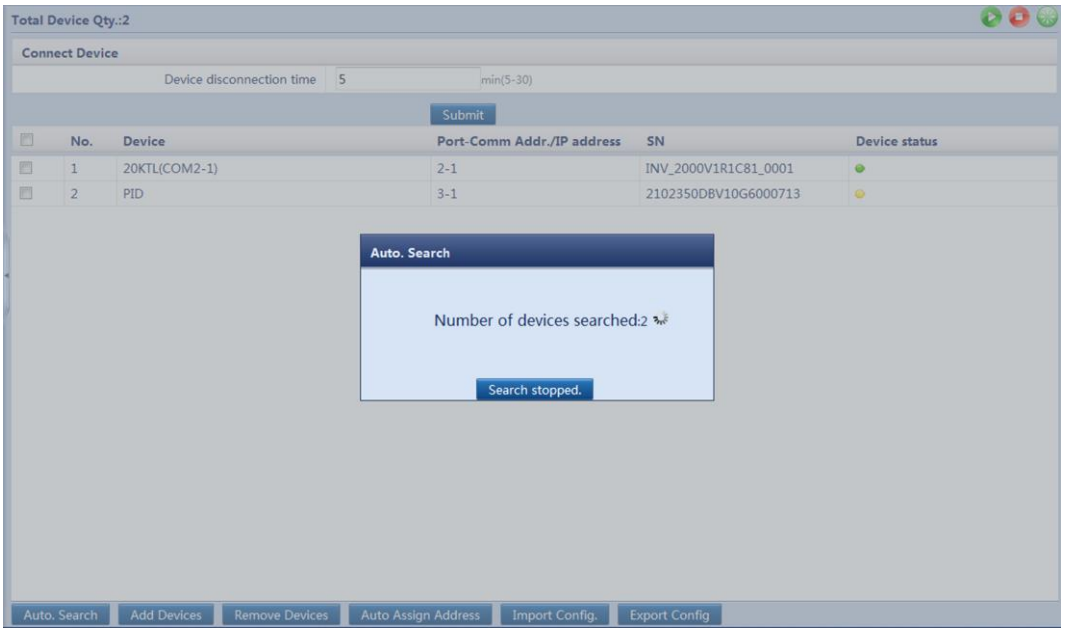
- Use the initial password upon first power-on and change it immediately after login. To ensure account security, change the password periodically and keep the new password in mind. Not changing the initial password may cause password disclosure. A password left unchanged for a long period of time may 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. For details about how to change the password, see *SmartLogger User Manual* or *SUN2000 APP User Manual*.
- This document introduces the commissioning operation on the WebUI using the SmartLogger V100R001C00SPC111 as an example.
- To query the SmartLogger version information, choose **Monitoring** > **Running Info.** or **Maintenance** > **Product Information**.

Step 2 On the **Maintenance** tab page, choose **Device Mgmt.** > **Connect Device**. Then click **Auto. Search** in the lower part of the **Connect Device** page, as shown in Figure 6-2.

NOTE

- You can also click **Add Devices** and manually add a PID module.
- If the PID module is not found, check whether the RS485 cable is properly connected.
- The default RS485 address for the PID module is 1. You can change it over the SmartLogger WebUI, LCD, or SUN2000 app. For details, see A Changing the RS485 Address.

Figure 6-2 Searching for devices



Step 3 On the **Monitoring** tab page, select the PID module whose running parameters need to be set, and then click **Running Param.**, as shown in Figure 6-3.

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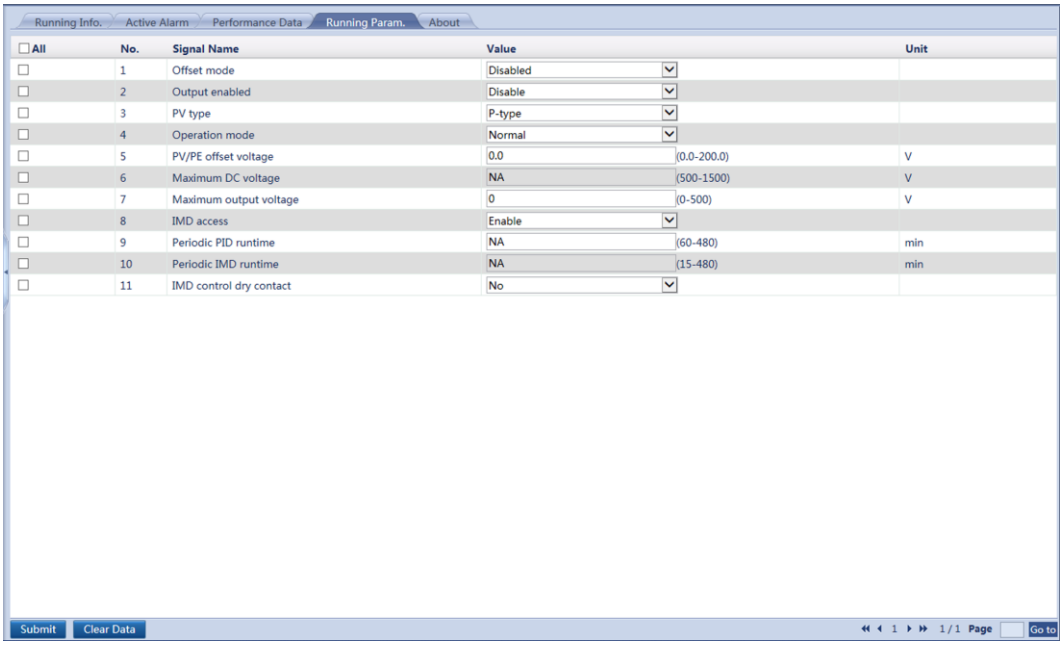
Figure 6-3 Setting running parameters



NOTE

Running parameters cannot be set if the PID module is in the **Disconnect** state.

Table 6-1 describes the parameters.

Table 6-1 Running parameter descriptions

No.	Parameter Name	Function	Parameter Value	Description
1	Offset mode	Specifies the offset mode of the PID module.	Disabled	Set this parameter to **Disable** if the PID module is not required.
			N/PE	Set this parameter to **N/PE** if the PID module is required to use voltage output from the inductor virtual midpoint N.
			PV/PE	Set this parameter to **PV/PE** if the PID module is required to use voltage output from the negative PV terminal. This mode is applicable only to SUN8000 Networking Scenario. Figure 2-3 shows the networking diagram.
			Automatic	• In the SUN2000 Networking Scenario (see Figure 2-2). **Automatic** indicates the N/PE offset mode. • In the SUN8000 Networking Scenario (see Figure 2-3). Set this parameter to **Automatic** if the PID is required to automatically switch between **N/PE** and **PV/PE** offset modes based on the PV module voltage.

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No.	Parameter Name	Function	Parameter Value	Description
2	Output enabled	Specifies whether the PID module output is enabled.	Enable	Set this parameter to **Enable** to allow the PID module output.
			Disable	Set this parameter to **Disable** to forbid the PID module output.
3	PV type	Specifies the type of the PV module used in the power station. For details about the PV module type, consult the manufacturer.	P-type	Set this parameter to **P-type** if the PV module type is P. In this case, the PID module output voltage is positive.
			N-type	Set this parameter to **N-type** if the PV module type is N. In this case, the PID module output voltage is negative.
4	PV/PE offset voltage	Specifies the DC voltage when the offset mode is set to PV/PE.	0–200 V	It is recommended that the offset voltage be set to a value ranging from 50 V to 200 V.
5	Operation Mode	Specifies whether the PID module is currently working in normal or commissioning mode.	Commissioning	In commissioning mode, if you need to set the output mode to **PV/PE** or **N/PE**, set **Output enabled** to **Enable**. The PID module delivers output voltages based on the value of **Commiss. out.volt**. **NOTE** Before the first power-on, to check whether the PID functions properly, it is recommended that **Operation mode** be set to **Commissioning**.
			Normal	In normal mode, the PID module operates automatically after the PID module, inverter, and SmartLogger communicate with each other properly. **NOTE** After checking that the PID module functions properly (by performing Step 4 to Step 6), you can set **Operation mode** to **Normal**.

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No.	Parameter Name	Function	Parameter Value	Description
6	Commissioning output voltage	Specifies the output voltage when **Operation Mode** or **Working mode** is set to **Commissioning**.	0–500 V	It is recommended that the commissioning voltage for the 1000 V/1100 V inverter be set to a value ranging from 50 V to 400 V, and the commissioning voltage in the SUN8000 scenario should be 50–200 V. **NOTICE** Do not set the commissioning output voltage higher than the voltage endurance capacity between the PV power system and the ground. **NOTE** After this parameter is set and the output from the PID module becomes stable, use a multimeter that is set to the DC position to measure the three-phase (A, B, and C) voltages of the power grid to the ground, and check whether the voltages are the same as the configured values.
7	Maximum DC voltage	Specifies the PV-PE voltage when the normal operation mode is used.	500–1500 V	If the PV module type is P, the parameter value indicates the highest DC voltage between PV+ and PE. If the PV module type is N, the parameter value indicates the highest DC voltage between PV– and PE.
8	Maximum output voltage	Specifies the highest output voltage of the PID module when **Operation Mode** or **Working mode** is set to **Normal** or **Commissioning**.	0–500 V	If the offset mode is **PV/PE**, the parameter value indicates the highest DC output voltage between PV and PE. If the offset mode is **N/PE**, the parameter value indicates the highest DC output voltage between N and PE.
9	IMD access	Specifies whether the PID module and insulation monitor device (IMD) can operate in cycle mode.	Enable	Select **Enable**if you allow the PID module and IMD operate in cycle mode. Only the IMDs of mainstream suppliers such as DOLD and BENDER are supported, and the IMDs must have enabled dry contacts. **NOTICE** Only when **IMD access** is set to **Enable**, can you set **Periodic PID runtime**, **Periodic IMD runtime** and **IMD control dry contact**.
			Disable	Select **Disable** if you forbid the access of IMDs.

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No.	Parameter Name	Function	Parameter Value	Description
10	Periodic PID runtime	Specifies the operating time segment of the PID module when the PID module and IMD operate in cycle mode.	60–480 minutes	The IMD is shut down when the PID module is operating.
11	Periodic IMD runtime	Specifies the operating time segment of the IMD when the PID module and IMD operate in cycle mode.	15–480 minutes	The PID module is standby when the IMD is operating.
12	IMD control dry contact	Dry contact No. over which the SmartLogger controls the IMD	• No • DO1 • DO2 • DO3	When the **IMD access** is enabled, the default value is **No**. Set an appropriate port based on the cable connections between the IMD and the SmartLogger. The default value cannot be set.
13	Data Clear	Clears the active alarms and historical alarms stored on the PID module.	-	You can select **Data Clear** to clear active alarms and historical alarms. **NOTE** To clear the historical information about the PID module stored on the SmartLogger, see the *SmartLogger User Manual*.

NOTE

- If the PID module is used in a PV power system installed with the IMD, connect the IMD to the SmartLogger (see B Connecting the SmartLogger to the IMD for details) and configure the **IMD access**, **Periodic PID runtime**, **Periodic IMD runtime**, and **IMD control dry contact** on the WebUI.
- The output voltage of the PID module is automatically capped to ensure the safety of a PV power plant. The output voltage is also related to the power grid voltage and PV voltage.

Step 4 Set **Operation mode** to **Commissioning**, enter a value for **Commiss. out.volt**, use a multimeter that is set to the DC position to measure the output voltage (inductor midpoint N to ground), and check whether the output voltage is close to the configured voltage.

Table 6-2 shows the supported running parameters of different types of PV modules and inverters in commissioning mode.

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Table 6-2 Supported running parameters in commissioning mode

Operation Mode	PV Module Type	Inverter Type	Offset Mode (Select One from Four)				Enabling Mode (Select Either)	
			Disabled	N/PE	PV/PE	Automatic	Enable	Disable
Commissioning	P	SUN2000	×	√	×	×	√	√
		SUN8000	×	√	√	×		
	N	SUN2000	×	√	×	×		
		SUN8000	×	√	√	×		

NOTE

In the table, √ indicates that the parameter is available, whereas × indicates that the parameter is unavailable.

Step 5 Use a multimeter that is set to the DC position to measure the three-phase (A/B/C) voltage of the power grid (A/B/C) to earth, and check whether the voltage is the same as the configured voltage.

If the voltage is different from the configured voltage, check whether the PID module output cables are correctly connected to the inductor, whether the inductor is correctly connected to the power grid, and whether the PID module is properly grounded.

Step 6 Set **Operation mode** to **Normal**.

NOTE

- Wait 10–15 minutes after the PID module is connected to the SmartLogger for the first time. When the SmartLogger page displays the running status as **Running**, the PID module runs properly.
- You need to wait at most 10 to 15 minutes for the first startup of the PID module after power-on, for the first startup of the PID module on every day, and for the first startup after the communication between the PID module and the SmartLogger resumes.
- To verify the voltage between the PV terminal of the inverter and the ground after the PID module is used in the networking system, disconnect one PV input terminal of the inverter (PV– for the P-type PV module and PV+ for the N-type PV module). Then set the multimeter to the DC position and use it to measure the voltage between the disconnected input terminal and the ground. For the P-type PV module, the voltage between PV– and the ground is greater than 0 V. For the N-type PV module, the voltage between PV+ and the ground is less than 0 V.

Table 6-3 shows the supported running parameters for different types of PV modules and inverters in normal mode.

Table 6-3 Supported running parameters in normal mode

Operation Mode	PV Module Type	Inverter Type	Offset Mode (Select One from Four)				Enabling Mode (Select Either)	
			Disabled	N/PE	PV/PE	Automatic	Enable	Disable
Normal	P	SUN2000	√	√	×	√	√	√
		SUN8000	√	√	√	√		

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Operation Mode	PV Module Type	Inverter Type	Offset Mode (Select One from Four)				Enabling Mode (Select Either)	
			Disabled	N/PE	PV/PE	Automatic	Enable	Disable
	N	SUN2000	√	√	×	×		
		SUN8000	√	√	×	×		

NOTE

In the table, √ indicates that the parameter is available, whereas × indicates that the parameter is unavailable.

----End

6.3.2 Commissioning over the LCD

Context

The SmartLogger1000 has a monitoring panel that provides one LCD, three indicators, and four buttons.

Procedure

Step 1 On the default screen of the SmartLogger, press ↵ to display the main menu, and then select  and press ↵, as shown in Figure 6-4.

This document introduces the commissioning operation on the LCD using the SmartLogger V100R001C00SPC111 as an example.

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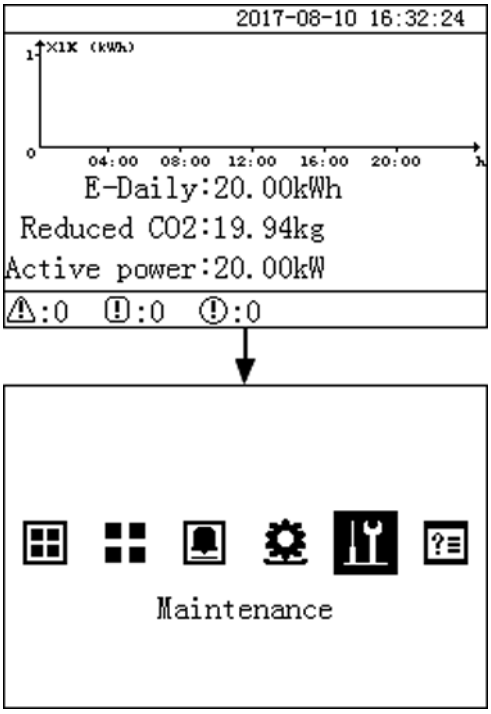
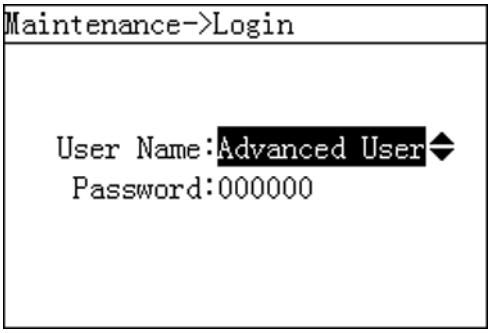
Figure 6-4 Main menu



Step 2 Specify **User Name** and **Password** and press ↵ to display the **Maintenance** screen, as shown in Figure 6-5.

Figure 6-5 Login screen



NOTE

- Specify **User Name** and **Password** by pressing ▲ and ▼, and then press ↵ to confirm the user name and password.
- Because of the permission restriction, log in as **Advanced User** or **Special User**. The initial password is **000001** for both **Advanced User** and **Special User**.
- After permission validation succeeds, the system keeps the authentication information for 30 seconds. If you exit from the **Maintenance** screen and log in again within 30 seconds, no identification authentication is required.

Step 3 On the **Maintenance** screen, choose **Device Mgmt.** > **Auto. Search** and press ↵, as shown in Figure 6-6.

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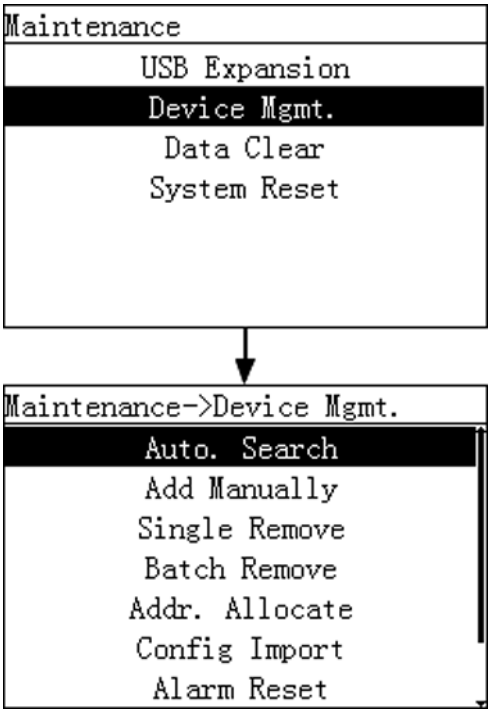
Figure 6-6 Maintenance screen

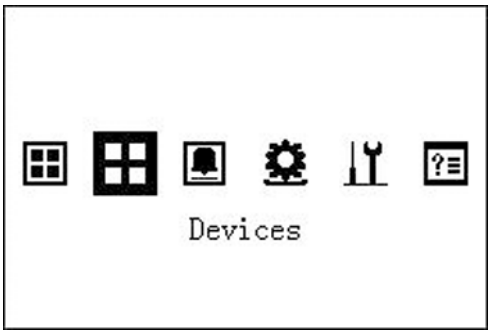


NOTE

- After automatic searching is complete, the PID module is added successfully. You can view and set running parameters for the PID module on **Devices** screen.
- You can also press **Add Manually** and manually add a PID module.
- The default RS485 address for the PID module is 1. You can change it over the SmartLogger WebUI, LCD, or SUN2000 app. For details, see A Changing the RS485 Address.

Step 4 Return to the main menu, select , and press to display the **Devices** screen, as shown in Figure 6-7.

Figure 6-7 Devices screen



Step 5 On the **Devices** screen, press ▲ and ▼ to view the operating status of the PID module, as shown in Figure 6-8.

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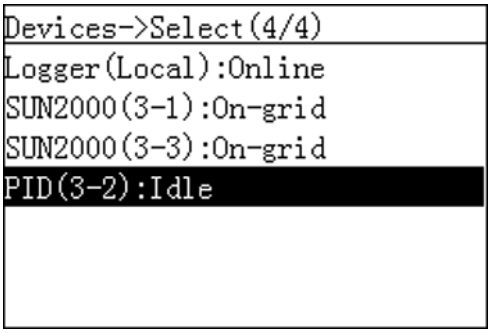
Figure 6-8 Viewing the status of the PID module



Step 6 Select the PID module, and press ↵ to enter **Settings** > **Running Param.**. You can set running parameters for the PID module on the **Running Param.** screen, as shown in Figure 6-9.

NOTE

For details about how to set running parameters for the PID module, see Table 6-1 in 6.3.1 Commissioning over the WebUI.

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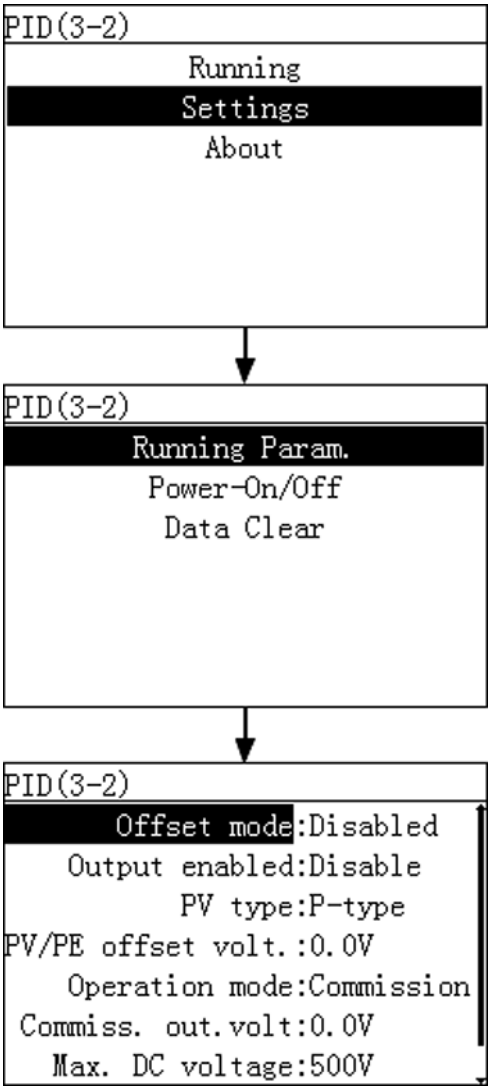
Figure 6-9 Setting running parameters



Step 7 Set **Operation mode** to **Commissioning**, and set **Commiss. out. volt.**. Set the multimeter to the DC position and use it to measure the output voltage (inductor midpoint N to ground), and then check whether the output voltage is the same as the preset voltage.

Table 6-4 shows the supported running parameters of different types of PV modules and inverters in commissioning mode.

Table 6-4 Supported running parameters in commissioning mode

Operation Mode	PV Module Type	Inverter Type	Offset Mode (Select One from Four)				Enabling Mode (Select Either)	
			Disabled	N/PE	PV/PE	Automatic	Enable	Disable
Commissioning	P	SUN2000	×	√	×	×	√	√
		SUN8000	×	√	√	×		

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Operation Mode	PV Module Type	Inverter Type	Offset Mode (Select One from Four)				Enabling Mode (Select Either)	
			Disabled	N/PE	PV/PE	Automatic	Enable	Disable
	N	SUN2000	×	√	×	×		
		SUN8000	×	√	√	×		

NOTE

In the table, √ indicates that the parameter is available, whereas × indicates that the parameter is unavailable.

Step 8 Use a multimeter that is set to the DC position to measure the three-phase (A/B/C) voltage of the power grid (A/B/C) to earth, and check whether the voltage is the same as the configured voltage.

If the voltage is different from the configured voltage, check whether the PID module output cables are correctly connected to the inductor, whether the inductor is correctly connected to the power grid, and whether the PID module is properly grounded.

Step 9 Set **Operation mode** to **Normal**.

NOTE

- Wait 10 to 15 minutes after the PID module is connected to the SmartLogger for the first time. When the SmartLogger page displays the running status as **Running**, the PID module runs properly.
- You need to wait at most 10 to 15 minutes for the first startup of the PID module after power-on, for the first startup of the PID module on every day, and for the first startup after the communication between the PID module and the SmartLogger resumes.
- To verify the voltage between the PV terminal of the inverter and the ground after the PID module is used in the networking system, disconnect one PV input terminal of the inverter (PV– for the P-type PV module and PV+ for the N-type PV module). Then set the multimeter to the DC position and use it to measure the voltage between the disconnected input terminal and the ground. For the P-type PV module, the voltage between PV– and the ground is greater than 0 V. For the N-type PV module, the voltage between PV+ and the ground is less than 0 V.

Table 6-5 shows the supported running parameters for different types of PV modules and inverters in normal mode.

Table 6-5 Supported running parameters in normal mode

Operation Mode	PV Module Type	Inverter Type	Offset Mode (Select One from Four)				Enabling Mode (Select Either)	
			Disabled	N/PE	PV/PE	Automatic	Enable	Disable
Normal	P	SUN2000	√	√	×	√	√	√
		SUN8000	√	√	√	√		
	N	SUN2000	√	√	×	×		

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Operation Mode	PV Module Type	Inverter Type	Offset Mode (Select One from Four)				Enabling Mode (Select Either)	
			Disabled	N/PE	PV/PE	Automatic	Enable	Disable
		SUN8000	√	√	×	×		

NOTE

In the table, √ indicates that the parameter is available, whereas × indicates that the parameter is unavailable.

----End

6.3.3 Commissioning over the SUN2000 App

Prerequisites

The app has successfully connected to the SmartLogger2000 through Bluetooth.

- For details about how to connect the app to the SmartLogger2000 through Bluetooth, see the *SUN2000 APP User Manual*.
- This section uses the screens for SUN2000APP 2.2.00 and SmartLogger V200R002C10SPC100 as an example.

Context

SmartLogger2000 has a built-in Bluetooth module. After the SUN2000 app successfully connects to the SmartLogger, you can view the running information and alarms, set parameters, and send commands for all devices connected to the SmartLogger.

Procedure

Step 1 On the app login screen, select **Advanced User**, enter the password, and tap **Log In**. The SmartLogger **Home** screen is displayed.

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Figure 6-10 SmartLogger home

NOTE

- The initial password for connecting to the SmartLogger from the app as **Common User**, **Advanced User**, and **Special User** is **00000a**. 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.
- If you log in to the app after the SmartLogger connects to the app for the first time or the SmartLogger factory defaults are restored, the quick settings screen will be displayed. You can set basic parameters for the SmartLogger on the quick settings screen. After the setting, you can modify the parameters after choosing **More** > **Settings**.
- If you do not set basic parameters for the SmartLogger on the quick settings screen, the screen is still displayed when you log in to the app next time.

Step 2 Choose **More** > **Device Mgmt.**. The **Device Mgmt.** screen is displayed.

Step 3 Tap in the upper right corner of the device management screen and choose **Auto Device Search**, as shown in Figure 6-11.

NOTE

- The SmartLogger can automatically detect and connect to the PID module.
- You can also tap **Add Device** and manually add a PID module.
- If no device is searched, check that the RS485 communications cable is properly connected and that the baud rate of the PID module is the same as the baud rate of the RS485 port on the SmartLogger.
- The default RS485 address for the PID module is 1. You can change it over the SmartLogger WebUI, LCD, or SUN2000 app. For details, see A Changing the RS485 Address.

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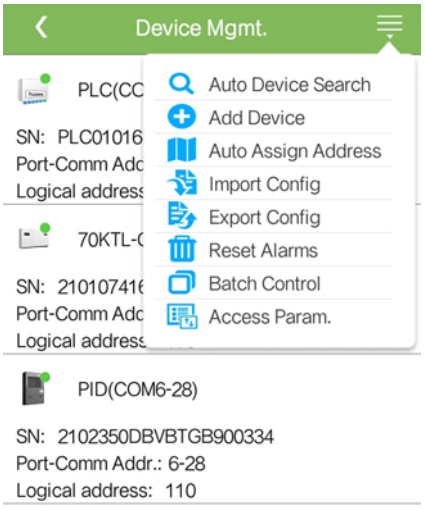
Figure 6-11 Device management



Step 4 Tap **Monitor** on the SmartLogger home screen to access the device monitoring screen, as shown in Figure 6-12.

Figure 6-12 Device monitoring

Step 5 Choose **PID** on the device monitoring screen to access the main menu screen of the PID module, as shown in Figure 6-13.

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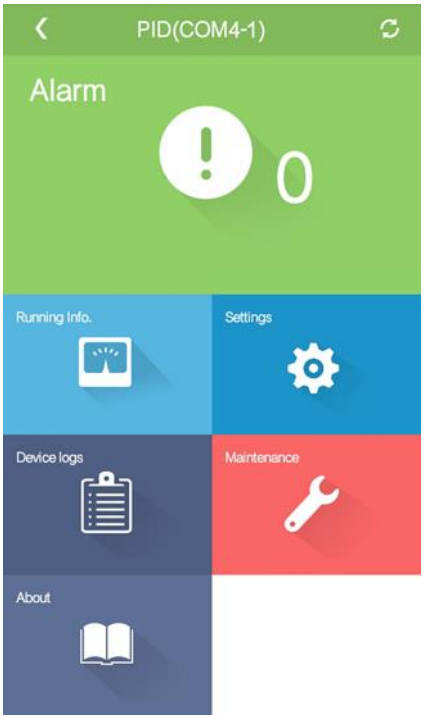
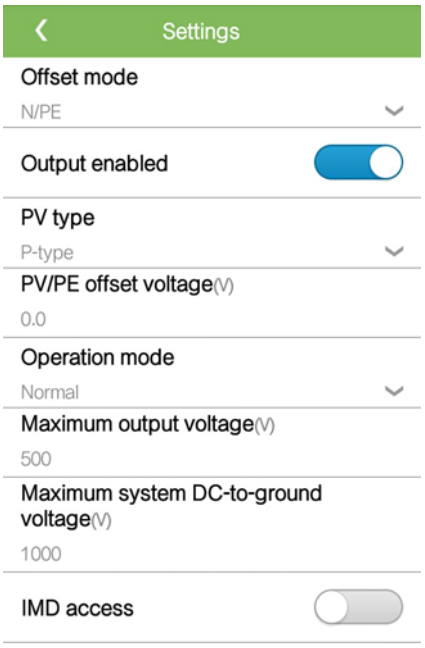
Figure 6-13 Main menu of the PID module



Step 6 Tap **Settings** to access the settings screen and set PID module running parameters, as shown in Figure 6-14.

Figure 6-14 Settings



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NOTE

- For details about how to set running parameters for the PID module, see Table 6-1 in 6.3.1 Commissioning over the WebUI.
- Running parameters cannot be set if the PID module is in the **Disconnect** state.

Step 7 Set **Operation mode** to **Commissioning**, enter a value for **Commiss. out.volt**, use a multimeter that is set to the DC position to measure the output voltage (inductor midpoint, N) and check whether the output voltage is close to the configured voltage.

Table 6-6 shows the supported running parameters of different types of PV modules and inverters in commissioning mode.

Table 6-6 Supported running parameters in commissioning mode

Operation Mode	PV Module Type	Inverter Type	Offset Mode (Select One from Four)				Enabling Mode (Select Either)	
			Disabled	N/PE	PV/PE	Automatic	Enable	Disable
Commissioning	P	SUN2000	×	√	×	×	√	√
		SUN8000	×	√	√	×		
	N	SUN2000	×	√	×	×		
		SUN8000	×	√	√	×		

NOTE

In the table, √ indicates that the parameter is available, whereas × indicates that the parameter is unavailable.

Step 8 Use a multimeter that is set to the DC position to measure the three-phase (A/B/C) voltage of the power grid (A/B/C) to earth, and check whether the voltage is the same as the configured voltage.

If the voltage is different from the configured voltage, check whether the PID module output cables are correctly connected to the inductor, whether the inductor is correctly connected to the power grid, and whether the PID module is properly grounded.

Step 9 Set **Operation mode** to **Normal**.

NOTE

- Wait 10–15 minutes after the PID module is connected to the SmartLogger for the first time. When the SmartLogger page displays the running status as **Running**, the PID module runs properly.
- You need to wait at most 10 to 15 minutes for the first startup of the PID module after power-on, for the first startup of the PID module on every day, and for the first startup after the communication between the PID module and the SmartLogger resumes.
- To verify the voltage between the PV terminal of the inverter and the ground after the PID module is used in the networking system, disconnect one PV input terminal of the inverter (PV– for the P-type PV module and PV+ for the N-type PV module). Then set the multimeter to the DC position and use it to measure the voltage between the disconnected input terminal and the ground. For the P-type PV module, the voltage between PV– and the ground is greater than 0 V. For the N-type PV module, the voltage between PV+ and the ground is less than 0 V.

Table 6-7 shows the supported running parameters for different types of PV modules and inverters in normal mode.

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Table 6-7 Supported running parameters in normal mode

Operation Mode	PV Module Type	Inverter Type	Offset Mode (Select One from Four)				Enabling Mode (Select Either)	
			Disabled	N/PE	PV/PE	Automatic	Enable	Disable
Normal	P	SUN2000	√	√	×	√	√	√
		SUN8000	√	√	√	√		
	N	SUN2000	√	√	×	×		
		SUN8000	√	√	×	×		

NOTE

In the table, √ indicates that the parameter is available, whereas × indicates that the parameter is unavailable.

----End

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7 Maintenance

7.1 Troubleshooting

DANGER

If operations such as connecting cables or opening the front cover are involved during troubleshooting, you must switch off the circuit breaker on the AC side and that on the DC side (if any) of the PID module. Then wait for at least 1 minute and perform operations on the PID module.

For details, see Table 7-1.

Table 7-1 Common faults and troubleshooting measures

No.	Symptom	Possible Cause	Measure
1	The PID module cannot be powered on.	1. The three-phase power grid input ports for the PID module are disconnected from cables or loosely connected to cables. 2. The power grid is disconnected from power. 3. The PID module is faulty.	1. Check whether the three-phase power grid input ports for the PID module are disconnected from cables or loosely connected to cables. If yes, reconnect them securely. 2. Check whether power is available to the power grid. 3. Contact the supplier or Huawei technical support.
2	The SmartLogger cannot find the PID module.	1. The RS485 port is not connected to the SmartLogger, or the cable between the RS485 port and the SmartLogger is loose, drops off, or is reversely connected. 2. The RS485 communications	1. Check the RS485 communications cable connection. If any cable is loose, drops off, or is reversely connected, rectify the connection. 2. Check the settings of the RS485 communications parameters or the build-out resistor. Ensure that the baud rate or build-out resistor is set correctly.

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No.	Symptom	Possible Cause	Measure
		parameters or the build-out resistor is set incorrectly. 3. The RS485 communications address of the PID module is outside the search scope configured for the SmartLogger. 4. The RS485 communications address of the PID module is the same as the communications address of another device connected to the SmartLogger. 5. The SmartLogger version and the PID module version do not match.	3. Set the RS485 communications address of the PID module to be within the search scope configured for the SmartLogger. 4. The PID module address is 1 by default. Check whether there is any other device with the address of 1 connects to the COM port that the PID module will connect to. If yes, reset the RS485 address for the PID module or change the address for the device with the address of 1. Then connect the PID module to the COM port. You can also connect the PID module to another COM port without changing and address. 5. If the software versions of the PID module and the SmartLogger do not match, upgrade the software versions until they match each other. • If the software version of the PID module is SUN2000 V100R001C71SPC100, the matched SmartLogger software version is SUN2000 V100R001C95SPC020 and later. • If the software version of the PID module is SUN2000 V100R001C71SPC102, the matched SmartLogger software version is SUN2000 V100R001C95SPC102 and later. • If the software version of the PID module is SUN2000 V100R001C71SPC103 or later, the matched SmartLogger software version is SmartLogger V100R001C00SPC010 and later or SUN2000 V100R001C95SPC105 and later. • If the software version is updated in future, contact Huawei technical support.

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No.	Symptom	Possible Cause	Measure
3	The PID module status is displayed as disconnected on the SmartLogger.	1. The cable between the PID module and the SmartLogger is loose or disconnected. 2. The PID module is disconnected from power. 3. The baud rate or RS485 communications address of the PID module is changed. 4. The PID module is replaced. 5. The PID module is no longer connected.	1. Verify that the cable between the PID module and the SmartLogger is properly connected and tightened. 2. After checking that the PID module is connected properly, power on the PID. 3. Verify the baud rate and RS485 communications address of the PID module. 4. Check whether the PID has been replaced. If yes, search for the PID module again or manually add the PID module on the SmartLogger. 5. If the PID module is removed, remove it on the SmartLogger.
4	On the SmartLogger WebUI, **NA** is displayed on the **Running Param.** page.	The versions of the SmartLogger and the PID module do not match.	If the software versions of the PID module and the SmartLogger do not match, upgrade the software versions until they match each other. • If the software version of the PID module is SUN2000 V100R001C71SPC100, the matched SmartLogger software version is SUN2000 V100R001C95SPC020 and later. • If the software version of the PID module is SUN2000 V100R001C71SPC102, the matched SmartLogger software version is SUN2000 V100R001C95SPC102 and later. • If the software version of the PID module is SUN2000 V100R001C71SPC103 or later, the matched SmartLogger software version is SmartLogger V100R001C00SPC010 and later or SUN2000 V100R001C95SPC105 and later. • If the software version is updated in future, contact Huawei technical support.

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7.2 Alarms

DANGER

If operations such as connecting cables or opening the front cover are involved during alarm handling, you must switch off the circuit breaker on the AC side and that on the DC side (if any) of the PID module. Then wait for at least 1 minute and perform operations on the PID module.

Table 7-2 describes the common alarms and clearing measures for the PID module.

NOTE

It takes at most 3 minutes from when a fault occurs to when the SmartLogger displays an alarm.

Table 7-2 Alarms

Alarm ID	Alarm	Severity	Cause	Impact on the System	Measure
1900	PV1 Reverse	Major	PV1 is reversely connected.	The PID module does not work.	1. Check whether PV1+ and PV1– are reversely connected for the PID module. If yes, reconnect the cables securely. 2. If the alarm is generated frequently, contact Huawei technical support.
1903	Module overtemp.	Major	The temperature of the PID module is excessively high.	The PID module does not work and generates no output.	1. Check the PID module installation environment and verify whether the heat dissipation meets requirements. If no, relocate the PID module. 2. If the alarm is generated frequently, contact Huawei technical support.
1914	Output overcur.	Major	The load current exceeds the alarm threshold.	The PID module does not work and generates no output. The fault can be automatically rectified.	1. Check whether a short circuit exists between both of the PV module and three-phase power grid and the ground. If yes, eliminate the short circuit. 2. If the alarm is generated frequently, contact Huawei technical support.
1917	Grid volt. imbal.	Major	The three phases of the power grid differ greatly in voltage.	The PID module does not work and generates no output. The fault can be automatically rectified.	1. Check whether the power grid is abnormal. If yes, rectify the fault. 2. If the alarm is generated frequently, contact Huawei technical support.

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Alarm ID	Alarm	Severity	Cause	Impact on the System	Measure
1918	Grid overvolt.	Major	The power grid line voltage exceeds the upper threshold.	The PID module does not work and generates no output. The fault can be automatically rectified.	1. Check whether the power grid is abnormal. If yes, rectify the fault. 2. If the alarm is generated frequently, contact Huawei technical support.
1919	Grid undervolt.	Major	The power grid line voltage is lower than the lower threshold.	The PID module does not work and generates no output. The fault can be automatically rectified.	1. Check whether the power grid is abnormal. If yes, rectify the fault. 2. If the alarm is generated frequently, contact Huawei technical support.
1920	Incorrect PV mode	Major	In commissioning or normal mode, running parameter settings are incorrect.	The PID module does not work and generates no output.	1. Check whether running parameters are correctly set in **Commissioning** and **Normal** modes. For details, see Table 6-2 and Table 6-3. 2. If they are correct but the fault persists, contact Huawei technical support.
1921	Incorrect wiring	Major	1. The output cable is not connected or in poor contact. 2. The ground cable is not connected or in poor contact.	The PID module does not work and generates no output.	1. Check the input and output power cables and PE cable for the PID module. If any cable is not properly connected, reconnect the cable securely. 2. If the alarm is generated frequently, contact Huawei technical support.
1924	Grid Loss	Major	The power grid is power off.	The PID module does not work.	1. Check whether the power grid is abnormal. If yes, rectify the fault. 2. If the alarm is generated frequently, contact Huawei technical support.

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Alarm ID	Alarm	Severity	Cause	Impact on the System	Measure
1925	Grid overfreq.	Major	The power grid frequency exceeds the upper threshold of the PID module working frequency.	The PID module does not work.	1. Check whether the power grid is abnormal. If yes, rectify the fault. 2. If the alarm is generated frequently, contact Huawei technical support.
1926	Grid underfreq.	Major	The power grid frequency is lower than the lower threshold of the PID module working frequency.	The PID module does not work.	1. Check whether the power grid is abnormal. If yes, rectify the fault. 2. If the alarm is generated frequently, contact Huawei technical support.
1927	Incorrect PV mod type	Major	The PV type is incorrectly set.	The PID module does not work.	1. Check the jumper terminals and verify that the **PV type** parameter setting is correct. If it is incorrect, correctly set the PV module type and restart the PID module. 2. If the alarm is generated frequently, contact Huawei technical support.
1928	PID inductor fault	Major	1. The cable between the PID module and the inductor is incorrectly connected. 2. The inductor is faulty.	The PID module does not work and generates no output. The fault can automatically disappear.	1. Check whether the cable is properly connected between the PID module and the inductor. If no, reconnect the cable securely. 2. If the alarm is generated frequently, contact Huawei technical support.
1929	PV2 Reverse	Major	PV2 is reversely connected.	The PID module does not work.	1. Check whether PV2+ and PV2– are reversely connected for the PID module. If yes, reconnect the cables securely. 2. If the alarm is generated frequently, contact Huawei technical support.

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Alarm ID	Alarm	Severity	Cause	Impact on the System	Measure
1930	Device fault	Major	A fault caused by incorrect device settings or cable connections or PID module exceptions.	The PID module does not work and generates no output.	1. Reason ID = 9 a. Check whether the baud rate setting on the SmartLogger is the same as that on the PID module. If no, modify the baud rates to the same value. b. Check whether the RS485 cable is properly connected. If no, reconnect the cable securely. 2. Other reason IDs a. Check whether the output virtual midpoint and PE are short-circuited, or the output impedance is less than 1 kilo-ohm. If yes, reconnect the cable securely. b. Check the cable connections for the output virtual midpoint and PE, neither of which should be connected to cable A/B/C/N on the power grid side. If they are connected to cable A/B/C/N on the power grid side, reconnect the cables securely. c. Check whether the PV module type specified by the jumper terminals matches the compensation mode in **Commissioning** and **Normal** modes. If no, modify the settings until they match each other. For details, see Table 6-2 and Table 6-3. d. Check whether PV1–/PV2 and PE are short-circuited, or the output impedance is less than 1 kilo-ohm in the SUN8000 scenario. If yes, reconnect the cable securely. e. Restart the PID module. 3. If the alarm is generated frequently, contact Huawei technical support.

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8 Disposal of the PID Module

If the PID module service life has expired, dispose of the PID module in accordance with local rules for disposal of electrical equipment waste.

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9 Technical Specifications

Table 9-1 Technical specifications

Item		Specifications
Dimensions (W x H x D)		220 mm x 355 mm x 90.1 mm
Net weight		3050 g
Operating temperature range		–25°C to +60°C
Relative humidity (non-condensing)		5%–95%
Operating altitude		4000 m
Degree of protection		IP20/Type 1
Class of protection		Class I
Input	Three-phase line voltage	Rated voltage range: 320–500 V AC
		Operating voltage range: 270–620 V AC
	Rated frequency	50/60 Hz
	Maximum input current	0.3 A AC
Output	Output voltage range	50–500 V DC
	Maximum output current	0.2 A DC

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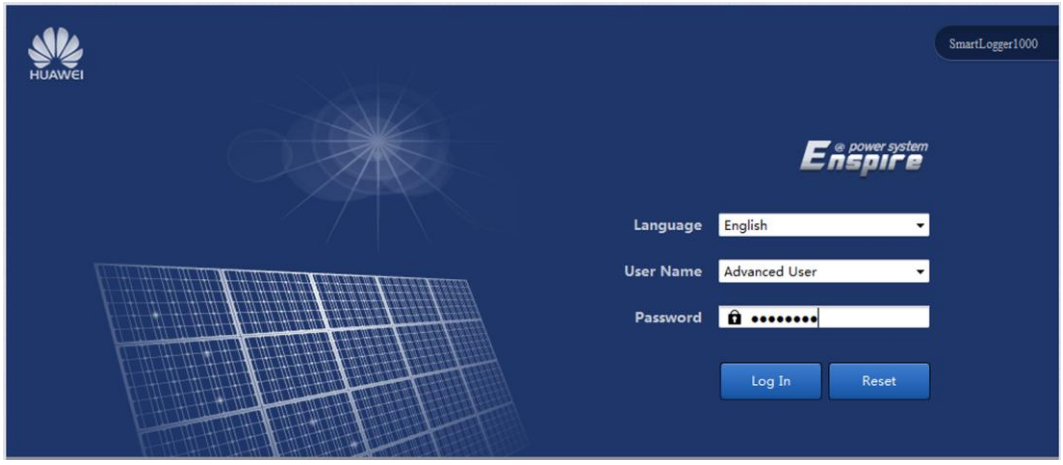
A Changing the RS485 Address

A.1 Changing the RS485 Address over the WebUI

Procedure

Step 1 Enter **https://XX.XX.XX.XX** in the address box of the browser, and press **Enter**. The login page is displayed, as shown in Figure A-1. Specify **Language**, **User Name**, and **Password**, and click **Log In** to display the main menu.

Figure A-1 Login page of the WebUI



NOTE

- Because of the permission restriction, log in as **Advanced User** or **Special User**.
- XX.XX.XX.XX is the IP address for the SmartLogger. The default IP address is **192.168.0.10**.
- If the SmartLogger software version is SUN2000 V100R001C95SPC010 or earlier, the initial password is **000001**. If the SmartLogger software version is SUN2000 V100R001C95SPC020 or later or SmartLogger V100R001C00SPC010 or later, the initial password is **Changeme**.
- 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. For details about how to change the password, see *SmartLogger User Manual* or *SUN2000 APP User Manual*.

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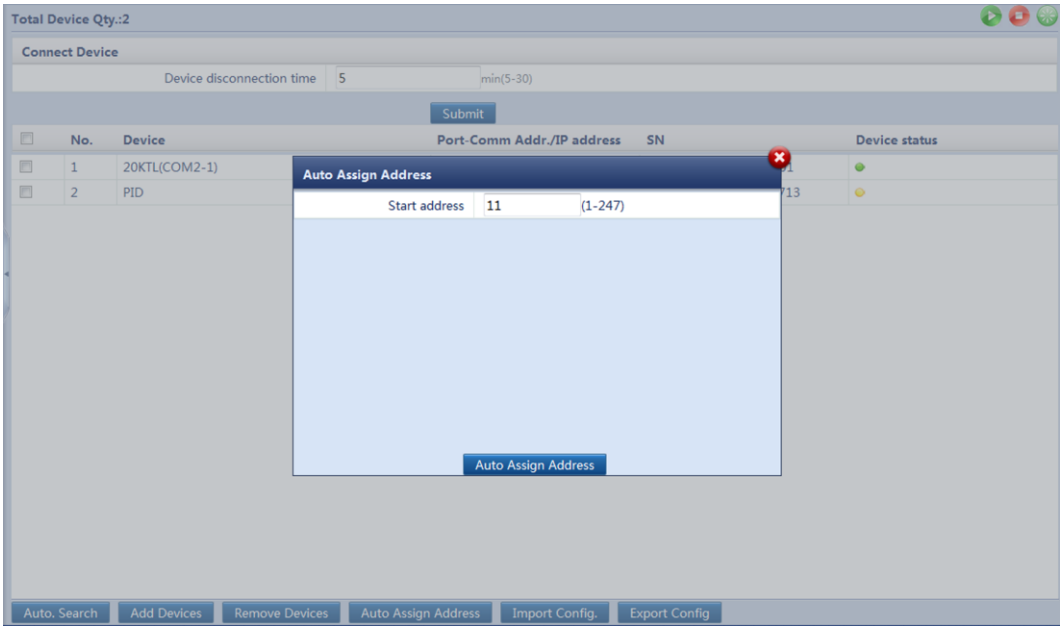
Step 2 On the **Maintenance** tab page, choose **Device Mgmt.** > **Connect Device**. Then click **Connect Device** in the lower part of the **Auto Assign Address** page, as shown in Figure A-2.

Figure A-2 Automatic address assigning

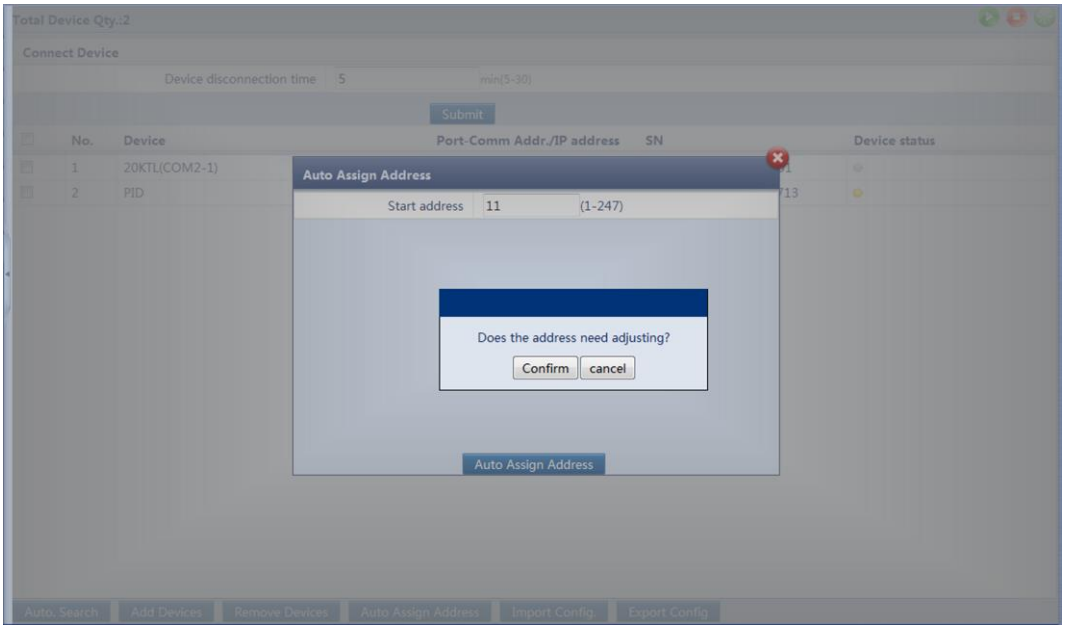


NOTE

Set **start addr.** to a value in the range of 1–247 based on site requirements.

Step 3 Click **Auto Assign Address** and then **OK**. In the displayed dialog box, click **OK**, as shown in Figure A-3.

Figure A-3 Address adjustment



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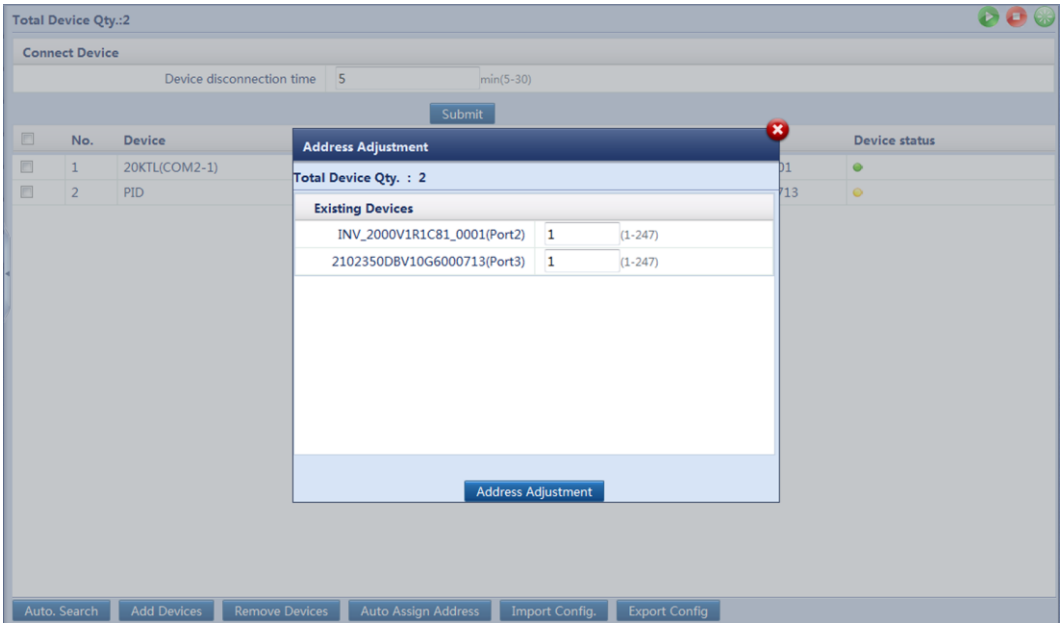
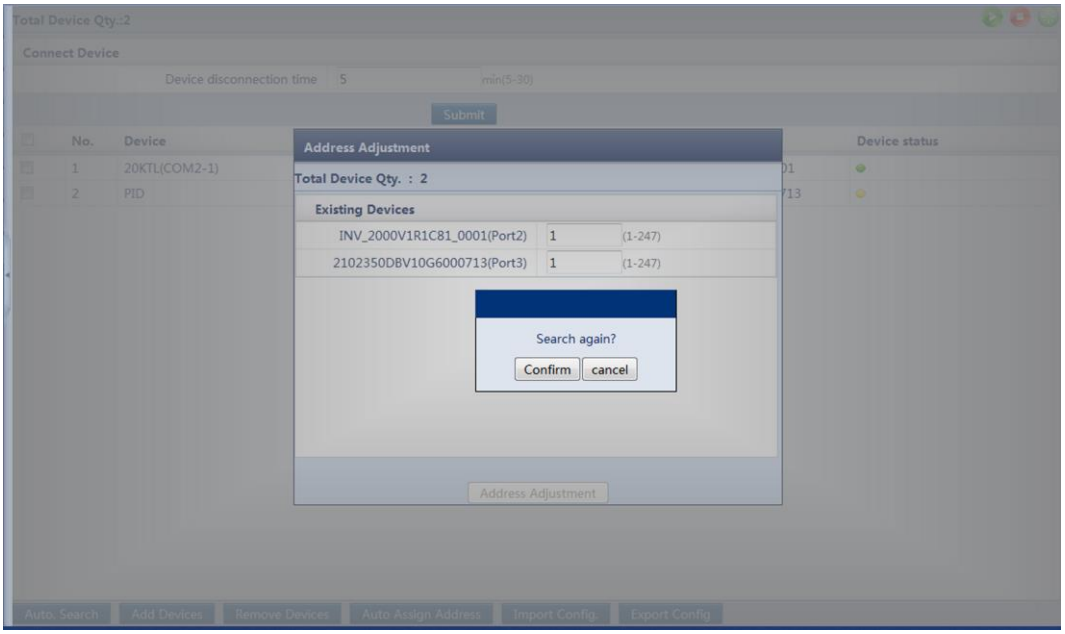
Step 4 In the **Address Adjustment** dialog box, change the device address corresponding to the serial number of the PID module, and then click **Address Adjustment**, as shown in Figure A-4.

Figure A-4 Changing the address



Step 5 Click **OK** to start the automatic searching, as shown in Figure A-5.

Figure A-5 Searching for the device again



Step 6 After the searching is complete, click **OK**.

----End

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A.2 Changing the RS485 Address over the LCD

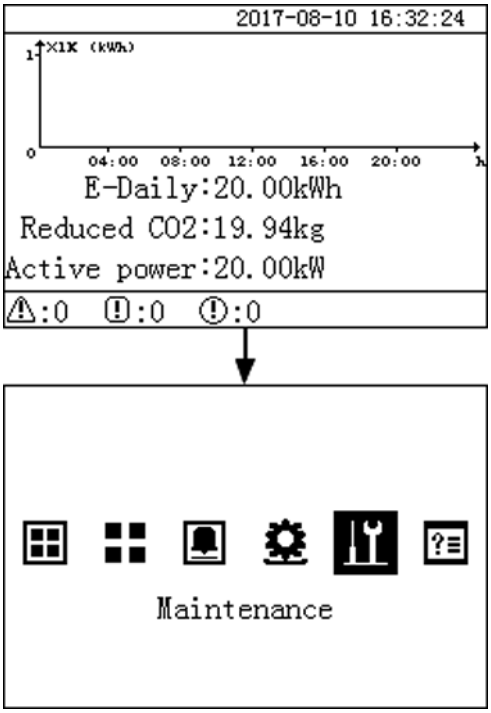
Context

The SmartLogger1000 has a monitoring panel that provides one LCD, three indicators, and four buttons.

Procedure

Step 1 On the default screen of the SmartLogger, press ↵ to display the main menu, and then select , as shown in Figure A-6.

Figure A-6 Main menu



Step 2 On the main menu, press ↵ to display the login screen. Specify **User Name** and **Password**, as shown in Figure A-7. Press ↵ to display the **Maintenance** screen.

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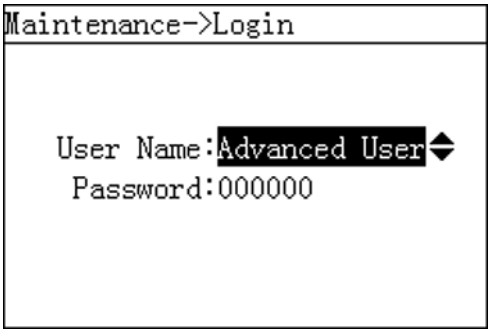
Figure A-7 Login screen



NOTE

- Specify **User Name** and **Password** by pressing ▲ and ▼, and then press ↵ to confirm the user name and password.
- Because of the permission restriction, log in as **Advanced User** or **Special User**. The initial password is **000001** for both **Advanced User** and **Special User**. 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.
- After permission validation succeeds, the system keeps the authentication information for 30 seconds. If you exit from the **Maintenance** screen and log in again within 30 seconds, no identification authentication is required.

Step 3 On the **Maintenance** screen, choose **Device Mgmt.** > **Addr. Allocate** and press ↵, as shown in Figure A-8.

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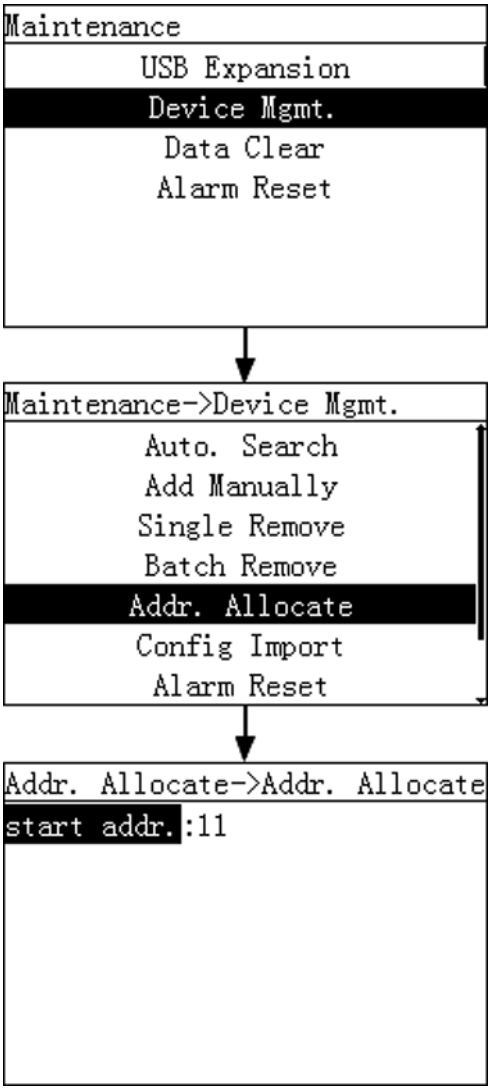
Figure A-8 Addr. Allocate 1



NOTE

Set **start addr.** to a value in the range of 1–247 based on site requirements.

Step 4 Set **start addr.** and then press ↵. On the screen shown in Figure A-9, press ↵ to start automatic addresses allocation.

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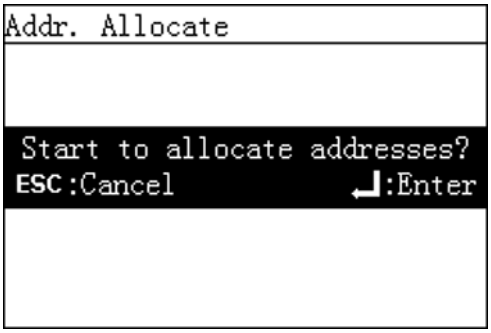
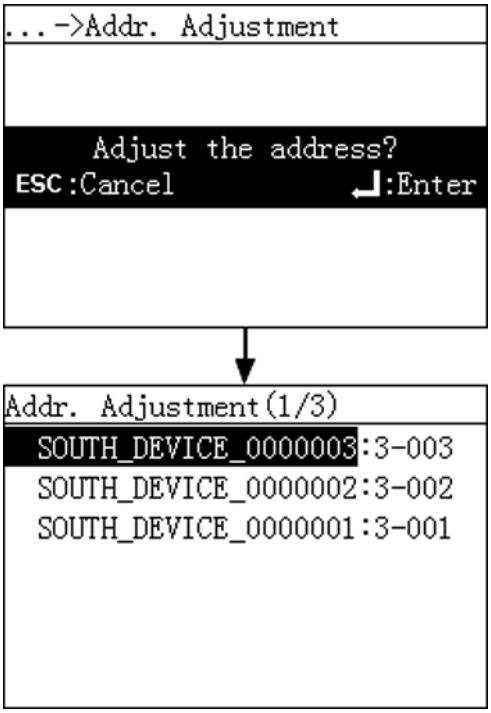
Figure A-9 Addr. Allocate 2



Step 5 After automatic address allocation is complete, press ↵. On the displayed **Addr. Adjustment** screen, press ↵ to adjust addresses, as shown in Figure A-10.

Figure A-10 Addr. Adjustment



NOTE

On the **Addr. Adjustment** screen, press ▲ and ▼ to select the PID module whose address needs to be adjusted; press ↵ to switch between the device name and address bar; press ▲ and ▼ to set the address.

Step 6 Choose **Device Mgmt.** > **Auto. Search**, and press ↵ to search for the device again, as shown in Figure A-11.

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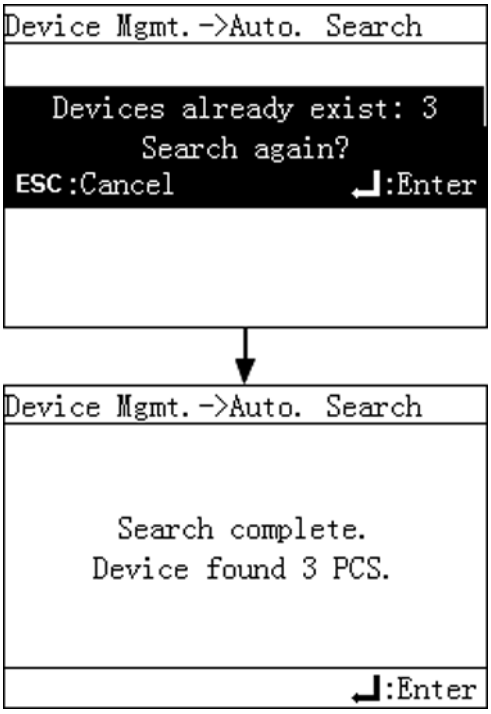
Figure A-11 Searching for a PID module again



Step 7 After the searching is complete, press ↵.

----End

A.3 Changing the RS485 Address over the SUN2000 App

Prerequisites

The app has successfully connected to the SmartLogger2000 through Bluetooth.

- For details about how to connect the app to the SmartLogger2000 through Bluetooth, see the *SUN2000 APP User Manual*.
- This section uses the screens for SUN2000APP 2.2.00 and SmartLogger V200R002C10SPC100 as an example.

Context

If the RS485 address of the PID module conflicts with that of another device, connect the app to the SmartLogger to enable automatic address assigning for the PID module.

Procedure

Step 1 On the app login screen, select **Advanced User**, enter the password, and tap **Log In**. The SmartLogger **Home** screen is displayed.

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Figure A-12 SmartLogger home

NOTE

- The initial password for connecting to the SmartLogger from the app as **Common User**, **Advanced User**, and **Special User** is **00000a**. 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.
- If you log in to the app after the SmartLogger connects to the app for the first time or the SmartLogger factory defaults are restored, the quick settings screen will be displayed. You can set basic parameters for the SmartLogger on the quick settings screen. After the setting, you can modify the parameters after choosing **More** > **Settings**.
- If you do not set basic parameters for the SmartLogger on the quick settings screen, the screen is still displayed when you log in to the app next time.

Step 2 Choose **More** > **Device Mgmt.**. The **Device Mgmt.** screen is displayed.

Step 3 Tap in the upper right corner of the device management screen and choose **Auto Assign Address**, as shown in Figure A-13.

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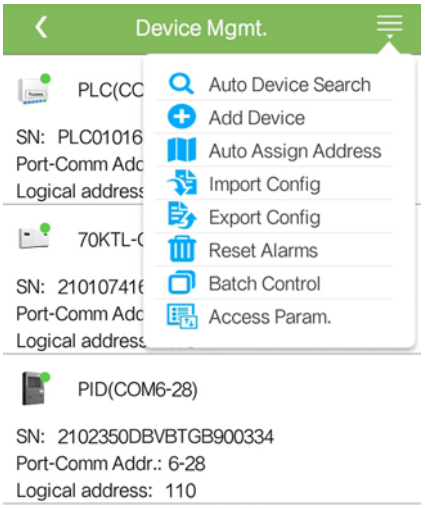
Figure A-13 Automatic address assigning



----End

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B Connecting the SmartLogger to the IMD

Prerequisites

A dry contact output cable, such as a two-core communications cable with a cross-sectional area of 0.2–1.5 mm^2 has been prepared.

Context

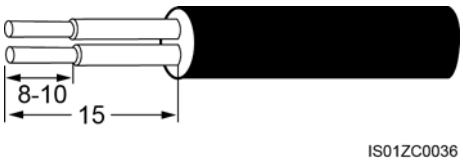
If the PID module is used in a PV power system installed with the IMD, connect the IMD to the SmartLogger. This document introduces the IMD connection using the SmartLogger1000 as an example.

Procedure

Step 1 Select a cable with an appropriate length, strip one end and connect the end to the dry contact port on the IMD.

Step 2 Strip the other end of the cable.

Figure B-1 Stripping a cable (unit: mm)



Step 3 Connect the stripped end to the SmartLogger terminal block.

Step 4 Insert the terminal block into the DO port on the SmartLogger.

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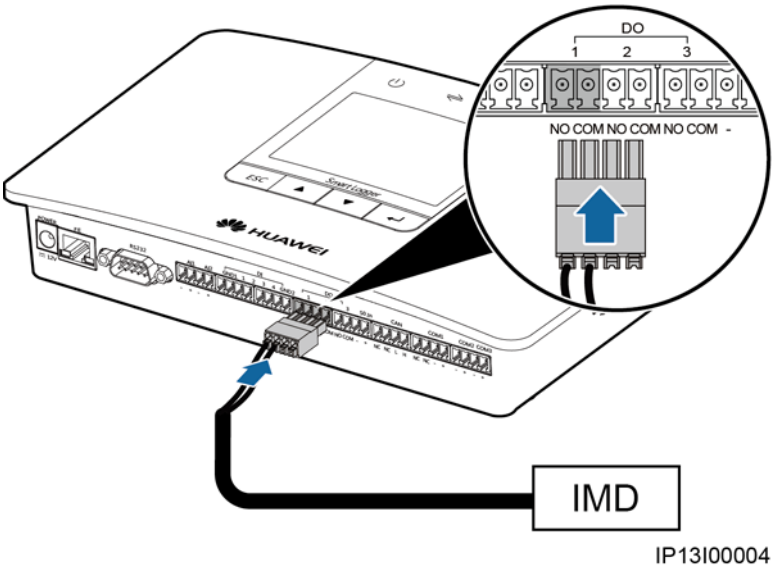
Figure B-2 Connecting the SmartLogger to the IMD



----End

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C Acronyms and Abbreviations

C

CCO	central controller

I

IMD	insulation monitor device

L

LCD	liquid crystal display

P

PE	protective earthing
PID	potential induced degradation
PLC	power line communication
PV	photovoltaic

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