Residential Smart PV Solution (Smart Dongle networking and Inverter Direct Connection)

User Manual

Issue 05

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About This Document

Purpose

This document describes the Residential Smart PV Solution (Smart Dongle networking & direct inverter networking) in terms of the networking, cable connections, and device commissioning. The safety precautions, product introduction, site selection requirements, and maintenance information of the devices involved in the solution are described in the user manuals of the corresponding devices.

Intended Audience

This document is intended for:

- Sales engineers
- System engineers
- Technical support engineers
- End users

Symbol Conventions

The symbols that may be found in this manual 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.

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	Supplements the important information in the main text. NOTE is used to address information not related to personal injury, equipment damage, or environment deterioration.

Change History

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

Issue 05 (2025-07-25)

- Updated **1 Solution Overview**.
- Updated **2.2 On-Grid PV+ESS Scenario**.

Issue 04 (2025-07-01)

- Updated **6.1 Grid-tied Point Control**.
- Added **D One-Click Network Disconnection Settings**.

Issue 03 (2024-12-25)

- Updated **1 Solution Overview**.
- Updated **8 Maintenance and Replacement**.

Issue 02 (2024-09-30)

- Updated **C SDongle Certificate Management and Maintenance**.
- Updated **6.1 Grid-tied Point Control**.
- Updated **6.7 Third-Party Management System Settings (Connecting to Two Management Systems)**.

Issue 01 (2024-04-30)

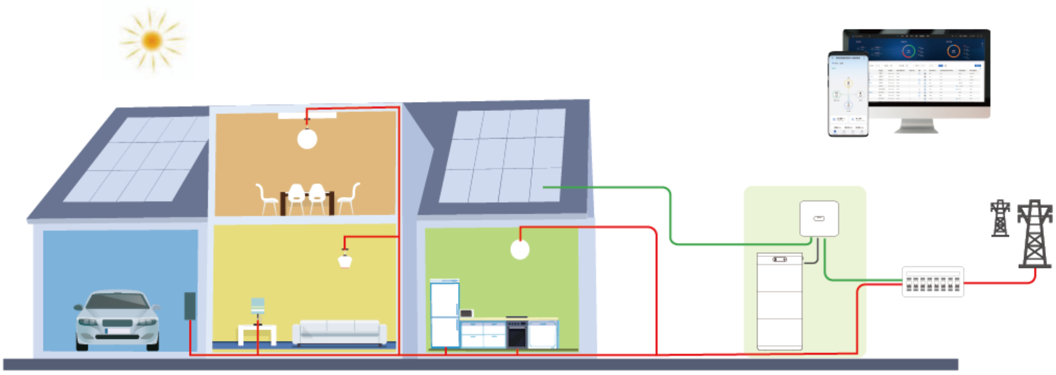
This issue is the first official release.

Contents

1 Solution Overview

The residential Smart PV solution integrates a PV system and energy storage system (ESS) to convert solar energy into green electricity to meet residential power consumption requirements. When the sunlight is sufficient in the daytime, the PV system generates electricity and supplies it to home appliances, and the surplus electricity is used to charge the ESS. When the sunlight is insufficient, the ESS discharges to loads. In this scenario, green power generation and efficient power consumption are achieved through load scheduling and control.

Figure 1-1 Overview of the residential Smart PV solution



Solution Networking

In the Smart Dongle networking scenario, the PV+ESS solution can be used to improve the self-consumption rate of PV power and reduce residential power consumption costs. One charger can be connected to supply the surplus PV power to vehicles. If the Backup Box-B0/B1 is configured, it can switch between the on-grid and off-grid states of the inverter. When the grid fails, the inverter switches to the off-grid state to supply power to critical residential loads.

Table 1-1 List of networking features

Feature	Smart Dongle
PV+ESS self-consumption	√

Feature	Smart Dongle
Response time controlled at the grid connection point	5s
AI-based PV+ESS scheduling	×
Max. number of chargers	1
Power meter	Required

Products in the Solution

Table 1-2 Product list

Product	Model	Description
Inverter	Single-phase: SUN2000-(2KTL-6KTL)-L1 SUN2000-(8K, 10K)-LC0 SUN2000-(8K, 10K)-LC0-ZH SUN2000-(3K-6K)-LB0 SUN5000-(3K, 6K)-LB0 Three-phase: SUN2000-(5KTL-12KTL)-M1 SUN2000-10KTL-BEM1 SUN2000-(8KTL-20KTL)-M2 SUN2000-(12KTL-25KTL)-M5 series SUN2000-(12K-25K)-MB0 series SUN2000-(5K-12K)-MAP0 series SUN5000-(8K, 12K)-MAP0 SUN5000-(17K, 25K)-MB0	The inverter converts the PV power generated by the PV system.
ESS	LUNA2000-(5-30)-S0 LUNA2000-S1	Energy storage system, used for electricity charge and discharge.
Backup Box	Backup Box-B0 (single-phase) Backup Box-B1 (three-phase)	Used for on/off-grid scenarios.

Product	Model	Description
AC charger	SCharger-7KS-S0 (single-phase) SCharger-22KT-S0 (three-phase)	Multiple charge modes are available.
Smart Power Sensor (RS485)	DDSU666-H YDS70-C16 DDSU71 DDSU1079-CT DTSU666-H DTSU666-H 250 A/50 mA YDS60-C24 DTSU71 DHSU1079-CT	Connects to the inverter over RS485 for output power management and power limiting control. It can also be used for dynamic charging power through virtual meter networking. For details about the power meter models supported by the inverters, see **Power Meter Models Supported by Inverters**. For the baud rates supported by the power meters, see **Table 1-5**.
Smart Power Sensor (FE)	DTSU666-FE	Used for dynamic power control of chargers in the Smart Dongle networking scenario.
Smart Dongle	WLAN-FE Smart Dongle 4G Smart Dongle	Connects to the management system and performs power scheduling. **NOTE** For the Dongle with a built-in SIM card, the SIM card can be used for free for five years.
Optimizer	SUN2000-450W-P2 SUN2000-600W-P MERC-600W-PA0 MERC-(1300W, 1100W)-P	• For details about the mapping between inverters and optimizers, see: – **SUN2000 Smart PV Optimizer User Manual** – **MERC-600W-PA0 Smart PV Optimizer User Manual** – **MERC-(1300W, 1100W)-P Smart PV Optimizer User Manual**

NOTE

- SUN5000 inverters cannot be cascaded with SUN2000 inverters.
- Optimizers must be configured for all PV modules connected to a SUN5000 inverter. Otherwise, the inverter cannot be started.
- The LUNA2000-(5-30)-S0 and LUNA2000-S1 cannot connect to the same inverter in a parallel system.
- If inverters are cascaded, the LUNA2000-(5-30)-S0 and LUNA2000-S1 cannot connect to different inverters.

Power Meter Models Supported by Inverters

Table 1-3 Power meter models supported by inverters

Inverter	Meter Model
SUN2000-(8K, 10K)-LC0/ SUN2000-(8K, 10K)-LC0-ZH	DDSU666-H, YDS70-C16, DDSU71, DDSU1079-CT
SUN2000-(2KTL-6KTL)-L1	DDSU666-H, YDS70-C16, DDSU71, DDSU1079-CT, DTSU666-H, DTSU71, and DHSU1079-CT
SUN2000-(3K-6K)-LB0	
SUN5000-(3K, 6K)-LB0	
SUN2000-(5KTL-12KTL)-M1	DTSU666-H, YDS60-C24, DTSU71, and DHSU1079-CT
SUN2000-10KTL-BEM1	
SUN2000-(12K-25K)-MB0	
SUN2000-(5K-12K)-MAP0 series	
SUN5000-(8K, 12K)-MAP0	
SUN5000-(17K, 25K)-MB0	

NOTE

- The DTSU666-H supports the three-phase four-wire system by default. To switch to the three-phase three-wire system, send a switch command from the inverter.
- After the inverter is powered on and detects the DTSU666-H meter, it sends a command to the meter, requiring it to automatically switch the power grid system. The command takes effect after the meter is powered off and restarted. After the command takes effect, the meter will identify the power grid system. The following table lists the inverter models and versions that support this function.

Table 1-4 Inverter versions

Model	Version
SUN2000-(5KTL-12KTL)-M1/ SUN2000-10KTL-BEM1 SUN2000-(8KTL-20KTL)-M2	SUN2000MA V100R001C00SPC166
SUN2000-(12K-25K)-MB0 SUN5000-(17K, 25K)-MB0 SUN2000-(12KTL-25KTL)-M5 series	SUN2000MB V200R023C10SPC207
SUN2000-(5K-12K)-MAP0 series SUN5000-(8K, 12K)-MAP0	SUN2000MA V200R024C00SPC101

Table 1-5 Baud rates supported by power meters

Meter Model	Baud Rate
DDSU666-H	9600 bit/s
YDS70-C16	• Default: 9600 bit/s • Maximum: 115200 bit/s
DDSU71	• Default: 9600 bit/s • Maximum: 115200 bit/s
DDSU1079-CT	• Default: 9600 bit/s • Maximum: 115200 bit/s
DTSU666-H (20022249)	9600 bit/s
DTSU666-H 250 A/50 mA (20022249-001)	9600 bit/s
DTSU666-H 250 A/50 mA (20022249-003)	• Default: 9600 bit/s • Maximum: 115200 bit/s
YDS60-C24	• Default: 9600 bit/s • Maximum: 115200 bit/s
DTSU71	• Default: 9600 bit/s • Maximum: 115200 bit/s
DHSU1079-CT	• Default: 9600 bit/s • Maximum: 115200 bit/s

References

For details about the installation, cable connection, and configuration of the products in the network, see the following documents.

Table 1-6 Quick guides for the solution

Networking Scenario	Link
Smart Dongle networking	**Residential Smart PV Solution Quick Guide (Single-Phase PV+ESS Scenario + Smart Dongle Networking)**
	Residential Smart PV Solution Quick Guide (Three-Phase PV+ESS Scenario + Smart Dongle Networking)

Table 1-7 Product documents

Item	Link
Single-phase inverter	SUN2000-(2KTL-6KTL)-L1 Quick Guide
	SUN2000-(8K, 10K)-LC0 Series Quick Guide
	SUN2000-(3K-6K)-LB0 Quick Guide
	SUN5000-(3K, 6K)-LB0 Quick Guide
Three-phase inverter	SUN2000-(3KTL-10KTL)-M1 Quick Guide
	SUN2000-(8KTL-20KTL)-M2 Quick Guide
	SUN2000-(12KTL-25KTL)-M5 Series Quick Guide
	SUN2000-(12K-25K)-MB0 Series Quick Guide
	SUN2000-(5K-12K)-MAP0 Series Quick Guide
	SUN5000- (8K, 12K)-MAP0 Quick Guide
	SUN5000-(17K, 25K)-MB0 Quick Guide
ESS	LUNA2000-(5-30)-S0 Quick Guide
	LUNA2000-(7, 14, 21)-S1 Quick Guide
Charger	Smart Charger User Manual (SCharger-7KS-S0, SCharger-22KT-S0)
Backup Box	Backup Box-(B0, B1) Quick Guide
Smart Dongle	SDongleA-05 Smart Dongle Quick Guide (WLAN-FE) SDongleB-06 Smart Dongle Quick Guide (4G)
Power meter	DTSU666-H 100 A and 250 A Smart Power Sensor User Manual DDSU666-H Smart Power Sensor User Manual YDS60-C24 Smart Power Sensor Quick Guide YDS70-C16 Smart Power Sensor Quick Guide DDSU71 Smart Power Sensor Quick Guide DDSU1079-CT Smart Power Sensor Quick Guide DTSU71 Smart Power Sensor Quick Guide DHSU1079-CT Smart Power Sensor Quick Guide For details about the DTSU666-FE Smart Power Sensor, see the quick guide delivered with the product.
Optimizer	SUN2000-(600W-P, 450W-P2) Smart PV Optimizer Quick Guide
	MERC-(1300W, 1100W)-P Smart PV Optimizer Quick Guide
	MERC-600W-PA0 Smart PV Optimizer Quick Guide
FusionSolar app	FusionSolar App Quick Guide (Charger) FusionSolar App Quick Guide

2 Networking Application

2.1 PV-Only Scenario

Single Inverter

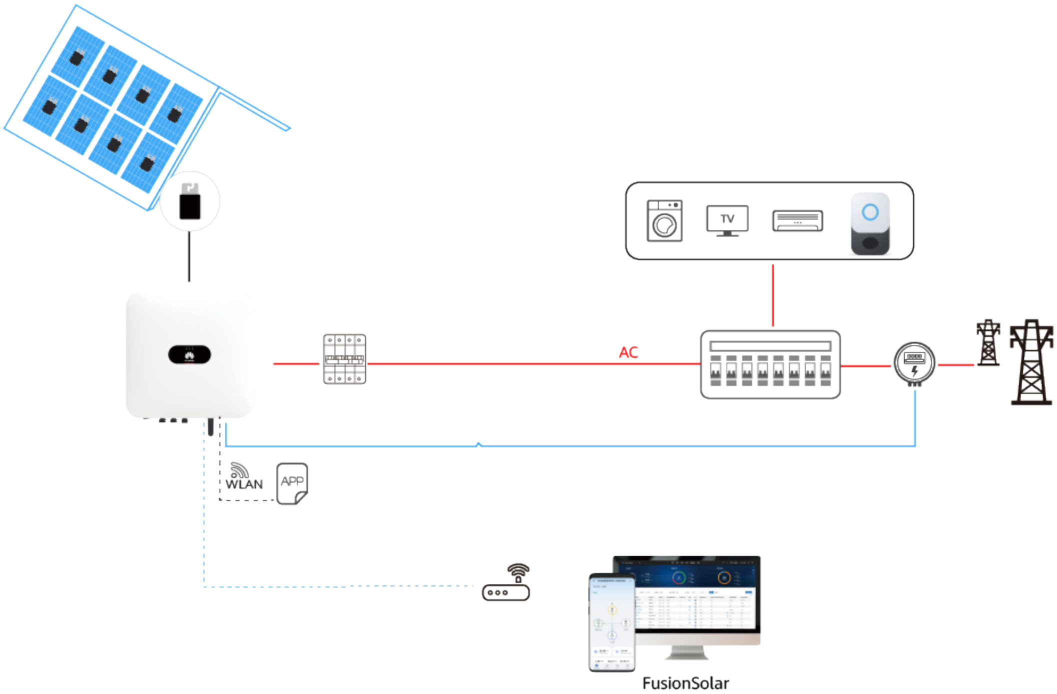


Table 2-1 Configuration description

Inverter	Management System Connection
SUN2000-(2KTL-6KTL)-L1	Inverter connected to the management system directly or through a Smart Dongle
SUN2000-(8K, 10K)-LC0/SUN2000-(8K, 10K)-LC0-ZH	
SUN2000-(3K-6K)-LB0	

Inverter	Management System Connection
SUN5000-(3K, 6K)-LB0	
SUN2000-(3KTL-10KTL)-M1	Connected through a Smart Dongle
SUN2000-10KTL-BEM1	
SUN2000-(12K-25K)-MB0	
SUN2000-(5K-12K)-MAP0 series	
SUN5000-(8K, 12K)-MAP0	
SUN5000-(17K, 25K)-MB0	

Multiple Inverters Cascaded

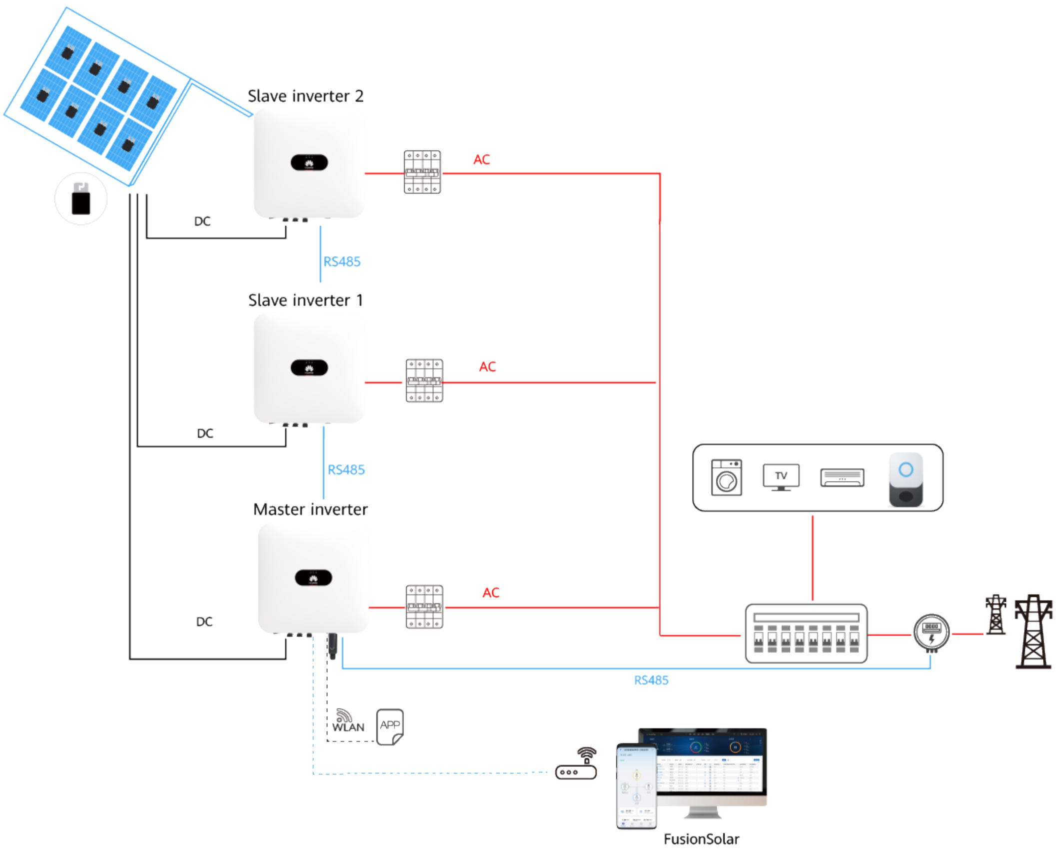


Table 2-2 Configuration description (single-phase system)

Master Inverter	Slave Inverter 1/Slave Inverter 2	Max. Number of Parallel Inverters	Management System Connection
SUN2000-(2KTL-6KTL)-L1 SUN2000-(8K, 10K)-LC0/SUN2000-(8K, 10K)-LC0-ZH SUN2000-(3K-6K)-LB0	SUN2000-(2KTL-6KTL)-L1 SUN2000-(8K, 10K)-LC0/ SUN2000-(8K, 10K)-LC0-ZH SUN2000-(3K-6K)-LB0	3	Connected through a Smart Dongle
SUN5000-(3K, 6K)-LB0	SUN5000-(3K, 6K)-LB0	3	

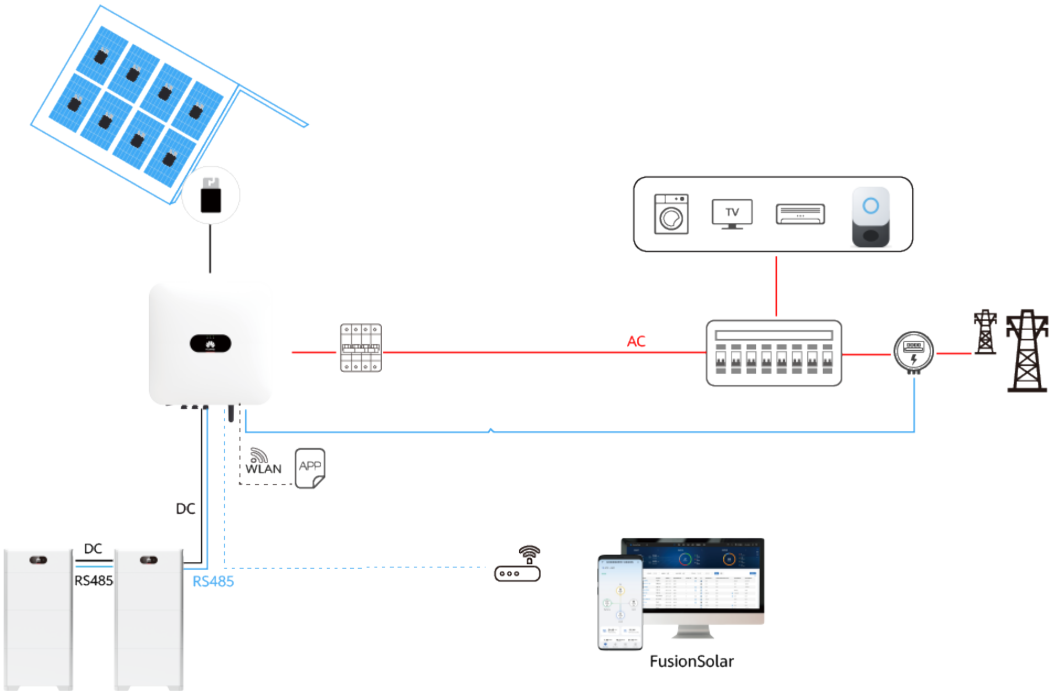
Table 2-3 Configuration description (three-phase system)

Master Inverter	Slave Inverter 1/Slave Inverter 2	Max. Number of Parallel Inverters	Management System Connection
SUN2000-(3KTL-10KTL)-M1 SUN2000-(8KTL-20KTL)-M2 SUN2000-(12KTL-25KTL)-M5 series SUN2000-(12K-25K)-MB0	SUN2000-(3KTL-10KTL)-M1 SUN2000-(8KTL-20KTL)-M2 SUN2000-(12KTL-25KTL)-M5 series SUN2000-(12K-25K)-MB0	3	Connected through a Smart Dongle
SUN2000-10KTL-BEM1	SUN2000-10KTL-BEM1	3	
SUN2000-(5K-12K)-MAP0 series	SUN2000-(5K-12K)-MAP0 series	3	
SUN5000-(8K, 12K)-MAP0	SUN5000-(8K, 12K)-MAP0	3	
SUN5000-(17K, 25K)-MB0	SUN5000-(17K, 25K)-MB0	3	

2.2 On-Grid PV+ESS Scenario

Single Inverter

Figure 2-1 Smart Dongle networking (single inverter)



Note: The figure uses the LUNA2000-(5-30)-S0 as an example.

Table 2-4 Configuration description [LUNA2000-(5-30)-S0]

Inverter	LUNA2000-(5-30)-S0	Max. Number of Connected ESSs	Management System Connection
SUN2000-(2KTL-6KTL)-L1	√	2	Inverter connected to the management system directly or through a Smart Dongle
SUN2000-(8K, 10K)-LC0/ SUN2000-(8K, 10K)-LC0-ZH	√	2	
SUN2000-(3K-6K)-LB0	√	2	
SUN5000-(3K, 6K)-LB0	√	2	

Inverter	LUNA2000-(5-30)-S0	Max. Number of Connected ESSs	Management System Connection
SUN2000-(3KTL-10KTL)-M1	√	2	Connected through a Smart Dongle
SUN2000-10KTL-BEM1	√	2	
SUN2000-(12K-25K)-MB0	√	4	
SUN2000-(5K-12K)-MAP0 series	√	2	
SUN5000-(8K, 12K)-MAP0	√	2	
SUN5000-(17K, 25K)-MB0	√	4	

Table 2-5 Configuration description [LUNA2000-S1]

Inverter	LUNA2000-S1	Max. Number of Connected ESSs	Management System Connection
SUN2000-(2KTL-6KTL)-L1	√	1	Inverter connected to the management system directly or through a Smart Dongle
SUN2000-(8K, 10K)-LC0/ SUN2000-(8K, 10K)-LC0-ZH	√	2	
SUN2000-(3K-6K)-LB0	√	2	
SUN5000-(3K, 6K)-LB0	√	2	
SUN2000-(3KTL-10KTL)-M1	√	2	Connected through a Smart Dongle
SUN2000-10KTL-BEM1	√	2	
SUN2000-(12K-25K)-MB0	√	4	
SUN2000-(5K-12K)-MAP0 series	√	2	

Inverter	LUNA2000-S1	Max. Number of Connected ESSs	Management System Connection
SUN5000-(8K, 12K)-MAP0	√	2	
SUN5000-(17K, 25K)-MB0	√	4	

Multiple Inverters Cascaded

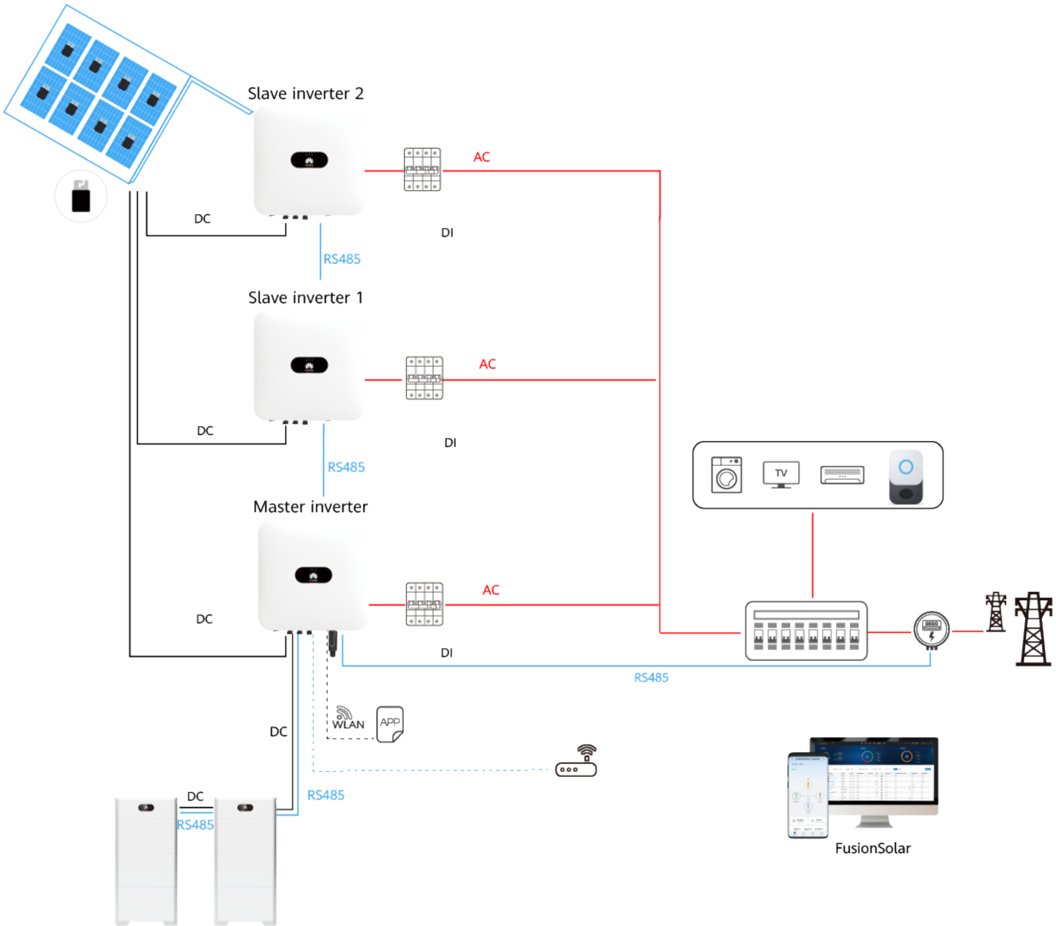


Table 2-6 Configuration description (single-phase system)

Master Inverter	Slave Inverter 1/Slave Inverter 2	Max. Number of Parallel Inverters	Management System Connection
SUN2000-(2KTL-6KTL)-L1 SUN2000-(8K, 10K)-LC0/SUN2000-(8K, 10K)-LC0-ZH SUN2000-(3K-6K)-LB0	SUN2000-(2KTL-6KTL)-L1 SUN2000-(8K, 10K)-LC0/ SUN2000-(8K, 10K)-LC0-ZH SUN2000-(3K-6K)-LB0	3	Connected through a Smart Dongle
SUN5000-(3K, 6K)-LB0	SUN5000-(3K, 6K)-LB0	3	

Table 2-7 Configuration description (three-phase system)

Master inverter	Slave Inverter 1/Slave Inverter 2	Max. Number of Parallel Inverters	Management System Connection
SUN2000-(3KTL-10KTL)-M1 SUN2000-(12K-25K)-MB0	SUN2000-(3KTL-10KTL)-M1 SUN2000-(8KTL-20KTL)-M2 SUN2000-(12KTL-25KTL)-M5 series SUN2000-(12K-25K)-MB0	3	Connected through a Smart Dongle
SUN2000-(5K-12K)-MAP0 series	SUN2000-(5K-12K)-MAP0 series	3	
SUN5000-(8K, 12K)-MAP0	SUN5000-(8K, 12K)-MAP0	3	
SUN5000-(17K, 25K)-MB0	SUN5000-(17K, 25K)-MB0	3	

NOTE

- A maximum of **three** inverters and **six** ESSs can be connected to the Smart Dongle.
- In the Smart Dongle networking scenario, the SUN2000-(20KTL, 29.9KTL, 30KTL, 36KTL, 40KTL)-M3 inverters can be cascaded in a three-phase system.

NOTICE

When MB0 functions as the master inverter and needs to connect to both a power meter and battery, if more than two batteries are connected, select one of the following meter models: YDS60-C24, DTSU666-H 250A/50mA(20022249-003), DTSU71, and DHSU1079-CT. The DTSU666-H(20022249) and DTSU666-H 250A/50mA(20022249-001) are not supported. Ensure that the baud rate for RS485-2 is negotiated to 115200 bit/s. For details about baud rate negotiation, see **Baud Rate Negotiation**.

2.3 Off-Grid PV+ESS Scenario

Single Inverter

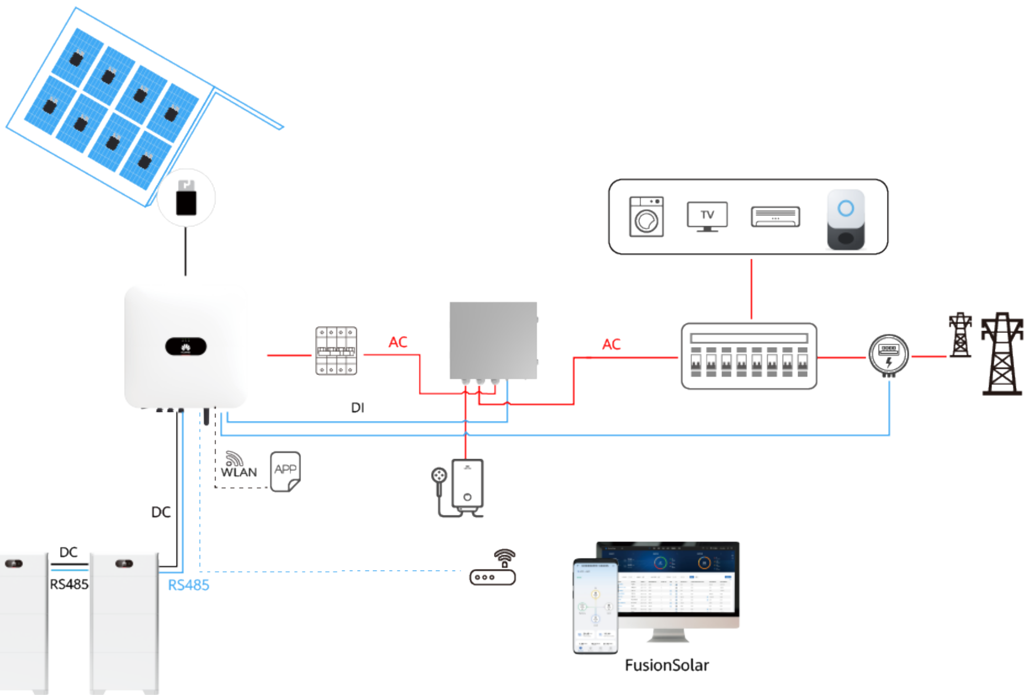


Table 2-8 Configuration description [LUNA2000-(5-30)-S0]

Inverter	LUNA2000-(5-30)-S0	Backup Box	Max. Number of Connected ESSs	Management System Connection
SUN2000-(2KTL-6KTL)-L1	√	Backup Box-B0	2	Inverter connected to the management system directly or through a Smart Dongle
SUN2000-(3KTL-10KTL)-M1	√	Backup Box-B1	2	Connected through a Smart Dongle

Table 2-9 Configuration description [LUNA2000-S1]

Inverter	LUNA2000-S1	Backup Box	Max. Number of Connected ESSs	Management System Connection
SUN2000-(2KTL-6KTL)-L1	√	Backup Box-B0	1	Inverter connected to the management system directly or through a Smart Dongle
SUN2000-(3KTL-10KTL)-M1	√	Backup Box-B1	2	Connected through a Smart Dongle

Multiple Inverters Cascaded

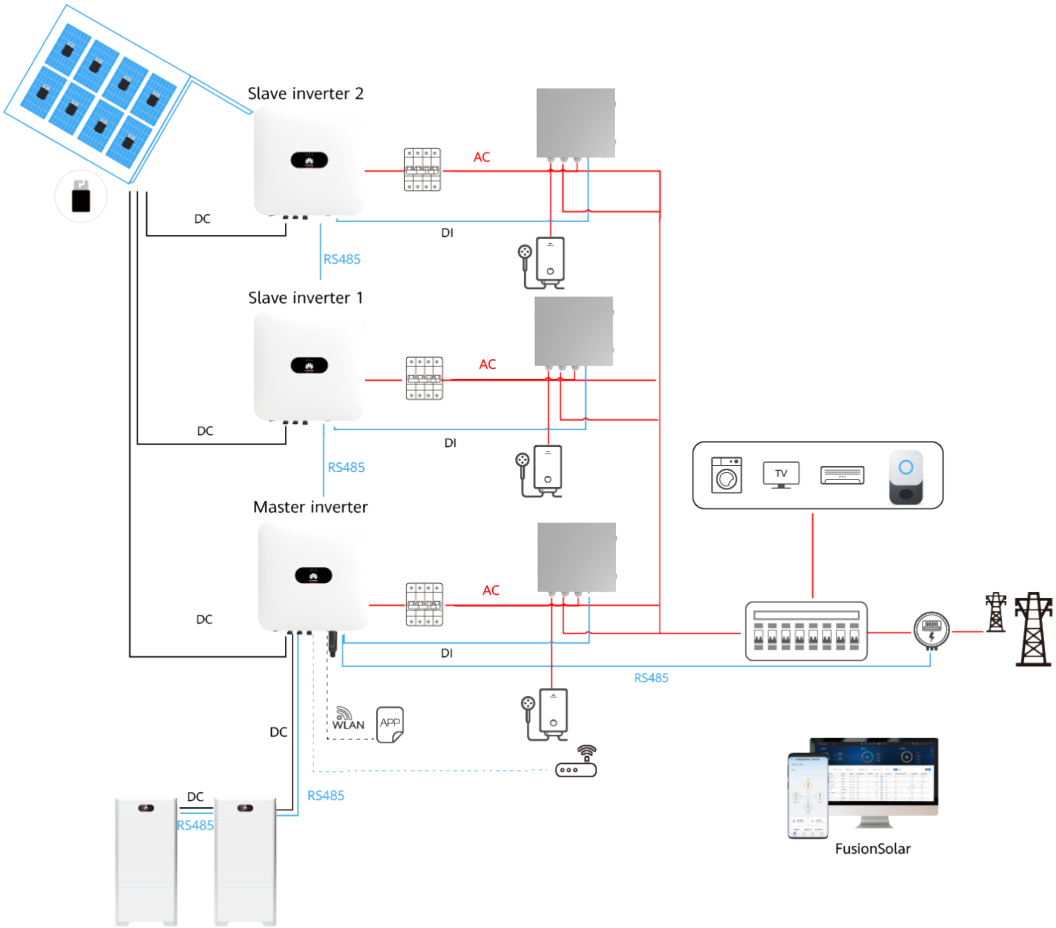


Table 2-10 Configuration description (single-phase system)

Master Inverter	Slave Inverter 1/Slave Inverter 2	Max. Number of Parallel Inverters	Management System Connection
SUN2000-(2KTL-6KTL)-L1	SUN2000-(2KTL-6KTL)-L1	3	Connected through a Smart Dongle

Table 2-11 Configuration description (three-phase system)

Master Inverter	Slave Inverter 1/Slave Inverter 2	Max. Number of Parallel Inverters	Management System Connection
SUN2000-(3KTL-10KTL)-M1	SUN2000-(3KTL-10KTL)-M1 SUN2000-(8KTL-20KTL)-M2 SUN2000-(12KTL-25KTL)-M5 series SUN2000-(12K-25K)-MB0	3	Connected through a Smart Dongle

NOTE

In the Smart Dongle networking scenario, the SUN2000-(20KTL, 29.9KTL, 30KTL, 36KTL, 40KTL)-M3 inverters can be cascaded in a three-phase system.

2.4 Pure Off-Grid Scenario

- The pure off-grid ESS consists of the PV strings, LUNA2000 ESS, inverter, AC switch, and load. In pure off-grid mode, the PV strings and ESS must be configured.
- The pure off-grid ESS supports only a single inverter instead of inverters connected in parallel.
- The pure off-grid ESS does not support optimizers. Otherwise, the ESS may fail to start.
- The SUN5000-(3K, 6K)-LB0, SUN2000-(3KTL-10KTL)-M1, SUN2000-(12K-25K)-MB0, SUN5000-(8K, 12K)-MAP0, and SUN5000-(17K, 25K)-MB0 do not support the pure off-grid mode.

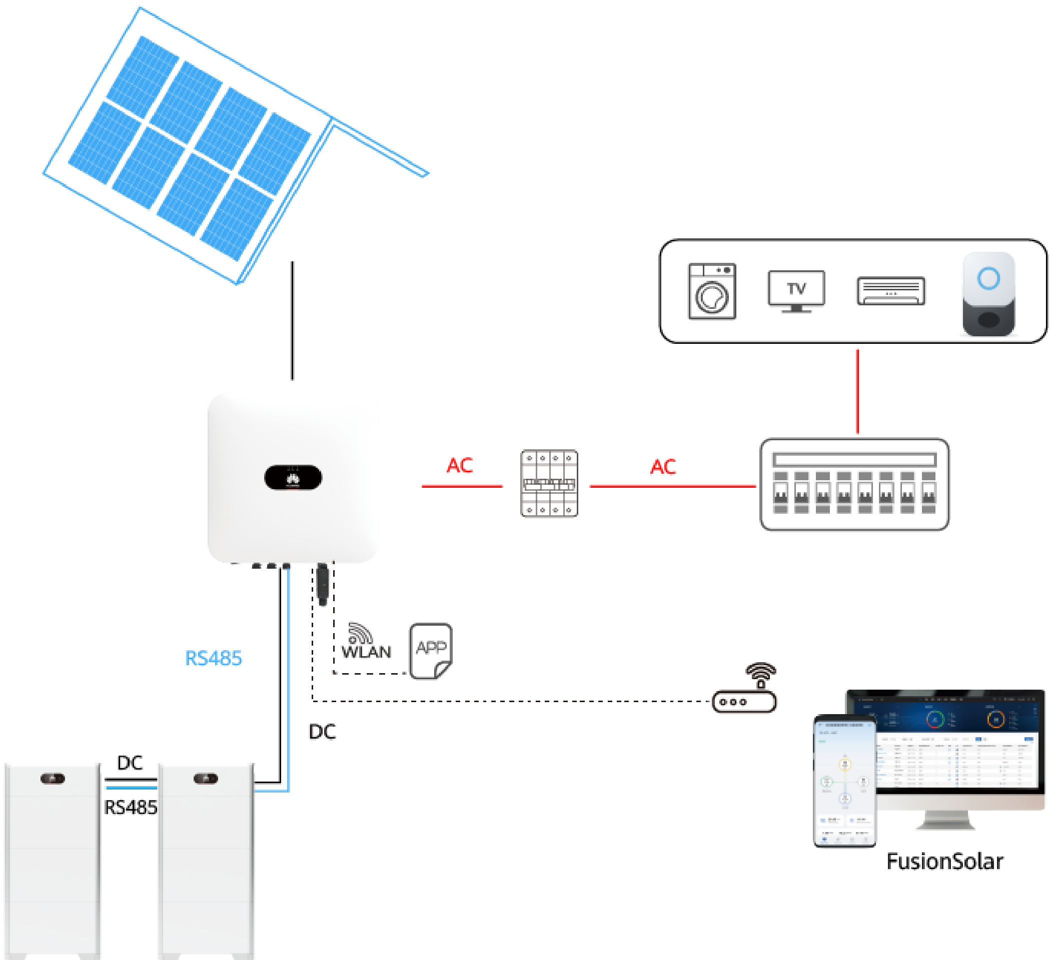


Table 2-12 Configuration description [LUNA2000-(5-30)-S0]

Inverter	LUNA2000-(5-30)-S0	Max. Number of Connected ESSs	Management System Connection
SUN2000-(2KTL-6KTL)-L1	√	2	Inverter connected to the management system directly or through a Smart Dongle
SUN2000-(8K, 10K)-LC0/ SUN2000-(8K, 10K)-LC0-ZH	√	2	
SUN2000-(3K-6K)-LB0	√	2	
SUN2000-(5K-12K)-MAP0 series	√	2	Inverter connected to the management system through a Smart Dongle

Table 2-13 Configuration description (LUNA2000-7/14/21-S1)

Inverter	LUNA2000-S1	Max. Number of Connected ESSs	Management System Connection
SUN2000-(2KTL-6KTL)-L1	√	1	Inverter connected to the management system directly or through a Smart Dongle
SUN2000-(8K, 10K)-LC0/ SUN2000-(8K, 10K)-LC0-ZH	√	2	
SUN2000-(3K-6K)-LB0	√	2	
SUN2000-(5K-12K)-MAP0 series	√	2	Inverter connected to the management system through a Smart Dongle

3 Electrical Connections

For details about cable connections in typical scenarios, see the following table.

Table 3-1 Typical scenarios

Documentation	Typical Cabling Scenario
Residential Smart PV Solution Quick Guide (Single-Phase PV+ESS Scenario + Smart Dongle Networking)	SUN2000-(2KTL-6KTL)-L1 + LUNA2000-(5-30)-S0 + Backup Box-B0
	SUN2000-(2KTL-6KTL)-L1 + LUNA2000-S1 + Backup Box-B0
	SUN2000-(8K, 10K)-LC0/SUN2000-(3K-6K)-LB0/ SUN5000-(3K, 6K)-LB0 + LUNA2000-(5-30)-S0
	SUN2000-(8K, 10K)-LC0/SUN2000-(3K-6K)-LB0/ SUN5000-(3K, 6K)-LB0 + LUNA2000-S1
Residential Smart PV Solution Quick Guide (Three-Phase PV+ESS Scenario + Smart Dongle Networking)	SUN2000-(3KTL-10KTL)-M1 + LUNA2000-(5-30)-S0 + Backup Box-B1
	SUN2000-(3KTL-10KTL)-M1 + LUNA2000-S1 + Backup Box-B1
	SUN2000-(12K-25K)-MB0/SUN5000-(17K, 25K)-MB0 + LUNA2000-(5-30)-S0
	SUN2000-(12K-25K)-MB0/SUN5000-(17K, 25K)-MB0 + LUNA2000-S1
	SUN2000-(5K-12K)-MAP0 series/SUN5000-(8K, 12K)-MAP0 + LUNA2000-(5-30)-S0
	SUN2000-(5K-12K)-MAP0 series/SUN5000-(8K, 12K)-MAP0 + LUNA2000-S1

4 System Power-On

DANGER

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

NOTICE

Before the equipment is put into operation for the first time, ensure that the parameters are set correctly by professional personnel. Incorrect parameter settings may result in noncompliance with local grid connection requirements and affect the normal operations of the equipment.

NOTICE

Before turning on the AC switch between the inverter and the grid, check that the AC voltage is within the specified range using a multimeter.

Check Before Power-On

Table 4-1 Checklist

No.	Check Item	Acceptance Criteria
1	Inverter	The inverter is installed correctly and securely.
2	Smart Dongle	The Smart Dongle is installed correctly and securely.
3	Cable routing	Cables are routed properly as required by the customer.

No.	Check Item	Acceptance Criteria
4	Cable tie	Cable ties are evenly distributed and no burr exists.
5	Reliable grounding	The PE cable is connected correctly, securely, and reliably.
6	Switch	The DC switch and all the switches connected to the inverter are turned off.
7	Cable connection	The AC output power cables, DC input power cables, ESS cables, and signal cables are connected correctly, securely, and reliably.
8	Unused terminal and port	Unused terminals and ports are locked by waterproof glands.
9	Installation environment	The installation space is proper, and the installation environment is clean and tidy.

Power-On Procedure

Step 1 Turn on the ESS switch.

Step 2 At the AC switch between the inverter and the power grid, use a multimeter to measure the grid voltage and ensure that the voltage is within the allowed operating voltage range of the inverter. If the voltage is not in the allowed range, check the circuits.

Step 3 Turn on the AC switch between the inverter and the power grid.

Step 4 Turn on the DC switch (if any) between the PV strings and the inverter.

Step 5 (Optional) Remove the knob locking screw next to the DC switch on the inverter.

Step 6 Set the DC switch on the inverter to ON.

Step 7 Observe the LED indicators on the inverter and the ESS to check their running status.

----End

For details about the indicator status, see the corresponding device documentation.

5 Deploying a New Plant

Smart Dongle Networking

Figure 5-1 Deploying a new plant

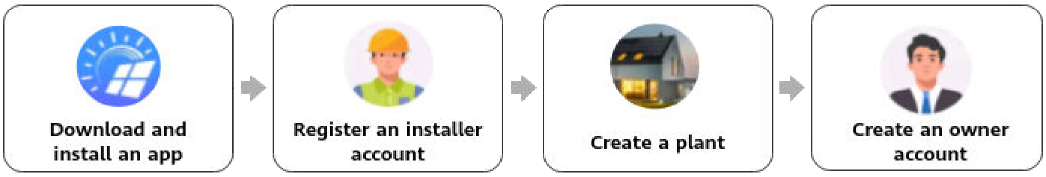


Table 5-1 Plant deployment description

No.	Task	Description
1	Downloading and installing an app	Download and install the FusionSolar app.
2	Registering an installer account	Register an installer account required for deployment and commissioning.
3	Creating a plant	Access the **Setup wizard** screen, scan the QR code to create a plant, commission devices according to the quick setting process, and connect devices to the plant.
4	Creating an owner account	Create an owner account that can be used to remotely monitor and manage devices.

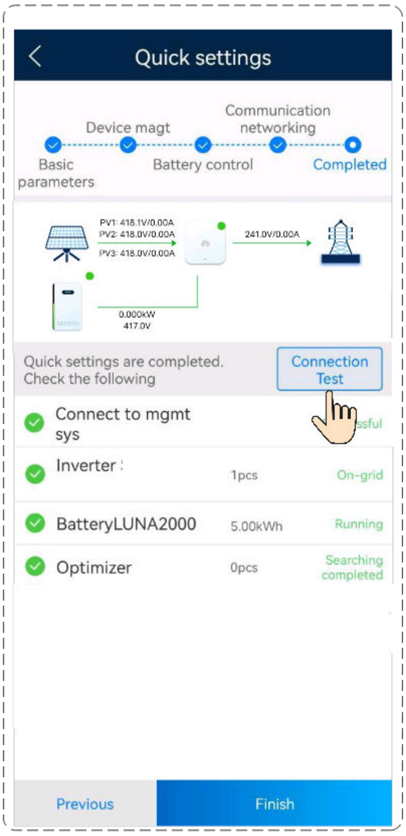
For details, see **FusionSolar App Quick Guide**. Scan the QR code of the inverter to create a plant.

If a charger is configured, scan the QR code of the charger and bind it to the created PV plant. For details, see **FusionSolar App Quick Guide (Charger)**.

System Self-Check

Connection Test is supported in quick settings. You can perform this step to check whether the cable connections are correct, avoiding site visits for rectification.

Tap **Connection Test** and wait until the test is complete. If the test fails, rectify the fault in a timely manner.



6 Parameter Settings

Table 6-1 Setting process

Procedure	Step		PV-Only Scenario	On-Grid PV+ESS Scenario	Off-Grid PV+ESS Scenario	Pure Off-Grid Scenario
1. Deploying a new plant	(1) Download and install the FusionSolar app.		Y	Y	Y	Y
	(2) Register an installer account. (Optional, required during initial registration)		Y	Y	Y	Y
	(3) Follow the setup wizard.	a. Scan the QR code.	Y	Y	Y	Y
		b. Perform quick settings.				
		c. Connect to the plant.				
		d. Create an owner account.				
		e. View the plant status.				
	(4) View the device status.		Y	Y	Y	Y
2. Grid-tied point control			Y	Y	Y	N
3. Physical layout of optimizers (to be configured if optimizers are used)			Y	Y	Y	N
4. ESS end-of-discharge SOC			N	Y	Y	Y
5. Off-grid mode enabling			N	N	Y	Y

6.1 Grid-tied Point Control

Many regions impose a limit on the feed-in power of a power generation system. Therefore, a power meter is required to measure the power at the grid-tied point to control the output of the inverter in real time, ensuring that the feed-in power meets the power requirement allowed by the power grid.

Prerequisites

To implement grid-tied point control in the Smart Dongle networking, you need to correctly install the power meter and current transformer (CT).

Implementation

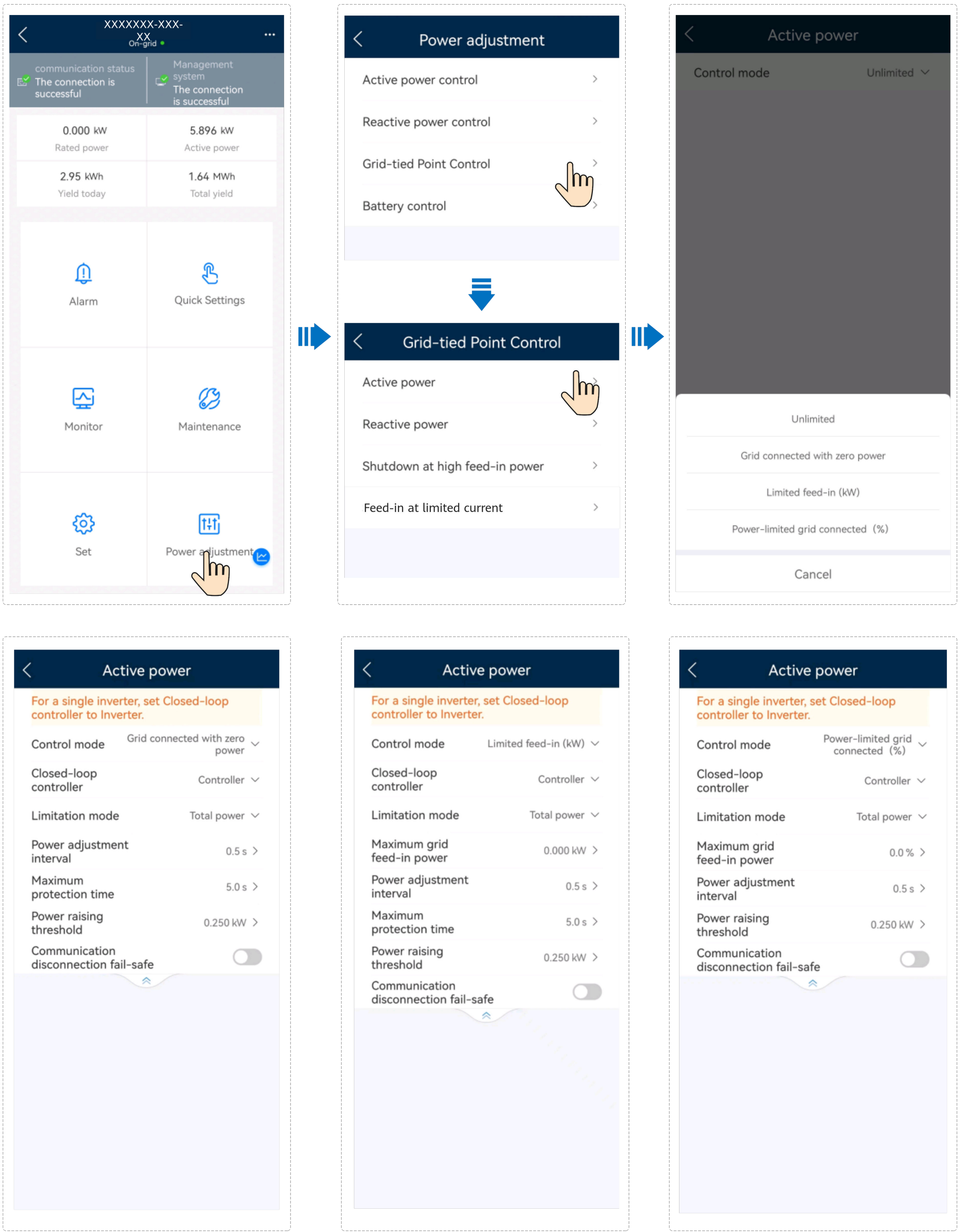
- **Control mode**: **Grid connected with zero power**, **Power-limited grid connected（%）** or **Limited feed-in (kW)**
- **Limitation mode**: **Single-phase power** or **Total power** (Select a mode based on the local grid requirements.)

  Single-phase power: The power of each phase cannot exceed the preset limit. **Total power** (default): The total power of three phases cannot exceed the preset limit.

NOTE

In a three-phase system, if **Limitation mode** at the grid-tied point is set to **Total power**, a phase may have feed-in power. However, if **Control mode** is set to **Grid connected with zero power**, **Limitation mode** is set to **Single-phase power**, and only L1 has single-phase loads while the other two phases do not have loads, the loads on L1 can only be powered by the grid because the inverter sets the output of each phase to be 0.

Procedure



Parameter Description

NOTE

If you select limited feed-in, you need to set **Maximum grid feed-in power**.

Parameter			Description
Active power	**Unlimited**	-	If this parameter is set to **Unlimited**, the output power of the inverter is not limited and the inverter can connect to the power grid at the rated power.
	Grid connected with zero power	**Closed-loop controller**	● If multiple inverters are cascaded, set this parameter to **Controller**. ● If there is only one inverter, set this parameter to **Inverter**.
		Limitation mode	**Total power** indicates export limitation of the total power at the grid-tied point. (When a single-phase power meter is connected, only **Total power** can be selected.
		Power adjustment interval	Specifies the shortest interval for a single export limitation adjustment.
		Maximum protection time	● Specifies the time for detecting power meter data. If the Smart Dongle does not detect any power meter data within the preset time, the Smart Dongle delivers the preset value of the **Active power threshold when communication fails** to the inverter for protection. ● The recommended value is 5s or greater.
		Power raising threshold	Specifies the deadband for adjusting the inverter output power. If the power fluctuation is within the power control hysteresis, the power is not adjusted.
		Communication disconnection fail-safe	In the inverter export limitation scenario, if this parameter is set to **Enable**, the inverter will derate according to the active power derating percentage when the communication between the inverter and the Smart Dongle is disconnected for a period longer than **Communication disconnection detection time**.
		Communication disconnection detection time	Specifies the fail-safe detection time in case of disconnection between the inverter and the Smart Dongle. This parameter is displayed when **Communication disconnection fail-safe** is set to **Enable**.
		Active power threshold when communication fails	Specifies the active power limit of the inverter when the export+import meter communication is abnormal. You can manually change the active power percentage of the inverter as required.
	Limited feed-in (kW)	**Closed-loop controller**	● If multiple inverters are cascaded, set this parameter to **Controller**. ● If there is only one inverter, set this parameter to **Inverter**.

Parameter			Description
		Limitation mode	**Total power** indicates export limitation of the total power at the grid-tied point. (When a single-phase power meter is connected, only **Total power** can be selected.
		Maximum grid feed-in power	Specifies the maximum active power transmitted from the grid-tied point to the power grid.
		Power adjustment interval	Specifies the shortest interval for a single export limitation adjustment.
		Maximum protection time	● Specifies the time for detecting power meter data. If the Smart Dongle does not detect any power meter data within the preset time, the Smart Dongle delivers the preset value of the **Active power threshold when communication fails** to the inverter for protection. ● The recommended value is 5s or greater.
		Power raising threshold	Specifies the deadband for adjusting the inverter output power. If the power fluctuation is within the power control hysteresis, the power is not adjusted.
		Communication disconnection fail-safe	In the inverter export limitation scenario, if this parameter is set to **Enable**, the inverter will derate according to the active power derating percentage when the communication between the inverter and the Smart Dongle is disconnected for a period longer than **Communication disconnection detection time**.
		Communication disconnection detection time	Specifies the fail-safe detection time in case of disconnection between the inverter and the Smart Dongle. This parameter is displayed when **Communication disconnection fail-safe** is set to **Enable**.
		Active power threshold when communication fails	Specifies the active power limit of the inverter when the export+import meter communication is abnormal. You can manually change the active power percentage of the inverter as required.
	Power-limited grid connected（%）	**Closed-loop controller**	● If multiple inverters are cascaded, set this parameter to **Controller**. ● If there is only one inverter, set this parameter to **Inverter**.
		Limitation mode	**Total power** indicates export limitation of the total power at the grid-tied point. (When a single-phase power meter is connected, only **Total power** can be selected.

Parameter			Description
		PV plant capacity	Specifies the total maximum active power in the inverter cascading scenario.
		Maximum grid feed-in power (%)	Specifies the percentage of the maximum active power at the grid-tied point to the PV plant capacity.
		Power adjustment interval	Specifies the shortest interval for a single export limitation adjustment.
		Maximum protection time	● Specifies the time for detecting power meter data. If the Smart Dongle does not detect any power meter data within the preset time, the Smart Dongle delivers the preset value of the **Active power threshold when communication fails** to the inverter for protection. ● The recommended value is 5s or greater.
		Power raising threshold	Specifies the deadband for adjusting the inverter output power. If the power fluctuation is within the power control hysteresis, the power is not adjusted.
		Communication disconnection fail-safe	In the inverter export limitation scenario, if this parameter is set to **Enable**, the inverter will derate according to the active power derating percentage when the communication between the inverter and the Smart Dongle is disconnected for a period longer than **Communication disconnection detection time**.
		Communication disconnection detection time	Specifies the fail-safe detection time in case of disconnection between the inverter and the Smart Dongle. This parameter is displayed when **Communication disconnection fail-safe** is set to **Enable**.
		Active power threshold when communication fails	Specifies the active power limit of the inverter when the export+import meter communication is abnormal. You can manually change the active power percentage of the inverter as required.
Shutdown at high feed-in power[a]	**Shutdown at high feed-in power**		● The default value is **Disable**. ● If this parameter is set to **Enable**, the inverter shuts down for protection when the power at the grid-tied point exceeds the threshold and remains in this condition for the specified time threshold.
	Upper feed-in power threshold for inverter shutdown		The default value is **0**. This parameter specifies the power threshold of the grid-tied point for triggering inverter shutdown.

Parameter		Description
	High feed-in power duration threshold for triggering inverter shutdown	The default value is **20**. This parameter specifies the duration threshold of high feed-in power for triggering inverter shutdown. ● When **High feed-in power duration threshold for triggering inverter shutdown** is set to **5**, **Shutdown at high feed-in power** takes precedence. ● When **High feed-in power duration threshold for triggering inverter shutdown** is set to **20**, **Limited Feed-in** takes precedence (when **Active power control** is set to **Limited Feed-in**).
Feed-in at limited current[b]	**Max. feed-in current**	Value range: [0, 100 A] ● Due to external disturbances, the feed-in current may exceed the specified value by 2%. In this case, the inverter will adjust the current to a value within the range limit. ● After the user changes the maximum feed-in current, the inverter will adjust the current to a value within the range limit. If the maximum feed-in current is not adjusted to a value within the range limit within 15s, the inverter will shut down and report an alarm.
	Max. grid supply current	Value range: [0, 100 A] If the grid supply current exceeds the specified value by 2%, the inverter will adjust the current to a value within the range limit.
	Current adjustment interval	Value range: [1, 5s] When this parameter is set to 2s, the inverter adjusts the current every 2 seconds.
	Restrict number of inverter startups	● If this parameter is set to **Enable**, the number of manual startups after shutdown due to current adjustment failure cannot exceed three within 30 days. ● If this parameter is set to **Disable**, the inverter does not limit the number of manual startups, which can then exceed three within 30 days.

NOTE

Note a: This parameter is supported only for the AS4777 or G99-TYPEA-LV grid code.

Note b: This parameter is supported only for the G98 or G99-TYPEA-LV grid code.

When inverters are connected in parallel, the parameters **Shutdown at high feed-in power** and **Feed-in at limited current** are not available.

NOTE

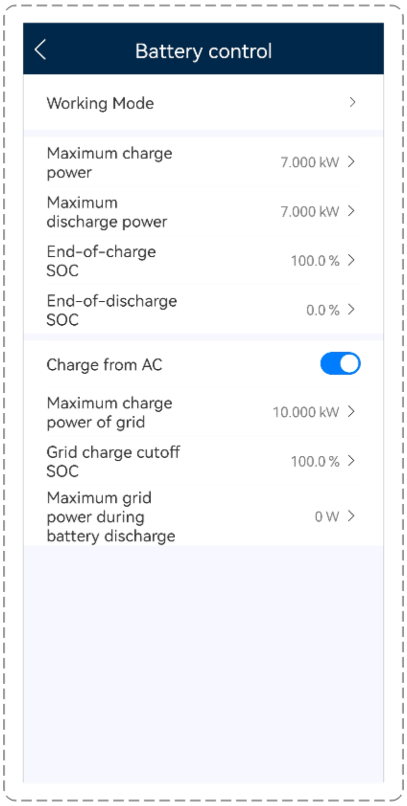
To use the **Feed-in at limited current** function, the following version mapping requirements must be met.

Table 6-2 Version mapping

Device	Inverter Version	Smart Dongle Version	FusionSolar App Version
SUN2000-(2KTL-6KTL)-L1	SUN2000L V200R001C00SPC137 or later	SDongle V200R022C10SPC113 or later	6.24.00.520 or later
SUN2000-(8K, 10K)-LC0	SUN2000LC V100R023C10SPC110 or later	SDongle V200R025C00 or later	25.1.0 or later
SUN2000-(12K-25K)-MB0	SUN2000MB V200R023C10SPC206 or later	SDongle V200R022C10SPC120 or later	24.6.100.007 or later
SUN5000-(17K, 25K)-MB0			
SUN2000-(5K-12K)-MAP0	SUN2000MA V200R024C00SPC100 or later	SDongle V200R022C10SPC118 or later	24.6.100.002 or later
SUN5000-(8K, 12K)-MAP0			

6.2 Setting ESS Parameters

Connect the inverter on the app. Choose **Power adjustment** > **Battery control** on the home screen to set related parameters. Set parameters of the ESS connected to each inverter separately.


Battery control
Working Mode
Maximum charge power
7.000 kW
Maximum discharge power
7.000 kW
End-of-charge SOC
100.0 %
End-of-discharge SOC
0.0 %
Charge from AC
Maximum charge power of grid
10.000 kW
Grid charge cutoff SOC
100.0 %
Maximum grid power during battery discharge
0 W

Battery Control

Table 6-3 Battery control parameters

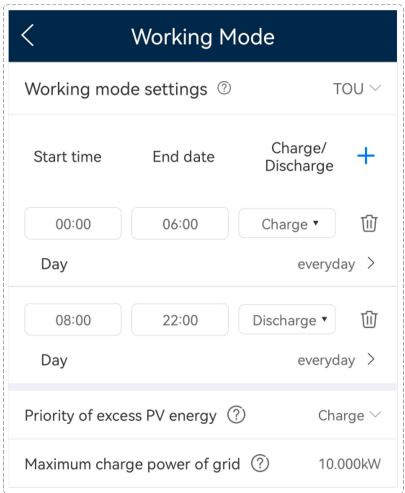
Parameter	Description	Value Range
Working Mode	Set the working mode of the ESS.	• Maximum self-consumption • TOU • Fully fed to grid • Third-party dispatch: Only a third-party platform controls battery charge and discharge. **NOTE** Before enabling **Third-party dispatch**, ensure that the system has been connected to the third-party management system.
Maximum charge power (kW)	Set the maximum charge power of the ESS.	Charge: [0, Maximum charge power]
Maximum discharge power (kW)	Set the maximum discharge power of the ESS.	Discharge: [0, Maximum discharge power]
End-of-charge SOC (%)	Set the end-of-charge SOC.	[90%, 100%]
End-of-discharge SOC (%)	Set the end-of-discharge SOC. If the battery SOC decreases to 0%, charge the battery in time. Otherwise, the battery capacity will attenuate irreversibly, and the resulting battery fault is not covered by the warranty. You are advised not to set the battery End-of-discharge SOC to 0.	[0, 20%]
Charge from AC	**Charge from AC** is disabled by default. After this function is enabled, power can be purchased from the grid. Comply with the grid charge requirements stipulated in local laws and regulations when this function is enabled.	• Disabled (default) • Enabled

Parameter	Description	Value Range
Maximum charge power of grid	Set the maximum power for charging from the grid.	[0, Maximum charge power of grid]
Grid charge cutoff SOC	Set the grid charge cutoff SOC.	[20%, 100%]
Maximum grid power during battery discharge (This parameter needs to be set only in the inverter parallel connection scenario with the Smart Dongle networking.)	When the power purchased from the grid exceeds the preset threshold, the ESS starts discharging. The default value is 0. For example, if this parameter is set to 50 W and the load power is 40 W, 40 W power is purchased from the grid and the ESS does not discharge. If the load power is 100 W, 50 W power is purchased from the grid, and the ESS discharge power is 50 W.	[0, 1000]

NOTE

If no PV modules are installed or the system has not detected sunlight for at least 24 hours, the minimum end-of-discharge SOC is 15%.

Setting TOU Parameters



Parameter	Description	Value Range
Priority of excess PV energy	● Charge: When the PV power is greater than the load power, the surplus PV energy is used to charge the batteries. After the maximum charge power is reached or the batteries are fully charged, the surplus PV energy is fed to the grid. ● Fed to grid: When the PV power is greater than the load power, the surplus PV energy is preferentially fed to the grid. When the maximum output power of the inverter is reached, the surplus energy is used to charge the batteries. This setting is applicable to the scenario where the feed-in tariff (FIT) is higher than the electricity price. The batteries are used only for backup power.	● Charge ● Fed to grid
Maximum charge power of grid (kW)	Maximum charge power allowed by the grid. The value is determined by the local grid company. If there is no requirement, the value is the maximum charge power of the ESS by default.	[0, Maximum charge power of grid]

6.3 Peak Shaving

Function

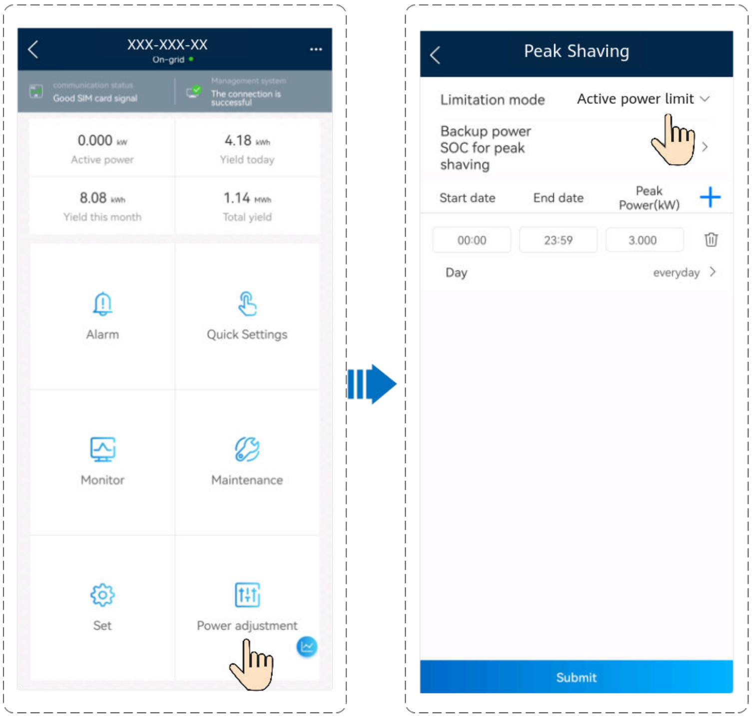
This function applies to areas that have peak demand charges. The peak shaving function allows you to lower the peak power drawn from grid in **Maximum self-consumption** or **TOU** mode during peak hours, reducing electricity fees.

NOTE

The peak shaving function cannot be used when the ESS working mode is set to **Fully fed to grid**.

Procedure

1. Log in to the local commissioning screen.
2. Choose **Power adjustment > Peak Shaving**, and set the working mode for peak shaving.



Parameter	Description	Value Range
Peak Shaving	To use **Peak Shaving**, you need to enable Charge from AC first.	• Disabled • Active power limit
Backup power SOC for peak shaving (%)	The value of this parameter affects the peak shaving capability. A larger value indicates stronger peak shaving capability.	Backup power SOC for peak shaving > Backup power SOC (when **Off-grid mode** is enabled) > End-of-discharge SOC
Start date	• Set the peak power range based on the start time and end time. The peak power is configured based on electricity prices in different time segments. You are advised to set the peak power to a low value when the electricity price is high. • A maximum of 14 time segments can be set.	-
End date		
Peak Power (kW)		[0.000, 1000.000]

NOTE

For details about the peak shaving function, see the **Introduction to Peak Shaving**.

6.4 Setting the Mode for the Grid-tied and Off-grid ESS

The grid-tied and off-grid ESS switches the grid connection status of the inverter through the Backup Box. When the grid fails, the ESS supplies power to critical loads in backup mode. When the grid recovers, the ESS automatically switches back to the grid-tied mode.

- Its modes can be used together with the self-consumption or TOU mode.
  - When the grid is normal, the self-consumption or TOU mode is used.
  - After the grid fails, the ESS switches to the power backup mode. The battery backup time depends on the battery SOC when the grid fails. (The battery SOC for power backup can be set based on customer requirements.)

Enabling Off-grid Mode

On the home screen, choose **Set** > **Feature parameters** and enable **Off-grid mode**.

Figure 6-1 Backup power setting

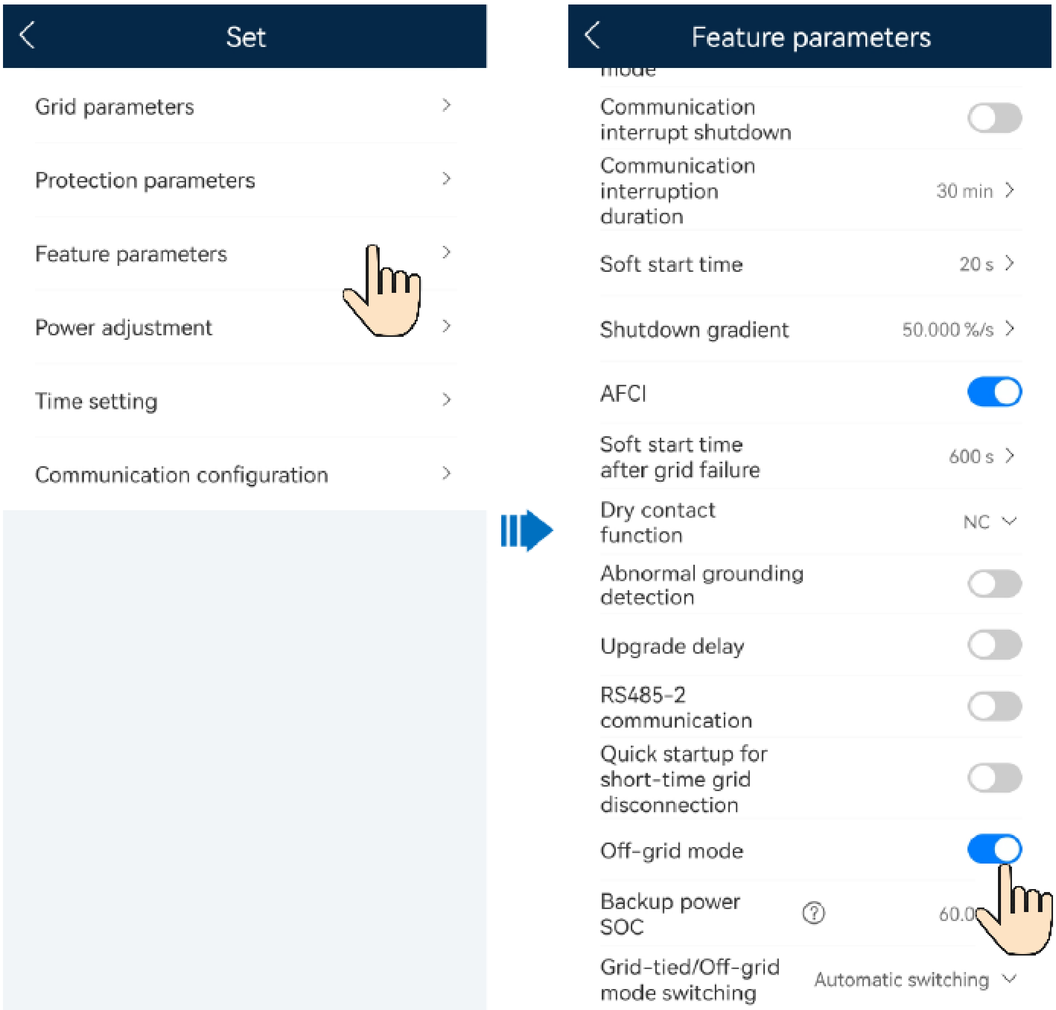


Table 6-4 Parameter settings for grid-tied and off-grid operation

Parameter	Description	Value Range
Off-grid mode	If this parameter is set to **Enable**, the ESS switches to the off-grid mode when the grid fails.	• Enable • Disable
Backup power SOC	Set the backup power SOC. In grid-tied mode, the ESS stops discharging energy to loads when its SOC reaches the backup power SOC and is used to keep the system running only when there is no irradiance. When the grid fails, the ESS supplies power to loads in backup mode. **Backup power SOC** has a higher priority than **End-of-discharge SOC**. For example, if **End-of-discharge SOC** is set to 10% and **Backup power SOC** is set to 20%, the ESS stops discharging energy to loads when it SOC decreases to 20%.	[0, 100%]
Grid-tied/ Off-grid mode switching	If this parameter is set to **Automatic switching**, the system switches to the off-grid mode when the grid fails, and switches to the grid-tied mode when the grid recovers.	• Automatic switching • Manual switching

Setting a Working Mode

The modes of the grid-tied and off-grid ESS can be used together with the self-consumption or TOU mode. Enable **Off-grid mode** during site deployment. For details about how to set the self-consumption or TOU mode, see **6.2 Setting ESS Parameters**.

6.5 Physical Layout of Optimizers

The Smart PV Optimizer is a DC-DC converter which implements maximum power point tracking (MPPT) of each PV module to improve the energy yield of the PV system. It also supports the module-level shutdown and monitoring functions.

If optimizers are configured for PV modules, you can view the physical location of each optimizer after creating a physical layout. If a PV module is faulty, you can quickly locate the faulty PV module from the physical layout to rectify the fault. If a PV module without an optimizer is faulty, you need to check the PV modules one by one to locate the faulty one, which is time-consuming and inefficient.

For details about the physical location layout of the optimizers, see **FusionSolar Physical Layout User Guide**.

Figure 6-2 Viewing a physical layout on the FusionSolar app

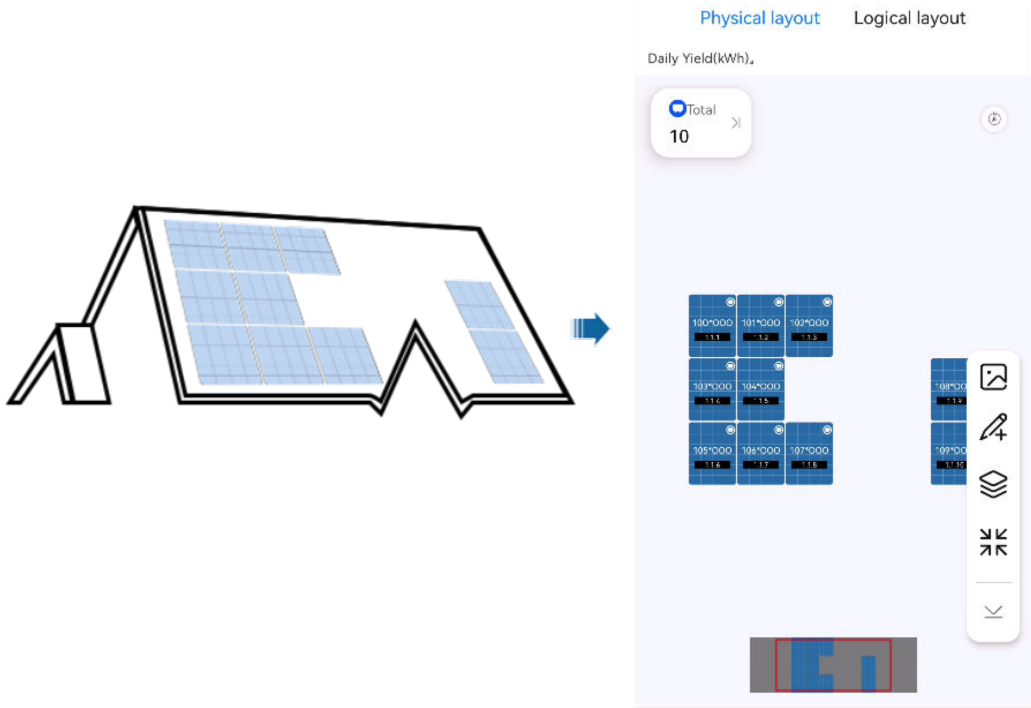
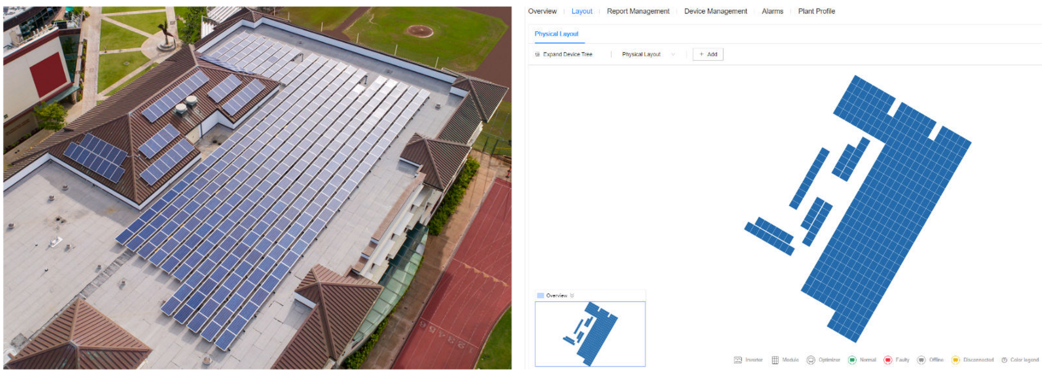


Figure 6-3 Viewing a physical layout on the SmartPVMS



6.6 Three-Phase Imbalance Control

NOTE

Only the SUN2000-(5K-12K)-MAP0 and SUN5000-(8K, 12K)-MAP0 inverters support three-phase imbalance control.

Function Description

Three-phase imbalance control applies to the following scenarios:

- Asymmetric phase feeding with feed-in limitation: The feed-in power of each phase in the three-phase power grid cannot exceed the preset threshold. The inverter outputs different power for each phase based on the loads of each phase to ensure that the feed-in power of each phase does not exceed the preset threshold.

- PV+ESS asymmetric phase feeding for self-consumption: When the ESS discharges power to the loads, the inverter outputs phase-specific power based on the load of each phase and tracks the loads on each phase to ensure that no ESS discharge power is fed to the grid while the PV power can be fed to the grid.

The preceding two scenarios are supported concurrently.

NOTE

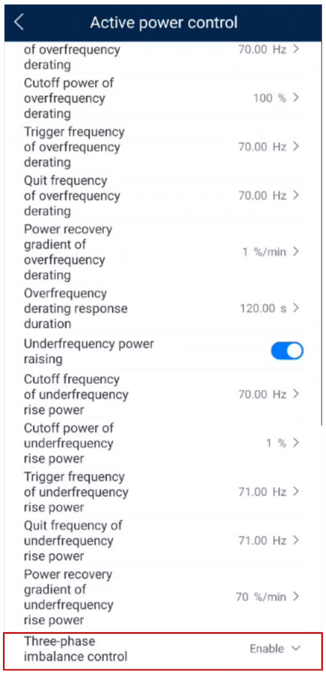
Three-phase imbalance control is not supported in the Smart Dongle networking scenario where inverters are connected in parallel.

Prerequisites

- Choose **Settings** > **Grid Parameters** and check that **Output mode** is set to **Three-phase, four-wire**.
- Choose **Power adjustment** > **Grid-tied Point Control** > **Active power** and check that **Closed-loop controller** is set to **Inverter** and **Limitation mode** is set to **Single phase power**.
- In the PV+ESS asymmetric phase feeding for self-consumption scenario, choose **Power adjustment** > **Battery control** and check that **Working Mode** is set to **Maximum self-consumption** or **TOU**.

Procedure

1. Log in to the local commissioning screen.
2. Choose **Power adjustment** > **Active power control** and set **Three-phase imbalance control** to **Enable**.



6.7 Third-Party Management System Settings (Connecting to Two Management Systems)

Prerequisites

If the inverter connects to a third-party management system, you also need to connect the inverter to Huawei management system to facilitate inverter O&M.

NOTE

- The FusionSolar app 6.24.00.008 or later can connect to a third-party management system.
- Only SDongleB-06 and SDongleA-05 (BOM number: 02312QMV-004) can connect to a third-party management system.
- For SUN2000-(12K-25K)-MB0 series and SUN5000-(17K, 25K)-MB0 series inverters, you can set third-party management system parameters using method 1 or 2. For other inverters, you can set third-party management system parameters only using method 2.

Method 1: Connecting to the Inverter and Setting Third-Party Management System Parameters

Step 1 Connect to the inverter by referring to B Connecting to the Inverter on the App, choose **Settings** > **Communication configuration** > **Management system-1 parameters** and set third-party management system parameters.

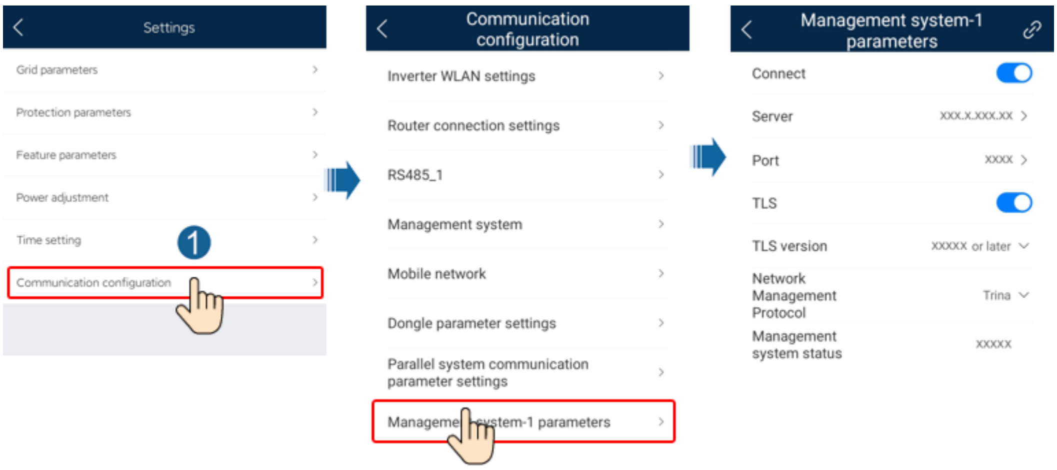


Table 6-5 Parameter settings

Parameter	Description	Value Range
Connect	• The default value is **Disable**, meaning that a third-party management system cannot be connected. • When this parameter is set to **Enable**, a third-party management system can be connected.	• Disable • Enable
Server	Domain name or IP address.	-

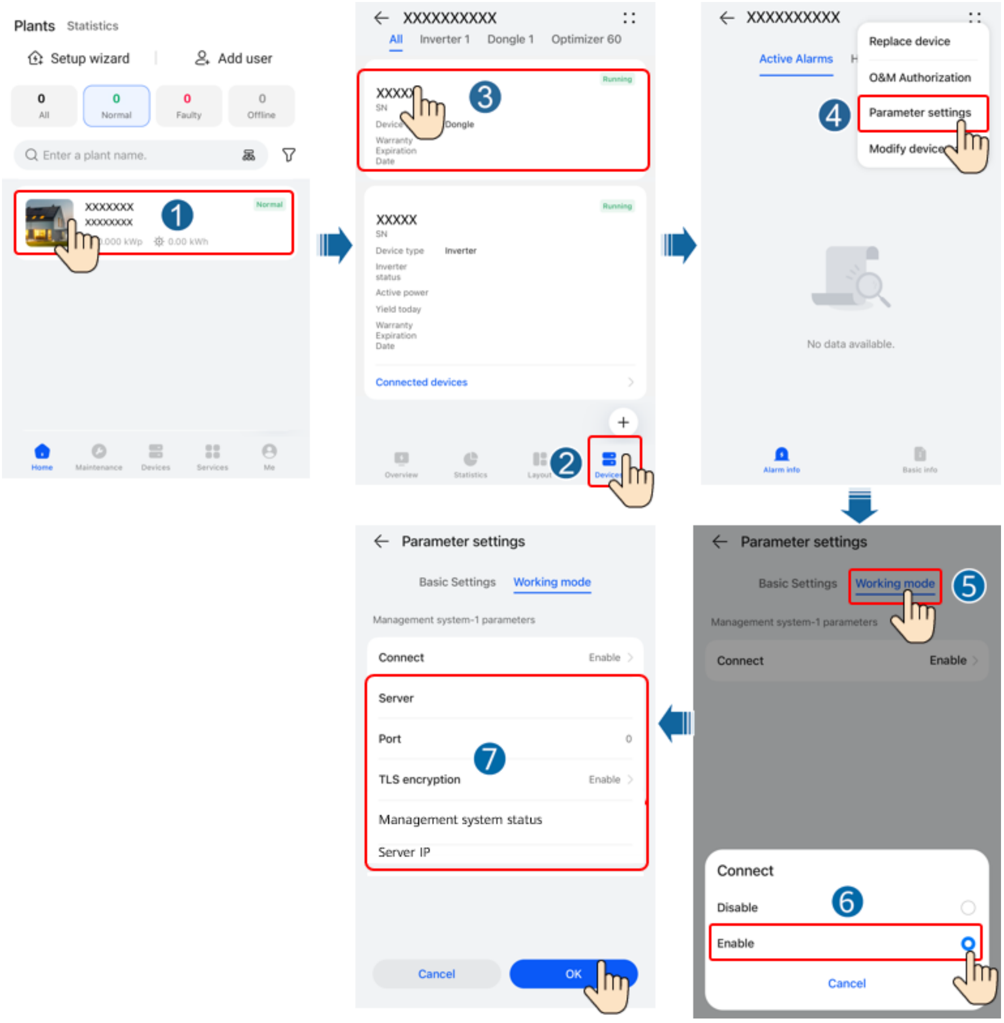
Parameter	Description	Value Range
Port	Server port.	[0, 65535]
TLS	● If the third-party management system uses the TLS encryption protocol, set this parameter to **Enable**. If this parameter is set to **Enable**, select a version based on the TLS version of the third-party management system. ● If the third-party management system does not use the TLS encryption protocol, set this parameter to **Disable**.	● Disable ● Enable
TLS version	Select a version based on the TLS version of the third-party management system.	● TLS 1.0 or later ● TLS 1.1 or later ● TLS 1.2 or later ● TLS 1.3
Network Managemen t Protocol	The default value is Standard Modbus.	Modbus
Managemen t system status	Connection status of the third-party management system.	-

----End

Method 2: Logging In to the FusionSolar Smart PV Management System and Setting Third-Party Management System Parameters

- Log in to the FusionSolar app and tap the plant name on the **Home** screen to access the plant screen. Choose **Devices**, select the Smart Dongle to be set, tap **Parameter settings**, and set parameters as prompted.

Figure 6-4 Setting third-party management system parameters



- Log in to https://intl.fusionsolar.huawei.com to access the WebUI of the FusionSolar SmartPVMS. On the **Home** page, click the plant name to go to the plant page. Select the Smart Dongle to be set, click **Configuration**, and set parameters as prompted.

Figure 6-5 Setting third-party management system parameters

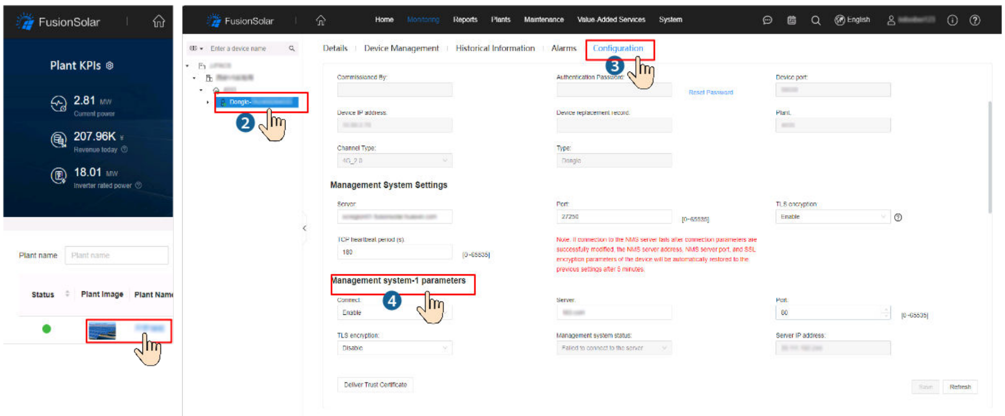


Table 6-6 Parameter settings

Parameter	Description	Value Range
Connect	• The default value is **Disable**, meaning that a third-party management system cannot be connected. • When this parameter is set to **Enable**, a third-party management system can be connected.	• Disable • Enable
Server	Domain name.	-
Port	Server port.	[0, 65535]
TLS encryption	• If the third-party management system uses the TLS encryption protocol, set this parameter to **Enable**. If this parameter is set to **Enable**, select a version based on the TLS version of the third-party management system. • If the third-party management system does not use the TLS encryption protocol, set this parameter to **Disable**.	• Disable • Enable
Management system status	Connection status of the third-party management system.	• Not connected • Internal error. Resources are insufficient. • Connection Successful • Connection deadlock • The peer end is disabled • Connection abnormal • Failed to connect to the port • Failed to verify the peer certificate • The local certificate is abnormal • Domain name resolution failed • Failed to connect to the server • Connecting… • Second challenge authentication failed

Parameter	Description	Value Range
Server IP address	IP address.	-
Deliver Trust Certificate	Import the CA certificate of the third-party management system to Huawei's device to ensure encrypted connection. Before import, ensure that the third-party management system is successfully connected.	-

7 Commissioning the Charger

For details about how to commission the charger, see **FusionSolar App Quick Guide (Charger)**.

8 Maintenance and Replacement

NOTE

Re-deployment is required if the EMMA is changed to the Dongle or the Dongle is changed to the EMMA.

8.1 Routine Maintenance

To ensure that the system operates properly for a long term, you are advised to perform routine maintenance as described in this section.

CAUTION

Power off the system before cleaning the system, connecting cables, and checking grounding reliability.

Table 8-1 Maintenance checklist

Check Item	Check Method	Maintenance Interval
System cleanliness	Check periodically whether the heat sinks are blocked or dirty.	Once every 6 to 12 months
System status	• Check that the device is not damaged or deformed. • Check that the device does not generate abnormal sound when it is in operation. • Check that ESS parameters are correctly set when the device is running.	Once every 6 months

Check Item	Check Method	Maintenance Interval
Electrical connections	● Check that cables are securely connected. ● Check that cables are intact, especially that the cable sheath contacting a metal surface is intact. ● Check that unused AC and DC input ports, COM ports, and waterproof covers on the device are locked.	6 months after the first commissioning and once every 6 to 12 months after that
Grounding reliability	Check that the PE cable is securely connected.	6 months after the first commissioning and once every 6 to 12 months after that

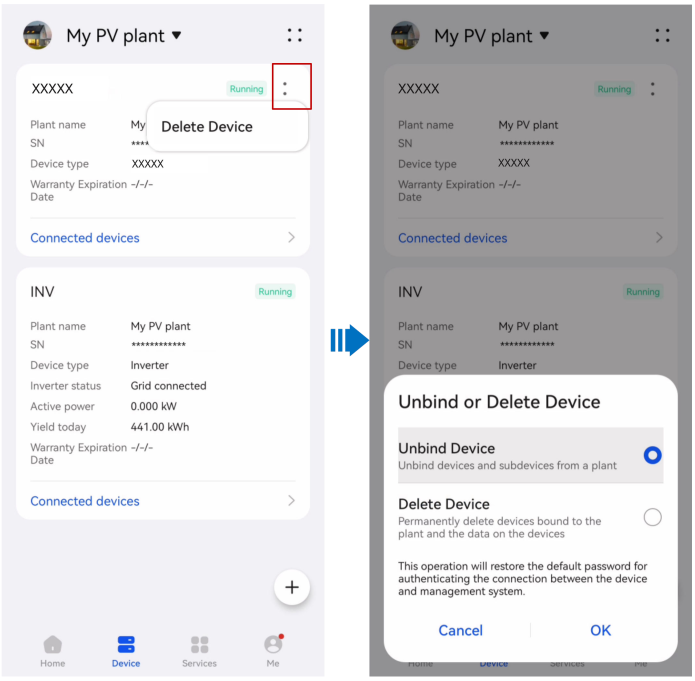
8.2 Troubleshooting

If an alarm is generated, rectify the fault by referring to the alarm list in the user manual of the related component.

8.3 Replacing a Charger

Smart Dongle or Inverter WLAN Direct Connection to the Management System/Charger-Only Scenario

1. Unbind the old charger on the FusionSolar app.
   a. On the home screen of the app, select the target plant.
   b. On the **Device** screen, choose **:** > **Delete Device** in the upper right corner of the target device card.
   c. Tap and select **Unbind Device** or **Delete Device** as required.



NOTE

- After a device is unbound, the running data of the device and its downstream devices is stored in the database. The default data retention period is six months. To change the retention period, contact the system administrator.
  - If a device is rebound to a plant within the data retention period, the device inherits the retained data.
  - If a device is not bound to a plant within the data retention period, the data will be automatically deleted.
- After a device is permanently deleted, the running data of the device and its downstream devices is deleted immediately. When the device is rebound to the plant, the running data of the device is not restored.

2. Remove the old charger.
   a. Turn off the upstream switch and ensure that the following operations are performed with power off.
   b. Remove the security torx screws from the bottom of the charger. (Use a TT20 security torx torque screwdriver.)
   c. Push the charger upwards to separate the charger from its rear cover.
   d. Remove the communication cable and power cables in sequence.
   e. Remove the wall-mounting screws and then the rear cover. (Use an M6 torque screwdriver.)
3. Install a new charger. For details, see **Smart Charger User Manual (SCharger-7KS-S0, SCharger-22KT-S0)**.
4. Commission the new charger. For details, see **FusionSolar App Quick Guide (Charger)**.

9 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

EU Representative Information: Huawei Technologies Hungary Kft.

Add.: HU-1133 Budapest, Váci út 116-118., 1. Building, 6. floor.

Email: hungary.reception@huawei.com

A Connecting to the Smart Dongle on the App

NOTICE

- When directly connecting your phone to a device, ensure that your phone is within the WLAN coverage of the device.
- When connecting the device to the router over WLAN, ensure that the device is within the WLAN coverage of the router and the signal is stable and good.
- The router supports WLAN (IEEE 802.11 b/g/n, 2.4 GHz) and the WLAN signal reaches the inverter.
- The WPA, WPA2, or WPA/WPA2 encryption mode is recommended for routers. The Enterprise mode is not supported (such as airport WLAN and other public hotspots that require authentication). WEP and WPA TKIP are not recommended because they have serious security vulnerabilities. If the access fails in WEP mode, log in to the router and change the encryption mode of the router to WPA2 or WPA/WPA2.

Step 1 Start device commissioning.

Figure A-1 Method 1: mobile phone connected to the Internet

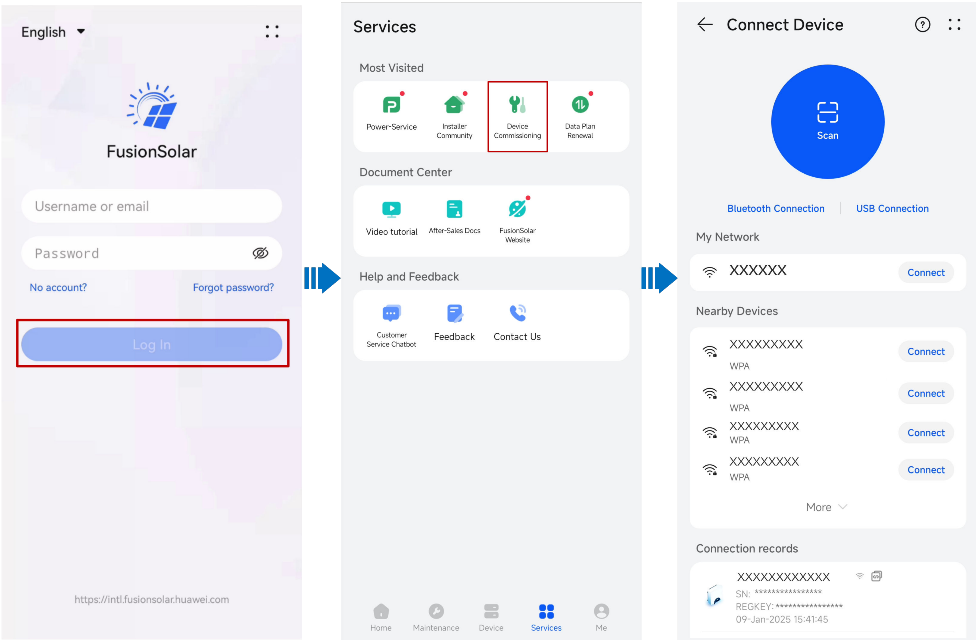
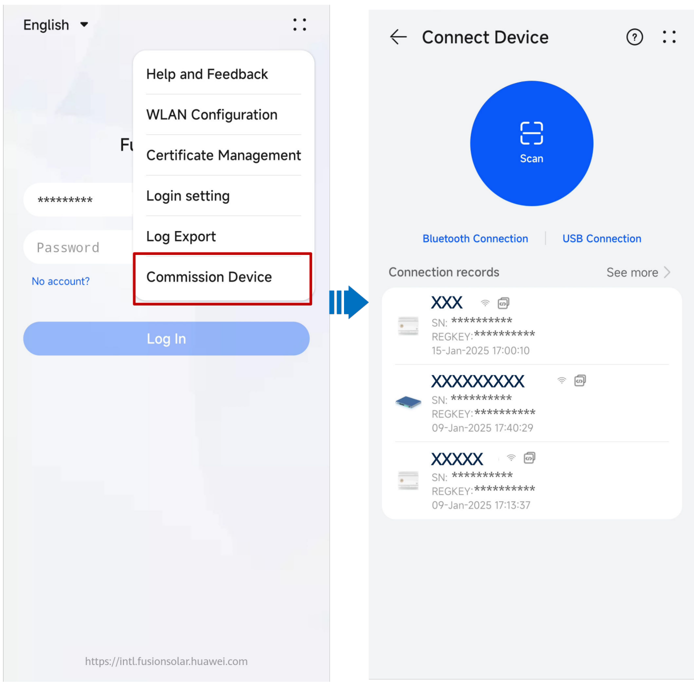


Figure A-2 Method 2: mobile phone not connected to the Internet



NOTE

Method 2 can be used only when no Internet access is available. You are advised to log in to the FusionSolar app to commission devices using method 1.

Step 2 Connect to the WLAN of the Smart Dongle.

Tap **Scan**. On the QR code scanning screen, align the QR code with the scanning box to automatically scan and connect to the WLAN of the Smart Dongle.

NOTE

- If the inverter has a WLAN, the WLAN of the Smart Dongle is disabled by default. If the inverter does not have a WLAN, the WLAN of the Smart Dongle is enabled by default.
- If the WLAN of the Smart Dongle is disabled, log in to the FusionSolar app, select the target plant on the home screen, tap **Device**, select the Smart Dongle card, choose **: :** > **O&M Authorization**, and enable **WLAN wakeup** to enable the WLAN of the Smart Dongle.

NOTE

- The WLAN name of a product consists of "Device name-Product SN." (The last six digits of the WLAN name of some products are the same as the last six digits of the product SN.)
- Use the QR code for the first connection. The QR code can be obtained from the label on the device.
- Ensure account security by changing the password periodically. Your password might be stolen or cracked if it is left unchanged for extended periods. If a password is lost, the device cannot be accessed. In these cases, the Company shall not be liable for any loss.
- If the login screen is not displayed after you scan the QR code, check whether your phone is correctly connected to the device WLAN. If not, manually select and connect to the WLAN.
- If the message **This WLAN network has no Internet access. Connect anyway?** is displayed when you connect to the built-in WLAN, tap **CONNECT**. Otherwise, you cannot log in to the system. The actual UI and messages may vary with mobile phones.

Step 3 Log in to the device commissioning screen as **Installer**.

NOTICE

- After completing the deployment settings, the installer should remind the owner to access the local commissioning screen of the device and set the login password of the owner account as prompted.
- Ensure account security by changing the password periodically. Your password might be stolen or cracked if it is left unchanged for extended periods. If a password is lost, the device cannot be accessed. In these cases, the Company shall not be liable for any loss.

----End

B Connecting to the Inverter on the App

NOTICE

- When directly connecting your phone to a device, ensure that your phone is within the WLAN coverage of the device.
- When connecting the device to the router over WLAN, ensure that the device is within the WLAN coverage of the router and the signal is stable and good.
- The router supports WLAN (IEEE 802.11 b/g/n, 2.4 GHz) and the WLAN signal reaches the inverter.
- The WPA, WPA2, or WPA/WPA2 encryption mode is recommended for routers. The Enterprise mode is not supported (such as airport WLAN and other public hotspots that require authentication). WEP and WPA TKIP are not recommended because they have serious security vulnerabilities. If the access fails in WEP mode, log in to the router and change the encryption mode of the router to WPA2 or WPA/WPA2.

Step 1 Start device commissioning.

Figure B-1 Method 1: mobile phone connected to the Internet

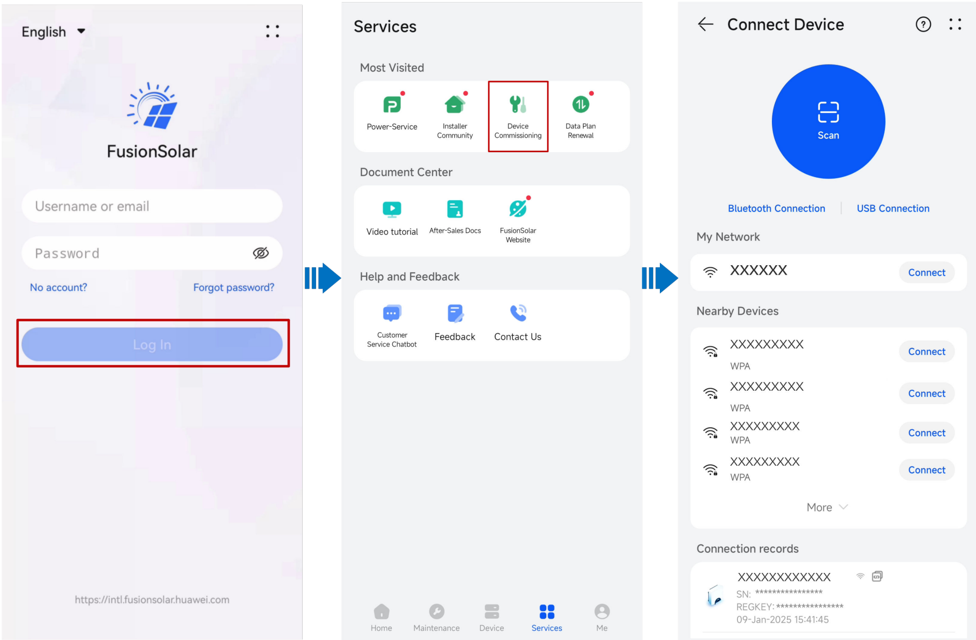
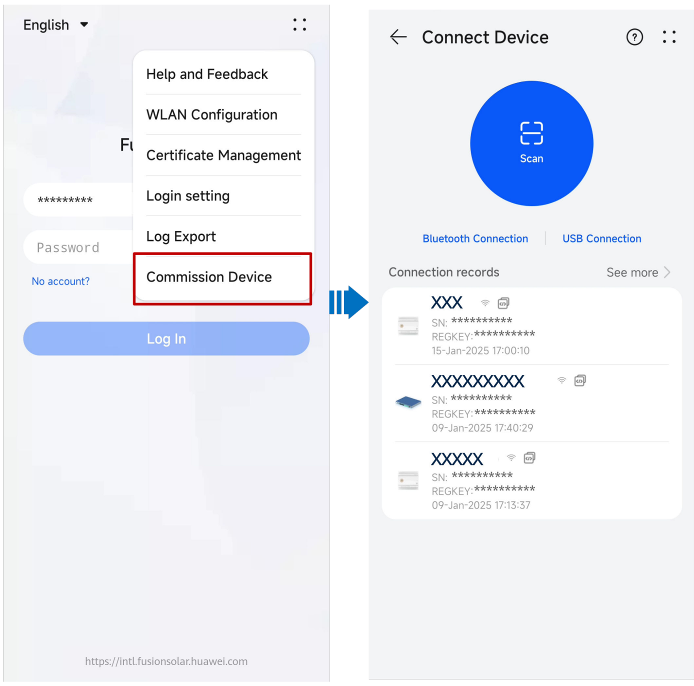


Figure B-2 Method 2: mobile phone not connected to the Internet



NOTE

Method 2 can be used only when no Internet access is available. You are advised to log in to the FusionSolar app to commission devices using method 1.

Step 2 Connect to the inverter WLAN.

Tap **Scan**. On the QR code scanning screen, align the QR code with the scanning box to automatically scan and connect to the WLAN of the inverter.

NOTE

- The WLAN name of a product consists of "Device name-Product SN." (The last six digits of the WLAN name of some products are the same as the last six digits of the product SN.)
- Use the initial password for the first connection. You can obtain the initial WLAN password from the label on the device.
- Ensure account security by changing the password periodically. Your password might be stolen or cracked if it is left unchanged for extended periods. If a password is lost, the device cannot be accessed. In these cases, the Company shall not be liable for any loss.
- If the login screen is not displayed after you scan the QR code, check whether your phone is correctly connected to the device WLAN. If not, manually select and connect to the WLAN.
- If the message **This WLAN network has no Internet access. Connect anyway?** is displayed when you connect to the built-in WLAN, tap **CONNECT**. Otherwise, you cannot log in to the system. The actual UI and messages may vary with mobile phones.

Step 3 Log in to the device commissioning screen as **Installer**.

NOTICE

- After completing the deployment settings, the installer should remind the owner to access the local commissioning screen of the device and set the login password of the owner account as prompted.
- Ensure account security by changing the password periodically. Your password might be stolen or cracked if it is left unchanged for extended periods. If a password is lost, the device cannot be accessed. In these cases, the Company shall not be liable for any loss.

----End

C SDongle Certificate Management and Maintenance

C.1 Initial Certificate Risk Disclaimer

Huawei's initial certificates are mandatory identity credentials for Huawei devices before delivery. The disclaimer statements for using the certificates are as follows:

1. Huawei's initial certificates are used only in the deployment phase, for establishing initial security channels between devices and the customer's network. Huawei does not promise or guarantee the security of the initial certificates.
2. Customers shall bear consequences of all security risks and security incidents arising from using Huawei's initial certificates as service certificates.
3. An initial Huawei-issued certificate is valid for 19 years starting from the manufacturing date.
4. Services using an initial certificate will be interrupted when the certificate expires.
5. It is recommended that customers deploy a PKI system to issue certificates for devices and software on the live network and manage the lifecycle of the certificates. To ensure security, certificates with short validity periods are recommended.

NOTE

You can view the validity period of an initial certificate on the network management system.

C.2 Application Scenarios of initial Certificates

File Path and Name	Scenario	Replacement
f:/sun_ca.crt f:/sun_tomcat_client.crt f:/sun_tomcat_client.key	Authenticates the validity of the peer mobile app for communication through Modbus TCP.	For details about how to replace a certificate, contact technical support engineers to obtain the corresponding security maintenance manual. Certificates for communication between the Company's products can be replaced.

D One-Click Network Disconnection Settings

After the **One-click network disconnection** function is enabled, the device is disconnected from Huawei management system, and all O&M services based on the management system are unavailable.

NOTE

Before using this function, ensure that the version of the FusionSolar app is 25.1.2.008 or later.

Procedure

1. Log in to the local commissioning screen.
   - Smart Dongle networking: **Connect to the Smart Dongle on the app**. Choose **Set** > **Communication configuration** as an installer.

     NOTE

     - In Smart Dongle networking, **One-click network disconnection** can be set only for the Smart Dongle B-06 (4G) and Smart Dongle A-05 (AP+STA).
     - If the WLAN of the Smart Dongle is disabled, log in to the FusionSolar app, select the target plant on the home screen, tap **Device**, select the Smart Dongle card, choose **: :** > **O&M Authorization**, and enable **WLAN wakeup** to enable the WLAN of the Smart Dongle.
   - Inverter direct connection networking: **Connect to the inverter on the app**. Choose **Set** > **Communication configuration** > **Management system settings** as an installer; or tap **Set** as an owner.

     NOTE

     Only the SUN2000-(8K, 10K)-LC0, SUN2000-(3K-6K)-LB0, and SUN5000-(3K-6K)-LB0 series inverters support **One-click network disconnection** in the inverter direct connection networking scenario on the app.
2. Tap **One-click network disconnection**, enter the password for logging in to the local commissioning screen, and enable or disable **One-click network disconnection** (disabled by default).

NOTICE

- When **One-click network disconnection** is enabled, the Huawei management system cannot be connected during app-based deployment. To connect to Huawei management system, disable **One-click network disconnection** first.
- If the system does not automatically connect to the Huawei management system after **One-click network disconnection** is disabled, you can reconnect to the Huawei management system in **Quick Settings**. In the inverter direct connection networking scenario, you can also reconnect to the Huawei management system in **Management system settings**.

Figure D-1 One-click network disconnection (using the installer user in the inverter direct connection scenario as an example)