SUN2000-(460KTL, 506KTL) Series Utility-Scale PV Solution

User Manual

Issue	02
Date	2026-03-30

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About This Document

Purpose

This document describes the cable connections, power-on and commissioning, and power-off operations for the SUN2000-(460KTL, 506KTL) series utility-scale PV-only solution. The safety precautions, product introduction, site selection requirements, and maintenance information of the products involved in the solution are described in the user manuals of the corresponding products.

Intended Audience

This document is intended for:

- Technical support engineers
- Hardware installation engineers
- Commissioning engineers

Symbol Conventions

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

Symbol	Description
DANGER	Indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.
WARNING	Indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.
CAUTION	Indicates a hazard with a low level of risk which, if not avoided, could 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	Supplements the important information in the main text. NOTE is used to address information not related to personal injury, equipment damage, and environment deterioration.

Change History

Changes between document issues are cumulative. The latest document issue contains all the changes made in earlier issues.

Issue 02 (2026-03-30)

Added **5.4 Smart Insulation Monitoring**.

Added **5.5 PV Black Start**.

Added **5.6 PV Grid Forming**.

Added **5.7 POD**.

Added **5.8 Auto-Start with Reactive Power at Night**.

Updated **1.1 Solution Architecture**.

Updated **1.2 Communication Networking**.

Updated **2.1 Installation**.

Updated **2.2 Cable Connections**.

Updated **3.1 System Power-On**.

Updated **5.1 Direct Power Sampling of the Transformer Station**.

Updated **5.2 Three-Level Fault Recording**.

Issue 01 (2025-09-30)

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

Contents

1 Solution Introduction

1.1 Solution Architecture

Figure 1-1 PV-only + third-party transformer station (MBUS networking)

NOTE

In the networking diagram, ⟋⟍⟋⟍ indicates the signal flow. Data is transmitted through AC power cables which serve as the medium for information transfer.

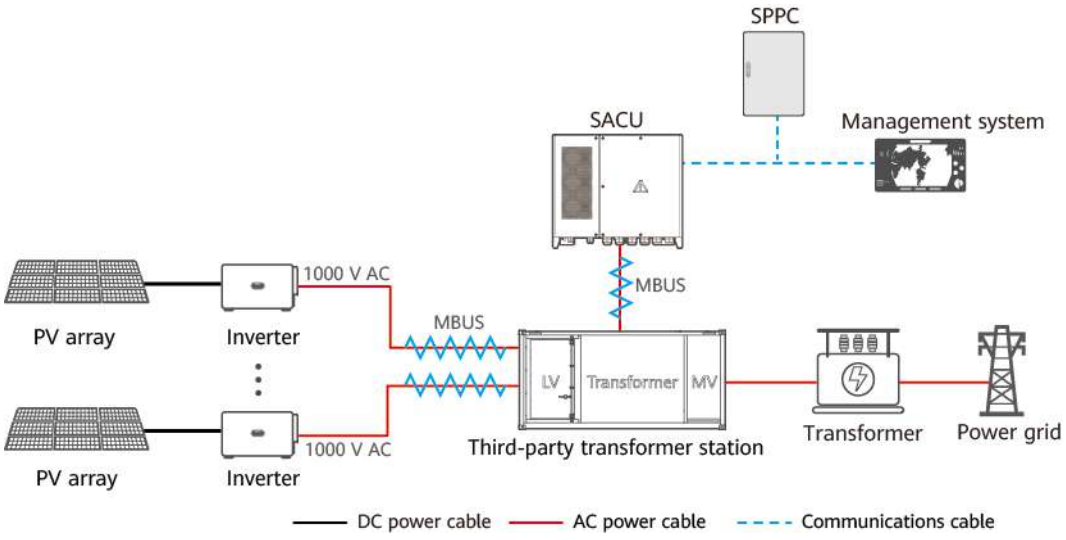


Table 1-1 Products

Product Name	Model	Remarks
Smart PV Controller (inverter)	• SUN2000-460KTL-H0 • SUN2000-506KTL-H1 • SUN2000-506KTL-H2 • SUN2000-506KTL-H3	Purchased from the Company.
Third-party transformer station	/	Purchased from other vendors. The customer can purchase a transformer station of the rated capacity based on the number of inverters.
Smart Array Controller (SACU)	• SmartACU2000F-F-00 • SmartACU2000F-F-01 • SmartACU2000F-F-02	Purchased from the Company.
SmartLogger	SmartLogger5000A	Integrated in the SACU.
Potential induced degradation (PID) module	SmartPID2000A	Integrated in the SACU.
SmartMBUS CCO	SmartMBUS CCO002A	Integrated in the SACU.
Smart Power Plant Controller (SPPC)	/	Purchased from the Company or other vendors. • Purchased from the Company: SPPC2000 • Purchased from other vendors: PPC
Management system	/	Optional. Purchased from the Company or other vendors.

Figure 1-2 PV-only + STS (MBUS networking)

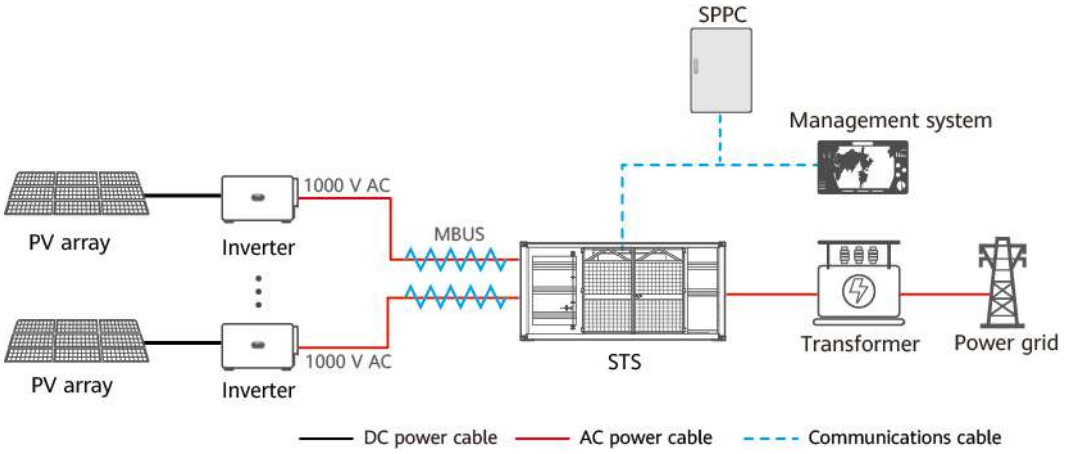


Table 1-2 Products

Product Name	Model	Remarks
Inverter	• SUN2000-506KTL-H1 • SUN2000-506KTL-H2 • SUN2000-506KTL-H3	Purchased from the Company.
STS	• JUPT-3000K-HD1 • JUPT-7000K-HD1 • JUPT-11000K-HD1	• Purchased from the Company. The customer can purchase an STS of the rated capacity based on the number of inverters. • The STS integrates the SACU; specifically, both the SmartLogger and CCO module are integrated inside the STS, while the PID module is externally mounted on the STS.
Smart Power Plant Controller (SPPC)	/	Purchased from the Company or other vendors. • Purchased from the Company: SPPC2000 • Purchased from other vendors: PPC
Management system	/	Optional. Purchased from the Company or other vendors.

1.2 Communication Networking

Third-Party Transformer Station Networking

For details about the cable connections when a third-party transformer station is configured, see the related documents provided by the vendor. The number of devices in the figures is for reference only. The actual configuration may vary.

NOTE

- One SACU manages multiple inverters and one third-party transformer station to form a PV array.
- The inverter communicates with the northbound SmartLogger over the MBUS.
- The SACUs communicate with each other over a hand-in-hand fiber ring network. Each ring network can connect to a maximum of 15 SACUs.
- If the SmartLoggers connect to the ring network switch through Ethernet cables, the communication distance shall be less than or equal to 100 m.

Figure 1-3 Communication logic diagram (third-party transformer station with a double-winding transformer)

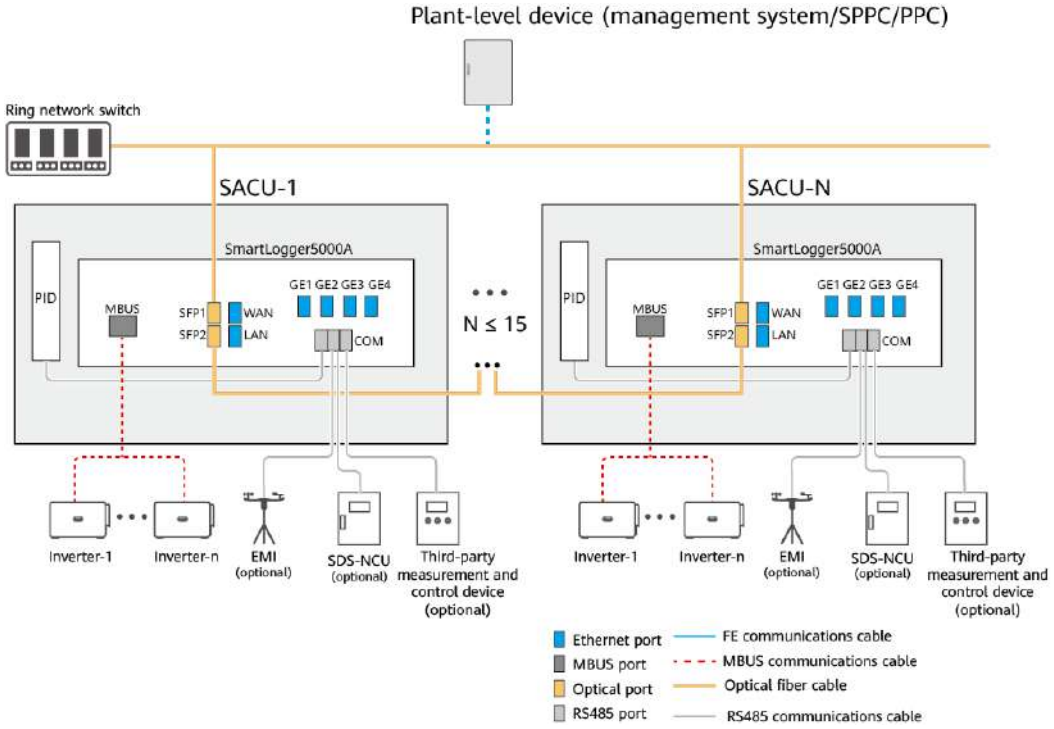


Table 1-3 SACU and inverter configuration information

Device	Model	Maximum Number of Connected Devices
SACU	SmartACU2000F-F-01	A maximum of 15 devices can be connected to each ring network. N ≤ 15
Inverter	SUN2000-460KTL-H0	A maximum of 15 devices can be connected to each PV array. n ≤ 15

Figure 1-4 Communication logic diagram (third-party transformer station with a double-split transformer)

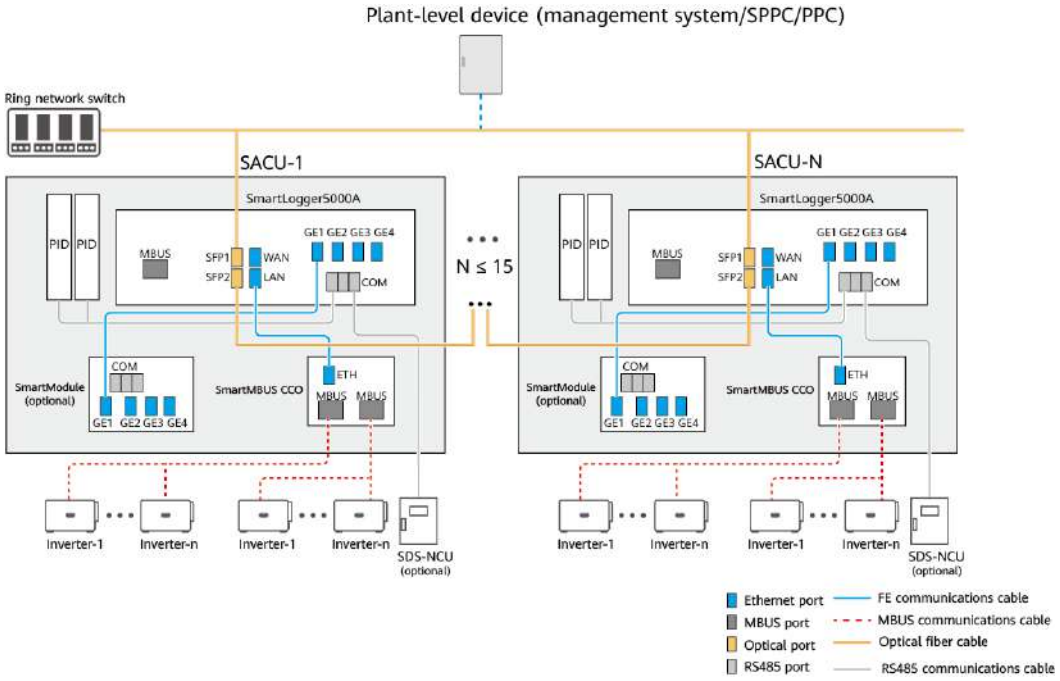


Table 1-4 SACU and inverter configuration information

Device	Model	Maximum Number of Connected Devices
SACU	SmartACU2000F-F-02	A maximum of 15 devices can be connected to each ring network. N ≤ 15

Device	Model	Maximum Number of Connected Devices
Inverter	• SUN2000-506KTL-H1 • SUN2000-506KTL-H2 • SUN2000-506KTL-H3	A maximum of 24 devices can be connected to each PV array. n ≤ 12

STS Networking

NOTE

- In the scenario using the STS with a double-winding transformer station, the SmartLogger is built in the STS and each array has one STS.
- The inverter communicates with the northbound SmartLogger over the MBUS.
- The STSs communicate with each other over a hand-in-hand fiber ring network. Each ring network can connect to a maximum of 15 STSs.

Figure 1-5 Communication logic diagram (STS with a double-winding transformer)

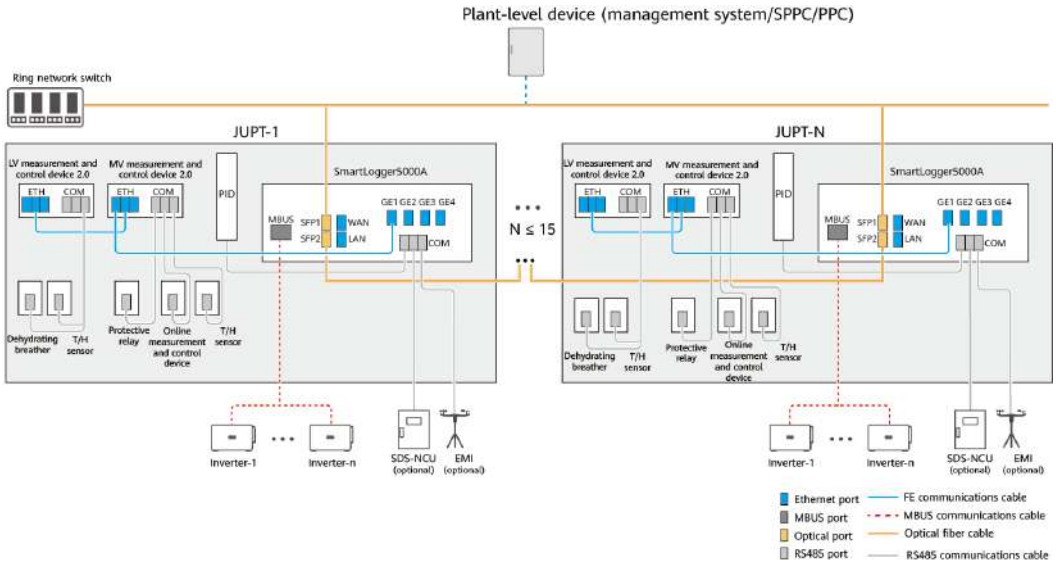


Table 1-5 STS and inverter configuration information

Device	Model	Maximum Number of Connected Devices
JUPT	JUPT-3000K-HD1	A maximum of 15 devices can be connected to each ring network. N ≤ 15

Device	Model	Maximum Number of Connected Devices
Inverter	• SUN2000-506KTL-H1 • SUN2000-506KTL-H2 • SUN2000-506KTL-H3	A maximum of 8 devices can be connected to each PV array. n ≤ 8

Figure 1-6 Communication logic diagram (STS with a double-split transformer)

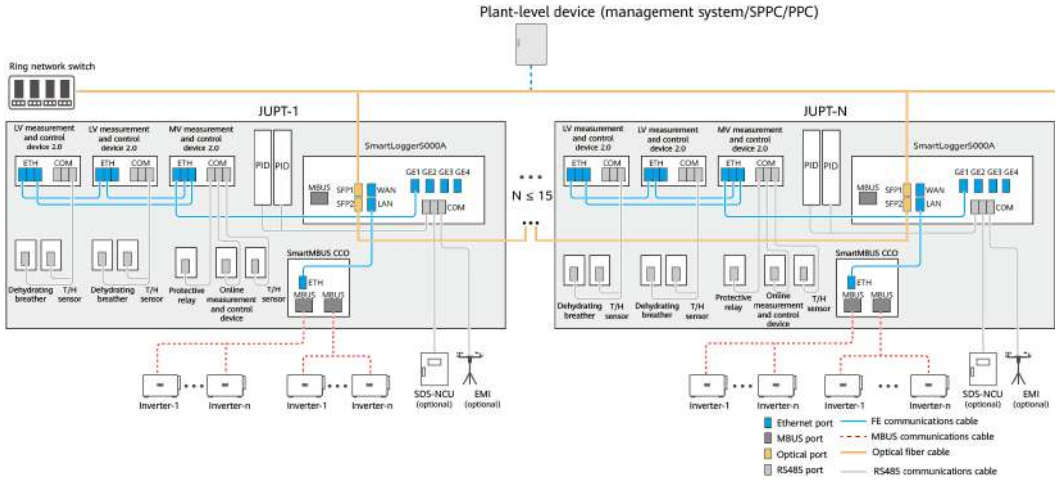


Table 1-6 STS and inverter configuration information

Device	Model	Maximum Number of Connected Devices
JUPT	• JUPT-7000K-HD1 • JUPT-11000K-HD1	A maximum of 15 devices can be connected to each ring network. N ≤ 15
Inverter	• SUN2000-506KTL-H1 • SUN2000-506KTL-H2 • SUN2000-506KTL-H3	If the JUPT-7000K-HD1 is used, a maximum of 16 devices can be connected to each PV array. n ≤ 8 If the JUPT-11000K-HD1 is used, a maximum of 24 devices can be connected to each PV array. n ≤ 12

1.3 O&M Methods

Table 1-7 O&M methods

Method	Description
SmartLogger WebUI	Connect to the SmartLogger in the SACU using a PC to manage the inverters in a PV array. (For details about the computer system version and browser requirements, see **3.2 Preparations and WebUI Login**.)
Management system	Log in to the management system using a web browser to view the performance data and alarm information of each device, and remotely control and manage the devices.
App	Connect to a device locally on the app to implement local O&M.
SPPC2000	Connect to the SPPC2000 using a PC and communicate with the SmartLogger in the PV array to perform active and reactive power control. (For details about the computer system version and browser requirements, see **8.1 WebUI Login**.)

1.4 PV Array Layout Principles

- The layout must meet the requirements of local fire protection regulations and relevant specifications of power plant design.
- It is recommended that the transformer station be deployed in the central position. For details, see the solution provided by the design institute.

2 Device Installation and Cable Connections

This section describes the process, precautions, and connections for installing devices and connecting cables in the solution. For details, see the user manuals or quick guides of the corresponding devices. To obtain the documents, see **A Reference Documents**.

2.1 Installation

Third-Party Transformer Station Scenario

Table 2-1 Device installation process

Installation Task	Precaution
Inverter	• For details about precautions for installing the inverter, see *SUN2000-(460KTL, 506KTL) Series User Manual* and *SUN2000-(460KTL, 506KTL) Series Quick Guide*. • Do not install the equipment in an area with strong vibration, noise, or electromagnetic interference. The equipment shall be installed in an environment with a magnetic field strength less than 4 Gauss. If the magnetic field strength is greater than or equal to 4 Gauss, the equipment may fail to work properly. If the magnetic field strength is high, for example, in a smeltery, you are advised to use a gauss meter to measure the magnetic field strength of the equipment installation position when the smelting equipment is running normally. • The inverter shall be physically separated from residential environments or radio receivers by distance greater than 30 m. If noise-sensitive areas are involved, the distance between the installation position and noise-sensitive areas must be greater than or equal to 40 m.

Installation Task	Precaution
SACU	• For details about the precautions for installing the SACU, see *SmartACU2000F Smart Array Controller User Manual* and *SmartACU2000F Quick Guide*. • Do not install the equipment in an area with strong vibration, noise, or electromagnetic interference. The equipment shall be installed in an environment with a magnetic field strength less than 4 Gauss. If the magnetic field strength is greater than or equal to 4 Gauss, the equipment may fail to work properly. If the magnetic field strength is high, for example, in a smeltery, you are advised to use a gauss meter to measure the magnetic field strength of the equipment installation position when the smelting equipment is running normally.
Third-party transformer station	For details about the precautions for installing the third-party transformer station, see the related documents provided by the vendor.
SPPC or PPC	• If the SPPC is configured, see *SPPC2000 Smart Power Plant Controller User Manual* for installation precautions. • If the PPC is configured, see the related documents provided by the vendor for installation precautions.
Management system	• If the Huawei management system is configured, see the management system user manual for installation precautions. • If a third-party management system is configured, see the related documents provided by the vendor for installation precautions.

STS Scenario

Installation Task	Precaution
Inverter	• For details about precautions for installing the inverter, see *SUN2000-(460KTL, 506KTL) Series User Manual* and *SUN2000-(460KTL, 506KTL) Series Quick Guide*. • Do not install the equipment in an area with strong vibration, noise, or electromagnetic interference. The equipment shall be installed in an environment with a magnetic field strength less than 4 Gauss. If the magnetic field strength is greater than or equal to 4 Gauss, the equipment may fail to work properly. If the magnetic field strength is high, for example, in a smeltery, you are advised to use a gauss meter to measure the magnetic field strength of the equipment installation position when the smelting equipment is running normally. • The inverter shall be physically separated from residential environments or radio receivers by distance greater than 30 m. If noise-sensitive areas are involved, the distance between the installation position and noise-sensitive areas must be greater than or equal to 40 m.
STS	For details about the precautions for installing the STS, see *JUPT-(3000K, 7000K, 11000K)-HD1 Smart Transformer Station User Manual* and *JUPT-(3000K, 7000K, 11000K)-HD1 Smart Transformer Station Installation Guide*.
SPPC or PPC	• If the SPPC is configured, see *SPPC2000 Smart Power Plant Controller User Manual* for installation precautions. • If the PPC is configured, see the related documents provided by the vendor for installation precautions.
Management system	• If the Huawei management system is configured, see the management system user manual for installation precautions. • If a third-party management system is configured, see the related documents provided by the vendor for installation precautions.

2.2 Cable Connections

Table 2-2 Device cable connection process

Cable Connection Task	Precaution
Connecting PE cables	• All devices shall be connected to the nearest grounding points, and the grounding methods shall comply with local electrical safety regulations. • Devices in the same array shall be equipotentially bonded. • To enhance the corrosion resistance of a ground terminal, apply silicone grease or paint on it after connecting a PE cable.
Connecting DC power cables	For details about precautions for installing DC power cables, see the inverter user manual.
Connecting AC power cables	• For details about precautions for installing AC power cables, see the user manuals of the corresponding components in the array. • The distance between the inverter and the transformer station must be greater than or equal to 10 m. • If multi-core cables are used, the maximum communication distance is 1000 m when the SACU is installed outside the transformer station (D ≤ 10 m). D indicates the distance from the busbar of the transformer station to the port of the SmartMBUS. If the distance is beyond the specified range, the communication may be interrupted. • If single-core cables are used, the maximum communication distance is 800 m when the SACU is installed outside the transformer station (D ≤ 10 m). D indicates the distance from the busbar of the transformer station to the port of the SmartMBUS. If the distance is beyond the specified range, the communication may be interrupted.

Cable Connection Task	Precaution
Connecting communications cables	• For details about the cable connections, see **1.2 Communication Networking**. • For details about precautions for installing communications cables, see the user manuals of the corresponding components in the array. • If the SmartLogger is connected to an Ethernet switch using a fiber optic cable (single-mode), the communication distance is less than or equal to 12 km (if a 100M optical module is used) or less than or equal to 10 km (if a 1000M optical module is used). • After installing the RJ45 connector of a network cable or splicing a fiber optic cable, check the communication between the two ends of the cable.

NOTE

After connecting cables, use sealing putty to seal all cable holes to prevent foreign objects like insects, mice, and snakes from getting in.

3 Deployment and Commissioning

3.1 System Power-On

DANGER

Wear personal protective equipment and use dedicated insulated tools to avoid electric shocks or short circuits.

Third-Party Transformer Station Scenario

Step 1 Power on the inverter by referring to sections "Check Before Power-On" and "Powering On the Inverter" in the inverter user manual.

Step 2 Power on the transformer station by referring to the related documents provided by the vendor.

Step 3 Power on the SACU by referring to sections "Check Before Power-On" and "System Power-On" in the SACU user manual.

Step 4 Power on the SPPC.

- If an SPPC is configured, power on the SPPC by referring to section "Power-On" in the SPPC user manual.
- If a PPC is configured, power on the PPC by referring to the related documents provided by the vendor.

Step 5 Power on the management system.

- If the Huawei management system is configured, power on the system by referring to the management system user manual.
- If a third-party management system is configured, power on the system by referring to the related documents provided by the vendor.

----End

STS Scenario

Step 1 Power on the inverter by referring to sections "Check Before Power-On" and "Powering On the Inverter" in the inverter user manual.

Step 2 Power on the STS by referring to section "Power-On" in the STS user manual.

Step 3 Power on the SPPC.

- If an SPPC is configured, power on the SPPC by referring to section "Power-On" in the SPPC user manual.
- If a PPC is configured, power on the PPC by referring to the related documents provided by the vendor.

Step 4 Power on the management system.

- If the Huawei management system is configured, power on the system by referring to the management system user manual.
- If a third-party management system is configured, power on the system by referring to the related documents provided by the vendor.

----End

3.2 Preparations and WebUI Login

NOTE

- If a PPC is configured, refer to the related documents provided by the vendor for preparations and WebUI login.
- If an SPPC is configured, refer to **SPPC2000 Smart Power Plant Controller User Manual** for preparations and WebUI login.
- This section describes preparations and WebUI login using the SmartLogger5000A.

Prerequisites

- Use an operating system of Windows 7 or later.
- An account can be used to log in to only one device at a time. An IP address can be used to log in with only one account at a time. A maximum of two different accounts can be used to log in to the WebUI concurrently.
- Use Chrome 135, Firefox 137, or a later version to log in. If you use other browsers or versions to log in, functions may be abnormal or cannot be used properly.

Procedure

Step 1 Connect any network port of the PC to the network port of the SmartLogger using a network cable.

Step 2 Set the IP address for the PC on the same network segment as the SmartLogger IP address.

Port	IP Setting	Default Value	PC Setting Example
LAN port	IP address	192.168.8.10	192.168.8.11

Port	IP Setting	Default Value	PC Setting Example
	Default gateway	192.168.8.1	192.168.8.1
	Subnet mask	255.255.255.0	255.255.255.0
WAN port	IP address	192.168.0.10	192.168.0.11
	Default gateway	192.168.0.1	192.168.0.1
	Subnet mask	255.255.255.0	255.255.255.0
GE1 port	IP address	192.168.3.10	192.168.3.11
	Default gateway	192.168.3.1	192.168.3.1
	Subnet mask	255.255.255.0	255.255.255.0
GE2 port	IP address	192.168.4.10	192.168.4.11
	Default gateway	192.168.4.1	192.168.4.1
	Subnet mask	255.255.255.0	255.255.255.0
GE3 port	IP address	192.168.5.10	192.168.5.11
	Default gateway	192.168.5.1	192.168.5.1
	Subnet mask	255.255.255.0	255.255.255.0
GE4 port	IP address	192.168.6.10	192.168.6.11
	Default gateway	192.168.6.1	192.168.6.1
	Subnet mask	255.255.255.0	255.255.255.0

NOTE

You can change the **IP address**, **Default Gateway**, and **Subnet Mask** of a network port on the page displayed after you choose **Settings** > **Port Settings** > **Ethernet**.

Step 3 Set LAN parameters.

NOTE

- If the SmartLogger is connected to a LAN and a proxy server has been configured, you need to cancel the proxy server configurations.
- If the SmartLogger is connected to the Internet and the PC is connected to the LAN, do not cancel the proxy server configurations.

1. Open **Control Panel** on the PC and choose **Network and Internet**.

2. Click **Internet Options** and then click the **Connections** tab.
3. Click **LAN settings**.
4. Clear **Use a proxy server for your LAN**.
5. Click **OK**.

Step 4 Log in to the WebUI. Enter the SmartLogger IP address (default IP address of the port connected to the network cable) in the address box of a browser to access the login page.

NOTE

If you are logging in to the WebUI for the first time, a security warning is displayed. Ignore the warning to continue the login.

Step 5 Select a desired language.

Step 6 Enter the username and password, and click **Log In**. For details about the account and password, see section **Logging In to the WebUI** in the *SmartLogger5000A User Manual*.

Step 7 (Optional) If device update is required, contact the Company's engineers to obtain the update package.

1. Choose **Maintenance** > **Device Management** > **Device Update** > **Software Package Management**.
2. Click **Upload**. The dialog box for software package information is displayed.
3. Upload the software package of the target version.
4. Click **Upload**.
5. Choose **Maintenance** > **Device Management** > **Device Update** > **Device Update**. Select the device to be updated.
6. Click **Update** to complete the device update.

----End

3.3 Commissioning Using the Deployment Wizard

NOTE

- If a PPC is configured, refer to the related documents provided by the vendor for deployment wizard.
- If an SPPC is configured, refer to **SPPC2000 Smart Power Plant Controller User Manual** for deployment wizard.
- This section describes how to perform commissioning using the deployment wizard on the SmartLogger5000A WebUI.

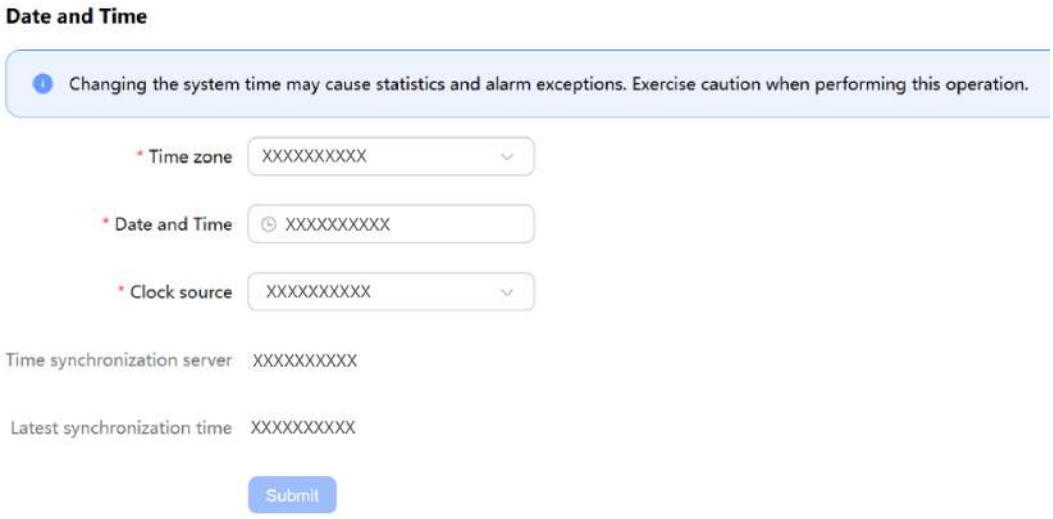
NOTE

- Path: **Wizard** > **Deployment Wizard**
- You can click **Previous**, **Next**, or **Skip** to set parameters in the wizard.

Procedure

Step 1 Choose **Deployment Wizard** > **Basic Settings** > **Date and Time** and set basic parameters.

Figure 3-1 Setting the date and time



Step 2 Choose **Deployment Wizard** > **Device Management**, click **MBUS**, select the target transformer scenario, and set the SN list.

NOTE

- If inverters are connected to the SmartLogger through MBUS networking, the inverter SN list must be set.
  - In the double-winding transformer scenario, set **Built-in MBUS** to **Enable** and then set the SN list.
  - In the double-split transformer scenario, ensure that **Built-in MBUS** is set to **Disable** and then set the SN list.
- If fast power scheduling is involved onsite, choose **Monitoring** > **MBUS** > **MBUS-Inside** > **Running Parameters**.
  - Click **Parameter Settings** and set **Network frequency band** to **Band 4**.
  - Click **Function Settings** and set **Fast scheduling** to **Enable**.

The SN list setting method is as follows:

- One by one: Click **Add**, enter the SN of the corresponding inverter, and click **Submit**.
- In batches:

Method 1: If this is the first time to configure the whitelist, click **Download Template** to download the template to the local PC, enter the inverter SNs in the template, and click **Import** to import the modified template.

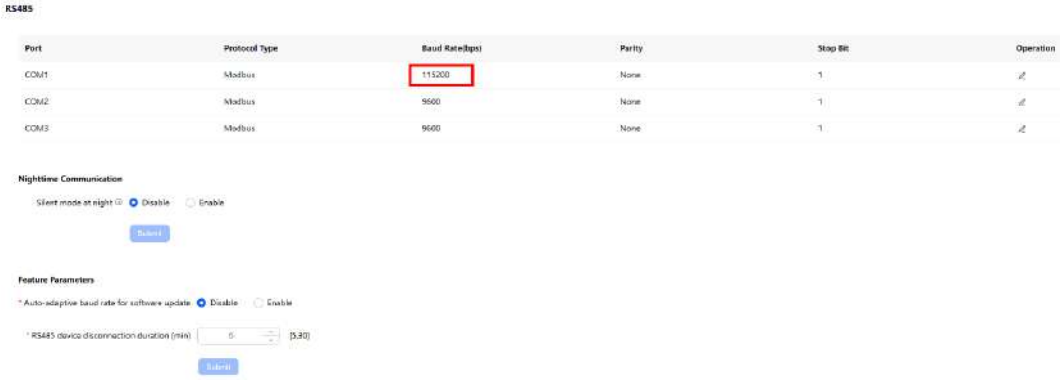
Method 2: If this is not the first time to configure the whitelist, click **Export** to download the template to the local PC, add the inverter SNs to the template based on the template format, and click **Import** to import the modified template.

Step 3 Choose **Deployment Wizard** > **Device Management**, click **RS485**, and set the PID baud rate.

NOTE

If the PID connects to the SmartLogger through the COM1 port, you need to manually change the **Baud Rate** to **115200**.

Figure 3-2 Setting the PID baud rate

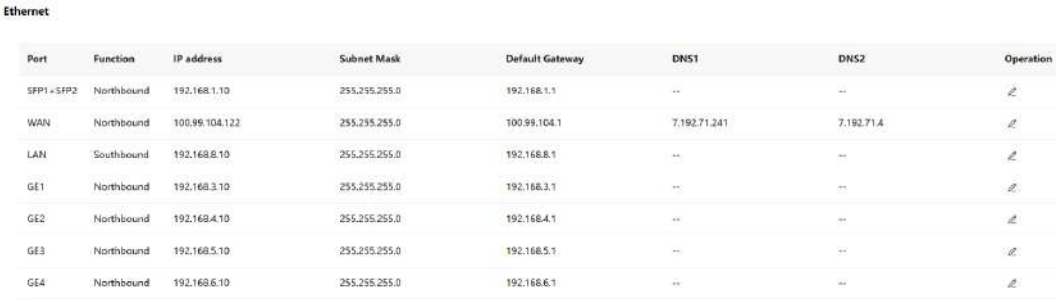


Step 4 Choose **Deployment Wizard** > **Device Management** > **Device Access** and click **Search**.

Figure 3-3 Searching for devices

Step 5 Choose **Deployment Wizard** > **Communication Networking**, click **Ethernet**, and set the IP address based on the actual port.

Figure 3-4 Ethernet configuration



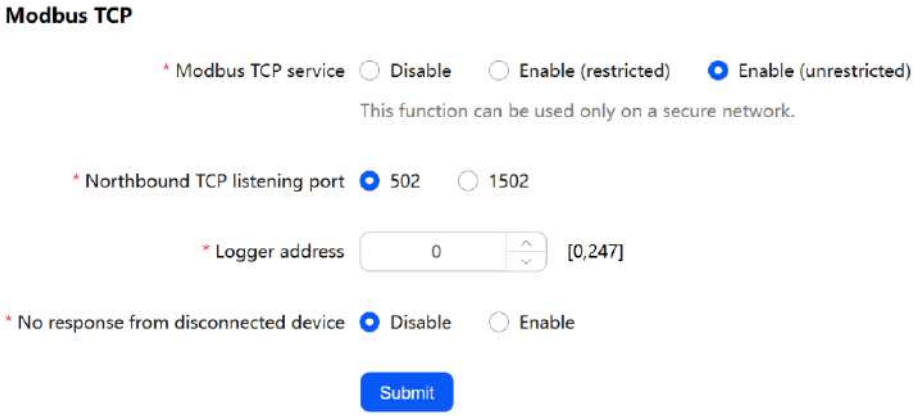
Step 6 (Optional) Connect to the Huawei management system. Choose **Deployment Wizard** > **Communication Networking**, click **Management System**, and set parameters.

Figure 3-5 Setting parameters for connecting to the Huawei management system

Step 7 (Optional) Connect to a third-party management system.

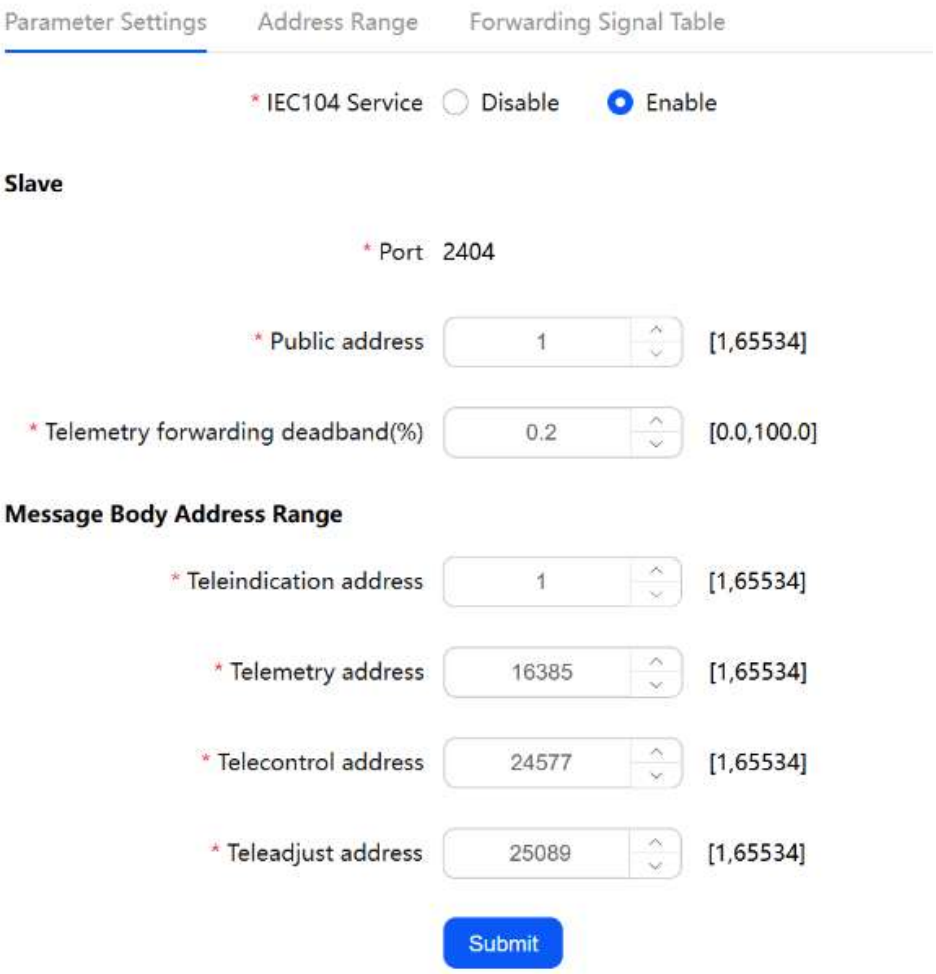
1. Set protocol parameters.
   - Method 1: Connect to a third-party management system over Modbus TCP.

     Figure 3-6 Setting Modbus TCP parameters

   - Method 2: Connect to a third-party management system over IEC 104.

Figure 3-7 Setting IEC 104 parameters

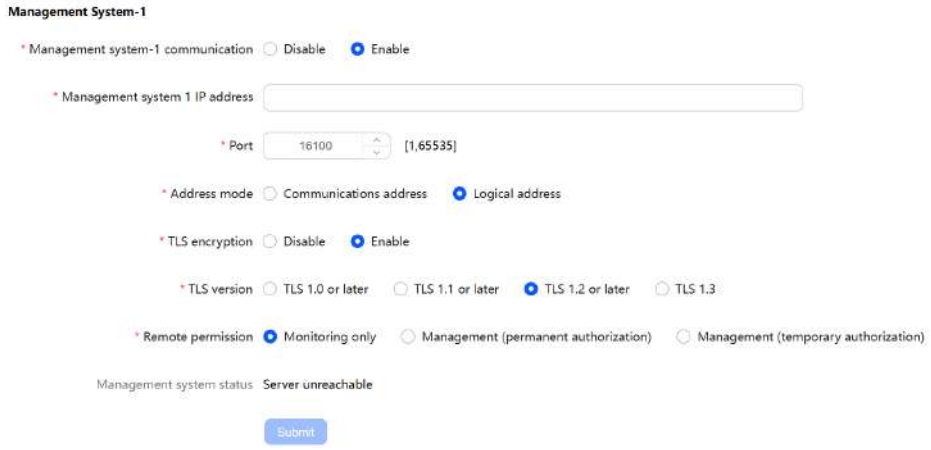


2. Set parameters for connecting to a third-party management system.

   NOTE

   Path: **Settings** > **Communications Protocol** > **Modbus** > **Client** > **Management System-1**

Figure 3-8 Setting parameters for connecting to a third-party management system



Step 8 Choose **Deployment Wizard** > **Parameter Settings** > **Inverter Parameters** and set inverter parameters.

Table 3-1 Inverter parameters

Parameter	Description
Grid code	Set this parameter based on the grid code of the country or region where the device is located and the application scenario of the device.
Working mode	Set the working mode of the device based on the actual scenario.

Step 9 Click **Finish** to complete the configuration.

----End

4 O&M

4.1 Shutdown and Power-Off

After power-on and commissioning are complete, you can power off the system as required (for example, for device maintenance), and power it on when the system needs to be put into use.

Step 1 Send a shutdown command.

1. Log in to the SmartLogger WebUI.
2. Choose **Maintenance** > **Device Management** > **Startup/Shutdown** and click **Shutdown** from the drop-down list to send a shutdown command to the devices in the array.

Step 2 Power off the system by performing the operations in reverse order of **3.1 System Power-On**.

----End

4.2 Startup and Operation

Step 1 Power on the device by referring to **3.1 System Power-On**.

Step 2 Send a startup command.

1. Log in to the SmartLogger WebUI.
2. Choose **Maintenance** > **Device Management** > **Startup/Shutdown** and click **Start** from the drop-down list to send a startup command to the devices in the array.

----End

5 Feature Description

This section describes the main features of the SUN2000-(460KTL, 506KTL) series utility-scale PV-only solution.

5.1 Direct Power Sampling of the Transformer Station

Function

The array voltage and current sampling functions are integrated in the transformer station to quickly obtain the power output of the transformer station, shortening the closed-loop control time for fast power dispatch. In addition, the array-level voltage and current fault recording function is supported when a fault occurs.

NOTICE

In the STS scenario, cable connections and parameter settings have been completed before delivery.

Cable Connections for a Third-party Transformer Station

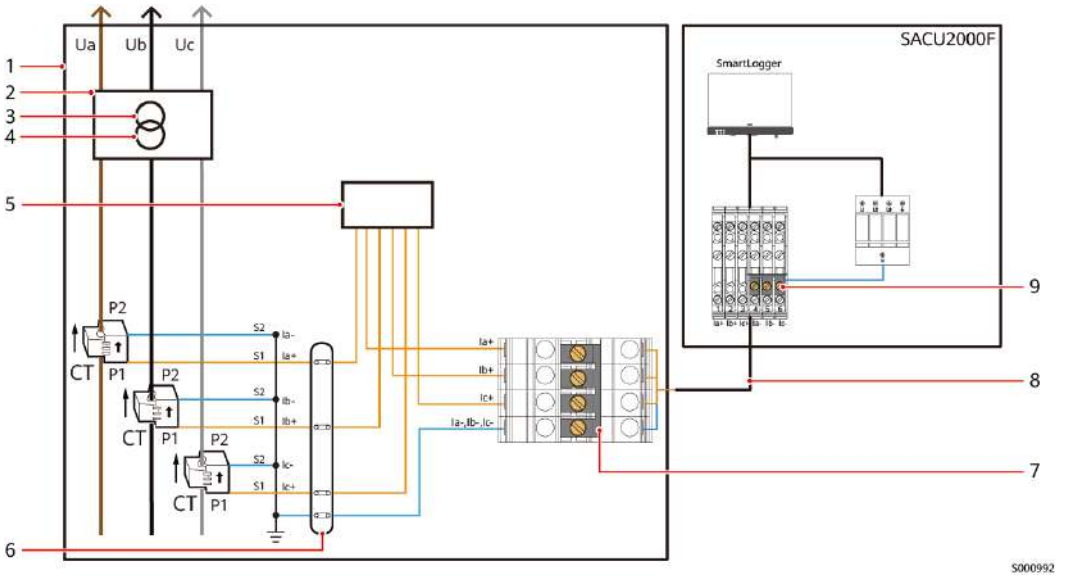
DANGER

High voltage hazard exists. Do not disconnect the CT terminals of the SACU. Before operating the CT loop, power off the corresponding array transformer station and short-circuit the CT at the CT test disconnect terminal block using jumper bars. Before normal use, remove the jumper bars at the CT test disconnect terminal block.

NOTE

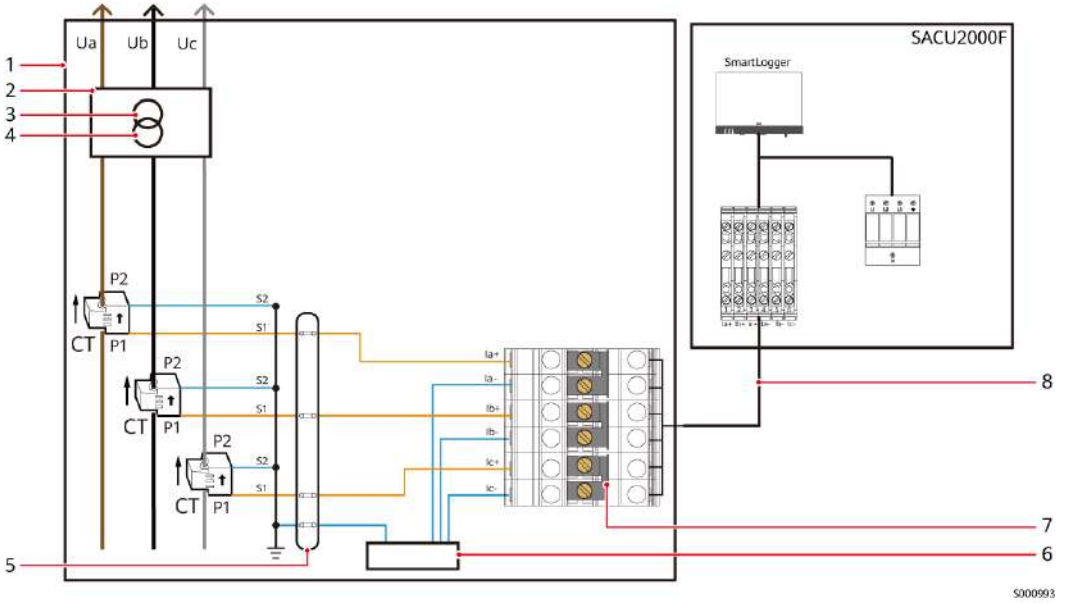
- The CT terminal bridges are for reference only. The actual terminal bridges provided by the vendor may vary.
- It is recommended that the SACU be used as the end device to connect to the transformer station.

Figure 5-1 The SACU is connected as an end device.



(1) Transformer station	(2) Transformer
(3) Transformer (corresponding to the medium-voltage side)	(4) Transformer (corresponding to the low-voltage side)
(5) Measurement and control device	(6) CT test disconnect terminal block
(7) Terminal bridge	(8) CT wiring (three-phase four-wire)
(9) CT terminal bridge	-

Figure 5-2 The SACU is connected as an intermediate device.



(1) Transformer station	(2) Transformer
(3) Transformer (corresponding to the medium-voltage side)	(4) Transformer (corresponding to the low-voltage side)
(5) CT test disconnect terminal block	(6) Measurement and control device
(7) Terminal bridge	(8) CT wiring (three-phase six-wire)

Setting Third-Party Transformer Station Parameters

1. Log in to the SmartLogger5000A WebUI of the PV array.
2. Choose **Settings** > **Port Settings** > **CT**.

Parameter	Description
CT sampling	Set **CT sampling** to **Enable**.
Primary current of CT	This parameter is displayed when **CT sampling** is set to **Enable**. The I_AC port is connected to the CT to sample current. Set this parameter based on the actual specifications of the CT.
Secondary current of CT	
CT wiring direction	Set this parameter to **Positive** or **Negative** based on the actual specifications of the CT.

5.2 Three-Level Fault Recording

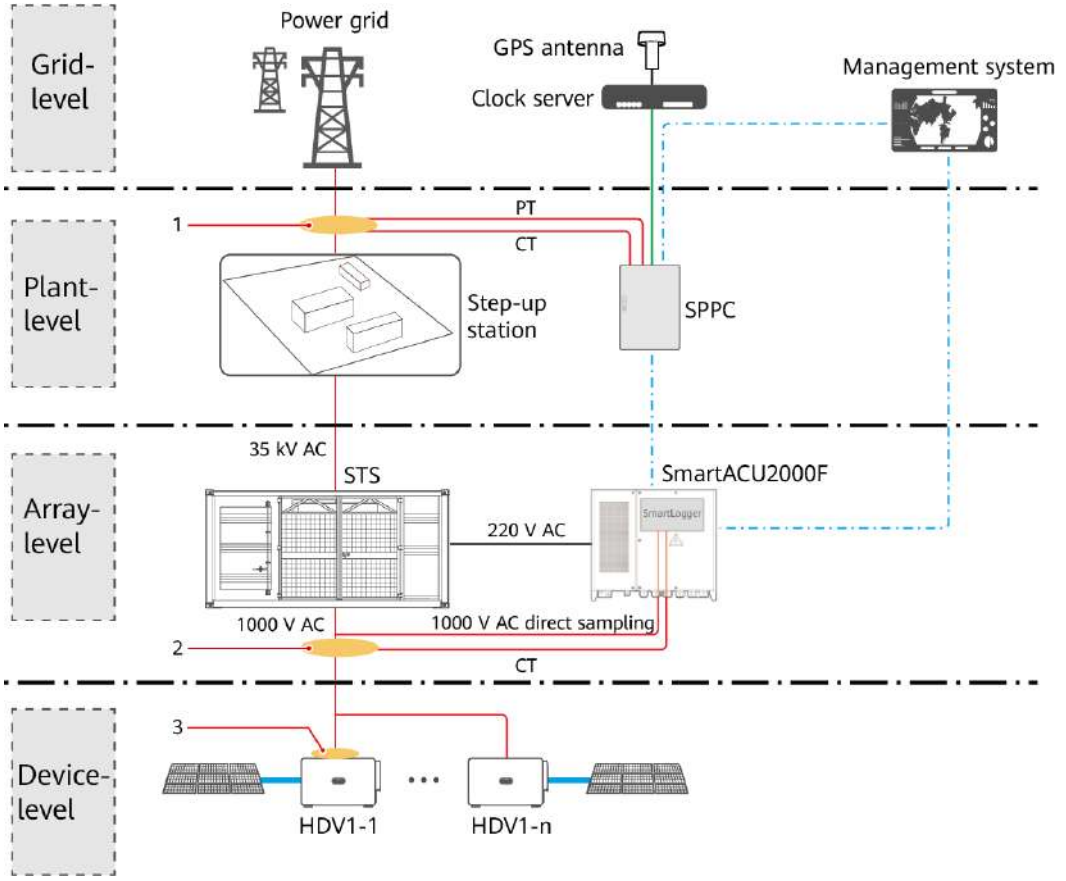
Function

The SUN2000-(460KTL, 506KTL) series inverter solution supports three-level (plant-level, array-level, and inverter-level) fault recording, enabling effective analysis of fault causes and sources during power grid faults.

NOTE

The plant-level fault recording function applies only to scenarios where Huawei SPPC2000 is deployed.

Figure 5-3 Three-level fault recording diagram



(1) Plant-level fault recording point — point of interconnection (POI)	(2) Array-level fault recording point — transformer station busbar on the low-voltage side	(3) Device-level fault recording point — inverter AC power cable port

5.2.1 Setting Fault Recording Parameters

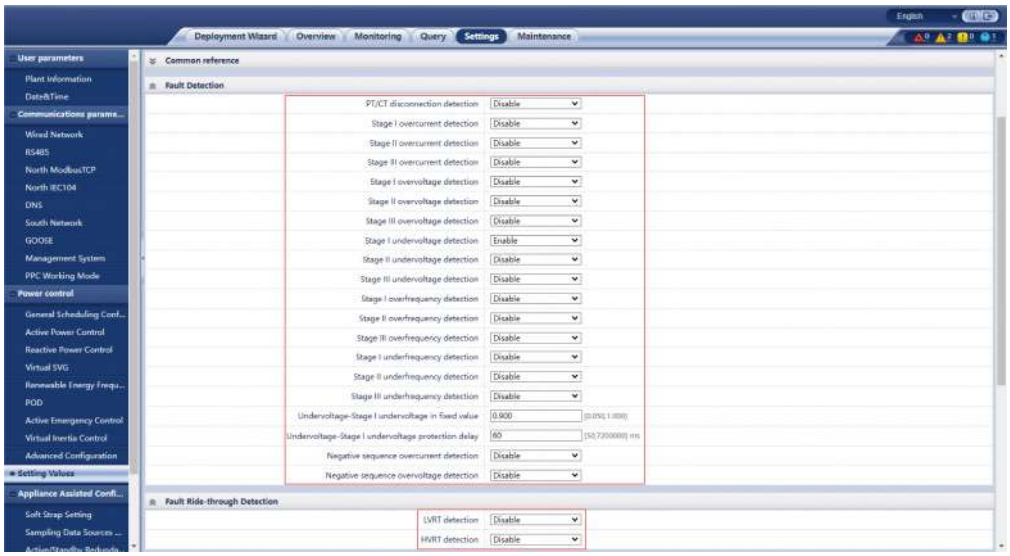
Plant-Level Fault Recording

The conditions for triggering automatic recording include grid faults such as high voltage ride-through (HVRT), low voltage ride-through (LVRT), overvoltage, undervoltage, overfrequency, and underfrequency.

Procedure

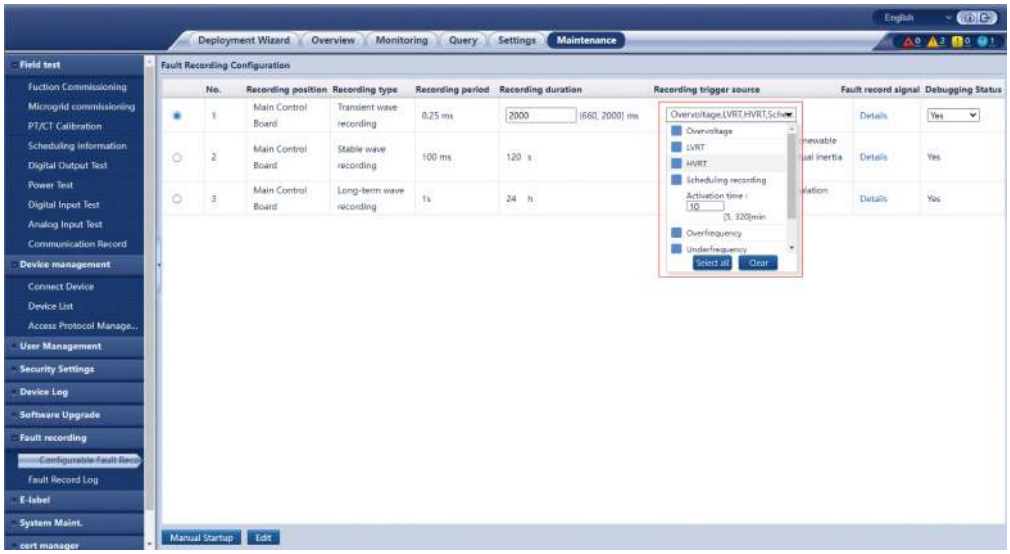
1. Log in to the SPPC2000 WebUI, choose **Settings** > **Setting Value**, set the corresponding fault recording function to **Enable** based on the actual grid fault recording requirements, and click **Setting**.

   Figure 5-4 Enabling fault recording

2. On the SPPC2000 WebUI, choose **Maintenance** > **Fault recording** > **Configurable Fault Record**.
3. Select **Recording trigger source** based on the local grid requirements and specific fault analysis requirements. A fault recording file is automatically generated when primary frequency regulation is triggered.

Figure 5-5 Setting fault recording parameters



4. To manually record faults, click **Manual Recording**.

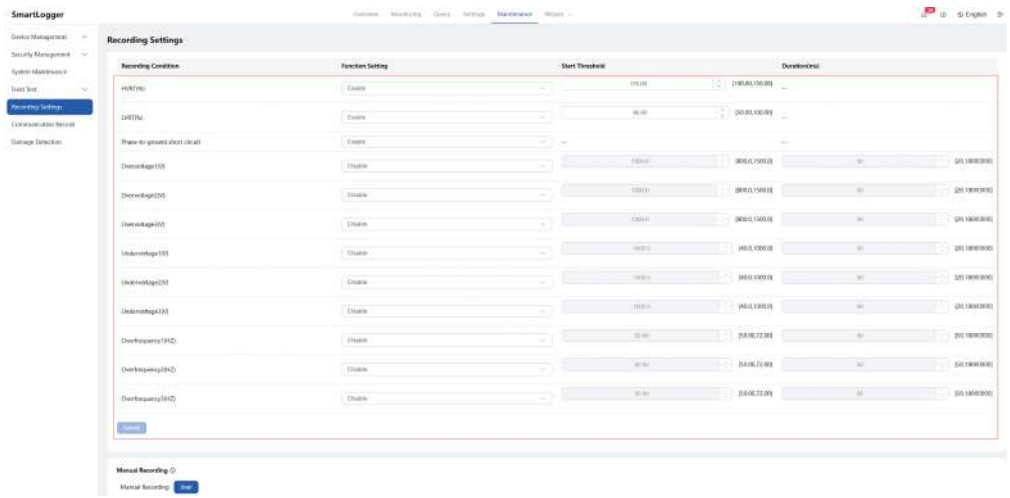
Array-Level Fault Recording

The conditions for triggering automatic recording include grid faults such as HVRT, LVRT, overvoltage, undervoltage, overfrequency, and underfrequency.

Procedure

1. For fault recording with a third-party transformer station, ensure that the cable connections and parameter configuration are complete by referring to **5.1 Direct Power Sampling of the Transformer Station**. For fault recording with an STS, skip this step.
2. Log in to the SmartLogger5000A WebUI of the PV array.
3. Choose **Maintenance** > **Recording Settings**. Set the recording conditions to **Enable** based on the local grid requirements and specific fault analysis requirements by referring to the **Recording Settings** parameter description.

Figure 5-6 Setting array-level fault recording parameters



NOTE

- For detailed parameter description about **Recording Settings**, see **SmartLogger5000A User Manual**.
- To manually record faults, click **Start** under **Manual Recording**.
- To set the same trigger conditions and parameters for array-level and inverter-level fault recording, you need to configure both array-level and inverter-level fault recording parameters on the SmartLogger5000A WebUI. For details about how to configure inverter-level fault recording parameters, see **Inverter-Level Fault Recording**.

Inverter-Level Fault Recording

The conditions for triggering automatic recording include grid faults such as HVRT, LVRT, overvoltage, undervoltage, overfrequency, and underfrequency.

Procedure

1. Log in to the SmartLogger5000A WebUI of the PV array.
2. Choose **Monitoring** > **Inverter** > **Running Parameters**, click **O&M Configuration**, and set **Fault recording** to **Enable**.

Figure 5-7 Setting inverter-level fault recording parameters

5.2.2 Exporting and Viewing a Fault Recording File

Using the Huawei Management System

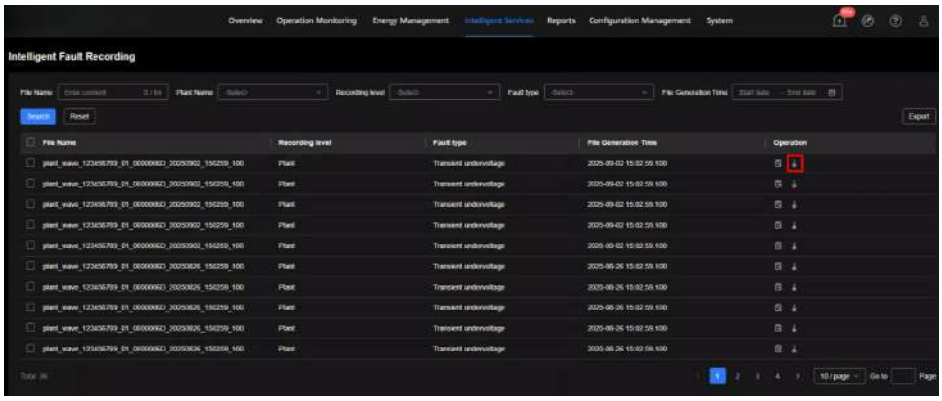
NOTICE

This method applies to the independent export and parsing of plant-level SPPC2000 fault recording files, array-level fault recording files, and inverter fault recording files of the entire plant.

Procedure

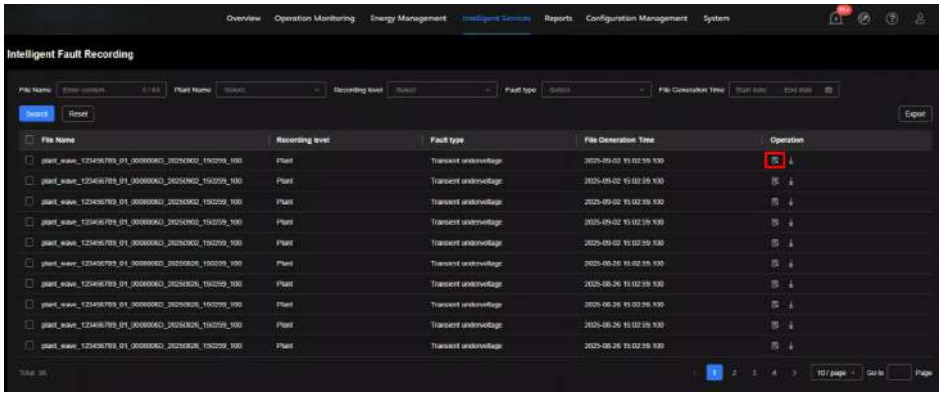
1. Log in to the Huawei management system and choose **Intelligent Services** > **Intelligent Fault Recording**.
2. Click the download icon to export the fault recording file.

Figure 5-8 Exporting a fault recording file



3. Click the view icon to view the fault recording file.

Figure 5-9 Viewing a fault recording file



Using the SPPC WebUI

NOTICE

- This method applies to the independent export of plant-level SPPC2000 fault recording files.
- Recording files are in the standard COMTRADE 2013 format. You can analyze the waveforms of the recording files using the standard COMTRADE recording parsing tool.

Procedure

1. Log in to the SPPC2000 WebUI and choose **Maintenance** > **Fault recording** > **Fault Record Log**.
2. Select the fault recording logs to be exported.
3. Click **Export Log** to export the selected fault recording logs.
4. After the logs are exported, choose **Saving Logs** to download the exported fault recording log file to the local PC.

Using the SmartLogger WebUI

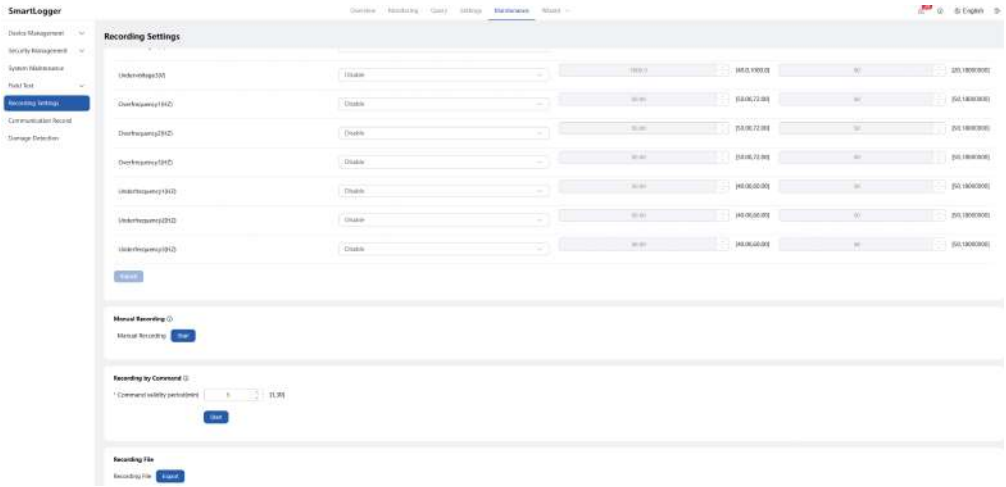
NOTICE

- This method applies to the independent export of array-level fault recording files and inverter fault recording files of the entire plant.
- Recording files are in the standard COMTRADE 2013 format. You can analyze the waveforms of the recording files using the standard COMTRADE recording parsing tool.

Procedure

1. Log in to the SmartLogger5000A WebUI of the PV array.
2. Choose **Maintenance** > **Recording Settings** > **Recording File** and click **Export**.

Figure 5-10 Exporting a fault recording file



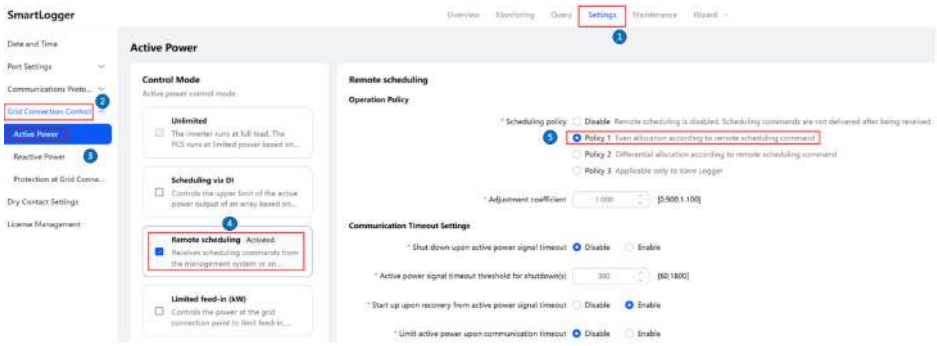
5.3 Grid Dispatch

The solution provides multiple power control policies to control the active power and adjust the reactive power of inverters. You can select a proper power control policy as required to meet the actual dispatch requirements of the local power grid, ensuring grid stability and reliability and efficient plant operation.

Policy 1: Even Allocation According to Remote Scheduling Command

- It is applicable to the ground-mounted utility-scale scenario.
- After receiving a remote scheduling command, the SmartLogger sends a power adjustment command to the inverter. This control policy is open-loop control. The SmartLogger does not adjust the power based on the actual power response of the inverter.
- The advantage is fast power response speed.

Figure 5-11 Policy 1: Even allocation according to remote scheduling command



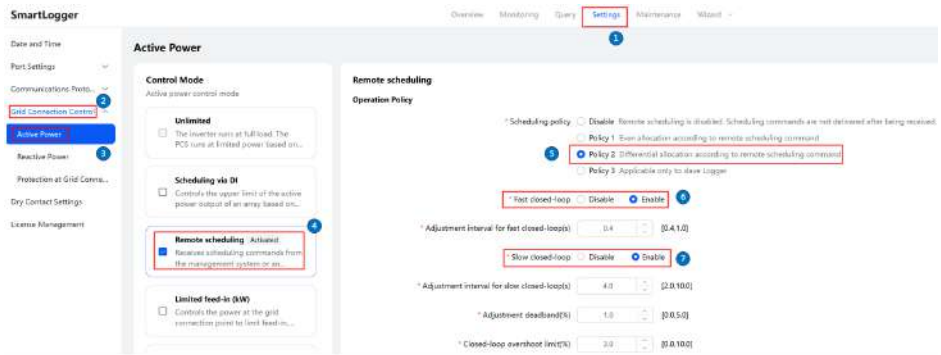
Policy 2: Differential Allocation According to Remote Scheduling Command

Method 1: Fast closed-loop

- It is applicable to the mountain utility-scale scenario.
- After receiving a remote scheduling command, the SmartLogger implements differentiated allocation for each inverter. If the SACU is connected to the CT on the low-voltage side of the transformer station and supports direct power sampling, fast closed-loop power control can be implemented, achieving precise closed-loop power scheduling and ensuring efficient plant operation.
- The advantage is precise control and fast response.

Step 1 Setting CT parameters

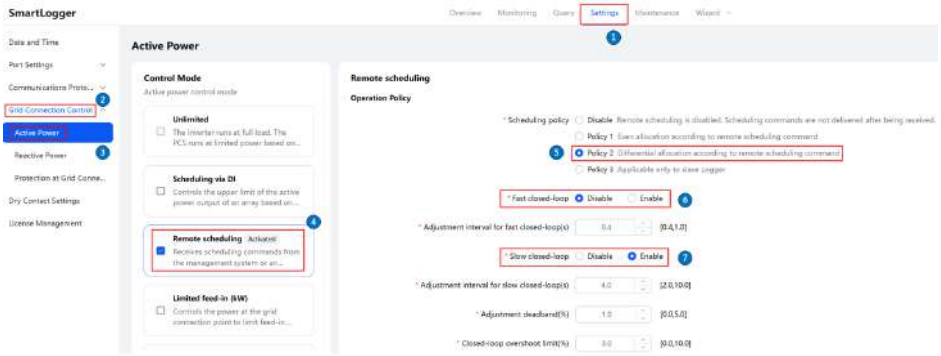
Step 2 Setting a scheduling policy



----End

Method 2: Slow closed-loop

- It is applicable to the mountain utility-scale scenario without direct sampling by the CT on the low-voltage side of the transformer station.
- After receiving a remote scheduling command, the SmartLogger implements differentiated allocation for each inverter. The SmartLogger controls the inverter power in closed-loop mode based on communication sampling, ensuring efficient plant operation.
- The advantage is precise control.



5.4 Smart Insulation Monitoring

Function

The insulation resistance monitoring function is used to monitor the insulation resistance of the PV-only system in real time. When the detected insulation resistance is lower than the warning or alarm threshold, the system triggers the corresponding warning or alarm action.

NOTE

- After the SmartIMD license is loaded, Huawei PID devices provide the smart insulation resistance monitoring function for the system and can replace third-party insulation monitoring devices (IMDs).
- The smart insulation monitoring function of Huawei PID devices can be used only after the SmartIMD license is purchased and loaded.

Table 5-1 Loading the SmartIMD license for Huawei PID devices

Step	Operation
1	Log in to the SmartLogger5000A WebUI of the PV array.
2	Prepare the purchased license file.
3	Choose **Settings** > **License Management** > **License Activation**, click **Upload**, upload the license file, and click **Activate**.

Application Scenarios

- Scenario 1: Huawei PID devices are configured (the SmartIMD license loaded).

- Scenario 2: Huawei PID devices (the SmartIMD license not loaded) and third-party IMDs are configured.
- Scenario 3: Huawei PID devices (the SmartIMD license loaded) and third-party IMDs are configured.

Parameter Settings

- Scenario 1
  a. Log in to the SmartLogger5000A WebUI of the PV array, choose **Monitoring** > **Logger** > **Running Parameters**, click **Function Settings**, and set **System insulation resistance error check** to **Enable**.
  b. On the SmartLogger5000A WebUI, choose **Monitoring** > **STS** > **Running Parameters**, click **Parameter Settings**, and set **IMD in low-voltage cabinet** to **None**.
  c. On the SmartLogger5000A WebUI, choose **Monitoring** > **PID** > **Running Parameters** and set PID parameters by referring to **Table 5-2**.

Table 5-2 Description of PID parameters

Running Parameter	Signal Name	Signal Value	Signal Value Setting	Description
Parameter Settings	System-to-ground impedance warning threshold	[1.0, 50.0]	Set this parameter as required.	• This parameter is displayed when **Smart insulation monitoring** is set to **Smart insulation monitoring** or **Alternate between IMD and PID module**. • In foggy, damp, or frosty seasons, you are advised to set this parameter to a smaller value.
	System-to-ground impedance alarm threshold	[1.0, 50.0]		

Running Parameter	Signal Name	Signal Value	Signal Value Setting	Description
	System-to-ground impedance detection duration	[50, 1800]	The recommended value is 100.	• This parameter is displayed when **Smart insulation monitoring** is set to **Smart insulation monitoring** or **Alternate between IMD and PID module**. • Select a proper value based on the estimated system-to-ground capacitance and system-to-ground impedance. It is recommended that the value be greater than or equal to three times the system time constant.
	Corresponding transformer winding	• **Not set** • **Low-voltage cabinet A** • **Low-voltage cabinet B**	In the double-winding transformer scenario, select **Low-voltage cabinet A**. In the double-split transformer scenario, set this parameter based on the corresponding winding connected to the PID module.	This parameter is displayed when **Smart insulation monitoring** is set to **Smart insulation monitoring** or **Alternate between IMD and PID module**.

Running Parameter	Signal Name	Signal Value	Signal Value Setting	Description
	PID Mode Operation Time	[1, 240]	The recommended value is 15.	• This parameter is displayed when **Smart insulation monitoring** is set to **Alternate between IMD and PID module**. • The sum of **PID Mode Operation Time** and **Running time of intelligent insulation monitoring mode** must be at least 30 minutes.
	Running time of intelligent insulation monitoring mode	[1, 240]	The recommended value is 15.	
	System-to-ground common-mode capacitor	[1, 1500]	Set this parameter as required.	Select a proper system-to-ground capacitance value based on the array scale.
Function Settings	IMD access	• **Yes** • **None**	Set this parameter to **None**.	• **Yes**: A third-party IMD has been configured. • **None**: No third-party IMD is configured.
	Trigger ACB tripping upon smart insulation monitoring alarm	• **Disable** • **Enable**	Set this parameter as required.	If this parameter is set to **Enable** and the PID device detects an insulation resistance exception alarm, the ACB on the low-voltage side of the corresponding transformer station winding will trip.

Running Parameter	Signal Name	Signal Value	Signal Value Setting	Description
	Smart insulation monitoring	• **Disable** • **Smart insulation monitoring** • **Alternate between IMD and PID module**	You are advised to set this parameter to **Alternate between IMD and PID module**.	**Alternate between IMD and PID module**: Both the potential induced degradation (PID) suppression function and the system-to-ground insulation monitoring function are supported.

- Scenario 2
  a. On the SmartLogger5000A WebUI, choose **Monitoring** > **STS** > **Running Parameters**, click **Parameter Settings**, and set STS parameters by referring to **Table 5-3**.

Table 5-3 Description of STS parameters

Signal Name	Signal Value	Signal Value Setting	Description
ACB for low-voltage cabinet	• **None** • **Yes**	Set this parameter to **Yes**.	-
IMD in low-voltage cabinet	• **None** • **Yes**	Set this parameter to **Yes**.	-
ACB tripping triggered by IMD alarm	• **Disable** • **Enable**	Set this parameter to **Enable**.	This parameter is displayed when **ACB for low-voltage cabinet** is set to **Yes** and **IMD in low-voltage cabinet** is set to **Yes**.

b. On the SmartLogger5000A WebUI, choose **Monitoring** > **PID** > **Running Parameters** and set PID parameters by referring to **Table 5-4**.

Table 5-4 Description of PID parameters

Running Parameter	Signal Name	Signal Value	Signal Value Setting	Description
Parameter Settings	System-to-ground impedance warning threshold	[1.0, 50.0]	Set this parameter as required.	• This parameter is displayed when **Smart insulation monitoring** is set to **Smart insulation monitoring** or **Alternate between IMD and PID module**. • In foggy, damp, or frosty seasons, you are advised to set this parameter to a smaller value.
	System-to-ground impedance alarm threshold	[1.0, 50.0]		
	System-to-ground impedance detection duration	[50, 1800]	The recommended value is 100.	• This parameter is displayed when **Smart insulation monitoring** is set to **Smart insulation monitoring** or **Alternate between IMD and PID module**. • Select a proper value based on the estimated system-to-ground capacitance and system-to-ground impedance. It is recommended that the value be greater than or equal to three times the system time constant.

Running Parameter	Signal Name	Signal Value	Signal Value Setting	Description
	Corresponding transformer winding	• **Not set** • **Low-voltage cabinet A** • **Low-voltage cabinet B**	In the double-winding transformer scenario, select **Low-voltage cabinet A**. In the double-split transformer scenario, set this parameter based on the corresponding winding connected to the PID module.	This parameter is displayed when **Smart insulation monitoring** is set to **Smart insulation monitoring** or **Alternate between IMD and PID module**.
	PID Mode Operation Time	[1, 240]	The recommended value is 15.	• This parameter is displayed when **Smart insulation monitoring** is set to **Alternate between IMD and PID module**. • The sum of **PID Mode Operation Time** and **Running time of intelligent insulation monitoring mode** must be at least 30 minutes.
	Running time of intelligent insulation monitoring mode	[1, 240]	The recommended value is 15.	
	System-to-ground common-mode capacitor	[1, 1500]	Set this parameter as required.	Select a proper system-to-ground capacitance value based on the array scale.
Function Settings	IMD access	• **Yes** • **None**	Set this parameter to **Yes**.	• **Yes**: A third-party IMD has been configured. • **None**: No third-party IMD is configured.

Running Parameter	Signal Name	Signal Value	Signal Value Setting	Description
	Trigger ACB tripping upon smart insulation monitoring alarm	• **Disable** • **Enable**	Set this parameter as required.	If this parameter is set to **Enable** and the PID device detects an insulation resistance exception alarm, the ACB on the low-voltage side of the corresponding transformer station winding will trip.

- Scenario 3
  a. Log in to the SmartLogger5000A WebUI of the PV array, choose **Monitoring** > **Logger** > **Running Parameters**, click **Function Settings**, and set **System insulation resistance error check** to **Enable**.
  b. On the SmartLogger5000A WebUI, choose **Monitoring** > **STS** > **Running Parameters**, click **Parameter Settings**, and set STS parameters by referring to **Table 5-5**.

Table 5-5 Description of STS parameters

Signal Name	Signal Value	Signal Value Setting	Description
ACB for low-voltage cabinet	• **None** • **Yes**	Set this parameter to **Yes**.	-
IMD in low-voltage cabinet	• **None** • **Yes**	Set this parameter to **Yes**.	-
ACB tripping triggered by IMD alarm	• **Disable** • **Enable**	Set this parameter to **Enable**.	This parameter is displayed when **ACB for LV panel** is set to **Yes** and **IMD in low-voltage cabinet** is set to **Yes**.

  c. On the SmartLogger5000A WebUI, choose **Monitoring** > **PID** > **Running Parameters** and set PID parameters by referring to **Table 5-6**.

Table 5-6 Description of PID parameters

Running Parameter	Signal Name	Signal Value	Signal Value Setting	Description
Parameter Settings	System-to-ground impedance warning threshold	[1.0, 50.0]	Set this parameter as required.	• This parameter is displayed when **Smart insulation monitoring** is set to **Smart insulation monitoring** or **Alternate between IMD and PID module**. • In foggy, damp, or frosty seasons, you are advised to set this parameter to a smaller value.
	System-to-ground impedance alarm threshold	[1.0, 50.0]		
	Periodic PID module runtime	[1, 480]	The recommended value is 30.	• This parameter is displayed when **IMD access** is set to **Yes**. • **Periodic PID module runtime** must be at least the sum of **PID Mode Operation Time** and **Running time of intelligent insulation monitoring mode**. • The sum of **Periodic PID module runtime** and **Periodic IMD runtime** must be at least 30 minutes.
	Periodic IMD runtime	[0, 480]	The recommended value is 15.	

Running Parameter	Signal Name	Signal Value	Signal Value Setting	Description
	System-to-ground impedance detection duration	[50, 1800]	The recommended value is 100.	• This parameter is displayed when **Smart insulation monitoring** is set to **Smart insulation monitoring** or **Alternate between IMD and PID module**. • Select a proper value based on the estimated system-to-ground capacitance and system-to-ground impedance. It is recommended that the value be greater than or equal to three times the system time constant.
	Corresponding transformer winding	• **Not set** • **Low-voltage cabinet A** • **Low-voltage cabinet B**	In the double-winding transformer scenario, select **Low-voltage cabinet A**. In the double-split transformer scenario, set this parameter based on the corresponding winding connected to the PID module.	This parameter is displayed when **Smart insulation monitoring** is set to **Smart insulation monitoring** or **Alternate between IMD and PID module**.

Running Parameter	Signal Name	Signal Value	Signal Value Setting	Description
	PID Mode Operation Time	[1, 240]	The recommended value is 15.	• This parameter is displayed when **Smart insulation monitoring** is set to **Alternate between IMD and PID module**. • The sum of **PID Mode Operation Time** and **Running time of intelligent insulation monitoring mode** must be at least 30 minutes.
	Running time of intelligent insulation monitoring mode	[1, 240]	The recommended value is 15.	
	System-to-ground common-mode capacitor	[1, 1500]	Set this parameter as required.	Select a proper system-to-ground capacitance value based on the array scale.
Function Settings	IMD access	• **Yes** • **None**	Set this parameter to **Yes**.	• **Yes**: A third-party IMD has been configured. • **None**: No third-party IMD is configured.
	Trigger ACB tripping upon smart insulation monitoring alarm	• **Disable** • **Enable**	Set this parameter as required.	If this parameter is set to **Enable** and the PID device detects an insulation resistance exception alarm, the ACB on the low-voltage side of the corresponding transformer station winding will trip.

Running Parameter	Signal Name	Signal Value	Signal Value Setting	Description
	Smart insulation monitoring	• **Disable** • **Smart insulation monitoring** • **Alternate between IMD and PID module**	You are advised to set this parameter to **Alternate between IMD and PID module**.	**Alternate between IMD and PID module**: Both the potential induced degradation (PID) suppression function and the system-to-ground insulation monitoring function are supported.

5.5 PV Black Start

Function

This mode applies to scenarios without power grids or gensets. The PV black start function is used to provide commissioning power for the PV array at the initial stage of site deployment.

NOTE

- Load requirements for PV black start:

The array supports RLC loads and asynchronous motors as the commissioning power supply, but does not support RCD loads, half-wave loads, unbalanced loads, or other impact loads.

- UPS specifications required for PV black start:

The UPS must have a capacity of at least 2 kVA and provide 8-hour backup power.

- PV black start mode description:
  - When the SmartACU2000F is powered by a UPS, the PV array can perform synchronous black start. This method is recommended by the Company.
  - When the SmartACU2000F is not powered by a UPS, the PV array can perform asynchronous black start. This method is not recommended by the Company.

PV Array Synchronous Black Start

Prerequisites:

1. The power grid has not supplied power.
2. The SmartACU2000F is powered by a UPS.

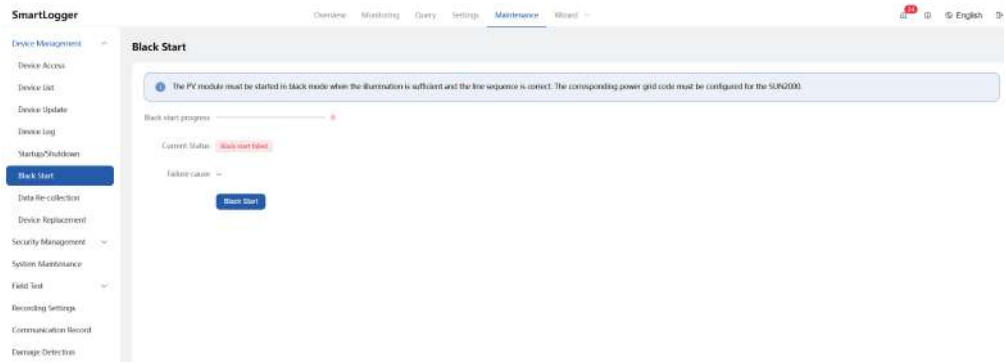
   NOTE

   - If a third-party transformer station is used, the SmartACU2000F shall be powered by a UPS.
   - If an STS is used, the SmartLogger5000A shall be powered by a UPS.
3. The irradiance is sufficient, and it is sunny or at noon.

Procedure:

1. Check that the external HDV1 AC power cables are correctly connected and the wiring sequence of phases A, B, and C is consistent. Turn on the MCCB and ACB on the low-voltage side of the transformer station, ensure that the VCB on the medium-voltage side of the transformer station remains off, and turn on all HDV1 DC switches.
2. Log in to the SmartLogger WebUI of the PV array, and check that all HDV1 inverters are connected to the PV array.
3. On the SmartLogger WebUI, set the grid code based on the country or region where the device is located.
4. On the SmartLogger WebUI, choose **Maintenance** > **Device Management** > **Black Start**.

   Figure 5-12 Sending a black start command on the WebUI

5. On the SmartLogger WebUI, check that the black start of the PV array is successfully initiated.
6. Perform subsequent operations as required after the black start is completed.

PV Array Asynchronous Black Start

Prerequisites:

1. The power grid has not supplied power.
2. The SmartACU2000F is not powered by a UPS.
3. The irradiance is sufficient, and it is sunny or at noon.

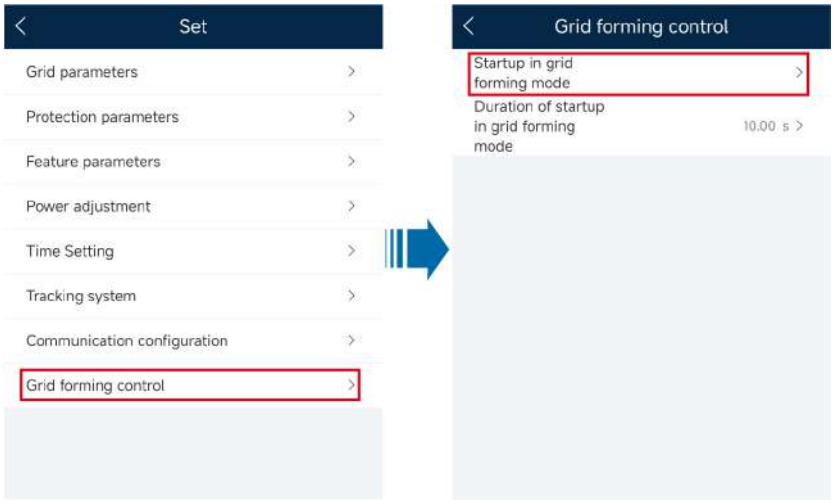
Procedure:

1. Check that the external HDV1 AC power cables are correctly connected and the wiring sequence of phases A, B, and C is consistent. Turn on the MCCB

and ACB on the low-voltage side of the transformer station, ensure that the VCB on the medium-voltage side of the transformer station remains off, and turn on all HDV1 DC switches.

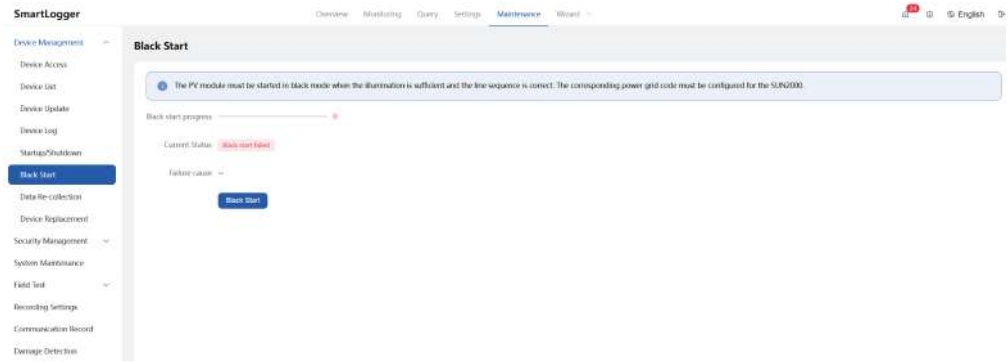
2. Use the local app to send a shutdown command to all HDV1 inverters in the array one by one.
3. Select an HDV1 inverter in the PV array, turn on the DC switch, connect to the inverter using the local app, and set the grid code based on the country or region where the device is located.
4. On the local app, choose **Set** > **Grid forming control** > **Startup in grid forming mode**.

Figure 5-13 Sending a startup command in grid forming on the app



5. Log in to the SmartLogger WebUI of the PV array, and check that all HDV1 inverters are connected to the PV array and that the grid code is correctly set.
6. On the SmartLogger WebUI, choose **Maintenance** > **Device Management** > **Black Start**.

Figure 5-14 Sending a black start command on the WebUI



7. On the SmartLogger WebUI, check that the black start of the PV array is successfully initiated.
8. Perform subsequent operations as required after the black start is completed.

Restoring On-Grid Operation

Procedure:

1. Change the working mode of the HDV1.
2. Log in to the SmartLogger WebUI of the PV array, choose **Maintenance** > **Startup/Shutdown**, and send a shutdown command.
3. Turn on the MCCB and ACB on the low-voltage side and the VCB on the medium-voltage side of the transformer station.
4. Log in to the SmartLogger WebUI of the PV array, choose **Maintenance** > **Startup/Shutdown**, and send a startup command.
5. Perform operations such as commissioning using the deployment wizard or system commissioning after grid connection based on site requirements.

5.6 PV Grid Forming

Function

The inverter runs in grid forming (GFM) mode and behaves as a virtual synchronous generator (VSG), improving grid stability during frequency and voltage fluctuations.

NOTE

This function can be enabled only when the following conditions are met:

1. After the evaluation and confirmation by the local grid company, set the parameters according to its requirements.
2. Purchase and load the Huawei grid forming control license.

Table 5-7 Loading the Huawei grid forming control license

Step	Operation
1	Log in to the SmartLogger5000A WebUI of the PV array.
2	Prepare the purchased Huawei grid forming control license file.
3	Choose **Settings** > **License Management** > **License Activation**, click **Upload**, upload the license file, and click **Activate**.

Prerequisites

1. The parameters have been set according to the requirements of the local grid company.
2. The inverter has been connected to the SmartLogger5000A.

   NOTE

   The SmartLogger5000A is integrated in the SACU or STS.
3. The Huawei grid forming control license has been loaded to the SmartLogger5000A WebUI.

Parameter Settings

1. Log in to the SmartLogger WebUI of the PV array.
2. Choose **Monitoring** > **Inverter** > **Running Parameters**, click **Working mode**, and set **Working mode** to **VSG**.
3. On the SmartLogger WebUI, choose **Monitoring** > **Inverter** > **Running Parameters**, click **Grid Forming Control**, and set **Grid forming mode certificate** to **Enable**.

   NOTE

   The inverter PV grid forming function provides functions such as primary frequency regulation, primary voltage regulation, and inertia response. You can set parameters based on site requirements by referring to **Table 5-8** to implement the PV grid forming function.

Table 5-8 Description of grid forming control parameters

Parameter	Description
On-grid VSG inertia time constant	Specifies the time required for the virtual rotor of the VSG in on-grid GFM mode to reach the rated speed from the static state under the rated torque. It describes the inverter inertia.
Active power frequency regulation coefficient in grid forming mode	This parameter is displayed when **Working Mode** is set to **VSG**. It specifies the ratio of the per unit value of the active power variation to the per unit value of the frequency variation for the frequency regulation.
Reactive power voltage regulation coefficient in grid forming mode	This parameter is displayed when **Working Mode** is set to **VSG**. It specifies the ratio of the per unit value of the reactive power variation to the per unit value of the root mean square voltage variation for the voltage regulation.
Active power frequency regulation deadband in grid forming mode	This parameter is displayed when **Working mode** is set to **VSG**. It specifies the frequency regulation deadband. When the grid frequency exceeds the rated frequency±deadband, the frequency regulation response is triggered.

Parameter	Description
Reactive power voltage regulation deadband in grid forming mode	This parameter is displayed when **Working mode** is set to **VSG**. It specifies the voltage regulation deadband. When the grid frequency exceeds the GFM reactive power voltage regulation baseline±deadband, the voltage regulation response is triggered.
Upper limit of active power variation for frequency regulation in grid forming mode	This parameter is displayed when **Working mode** is set to **VSG**. It specifies the active power variation limiting percentage for frequency regulation.
Lower limit of active power variation for frequency regulation in grid forming mode	This parameter is displayed when **Working mode** is set to **VSG**. It specifies the active power variation limiting percentage for frequency regulation.
Upper limit of reactive power variation for voltage regulation in grid forming mode	This parameter is displayed when **Working mode** is set to **VSG**. It specifies the reactive power increase limiting percentage for voltage regulation.
Lower limit of reactive power variation for voltage regulation in grid forming mode	This parameter is displayed when **Working mode** is set to **VSG**. It specifies the reactive power decrease limiting percentage for voltage regulation.
Grid forming mode certificate	Specifies whether to enable the certificate for grid forming mode.

Parameter	Description
Reactive power voltage regulation baseline in grid forming mode	This parameter is displayed when **Grid forming mode certificate** is set to **Enable**. It specifies the baseline voltage for reactive power voltage regulation in grid forming mode.
Active power frequency regulation baseline in grid forming mode	This parameter is displayed when **Grid forming mode certificate** is set to **Enable**. It specifies the active power voltage regulation baseline in grid forming mode.

5.7 POD

Function

The power oscillation damping (POD) function supports low frequency (0.1 Hz to 5 Hz) based on algorithms and grid forming technologies.

NOTE

This function can be enabled only when the following conditions are met:

1. The Huawei SPPC2000 is used as the power plant controller for the PV array.
2. Inverters in the PV array must operate in grid following mode.

Parameter Settings

1. Log in to the SPPC2000 WebUI, choose **Settings** > **Power control** > **POD**, and set **POD Mode** to **Reactive power dispatch only**, **Active power dispatch only**, or **Simultaneous dispatch of active and reactive power** by referring to **Frequency oscillation suppression parameters**.
2. Log in to the SmartLogger5000A WebUI of the PV array, choose **Monitoring** > **Inverter** > **Running Parameters**, click **Working mode**, and set **Working mode** to **PQ**.
3. On the SmartLogger5000A WebUI of the PV array, choose **Monitoring** > **Inverter** > **Running Parameters**.
   - Click **Frequency Regulation Control** and check that **Frequency regulation control** is set to **Disable**.
   - Click **Overfrequency-caused Power Derating** and check that **Overfrequency-caused power derating** is set to **Disable**.
   - Click **Underfrequency-caused Power Raising** and verify that **Underfrequency-caused power raising** is set to **Disable**.

NOTE

PQ mode: The SPPC2000 detects low-frequency oscillations at the grid connection point and enables the POD function of the HDV1 to suppress low-frequency oscillations ranging from 0.1 Hz to 5 Hz.

5.8 Auto-Start with Reactive Power at Night

Function

In the scenario where the inverter generates reactive power at night, if the inverter shuts down due to a grid exception, the inverter can automatically reconnect to the grid after the grid recovers.

NOTE

This function applies to the SUN2000-506KTL-H1 HDV1 inverter equipped with a soft-start board.

Parameter Settings

1. Log in to the SmartLogger5000A WebUI of the PV array.
2. Choose **Monitoring** > **Inverter** > **Running Parameters**, click **Grid Parameters**, and set **Isolation setting** to **Input not grounded, with a transformer**.
3. Choose **Monitoring** > **Inverter** > **Running Parameters**, click **Power Adjustment**, set **Night-time reactive power** to **Enable**, and set **Nocturnal Reactive Power Self-Startup** to **Enable**.

A Reference Documents

Device/Product Name	Document
Third-party management system	Refer to the documents provided by the corresponding vendor.
Management system	Management system user manual
Third-party transformer station	Refer to the documents provided by the corresponding vendor.
STS	• **JUPT-(3000K, 7000K, 11000K)-HD1 Smart Transformer Station User Manual** • **JUPT-(3000K, 7000K, 11000K)-HD1 Smart Transformer Station Installation Guide**
PPC	Refer to the documents provided by the corresponding vendor.
SPPC	**SPPC2000 Smart Power Plant Controller User Manual**
SACU	• **SmartACU2000F Smart Array Controller User Manual** • **SmartACU2000F Quick Guide**
Inverter	• **SUN2000-(460KTL, 506KTL) Series User Manual** • **SUN2000-(460KTL, 506KTL) Series Quick Guide**
SmartLogger	• **SmartLogger5000A User Manual** • **SmartLogger5000 Quick Guide**
PID	**SmartPID2000A User Manual**
SmartMBUS CCO	**SmartMBUS CCO02A User Manual**

B Contact Information

If you have any questions about this product, please contact us.

https://digitalpower.huawei.com

Path: **About Us** > **Contact Us** > **Service Hotlines**

To ensure faster and better services, we kindly request your assistance in providing the following information:

- Model
- Serial number (SN)
- Software version
- Alarm ID or name
- Brief description of the fault symptom

NOTE

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C Digital Power Customer Service

https://digitalpower.huawei.com/robotchat/

D Acronyms and Abbreviations

M	
MBUS	monitoring bus
P	
PID	potential induced degradation
S	
SACU	Smart Array Controller

