

User Manual

PV Rapid Shutdown Equipment

SR20D-M



All Rights Reserved

All Rights Reserved

No part of this document can be reproduced in any form or by any means without the prior written permission of Sungrow Power Supply Co., Ltd (hereinafter "SUNGROW").

Trademarks

SUNGROW and other Sungrow trademarks used in this manual are owned by SUNGROW.

All other trademarks or registered trademarks mentioned in this manual are owned by their respective owners.

Software Licenses

- It is prohibited to use data contained in firmware or software developed by SUNGROW, in part or in full, for commercial purposes by any means.
- It is prohibited to perform reverse engineering, cracking, or any other operations that compromise the original program design of the software developed by SUNGROW.

About This Manual

This manual gives an introduction to the PV rapid shutdown equipment as well as instructions on its installation, operation, and maintenance, yet not all-encompassing regarding the information about the PV system. You may visit www.sungrowpower.com or the website of the device manufacturer for more information.

Validity

This manual applies to the following product:

- SR20D-M

It is referred to as "RSD" hereinafter unless otherwise specified.

Target Group

This manual is intended for qualified technical persons who are responsible for the RSD installation, operation, and maintenance and users who need to check its parameters.

The installation must only be performed by qualified technical persons. Qualified technical persons must:

- Have certain electrical wiring, electronic, and mechanical expertise, and be familiar with electrical and mechanical schematics;
- Have received professional training in the installation and commissioning of electrical equipment;
- Be able to respond quickly and effectively to dangers or emergencies that may occur during the process of installation and commissioning;
- Be familiar with applicable local standards and relevant safety regulations on electrical systems;
- Read through this manual carefully and have a good understanding of the relevant safety instructions.

How to Use This Manual

Read through this manual carefully before using the product, and keep it properly in an easy-to-reach place.

The manual may be updated and revised from time to time, however, there still might be slight deviation from the real product or errors. In such cases, the actual product you have purchased should take precedence. You can find the latest version of the manual at <https://support.sungrowpower.com> or reach your sales for it.

Security Declaration

For details on the product's network security vulnerability response process and vulnerability disclosure, please visit the following website: <https://en.sungrowpower.com/security-vulnerability-management>.

For more information on network security, please refer to the user manual of the communication module or the Data Logger that comes with the product.

Symbols in the Manual

To ensure the safety of life and property for users when using the product and to improve the efficiency of product use, the manual provides relevant information, which are highlighted by the following symbols.

Symbols used in this manual are listed below. Please review carefully for better use of this manual.

DANGER

Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

WARNING

Indicates a moderately hazardous situation which, if not avoided, will result in death or serious injury.

CAUTION

Indicates a slightly hazardous situation which, if not avoided, may result in minor or moderate injury.

NOTICE

Indicates a potential hazard which, if not avoided, will result in device malfunction or property damage.



“NOTE” indicates supplementary information, emphasis on specific points, or tips related to the use of the product that might help to solve your problems or save your time.

Contents

All Rights Reserved	I
About This Manual	II
1 Safety Instructions	1
1.1 Unpacking and Inspection	1
1.2 Installation Safety	1
1.3 Electrical Connection Safety	2
1.4 Operation Safety	3
1.5 Maintenance Safety	3
1.6 Disposal Safety	4
2 Product Description	5
2.1 System Introduction	5
2.2 RSD Introduction	6
2.3 Signs on the Product	7
2.4 Configuration Principles	8
2.5 Application Scenario	8
3 Unpacking and Storage	9
3.1 Unpacking and Inspection	9
3.2 RSD Storage	9
4 Mechanical Mounting	11
4.1 Installation Site Selection	11
4.2 Installation Tools	12
4.3 RSD Mounting	12
4.3.1 Installation Scenarios	13
4.3.2 Preparation Before Mounting	13
4.3.3 Mounted on PV Module (Clip-on)	15
4.3.4 Mounted on Aluminum Guide Rail	16
4.3.5 Mounted on Steel Guide Rail (T-head bolt)	17
4.3.6 Mounted on Steel Guide Rail (Bolt Assembly)	17
5 Electrical Connection	18
5.1 Safety Instructions	18
5.2 Terminal Description	20

5.3 Cable Preparation	20
5.4 RSD Wiring	22
5.5 Wiring Notices	28
6 Commissioning	30
6.1 Inspection Before Commissioning	30
6.2 Set RSD Physical & Logical Layouts	30
6.2.1 RSD Physical Layout Setting (iSolarCloud App)	30
6.2.2 RSD Logical Layout Setting (iSolarCloud App)	35
6.2.3 RSD Physical Layout Setting (iSolarCloud)	37
6.2.4 RSD Logical Layout Setting (iSolarCloud)	40
6.3 View RSD Layout	41
6.3.1 Check RSD Status	41
6.3.2 View Layout	43
6.3.3 View Module Information	44
7 RSD Decommissioning, Dismantling, and Disposal	46
7.1 Decommission the RSD	46
7.2 Dismantle the RSD	46
7.3 Dispose of the RSD	47
8 Troubleshooting and Maintenance	48
8.1 Troubleshooting	48
8.2 Maintenance	48
8.2.1 Maintenance Notices	48
8.2.2 Routine Maintenance	49
8.2.3 Replace the RSD	50
8.3 Appendix	51
8.3.1 Technical Data	51
8.3.2 Quality Assurance	51
8.3.3 Contact Information	52

1 Safety Instructions

When installing, commissioning, operating, and maintaining the device, strictly observe relevant safety instructions. Incorrect operation or work may cause:

- Injury or death to the operator or a third party.
- Damage to the device and other properties.

Strictly follow the safety instructions stated in the manual to avoid the hazards mentioned above.



- The safety instructions in this manual are only supplements and cannot cover all the precautions that should be followed. Perform operations considering actual on-site conditions.
- SUNGROW shall not be held liable for any damage caused by violation of general safety operation requirements, general safety standards, or any safety instruction in this manual.
- When installing, operating, and maintaining the device, comply with local laws and regulations. The safety precautions in this manual are only supplements to local laws and regulations.

1.1 Unpacking and Inspection

WARNING

Check all safety signs, warning labels, and nameplates on products.
The safety signs, warning labels and nameplates must be clearly visible and cannot be removed or covered before the product is decommissioned.

NOTICE

After receiving the product, check whether the appearance and structural parts of the device are damaged, and check whether the product received is consistent with the order. If there are problems with the above inspection items, do not install the device and contact SUNGROW in time.

1.2 Installation Safety

DANGER

Make sure there is no electrical connection before installation.

NOTICE

Before operating the product, please check and ensure that tools to be used have been maintained regularly.

1.3 Electrical Connection Safety

⚠ DANGER

Before electrical connections, make sure that the RSD is not damaged. Otherwise, it may lead to dangers!

Before electrical connections, make sure that all switches connected to the RSD are set to "OFF". Otherwise, it may lead to electric shocks!

The RSD does not support hot swapping. Do not add or remove an RSD with power on, otherwise, the RSD may get damaged!

⚠ DANGER

Hazardous voltages on the PV string when it is exposed to sunlight!

- **Operators must wear proper personal protective equipment during electrical connections.**
- **Check and confirm that the DC cables are voltage-free using a measuring instrument before touching them.**
- **Observe all the safety instructions listed in the documents for the PV string and other relevant documents.**

⚠ DANGER

- **Be sure to use specialized insulated tools during wiring.**
- **Observe the warning signs on the RSD, and perform operations by strictly following the corresponding safety instructions.**
- **Observe all the safety instructions listed in this manual and other relevant documents for the product.**

⚠ WARNING

Improper wiring may damage the product, and such damage will not be covered by the warranty.

- **Electrical connections must only be performed by qualified technical persons.**
- **The specification of cables used in the PV system should meet the relevant requirements. The cables should be well-insulated and firmly connected.**

⚠ WARNING

Check the positive and negative terminals of the PV module cables first. Connect the PV module cables to the DC terminals on the product only after confirming that the polarity is correct.

During the installation and operation of the RSD, ensure that the positive or negative of the PV string is not short-circuited to the ground. Otherwise, the product may be damaged, and such damage will not be covered by warranty.

NOTICE

Wiring must be done in compliance with the applicable local grid regulations and relevant safety instructions specified for the PV string.

1.4 Operation Safety

⚠ DANGER

- Do not plug or pull out any connector on the RSD when it is running.
- Do not disassemble the RSD or remove any of its parts or components when it is running. Otherwise, it may lead to electric shocks.
- Do not touch the RSD when it is running. Otherwise, it may cause burns.
- Do not take other actions, such as setting parameters, during the process of firmware update, to avoid update failure.

1.5 Maintenance Safety

⚠ DANGER

Risk of personal injury or device damage due to improper servicing!

- Be sure to use specialized insulated tools when performing high-voltage operations.
- Before maintenance, power off the input and output sides first, then test the voltage and current using the specialized measuring instrument. Maintenance can be carried out by qualified persons who wear proper protective equipment only after confirming that no voltage or current is present.
- Danger of burns due to a hot surface still exists even if the product has stopped running. Perform operations on the product wearing protective gloves after it cools down.

⚠ WARNING

In case of a fault in the product during its operation, before powering on again, make sure the fault has been removed. Otherwise, it may cause the influence of the fault to spread or device damages.

⚠ CAUTION

To prevent irrelevant personnel from operating the product by mistake or other accidents, please set up highly visible warning signages around the product or fence off a warning zone.

NOTICE

To minimize the risk of electric shocks, do not perform maintenance operations that are not specified in this manual. If necessary, contact SUNGROW for maintenance. Losses arising from failure to observe this instruction will not be covered by warranty.

1.6 Disposal Safety

⚠ WARNING

Please scrap the product in accordance with relevant local regulations and standards to avoid property losses or casualties.

2 Product Description

2.1 System Introduction

The PV Rapid Shutdown Equipment (hereinafter referred to as "RSD") is a device that can quickly cut off the PV modules. It can break the connections of PV modules in case of an emergency, thus eliminating the high DC voltage in the PV array, to ensure the safety of the whole PV system.

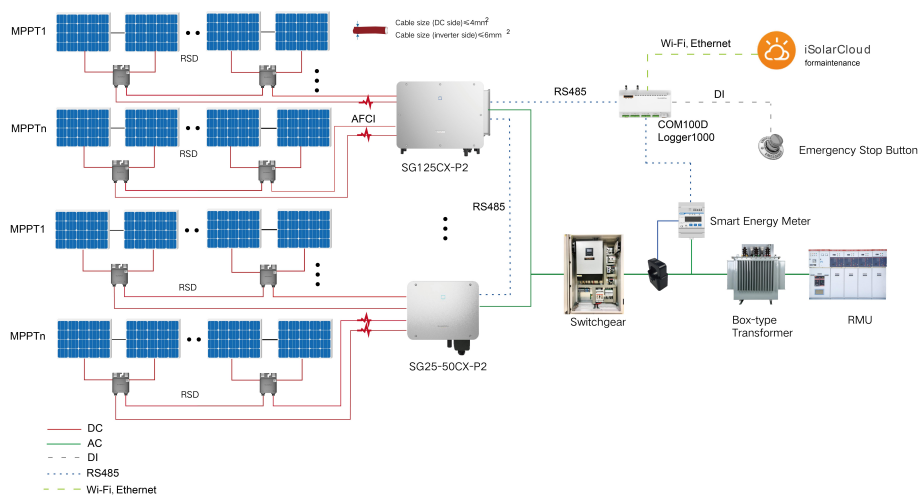


figure 2-1 Application of RSDs in Commercial and Industrial System

NOTICE

The SR20D-M RSD is not compatible with third-party inverters.

2.2 RSD Introduction

Product Model

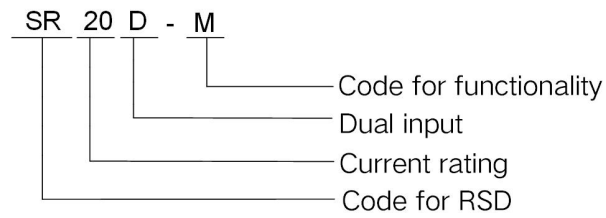


figure 2-2 Product Model

External Design

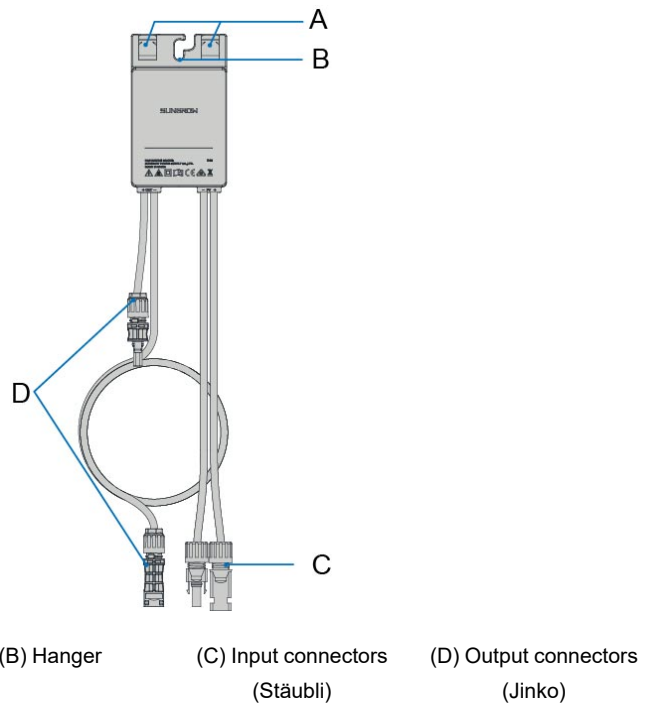
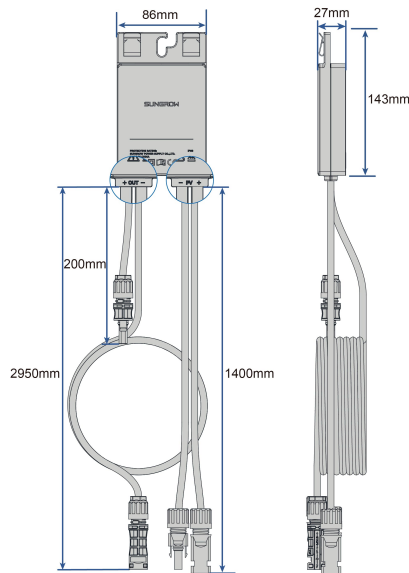


figure 2-3 External Design

*The figure here is for illustration only and the real product may differ.

Dimensions



2.3 Signs on the Product

Sign	Description
	Do not dispose of the RSD as household waste.
	Read the manual before performing any operation on the RSD.
	CE compliance mark. EU/EEA imports.
	RCM compliance mark.
	Burn hazard due to the hot surface that may exceed 60°C.
	Beware of electric shocks.
	Equipment protected by double insulation or reinforced insulation.

2.4 Configuration Principles

Compatible inverter models

This RSD can be used in conjunction with SUNGROW SG25/30/33/40/50CX-P2 and SG125CX-P2 inverters.

Number of RSDs supported by communication device

The WiNet-S2 supports the use of up to 400 RSDs, while the Logger1000A and the Logger1000B support up to 4900 RSDs.

Requirements for PV module connection

- Up to 15 RSDs can be installed in each PV string.
- The number of PV modules connected to RSDs in each PV string must not exceed the maximum number of modules allowed in one string by the inverter.
- The maximum open-circuit voltage of each PV string must not exceed 1100V.

2.5 Application Scenario

Full-coverage Deployment

Full-coverage deployment refers to the scenario where the PV modules attached to the inverter are all connected to RSDs.

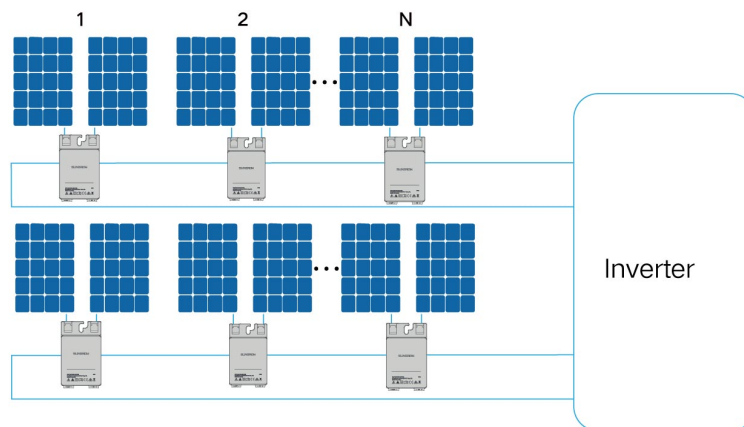


figure 2-4 Full-coverage Deployment



The RSD supports full-coverage deployment only. Partial-coverage deployment is not supported.

3 Unpacking and Storage

3.1 Unpacking and Inspection

The device is thoroughly tested and strictly inspected before delivery. Nonetheless, damage may still occur during shipping. For this reason, please conduct a thorough inspection after receiving the device.

- Check the packing case for any visible damage.
- Check the inner contents for damage after unpacking.

Contact SUNGROW or the transport company in case of any damage or incompleteness, and provide photos to facilitate services.

Do not dispose of the original packing case. It is recommended to store the device in the original packing case when the product is decommissioned.

NOTICE

After receiving the product, check whether the appearance and structural parts of the device are damaged, and check whether the packing list is consistent with the actual order. If there are problems with the above inspection items, do not install the device and contact SUNGROW in time.

If any tool is used for unpacking, be careful not to damage the product.

3.2 RSD Storage

If the RSD is not to be put into use immediately, store it properly by following the below requirements.

- Repack it using the original packing crate.
- The temperature for RSD storage is -40°C to 85°C and the humidity is 0% to 95%.
- If the RSD crates are stacked, the number of layers in a stack should not exceed the maximum layers of stack indicated on the crate.
- The packing crate cannot be tilted or turned upside down.
- Do not store the RSD in places prone to direct sunlight, rain, or strong electric field.
- Do not store the RSD in places with items that may affect or damage it.
- The RSD should be kept in a clean, dry, and ventilated place and protected from the intrusion of dust and moisture.

- Do not store the RSD in places with corrosive chemicals or prone to damages by rodents or pests.
- Carry out routine inspections. Inspection should be conducted at least once every six months. Re-pack the RSD in time if any damage caused by pests or animals is found.
- If the RSD has been stored for more than a year, ask qualified personnel to inspect and test it before putting it into use again.

NOTICE

Store the RSD according to the storage requirements. Device damage arising from failure to observe the storage requirements will not be covered by warranty.

4 Mechanical Mounting

WARNING

Respect all local standards and requirements during mechanical installation.

4.1 Installation Site Selection

A good location is critical to the safe operation, long service life, and good performance of the RSD.

- The RSD is IP68 rated.
- It should be installed at a position convenient for electrical connection, operation, and maintenance.

Installation Environment Requirements

- Do not install the device in an environment with flammables, explosives, or smoke.
- Do not install the device in a place prone to water leak, e.g., under the air-conditioner vent, the air vent, or the cable outlet window of the machine room, so as to prevent device damage or short circuit caused by intrusion of water.
- Do not install the device in a place with corrosives such as corrosive gas and organic solvent, etc.
- Do not install the device in an environment contaminated with chemicals such as halogen and sulfide.
- Do not install the device in an environment with vibration and strong electromagnetic field. Strong-magnetic-field environments refer to places where magnetic field strength measures over 30A/m.
- The device must be out of reach of children.
- Protect the device from direct sunlight, rain, or snow to prolong its service life. A place with shelter is recommended for installing the device.
- Good heat dissipation is very important to the device. Please install it in a ventilated environment.
- The average temperature approximately 1 m around the device should be taken as its operating temperature. The temperature and humidity should meet the requirements below:

-40°C ~ 85°C



0 ~ 100%



4.2 Installation Tools

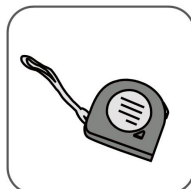
Installation tools include but are not limited to the following recommended ones. Use other auxiliary tools on site as needed.



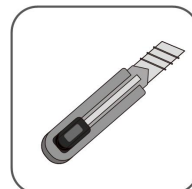
Protective gloves



Insulated shoes



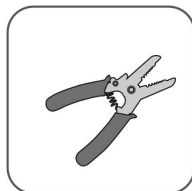
Tape



Utility knife



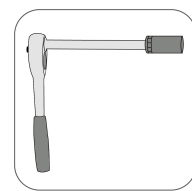
Wire cutter



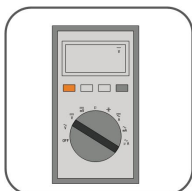
Wire strippers



Crimping tool



Socket wrench (M8)



Multimeter



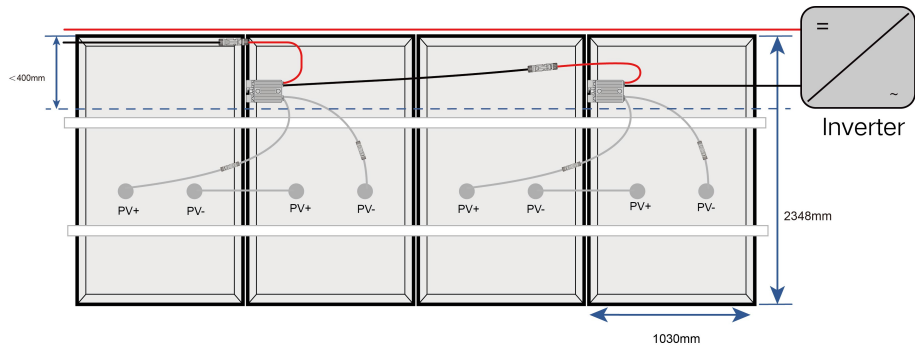
Open-end wrench
kit

4.3 RSD Mounting

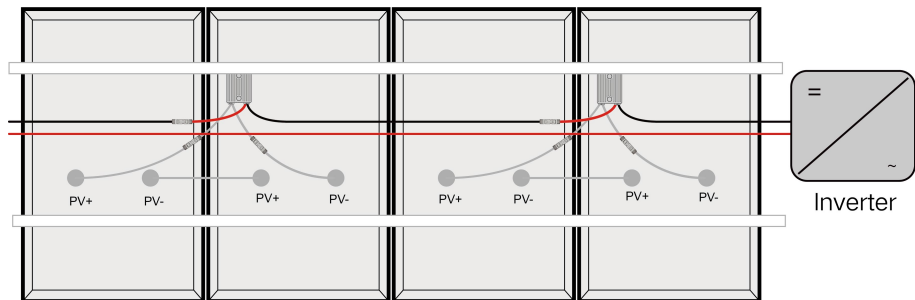
The RSD supports clip-on mounting and bolt mounting. Please choose a mounting method based on the on-site conditions.

4.3.1 Installation Scenarios

Clip-on mounting



Bracket mounting



NOTICE

- Before installation, select the appropriate RSD variant and decide the installation and arrangement schemes based on the actual situation, to ensure that the RSD can be connected to PV modules and adjacent RSDs normally.
- The mounting and wiring should be performed in compliance with local laws, regulations, safety standards, and installation specifications. If the cable is too long, do not let it hang down to the ground. You can secure it nearby to the bracket or the edge of the module.

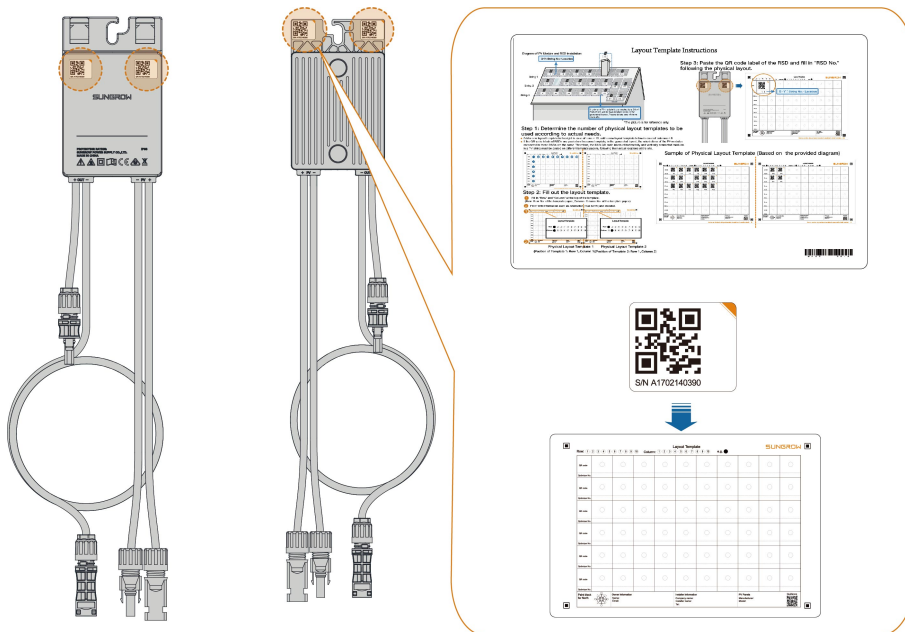
4.3.2 Preparation Before Mounting

Choose a mounting method based on actual needs



Decide the installation position of the RSD properly, to ensure that the RSD can be connected to PV modules and adjacent RSDs normally.

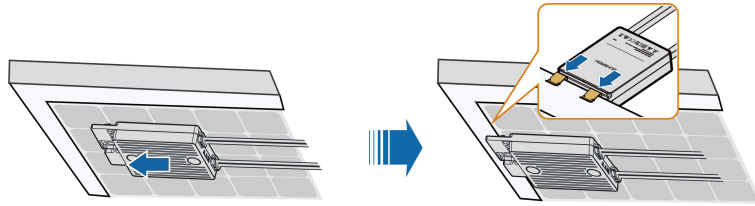
Decide on an appropriate position to mount the RSD. Remove the QR code label from the RSD, and attach the label to the template paper by referring to the instructions for "**Physical Layout Template**".



- Read through the instructions provided on the back of the layout template carefully before operation.
- Remove the QR code label from the RSD, and attach it to the layout template.
- Stick the RSD QR code label in the corresponding position on the template paper based on the actual position of the RSD at the site. Keep the QR code label flat and even, and make sure it does not go outside the cell border.

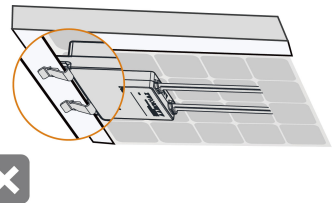
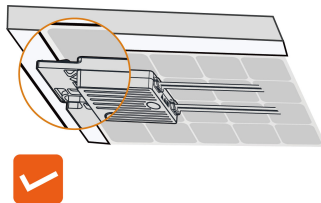
4.3.3 Mounted on PV Module (Clip-on)

Step 1 Clip the RSD into the back of the PV module, as shown in the figure below. Keep the RSD parallel to the PV module when clipping it on.

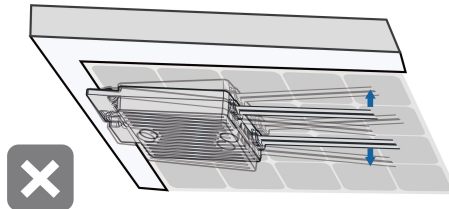


NOTICE

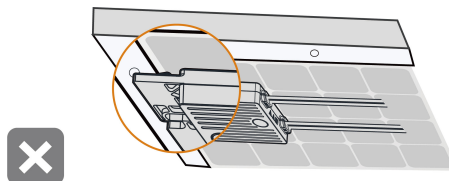
- Ensure that the RSD is installed facing the back of the module. Otherwise, the clips may get damaged.



- Do not apply force to the RSD in a direction vertical to its clips when clipping it onto the module. Otherwise, the clips may get damaged.



- Do not clip the RSD into holes in the module frame during installation. Otherwise, you may not be able to remove the RSD again and its clips may get damaged.

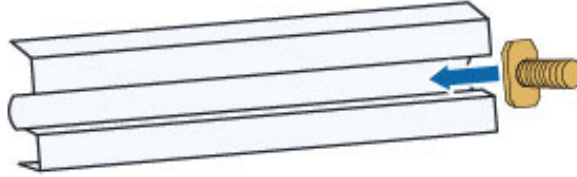


- It is recommended to install RSDs on the same side of modules.
- Do not clip and remove the RSD repeatedly. Otherwise, the clips may become loose and thus cannot function properly.

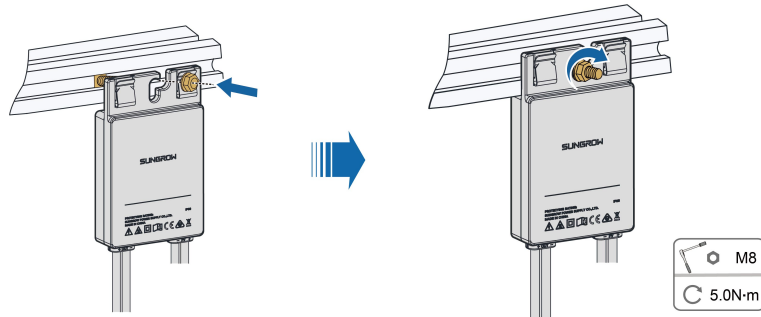
-- End

4.3.4 Mounted on Aluminum Guide Rail

Step 1 It is recommended to use M8×25 T-head bolt (not included in the scope of delivery). Slide the T-head bolt into the groove in the aluminum guide rail.

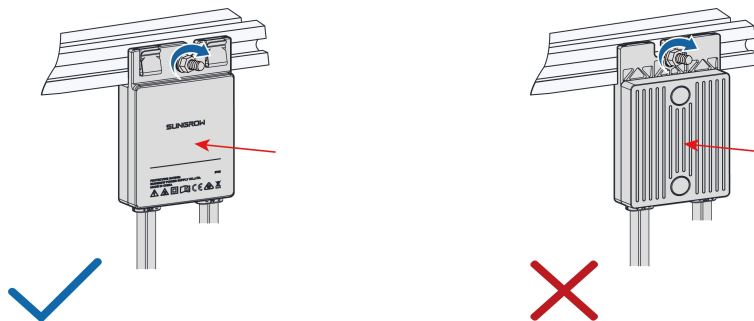


Step 2 Hang the RSD to the T-head bolt by its hanger, then fit the nut onto the bolt using a socket wrench, to secure the RSD to the aluminum guide rail. They are connected together in the order of nut, hanger, and then T-head bolt.



⚠ WARNING

- During installation, make sure the metal clips do not get in contact with the bracket.
- Install the RSD with its back tightly against the bracket. Installing it from the opposite direction may damage the RSD and such damage will not be covered by warranty.



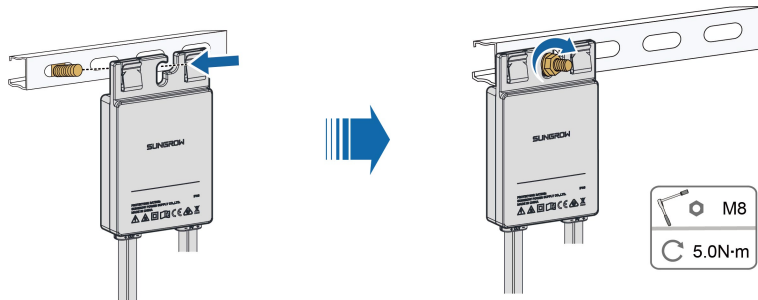
-- End

4.3.5 Mounted on Steel Guide Rail (T-head bolt)

Step 1 It is recommended to use M8×25 T-head bolt (not included in the scope of delivery). Insert the T-head bolt into the guide rail, and turn it 90°.



Step 2 Hang the RSD to the T-head bolt by its hanger, then fit the nut onto the bolt using a socket wrench, to secure the RSD to the steel guide rail. They are connected together in the order of nut, hanger, and then T-head bolt.



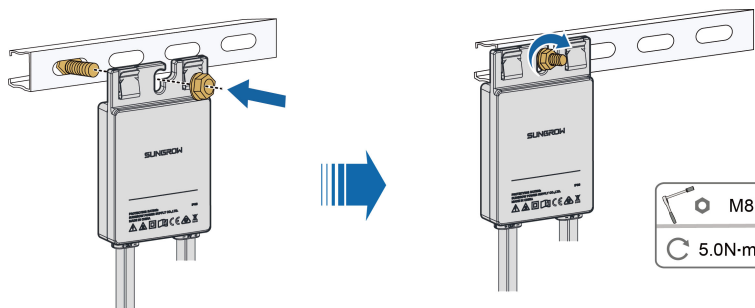
-- End

4.3.6 Mounted on Steel Guide Rail (Bolt Assembly)

Step 1 It is recommended to use the M8×25 bolt assembly (not included in the scope of delivery). Insert the bolt through the flat washer and spring washer into the guide rail.



Step 2 Hang the RSD to the bolt by its hanger, then fit the nut onto the bolt using a socket wrench, to secure the RSD to the steel guide rail. They are connected together in the order of nut, hanger, spring washer, flat washer, and then bolt.



-- End

5 Electrical Connection

5.1 Safety Instructions

DANGER

Hazardous voltages on the PV string when it is exposed to sunlight!

- Operators must wear proper personal protective equipment during electrical connections.
- Check and confirm that the DC cables are voltage-free using a measuring instrument before touching them.
- Observe all the safety instructions listed in the documents for the PV string and other relevant documents.

DANGER

- Before electrical connections, make sure that the RSD is not damaged. Otherwise, it may lead to dangers!
- Before electrical connections, make sure that all switches connected to the RSD are set to "OFF". Otherwise, it may lead to electric shocks!
- The RSD does not support hot swapping. Do not add or remove an RSD with power on, otherwise, the RSD may get damaged!
- Check that the input and output cables of the RSDs are all connected correctly (that is, the PV module should not be connected to the output side of the RSD, while the input side of the RSD should not be connected to the inverter side or other RSDs in the system); if the connection is wrong, correct it in time. Add and activate the RSDs in the software only after confirming that the connections are all correct. Otherwise, the improperly wired RSD may get damaged, and such damage will not be covered by warranty.

WARNING

Improper wiring may damage the product, and such damage will not be covered by the warranty.

- Electrical connection must only be performed by qualified technical persons.
- Operators must wear proper personal protective equipment during electrical connections.
- The specification of cables used in the PV system should meet the relevant requirements. The cables should be well-insulated and firmly connected.

NOTICE

All electrical connections must be done in compliance with the applicable local and national/regional electrical standards.

- **Cables used by the user should comply with the requirements of local laws and regulations.**

NOTICE

Wiring must be done in compliance with the applicable local grid regulations and relevant safety instructions specified for the PV string.



The wire colors in the figures in this manual are for reference only. Please select cables according to local cable codes.

5.2 Terminal Description

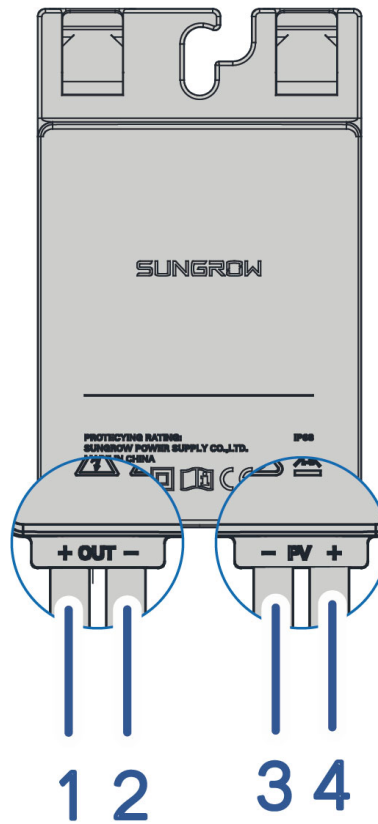


figure 5-1 Internal Terminals

No.	Mark	Description
1	OUT+	Positive output.
2	OUT-	Negative output.
3	PV-	Negative input.
4	PV+	Positive input.

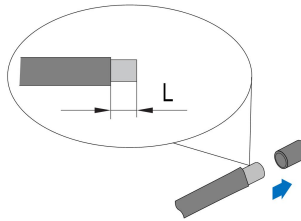
5.3 Cable Preparation

In the process of RSD wiring, if the main cable falls short and the connectors cannot reach each other, an extension cable is needed.

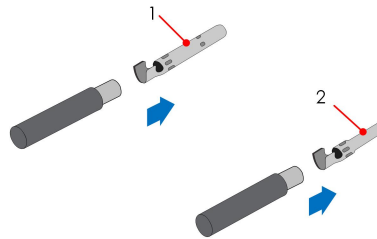
NOTICE

- **When preparing an extension cable, pay attention to the selection of DC connectors at the two ends of the cable. Do not mix them up.**
- **Make sure the DC connectors of the cable are identical to or compatible with the connectors on the product. Otherwise, it may lead to damage and such damage will not be covered by the warranty.**

Step 1 Strip the insulation layer of the DC cable by a length (L) of about 7–8 mm.



Step 2 Crimp the terminal onto the cable.



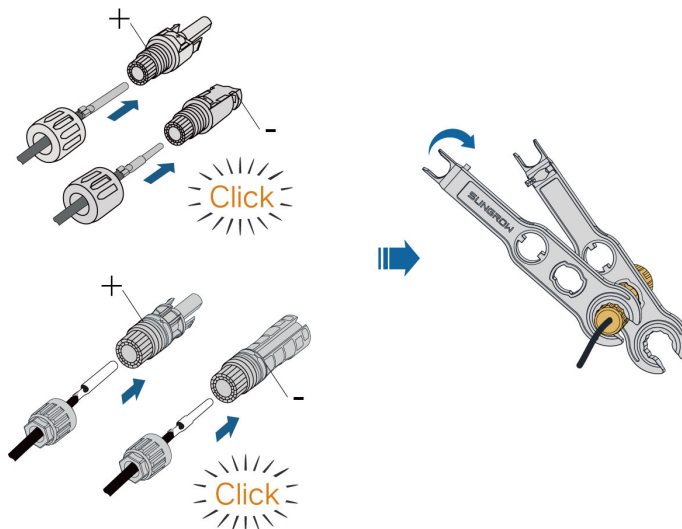
(1) Cold-pressed terminal, positive

(2) Cold-pressed terminal, negative

NOTICE

When making an extension cable, ensure that the cold-pressed terminals are of the same model as the DC connector, otherwise, the connection may be unreliable and the DC connector may be burned.

Step 3 Lead the cable through the cable gland, and insert the cold-pressed terminal into the insulator until it snaps into place. Pull gently the cable backward to make sure the connection is secure. Then, tighten the cable gland and the insulator at a torque of 2.5–3 N·m.



Step 4 Insert the positive DC connector into the corresponding negative DC connector, until there is an audible "click".

-- End

5.4 RSD Wiring

⚠ DANGER

Danger of electric shocks!

Pay attention! PV arrays carry hazardous high voltages when exposed to sunlight.

Ensure all cables are voltage-free before performing electrical operations.

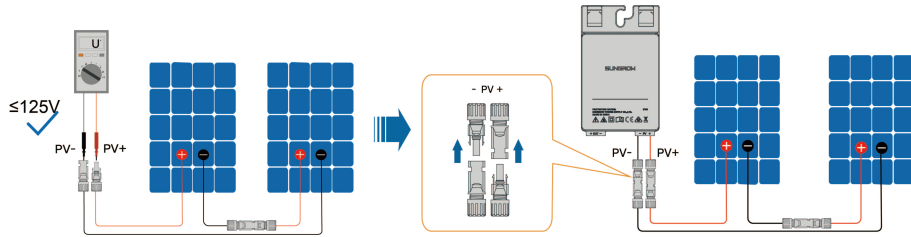
⚠ WARNING

- **Ensure that the PV array is well insulated from the ground before connecting a PV module to an RSD.**



Shorten the distance between the positive and negative cables of the RSD according to on-site conditions to reduce electromagnetic interference.

Step 1 Connect the PV+ and PV- cables of the RSD respectively to the positive and negative terminals in the junction box of the PV module.



NOTICE

- Before connecting the PV module to the RSD's input terminals, test the output voltage of the module using a multimeter and make sure it is below 125V. RSD or PV module damage caused by failing to observe this instruction will not be covered by the warranty.
- Do not connect the PV module to the OUT+ and OUT- of the RSD. Otherwise, the RSD or PV module will be damaged, and such damage will not be covered by warranty.

Step 2 Connect the positive probe of a multimeter to the OUT+ of the RSD, and negative probe to OUT-, to check whether there is a fault in the RSD. If the typical value of the output voltage (U) is 1V, the RSD has no fault.

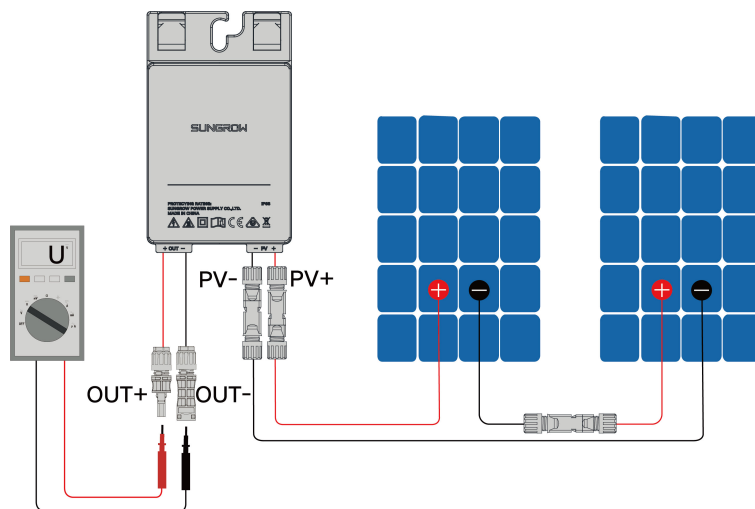


table 5-1 Output Voltage

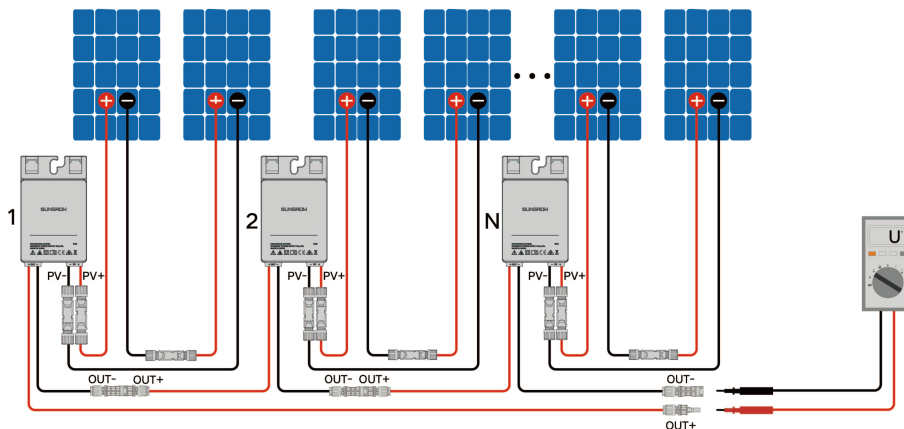
Voltage	Possible Cause	Suggestions
$0.9\text{ V} \leq U \leq 1.1\text{ V}$	Nothing abnormal with the RSD.	/
$U < 0.9\text{ V}$	1. Poor sunlight. 2. No PV module is connected to the input side of the RSD. 3. The wiring of the RSD is wrong. 4. There is a fault in the RSD.	1. Measure the voltage when there is sufficient sunlight. 2. Connect the PV module to the input side of the RSD. 3. Re-connect the RSD cables correctly. Make sure the input side of the RSD is connected to the output side of the PV module. 4. Replace the RSD.
$U > 1.1\text{ V}$	There is a fault in the RSD.	Replace the RSD.

NOTICE

Complete the RSD wiring and measure the output voltage by following the steps below.

- **After completing the wiring of an RSD, use a multimeter to measure its output voltage. Ensure that the output voltage of each RSD is within the normal range.**
- **After confirming that the output voltages of all RSDs are normal, use a multimeter to measure the output voltages of RSDs in the same string.**
- **If you do not check the RSD output voltages and confirm the string has been wired properly in this step, in case of something abnormal, you may have to check the whole wiring again, where rework is required.**

Step 3 Where multiple RSDs are used, connect the OUT- of the first RSD to the OUT+ of the second one, and so on. Use a multimeter to test the positive and negative terminals of the RSDs. If the typical value of the output voltage is $1\text{ V} \times N$ (N = number of RSDs), the system is fault-free.



NOTICE

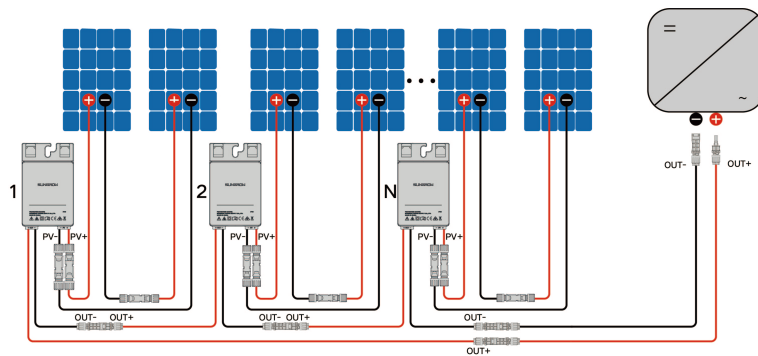
In the actual wiring, the connection of the negative/positive terminal of the first RSD to that of the second one (whether connecting OUT1+ to OUT2-, or OUT1- to OUT2+) should be decided considering the negative and positive terminals of the inverter.

table 5-2 Output Voltage

Voltage	Possible Cause	Suggestions
$U=1 \times N$	Nothing abnormal with the RSD.	/
$U=0$	- The PV string is open-circuited. - The cables are not connected to the same string.	- Check whether the string is open-circuited. - Identify the string cables correctly.
$U < 0$	- The probes are connected reversely. - The cable labels are incorrect.	- Reconnect the positive and negative probes correctly. - Prepare cable labels correctly.

Voltage	Possible Cause	Suggestions
$U < 0.9 * N$	1. The input cables of some RSDs are not connected.	Check whether the cables of modules and strings are properly connected.
	2. The output cables of some RSDs are not connected.	
	3. The output cables of some RSDs are connected reversely.	
$U > 1.1 * N$	1. The actual number of RSDs in the string is greater than expected.	1. Check whether the number of RSDs in the string is correct.
	2. The PV module is connected to the string directly, not connected to any RSD.	2. Check whether the cables of modules and strings are properly connected.

Step 4 Connect the OUT+ of the first RSD and the OUT- of the last one to the DC input terminals of the inverter.



⚠ WARNING

- If all PV modules in a string go offline while creating a plant on iSolarCloud, first check whether the string is connected to the inverter with reverse polarity.
- The total power of PV modules in a PV string should not exceed the maximum input power of a single input of the inverter.

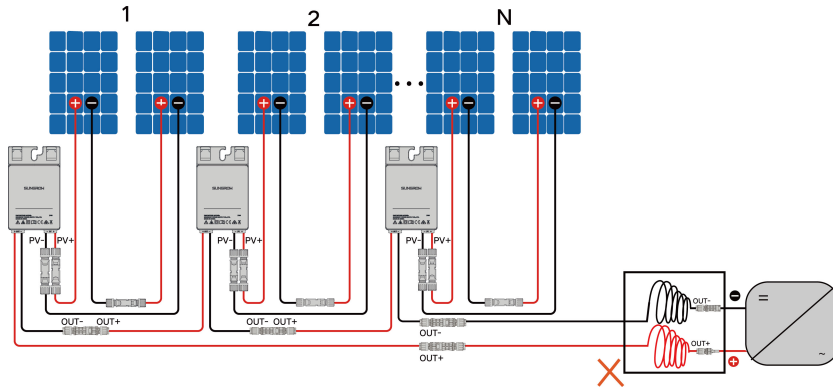
NOTICE

- The RSD supports full-coverage deployment only.
- To deploy the RSD, the use of Y-type connectors on the input side of the inverter is not supported, as the RSD is not compatible with such connectors.

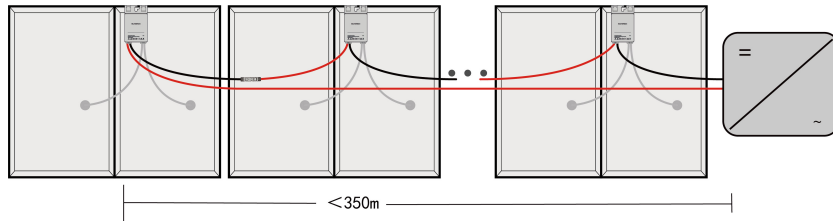
-- End

5.5 Wiring Notices

Do not coil the RSD's cable when wiring, given that the communication quality may decline if the extension cable is too long.



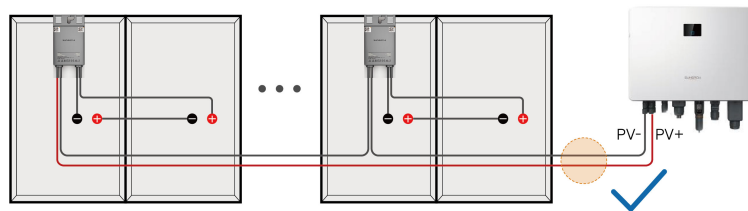
The maximum communication distance between the inverter and the RSD should be less than 350m. If the distance exceeds 350m, consult SUNGROW first.



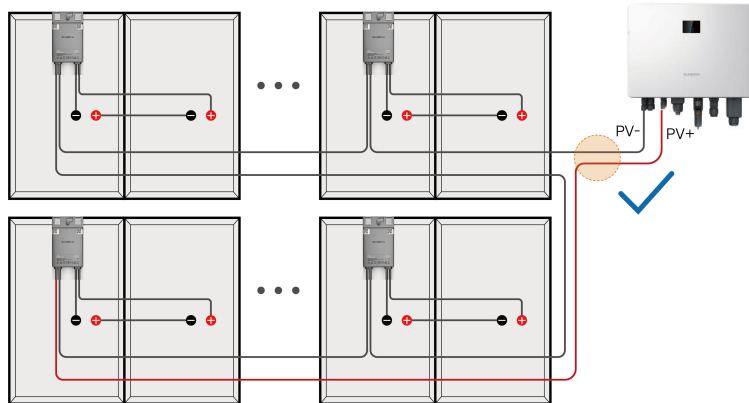
⚠ WARNING

DC Wiring Requirements: The positive and negative DC cables of the same PV string should be kept parallel and close to each other. The correct wiring is shown below.

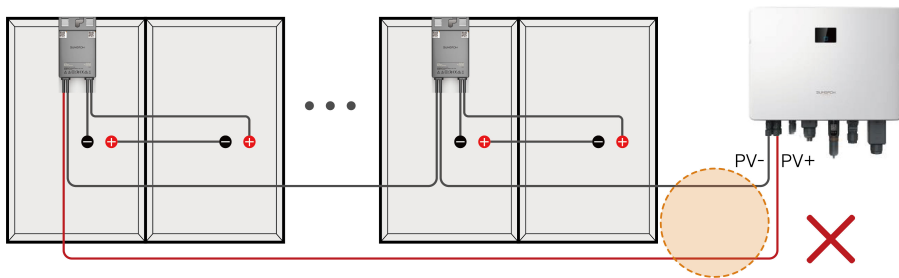
Scenario 1:



Scenario 2:

**⚠ WARNING**

The positive and negative DC cables of the same PV string are not allowed to be laid apart, as shown in the figure below.



6 Commissioning

6.1 Inspection Before Commissioning

Perform inspections as follows before starting the RSD for the first time, and make sure the requirements below are all met.

- All devices are properly installed.
- All cables are connected properly in the correct polarity.
- Check that the input and output cables of all RSDs are connected correctly.
- The RSD QR code labels are attached to the corresponding cells on the physical layout template correctly.
- All warning signs and labels are intact and legible.

6.2 Set RSD Physical & Logical Layouts

To set up the physical layout of the RSDs, create a plant on iSolarCloud first. For details on how to create a plant on iSolarCloud, please refer to the *iSolarCloud App User Manual*. Scan the QR code below to get the user manual.

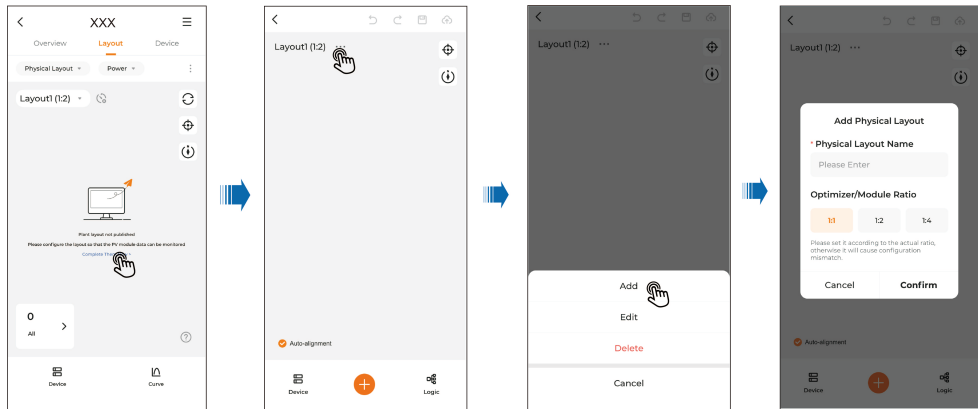


6.2.1 RSD Physical Layout Setting (iSolarCloud App)

The physical layout refers to the actual arrangement of PV modules at the site.

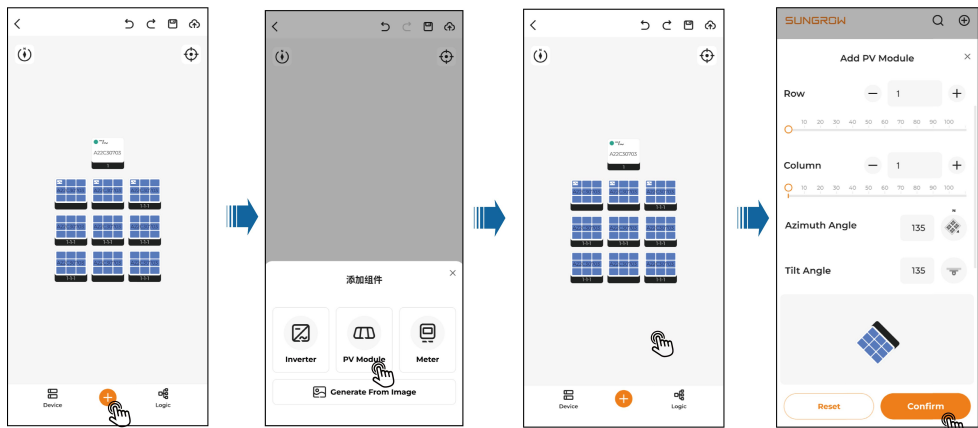
Step 1 Log in to the iSolarCloud App. Tap a plant name on the home screen and go to “Layout Settings”.

Step 2 Set up the layout. Go to **Layout**, and tap **Go to set**. Then, choose *** in the upper left corner of the layout. You can then tap **Edit** to set the **Physical Layout Name** and the ratio of RSDs to PV modules, or tap **Add** to add a new physical layout.

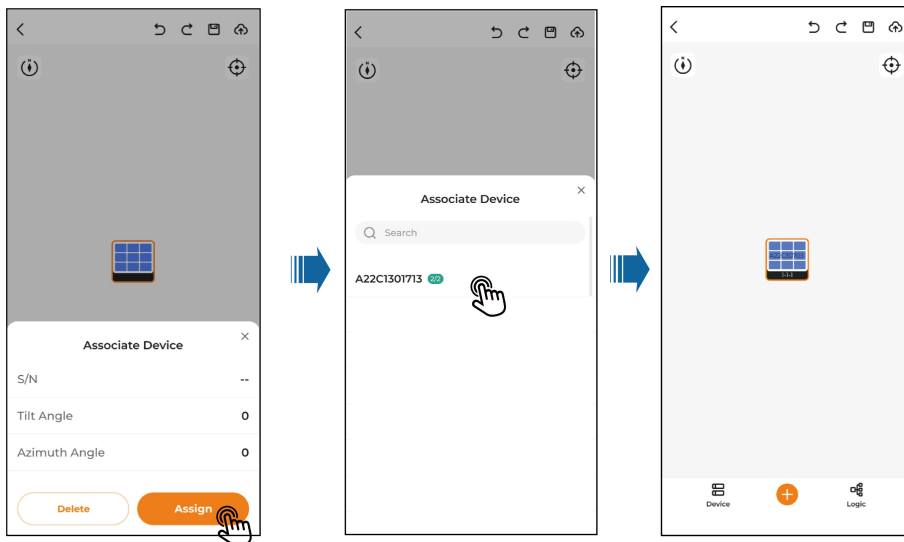


- The system will not auto-save the settings you have made on the layout. Be sure to publish the current layout to save your settings first before switching to another one.
- It is not allowed to add any RSD attached to one inverter to different layouts.

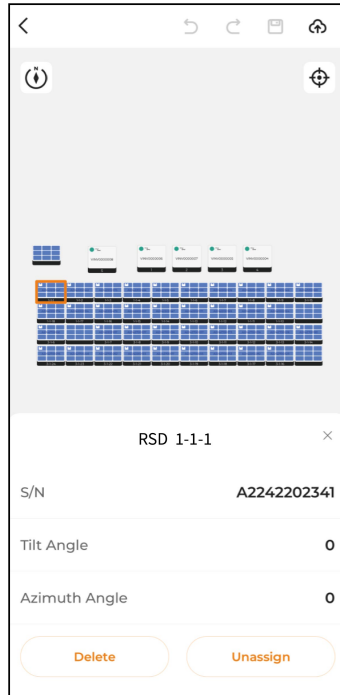
Step 3 Add the module and associate it with an RSD by S/N. Tap  in the layout, and choose **PV Module**. Then, tap the blank area in the canvas, set the number of rows and columns and the angles of modules according to the actual conditions, and tap **Add** to add the module.



Step 4 The manually added PV module is not associated with any RSD. You need to assign an RSD to the module. Tap **Assign** in the lower right corner of the screen, select the S/N of the target RSD, and confirm. This module is then associated with an RSD.

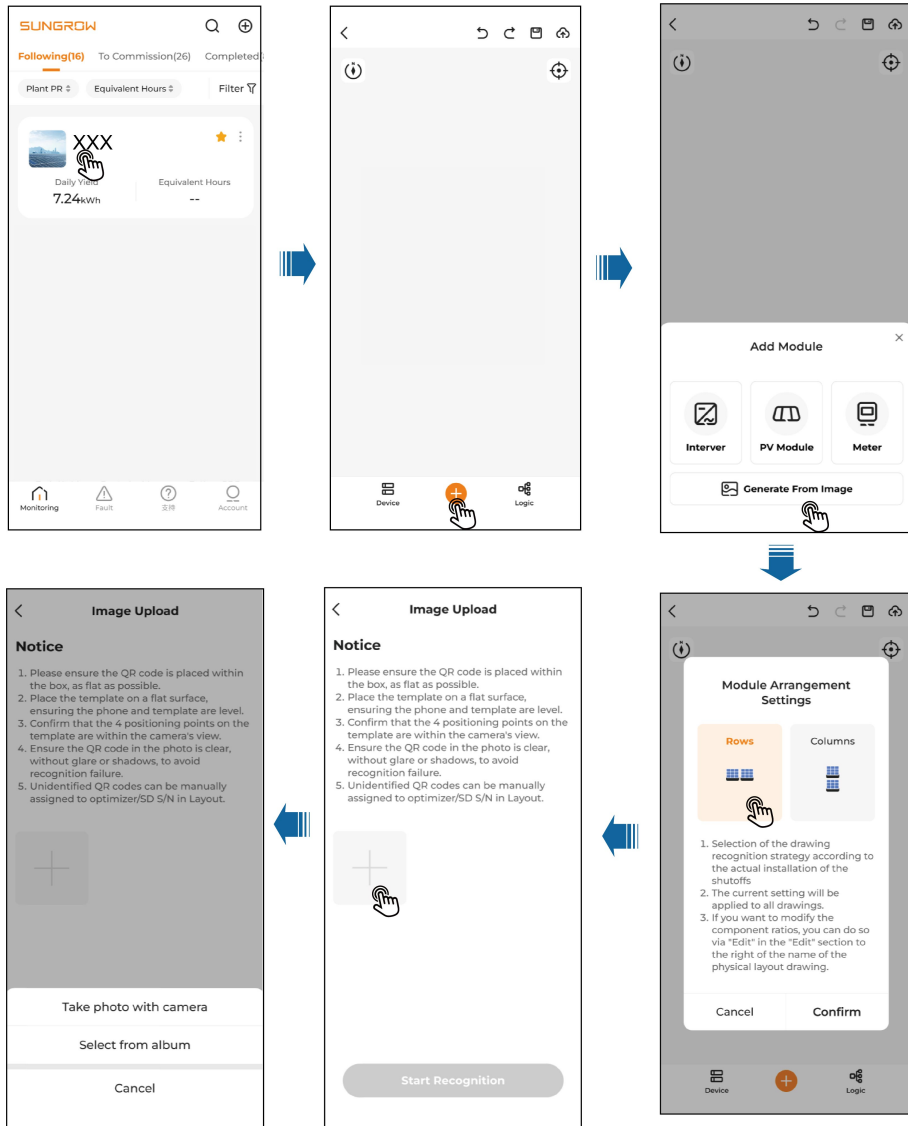


Step 5 If the module is incorrectly associated with an RSD or the module is unnecessary, you may tap it and choose **Unassign** or **Delete**.



Step 6 Physical layout template recognition upload (optional).

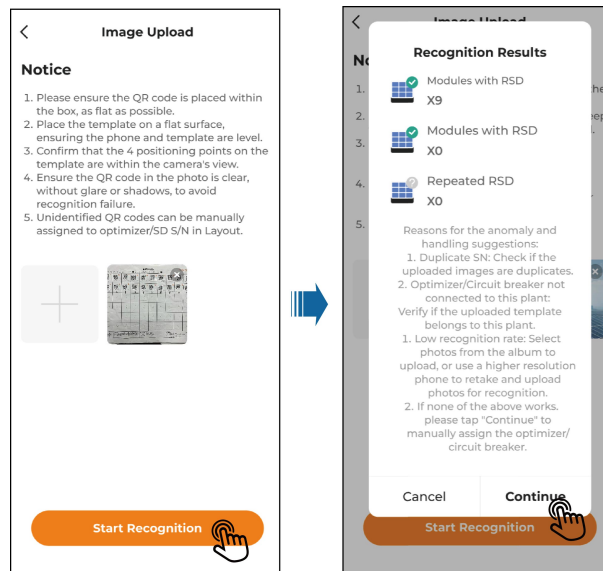
- 1 Tap  at the bottom of the screen to add a device. Tap **Generate From Image**, and select **Rows** or **Columns** based on the arrangement of the PV modules indicated in the physical layout template to be uploaded. Then, choose **Take photo with camera** or **Select from album** to upload a picture of the physical layout template.



NOTICE

- **Do not take photos of the physical layout template under strong light. Otherwise, the QR code may not be recognized due to reflection of light.**
- **Turn off the live photo function on the phone before taking a photo. Upload a still photo to ensure successful QR code recognition.**
- **Check the recognition result carefully. If the QR code cannot be recognized due to damage or folding, add the RSD manually by its S/N.**
- **Incremental upload is supported, which means users can upload physical layout templates in multiple steps as needed. To re-read the information from an uploaded template picture, delete the picture and re-upload it. Please note that deleting a template picture will not remove the data read from it; if needed, please delete the modules from the layout manually.**

- 2 Tap **Start Recognition**, wait for the **Recognition Results** window to pop up. Then, tap **Continue**.

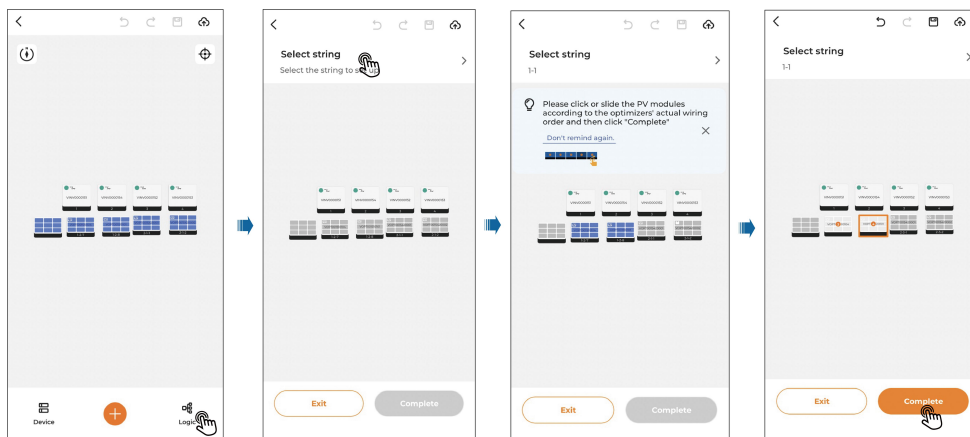


-- End

6.2.2 RSD Logical Layout Setting (iSolarCloud App)

The logical layout refers to the arrangement of modules in each PV string at the site.

Step 1 Tap **Logic** in the lower right corner of the screen. Select the string to be set, then tap and move the corresponding modules with your finger to arrange them in the correct order according to the actual wiring of the RSDs. Then, tap **Complete**.



Step 2 Tap **Exit** after completing the logical layout settings for all RSDs.

Step 3 In case modules are arranged incorrectly, you can select a module, choose **Clear**, and confirm. Then, the short codes of the current and subsequent modules will be cleared.

NOTICE

If multiple inverters are used at the same time, please set different frequency points respectively for the RSDs attached to these inverters, so as to avoid RSD communication interference.

Step 4 After completing the above settings, tap  in the upper right of the screen to publish.

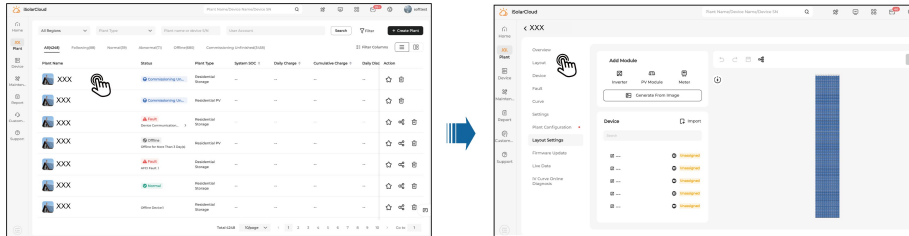


If the layout is not to be published immediately, you can tap  in the upper right corner of the screen to save the layout settings.

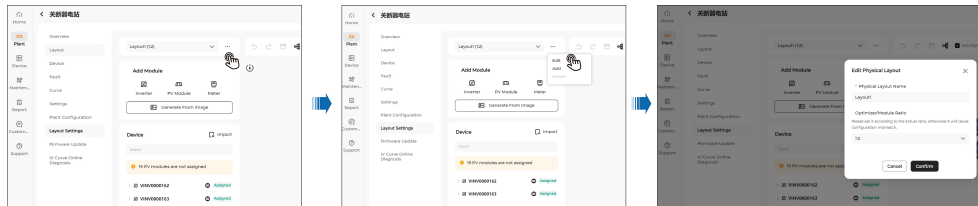
-- End

6.2.3 RSD Physical Layout Setting (iSolarCloud)

Step 1 Enter <https://web3.isolarcloud.com> in the address bar of a browser. On the **Plant** page, click on a plant name to go to its details page. Then, choose **Layout Settings** to set up the physical layout of RSDs in the plant.

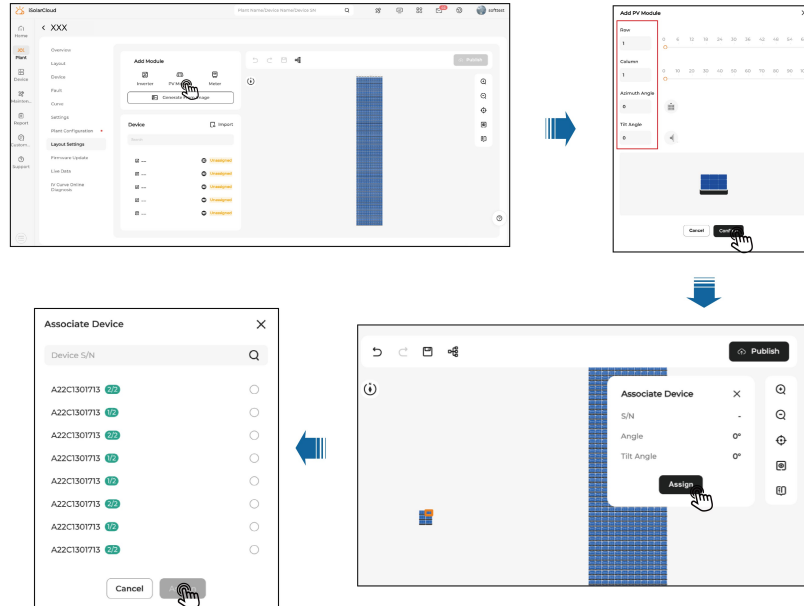


Step 2 Set up the layout. Click *** on the right of the **Layout**. Then, you can choose **Edit** to set the **Physical Layout Name** and the ratio of RSDs to PV modules, or choose **Add** to add a new physical layout.

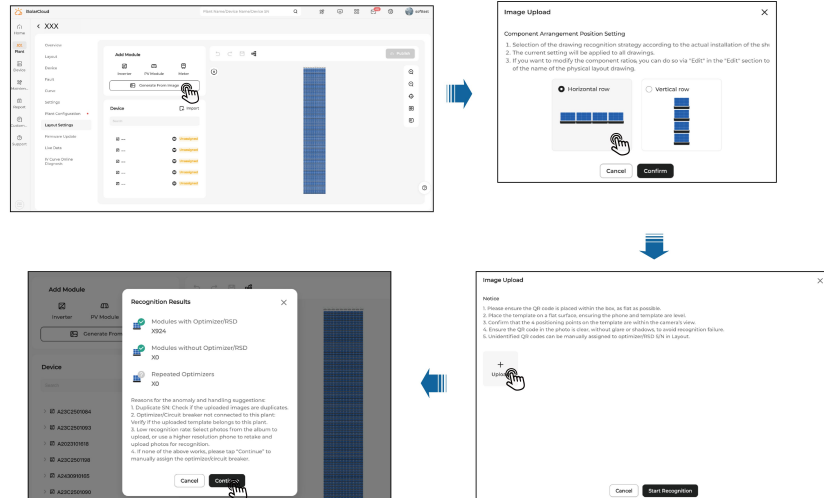


- The system will not auto-save the settings you have made on the layout. Be sure to publish the current layout to save your settings first before switching to another one.
- It is not allowed to add any RSD attached to one inverter to different layouts.

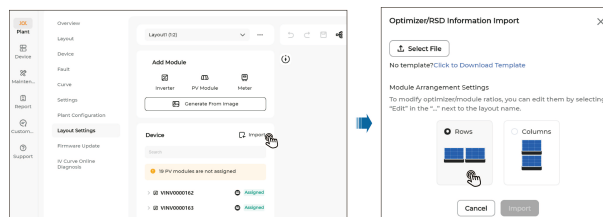
Step 3 Drag and drop the icon  to the layout. Then, fill in the PV module information such as **Row**, **Column**, **Azimuth Angle**, and **Tilt Angle**, and click **Confirm**. Click the PV module, choose **Assign**. Then, select the S/N of the corresponding RSD to associate it with this module.



Step 4 Physical layout template recognition upload (optional). Click **Generate From Image**, choose **Horizontal row** or **Vertical row** based on the actual arrangement of the PV modules, and then upload a picture of the layout template paper. Please note that if there are already some PV modules in the current layout, importing a template will clear all current layout settings. After clicking **Upload**, wait for the recognition results to show up and check that the PV module information are all correct. Then, click **Confirm**.



- If no template file is available, click **Import** on the right of “Device” and click **Click to Download Template** to download one. Then, fill in the required information, including the S/N and No. of the inverter and the S/N and short code of the RSD.
- After filling out the template file, click **Import** to upload it to the system. Then, choose **Horizontal row** or **Vertical row** based on the actual arrangement of PV modules.



- This import option is available for distributed power plants only.

NOTICE

- Please fill in the information required in the physical layout template according to actual conditions.
- Fill in the inverter S/N and assign a number to the inverter (start numbering from 1).
- Fill in the S/N and number of the RSD (for example, the number of the first RSD in String 1 that is connected to Inverter 1 should be 1-1-1, and so on).
- Where there is a PV module but no RSD, fill the corresponding cell in the template with black.
- For the S/N and number of the RSD, you can add rows and columns based on actual needs (up to 1000 rows and 1000 columns).
- Incremental upload is supported, which means users can upload physical layout templates in multiple steps as needed. To re-read the information from an uploaded template picture, delete the picture and re-upload it. Please note that deleting a template picture will not remove the data read from it; if needed, please delete the modules from the layout manually.

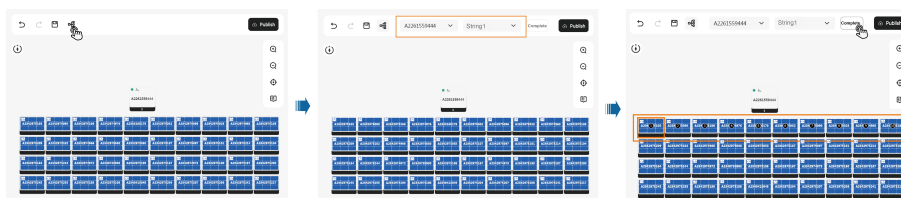
-- End

6.2.4 RSD Logical Layout Setting (iSolarCloud)

Step 1 Click  and select the inverter and string to be set.

Step 2 Click to drag the PV modules and arrange them in the correct order based on the actual wiring of the RSDs, and then click **Complete**.

Step 3 In case modules are arranged incorrectly, you can right-click on a module and choose **Clear**. After confirmation, the short codes of the current and subsequent modules will be cleared.



Step 4 After completing the above settings, click  in the upper right of the screen to publish.



If you do not want to publish the layout immediately, you can click  to save the current layout settings.

-- End

6.3 View RSD Layout

6.3.1 Check RSD Status

RSD Running Status

You can tell the status of the RSD based on the color of the corresponding PV module in the layout. The table below shows the relation between the PV module color and the RSD status.

Layout	Status	Cause	Suggestions
	The RSD is operating normally.	/	/
	There is a fault in the RSD	1. There is a hardware fault in the RSD. 2. The PV voltage exceeds the preset voltage protection threshold.	See " 8.1 Troubleshooting " for troubleshooting methods.

Layout	Status	Cause	Suggestions
	There is an alarm in the RSD.	RSD software update has failed.	1. Software update may take more than 20 minutes for a large-scale system with a large number of RSDs. Please check the light condition, and perform software update under good light conditions. 2. If the fault persists, please contact SUNGROW Customer Service.
			1. Check if the RSD input cables are properly connected. 2. After powering off, check whether the voltage of the module is in normal range using a multimeter. 3. Check if the modules are shaded. 4. After powering off, check whether the voltage of the RSD is in normal range using a multimeter. 5. After powering off, check whether the string voltage is in normal range using a multimeter. If the voltage is negative, check whether the PV cables are connected with reverse polarity.
	The RSD is offline.	1. The RSD input connectors are in poor contact. 2. There is a fault in the module attached to the RSD. 3. The modules attached to the RSD are shaded. 4. There is a fault in the RSD. 5. The PV string may be connected with reverse polarity.	

NOTICE

"Power off": Switch off the external AC circuit breaker of the inverter, and then set the DC switch to "OFF". After that, wait 5–15 minutes, depending on the specific inverter model, until the capacitors inside the inverter are fully discharged.

The PV module is blue if the RSD is operating properly. The color shade of a module reflects its power generation efficiency. Darker blue indicates a higher power ratio and greater power generation efficiency.

Color Shade	Actual Power/PV Module Peak Power*100%
	80–100%
	60–80%
	40–60%
	20–40%
	0–20%
	Default

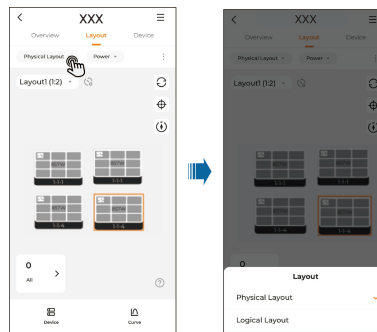
6.3.2 View Layout

Physical layout: The actual arrangement of the PV modules at the site.

Logical layout: The arrangement of PV modules in each string.

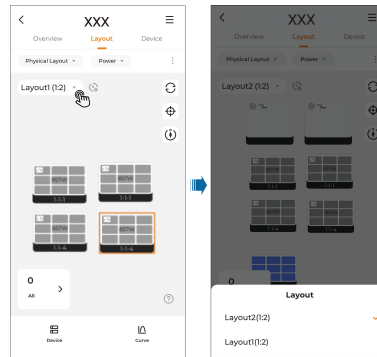
Switch between physical layout and logical layout

Tap **Layout** at the top of the screen. You may then choose to view the **Physical Layout** or **Logical Layout**.



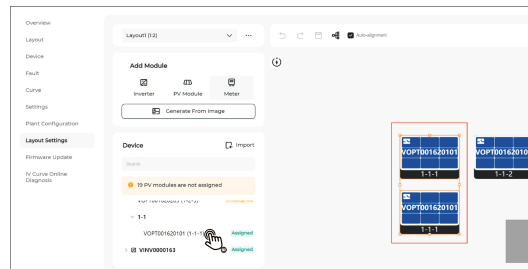
Switch between physical layouts

Tap **Layout1 (1:2)**. You may then switch between physical layouts with different device-to-module ratios.



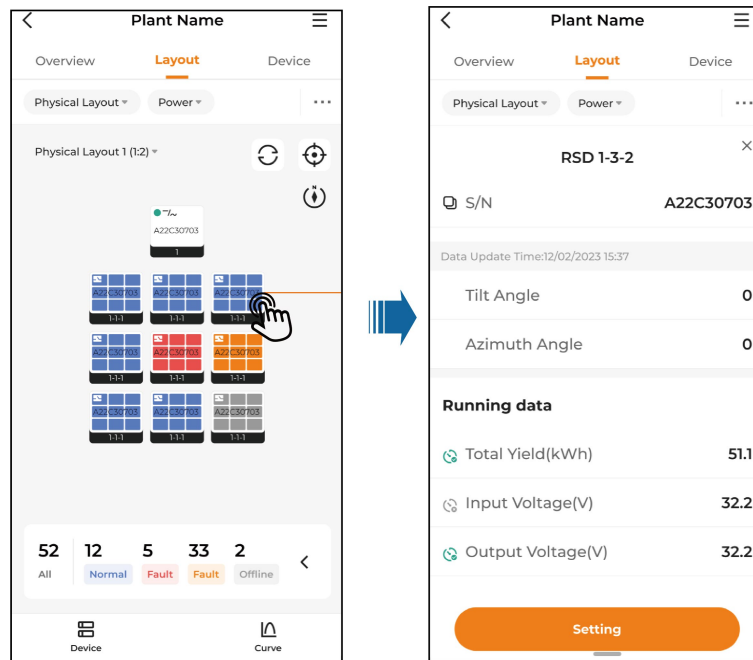
Quickly locate PV modules (for iSolarCloud only)

Double-click a device in the layout. The module associated with this device will also be selected.

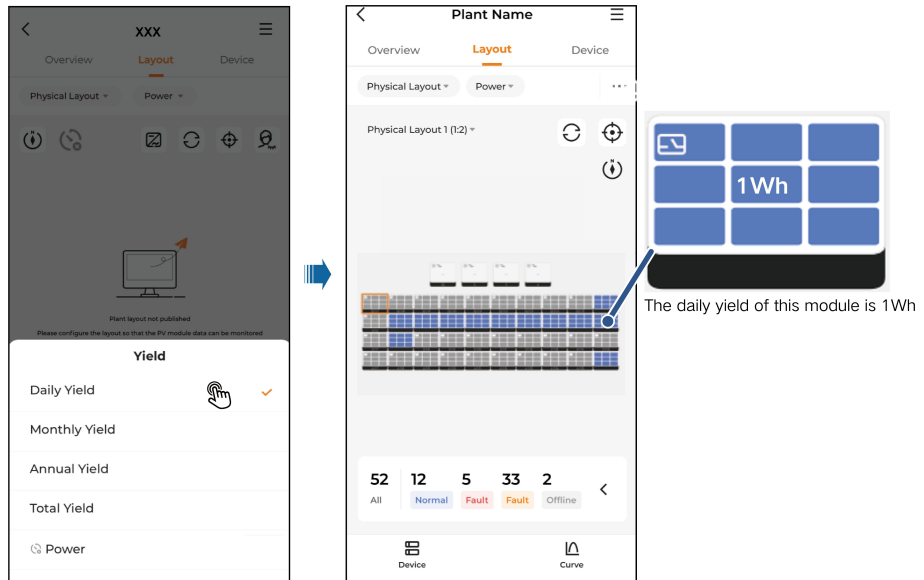


6.3.3 View Module Information

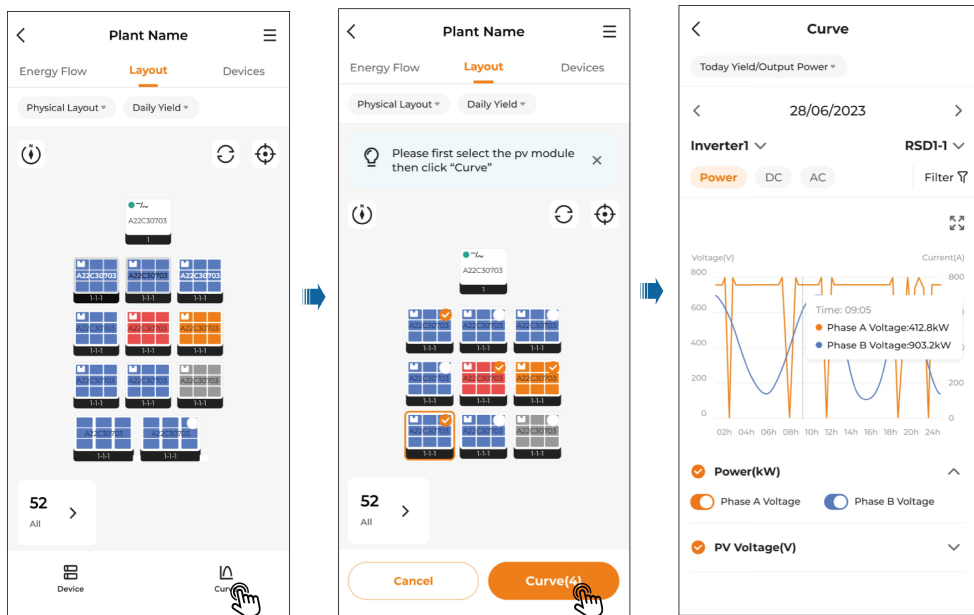
Step 1 Tap a module in the layout to view the device information and running data of the RSD.



Step 2 Tap **Daily Yield**. You can then choose to check the data on **Daily Yield**, **Monthly Yield**, **Annual Yield**, **Total Yield**, or **Power**. After an option is selected, the corresponding data will be shown on the modules. You can also select **Power** to get the data refreshed at intervals of seconds.



Step 3 To see how the data of a module changes over time, tap  in the lower right corner, select the target module, and tap **Curve**. The data curve of this module will then be shown.



-- End

7 RSD Decommissioning, Dismantling, and Disposal

7.1 Decommission the RSD

⚠ CAUTION

Danger of burns!

Even if the RSD has stopped running, it may still be hot and cause burns. Perform operations on the RSD wearing protective gloves after it cools down.

Step 1 The inverter that is connected to the RSD has been powered off.

Step 2 Test the DC cables using a current clamp and confirm that they are current-free.

-- End

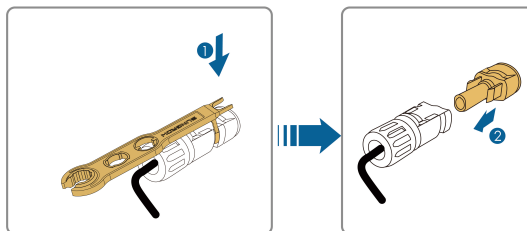
7.2 Dismantle the RSD

⚠ CAUTION

Danger of burns and electric shocks!

After the upstream and downstream devices of the RSD have been powered off, test the voltage and current using proper measuring instruments. Operations on the RSD can be performed by qualified persons who wear proper protective equipment after confirming that no voltage or current is present.

Step 1 Disconnect all electrical connections of the RSD by completing in reverse order the procedure described in ["5.4 RSD Wiring"](#). To disconnect the DC connector, use a specialized wrench to release the locking element first. Then, fit the waterproof stopper plug.



Step 2 If the RSD will be used again in the future, store it properly by referring to ["3.2 RSD Storage"](#).

-- End

7.3 Dispose of the RSD

Users shall bear the responsibility for RSD disposal.

WARNING

Please dispose of the product in accordance with applicable local regulations and standards, to avoid property damages or personal injuries.

NOTICE

Some parts or components of the RSD may contaminate the environment. Please dispose of them by following the applicable electronic waste disposal regulations in the place where the RSD is installed.

8 Troubleshooting and Maintenance

8.1 Troubleshooting

If a fault occurs in the RSD, the fault information will be shown on the iSolarCloud App.

Fault Code	Fault Name	Possible Cause	Corrective Method
4	Input overvoltage	The PV voltage is higher than the set protection threshold value.	Check whether the open-circuit voltage of the PV modules attached to the RSD exceeds the maximum allowable input voltage of the RSD.
512	Hardware fault	A hardware fault occurs to the RSD.	Please contact SUNGROW Customer Service.

8.2 Maintenance

8.2.1 Maintenance Notices

DANGER

Risk of personal injury or device damage due to improper servicing!

- Be sure to use specialized insulated tools when performing high-voltage operations.
- Before maintenance, power off the input and output sides first, then test the voltage and current using the specialized measuring instrument. Maintenance can be carried out by qualified persons who wear proper protective equipment only after confirming that no voltage or current is present.
- Danger of burns due to a hot surface still exists even if the product has stopped running. Perform operations on the product wearing protective gloves after it cools down.

⚠ WARNING

In case of a fault in the product during its operation, before powering on again, make sure the fault has been removed. Otherwise, it may cause the influence of the fault to spread or device damages.

⚠ CAUTION

To prevent irrelevant personnel from operating the product by mistake or other accidents, please set up highly visible warning signages around the product or fence off a warning zone.

NOTICE

The RSD contains no components or parts that can be maintained. Do not open its enclosure or replace any of its internal components.

To minimize the risk of electric shocks, do not perform maintenance operations that are not specified in this manual. If necessary, contact SUNGROW for maintenance. Losses arising from failure to observe this instruction will not be covered by warranty.

NOTICE

Touching the PCB or other static-sensitive components may lead to device damages.

- Do not touch the circuit board unnecessarily.
- Observe the specifications for protection against electrostatic discharges and wear an anti-static wrist strap.

8.2.2 Routine Maintenance

The maintenance item and period of the device are listed in the table below.

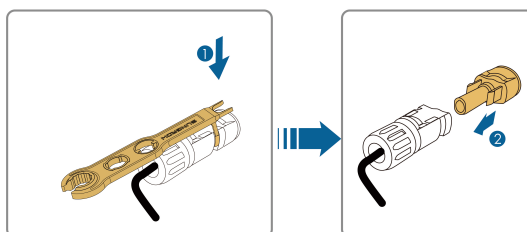
Check Item	Check Method	Maintenance Period
Running status	Check whether the device operates normally.	Once every six months
	Check whether there is abnormal noise or sound during operation.	
Electrical connection	Check whether cables are loose or fall off.	Once every six months to a year
	Check whether cables are damaged.	

8.2.3 Replace the RSD

Step 1 The inverter connected to the RSD has been powered off.

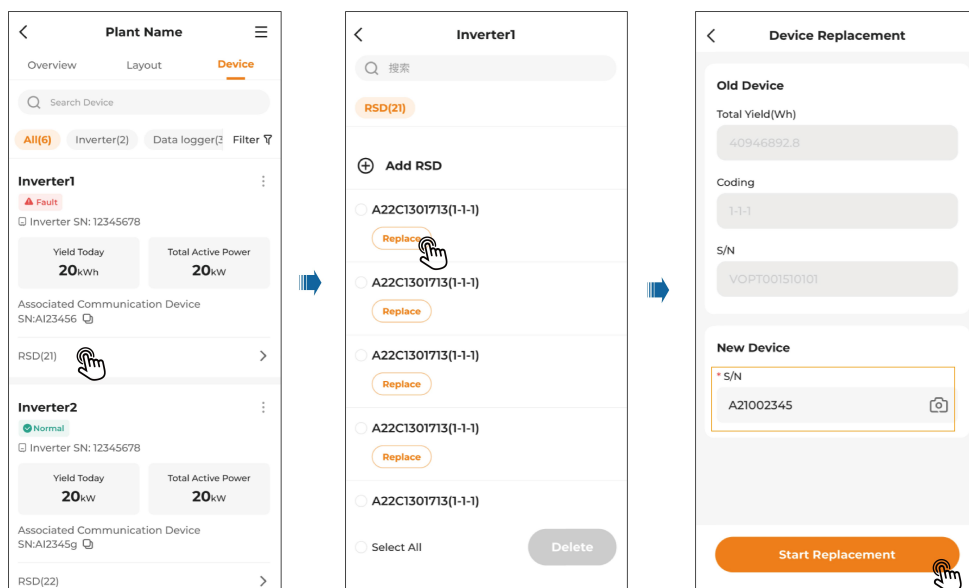
Step 2 Check and confirm that the DC cables are current-free using a current clamp.

Step 3 Disconnect all the electrical connections of the RSD. When disconnecting the DC connector, use an MC4 wrench to release the locking element first, and then fit the waterproof stopper plug.



Step 4 Replace the RSD. Mount the RSD and complete the wiring by referring to "5.4 RSD Wiring".

Step 5 Power on the inverter. Log in to the iSolarCloud App. Tap the plant name from the plant list on the **Monitoring** screen. Then, on the **Device** screen, choose "RSD" at the bottom of the inverter card. Find the S/N of the RSD to be replaced, and tap **Replace** below. Enter the S/N of the new RSD, or tap  to scan the QR code on its enclosure. Then, tap **Start Replacement**.



After replacement, the new device will take the place of the old device in the layout automatically and thus does not need to be added again.

-- End

8.3 Appendix

8.3.1 Technical Data

Parameter	SR20D-M
Electrical Data	
Input channels / Number of PV Modules	1 / 2
Input voltage range per channel	12V – 125V
Output voltage range	12V – 125V
Max.PV input current per channel	20A
Max.DC short-circuit current per channel (I _{sc})	30A
Maximum system voltage	1100V
Shutdown output voltage	1V
Power consumption	< 1W
Mechanical Data	
Input/Output Connector	Stäubli MC4/MC4 compatible
Mounting Method	push-in or bolt installation
PV input wire length	1.4 m (+ / -)
Output wire length	0.2 m (+) / 2.95 m (-)
Dimensions (W * H * D)	86 mm * 143 mm * 27 mm
Environmental & Protection	
Operating ambient temperature range	-40°C to 85°C
Allowable relative humidity range (non-condensing)	0% to 100%
Degree of protection	IP68
Communication	PLC (≤ 350m)
Compliance	
Safety	IEC/EN 62109-1, IEC/EN 61000-6-1/-2/-3/-4
Compatibility	
Compatible products	SG25 / 30 / 33 / 36 / 40 / 50CX-P2 SG125CX-P2

8.3.2 Quality Assurance

When product faults occur during the warranty period, SUNGROW will provide free service or replace the product with a new one.

Evidence

During the warranty period, the customer shall provide the product purchase invoice and date. In addition, the trademark on the product shall be undamaged and legible. Otherwise, SUNGROW has the right to refuse to honor the quality guarantee.

Conditions

- After replacement, unqualified products shall be processed by SUNGROW.
- The customer shall give SUNGROW a reasonable period to repair the faulty device.

Exclusion of Liability

In the following circumstances, SUNGROW has the right to refuse to honor the quality guarantee:

- The free warranty period for the whole machine/components has expired.
- The device is damaged during transport.
- The device is incorrectly installed, refitted, or used.
- The device operates in harsh conditions beyond those described in this manual.
- The fault or damage is caused by installation, repairs, modification, or disassembly performed by a service provider or personnel not from SUNGROW.
- The fault or damage is caused by the use of non-standard or non-SUNGROW components or software.
- The installation and use range are beyond stipulations of relevant international standards.
- The damage is caused by unexpected natural factors.

For faulty products in any of above cases, if the customer requests maintenance, paid maintenance service may be provided based on the judgment of SUNGROW.



Product data such as product dimensions are subject to change without prior notice. The latest documentation from SUNGROW should take precedence in case of any deviation.

8.3.3 Contact Information

In case of questions about this product, please contact us.

We need the following information to provide you the best assistance:

- Model of the device
- Serial number of the device
- Fault code/name
- Brief description of the problem

For detailed contact information, please visit: <https://en.sungrowpower.com/contactUS>