eManager

SMART ENERGY CONTROLLER

USER MANUAL

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Preface

Thank you for choosing SAJ products. We are pleased to provide you first-class products and exceptional service.

This manual provides information about installation, operation, maintenance, troubleshooting and safety. Please follow the instructions of this manual so that we can ensure delivery of our professional guidance and whole-hearted service.

Customer-orientation is our forever commitment. We hope this document proves to be of great assistance in your journey for a cleaner and greener world.

We make constant improvements on the products and their documentation. This manual is subject to change without notice; these changes will be incorporated in new editions of the publication. To access the latest documentation, visit the SAJ website at https://www.saj-electric.com/.

Guangzhou Sanjing Electric Co., Ltd.

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1. About this Document

1.1. Application Scope

This user manual provides instructions and detailed procedures for installing, operating, and maintaining the SAJ product:

- eManager

1.2. Safety

CAUTION:

ONLY qualified and trained electricians who have read and fully understood all safety regulations contained in this manual can install, maintain, and repair the equipment. Access to the equipment is by the use of a tool, lock and key, or other means of security.

1.3. Safety Levels

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

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

CAUTION
Indicates a hazardous condition which, if not avoided, could result in minor or moderate injury.

NOTICE
Indicates a situation which, if not avoided, can result in property damage.

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1.4. Symbol Explanation

Symbol	Description
	Dangerous electrical voltage This device is directly connected to public grid, thus all work to the device shall only be carried out by qualified personnel.
	No open flames Do not place or install near flammable or explosive materials.
	Attention: Install the product out of reach of children.
	This device shall NOT be disposed of in residential waste.
	CE Mark Equipment with the CE mark fulfills the basic requirements of the Guideline Governing Low-Voltage and Electro-magnetic Compatibility.
	Recyclable
	Avoid liquid or moisture

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1.5. Safety Instructions

Keep the manual for future reference.

To prevent personal injury and property damage and to ensure long-term operation of the product, be sure to read all the safety instructions in this section carefully prior to any works and observe the appropriate rules and regulations of the country or region where you install the device.

1.6. Safe Handling

The product has been designed and tested strictly in accordance with international safety regulations. As an electrical and electronic equipment, it must be installed, commissioned, operated, and maintained in strict accordance with related safety instructions. Incorrect operation or misuse of this device may cause personal injury or device damage. This will void the limit warranty and SAJ will not be responsible for the loss caused by those behaviors.

- The eManager must be installed and maintained by authorized technicians based on local laws and regulations.
- Before installing or maintaining the eManager, make sure that it is disconnected from the grid.
- When the eManager is working, do not touch the internal component or cable to avoid electric shock.
- Before replacing an internal component within the eManager, make sure that the eManager is disconnected from the grid and the new component meets the usage requirement.
- When the eManager is working, do not plug in or out the cables.
- Make sure that the AC input voltage and current are compatible with the rated voltage and current of the eManager; otherwise, components might be damaged, or the device cannot work properly.

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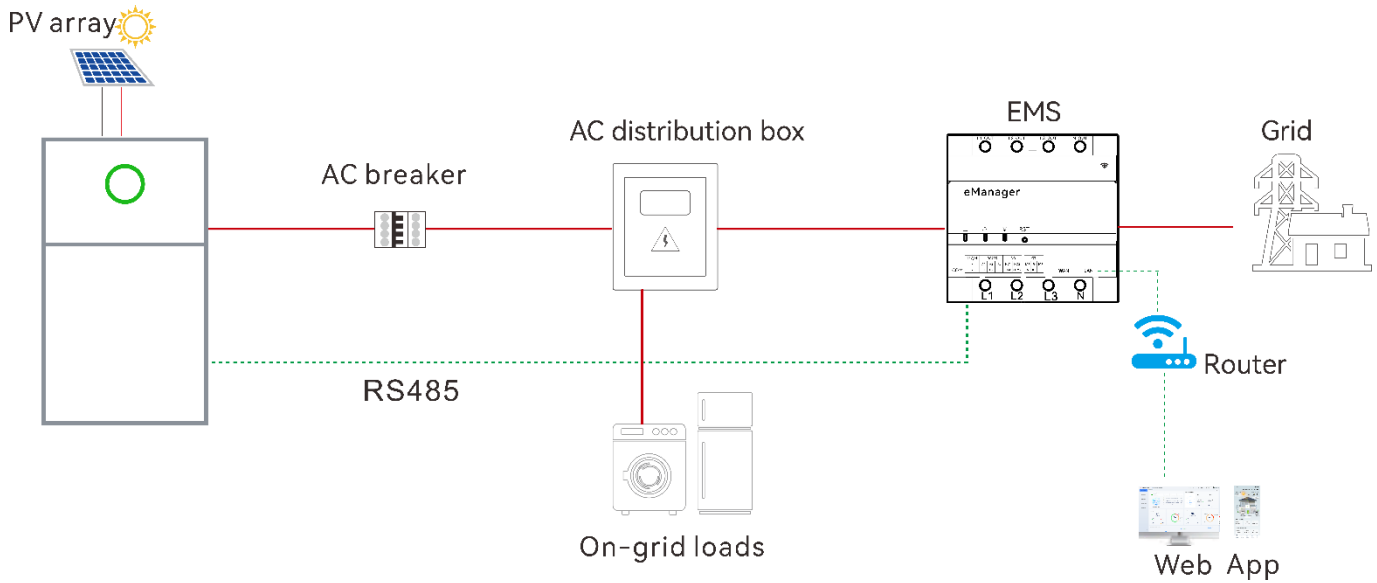
2. Product Information

2.1. Application Topology Diagram



2.2. Main Features

SAJ eManager smart communication device (hereinafter called the eManager) is applied to the photovoltaic (PV) energy storage system (ESS).

- Energy scheduling management: schedule the energy to the loads, batteries, heat pumps, and the grid based on user requirements.
- Provide same functions as the smart meter: power monitoring and energy metering.
- Collect and transmit data for inverters, batteries, and other equipment.

In addition, it provides the following functions:

- Smart and flexible support
  - Support for RS485, Ethernet, Wi-Fi, and Bluetooth communication
  - Support for communication and monitoring on a maximum of 6 hybrid inverters or 10 solar inverters

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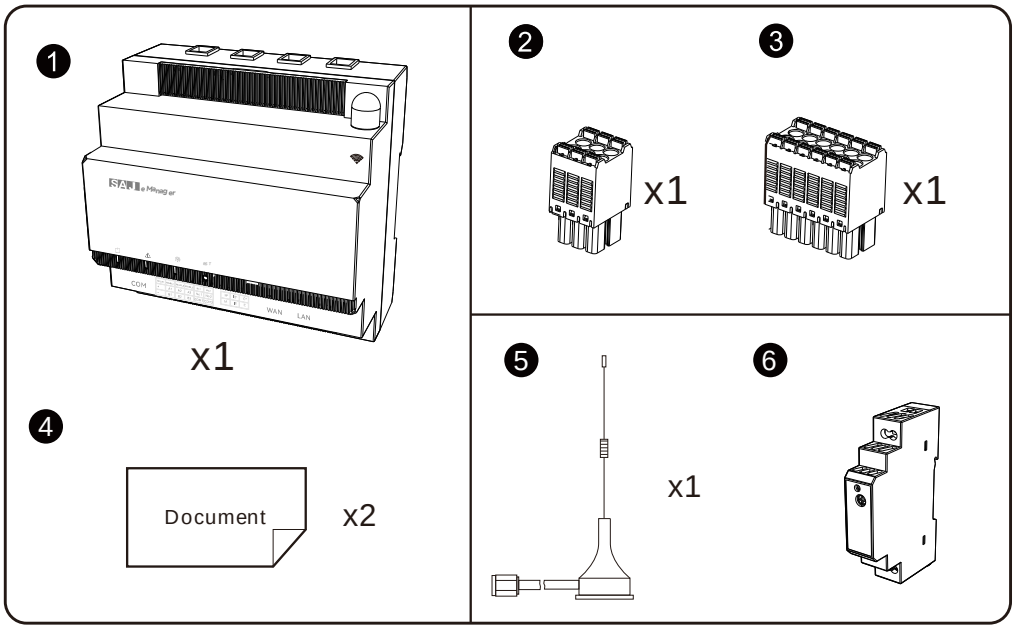
- Convenient operation and maintenance
  - Easy installation
  - 24-hour local and remote monitoring
  - Remote operation: PV-plant maintenance on App or Web

2.3. Package Contents



Item	Quantity	Item	Quantity
❶ eManager	1	❷ 6-pin connector	1
❸ 12-pin connector	1	❹ Documents	● Quick Guide: 1 ● Commissioning Guide: 1
❺ Antenna	1	❻ AC-DC power supply module (optional)	1

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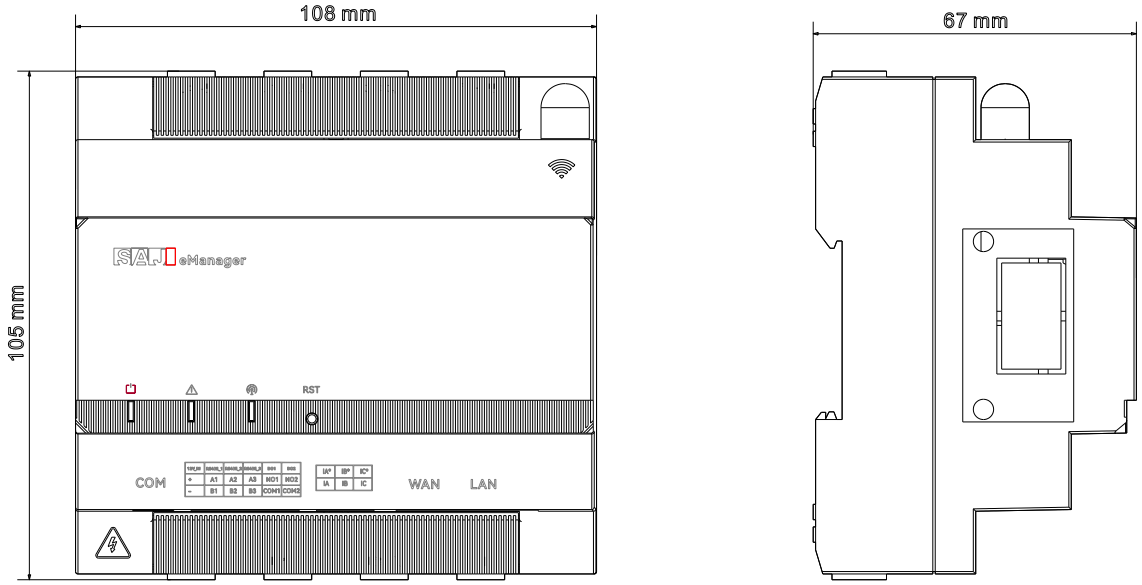
2.4. Dimension

Height: 105 mm

Width: 108 mm

Depth: 67 mm



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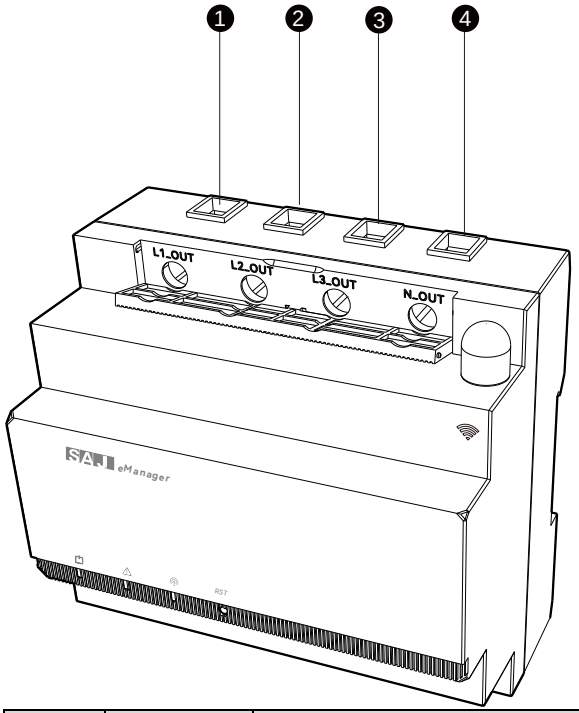
2.5. Upper view



Callout	Name	Description
❶	L1_OUT	ONLY applicable in internal CT connection scenario. For connecting the AC power cable for grid phase L1 and supplying power to loads.
❷	L2_OUT	ONLY applicable in internal CT connection scenario. For connecting the AC power cable for grid phase L2 and supplying power to loads.
❸	L3_OUT	ONLY applicable in internal CT connection scenario. For connecting the AC power cable for grid phase L3 and supplying power to loads.
❹	N_OUT	ONLY applicable in internal CT connection scenario. For connecting the AC power cable for grid phase N and supplying power to loads.

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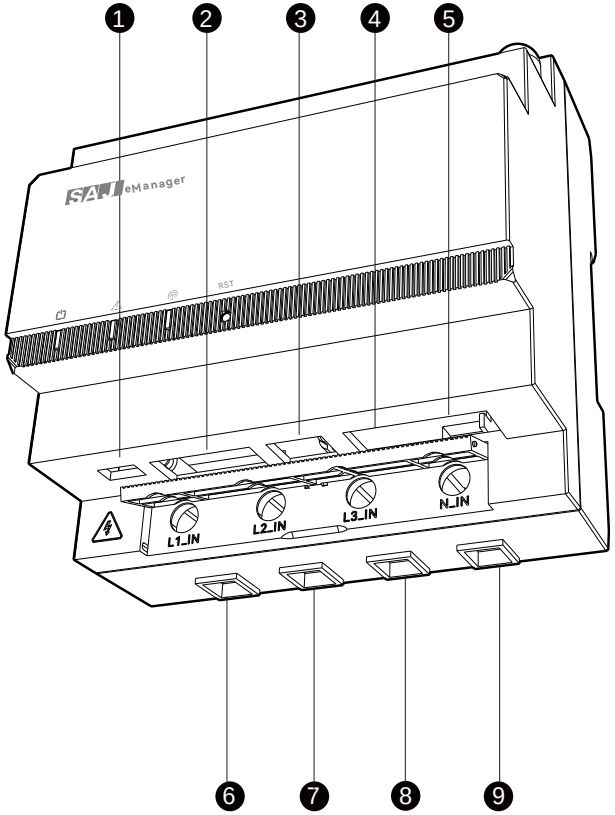
2.6. Bottom view



Callout	Name	Description
❶	COM	For debugging in maintenance.
❷	12V_IN+ and 12V_IN-	eManager backup power supply input; to connect to the DC output of the AC-DC power supply module.
	RS485 A1 and RS485 B1 RS485 A2 and RS485 B2 RS485 A3 and RS485 B3	For communication with the inverter(s). **Notes:** ● You can use any pair of RS485 terminal combination to connect to the inverter(s). ● For optimal performance, it is strongly recommended that one pair of RS485 terminal

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		combination be connected to up to two inverters.
	DO NO1 and DO COM1 DO NO2 and DO COM2	Reserved for future use. Digital output for connecting to the pump or generator.
❸	CT IA* and CT IA CT IB* and CT IB CT IC* and CT IC	For connecting the wires of three CTs. **Note:** The asterisk (*) symbol indicates the positive wire of the CT.
❹	WAN	To connect to the router for data transmission in Ethernet network configuration mode
❺	LAN	For Modbus TCP communication. ONLY applicable to the H2-(10K-30K)-(T2, T3) series inverter. (Connect to the LAN port on this inverter.)
❻	L1_IN	AC power cable input for grid phase L1
❼	L2_IN	AC power cable input for grid phase L2
❽	L3_IN	AC power cable input for grid phase L3
❾	N_IN	AC power cable input for grid phase N

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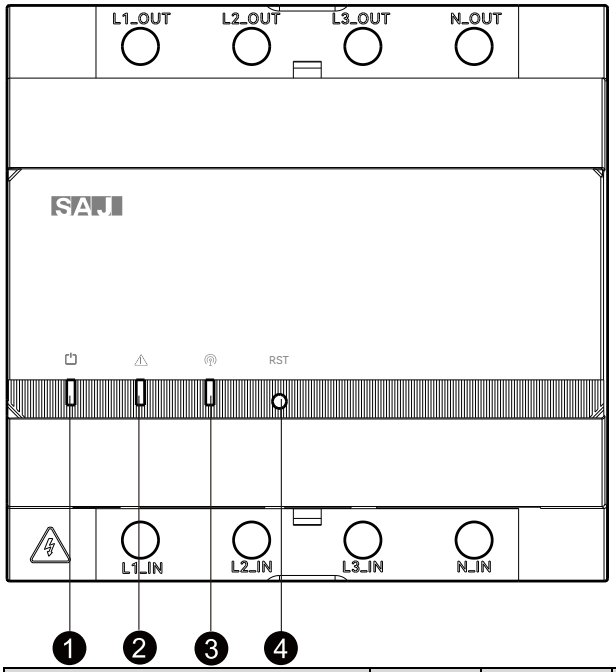
2.7. LEDs



LED and button	Status	Color	Description
❶ Power status LED	On	Green	The eManager is powered on.
	Off	None	The eManager is powered off.
❷ Fault LED	On	Red	An error has occurred.
	Off	None	The eManager is working properly.
❸ Communication status LED	Blinking	Green	The eManager is connected to the monitoring platform.
	Off	None	The eManager is not connected to the monitoring platform.
❹ Reset button	/	/	You can use a clip to press the button to reset the system.

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2.8. Datasheet

General parameters	
Application	Home usage
Communication	Bluetooth, Ethernet, Wi-Fi, RS485
Data collection interval (Min)	5 by default
Firmware update	Remote or local (Bluetooth) update
Data access	App or Web
Electrical parameters	
Input AC voltage	96 – 264 V AC
Input DC voltage	12 V DC
Input frequency	50/60 Hz
Max. power	3 W
Nominal current/limiting current per line conductor	63 A
Operating temperature range	-25℃ to +40℃ (-13℉ to +104℉)
Storage temperature range	-25℃ to +70℃ (-13℉ to +158℉)
Ambient humidity	0% – 95% (non-condensing)
Dimension (H x W x D) (mm)	105 x 108 x 67
Weight (g)	500
Ingress protection	IP20
Mounting	Rail-mounted
Warranty	3 years

3. Installation

About this task

The eManager and the AC-DC power supply module (if available) need to be installed inside the AC distribution box.

Before you start

- Make sure that the AC distribution box meets the requirements:
  - It has a surge protective device configured.
  - It must be locked by a tool for safety, so that it cannot be opened easily.

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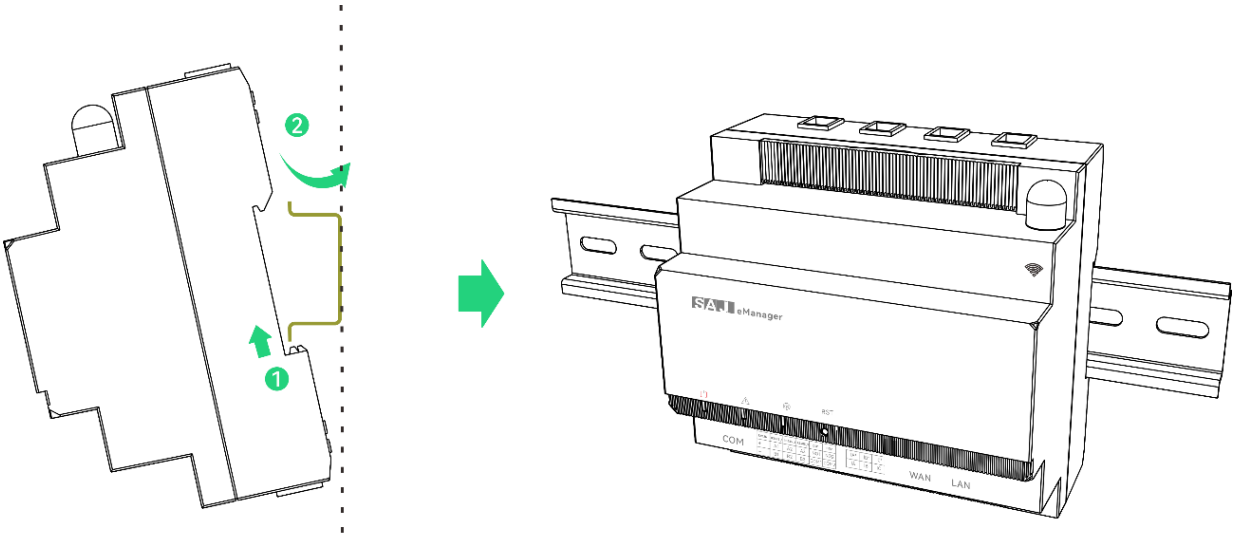
- Make sure that the length of the rail meets the requirement:
  - If only the eManager needs to be installed, the length of the rail is not less than 108 mm.
  - If the AC-DC power supply module needs to be installed with the eManager, the length of the rail is not less than 126 mm. Alternatively, the module can be installed in another rail inside the AC distribution box.

Procedure

Step 1. Install the eManager to the rail.

a. Insert the lower side of the rail into the lower slot on the back of the eManager. Push the eManager upwards until it is secured to the rail.

b. Pivot the eManager until the upper side of the rail is inserted into the upper slot of the eManager.



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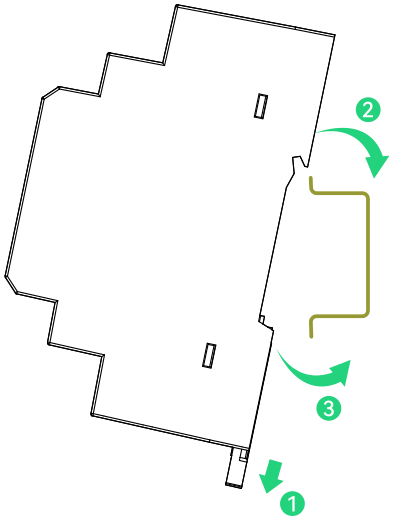
Step 2. (Optional) Install the AC-DC power supply module to the rail.

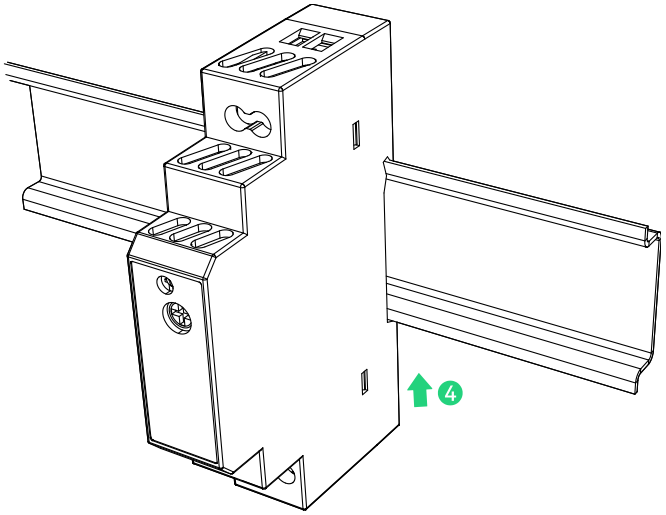
a. Pull the tab at the bottom of the module downwards.

b. Insert the upper side of the rail into the upper slot on the back of the module.

c. Pivot the module until the lower side of the rail is inserted into the lower slot of the module.

d. Push the tab at the bottom of the module upwards to secure module to the rail.





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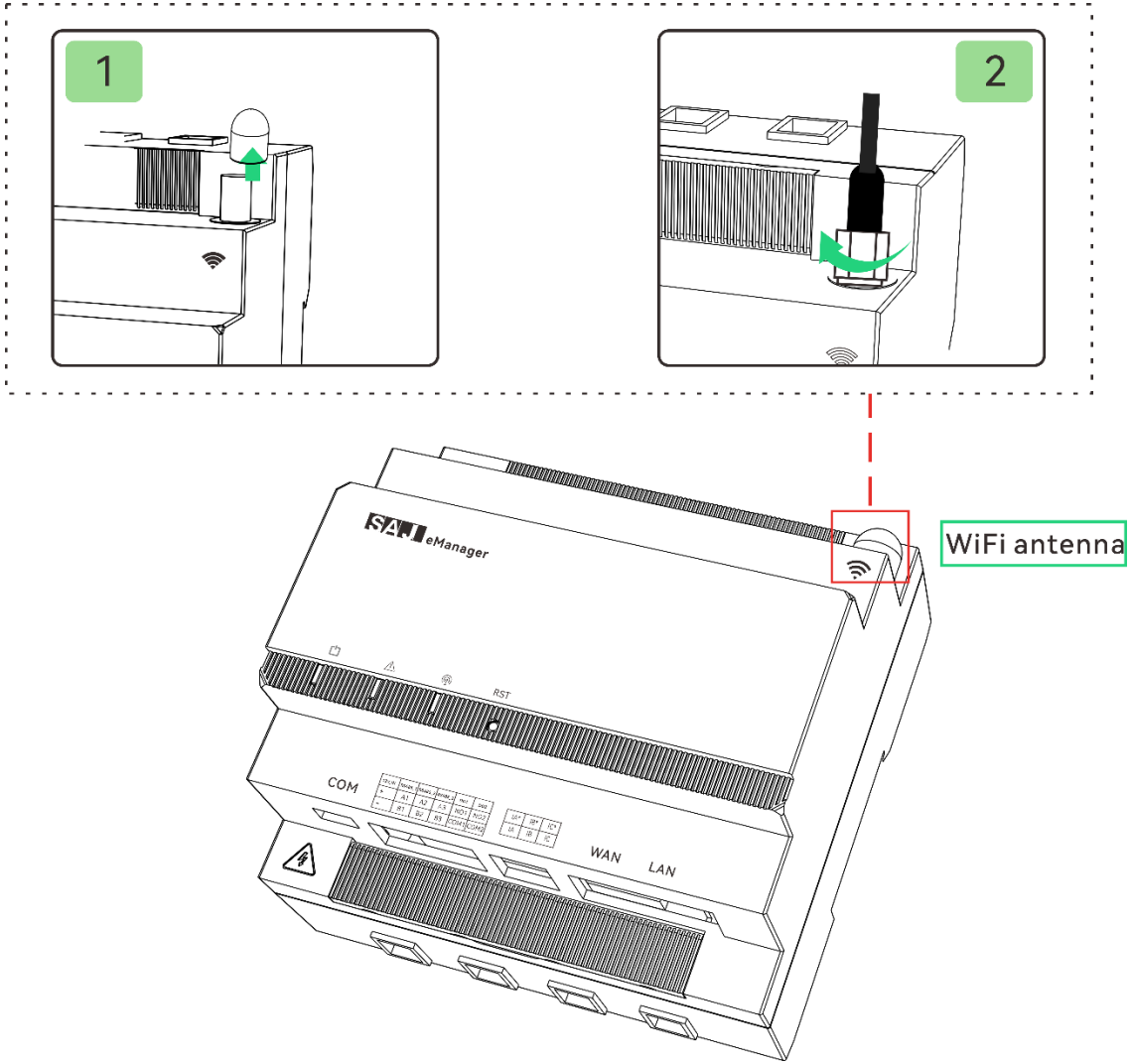
Step 3. Install the antenna to the eManager.

a. Remove the stud cap on the upper right corner of the eManager.

b. Install the antenna to the stud and tighten it.



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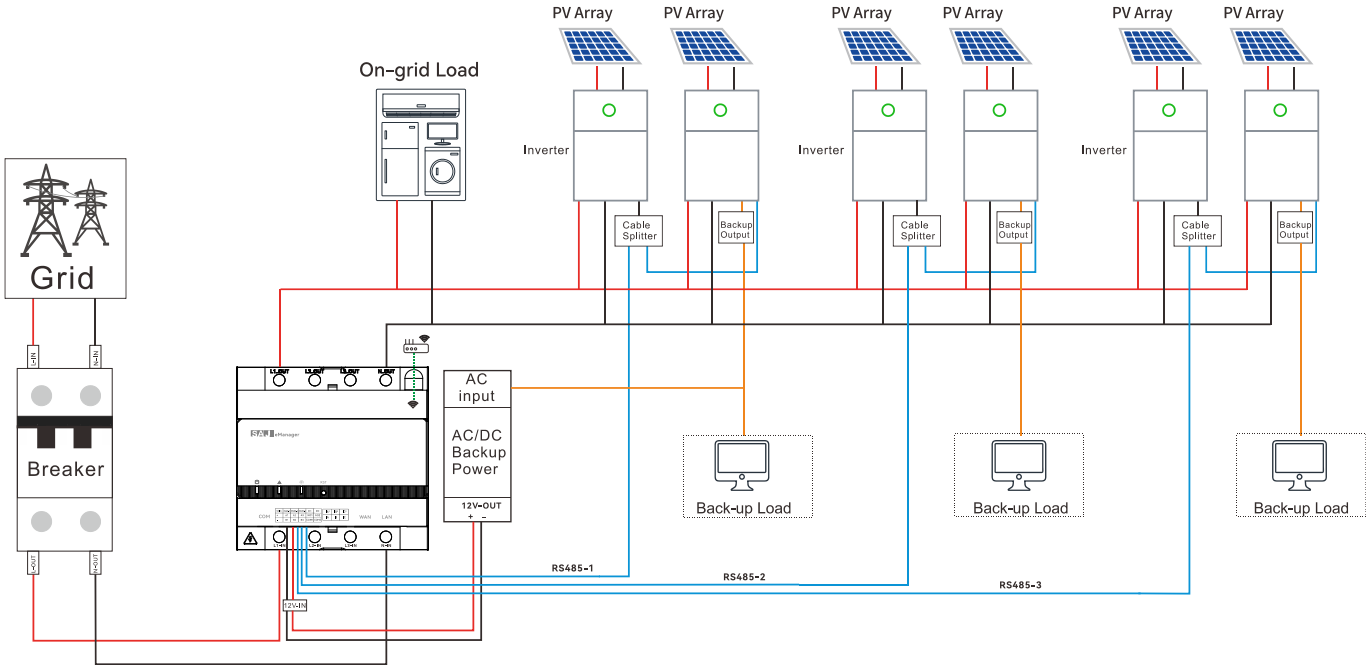
4. Electrical Connection

4.1. System Connect Diagram

4.1.1. Single-phase grid, internal CT connection



Notes:

- For detailed connection on the inverter side, refer to section 4.2 "Inverter Connection".
- For detailed connection on the AC-DC power supply module side, refer to section 4.4 "AC-DC Power Supply Module Connection".
- For detailed connection between the grid and the inverter, refer to the Quick Guide.

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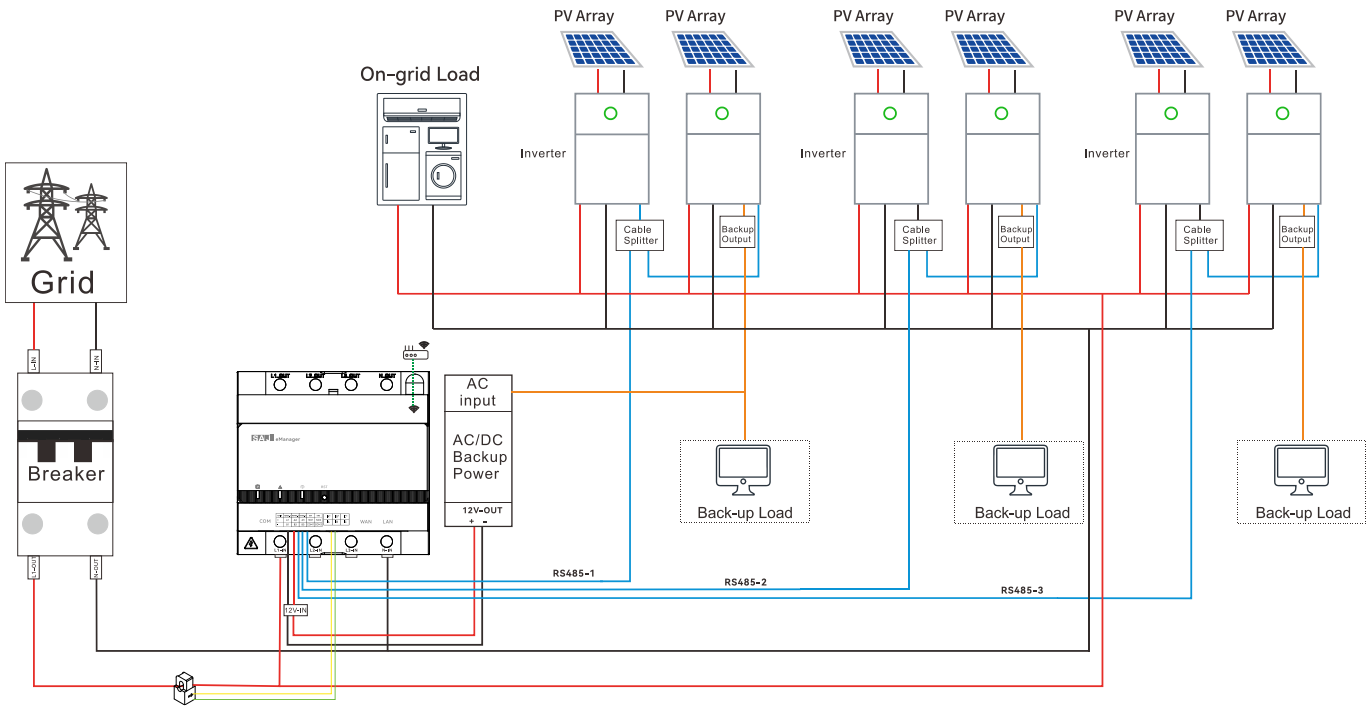
4.1.2. Single-phase grid, external CT connection



Notes:

- Choose CTs according to the plant capacity. (Plant capacity = The greater value of the total inverter power or the total on-grid load power) It is recommended that 100A/50mA or 250A/50mA CTs be used.
- For detailed connection on the inverter side, refer to section 4.2 "Inverter Connection".
- For detailed connection on the AC-DC power supply module side, refer to section 4.4 "AC-DC Power Supply Module Connection".
- For detailed connection between the grid and the inverter, refer to the Quick Guide.

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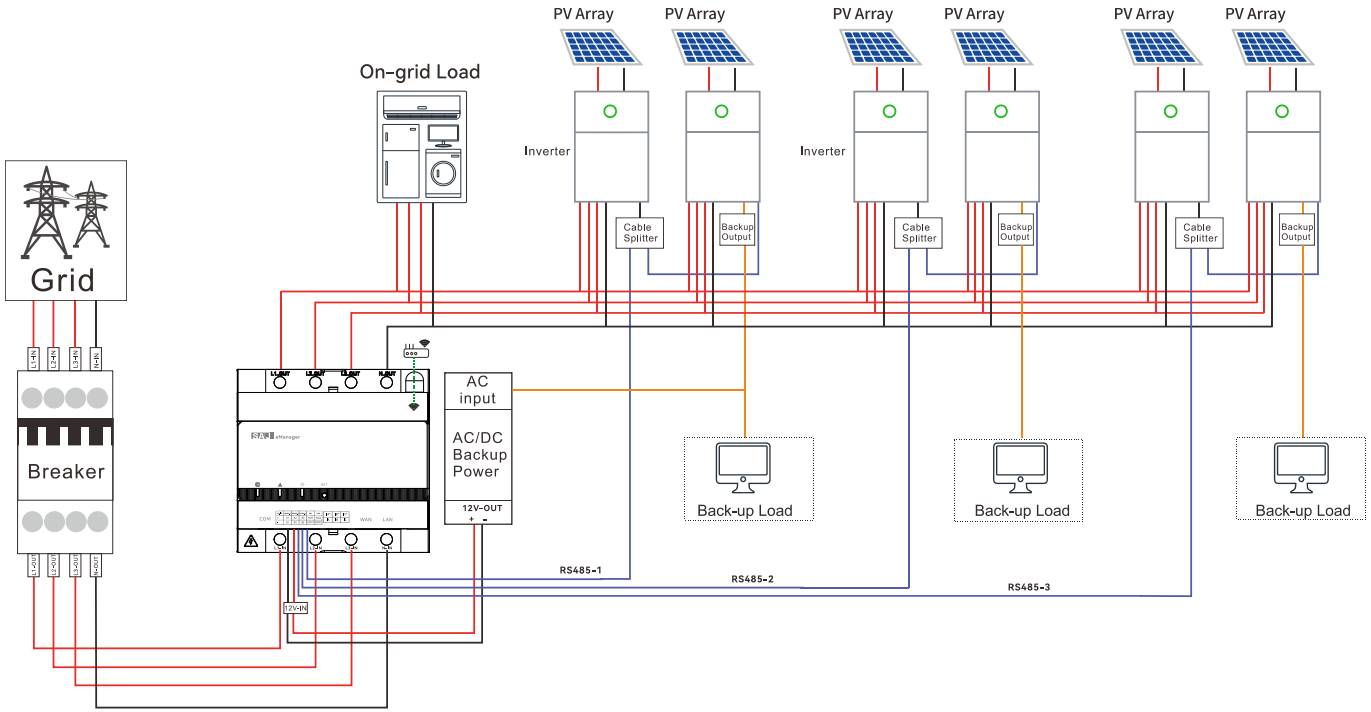
4.1.3. Three-phase grid, internal CT connection



Notes:

- For detailed connection on the inverter side, refer to section 4.2 "Inverter Connection".
- For detailed connection on the AC-DC power supply module side, refer to section 4.4 "AC-DC Power Supply Module Connection".
- For detailed connection between the grid and the inverter, refer to the Quick Guide.

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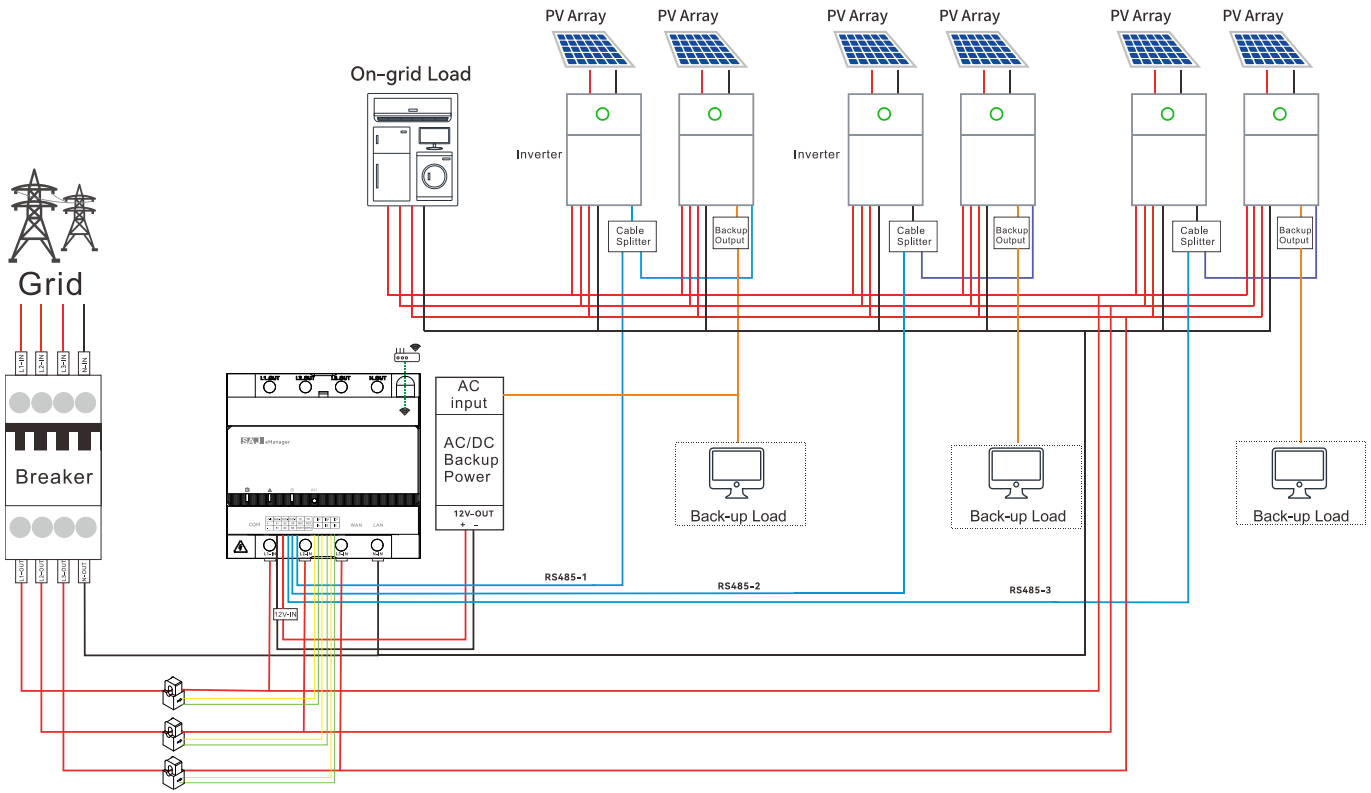
4.1.4. Three-phase grid, external CT connection



Notes:

- Choose CTs according to the plant capacity. (Plant capacity: the total inverter power or the total on-grid load power, whichever is greater) It is recommended that 100A/50mA or 250A/50mA CTs be used.
- For detailed connection on the inverter side, refer to section 4.2 "Inverter Connection".
- For detailed connection on the AC-DC power supply module side, refer to section 4.4 "AC-DC Power Supply Module Connection".
- For detailed connection between the grid and the inverter, refer to the Quick Guide.

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4.2. Inverter Connection

Depending on your inverter models, connect the communication wires from the eManager to the inverter according to the below table:

Inverter type	Adopted inverter port	Connection manner
Inverter WITH an RS485 silkscreen port	RS485 port	RS485-A terminal (eManager) <-> pin 7 (inverter) RS485-B terminal (eManager) <-> pin 8 (inverter)
Inverter WITHOUT an RS485 silkscreen port	EMS/METER port	

Notes:

- You can use any pair of RS485 terminal combination to connect to the inverter(s).
  - RS485 A1 and RS485 B1
  - RS485 A2 and RS485 B2
  - RS485 A3 and RS485 B3
- For optimal performance, to connect to one pair of RS485 terminal combination, it is strongly recommended that you:
  - connect a maximum of two inverters; and
  - use inverters of the same type. For example, a hybrid inverter and a solar inverter cannot be connected to a same pair of RS485 terminal combination.

4.3. Ethernet Connection (Optional)

If you choose to connect the eManager to the router through Ethernet, connect the cable as listed:

From	To
WAN port on the eManager	LAN port the router

4.4. AC-DC Power Supply Module Connection (Optional)

Connect the cables from the AC-DC power supply module to the inverter by referring to the below table:

From	To
AC input of the AC-DC power supply module	BACKUP port on the inverter (Any phase in three-phase grid connection)
DC output of the AC-DC power supply module	12V_IN port of the eManager

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5. Firmware Update

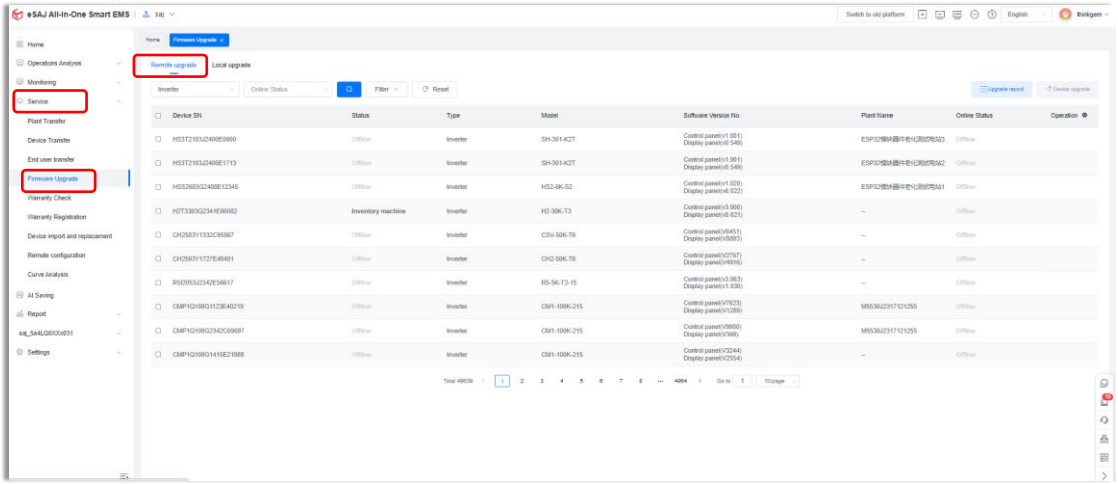
In one energy storage system, to work with the eManager, the inverter firmware must be upgraded. Choose one of the following methods:

- Remote upgrade (on the Web platform: eSAJ All-In-One Smart EMS platform at: https://esaj-home.saj-electric.cn/system/account)
- Local upgrade (on the Web platform and the eSAJ Home App) (Bluetooth connection)

5.1. Remote upgrade (Web platform)

Step 1. Log in to the eSAJ All-In-One Smart EMS platform at https://esaj-home.saj-electric.cn/system/account.

Step 2. On the left navigation pane, choose **Service** > **Firmware Upgrade**. On the right pane, click **Remote upgrade**.



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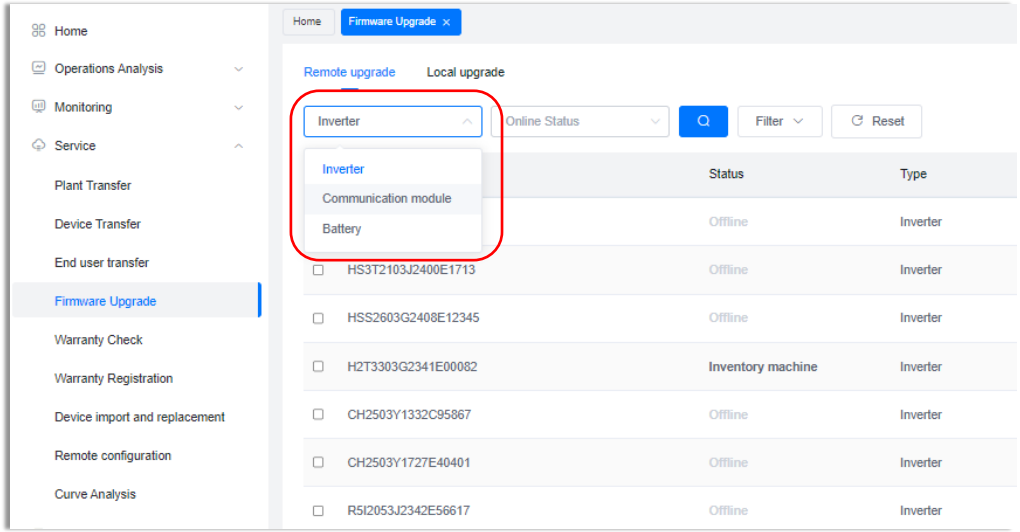
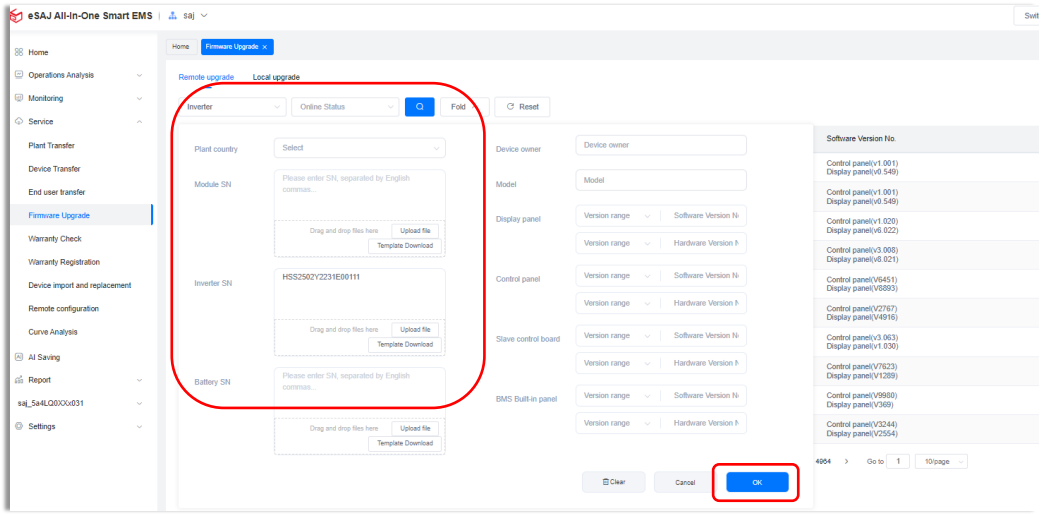
Step 3. Select **Inverter** or **Communication module** to display corresponding devices.

Note: No need to upgrade the battery.



Alternatively, you can locate the required device based on its SN: Click **Filter** to display the detailed search box. Input the SN and click **OK**.



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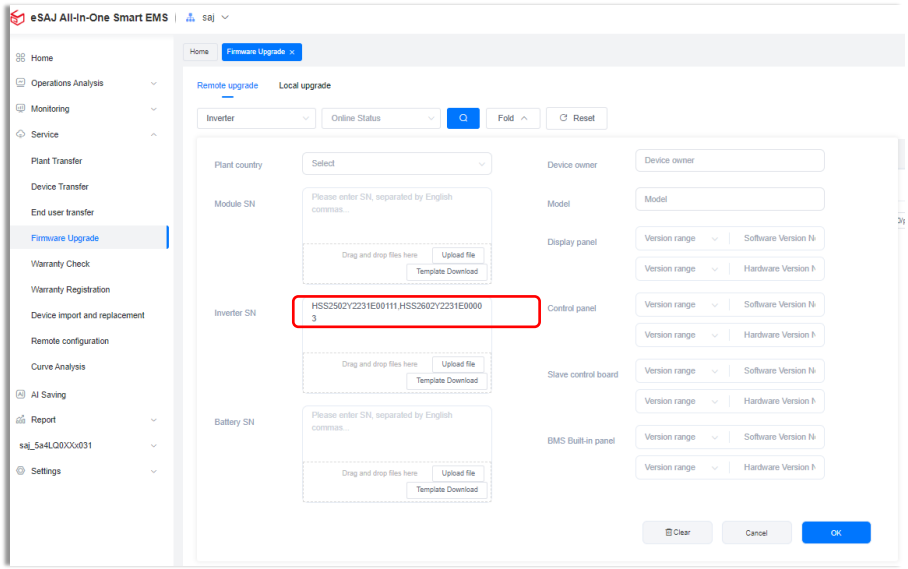
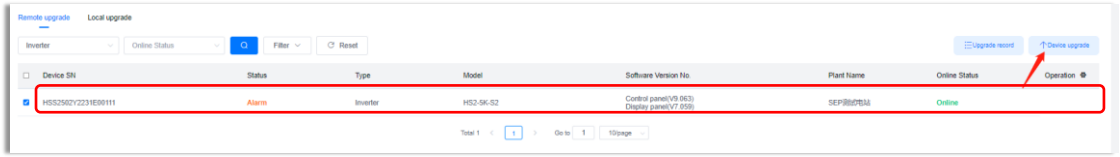
Note: For batch upgrade, separate the device SNs by using the comma (,).



Step 4. Select the required device and click **Device upgrade**.



Step 5. Select the firmware version: To upgrade to the up-to-date firmware version, select the latest firmware version; to upgrade to a specific firmware version, click **Upload local upgrade package** to upload the local upgrade file.

Set the upgrade time: Depending on your needs, upgrade the firmware right now or in a specific time:

- Upgrade now: Select **Instant distribution** and click **Upgrade Now**.
- Upgrade later: Select **Regular distribution**, set the specific upgrade time, and click **Upgrade Now**. The upgrade will start according to the configured time.

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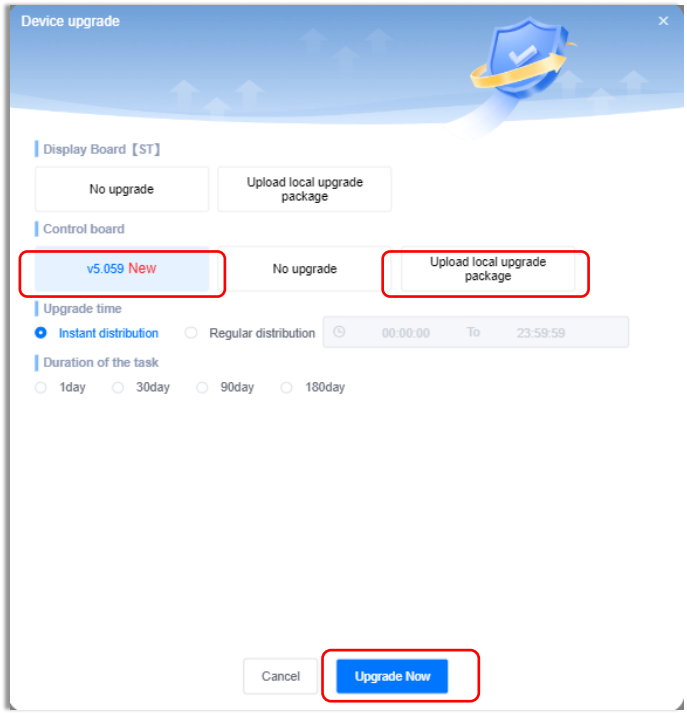
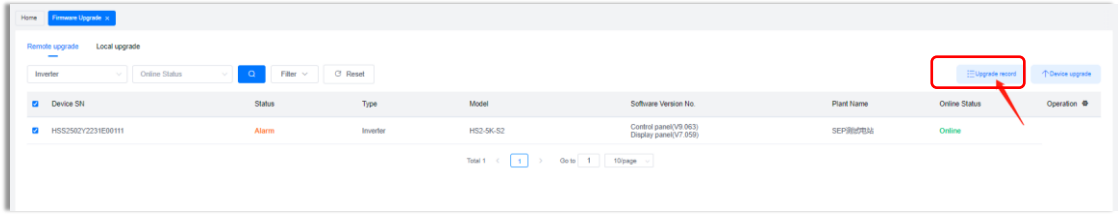


Step 6. Click **Upgrade record** and then click the icon under **Operation** to view the upgrade details (including the upgrade status and result).



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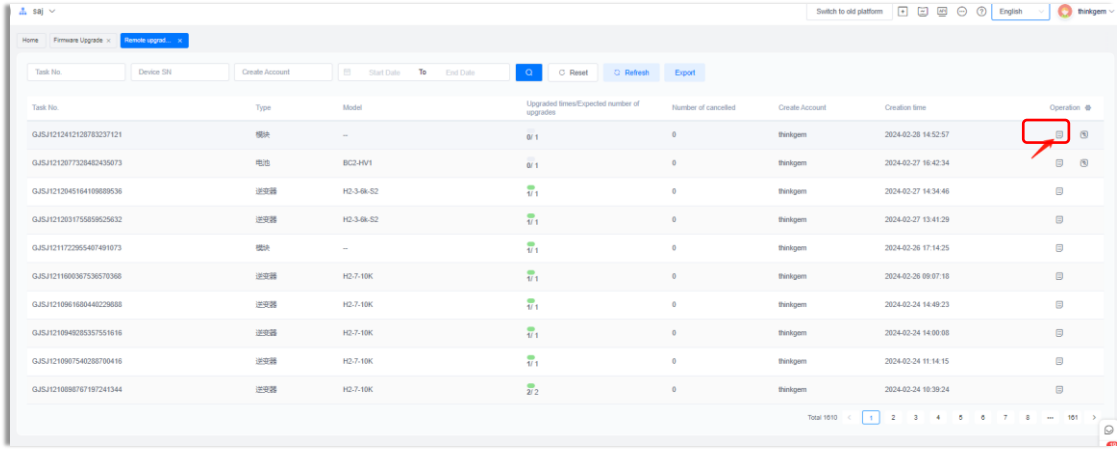
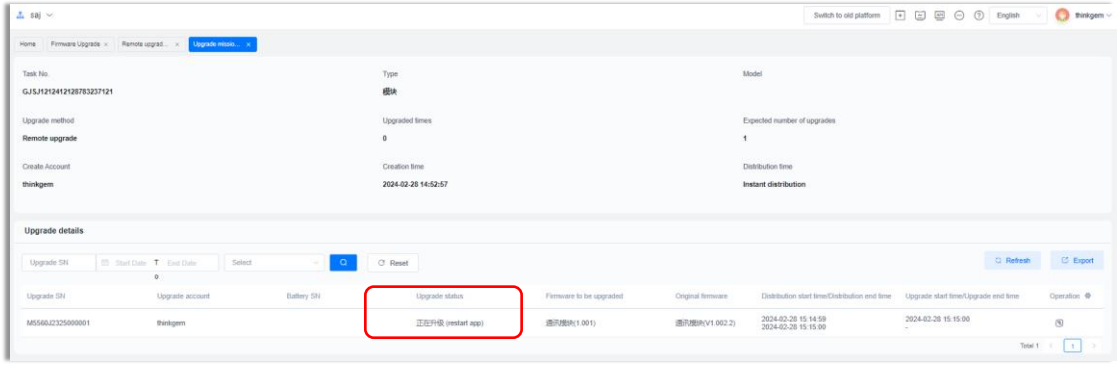


Upgrade status: Being upgraded



Upgrade status: Upgrade successfully

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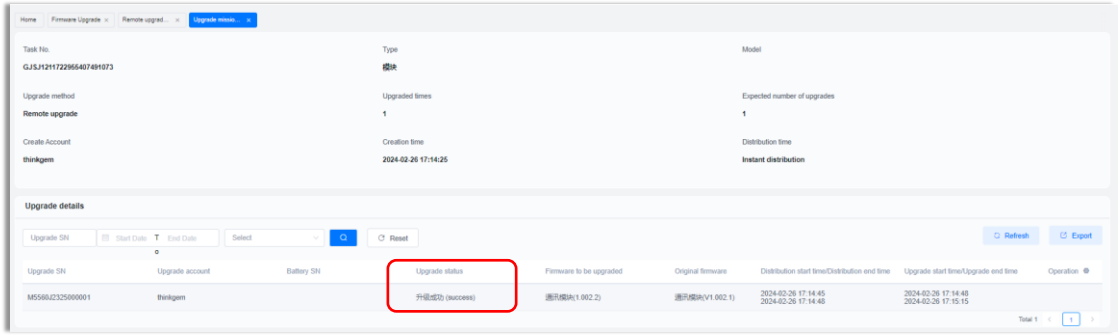

---End

5.2. Local Upgrade (Web page and App) (Bluetooth Connection)

Before you start

The firmware package has been uploaded. If any question, contact SAJ technical support.

Procedure

Step 1. Log in to the eSAJ All-In-One Smart EMS platform at https://esaj-home.saj-electric.cn/system/account.

a. On the left navigation pane, click the icon and choose **Local upgrade** > **Firmware upgrade tasks**.

b. On the **Please select upgrade** section, select the device type, model name, and required firmware version.

c. On the **Upgradable equipment** section, input the device SN.

d. Click **OK**.

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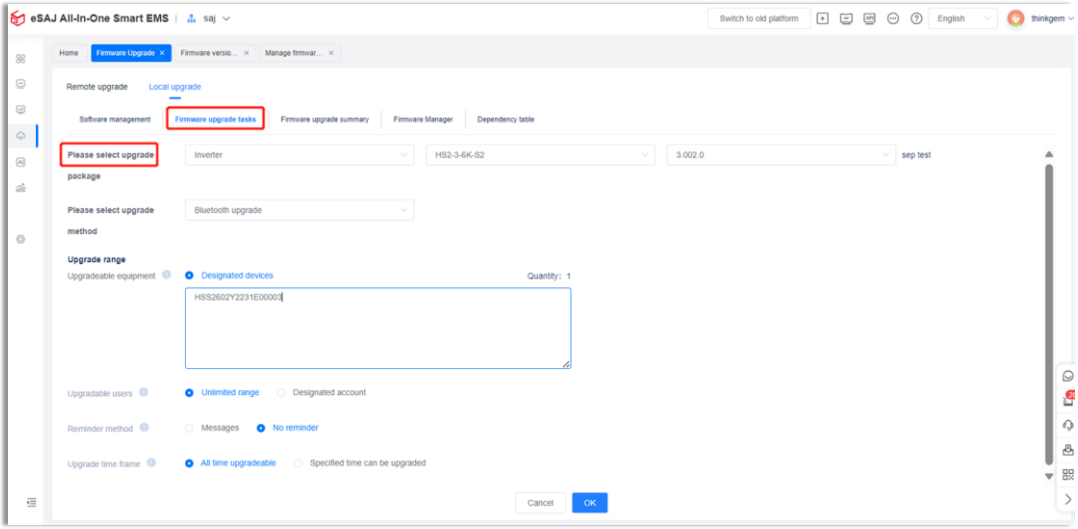
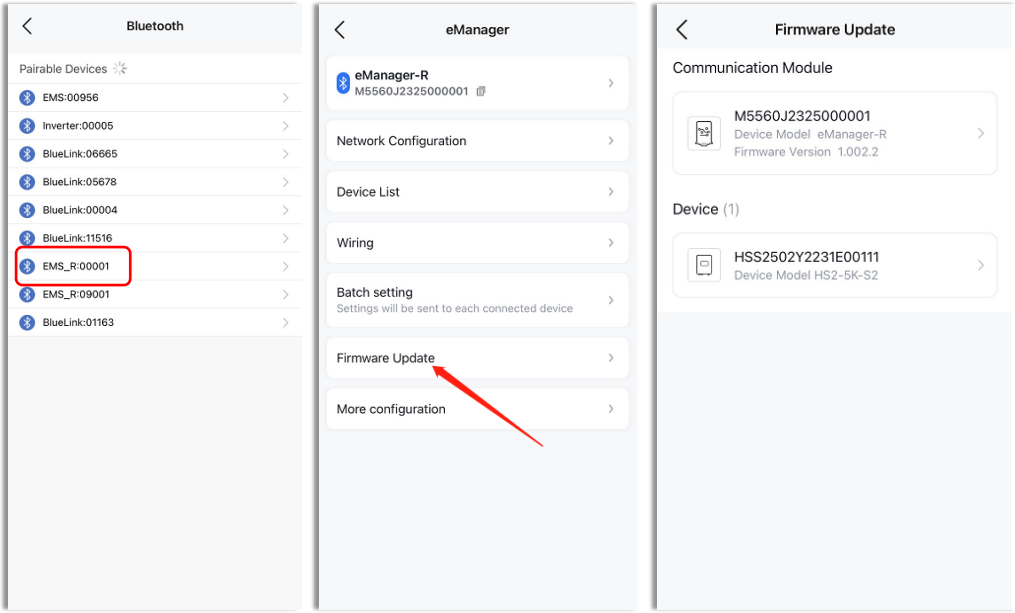


e. Log in to the eSAJ Home App. Select the required EMS device (the suffix is last five number of the EMS device SN). Tap **Firmware Update** and then tap the device to be upgraded.



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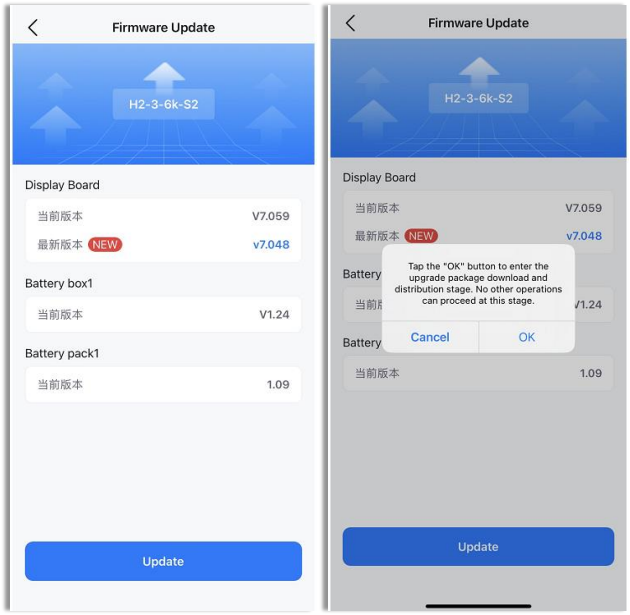
f. On **Firmware Update**, select the latest version and tap **Update**. On the displayed dialog box, tap **OK** to confirm the upgrade.

During the upgrade, the Bluetooth connection will be disconnected.

After the upgrade, reconnect the Bluetooth and click **Firmware Update** again to check the upgrade result.



---End

5.3. After Upgrade

Step 1. Use the AIO3 module installed on the inverter to make sure that:

a. the inverter is set to no meter status; and

b. the export limit function is disabled.

Step 2. If the AIO3 module is installed on the inverter, remove it from the inverter. If the AIO3 module is embedded in the inverter, set it to Ethernet connection mode and then disconnect the Ethernet cable from the LAN port on the inverter.

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6. Commissioning by the App

The eSAJ Home App can be used for both nearby and remote monitoring. It communicates with different devices through Bluetooth or Ethernet connection.

The detailed operations on the App might vary, depending on the version you are using.

6.1. Installing the App

On your mobile phone, search for “eSAJ Home” in the App store. Download and install the App.

6.2. Logging In to the App

Have an account? — Log in to the App.

1. Click the three-dot icon ••• on the top right corner. Choose the language and network node based on your needs.
2. Use your account and password for login.

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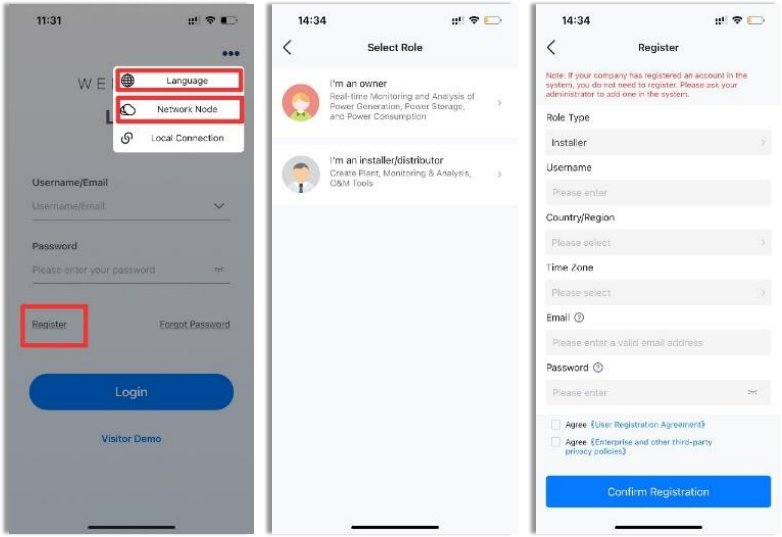

No account? — Apply for a new account for login.

1. Click the three-dot icon ••• on the top right corner. Choose the language and network node based on your needs.
2. Click **Register.** Choose whether you are an owner, an installer, or a distributor.
   Note: For commissioning convenience, it is suggested that the install apply for the owner account.
3. Set your username, country/region, time zone, email, and password. Select the registration agreements and confirm the registration.
4. Use the applied account and the password for login.

6.3. Performing the Initialization Settings

Before you start

Enable the Bluetooth function on your mobile phone.

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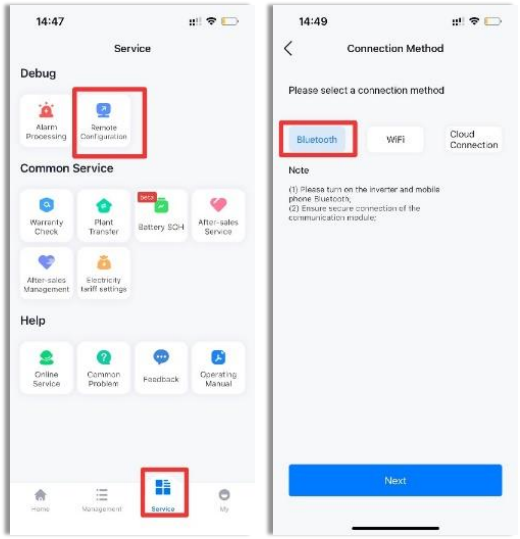
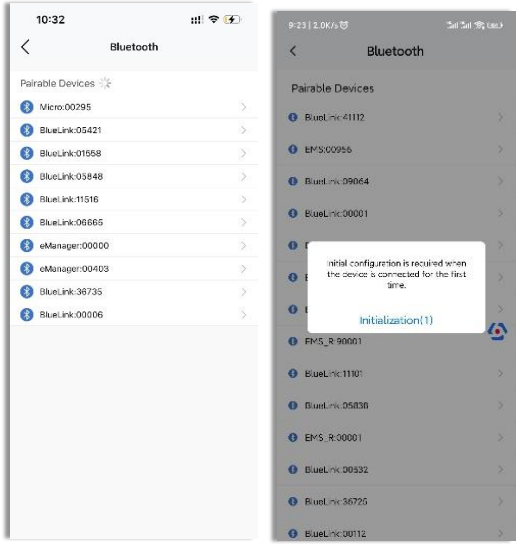
	1. On the **Service** interface, select **Remote Configuration**. Tap **Bluetooth** and then **Next**.
	2. Choose your EMS device (eManager: *XXXXX*) from the device list. Then, tap **Initialization**. **Note:** *XXXXX* are the last five number of the serial number (SN) of your EMS device.

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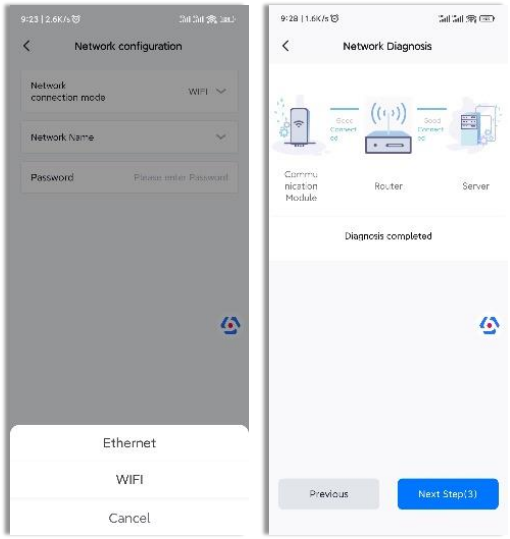
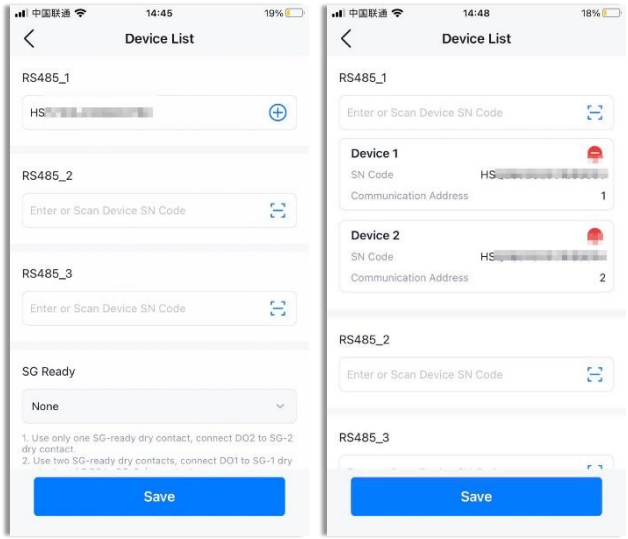


3. **Network configuration**

Choose **Ethernet** or **WIFI** according to your needs. Set the parameters.

Note: If you choose to use **Ethernet**, make sure that the Ethernet cable is connected from the WAN port of the eManager to the LAN port of the router.



4. **Device configuration**

To add an inverter, under its RS485 connection setting area (RS485_1, RS485_2, or RS485_3), scan the SN barcode of each connected inverter and click ⊕ to add it.

Notes:

- Make sure that each inverter is added in the proper RS485 connection setting area. For example, the inverter connected to the RS485_A1 and RS485_B1 ports of the eManager must be added to the RS485_1 setting area.
- If one inverter is mistakenly added, you can tap ⊖ to remove it.
- Do not change the **SG Ready** settings. This function is reserved for future use.

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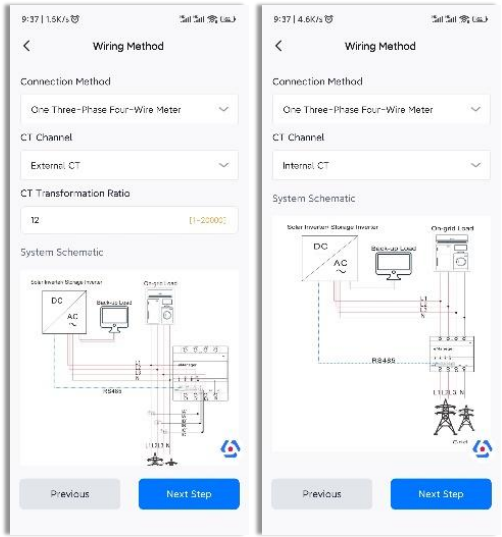
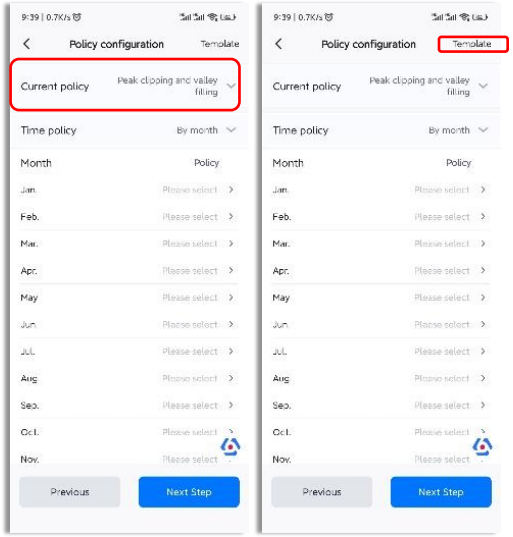


5. **Wiring method**

Set the wiring method and CT connection details.

- If external 100A/50mA CT connection is used, set **CT Transformation Ratio** to **10**.
- If external 250A/50mA CT connection is used, set **CT Transformation Ratio** to **25**.



6. **Policy configuration** — Creating policy templates

a. Verify that **Current policy** is set to **Peak clipping and valley filling** by default.

b. Tap **Template** on the upper right corner. Create a policy template based on your needs and then tap **Save**.

- **Name**: Name the template.
- **Battery protection**: When it is enabled, you need to set the battery SOC (upper threshold for charging and lower threshold for discharging) to prevent battery over-charging or over-discharging.
- **Demand control**: When it is enabled, you need to set the upper threshold for the system input from the grid.
- **Backup power supply**: When it is enabled, you need to set the backup SOC threshold, which must be higher than the lower threshold for discharging that you set in **Battery protection**.
- **Self-consumption Mode**: It is suggested that you enable this function.

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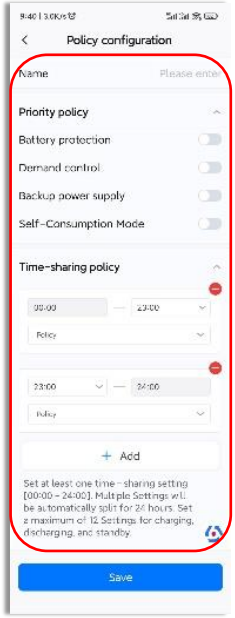

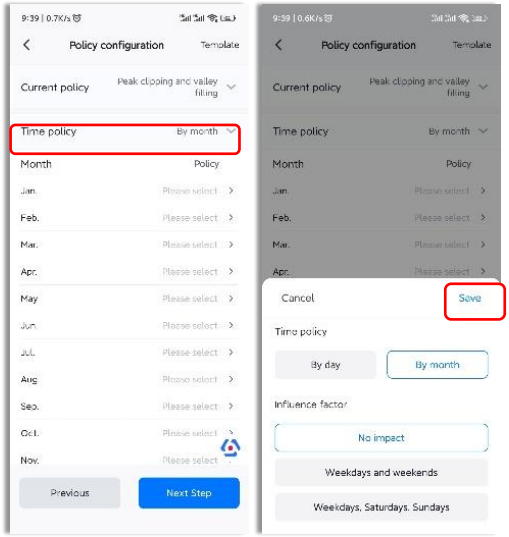

- **Time-sharing policy**: You can set a maximum of 12 periods for one day and set different work statuses (charging, discharging, and standby) for these periods.

  Notes:

  - The charging and discharging power set here is for the whole system.
  - If **Self-consumption mode** is enabled, the inverter works in the self-consumption mode in standby status.

c. (Optional) After saving this template, you can tap **Local Add** to create another new template.

7. **Policy configuration** — Setting time policies

a. On **Policy configuration**, tap **Time Policy**. Set the policy based on your needs and then tap **Save**.

- **By day**: Set different policies for each day.
- **By month**: Set different policies for each month.
  - **No impact**: One policy template is used in all days in a month.
  - **Weekdays and weekends**: Two templates are used in weekdays and weekends separately in one month.
  - **Weekdays, Saturdays, and Sundays**: Three templates are used in weekdays, Saturdays, and Sundays separately in a month.

b. Choose the required policy templates for different periods (day or month) and tap **Save**.

Note: You can select different policy templates for each

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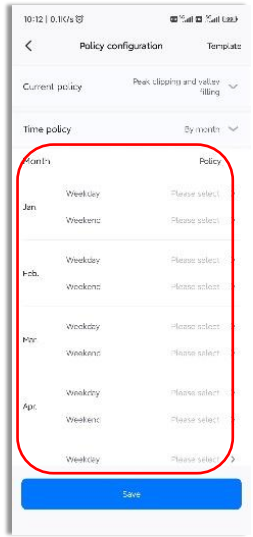
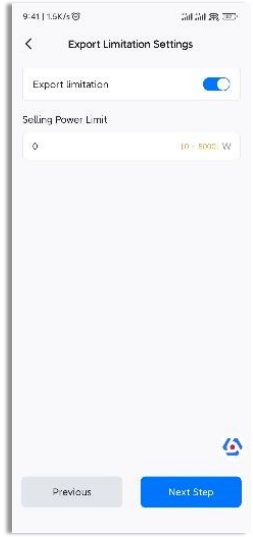
<table>
<tr>
<td> 
</td>
<td>period one by one; or you can use batch settings to select one certain policy template for periods of a same type.
c. After all the policy configuration is set, tap Next Step to go to next configuration.</td>
</tr>
<tr>
<td> 
</td>
<td>8. Export limitation settings
Depending on your needs, enable Export limitation and set Selling Power Limit. Then, tap Next Step.</td>
</tr>
</table>

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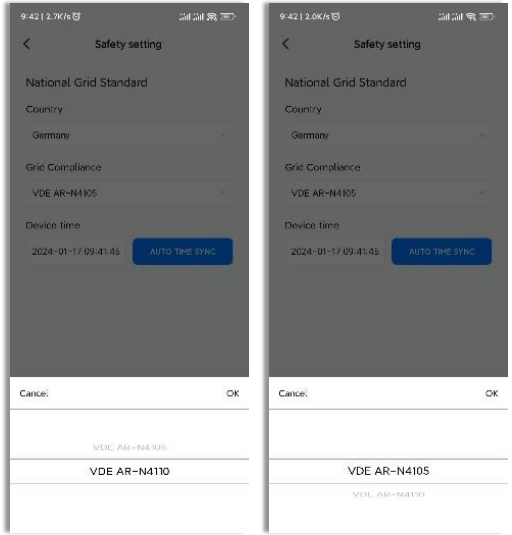
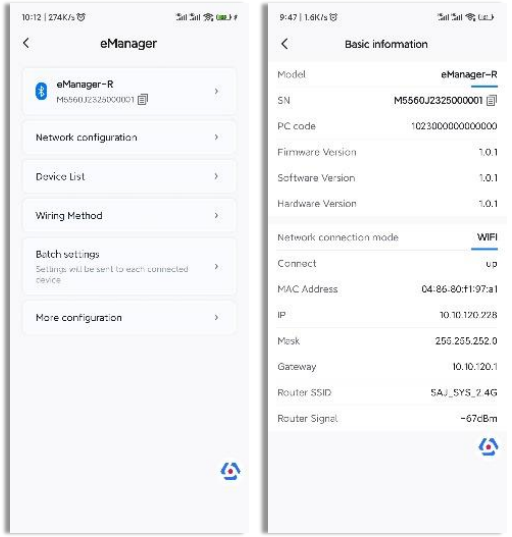
<table>
<tr>
<td> 
</td>
<td>9. Safety settings
a. Select Country and Grid Compliance.
b. Tap AUTO TIME SYNC to set Device time to your current time zone.</td>
</tr>
<tr>
<td> 
</td>
<td>10. After the initialization is completed, view the EMS settings for double check, especially check the followings:
a. Tap Network configuration and verify that it is set to up. Note: If the Wi-Fi signal strength is lower than -70 dBm, it is recommended to use Ethernet connection manner.
b. Tap Device list and verify that all required devices are added.
11. If you need to change the default settings of the Battery brand and Lower limit of battery charging capacitance (off-grid) parameters, tap the required device in Device list, set the values, and save the changes.</td>
</tr>
</table>

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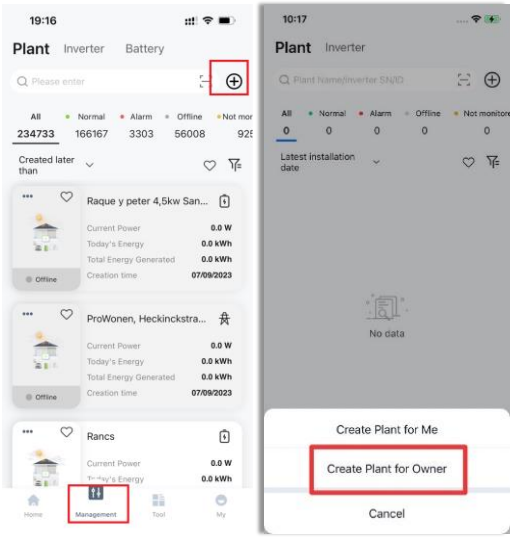
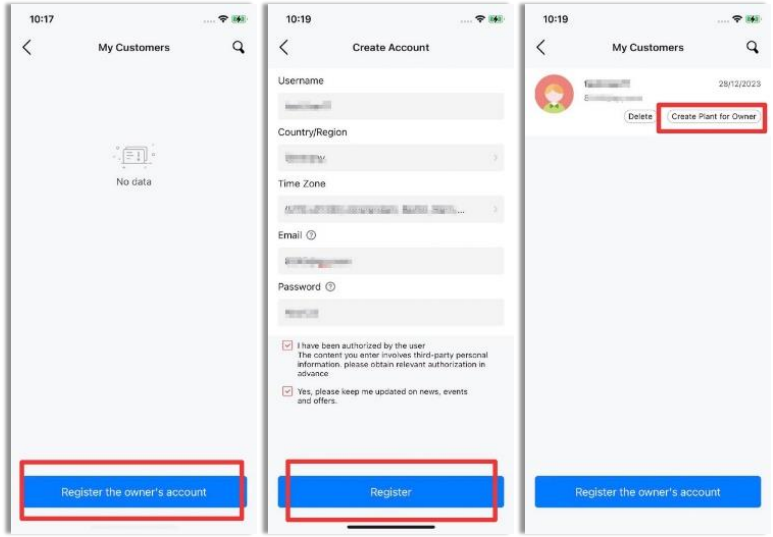
6.4. Creating a Plant



1. On the **Management** page, click the ⊕ icon on the top right corner. Select **Create Plant for Owner**.



2. Apply for an account for the end user.

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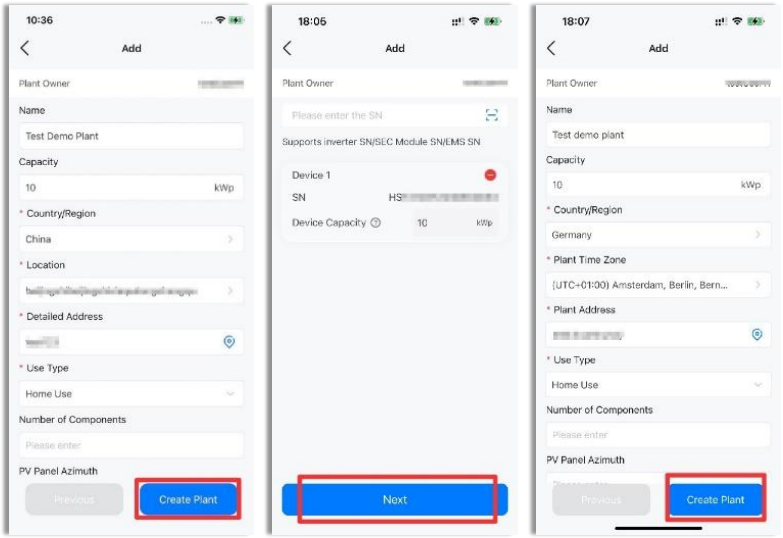

3. Configure the plant details based on your actual conditions.
   a. Set the name, capacity, country or region, location, detailed address, user type, number of components, and PV panel azimuth.
   b. Scan the EMS SN. Double check whether all devices added to this EMS are displayed. If not, check whether there is any communication error occurs between the EMS and the inverter.

---End

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7. Appendix

7.1. Recycling and Disposal

This device should not be disposed as a residential waste.

The device that has reached the end of its operation life is not required to be returned to your dealer; instead, it must be disposed by an approved collection and recycling facility in your area.

7.2. Warranty

Check the product warranty conditions and terms on the SAJ website: https://www.saj-electric.com/

7.3. Contacting Support

Guangzhou Sanjing Electric Co., Ltd.

Address: SAJ Innovation Park, No.9, Lizhishan Road, Guangzhou Science City, Guangdong, P.R.China.

Postcode: 510663

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Fax: 020-66608589

7.4. Trademark

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