Single Phase Hybrid Inverter

CPS ECH7.6/9.6/12KTL-US

Installation and Operation Manual - Rev 1.5

CHINT POWER SYSTEMS AMERICA CO.

Revision 1.5 – March 2025

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Acronym Key			
Acronym	**Meaning**	**Acronym**	**Meaning**
AHJ	Authority having jurisdiction	OCPD	Overcurrent protection device
DSP	Digital signal processor	P&O	Perturb and observe
EGC	Equipment grounding conductor	PCB	Printed circuit board
FIT	Feed-in tariff	PF	Power factor
GFCI	Ground-fault circuit interrupter	PLC	Powerline communication
HVRT	High voltage ride through	POI	Point of interconnection
IEEE	Institute of Electrical and Electronics Engineers	PV	Photovoltaic
LVRT	Low voltage ride through	PVRSS	PV rapid shutdown system
MLPE	Module-level power electronics	RSD	Rapid shutdown
MPPT	Maximum power point tracker	SCADA	Supervisory control and data acquisition
NEC	National Electric Code	SPD	Surge protective device
NFPA	National Fire Protection Association		

0 Before You Start…

Scope

This Installation Manual contains important information, safety guidelines, detailed planning, and setup information for installation, as well as information about configuring, operating, and troubleshooting for the CPS Single-Phase Hybrid Inverter (hereafter referred to as the "inverter") developed by Chint Power Systems America Co., Ltd. (hereafter referred to as "CPS").

Audience

The information in Sections 2 Overview, 6 App Local Control, 8 MatriCloud Platform, 10 Troubleshooting, 11 Technical Data, 12 Limited Warranty, and 13 Recycling is intended for the owner and operator of the inverter and does not require any special training or qualifications. The information in Sections 3 Mechanical Installation, 4 Electrical Connection, 5 Commissioning, 7 App Remote Control, and 9 Operation and Maintenance is intended for qualified personnel only. Qualified personnel have training, knowledge, and experience in:

- Installing electrical equipment and PV power systems.

- Appling all local installation codes.

- Analyzing and eliminating the hazards involved in performing electrical work.

- Selecting and using personal protective equipment (PPE).

Installation, commissioning, troubleshooting, and maintenance of the inverter must be done *only* by qualified personnel.

Thank you for choosing a CPS single-phase hybrid inverter. These inverters are high performance and highly reliable products specifically designed for the North American solar market.

The instructions in this user manual will help you solve most installation and operation difficulties. Installation, commissioning, troubleshooting, and maintenance of this inverter must be performed by qualified personnel. If you encounter any problems during installation or operation of this unit, first check the user manual before contacting CPS Customer Service.

Please keep this user manual on hand for quick reference.

The manual will be periodically updated or revised due to product development or improvement. The latest version of this manual can be acquired via our website: www.chintpowersystems.com.

1 Important Safety Instructions

(SAVE THESE INSTRUCTIONS)

Please read this user manual carefully before installing the inverter. CPS reserves the right to refuse warranty claims for equipment damage if the user fails to install the product according to the instructions in this manual.

Failure to follow these instructions and other relevant safety procedures may result in the voiding of the product warranty and/or damage to the inverter or other property.

Warnings and symbols in this document include:

⚠️	**DANGER:** DANGER indicates a hazardous situation which, if not avoided, will result in death or injury.
⚠️	**WARNING:** WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.
⚠️	**CAUTION:** CAUTION indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
⚠️	**NOTICE:** NOTICE indicates a hazardous situation which, if not avoided, could result in the inverter working abnormally or property loss.
ⓘ	**INSTRUCTION:** INSTRUCTION indicates important supplementary information or provides skills or tips that can be used to help you solve a problem or save you time.

Warnings and markings on the product include:

Symbol	Meaning
	HIGH VOLTAGE! There is high voltage inside the machine; the instructions in this manual *must* be followed for the operation of this product.
	HIGH ENERGY! Risk of electric shock from energy stored in capacitor. Do NOT remove cover until five (5) minutes *after* disconnecting all sources of power supply.
	HOT SURFACES! To reduce the risk of burns, do NOT touch.
	INFORMATION: For more details please see the user manual.
	WARNING: For continued protection against risk of fire, replace ONLY with the same type and ratings of fuse. Refer to instruction manual for details.
	EARTH GROUND: This symbol marks the location of a grounding lug, which must be securely connected to the earth through the PE (protective earthing) cable to ensure operational safety.
	RoHS Symbol: In accordance with 2011/65/EU regulations, the inverter imposes restrictions on the use of specific hazardous substances in electrical and electronic equipment.
	Certification Marking This product complies with the provisions of the CE Directive.
	CSA The safety and quality of the inverter have been certified by the CSA.

1.1　Safety Precautions of Operating the Inverter

WARNING:

All operations and connections must be performed by professional engineering and technical personnel!

WARNING:

To prevent the risk of electric shock during equipment maintenance or installation, ensure that all DC and AC power has been separated from the equipment, and ensure that the equipment is reliably grounded.

DANGER:

- Before opening the inverter enclosure for maintenance, you MUST first disconnect the grid-side AC power supply and PV-side DC power supply and ensure that the high-voltage energy inside the equipment has been completely released.

- All connections to the inverter MUST be cut off for at least five (5) minutes before maintaining and operating the equipment.

NOTICE:

The inverter is specially designed to integrate the generated AC power into the public grid. Do NOT directly connect the AC output terminal of the device to private AC power equipment. The inverter does not support battery panel grounding. If grounding is necessary, a transformer must be added to the AC side.

NOTICE:

After unpacking the inverter, keep all its interfaces sealed before and after connecting wires.

CAUTION:

Check the wall bracket before hanging the machine to ensure that the wall bracket is firmly fixed onto the supporting surface.

CAUTION:

For continued protection against the risk of fire, replace ONLY with the same type and ratings of fuse. Disconnect supply before charging the fuse.

INSTRUCTION:

Before choosing a power grid code, contact your local power supply company. If the inverter is set to work under the wrong grid regulations, the power supply company can cancel the operation permit of the equipment.

INSTRUCTION:

Ensure that the entire system complies with national and local standards and applicable safety regulations before running the inverter.

2 Overview

2.1 Model Number

ECH12K-T-L-US
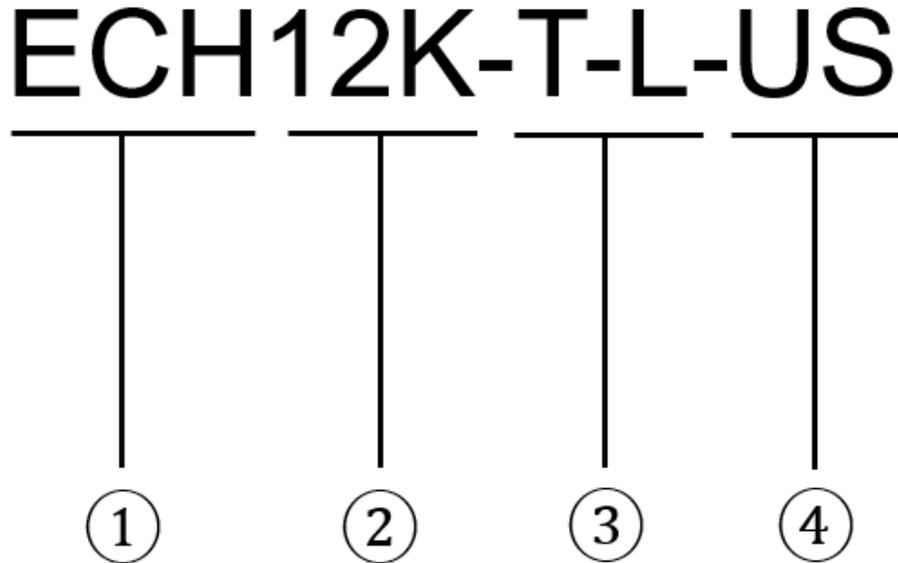
Figure 2-1 Product Model Number

No.	Letter Combination	Meaning
①	ECH	Hybrid, energy storage capable inverter
②	12K	Rated power 12 kW
③	TL	Transformerless
④	US	United States

2.2   Dimensions and Appearance
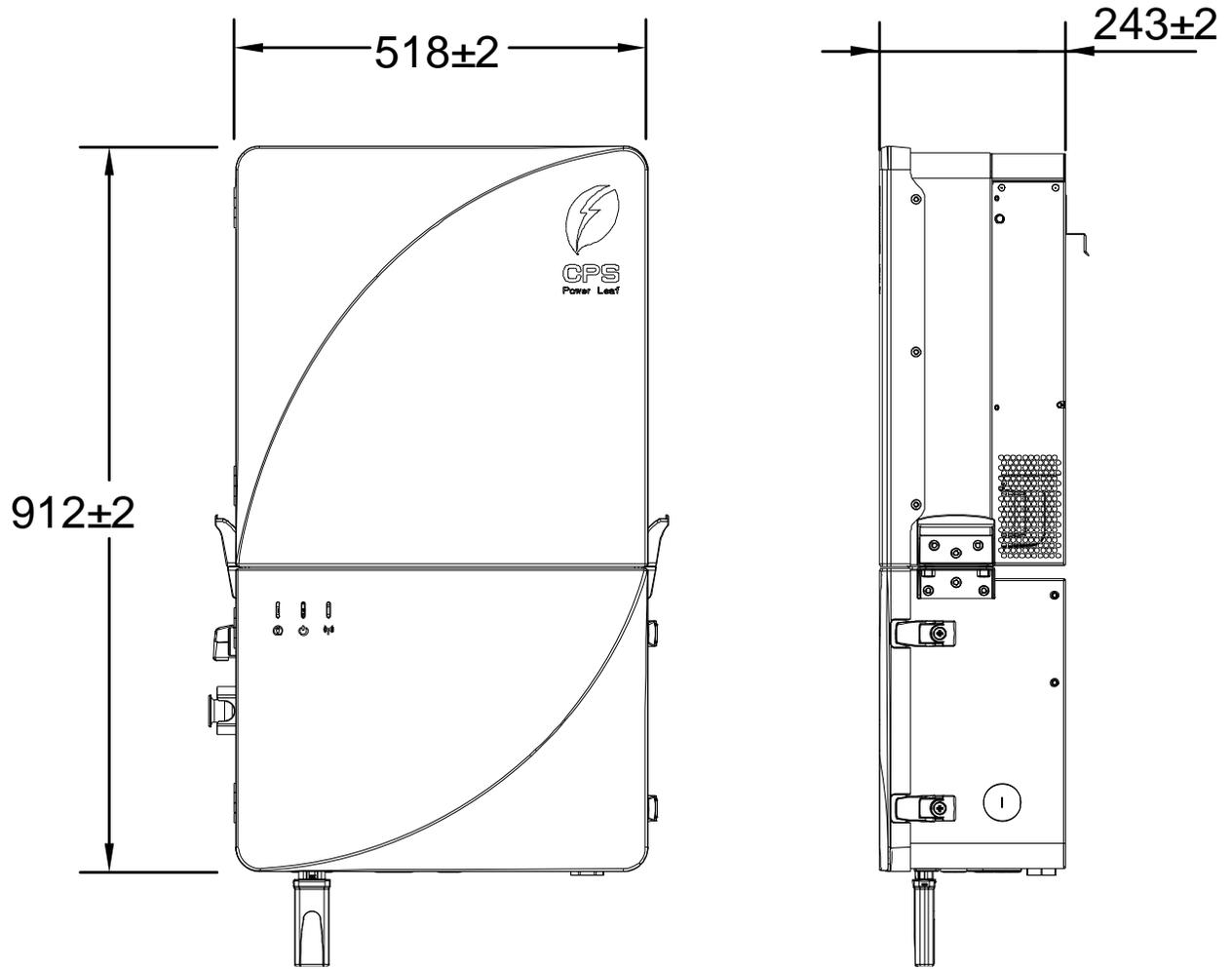
Figure 2-2 Inverter Dimensions
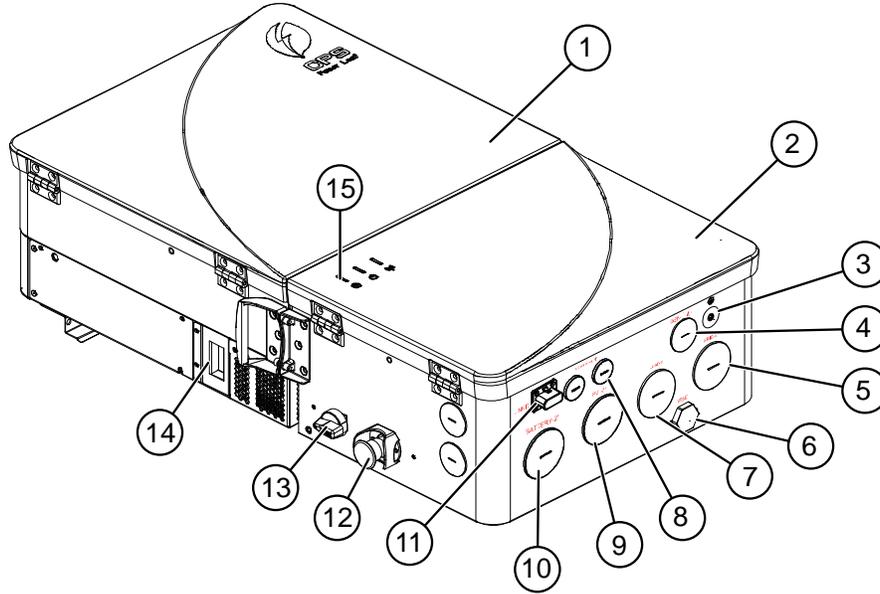
Figure 2-3 Product Appearance

Table 2-1 Product Components

No.	Name	Function
1	Main inverter module	-
2	Wire box	-
3	External protection earthing	Grounding connection
4	GEN knockout	GEN wiring
5	Grid knockout	Grid AC wiring
6	Vent valve	Vent air
7	Backup load knockout	Backup load wiring
8	COM port	Communication wiring (for BMS / EMS communication, if applicable)
9	PV knockout	PV wiring
10	Battery knockout	Battery wiring
11	Wi-Fi communication port	Wi-Fi communication
12	RSD button	RSD emergency shutdown
13	PV switch	Cuts off PV power supply safely
14	Fan	Cooling
15	LED indicator	Indicates the running status
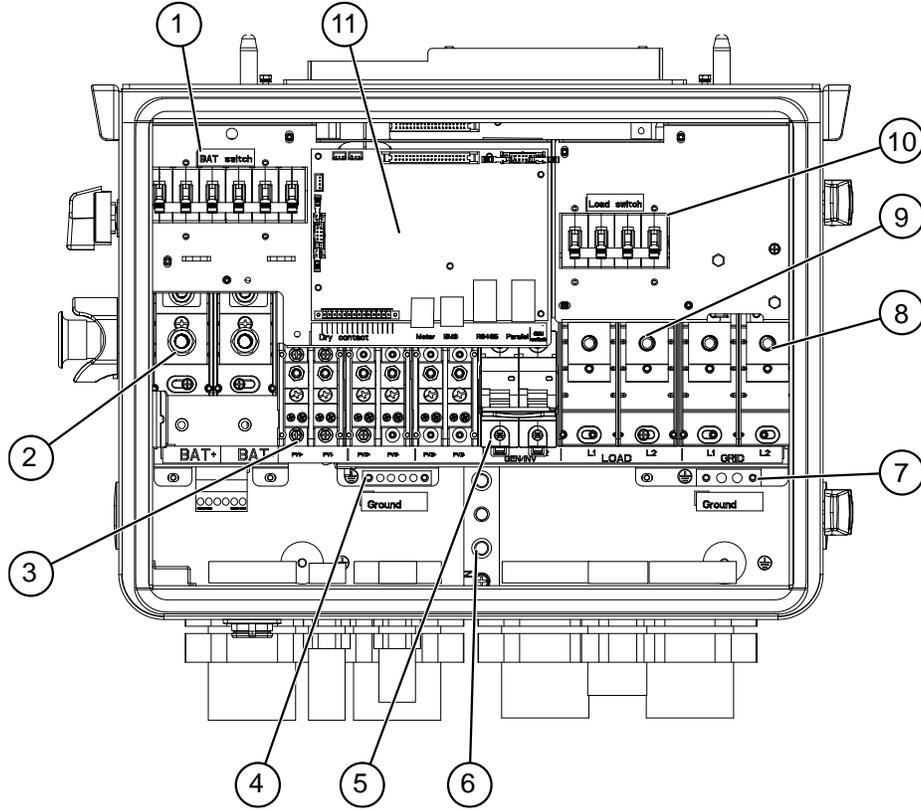
Figure 2-4 Wire Box

Table 2-2 Wire Box Components

No.	Name	Function
1	Battery circuit breaker	Disconnects battery circuit
2	Battery terminal	Connects to battery
3	PV terminal	Connects to PV panels
4	Grounding copper bar 1	Grounding point of PV
5	Generator circuit breaker	Disconnects generator circuit
6	Neutral copper bar	Connects neutral cables
7	Grounding copper bar 2	Grounding point of backup load and grid cable
8	Grid terminal	Connects to grid cables
9	Load terminal	Connects to backup load cables
10	Load circuit breaker	Disconnects backup load circuit
11	Communication board	Connects communication cables (For further details, see Section 4 Electrical Connection.)

2.3 LED Indicator

The LED display on the ECH7.6-12KTL-US inverter is shown in the image below:
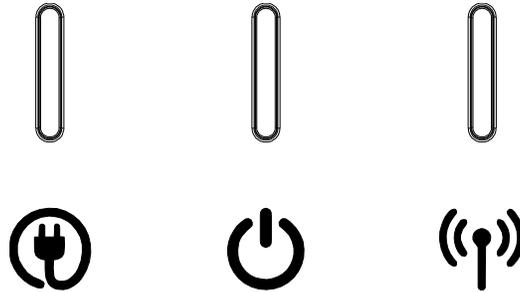
LED indicators and their indications are shown in the table below:

Table 2-3 LED Indicators

LED	Name	Indication	Status
(plug icon)	Backup / grid indicator	On (green)	Grid connection is normal and in on-grid mode.
		Flashing (green)	Grid connection is normal and in off-grid mode.
		Off	Grid connection is abnormal.
(power icon)	System indicator	On (green)	Running
		Flashing (green)	Pre-inspection
		On (yellow)	Standby
		Off	Not running
		On (red)	System failure
(signal icon)	COM indicator	On (green)	Communication is normal.
		On (red)	BMS communication is abnormal.
		Flashing (red)	Wi-Fi module communication is abnormal.
		Off	All communications are abnormal.

2.4   System Schematic Diagram
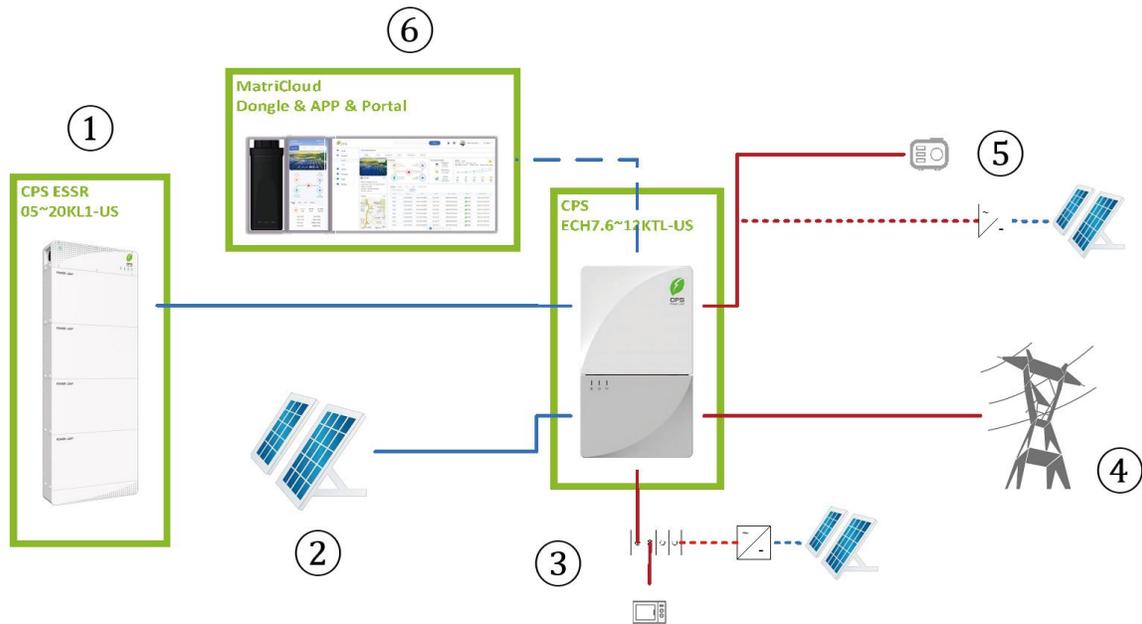
Figure 2-5 ECH Residential Hybrid System

No.	Name
1	Low voltage battery
2	PV array
3	Backup loads
4	Grid
5	Generator (optional)
6	Monitoring

NOTICE:

- If connecting a generator to the inverter, the maximum allowable generator power is 24 kW.

- The solar inverter is connected either to the load panel or the generator circuit breaker.

- The maximum power of an AC coupled PV inverter is 12 kW.

- The generator and AC coupled inverter cannot be connected to the system at the same time.

- In off-grid scenarios, the generator must be connected. The wiring diagram refers to the off-grid applications Single Unit – 120/240 V – Off-grid – Hybrid and 3 Parallel – 120/240 V – Off-Grid – Hybrid.

2.5   System Working Modes

The system has five (5) working modes and a time of use (TOU) function.

- **Pure PV mode:**

  o   The hybrid inverter functions like a normal PV inverter without battery.

  o   Suitable for systems without batteries and extending battery life in the winter.

- **Self-powered mode:**

  o   When the PV power is high enough, it will first power the loads, then charge the battery. Excess PV power will be exported to the grid if the anti-backflow function is disabled.

  o   If the battery SOC is lower than the backup SOC and there is no more PV power, the battery can be charged by the grid if enabled.

  o   When PV power is sufficient, the battery and the grid (if allowed) will power the load together.

  o   Generators will function during a grid outage.

- **Fully fed mode:**

  o   The PV powers the loads and exports to the grid as much as possible. Excess PV power charges the battery.

  When PV power is less than the hybrid inverter AC output power (loads + grid), the battery will discharge to increase the AC output power to maximum.

  o   Suitable for very high electricity rates such as feed-in tariffs (FIT).

- **Emergency charging mode:**

  o   When the grid is available, the inverter will force charge the battery with PV and grid until it reaches 100% SOC.

  o   The load is powered by PV first; the grid will power the load if PV power is insufficient.

  o   The battery can be charged by the grid if enabled.

  o   The battery can only discharge to power the loads if there is a grid outage.

- **Forced off-grid mode:**

  o   Off-grid mode can be entered, even if the grid is functioning properly, to test off-grid function and estimated backup time.

  o   In off-grid mode, there is no more energy flow between the system and the grid.

  o   When the off-grid load capacity of the system is low—such as low battery SOC or low PV power—the PCS will automatically switch to the on-grid mode that was running previously.

- **Time of use (TOU) function:**

  o In addition to the above five basic running modes, you can also make use of the TOU function to select different running mores for each day and hour of the year.

  o By customizing these basic running modes, the inverter can meet the diversified demands of various applications and the economic benefits of time use can be improved.

  For example:

Season Name	Season Dates	Weekday Name	Weekday Setting	Time Slot	Basic Modes
Summer	June 1 to August 31	Workday	Monday-Friday	5:01-18:00	Fully fed
		Weekend	Saturday-Sunday	18:01-5:00	Self-powered
Other	September 1 to May 31	Weekday	Monday-Sunday	0:00-24:00	Self-powered
Annual leave	July 5 to July 7	-	-	10:01-12:00	Fully fed
				12:01-10:00	Self-powered

For further information, see Figure 6-8 in Section 6.1 App Quick Connection and Configuration.

2.6 Optional Generator

When the system is running in off-grid scenarios or the battery SOC is less than the set value, if an optional generator is connected, it will start and supply power to the backup loads. After startup, there are two control strategies integrated into the generator system: quiet mode and economy mode. The battery running status and shutdown conditions of the two strategies are different, as described below.

2.6.1 Quiet Mode

In this mode, the battery gets energy from a diesel generator. After charging the battery as quickly as possible, the generator will shut down and enter the off-grid phase.

- **Battery and PV**: The diesel generator and PV supply power to the backup loads and charge the battery at the same time. You can set the charging end SOC.

- **Diesel generator shutting down**: When the grid recovers or the battery is charged to the set end SOC, the generator will shut down.

2.6.2 Economy Mode

In this mode, the battery will not take energy from the generator to avoid energy loss during charging and discharging.

- **Battery and PV**: As the diesel generator and PV supply power to the backup loads, the excess power will charge the battery to avoid damaging the generator.

- **Diesel generator shutting down**: When the grid recovers or the battery is full, the generator will shut down.

For further information, see Section 6.3.20 GEN Parameters.

2.7 Electrical Schematic Diagram and Single Line Diagram

The electrical schematic diagram of the inverter is as shown in Figure 2-6:
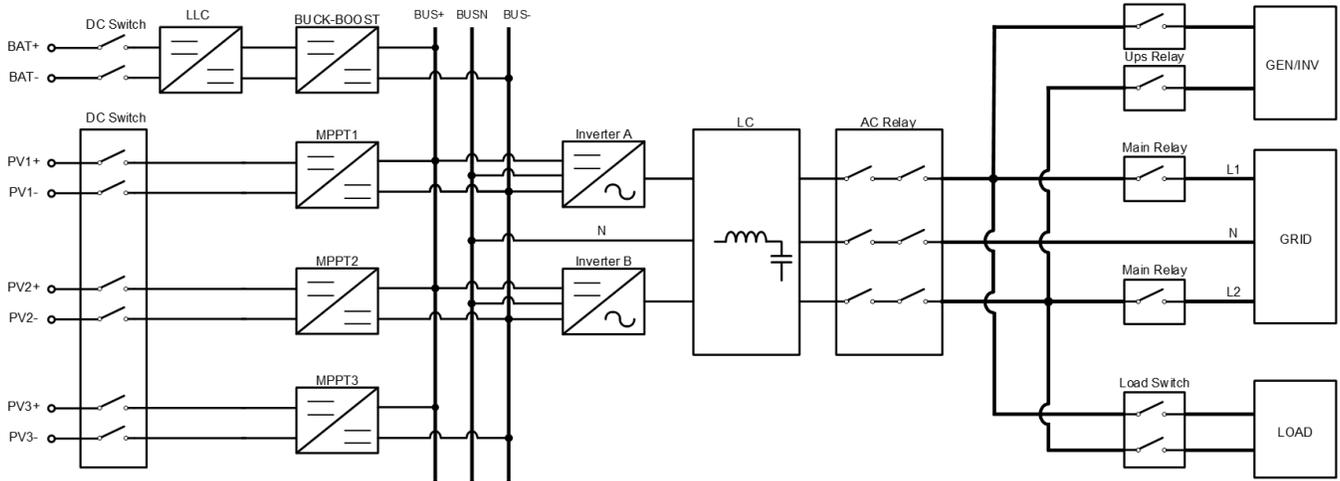
Figure 2-6 Electrical Schematic Diagram

The single line diagram is as shown in Figure 2-7:
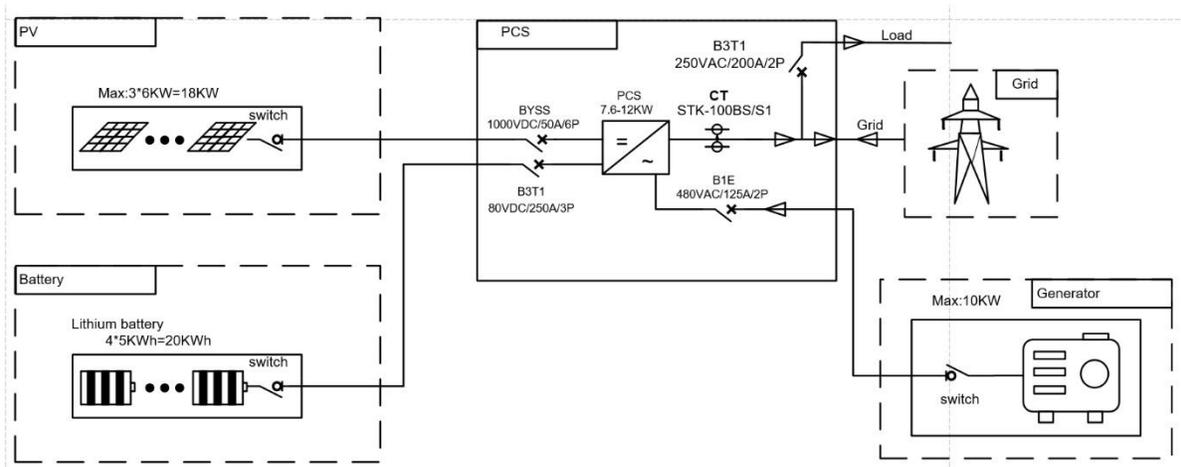
Figure 2-7 Single Line Diagram

2.8   Rapid Shutdown

2.8.1   Single Hybrid Inverter

The ECH7.6/9.6/12kW inverters are PVRSS certified to perform module-level rapid shutdown when used with APS RSD-S-PLC/RSD-D products. For a single hybrid inverter, rapid shutdown can be initiated by pressing the RSD button on the left side of the inverter. When the RSD button is pressed, the inverter will disconnect the power supply to the internal RSD transmitter, turn off the power input on the battery side, and shut down the inverter.

With one inverter, pins 13 and 14 need to be connected:
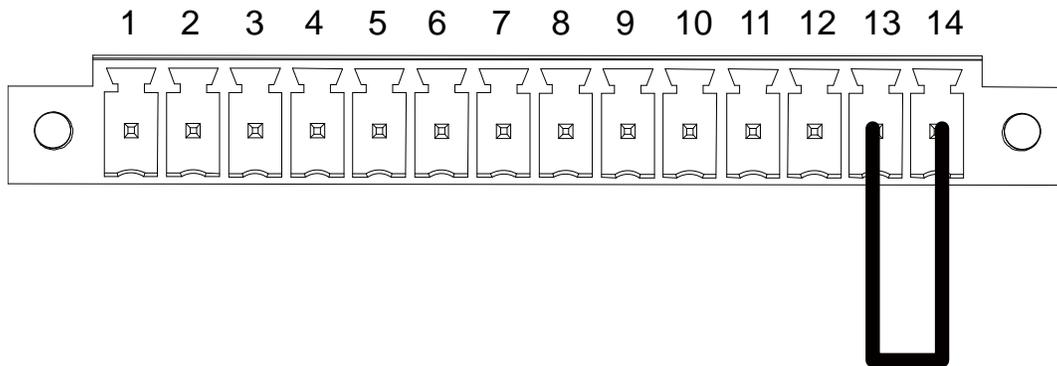
Figure 2-8 14-pin Terminal

The RSD transmitter is integrated in the inverter wire box, and the installation of the receiver on the PV panel is shown in the following schematic diagram below (Figure 2-8). **Please refer to the APS RSD-S-PLC/RSD-D product user manual for installation and operation requirements.**
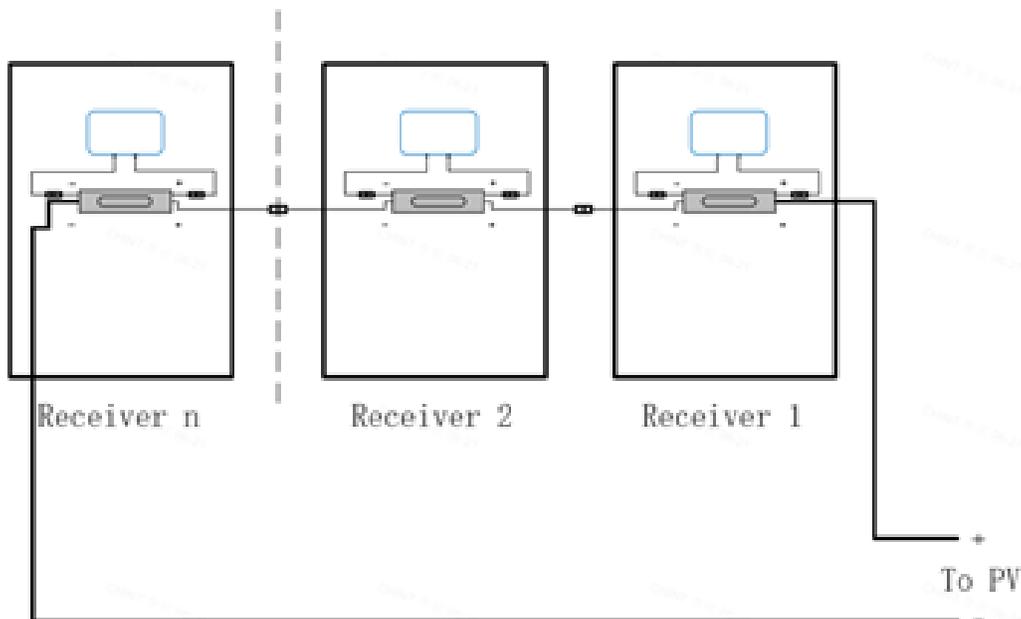
Figure 2-9 Module-Level RSD Device Connection

2.8.2   Multiple Hybrid Inverters in Parallel

For multiple hybrid inverters in parallel, the connecting wires between pins 13 and 14 of ALL the hybrid inverters can be removed and connected to an external RSD initiation device. The external RSD initiation device is then able to initiate the rapid shutdown of all the hybrid inverters simultaneously.

Note that the external RSD initiation device must be a normally closed contact. Pin 13 of all the hybrid inverters must be combined and connected to one end of the external RSD initiation device; pin 14 of all the hybrid inverters must be combined and connected to the other end of the external RSD initiation device. The recommended wire size is 16 AWG.
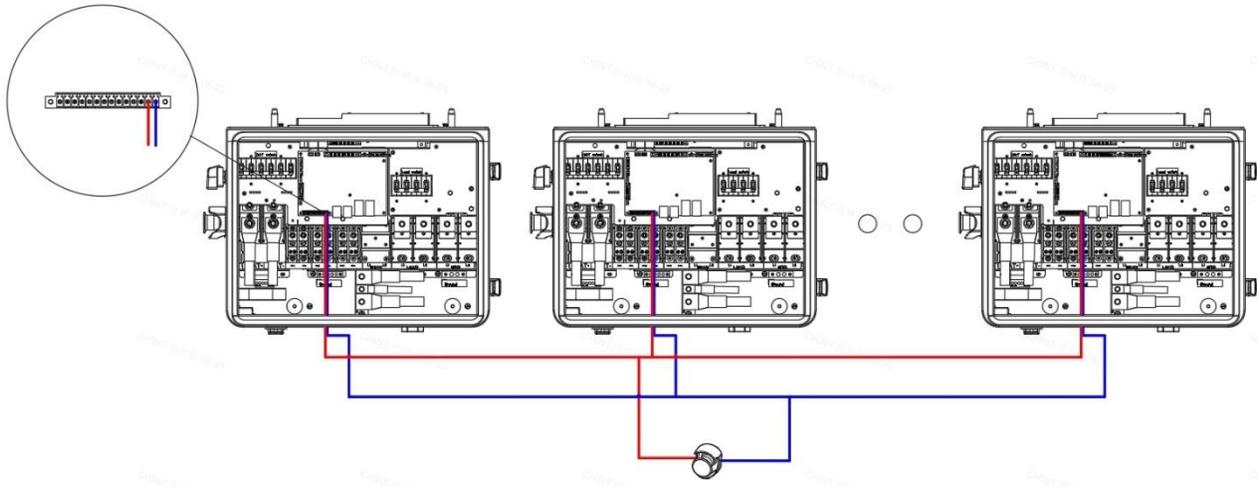
Figure 2-10 RSD Connection

The external RSD initiation device can shut down all hybrid inverters simultaneously if pins 13 and 14 of the inverters are connected.

⚠ **NOTICE:**

Do NOT connect pin 13 of one inverter to pin 14 of another inverter to avoid interference.

2.9 PCS Operating Mode

This system is equipped with a power control system (PCS). All PCS-controlled busbars or conductors must be protected with suitably rated overcurrent devices that are appropriately sized for the busbar rating or conductor ampacity.

There are multiple PCS operating modes:

- **Export Only mode**: The ESS can export active power to the area EPS during discharging but will not import active power from the area EPS for ESS charging purposes.

- **Import Only mode**: The ESS can import active power from the area EPS for charging purposes but will not export active power from the ESS to the area EPS.

⚠	**NOTICE:**
	The PCS operating mode can only be configured by CPS contacting your local dealer or supplier to change the PCS operating mode.

⚠	**NOTICE:**
	For Import Only mode, the longest measured open loop response time is 1.325 seconds and the longest steady state time is 1.585 seconds. For Export Only mode, the longest measured open loop response time is 1.9 seconds and the longest steady state time is 4.98 seconds.

⚠	**WARNING:**
	The PCS must be programmed such that the system does not exceed the limitations of the overcurrent devices in the panelboard and connected circuit. The PCS must be coordinated within the limits defined by NEC 210.20, 705.12 or NFPA 70 2020 Ed., Section 705.13.

3 Mechanical Installation

3.1 Unpacking

Before installation, check the product for any visible damage and verify that all items on the delivery list (see Tables 3-1 and 3-2) are present. Contact CPS customer service if there are any issues.

A	B	C	D
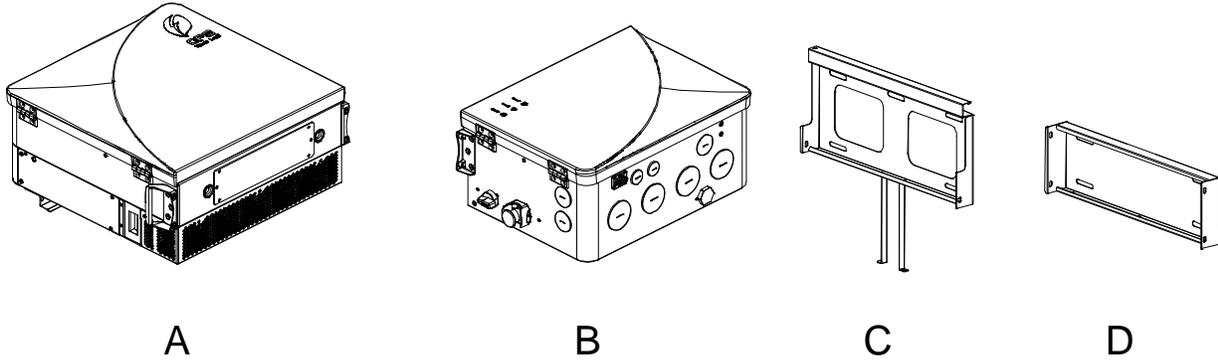
Figure 3-1 Main Components

No.	Item	Qty.	Purpose
A	Main inverter module	1	-
B	Wire box	1	-
C	Upper mounting bracket	1	Hangs the inverter.
D	Lower mounting bracket	1	Hangs the wire box.

E   F   G   H   I   J

K   L   M   N   O   P   Q   R   S   T
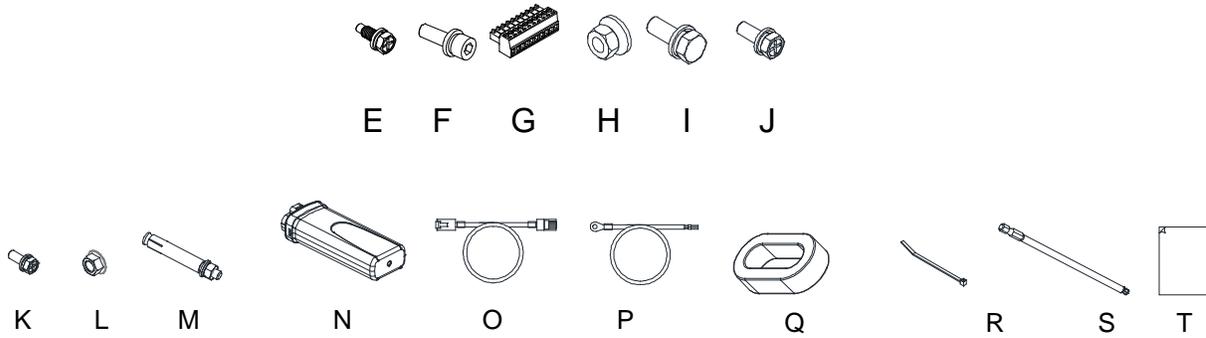
Table 3-1 Accessories in Accessory Bag

No.	Accessory name	Qty.	Purpose
E	M6x18 cross hexagon head combined screw	7	One (1) for grounding terminal, six (6) for attaching the inverter and wire box onto the mounting bracket.
F	M6x20 hexagon socket head combined screw	4	Attaches the inverter and wire box.
G	Power connector for the line end	1	Connects the external communication line.
H	M10 cap nut	6	AC terminal and battery terminal.
I	M10x25 screw	2	Neutral busbar.
J	M8x25 screw	1	Neutral busbar.
K	M4x10 cross hexagon head combined screw	2	Attaches the upper and lower mounting brackets.
L	M6 nut with flange	1	External grounding.
M	M8 expansion nut	9	Attaches the mounting bracket.
N	Wi-Fi module	1	Wi-Fi communication.
O	RJ45 cable (length: 78.74 in / 2000 mm)	1	Parallel network cable.
P	Battery temperature sampling cable	-	N/A
Q	EMC magnetic ring	1	Attaches the battery cables.
R	Ball head hexagonal screwdriver head (length: 5.9 in / 150 mm)	1	Tool for attaching the inverter and wire box.
S	Cable tie	1	Ties the EMC magnetic ring and battery cables.
T	Documents	2	Quick guide and warranty card.

3.2 Installation Tools

Use	Tools and Instruments Required for Installation		
Installation	Impact drill (Φ10 mm drill bit)	Torque socket wrench	Multimeter
	Marker / pen	Measuring tape	Level ruler
	Torque screwdriver	Diagonal pliers	Rubber hammer
	Wire crimpers (Type: PV-CZM-22100/19100)	Wire stripper	Hot air gun
	Heat shrinkable tubing		
Personal protection	Safety gloves	Protective glasses	Safety shoes
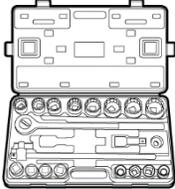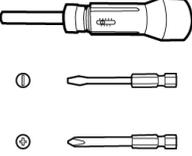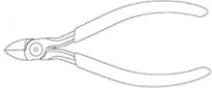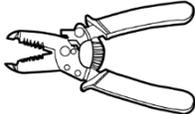
3.3   Installation Precautions

- Check that the product's environmental specifications (i.e., protection degree, operating temperature range, humidity and altitude, etc.) meet the requirements of the project location.

- Ensure that the power grid voltage is within the normal range of the selected grid standard.

- Ensure that you have been authorized by the local electricity supply authority to connect to the grid.

- Installation personnel MUST be qualified electricians or those who have received professional training.

- Wear and use proper PPE during installation.

- Sufficient space must be provided to allow the inverter cooling system to operate normally.

- Install the inverter away from flammable and explosive substances.

- To prevent unwanted power loss, ensure that the installation conditions do not exceed the temperature limits specified for the inverter.

- Do NOT install the inverter near an electromagnetic source, as this can compromise the normal operation of the electronic equipment.

- Check that the PV array is not grounded.

- Ensure the conduit entries meet the following requirements:

  o   ALL conduit entries must use watertight fittings.

  o   ALL conduit entries must use sealant around wires inside the wire box to avoid moisture ingress.

  o   Metallic conduit is recommended to prevent propagation.

3.4   Installation Requirements

3.4.1   Environment

The installation site of the inverter must meet the following environmental requirements:
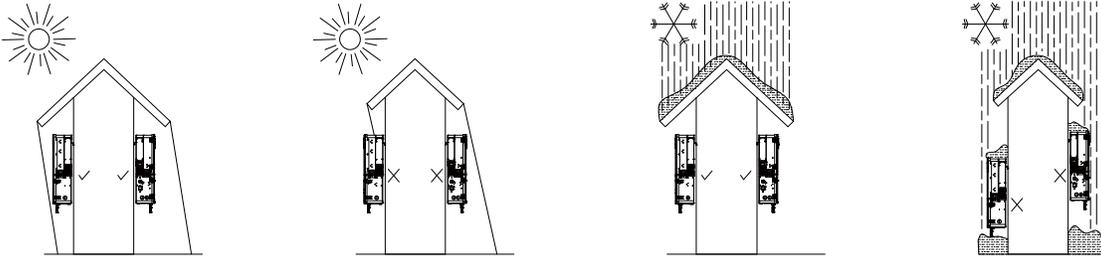
Figure 3-2 Environmental Requirements

If the installation environment allows, avoiding direct sunlight, rain, and snow can reduce power derating and extend the life of the inverter. It is recommended that the inverter is installed under a roof or sunshade. (**Note**: Installing the inverter outdoors with direct sunlight, rain, and snow does not impact the warranty.) Ensure that the inverter is installed away from flammable and explosive substances.

3.4.2   Installation Methods

The inverter must be installed according to the following requirements:

| Vertical | Tilted backward | Leaning forward | Horizontally | Upside down |
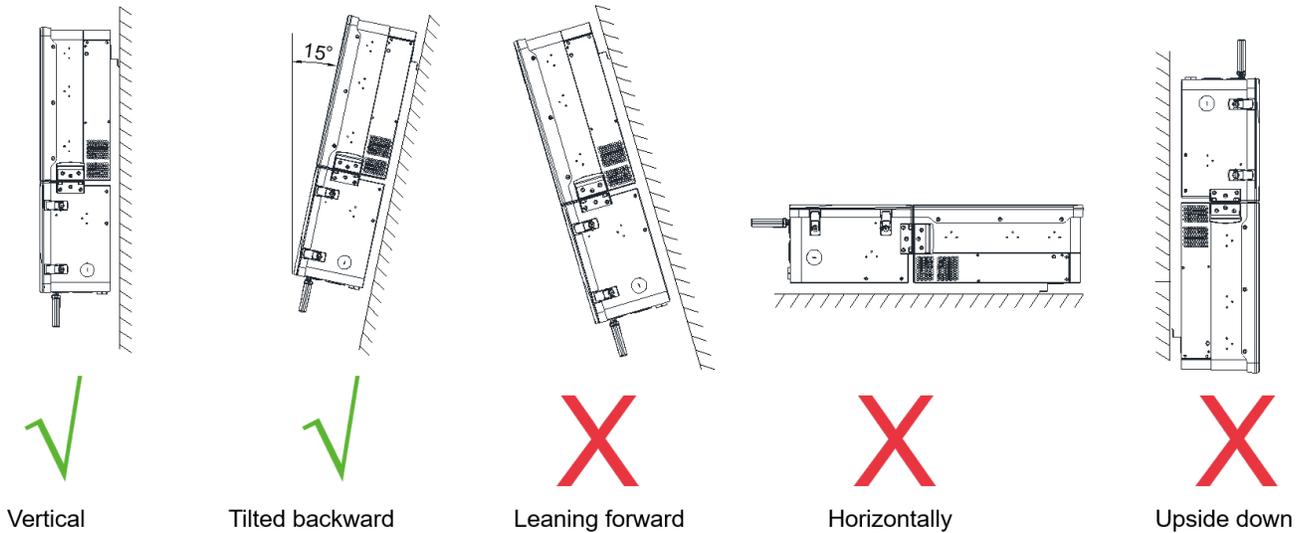
Figure 3-3 Installation Requirements

⚠ **NOTICE:**

Ensure that the mounting structure (bearing wall, rack, etc.) is capable of bearing the weight of the inverter.

3.4.3 Space Requirements

The distance between the inverter and the surrounding objects must meet the following conditions
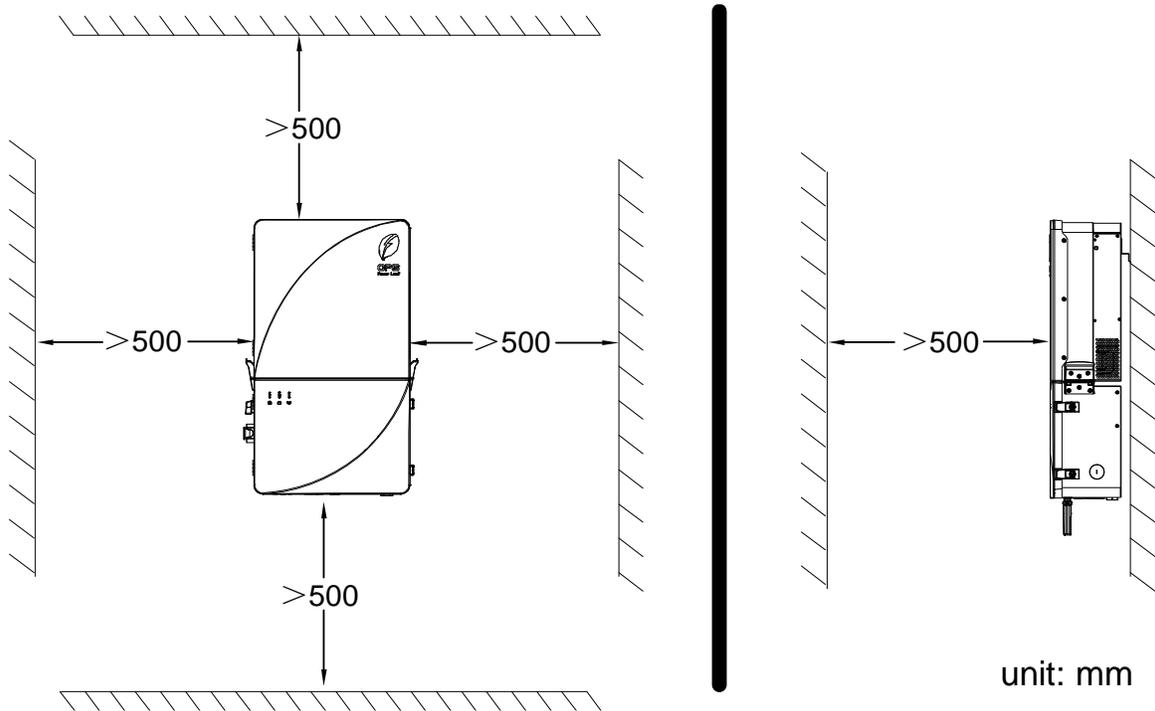
Figure 3-4 Installation Space Requirements for Inverter Racks

NOTICE:

- The distance from the inverter to any objects to its left or right must be greater than 19.7 in (500 mm).

- The distance from the inverter to any objects above, below, or in front of it must be longer than 19.7 in (500 mm).

- If multiple inverters are being used simultaneously, objects that inhibit heat dissipation must NOT be placed between the inverters.

3.5   Installation Procedure

1. Tighten the two M4x10 screws to affix the upper mounting bracket and lower mounting bracket; torque to 13.9 lbf-in (16 kgf-cm).
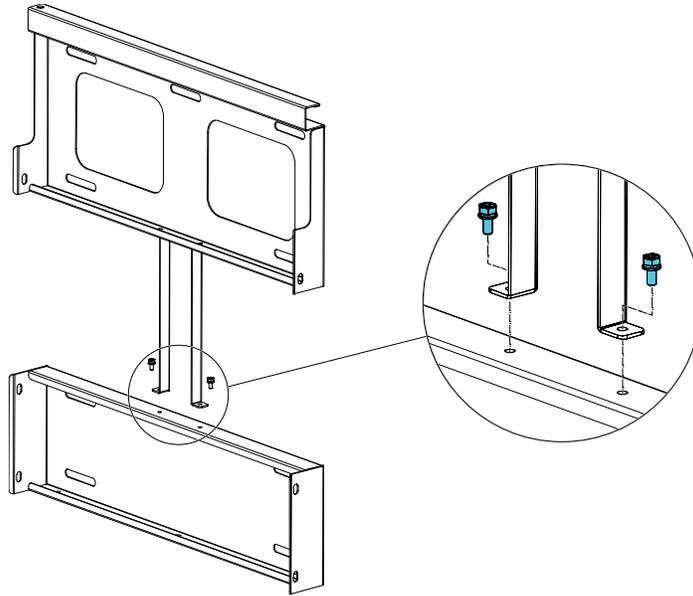
Figure 3-5 Affix the Mounting Brackets

2. Mark the positions of the mounting holes on the installation structure:
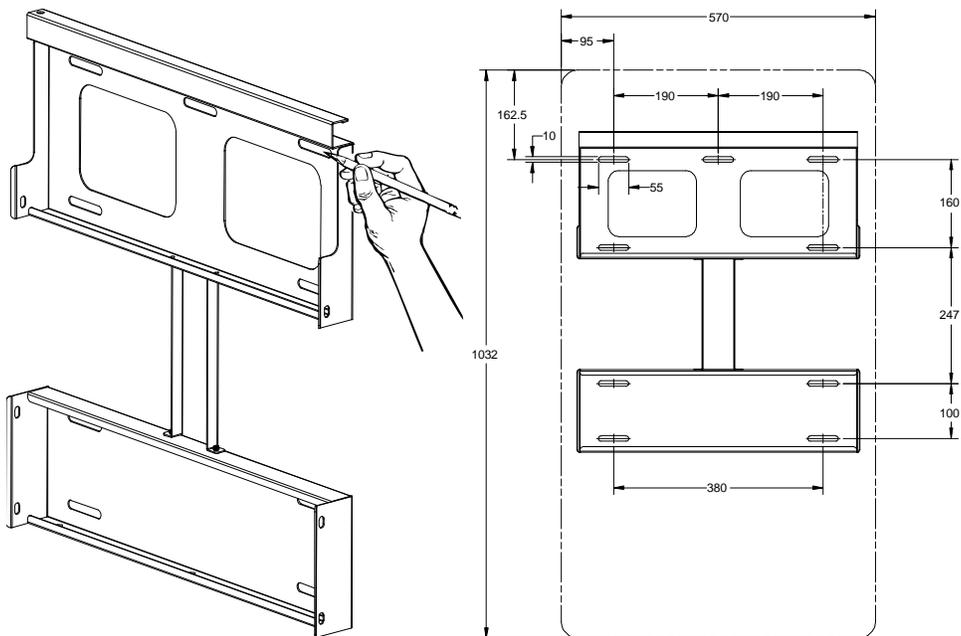
Figure 3-6 Mark the Mounting Holes of the Mounting Bracket

3. Use a percussion drill (Φ12 mm bit) to drill a hole 2.75 in (70 mm) deep, then use the rubber hammer to knock in the four expansion tubes.

4. Remove the nuts from the expansion tubes, then place the mounting bracket on the wall and ensure that the expansion tubes thread the holes of the mounting bracket. Tighten the nuts with an adjustable wrench and torque to 108.4 lbf-in (124.9 kgf-cm).
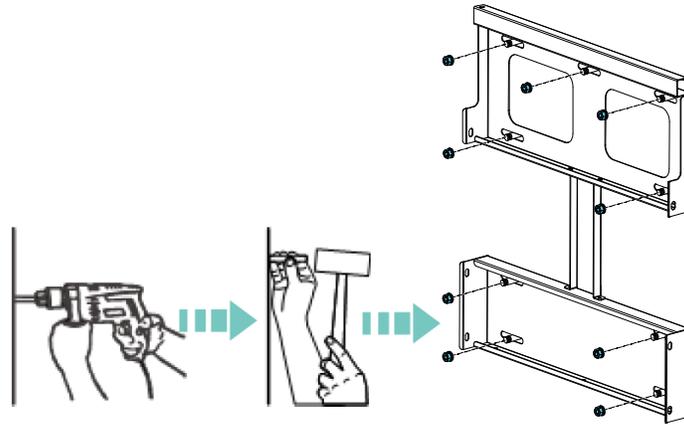
Figure 3-7 Fasten the Mounting Bracket

5. Remove the cover plates of the inverter and the wire box and set the two plates aside; these plates will be reaffixed as indicated in Step 10.
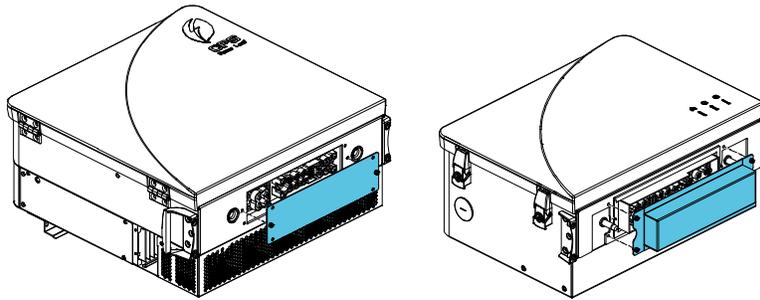
Figure 3-8 Remove the Cover Plates

6. Use the ball head hexagonal screwdriver with a combined handle to preload (but do not tighten) the four M6x18 screws to install the wire box onto the mounting bracket.
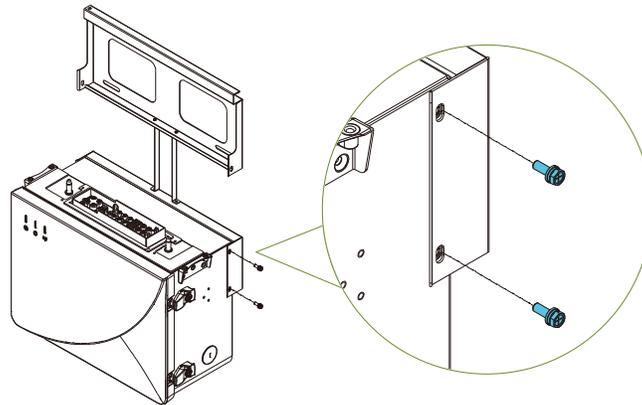
Figure 3-9 Install the Wire Box

7. Hang the inverter onto the mounting bracket as shown in Figure 3-9:

    a. **Lift mounting**: Two M10 lifting eye nuts may be installed on the sides of the inverter. Use sling rope or bar, inserted through both lifting eye nuts, to lift the inverter onto the bracket. (Note that the M10 lifting eye nuts are not included with the inverter.)

    b. **Manual mounting**: At least two (2) people are required to safely lift the inverter by the four arrow positions shown below.
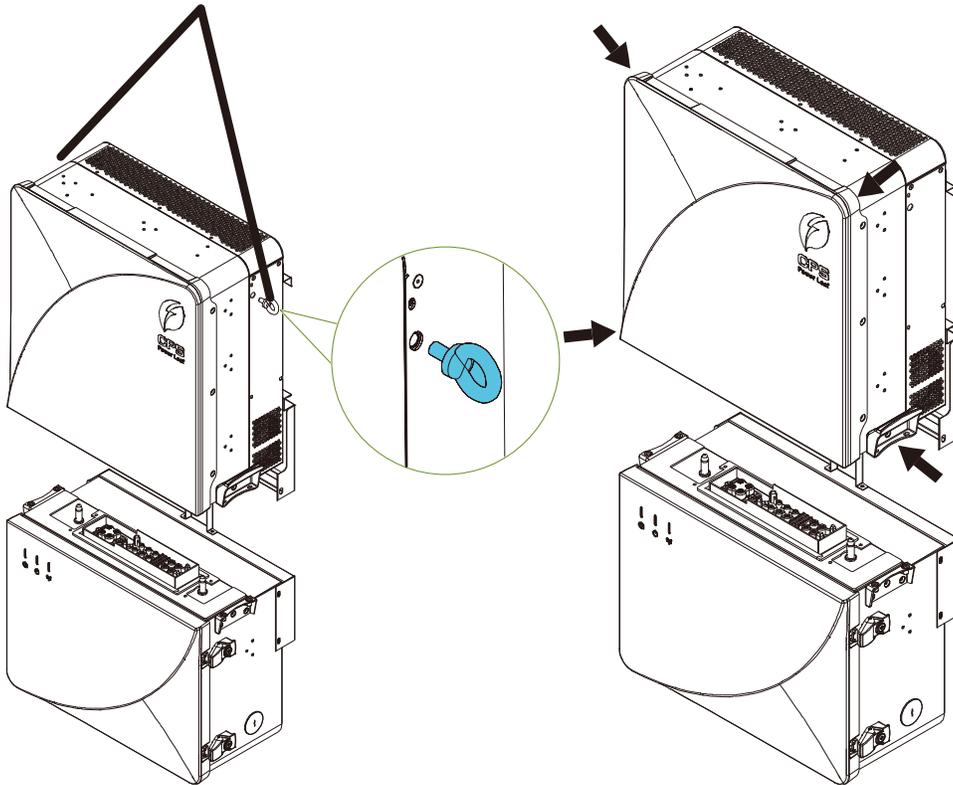
Figure 3-10 Lift or Manually Hang the Inverter

![caution symbol] **CAUTION:**

The weight of the inverter is approximately 139 lb (63 kg). If you want to manually lift the inverter, it is recommended to have AT LEAST two (2) people to lift it.

---

8. Use the ball head hexagonal screwdriver with a combined handle to tighten the four M6x20 combined screws on both sides to ensure close contact between the inverter handle and the wire box handle; torque to 52.1 lbf-in (60.0 kgf-cm).
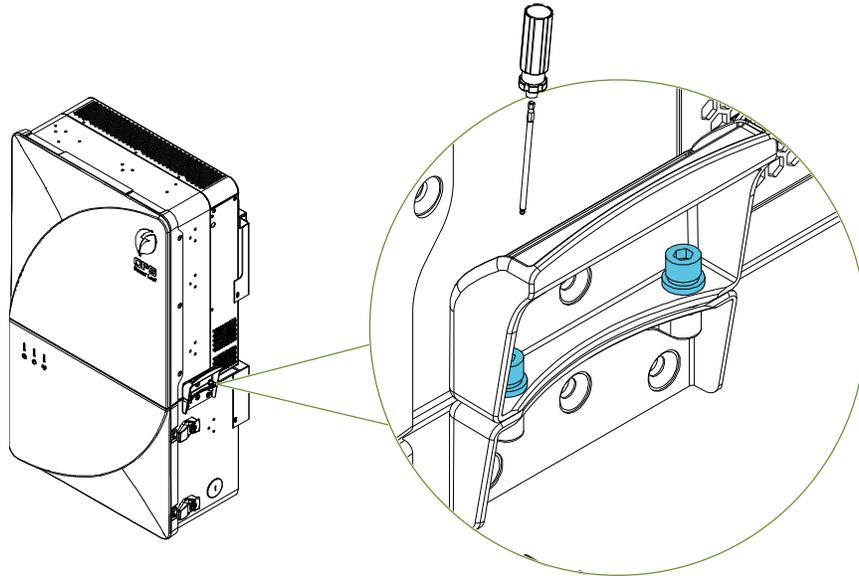
Figure 3-11 Affix Inverter onto Mounting Bracket

9. Tighten the six M6x18 screws to affix the inverter and wire box onto the mounting bracket and torque to 52.0 lbf-in (59.9 kgf-cm).

   OPTIONAL: Install an anti-theft padlock to prevent the inverter from being stolen if installed outdoors.
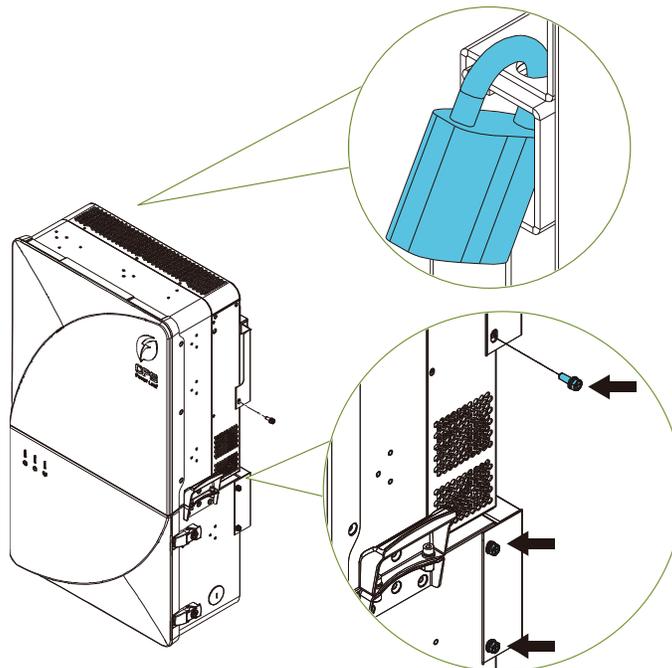
Figure 3-12 Attach the Inverter and Wire Box

10. Tighten the screws to secure the two cover plates on top of the inverter.
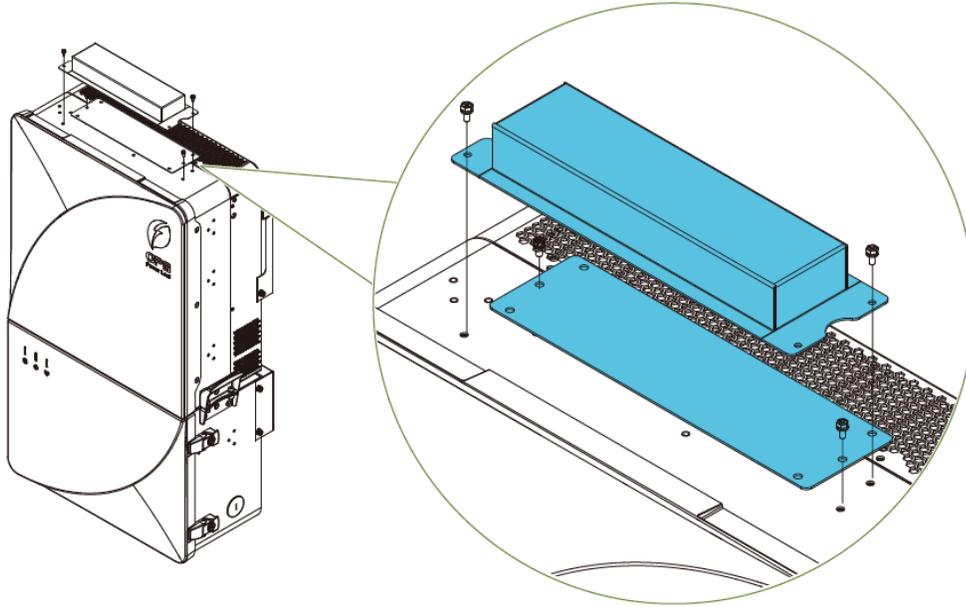
Figure 3-13 Affix the Cover Plates

4 Electrical Connection

⚠️ **CAUTION:**

All cables must be connected in accordance with the NEC and all other applicable local codes or jurisdictions.

4.1   Cable Specification

All cables must be connected in accordance with the following specifications:

Table 4-1 Cable Specifications for the Single Phase Hybrid Inverter

Name	Type	Conductor AWG		
		Range		**Recommended**
AC	Multi-core cables specialized for outdoor use (use 90°C copper wire ONLY)	Grid & load cable	#1/0-4/0 AWG (3/8 in lugs)	#4/0 AWG (3/8 in lugs)
		Generator L1/L2 cable	#1/0-2/0 AWG	#1/0 AWG
		Generator neutral	#1/0-2/0 AWG (5/16 in lugs)	#1/0 AWG (5/16 in lugs)
		Grounding cable	#4-14 AWG	#4 AWG
PV	Industry common PV tables (type: PV1-F, use 90°C copper wire ONLY)	#12-8 AWG		#10 AWG
BAT	Multi-core cables specialized for outdoor use (use 90°C copper wire ONLY)	#2/0-4/0 AWG (3/8 in lugs)		#4/0 AWG (3/8 in lugs)
PE	Cables specialized for outdoor use (use 90°C copper wire ONLY)	#6-4 AWG (copper)		#4 AWG
COM	Cables specialized for outdoor use (use 90°C copper wire ONLY)	UTP Cat5e or #22-18 AWG communication cable (e.g., Belden 3106A)		

4.2   Tools Required and Torque Values

> ⚠️ **NOTICE:**
>
> Cable sizing must be processed by a licensed electrical engineer according to the electrical code and cable OEM recommendation.

Table 4-2 Required Tools and Torque Values

No.	Tool	Usage	Torque
1	No. 16 hex socket wrench	Attaching battery cables, AC (Load L1 and L2, Grid L1 and L2) live cables, and AC neutral cables (Load and Grid)	200 in-lb (22.5 N·m)
2	No. 13 hex socket wrench	Attaching generator neutral cable	110 in-lb (12.5 N·m)
3	No. 10 hex socket wrench	Attaching external grounding cable	53 in-lb (6 N·m)
4	5 mm flat screwdriver	DC internal grounding bar	26 in-lb (3 N·m)
		AC internal grounding bar	
5	No. 2 Phillips screwdriver	Attaching screws of generator terminal block (generator L1 and L2)	32 in-lb (3.5 N·m)
		Attaching screws of PV terminal (PV1-3+ and PV1-3-)	26 in-lb (3 N·m)
6	Diagonal pliers	Preparing cables	-
7	Wire stripper	Preparing cables	-
8	Crimping tool	Preparing cables	-

4.3 Electrical Cable Connection

⚠️ **NOTICE:**

Ensure watertight seals during installation.

Read these instructions carefully and refer to Section 11 Technical Data before wiring.
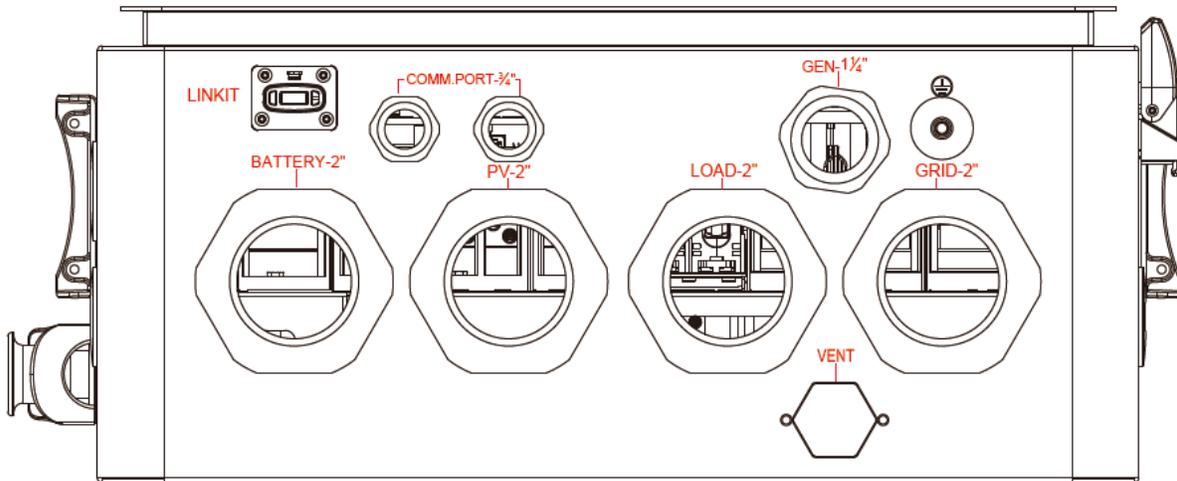
Figure 4-1 Conduit Knockout Locations and Trade Size

Connection Knockout	Trade Size (inches)
BATTERY (CPS battery)	2
PV (photovoltaic)	2
LOAD (backup loads)	2
GRID (power grid)	2
GEN (generator)	1.25
COMM PORT (EMS / BMS communication)	0.75

4.3.1   Ground Cable Connection

Crimp the compression lug and tighten an M6x18 screw to attach the grounding lug to the grounding hole.
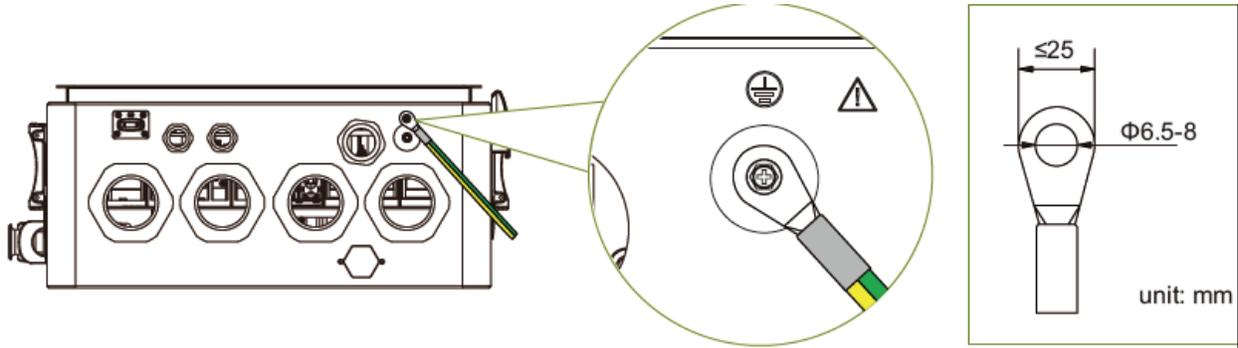
Figure 4-2 Connect the Ground Wire

4.3.2   AC Wiring

1. Use the key ① to unlock the two buckle locks, pull part ② first, then pull part ③ to open the front cover.
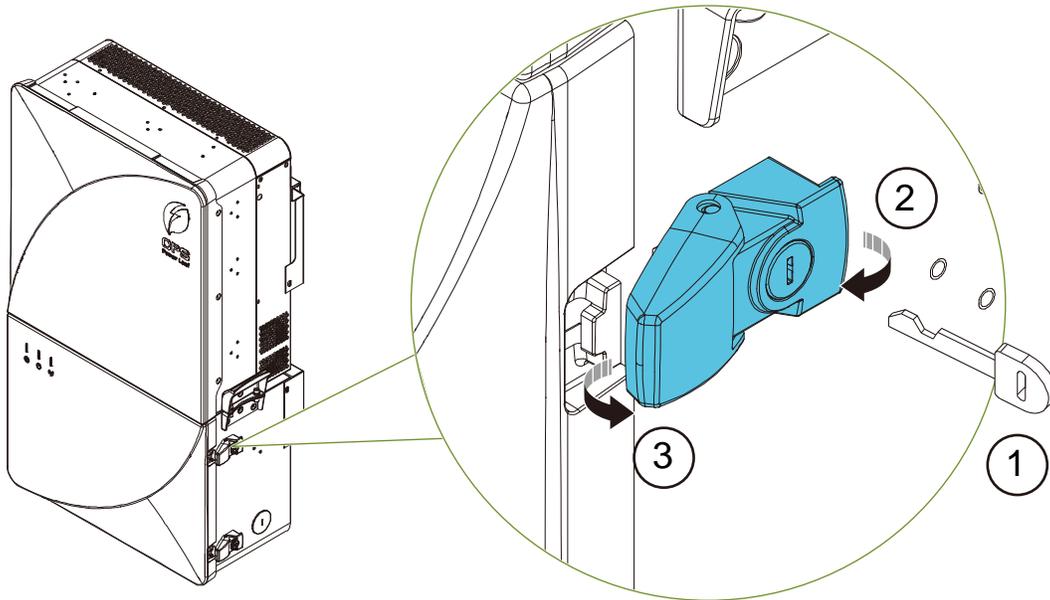
Figure 4-3 Open the Front Cover

2. Use the supporting rod to hold the front cover open.
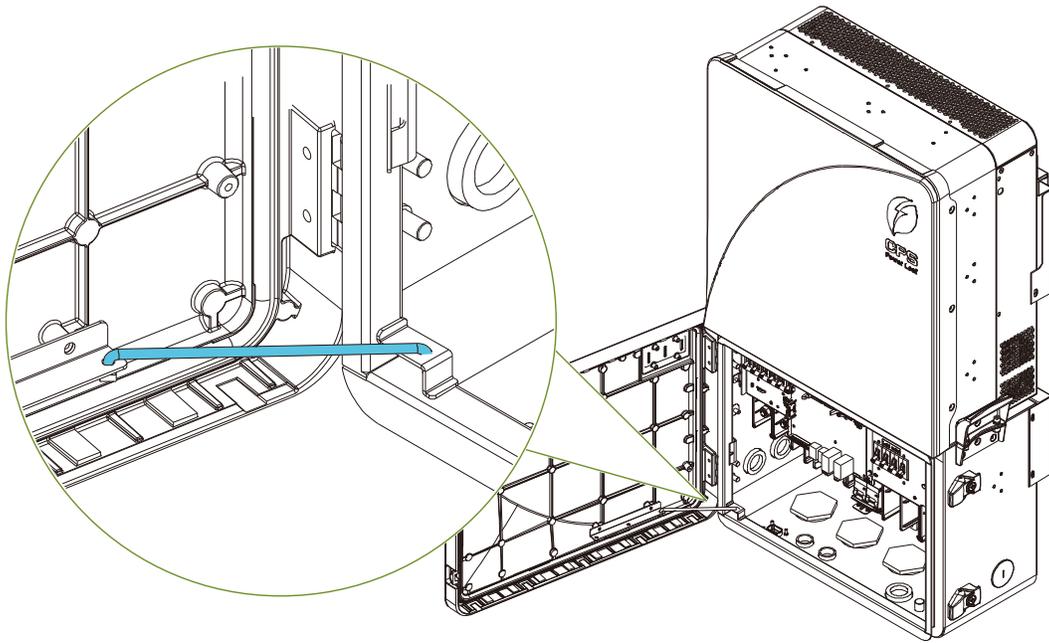
Figure 4-4 Hold the Front Cover

3. Loosen the two screws and remove the transparent cover.
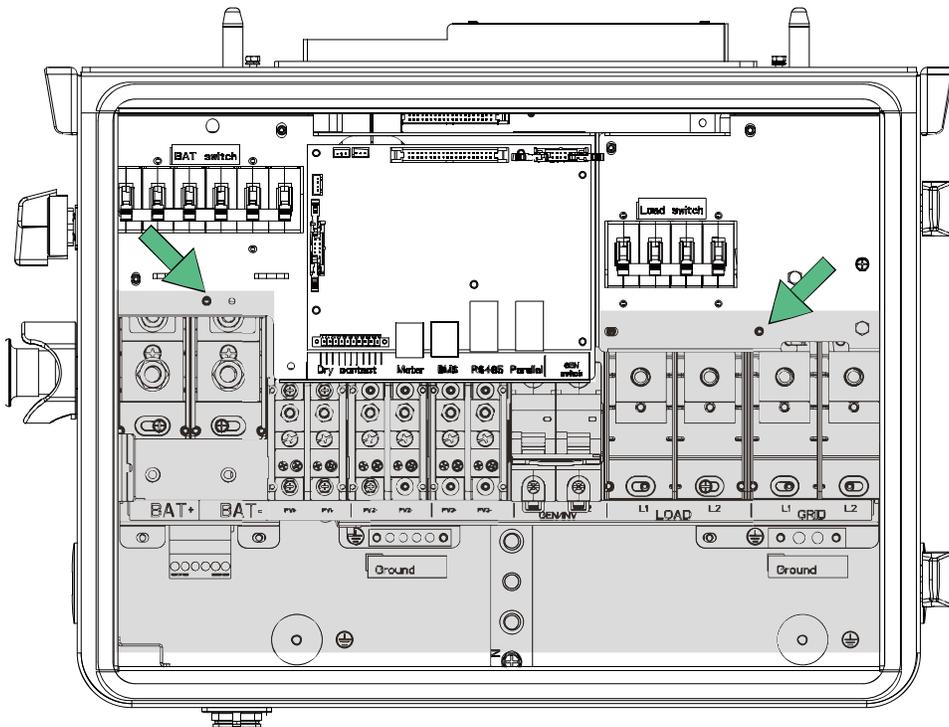
Figure 4-5 Remove Transparent Cover

4. Remove the watertight hole plugs and insert the corresponding conduits and conduit fittings through the battery, COMM PORT, PV, LOAD, GEN, and GRID knockouts.

   NOTE: Customer needs to prepare the steel conduits and conduit fittings according to the size of the knockout.
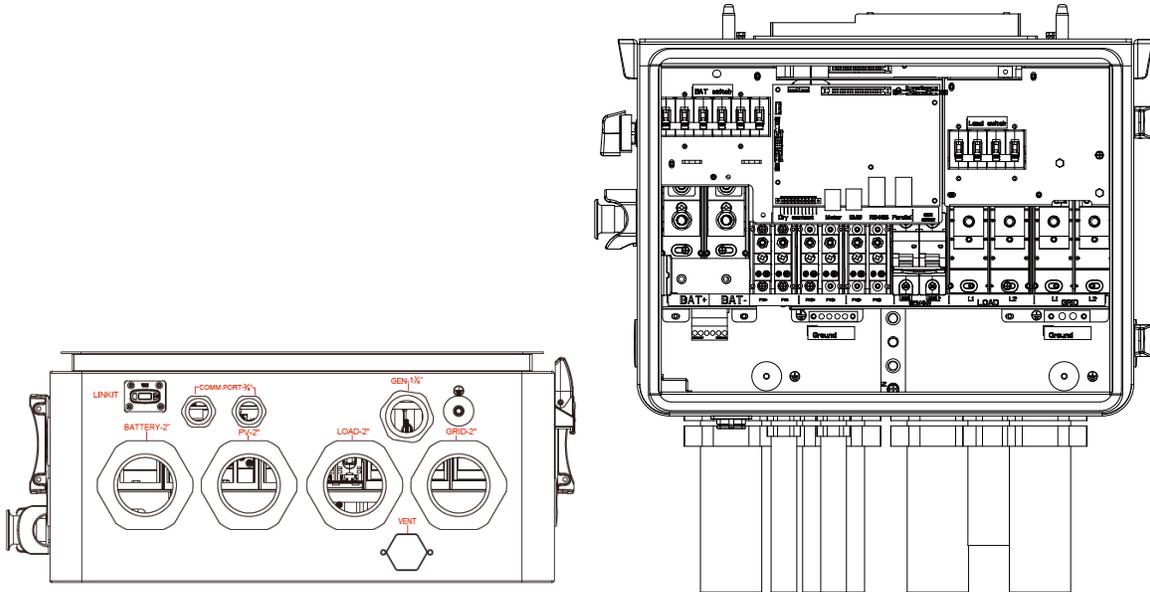
Figure 4-6 Insert the Steel Pipes

5. When the LOAD, GRID, and GEN cables are ready to use, thread them through the conduit, then remove an appropriate length of the insulation layer from the cable (see Figure 4-7):
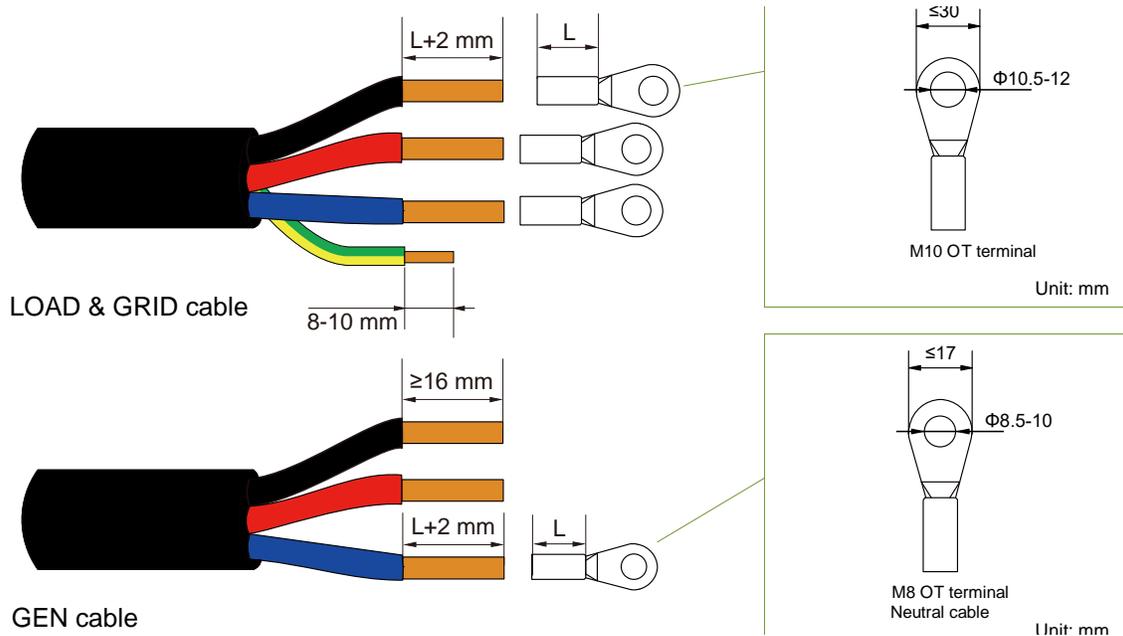
Figure 4-7 Remove Jacket and Insulation Layer

6. Insert the exposed wire core into the crimped area of the compression lugs, then crimp the compression lugs.

7. After crimping, wrap the wire crimp area with heat shrink tubing and use the hot air gun to seal the tubes.
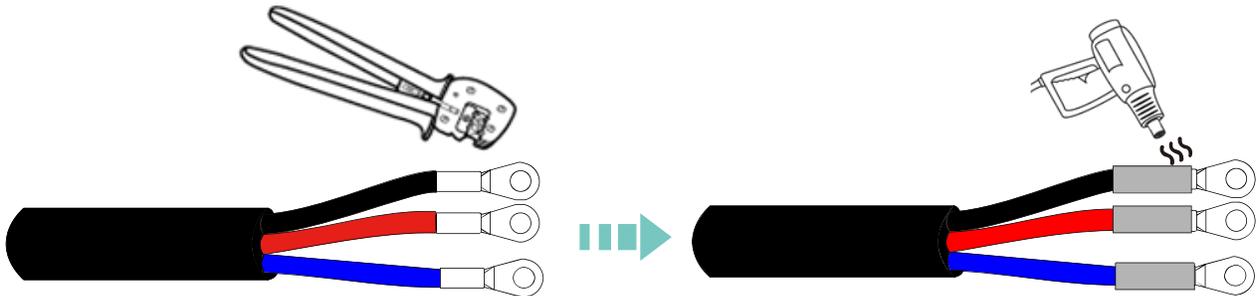
Figure 4-8 Crimp and Seal the Lugs

8. Connect the AC GRID cables and backup LOAD cables (if applicable).

   NOTE: For grid-tied PV only applications, the AC cables must be connected to the GRID terminals.
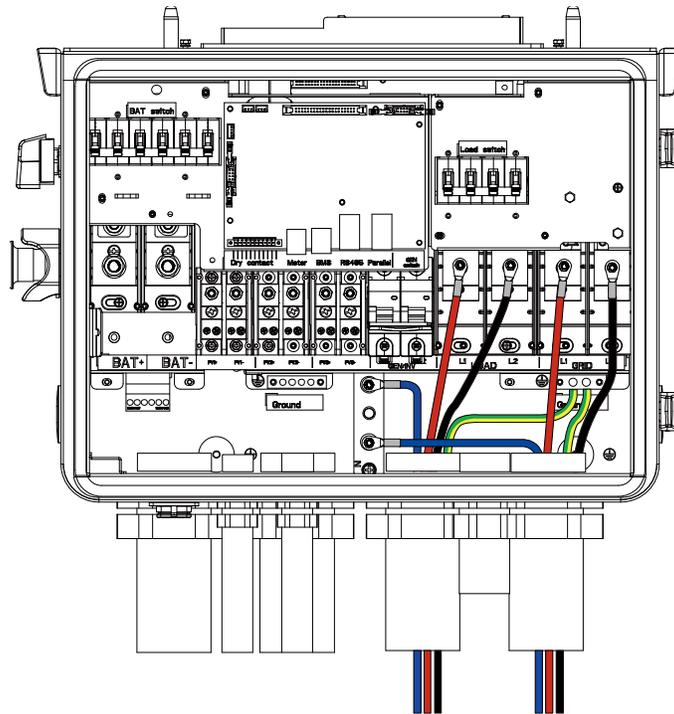
Figure 4-9 Connect the AC GRID Cables and Backup LOAD Cables (if applicable)

9. Connect the GEN cable (if applicable).
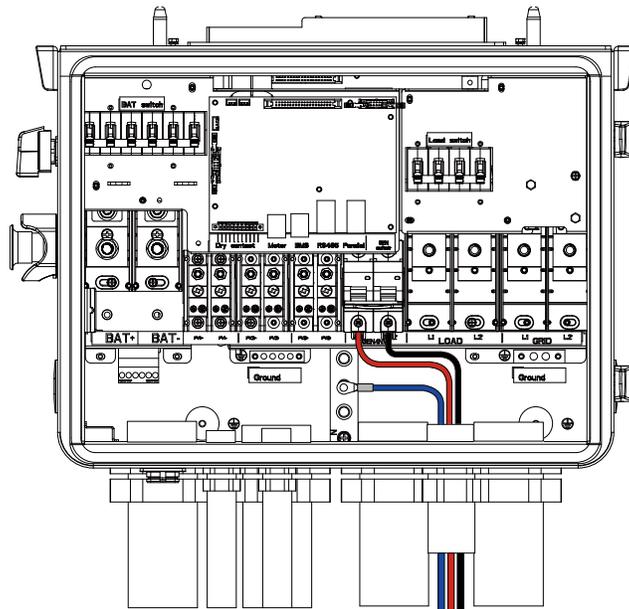
Figure 4-10 Connect GEN Cables

⚠️ **NOTICE:**

Ground cables, N phase, and L phases must correspond to the PE, N, and L1/L2 terminal. If they are connected incorrectly, the inverter may not work properly.

⚠️ **NOTICE:**

The connection of a secondary protection ground wire cannot be replaced by that of the PE wire—both must be grounded correctly. CPS will not take any responsibility for the possible consequences caused by such an omission.

The L1/L2/N output cables of the inverter must be connected to the power grid via an independent 4-pole AC circuit breaker to ensure that the inverter can be disconnected safely from the power grid.

4.3.3　PV Wiring

⚠️ **NOTICE:**

It is important to use a multimeter to check the polarity of the DC input cables to avoid reverse polarity.

For PV cable connection, check the polarity _before_ terminating the DC cables of the PV strings according to the following steps (shown in Figure 4-11):

1. Use a multi-meter to measure the PV strings' cable ends to check the polarity.

2. The positive (+) lug of the cable must match the positive (+) terminal of the inverter's DC input.

3. The negative (-) lug of the cable must match the negative (-) terminal of the inverter's DC input.
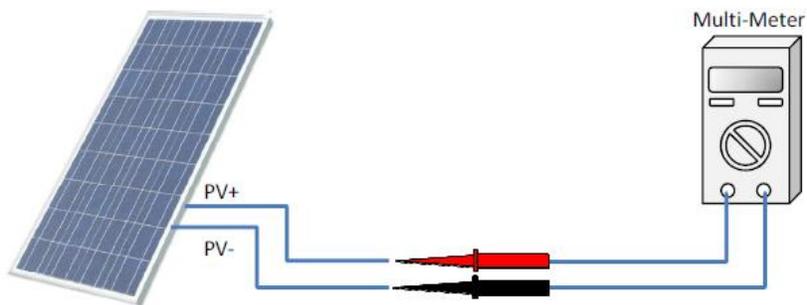
Figure 4-11 Polarity Check

Connect the cables:

⚠️ **NOTICE:**

The grounding wire MUST be properly connected and the DC switch must be in the OFF state.

---

1. Remove an appropriate length (see Figure 4-12) of the jacket and insulation layer from the PV input cable of the PV strings.
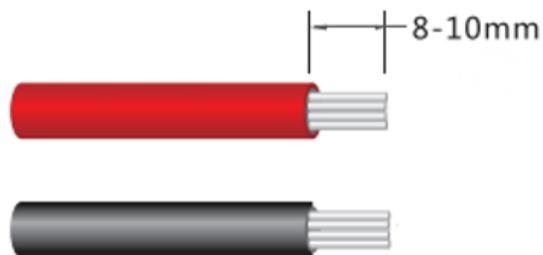
Figure 4-12 Wire Stripping

2. Insert the PV wires into the PV terminals and tighten the screws.
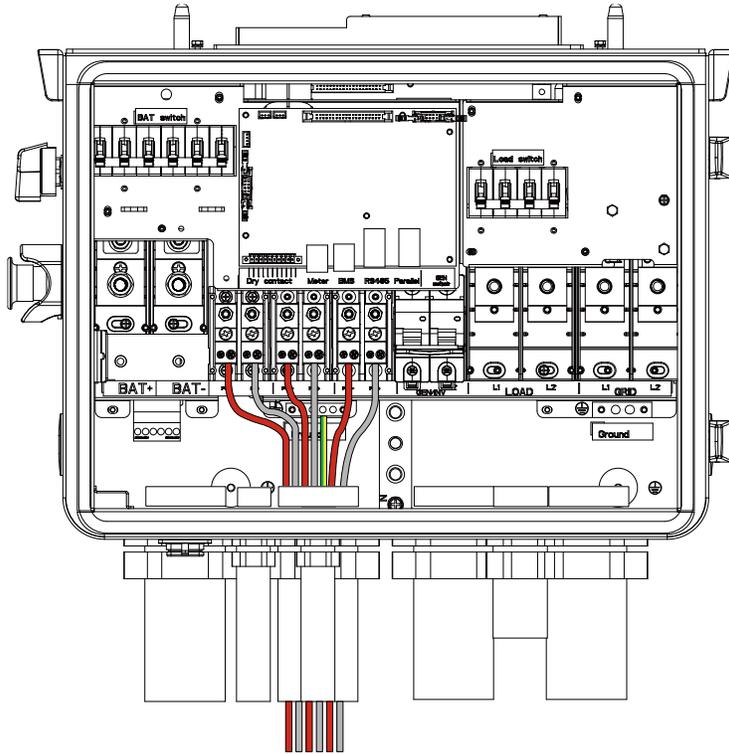
Figure 4-13 Connect the PV Cables

⚠️ **NOTICE:**

To maximize production, reduce clipping losses, and optimize thermal performance, distribute the PV input power across all MPPTs as evenly as possible (e.g., the difference in the number of strings per MPPT is not larger than 1).

4.3.4   Battery Wiring

⚠️ **NOTICE:**

Before connecting the battery cables, use a multimeter to ensure that the polarities are correct.

It is recommended that the rated current of the fuse is equal to the battery maximum discharge current × 1.25 (fuse safety factor). The specific value is subject to the battery manufacturer's requirements.

---

1. Remove an appropriate length (see Figure 4-14) of the jacket and insulation layer from the cable.
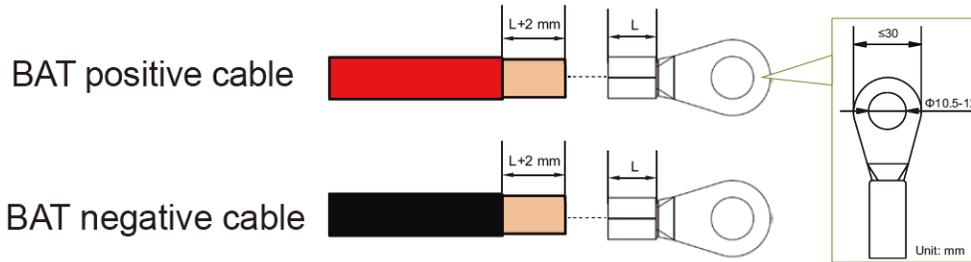
Figure 4-14 Remove Insulation Layer

2. Insert the exposed wire core into the crimped area of the compression lugs, using crimping pliers to crimp the lugs.

3. After crimping, wrap the wire crimp area with heat shrinkable tubing and use the hot air gun to seal the tubes.

Figure 4-15 Crimp and Seal Lugs

4. Connect the battery cable to the battery terminal and use a cable tie to tie the magnetic ring and cables.
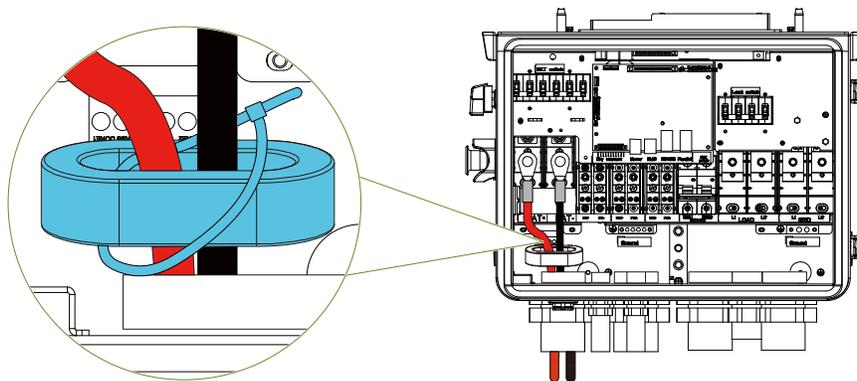
Figure 4-16 Connect Battery Cables

4.3.5 Communication Wiring

4.3.5.1 Connect the Wi-Fi Module

1. Remove the silicone cover from the wire box.

2. Insert the Wi-Fi module into the Wi-Fi port until you hear a click sound.

   NOTE: The indicator of the Wi-Fi module faces outward.
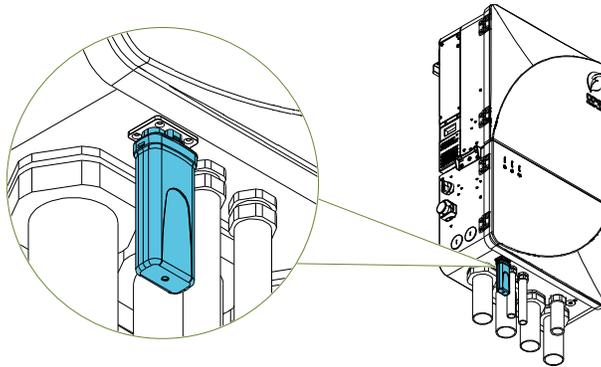
Figure 4-17 Install the Wi-Fi Module

4.3.5.2 Connect Communication Cables
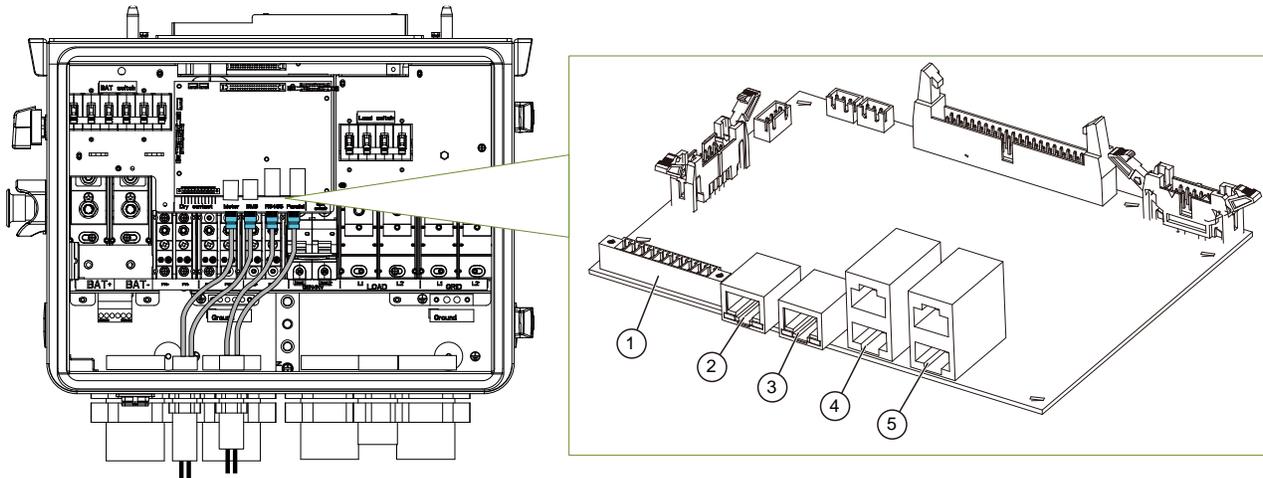
Table 4-3 Communication Cable Ports

No.	Port Function
1	Connects the 14-pin terminal.
2	Connects the optional CPS Meter Kit.
3	Connects the BMS (CAN communication).
4	Connects EMS and BMS (RS485 communication).
5	Parallel communication connection between multiple inverters.

Select the pins to connect the communication cables according to the actual usage or application upon the following definition of dry contacts:

PIN	Name	Definition	Function
1	BAT_T+	Battery temperature positive port	Reads the battery temperature.
2	BAT_T-	Battery temperature negative port	
3	CT1+	External CT1 positive port	Reads the current phase A by external CT.
4	CT1-	External CT1 negative port	
5	CT2+	External CT2 positive port	Reads the current phase B by external CT.
6	CT2-	External CT2 negative port	
7	DI+	Digital input positive port	Digital signal input (reserve).
8	DI-	Digital input negative port	
9	GEN_S+	Generator startup signal positive port	Sends the generator startup signal.
10	GEN_S-	Generator startup signal negative port	
11	NC	Reserved	-
12	NC	Reserved	-
13	RSD+	Rapid shutdown device positive port	Receives the RSD initiation signal (for parallel connection).
14	RSD-	Rapid shutdown device negative port	
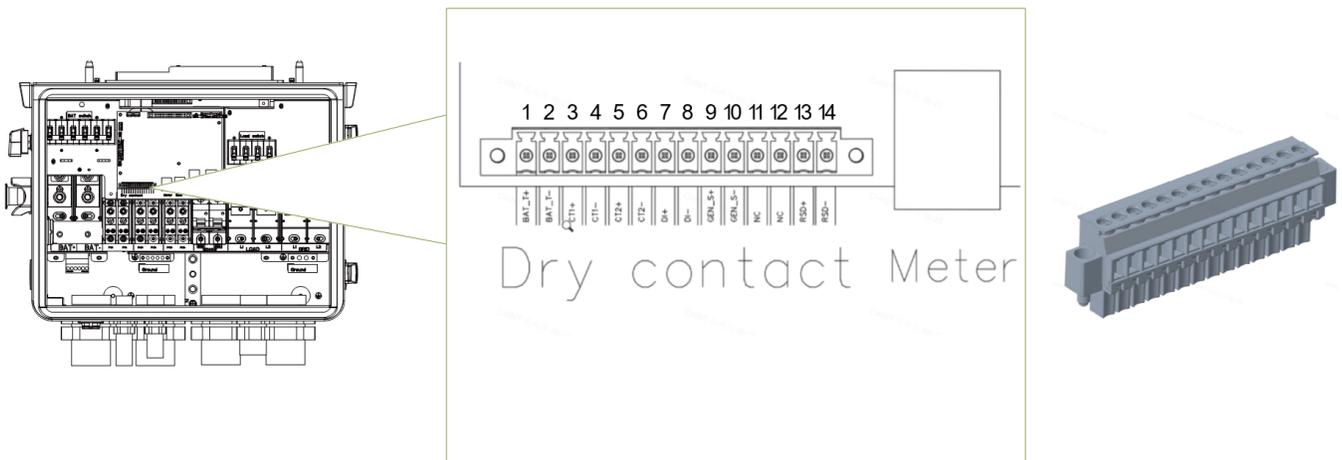
Figure 4-18 Dry Contacts

4.4   Inverter Parallel Connection

The inverter supports the following three parallel modes:

- Multiple inverters in parallel: 120/240 V.

- Two (2) inverters in parallel: 120/208 V.

- Three (3) inverters in parallel: 120/208 V.

⚠ **NOTICE:**

When the quantity of parallel inverters is greater than three (3) for PV + Battery applications, please contact CPS customer support.

The positions of the Grid and Backup Load terminals are shown in Figure 4-19 below. Before parallel connection, turn the CAN DIP switch ① of each inverter to the ON position.
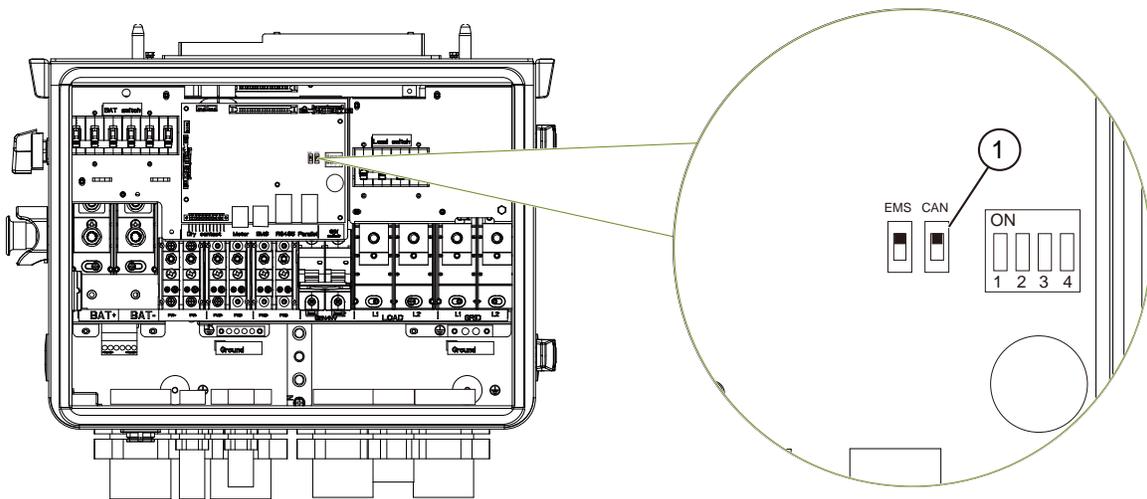
Figure 4-19 Positions of Grid and Load Terminals

4.4.1 Multiple Inverters in Parallel – 120 / 240 V

NOTICE:

If the quantity of parallel inverters is more than three (3) for PV + Battery applications, contact CPS customer service.

The load of each inverter runs in parallel mode.

Inverter	Grid	
	Phase A	**Phase B**
Primary	GRID L1	GRID L2
Secondary 1		
Secondary 2		

4.4.2 Two Inverters in Parallel – 120 / 208 V

This mode consists of one primary inverter and one secondary inverter.

The load of each inverter runs in parallel mode.

Inverter	Grid		
	Phase A	**Phase B**	**Phase C**
Primary	GRID L1	GRID L2	-
Secondary	-	GRID L1	GRID L2

4.4.3 Three Inverters in Parallel – 120 / 208 V

This mode consists of one primary inverter and two secondary inverters.

The load of each inverter runs in parallel mode.

Inverter	Grid		
	Phase A	**Phase B**	**Phase C**
Primary	GRID L1	GRID L2	-
Secondary 1	-	GRID L1	GRID L2
Secondary 2	GRID L2	-	GRID L1

4.5 Meter and CT Connection

Connecting the CPS Meter Kit and CTs is optional:

- In grid-tied PV only applications, there is no need to connect the CPS Meter Kit.

- If there are multiple PV + Battery systems operating in parallel, it is necessary to connect the meter and CT.

For more detailed information, refer to the application notes or user manuals of the meter and CT.

4.6 Inverter and Parallel Connection Functions

4.6.1 Setting the Primary Inverter and Secondary Inverter

The inverter parallel connection plan adopts primary-secondary control mode. Each inverter address can be set in the app (see Section 8.4.2.4 Setting). **NOTE**: For grid-tied PV only applications, multiple inverters can operate independently in the "Single Machine" mode.

4.6.2 Synchronization of Parallel System (Not Applicable for PV Only Systems)

- **Powering inverters in the parallel system ON/OFF**:

    o The powering ON and OFF of all the inverters in a parallel system is controlled by the primary inverter.

    o If the primary inverter is powered on, all the inverters in the parallel system are powered on and if the primary inverter is powered off, all the inverters in the parallel system are powered off.

- **Inverter failure in a parallel system**: If any inverter (primary or secondary) in the parallel system fails, the entire system will stop running.

4.6.3 Current Sharing Control (Not Applicable for PV Only Applications)

- **In on-grid mode**:

    o Power limit: When inverters are connected in parallel, the primary inverter will connect to and receive grid power from the electricity meter. The primary inverter will then deliver power distribution value to the secondary inverters according to the parallel connection mode. In on-grid mode, the states of the inverters and the batteries are different and no current sharing control is performed.

    o Parameter setting synchronization: The primary inverter synchronizes its own registered parameters to the secondary inverters to ensure consistent running parameters.

- **In off-grid mode**: Due to the different PV and batteries connected to each inverter, the inverter output cannot achieve current sharing control when the power is insufficient.

5 Commissioning

> **WARNING:**
>
> To eliminate possible danger, read and follow the steps described below in Section 5.1 *before* performing any on-grid operations.

5.1 Pre-Commissioning Checks and Preparation

5.1.1 Mechanical Installation Checks

Perform the following inspections by referring to Section 3 Mechanical Installation:

- Ensure all the mounting brackets are secure.

- Ensure all the screws have been tightened to the specified torque values.

5.1.2 Cable Connections Checks

Perform the following inspections by referring to Section 4 Electrical Connection:

- Ensure all the cables are connected to the correct lugs and properly labeled.

- Ensure the cables are appropriately managed to avoid physical damage.

- Check the polarity of the DC input conductors (the DC switches must be in the OFF position).

5.1.3 Electrical Connection Checks

Perform the following inspections by referring to Section 4 Electrical Connection:

- Ensure the AC circuit breaker and/or fused switch disconnect is appropriately sized.

- Test and check that the AC voltage is within the normal operating range.

- Ensure that the DC open circuit voltage of the PV input strings is less than 600 V.

5.2   Commissioning Steps

1. Open the front cover and turn the LOAD, BAT, and GEN switches to the ON position before closing the front cover again.

2. Set the inverter DC switch to the ON position. When the solar array produces enough power, the inverter's LED power indicator will be lit and the inverter will enter the self-check state.

Once powered, the inverter will automatically create a wireless Bluetooth network that is visible as an access point from the user communication devices (e.g., tablet, smartphone). Users can download the MatriCloud app for iOS from the App Store or for Android from the Google store; the app can be also downloaded by scanning the QR code below (supports Android 4.4 and iOS 11.0 or later).

![CPS America logo]

6 App Local Control

6.1 App Quick Connection and Configuration

INSTRUCTION:

Complete the test and inspection BEFORE operation to confirm that there is no error.

Users can perform the following procedures to set up the app.

1. Turn on the device's Bluetooth.

2. Open the MatriCloud app.

3. Tap the **Settings** icon at the top of the screen, then select the correct server and language.
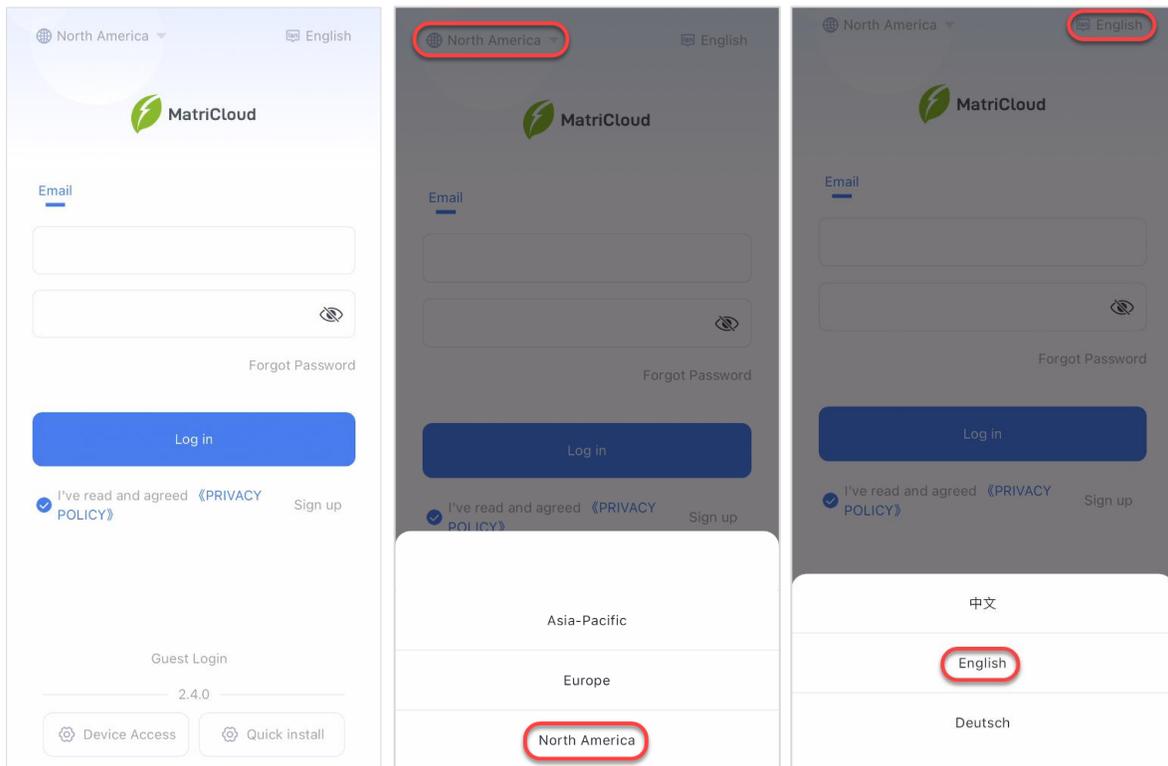
Figure 6-1 Select the Server and Language

4. After selecting the server and language, tap **Quick Install** at the bottom of the screen.
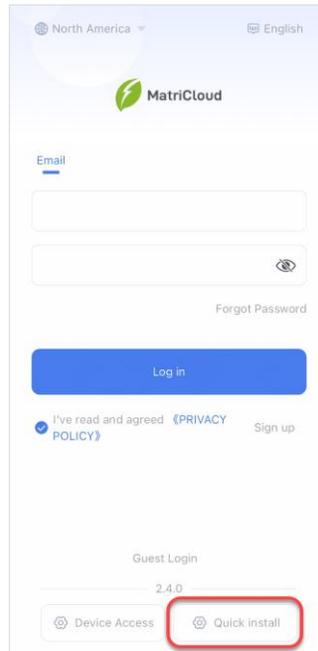
Figure 6-2 Quick Install

5. On this page, tap **Bluetooth Connect** at the bottom of the screen to open the device name list. The device name *XXXXXXXX* is the last eight (8) digits of the SN on the Wi-Fi module label.

    NOTE: The NFC function is now unavailable.
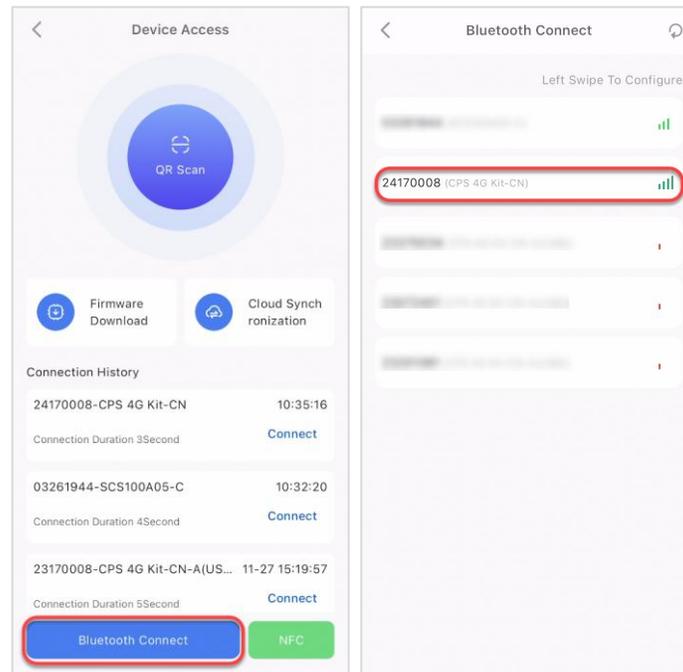
Figure 6-3 Connect to Inverter

![CPS America logo]

6. When the app is successfully connected to the inverter, the **Installation Settings Wizard** page will appear (Figure 6-4). Check if the cables are connected correctly; if yes, tap **Next Step**.
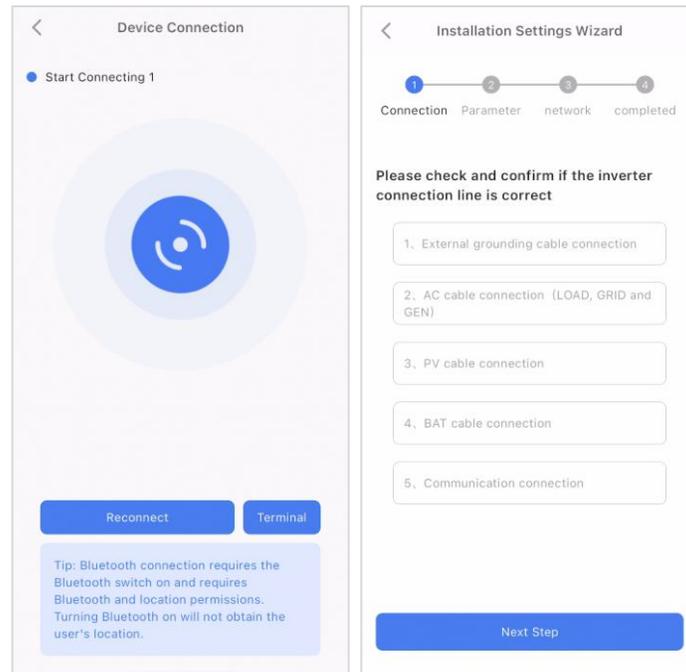
Figure 6-4 Connection Check

7. In the next step of the **Installation Settings Wizard**, parameter configuration, you can set up the grid information, parallel mode, device access, and running mode parameters by tapping each setup wizard one by one.
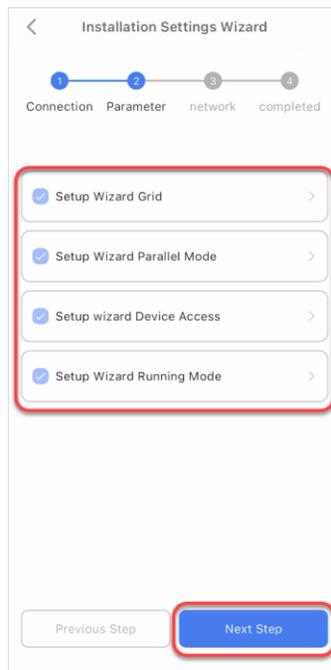
Figure 6-5 Parameter Configuration

a. **Setup Wizard Grid**: Select the standard value according to the requirements of your local authority.

- The available grid standards are IEEE 1547-2018, CA Rule 21, and HECO.

- Choose the grid type, such as 120/240 V split phase or 120/208 V three phrase.

- Choose rated frequency: 50 Hz or 60 Hz.
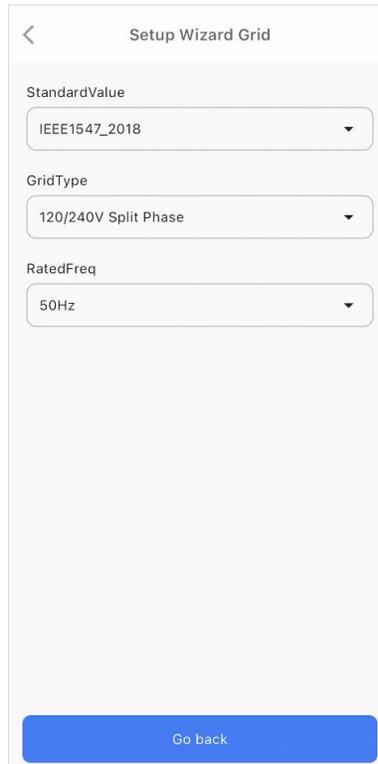
Figure 6-6 Setup Wizard Grid

INSTRUCTION:

Check with your local electric supply company *before* selecting a grid standard. If the inverter operates with an incorrect standard, the electric supply company can cancel the interconnection agreement.

b. **Setup Wizard Parallel Mode**: Set the parallel mode of the inverter to "single machine" or "two phases in parallel."

NOTE: If the inverters run in parallel, you can set their address as "Primary" or "Secondary," as well as the quantity of parallel inverters.
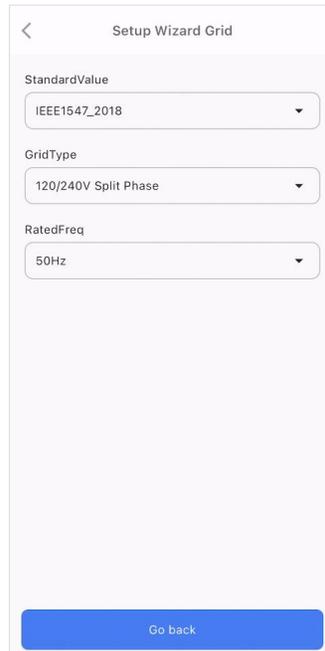
Figure 6-7 Setup Wizard Parallel Mode

c. **Setup Wizard Device Access**: Set the battery type and generator type.
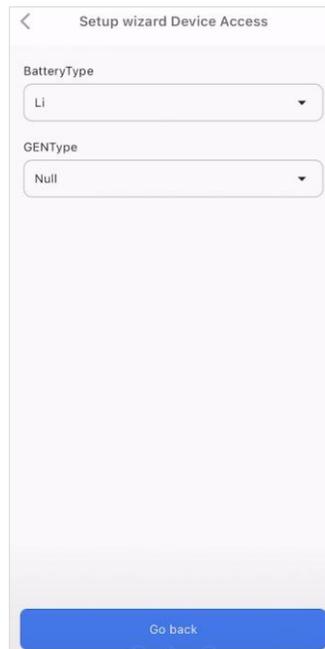
Figure 6-8 Setup Wizard Device Access

d. **Setup Wizard Running Mode**: Set the running mode to any option listed in the dropdown list.
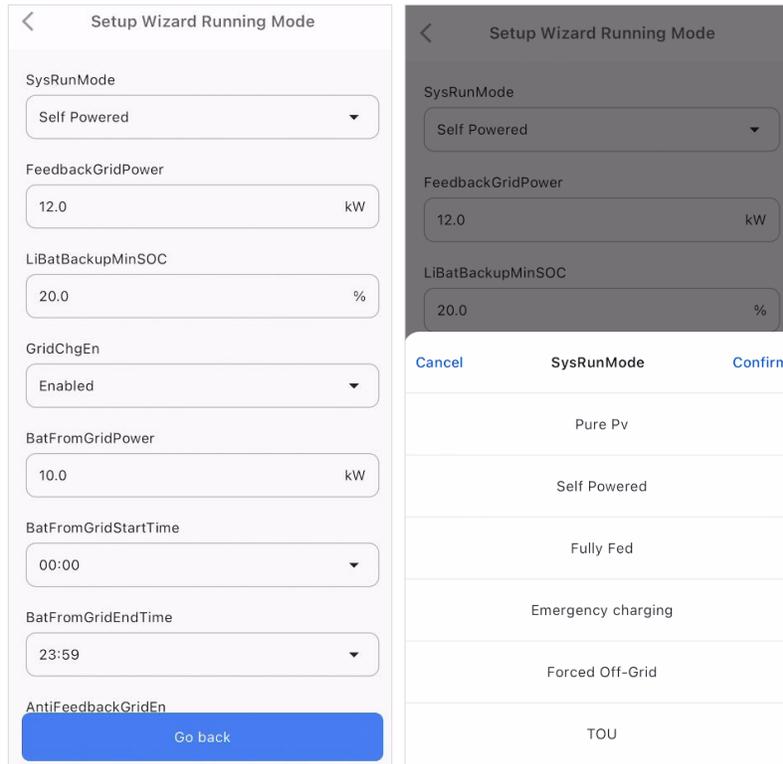
Figure 6-9 Setup Wizard Running Mode

After setting the system running mode, you can also set other relevant parameter items in the **SysRunMode** dropdown:

- **FeedbackGridPower**: The maximum power fed from the inverter to the grid.

- **LiBatBackupMinSOC**: Battery backup minimum SOC. When the battery is discharged to minimum SOC in on-grid mode, it will not continue to discharge unless it is off-grid.

- **GridChgEn**: Enable or disable the ability of the battery to draw power from the grid.

- **BatFromGridPower**: The maximum power at which the power grid can charge batteries; i.e., the power grid will charge the batteries at a power rate lower than the preset value.

- **BatFromGridStartTime**: Start time of charging the battery by drawing power from the grid.

- **BatFromGridEndTime**: End time of charging the battery by drawing power from the grid.

- **AntiFeedbackGridEn**: Enable or disable the anti-feedback function.

8. After finishing parameter configuration, tap **Next Step** to proceed to the network configuration page.

9. In the next step of the **Installation Settings Wizard**, network connection configuration:

    a. Tap Wi-Fi, then tap **Select** to choose the desired Wi-Fi and enter its password.
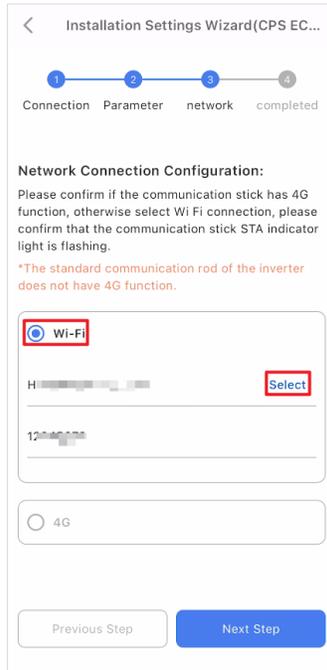
Figure 6-10 Network Configuration

    b. After choosing the Wi-Fi and entering its password, tap **Confirm**, then **Next Step**.
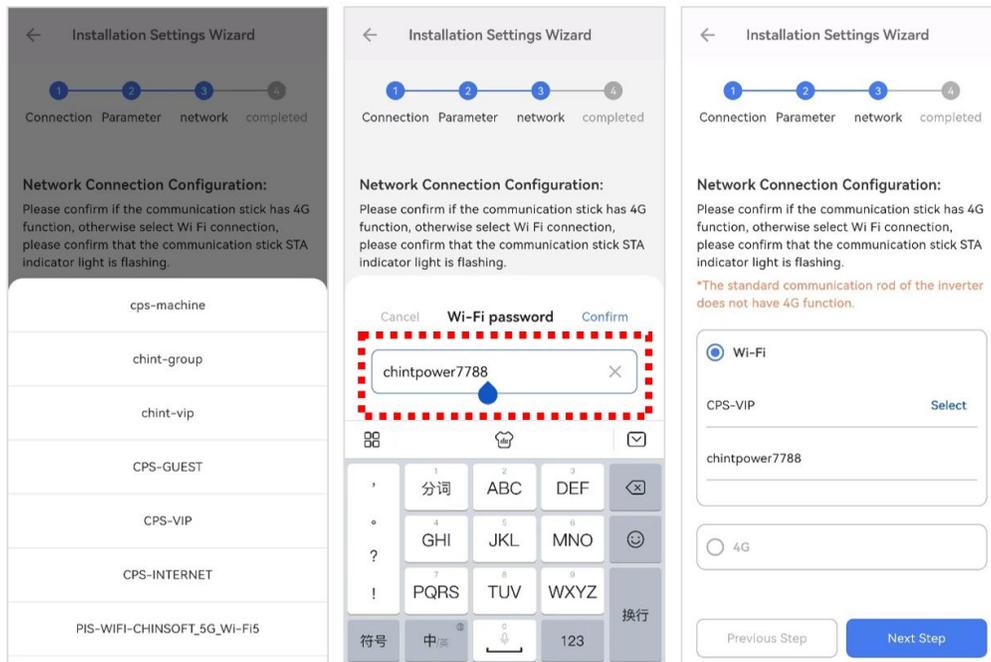
Figure 6-11 Select Wi-Fi

10. On the final page, tap **Complete and reboot** to complete the Installation Settings Wizard.

- If the screen shows "Initialization setting completed" (see Fig. 6-12), the inverter will automatically restart when **Complete and reboot** is tapped.

Figure 6-12 Settings Completed Page

- If there is equipment failure, it will display as shown in Figure 6-13.
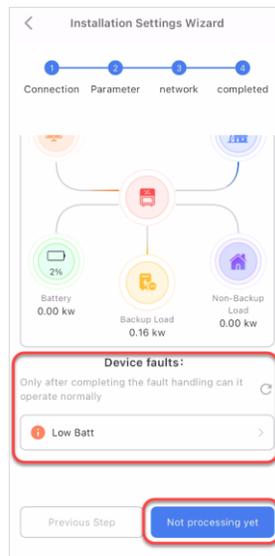
Figure 6-13 Troubleshooting or Skip Device Faults

a. If this occurs, troubleshoot until the failures have been cleared.

   NOTE: You can also tap **Not processing yet** to skip troubleshooting.

b. Tap the refresh icon ↻ to check for further equipment failure.

c. If there are no additional failures, the **Complete and reboot** button will appear; tap it to continue.

11. From the login screen, tap **Device Access** at the bottom, then tap **Bluetooth Connect** to open the device list.
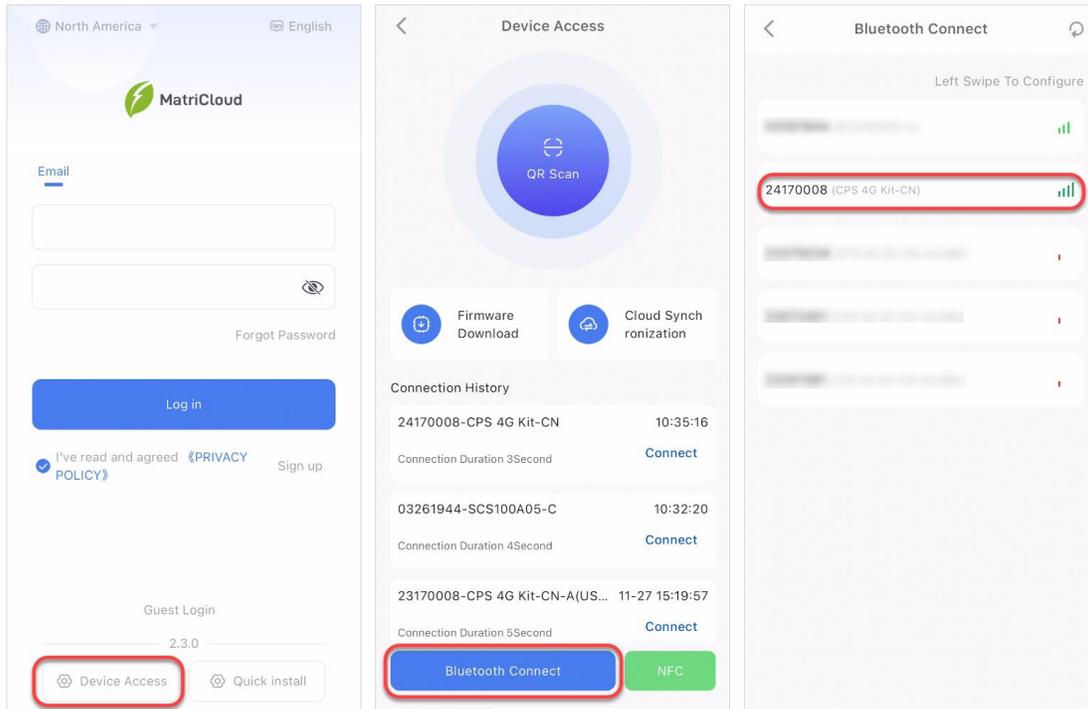
Figure 6-14 Connect Bluetooth

You will be redirected to the home screen after selecting a device from the device list to connect.

6.2   Home Menu

> **NOTICE:**
>
> The parameters displayed on the interfaces throughout this chapter may vary with specific product models and user choices. Always refer to the actual interface shown on your device.

After successful connection, the main interface will be displayed as follows:

1. **Terminal parameter settings**: Tap the icon in the top right corner to enter the terminal parameter settings interface.

   Here, users can set the Wi-Fi, users need to set or modify the **wifi ssid** and **wifi pwd** to ensure the inverter is connected to the internet. (For more information, see Section 6.4.8 Gateway Configuration.)
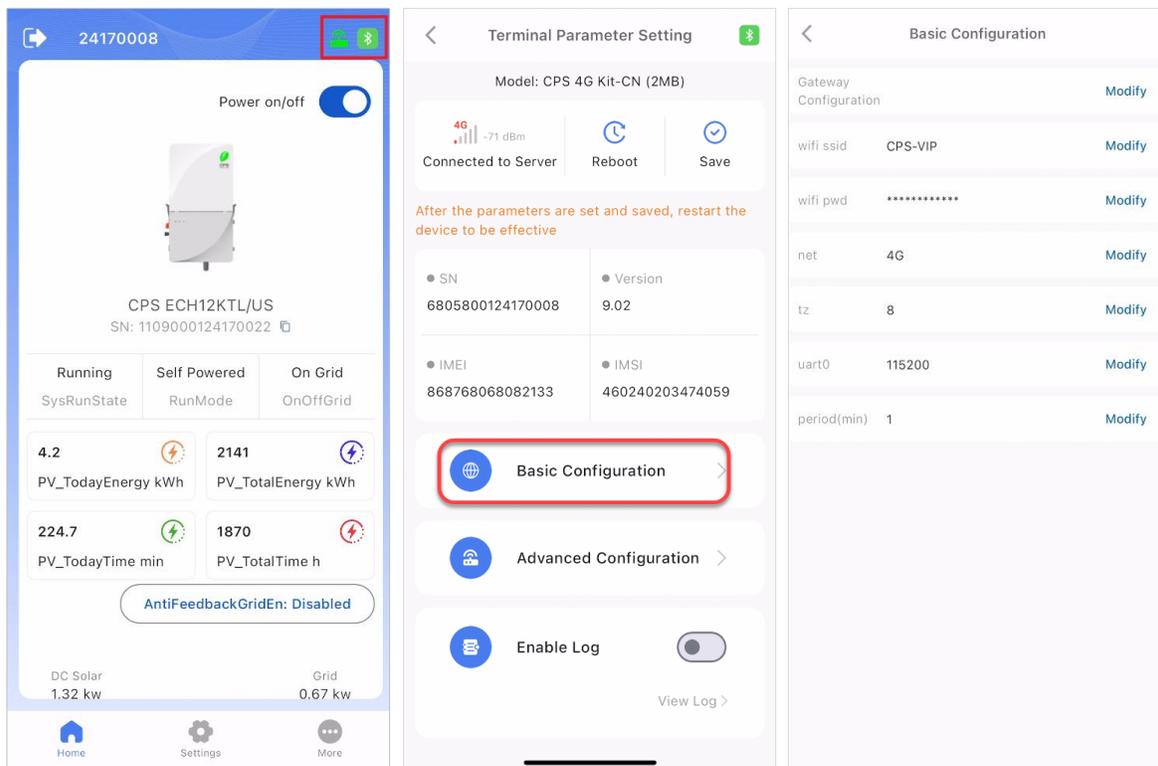
Figure 6-15 Communication Mode Configuration

2. The **Power on/off** button controls turning the inverter on and off.

3. The system status (**SysRunState**) has four inverter modes:

- **Standby**: After the inverter is powered on, it enters Standby mode and the **Power on/off** button will be gray.

- **PreChecking**: After sliding the **Power on/off** button to *on*, after which it will appear blue, the inverter will begin a series of self-checks.

- **Running**: If there is no failure and the **Power on/off** button remains blue, the inverter will turn on and begin running.

- **Fault**: If there are any failures, the **Power on/off** button will return to gray and a red fault message will appear beneath it. Tap **View** in this fault message to access the fault records and clear faults.
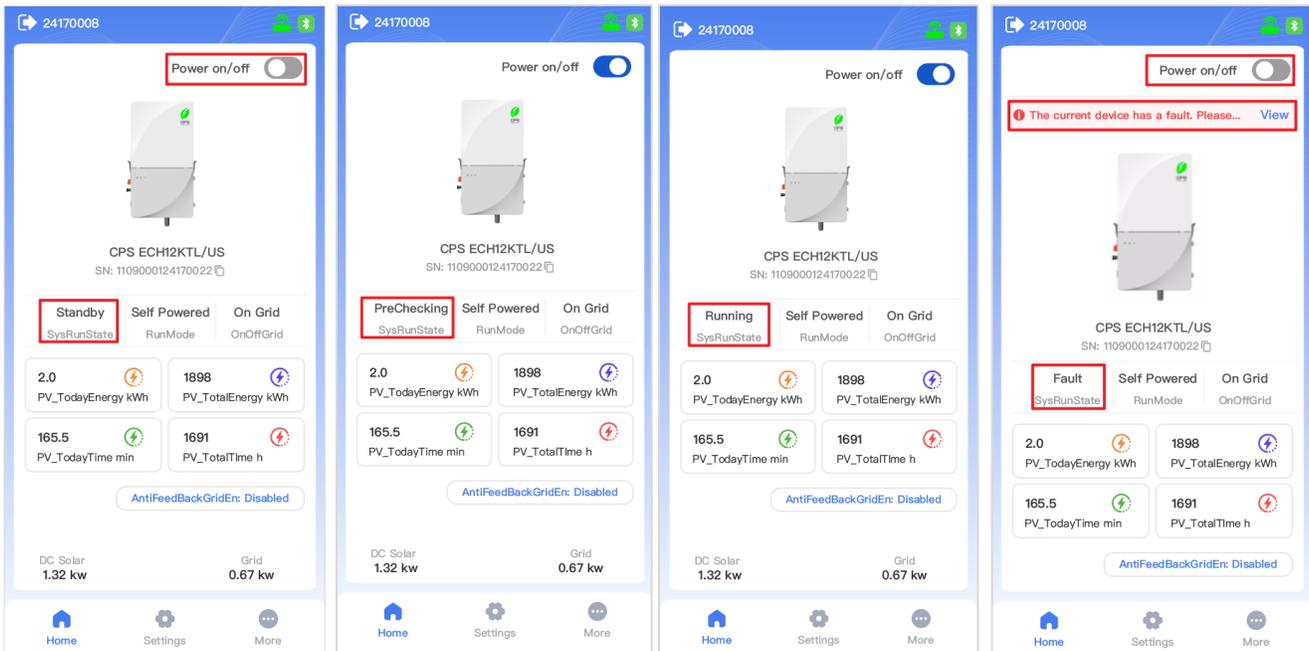
Figure 6-16 Switch On/Off and System Modes

4. There are multiple running modes (**RunMode**), which can be set up in the **Settings** menu (see Section 6.3.18 EMS Parameters):

- Pure PV

- Self-Powered

- Fully Fed

- Emergency Charging

- Forced Off-Grid

- TOU function

Figure 6-17 RunMode

5. **OnOffGrid** shows the on-grid or off-grid status of the inverter, which cannot be set in this interface and will change according to the actual grid connection state.
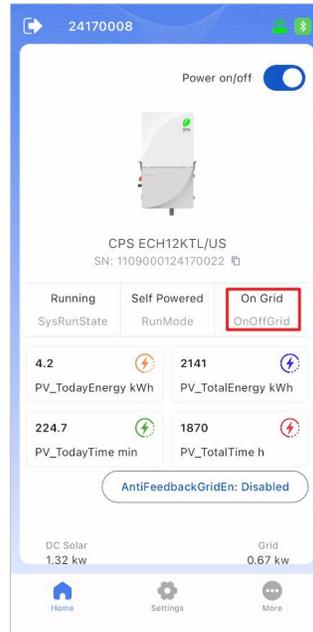
Figure 6-18 OnOffGrid

6. Below **SysRunState**, **RunMode**, and **OnOffGrid**, the energy generation statistics are displayed: the current day's energy generation, energy from PV in total, the current day's PV generation time in minutes, and the current day's PV generation time in hours.

Figure 6-19 Energy Generation Statistics

7.   Tap **AntiFeedbackGridEn** to enable or disable the anti-feedback (anti-backflow) function:
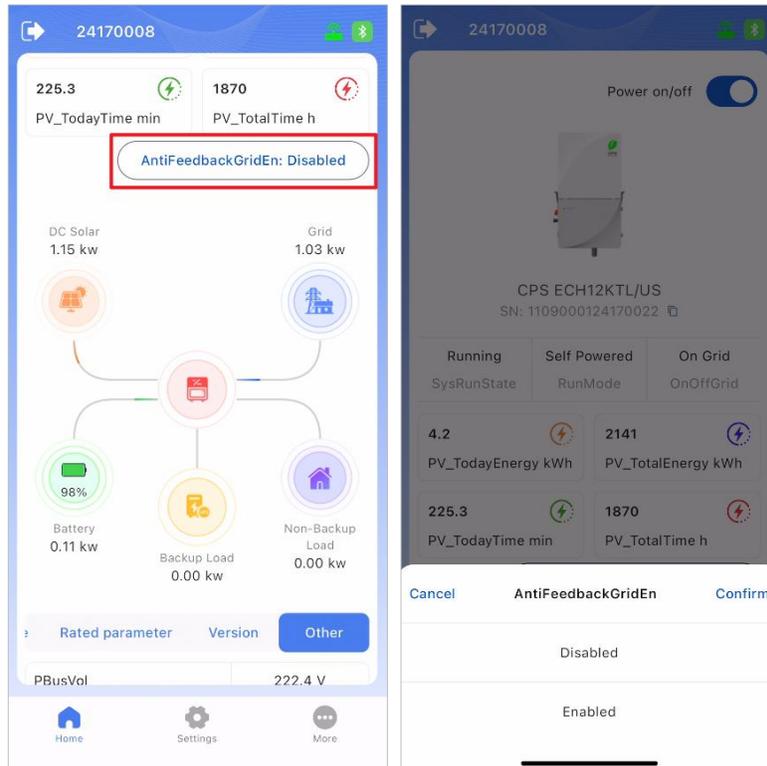
Figure 6-20 Enable or Disable Anti-feedback

8. This portion of the screen has a series of tabs, and by selecting these tabs, you can see the generation capacity and access eight submenus: Detail, Parallel operation, PV, Power grid, Inversion, Battery information, Temperature, Rated parameter, Version, and Other.
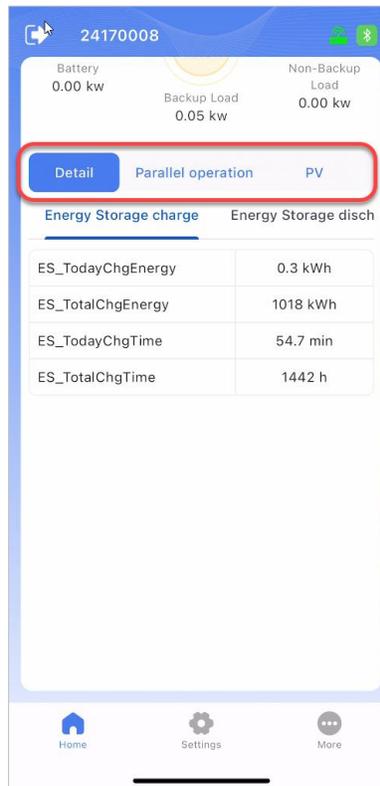
Figure 6-21 Parameter Subcategories

- **Detail**: Displays energy storage charge and energy storage discharge information, power purchase, power feedback, load consumption, and charge and discharge information.

- **Parallel operation**: Displays the total power of PV inverters, batteries, loads, and generators in parallel.

- **PV**: Displays the average voltage, average current, and power of the three (3) MPPT channels (PV1, PV2, and PV3).

- **Battery information**: Displays battery parameters, including voltage, current, temperature, SOC, and SOH.

- **Inversion**: Displays two-phase voltage, current, frequency, and power, reactive power values, total power, power factor, and apparent power parameters of the inverter.

- **Power grid**: Displays the two-phase voltage, current, power, and reactive power values of the power grid.

Screen 1 (Detail - Energy Storage charge)

| Backup Load | 0.00 kw |
| 0.05 kw | |

Detail | Parallel operation | PV

Energy Storage charge | Energy Storage disch

ES_TodayChgEnergy	0.3 kWh
ES_TotalChgEnergy	1018 kWh
ES_TodayChgTime	54.7 min
ES_TotalChgTime	1442 h

Home | Settings | More

Screen 2 (Parallel operation)

24170008

Detail | **Parallel operation** | PV

ParallelPVTotalPwr	0.75 kW
ParallelBatteryTotalPwr	0.04 kW
ParallelBatteryAvgSOC	2.0 %
ParallelLoadL1TotalPwr	0.01 kW
ParallelLoadL2TotalPwr	0.00 kW
ParallelLoadL3TotalPwr	0.00 kW
ParallelGenL1TotalPwr	0.00 kW
ParallelGenL2TotalPwr	0.00 kW

Home | Settings | More

Screen 3 (PV)

24170008

Parallel operation | **PV** | battery informati

PV1AvgVol	0.0 V
PV2AvgVol	340.5 V
PV3AvgVol	0.0 V
PV1AvgCurr	0.00 A
PV2AvgCurr	2.21 A
PV3AvgCurr	0.00 A
PV1Power	0.00 kW
PV2Power	0.75 kW
PV3Power	0.00 kW

Home | Settings | More

Screen 4 (battery information)

24170008

PV | **battery information** | inversion

BatteryVol	48.9 V
BatteryCurr	0.00 A
BatPower	0.00 kW
BatteryState	Standby
BatterySOC	2 %
ChargeCurrLimt	200.00 A
DisChargeCurrLimt	0.00 A
BattRateCap	400 Ah
ABF_Rated_Capacity	1600 kWh

Home | Settings | More

Screen 5 (inversion)

24170008

tery information | **inversion** | Power grid | T

InvL1Curr	3.03 A
InvL2Curr	3.06 A
InvL1Freq	50.01 Hz
InvL2Freq	50.01 Hz
InvL1Power	0.35 kW
InvL2Power	0.35 kW
InvPower	0.70 kW
InvL1ReactivePower	0.02 kVar
InvL2ReactivePower	0.01 kVar
InvReactivePower	0.03 kVar
InvL1ApparentPower	0.38 kVA
InvL2ApparentPower	0.39 kVA
InvApparentPower	0.77 kVA
InvL1PF	0.899
InvL2PF	0.897

Home | Settings | More

Screen 6 (Power grid)

24170008

on | Inversion | **Power grid** | Temperature

GridFreq	50.00 Hz
GridL1Volt	127.6 V
GridL2Volt	127.5 V
GridL1Curr	4.13 A
GridL2Curr	4.15 A
GridL1Power	-0.37 kW
GridL2Power	-0.37 kW
GridPower	-0.75 kW
GridL1ReactivePower	-0.31 kVar
GridL2ReactivePower	-0.29 kVar
GridReactivePower	-0.62 kVar

Home | Settings | More

Figure 6-22 Detail, Parallel Operation, PV, Battery Information, Inversion, and Power Grid Subcategories

- **Temperature**: Displays the temperature for the environment, inverter mode heat sink, PCB, battery, junction box interior, Acs, and Dcs.

- **Other**: Displays important parameters of the generator, power and voltage values of critical loads, ordinary loads, and the inverter.

- **Rated parameter**: Displays the three main rated parameters (frequency, voltage, and power) of the inverter.

- **Version**: Displays the software version numbers of the current six modules for customers to check if the software is updated to the latest version.
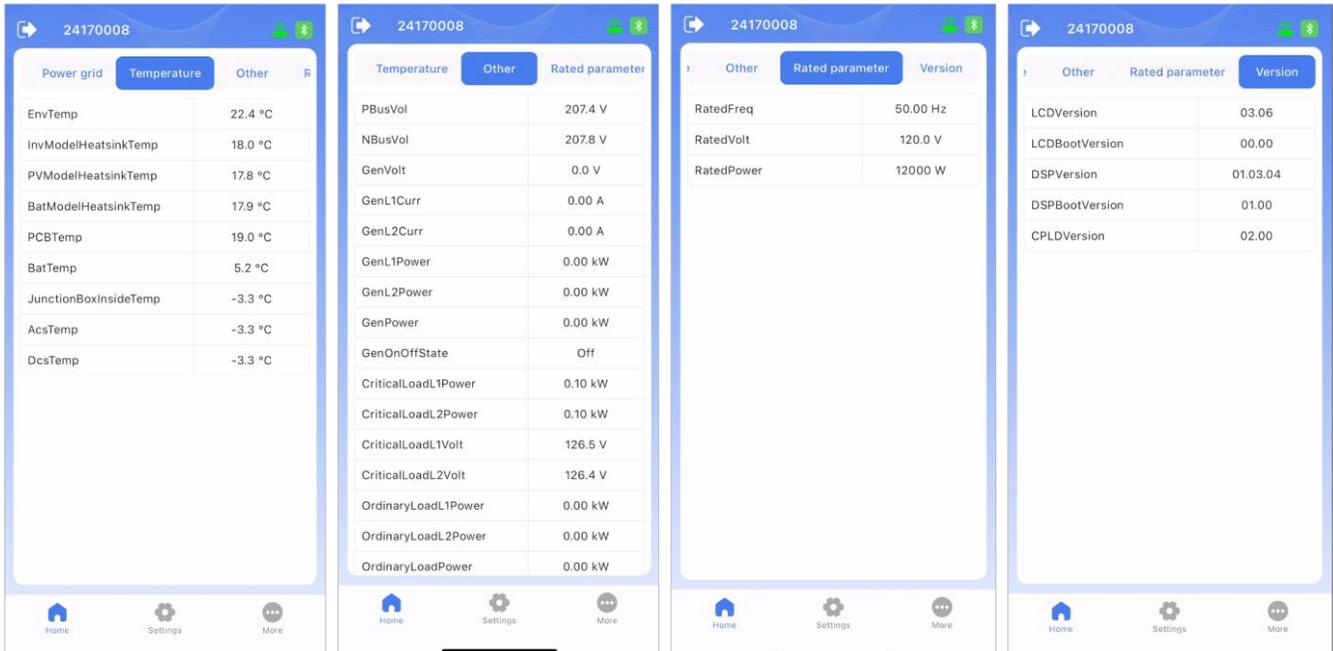
Figure 6-23 Temperature, Rated Parameter, Version, and Other Subcategories

6.3 Settings Menu

> ⚠️ **NOTICE:**
>
> The following screenshots show parameters in accordance with IEEE 1547-2018.

1. Tap the **Settings** icon at the bottom of the screen.

2. Enter "1111" as the password to enter the settings interface.
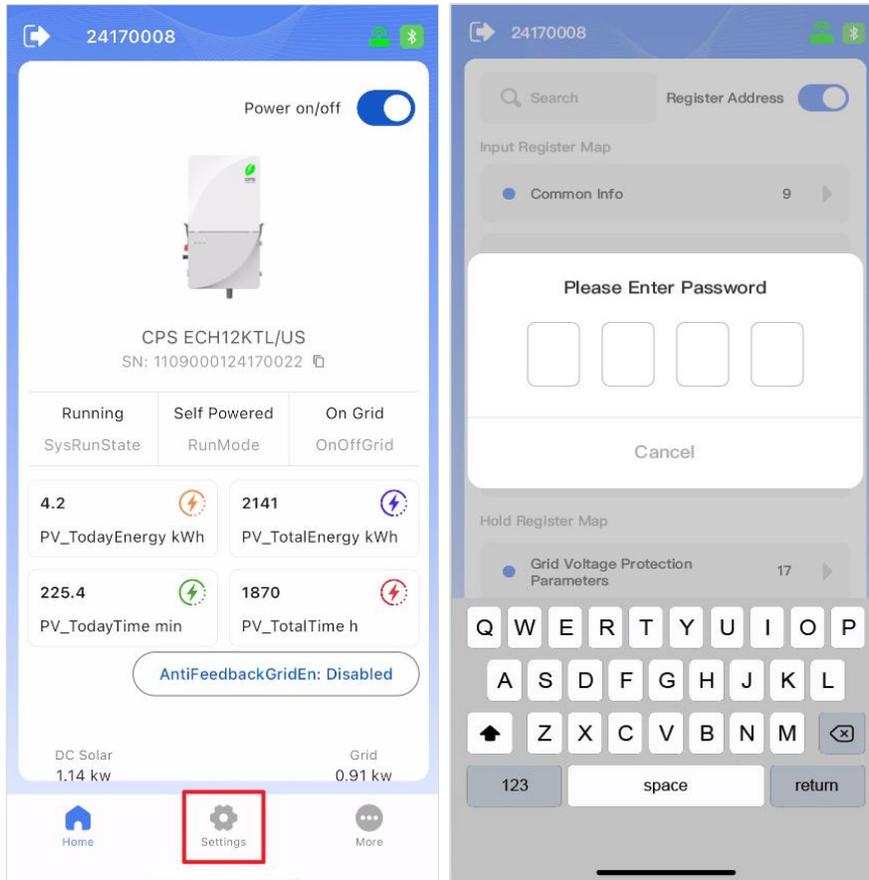
Figure 6-24 Settings Interface

The Settings page comprises two parts: Input Register Map and Hold Register Map. (The Input Register Map is read only.)
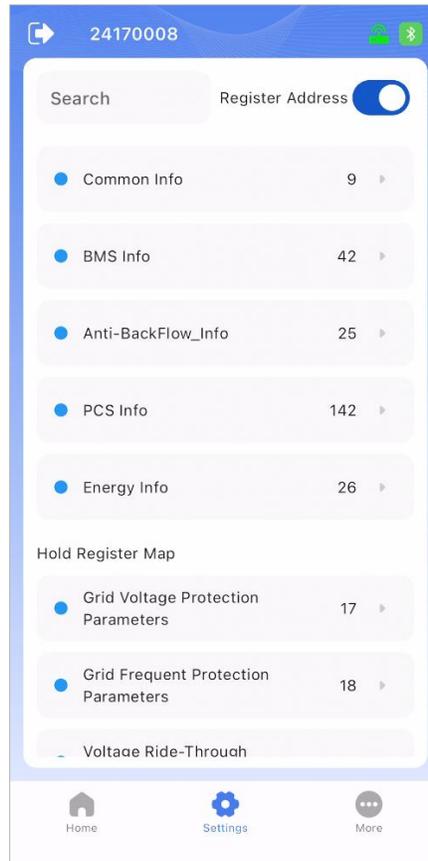
Figure 6-25 Input Register map

Input Register Map:

- Common Info

- BMS Info

- Anti-backflow Info

- PCS Info

- Energy Info
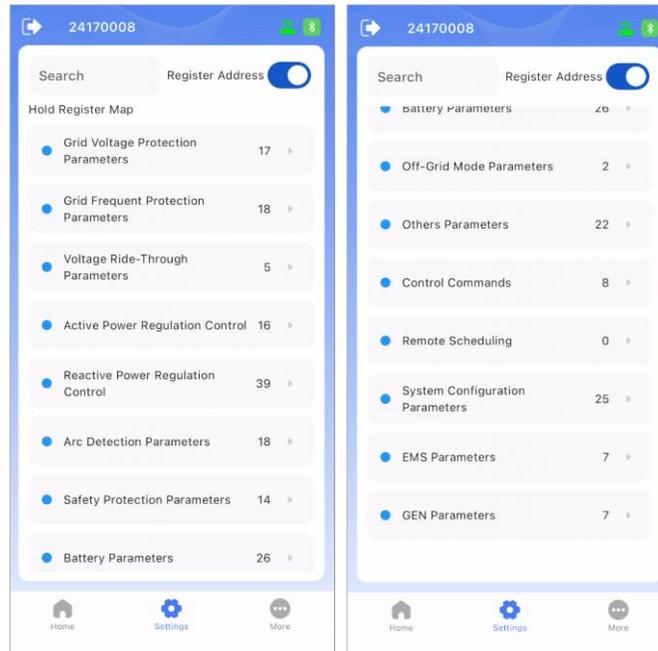
Figure 6-26 Hold Register Map

Hold Register Map:

- Grid Voltage Protection Parameters

- Grid Frequency Protection Parameters

- Voltage Ride-Through Parameters

- Active Power Regulation Control

- Reactive Power Regulation Control

- ARC Detection Parameters

- Safety Protection Parameters

- Battery Parameters

- Off-Grid Mode Parameters

- Other Parameters

- Control Commands

- Remote Scheduling

- System Configuration Parameters

- EMS Parameters

- GEN Parameters

NOTE: The Hold Register parameters are set by default at the factory and the user cannot modify them without authorization.
If you need to modify them, contact CPS customer service.

6.3.1 Common Info

In Common Info, you can see the hardware and software device information.

Figure 6-27 Common Info

6.3.2   BMS Info

In BMS Info, you can see various battery parameters such as SOC, charge/discharge limit current, voltage, current, temperature, and work status, as well as cell voltage, minimum and maximum temperature, minimum and maximum voltage address, minimum and maximum temperature address, battery SN, and software version.

Figure 6-28 BMS Info

6.3.3 Anti-Backflow Info

In Anti-Backflow Info, you can access anti-backflow information such as grid power, total energy bought and sold, current day's energy bought and sold, total load energy, current day's load energy, total PV energy, current day's PV energy, ABF enable and disable, battery charge and discharge kWh, grid load power, and backup load power.

Figure 6-29 Anti-Backflow Info

6.3.4 PCS Info

In PCS Info, you can access more detailed PCS information such as LCD/DSP version, rated power, rated frequency, rated voltage, parallel mode, generator type, grid type, battery type, standard value, inverter L1/L2 frequency, inverter L1/L2 current, inverter L1/L2 voltage, inverter L1/L2 power, PV 1/2/3 current, PV 1/2/3 voltage, generator L1/L2 power, warnings, faults, running mode, system status, and battery status.

PCS Info

Parameter	Value
Device 0x0800 - 2048	CPS 12kW Photovoltaic Storage
SafetyVersion 0x0802 - 2050	01.00
LCDVersion 0x0803 - 2051	02.27
LCDBootVersion 0x0804 - 2052	01.00
DSPVersion 0x0805 - 2053	02.16
DSPVersion 0x0805 - 2053	01.02.16
DSPBootVersion 0x0806 - 2054	01.00
CPLDVersion 0x0807 - 2055	02.00
SN 0x0808 - 2056	1109000124170022
Model 0x080C - 2060	CPS ECH12KTL/US
RatedFreq Hz 0x0816 - 2070	50.00

PCS Info

Parameter	Value
RatedVolt V 0x0817 - 2071	120.0
RatedPower W 0x0818 - 2072	12000
InvParallelMode 0x0819 - 2073	Single machine
PVLinkMode 0x081B - 2075	Independent mode
GenPortType 0x081C - 2076	Null
GridType 0x081D - 2077	120/240V split phase
StandardValue 0x081E - 2078	IEEE1547_2018
BatteryType 0x081F - 2079	Li
GridPortType 0x0820 - 2080	Grid
LoadPortType1 0x0821 - 2081	Null
InvL1Volt V 0x082C - 2092	125.1

PCS Info

Parameter	Value
InvL2Volt V 0x082D - 2093	125.5
InvL1L2Volt V 0x082E - 2094	250.6
InvL1Curr A 0x082F - 2095	1.68
InvL2Curr A 0x0830 - 2096	1.76
InvL1Freq Hz 0x0831 - 2097	49.99
InvL2Freq Hz 0x0832 - 2098	49.99
EnvTemp °C 0x0833 - 2099	46.7
InvModelHeatsinkTemp °C 0x0834 - 2100	41.2
PVModelHeatsinkTemp °C 0x0835 - 2101	42.5
BatModelHeatsinkTemp °C 0x0836 - 2102	44.0
PBusVol V 0x0837 - 2103	215.1

PCS Info

Parameter	Value
NBusVol V 0x0838 - 2104	214.9
BatteryVol V 0x0839 - 2105	52.7
BatteryCurr A 0x083A - 2106	-14.60
PV1AvgVol V 0x083B - 2107	0.0
PV2AvgVol V 0x083C - 2108	303.0
PV3AvgVol V 0x083D - 2109	0.0
PV1AvgCurr A 0x083E - 2110	0.00
PV2AvgCurr A 0x083F - 2111	2.84
PV3AvgCurr A 0x0840 - 2112	0.00
BatPower kW 0x0841 - 2113	-0.80
PV1Power kW 0x0842 - 2114	0.00

PCS Info

Parameter	Value
PV3AvgCurr A 0x0840 - 2112	0.00
BatPower kW 0x0841 - 2113	-0.80
PV1Power kW 0x0842 - 2114	0.00
PV2Power kW 0x0843 - 2115	0.87
PV3Power kW 0x0844 - 2116	0.00
InvL1Power kW 0x0845 - 2117	0.01
InvL2Power kW 0x0846 - 2118	0.01
InvPower kW 0x0847 - 2119	0.02
InvL1ReactivePower kVar 0x0848 - 2120	-0.12
InvL2ReactivePower kVar 0x0849 - 2121	-0.14
InvReactivePower kVar 0x084A - 2122	-0.27

PCS Info

Parameter	Value
InvL1ApparentPower kVA 0x084B - 2123	0.21
InvL2ApparentPower kVA 0x084C - 2124	0.22
InvApparentPower kVA 0x084D - 2125	0.43
InvL1PF 0x084E - 2126	0.000
InvL2PF 0x084F - 2127	0.000
CriticalLoadL1Power kW 0x0850 - 2128	0.00
CriticalLoadL2Power kW 0x0851 - 2129	0.00
ParallelBatteryAvgSOC % 0x0852 - 2130	28.0
GenL1Power kW 0x0853 - 2131	0.00
GenL2Power kW 0x0854 - 2132	0.00
GenPower kW 0x0855 - 2133	0.00

PCS Info

Parameter	Address	Value
PvInvL1Power kW	0x0856 - 2134	0.00
PvInvL2Power kW	0x0857 - 2135	0.00
PvInvPower kW	0x0858 - 2136	0.00
OrdinaryLoadL1Power kW	0x0859 - 2137	0.00
OrdinaryLoadL2Power kW	0x085A - 2138	0.00
OrdinaryLoadPower kW	0x085B - 2139	0.00
OnOff	0x085C - 2140	Power on
Warning0	0x085D - 2141	Ex Fan Abn
Warning1	0x085E - 2142	
Warning2	0x085F - 2143	
MCUWarn	0x0860 - 2144	

PCS Info

Parameter	Address	Value
Fault0	0x0861 - 2145	
Fault1	0x0862 - 2146	
Fault2	0x0863 - 2147	
Fault3	0x0864 - 2148	
Fault4	0x0865 - 2149	
PFault	0x0866 - 2150	
MCUFault	0x0867 - 2151	
FaultTime	0x0868 - 2152	2024-09-18 10:05:24
RunMode	0x086C - 2156	Self Powered
SysState	0x086D - 2157	InverterRun GridOk Derating Warning OnOffGrid:On Grid;

PCS Info

Parameter	Address	Value
OnOffGrid	0x086D - 2157	On Grid
BatteryState	0x086E - 2158	Charge
SysRunState	0x086F - 2159	Running
PCBTemp °C	0x0870 - 2160	48.0
BatterySOC %	0x0871 - 2161	28
ChargeCurrLimt A	0x0872 - 2162	200.00
DisChargeCurrLimt A	0x0873 - 2163	200.00
DrivePwrSignal	0x0874 - 2164	Norm
OnOffOrderState dB	0x0875 - 2165	1
PvSysMode	0x0876 - 2166	4
BatSysMode	0x0877 - 2167	4

PCS Info

Parameter	Address	Value
InvSysMode	0x0878 - 2168	4
PvInvL1Volt V	0x0883 - 2179	0.0
PvInvL2Volt V	0x0884 - 2180	0.0
PvInvL1Curr A	0x0885 - 2181	0.00
PvInvL2Curr A	0x0886 - 2182	0.00
GridFreq Hz	0x0888 - 2184	49.99
GridL1Volt V	0x0889 - 2185	127.0
GridL2Volt V	0x088A - 2186	127.0
GridL1Curr A	0x088C - 2188	1.63
GridL2Curr A	0x088D - 2189	1.94
GridL1Power kW	0x088F - 2191	0.00

PCS Info

Parameter	Address	Value
GridL2Power kW	0x0890 - 2192	0.00
GridPower kW	0x0892 - 2194	0.00
GridL1ReactivePower kVar	0x0893 - 2195	0.13
GridL2ReactivePower kVar	0x0894 - 2196	0.14
GridReactivePower kVar	0x0895 - 2197	0.27
CriticalLoadL1Volt V	0x0896 - 2198	126.8
CriticalLoadL2Volt V	0x0897 - 2199	126.7
GenVolt V	0x0898 - 2200	0.0
GenL1Curr A	0x0899 - 2201	0.00
GenL2Curr A	0x089A - 2202	0.00
ExtL1Curr A	0x089B - 2203	0.18

PCS Info

Parameter	Address	Value
ExtL2Curr A	0x089C - 2204	0.20
BatTemp °C	0x089D - 2205	33.4
JunctionBoxInsideTemp °C	0x089E - 2206	31.2
AcsTemp °C	0x089F - 2207	31.2
DcsTemp °C	0x08A0 - 2208	31.2
BatteryProtocol	0x08A1 - 2209	1
BatNumOfReg	0x08A2 - 2210	39
OffsetAddrOfBat	0x08A3 - 2211	2256
GenOnOffState	0x08A6 - 2214	Off
BattRateCap Ah	0x08A8 - 2216	400
ParallelPVTotalPwr kW	0x08BB - 2235	0.87

PCS Info

Parameter	Address	Value
OffsetAddrOfBat	0x08A3 - 2211	2256
GenOnOffState	0x08A6 - 2214	Off
BattRateCap Ah	0x08A8 - 2216	400
ParallelPVTotalPwr kW	0x08BB - 2235	0.87
ParallelBatteryTotalPwr kW	0x08BC - 2236	-0.78
ParallelLoadL1TotalPwr kW	0x08BD - 2237	0.00
ParallelLoadL2TotalPwr kW	0x08BE - 2238	0.00
ParallelLoadL3TotalPwr kW	0x08BF - 2239	0.00
ParallelGenL1TotalPwr kW	0x08C0 - 2240	0.00
ParallelGenL2TotalPwr kW	0x08C1 - 2241	0.00

Figure 6-30 PCS Info

6.3.5 Energy Info

In Energy Info, you can access energy information such as the ES and PV total charge / discharge energy and time, ES and PV charge / discharge energy and time for the current day, grid total buy / sell energy and time, grid buy / sell time for the current day, load total buy / sell energy and time, and load buy / sell energy and time for the current day.

Figure 6-31 Energy Info

6.3.6   Grid Voltage Protection Parameters

The Grid Voltage Protection Parameters interface displays the protection parameters of the AC grid voltage such as maximum and minimum grid voltage in various levels, maximum and minimum grid trip time in various levels, and over voltage / under voltage recovery value and time. Additionally, you can enable or disable over voltage / under voltage protection.

Figure 6-32 Grid Voltage Protection Parameters

Table 6-1 Grid Voltage Protection Parameters

Parameter Group		Setting Range								
Parameter Name	**Description**	**IEEE 1547-2018**			**Rule 21**			**HECO**		
		Min	Default	Max	Min	Default	Max	Min	Default	Max
Grid Over Voltage Protection										
OVEnable	-	Disabled	**Enabled**		Disabled	**Enabled**		Disabled	**Enabled**	
GridV.Max_1 (%)	Threshold level 1 max. grid voltage	100.0	**110.0**	135.0	100.0	**110.0**	135.0	100.0	**110.0**	135.0
VolMaxTripTime_1 (s)	Trip time level 1 max. grid voltage	0	**13.00**	655.35	0	**13.00**	655.35	0	**13.00**	655.35
GridV.Max_2 (%)	Threshold level 2 max. grid voltage	100.0	**120.0**	135.0	100.0	**120.0**	135.0	100.0	**120.0**	135.0
VolMaxTripTime_2 (s)	Trip time level 2 max. grid voltage	0	**0.16**	655.35	0	**0.16**	655.35	0	**0.16**	655.35
GridV.Max_3 (%)	Threshold level 3 max. grid voltage	100.0	**120.0**	135.0	100.0	**120.0**	135.0	100.0	**120.0**	135.0
VolMaxTripTime_3 (s)	Trip time level 3 max. grid voltage	0	**0.16**	655.35	0	**0.16**	655.35	0	**0.16**	655.35
GridVolRecover_Max (%)	Over voltage recovery parameter	100.0	**105.0**	110.0	100.0	**108.0**	110.0	100.0	**108.0**	110.0
Grid Under Voltage Protection										
UVEnable	-	Disabled	**Enabled**		Disabled	**Enabled**		Disabled	**Enabled**	
GridV.Min_1 (%)	Threshold level 1 min. grid voltage	0	**88.0**	100	0	**88.0**	100	0	**88.0**	100
VolMinTripTime_1 (s)	Trip time level 1 min. grid voltage	0	**21.00**	655.35	0	**21.00**	655.35	0	**21.00**	655.35
GridV.Min_2 (%)	Threshold level 2 min. grid voltage	0	**50.0**	100	0	**50.0**	100	0	**10.0**	100
VolMinTripTime_2 (s)	Trip time level 2 min. grid voltage	0	**2.00**	655.35	0	**2.00**	655.35	0	**2.00**	655.35
GridV.Min_3 (%)	Threshold level 3 min. grid voltage	0	**50.0**	100	0	**50.0**	100	0	**10.0**	100
VolMinTripTime_3 (s)	Trip time level 3 min. grid voltage	0	**2.00**	655.35	0	**2.00**	655.35	0	**2.00**	655.35
GridVolRecover_Min (%)	Under voltage recovery parameter	88.0	**91.7**	100.0	88.0	**90.0**	100.0	88.0	**90.0**	100.0
GridVolRecover_Time (s)	Over and under voltage recovery time	0	**300.00**	655.35	0	**300.00**	655.35	0	**300.00**	655.35

6.3.7   Grid Frequency Protection Parameters

The Grid Frequency Protection Parameters interface displays the protection parameters of the grid frequency such as maximum and minimum grid frequency at various levels, maximum and minimum grid trip time at various levels, and over frequency / under frequency recovery values and times. Additionally, you can enable or disable over frequency / under frequency protection.
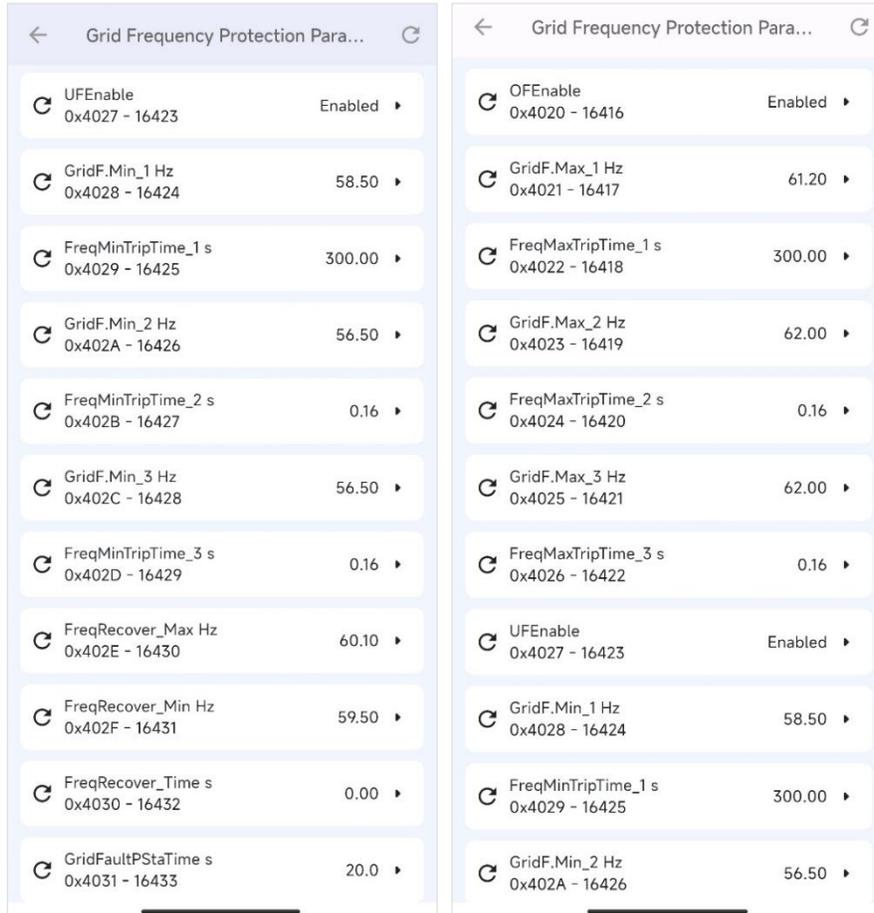
Figure 6-33 Grid Frequency Protection Parameters

Table 6-2 Grid Frequency Protection Parameters

Parameter Group		Setting Range								
Parameter Name	Description	IEEE 1547-2018			Rule 21			HECO		
		Min	Default	Max	Min	Default	Max	Min	Default	Max
Grid Over Frequency Protection										
OFEnable	-	Disabled	**Enabled**		Disabled	**Enabled**		Disabled	**Enabled**	
GridF.Max_1 (Hz)	Threshold level 1 max. grid frequency	50.00	**61.20**	62.00	50.00	**60.50**	135.0	50.00	**63.00**	62.00
FrqMaxTripTime_1 (s)	Trip time level 1 max. grid frequency	0	**300.00**	1310.7	0	**300.00**	1310.7	0	**180.00**	1310.7
GridF.Max_2 (Hz)	Threshold level 2 max. grid frequency	50.00	**62.00**	62.00	50.00	**62.00**	135.0	50.00	**65.00**	65.00
FrqMaxTripTime_2 (s)	Trip time level 2 max. grid frequency	0	**0.16**	1310.7	0	**0.16**	1310.7	0	**0.16**	1310.7
GridF.Max_3 (Hz)	Threshold level 3 max. grid frequency	50.00	**62.00**	62.00	50.00	**62.00**	135.0	50.00	**65.00**	65.00
FrqMaxTripTime_3 (s)	Trip time level 3 max. grid frequency	0	**0.16**	1310.7	0	**0.16**	1310.7	0	**0.16**	1310.7
FreqRecover_Max (Hz)	Over frequency recovery parameter	50.00	**60.10**	51.00	50.00	**60.40**	51.00	50.00	**60.10**	65.00
Grid Under Frequency Protection										
UFEnable	-	Disabled	**Enabled**		Disabled	**Enabled**		Disabled	**Enabled**	
GridF.Min_1 (Hz)	Threshold level 1 min. grid frequency	38.00	**58.5**	50.00	38.00	**58.5**	50.00	38.00	**57.0**	65.00
FrqMinTripTime_1 (s)	Trip time level 1 min. grid frequency	0	**300.00**	1310.7	0	**300.00**	1310.7	0	**180.00**	1310.7
GridF.Min_2 (Hz)	Threshold level 2 min. grid frequency	38.00	**56.5**	50.00	38.00	**57.0**	50.00	38.00	**50.0**	65.00
FrqMinTripTime_2 (s)	Trip time level 2 min. grid frequency	0	**0.16**	1310.7	0	**0.16**	1310.7	0	**0.16**	1310.7
GridF.Min_3 (Hz)	Threshold level 3 min. grid frequency	38.00	**56.5**	50.00	38.00	**57.0**	50.00	38.00	**50.0**	50.00
FrqMinTripTime_3 (s)	Trip time level 3 min. grid frequency	0	**0.16**	1310.7	0	**0.16**	1310.7	0	**0.16**	1310.7
FreqRecover_Min (Hz)	Under frequency recovery parameter	49.00	**59.50**	50.00	49.00	**58.60**	50.00	49.00	**59.50**	65.00
FreqRecover_Time (s)	Over and under frequency recovery time	0	**30.00**	655.35	0	**30.00**	655.35	0	**300.00**	655.35
GridFaultPStaTime (s)	Frequency fault recovery time	1.0	**20.0**	1000.0	1.0	**20.0**	1000.0	1.0	**300.00**	1000.0

6.3.8 Voltage Ride-Through Parameters

The Voltage Ride-Through Parameters interface displays the LVRT and HVRT protection parameters.
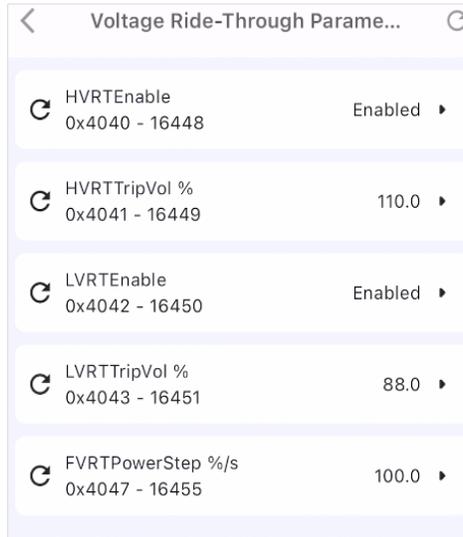
Figure 6-34 Voltage Ride-Through Parameters

Table 6-3 Voltage Ride-Through Parameters

Parameter Group		Setting Range								
Parameter Name	**Description**	**IEEE 1547-2018**			**Rule 21**			**HECO**		
		Min	**Default**	**Max**	**Min**	**Default**	**Max**	**Min**	**Default**	**Max**
HVRT										
HVRTEnable	Enable or disable HVRT protection	Disabled	**Enabled**		Disabled	**Enabled**		**Disabled**		Enabled
HVRTTripVolt	HVRT trigger voltage	100%	**110%**	120%	100%	**110%**	120%	100%	**110%**	120%
LVRT										
LVRTEnable	Enable or disable LVRT protection	Disabled	**Enabled**		Disabled	**Enabled**		**Disabled**		Enabled
LVRTTripVolt	LVRT trigger voltage	70%	**88%**	100%	70%	**88%**	100%	70%	**88%**	100%
FVRT										
FVRTPowerStep (%/s)	Power step size when crossing	-	**100.0**	-	-	**100.0**	-	-	**100.0**	-
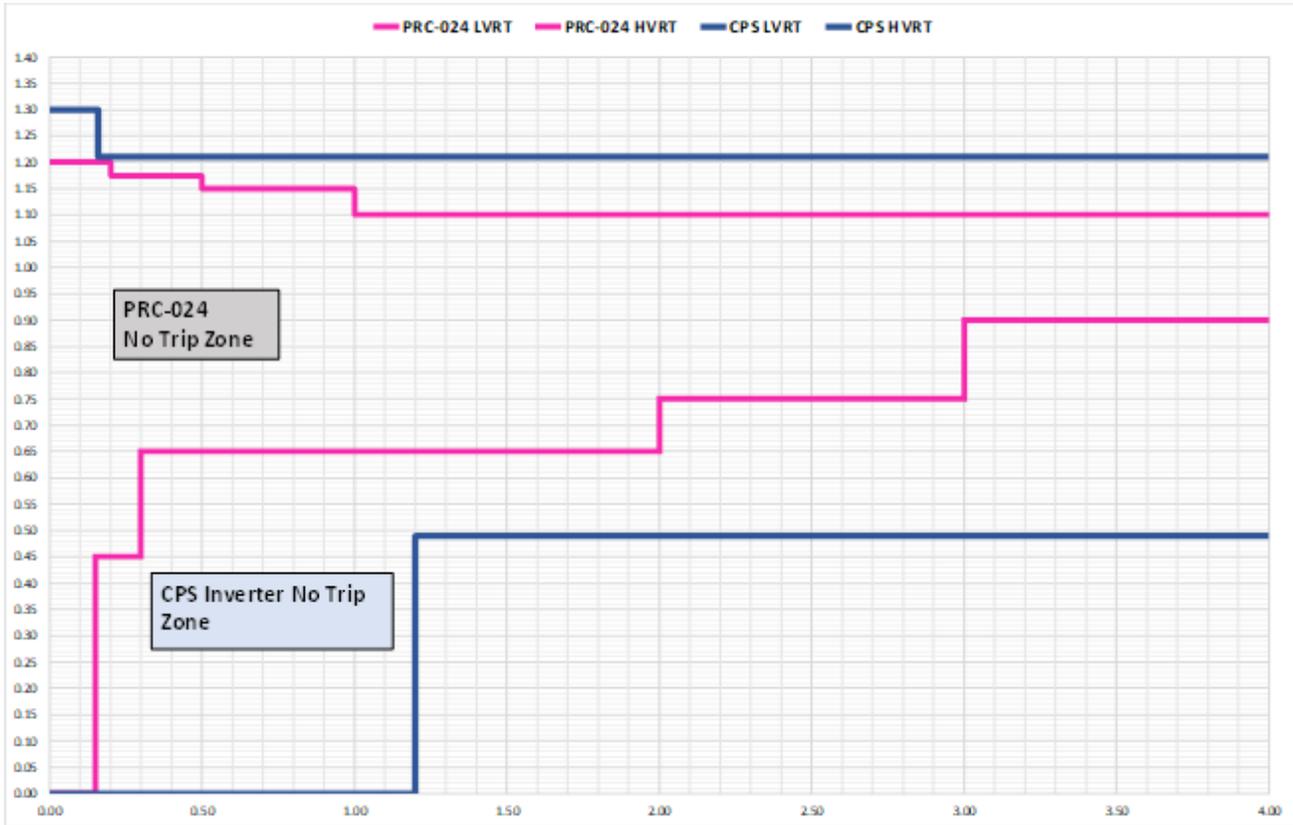
Figure 6-35 HVRT Curve
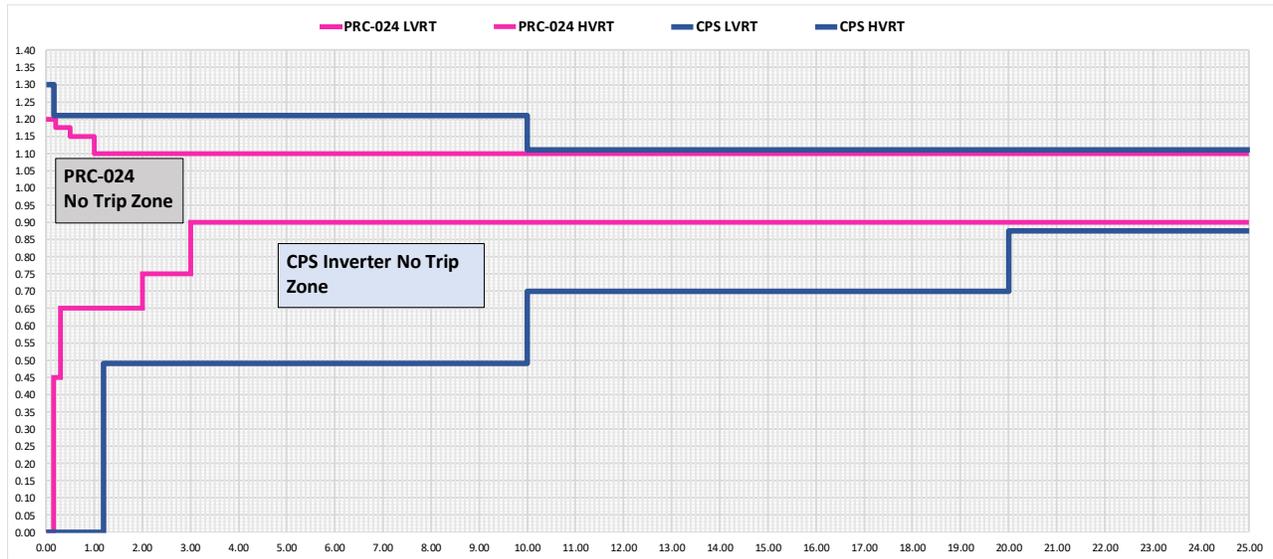
Figure 6-36 LVRT Curve

6.3.9   Active Power Regulation Control

The Active Power Regulation Control interface allows you to set the inverter L1/L2 active power, over frequency / under frequency derating trigger frequency, over frequency / under frequency derating slope, frequency active power recovery time, frequency active response time, over voltage derating start voltage, over voltage derating end voltage, over voltage derating start power, over voltage derating end power, voltage derating response time, and more.

Figure 6-37 Active Power Regulation Control
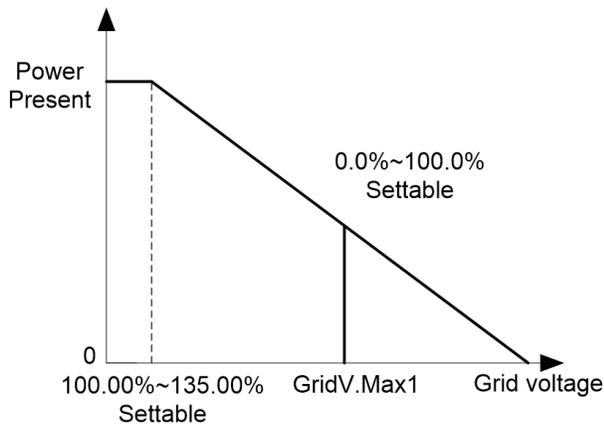
Figure 6-38 Over Voltage Derating Curve
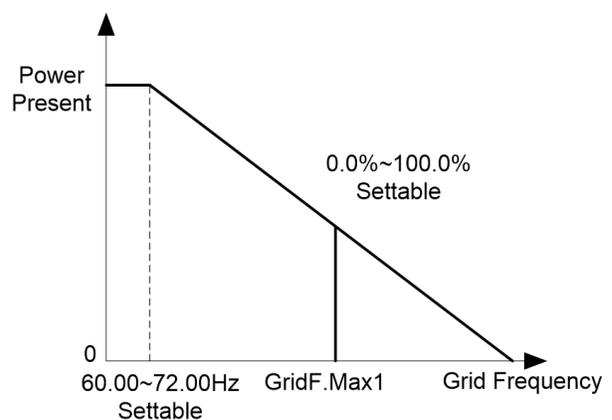
Figure 6-39 Over Frequency Derating Curve

Table 6-4 Active Power Parameters

Parameter Group		Setting Range								
Parameter Name	Description	IEEE 1547-2018			Rule 21			HECO		
		Min	Default	Max	Min	Default	Max	Min	Default	Max
InvL1CSPPer (%)	Inverter L1 active power setting	-100	**100**	100	-100	**100**	100	-100	**100**	100
InvL2CSPPer (%)	Inverter L2 active power setting	-100	**100**	100	-100	**100**	100	-100	**100**	100
PActStep (%)	Active response step size	0.1	**100**	100.1	0.1	**0**	100.1	0.1	**0**	100.1
FWEnable	Frequency active control enable	Disabled	**Enabled**		Disabled	**Enabled**		Disabled	**Enabled**	
FWdbOF (Hz)	Over frequency derating trigger frequency	0.001	**0.036**	1.000	0.001	**0.036**	1.000	0.001	**0.036**	1.000
FWkOF	Over frequency derating slope	0.001	**0.050**	1.000	0.001	**0.050**	1.000	0.001	**0.040**	1.000
FWdbUF (Hz)	Under frequency derating trigger frequency	0.001	**0.036**	1.000	0.001	**0.036**	1.000	0.001	**0.036**	1.000
FWkUF	Under frequency derating slope	0.001	**0.050**	1.000	0.001	**0.050**	1.000	0.001	**0.040**	1.000
FWRecPowerTime	Frequency active power recovery time	0.0	**10.0**	60.0	0.0	**10.0**	60.0	0.0	**10.0**	60.0
FWActTime	Frequency active response time	0.2	**5.0**	10.0	0.2	**5.0**	10.0	0.2	**0.5**	10.0
VWEnable	Overvoltage derating enable	**Disabled**		Enabled	**Disabled**		Enabled	Disabled	**Enabled**	
VWCurveVolt1 (%)	Over voltage derating starting voltage	105	**106**	109	105	**106**	109	105	**106**	109
VWCurvePow1 (%)	Over voltage derating starting power	0	**100**	100	0	**100**	100	0	**100**	100
VWCurveVolt2 (%)	Over voltage derating end voltage	106	**110**	110	106	**110**	110	106	**110**	110
VWCurvePow2 (%)	Over voltage derating end power	-100	**0**	100	-100	**0**	100	-100	**0**	100
VWActTime	Voltage derating response time	0.5	**10**	60	0.5	**10**	60	0.5	**10**	60

6.3.10 Reactive Power Regulation Control

In Reactive Power Regulation Control, you can choose different reactive power control modes by tapping **CSQCtrModeSet** and setting the corresponding parameters that appear under the running mode.
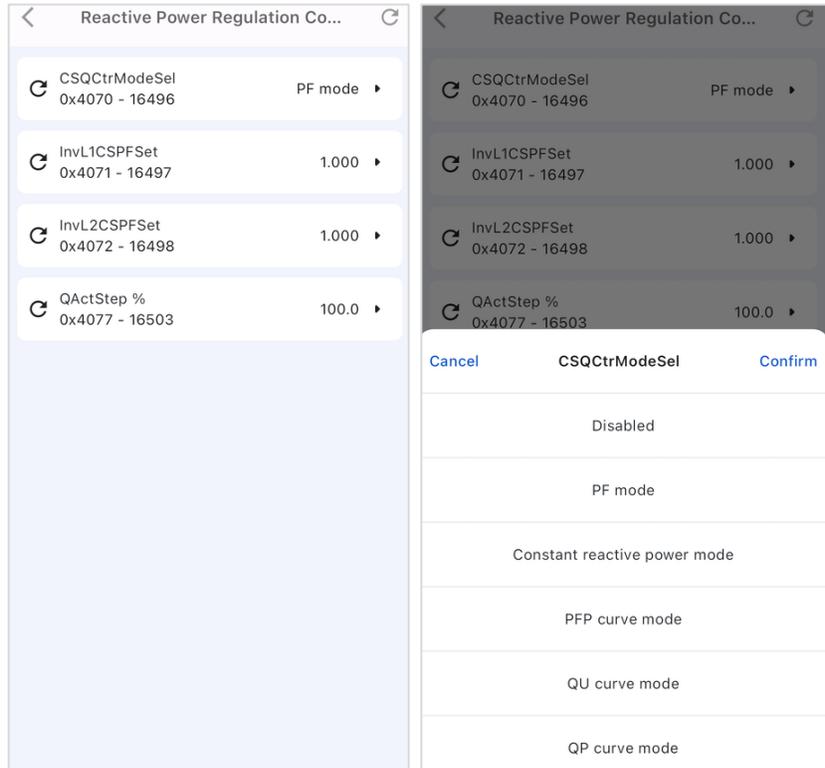
Figure 6-40 Reactive Power Regulation Control

In this menu, the five different modes have different register parameters.

- PF mode
- Constant reactive power mode
- PFP mode
- QU curve mode
- QP curve mode

6.3.10.1   PF Mode

In this mode, you can set the inverter L1/L2 PF and reactive power response step.
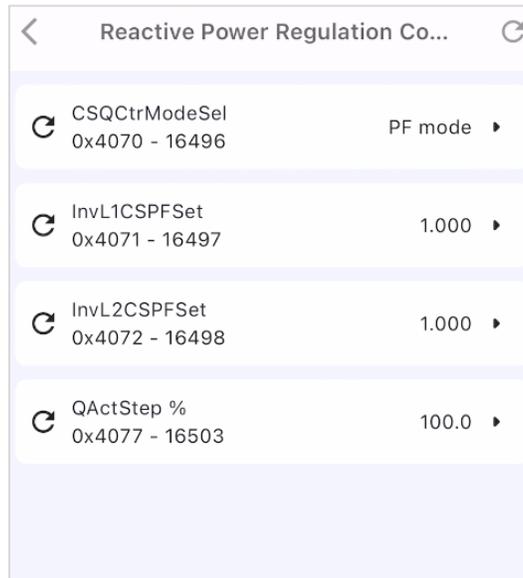
Figure 6-41 PF Mode

Table 6-5 PF Mode Parameters

Parameter Group		Setting Range								
Parameter Name	**Description**	**IEEE 1547-2018**			**Rule 21**			**HECO**		
		Min	**Default**	**Max**	**Min**	**Default**	**Max**	**Min**	**Default**	**Max**
PFMode	Constant power factor mode	-	-	-	-	-	-	**Disabled**		Enabled
InvL1CSPFSet (%)	Inverter L1 PF settings	-1.000, -0.800	**1.000**	0.800, 1.000	-1.000, -0.800	**1.000**	0.800, 1.000	-1.000, -0.800	**-0.950**	0.800, 1.000
InvL2CSPFSet (%)	Inverter L2 PF settings	-1.000, -0.800	**1.000**	0.800, 1.000	-1.000, -0.800	**1.000**	0.800, 1.000	-1.000, -0.800	**-0.950**	0.800, 1.000
QActStep (%)	Reactive power response step	0.1	**100.0**	100.1	0.1	**100.0**	100.0	0.1	**100.0**	100.1

6.3.10.2 Constant Reactive Power Mode

In this mode, you can set the inverter L1/L2 reactive power and reactive power response step.
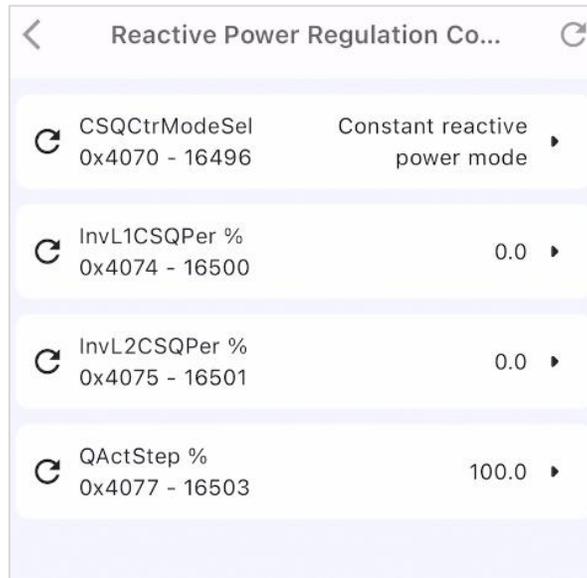
Figure 6-42 Constant Reactive Power Mode

Table 6-6 Constant Reactive Power Mode Parameters

Parameter Group		Setting Range								
Parameter Name	Description	IEEE 1547-2018			Rule 21			HECO		
		Min	Default	Max	Min	Default	Max	Min	Default	Max
QMode	Constant Q Mode	Disabled		Enabled	Disabled		Enabled	Disabled		Enabled
InvL1CSQPer (%)	Inverter L1 reactive power settings	-60.0	**0.0**	60.0	-60.0	**0.0**	60.0	-60.0	**0.0**	60.0
InvL2CSQPer (%)	Inverter L2 reactive power settings	-60.0	**0.0**	60.0	-60.0	**0.0**	60.0	-60.0	**0.0**	60.0
QActStep (%)	Reactive power response step	0.1	**100.0**	100.1	0.1	**100.0**	100.0	0.1	**100.0**	100.1

6.3.10.3 PFP Mode

In this mode, you can set the PFP curve P1/PF1, PFP curve P2/PF2, and PFP curve trigger / withdrawal voltage.

Figure 6-43 PFP Mode

Table 6-7 PFP Mode Parameters

Parameter Group		Setting Range								
		IEEE 1547-2018			Rule 21			HECO		
Parameter Name	Description	Min	Default	Max	Min	Default	Max	Min	Default	Max
PFPMode	Power factor – power mode	-	-	-	-	-	-	**Disabled**		Enabled
QActStep (%)	Reactive power response step	0.1	**100.0**	100.1	0.1	**100.0**	100.0	0.1	**100.0**	100.1
PFPCurveActPw1 (%)	PFP curve P1	-100	**50**	100	-100	**50**	100	-100	**50**	100
PFPCurvePF1	PFP curve PF1	-1.000, 0.800	**1.000**	-0.800, 1.000	-1.000, 0.800	**1.000**	-0.800, 1.000	-1.000, 0.800	**1.000**	-0.800, 1.000
PFPCurveActPw2 (%)	PFP curve P2	-100	**100.0**	100	-100	**100.0**	100	-100	**100.0**	100
PFPCurvePF2	PFP curve PF2	-1.000, 0.800	**-0.900**	-0.800, 1.000	-1.000, 0.800	**-0.900**	-0.800, 1.000	-1.000, 0.800	**-0.900**	-0.800, 1.000
PFPCurveLockInV (%)	PFP curve trigger voltage	100.0	**100.0**	110.0	100.0	**100.0**	110.0	100.0	**100.0**	110.0
PFPCurveLockOutV (%)	PFP curve withdrawal voltage	80.0	**90.0**	100.0	80.0	**90.0**	100.0	80.0	**90.0**	100.0

PF(P) curve: PF curve mode; note that the power factor changes according to the power change, as shown in Figure 6-42.
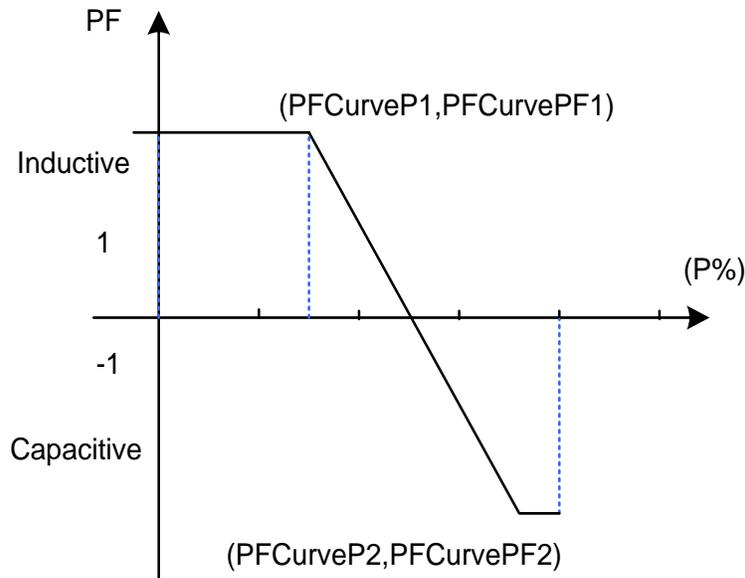
Figure 6-44 PF(P) Curve

6.3.10.4 QU Curve Mode

In this mode, you can set the Qu curve U1/Q1, Qu curve U2/Q2, Qu curve U1i/Q1i, Qu curve U2i/Q2i, Qu curve trigger / withdrawal voltage, Qu curve response time, Qu curve Vref adjustment time / enable, and more.
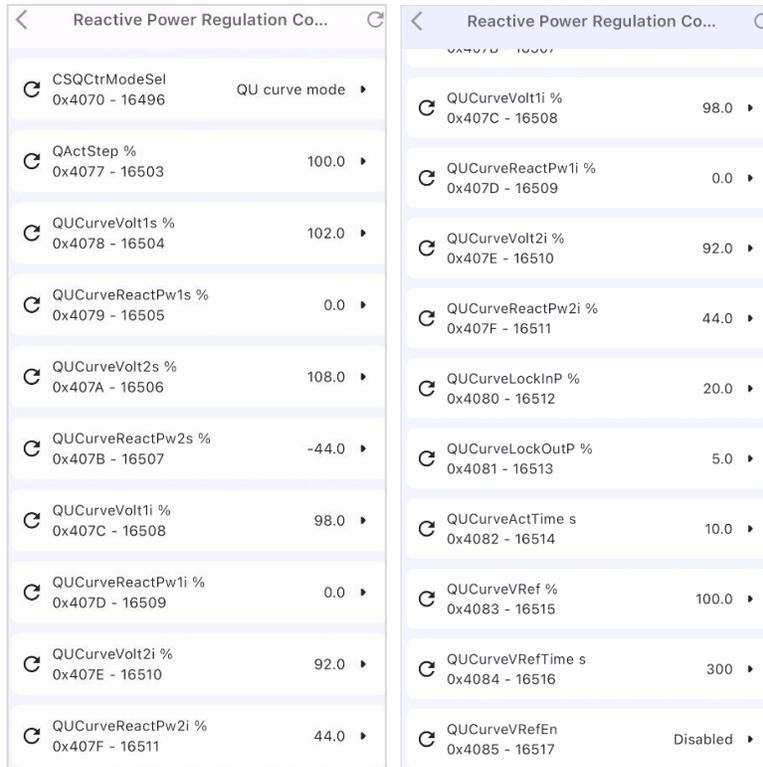
Figure 6-45 QU Curve Mode

Table 6-8 QU Curve Mode Parameters

Parameter Group		Setting Range								
Parameter Name	**Description**	**IEEE 1547-2018**			**Rule 21**			**HECO**		
		Min	**Default**	**Max**	**Min**	**Default**	**Max**	**Min**	**Default**	**Max**
QUmode	Vol-Var mode	-	-	-	-	-	-	**Disabled**		Enabled
QActStep (%)	Reactive power response step	0.1	**100.0**	100.1	0.1	**100.0**	100.0	0.1	**100.0**	100.1
QUCurveVolt1s (%)	Qu curve U1	90.0	**102.0**	120.0	90.0	**103.3**	120.0	90.0	**100.0**	120.0
QUCurveReactPw1s (%)	Qu curve Q1	-60.0	**0.0**	60.0	-60.0	**0.0**	60.0	-60.0	**0.0**	60.0
QUCurveVolt2s (%)	Qu curve U2	100.0	**108.0**	120.0	100.0	**107.0**	120.0	100.0	**106.0**	120.0
QUCurveReactPw2s (%)	Qu curve Q2	-60.0	**-44.0**	60.0	-60.0	**-30.0**	60.0	-60.0	**-44.0**	60.0
QUCurveVolt1i (%)	Qu curve U1i	80.0	**98.0**	110.0	80.0	**96.7**	110.0	80.0	**98.0**	110.0

Parameter Group		Setting Range								
		IEEE 1547-2018			Rule 21			HECO		
Parameter Name	Description	Min	Default	Max	Min	Default	Max	Min	Default	Max
QUCurveReactPw1i (%)	Qu curve Q1i	-60.0	**0.0**	60.0	-60.0	**0.0**	60.0	-60.0	**0.0**	60.0
QUCurveVolt2i (%)	Qu curve U2i	80.0	**92.0**	100.0	80.0	**92.0**	100.0	80.0	**92.0**	100.0
QUCurveReactPw2i (%)	Qu curve Q2i	-60.0	**44.0**	60.0	-60.0	**30.0**	60.0	-60.0	**44.0**	60.0
QUCurveLockInP (%)	Qu curve trigger voltage	0.1	**20.0**	20.0	0.1	**20.0**	20.0	0.1	**20.0**	20.0
QUCurveLockOutP (%)	Qu curve withdrawal voltage	0.1	**5.0**	20.0	0.1	**5.0**	20.0	0.1	**5.0**	20.0
QUCurveActTime (s)	Qu curve response time	0.5	**10.0**	90.0	0.5	**10.0**	90.0	0.5	**5.0**	90.0
QUCurveVRef (%)	Qu curve Vref	95.0	**100.0**	105.0	95.0	**100.0**	105.0	95.0	**100.0**	105.0
QUCurveVRefTime (s)	Qu curve Vref adjustment time	300	**300**	5000	300	**300**	5000	300	**300**	5000
QUCurveVRefEn	Enable / disable Qu curve Vref adjustment	**Disabled**		Enabled	**Disabled**		Enabled	**Disabled**		Enabled

Qu Curve: QU curve mode; note that the reactive compensation changes according to the grid voltage change, as shown in Figure 6-44.
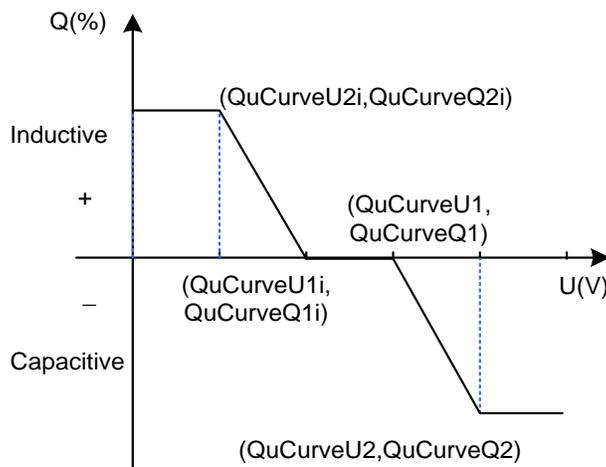
Figure 6-46 QU Curve

6.3.10.5 QP Curve Mode

In this mode, you can set the QP curve P1/Q1, QP curve P2/Q2, QP curve P3/Q3, QP curve P1i/Q1i, QP curve P2i/Q2i, QP curve response time, and more.
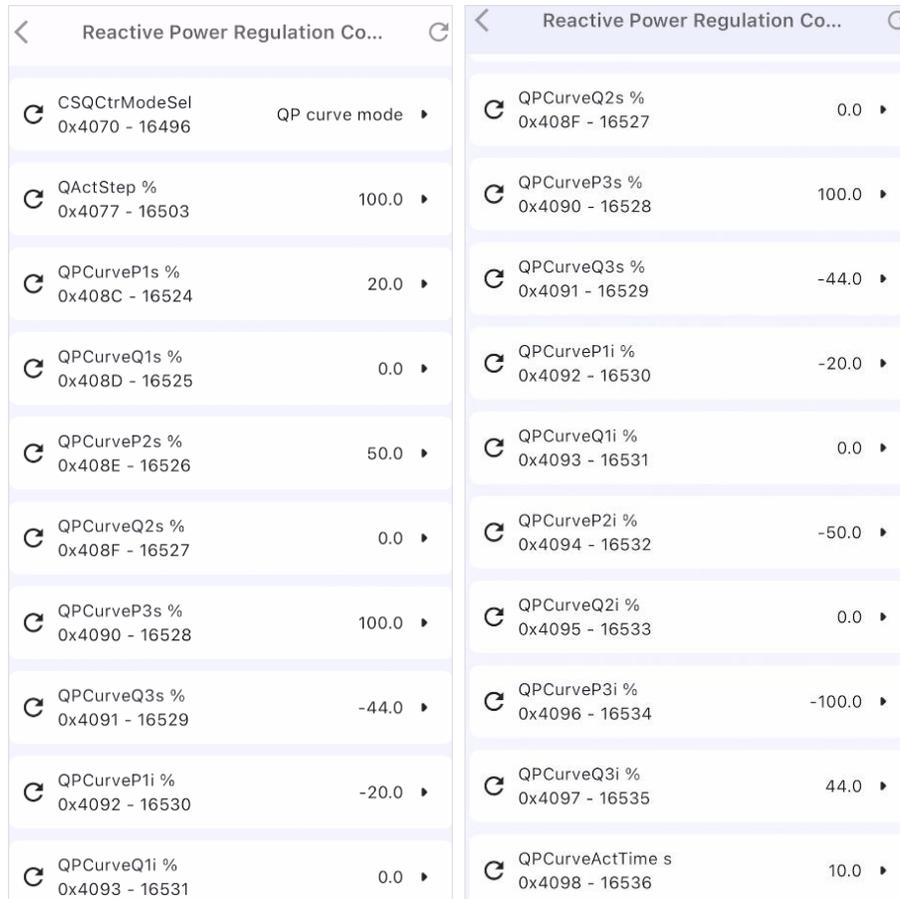
Figure 6-47 QP Curve Mode

Table 6-9 QP Curve Mode Parameters

Parameter Group		Setting Range								
Parameter Name	Description	IEEE 1547-2018			Rule 21			HECO		
		Min	Default	Max	Min	Default	Max	Min	Default	Max
QPMode	VAR-Watt mode	-	-	-	-	-	-	**Disabled**		Enabled
QActStep (%)	Reactive power response step	0.1	**100.0**	100.1	0.1	**100.0**	100.1	0.1	**100.0**	100.1
QPCurveP1s (%)	QP curve P1s	0.0	**20.0**	40.0	0.0	**20.0**	40.0	0.0	**20.0**	40.0
QPCurveQ1s (%)	QP curve Q1s	-60.0	**0.0**	60.0	-60.0	**0.0**	60.0	-60.0	**0.0**	60.0
QPCurveP2s (%)	QP curve P2s	40.0	**50.0**	80.0	40.0	**50.0**	80.0	40.0	**50.0**	80.0

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Parameter Group		Setting Range								
Parameter Name	Description	IEEE 1547-2018			Rule 21			HECO		
		Min	Default	Max	Min	Default	Max	Min	Default	Max
QPCurveQ2s (%)	QP curve Q2s	-60.0	**0.0**	60.0	-60.0	**0.0**	60.0	-60.0	**0.0**	60.0
QPCurveP3s (%)	QP curve P3s	60.0	**100.0**	100.0	60.0	**100.0**	100.0	60.0	**100.0**	100.0
QPCurveQ3s (%)	QP curve Q3s	-60.0	**-44.0**	60.0	-60.0	**-44.0**	60.0	-60.0	**-44.0**	60.0
QPCurveP1i (%)	QP curve P1i	-40.0	**-20.0**	0.0	-40.0	**-20.0**	0.0	-40.0	**-20.0**	0.0
QPCurveQ1i (%)	QP curve Q1i	-60.0	**0.0**	60.0	-60.0	**0.0**	60.0	-60.0	**0.0**	60.0
QPCurveP2i (%)	QP curve P2i	-80.0	**-50.0**	-40.0	-80.0	**-50.0**	-40.0	-80.0	**-50.0**	-40.0
QPCurveQ2i (%)	QP curve Q2i	-60.0	**0.0**	60.0	-60.0	**0.0**	60.0	-60.0	**0.0**	60.0
QPCurveP3i (%)	QP curve P3i	-100.0	**-100.0**	-60.0	-100.0	**-100.0**	-60.0	-100.0	**-100.0**	-60.0
QPCurveQ3i (%)	QP curve Q3i	-60.0	**44.0**	60.0	-60.0	**44.0**	60.0	-60.0	**44.0**	60.0
QPCurveActTime (s)	QP curve response time	0.0	**10.0**	10.0	0.0	**10.0**	10.0	0.0	**10.0**	10.0

The QP curve in QP curve mode is as shown below in Figure 6-46:
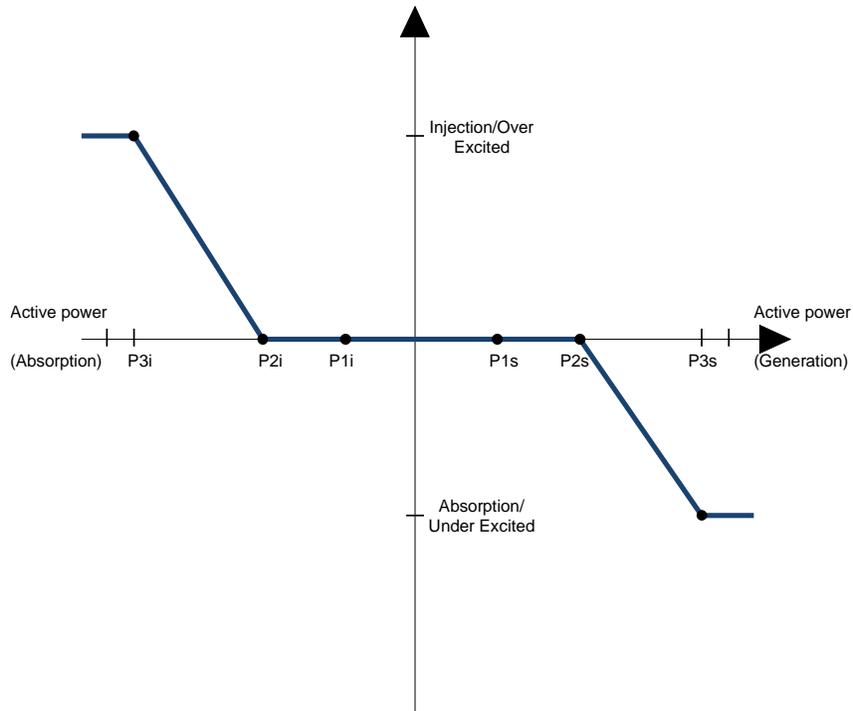
Figure 6-48 QP Curve

6.3.11 ARC Detection Parameters

In the **ARC Detection Parameters** interface, you can enable and disable arc detection, change the sensitivity of arc detection, and set the ArcFactory values, arc base and differential values, and arc recovery time.
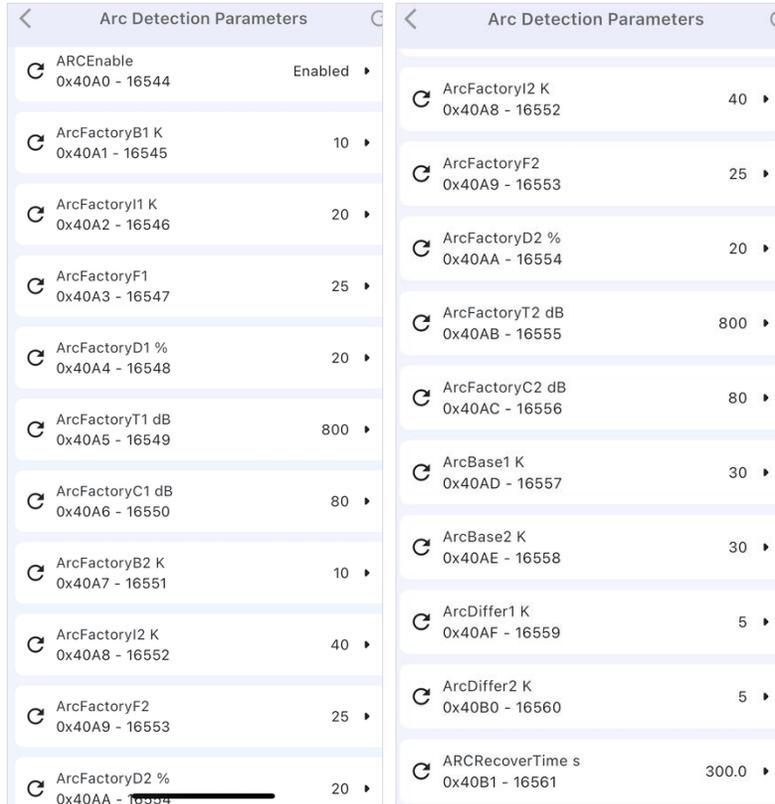
Figure 6-49 ARC Detection Parameters

Parameter Group		Setting Range								
Parameter Name	**Description**	IEEE 1547-2018			Rule 21			HECO		
		Min	**Default**	**Max**	**Min**	**Default**	**Max**	**Min**	**Default**	**Max**
ARCEnable	Enable or disable arc protection	Disabled	**Enabled**		Disabled	**Enabled**		Disabled	**Enabled**	
ArcFactoryB1 (K)	Arc parameter bandwidth 1	0.0	**10**	100.0	0.0	**10**	100.0	0.0	**10**	100.0
ArcFactoryL1 (K)	Arc parameter starting frequency 1	0.0	**20**	100.0	0.0	**20**	100.0	0.0	**20**	100.0
ArcFactoryF1	Arc parameter weight 1	0.0	**25**	100.0	0.0	**25**	100.0	0.0	**25**	100.0

Parameter Group		Setting Range								
Parameter Name	Description	IEEE 1547-2018			Rule 21			HECO		
		Min	Default	Max	Min	Default	Max	Min	Default	Max
ArcFactoryD1 (%)	Arc parameter filter parameter 1	0.0	**20**	100.0	0.0	**20**	100.0	0.0	**20**	100.0
ArcFactoryT1 (dB)	Arc parameter threshold 1	0.0	**740**	1000	0.0	**740**	1000	0.0	**740**	1000
ArcFactoryC1 (dB)	Arc parameter single cycle limit value 1	0.0	**74**	100.0	0.0	**74**	100.0	0.0	**74**	100.0
ArcFactoryB2 (K)	Arc parameter bandwidth 2	0.0	**10**	100.0	0.0	**10**	100.0	0.0	**10**	100.0
ArcFactoryL2 (K)	Arc parameter starting frequency 2	0.0	**40**	100.0	0.0	**40**	100.0	0.0	**40**	100.0
ArcFactoryF2	Arc parameter weight 2	0.0	**25**	100.0	0.0	**25**	100.0	0.0	**25**	100.0
ArcFactoryD2 (%)	Arc parameter filter parameter 2	0.0	**20**	100.0	0.0	**20**	100.0	0.0	**20**	100.0
ArcFactoryT2 (dB)	Arc parameter threshold 2	0.0	**690**	1000	0.0	**690**	1000	0.0	**690**	1000
ArcFactoryC2 (dB)	Arc parameter single cycle limit value 2	0.0	**69**	100.0	0.0	**69**	100.0	0.0	**69**	100.0
ArcBase1 (K)	Band 1 fundamental amplitude	0.0	**30**	100.0	0.0	**30**	100.0	0.0	**30**	100.0
ArcBase2 (K)	Band 2 fundamental amplitude	0.0	**30**	100.0	0.0	**30**	100.0	0.0	**30**	100.0
ArcDiffer1 (K)	Band 1 difference threshold	0.0	**5**	100.0	0.0	**5**	100.0	0.0	**5**	100.0
ArcDiffer2 (K)	Band 2 difference threshold	0.0	**5**	100.0	0.0	**5**	100.0	0.0	**5**	100.0
ARCRecoverTime (s)	Arc recovery time	0.0	**300.0**	655.35	0.0	**300.0**	655.35	0.0	**300.0**	655.35

6.3.12 Safety Protection Parameters

In the **Safety Protection Parameters** interface, you can enable and disable insulation resistance detection, leakage current CT detection, dynamic leakage current detection, static leakage current detection, rapid shutdown, island detection, instantaneous over voltage detection, and DCI detection. Additionally, you can set the ISO protection value, maximum leakage current, island trigger frequency and threshold, switching over voltage, and DCI maximum value.

Figure 6-50 Safety Protection Parameters

Table 6-10 Safety Protection Parameters

Parameter Group		Setting Range								
		IEEE 1547-2018			Rule 21			HECO		
Parameter Name	Description	Min	Default	Max	Min	Default	Max	Min	Default	Max
ISOChkEnable	Enable / disable insulation resistance detection	Disabled	**Enabled**		Disabled	**Enabled**		Disabled	**Enabled**	
IsoImpMin (kohm)	ISO protection value	0	**100**	2000	0	**100**	2000	0	**100**	2000
GFCICTChkEnable	Enable / disable leakage current CT detection	Disabled	**Enabled**		Disabled	**Enabled**		Disabled	**Enabled**	
GFCIDynChkEnable	Enable / disable dynamic leakage current detection	Disabled	**Enabled**		Disabled	**Enabled**		Disabled	**Enabled**	
GFCIstyChkEnable	Enable / disable static leakage current detection	Disabled	**Enabled**		Disabled	**Enabled**		Disabled	**Enabled**	
GFCIMax (mA)	Maximum leakage current	100	**250**	1000	100	**250**	1000	100	**250**	1000
RSDEnable (%)	Enable / disable rapid shutdown	Disabled	**Enabled**		Disabled	**Enabled**		Disabled	**Enabled**	
AIEnable	Enable / disable island detection	Disabled	**Enabled**		Disabled	**Enabled**		Disabled	**Enabled**	
AITripFreq (Hz)	Island trigger frequency	0.0	**2.0**	10.0	0.0	**2.0**	10.0	0.0	**2.0**	10.0
AIDisFreq (Hz)	Island frequency threshold	0.0	**0.04**	1.0	0.0	**0.04**	1.0	0.0	**0.04**	1.0
InstVolChkEnable	Enable / disable instantaneous over voltage detection	Disabled	**Enabled**		Disabled	**Enabled**		Disabled	**Enabled**	
OpVoltOver (%)	Switching over voltage	100	**130**	150	100	**130**	150	100	**130**	150
DCIEnable	Enable / disable DCI detection	Disabled	**Enabled**		Disabled	**Enabled**		Disabled	**Enabled**	
DCIMax (mA)	Maximum DCI	0	**250**	1000	0	**250**	1000	0	**250**	1000

6.3.13 Battery Parameters

In the **Battery Parameters** interface, you can change the charging current, discharging current, voltage, and more.
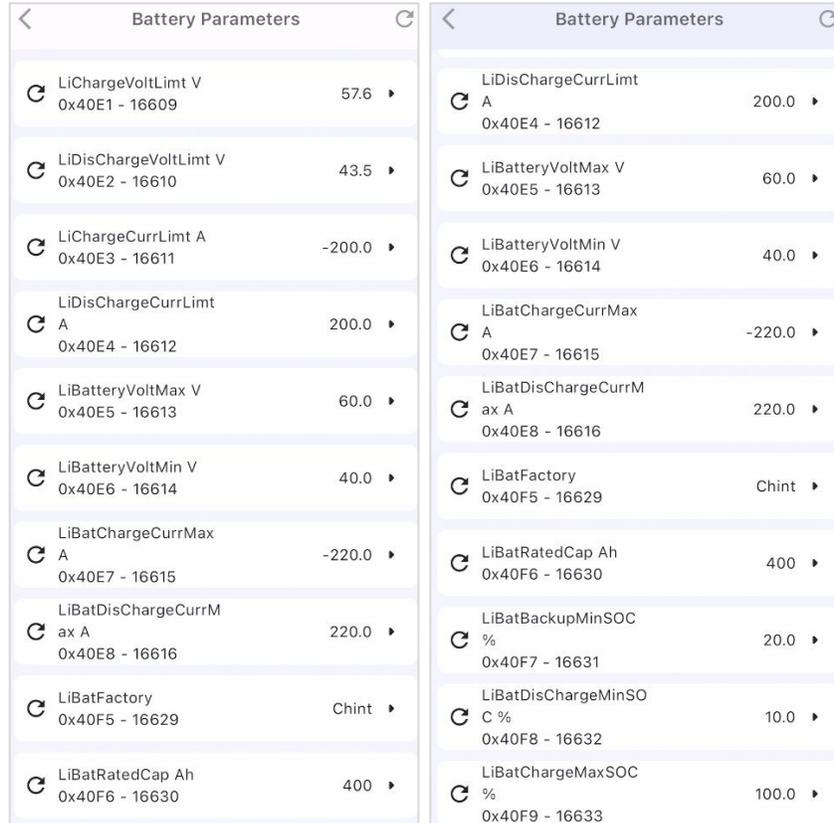
Figure 6-51 Battery Parameters

Table 6-11 Battery Parameters

Parameter Group		Setting Range								
Parameter Name	Description	IEEE 1547-2018			Rule 21			HECO		
		Min	Default	Max	Min	Default	Max	Min	Default	Max
LiChargeVoltLimit (V)	Battery charge voltage limit	50.0	**57.6**	60.0	50.0	**57.6**	60.0	50.0	**57.6**	60.0
LiDisChargeVoltLimit (V)	Battery discharge voltage limit	40.0	**51.0**	50.0	40.0	**51.0**	50.0	40.0	**51.0**	50.0
LiChargeCurrLimit (A)	Battery charge current limit	-200	**-200**	0.0	-200	**-200**	0.0	-200	**-200**	0.0
LiDisChargeCurrLimit (A)	Battery discharge current limit	0.0	**200.0**	200.0	0.0	**200.0**	200.0	0.0	**200.0**	200.0
LiBatteryVoltMax (V)	Battery voltage upper limit	50.0	**60.0**	65.0	50.0	**60.0**	65.0	50.0	**60.0**	65.0
LiBatteryVoltMin (V)	Battery voltage lower limit	35.0	**46.0**	50.0	35.0	**46.0**	50.0	35.0	**46.0**	50.0
LiBatChargeCurrMax (A)	Battery charge current protection point	-250	**-220**	0.0	-250	**-220**	0.0	-250	**-220**	0.0
LiBatDisChargeCurrMax (A)	Battery discharge current protection point	0.0	**220.0**	250.0	0.0	**220.0**	250.0	0.0	**220.0**	250.0
LiBatFactory	Battery factory	Null	**Chint**	Chint	Null	**Chint**	Chint	Null	**Chint**	Chint
LiBatRatedCap (Ah)	Battery rated capacity	0	**400**	2000	0	**400**	2000	0	**400**	2000
LiBatBackupMinSOC (%)	Battery backup SOC	0.0	**20.0**	100.0	0.0	**20.0**	100.0	0.0	**20.0**	100.0
LiBatDisChargeMinSOC (%)	Minimum discharge SOC	0.0	**10.0**	20.0	0.0	**10.0**	20.0	0.0	**10.0**	20.0
LiBatChargeMaxSOC (%)	Maximum charge SOC	0.0	**100.0**	100.0	0.0	**100.0**	100.0	0.0	**100.0**	100.0

6.3.14 Off-Grid Mode Parameters

In **Off-Grid Mode Parameters**, you can enable and disable on/off grid mode automatic switching and set voltage source (VS) voltage and frequency.
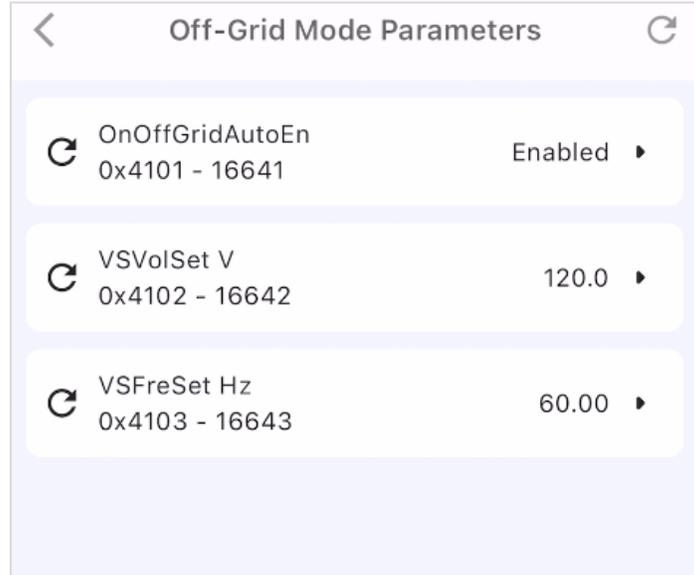
Figure 6-52 Off-Grid Mode Parameters

Table 6-12 Off-Grid Mode Parameters

Parameter Group		Setting Range								
Parameter Name	**Description**	**IEEE 1547-2018**			**Rule 21**			**HECO**		
		Min	Default	Max	Min	Default	Max	Min	Default	Max
OnOffGridAutoEn	On/off grid automatic switching {Disabled, Immediately Off Grid, After Ride Through Off Grid}	-	**Immediately Off Grid**	-	-	**Immediately Off Grid**	-	-	**Immediately Off Grid**	-
VSVolSet (V)	VS voltage setting	108.0	**120.0**	132.0	108.0	**120.0**	132.0	108.0	**120.0**	132.0
VSFreSet (Hz)	VS frequency setting	55.0	**60.0**	65.0	55.0	**60.0**	65.0	55.0	**60.0**	65.0

6.3.15 Other Parameters

In the **Other Parameters** interface, you can enable or disable DCV, fan detection, IV scan, pure PV off-grid operation, battery recovery, and internet access with battery power function and set parameters such as IV curve scan cycle, bi-directional DC current maximum, inverter current maximum, bias upper limit, DCI bias error allowable upper limit, bus / half-bus voltage upper limit, power on delay, soft-start time, soft-stop time, and filter capacitor damping.

Figure 6-53 Other Parameters

Table 6-13 Other Parameters

Parameter Group	Setting Range								
		IEEE 1547-2018			Rule 21			HECO		
Parameter Name	Description	Min	Default	Max	Min	Default	Max	Min	Default	Max
DCVEnable	DCV enable / disable	Disabled		Enabled	Disabled		Enabled	Disabled		Enabled
APFCtrlScale (%)	Harmonic suppression coefficient	0	10	100	0	10	100	0	10	100
FanChkEnable	Enable / disable fan detection	Disabled	Enabled		Disabled	Enabled		Disabled	Enabled	
BiDirDCCurrMax (A)	Bi-directional DC current maximum	0	20	100	0	20	100	0	20	100
InvCurrMax (A)	Inverter current maximum	0	145	200	0	145	200	0	145	200
InvCurroffsetDiffMax	Inverter current bias upper limit	0	100	1000	0	100	1000	0	100	1000
DCIOffsetDiffMax	DCI bias error allowable upper limit	0	500	1500	0	500	1500	0	500	1500
EnvironmentTmpMax (°C)	Ambient temperature maximum	0	83	100	0	83	100	0	83	100
ModuleTmpMax (°C)	Inverter module temperature maximum	0	92	120	0	92	120	0	92	120
BusVolMax (V)	Bus voltage maximum	400	580	600	400	580	600	400	580	600
CapVolMax (V)	Half bus voltage maximum	200	300	350	200	300	350	200	300	350
PVStartUpVol (V)	PV startup voltage	0	150	500	0	150	500	0	150	500
PowerOnDelayTime (s)	Power on delay time	0	300	1000	0	15	1000	0	300	1000
PSoftStaTime (s)	Power soft-start time	1	300	1000	1	10	1000	1	300	1000

Parameter Group		Setting Range								
Parameter Name	Description	IEEE 1547-2018			Rule 21			HECO		
		Min	Default	Max	Min	Default	Max	Min	Default	Max
PSoftSTopTime (s)	Power soft-stop time	1	**1**	120	1	**1**	120	1	**1**	120
ResComp (mohm)	Filter capacitor damping	0	**1000**	5000	0	**1000**	5000	0	**1000**	5000
IVCurrScanEnable	Enable / disable IV scan	**Disabled**		Enabled	**Disabled**		Enabled	**Disabled**		Enabled
IVCurrScanCycle (s)	IV curve scan cycle	0	**3000**	3000	0	**3000**	3000	0	**3000**	3000
PurePVOffGridRunEn	Enable / disable pure PV off-grid operation	**Disabled**		Enabled	**Disabled**		Enabled	**Disabled**		Enabled
VSBatRecoverEnable	Enable / disable battery recovery	**Disabled**		Enabled	**Disabled**		Enabled	**Disabled**		Enabled
BatPowerToGridEnable	Enable / disable internet access with battery power	Disabled	**Enabled**		Disabled	**Enabled**		Disabled	**Enabled**	

6.3.16   Control Commands

In the **Control Commands** interface, you can set the power on/off, restart, restore factory, arc self-check, clear arc fault, IV curve scanning, battery wake-up, and overload fault clearing commands.
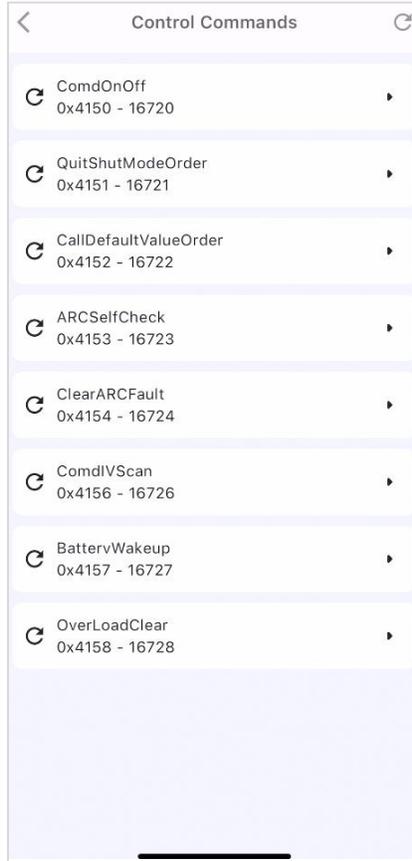
Figure 6-54 Control Commands

Table 6-14 Control Commands Parameters

Parameter Name	Description
ComdOnOff	Power on/off command
QuitShutModeOrder	Force restart command
CallDefaultValueOrder	Restore factory command
ARCSelfCheck	Arc self-check command
ClearARCfault	Clear arc fault command
ComdIVScan	IV curve scanning command
BatteryWakeup	Battery wake-up command
OverLoadClear	Overload fault clearing action

6.3.17　System Configuration Parameters

In the **System Configuration Parameters** interface, you can set the parameters listed in Table 6-15 below.

Figure 6-55 System Configuration Parameters

Table 6-15 System Configuration Parameters

Parameter Name	Description
PvLinkMode	PV connection mode. If the system consists of multiple inverters, choose **parallel mode**; otherwise, choose **independent mode**.
GENType	Generator type. If the inverter is connected to a microinverter, choose **Connect Inv**; If the inverter is connected to a generator, choose **Connect GEN**; otherwise, choose **Null**.
GridType	Choose grid type (120/240 V split phase or 120/208 V three-phrase) according to the grid voltage.
InvParallelMode	Parallel mode. If you select a PCS system consisting of more than one inverter, choose **Multi machine parallel**; otherwise, choose **Single machine**.
SerialNumber	Serial number of hybrid inverter.
StandardValue	Choice of regulations. Choose the inverter standard (IEEE 1547-2018, CA Rule 21, or HECO) applicable to the local area. The parameters of the three standard values are different, as shown in the parameter tables in this document.
RatedFreq	Rated frequency: 50 Hz or 60 Hz.
InvParallelAddr	Parallel address: primary or secondary 1-11.
RatedPower	Select the rated power (7.6, 9.6, or 12.0 kW) according to the inverter type.
BatteryType	Battery type selection: lithium.
BMS 485 address	BMS 485 address.
BMS 485 baudrate	BMS 485 baudrate: 2400, 4800, 9600 (default), or 19200.
System time	System time format setting.
LED test	LED test.
EEPROM test	EEPROM test.
FLASH test	Flash test.
System data clear	System data clear.
GridQShiftCnt	Grid reactive power sampling offset value.
GridPortType	Grid port type: no grid, grid, or grid with load.
LoadPortType	Load port type: null or inverter.

6.3.18 EMS Parameters

In the **EMS Parameters** interface, you can set the running mode (see Section 2.5 System Working Modes), maximum battery charging grid power, maximum online power, grid charging battery start time, and grid charging battery end time. Additionally, you can enable and disable power limit and power grid charging.
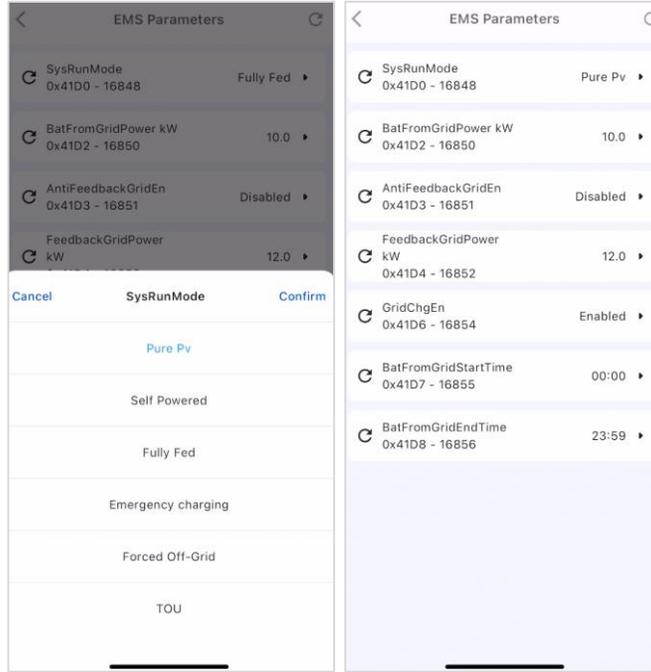
Figure 6-56 EMS Parameters

Table 6-16 EMS Parameters

Parameter Group		Setting Range								
Parameter Name	**Description**	**IEEE 1547-2018**			**Rule 21**			**HECO**		
		Min	Default	Max	Min	Default	Max	Min	Default	Max
BatFromGrid Power (kW)	Maximum power at which the grid can charge batteries	0	**10**	10	0	**10**	10	0	**10**	10
AntiFeedback GridEn	Enable / disable power limit	**Disabled**		Enabled	**Disabled**		Enabled	**Disabled**		Enabled
FeedbackGrid Power (kW)	Maximum online power	0	**12**	12	0	**12**	12	0	**12**	12
GridChgEn	Enable / disable power grid charging	Disabled	**Enabled**		Disabled	**Enabled**		Disabled	**Enabled**	
BatFromGrid StartTime	Starting time at which power grid begins to charge batteries	00:00	**00:00**	24:00	00:00	**00:00**	24:00	00:00	**00:00**	24:00
BatFromGrid EndTime	End time at which the power grid stops charging batteries	00:00	**23:59**	23:59	00:00	**23:59**	23:59	00:00	**23:59**	23:59

![CPS America logo]

6.3.19 GEN Parameters

In the **GEN Parameters** interface, you can set parameters related to the generator.
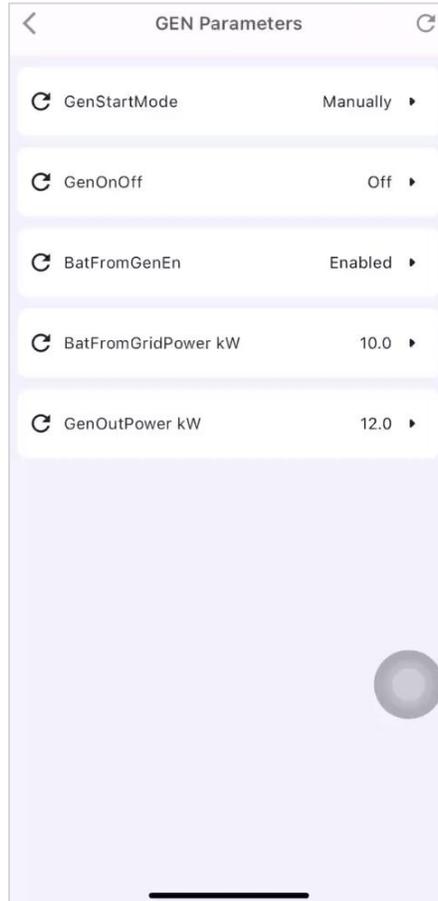
Figure 6-57 GEN Parameters

The generator can only start in off-grid mode, and the N line of the generator needs to be connected to the N line of the inverter. Parallel inverters on a three-phase grid do not support diesel generators.

> ⚠️ **NOTICE:**
>
> The maximum allowable generator power is 24 kW. The power of the generator must be greater than the load, and it is not recommended for the generator to operate at full power; the maximum recommended value is 80% of the rated power.

The generator can be started up in two ways: manually or automatically.

1. Manual startup:

    a. In the **GEN Parameters** interface, tap **GenStartupWay**.

    b. Select **Manually**.

    c. Return to the **GEN Parameters** interface and tap **GenOnOff**.

    d. Select **On** to start up the generator and **Off** to shut down the generator.
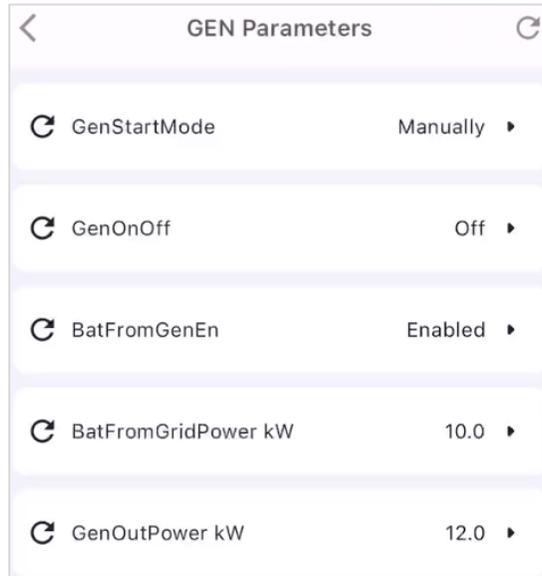
Figure 6-58 Manual Startup

Table 6-17 Manual Startup Parameters

Parameter Group		Setting Range								
Parameter Name	**Description**	**IEEE 1547-2018**			**Rule 21**			**HECO**		
		Min	**Default**	**Max**	**Min**	**Default**	**Max**	**Min**	**Default**	**Max**
GenStartMode	Generator startup mode	Automatically	**Manually**		Automatically	**Manually**		Automatically	**Manually**	
GenOnOff	Turn generator on / off	Off	**Off**	On	Off	**Off**	On	Off	**Off**	On
BatFromGenEn	Enable / disable generator charging	Disabled	**Enabled**		Disabled	**Enabled**		Disabled	**Enabled**	
BatFromGridPower (kW)	Generator charging power	0.1	**10.0**	10.0	0.1	**10.0**	10.0	0.1	**10.0**	10.0
GenOutPower (kW)	Generator output power	0.0	**0.0**	24.0	0.0	**0.0**	24.0	0.0	**0.0**	24.0

2. Automatic startup:

    a. In the **GEN Parameters** interface, tap **GenStartupWay**.

    b. Select **Automatically**.

    c. Set the **GenStartSoc %**; if the SOC value is lower than the set value, the generator will start up.

    d. Set the **GenEndSoc %**; if the SOC value is higher than the set value, the generator will shut down.
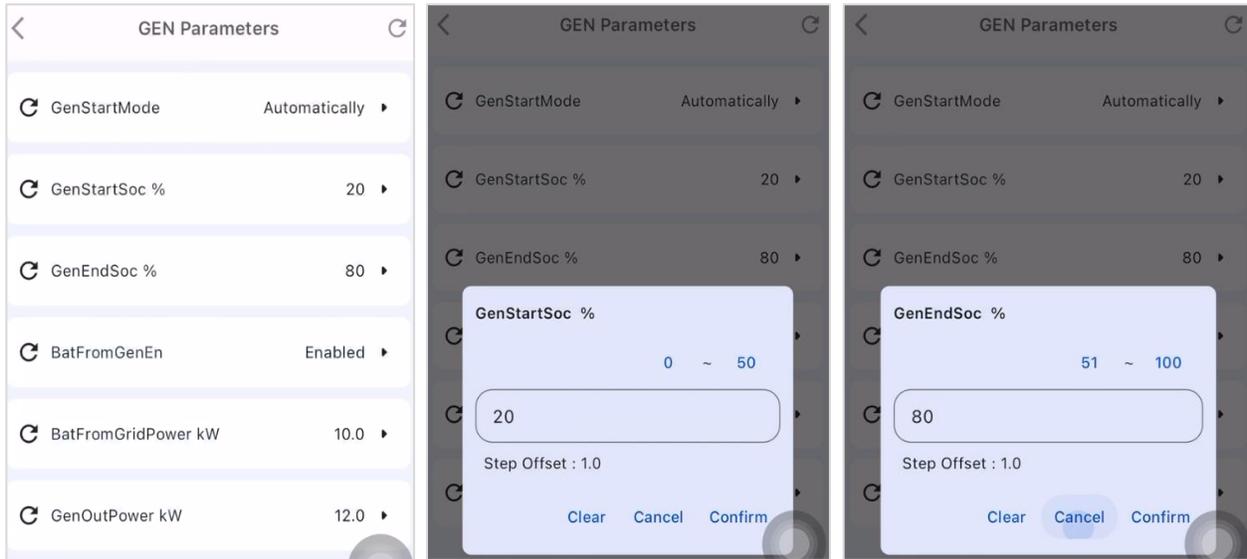
Figure 6-59 Automatic Startup

Table 6-18 Automatic Startup Parameters

Parameter Group		Setting Range								
Parameter Name	Description	IEEE 1547-2018			Rule 21			HECO		
		Min	Default	Max	Min	Default	Max	Min	Default	Max
GenStartMode	Generator startup mode	Automatically	**Manually**		Automatically	**Manually**		Automatically	**Manually**	
GenStartSoc (%)	Generator start SOC	0	**20**	50	0	**20**	50	0	**20**	50
GenEndSoc (%)	Generator end SOC	51	**80**	100	51	**80**	100	51	**80**	100
BatFromGenEn	Enable / disable generator charging	Disabled	**Enabled**		Disabled	**Enabled**		Disabled	**Enabled**	
BatFromGridPower (kW)	Generator charging power	0.1	**10.0**	10.0	0.1	**10.0**	10.0	0.1	**10.0**	10.0
GenOutPower (kW)	Generator output power	0.0	**0.0**	24.0	0.0	**0.0**	24.0	0.0	**0.0**	24.0

⚠ NOTICE:

- If the generator is set to start up manually, it will not stop working automatically. It must be shut down via the app (see Figure 6-56).

- If the generator is set to start up automatically, the generator will stop working automatically according to the preset SOC values (see Figure 6-57).

BatFromGenEn: Regardless of whether the generator is started up automatically or manually, **BatFromGenEn** can be enabled or disabled.

- Enabled (Quiet Mode): In this mode, the generator and PV will supply power to the load and charge the battery at the same time.

- Disabled (Economy Mode): In this mode, the generator and PV will supply power to the load preferentially and will charge the battery only when there is surplus.
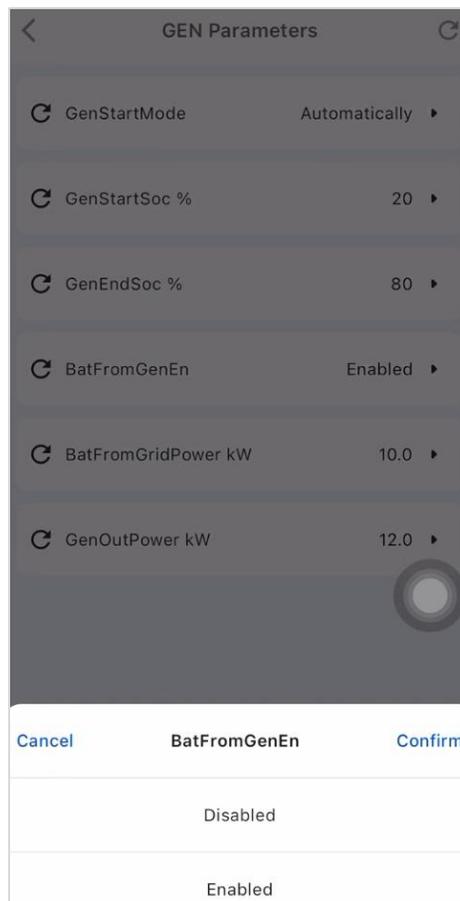
Figure 6-60 BatFromGenEn

BatFromGridPower: The maximum power at which the power grid can charge batteries (i.e., the power grid will charge batteries at a power rate lower than the preset value).

Figure 6-61 BatFromGridPower

GenOutPower: Generator power output.
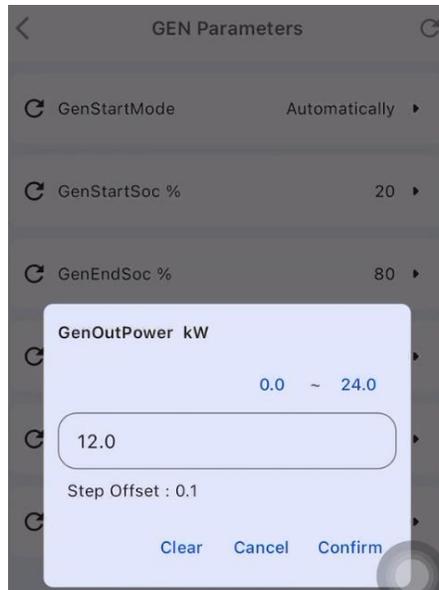
Figure 6-62 GenOutPower

6.4   More Menu

Tap the **More** icon in the bottom right corner of the screen to access the following parameters:

- Basic Settings

- Fault History

- Operation History

- Running Log

- Upgrade

- Yield Statistics

- Mode

- NFC Write (reserved)

- Gateway Configuration
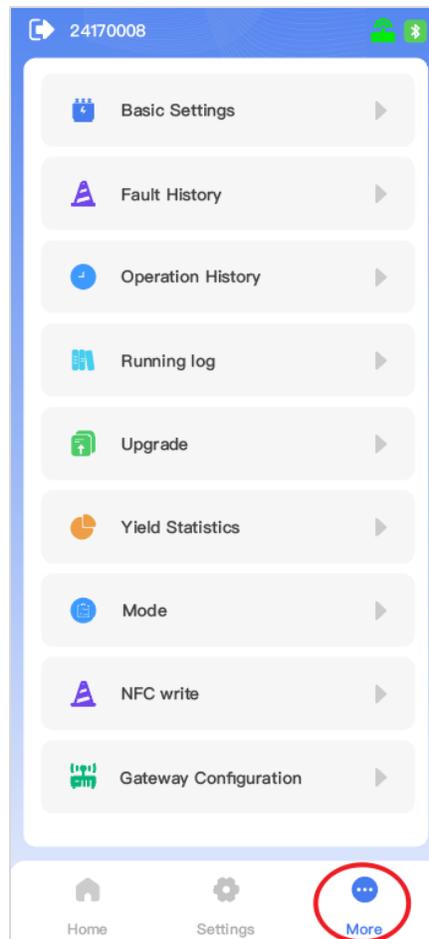
Figure 6-63 More Menu

6.4.1 Basic Settings

In the **Basic Settings** interface, users can set the generator type, grid type, inverter parallel mode, standard value, rated frequency, inverter parallel address / number, battery type, grid / load port type, and more.
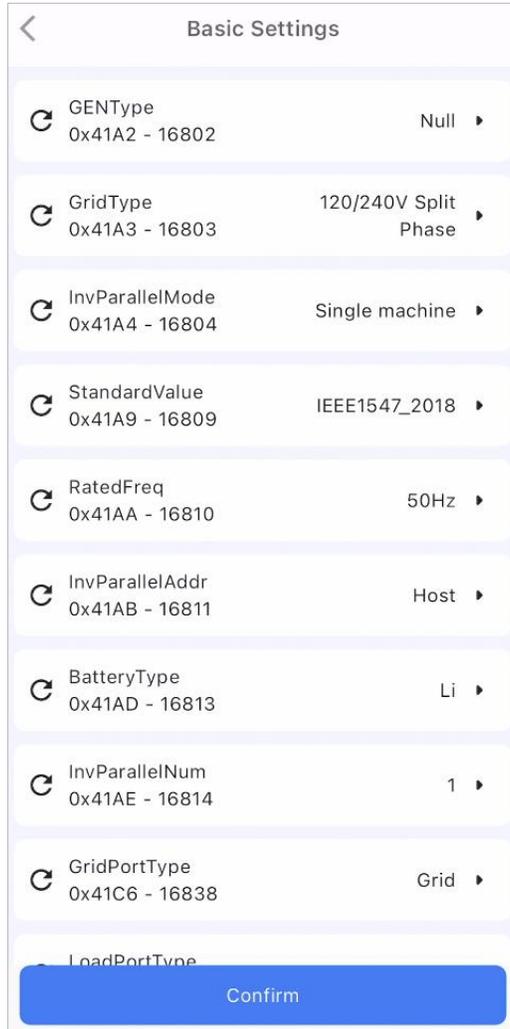
Figure 6-64 Basic Settings

6.4.2 Fault History

In the **Fault History** interface, you can find a list of faults: current faults are in the **Current Faults** tab, and a list of all previous faults can be found in the **Historic Faults** tab. Current faults show their severity level; tap any fault to view its cause.
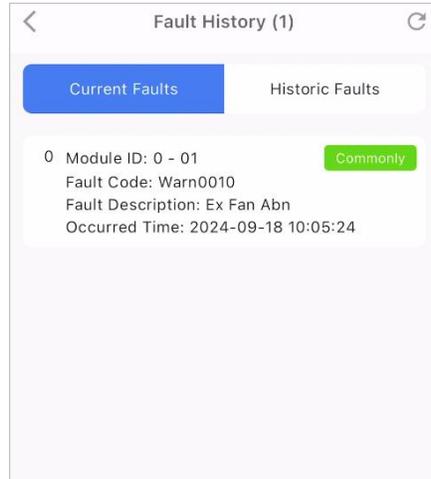
Figure 6-65 Fault History

6.4.3 Operation History

In this interface, you can find the operation history of the inverter.
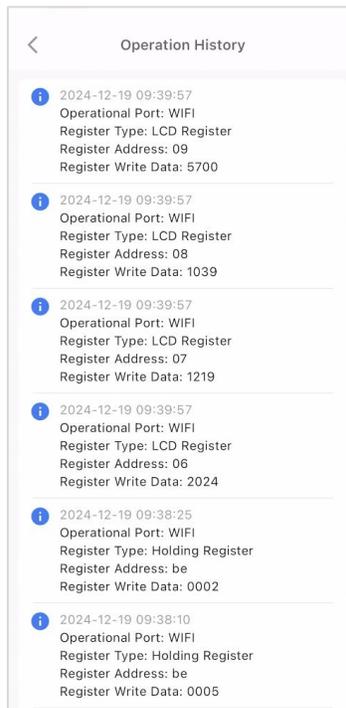
Figure 6-66 Operation History

6.4.4 Running Log

In this interface, you can find the history log of the running status of the inverter (e.g., standby, prechecking, running, or fault).
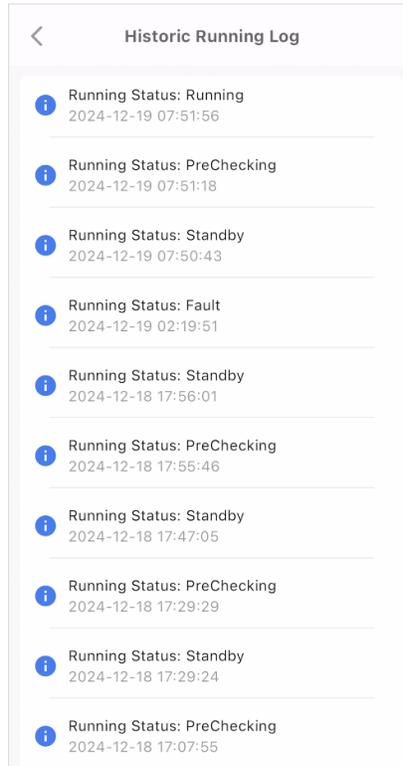
Figure 6-67 History Running Log and Yield Statistics

6.4.5 Upgrade

If a firmware upgrade is needed, contact CPS customer service.

6.4.6 Yield Statistics

In this interface, yield statistics can be shown for the day, month, and year. After setting the parameters for PV yield, loads, battery charge, battery discharge, import, and export, corresponding line charts of yield statistics will appear.

Figure 6-68 Yield Statistics

6.4.7 Mode

In this interface, you can configure the system running mode. See Section 2.5 System Working Modes for further information on the different modes; see Section 6.3.18 EMS Parameters for details on the parameters and value settings.
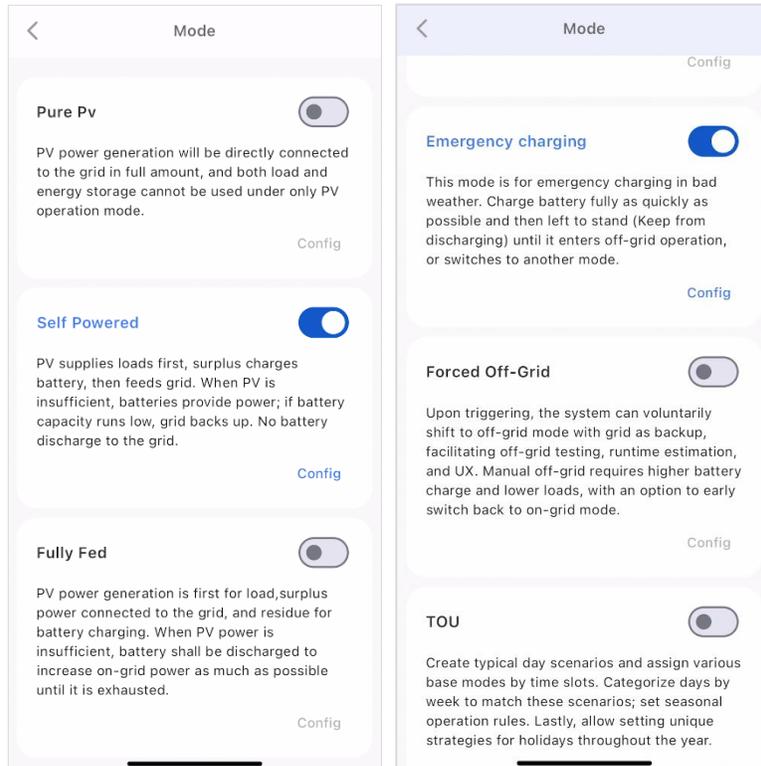
Figure 6-69 Mode Configuration

6.4.8　Gateway Configuration

In this interface, you can access the Gateway settings.
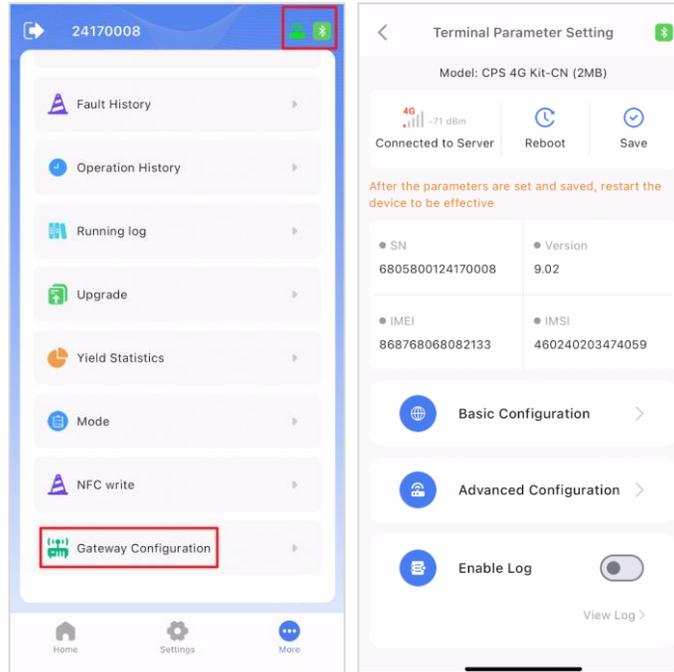
Figure 6-70 Gateway Configuration

- **Basic Configuration**: Set the protocol, Wi-Fi, network, uart, and period.
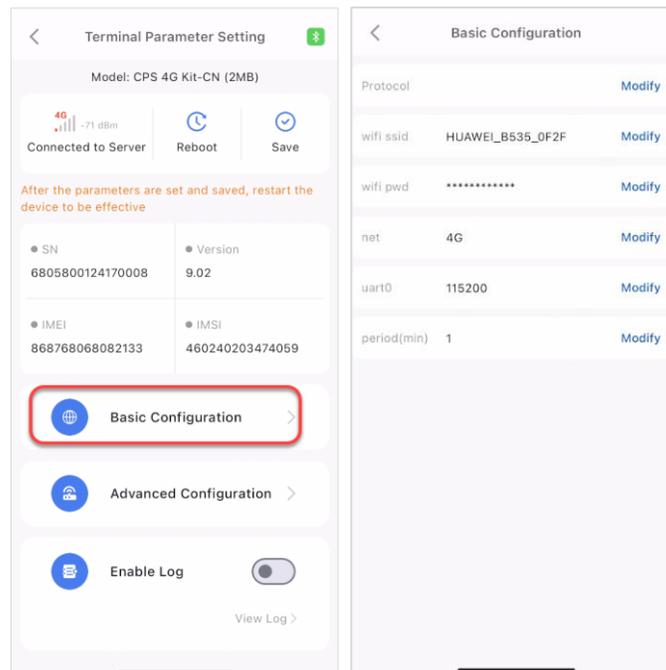
Figure 6-71 Basic Gateway Configuration

- **Advanced Configuration**: Set the MQTT host and port. If a firmware upgrade is needed, contact CPS Customer Service.
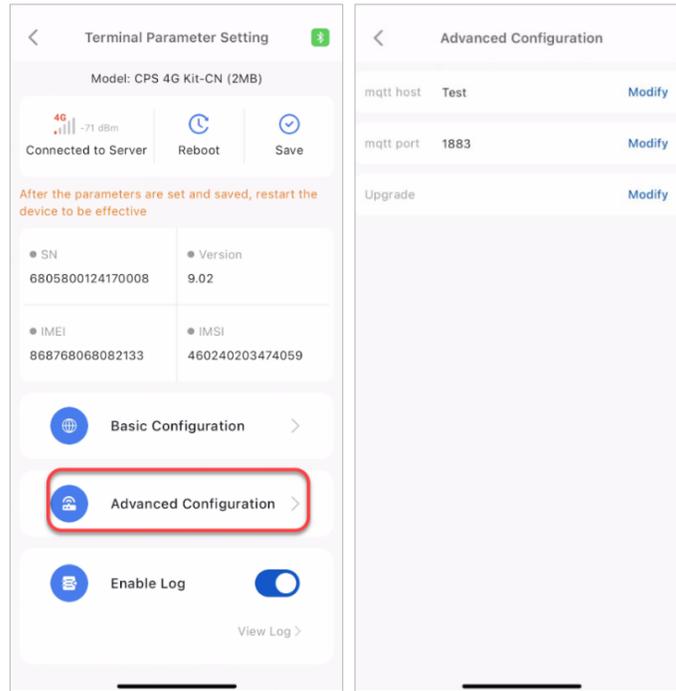
Figure 6-72 Advanced Gateway Configuration

- **Enable Log**: Enable the log to view the Gateway log.
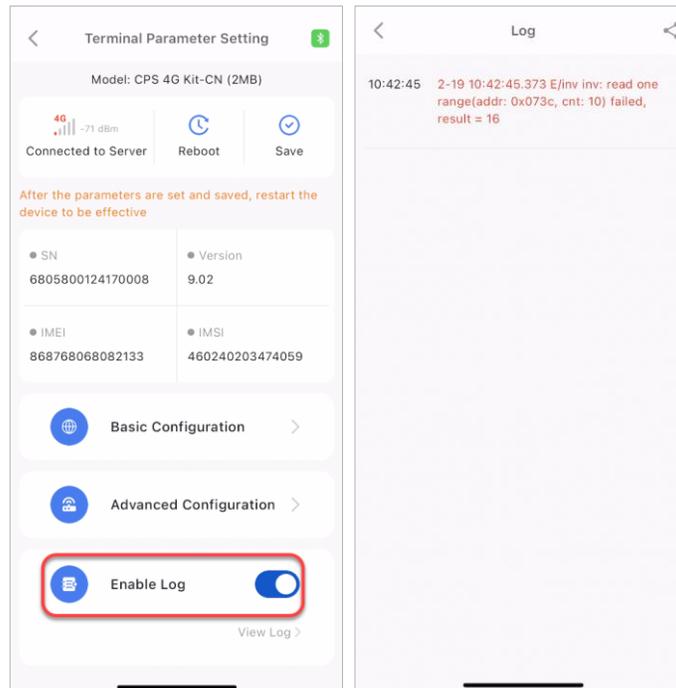
Figure 6-73 Enable Gateway Log

7 App Remote Control

7.1 Login Interface

Open the app to see the login interface:
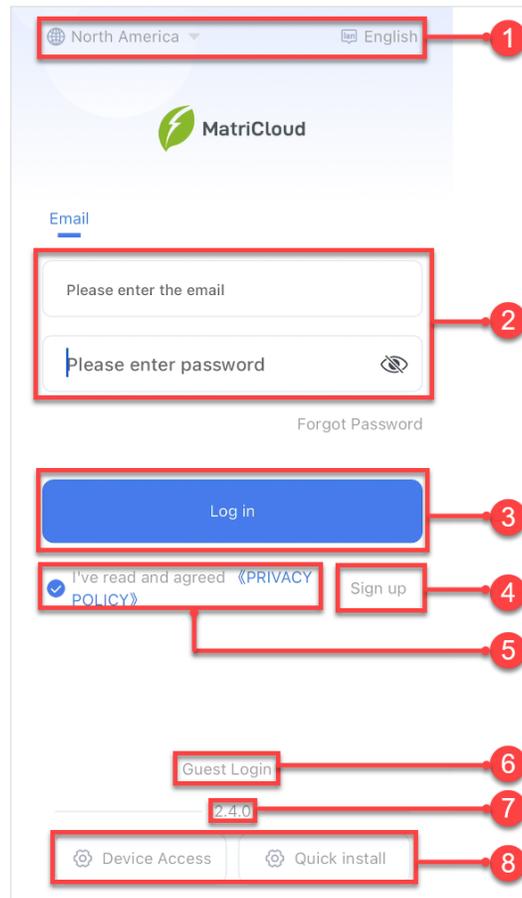
Figure 7-1 Login Interface

No.	Name	Description
1	Setting	Select the server: Switch a Cloud platform site (e.g., China, Europe, and the US). Multi-language setting: Select the system language.
2	Email input field	Login: Enter the account's email and password. Forgot password: Tap **Forgot Password** to retrieve the account password.
3	Login	After inputting the account email and password, tap **Login** to log into the app.
4	Sign up	Register an account: See Section 7.1.1 Account Registration for details.
5	Privacy policy	Privacy policy: Check the privacy policy and log in after agreeing. Refer to the description of Privacy Policy for details.
6	Guest login	For temporary visitors to view remote control interfaces.
7	Version number	The latest app version number.
8	Device access & quick install	Buttons to achieve local control of the app; see Section 6 App Local Control.

7.1.1 Sign Up

There are two account types: distributor and installer. The distributor / installer can help the owner user create the site, manage the installed / operated and maintained sites, and manage users and organizations.
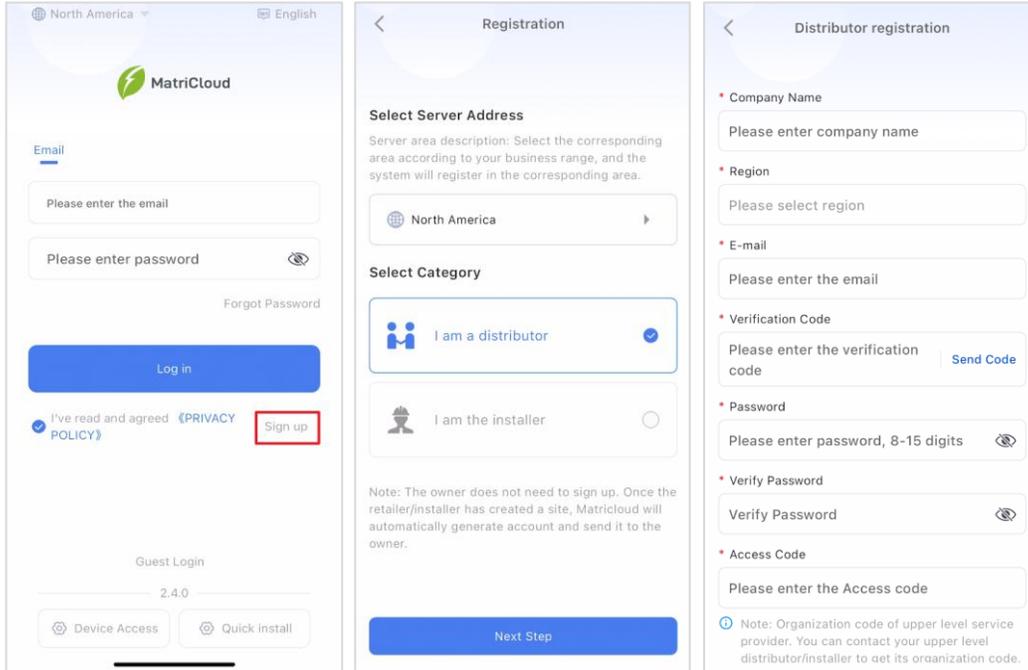
Figure 7-2 Distributor Signup Process
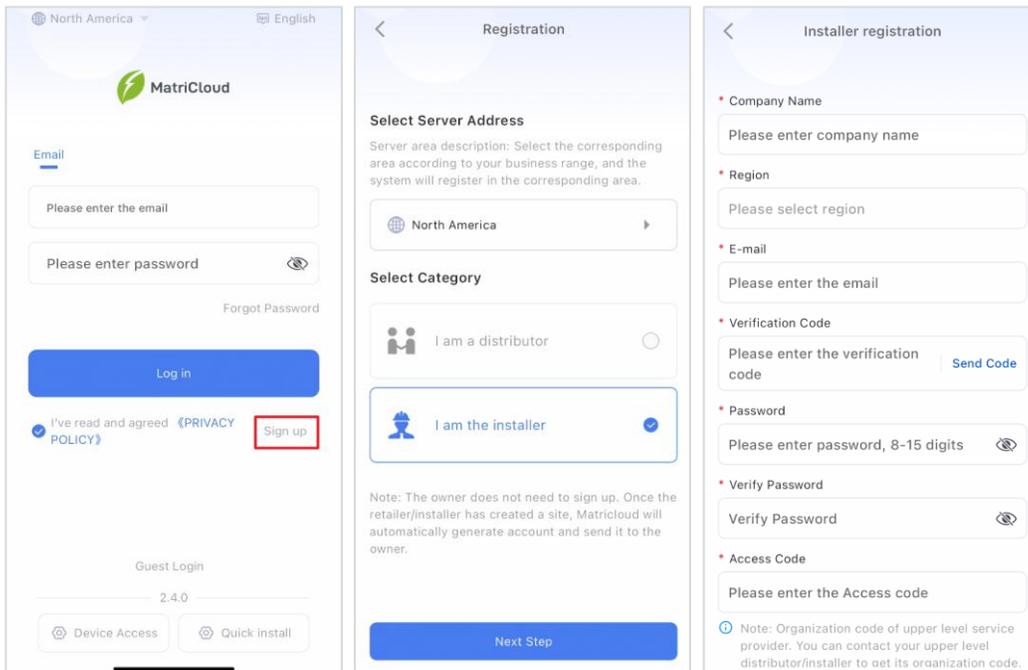
Figure 7-3 Installer Signup Process

To register an account:

1. Tap **Sign up** to enter the user registration interface.

2. According to the account type, select the distributor or installer to enter the corresponding registration interface.

3. Enter the registration information, which includes:

   - Company name

   - Country

   - Email

   - Verification code

   - Password

   - Distributor number

4. Tap **Submit** to complete the account registration.

INSTRUCTION:

The distributor number can be obtained by contacting your distributor or CPS customer service.

7.1.2　Site and Language Selection

1.　Tap the globe icon in the top left of the screen, then select the correct service area and site.

2.　Tap the speech icon in the top right of the screen, then select the desired language.
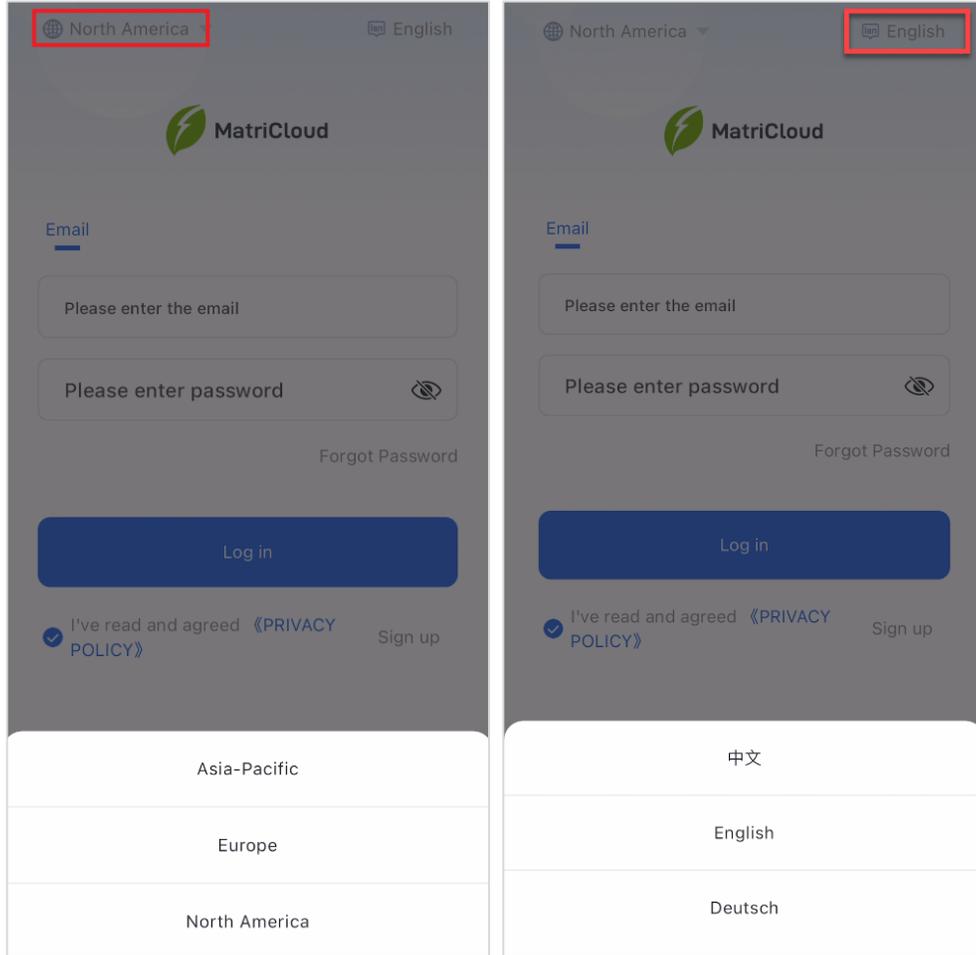
Figure 7-4 Site Selection

![CPS America logo]

7.1.3 Account Login

Before logging into the MatriCloud app, the MatriCloud app must be installed and an account must be registered, OR an account and password to log into the app have been obtained from the distributor/installer or CPS.

To log in:

1. Enter the account email and password into the login interface.

2. Read the privacy policy and check ✓ the "I have read and agreed" box.

3. Tap **Log in** to log into the app successfully and access the **Data Overview** screen.
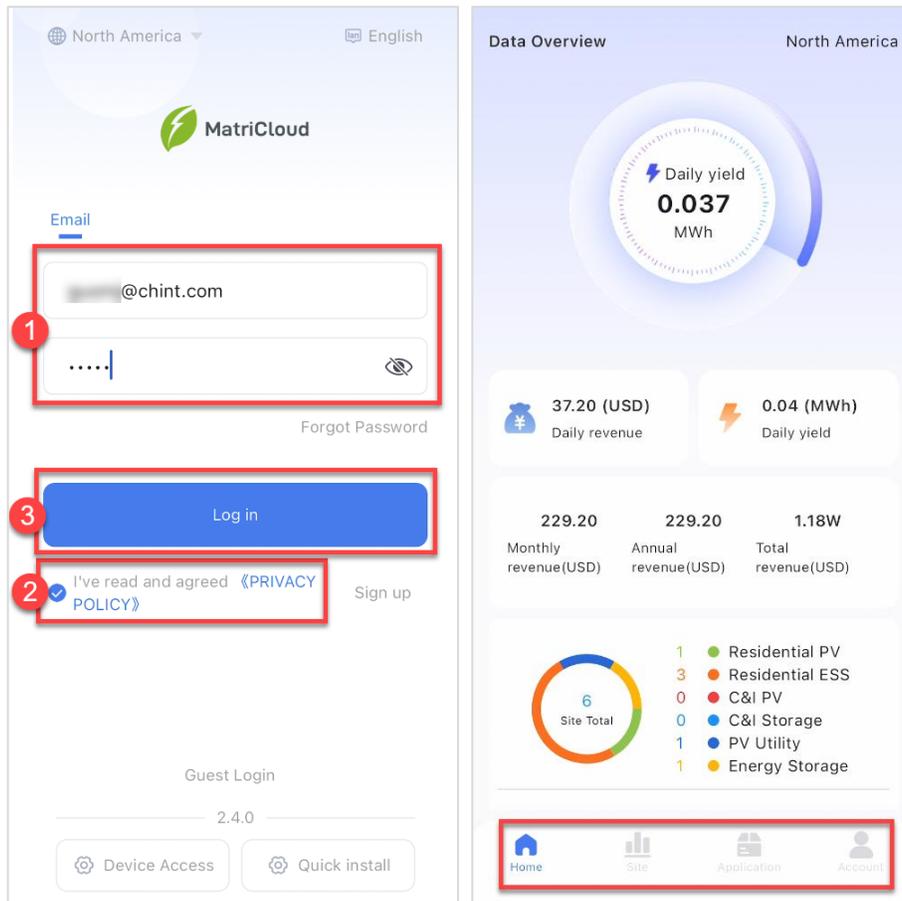
Figure 7-5 Account Login and Data Overview

Navigation Bar	Description
Home Page	View the electricity generation data and energy conservation and emission reduction indexes of all sites on the account. See Section 7.2 Home Page for details.
Site	View all sites on the account, create a site, view site information, and set up a site. See Section 7.3 Site for details.
Application	Alarm, device center, gateway center, maintenance service, and other applications. See Section 7.4 Application for details.
Account	View and set the account information. See Section 7.5 Account for details.

7.1.4   Reset Password

1.   Tap **Forgot Password** on the login interface.

2.   Enter the account's email address and tap **Send Code**.

3.   Enter the verification code.

4.   Change the login password.

     NOTE: The password must be at least eight characters and must contain one letter and one number.

5.   Tap **Submit** when finished.
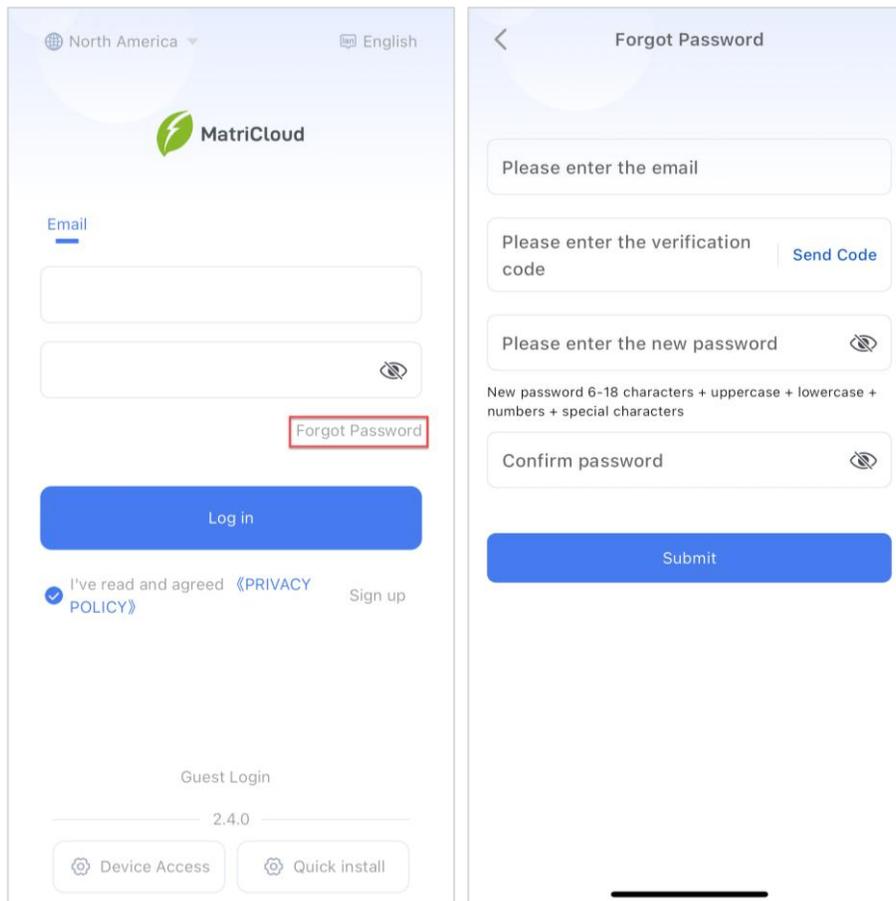
Figure 7-6 Reset Password

> **NOTICE:**
>
> Password retrieval is not supported in the following cases:
> - The account is not associated with a mobile phone number or an email address.
> - Personal information (such as phone number and email) is deleted for user privacy protection.
> - The associated mobile phone number or email address was forgotten.
>
> If any of the above situations occur, please contact CPS Customer Service.

7.2   Home Page

On the **Data Overview** screen, users can view the daily yield, the total revenue, and the revenue for the current day, and month. Additionally, users can access online / offline / abnormal sites, monthly yield chart, revenue history chart, and the energy conservation and emission reduction indexes of all sites associated with the account.
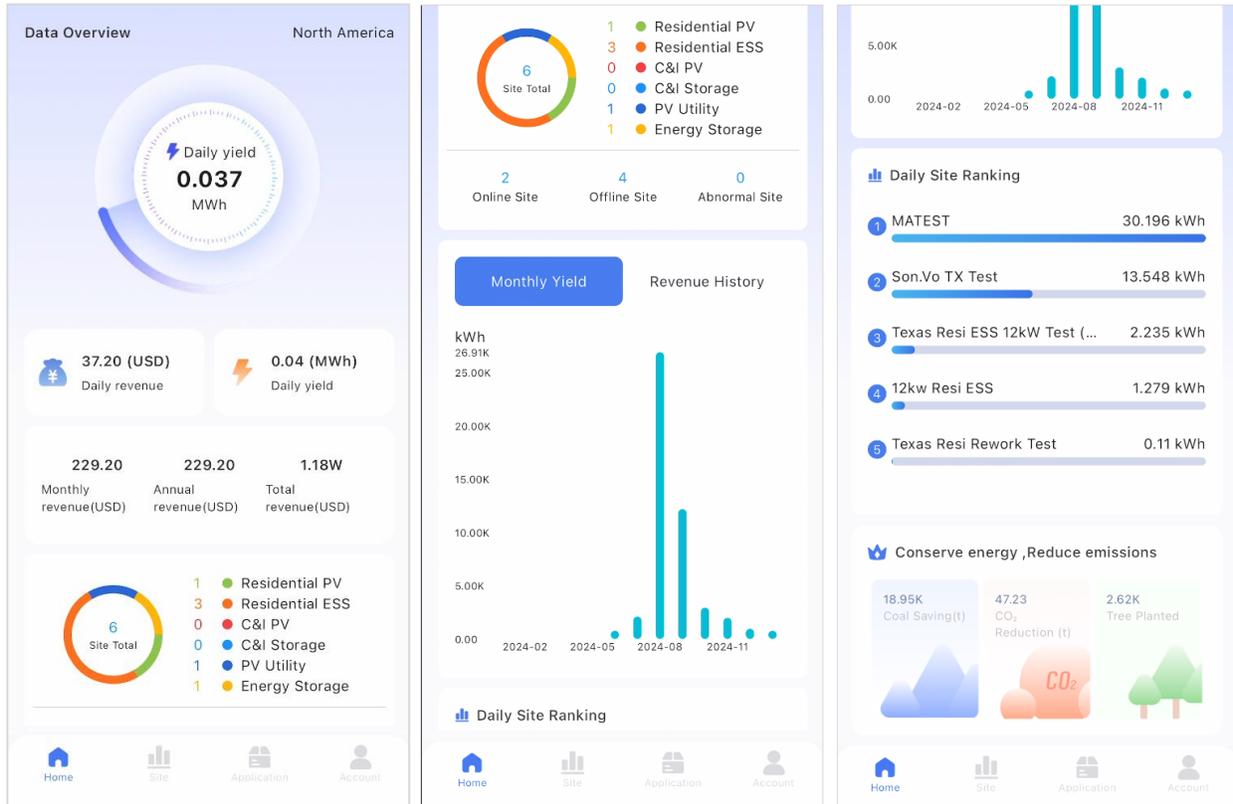
Figure 7-7 Data Overview

7.3　Site

After logging into the app, tap **Site** to enter the **Site List** interface.
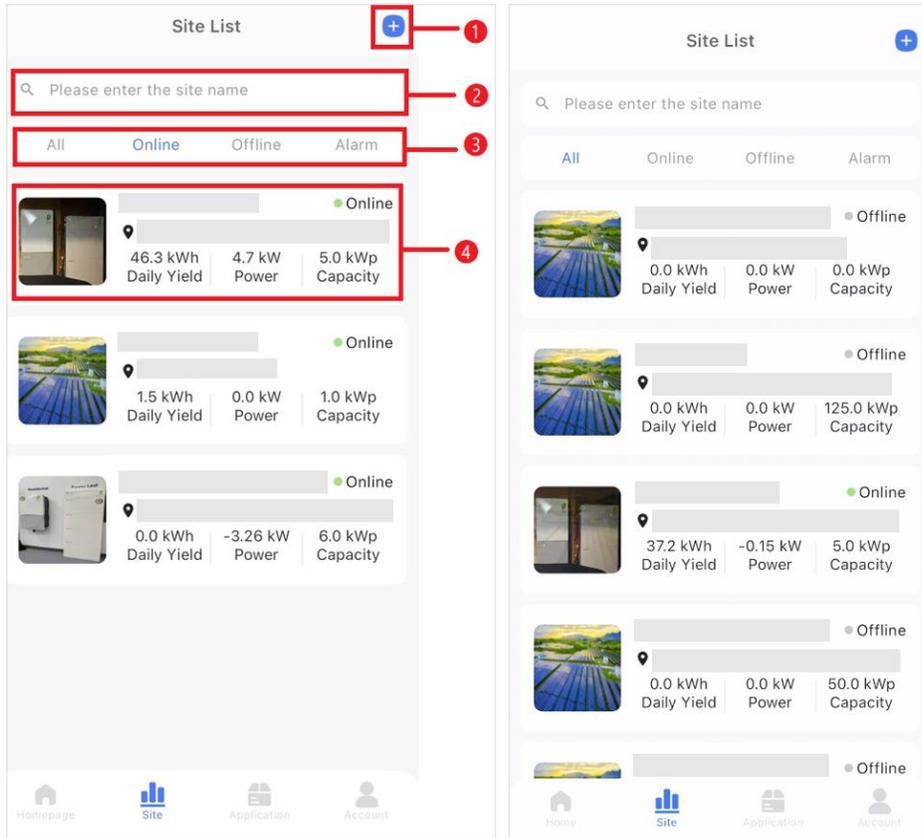
Table 7-1 Site List Interface

No.	Name	Description
1	New site	Tap to enter the site creation interface. See Section 7.3.1 Create Site for details.
2	Search box	Search for the site by its name.
3	Status bar	Filter by site status: All, Online, Offline, and Abnormal.
4	Site list	Tap a site to view its details.

7.3.1   Create Site

The interface for creating a new site will differ depending on the site type, inverter type, and communication device. For specific instructions, please refer to the app interface.

Before creating a site:

- An account must be registered or an account and password have been obtained from the distributor/installer or CPS to log into the MatriCloud app.

    o   If the owner user gives the site to the distributor/installer for management, they must obtain the distributor/installer code from the distributor/installer.

    o   If the distributor/installer helps the owner user set up a new site, they must obtain the mobile phone number from the owner user.

- The inverter must be connected to the communication device and operating normally.

To create a new site:

1.   Tap the **+** icon in the upper right corner of the screen.
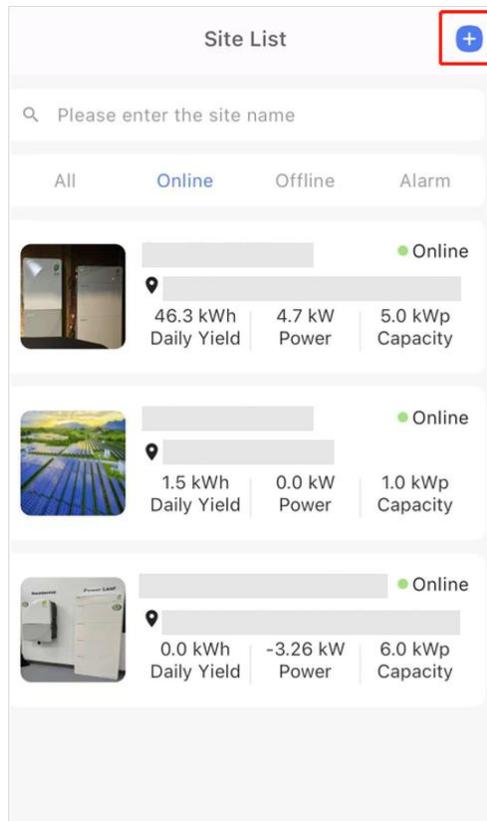
Figure 7-8 Create New Site

2. Tap **Scan to add device** to scan the barcode on the dongle, then tap **Confirm**.

   NOTE: If the barcode cannot be scanned, you can also enter the dongle serial number manually.
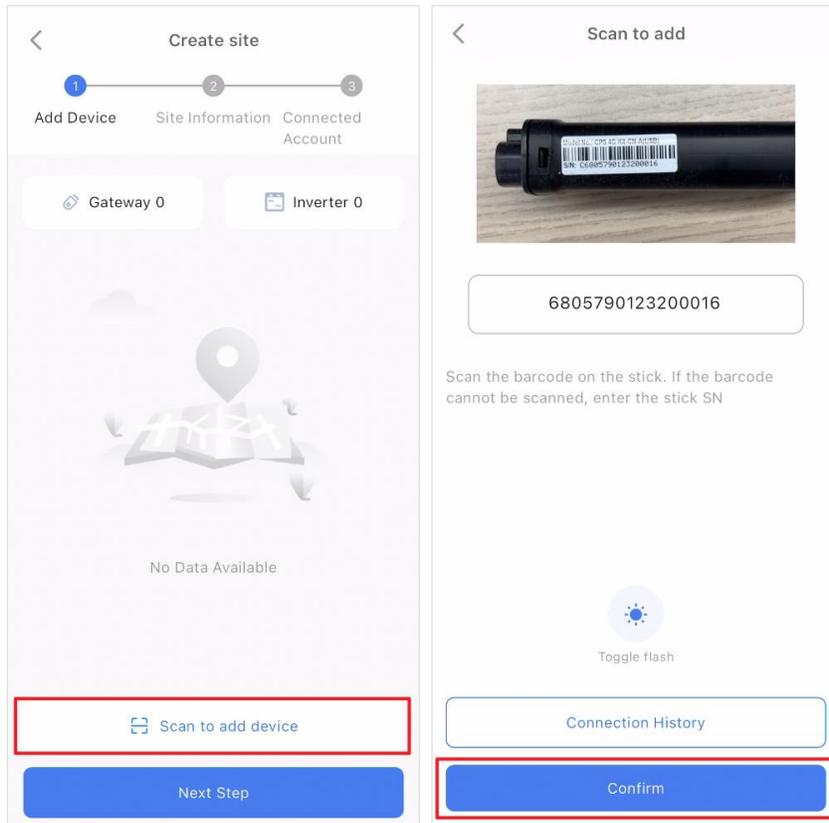
Figure 7-9 Scan to Add Device

3. Enter the required information, then tap **Next Step**.
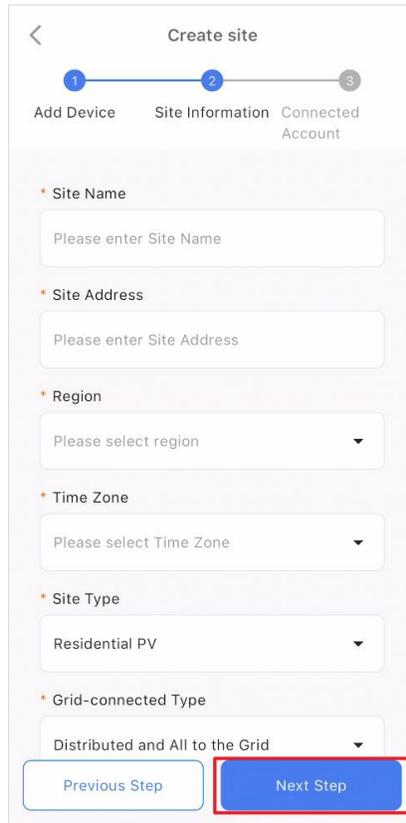
Figure 7-10 Enter Required Information

4. Tap the company name to filter the results, select an existing account to connect, then tap **Create** to create the site.

    NOTE: You can create a new account by tapping **Create Account** and entering the required information.
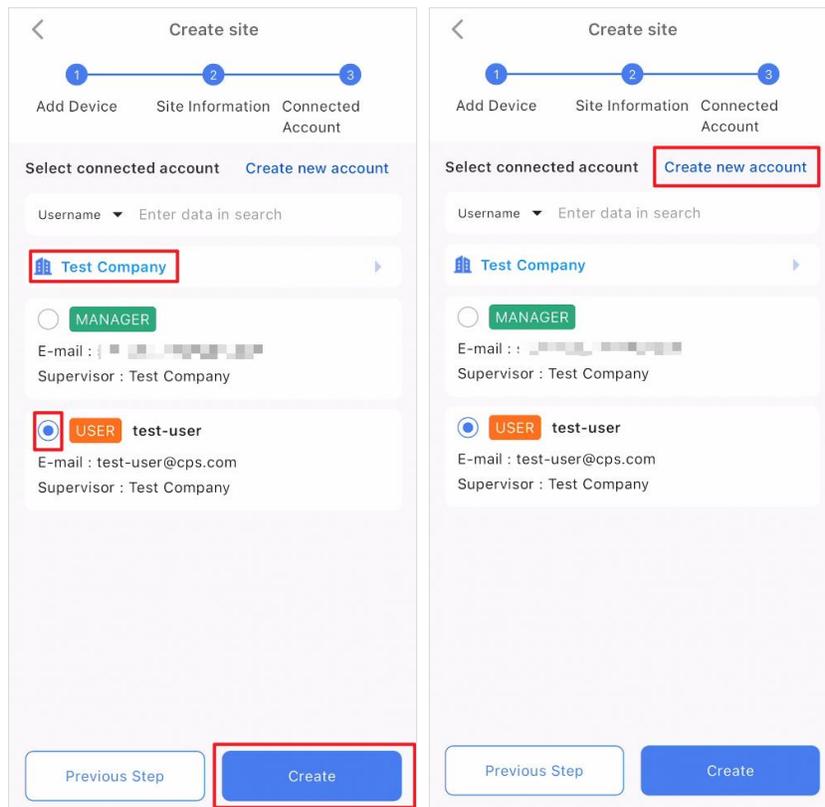
Figure 7-11 Select Connected Account or Create Account

7.3.2　Site Details

In the **Site Details** interface, you can view the electricity generation and device information of a site. On the **Site List** screen, tap the site name to see its details.

NOTE: The parameters displayed on the interface will differ for different types of sites; please refer to the app interface.
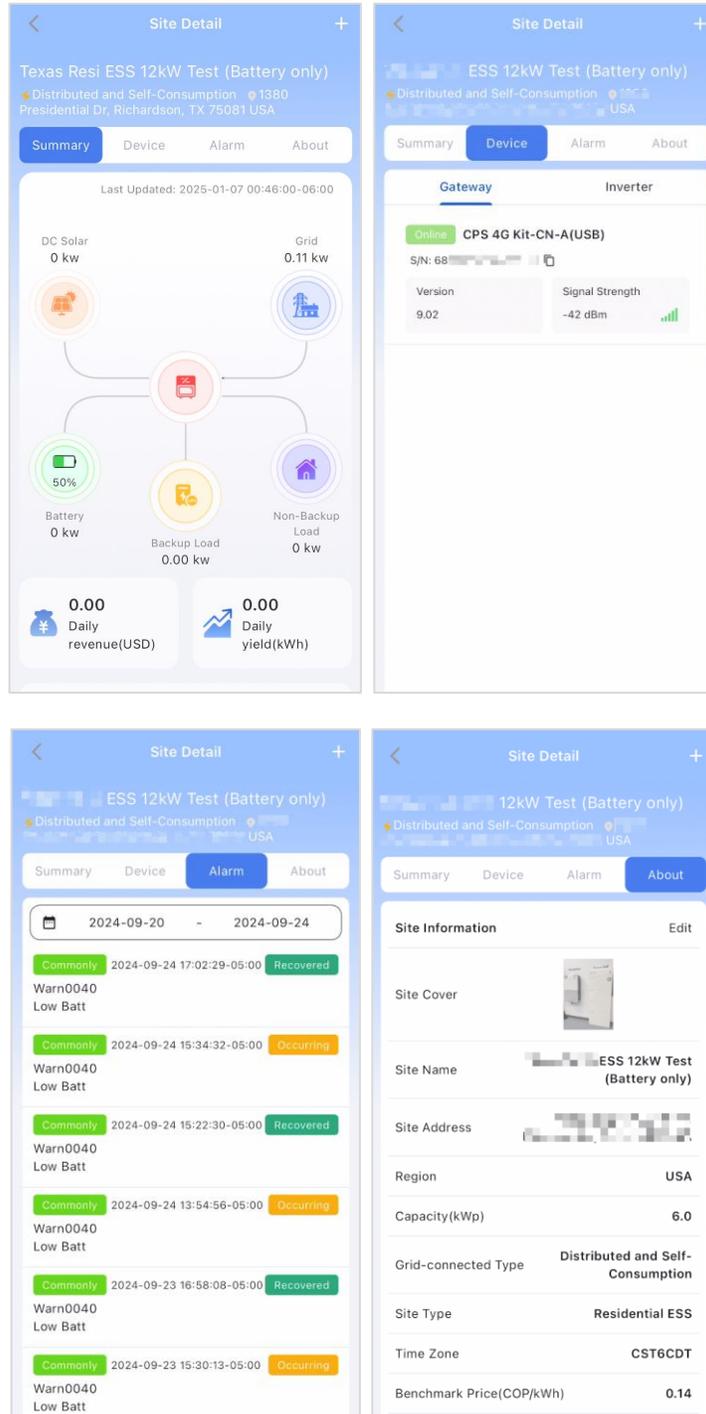
Figure 7-12 Site Details

7.4 Application

Operations such as device maintenance, asset management, and maintenance services can be accessed in the **Application** menu.
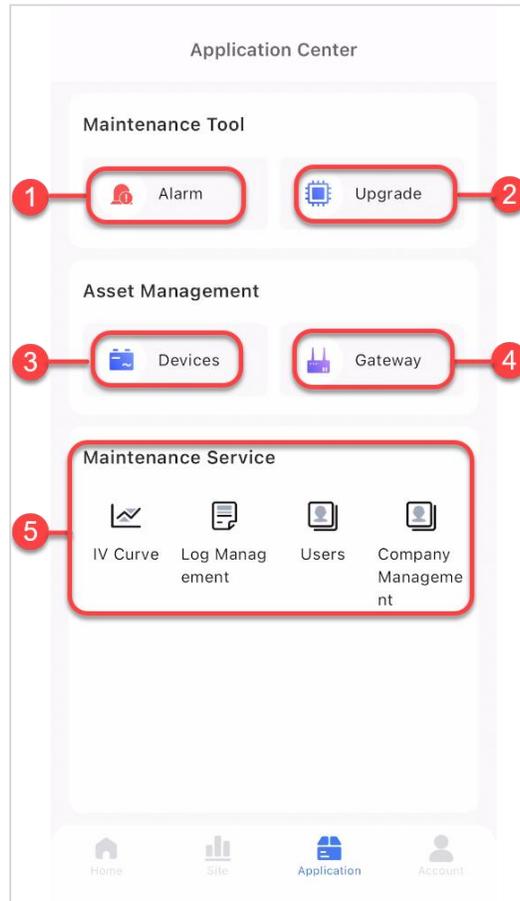
No.	Name	Description
1	Alarm	Tap to enter the alarm information page, which shows all alarm information for the account.
2	Update	The device can be remotely upgraded with firmware in the cloud and the app.
3	Devices	View all devices on the current account, including inverters and energy storage devices.
4	Gateway	View all gateway devices on the current account.
5	Maintenance Service	IV Curve: IV curve scanning. Log Management: System log management. Users: Management of users on the current account. Device Type: Device types can be added or deleted.

7.4.1 Alarm

The alarm information list can be used to screen sites by selecting the time range, entering the keywords to search, and selecting the alarm type. The alarm information is sorted into the following status categories:

- **Resolved**: Indicates that the fault status has been recovered.

- **Pending**: Indicates ongoing fault status.
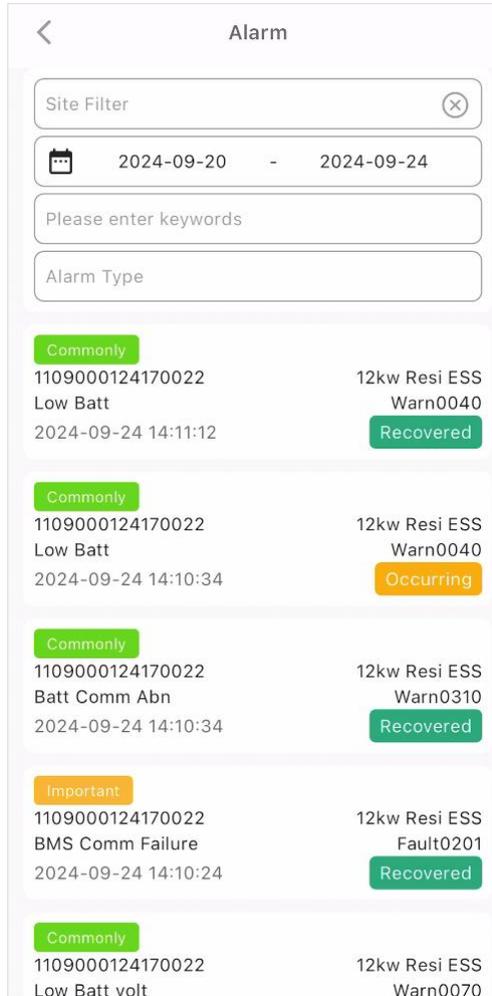
Alarm Type	Description
Urgent	The device stops running and immediate intervention is required.
Important	The efficiency of the device is affected and intervention is required.
Commonly	No impact on device operation and intervention is optional.
Prompt	Messages are prompted.

7.4.2   Firmware Upgrade (Remote)

If the inverter firmware needs to be updated, contact CPS customer service.

7.4.3   Device

This interface contains the details and settings of the devices managed by the current login account. Users can input the inverter name or SN to search for a certain device or sort by status (operating / fault / offline) to see device information. After locating the target device, you can tap it to see more detailed information.

In the **Overview** tab, users can view the serial number, operation status, overview information, DC information, AC information, and device information. Please note that the exact information displayed will vary by equipment type; refer to the app screen.

- **Details**: Users can view the running status, running mode, daily yield, SOC, and device profile.

- **Chart**: Select Day, 3-Day, or 7-Day for the chart, or set the desired display time range, or turn detail charts on and off. Switch tabs to view the power and DC and AC curves of the inverter.
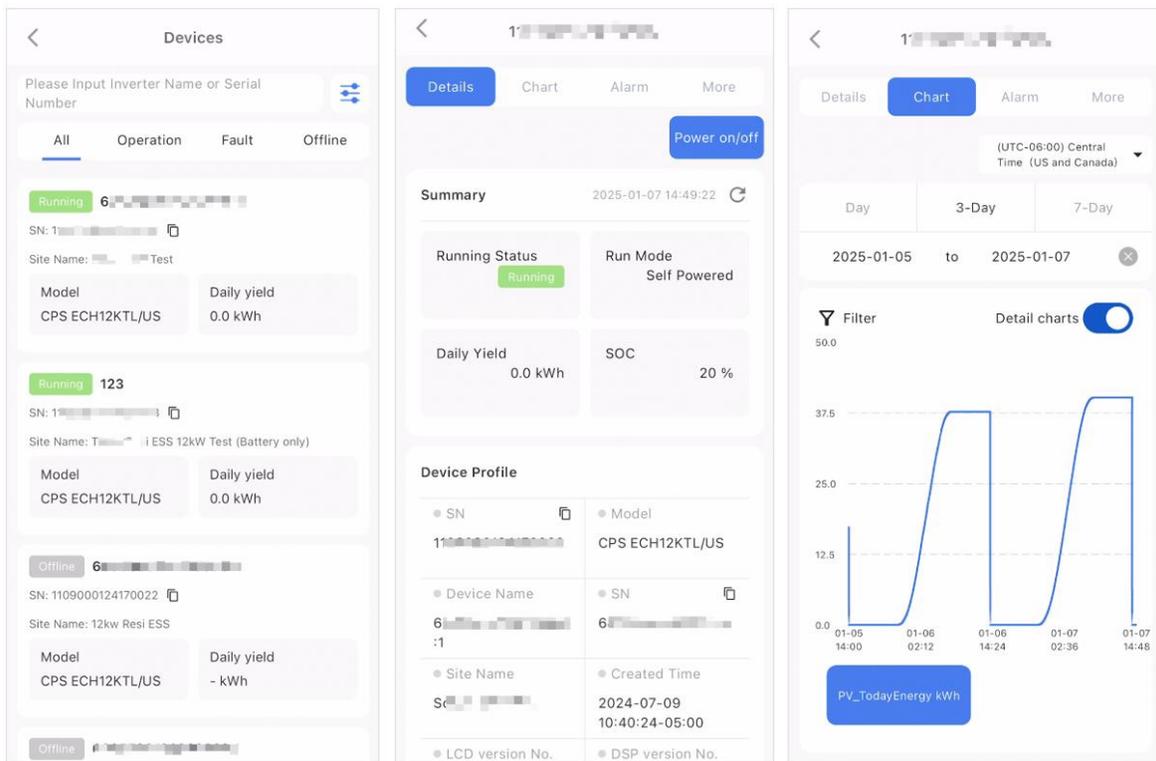
Figure 7-13 Device Information

- **Alarms**: Users can view alarm history in this tab. For the alarm definitions see Section 7.4.1 Alarm.

- **More**: This tab includes the device remote setting, yield, data, upgrade history, mode, and configuration settings.
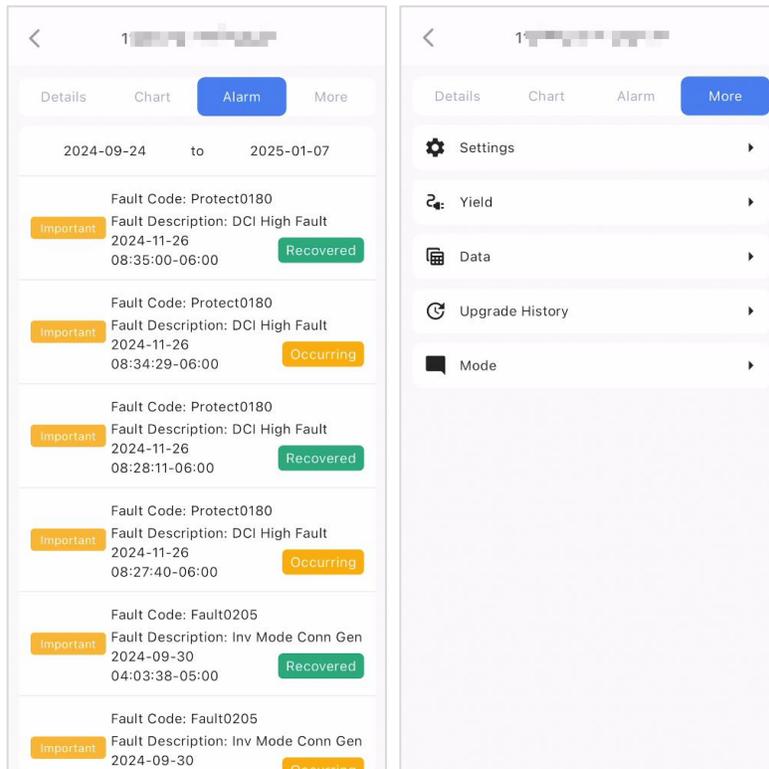
Figure 7-14 Device Information

7.4.4 Gateway

The **Gateway** interface features the details and settings of gateways managed by the current login account. Users can input the SN to search for a certain gateway or sort by status (operating / fault / offline). After locating the target gateway, you can tap it to see more detailed information.

Figure 7-15 Gateway Interface

- **Details**: Displays the overview and detailed information of gateway devices.

- **Devices**: Displays the devices affiliated with the gateway.

- **Upgrade History**: Displays the upgrade history of the gateway.

- **More**: Set gateway parameters.
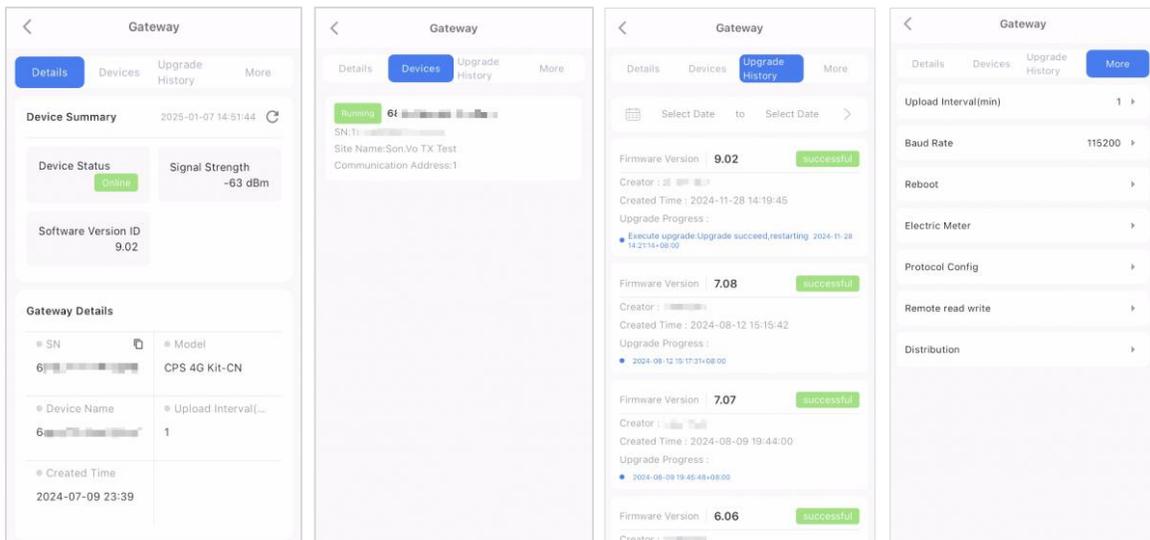
Figure 7-16 Gateway Details, Devices, Upgrade History, and More

7.4.5   Maintenance Services

The **Maintenance Services** interface includes Equipment Type, IV Curve, Log Management, and Users.
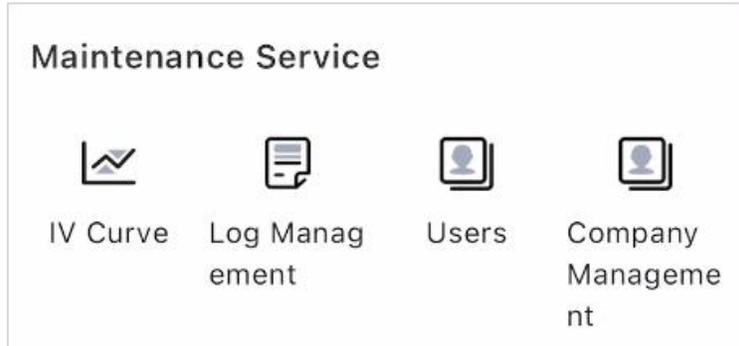
Name	Description
IV Curve	IV curve function; able to be searched by time range or device name / SN.
Log Management	View and manage the system log.
Users	Manage users on the current account.
Company Management	Manage company, edit company information, or add a new company.

NOTICE:

The parameters displayed on the interface will vary for different models of gateways. Refer to the app interface.

![CPS America logo]

7.5   Account

After logging into the app, tap **Account**. On this screen, users can access account information modification, security settings, account logout, general settings, and software information.
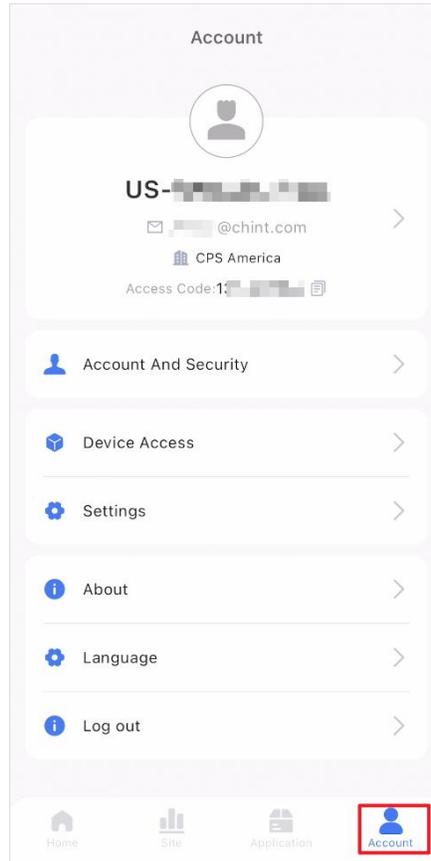
Figure 7-17 Account

Name	Description
Account and Security	Change the email address and password.
Device Access	Local debugging and testing functions.
Settings	Delete account.
About	Displays the app software version and download QR code.
Language	Set the system language.
Log Out	Log out of the system.

7.5.1   Account and Security

In this interface, you can add or update the email address and password associated with the account.

To modify the email address:

1.   Tap **Account and Security**.

2.   Tap **Modify** next to the email address you wish to change.

3.   Tap **Send Code** and wait for a maximum of 60 seconds.

4.   Enter the received verification code, then tap **Confirm** to proceed to the modify interface.

5.   Enter the new email address to be associated with the account, then tap **Confirm**.
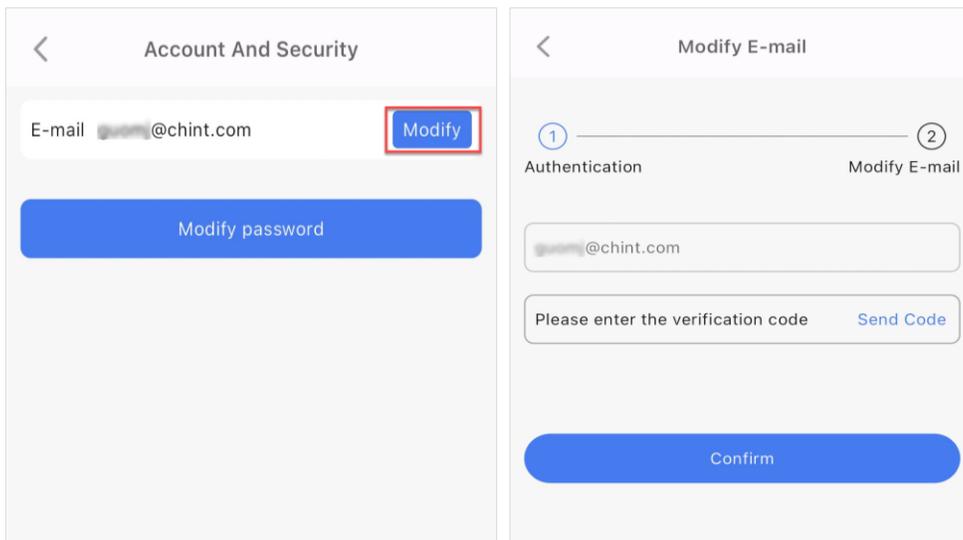
Figure 7-18 Modify Email Address

To reset the password:

1. In the **Account and Security** interface, tap **Modify password**.

2. On the next screen, enter the old password and the new password into the appropriate fields.

3. Tap **Confirm**.
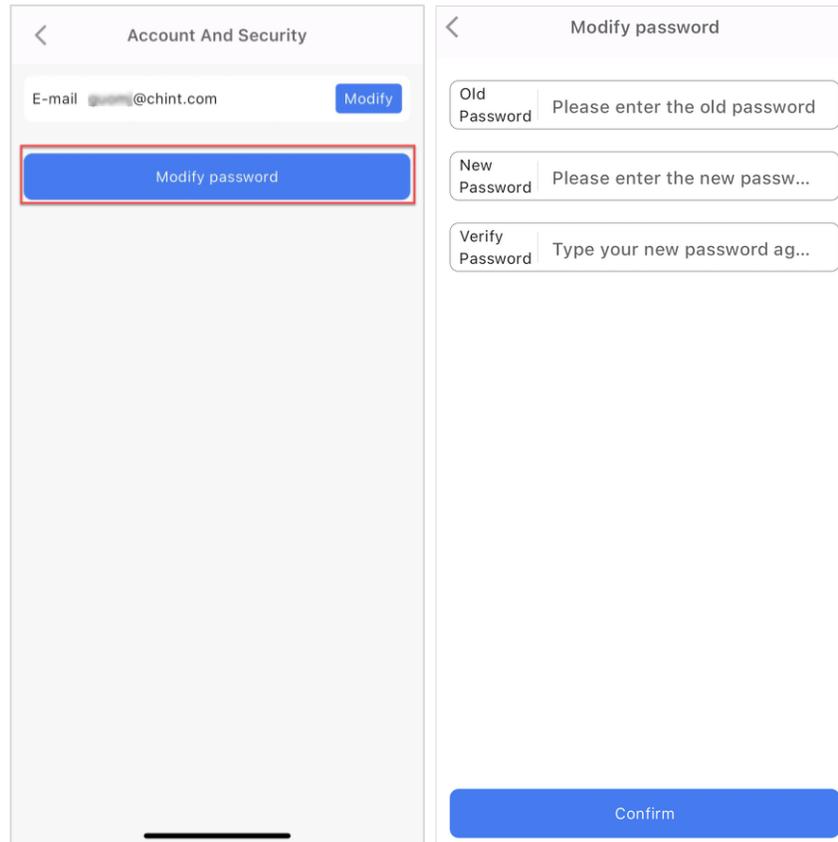
Figure 7-19 Modify Account Password

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7.5.2   Device Access

In **Device Access**, users can view and set parameters for the local inverter via Bluetooth connection. This function is provided based on the specific needs of the customers or O&M personnel. It can be used for local troubleshooting and testing, O&M, parameter configuration, fault reading, and other device functions.
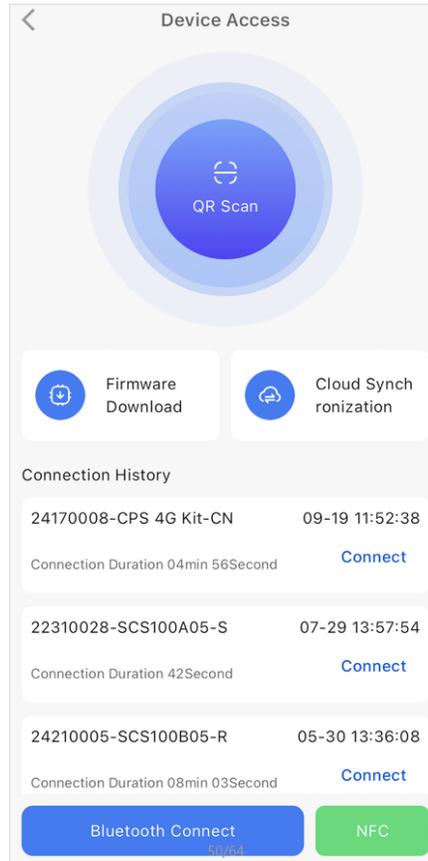
Figure 7-20 Device Access

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7.5.3　Settings

In **Settings**, you can delete your account. After tapping **Delete Account**, you must wait for review.
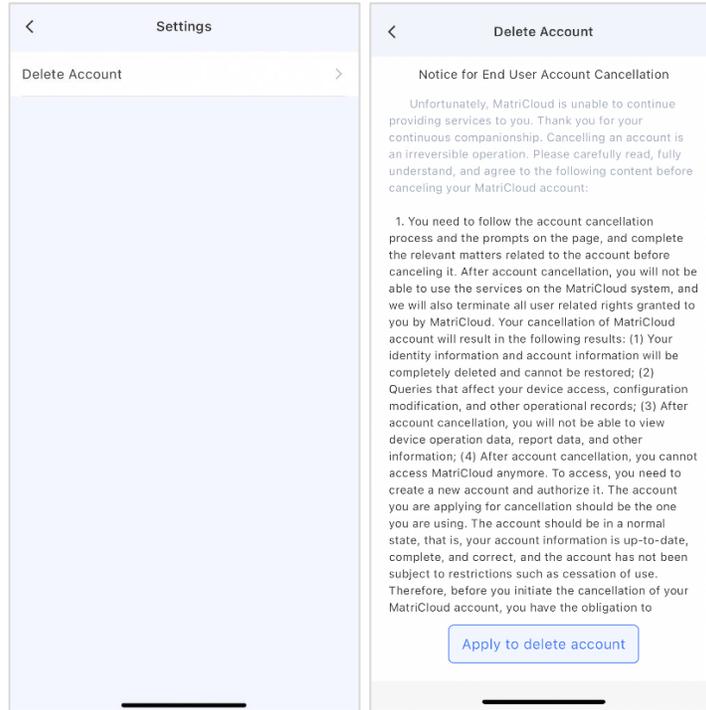
Figure 7-21 Settings

⚠️ **NOTICE:**

After account cancellation, ALL relevant information associated with the account will be **permanently deleted** and cannot be recovered.

7.5.4 About

In this interface, you can find the QR code to download the MatriCloud app, the user agreement, and the privacy policy.

Figure 7-22 About

7.5.5 Language

In this interface, you can select Chinese or English for the app language.
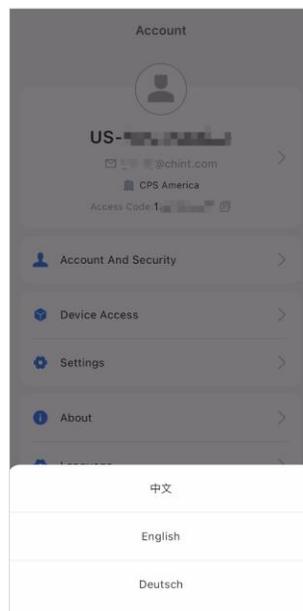
Figure 7-23 Language

7.5.6 Log Out

When you have finished browsing and want to log out of the app, navigate to this interface to confirm logout. To log in after logging out, you can log back in with your current account.

NOTE: Logging out only exits from the account; the account will not be deleted or forfeited.
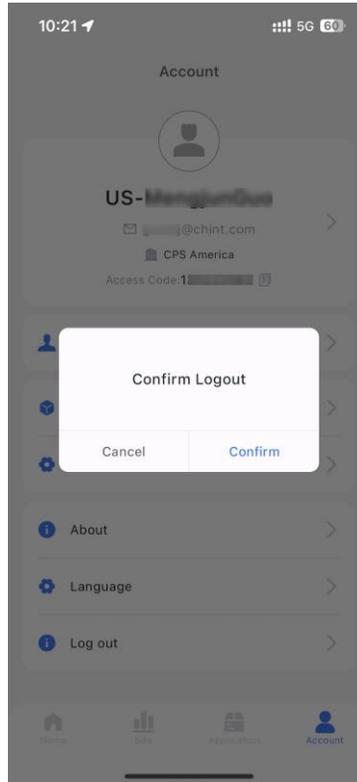
Figure 7-24 Logout

8 MatriCloud Platform

8.1 System Login

8.1.1 Sign Up and Login

INSTRUCTION:

This section applies to users who provide the owner with services such as site construction, installation, and operation and maintenance.

There are two methods for creating a MatriCloud account: contact the superior company for registration assistance, or self-register.

To self-register:

1. In your device's browser, navigate to **https://icloud.chintpowersystems.com** to access the login page.

2. Click **Sign Up Now** to access the registration page.
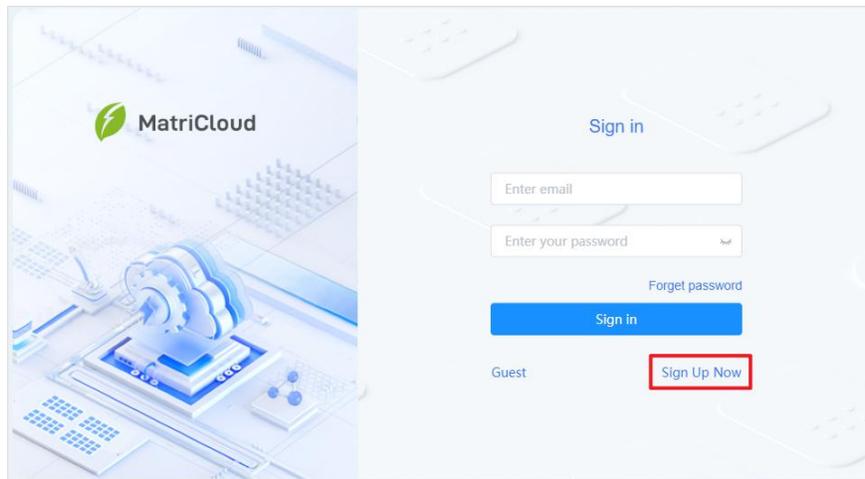
3. Select your account type (distributor or installer), then click **Next**.
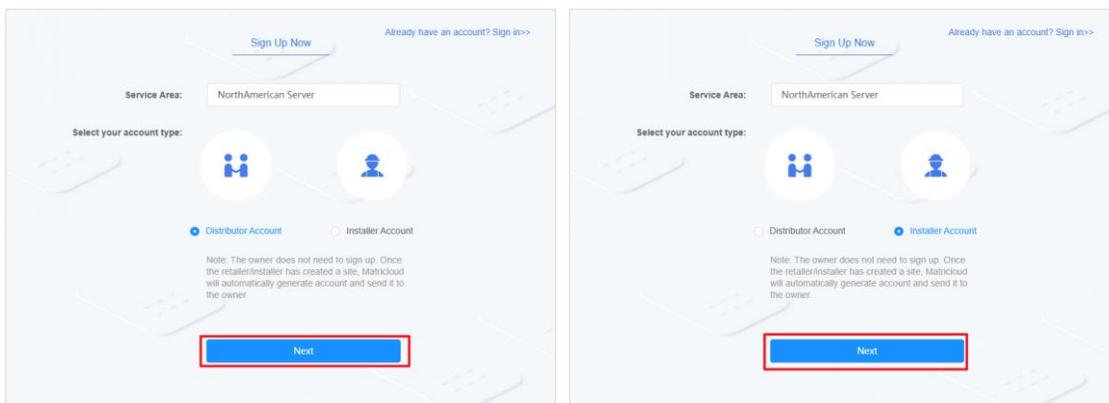
4. Enter your registration information, check the box to agree to the privacy policy, and click **Submit** to complete registration.
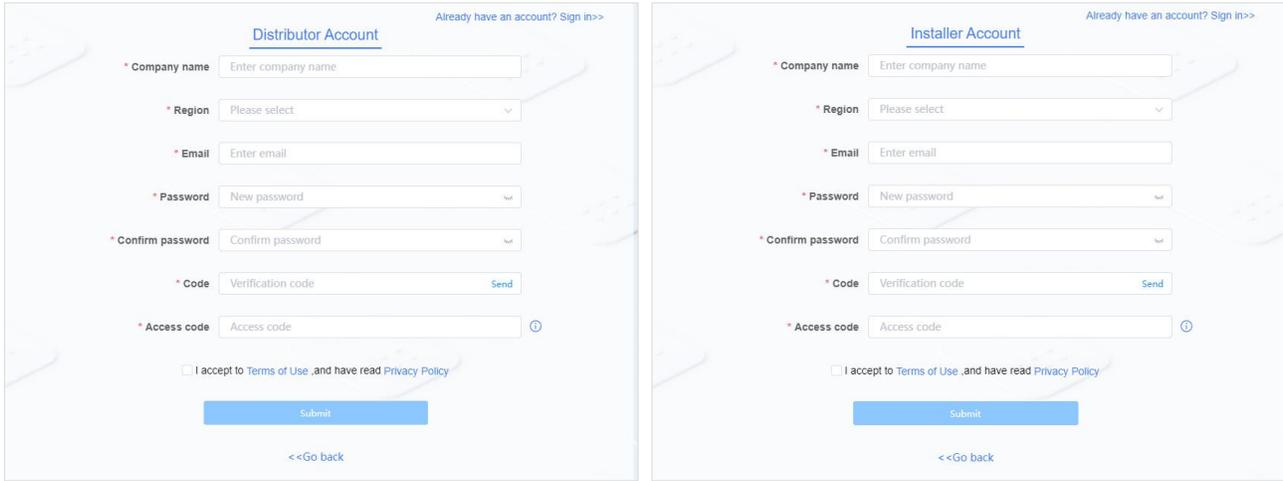
Field	Description
Company name	Enter the company name.
Region	Select a region from the dropdown list.
Email	Enter the associated email address.
Password	Create and enter a password; it must be between 6-18 characters, including upper / lower case letters, numbers, and special characters.
Confirm password	Re-enter the password you just created.
Code	Click **Send** to receive a verification code to the associated email address, then enter it here.
Access code (manufacturer number / distributor number)	Enter the organization code of the superior service provider. This can be obtained by contacting the superior service provider; once that code is entered in account registration, the provider can browse and manage the site associated with the account.
Terms of use & privacy policy	Read the terms of use and privacy policy, then check the box to indicate you agree.

5. Return to the login page and enter your email and password, then click **Sign in**.

![CPS America logo]
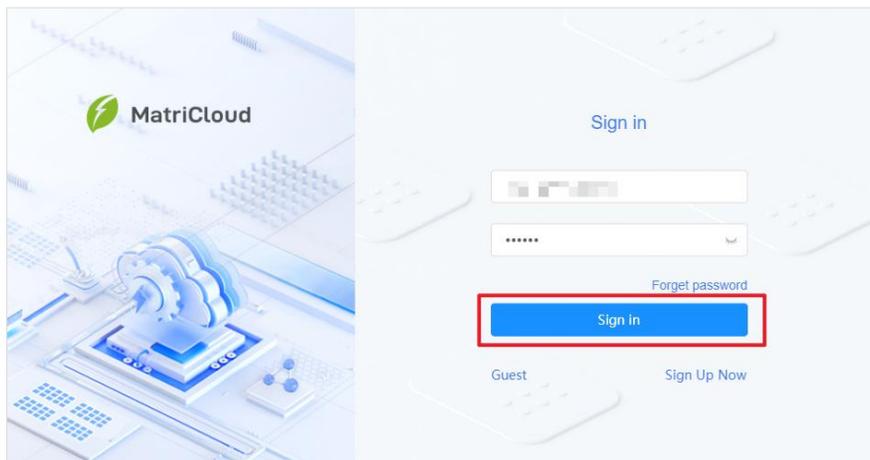
8.1.2   Reset Password

There are two methods to retrieve a password:

- Contact the service provider to reset the password. After resetting, the new password will be sent to the email address associated with the account.

- Reset it directly in MatriCloud.

To reset the password yourself directly in MatriCloud:

1. In your device's browser, navigate to **https://icloud.chintpowersystems.com** to access the login page.

2. Click **Forget password** to access the password retrieval page.
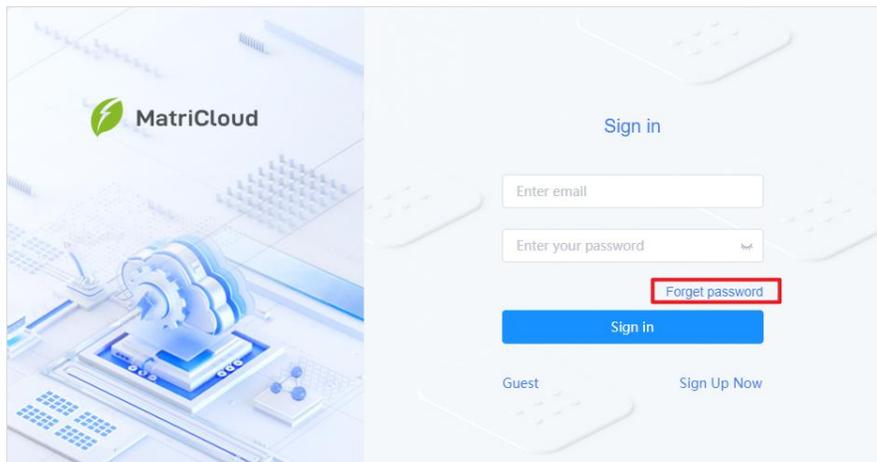
3. Enter the correct information in the appropriate fields, then click **Confirm** to reset / retrieve the password.
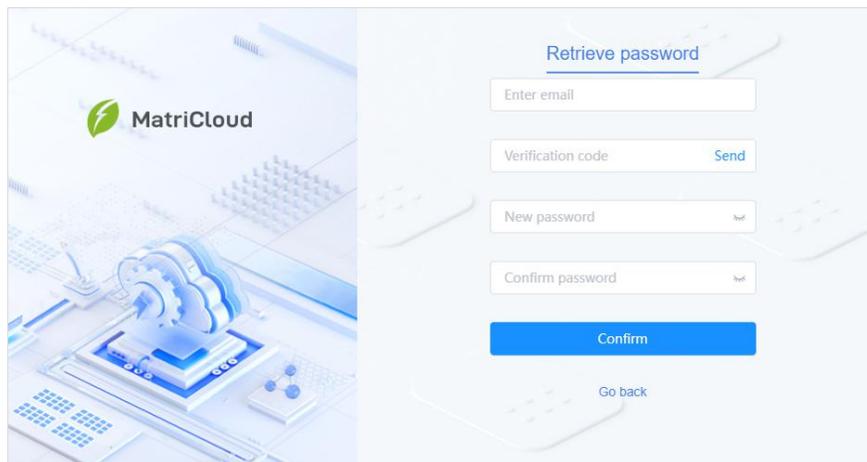
Field	Description
Email	Enter the associated email address.
Verification code	Click **Send** to receive a verification code to the associated email address, then enter it here.
New password	Create and enter a password; it must be between 8-30 characters, letters, and/or symbols.
Confirm password	Re-enter the password you just created.

8.2 Home

After logging into MatriCloud, you can enter the Home page. From here, you can view the status, KPI, yield, and revenue of all sites associated with the account. Information such as active alarms, yield trends, yield ranking, and CERs can also be checked in this interface.
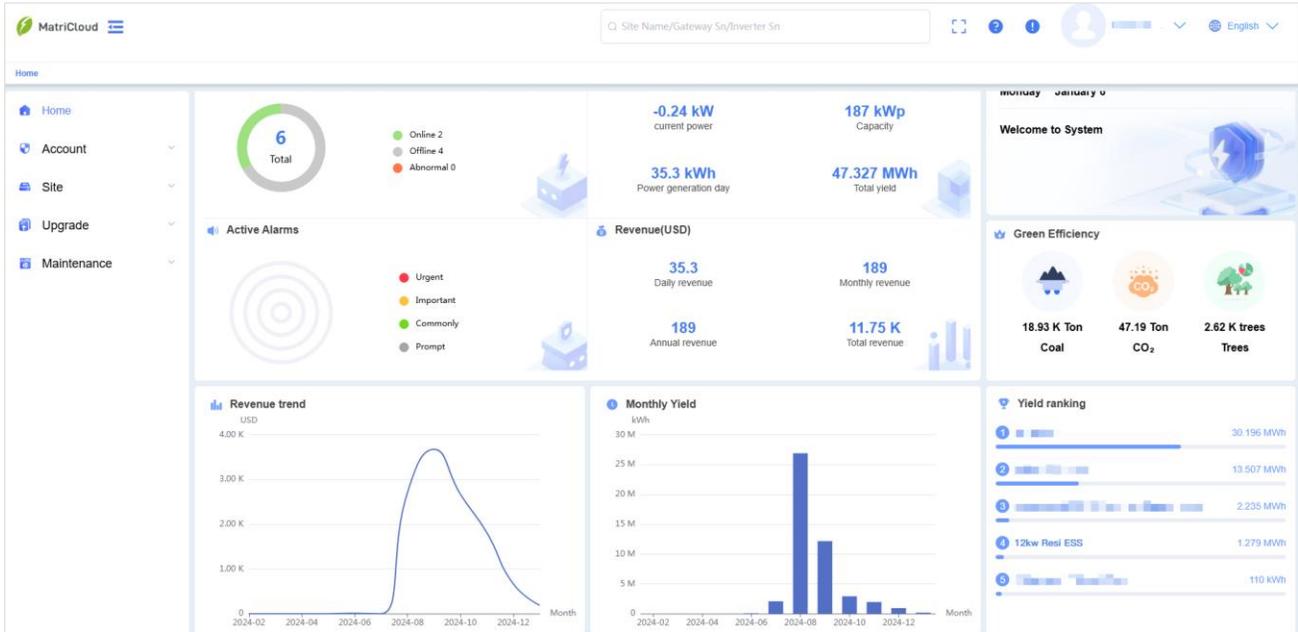
8.3   Site Management

On the **Site** page, click any site name to view site information, the number of devices at the site, its energy yield, its revenue, as well as an overall site list.

8.3.1   Site

On the **Site** page, you can view information about the site details, number of devices, energy yield, and revenue.
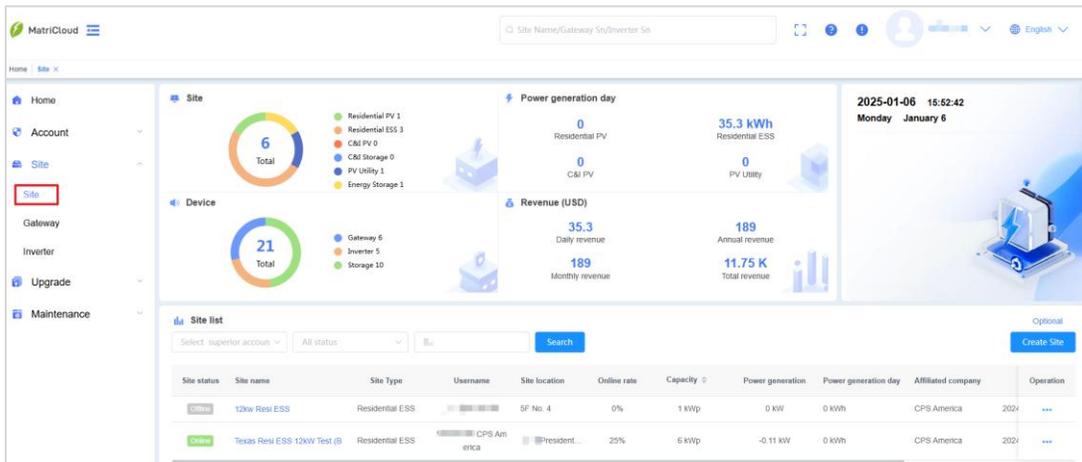
8.3.1.1   Search for Site

For the site list, enter the relevant search information into the **Select superior account**, **All status**, and **Search by site name** search boxes to the left of the blue **Search** button.
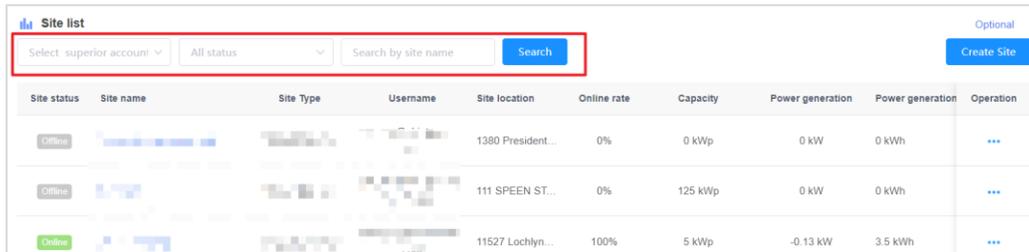
You can also change the information columns by clicking **Optional** in the top right corner (above the **Create Site** button). Check the desired boxes and click **Confirm** to hide or show different columns.
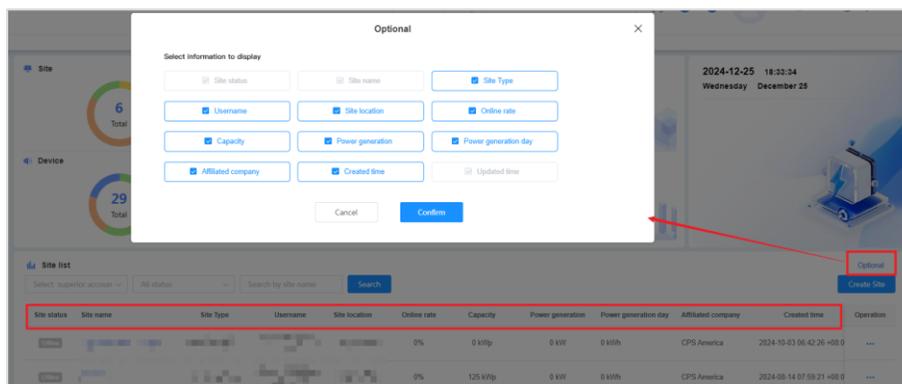
8.3.1.2   Create Site

To create a site:

1. Click the **Create Site** button in the top right corner; this will produce the dialog box used to create a new site.
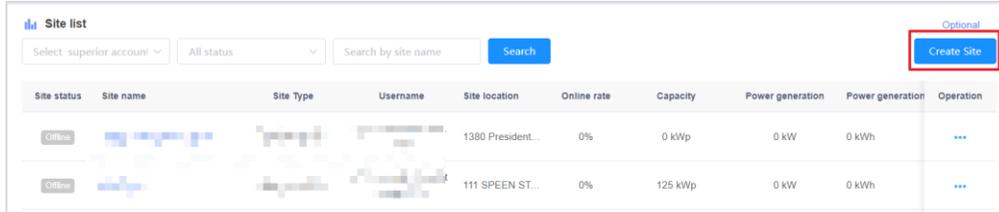
2. Enter the gateway information (or skip this step, as it is optional).
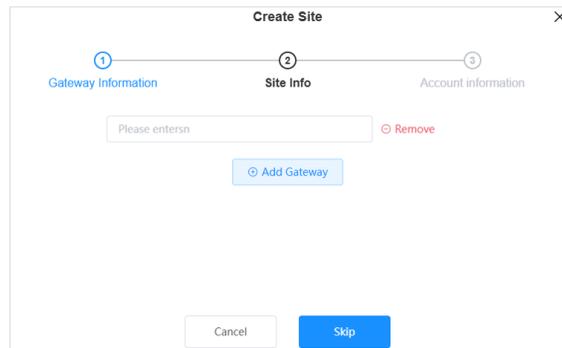
3. Enter the basic information for the site.
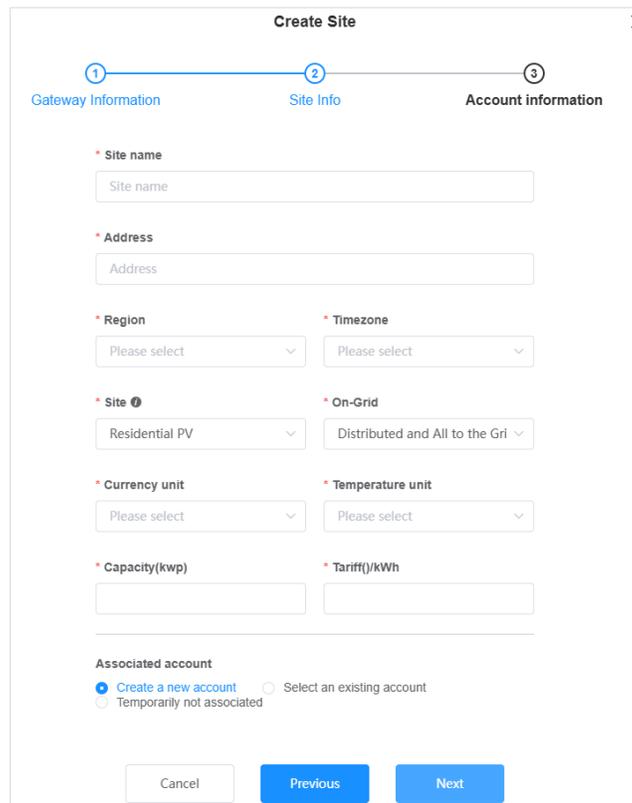
Field	Description
Site name	Enter the name of the site; if you need to modify it after, go to the **Site Details** page.
Address	Enter the address of the site.
Region	Select the region where the site is located.
Time zone	Select time zone based on the site location.
Site type	Select the site type.
On-grid	Select according to the site. DAG: Distributed full feed-in DSC: Distributed self-consumption OG: Off-grid AG: Ground-mounted power station full feed-in
Currency unit	Select based on the selected region.
Temperature unit	Automatically chosen based on the selected region.
Capacity	Set according to the site.
Tariff	Automatically chosen based on the selected region.
Associated account	Create a new count or select an existing one.

4. Select the company and language and enter the mobile phone number.
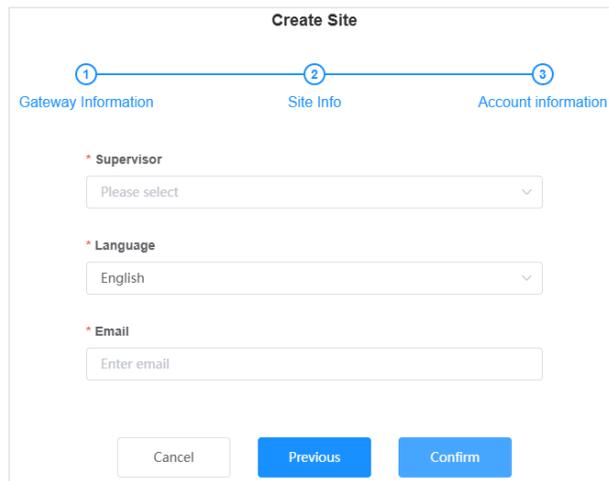
5. Click **Confirm** to confirm the account information.

8.3.1.3   Site Overview

Click on the site name from the list to enter the site overview interface.

After clicking **Edit** in the basic information area of the site, you can edit and modify the site information. After the specific address of the site is entered, the geographical location of the site can be located and the meteorological data of the last seven (7) days can be displayed according to the preset site coordinates.

The flow diagram shows the current power supply equipment, site, feed volume, load consumption, purchased power, and power supply direction. With these data values, the contribution area on the right can show the energy saving and emission reduction effect on the current site.

To add a Gateway, click **Add Gateway**, enter the Gateway SN, and click **Confirm**. After being added successfully, the Gateway will automatically display in the Gateway list; the inverters associated with the Gateway will also appear in the inverter list.
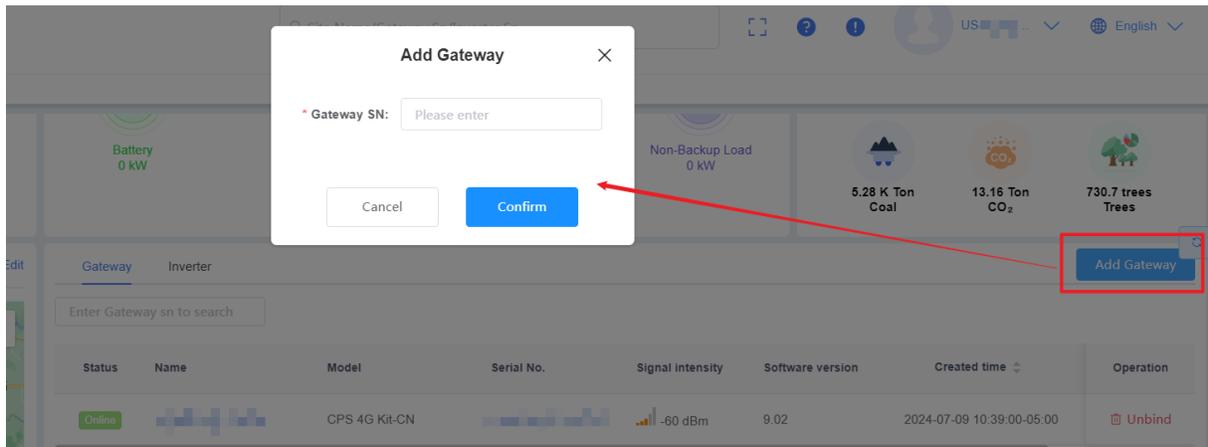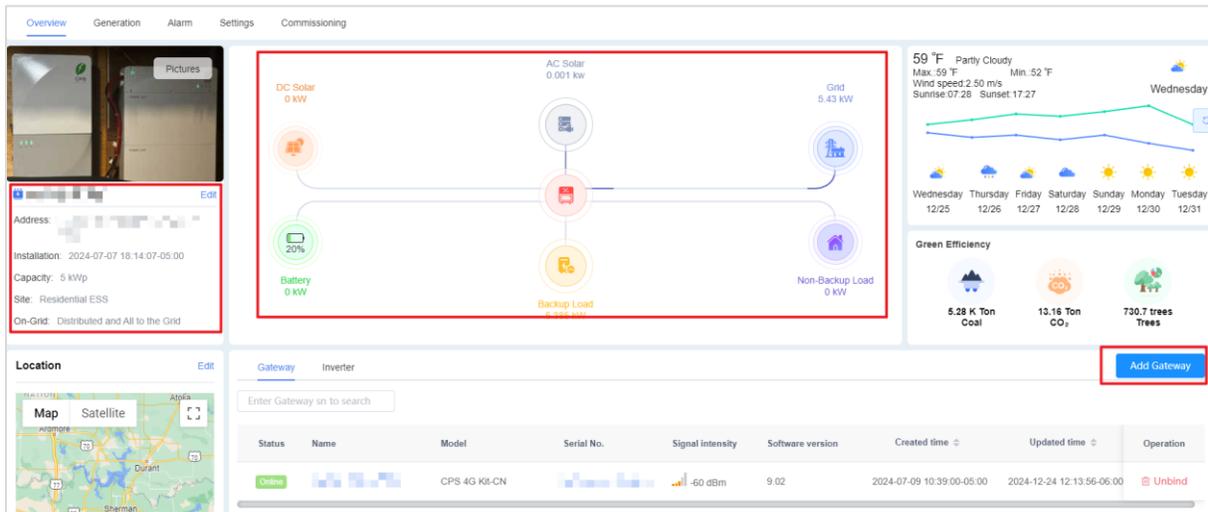
8.3.1.4   Chart

In the **Chart** menu, users can select specific devices and parameters to visually compare data within the power station.
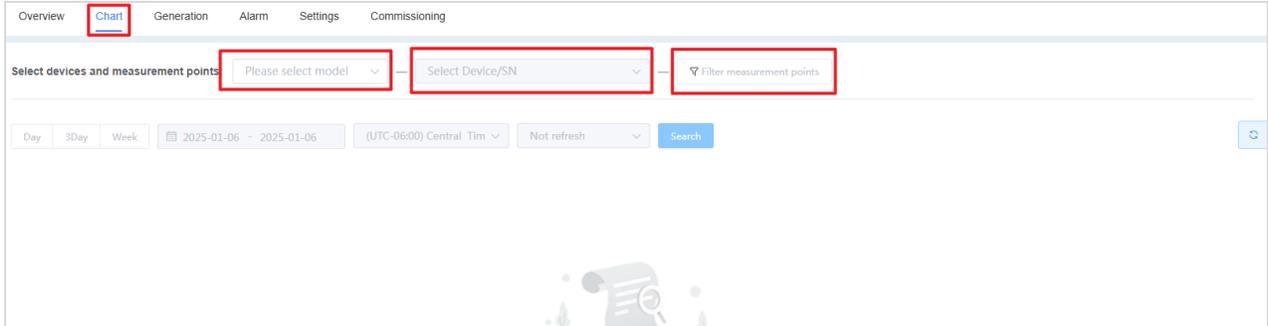
Select the model, SN, and measurement points, and the data chart will automatically appear. Hover the mouse over the chart to display detailed data for the measurement points.
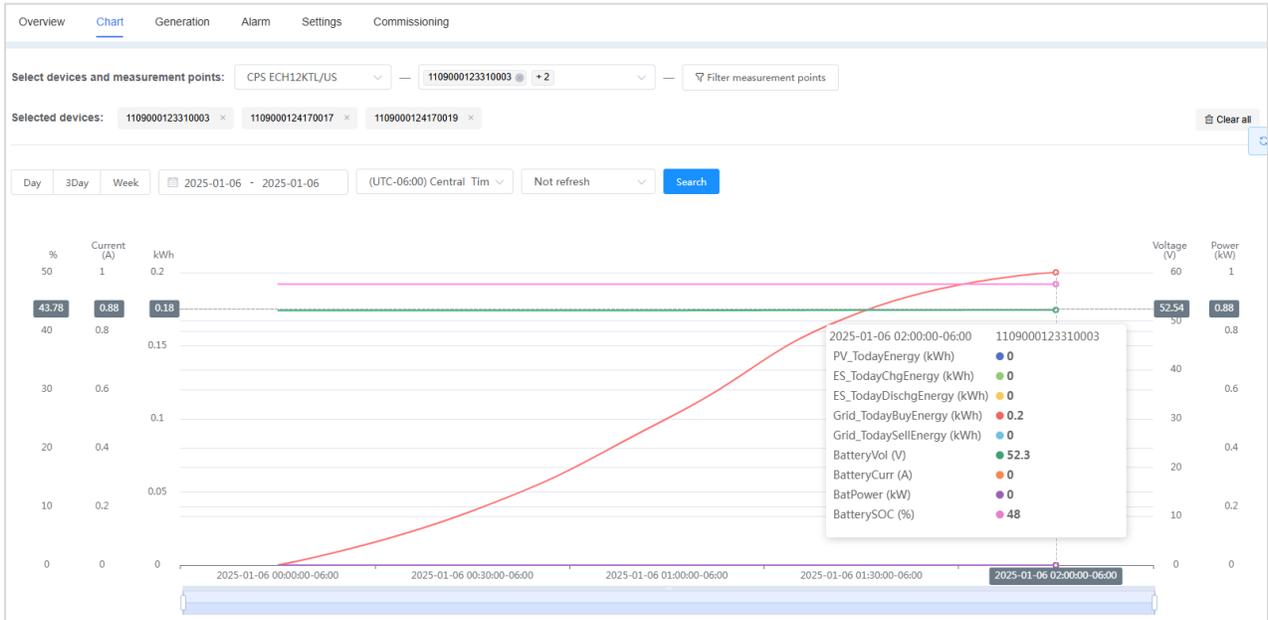
8.3.1.5 Generation

1. In the **Generation** menu, click **Select Device**, then select a device to view its site.
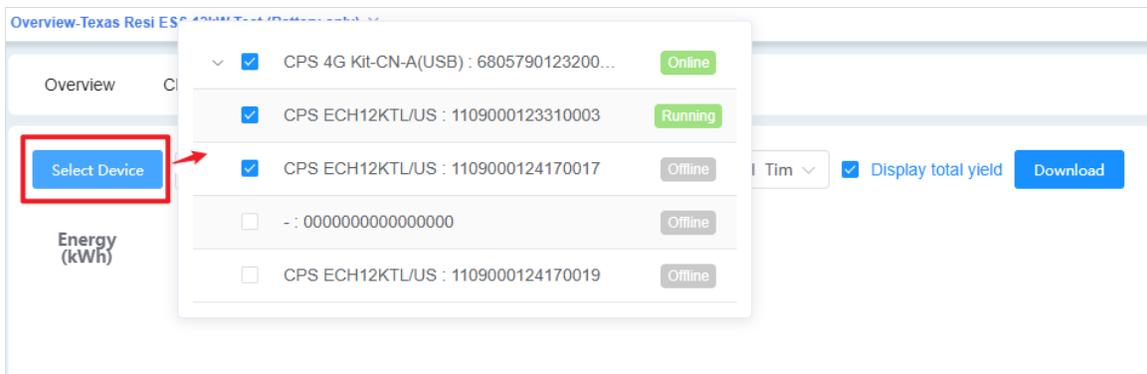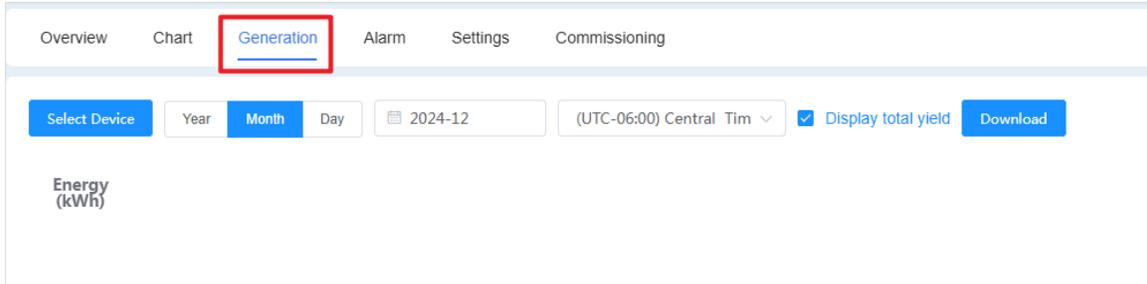
2. After selecting the device(s), the power column diagram will automatically appear.
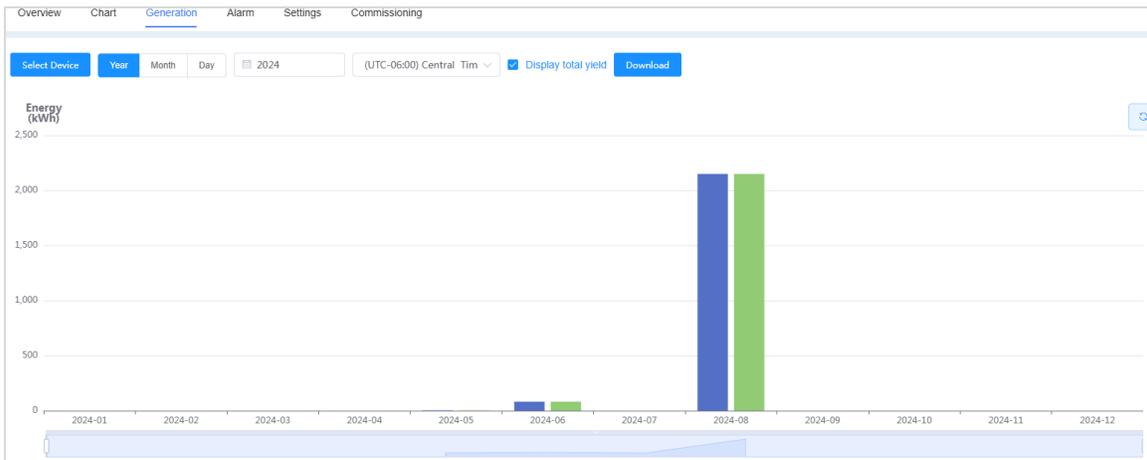
3. Select the time range.

   NOTE: You can display the energy generation bar graph in a variety of time ranges (e.g., year, month, day). If you want to display the total yield for the entire site, select **Display Total Yield**. You can also click the **Download** button to download the searched site information for a certain device in the time range of your choosing.
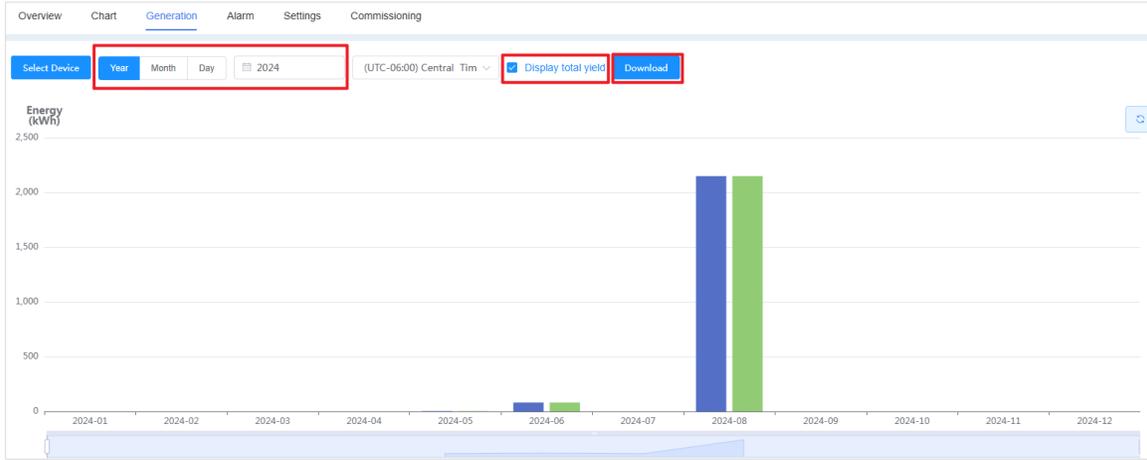
8.3.1.6   Alarm

In case of an abnormality or fault with the device, key information (such as occurrence time and content) is recorded in real time and displayed in the alarm list. To access this information:

1. In the **Alarm** menu, click **Select Device** to choose the desired device.

2. Click **Alarm Type** to select the alarm level.

3. Select a time zone and time range to search.

The information includes the alarm level, time, device name, fault code, alarm content, and status. You can also click **Download** to save the selected fault records.

Alarm Type	Description
Urgent	The device stops running and immediate intervention is required.
Important	The efficiency of the device is affected and intervention is required.
Commonly	No impact on device operation and intervention is optional.

Prompt	Messages are prompted.

8.3.1.7   Commissioning

The **Commissioning** menu is used to generate the commission report.

1. In the **Commissioning** tab, click **Create**.
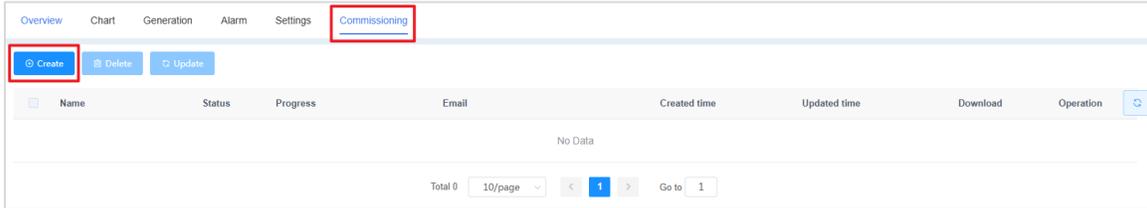
2. Enter the report name and (optional) email, select the Gateway, and click **Confirm**.

3. Click **PDF** to download the report when it is complete.

4. Click **Update** to update the report.
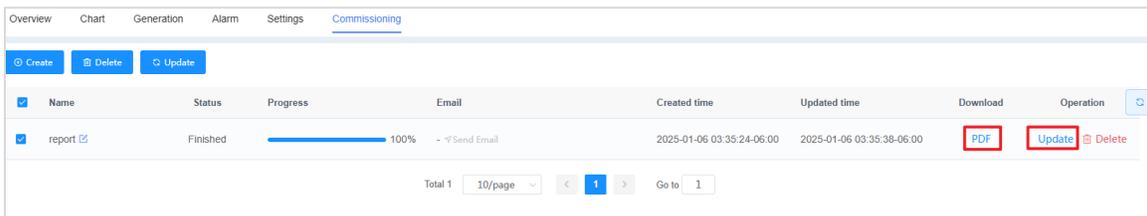
8.3.2　Gateway

Click **Gateway** on the left side of the screen to enter the Gateway interface. In this interface, you can view the Gateway status, Gateway type, and firmware version information.
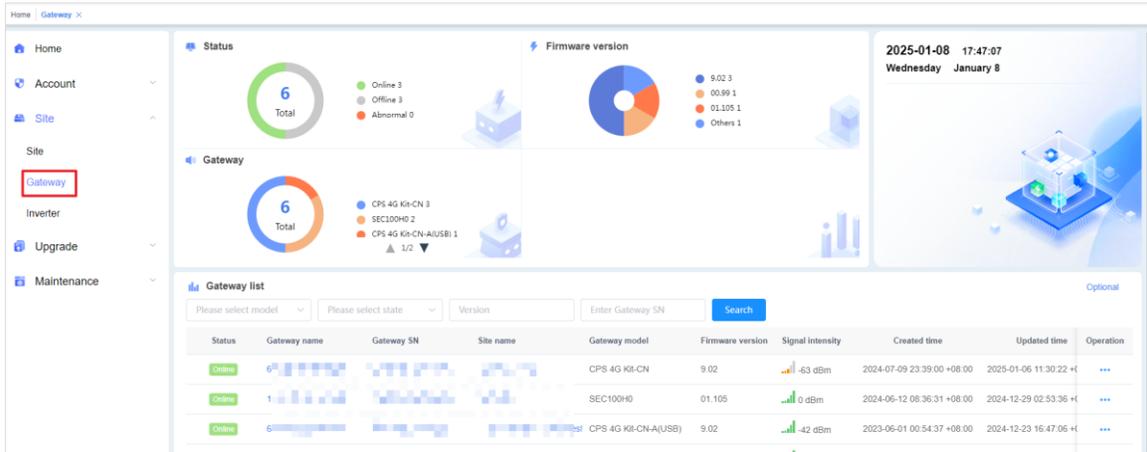
8.3.2.1　Search for Gateway

1.　On the **Gateway > Gateway List** page, select the gateway type (Wi-Fi) in the **Please select model** box.

2.　Select the status (online, offline, faulty) in the **Please select state** box.

3.　Enter the version in the **Version** box.

4.　Enter the serial number in the **Enter Gateway SN** box, then click **Search**.

5.　Click **Optional** in the top right corner to filter the content categories you want to display.

6.　Click "**…**" in the Operation column to distribute or rename a gateway.
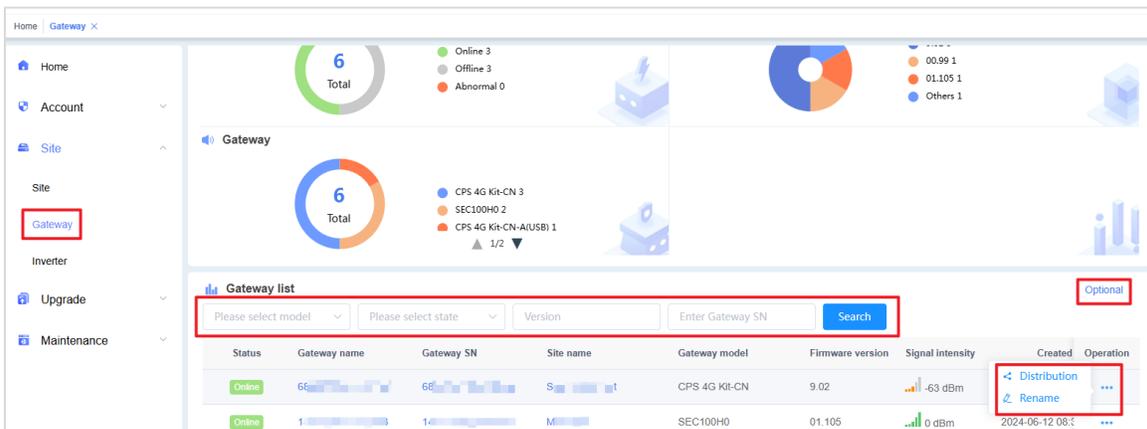
8.3.2.2 Gateway Overview

Click the Gateway name from the list to view the details of a Gateway. Click **Delete** to delete the current device.
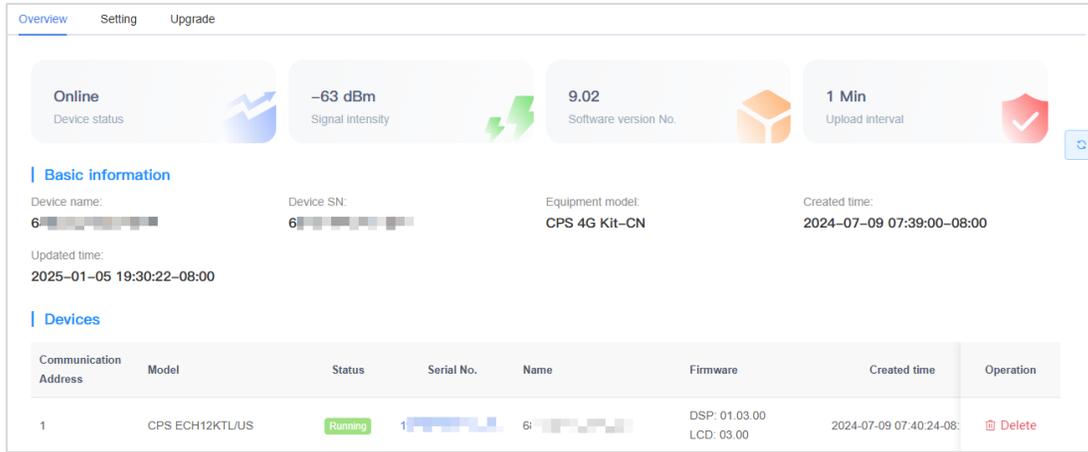
8.3.2.3 Setting

In the network card parameter setting, the user can match the model protocol, upload interval, device address, and more to configure the device data parsing rules.

1. Click **Add Protocol** to add the protocol address and protocol selections.

2. Click **Submit** to submit the NIC settings and restart the device (10-20 s).

3. Click **Intellisense** to automatically identify the device protocol.
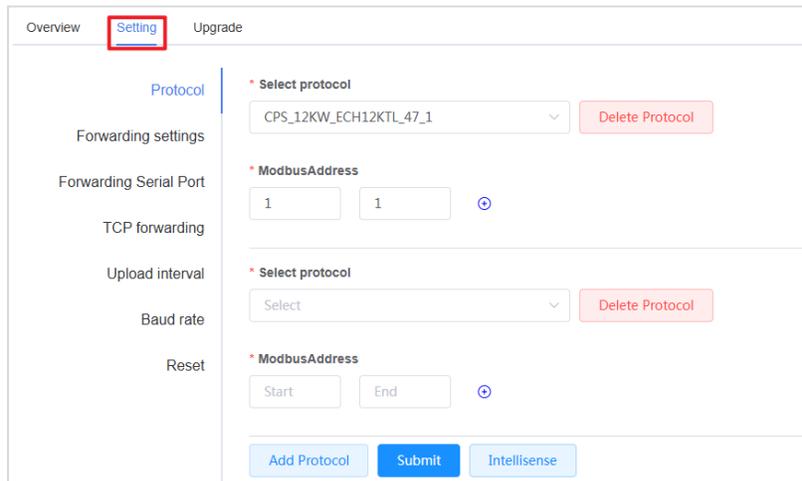
Field	Description
Select protocol	Select the parsing protocol used by the device under the network card and the data uploaded by the user parsing device.
Modbus address	Set the parsing address for the protocol.

NOTE: If there is more than one protocol, click **Delete Protocol** to remove it.

Forwarding settings: Select the forwarding settings.
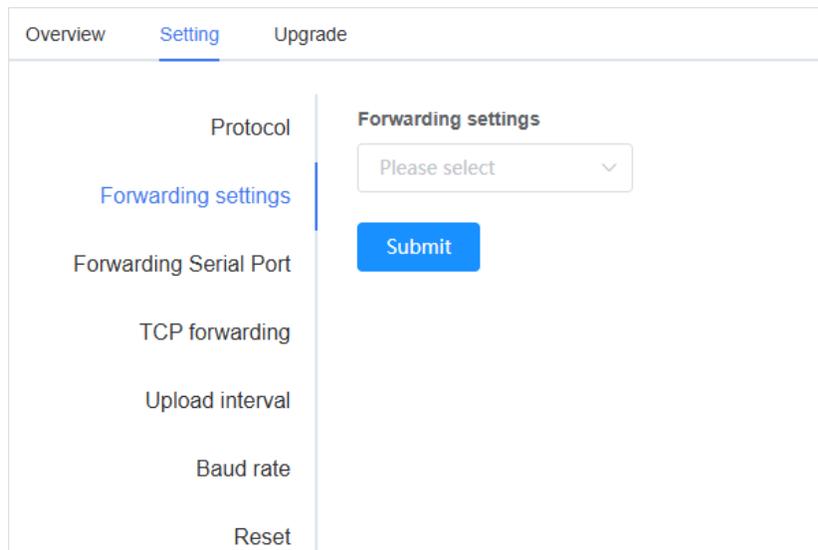
Forwarding serial port: Enter the communication port, baud rate, check bit, protocol type, and other information.
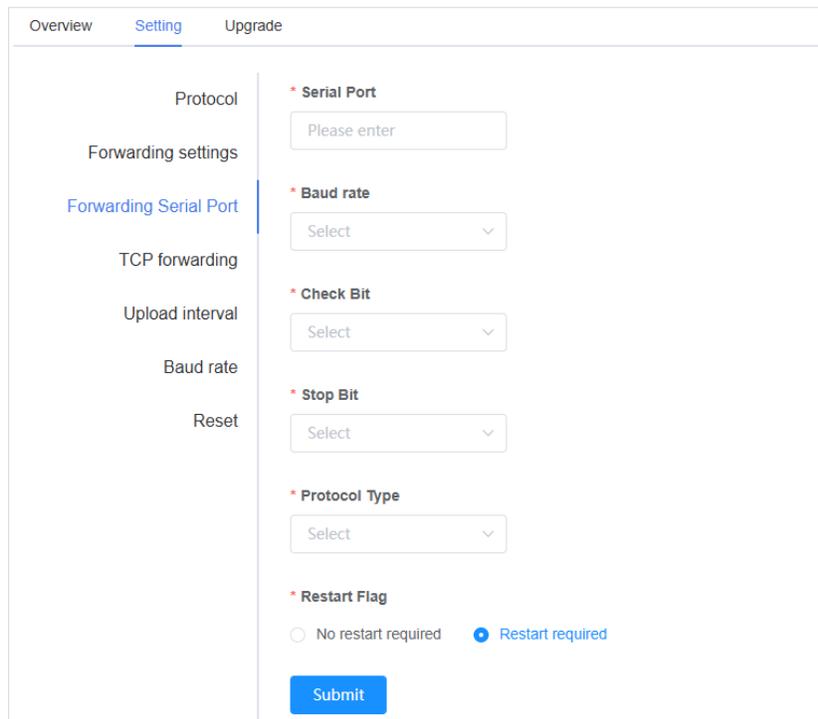
TCP forwarding: Set the serial port and protocol type, as well as whether a restart flag is required.

Upload interval: Configure the upload time of device data and select whether to restart safely.

Baud rate: Set the upload speed of communication data; note that this must be consistent with the baud rate of the device. Select or enter the corresponding values or options in each text box.

Reset: Click to reset the gateway.

8.3.2.4   *Upgrade*

If a firmware upgrade is needed, contact CPS Customer Service.

8.3.3   Inverter

On the **Inverter** page, you can select the status of the device in the **All status** box, search for the model of the device in the **Model** box, enter a keyword in the **Please enter search** box, and click **Search** to search for eligible devices that meet the selected requirements.

For a specific device item, you can click the "**…**" in the operation column to delete or rename it.
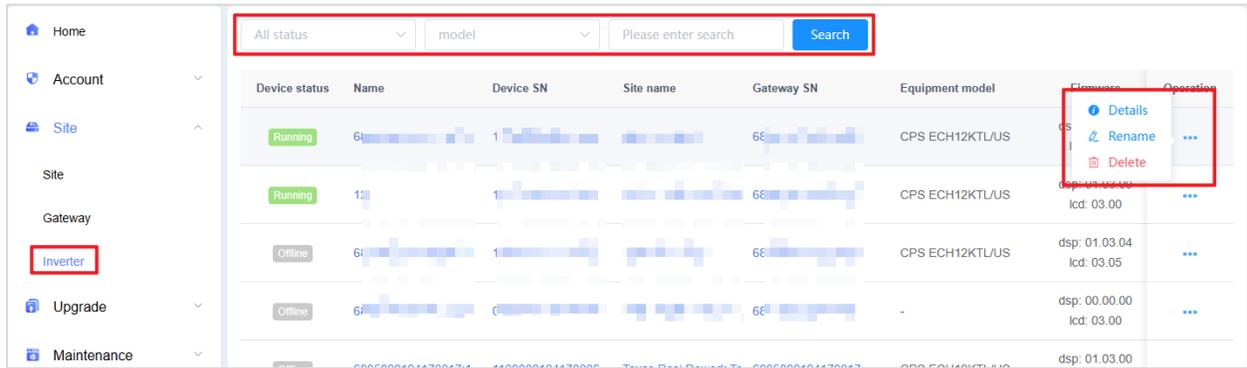
8.3.3.1   Details

From the device list page, click any device name or serial number to enter its **Details** page. You can also click the **Power on/off command** button in the top right to easily power devices on and off.
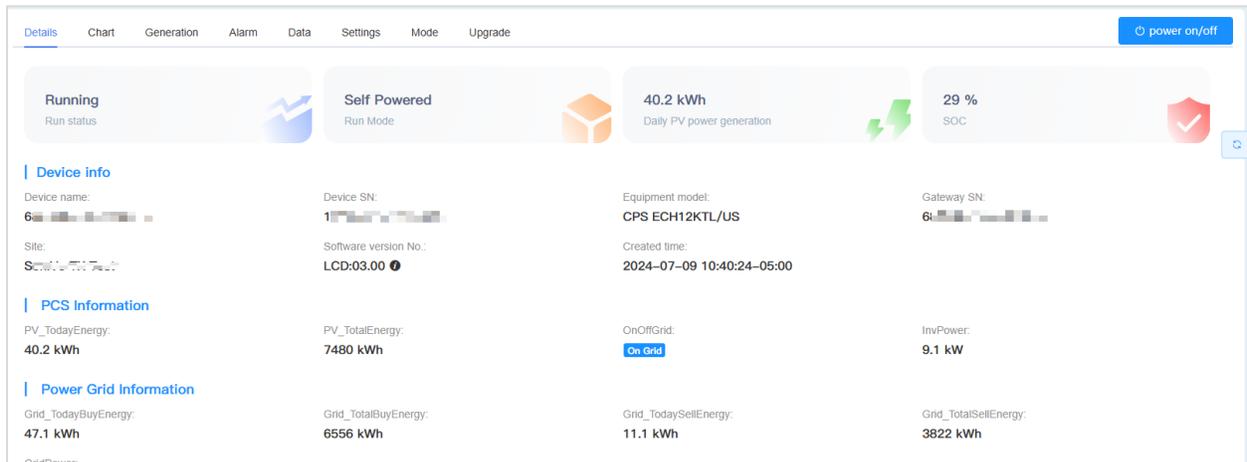
8.3.3.2   Chart

Chart data is displayed by selecting the chart style (simplified or detailed), time interval, unit of time, time range, refresh interval, and filtering curve parameters (measurement points). Hover the mouse over the chart to display detailed data for the measurement points.

8.3.3.3   Generation

1. Select the unit of time (year, month, day).

2. Click the calendar to select the time or time range.

3. Click **Search**.

NOTE: You can also click **Download** to save the energy yield information of a searched device for a certain time range.
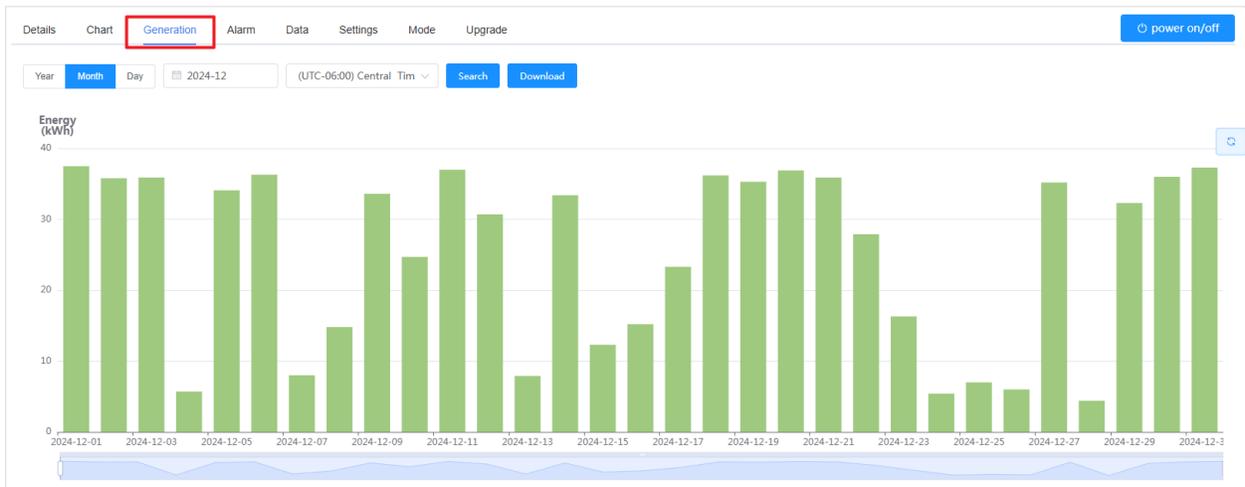
8.3.3.4 **Alarm**

You can search for alarm events that occurred within a specified period of time by selecting the alarm severity and time range within which the alarm occurred. Click **Download** to save this information.

8.3.3.5 **Data**

1. Select a time range.

2. Click **Search** to search for data within that time range.

3. Click **Download** to save the data.

8.3.3.6   Mode

1. In the **Inverter** interface, click any device name to enter the **Details** page.

2. Click **Mode** at the top.
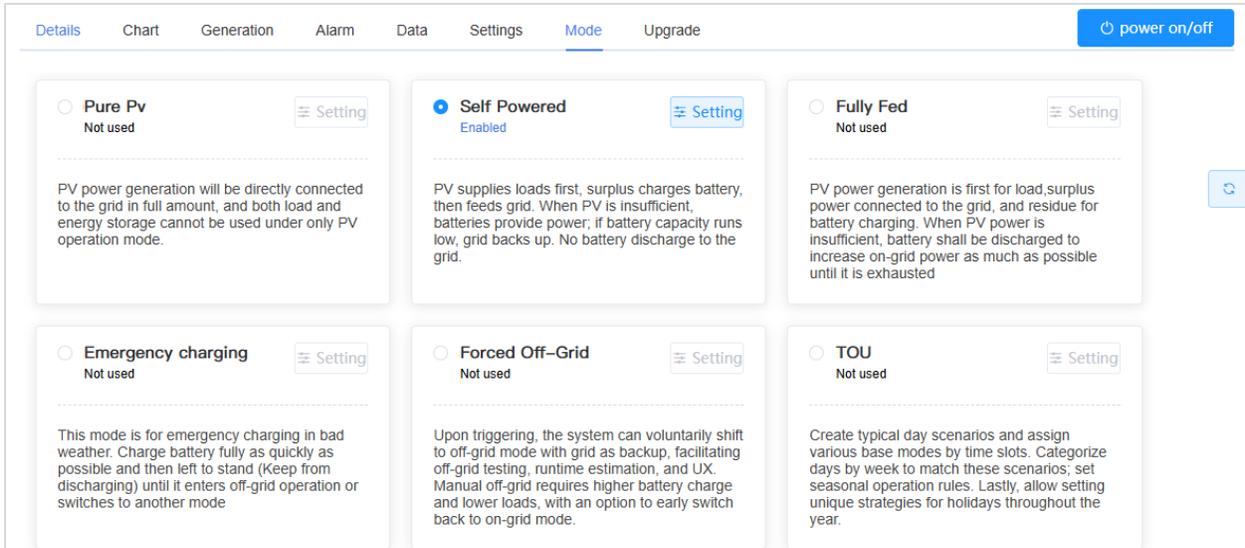
Mode	Description
Pure PV	PV site will be directly and fully connected to the grid. Both load and energy storage cannot be used in PV operation mode.
Self-powered	PV supplies load first, surplus charges the battery, then feeds the grid. When PV is insufficient, batteries are preferred to provide power. If battery capacity runs low, the grid backs up. No battery discharge to the grid.
Fully fed	PV supplies load first, surplus power connected to the grid, residual charges battery. When PV power is insufficient, the battery will be discharged to increase on-grid power as much as possible until it is exhausted.
Emergency charging	This mode is for emergency charging in bad weather. The battery is fully charged as quickly as possible, then left to stand (to prevent discharging) until it enters off-grid operation or switches to another mode.
TOU function	Creates typical day scenarios and assigns various base modes by time slots, categorizes days by week to match these scenarios, sets seasonal operation rules, and allows custom settings for certain days of the year.
Forced off-grid	Upon triggering, the system can voluntary shift to off-grid mode with grid as backup, facilitating off-grid testing, runtime estimation, and UX. Manual off-grid requires higher battery charge and lower load, with an option to switch back to on-grid mode.

3. Click **Setting** to set the parameters of the corresponding mode. See the screenshot below for TOU mode as an example:
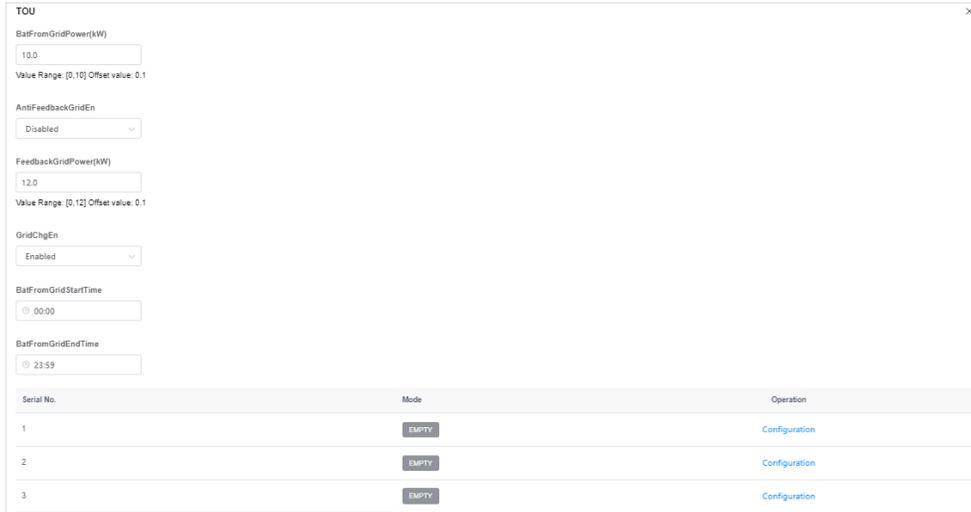
8.3.3.7   *Upgrade*

If a firmware upgrade is needed, contact CPS Customer Service.

8.4   Maintenance

Alarm Management

Select a site in the **Site screening** box, a serial number in the **SearchSN** box, an alarm level in the **Please select** box, a time zone in the time zone box, and a time range in the time range box to view alarm information that meets these selections.

NOTE: You can also click **Download** to save this information.

Alarm Type	Description
Urgent	The device stops running and immediate intervention is required.
Important	The efficiency of the device is affected and intervention is required.
Commonly	No impact on device operation and intervention is optional.
Prompt	Messages are prompted.

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9 Operation and Maintenance

⚠️ **WARNING:**

Prior to performing any product maintenance, the inverter must not be running, the AC circuit breaker must be connected to the grid, and the PV input on the DC side must all be disconnected. After these steps have been taken, wait at least five (5) minutes before performing any maintenance.

⚠️ **WARNING:**

These instructions are for use by qualified personnel ONLY.

Do reduce the risk of electrical shock, do NOT perform any other maintenance or services other than those specified in these instructions unless qualified to do so.

9.1 Check Electrical Conditions

• Check all the cable connections as part of a regular maintenance inspection every six (6) to 12 months.

• If any cable connections are loose when checked, tighten them according to Section 4.3 Electrical Cable Connection.

• Check for cable damage, especially whether the cable surface is scratched. Repair or replace the cables if necessary.

9.2 Clean Fan Inlets and Outlets

The inverter produces heat during running and uses a forced air-cooling method to ensure normal running. To ensure good head dissipation, check its fan inlets and outlets regularly to ensure they are not dirty or obstructed. If necessary, use a soft brush or vacuum to clean the inverter inlets and outlets.

9.3 Replace Fans

If the fan inlets and outlets are all functioning normally but the inverter temperature is high or producing abnormal noise, the fans need to be replaced according to the following steps:

1. Remove the three (3) screws of the fan bracket with a no. 2 Phillips screwdriver, then pull out the fan bracket until you can see the connector.
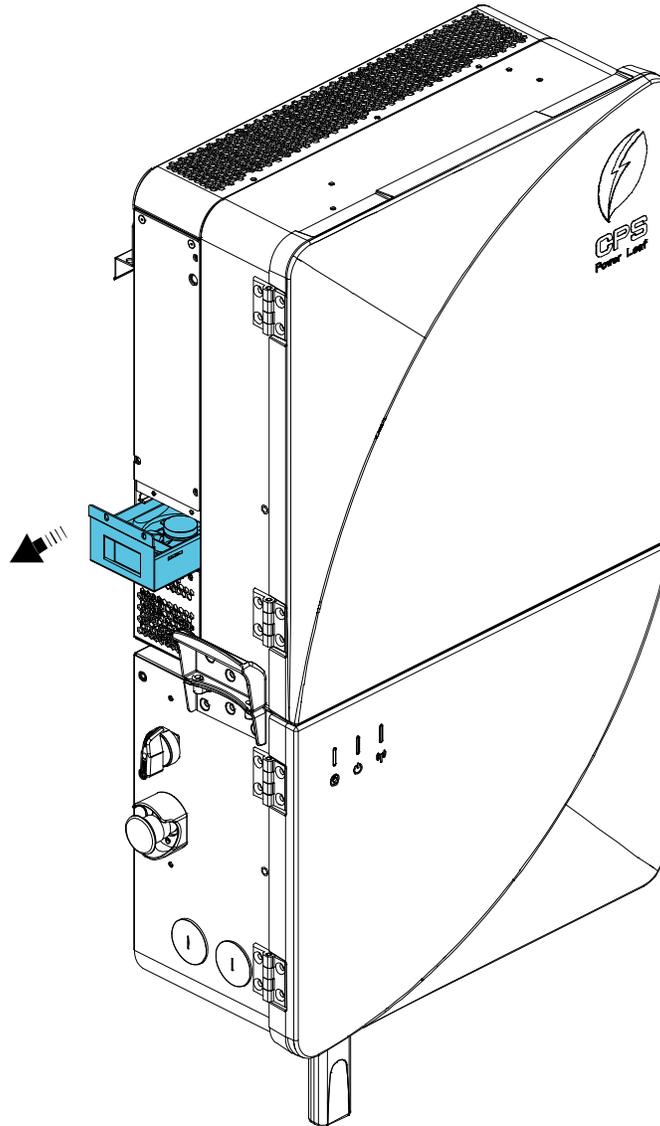
Figure 9-1 Remove Fan Bracket Fastening Screws

2. Disconnect the watertight cable connector from the cooling fan and pull out the entire fan bracket from the inverter.
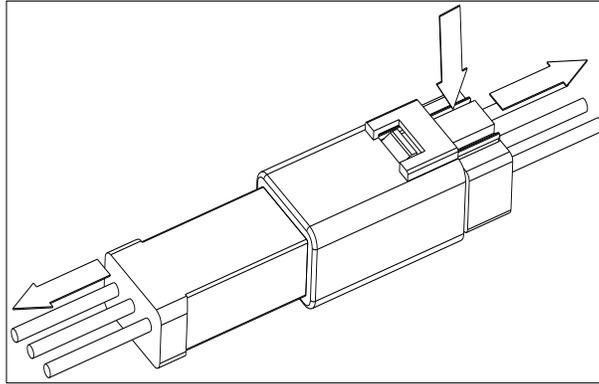
Figure 9-2 Disconnect Watertight Cable Connector

3. Use the no. 2 Phillips screwdriver to remove the four (4) fastening screws.
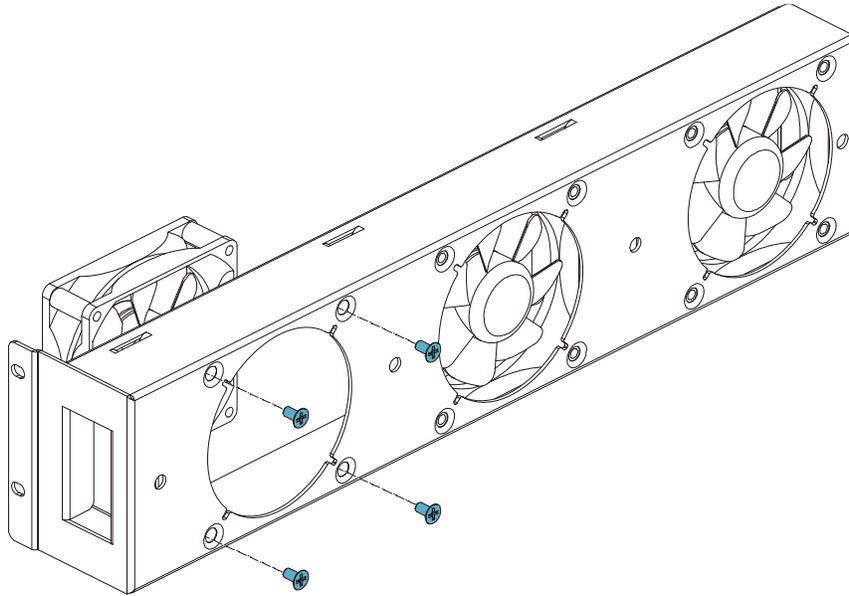
Figure 9-3 Remove Screws

4. Fasten the new cooling fans onto the fan tray using the no. 2 Phillips screwdriver and torque to 12.2-15.6 lbf-in (14-18 kgf-cm).

5. Use the no. 2 Phillips screwdriver to reinstall the assembled fans onto the inverter and torque to 13.9 lbf in (16 kgf-cm).

9.4 Replace Inverter

INSTRUCTION:

The inverter can only be replaced when it is completely powered OFF.

---

1. Turn OFF the AC and DC switch of the inverter.

2. Disconnect the AC wires, grounding wires, PV wires, and battery wires (see Section 4.3 Electrical Cable Connection).

3. Remove the two screws and, if present, the anti-theft padlock.
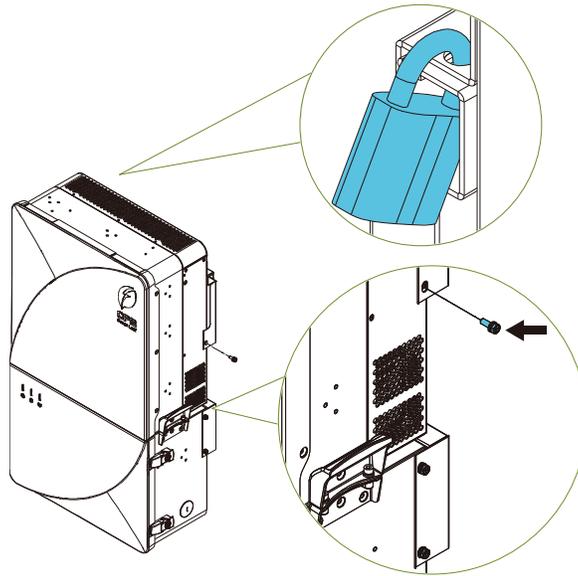
Figure 9-4 Remove the Screws and Lock

4. Remove the four M6x20 hexagon socket head combined screws on both sides of the inverter.
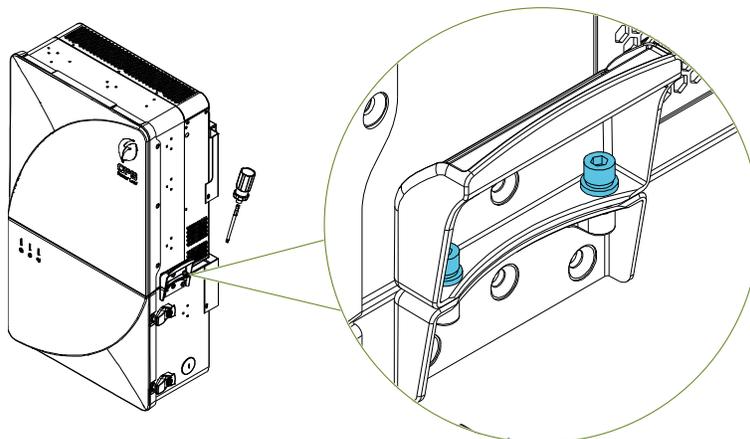
Figure 9-5 Remove M6x20 Screws

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5. Remove the inverter from the upper mounting bracket.

⚠️ **NOTICE:**

The weight of the inverter is approximately 139 lb (63 kg). If manually lifting the inverter, is recommended to have at least two people to hang it.

Lift mounting: Tighten the M10 lifting eye nuts (supplied by customer) to lift the inverter onto the upper mounting bracket.

Manual mounting: Use at least two people to lift the inverter safely using the four arrow positions shown in Figure 9-6.
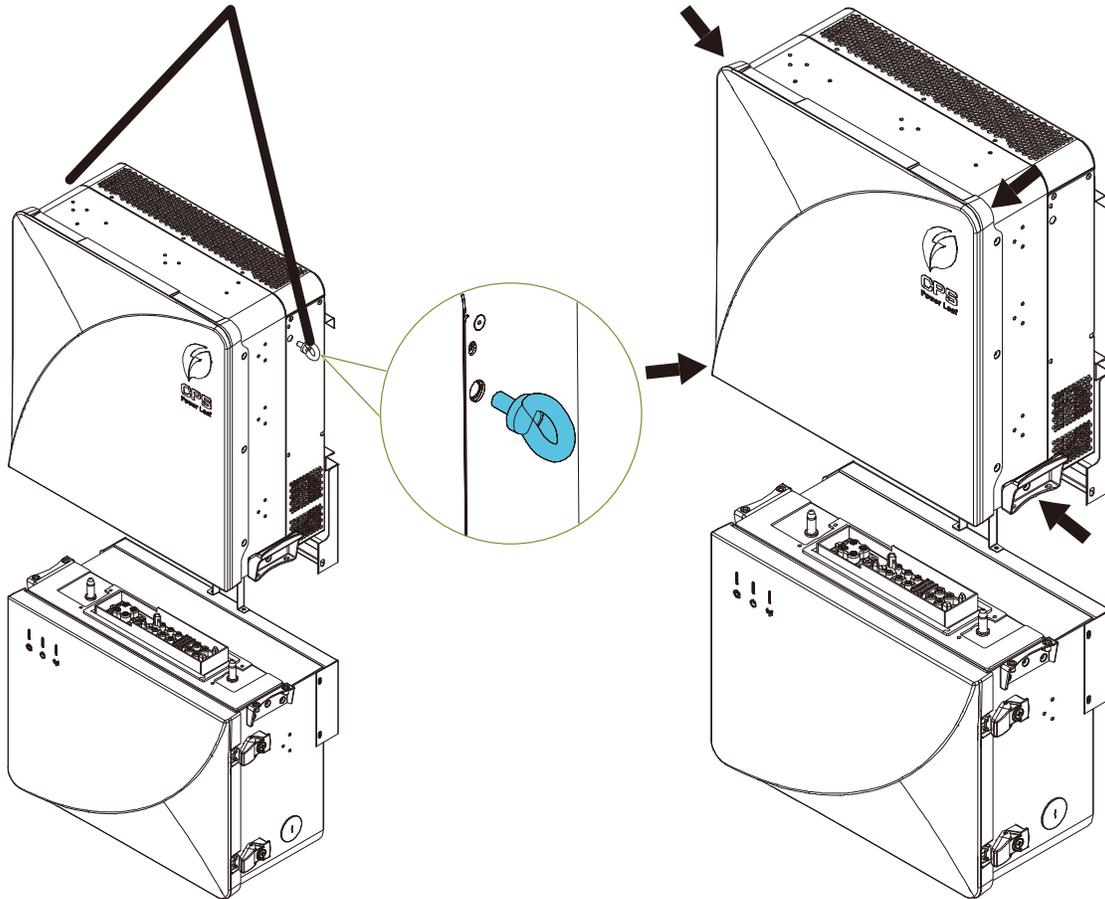
Figure 9-6 Lift the Inverter

6. Install a new inverter using the instructions in Section 3.5 Installation Procedure.

10 Troubleshooting

10.1 LED Indicator Troubleshooting

If the LED light indicates any faults, please perform troubleshooting according to Table 10-1 and Table 10-2.

Table 10-1 LED Indicator Fault Descriptions

LED	Indication	Possible Fault
⏻ (plug icon)	Off	ARM and DSP CAN communication fault
⏻ (power icon)	Flashing (green)	Inversion fault, DC fault, or PV fault
	Off	ARM and DSP CAN communication fault
	On (red)	System fault
((•)) (signal icon)	On (yellow)	Meter communication fault
	On (red)	BMS communication fault or the battery is not connected
	Flashing (red)	ARM and DSP CAN communication fault
	Off	BMS CAN communication fault, ARM and DSP CAN communication fault, or meter communication fault

Table 10-2 Troubleshooting

Fault Name	Solution
Battery connection failure	1. Check if the battery switch is closed. 2. Check if the battery voltage is too low. 3. If the fault persists, contact CPS Customer Service.
Temperature sensor abnormality	1. Check the temperature display value. 2. Disconnect the power grid switch, backup switch, battery power switch, and PV input switch. 3. Wait for 60 seconds to discharge, then power on again. 4. If the fault persists, contact CPS Customer Service.
Internal communication failure	
Bus voltage too high	

Fault Name	Solution
EEProm fault	1. Observe for 5 minutes to see if the inverter will automatically clear the alarm. 2. If the fault persists, contact CPS Customer Service.
Internal fan abnormality	1. Observe for 5 minutes to see if the inverter will automatically clear the alarm.
Internal communication failure	2. Disconnect the power grid switch, backup switch, battery power switch, and PV input switch 3. If the fault persists, contact CPS Customer Service.
Over-temperature protection	1. Reduce the load and observe whether the alarm will be automatically cleared after the inverter drops to 158°F (70°C). 2. If the fault persists, contact CPS Customer Service.
Power grid relay abnormality	1. Disconnect the power grid switch, backup switch, battery power switch, and PV input switch 2. If the fault persists, contact CPS Customer Service.
Low grid frequency	1. If this occurs accidentally, it may be due to a short-term abnormality in the power grid. After it has been detected that the power grid is normal, the inverter will resume normal operation without any manual intervention.
High grid frequency	2. If it occurs frequently, check whether the grid frequency is within the allowable range. • If the grid frequency is outside the allowable range, contact the local power operator.
Grid phase voltage over threshold	• If the grid frequency is within the allowable range, modify the inverter's grid over frequency threshold or disable the grid over frequency protection function after obtaining the consent of the local power operator.
High inverter current	1. Modify the load or make the on-grid power lower than the rated output power. 2. Observe to see if the fault automatically disappears. 3. If the fault persists, contact CPS Customer Service.
PV overcurrent	1. Check whether the PV input current is within the parameter range.
PV2 voltage too high	2. Disconnect the power grid switch, backup switch, battery power switch, and PV input switch. 3. Wait for 6 seconds to discharge, then power on again.
PV1 voltage too high	4. If the fault persists, contact CPS Customer Service.

Fault Name	Solution
Leakage current CT abnormality	Contact CPS Customer Service.
Inverter relay abnormality	
Bus fault	
Bus hardware overvoltage	1. Force-restart the software. 2. Observe whether the fault disappears automatically. 3. Disconnect the power grid switch, backup switch, battery power switch, and PV input switch. 4. Wait 60 seconds to discharge, then power on again. 5. If the fault persists, contact CPS Customer Service.
Inverter hardware overcurrent	
LLC hardware overcurrent	
PV hardware overcurrent	
Leakage current too high	1. Check whether the PV cable and ground cable are normal (no signs of breakage, distortion, or damage). 2. Restart the inverter to see if the fault will automatically disappear. 3. If the fault persists, contact CPS Customer Service.
Insulation impedance too low	
Steady-state leakage current protection	
DCI too high	1. Set the maximum DCI. 2. Restart the inverter to see if the fault will automatically disappear. 3. If the fault persists, contact CPS Customer Service.
Bidirectional DC overcurrent	1. Check whether the off-grid load is too high. 2. Restart the inverter to see if the fault will automatically disappear. 3. If the fault persists, contact CPS Customer Service.

Fault Name	Solution
PV2 input reverse connection	1. Check whether the PV cable is connected reversely. 2. Disconnect the power grid switch, backup switch, battery power switch, and PV input switch. 3. Wait 60 seconds to discharge, then exchange the positive and negative poles of the reversed branch. 4. Restart the inverter and observe to see if it returns to normal. 5. If the fault persists, contact CPS Customer Service.
PV1 input reverse connection	
Arc protection	1. Disconnect the PV input switch and check the wiring of the PV panel. 2. After troubleshooting, turn the device on again. 3. If the fault persists, contact CPS Customer Service.
Battery voltage too low	1. Stop discharging or switch to emergency backup mode. 2. If the fault persists, contact CPS Customer Service.
Battery voltage too high	1. Stop charging, then wait for a moment to discharge; the voltage will become normal. 2. If the fault persists, contact CPS Customer Service.
System fault	1. Disconnect the power grid switch, backup switch, battery power switch, and PV input switch. 2. Wait 60 seconds to discharge, then restart the device to see if the fault will automatically disappear. 3. Check whether the ground cable is connected correctly, firmly, and reliably. 4. If the fault persists, contact CPS Customer Service.
PV fault	1. Check whether the wiring mode (parallel mode or independent mode) matches the setting. 2. Disconnect the power grid switch, backup switch, battery power switch, and PV input switch. 3. Wait 60 seconds to discharge, then restart the device to see if the fault will automatically disappear. 4. If the fault persists, contact CPS Customer Service.

Fault Name	Solution
DC fault	1. Disconnect the power grid switch, backup switch, battery power switch, and PV input switch. 2. Wait 60 seconds to discharge, then restart the device to see if the fault will automatically disappear. 3. If the fault persists, contact CPS Customer Service.
Inverter fault	
Intermediate bus fault	
Overload	1. Check whether the output power exceeds the rated power. 2. Cut off the load output and observe whether the fault disappears automatically. 3. If the fault persists, contact CPS Customer Service.
Battery fault	1. Check whether the battery parameter is consistent with the settings. 2. If the fault persists, contact CPS Customer Service.
Output fault	1. Check whether the load cable is short-circuited. 2. If the fault persists, contact CPS Customer Service.
Steady-state leakage current protection	1. Determine whether the battery switch is closed. 2. Check if the battery voltage is too low. 3. If the fault persists, contact CPS Customer Service.
Bus fault	1. Determine whether the battery switch is closed. 2. Check if the battery voltage is too low. 3. If the fault persists, contact CPS Customer Service.

10.2 Common Fault and Troubleshooting

DANGER:

Disconnect the inverter from the AC grid and PV modules _before_ opening the equipment. Make sure hazardous high voltage and energy inside the equipment has been discharged.

Do NOT operate or maintain the inverter until at least five (5) minutes after disconnecting all sources of DC and AC.

The inverter will be shut down automatically if the PV power generation system fails. Fault information will be displayed on the app interface.
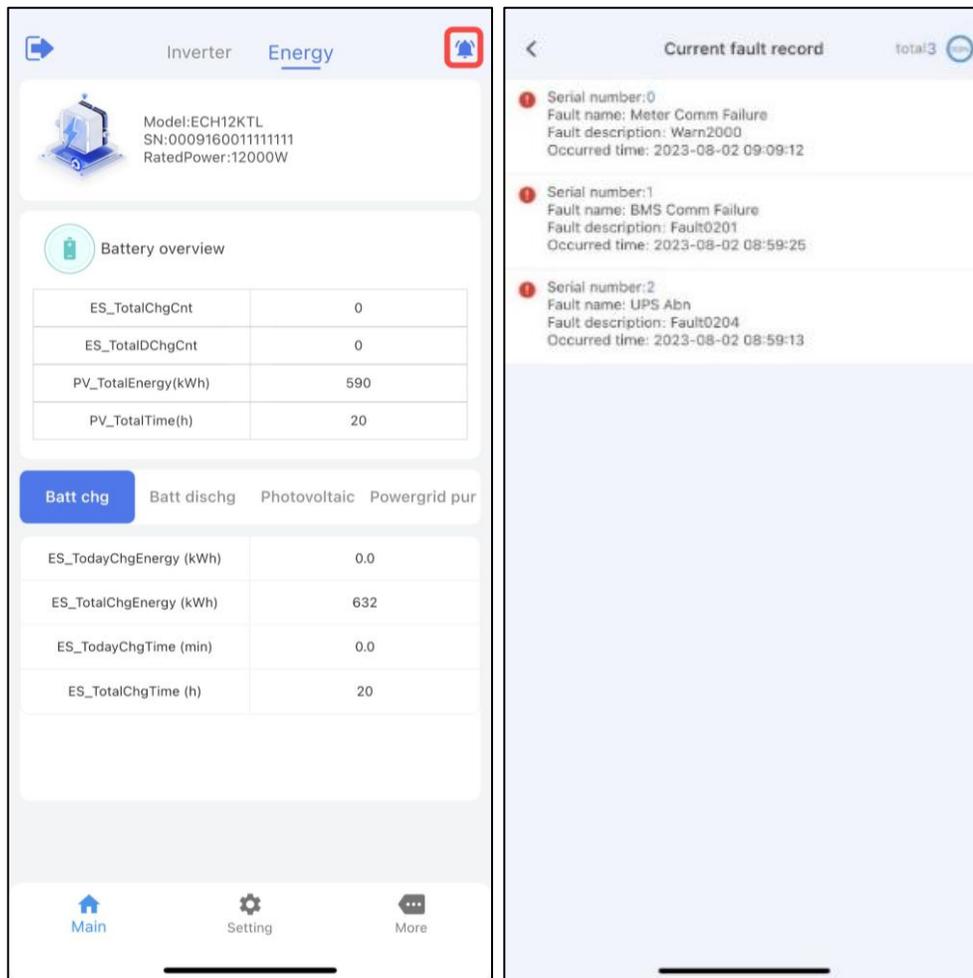
Figure 10-1 Fault Codes

11 Technical Data

11.1 Datasheet

Inverter (CPS ECH *XX*KTL/US)	7.6	9.6	12
PV Input			
Max. PV input power	11.4 kW (7.5 kW per MPPT)	14.4 kW (7.5 kW per MPPT)	18 kW (7.5 kW per MPPT)
Max. PV input voltage	600 Vdc		
Operating PV input voltage range	120-550 Vdc		
MPPT voltage range	150-480 Vdc		
Startup voltage	150 Vdc		
Number of PV inputs	6 inputs, 2 per MPPT, non-fused		
Max. input current (clipping point)	30 A		
DC disconnection type	DC switch		
Short-circuit current per MPPT	40 A		
Battery Input			
Battery type	Lithium-ion (CPS 5-20 kWh batteries)		
Battery voltage range	40-60 V		
Max. charge/discharge current	200 A / 152 A	200 A / 192 A	200 A / 200 A
Max. charge/discharge power	10 kW / 7.6 kW	10 kW / 9.6 kW	10 kW / 10 kW
Generator Input			
Max. input current	100 A		
Max. input power	24 kW @ 240 Vac		
Operating input voltage range	211.2-264 Vac (@ 240 Vac)		
Full power input voltage range	240-264 Vac (@ 240 Vac)		
Grid			
Max. input current (on grid)	200		
Max. output current	31.7 A	40 A	50 A
Max. output apparent power	7.6 kVA	9.6 kVA	12 kVA
Standby / night consumption	< 50 W	< 50 W	< 60 W
Output voltage range	183-228.8 Vac (@ 208 Vac) / 211.2-264 Vac (@ 240 Vac)		
Max. OCPD rating	200 A	250 A	250 A
Output frequency	60 Hz		
Grid connection type	Split phase with N		
Rated grid frequency range	57-63 Hz		
Output voltage	240 V / 208 V (120 Vac)		
Current TRD @ rated load	< 3%		
Power factor	>0.99 (adjustable ±0.8)		

Backup Port			
Max. output current (on grid)	200		
Max. output current (off grid)	31.7 A	40 A	50 A
Max. output apparent power (off grid)	7.6 kVA	9.6 kVA	12 kVA
On-grid / off-grid switching time	20 ms		
General Data			
Operating temperature range	-13°F to 140°F / -25°C to 60°C		
Cooling method	Variable speed cooling fan		
Audible noise	< 45 dB @ 1 m and 77°F (25°C)		
Dimensions (H × W × D)	36 × 20.4 × 9.3 in (912 × 518 × 243 mm)		
Weight	Inverter: 101.7 lb (46.2 kg) Wire box: 37.2 lb (16.9 kg)		
User interface and display	LED, app, and web portal via Wi-Fi connection[1]		
Inverter monitoring	Wi-Fi		
Protection degree	NEMA 4X		
Max. efficiency	97.5%		
CEC efficiency	96.5%		
Surge protection	DC Type II / AC Type II		
Standard Compliance			
Certifications and standards	CSA107.1-16, UL1741/SA, UL1741 SB, UL 1998, UL 1699B, FCC Part 15		
Selectable grid standards	IEEE 1547-2018, HECO, CA Rule 21		
Warranty			
Standard	10 years		

1 Wi-Fi network connection required for web portal communication.

12 Limited Warranty

The warranty policy for this product is specified in the contract; otherwise, the standard warranty is ten (10) years. For service, CPS America will provide technical support. For warranty terms, refer to the CPS America standard warranty policy in place at time of purchase.

13 Recycling

This product cannot be disposed of as a household waste. When the product has reached the end of its service life, dispose of it in accordance with the local applicable electrical waste regulations and standards. For more information, contact CPS Customer Service.

CHINT POWER SYSTEMS AMERICA CO., LTD.

Address: 1380 Presidential Drive, Richardson, Texas 75081

Service Hotline: 855-584-7168

Email: AmericaSales@chintpower.com

Website: www.chintpowersystem.com

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Headquarters: Building 4, No. 3255, Sixian Road

       Songjiang District, Shanghai, China

Tele: +86-21 -3779 1222-866300

Fax: +86-21 -3779 1222-866001