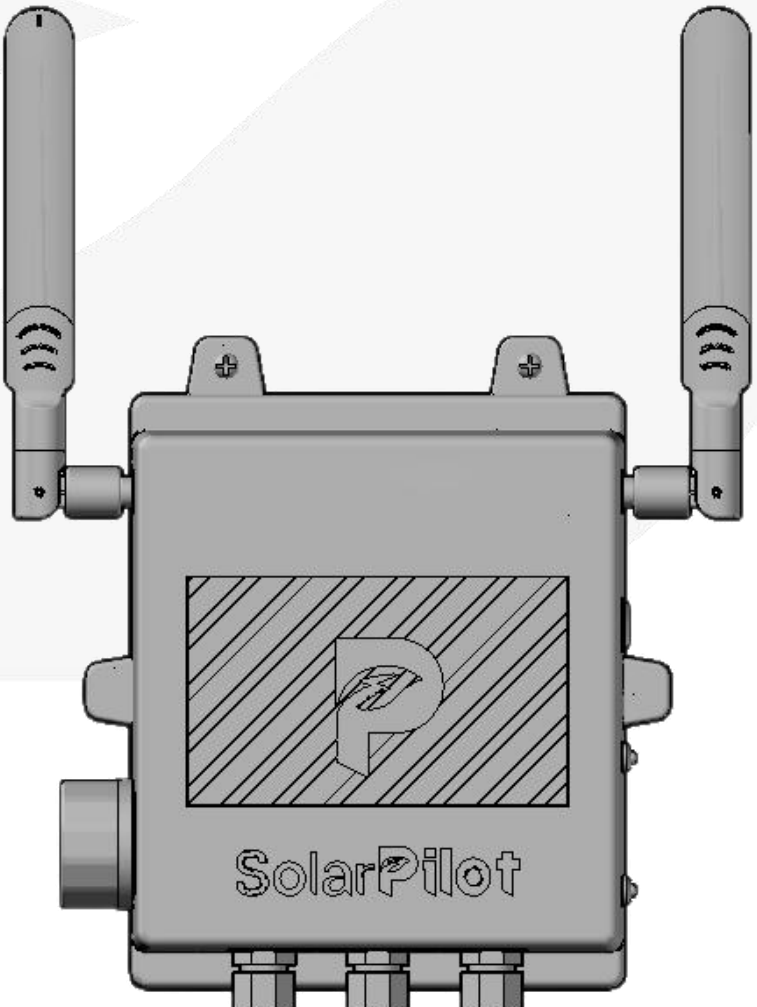
SolarPilot

Zigbee Gateway

SP1-Zigbee-GW-W

User Manual



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About this manual

This document mainly introduces the functional characteristics, electrical parameters, product structure and other contents of the Zigbee gateway.

The pictures in this article are for reference only. Please refer to the actual product for details.

The content of the manual will be constantly updated and revised, but it is inevitable that there will be slight discrepancies or errors with the actual product.

Users should refer to the purchased product, and can download the latest version of the manual through www.solarpilot.com or sales channels.

Scope of application

This manual is mainly aimed at the following products:

Zigbee Gateway (SP1-Zigbee-GW-W)

In the following text, unless otherwise specified, it is referred to as "Gateway".

Intended Readers

- Sales engineer
- Technical support engineer
- Hardware installation engineer
- Maintenance engineer

Directory

1 Introduction

1.1 Product Introduction

SP1-Zigbee-GW series products are SolarPilot Data Acquisition products. They use a 2.4G wireless solution to collect information and data from on-site optimizers and send data to SolarPilot Cloud Computing Platform through Ethernet or Wi-Fi communication.

Through SP1-Zigbee-GW-W, users can obtain module-level data and alarms, while achieving remote and local shutdown. Remote operation and maintenance of photovoltaic systems can be realized anytime and anywhere on the SolarPilot data platform.

SP1-Zigbee-GW-W is used with SP1/SP2/SP3 series optimizers.

1.2 Product Features

1)Flexible and stable

Data upload supports Ethernet or 2.4G Wi-Fi communication methods, and supports RS485 communication with external devices.

2)Intelligent operation and maintenance

Implement module-level monitoring and operation and maintenance functions, simulate actual component layout, and dynamically display module status.

3)Second-level monitoring

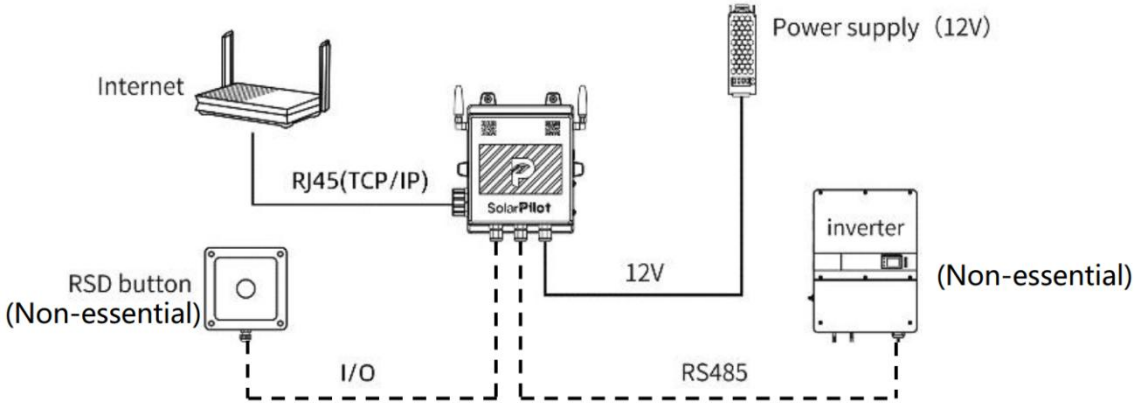
Module parameters are collected every 60 seconds for real-time anomaly analysis.

4)Quick shutdown

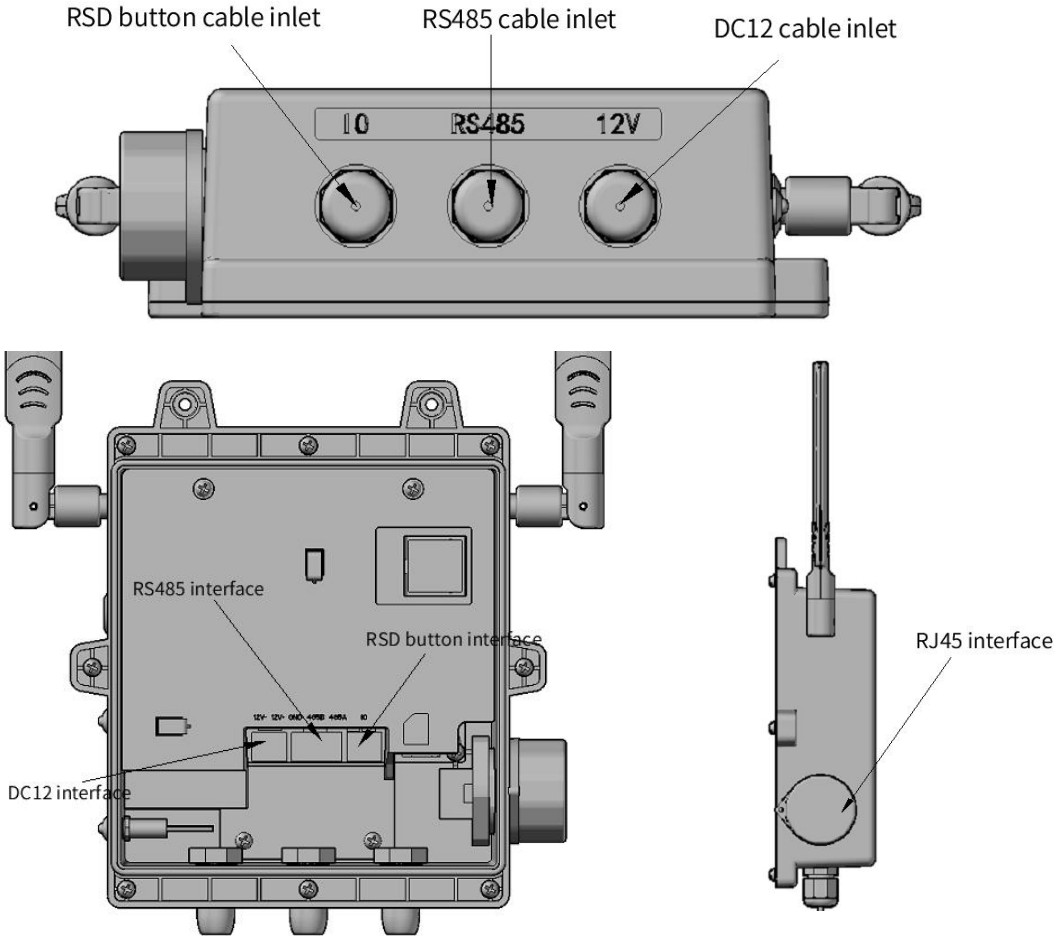
Quick shutdown can be achieved through local buttons or apps.

2 Interface

2.1 Topology



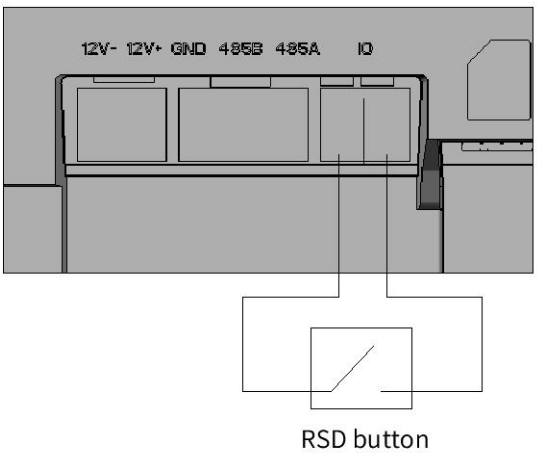
2.2 Interface location



2.3 Interface description

2.3.1 RSD button cable inlet

Connect an external RSD button(self-locking button) via a 3-6.5mm diameter cable to perform local quick-break operation. The connection relationship is shown in the figure below. If not needed, you can leave it unconnected.



2.3.2 RS485 Cable inlet

Connect external RS485 devices, such as inverters, weather stations, etc., via a 3-6.5mm diameter cable, and obtain available information of external devices through the modbus protocol (need to contact after-sales personnel for protocol development). The hardware connection relationship is 485A to A, 485B to B, and GND to G. If not needed, you can leave it unconnected.

2.3.3 DC12 Cable inlet

Connect the external power supply device through a cable via a 3-6.5mm diameter cable. The rated power supply voltage is DC12V and the rated power is 10W. When the voltage is too high (>15V) or the positive and negative poles are connected in reverse, the device may be damaged.

2.3.4 RJ45 Interface

Connect to an external router device via Category 5 or above Ethernet cables to provide network for the Zigbee gateway.

3 Button and indicator lights

3.1 Button and indicator lights position

3.2 Button and indicator lights instructions

3.2.1 Button Instructions

Depending on how long you press the button, the button has the following functions:

Operation	**Gateway Status**
Long press for < 3 seconds	No Action
Long press for 3-10 seconds	Activate AP distribution network
Long press for ≥10 seconds	Restart gateway

3.2.2 LED1 Instructions

LED STATUS	Gateway Status
Quick flash	Unable to connect to the Internet
Slow flash	AP distribution network
Always On	Connect to the Internet normally, and flash when receive a message from the platform

3.2.3 LED2 Instructions

LED STATUS	Gateway Status
Always On	The power supply is normal
Always Off	The power supply is abnormal

4 Unpacking and storage

4.1 Unpacking and inspection

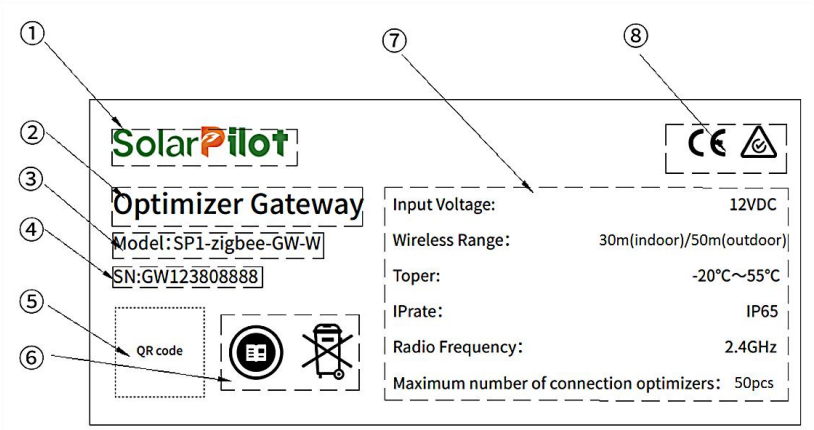
The gateway has been fully tested and strictly inspected before leaving the factory, but there may still be damage during transportation. Please conduct a detailed inspection before signing for the product.

- Inspect the packaging box for damage.
- Check whether the goods are complete and match the order according to the packing list.
- Unpack and check if all internal equipment is intact.

If any damage is found, please contact the transportation company or directly contact SolarPilot Company and provide photos of the damaged area for easy service. Do not discard the original packaging of the gateway. It is best to store it in the original packaging box after the gateway is shut down and dismantled.

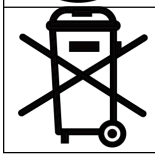
4.2 Identify the gateway

The back of the gateway is pasted with a nameplate. The nameplate provides the model information of the gateway, as well as the most important parameters and certification marks.



Serial Number	Explanation
1	SolarPilot trademark
2	Product name
3	Model specification
4	SN code
5	Product SN QR code
6	Related identification
7	Product parameters
8	Related Certification

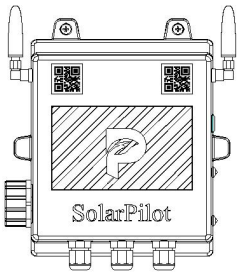
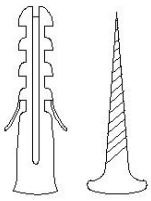
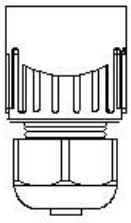
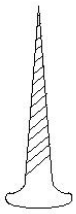
Nameplate identification instructions

	Read the instruction
	WEEE recycling logo

Certification Instructions

	Compliant with TUV certification mark
	Compliant with CE certification mark

4.3 Scope of supply

		
Gateway×1	Quick Installation Manual×1	Certificate×1
		
Expansion screw×2	RJ45 waterproof plug×1	Bolt ×8

4.4 Gateway storage

If the gateway is not used immediately, it needs to be stored in a specific environment:

- Storage temperature range -40℃-70 ℃, relative humidity range 5%-95%, no condensation
- The storage time of the gateway is six months or more, and it needs to be comprehensively checked and tested by professionals before it can be put into operation.

5 Installation

5.1 Preparation

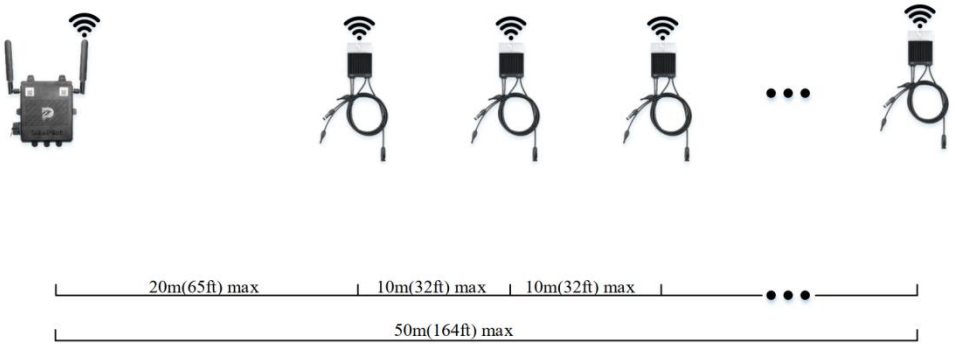
Before installing the gateway, you need to prepare the following materials in advance:

- Standard DC12V power supply
- Power cable, network cable
- Router with Ethernet interface
- Phone with "SolarPilot" APP installed
- Screwdriver, wire stripper, etc.

5.2 Installation location instructions

To ensure reliable communication of Zigbee, the location relationship between devices should be reasonably planned:

In the absence of obstructions, the maximum distance between the SP1 gateway and the nearest PV optimizer should not exceed 20m(65ft), the maximum distance to the farthest PV optimizer should not exceed 50m(164ft), and the maximum distance between PV optimizers should not exceed 10m(32ft), as shown below.



5.2.1 Recommended location of Gateway and PV Optimizer

Based on the above distance requirements, according to the maximum ratio of 1:50 between the SP1 gateway and the SP1 PV optimizer, the optimal installation layout is shown in Fig.5-1:

All PV panels are installed with SP1 PV optimizers, the SP1 gateway is placed at the center of the PV array, and the PV array radius does not exceed 50m (164ft), that is, each SP1 PV optimizer is within the communication coverage of the SP1 gateway.

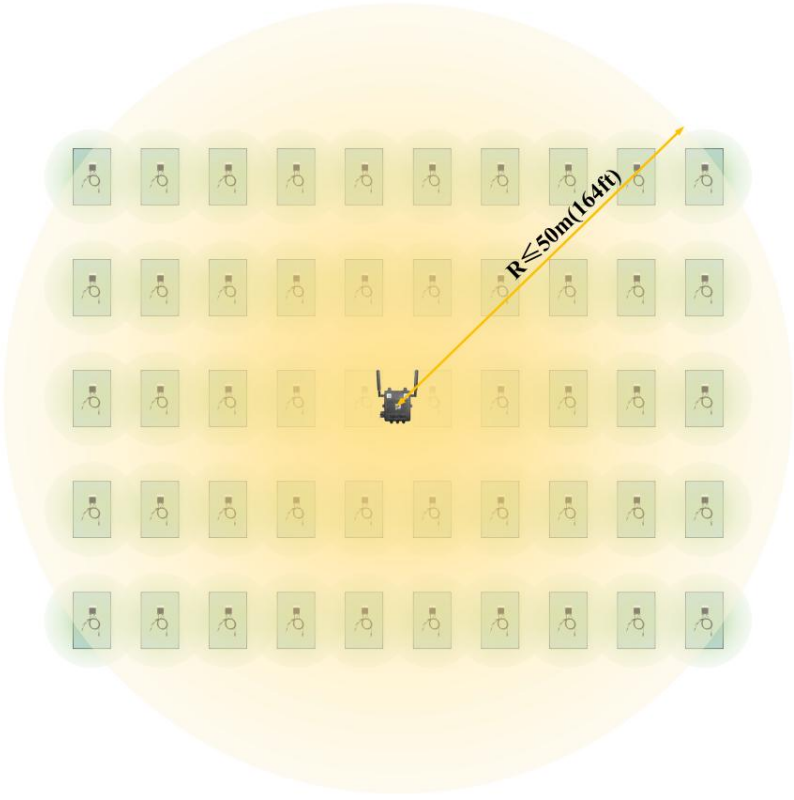


Fig.5-1 Recommended Layout of Gateway and PV Optimizer (1:50)

5.2.2 General location of Gateway and PV Optimizer

If the on-site environment does not meet the recommended location, the installation location of the SP1 gateway and the SP1 PV optimizer should follow the following general principles, as shown in Fig.5-2:

The maximum distance between the SP1 gateway and the nearest PV optimizer should not exceed 20m (65ft), and the maximum distance to the farthest PV optimizer should not exceed 50m(164ft), the maximum distance between PV optimizers should not exceed 10m (32ft).

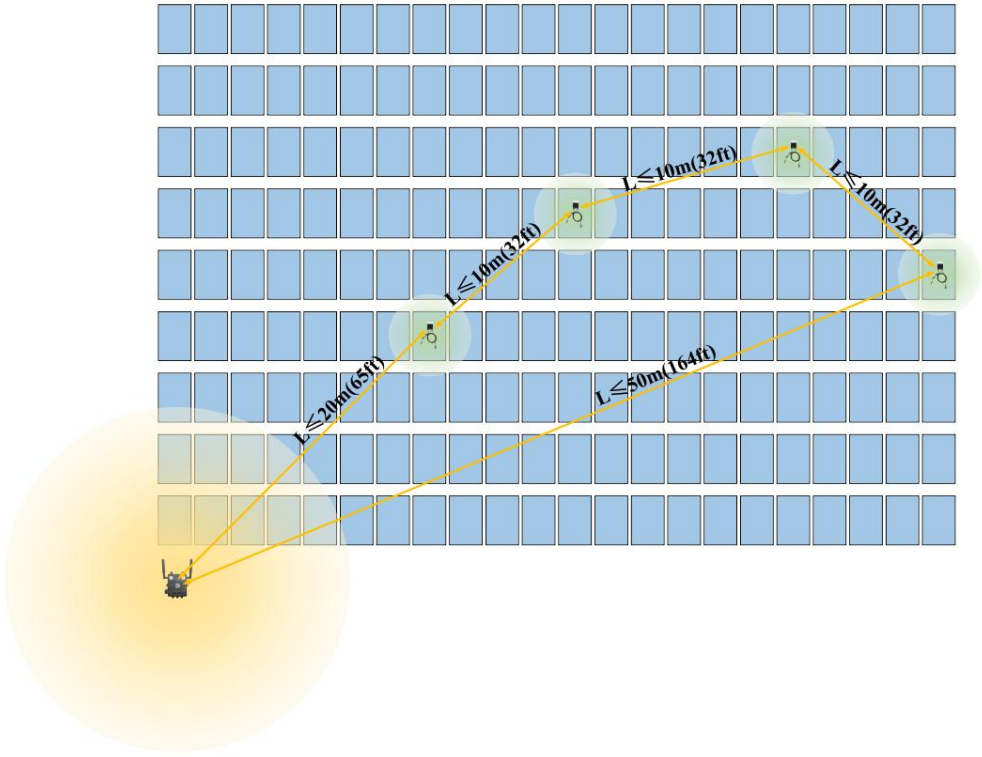


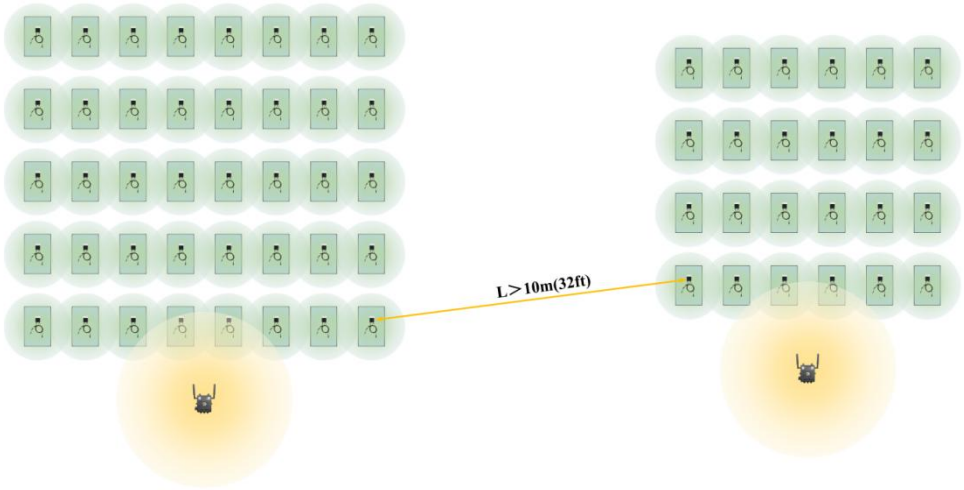
Fig.5-2 General location of SP1 gateway and SP1 PV optimizer

5.2.3 Factors Affecting Reliable Communications

In actual applications, the long distance between PV arrays, obstructions on the communication path, roof materials, etc. may affect the stability of Zigbee communication.

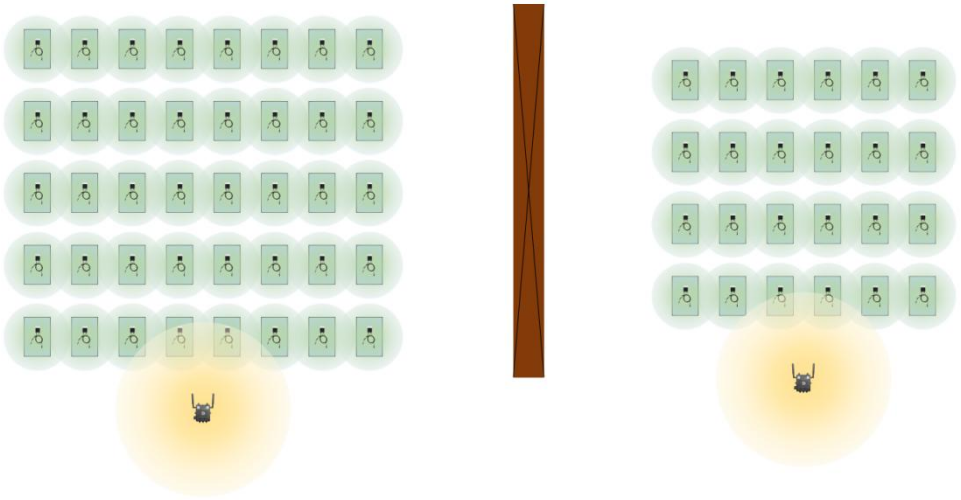
- The gap between PV arrays

If the gap between PV array A and PV array B is greater than 10m(32ft), the transmission quality of the wireless signal will be affected, it is recommended that PV array A and PV array B use different gateways for communication.



- Obstructions

If there are obstructions such as solid walls, floor-to-ceiling windows, fully enclosed metal guardrails, etc. between PV arrays A and B, which will affect the transmission quality of wireless signals. In that case, it is recommended that PV arrays A and B use different gateways for communication.

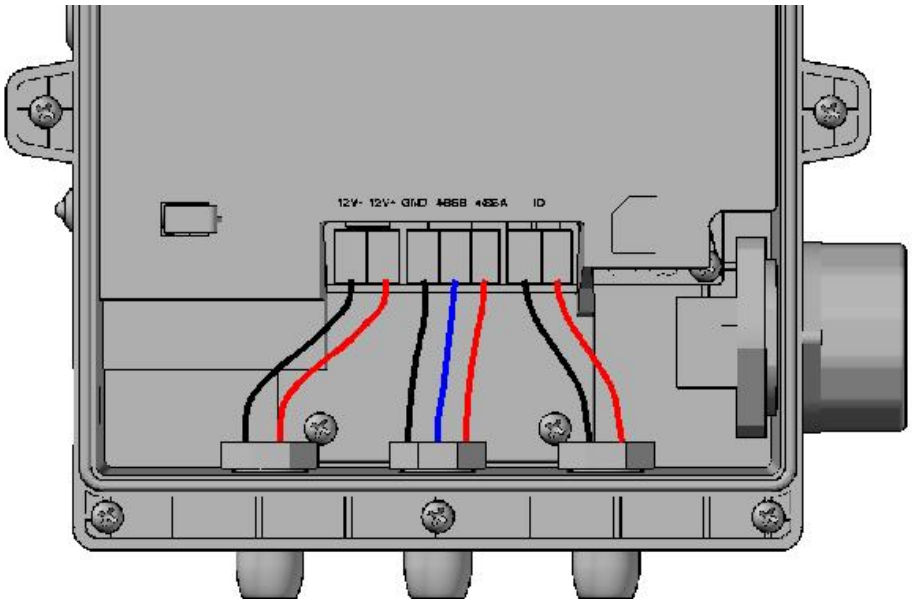


- Roof material

If the roof is made of metal such as aluminum alloy and the distance to the PV optimizer does not exceed 0.2m (0.65ft), the transmission quality of the wireless signal will be affected. In this case, the appropriate installation location needs to be confirmed based on actual on-site debugging.

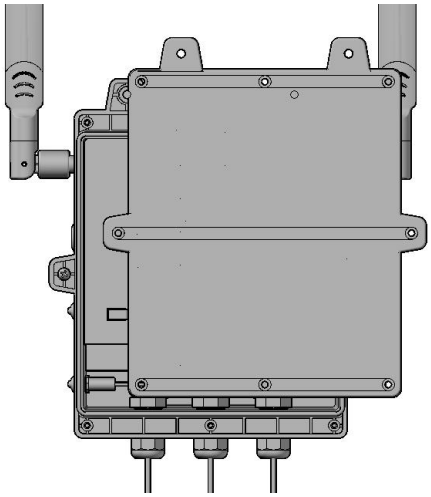
5.3 Connect cables

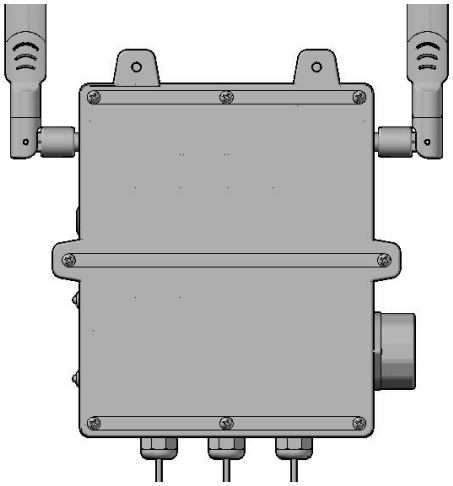
According to the on-site access situation of the project, reliably connect the corresponding cables from right to left, which are IO, RS485, and DC12V respectively. The wiring is shown in the following figure.



5.4 Install back panel

Fix the back panel with matching bolts (Note: 8 bolts must not be used less, and the bolts must be tightened in place, otherwise it will affect the waterproof performance).





5.5 Connect Ethernet cable

Follow the steps below to install the RJ45 waterproof plug. Be sure to install it in place, otherwise communication may fail.

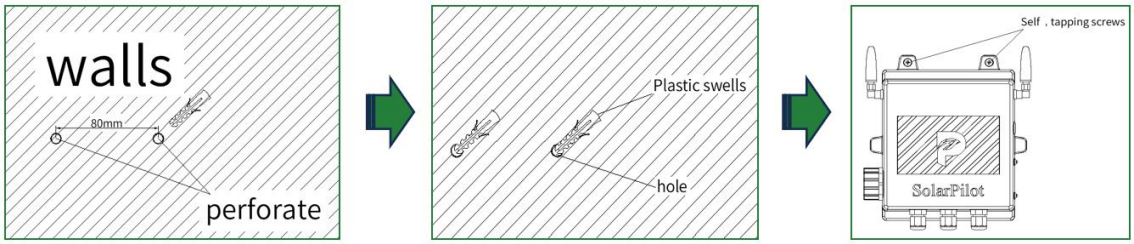
If you use the AP distribution network method, this steps can be ignored.

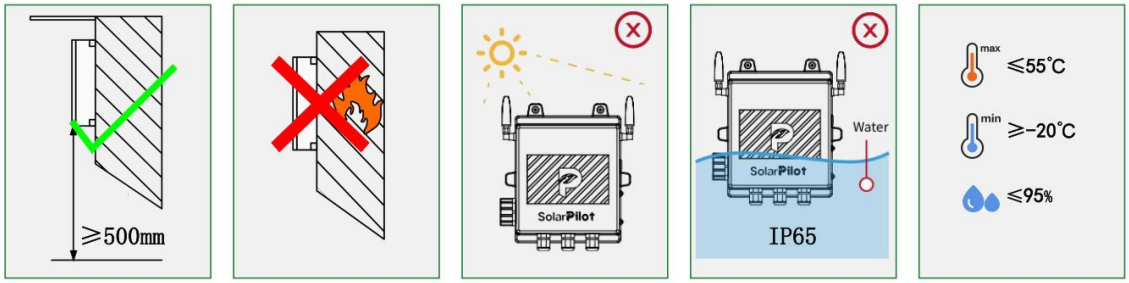
5.6 Install Gateway

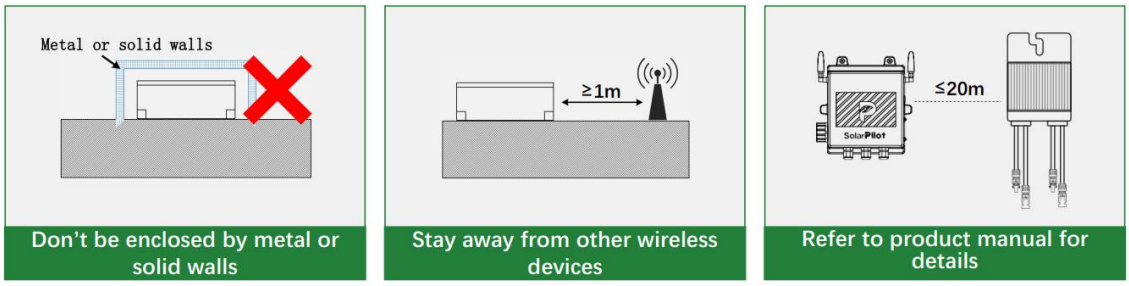
Install gateways should follow the following principles, otherwise poor communication may occur.

- It is recommended to be fixed on the wall and placed in an open environment.
- The installation height should be greater than 0.5m.
- Keep away from high temperature equipment and flammable and explosive materials.
- Avoid sun exposure.
- No immersion in water.

- Do not install inside a closed metal box or solid wall.
- Stay away from other wireless devices.







6 APP operation guide

6.1 Download the APP

Method 1: Download from APP Store & Google Play.

iPhone mobile phone users: search for "SolarPilot Energy" in the App Store.

Other mobile phone users： search for "SolarPilot Energy" in the application market.

Method 2: Download by scanning below QR code.

Android

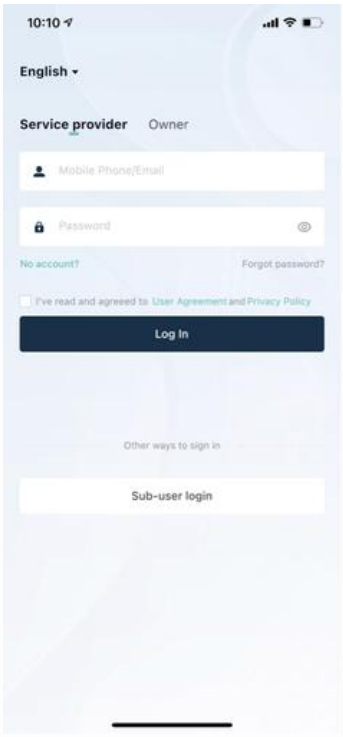
IOS

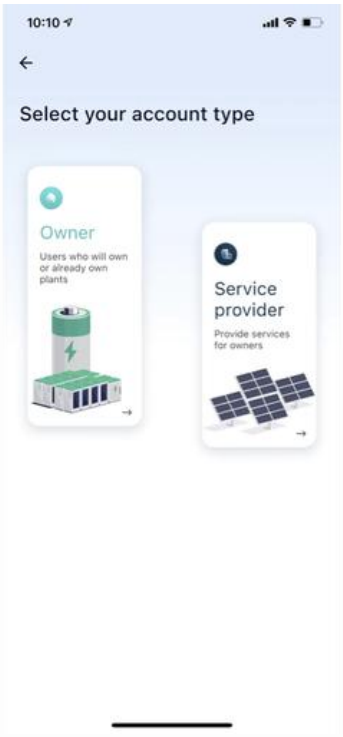
Note: When you selecting "Browser download" method. If prompted "This application is from an

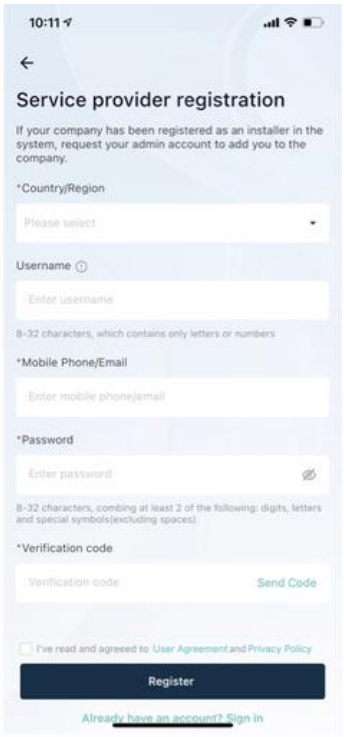
unofficial app store..." and other prompts during the installation process, please click "Continue installation".

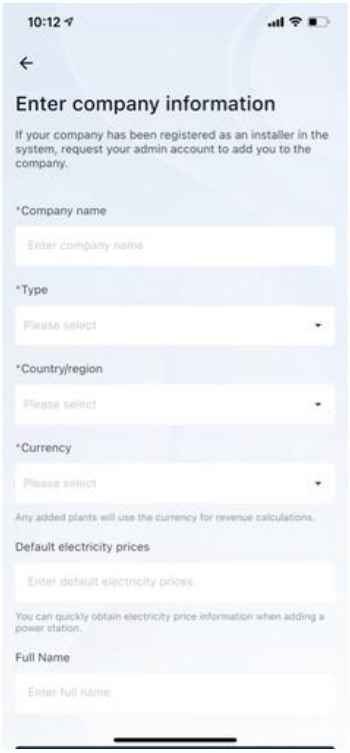
6.2 Registration and Login

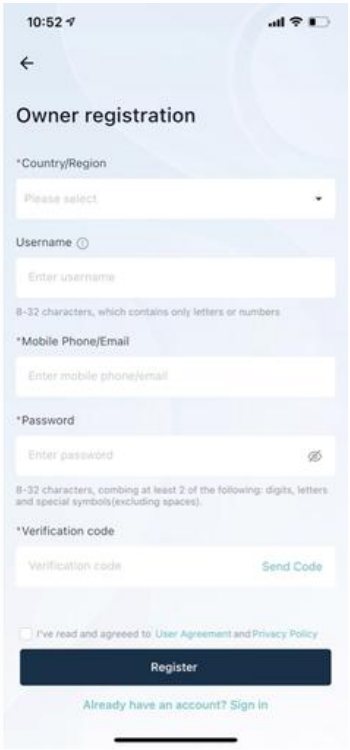
Please follow the prompts, enter your mobile phone number or email account correctly and verify it. After passing the verification, complete the business information.









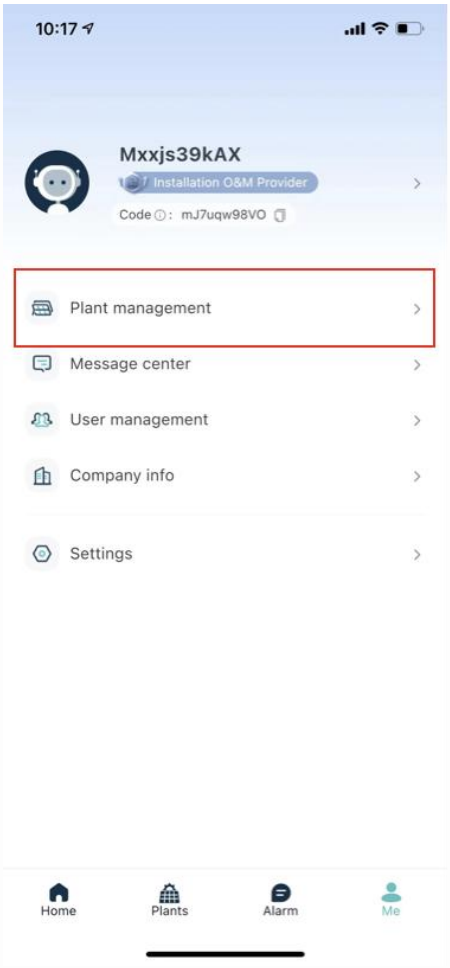


6.3 Create a Power Station

Step 1: Enter the power station addition page

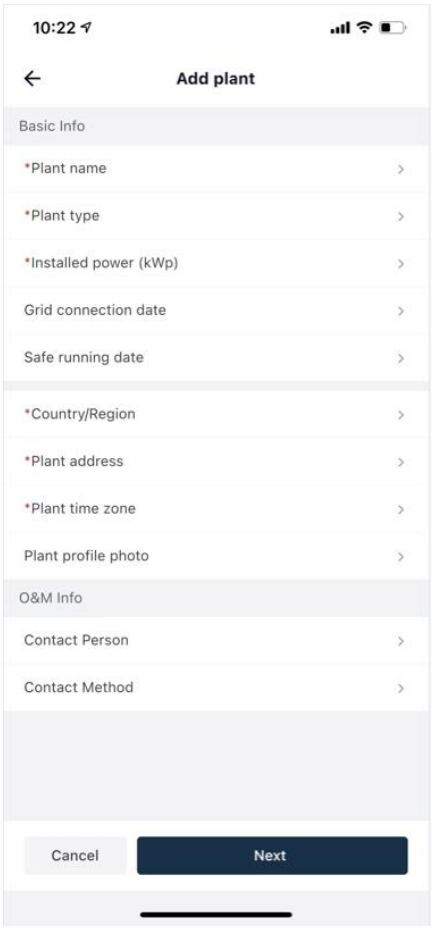
Log in to the account you just created, and gradually click [Me] - [Plant Management]

- [+] to enter the power station addition page.



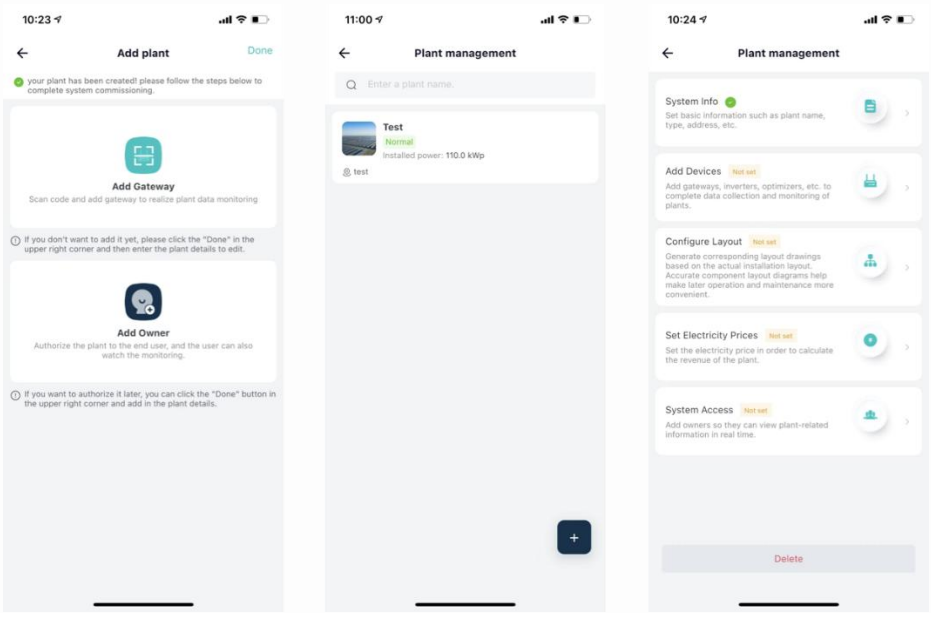
Step 2: Improve the power station information

1) Please follow the prompts to improve the basic information of the power station: the name of the power station, the location of the power station, the area, the address, the installed power, etc. The fields indicated with an asterisk are required, and the more complete the rest of the information is, the better it is for you to manage the power station.



2) After completing the power station information, please click the [Next] button at the bottom of the page to complete the creation, and the system will enter the interface of Figure 1 below.

- You can directly add devices and authorized users on the Power Station Creation Success page in Figure 1, or click the [Done] button in the upper right corner to skip device binding and authorization first.
- Later, you can also directly in the power station management list interface (Figure 2 below), click the power station name to enter the main interface of the power station editor (Figure 3) to complete and supplement the information.

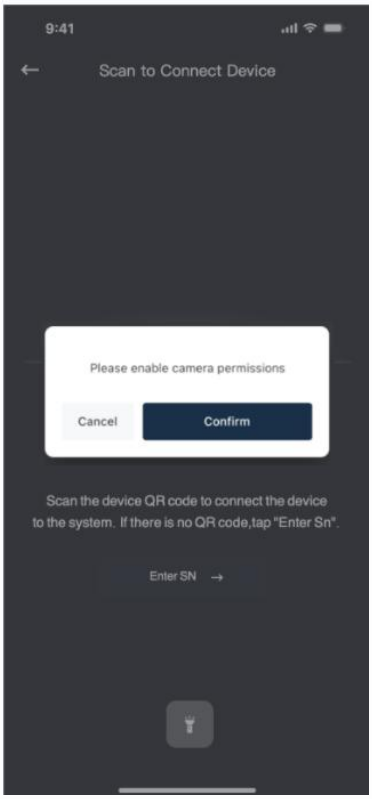


Step 3: Configure the gateway

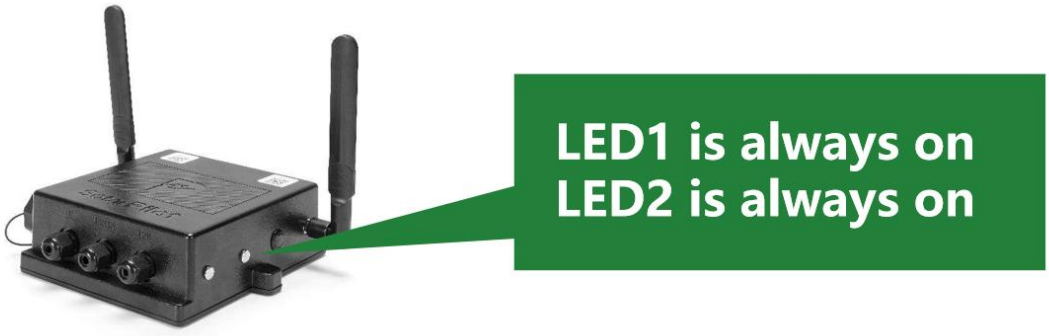
The SP1 gateway provides two modes: wired distribution network and AP distribution network, which can be flexibly selected according to the on-site environment.

- Wired distribution network

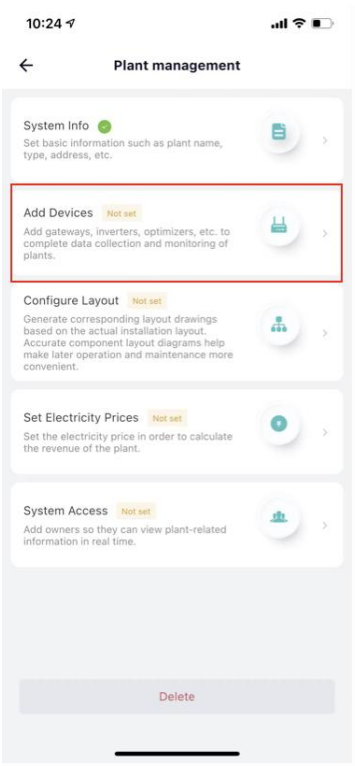
1) Enable the camera permission of the mobile phone: Click [Add Gateway] on the power station creation successfully completed page or click [Add Devices] on the main interface of power station editing, and the system will enter the code scanning interface.When using it for the first time, the page prompts that the permission of camera needs to be enabled, which is convenient for you to scan the code for identification.

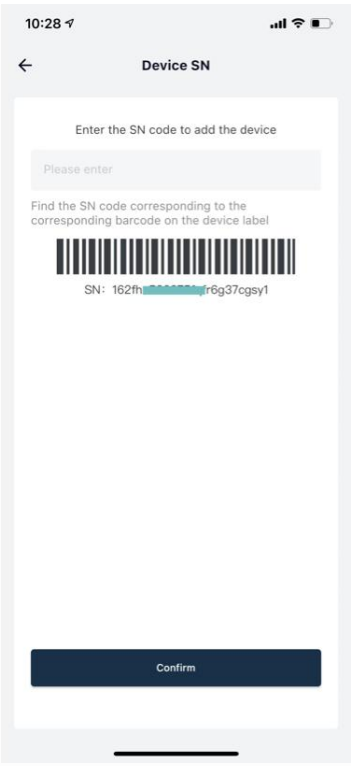


2) Reset the device: Connect the power supply, connect to the router via the Ethernet cable, and confirm that the indicators are as expected: LED1 and LED2 are always on.



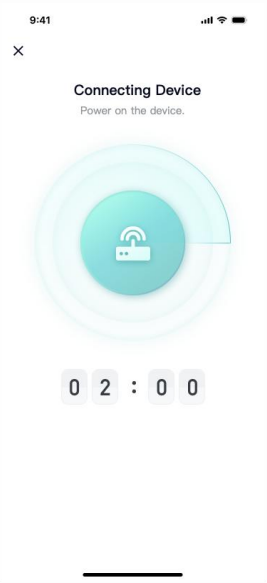
3) After completing the authorization and confirming that the device is connected to the Internet, you can choose to directly scan the barcode or QR code on the device to add it, or manually enter the serial number to add it.





4) The device will enter the distribution network interface if the code is successfully scanned, and the distribution network will count down for 2 minutes.

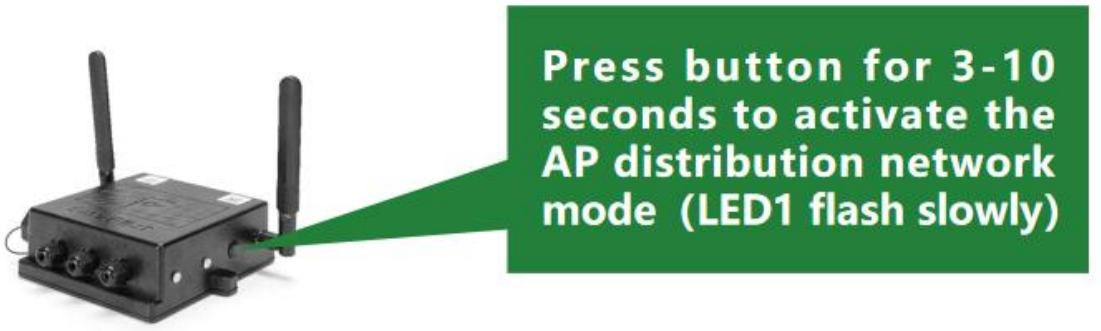
- If the addition is successful, the system will enter the distribution network success interface . You can set the device name in the current interface. After setting the name, click the [Done] button to enter the main interface of the gateway.
- If the gateway fails to be added, the system will enter the distribution network failure interface. Please check the device and network conditions. And the network distribution can be performed again after the device is reset.



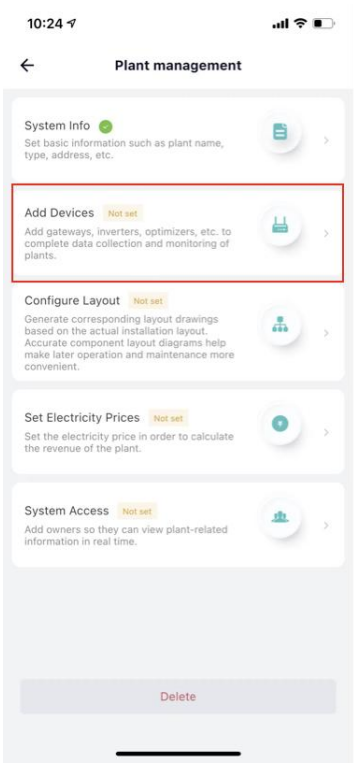
- AP distribution network

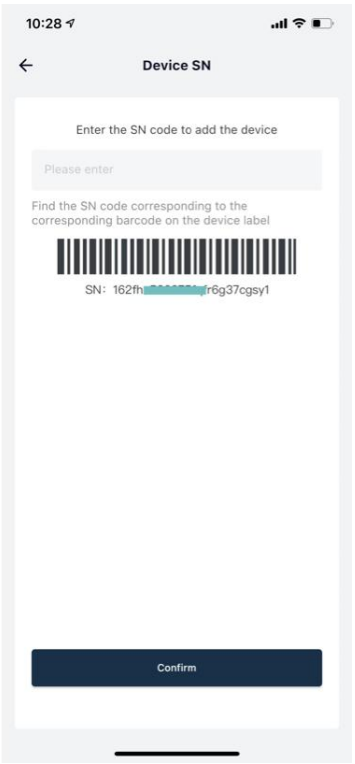
Please use 2.4G Wi-Fi for configuration in all the following network distribution processes. 5G Wi-Fi is not currently supported.

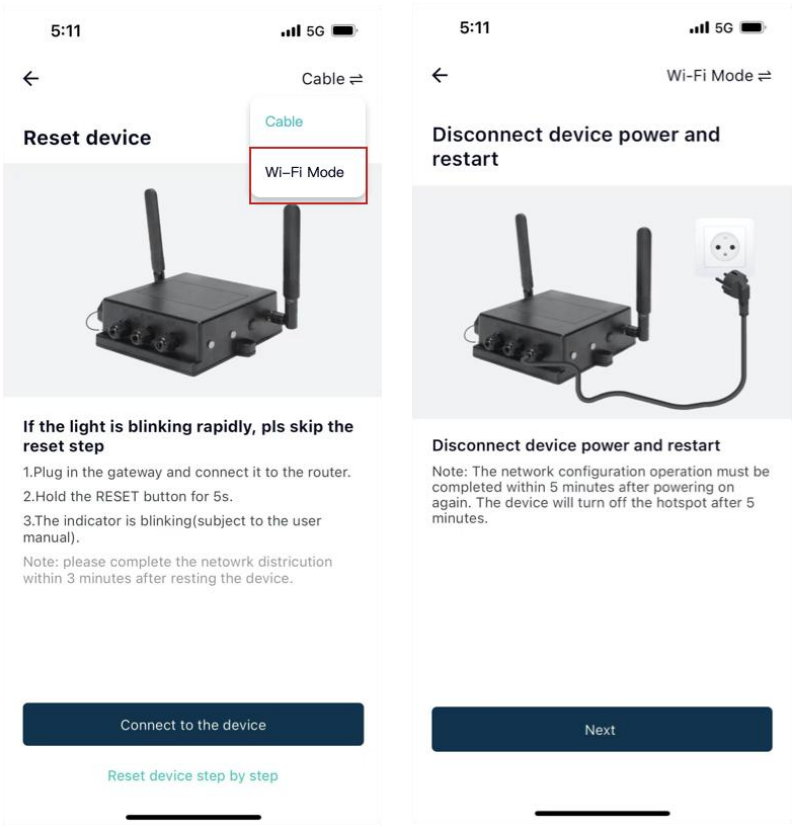
1) Press button for 3-10 seconds to activate the AP distribution network mode. After success, LED1 will flash slowly.



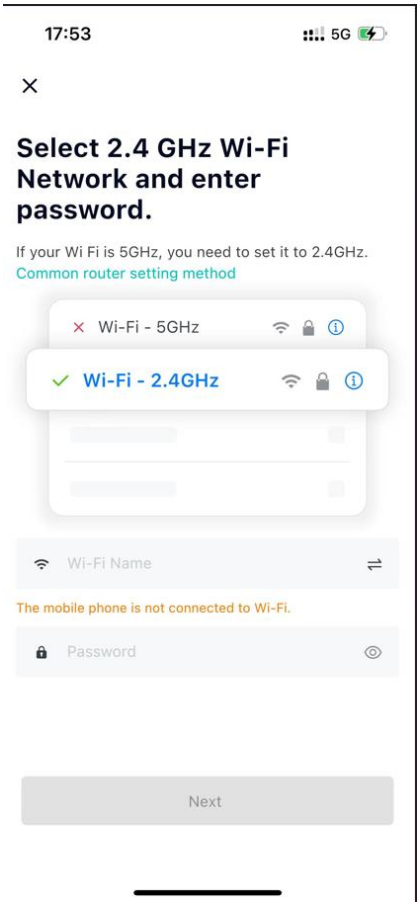
2) Enter the power station configuration device interface, select [Add Devices], and scan or enter the SN of the gateway to be configured. After finding the corresponding device, switch to Wi-Fi Mode as shown below.



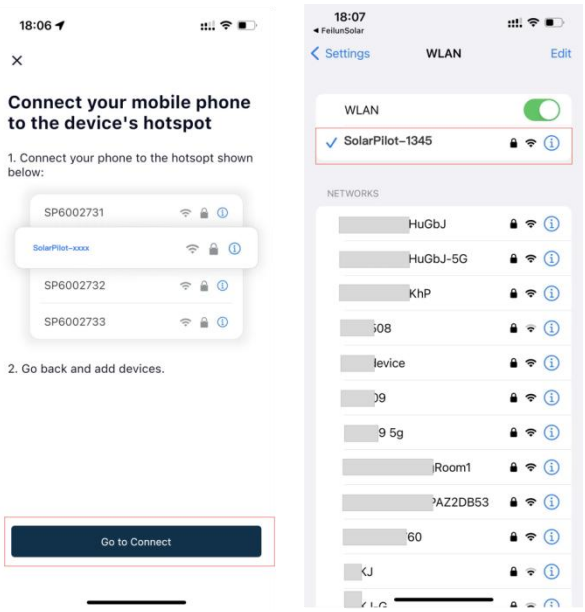




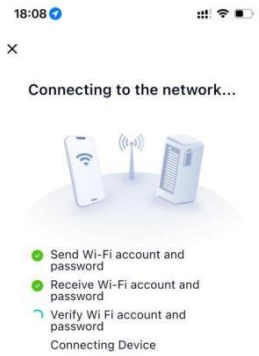
3) Please make sure your phone is connected to the 2.4G Wi-Fi, consistent with the network displayed on the page, and enter the password for that network. After completing the input and confirming that the information is correct, click the [Next] button.



4) According to the instructions on the page, you now need to connect your phone to the network "SolarPilot_XXXXXX". Please click the [Go to Connect] button and connect to this network in the "WLAN" page of the phone system. After successful connection, please return to the SolarPilot APP.



5) Wait for the configuration to complete.



If the page prompts that the configuration fails, please check and try again according to the following possible reasons

1.Make sure your phone's WLAN is turned on

2.Confirm that the Wi-Fi network can access the Internet normally

3.Ensure that the wireless router does not enable the black and white list

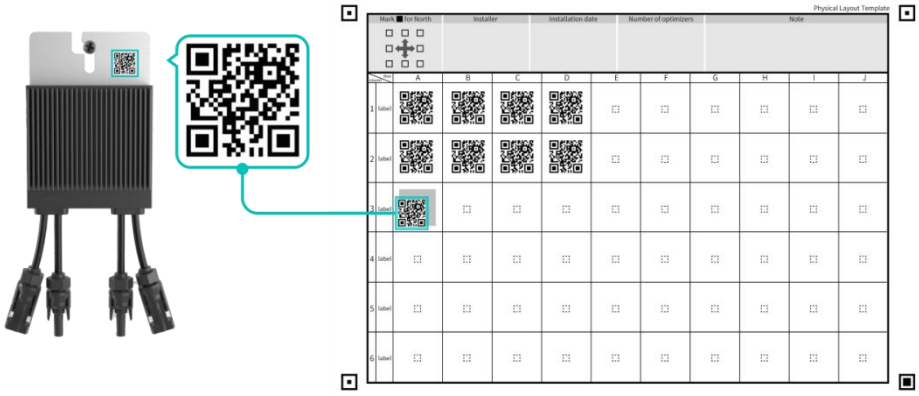
4.Try to shorten the distance between your phone and device

5.Try connecting to another Wi-Fi network to reconfigure the network

6.Try removing special characters such as (, ; ‘’= “” `) from the Wi-Fi network name

6.4 Add Layout

1. After determining the optimizer installation location, remove the SN label from the optimizer and stick it on the physical layout template.



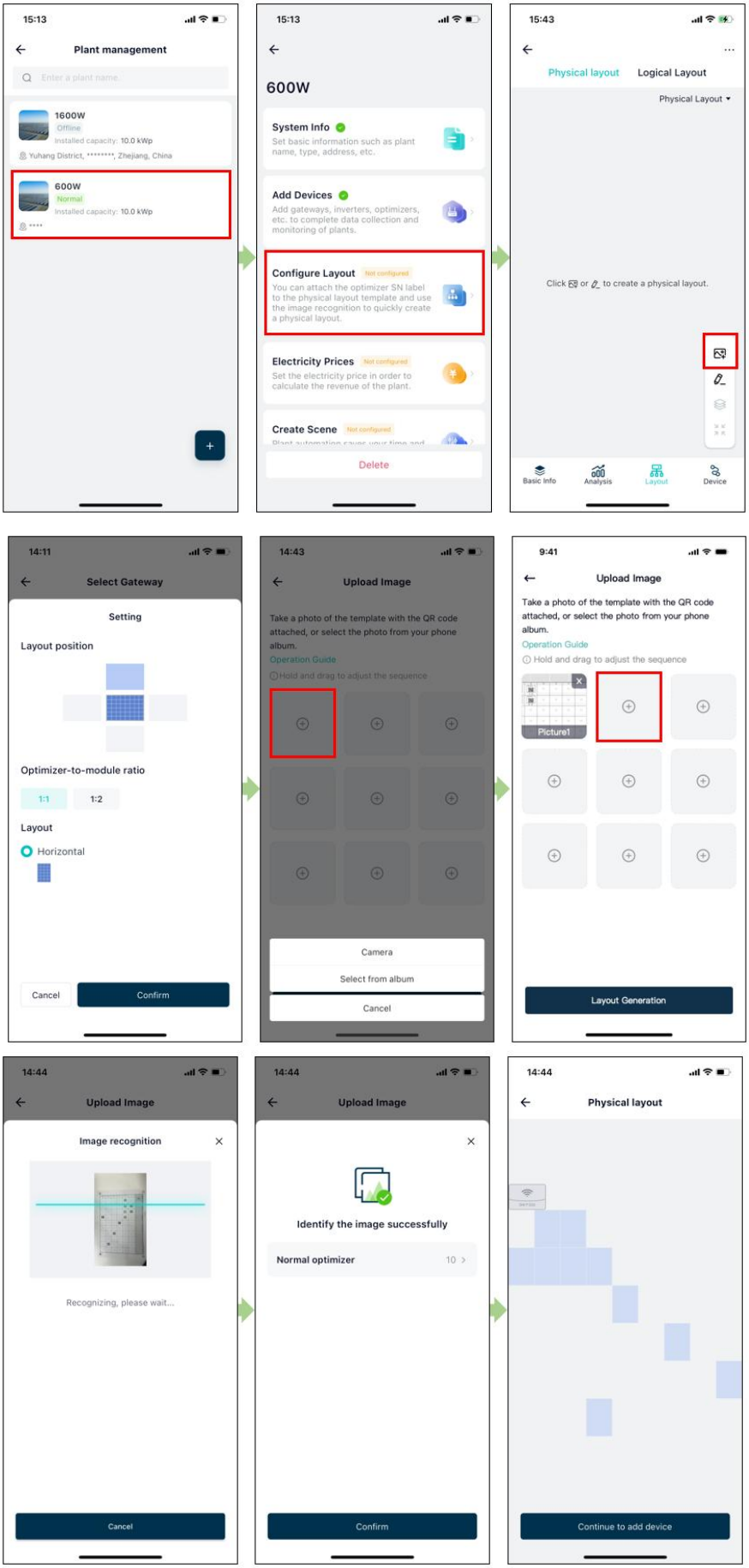
NOTE

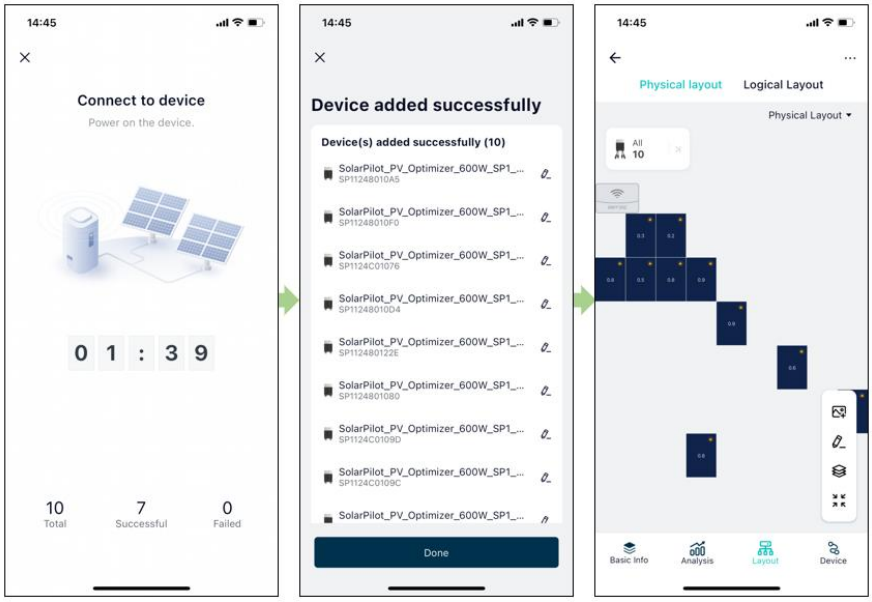
When pasting a QR code, the following principles must be followed, otherwise the optimizer will fail to recognize the QR code.

- Please stick the QR code flatly in the center of the frame without blocking the border;
- Multiple QR codes must not block or cover each other;
- When taking pictures, face the paper directly and ensure that the paper is flat, with the paper area accounting for more than 50% of the entire image area, and the background is a solid color to avoid QR code reflection;
- When taking pictures with a mobile phone, the shooting range needs to cover the entire layout card, that is, including the 4 positioning squares around the layout card.

2. Select the gateway to which the optimizer needs to be configured, then use the camera to take a photo of the template with the QR code just pasted on it, and follow the instructions in the figure below to complete the optimizer layout generation.

   Note: A gateway can have a maximum of 50 optimizers


15:13
Plant management
Enter a plant name.
1600W
Offline
Installed capacity: 10.0 kWp
Yuhang District, ********, Zhejiang, China
600W
Normal
Installed capacity: 10.0 kWp
15:13
600W
System Info
Set basic information such as plant name, type, address, etc.
Add Devices
Add gateways, inverters, optimizers, etc. to complete data collection and monitoring of plants.
Configure Layout
Not configured
You can attach the optimizer SN label to the physical layout template and use the image recognition to quickly create a physical layout.
Electricity Prices
Not configured
Set the electricity price in order to calculate the revenue of the plant.
Create Scene
Not configured
Delete
15:43
Physical layout
Logical Layout
Physical Layout
Click or to create a physical layout.
Basic Info
Analysis
Layout
Device
14:11
Select Gateway
Setting
Layout position
Optimizer-to-module ratio
1:1
1:2
Layout
Horizontal
Cancel
Confirm
14:43
Upload Image
Take a photo of the template with the QR code attached, or select the photo from your phone album.
Operation Guide
Hold and drag to adjust the sequence
Camera
Select from album
Cancel
9:41
Upload Image
Take a photo of the template with the QR code attached, or select the photo from your phone album.
Operation Guide
Hold and drag to adjust the sequence
Picture1
Layout Generation
14:44
Upload Image
Image recognition
Recognizing, please wait...
Cancel
14:44
Upload Image
Identify the image successfully
Normal optimizer
10
Confirm
14:44
Physical layout
Continue to add device


14:45
Connect to device
Power on the device.
0 1 : 3 9
10
Total
7
Successful
0
Failed
14:45
Device added successfully
Device(s) added successfully (10)
Done
14:45
Physical layout
Logical Layout
Physical Layout
All
10
Basic Info
Analysis
Layout
Device

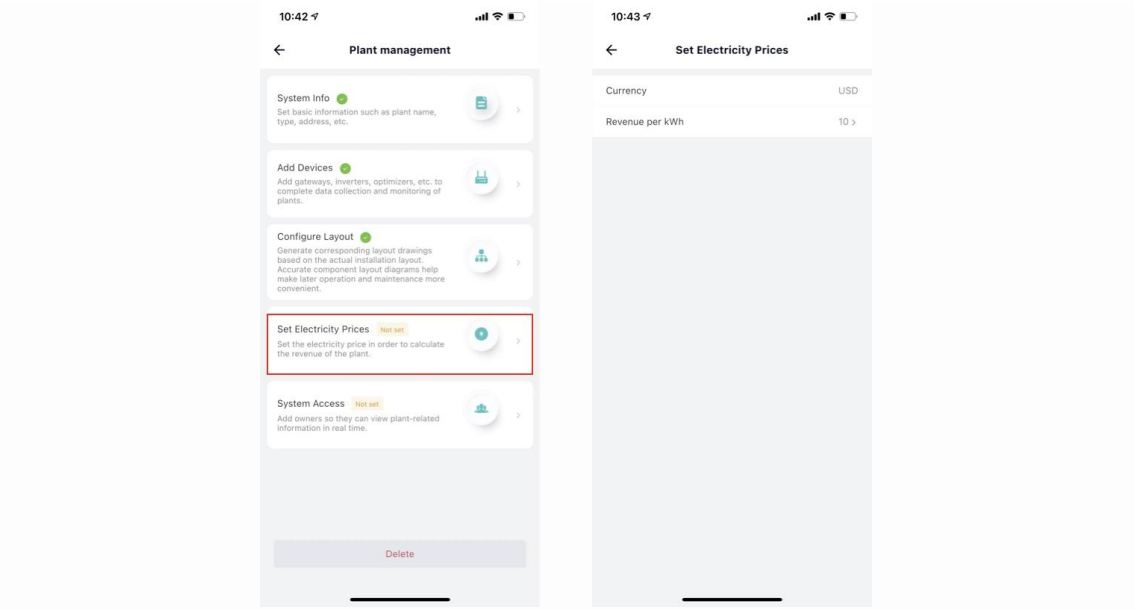
6.5 Improve the information

Improve the electricity revenue, owner information, etc. to facilitate better operation and maintenance of photovoltaic power stations.

Not required, if not used, you can ignore the following steps.

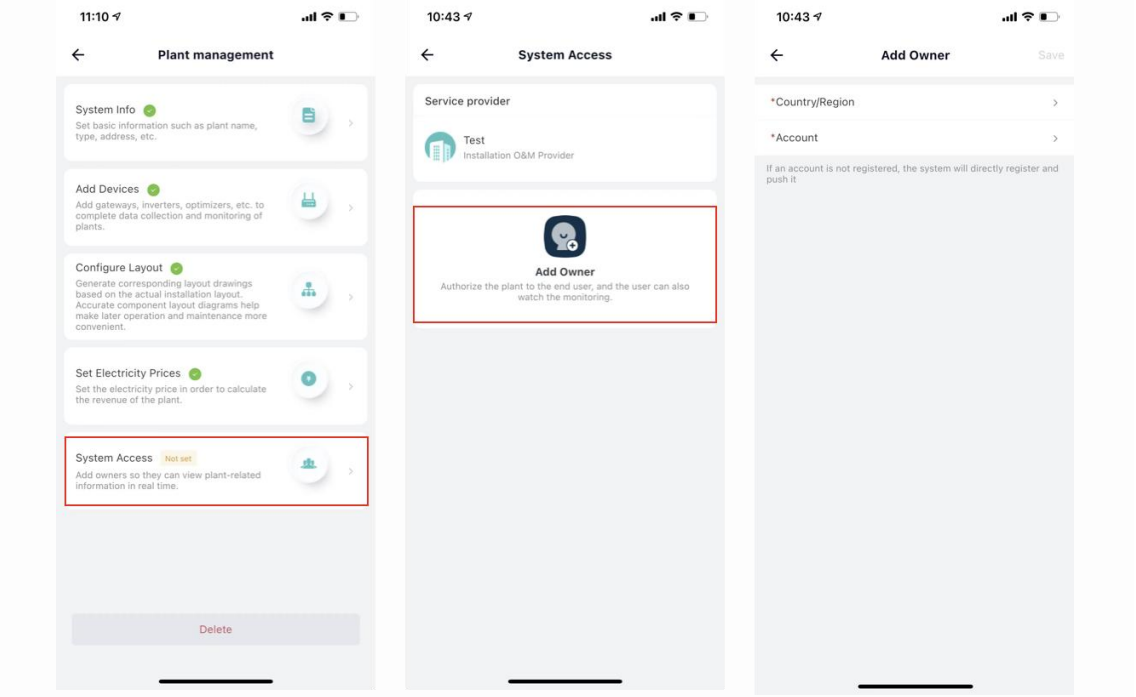
6.5.1 Set electricity price

Enter the revenue per kilowatt hour, and the system will calculate the revenue of the entire power station according to the unit price set here.



6.5.2 Add owner

Enter the owner account number and user name to complete the authorization operation of the power station.



7 Practice Running

NOTICE

- All cables and accessories are connected properly and securely.
- The cables are reasonably distributed and well protected without mechanical damage.
- The vacant terminals are sealed.
- All safety signs and warning labels are firmly affixed and clearly visible.

7.1 Practice Running Steps

Step 1: Turn the DC switch on the inverter to "ON".

Step 2: If there is an AC switch between the inverter and the power grid, close the switch.

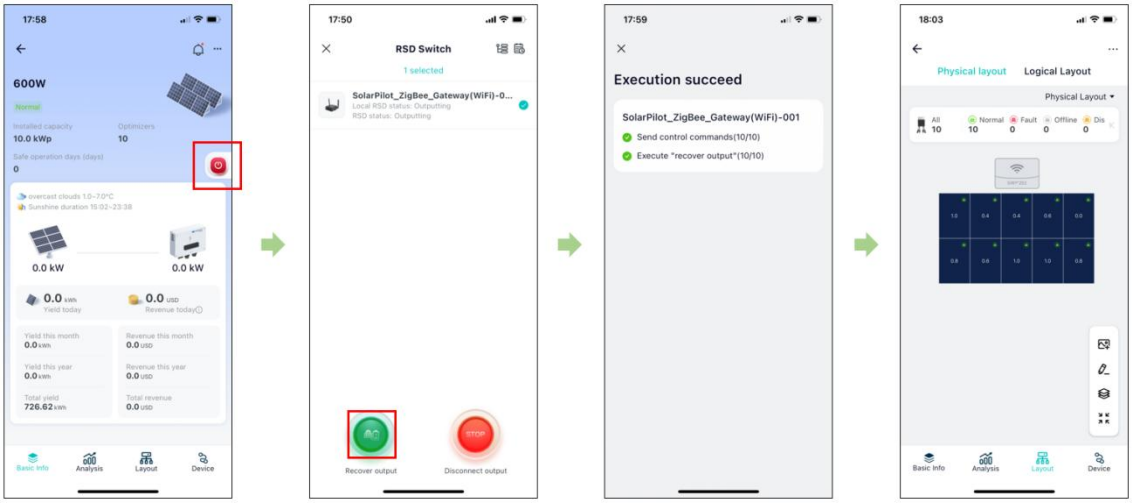
Step 3: If DC switch is provided between the inverter and the photovoltaic string, close the switch.

Step 4: When the irradiance is adequate and the grid conditions meet the grid requirements, the power station will operate normally.

7.2 Execute Recover 0utput(Very Important)

The optimizer works in RSD mode by default and needs to recover output.

Otherwise the PV system will work abnormally.



8 Replace faulty gateway

NOTICE

- Please use special insulation tools, wear insulated shoes and insulated gloves before operating.
- Prepare the new Zigbee gateway.
- Prepare your phone with SolarPilot app.

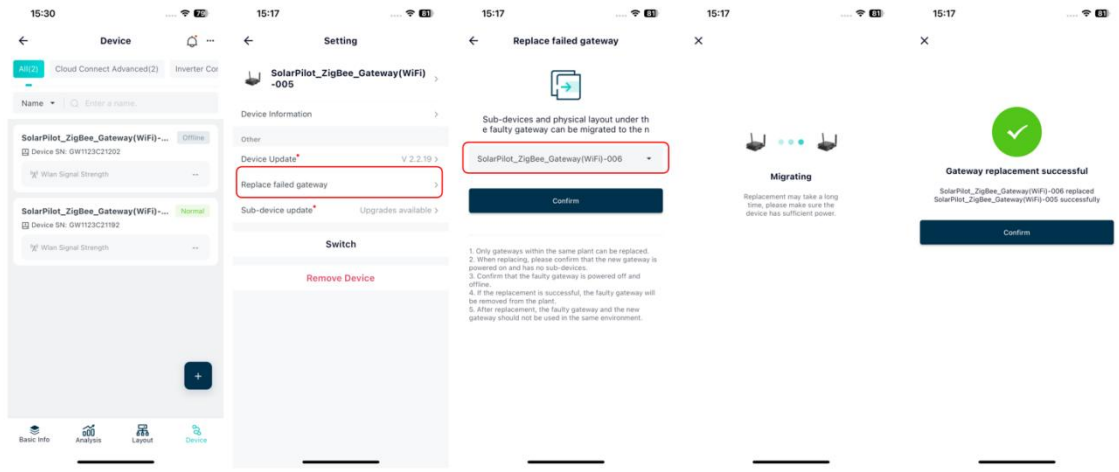
1) Power off the faulty gateway and disconnect it from the Internet;

2) Power on the new gateway and connect it to the Internet;

3) Use the APP to add the new gateway to the corresponding power station;

4) Use the APP to complete the gateway replacement process, as shown in the figure below;

5) Check whether the optimizer is online and reporting data normally.



9 Technical Parameters

Communicate with Optimizer	
Communication Type	Zigbee(2.4G)
Max. data transmission distance	30m(indoor), 50m(outdoor)
Max. number of connected devices	50 pcs optimizers
Expandable Connection	
RSD button control mode	I/O(Dry Contact)
RS485 connection	COMx1, 9600bps, Modbus-RTU
Communicate with Cloud Computing Platform	
Wired internet access	RJ45x1, 100Mbps
Wireless internet access	Wi-Fi(2.4G)
The number of antennas	2

Data sampling interval	1min (I/V/P) / 5min / 15 min
Configured Components	
Button	Button x 1
Indicator light	LED x 2
Monitoring APP	SolarPilot Energy
General Parameters	
Dimension	181mm*163mm*51mm
Net Weight	≤200g
Ingress Protection	IP 65
Storage temperature	-40℃ ~ 70℃
Operating temperature	-20℃ ~ 55℃
Operating humidity	5% ~ 95%
Operating altitude	≤2000m
Power supply	DC 12V
Power consumption	≤10W
Installation method	Wall-mounted
Compatible optimizers	SP1, SP2, SP3 series
Others	
Compliance Standard	CE, RoHS, RED
Recommended scenarios	Residential & small commercial solar plant

If you have technical querise concerning our products,

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