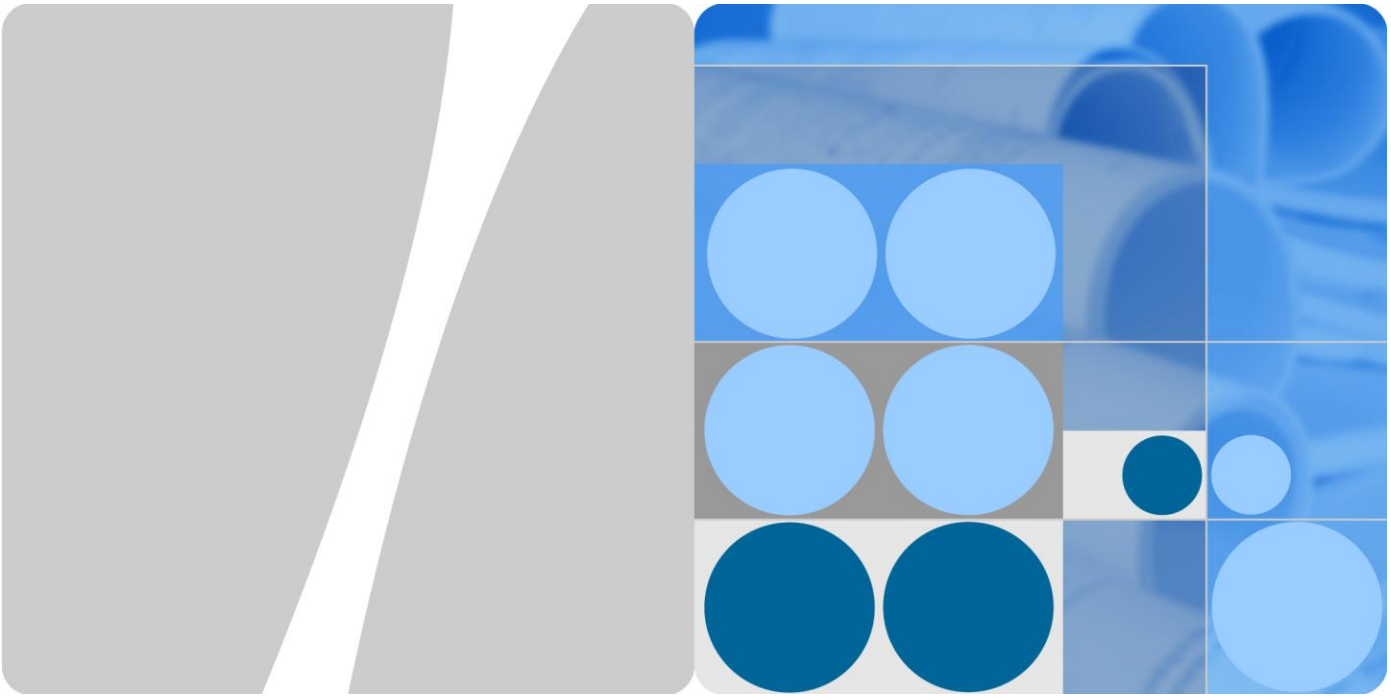

SmartPID2000

User Manual

Issue 02

Date 2017-08-05

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About This Document

Purpose

This document describes the SmartPID2000 in terms of its working principle, electrical connections, parameter configuration, maintenance, and troubleshooting. Get familiar with the SmartPID2000 features, functions, and safety precautions provided in this document before operating the SmartPID2000.

Figures provided in this document are for reference only.

Intended Audience

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

Symbol Conventions

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

Symbol	Description
 DANGER	Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
 WARNING	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
 CAUTION	Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.
 NOTICE	Indicates a potentially hazardous situation which, if not avoided, could result in equipment damage, data loss, performance deterioration, or unanticipated results. **Notice** is used to address practices not related to personal injury.

Symbol	Description
NOTE	Calls attention to important information, best practices and tips. **NOTE** is used to address information not related to personal injury, equipment damage, or environment deterioration.

Change History

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

Issue 02 (2017-08-05)

System requirements in the 2.5 Networking is updated.

Figure 2-8 in the 2.6 Label Conventions is updated.

Table 4-1 in the 4.3.1 Commissioning over the WebUI is updated.

Table 6-2 in the 6 Technical Specifications is updated.

Issue 01 (2017-02-28)

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

Contents

1 Safety Precautions

Personnel Requirements

- Only qualified and trained electrical technicians are allowed to operate the SmartPID2000 (PID module for short).
- 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 chassis because it contains important product information.

System Installation

NOTICE

Before installation, read this document carefully. 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.
- Open the maintenance compartment door of the chassis before connecting cables. Do not perform any operation on other components inside the chassis except connecting cables.

Operation

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 a PID module, ensure that the circuit breaker on the AC side of the PID module is OFF.

- In a smart array controller equipped with one PID module, switch off QF02 and then QF03.
- In a smart array controller equipped with two PID modules, switch off QF02 and QF04, then QF03 and QF05.

- 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.

2 Overview

2.1 Introduction

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 injects voltage between the phase wire and the ground cable of the isolation transformer to adjust the voltage between PV+ or PV– of the PV module and ground to avoid the PID effect, thereby improving energy yields and increasing revenue.

The PID module must work with Huawei SUN2000 and SmartLogger2000 (SmartLogger for short) and is factory-installed in the SmartACU2000B smart array controller (smart array controller for short).

It can automatically switch the output status based on the SUN2000 status, and shut down for protection if a fault occurs.

Benefits

The PID module supports double-column transformers and dual-split transformers. It features centralized compensation, automatic output control, and easy installation, commissioning, and maintenance.

- Supporting double-column transformers and dual-split transformers

  Each smart array controller can house two PID modules. For a dual-split transformer, two PID modules can meet the requirement for avoiding the PID effect in the PV power system.
- Centralized compensation

  The PID module supports both the 1000 V, 1100 V, and 1500 V DC SUN2000s. If a double-column transformer is used, the DC capacity for a single PID module is 5 MW at most. If a dual-split transformer is used, the DC capacity for two PID modules is 7 MW at most. The PID module can simultaneously compensate for all the PV modules for the connected SUN2000s.
- Automatic output control
  - The PID module automatically starts immediately when the SUN2000 exports power to the power grid at day. The PID module injects voltage between the phase wire and the ground cable of the isolation transformer to adjust the voltage between PV+ or PV– and ground to avoid the PID effect.

  - The PID module enters Standby mode automatically after the SUN2000 stops exporting power to the power grid at night.

NOTE

The PID module works properly when the SUN2000 exports power to the power grid after **Reactive power output at night** is set to **Enable**.

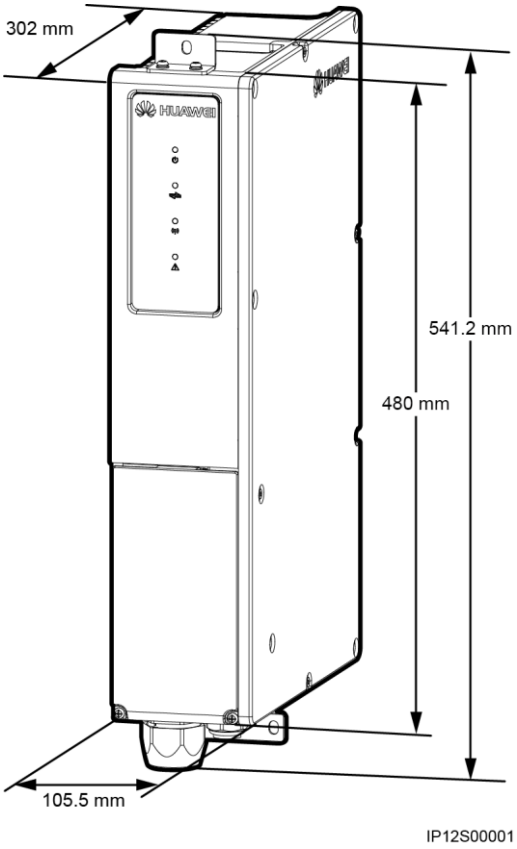
- Easy installation and commissioning
  - The PID module has been wired when it is factory-installed in the smart array controller.
  - The embedded commissioning mode enables commissioning over the SmartLogger embedded WebUI or the local commissioning tool SUN2000 app.
- Easy maintenance
  - On the embedded WebUI of Huawei SmartLogger, you can view the running information, active alarms, and performance data about the PID module, upgrade the firmware of the PID module, export logs, and set running parameters for the PID module.
  - By connecting Huawei SUN2000 app to the PID module over a Bluetooth module or USB data cable, you can also view the running information, active alarms, and performance data about the PID module, upgrade the firmware of the PID module, export logs, and set running parameters for the PID module.
  - If you connect a USB flash drive to the USB port of the PID module, the PID module can read the automatic maintenance script saved in the USB flash drive for firmware upgrade and log export.

2.2 Appearance

Dimensions

Figure 2-1 shows the PID module dimensions.

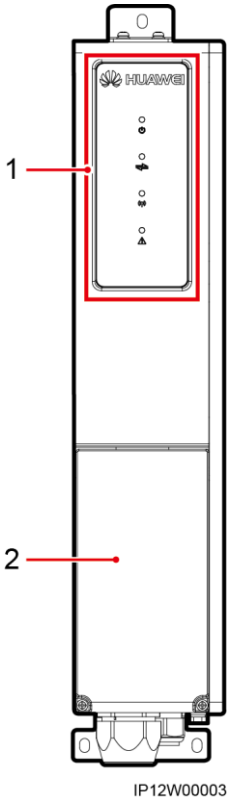
Figure 2-1 PID module dimensions



Front View

Figure 2-2 shows the front view of the PID module.

Figure 2-2 Front view of the PID module



(1) LED Indicators (2) Maintenance compartment door

Table 2-1 describes the LED indicators.

Table 2-1 LED indicator description (from top to bottom)

Indicator	Status	Meaning
Power indicator	Steady green	The PID module is powered on.
	Green off	The PID module is powered off.
Run indicator	Steady green	The PID module works in normal mode and **Running status** is **Starting** or **Running**.
	Blinking green at short intervals (on for 0.5s and then off for 0.5s)	The PID module works in commissioning mode and **Running status** is **Commission: running**.
	Green off	**Running status** is not **Starting**, **Running** or **Commission: running**.

Indicator	Status		Meaning
Communication indicator	Blinking green at short intervals (on for 0.5s and then off for 0.5s)		The PID module is receiving data over RS485.
	Green off		The PID module has not received data over RS485 for 10 seconds.
Fault/Maintenance indicator	Fault state	Steady red	The PID module is faulty.
	Local maintenance state	Blinking green at long intervals (on for 1s and then off for 1s)	Local maintenance is in progress.
		Blinking green at short intervals (on for 0.125s and then off for 0.125s)	Local maintenance fails.
		Green steady on	Local maintenance succeeds.
		Green off	The PID module is not under maintenance.

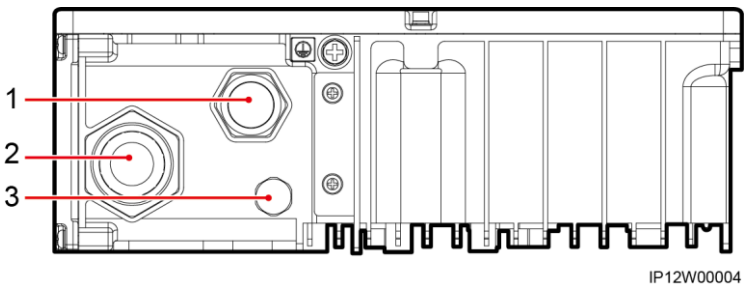
NOTE

- Local maintenance refers to operations performed after a USB flash drive, Bluetooth module, or USB data cable is inserted into the USB port of the PID module. For example, local maintenance includes data import and export using a USB flash drive and connecting to the SUN2000 app over a Bluetooth module or USB data cable.
- If a fault occurs during maintenance, the alarm/maintenance indicator shows the maintenance state first. After the USB flash drive, Bluetooth module, or USB data cable is removed, the indicator shows the fault state.

Bottom View

Figure 2-3 shows the bottom view of the PID module.

Figure 2-3 Bottom view of the PID module



(1) Waterproof connector (2) Waterproof connector for the PID input power cable,

for the PID DO signal cable	functional earthing cable, RS485 communications cable, and protective earthing (PE) cable

(3) Ventilation valve

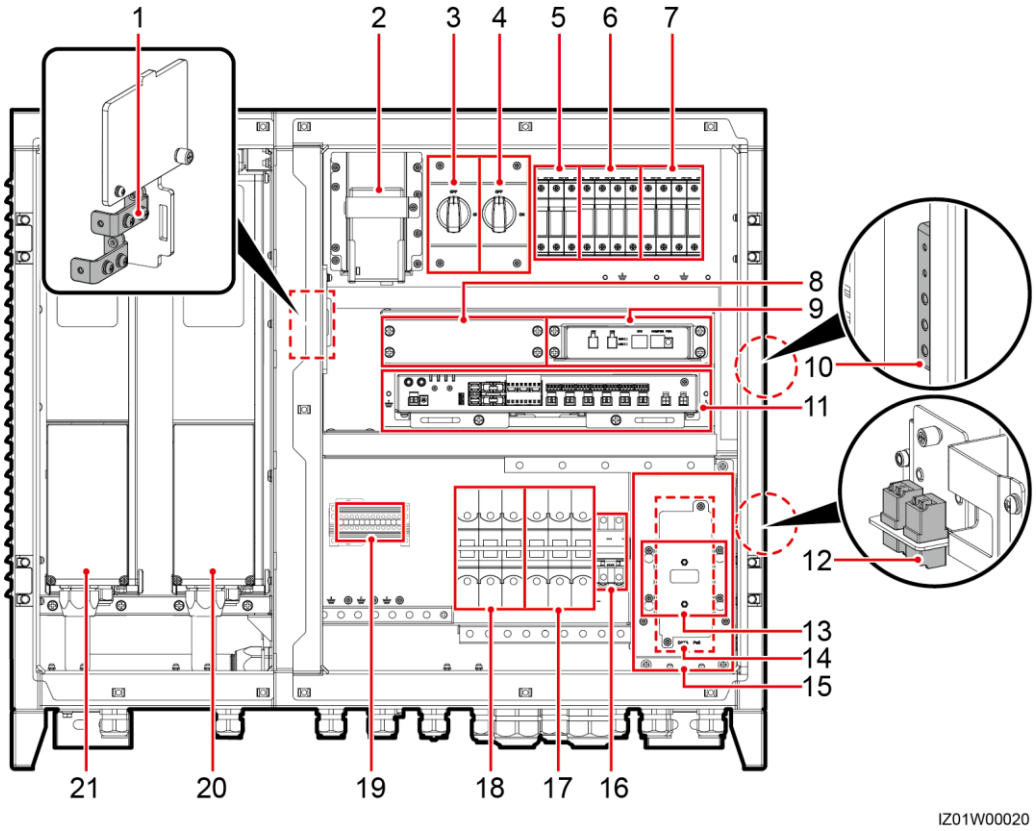
NOTE
There is a standby ground point at the bottom of the PID module.

2.3 Installation Positions

Figure 2-4 shows the positions for the PID module and other components in the smart array controller. Table 2-2 describes the components.

Figures in this section show the smart array controller configured with a power adapter and two PID modules. The smart array controller with one PID module does not contain the PID02 input switch, three-phase SPD 2, PLC CCO module, three-phase input switch 2, and PID02 module.

Figure 2-4 Positions for the PID module and other components



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

Table 2-2 Description about the PID module and other components

No.	Name	Specifications	Quantity	Label
1	Functional earthing bar	N/A	1	• FE01 (PID01 functional earthing bar) • FE02 (PID02 functional earthing bar)
2	Power adapter	• AC input: 100–240 V, 50 Hz/60 Hz • DC output: 12 V/2 A	1	U01
3	PID01 input switch	AC: 3 A/3 P	1	QF03
4	PID02 input switch	AC: 3 A/3 P	1	QF05
5	Single-phase SPD	Uc = 385 V AC 30 kA/60 kA, 8/20 μs	3	F03
6	Three-phase SPD 1	Uc = 680 V AC 20 kA/40 kA, 8/20 μs	4	F01
7	Three-phase SPD 2	Uc = 680 V AC 20 kA/40 kA, 8/20 μs	4	F02
8	Position for the LAN switch	N/A	1	SWITCH
9	PLC CCO	PLC CCO01A	1	PLC CCO
10	PE bar	N/A	1	N/A
11	SmartLogger	SmartLogger2000	1	SmartLogger (SL)
12	Fiber adapter	2LC/PC-2LC/PC-4	2	• OFA01: TX1 RX1 • OFA02: TX2 RX2
13	Position for the POE SPD	N/A	1	N/A
14	Position for the POE module	N/A	1	POE
15	ATB	N/A	1	ATB
16	Single-phase input switch	32 A/2 P	1	QF01
17	Three-phase input switch 2	32 A/3 P	1	QF04

No.	Name	Specifications	Quantity	Label
18	Three-phase input switch 1	32 A/3 P	1	QF02
19	RS485 communications terminal	12P/supporting 1–2.5 mm^2 (or 18–14 AWG) cable connection	1	JX01
20	PID02	SmartPID2000	1	PID02
21	PID01	SmartPID2000	1	PID01

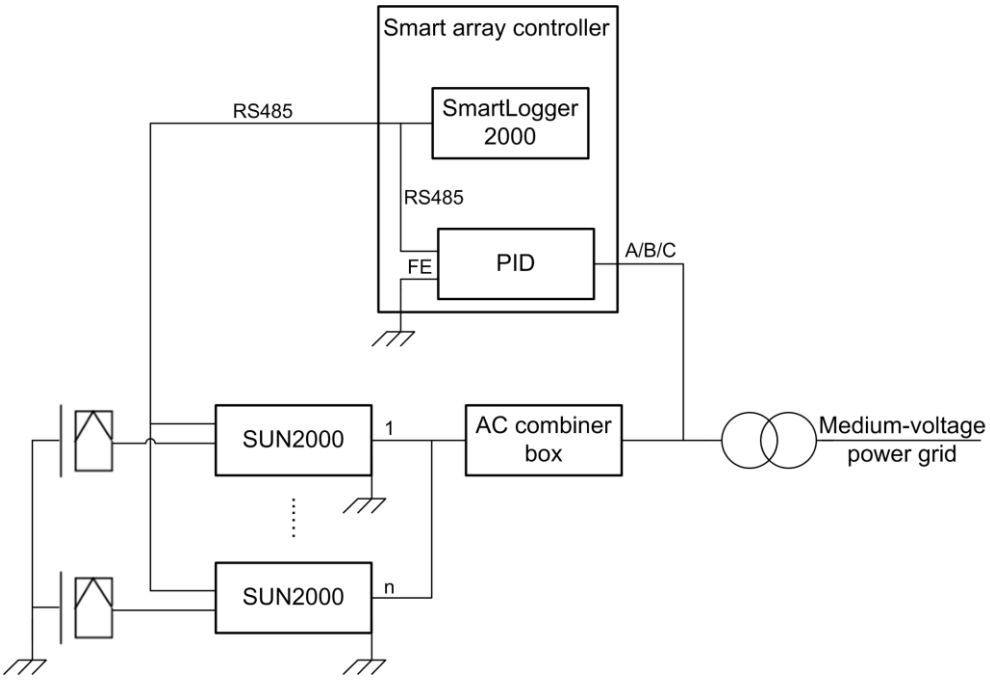
2.4 Working Principle

A PID module is used in a PV array that comprises SUN2000s and is often installed in a smart array controller. In the scenario with a double-column transformer, the DC capacity of the PV array should be less than or equal to 5 MW. In the scenario with a dual-split transformer, the DC capacity of the PV array should be less than or equal to 7 MW.

The PID module connects to a three-phase (A, B, and C) power cable, functional earthing cable, and RS485 communications cable. The PID module communicates with the SmartLogger over an RS485 communications cable. The SmartLogger collects the voltages of all SUN2000s and transfers the voltages to the PID module. Then, the PID module injects voltage between the phase wire and the ground cable of the isolation transformer to adjust the voltage between PV+ or PV– of the PV module and the ground until the voltage becomes less than or equal to zero, thereby surpassing the PID effect.

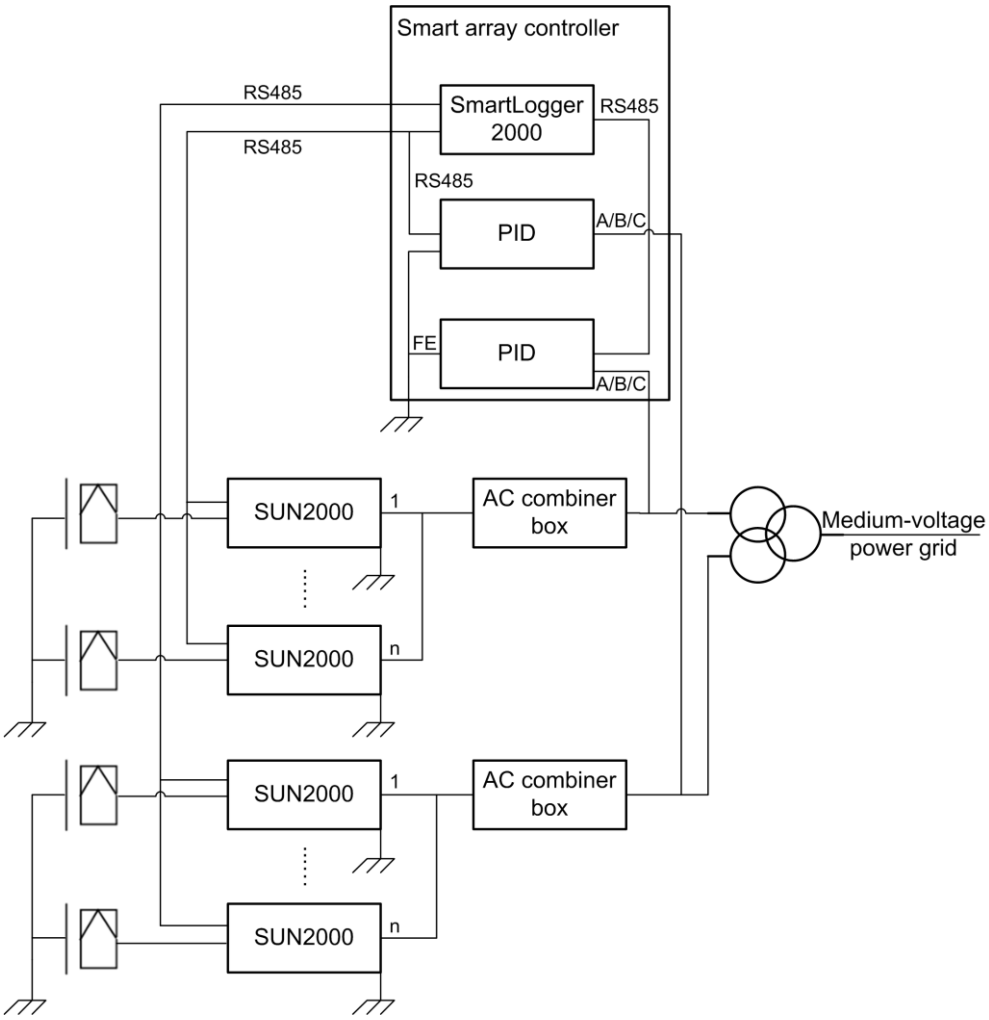
Scenario with a Double-Column Transformer

Figure 2-5 Conceptual diagram for the scenario with a double-column transformer



Scenario with a Dual-Split Transformer

Figure 2-6 Conceptual diagram for the scenario with a dual-split transformer



2.5 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.
- Application scenario requirement: If a double-column transformer is used, select the smart array controller with one PID module. If a dual-split transformer is used, select the smart array controller with two PID modules.
- PV array requirement: When the PID module is used in a PV array that comprises SUN2000s (in the scenario with a double-column transformer, the DC capacity of the PV array should be less than or equal to 5 MW; in the scenario with a dual-split transformer,

the DC capacity of the PV array should be less than or equal to 7 MW), the PV modules in the array must be of the same type.

- Functional earthing requirement: The PID module functional earthing cable should connect to the ground bar on the low-voltage side of the box-type transformer and be grounded reliably.
- AC power cable requirement 1:

  The AC power cables refer to those from the SUN2000 to the AC combiner box, from the AC combiner box to the box-type transformer, from the box-type transformer to the smart array controller, inside the AC combiner box, inside the box-type transformer, and directly or indirectly from the box-type transformer to the busbar on the low-voltage side of the box-type transformer.

  - When the rated three-phase AC input voltage of the smart array controller is 800 V, ensure that the rated operating voltage of the AC power cable to ground is greater than or equal to 1000 V AC.
  - When the rated three-phase AC input voltage of the smart array controller is 500 V, ensure that the rated operating voltage of the AC power cable to ground is greater than or equal to 600 V AC.
- AC power cable requirement 2: The AC power cable from the low-voltage side of the box-type transformer to the smart array controller is at least 3 meters, and a four-core outdoor armored cable with a cross-sectional area of 10 mm^2 is recommended.
- AC power cable connection requirement: The PID module must be applied to 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 connect 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.
- Requirements for the SPD on the AC combiner box and that on the low-voltage side of the box-type transformer:
  - When the rated three-phase AC input voltage of the smart array controller is 800 V, SPDs are connected in 3+1 mode. All SPD modules use piezo-resistors and no gas discharge tube is allowed. The maximum continuous operating voltage (Uc) of each SPD module should be greater than or equal to 680 V AC.
  - When the rated three-phase AC input voltage of the smart array controller is 500 V, SPDs are connected in 3+1 mode. All SPD modules use piezo-resistors and no gas discharge tube is allowed. The maximum continuous operating voltage (Uc) of each SPD module should be greater than or equal to 385 V AC.
- Knife fuse switch requirements: In the scenario with a double-column transformer, one knife fuse switch should be reserved for the busbar on the low-voltage side of the box-type transformer. In the scenario with a dual-split transformer, one knife fuse switch should be reserved for each low-voltage winding main busbar on the low-voltage side of the box-type transformer. This power branch connects to the smart array controller and delivers input voltage to it. This power branch must directly connect to the busbar on the low-voltage side of the box-type transformer, and must not connect to the isolation transformer embedded in the box-type transformer.

System Networking

Figure 2-7 shows the cable connections for the smart array controller in which the PID module is used.

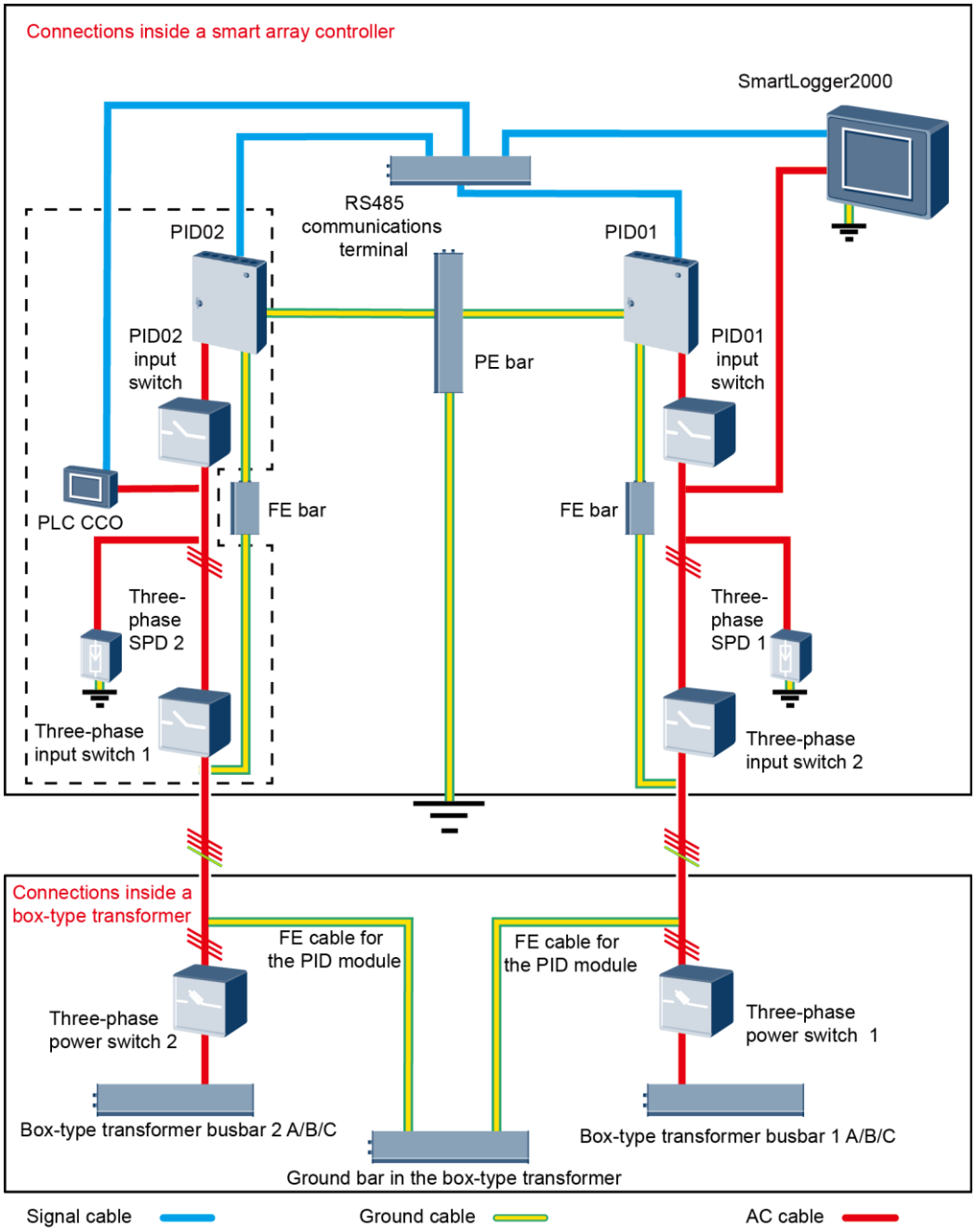
- If a double-column transformer is used, select the smart array controller with one PID module.

- If a dual-split transformer is used, select the smart array controller with two PID modules.

NOTE

For details about the working principle of the smart array controller, see the *SmartACU2000B Smart Array Controller User Manual (with PID Modules, 800 V AC)*.

Figure 2-7 Cable connections



NOTE

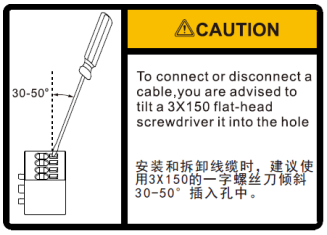
- Components in dashed-line boxes are optional.
- In the box-type transformer, the knife fuse switch serves as the three-phase power switch.

2.6 Label Conventions

Labels

Table 2-3 describes the labels on the PID module chassis and their meanings.

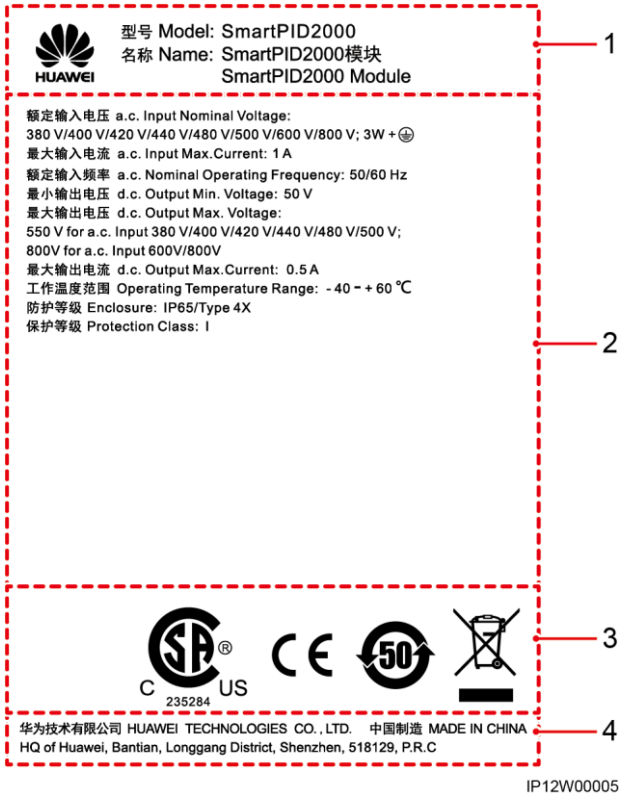
Table 2-3 Label description

Label	Name	Meaning
	Danger high voltage label	High voltage exists after the PID module is powered on. Only qualified electrical technicians are allowed to operate the device.
	Operation warning label	High voltage exists after the PID module is powered on. Therefore, the AC switch must be turned off before you operate the device.
	Scald hazard label	The PID module surface is hot, and you will be scalded if touching the surface.
	Anti-dropping label	When taking the PID module out of the smart array controller, hold the bottom of the PID module to prevent it from falling off.
	Installation or removal reminder label	When installing or removing cables for the PID module, insert a 3x150 flat-head screwdriver into the hole at a tilt of 30–50 degrees to facilitate installation or removal.
	Warranty label	Never open the host panel of the PID module.

Nameplate

On the side of the PID module, there is a nameplate that contains the model information, technical specifications, and compliance symbols, as shown in Figure 2-8.

Figure 2-8 Nameplate



(1) Trademark, product name, and model number

(2) Important technical specifications

(3) Compliance symbols

(4) Company name and country of manufacture

NOTE

The nameplate figure is for reference only.

Table 2-4 Compliance symbols

Symbol	Name	Meaning
C US 235284	CSA certification of America and Canada	The device complies with CSA certification standards.
CE	CE certification mark	The device complies with Conformité Européenne (CE) certification standards.

Symbol	Name	Meaning
	Environmentally friendly use period (EFUP)	The PID module is environmentally friendly for the specified period.
	EU WEEE mark	Do not dispose of the PID module as household garbage.

3 Electrical Connections

- The cable colors shown in the electrical connection diagrams provided in this chapter are for reference only. Select cables in accordance with local cable specifications (green-and-yellow cables are only used for grounding).
- The PID module is factory-installed in the smart array controller, and the PE cable, RS485 communications cable, and three-phase AC power cable have already connected to the PID module.

3.1 Port Description

Figure 3-1 shows the ports on the PID module.

Figure 3-1 Ports on the PID module

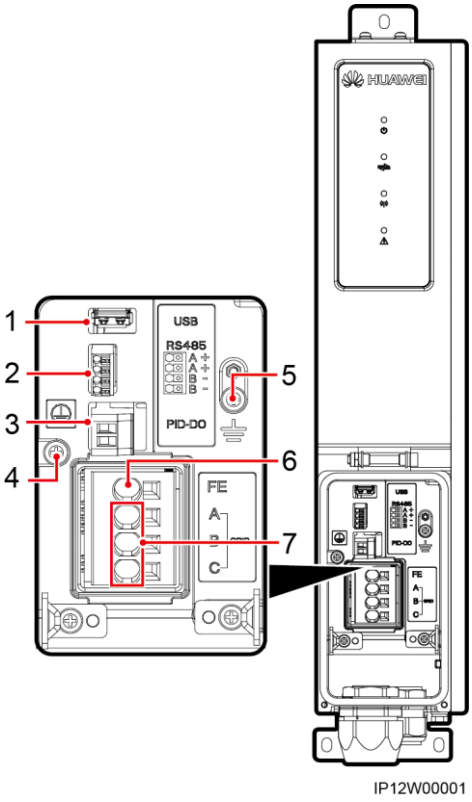


Table 3-1 PID module port description

No.	Silk Screen	Description
1	USB	USB port, used for connecting to a Bluetooth module, USB data cable, or USB flash drive for maintaining or commissioning a PID module
2	RS485 (A+, A+, B-, B-)	Connects to the SmartLogger for RS485 communication.
3	PID-DO	Dry contact
4	⏚	Protective earthing for the PID module
5	⏚	Shield earthing for an RS485 communications cable
6	FE	Port for functional earthing
7	A, B, C	Power grid line voltage port; A/B/C corresponds to the three-phase input of the power grid.

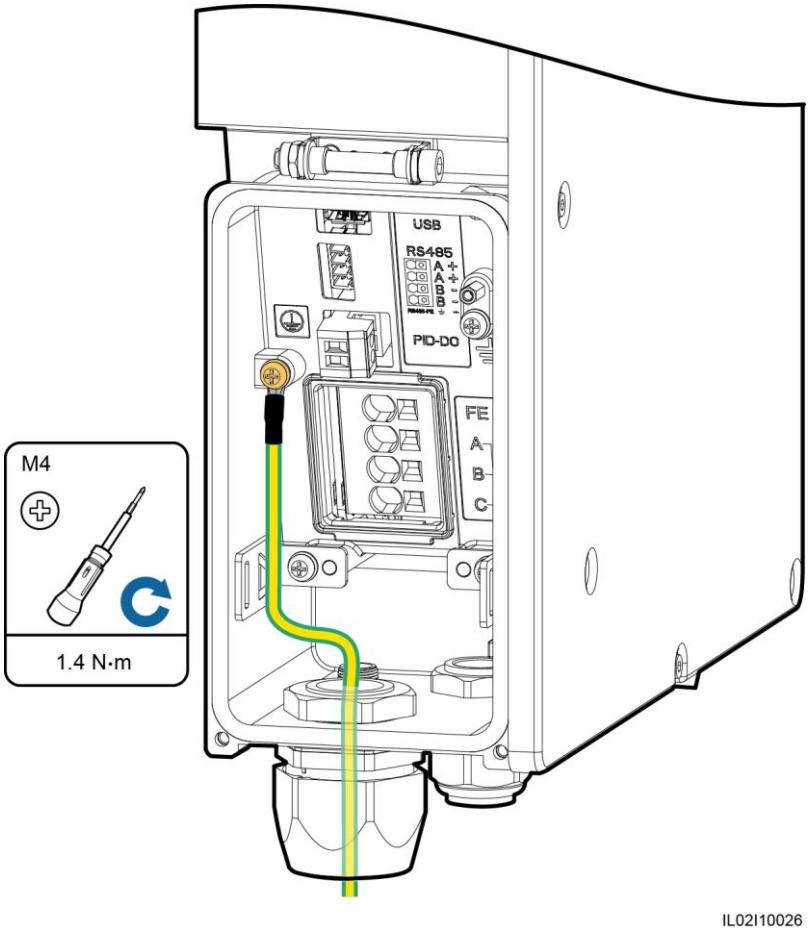
3.2 Connecting the PID Module PE Cable

Procedure

Step 1 Secure the PE cable.

NOTE
Connect the PID module PE cable to the PE bar in the smart array controller.

Figure 3-2 Connecting a PE cable



----End

3.3 Connecting the SmartLogger

Context

The PID module connects to the SmartLogger over the RS485 communications terminals (JX01) in the smart array controller. The RS485 communications ports on the PID module are from an RS485 terminal block. Table 3-2 defines the functions of the RS485 terminal block.

Table 3-2 Functions of the RS485 terminal block

Silk Screen	Port Definition	Function
A+	RS485A	RS485 differential signal+
B-	RS485B	RS485 differential signal–

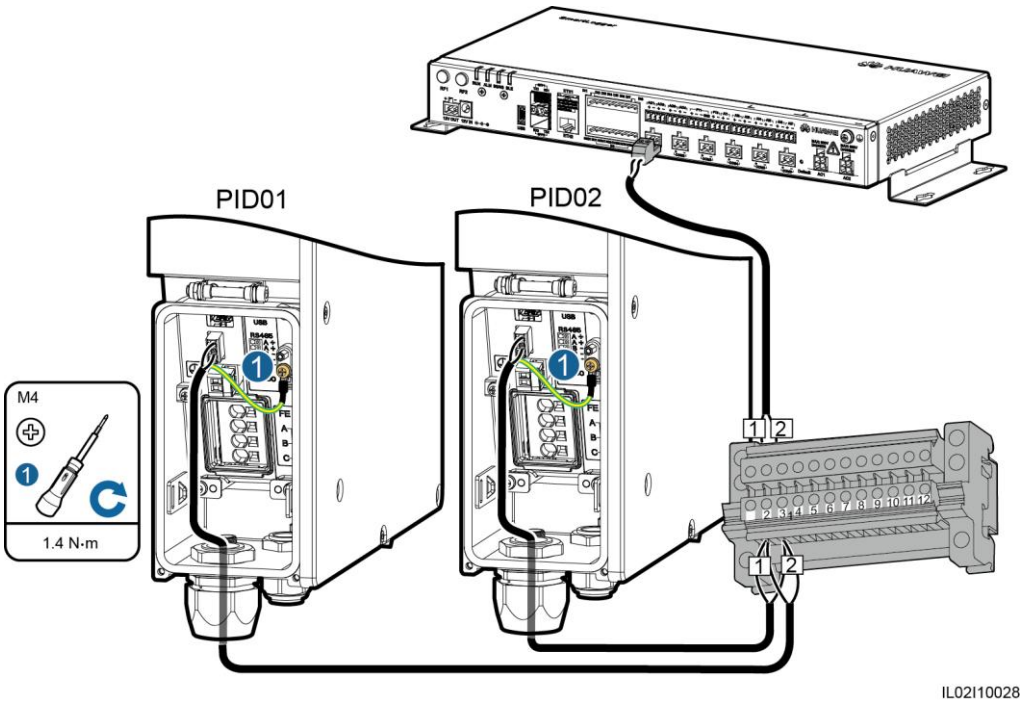
Connect the RS485 communications cable to any A+ and B– ports of the RS485 communications ports on the PID module, and connect the shield layer to the RS485 shield ground point.

This section uses the smart array controller with two PID modules as an example to describe how to connect the PID module to the SmartLogger. For the smart array controller with one PID module, refer to the way of connecting one route of cable connection.

Procedure

Step 1 Connect the RS485 communications cable to the RS485 communications port on the PID module. The RS485 communications cable is a two-core balanced twisted pair (brown and black) with a cross-sectional area of 22 AWG (0.3 mm^2).

Figure 3-3 Connecting the SmartLogger



Step 2 Connect the other end of the cable to the JX01 terminal block.

Step 3 Connect the RS485 communications cable to the COM1 port on the SmartLogger over the JX01 terminal block.

----End

3.4 Connecting the Three-Phase AC Power Cable

Context

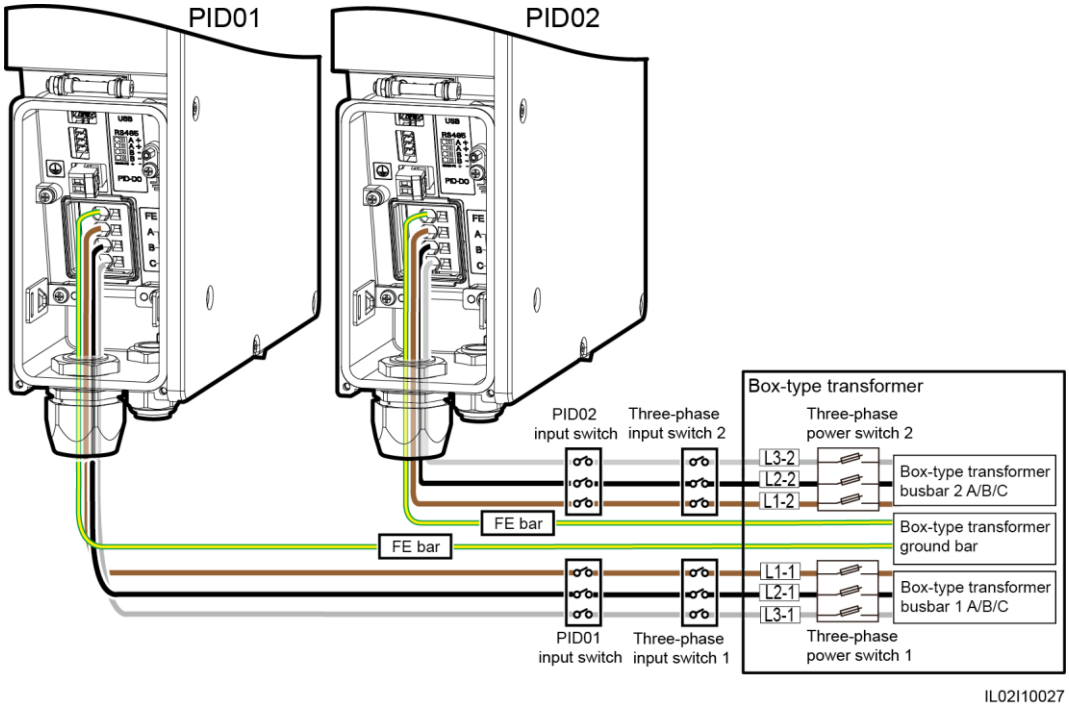
- For the smart array controller with one PID module, connect the three-phase AC power cable to the QF03 switch, and the functional earthing cable to the FE01 port on the functional earthing bar.
- For the smart array controller with two PID modules, connect the first route of three-phase AC power cable to the QF03 switch, and the corresponding functional earthing cable to the FE01 port on the functional earthing bar. Connect the second route of three-phase AC power cable to the QF05 switch, and the corresponding functional earthing cable to the FE02 port on the functional earthing bar.

This section describes how to connect three-phase AC power cables for the smart array controller with two PID modules. For details about how to connect a three-phase AC power cable for the smart array controller with one PID module, refer to the way of connecting the first route of three-phase AC power cable.

Procedure

Step 1 Connect the three phase wires A, B, and C of the AC input power cable for the PID module to the PID input switch, and connect the functional earthing cable to the functional earthing bar.

Figure 3-4 Connecting a three-phase AC power cable



NOTE

- The three phase wires A, B, and C of the AC input power cable for the PID01 module connect to A, B, and C of busbar 1 in the box-type transformer over the QF03, QF02, and three-phase power switch, respectively.

- The three phase wires A, B, and C of the AC input power cable for the PID02 module connect to A, B, and C of busbar 2 in the box-type transformer over the QF05, QF04, and three-phase power switch, respectively.
- The functional earthing cables for the PID01 and PID02 modules connect to the ground bar in the box-type transformer over the functional earthing bars FE01 and FE02, respectively.

----End

3.5 Connecting an IMD

Prerequisites

A dry contact output power cable, such as a two-core communications cable with a cross-sectional area of 0.5–1 mm^2 has been prepared.

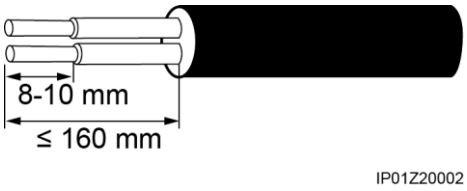
Context

The PID module connects to the insulation monitor device (IMD) to detect the insulation resistance between the power grid on the AC side of the PID module and ground.

Procedure

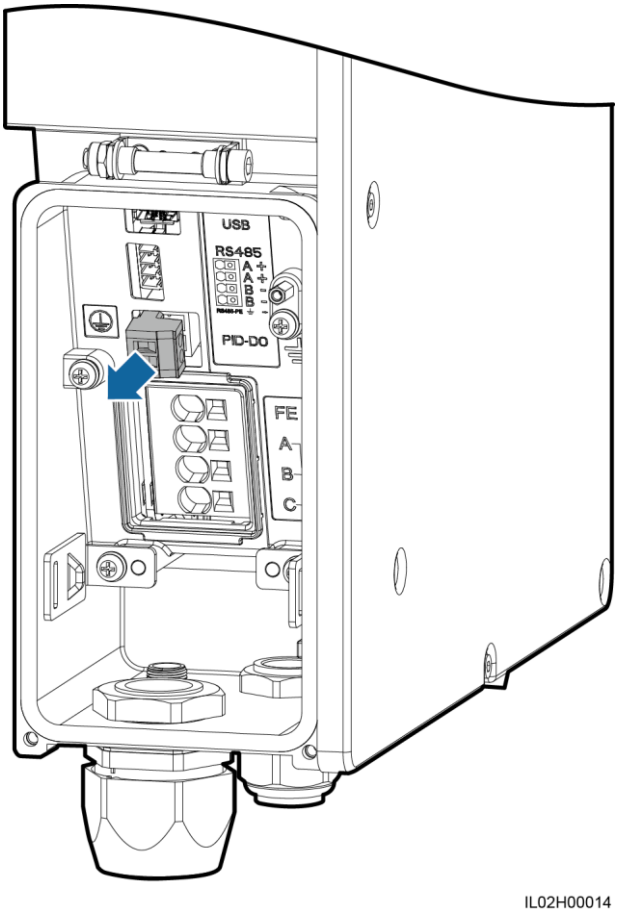
Step 1 Strip an appropriate length from both ends of the cable using a wire stripper, as shown in Figure 3-5.

Figure 3-5 Stripping a cable



Step 2 Remove the terminal block from the PID-DO port.

Figure 3-6 Removing a terminal block

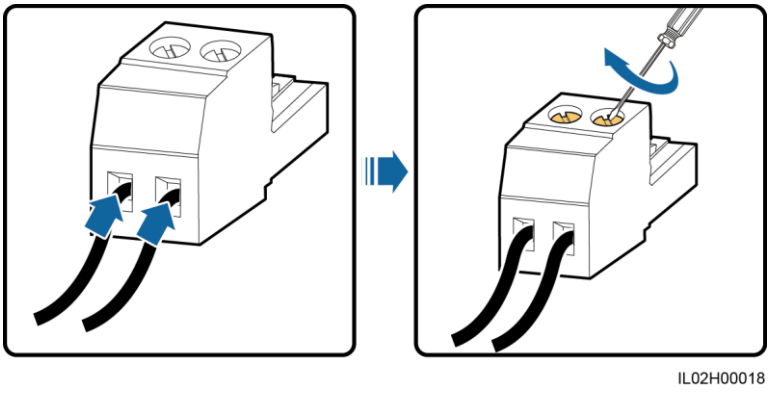


NOTE

A flat-head screwdriver can be used to remove the terminal block.

Step 3 Connect one end of the cable to the terminal block, and tighten the screw on the terminal using a 3x150 flat-head screwdriver.

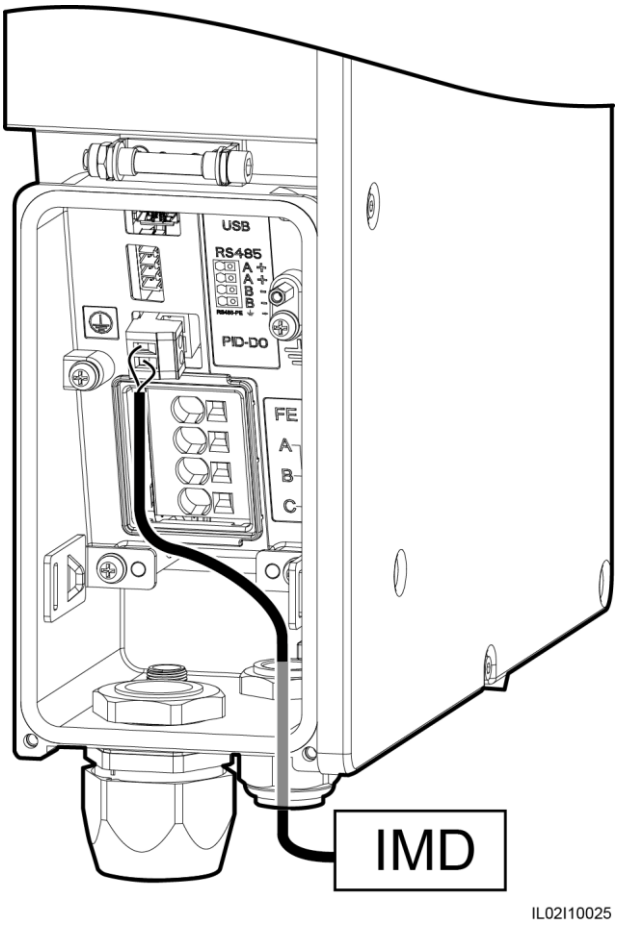
Figure 3-7 Connecting a cable



Step 4 Insert the terminal block into the PID-DO port.

Step 5 Connect the other end of the cable to the dry contact port on the IMD.

Figure 3-8 Connecting an IMD



----End

4 System Operation

4.1 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 RS485 communications cable is connected correctly and securely.
3. All ground cables are connected securely and reliably.
4. All AC input power cables and functional earthing cables are connected correctly and securely, without open circuits or short circuits.
5. The maintenance compartment door is closed and the door screws are tightened.
6. All used connectors at the chassis bottom are applied with firestop putty.

4.2 System Power-On

Prerequisites

- You have completed the power-on check.
- The SmartLogger has been powered on.
- You have put on insulation gloves.

Procedure

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

Step 2 Turn on the miniature circuit breaker in the box-type transformer.

Step 3 Turn on the PID module input switch in the smart array controller.

- If the smart array controller is equipped with one PID module, turn on the PID module switch **QF03**.
- If the smart array controller is equipped with two PID modules, turn on the PID module switches **QF03** and **QF05**.

Step 4 Turn on the three-phase input switch in the smart array controller.

- If the smart array controller is equipped with one PID module, turn on the switch **QF02**.
- If the smart array controller is equipped with two PID modules, turn on the switches **QF02** and **QF04**.

----End

4.3 System Commissioning

The PID module parameters can be set over the Huawei SmartLogger embedded WebUI or SUN2000 app.

NOTE

For updates of the SmartLogger or SUN2000 app, see the *SmartLogger2000 User Manual* or *SUN2000 APP User Manual*.

4.3.1 Commissioning over the WebUI

Prerequisites

You have connected the SmartLogger to a PC.

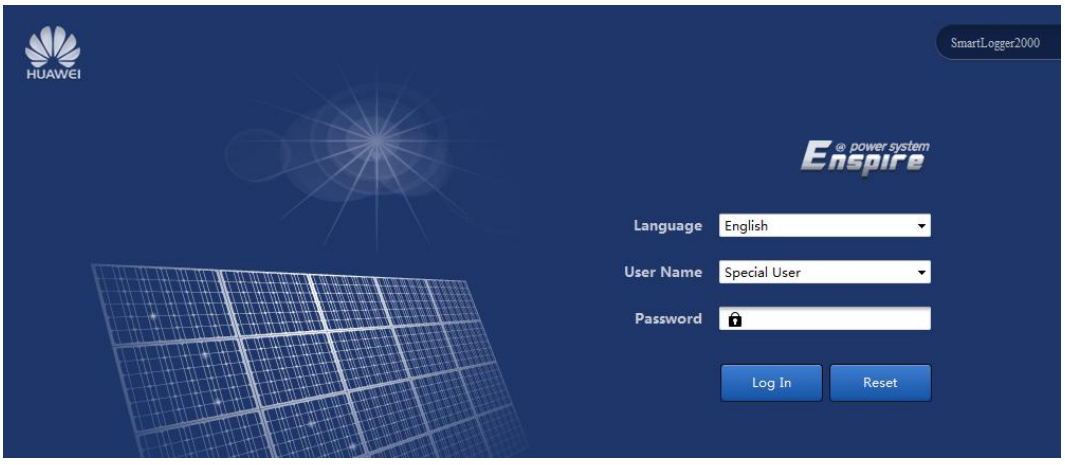
NOTE

This section uses the WebUIs for SmartLogger V200R001C30SPC103 as an example.

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 4-1. Specify **Language**, **User Name**, and **Password**, and click **Log In** to display the main menu.

Figure 4-1 WebUI login page



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**.

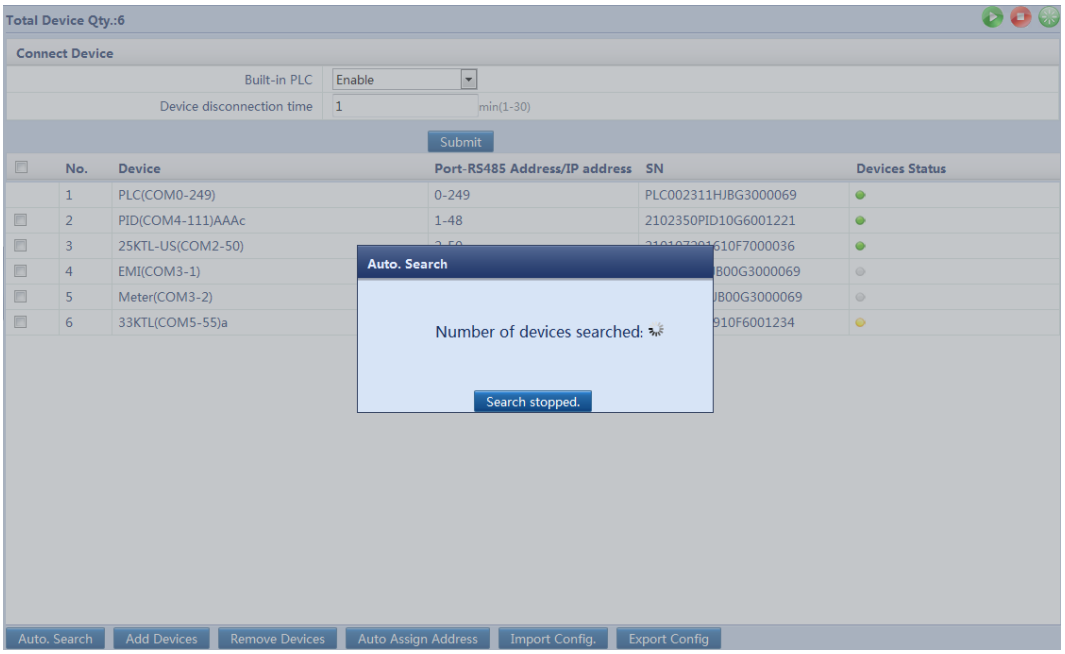
- If web pages cannot be opened, specify security settings for the browser. For details, see **Preparations for Login** in the *SmartLogger2000 User Manual*.
- For the SmartLogger software versions that are SmartLogger V200R001C30SPC103 and later, the initial password is **Changeme**.
- After the first login, it is recommended that you change the initial password immediately to ensure account security.

Step 2 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 4-2.

NOTE

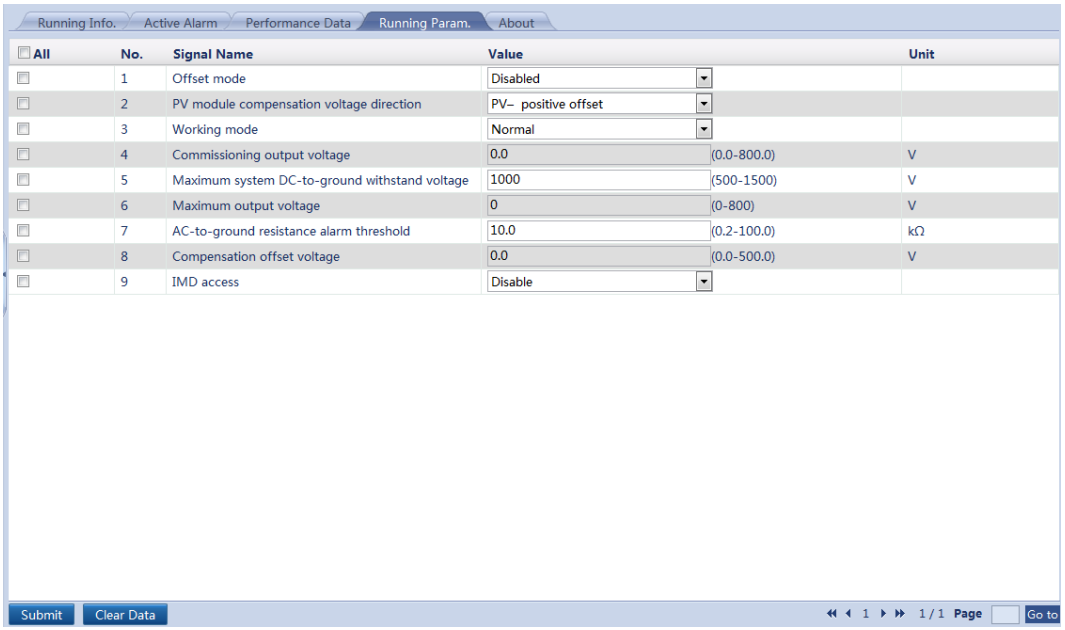
- You can also click **Add Devices** and manually add a PID module.
- If no device is searched, check that the RS485 communications cable is properly connected and that the baud rate of the PID module is the same as the baud rate of the RS485 port on the SmartLogger.
- If a double-column transformer is used, the default RS485 address for the PID module is 199. If a dual-split transformer is used, the default RS485 addresses for the PID modules are 199 and 200. You can change the RS485 address over the SmartLogger WebUI or SUN2000 app. For details, see A Changing the RS485 Address.

Figure 4-2 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 4-3.

Figure 4-3 Setting running parameters



NOTE

- The parameter setting page shown in Figure 4-3 is for SmartLogger V200R001C30SPC103. To view the SmartLogger version information, choose **Monitoring** > **About** or **Maintenance** > **Product Information**.
- Running parameters cannot be set if the PID module is in the **Disconnect** state.
- If a dual-split transformer is used and the SUN2000s connecting to PID modules have the same configurations, you are advised to set the operating parameters of both PID modules to the same.

Table 4-1 describes the parameters.

Table 4-1 Running parameter descriptions

No.	Parameter Name	Function	Value	Description
1	Offset mode	Specifies the offset mode of the PID module.	Disabled	Select **Disabled** if the PID module is not required.
			N/PE	Select **N/PE** if the PID module is required to use voltage output from the power grid.
2	PV module compensa	Specifies the offset direction of the PID module.	PV– positive offset	• **PV– positive offset** refers to raising the voltage between PV– and ground to above 0 V through voltage compensation.

No.	Parameter Name	Function	Value	Description
	tion voltage direction		PV+ negative offset	Select **PV– positive offset** for P-type PV modules or the N-type PV modules that comprise the solar cells whose positive and negative polarities are on different sides. For example, P-type PV modules, HIT, CIS, thin-film PV modules, and CdTe PV modules meet the requirement for PV– positive offset. • **PV+ negative offset** refers to lowering the voltage between PV+ and ground to below 0 V through voltage compensation. Select **PV+ negative offset** for the N-type PV modules that comprise the solar cells whose positive and negative polarities are on the same side. **NOTE** When designing a PV plant, the design institute or user should ask the PV module vendor about the direction of voltage compensation for resisting the PID effect.
3	Working mode	Specifies the working mode of the PID module.	Normal	In normal mode, the PID module operates automatically after the PID module, SUN2000, and SmartLogger communicate with each other properly.
			Commissioning	In commissioning mode, set **Commissioning output voltage**. The PID module delivers voltage based on the commissioning output voltage. **NOTE** To check whether the PID module functions properly upon first power-on, it is recommended that **Working mode** be set to **Commissioning**.
4	Commissioning output voltage	Specifies the output voltage when the PID module works in commissioning mode.	0–800 V	It is recommended that the commissioning output voltage for the 1000 V/1100 V SUN2000 be set to a value ranging from 50 V to 400 V, and that the commissioning output voltage for the 1500 V SUN2000 be set to a value ranging from 50 V to 600 V. **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.
5	Maximum system DC-to-ground withstand voltage	Specifies the voltages between the PV side and ground and between the AC side and ground in normal mode.	500–1500 V	Specifies the lower thresholds of the maximum voltage ranges between the SUN2000 DC side (including the SUN2000, PV module, cable, SPD, and switch) and ground in a PV power system. The default value is 1000 V. For the 1500 V SUN2000, the recommended value is 1500 V.

No.	Parameter Name	Function	Value	Description
6	Maximum output voltage	Specifies the highest output voltage of the PID module in normal or commissioning mode.	0–800 V	• For the 1000 V/1100 V SUN2000, the value ranges from 0 V to 550 V. The parameter value indicates the maximum DC raise voltage between PV and ground. • For the 1500 V SUN2000, the value ranges from 0 V to 800 V. The parameter value indicates the maximum DC raise voltage between PV and ground. The default value is 500 V. For the 1500 V SUN2000, the recommended value is 800 V.
7	AC-to-ground resistance alarm threshold	Specifies the alarm threshold for the impedance between the AC side of the PID module and ground.	0.2–100 kΩ	You can set an alarm threshold for the impedance between the AC grid and ground for the PID module. If the detected impedance is below the threshold, the PID module will generate an alarm.
8	Compensation offset voltage	Specifies the compensation offset voltage between PV and ground after the PID module operates stably.	0–500 V	The value ranges from 0–500 V, and the default value is **50 V**. • If **PV module compensation voltage direction** is set to **PV– positive offset**, the value indicates the positive voltage between PV- and ground, and the compensation range is 0–500 V. • If **PV module compensation voltage direction** is set to **PV+ negative offset**, the value indicates the negative voltage between PV+ and ground, and the compensation range is –500 V to 0 V. **NOTE** • If **Compensation offset voltage** is set to 500 V, the PID module provides the maximum output to enhance the voltage compensation effect. The output voltage amplitude of the PID module is automatically capped to ensure the safety of a PV power plant. The output voltage amplitude is also related to the maximum system DC-to-ground withstand voltage and maximum output voltage. • After this parameter is set and the PID module works properly, use a multimeter that is set to the DC position to measure the voltage between the PV input terminal of the SUN2000 and ground. (For **PV– positive offset**, check whether the voltage between PV– and ground is greater than or equal to 0 V. For **PV+ negative offset**, check whether the voltage between PV+ and ground is equal to or less than 0 V.)
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 to 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** and **Periodic IMD runtime**.

No.	Parameter Name	Function	Value	Description
			Disable	Select **Disable** if you forbid the access of IMDs.
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 min	The IMD device 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 min	The PID module is standby when the IMD device is operating.

Step 4 Set **Working mode** to **Commissioning** and set **commissioning output voltage**. 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.

If they are different, check whether the PID module is correctly grounded.

Step 5 Set **Working mode** to **Normal**.

NOTE

- Wait 3 minutes when the PID module connects to the SmartLogger for the first time. When the running state displayed on the SmartLogger page is **Running**, the PID module is working properly.
- To verify the voltage between the PV terminal of the SUN2000 and ground after the PID module is used in the networked system, disconnect one PV input terminal of the SUN2000. Then use a multimeter that is set to the DC position to measure the voltage between the disconnected PV input terminal and ground. (For **PV– positive offset**, check whether the voltage between PV– and ground is greater than or equal to 0 V. For **PV+ negative offset**, check whether the voltage between PV+ and ground is equal to or less than 0 V.)

----End

4.3.2 Commissioning over the SUN2000 App

PID module parameters can be set over the SUN2000 app in the following ways:

- Connect to the SmartLogger.
- Connect to the PID module.

4.3.2.1 Connecting to the SmartLogger

Prerequisites

The app has successfully connected to the SmartLogger through Bluetooth.

NOTE

- For details about how to connect the app to the SmartLogger through Bluetooth, see the *SUN2000 APP User Manual*.
- This section uses the screens for SUN2000APP V200R001C20SPC010 and SmartLogger V200R001C30SPC103 as an example.

Context

After the 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 on the **Monitoring** screen.

Procedure

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

Figure 4-4 SmartLogger home screen

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 when connecting to the app for the first time. To ensure account security, change the password promptly and update it regularly.
- 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.

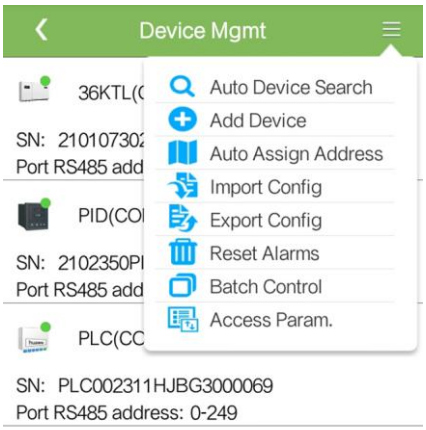
Step 2 Choose **More** > **Monitoring**. The **Device Mgmt** screen is displayed.

Step 3 Click  in the upper right corner of the device management screen and choose **Auto Device Search**, as shown in Figure 4-5.

NOTE

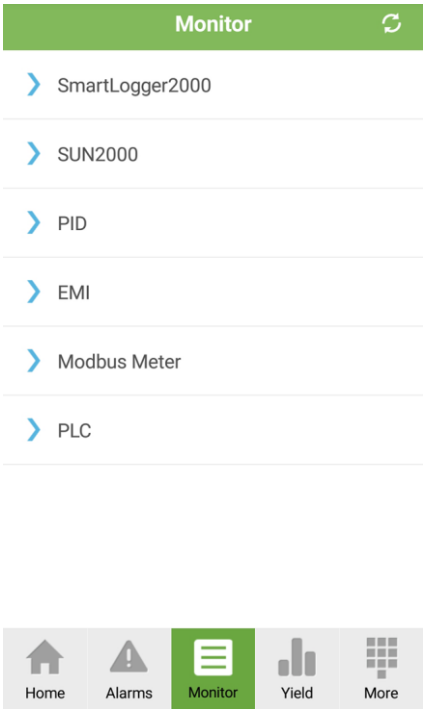
- The SmartLogger can automatically detect and connect to the PID module.
- You can also click **Add Devices** and manually add a PID module.
- If no device is searched, check that the RS485 communications cable is properly connected and that the baud rate of the PID module is the same as the baud rate of the RS485 port on the SmartLogger.
- If a double-column transformer is used, the default RS485 address for the PID module is 199. If a dual-split transformer is used, the default RS485 addresses for the PID modules are 199 and 200. You can change the RS485 address over the SmartLogger WebUI or SUN2000 app. For details, see A Changing the RS485 Address.

Figure 4-5 Device management screen



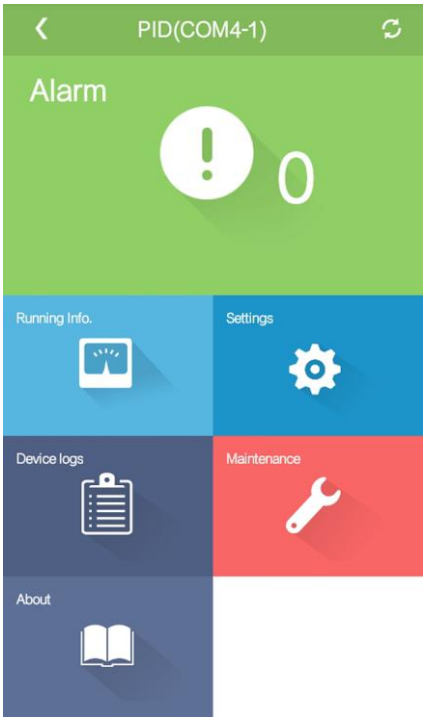
Step 4 Tap **Monitoring** on the SmartLogger home screen to access the device monitoring screen, as shown in Figure 4-6.

Figure 4-6 Device monitoring screen



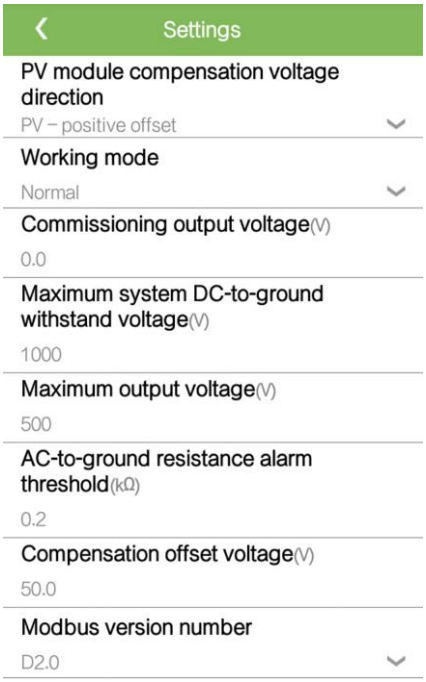
Step 5 Choose **PID** on the device monitoring screen to access the main menu screen of the PID module, as shown in Figure 4-7.

Figure 4-7 Main menu screen of the PID module



Step 6 Tap **Settings** to access the settings screen and set PID module running parameters, as shown in Figure 4-8.

Figure 4-8 Settings screen



NOTE

- For details about how to set running parameters for the PID module, see Table 4-1 in 4.3.1 Commissioning over the WebUI.
- Running parameters cannot be set if the PID module is in the **Disconnect** state.

Step 7 Set **Working mode** to **Commissioning** and set **commissioning output voltage**. 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.

If they are different, check whether the PID module is correctly grounded.

Step 8 Set **Working mode** to **Normal**.

NOTE

- Wait 3 minutes when the PID module connects to the SmartLogger for the first time. When the running state displayed on the SmartLogger page is **Running**, the PID module is working properly.
- To verify the voltage between the PV terminal of the SUN2000 and ground after the PID module is used in the networked system, disconnect one PV input terminal of the SUN2000. Then use a multimeter that is set to the DC position to measure the voltage between the disconnected PV input terminal and ground. (For **PV– positive offset**, check whether the voltage between PV– and ground is greater than or equal to 0 V. For **PV+ negative offset**, check whether the voltage between PV+ and ground is equal to or less than 0 V.)

----End

4.3.2.2 Connecting to the PID Module

Prerequisites

The app has been connected to the PID module over a Bluetooth module or a USB data cable.

NOTE

- For details about how to connect the app to the PID module, see the *SUN2000 APP User Manual*.
- This section uses the screens for SUN2000APP V200R001C20SPC010 and SmartPID2000 V100R001C00 as an example.

NOTICE

The Bluetooth module used for connecting the app to the PID module must be USB-Adapter2000-B.

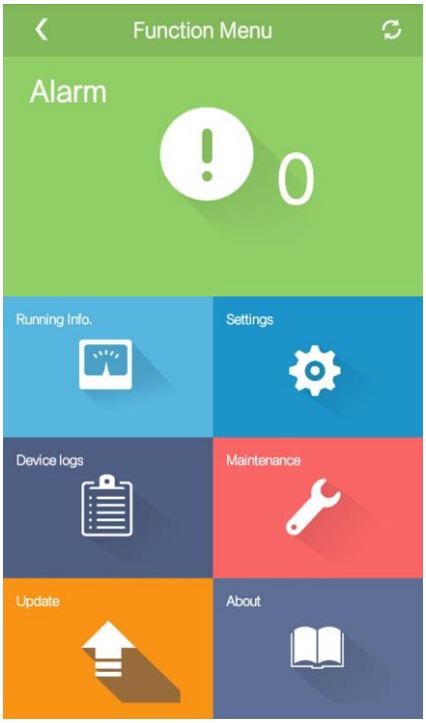
Context

After the app successfully connects to the PID module, set protection and feature parameters on the **Settings** screen, and set PID module running parameters on the **Maintenance** screen.

Procedure

Step 1 On the app login screen, select **Advanced User**, enter the password, and tap **Log In**. The main menu screen of the PID module is displayed, as shown in Figure 4-9.

Figure 4-9 Main menu screen of the PID module



NOTE

- The initial password for connecting to the PID module from the app as **Common User**, **Advanced User**, and **Special User** is **00000a**. Use the initial password when connecting to the app for the first time. To ensure account security, change the password promptly and update it regularly.
- If you log in to the app after the PID module connects to the app for the first time or PID module factory defaults are restored, the quick settings screen will be displayed. On the quick settings screen, you can set basic parameters for the PID module. After setting parameters, you can modify the parameters after tapping **Settings** on the main menu screen.
- If you do not set basic parameters for the PID module on the quick settings screen, the screen is still displayed when you log in to the app next time.

Step 2 Choose **Function Menu** > **Settings** and set protection and feature parameters for the PID module, as shown in Figure 4-10 and Figure 4-11.

NOTE

- For details about how to set running parameters for the PID module, see Table 4-1 in 4.3.1 Commissioning over the WebUI.
- Running parameters cannot be set if the PID module is in the **Disconnect** state.

Figure 4-10 Setting protection parameters

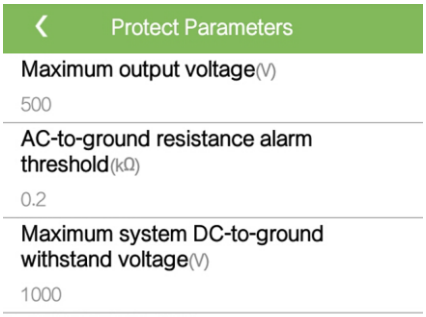
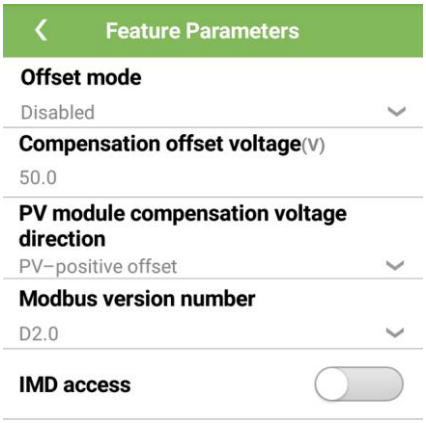
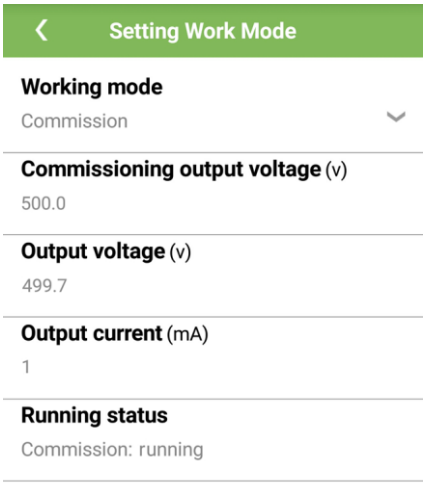


Figure 4-11 Setting feature parameters



Step 3 Choose **Function Menu** > **Maintenance** > **Setting Work Mode**, set **Working mode** to **Commissioning**, and set **Commissioning output voltage**, as shown in Figure 4-12.

Figure 4-12 Setting a working mode



Step 4 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 voltages.

If they are different, check whether the PID module is correctly grounded.

Step 5 Set **Working mode** to **Normal**.

NOTE

- When the running state displayed on the working mode screen is **Running**, the PID module is working properly.
- To verify the voltage between the PV terminal of the SUN2000 and ground after the PID module is used in the networked system, disconnect one PV input terminal of the SUN2000. Then use a multimeter that is set to the DC position to measure the voltage between the disconnected PV input terminal and ground. (For **PV– positive offset**, check whether the voltage between PV– and ground is greater than or equal to 0 V. For **PV+ negative offset**, check whether the voltage between PV+ and ground is equal to or less than 0 V.)

----End

4.4 Man-Machine Interaction

4.4.1 Operations with a USB Flash Drive

USB flash drives of SanDisk, Netac, and Kingston are recommended. Other brands may not be recognizable.

4.4.1.1 Exporting Logs

Procedure

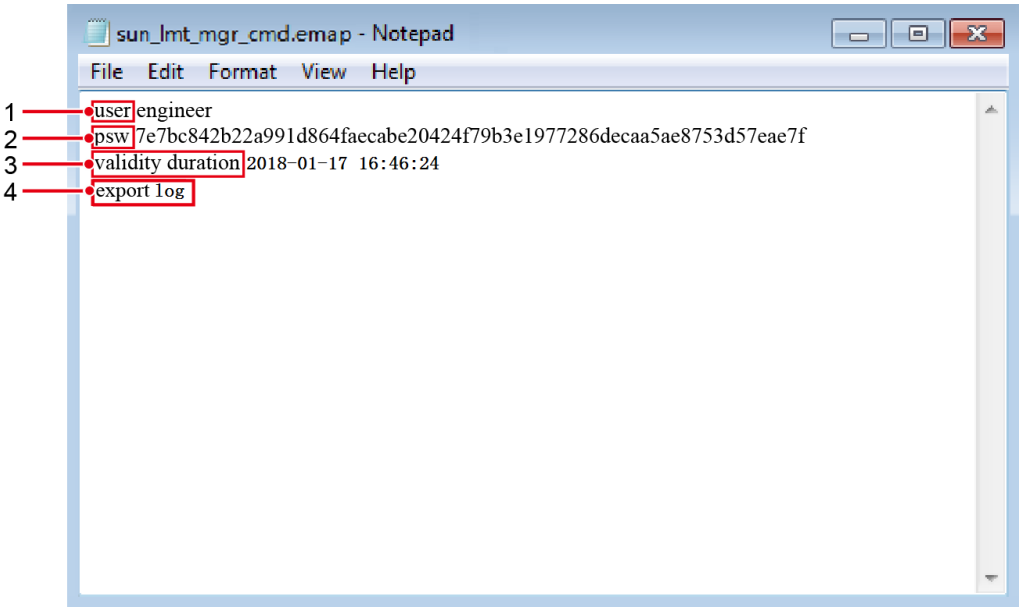
Step 1 Generate a boot script file by choosing **Tool Kit** > **Local maintenance script** > **PID maintenance script** on the SUN2000 app. For details, see the *SUN2000 APP User Manual*.

NOTE
Use the screens for SUN2000APP V200R001C20SPC010 as an example.

Step 2 Import the boot script file to a computer.

(Optional) The boot script file can be opened as a .txt file, as shown in Figure 4-13.

Figure 4-13 Boot script file



No.	Meaning	Remarks
1	User name	• Advanced User: engineer • Special User: admin
2	Ciphertext	The ciphertext varies depending on the login password of the PID module.
3	Script validity period	The script validity period varies depending on the script export time.
4	Command	Different command settings can produce different commands. • Data export command: export log • Upgrade command: upgrade

Step 3 Copy the boot script file to the root directory of a USB flash drive.

Step 4 Connect the USB flash drive to the USB port. The system automatically identifies the USB flash drive and executes all commands specified in the boot script file. View the LED indicators to determine the operating status.

NOTICE

Verify that the ciphertext in the boot script file matches the login password of the PID module. Otherwise, if you insert the USB flash drive for five consecutive times, the user account will be locked for 10 minutes.

Table 4-2 LED indicator description

LED Indicator	Status	Meaning
	Off	There is no operation with a USB flash drive.
	Blinking green at long intervals (on for 1s and then off for 1s)	There is an operation with a USB flash drive.
	Blinking green at short intervals (on for 0.125s and then off for 0.125s)	An operation with a USB flash drive has failed.
	Steady green	An operation with a USB flash drive is successful.

Step 5 Insert the USB flash drive into a computer and check the exported logs.

NOTE

After logs are exported, the boot script file and exported log file are stored in the root directory of the USB flash drive.

----End

4.4.1.2 Upgrade

Prerequisites

You have obtained the PID module upgrade package with the help of the supplier or Huawei engineers.

Context

This section uses SmartPID2000 V100R001C00SPC*XXX* as an example.

Procedure

Step 1 Decompress the upgrade package.

The upgrade package you obtained is **SmartPID2000V100R001C00SPC***XXX*_package.zip. Ensure that the extracted files include:

- SmartPID2000.bin
- SmartPID2000_Master_Release.bin
- SmartPID2000_Slave_Release.bin
- SmartPID2000_CPLD.bin
- config.txt
- vercfg.xml
- sun_lmt_mgr_cmd.emap (This is a boot script file.)

NOTICE

- If the initial password (**00000a**) is used to log in to the PID module as **Advanced User**, there is no need to perform Step 2 to Step 4.
- If a non-initial password is used to log in to the PID module as **Advanced User**, perform Step 2 to Step 6.

Step 2 Generate a boot script file by choosing **Tool Kit** > **Local maintenance script** > **PID maintenance script** on the SUN2000 app. For details, see the *SUN2000 APP User Manual*.

NOTE
Use the screens for SUN2000APP V200R001C20SPC010 as an example.

Step 3 Import the boot script file to a computer.

Step 4 Replace the boot script file in the upgrade package with the one generated by the SUN2000 app.

Step 5 Copy the extracted files to the root directory of the USB flash drive.

Step 6 Connect the USB flash drive to the USB port. The system automatically identifies the USB flash drive and executes all commands specified in the boot script file. View the LED indicators to determine the operating status.

NOTICE

Verify that the ciphertext in the boot script file matches the login password of the PID module. Otherwise, if you insert the USB flash drive for five consecutive times, the user account will be locked for 10 minutes.

Table 4-3 LED indicator description

LED Indicator	Status	Meaning
	Off	There is no operation with a USB flash drive.
	Blinking green at long intervals (on for 1s and then off for 1s)	Upgrading with a USB flash drive is in progress.

LED Indicator	Status	Meaning
	Blinking green at short intervals (on for 0.125s and then off for 0.125s)	Upgrading with a USB flash drive has failed.
	Steady green	Upgrading with a USB flash drive is successful.

NOTE

The system automatically restarts when the upgrade is completed. All indicators are off during the restart. After the restart, the preceding indicator is blinking green slowly (on for 1s and then off for 1s) for 1 minute until becoming steady on, which indicates that the upgrade is successful.

Step 7 Connect the SUN2000 app to the PID module, choose **About** from the main menu of the PID module, and check whether the firmware version is the target one.

----End

4.4.2 Operations with a SmartLogger

For details about how to upgrade the firmware and export logs for the PID module over a SmartLogger, see the *SmartLogger2000 User Manual*.

4.4.3 Operations with the SUN2000 App

For details about how to upgrade the firmware and export logs for the PID module over the SUN2000 app, see the *SUN2000 APP User Manual*.

5 Maintenance

5.1 Alarms

DANGER

If cables need to be reconnected during alarm handling, open the maintenance compartment and turn off the AC input switch for the PID module. Then wait for at least 1 minute and perform operations on the PID module.

Table 5-1 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 5-1 Alarms

Alarm ID	Alarm	Severity	Cause	Impact on the System	Measure
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.

Alarm ID	Alarm	Severity	Cause	Impact on the System	Measure
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.
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 the **Working mode** of the PID module is **Normal**. If not, set the working mode of the PID module to **Normal**. 2. For details, see 4.3 System Commissioning.
1921	Incorrect wiring	Major	1. The functional earthing cable is not or loosely connected. 2. The PE cable is not or loosely connected.	The PID module does not work and generates no output. The PID module should be restarted to clear the alarm.	1. Check the input power cable, functional earthing cable, and PE cable for the PID module. If any cable is not properly connected, reconnect it securely. 2. If the alarm is generated frequently, contact Huawei technical support.

Alarm ID	Alarm	Severity	Cause	Impact on the System	Measure
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.
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.
1930	Device fault	Major	The PID module is faulty.	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 cause IDs Restart the PID module. 3. If the alarm is generated frequently, contact Huawei technical support.

Alarm ID	Alarm	Severity	Cause	Impact on the System	Measure
1931	Abnormal AC-to-ground resistance	Major	The system AC-to-ground resistance is lower than the threshold.	The PID module does not work.	1. Check the resistance between the AC power cable and the ground. If the resistance is abnormal, reconnect and secure the cable. 2. Check the ground resistance of each inverter in the system and calculate the resistance in parallel. If the result is below the detection threshold, change the threshold. 3. If the alarm is generated frequently, contact Huawei technical support.

5.2 Troubleshooting

DANGER

If cables need to be reconnected during troubleshooting, open the maintenance compartment and turn off the AC input switch for the PID module. Then wait for at least 1 minute and perform operations on the PID module.

For details, see Table 5-2.

Table 5-2 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.

No.	Symptom	Possible Cause	Measure
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 parameter values are incorrect. 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.	1. Check the RS485 communications cable connection. If any cable is loose, drops off, or is reversely connected, rectify the connection. 2. Check the RS485 communications parameter settings and ensure that the baud rate is set correctly. 3. Set the RS485 communications address of the PID module to be within the search scope configured for the SmartLogger. 4. The default address is 199 for the PID01, and 200 for the PID02. Check whether the COM port connected to the PID module is also connected to a device with the address 199 or 200. If so, reset the RS485 address for the PID module or change the address of that device and then connect the PID module. 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 SmartPID2000 V100R001C00, the matched SmartLogger software versions are SmartLogger V200R001C30SPC103 and later. • If the software version is updated in future, contact Huawei technical support.

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, choose **Maintenance** > **Device Mgmt.** > **Connect Device** and 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 SmartPID2000 V100R001C00, the matched SmartLogger software versions are SmartLogger V200R001C30SPC103 and later. • If the software version is updated in future, contact Huawei technical support.
5	If both the PID module and IMD are connected in the PV system, the power grid will power off after the PID module is started.	The PID module running parameter is incorrectly set.	Set the PID module running parameter **IMD access** to **Enable**.

5.3 Replacing a PID Module

Prerequisites

- The PID module has failed.
- A spare PID module of the same model is available and functional.

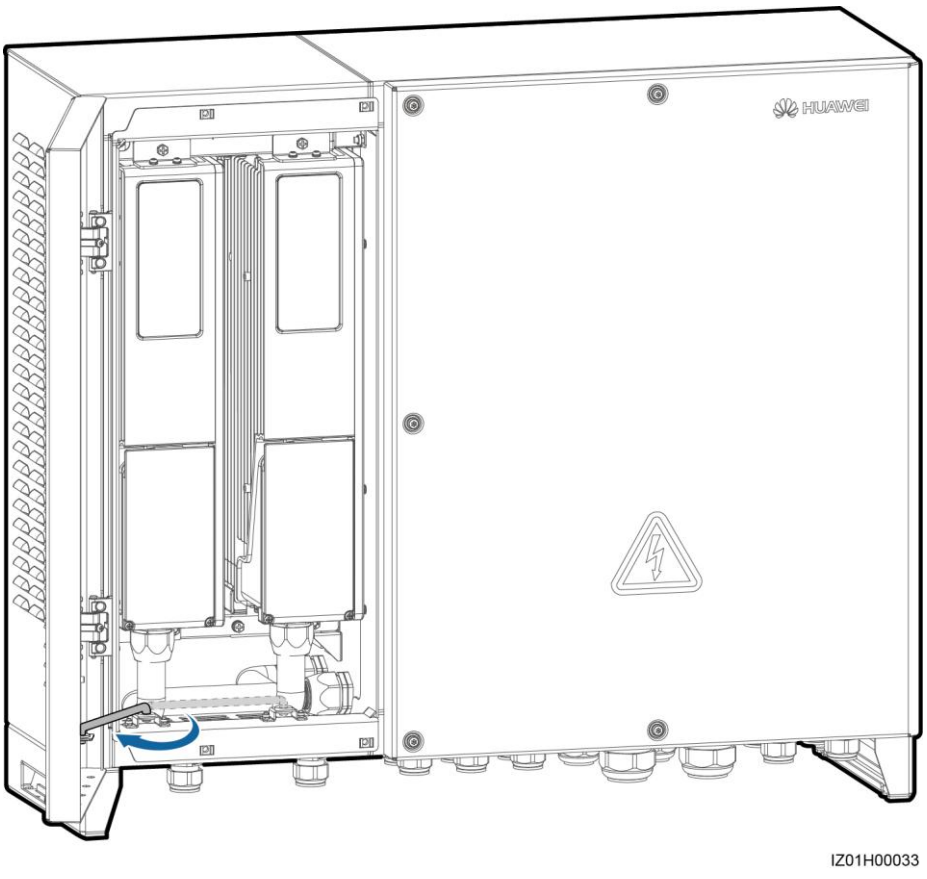
NOTE

This section uses the smart array controller with two PID modules as an example. The two PID modules are replaced in the same way.

Procedure

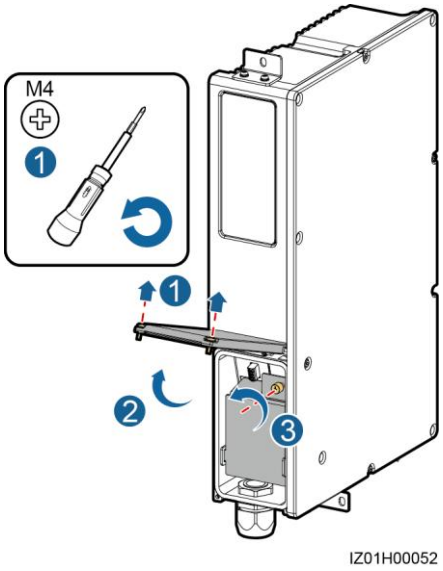
Step 1 Open the PID module cabinet door of the smart array controller and adjust the support bar.

Figure 5-1 Adjusting a support bar



Step 2 Open the PID module maintenance compartment door, and remove the cover from the connection box.

Figure 5-2 Removing a connection box cover



Step 3 Disconnect cables from the faulty PID module, and label the cables.

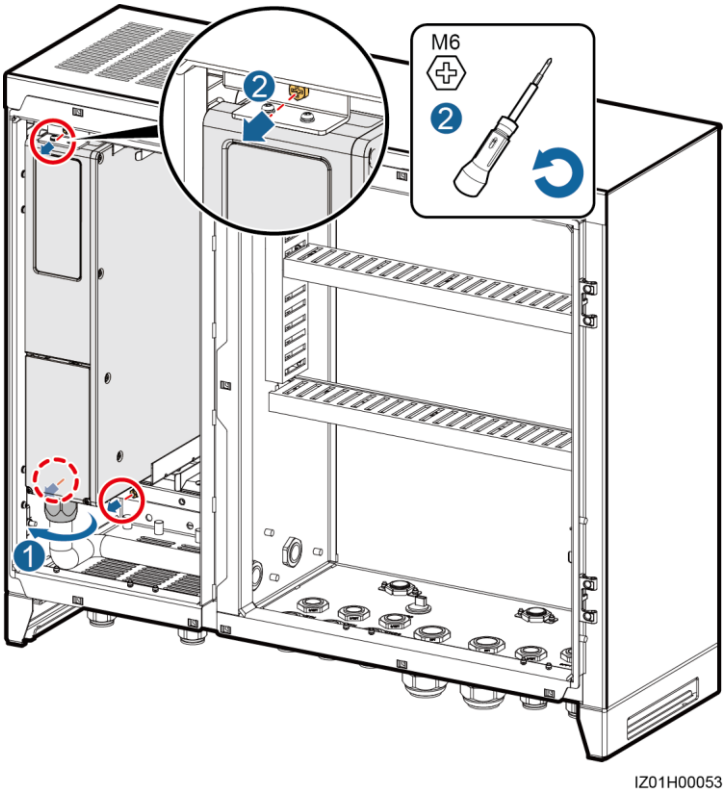
NOTE

When disconnecting the PID module input and power cables (three-phase AC power cable and FE cable), you are advised to insert a 3x150 flat-head screwdriver into the hole at a tilt of 30–50 degrees and pull out the cables.

Step 4 Remove the cable routing pipe connector from the faulty PID module.

Step 5 Remove the faulty PID module with one hand holding the bottom and the other holding the top.

Figure 5-3 Removing a PID module



Step 6 Install the new PID module. Secure the PID module by tightening the removed M6 screws to a torque of 2 N•m.

Step 7 Open the PID module maintenance compartment door, and remove the cover from the connection box.

Step 8 Connect the cables to the new PID module based on the cable labels.

NOTE

When connecting the PID module input and output cables (three-phase AC power cable and functional earthing cable), you are advised to insert a 3x150 flat-head screwdriver into the hole at a tilt of 30–50 degrees and insert the cables. After connecting the cables, remove the flat-head screwdriver and pull the cables to check that they are securely connected.

Step 9 Secure the cable routing pipe connector to the PID module.

Step 10 Install the cover for the connection box and close the PID module maintenance compartment door by tightening the removed M4 screws to a torque of 1.4 N•m.

Step 11 After checking that the PID module works properly, set aside the support bar and close the PID module cabinet door of the smart array controller.

NOTICE

The RS485 address for the replacement PID module must be changed to 199 or 200, the same as the RS485 address for the faulty PID module, over the SmartLogger WebUI or SUN2000 app. For details, see A Changing the RS485 Address.

----End

Follow-up Procedure

1. To delete the faulty PID module from the SmartLogger, use either of the following methods:
   - Log in to the WebUI, choose **Maintenance** > **Device Mgmt.** > **Connect Device** and delete the faulty PID module.
   - Log in to the SUN2000 app and connect to the SmartLogger, choose **More** > **Device Mgmt.**, hold down and select the PID module name, and then delete the faulty PID module.
2. Set parameters for the PID module again by following the instructions in 4.3 System Commissioning.

6 Technical Specifications

Table 6-1 System specifications

Item	Specifications
Dimensions (W x H x D)	480 mm x 302 mm x 105.5 mm
Weight	9 kg
Operating temperature range	–40 ℃ to +60 ℃
Relative humidity	0%–100%
Operating altitude	0–4000 m
Storage temperature range	–40 ℃ to +70 ℃
Storage humidity	5%–95%
Degree of protection	IP65/Type 4X

Table 6-2 Electrical specifications

Item		Specifications	
		1000 V/1100 V SUN2000	1500 V SUN2000
Input	Rated three-phase line voltage	380V AC/400V AC/420V AC/440V AC/480V AC/500V AC	600 V AC/800 V AC
	Maximum input current	1A AC	
	Rated frequency	50/60 Hz	
Output	Maximum output power	275 W	400 W
	Output voltage range	50–550 V DC	50–800 V DC

Item		Specifications	
		1000 V/1100 V SUN2000	1500 V SUN2000
	Maximum output current	0.5 A DC	
Communication mode		RS485/USB	
Display		LED indicator, Bluetooth+app, USB data cable+app	

A Changing the RS485 Address

Context

The RS485 address for the PID module can be changed in the following ways:

- Use the SmartLogger embedded WebUI.
- Connect the SUN2000 app to the SmartLogger.
- Connect the SUN2000 app to the PID module.

To facilitate onsite operations, it is recommended that you connect the SUN2000 app to the PID module to change the RS485 address.

A.1 Changing the RS485 Address over the WebUI

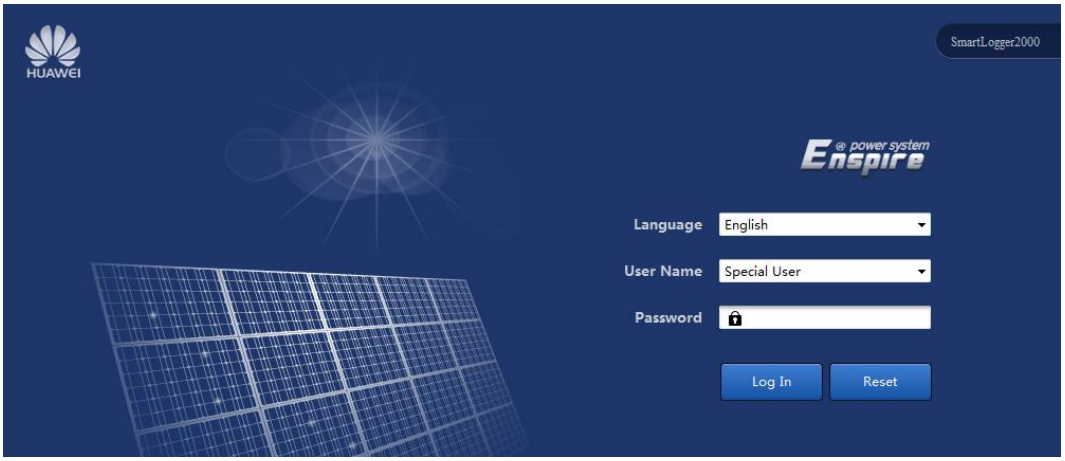
Context

This section uses the WebUIs for SmartLogger V200R001C30SPC103 as an example.

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 WebUI login page



NOTE

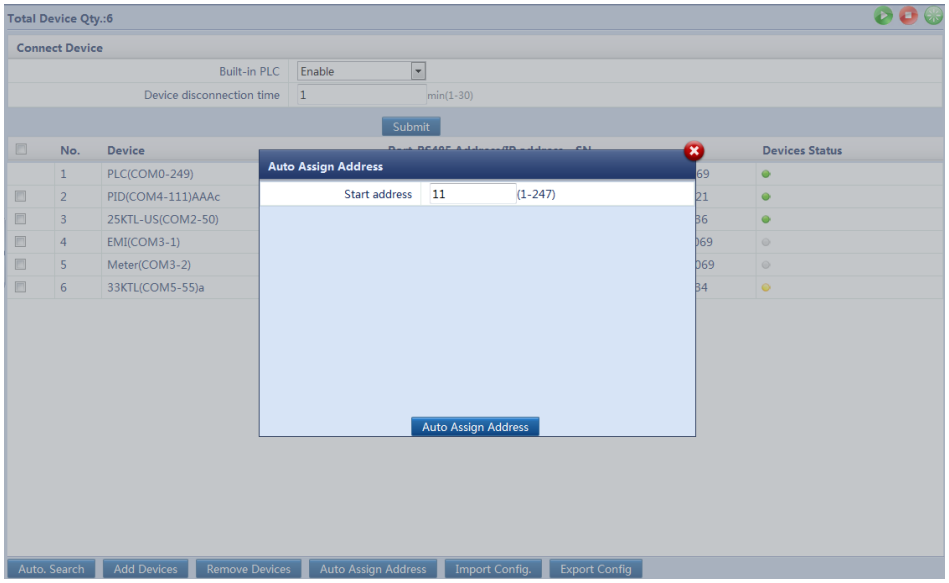
- Because of the permission restriction, log in as **Advanced User** or **Special User**.
- *XX.XX.XX.XX* is the IP address for the SmartLogger. The default IP address is **192.168.0.10**.
- For the SmartLogger software versions that are SmartLogger V200R001C30SPC103 and later, the initial password is **Changeme**.
- After the first login, it is recommended that you change the initial password immediately to ensure account security.

Step 2 Change the RS485 address of the PID module.

The following two methods can be used to change the RS485 address over the SmartLogger WebUI:

- Method 1
  a. On the **Maintenance** tab page, choose **Device Mgmt.** > **Connect Device**. Then click **Auto Assign Address** in the lower part of the **Connect Device** 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.

b. Click **Auto Assign Address**. In the displayed dialog box, click **Confirm**, as shown in Figure A-3 and Figure A-4.

Figure A-3 Address allocation

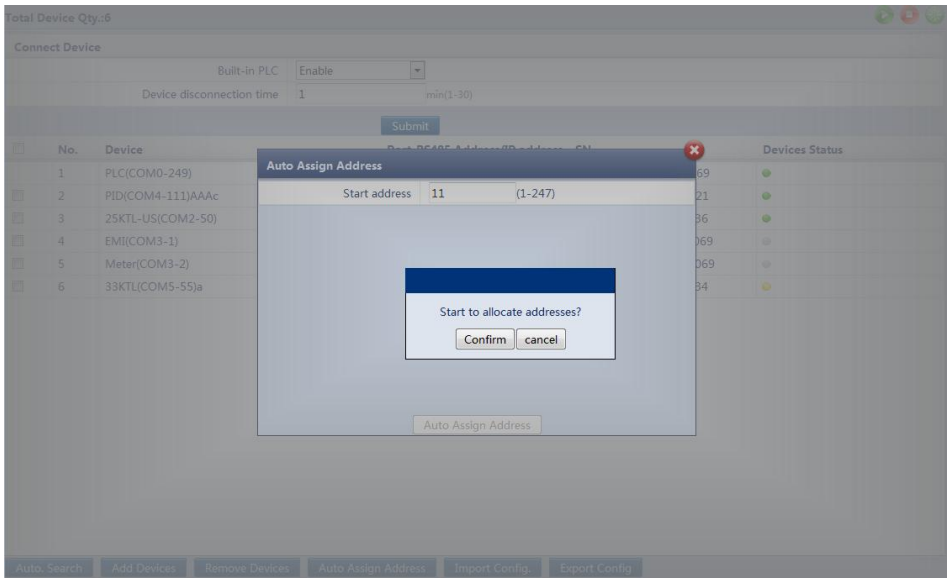
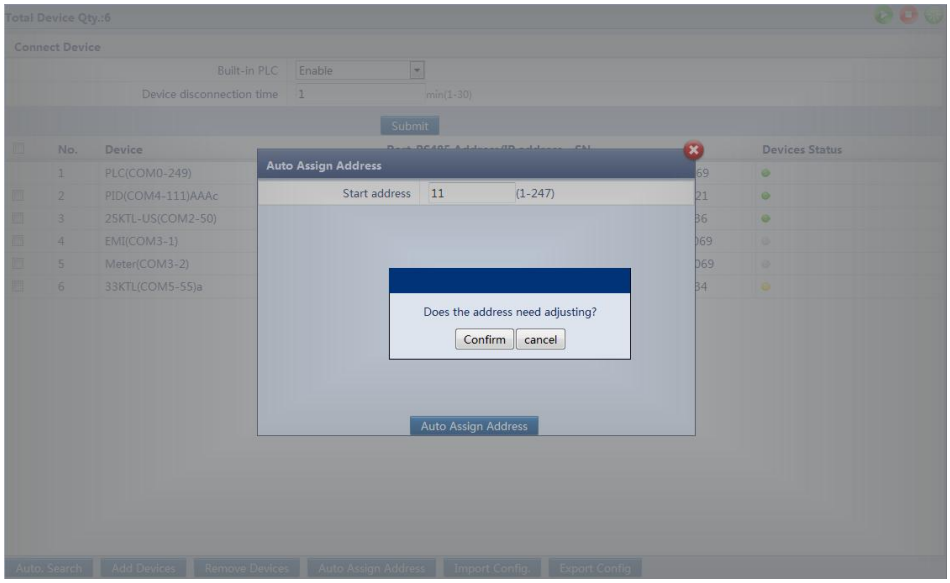
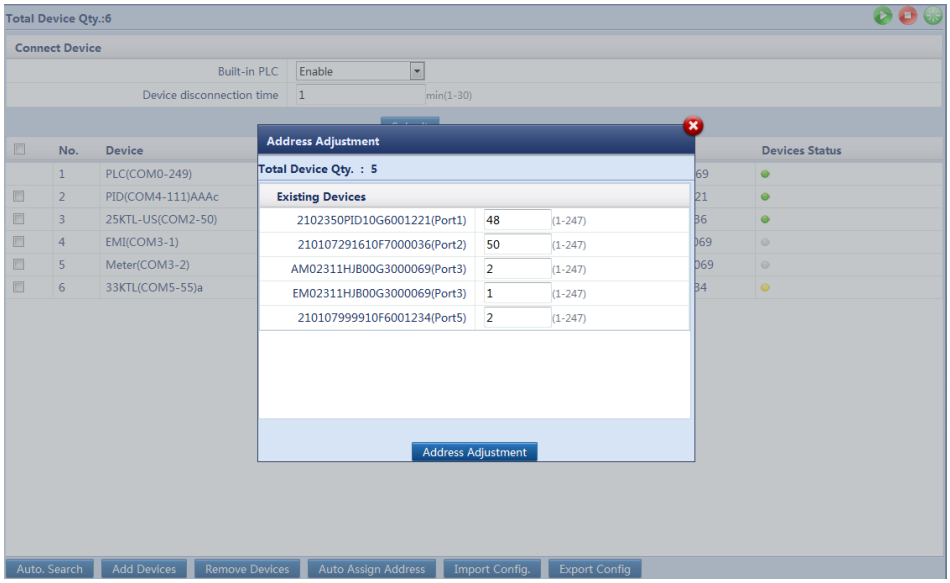


Figure A-4 Address adjustment



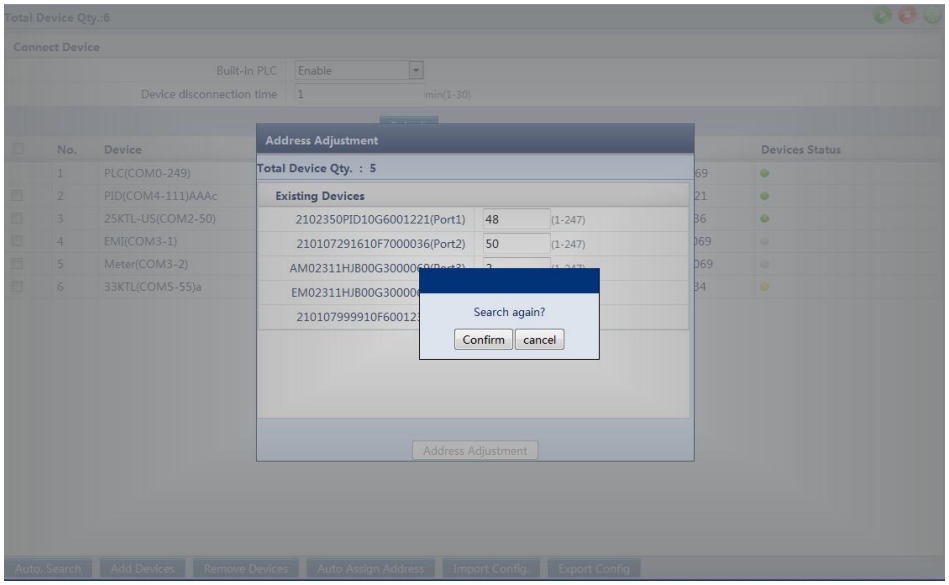
c. In the **Address Adjustment** dialog box, change the device address corresponding to the serial number of the PID module, and then click **Address Adjustment**, as shown in Figure A-5.

Figure A-5 Changing the address



d. Click **Confirm** to search for the device again, as shown in Figure A-6.

Figure A-6 Searching for the device again

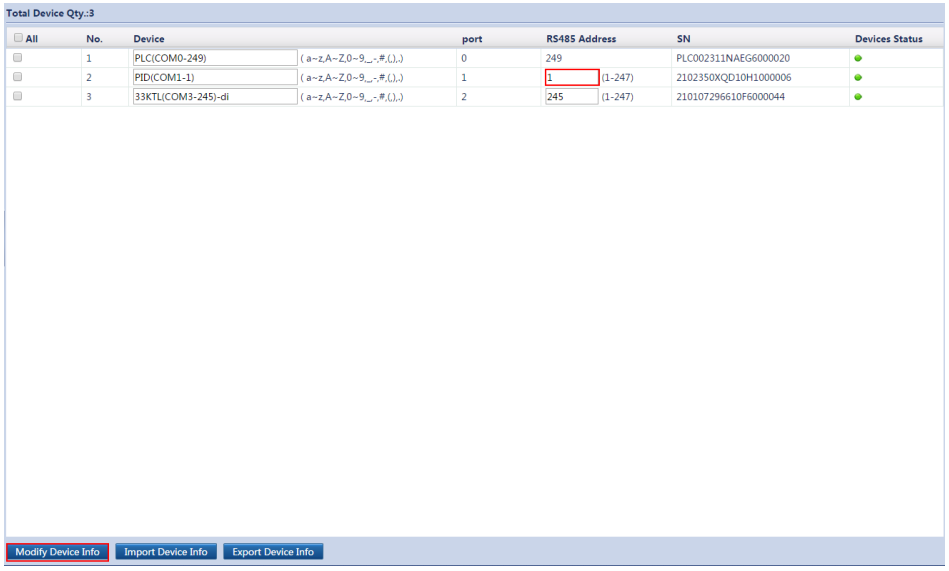


e. After the searching is complete, click **Confirm**.

- Method 2

a. On the **Maintenance** tab page, choose **Device Mgmt.** > **Device List**. On the **Device List** page, change the PID module address in the **RS485 Address** column, as shown in Figure A-7.

Figure A-7 Device list



b. In the lower left corner of the **Device List** page, click **Modify Device Info**.

c. On the **Maintenance** tab page, choose **Device Mgmt.** > **Connect Device**. Then click **Auto. Search** in the lower part of the **Connect Device** page and check whether the RS485 address of the PID module has been changed.

----End

A.2 Changing the RS485 Address over the SUN2000 App

The RS485 address can be changed over the SUN2000 app in the following ways:

- Connect to the SmartLogger.
- Connect to the PID module.

A.2.1 Connecting to the SmartLogger

Prerequisites

The app has successfully connected to the SmartLogger through Bluetooth.

NOTE

- For details about how to connect the app to the SmartLogger through Bluetooth, see the *SUN2000 APP User Manual*.
- This section uses the screens for SUN2000APP V200R001C20SPC010 and SmartLogger V200R001C30SPC103 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.

Figure A-8 SmartLogger home screen

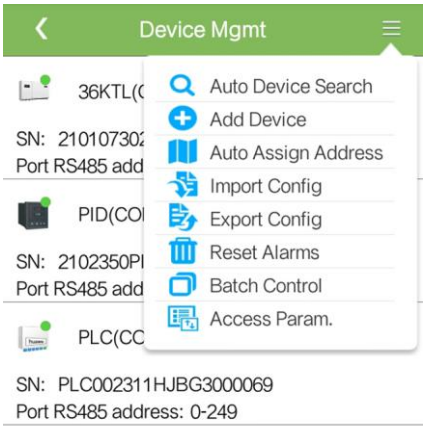
NOTE

- 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 when connecting to the app for the first time. To ensure account security, change the password promptly and update it regularly.
- 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** to access the device management screen.

Step 3 Tap  in the upper right corner of the device management screen and choose **Auto Assign Address**, as shown in Figure A-9.

Figure A-9 Automatic address assigning



----End

A.2.2 Connecting to the PID Module

Prerequisites

The app has been connected to the PID module over a Bluetooth module or a USB data cable.

NOTE

- For details about how to connect the app to the PID module, see the *SUN2000 APP User Manual*.
- This section uses the screens for SUN2000APP V200R001C20SPC010 and SmartPID2000 V100R001C00 as an example.

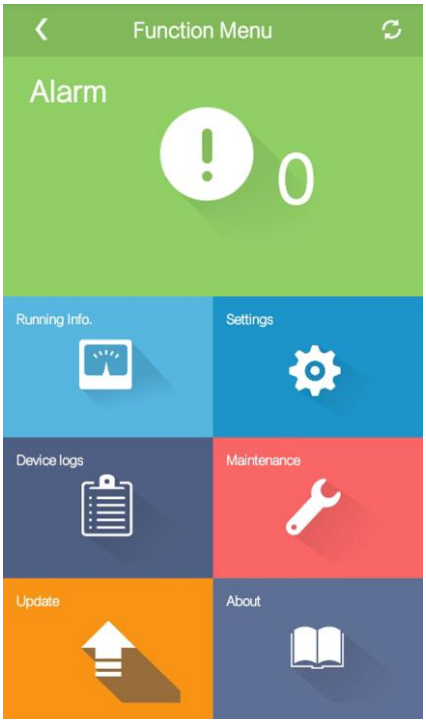
NOTICE

The Bluetooth module used for connecting the app to the PID module must be USB-Adapter2000-B.

Procedure

Step 1 On the app login screen, select **Advanced User**, enter the password, and tap **Log In**. The main menu screen of the PID module is displayed, as shown in Figure A-10.

Figure A-10 Main menu screen of the PID module

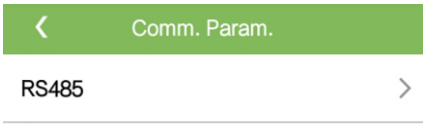


NOTE

- The initial password for connecting to the PID module from the app as **Common User**, **Advanced User**, and **Special User** is **00000a**. Use the initial password when connecting to the app for the first time. To ensure account security, change the password promptly and update it regularly.
- If you log in to the app after the PID module connects to the app for the first time or PID module factory defaults are restored, the quick settings screen will be displayed. On the quick settings screen, you can set basic parameters for the PID module. After setting parameters, you can modify the parameters after tapping **Settings** on the main menu screen.
- If you do not set basic parameters for the PID module on the quick settings screen, the screen is still displayed when you log in to the app next time.

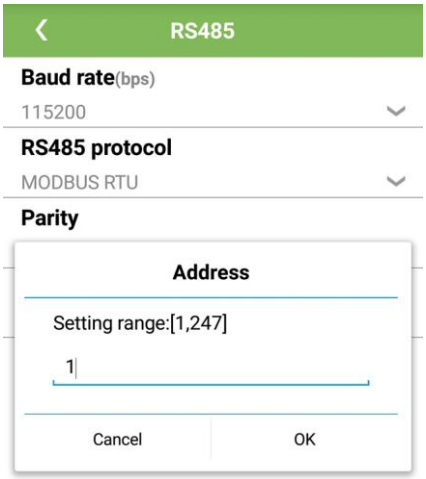
Step 2 Choose **Function Menu** > **Settings** > **Comm. Param**. The screen for setting communications parameters is displayed.

Figure A-11 Communications parameter screen



Step 3 Choose **RS485** > **RS485 Address** and change the RS485 address.

Figure A-12 Setting the RS485 address



----End

B Acronyms and Abbreviations

C	
CPE	customer-premises equipment
D	
DO	digital output
E	
EMC	electromagnetic compatibility
ETH	Ethernet
F	
FE	functional earth
I	
IMD	insulation monitor device
L	
LCD	liquid crystal display
P	
PE	protective earthing
PID	potential induced degradation
PLC	power line communication
PV	photovoltaic

S

SFP	small form-factor pluggable