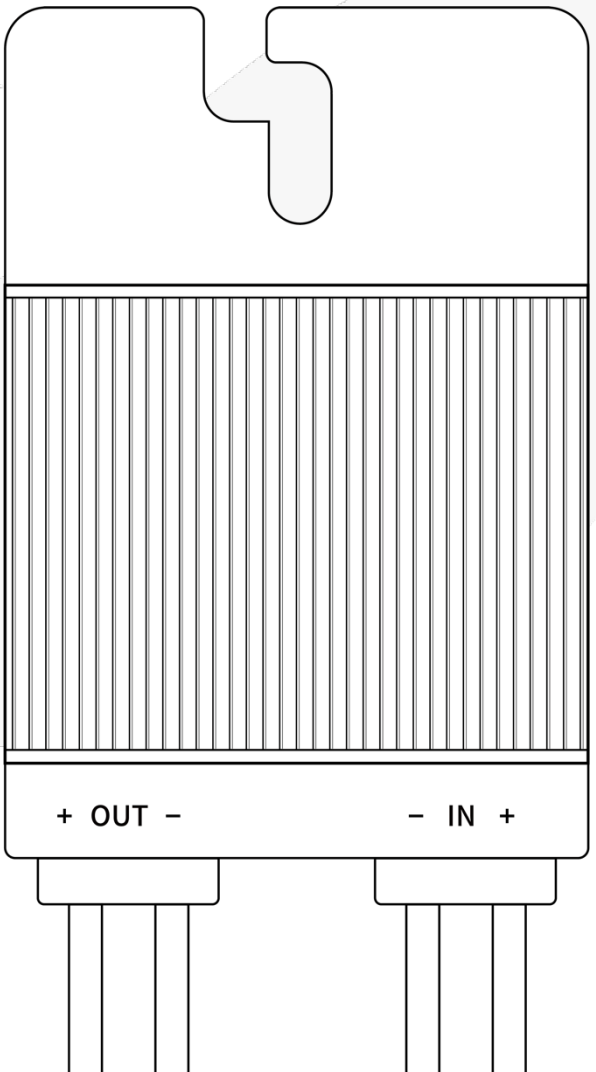
SolarPilot

Smart PV Optimizer

SP1-600W-AL/SP1-600W-AS

User Manual



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About this manual

This document mainly introduces the functional characteristics, electrical parameters, product structure and so on of smart photovoltaic power optimizer for purpose of overview, installation, commissioning, maintenance, and troubleshooting. The pictures in this article are for reference only, and the specifics are subject to the actual product. Please read the manual carefully before using the product and keep it in a convenient place.

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:

Smart PV Power Optimizer (SP1-600W-AS/SP1-600W-AL)

Hereinafter, unless otherwise noted, are referred to as "optimizer".

Intended Readers

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

Symbolic conventions

Use of Symbols In order to ensure the personal and property safety of users when using the product, and to use the product more efficiently and optimally, the relevant information is provided in the manual, and the following symbols are used to highlight it. The following lists the symbols that may be used in this manual, please read them carefully to make better use of this manual.

Symbol	Description
DANGER	Indicates a high potential hazard that, if not avoided, would result in death or serious injury.
WARNING	Indicates a moderate potential hazard if a situation that could result in death or serious injury to a person is not avoided.
CAUTION	Indicates a low potential hazard that, if not avoided, could result in moderate or light injury to a person.

NOTICE	Indicates a potentially hazardous situation which, if not avoided, could result in equipment damage, data loss, performance deterioration, or unanticipated results. NOTICE is used to address practices not related to personal injury
NOTE	Supplements the important information in the main text. NOTE is used to address information not related to personal injury, equipment damage, and environment deterioration.

Directory

1 Safety Instructions

As a power electronic device, the optimizer must comply with relevant safety regulations during its installation, practice running, operation and maintenance. Unreasonable use or misoperation may lead to:

- Harm the life and personal safety of the operator or a third party.
- Damage to the optimizer or other property belonging to the operator or a third party.

Precautions during operation will be explained in detail in the corresponding section.

NOTE	The safety precautions in this manual cannot contain all the specifications that should be followed, and various tasks should be carried out in combination with the actual situation on site. SolarPilot does not accept any responsibility for any loss caused by not following the safety precautions in the manual.

1.1 General Security Precautions

- When carrying out various operations of this product, the relevant equipment precautions and special safety instructions provided by SolarPilot Energy GmbH must be strictly followed. Personnel responsible for installing and maintaining SolarPilot Energy GmbH equipment must first undergo strict training, understand various safety precautions, and master correct operation methods before installing, operating and maintaining the equipment. SolarPilot Energy GmbH does not assume any responsibility for violations of general safe operating requirements and safety standards for the use of equipment.
- Before starting the operation, please read the precautions and operation instructions in this manual carefully to avoid accidents. The "dangers", "warnings", "instructions" and "precautions" in each manual do not represent all the safety matters that should be observed, but only supplement the safety precautions in various operations.
- Operators are expected to comply with local regulations and codes. The safety precautions in the manual are only in addition to local safety codes.
- It is strictly forbidden to wear watches, bracelets, bracelets, rings and other easily conductive objects on the wrist during operation.
- Special insulated tools must be used during operation.
- Torque wrenches should be used to fix the bolts and double-checked with red and blue markings. After the installer confirms that the bolts are tightened, paint the blue logo on the bolts; after the inspector confirms that the bolts are tightened, paint the red logo. If the bolts or bolts of the fixed equipment are not installed according to the torque requirements, there is a risk that the equipment will come loose from the installation.
- Installation or maintenance operations must conform to the sequence of steps of the task, and do not change the structure and installation sequence of the equipment without the manufacturer's permission.
- Installation must be carried out in strict accordance with the requirements of the Quick Guide.

1.2 Statement

In the event of any of the following circumstances, SolarPilot Energy GmbH has the right not to carry out quality assurance.

- Damage to transport.
- Damage caused by storage conditions not meeting product doc requirements.
- Incorrect installation and use of equipment.
- Unqualified personnel to install and use equipment.
- Failure to follow the operating instructions and safety warnings in the product and doc.
- Operates in harsh environments beyond product and doc specifications.
- Operate beyond the parameters specified in the applicable technical specifications.
- Unauthorized disassembly, modification of products, or modification of software code.
- Equipment damage caused by abnormal natural environment. (Force majeure, such as lightning, fire, storm, etc.)
- Exceeded the quality assurance period and did not extend the quality assurance service.
- Any installation and operating environment beyond those specified in the relevant international standards.

1.3 Personnel Requirements

Optimizer installation, electrical connection, maintenance, troubleshooting, and replacement operations must be performed by professional electrical technicians.

- Operators need to undergo professional training.
- Operators should read this manual completely and master the safety matters related to operation.
- Operators should be familiar with the relevant safety regulations of electrical systems.
- Operators need to be fully familiar with the composition and working principle of the entire photovoltaic grid-connected power generation system, as well as the relevant standards of the country/region where the project is located.
- Operators must wear personal protective equipment.

1.4 Mark Protection

- The warning label on the optimizer contains important information for its safe operation, and human alteration and damage are strictly prohibited.
- There is a nameplate on the back of the optimizer, which contains important parameter information related to the product, and artificial alteration and damage are strictly prohibited.

1.5 System Installation

- The optimizer is prohibited from being installed in locations where water can submerge for a long time.
- Improper operation during the installation and operation of the optimizer may lead to fire, and the storage of flammable and explosive materials is prohibited in the installation location area.
- It is forbidden to cut the cable that comes with the optimizer, otherwise the quality assurance will fail.
- When installing the optimizer, make sure that it is not electrically connected and energized.
- A certain distance should be reserved between the optimizer and the surrounding objects to ensure sufficient installation and heat dissipation space.

1.6 Electrical Connections

DANGER

Before making electrical connections, make sure that the optimizer is not damaged, otherwise it may cause electric shock or fire.

- All electrical connections must meet the electrical standards of the country in which they are located.
- The cables used in the photovoltaic grid-connected power generation system must be firmly connected, well insulated, and of suitable specifications.
- The optimizer output terminal does not support hot swapping, otherwise, it may cause damage to the optimizer.
- The DC connector model of the optimizer is Staubli MC4, make sure the mating DC connector model is the same. If the model is different, the DC connector manufacturer must provide a connector compatibility report and a third-party external laboratory (TUV, VED or Bureau Veritas) report. Using other incompatible DC connectors may have serious consequences, and equipment damage caused by them is not covered by the equipment quality assurance.

1.7 Operation

DANGER

During the operation of the optimizer in the string, there is a high voltage, which may produce electric shock, resulting in death, serious personal injury, or serious property damage. Please strictly follow the safety precautions listed in this manual and other related documents.

- When the optimizer is running, the temperature is high and there is a risk of burns. Do not touch it.
- Local regulations and codes should be observed when operating equipment.

1.8 Maintenance and Replacement

DANGER

During the operation of the optimizer, there is a high voltage, which may produce electric shock, resulting in death, serious personal injury, or serious property damage. Therefore, before any maintenance work, the optimizer must be powered off and operated strictly in accordance with the safety precautions listed in this manual and other related documents.

- Maintain the optimizer with a good understanding of this manual and with appropriate tools and test equipment.
- During the maintenance process, please try to avoid unrelated personnel entering the maintenance site, and temporary warning signs or fences must be erected for isolation.
- The fault must be dealt with before the optimizer can be powered on again, otherwise it may cause the fault to expand or damage the equipment.
- During maintenance, please follow the electrostatic protection regulations and wear anti-static gloves.
- If the equipment fails, please contact your dealer or the original factory.

2 Product Description

2.1 Applicable Systems

SP1-600W-AS/SP1-600W-AL defines the first generation of smart PV optimizer product. The photovoltaic power optimizer is a DC/DC conversion power supply used behind the photovoltaic modules in the photovoltaic system. It improves the photovoltaic system by constantly tracking the maximum power point (MPPT) of each photovoltaic module. The power generation of the system is connected to the inverter in the latter stage. The inverter converts the direct current generated by the photovoltaic cells into alternating current that meets the grid requirements and feeds it into the grid. The optimizer can be applied to the following scenarios:

(1) Grid-connected PV systems; (2) Off-grid PV systems; (3) PV and EESS systems.

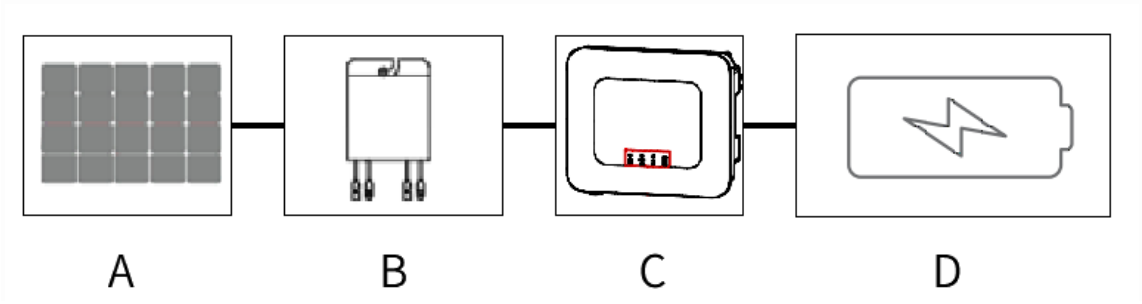
⚠ CAUTION

- The optimizer cannot be connected to photovoltaic strings that require positive or negative ground.
- During the installation and operation of the optimizer, please ensure that the positive or negative poles of the photovoltaic string are not short-circuited to ground, otherwise, it may cause a DC short circuit of the optimizer, resulting in equipment damage, which will not be within the scope of quality assurance.
- Before the optimizer is installed, confirm that the component parameters meet the requirements of the optimizer.

1) Grid-connected photovoltaic system

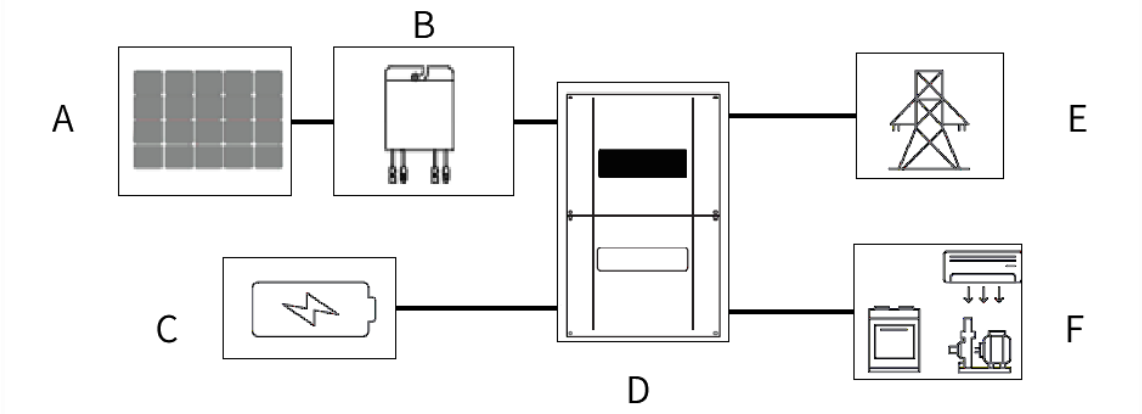
Serial	Description	Remarks
A	PV modules	Monocrystalline silicon, polycrystalline silicon, thin film battery without grounding
B	Optimizer	SP1-600W-AS/ SP1-600W-AL
C	Inverter	String inverter, centralized inverter, distributed inverter
D	Step-up transformer	Raise the output voltage of the inverter to a level that meets the requirements of the grid
E	Power grid	Power Grid Supported by Inverters

2) Off-grid PV systems



Serialr	Description	Remarks
A	PV modules	Monocrystalline silicon, polycrystalline silicon, thin film battery without grounding
B	Optimizer	SP1-600W-AS/ SP1-600W-AL
C	Off-grid inverter	Off-grid inverter
D	Battery	Lead-acid battery, lithium battery

3) PV and EESS systems



Section	Description	Remarks
A	PV modules	Monocrystalline silicon, polycrystalline silicon, thin film battery without grounding
B	Optimizer	SP1-600W-AS/ SP1-600W-AL
C	Battery	Lead-acid battery, lithium battery
D	Storage inversion All in One	Storage inversion All in One
E	Power grid	All in One Supported Power Grid
F	Load	DC or AC load

2.2 Product Introduction

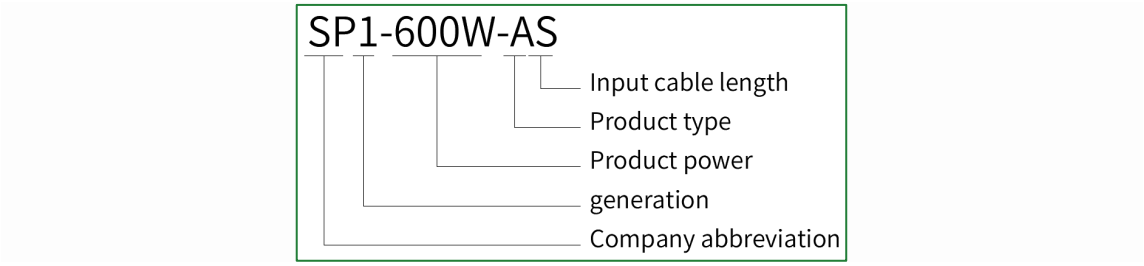
The photovoltaic power optimizer is a DC/DC conversion power supply for the post-stage of photovoltaic modules in photovoltaic systems. It increases the power generation of photovoltaic systems by continuously tracking the maximum power point (MPPT) of each photovoltaic module. It also has module-level shutdown., module-level monitoring and other functions, and supports long string design.

2.2.1 Functional Features

- Module-level MPPT function: Increases the power generation of the photovoltaic system by continuously tracking the maximum power point of the photovoltaic module.
- Component-level shutdown function: realize component-level voltage shutdown, fire emergency stop button start or background control shutdown, the optimizer can adjust the component output voltage to a safe range.
- Component-level monitoring function: The optimizer can detect the running status of components and achieve component-level monitoring.
- Long String: In the scenario where all PV modules are configured with optimizers, the number of components that can be connected in a single string is greater than the number of components that can be connected in a traditional string.

2.2.2 Model Description

The description is as follows:



Optimizer model	Rated input power	Input line length	Output line length
SP1-600W-AS	600W	120mm/120mm	1300mm/1300mm
SP1-600W-AL	600W	1000mm/1000mm	1300mm/1300mm

2.2.3 Product interface

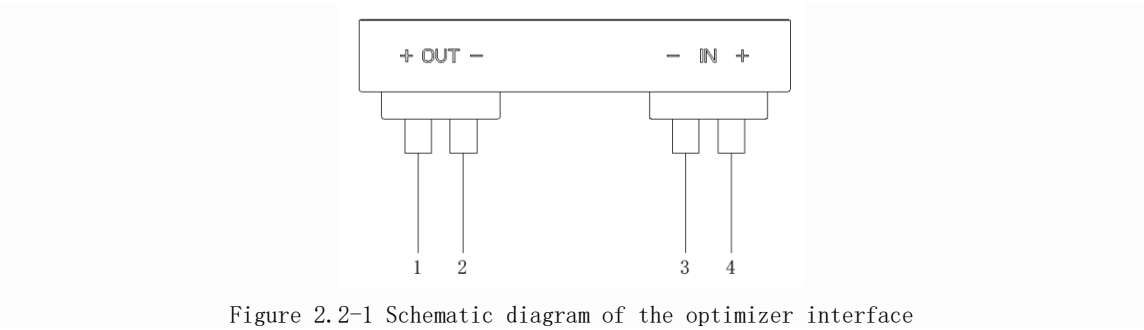


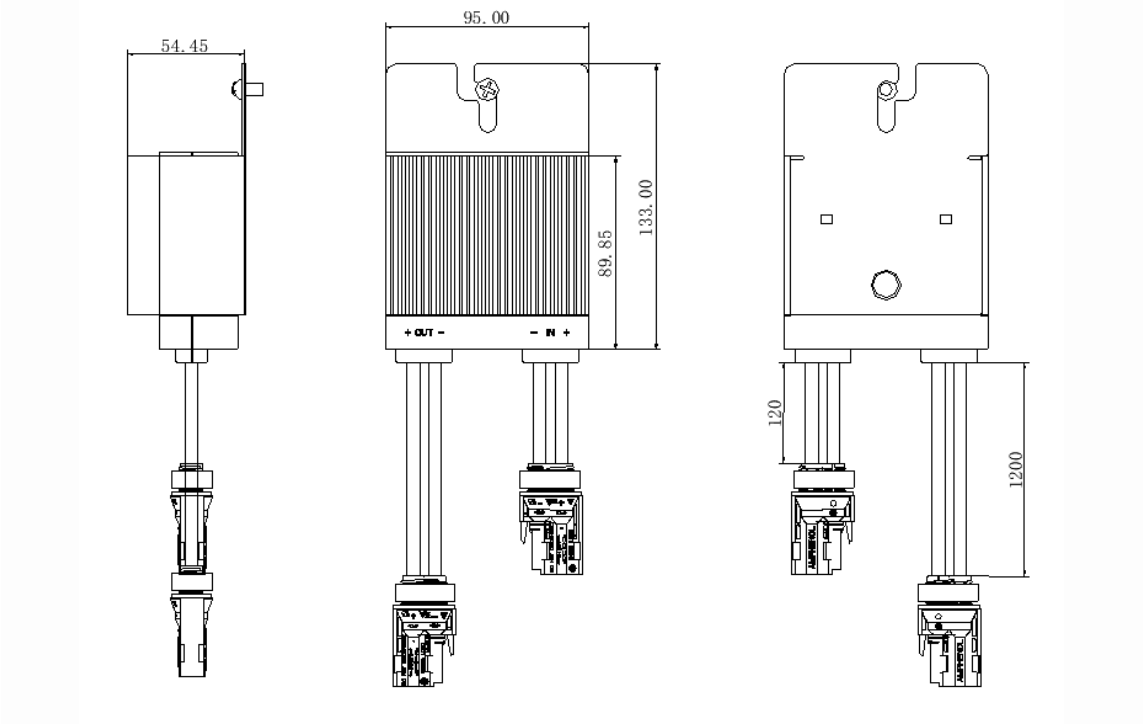
Figure 2.2-1 Schematic diagram of the optimizer interface

Number	Name	Description
1	Output positive	Connect the positive electrode of the output

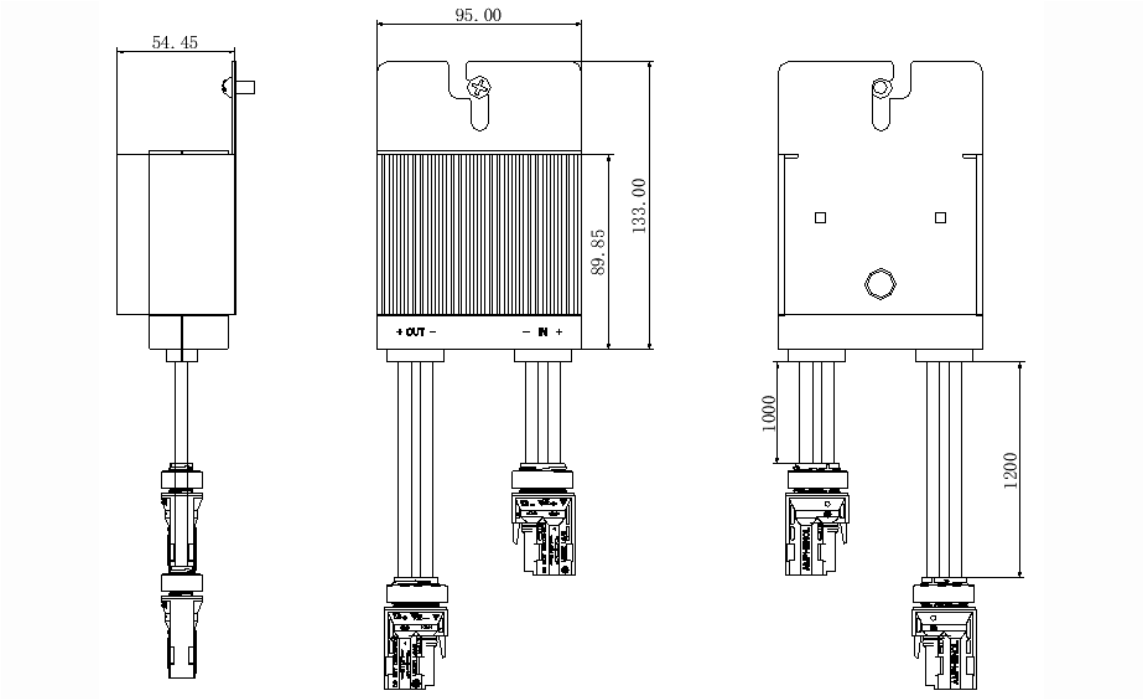
		of the photovoltaic module, 0.12m/1.0m
2	Input negative	Connect the negative electrode of the output of the photovoltaic module, 0.12m/1.0m
3	Output negative	Connect the negative pole of the inverter, the positive pole of the series optimizer or the component, 1.2m
4	Output positive	Connect the positive pole of the inverter, the negative pole of the series optimizer or the component, 1.2m

2.2.4 Product Size

SP1-600W-AS:



SP1-600W-AL:



2.3 Application Scenarios

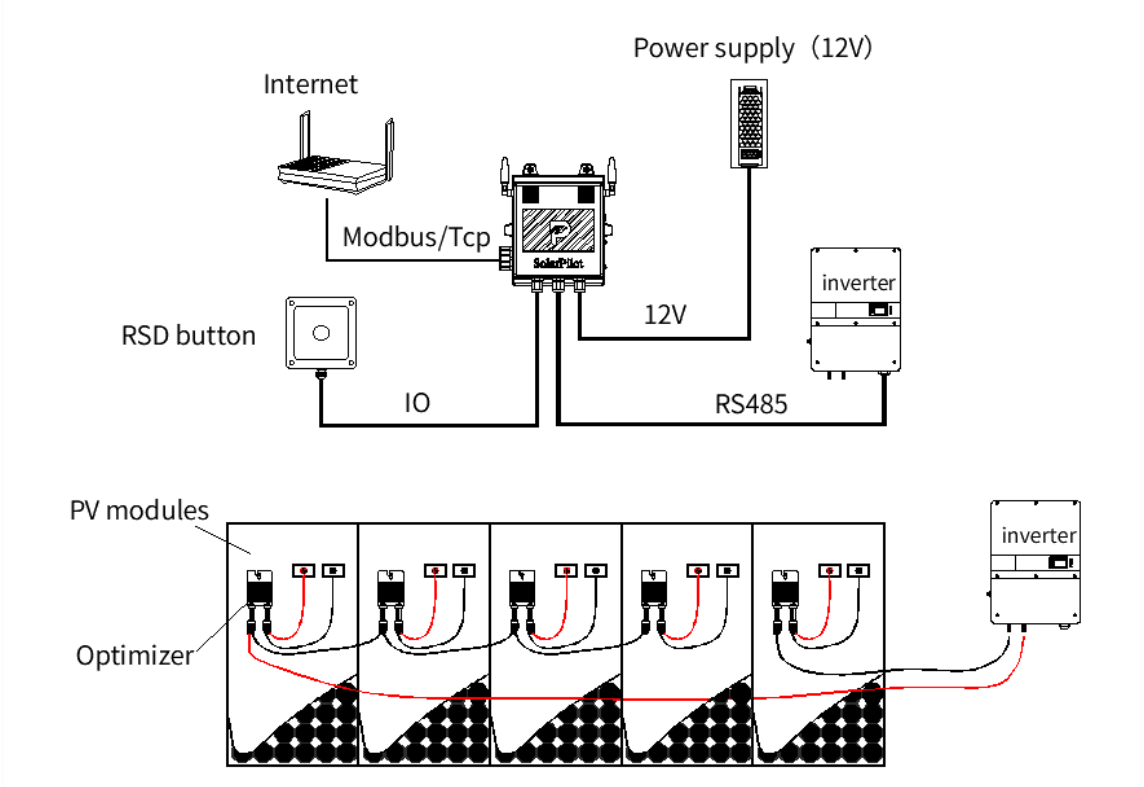
NOTE

In order to ensure that the optimizer successfully connects the photovoltaic module, please select the photovoltaic module whose output line meets the length.

To minimize electromagnetic interference, it is recommended to minimize the distance between the optimizer's positive and negative cables.

Full optimizer: All PV modules connected to the inverter are connected to the optimizer.

In the full optimizer scenario, it has MPPT function, which can realize component-level shutdown and monitoring functions, and supports long string design.



2.4 Configuration Principles

- Optimizer + Gateway + Quick Shutdown Button: Functions for power optimizer, component-level monitoring, and remote/local quick shutdown.
- Optimizer + Gateway: Functions for power optimizer, component-level monitoring, and remote fast shutdown.
- Optimizer: It functions as a power optimizer.

2.5 Configuration Recommendations

Number	Applicable Scenarios	Implemented Functions	Configuration Scheme
1	Some PV modules are shaded	Decrease in power generation due to increased shading	Shade PV modules Installation Optimizer
2		Decrease in power generation due to increased shading Monitoring of installed PV modules	Shade PV modules installation optimizer + optimizer gateway
3		Decrease in power generation due to increased shading Increase component aging mismatch causes power generation to decrease	All PV modules install optimizer
4		Decrease in power generation due to increased shading	All PV modules install optimizer + optimizer gateway

		Increase component aging mismatch causes power generation to decrease Component monitoring and remote fast shutdown	
5		Decrease in power generation due to increased shading Increase component aging mismatch causes power generation to decrease Component monitoring and remote/local fast shutdown	All PV modules install optimizer + optimizer gateway + RSD button
6	Unsheltered	Increase component aging mismatch causes power generation to decrease	All PV modules install optimizer
7		Increase component aging mismatch causes power generation to decrease Component monitoring and remote fast shutdown	All PV modules install optimizer + optimizer gateway
8		Increase component aging mismatch causes power generation to decrease Component monitoring and remote/local fast shutdown	All PV modules install optimizer + optimizer gateway + RSD button

3 Unpacking and Storage

3.1 Unpacking and Inspection

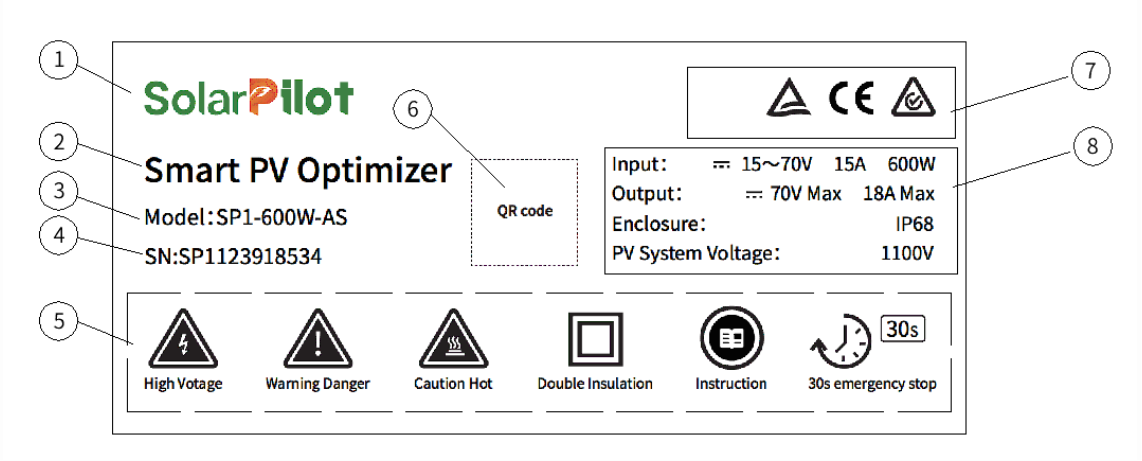
The optimizer has been fully tested and strictly inspected before leaving the factory, but damage may still occur during transportation. Please conduct a detailed inspection before signing for the product.

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

If any damage is found, please contact the transportation company or directly with SolarPilot Energy GmbH Company, and provide photos of the damage to facilitate service. Do not discard the original packaging of the optimizer. It is best to store the optimizer in the original packaging box after it is out of service and dismantled.

3.2 Identify the optimizer

There is a nameplate attached to the back of the optimizer. The nameplate provides the model information of the optimizer as well as the most important parameters and certification marks.



Number	Description
1	SolarPilot Trademark
2	Optimizer Product Name
3	Optimizer Model Specifications
4	Optimizer SN Code
5	Related Symbols
6	Product SN QR code
7	Related Certification
8	Related Parameters

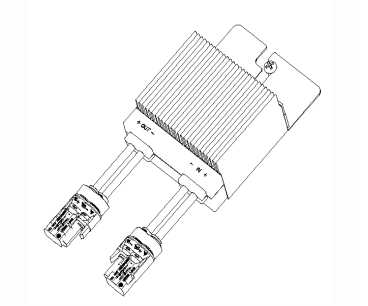
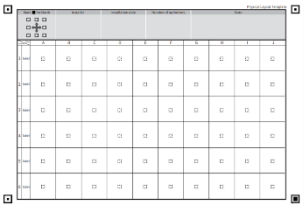
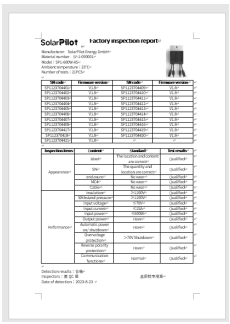
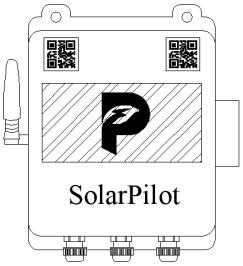
Description of Nameplate Symbol Identification

	High Votage warning
	Warning Danger
	High temperature warning
	Double insulated marking
	Read instruction manual logo
	30 seconds quick break sign

Certification Instructions

	Compliant with TUV certification mark
	Comply with CE certification mark
	Complies with RCM certification mark

3.3 Scope of Supply

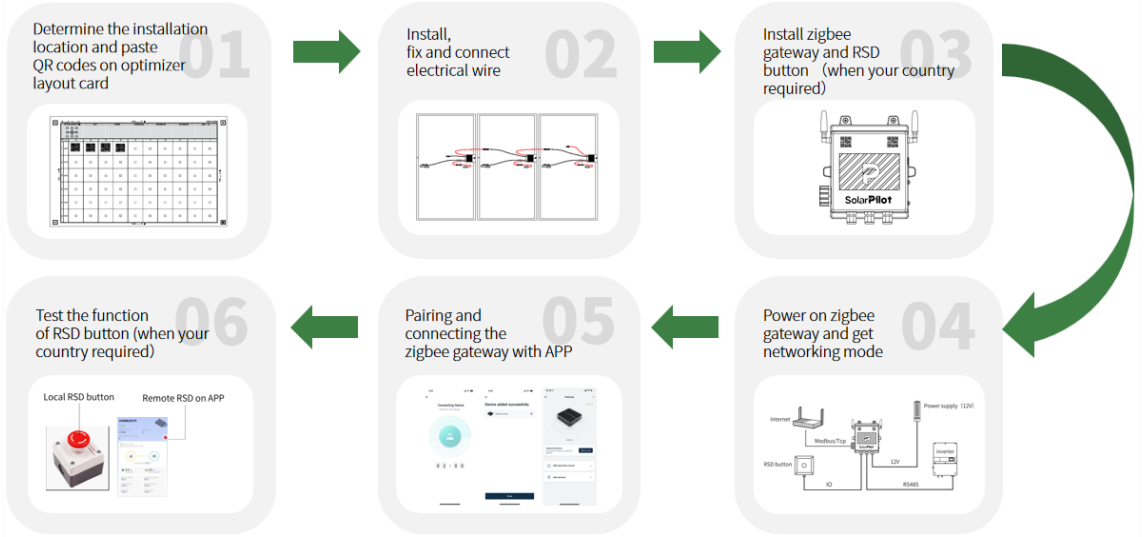
		
Optimizer	Layout Card	Certificate of Conformity
		
Product Manual	Gateway	

3.4 Optimizer storage

If you do not use the optimizer immediately, you need to store it in a specific environment.

- Repack using the original packaging box, retaining the desiccant.
- Storage temperature range -40 ℃~ 70 ℃, relative humidity range 0~ 95%, no condensation.
- The storage time of the optimizer is more than half a year, and it needs to be fully checked and tested by professionals before it can be put into operation.

4 Installation and use steps of the optimizer



5 Fixed installation

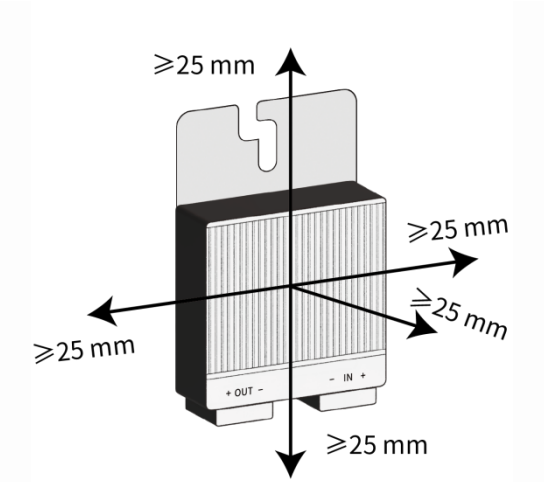
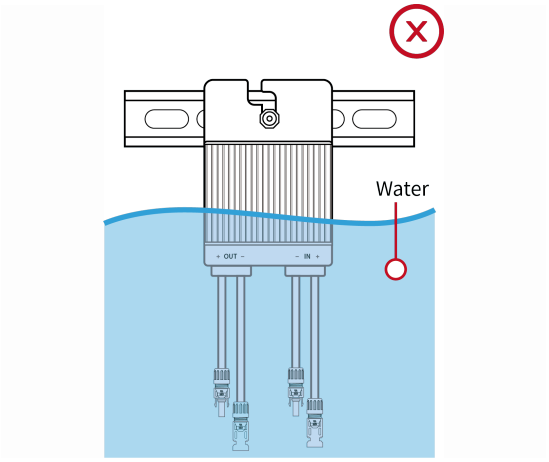
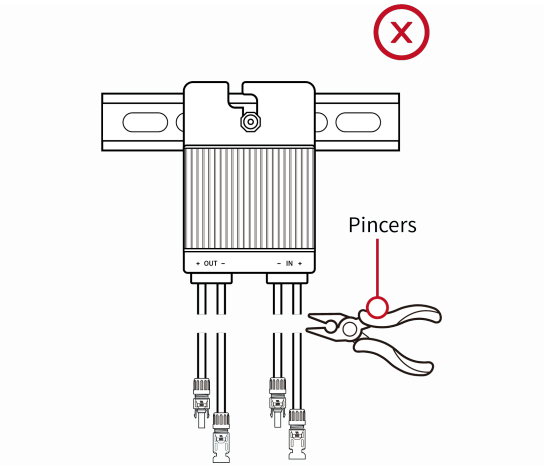
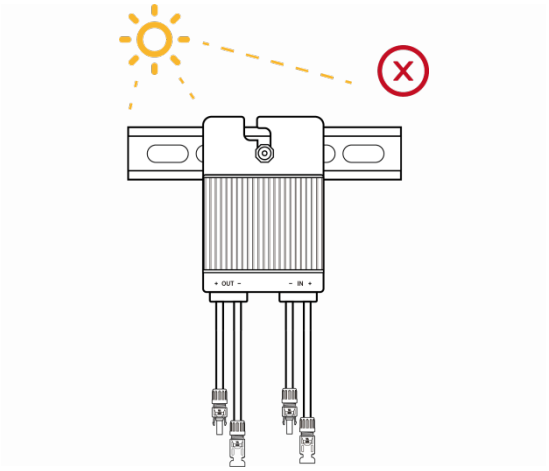
5.1 Requirements and Precautions

DANGER

Before installing the optimizer, make sure there are no electrical connections

CAUTION

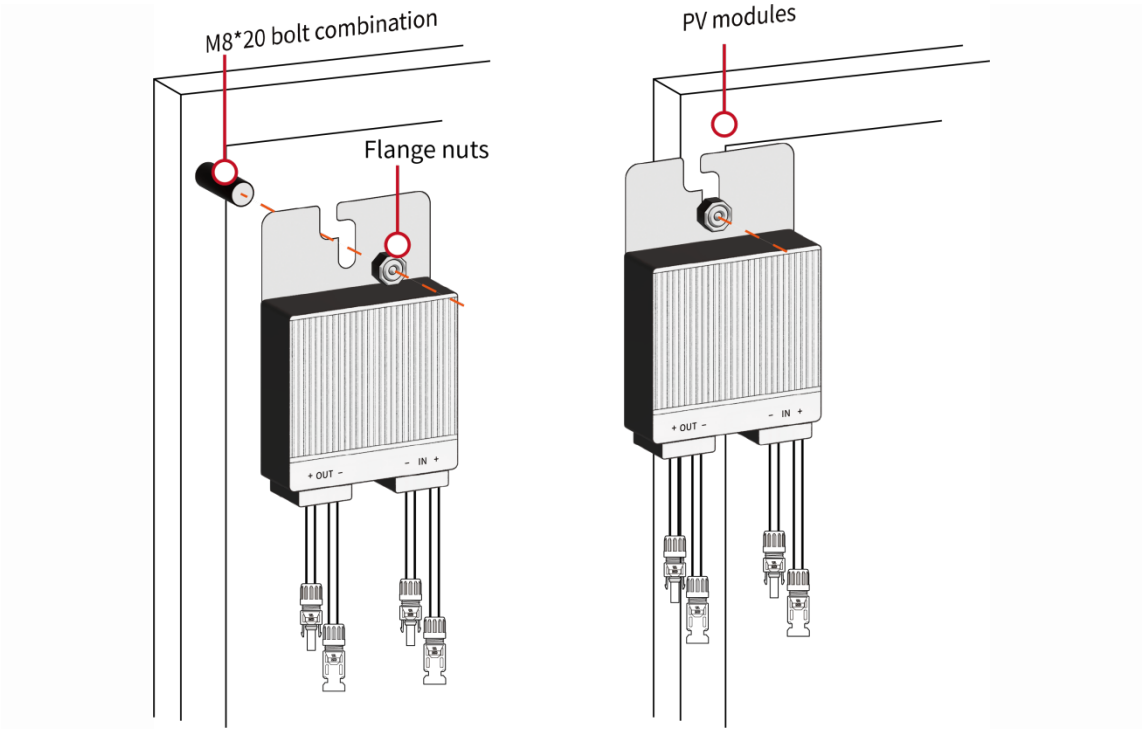
- Improper handling of equipment may result in minor injuries or contusions
- The position of the heat sink of the equipment must be kept uncovered, otherwise the heat dissipation of the optimizer will be affected and the good operation of the system will be affected

	
1. Ensure the optimizer to leave space for heat dissipation	2. The optimizer is prohibited from being installed in locations that may be submerged by water
	
3. It is forbidden to cut the cable of the optimizer, otherwise the quality assurance	4. No sun exposure

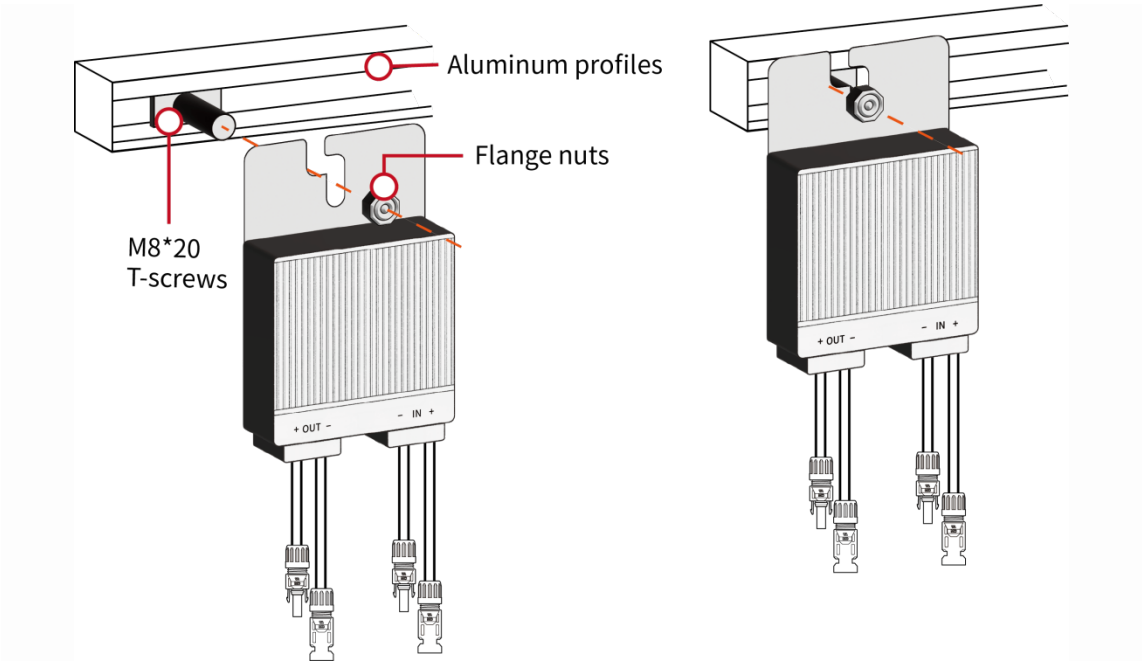
will fail	

5.2 Installation and Fixing

5.2.1 Fixed Component Border



5.2.2 Fixed Installation Guide



5.3 Installation Tools and Parts

		
Insulated shoes	Insulated gloves	Goggles
		
Wire stripper	M6/M8 sleeve	Pliers
		
MC4 wrench	MC4 crimping plie	Multimeter

6 Physical Layout

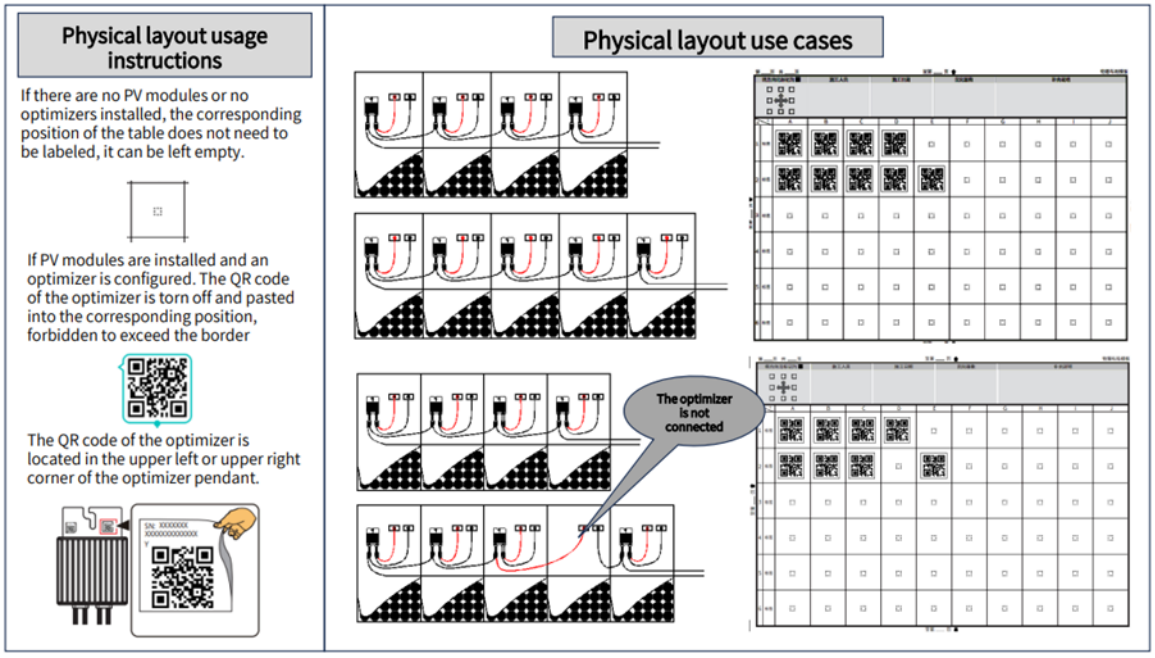
6.1 Layout Card

Physical Layout Template

Mark ■ for North	Installer	Installation date	Number of optimizers	Note

Row / Column		A	B	C	D	E	F	G	H	I	J
1	label										
2	label										
3	label										
4	label										
5	label										
6	label										

6.2 How to Layout



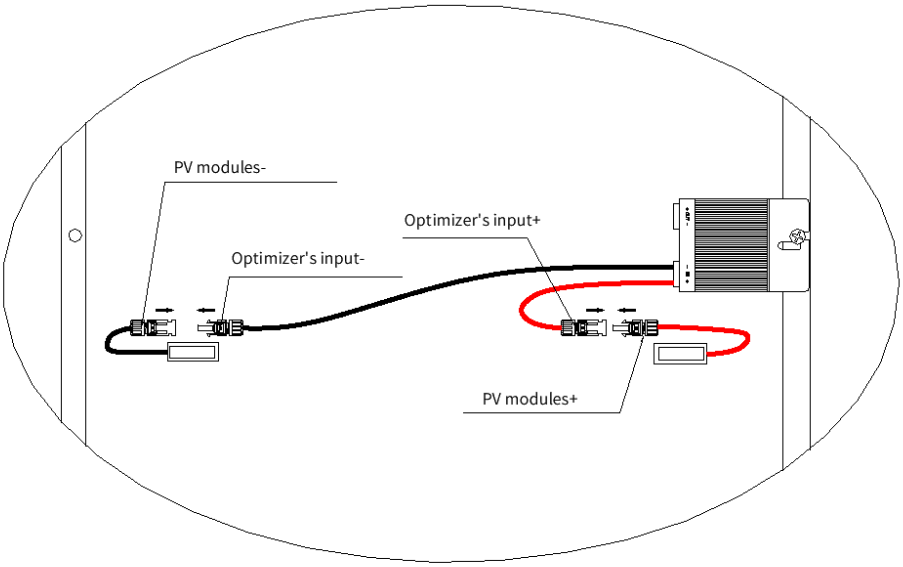
7 Electrical Connection

7.1 Connection with PV modules

Connect the input positive electrode of the optimizer to the positive electrode of the component, and connect the input negative electrode of the optimizer to the negative electrode of the component.

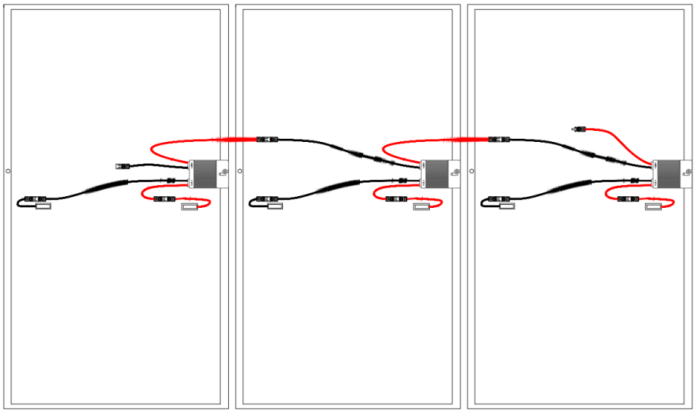
7.2 Check if the optimizer is normal

- Multimeter to DC file;
- Insert the positive pen of the multimeter into the MC4 terminal of the positive output of the optimizer;
- Insert the negative pen of the multimeter into the MC4 terminal of the negative output of the optimizer;
- Measure the output voltage value of the optimizer, and the multimeter shows that the voltage value is normal.



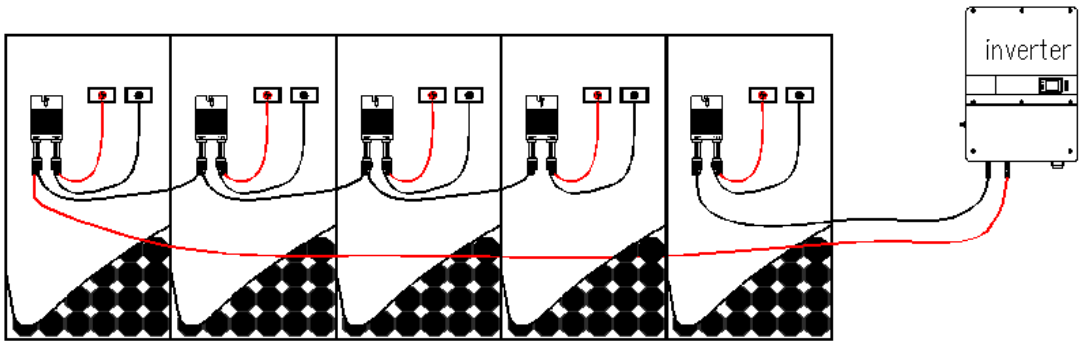
7.3 Connection between optimizers

The optimizer is connected according to the photovoltaic design requirements, and the output of the optimizer is connected with the negative electrode of the side optimizer.



7.4 Both ends of the string are connected to the inverter

After the direct connection of the optimizer is completed, the remaining output of a string is connected to the positive access of the inverter, and the output is connected to the negative access of the inverter.



8 APP operation Find

8.1 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.

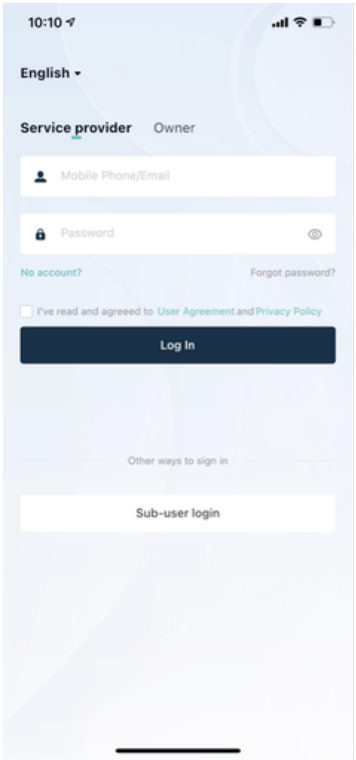
Android

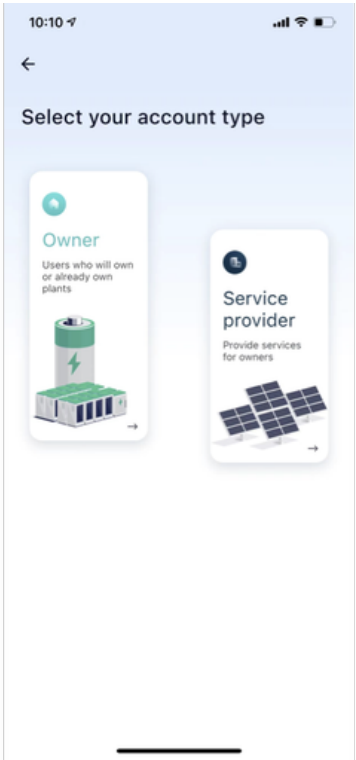
IOS

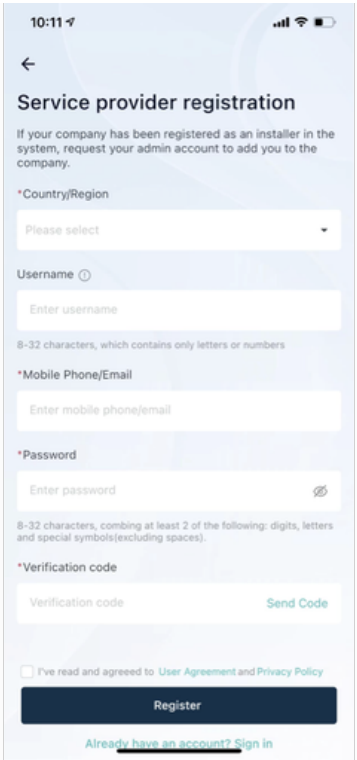
Note: When you selecting "Browser download" method. If prompted "This application is from an unofficial app store..." and other prompts during the installation process, please click "Continue installation".

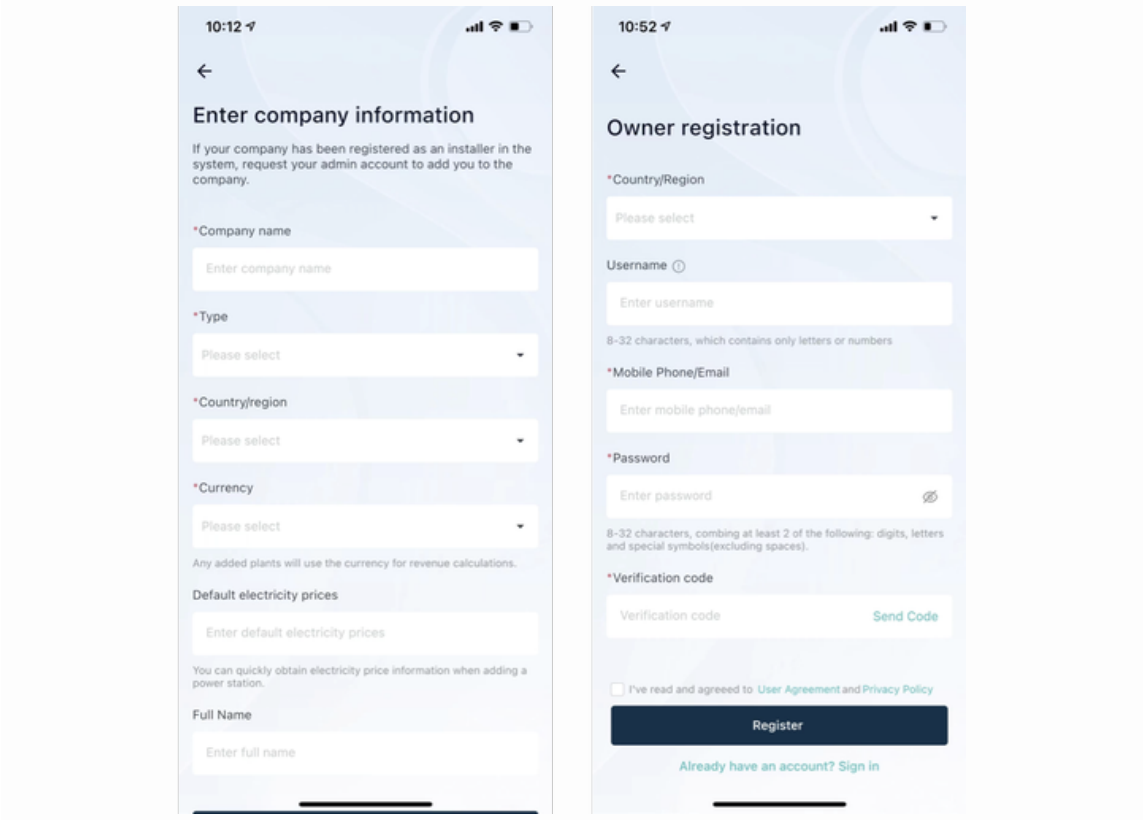
8.2 Registration and Login

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





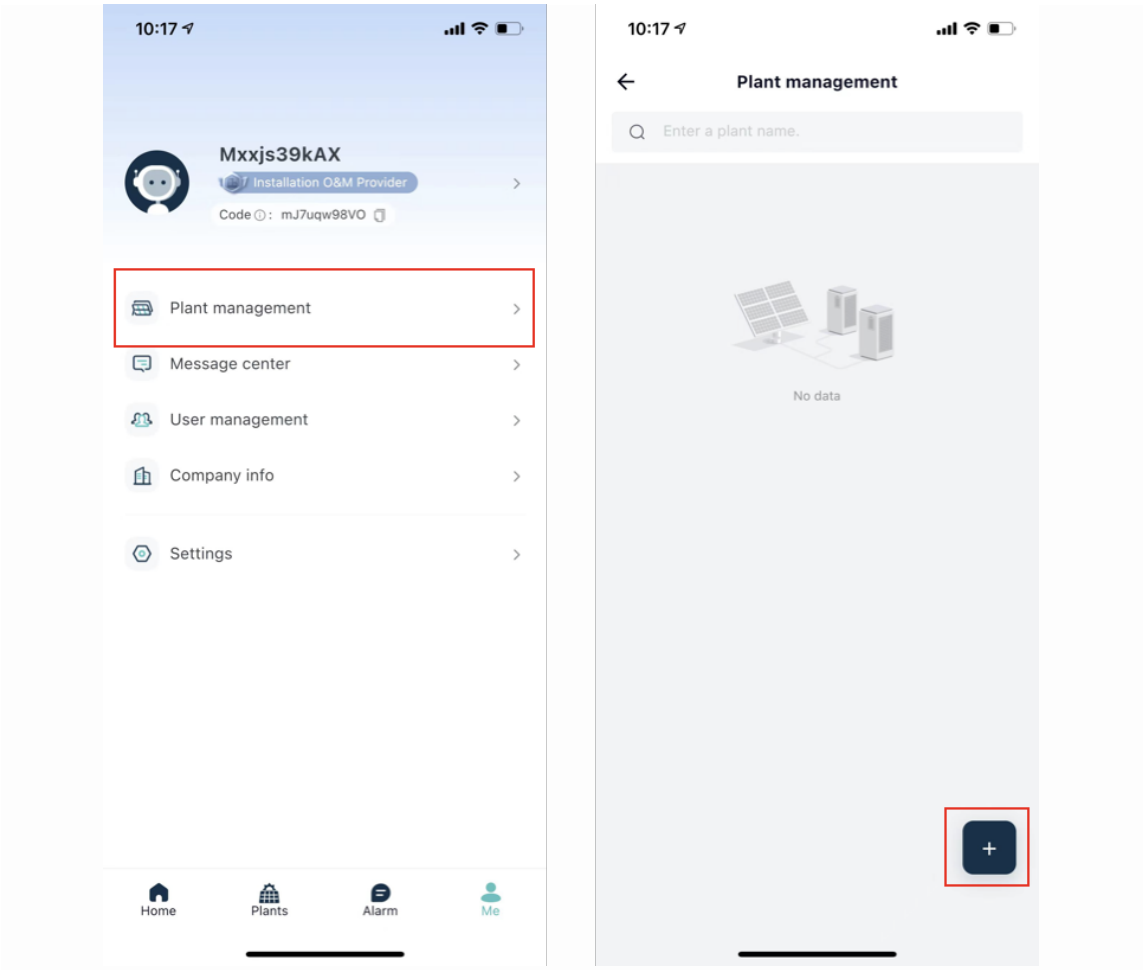




8.3 Create a Power Station

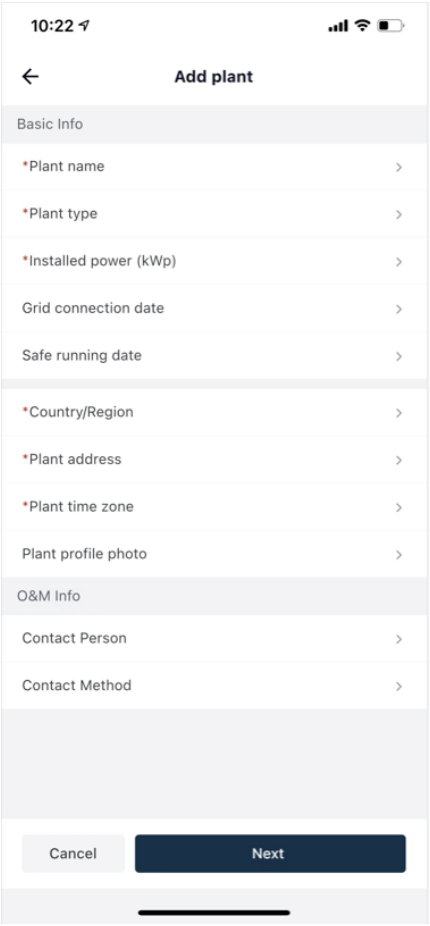
Step 1: Enter the power station addition page

Log in to the account you just created, and gradually click [My] - [Power Station Management] - [+] to enter the power station addition page.



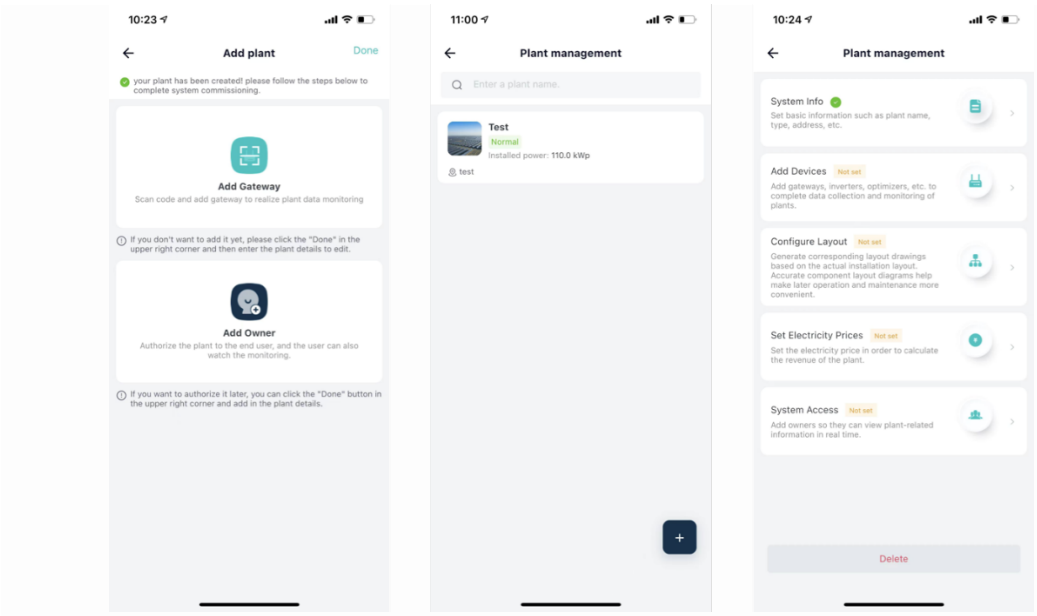
Step 2: Improve the power station information

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.



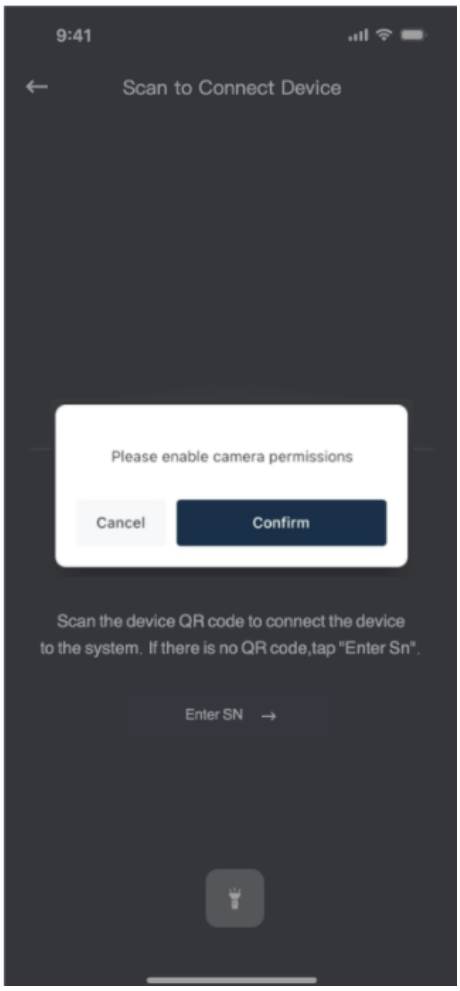
2) After completing the power station information, please click the [Next] button at the bottom of the page to complete the creation, and the system will enter the interface of Figure 1 below.

- You can directly add devices and authorized users on the Power Station Creation Success page in Figure 1, or click the [Finish] 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.



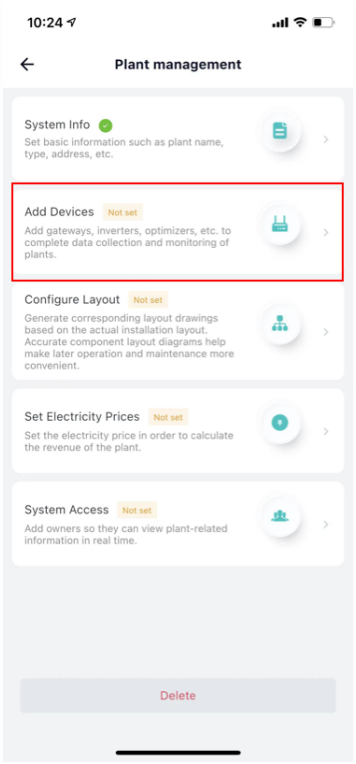
Step 3: Configure the gateway

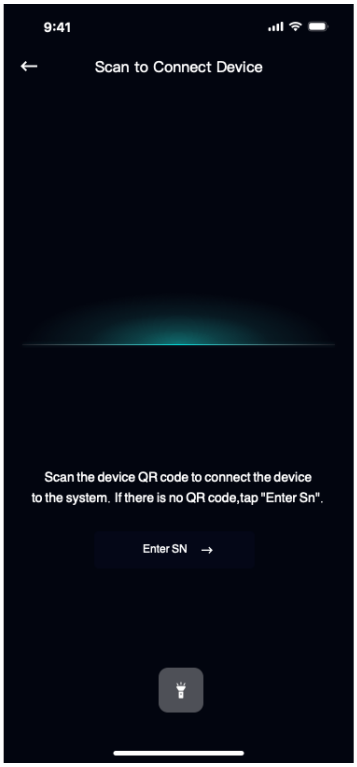
1) Enable the camera permission of the mobile phone: Click [Add Gateway] on the power station creation successfully completed page or click [Configure Gateway] on the main interface of power station editing, and the system will enter the code scanning interface. When using it for the first time, the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

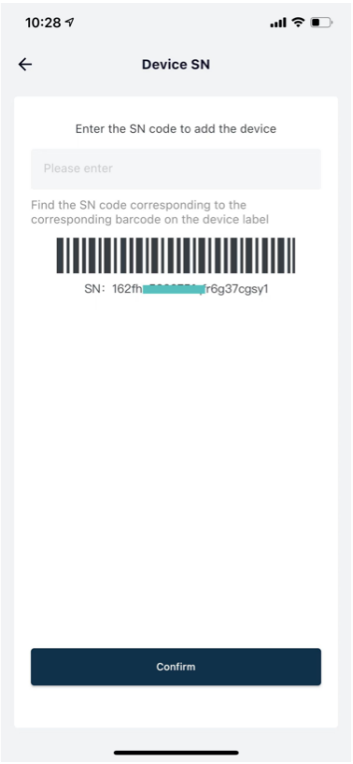


2) Reset the device: connect the device to the power supply and connect it to the home router, and confirm that the indicator light is always on.

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

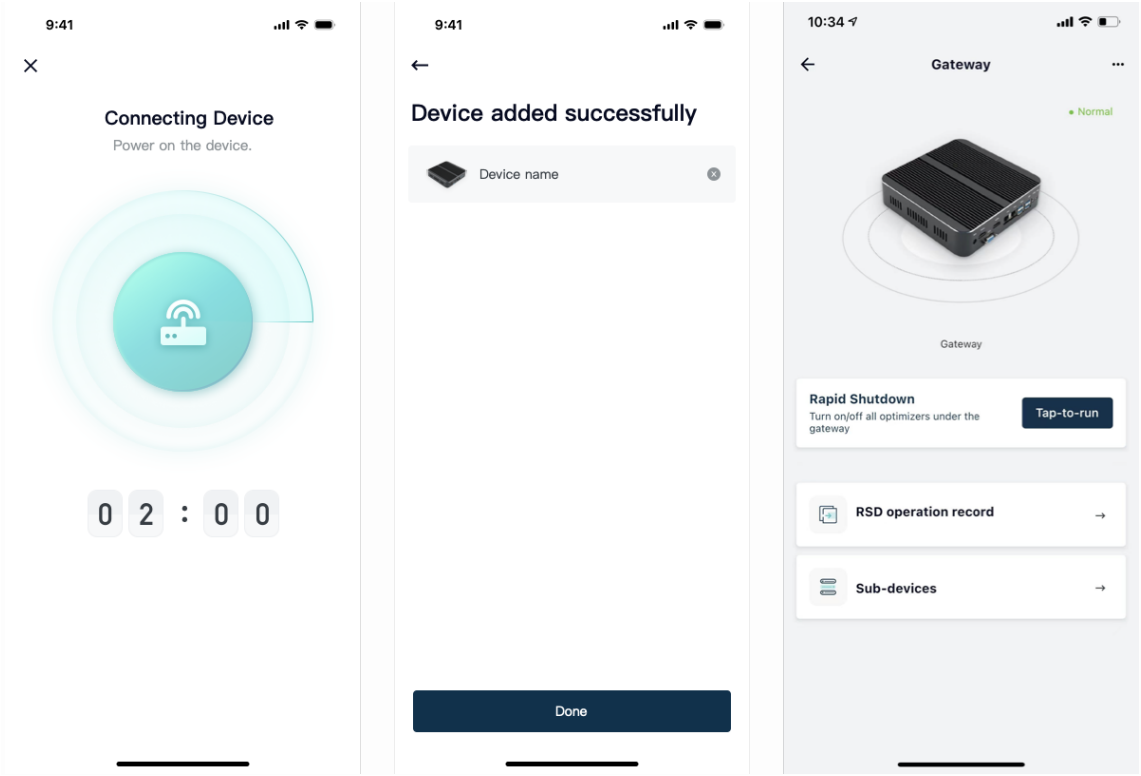






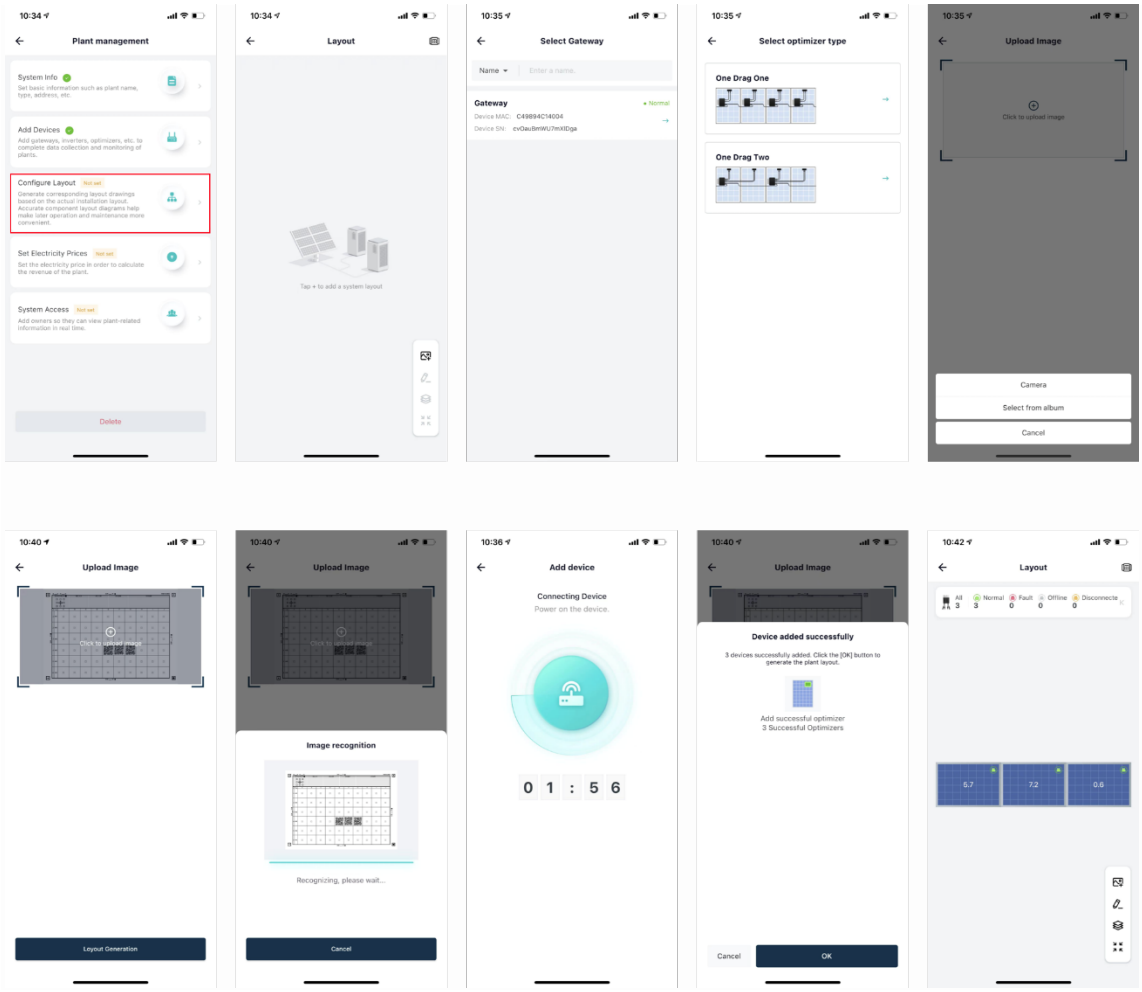
4) The device will enter the distribution network interface if the code is successfully scanned, and the distribution network will count down for 2 minutes.

- If the addition is successful, the system will enter the distribution network success interface (Figure 2 below). 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.



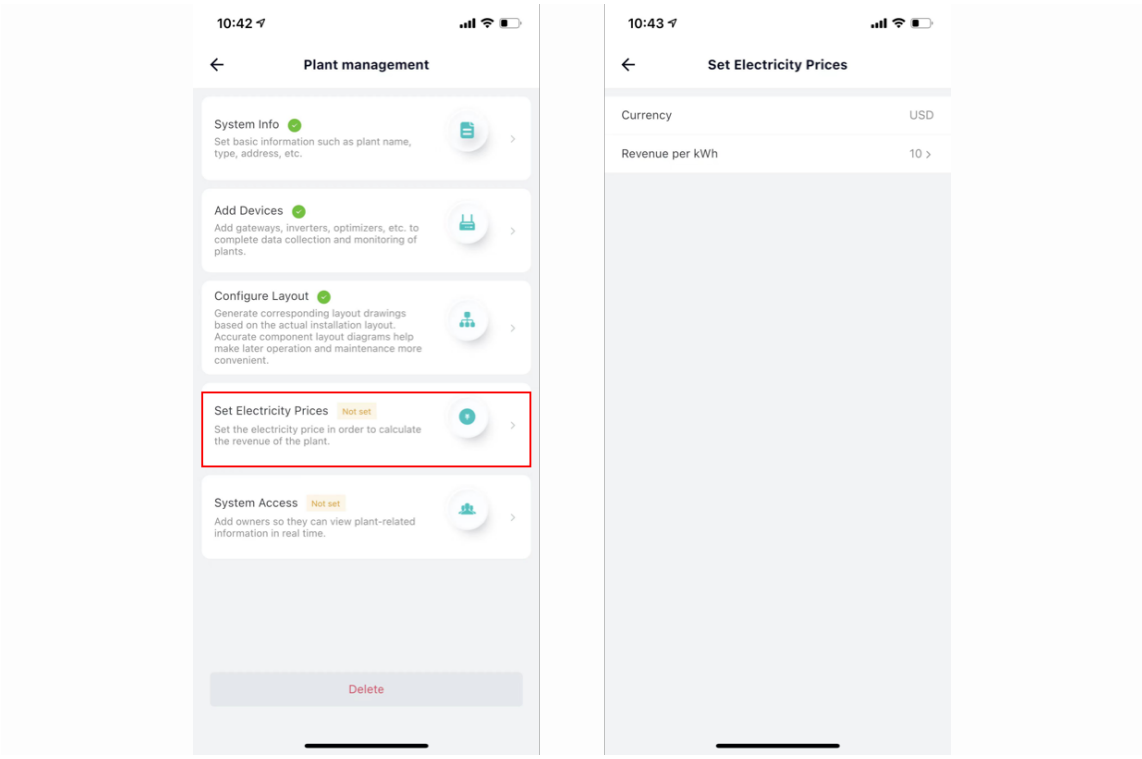
8.4 Add Layout

Select the gateway to which the optimizer needs to be configured, then select the template to shoot the QR code that has just been pasted, and follow the figure to complete the optimizer layout generation. Note: An optimizer can have up to 30 gateways.

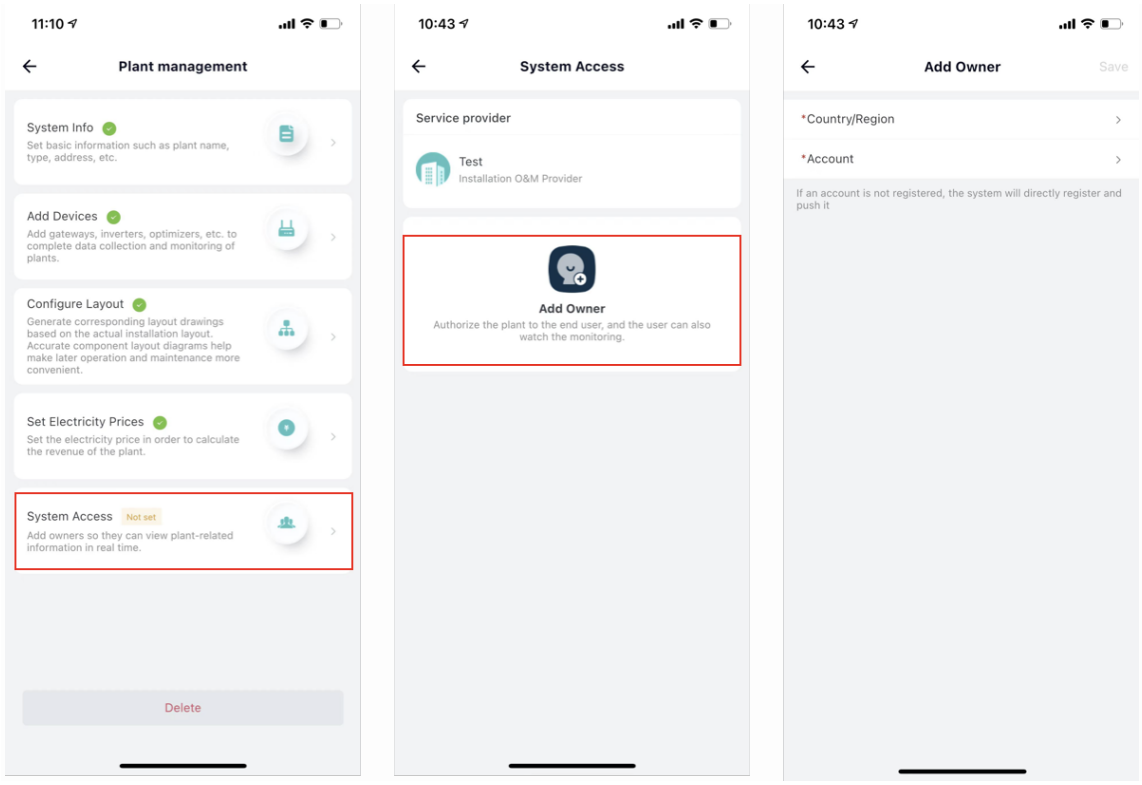

Plant management
System Info
Add Devices
Configure Layout
Set Electricity Prices
System Access
Delete
Layout
Select Gateway
Gateway
Select optimizer type
One Drag One
One Drag Two
Upload Image
Camera
Select from album
Cancel
Upload Image
Layout Generation
Upload Image
Image recognition
Recognizing, please wait...
Cancel
Add device
Connecting Device
Power on the device.
01 : 56
Upload Image
Device added successfully
3 devices successfully added. Click the [OK] button to generate the plant layout.
Add successful optimizer
3 Successful Optimizers
Cancel
OK
Layout

8.5 Improve the information

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.



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



9 Practice Running

9.1 Check before Running

- 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.

9.2 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.

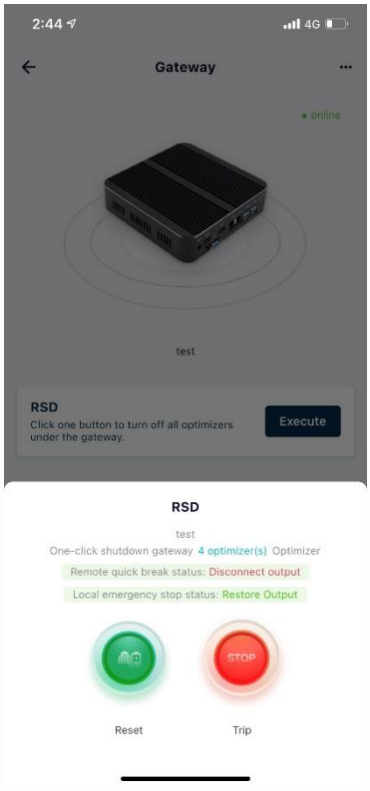
Step 3: If DC switch is provided between the inverter and the photovoltaic string, close the switch.

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

9.2.1 Remote Quick Break Function Detection

1) Fast break the hair

Use the mobile phone to issue a fast shutdown command. After the command is issued, observe the return state on the app and observe whether the input voltage of the inverter decreases below 30V.



2) Quick break recovery

After testing the fast break command, click the resume command to restore the output of the

optimizer. (Important: Otherwise the photovoltaic system cannot generate electricity)

9.2.2 Local quick-break function detection

- Under the premise of normal grid-connected operation, press the quick-break button switch, and observe the input state of the inverter after 18 seconds. If the DC input voltage of the inverter is lower than 30V, it means that the quick-break function is realized.
- After the quick-break function test is completed, reset the quick-break button. After 10 seconds, observe whether the DC input of the inverter is normal. If normal, the quick-break reset is successful.
- There is no difference after a round of testing.

10 Troubleshooting and operation and maintenance

- Once the optimizer fails, the fault information can be displayed on the mobile App interface or the PC interface.
- The fault codes and troubleshooting methods of all optimizers are detailed in the table below. The model you purchased may only contain part of the fault information. When the optimizer fails, you can use the fault code or alarm name on the mobile App to carry out the corresponding information. query.

Fault code	Alarm name	Cause	Handle opinions
0300	Input overvoltage	Optimizer input overvoltage	Check whether the open circuit voltage specification of the optimizer input component exceeds 70V
0301	Input ≤ 15V	Optimizer input is too low, insufficient sunlight	Detect if the open circuit voltage of the optimizer access component is below 15V
0303	Input overcurrent	Optimizer input overcurrent	Check if the operating current of the optimizer input component is greater than 18A
0306	ShortOverLoad	Optimizer input overload	Check if the peak power of the optimizer input component is greater than 600W
0307	LongOverLoad	Optimizer input overload	Check if the peak power of the optimizer input component is greater than 600W
0308	Output overtemperature	Optimizer output overtemperature	1. Check whether the ventilation of the installation location of the optimizer is good and whether the ambient temperature exceeds the maximum allowable ambient temperature range. If there is no ventilation or the ambient temperature is too high, please improve its ventilation and heat dissipation. 2. If the ventilation and ambient temperature are normal, please contact the dealer or Changyuan SolarPilot
0309	Anti-reverse overtemperature	Anti-anti-diode overtemperature	
0310	MOS over temperature, alarm	MOS tube over temperature	
0311	MOS over temperature, malfunction	MOS tube overtemperature and failure	
0312	Loss > 20W	The optimizer's own loss is too large	Please contact the dealer or Changyuan SolarPilot
0313	Efficiency < 70%	Optimizer efficiency is too	Please contact the dealer or Changyuan SolarPilot

		low	

11 Replace the Optimizer

11.1 Prerequisites

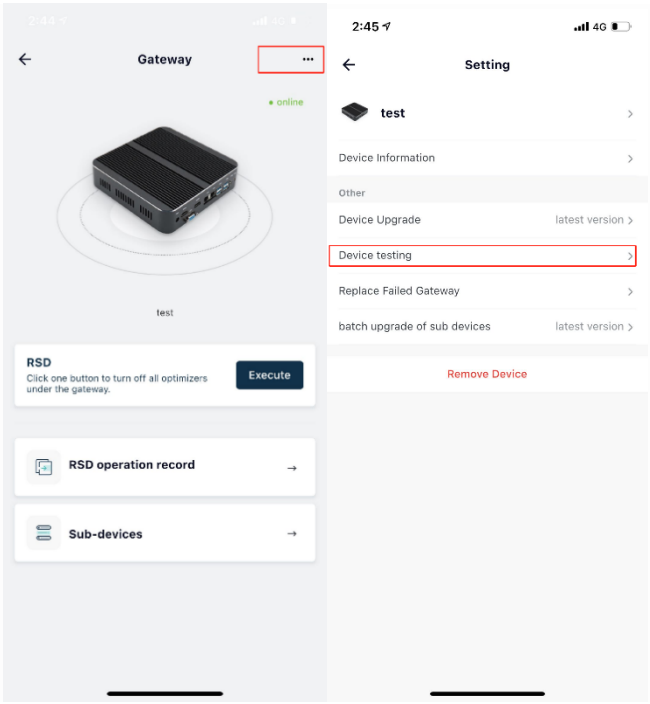
Please use special insulation tools, wear insulated shoes and protective gloves before operating;

Ready for the new smart PV optimizer;

Prepare your phone with an installed monitoring app.

11.2 Operation steps

1) Wear labor protection gloves to disconnect the external AC circuit breaker and prevent reconnection due to misoperation.
2) Disconnect the external DC circuit breaker and turn the DC switch of the inverter to "OFF".
3) 3Wait for at least 5 minutes until the capacitance inside the inverter is fully discharged.
4) Use the current clamp to detect the DC cable and confirm that there is no current.
5) Disconnect the input terminal of the optimizer.
6) Remove the old optimizer.
7) Re-walk the distribution network process with APP.
8) Operate the replacement optimizer function on the APP.
9) Install a new optimizer.
10) Power on the inverter again, open the app to observe the monitoring status.



12 Technical Indicators

Product specification	SP1-600W-AS	SP1-600W-AL
Efficiency		
Maximum efficiency	≥99.5%	
European efficiency	≥99.0%	
Direct current input		
Input maximum power	600W	
Maximum input voltage	70V	
MPPT voltage range	10～70V	
Starting voltage	15V	
Maximum input current	15A	
DC output		
Output power	0～600W	
Output voltage	0～70V	
Maximum output current	18A	
Function		
Bypass cut-off function	have	
Automatic shutdown function	have	
Manual shutdown function	have	
DC overvoltage protection	have	
DC overload protection	have	
Polarity reverse protection	have	
Short circuit protection function	have	
Wireless Data Acquisition	have	
Detection accuracy		
Voltage	0.01V	
Current	0.001A	

General parameters		
Dimensions (width * length * thickness)	95mm*129mm*56mm	
Net weight	≤1000g	
Protection class	IP68	
System voltage	1100V	
Data reporting cycle	1 minute	
Data transmission distance	≤100m(outdoor)	
	≤30m(indoor)	
DC input/output terminals	MC4	
Input DC line length	≥0.12m	≥1.0m
Output DC line length	≥1.2m	
Working temperature	-45℃～85℃	
Storage temperature	-40℃～70℃	
Working humidity	0%～100%	
Working altitude	2000m	
Power supply mode	PV module supply	
Off time	≤18S	
Installation method	Fixed bracket/Fixed photovoltaic panel frame	

Appendix A: Contact Information

If you have technical questions concerning our products, please contact our support through SolarPilot web service portal: www.solarpilot.com/support

Region	Country	Email	Tel.

Appendix B: Acronyms and Abbreviations

D	
DC	direct current
E	
EFT	electrical fast transient
EMI	electromagnetic interference
EMS	eletromagnetic susceptibility
ESD	electrostatic discharge
M	
MPPT	maximum power point tracking
R	
RE	radiated emission
RS	radiated susceptibility

SolarPilot

If you have technical querise concerning our products,

please contact us:

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Telephone: +86 0751-88779861

Website: https://www.solarpilot.com