# Wi-SUN Gateway

## SP4-WiSUN-GW-N/G

**User Manual**
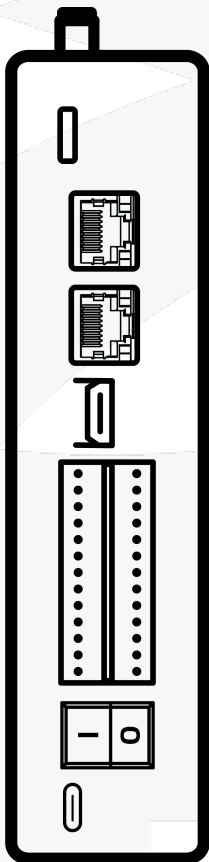
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## About this manual

This document describes the features, electrical parameters, and product structure of the Wi-SUN gateway.

The pictures in this article are for reference only, and the actual product shall prevail.

## Scope of application

This manual is mainly for the following products:
Wi-SUN Gateway (Standard: SP4-WiSUN-GW-N / 4G model: SP4-WiSUN-GW-G)                Unless otherwise specified, the "Gateway" is referred to hereinafter.

## Intended Readers

■   Sales Engineer

■   Technical Support Engineer

■   Maintenance Engineer

## Manual use

Please read the manual carefully before using the product and keep the manual in a place where it is easily accessible.

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

Users should refer to the actual product purchased, and can enter http://www.solarpilot.com/ or download the latest version of the brochure from your sales channel.

# Directory

# 1 Preface

## 1.1 Product Introduction

The SP4-WiSUN-GW series products are CYGI's flywheel data acquisition products, which use the Wi-SUN wireless solution to collect information and data from the field optimizer and send the data to the SolarPIlot cloud platform via Ethernet or 4G communication.

Through the SP4-WiSUN-GW series gateway, users can obtain PV module-level data and alarm information, and realize remote and local shutdown, and realize remote operation and maintenance of PV systems anytime and anywhere on the SolarPilot data platform. At the same time, the Wi-SUN gateway can also be used as an edge gateway to connect to inverters, energy storage converters, storage and inverter machines and other equipment in the southbound.

SP4-WiSUN-GW is used in pairing with SP4 / SP5 Series Optimizers or Shutdown Collectors.

## 1.2 Features

- Setup simply and stably
- The sampling Wi-SUN communication mode communicates with the optimizer, without additional wiring, and the communication distance can reach 500m.
- Intelligent O&M
- Implement component-level monitoring and O&M functions, simulate the actual component layout, and dynamically display component status.
- The number of interfaces is upgraded, and data access is more flexible
- Abundant peripheral interfaces, equipped with 1 100 Gigabit LAN port, 1 Gigabit WAN port, 3 independent serial RS485 ports, 1 CAN communication port, support two DO ports and 4 DI ports, convenient for field equipment access, for multiple types of equipment, a variety of application scenarios to provide more complete hardware interface support.

# 2 Introduction to the device

## 2.1 Communication topology

As shown in Figure 2.1-1 below, the Wi-SUN gateway communicates with the optimizer with Wi-SUN wireless and supports 3 RS485 interfaces, 1 CAN interface, 4 DI outputs, 2 DO outputs, and 1 HDMI port.
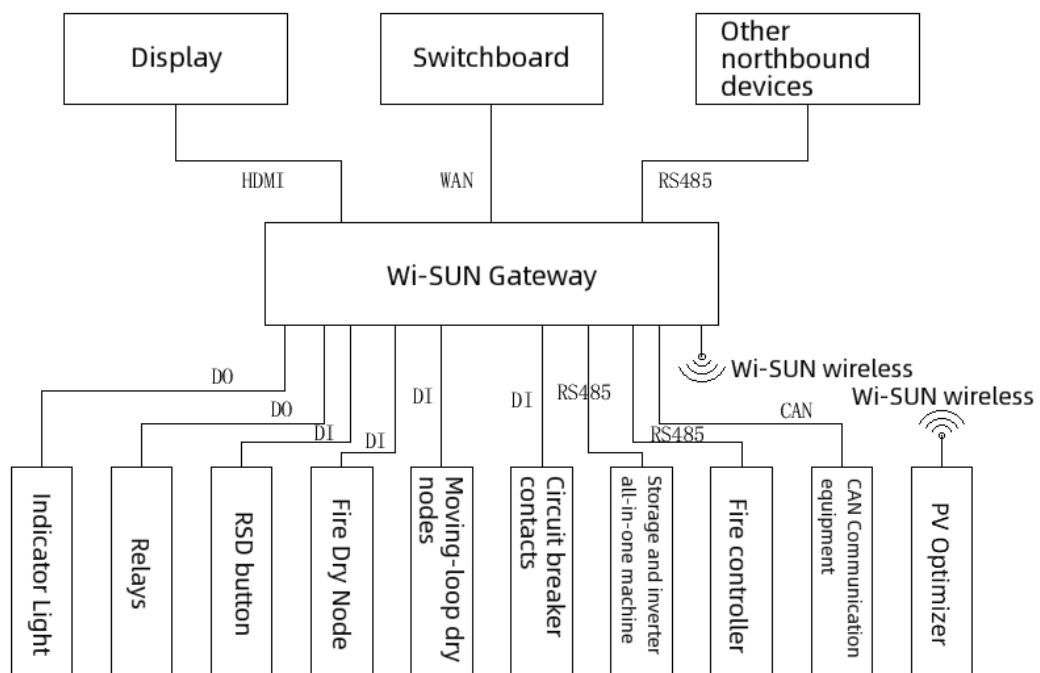


Figure 2.1-1 Wi-SUN gateway communication topology
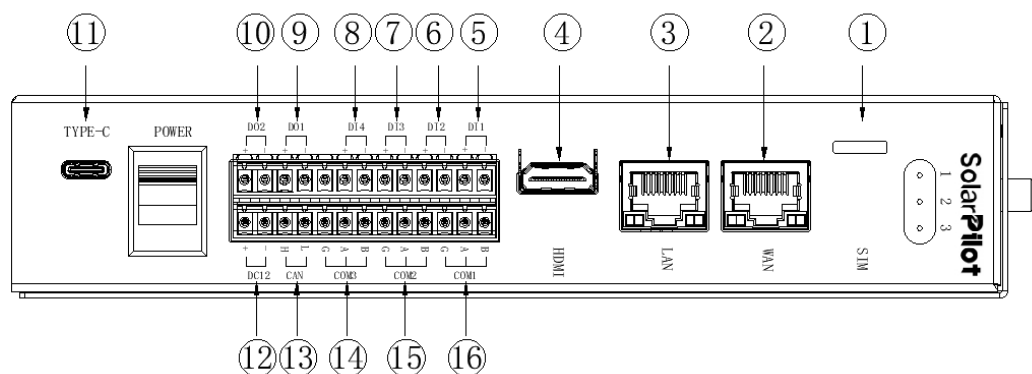
## 2.2 Gateway interface



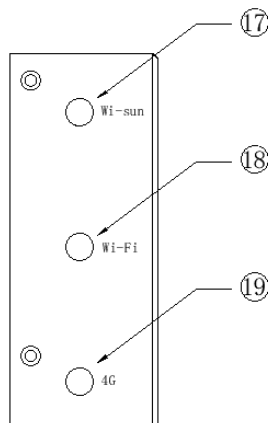Figure 2.2-1 Front interface diagram of Wi-SUN gateway

Copyright: SolarPilot Energy

Figure 2.2-1 Front interface diagram of Wi-SUN gateway

| 1 | Flow card slot | 5 | DI1 interface | 9 | DO1 interface | 13 | CAN interface |
|---|---|---|---|---|---|---|---|
| 2 | WAN interface | 6 | DI2 interface | 10 | DO2 interface | 14 | COM3 interface （Southbound） |
| 3 | LAN interface | 7 | DI3 interface | 11 | Type-C interface | 15 | COM2 interface （Southbound） |
| 4 | HDMI interface | 8 | DI4 interface | 12 | Power input interface | 16 | COM1 interface （Northbound） |
| 17 | Wi-SUN antenna SMA interface (required) | | | | | | |
| 18 | Wi-Fi antenna SMA interface（Wi-Fi is not supported at this time） | | | | | | |
| 19 | 4G antenna SMA interface（Select SP4-WiSUN-GW-G Model，and use 4G data to access the Internet, you need to connect） | | | | | | |

## 2.3 Terminal interface definition
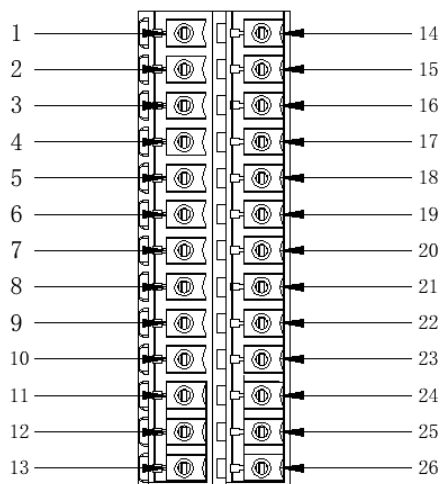


Figure 2.3-1 Definition of 2 x 13P terminal interfaces

| 1 | DI1- | 10 | DO1- | 19 | RS485-2GND |
|---|------|----|------|----|-----------|
| 2 | DI1- | 11 | DO2+ | 20 | RS485-3A |
| 3 | DI2- | 12 | DO2- | 21 | RS485-3B |
| 4 | DI2+ | 13 | DO2+ | 22 | RS485-3GND |
| 5 | DI3- | 14 | RS485-1B | 23 | CAN-L |
| 6 | DI3+ | 15 | RS485-1A | 24 | CAN-H |
| 7 | DI4- | 16 | RS485-1GND | 25 | Power DC12- |
| 8 | DI4+ | 17 | RS485-2B | 26 | Power DC12+ |
| 9 | Obligate | 18 | RS485-2A | | |

## 2.4 Interface description

■ Traffic card socket: SP4-WiSUN-GW-G model is selected to support 4G data upload. Both 4G cards and IoT cards can be used, pay attention to the direction of the notch when inserting, and the direction of the SIM card notch is shown in Figure 2.3-1.
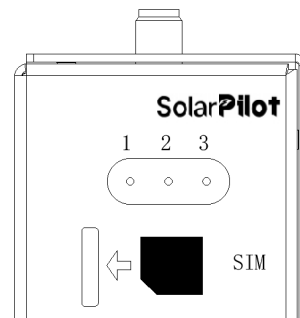


Figure 2.3-1 Schematic diagram of SIM card notch direction

■ WAN interface: 1000 Mbps Ethernet port, which serves as the northbound interface of the device and connects to the Internet or LAN.

■ LAN interface：100 Mbps Ethernet port serves as the southbound interface of the device and connects to the Modbus TCP protocol device.

■ HDMI interface：HDMI transmits audio and video signals, can support audio and video synchronous output, and supports 720P and 1080P resolution.

■ DI1 interface：The switching input interface is the interface of the shutdown button by default, when the shutdown button is closed, the quick disconnect function is triggered, and all optimizers under the gateway are quickly shut down.

■ DI2 interface: The switching input interface can be connected to the dry node of the third-party equipment, and when the dry node is closed, a certain control logic will be triggered, and the control logic can be customized. (Commonly connected equipment is: fire-fighting equipment, moving ring equipment, circuit breaker contacts, etc.)

■ DI3 interface: The switching input interface can be connected to the dry node of the third-party equipment, and when the dry node is closed, a certain control logic will be triggered, and the control logic can be customized. (Commonly connected equipment is: fire-fighting equipment, moving ring equipment, circuit breaker contacts, etc.)

■ DI4 interface: The switching input interface can be connected to the dry node of the third-party equipment, and when the dry node is closed, a certain control logic will be triggered, and the control logic can be customized. (Commonly connected equipment is: fire-fighting equipment, moving ring equipment, circuit breaker contacts, etc.)

■ DO1 interface: The signal output interface provides 5V voltage, which can be used for the

indicator light to be on or the small relay device to close, and the interface outputs 5V voltage when the shutdown button is closed by default (DI1 receives 1 signal).

■ DO2 interface：The signal output interface provides 5V voltage, which can be used to turn on the indicator light or small relay device, and can customize the control logic.

■ Type-C interface：Test and debug the gateway interface, which can be connected to the host computer software to test and debug the gateway.

■ Power input interface: the power supply interface of the gateway, the input voltage is DC12V, the current is ≥1A, and the appropriate switching power supply equipment is selected.

■ CAN interface：The southbound can be connected to the CAN communication device, and the data of the device can be uploaded through the gateway.

■ COM3 interface：RS485 communication devices can be connected to the southbound direction, and the data of the devices can be uploaded through the gateway.

■ COM2 interface：RS485 communication devices can be connected to the southbound direction, and the data of the devices can be uploaded through the gateway.

■ COM1 interface：RS485 devices can be connected to the northbound to transmit gateway data to third-party devices in the form of Modbus RUT. For details of communication, please refer to the Wi-SUN Gateway Communication Protocol

■ Wi-SUN antenna SMA interface：This interface must be connected to a 433MHz antenna provided by CYG Flywheel or purchased by itself to communicate with the optimizer, otherwise it will cause data communication abnormalities.

■ Wi-Fi antenna SMA interface: Reserved interfaces (Wi-Fi is not supported at this time).

■ 4G antenna SMA interface: Select SP4-WiSUN-GW-G model, use 4G traffic to access the Internet, and connect to the 4G antenna provided by SolarPilot or purchased by itself.
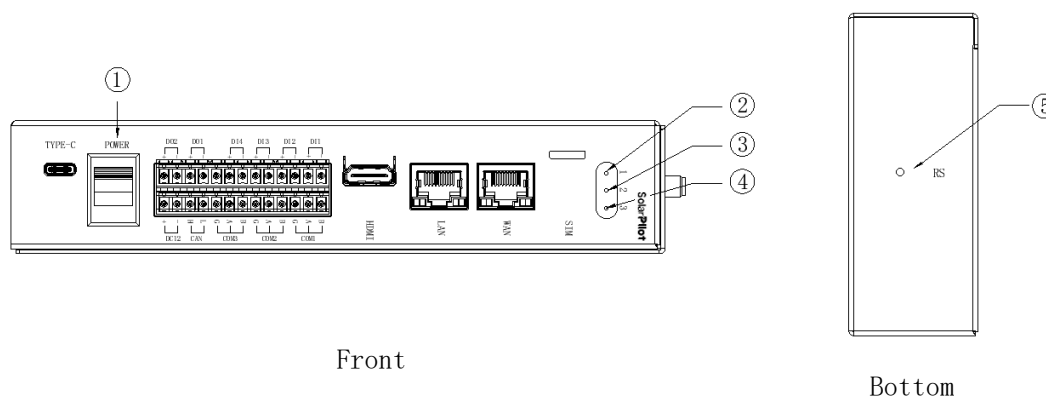
## 2.5 Buttons and indicators



Front

Bottom

Figure 2.3-1 Schematic diagram of SIM card notch direction

| 1 | Gateway switch button | When gear ON: the gateway is activated;<br>When gear OFF: the gateway is turned off; |
|---|---|---|
| 2 | Power lights | The light is always on: the power is on;<br>The light is always off: the power supply is not connected; |
| 3 | Lights | The light is always off: there is no network;<br>The light flashes slowly (flashes once every 3S): there is a network, the gateway is not activated;<br>The light flashes quickly (flashes once every 1S): there is a network, the gateway service is abnormal;<br>The light is always on: There is a network, and the gateway is normal; |
| 4 | Service lights | The light is always on: the northbound transmission function of the gateway is turned on;<br>The light flashes (flashes once at an interval of 0.3S): The gateway has data in the northbound direction; |
| 5 | Reset button | Press and hold the ≥ with a needle for 10S to restore the factory settings (operate with caution, and the distribution network needs to be re-walked). |

# 3 Unpacking and storage

## 3.1 Unpacking and inspection

The gateway has been fully tested and rigorously inspected before leaving the factory, but damage may still occur during transportation, please inspect it in detail before signing for the product.

- Inspect the box for damage.
- Check whether the goods are complete and in accordance with the order according to the packing list.
- Unpack and inspect the internal equipment for intact.

If any damage is detected, please contact the shipping company or SolarPilot directly and provide photos of the damage to facilitate the service. Do not dispose of the original packaging of the gateway, and it is best to store it in the original packaging box after the gateway is dismantled.

## 3.2 Identify the gateway

There is a nameplate on the back of the gateway. The nameplate provides information about the gateway model as well as the most important parameters and certification marks, among other things.
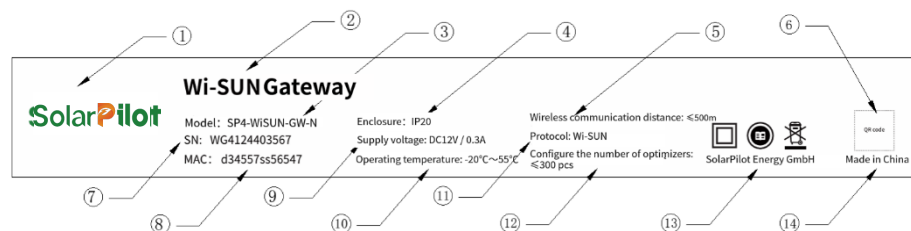
| 1 | SolarPilot trademark | 8 | The MAC address of the product. |
|---|---|---|---|
| 2 | Product name | 9 | The type and voltage of the power supply of the product. |
| 3 | Product Specifications | 10 | Product operating temperature. |

| 4 | Ingress protection | 11 | Product communication. |
| 5 | Product communication distance | 12 | The maximum number of matches between the gateway product and the optimizer. |
| 6 | Product SN QR code | 13 | Product nameplate. |
| 7 | Product SN code | 14 | The country in which the product is manufactured. |

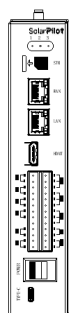## Nameplate identification description
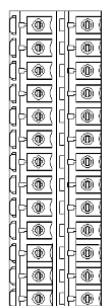
Read the instruction manual
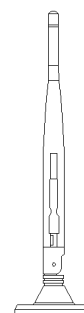
Recycle the WEEE logo

Reinforced insulation

## 3.3 Scope of supply

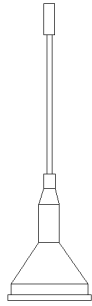Gateway×1          Terminal blocks×1          868 antenna×1

Copyright: SolarPilot Energy

4G antenna ×1
（SP4-WiSUN-GW-N only）

Quick installation
manual ×1

Certificate ×1

## 3.4 Gateway storage

If you don't use the gateway immediately, you need to store it in a specific environment:

- The storage temperature range is -20°C~55°C, the relative humidity range is 0~95%, and there is no condensation.
- The gateway is stored for more than half a year and needs to be fully inspected and tested by professionals before it can be put into operation.

# 4 Installation

## 4.1 Prepare the materials

| SP4-WiSUN-GW-N gateway recommended to prepare | | | |
|---|---|---|---|
| Material | Recommended specifications and models | Function | Remark |
| Power switch | DC12V /20W/rail type | Provide power to Wi-SUN gateway | |
| Cable | Super Six Categories | Provide a network for Wi-SUN gateway | |
| Distribution box | Size≥250*300*160mm Protection level is IP54 or above | Install gateways and switching power supplies | Metal distribution box: The external antenna needs to be sucked on the housing. Plastic distribution box: the antenna can be placed together in the box. |
| Power cable | ZR-YJV-0.6/1KV 3*2.5mm² | Cables for switching power supplies are provided. | |
| Power cord | BVR-0.75mm² | Gateway power supply line | 0.2~1.5mm² or 26~16AWG Adjust the wire diameter according to the actual power supply distance. |
| Communication line 1 | RVSP-3*0.75mm² | COM interface wiring cable | 0.2~1.5mm² or 26~16AWG Adjust the wire diameter according to the actual communication distance. |
| Communication line 2 | RVVP-2*0.5mm² or RVSP-2*0.5mm² | DI/DO interface wiring cables | 0.2~1.5mm² or 26~16AWG Adjust the wire diameter according to the actual communication distance. |
| Guide rail | National standard guide rail 35mm,length≥0.2m | Fixed gateway | |

| SP4-WiSUN-GW-G gateway recommended to prepar | | | |
|---|---|---|---|
| Material | Recommended specifications and models | Function | Remark |
| Power switch | DC12V /20W/rail type | Provide power to Wi-SUN gateway | |
| IoT cards | The process of each sub-equipment is about 1M/day | Provide network traffic to the gateway | |
| Distribution box | Size≥250*300*160mm<br>The protection level is IP54 or above | Install gateways and switching power supplies | Metal distribution box: The external antenna needs to be sucked on the housing.<br>Plastic distribution box: the antenna can be placed together in the box. |
| Power cable | ZR-YJV-0.6/1KV<br>3*2.5mm² | Cables for switching power supplies are provided | |
| Power cord | BVR-1mm² | Gateway power supply line | 0.2~1.5mm² or 26~16AWG<br>Adjust the wire diameter according to the actual power supply distance. |
| Communication line 1 | RVSP-3*0.75mm² | COM interface wiring cable | 0.2~1.5mm² or 26~16AWG<br>Adjust the wire diameter according to the actual communication distance. |
| Communication line 2 | RVVP-2*0.5mm² or RVSP-2*0.5mm² | DI/DO interface cable | 0.2~1.5mm² or 26~16AWG<br>Adjust the wire diameter according to the actual communication distance. |
| Guide rail | National standard guide rail 35mm<br>0.5m length | Fixed gateway | |

## 4.2 Prepare the tools

1. 1. Insulated shoes
2. 2. Tool knives
3. 3. Goggles
4. 4. Wire cutters

5. 5. Wire strippers
6. 6. Insulated gloves
7. 7. Phillips screwdriver
8. 8. Percussion drills

9. 9. Multimeter
10. 10. Crimping pliers
11. 11. Spirit level
12. 12. Rubber hammer

## 4.3 Choose the right location

Wi-SUN gateway card can be installed in the distribution box, and the distance of the optimizer from the nearest location of the distribution box shall not exceed 500m, and the distance within 300m is the best.

≤500m(Optimal within 300 meters)

PV Array                    Gateway
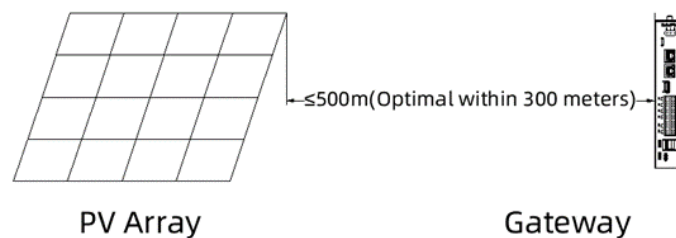
## 4.4 Install the distribution box

According to the installation method of the purchased distribution box, the distribution box is installed fixedly. It is generally fixed on the wall or fixed on the photovoltaic bracket.

## 4.5 Install Wi-SUN Gateway and switching power supplies



① Install the rails    ② Fixed gateways    ③ Fixed switching power supply
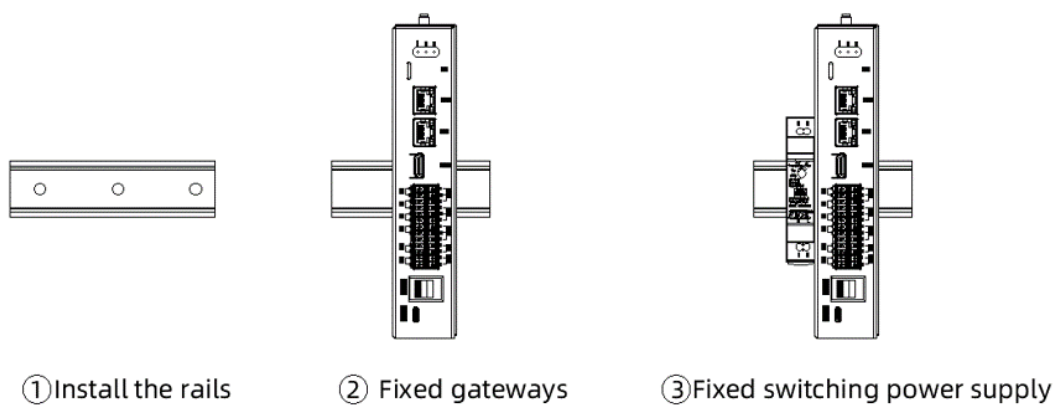
## 4.6 Install a fixed antenna

Suck the antenna on the top of the distribution box, and the installation diagram is shown in the following figure:
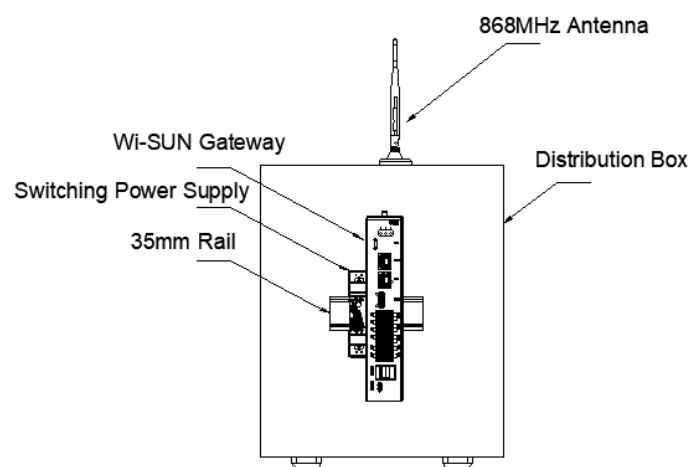


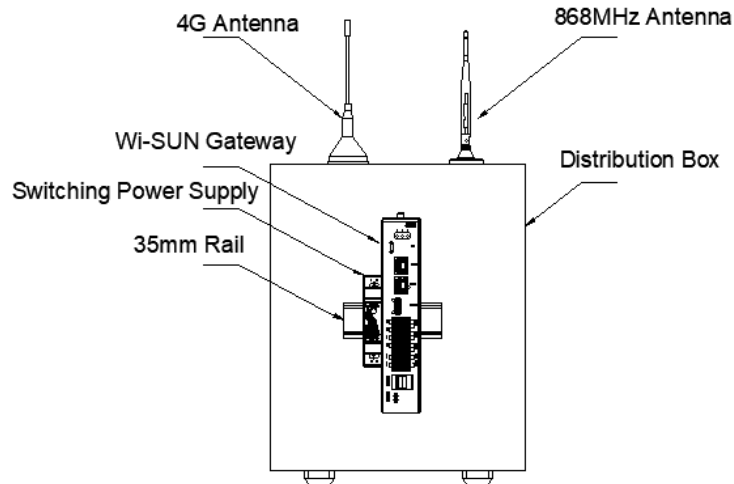Figure 4.6-1 Installation diagram of SP4-WiSUN-GW-N gateway antenna

Figure 4.6-2 Installation of the SP4-WiSUN-GW-G gateway antenna

## 4.7 Gateway wiring

Follow the wiring example in the figure below to complete the wiring. The communication interface is not completely wired according to the schematic diagram, and can be wired according to the actual situation of the project.
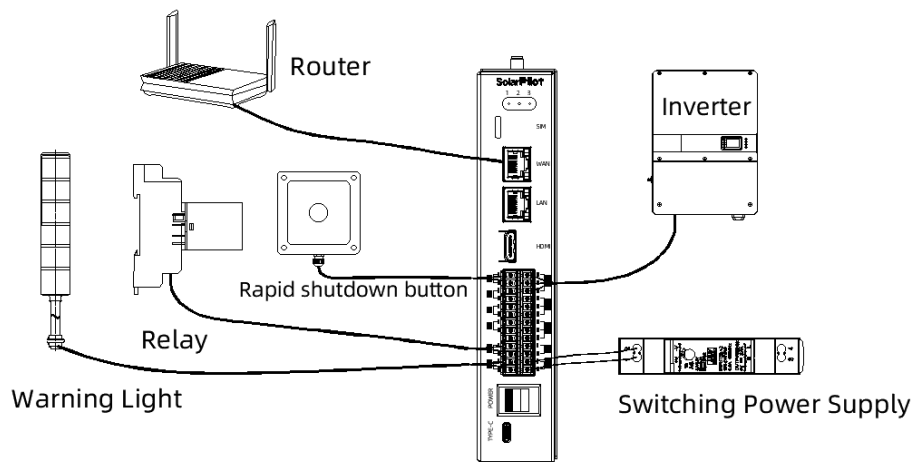


Figure 4.7-1 Schematic diagram of gateway wiring

## 5 Configuration operations

### 5.1 Download the APP

# Method 1

**Install via the Marketplace:**

IOS mobile phone users: search for "SolarPilot" in the App Store or scan the QR code below;

Android phone users: Search for "SolarPilot" in the App market or scan the QR code below.

# Method 2

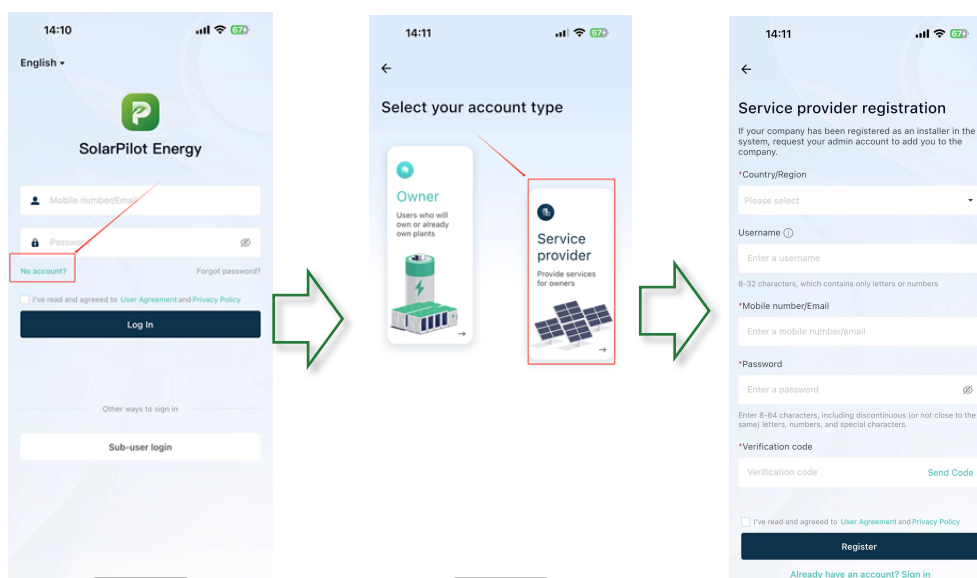**Install by scanning the QR code:**



Android version                    IOS version

### 5.2 Registration & Login

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

Note: You need to select a service provider here.



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## 5.3 Create a power station

Follow the steps below to create a power station and fill in the relevant information.
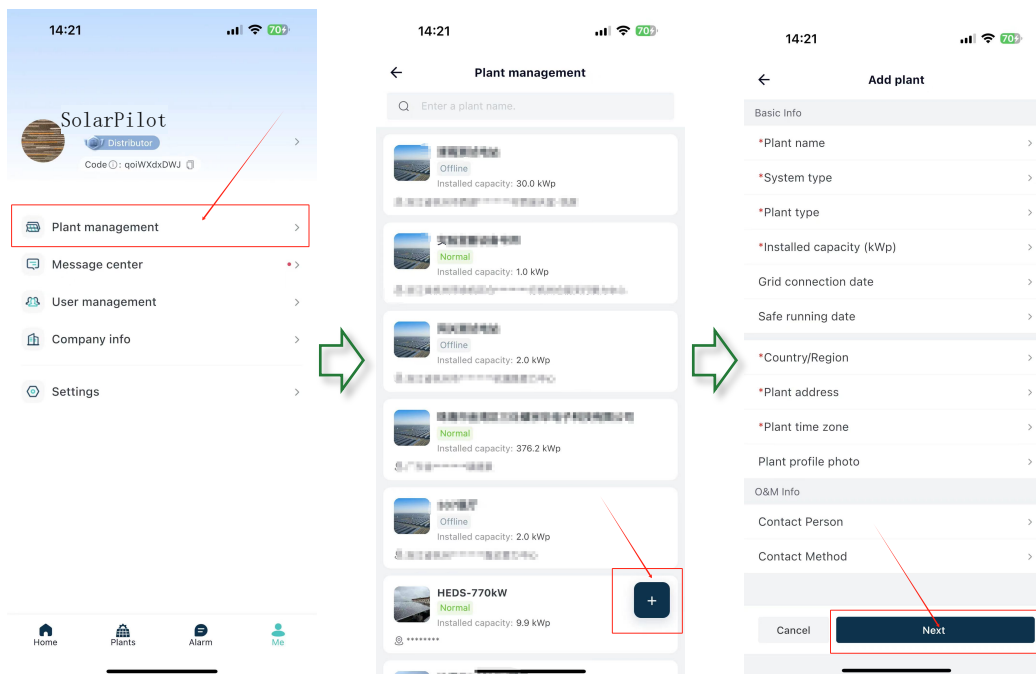


## 5.4 Add the gateway

After the power station is created, click Next to add the gateway of the power station. There are two ways to add a gateway: one is to scan the QR code of the product, and the QR code is on the front of the product, the label position, and the carton shell. The other is to manually enter the SN code.

| How to add a gateway | Operational view |
| --- | --- |
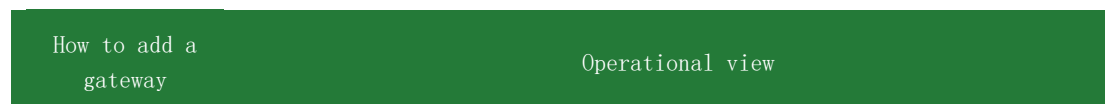
Scan the QR code to add a gateway

Manually enter the gateway SN to add a gateway.

## 5.5 Component layout

### 1. Add components and gateways

After adding the gateway, you need to start the layout of the components, you need to operate on the APP, enter the "Power Station View > Physical View", click the edit small icon to enter the manual physical layout interface, and click on the blank space to add the gateway and components.
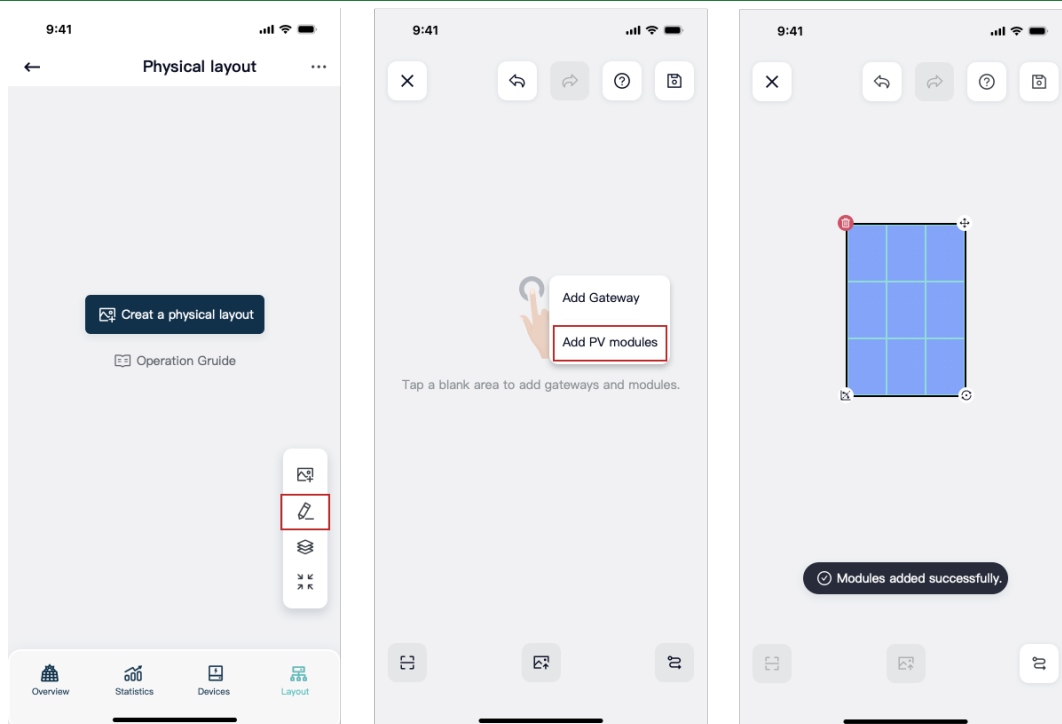
## 2. Adjust the position of the component

Click the inverter or module to adjust the position and angle of the inverter and module, and click the [Save] icon in the upper right corner to save the data.
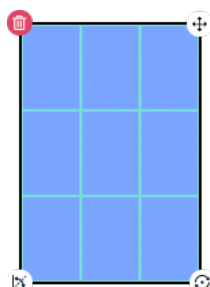


| Function | Operation |
| --- | --- |
| Adjusting the position | Press and hold ✛ to move an inverter or PV module to an appropriate position. |
| Adjusting the azimuth | Press and hold ◯ to move or tap ◯ to enter the azimuth. |
| Adjusting the tilt angle | Tap △ and enter the tilt angle of a PV module. |
| Deleting an inverter or PV module | Tap 🗑 to delete an inverter or PV module. |

## 3. Bind optimizer

Click the [Scan] small icon, as shown in the following figure, to select the corresponding data to be scanned as needed:

If there are many components in the entire site, and the current installation is part of it, you can select a certain area to scan the code and bind, and the system will load only the selected content into the code scanning process.
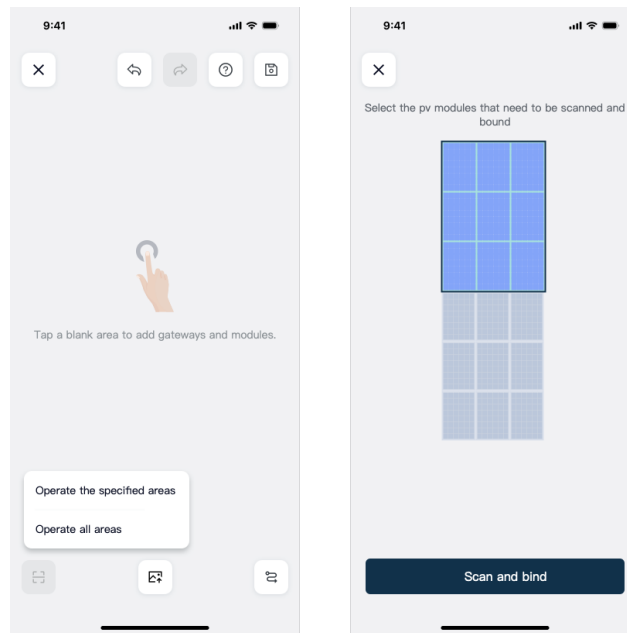
## 4. Scan the QR code on the optimizer

Click on the barcode icon (Figure 1) and select the optimizer-to-module configuration – 1-to-1 (Figure 2) or 1-to-2 (Figure 3). In a 1-to-2 installation, you'll be asked to select a second module connected to the same optimizer before you begin (see the red arrow in Figure 3). Start using the camera to scan the optimizer barcode sticker. After a successful scan, the serial number of the optimizer will be displayed on the screen;
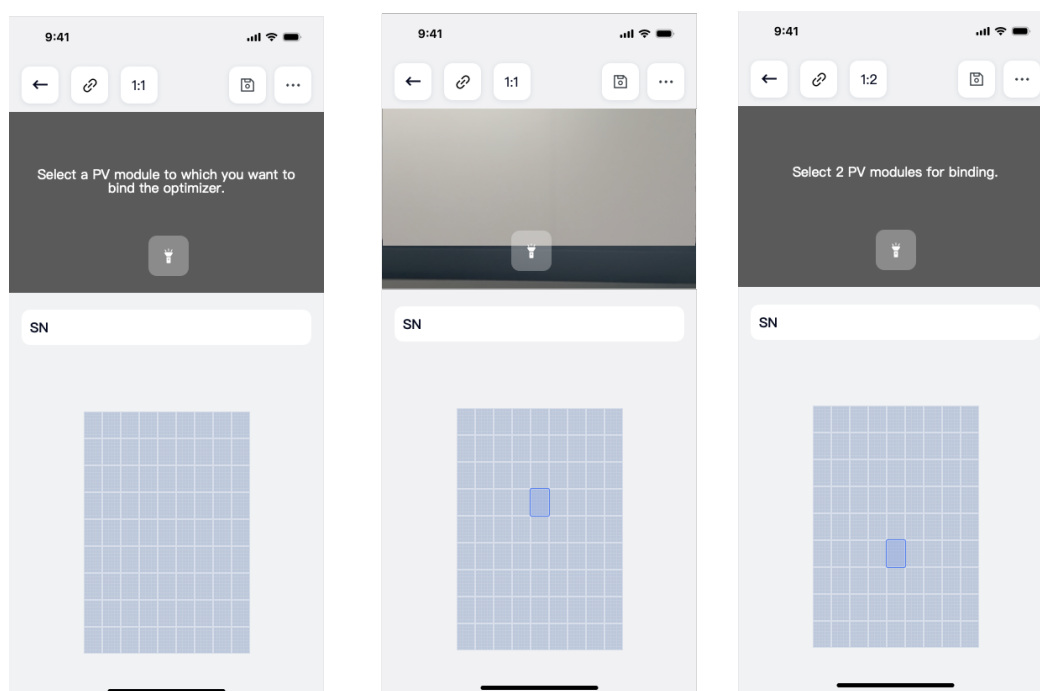
## 5. Delete SN serial number that is bound

If you want to delete the serial number in the layout of domestic production, please click the relevant module, and click "Unbind" in the pop-up secondary confirmation prompt.
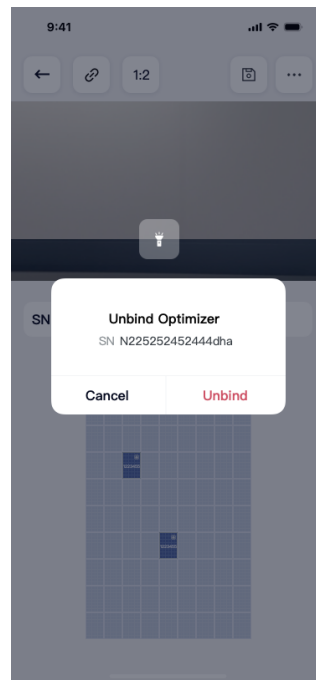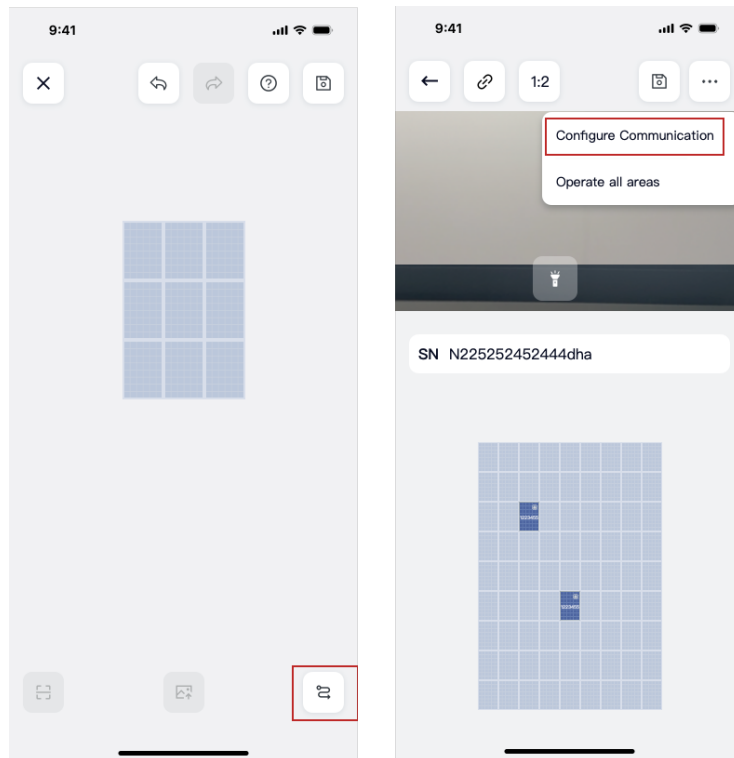


## 6. Confirm completion

Once the scan is complete, confirm that all modules and inverters are assigned serial numbers.

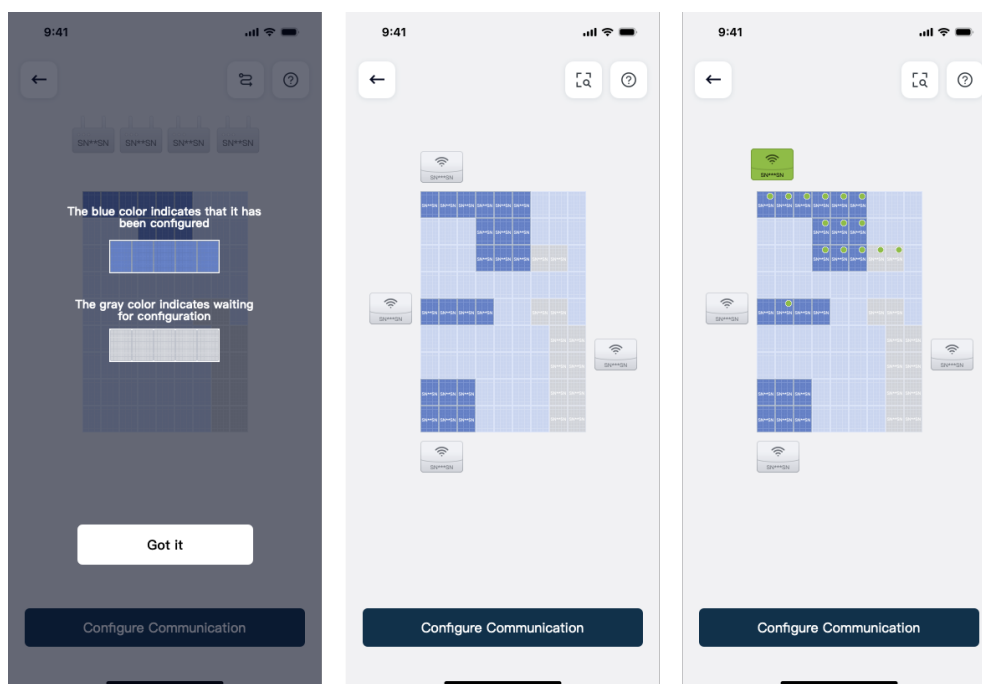## 5.6 Start network configuration

### 1. Activate the optimizer

Activate the optimizer as shown in the following figure.

## 2. Configure Gateway:

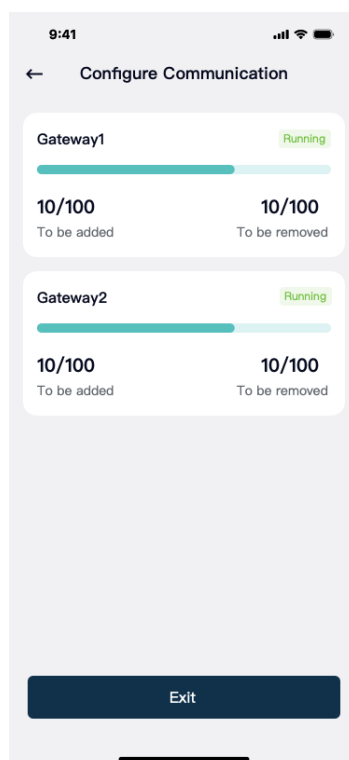After activation, assign a provisioned gateway to the optimizer.



## 3. Start network configuration:

After the distribution is completed, click the [Network Configuration] button in the above figure, and the system will perform the pairing work between the optimizer and the gateway
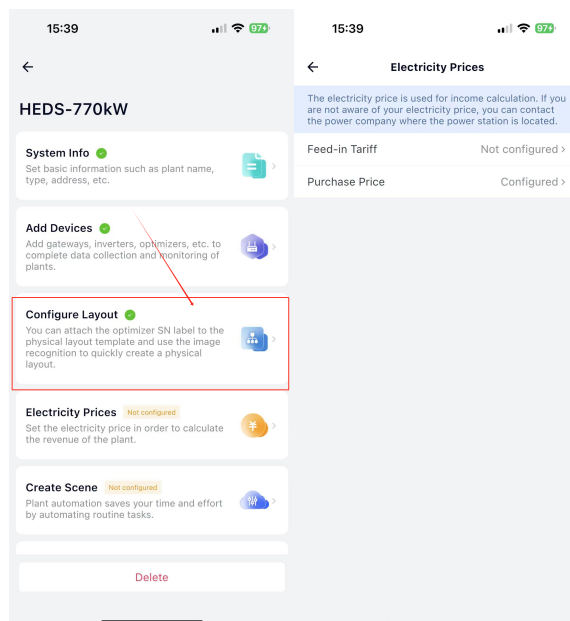
Copyright: SolarPilot Energy

in the background.



## 5.7 Other settings

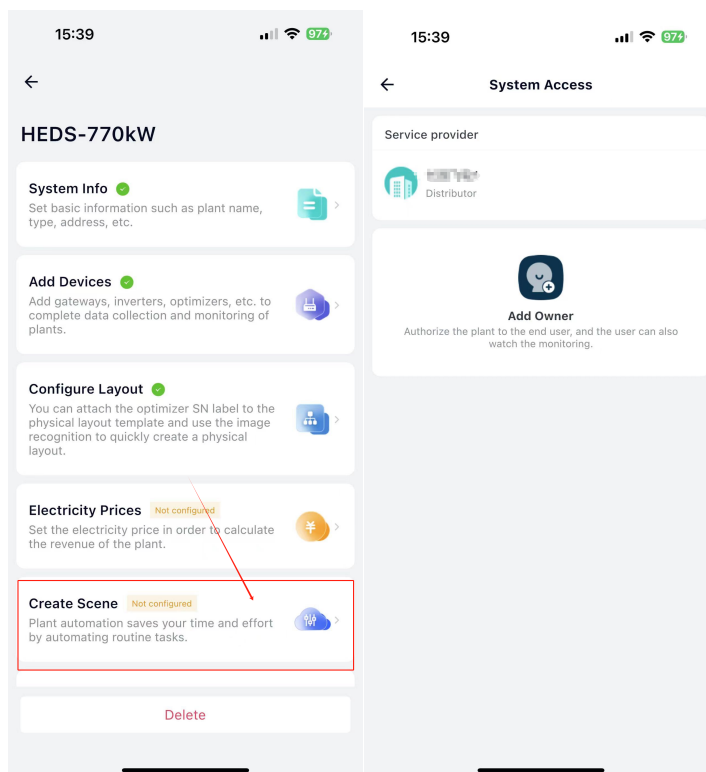**1.** Electricity tariff setting:

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



**2.** Add the owner of the power station:

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

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# 6 Replace the gateway

## 6.1 Precondition

- Please use special insulating tools, wear insulated shoes and protective gloves before operating;
- Prepare the new gateway;
- Prepare a mobile phone with a monitoring app already installed;
- Make sure that both the optimizer and the gateway are online.

## 6.2 Procedure

- A normal gateway (replacement gateway) will need to be powered on;
- Use the APP to add the normal gateway to the corresponding power station;
- Power off the abnormal gateway (replaced gateway);
- Operate the gateway replacement process on the App
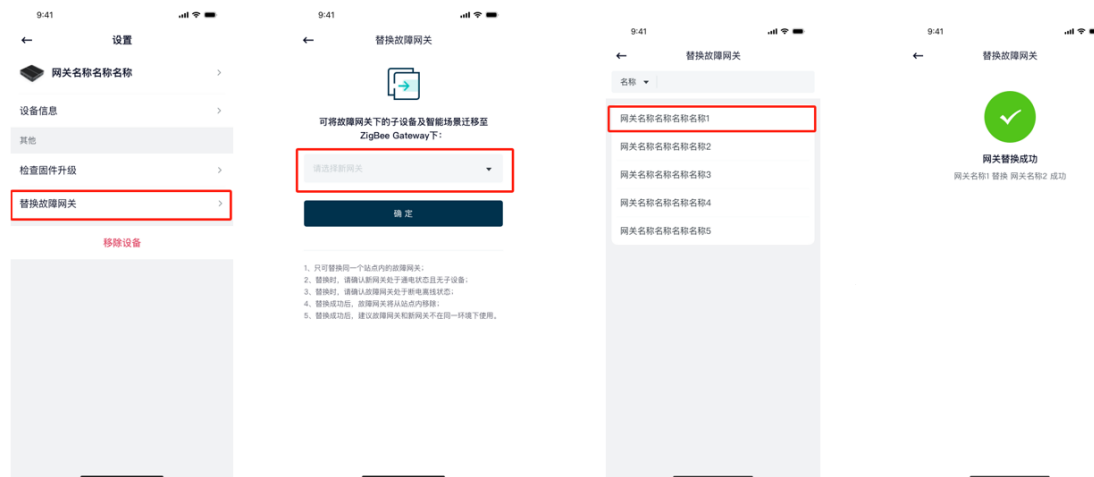
# 7 Specifications

| Model | SP4-WiSUN-GW-N | SP4-WiSUN-GW-G |
|---|---|---|
| **Communicate with the optimizer or shutdown** | | |
| Type of communication | Wi-SUN Wireless communications | |
| Wireless data transmission distance | ≤500m | |
| Maximum number of connected devices | 300pcs | |
| **System parameters** | | |
| CPU | 4 core Cortex-A53, Frequency 1.6GHz | |
| RAM | 2G | |
| Memorizer | 8GB eMMC | |
| System parameters | Linux 5.10.160 | |
| WAN | RJ45×1 1000Mbps | |
| LAN | RJ45×1 100Mbps | |
| HDMI | 1080P | |
| Type-C | Debug interface | |
| Wi-SUN | 868 MHz* Europe, 915 MHz* North America | |
| 4G | Not supported | N/A/CAT1, Pluggable SIM card, |
| RS485 | COM × 3 | |
| CAN | CAN × 1 | |
| DI | DI × 4, DI1 is a quick break button interface by default. | |
| DO | DO × 2, DO1 has an output when the DI receives a closed signal by default. | |
| **General parameters** | | |
| Working temperature | -20℃～55℃ | |
| Dimension | 190mm*94.8mm*38.7mm (height*depth*width) | |
| Weight | ≤800g | |
| Installation method | Fixed on DIN35mm guide rail | |
| Indicator light | LED × 2 | |
| Ingress protection | IP20 | |
| Power supply | DC 12V | |
| Comsumption | ≤4W ｜ ≤6W | |
| **Specification** | | |
| Compliant to | CE、RoHS、RED | |
| Warrany | 3 years | |
| **Compatibility with optimizer/RSD** | | |
| Model | SP4、SP5 series | |

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