User Manual

Hybrid Inverter

Ven-3/3.6/4/5/6/6.6G1-LE

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Cautions

- Before using this product, please read the instruction manual carefully.
- Non-professionals should not disassemble the machine, wrong reassembly may cause electric shock or fire. If you need maintenance or repair, please contact the after-sales service center.
- For your safety, please disconnect all power and cables of this equipment before maintenance or cleaning.
- Note: Non-professionals are not allowed to install this device and battery.
- In order to ensure the best working condition of this device, please select the appropriate cable size correctly.
- Please try to avoid using metal tools near the battery. If you must use it, please be careful. Dropping the tool may cause sparks or short circuits on the battery or other electrical components, or even cause an explosion.
- When disconnecting the AC or DC terminals, please strictly follow the installation steps. For details, please refer to the "Installation" section of this manual.
- Grounding Instructions - This equipment should be connected to a permanently grounded wiring system. Be sure to follow local requirements and regulations when installing this equipment.
- Do not short-circuit the AC output and DC input, and do not connect the mains when short-circuited.

1 General Introduction

This manual mainly introduces product information, functional operation, equipment installation and maintenance guidelines. This brochure does not cover all information related to photovoltaics.

1.1 Brief Description

The hybrid inverter intergrate PV power generation and energy storage, it fouse on provide high power generation and stable power supply. It designed according to market requirements of residential and industrial hybrid system. It not only can be used in self-consumprion hybrd system, but also be use for battery back system. To meet different condition, it can work at on-grid and off-grid condition. You can parallel more inverters to meet industrial system require ments.

1.2 Product Features

The hybrid inverter adopts advanced digital control technology, which optimizes the control performance and improves the reliability of the system. The inverter features as below：

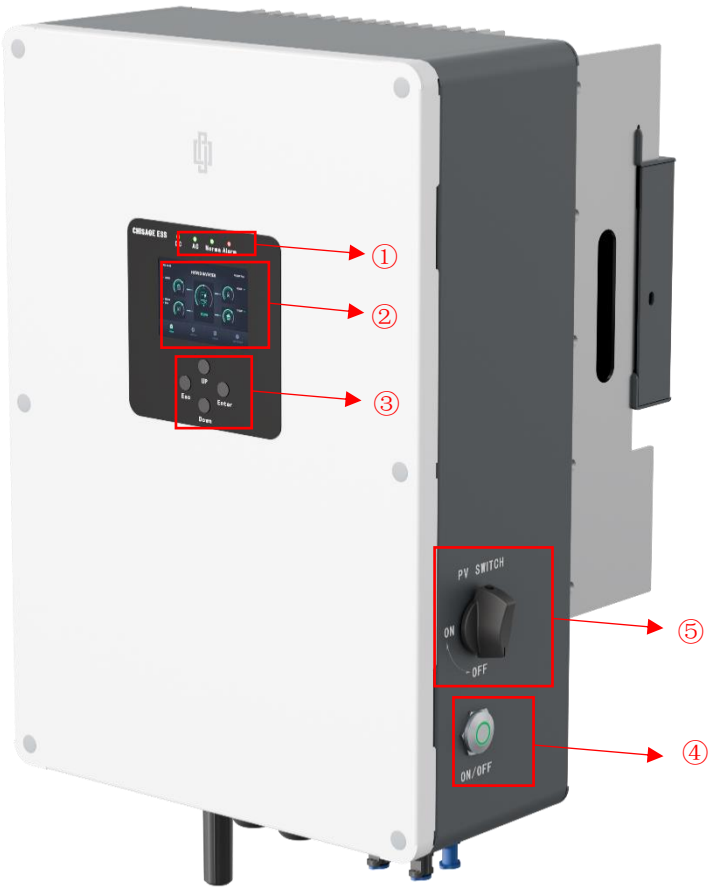
- Intelligent management system and a variety of working modes to meet different customer needs.
- Strong scalability. Support different power inverters parallel, support a maximum of 20 inverters parallel operation.
- Supports on/off-grid work mode switching. Strong overload capability. 110% overload can run for 2 hours. 100% unbalanced load is supported
- Installed a large touch screen color. It also supports computer, mobile phone or Internet remote monitoring, operation and upgrade. The operating information such as inverter and battery mode can be set on the touch screen.
- Protection class IP65. Light weight, small size. Easy to install.
- Two MPPT, flexible module configuration.
- Independent AC input interface for diesel generator. Support storage of energy from diesel generators.
- With intelligent load or AC coupling device interface. Suitable for a variety of scenarios.
- Photovoltaic arc detection optional. With photovoltaic input lightning protection.
- With reactive power regulation function.
- Supports overtemperature, overcurrent, and short circuit protection. Supports anti-island protection and other protection functions. Ensure the safe, stable and reliable operation of the system.

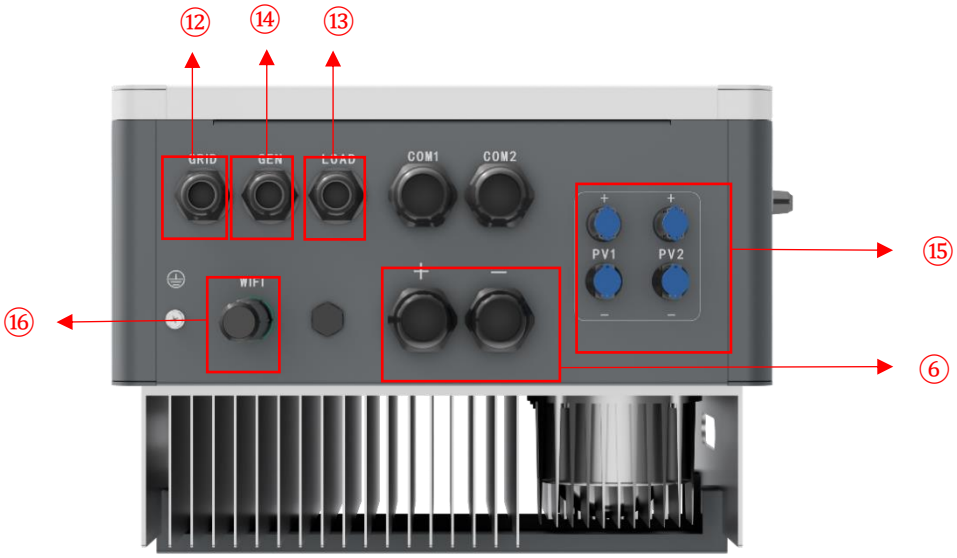
1.3 Product Appearance Introduction

The appearance of this product and its various descriptions are shown in Figure 1.1 and Table 1.1 below.

Table 1.1 Description of product componets

Number	Definition	Description
1	Indicator light	
2	LCD display screen	
3	Function buttons	
4	Battery forced start button	
5	PV input knob	
6	Battery input interface	
7	ModBUS interface	
8	Meter-485 interface	
9	Parallel communication interface	
10	CT and other port	
11	BMS interface	
12	Grid switch	
13	Load interface	
14	Gen interface	
15	PV input interface	With 2 MPPT
16	WIFI interface	


①
②
③
PV SWITCH
ON
OFF
ON/OFF
⑤
④


⑫
⑭
⑬
GRID
GEN
LOAD
COM1
COM2
PV1
PV2
WIFI
⑯
⑮
⑥

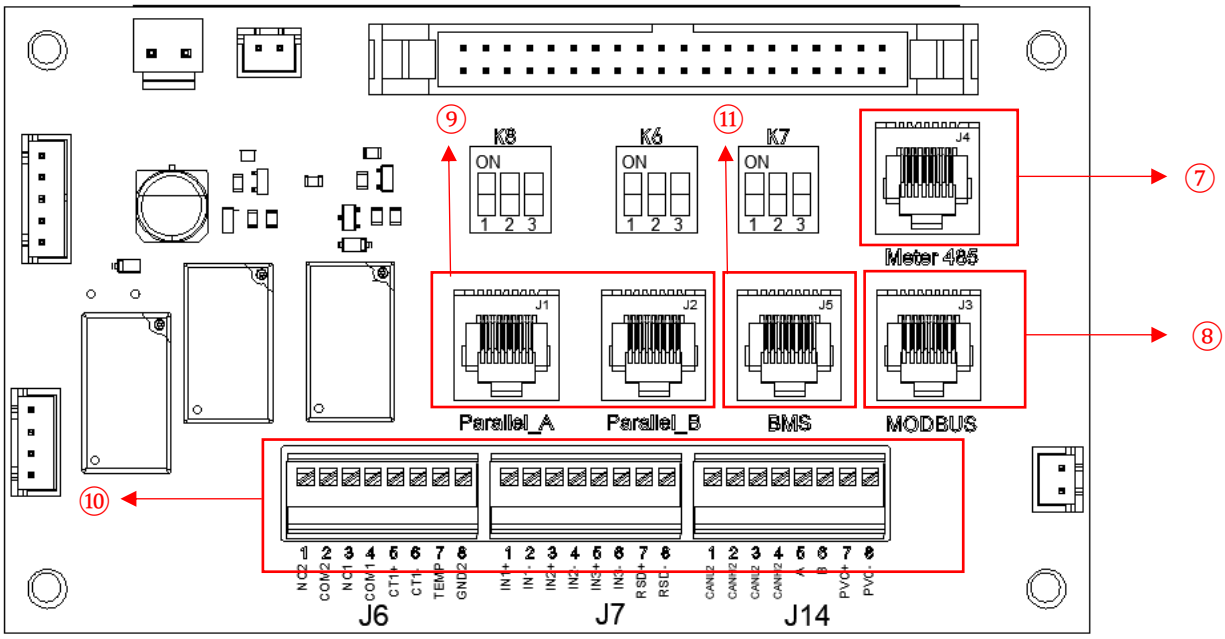
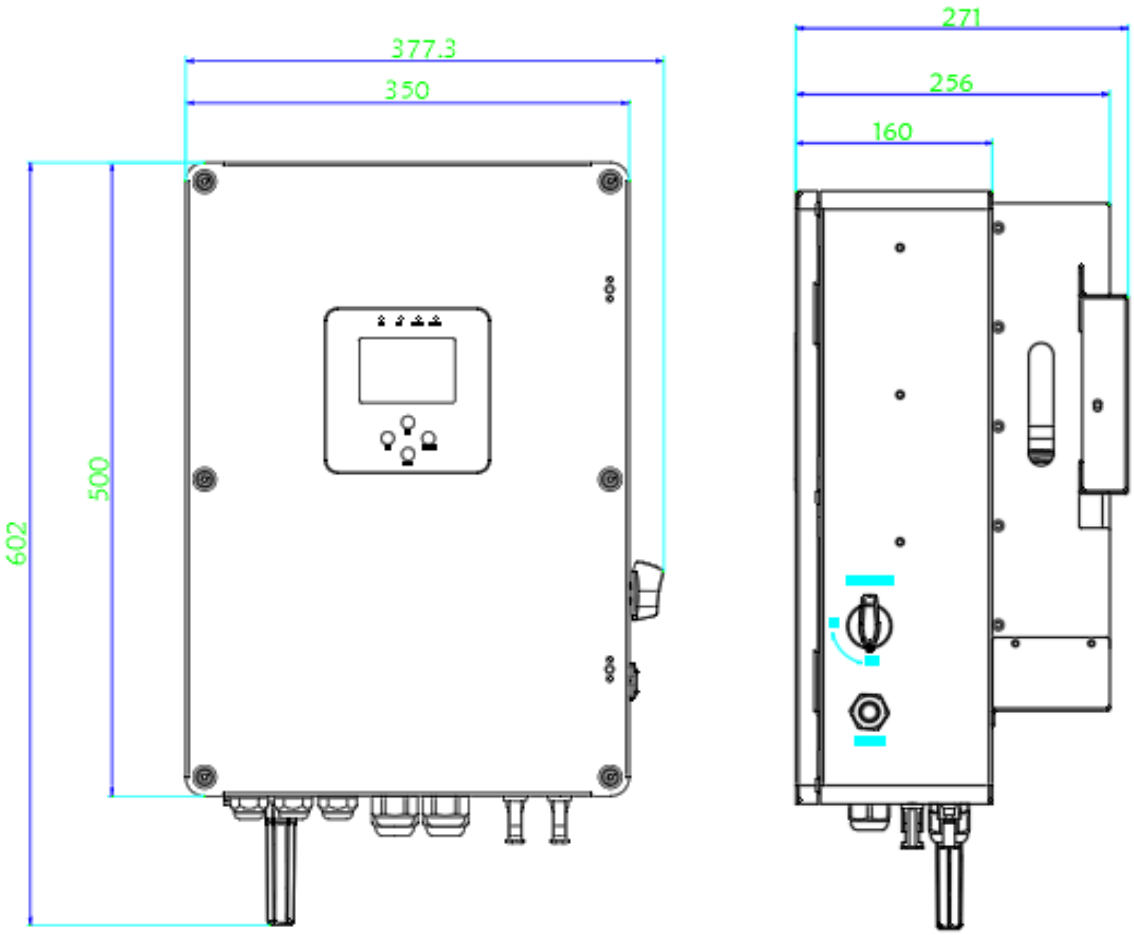
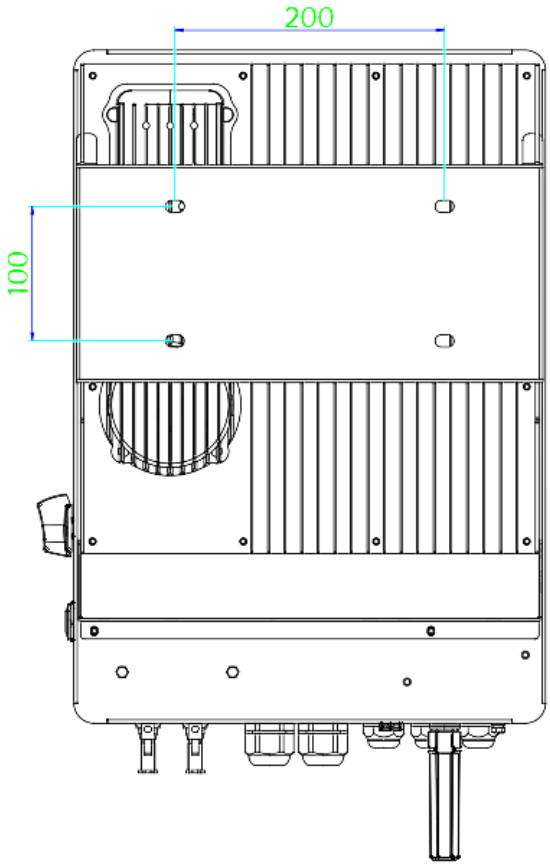


Figure 1.1 Overview of Hybrid Inverter Appearance

1.4 Product Size





- Size W*H*D mm ： 350x500x256.
- Weight kg ： 23 .

1.5 System structure

As shown in Figure 1.2, it shows the basic application of the solar-storage integrated machine, and its complete operating system also includes: diesel generators, power grids, and photovoltaic modules. Depending on your requirements, other possible system architectures are available from your system integrator. The device can power a variety of appliances in a home or office environment, including motor-type appliances such as refrigerators and air conditioners.

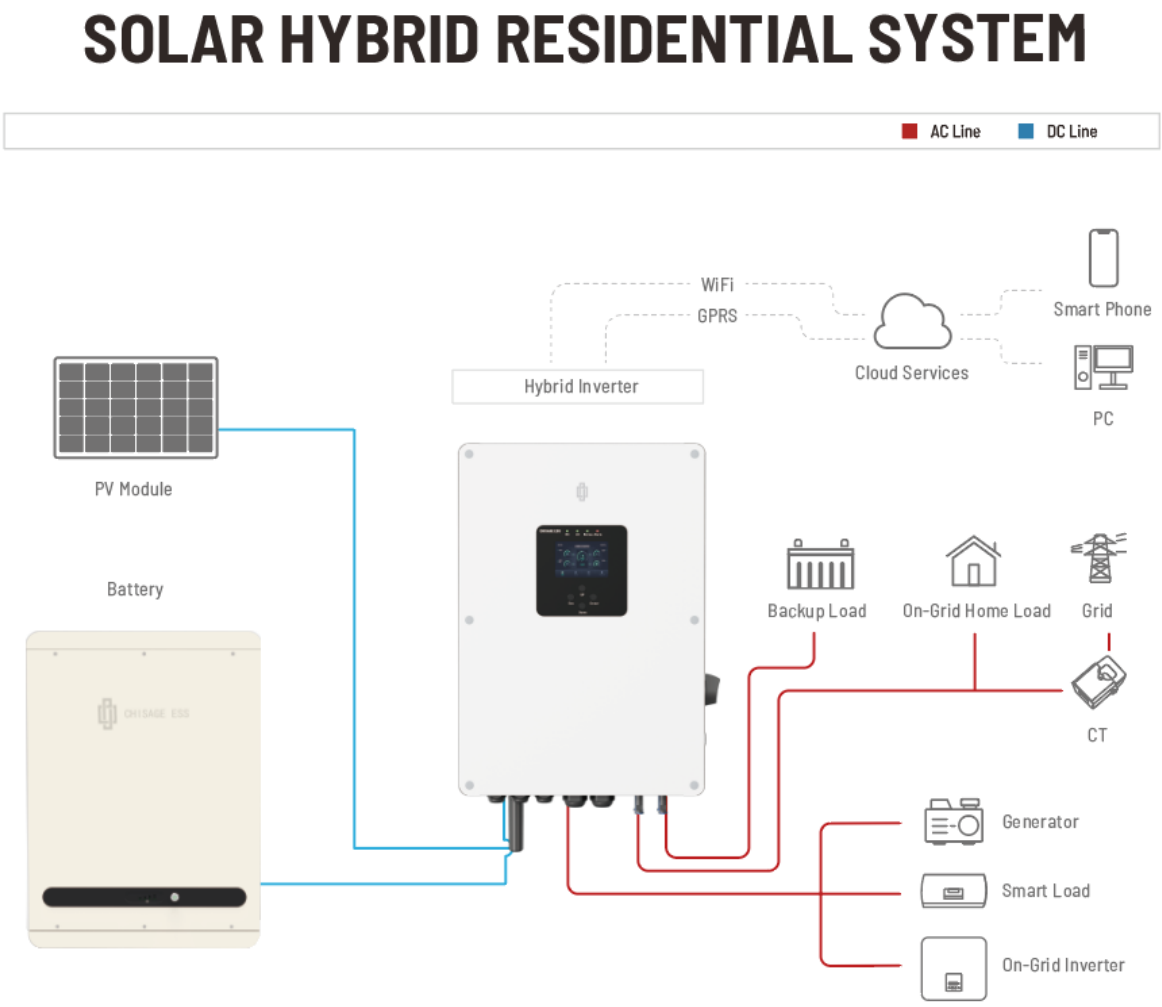


Figure 1.2 Complete operation system of hybrid inverter

1.6 Inverter parameter

The detailed technical specifications of this equipment are detailed in the annex 3.

2 Installation Instructions

2.1 Installation preparation

2.1.1 Installation Notes Reiterated

This device is designed for outdoor use IP65 , please ensure that the installation site meets the following conditions:

- out of direct sunlight.
- Not in areas where highly flammable materials are stored.
- Not in potentially explosive area.
- Do not expose directly to cold air.
- Keep away from TV antennas or antenna cables.

2.1.2 Installation environment, space requirements

To ensure the normal operation of the hybrid inverter, please install the equipment in a controlled environment. At the same time, in order to avoid overheating of the energy storage converter module, please keep the storage device ventilated smoothly. The ventilation holes and fans must not be blocked by sundries. The installation site must meet the following conditions:

1 Close to the power supply, easy to distribute power.

2 Clean and dust-free environment.

3 The altitude does not exceed 2000m, if it exceeds, the relevant national standards need to be installed for derating.

4 The ambient temperature is -45～60℃.

5 No corrosive, explosive and insulating gas and conductive dust, and keep away from heat sources.

6 No vibration and bumps, and the vertical inclination does not exceed 5%.

7 If the energy storage converter module operates in an air-conditioned environment around 20° C , it will improve reliability and prolong service life.

Consider the following points before choosing an installation location:

- For installation, please choose a vertical wall with strong load-bearing capacity, suitable for installation.
- On concrete or other non-flammable surfaces, install as shown in figure 1.3 below.
- Install this inverter at the line of sight level so that the LCD display can be read at any time.
- The ambient temperature should be between-45 ℃ and 60 ℃ to ensure the best operation.
- Please install the equipment in a position with sufficient distance reserved, as shown in figure

2.1 to ensure sufficient heat dissipation and enough space to remove the stitches. For proper air circulation to dissipate heat, leave a gap of approximately 1000mm. Lateral 500mm, upper and lower 500mm, and anterior outflow of 1000mm.

Figure 2.1 recommended reserved distance around the equipment

2.1.3 Installation tool preparation

Phillips screwdriver specification: PH2, moderate length , diameter 5.5mm, 10mm, 13mm wrench or sleeve for M3, M6, M8 outer hexagon screws

2.1.4 Inspection of out-of-box accessories

Please check the equipment before installation. Please make sure that there is no damage to the packing. The package you receive should include the items in Table 2.1, as shown in figure 2.2 below.

Table 2.1 Product list details

Serial number	Item name/specification	Quantity	Remarks
1	Inverter this equipment	1	
2	User manual	1	Place it in the box
3	Shipment inspection report	1	
4	Hardware/screws/stainless steel built-in expansion screws, hexagonal internal expansion bolts, M8*80	4	For securing the chassis
5	4mm/L-type hexagon socket/22mm*66mm	1	Optional
6	Quick Installation Guide	1	
7	Wi-Fi Stick	1	
8	Current sensor/ AKH-0.66 K-￠16 100A/50mA	1	
9	Communication cable/Cat5e super 5 category 5 finished network cable 2 meters long	1	
10	CAN parallel wire/twisted pair shielded wire 2m	1	For parallel operation
11	PV input connector/MC4/line end female end/H4CFD2TMS/nut with pin	2	
12	PV input connector/MC4/line-end male/H4CMD2TMS/nut with pin	2	
13	Smart Meter/ DTSD1352-C	1	Optional
14	Battery Temperature Sensor/NTC Temperature Sensor B3950 10K thermistor, stainless steel waterproof probe 3 meters long	1	Optional
15	Certificate	1	
16	Warranty card	1	
17	PE transparent bag/transparent ziplock bag 160*320	4	Assembly accessories, accessories, etc
18	Excipients / environmental protection / desiccant / 5g / pack	1	Packed in a box

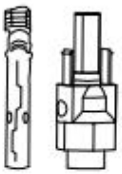
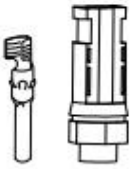
Hybrid Inverter X1	User manual User manual X1	Shipment inspection report Shipment inspection report X1	Certificate of approval Certificate of approval X1
Warranty Card Warranty Card X1	Quick Install Guide Quick Install Guide X1	Stainless steel anti-collision bolt M8X80 X4	Desiccant ×1
 PV input connector/MC4 line end male/H4CMD2TMS/ with pin nut X2	 PV input connector/MC4 line end female/H4CFD2TMS/ with pin nut X2	Wifi-stick X1	(Optional) L-shaped 4mm hexagon wrench X1
Communication cable X 2m	Can parallel line X 2m	NTC Battery Temperature Sensor X1	Sensor Clamp X1
(Optional) Smart Meter X1	Self-sealing bags ×4		

Figure 2.2 Product list details

2.2 Introduction of equipment terminal

The function of the keys near the LCD is shown in figure 2.3.The function of the connection socket and through hole at the bottom of the equipment is shown in figure 2.4. the function of the button and knob on the side of the equipment is shown in figure 2.5. the internal and external interface board of the equipment is shown in figure 2.6. the corresponding terminal function is shown in Table 2.2.

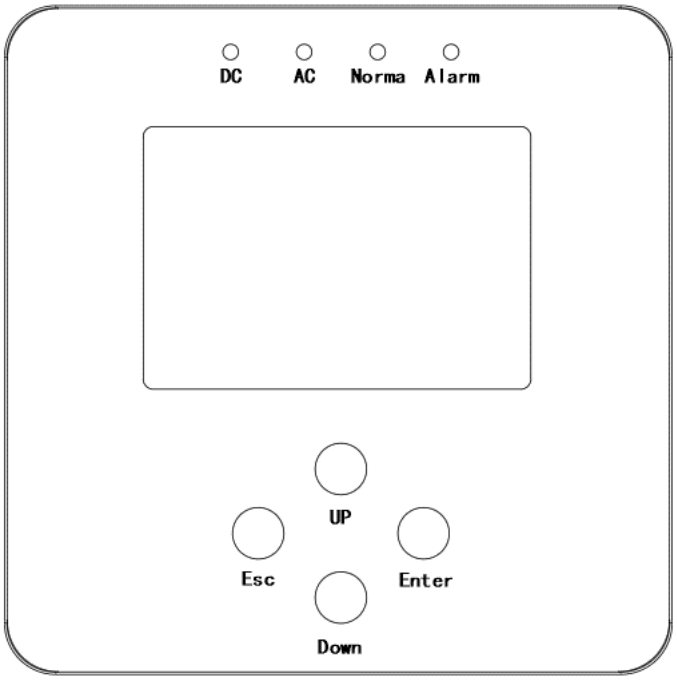


Figure 2.3 key definition near LCD

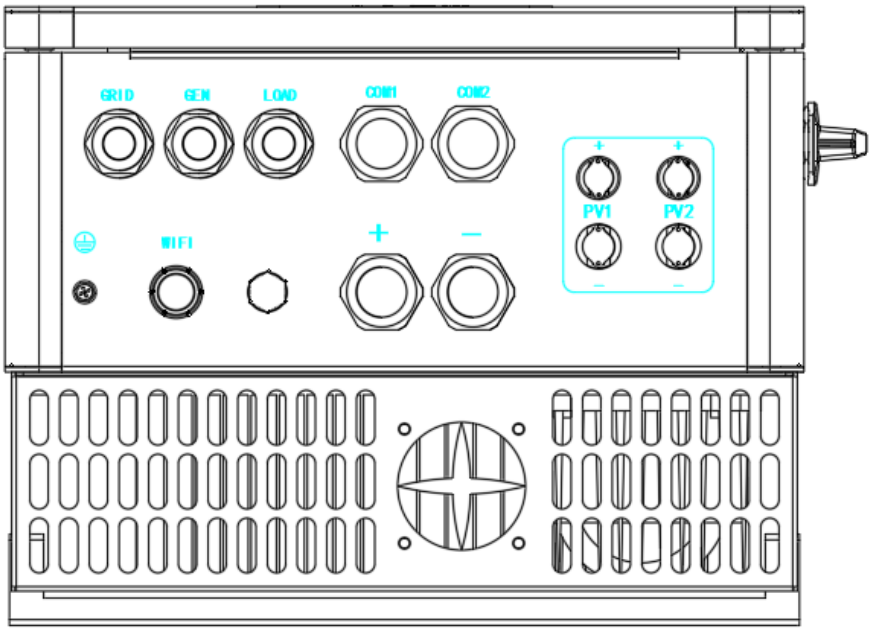


Figure 2.4 definition of socket terminal at the bottom of the device

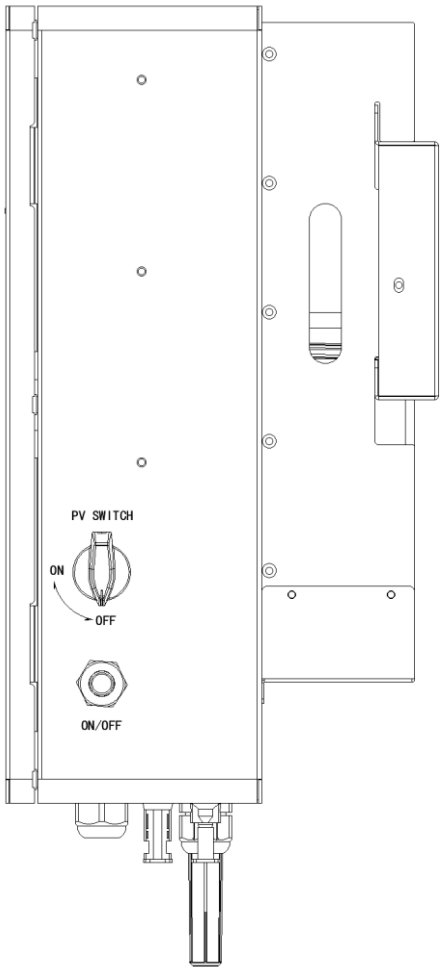


Figure 2.5 definition of side buttons and knobs on the device

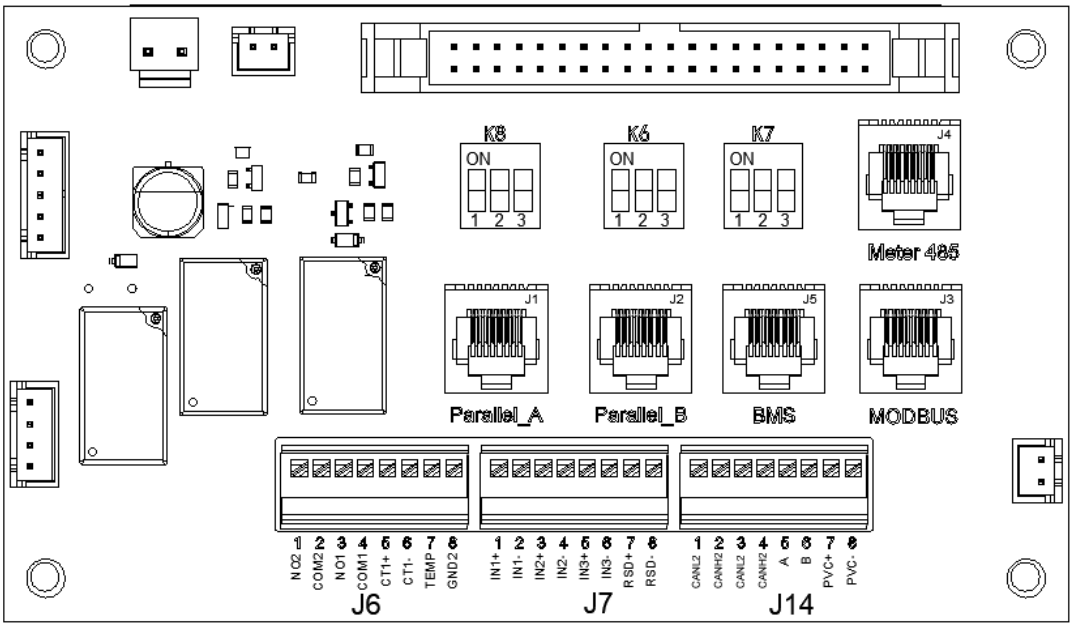


Fig. 2.6 schematic diagram of internal and external interface board of equipment

Table 2.2 definition of device internal external interface board

MARK	J6-1	J6-2	J6-3	J6-4	J6-5	J6-6	J6-7	J6-8
Definition	NO2	COM2	NO1	COM1	CT1+	CT1-	BAT-TEMP	ISOGND2
Function	Reserved		Gen start control		External A-phase CT1 sampling input		Battery temperature sampling input	
MARK	J7-1	J7-2	J7-3	J7-4	J7-5	J7-6	J7-7	J7-8
Definition	IN1+	IN1-	IN2+	IN2-	IN3+	IN3-	RSD+	RSD-
Function	Reserve for spare						+12Voutput	12VGND
MARK	J14-1	J14-2	J14-3	J14-4	J14-5	J14-6	J14-7	J14-8
Definition	CANL2	CANH2	CANL2	CANH2	RS485A1	RS485B1	PV C	PV C
Function	Parallel CAN communication				Meter communication		PV control	
RJ45-	1	2	3	4	5	6	7	8
BMS	RS485B3	RS485A3	NC	CANH	CANL	NC	RS485A3	RS485B3
Function	BMS-485 communication			BMS-CAN communication			BMS-485 communication	
Parallel_A	CANH1	CANL1	SNY-01	SNY-02	ISOGND1	ISOGND1	CAN-SMH	CAN-SML
Function	Parallel synchronous communication							
Parallel_B	CANH1	CANL1	SNY-01	SNY-02	ISOGND1	ISOGND1	CAN-SMH	CAN-SML
Function	Parallel synchronous communication							
Meter_485	RS485B1	RS485A1	NC	NC	NC	NC	RS485A1	RS485B1
Function	Meter communication						Meter communication	
MODBUS	RS485B4	RS485A4	NC	RS485B2	RS485A2	NC	RS485A4	RS485B4
Function	EMS monitoring			Reserve background monitoring communications			EMS monitoring	

2.3 Wall mount

Warm reminder, the equipment is very heavy, please take it out carefully!

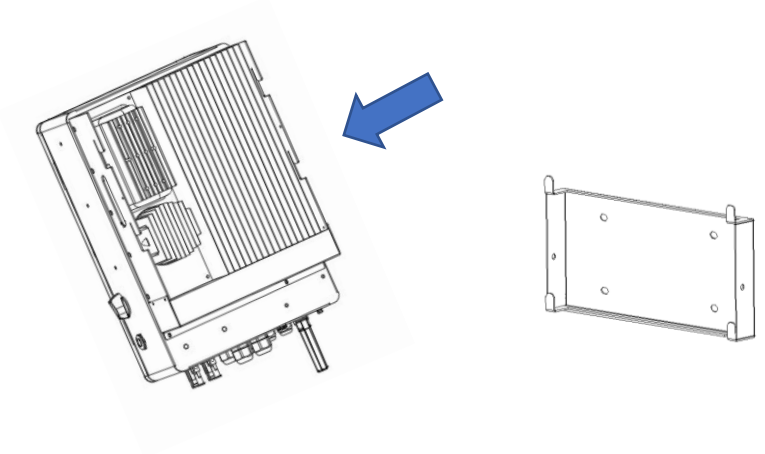


Figure 2.7 schematic diagram of device bracket removal

- Separate the large bracket from the back of the device and mark the four bolt positions in the middle of the large bracket panel (250X200mm) on the installation wall;.
- Select the recommended bit shown in figure 2.8 below to drill 4 holes in the wall with a depth of 52-60 mm.
- Use a suitable hammer to install the expansion bolts into the holes (all four holes shown in the figure need to be installed with expansion screws. The current figure only uses a single screw as an installation diagram. The installation method of the other three screws is the same as the figure), fix the rear cover to the bolts on the wall, and tighten the screw heads of the expansion bolts.
- Carry the device and hold it, making sure the inverter mounting holes of the device are aligned with the large bracket of the rear cover, and fix the device to the rear cover that has been fixed on the wall.
- Ensure that the four bolt holes on the side of the device and the rear cover are aligned, and tighten the four bolts on the side of the device and the rear cover to complete the installation.

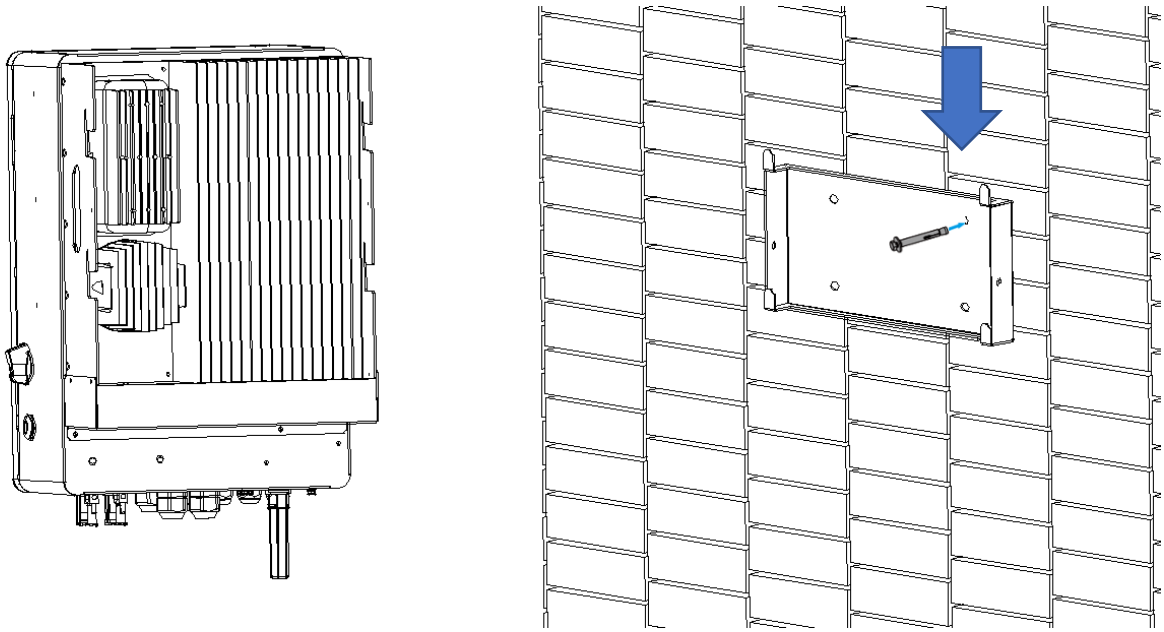


Fig. 2.8 schematic diagram of borehole location

2.4 Battery wiring work

For safe operation and compliance, a separate DC circuit breaker is required between the battery and the equipment. In some applications, switchgear may not be required, but circuit breakers still need to be disconnected. For the required fuse or circuit breaker specifications, please refer to the typical data selection in Table 2.3 below.

2.4.1 Battery Power Cable Wiring

For your safety and efficient operation of the equipment, please connect the battery with a suitable cable to reduce the risk of injury. You can also refer to the recommended cable shown in Table 2.3.

Table 2.3 Recommended cable example

	Rated Power	Cable size	Cable size mm^2	Torque value
Bat side	6Kw	2AWG	35	38.2Nm
	5Kw	2AWG	35	31.8Nm
	4Kw	6AWG	16	25.5Nm
	3Kw	8AWG	10	19.1Nm

	Rated Power	Cable size	Cable size mm^2	Beeaker Current
AC side	6Kw	10AWG	6	40A
	5Kw	12AWG	4	30A
	4Kw	12AWG	4	30A
	3Kw	14AWG	2.5	20A

All wiring must be carried out by professionals!

Please select the appropriate battery cable and bolt, find the "Battery end hole" in the schematic diagram of "Figure 2.8 Definition Diagram of Socket Terminal at the Bottom of Equipment", and insert the cable into the correct through hole. Tips: Please pay attention to the positive +, negative - corresponding wiring . Use a suitable screwdriver to unscrew the bolt, install the battery cable terminal, and then use the screwdriver to tighten the bolt to ensure that the bolt is tightened, the torque is 24.5Nm, clockwise, to ensure that the polarity of the battery and inverter is correctly connected. Before making the final DC connection or closing/disconnecting the DC breaker, make sure that the battery positive + must be connected to the inverter positive + and the battery negative - must be connected to the inverter negative - . Reversed battery connections can damage the device.

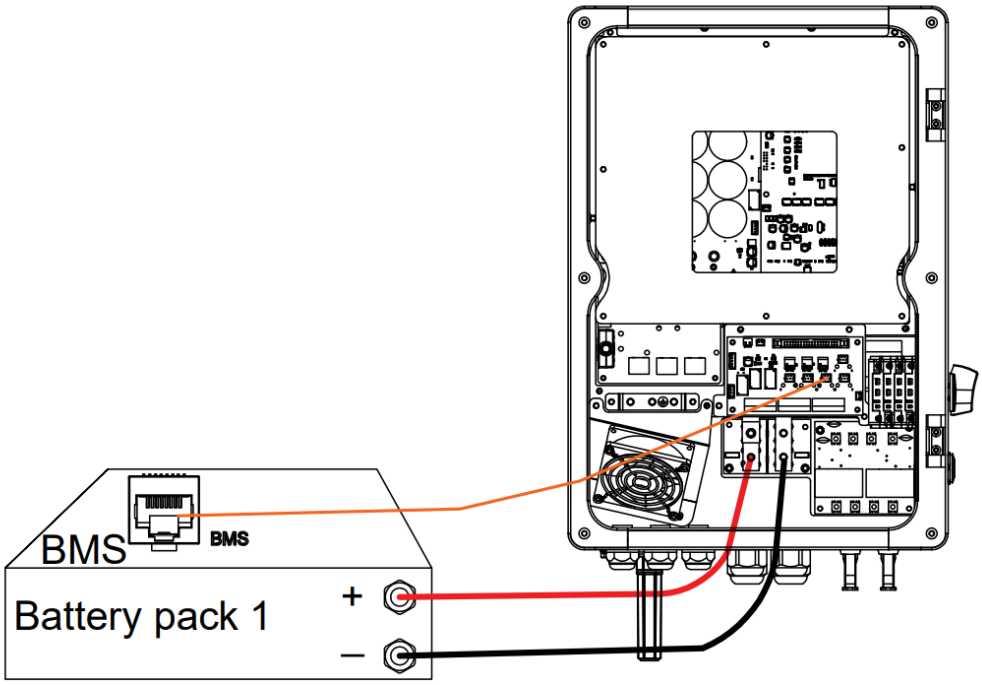


Figure 2.9 Schematic diagram of battery communication connection

2.4.2 Battery communication cable connection

As shown in Figure 2.9, connect the BMS of BAT_PACK to the BMS network port of the device in the figure. The definition of the communication connection line is shown in Table 2.2. (In the actual wiring process, the BMS communication line and the battery line need to be routed from the corresponding ports. This schematic diagram is only used to illustrate the specific location of the wiring position.)

2.5 Power grid, load, GEN wiring

Before connecting to the grid, please install a separate AC circuit breaker between the device and the grid. In addition, it is recommended to install an AC circuit breaker between the standby load and the device. This ensures that the inverter can be safely disconnected during maintenance and fully protected from overcurrent. The recommended cable size and circuit breaker current are shown in Table 2.3.

There are three terminal blocks marked with "Grid", "Load" and "GEN". Please do not connect the input and output connectors by mistake. In addition, the GEN port can be connected to the oil generator, smart load or AC coupling unit (grid-connected inverter). After the actual wiring is completed, you need to set the corresponding interface type on the LCD. For details on the setting

method, please refer to Chapter 3, Section 3.2.3 Oil Generator Port Function Setting.

All wiring must be performed by qualified personnel. Using the appropriate cable for AC input connection is very important for the safe and efficient operation of the system. To reduce the risk of injury, please use the correct recommended cable as shown in Figure 2.10 below.

Please make sure that the AC side power supply is open before connecting.

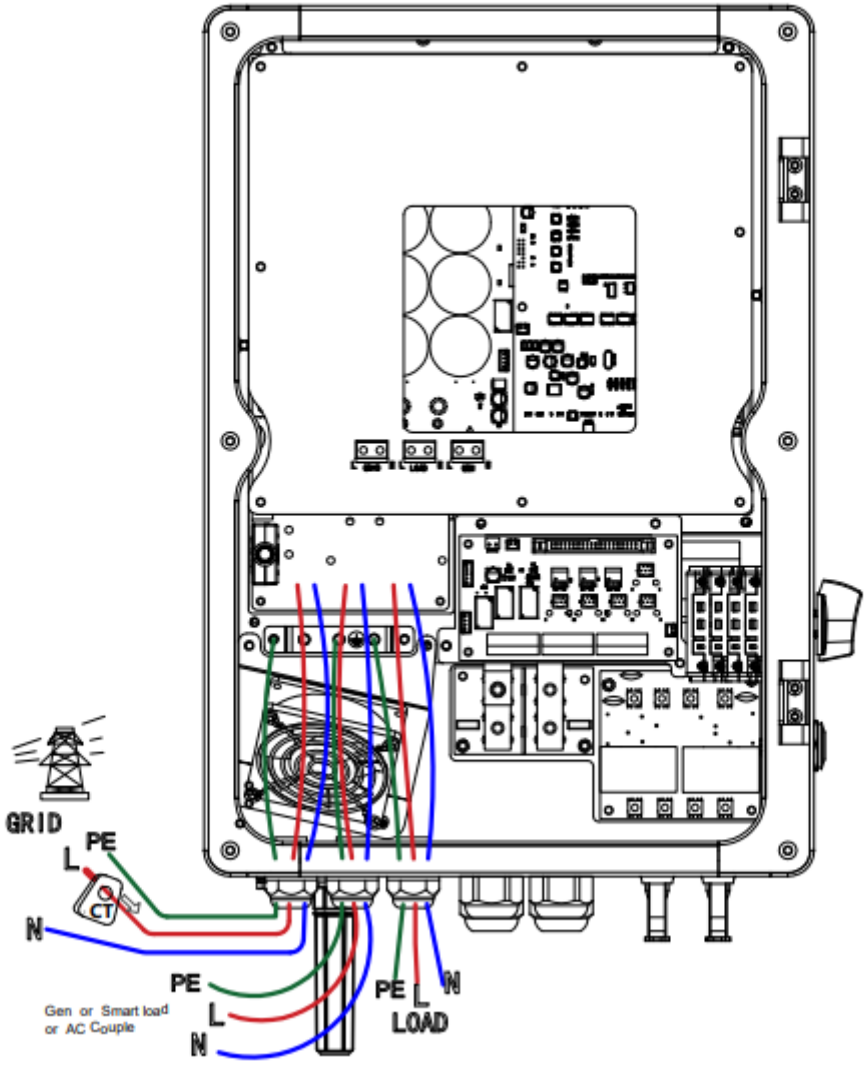


Figure 2.10 connection of power grid, load and generator

Follow these steps to connect the Grid grid, Load load, and Gen generator ports:

- Be sure to turn off the AC circuit breaker or isolation switch before connecting the power grid, load, and generator.
- Remove the 10mm long insulating sleeve, unscrew the bolts, insert the wire according to the polarity marked on the terminal, and tighten the wiring screw. Make sure the connection is

complete.

- Then insert the AC output wire according to the polarity marked on the terminal and tighten the terminal. Be sure to connect the corresponding N and PE wires to the relevant terminals to ensure that the wires are firmly connected.
- Electrical appliances such as air conditioners need at least 2-3 minutes to restart because they need enough time to balance the refrigerant gas in the loop. If a power shortage occurs and recovers within a short period of time, it will cause damage to the equipment you are connected to. To prevent such damage, check whether the air conditioner manufacturer is equipped with a delay function before installation. Otherwise, this equipment will trigger an overload failure and cut off the output to protect your equipment, but sometimes it will still cause internal damage to the air conditioner.

2.6 Photovoltaic wiring

Before connecting the photovoltaic module, install a separate DC circuit breaker between the device and the photovoltaic assembly. Connecting photovoltaic modules with appropriate cables is very important for the safe and efficient operation of the system. To reduce the risk of injury, the recommended cable size is 12AWG, each 4mm^2 cable.

To avoid any failure, do not connect any photovoltaic components that may leak to the device. For example, a grounded photovoltaic module can cause current leakage to the device. Photovoltaic junction boxes with surge protection are required. Otherwise, when the photovoltaic module is struck by lightning, the equipment will be damaged.

When using photovoltaic modules, make sure that there is no grounding.

- When using photovoltaic modules, make sure that there is no grounding：

1.The open circuit voltage Voc of the photovoltaic module does not exceed the maximum open circuit voltage of the photovoltaic array photovoltaic integrated storage machine.

Table 2.4 description of photovoltaic module selection

Item	3KW	3.6KW	4KW	5KW	6KW	6.6KW
PV Input Voltage	370V(125V~500V)					
MPPT Range	150V~425V					
No. of MPPT Tracker	2					
No. of String Per MPPT Tracker	1+1	1+1	1+1	1+1	1+1	1+1

2.The open circuit voltage Voc of the photovoltaic module should be higher than the minimum starting voltage of the integrated photovoltaic storage machine.

- Photovoltaic module wiring

1 Turn off the main AC circuit breaker of the power grid.

2 Close the DC circuit breaker.

3 Assemble the photovoltaic input connector as shown in Figure 2.11 at the bottom of the device.

Safety tips: Do not ground the positive or negative electrode of the photovoltaic panel device, otherwise it will seriously damage the inverter.

Safety tip: Before connecting, please ensure that the polarity of the output voltage of the photovoltaic panel device is consistent with the "DC+" and "DC-" symbols.

Safety tip: Select a qualified DC cable: 4~6mm2 12~10AWG single cable .

Safety tip: Before connecting the inverter, ensure that the open circuit voltage of the photovoltaic panel device is within 500V

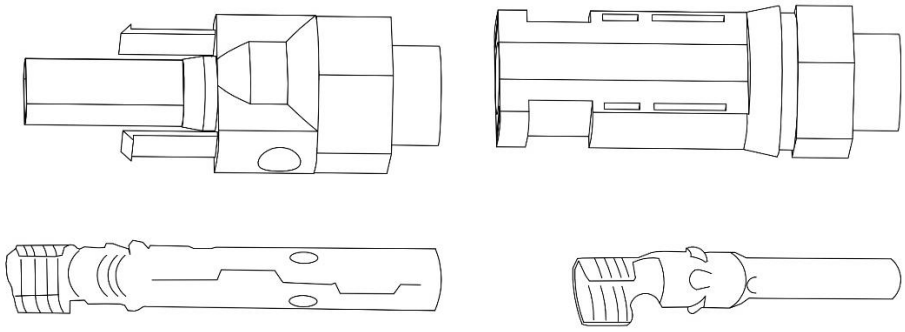


Figure 2.11 Photovoltaic input connector: DC+ connector left DC-Connector right

- The steps for assembling DC connectors are as follows：

1.Peel off the DC line about 7mm and remove the connector cover nut see figure 2.12 .

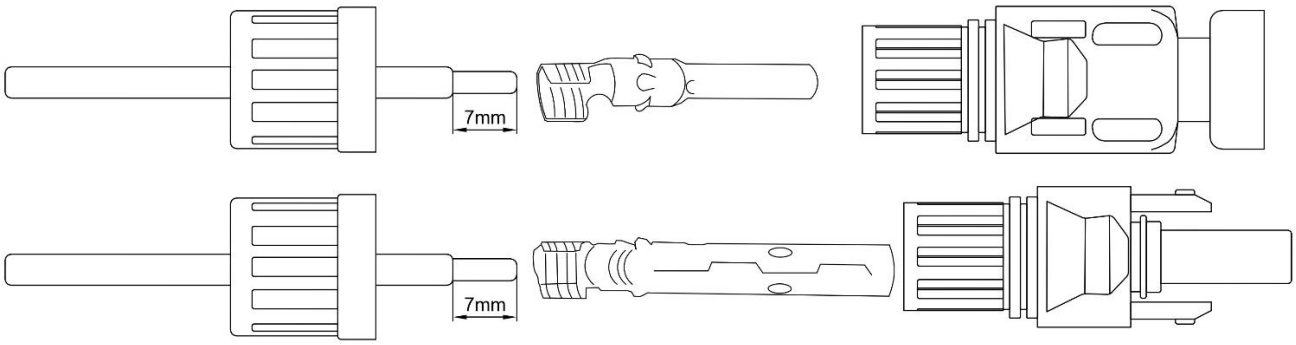


Figure 2.12 Connector cover nut

2.Crimp the metal terminal with crimping pliers, as shown in figure 2.13.

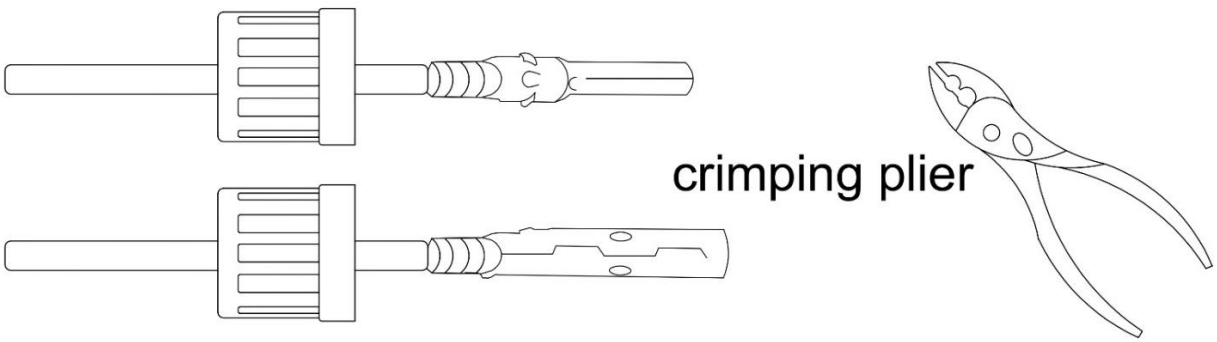


Figure 2.13 Crimping clamp crimping metal terminal

3.Insert the stylus into the top of the connector and screw the cover nut to the top of the connector. figure 2.14 .

4.Finally, insert the photovoltaic DC connector into the positive and negative input of the Hybrid inverter, as shown in figure 2.15.

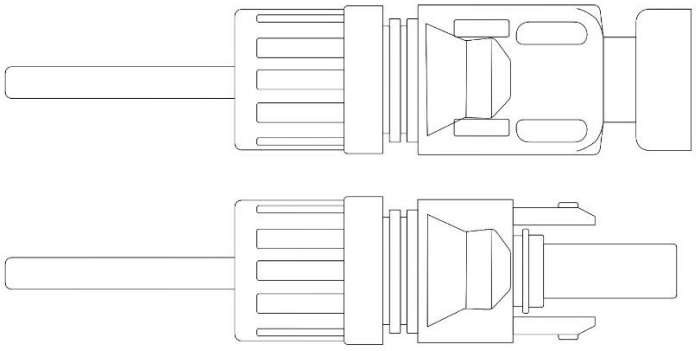


Figure 2.14 Stylus inserted into the top of the connector

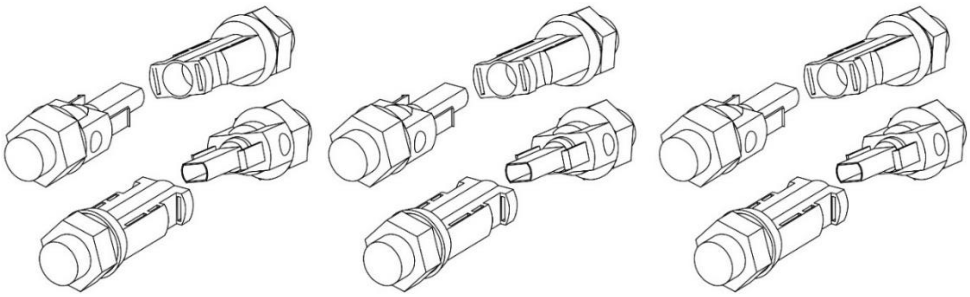


Figure 2.15 The DC connector is inserted into the positive and negative input of the hybrid inverter equipment.

Warning: sunlight on the panel will generate voltage, high voltage series may be life-threatening. Therefore, before connecting the photovoltaic DC input line, the solar panels need to be blocked by opaque materials, and the DC switch should be turned off, otherwise the high voltage of the equipment may be life-threatening.

2.7 CT wiring

In the power grid cable, as shown in figure 2.16, three current transformers are passed through three phases, the direction arrow of the transformer faces the equipment side, and the transformer sampling line reaches the internal interface board J6 sampling terminal through the equipment COM3 through hole. At the same time, the J6 terminal is connected to the battery temperature sampling signal line.

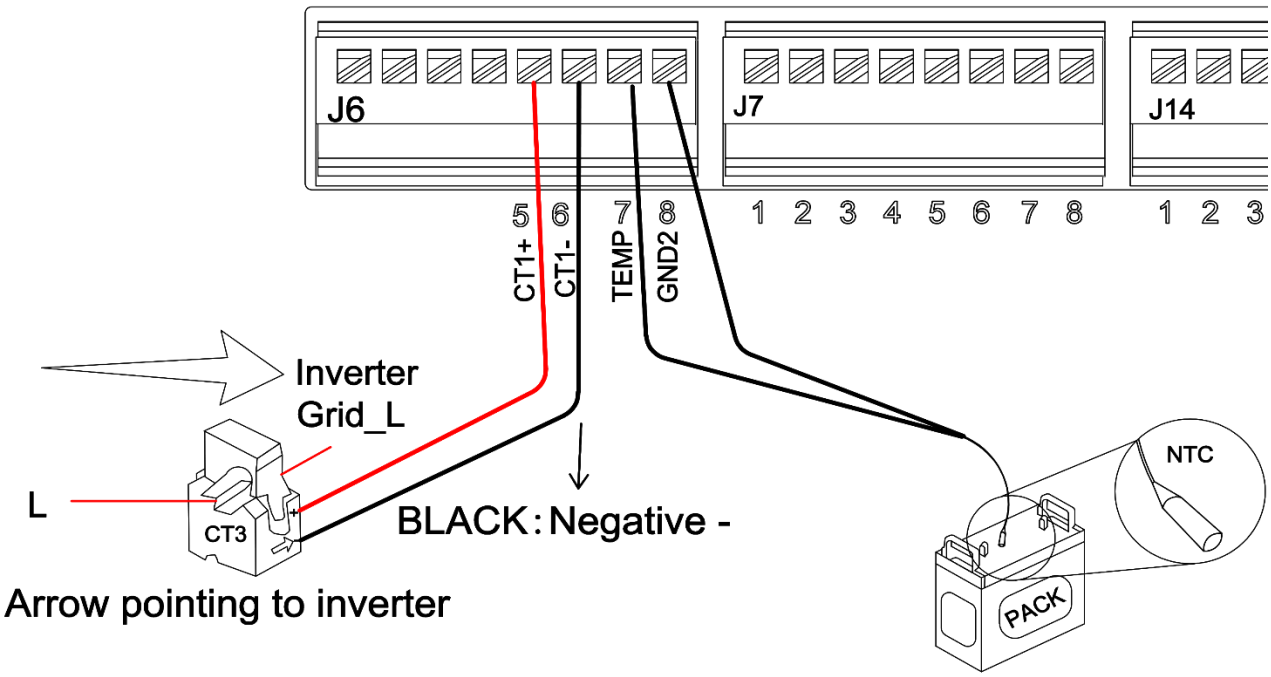


Figure 2.16 schematic diagram of external CT wiring and battery temperature sampling wiring

2.8 Meter connection

As show in figure. 2.17 Meter wiring diagram.The line shows the Eastron SDM230 is connected. See the actual model wiring.

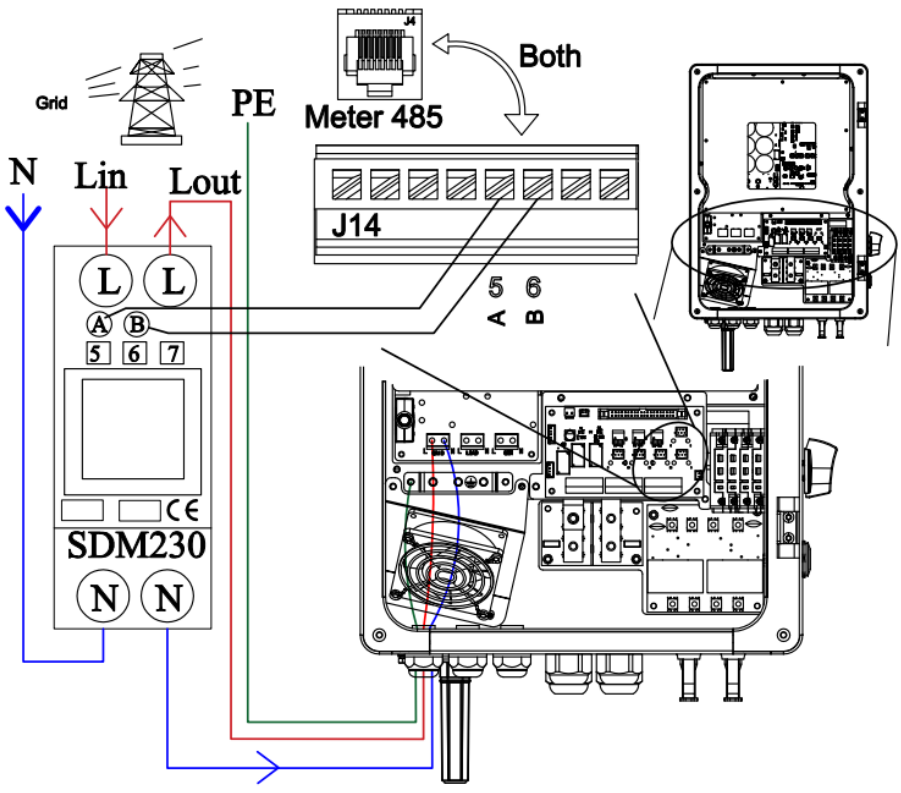


Fig. 2.17 Meter wiring diagram

2.9 Ground connection

To prevent electric shock, connect the ground cable on the power grid side to the inverter. Fasten the bottom line in the "ground" bolt hole as shown in Figure 2.18 ⏚.

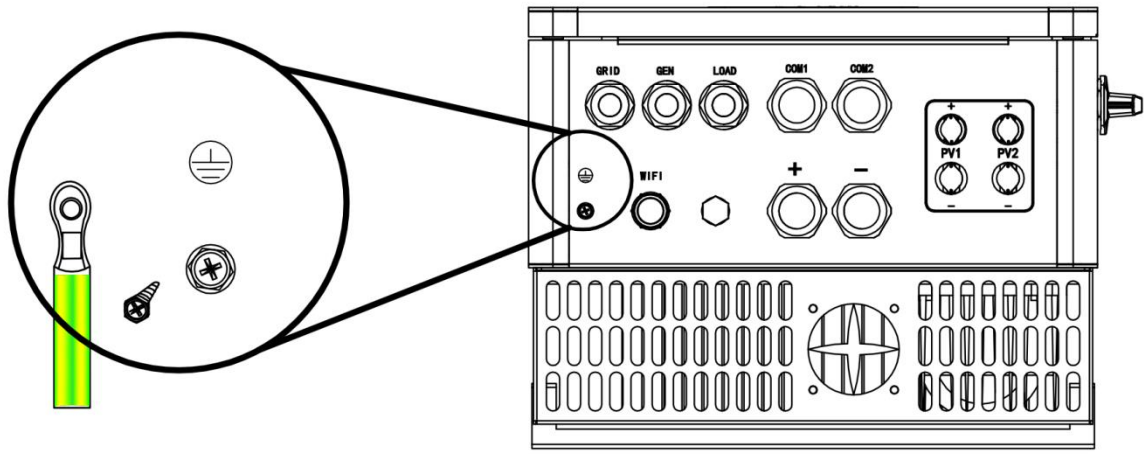


Fig. 2.18 Schematic diagram of equipment grounding

2.10 WIFI connection

For the configuration of Wi-Fi, please refer to the schematic wiring of Wi-Fi socket, and refer to the user manual of WIFI socket for details.

2.11 Stand-alone operation system diagram

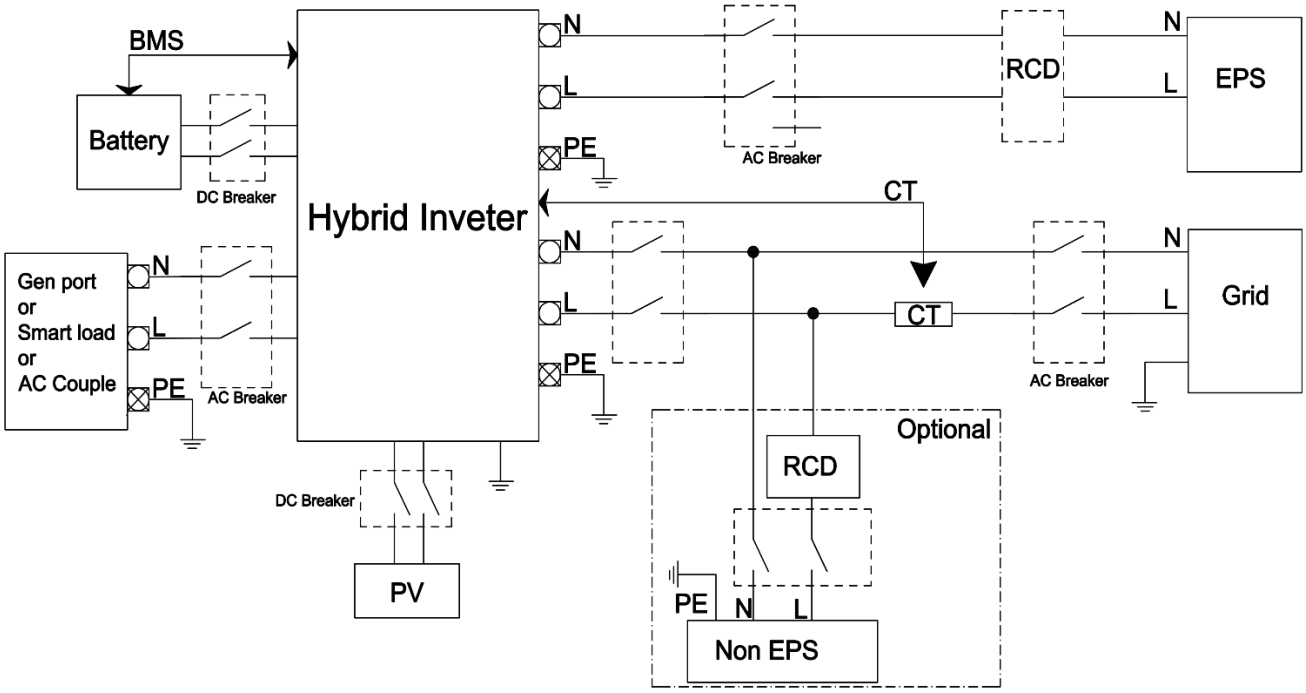


Figure 2.19 schematic diagram of stand-alone wiring

3 Display and setup

3.1 Run data display instructions

Note: All LCD passwords are 888888

The LCD screen topology is shown in Figure 3.1, and the main interface is shown in Figure 3.2. The main screen displays information including solar energy, grid, load and battery, and the icon in the upper right corner is "Settings".

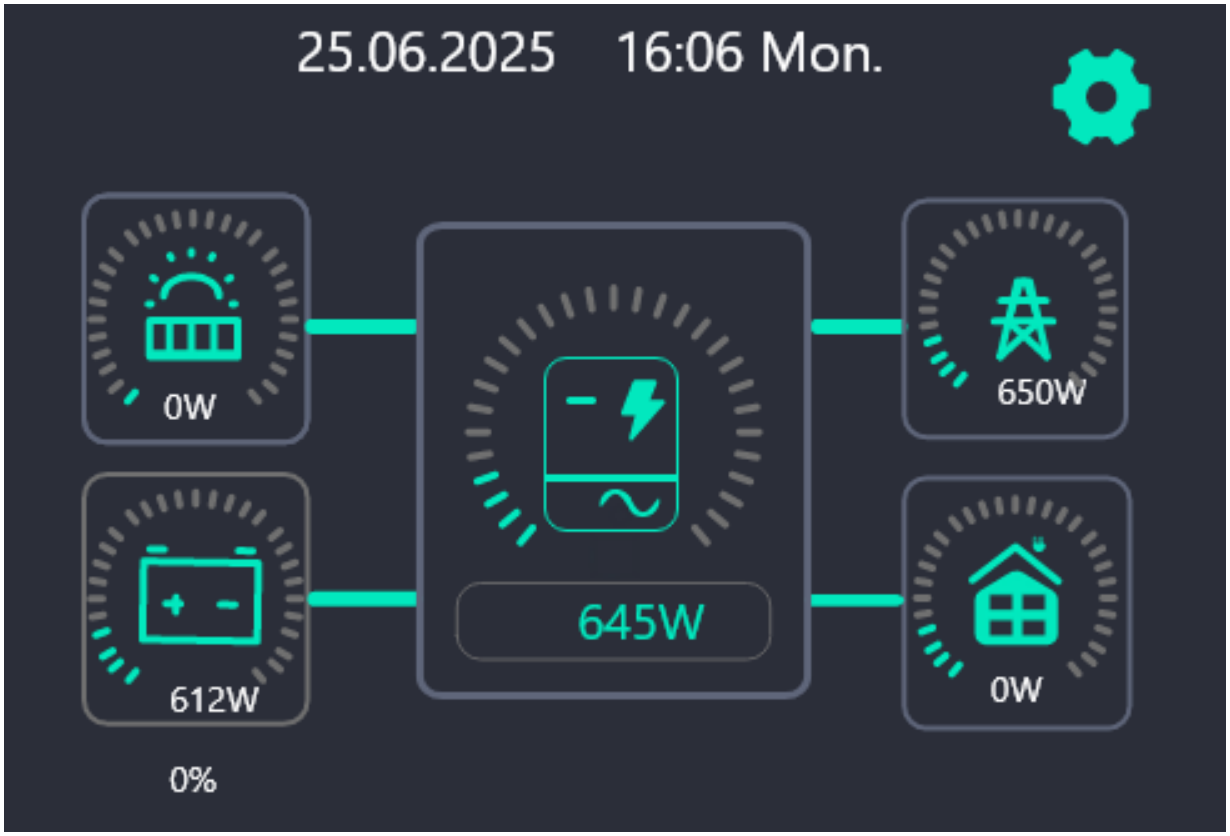


Figure3.2 LCD Main interface

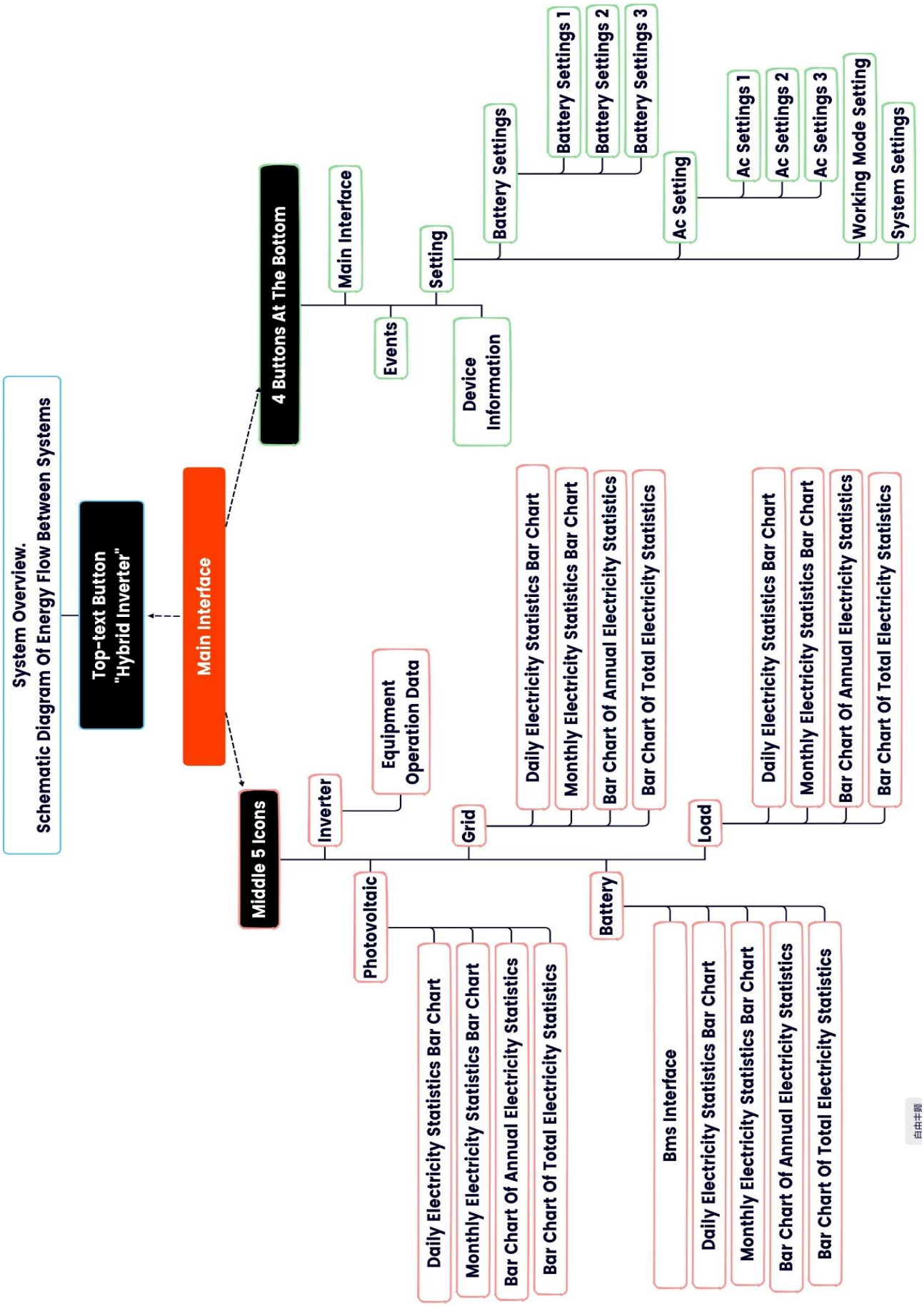


Figure3.1 LCD Topology structure diagram

3.1.1 Photovoltaic data

Click the photovoltaic panel icon on the main interface to view the photovoltaic voltage, current, daily and total power generation and photovoltaic stage. Click the arrow on the right side of the interface to view its annual, monthly, daily and daily power statistics. Click DEL on this interface to delete all photovoltaic power statistics. See Figures 3.3 to 3.7 below.

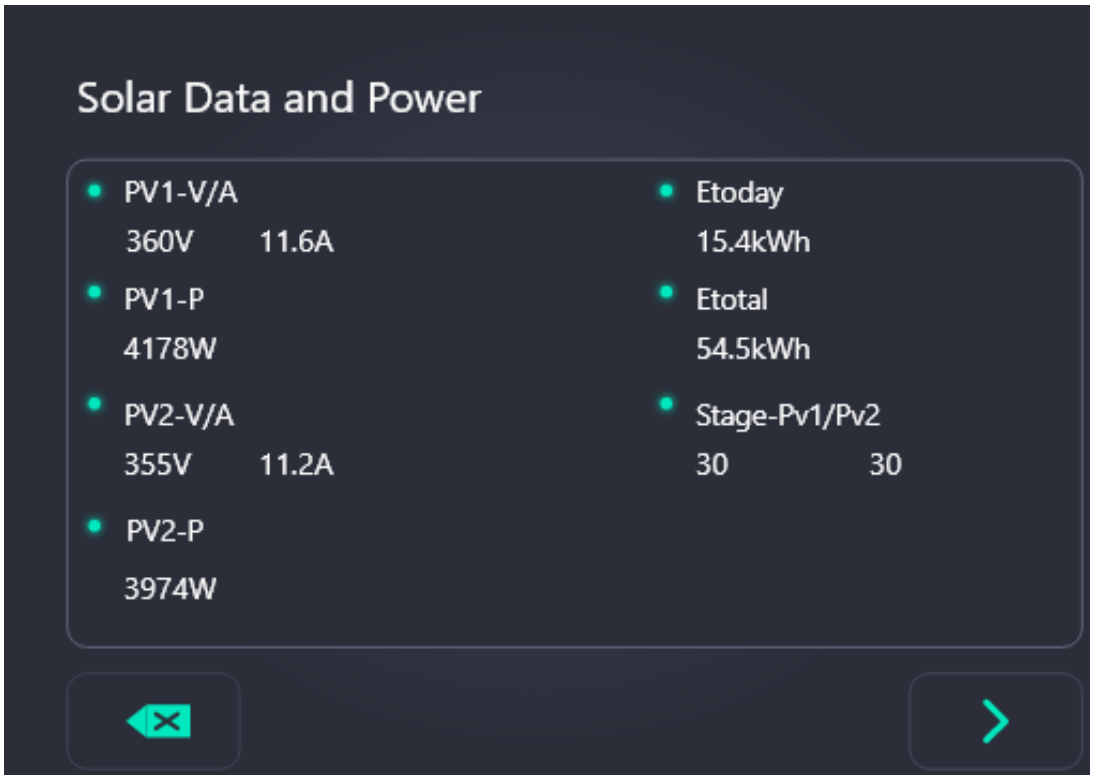


Figure 3.3 Photovoltaic data

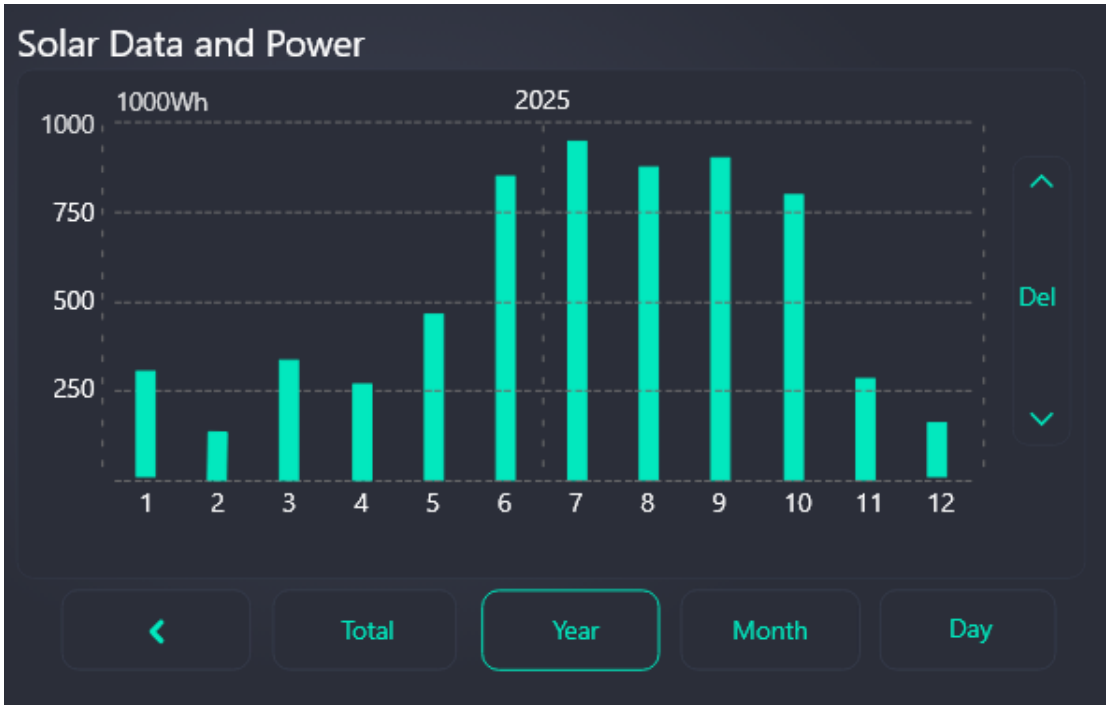


Figure 3.4 Annual Statistical Data of Photovoltaic Power Generation

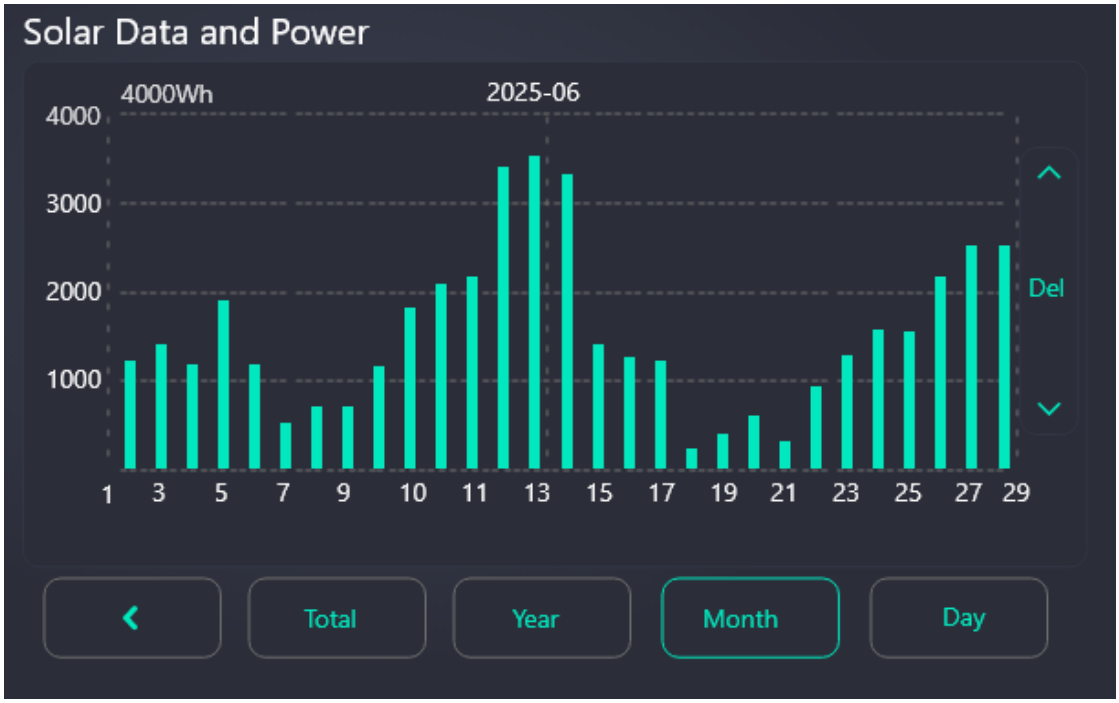


Figure 3.5 Monthly Statistical Data of Photovoltaic Power Generation

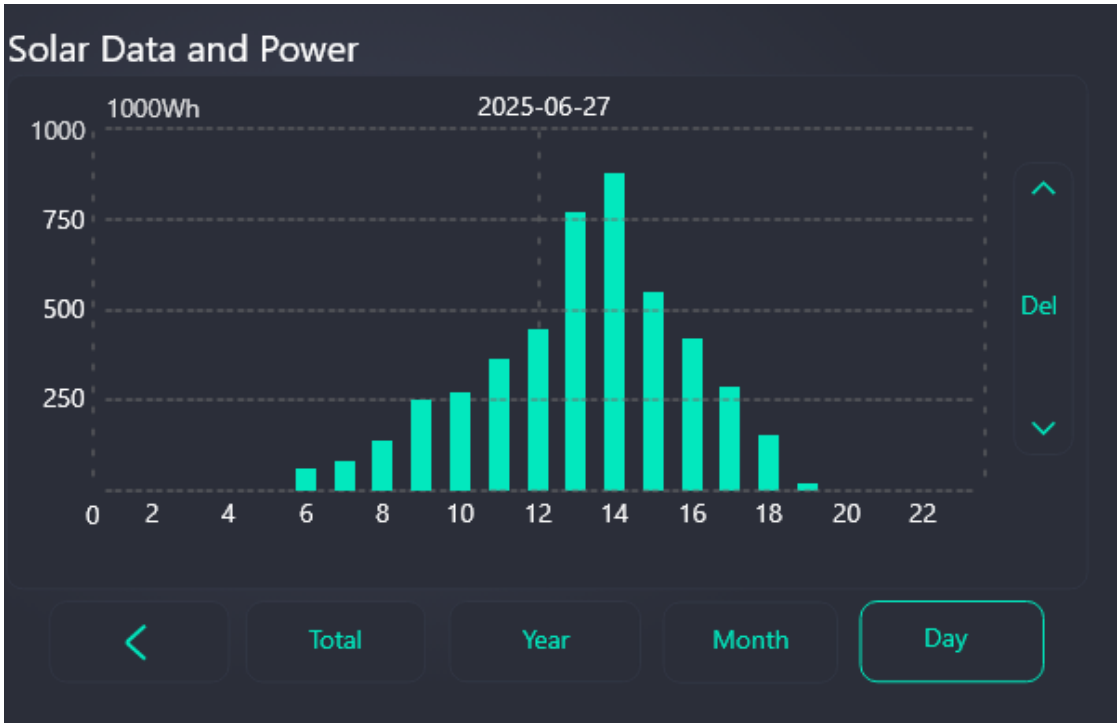


Figure 3.6 Daily statistical data of photovoltaic power generation

Table3.1 PV stage illustrate

Stage	Number	Illustrate
PV Stage	101~201	Shutdown
	98	Standby
	30	Normal working

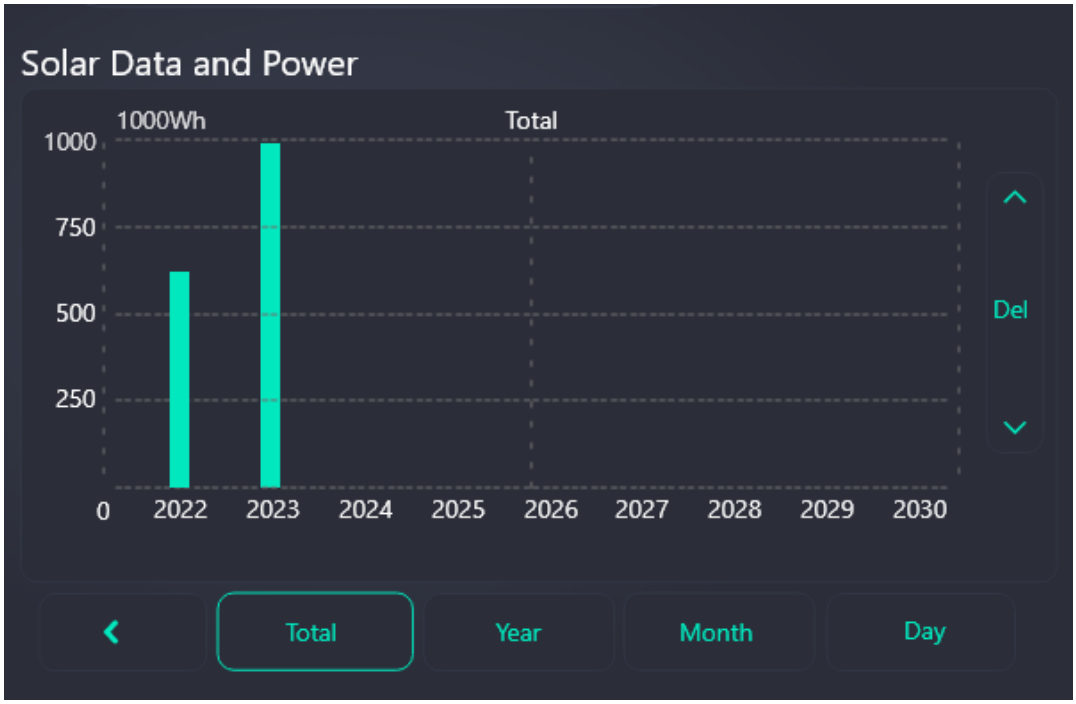


Figure 3.7 All measurement data of photovoltaic power generation

3.1.2 Battery data

Click the battery icon on the main interface to view the battery voltage, current, stage, power, temperature, power, charge and discharge current, charge and discharge voltage and other data, as shown in Figure 3.8 below. Click DEL on this interface to delete all battery power statistics. Click the arrow on the right side of the interface to view its annual, monthly, daily, and current power statistics, as shown in Figure 3-9. Click the BMS button to switch the interface to view the battery request charge and discharge information and battery status, as shown in Figure 3.10.

Figure 3.8 Statistical diagram of battery power data, etc.

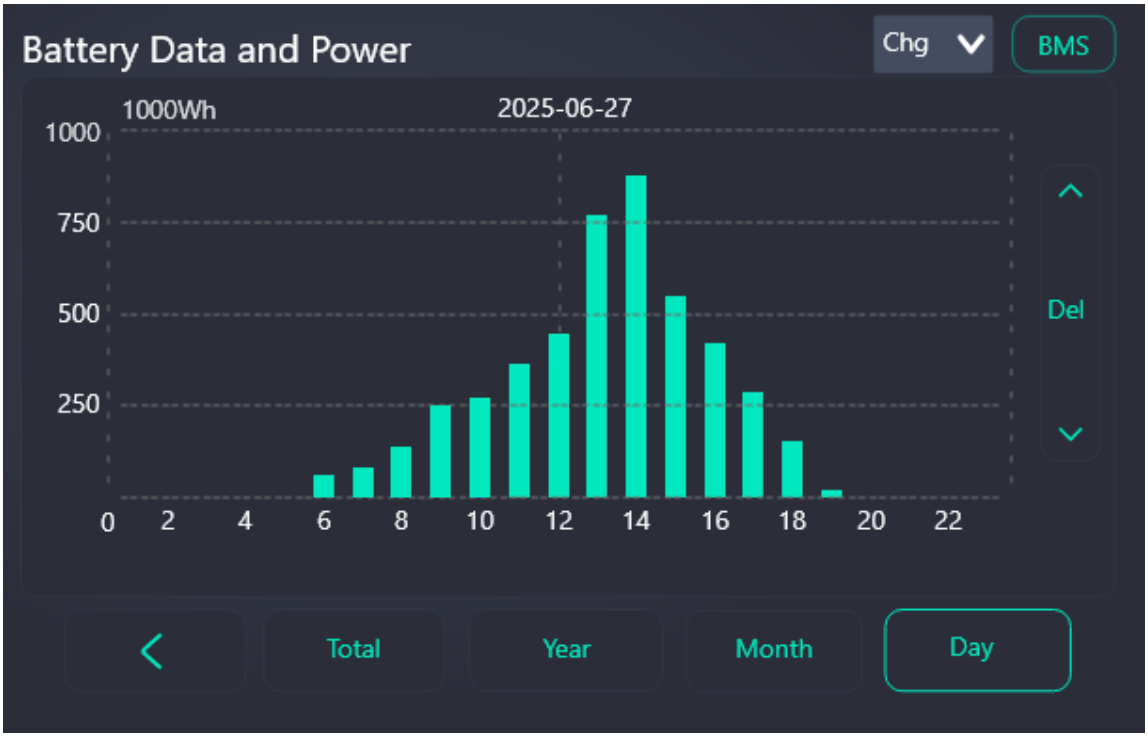


Figure 3.9 Statistical diagram of battery power data, etc.

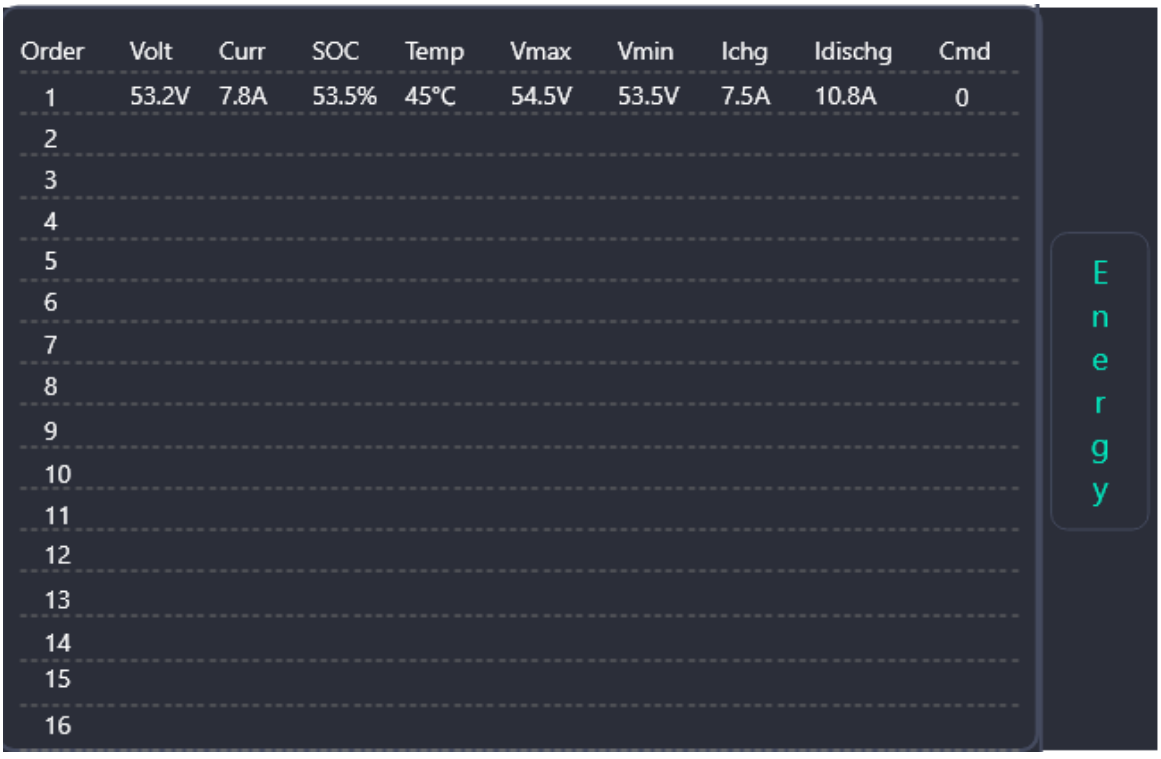


Figure 3.10 Battery information diagram

The meaning of Stage on the left side of the interface is shown in Table 3.2.

Table 3.2 DC stage description

Stage	Number	Illustrate
DC Stage	102~129	Protect shutdown
	101	Shutdown
	201	
	231	
	89	Standby
	10	Normal off-grid operation

3.1.3 Inverter data

Click the middle inverter icon on the main interface to view the running data, as shown in Figure 3.11 below. The meaning of Stage on the right side of the interface is shown in Table 3.3

Figure 3.11 Schematic diagram of inverter operation data

Table 3.3 INV-Stage illustrate

Stage	Number	Illustrate
INV Stage	102~129	Protect shutdown
	101	Shutdown
	201	
	231	
	90	Wait for DC to power on

89	Standby
30	Normal grid-connected operation
10	Normal off-grid operation

3.1.4 Grid data

Click the grid icon on the main interface to view grid voltage, current, active power, reactive power, frequency, daily power and total power data, as shown in Figure 3.12. Click the arrow on the right side of the interface to view its annual, monthly, daily and daily power statistics. Click DEL on this interface to delete all grid power statistics, as shown in Figure 3.13.

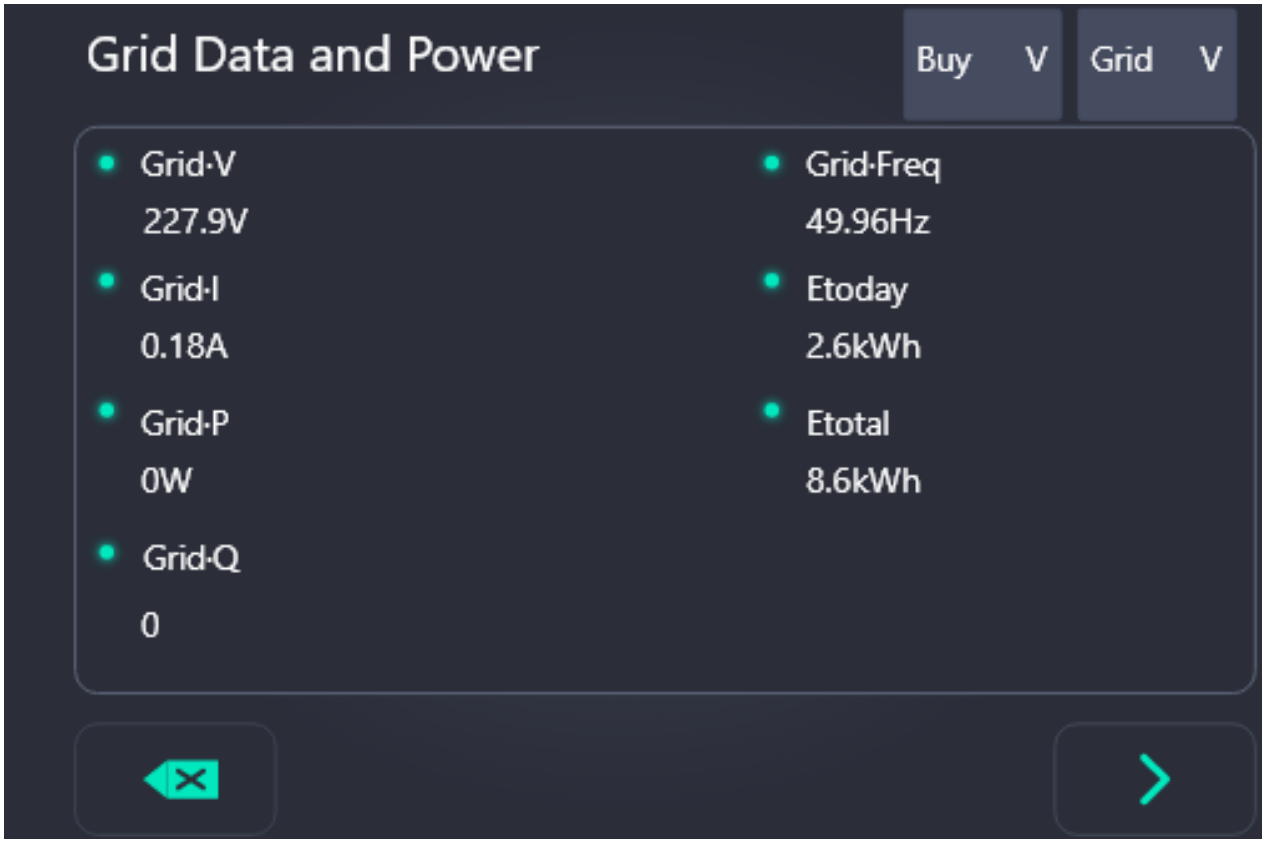


Figure 3.12 power grid electricity data

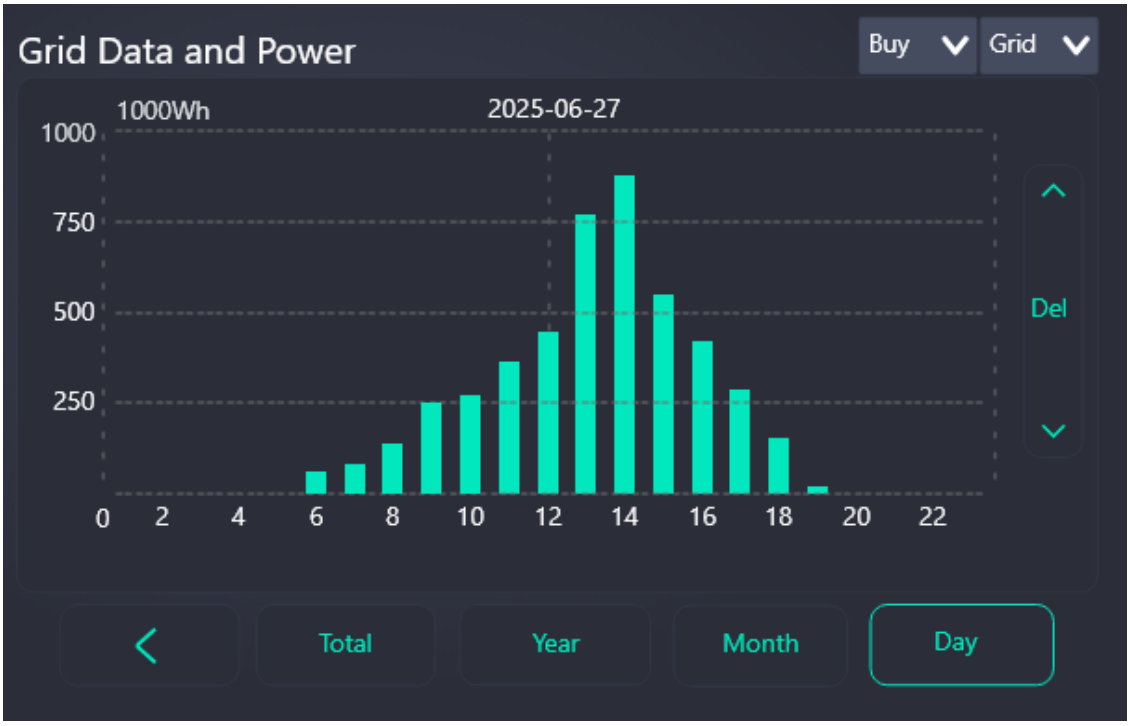


Figure 3.13 Statistics of power grid electricity data

3.1.5 Load data

Click the load icon on the main interface to view the load side voltage, current, active power, reactive power, frequency, daily power and total power data, as shown in Figure 3.14. Click the arrow on the right side of the interface to view the annual, monthly, daily and daily power statistics. Click DEL on this interface to delete all load power statistics, as shown in Figure 3.15.

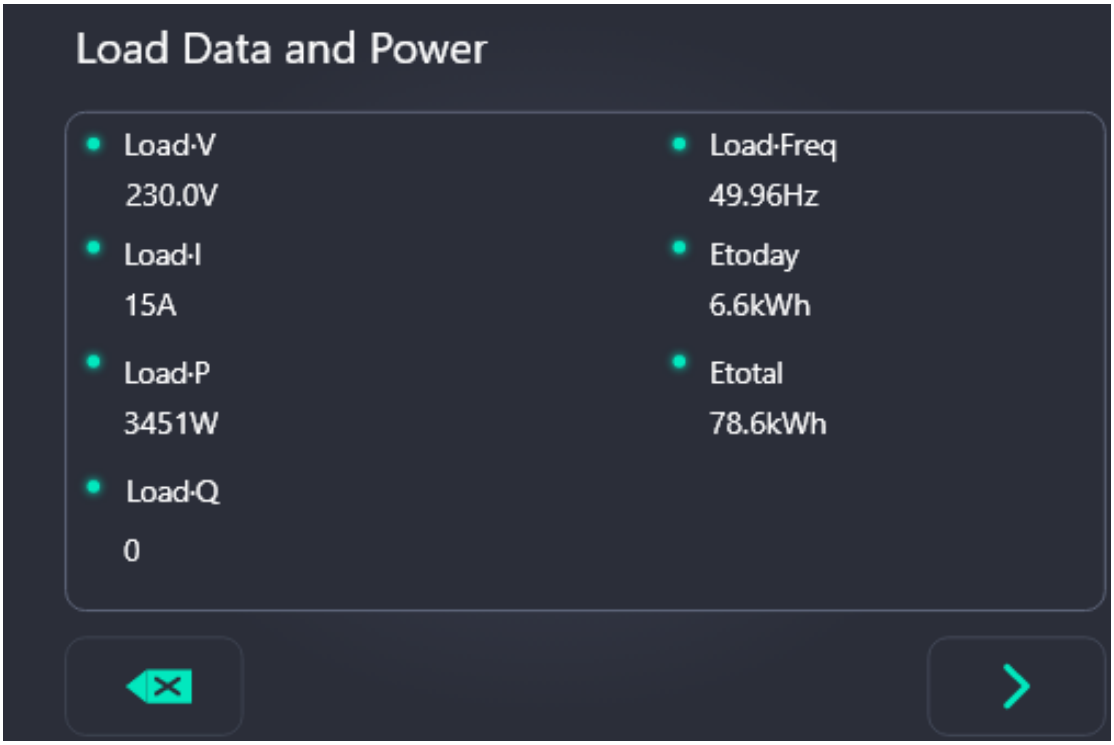


Figure 3.14 Load power data and other statistics

Figure 3.15 Load power data and other statistics

3.2 Run parameter setting

Note again: the password is 888888 when setting the LCD of this device.

Click the "Setting" icon on the main interface to enter the system setting interface, as shown in Figure 3.16. From left to right, they are "Battery Setting", "Grid Setting", "Professional Setting", "System Setting", "Event", and "Device Info".

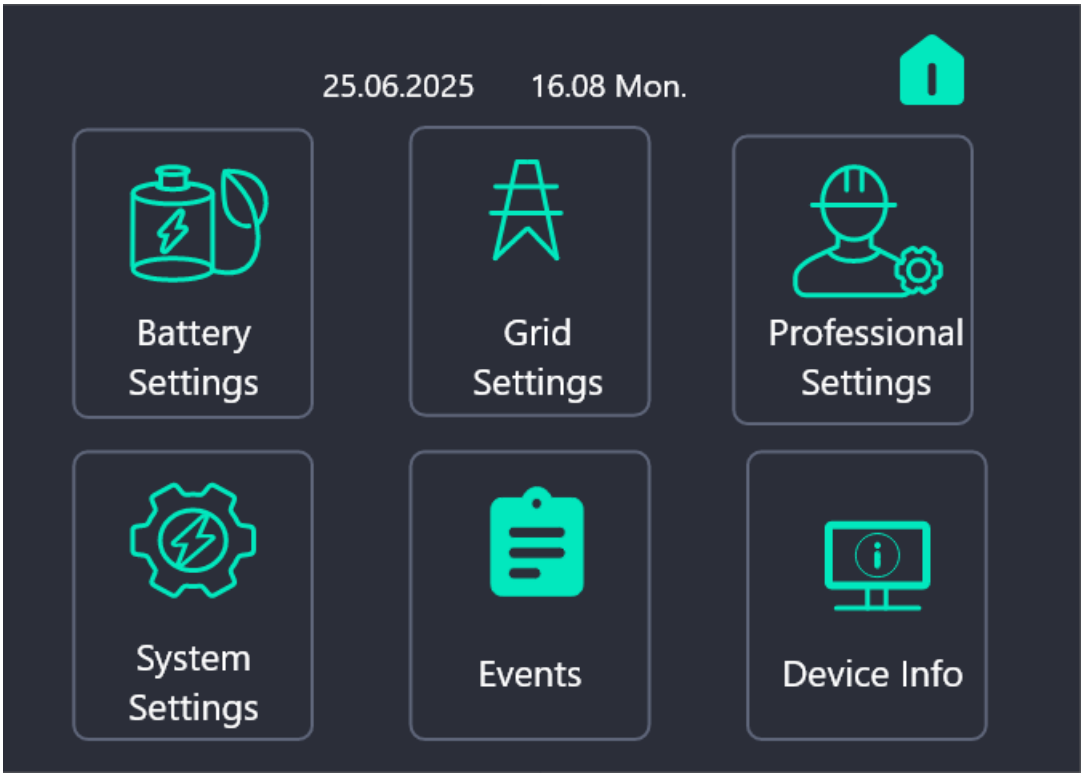


Figure 3.16 System setting interface

3.2.1 Battery parameter setting

Click "Battery Settings" to set battery-related parameters, as shown in Figure 3.17~Figure 3.18.

As shown in Figure 3.17-1, battery Setting 1: you can set the upper and lower limits of battery voltage, the upper and lower limits of PV1 and PV2 voltages and the maximum current, as well as the maximum value of charge and discharge current.

Bat capacity AH： it tells hybrid inverter to know your battery pack size.

"Battery charge and discharge current setting": For AGM and Flooded, we recommend using Ah battery size x 20%= charge/discharge current. For lithium batteries, we recommend Ah battery size x 50%= charge/discharge amps. For GEL lead-acid batteries, follow factory recommendations.

Bat Mode： Select one of "Lithium" and "Use Bat V" to set.

As shown in Figure 3.17-2, the second part is the lithium battery maintenance settings

- **CanEn,** battery CAN communication can be enabled. When selecting the battery communication mode as CAN in the system setting interface of Figure 3.23-4, please check this setting. When you want to control the lithium battery in voltage mode, you can uncheck this setting.
- **BatActEn,** automatic battery activation enable. After checking this option, check the grid charging enable. When the battery enters the dormant state, it enters the battery activation mode and the device will automatically activate the battery for use.
- **Shutdown**,If the SOC is below this setting, the inverter will shut down.
- **Low Bat**,If the SOC is below this setting, the inverter will alarm.
- **Restart**,The device will resume operation when the SOC reaches the set value and the AC output will resume.

As shown in the first part of Figure 3.17-2: Other battery maintenance settings, parameters can be set as needed

- **Shutdown V,** the device will shut down when the battery voltage drops below the set value.
- **Low Bat V,** the device will alarm when the battery voltage reaches the set value.
- **Restart V,** the device will resume working when the battery voltage reaches the set value, and the AC output will resume.

As shown in the third part of Figure 3.17-2, please refer to the corresponding setting values of different voltage types in the following table 3.4. If you are not sure, you can choose the default without modification.

Battery Setting2 and 3 are for battery power, voltage, upper limit of charge and discharge current,

battery operation mode, time curve operation mode and other settings. If you are not sure, you can choose to leave it as default.

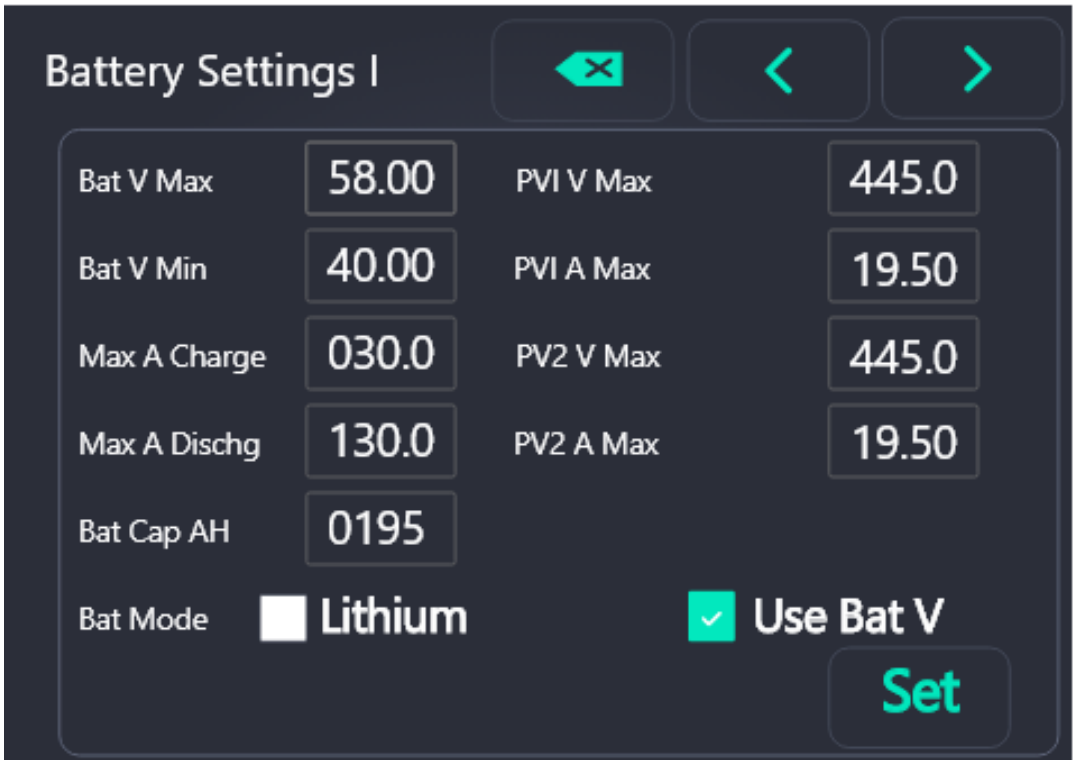


Figure 3.17-1 Battery Setting 1 Interface

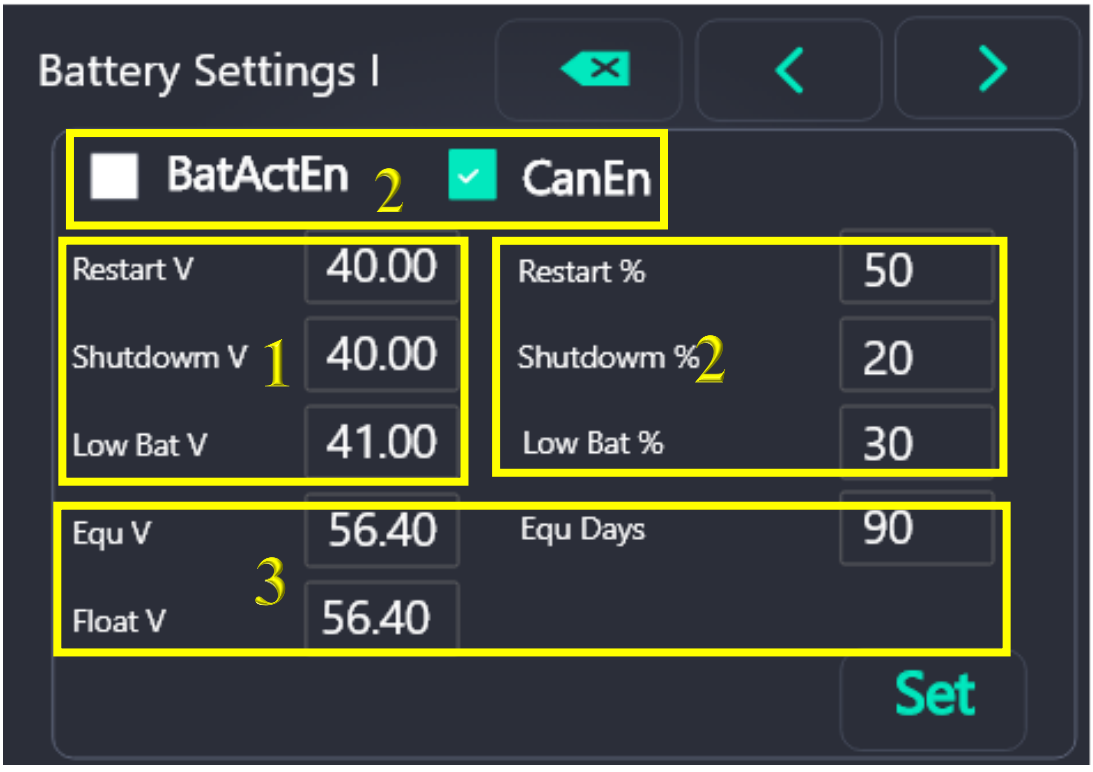


Figure 3.17-2 Battery Setting 1 Interface

Figure 3.18 Battery Setting 2 Interface

When setting the battery setting interface 2, please pay attention to whether the current battery control mode is SOC control mode or voltage control mode (Battery setting interface 1 Bat Mode setting check option).

- **Dischg Pmax-W**：The maximum power that the battery can discharge when connect to the grid.
- **Stop Dischg SOC-%**: When connect to the grid the SOC value of the battery stops discharging. If the SOC is lower than this value, the battery will no longer discharge.
- **AC Chg SOCmax-%**: When connected to the grid, the maximum SOC that can be reached by grid charging. If the battery SOC is higher than this value, it will no longer be charged by the grid.
- **Stop Dischg Vol-V:** When connected to the grid, the battery stops discharging at the voltage value below which the battery will no longer discharge.
- **Grid Chg Vmax-V:** The maximum voltage of the battery when connected to the grid. If the battery voltage is higher than this value, it will no longer be charged by the grid.
- **Chg Imax-A**：Connect to the grid and allow the maximum grid charging current when charging from the grid.

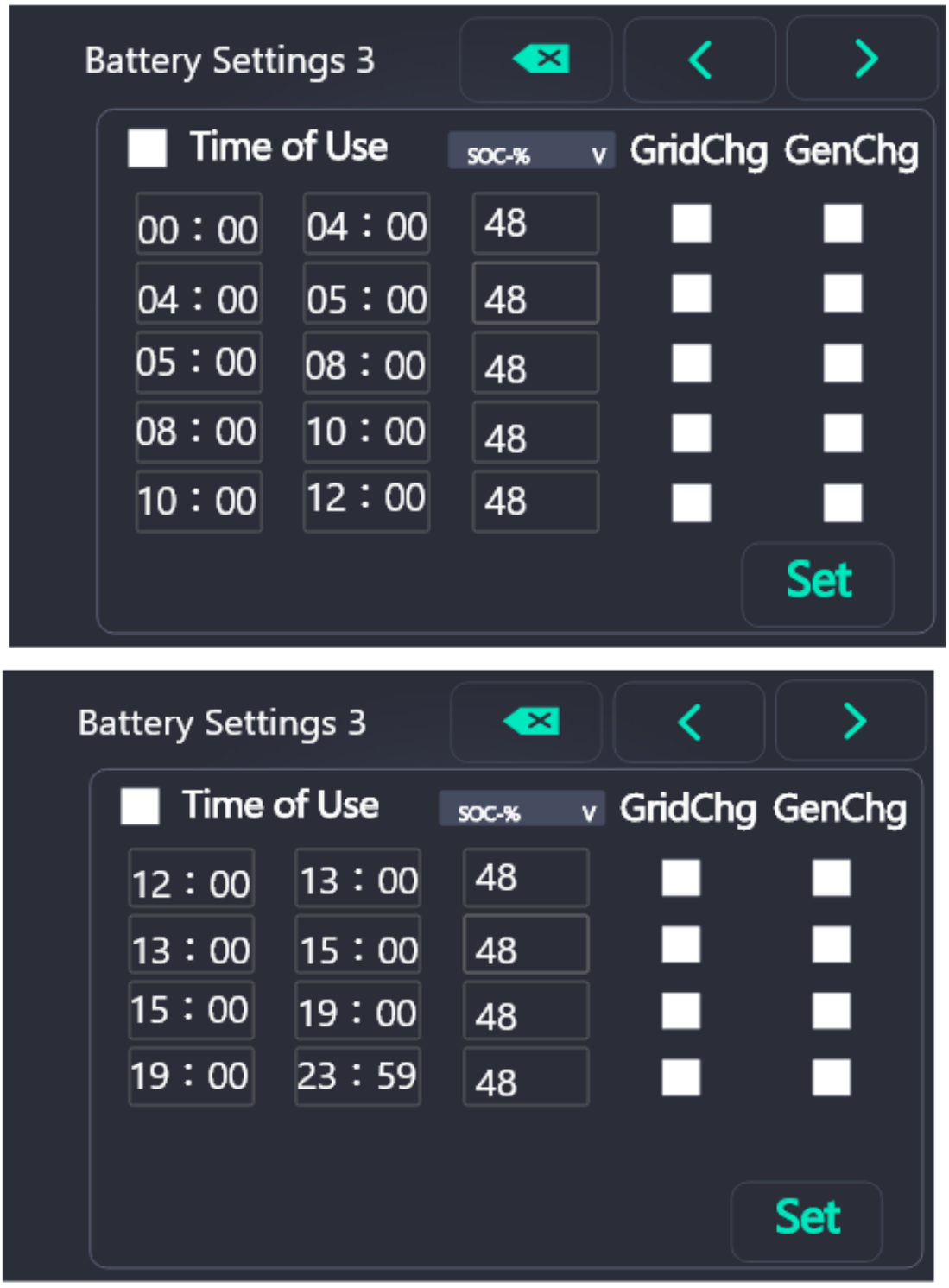


Figure 3.18 Battery Setting 3 Interface

Table 3.4 Recommended settings for different batteries

Battery Type	Absorption stage	Float stage	Torque value Per 3hours per 30 days
AGM or PCC	14.2V 57.6V	14.4V 53.6V	14.2V 57.6V
GEL	14.1V 57.4V	14.4V 54.0V	
WET	14.1V 59V	14.4V 55V	14.7V 59V
LITHIUM		Per their BMS decision	

3.2.2 Grid parameter setting

Click "Grid Setting" to set grid-related parameters.

As shown in Figure 3.19-1, you can set grid standards, voltage and frequency upper and lower limits, voltage value upper and lower limits, inverter output rated frequency and voltage, CT ratio, grid power limit, etc.

As shown in Figure 3.19-2, you can set the upper and lower limits of oil engine voltage and frequency, maximum grid current, maximum grid power, automatic grid reconnection time, N line grounding enable, etc., smooth grid output enable, grid power limit enable.

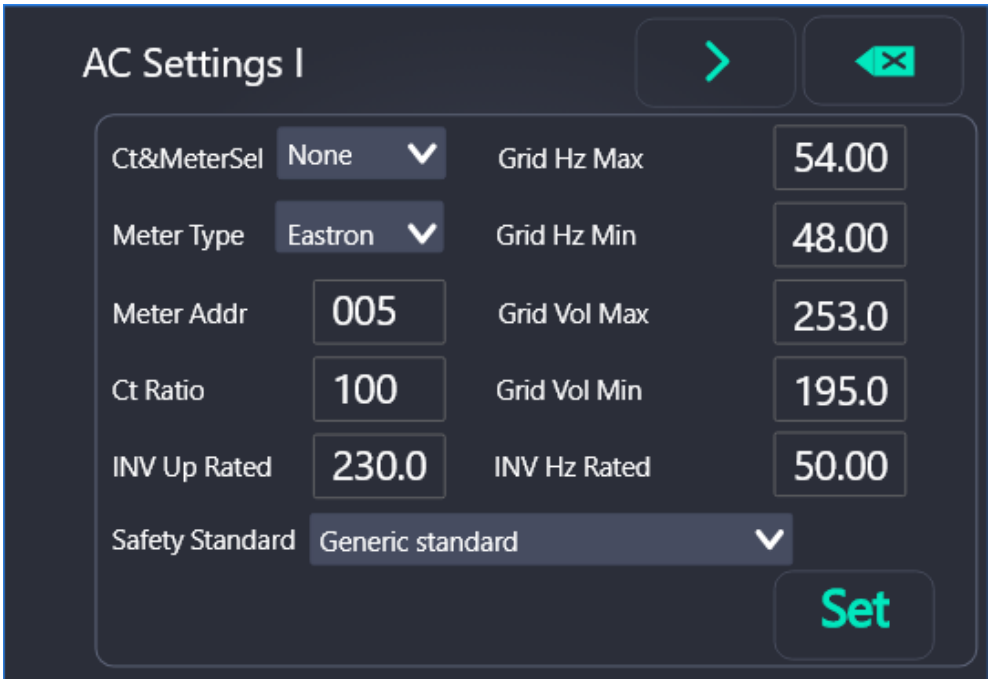


Figure 3.19-1 AC Setting 1

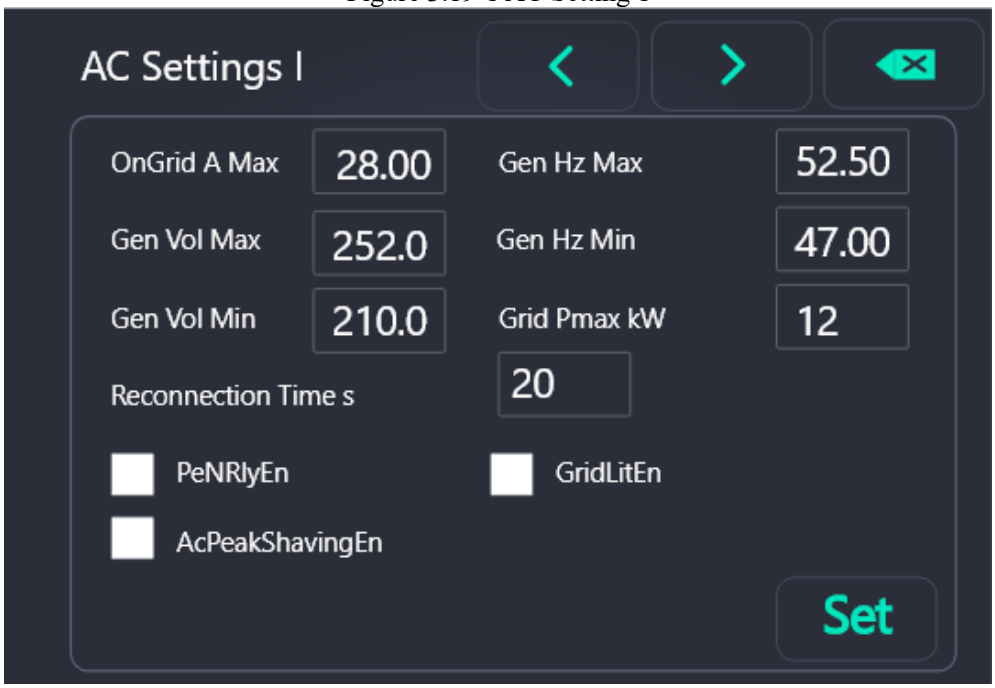


Figure 3.19-2 AC Setting 1

3.2.3 GEN port function settings

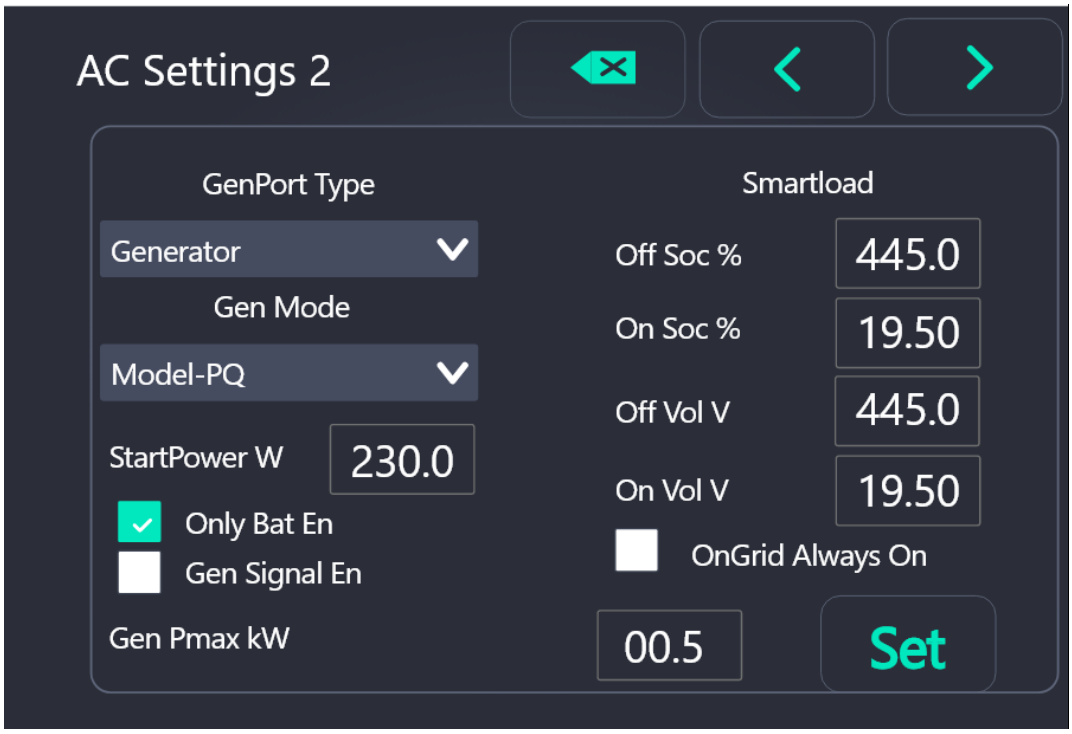


Figure 3.20-1 AC Setting 2

Figure 3.20-2 AC Setting 2

When the GEN port can be connected to a generator, smart load or AC coupling unit (grid-connected inverter), you need to change the GEN interface type in the settings to the corresponding type. The setting path is shown in Figure 3.20-1/2. Click GenPort Typee to select the generator interface type as Generator, Smart loads or AC Couple. Please select according to the actual wiring.

Operation logic description:

- When selecting the oil generator connected to the GEN interface, please confirm that the control line of the generator is also connected to the terminals C~D, NO1\COM1 (generator start control) in the schematic diagram of the external interface board of the equipment as shown in Figure 2.6, select Generator as Generator for GenPort Typee in the power grid setting interface of Figure 3.20-1, and select Gen Mode at the same time. You can choose one of the two operating modes. At this time, when the power grid is cut off and the battery voltage or SOC value is lower than the battery discharge voltage or SOC setting value, the generator will automatically start to power the system.
- When selecting a smart load connected to the GEN interface, select Smart load as GenPort Type in the power grid setting interface of Figure 3.20-1. At this time, the Gen relay will open and the GEN interface will supply power to the smart load.

The function setting definition in Figure 3.20-1:

StartPower: The smart load is set to the power settings. When the photovoltaic power is greater than the setting of this settings, the inverter will power the smart load power.

Off Soc%: When the battery SOC% is lower than the set value, the inverter will stop supplying power to the Smart load.

On Soc%: When the battery SOC% is higher than the set value, the inverter will start supplying power to the Smart load.

Off Vol V: When the battery voltage is lower than the set value, the inverter will stop supplying power to the Smart load.

On Vol V: When the battery voltage is higher than the set value, the inverter will start supplying power to the Smart load.

Only Bat En: If the battery SOC/voltage is higher than "On Soc%"/ "On Vol V", the system will continue to supply power to the Smart Load until the battery SOC/voltage is lower than "off Soc%"/ "off Vol V", at which time the system will cut off the smart load.

OnGrid Always on: When the inverter is connected to the grid, the system will always supply power to the Smart Load.

Gen Pmax kW:This value is the maximum power value of the external Gen, and the system will regulate the system according to this value。

Gen Signal En: Output Gen signal control enablement, including power on and off .

Gen Mode:According to different types of Gen, inverter operation mode is different, most equipment

choose MODE2, if the main interface does not show that the Gen participates in system operation, please switch MODE1.

- When selecting the AC coupling unit connected to the GEN interface, select AC Couple as GenPort Typee in the power grid setting interface of Figure 3.20-1. At this time, AC Couple and the power grid together supply power to the system.

The function settings in Figure 3.20-2 are defined as follows:

Off Soc%: When the battery SOC% is higher than the set value, the AC couple will not participate in the system power supply.

On Soc%: When the battery SOC% is lower than the set value, the AC couple and the inverter are connected to the grid to supply power to the system.

Off Vol V: When the battery voltage is higher than the set value, the AC couple does not participate in the system power supply. .

On Vol V: When the battery voltage is lower than the set value, the AC couple and the inverter are connected to the grid to supply power to the system.

Couple Fre Hz: AC coupling device frequency setting.

AC Couple Sell Ban: Prohibit AC couple from selling electricity to the grid.

3.2.4 CT transformation ratio setting

Click the CT Ratio data box in the power grid setting interface of Figure 3.19-1 to set the CT ratio. When the transformer model is 100:50mA, the interface value should be filled in as 100; if the transformer is 150:50mA, the value should be filled in as 150. The setting method is shown in Figure 3.21.

This value is very important. Wrong setting will affect the normal operation of the equipment. If you are not sure, please keep the default or contact us.

Figure 3.21 CT Ratio Setting Path

3.2.5 Operating Mode Settings

Click "Professional Setting" to select equipment operation mode, parallel operation quantity and address during parallel operation, Inv address of each equipment shall be set differently and cannot be repeated, for example, equipment A Inv is 1 and equipment B Inv can be set to 3 , as shown in Figure 3.22-1/2. For detailed operation logic, see Section 2.9 Single-machine operation and logic description.

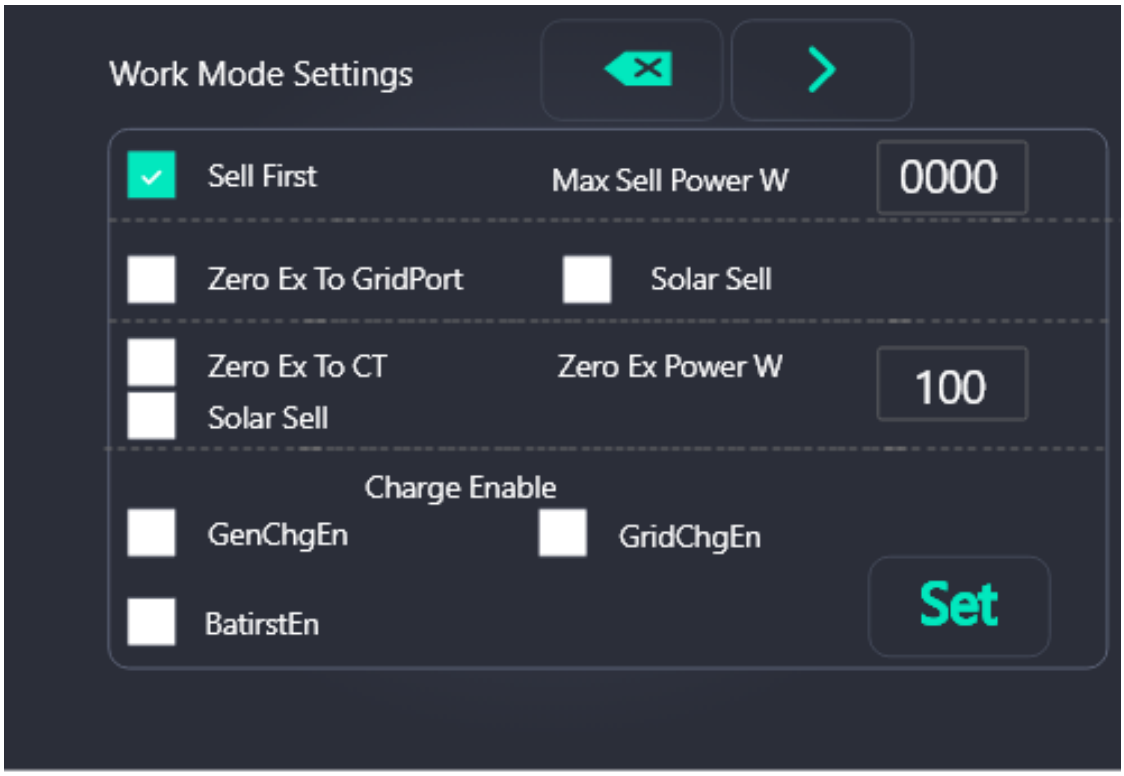


Figure 3.22-1 Working mode setting interface

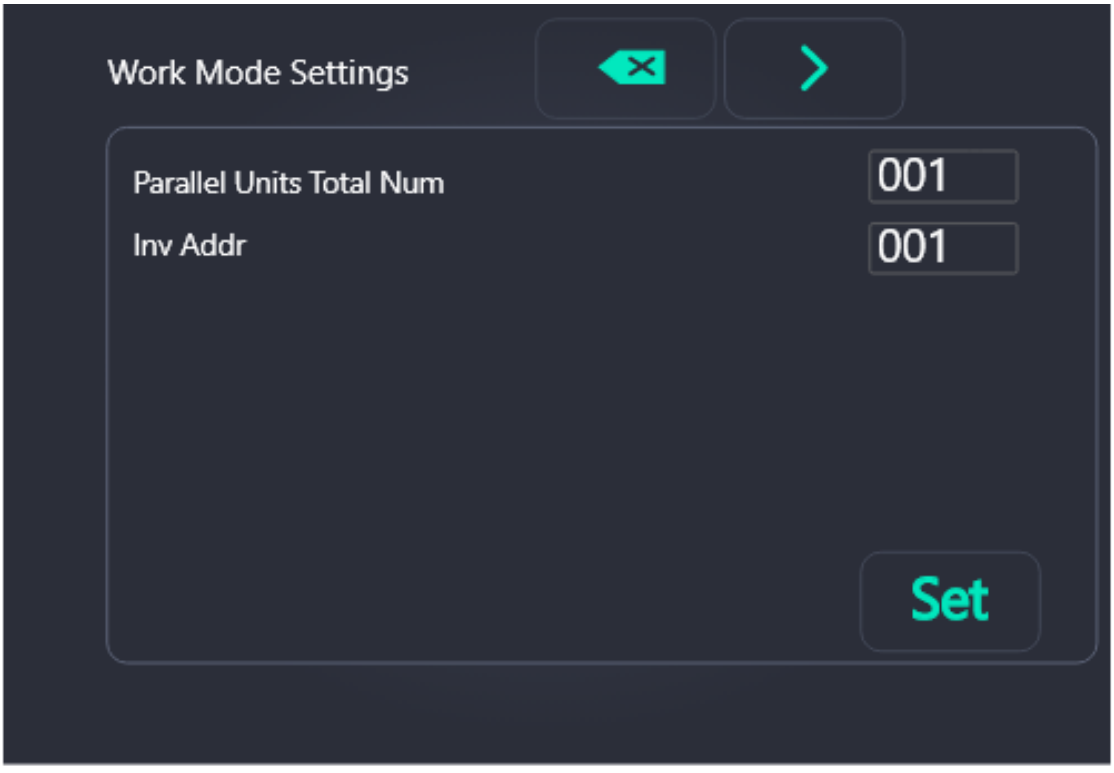


Figure 3.22-2 Working mode setting interface

3.2.6 System Setup

Click "System Setting" to set relevant parameters of the system, as shown in Figure 3.23-1/2/3/4, including device time, LCD address, device serial number, read firmware status, BMS address, etc.

Click on the BMS PORT list to select the battery brand you are using. If multiple devices are used in

parallel with one battery set, please tick BatShareEn.

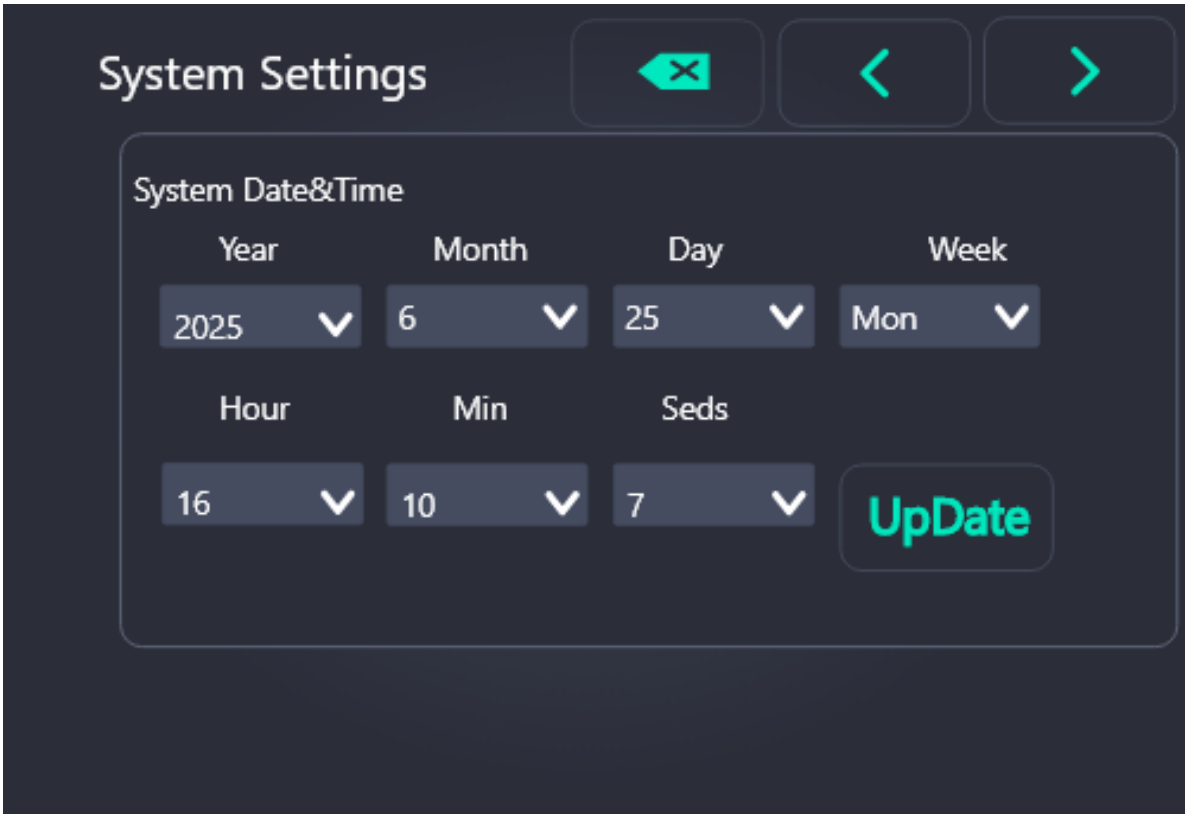


Figure 3.23-1 System Setting Interface

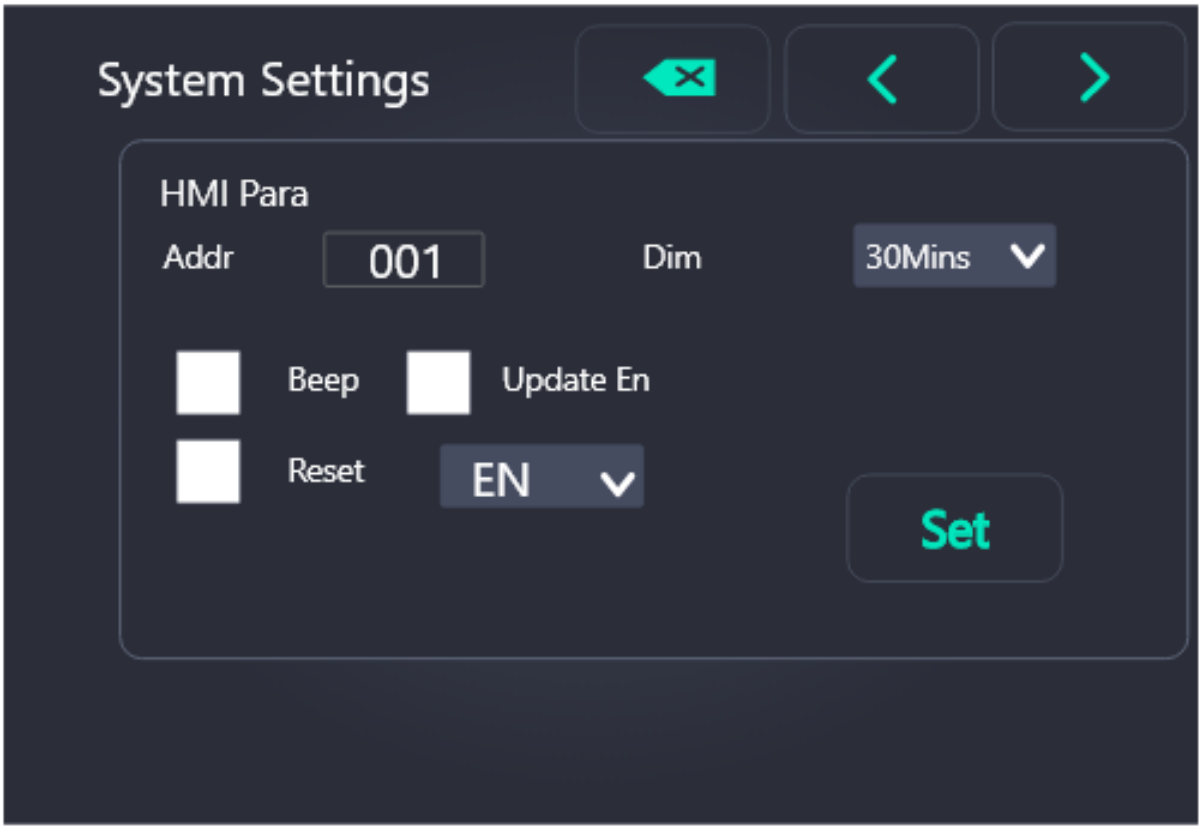


Figure 3.23-2 System Setting Interface

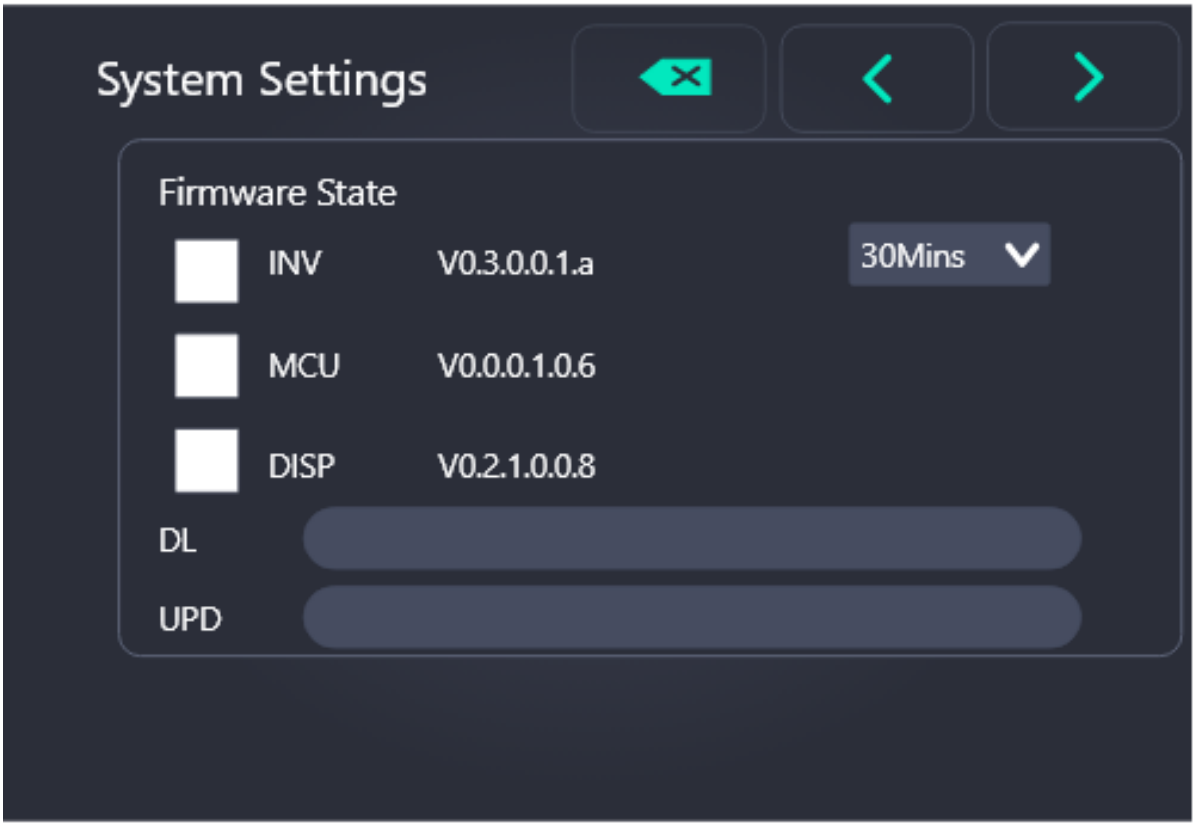


Figure 3.23-3 System Setting Interface

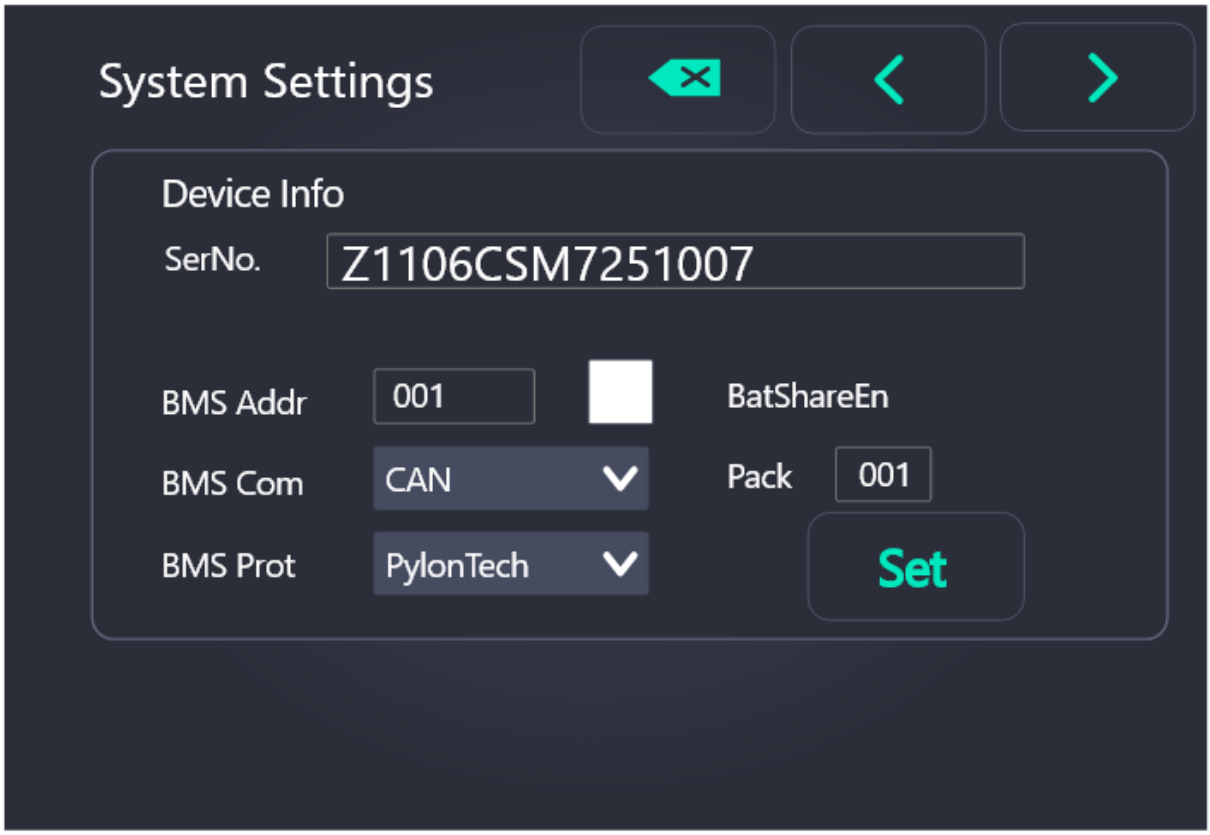


Figure 3.23-4 System Setting Interface

3.3 Events Display

Click the "Events" icon on the main interface to view all the running status and other information of the equipment, as shown in Figure 3.24. When the equipment runs abnormally, you can view this event record. For detailed handling opinions, please refer to "Table 4.2 Equipment Alarm Information and Handling Methods" in Section 4 Operation and Maintenance.

3.4 Device Info

Click the "DeviceInfo" icon on the main interface to view the equipment serial number, BMS communication protocol, BMS communication address, INV/MCU software version, LCD software version HMI and other status information, as shown in Figure 3.25.

Figure 3.24 Historical Information Interface

Figure 3.25 Equipment Information Interface

4 Operation and maintenance

4.1 Trial run

When the device and other device cables such as batteries are properly installed and connected, start the device by following the following steps: The LED flashing signal definition and LCD key definition are described in Table 4.1: Hold down UP and ENTER at the same time to restart the LCD.

- Turn on the power supply of grid, battery, photovoltaic switch, the LCD will light up.
- Select a meter or CT and set its address based on the actual used. If neither is used, select None .The setting position is on AC Setting1 on the LCD screen.
- Select a Grid standard based on the actual power grid usage. If no corresponding standard is available, select the general standard. The setting position is on AC Setting1 on the LCD screen.
- Select the battery control mode based on the actual use of the battery.This setting is located in the LCD battery device screen Batttery Setting1.When the system is not connected to the battery, but is connected to the PV or power grid, in this case, the system can still work without selecting Bat Mode.
- Press the ON/OFF button to turn on the device.The round button located on the right side of the housing.
- For details about the operating mode, see descriptions of the single machine Operating Mode.

Table 4.1 Definition of LCD keys

	LED definition	Instructions
DC	The green light continues to shine.	PV connection normal
AC	The green light continues to shine.	Power grid connection normal
Normal	The green light continues to shine.	Normal inverter operation
Alarm	Red light flashing	Fault or warning
ESC	Exit setting	
UP	Go to the previous option	
DOWN	Go to the next option	
ENTER	ENTER certainty	

4.2 Stand-alone operation and logic description

When the stand-alone operation, The K6 dialing code on the internal and external interface board of the device needs to be opened, set ON, as shown in Figure 4.1. K8 and K7 remain closed.

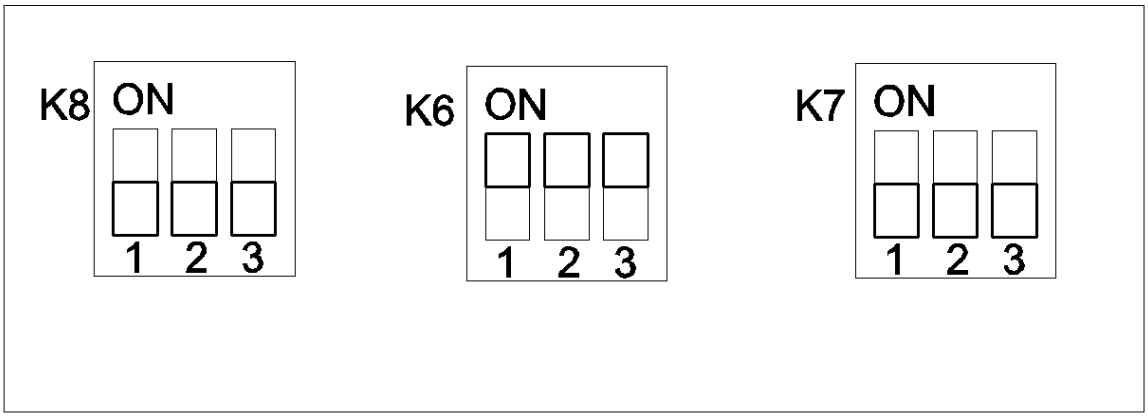


Figure 4.1 Schematic diagram of DIP terminal ON

4.2.1 Enter working mode to set path

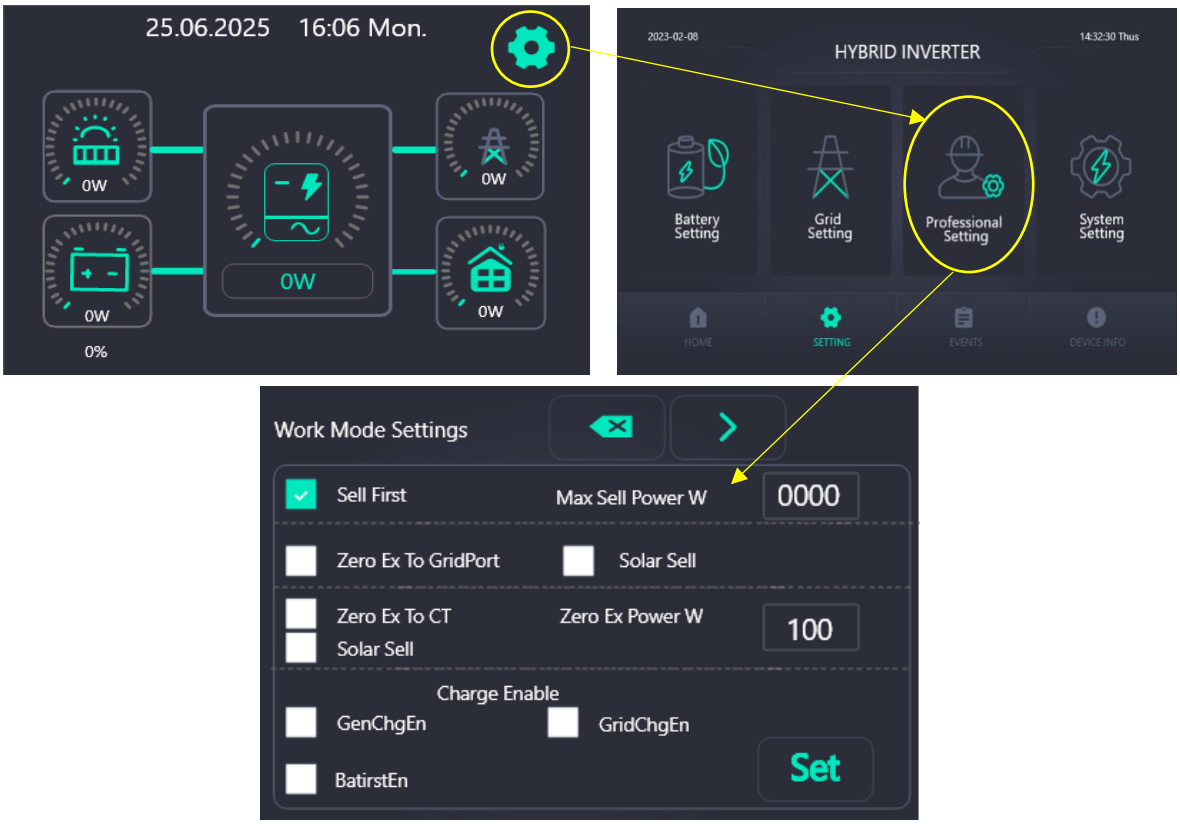


Figure 4.2 schematic diagram of entering the working mode

4.2.2 Sell First

Priority mode of selling electricity.This mode allows hybrid inverters to sell excess photovoltaic power back to the grid, and it can also be sold to the grid when time permits and the battery energy is surplus when the current capacity of the battery is greater than the minimum discharge SOC or the minimum discharge voltage setting value , but the selling power should be limited, the total power set rule is the maximum load power and the power sold to the grid shall not exceed of its total inverter rated power. When photovoltaic power generation and battery energy can not meet the power consumption of the load, the power grid will be used as a supplementary power supply. At the same

time, if time and conditions permit, you can also check "Genchargeable" or "Gridchargeable" to use the power grid or generator to charge the battery.

4.2.3 Zero Ex To Grid Port

This mode hybrid inverter only supplies power to the connected "LOAD" local load. The hybrid inverter will neither provide power for the household load nor sell power to the grid. The built-in CT will keep the detected power flowing to the grid side to zero, while photovoltaic power generation will only provide the local load and charge the battery. When the photovoltaic power generation is strong, the battery is full, and the load cannot be consumed. The inverter will operate with limited power excess photovoltaic power can also be sold to the grid if time permits: this function can be checked . When photovoltaic power generation and battery energy can not meet the load, it will be supplemented by the power grid. At the same time, if time and conditions permit, you can also check "Genchargeable" or "Gridchargeable" to use the power grid or generaotr to charge the battery.

4.2.4 Zero Ex To CT

This mode hybrid inverter not only supplies power to the local load on the connected Load terminal, but also provides power to the home load. The external CT keeps the detected power flow to the grid side zero. Photovoltaic power generation can be provided to the local load and household load, and the battery can be charged. When the photovoltaic power generation is strong, the battery is full, and the load cannot be consumed. The inverter will operate with limited power excess photovoltaic power can also be sold to the grid if time permits: this function can be checked . When photovoltaic power generation and battery energy can not meet the load, it will be supplemented by the power grid. At the same time, if time and conditions permit, you can also check "Genchargeable" or "Gridchargeable" to use the power grid or generator to charge the battery.

4.2.5 Time curve mode

Power grid peak regulation.Click on the home page to set "SETTING", click on the battery setting "BatterySetting" graph in the settings interface, you can enter the battery parameter setting interface, click the next page, check "TimeofUse" on the "BatterySetting3" page, and set the time curve related parameters, as shown in figure 4.3 below, you can choose the three time curve operation modes of "SOC-%", "Power-W" or "Bat-V" in the drop-down box.

The hybrid inverter in this mode operates according to the set time period and the corresponding allowable conditions, and the battery discharge power will be limited to the set value. If the load power exceeds the allowable value, photovoltaic will be used as a supplement. If it still can not meet the load demand, then increase the grid power to meet the load demand. At the same time, if time and

conditions permit, you can also check "Genchargeable" or "Gridchargeable" in the working mode interface to charge the battery using the power grid or generator.

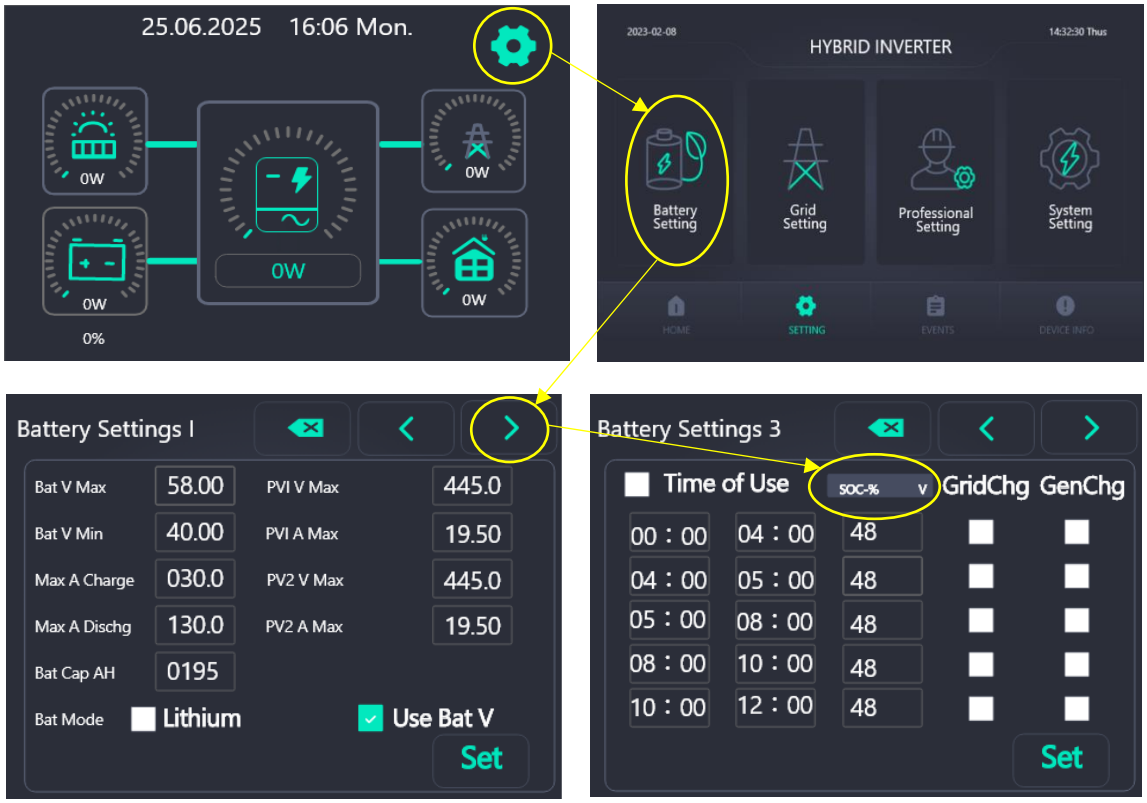


Figure 4.3 Schematic diagram of setting time curve

Figure 4.4 Enter the parameter setting diagram of the parallel machine and the address setting of the three machines

4.3 Parallel operation and logical explanation

When running in parallel, the internal and external interface board of the first device and the last device is placed as shown in Figure 4.1 K6 dialing code needs to be opened,"ON", K8 and K7 are currently closed. This is shown in Figure 4.5 for example, the grid-connected parallel wiring diagram, the three devices need to be placed, and the K6 dialing code of 1# and 3# needs to be opened, and the dialing code of 2# does not need to be opened.

4.3.1 Set entry path description

Click "Setting" ,display at screen on the home page, and click "Professional Setting" in the setting interface to enter the working mode setting interface and select the address setting of the device, as shown in figure 4.4.

4.3.2 Parallel operation logic

When multiple parallel machines are connected, first connect the communication network lines ports Parallel_A and Parallel_B and CAN communication lines port J14CAN2HandCAN2L of the parallel equipment to form a ring connection system, then set the address parameters of each module respectively after power-on, As shown in the third figure of Figure 4.4, the address setting of three parallel units is set. Set the number of parallel units "Parallel Units Total Num" and the inverter address "Inv Addr" (can only be an odd number, starting from 1 and cannot be repeated). The hybrid inverter module with Inv Addr = 1 will be defined as the master by the system, and the hybrid inverter module with Inv Addr as other odd numbers will be defined as a slave.

In this mode, all hybrid inverters will run synchronously according to the scheduling of the master, so when powering up, the power button of all slaves should be pressed first, and finally the power button of the master should be pressed, so that the master can automatically identify the slave state in the merging system, which is conducive to logic and power regulation when power is turned on and connected to the grid. If there is an individual slave failure or communication interruption in the

normal operation, the master will automatically identify and withdraw the slave from the whole parallel system and re-regulate the power. When the fault slave returns to normal, the host will automatically identify and merge the slave into the system and re-regulate the power. All the working modes of the parallel system are the same as those of the stand-alone machine. It should be noted that the parallel machine only needs a set of external CT, which is connected to the grid power trunk line, and the sampling signal is connected to the CT input port of the master inverter.

4.3.3 Parallel system wiring diagram

See Figure 4.5 for grid-connected parallel wiring and Figure 4.6 for off-grid parallel wiring. When connected to Grid, Gen or AC Couple, grid-connected operation requires wiring according to Figure 4.5; when neither the grid nor the generator is connected, off-grid parallel operation requires wiring according to Figure 4.6 (in the actual wiring process, the BMS communication line, parallel communication line, and BAT line need to be routed from the corresponding ports, and schematic diagrams 4.5 and 4.6 are only used to illustrate the specific location of the wiring position).

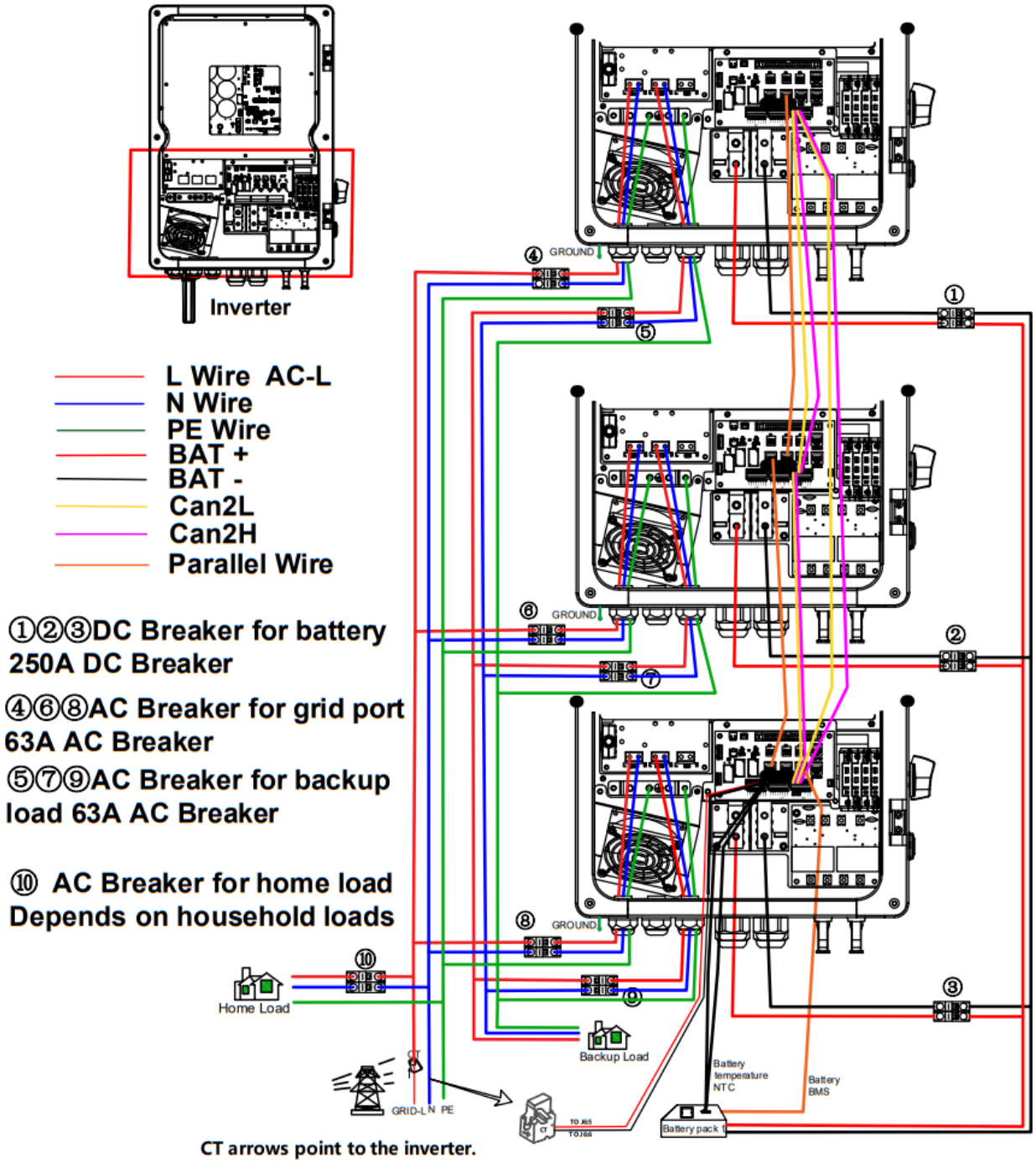


Figure 4.5 On-grid parallel wiring diagram

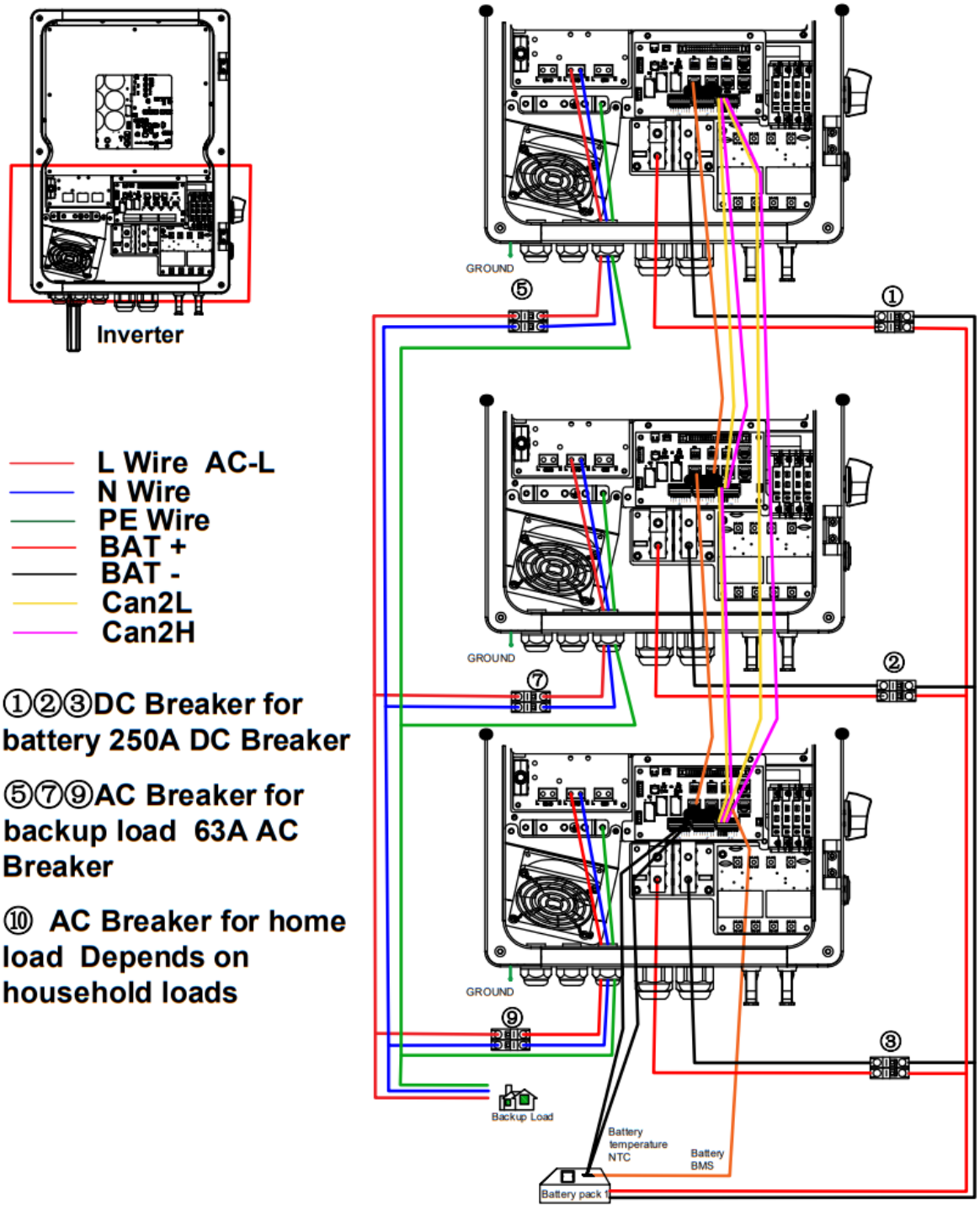


Figure 4.6 Off-grid parallel wiring diagram

4.4 Example of five parallel inverter on grid

4.4.1 Grid and load connection

Figure 4.7 below shows the connection diagram of five inverters (No. 1, 3, 5, 7, 9). K0 is the main circuit breaker of the power grid. K11, K13, K15, K17, K19 are load circuit breakers, K1 is the load circuit breaker. K02 is a home load circuit breaker. Each inverter has its own power grid circuit breaker respectively K01, K03, K05, K07, K09.

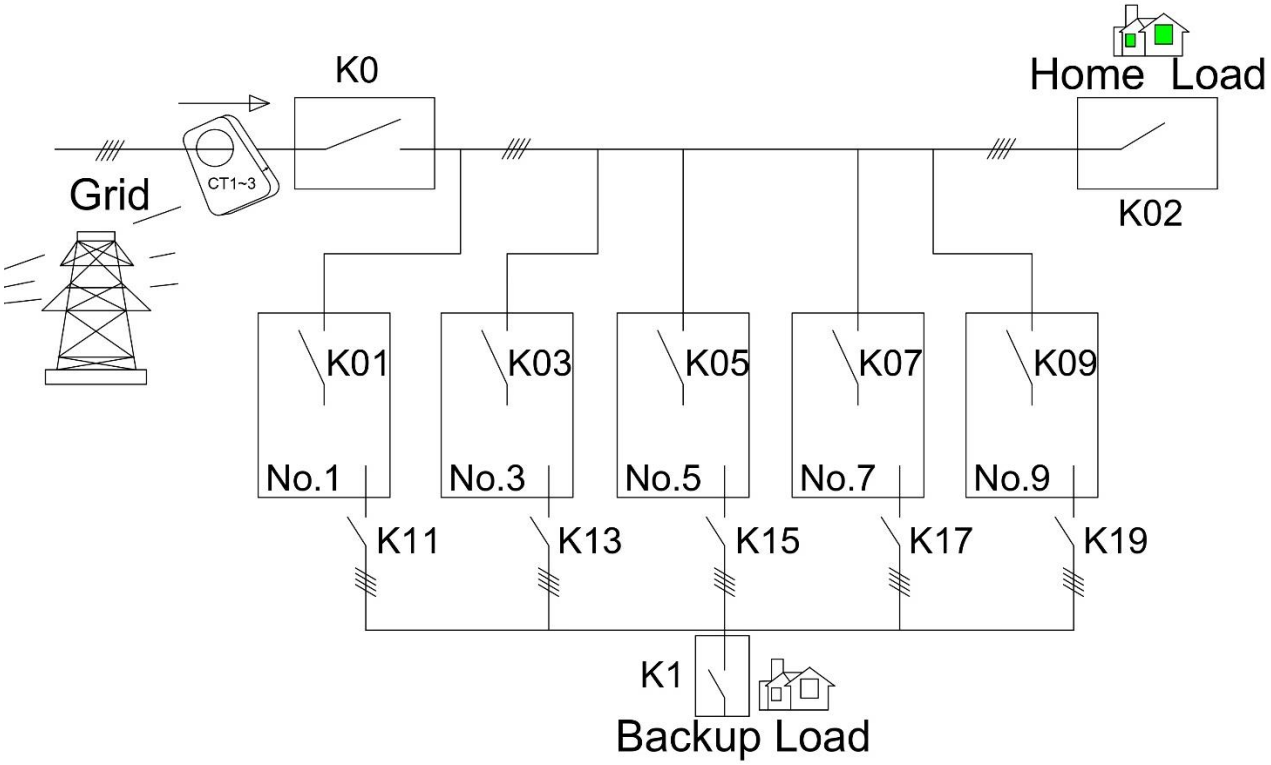


Figure 4.7 The connection diagram of five inverters

4.4.2 Parallel cable connection and check

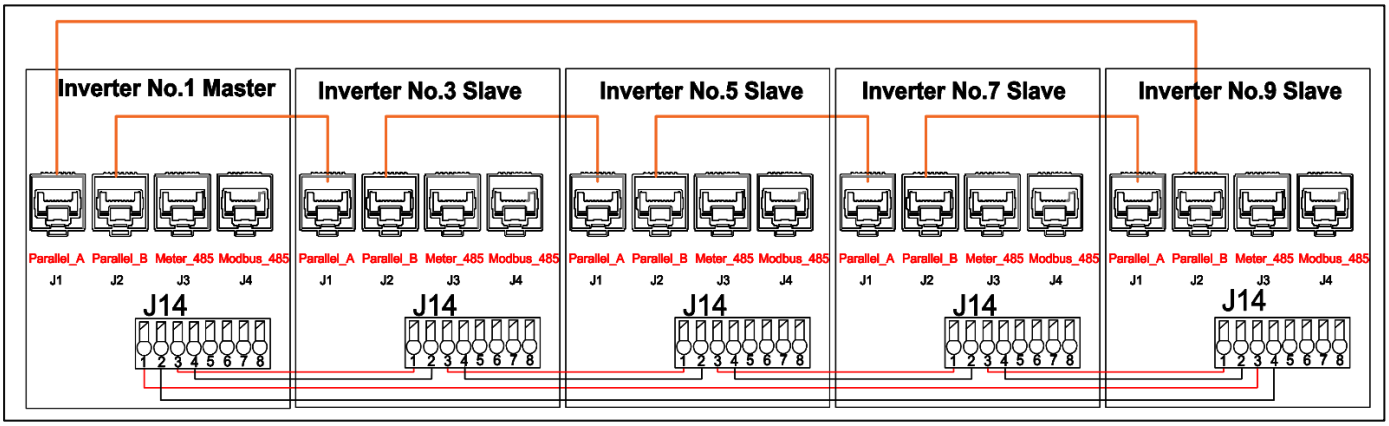


Figure 4.8 Parallel cable connection

Step 1:

a) Check whether the cable connection is correct as shown in Figure 4.7 (for BMS connection, CT or

ammeter connection, battery connection, and ground cable connection, refer to the previous chapter.) Check whether the positive and negative batteries are consistent.

b) Please check whether the parallel cable connection is correct as shown in Figure 4.8.

c) Set the K6 DIP switch in the middle of the first and last inverters to ON, and turn off the others.

Step 2:

a) Only turn on the Grid circuit breaker K0.

b) Check the phase voltage of each inverter grid breaker (inside)input port, and check the same phase voltage difference between grid main break and inverter grid breaker is near zero.checking K01,K03,K05,K07,K09,if the voltage is not normal please check the wire connection between grid and inverter grid breaker. if the connection all normal, go to step 3.

Step 3:

a) Turn on K01,K03,K05,K07,K09. Keep battery not add to inverter and those load breakers off(K11,K13,K15,K17,K19).

b) Check the display lcd screan is on, and the grid data page shown the grid voltage and frequency are normal.

c)For details about how to set the device address, see Figure 4.1.1 Settings. Set the master address to 1, and set the slave address to 3, 5, 7, and 9.

d) Battery sharing Settings, if the same battery group is used, please check BatShareEn in system Settings, and set the BMS communication mode and communication address.

e) For CT or smart meter Settings, please select the metering mode used by the system in AC Settings1, if both are no-used, please select None.

f) To select the battery control mode, please select SOC control, voltage control or lithium battery control mode in Battery Setting1 according to the actual battery type. If the battery is not connected, you can run without selecting.

g) Turn on the button. The sequence is to close the slave 3/5/7/9 first, and finally close the master 1.

h) After the grid relay is closed, check whether the voltage on the load page of the main screen is normal. Click the middle inverter icon on the main screen of each device to check whether the INV Stage is 30-Working.

i) Check the voltage difference of same phase between inverter grid input port and inverter's load output port ,make sure all voltage difference of each inverter are near zero.

j) Check the voltage difference of same phase between inverter's load output port and load

breaker(K11,K13,K15,K17,K19) ,make sure all voltage difference of each inverter are near zero. if the voltage difference is not near zero, check the wire connection between inverter load port and load breaker.

k) If all are normal, go to step 4.

Step 4:

a) Turn on one of the load circuit breakers such as K11.

b) Check the voltage difference of same phase between breaker K13(K15,K17,K19)'s input port and output port, make sure all voltage difference of each inverter are near zero.

c) If the voltage difference is not near zero, check the connection between the load circuit breaker output port and the main load circuit breaker K1.

d) If all in-phase voltage differences are close to zero, open the load circuit breaker K13 (K15, K17, K19).

e) If all load circuit breakers are turned on, the connection check is completed. Turn off the load circuit breaker, release the round button, turn off all network circuit breakers

4.4.3 ON-Grid startup parallel

a) Before the parallel operation, please ensure that all lines have been checked and correct.

b) Close the main grid circuit breaker K0, close the inverter internal grid circuit breaker (K01, K03, K05, K07, K09).

c) Check whether the grid interface voltage and frequency of each inverter are normal.

d) Close all battery circuit breakers and check whether the battery interface voltage of each inverter is normal. If it is lithium battery or SOC control mode, check whether the SOC value is displayed correctly next to the battery icon on the main interface.

e) Close all load circuit breakers (K11, K13, K15, K17, K19).

f) Press the round buttons on the side of all **slaves**.

g) Press the round button on the side of the **master**.

h) After the power grid relay is closed, check whether the voltage on the load page of the main screen is normal. Click the middle inverter icon on the main screen of each device to check whether the INV Stage is 30-Working.

i) Close the total load circuit breaker for power supply, and the operation is complete.

4.4.4 Off-grid startup parallel

a) Before the parallel operation, please ensure that all lines have been checked and correct.

b) Close all battery circuit breakers and check whether the battery interface voltage of each inverter

is normal. If it is lithium battery or SOC control mode, check whether the SOC value is displayed correctly next to the battery icon on the main interface.

c) Close all load circuit breakers (K11, K13, K15, K17, K19).

d) Press the round buttons on the side of all **slaves.**

e) Press the round button on the side of the **master**

f) After the grid relay is closed, check whether the voltage on the load page of the main screen is normal. Click the middle inverter icon on the main screen of each device to check whether the INV Stage is 10-Working.

h) Close the total load circuit breaker for power supply, and the operation is complete.

4.4.5 Shut down the Inverter

a) Turn off total load circuit breaker K1

b) Turn off all load circuit breakers (K11, K13, K15, K17, K19).

c) Release the round button on the side of the host

d) Release all round buttons on the side of the slaves

e) Turn off the grid circuit breaker K0 and all battery circuit breakers

f) The system exits from operation.

4.5 Fault alarm and handling

If the device fails to start, click the Events icon on the home screen to view historical alarms and rectify faults one by one. Through the analysis of the above methods, determine the cause of the fault, and then determine the appropriate solution according to the field conditions. Table 4.2 lists the device alarm information and handling methods.

- Periodically check whether the wiring of each part of the inverter is firm and loose, especially carefully check the fan, power module, input terminal, output terminal, and grounding.
- Once the alarm stops, do not start immediately, should find out the cause and repair the restart, check should be strictly in accordance with the inverter maintenance manual prescribed steps.
- Operators must be specially trained to identify the causes of general failures and be able to troubleshoot them, such as skilfully replacing fuses, components and damaged circuit boards. Personnel without training are not allowed to operate the equipment.
- If there is an accident that is not easy to exclude or the cause of the accident is unclear, a detailed record of the accident should be made and the inverter manufacturer should be notified in time for solution.

Table 4.2 Device alarm information and handling methods

NO.	Warning	Handling Suggestions
W01	Insulation_Warning	1.Please check that the ground wire is connected correctly. 2.Seek help from us, if you cannot return to normal.
W02	Comm_LCD_Lose_Warning	1.Please Check the communication line between the LCD and the control board. 2.Seek help from us, if you cannot return to normal.
W03	LVRT_Fault_Warning	Grid voltage fluctuation,the equipment records this event.
W04	Fan_Faullt_Warning	1.Please check the fan outside the enclosure for foreign objects. 2.Restart the equipment, please contact us if you still fail.
W05	PV1 low voltage warning	1.Please check the PV1 voltage range in the equipment system settings. The PV voltage setting value is between (150 ~ 500) V; 2.At present, the light is weak, and the actual photovoltaic power is low; 3.Please contact us or PV supplier again.
W06	PV2 low voltage warning	1.Please check the PV2 voltage range in the equipment system settings. The PV voltage setting value is between (150 ~ 500) V; 2.Please contact us or PV supplier again.
W07	Battery low voltage warning	1.Please check whether the battery voltage is too low; 2. Check whether the battery voltage lower limit on the battery setting page is higher than the actual battery. The minimum battery voltage setting value is between (10 ~ 55) V; 3.Check whether the maximum discharge current on the battery page exceeds the maximum battery operating current; 4.Please contact us or battery suppliers if you are alert again.
W08	ACgrid low voltage warning	1.Please check whether the grid voltage is too low; 2.Check whether the lower limit of AC voltage is too high on the AC setting page. The minimum grid voltage setting value is between (198 ~ 220) V. 3.Please contact us if you are alert again.
W09	ACgen low voltage warning	1.Please check whether the gen voltage is too low; 2.Check whether the lower limit of Gen voltage is too high on the AC setting page. The minimum gen voltage setting value is between (198 ~ 220) V. 3.Please contact us if you are alert again.
W10	AC_Volt_Unbalance_Warning	The AC voltage amplitude is unbalanced 1.Please check the AC wiring of the equipment and restart after errors; 2.If the restart failed and reported the error again, please contact us.
W11	AC_PLL_Warning	Failed to detect the output phase lock after power-on 1.Please check the AC wiring of the equipment and restart after errors; 2.If the restart failed and reported the error again, please contact us.
W12	Power_Derate_ Warning	The equipment is output derated due to environmental influence， records this event.
W14	Heatsink_LoTemp_Warning	Low temperature warning due to environmental influences

W15	BMS Communication Warning	1.Please check whether the BMS communication cable is well connected. 2.If you still alert, please contact us.
W16	Grid voltage_Fault	1.The output voltage is not within the equipment setting range, and it may be caused by the device stop. 2.If you still alert, please contact us.
W17	grid_GridPhhaseSeque_Fault	1.Check the device wiring and the equipment of each power supply normally. restart the device. 2.If you still alert, please contact us.
W18	AC_Freq_Fault	1.Please check the grid frequency range value in the equipment system. 2.Please check whether the grid wiring is correct. 3.If you still alert, please contact us.
W19	gen_ voltage _Fault	1.The output voltage is not within the equipment setting range, and it may be caused by the device stop. 2.If you still alert, please contact us.
W20	Gen_GridPhhaseSeque_Fault	1.Please check whether the gen wiring is correct. 2.Restart the equipment, please contact us if you still fail.
W21	GEN_Freq_Fault	1.Please check the gen frequency range value in the equipment system. 2.Please check whether the gen wiring is correct. 3.If you still alert, please contact us.
W23	Load low voltage warning	1.Please check whether the load line wiring is correct. 2.Please check the range of AC voltage. 3.Restart the equipment, please contact us if you still fail.
W24	PV2_VoltHigh_warning	1.Please check the PV2 voltage range in the equipment system settings. The PV voltage setting value is between (150 ~ 500) V. 2.Please contact us or PV supplier again.
W25	PV1_VoltHigh_warning	1.Please check the PV1 voltage range in the equipment system settings. The PV voltage setting value is between (150 ~500) V. 2.Please contact us or PV supplier again.
W26	Bat_VoltHigh_warning	1.Please check whether the battery voltage is too high. 2.Please check whether the upper limit of the battery voltage range in the equipment system is too low. The highest battery voltage setting value is between (15 ~ 60) V. 3. Please contact us or battery suppliers if you are alert again.
F01	DC Inversed Failure	1.Please check whether the positive and negative batteries are reversed. 2.If you still alert, please contact us.
F02	Insulattion_Failure	1.Please check that the ground wire is connected correctly 2.Seek help from us, if you cannot return to normal.
F03	EEPROM_Read_Failure	Restart the equipment, please contact us if you still fail.
F04	EEPROM_Write_Failure	Restart the equipment, please contact us if you still fail.

F05	DC soft start Failure	1.Please check whether the battery voltage is normal. 2.Please check whether the battery voltage setting value of the device is normal， The battery voltage setting value is between (15 ~ 60) V. 3. Please contact us or battery suppliers if you are alert again.
F06	Tz_Dc_OverCurr_Fault	1.Please check the battery current limit value in the equipment system. 2.Please check whether the PV and battery wiring of the equipment are normal. 3.Cut off all power soure and wait for 2 minutes to discharge the inverter.Open all power circuit breakers and restart the device. 4.If the restart failed and alarmed again, please contact us.
F07	DC_OverCurr_Failure	1.Please check the battery current limit value in the equipment system. 2.Please check whether the PV and battery wiring of the equipment are normal. 3. Cut off all power soure and wait for 2 minutes to discharge the inverter.Open all power circuit breakers and restart the device. 4. If the restart failed and alarmed again, please contact us.
F08	AuxPowerBoard_Failure	Restart the equipment, please contact us if you still fail.
F09	IGBT_Failure	Restart the equipment, please contact us if you still fail.
F11	AC_Main Contactor_Failure	Restart the equipment, please contact us if you still fail.
F12	AC_Slave Contactor_Failure	Restart the equipment, please contact us if you still fail.
F13	Tz_Ac_OverCurr_Fault	1.Please check whether the backup load power is within the range. 2.Restart and check whether it is normal. 3.Seek help from us, if you cannot return to normal.
F14	AC_OverCurr_Failure	1.Please check whether the backup load power is within the range. 2.Restart and check whether it is normal. 3.Seek help from us, if you cannot return to normal.
F15	GFCI_Failure	1.Please check the wiring of the equipment and restart after errors. 2.If the restart failed and reported the error again, please contact us.
F16	Tz_COM_OC_Fault	1.Please check whether the backup load power is within the range. 2. Restart and check whether it is normal. 3.Seek help from us, if you cannot return to normal.
F17	BusUnbalance_Fault	Restart the equipment, please contact us if you still fail.
F18	Load_voltage_Fault	1.Please check whether the load line wiring is correct. 2.Please check the range of AC voltage. 3.Restart the equipment, please contact us if you still fail.
F24	Grid_Overload_Fault	1.Please check whether the backup load power is within the range. 2.Restart and check whether it is normal. 3.Seek help from us, if you cannot return to normal.
F25	Gen_Overload_Fault	1.Please check whether the backup load power is within the range. 2.Restart and check whether it is normal. 3.Seek help from us, if you cannot return to normal.

F26	DC_VoltHigh_Fault	Restart the equipment, please contact us if you still fail.
F27	DC_VoltLow_Fault	Restart the equipment, please contact us if you still fail.
F28	AC_BackFeed_Fault	Restart the equipment, please contact us if you still fail.
F29	Heatsink_HiTemp_Fault	Overhigh temperature alarm
F30	PV1 arc Failure	1.Please check the wiring of the equipment and restart after errors. 2.If the restart failed and reported the error again, please contact us.
F31	PV1 Inversed Failure	1.Please check PV1 terminal is correct. 2.If you still alert, please contact us.
F32	PV2 Inversed Failure	1.Please check PV2 terminal is correct. 2.If you still alert, please contact us.

4.6 Product routine maintenance suggestions

- **Ensure that all the switches on the DC side and AC side of the energy storage controller, battery components, and AC power distribution cabinet are turned off.**
- **After the AC/DC switch of the energy storage converter is turned off, some components of the energy storage controller still have residual voltage. Please wait at least 5 minutes before maintaining the energy storage converter to prevent electric shock!**

4.6.1 Routine inspection

- Check whether the temperature of each circuit breaker of the inverter is too high during the daily peak load generally not more than 90℃ .
- Check whether the ambient temperature of the inverter is too high for example, ventilate and dissipate the inverter when the temperature is too high .
- The values of inverter, box transformer voltage, current and power are compared during daily peak load.
- Daily check whether the inverter sound is normal.
- Check fault records daily to see if new faults occur.

4.6.2 Monthly inspection

- Check the wiring of each part of the inverter regularly every month, whether it is firm, whether it is loose, and check whether the fan, power module, and terminal block are burned or heated.
- When the inverter needs to be started and stopped, strictly follow the instructions provided by the manufacturer.
- Operators through professional training, no violations of rules and regulations.

4.6.3 Quarterly inspection

- Tighten the screws on the AC and DC sides of the inverter every six months.
- Dust the inverter once every three months.
- In hot weather, open the inverter room vent for ventilation and heat dissipation.

5 Transportation and storage

5.1 Product Shipping Requirements

5.1.1 Logistics

- The company's inverter is delivered by a professional logistics company, and the logistics company will communicate with the dealer before delivery. Pay attention to accurately grasp the location and contact person of the delivery point, plan the delivery route, and preferably have an alternate route.
- The logistics drivers are very professional. No alcohol, drugs, or phone calls are allowed during driving. The drivers will stop to contact the distributor and consignee before arriving at the destination. Pay attention to communicating in advance, it is best not to disturb the driver halfway and distract the driving attention.
- The type of transport vehicle must be selected according to the actual road conditions. If it is too large, it may exceed the limit and cannot pass, or an unexpected situation may occur.

5.1.2 Unloading and handling

- You must have a special equipment operation certificate to drive a forklift, and you must pay attention to the inspection, and remember to prohibit unlicensed operation.
- Handlers must be equipped with relevant PPE.
- If there is no delivery point for forklift unloading, the pallet can only be removed on the logistics vehicle, and 4 people cooperate to unload one set each time.

5.2 Product storage environment requirements

If the inverter is not put into use immediately, it must be stored as required.

- Pack the inverter in its original packaging, retain the desiccant, and seal it with tape.
- The storage temperature should be kept at –40ºC～+70ºC. the relative humidity should be kept at 5%RH～95%RH.
- Store in a clean and dry place, and prevent the erosion of dust and water vapor.
- Inverters with an outer packaging size of 630*460*350 width×height×depth can be stacked up to 4 layers. When stacking, please place the inverter carefully to avoid personal injury or equipment damage caused by the equipment falling over. Please place it upward first, and it is forbidden to invert it.
- Periodic inspection is required during storage. If insects and rats are found to bite, the packaging materials need to be replaced in time.
- After long-term storage, the inverter needs to be inspected and tested by professionals before it can be put into use.

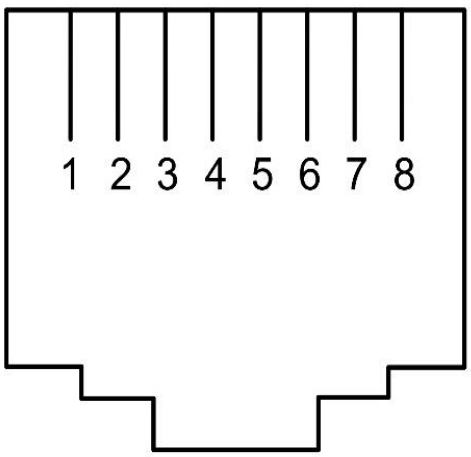
6 Legal Notices

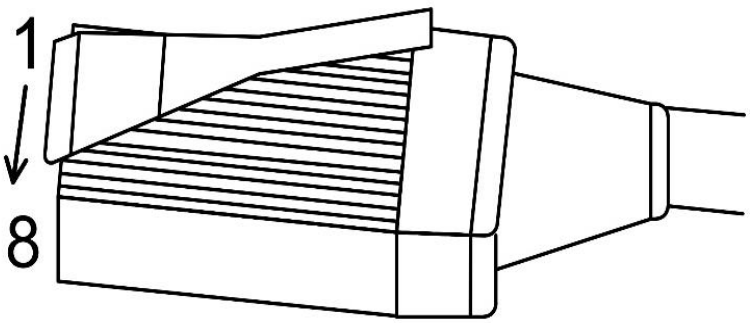
In addition to the above product warranty, national and local laws and regulations govern the power connection of the product including breach of implied terms and warranties . The company hereby declares that the terms and conditions of the product and the policy cannot and can only legally exclude all liability within a limited scope.

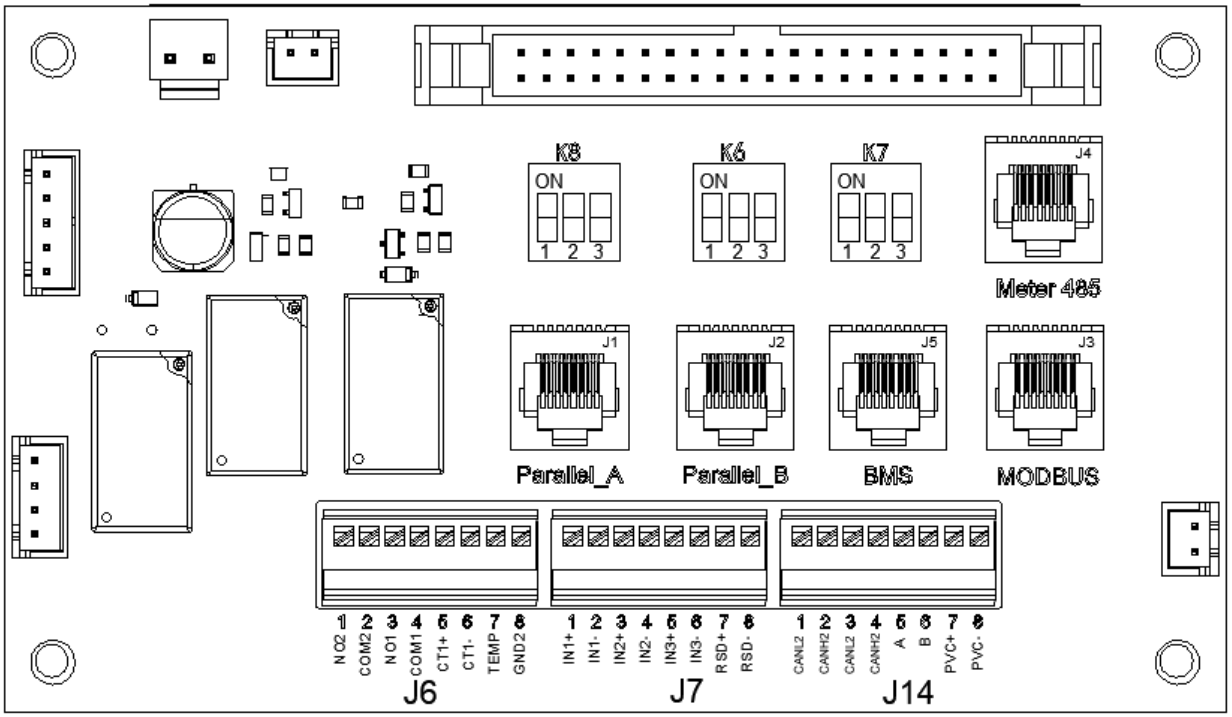
7 Attachments

Attachments 1 Network port definition description

MARK	J6-1	J6-2	J6-3	J6-4	J6-5	J6-6	J6-7	J6-8
Definition	NO2	COM2	NO1	COM1	CT1+	CT1-	BAT-TEMP	ISOGND2
Function	Reserved		Gen start control		External A-phase CT1 sampling input		Battery temperature sampling input	
MARK	J7-1	J7-2	J7-3	J7-4	J7-5	J7-6	J7-7	J7-8
Definition	IN1+	IN1-	IN2+	IN2-	IN3+	IN3-	RSD+	RSD-
Function	Reserve for spare						+12Voutput	12VGND
MARK	J14-1	J14-2	J14-3	J14-4	J14-5	J14-6	J14-7	J14-8
Definition	CANL2	CANH2	CANL2	CANH2	RS485A1	RS485B1	PV C	PV C
Function	Parallel CAN communication				Meter communication		PV control	
RJ45-	1	2	3	4	5	6	7	8
BMS	RS485B3	RS485A3	NC	CANH	CANL	NC	RS485A3	RS485B3
Function	BMS-485 communication			BMS-CAN communication			BMS-485 communication	
Parallel_A	CANH1	CANL1	SNY-01	SNY-02	ISOGND1	ISOGND1	CAN-SMH	CAN-SML
Function	Parallel synchronous communication							
Parallel_B	CANH1	CANL1	SNY-01	SNY-02	ISOGND1	ISOGND1	CAN-SMH	CAN-SML
Function	Parallel synchronous communication							
Meter_485	RS485B1	RS485A1	NC	NC	NC	NC	RS485A1	RS485B1
Function	Meter communication						Meter communication	
MODBUS	RS485B4	RS485A4	NC	RS485B2	RS485A2	NC	RS485A4	RS485B4
Function	EMS monitoring			Reserve background monitoring communications			EMS monitoring	

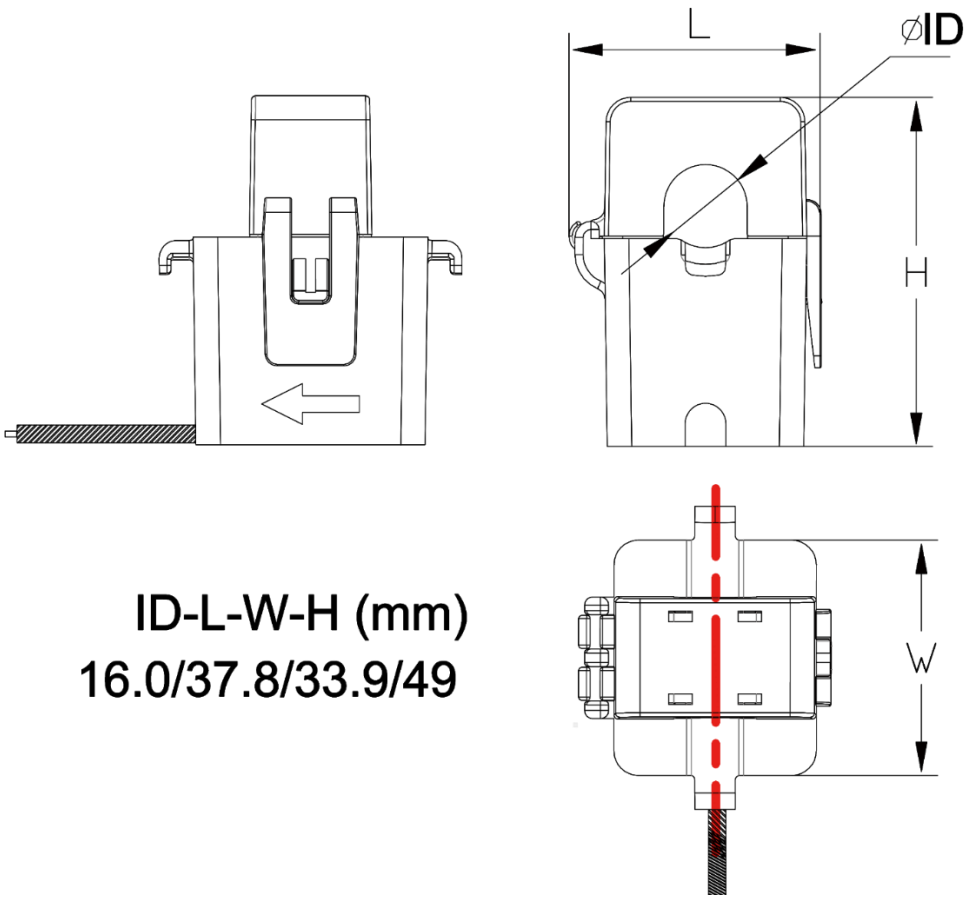






Attachments 2 CT size and model

CTSA016 100A:50mA



Attachments 3 Hybrid Inverter data

Model	Ven-3G1-LE	Ven-3.6G1-LE	Ven-4G1-LE	Ven-5G1-LE	Ven-6G1-LE	Ven-6.6G1-LE
Product Type	Hybrid Inverter					
Battery Input Data						
Battery Type	Lead acid or Lithium-ion					
Battery Voltage(V)	48(40V-60V)					
Battery Charge/Discharge Current(A)	60	75	85	110	135	150
Charging Strategy for Li-Ion	Self-Adaption to BMS					
PV Input Data						
Max.PV Input Power(W)	4500	5400	6000	7500	9000	9900
Max.PV Input Voltage(V)	500					
Start-up Voltage(V)	125					
PV Input Voltage Range (V)	125-500					
Rated PV Input Voltage(V)	370					
MPPT Input Range(V)	150-425					
Full Load MPPT Voltage Range(V)	300-425					
Max Operating PV Input Current(A)	18+18	18+18	18+18	18+18	18+18	18+18
Max.PV Input Short-Circuit Current(A)	27+27	27+27	27+27	27+27	27+27	27+27
No.of MPPT Trackers/No.of Strings per MPPT Tracker	2/1+1					
AC Input/Output Data						
Rated AC Input/Output Active Power(W)	3000	3600	4000	5000	6000	6600
Max. AC Input/Output Apparent Power(W)	3300	3960	4400	5500	6600	7260
Peak Power (off-grid)(W)	2 times of rated power，>10S					
Rated AC Input/Output Current(A)	13	15. 7	17. 4	21. 7	26. 1	28. 7

Max. AC Input/Output Current(A)	14.3	17.2	19.1	23.9	28. 7	31.6
Max.Continuous AC Passthrough(grid to load) (A)	40					
Short Circuit Protection Current(A)	73					
Grid Connection Form	L+N+PE					
Rate Input/Output Grid Frequency/Range	50Hz/60Hz					
Power Factor Adjustment Range	0.8 leading-0.8 lagging					
Total Current Harmonic Distortion THDi	THD<3%(Linear load <1.5%)					
DC Injection Current	<0.5%In					
Efficiency						
Max.Efficiency	97.60%					
Euro Efficiency	96.50%					
MPPT Efficiency	99%					
Equipment Protection						
DC Polarity Reverse Connection Protection	YES					
AC Output Overcurrent Protection	YES					
AC Output Overvoltage Protection	YES					
AC Output Short Protection	YES					
Thermal Protection	YES					
DC Terminal Insulation Impedance Monitoring	YES					
Ground Fault Current Monitoring	YES					
Island Protection Monitoring	YES					
DC Input Switch	YES					
Residual Current Detection (RCD)	YES					
Surge Protection Level	TYPE II(DC),TYPE II(AC)					
Arc Fault Circuit Interrupters(AFCI)	Optional					
Protection						

Integrated	PV Input Lightning Protection, Anti-islanding Protection, PV String Input Reverse Polarity Protection, Insulation Resistor Detection, Residual Current Monitoring Unit, Output Over Current Protection, Output Shorted Protection	
PV ARC Fault Detection	Optional	
Output Over Voltage Protection	DC Type II/AC Type III	
Certification and Standards		
Grid Regulation	CEI 0-21,VDE-AR-N 4105,NRS 097,IEC61727,G99,G98,VDE 0126-1-1,RD 1699,C10-11	
EMC/Safety Regulation	IEC/ED 62109-1 IEC/EN 62109-2,IEC/EN 61000-6-1,IEC/EN 61000-6-2, IEC/EN 61000-6-3, IEC/EN 61000-6-4	
General Data		
Operating Temperature Range	-40-60℃（>45℃ derating)	
Permissible Ambient Humidity	0-100%	
Permissible Altitude	2000m	
Noise	<30dB	<40dB
With/without external fan	/	√
Ingress Protection(IP) Rating	IP65	
Inverter Topology	Non-Isolated	
Over Voltage Category	OVC II(DC),OVC III(AC)	
Cabinet size(W*H*D)(mm)	350*500*256(Excluding connectors and brackets)	
Weight(kg)	22	23
Installation Style	Wall-mounted	

Version No.1.0

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