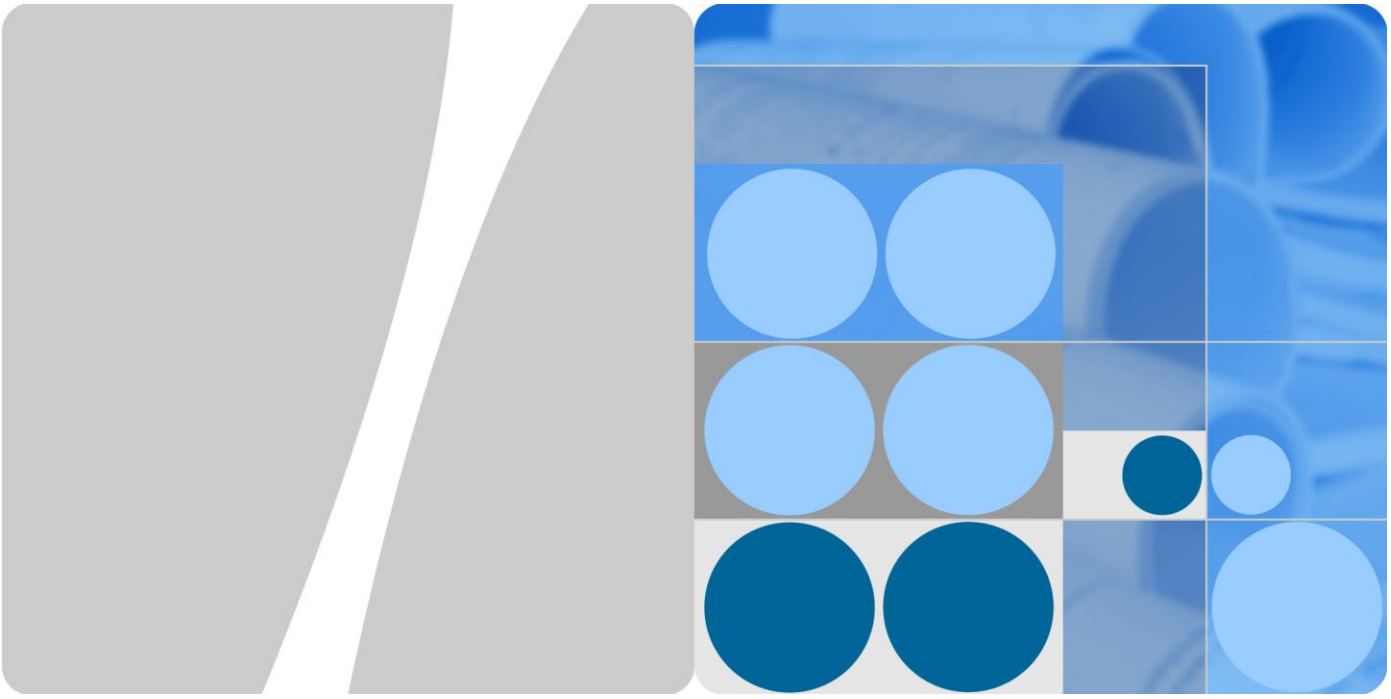
Part Number: 31010TFT



PID Module

User Manual

Issue	Draft D
Date	2015-09-28

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About This Document

Purpose

This document describes the PID installation, electrical connections, maintenance, and troubleshooting. Readers should be familiar with the PID features, functions, and safety precautions provided in this document before installing and operating the PID.

NOTICE

For details about how to install the PID and perform electrical connections when installing the PID inside a Huawei communications cabinet, see the *SUN2000 Communications Cabinet 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://support.huawei.com.

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
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.

Symbol	Description
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.
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 Draft C (2015-09-28)

Updated descriptions in 1 Safety Precautions.

Updated descriptions and figures in 2.2 Networking.

Deleted the descriptions about installation using mounting ears.

Updated descriptions in 4.1 Port Description and 4.2 Cable Connection Description.

Updated descriptions and figures in 5.1 Setting Communications Parameters.

Added configuration descriptions about running parameters in 6.2 Powering on and Commissioning.

Updated 9 Technical Specifications.

Issue Draft B (2015-05-10)

Updated descriptions in 6.2 Powering on and Commissioning.

Updated alarm impacts and troubleshooting in 7 Device Maintenance.

Added B Installing an Inductor and Connecting Cables.

Issue Draft A (2014-12-20)

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

Contents

1 Safety Precautions

This chapter describes the safety precautions for installing and operating the PID.

Personnel Requirements

- Only qualified and trained electrical technicians are allowed to install and operate the PID.
- 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 enclosure because these signs contain important information about safe operation.
- Do not remove or damage the nameplate on the PID enclosure because it contains important product information.

System Requirements

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 is not connected to a power supply and is not powered on before starting installation.
- Install the PID in an environment with good ventilation to ensure efficient and long-term system performance.
- Ensure that the PID heat sinks are free from blockage.
- Do not touch any component inside the enclosure except the wiring terminals at the bottom.
- Ensure that the withstand voltage between the AC power cable and the ground is at least 600 V AC, and the withstand voltage between lines is at least 1000 V AC.
- Ensure that the voltage between the SPD on the AC combiner box or the low-voltage side of the box-type transformer and the ground is at least 600 V AC.

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, ensure that:

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

- A faulty PID requires overall maintenance. Contact the dealer if the PID is faulty.
- Maintain the PID 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

This chapter describes the appearance, functions, features and networking of the PID.

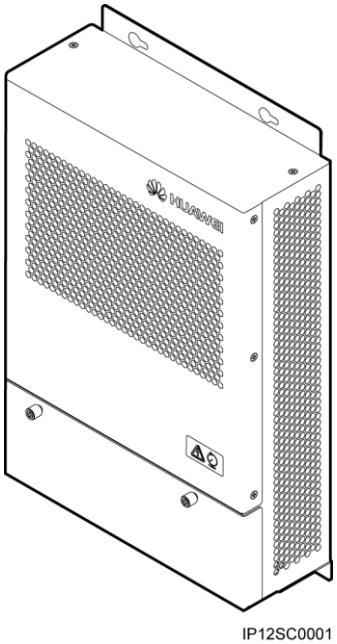
2.1 Introduction

This section describes the appearance, functions, and benefits of the PID.

Appearance

Figure 2-1 shows the PID appearance.

Figure 2-1 PID appearance



Functions

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

The PID 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.

Benefits

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

- Centralized compensation

  The PID can centrally manage up to 80 inverters and simultaneously compensate for all PV modules connected to these inverters.
- Easy installation and commissioning
  - Fewer than 10 cables need to be connected during installation.
  - A build-in commissioning mode facilitates onsite problem location.
- Automatic output control

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

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

- Easy maintenance
  - On the build-in WebUI of the Huawei SmartLogger, you can view the PID running information, active alarms, and performance data, and upgrade the PID firmware, export data and logs, and configure PID running parameters.
  - Using the USB interface of Huawei SmartLogger, you can upgrade the firmware of the PID.
  - Using the Huawei NetEco network management software, you can upgrade the firmware of the PID, and export data and logs.

2.2 Networking

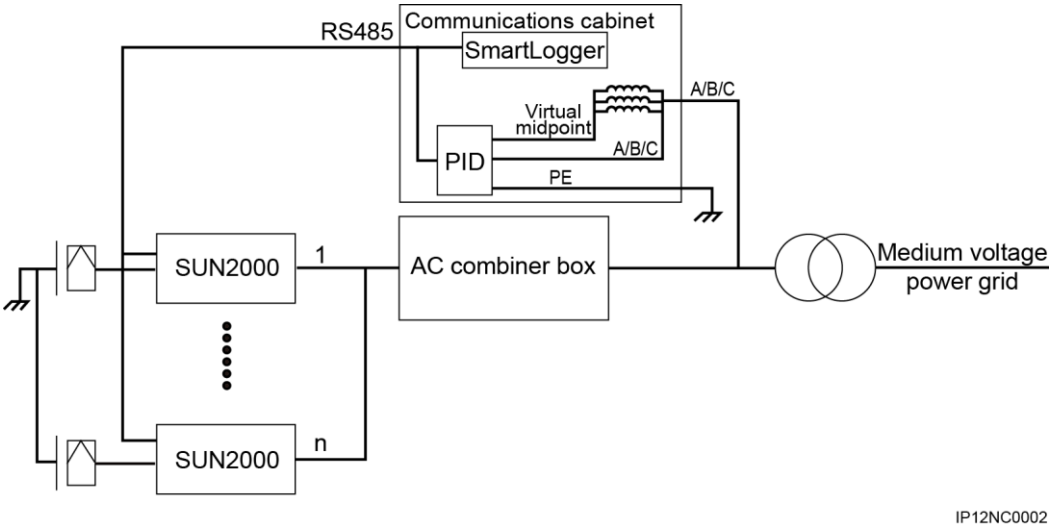
The PID is a component of an SUN2000 or SUN8000 power station array with a power of 1 MW to 2 MW. It is usually installed in a communications cabinet, and can also be installed inside other devices such as a box-type transformer when necessary.

The PID input is three-phase AC power supply, and the output is connected to a PID inductor midpoint and the ground.

SUN2000 Networking Scenario

In a power station formed by SUN2000 units (string inverter), the PV cables cannot be centrally connected to the output terminal; therefore, the negative PV terminal cannot be connected to the PID. In this scenario, midpoint injection to the power grid is available, but PV compensation at night is unavailable. Figure 2-2 shows the SUN2000 networking scenario.

Figure 2-2 SUN2000 networking scenario



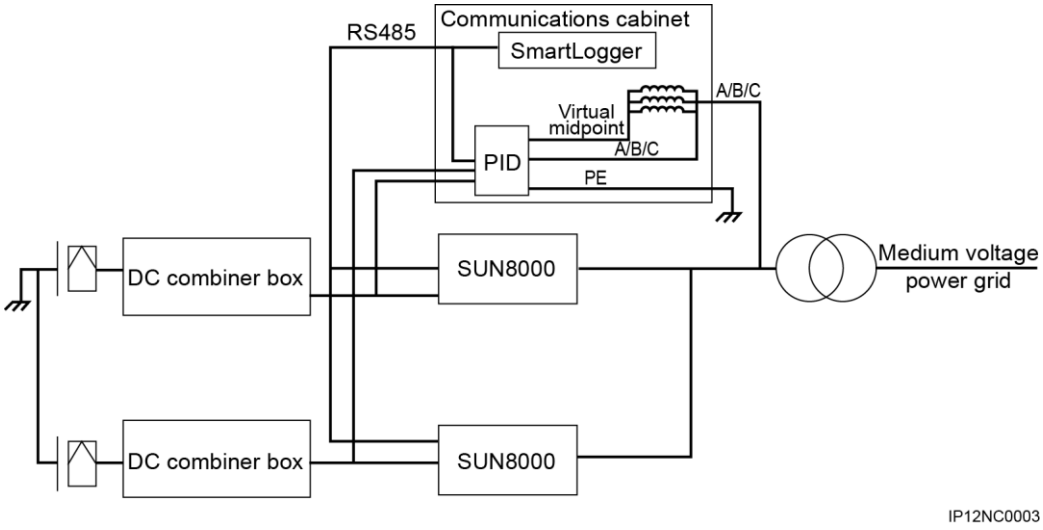
Limitation:

1. The PID must be applied to an isolated system. The AC and DC sides of the SUN2000 are not grounded. Therefore, when the PID is applied to a low-voltage power grid, an isolation transformer must be used for isolation.
2. The PID 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 SUN2000, 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.
3. The PID is a component of a SUN2000 or SUN8000 power station array with a power of 1 MW to 2 MW. PV modules used in the array must be of the same type (P or N).
4. The PID applied to a SUN2000 system does not support the PV/PE compensation mode.

SUN8000 Networking Scenario

In a power station formed by SUN8000 units (central inverter), the PV cables can be centrally connected to inverters; therefore, the negative PV terminal can be connected to the PID. In this scenario, both midpoint injection to the power grid and PV compensation at night are available. Figure 2-3 shows the SUN8000 networking scenario.

Figure 2-3 SUN8000 networking scenario



2.3 Label Conventions

This section describes the labels on the PID enclosure and their meanings.

Table 2-1 describes the labels on the PID enclosure and their meanings.

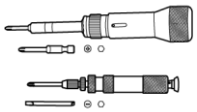
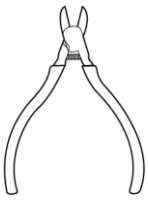
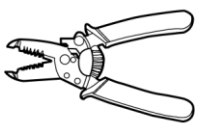
Table 2-1 Label description

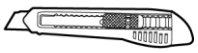
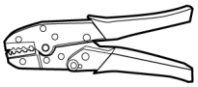
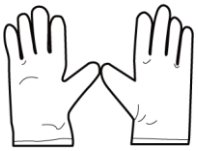
Label	Name	Meaning
	Two-in-one label	• The PID operates at high voltage. • Residual voltage in the PID takes 1 minute to fully discharge after the AC input is disconnected.

3 Equipment Installation

3.1 Tools

Prepare the tools required for installation and cable connections.

Tool	Model	Function
Torque screwdriver 	Cross head: M4.	Fastens or unfastens screws on the PID.
Flat-head screwdriver 	3 x 100 • Head width: 3–3.5 mm. • Pole length (excluding the handle): at least 100 mm.	Tightens or loosens screws when installing power cables.
Diagonal pliers 	N/A	Used to cut and tighten cable ties.
Wire stripper 	Applies to cables with cross-sectional areas of 4 mm^2, 6 mm^2, and 10 mm^2.	Used to peel cable jackets.

Tool	Model	Function
Guarded blade utility knife 	N/A	Used to remove packing materials.
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 	N/A	Crimp power cables.
Tweezers 	N/A	Set the DIP switch.
Multimeter 	N/A	Checks grounding.
ESD gloves 	N/A	Operators wear ESD gloves when installing equipment.

3.2 Determining the Installation Position

For the PID installed in a Huawei communications cabinet, cables are connected before delivery. No installation operation is required. If the PID needs to be installed in a non-Huawei communications cabinet, it is recommended that the PID be installed using a guide rail. Determine the installation position by following the descriptions in this section.

Basic Requirements

- The installation methods and position must match the weight and dimensions of the SUN2000. For details, see 9 Technical Specifications.
- Do not store the PID in areas with flammable or explosive materials.

Installation Environment Requirements

- The ambient temperature must be below 60 ℃ which ensures optimal PID operation and extends the service life of the PID.
- The protection level of the PID is IP20. It must be installed in a dry and clean indoor environment.

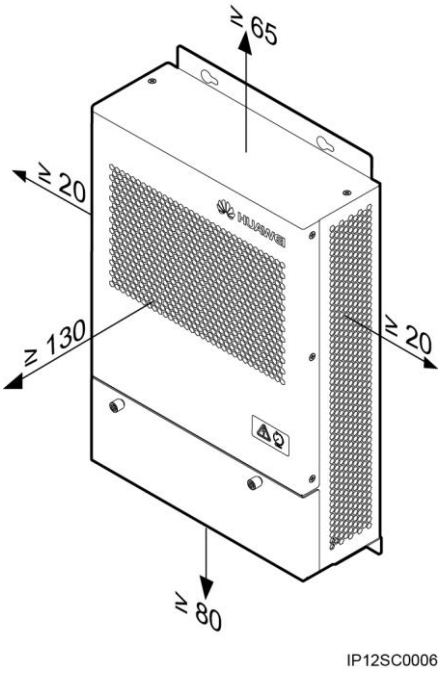
Carrier Requirements

- The carrier where the PID is installed must be fireproof.
- Do not install the PID on flammable building materials.
- Verify that the surface on which the PID is installed is strong enough to bear the weight of the PID.

Installation Space Requirements

Reserve enough clearance around the PID to ensure sufficient space for installation and heat dissipation, as shown in Figure 3-1.

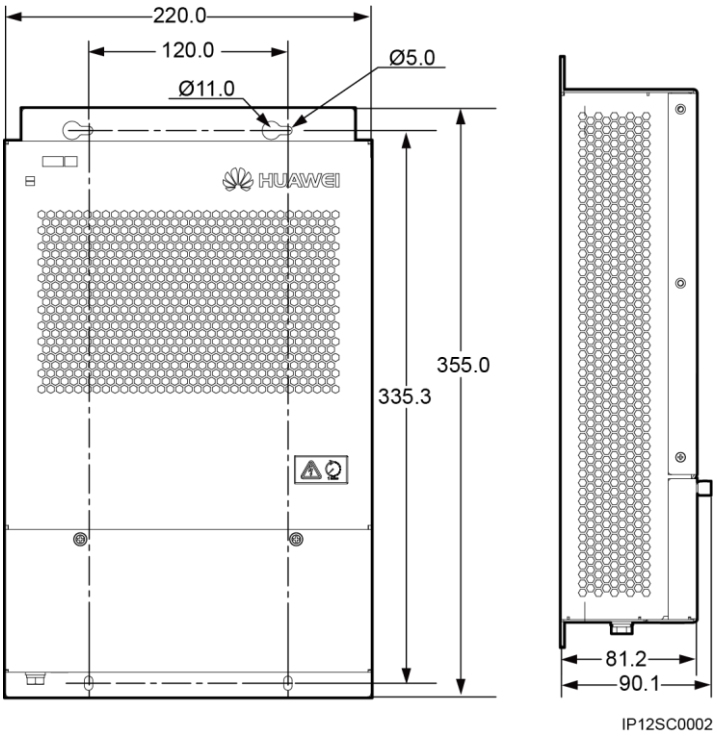
Figure 3-1 Installation space (unit: mm)



Installation Dimensions

Figure 3-2 shows the PID installation dimensions.

Figure 3-2 Installation dimensions (unit: mm)

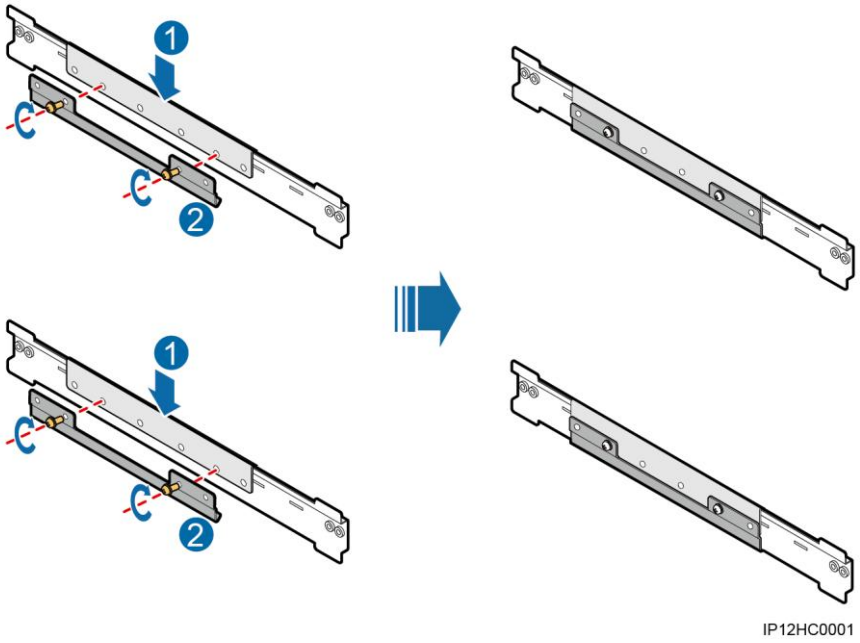


3.3 Installation Using a Guide Rail

Procedure

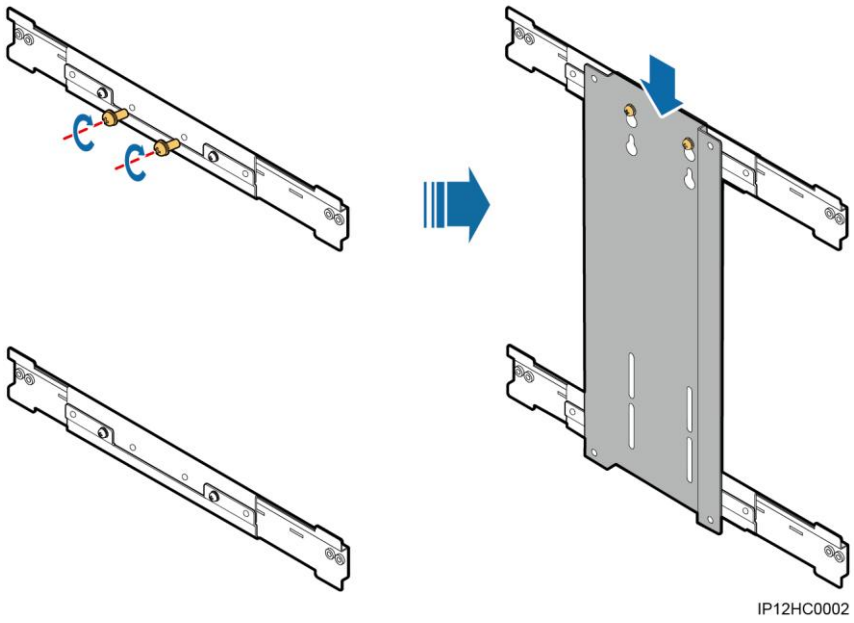
Step 1 Install clip 1 and clip 2 on the upper and lower guide rails, and secure the clips to the upper and lower guide rails each using two assembly screws (M4x10), as shown in Figure 3-3. The tightening torque is 1.2 N ⋅m.

Figure 3-3 Installing the clips



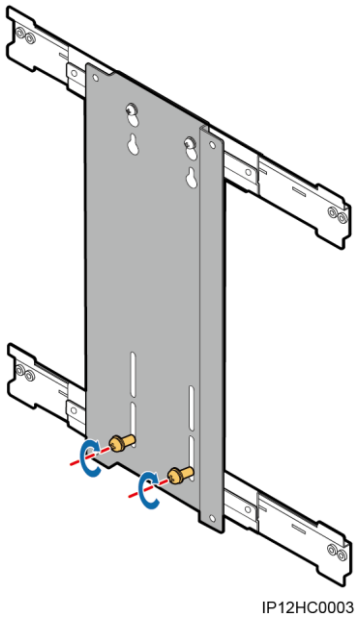
Step 2 Preinstall two assembly screws (M4x10) on the clip for the upper guide rail, and mount a rear panel to the assembly screws through the cucurbit holes on the panel, as shown in Figure 3-4.

Figure 3-4 Mounting a rear panel



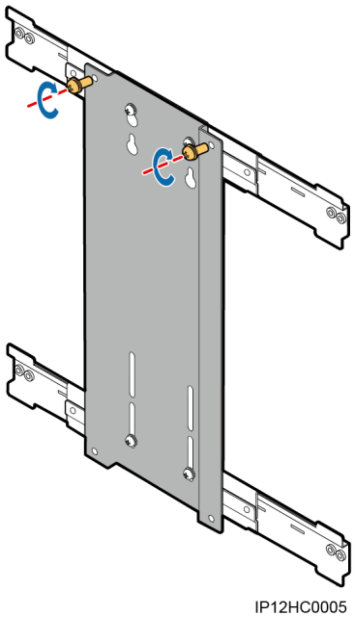
Step 3 Adjust the position of the clip on the guide rail, and secure the rear panel to the clip using the two assembly screws preinstalled in Step 2. The tightening torque of the four screws is 1.2 N·m, as shown in Figure 3-5.

Figure 3-5 Securing a rear panel



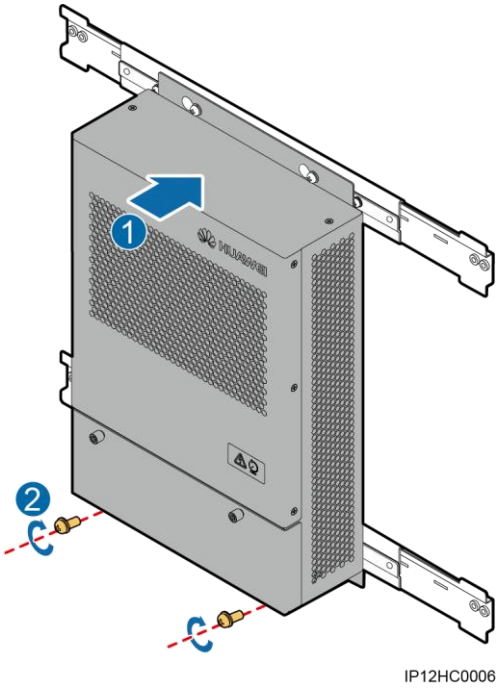
Step 4 Preinstall two assembly screws (M4x10) on the rear panel, as shown in Figure 3-6.

Figure 3-6 Preinstalling PID screws



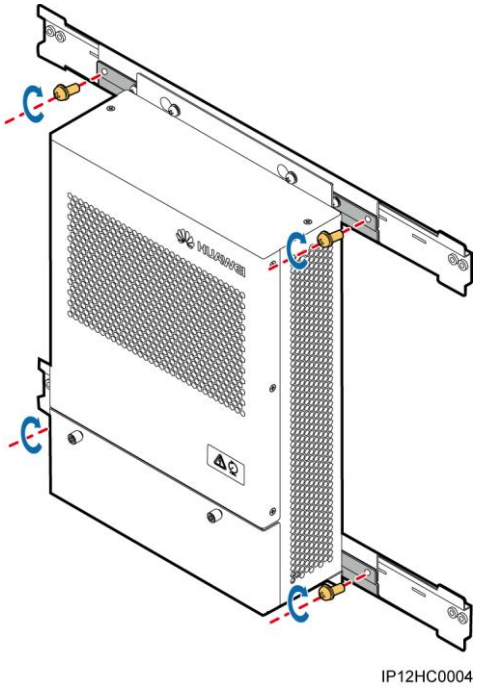
Step 5 Mount the PID onto the assembly screws preinstalled in Step 4 through the cucurbit holes on the PID, secure the PID to the rear panel using two assembly screws (M4x10), and tighten the two assembly screws preinstalled in Step 4. The tightening torque of the four screws is 1.2 N m, as shown in Figure 3-7.

Figure 3-7 Mounting the PID



Step 6 Tighten the anti-slip screws, as shown in Figure 3-8.

Figure 3-8 Tightening the anti-slip screws



----End

4 Electrical Connections

Context

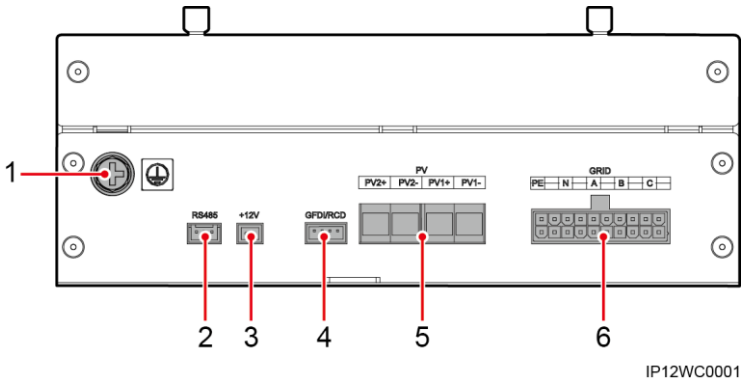
NOTICE

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.

Figure 4-1 Ports on the PID



NOTE

The silk screen of port 6 may be different from the one in the figure because of the product change or upgrade. The actual silk screen prevails. The port wiring sequence does not change.

Table 4-1 Description of ports on the PID

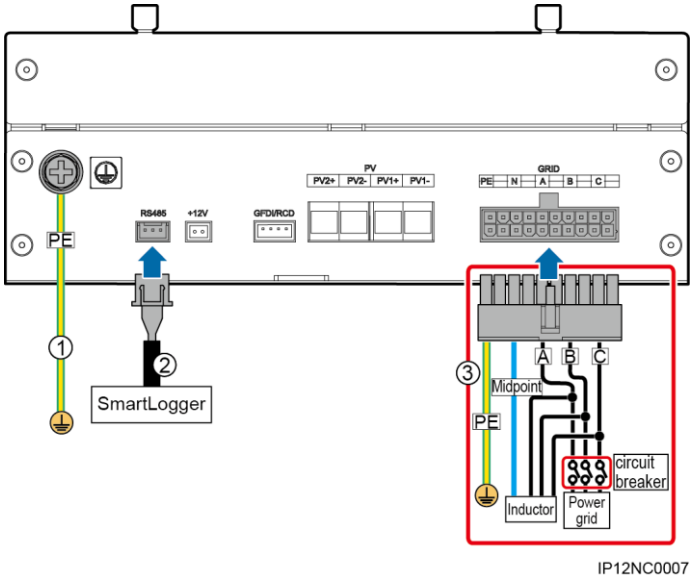
No.	Port Name (Silk Screen)	Description
1	Protective earthing (PE) bolt	Provides ground protection.
2	RS485 port (RS485)	Communicates with the SmartLogger using the RS485 protocol. Connect RS485+ to PIN1 and connect RS485- to PIN3.
3	Reserved function port (+12V)	Reserved.
4	Reserved function port (GFDI/RCD)	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 (GRID_PE/N/A/B/C)	PIN5, PIN7, and PIN9 are connected to the three-phase power grid input, PIN3 is connected to the virtual midpoint, and PIN1 is connected to the PE cable.

4.2 Cable Connection Description

4.2.1 Application in the SUN2000 Scenario

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

Figure 4-2 Cable connection for the SUN2000 scenario



WARNING

The ground wire in cable 3 is the PID output wire used for function 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 must not be connected to the N cable of the power grid or the ground.

NOTE

The silk screen of port 6 may be different from the one in the figure because of the product change or upgrade. The actual silk screen prevails. The port wiring sequence does not change.

Table 4-2 describes the cable specifications.

Table 4-2 Cable specifications

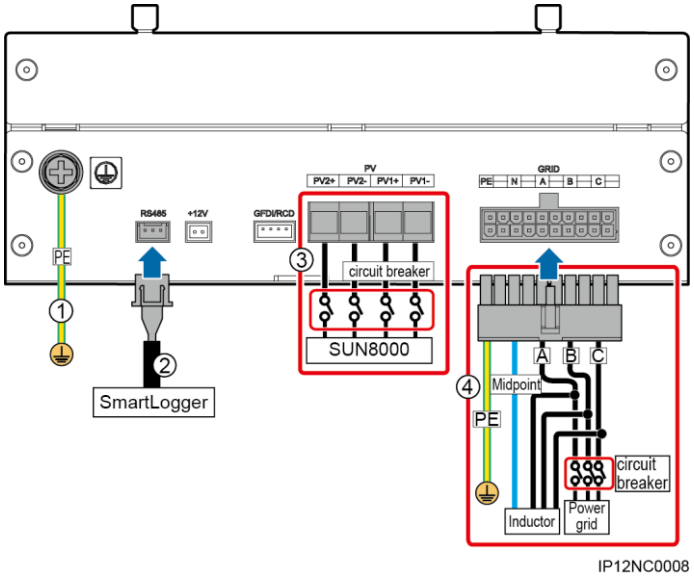
Cable No.	Cable Name	Cable Specifications	Description
1	Ground cable	10 AWG (4 mm^2), yellow-green, meeting the UL1015 standard; OT: M6.	Prepared by the customer. Ensure that the tightening torque is 4 N·m.
2	RS485 communications cable	22 AWG (0.3 mm^2), symmetrical twisted pair cable with two cores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

Cable No.	Cable Name	Cable Specifications	Description
3	Power grid input and PID output cables	• A: 2 x 18 AWG (1 mm^2), red, 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), yellow, 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.

4.2.2 Application in the SUN8000 Scenario

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

Figure 4-3 Cable connection for the SUN8000 scenario



WARNING

- A DC circuit breaker needs to be installed for cable 3 at the end close to the PID. The recommended DC circuit breaker specifications are a rated operating voltage equal to or greater than 1200 V DC and a rated operating current equal to or greater than 1 A.
- The ground wire in cable 4 is the PID output wire used for function 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 must not be connected to the N cable of the power grid or the ground.

NOTE

The silk screen of port 6 may be different from the one in the figure because of the product change or upgrade. The actual silk screen prevails. The port wiring sequence does not change.

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 ṁ.

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.
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	Power grid input and PID output cables	• A: 2 x 18 AWG (1 mm^2), red, 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), yellow, 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.

5 Parameter Settings

5.1 Setting Communications Parameters

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

Context

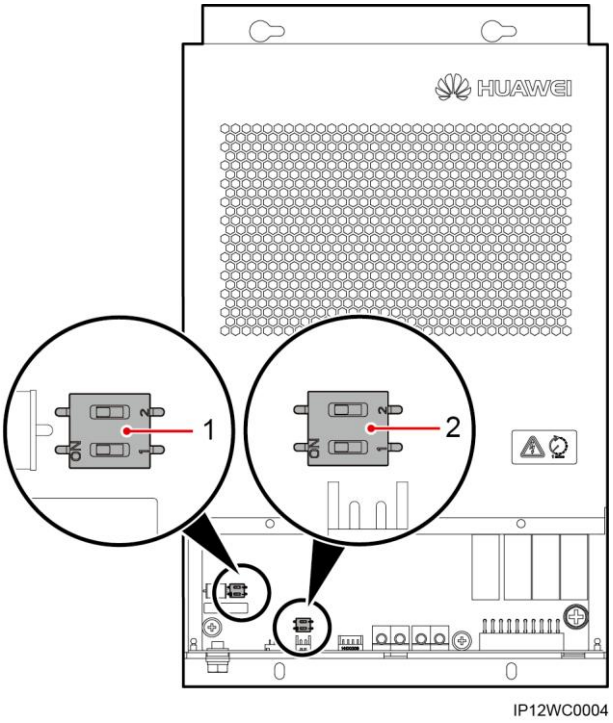
DANGER

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

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

Figure 5-1 describes the DIP switches.

Figure 5-1 DIP switches

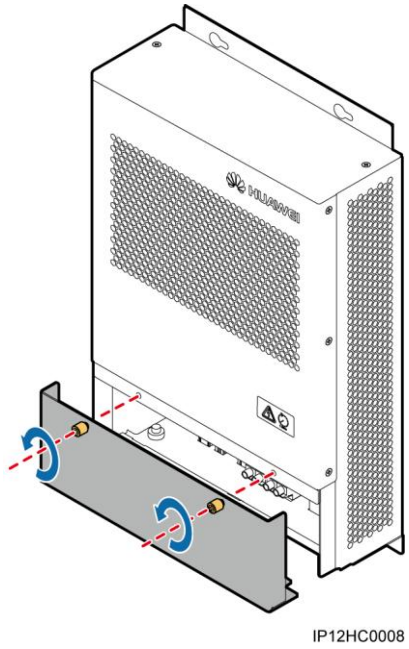


No.	Component	Description
1	DIP switch S1	Specifies the connection status of the RS485 build-out resistor which is disconnected by default before delivery. For details, see Step 2.
2	DIP switch S2	Specifies the RS485 baud rate which is set to 9600 bps by default before delivery. For details, see Step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

Procedure

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

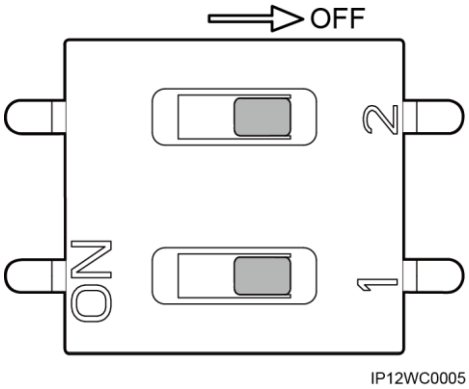
Figure 5-2 Removing the front panel



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 build-out resistor can be set to **connected** or **disconnected**. This parameter is set to **disconnected** by default. If signals are distorted or the communication is of poor quality because of a lengthy communications cable, set the parameter to **connected**.

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.

Connection Status of RS485 Built-out Resistor	DIP1	DIP2
Connect	ON	ON

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

NOTE

- If the PID 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 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

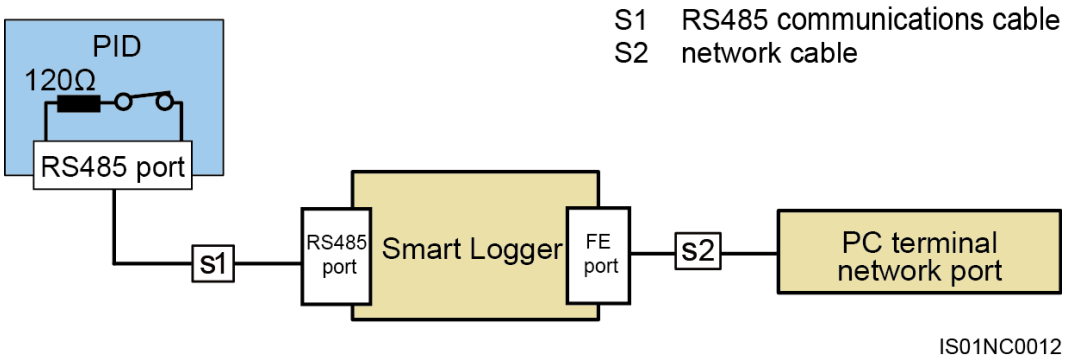
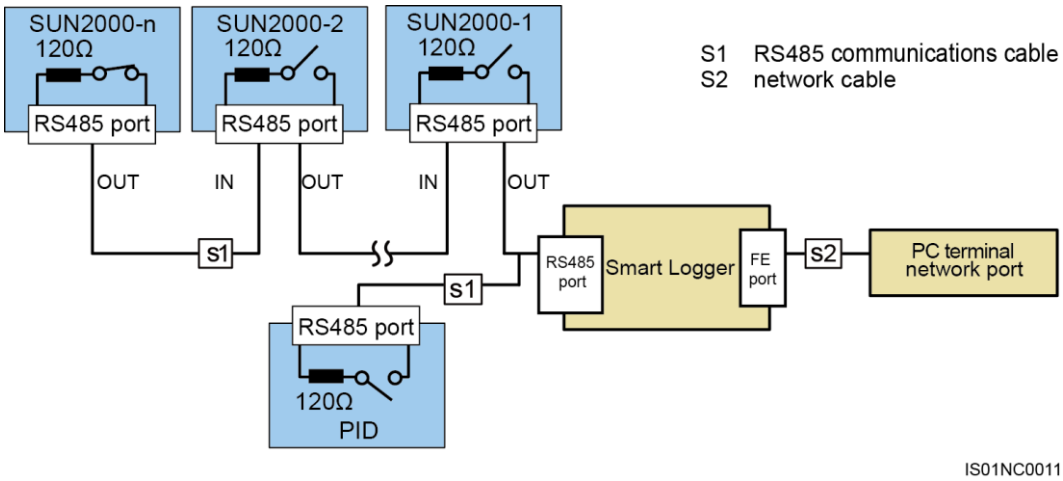


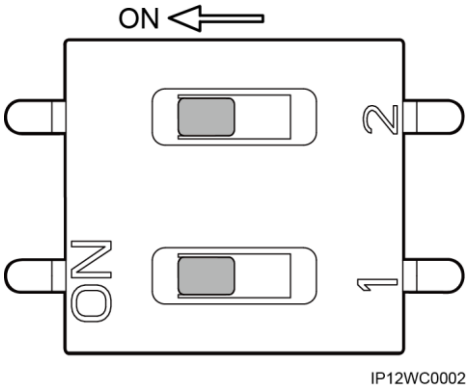
Figure 5-5 Connection method 2



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.

Figure 5-6 DIP switch S2



NOTE

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

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 maintaining or replacing a PID, ensure that:

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

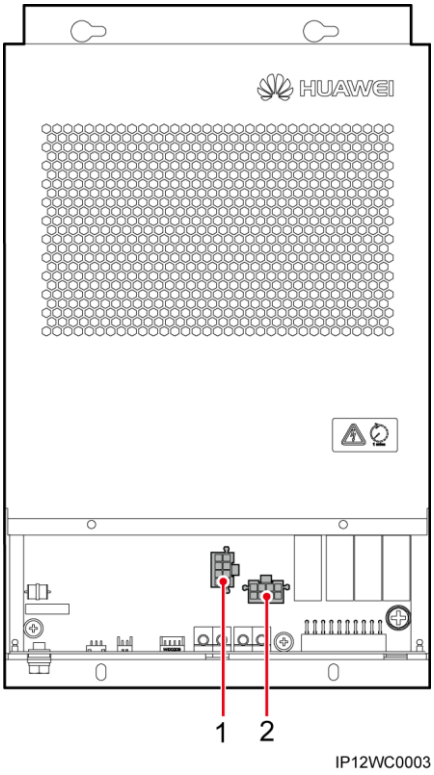
NOTICE

The PID is a component of a SUN2000 or SUN8000 power station array with a power of 1 MW to 2 MW. PV modules used in the array must be of the same type (P or N). Ensure that the PID setting is consistent with the PV module type. Otherwise, the effect of using the PID to prevent potential induced degradation is affected.

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

Figure 5-7 describes the jumper terminal ports.

Figure 5-7 Jumper terminal ports



No.	Component	Description
1	Jumper terminal J61 port	Used for a power station using P-type PV modules. 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 modules.

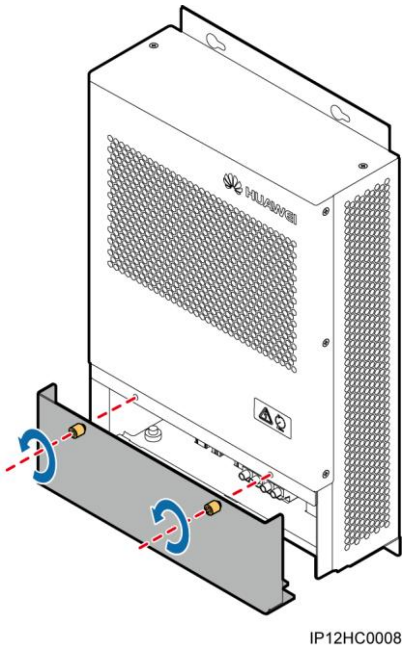
NOTE

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

Procedure

Step 1 Loosen the two captive screws on the PID 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

6 System Operation

6.1 Checking Before Power-on

To ensure the normal PID operating, check the PID before powering it on.

Before powering on the PID, check that:

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

6.2 Powering on and Commissioning

Context

The PID output voltage is automatically capped to ensure the safety of a PV power plant. For example, the voltage caps are respectively 500 V and 200 V for SUN2000 and SUN8000. The output voltage is also related to the power grid voltage and PV voltage.

PID parameters can be set on the WebUI or LCD of the SmartLogger. This section uses parameter settings on the WebUI as an example. For information about parameter settings on the LCD, see the *SmartLogger1000 User Manual*.

Procedure

Step 1 Turn the power switch of the PID to ON to power on the PID.

NOTE

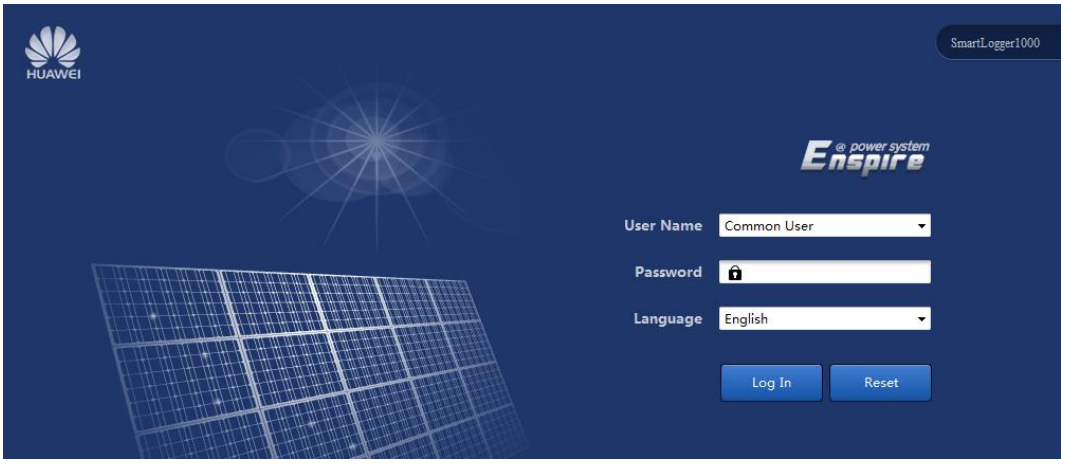
If the PID is installed in a communications cabinet, the power switch is inside the communications cabinet. If the PID is used in other scenarios, the power switch may be located in different places based on the actual situation.

Step 2 Enter **https://xxx.xxx.xxx.xxx** in the address box of the browser, and press **Enter**. The login page is displayed, as shown in Figure 6-1. Set **User Name** to **Advanced User** (for required user rights), specify **Password**, select a value for **Language**, and click **Login**.

NOTE

If web pages cannot be opened, specify security settings for the browser. For details, see **Preparations for Login** in the *SmartLogger1000 User Manual*.

Figure 6-1 Login page of the WebUI



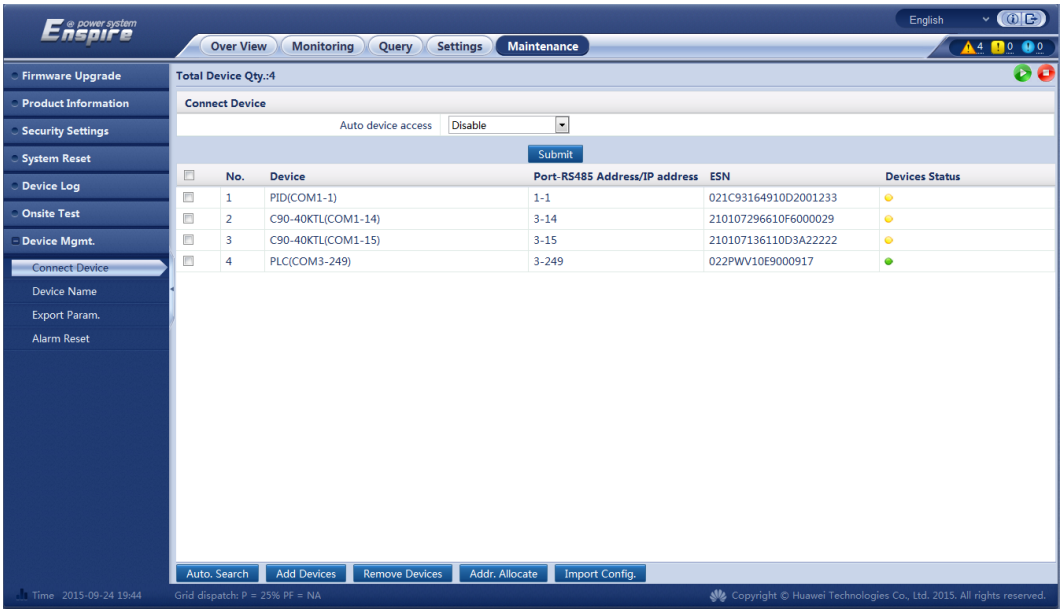
NOTE

- xxx.xxx.xxx.xxx is the IP address of the SmartLogger, for example, **https://192.168.0.10**.
- The preset password is **000001** in SmartLogger1000 V100R001C95SPC010 or earlier and is **Changeme** in SmartLogger1000 V100R001C95SPC020 or later.
- After the first login, it is recommended that you change the initial password immediately to ensure account security.

Step 3 On the **Maintenance** tab page, choose **Device Mgmt.** > **Connect Device**, as shown in Figure 6-2.

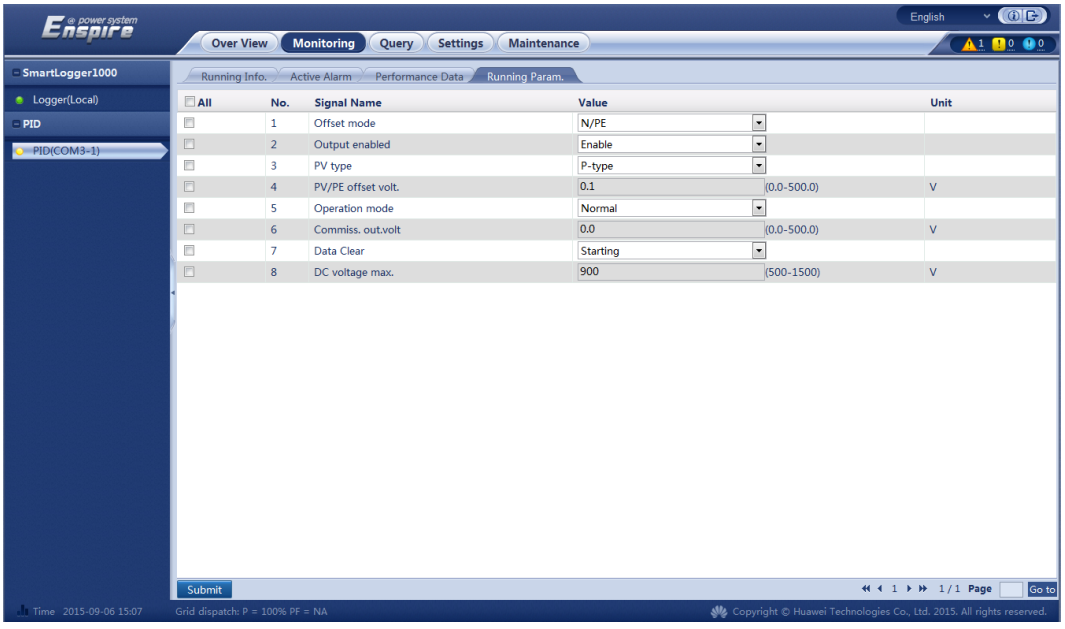
If the PID is not found, check whether the RS485 cable is properly connected.

Figure 6-2 Searching a Device



Step 4 On the **Monitoring** tab page, select a PID to be set and click **Running Param.**. The running parameters settings page is displayed, as shown in Figure 6-3.

Figure 6-3 Setting running parameters



NOTE

- The running parameters settings page is for the SmartLogger SUN2000V100R001C95SPC101. The page for a version earlier than V100R001C95SPC101 is different.
- Running parameters cannot be set if the PID 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.	Disabled	Set this parameter to **Disable**if the PID is not required.
			N/PE	Set this parameter to **N/PE** if the PID is required to use voltage output from the inductor virtual midpoint N.
			PV/PE	This mode applies only to the SUN8000 Networking Scenario (see Figure 2-3). Set this parameter to **PV/PE** if the PID is required to use voltage output from the negative PV terminal.
			Automatic	• In the SUN2000 Networking Scenario (see Figure 2-2). **Automatic** indicates the N/PE offset mode. • In theSUN8000 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.
2	Output enabled	Specifies whether PID output is enabled.	Enable	Set this parameter to **Enable** to allow the PID output.
			Disable	Set this parameter to **Disable** to forbid the PID 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 output voltage is positive.
			N-type	Set this parameter to **N-type** if the PV module type is N. In this case, the PID output voltage is negative.
4	PV/PE offset volt.	Specifies the DC voltage when the offset mode is set to PV/PE.	N/A	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 is currently working in normal or commissioning mode.	Commissioning	In the commissioning mode, set the output mode to **PV/PE** or **N/PE**, and set **Output enabled** to **Enable**. The PID generates output based on the configured voltage. **NOTE** Before the first power-on, to check whether the PID functions properly, it is recommended that **Operation mode** be set to **Commissioning**.

No.	Parameter Name	Function	Parameter Value	Description
			Normal	In normal mode, the PID must be connected to inverters and the data collector, and start working automatically. **NOTE** After checking that the PID functions properly (by performing Step 5 to Step 7), **Operation mode** can be set to **Normal**.
6	Commiss. out. volt.	Specifies the output voltage when the PID works in commissioning mode.	N/A	The value range is 0–500 V. It is recommended that the commissioning voltage be set to a value ranging from 50 V to 400 V. **NOTE** Commissioning output voltage is 200 V if the PID is connected to the SUN8000.
7	Data Clear	Data that can be cleared includes active alarms, historical alarms, and performance data.	Starting	When the **Data Clear** operation is performed on the WebUI for the PID, the operation must also be performed on the SmartLogger; otherwise, data will not be cleared.
8	DC voltage max.	Specifies the PV-PE voltage when the normal operation mode is used.	N/A	In normal operation mode, 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. The value range is 500–1500 V.

Step 5 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 (midpoint voltage to earth), and check whether the output voltage is close to the configured voltage.

Table 6-2 Supported running parameters in commissioning mode

Operation Mode	PV Module Type	Inverter Type	Offset Mode				Enable/Disable
			Disabled	N/PE	PV/PE	Automatic	
Commissioning	P	SUN2000	×	√	×	×	Enable/Disable
		SUN8000	×	√	√	×	
	N	SUN2000	×	√	×	×	
		SUN8000	×	√	√	×	

Step 6 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 output cables are correctly connected to the inductor, whether the inductor is correctly connected to the power grid, and whether the PID is properly grounded.

Step 7 Set **Operation mode** to **Normal** and verify that the PID works properly.

NOTE

- Wait 10–15 minutes after the PID is connected to the SmartLogger for the first time. When the SmartLogger page displays the running status as **Running**, the PID runs properly.
- To check whether the PID in the system functions properly, disconnect the PV input terminal (PV- for P PV modules and PV+ for N PV modules) of an inverter, use a multimeter set to the DC position to measure the voltage between the PV terminal and the ground (voltage between PV- and the ground is greater than 0 for P PV modules and the voltage between PV+ and the ground is less than 0 for N PV modules).

Table 6-3 Supported running parameters in normal mode

Operation Mode	PV Module Type	Inverter Type	Offset Mode				Enable/Disable
			Disabled	N/PE	PV/PE	Automatic	
Normal	P	SUN2000	√	√	×	√	Enable/Disable
		SUN8000	√	√	√	√	
	N	SUN2000	√	√	×	×	
		SUN8000	√	√	×	×	

NOTE

The default RS485 communications address of the PID is 1. If the RS485 communications address needs to be changed, change it after choosing **Addr. Allocate** > **Addr. Adjustment** on the WebUI or LCD of the SmartLogger. For details, see **Managing Devices** in the *SmartLogger1000 User Manual*.

----End

7 Device Maintenance

7.1 Troubleshooting

This section describes the common faults and troubleshooting measures for the PID.

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 PID. Then wait for at least 1 minute and perform operations on the PID.

For details, see Table 7-1.

Table 7-1 Common faults and troubleshooting measures

No.	Symptom	Possible Cause	Measure
1	The PID cannot be powered on.	1. The three-phase power grid input ports for the PID are disconnected from cables or loosely connected to cables. 2. The power grid is disconnected from power. 3. The PID is faulty.	1. Check whether the three-phase power grid input ports for the PID 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.	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 parameters or the build-out resistor is set incorrectly. 3. The RS485 communications address of the PID is outside the search scope configured for the SmartLogger. 4. The RS485 communications address of the PID is the same as the communications address of another device connected to the SmartLogger. 5. The SmartLogger version and the PID 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 settings of the RS485 communications parameters or the build-out resistor. Ensure that the baud rate or build-out resistor is set correctly. 3. Set the RS485 communications address of the PID to be within the search scope configured for the SmartLogger. 4. Reset the RS485 communications address of the PID. 5. Download the *SUN2000V100R001C71 Release Notes* from http://support.huawei.com, and upgrade the PID software version to the required version.
3	The PID status is displayed as disconnected on the SmartLogger.	1. The cable between the PID and the SmartLogger is loose or disconnected. 2. The PID is disconnected from power. 3. The baud rate or RS485 communications address of the PID is changed. 4. The PID is replaced. 5. The PID is no longer connected.	1. Verify that the cable between the PID and the SmartLogger is properly connected and tightened. 2. After checking that the PID is connected properly, power on the PID. 3. Verify the baud rate and RS485 communications address of the PID. 4. Check whether the PID has been replaced. If yes, search for the PID again or manually add the PID on the SmartLogger. 5. If the PID is removed, remove it on the SmartLogger.

7.2 Alarms

This section describes common alarms and alarm handing suggestions.

DANGER

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

For details, see Table 7-2.

NOTE

It takes 3 minutes for an alarm to display on the SmartLogger user interface after a fault occurs.

Table 7-2 Alarms

Alarm ID	Alarm	Severity	Cause	Impact on the System	Measure
1900	PV1 Reverse	Major	PV1 is reversely connected.	The PID does not work.	1. Check whether PV1+ and PV1- are reversely connected. If yes, reconnect the cables. 2. If the cable connection is correct, contact Huawei technical support.
1903	Module overtemp.	Major	The temperature of the PID is excessively high.	The PID does not work and generates no output.	1. Check the PID installation environment and verify whether the heat dissipation is normal. If no, relocate the PID. 2. If the heat dissipation is normal but the fault persists, contact Huawei technical support.
1914	Output overcur.	Major	The load current exceeds the alarm threshold.	The PID does not work and generates no output. The fault can be automatically rectified.	If the fault occurs frequently, contact Huawei technical support.
1917	Grid volt. imbal.	Major	The three phases of the power grid differ greatly in voltage.	The PID does not work and generates no output. The fault can be automatically rectified.	If the fault occurs frequently, contact Huawei technical support.

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 does not work and generates no output. The fault can be automatically rectified.	If the fault occurs frequently, contact Huawei technical support.
1919	Grid undervolt.	Major	The power grid line voltage is lower than the lower threshold.	The PID does not work and generates no output. The fault can be automatically rectified.	If the fault occurs frequently, contact Huawei technical support.
1920	Incorrect PV mode	Major	In commissioning or normal mode, running parameter settings are incorrect.	The PID does not work and generates no output.	1. Check whether running parameters are correct. For details, see Table 6-2 and Table 6-3. 2. If the PV type is correctly set 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 does not work and generates no output.	1. Reconnect the output cable securely. 2. Reconnect the ground cable securely.
1924	Grid Loss	Major	The power grid is power off.	The PID does not work.	1. If the fault occurs accidentally, the possible cause is that the power grid is power off temporarily. The PID automatically recovers after the power grid becomes normal. 2. If the alarm occurs repeatedly, contact Huawei technical support.

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 working frequency.	The PID does not work.	1. If the fault occurs accidentally, the possible cause is that the power grid is abnormal temporarily. The PID automatically recovers after the power grid becomes normal. 2. If the alarm occurs repeatedly, contact Huawei technical support.
1926	Grid underfreq.	Major	The power grid frequency is lower than the lower threshold of the PID working frequency.	The PID does not work.	1. If the fault occurs accidentally, the possible cause is that the power grid is abnormal temporarily. The PID automatically recovers after the power grid becomes normal. 2. If the alarm occurs repeatedly, contact Huawei technical support.
1927	Incorrect PV mod type	Major	The PV type is incorrectly set.	The PID does not work.	1. Check whether the PV type is correctly set. If no, correct the PV type setting. 2. If the PV type is correctly set but the fault persists, contact Huawei technical support.
1928	PID inductor fault	Major	1. The PID inductor cable is incorrectly connected. 2. The PID inductor is faulty.	The PID does not work and generates no output. The fault can automatically disappear.	1. Check whether the PID inductor cable is connected properly. If the cable is not connected properly, reconnect the cable. 2. If the PID inductor cable is connected properly, replace the PID inductor or contact Huawei technical support.
1929	PV2 Reverse	Major	PV2 is reversely connected.	The PID does not work.	1. Check whether PV2+ and PV2- are reversely connected. If yes, reconnect the cables. 2. If the cable connection is correct, contact Huawei technical support.

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 exceptions.	The PID does not work and generates no output.	• Reason ID = 5 1. Check whether the output virtual midpoint and PE are short-circuited, or the output impedance is less than 1 kilohm. If yes, reconnect the cable securely. 2. Check the cable connections for the output virtual midpoint and the PE cable, which should not be connected to cables on the power grid side. If they are connected to cables on the power grid side, reconnect the cables. 3. If no, replace the PID or contact Huawei technical support. • Reason ID = 6 1. Check whether PV1-/PV2- and PE are short-circuited, or the output impedance is less than 1 kilohm. If yes, reconnect the cable securely. 2. If no, replace the PID or contact Huawei technical support. • Reason ID = 9 1. Check whether the baud rate settings on the data collector and PID are the same. 2. Check whether the RS485 cable is connected properly. 3. If the fault occurs repeatedly, replace the PID or contact Huawei technical support. • For other reason IDs Please replace the PID or contact Huawei technical support.

8 PID Disposal

This section describes how to dispose of the PID.

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

9 Technical Specifications

This section describes technical specifications of the PID.

Table 9-1 Technical specifications

Item		Specifications
Operating temperature range		-25 ℃ to +60 ℃
Relative humidity (non-condensing)		5%–95%
Operating altitude		4000 m
Degree of protection		IP20
Class of protection		Class I
Input	Three-phase line voltage	Rated voltage range: 320–480 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

A Acronyms and Abbreviations

L

LCD	Liquid Crystal Display

P

PE	Protective Earthing
PID	Potential Induced Degradation
PV	Photo Voltaic

S

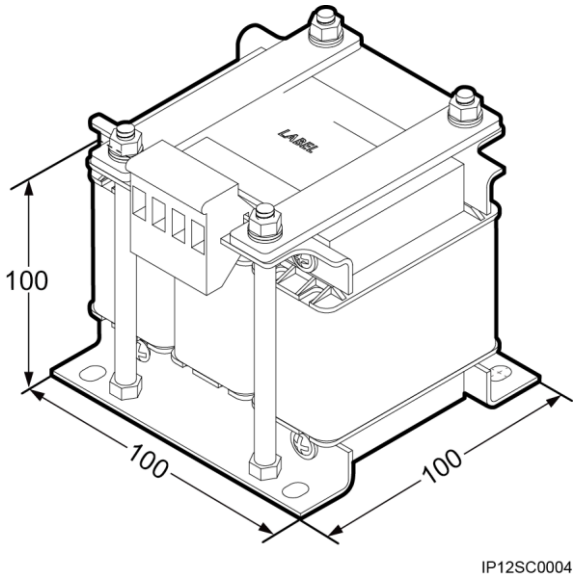
SPD	Surge Protective Device

B Installing an Inductor and Connecting Cables

Appearance

Figure B-1 shows the appearance and dimensions of an inductor.

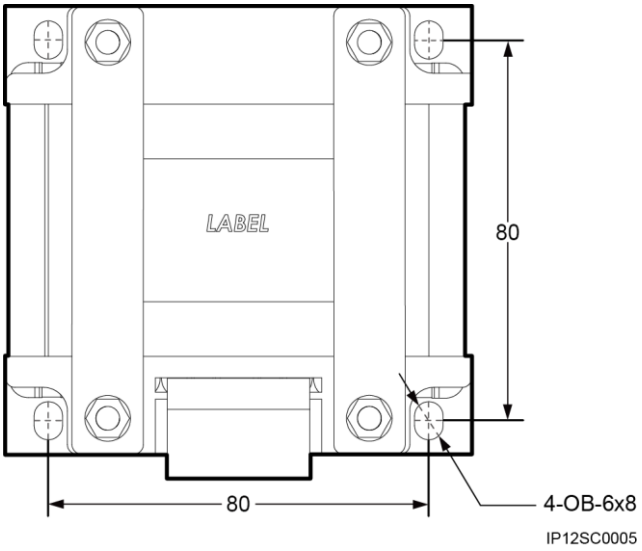
Figure B-1 Inductor (unit: mm)



Installation

Figure B-2 shows the installation dimensions of an inductor.

Figure B-2 Installation dimensions (unit: mm)



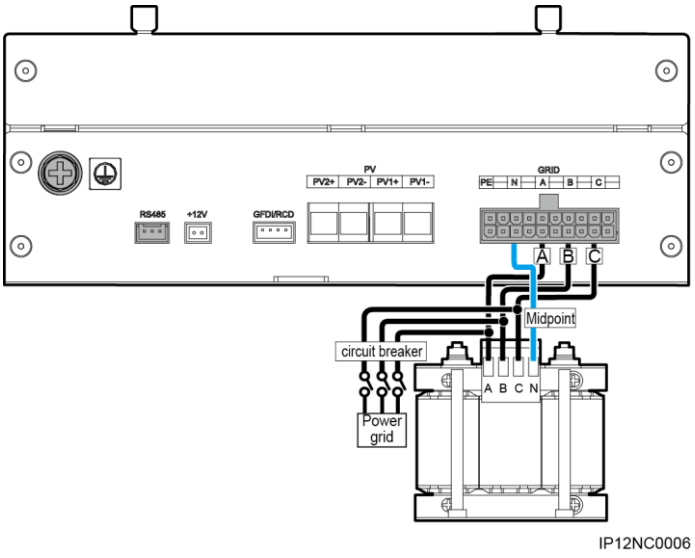
NOTE

- Space for installing an inductor (H x W x D): 150 mm x 150 mm x 150 mm.
- Screw model for installing an inductor: M5x12; 4 PCS.

Cable Connection

Figure B-3 shows how to connect cables between an inductor and the PID.

Figure B-3 Cable connection



NOTE

- Recommended cable: 18 AWG (1 mm^2); meeting the UL1015 standard.
- A circuit breaker (480 V AC/6 A) can be installed at the power grid side or between the PID and inductor depending on the actual situation.