AMPI PWR

All-in-one

Balcony Solar Power System

Operation Instruction

V2.0

Foreword

This user manual is intended to introduce the functional characteristics of the device and the correct usage methods.

Statement:

1. Before commencing the use of this product, please peruse this document meticulously to ensure that you have a thorough understanding and can utilize it appropriately.
2. Once you have read this document, please store it in a secure location for future consultation.
3. Improper operation of this product might lead to severe injuries to yourself or others, or cause damage to this product and other properties.
4. By employing this product, you are regarded as having comprehended, acknowledged, and accepted all the terms and conditions stipulated in this document.
5. The Company will not be held accountable for any damages arising from the user's failure to operate this product in accordance with the instructions for use.
6. In compliance with laws and regulations, the Company reserves the right of final interpretation for this document and all documents related to this product.
7. This document is prone to update without prior notification. Kindly visit the official website for the most recent version.

Precautions:

1. The illustrations in this manual are for illustrative purposes only and may differ from the products you ordered.
2. Due to product upgrade or change, and to improve the convenience and accuracy of the manual, the contents of this manual may be changed from time to time.
3. If the manual is damaged or lost and you need to order a new one, please contact our regional agents or our customer service directly.
4. If you still have some unclear issues during use, please contact our customer service center.

Safety Precautions:

1. Before installation: Please carefully check the materials. If there are any missing or damaged materials, do not install the machine as it is dangerous.
2. Before installation: Be sure to read the operation manual carefully before operating.
3. When installing: Observe the installation sequence strictly.
4. All modules can be powered on only after they are properly connected. Plugging and unplugging are prohibited when they are powered on; otherwise, there is a risk of electric shock or burning out the modules.
5. Non-professionals are not allowed to disassemble the module shell or touch the internal circuit board to avoid electric shock accidents.
6. It is forbidden to modify or use this system on other projects without the confirmation of the manufacturer's technicians to avoid serious accidents.

Catalogue

Packing List

No.	Name	Quantity
1	All-in-one machine	×1
2	Rubber stopper for MC4	×8
3	MC4 disassembly and assembly wrench	×1
4	Operation Instruction	×1
5	Warranty card	×1

*If any parts are missing, please contact our customer service.
*Other tools and accessories involved in the installation and commissioning are not included in the package list. Please purchase them as needed.

Chapter 1 Introduction of the Product

1.1 Overview

The device is an All-in-One machine, which is used in Balcony solar power system. It is a micro solar power generation system integrating batteries and PV control modules. Comprised of a battery section and a PV control section, it forms a complete set of balcony PV energy storage system in conjunction with PV modules, micro-inverters, smart electricity meters, and the power grid. This product can efficiently store the direct current generated by solar panels in the storage battery and connect to the electrical loads and the power grid through the micro-inverter, providing people with green electric energy while effectively addressing the key technical challenges such as the usability, safety, and service life of the PV energy storage system.

1.2 System Parameters

Table 1-2 Parameters

Battery	
Battery Type	$LiFePO_4$
Rated Voltage	51.2V（16S）
Battery Capacity	2048WH
Cycle Life	6000（25℃）
Discharge Depth	90%
Maximum Charging Current	60A
DC Input (PV Input)	
Maximum Input Power	800W×2 Max
MPPT Voltage Range	18V-60V
Start-up Voltage	12V
Operating Voltage Range	12V-60V
Input Conversion Efficiency	98% Max
Maximum Input Voltage	60V
Maximum Input Current per Channel	25A
Maximum Input Short-circuit Protection Current (Transient) per Channel	90A
Number of MPPT Tracking	2
MPPT Tracking Efficiency	99%
DC Output (INV Output)	
Maximum Output Power	800W×2 Max
Output Conversion Efficiency	98% Max
Operating Voltage Range	18V~55V
Maximum Output Voltage	55V
Maximum Output Current per Channel	28
Maximum Input Short-circuit Protection Current (Transient) per Channel	90A
General Parameters	
Product Dimensions	480mm×230mm×296mm
Net Weight	≈23kg
Maximum Number of External Parallel Slave Battery Packs	3 PCS
Capacity of a Single Slave Battery Pack	2048WH
Dimensions of a Single Slave Battery Pack	480mm×230mm×240mm
Net Weight	≈20kg
Charging Operating Temperature	0℃ ~ 55℃
Discharging Operating Temperature	-20℃~60℃

Protection Grade	IP65
Communication Mode	WIFI
Heat Dissipation Mode	natural cooling
Packaging Dimensions	532mm×282mm×373mm

Chapter 2 Port Function and Structure Description

2.1 Ports

This product achieves electrical connection with the solar PV panel and the micro-inverter through the interlocking of the MC4 connectors. The outgoing lines of the solar PV panel and the micro-inverter must refer to the connector type shown in the schematic diagram of the MC4 connector in Figure 2-2-1; otherwise, the connection cannot be completed. (Hereinafter, Inverter1 is INVA, Inverter2 is INVB, PV1 is PVA, and PV2 is PVB.)

The complete machine with the shell of this product is shown in Figure 2-1-1.

Figure 2-1-1 All-in-one

Figure 2-1-2 Schematic Diagram of Battery Pack Parallel Connection

2.2 Port Definition

Table 2-2 Port Specification

PV Control Module Part	
Port	**Definition**
PV1+/ PV1-	PV1 input+, input voltage range: 12-60V
PV2+/ PV2-	PV2 input+, input voltage range: 12-60V
INV1+/ INV1-	Micro-inverter 1 output, output voltage range: 18V-55V
INV2+/ INV2-	Micro-inverter 2 output, output voltage range: 18V-55V
Wi-Fi	Wi-Fi Antenna and Connector Socket for Built-in Wi-Fi Module
Battery Part	
Power	Battery Power On/Off Button

Chapter 3 Product installation

3.1 Installation Sequence

The integrated structural design of this product is extremely user-friendly and does not require complicated installation. Users can place it on the balcony, by the wall, or other locations that are convenient for connection with the PV panel and the micro-inverter for usage.

3.2 Wiring Introduction

3.2.1 Wiring connection with the PV panel

Before connecting the PV panel to the device, ensure that the PV panel is functioning properly. Please note the following before wiring:

1	The maximum voltage of each connected PV panel should not exceed 60V.
2	The polarity and model of the outgoing terminal of the PV panel should match the device. Refer to Section 2.1 - Port Function
3	The PV panel cannot be input in parallel. That is, PV1+, PV1- cannot be directly connected to PV2+, PV2-.

3.2.2 Wiring connection with the micro-inverter

The following precautions should be confirmed before connecting the micro-inverter:

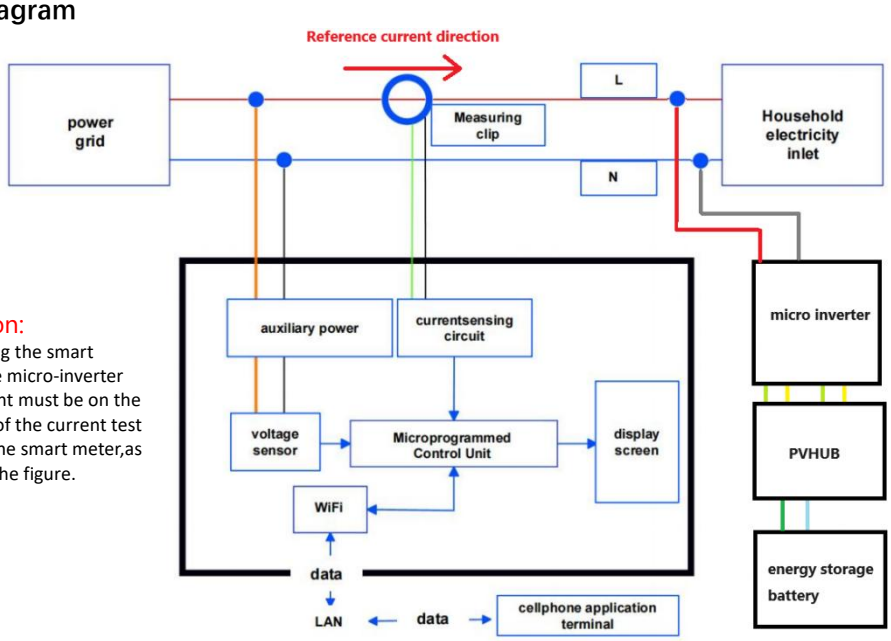
1	The micro-inverter operates properly.
2	The input voltage and power comply with the device system parameters.
3	Never artificially connect or disconnect the wiring terminal between the micro-inverter and the device when the device is powered on.
4	When the AC plug of the micro-inverter is connected to the power grid, it is necessary to ensure that the ground terminal in the AC plug can be reliably grounded. Otherwise, it will affect the system communication and cause abnormal operation of the system.

3.2.3 Battery Pack Capacity Expansion

For the stacking and capacity expansion of this product and the slave battery packs, please refer to Section 2.1 for details. When expanding the capacity by stacking multiple battery packs, the following points should be noted:

1	When using 2 PV panels (with a total PV power of 800W to 1000W) to connect to this product, using this product alone is sufficient.
2	When 4 PV panels (with a total PV power ranging from 800W to 1000W) are connected in parallel to this product, a slave battery pack with a capacity of 2 kWh needs to be stacked below this product.

3.3 Wiring Diagram



Attention:
When using the smart mode , the micro-inverter access point must be on the right side of the current test clamp of the smart meter,as shown in the figure.

Figure 3-4 Wiring Diagram of the Smart Power Meter

3.4 System Installation Sequence

Step 1: First, connect the micro-inverter to the INV1 and INV2 ports of this product;
Step 2: Connect the micro-inverter's grid-connected plug to the household socket;
Step 3: Connect the solar panel to the PV1 and PV2 ports of this product;
Step 4: Press the Power switch of this product to start the system.

Notice:

After the solar panel is connected, if the Power switch of this product is not turned on for more than one minute, the system will bypass PV1 output to INV1 and PV2 output to INV2. The system will start operating normally only when the Power switch is turned on.

If a slave battery pack needs to be added, the battery pack capacity expansion should be completed before installing the system, and then the micro-inverter and PV panel plugs should be connected in sequence.

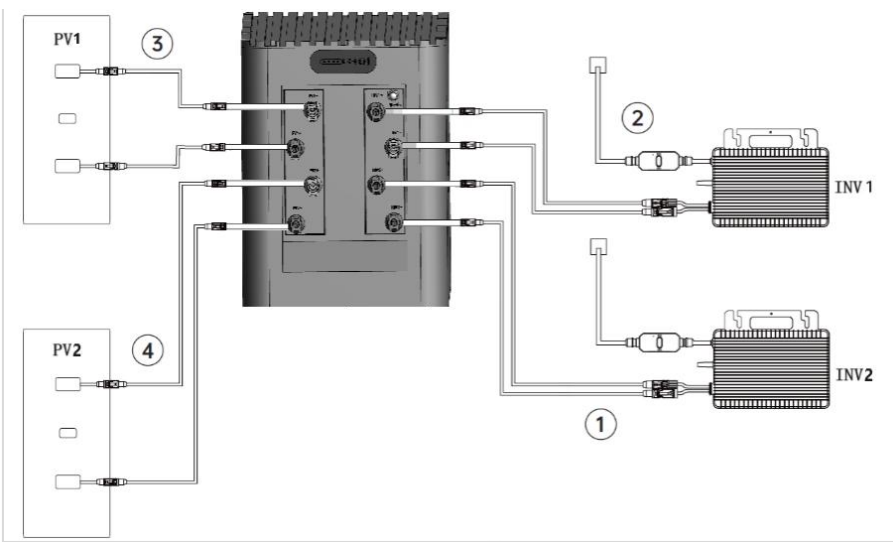


Figure 3-4 System Installation Schematic Diagram

3.5 System Disassembly Sequence

Step 1: First, turn off the device through the APP, then press and hold the Power button on the panel of this product for 3 seconds to turn off this product;

Step 2: Disconnect the home power grid and unplug the cables of the inverter and household appliances;

Step 3: Disconnect the solar panels and unplug the cables connecting the two solar panels to this product.

Notice: Please take good care of all components for reinstallation if necessary.

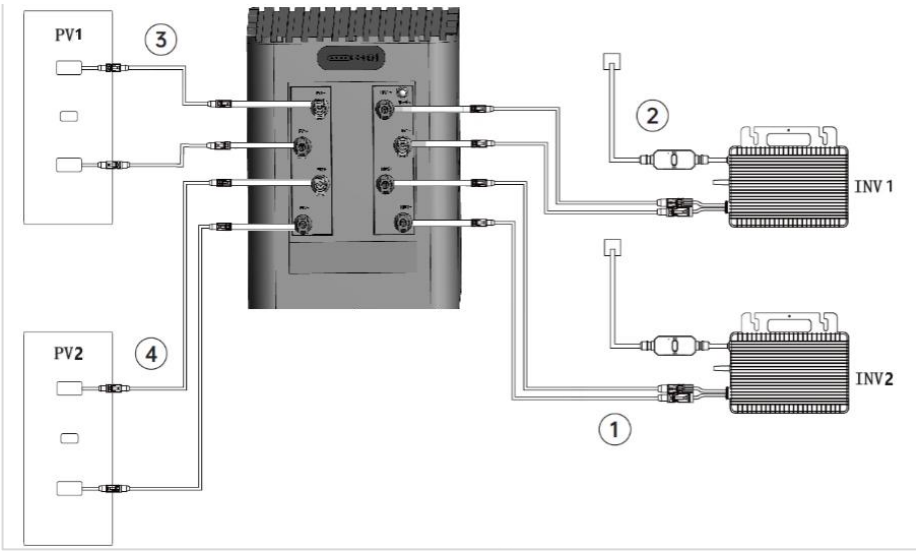


Figure 3-5 System Disassembly Schematic Diagram

Chapter 4 System Operation Instructions

4.1 System Startup

1. When the device is powered on for the first time or re-run, if the battery is connected normally, it will immediately enter the self-check state. If the battery connection is not detected within one minute, the electrical energy of the PV will be bypassed and output to the micro-inverter.
2. After entering the self-check state, the equipment will detect the connection status of the PV and the micro-inverter, as well as the maximum power of the micro-inverter. Please ensure the normal grid connection of the micro-inverter. The self-check time is approximately up to 150 seconds.
3. After the self-check is completed, it operates normally according to the battery power and working mode.
4. At 9:30 am and 21:30 every day, the device suspends charging and discharging and detects the connection status of the PV for approximately 15 seconds. After the detection is completed, it resumes the operating state before the suspension.

4.2 Mode Description

4.2.1 Charge priority mode

When the user selects the charging priority mode, it is necessary to set the discharge time period and discharge power.

(1) When the current time is not within the discharge time period range, or when no micro-inverter is detected during self-inspection:

- If the battery power is lower than a certain threshold (default is 95%), the device will turn off the INV output. The single-channel charging limit of charging power is 800W, and the total power limit is 1600W.
- If the battery power is higher than a certain threshold (default is 95%) but not reaching 100%, the device will turn off the INV output. The single-channel limit of charging power is 200W, and the total power limit is 200W.
- If the battery is fully charged to 100%, the PV power will be bypassed to the INV output.

(2) When the current time is within the discharge time period range and a micro-inverter is detected during self-inspection:

- The device simulates the I-V curve output of the PV panel. The open-circuit voltage is the open-circuit voltage of the PV during self-inspection. If there is no PV connected, the open-circuit voltage is defaulted to 45V. The preset power setting value is the maximum power point of the I-V curve. In this working state, the MPPT tracking function is completed by the micro-inverter.
- When the INV output power reaches the preset power, if there is surplus PV energy, the excess energy will be used to charge the battery. After the battery is fully charged, the PV will supply power to the micro-inverter entirely.
- When the PV energy is lower than the preset power, the battery will supplement the power supply until the battery power is lower than a certain threshold (default is 10%), and the battery will stop discharging.

This mode is applicable to situations where electricity needs to be concentratedly used in a certain time period, and the open-circuit voltage of the PV panel is low and the power is small. It is necessary to charge first and then discharge.

4.2.2 Discharge priority mode

When the user selects the discharge priority mode, only the power that needs to be discharged needs to be set.

- The device simulates the I-V curve output of the PV panel. The open-circuit voltage is the open-circuit voltage of the PV during self-inspection. If there is no PV connected, the open-circuit voltage is defaulted to 45V. The preset power setting value is the maximum power point of the I-V curve. In this working state, the MPPT tracking function is completed by the micro-inverter.
- When the INV output power reaches the preset power, if there is surplus PV energy, the excess energy will be used to charge the battery. After the battery is fully charged, the PV will supply power to the micro-inverter entirely.
- When the PV energy is lower than the preset power, the battery will supplement the power supply until the battery power is lower than a certain threshold (default is 10%), and the battery will stop discharging.

This mode is suitable for use when the PV panel has strong capacity and the micro-inverter cannot completely use up the PV energy.

4.2.3 Smart mode

The smart mode requires the use of a smart power meter, and the compatible model is MS-SM220V50. The smart power meter serves as a sub-device of the device.

When the user adds this sub-device in the APP, the smart mode can be selected in the APP.

- In the smart mode, the user does not need to set the discharge power and discharge time.

- The output power of the micro-inverter can be adjusted by real-time detection of the household electricity consumption power through the smart power meter to reduce the grid power to 0W.

This mode is suitable for families that have the conditions to install a smart power meter.

4.3 Device Status Description

Table 4-3 Device Status Description

Status	Description
Standby	Device stops charging and discharging.
Self-check	The device detects battery, PV and micro-inverter connection status and the micro-inverter's maximum power. Self-check time is affected by micro-inverter grid connection speed, max 150s.
Running	1.Without micro-inverter connection, device turns off output. If no PV connection, waits for PV. With PV connection, charges battery until full. 2.With micro-inverter connection, works as configured. Micro-inverter's grid-connected power doesn't exceed max power during self-check.
Low battery	When the battery power is lower than 10% power, it enters a low battery state. In the low battery state, the device stops discharging and waits for photovoltaic (PV) connection to charge.
Calibration	When detecting large deviation between battery power and actual SOC, enters calibration state. Turns off micro-inverter and charges battery first. Exits automatically when fully charged. User can restart on APP to exit actively.
Fault	When detecting sudden battery disconnection or abnormal PV connection, enters fault state. Shut down and restart after normal connection is restored.

4.4 Indicator Light Signal

The device is equipped with 5 LED indicators to indicate the current operating status of the device. The definitions of the indicators are presented in the table below:

Table 4-4-1 Definition of indicator lights

Solar Power System Indicator Light

Indicator	Status	Description	Solution
ALM	light up	System failure/Protection	Turn off the device operation and then turn it on again to see if it can be restored. If it cannot be restored, power off the system and restart it. If the restart fails to restore, please contact the after-sales technical support.
	slow flashinging	Alarm	Under normal circumstances, the device will recover automatically. If the device fails to recover automatically, turn off the device operation and then turn it on again, and it can return to normal.

	light off	No system failure/alarm	
PV	light up	With PV charging power	
	slow flashing	PV in self-check	
	light off	No PV charging power	
LOAD	light up	With micro-inverter output power	
	slow flashing	Micro-inverter in self-check	
	light off	No micro-inverter output power	
Wi-Fi	light up	Device successfully configured with network	
	slow flashing	Device not connected to network and in STA mode.	
	double flashing	Device not connected to network and in AP mode.	
BAT	light up	Battery normally connected	
	light off	Battery not connected	

Battery System Indicator Light

Indicator	Status	Description	Solution
POWER	-	Battery power button	
RUN	Green Red	Battery running light	
ALM	red	Alarm light	
SOC	green	Battery power level display	

Table 4-4-2 Details of battery capacity indicator light

Status	Charging				Discharging			
Capacity indicator	S0C4●	S0C3●	S0C2●	S0C1●	S0C4●	SOC3●	soc2●	S0C●
0∽25%	flashing2	light off	light off	light off	light up	light off	light off	light off
25 ∽50%	light up	flashing2	light off	light off	light up	light up	light off	light off
50∽75%	light up	light up	flashing2	light off	light up	light up	light up	light off
75∽100%	light up	light up	light up	flashing2	light up	light up	light up	light up
Running indicator●	light up				flashing3			

Table 4-4-3 Details of battery System Indicator Light

System status	Abnormal event	Battery level LED	ALM	RUN	Remarks
		● ● ● ●	●	●	
power off	power off/ sleep mode			All lights off	
standby	normal	Indicate	light off	flashing1	In standby mode, there are only

	alarm	according to battery level	flashing2	flashing1	normal and alarm. Protection and fault are reported according to the charging/discharging state. Alarm includes the following categories: large voltage difference alarm, low capacity alarm, high/low single cell voltage, high/low overall voltage, and all temperature alarms (high/low cell temperature, high/low ambient temperature, high MOS temperature). (When there is a single cell & overall voltage overvoltage alarm, ALV does not flash).
charging	normal	Indicate according to battery level (Highest indicator LED flashing2)	light off	light up	
	alarm		flashing2	light up	Alarm includes the following categories: large voltage difference alarm, low capacity alarm, high/low single cell voltage, high/low overall voltage, and all temperature alarms (high/low cell temperature, high/low ambient temperature, high MOS temperature: overcurrent alarm). (When there is a single cell & overall voltage overvoltage alarm, ALM does not flash).
	Single cell / Whole set overvoltage / protection/fully charged protection	Indicate according to battery level	light off	flashing2	
	overcurrentprotection (Enter current-limited charging mode)	Indicate according to battery level (with charging current flashing2)	light off	light up	After overcurrent protection during charging, if it enters current-limited charging and there is charging current, it is displayed as normal state. After overcurrent protection during charging, if it enters current-limited charging and there is no charging current, it is displayed as fault state. AU is constantly on and all others are off.
	Temperature protection	light off	light up	light off	cells, MOS, and environment
discharging	normal	Indicate according to battery level	light off	flashing3	
	alarm		flashing2	flashing3	Alarms include the following categories: large voltage difference alarm, low capacity alarm, high/low single cell voltage alarm, high/low overall voltage alarm, and all temperature alarms (high/low cell temperature alarm, high/low ambient temperature alarm, high MOS temperature alarm, overcurrent alarm).
	Single cell / Whole set Ndervoltage protection		flashing2	light off	

	overcurrent,short circuit protection	light off	light up	light off	
	temperatureprotection	light off	light up	light off	cells, MOS, and environment
fault	NTC fault, MOSfault, Reverse connection, Voltage difference protection, Ultra-low voltage protection	light off	light up	light off	
Details of battery indicator light flashing mode			Flashing mode	light up	light off
			flashing1	0.25S	3.75 S
			flashing2	0. 5 S	0. 5 S
			flashing3	0. 5 S	1. 5 S

4.5 Button Control

The device feature 2 control buttons. Different triggering methods can yield diverse control effects. The specific definitions are presented in the table below:

Table 4-5 Button Functions

Button	Control Mode	Description
Battery system button	Press and hold for 3 seconds or more	Device power on/off
Solar power system button	Press and hold for 3 seconds or more	Device power on/off
	Press consecutively for 5 times or more	Clear Wi-Fi network configuration
	Press consecutively for 3 times or more	Switch Wi-Fi network configuration mode (effective in the unconfigured network mode)

4.6 Power Derating

When the device temperature exceeds 75°C, the output of this product to the micro-inverter end begins to reduce power. The power derating curve is as shown in the following figure.

When the device temperature is higher than 80°C, to protect the device, this product will shut down charging and discharging until the temperature drops to 75°C before resuming.

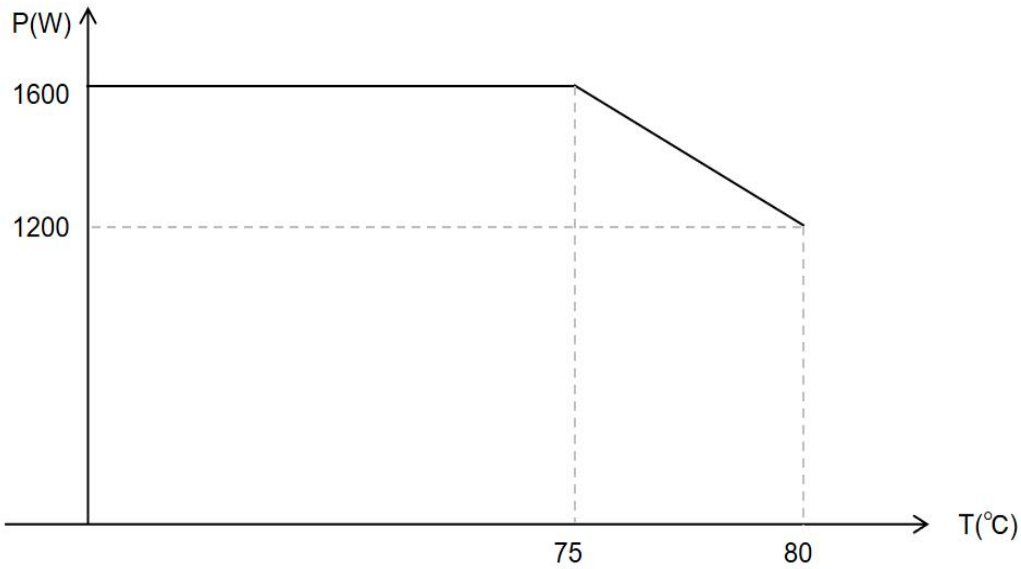


Figure 4-6 Power Derating Curve Graph

Chapter 5 APP User Manual

5.1 Download and Installation of the APP

5.1.1 Download Methods

The download methods of the APP, please refer to the following table.

Table 5-1-1 APP Download Methods

IOS	Search for "**SolarECO**" in the APP Store or scan the QR code to download.	APP Store	AMPI PWR
Android	Search for "**SolarECO**" on Google Play or scan the QR code to download.	Google Play	

5.1.2 Installation

After the download is completed, click "Install". Then open the APP. On the startup interface, two connection modes will be presented for your selection:

Wi-Fi Mode:

Suitable for usage in homes equipped with Wi-Fi. In this mode, it can be shared among multiple family members to jointly view the operating status of the device.

AP Mode:

When there is no Wi-Fi in the home, the Wi-Fi module within the device can serve as an AP hotspot for direct connection to the mobile phone. Users can connect to the device via this mode to view the operating status.
In this mode, only one mobile phone can be connected.

The system is set to Wi-Fi mode by default. If the AP mode needs to be selected, please clear the network configuration of the device and configure it to AP mode through the button.
Regarding how to clear the network configuration and switch the network configuration mode via the button, please refer to Section 2.3 - Indicator Signal and Section 2.4 - Button Control.

5.2 Wi-Fi Mode

5.2.1 Login / Register for an Account

1．Select the "Wi-Fi Mode" to access the login interface.
2．Register for a new account or log in to an existing account.
3．Choose the country or region.
4．Register for an account with an email address.

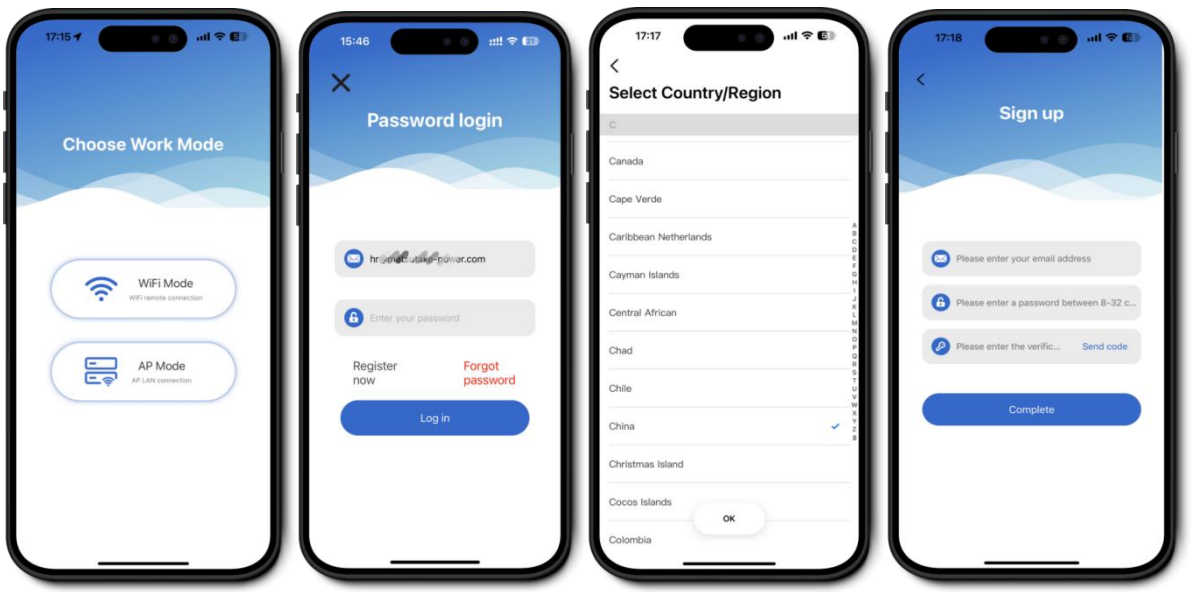


Figure 5-2-1 Login / Register for an Account

5.2.2 Adding the Device

Before starting to add the device, please ensure that it has been powered on normally. The operation steps for adding the device are as follows:

1．Firstly, confirm that the device is powered on and operating properly. Click on "Add Device".
2．The discovered devices will pop up on the page. Click the "+" to add the device.
3．Wait for the successful addition of the device.
4．If desired, you can rename the device.

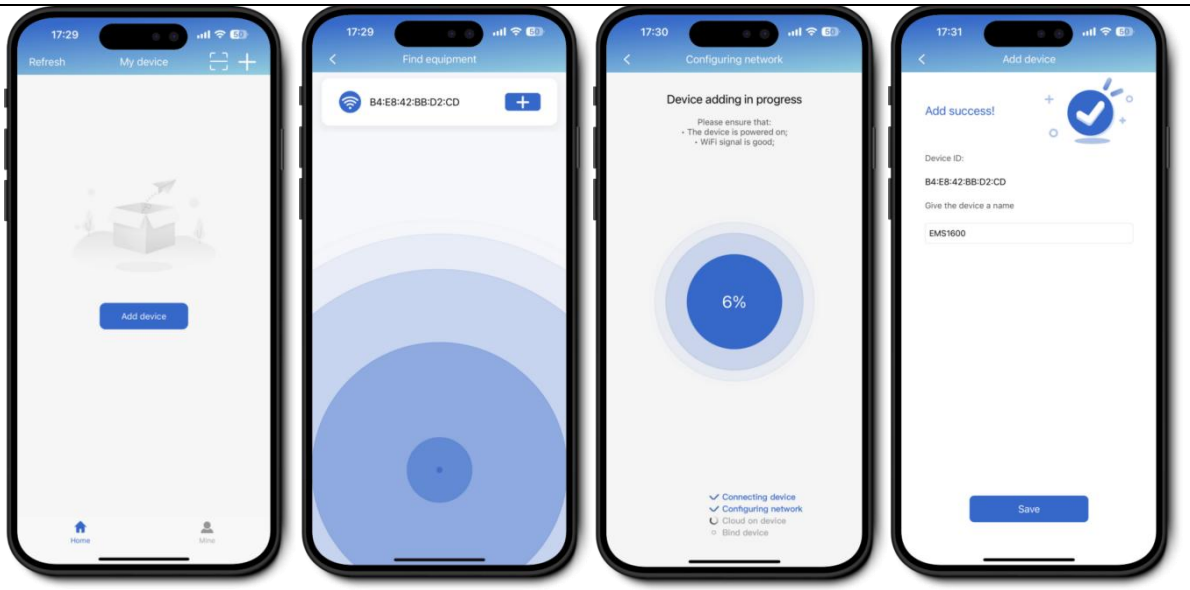


Figure 5-2-2 Adding the Device

Notice: If the device is not found, please verify whether the device is powered on. If the power supply is normal, you can reset the network information by pressing the button on the device five times. If the device is still not detectable, turn off the power and attempt again.

5.3 AP Mode

Before entering the AP mode, if the device has been networked, it is necessary to continuously short-press the button 5 times to clear the network configuration information.

Observe the status of the Wi-Fi indicator light:
If the Wi-Fi indicator light flashes slowly, it indicates that the device is currently in the Wi-Fi mode, and it is necessary to continuously short-press the button 3 more times to enter the AP mode;
If the Wi-Fi indicator light flashes twice quickly and periodically, it indicates that the device is currently already in the AP mode.

When the device is in the AP mode, the AP hotspot named SR-xxx opened by the device can be found through the mobile phone. The password is 12345678. After connecting to this Wi-Fi, return to the APP and click to select the AP mode to enter it.

5.4 APP Operation Interface

5.4.1 Device Status Checking

1．Click on the online device to enter the "Home Page" to view the operating status and energy flow direction of the device.

2．Click "Mode" to enter the device mode setting interface. In this interface, you can view the device operating condition, operating mode and power.

3．Click "Details" to view the detailed information of each component of the device.

4．Click "Energy" to view the energy statistics situation of the device.

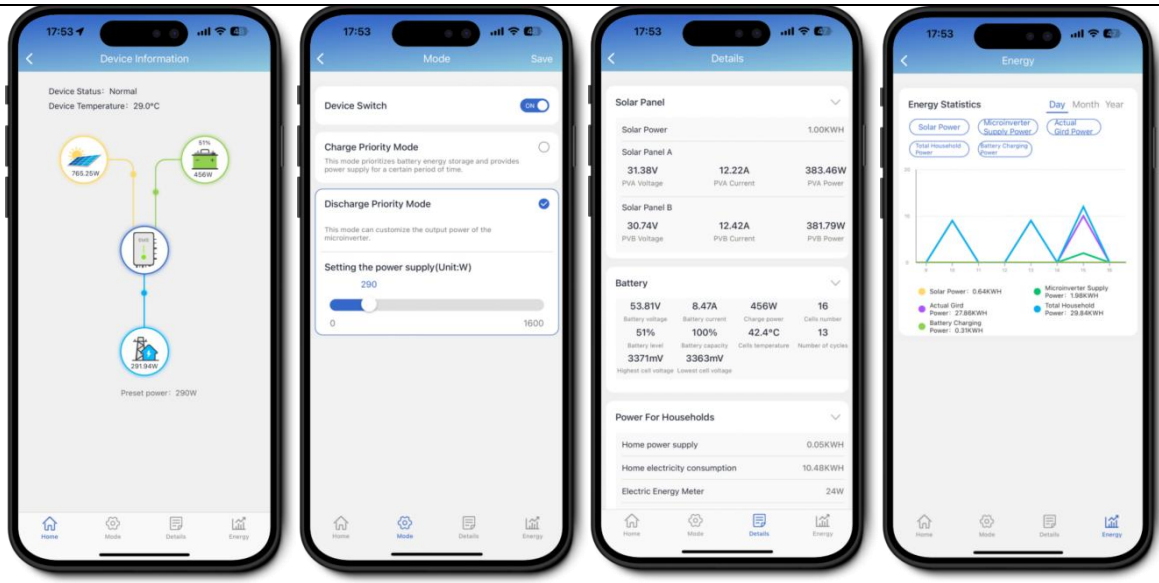


Figure 5-4-1 Device Status Checking

5.4.2 Charging Priority Mode Setting

1．Click the small circle on the right side of the charging priority mode to select the mode;
2．Set the start time and end time of the discharge.
3．Set the discharge power, click Save, and complete the settings.

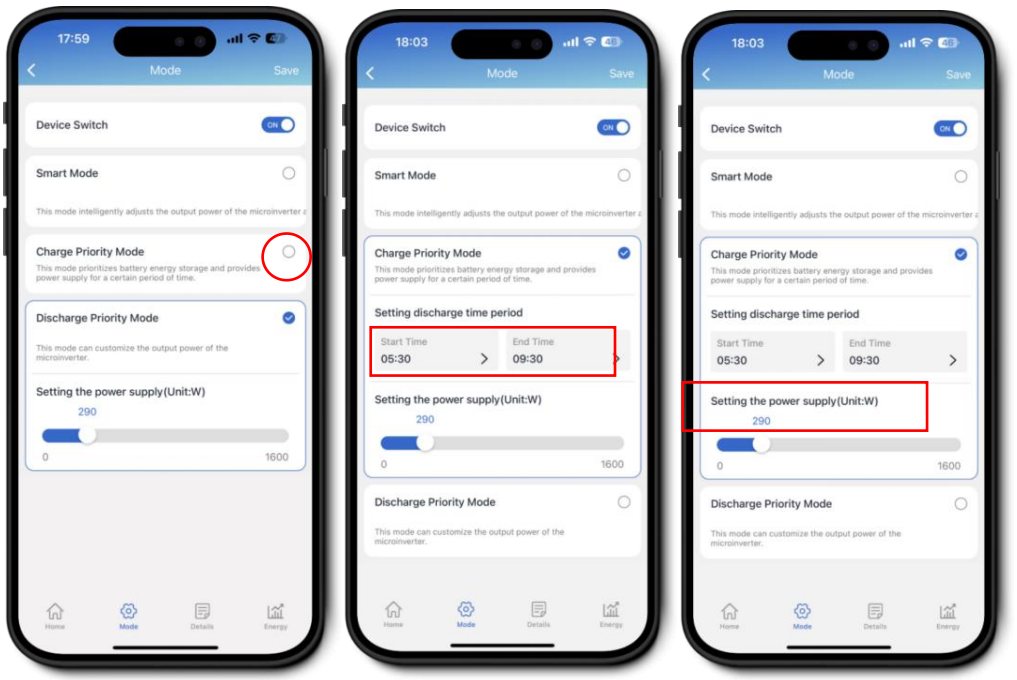


Figure 5-4-2 Charging Priority Mode Setting

5.4.3 Discharge Priority Mode Setting

1．Click the discharge priority mode Option to enter the discharge priority mode.

2．Set the discharge power and click "Save" to complete the Settings.

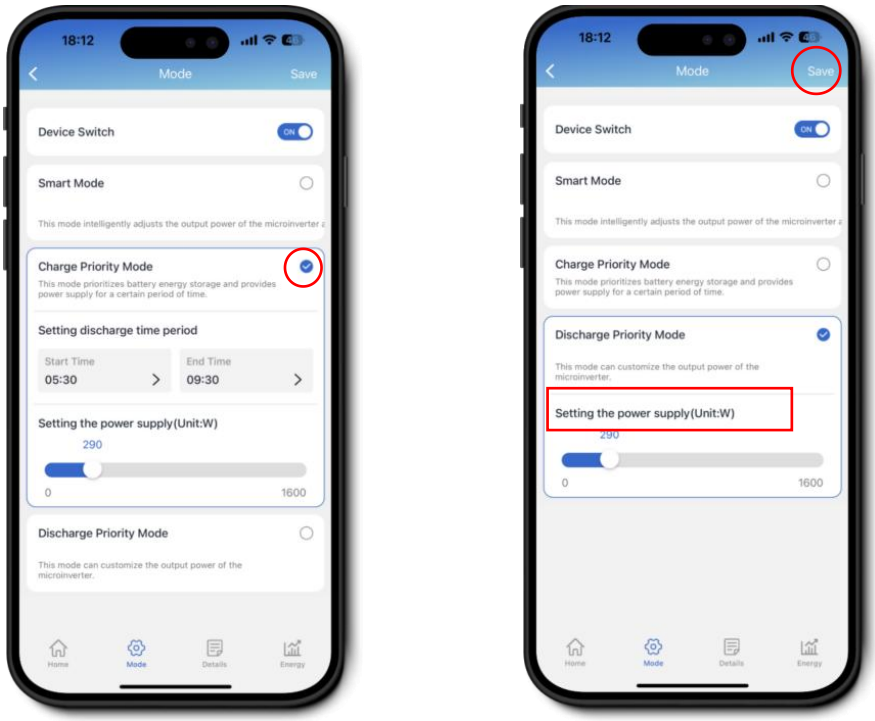


Figure 5-4-3 Discharge Priority Mode Setting

5.5 Device Deleting

1．Press and hold the added device.

2．Select “Delete Device”.

3．Click “OK”. The device will be successfully deleted.

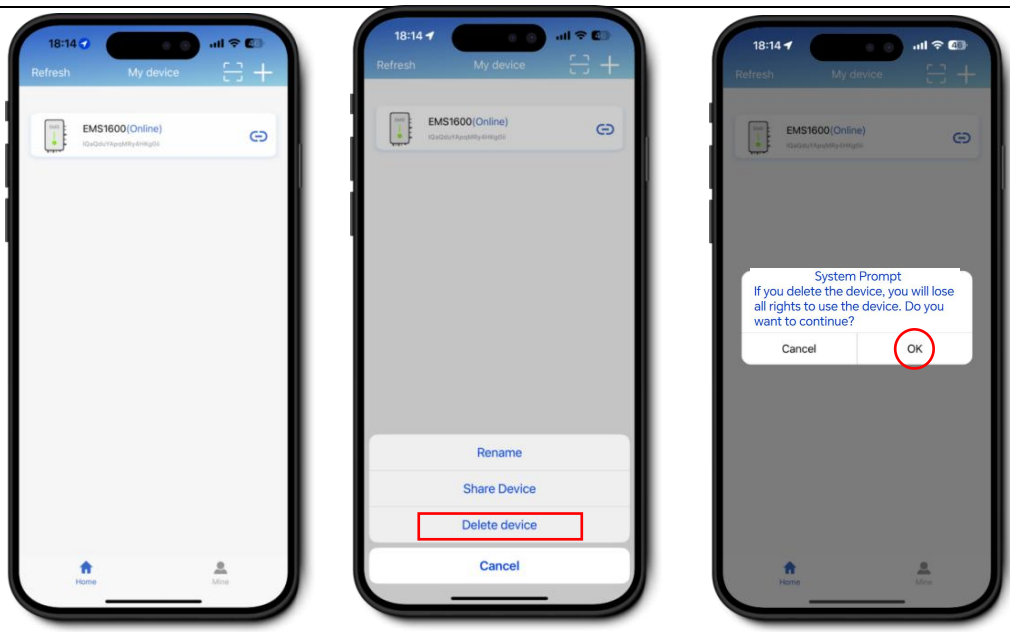


Figure 5-5 Device Deleting

Chapter 6 Fault Resolution and Prohibited Matters

6.1 Fault Resolution

Phenomenon	Probable Cause	Solutions
Red light alarm, the micro-inverter fails to output.	Battery short circuit protection; DCDC inductor overcurrent protection; Output overcurrent protection.	Press the physical button or use the APP to turn off and restart the device. If the issue persists, please contact the after-sales technicians.
Unable to power on.	Unable to start after PV connection.	Check whether the wiring harness is properly connected.
After the PV is connected, it cannot be charged and discharged, and the battery indicator light does not light up.	Poor contact of the power line, abnormal communication of the battery pack.	Check whether the wiring harness is properly connected.
After the PV is connected, it cannot be charged and discharged immediately, and the battery indicator light is on.	After device is activated, it will be in the self-checking state for 150 seconds continuously to check the connection status of the PV panel and the micro-inverter.	If the system connection is correct, wait for 150 seconds.
The device is not found.	Abnormal query of Wi-Fi device.	Check the mobile phone network and the device to determine if it has been bound by other devices.

6.2 Prohibited Matters

No.	Prohibited Matters
1	The input voltage at the PV terminal is strictly forbidden to exceed 60V.
2	The voltage input at the micro-inverter terminal is strictly forbidden to exceed 60V.
3	The four sockets at the PV terminal and the four sockets at the micro-inverter terminal must not be connected without adhering to the correct connection method.
4	Cross-connections between the PV port and the micro-inverter port are strictly prohibited.
5	Connecting a battery with a voltage exceeding 60V to the device is strictly prohibited.
6	Using the device in a sealed environment with a temperature exceeding 65°C is strictly prohibited.
7	Disassembling the outer shell for operation is strictly prohibited.
8	Short-circuit wiring between the various ports on the device is prohibited.
9	Touching the shell with exposed high-voltage wires is strictly prohibited.

Warning: The above operations will damage the device and may even cause safety accidents.