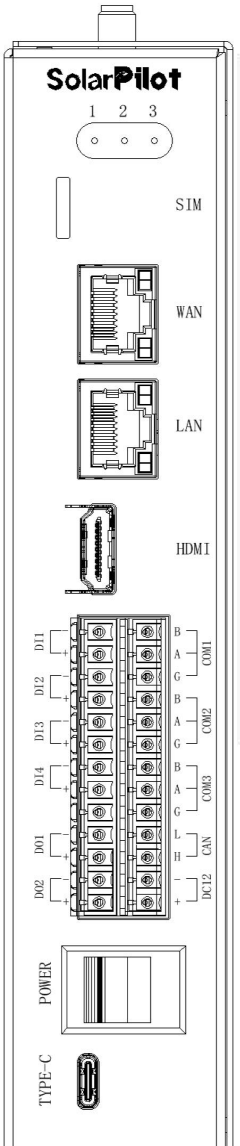
SolarPilot

# Wi-SUN Gateway

## SP4-WiSUN-GW-N/G

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 Wi-SUN 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:

Wi-SUN Gateway (Standard Version:SP4-WiSUN-GW-N / 4G Version:SP4-WiSUN-GW-G)

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

SolarPilot

# Directory

# 1 Introduction

## 1.1 Product Introduction

SP4-WiSUN-GW series products are SolarPilot Data Acquisition products. They use a Wi-SUN wireless solution to collect information and data from on-site optimizers and send data to SolarPilot Cloud Computing Platform through Ethernet or 4G communication.

Through SP4-WiSUN-GW, 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.

SP4-WiSUN-GW is used with SP4 series optimizers or SP5 series RSD.

## 1.2 Product Features

**1)Flexible and stable**

Data upload supports Ethernet or 4G 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**

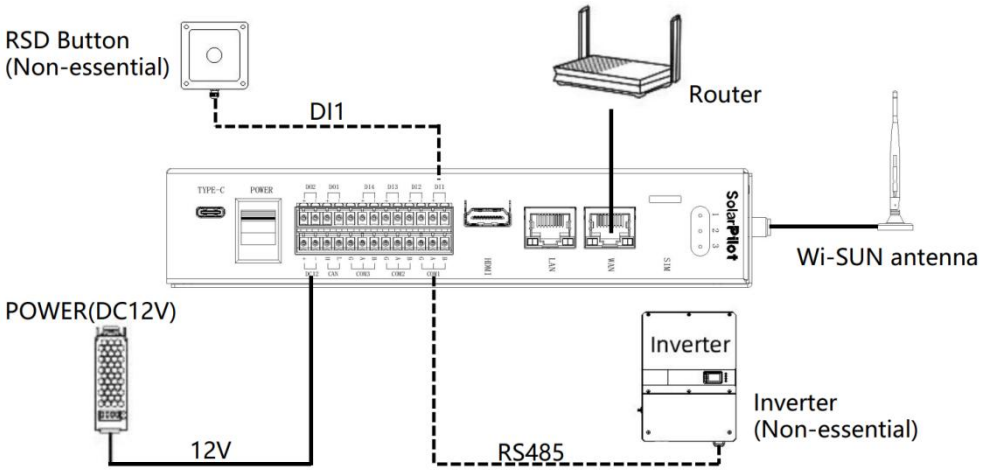
Module parameters are collected every 60 seconds for real-time anomaly analysis.

**4)Quick shutdown**

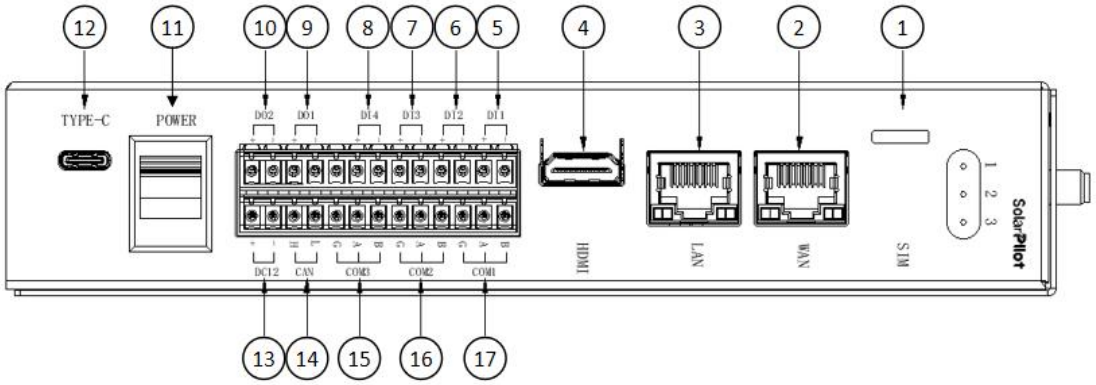
Quick shutdown can be achieved through local buttons or apps.

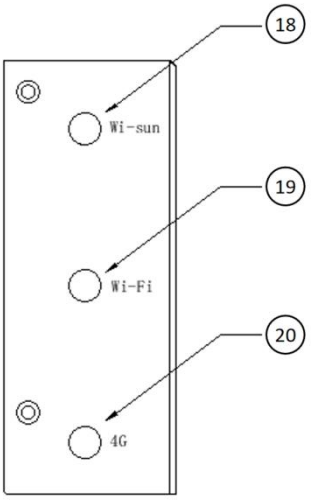
# 2 Topology

## 2.1 Gateway Topology



## 2.2 Interface location

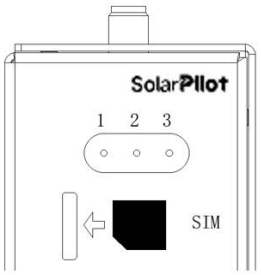



| | | | |
|---|---|---|---|
| 1 | Nano SIM card socket | 2 | WAN |
| 3 | LAN | 4 | HDMI |
| 5 | DI1 | 6 | DI2 |
| 7 | DI3 | 8 | DI4 |
| 9 | DO1 | 10 | DO2 |
| 11 | Power Switch | 12 | USB Type-c |
| 13 | DC12 | 14 | CAN |
| 15 | COM3 | 16 | COM2 |
| 17 | COM1 | 18 | Wi-SUN antenna SMA connector |
| 19 | Wi-Fi antenna SMA connector | 20 | 4G antenna SMA connector |

## 2.3 Interface description

■ 1. Nano SIM card socket: SP4-WiSUN-GW-G supports 4G. Both 4G cards and IoT cards can be used, pay attention to the direction when inserting, and the direction of the Nano SIM card is shown in figure below.




■ 2. WAN: Gigabit network interface, connected to a switch or router through a network cable to provide network services for the device.

■ 3. LAN: 100M network interface, can be connected to external devices, such as cameras, etc., if not in use, it can be left floating.

■ 4. HDMI: Supports 1080P@60fps video output and can be connected to an external monitor. If not in use, it can be left floating.

■ 5. DI1: Dry contact signal input 1, the default function is the local RSD control interface, an external RSD control button can be connected. The button needs to be a self-locking type. Pressing the button triggers the RSD function, and all optimizers turn off the output.If not in use, it can be left floating.

■ 6-8. DI2-4: Dry contact signal input 2-4, can connect to third-party devices.If not in use, it can be left floating.

■ 9-10.DO1-2: Signal output interface 1-2, providing 5V voltage, can be used to connect external indicator lights or relays. If not in use, it can be left floating.

■ 11. Power Switch: It is closed by default and needs to be opened after the gateway wiring is completed.

■ 12. USB Type-c: Debug interface, not open to customers.

■ 13. DC12: Power supply interface, 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.

■ 14. CAN: CAN interface, which can be connected to external devices. If not in use, it can be left floating.

■ 15-17. COM3-1: RS485 interface, which can be connected to external RS485 devices, such as inverters, weather stations, etc.If not in use, it can be left floating.

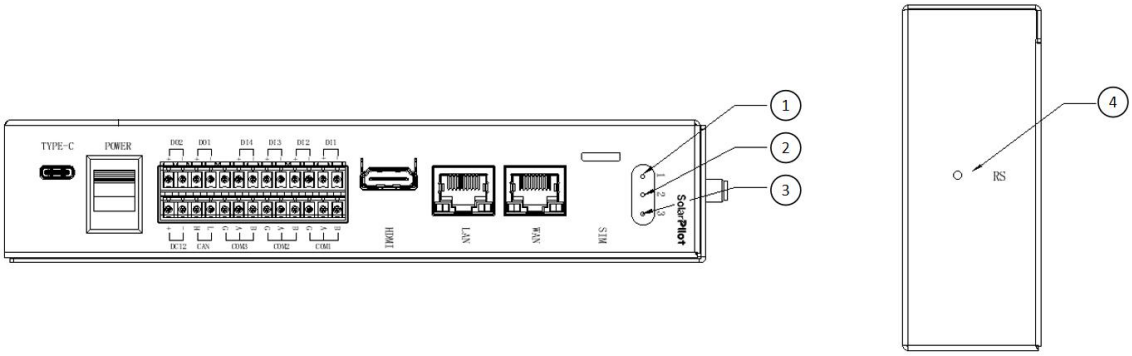
■ 18. Wi-SUN antenna SMA connector: Connect the built-in Wi-SUN antenna and install it in place, otherwise it will affect the communication of the device.

■ 19. Wi-Fi antenna SMA connector: reserved Wi-Fi antenna, does not need to be connected to the antenna and can be left floating.

■ 20. 4G antenna SMA connector: Connect the built-in 4G antenna and install it in place, otherwise it will affect the communication of the device (Only for 4G version).

# 3 Button and indicator lights

## 3.1 Button and indicator lights position




| No. | Name | Description |
|---|---|---|
| 1 | LED1 | Power LED |
| 2 | LED2 | Network LED |
| 3 | LED3 | DATA LED |
| 4 | RS Button | Reset button |

## 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 ＜10 seconds | No Action |
| Long press for ≥10 seconds | Reset to factory settings |

### 3.2.2 LED1 Instructions

| LED STATUS | Gateway Status |
|---|---|
| Always off | Abnormal power supply |
| Always on | Normal power supply |

### 3.2.3 LED2 Instructions

| LED STATUS | Gateway Status |
|---|---|
| Always off | Abnormal network |
| Flashing | Normal network, gateway is not activated |
| Always on | Normal network, gateway is activated |

### 3.2.4 LED3 Instructions

| LED STATUS | Gateway Status |
|---|---|
| Always off | Data transfer service is disabled |
| Always on | Data transfer service is enabled |

# 4 Unpacking and storage

## 4.1 Unpacking and inspection

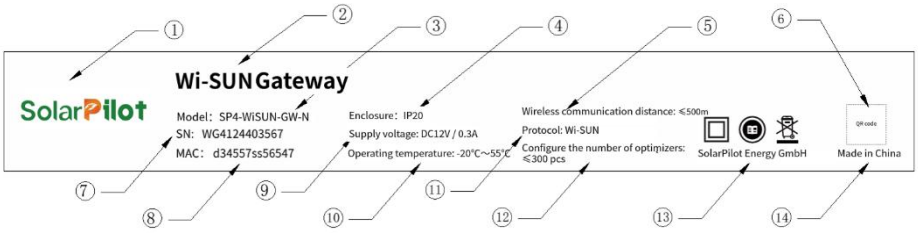
The gateway has been fully tested and strictly inspected before leaving the factory, but there may still be damage during transportation. Please conduct a detailed inspection before signing for the product.

- 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

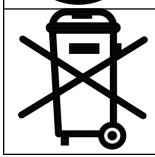
The back of the gateway is pasted with a nameplate. The nameplate provides the model information of the gateway, as well as the most important parameters and certification marks.



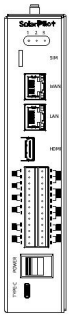
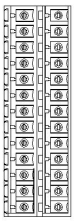
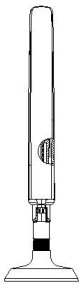

| Serial Number | Explanation |
|---|---|
| 1 | SolarPilot trademark |
| 2 | Product name |
| 3 | Model specification |
| 4 | Ingress protection Level |
| 5 | Product communication distance |
| 6 | Product SN QR code |

| | |
|---|---|
| 7 | Product SN code |
| 8 | MAC address |
| 9 | Power supply |
| 10 | Operating temperature range |
| 11 | Communication method |
| 12 | Number of sub-devices |
| 13 | Nameplate |
| 14 | Place of origin |

**Nameplate identification instructions**

| | |
|---|---|
|  | Read the instruction |
|  | WEEE recycling logo |

## 4.3 Scope of supply

| | | |
|---|---|---|
|  |  |  |
| Gateway×1 | Terminal block×1 | Wi-SUN Antenna×1 |
|  |  |  |
| 4G Antenna×1<br><br>(only for 4G version) | Quick installation manual×1 | Certificate×1 |

## 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 0~ 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

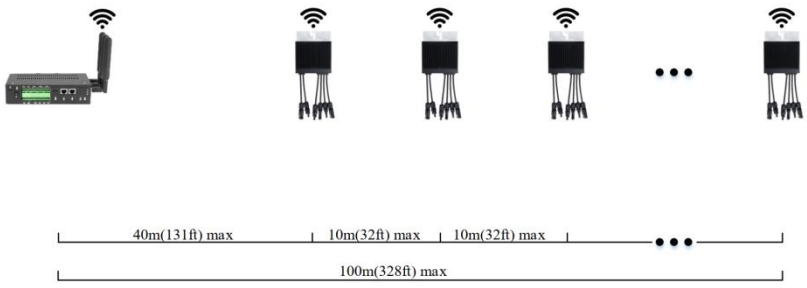
Before installing the gateway, you need to prepare the following materials in advance:

- 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 Wi-SUN, the location relationship between devices should be reasonably planned:

In the absence of obstructions, the maximum distance between the SP4 gateway and the nearest PV optimizer should not exceed 40m (131ft), and the maximum distance to the farthest PV optimizer should not exceed 100m(328ft), 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 1:300 between SP4 gateway and SP4 PV optimizer, the optimal installation layout is shown in Fig.5-1:

All PV panels are installed with SP4 PV optimizers, the SP4 gateway is placed at the center of the PV array, and the PV array radius does not exceed 100m (328ft), that is, each SP4 PV optimizer is within the communication coverage of the SP4 gateway.

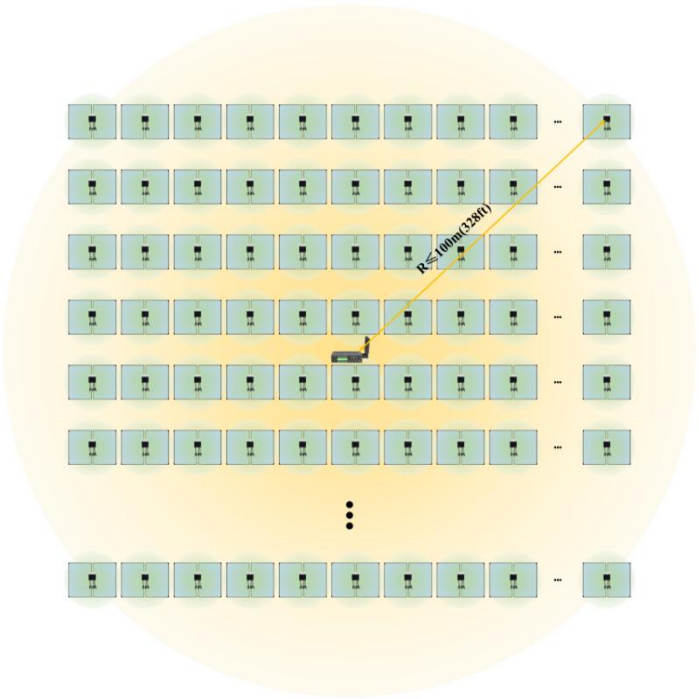



Fig.5-1 Recommended Layout of Gateway and PV Optimizer (1:300)

## 5.2.2 General location of Gateway and PV Optimizer

If the on-site environment does not support the above recommended layout, for example, the PV array is not a complete rectangular array, the installation location of the SP4 gateway and the SP4 PV optimizer should follow the following general principles, as shown in Fig.5-2:

The maximum distance between the SP4 gateway and the nearest PV optimizer should not exceed 40m (131ft), and the maximum distance to the farthest PV optimizer should not exceed 100m(328ft), the maximum distance between PV optimizers should not exceed 10m (32ft).

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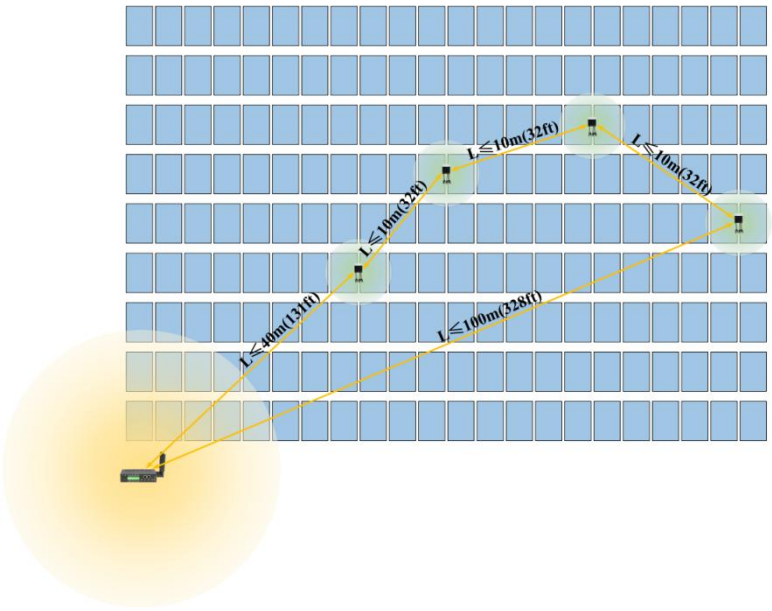


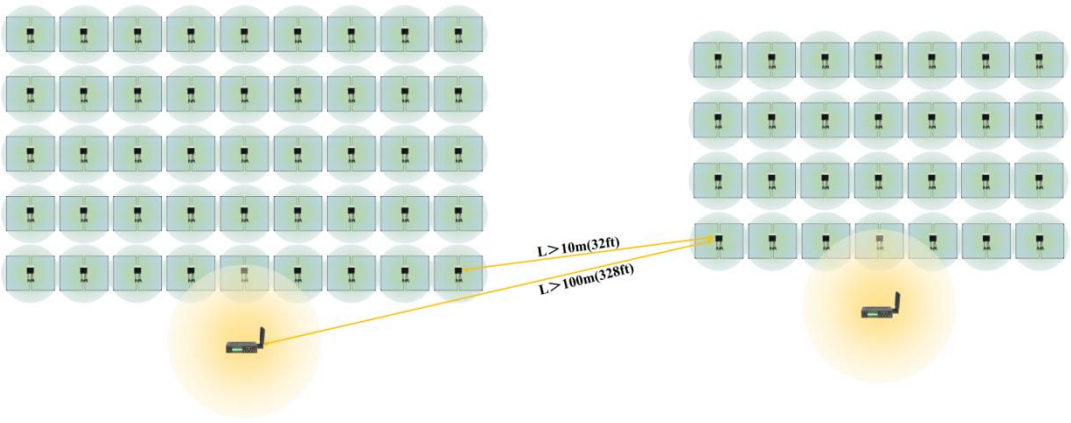

Fig.5-2 General location of SP4 gateway and SP4 PV optimizer

### 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 Wi-SUN communication.

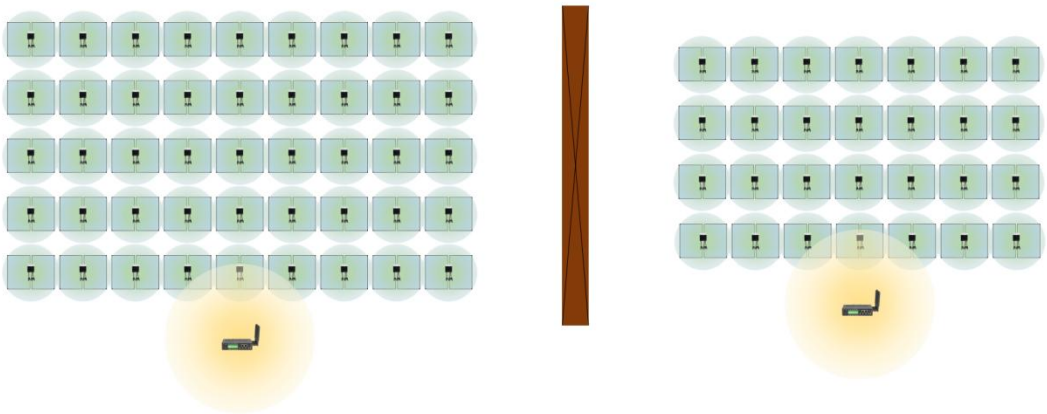
- The gap between PV arrays

If the gap between PV array A and PV array B is greater than 10m(32ft), and the distance between the PV optimizer in array B and the SP4 gateway is greater than 100m(328ft), 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, 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

Connect cables through the terminal block according to the screen printing on the shell.

1） Connect to DC12V power supply;

2） Connect to router;

3） Connect to Inverter RS485 (If not needed, you can leave it unconnected);

4） Connect to quick break button (If not needed, you can leave it unconnected).

## 5.4 Install Gateway

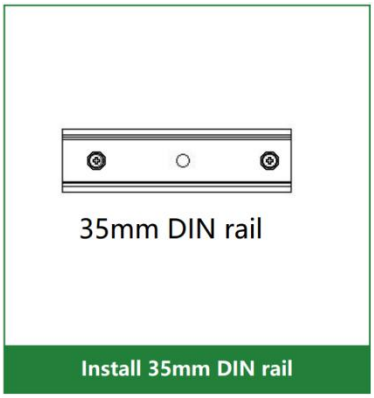
Since only supports IP20 level, the gateway needs to be installed in a box, such as a distribution box. In addition, rail installation is recommended.

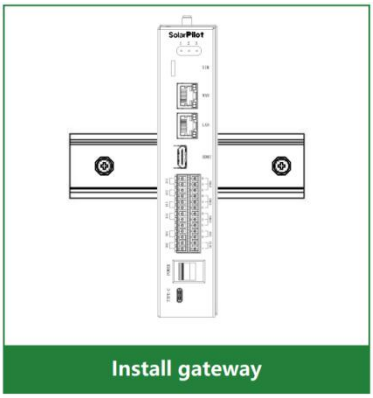
1）Install rail, rail specification is 35mm DIN, length can be customized;

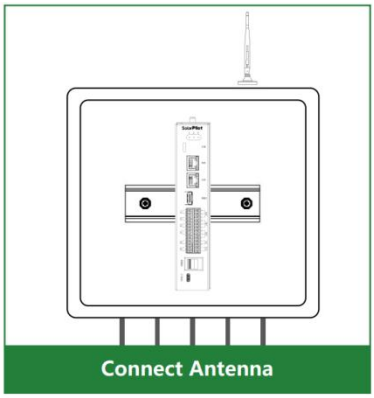
2）Install the gateway by snap-on;

3）Connect the Wi-SUN Antenna、4G Antenna(only for 4G Version).

Note that the antenna should be placed outside the combiner box, not enclosed in a metal shell, and away from other wireless devices. Otherwise it will affect the communication of the device.



## 5.5 Installation instructions

When installing the gateway, you need to pay attention to the following points, otherwise it may cause device failure or affect device communication.

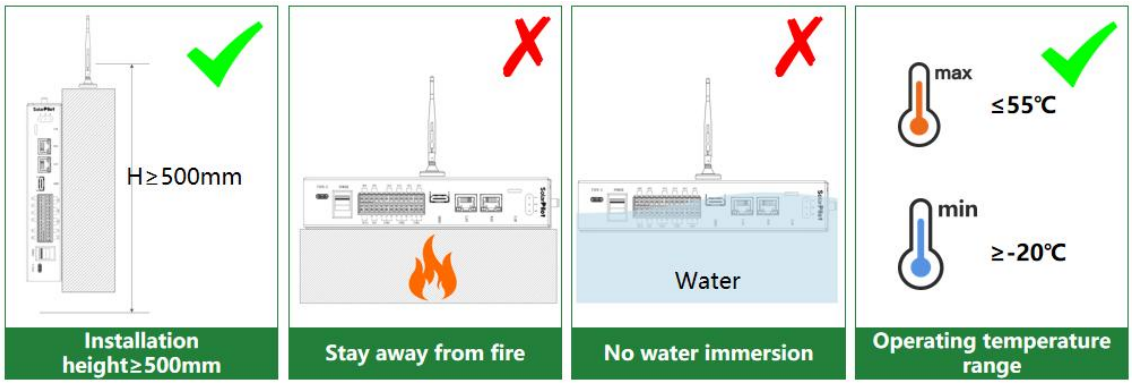
1) The antenna installation height needs to be greater than 500mm, otherwise it will affect device communication.

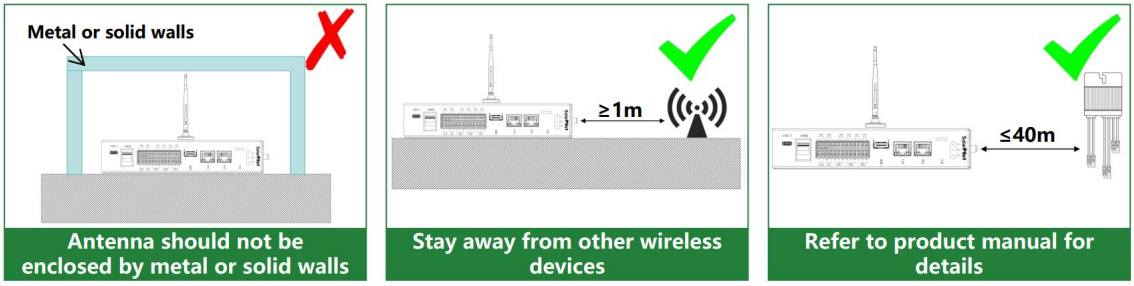
2) The gateway needs to be kept away from fire or other high-temperature equipment, otherwise it will cause device failure.

3) The gateway is strictly prohibited from being soaked in water, otherwise it will cause device failure.

4) The antenna should be placed outside the combiner box, not enclosed in a metal shell, and away from other wireless devices, otherwise it will affect device communication.

5) The installation locations of the gateway and optimizer must follow the above principles, otherwise it will affect device communication.



# 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.

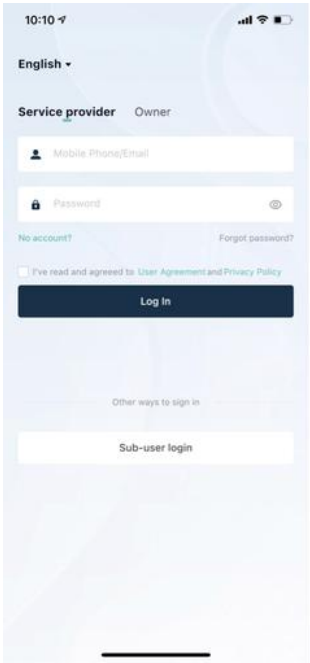
Android

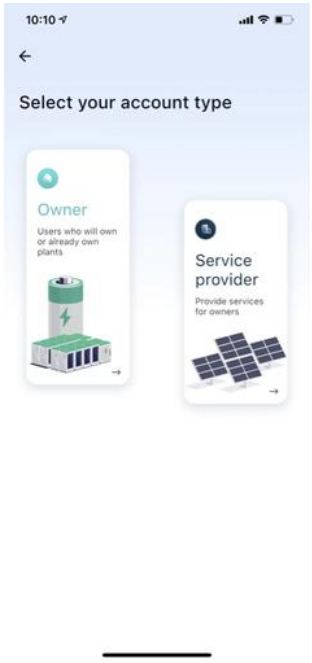
IOS

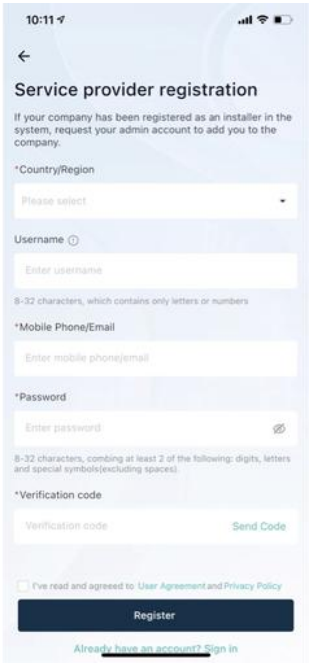
Note: When you selecting "Browser download" method. If prompted "This application is from an unofficial app store..." and other prompts during the installation process, please click "Continue installation".

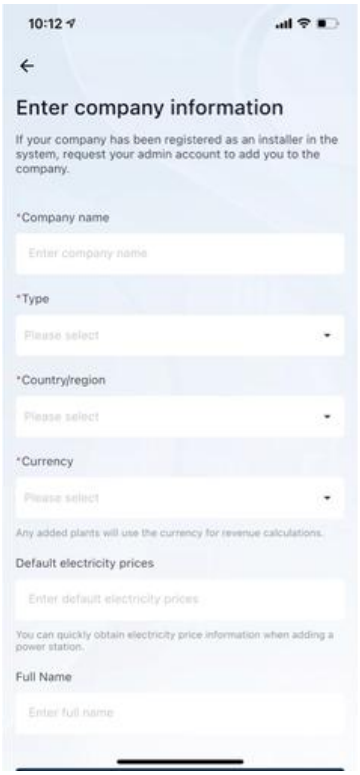
## 6.2 Registration and Login

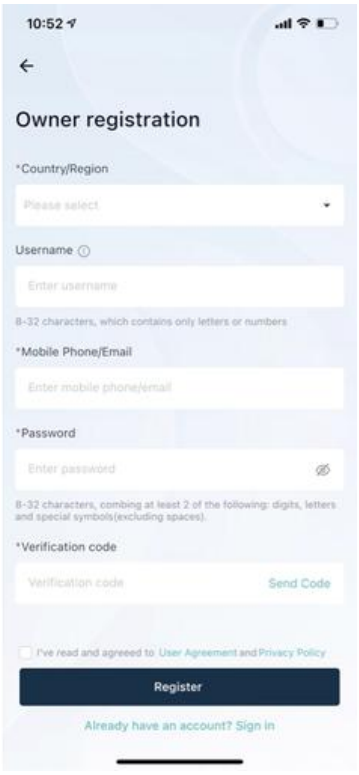
Please follow the prompts, enter your mobile phone number or email account correctly and verify it. After passing the verification, complete the business information.



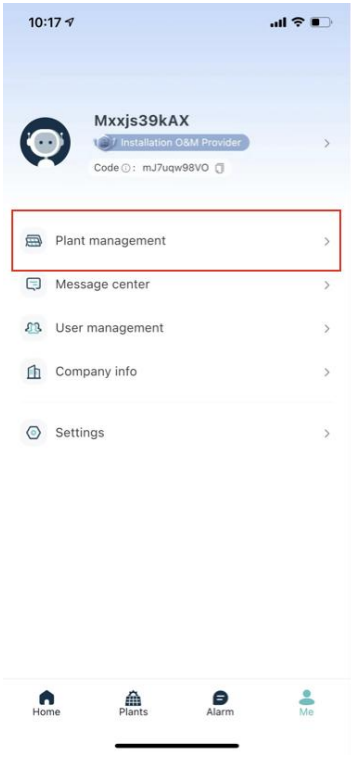


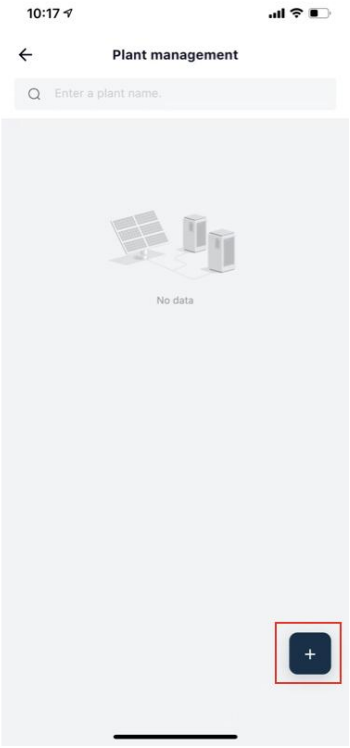




## 6.3 Create a Power Station

### Step 1: Enter the power station addition page

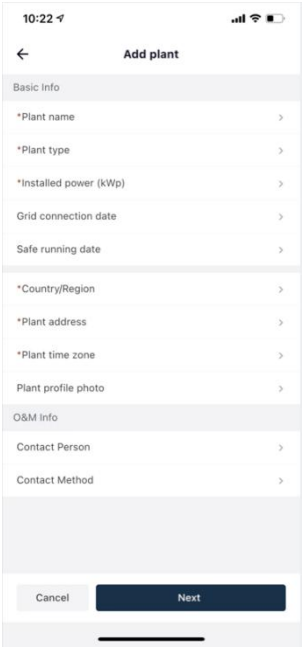
Log in to the account you just created, and click [Me] - [Plant Management] - [+] to enter the power station addition page.



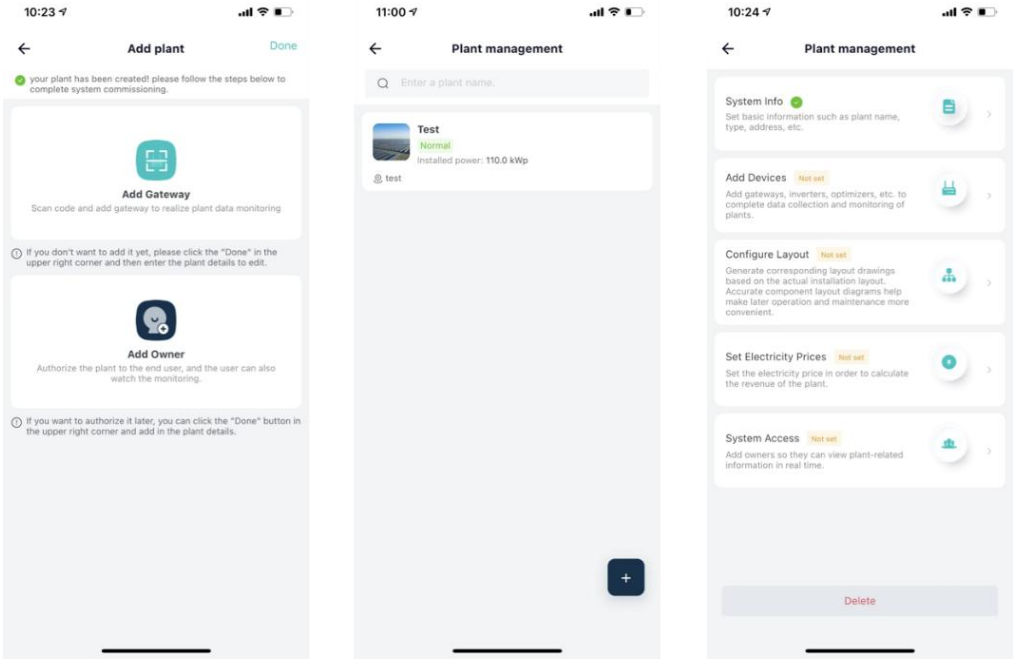
## Step 2: Improve the power station information

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.



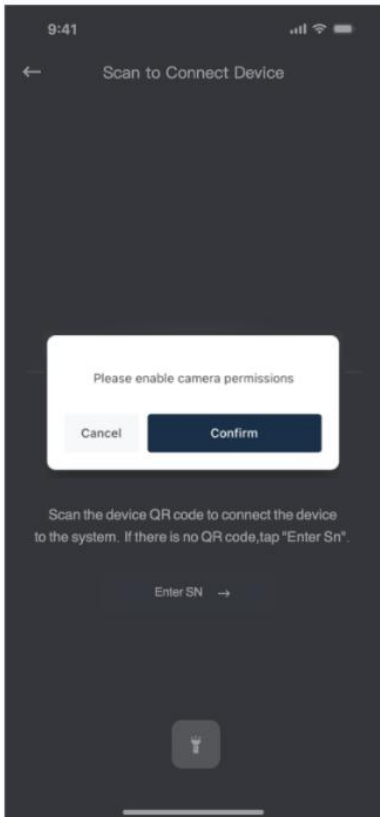

2) After completing the power station information, please click the [Next] button at the bottom of the page to complete the creation, and the system will enter the interface of Figure 1 below.

- 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.



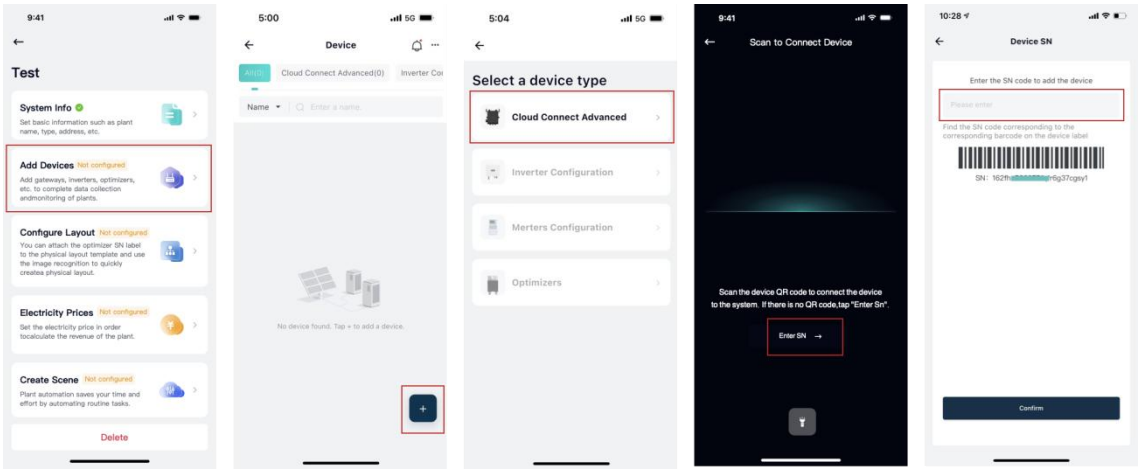
## Step 3: Configure the gateway

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.



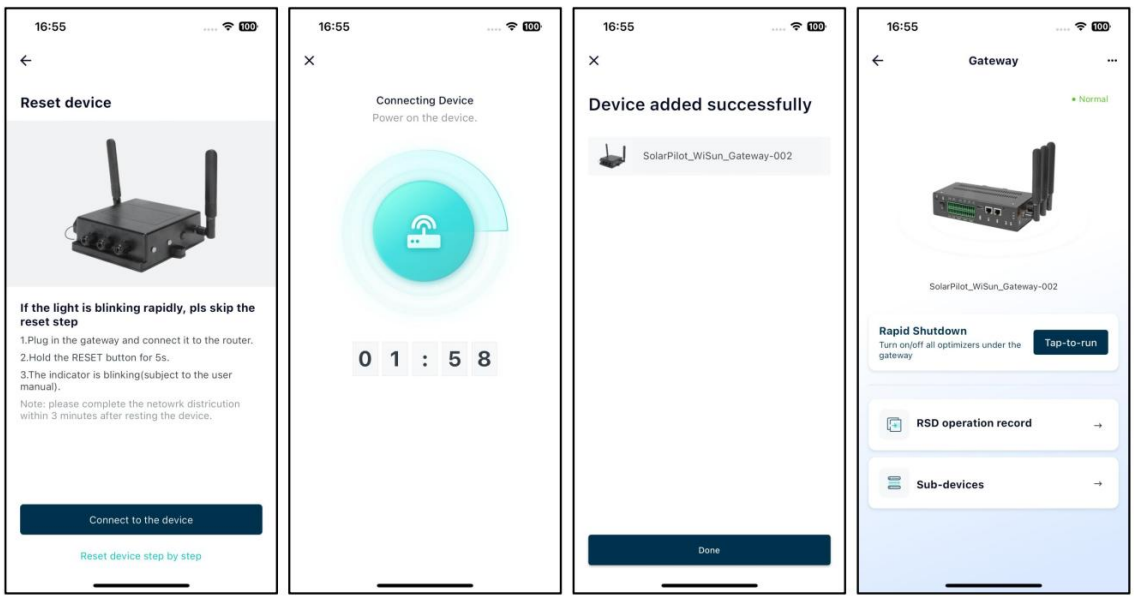

2) Reset the device: Connect the power supply, connect to the router via the Ethernet cable, and confirm that the indicators are as expected: LED1 is always on、LED2 is flashing or always on.

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.



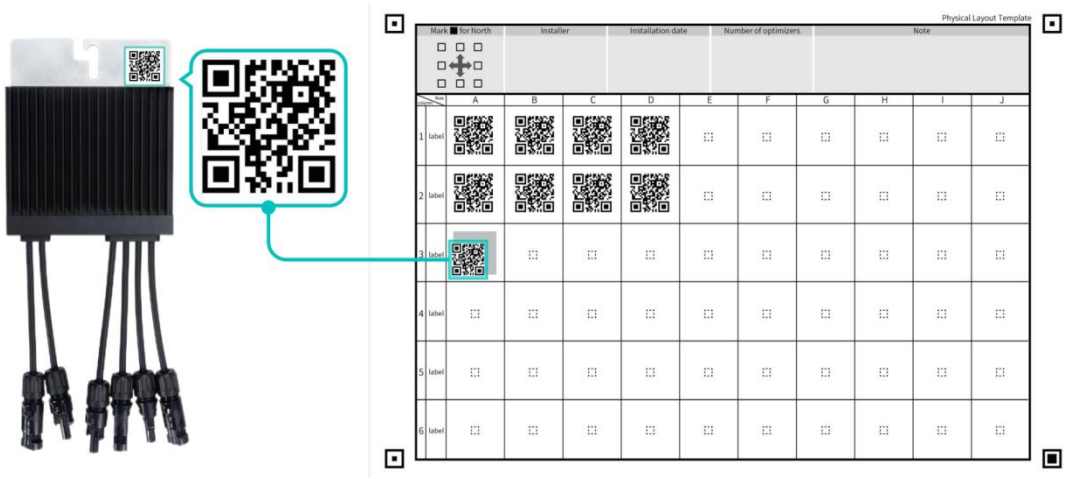

4) The device will enter the distribution network interface if the code is successfully scanned, and the distribution network will count down for 2 minutes.

- 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 [Finish] 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.



## 6.4 Add Layout

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



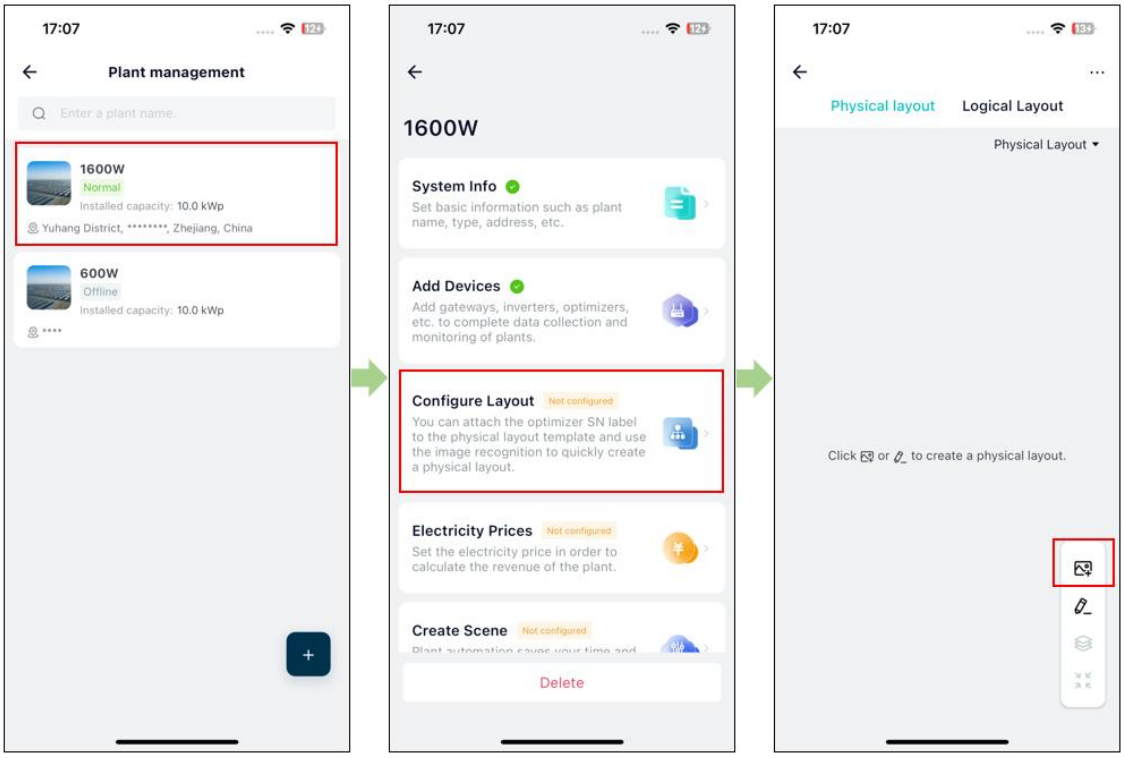

**NOTE**

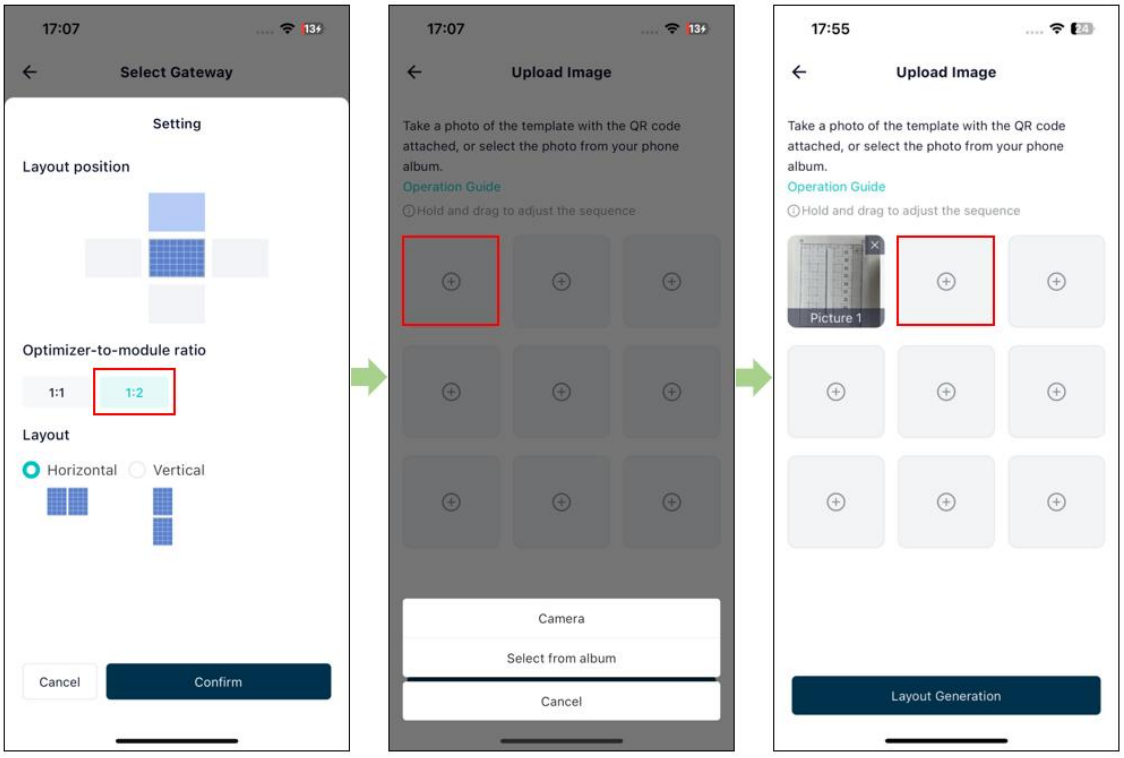
When pasting a QR code, the following principles must be followed, otherwise the optimizer will fail to recognize the QR code.

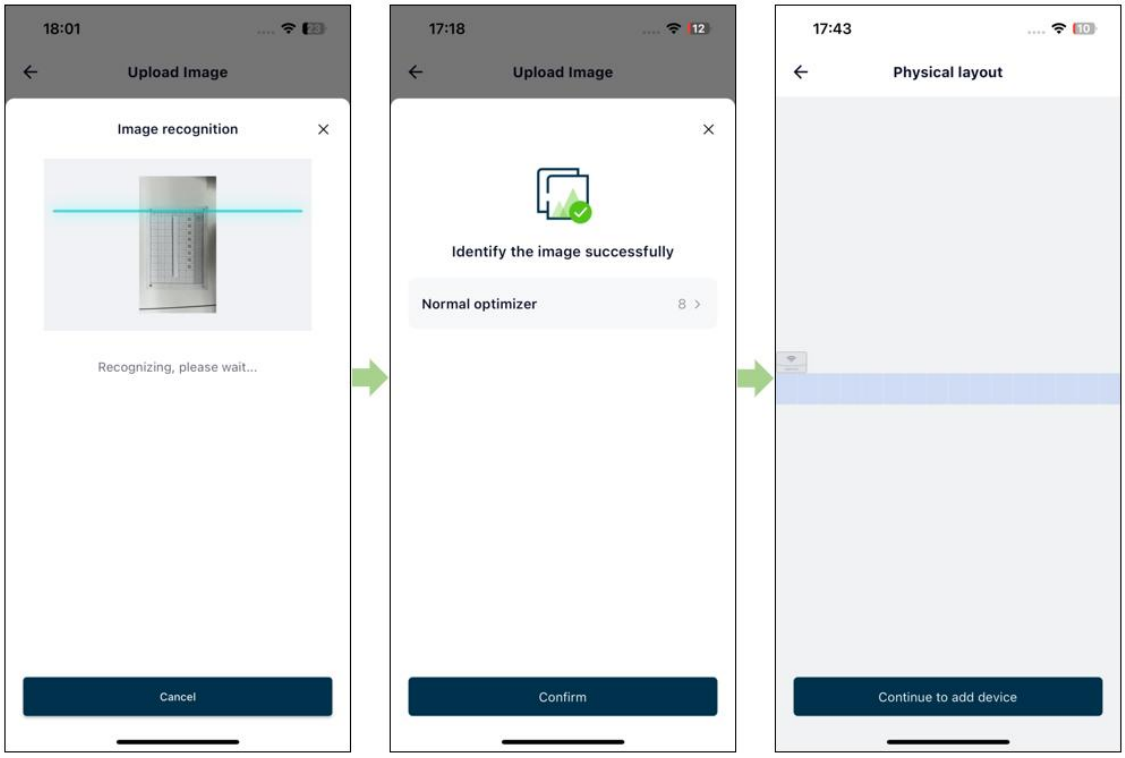
- Please stick the QR code flatly in the center of the frame without blocking the border;
- Multiple QR codes must not block or cover each other;
- When taking pictures, face the paper directly and ensure that the paper is flat, with the paper area accounting for more than 50% of the entire image area, 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.

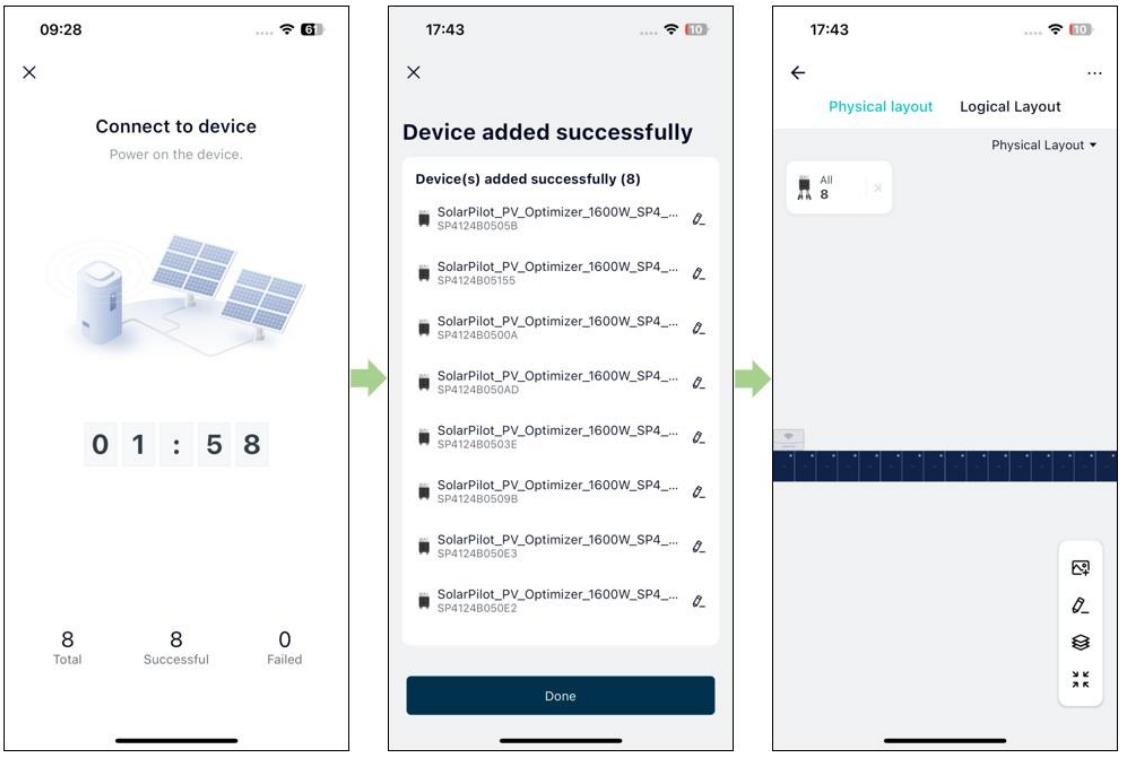
Select the gateway to which the optimizer needs to be configured, then use the camera to take a photo of the template with the QR code just pasted on it, and follow the instructions in the figure below to complete the optimizer layout generation.

Note: A Wi-SUN gateway can have a maximum of 300 optimizers


17:07
Plant management
Enter a plant name.
1600W
Normal
Installed capacity: 10.0 kWp
Yuhang District, ********, Zhejiang, China
600W
Offline
Installed capacity: 10.0 kWp
17:07
1600W
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
17:07
Physical layout
Logical Layout
Physical Layout
Click or to create a physical layout.


17:07
Select Gateway
Setting
Layout position
Optimizer-to-module ratio
1:1
1:2
Layout
Horizontal
Vertical
Cancel
Confirm
17:07
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
17:55
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
Picture 1
Layout Generation


18:01
Upload Image
Image recognition
Recognizing, please wait...
Cancel
17:18
Upload Image
Identify the image successfully
Normal optimizer
8
Confirm
17:43
Physical layout
Continue to add device


09:28
Connect to device
Power on the device.
0 1 : 5 8
8
Total
8
Successful
0
Failed
17:43
Device added successfully
Device(s) added successfully (8)
SolarPilot_PV_Optimizer_1600W_SP4_...
SP4124B0505B
SP4124B05155
SP4124B0500A
SP4124B050AD
SP4124B0503E
SP4124B0509B
SP4124B050E3
SP4124B050E2
Done
17:43
Physical layout
Logical Layout
Physical Layout
All
8

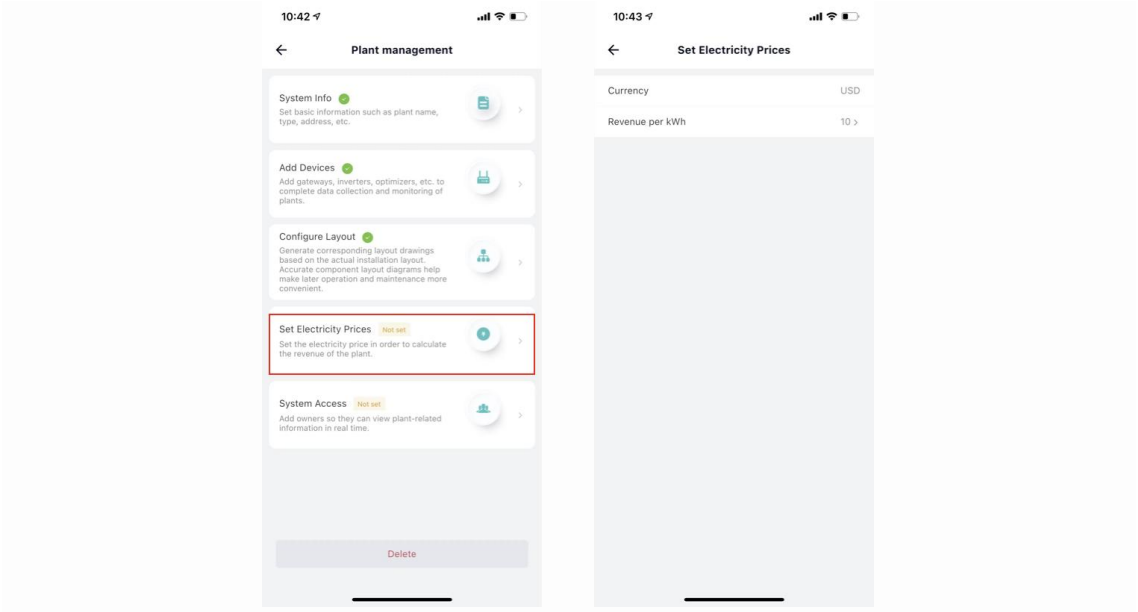
## 6.5 Improve the information

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.

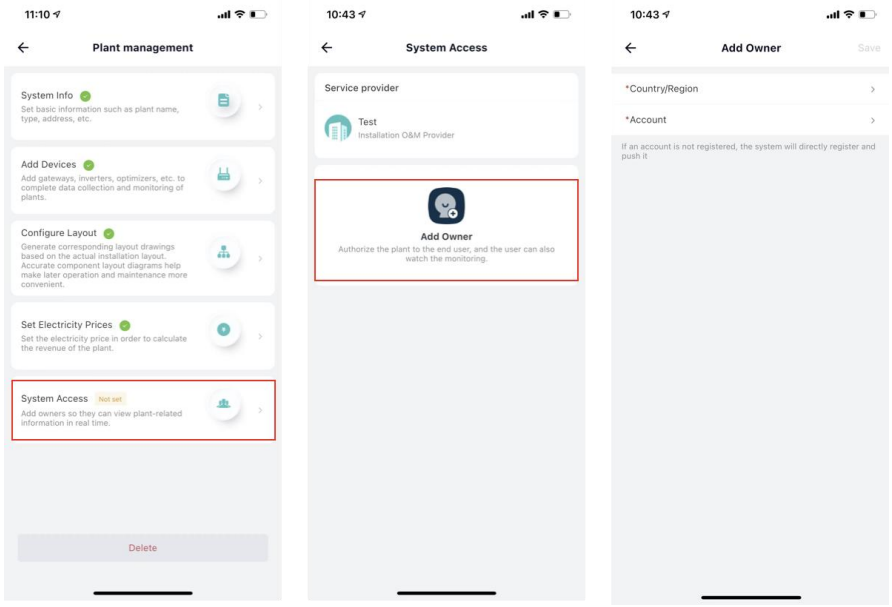
### 6.5.1 Set electricity price

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.

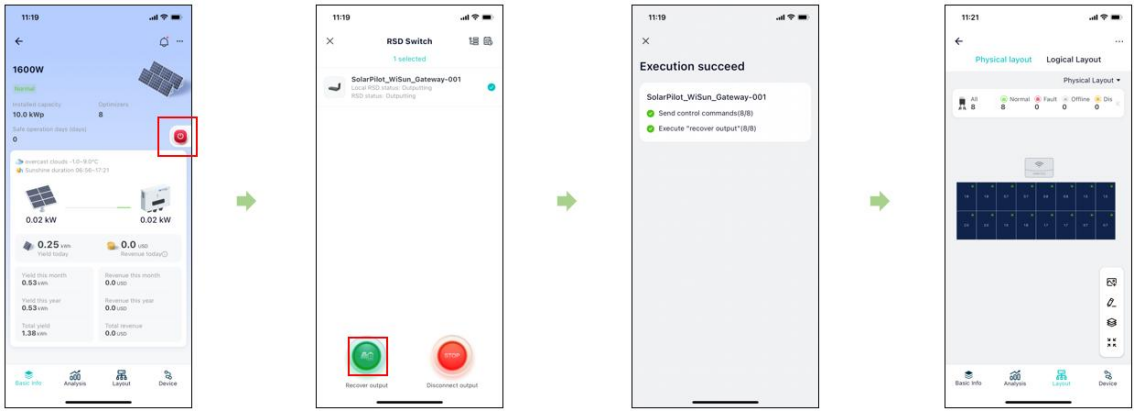
Step 3: If DC switch is provided between the inverter and the photovoltaic string, close the switch.

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 Output(Very Important)

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

Otherwise the PV system will work abnormally.



# 8 Technical Parameters

| | |
|---|---|
| **Communicate with Optimizer** | |
| Communication Type | Wi-SUN |
| Max. data transmission distance | 50m(indoor),200m(outdoor) |
| Max. number of connected devices | 300 pcs optimizers/RSD |
| **System Parameters** | |
| CPU | Quad core ARM Cortex-A53 @1.6 GHz |
| RAM | 2GB DDR4 |
| Memory | 8GB eMMC |
| OS | Linux 5.10.160 |
| **Communication Interface** | |
| WAN | RJ45x1 1000Mbps |
| LAN | RJ45x1 100Mbps |
| HDMI | 1080P@60fps |
| Console port | USB Type-C |
| WiSUN | 868MHz |
| 4G | CAT1( only for 4G version) |
| RS485 | COM x 3 |
| CAN | CAN x 1 |
| DI | DI x 4 |
| DO | DO x 2 |
| Data sampling interval | 1min (I/V/P) / 5min / 15min |
| **Configured Components** | |
| Button | Button x 1 |
| Indicator light | LED x 3 |
| Monitoring APP | SolarPilot Energy |
| **General Parameters** | |
| Dimension | 190mm*94.8mm*38.7mm |
| Net Weight | ≤800g |
| Ingress Protection | IP 20 |
| Storage temperature | -40℃ ~ 70℃ |
| Operating temperature | -20℃ ~ 55℃ |
| Operating humidity | 5% ~ 95% |

| | |
|---|---|
| Operating altitude | ≤2000m |
| Power supply | DC 12V |
| Power consumption | ≤10W |
| Installation method | Fixed on DIN35mm guide rail |
| Compatible optimizers | SP4, SP5 series |
| **Others** | |
| Compliance Standard | CE, RoHS, RED |
| Recommended scenarios | Commercial & industrial solar plant |

If you have technical querise concerning our products,

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