Off-Grid Inverter

Product Manual



GTOF51120US2P03

GTOF51100US2P03

GTOF51080US2P03

V1.2

GRANDTECH

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1. Information on this manual

This manual covers key precautions, operation guidelines, usage instructions and maintenance requirements. Users shall strictly comply with the above specifications during installation, operation and maintenance. The inverter manufacturer shall not be liable for any faults or damages arising from non-compliance with the provisions of this manual.

1.1. Target Group

Authorized use of this equipment is restricted to personnel holding certified skills as specified below, and to end-users. End-users are permitted to operate only functions that do not necessitate such certified skills.

- Knowledge of local regulatory requirements.
- Complete training in electrical safety.
- Complete training in the installation and commissioning of electrical equipment and systems.
- Understand and comply with all requirements outlined in this manual.

1.2. Safety Instructions

Warning! Installation, operation and maintenance of the equipment must be strictly performed in accordance with the provisions of this manual. Any improper operation that causes equipment damage or safety hazards will void the manufacturer’s warranty, and the manufacturer shall not be held liable for any resulting accidents.

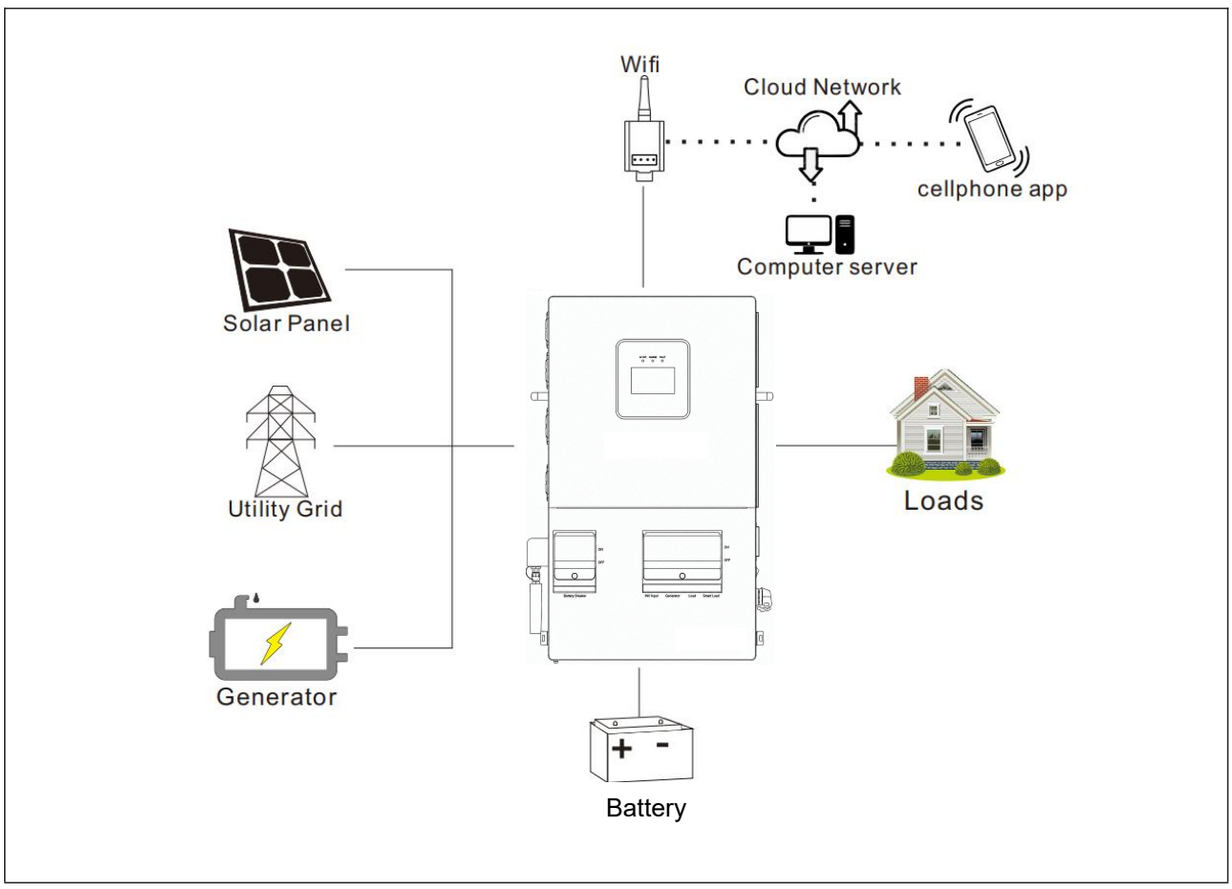
- Strictly comply with local regulatory requirements during installation.
- Only certified electricians may perform installation/wiring. De-energize all power sources first.
- Do not install the inverter in harsh environments such as humid, oily, flammable, explosive, or dusty areas.
- To ensure safe inverter operation, select cables according to technical specifications and install appropriate external fuses or circuit breakers.
- The inverter must be properly grounded. Prioritize connecting the ground wire during wiring and disconnect it last during disconnection.
- Do not disassemble the inverter while it is in operation. For maintenance or servicing, please send it to a professional service center.
- Select the correct battery type. Only rechargeable deep-cycle lead-acid batteries and

lithium-ion batteries are supported, and the battery polarity must not be reversed.

- It must be confirmed that the AC output power of the inverter is the only input power source for the load to avoid damage.
- Ensure the inverter is fully assembled before turning it on for operation.

1.3. Introduction

- The diagram below is for reference only regarding inverter system application scenarios. The specific system wiring method depends on the actual application, and a complete system consists of the following parts:

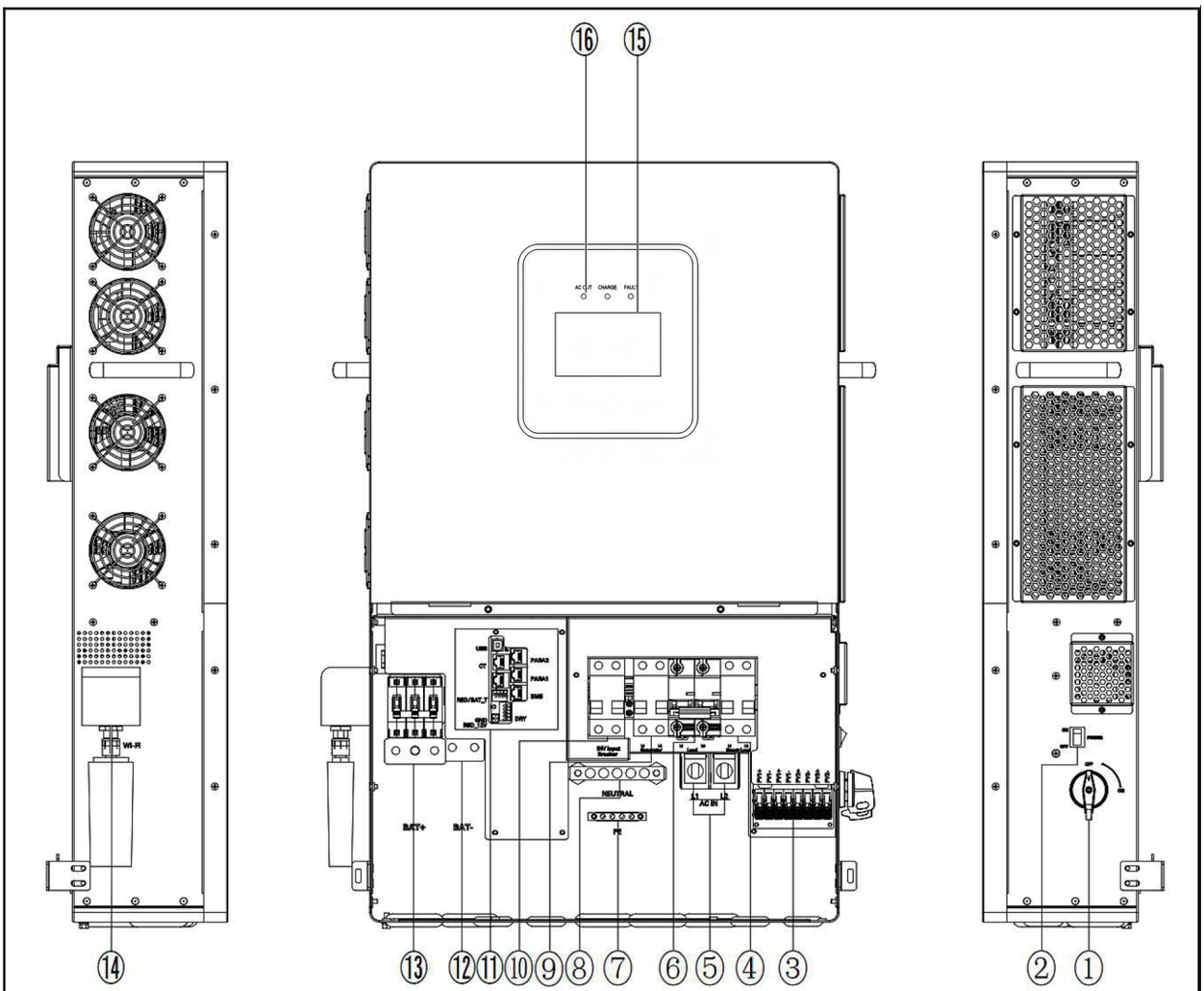


1.4. Product Features

- This is an off-grid inverter that does not have the ability to sell power back to the grid but can utilize grid power for battery charging and pass-through to loads.
- Max. 6 inverters parallelable (72kW total output)
- The system supports lithium battery activation from both grid power and solar power sources.
- Features scheduled charging and discharging function, supporting multiple charging modes.
- The photovoltaic system features dual 12kW with a total capacity of 24kW, supporting a maximum input current of 32A per circuit.
- Equipped with AFCI detection function，Has photovoltaic rapid shutdown function (RSD).
- Has photovoltaic insulation resistance detection function (ISO).
- Equipped with a dedicated generator input interface and supports dry contact control. It also features a generator efficiency enhancement function.
- Dual output interfaces (standard & smart load), with smart load configurable as AC-coupled input.
- Communication: CAN, USB, Wi-Fi, RS485；Control & Updates: Local & Remote
- Comes with comprehensive protection functions, including over-voltage/under-voltage protection, over-current and overload protection, reverse protection, etc.

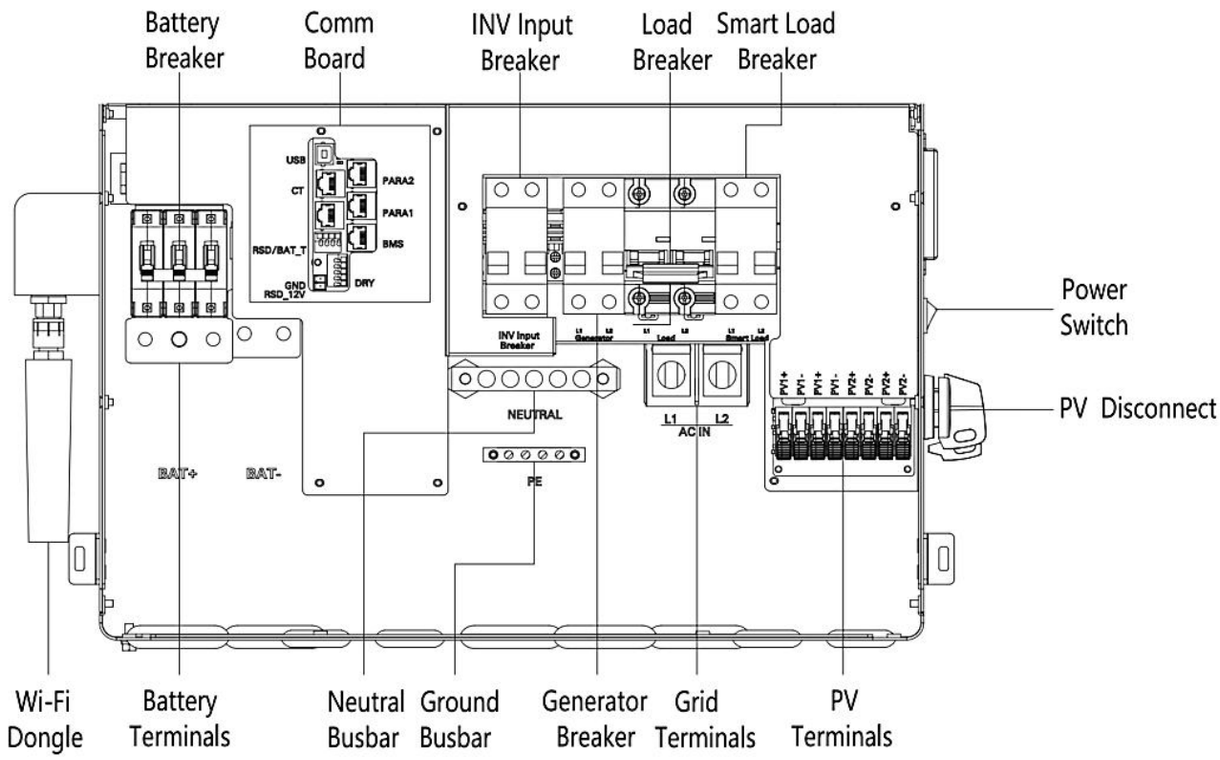
2. Product Overview

2.1. Introduction to Functional Modules and Interfaces



①	PV Switch	⑩	INV Input Breaker
②	Power Switch	⑪	Communication Interface
③	PV Input Terminal	⑫	BAT Terminal
④	Smart Load L1/L2 Breaker	⑬	BAT Breaker
⑤	AC Input L1/L2 Terminal	⑭	Wi-Fi Port
⑥	Load L1/L2 Breaker	⑮	LED Display
⑦	PE Terminal	⑯	Run Indicator
⑧	Neutral		
⑨	Generator Input Breaker		

2.2. Terminal Port Functions and Specifications

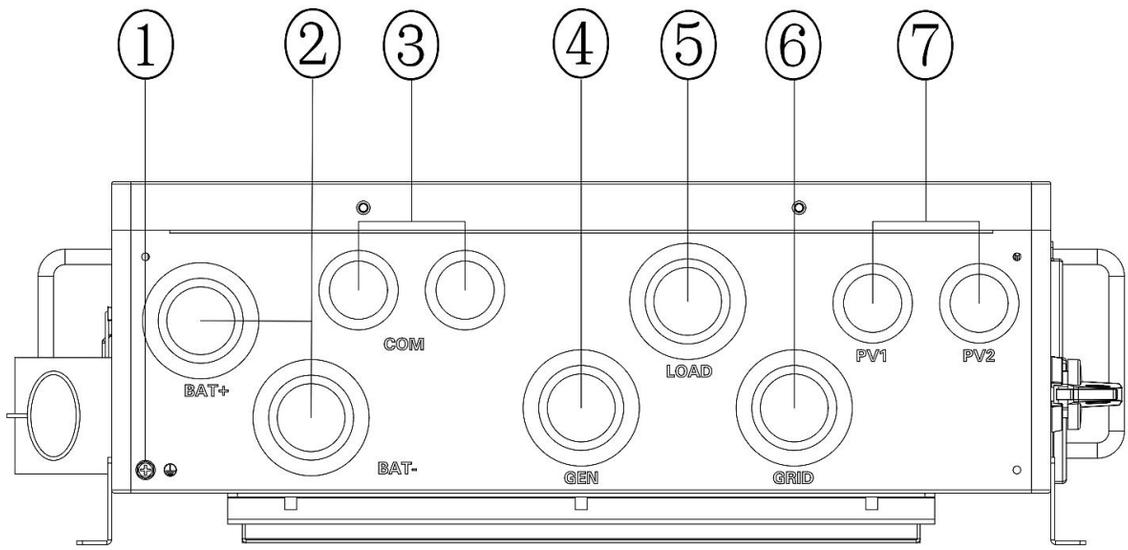


Battery Breaker	**Battery Switch Port (Rated Current: 300A):** ***CAUTION:*** Close this switch first before activating the battery BMS when starting the inverter. This sequence helps prevent potential damage to the switch caused by inrush current surges.
INV Input Breaker	**INV Input Switch Port (Rated Current: 60A):** 1. This switch provides charging short-circuit protection and discharging overload protection. It must remain closed during normal operation. Opening the switch will: ◆ Disable grid-to-battery charging functionality ◆ Provides overload protection for load terminals in off-grid mode 2. The system will trigger Fault Alarm 77 when detecting either of these abnormal conditions: 1) the smart load switch opens unexpectedly during grid-to-battery charging, or 2) grid power is suddenly restored while the switch remains open. The system will automatically initiate emergency protocols, attempting to close the bypass relay (up to 3 attempts) to restore grid charging functionality. If all attempts fail, manual intervention according to standard emergency procedures is required. ◆ Set the rocker switch(Switch marked ⑥) to OFF position

	◆ Re-close the protection switch ◆ Return rocker switch(Switch marked ⑥) to ON，Restart the inverter。
Generator Breaker	**Generator Input Switch Port (Rated Current: 60A):** 1. The system supports two generator solutions with a maximum input current of 60A (adjustable 0-60A) and configurable battery charging current (0-160A). When directly connected to the generator port, the total harmonic distortion (THD) should be maintained below 3%. For optimal THD performance while meeting both load and battery charging demands, the generator capacity should be at least 1.5 times the inverter's output power. ◆ Solution 1 recommends a 15kW+ generator as backup power during grid failures, ◆ Solution 2 enables hybrid operation with smaller generators coordinated with battery systems (configuration via LCD menu), without requiring the generator to exceed the inverter's rated power. 2. Generator Auto-start Function: The generator's start/stop operations are controlled by the parameter settings under "EMS Setting > Battery Power to Mains / Mains Power to Battery / SOC Switching Mains (BMS Enabled) / SOC Switching Inverter (BMS Enabled)" as specified in Section 4.2, Point 5. For the generator's start/stop wake-up wiring connections, please refer to the instructions in Section 7.5.
Load Breaker	**Load Switch Port (Rated Current: 125A):** Load switch rated for 125A (grid-powered)
Smart Load Breaker	**Smart Port (Rated Current: 60A):** This port can serve as a load interface or an AC coupling interface. The selection of port functions can be set on the LCD screen. 1. The intelligent port supports the connection of up to 60A grid-connected solar system equipment to achieve AC coupling. The grid-connected solar system equipment can charge the battery and supply power to the load through the AC coupling inverter. This GES48120M series inverter belongs to a stand-alone inverter and can perform AC coupling, but it cannot reverse the energy back to the grid. Special attention should be paid to this. The opening and closing of the AC coupling function can be controlled according to the battery voltage and capacity.

	◆ ON when: battery SOC/voltage ⩽ set point ◆ OFF when: battery SOC/voltage ⩾ set point 2. The intelligent load port significantly enhances energy utilization through intelligent energy management technology. It enables the sharing or adjustment of the total output load capacity. Once enabled, the system can automatically implement start-stop control based on battery voltage and state of charge (SOC). ◆ ON when: battery SOC/voltage ⩾ set point ◆ OFF when: battery SOC/voltage ≤ set point
Power Switch	**Main Power / Emergency Output Disconnect (EPO) Switch:** Closing this switch restores normal operation and power output. In emergencies, opening the switch immediately cuts all outputs to terminate power supply.
PV Disconnect	**PV (Photovoltaic) Array Disconnect Switch Port :** 1. This switch safely connects/disconnects the PV array from the inverter. In case of PV module abnormalities (e.g., faults, maintenance, or fire risks), open the switch to de-energize the DC input circuit. 2. This inverter is equipped with a dual-channel MPPT (Maximum Power Point Tracking) system. The detailed parameters and operation requirements are as follows: ◆ The maximum open-circuit voltage of each MPPT channel is 500Vdc. When configuring photovoltaic panels, their maximum open-circuit voltage shall not exceed this limit. Meanwhile, full consideration shall be given to the fluctuations in the open-circuit voltage of photovoltaic panels caused by seasonal and temperature variations, and a sufficient voltage margin shall be reserved to prevent the open-circuit voltage from exceeding the limit during operation. ◆ Each MPPT channel supports a maximum operating current of 32A and is configured with two input ports, which is compatible with the parallel connection of two photovoltaic systems. 3. Each MPPT channel supports up to 12kW output, with a total system capacity of 24kW.

2.3. Bottom view/Apertures per industry regs.



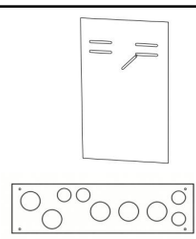
①	PE Terminal
②	Battery Wiring Entry，Diameter: 1.98 in. (50.4 mm). Recommended conduit size: 1 1/2 in.
③	COM Wiring Entry，Diameter: 1.38 in. (34.9 mm). Recommended conduit size: 1 in.
④	GEN Wiring Entry，Diameter: 1.98 in. (50.4 mm). Recommended conduit size: 1 1/2 in.
⑤	Load Wiring Entry，Diameter: 1.98 in. (50.4 mm). Recommended conduit size: 1 1/2 in.
⑥	GRID Wiring Entry，Diameter: 1.98 in. (50.4 mm). Recommended conduit size: 1 1/2 in.
⑦	PV Wiring Entry，Diameter: 1.38 in. (34.9 mm). Recommended conduit size: 1 in.

3. Installation

3.1. Unpacking and Inspection

Before installation, please inspect the unit. Be sure that nothing inside the package is damaged.

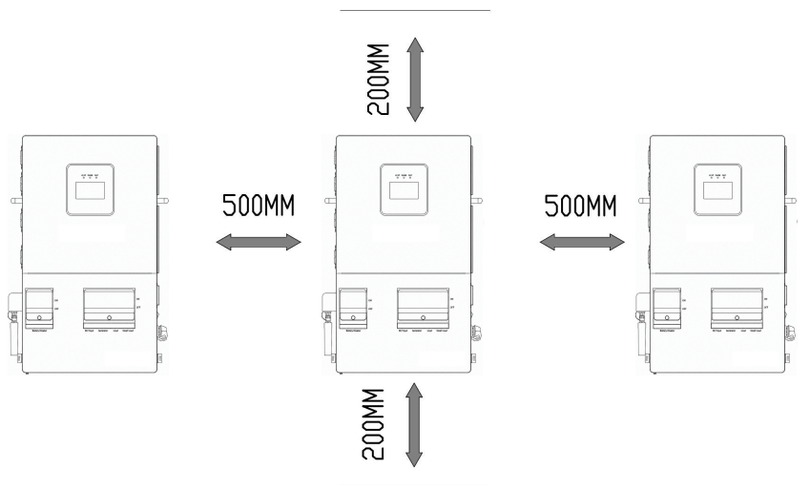
You should have received the following items in the package:

 Parallel Cable x1	 Hex key (2.5mm)x1 Hex key (8mm)x1 Hex key3/16 (4.7mm)x1	 Bracket wall-mountedx1
 Wall-mounted x2	 Ring Terminal(M8) × 4	 Anchor Bolt x4
 Hex Flange Nut(M8)x5	 Product Manual x1	 Mounting Hole Template x1
 Anchor Bolt x4	 expansion tubes x 2 self-tapping screws x 2	 Warranty Card x 1
 Certificate x 1		

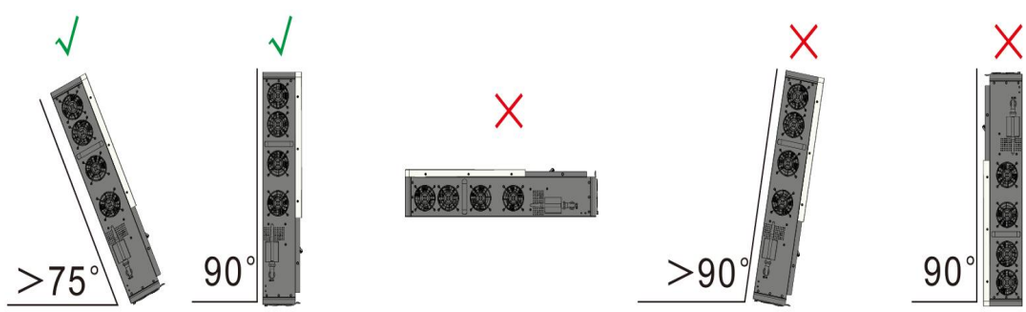
3.2. Environmental Requirements for Installation

The following points shall be followed and referenced when selecting an installation location:

- ***Warning!*** Do not install the inverter in areas with flammable building materials or potential explosion hazards. We shall not be liable for any accidents resulting from violation of this installation principle.
- ***CAUTION：*** Please install the inverter in a cool, shaded, and rain-protected location. Avoid direct sunlight, rain, and snow exposure, as this may damage the inverter or shorten its -service life.
- ***CAUTION：*** To ensure optimal operation, the ambient temperature should be maintained between -10°C and 55°C. Sufficient heat dissipation space must be ensured, and the following minimum clearances should be met.



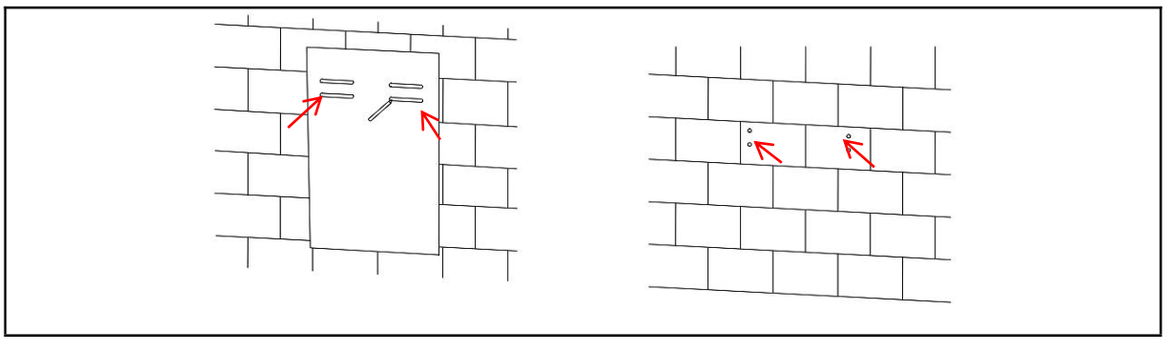
- ***CAUTION：*** The inverter must be installed on a supporting surface capable of bearing its weight. Refer to the diagram below for the installation angle.



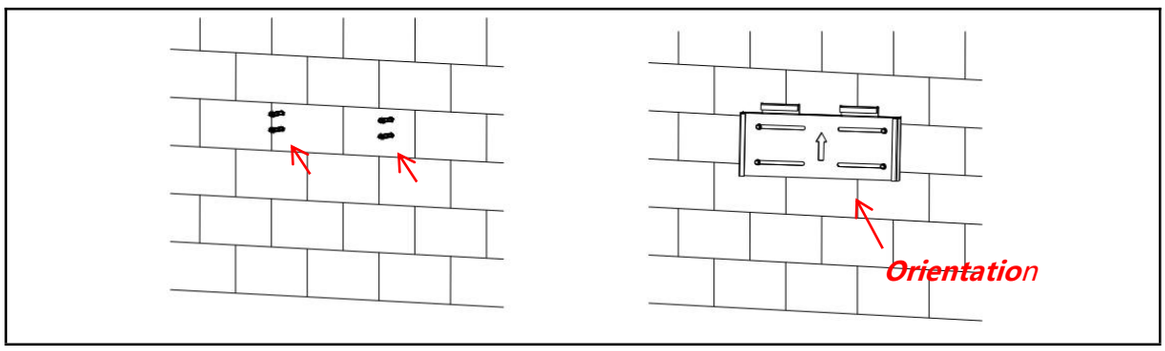
3.3. Installing the inverter

CAUTION： The slotted holes on the wall - mount bracket accommodate various wall stud spacings ranging from 12 inches (305 mm) to 16 inches (406 mm). The inverter weighs 37.5 kg. Select a mounting location capable of supporting this weight for inverter installation.

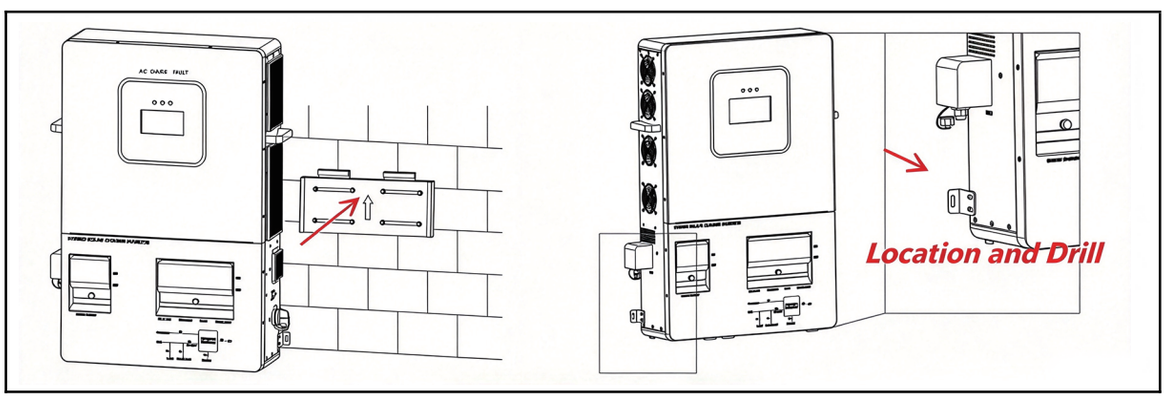
- Step 1：Position the Drill Template on the wall, mark the holes, and drill.



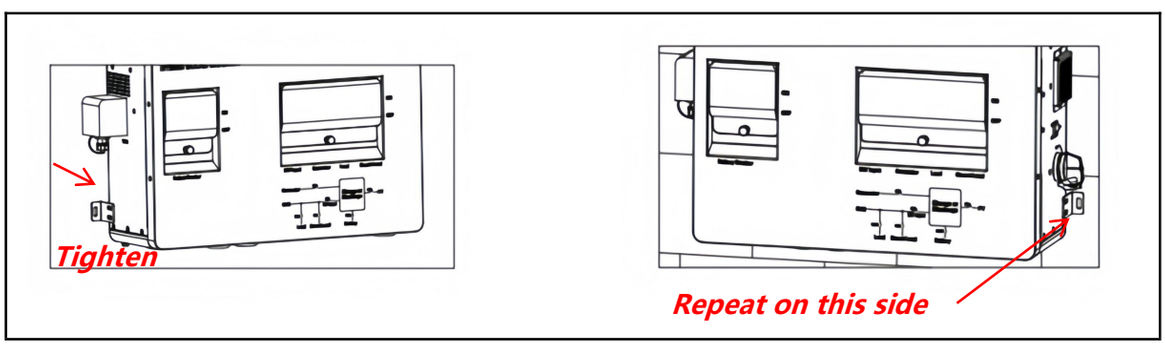
- Step 2：Install the expansion bolts and wall-mount bracket.



- Step 3：Lift the inverter and secure it onto the wall mount.
- Step 4：Fix the inverter with the right-angle brackets (supplied) on both bottom sides.



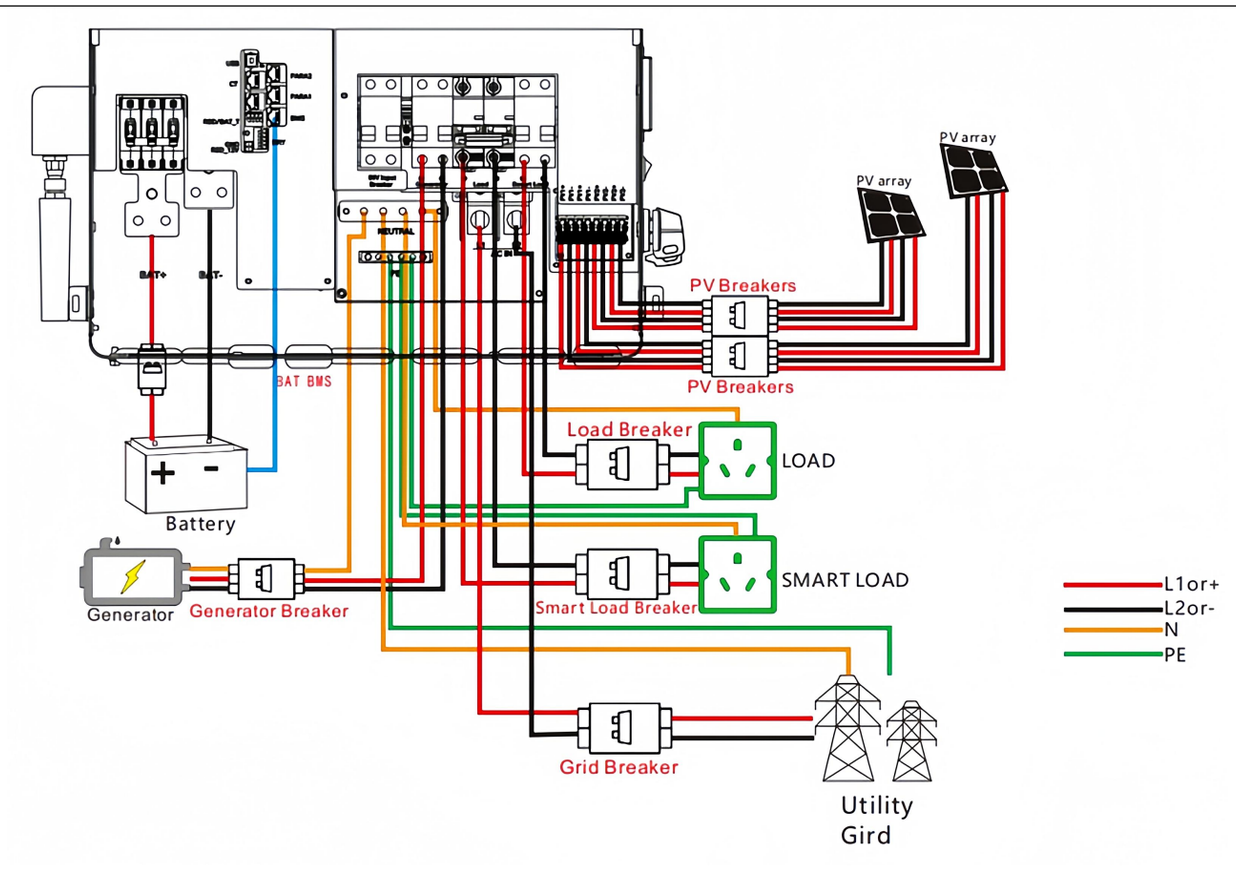
- Step 5：Installation Finished.



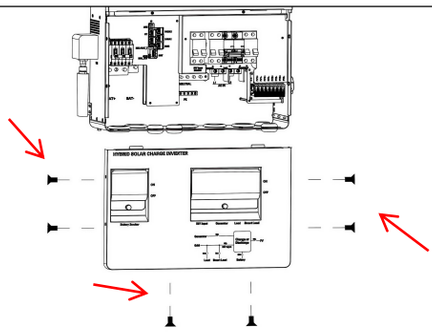
3.4. System Wiring Diagram

CAUTION: Wiring Diagram Reference (Actual connections shall be determined by user application)

Neutral-to-Ground Connection: The neutral line is a solid bond between AC input and output (common neutral architecture), remaining permanently connected. The system requires only one neutral-to-ground connection, typically provided by the main bonding jumper at the first utility disconnection point; if absent, the inverter can internally establish .this connection via settings. Path: 3.9.5) GRID — No Mains Neutral



3.5. Start Wiring

	◆Remove the terminal cover before beginning the wiring process. ◆Install the terminal cover after all connections are made.

3.6. Battery Connection

CA npliance with regulatory requirements, please install the ns.

- **GTOF51120US2P03**
- **GTOF51100US2P03**
- **GTOF51080US2P03**

◆ e battery and the inverter

◆ ited for the required current.

◆ eads can support the full rated current.

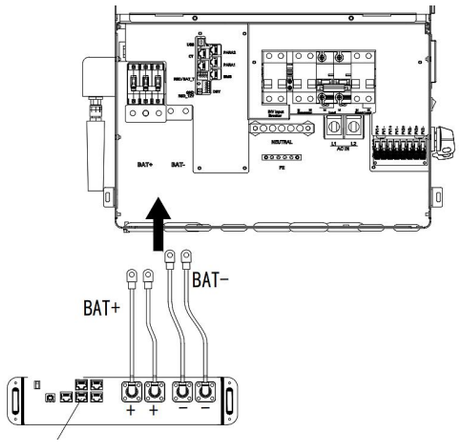
Recommended Battery Cable and Switch Specifications:

Models	Wire Size	Rated discharge current	breaker type	Torque value
GTOF51120US2P03	53.5mm^2/0AWG*2P	270A	2P—300A	2-3Nm
GTOF51100US2P03	42.4mm^2/1AWG*2P	220A	2P—250A	2-3Nm
GTOF51080US2P03	33.6mm^2/2AWG*2P	180A	2P—200A	2-3Nm

3.6.1. Lead-Acid Battery

Equip with a 48V rated lead-acid battery of suitable capacity; the recommended charging current is 0.1–0.25C(C→battery capacity)

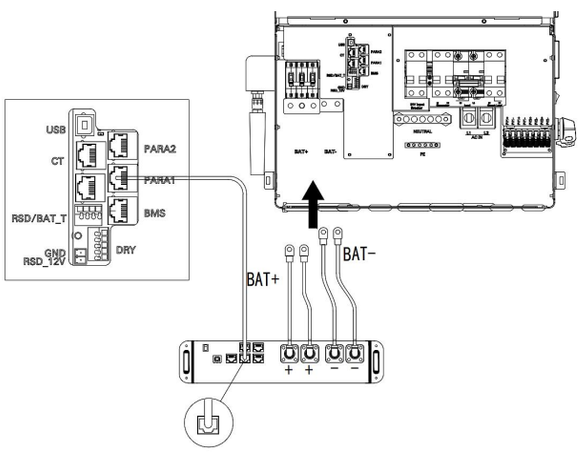
Battery Connection Diagram

	***Warning!*** ◆Turn off the switch before connecting the wires. ◆Ensure the correct polarity of the battery terminals. ◆The cable lengths for the positive and negative terminals must be identical. ◆Ensure all battery connections are securely tightened.

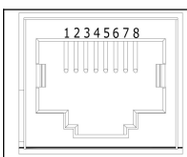
3.6.2.Lithium Battery Connection

The battery and inverter communication protocols must be compatible.

A. Battery Connection Diagram

	***Warning!*** ◆Turn off the switch before connecting the wires. ◆Ensure the correct polarity of the battery terminals. ◆Keep the cable lengths for the positive and negative battery terminals identical. ◆Ensure secure battery connection. ***CAUTION:*** Battery and inverter require BMS communication connection.

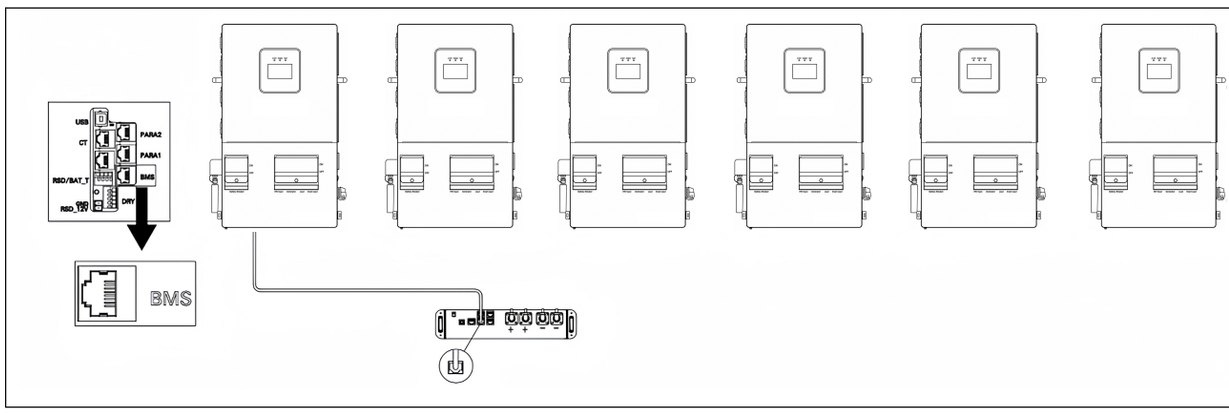
B. RS485 Communication Port



RJ45	PIN_1	PIN_2	PIN_3	PIN_4	PIN_5	PIN_6	PIN_7	PIN_8
Note	485-B	485-A		CAN_H	CAN_L		485-A	485-B

C. Communicating with battery BMS in parallel system

CAUTION : Connect the battery BMS to the master inverter in a parallel system for best performance. (Connection to any slave unit is also functional.)


USB
CT
PARA2
PARA1
RSD/BAT_T
BMS
DRY
BMS

3.7. AC Input/Output Connection

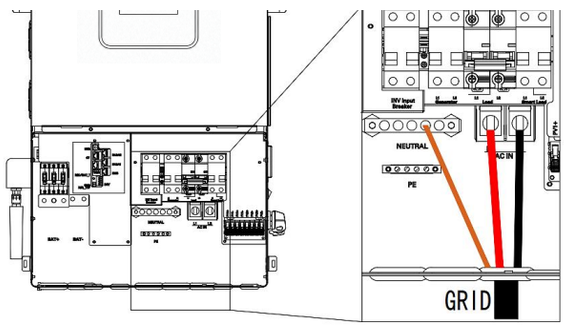
CAUTION: To ensure safe operation and compliance with regulatory requirements, please install the equipment as per the following instructions.

- A protective switching device shall be installed between the utility grid and the inverter.
- The electrical specifications of conductors and protective switching devices shall meet or exceed the rated parameters of the equipment.
- Confirm that all electrical connections are tight.
- ***Warning!*** For parallel systems, correct polarity must be strictly observed during installation. Failure to do so may result in a severe short-circuit hazard.

3.7.1 Recommended AC Input Cable and Switch Specifications

Models	Wire Size	Maximum bypass input current	air switch or circuit breaker type	Torque Value
GTOF51120US2P03	53.5mm^2/0AWG*2P	200A	3P—200A	1.2-1.6Nm
GTOF51100US2P03	53.5mm^2/0AWG*2P	200A	3P—200A	1.2-1.6Nm
GTOF51080US2P03	53.5mm^2/0AWG*2P	200A	3P—200A	1.2-1.6Nm

- AC Input Connection Diagram



Warning!

◆Turn OFF the power switch before starting any wiring work.

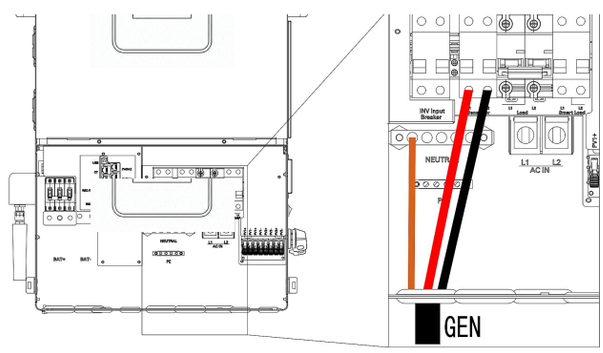
◆Always connect the Protective Earth (PE) wire first.

◆Ensure correct circuit polarity by paying close attention to the polarity markings.

3.7.2. Recommended GEN Input Cable and Switch Specifications

Models	Wire Size	Maximum GEN input current	air switch or circuit breaker type	Torque Value
GTOF51120US2P03	16.7mm^2/5AWG	60A	3P—63A	1.2-1.6Nm
GTOF51100US2P03	16.7mm^2/5AWG	60A	3P—63A	1.2-1.6Nm
GTOF51080US2P03	16.7mm^2/5AWG	60A	3P—63A	1.2-1.6Nm

◆ GEN Input Connection Diagram



Warning!

◆Turn OFF the power switch before starting any wiring work.

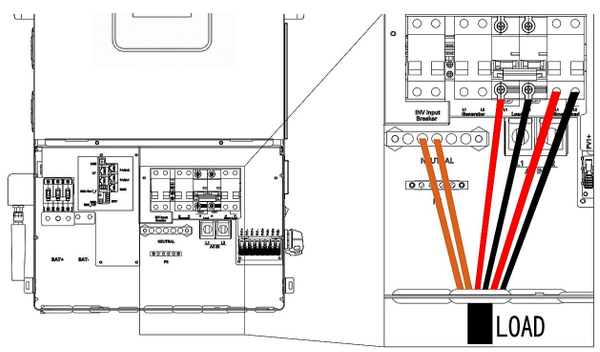
◆Always connect the Protective Earth (PE) wire first.

◆Ensure correct circuit polarity by paying close attention to the polarity markings.

3.7.3. Recommended LOAD Cable and Switch Specifications

Models	Wire Size	Maximum Load output current	air switch or circuit breaker type	Torque Value
GTOF51120US2P03	42.4mm^2/1AWG	125A	3P—125A	1.2-1.6Nm
GTOF51100US2P03	42.4mm^2/1AWG	125A	3P—125A	1.2-1.6Nm
GTOF51080US2P03	42.4mm^2/1AWG	125A	3P—125A	1.2-1.6Nm

◆ LOAD Connection Diagram



Warning!

◆Turn OFF the power switch before starting any wiring work.

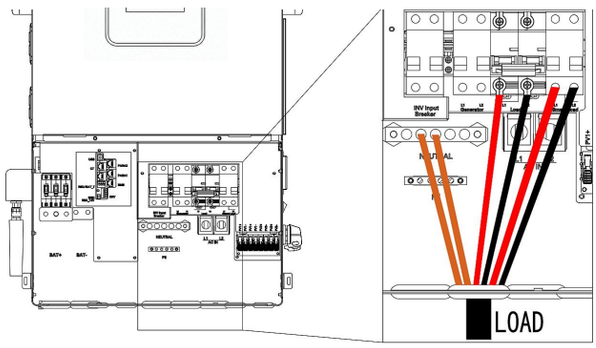
◆Always connect the Protective Earth (PE) wire first.

◆Ensure correct circuit polarity by paying close attention to the polarity markings.

3.7.4. Recommended Smart Load Cable and Switch Specifications

Models	Wire Size	Maximum Load output current	air switch or circuit breaker type	Torque Value
GTOF51120US2P03	16.7mm^2/5AWG	60A	3P—63A	1.2-1.6Nm
GTOF51100US2P03	16.7mm^2/5AWG	60A	3P—63A	1.2-1.6Nm
GTOF51080US2P03	16.7mm^2/5AWG	60A	3P—63A	1.2-1.6Nm

◆ Smart Load Connection Diagram



Warning!

◆Turn OFF the power switch before starting any wiring work.

◆Always connect the Protective Earth (PE) wire first.

◆Ensure correct circuit polarity by paying close attention to the polarity markings.

◆ Special Load Application Notes

CAUTION: To allow refrigerant pressure to stabilize, air conditioners must remain powered off for 2-3 minutes before a safe restart. Immediate power restoration after an outage may cause equipment damage.Before installation, verify whether the air conditioner features built-in start-up delay protection. If this protection is not available, the high inrush current during immediate restart may repeatedly trigger the overload protection mechanism of the off-grid solar inverter, potentially leading to damage of internal components in the air conditioner.

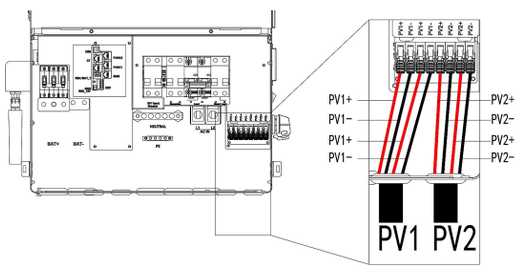
3.8. PV Connection

CAUTION: To ensure safe operation and compliance with regulatory requirements, please install the equipment as per the following instructions.

- Install a protective switch between PV panels and inverter.
- Wire and switch ratings must satisfy the equipment's specifications.
- Install a Lightning Protection Device (LPD) at the inverter's DC input side.
- Confirm that all electrical connections are tight.

Models	Wire Size	Maximum PV input current	air switch or circuit breaker type	Torque value
GTOF51120US2P03	5.2mm^2/10AWG	32A	2P—40A	1.2-1.6Nm
GTOF51100US2P03	5.2mm^2/10AWG	22A	2P—32A	1.2-1.6Nm
GTOF51080US2P03	5.2mm^2/10AWG	22A	2P—32A	1.2-1.6Nm

- PV Connection Diagram



Warning!

◆Turn OFF the power switch before starting any wiring work.

◆Always connect the Protective Earth (PE) wire first.

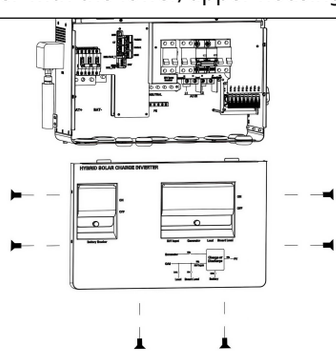
◆Ensure correct circuit polarity by paying close attention to the polarity markings.

◆One PV array cannot be connected to two inverters.

◆Prevent system overvoltage to avoid damage to components.

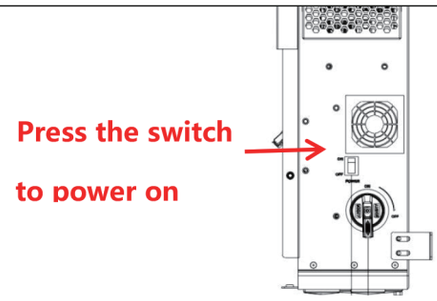
3.9. Final Assembly

Complete all wiring connections, then cover with the lower/upper housing and securely fasten the mounting screws.



4. Operation

4.1. Power ON/OFF

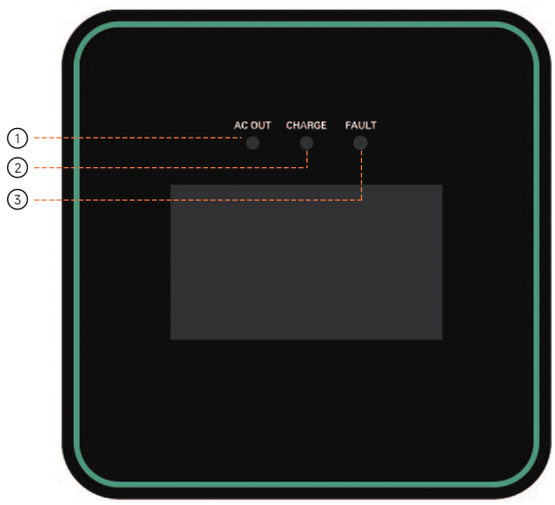


Warning!

◆Ensure all installation and wiring are correct before powering on.

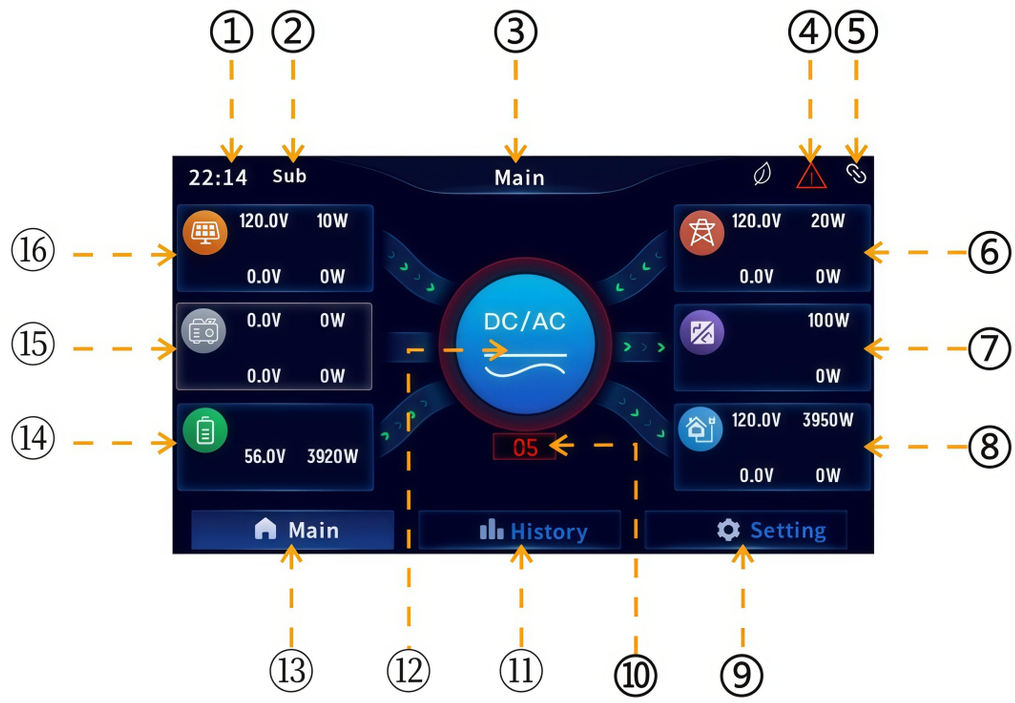
4.2. Operation and Display Panel

1) LED lighting introduction



①	Output Indicator (Green): Flashes when the inverter is supplying power.
②	Charging Indicator (Yellow): Flashes during charging.
③	Fault Indicator (Red): Lights up when a fault occurs. It will either remain steadily on or flash, indicating the severity level of the fault.

2) LCD Display & Parameter Configuration

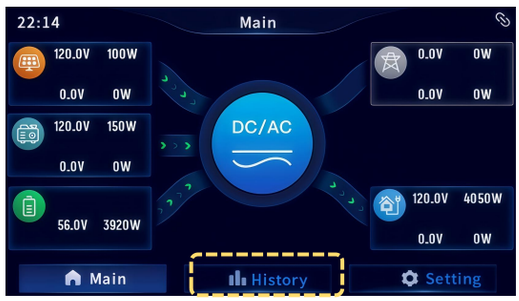


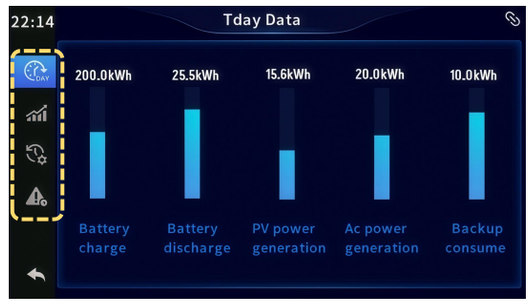
①	Time	⑨	Setting
②	Parallel Mode Tag	⑩	Alarm Code
③	Page Selection Note	⑪	Historical data
④	Alert Indicator	⑫	System information
⑤	LCD Communication Indicator	⑬	Main
⑥	AC input parameters	⑭	Battery parameters
⑦	Normal Load	⑮	Generator parameters
⑧	Total Output Load	⑯	Photovoltaic (PV) parameters

3) Introduction to Main Interface Icon Functions

- The main interface of the LCD is equipped with icons for functional modules such as Battery, PV, and Power Grid. Each icon displays core parameters in real time, and you can tap it to enter the corresponding module’s details page for full parameter viewing.
- For example, tapping the DC/AC icon in the center of the main interface allows you to query the inverter’s operating temperature, rated power, software version and other information.
- When an inverter alarm is triggered, the outer ring of the icon will turn red, and an alarm code will be displayed below simultaneously. Tapping the alarm code enables you to check the specific alarm type.
- Details of all icons and their corresponding viewable content are shown in the table below

A. Click the History icon to view Today, Accumulation, Setting log, and Fault log data.





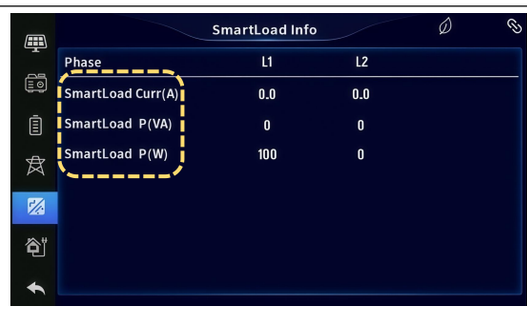
B. Click grid icon to view L1/L2 parameters: V, A, VA,W, Hz





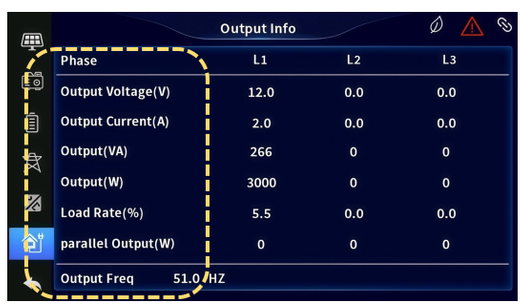
C. Click the Smart Load/MicInv Info icon to view A,VA and W



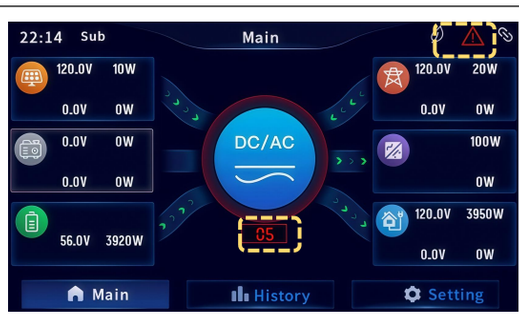


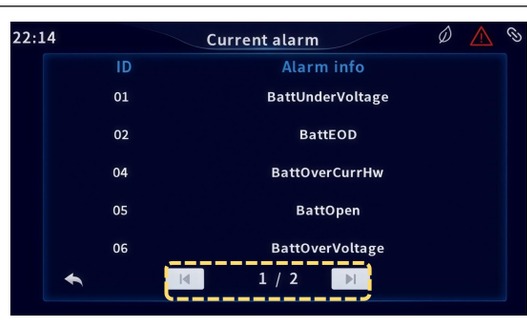
D. Click Total Output Load icon to view L1/L2 parameters: V, A, VA, W, Load Rate, Hz





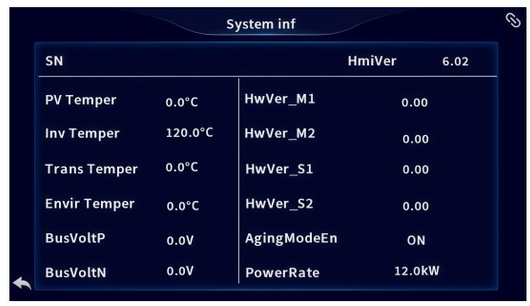
E. Click Alarm Code icon or Alert Indicator to view device alarm log





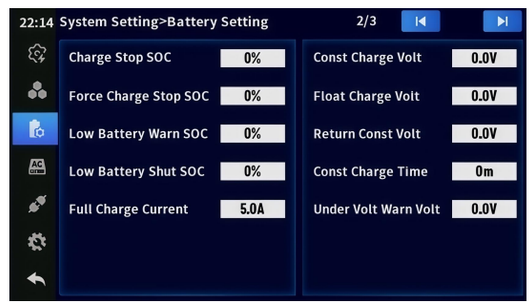
F. Click System information to view device specs: Temp,Barcode,Power,Firmware, BUS V





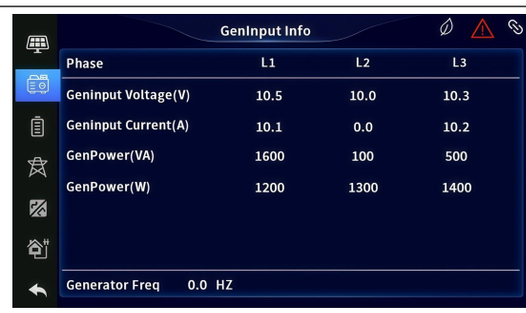
G. Click Battery parameters icon to view Voltage, Charge/Discharge Current, SOC





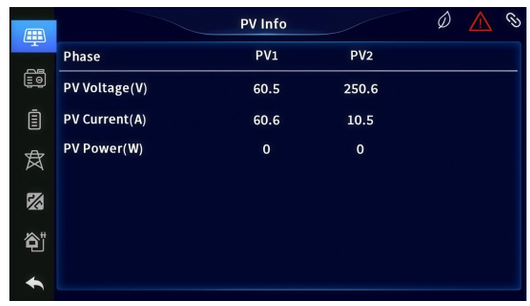
H. Click Generator parameters icon to view L1/L2 parameters: V, A, Hz, VA,W





I. Click Photovoltaic (PV) parameters icon to view L1/L2 parameters: V, A, W

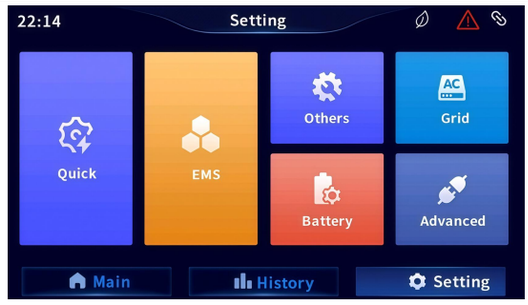




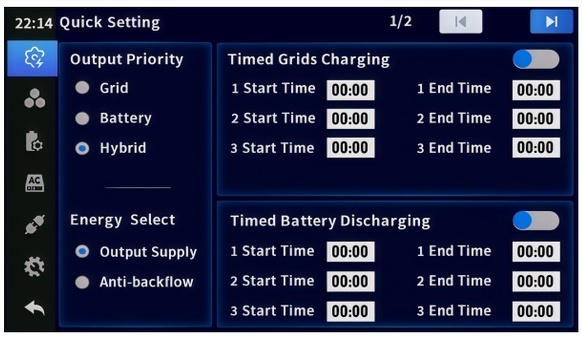
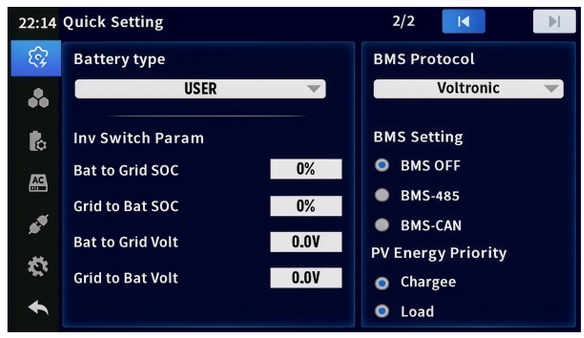
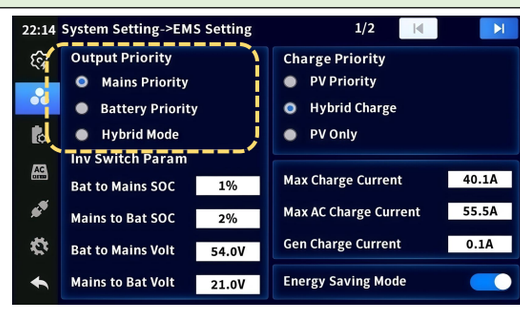
4) Setup parameters description

Step1. Click Setting on the main interface to enter the settings page, where you will see six major setting categories: Quick, EMS, Battery, Grid, Others, and Advanced.





5) All settings are categorized and annotated in the table below. Please read carefully before configuration.

Quick	
	
1. **Output priority**：For details, refer to the "EMS" setting item. 2. **Energy Select**：For details, refer to the "Advanced" setting item. 3. **Timed Grid Charging and Timed Battery discharging**：For details, refer to the "EMS" setting item. 4. **Battery Type/Inv Switch Param/BMS Protocol/BMS Setting**：For details, refer to the "Battery" setting item. 5. **PV Energy priority:**For details, refer to the "Advanced" setting item.	
EMS	
Output priority 1. Mains Priority Default 2. Battery Priority 3. Hybrid Mode	

1. Mains Priority Default

The mains power is normal and it will operate in the mains power mode. In case of mains power failure, it will switch to the battery inverter mode.Battery Priority

2. Battery Priority

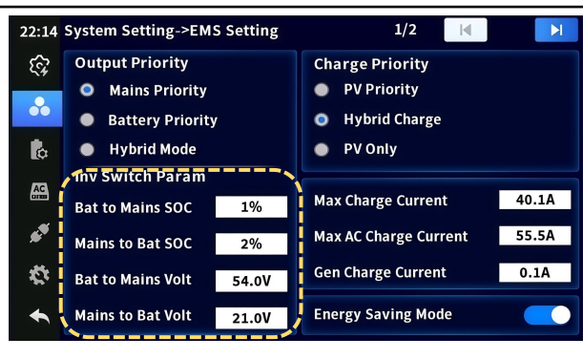
Grid normal. When battery voltage is below the set "Bat to Mains Volt/SOC", switch to mains supply mode. When battery voltage is above the set "Mains to Battery Volt/SOC", switch to battery discharge mode. Grid fault: inverter stops output when battery voltage is below "EOD Volt/Low Battery Shutoff".

3. Hybrid Mode

can set this mode through the "hybrid→mixed mode" setting item.

Inv Switch Param

1. Bat to Grid SOC 10% default
2. Grid to Bat SOC 100% default
3. Bat to Grid Volt 46V default
4. Grid to Bat Volt 57.6V default



1. Bat to Grid SOC 10% default

When BMS is enabled, the system switches to mains power if battery capacity ratio is below the threshold and mains is available.

2. Grid to Bat SOC 100%default

This function is active in battery priority mode with BMS enabled. The system switches from mains mode to inverter mode when battery capacity exceeds the threshold.

3. Bat to Grid Volt 46V default

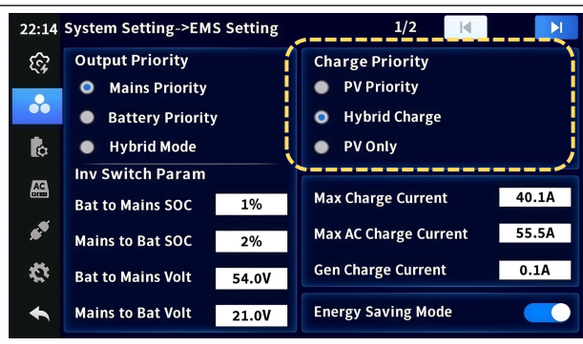
In battery priority mode, the output switches from inverter to mains supply when battery voltage falls below the set value. Setting range: 44V～52V.

4. Grid to Bat Volt 57.6V default

When the parameter **"Output source priority"** =Bat, the battery voltage is higher than the set value, and the output is switched from the mains to the inverter. Setting range: 48V~60V.

Charge Priority

1. PV priority
2. Hybrid charging
3. Only Solar



1. PV priority

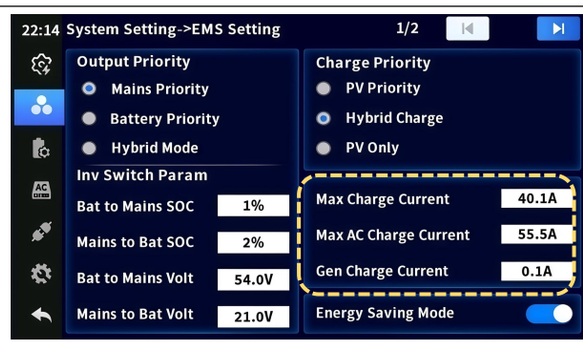
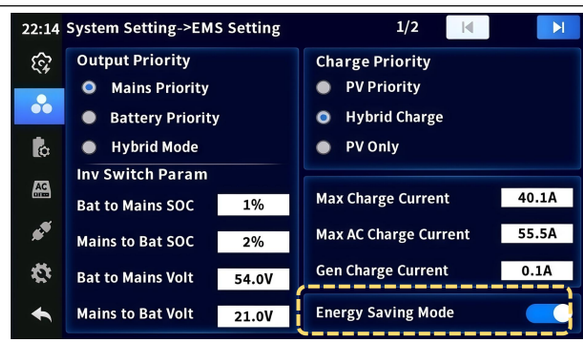
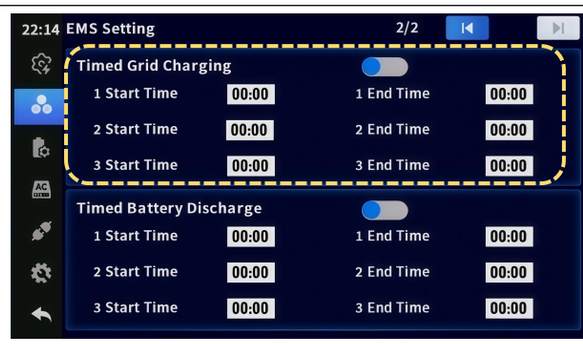
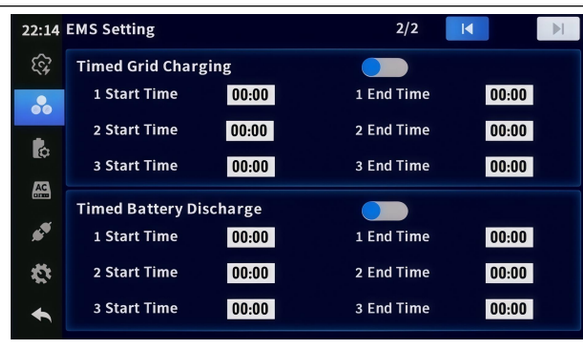
The system prioritizes battery charging with PV energy when sufficient, powering loads with surplus; when PV is insufficient, charging remains prioritized while loads switch to grid supply.

2. Hybrid charging

Hybrid PV-Grid Charging Mode: PV charging priority; when PV generation is insufficient, the grid provides supplementary charging.

3. Only Solar

PV-only charging mode: Exclusively uses solar power without grid supplementation.

1. Max charge current, range:0~250A; 60A **default** **2. Max AC charge current**, range: 0~160A; 120A **default** **3. Gen charge current**, range:0~250A; 60A **default**	
1. Power saving mode: Disable default When energy-saving mode is enabled, if each phase load < 25W, the inverter outputs pulsed voltage after 5 minutes. If any phase load > 50W, it automatically resumes normal output.	
1. Timed Grid Charging ◆Disable **default or** Enable When enabled, the grid charges the battery and supplies the load during user-set charging periods or when battery voltage is low. ◆1-3st slot start charging; range: 00:00-23:59 ◆1-3st slot end charging; range: 00:00-23:59	
1. Timed Battery discharging ◆Disable **default or** Enable When enabled, the battery discharges only during user-set discharge periods or when utility power is unavailable. ◆1-3st slot start charging; range: 00:00-23:59 ◆1-3st slot end charging; range: 00:00-23:59	

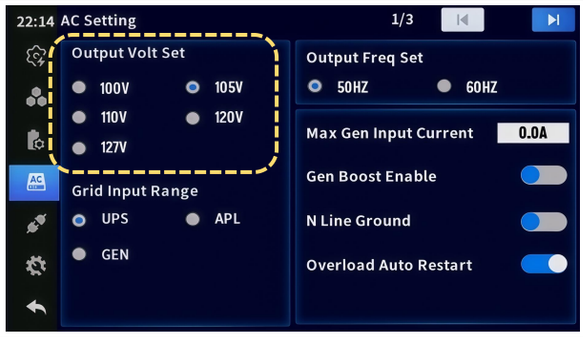
Grid

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1. Output Volt Set

◆120Vac **default**

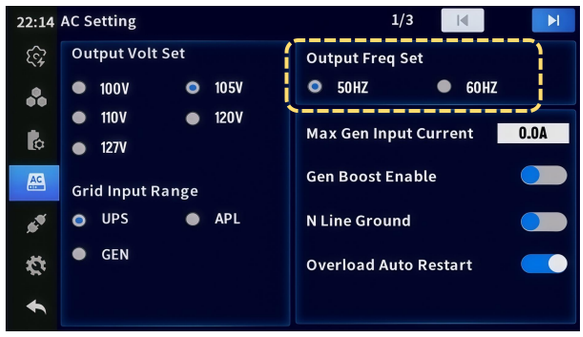
Allow to set to100Vac/105Vac/110Vac/120Vac/127Vac, default 120V. The rated output power will be reduced= (Power Rate)*(Vset/120)

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1. Output Frequency

◆50.0HZ or 60.0HZ

Grid-adaptive feature: When connected to the grid, the system automatically adapts to the grid frequency. When the grid is disconnected, the output frequency can be set via this menu. Default output frequency is 60Hz for 120Vac."

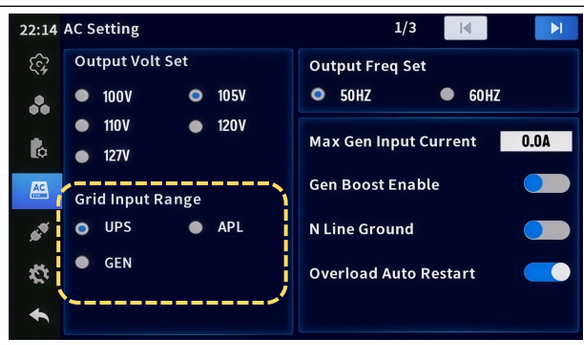
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Grid Input range

1. UPS default

2. Generator

3. APL

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1. UPS default

◆Auto-detection when Grid is connected: voltage range 90–140Vac (when system voltage is 100V/105V, minimum input voltage is limited to 85V); frequency range: 47–55Hz (for 50Hz); 57–65Hz (for 60Hz)."

2. Generator

Auto-detection enable when diesel generator is connected: voltage range 90–140VAC; frequency range 40–70Hz."

3. APL

User-enabled APL: for both grid and generator, voltage range 85–140Vac; frequency range 40–70Hz."

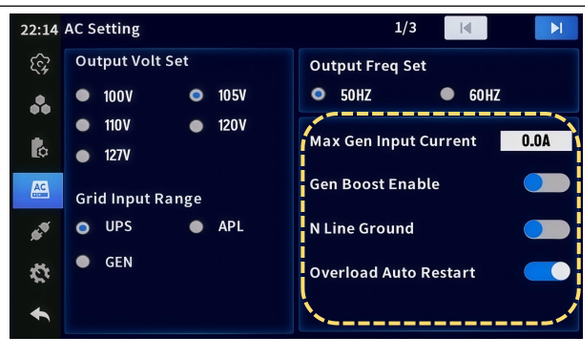
</td>
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<tr>
<td>

1. MAX Gen Input Current，60A default，Range: 0-60A；

2. Gen Boost Enable

3. N Line Ground

4. Overload Auto Restart

</td>
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</tr>
</table>

1. Gen Boost Enable

◆For function explanation, see section 2.2, item ③ 'Generator Input Switch Port'.

2. N Line Ground

◆For application of the function, refer to 'Neutral-to-Ground Connection' in section 3.4 'System Wiring Diagram'.

3. Overload Auto Restart

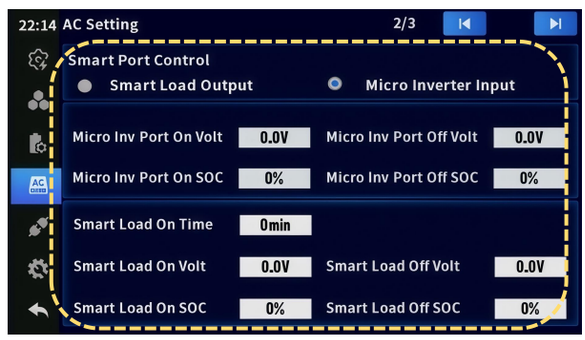
◆Enable overload automatic restart. If overload shutdown output occurs, the machine will restart the output after a delay of 3 minutes. After a total of 5 times in 30 minutes, the startup system is no longer resumed.

Smart Port Control

1. Smart Load Output

2. Micro Inverter Input

◆For function description, see section 2.2, item ⑤ 'Smart Port'.



1. Micro Inv Port on Volt: 50V default; Setting range: 40V~60V; start voltage must be 1.2V lower than stop voltage to set.

2. Micro Inv Port Off Volt: 52V default; Setting range: 40V~60V; the shutdown voltage must be 1.2V higher than the start voltage to set.

3. Micro Inv Port on SOC: 20% default; Setting range:0%~100%; start SOC must be at least 1% below close SOC to set.

4. **Micro Inv Port Off SOC: 85% default;** Setting range:0%~100%; Close SOC must be at least 1% above start SOC to set.

5. Smart Load on Volt: 52V default; Setting range: 40V~60V; Start voltage must be 1.2V above shutdown voltage to set.

6. Smart Load Off Volt: 50V default; Setting range: 40V~60V; Shutdown voltage must be 1.2V below start voltage to set.

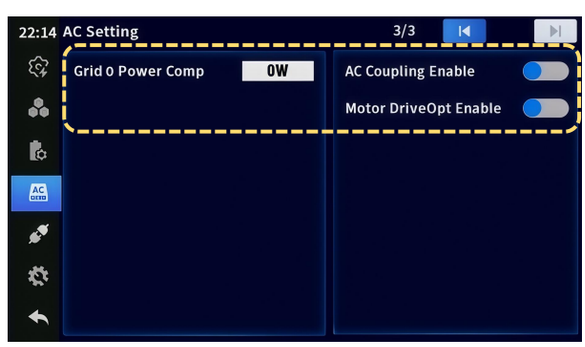
7. Smart Load on SOC: 85% default; Setting range:0%~100%; Start SOC must be at least 1% above set stop SOC.

8. Smart Load Off SOC: 20% default; Setting range:0%~100%; Shutdown SOC must be at least 1% below set start SOC.

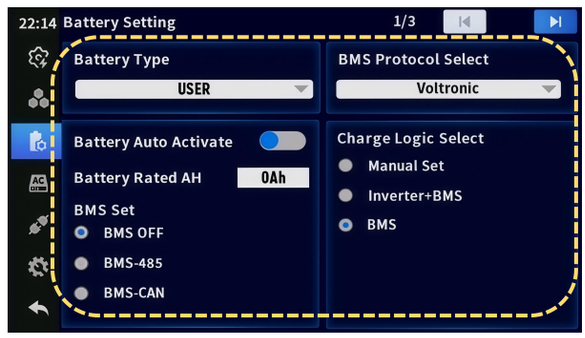
1. Grid Zero Power Compensa; 0W **default;** Regulating compensation grid power.

2. AC Couple Enable; Disable **default**

3. Motor DriveOpt Enable; Disable **default**; Enables highly reliable startup for inverter air conditioners.



Battery

1. **Battery Type** 2. **Automatic battery activation** 3. **Battery pack rate AH** 4. **BMS Set**(BMS OFF **default**，BMS 485，BMS CAN) 5. **BMS Protocol Select** 6. **Charge Logic Select**(Manual Set，Inverter+BMS，BMS)	

1. Battery Type

◆**USER：** User-defined; all battery parameters can be set；

◆**SLD**，Sealed lead-acid battery; constant-voltage charge voltage: 57.6V, floating charge voltage: 55.2V；

◆**FLD**，Vented lead-acid battery; constant-voltage charge voltage: 58.4V, floating charge voltage: 55.2V；

◆**GEL default,** Colloidal lead-acid battery; constant-voltage charge voltage: 56.8V, floating charge voltage: 55.2V；

◆**LFP15/LFP16：** Lithium iron phosphate battery LFP15/LFP16, corresponding to 15 strings and 16 strings of lithium iron phosphate battery; for 16 strings, default constant-voltage charge voltage is 56.8V; for 15 strings, default constant-voltage charge voltage is 53.2V; Allow adjustable；

◆**NCM14：** Ternary lithium battery; which is adjustable. The default constant voltage charging voltage of NCM 14 series is 57.6V.

2. Automatic battery activation

◆When the battery is dormant or not connected, the PV or mains automatically activates the battery to turn on the battery output.

3. BMS Protocol Select

◆When the BMS communication setting was on, the corresponding lithium battery manufacturer brand needs to be selected for communication.

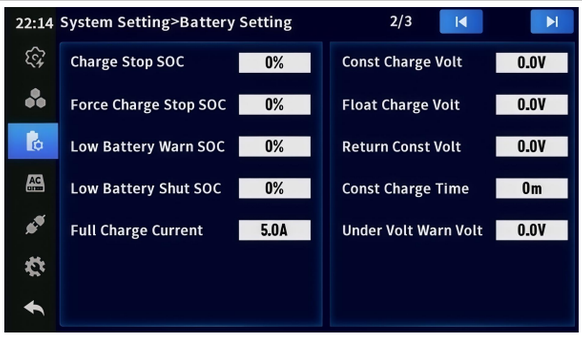
4. Charge Logic Select(Manual Set，Inverter+BMS，BMS)

◆Manual Set：The maximum charging current of the battery is limited according to the set value of item .

◆**BMS+inverter**：The maximum charging current of the battery is limited according to the descending logic of the machine.

◆**BMS only:** The maximum charging current of the battery is limited according to the current limit value of BMS.

1. The diagram below shows battery-related application settings. Customers can configure them according to the actual battery used and their specific needs.



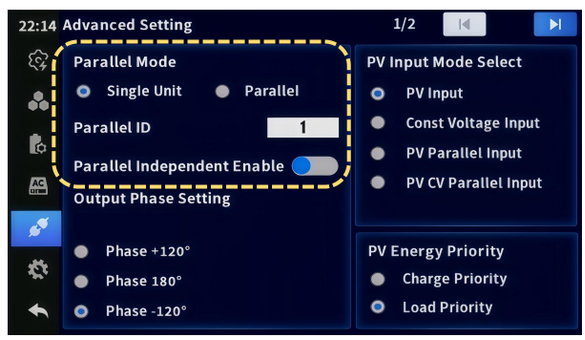


Advanced

Parallel Mode

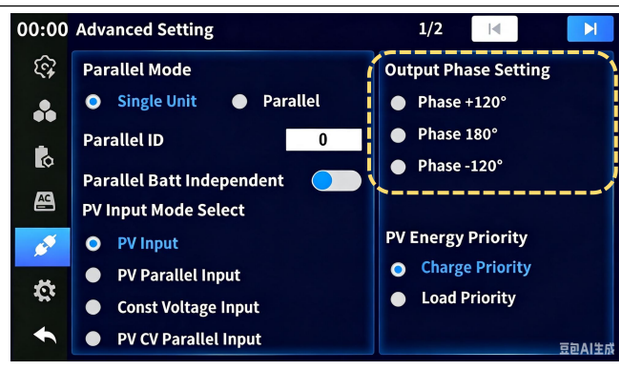
1. Single Unit
2. Parallel
3. Parallel ID
4. Parallel Independent Enable

For parallel system wiring and setup, refer to Chapter 8: Parallel Installation, Wiring, and Setup.



output phase setting

1. Split 120°:
2. Split 180°
3. Split -120°



- Split 120°: L1 and L2 have a 120° phase difference, using tapped connection.L1- N / L2- N: 120Vac, L1- L2: 208Vac
- Split 180°: L1 and L2 have a 120° phase difference with tapped connection.L1- N / L2- N: 120Vac, L1- L2: 240Vac
- Split -120°: L1 and L2 have a phase difference of -120° with tapped connection.L1- N / L2- N: 120Vac, L1- L2: 208Vac

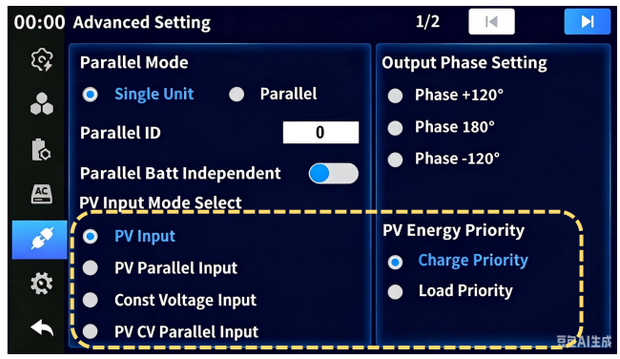
Output phase settings must be configured by the user in standby mode. Ensure the inverter wiring is correctly set; otherwise, malfunctions may occur.

PV Input Mode Select

- PV Input
- Const Voltage Input
- PV Parallel Input
- PV CV Parallel Input

PV Energy Priority

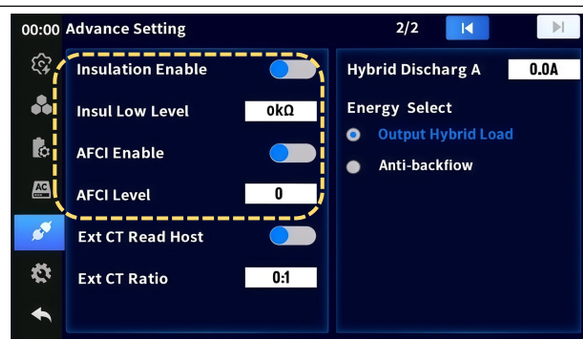
- Charge Priority
- Load Priority



PV Input Mode Select

1. **PV Input:** Two independent PV string systems connected to two separate PV inputs respectively.
2. **Const Voltage Input:** Two PV inputs connected to two independent DC constant-voltage power supplies respectively.
3. **PV Parallel Input:** Two PV inputs can be connected in parallel to one PV string system.
4. **PV CV Parallel Input:** Two PV inputs connected in parallel to one DC constant-voltage source system.

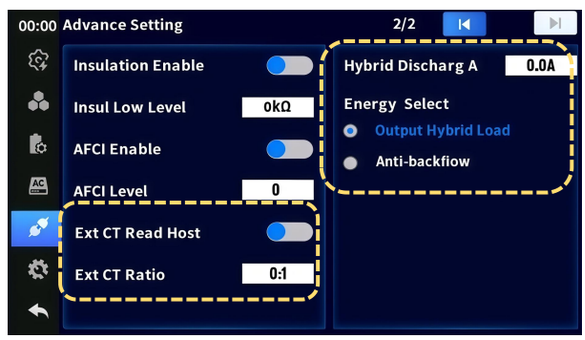
1. **Insulation Enable**
2. **Insul Low Level:** 15kΩ, Set value range: 0 –3MkΩ
3. **AFCI Enable**, Disable default:
4. **AFCI Level**



1. **Insulation Enable:** MPPT operates only if the inverter detects PV grounding impedance below the set threshold.
2. **AFCI Enable:** Function enabled: inverter detects PV arc faults → cuts off RSD_12V power supply and shuts down MPPT system.

1. **Hybrid Discharge A**: 272A default, Setting range: 0~272A.
2. **External CT Get Host Enable**
3. **External CT Ratio**, 2000:1 default: Can be set according to actual needs
4. **Energy Select**

- Output Hybrid Load
- Anti-backflow



External CT Get Host Enable:

- Disable **default:** Only control the grid-connected power of this inverter.
- Enable: Anti-backflow host,plug the CT into this inverter, to control the total grid-connection power.

Energy Select

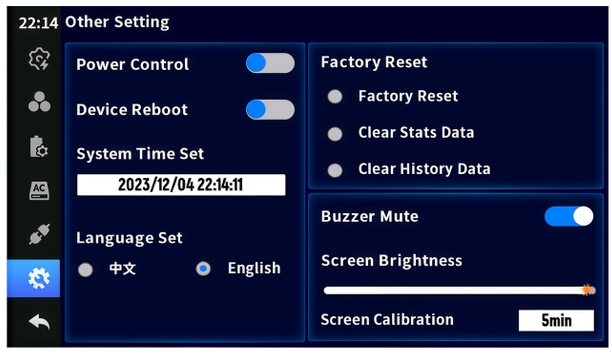
- Output Hybrid Load: Inverter power generation energy only to the load (generation power <

Load power).Note: mixed load, mains and photovoltaic are loaded together, photovoltaic is not enough to supplement the mains.

- Anti-backflow： Anti-counter current, self-use according to the load power, do not input current to the mains.

Others setting

1. Power Control: Control the inverter AC output.
2. Device Reboot: Restart the inverter.
3. System time Set
4. Language Set: Chinese or English.
5. Factory Reset: Factory Reset, Clear Stats Date, Clear History Date
6. Buzzer Mute
7. Screen Bright
8. Screen Bright Times;5/10/15/20Min



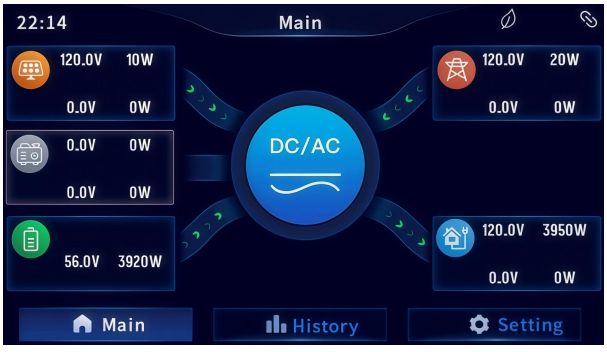
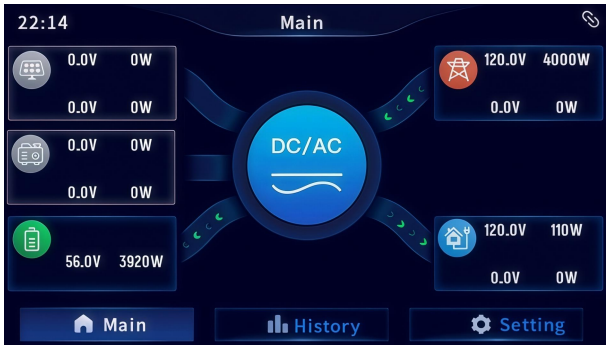
5. Operating Mode Description

5.1. Charging mode

1) **PV priority**: PV module will charge the battery preferentially, and the battery is charged by the Mains only when the PV system fails. During the day, solar energy is fully used to charge, while at night, it converts to the Mains. This can maintain battery level, and is ideal for areas where the grid is relatively stable and electricity price is relatively high.

Solar Sufficient	Solar Insufficient
	

2) **Hybrid charging:** PV and mains hybrid charging. PV MPPT charging is a priority, and when PV energy is insufficient, the mains supply supplements. When the PV energy is sufficient again, the mains stops charging. This is the fastest charging mode, suitable for the areas where power grid is unstable, providing sufficient backup power supply at any time.

Solar Sufficient	Solar Insufficient
	

3) **Only Solar:** Only PV charging, without Mains charging. This is the most energy-efficient way in which battery is charged only by solar panels, and is usually used in areas with good lighting conditions.

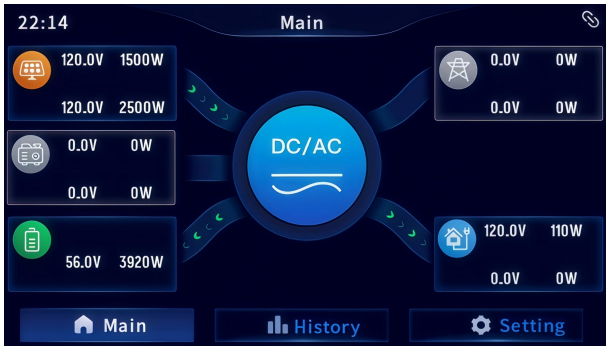
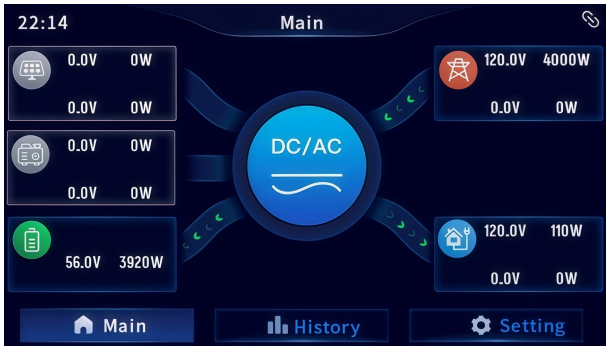


5.2. AC output mode

◆ **PV priority mode:** Photovoltaics and batteries power the load, switch to mains supply when the PV charging fails. This mode maximizes the use of solar energy while maintaining battery power, suitable for use in the areas with relatively stable grid.

Power supply priority: Solar→Battery→Utility. (Solar Sufficient)

Power supply priority: Solar→Utility→Battery. (Solar Insufficient)

Solar Sufficient	Solar Insufficient
	

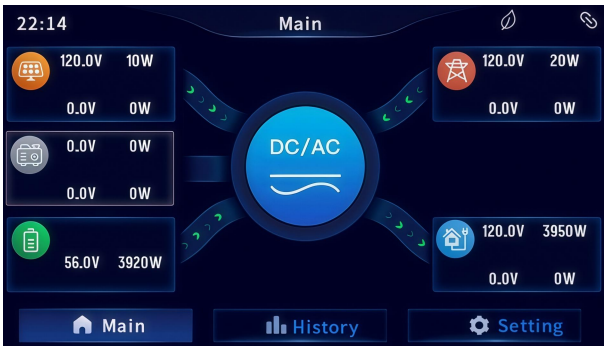
- **Mains priority mode：** Switch to inverter only when the mains fails (when there was mains power, switch to mains power for charging and power supply).Then, the unit is equivalent to a backup UPS, suitable for areas with unstable grid. Switching does not affect PV charging.

Power supply priority：Utility→Solar→Battery.

Utility Valid	Utility Outage
	

- **Battery priority mode：** Switch to mains supply only when the battery discharge undervoltage is lower than the set point (16 setting item). When the charging battery is higher than the set point of (17 setting item), switch to the battery discharge mode. This can cycle the battery charge and discharge. This mode maximizes the use of DC power and is used in the area with stable grid. Switching does not affect PV charging.

Power supply priority：Solar→Battery→Utility.

Battery Available	Battery Under-voltage
	

◆ **Hybird mode：**

Energy To Output ：Inverter power generation energy only to the load (generation power & Load power).

Note: mixed load, mains and photovoltaic are loaded together, photovoltaic is not enough to supplement the mains.

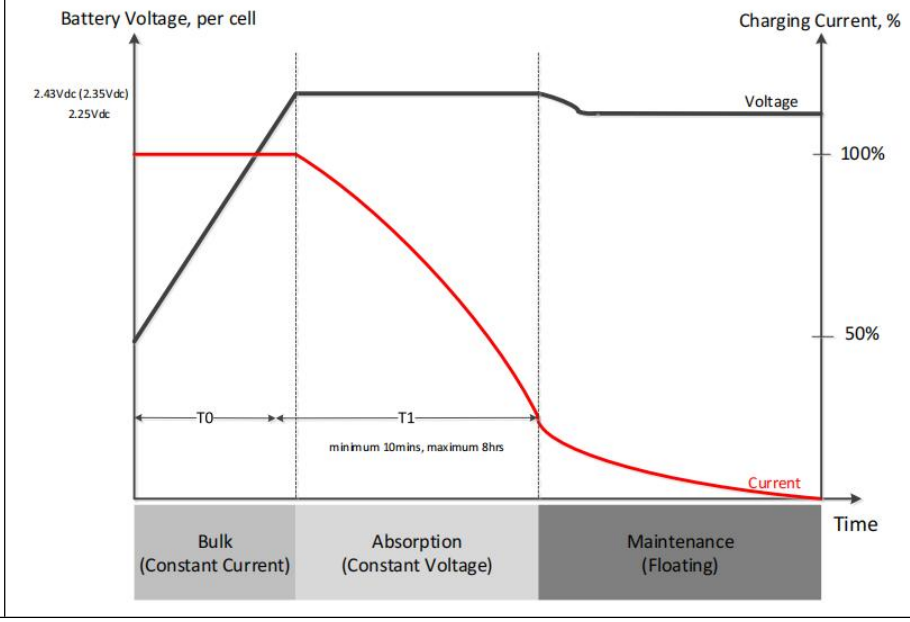
Curr Anti Rev (CT): Anti-countercurrent, self-use according to the load power, do not input current to the mains



6. Battery type parameters

6.1. For Lead-acid Battery

Battery Type / parameter	Sealed lead acid battery (SLD)	Colloidal lead acid battery (GEL)	Vented lead acid battery (FLD)	User-defined (User)
Overvoltage disconnection voltage	60V	60V	60V	40～60V (Adjustable)
Battery fully charged recovery point(setup item)	52V (Adjustable)	52V (Adjustable)	52V (Adjustable)	52V (Adjustable)
Boost charge voltage	57.6V	56.8V	58.4V	40～60V (adjustable)
Floating charge voltage	55.2V	55.2V	55.2V	40～60V (adjustable)
Undervoltage alarm voltage(01 fault)	44V	44V	44V	40～60V (adjustable)
Undervoltage alarm voltage recovery point(01 fault)	Undervoltage alarm voltage+0.8V			
Low voltage disconnection voltage(02 fault)	42V	42V	42V	40～60V (Adjustable)
Low voltage disconnection voltage recovery point (02 fault)	52V (Adjustable)	52V (Adjustable)	52V (Adjustable)	52V (Adjustable)
Discharge limit voltage	40V	40V	40V	40～60V (Adjustable)

Over-discharge delay time	5s	5s	5s	1 ~ 30s (Adjustable)
Boost charge duration	120 minutes	120 minutes	120 minutes	10 ~ 600 minutes (Adjustable)
Lead acid Charging Curve				

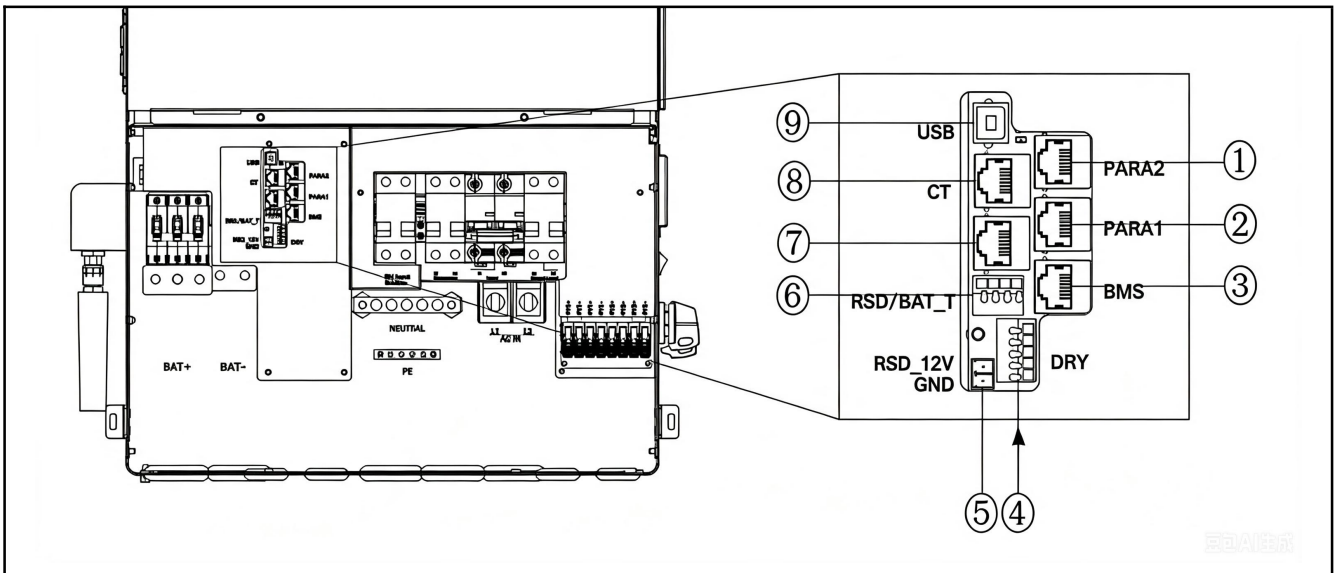
6.2. For Lithium Battery

Battery type / Parameters	Ternary lithium battery (N14)	Lithium iron phosphate battery (LF16)	Lithium iron phosphate battery (LF15)	Lithium iron phosphate battery (LF14)
Overvoltage disconnection voltage	60V	60V	60V	60V
Battery fully charged recovery point(setup item)	54.8V (Adjustable)	53.6V (Adjustable)	50.4V (Adjustable)	47.6V (Adjustable)
Boost charge voltage	57.6V (Adjustable)	56.8V (Adjustable)	53.2V (Adjustable)	49.2V (Adjustable)
Floating charge voltage	57.6V (Adjustable)	56.8V (Adjustable)	53.2V (Adjustable)	49.2 (Adjustable)
Undervoltage alarm voltage(01 fault)	46.8V (Adjustable)	49.6V (Adjustable)	46.4V (Adjustable)	43.2V (Adjustable)
Undervoltage alarm voltage recovery point(01 fault)	Undervoltage alarm voltage+0.8V			
Low voltage disconnection voltage(04 fault)	42V (Adjustable)	48.8V (Adjustable)	45.6V (Adjustable)	42V (Adjustable)
Low voltage disconnection voltage recovery point (04 fault)(setup item 35)	49.6V (Adjustable)	52.8V (Adjustable)	49.6V (Adjustable)	46V (Adjustable)
Discharge limit voltage	39.2V	46.4V	43.6V	40.8V

Over-discharge delay time	30s (Adjustable)	30s (Adjustable)	30s (Adjustable)	30s (Adjustable)
Boost charge duration	120 minutes (Adjustable)	120 minutes (Adjustable)	120 minutes (Adjustable)	120 minutes (Adjustable)

7. Communication

7.1. Overview

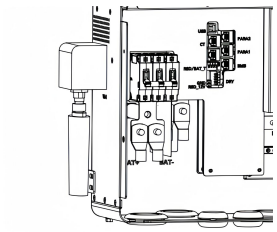


①	Parallel_2	⑥	RSD Input Control/BAT_T
②	Parallel_1	⑦	
③	Wi-Fi Port BMS Port	⑧	CT Port
④	DRY	⑨	USB Port
⑤	RSD_12V Power		

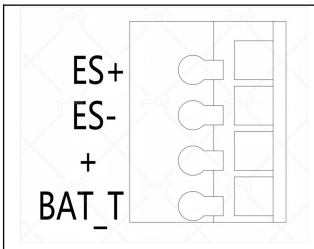
7.2. USB port

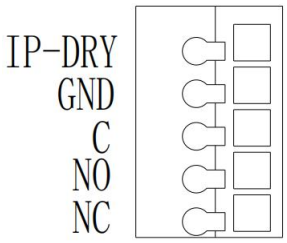
	◆ For USB communication with optional PC host software ◆ The computer requires installation of the "USB to Serial Port Chip CH340T Driver".

7.3. Wi-Fi Port

	◆ WiFi/GPRS Module Signal Conversion from 485 Signal ◆ View operational data and configure parameters remotely via mobile phone or computer. ◆ Optional installation via RJ45 interface (RJ45 and USB port are compatible, choose one) or aviation plug interface.

7.4. Rapid Shutdown System

	◆ When the ES+ and ES- terminals are connected to an emergency push-button switch and closed, or when a 12V DC voltage is applied to the + and - terminals, the 12V DC output at the RSD+ and RSD- terminals will be de-energized.

	**N-NO-NC function:Control diesel generator start/stop** 1)Initial state: NC-N closed, NO-N open 2)When the battery voltage falls below the grid-switching threshold, NC-N opens and NO-N closes. The NO-N contact drives resistive loads rated at 125VAC/1A, 230VAC/1A, or 30VDC/1A.
	IP-GND function:Remote Control of Inverter AC Output 1) IP-GND is disconnected AC output ON; 2) IP-GND is connected AC output OFF;

7.5. Dry contact port

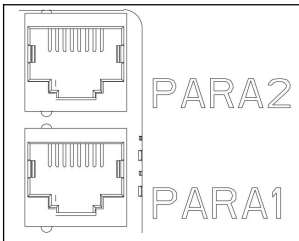
7.6. CT sampling detection(Optional Feature)

Real-time monitoring of inverter output current to prevent reverse power flow to the grid.

Warning! This inverter has not obtained the required grid-connection certification and is restricted to off-grid applications only. Any unauthorized connection to the public grid violates local laws and regulations. For specific compliance requirements, consult qualified legal counsel in

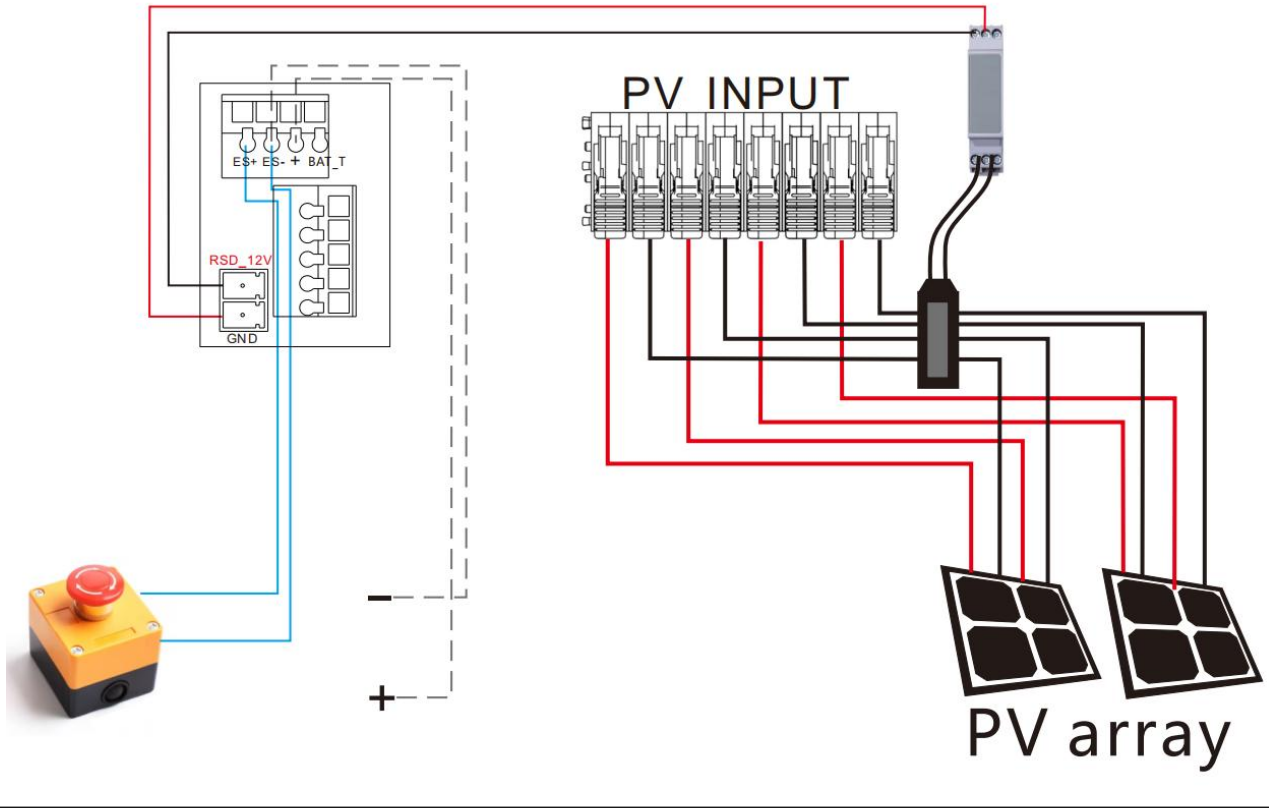
your jurisdiction. Our company explicitly disclaims all liability for any legal consequences or damages resulting from unauthorized grid-tied operation.

7.7. Parallel communication function(Model -500P Supported)

	◆ Equipped with two RJ485 ports: PARA_1 and PARA_2

7.8. RSD System Introduction

The 12Vdc/1Adc supply from the RSD to the TRANSMITTER-PLC is disconnected upon activation of the ES button (between ES+/ES-) OR application of a 12V signal (to +/- terminals).



8. Parallel Installation, Wiring, and Setup

CAUTION: To ensure safe operation and compliance with regulatory requirements, please install the equipment as per the following instructions.

- Maximum six inverters can be used for parallel operation
- Before and after connecting the system, please refer to the following wiring diagram to ensure all connections are correct.
- When adding or removing inverter units in a parallel system during operation, all power switches must be turned off before performing wiring operations.
- Verify all connections for correctness before powering on to prevent abnormal operation of the parallel system due to incorrect wiring.

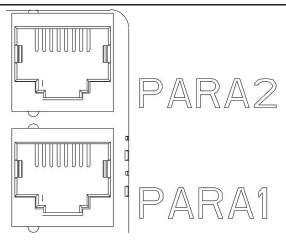
8.1. Precautions for connecting the parallel connecting lines

Battery wiring	◆ All inverters are connected to the same battery bank. ◆ Connect BAT+ to BAT+ and BAT- to BAT-, ensuring identical length and gauge for the positive and negative wiring. ◆ Maintain identical wiring length and gauge among all inverters.
GRID IN wiring	**Parallel connection in split phase**: ◆ L1 to L1, L2 to L2, N to N, PE to PE connections for all inverters. **Parallel connection in single phase:** ◆ Ensure that the connections for all inverters are correct and fault-free: parallel L1 and L2 outputs to their respective buses, N to N, and PE to PE.

	◆ Maintain uniform wire length and gauge for all interconnecting cables between the inverters
GEN IN wiring	**Parallel connection in split phase**: ◆ L1 to L1, L2 to L2, N to N, PE to PE connections for all inverters. **Parallel connection in single phase:** ◆ Ensure that the connections for all inverters are correct and fault-free: parallel L1 and L2 outputs to their respective buses, N to N, and PE to PE. ◆ Maintain uniform wire length and gauge for all interconnecting cables between the inverters
AC OUT LOAD/SMART LOAD wiring:	**Parallel connection in split phase**: ◆ L1 to L1, L2 to L2, N to N, PE to PE connections for all inverters. **Parallel connection in single phase:** ◆ Ensure that the connections for all inverters are correct and fault-free: parallel L1 and L2 outputs to their respective buses, N to N, and PE to PE. Maintain uniform wire length and gauge for all interconnecting cables between the inverters
PV IN wiring	◆ For every inverter, each and every PV input must be matched to an independent and unique photovoltaic system.

8.2. Precautions for connecting the parallel connecting lines

1) Wiring of parallel communication line:

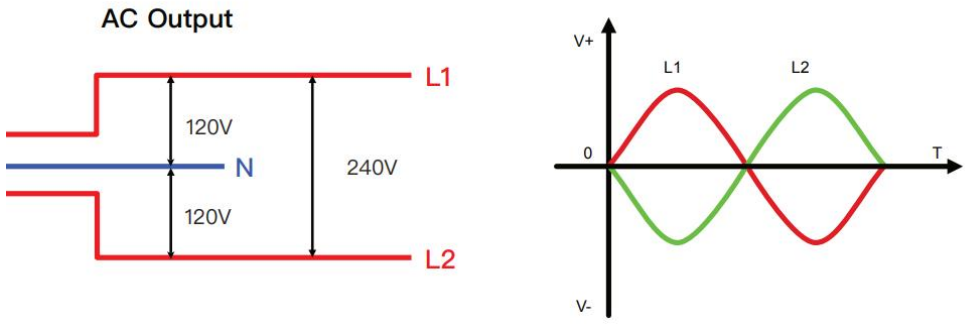
 	◆ Equipped with two RJ485 ports: PARA_1 and PARA_2 ◆ Inverters must be interconnected exclusively between PARA_1 and PARA_2 ports. Connections between identical port types (e.g., PARA_1 to PARA_1, PARA_2 to PARA_2) on any inverter units are strictly prohibited.

	◆ Electrical connections must be secure and reliable.

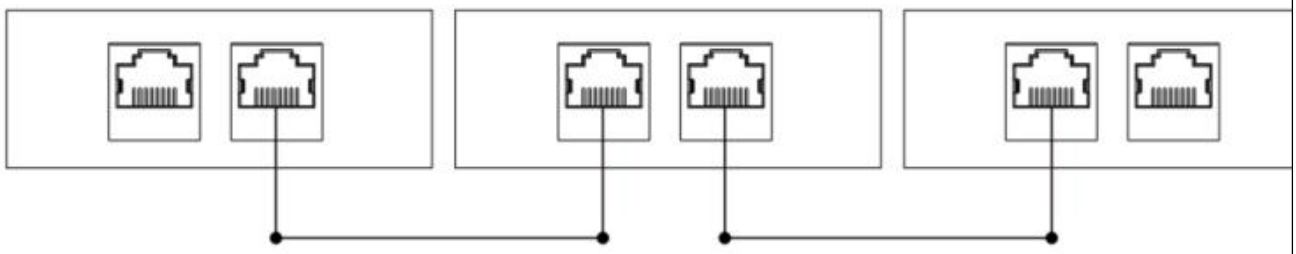
8.3. Schematic diagram of parallel connection in single phase

1) In case of parallel operation with multiple inverters, the schematic diagram of parallel connection is as follows:

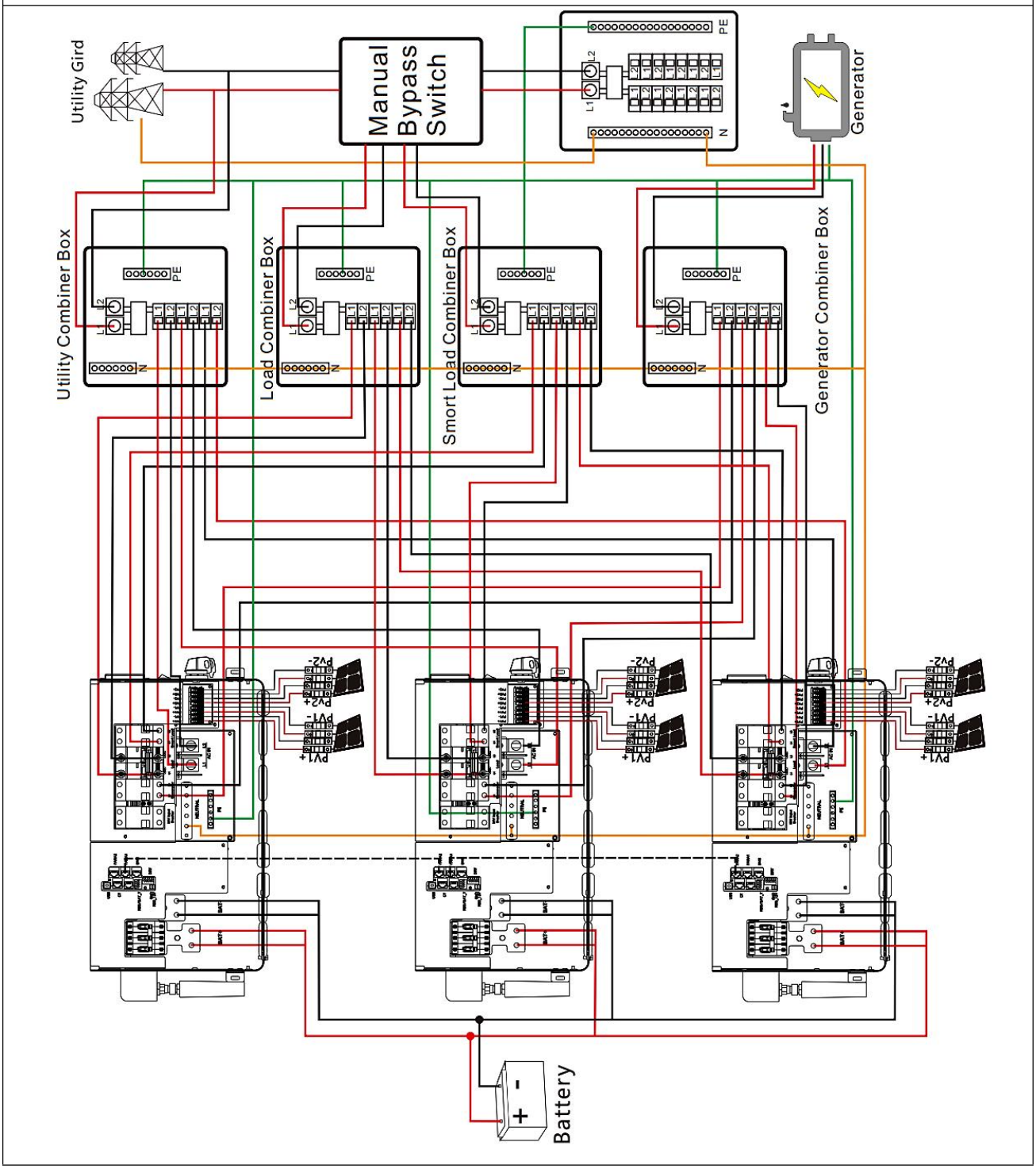
Parallel connection in split phase :



Connection Diagram of Parallel Communication Cable:



Three inverters of the system connected in split parallel(Max. 6 inverters parallelable):



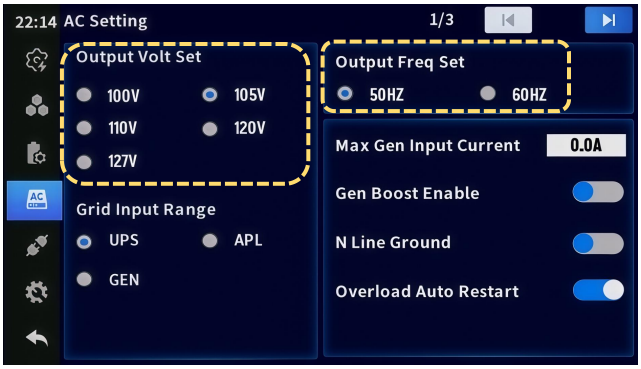
8.4. Parallel System Setup

CAUTION: When starting the inverters for parallel system configuration, please follow the steps below and observe these precautions.

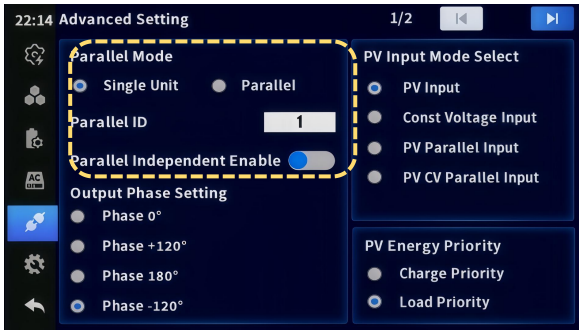
- Ensure Unique AC/Generator Inputs for All Inverters in Parallel System.
- Confirm output voltage/frequency settings are identical on all parallel inverters.
- To set the phase sequence, each unit must be configured individually while all others are powered off. After all units have been set one by one, the entire system can be restarted.
- ***CAUTION:*** Phase sequence modification necessitates rewiring of the system to match the new configuration.
- Measure output voltage when running, confirm accuracy, then connect loads.

8.4.1.Parallel System Setup Procedure

◆ Step 1：Output Voltage/Frequency Settings

A. Click Setting	B. Click GRID
	
C. Click AC output phase voltage/frequency	
	

◆ Step 2：Parallel Mode Setup

A. Click Advanced	B. Click Parallel mode，ID
	
C. Select 'Parallel', then confirm	D. Click Communication address

9. Failure codes and countermeasures

9.1. Fault code

Fault code	Fault name	Turn off the output	Description
【01】	Battery under voltage warning	No	If the battery voltage is lower than “battery under voltage alarm” setting, the battery was in the undervoltage state.
【02】	Battery under voltage protection	Yes	When the battery voltage was low, turn off the output to stop the battery discharge protection.
【03】	Average battery discharge current over current protection	Yes	If the average battery discharge current remains above the maximum battery input current for a duration of 1 minute, turn off the output.
【04】	Instantaneous battery discharge over current protection	Yes	If the instantaneous value of the battery discharge current is greater than the maximum instantaneous value of the device, turn off the output to stop the battery discharge protection.
【05】	Battery not connected	Yes	Battery not connected warning.
【06】	Battery over voltage	Yes	When the selected battery type or set battery voltage is exceeded, turn off the output to stop the battery charging protection.
【07】	BMS low battery talarm	No	BMS alarm low battery （Set BMS enablement to work）
【08】	BMS low battery protection	Yes	The BMS battery capacity rate is low. Disable the output to stop the battery discharge protection. (Set BMS enablement to work)
【09】	Bypass overload protection	Yes	If the mains is overloaded, turn off the AC output and stop the mains charging.
【10】	Battery output overload protection	Yes	If the battery discharge inverter is overloaded, turn off AC output and stop battery discharge protection.
【11】	Battery inverter output short circuit	Yes	If the AC output of the battery inverter discharge is short circuiting, turn off the AC output and stop

			the battery discharge protection.
【12】	The AC output of the battery inverter over circuit	Yes	If the AC output of the battery inverter discharge is over circuit, turn off the AC output and stop the battery discharge protection.
【13】	The DC component of the battery inverter voltage is abnormal	Yes	If the DC component of the battery inverter voltage is abnormal, turn off the AC output and stop the battery discharge protection.
【14】	Bus over voltage software sampling protection	Yes	Internal battery boost, boost bus voltage overvoltage software protection, turn off AC output and charge.
【15】	Bus over voltage hardware sampling protection	Yes	Internal battery boost, boost bus voltage overvoltage hardware protection, turn off AC output output and charge.
【16】	Bus under voltage protection	Yes	Internal battery boost, boost bus voltage undervoltage protection, turn off AC output output and charge.
【17】	Bus short circuit protection	Yes	Internal battery boost, boost bus voltage short-circuit protection, turn off AC output output and charge.
【18】	The PV input voltage is over voltage	Yes	The solar input voltage exceeds the maximum allowable input voltage protection.
【19】	PV Over Curr Sw	Yes	Solar charging overcurrent software protection, turn off solar charging.
【20】	PV over curr Hw	No	Solar charging overcurrent hardware protection, turn off solar charging.
【21】	PV ISO Low	Yes	The PV insulation impedance is low, and the inverter is shutdown.
【22】	The PV heat sink is overheated. Procedure	No	If the temperature of the solar charging radiator is too high, turn off the solar charging.
【23】	The AC heat sink is overheated. Procedure	Yes	If the temperature of the heat sink is too high, turn off the AC charging or battery inverter discharge.
【24】	The temperature of the main transformer is overheated	Yes	If the internal main transformer temperature is too high, turn off the AC charging or battery inverter discharge.
【25】	**Ac input** relay short circuit	Yes	Ac input relay short-circuit protection prevents the inverter AC output from being pumped back into

			the bypass AC input,the inverter is turned off.
【26】	Output relay short	Yes	Output relay short circuit,
【27】	Fan failure	Yes	If the fan is blocked or fails, disable the inverter output and charging functions.
【28】	EEPROM	Yes	The program is not activated.
【29】	SPI Comm Err	Yes	Master chip and from the chip communication error.
【30】	Type detectionerror	Yes	The model is not set before delivery, and the model identification is wrong.
【31】	Bus Soft Start Fail	Yes	Inverter busbar soft start failed.
【32】	LeakageCurr Over	Yes	The leakage current sensor has a sampling exception.
【33】	Parallel control can communication is faulty	Yes	In parallel mode, CAN communication is lost, AC output and charging are turned off.
【34】	Parallel control can communication is faulty	Yes	In parallel mode, CAN communication is lost, AC output and charging are turned off.
【35】	Parallel mode is faulty	Yes	In parallel mode, the system has inconsistent machine parallel mode **[31]** Settings.
【36】	Parallel current sharing fault	Yes	In parallel mode, the AC output of the battery inverter differs greatly from the non-uniform current output of each machine. Turn off the AC output and charge.
【37】	Parallel ID setting error	Yes	In parallel mode, the RS485 addresses repeatedly conflict. The fault stops the AC output and charge. After the host automatically reallocates the address, the fault is cleared and the host enters the parallel.
【38】	Inconsistent Battery in parallel mode	Yes	In parallel mode, the battery voltage input of each machine varies greatly.
【39】	Inconsistent AC input source in parallel mode	Yes	Inconsistent AC input source in parallel mode
【40】	The parallel mode synchronization fails	Yes	Parallel mode, hardware synchronization signal reception failure, stop parallel and AC output.

【41】	Inconsistent system firmware version in parallel mode	Yes	If the program version is inconsistent in the parallel system, stop the parallel and AC output.
【42】	The parallel communication cable is faulty	Yes	The parallel communication line is faulty. Stop the parallel and AC output.
【43】	Serial number error	Yes	The serial number is not set before the factory, or the factory serial number is set repeatedly in the system.
【44】	Battery cap not enough	Yes	The battery voltage of the connected machine is low
【45】	Aux DSP abnormal	Yes	Contact the manufacturer
【48】	Grid phase err	No	Check the grid phase
【49】	BMS communication error	No	Check whether the communication line is connected correctly and whether **BMS** is set to the corresponding lithium battery communication protocol
【50】	BMS other alarm	No	Check the BMS fault type and troubleshoot lithium battery problems
【51】	BMS battery over temperature alarm	No	BMS alarm lithium battery over temperature
【52】	BMS battery over current alarm	No	BMS alarm lithium battery over current
【53】	BMS battery over voltage alarm	No	BMS alarm lithium battery over voltage
【54】	BMS battery low voltage alarm	No	BMS alarm lithium battery low voltage
【55】	BMS battery low temperature alarm	No	BMS alarm lithium battery low temperature
【73】	DC AFCI Abnormal	No	PV Arc Fault Detected. Check Installation & Wiring.
【77】	Grid Circuit Open	No	Check if the AC circuit breaker is closed. If open, close the breaker and restart the inverter to clear the fault.

9.2. Trouble Shooting

Fault code	Faults	Handling measures
/	No display on the screen	Check if the battery air switch or the PV air switch has been closed; if the switch is in the "ON" state; press any button on the screen to exit the screen sleep mode.
【06】	Rechargeable battery overvoltage protection	Measure if the battery voltage exceeds rated。If it exceeds, the battery needs to be discharged until the voltage is below the overvoltage recovery point of the battery.
【01】 【02】	Battery under voltage protection	Charge the battery until it returns to the low voltage disconnection recovery voltage.
【27】	Fan failure	Check if the fan is not turning or blocked by foreign object.
【22】 【23】	Heat sink over temperature protection	When the temperature of the device is cooled below the recovery temperature, normal charge and discharge control is resumed.
【09】 【10】	Bypass overload protection, inverter overload protection	1.Reduce the use of power equipment; 2.Restart the unit to resume load output.
【11】	Inverter short circuit protection	1.Check the load connection carefully and clear the short-circuit fault points; 2.Re-power up to resume load output.
【18】	PV overvoltage	Use a multimeter to check if the PV input voltage exceeds the maximum allowable input voltage rated.
【05】	Battery missed alarm	Check if the battery is not connected or if the battery circuit breaker is not closed.
【40】 【42】	Parallel connection fault	Check whether the parallel line is not connected well, such as loose or wrong connection.
【37】	Parallel ID setting error	Check whether the setting of parallel ID number is repeated.
【36】	Parallel current sharing fault	Check whether the parallel current sharing line is not connected well, such as loose or wrong connection.

【39】	Inconsistent AC input source in parallel mode	Check whether the parallel AC inputs are from the same input interface. If two of the three phases report that the mains input sources are inconsistent in the three-phase mode, you can try to swap the mains input wiring of any two machines to check whether the mains input phase sequence is inconsistent with the set phase sequence.
【41】	Inconsistent system firmware version in parallel mode	Check whether the software version of each inverter is consistent.
CAUTION: If you encounter a product fault that cannot be solved by the methods in the above table, please contact our after-sales service department for technical support, and do not disassemble the equipment yourself.		

10.Protection and Maintenance

10.1. Protections provided

No.	Protections	Description
1	PV current/ power limiting protection	When charging current or power of the PV array configured exceeds the PV rated, it will charge at the rated.
2	PV night reverse-current protection	At night, the battery is prevented from discharging through the PV module because the battery voltage is greater than the voltage of PV module.
3	Mains input over voltage protection	When the mains voltage exceeds 140V, the mains charging will be stopped and switched to the inverter mode.
4	Mains input under voltage protection	When the mains voltage is lower than or 85V , the mains charging will be stopped and switched to the inverter mode.
5	Battery over voltage protection	When the battery voltage reaches the overvoltage disconnection point, the PV and the mains will be automatically stopped to charge the battery to prevent the battery from being overcharged and damaged.
6	Battery low voltage protection	When the battery voltage reaches the low voltage disconnection point, the battery discharging will be automatically stopped to prevent the battery from being over-discharged and damaged.
7	Load output short circuit protection	When a short circuit fault occurs at the load output terminal for more than 200 milliseconds, the AC output is immediately turned off.
8	Heat sink over temperature protection	When the internal temperature is too high, the all-in-one machine will stop charging and discharging; when the temperature returns to normal, charging and discharging will resume.
9	Overload protection	Output again 3 minutes after an overload protection, and turn the output off after 5 consecutive times of overload protection until the machine is re-powered. For the specific overload level and duration, refer to the technical parameters table in the manual.
10	PV reverse polarity protection	When the PV polarity is reversed, the machine will not be damaged.

11	AC reverse protection	Prevent battery inverter AC current from being reversely input to Bypass.
12	Bypass over current protection	Built-in AC input overcurrent protection circuit breaker.
13	Battery input over current protection	When the discharge output current of the battery is greater than the maximum value and lasts for 1 minute, the AC input would switched to load.
14	Battery input protection	When the battery is reversely connected or the inverter is short-circuited, the battery input fuse in the inverter will blow out to prevent the battery from being damaged or causing a fire.
15	Charge short protection	When the external battery port is short-circuited in the PV or AC charging state, the inverter will protect and stop the output current.
16	CAN communication loss protection	In parallel operation, an alarm will be given when CAN communication is lost.
17	Parallel connection error protection	In parallel operation, the equipment will be protected when the parallel line is lost.
18	Parallel battery voltage difference protection	In parallel operation, the equipment will be protected when the battery connection is inconsistent and the battery voltage is greatly different from that detected by the host.
19	Parallel AC voltage difference protection	In parallel operation, the equipment will be protected when the AC IN input connection is inconsistent.
20	Parallel current sharing fault protection	In parallel operation, the running equipment will be protected when the load difference of each inverter is large due to improper connection of current sharing line or device damage.
21	Synchronization signal fault protection	The equipment will be protected when there is a fault in the guidance signal between parallel buses, causing inconsistent behavior of each inverter.

10.2. Maintenance

- In order to maintain the best long-term performance, it is recommended to conduct following checks twice a year.
- Make sure that the airflow around the unit is not blocked and remove any dirt or debris from the heat sink.
- Check that all exposed wires are damaged by exposure to sunlight, friction with other objects around them, dryness, bite by insects or rodents, etc., and the wires shall be repaired or replaced if necessary.
- Verify for the consistency of indication and display with the operation of the device. Please pay attention to the display of any faults or errors, and take corrective actions if necessary.
- Check all wiring terminals for corrosion, insulation damage, signs of high temperature or burning/discoloration, and tighten the screws.
- Check for dirt, nesting insects and corrosion, and clean up as required.
- If the arrester has failed, replace in time to prevent lightning damage to the unit or even other equipment of the user.

The company does not assume any liability for damage caused by:

1) Improper use or use in improper site.
2) Open-circuit voltage of the PV module exceeds the maximum allowable rated voltage.
3) Temperature in the operating environment exceeds the limited operating temperature range.
4) Disassemble and repair the all-in-one solar charge inverter without permission.
5) Force majeure: Damage that occurs in transportation or handling of the all-in-one solar charge inverter.

Warning!

Danger of electric shock! When doing the above operations, make sure that all power supplies of the all-in-one machine have been disconnected, and all capacitors have been discharged, and then check or operate accordingly!

11.Technical parameters

Models	GTOF51120US2P03	GTOF51100US2P03	GTOF51080US2P03
Parallel mode			
Permitted parallel number	1~6		
AC mode			
Rated input voltage	120(L1/N, L2/N)/240Vac(L1/L2)		
Input phase voltage range	(85Vac~140Vac)±2%		
Frequency	50Hz/60Hz (Auto detection)		
Frequency Range	47±0.3Hz~55±0.3Hz (50Hz); 57±0.3Hz~65±0.3Hz (60Hz);		
Overload/ short circuit protection	Circuit breaker		
Efficiency	>95%		
Conversion time (bypass and inverter)	10ms (typical)		
AC reverse protection	Yes		
Maximum bypass phase overload current	2pole, 200A/200A(L1/L2)		
Inverter mode			
Output voltage waveform	Pure sine wave		
Rated output power (VA)	Split phase: 8000	Split phase: 10000	Split phase: 12000
Rated output power (W)	Split phase: 8000	Split phase: 10000	Split phase: 12000
Power factor	1		
Rated output	120Vac (L1/N, L2/N)/240Vac(L1/L2)		

voltage (Vac)			
Output voltage error	±5%		
Output frequency range (Hz)	50Hz±0.3Hz/60Hz±0.3Hz		
Maximum Efficiency	>93%		
Overload protection	(105% < load <110%) ±5%: report error and turn off the output after 5 minutes; (110% < load < 125%) ± 5%: report error and turn off the output after 10 seconds; Load >125% ±5%: report error and turn off the output after 5 seconds;		
Peak power	Split phase: 12000VA	Split phase: 15000VA	Split phase: 18000VA
Loaded motor capability	4HP	5HP	6HP
Output short circuit protection	Can protect, after continuous short circuit for 1 second		
Bypass circuit breaker phase specification	2pole, 200A/200A(L1/L2)		
Rated battery input voltage	51.2V (Minimum starting voltage 44V)		
Battery voltage range	40.0Vdc~58.6Vdc±0.6Vdc (Under voltage alarm/shutdown voltage/over voltage alarm /over voltage recovery... settable on LCD screen)		
Power saving mode self-consumption	Load per phase is null or less than 25W enter power-saving mode		
AC charging			
Battery type	Lead acid or lithium battery		
Maximum charge current(can be set)	100A	120A	160A
Charge current	±5Adc		

error			
Charge voltage range	40 –58.6Vdc		
Short circuit protection	Circuit breaker and blown fuse		
Circuit breaker phase specifications	2pole, 63A/63A(L1/L2)		
Generator Mode			
Rated input voltage	120(L1/N, L2/N)/240Vac(L1/L2)		
Input phase voltage range	(85Vac~140Vac)±2%		
Frequency Range	40±0.3Hz~70±0.3Hz		
Maximum charge current(can be set)	100A	120A	160A
Overload/ short circuit protection	Circuit breaker		
Circuit breaker phase specifications	2pole, 63A/63A(L1/L2)		
PV charging			
Number of MPPT groups	2		
Maximum PV open circuit voltage	500Vdc		
PV operating voltage range	90Vdc~500Vdc		
MPPT voltage range	90Vdc~450Vdc		
Battery voltage	40-58.6Vdc		

range			
Maximum PV input power	6000W+6000W		12000W+12000W
Maximum PV input current	22A+22A		32A+32A
PV charge current(can be set)	180A	220A	250A
Charging short circuit protection	Circuit breaker		
Wiring protection	Reverse polarity protection		
Hybrid charging Max charger current specifications (AC charger+PV charger)			
Max charger current(can be set)	0-180A	0-220A	0-250A
Output Port（Back_up)			
Load port Rated output current	125Aac		
Smart Load port Rated output current	60Aac		
Power supply parameters of RSD			
Rated output voltage	12Vdc		
Rated output current	1Adc		
Certified specifications			
Certification	UL1741		
EMC certification level	FCC part15, CLASS B		
Operating	-10°C to 55°C(>45°C derating)		

temperature range	
Storage temperature range	-25°C ~ 60°C
Humidity range	5% to 95%（Conformal coating protection）
Noise	≤60dB
Heat dissipation	Forced air cooling, variable speed of fan
Communication interface	USB/RS485(/WiFi/GPRS)/ Dry node control
Size (L*W*D)	785mm*485mm*160.8mm
Net Weight(kg)	35.8±3%