User Manual for CPS ECB200KTL
Bi-directional Power Conversion System

Shanghai Chint Power Systems Co., Ltd.

Rev 1.0 April, 2025 Doc. No.: 9.0020.0933A0

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Revision History			
Rev No.	**Section**	**Rev Date**	**Description**
1.0	N/A	April 2025	Initial release

Before You Start…

This manual contains important information regarding installation and safe operation of this unit. Be sure to read this manual carefully before using the product.

Thank you for choosing CPS ECB200KTL Bidirectional Power Conversion System (hereinafter shortly referred to as “PCS”). The PCS is a high-performance and highly reliable product specifically designed for European market.

If you encounter any problems during installation or operation of this unit, first check the user manual before contacting your local dealer or supplier.

Instructions inside this user manual will help you solve most installation and operation difficulties. Contact your local representative if the problem persists.

Please keep this user manual on hand for quick reference.

1 Important Safety Instructions

(SAVE THESE INSTRUCTIONS)

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

1.1 Warnings and Symbols in this Document

Before reading the manual, please pay attention to several very important safety warnings. Being familiar with them can make you safer in operation and maintenance.

	DANGER: DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury. **DANGER!** DANGER indique une situation dangereuse avec un niveau de risque élevé qui, si elle n'est pas évitée, entraînera la mort ou des blessures graves.
	WARNING: WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury. **ATTENTION!** AVERTISSEMENT indique une situation dangereuse avec un niveau de risque moyen qui, si elle n'est pas évitée, pourrait entraîner la mort ou des blessures graves.
	CAUTION: CAUTION indicates a hazardous situation which, if not avoided, could result in minor or moderate injury. **AVERTIR!** ATTENTION indique une situation dangereuse avec un faible niveau de risque qui, si elle n'est pas évitée, pourrait entraîner des blessures mineures ou modérées.
	NOTICE: NOTICE indicates a hazardous situation which, if not avoided, could result in equipment working abnormally or property loss. **AVIS!** indique une situation dangereuse qui, si elle n'est pas évitée, pourrait entraîner un fonctionnement anormal de l'équipement ou la perte de biens.
	INSTRUCTION: INSTRUCTION indicates important supplementary information or provides skills or tips that can be used to help you solve a problem or save your time.

	IMPORTANT! Indique des informations supplémentaires importantes ou fournit des compétences ou des conseils qui peuvent être utilisés pour vous aider à résoudre un problème ou vous faire gagner du temps.

1.1 Markings on the Product

Symbols	Meanings
	**WARNING:** Risk of Electric Shock. **ATTENTION:** Risque de choc electrique.
	**CAUTION:** Risk of electric shock from energy stored in capacitor. Do not remove cover until 10 minutes after disconnecting all sources of supply. **ATTENTION:** Risque de choc électrique à partir d´énergie stockée dans les condensateurs. Retirer le couvercle du boîtier au moins 10 minutes après avoir débranché toutes les sources d´approvisionnement.
	**CAUTION:** Hot surfaces. To reduce the risk of burns. Do not touch. **ATTENTION:** Surface chaude. Pour réduire le risqué de brûlures ne pas toucher.
	For more details, please see the user manual. Pour plus de détails, veuillez consulter le manuel d'utilisation.
	**WARNING:** For continued protection against risk of fire, replace only with same type and ratings of fuse. Refer to instruction manual for details. **ATTENTION:** Pour continuer d'assurer la protection contre les risques d'incendie, il faut remplacer les fusibles de même type et courant. Reportez-vous au manuel d'instructions pour plus de détails.

	**EARTH GROUND!** This symbol marks the location of a grounding terminal, which must be securely connected to the earth through the PE (protective earthing) cable to ensure operational safety. **MISE À LA TERRE !** Ce symbole marque l'emplacement d'une borne de mise à la terre, qui doit être solidement connectée à la terre via le câble PE (mise à la terre de protection) pour assurer la sécurité de fonctionnement.
	**CE Certification** The PCS has passed CE Certification. **CE Certification** **Cet PCS a passé la certification CE.**
	**RoHS SYMBOL** In accordance with 2011/65/EU regulations, PCS imposes restrictions on the use of specific hazardous substances in electrical and electronic equipment. **SYMBOLE RoHS** Conformément à la réglementation 2011/65/UE, PCS impose des restrictions sur l'utilisation de substances dangereuses spécifiques dans les équipements électriques et électroniques.
	**TÜV Certification** The PCS has passed TÜV Certification. **TÜV Certification** Cet PCS a passé la certification TÜV.
	Phase information of the PCS. Information de phase de l'onduleur.

2 Overview

2.1 PCS for Energy Storage Systems

The PCS is suitable for large-scale energy storage applications. A typical energy storage system with this product generally consists of battery modules, PCS (this product), energy management systems (EMS) and AC power distribution equipment (Figure 2-1a /Figure 2-1b). It is used to convert DC power from battery modules to AC with the same frequency and phase as the AC grid.

The PCS is certified across multiple European markets, for detailed certifications, see chapter 10 Technical Data. It also features Volt-Ride Thru, Freq-Ride Thru, Ramp-Rate, PF, Volt-Var, Freq-Watt, Volt-Watt and other grid-support functions.

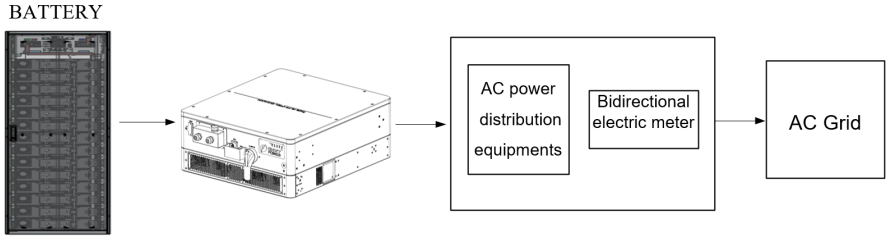


Figure 2-1a Grid-tied energy storage system example

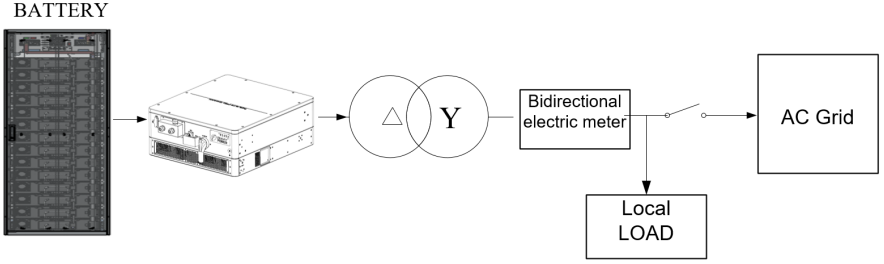


Figure 2-1b Off-grid energy storage system example

When the storage system is in off-grid mode and has unbalanced single phase loads, an external isolation transformer is necessary. If the power grid is lost, the contactor on the grid side must be disconnected, and the PCS supplies power to the local load.

2.2 Appearance and Dimensions

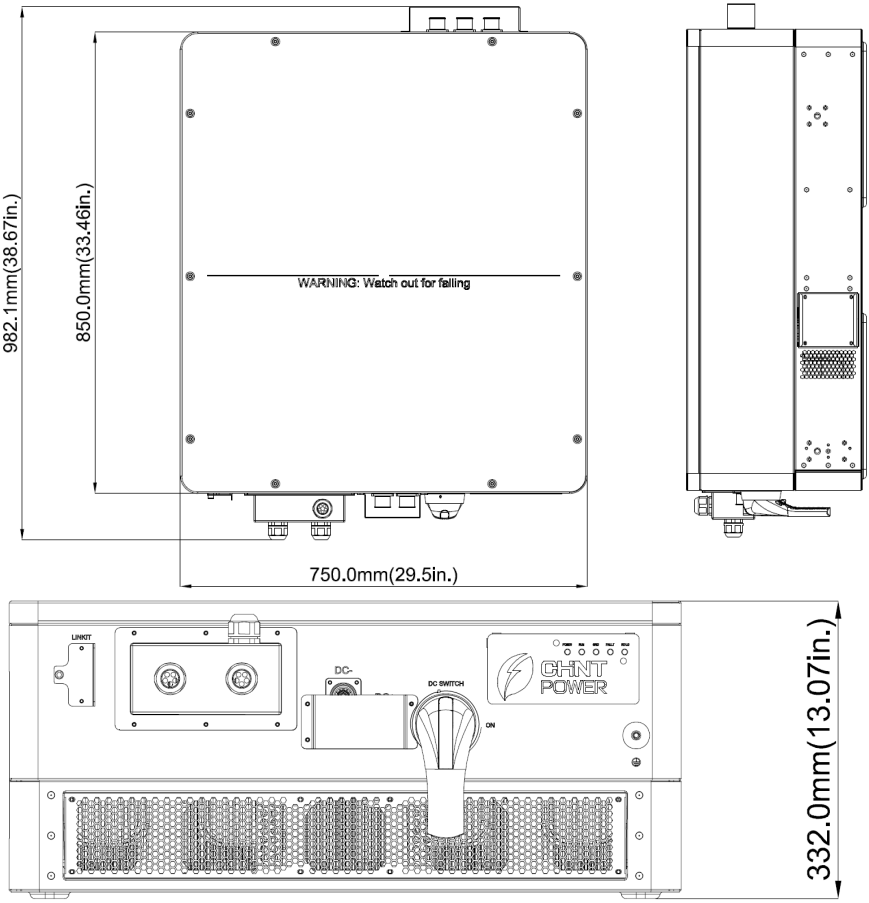


Figure 2-2 Dimensions of CPS ECB200KTL

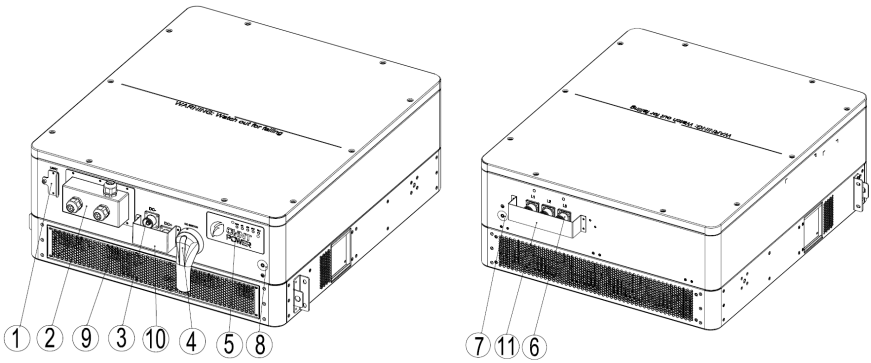


Figure 2-3 Appearance of the PCS

Main components on the inverter enclosure are as described below:

No.	Name	Function
1	LINKIT module interface	Connect LINKIT module
2	Cover of communication interface	Seal the communication interface
3	DC connector	Connect DC cable
4	DC switch	Turn on/off the DC side power supply
5	LED indicator	Indicates operation status of the PCS
6	AC connector	Connect AC cable
7	PE terminal	Connect one of the PE terminals (protection grounding cable)
8		
9	Fans	Forced cooling of the PCS
10	DC input mask	Protect DC connector
11	AC output mask	Protect AC connector

Table 2-1 Product Components

2.3 Nameplate

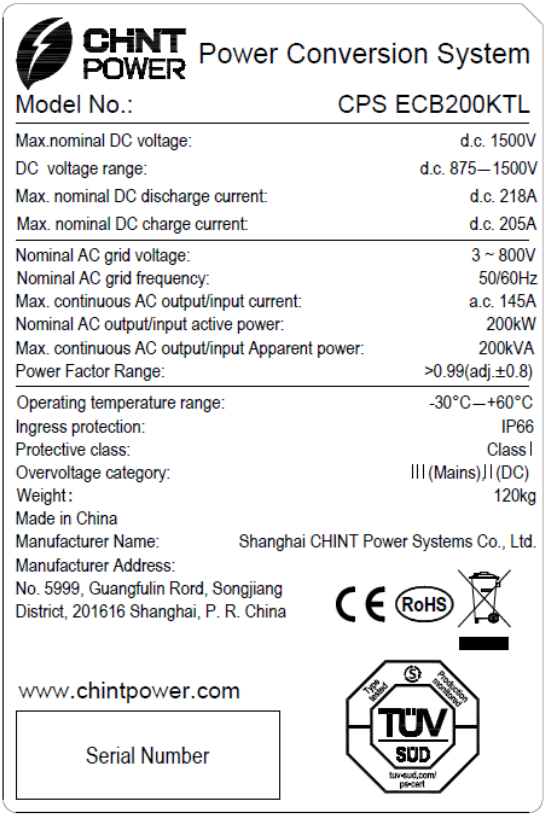


Figure 2-4 Nameplate of CPS ECB200KTL

2.4 Product Features

- **High conversion efficiency**：Advanced 3-level conversion technology; Max. discharge efficiency: 98%, Max. charge efficiency: 97%;
- **Flexible grid support capabilities:** Multiple selectable grid standards; adjustable reactive power: ±0.8, remote curtailment;
- **Flexible communication:** Supports standard Modbus (RTU, TCP, ASCII) and CANbus (extended frame, data frame) communications to ensure compatibility with 3rd party monitoring and control systems;

- **Wide DC input voltage range**：Operating DC input voltage range: 875-1500Vdc; Max DC input voltage: 1500V.
- **Charge and discharge:** The PCS can charge/discharge the batteries from/to the grid.
- **Outdoor rating:** IP66 protection degree meets outdoor application;
- **Grid-tied/off-grid capability**: Support grid-tied and off-grid switching. If the off-grid mode is set in the auto-switch mode, when the power grid has failed, the PCS will be automatically switched from grid-tied to off-grid mode.

2.5 Protection Functions

- Reverse-polarity protection of DC input
- Short circuit protection
- AC output voltage and frequency monitoring
- AC insulation resistance monitoring
- Monitoring of DC injection into AC output
- Anti-islanding protection
- Input and output over-voltage protection
- Input over-current protection
- Environmental temperature monitoring
- Battery temperature monitoring
- LVRT (Low-voltage ride-through) and HVRT (High-voltage ride-through)
- GFCI protection

2.6 Circuit Structure Design

Basic schematic diagram of the PCS is shown below. The input of the batteries passes through contactors and pre-charge circuit. The output of the PCS converts the DC voltage to 3-phase AC voltage. An output filter is employed to remove the high-frequency harmonics and reduce THD (Total Harmonic Distortion). Then the 3-phase AC voltage is passed through two-stage relays and EMI wave filter to produce high quality AC power.

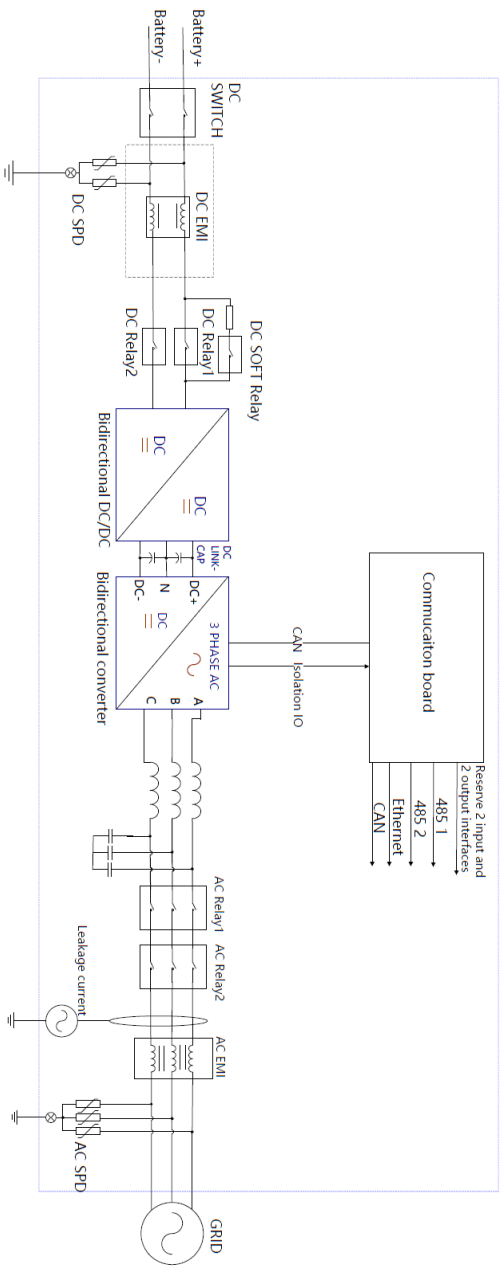


Figure 2-5 Schematic diagram of the PCS

3 Mechanical Installation

3.1 Unpacking for Inspection

Before installation, please check that the following items are included in the package.

Table 3-1 Main items

No.	Item	Qty	Note
1	CPS ECB200KTL	1	PCS
2	Accessory kit	1	Contains all necessary accessories

The Accessory Kit contains items listed below.

Table 3-2 ECB200KTL Accessories

No.	Item	Qty	Note
(1)	10-pin terminal	4	For Communication cables
(2)	4-pin terminal	1	For output dry node cable
(3)	M6X16 screw, Grade: A2-50	8	For fastening PCS
(4)	95mm^2 Connector, black	4	For DC- and L1/L2/L3 cable connection
(5)	95mm^2 Connector, orange	1	For DC+ cable connection
(6)	LINKIT2NO-LCD (Optional)	/	For bluetooth communication

INSTRUCTION:
The items in the accessory kit table above are for the standard configuration.

3.2 Installation Precautions

- Check that the product environmental specifications (protection degree, operating temperature range, humidity and altitude, etc.) meet the requirements of the specific project location;
- Make sure that the output voltage is within allowed range: 704~880 VAC;
- Ensure that the local electricity supply authority has granted permission to connect to the grid;
- Installation personnel must be qualified electricians or people who have received professional training;
- Wear and use PPE (personal protective equipment) during installation and

cable connection, such as safety shoes, safety gloves, safety helmet, etc.

- Enough space is provided to allow the PCS cooling system to operate normally;
- Install the PCS away from flammable or explosive substances;
- Avoid installing the PCS in locations that exceed the temperature limits specified in the PCS data sheet to limit undesirable power loss;
- Do not install the PCS near any electromagnetic source which can compromise the normal operation of electronic equipment;
- The characteristics of salt mist are easily affected by factors such as seawater, sea breeze, precipitation, relative humidity, terrain, and forest range near the coast. Therefore, inverters should not be installed outdoors in salt affected areas (within 500m from the coast).

3.3 Environment Requirements

The PCS is designed for large-scale energy storage application, it shall be installed and used together with energy storage system. It is recommended to install the PCS under a roof or sunshade/rain-shed to avoid direct sunlight, prevent from power derating due to high or sudden temperature fluctuations.

3.4 Horizontal Installation Process

The PCS can be installed on the mounting bracket horizontally, depending on the on-site application requirements/demands.

3.4.1 Space Requirements

The following installation space clearance shall be met according to different installation scenarios:

- Install a single PCS horizontally.
  The PCS shall be installed horizontally in a place meeting the following space requirements and shall not be installed within the vicinity of any heat sources.

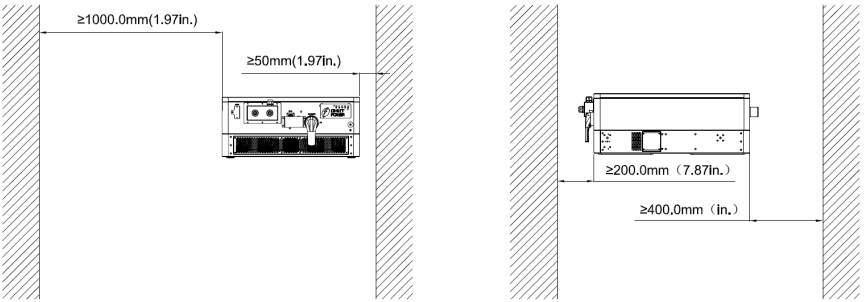


Figure 3- 1 Install a single PCS horizontally on mounting bracket

- Install several PCSs horizontally by stacking on the same mounting bracket (the bracket is not included in the package and the diagram is for illustration purposes).
  In addition to all the above distance requirements, a minimum distance of 50mm shall be kept between upper-lower two adjacent PCSs to ensure good ventilation.

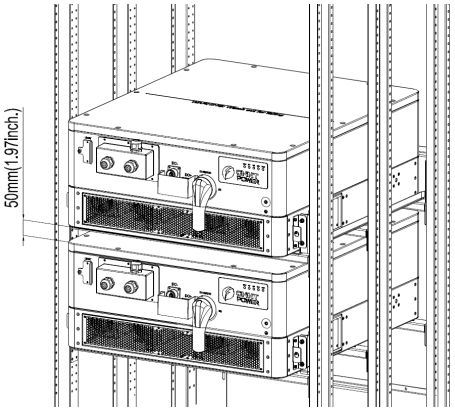


Figure 3- 2 Stack installation on one mounting bracket

- Position two sets of mounting brackets side by side with horizontally stacked PCSs.
  In this scenario, a minimum distance of 1000 mm (39.37 in.) shall be reserved on both sides of these two mounting brackets so that the fan brackets can be pulled out from their left side or the right side completely without any obstruction. In the same way, a minimum distance of 50 mm shall be kept between two adjacent stacked PCSs to ensure good ventilation.

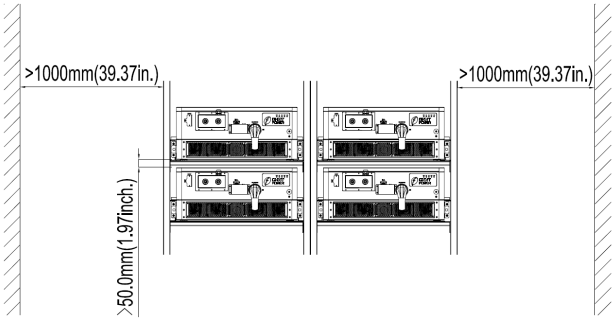


Figure 3- 3 Two sets of mounting brackets with vertically stacked PCSs

NOTICE:
The Weight of one PCS is about **120kg (≈265 pounds)**.
Make sure mounting brackets can bear the total weight of all horizontally stacked PCSs to avoid bracket damages and PCS falling off!
Consult the after-sale personnel for any special scenarios.

3.4.2 Prepare Mounting Bracket

To illustrate mounting steps, the mounting bracket shown in the following figure will be used as an example.

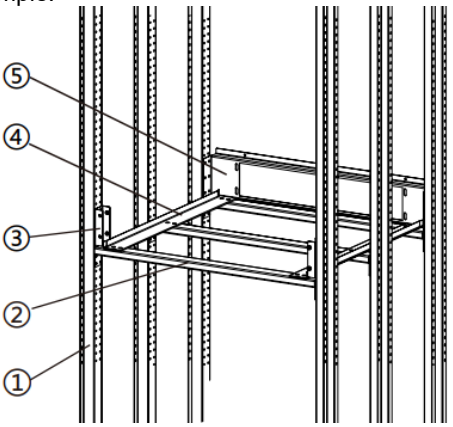


Figure 3- 4 Reference mounting bracket assembly

No.	Component name	Qty
1	Vertical beam	6
2	Horizontal beam	3
3	Front mounting bracket	2
4	Rail bracket	2
5	Back plate	1

Table 3-3 Accessories of the reference mounting bracket

The assemble procedures of reference mounting brackets are as follow:

1. Assemble three horizontal beams (2) on the three groups of vertical beams (1) in sequence and pre-tighten them with four M6x16 screws on every end of the horizontal beam.
2. Position two rail brackets (4) onto the two ends of the three horizontal beams (1), align their screw holes and pre-tighten them with six sunk screws.

NOTICE:
The side guards of the two rail brackets shall be facing outside.

3. Pre-tighten the two endplates of the back plates onto the rear vertical beams with six M6x16 screws on each endplate. See the following figure for the hole dimensions of the back plate.

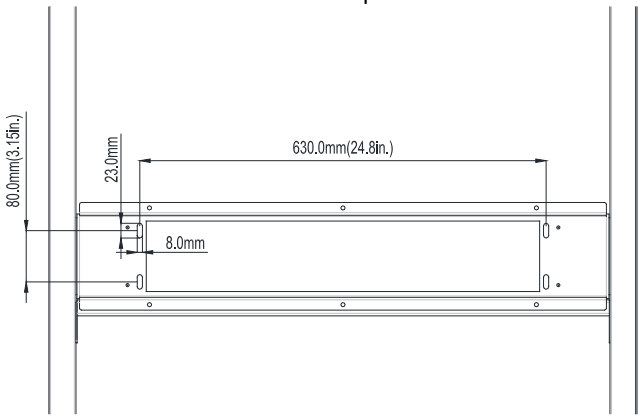


Figure 3- 5 Hole dimensions of the back plate

4. Pre-tighten the two endplates of the back plates onto the rear vertical beams with six M6x16 screws on each endplate. See the following figure for the hole dimensions of the two front mounting brackets.

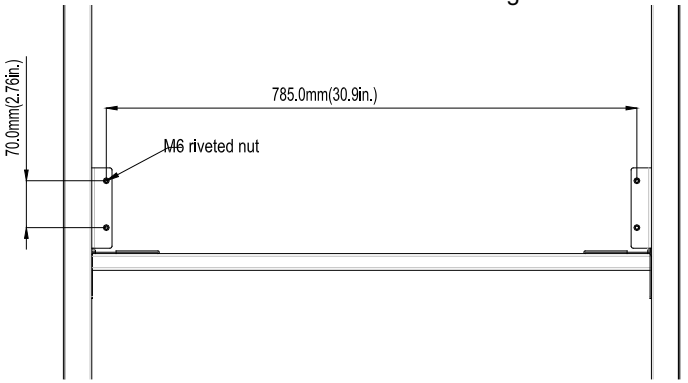


Figure 3- 6 Hole dimensions of the front mounting brackets

5. Tighten all the screws with No.3 Phillips head screwdriver, torque value: 6-7 Nm (53-62 In-lbs).

3.4.3 Install Fixing Pieces

Before lifting the PCS, install suitable fixing pieces on both sides so that the PCS can be fastened on mounting bracket, to prevent from accidentally moving or falling off. The dimensions of fixing holes are as shown below.

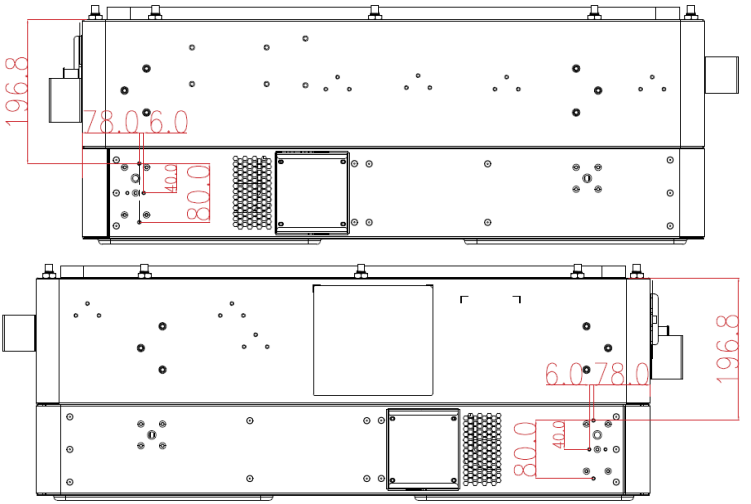


Figure 3- 7 The dimensions of fixing holes

Fixing pieces in the following figure are for reference.

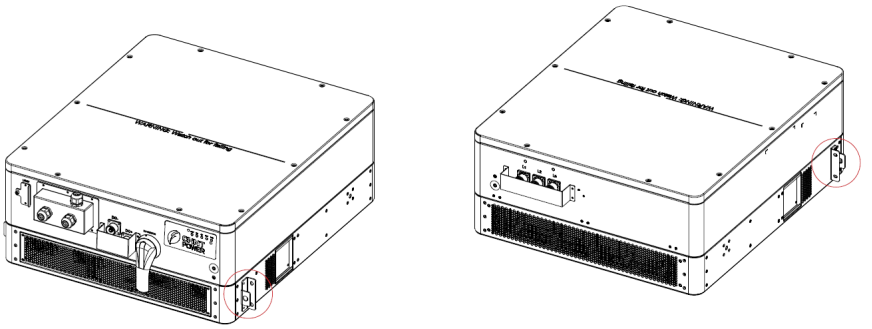


Figure 3- 8 Fixing pieces reference

3.4.4 Lifting Instruction

Lift the PCS to make its bottom aligned with the rail bracket so that it can be placed onto the rail bracket smoothly. This operation can be achieved by the following three lifting options shown below.

- Manual lifting: at least three people are needed to properly lift and support from the base surface;

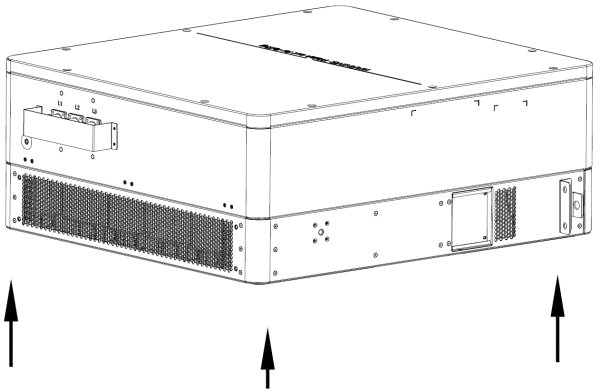


Figure 3- 9 Manual lifting from the base surface

- Rope lifting: Operate as following steps.

a) Screw two M10 eyebolts (non-standard) in two opposite sides of the PCS.

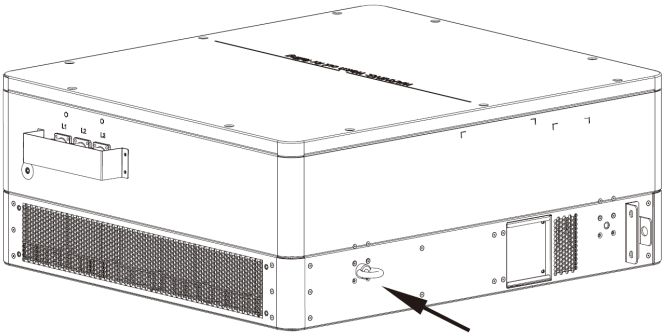


Figure 3- 10 Screw two M10 eyebolts

b) Use two ropes to lift the device with above mentioned eyebolts and the two lifting holes on the fixing pieces.

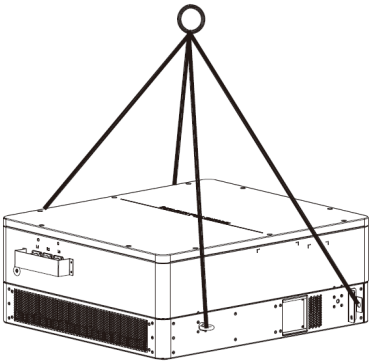


Figure 3- 11 Rope lifting with eyebolts and lifting holes

NOTICE:
The length of ropes shall make sure the angle between two sling ropes is less than 60 degree, thus avoiding to damage or bend the enclosure edges.
Consult the after-sale personnel for any special scenarios.

- Hoist the bottom of the PCS with forklift

a) Find the center of gravity of the PCS as shown below.

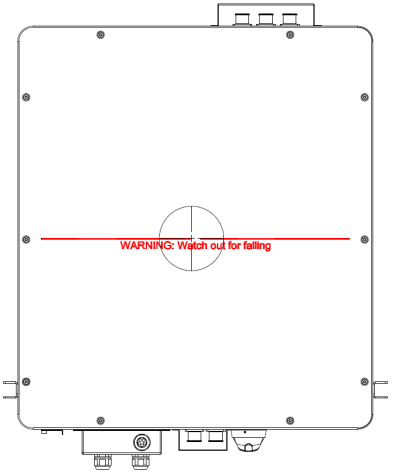


Figure 3- 12 Center of gravity of the PCS

b) Hoist the bottom of the PCS till its bottom are aligned with the rail bracket of the forklift. Strap the PCS as appropriate to ensure secure lift and installation.

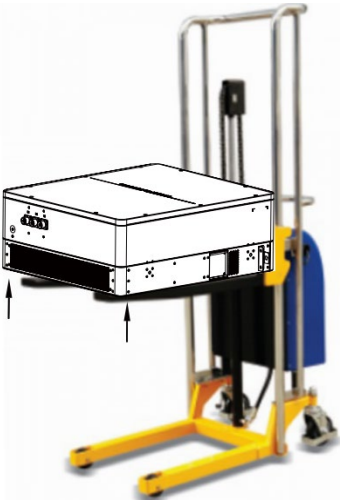


Figure 3- 13 Hoist the bottom of the PCS with forklift (only for reference)

WARNING!

- All the hoisting operations should be performed only by qualified technical personnel to guarantee the PCS will not tilt or fall off.
- Operate the hydraulic vehicle or forklift on level ground to prevent the vehicle and the PCS tilting.
- The center of gravity of the PCS shall be kept in the central position of the hoisting fork.
- During all the hoisting operations, the hoisting fork shall be kept horizontal to avoid the PCS tilting or even falling off.

3.4.5 Install the PCS Horizontally

1. Place the PCS on mounting bracket steadily and push it along the rail brackets until the AC side surface of the PCS touches the back plate of the mounting bracket.

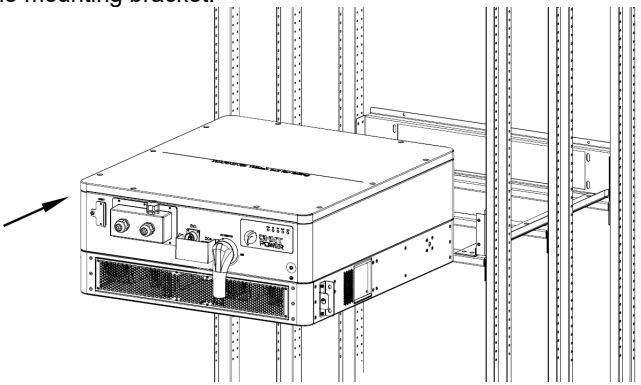


Figure 3- 14 Place the PCS on the mounting bracket

2. Fasten two lugs of the PCS onto the front mounting brackets with four M6x18 screws, and then fasten AC side surface of the PCS onto the back plate with another four M6x18 screws. Tool: No.3 Phillips head screwdriver, torque value: 6-7 Nm (53-62 In-lbs).

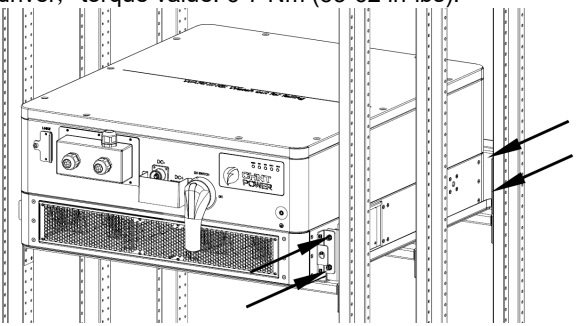


Figure 3- 15 Fasten the PCS with screws

3. Install multiple PCSs in the similar way in accordance with the space requirements in 3.4.1 Space Requirements.

3.5 Vertical Installation Process

3.5.1 Space Requirements

The following installation space clearance shall be met according to different installation scenarios:

- Install a single PCS vertically.
  The PCS shall be installed vertically in a place meeting the following space requirements and shall not be installed within the vicinity of any heat source.

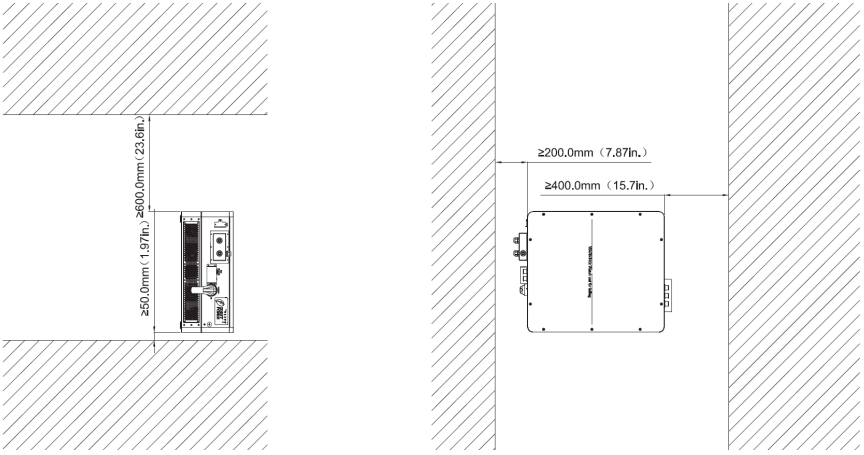


Figure 3- 16 Install a single PCS on mounting bracket vertically

- Install several PCSs vertically on the same mounting bracket (the bracket is not included in the package and the diagram is for illustration purposes). In addition to all the above distance requirements, a minimum distance of 150mm (5.91 in.) shall be kept between left-right two adjacent PCSs to ensure good ventilation.

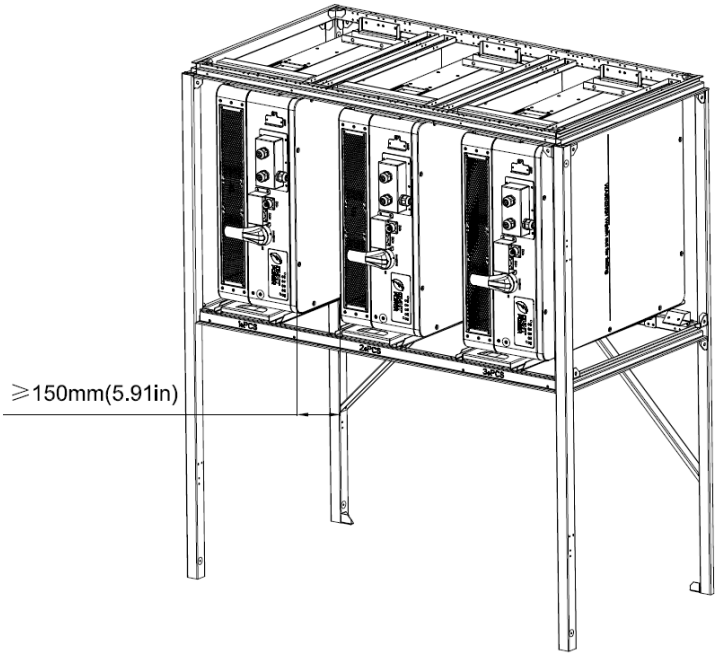


Figure 3- 17 Stack installation on one mounting bracket vertically

NOTICE:
The Weight of one PCS is about **120kg (≈265 pounds)**.
Make sure mounting brackets can bear the total weight of all stacked PCSs to avoid bracket damages and PCS falling off!
Consult the after-sale personnel for any special scenarios.

3.5.2 Prepare Mounting Bracket

To illustrate mounting steps, the mounting bracket (not included in the package) shown in the following figure is used as an example.

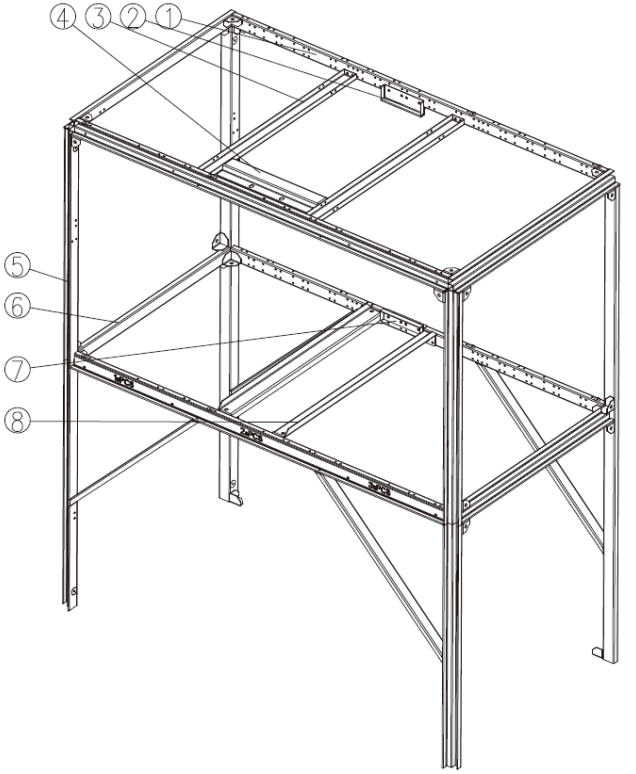


Figure 3- 18 Reference mounting bracket assembly

No.	Component name	Qty
1	Horizontal beam 01	4
2	Fixing bracket 01	1
3	Connecting piece	2
4	Fixing bracket 02	1
5	Vertical beam	4
6	Horizontal beam 02	4
7	Fixing bracket 03	1
8	Rail bracket	2

Table 3-4 Accessories of the reference mounting bracket

The assemble procedures of reference mounting brackets are as follows. Note: all the components of the whole bracket are assembled with M6x12 locking screws.

1. Fasten two Connecting pieces (3) onto two Horizontal beam 01 (1).
2. Fasten two Rail brackets (8) onto two Horizontal beam 01 (1).

NOTICE:
The side guards of the two rail brackets shall be facing outside.

3. Fasten four Horizontal beam 02 (6) onto Horizontal beam 01 (1).
4. Fasten Fixing bracket 01 (2) onto Horizontal beam 01 (1).
5. Fasten Fixing bracket 02 (4) onto Connecting pieces (3).
6. Fasten Fixing bracket 03 (7) onto Horizontal beam 01 (1).
7. Fasten Horizontal beam 02 (6) and Horizontal beam 01 (1) onto four Vertical beams (5).
8. Tighten all the M6x12 locking screws again with 10mm outer hexagon wrench, torque value: 6-7 Nm (53-62 In-lbs).

3.5.3 Install Fixing Pieces

Before lifting the PCS, install suitable fixing pieces on both sides so that the PCS can be fastened on mounting bracket, to prevent from moving or falling off. The dimensions of fixing holes are as shown below.

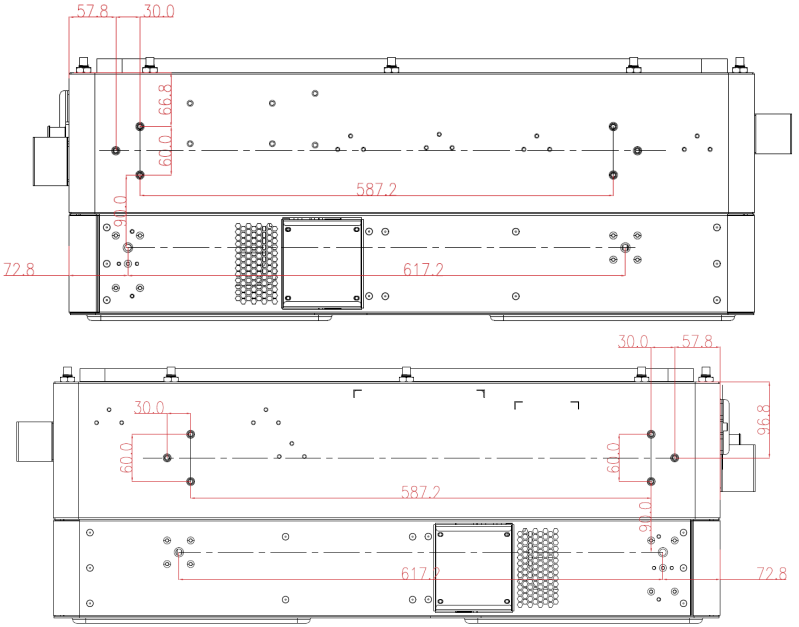


Figure 3- 19 The dimensions of fixing holes

Fixing pieces in the following figure are for reference.

1. Install fixing bracket 01 (1) and fixing bracket 02 (2) onto PCS with M10x20 combination screws and M6x12 combination screws, as shown below.

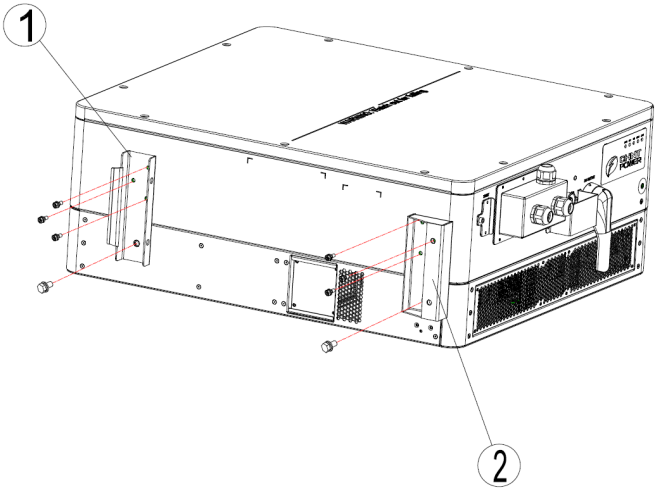


Figure 3- 20 Install fixing brackets

2. Install fixing plate (1) onto PCS with M10x20 combination screws and M6x12 combination screws, as shown in the following figure.

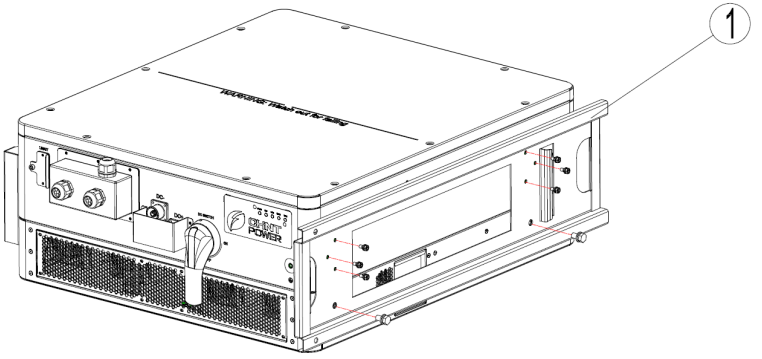


Figure 3- 21 Install fixing plate

3. Tighten M6x12 screws with 10mm outer hexagon wrench, torque value: 6-7 Nm (53-62 In-lbs). Tighten M10x20 screws with 16mm outer hexagon wrench, torque value: 22.5-27.5 Nm (199-243 In-lbs).

3.5.4 Lifting Instruction

Lift the PCS to make its bottom aligned with the rail bracket so that it can be placed onto the rail bracket smoothly.

At least three people are needed to properly lift and support from the base surface;

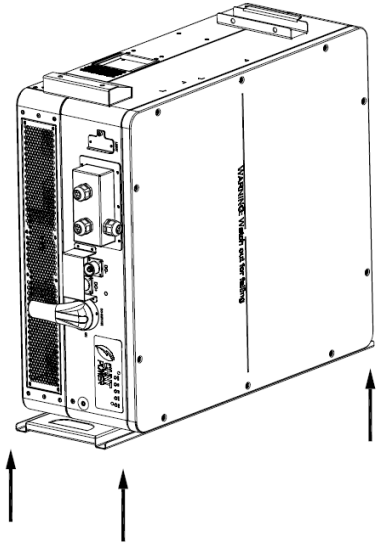


Figure 3- 22 Manual lifting from the base surface

3.5.5 Install the PCS Vertically

1. Align PCS fixing plate (1) with rail bracket (2) and push in PCS till its fixing bracket 01 (5) fits into fixing bracket 01 (3) and the mounting holes (4) aligns with mounting holes (6) of fixing bracket.

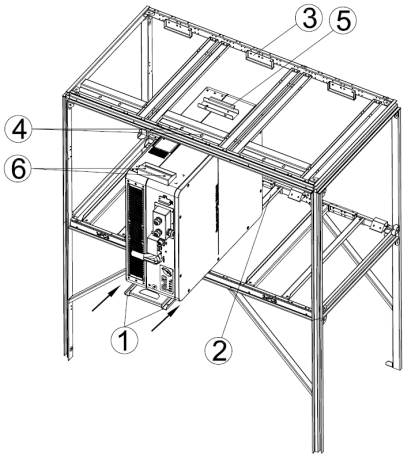


Figure 3- 23 Place the PCS on the mounting bracket

2. Tighten fixing plate onto rail bracket with two M10X20 combination screws, and tighten fixing bracket 02 and PCS fixing bracket with another two M10X20 combination screws, torque value: 22.5-27.5 Nm (199-243 In-lbs).

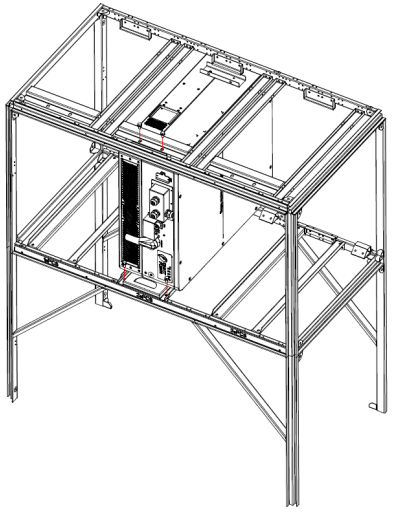


Figure 3- 24 Fasten the PCS with screws

3. Install more PCSs vertically in the same way according to actual demands.

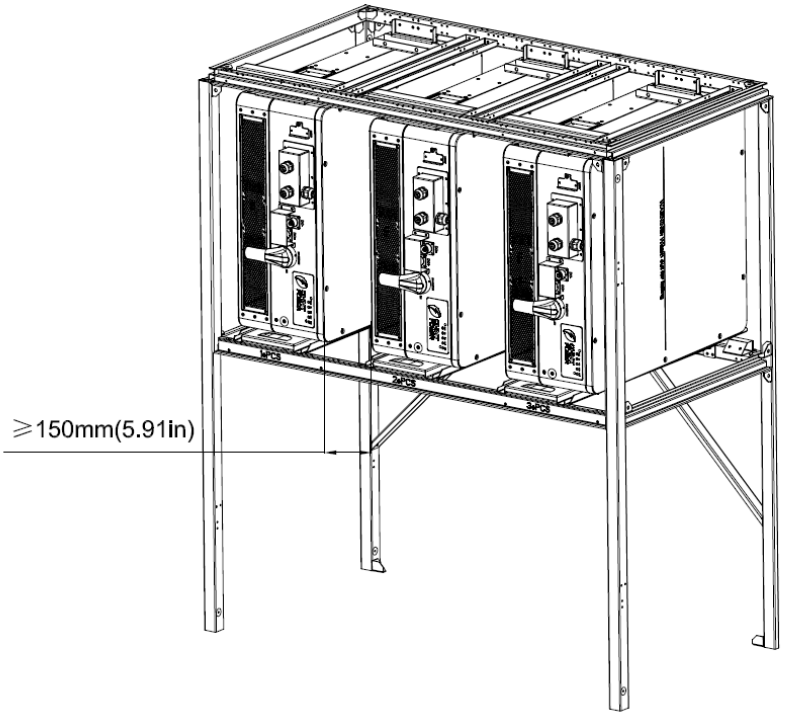


Figure 3- 25 Install more PCSs vertically

4 Electrical Connection

4.1 Cables Specifications

Choose the cables according to the following configuration table.

Table 4-1 Cables specifications

Position	Cable specifications	
	Acceptable Range	Recommended Size
DC input/output (+ / -)	#95mm^2 (Copper); O.D.: Φ19±0.4mm	#95mm^2 (Copper)
AC input/output (L1/L2/L3)	#70~95mm^2 (Copper) O.D.: Φ17±0.4mm~Φ19±0.4mm	#95mm^2 (Copper)
PE	#35~50mm^2 (Copper)	#50mm^2 (Copper)
RS485 & CAN communication	UTP CAT-5e or 3x#22~18AWG communication cable (e.g. Belden 3106A)	

4.2 Tools Required and Torque Values

Table 4-2 Tools Required and Torque Values

No.	Tools	Usage	Torque value
1	No.2 Phillips head screwdriver	LINKIT	1.6 N.m (14 in-lbs)
2	No.2 Phillips head screwdriver	Cover of communication interface	1.2 N.m (10.6 in-lbs)
3	No.3 Phillips head screwdriver	DC grounding terminal AC grounding terminal	6-7 N.m (53-62 in-lbs)
4	1.5mm flat screwdriver	RS485 comm. terminal	0.2 N.m (1.8 in-lbs)
5	Diagonal pliers	Cut cable	-
6	Wire stripping pliers	Remove jacket	-
7	Crimping pliers	Crimp terminal	-

4.3 Connection Interface

After loosening all the six M4x12 screws located on the cover of the communication module, you can see all the connection interface of CPS ECB200KTL, shown as below.

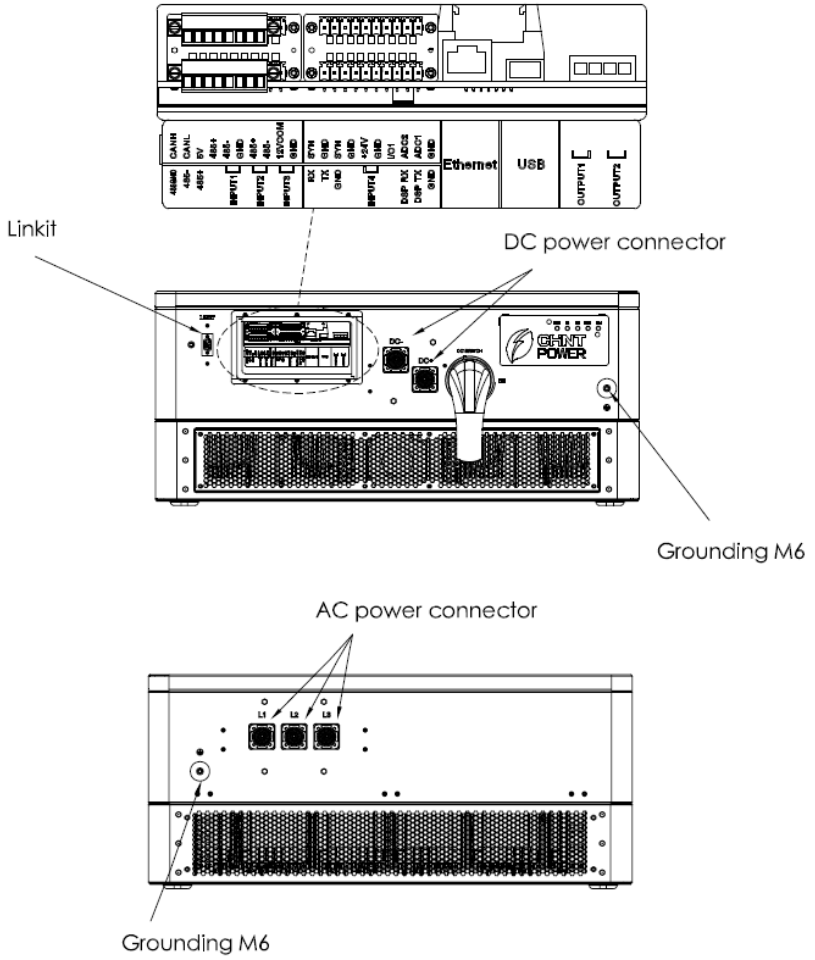


Figure 4- 1 Full view of External wiring panel

4.4 AC and Grounding Connection

The following contents describes how to connect the AC and grounding cables between the PCS and the AC grid:

1. Remove protection cover of AC terminal by removing its four fixing screws.

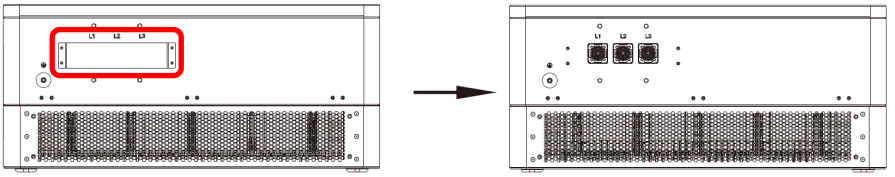


Figure 4- 2 Remove protection cover of AC terminal

2. Connect the crimped grounding cable to the grounding terminal and tighten it with one M6X12 screw.

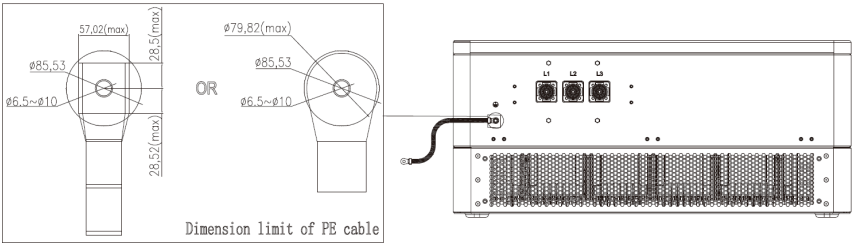


Figure 4- 3 Connect the crimped grounding cable

3. Plug the AC (L1, L2, L3) connector to the correct sockets and push all the way to the end till you hear a click. The connectors can be also rotated for convenient wiring.

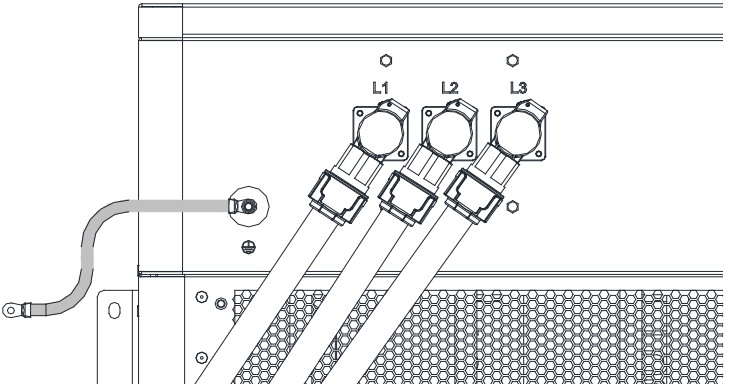


Figure 4- 4 AC output and grounding cable connection

4. If you need to unplug the connector, press down and hold the buckle of AC connector with your thumb and unplug the AC connector.

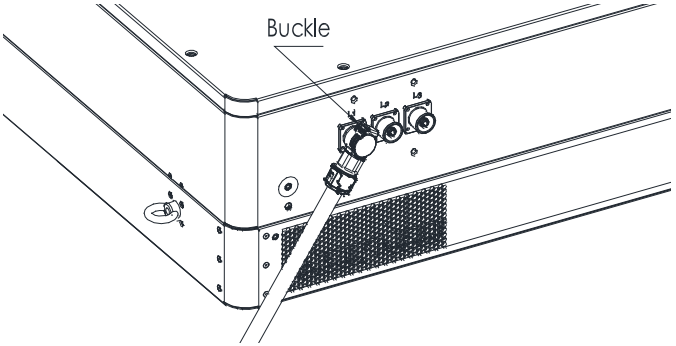


Figure 4- 5 Buckle on the AC connector

4.5 DC and Grounding Connection

To ensure the optimum performance of the PCS, please read the following guidelines before DC connection:

1. Ensure that the maximum open circuit voltage of the Battery is lower than 1500Vdc under any conditions.
2. Do not mix different types of battery chemicals, and make sure that the specifications of batteries are identical in a string.
3. Check the polarity (Figure 4- 6) before plugging the DC connectors with the cables of batteries according to the following steps:
   a) Use a multi-meter to measure the batteries cable ends and check the polarity.
   a) The positive (+) terminal of cable should match the positive (+) terminal of PCS's DC input.
   b) The negative (-) terminal of cable should match the negative (-) terminal of PCS's DC input.

NOTICE:
It is important to use a multi-meter to check the polarity of DC input cables to avoid any risk of reverse polarity.

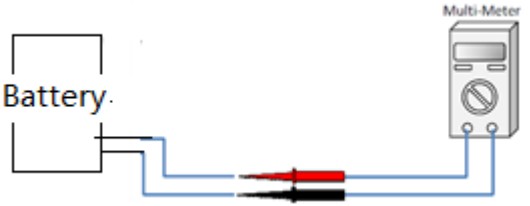


Figure 4- 6 Polarity check

Connect the DC and grounding cables according to the following steps:

1. Remove protection cover of DC terminal by removing its four fixing screws.

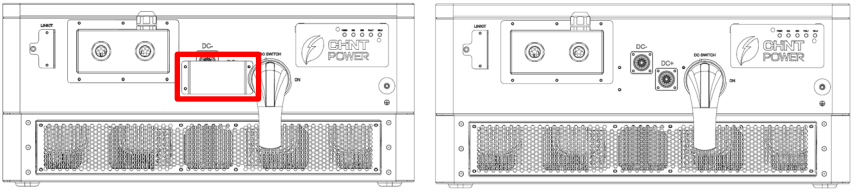


Figure 4- 7 Remove protection cover of DC terminal

2. Connect the crimped grounding cable to the grounding terminal and tighten it with one M6X12 screw.

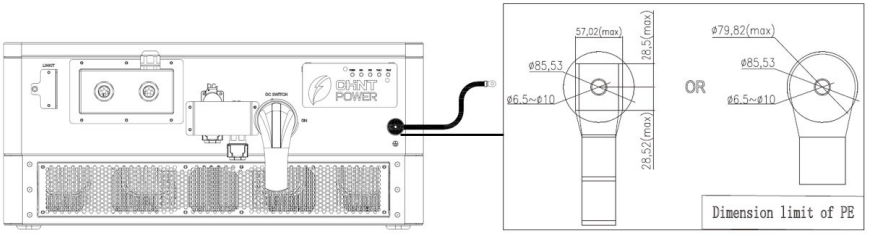


Figure 4- 8 Connect the crimped grounding cable

3. Plug orange DC+ and black DC- connector to correct sockets and push them all the way to the end till you hear a click. The connectors can be also rotated for convenient wiring.

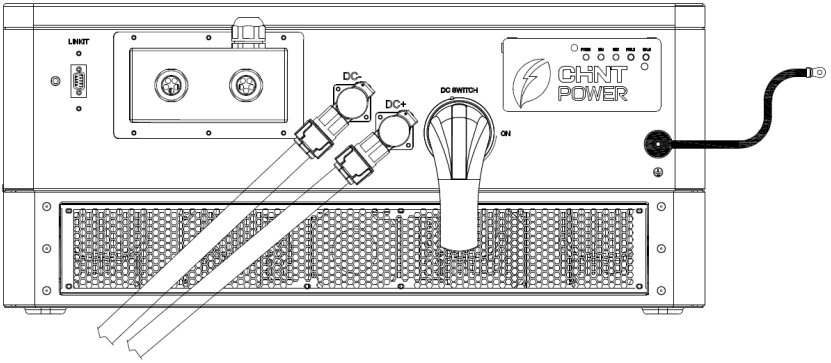


Figure 4- 9 Plug orange DC+ and black DC- connector

4. If you need to unplug the connector, press down and hold the buckle of DC connector with your thumb and unplug the DC connector.

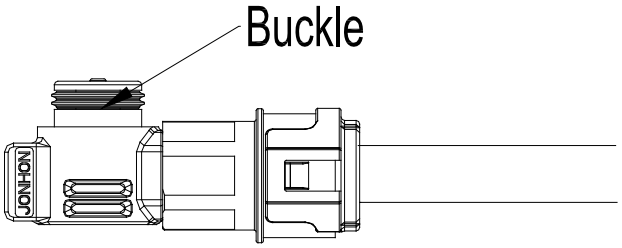


Figure 4- 10 Unplug the DC connector

INSTRUCTION:

- Both AC and DC connectors will be provided as standard accessory.
- AC and DC connectors shall be crimped with proper cables to ensure good watertight protection performance.
- Choose one of PE terminal holes for grounding according to needs.

4.6 Communication Connection

The PCS supports industry standard Modbus RS485 communication/TCP IP communication. A terminal resistor shall be connected at the beginning and end of RS485 bus.

4.6.1 Communication Interfaces and Cards

Communication interfaces and cards are as shown in the following figure.

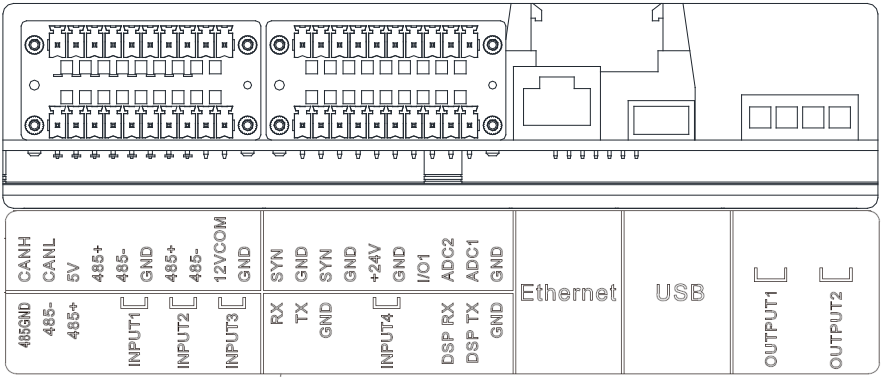
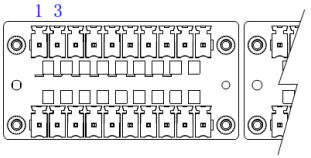
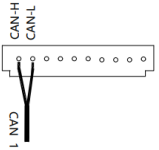
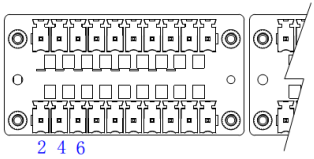
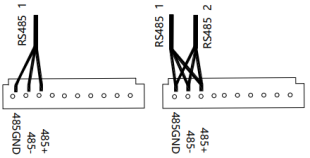
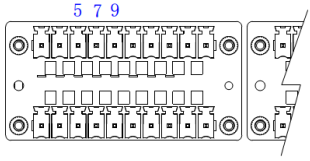
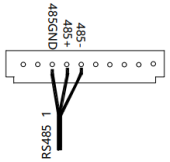
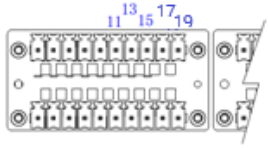
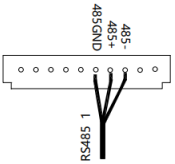
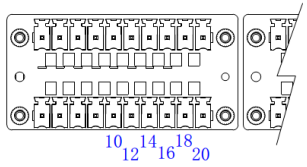
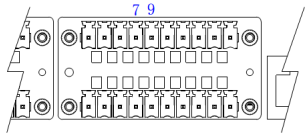
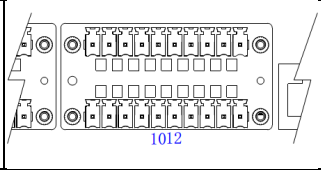


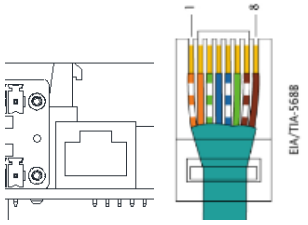
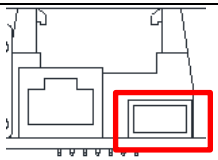
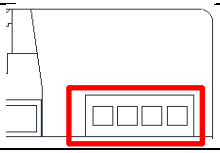
Figure 4- 11 Communication interfaces and communication cards

The correspondence between communication interfaces and cards, the configuration description and the target wiring positions of these communication interfaces are all included in the following table 4-3.

Table 4-3 Communication connection interfaces

Item	Picture	Configuration description	Remark
①CAN		1--CANH 3—CANL Stand-alone Networking  NA	Connect EMS / BMS
②RS485		2 --ExRS485-GND 4 --ExRS485- 6--ExRSB485+ Stand-alone Networking 	Connect EMS

③RS485		5 --IOS2RS485-5V 7 --IOS2RS485+ 9 --IOS2RS485- Stand-alone Networking  NA	Connect BMS
④RS485		11 --IOS1RS485-GND 13 --IOS1RS485+ 15 --IOS1RS485- 17 --12VCOM 19--GND Stand-alone Networking  NA	Connect MatriCloud gateway
⑤ Input node		10—INPUT1-COM1 12—INPUT1-State1 14—INPUT2-COM2 16—INPUT2-State2 18—INPUT3-COM3 20—INPUT3-State3	Reserved
⑥ 24V Input		7-- GND 9--24V	Reserved for external power supply
⑦ Input node		10—INPUT4-COM4 12—INPUT4-State4	Reserved

⑧ Ethernet port (RJ45)		No Color Func. 1 White-orange TP 2 Orange TN 3 White-green N.C. 4 Blue N.C. 5 White-blue N.C. 6 Green N.C. 7 White-brown RP 8 Brown RN	Connect EMS
⑨ USB port		Firmware upgrade and fault wave records export	Connect USB cable
⑩ Output dry node		NA	Reserved for service

The wiring methods of communication cables are as described below:

1. Loosen all the six fastening screws on the communication cover and take off the communication cover.

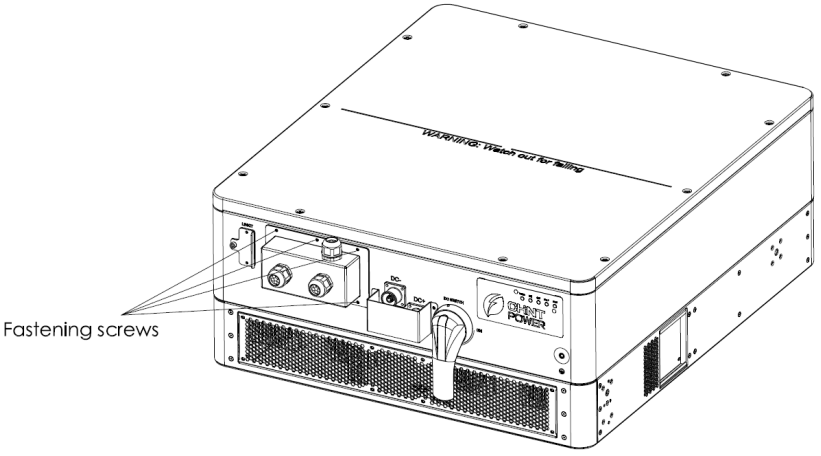


Figure 4- 12 Loosen fastening screws

2. Loosen the nut in the cable fastening head, and then take out the proper quantity of stoppers as required, as shown in the following figure.

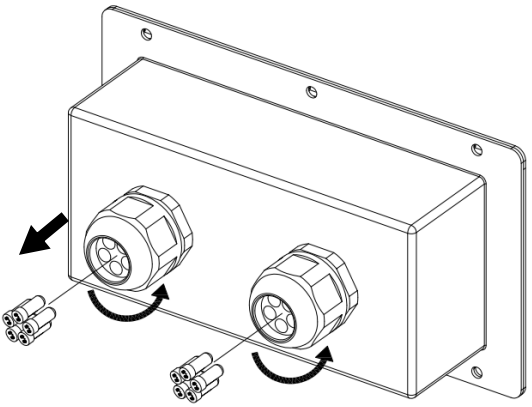


Figure 4- 13 Remove the stopper

NOTICE:
Do not take out any unnecessary stopper to prevent water from entering communication cover.

3. Lead the communication cables through the wiring holes of cable fastening head. Crimp CAN, RS485 and other cables to correct pins of 10-pin terminals and prepare an Ethernet connector.

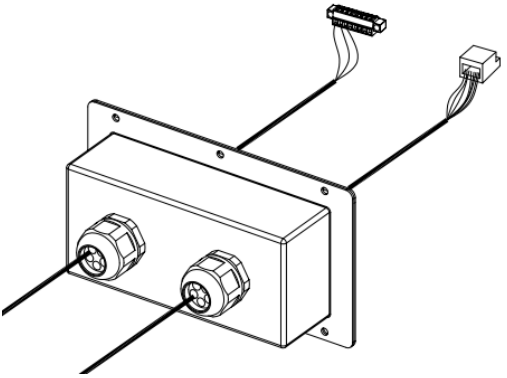


Figure 4- 14 Prepare wiring terminals

NOTICE:

- To achieve EMS RS485 networking communication, we shall open the top cover and find correct RS485 ports. It may be a little difficult for users, so please contact our service team for help.
- The USB port is designed for system upgrading by a USB drive.

4. Plug 10-pin terminals and Ethernet connector into their ports correctly. Reserve proper cable length and recover the communication cover.
5. Re-tighten the nuts onto the cable fastening heads and all the screws onto the communication cover.

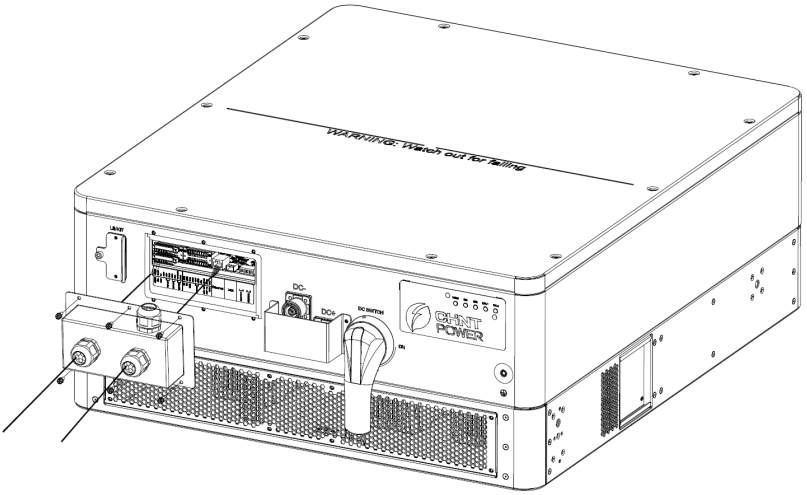


Figure 4- 15 Re-tighten the nuts and screws

4.6.2 LINKIT Module Installation

1. Unscrew the two fastening screws on the protection cover of the LINKIT interface as showed below.

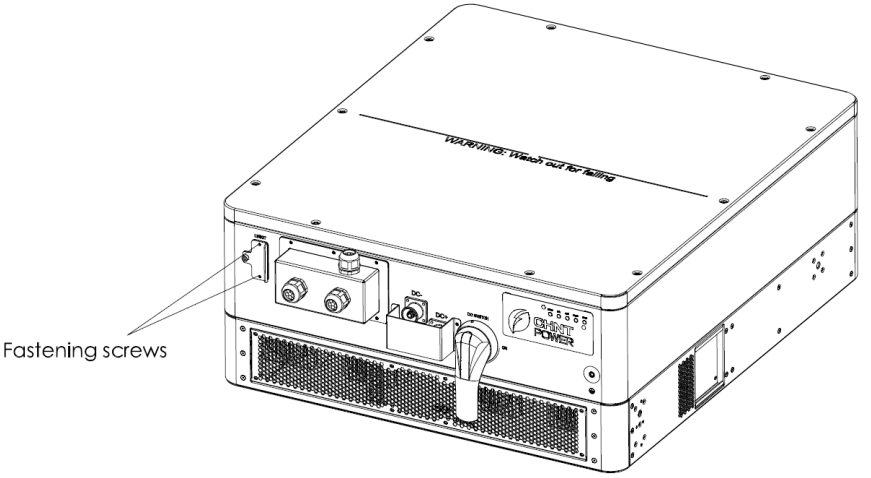


Figure 4- 16 Unscrew the fastening screws

2. Rotate the protection cover onto its opposite side, and then plug in LINKIT module and re-tighten the two fastening screws.

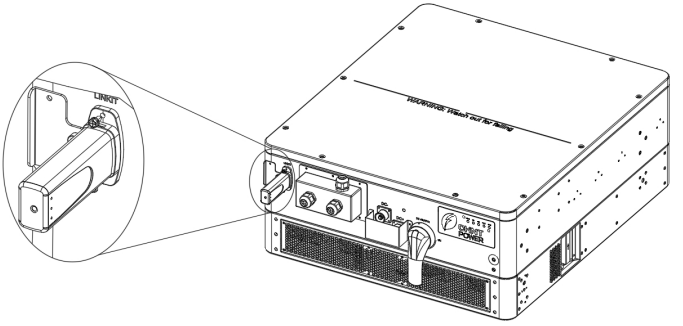


Figure 4- 17 Re-tighten LINKIT module

4.7 Connect PCS with MatriCloud Gateway

The PCS allows remote communications and firmware upgrades using MatriCloud Gateway (purchased separately). Read the following texts to find more information about the MatriCloud Gateway.

4.7.1 Main Interfaces of MatriCloud Gateway

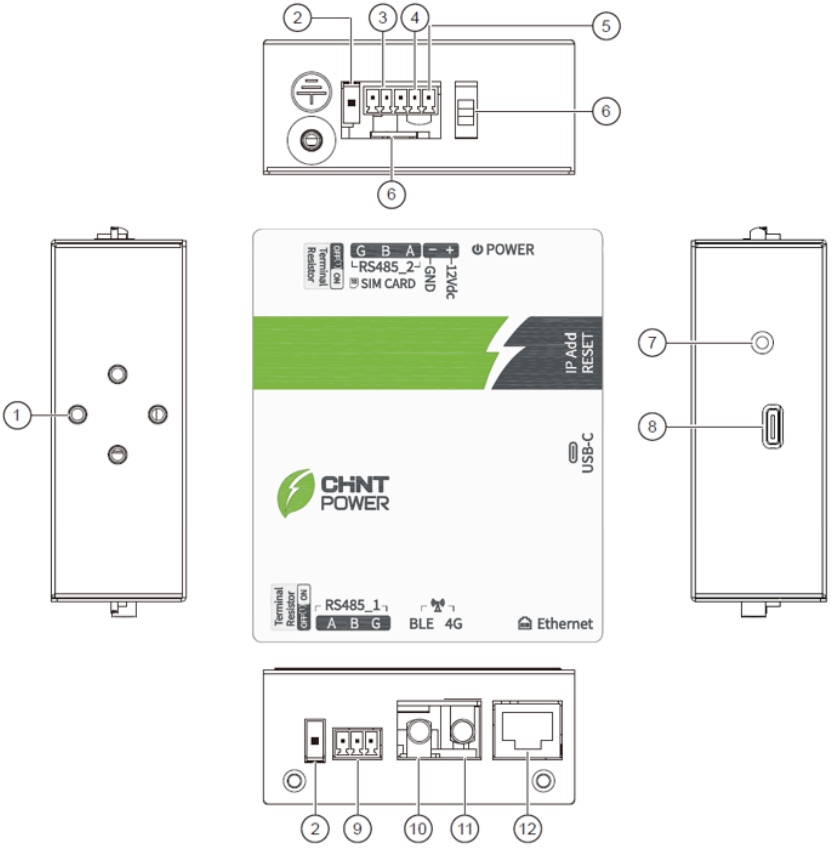


Figure 4- 18 Main interfaces of MatriCloud Gateway

No.	Description	Function
1	Mounting Hole	Install guide rail clips
2	RS485_2 terminal Resistor	RS485 multi-device communication, terminal matching resistor (If length of cable connecting to RS485 port of MatriCloud gateway is over 1000m, the switch must be set to ON.)
3	RS485_2 Interface	Connect MatriCloud Gateway and PCS (refer to

		Table 4-3 item 4)
4	12Vdc Power GND	12Vdc power grounding (see Table 4-3 item 4)
5	12Vdc Power Interface	DC power supply (see Table 4-3 item 4)
6	Power Switch	Power on/off (Before configuring gateway, set it to ON)
7	IP Address Reset	Long press for 12 seconds to reset factory parameter settings
8	USB-C Interface	Connect to USB cable (type-c)
9	Ethernet Interface	Connect Ethernet cable (open LAN firewall ports before commissioning)
10	Bluetooth Antenna Terminal Post	Connect bluetooth antenna
11	4G Antenna Terminal Post	Connect 4G antenna (Unavailable for US)
12	RS485_1 Interface	Connect MatriCloud gateway and 3rd party monitoring gateway
13	RS485_1 Terminal Resistor	RS485 multi-device communication, terminal matching resistor (If length of cable connecting to RS485 port of 3rd party gateway is over 1000m, the switch must be set to ON.)

4.7.2 RS485 Cable and Power Cable Connection

The wiring position of RS485 cable and power cable of PCS to MatriCloud Gateway is illustrated in red box as shown in the following figure.

Figure 4- 19 Wiring position of RS485 cable and power cable of PCS

Among them, we use Pin 6 (GND), Pin 7 (RS485+), Pin 8 (RS485-), Pin 9 (12VCOM) and Pin 10 (GND) for wiring to MatriCloud Gateway.

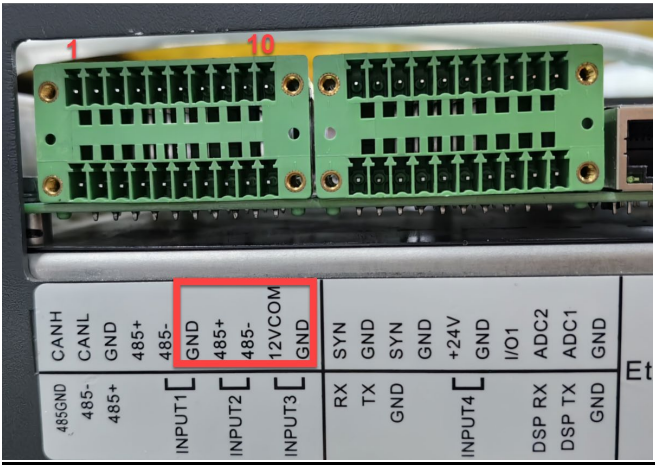


Figure 4- 20 Pins of RS485 cable and power cable

4.7.2.1 Connect MatriCloud Gateway with one PCS

1. Wiring MatriCloud Gateway to PCS according to the following table:

Pins of MatriCloud Gateway	Pins of PCS
RS485_2 G	Pin 6 (GND)
RS485_2 B	Pin 8 (485-)
RS485_2 A	Pin 7 (485+)
GND	Pin 10 (GND)
12Vdc	Pin 9 (12VCOM)

2. Insert the SIM card as shown in the following figure:

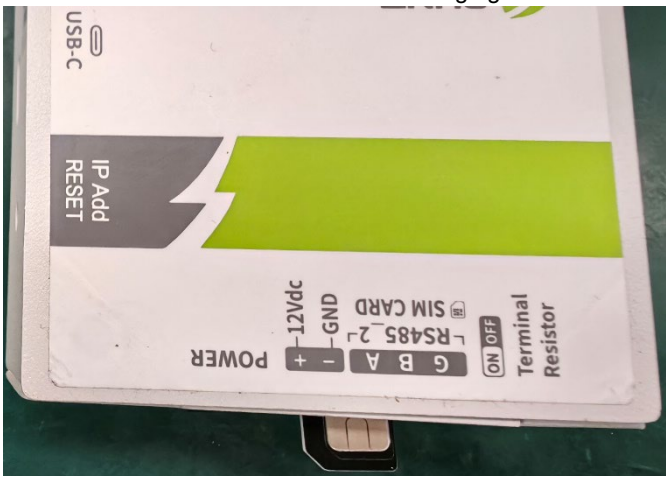


Figure 4- 21 Insert SIM card

3. Set the DIP switch of MatriCloud Gateway to position 1, as shown in the following figure.

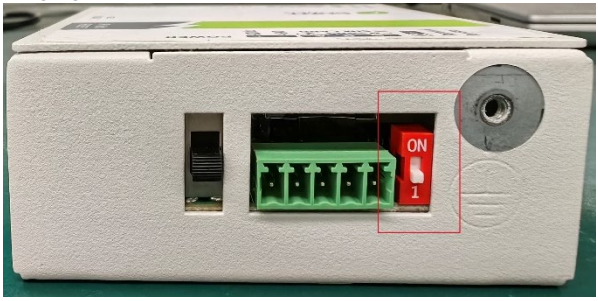


Figure 4- 22 Set DIP switch of MatriCloud Gateway

4.7.2.2 Connect MatriCloud Gateway with multiple PCSs

1. Wiring
   Connect MatriCloud Gateway with multiple PCSs in a daisy-chain mode according to the following figure.

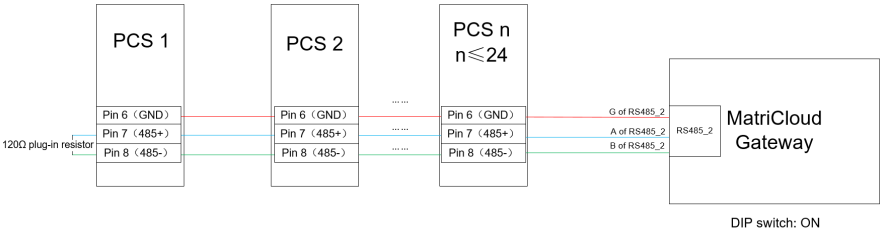


Figure 4- 23 Connect MatriCloud Gateway with multiple PCSs

2. Insert SIM Card according to the illustration as shown in Figure 4- 21.
3. Connect a 120Ω plug-in resistor in parallel between Pin 7(485+) and Pin 8 (485-) for the first PCS (farthest from the MatriCloud Gateway), as shown in Figure 4- 23.
   Simultaneously, set the DIP switch of MatriCloud Gateway to ON, as shown in the following figure:

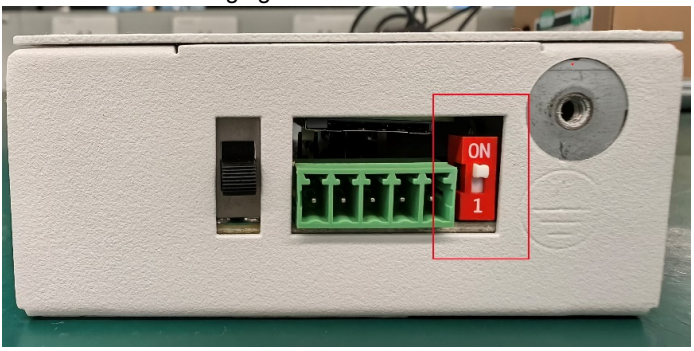


Figure 4- 24 Set DIP switch of MatriCloud Gateway

4.7.3 Powering On

Connect the power interface to power supply (pay attention to the positive and negative poles). Close the power switch, the POWER light comes on, indicating successful power on and startup.

4.7.4 Set Modbus Address and Gateway IP via MatriCloud APP

After the Ethernet card is running normally, you can perform local control and other operations through the MatriCloud App.
Download and install this APP by referring to the steps in section 6.1 App Installation.
Note: Only mobile phone with Android 8.0 or iOS 13.0 and above can download the APP.
Turn on the Bluetooth of mobile phone and make the following settings.

1. Tap “Device Access” and then tap “Bluetooth Connect”.

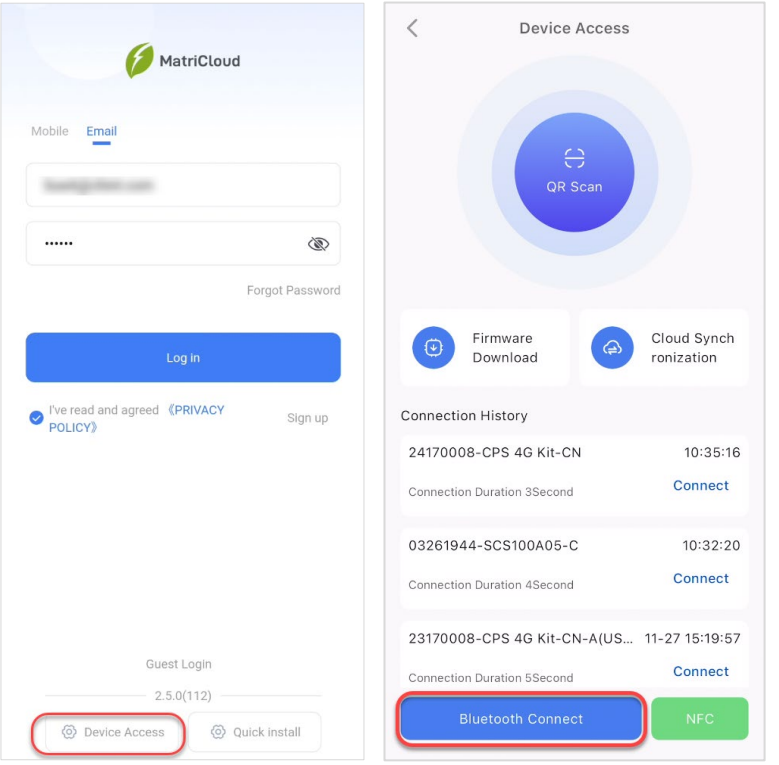
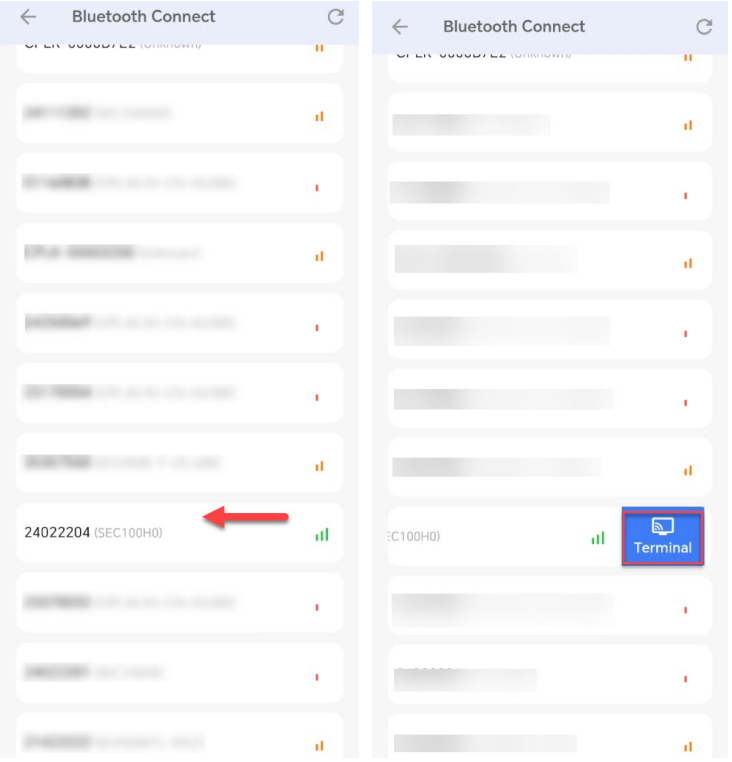


Figure 4- 25 Tap “Device Access” and tap “Bluetooth Connect”

2. Left swipe to configure terminal settings, tap “Terminal” and then tap “Basic Configuration”.



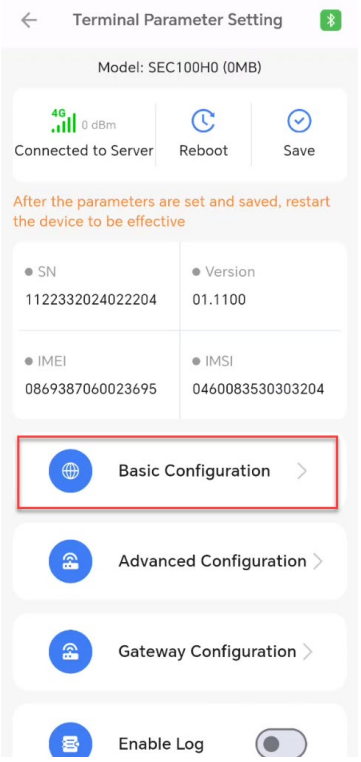


Figure 4- 26 Configure terminal settings

3. Tap “Modify” to modify protocol, select PCS protocol and configure Modbus ID.

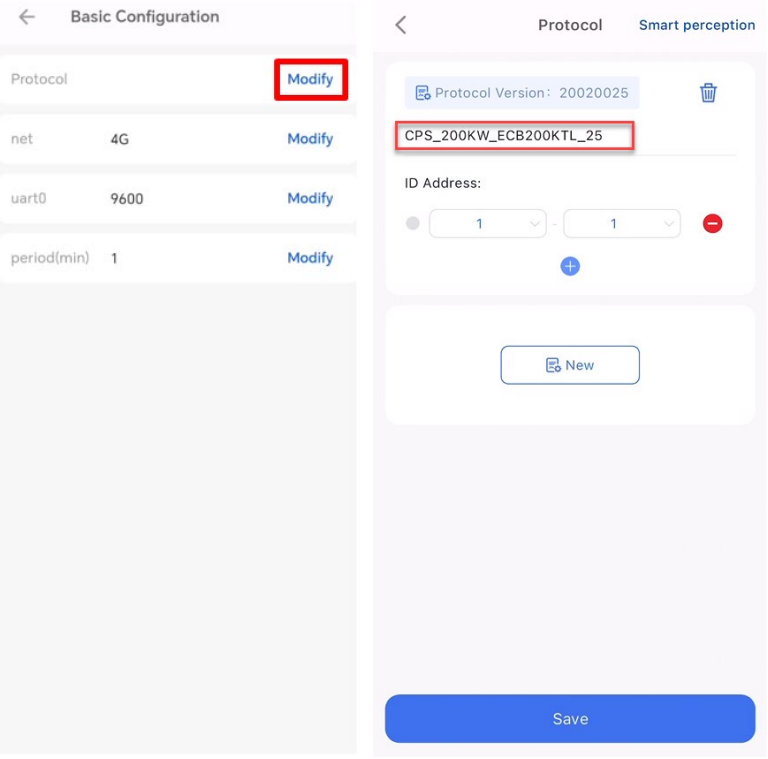


Figure 4- 27 Modify protocol

4. Tap “Gateway IP Configuration” and enter password “1111.

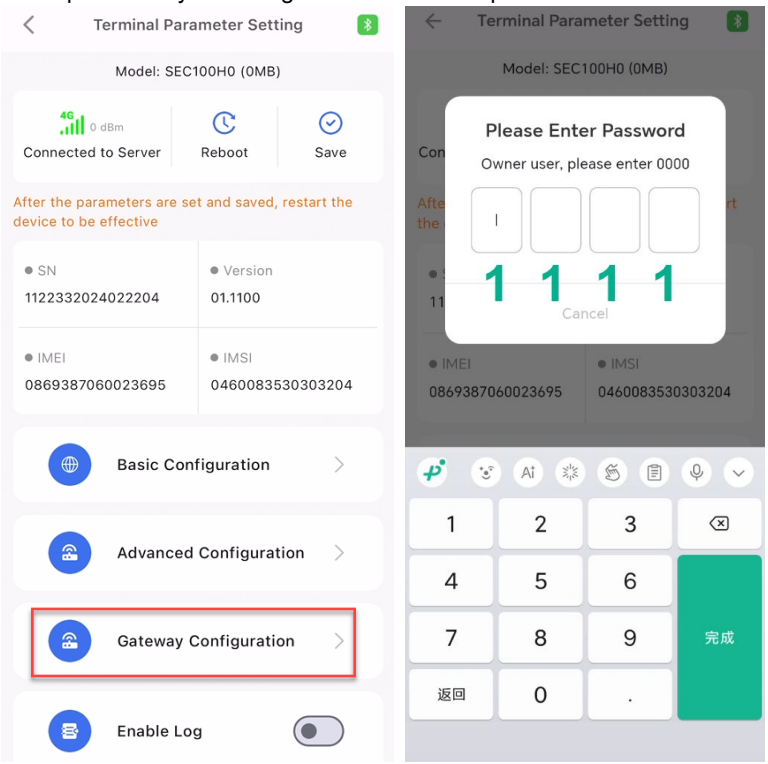


Figure 4- 28 Enter password

5. Tap “Gateway IP Configuration”, enable “DHCP” and configure IP address.

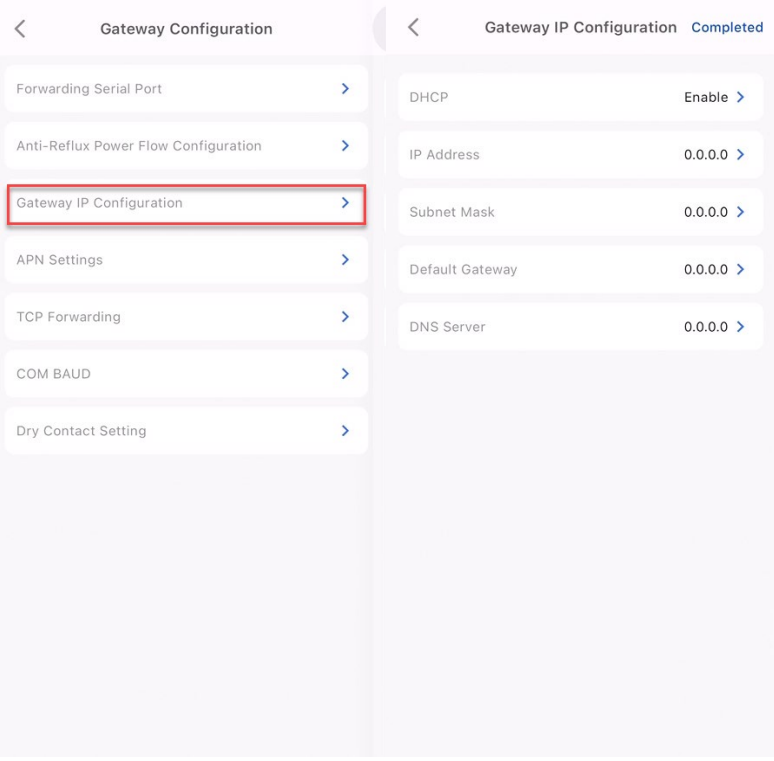


Figure 4- 29 Gateway IP configuration

6. Tap “Save”, and then tap “Reboot” (30 seconds). If the reboot is successful, the “Connected to Server” option will appear on the interface.

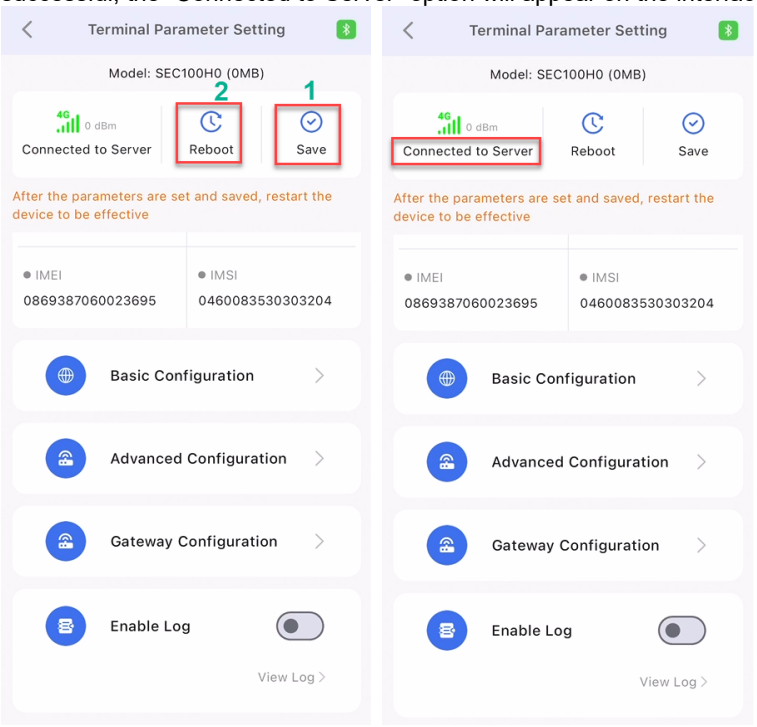


Figure 4- 30 Connected to server

4.7.5 Gateway Configuration via MatriCloud Platform

4.7.5.1 Add Gateway

1. Enter the specified website https://eu.chintpower.com and click “Sign Up Now”, following interface prompts, to create an account.

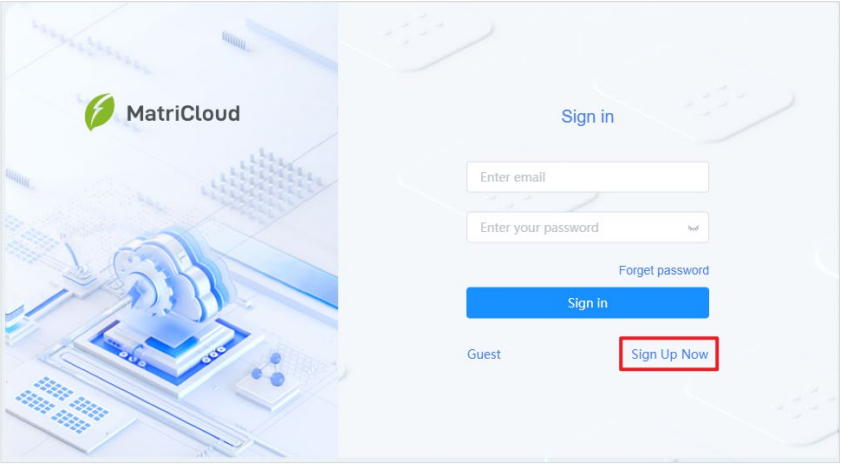


Figure 4- 31 Enter the website & create account

2. Input account name and password to sign in the cloud platform.

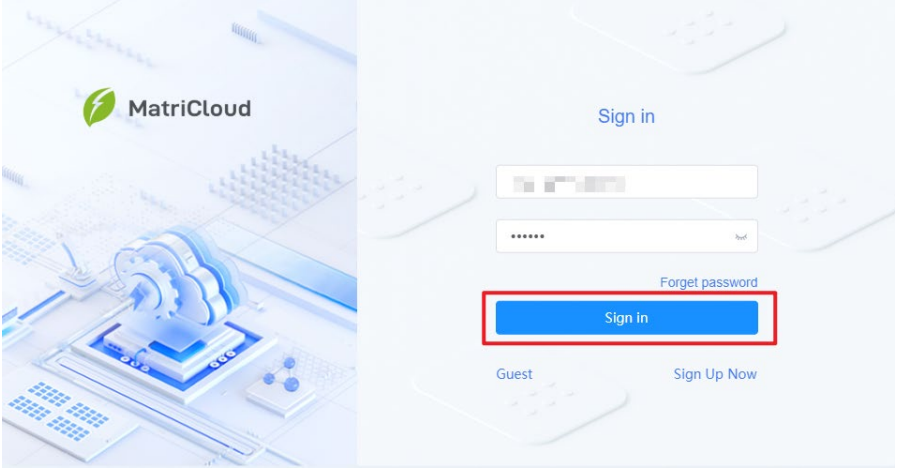


Figure 4- 32 Enter the website & create account

3. Click the **Create Site** button to open the site creation dialog box.

Figure 4- 33 Column Customization

4. Enter the SN of gateway and click **Next**.

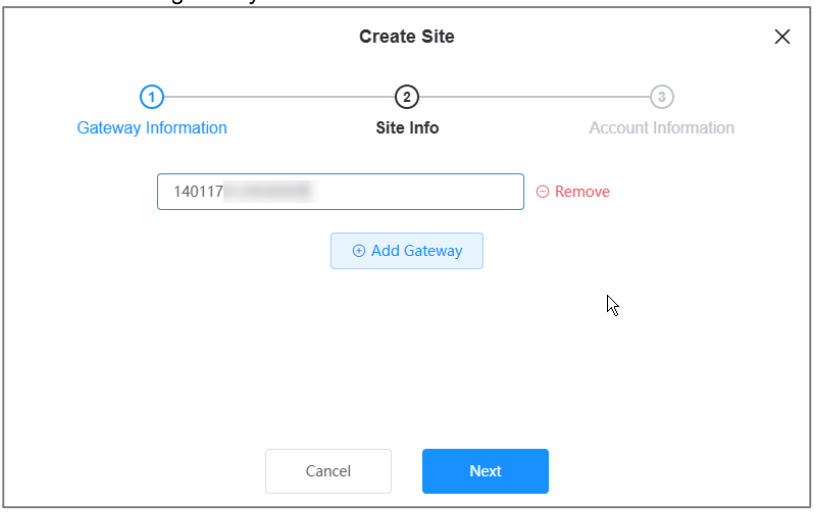


Figure 4- 34 Add gateway

5. Enter the site's basic information using the items listed below.

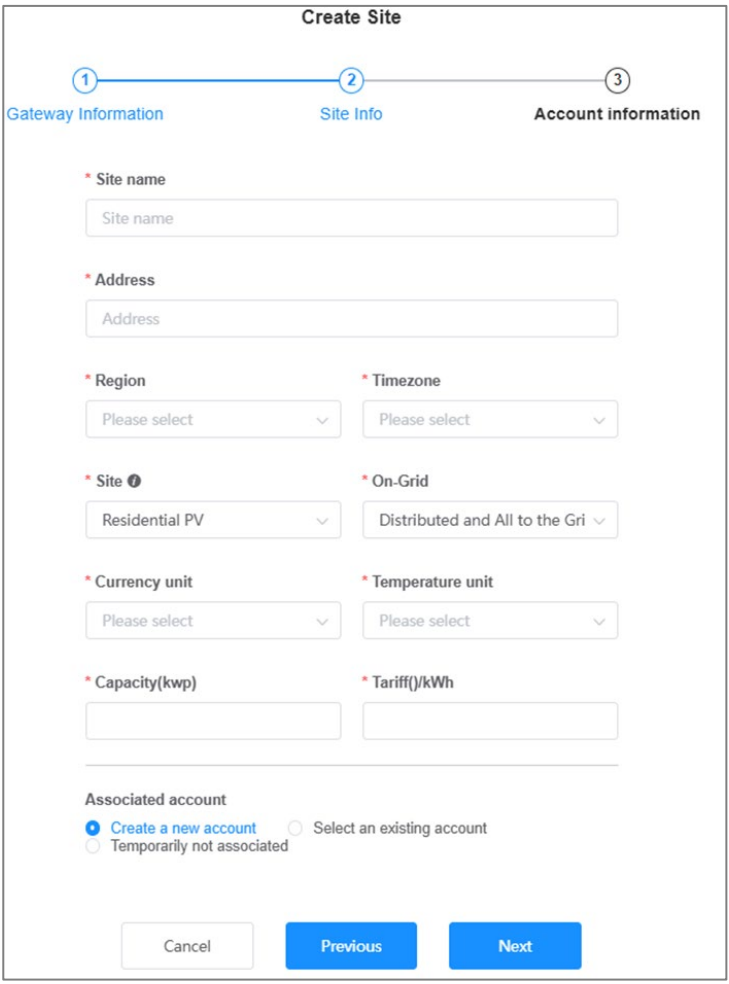


Figure 4- 35 Fill in New Site Information

Items	Description
Site Name	Enter the site's name. To modify it later, use the Site Details page.
Address	Enter the site's physical address based on its actual location.
Region	Specify the region where the site is located.

Time Zone	Automatically set based on the selected region.
Site Type	Select the site type based on its actual characteristics.
On-Grid	Indicate the site's grid connection status based on its actual setup.
Currency Unit	Automatically set based on the selected region.
Temperature Unit	Automatically set based on the selected region.
Capacity	Enter the site's capacity based on its actual specifications.
Tariff ()/kWh	Automatically set based on the selected region. You can also customize
Associated Account	Choose to create a new account, link an existing one, or leave it unassociated.

6. Associate the site with an account. The options in this step depend on your selection:
   - **Option 1: Create a New Account:** If you chose Create a new account as shown in Figure 4- 35, enter the account details here.

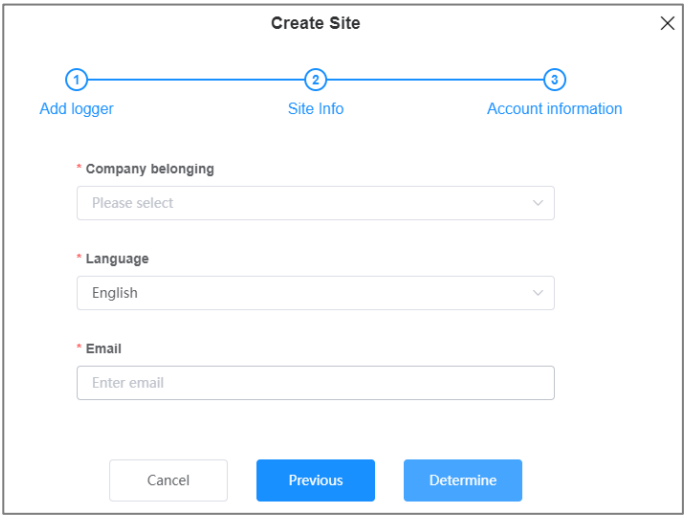


Figure 4- 36 Create a New Account for New Site

- **Option 2: Select an Existing Account:** If you chose Select an existing account as shown in Figure 4- 35, select a user to assign the site to.

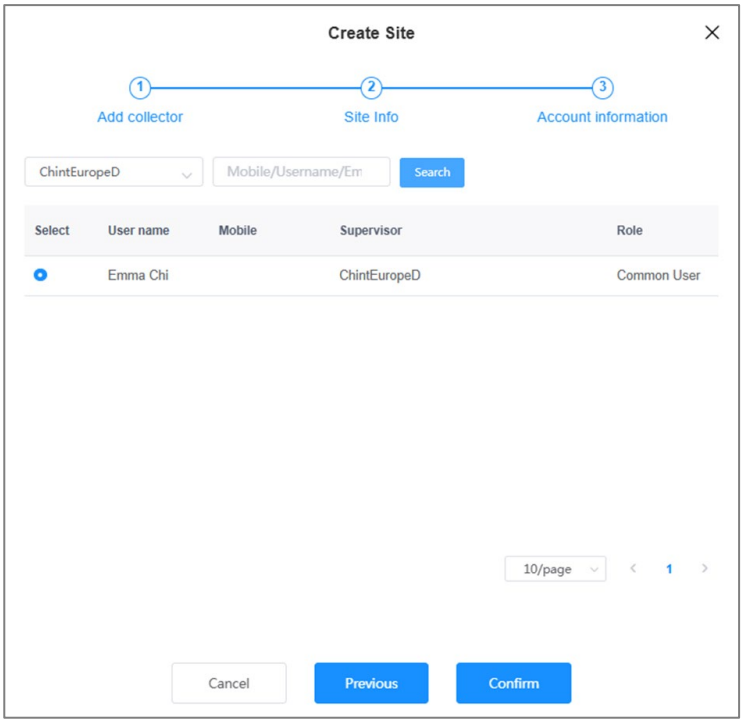


Figure 4- 37 Select an Exisiting Account for New Site

- **Option 3: Temporarily Not Associated:** If you chose Temporarily not associated as shown in Figure 4- 35, the new site will appear in the Site List without an associated account.

7. Click "Site" menu and then "Gateway" to enter the gateway interface. You can view gateway status, gateway type, firmware version and gateway list here.

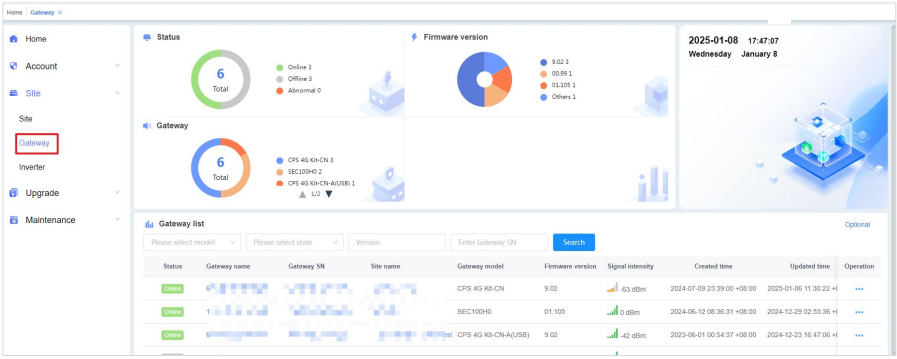


Figure 4- 38 Enter the gateway interface

4.7.5.2 Search for Gateway

On the Gateway > Gateway List page, select the gateway type (4G/WIFI/ETH) in the "Please select model" text box, select the status (online, offline, faulty) in the "Please select status" text box, enter the version in the "Version" text box, and enter the serial number in the "Enter Gateway SN" text box to search and view the relevant gateway information, device information, and configure the gateway.

Click "Optional" in the top right corner to filter the content categories you want to display. Click "…" icon under the operation column can distribute/rename a gateway.

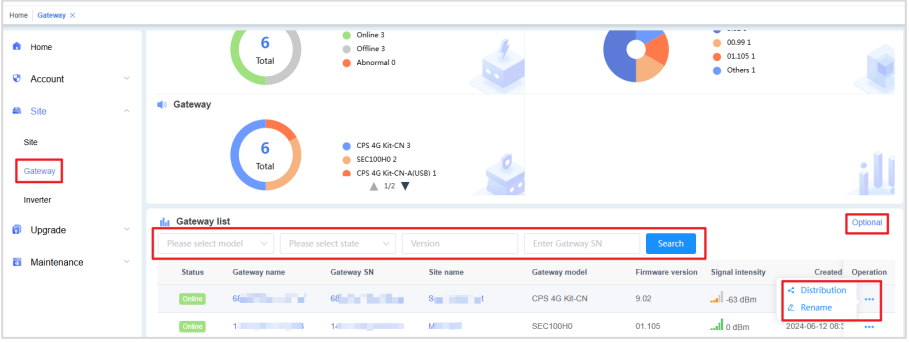


Figure 4- 39 Gateway List

4.7.5.3 Gateway Overview

Click the gateway name on the gateway list to view the details of a gateway. Click “Delete” to delete the current device.

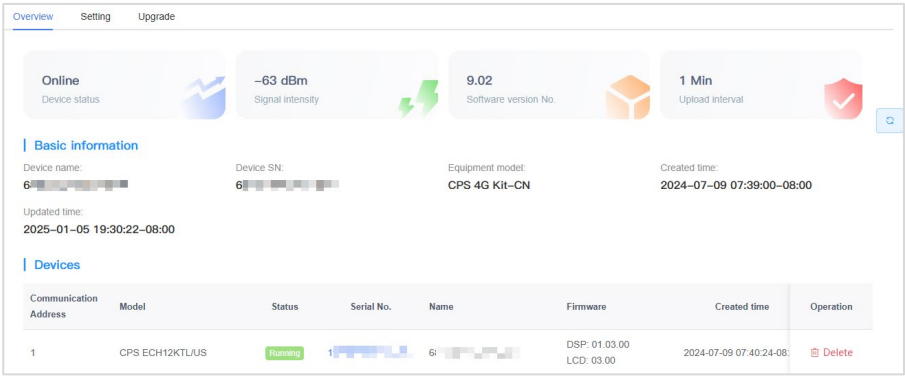


Figure 4- 40 Gateway overview

4.7.5.4 Setting

MatriCloud Gateway parameter setting, user can match model protocol, upload interval, device address, etc.

Protocol: Configure device data parsing rules.

Click the "Add Protocol" button to add a set of protocol address and protocol selections; Click "Submit" button to submit the NIC settings and restart it (10s-20s); Click "Intellisense" button to automatically identify the device protocol.

If there is more than one protocol, click "Delete Protocol" to remove it.

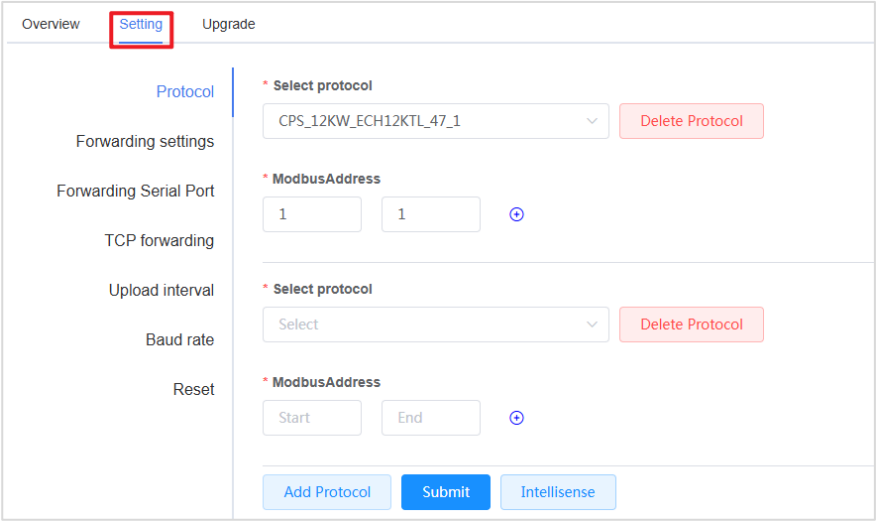


Figure 4- 41 Protocol setting

Parameter name	Description
Select protocol	Select the parsing protocol used by the device under the MatriCloud Gateway and the data uploaded by the user parsing device
Modbus Address	Set the parsing address of the protocol application parsing

Forwarding settings: select forwarding settings in the text box, then click “Submit” to save the settings.

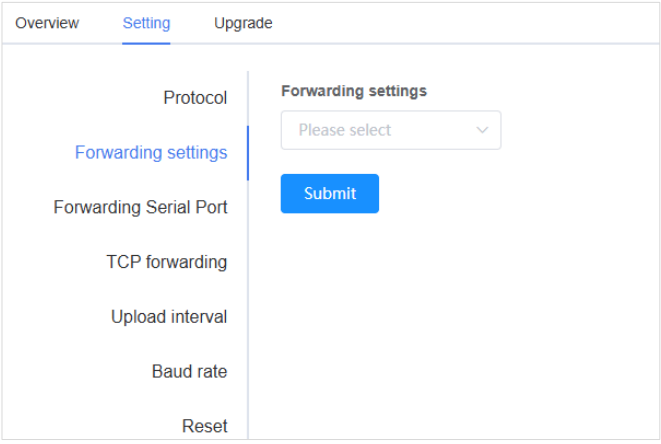


Figure 4- 42 Forwarding settings

Forwarding Series Port: Enter the communication port, select the baud rate, check digit, protocol type and other information as needed and click the "Submit" button to submit.

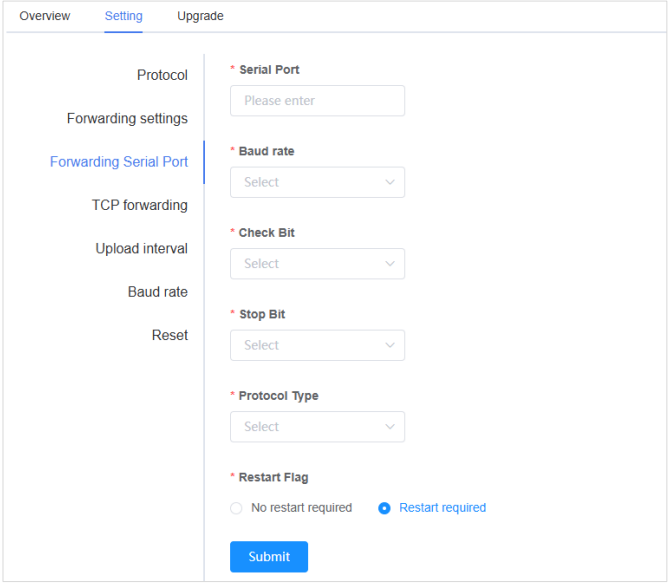


Figure 4- 43 Forwarding Series Port

TCP forwarding: set serial port and protocol type, as well as whether restart flag is required.

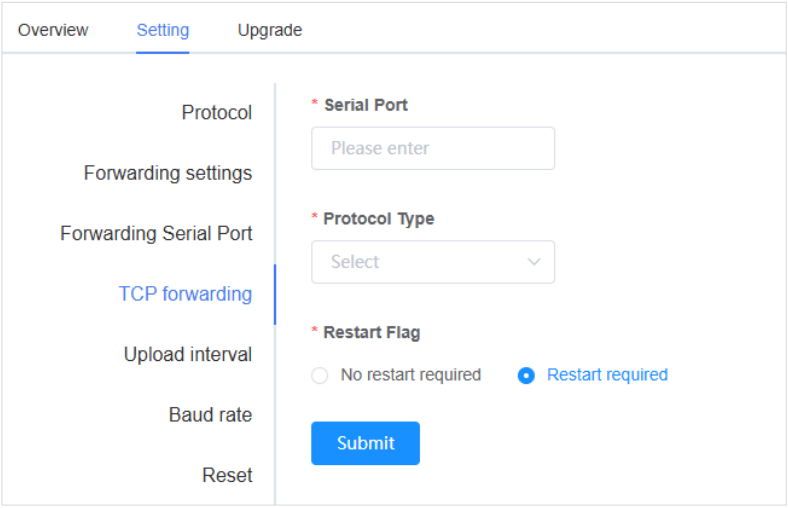


Figure 4- 44 TCP forwarding

Upload Interval: Configure the upload time of device data, select whether to restart safely (10s-20s), and click the "Submit" button to submit the settings.

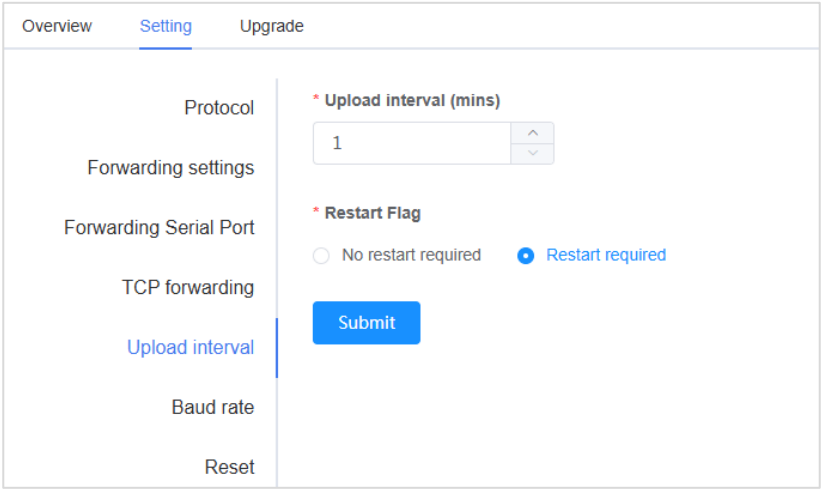


Figure 4- 45 Upload Interval

Baud Rate: Upload speed of communication data. It needs to be consistent with the baud rate of the device. Select or enter the corresponding values or options in each text box, and click "Submit" to confirm the selection and complete the Baud Rate settings.

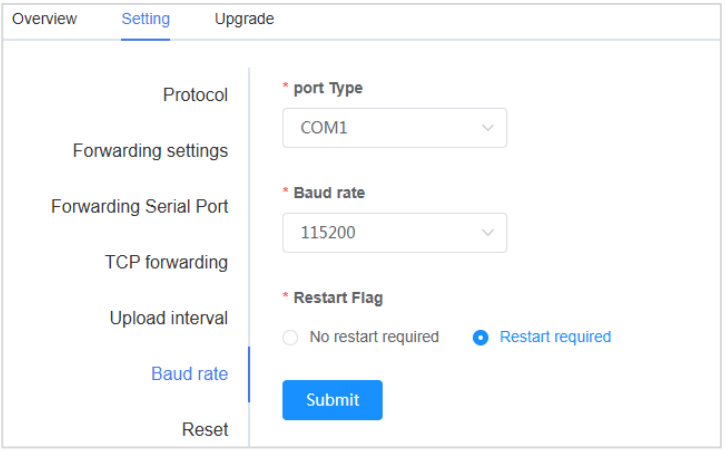


Figure 4- 46 Baud rate

Parameter name	Description
Baud rate	The transmission speed of electronic communication data and baud rate of each model are different. The MatriCloud Gateway shall be adjusted as required to be consistent.

Reset: Click to Reset gateway.

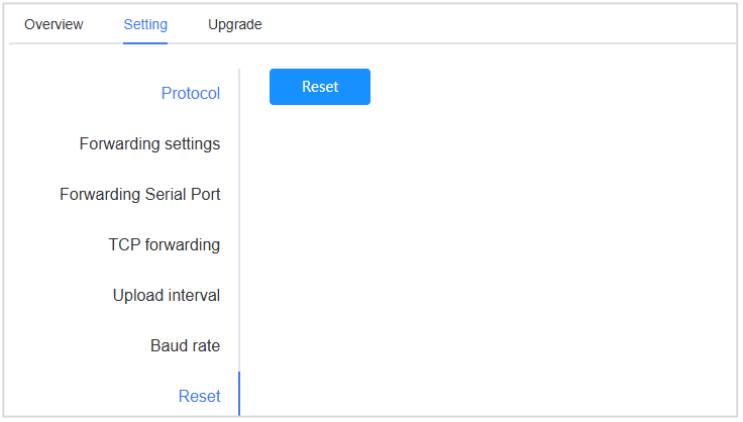


Figure 4- 47 Reset Gateway

4.7.5.5 Upgrade

Select time range and search the gateway to be upgraded. Or click the "…" under the operation column to delete certain item.

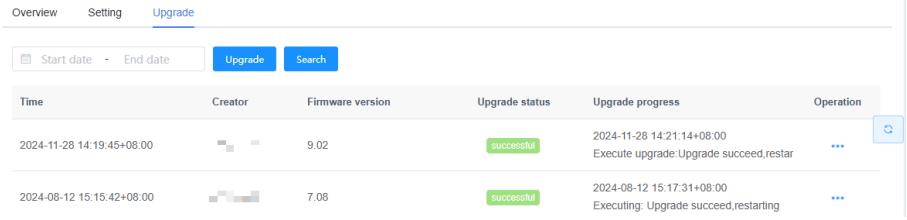


Figure 4- 48 Upgrade

Click "Upgrade" button to pop-up an upgrade window. Select firmware in textbox and select reservation options, and click "Confirm" to upgrade.

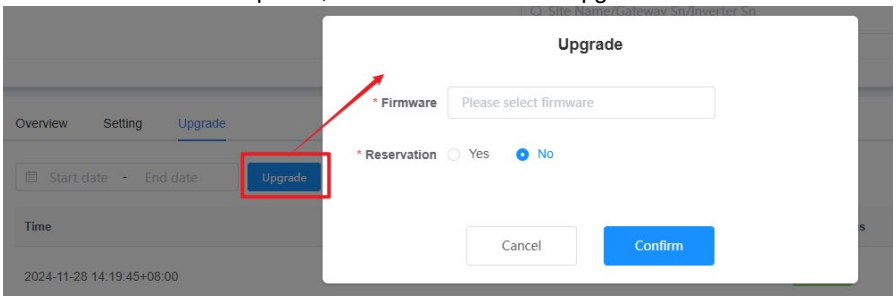


Figure 4- 49 Upgrade window

Parameter	Description
Firmware	Firmware version of MatriCloud Gateway
Reservation	Correct: upgrade according to the reservation time; Deny: upgrade immediately
Reservation time	When the Reservation option is Correct, the time can be selected

For more information about remote communications and firmware upgrades using the MatriCloud Gateway, contact our after-sale department for help if necessary.

5 Commissioning

WARNING:

Please follow the guidelines below before on-grid operation to eliminate possible dangers to ensure safety.

5.1 Pre-commissioning Checklist

Item	Method
Mechanical installation	• Make sure that the PCS is installed properly according to the previous sections. • Make sure all the screws have been tightened to the specified torque values. (Refer to Section 3 Mechanical installation)
Cable connections	• Make sure that all cables are connected to the terminals properly. • Use appropriate cable management to avoid physical damage. • The polarity of DC input cables should be correct • AC output cables should be correct (Please refer to 4 Electrical Connection)
Electrical check	• Test whether the AC voltage is within the normal operating range. • Make sure the DC open circuit voltage of input Battery is less than 1500V.

Table 5-1 Pre-commissioning Checklist

5.2 Commissioning Steps

Complete the checklist above before commissioning the PCS as follows:

1. Turn on the DC Switch.
2. When the energy supplied by the Battery is enough, the LED of PCS will light up. The PCS will start up then.
3. Set up the PCS according to section 6 APP Local Control or 7 Web Application and Modbus.

6 APP Local Control

6.1 App Installation

This section provides a step-by-step guide on how to download and install the MatriCloud App.

6.1.1 Preconditions

Before downloading and installing the MatriCloud App, ensure the following requirements are met:

- Mobile Phone Operating System: Android 8.0 and above; iOS 13.0 and above.
- The mobile phone must be able to connect to WLAN (Wi-Fi) or a 2G/3G/4G/5G cellular network.
- Sufficient memory space must be available on the mobile phone to install the application.
- Ensure the mobile phone has adequate battery power to complete the installation process.

6.1.2 Operation Steps

Follow these steps to download and install the MatriCloud App:

1. Search or Scan to Download:
   - For Android Users: Open the Google Play Store (or other Android app stores) and search for MatriCloud.
   - For iOS Users: Open the App Store and search for MatriCloud.
   - Alternatively, scan the QR code provided below using your mobile phone and follow the on-screen prompts to download the App.

Figure 6- 1 Scan QR code

2. Install the App:
   a) Locate the downloaded installation package on your mobile phone.
   b) Tap the package and follow the on-screen instructions to complete the installation.

c) Once installed, the **MatriCloud icon** will appear on your mobile phone's home screen or app drawer.

6.2 APP Operations and Configuration

IMPORTANT!

- To ensure optimal communication signal quality between the App and the PCS, keep the mobile phone within a visible distance of 5 meters from the PCS. Exceeding this range may result in unreliable connectivity.
- The following contents are applicable to CPS ECB200KTL PCS.

6.2.1 Preconditions

Before establishing a connection for near-end maintenance, ensure the following conditions are met:

- The AC/DC side or AC side of the PCS has been powered on.
- The mobile device (e.g., mobile phone) must be within 5 meters of the 4G dongle or PCS, with no obstructions in between.
- The mobile device should be positioned within a 60° angle of the forward bearing of the 4G dongle or PCS.
- Ensure the Bluetooth function on the mobile device is turned on.
- The mobile device must be connected to a network (Wi-Fi or cellular data).
- The connection can be established via QR code scanning or manual connection.

6.2.2 Preparation Before Connection

Before connection, make sure that the Bluetooth function of the mobile phone is turned on as follows:

For Apple iOS and Android users, turn on mobile phone system **Settings > Bluetooth > Turn on** the Bluetooth function to enable it.

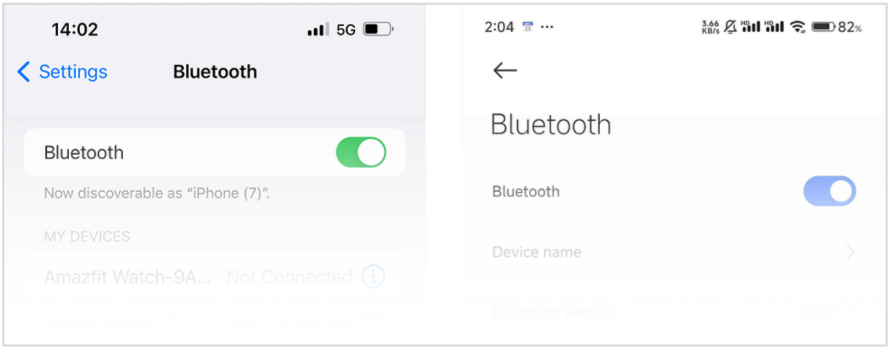


Figure 6- 2 Turn on bluetooth

Follow these procedures to easily configure the MatriCloud App:

1. Set server and language:

   a. Open the MatriCloud APP.

   b. Tap the server icon to select the appropriate server.

   c. Tap the Language icon to select your preferred language.

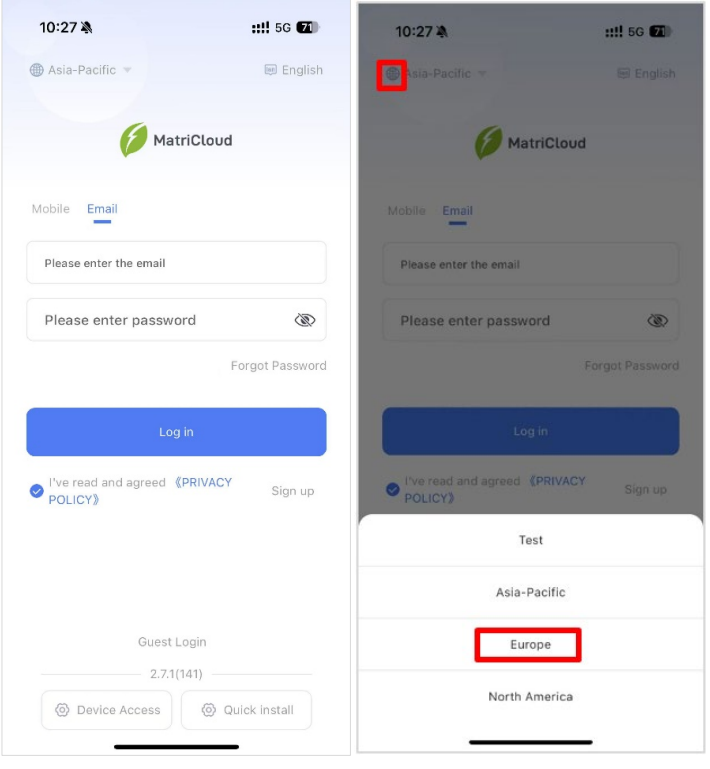
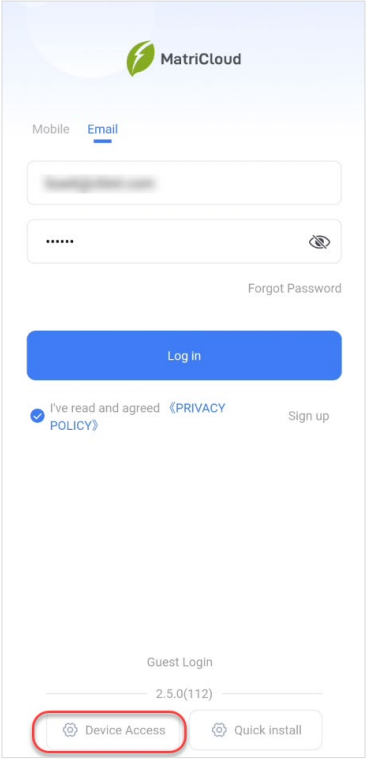
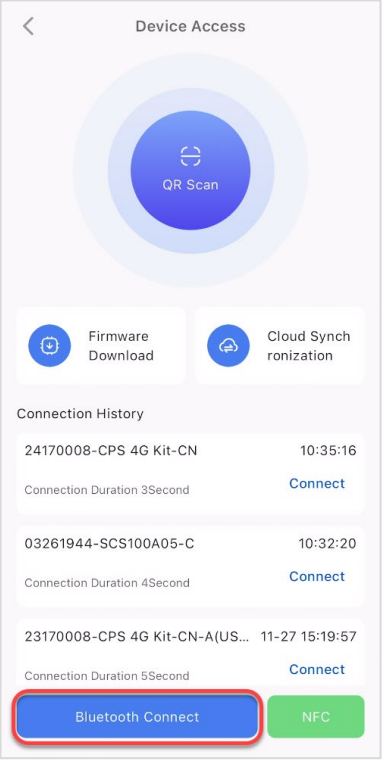


Figure 6- 3 Set the server and language

2. Tap “Device Access” button and then tap "Bluetooth Connect" button to open the device name list. The device name "XXXXXXXX" is the last 8 digits of SN on the WIFI module label.

   Note: NFC function is now unavailable.





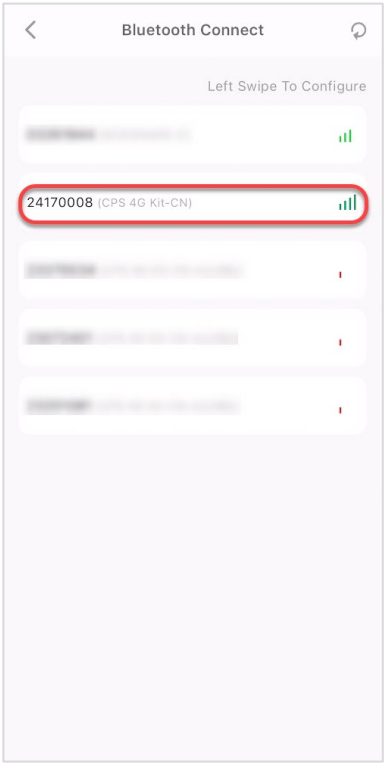


Figure 6- 4 Connect to PCS

3. When APP is successfully connected to PCS, You will be directed to the Home page.

6.3 Home Menu

IMPORTANT!

The parameters displayed on the following interfaces in this chapter may vary with specific product models and specific choice. Actual interface shall prevail.

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

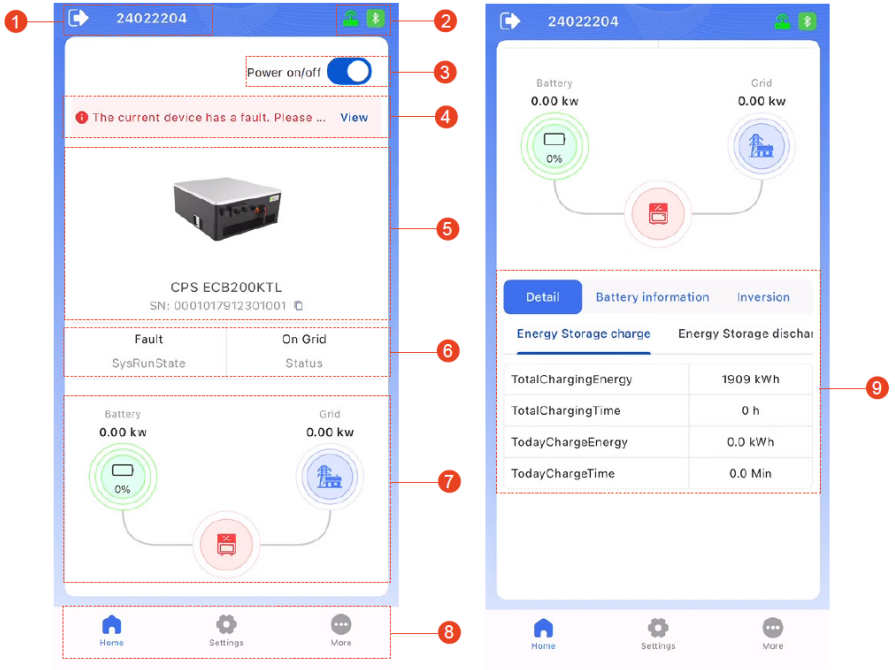


Figure 6- 5 Home Page

The Home interface provides an overview of the running state of PCS. Users can visually monitor the energy flow chart, which includes:

- Battery: Acts as the energy storage unit, supplying stored DC power to the PCS during discharge or receiving AC power from the PCS for charging.
- Grid: The PCS converts DC power from the battery to AC power for grid (discharge mode) or converts grid AC power to DC for battery charging (charge mode).
- PCS: Serves as the energy conversion hub for the energy flow between the battery and grid.

Refer to the following table for a detailed description of the main components of the Home interface:

No.	Name	Description
1	Exit	Tap the exit icon to disconnect the device.
2	Bluetooth and network status	Bluetooth status: Indicates the connection status of the mobile phone's Bluetooth: • : Bluetooth connected • : Bluetooth disconnected. Networking status: Indicates the connection status of the network card device: • : Network connected, • : Network disconnected. Tap the icon to set the network or navigate to **More->Gateway Configuration**. For details, refer to 6.5.7 Gateway Configuration.
3	Power on/off	Tap the button to power on/off the PCS.
4	Alarm information	When a fault occurs, the red fault text will be displayed on the Home interface. Tap to access detailed fault information and perform troubleshooting procedures promptly.
5	Device information	Display the device picture, model, SN number and running states. Tap the copy icon ( ) next to the SN number to copy it. The device has four running states: Standby, Running, Fault and Warning. For details, refer to 6.3.1 System Running State.
6	Energy flow chart	Display the energy flow chart including Battery, Grid and PCS.
8	Navigation bar	Including three tabs: • **Home**: Returns to the Home interface. • **Settings**: Accesses device settings. • **More**: Provides additional options and configurations.
7	Detailed parameter information	Display the information of summary of the day, DC, AC, version and other information. For details, refer to 6.3.2 Home Interface Information Tabs.

6.3.1 System Running State

The "Power on/off" button controls the turning on/off of the PCS. The "SysRunState" item shows four modes of PCS: Standby, SysChecking, Running and Fault.

- Standby: After PCS is powered on, it enters standby status and the “SysRunState” shows “Standby” status. Now the “Power on/off” button shows grey color.
- SysChecking: Once you slide button to the right-hand side (blue color), the bottom will pop out “Power on/ Power off”, the PCS enters “Checking” status and begins to perform a series of self-checking.
- Running: If there is no any failure, the button keeps blue color, the PCS will turn on and begin running, converting the direct current into alternating current. Now the “SysRunState” shows “Running”.
- Fault: If there are some failures, the button will get back to left-hand side (grey color) and pop out failure tips in the top of the interface, you can tap “View” to find fault records and clear faults. Now the “SysRunState” shows “Fault”.

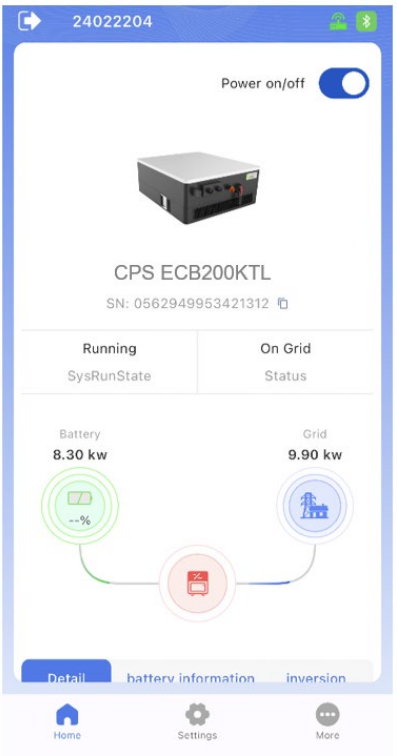


Figure 6- 6 PCS menu

The “Status” item shows the on-grid and off-grid status of PCS, which cannnot be set and will change with the actual grid-connected state.

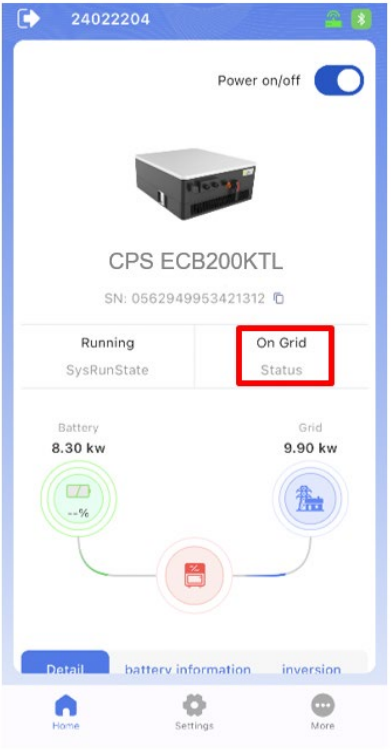


Figure 6- 7 Run mode

6.3.2 Home Interface Information Tabs

The Home interface 8 subcategories of important parameters: Detail, Battery information, Inversion, Power Grid, Generatrix, Temperature, Rated parameter and Version. You can switch the subcategories by sliding to left or right.

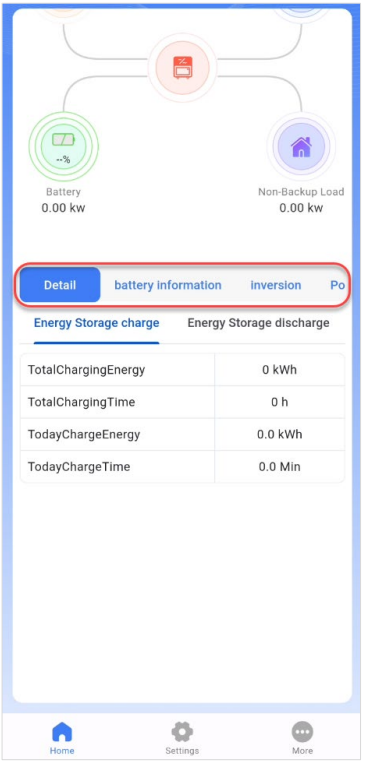
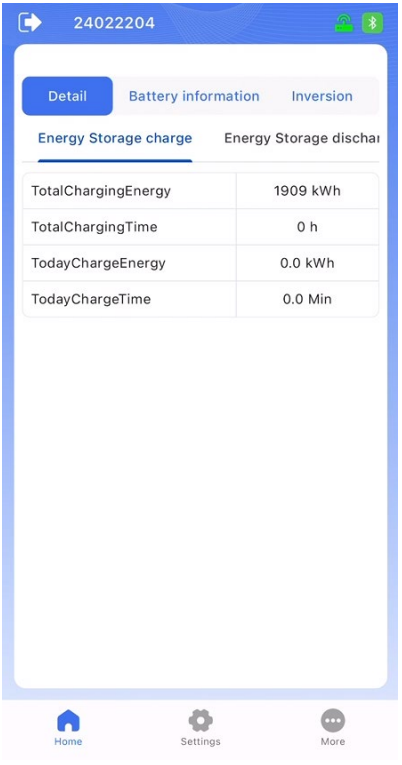


Figure 6- 8 Subcategories of important parameters

- Detail: Display the information of Energy Storage charge, Energy Storage discharge, charge and discharge etc. You can switch the information by sliding to left or right.
- Battery information: Dislay the battery voltage, current, power, isolation positive impedance, battery stack SOC the maximum temperature of battery stack, battery average current of each cluster, isolation negative impedance, ect.
- Inversion: Display three-phase (A, B, C) current, apparent power, active power from PCS, reactive power from PCS, power factor, (R,S,T) phase PCS RMS voltage etc.
- Power grid: Display three-phase voltage, grid voltage balance degree and (R, S, T) phase grid frequency.



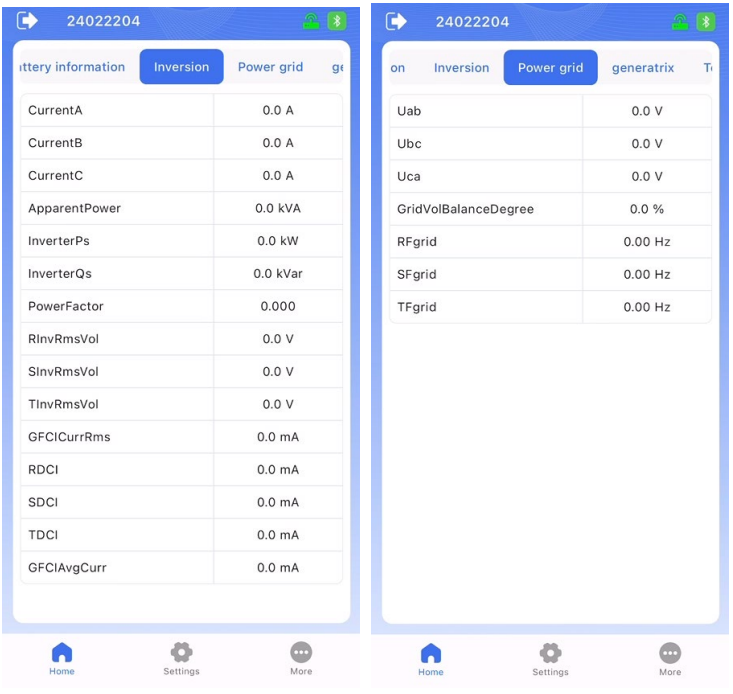
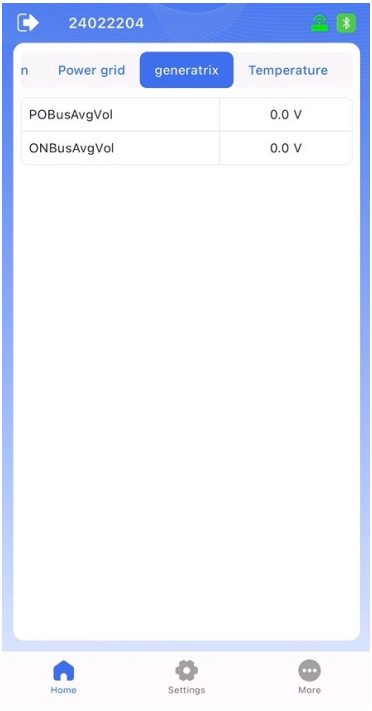
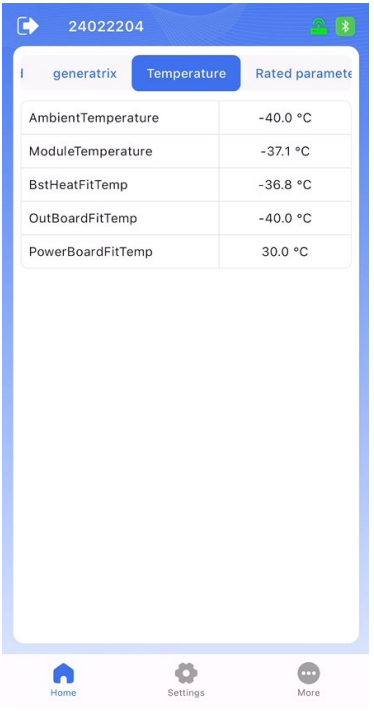


Figure 6- 9 First 4 subcategories of important parameters

- Generatrix: Display the average voltage of positive bus voltage and negative bus voltage.
- Temperature: Display the temperatures of environment, PCS module, boost module, output board and power board.
- Rated parameter: Display the three main rated parameters (frequency, voltage, power) of the PCS.
- Version: Display the software version numbers of the current modules for customers to check if the software used is the latest version.





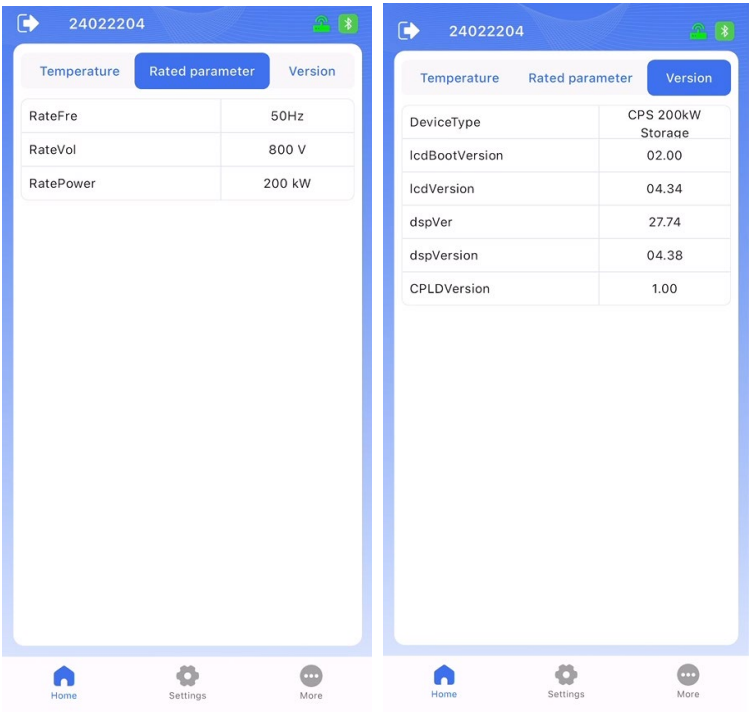


Figure 6- 10 Last 4 subcategories of important parameters

6.4 Settings Menu

Touch the **Settings** button, enter the password “1111”, you will go to the settings interface.

Then it’s possible to access the following sub-menus on the settings interface.

Note: Passwords are divided into three levels, the following contexts take “Installer and Distributor” interfaces as instance. Other roles can see the same interface, but the parameter entries shown are slightly different.

- Level 1 password (any 4 digit number) – Customer
- Level 2 password (1111) - Installer and Distributor
- Level 3 Password (not supplied) - Only for R&D engineers.

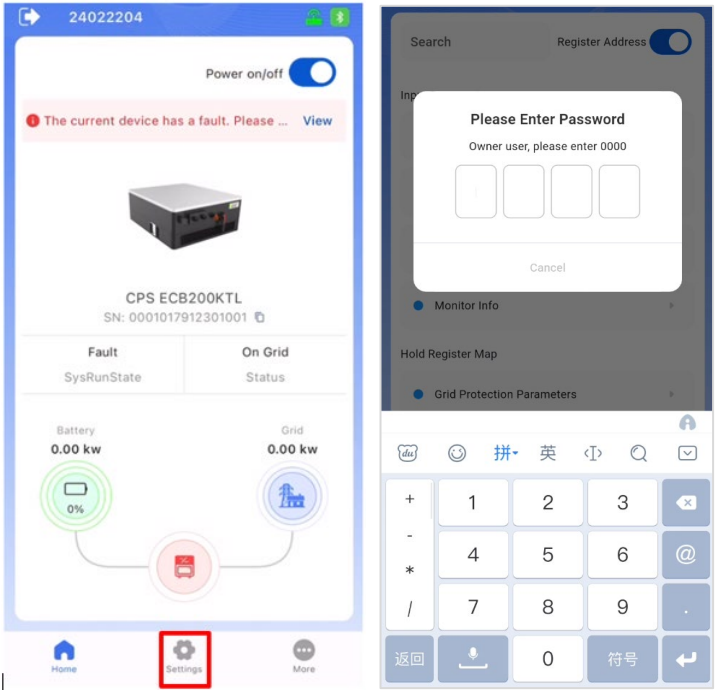


Figure 6- 11 Settings interface

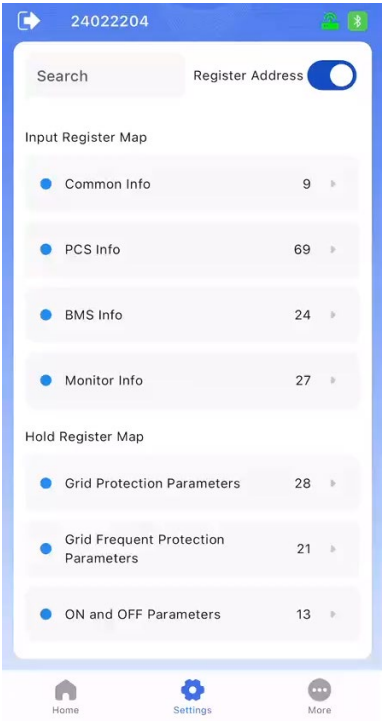
“Settings” page includes two parts: “Input Register Map” & “Hold Register Map”.

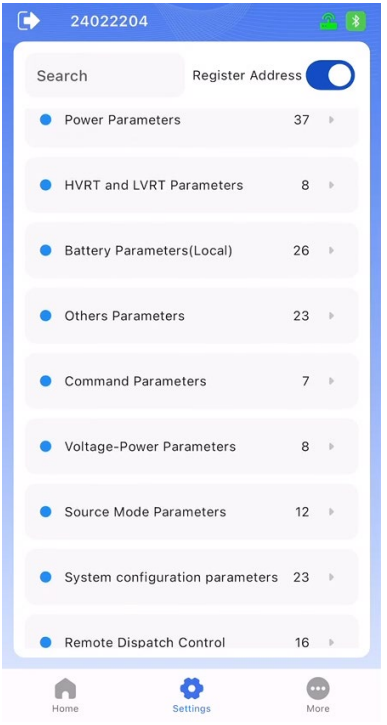
Input Register Map (only “READ”)

- Common Info
- PCS Info
- BMS Info
- Monitor Info

Hold Register Map

- Grid Protection Parameters
- Grid Frequency Protection Parameters
- ON and OFF Parameters
- Power Parameters
- HVRT and LVRT Parameters
- Battery Parameters (local)
- Other Parameters
- Command Parameters
- Voltage-Power Parameters
- Source Mode Parameters
- System Configuration Parameters
- Remote Dispatch Control
- Remote Data Parameters
- BMS/EMS Function Setting Items
- QP/QU Function Setting Items
- Dry node and ADC Setting Items


24022204
Search
Register Address
Input Register Map
Common Info 9
PCS Info 69
BMS Info 24
Monitor Info 27
Hold Register Map
Grid Protection Parameters 28
Grid Frequent Protection Parameters 21
ON and OFF Parameters 13
Home
Settings
More


24022204
Search
Register Address
Power Parameters 37
HVRT and LVRT Parameters 8
Battery Parameters(Local) 26
Others Parameters 23
Command Parameters 7
Voltage-Power Parameters 8
Source Mode Parameters 12
System configuration parameters 23
Remote Dispatch Control 16
Home
Settings
More

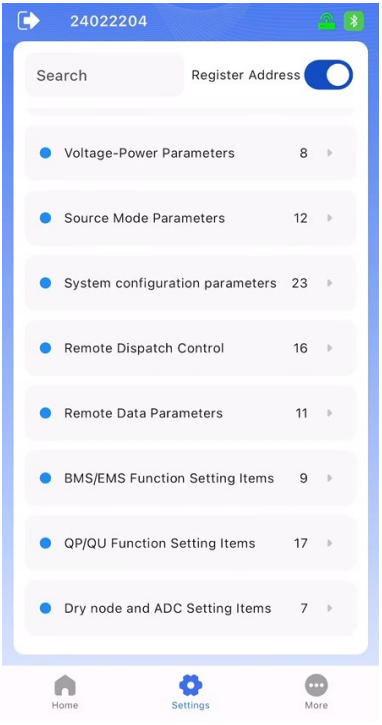


Figure 6- 12 “Input Register Map” & “Hold Register Map”

Note: These hold register parameters are set by default at the factory, user cannot modify without authorization. If you need to modify them, please contact after-sales or under the guidance of technical personnel.

6.4.1 Common Info

On this page, you can find device information, LCD/pro/minor version, number of input/hold register parameters, SN/model, as well as hold register address information.

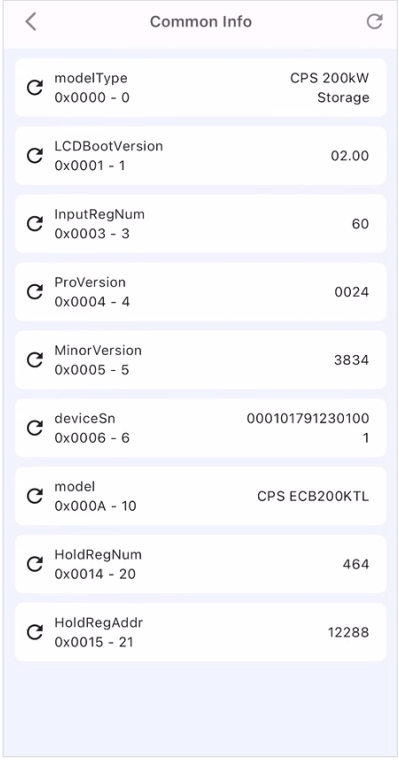
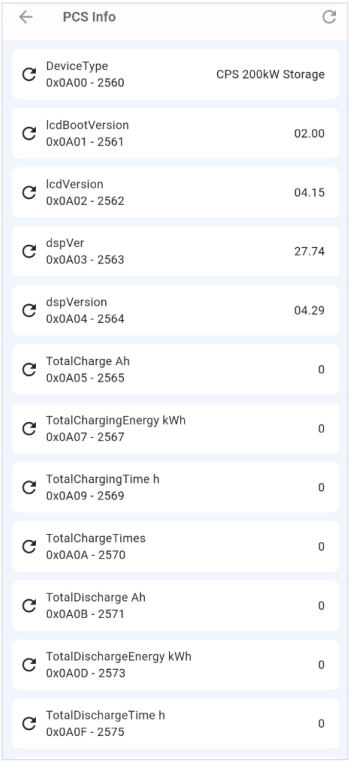
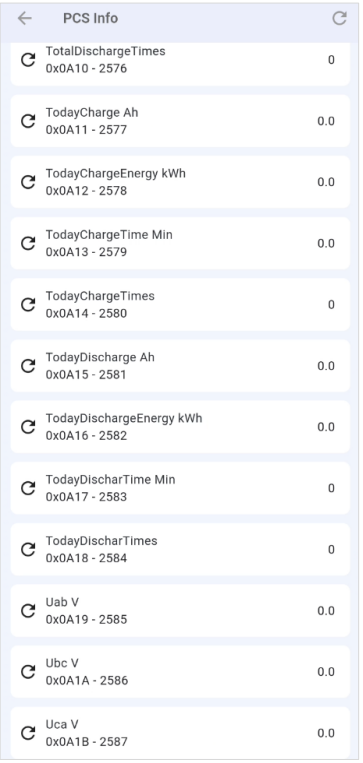


Figure 6- 13 Common Info

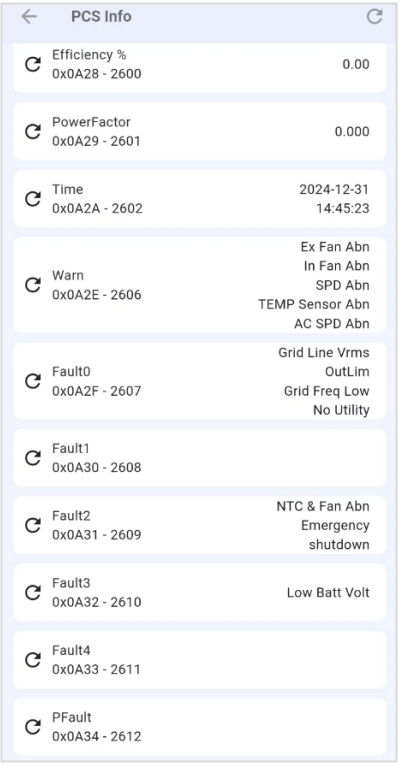
6.4.2 PCS Info

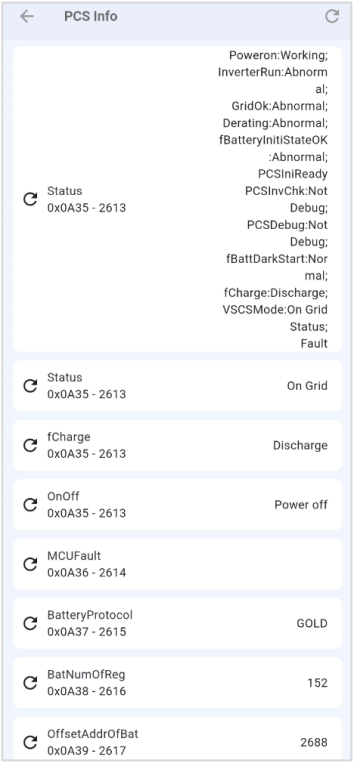
On this page, you can see the more detailed PCS information, such as LCD/DSP version, total charge, total charge/energy/time, total discharge/energy/time, line voltage Uab/Ubc/Uca, grid frequency, phase A/B/C current, module temperature, ambient temperature, battery voltage/current, apparent power, input power from DC side, active/reactive power from PCS, efficiency, power factor, fault code, warn code, system status, etc.

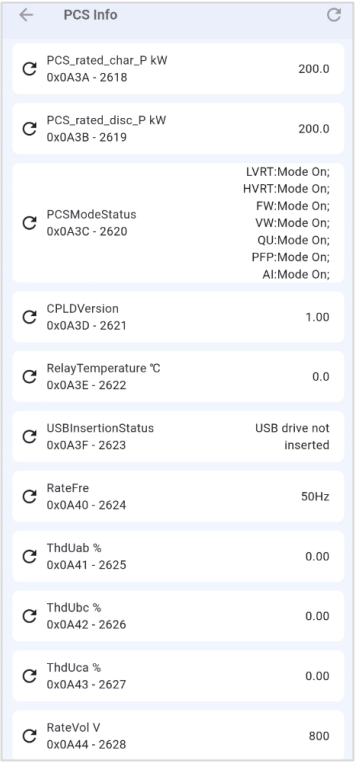





PCS Info
GridFrequent Hz
0x0A1C - 2588
0.00
CurrentA A
0x0A1D - 2589
0.0
CurrentB A
0x0A1E - 2590
0.0
CurrentC A
0x0A1F - 2591
0.0
ModuleTemperature ℃
0x0A20 - 2592
-37.1
AmbientTemperature ℃
0x0A21 - 2593
-40.0
DCVoltage V
0x0A22 - 2594
-1.0
DCCurrent A
0x0A23 - 2595
0.0
ApparentPower kVA
0x0A24 - 2596
0.0
DCPower kW
0x0A25 - 2597
0.0
InverterPs kW
0x0A26 - 2598
0.0
InverterQs kVar
0x0A27 - 2599
0.0


PCS Info
Efficiency %
0x0A28 - 2600
0.00
PowerFactor
0x0A29 - 2601
0.000
Time
0x0A2A - 2602
2024-12-31
14:45:23
Warn
0x0A2E - 2606
Ex Fan Abn
In Fan Abn
SPD Abn
TEMP Sensor Abn
AC SPD Abn
Fault0
0x0A2F - 2607
Grid Line Vrms
OutLim
Grid Freq Low
No Utility
Fault1
0x0A30 - 2608
Fault2
0x0A31 - 2609
NTC & Fan Abn
Emergency
shutdown
Fault3
0x0A32 - 2610
Low Batt Volt
Fault4
0x0A33 - 2611
PFault
0x0A34 - 2612


PCS Info
Status
0x0A35 - 2613
Poweron:Working;
InverterRun:Abnormal;
GridOk:Abnormal;
Derating:Abnormal;
fBatteryInitiStateOK:Abnormal;
PCSIniReady
PCSInvChk:Not Debug;
PCSDebug:Not Debug;
fBattDarkStart:Normal;
fCharge:Discharge;
VSCSMode:On Grid
Status;
Fault
Status
0x0A35 - 2613
On Grid
fCharge
0x0A35 - 2613
Discharge
OnOff
0x0A35 - 2613
Power off
MCUFault
0x0A36 - 2614
BatteryProtocol
0x0A37 - 2615
GOLD
BatNumOfReg
0x0A38 - 2616
152
OffsetAddrOfBat
0x0A39 - 2617
2688


PCS Info
PCS_rated_char_P kW
0x0A3A - 2618
200.0
PCS_rated_disc_P kW
0x0A3B - 2619
200.0
PCSModeStatus
0x0A3C - 2620
LVRT:Mode On;
HVRT:Mode On;
FW:Mode On;
VW:Mode On;
QU:Mode On;
PFP:Mode On;
AI:Mode On;
CPLDVersion
0x0A3D - 2621
1.00
RelayTemperature ℃
0x0A3E - 2622
0.0
USBInsertionStatus
0x0A3F - 2623
USB drive not inserted
RateFre
0x0A40 - 2624
50Hz
ThdUab %
0x0A41 - 2625
0.00
ThdUbc %
0x0A42 - 2626
0.00
ThdUca %
0x0A43 - 2627
0.00
RateVol V
0x0A44 - 2628
800

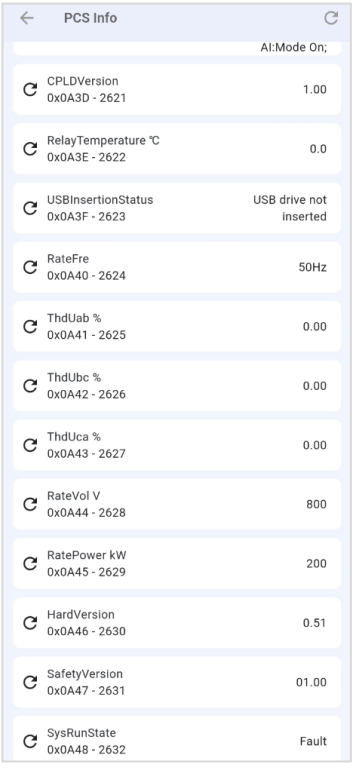


Figure 6- 14 PCS Info

6.4.3 BMS Info

On this page, you can see various battery parameters, such as battery stack working status, battery system voltage/current/power, battery stack SOC/SOH, battery stack charge/discharge current limit, battery stack charge/discharge power limit, lowest/highest voltage of stack, maximum/lowest temperature of stack, rated capacity, maximum charge/discharge capacity, number of online battery packs, etc.

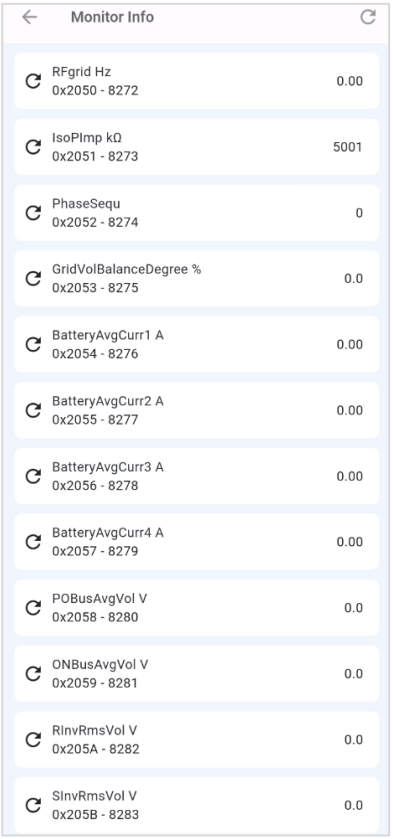
Figure 6- 15 BMS Info

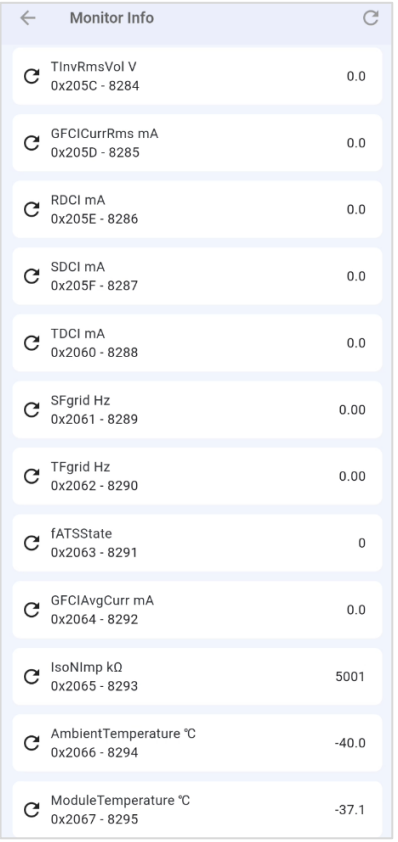
6.4.4 Monitor info

On this page, you can see the monitor info, such as Grid voltage balance degree, Battery average current 1/2/3/4, Positive/ Negative bus average voltage, R/S/T phase PCS RMS voltage, GFCI leakage current Rms value,

R/S/T phase direct current ingredient, S/T phase Grid frequency, Dry contact state, GFCI leakage current average value

Isolation negative impedance and so on.





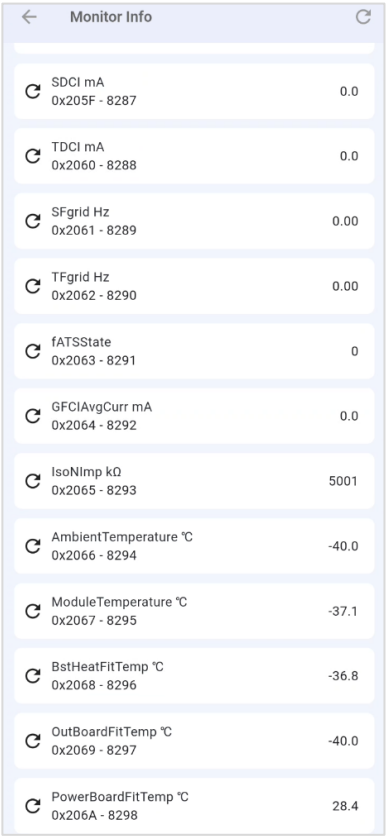
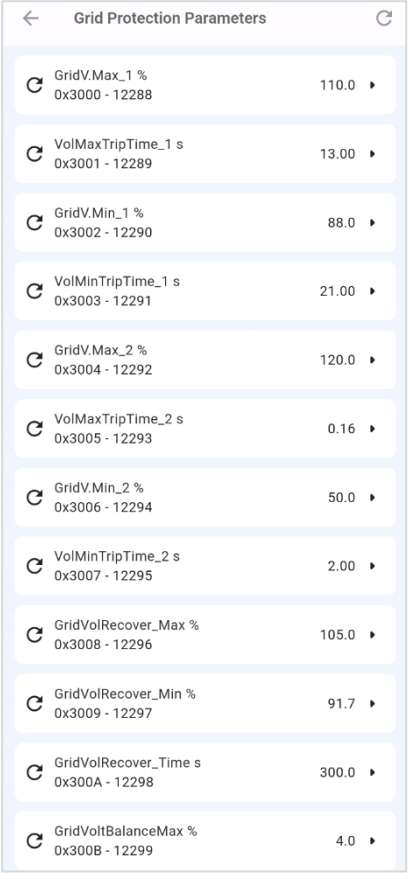
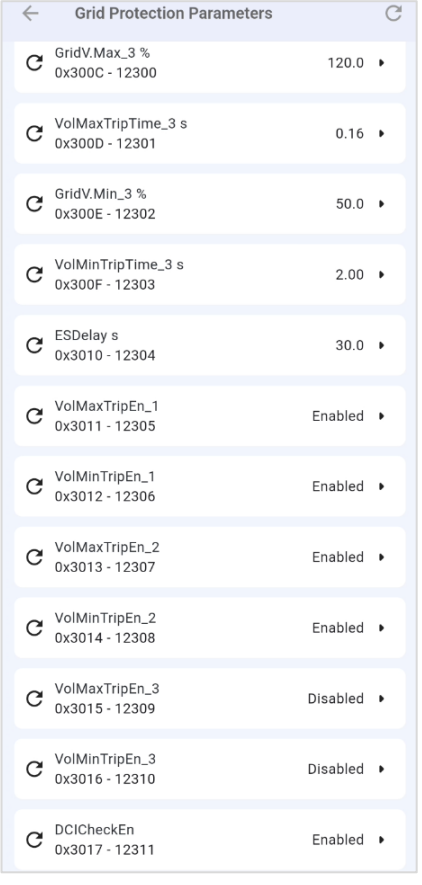


Figure 6- 16 Monitor Info

6.4.5 Grid Voltage Protection Parameters

On this page, you can set the protection parameters of the grid voltage, such as max./min. grid voltage in various levels, max./min. grid trip time in various levels, as well as over voltage/ under voltage recover value/time. In addition, you can also set if enabling/disabling over voltage/under voltage protection.





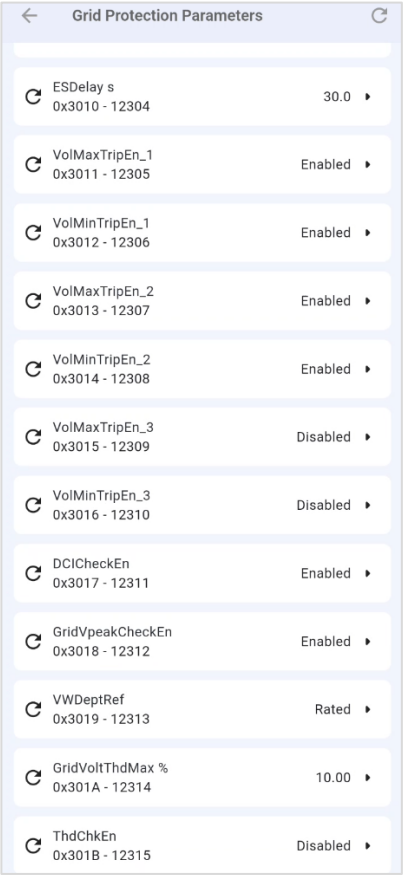


Figure 6- 17 Grid Voltage Protection Parameters

6.4.6 Grid Frequency Protection Parameters

On this page, you can set the protection parameters of the grid frequency, such as max./min. grid frequency in various levels, max./min. grid trip time in various levels, as well as over frequency / under frequency recover value/time. In addition, you can also set if enabling/disabling over frequency /under frequency protection.

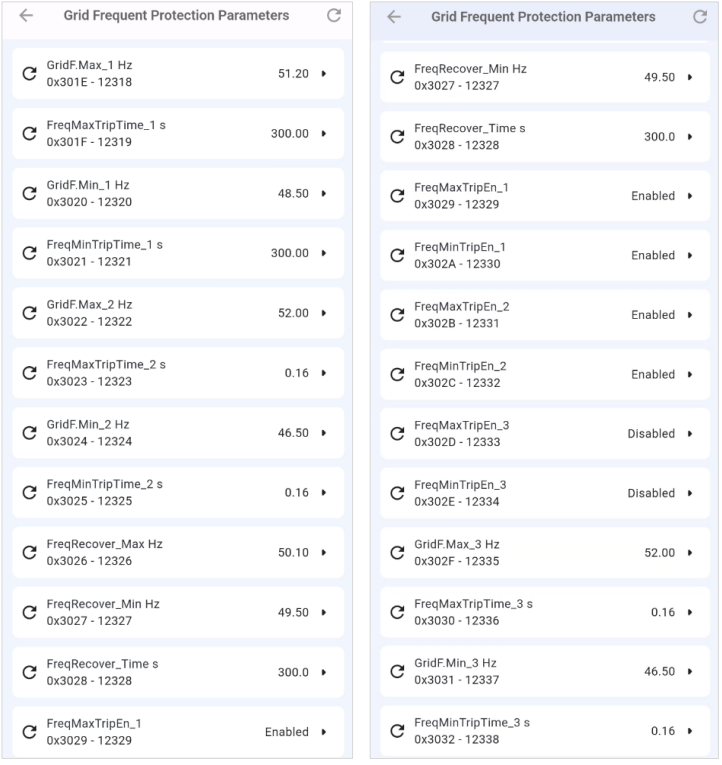


Figure 6- 18 Grid Frequency Protection Parameters

6.4.7 ON and OFF Parameters

On this page, you can set ON and OFF parameters, such as Max power on frequency, Isolation Resistance, Virtual impedance, Islanding detection enable state, Passive islanding detection enable state, Leakage current High limit, DC bias current upper limit, Dry contact 1 mode selection, Dry contact 1 event selection, Isolation resistance enable state, GFCI enable state, APF enable, and Manual fault clear enable command.

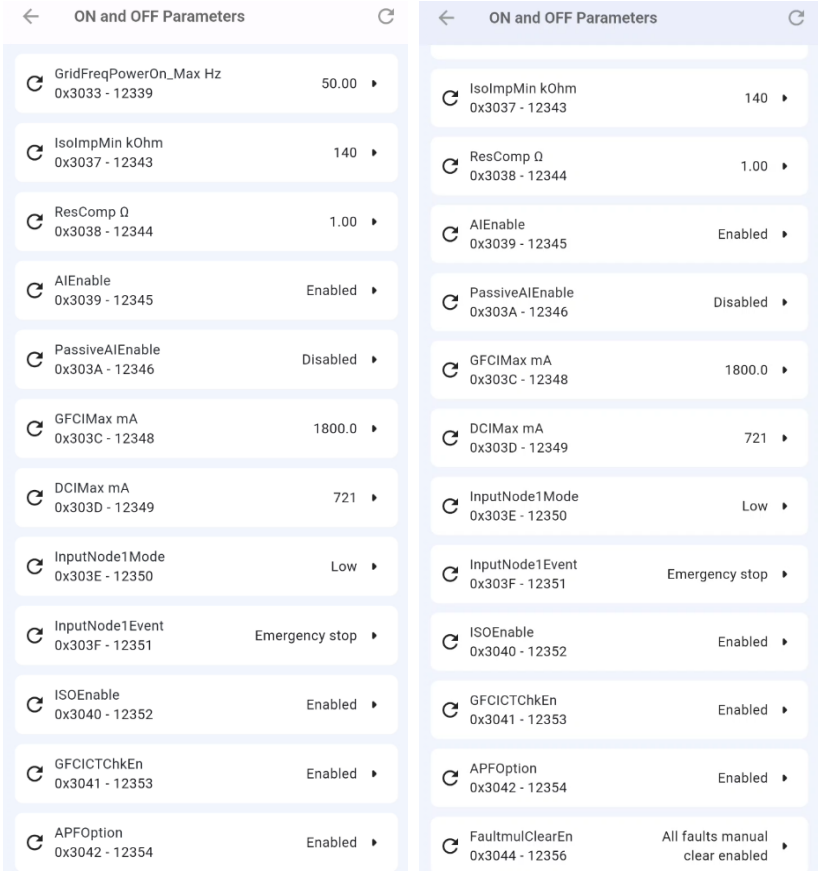
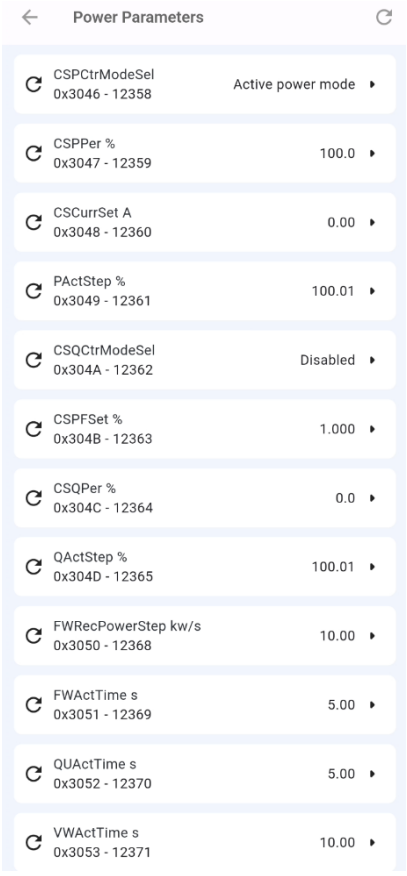
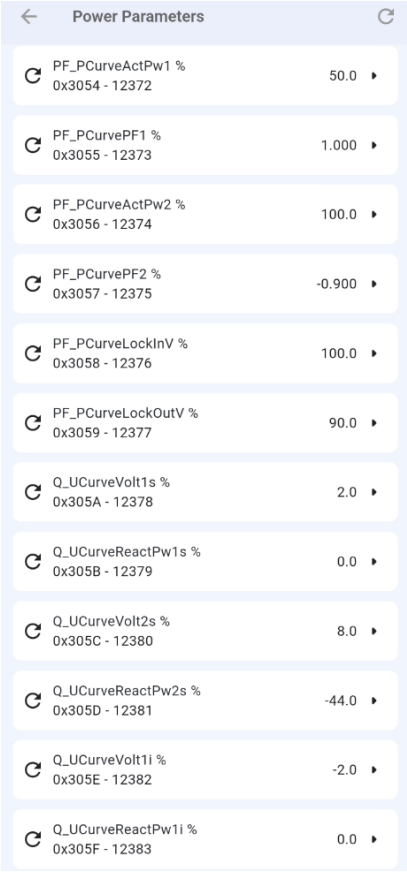


Figure 6- 19 ON and OFF parameters

6.4.8 Power Parameters

On this page, you can set power parameters, such as Active power control mode set, Active power set in percentage, Direct current set in A, Response step of active power, Reactive power control mode set, CS power factor setting range, Reactive power set in per, Response step size setting for reactive power, Frequency Power recover power step, Frequency Power curve response time, Voltage Power curve response time, Voltage active response time, etc.





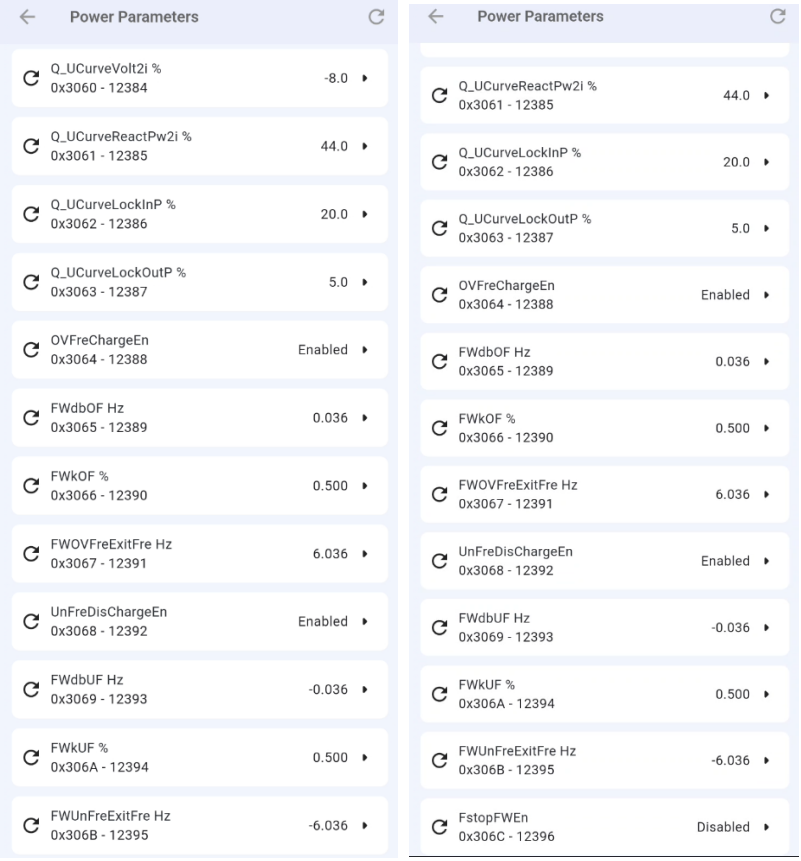


Figure 6- 20 Power Parameters

6.4.9 HVRT and LVRT Parameters

On this page, you can enable/disable HVRT (High voltage ride through) and LVRT (Low voltage ride through) protection and set HVRT & LVRT parameter values.

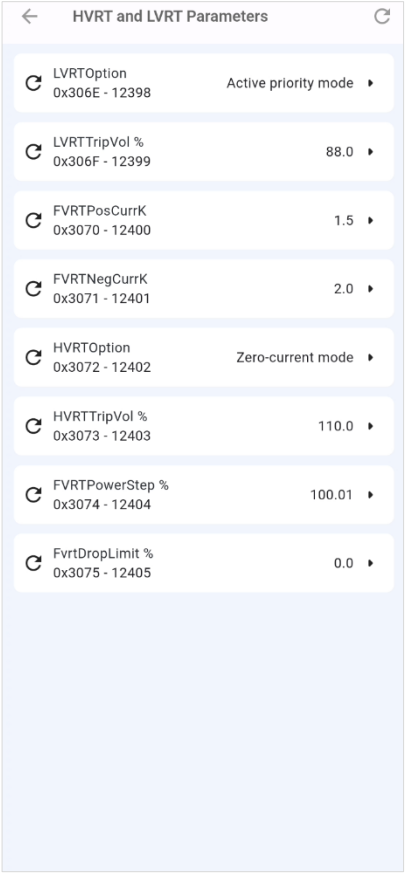
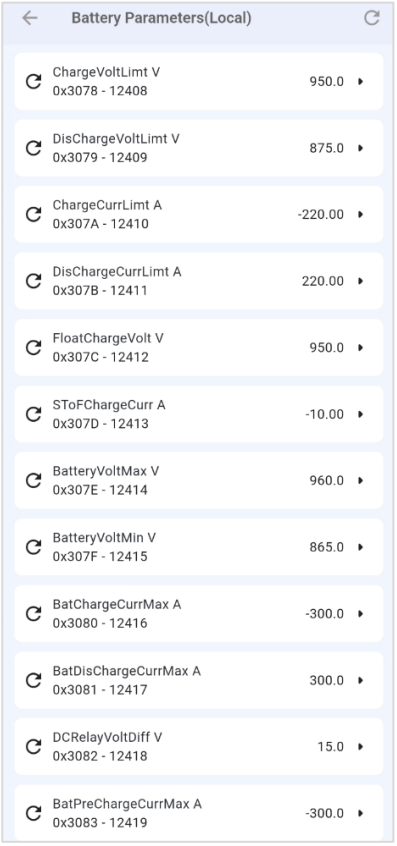
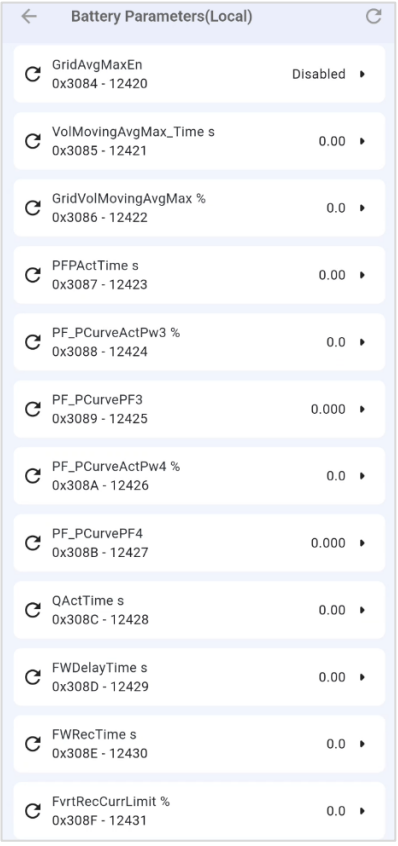


Figure 6- 21 HVRT & LVRT Parameters

6.4.10 Battery Parameters

On this page, you can set the battery parameters, such as Battery charging voltage limit, Battery discharge voltage limit, Battery charging current limit, Battery discharge current limit, Battery Floating Charging Voltage, Battery Floating Charging current, Maximum battery voltage, Lower battery voltage limit, Battery charge current protection point, Battery discharge current protection point, DC relay closing voltage difference limit, Battery pre-charge current limit, Sliding average voltage upper limit protection time, Sliding average voltage upper protection value, PFP response time, etc.





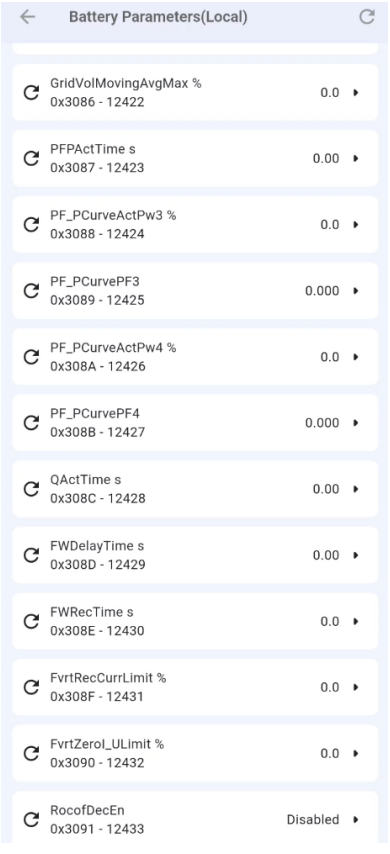


Figure 6- 22 Battery Parameters

6.4.11 Other Parameters

In this page, you can set the following parameters, such as PCS current upper limit, DC offset difference high limit, Offset, ceiling of PCS current, Ambient temperature upper limit, PCS Module temperature upper limit, Boost module temperature upper limit, Out board temperature upper limit, Bus voltage upper limit, Half Bus voltage upper limit, etc.

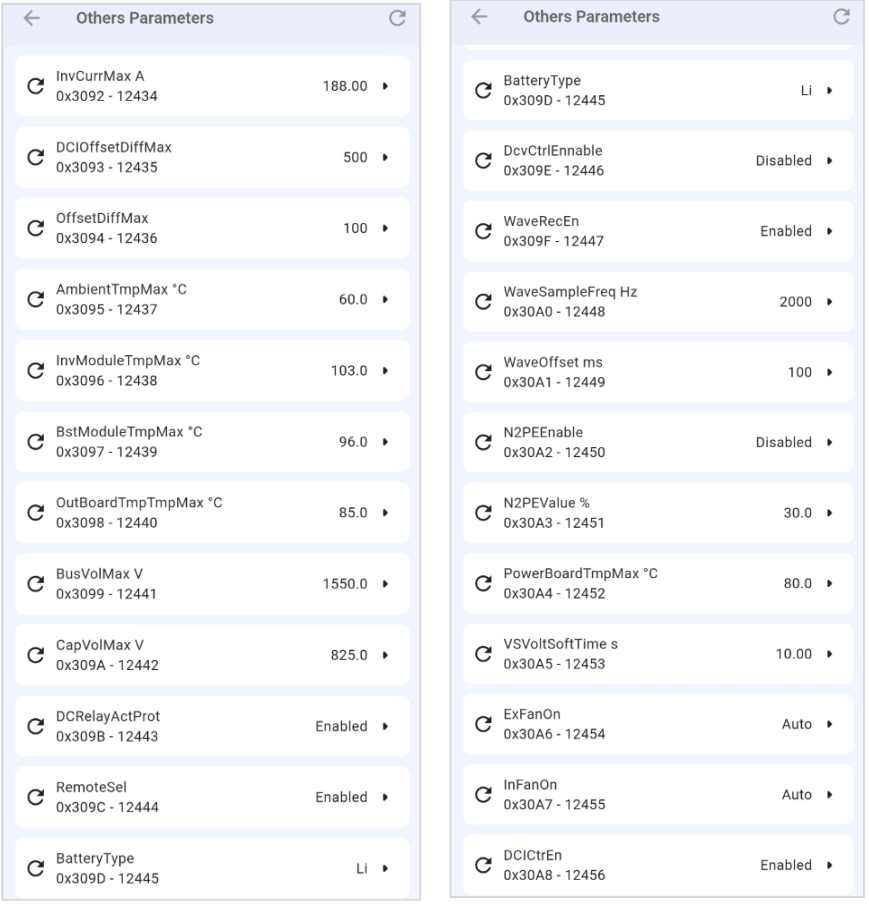


Figure 6- 23 Other Parameters

6.4.12 Command Parameters

On this page, you can release residual voltage quickly, remotely control power status, restart PCS, perform ARC self-check, and clear faults manually.

Note: It is recommended to set these parameters in the presence of after-sales or technical personnel. It is not recommended that customers set these parameters by themselves.

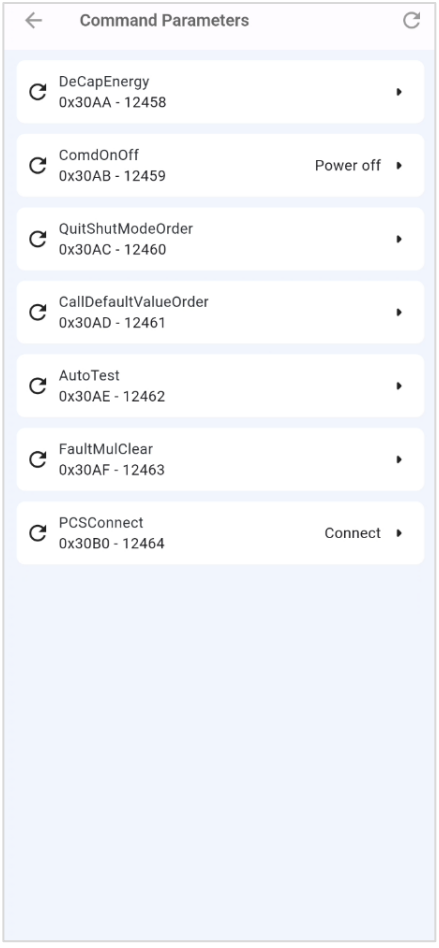


Figure 6- 24 Control Commands

6.4.13 Voltage Power Parameters

On this page, you can enable/disable over voltage derate function, under voltage uprate function and set parameters, such as start voltage of over voltage deration, stop voltage of over voltage deration, stop power of over voltage deration, start voltage of under voltage uprate, stop voltage of under voltage uprate, and stop power of under voltage deration.

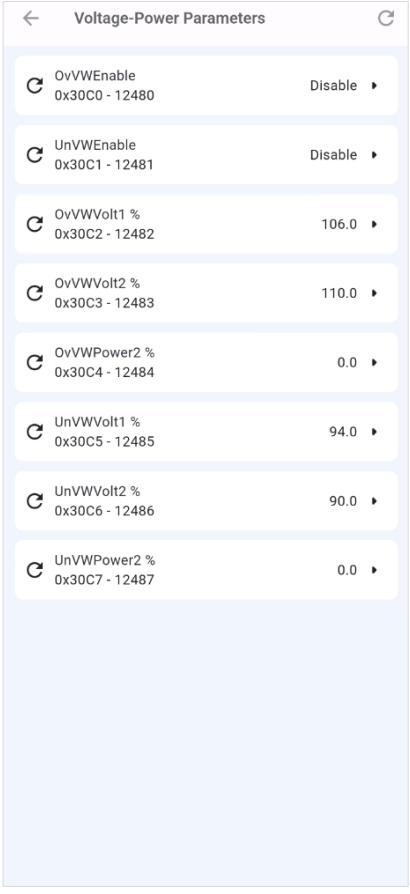


Figure 6- 25 Voltage Power Parameters

6.4.14 Source Mode Parameters

On this page, you can manually switch the current or voltage source mode, set auto switch of CS mode and VS mode,
enable VS mode, set voltage/frequency/active power/reactive power of VS mode, enable VS droop control, set the coefficient of the power and frequency in VS mode, the coefficient of the Q Power and voltage in VS mode, VS virtual reactance and VS virtual resistance.

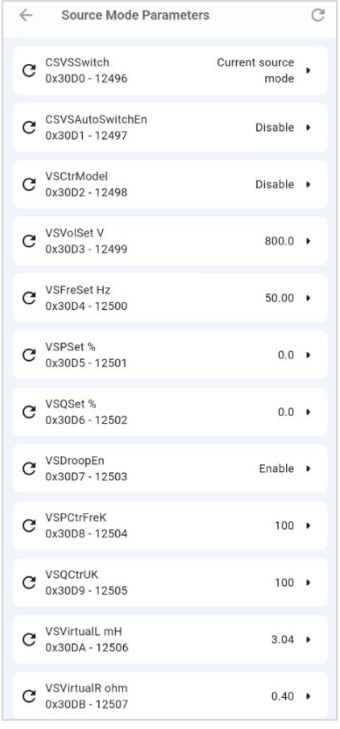


Figure 6- 26 Source Mode Parameters

The 5 different control modes have different register parameters interfaces as shown below:

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

6.4.15 System Configuration Parameters

On this page, you can set system parameters, such as EMS address, standard, battery manufacturers, external 485 address, external 485 baud rate, host name, MAC address, IP address, subnet mask, etc.

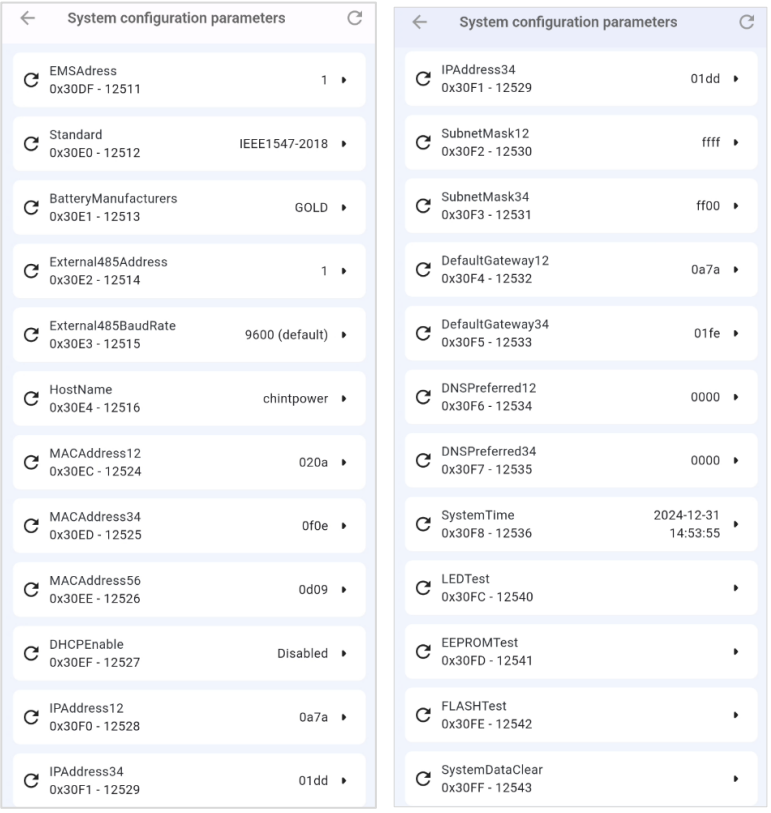


Figure 6- 27 System Configuration Parameters

6.4.16 Remote Dispatch Control

This page is specialized for sending commands and solving problems remotely by R&D personnel. Therefore, installer or distributor cannot see detailed command parameters.

6.4.17 Remote Data Parameters

This page is specialized for sending commands and solving problems remotely by R&D personnel. Therefore, installer or distributor cannot see detailed command parameters.

6.4.18 BMS/EMS Function Setting Items

On this page, you can set the BMS/EMS function items, such as SOC max value of battery and SOC min value of battery, set the battery on or off, enable or disable the function to detect the heartbeat of the EMS, set the max time for PCS to detect the heartbeat of EMS, set the battery rated capacity and rated voltage, etc.

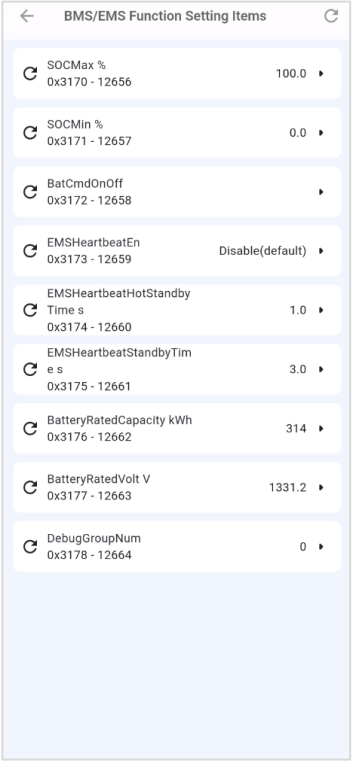


Figure 6- 28 BMS/EMS function setting items

6.4.19 QP/QU Function Setting Items

On this page, you can set the QP/QU parameters, such as QP curve P1s, QP curve Q1s, QP curve P2s, QP curve Q2s, QP curve P3s, QP curve Q3s, QP curve P1i, QP curve Q1i, QP curve P2i, QP curve Q2i, QP curve P3i, QP curve Q3i, QP curve action time, QU curve Vref, etc.

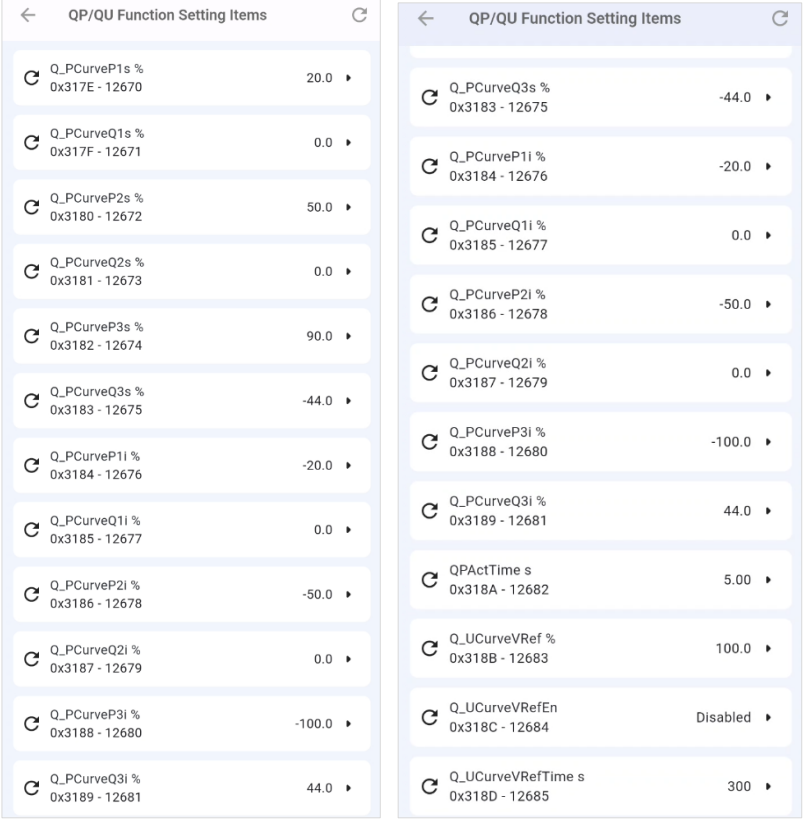


Figure 6- 29 QP/QU Function Setting Items

6.4.20 Dry Node and ADC Setting Items

On this page, you can set dry node and ADC parametes, such as input dry contact status, output dry contact settings and status, ADC AD Value and P12V AD value.

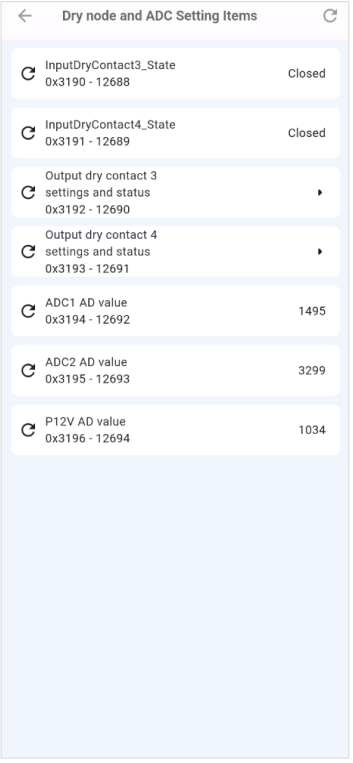


Figure 6- 30 Dry Node and ADC Setting Items

6.5 More Menu

Touch the “More” icon and you will go to the More interface. On this page, you can access to the following functions:

- Basic Settings
- Fault History
- Operation History
- Upgrade
- Yield Statistics
- NFC write (Reserved.)
- Gateway Configuration

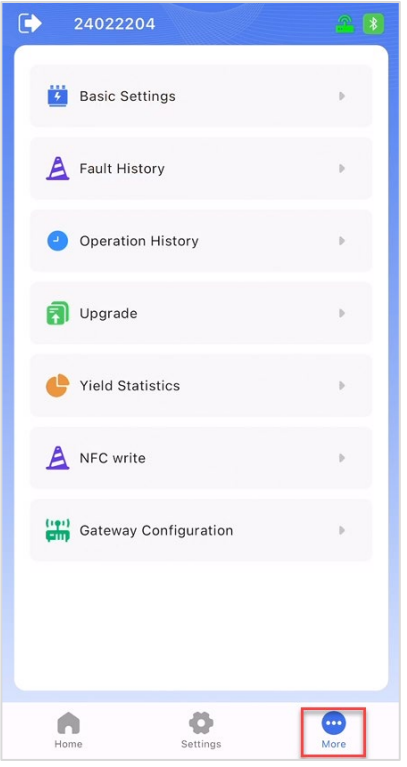


Figure 6- 31 More menu

6.5.1 Basic Settings

On this page, you can set standard and battery manufacturers.

Figure 6- 32 Basic Settings

6.5.2 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.

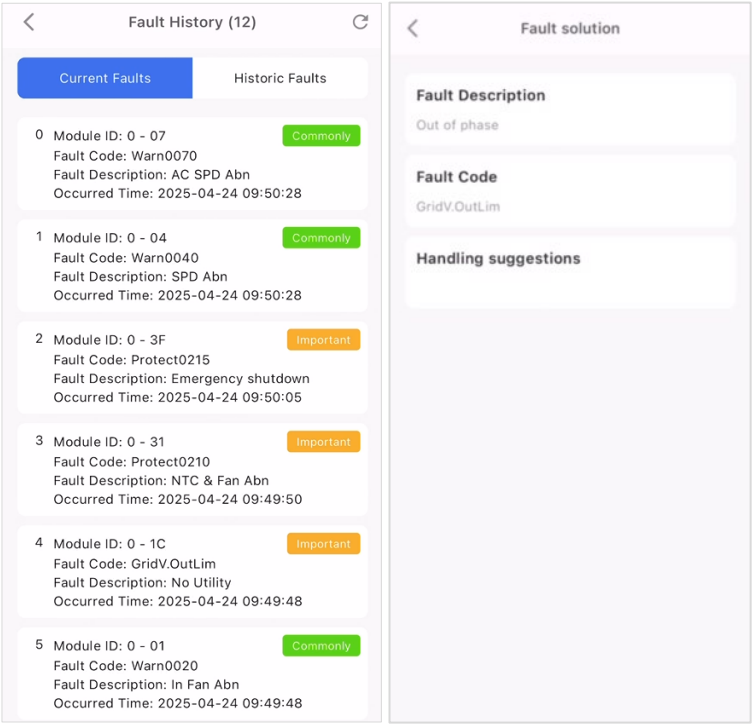


Figure 6- 33 Fault History

6.5.3 Operation History

The operation history is a record that tracks the operation of register.

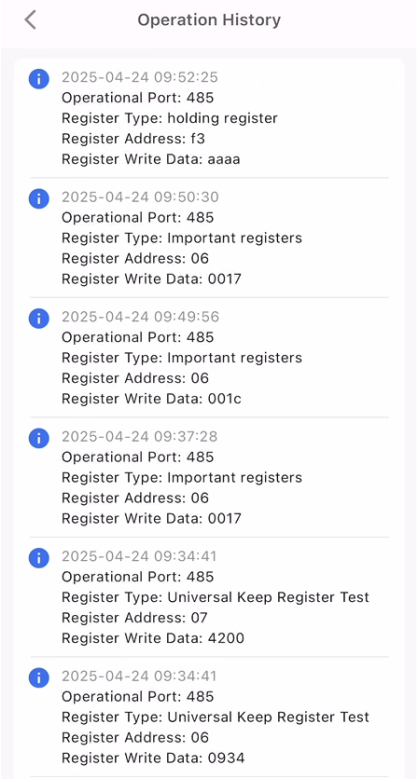


Figure 6- 34 Operation History

6.5.4 Upgrade

If firmware upgrading is needed, please contact our service personnel to obtain authorization and guidance.

6.5.5 Yield Statistics

Yield Statistics can be shown in four dimensions: hour, day, month, and year. After choosing Bat charge/Bat discharge, corresponding line charts of yield statistics will be displayed.

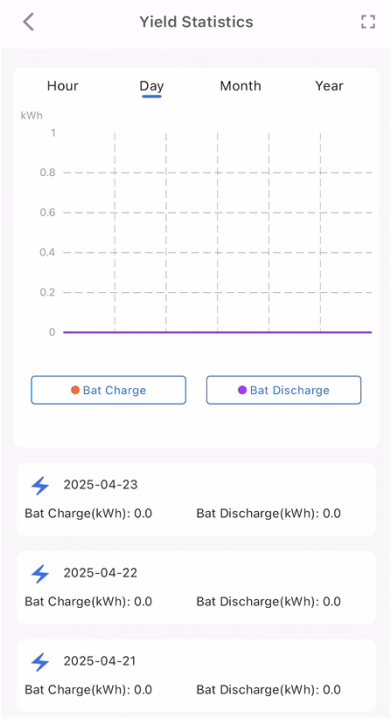


Figure 6- 35 Yield Statistics

6.5.6 NFC Write

You need to approach NFC devices to use this function. Currently, this function is not available.

6.5.7 Gateway Configuration

You can access the gateway settings interface by tapping on "More -> Gateway Configuration", or by tapping the icon in the top-right corner of the interface to enter the gateway settings interface.

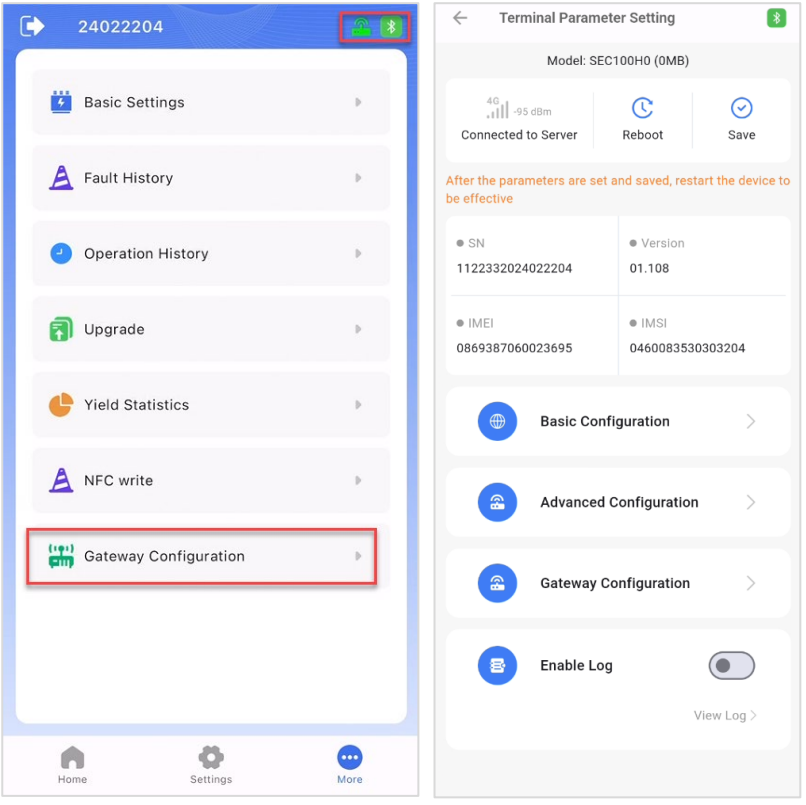


Figure 6- 36 Gateway Configuration

- **Basic Configuration:** Tap “Basic Configuration” to set the protocol, net, uart and period.

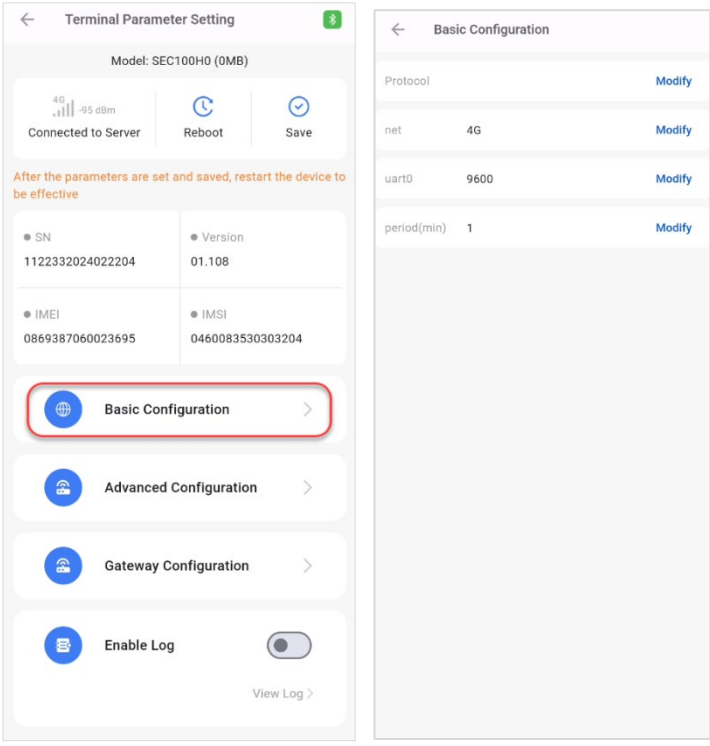


Figure 6- 37 Gateway basic configuration

- **Advanced Configuration:** Tap “Advanced Configuration” to set the MQTT host and port, or upgrade the gateway.

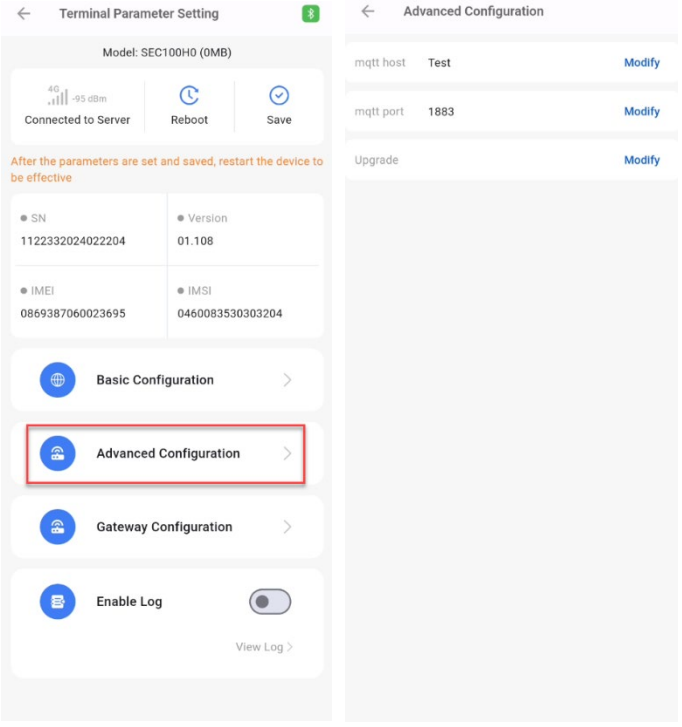


Figure 6- 38 Advanced Configuration of Gateway

- **Gateway Configuration:** Tap “Gateway Configuration” to set the forwarding serial port, anti-reflux power flow, gateway IP, APN, TCP forwarding and COM BAUD.

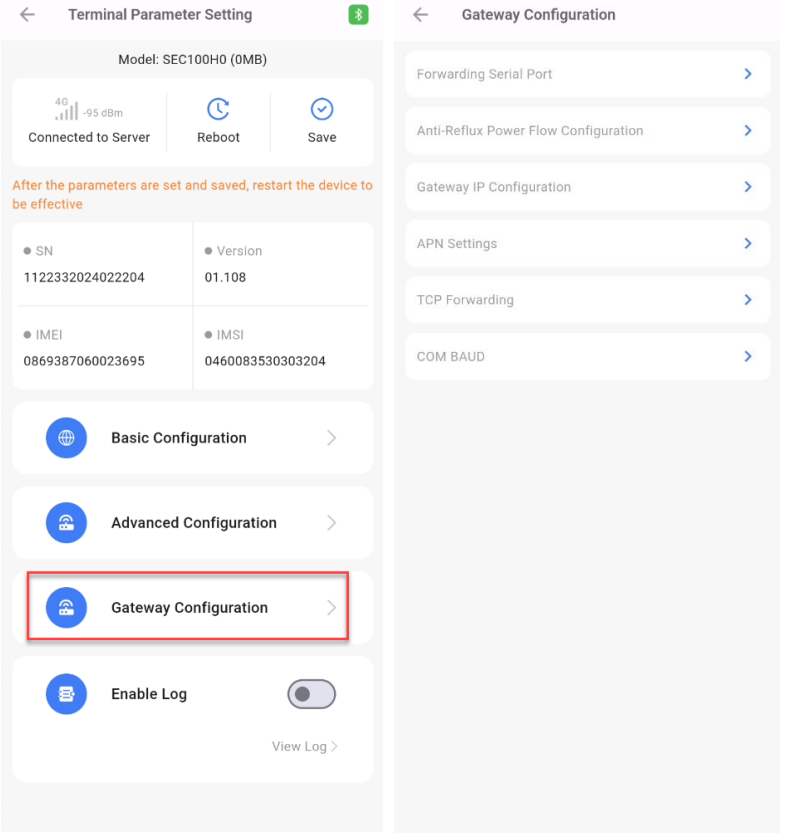


Figure 6- 39 Gateway Configuration

- **Enable Log:** Enable the log to view gateway log.

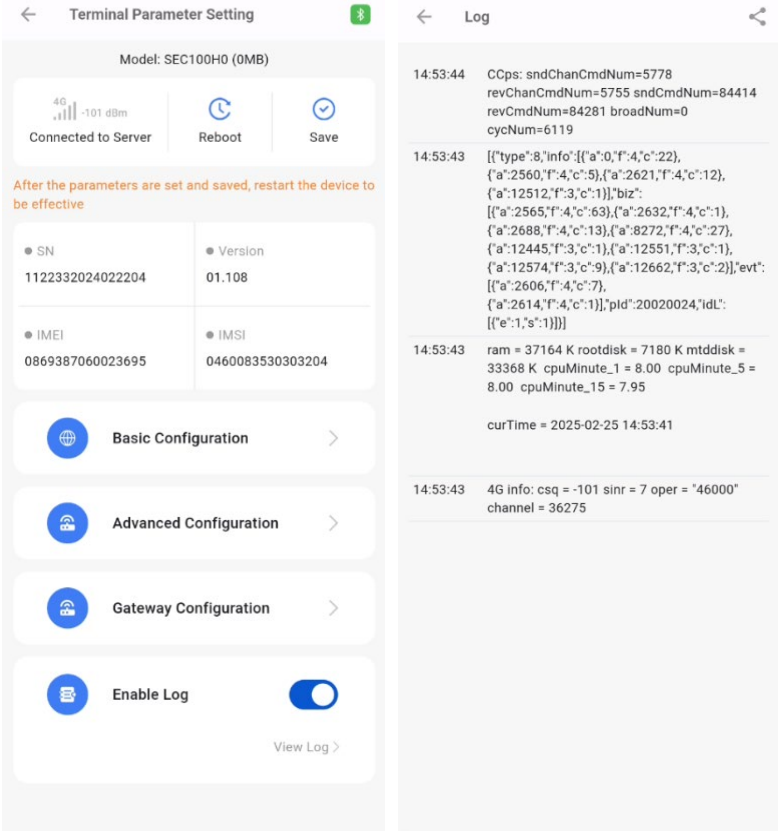


Figure 6- 40 Enable Log of Gateway

7 Web Application and Modbus

7.1 Ethernet Connection and Setting

Connect the two ports of Ethernet wire between the PCS and your computer. The steps to connect to the Gateway are as follows and may vary depending on the computer operating system:

Click Control panel or Windows setting → network and Internet (view network status and tasks) → change adapter settings → right-click Ethernet → properties (Figure 7- 1)→ Double click Internet Protocol version 4 → Advanced → add IP address: 10.122.1.100, subnet mask: 255.255.255.0 in the IP address area → add gateway: 10.122.1.254 in the default gateway area (Figure 7- 2) → OK.

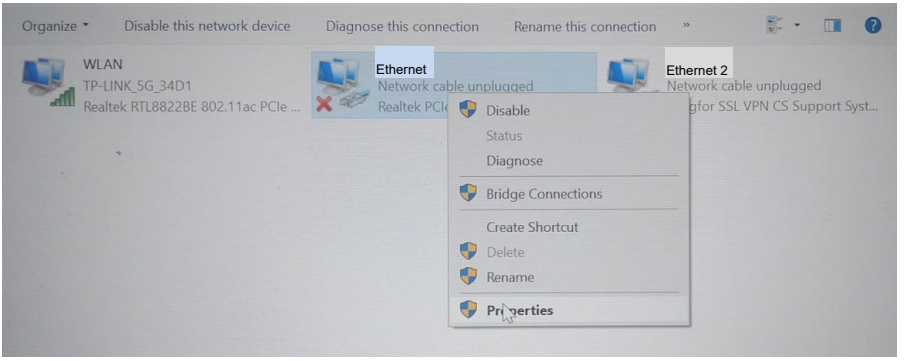


Figure 7- 1 Choose properties

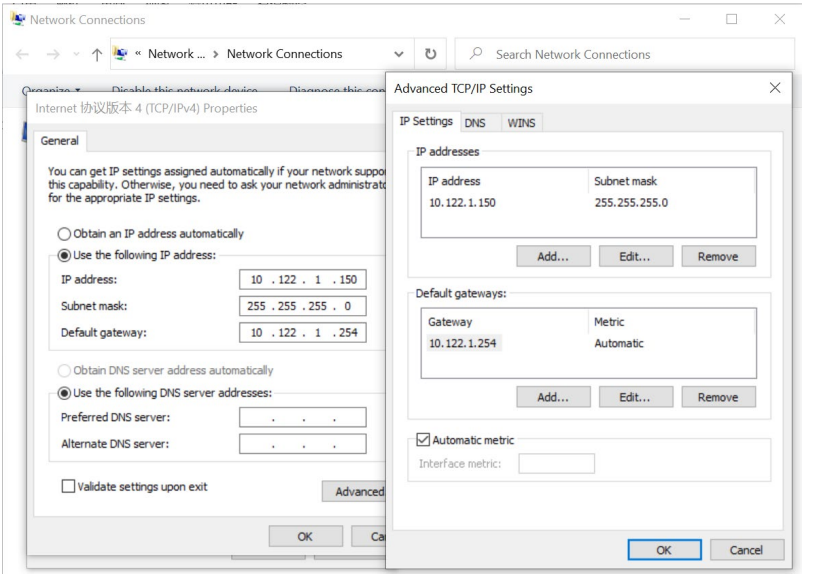


Figure 7- 2 Add IP address and gateway

Then you can visit the Web application functions successfully via the internet address: http://10.122.1.221/.

7.1.1 Web Application Setting

1. After logging onto the web page, click Important menu and then click “Set” button to set the grid standard according to the requirements of your local authority and related parameters as required.

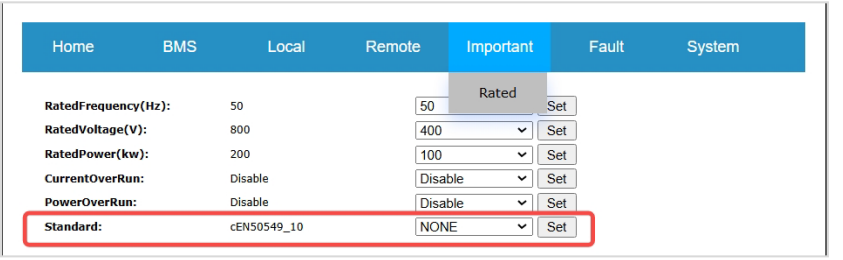


Figure 7- 3 Set the grid standard

IMPORTANT!

- Please check with your local utility company before selecting a Grid Code. If the PCS is operated with a wrong Grid Code, the electric utility may reject the interconnection agreement.
- It is prohibited to place the PCS into operation before the overall system complies with the national rules and safety regulations.

2. Click System menu to set RS485, synchronize Time/data, update Firmware or set other parameters in related drop-down list as required.

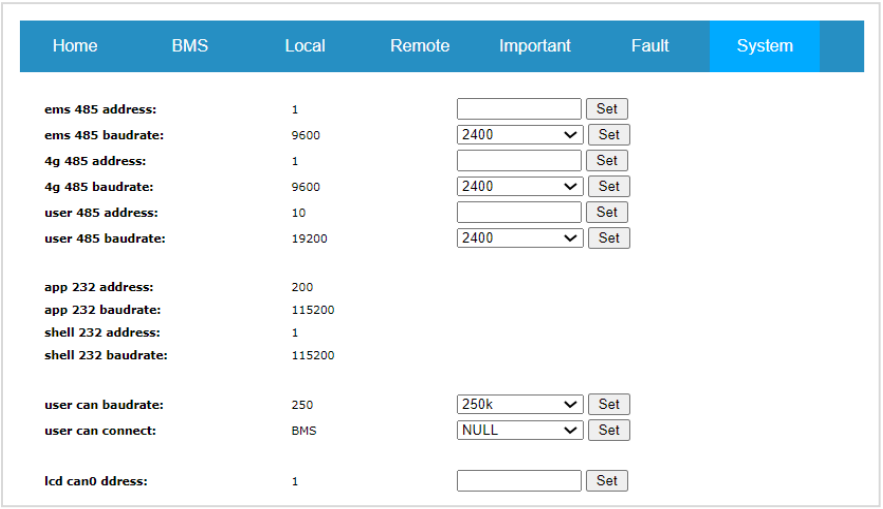


Figure 7- 4 Set system parameters

3. Click Local menu and then choose Battery item in the drop-down list to set Maximum battery voltage and Minimum battery voltage according to the requirements of battery OEM.

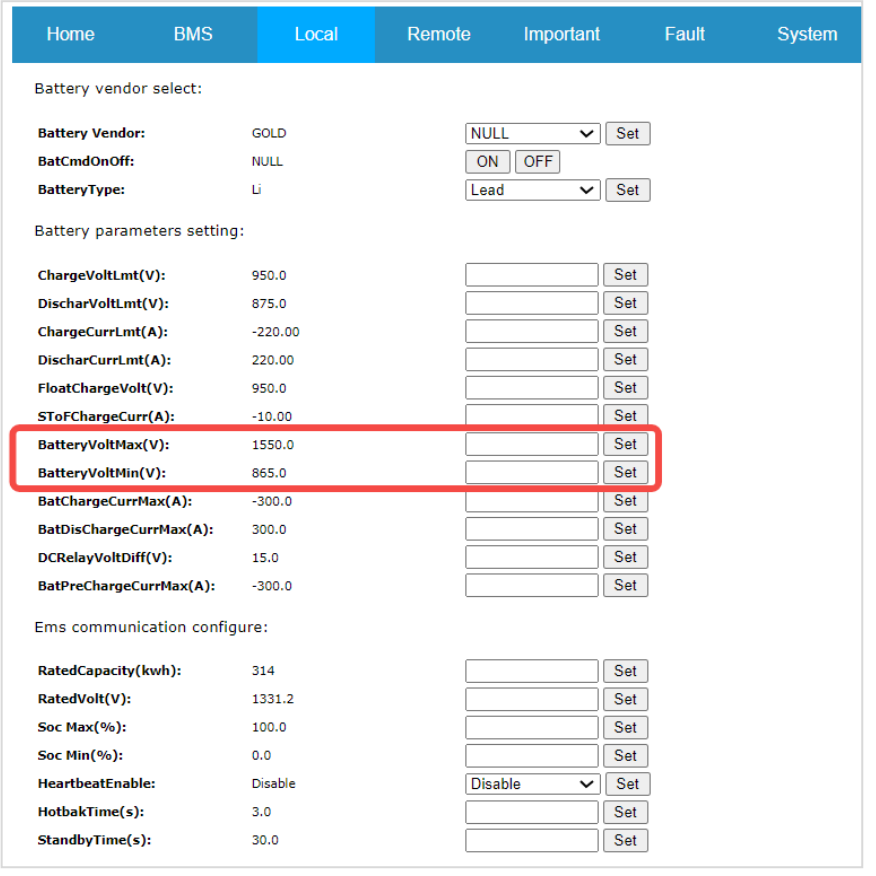
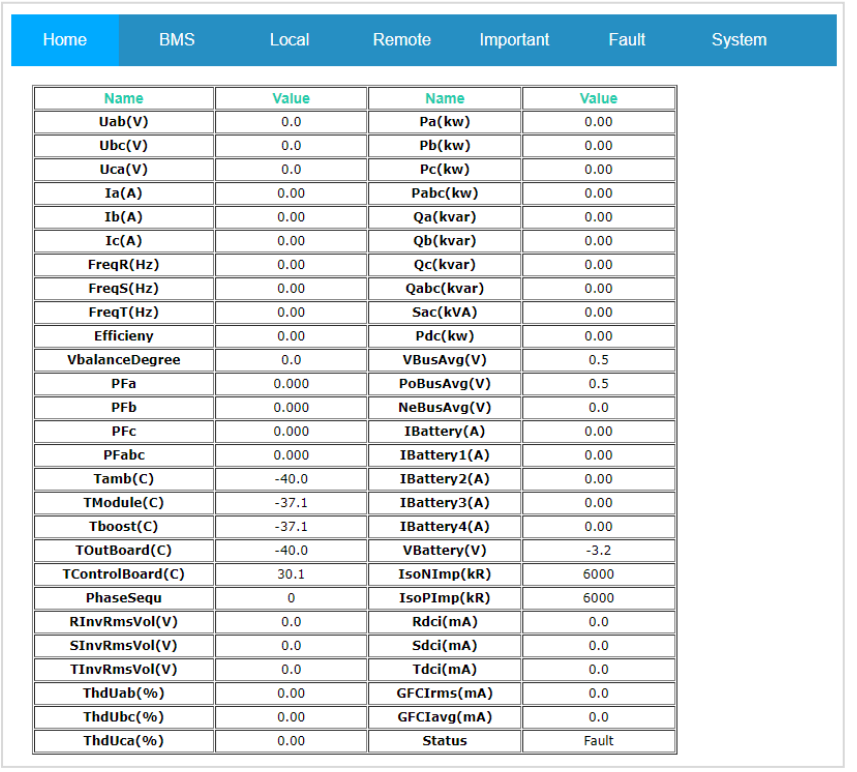


Figure 7- 5 Set battery voltage

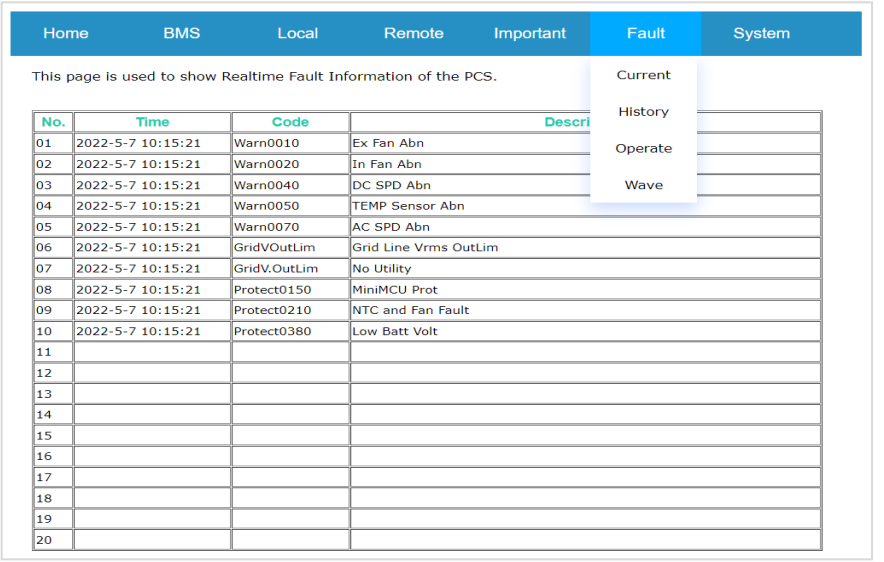
4. When the device screen shows normal operation status and the RUN light on the LED panel is illuminated, it indicates that the grid connection and power generation are successful. You can now browse through the real-time data in the web application.



Name	Value	Name	Value
Uab(V)	0.0	Pa(kw)	0.00
Ubc(V)	0.0	Pb(kw)	0.00
Uca(V)	0.0	Pc(kw)	0.00
Ia(A)	0.00	Pabc(kw)	0.00
Ib(A)	0.00	Qa(kvar)	0.00
Ic(A)	0.00	Qb(kvar)	0.00
FreqR(Hz)	0.00	Qc(kvar)	0.00
FreqS(Hz)	0.00	Qabc(kvar)	0.00
FreqT(Hz)	0.00	Sac(kVA)	0.00
Efficieny	0.00	Pdc(kw)	0.00
VbalanceDegree	0.0	VBusAvg(V)	0.5
PFa	0.000	PoBusAvg(V)	0.5
PFb	0.000	NeBusAvg(V)	0.0
PFc	0.000	IBattery(A)	0.00
PFabc	0.000	IBattery1(A)	0.00
Tamb(C)	-40.0	IBattery2(A)	0.00
TModule(C)	-37.1	IBattery3(A)	0.00
Tboost(C)	-37.1	IBattery4(A)	0.00
TOutBoard(C)	-40.0	VBattery(V)	-3.2
TControlBoard(C)	30.1	IsoNImp(kR)	6000
PhaseSequ	0	IsoPImp(kR)	6000
RInvRmsVol(V)	0.0	Rdci(mA)	0.0
SInvRmsVol(V)	0.0	Sdci(mA)	0.0
TInvRmsVol(V)	0.0	Tdci(mA)	0.0
ThdUab(%)	0.00	GFCIrms(mA)	0.0
ThdUbc(%)	0.00	GFCIavg(mA)	0.0
ThdUca(%)	0.00	Status	Fault

Figure 7- 6 Browse through the real-time data

5. If the PCS fails to operate normally, the FAULT light will illuminate, and the fault information will be shown on the interface. You can click the Fault menu to check the detailed fault information.



No.	Time	Code	Descri
01	2022-5-7 10:15:21	Warn0010	Ex Fan Abn
02	2022-5-7 10:15:21	Warn0020	In Fan Abn
03	2022-5-7 10:15:21	Warn0040	DC SPD Abn
04	2022-5-7 10:15:21	Warn0050	TEMP Sensor Abn
05	2022-5-7 10:15:21	Warn0070	AC SPD Abn
06	2022-5-7 10:15:21	GridVOutLim	Grid Line Vrms OutLim
07	2022-5-7 10:15:21	GridV.OutLim	No Utility
08	2022-5-7 10:15:21	Protect0150	MiniMCU Prot
09	2022-5-7 10:15:21	Protect0210	NTC and Fan Fault
10	2022-5-7 10:15:21	Protect0380	Low Batt Volt
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			

Figure 7- 7 Detailed fault information

6. Troubleshoot related problems and restart. Contact our after-sale department if necessary.

7.1.2 Main Menus of Web Page

7.1.2.1 Home

The Home main menu contains two sub-menus: Home and Running. Choose the Home Sub-menu from the above-mentioned drop-down menu, you can find lots of important information shown below, such as the Total discharge (Ah), On Grid/Off-grid, Derating/Normal, Mcu version etc. as shown in the following figure.

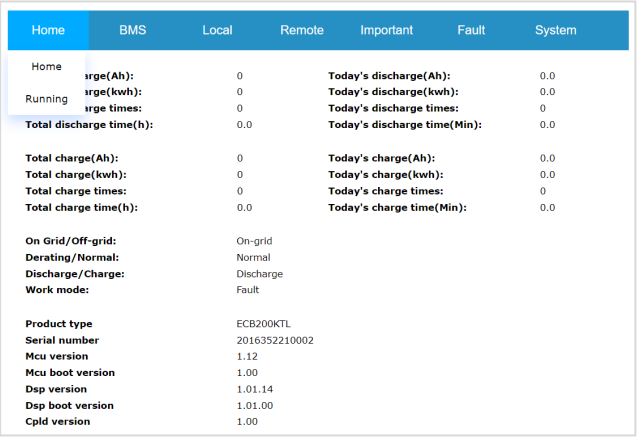


Figure 7- 8 Home Sub-menu

The Running Sub-menu displays Uab(V) , Ia(A) , FreqR(Hz) , TModule(C), etc. See the following figure for details.

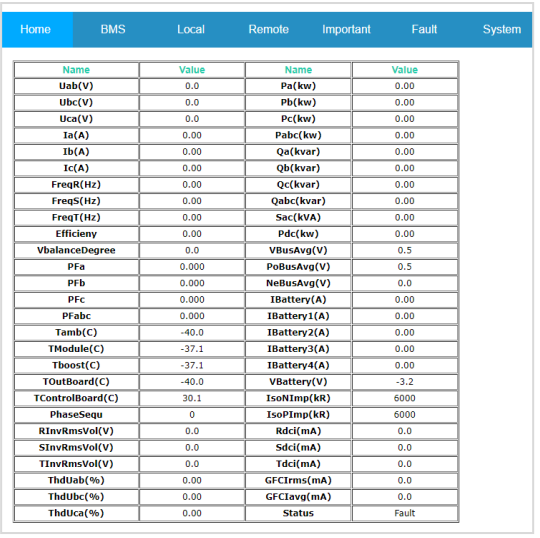
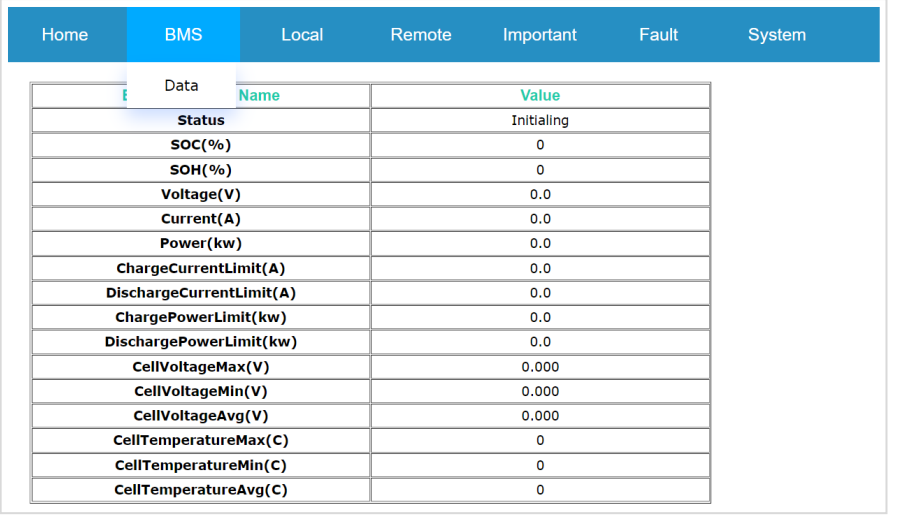


Figure 7- 9 Running Sub-menu

7.1.2.2 BMS (Battery Management System)

The BMS menu contains only one Sub-menu: Data. The Data Sub-menu displays Status, SOC (%), ChargeCurrentLimit (A), DischargeCurrentLimit (A) etc. as shown in the following figure. Note: this menu is only for research and development team.



Name	Value
Status	Initialing
SOC(%)	0
SOH(%)	0
Voltage(V)	0.0
Current(A)	0.0
Power(kw)	0.0
ChargeCurrentLimit(A)	0.0
DischargeCurrentLimit(A)	0.0
ChargePowerLimit(kw)	0.0
DischargePowerLimit(kw)	0.0
CellVoltageMax(V)	0.000
CellVoltageMin(V)	0.000
CellVoltageAvg(V)	0.000
CellTemperatureMax(C)	0
CellTemperatureMin(C)	0
CellTemperatureAvg(C)	0

Figure 7- 10 Data Sub-menu

7.1.2.3 Local

The Local main menu contains nine Sub-menus: GridVol, GridFreq, Start/Vrt, Dispatch, Command, PFP/QU/QP, FW/VW, Battery, Others as shown in the following figure.

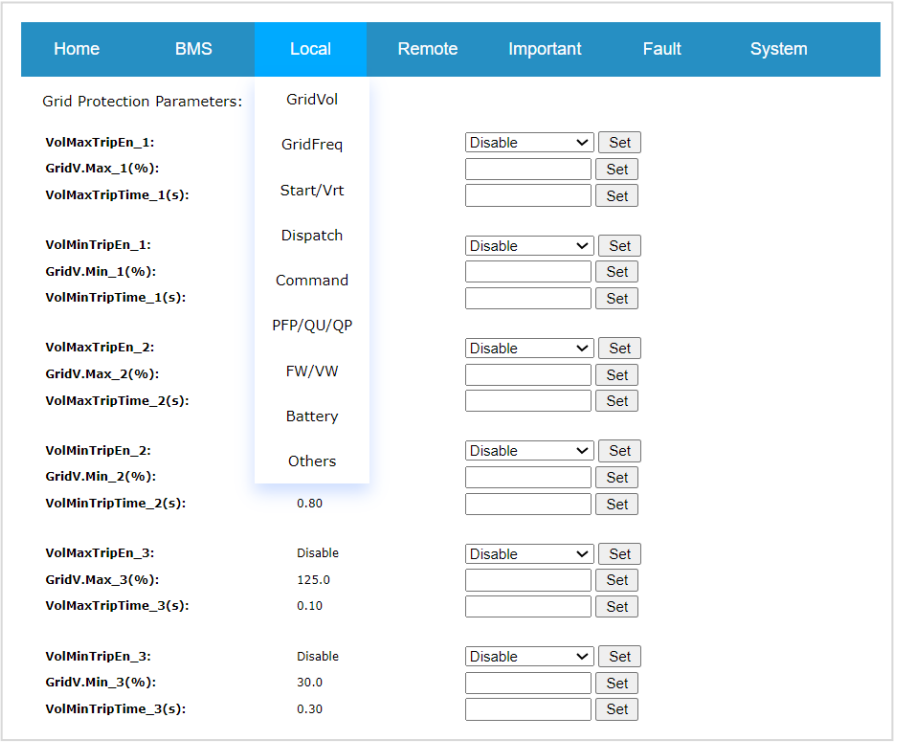


Figure 7- 11 Local menu

For GridVol, GridFreq, Start/Vrt, Dispatch, Command, Battery, Others sub-menus, customers can choose any options from the drop-down list and click right-hand Set button to modify the parameters as required on site; while PFP/QU/QP and FW/VW curve parameters shall be modified only by qualified engineers who are thoroughly familiar with the system and the relevant parameters. See figures below for details.

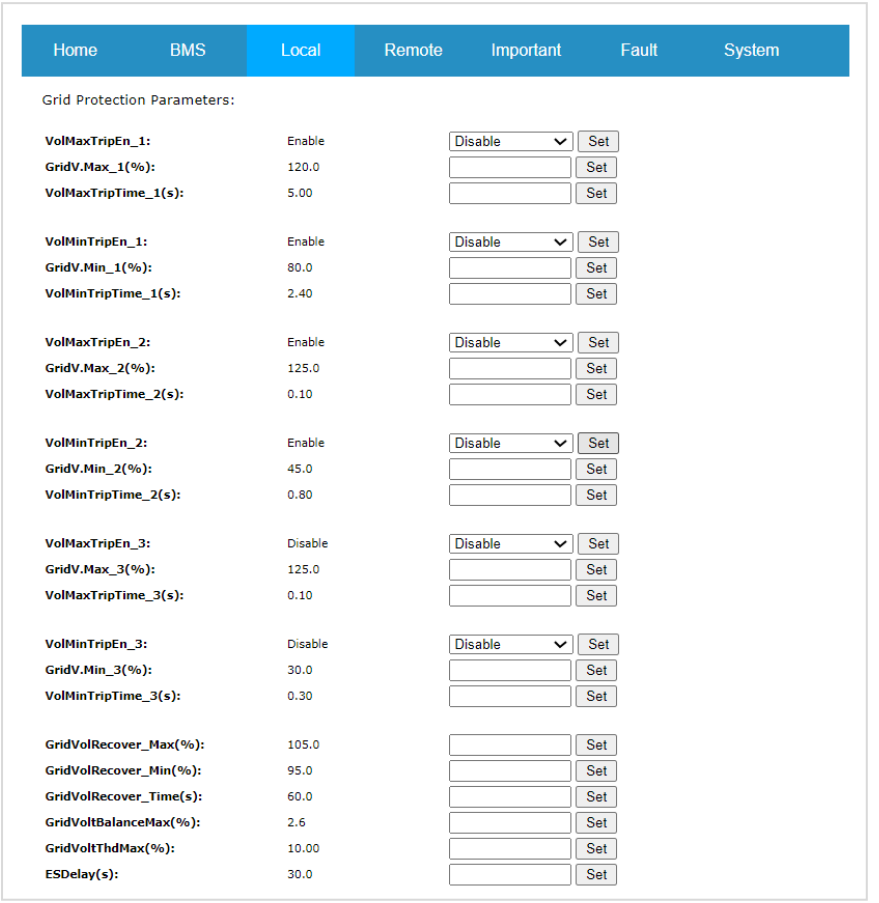


Figure 7- 12 GridVol Sub-menu

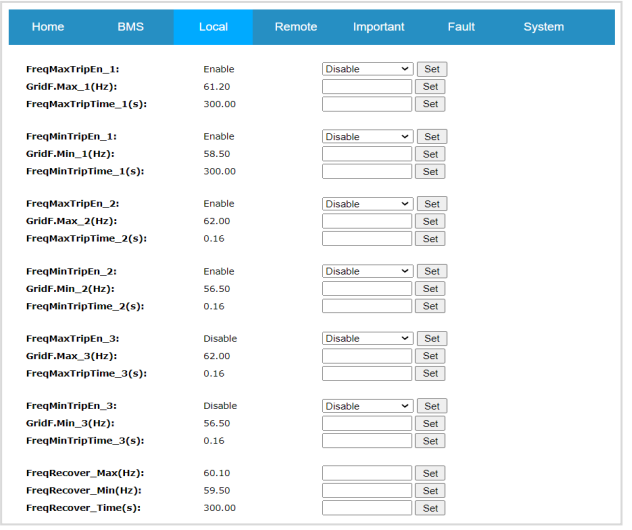


Figure 7- 13 GridFreq Sub-menu

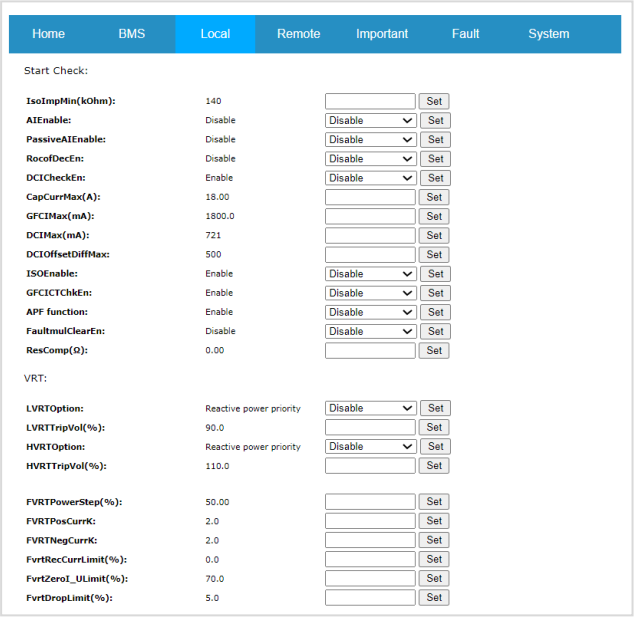


Figure 7- 14 Start/Vrt Sub-menu

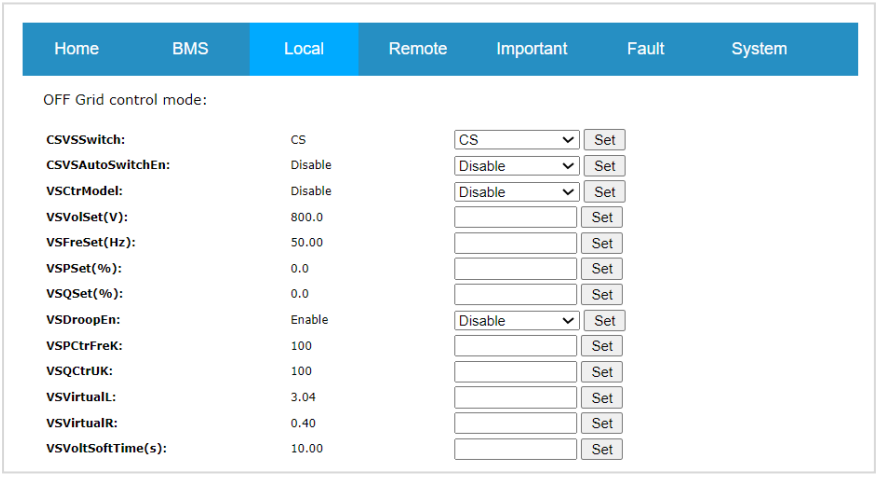


Figure 7- 15 Dispatch Sub-menu

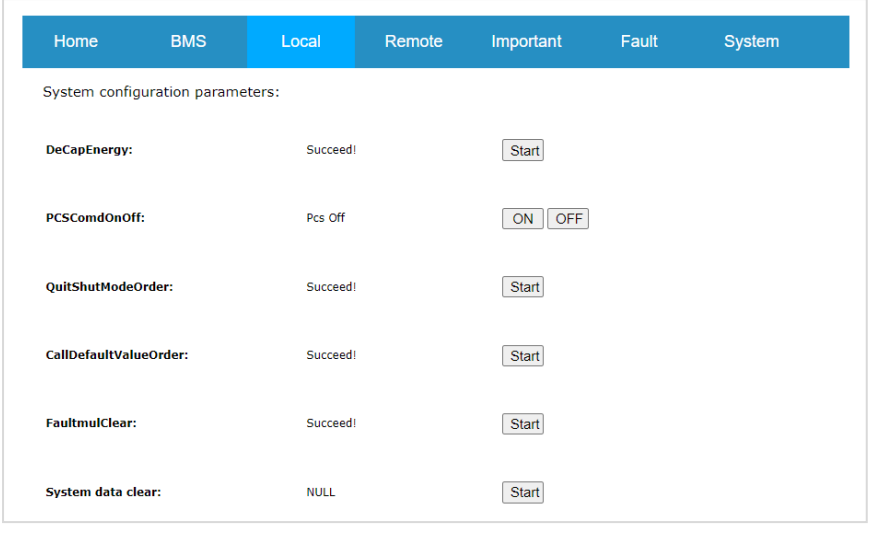


Figure 7- 16 Command Sub-menu

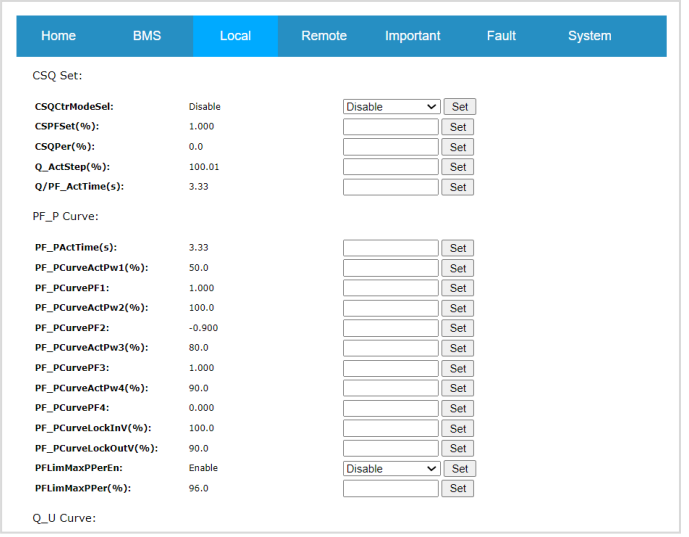


Figure 7- 17 PFP/QU/QP Sub-menu

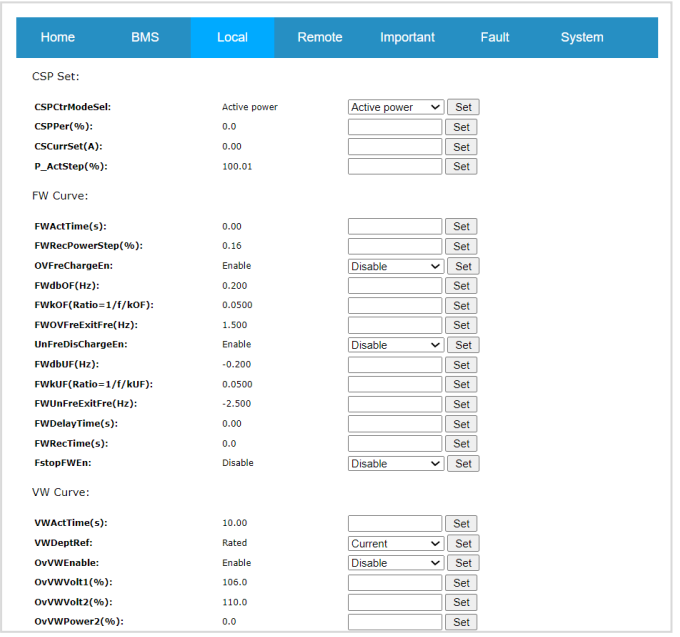


Figure 7- 18 FW/VW Sub-menu

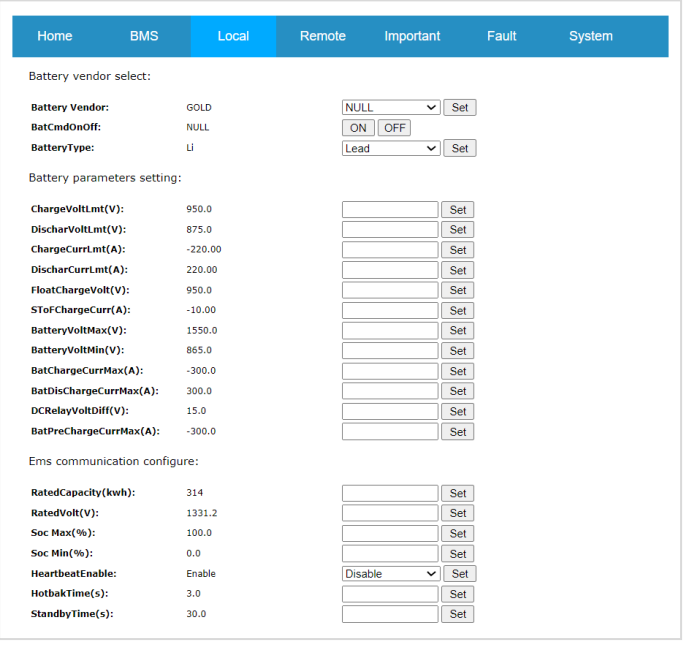


Figure 7- 19 Battery Sub-menu

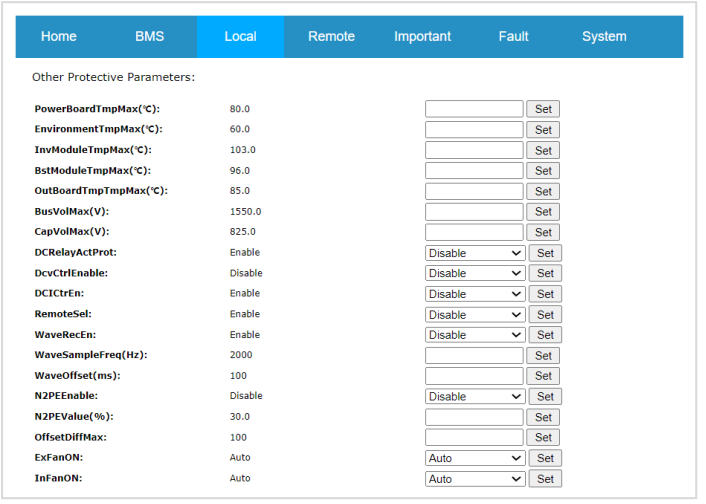


Figure 7- 20 Others Sub-menu

7.1.2.4 Remote

The Remote main menu contains two Sub-menus: Dispatch, Data.

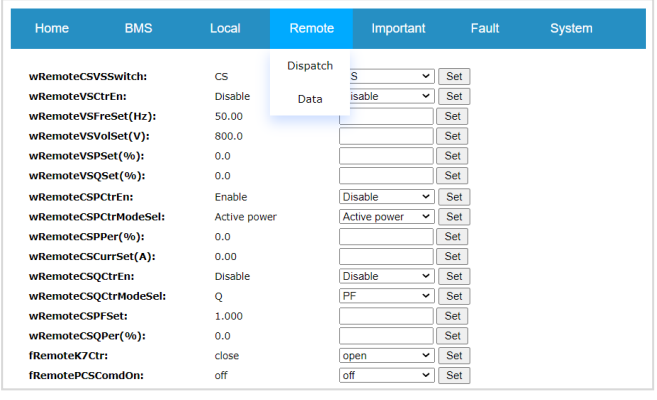


Figure 7- 21 Remote Main menu

The Dispatch Sub-menu displays CS/VS switch, VS PPer (%), CS PPer (%), PCS on/off etc. The Data Sub-menu displays ChargeVoltLmt (V), DischarVoltLmt (V),

ChargeCurrLmt (A), DischarCurrLmt (A) etc.

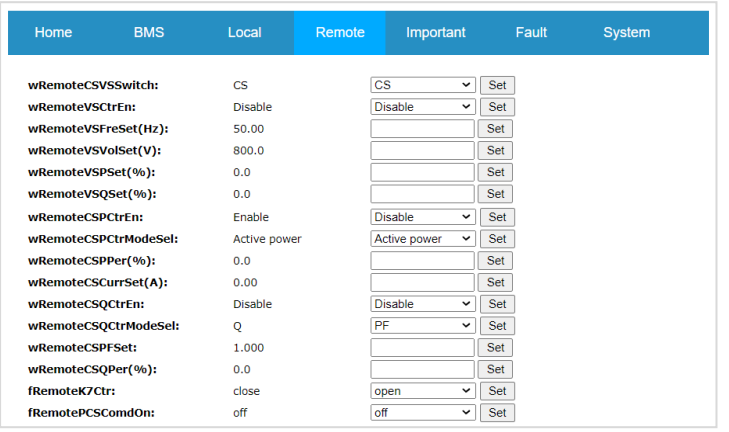


Figure 7- 22 Dispatch Sub-menu

You can choose any options from the drop-down list and click right-hand Set button to modify the parameters as required on site. See Figures below for details.

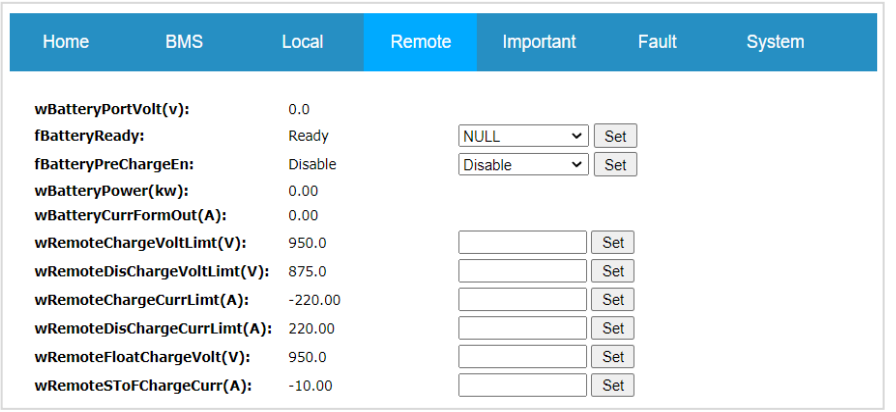


Figure 7- 23 Data Sub-menu

7.1.2.5 Important

The Important main menu contains only one Sub-menu: Rated. The Rated Sub-menu displays RatedFrequency (Hz), RatedVoltage (V), RatedPower (kw),

Standard etc. You can choose any options from the drop-down list and click the Set button on the far right to modify the parameters as required on site.

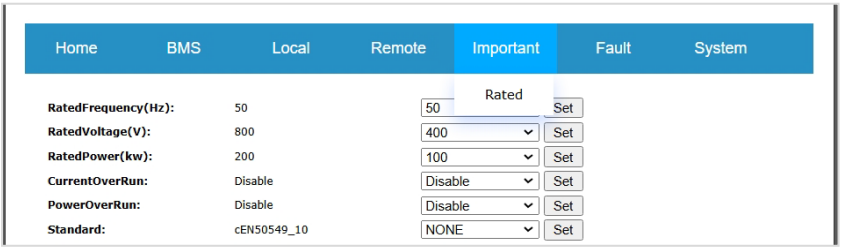
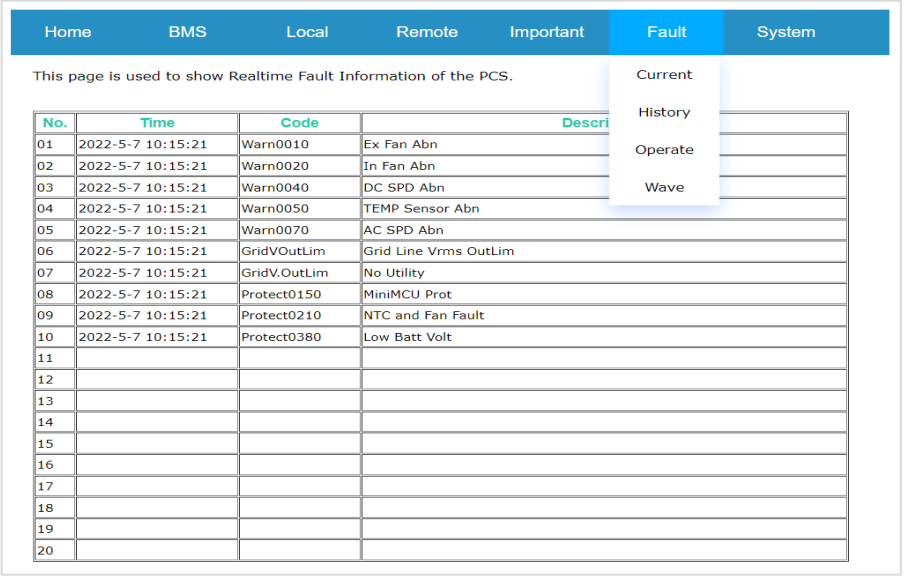


Figure 7- 24 Rated Sub-menu

7.1.2.6 Fault

The Fault main menu contains four Sub-menus: Current, History, Operate and Wave.

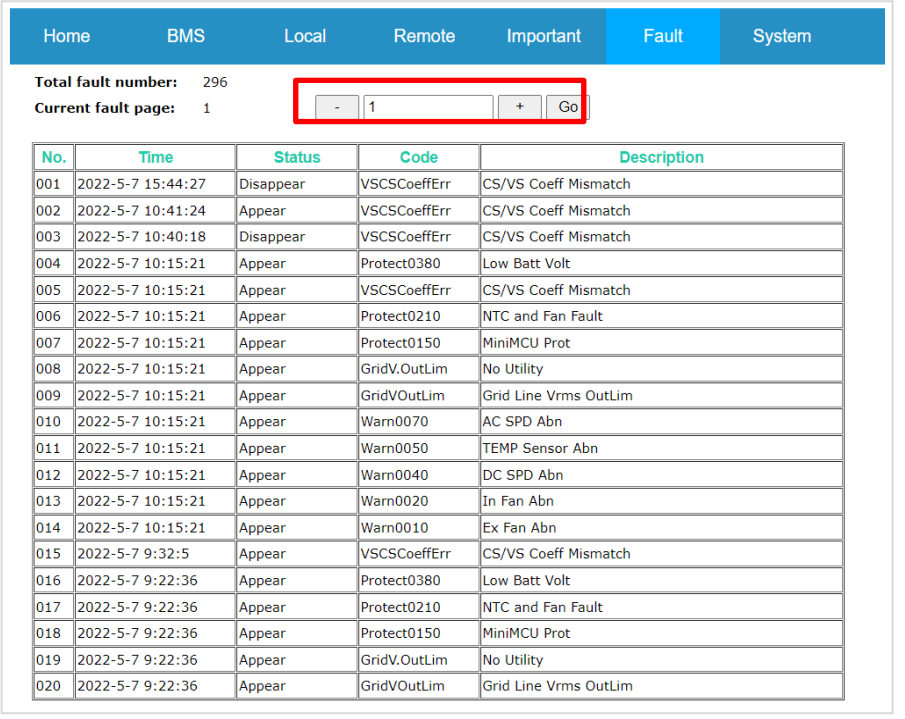
The Current Sub-menu displays a maximum of 20 recent fault records. These are labeled as Realtime Fault Information of the PCS. Once the number of faults exceeds 20, the oldest record will be overwritten.



No.	Time	Code	Descri
01	2022-5-7 10:15:21	Warn0010	Ex Fan Abn
02	2022-5-7 10:15:21	Warn0020	In Fan Abn
03	2022-5-7 10:15:21	Warn0040	DC SPD Abn
04	2022-5-7 10:15:21	Warn0050	TEMP Sensor Abn
05	2022-5-7 10:15:21	Warn0070	AC SPD Abn
06	2022-5-7 10:15:21	GridVOutLim	Grid Line Vrms OutLim
07	2022-5-7 10:15:21	GridV.OutLim	No Utility
08	2022-5-7 10:15:21	Protect0150	MiniMCU Prot
09	2022-5-7 10:15:21	Protect0210	NTC and Fan Fault
10	2022-5-7 10:15:21	Protect0380	Low Batt Volt
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			

Figure 7- 25 Current Sub-menu

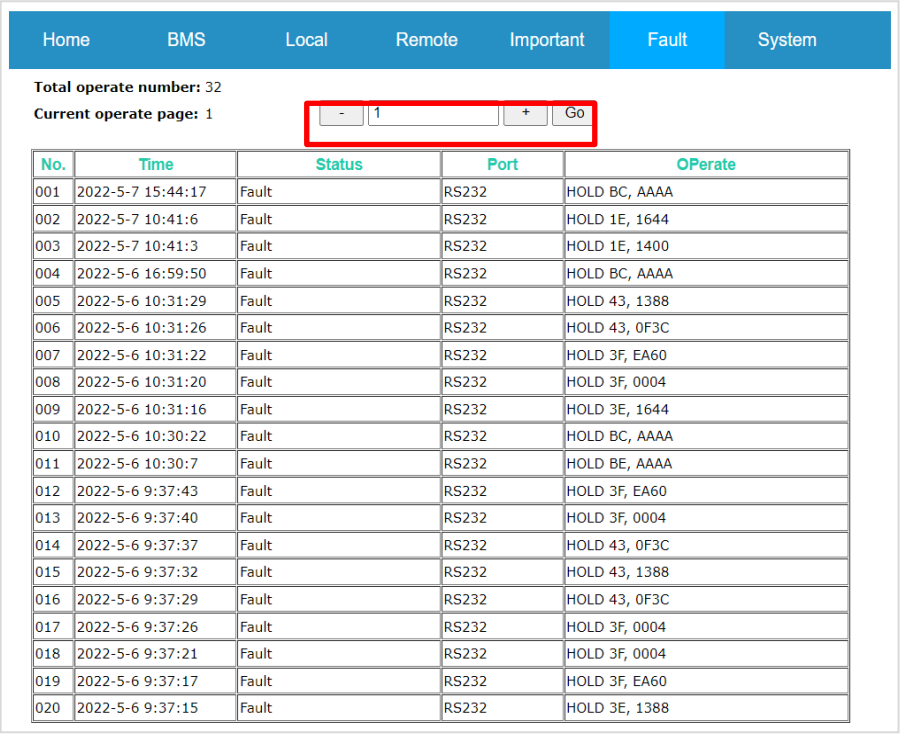
The History sub-menu displays a maximum of 1000 history fault records. Once the number of faults exceeds 1000, the oldest record will be overwritten. Enter a page number in the middle textbox and then click the right-hand Go button, it skips to the target fault page. Clicking “–” and “+” buttons to switch between its previous page or the next page. See figure below for details.



No.	Time	Status	Code	Description
001	2022-5-7 15:44:27	Disappear	VSCSCoeffErr	CS/VS Coeff Mismatch
002	2022-5-7 10:41:24	Appear	VSCSCoeffErr	CS/VS Coeff Mismatch
003	2022-5-7 10:40:18	Disappear	VSCSCoeffErr	CS/VS Coeff Mismatch
004	2022-5-7 10:15:21	Appear	Protect0380	Low Batt Volt
005	2022-5-7 10:15:21	Appear	VSCSCoeffErr	CS/VS Coeff Mismatch
006	2022-5-7 10:15:21	Appear	Protect0210	NTC and Fan Fault
007	2022-5-7 10:15:21	Appear	Protect0150	MiniMCU Prot
008	2022-5-7 10:15:21	Appear	GridV.OutLim	No Utility
009	2022-5-7 10:15:21	Appear	GridVOutLim	Grid Line Vrms OutLim
010	2022-5-7 10:15:21	Appear	Warn0070	AC SPD Abn
011	2022-5-7 10:15:21	Appear	Warn0050	TEMP Sensor Abn
012	2022-5-7 10:15:21	Appear	Warn0040	DC SPD Abn
013	2022-5-7 10:15:21	Appear	Warn0020	In Fan Abn
014	2022-5-7 10:15:21	Appear	Warn0010	Ex Fan Abn
015	2022-5-7 9:32:5	Appear	VSCSCoeffErr	CS/VS Coeff Mismatch
016	2022-5-7 9:22:36	Appear	Protect0380	Low Batt Volt
017	2022-5-7 9:22:36	Appear	Protect0210	NTC and Fan Fault
018	2022-5-7 9:22:36	Appear	Protect0150	MiniMCU Prot
019	2022-5-7 9:22:36	Appear	GridV.OutLim	No Utility
020	2022-5-7 9:22:36	Appear	GridVOutLim	Grid Line Vrms OutLim

Figure 7- 26 History Sub-menu

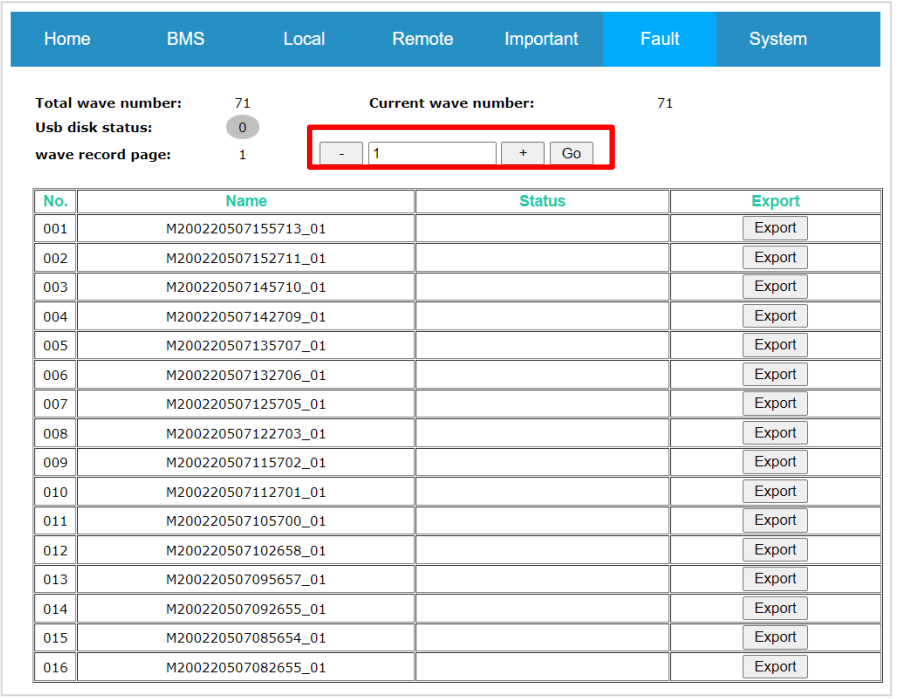
The Operate menu displays a maximum of 256 system parameter modification records. Once the number of operate entries exceeds 256, the oldest record will be overwritten. Enter a page number in the middle textbox and then click the right-hand Go button, it skips to the target operate page. Clicking “–” and “+” buttons to switch between its previous page or the next page.



No.	Time	Status	Port	OPerate
001	2022-5-7 15:44:17	Fault	RS232	HOLD BC, AAAA
002	2022-5-7 10:41:6	Fault	RS232	HOLD 1E, 1644
003	2022-5-7 10:41:3	Fault	RS232	HOLD 1E, 1400
004	2022-5-6 16:59:50	Fault	RS232	HOLD BC, AAAA
005	2022-5-6 10:31:29	Fault	RS232	HOLD 43, 1388
006	2022-5-6 10:31:26	Fault	RS232	HOLD 43, 0F3C
007	2022-5-6 10:31:22	Fault	RS232	HOLD 3F, EA60
008	2022-5-6 10:31:20	Fault	RS232	HOLD 3F, 0004
009	2022-5-6 10:31:16	Fault	RS232	HOLD 3E, 1644
010	2022-5-6 10:30:22	Fault	RS232	HOLD BC, AAAA
011	2022-5-6 10:30:7	Fault	RS232	HOLD BE, AAAA
012	2022-5-6 9:37:43	Fault	RS232	HOLD 3F, EA60
013	2022-5-6 9:37:40	Fault	RS232	HOLD 3F, 0004
014	2022-5-6 9:37:37	Fault	RS232	HOLD 43, 0F3C
015	2022-5-6 9:37:32	Fault	RS232	HOLD 43, 1388
016	2022-5-6 9:37:29	Fault	RS232	HOLD 43, 0F3C
017	2022-5-6 9:37:26	Fault	RS232	HOLD 3F, 0004
018	2022-5-6 9:37:21	Fault	RS232	HOLD 3F, 0004
019	2022-5-6 9:37:17	Fault	RS232	HOLD 3F, EA60
020	2022-5-6 9:37:15	Fault	RS232	HOLD 3E, 1388

Figure 7- 27 Operate Sub-menu

The Wave Sub-menu displays a maximum of 128 fault wave records. Once the number of fault wave records exceeds 128, the oldest record will be overwritten. Enter a page number in the middle textbox and then click the right-hand Go button, it skips to the target wave record page. Clicking “–” and “+” buttons to switch between its previous page or the next page.



No.	Name	Status	Export
001	M200220507155713_01		Export
002	M200220507152711_01		Export
003	M200220507145710_01		Export
004	M200220507142709_01		Export
005	M200220507135707_01		Export
006	M200220507132706_01		Export
007	M200220507125705_01		Export
008	M200220507122703_01		Export
009	M200220507115702_01		Export
010	M200220507112701_01		Export
011	M200220507105700_01		Export
012	M200220507102658_01		Export
013	M200220507095657_01		Export
014	M200220507092655_01		Export
015	M200220507085654_01		Export
016	M200220507082655_01		Export

Figure 7- 28 Wave Sub-menu

7.1.2.7 System

The System main menu contains six sub-menus: Comport, DryNode, Network, Date/Time, Firmware and Debug.

The Comport Sub-menu displays EMS 485 address, EMS 485 baudrate, user can baudrate, user can connect, etc. The IP address and MAC address can be modified by choosing any options from the drop-down list and clicking “Set.”

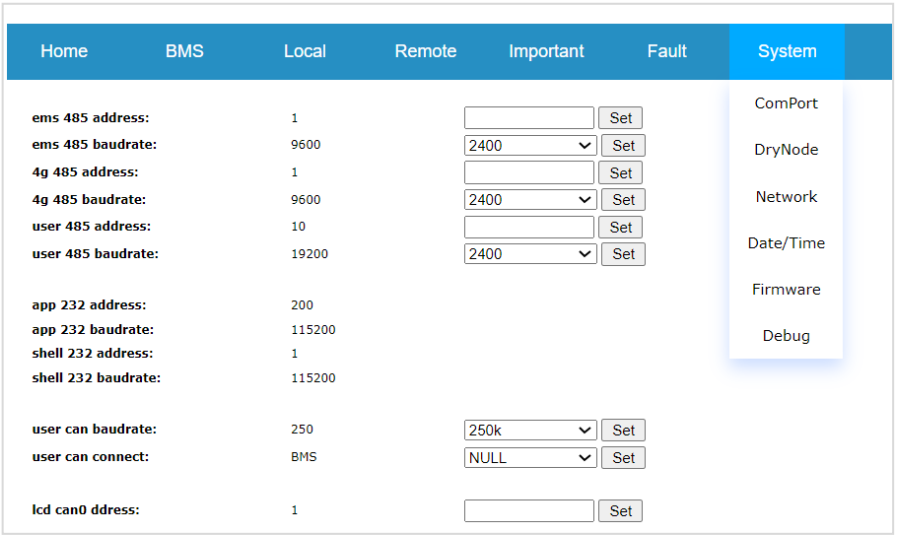


Figure 7- 29 Comport Sub-menu

The parameters on the DryNode and Network sub-menus can also be modified by choosing any options from the drop-down list and clicking “Set.”

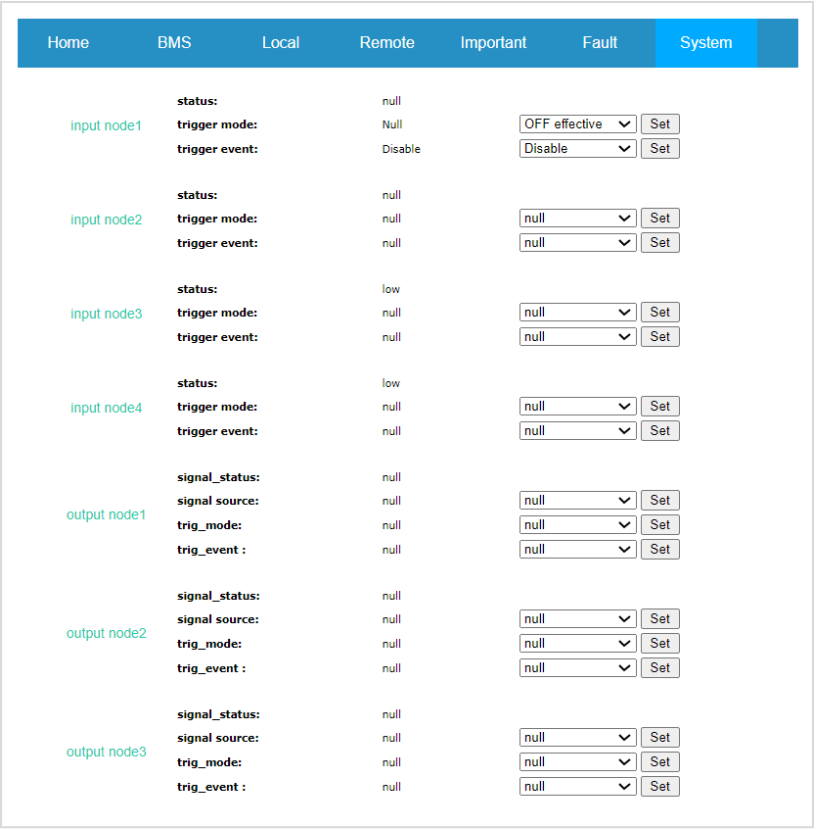


Figure 7- 30 Drynode Sub-menu

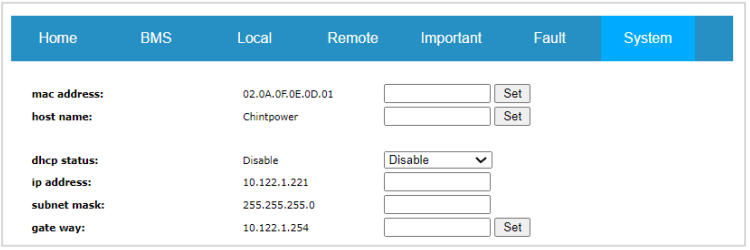


Figure 7- 31 Network Sub-menu

If the TIME displayed on the web page is incorrect. Customers can switch to the Date/Time sub-menu, then click the Sync button to synchronize the time of PCS.

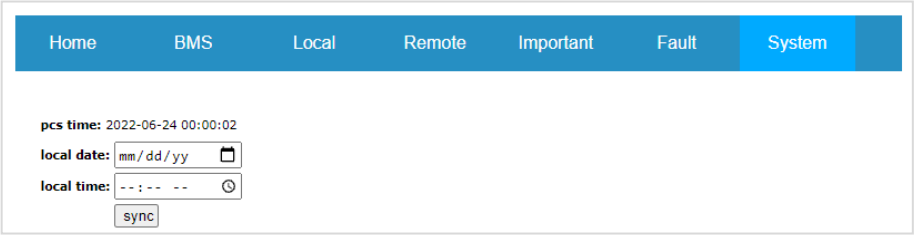


Figure 7- 32 Date/Time Sub-menu

Customers can also upgrade LCD or DSP firmware through the Firmware interface. Choose the target upgrading files and click Download to upgrade the firmware.

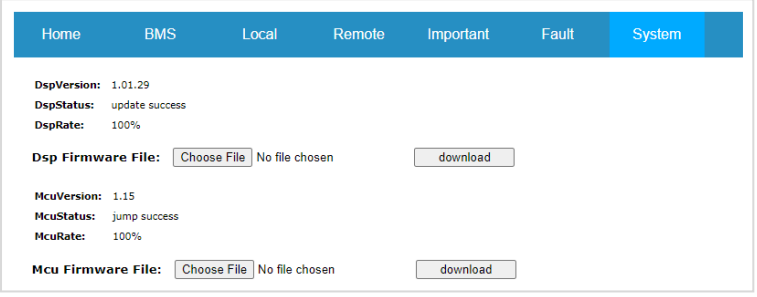


Figure 7- 33 Firmware Sub-menu

The Debug sub-menu is **only** for professional service personnel to maintain or service the system.

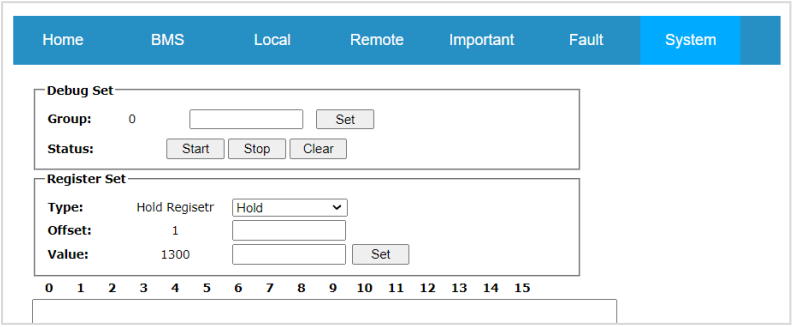


Figure 7- 34 Debug Sub-menu

7.2 Modbus Function

The Modbus function supports two interfaces, one is Modbus RTU that supports RS485 interface, and the other is Modbus TCP that supports network interface. For specific register settings, see "200kW PCS Protocol" external communication document.

7.2.1 Modbus RTU

Address: 1 (default)

Baud Rate: 9600(default)

Data Bits: 8

Parity: None

Stop Bit: 1

DTR: Disable

RTS: Disable

Modbus RTU Frame Format:

start	Address	Function Code	Data	CRC16	end
T1-T2-T3-T4	1Byte	1Byte	N	2Byte	T1-T2-T3-T4

Examples for writing to single register

1. To modify “Active power set in per” to 50%, the following instruction can be issued:
   01 06 30 47 01 F4 36 C8
2. To modify “Active power set in per” to -100%, the following instruction can be issued:
   01 06 30 47 FF 9C 77 46
3. To modify “Reactive power set in per” to 10%, the following instruction can be issued:
   01 06 30 4C 00 64 46 F6
4. To modify “Reactive power set in per” to -20%, the following instruction can be issued:
   01 06 30 4C FF EC 07 60
5. To change the local / remote control item to remote control mode, the following instruction can be issued:
   01 06 30 9C 00 01 87 24
6. To have the PCS power-off in local control mode, the following instruction can be issued:
   01 06 30 AB 55 55 08 45
7. To have the PCS power-on in remote control mode, the following instruction can be issued:
   01 06 31 0E 00 01 27 35

7.2.2 Modbus TCP

Port: 502

IP Address: 10.122.1.221 (default)

Modbus TCP Frame Format:

Head						*Length* (Bytes)		
						Address	Function Code	Data
00	00	00	00	00	Length	1Byte	1Byte	N(Bytes)

Examples for writing to single register

1. To modify “Active power set in per” to 50%, the following instruction can be issued:
   00 00 00 00 00 06 01 06 30 47 01 F4
2. To modify “Active power set in per” to -100%, the following instruction can be issued:
   00 00 00 00 00 06 01 06 30 47 FF 9C
3. To modify “Reactive power set in per” to 10%, the following instruction can be issued:
   00 00 00 00 00 06 01 06 30 4C 00 64
4. To modify “Reactive power set in per” to -20%, the following instruction can be issued:
   00 00 00 00 00 06 01 06 30 4C FF EC
5. To change the local / remote control item to remote control mode, the following instruction can be issued:
   00 00 00 00 00 06 01 06 30 9C 00 01
6. To have the PCS power-off in local control mode, the following instruction can be issued:
   00 00 00 00 00 06 01 06 30 AB 55 55
7. To have the PCS power-on in remote control mode, the following instruction can be issued:
   00 00 00 00 00 06 01 06 31 0E 00 01

8 Operation

The PCS is an essential component of an energy storage system. The following diagram gives an example of how it works with other components in such a system. The PCS is bidirectional power conversion system. It can charge or discharge energy to/from batteries.

The BMS (Battery Management System) in a battery container is used to intelligently manage and maintain each battery module and rack, prevent the battery from overcharging and discharging. It can extend the life of batteries, monitor the batteries status.

The EMS (Energy Management System) is power grid dispatching automation system (including hardware and software). It is used for data collection, energy management, and network analysis.

The EMS sends commands to the PCS to monitor the status of the PCS and BMS. The PCS can charge or discharge the batteries. The EMS communicates with PCS by RS485/RTU or Ethernet. The PCS communicates with BMS via CAN port.

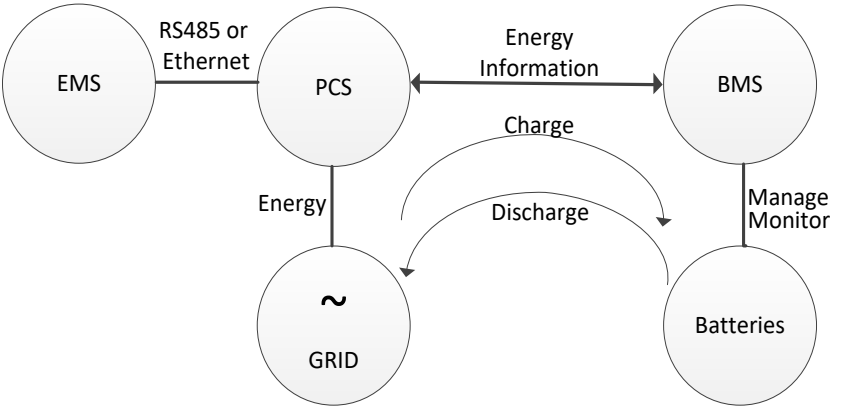


Figure 8- 1 System connection (with one PCS)

EMS can connect many PCS and then PCS transfer information to BMS.

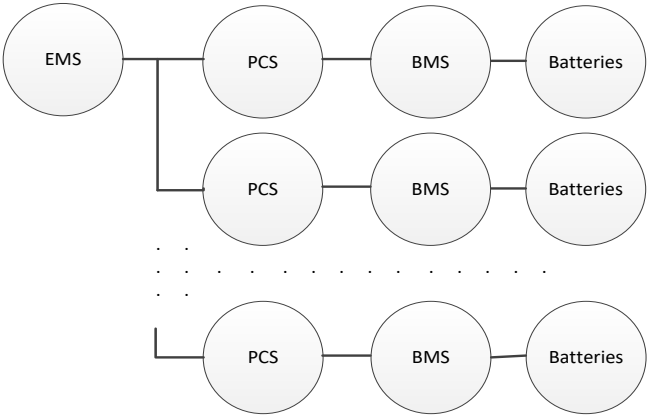


Figure 8- 2 System connection (with multiple PCS)

The EMS can also be directly connected to the BMS and the PCS respectively. All the BMS and PCS can be daisy-chained and star-connected. The EMS manages the two systems together. EMS can transfer information to BMS and the PCS respectively, and BMS and the PCS can also transfer information to each other. The communication is a triangular structure. The following figure shows the system architecture.

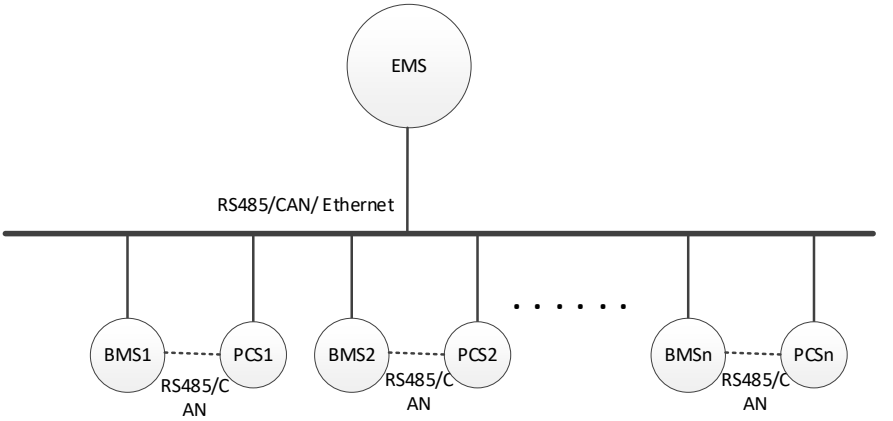


Figure 8- 3 Triangular structure diagram

8.1 Start-up and Shut Down

8.1.1 Start-up

The PCS can be started up with both local and remote modes. Before starting up, complete the commissioning per section 5.2 Commissioning Steps and setup Grid Standard, communication information, battery voltage and other parameters as required.

Local Start-up: Start-up is required after regulation setting or manual (fault) shut-down. You can refer to section 7.1.2 Main Menus of Web Page, and set "PCScommandonoff" parameter as "PCS on" by web browser (Figure 8- 4). Then the PCS will start-up and operate normally if the start-up condition is met. Otherwise, the PCS will go to stand-by mode. Local start-up is mainly used to modify parameter manually. The parameter modify history will be stored in the register.

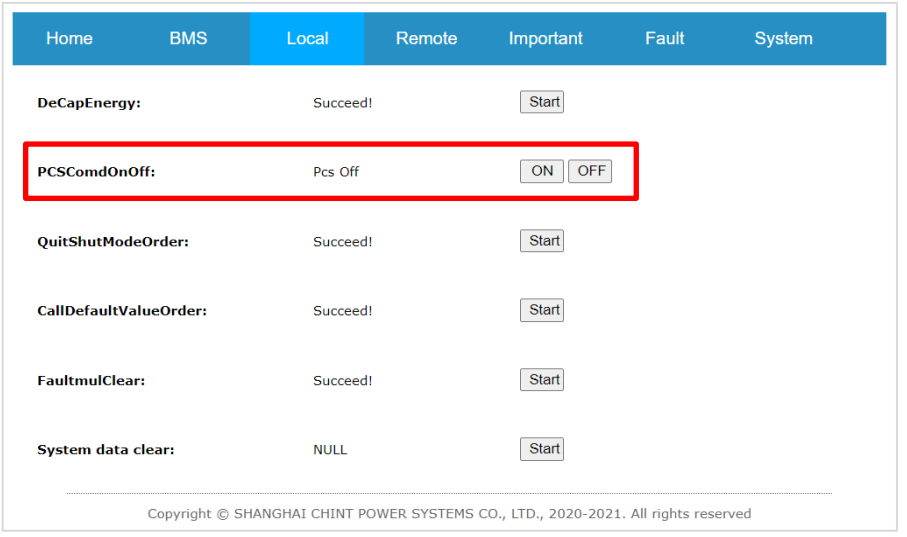


Figure 8- 4 PCS on for local start-up

Remote start-up: Refer to section 7.1.2 Main Menus of Web Page, and set "rRemotePCSComdOn" parameter as "PCS on" by web browser (Figure 8- 5) to start the PCS remotely.

The PCS will start-up automatically when the EMS sends a command to start, AC power grid is normal, and the ambient temperature is within allowable operating range. Note: The parameter modify history will not be stored in register.

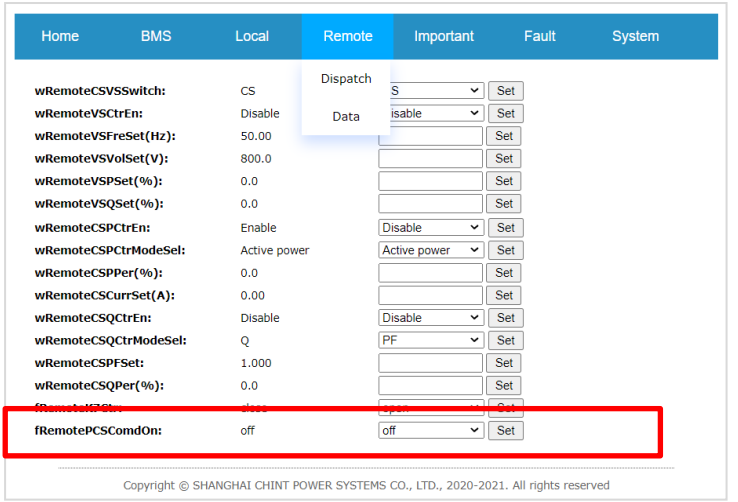


Figure 8- 5 PCS on for Remote start-up

8.1.2 Shutdown

Local shutdown: Normally, it is not necessary to shut down the PCS, but it can be shut down if a regulation setting change or maintenance is required.

Refer to 8.1.1 Start-up, set "PCScommandonoff" parameter as "PCS off" by web browser and then the PCS will be shut down.

Remote shutdown: Refer to 8.1.1 Start-up, and set "rRemotePCSComdon" parameter as "PCS off" by web browser to shut down the PCS.

Note: PCS will be shut down automatically when the output voltage and power of Batteries are lower than the set value; or AC power grid fails; or the ambient temperature exceeds the normal range.

8.2 Operation Modes

There are 4 operation modes. The following are corresponding indications for each mode.

- System check mode: This mode indicates that the PCS is checking whether it is ready for normal operation after the manual start-up of PCS.
- Normal operation mode: Default indication interface for normal operation.

  Battery discharge, the PCS converts the power generated by batteries to AC continuously and feeds into the power grid.

  Battery charge, the PCS converts power from the grid to continuously charge the batteries.
- Standby mode: The PCS will enter standby mode when the output voltage and power of Battery modules do not meet the startup conditions or Battery voltage and input power are lower than the set value. The PCS will check automatically whether it meets the startup conditions in this mode until it turns back to normal mode. The PCS will switch from standby mode to fault mode if a malfunction occurs.
- Fault mode:The PCS will disconnect from the power grid and turn into fault mode when the PCS or power grid fails. Check the specific cause in “Troubleshooting table” according to the fault message displayed on the Web and eliminate the fault referring to the instructions.

WARNING:

All the installation and wiring connections should be performed by qualified technical personnel. Disconnect the PCS from Battery modules and the AC supply before undertaking maintenance.

Do not operate or maintain the PCS until at least 5 minutes after disconnecting all sources of DC and AC.

8.3 Anti-islanding Safety Function

The PCS is equipped with an anti-islanding safety function. The PCS continuously monitors the AC power grid to ensure it meets the conditions for Power generation and checks whether the Battery array has enough energy. Once all conditions are met, the PCS enters a state of Power generation, constantly detecting the power grid for any abnormalities. If any abnormalities are detected, the PCS will trip according to the protection settings. Additionally, when power generation is inadequate to keep the PCS running, it will switch to standby mode. Upon detecting a stable and higher voltage in the Battery array, the PCS will attempt to start Power generation again.

9 Maintenance and Troubleshooting

9.1 Regular Maintenance

Item	Method	Maintenance intervals
System clean	1. Check the temperature and dust of the PCS. Clean enclosure if necessary. 2. Check if the air inlet and outlet as well as air vent filter are normal. Clean the air inlet and outlet as well as air vent filter, with soft brush or vacuum cleaner, if necessary.	6 months to 1 year (depending on the installation environment)
Cable entry	Check whether the cable entry is insufficiently sealed or the gap is excessively large, and reseal the entry when necessary.	Once a year
Electrical connection	1. Check whether all cables are firmly in place. If loose, please tighten all the cables referring to “4 Electrical installation”. 2. Check for cable damage, especially whether the cable surface is scratched or smooth. Repair or replace the cables if necessary.	6 months to 1 year

Table 9-1 Regular maintenance

9.2 Service and Replace

9.2.1 Replace Cooling Fans

If the internal temperature of the PCS is higher than normal operating temperature or abnormal noise is heard assuming the air vent is not blocked and is clean, it may be necessary to replace the external fans. Please refer to the following steps for replacing the cooling fans.

1. Use a No.2 Phillips head screwdriver to unscrew the eight screws on the front plate and take off the fan tray.

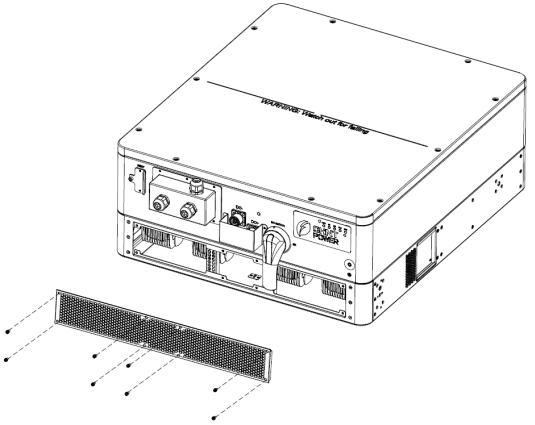


Figure 9- 1 Unscrew the four screws on the front plate

2. Disconnect the cable connector from the cooling fan and cut the cable ties (1).

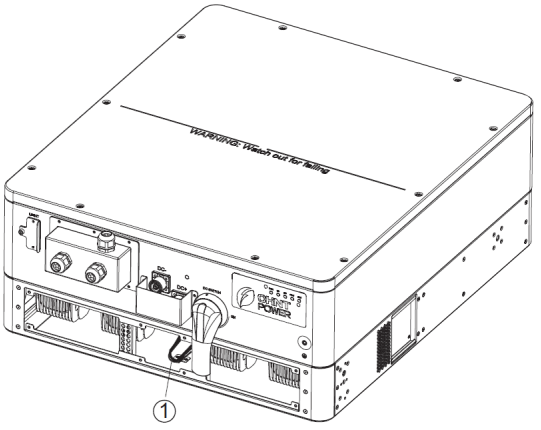


Figure 9- 2 Cut the cable ties

3. Use a No.2 Phillips head screwdriver to take off the four M4 screws (2) on the left or right clamp plate (3) and pull it out.

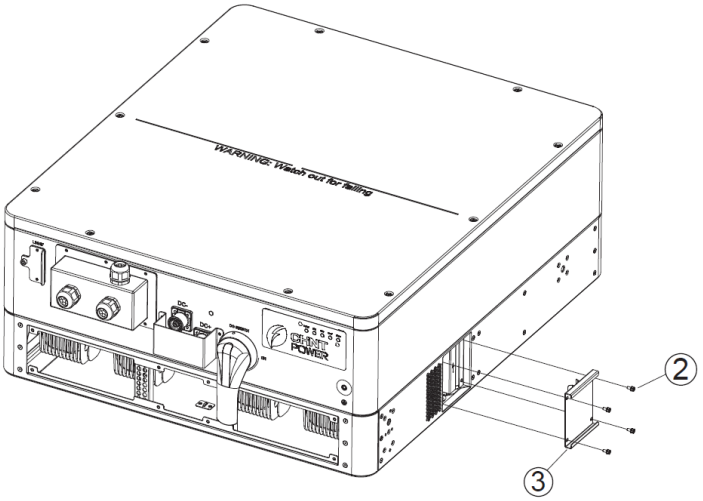


Figure 9- 3 Pull clamp plate out

4. After removing the clamp plate, pull out the fan tray with the aid of the exposed handle of the fan tray.

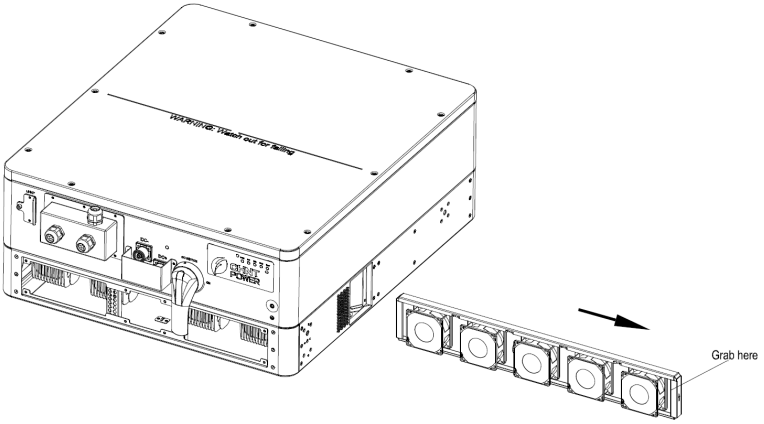


Figure 9- 4 Pull out the fan tray

NOTICE:
Do not pull it too hard to protect the fan cables from being damaged.

5. Cut off the cable ties between fan cable and fan tray, remove the damaged fans and replace them. Tighten the tapping screws with a torque value of 0.8-1N.m (7.1-8.9 in-lbs).

NOTICE:
A rubber pad shall be placed between the fan and fan tray to reduce noise caused by vibration.

6. Fix the new cooling fan on the fan tray and fasten the cable on the fan tray with cable ties in ways shown as below. Torque value: 0.8-1N.m(7.1-8.9 in-lbs)

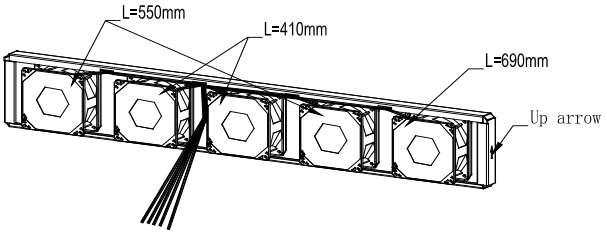


Figure 9- 5 Fasten the cable on the fan tray with cable ties

NOTICE:
Fan cables shall be placed in the groove of the fan tray.
Pay attention to the arrows on the fans. Do not install the fans in wrong orientation.

7. Re-attach the assembled fan trays, clamp plates and front plate to the PCS with a torque value of 1.2N.m (10.6 in-lbs).

9.2.2 Replace the PCS

DANGER:
Please disconnect the electrical connection in strict accordance with the following steps. Otherwise, the PCS may be damaged, and the personal and life safety of service personnel may be endangered.

Dismount and replace the PCS according to the following steps when the service time is due or when it is needed:

1. Ensure the DC and AC sides are disconnected from power
2. Turn off the AC breaker and use LOTO Padlocks if provided. (Skip this step if there is no AC breaker)
3. Turn off the DC breaker and use LOTO Padlocks if provided. (Skip this step if there is no DC breaker)
4. Switch the AC switch to “OFF” position.
5. Switch the DC switch to “OFF” position.
6. Wait for 10 minutes to ensure the internal capacitors have been completely discharged.
7. Measure the AC output cable terminal voltage against the ground, and make sure the voltage is 0V.
8. Disconnect the AC cables referring to “4.4 AC and Grounding Connection”.
9. Disconnect the DC cables referring to “4.5 DC and Grounding Connection”.
10. Disconnect AC and DC grounding connection.
11. Take off all eight (8) M6 screws and pull out the PCS by inserting hooks and other applicable tools into the holes of the fixing brackets. For more detailed steps, please refer to the installation steps in “3 Mechanical Installation” and implement in reverse order.

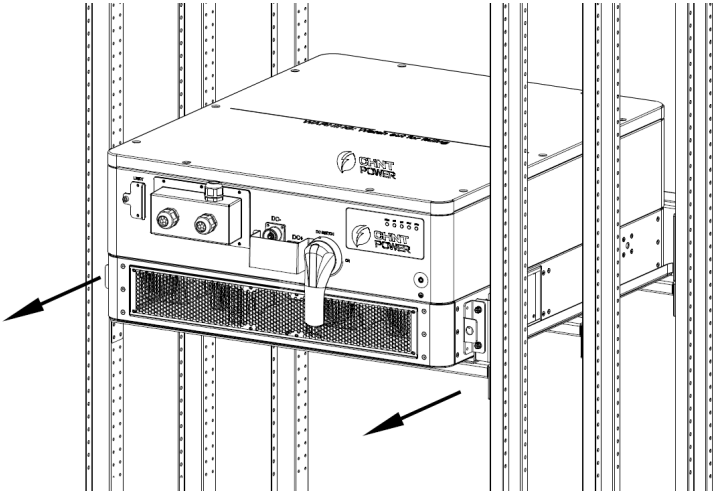


Figure 9- 6 Pull out the PCS by hooks onto forklift support

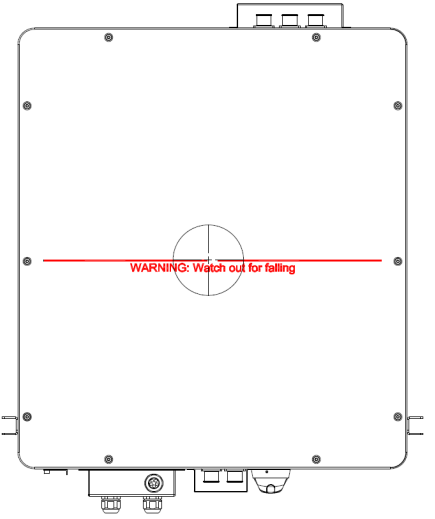


Figure 9- 7 Warning line of the middle position

WARNING:
Watch out for falling off when replacing the PCS.
Support the PCS carefully when the external part is approaching to the warning line.

9.3 Troubleshooting

Please refer to the definition of LED lights in Table 9-2 and troubleshoot according to Table 9-3:

Table 9-2 Trouble shooting of LED lights

LED fault status	Solutions
The “Power” LED does not light up.	1. Turn off the external AC breaker 2. Switch the external DC switch to “OFF” position 3. Check the batteries input voltage and polarity
The “GRID” LED is blinking.	1. Turn off the external AC breaker 2. Switch the external DC switch to “OFF” position 3. Check whether the grid voltage is normal and whether the cable connection of AC side is correct and secure
The “RUN” LED lights off and “FAULT” LED lights up.	Refer to table 9-3 for troubleshooting

The causes of a fault can be identified based on the faults listed in Table 9-3.

Table 9-3 Web Troubleshooting table

Alarm	1.TempSensorErr	Definition: Prompt detection of abnormal temperature
		Possible causes: 1.Temperature Sensor socket connector has poor contact; 2.Temperature Sensor is damaged;
		Recommended solutions: 1.Observe temperature display; 2.Switch off 3-phase working power supply and then reboot the system; 3.Contact service personnel
	2.CommErr	Definition: Communication inside PCS fails
		Possible causes: Terminal block connecters of internal communication wires have poor contact
		Recommended solutions: 1.Observe for 5 minutes and see whether the alarm will be eliminated automatically; 2.Switch off 3-phase power supply and then reboot the system; 3.Contact service personnel
	3.ExtFanErr	Definition:

		Cooling fan failure by visual check
		Possible causes: 1.Fan is blocked; 2.Fan service life has expired; 3. Fan socket connecter has poor contact.
		Recommended solutions: 1.Observe for 5 minutes and see whether the alarm will be eliminated automatically; 2.Check for foreign objects on fan blades; 3.Switch off 3-phase power supply and then reboot the system; 4.Contact service personnel
	4.EepromErr	Definition: Internal alarm
		Possible causes: Internal memory has a problem
		Recommended solutions: 1.Observe for 5 minutes and see whether the alarm will be eliminated automatically; 2.Contact service personnel
Protection	1.TempOver	Definition: Ambient or internal temperature is too high
		Possible causes: 1.Ambient temperature outside the PCS is too high; 2.Fan is blocked; 3.Convection airflow is insufficient due to improper installation.
		Recommended solutions: 1.Confirm that external ambient temperature is within the specified range of operating temperature; 2.Check whether air inlet is blocked; 3.Check whether fan is blocked; 4.Check whether the location of installation is appropriate or not; 5.Observe for 30 minutes and see whether the alarm will be eliminated automatically; 6.Contact service personnel
	2.GridV.OutLim	Definition: Grid voltage exceeds the specified range,
		Possible causes: 1.Grid voltage is abnormal; Power grid breaks down 2.Cable connection between the PCS and the grid

		is poor;
		Recommended solutions: 1.Observe for 10 minutes and see whether the alarm will be eliminated automatically; 2.Check whether the grid voltage is within the specified range; 3.Check whether the cable between the PCS and power grid is disconnected or has any fault; 4.Contact service personnel
	3.GridF.OutLim	Definition: Grid voltage frequency is abnormal, or power grid is not detected
		Possible causes: 1.Grid frequency is abnormal; 2.Cable connection between the PCS and the grid is poor;
		Recommended solutions: 1.Observe for 10 minutes and see whether the alarm will be eliminated automatically; 2.Check whether the grid frequency is within the specified range; 3.Check whether the cable between the PCS and power grid is disconnected or has any fault; 4.Contact service personnel
	4. Battery VoltOver*	Definition: Battery voltage exceeds the specified value
		Possible causes: Battery overvoltage
		Recommended solutions: 1.Observe for 30 minutes and see whether the alarm will be eliminated automatically; 2.Check whether Battery voltage exceeds the specified range; 3.Turn off the Battery input switch, wait for 5 minutes, and then turn on the switch again; 4.Contact service personnel
	6.GFCI.Err	Definition: System leakage current is too high
		Possible causes: 1.Excessive parasitic capacitance on Battery module due to environmental factor; 2.Grounding is abnormal; 3.Internal PCS fault

		Recommended solutions: 1.Observe for 10 minutes and see whether the alarm will be eliminated automatically; 2.Detect whether the electrical connection is abnormal 3.Contact service personnel
	8.IntProtect0010~0620	Definition: Internal protection of the PCS
		Possible causes: Protection procedure occurs inside the PCS
		Recommended solutions: 1.Observe for 10 minutes and see whether the alarm will be eliminated automatically; 2.Contact service personnel
Fault	IntFault0010~0150	Definition: Internal fault of the PCS
		Possible causes: Fault occurs inside the PCS
		Recommended solutions: 1.The PCS can be forced to restart once if it is required by operation and if it is confirmed that there is no other problem; 2.Contact service personnel

10 Technical Data

Model Name	CPS ECB200KTL
DC Input	
Max. DC Input Voltage	1500V
Min. DC Input Voltage	875V
Operating DC input Voltage Range (1)	950-1500V (45°C)
Max. DC Input Current	218A
DC Disconnection Type	Load-rated DC Switch
DC Surge Protection	Type II
AC Output	
Rated AC Output Power @ PF>0.99	200kVA / 200kW @ 45°C 170kVA / 170kW @ 50°C
Rated Output Voltage	800Vac
Output Voltage Range (4)	704-880Vac
Grid Connection Type	3-Phase / PE
Max. AC Output Current @ 800Vac	145A
Nominal Grid Frequency / Grid Frequency Range	50Hz (45 – 55 Hz) / 60 Hz (55 – 65 Hz)
Adjustable Reactive Power	-100% to +100%
AC Current THD	< 3% (at nominal power)
DC Current Injection	< 0.5% Inom.
Max. OCPD Rating	285A
AC Surge Protection	Type II
System and Performance	
Max. Efficiency	98.0%
CEC Efficiency	97.0%
Stand-by Consumption	<30W
Environment	
Enclosure Protection Degree	IP66
Cooling Method	Variable speed cooling fans
Operating Temperature Range (2)	-22°F to +140°F/ -30°C to +60°C (derating from +113°F / +45°C)
Operating Humidity	0 to 100%
Operating Altitude (3)	9842.5ft / 3000m (no derating)
Display and Communication	
User Interface and Display	LED indicators, WiFi + APP
PCS Monitoring	CAN/ Ethernet/RS485
Modbus Data Mapping	SunSpec/ CPS
Safety	

Certifications and Standards	IEC 62109, IEC 62477, IEC 61000, IEC 62920, EN 50549-2:2019, EN 50549-10:2022, RfG:2016, NC RfG:2018, PTPiREE:2021, UNE 217001:2020, RD 647:2020, RD 1699:2011, RD 661:2007, RD 413:2014, UNE 217002:2020, NTs Version 2.1, VDE 4110, VDE 4120
Smart-Grid Features	Volt-Ride Thru, Freq-Ride Thru, Ramp-Rate, PF, Volt-Var, Freq-Watt, Volt-Watt
Protection Functions	
Black Start	Yes
Reverse Polarity Protection	Yes
Overvoltage Protection	Yes
Grid Monitoring	Yes
Ground Fault Monitoring	Yes
Active/Reactive Power Response Time	<100mSec.

Table 10-1 Technical parameters

Note 1: When the DC input voltage is lower than 950V or higher than 1500V, the PCS begins derating, as shown in the following figure:

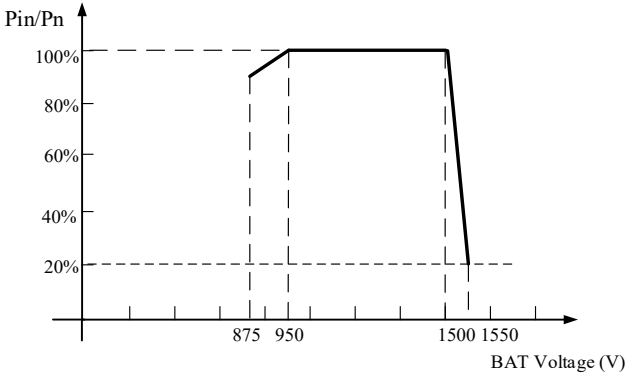


Figure 10-1 ECB200KTL derating curve of Battery input voltage

Note 2: When the ambient temperature is higher than 113℉ (45℃), the output power begins derating in 2%/℃, as shown in the following figure:

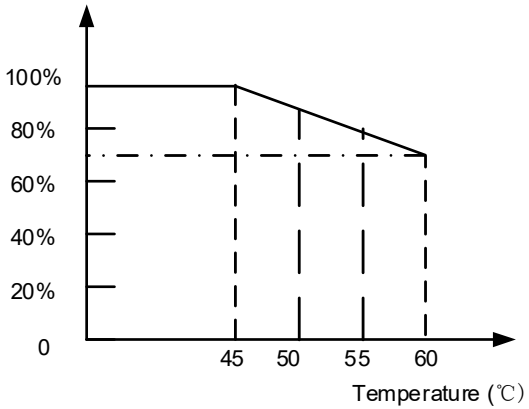


Figure 10-2 ECB200KTL derating curve with high temperature

Note 3: When the altitude is higher than 9842ft (3000m), the power of the PCS needs derating, as shown in the following figure:

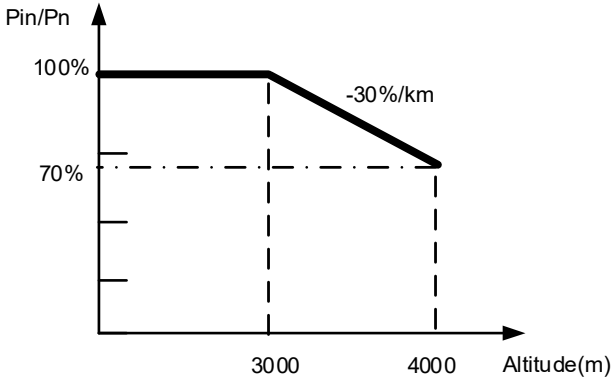


Figure 10-3 ECB200KTL derating curve with high altitude

Note 4: The PCS can output AC power with full loads under 100%~110% of the rated grid voltage. When the grid voltage is lower than rated voltage, AC output will be kept on constant current of rated value.

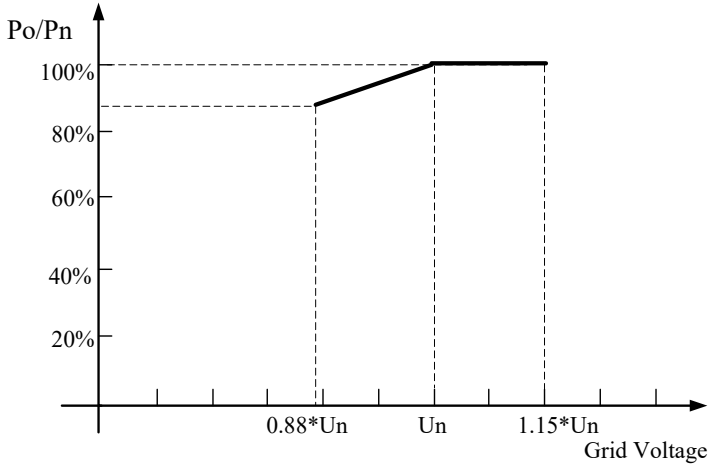


Figure 10-4 ECB200KTL derating curve of grid voltage

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