



Hybrid Solar Inverter

RX-12K User Manual

Version: V1.1

Preface

Thank you for choosing RUIXU 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 RUIXU website at <https://www.ruixubattery.com>

RUIXU Electronic

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1. Safety Precautions

1.1 About this document

1.1.1. Overview

This user manual provides an introduction and instructions for the installation, operation, maintenance and troubleshooting of the RUIXU inverter product RX-12K.

Read the user manual carefully before any installation, operation and maintenance and follow the instructions during installation and operation. Keep this manual all time available in case of emergency.

Failure to follow any of the instructions or warnings in this document can result in device damage, potentially rendering it inoperable; or even causes electrical shock, serious injury, or death. RUIXU shall take no responsibility for any personal injuries or property damage caused by improper use.

1.1.2. Target audience

This document is applicable to:

- Installers
- Users

The qualified and trained installers must have knowledge and experience in:

- Installing electrical equipment. Applying all applicable installation codes.
- Analyzing and reducing the hazards involved in performing electrical work.
- Installing and configuring batteries.
- Selecting and using Personal Protective Equipment (PPE).

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.

1.2.1. Safety levels

A 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, can result in death or serious injury or moderate injury.
⚠ CAUTION
Indicates a hazardous condition which, if not avoided, can result in minor or moderate injury.
ⓘ NOTICE
Indicates a situation that can result in potential damage, if not avoided.

1.2.2.Symbol explanation

Symbol	Description
	Danger: Electrical shock hazard This device is directly connected to public grid, thus all work to the battery shall only be carried out by qualified personnel.
	WARNING: No open flames Do not place or install near flammable or explosive materials.
	Danger: Hot surface The components inside the battery will release a lot of heat during operation. Do not touch metal plate housing during operating.
	Attention: Install the product out of reach of children.
	Attention: Check the user manual before service. If an error has occurred, refer to the troubleshooting chapter to remedy the error.
	Attention: This device shall NOT be disposed of in residential waste.
	Attention: This battery module shall NOT be disposed of in residential waste.
 G 5min	CAUTION: Risk of electric shock from energy stored in capacitor. Do not remove cover until 5 minutes after disconnecting all sources of supply
	CE mark Equipment with the CE mark fulfills the requirements of the Low Voltage Directive and Electro Magnetic Compatibility.
	ETL mark The ETL Mark is proof of product compliance to North American safety standards.
	RoHS compliant mark Equipment with the RoHS mark does not exceed the allowable amounts of the restricted substances defined in Restriction of Hazardous Substances in Electrical and Electronic Equipment.
	RCM compliant mark Equipment with the RCM mark is in compliance with AS/NZS 4417.1 & 2 and the EESS.
	Recyclable

1.2.3.Safety instructions

For safety, be sure to read all the safety instructions carefully prior to any works, and please observe the appropriate rules and regulations of the country or region where you installed all-in-one energy storage system.



DANGER

- There is possibility of fatal personnel injuries due to electrical shock and high voltage.
- Do not touch the operating component of the inverter; it might result in burning or death.
- To prevent risk of electric shock during installation and maintenance, please make sure that all AC and DC terminals are disconnected prior to work.
- Do not touch the surface of the inverter while the housing is wet, otherwise, it might cause electrical shock.
- Do not stay close to the inverter while there are severe weather conditions including storm, lightning, etc.
- Before opening the housing, the RUIXU inverter must be disconnected from the grid and PV generator; you must wait for at least five minutes to let the energy storage capacitors
- completely discharge after disconnecting from power source.
- Please keep the power off prior to any operations.



WARNING

- Any unauthorized actions including modification of product functionality of any form may cause lethal hazard to the operator, third parties, the units or their property. RUIXU is not responsible for the loss and these warranty claims.
- Do not touch non-insulated parts or cables.
- For personal and property safety, do not short-circuit the positive (+) and negative (-) electrode terminals.
- Disconnect the PV array from the inverter by using an external disconnection device. If no external disconnection device is available, wait until no more DC power is applied to the inverter.
- Disconnect the AC circuit breaker, or keep it disconnect if it is tripped, and secure it against reconnection.
- The RUIXU inverter must only be operated with the PV generator. Do not connect any other source of energy to the RUIXU inverter.
- Be sure that the PV generator and inverter are well grounded in order to protect properties and persons.



CAUTION

- The inverter will become hot during operation. Please do not touch the heat sink or peripheral surface during or shortly after operation.
- Risk of damage due to improper modifications.



NOTICE

- Moving or reinstall the inverter to another location might void the warranty without prior written permission from RUIXU.

1.3. Safe handling

Only qualified electricians who have read and fully understood all safety regulations in this manual can install, maintain, and repair the inverter.

When the inverter is working, do not touch the internal components or cables to avoid electric shock. When the inverter is working, do not plug in or out the cables.

Make sure the AC input voltage and current are compatible with the rated voltage and current of the inverter;

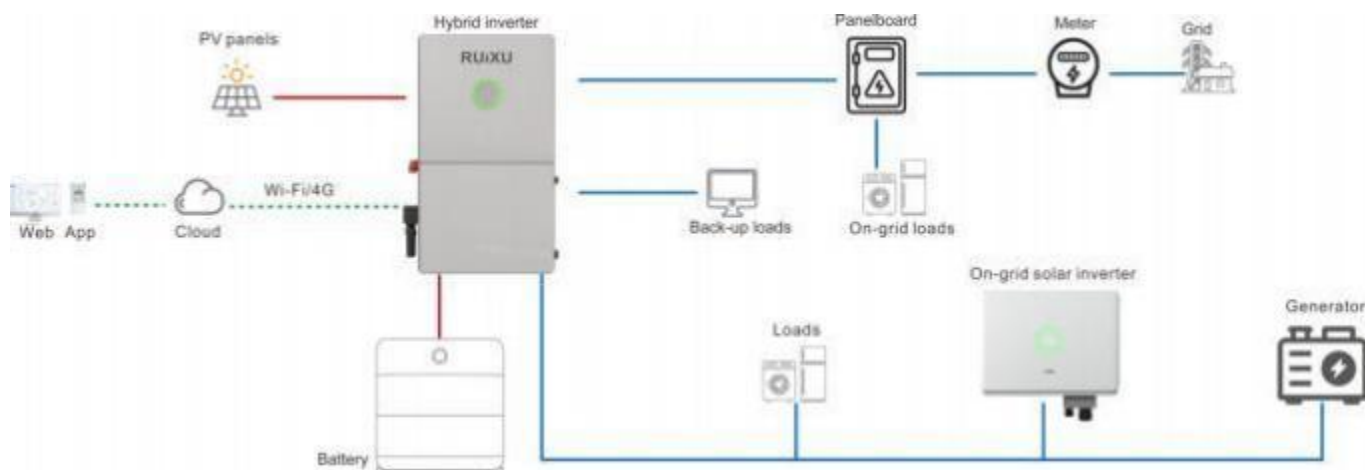
otherwise, components might be damaged, or the device cannot work properly.

2. Product Information

2.1 General introduction

The RX-12K low-voltage inverter is a transformer-less hybrid solar inverter, which is a key component of a complete energy storage system.

The inverter provides the maximum power point tracking (MPPT), battery charging/discharging circuit and full-bridge inverting circuit. It converts the solar power to grid-compliant AC power for home loads and export extra power to the grid. The solar power can also be stored into the battery for later use when grid is down or during peak electricity price period.



When power outage occurs, the inverter transfers the critical loads to battery power immediately and seamlessly without supply interruption to the critical loads.

2.2 Datasheet

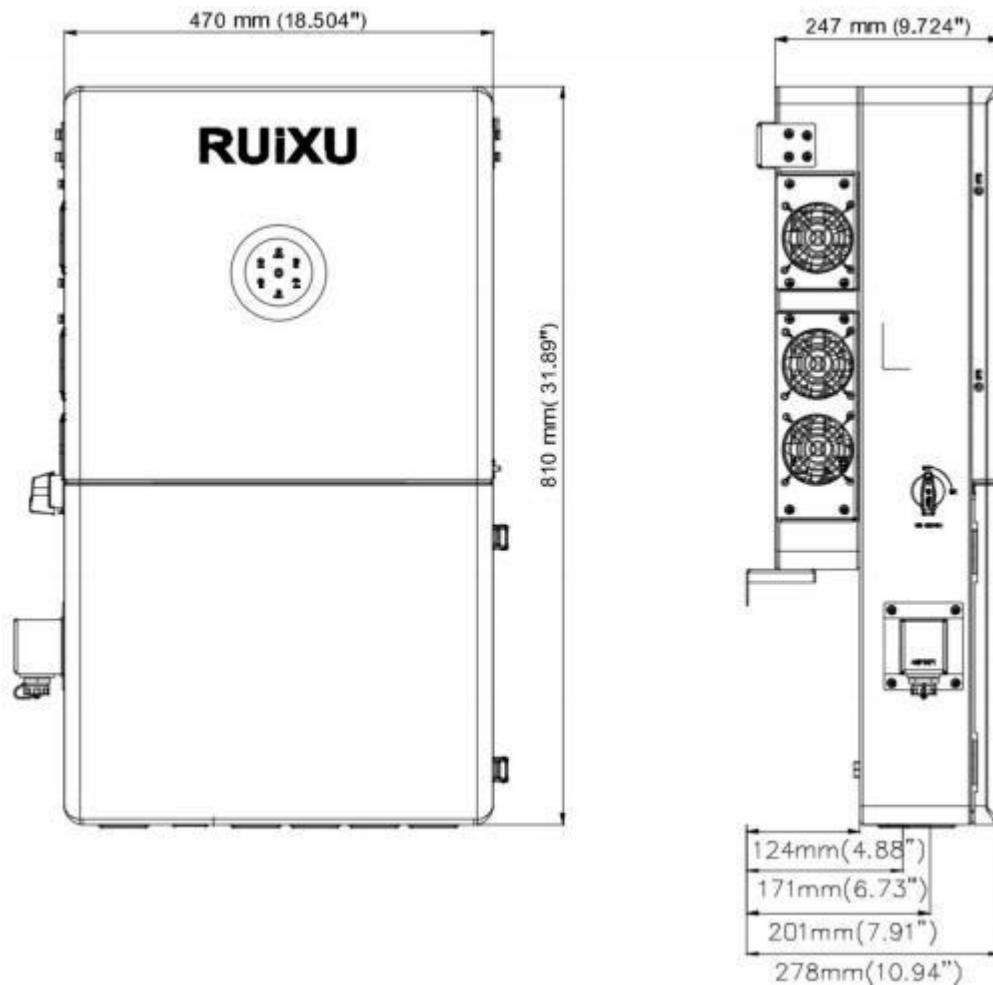
PV String Input	
Max PV Array Power [Wp]@STC	17100
Max DC Voltage[V]	600
MPPT Voltage Range[V]	90 –510
Nominal DC Voltage[V]	380
Start Voltage [V]	100
Min Input Voltage [V]	80
Max Input Current[A]	16/16/16/16
Max. Short Current [A]	19.2/ 19.2/ 19.2/19.2
No. of Strings per MPPT	1/1/1/1
No. of MPPT	4
DC switch	Integrated
Battery Port Connection	
Battery Type	Lead-acid battery/Lithium battery
Voltage Range [V]	40 –60
Start Voltage [V]	42
Max. Charging/ Discharging Current [A]	228
AC Output [On-grid]	
Rated AC Power [W]@240 V AC	11400

Rated AC Current [A]@208/240 V AC	47.5
Rated AC Voltage/Range	L1/L2/N/PE, 120 V AC (split-phase), L1/L2/PE: 240 V AC 120 V: 106 – 132 V 240 V: 211 –264 V
Rated Output Frequency and Range [Hz]	50 Hz: 47 –53
	60 Hz: 57 –63
Power Factor [cosφ]	0.8 leading –0.8 lagging
Total Harmonic Distortion [THDi]	< 3%
AC Output [Back-up Mode]	
Rated Apparent Power [VA]	5700@120VAC/ 11400@240VAC
Rated AC Current [A]	47.5
Peak output power [VA, 1 min]	12540@240VAC
Peak output power [VA, 10s]	17100
Rated output voltage [V]	120 /240
Rated output frequency and range [Hz]	50 Hz: 45–55
	60 Hz: 55–65
Output THDV (@ Liner Load)	< 3%
Switching time	< 10 ms
AC Input [GEN]	
Maximum continuous input power@240V	11400
Rated Voltage [V]	240
Rated Current [A]	47.5
Efficiency	
Maximum efficiency	97.20%
CEC efficiency	96.50%
AC-Bat maximum efficiency	94.20%
Protection &Features	
Overvoltage protection	Integrated
ISO monitoring	Integrated
DC component monitoring	Integrated
Monitoring of ground fault current	Integrated
Grid monitoring	Integrated
AC output short circuit protection	Integrated
AC grounding detection	Integrated
DC surge protection	Type II
AC surge protection	Type II
Island protection monitoring	Integrated
AFCI	Integrated
RSD	Integrated
Interface	
Display	LED/App (via Bluetooth)
Communication Port	RS485/Wi-Fi/CAN
Communication	Wi-Fi/4G (optional)
Load Monitor	24 hours
General Data	

Topology type	Transformer-less (DC–AC)
Standby power consumption [W]	< 35
Operating Temperature Range	-40℃ to +60℃ (-40°F to 140°F) [Load shedding operation above 45℃]
Cooling Method	Air fan cooling
Relative humidity	0% – 100% RH, no condensation
Altitude	< 2000 m
Noise [dBA]	< 50
Ingress Protection	NEMA 4X
Mounting	Wall mounting
Dimension [H x W x D]	810x470x247 mm (31.89x18.504x9.724 inch)
Weight	48 kg (105.82 lb)
Warranty [year]	10 years
Applicable Standard	UL 1741 and 1741SB; IEEE1547 and 1547.1; UL1699B, UL1998; CSA STD. C22.2 No.107.1, FCC, Part15, Class B, Rule21, HE CO 14H

2.3 Dimension

Dimension (HWD): 810x470x247 mm (31.89x18.504x9.724 inch)



3. Transportation And Storage

3.1 Transportation

- The transportation service provider must be qualified to transport dangerous goods.
- Keep less than 4 cartons of inverter in one stack.

3.2 Storage

- Store it in a dry and ventilated environment and keep it away from heat sources.
- Keep the inverter in an environment with storage temperature as -40°C to $+60^{\circ}\text{C}$ (-40°F to 140°F), humidity 5% to 95% RH.

4 Installation

4.1 Preparation

For safety, be sure to read all the safety instructions carefully prior to any works and observe the appropriate rules and regulations of the country or region where you installed the energy storage system.

 DANGER
● Dangerous to life due to potential fire or electricity shock. ● I Do not install the inverter near any inflammable or explosive items.

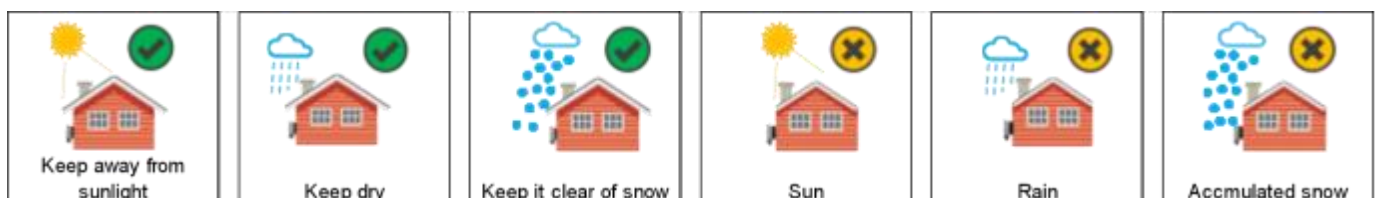
 NOTICE
● This equipment meets the pollution degree. ● Inappropriate or the harmonized installation environment may jeopardize the life span of the inverter. ● Installation directly exposed under intensive sunlight is not recommended. ● The installation site must be well ventilated.

4.2 Determine the installation site

Read the following sections to cautiously determine the installation site.

The safety regulations vary in different countries and regions. Follow local safety regulations.

4.2.1 Installation environment requirements



- Do not expose the device to direct solar irradiation as this could cause power derating due to overheating.
- The installation environment must be free of inflammable or explosive materials.
- The device must be installed in a place away from heat sources.

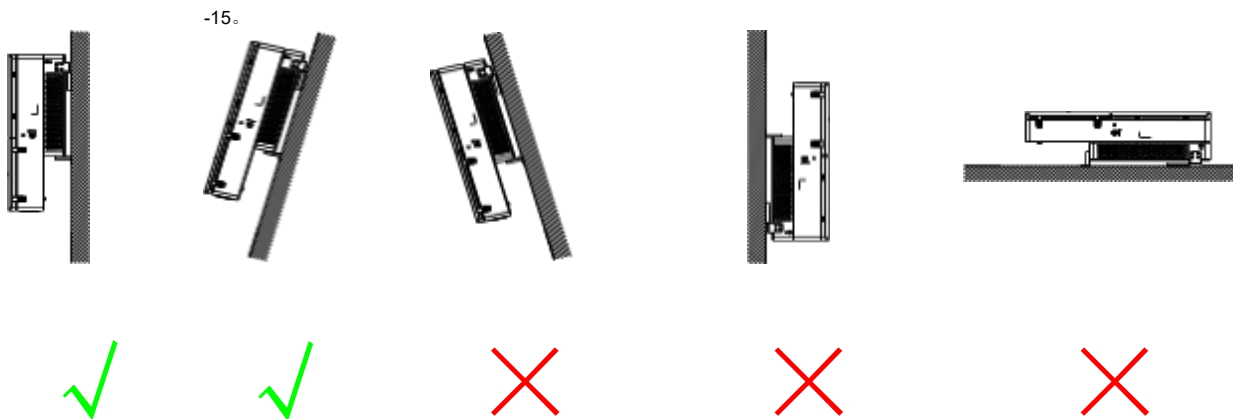
- Do not install the device at a place where the temperature changes extremely.
- Keep the device away from children.
- Do not install the device at daily working or living areas, including but not limited to the following areas: bedroom, lounge, living room, study, toilet, bathroom, theater, and attic.
- When installing the device at the garage, keep it away from the driveway.
- Keep the device from water sources such as taps, sewer pipes and sprinklers to prevent water seepage.
- It is recommended that the device be installed in an area where its status can be easily checked and maintained in case of failure or emergency.

4.2.2 Installation location requirements

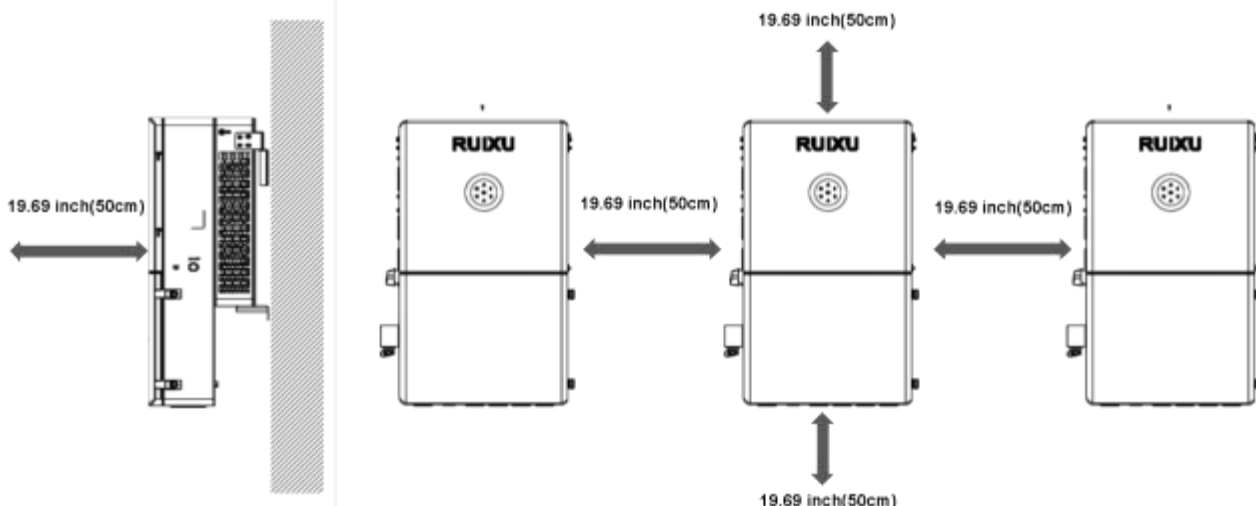
The device employs natural convection cooling, and it can be installed indoor or outdoor.

- Indoor requirement: The battery connected to the device CANNOT be installed in the habitable rooms.
- Outdoor requirement: The height of the device from the ground should be considered to prevent the device from soaking in water. The specific height is determined by the site environment.

Install the device vertically. Do not install it forward-tilted, horizontally or upside down. The maximum allowable backward-tilted angle is 15 degrees



- Choose a solid and smooth wall to ensure that the inverter can be installed securely on the wall. Make sure that the wall can bear the weight of the inverter and accessories.
- Reserve enough clearance around the inverter to ensure a good air circulation at the installation area, especially when multiple inverters need to be installed in the same area.



4.3 Prepare installation tools

The tools illustrations are for your reference. Installation tools include but are not limited to the following recommended ones. Use other auxiliary tools based on site requirements.

			 Multimeter Measurement range: ≥ 1100 V DC	
				
			 Drill bit: $\Phi 10$	
 Tool bit: M4	 Specification: M4			 Crimping range: 2.5-6
			 Flat-blade screwdriver M2	 Torx screwdriver TX30
 Socket wrenches				

4.4. Unpacking

4.4.1. Check the outer packing

Although RUIXU's products have thoroughly tested and checked before delivery, there is possibility that the products may suffer damages during transportation.

1. Check the outer packing package for any damage, such as holes and cracks.
2. Check the equipment model.

If any serious damage is found or the model is not what you requested, do not unpack the product, and contact your dealer as soon as possible.

4.4.2. Check the package contents

1. Verify that the shipment contains everything that you expected to receive. Contact after-sales if there are missing or damaged components.



Inverter



Mounting plate



Communication module



Flathead tool



Key x4



Allen wrench



650 Screw 8
Expansion tube8



Hex wrench



current transformer 2



manual

2. Place the connectors separately after unpacking to avoid confusion for connection of cables.

4.5. Install the inverter

Before you start

Make sure that the wall can bear the weight of the inverter and accessories.

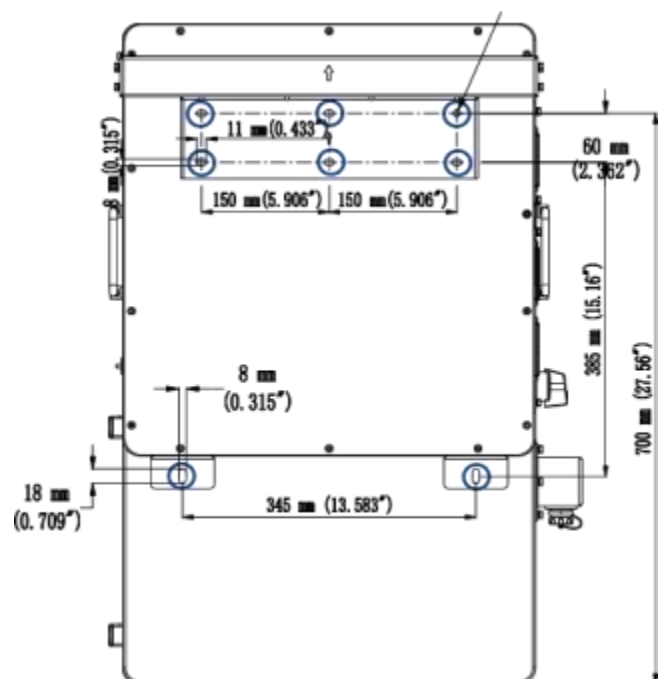
Procedure

Step 1. Use a positioning jig to mark eight holes on the wall according to the following figure. Then, drill eight holes on the wall.

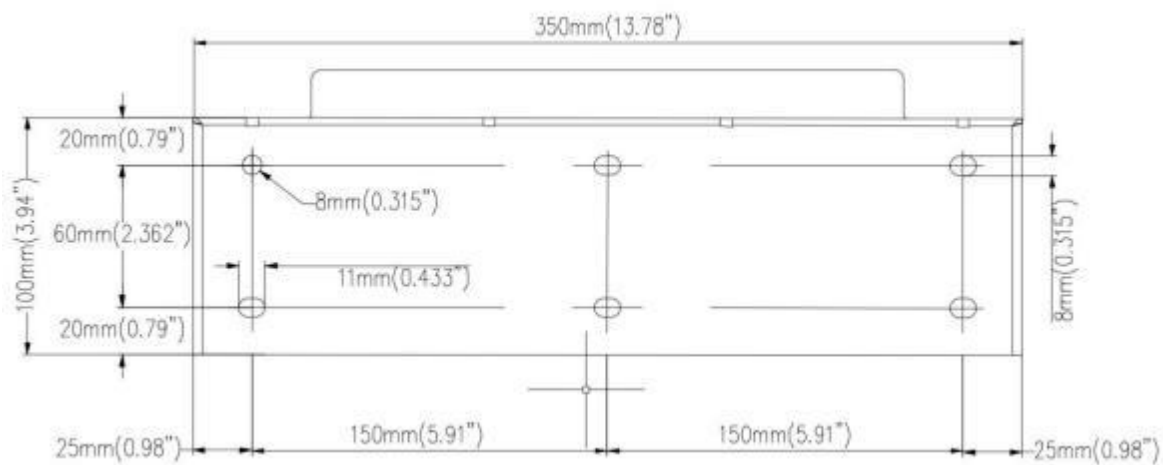
Alternatively, you can place the mounting plate onto the wall and mark upper six holes and place the inverter onto the wall to mark the bottom two holes.

Notes:

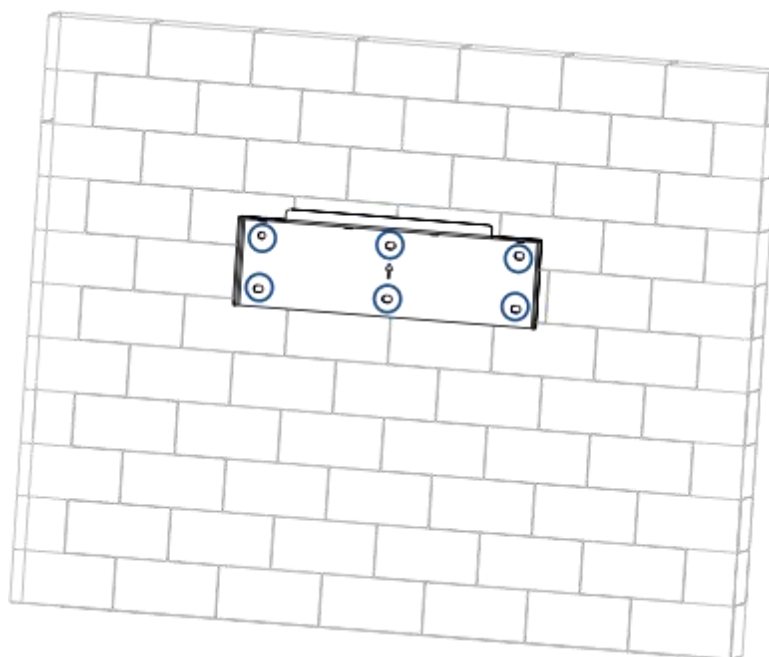
- Reserve enough distance at the inverter bottom for installing the metal cable conduits.
- The upper six holes are reserved for installing the upper mounting plate while the bottom two holes are for the bottom locking brackets of the inverter.



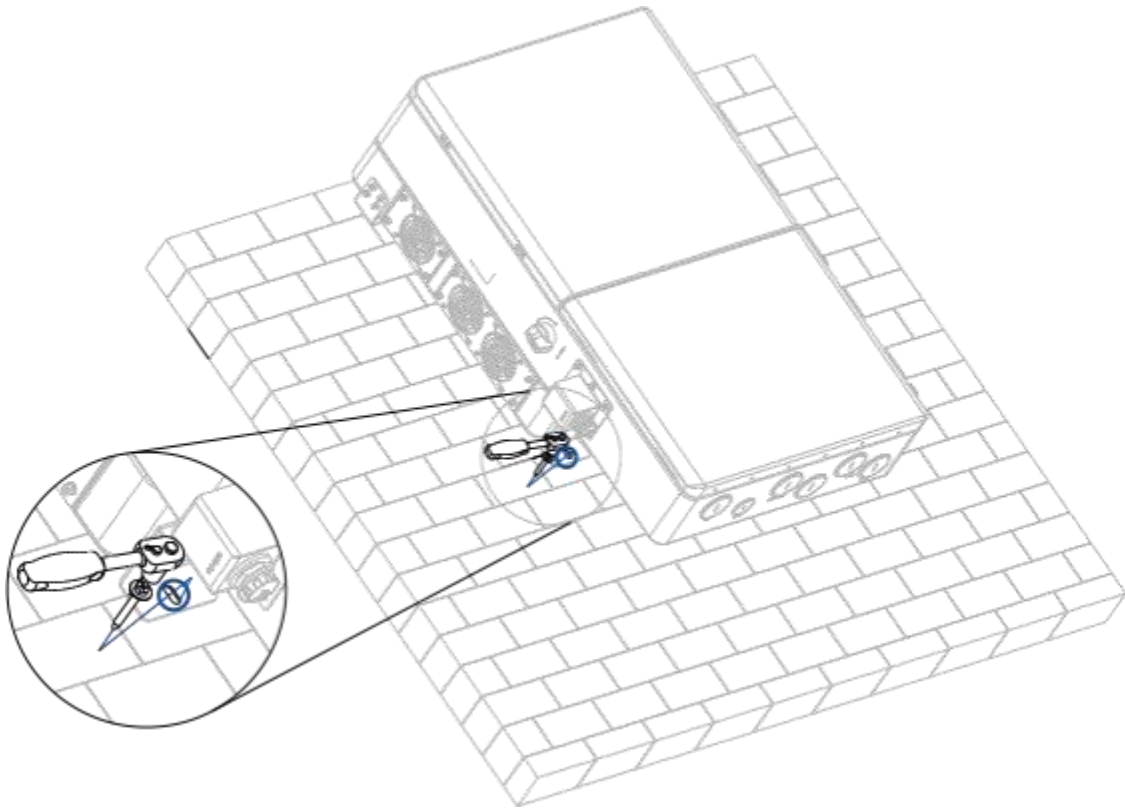
Step 2. Use six M650 screws to secure the mounting plate to the wall.




Six M6*50



Step 3. Mount the inverter onto the mounting plate. Insert two M650 screws (1.2-1.5 N·m) on each bottom side of the inverter to secure it to the wall.



Step 4. If required, install metal conduits to the knockout holes at the bottom of the inverter.

4.6. Install the battery

For details, refer to the battery user manual.

5. Electrical Connection

5.1 Safety instructions

Electrical connection must only be operated on by professional technicians. Operators must be aware that the inverter is a bi-power supply equipment. Before connection, necessary protective equipment must be employed by technicians including insulating gloves, insulating shoes, and safety helmet.

DANGER

- Dangerous to life due to potential fire or electricity shock.
- Do not install the inverter near any inflammable or explosive items
- Dangerous to life due to potential fire or electricity shock.
- When it is powered on, the equipment should in conformity with national rules and regulations.
- The direct connection between the inverter and high voltage power systems must be operated by qualified technicians in accordance with local and national power grid standards and regulations.

WARNING

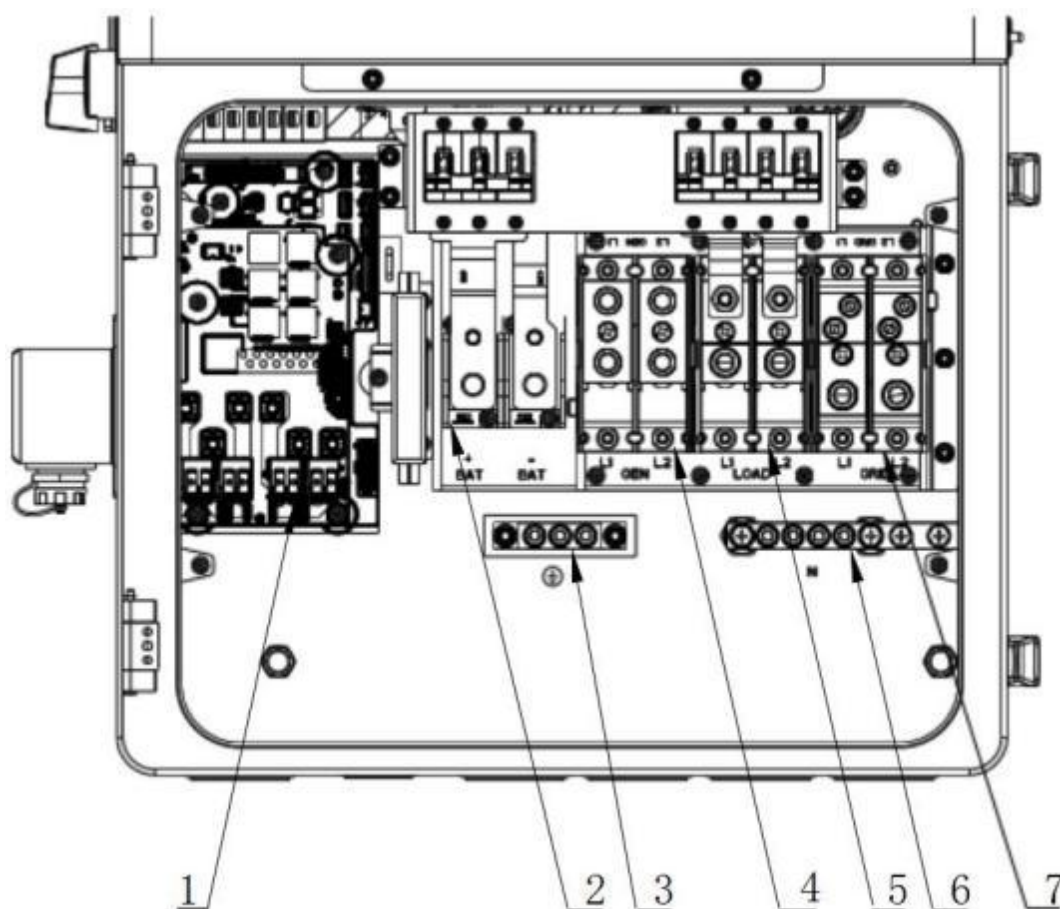
- The PV arrays will produce a DC voltage when exposed to sunlight.

NOTICE

- Any improper operation during cable connection can cause device damage or personal injury.
- Electrical connection should in conformity with proper stipulations, such as stipulations for cross- sectional area of conductors, fuses, and ground protection.
- The overvoltage category of the DC input port is II and that of the AC output port is III.

5.2 Connection Overview

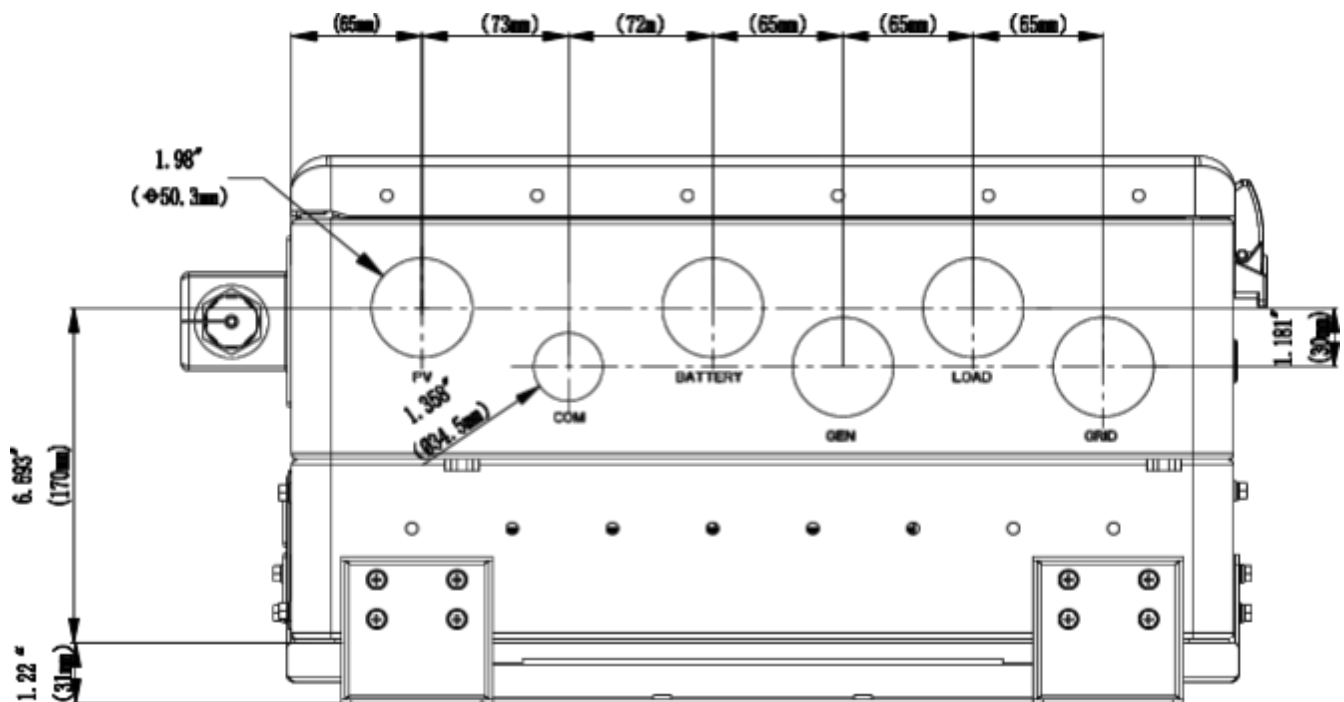
Overview of the Cable Box



Callout	Description	Callout	Description
1	PV1-PV4	2	BAT (BAT+ and BAT-)
3	PE	4	GEN (L1 and L2)
5	LOAD (L1 and L2)	6	N
7	GRID (L1 and L2)	/	/

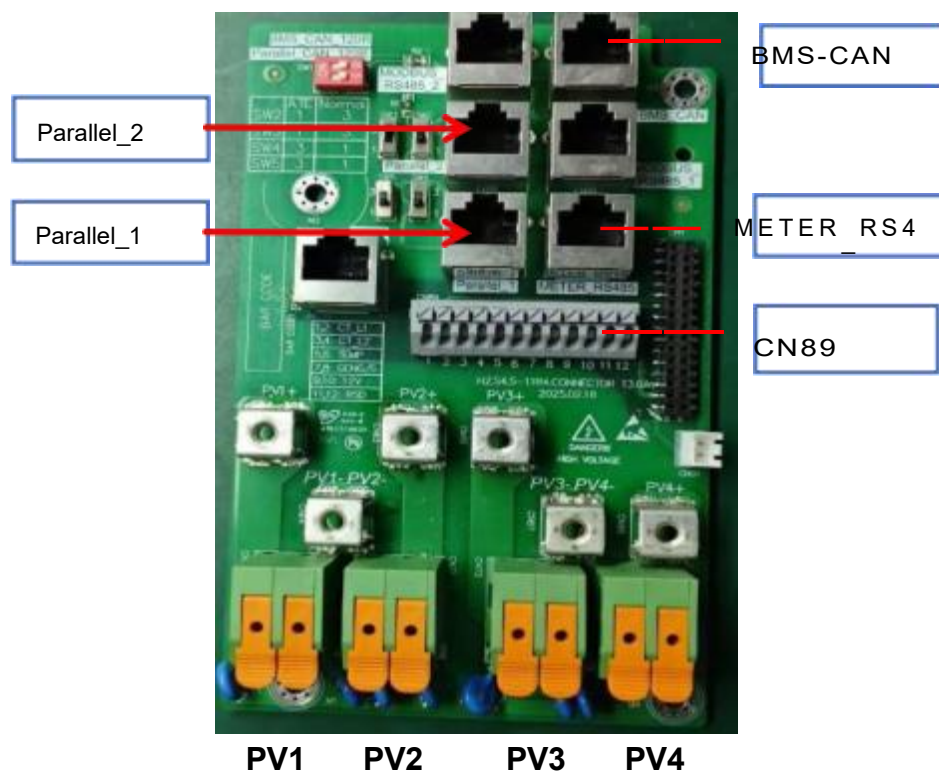
Integrated Bonded Load Breaker	L1 :200A L2: 200A
Integrated Bonded Bat. Breaker	300A

Knockout holes

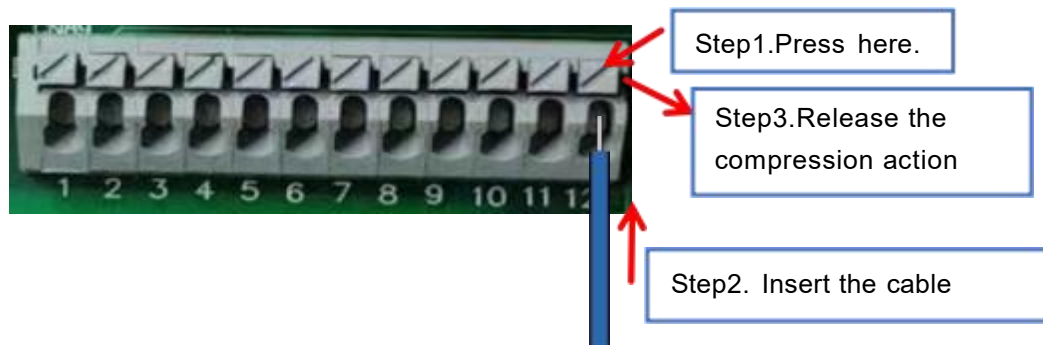


Knockout hole	Dimension	Knockout hole	Dimension
PV	φ50.3 mm (φ1.98")	COM	φ34.5mm (φ1.358")
BATTERY	φ50.3 mm (φ1.98")	LOAD	φ50.3 mm (φ1.98")
GEN	φ50.3 mm (φ1.98")	GRID	φ50.3 mm (φ1.98")

Communication PCB



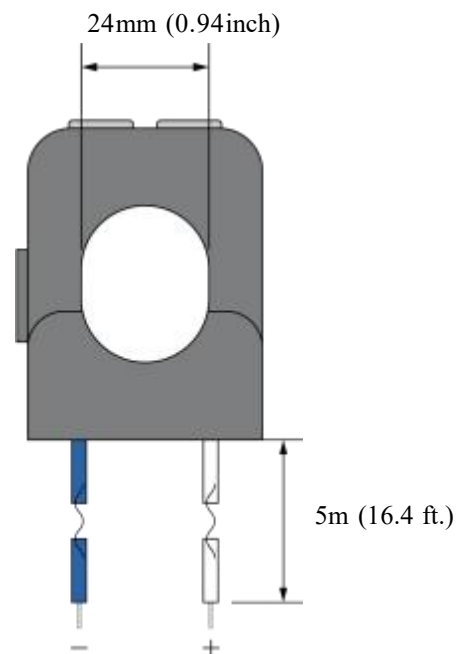
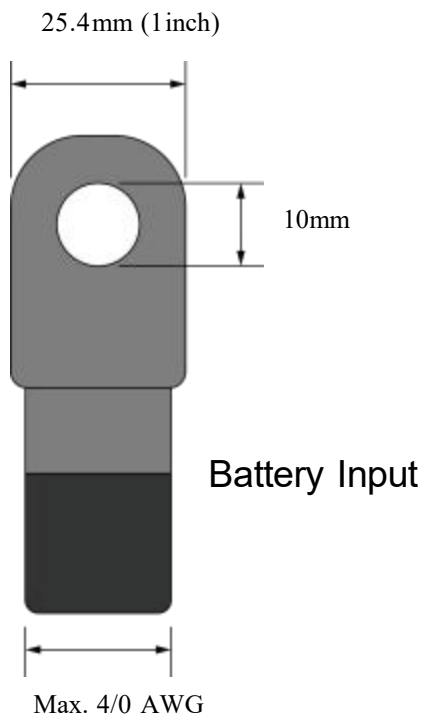
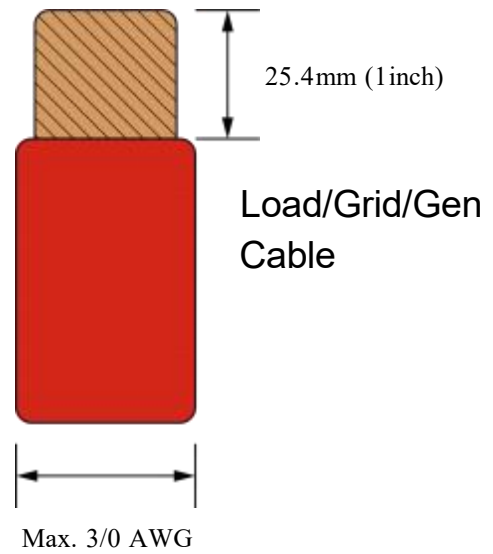
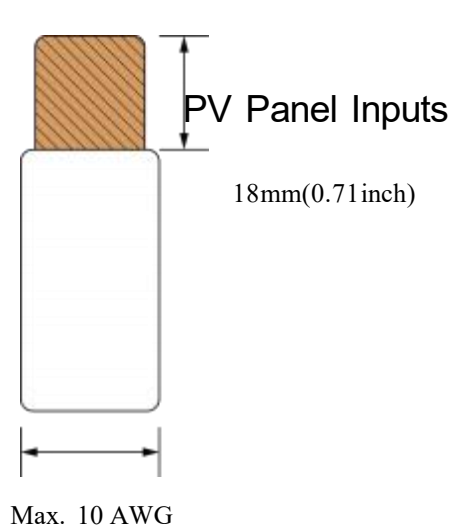
CN89 terminal



PIN		PIN	
1	GRID-L1 CT+	7	Generator signal cable
2	GRID-L2 CT-	8	
3	GRID-L2 CT+	9	12 V +
4	GRID-L2 CT-	10	12 V-
5	Battery temperature sensor cable	11	Emergency Stop
6		12	

5.3 Wire Gauge Guide (copper)

Cable	Recommended cable	Recommended torque	Note
LOAD/GRID	L1,L2: 2/0AWG	62 LB-IN (7. N·m)	Distance Limits Will Vary Per User
	N: 2/0AWG	26.5 LB-IN (3. N·m)	
	G: 2/0AWG	26.5 LB-IN (3. N·m)	
GEN	L1,L2: 2AWG	62 LB-IN (7. N·m)	
	N:2AWG	26.5 LB-IN (3. N·m)	
	G:2 AWG	26.5 LB-IN (3. N·m)	
PV	10~12AWG		
BAT+, BAT-	2/0 AWG(0~12ft.) 4/0 AWG(12~20ft.)	80 LB-IN (9. N·m)	



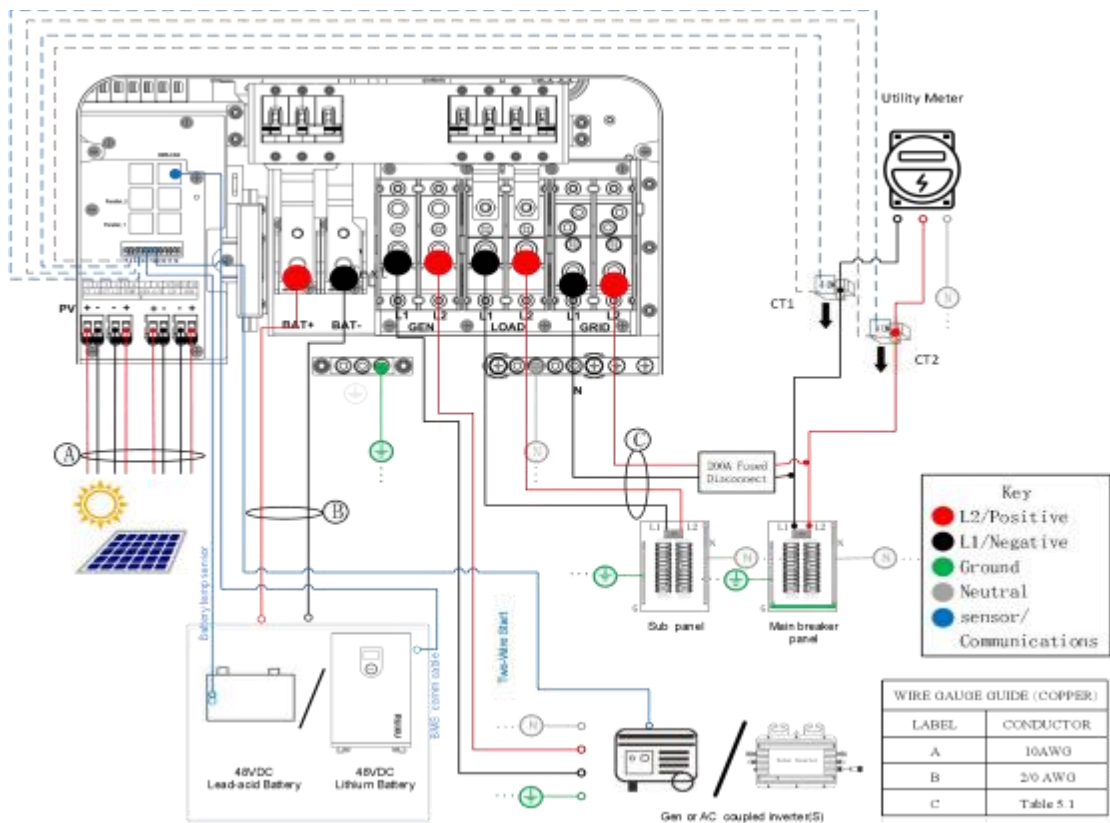
Breaker	Recommended Breaker Rating
PV Input	600VDC/20A
Grid Input/Output	240VAC/200A Max.
Gen Input	240VAC/50A

5.4 Wiring Diagrams

⚠ NOTICE

These wiring diagrams are examples of common use-cases for RUIXU inverters (RX-12K)). Diagrams must meet local electrical code and authorized jurisdiction requirements.

5.4.1. Single inverter



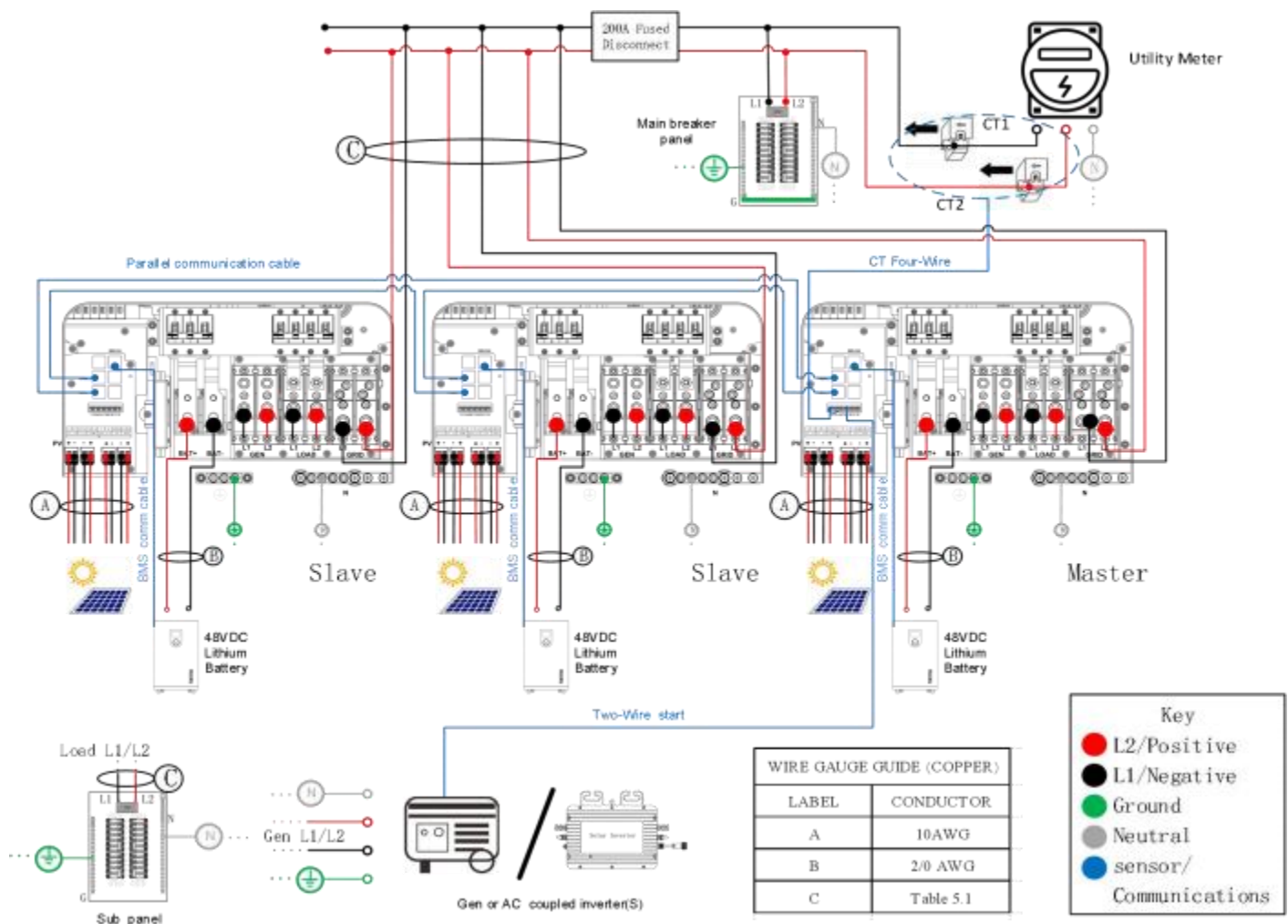
Notes:

- Note the N-G bonding point—according to NEC requirements, N-G bonding is only allowed at the service entrance.
- The grid connection can be omitted, putting the system in off-grid mode.
- The PV terminals can remain unconnected, making the inverter function solely as a battery inverter (Alternatively, PV can first connect to a PV inverter, which then connects to the GEN port of the inverter).
- A circuit breaker (200A rated) can also be installed at the service entrance.

5.4.2. Multiple inverters: Batteries not in parallel

Scenario: Split phase, 120/240 V

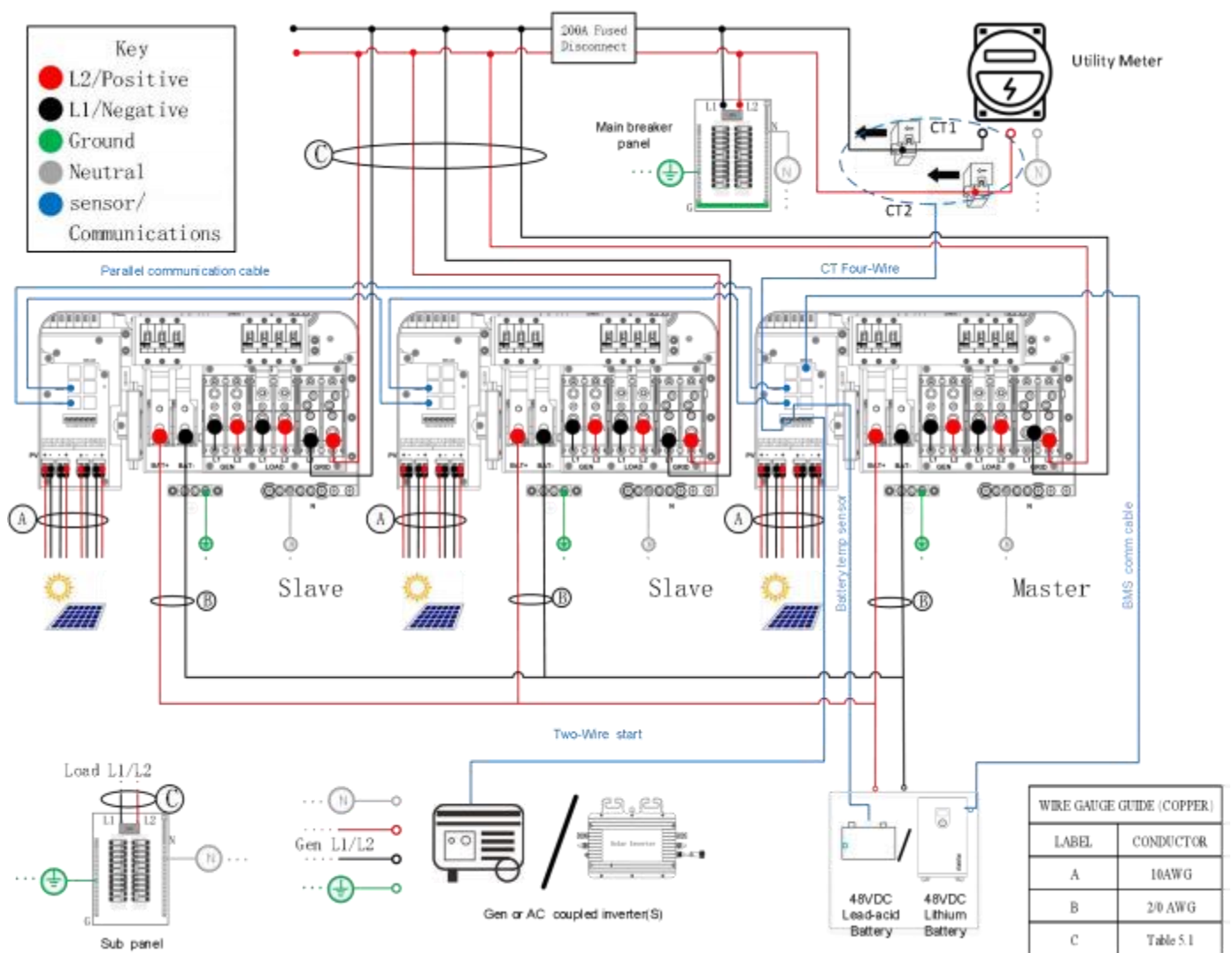
A maximum of four inverters are supported. Each inverter is connected to a different cluster of batteries. Batteries are not in parallel(Not shared battery).



5.4.3. Multiple inverters: Batteries in parallel

Scenario: Split phase, 120/240 V

A maximum of four inverters are supported. Batteries are in parallel(shared battery).



5.5 Connecting Solar Panels

The rated Voc (Open-Circuit Voltage) on solar panels is measured under STC (Standard Test Conditions: 77°F/25°C). As ambient temperature decreases, the Voc of solar panels increases (the specification sheet provides the temperature-voltage coefficient for this increase). Ensure that the maximum voltage of the solar string does not exceed the inverter's maximum input voltage of 600V at the local lowest temperature.

If power is solely sourced from PV (photovoltaic), the inverter will only start when the PV voltage exceeds 80VDC. Power will be delivered to the LOAD port only when PV voltage surpasses 100VDC. The inverter's MPPT (Maximum Power Point Tracking, ensuring optimal PV conversion efficiency) is effective only when PV voltage is between 90–510VDC.

The RX-12K features four independent MPPTs. Each MPPT must connect to a single PV string. PV strings may vary in specifications or quantity (though it is recommended to keep them identical or

minimally different). Each MPPT has a maximum input current of 16A.

Notes:

- Before connecting or disconnecting wires, ensure all circuit breakers and disconnect switches are in the OFF position. Use a voltmeter to confirm the absence of voltage.
- If PV string conductors are stranded wires, use ferrules (wire sleeves).
- The PV system must include lightning protection, grounding, equipotential bonding, and surge protection devices (SPDs) to prevent inverter and battery damage from lightning strikes.

5.6 Connecting Batteries

1. For an inverter system with n parallel units, there are two battery connection methods:

- Shared Battery Configuration**: All batteries can be paralleled first and then connected to each inverter.
 - Non-Shared Battery Configuration**: Batteries are divided into n clusters (each cluster must contain at least one battery bank). Each cluster is connected to a separate inverter. This connection method is typically used to address issues when mixing old/new batteries or multiple brands (batteries with similar age are grouped together in the same cluster, and batteries of the same model are placed in the same cluster).
2. Do NOT connect the positive port to the negative port on one battery. This will short-circuit this battery, causing serious battery damage.

5.7 Integrating a Generator

1. Supports 240V generators, 47.5A (11.4kw) Terminal Block
2. Connect the generator output to the “GEN INPUT” breaker terminal in of the wiring compartment.
3. The inverter cannot be connected to the generator grid simultaneously. Before connecting the generator, it is necessary to ensure that it is not connected to the grid
4. The generator start signal must be connected to the COM board GEN (NO, NC port, Refer to Section 5.2 - Communication PCB section.) if users want to start the generator remotely. The pass-through relay on the generator port is 50A. When the generator is on, please ensure that the total load and charge current will not exceed the 50A limit.

5.8 AC Coupling Installation Connection

The RX-12K inverter supports connection to solar energy through AC coupling. The PV panel is connected to a micro-inverter or a string inverter, and the AC output terminal is connected to the GEN port

of the RX-12K inverter.

When the power grid connection is interrupted or the system is off-grid, the AC coupling can still work normally, capable of charging the battery or supplying power to the LOAD port with the alternating current generated by the micro-inverter or string inverter. The GEN port can monitor the output of AC-coupled solar energy.

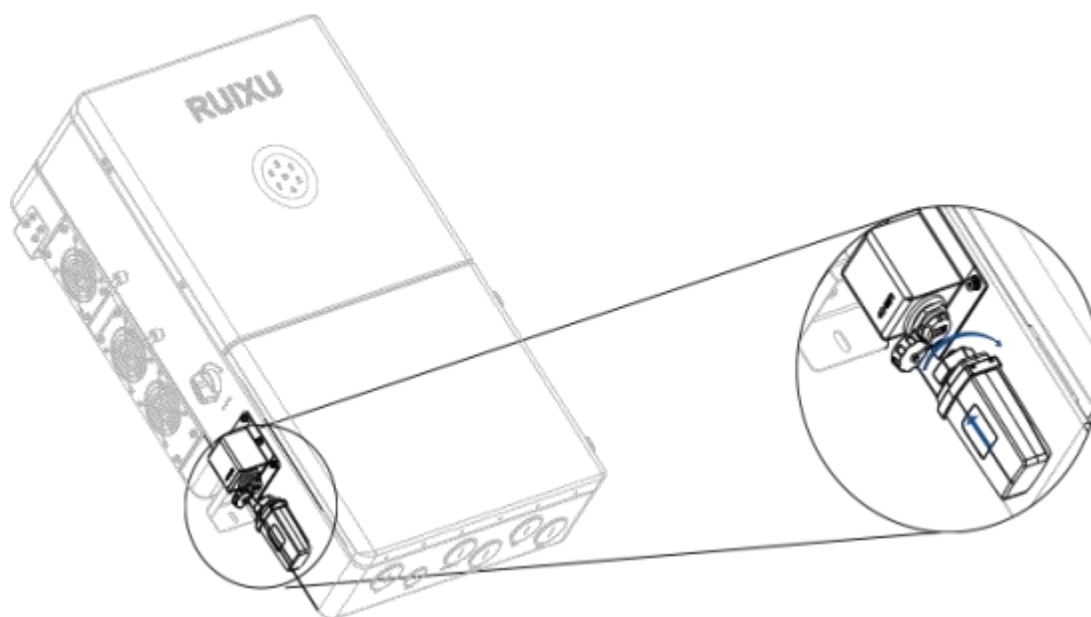
The GEN port can support a maximum coupled power input of 11.4K

5.9. Assemble the communication connection

5.9.1. Install the communication module

An RS232 USB communication port is provided at the bottom of the junction box. This port is used to connect the communication module, such as a Wi-Fi or Bluetooth module.

The package contains a WiFi+ Bluetooth communication module.



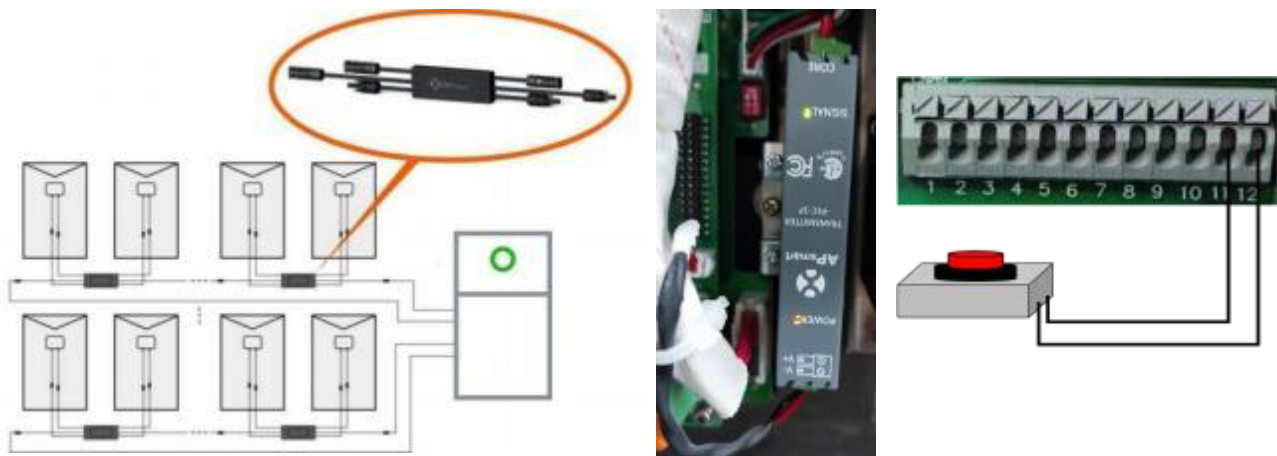
Installation steps of the communication module

Step 1. On the left side of the inverter, remove the cover from the communication port.

Step 2. Insert the communication module into the communication port. Secure the module by rotating the nut.

5.9.2. Connect the BMS communication cable

Connect one end of the network cable to the communication port on the master Battery (BMS - CAN port).Insert the other end of the network cable through the COM knockout hole of the inverter and connect it to the BMS_CAN port.



According to local safety regulations, an external rapid shutdown switch is required in case of emergency. After the switch is turned off (pressed), the system stops working immediately.

According to local safety regulations, an external emergency shut-off switch is required in emergency situations. When the emergency switch button is pressed, the inverter will cut off the photovoltaic relay and also the RSD power supply, thereby stopping the inverter's AC output.

Connect the wires of the external rapid shutdown switch to pins 11 and 12 on the CN89 terminal in the junction box of the inverter.

6. Operation and Settings

6.1 Startup

Step 1. Open the junction box. Turn on the battery following breakers by pushing their handles upwards:

- Load breaker (optional, only when loads are connected)
- Battery breaker

Step 2. Close the breaker on the grid side.

Step 3. Turn on DC SWITCH on the left side of the inverter.

Step 4. Turn on the battery switch on the battery. For details, refer to the battery user manual.

Step 5. Press down the ON/OFF button on the right side of the inverter.

Step 6. Check the LED indicator status on the inverter panel to ensure that the inverter is running properly. For details, refer to section 6.3 "LED indicators".

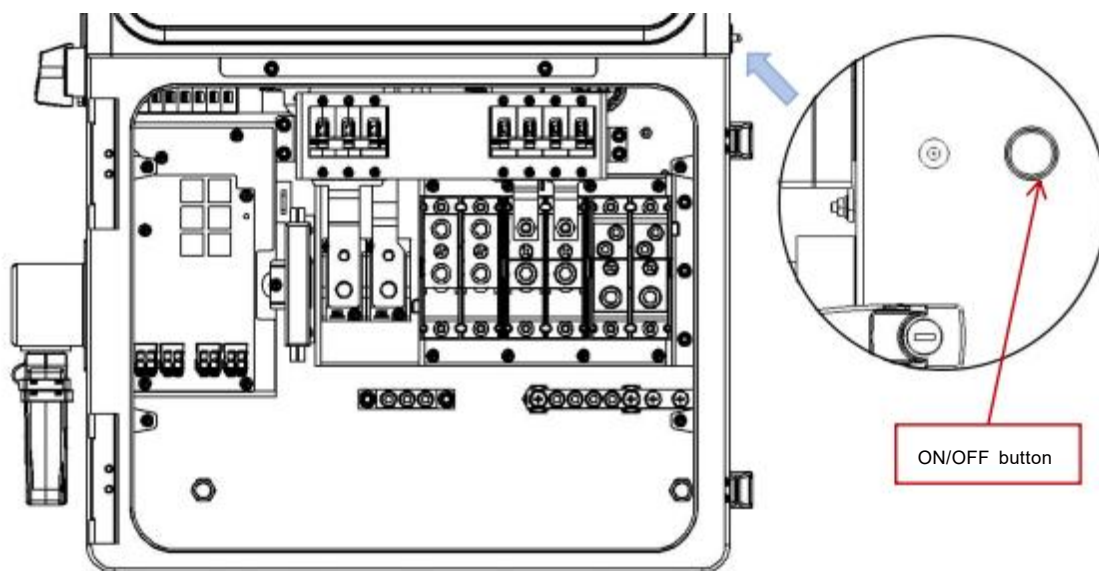
6.2 Shutdown

Step 1. Press the ON/OFF button on the right side of the inverter to release

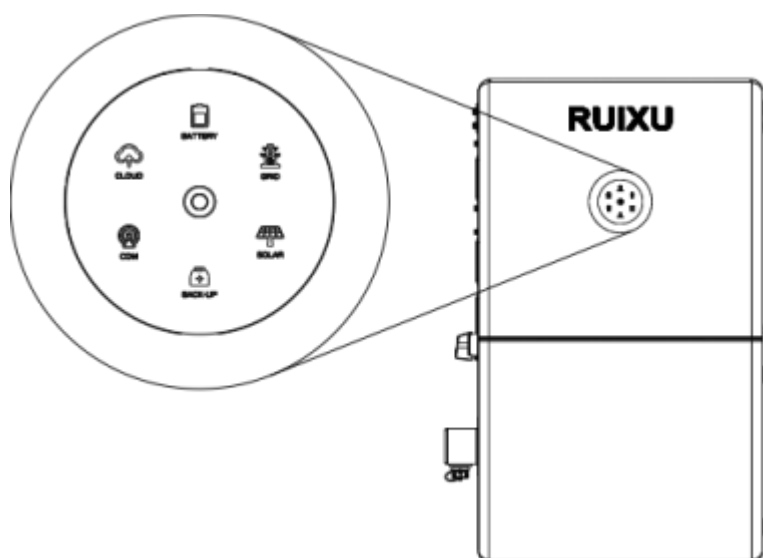
Step 2. Turn off DC SWITCH.

Step 3. Turn off the battery switch and load switch.

Step 4. Turn off the breaker on the grid side.



6.3 LED indicators



LED indicator	Status	Description
	Off	The inverter is powered off.
	Blinking 6s	The inverter is in initialization or standby state.
	Solid on	The inverter is working properly.
	Blinking 6s	The inverter is upgrading.
	Solid on	The inverter is not working properly.
 System	Solid on	The battery is importing electricity from the grid.
	On 1s, off 1s	The battery is exporting electricity to the grid.
	On 1s, off 3s	No electricity is imported from or exported to the grid.
	Off	The inverter is disconnected from the grid.
 Battery	Solid on	The battery is in discharging status.
	On 1s, off 1s	The battery is in charging status.
	Off	The battery is disconnected or inactive.
 Grid	Solid on	The grid is connected and working properly.
	On 1s, off 1s	The inverter is trying to connect to the grid.
	On 1s, off 3s	The grid is not working properly.
	Off	No grid is detected.
 PV	Solid on	The PV array is working properly.
	On 1s, off 1s	The PV array is not working properly.
	Off	The PV array is not working.
 Backup	Solid on	The AC-side load is working properly.
	On 1s, off 1s	The AC-side load is overloaded.
	Off	The AC-side load is disconnected or off.
 Communication	Solid on	In good communication with both the meter and BMS.
	On 1s, off 1s	In good communication with the meter but lost communication with the BMS.
	On 1s, off 3s	In good communication with the BMS but lost communication with the meter.
	Off	Lost communication with the meter and the BMS.
 Cloud	Solid on	The inverter is connected to the cloud.
	On 1s, off 1s	The inverter is trying to connect to the cloud.
	Off	The inverter is disconnected from the cloud.

6.4 App Setting Guide

6.4.1 Download the App

The “Elekeeper”App enables both local and remote monitoring of your energy storage system (ESS).

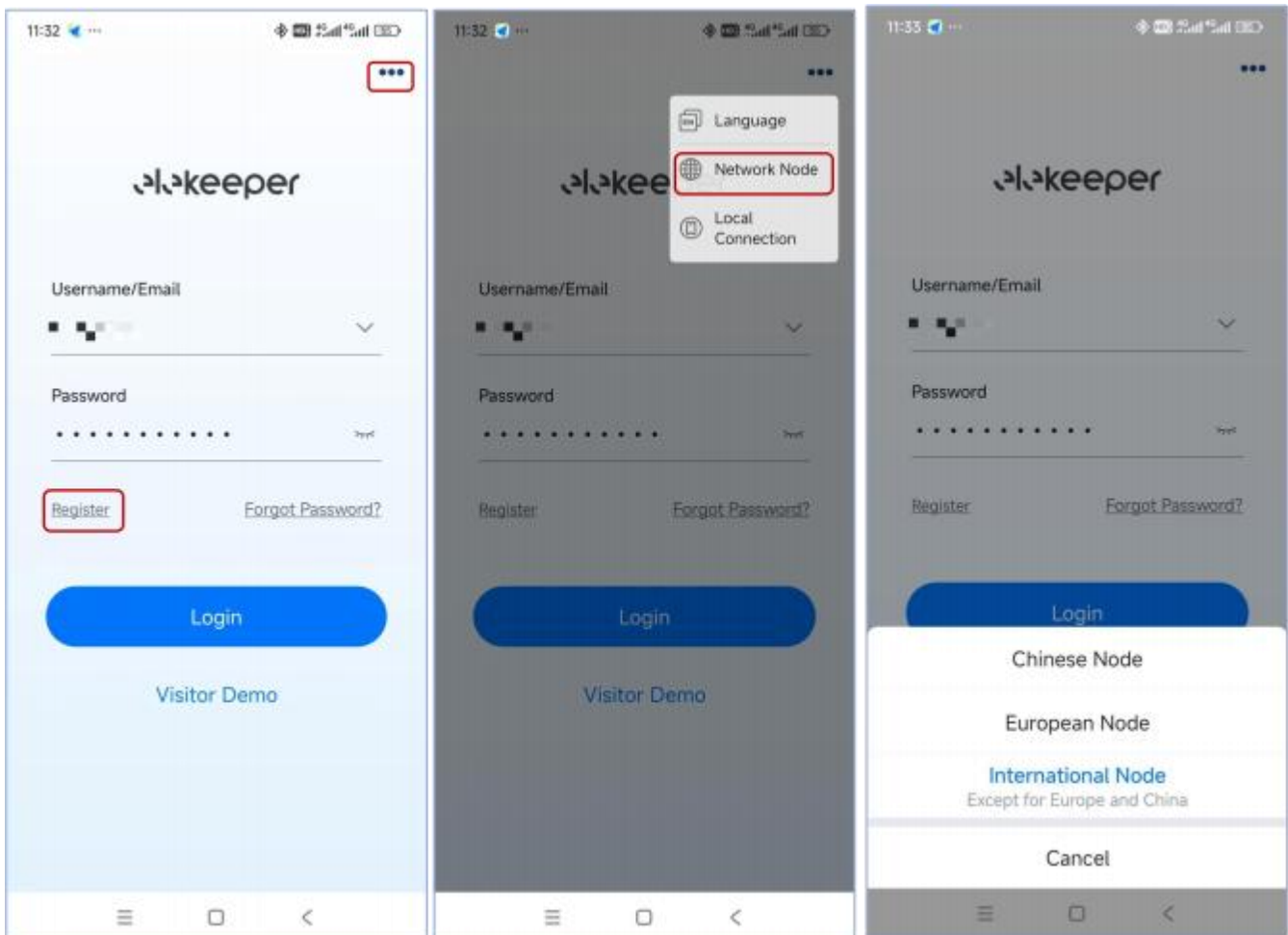
Download the App

1. Open the App Store (iOS) or Google Play Store (Android) on your mobile device.
2. Search for "Elekeeper" (📱).
3. Download and install the official Elekeeper App.

6.4.2 Enter the Settings interface

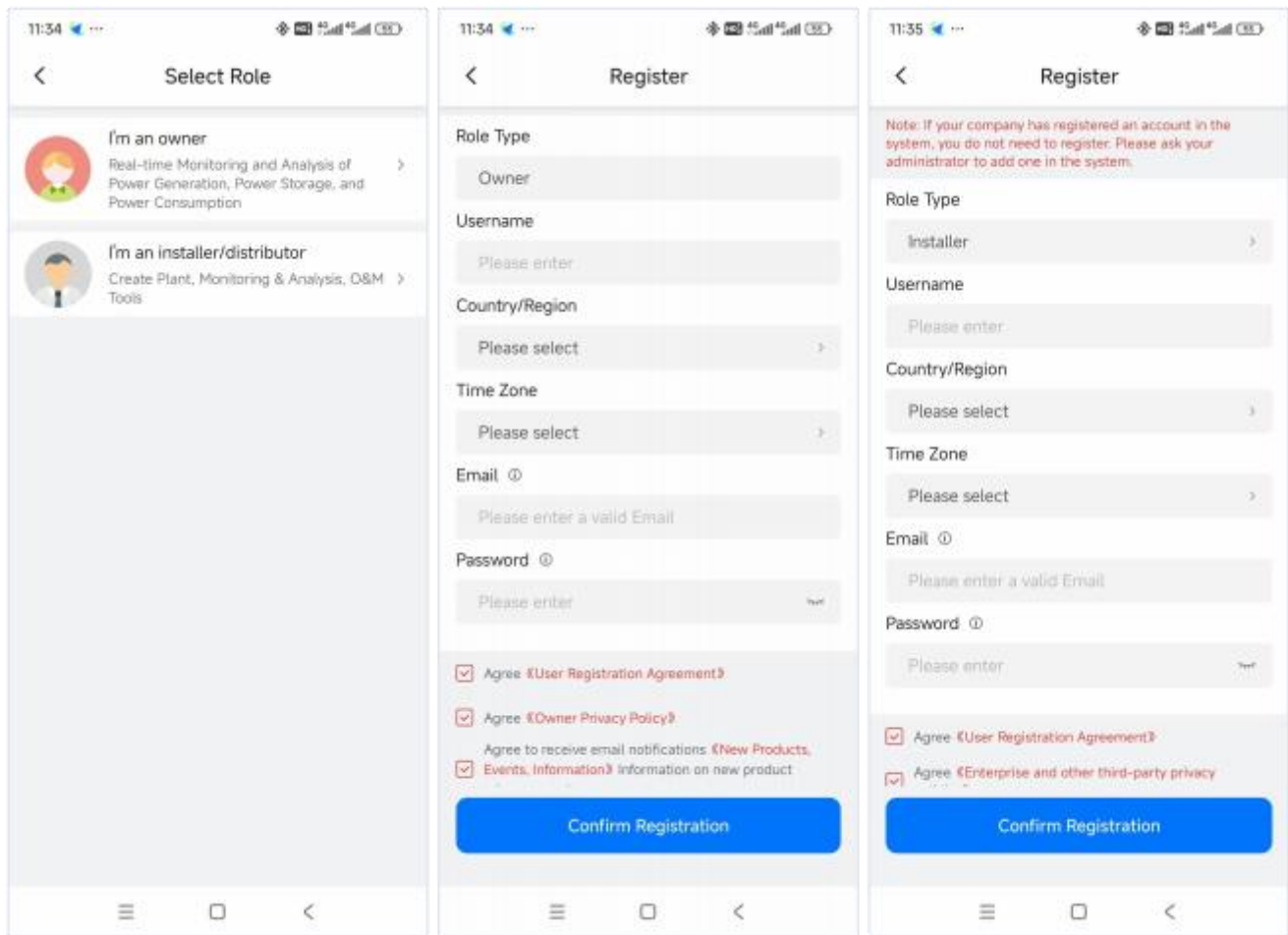
Launching the APP and Selecting a Server Node:

1. Open the APP. The first step is to select a server node for connection.
2. Click the three dots (⋮) in the upper right corner of the APP.
3. Select "Network Node" , then choose the appropriate server node based on your region.



Account Registration:

1. Click "Register" to enter the role selection page.
 - For individual users, select "Owner" .
 - For installers/distributors, choose "Installer/Distributor" and register as an Installer.
2. After selecting the role, proceed to the registration form. Fill in the required details and submit.
3. Upon successful registration, a Registration Successful prompt message will appear.



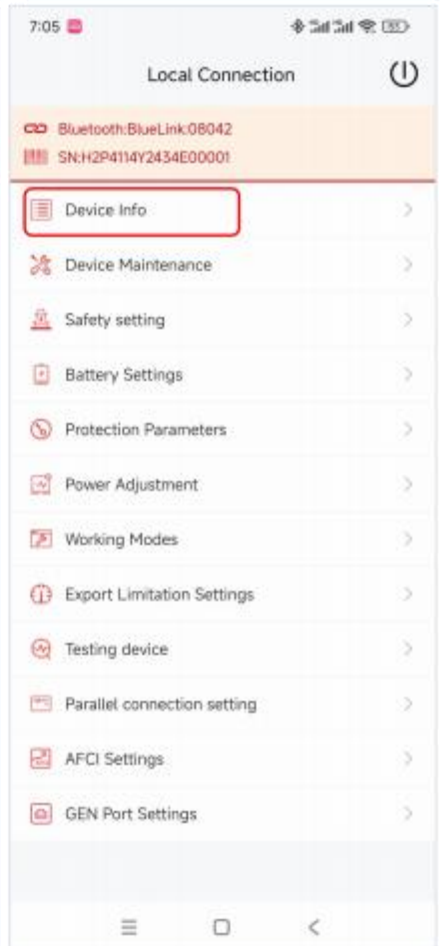
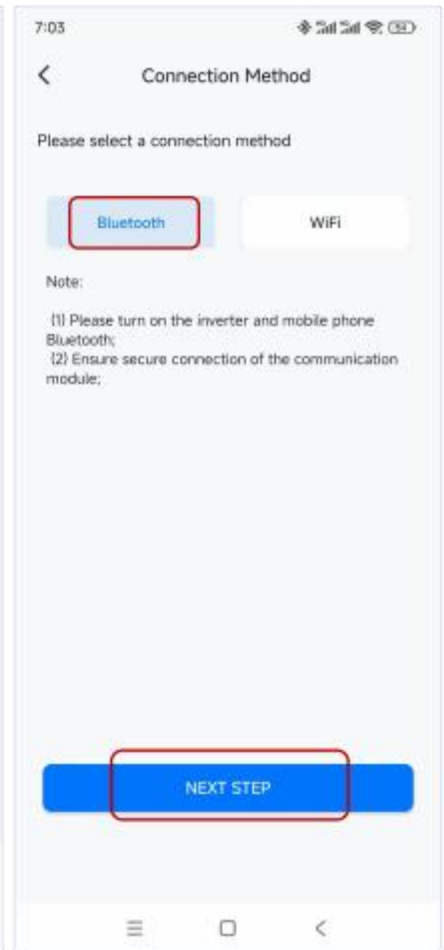
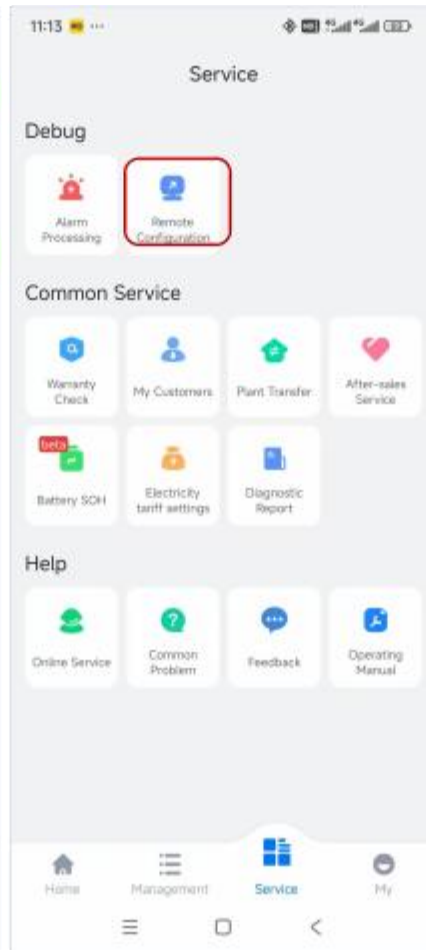
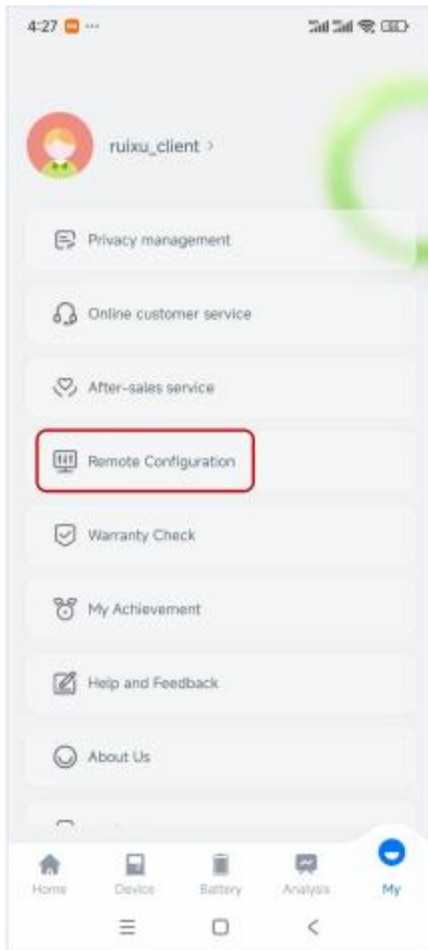
Under the Installer account, you can also create Owner accounts, which will automatically gain configuration permissions for power plants under the Owner account. For details, refer to the Power Plant section.

Logging In:

1. Return to the login screen.
2. Enter your registered username and password, then log in.

Accessing Remote Configuration:

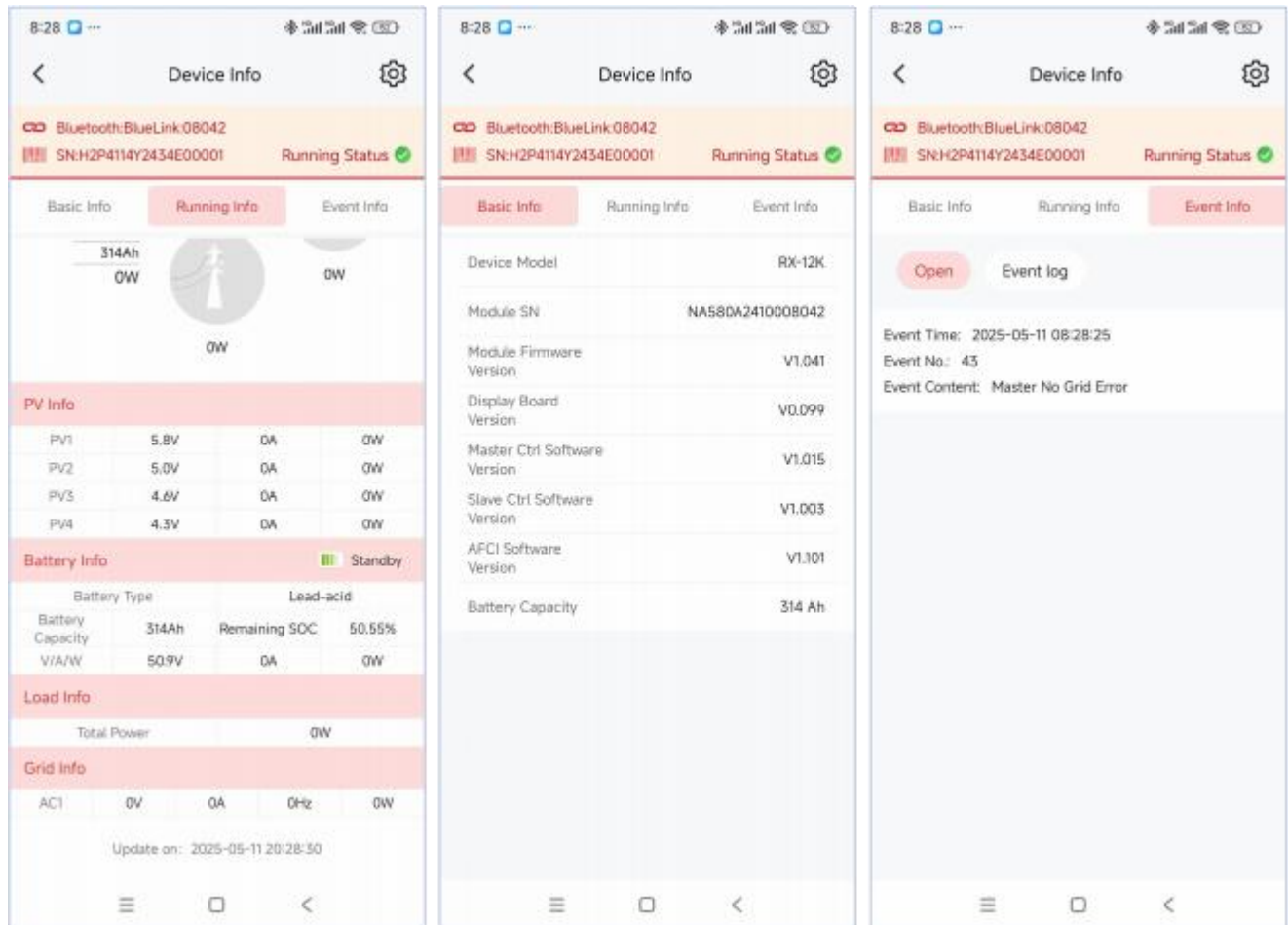
- . For Owners:
Navigate to "My" > "Remote Configuration" to enter the "Connection Method" interface.
- . For Installers:
Navigate to "Service" > "Remote Configuration" to enter the "Connection Method" interface.
- . Select "Bluetooth" → "NEXT STEP" (requires powered-on inverter with inserted module, The mobile phone should be closer to the inverter.) Select the Bluetooth module matching the last 5 digits on your communication module, choose 'Skip' in the pop-up (selecting 'WiFi Configuration' enters WiFi setup), then pick your inverter from the Device List to access its control interface



6.4.3 Device Information and Basic Operations

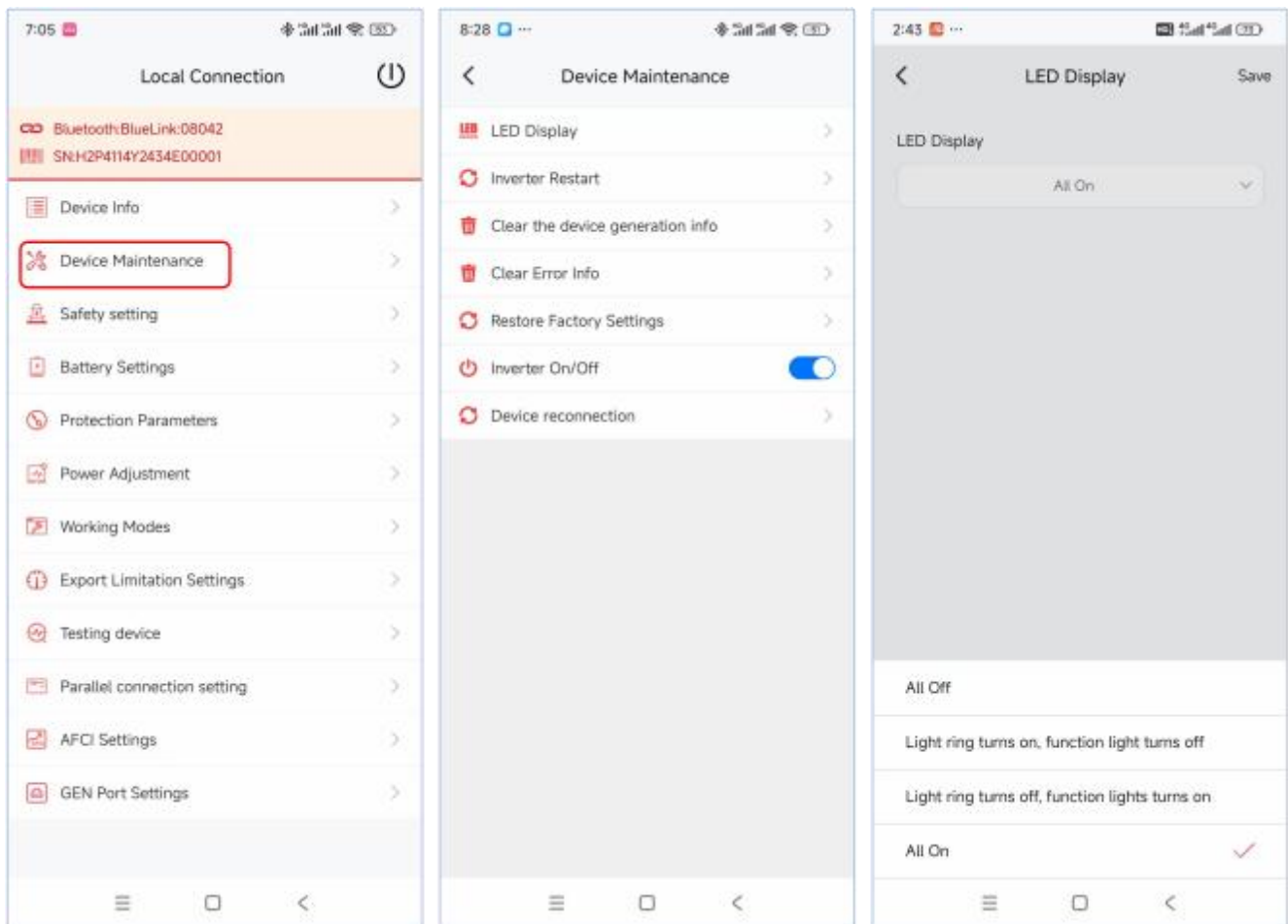
Device Information Display

1. Click "Device Info" to access the device information interface.
2. The interface displays the following details:
 - Basic Information
 - Running Information
 - Fault Event Information



Device Maintenance

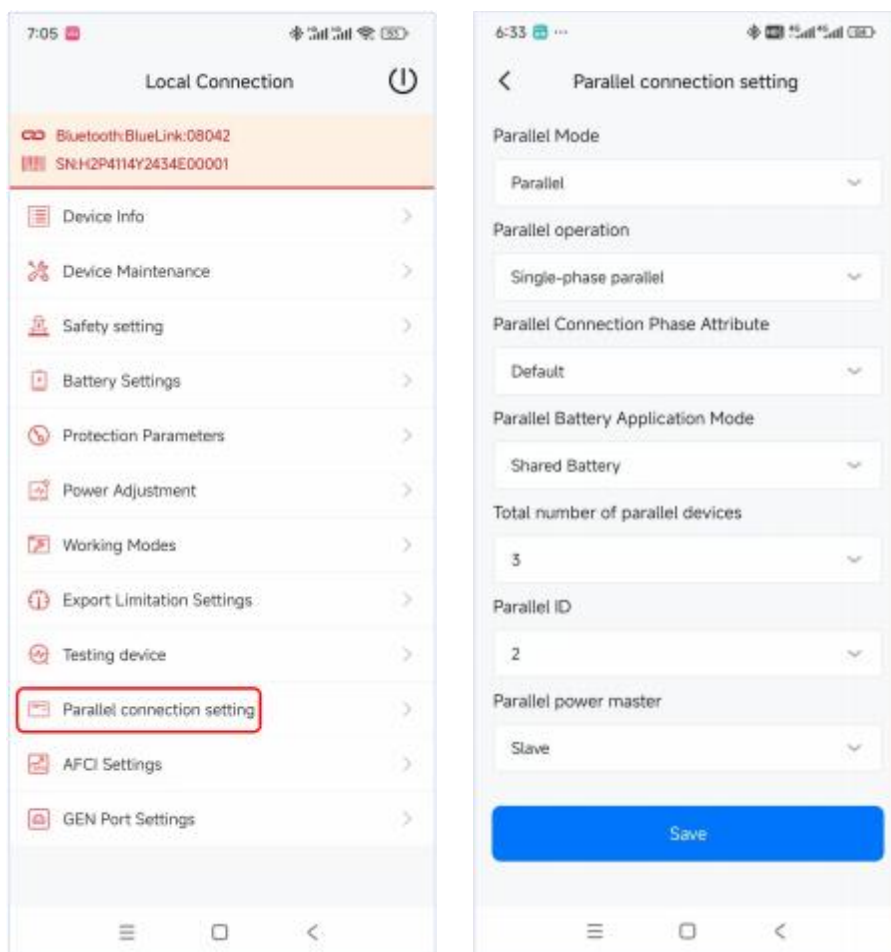
1. Click "Device Maintenance" to access the interface.
2. Available operations:
 - LED Display Mode: Toggle between different display modes
 - Inverter Restart: Click "Inverter Restart" to reboot the inverter
 - Inverter On/Off: Click to enable/disable inverter functionality
 - Factory Reset: Click "Restore Factory Settings" to reset the inverter to default configuration



6.4.4 Parallel connection setting

Parallel Settings Guide

1. **Enter Settings**
Click "Parallel Setting". Default is "OFF" (single inverter mode).
2. **Turn On Parallel Mode**
Select "Parallel" for multi-inverter operation. Settings window will open.
3. **Choose Connection Type**
Select "Single-Phase Parallel" (three-phase not available yet). Keep "Phase Attribute" as "Default".
4. **Setup Inverters**
Enter how many inverters you have. Set ID numbers: Make ID "1" the Master, others will be Slaves.
5. **Battery Settings** - Two options:
 - "Shared Battery": All batteries connected together (see diagram 5.4.3)
 - "Not Shared Battery": Separate battery groups for each inverter (see diagram 5.4.2). Note: May need different settings for each battery group.



6.4.5 Grid connection Settings

Safety Setting:

1. Grid Execution Standard

Select the appropriate grid standard based on your region's requirements.

2. Time Zone & Time Setting

Set the correct time zone and local time for the inverter.

Testing Device :

1. CT (Current Transformation) Setup

- Can be configured in the "Testing Device" section.

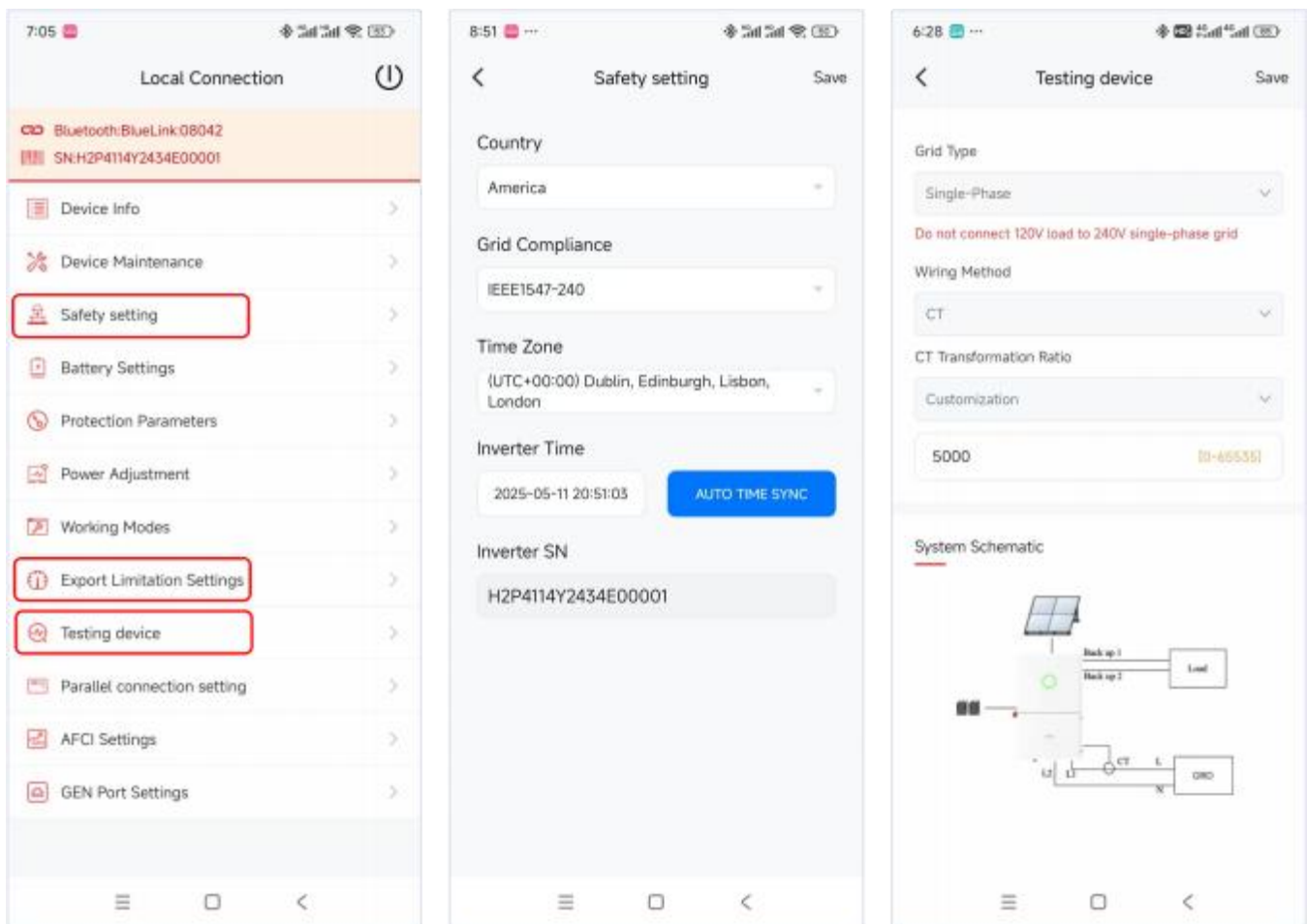
2. Grid Type Selection

- Choose "split Phase" for the Grid Type.

3. Wiring Method Options

Three available options:

- No Meter – Select this for whole-house backup power mode.
 - No external CTs required (inverter has built-in CTs for grid current monitoring).
- CT – Required for partial backup power mode.
 - Use the two included CTs (follow circuit diagram for installation).
 - Set "Transformation Ratio" to 5000.
- Split-Phase Meter – Alternative for partial backup mode.



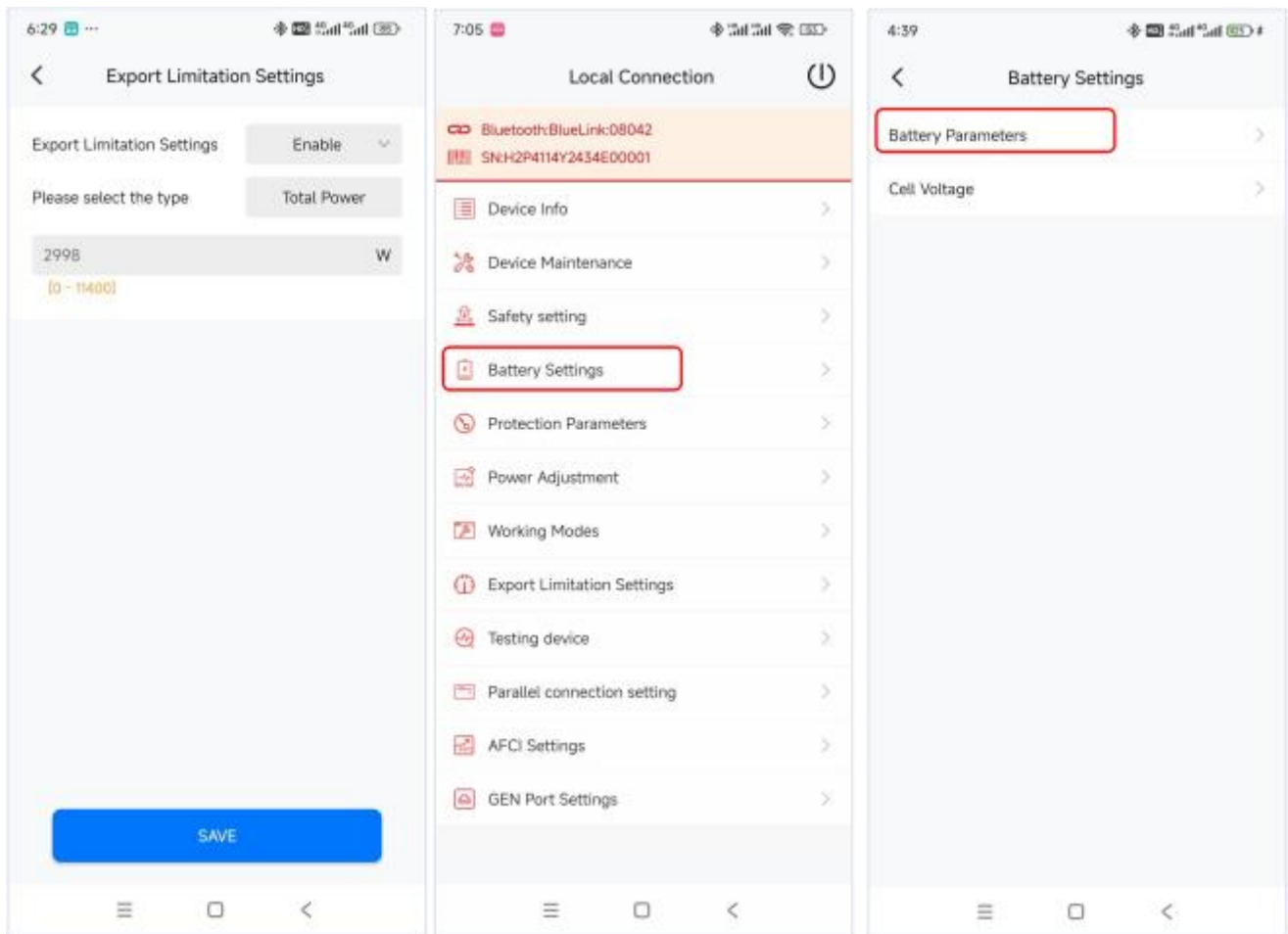
Export Limitation Settings:

1. Enable Export Limitation

- Set "Export Limitation Settings" to "Enable" before configuration.

2. Grid Feedback Power Setting

- Adjust the power value fed back to the grid:
 - "0W" – No export to grid (required if prohibited by local regulations).
 - Custom value ($\leq 11400W$) – Set any allowed export limit.



6.4.6 Battery Setting

Click "Battery Setting". Select "Battery Parameters" to enter the configuration interface.

6.4.6.1 Lithium battery parameter configuration with closed-loop communication

1. Battery Brand Selection

- Select the corresponding brand from "Battery Brand" options (e.g., choose "Ruixu" for Ruixu batteries).
- Adjust parameters as needed after selection.

2. Forced/Equal Charging Power

- Lower power settings extend battery lifespan but increase charging time. Adjust based on customer requirements.

3. Discharge Current Limit / Charging Current Limit:

- Set to the maximum values specified in the battery datasheet.

4. SOC Thresholds

- On-Grid Discharge Lower Limit:

SOC cutoff for battery discharge during grid-connected operation.

- Off-Grid Discharge Lower Limit:

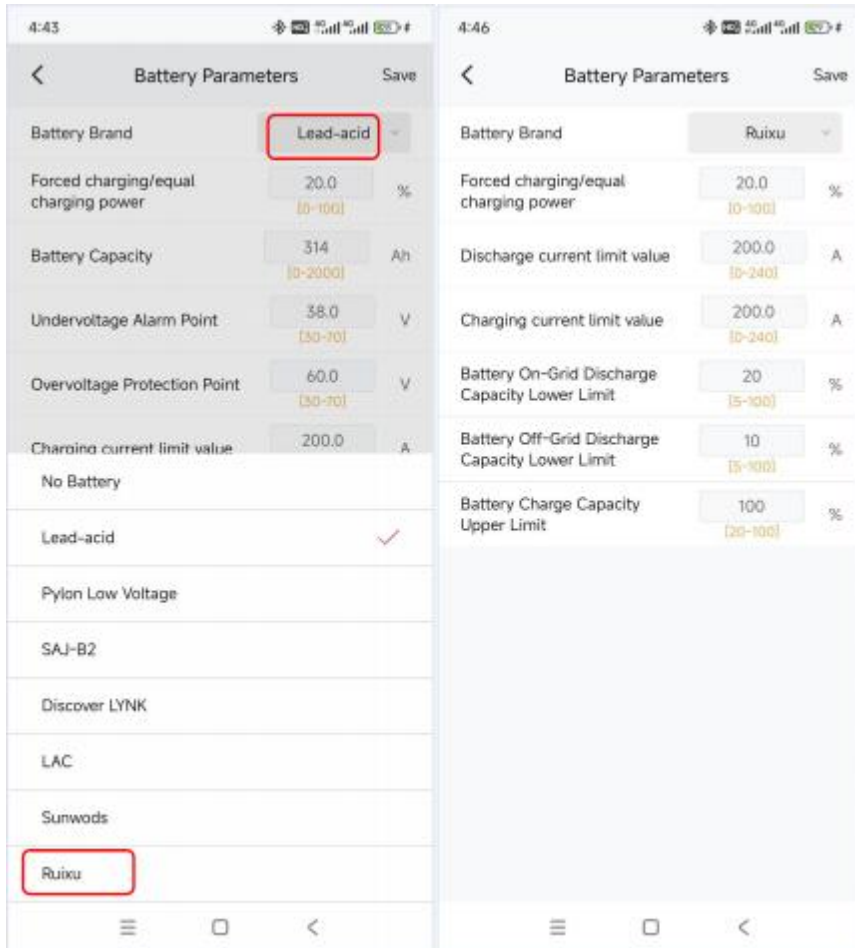
SOC cutoff for battery discharge during off-grid operation.

- Charge Upper Limit (Recommended for LFP Batteries) :

Set to 100% SOC to ensure proper calibration and minimal lifespan impact.

Note:

Forced charging occurs when the battery discharges to a preset low level (e.g., 10% SOC - model-dependent threshold). The battery sends a mandatory charge request to the inverter. If grid-connected, the inverter will charge the battery regardless of other settings. Charging stops once the battery reaches a higher preset level (e.g., 30% SOC - also model-specific).



6.4.6.2 Battery Settings for Non-Communication Connection

1. Battery Brand Selection

- Select "Lead-acid" from the battery brand options.
- Modify relevant parameters as needed after selection.

2. Battery Capacity

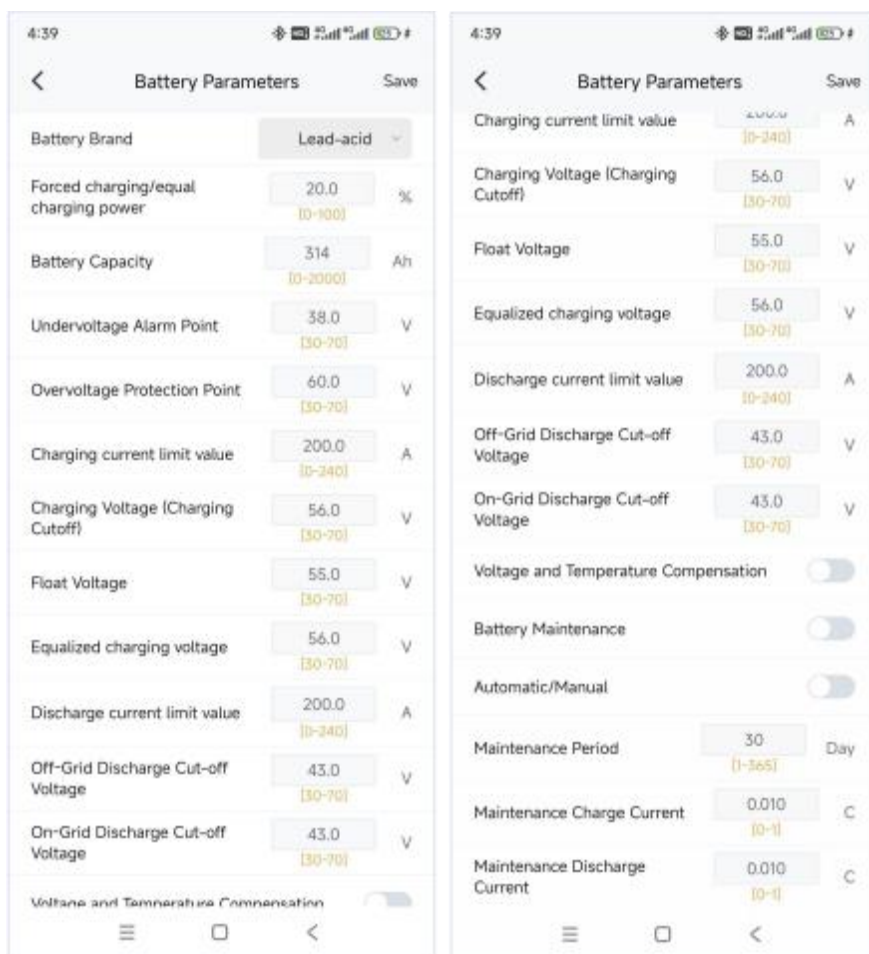
- Enter the value based on the actual battery specifications and quantity.

3. Overvoltage Protection Point

- Set the voltage value 1V higher than the charging voltage.

4. Cut-off Voltage

- Determine the value based on the SOC-voltage correlation.
- Consult your battery provider for exact data.



Charging Voltage Values for Different Battery Types:

Battery	Charging (Absorption)voltage	Float voltage	Equalize voltage
AGM4	57.6v	53.6v	57.6v
Gel4	56.4v	54.0v	56.4V
Wet4	59.0v	55.0V	59.0v
12.8V LFP-Lithium*4	54.6v	54.6v	54.6v
48V LFP-Lithium	52.5v	52.5v	52.5v
51.2V LFP-Lithium	56v	56v	56v

Notes:

- Due to safety concerns, this inverter is prohibited from using lithium-ion batteries with any material system other than LFP (positive electrode)
- It is not recommended to use 12V LFP-Lithium batteries connected in series. These batteries are protected by their respective BMS. Differences can easily occur between batteries/cells, and protection caused by differences between batteries is very likely to occur.

6.4.7 Gen port setting

The GEN port can be connected to a generator or a micro-inverter (photovoltaic inverter). Click "GEN Port settings" to enter the Settings interface.

6.4.7.1 Generator setting

1. Generator function selection

- Select "diesel generator port" in the "Port Access Enable" option box.
- Set "External enable" to ON.
- Set "Work enable" to ON.

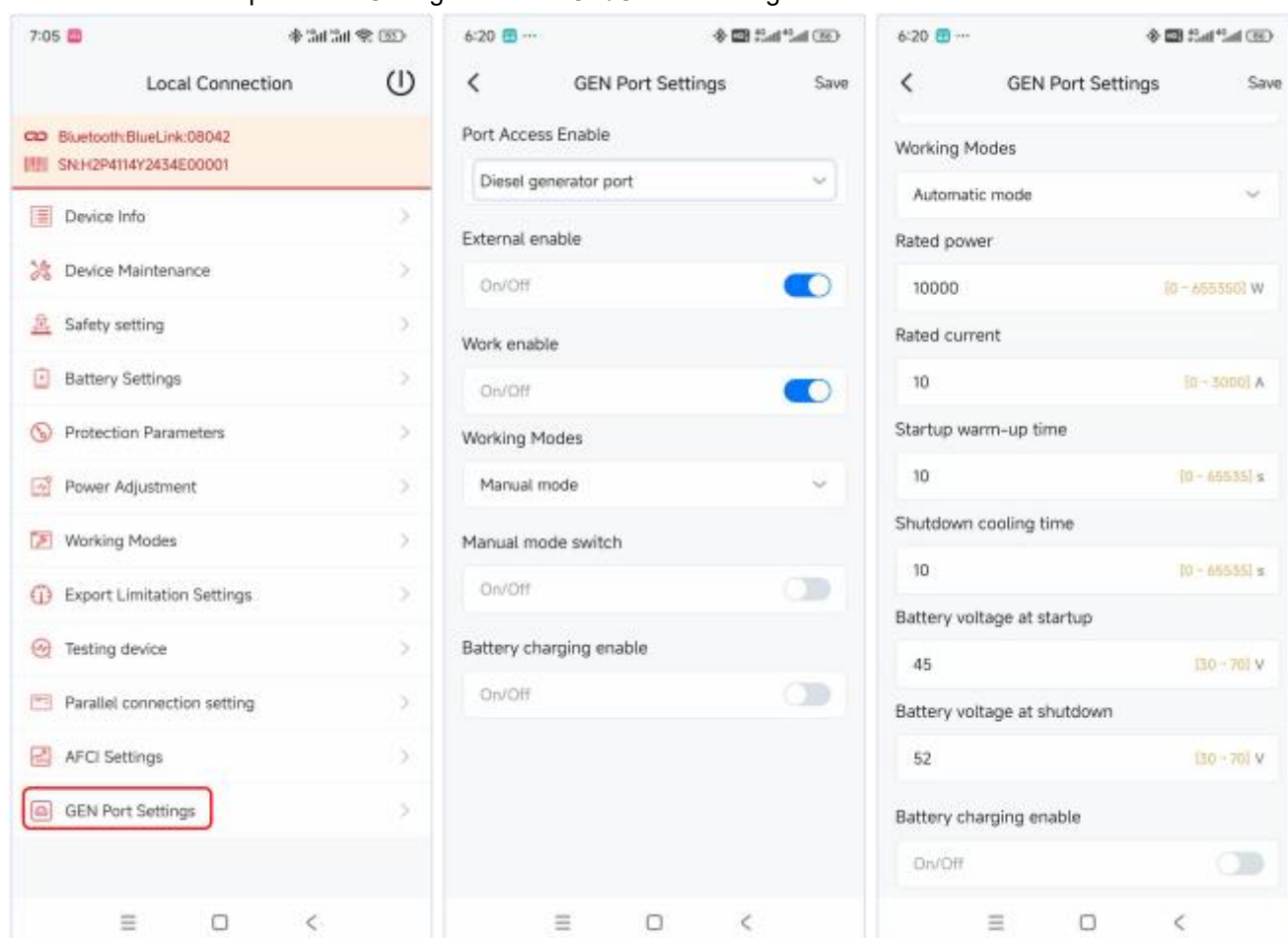
2. Working Modes

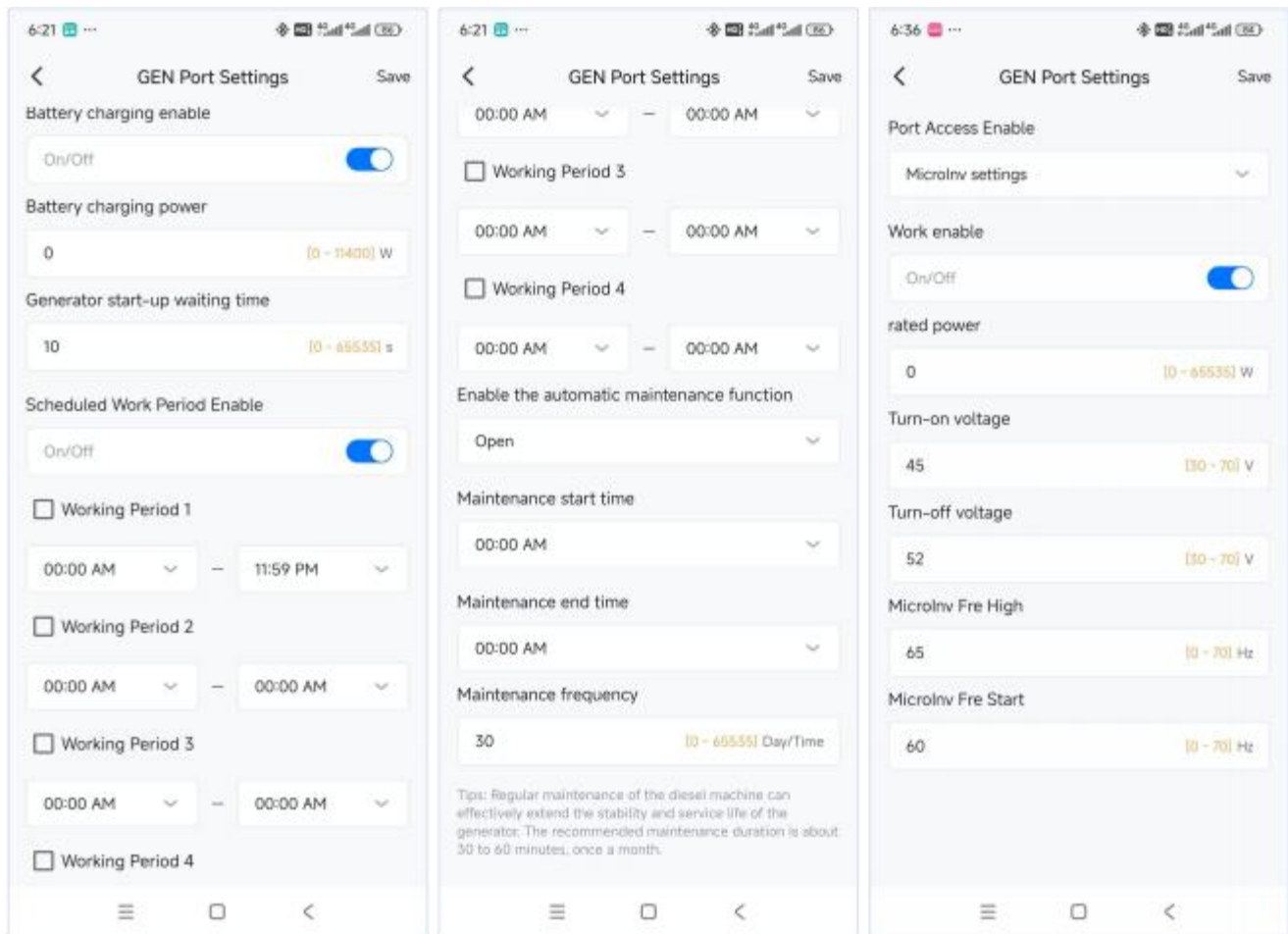
● Manual Mode

- Select "Manual mode"
- Turn on the "manual mode switch"
- Generator operation must be manually controlled(ON/OFF).
- By default, the generator only powers the load.
- To charge the battery, set "Battery charging enable" to ON.

● Auto Mode

- The inverter connects to the generator via two control wires.
- The generator automatically starts when threshold conditions are met.
- Rated power/current: Enter values based on the generator's nameplate.
- Startup warm-up / Shutdown cooling time: Set between 0–180 seconds (recommended).
- By default, the generator only powers the load.
- To charge the battery, set "Battery charging enable" to ON.
- Startup/Shutdown thresholds:
 - For lead-acid batteries: Set by voltage.
 - For lithium batteries (with communication): Set by SOC.
- Scheduled operation: Configure timed ON/OFF for the generator.





6.4.7.2 Micro-inverter setting

1. Microinv function selection

- Select "Microinv setting" in "Port Access Enable"
- Set "work enable" to ON

2. Rated Power Settings

- Enter "rated power" (Sum of the rated powers of the micro-inverters)

3. Charging Control

- Turn-on condition: When the battery voltage /SOC is lower than this value, micro-inversion is initiated to charge the battery
- Turn-off condition: When the battery voltage /SOC is higher than this value, stop micro-reverse charging of the battery. For Lithium batteries (with communication): Recommended SOC threshold: 100%

6.4.8 working mode

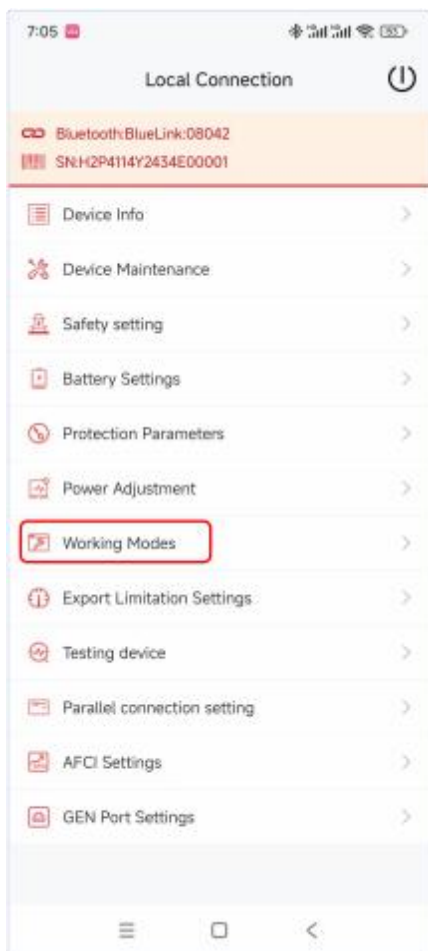
In the "working modes" setting section of the APP, we can manage the power conversion logic among PV, battery and grid by adjusting some parameters, thereby achieving the optimal utilization of power (meeting our needs and at the most favorable cost)

1. Off-Grid Backup Power Enable

- When set to ON, if the power grid suddenly fails, the Load port will switch to using the battery for emergency power supply within 20 ms, ensuring that electrical appliances are not affected by the power outage.

2. Working Modes Options

- Four selectable modes available (details depend on system configuration).



6.4.8.1 Self Consumption mode

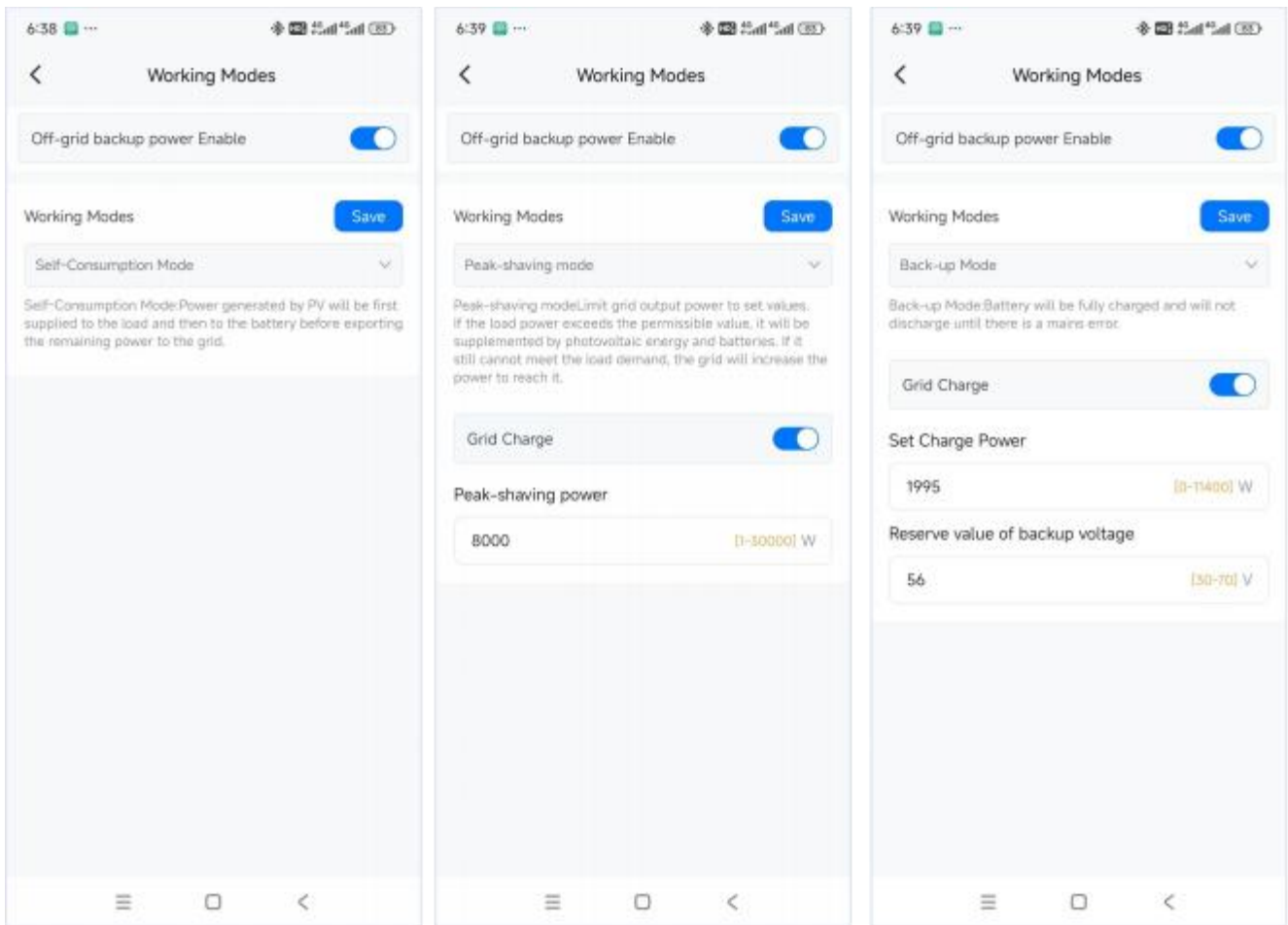
In this mode, the priority order for powering the loads is: Solar > Battery > Grid. For solar energy usage, the priority order is: Load > Battery > Grid.

6.4.8.2 Peak-shaving mode

Peak-shaving mode Limit grid output power to set values(peak-shaving power).If the load power exceeds the permissible value, it will be supplemented by PV energy and batteries. If it still cannot meet the load demand, the grid will increase the power to reach it.

6.4.8.3 Backup mode

When the battery is charged to a certain voltage/SOC, only in the event of a power outage will load switch to battery power supply. The charging power (which should be less than the battery's allowable power) and the charging cut-off voltage/SOC can be set.



6.4.8.4 Time-base mode

1. Time Slots & Actions

- Low Electricity Price Periods (Off-Peak & Super Off-Peak)
Charge battery using grid or solar power.
Adjustable charging power.
- High Electricity Price Periods (On-Peak & Mid-Peak)
Discharge battery to feed power back to the grid.
Adjustable discharge power.

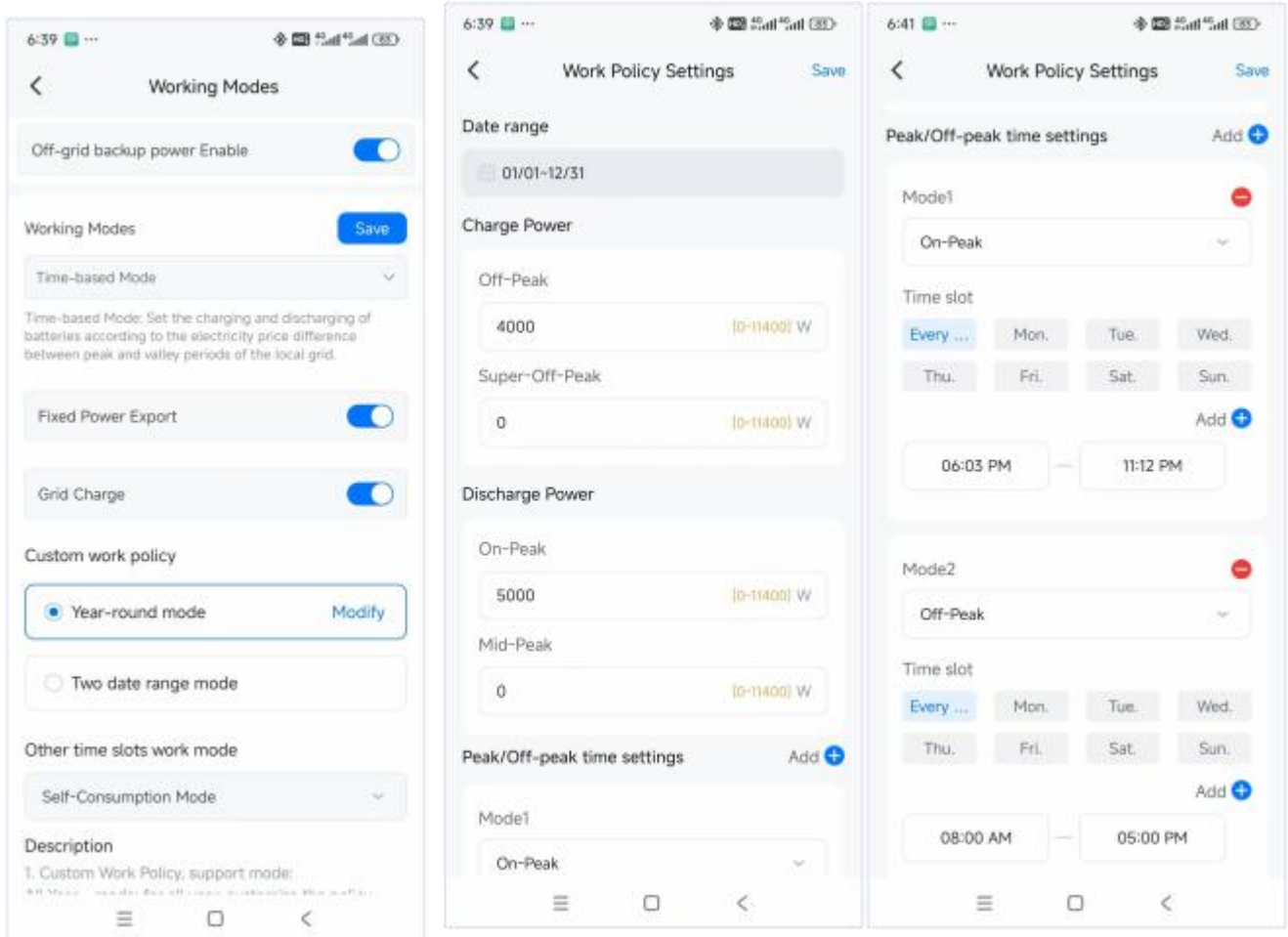
2. Key Settings

- Fixed Power Export (On/Off)
 - If ON, exports power to the grid during On/Mid-Peak.
 - Default: OFF.
- Grid Charge (On/Off)
 - If ON, allows charging from the grid.
 - If OFF, only solar charging is allowed.
- Other Time Slots Work Mode
 - Options: Self-Consumption Mode or Standby Mode.

3. Custom Work Policy

- Policy Types
 - Year-Round Mode (single policy for the entire year).
 - Two-Date Range Mode (seasonal adjustments).

- Click "Modify" to configure settings.
 - Charge/Discharge Power
- Set charging & discharging power for each time slot.
 - Peak/Off-Peak Time Setting
- Adjust based on local electricity rates & user preferences.



6.4.9 Inverter Cloud Connection

6.4.9.1 WiFi Connection for Communication Module

1. Initial WiFi Setup via Bluetooth

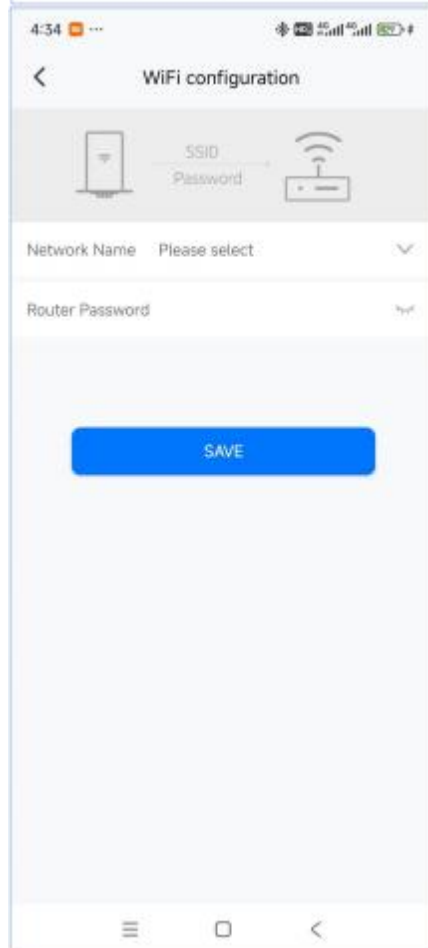
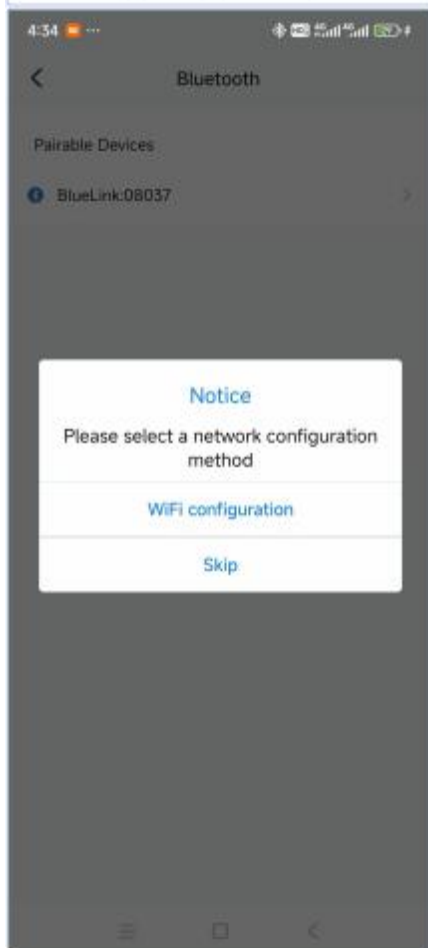
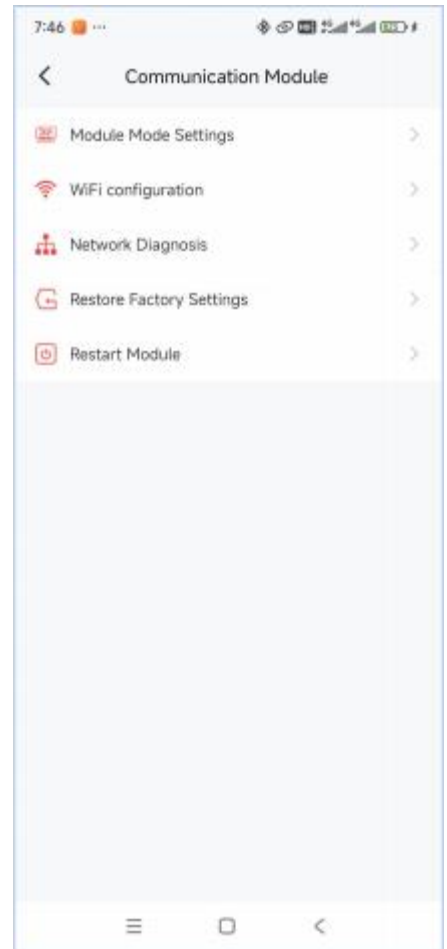
- If the communication module has no WiFi configured, a network configuration prompt will appear when connecting via Bluetooth.
- Select "WiFi configuration" to enter the WiFi setup interface.
- Choose the desired WiFi access point, enter the password, and click "Save".
- If entered correctly, a success message will appear.

2. WiFi Setup/Modification in Device List

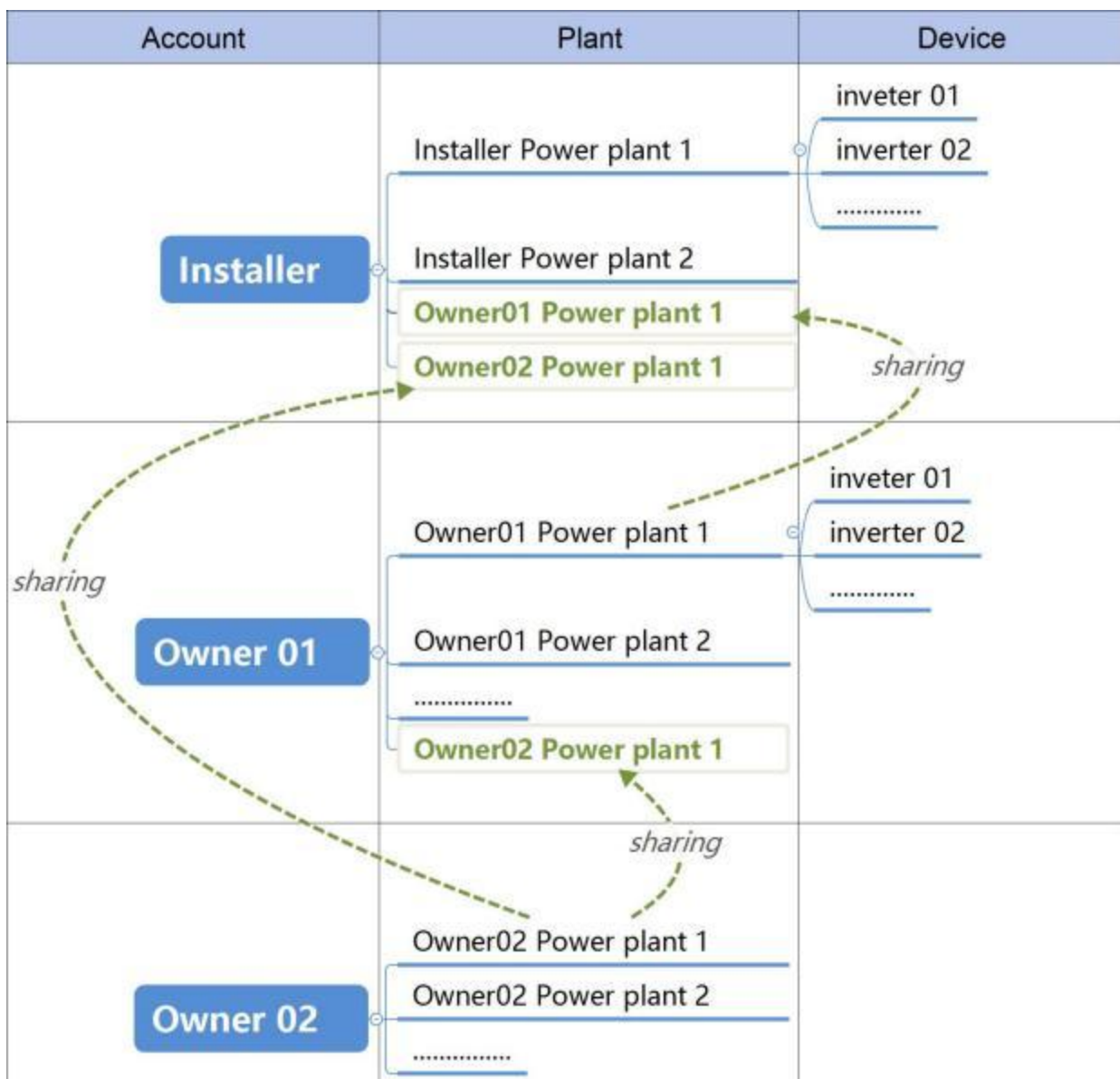
- If "Skip" is selected in the network configuration prompt, the Device List interface will open.
- If WiFi was previously configured, Bluetooth connection will directly open the Device List.
- Select the communication module matching the inverter's module (last 5 digits of the ID).
- Click the Settings button (top-right), then select "WiFi configuration" to modify WiFi settings.

3. Network Status Verification

- If WiFi is correctly configured, the Network status icon (top-right) will display signal strength.
- Ensure the communication module is properly connected to the router.



6.4.9.2 Power plant



1. Account and Plant Setup

- Each Owner/Installer account can manage one or multiple power plants.
- A default plant is automatically created upon account registration.
- Each plant can manage one or multiple inverters/devices.

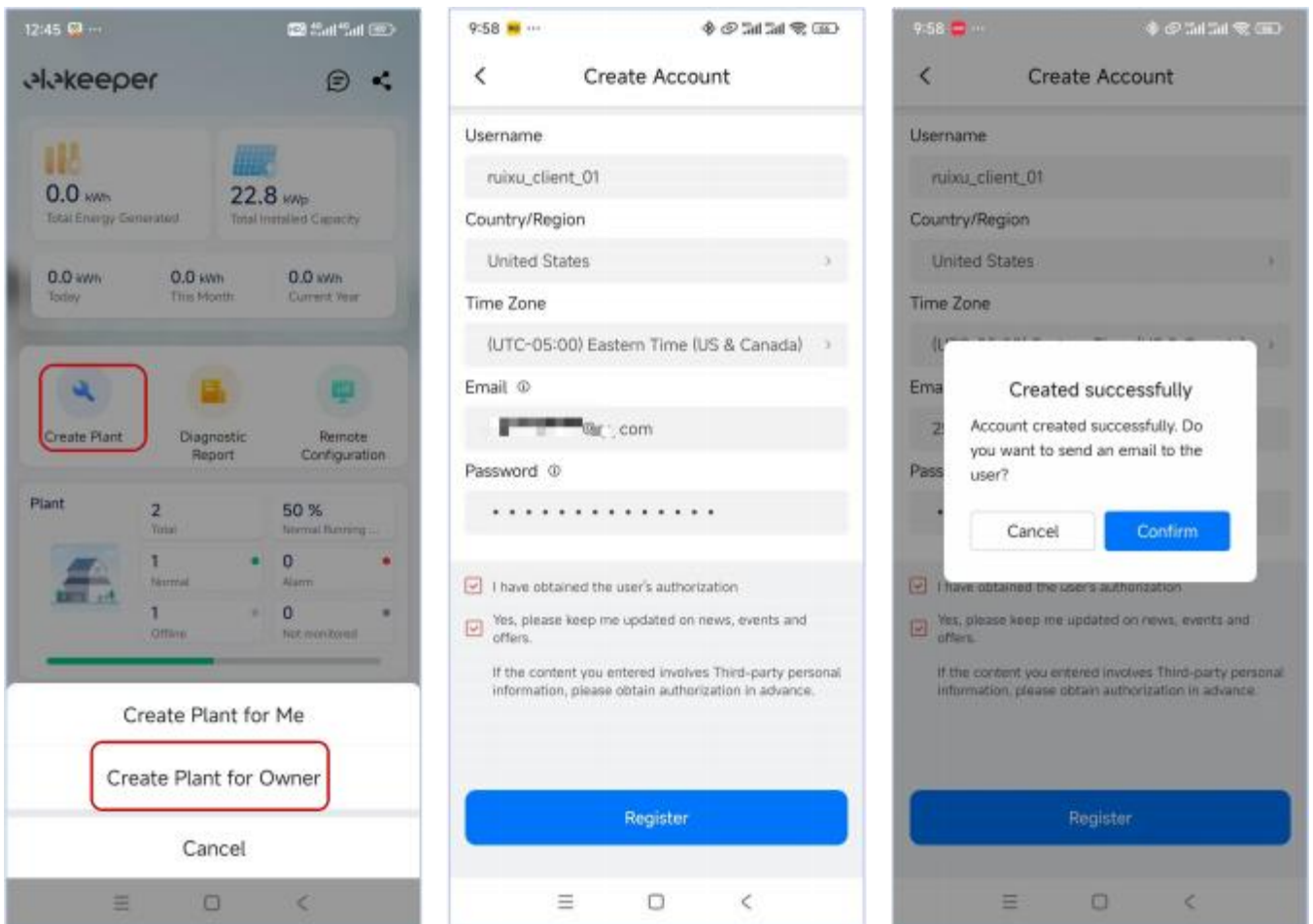
2. Plant Sharing

- Owners/Installers can share plants with others (Owners or Installers).
- Permissions can be customized during sharing.
- Sharing can be revoked at any time.
- Shared plants appear in the recipient's account after a few minutes.

3. Setting Up an Owner Account (Installer Role)

In the Installer Home interface:

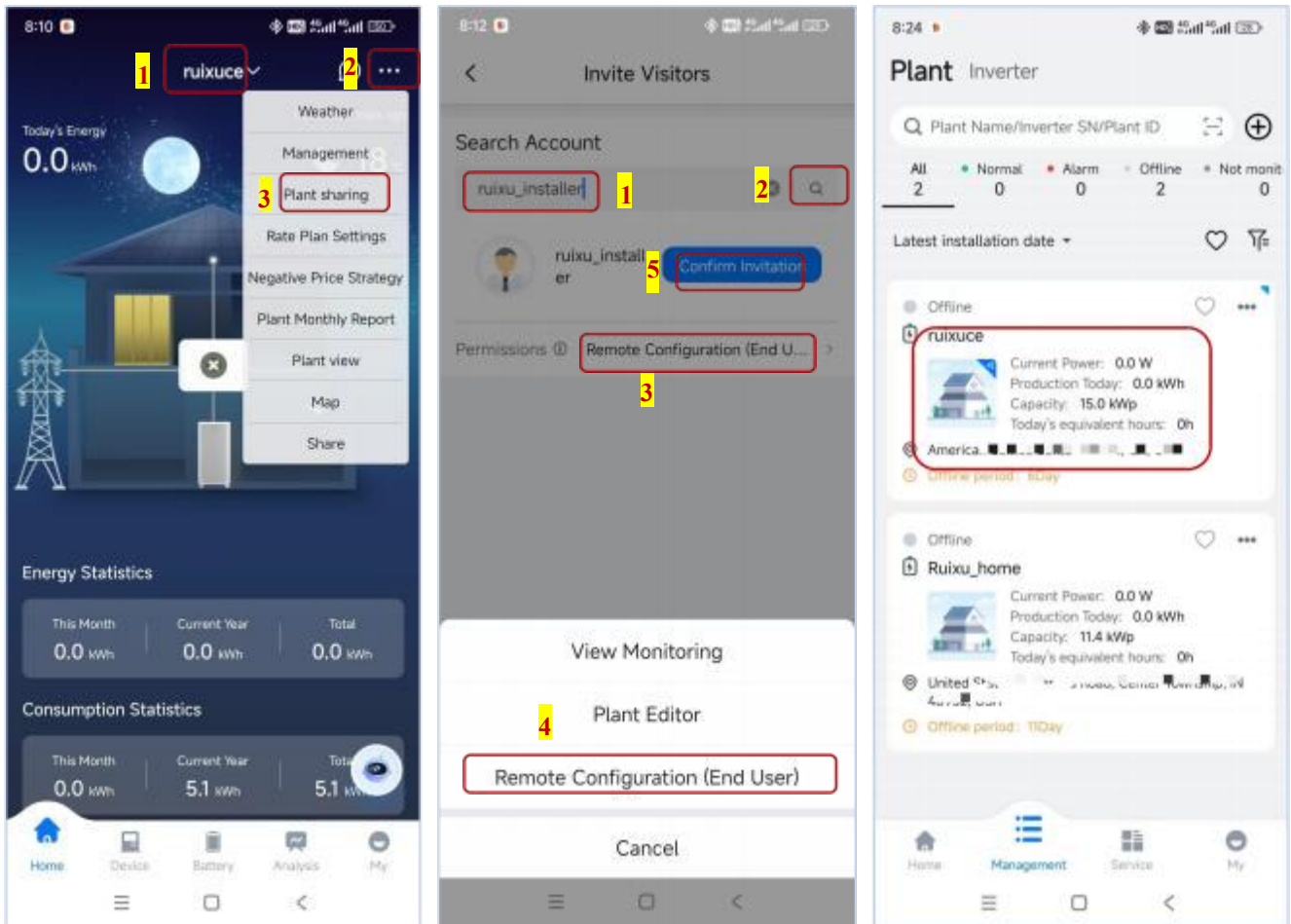
- Click "Create Plant" → "Create Plant for Owner"
- Fill in required details and click "Register"
- A success message confirms account creation.
- The installer automatically gains setup permissions for the new owner's plant.



4. Sharing a Plant (Owner Role)

In the Owner Home interface:

- Select the desired plant.
- Click the three-dot menu (...) → "Plant Sharing".
- Enter the recipient's account and search.
- Select permissions from the dropdown list.
- Click "Confirm Invitation" to complete sharing.



6.4.9.3 Plant and Inverter Binding

1. Binding an Inverter to a Plant

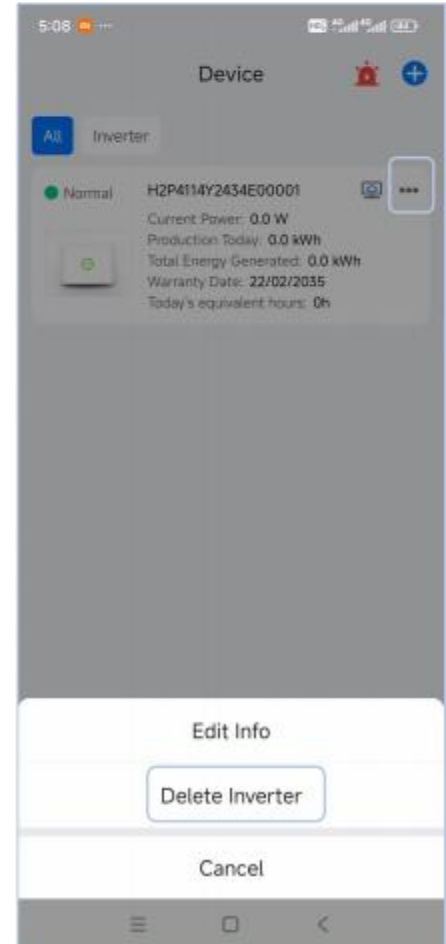
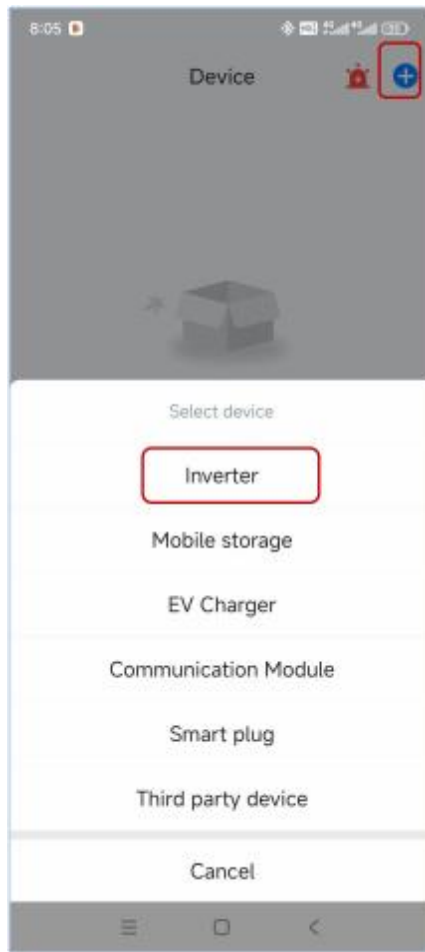
In the Plant interface:

- Go to "Device"→ Click the "+" icon.
- Select "Inverter".
- Enter the "Inverter S/N" manually or scan the QR code.
- Fill in other required details (if applicable).
- Save to complete the binding.

2. Unbinding an Inverter from a Plant

In the Device interface:

- Locate the target inverter.
- Click the "..."(menu) icon.
- Select "Delete Inverter"to unbind it from the current plant.



6.4.9.4 Accessing and Configuring Inverters via Cloud Platform

1. Selecting the Plant

- For Installer Account:

Go to "Management" → Select the desired Plant.

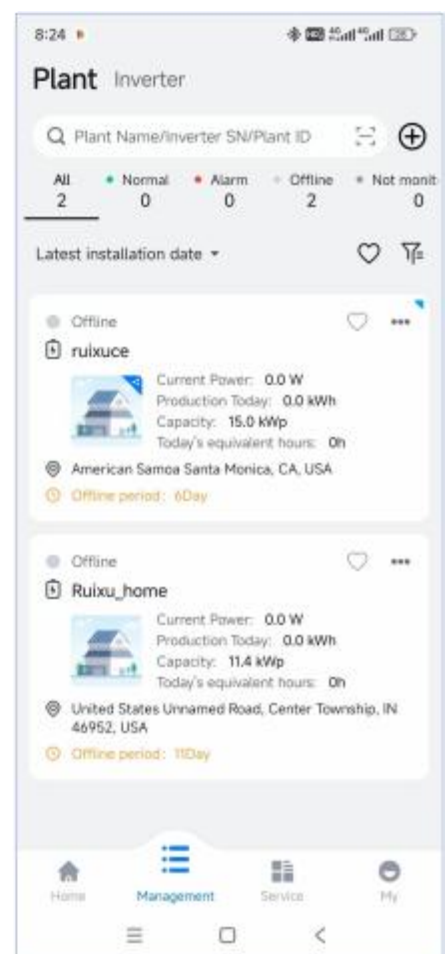
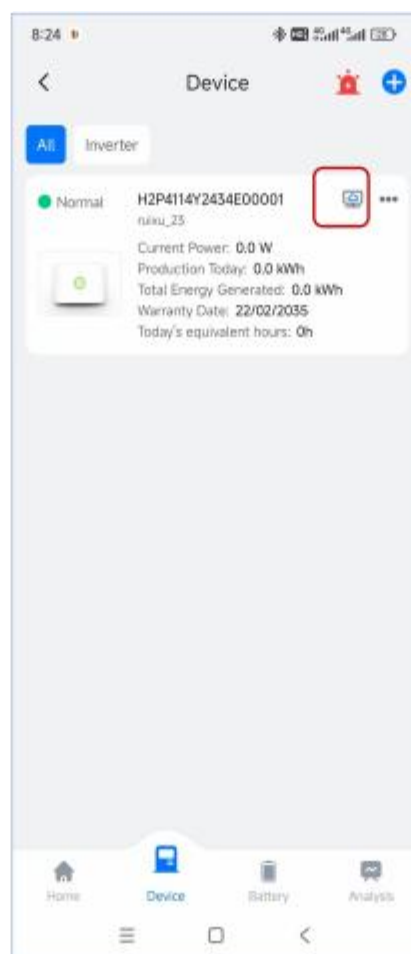
- For Owner Account:

On the Home screen, click the Plant name at the top.

Choose the correct Plant from the dropdown list.

2. Accessing Inverter Remote Configuration

- Navigate to the "Device" interface.
- Locate the target Inverter and click the cloud link icon in the top-right corner.
- This opens the "Remote Configuration" interface for adjustments.



7. Trouble Shooting

For any errors reported as below, contact the after-sales for service support. The operations and maintenance must be performed

Error message	Description
Master Bus Voltage High	The DC input voltage exceeds the allowed input limit of the inverter.
Master HW Bus Voltage High	The DC input voltage exceeds the allowed input limit of the inverter.
Master Bus Voltage Low	The bus voltage of the inverter is too low.
Master PV Voltage High	The DC input voltage of the inverter is too high.
Slaver Adc Sample Error	The inverter sampling circuit is faulty.
Master Adc Sample Error	The inverter sampling circuit is faulty.
Consistent Adc Adc Sample Error	The inverter sampling circuit is faulty.
Master Pv Input Error	PV reverse connection or sensor abnormality.
Frequency Config Error	The center frequency of the safety configuration does not match the real frequency of the power grid.
Master HW PV Current High	1. The positive and negative poles of the string are reversely connected. 2. Internal damage to the inverter.
Master SW PV Current High	1. The positive and negative poles of the string are reversely connected. 2. Internal damage to the inverter.
Master HW Inv Current High	1. The positive and negative poles of the string are reversely connected. 2. Internal damage to the inverter.
Master SW Inv Current High	The grid-side output current exceeds the inverter limit.
Master HW BAT Current High	The grid-side output current exceeds the inverter limit.
Master SW BAT Current High	The battery charging and discharging current exceeds the inverter limit.
Master HW BLC Current High	The battery charging and discharging current exceeds the inverter limit.
Master SW BLC Current High	The operating current of the balancing bridge exceeds the inverter limit.
Master Grid NE Voltage Error	Live line grounding occurs on the grid side
Master Arc Device Error	Arc equipment failure.
Master Arc Error	DC arcing caused by DC short circuit or poor terminal contact.
Arc Permanent Err	Permanent arc error
Master Battery Voltage Error	1. Bad battery connection. 2. Lithium battery is turned off.
Gen Output OverLoad	The load connected to the generator output is greater than the maximum output power.
Battery Open Circuit	Inverter cannot detect battery voltage.
Master Battery Discharge Voltage Low	Low voltage detected during battery discharge and overload.
Lost Communication between M<->H	Internal communication of the inverter is lost.
Lost Communication between M<->S	Internal communication of the inverter is lost.
Lost Communication between S<->H	Internal communication of the inverter is lost.

Error message	Description
Master Grid Rly Error	1. A live wire grounding occurs on the power grid side. 2. The grid voltage is too low. 3. The inverter relay circuit is faulty.
Master Inv Rly Error	1. A live wire grounding occurs on the power grid side. 2. The grid voltage is too low. 3. The inverter relay circuit is faulty.
Master Temperature High Error	Inverter temperature is too high.
Master Temperature Low Error	Inverter temperature is too low.
GFCI Device Error	Inverter leakage current detection equipment fails.
Grid Voltage High	The grid voltage is higher than the inverter safety regulations allow.
Grid Voltage 10Min High	The grid voltage is higher than the inverter safety regulations allow.
Grid Voltage Low	The grid voltage is lower than the allowable range of the inverter safety regulations.
EpsPort Voltage Error	Before leaving the grid, detect abnormal voltage at the off-grid port.
Master Grid Frequency High	The grid frequency is higher than the upper limit specified by the local power grid.
Master Grid Frequency Low	The grid frequency is lower than the lower limit specified by the local power grid.
Output OverLoad	The load connected to the back-up end is greater than the maximum output
	power of the inverter.
Output Volt DCV High	The DC component of the AC output exceeds the limit range.
Output Current Dci High	The DC component of the AC output exceeds the limit range.
Master No Grid Error	The inverter cannot detect the grid voltage.
Master BMS com Lost	BMS does not start normally.
Gen Rly Error	1. Diesel engine sampling circuit abnormality. 2. Diesel engine relay failure.
GFCI Error	A ground leakage current fault was detected in the power station system.
ISO Error	The insulation resistance between the string and the ground is less than the set value.
Bus Voltage Imbalance	Bus voltage imbalance.
Lost Communication between H<->M	Internal communication of the inverter is lost.
Lost Communication between H<->S	Internal communication of the inverter is lost.
HMI EEPROM Error	memory failure.
Lost Communication between Master and Meter	Abnormal communication between inverter and meter.
Lost Communication between inverter and SEC	Communication abnormality between inverter and load monitoring module.
HMI RTC Error	RTC failure

Error message	Description
BMS Device Error	Battery abnormality
BMS Lost.Conn	BMS does not start normally.
CT Device Err	CT equipment failure
AFCI Lost Com.Err	AFCI board communication interrupted.
Master FAN Error	Master FAN Error
Master Bat Midbus Error	Battery voltage is too high or too low

In case of any issues, you can also share the power plant with the installer or other owners for remote assistance and handling.

8. Appendix

8.1. Recycling and disposal

This device should not be disposed as a residential waste.

An inverter 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.

8.2. Warranty

Check the product warranty conditions and terms on the RUIXU website:<http://www.ruixubattery.com>

8.3. Contacting support

RUIXU Electronic

Address: Factory Blog. 1, No.6 Chuangye N. Rd, Hongqi Town, Jinwan District, Zhuhai, Guangdong, China, P.C. 519000

Website:<http://www.ruixubattery.com>

Technical Support & Service

Tel: +86 15019934220

Sales

E-mail: sales@ruixubattery.com

8.4. Trademark

RUIXU is the trademark of RUIXU Electronic.