ALPS Cube Pro Hybrid Inverter

ALPS Cube HY3.6/4.6/5.0/6.0 Pro

User Manual

Contents

1 Notes

1.1 Validity

This manual describes the assembly, installation, commissioning and maintenance of the Polar-ESS single-phase hybrid inverter. Only applicable to the following machine models.

Model	Input data (PV)	Input data (Battery)	Rated output power	AC normal voltage
ALPS Cube HY3.6 Pro	90-600Vdc 17A*2(Max.)	46.7-57.6Vdc 120A(Max.) Li-ion	3,600W	230Va.c L+N+PE
ALPS Cube HY4.6 Pro			4,600W	
ALPS Cube HY5.0 Pro			5,000W	
ALPS Cube HY6.0 Pro			6,000W	

This document mainly introduces the product information, installation and wiring, configuration commissioning, troubleshooting and maintenance content of the single-phase inverter. Please read this manual carefully before installing and using this product to understand product safety information and be familiar with the functions and features of the product. The documentation may be updated from time to time, please obtain the latest version information and product information from the official website.

This manual does not cover any details about other devices connected to the device (e.g., PV modules). Information about the connected device can be obtained from the manufacturer's instructions at the following URL.

1.2 Personnel Requirement

 **Caution**	**This manual is for qualified personnel that have received training and have demonstrated skills and knowledge in construction and operation of this device. Qualified personnel are trained to deal with the dangers and hazards involved in installing electric devices.**

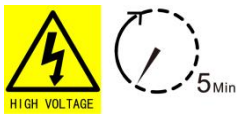
1.3 Symbol Description

- The following types of safety instructions and general information appear in this document as described below:

Symbols	Description
 Manual	**Manual – Read the manual.**
 Danger	**Danger indicates a hazardous situation which, if not avoided, will result in death or serious injury.**
 Warning	**Warning indicates a hazardous situation which, if not avoided, will result in death or serious injury.**
 Caution	**Caution indicates a hazardous situation which, if not avoided, could result in a minor or moderate injury.**
 Note	**Note Failure to observe this warning may lead to damage to property.**

- Markings on this product:

Symbols	Description
	**Warning regarding dangerous voltage.** **The product works with high voltage. All work on the product must only be performed as described in its documentation and by qualified trades people.**
	**Beware of hot surface.** **The product can become hot during operation.** **Do not touch the product during operation.**
	**Observe the operating instructions.** **Read the product's documentation before working on it.** **Follow all safety precautions and instructions as described in the documentation.**
	**Point of connection for grounding protection.**

	**Direct Current (DC)**
	**Alternating Current (AC)**
	**Signals danger due to electrical shock and indicates the times (5 minutes) to allow after the inverter has been turned off and disconnected to ensure safety in any installation operation.**
	**The inverter complies with the requirements of the applicable CE guidelines.**
	**The Hybrid inverter must not be disposed of with the household waste.**

1.4 Additional Information

Due to product version upgrades or other reasons, the document content will be updated from time to time, unless there is a special agreement, the document content cannot replace the security precautions in the product label. All descriptions in the documentation are intended as a guide for use only.

Please get the latest version information and product information from the official website.

2 Safety Instruction

2.1 General Safety

The terms "note", "caution", "warning" and "danger" in the manual do not represent all safety precautions to be observed, but only supplement all safety precautions. We do not accept any liability for violations of general safe operating requirements or violations of safety standards for design, production and use of equipment.

- Please read this document carefully to understand the products and precautions before installing the device.
- All equipment operations must be carried out by professional and qualified electrical technicians, who are familiar with the relevant standards and safety specifications of the project location.
- When the inverter is operated, it is necessary to use insulating tools and wear personal protective equipment to ensure personal safety. Contact electronic devices need to wear electrostatic gloves, electrostatic bracelets, anti-static clothing, etc. to protect the inverter from electrostatic damage.
- Equipment damage or personal injury caused by failure to install, use and configure the inverter in accordance with the requirements of the documentation is not within the scope of responsibility of the equipment manufacturer.
- It is strictly forbidden to install, use and operate outdoor equipment and cables (including but not limited to handling equipment, operating equipment and cables, plugging and unplugging signal interfaces connected to outdoors, working at height, outdoor installation, etc.) in bad weather such as lightning, rain, snow, and level 6 winds.
- Please follow the requirements of this manual, use the correct tools, and master the correct use of the tools, please follow the warning signs, warnings and protective measures on the equipment.
- It is forbidden to carry out installation, wiring, maintenance and replacement operations with electricity, and the voltage at the contact point should be measured before touching any conductor surface or terminal to confirm that there is no risk of electric shock.
- When transporting, turnover, installation, wiring and maintenance, etc., it must meet the laws and regulations and relevant standards of the country and region where it is located. The materials provided by the user and the tools required during operation must meet the requirements of the laws, regulations and relevant standards of the country and region where they are located.
- Do not disassemble the system equipment arbitrarily.

For more information about product safety and warranty, please visit the official website.

2.2 Electrical Safety

2.2.1 Grounding Requirements

- Equipment to be grounded, when installing, must first install a protective ground wire; When removing equipment, the protective ground wire must be removed last
- The grounding of the energy storage inverter meets the local requirements for the grounding of photovoltaic modules and energy storage inverters. To ensure continuous conduction with the ground in order to optimally protect the system and personnel.

 **Caution**	**It is strictly forbidden to operate the equipment on the equipment that is not grounded, the live equipment may cause injury to the operator, and it is necessary to check whether the grounding is good in advance when operating the equipment.**

2.2.2 PV String Side Operation

- Please use the DC terminal block supplied with the box to connect the inverter DC cable. Using other models of DC terminal blocks can lead to serious consequences.
- It is recommended that the panel string be connected to the equipment to add a breaking device, and before the electrical connection of the equipment, if it may encounter a live part, the corresponding breaking device of the front stage of the equipment must be disconnected.
- Use the measuring equipment to confirm the positive and negative poles of the DC cable to ensure that the positive and negative poles are correct and there is no reverse connection; And the voltage is within the permissible range.
- The unit is a transformerless inverter. It has no galvanic isolation. Do not ground the DC circuit of the PV module to the inverter. Grounding only the mounting frame. If you bond PV modules to the inverter, you will receive an error message "PV ISO is low".
- PV modules with large land capacity, such as thin-film PV modules with cells on metal substrates, can only be used if their coupling capacity does not exceed 470nF. During feed-in operation, leakage current flows from the battery to the earth, the magnitude of which depends on how the PV modules are installed (e.g., foil on a metal roof) and the weather (rain, snow). This "normal" leakage current may not exceed 30mA, as the inverter will automatically disconnect from the grid as a protective measure.
- To disassemble, unplug and maintain the inverter DC string terminal wire, it must be confirmed that the equipment switch, and the corresponding breaking device of the previous stage are disconnected, and confirm that the equipment and machine are stopped and there is no work.

 **Danger**	**Sparks and arcs may occur in the DC string terminal of the live plugging equipment, and the human body touches the metal part of the terminal to cause electric shock casualties; Sparks and arcs can cause fires.**

2.2.3 Inverter Requirements

- Ensure that the voltage and frequency of the grid-connected meet the grid-connected specifications of the inverter.
- It is recommended that AC power grid add a breaking device to the equipment, and the inverter AC side recommends adding protection devices such as circuit breakers or fuses, and the specifications of the protection device should be greater than 1.25 times the maximum current of the inverter AC output.
- Risk of burns due to overheating of housing parts! During operation, the four sides of the cabinet cover and radiator may become hot. Only contact with the front chassis cover during operation.
- Deadly voltage is life-threatening! The lethal voltage is present inside the device and on the power line. Therefore, only authorized electricians can install and open this unit. Even if the device is disconnected, high contact voltages may still exist within the device.

 **Caution**	**Beware of hot surface** **The product can become hot during operation.** **Do not touch the product during operation.**
 **Danger**	**Dangerous voltage** **There is a high voltage inside the machine, and unauthorized non-professionals opening and touching the internal devices can cause electric shock and cause personal injury.**

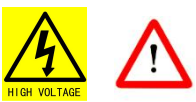
2.2.4 AC Side Operation

- Please connect the wire L/N/PE on the AC side of the single-phase inverter equipment according to the instructions in this manual. Incorrect connection of the wire sequence may cause damage to the equipment and cause leakage and electric shock.
- The AC wire must be disconnected by the corresponding breaking device of the previous stage before being connected to the equipment, and any two AC wires cannot be short circuited.
- Disassembling, unplugging, and maintaining the AC connection wires of the inverter must confirm that the power grid is disconnected from the equipment switch and the corresponding breaking device of the previous stage and confirm that the equipment and machine are stopped and not working.

 **Danger**	**Sparks and arcs may occur at the AC side terminals of live plug and unplug equipment, causing electric shock accidents when the human body comes into contact with the metal parts of the terminals; Sparks and arcs can cause fires.**

2.3 Battery Safety

- The battery to be connected must be matched with the corresponding battery of this product's equipment and the corresponding voltage range of the product for connection. Improper connection of other corresponding battery products may cause equipment damage.
- The battery used in conjunction with the inverter needs to be approved by the inverter manufacturer. Please consult through the official website.
- During the battery installation process, pay attention to the positive and negative poles, and do not short circuit the positive and negative poles of the battery, as it may cause personal injury and permanent damage to the equipment and battery.
- The battery current may be affected by some factors, such as temperature, humidity, weather conditions, etc., which may lead to battery current limiting and affect the carrying capacity.
- Do not connect the same battery pack to multiple inverters, otherwise it may cause damage to the inverters.
- If the battery cannot start, please contact the after-sales service center as soon as possible. Otherwise, the battery may be permanently damaged.
- To disassemble, unplug, and maintain the inverter battery connection wires, it is necessary to confirm that the battery and equipment switches and corresponding disconnecting devices of the previous stage are disconnected, and to confirm that the equipment and machine are stopped and not working.

 **Danger**	**Sparks and arcs may occur at the battery side terminals of live unplugging equipment, causing electric shock injuries and fatalities when the human body comes into contact with the metal parts of the terminals; Sparks and arcs can cause fires.**
 **Danger**	**Avoid high temperatures** **Do not expose the battery to high temperature environments or around heating devices. Overheating the battery may cause thermal runaway and cause fire and explosion.** **Hazardous voltage** **The battery used in this device exceeds the safety voltage of the human body. Please do not touch the positive and negative poles of the battery, and do not short circuit the battery to cause electric shock risk and harm personal safety.**

3 Product Introduction

3.1 Product Description

3.1.1 Function Overview

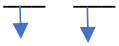
This device is bidirectional and suitable for photovoltaic systems with battery storage. The energy generated by photovoltaic systems is used to optimize self-consumption. The excess energy is used to charge the battery and then fed into the public grid when the photovoltaic energy is sufficient.

When the photovoltaic energy output is insufficient to support the connected load, if the battery capacity is sufficient, the system will automatically obtain energy from the battery. If the battery capacity is insufficient to meet its own consumption needs, electricity will be extracted from the public grid.

3.1.2 Applicable Models

Model
ALPS Cube HY3.6 Pro
ALPS Cube HY4.6 Pro
ALPS Cube HY5.0 Pro
ALPS Cube HY6.0 Pro

ALPS Cube HY6.0 Pro



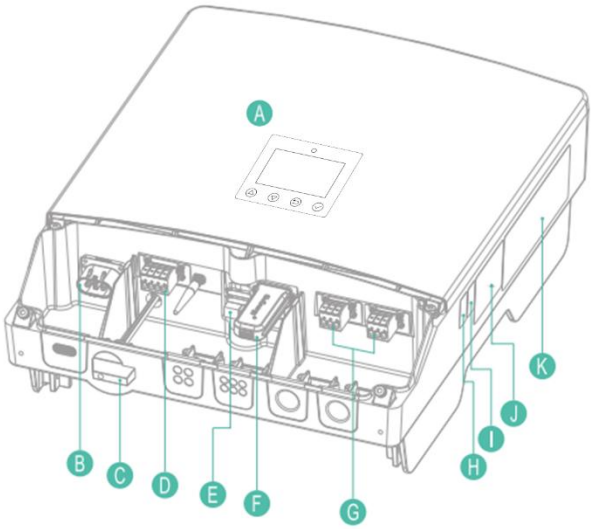
① ②

Item	Implication	Instructions
①	Machine type	The company's product series.
②	Rated output power	5.0: Rated output power 5.0kW. HY: hybrid inverter. Pro: professional model.

3.2 Appearance Description

3.2.1 Inverter Overview

3.2.2 Inverter Interface View



Item	Description
A	LCD display screen

B	All in One Battery Connection
C	PV Input Switch
D	PV Input Terminals
E	WiFi or 3G/4G Module (USB Port)
F	LC, RS485, METER, LAN, CAN, DRM
G	AC Supply Terminals (Right) and EPS Terminals (Left)
H	Machine Serial No.
I	WiFi Serial No. and Verification Code
J	Warning Signs Label
K	Specification Label

3.2.3 LED Display Description

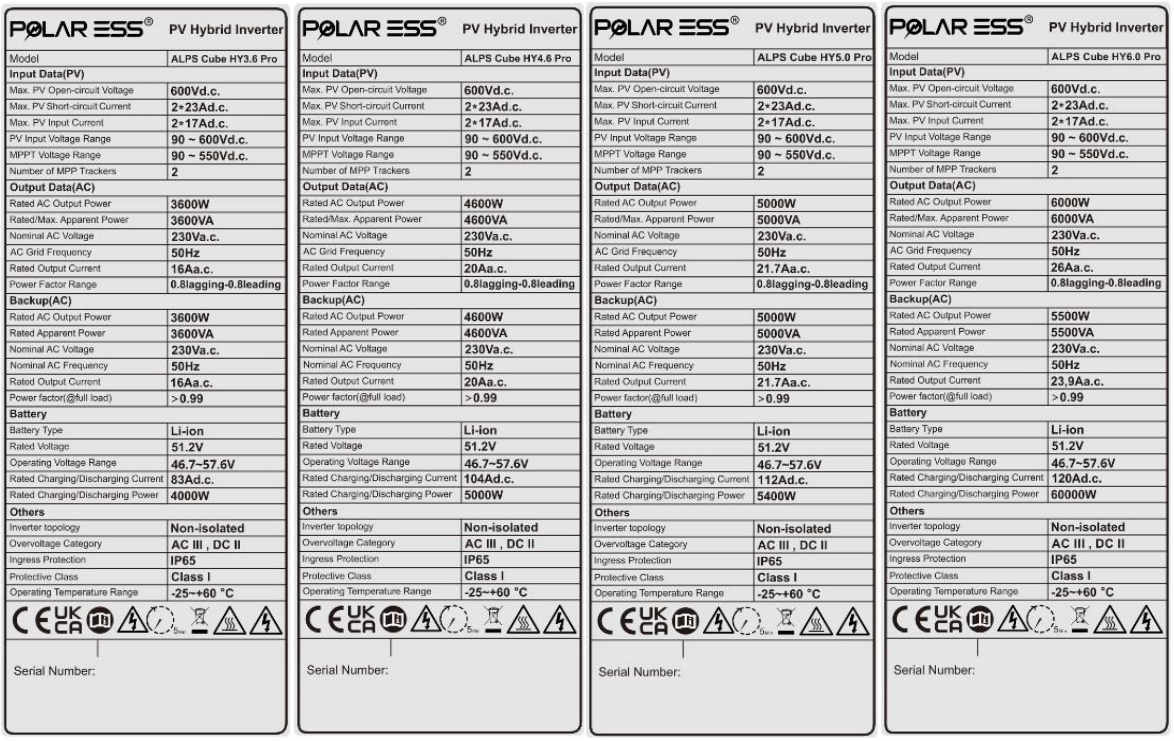
Item	Description
1	LED status display (red fault, green normal).
2	The LCD touch screen displays information and parameter Settings.
3*1	Touch buttons control the display of the LCD screen and set parameters. Implement the up and down scrolling of the interface and parameters and set confirm and cancel.

Note *1: This is different from the button form. It only requires a light touch and there is no need to press hard.

3.3 Label Description

3.3.1 Model Labels

Provide unique identification of the inverter (product type, device-specific characteristics, certificates and approvals). The Type label is located on the right side of the enclosure.



PV Hybrid Inverter	
Model	ALPS Cube HY3.6 Pro
Input Data(PV)	
Max. PV Open-circuit Voltage	600Vd.c.
Max. PV Short-circuit Current	2*23Ad.c.
Max. PV Input Current	2*17Ad.c.
PV Input Voltage Range	90 ~ 600Vd.c.
MPPT Voltage Range	90 ~ 550Vd.c.
Number of MPP Trackers	2
Output Data(AC)	
Rated AC Output Power	3600W
Rated/Max. Apparent Power	3600VA
Nominal AC Voltage	230Va.c.
AC Grid Frequency	50Hz
Rated Output Current	16Aa.c.
Power Factor Range	0.8lagging-0.8leading
Backup(AC)	
Rated AC Output Power	3600W
Rated Apparent Power	3600VA
Nominal AC Voltage	230Va.c.
Nominal AC Frequency	50Hz
Rated Output Current	16Aa.c.
Power factor(@full load)	>0.99
Battery	
Battery Type	Li-ion
Rated Voltage	51.2V
Operating Voltage Range	46.7~57.6V
Rated Charging/Discharging Current	83Ad.c.
Rated Charging/Discharging Power	4000W
Others	
Inverter topology	Non-isolated
Overvoltage Category	AC III , DC II
Ingress Protection	IP65
Protective Class	Class I
Operating Temperature Range	-25~+60 °C

Serial Number:

PV Hybrid Inverter	
Model	ALPS Cube HY4.6 Pro
Input Data(PV)	
Max. PV Open-circuit Voltage	600Vd.c.
Max. PV Short-circuit Current	2*23Ad.c.
Max. PV Input Current	2*17Ad.c.
PV Input Voltage Range	90 ~ 600Vd.c.
MPPT Voltage Range	90 ~ 550Vd.c.
Number of MPP Trackers	2
Output Data(AC)	
Rated AC Output Power	4600W
Rated/Max. Apparent Power	4600VA
Nominal AC Voltage	230Va.c.
AC Grid Frequency	50Hz
Rated Output Current	20Aa.c.
Power Factor Range	0.8lagging-0.8leading
Backup(AC)	
Rated AC Output Power	4600W
Rated Apparent Power	4600VA
Nominal AC Voltage	230Va.c.
Nominal AC Frequency	50Hz
Rated Output Current	20Aa.c.
Power factor(@full load)	>0.99
Battery	
Battery Type	Li-ion
Rated Voltage	51.2V
Operating Voltage Range	46.7~57.6V
Rated Charging/Discharging Current	104Ad.c.
Rated Charging/Discharging Power	5000W
Others	
Inverter topology	Non-isolated
Overvoltage Category	AC III , DC II
Ingress Protection	IP65
Protective Class	Class I
Operating Temperature Range	-25~+60 °C

Serial Number:

PV Hybrid Inverter	
Model	ALPS Cube HY5.0 Pro
Input Data(PV)	
Max. PV Open-circuit Voltage	600Vd.c.
Max. PV Short-circuit Current	2*23Ad.c.
Max. PV Input Current	2*17Ad.c.
PV Input Voltage Range	90 ~ 600Vd.c.
MPPT Voltage Range	90 ~ 550Vd.c.
Number of MPP Trackers	2
Output Data(AC)	
Rated AC Output Power	5000W
Rated/Max. Apparent Power	5000VA
Nominal AC Voltage	230Va.c.
AC Grid Frequency	50Hz
Rated Output Current	21.7Aa.c.
Power Factor Range	0.8lagging-0.8leading
Backup(AC)	
Rated AC Output Power	5000W
Rated Apparent Power	5000VA
Nominal AC Voltage	230Va.c.
Nominal AC Frequency	50Hz
Rated Output Current	21.7Aa.c.
Power factor(@full load)	>0.99
Battery	
Battery Type	Li-ion
Rated Voltage	51.2V
Operating Voltage Range	46.7~57.6V
Rated Charging/Discharging Current	112Ad.c.
Rated Charging/Discharging Power	5400W
Others	
Inverter topology	Non-isolated
Overvoltage Category	AC III , DC II
Ingress Protection	IP65
Protective Class	Class I
Operating Temperature Range	-25~+60 °C

Serial Number:

PV Hybrid Inverter	
Model	ALPS Cube HY6.0 Pro
Input Data(PV)	
Max. PV Open-circuit Voltage	600Vd.c.
Max. PV Short-circuit Current	2*23Ad.c.
Max. PV Input Current	2*17Ad.c.
PV Input Voltage Range	90 ~ 600Vd.c.
MPPT Voltage Range	90 ~ 550Vd.c.
Number of MPP Trackers	2
Output Data(AC)	
Rated AC Output Power	6000W
Rated/Max. Apparent Power	6000VA
Nominal AC Voltage	230Va.c.
AC Grid Frequency	50Hz
Rated Output Current	26Aa.c.
Power Factor Range	0.8lagging-0.8leading
Backup(AC)	
Rated AC Output Power	5500W
Rated Apparent Power	5500VA
Nominal AC Voltage	230Va.c.
Nominal AC Frequency	50Hz
Rated Output Current	23,9Aa.c.
Power factor(@full load)	>0.99
Battery	
Battery Type	Li-ion
Rated Voltage	51.2V
Operating Voltage Range	46.7~57.6V
Rated Charging/Discharging Current	120Ad.c.
Rated Charging/Discharging Power	60000W
Others	
Inverter topology	Non-isolated
Overvoltage Category	AC III , DC II
Ingress Protection	IP65
Protective Class	Class I
Operating Temperature Range	-25~+60 °C

Serial Number:

3.3.2 Warning Labels

Located under the nameplate of the machine, as shown in the picture:

3.3.3 Serial Number Labels

Located in the lower right corner of the machine, the current inverter serial number information.

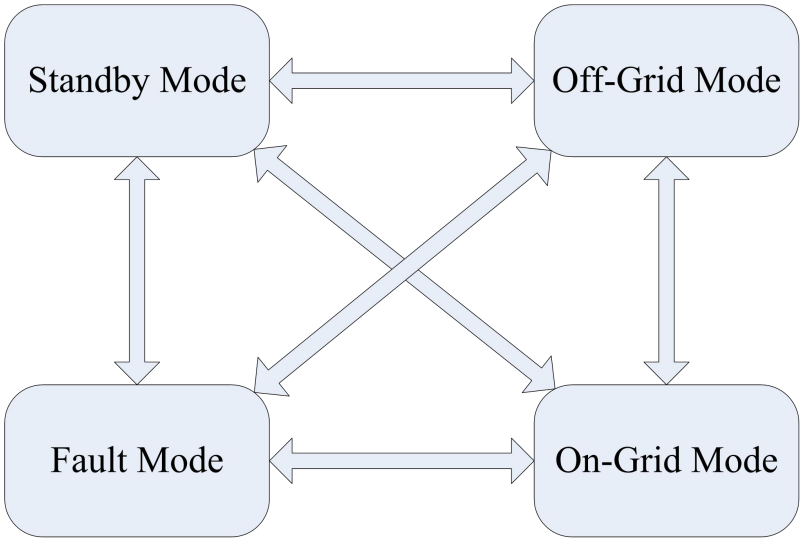
SN: PIE 25 5 0001
↓ ↓ ↓ ↓
1 2 3 4

Number	Description
1	Identification code
2	Year
3	Month
4	Serial number

3.4 Operating Mode

3.4.1 Inverter Operating Mode

The basic operating mode and working status of this product are shown in the figure below.



Item	Specification	Description
1	Standby Mode	After the machine is powered on for the first time • Performs various self-tests and enters the mode state after normal • Switch between modes in one end of the time to enter the standby state

2	On-Grid Mode	The inverter is normally connected to the grid • When the grid jumps open, it cannot detect that the grid will enter the off-grid mode at any time. • When a machine fault occurs, jump to the fault mode and not run, and report an error corresponding to the fault message. • When the grid does not meet the grid-connected conditions and the off-grid cannot meet the situation, the machine enters standby mode and waits for the conditions to be met.
3	Off-Grid Mode	The machine is disconnected from the grid, and the inverter switches EPS to off-grid mode by default • When a machine fault occurs, jump to the fault mode and not run, and report an error corresponding to the fault message. • When the power grid returns to normal, the machine enters standby mode after detection, confirms that the self-test is OK and enters grid-connected mode operation. • When the power grid does not meet the conditions, the battery has no power or other off-grid conditions are not met, enter the standby mode, and when the conditions are not met, disappear and enter the off-grid mode operation.
4	Fault Mode	If the machine detects a fault, the machine quickly switches to this mode, reports the error corresponding to the fault message, and switches to the standby mode for self-test for fault elimination, and runs the corresponding setting mode.

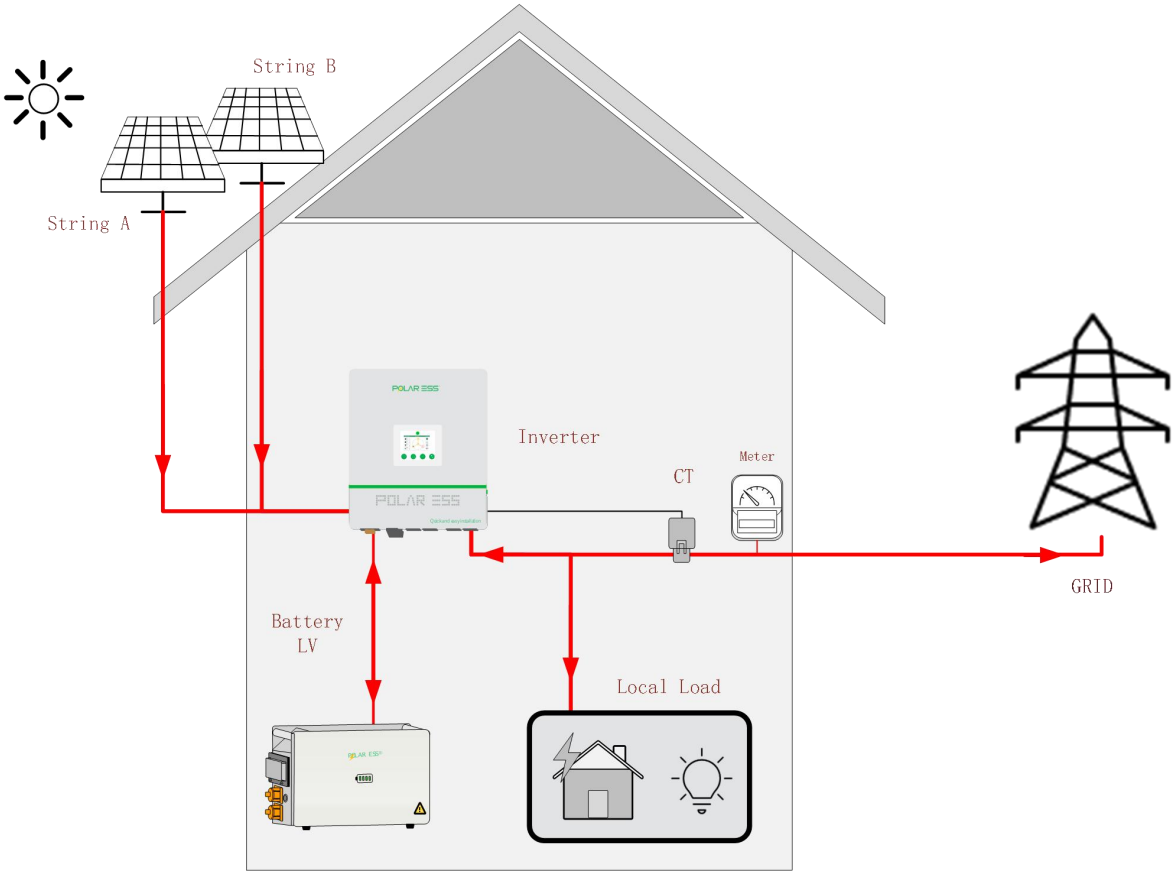
3.4.2 Main Work Modes

The Polar-ESS ALPS CUBE series hybrid Inverter has the following main work modes.

3.4.2.1 Daytime Mode

The system optimizes the delivery of generated PV power, prioritizing local loads then battery if necessary and finally ending excess generated power to the grid.

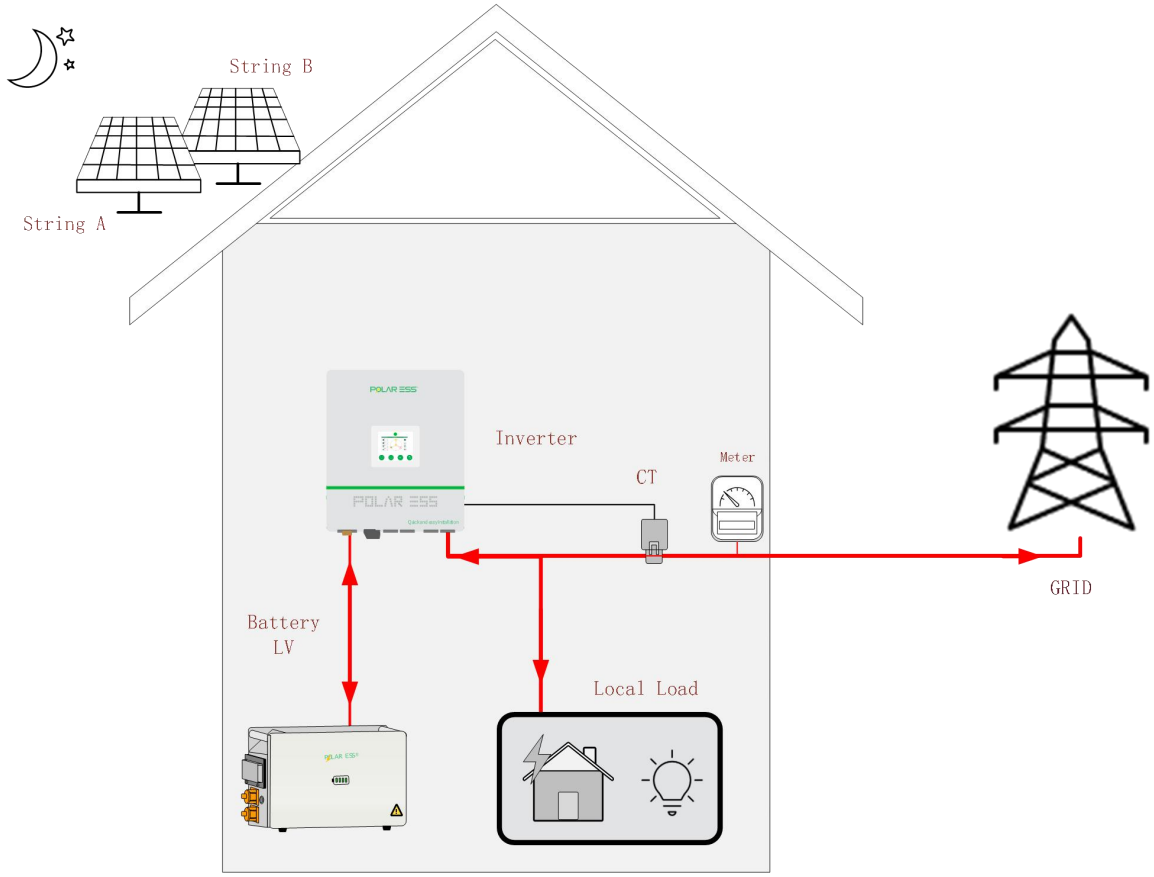
Energy prioritization: Priority solar output, insufficient battery replenishment, last grid replenishment.



3.4.2.2 Night Mode/Peak Night

This is prioritized to discharge the battery ready for the off-peak time to refill, if necessary, at the cheapest rate. When the battery is depleted, automatic switching will occur, and grid power will be used.

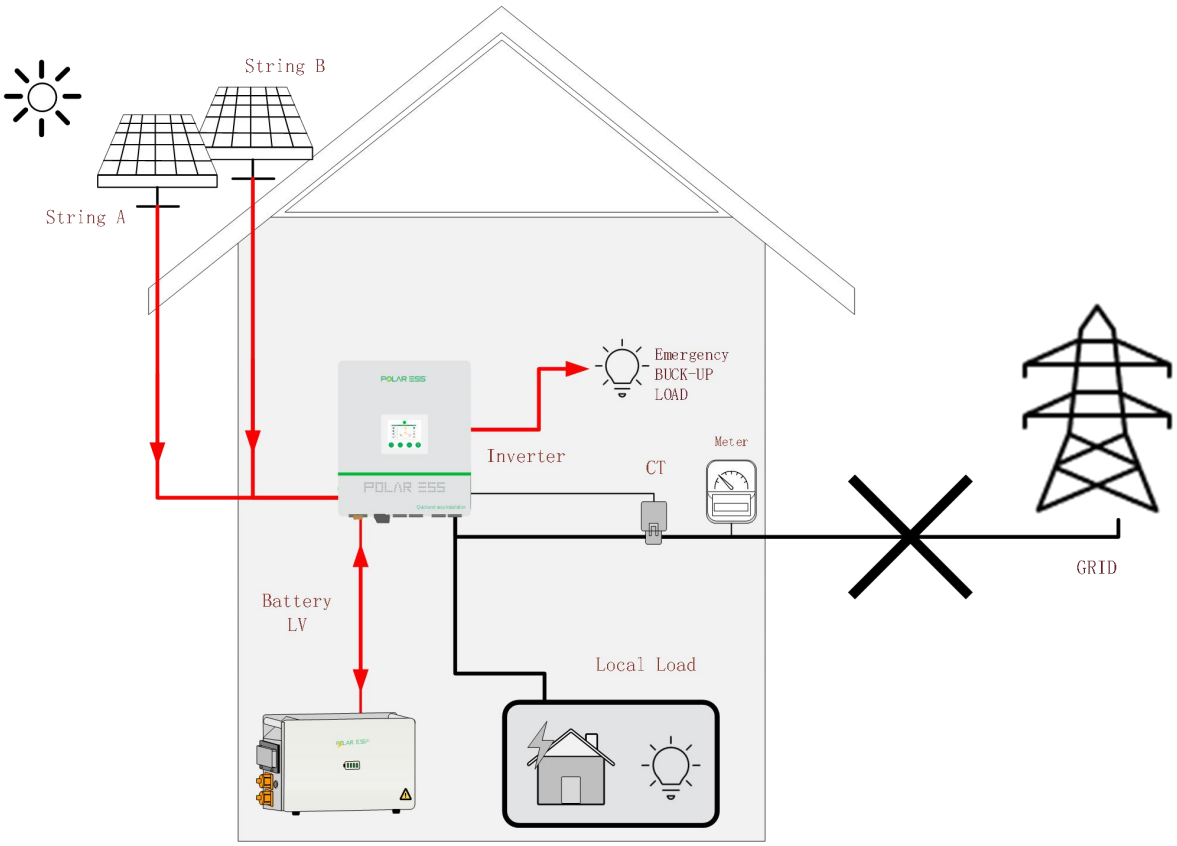
Energy prioritization: Priority battery output, insufficient power grid supplement, fully use the power grid after the battery is exhausted.



3.4.2.3 Emergency Back-up and Island Mode

The system has the ability to be a stand-alone system in island mode. There is also an essential backup power system available for using when there is a power cut.

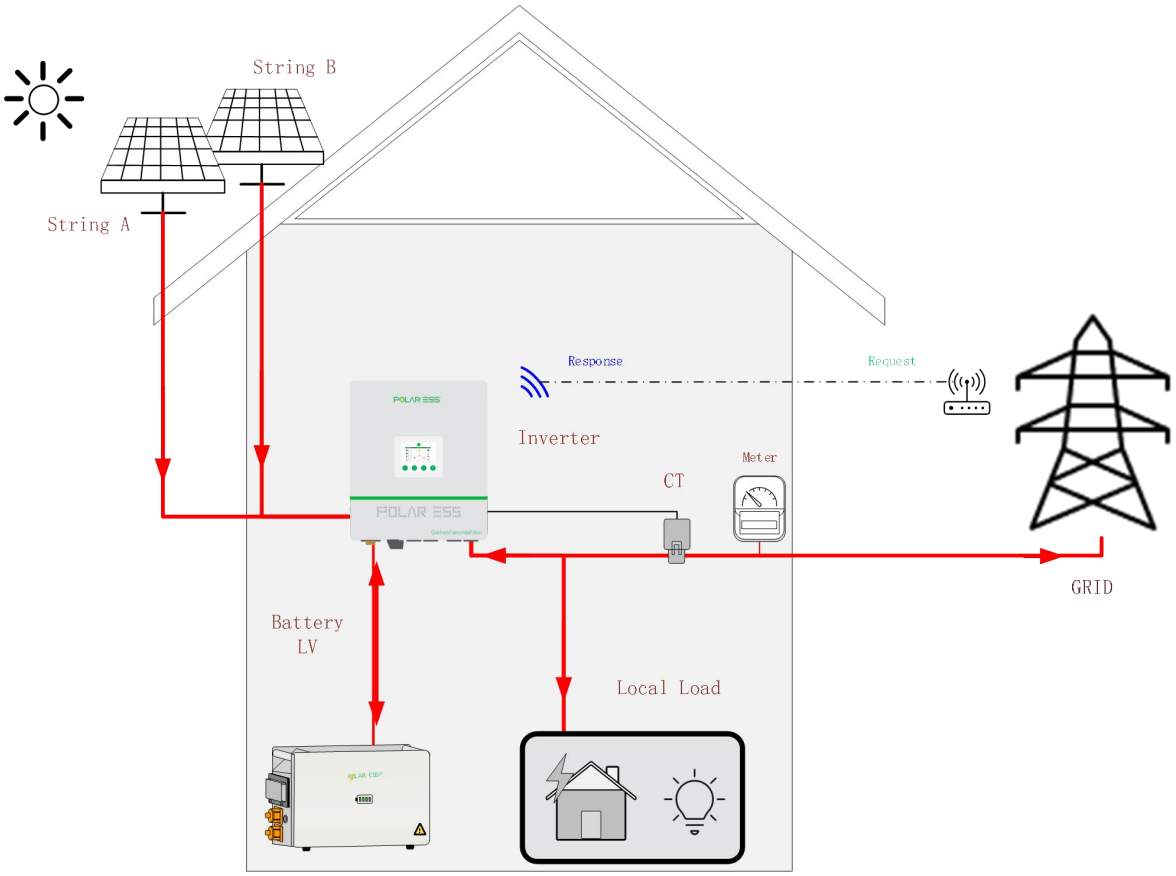
Energy prioritization: Priority battery output, solar energy replenishment, excess battery charging.



3.4.2.4 Demand Side Response

There is an option in our software to allow remote data collection and analysis. This gives vital information to utility providers and can allow a high level of indication to when demand will occur.

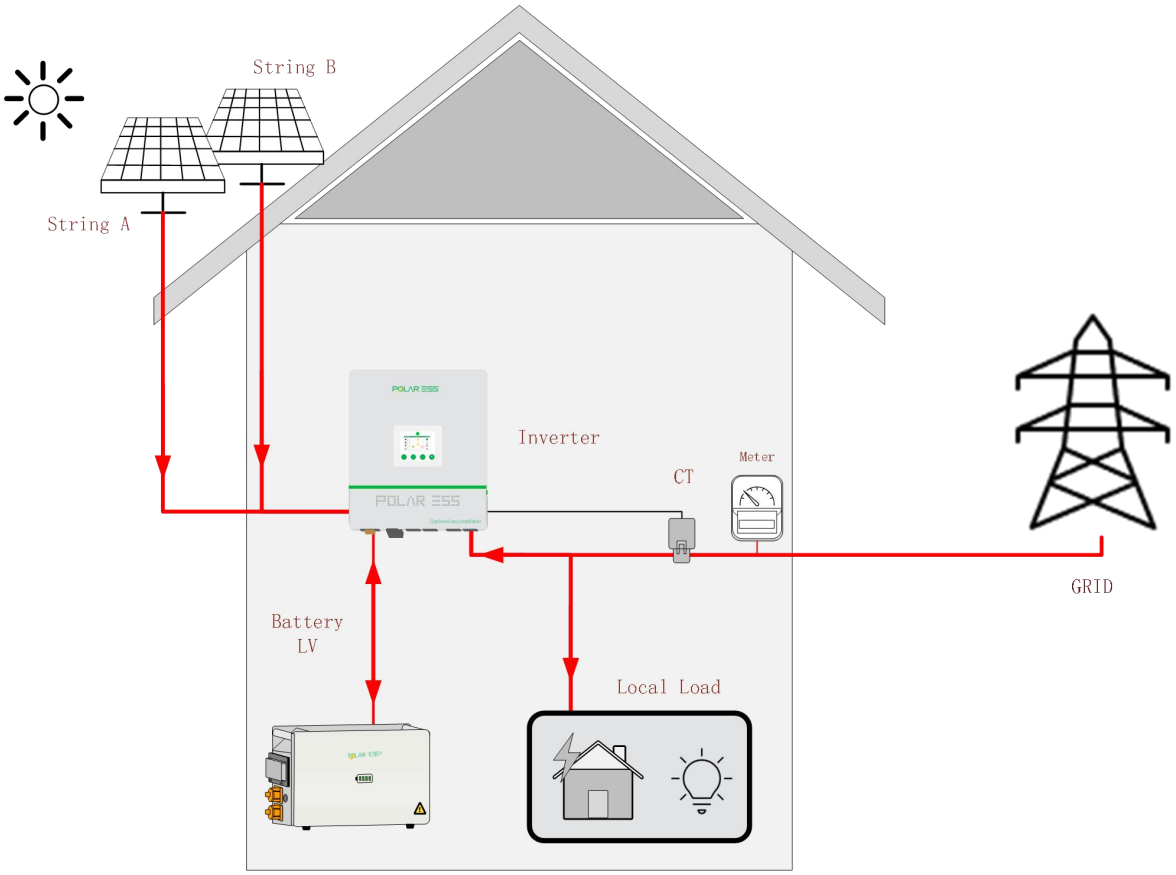
Energy prioritization: Priority solar output, insufficient battery replenishment, last grid replenishment.



3.4.2.5 Back-up Power Storage

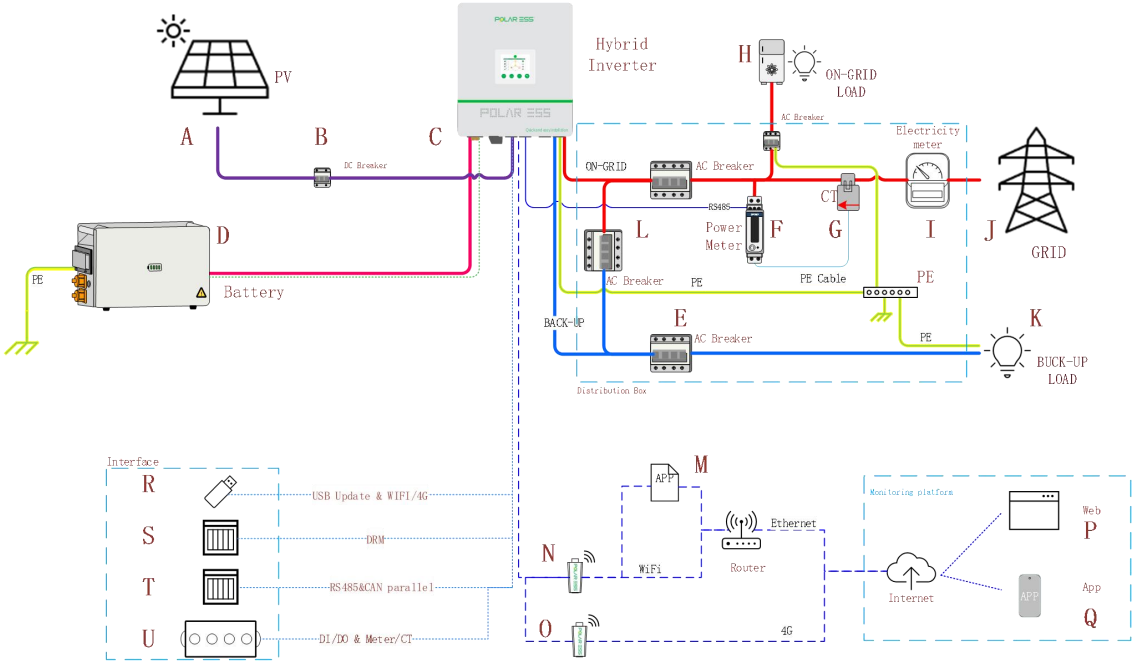
When it is clear that a power outage is about to happen or at night when the electricity price is low, but there is no solar power at this time, you can use the AC input mode to charge the battery, which is convenient for using at the time of the blackout or during the day when the electricity price is high.

Energy prioritization: Fully use the grid.



3.5 Combined Grid Applications

Convenient combined grid applications, a single machine can be carried out with very little grid-side transformation, grid-connected energy storage system is composed of photovoltaic string, energy storage battery, ALPS CUBE HY6.0 PRO inverter, AC switch, load and distribution unit, meter, power grid, etc.



Item	Description	Item	Description
A	String PV photovoltaic panels	L	Reserved load Breaker (normal use OFF state)
B	DC Breaker	M	Built-in WiFi setting APP
C	ALPS CUBE HY6.0 PRO	N	External WiFi module
D	Energy storage lithium-ion battery	O	External 4G module
E	AC Breaker (Grid & Load side)	P	Web monitoring web pages
F	Single-phase electricity meter	Q	Phone monitoring app
G	Electricity meter with CT or CT	R	USB for update or WiFi&4G monitor
H	Grid-side loads	S	DRM
I	Home electricity meter	T	For parallel &LAN
J	Power grid	U	CT/METER/DIDO
K	BUCK-UP load		

3.6 Features

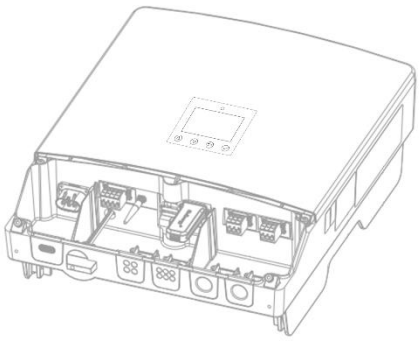
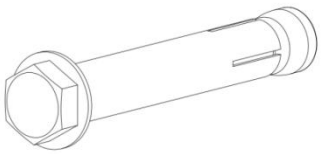
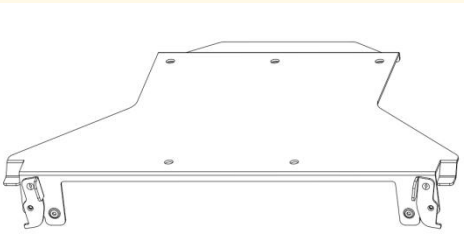
- Support grid-connected, off-grid, pure off-grid multi-scenario, spontaneous self-use, TOU, full Internet access multiple working modes.
- Support users to query the total discharge information of the product life cycle in real time.
- Intelligent operation and simple operation.
- Built-in Wi-Fi and expandable external Wi-Fi and 4G modules for easy connection to server.
- Operates independently of three-phase output to accommodate irregular load changes.
- Real-time adjustment of spontaneous self-consumption, full control of output grid power.
- Easy installation and replacement.
- Modular terminals for system connections facilitate installation and removal of individual components.
- Modular design of supporting battery, can be freely matched with capacity.
- One person can operate.
- Intelligent operation and maintenance.
- The factory settings meet the default settings of the main target market, and the power can be generated by connecting OK.
- LED indicator status indication, at the same time can use the mobile APP, to achieve all remote and near end operations.

4 System Installation

4.1 Unpacking Inspection

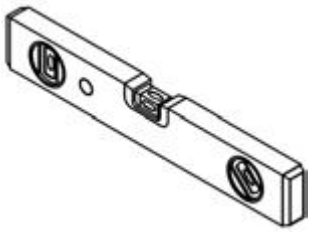
Thoroughly inspect the packaging upon receipt. If any damage to the packaging is visible, or if you find that the unit is damaged after unpacking, please notify the distributor immediately. If there is anything damaged or missing, please contact your supplier. Do not dispose of the original packaging. If you want to transport the unit, it is better stored in the original packaging.

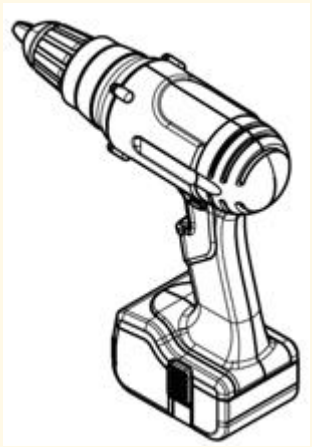
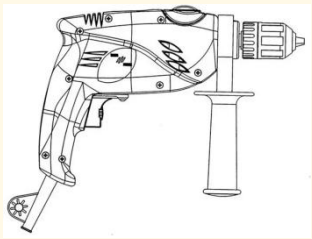
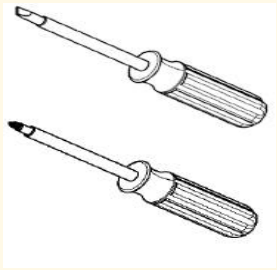
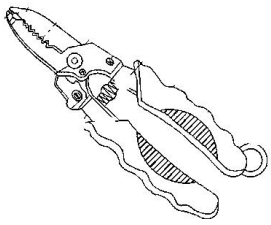
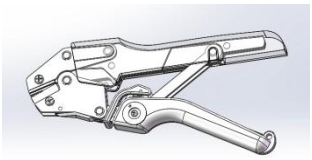
The machine unboxing includes the following accessories:

Accessory Sketch Map	quantity	Accessory Sketch Map	quantity
	1		5
	1		

4.2 Tools and Instruments

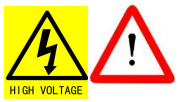
For the convenience of installing the machine, the following tools are required:

Tool Sketch Map	Tools Name	Tool Sketch Map	Tools Name
	Pencil		Crankshaft level

	Electric screwdriver		Diagonal Pliers
	Hexagonal Screwdriver		Multimeter
	Impact Drill		Slotted Screwdriver Phillips Screwdriver
	Wire stripper		Crimping Pliers

4.3 Equipment Installation

4.3.1 Safety Attention

 **Danger**	**Danger to life due to fire or explosion** ● **Despite careful construction, electrical devices can cause fires. Do not install the inverter on easily flammable materials and where flammable materials are stored.**

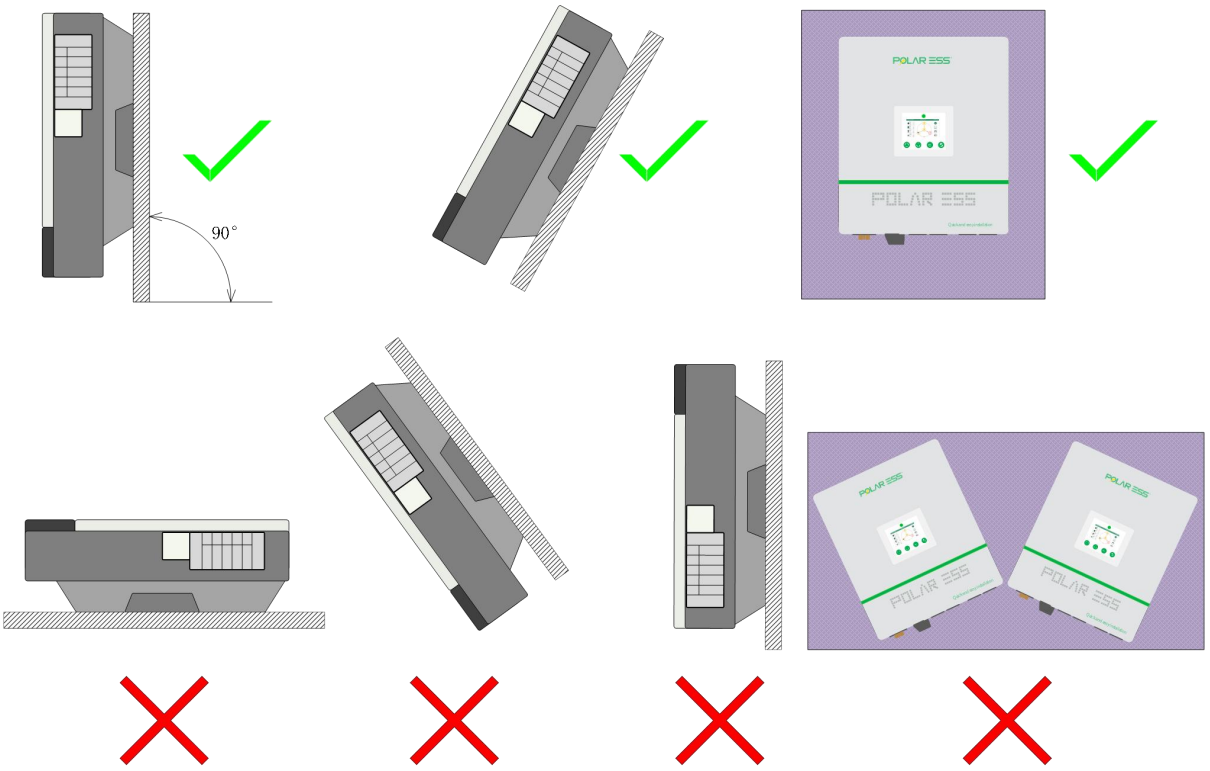
 **Danger**	**Risk of burns due to hot enclosure parts** ● **Mount the inverter in such a way that it cannot be touched inadvertently.**
 **Danger**	● **All electrical installations shall be done in accordance with the IEE Wiring Regulations.** ● **Do not remove the casing. The inverter contains no user serviceable parts. Please refer servicing to qualified service personnel.** ● **All wiring and electrical installation should only be conducted by a qualified electrician.** ● **Carefully remove the unit from its packaging and inspect for external damage. If you find any imperfections, please contact your local supplier.** ● **The inverter must only be operated with PV generation. Do not connect any other source of renewable energy to it.** ● **Both AC and DC voltage sources are terminated inside the PV Inverter. Please disconnect these circuits before servicing.** ● **This unit is designed to feed power to the public power grid (utility) only. Do not connect this unit to a generator. Connecting the inverter to external devices could result in serious damage to your equipment.** ● **When a photo-voltaic panel is exposed to light, it generates a DC voltage. When connected to this equipment, a photo-voltaic panel will charge the DC capacitors.** ● **Energy stored in this equipment's DC capacitors presents a risk of electric shock. Even after the unit is disconnected from the grid and photo-voltaic panels, high voltages may still exist inside the PV-Inverter.** ● **Although designed to meet all safety requirements, some parts and surfaces of the Inverter are still hot during operation. To reduce the risk of injury, do not touch the heat sink at the back of the PV-Inverter or nearby surfaces while Inverter is operating.**

4.3.2 Select The Installation location

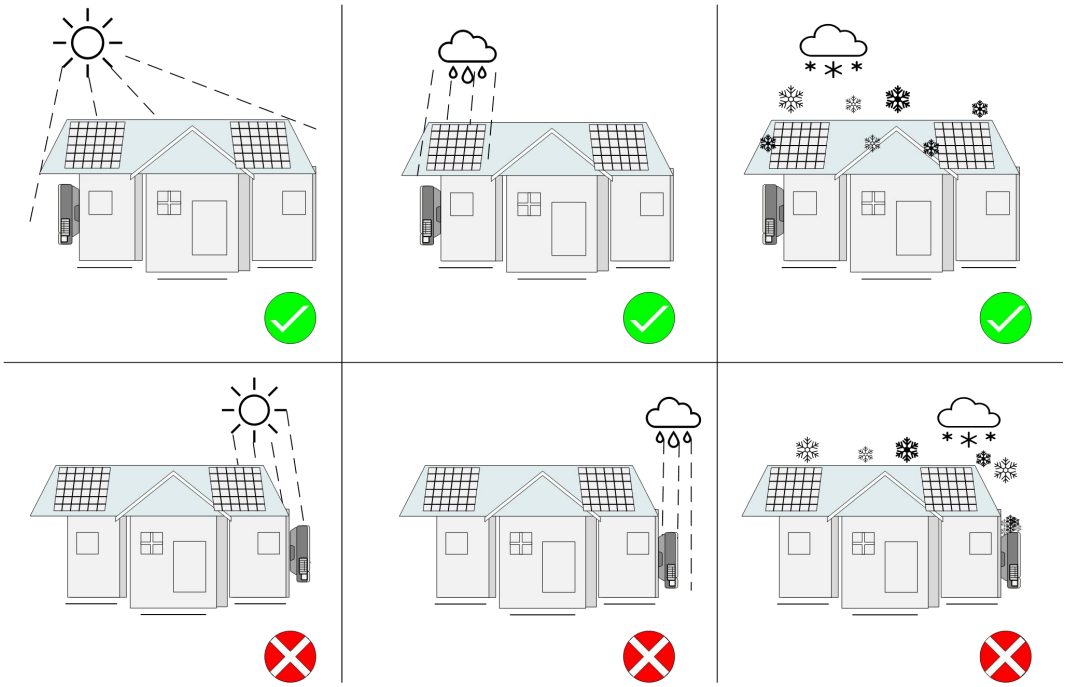
This is guidance for the installer to choose a suitable installation location, to avoid potential

damages to the device and operators.

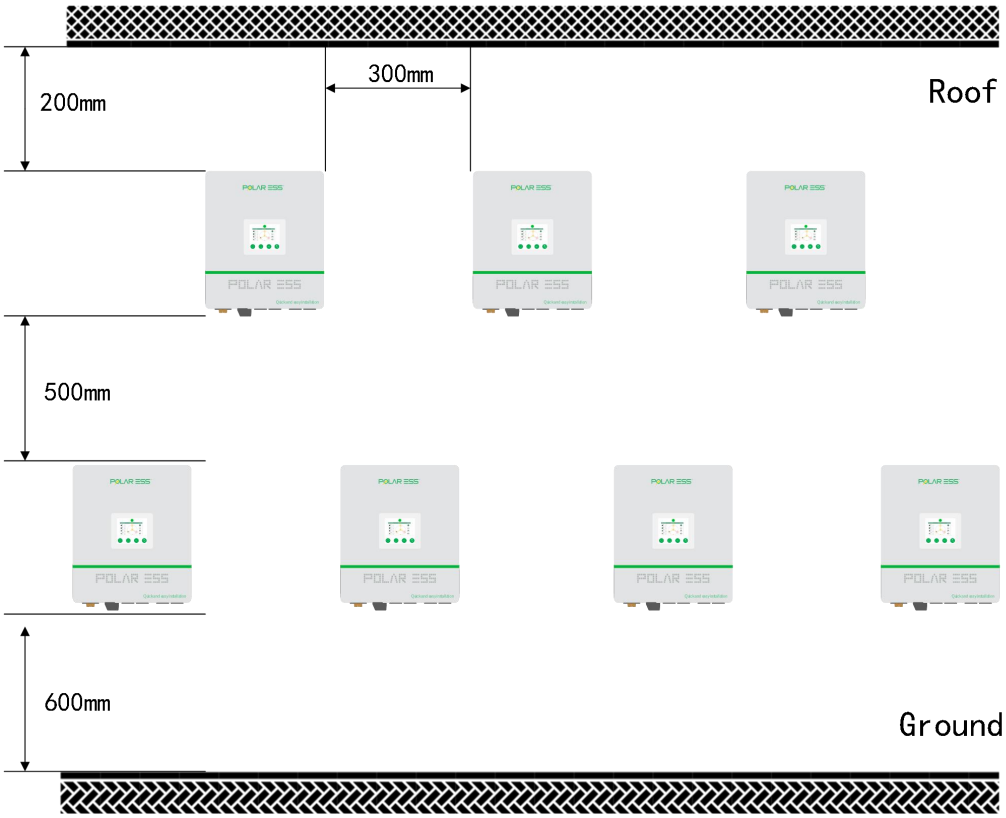
- The inverter shall not be installed were in direct contact with water or in direct sunlight.
- The unit shall be mounted at least 914 mm (3 feet) above the ground.
- The installation location must be suitable for the inverter's weight and dimensions for a long period of time.
- Select the installation location so that the status display can be easily viewed.
- Do not install the inverter on structures constructed of flammable materials.
- The humidity of the installation location should be 0 - 95%, without condensation.
- The installation location must be safely accessible to get to at all times.
- Vertical installation or tilted backwards by max. 15° and make sure the connections of inverter are at the bottom. Never install horizontally and avoid forward and sideways tilt.
- Be sure that the inverter is out of the children's reach.
- Do not put anything on the inverter. Do not cover the inverter.
- Do not install the inverter near television antenna or any other antennas, antenna cables.
- The Inverter requires adequate cooling space. Provide the best ventilation for the Inverter to ensure the heat escapes adequately. The ambient temperature should be below 40℃ to ensure optimum operation.



The inverter should not be installed in direct sunlight, direct heavy water sources or unstable locations. We recommend that the inverters be installed at a location with some cover or protection.



Observe the minimum clearances to walls, other inverters or objects as shown in the diagram below in order to guarantee sufficient heat dissipation.



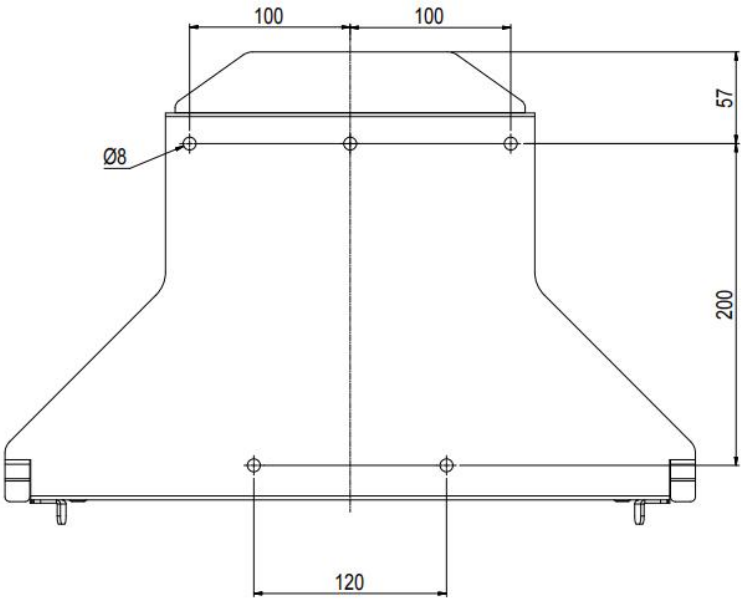
Ambient Dimensions Using Inverters in Series:

- There must be sufficient clearance between the individual inverters to ensure that the ambient air from the adjacent inverter is not taken in.
- If necessary, increase the clearance spaces and make sure there is enough fresh air supply to ensure sufficient cooling of the inverters, and heat dissipation.

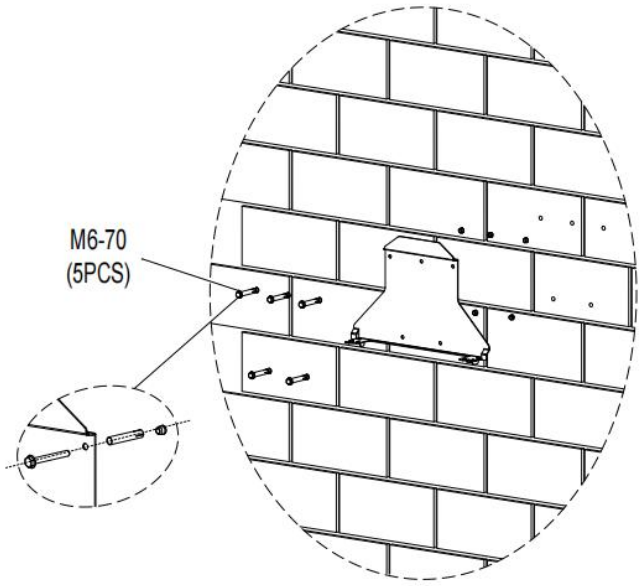
4.3.3 Installing inverters with brackets

Warning	**In order to avoid electrical shock or other injury, inspect existing electrical wiring systems or plumbing installations before drilling holes for bracket fixings.**
Warning	**Falling equipment can cause serious or even fatal injury. Never mount the inverter on the bracket unless you are sure that the mounting frame is securely mounted on the wall.**

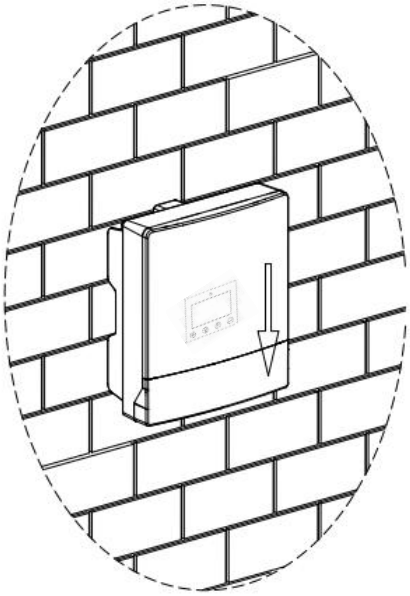
(1) Wall thickness for mounting the inverter must be no less than 100mm. Place the wall mounting bracket horizontally onto the wall and mark the position of the bracket holes.



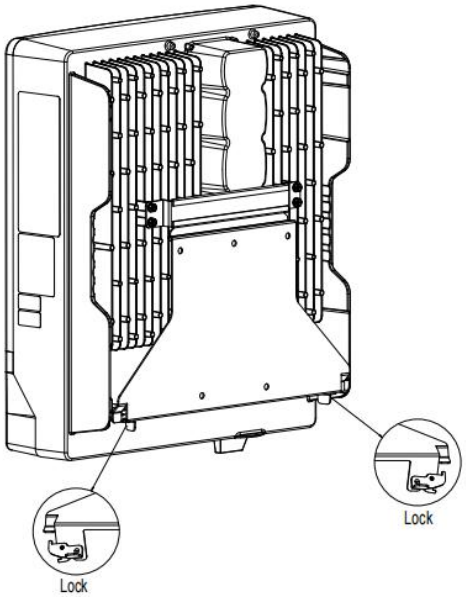
(2) Drill 5 holes at the marked positions, at least 80mm deep. Fix the mounting bracket to the wall using 5x M6x70 expansion bolts.



(3) Move the wall bracket in the direction of the arrow. Hang the inverter on the bracket through the hooks on bracket.



(4) After confirming the inverter is fixed securely. Lock Hit the head of buckle from the front to the side to prevent the inverter from being lifted off the bracket.



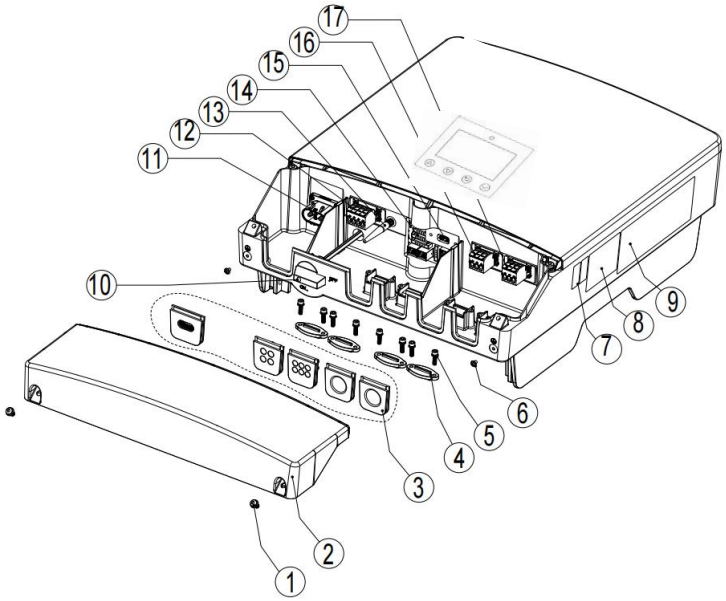
4.3.4 Check Inverter Installation Status

Check the mounting of the inverter by trying to raise it from the bracket. The inverter should

remain firmly attached.

Please ensure that the correct mounting surface is selected to allow for vibration of the inverter during normal operation.

4.4 Disassemble the wiring chamber and other accessories



Item	Description
1	2 hexagon socket screws, size M6x14, for fixing the wiring compartment
2	Wiring chamber
3	Wire sealing ring
4	Fixed wire
5	8 internal hexagonal screws, size M5x18, used to fix wires
6	2 Phillips screws, size M4x8, used for connecting the machine to the ground
7	Machine serial number and WIFI serial number
8	Warning signs label
9	Specification label
10	PV Input Switch
11	All in One Battery Connection
12	PV Input Terminals
13	Built in WIFI antenna
14	Signal connection: CT, BMS, METER, LAN, CAN, DRM, PARALLEL
15	External WIFI or 4G Module (USB Port)
16	EPS Terminals

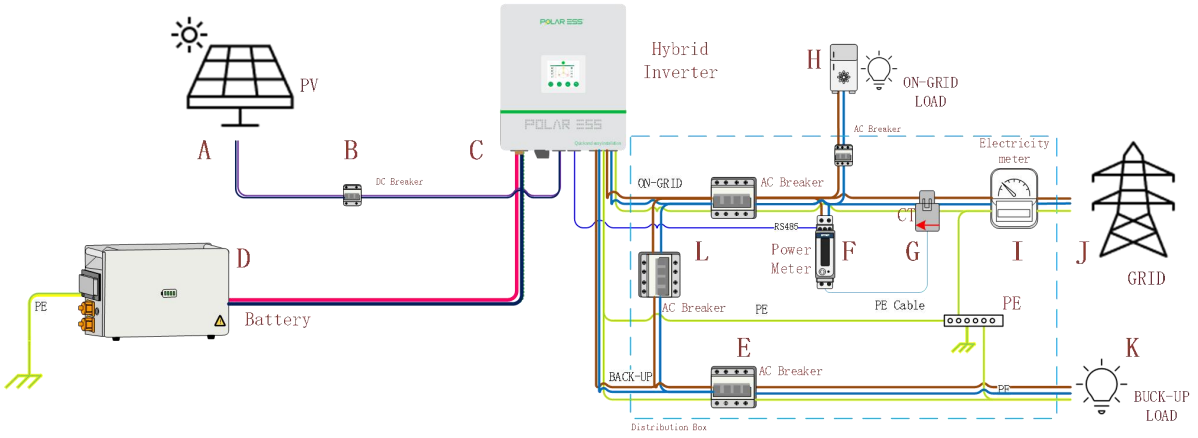
17	AC Supply Terminals

5 Electrical Connection

5.1 Safety Attention

 Danger	**Danger To Life Due to Lethal Voltages!** ● **High voltages which may cause electric shocks are present in the conductive parts of the inverter. Prior to performing any work on the inverter, disconnect the inverter on the AC side, PV side and battery side.** ● **Do not reverse the polarity of the battery! It will damage the inverter and void any warranty.**
 Danger	**Before connecting the DC power cables, the AC supply must be earthed.**
 Warning	**Danger of damage to electronic components due to electrostatic discharge. Take appropriate ESD precautions when replacing and installing the inverter.**

5.2 Electrical system connection diagram



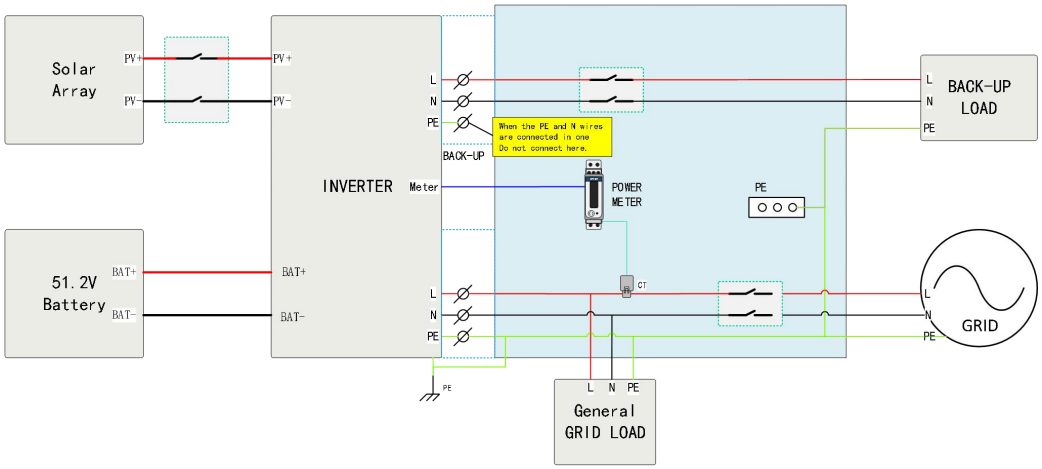
Item	Description	Item	Description
A	String PV photovoltaic panels	G	Electricity meter with CT
B	DC Breaker	H	On-Grid load
C	ALPS CUBE HY6.0 PRO Inverter	I	Home electricity meter
D	Energy storage lithium-ion	J	Power grid

	battery		
E	AC Breaker (Grid & EPS)	K	Buck-up Load
F	Single-phase electricity meter	L	Reserved load Breaker (normal use OFF state)

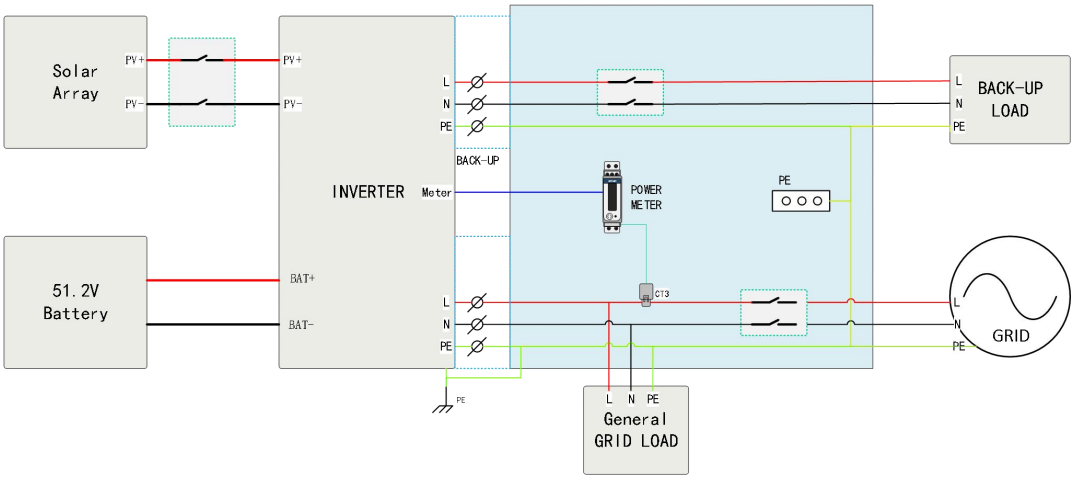
Caution	**Ensure all wiring is correctly selected and erected in accordance with BS7671:2018, IEE wiring regulations.**

5.3 Power Line Connection

For systems where N lines and PE are connected together in the system line, do not connect the load side PE line to the ground of the system wiring.



Except for regions such as Australia, New Zealand, and South Africa, the following connection



5.3.1 Grid connection

Model	Max Current (A)	Wire Size	Cable(mm^2)
ALPS CUBE HY3.6 PRO	16	11AWG	4-5
ALPS CUBE HY4.6 PRO	20	10 AWG	5-6
ALPS CUBE HY5.0 PRO	21.7	10 AWG	5-6
ALPS CUBE HY6.0 PRO	23.9	9 AWG	6-7

 **Caution**	**To reduce risk of injury, please use the proper recommended cable as below.**
 **Notice**	**The length of the wire should not exceed 50m as the resistance of the cable will consume inverter output and reduce the inverter efficiency.**
 **Warning**	**You must install a separate AC circuit-breaker or other load disconnection unit between the inverter and utility, in order to ensure that the inverter can be safely disconnected under load.**

5.3.2 Back-up Load Connection

Model	Max Current (A)	Wire Size	Cable(mm^2)
ALPS CUBE HY3.6 PRO	16	11AWG	4-5
ALPS CUBE HY4.6 PRO	20	10 AWG	5-6
ALPS CUBE HY5.0 PRO	21.7	10 AWG	5-6
ALPS CUBE HY6.0 PRO	23.9	9 AWG	6-7

 **Caution**	**To reduce risk of injury, please use the proper recommended cable as below.**
 **Warning**	**You must install a separate AC circuit-breaker or other load disconnection unit between the inverter and utility, in order to ensure that the inverter can be safely disconnected under load.**

5.3.3 PV Module Selection

 **Danger**	**Risk of electric shock and fire, use only with PV modules, and with a maximum system voltage of 600Vdc per string.** **Electric shock hazard, the DC conductors of this photovoltaic system are normally ungrounded but will become intermittently grounded without indication when the inverter measures the PV array isolation. Because of the transformer less design, the DC positive pole and DC negative pole of PV arrays are not permitted to be grounded.** **Do not disconnect the DC connectors under load!**

There are two MPPT on the unit, so you can connect two independent MPPT channels.

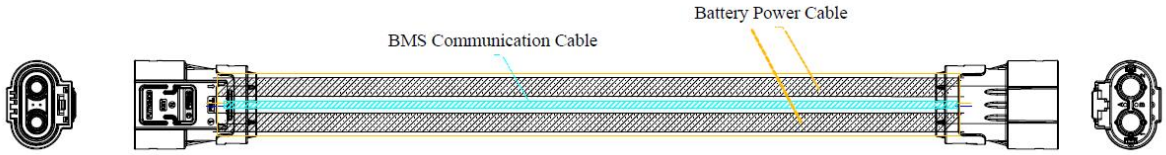
- Suggestions for the PV modules of the connected strings:
  - Same type of modules.
  - The same or different number of PV modules in series should not exceed the maximum Voc 600V.
- Under all conditions! Make sure the maximum open circuit voltage (Voc) of each PV string is less than 600Vdc:
  - Do not connect strings with an open circuit voltage greater than the maximum input voltage of the inverter. If the strings voltage exceeds the maximum input voltage of the inverter, the inverter can be destroyed due to over voltage. All warranty claims become void.
  - Under all conditions! Make sure the maximum open circuit voltage (Voc) of each PV string is less than 600Vdc.
- Before connecting PV panels to the DC terminals, please make sure the polarity is correct. Incorrect polarity connection could damage the inverter.
- Check short-circuits current of the PV string. The total short-circuit current of the PV string should be less than the inverter's maximum short-circuits current.
- Connect the positive and negative terminals from the PV panel to positive (+) terminals and negative (-) terminals on the Inverter. Each DC terminal on Inverter can withstand 17A.
- For instance, if the positive pole of a string is connected at MPP tracker A and the string's negative pole at MPP tracker B, this is called a mixed connection, the inverter no longer meets the requirements of the EMC directive.
- Only connect strings at one input zone and never mix the input zones A and B. High voltages exist when the PV panel is exposed to the sun. To reduce risk of electric shock, avoid touching live components and treat connection terminals carefully.

We suggest the PV side cables spec as follow:

Model	Max Current (A)	Wire Size	Cable(mm^2)
ALPS CUBE HY3.6 PRO	17	12AWG	4.0-5.0
ALPS CUBE HY4.6 PRO			
ALPS CUBE HY5.0 PRO			
ALPS CUBE HY6.0 PRO			

5.3.4 Battery Connection

Because the maximum charging and discharging current of the inverter is 120A/120A, it is important to use appropriate cables to connect the battery for safe and efficient operation of the system. The battery cables used in this inverter are as follows:



It integrates battery power cables and communication cables between the battery and inverter, so there is no need for additional battery communication cable connections.

Model	Max Current (A)	Wire Size	Cable (mm^2)
ALPS CUBE HY3.6 PRO	120	3AWG	33.6
ALPS CUBE HY4.6 PRO			
ALPS CUBE HY5.0 PRO			
ALPS CUBE HY6.0 PRO			

The battery must be installed in accordance with the manufacturer's instructions. Follow the below steps to implement the battery connection:

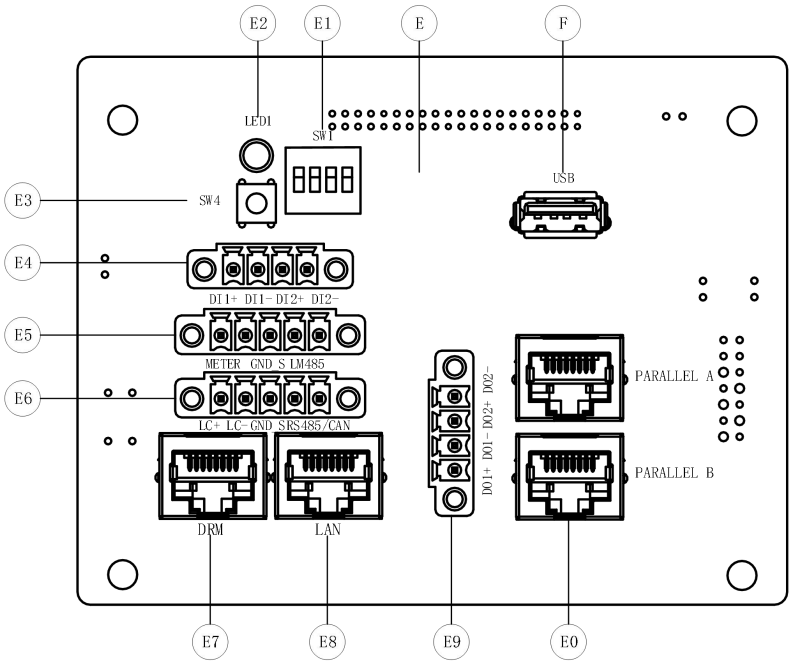
1. Check if the plugs at both ends of the battery connection cable match the sockets of the battery and inverter.
2. Disconnect the circuit breaker for battery output.
3. Insert the plug of the battery connection cable into the socket of the battery and inverter and lock it to ensure a secure connection.
4. The correct battery technology must be selected upon commission, so that it can be controlled via the BMS.

Notice	**we recommend using the Polar-ESS appointed lithium battery, because the battery BMS communication has been designed to be compatible with the Polar-ESS Hybrid Inverter.**
Danger	**Danger to life due to voltages!** **Before you install the battery power cable, you must turn off the inverter, check all the separate breakers are off, and the inverter's LED is off. Then you can safely install the BAT.NTC terminal to the inverter.**

5.4 Sampling Signal Connection

5.4.1 Description of the Communication Port

Diagram of the communication port as show below:

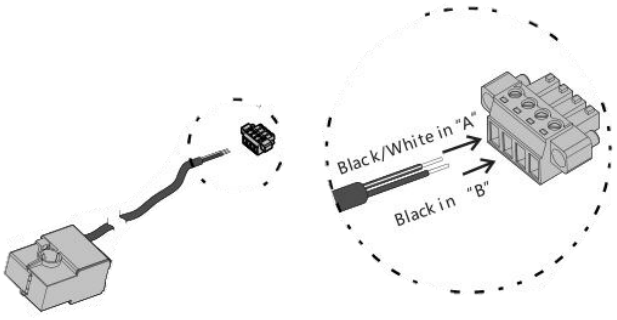


Item	Function	Foot position	Note
E1	Network communication methods DIP switch	1: Built-in WIFI: 1111 2: External WIFI/4G: 0000 3: LAN mode: 0111	
E2	LED of WiFi operating status	1: Fast blink 2: Slow blink 3: Keep bright	Start up; Access to the network; Connection success
E3	Switch of WiFi reset	/	Long press for more than 3 seconds
E4	DI1 and DI2 Input port	1: DI1+ 2: DI1-	Just DI1+ and DI1- for customer use

		3: DI2+ 4: DI2-	
E5	Meter and EMS communication port	1: Meter-RS485+ 2: Meter-RS485- 3: GND-S 4: EMS-RS485+ 5: EMS-RS485-	
E6	CT and reserve BMS communication port	1:LC+ 2: LC- 3: GND-S 4: BMS-CANH/RS485+ 5: BMS-CANL/RS485-	LC±: Use the CT connection. BMS communication: include CAN communication and RS485 communication
E7	LAN port	/	With "E1" DIP switch to use LAN port
E8	DRM port	/	DEMAND RESPONSE MODES
E9	DO1 and DO2 Input port	1: DO1+ 2: DO1- 3: DO2+ 4: DO2-	Just DO1+ and DO1- for customer use
E0	Parallel connect port	/	For inverter parallel communication
F	USB port	/	For update or External 4G/WiFi

5.4.2 Connect CT Clamp and Power Meter to Inverter

In order to accurately measure the power interaction between the system and the grid, it is necessary to install a CT at the total output port of the system, usually in front of the metering meter or the main switch. ships with a standard CT.

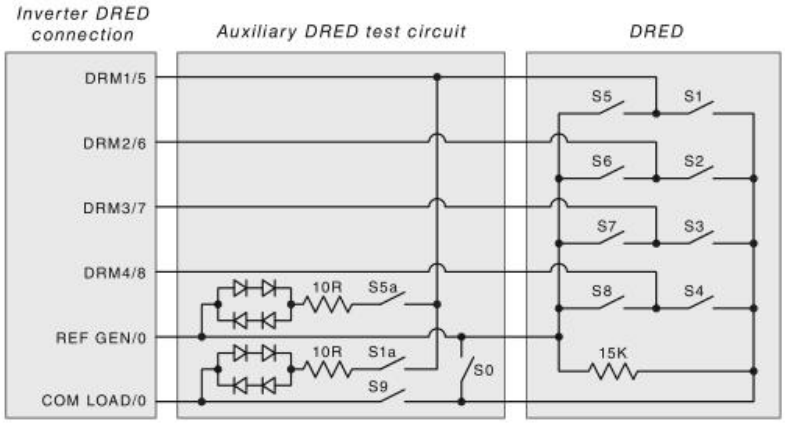


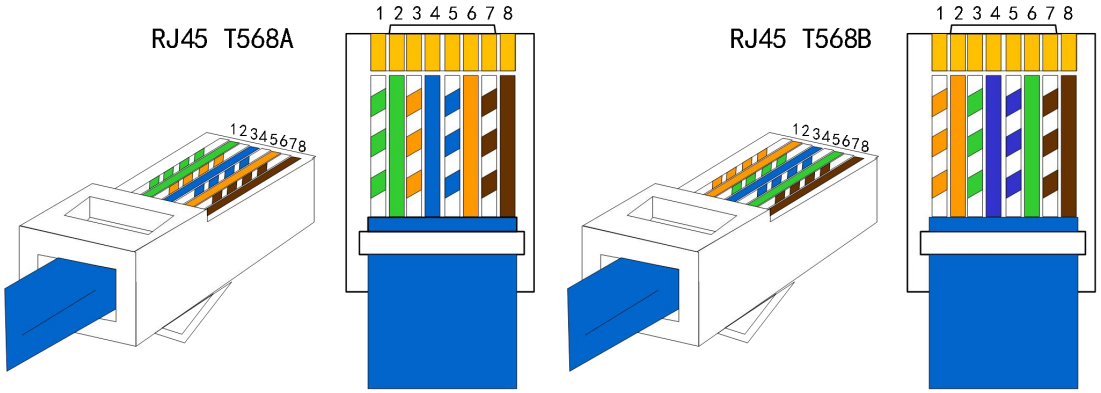
5.4.3 Wi-Fi/4G

Hybrid inverter uses Wi-Fi/4G as standard wireless communication. The machine comes with internal WiFi wireless communication, and the corresponding communication connection can be connected to the monitoring server for real-time data monitoring and control inverter, specifically refer to the WiFi configuration instructions or consult the installation supplier.

5.4.4 DRM

when the inverter is used in Australia, it needs to connect the DRMS device and DRMS terminal of the inverter to run, the RJ45 terminal is defined as follows:





1. White&Green
2. Green
3. White&Orange
4. Blue
5. White&Blue
6. Orange
7. White&Brown
8. Brown

1. White&Orange
2. Orange
3. White&Green
4. Blue
5. White&Blue
6. Green
7. White&Brown
8. Brown

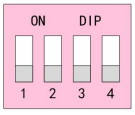
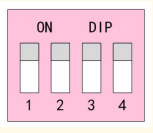
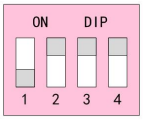
Pin	DRMS	Pin	DRMS
Pin1	DRM1/5	Pin5	Ref/Gen
Pin2	DRM2/6	Pin6	GND
Pin3	DRM3/7	Pin7	/
Pin4	DRM4/8	Pin8	/

Inverter demand response modes (For Australia and New Zealand) :

Mode	RJ45 pins to be connected	Demand
DRM0	Connect Pin5 and Pin6	Stop
DRM1	Connect Pin1 and Pin5	Disallow charge
DRM2	Connect Pin2 and Pin5	Charge power should be less than 50% of the rated power
DRM3	Connect Pin3 and Pin5	Charge power should be less than 75% of the rated power
DRM4	Connect Pin4 and Pin5	Charge power should be less than 100% of the rated power
DRM5	Connect Pin1 and Pin5	Disallow discharge
DRM6	Connect Pin2 and Pin5	Discharge power should be less than 50% of the rated power
DRM7	Connect Pin3 and Pin5	Discharge power should be less than 75% of the rated power
DRM8	Connect Pin4 and Pin5	Discharge power should be less than 100% of the rated power

5.4.5 DIP Switch

Select the network connection and battery communication method through DIP switch as follows:

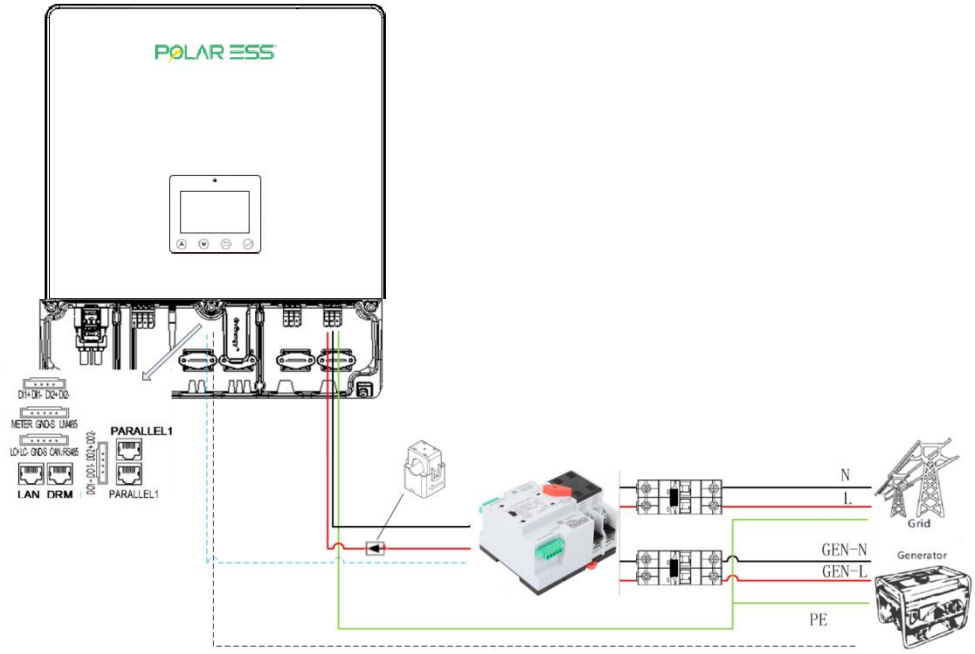
Tag Number	Sketch Map	Description
SW4		Upgrade Program Through USB Drive or External WIFI/4G: 0000
		Built-in WIFI: 1111
		LAN Mode: 0111

5.5 Generator System Connection

(1) Connect the generator and Grid to the ATS to the AC IN port.

(2) Connect the DO1+ and DO1- terminals (As figure 5.4.1 show) of the inverter to the remote-control port of the generator.

(3) The digital signal of ATS connect to the DI1+ and DI1- terminal of the inverter.

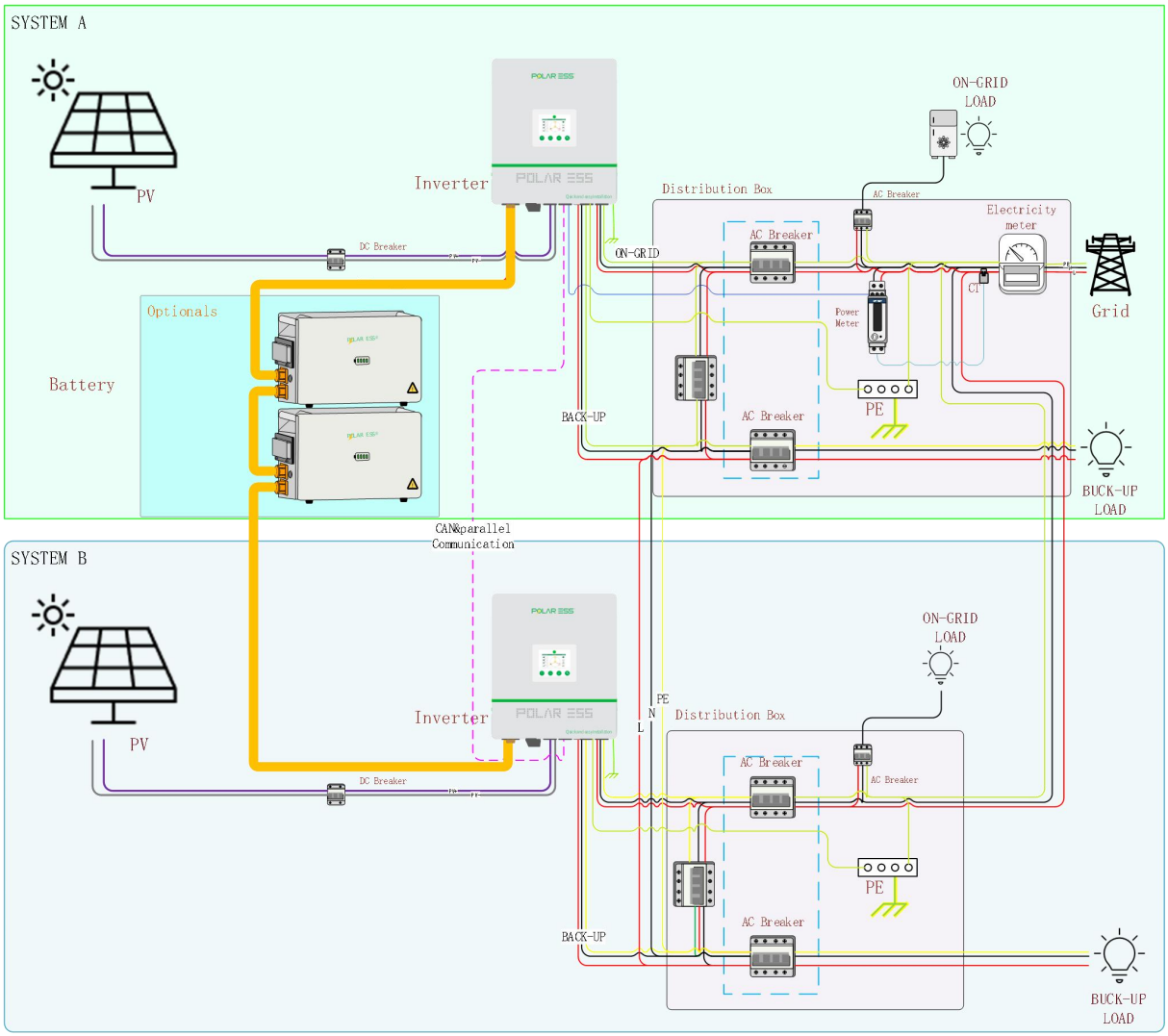


5.6 Parallel Operation

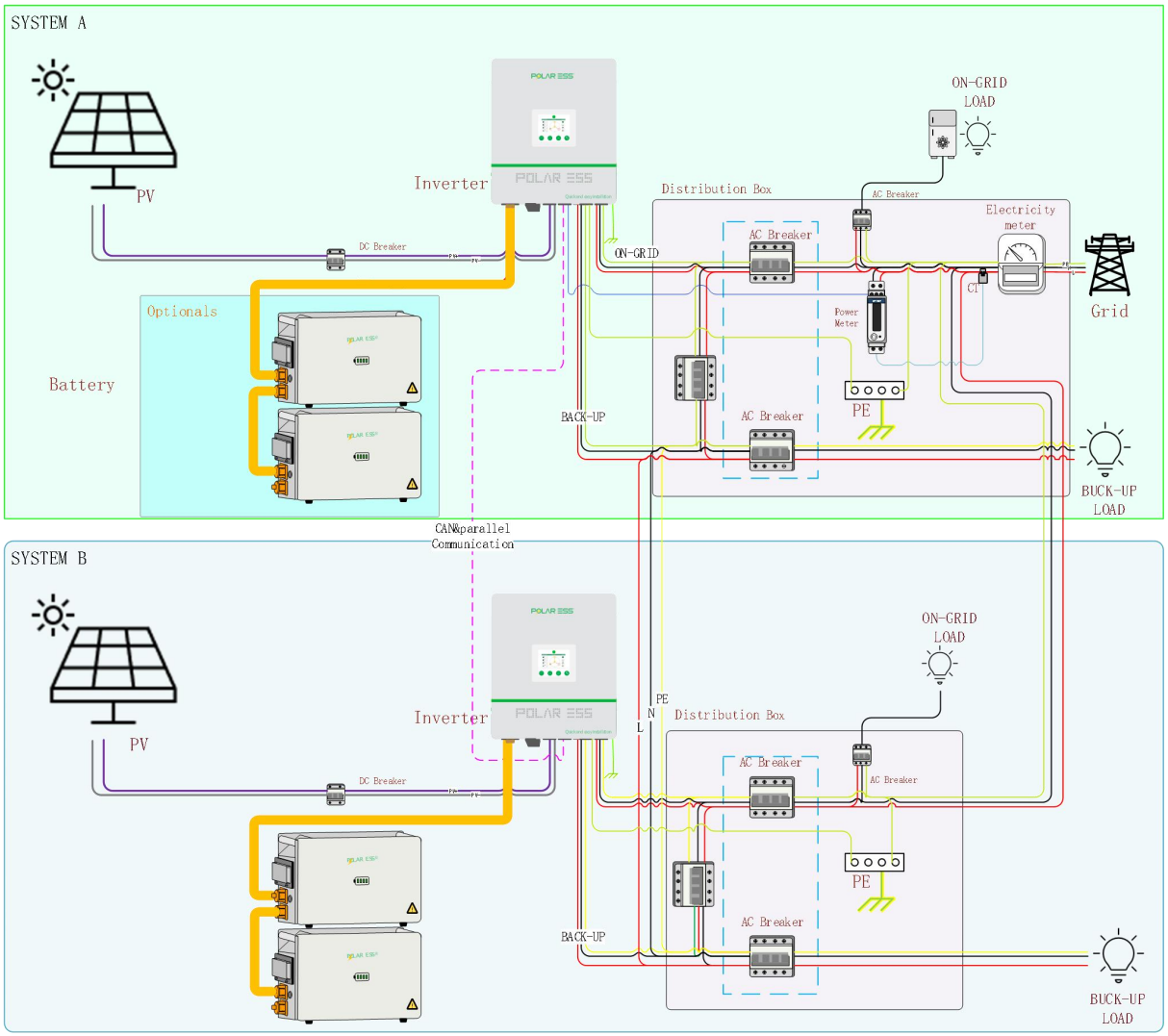
Warning	**All inverters must be connected to the same batteries and ensure each group of cables from the inverters to the batteries in the same length.**

ALPS CUBE series inverter supports up to 6 units to composed single phase parallel system for parallel system setup. The system connection is as below:

5.6.1 Battery Interdependent



5.6.2 Battery Independence



6 LCD Display and Setup

6.1 LCD&LED Description

Item	Function	Description
1	LED Display	**Green**: The inverter is operating normally. **Red**: The inverter is alarming or operating abnormally. **Blinking Red**: Inverter upgrade or maintenance. **Blinking Green**: The inverter is in standby mode.
2*1	LCD Display	The LCD touch screen displays information and parameter Settings. For more detailed content, please refer to this chapter.
3*2	Up	To go to previous selection
4*2	Down	To go to next selection
5*2	Esc	To exit setting mode
6*2	Enter	To confirm the selection

Note：

***1**: The LCD is designed with a capacitive touch screen. Light touches are sufficient for switching and setting; do not press forcefully.

***2**: This button is designed differently from a press-button switch. It only requires a light touch to perform switching and settings—no need to press forcefully.

6.2 LCD information & Setup

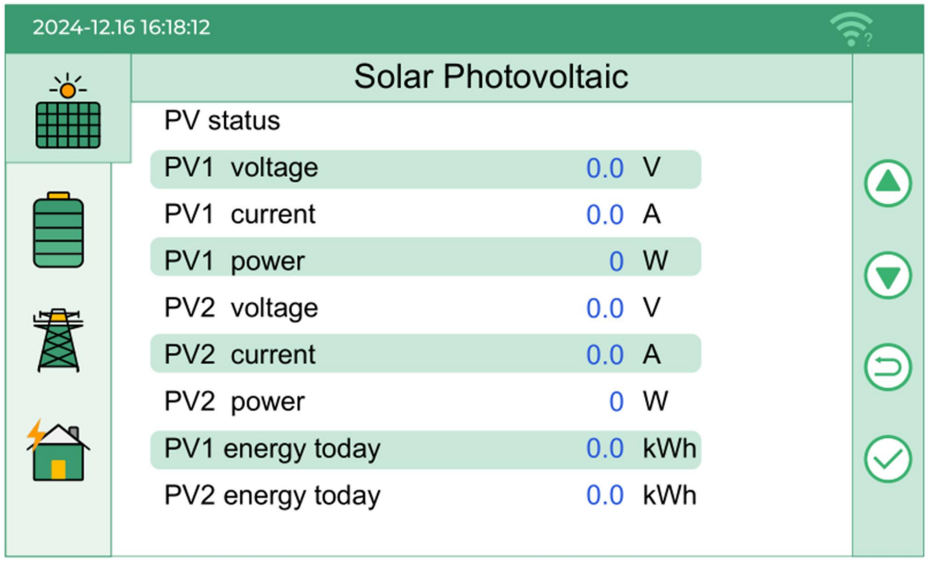
Notice	**The content information of the LCD is used for display and setting the inverter.** **The LCD display content may vary slightly depending on the machine version. Changes may occur without prior notice. Modifications are subject to the specific version, and this is stated for reference.**

Item	Function	Touch & set to enter	Description
1	System Time	NO	Display the current system time.
2	System Status	NO	Display machine status information.
3	WIFI Status	NO	Display the WIFI Connect information.
4	PV Info	YES	Display the voltage and current information of two PV panels.
5	BATT Info	YES	Display the voltage, current, power, SOC information of the battery.
6	Grid Info	YES	Display the voltage, current, power and frequency information on the grid side.
7	Load Info	YES	Display the voltage, current, power and frequency information on the load side
8	Function Setting	YES	set the basic parameters of the Hybrid Inverter. Includes HMI, Basic, Work Mode, Battery, and Advanced settings.
9	Inverter Info	YES	Display the real-time parameters inside the machine.
10	Log Info	YES	Display the record the content of machine abnormal log

			information.
11	Generator Info*1	YES	Display the data information content of the machine after accessing the diesel engine.
12	Energy flow diagram	YES	Display the real-time energy flow of PV/BAT/GRID/LOAD.

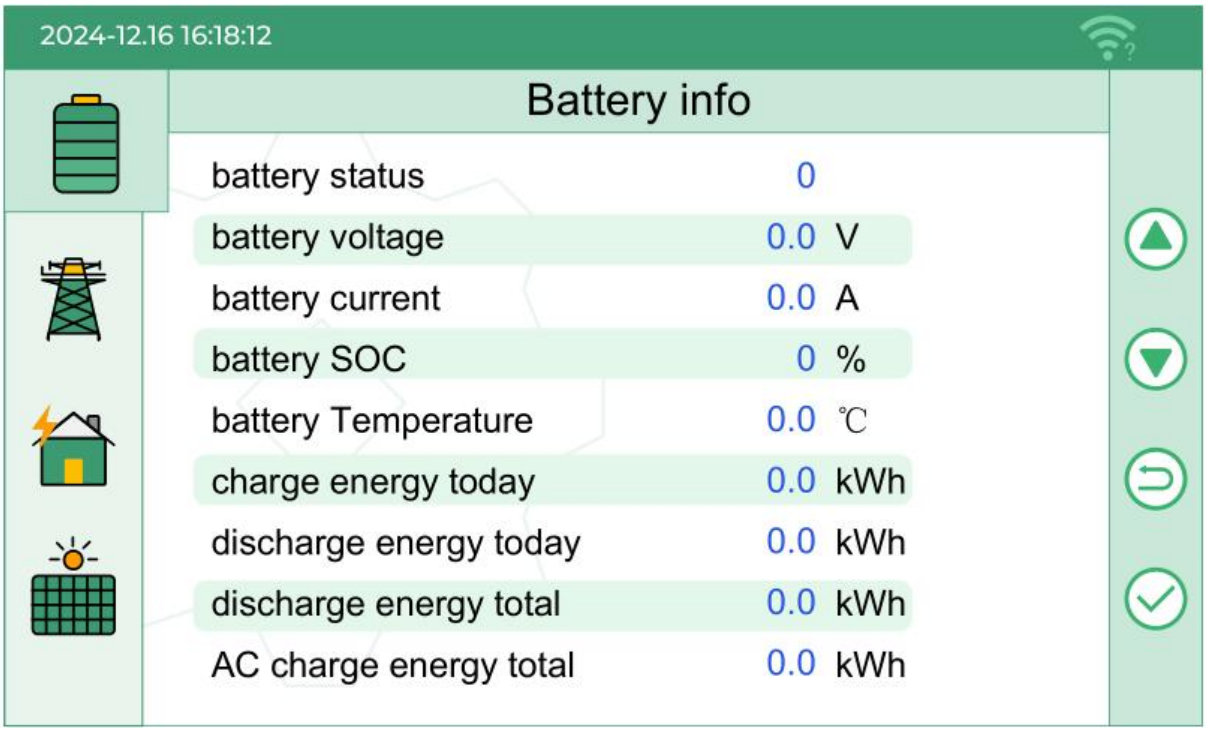
Note *1: It is usually hidden and only displayed when the generator is turned on.

6.2.1 PV Solar information



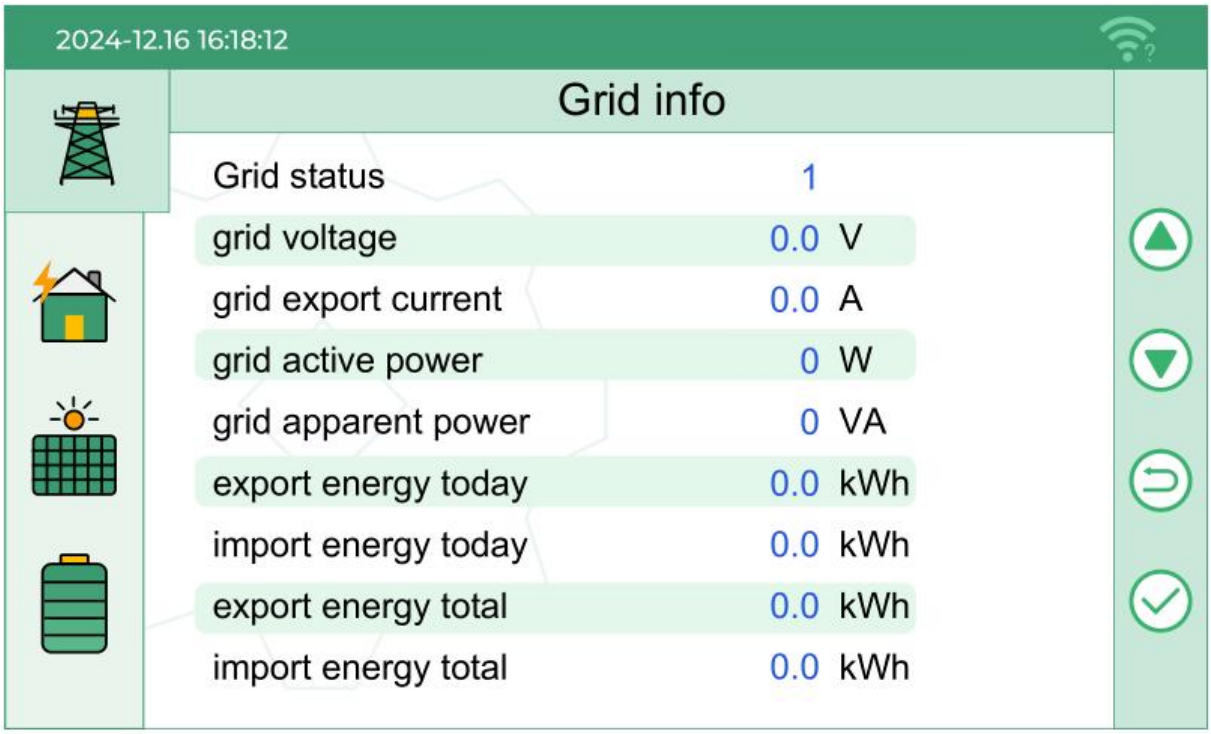
Item	Function	Touch & set to enter	Description
1	PV Status	NO	Displays real-time PV status information of the current inverter operation.
2	PV1 Voltage	NO	Displays real-time PV1 Voltage information of the current inverter operation.
3	PV1 Current	NO	Displays real-time PV1 Current information of the current inverter operation.
4	PV1 Power	NO	Displays real-time PV1 Power information of the current inverter operation.
5	PV2 Voltage	NO	Displays real-time PV2 Voltage information of the current inverter operation.
6	PV2 Current	NO	Displays real-time PV2 Current information of the current inverter operation.
7	PV2 Power	NO	Displays real-time PV2 Power information of the current inverter operation.
8	PV1 Energy Today	NO	Displays real-time PV1 Energy Today information of the current inverter operation.
9	PV2 Energy Today	NO	Displays real-time PV2 Energy Today information of the current inverter operation.

6.2.2 BAT information



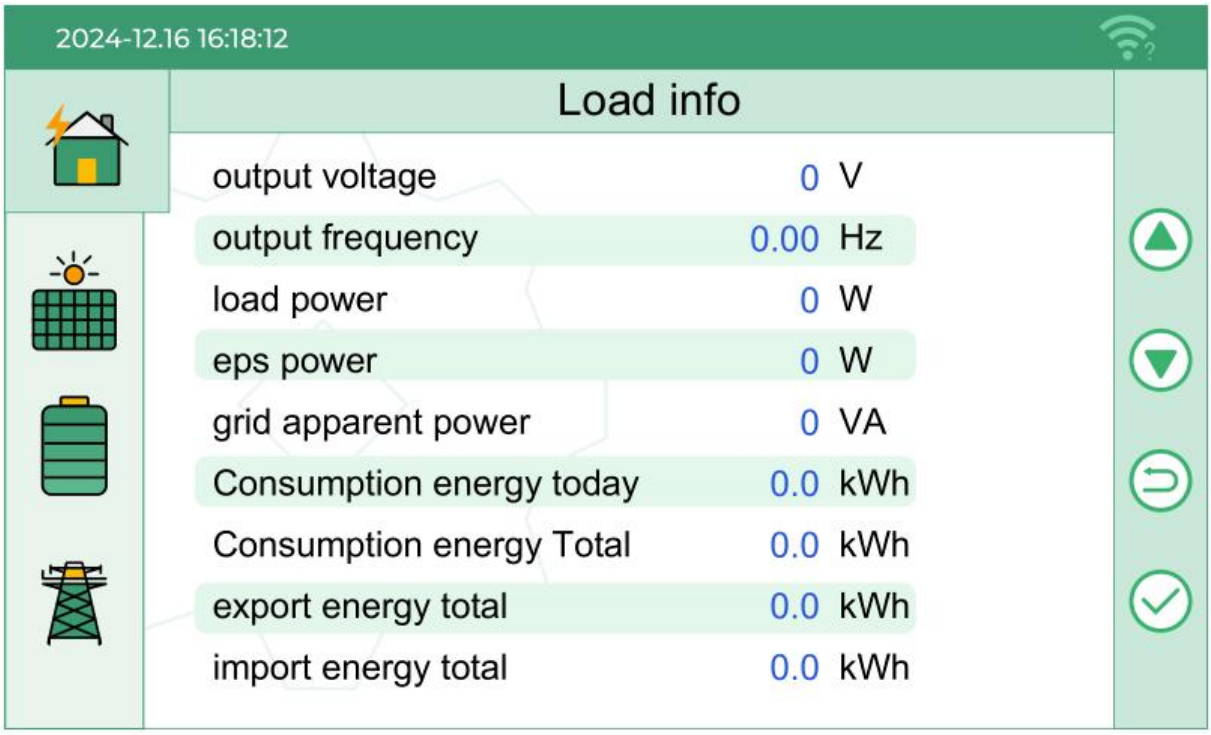
Item	Function	Touch & set to enter	Description
1	Battery Status	NO	Displays real-time Battery Status information of the current inverter operation.
2	Battery Voltage	NO	Displays real-time Battery Voltage information of the current inverter operation.
3	Battery Current	NO	Displays real-time Battery Current information of the current inverter operation.
4	Battery SOC	NO	Displays real-time Battery SOC information of the current inverter operation.
5	Battery Temperature	NO	Displays real-time Battery Temperature information of the current inverter operation.
6	Charge Eenergy Today	NO	Displays real-time Charge Eenergy Today information of the current inverter operation.
7	Discharge Eenergy Today	NO	Displays real-time Discharge Eenergy Today information of the current inverter operation.
8	Discharge Eenergy Total	NO	Displays real-time Discharge Eenergy Total information of the current inverter operation.
9	AC charge Eenergy Total	NO	Displays real-time charge from AC side Eenergy information of the current inverter operation.

6.2.3 Grid information



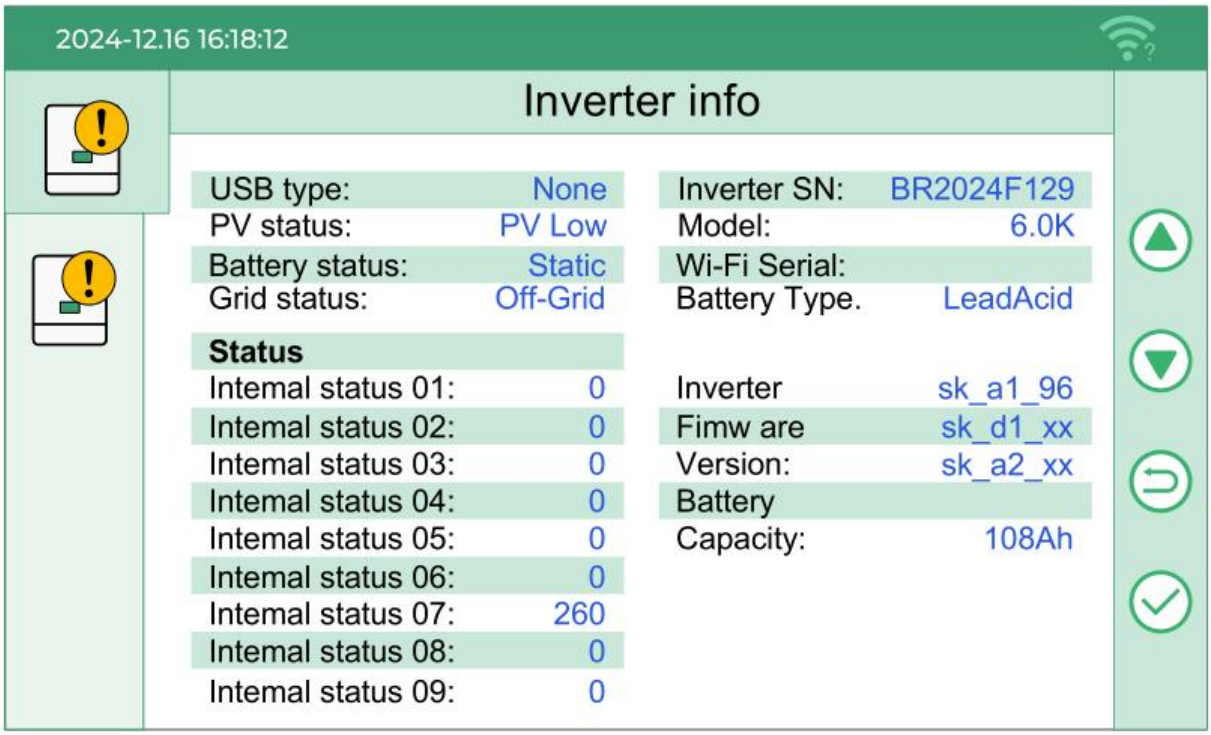
Item	Function	Touch & set to enter	Description
1	Grid Status	NO	Displays real-time Grid Status information of the current inverter operation.
2	Grid Voltage	NO	Displays real-time Grid Voltage information of the current inverter operation.
3	Grid Export Current	NO	Displays real-time Grid Export Current information of the current inverter operation.
4	Grid Active Power	NO	Displays real-time Grid Active Power information of the current inverter operation.
5	Grid Apparent Power	NO	Displays real-time Grid Apparent Power information of the current inverter operation.
6	Export Energy Today	NO	Displays real-time Export Energy Today information of the current inverter operation.
7	Import Energy Today	NO	Displays real-time Import Energy Today information of the current inverter operation.
8	Export Energy Total	NO	Displays real-time Export Energy Total information of the current inverter operation.
9	Import Energy Total	NO	Displays real-time Import Energy Total information of the current inverter operation.

6.2.4 Load information



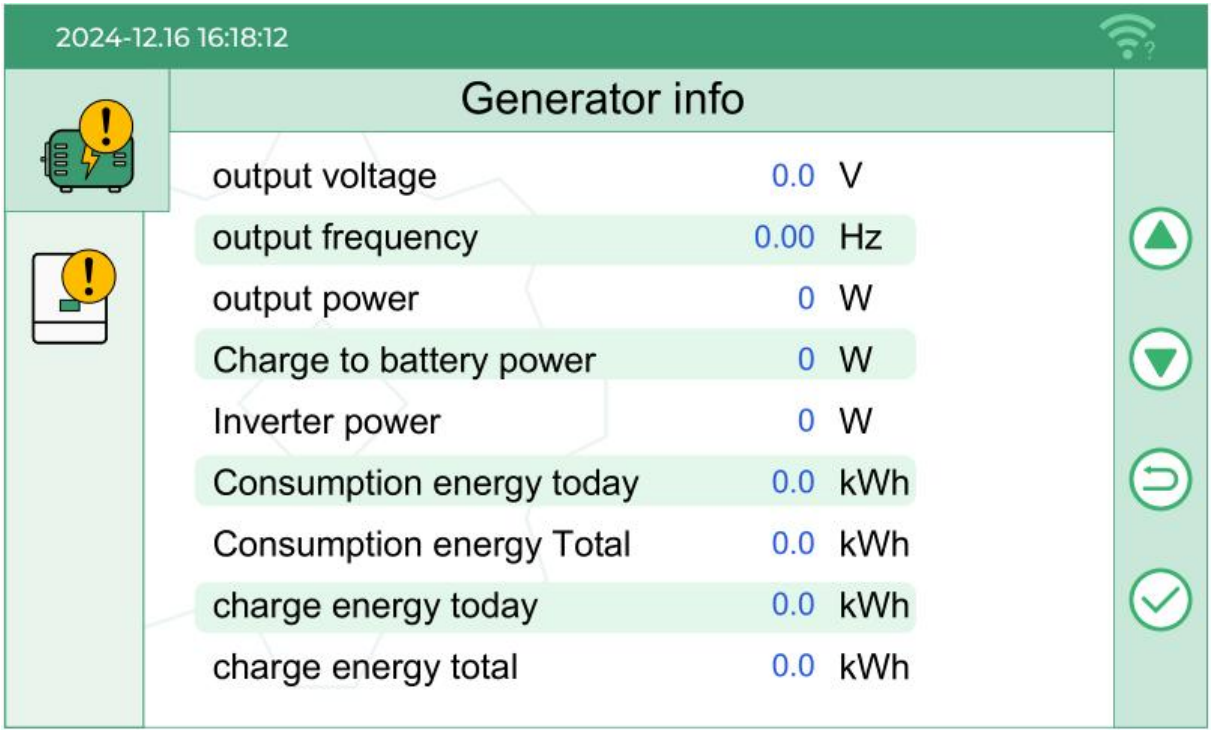
Item	Function	Touch & set to enter	Description
1	Output Voltage	NO	Displays real-time load Voltage(on-grid or off-grid) information of the current inverter operation.
2	Output Frequency	NO	Displays real-time Load Frequency information of the current inverter operation.
3	Load Power	NO	Displays real-time Load Power information of the current inverter operation.
4	EPS Power	NO	Displays real-time EPS Power information of the current inverter operation.
5	Grid Apparent Power	NO	Displays real-time Grid Apparent Power information of the current inverter operation.
6	Consumption Energy Today	NO	Displays real-time Consumption Energy Today information of the current inverter operation.
7	Consumption Energy Total	NO	Displays real-time Consumption Energy Total information of the current inverter operation.
8	Export Energy Total	NO	Displays real-time Export Energy Total information of the current inverter operation.
9	Import Energy Total	NO	Displays real-time Import Energy Total information of the current inverter operation.

6.2.5 Inverter information



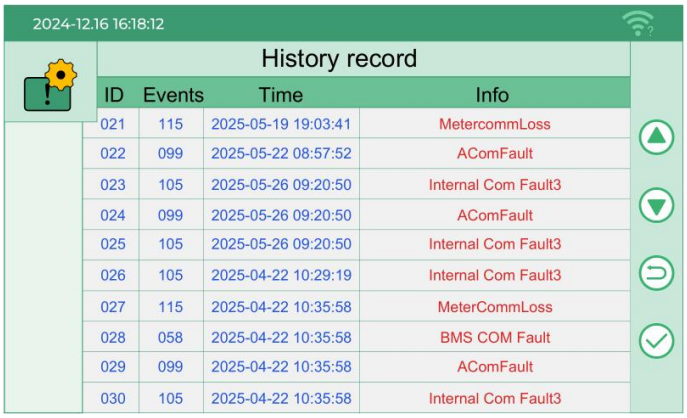
Item	Function	Touch & set to enter	Description
1	USB Type	NO	Displays real-time USB Type information of the current inverter operation.
2	PV Status	NO	Displays real-time PV Status information of the current inverter operation.
3	Battery Status	NO	Displays real-time Battery Status information of the current inverter operation.
4	Grid Status	NO	Displays real-time Grid Status information of the current inverter operation.
5	Status	NO	Displays real-time Internal Status information of the current inverter operation. Include PV、AC、BAT、Load and inverter info.
6	Inverter SN	NO	Displays Inverter SN information.
7	Model	NO	Displays the inverter Model information.
8	WIFI serial	NO	Displays connect WIFI serial number.
9	Battery Type	NO	Displays real-time Battery Type information of the current inverter operation.
10	Firmware Version	NO	Displays real-time Inverter Firmware Version information of the current inverter operation.
11	Battery Capacity	NO	Displays real-time Battery Capacity information of the current inverter operation.

6.2.6 Generator information



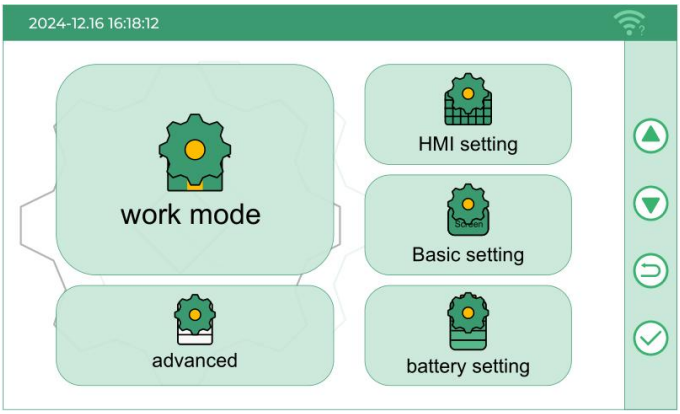
Item	Function	Touch & set to enter	Description
1	Output voltage	NO	Displays real-time Output voltage information of the current inverter operation.
2	Output frequency	NO	Displays real-time Output frequency information of the current inverter operation.
3	Output power	NO	Displays real-time Output power information of the current inverter operation.
4	Charge to battery power	NO	Displays real-time Generator Charge to battery power information of the current inverter operation.
5	Inverter power	NO	Displays real-time Inverter power information of the current inverter operation.
6	Consumption energy today	NO	Statistical information on electricity consumption for the day.
7	Consumption energy Total	NO	Statistical information on electricity consumption for the total.
8	charge energy today	NO	Displays the amount of electricity charged to the battery by the generator on the day.
9	charge energy total	NO	Displays the amount of electricity charged to the battery by the generator on the total.

6.2.7 Log information



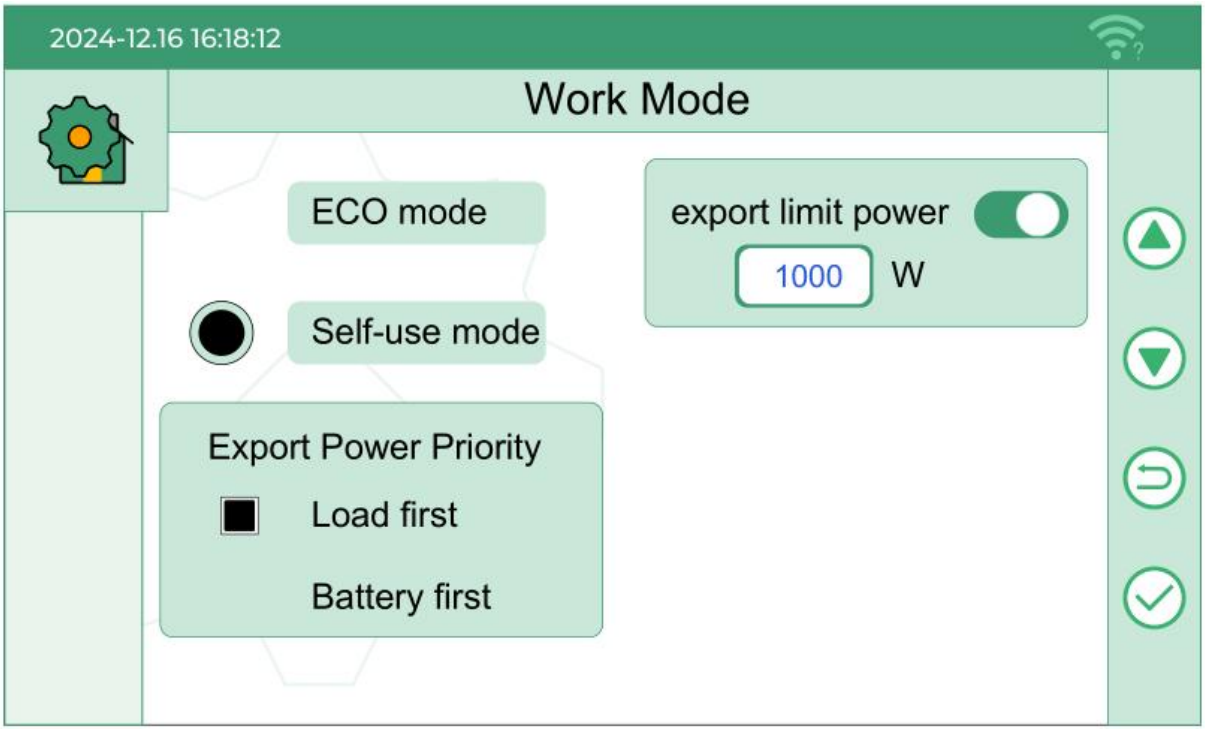
Item	Function	Touch & set to enter	Description
1	History record	NO	Displays the historical alarm records of the current machine, facilitating confirmation and resolution of related issues.

6.2.8 Setting information



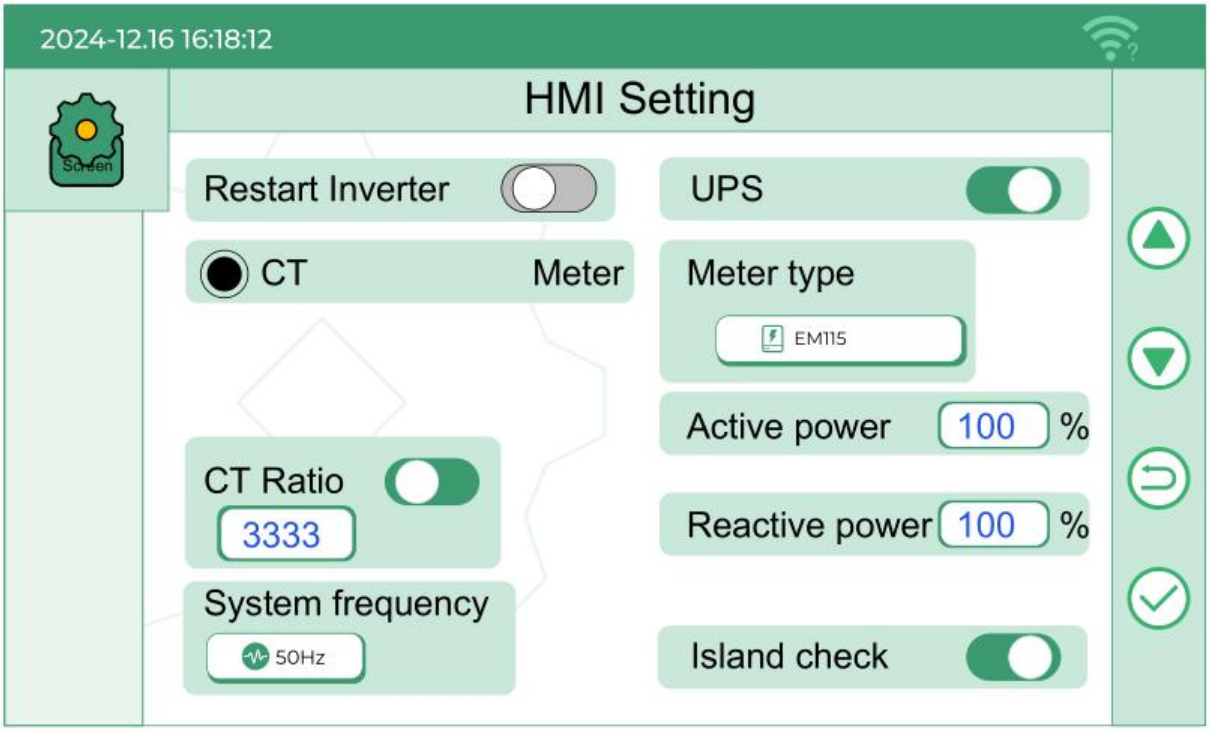
Item	Function	Touch & set to enter	Description
1	Work Mode	Yes	Set basic operating mode parameters for the machine, such as self-use, ECO, TOU, etc.
2	HMI setting	Yes	Actions related to the machine include connecting an external meter, CT (current transformer), and rebooting the system.
3	Battery setting	Yes	Set parameters for lithium battery, lead-acid battery modes, and generator settings for the inverter.
4	Basic setting	Yes	Settings for basic screen information, time, and other related parameters of the inverter.
5	Advanced setting	Yes	Settings for advanced functions of the machine, including grid configuration, parallel operation, and system reset.

6.2.8.1 Work Mode Setting



Item	Function	Touch & set to enter	Description
1	ECO Mode	**Select**/NO	This setting will use your battery or solar power to meet the electricity needs of your home.
2	Self-Use Mode	Select/**NO**	In this mode, the system operates in self-consumption mode, and the machine's power will not be fed back to the AC grid.
3	Export Power Priority	**Load first** Battery first Grid first	**Load First**: Solar energy from the PV side is prioritized for powering the load. Any excess energy is used to charge the battery. When PV power is insufficient, the battery and grid power work together to supplement the load. **Battery First**: Solar energy from the PV side is prioritized for charging the battery. Any excess energy is then used to power the load. When PV power is insufficient, the grid supplements both the battery charging and load power requirements
4	Export limit Power	**ON**/OFF	Set the power output to the AC grid. This setting is only enabled in Eco mode, The range of 0–8000W.

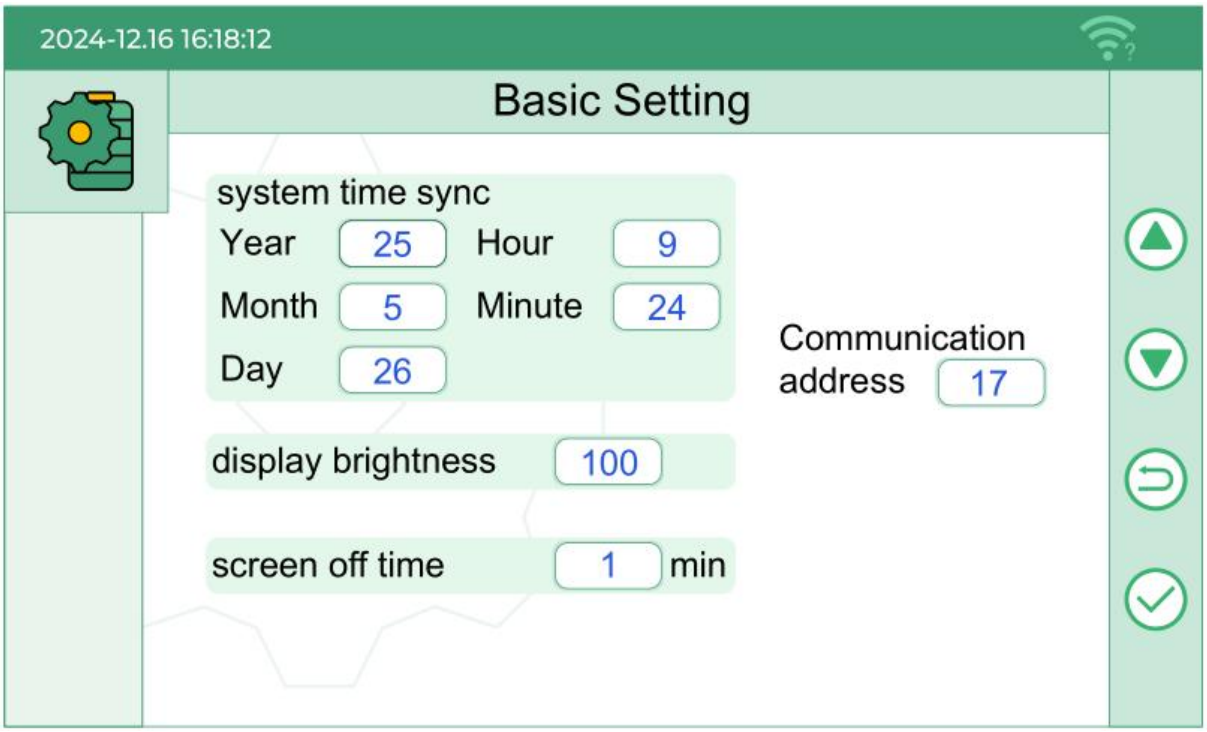
6.2.8.2 HMI Setting



Item	Function	Touch & set to enter	Description
1	Restart Inverter	ENABLE/ **DISABLE**	Enabling this button will trigger a reboot of the machine, cutting off PV, AC, and BAT operations. The machine will then restart with a countdown and resume operation.
2	UPS	**ON**/OFF	Enable off-grid output. The machine will automatically switch to off-grid output when off-grid conditions are detected, with a switching time ≤ 10ms.
3	CT	**CT**/Meter	Select an external CT or meter for the machine to perform anti-backflow detection. In a single-machine system, either CT or meter can be selected. In an inverter parallel system, only the meter can be used for connection.
4	CT/Meter Direction	**Positive**/ Negative	Set the CT direction for the machine. Normally, if the arrow on the CT points toward the inverter, this setting is not required. If the CT arrow is pointing in the wrong direction, you can adjust it accordingly.
5	CT Ratio	**1:2000**/ other	Set the CT ratio. If the customer uses a self-provided CT, adjust the ratio according to the provided CT specifications. (The Inverter comes with a standard CT module; this setting is not required when

			using the standard CT. If custom CT is used, please consult the supplier for confirmation.)
6	Meter Type	**GEM120**	When using an energy meter, select the meter type. Currently, only the GEM120 meter is supported. (Custom configurations require consultation with the supplier for confirmation.)
7	System Frequency	**50**/ 60Hz	Set the output frequency of the machine for grid-tied and off-grid operation. The available options are 50Hz or 60Hz.
8	Active Power Percent	0-**100**%	Set the percentage of active power for AC output, with a configurable range of 0–100%.
9	Reactive Power Percent	0-**100**%	Set the percentage of reactive power for AC output, with a configurable range of 0–100%.
10	Island Check	**ON**/OFF	Enable anti-islanding detection.

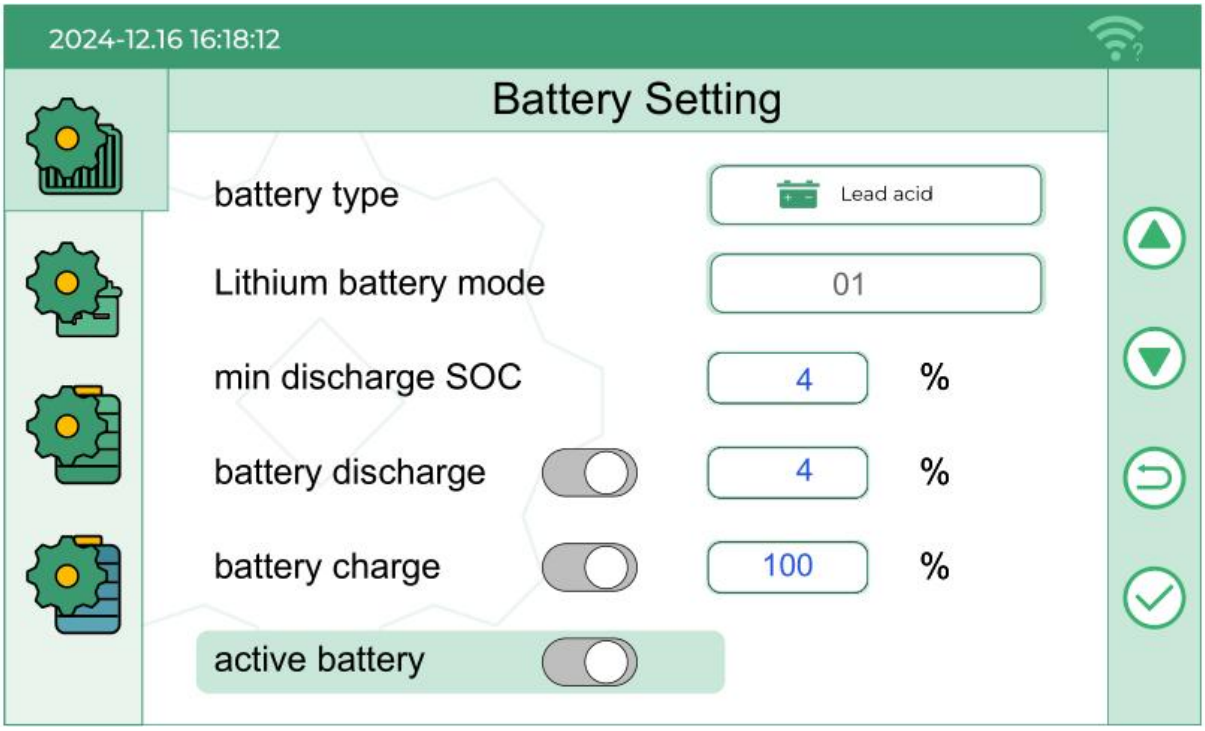
6.2.8.3 Basic Setting



Item	Function	Touch & set to enter	Description
1	System time sync	Year Month Day Hour Minute	Year: Set the year; range: 25–50. Month: Set the month; range: 1–12. Day: Set the day; range: 1–31. Hour: Set the hour; range: 0–23. Minute: Set the minute; range: 0–59.
	Display brightness	20-100	Set the current LCD brightness, with a configurable range of 20–100.
	Screen off time	1-5min	Set the screen timeout time for the current LCD, with a configurable range of 1–5 minutes.
	Buzzer	**ON**/OFF	Set the touch screen sound on/off for the current LCD.
	Language	**English**	Local language support is currently limited to English. Other languages can be customized upon request. Please contact your supplier or manufacturer.
	Communication address	1-254	Set the communication address for the current machine, with a configurable range of 1–254.

6.2.8.4 Battery Setting

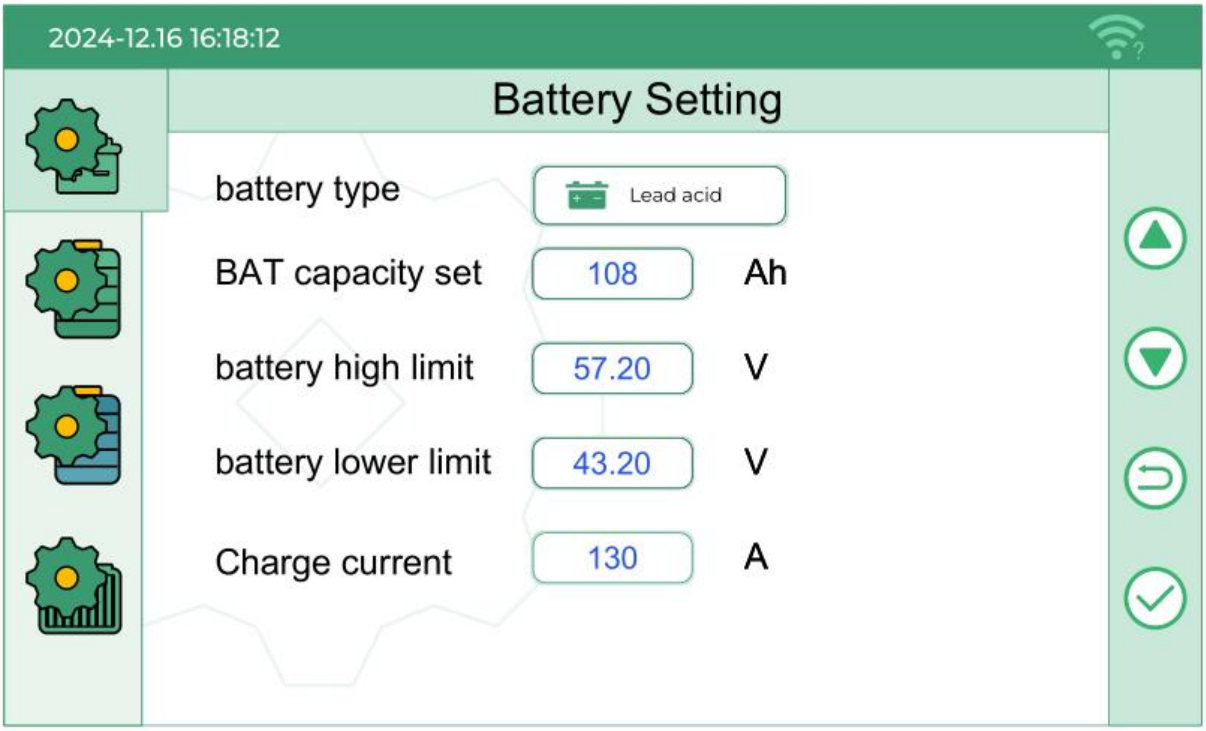
Setting 01:



Item	Function	Touch & set to enter	Description
1	Battery Type	**Lithium-ion**/Lead acid	Select the battery type connected to the machine. Lithium and lead-acid batteries are supported. This interface is for lithium battery control.
2	Lithium Battery Mode	/	This mode is for selecting the communication battery type after connecting a lithium battery. The default setting is for PolarESS batteries.
3	Min. Discharge SOC	4-100%	Set the lower limit of battery SOC (State of Charge) under the current lithium battery mode. The default is 4%, with a configurable range of 4–100%.
4	Battery Discharge	0-100%	Set the battery discharge power percentage. The default is 100%, with a configurable range of 0–100%.
5	Battery Charge	0-100%	Set the battery charging power percentage. The default is 100%, with a configurable range of 0–100%.
6	Active Battery	ENABLE/ **DISBALE**	Enable battery voltage activation. When the connected battery voltage is too low and the battery cannot be turned on, use this function to perform a forced charge.

			This feature is suitable for battery discharge scenarios, allowing the battery to be awakened and charged forcibly. Once the battery reaches 10% charge, the system will exit this mode and enter normal operation.

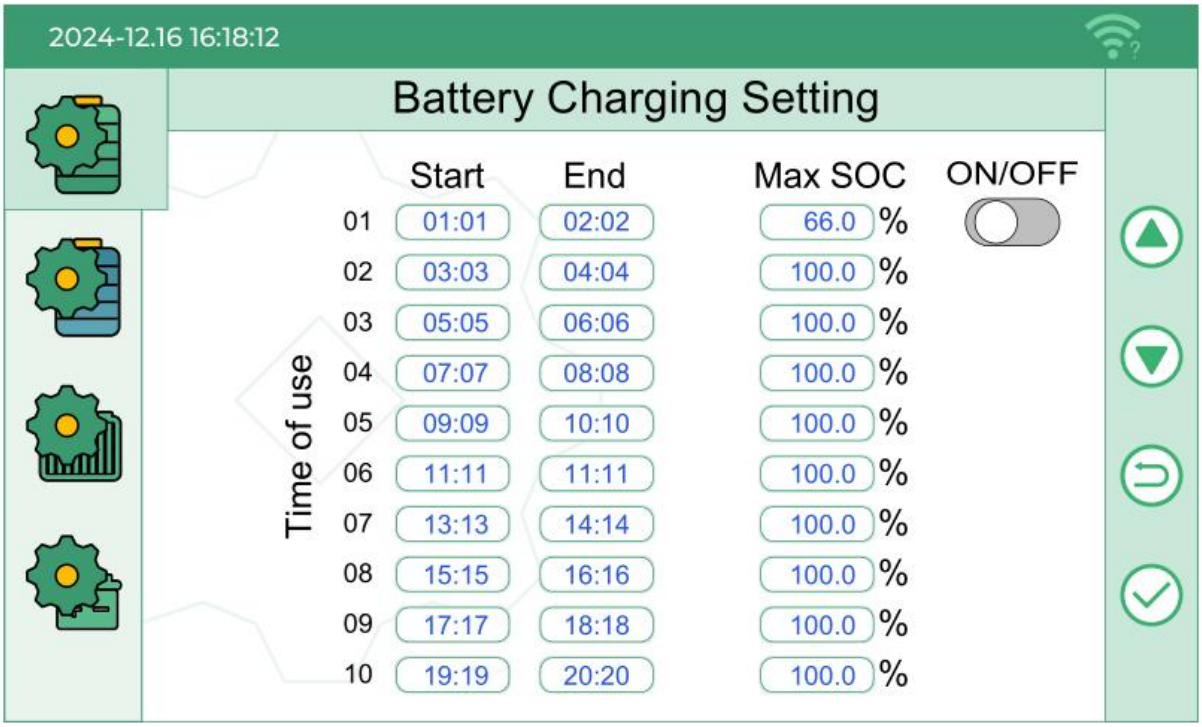
Setting 02:



Item	Function	Touch & set to enter	Description
	Battery Type	Lithium-ion/**Lead acid**	Select the battery type connected to the machine. Both lithium and lead-acid batteries are supported. This interface is for lead-acid battery control.
	BATT Capacity Set	0-1000Ah	Set the capacity of the connected lead-acid battery; range: 0–1000Ah. Please enter the value according to the actual rated capacity of the lead-acid battery.
	Battery high limit	40-60V	Set the upper voltage limit for the current lead-acid battery; range: 40–60V. Please enter the value according to the actual rated specifications of the connected lead-acid battery.
	Battery lower limit	40-60V	Set the lower voltage limit for the current lead-acid battery; range: 40–60V. Please enter the value according to the actual

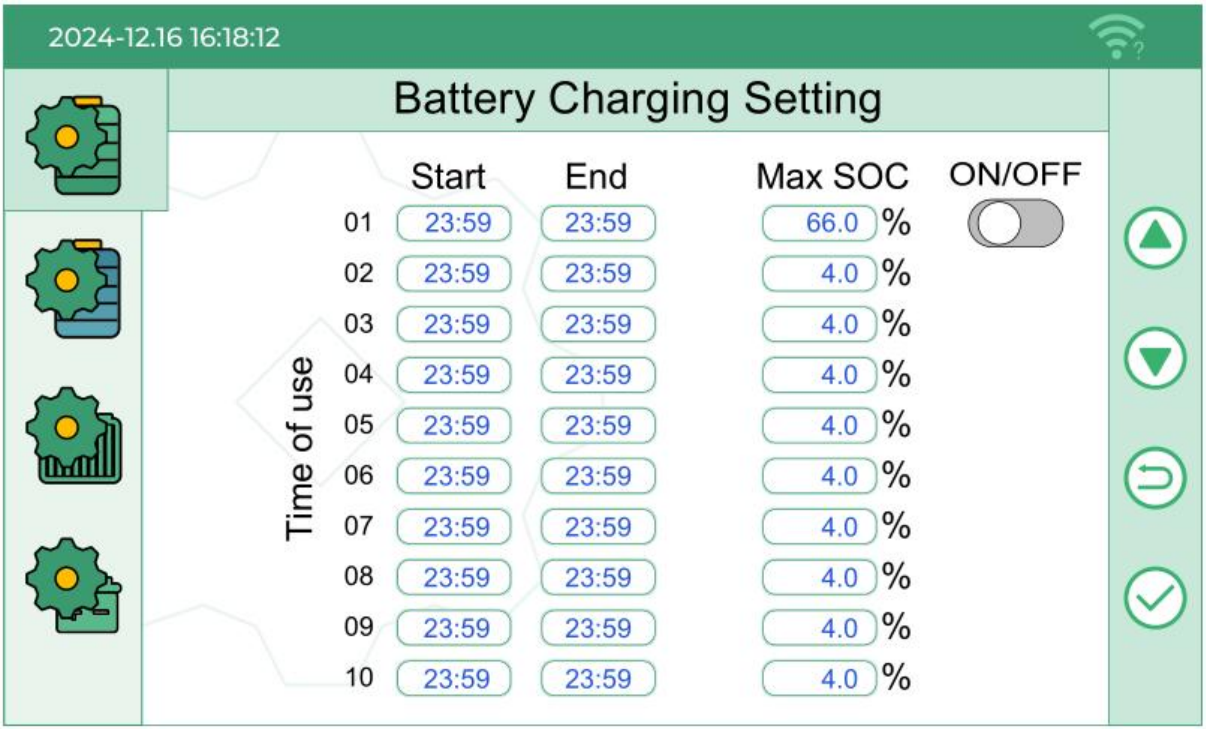
			rated specifications of the connected lead-acid battery.
	Charge current	0–175A	Set the maximum battery charging current. The default is 100A, with a configurable range of 0–175A.
	DisCharge current	0–175A	Set the maximum battery discharge current. The default is 100A, with a configurable range of 0–175A.

Setting 03:



Item	Function	Touch & set to enter	Description
1	Start Discharging	00:00-23:59	Set the battery discharge start time, with a range of 00:00 to 23:59. Up to ten discharge time periods can be configured.
2	End Discharging	00:00-23:59	Set the battery discharge end time, with a range of 00:00 to 23:59. Up to ten discharge time periods can be configured.
3	Min SOC	4-100%	Set the minimum battery discharge SOC (4–100%). Up to 10 discharge time periods can be configured.
4	ON/OFF	Enable/ disable	Enable/disable switch for battery discharge time control.

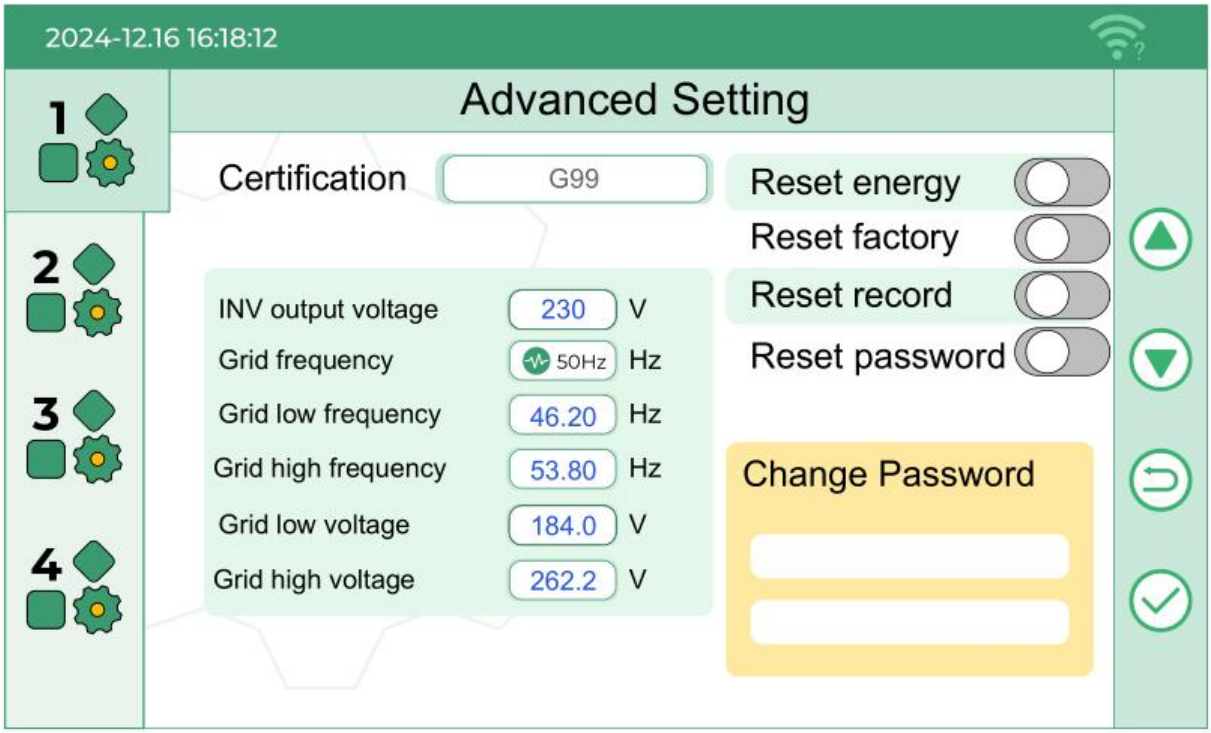
Setting 04:



Item	Function	Touch & set to enter	Description
1	Start Charging	00:00-23:59	Set the battery charging start time, with a range of 00:00 to 23:59. Up to ten charging time periods can be configured.
2	End Charging	00:00-23:59	Set the battery charging end time, with a range of 00:00 to 23:59. Up to ten charging time periods can be configured.
3	Max SOC	4-100%	Set the minimum battery charge SOC (4–100%). Up to 10 discharge time periods can be configured.
4	ON/OFF	Enable/ disable	Enable/disable switch for battery charge time control.

6.2.8.5 Advanced Setting

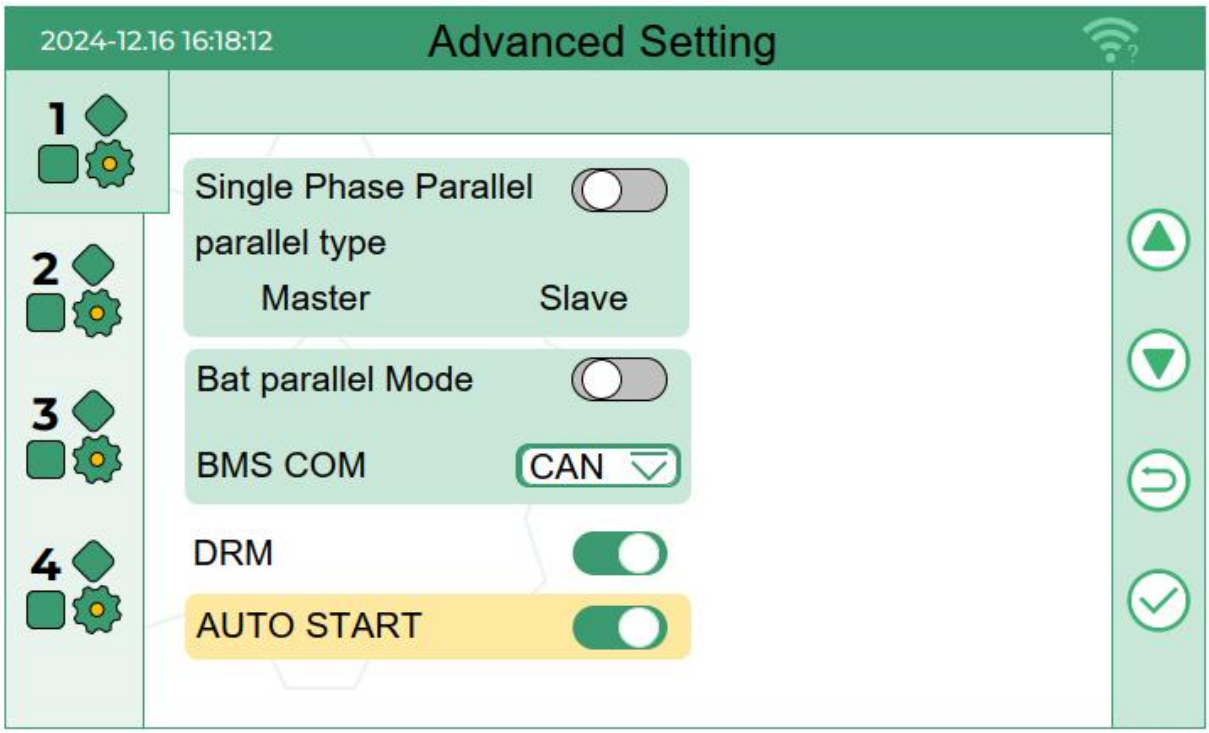
Setting 01:



Item	Function	Touch & set to enter	Description
	Certification	General	Set the Inverter safety standard type according to the applicable country.
	INV Output Voltage	200-240V	Set the grid output voltage. The default is 230V, with a configurable range of 200–240V.
	Grid Frequency	**50**/ 60Hz	Set the lower limit of grid output frequency. Default is safety-rated; configurable range: 50 or 60Hz.
	Grid Low Frequency	45–50/ 55–60Hz	Set the lower limit of grid output frequency. Default is safety-rated; configurable range: 45–50Hz or 55–60Hz.
	Grid High Frequency	50–55/ 60–65Hz	Set the upper limit of grid output frequency. Default is safety-rated; configurable range: 50–55Hz or 60–65Hz.
	Grid Low Voltage	180–230V	Set the lower limit of grid output voltage. Default is safety-rated; configurable range: 180–230V.
	Grid High Voltage	230–270V	Set the upper limit of grid output voltage. Default is safety-rated; configurable range: 230–270V.
	Reset Energy	ENABLE/ **DISABLE**	Reset energy data, clearing the accumulated energy values for PV, AC, BATT, and LOAD.

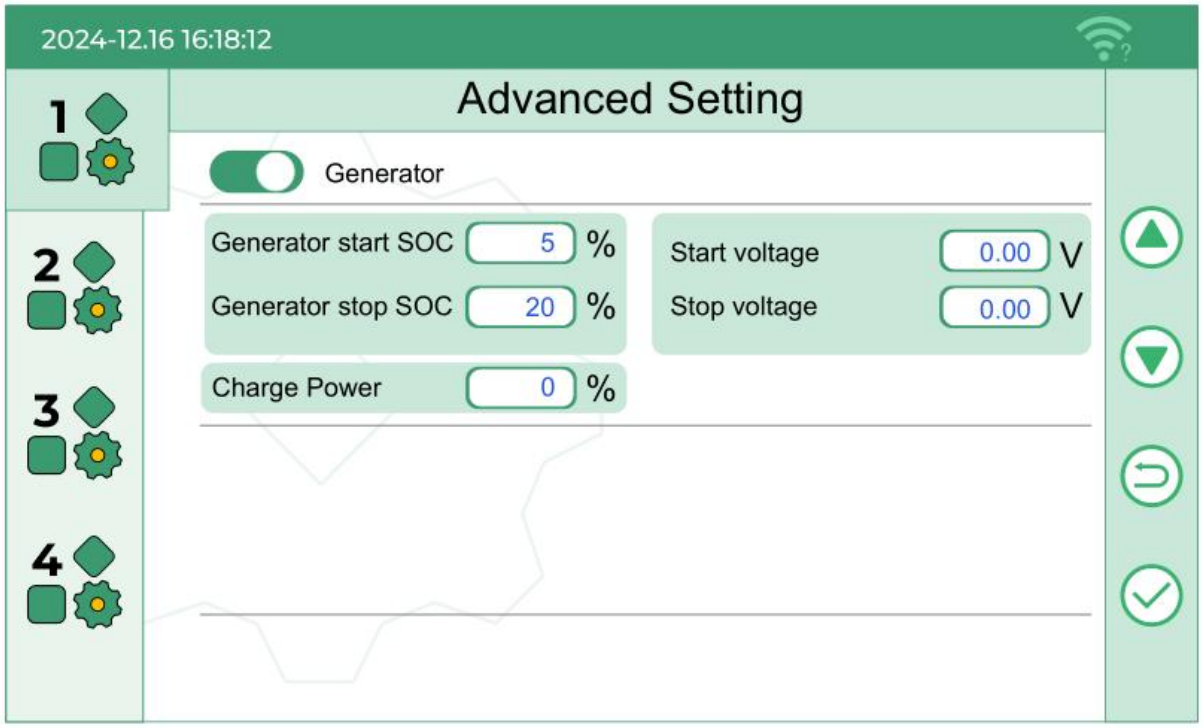
	Reset Factory		Restore all settings to factory defaults.
	Reset Record		Clear log information (perform a reset/clear operation).
	Reset Password		Reset the password if forgotten. The default password must be obtained from the supplier or manufacturer.
	Change Password	/	Set a new machine password.

Setting 02:



Item	Function	Touch & set to enter	Description
1	INV Parallel mode	ON/OFF	Set the machine to single-phase inverter parallel mode for parallel operation; supports up to 6 inverters in parallel.
2	Parallel Type	Master/ Slave	Set the master/slave relationship for inverter parallel operation.
3	Battery Parallel mode	ON/OFF	Enable battery parallel mode; after activation, confirm successful parallel connection and view basic battery parallel information.
4	BMS COM	CAN/ RS485	Switch the BMS communication mode between CAN and RS485.
5	DRM	ENABLE/ **DISABLE**	Enable the DRM function on the machine; it is disabled by default.

Setting 03:



Item	Function	Touch & set to enter	Description
1	Generator	ON/OFF	Enable/disable generator connection. The machine can operate normally when connected to a generator via the GEN port.
2	Generator Start SOC	5-20%	Set the battery SOC threshold for starting the generator. The generator will start when the battery SOC drops below this value (applicable in lithium battery mode).
3	Generator Stop SOC	20-100%	Set the battery SOC threshold for stopping the generator. The generator will stop when the battery SOC rises above this value (applicable in lithium battery mode).
4	Generator Start Voltage	40-60V	Set the battery voltage threshold for starting the generator. The generator will start when the battery voltage drops below this value (applicable in lead-acid battery mode).
5	Generator Stop Voltage	40-60V	Set the battery voltage threshold for stopping the generator. The generator will stop when the battery voltage rises above this value (applicable in lead-acid battery mode).
6	Generator Charge Power	0-20%	Set the charging power from the generator to the inverter. Maximum recommended is 20%, to prevent generator output from being lower than the machine's operating power.

7 System Commissioning

 Notice	**Without setting the parameters, the inverter will not be commissioned.**

Connect to the inverter via the Engineers software to set the battery parameter, grid charger time, inverter discharge time and various other functions.

7.1 Inspection Before Power On

 Warning	**Check that all the wires are securely connected before the battery breaker and the AC breaker is switched on. The PV should be switched on first to start the inverter, and you must set the parameter of battery according to your battery system.**

7.2 System Startup and Shutdown

 Warning	**The inverter will generate high voltage inside after opening, please do not touch the internal wiring position of the machine after power-on to prevent electric shock from damaging personal safety.**

7.2.1 Start-Up the Inverter

(1) Connect the AC circuit breaker.

(2) Turn on the DC switch.

(3) Turn on the battery breaker.

(4) The inverter will start automatically when the PV voltage is higher than 90V, the battery voltage is higher than 46.7V and Hybrid Inverter setting is correct.

7.2.2 Disconnect the Inverter

(1) Disconnect the AC circuit breaker to prevent it from being reactivated.

(2) Disconnect the Battery breaker to prevent it from being reactivated.

(3) Turn off the PV switch.

(4) Check the inverter operating status.

(5) Wait until LED display has gone out, the inverter is shut down.

7.3 Equipment Parameter Setting and Monitoring

The following methods can perform the following operation contents of the inverter:

(1) View the running data, software version, alarm information, etc. of the device.

(2) Set the power grid parameters, communication parameters, safety areas, anti-reverse current, etc. of the equipment.

(3) Maintain the equipment.

(4) Upgrade the device software version.

8 System Maintenance

8.1 System Power-Off

(1) Disconnect the AC circuit breaker to prevent it from reactivating.

(2) Disconnect the battery circuit breaker to prevent it from reactivating.

(3) Turn off the photovoltaic switch.

(4) Check the operating status of the inverter.

(5) Wait until the LED display goes out and the inverter turns off.

(6) It is necessary to wait for more than 20min to confirm that the machine is completely powered off and the surface temperature is cooled, and other actions of the machine are performed.

8.2 Regular Maintenance

(1) Checking Heat Dissipation.

If the inverter regularly reduces its output power due to high temperatures, please improve the heat dissipation conditions. You need to clean the heat sink or look for other obstructions.

(2) Cleaning the Inverter.

If the inverter is dirty, please shut down the inverter and clean the enclosure lid.

(3) Checking the DC switch.

Check for externally visible damage and discoloration of the breaker, and the cables at regular intervals. If there are any signs of visible damage to the breaker, or visible discoloration or damage to the cables, contact the installer.

 **Warning**	**Once a year, turn the rotary switch of the DC switch from the ON position to the OFF position 5 times in succession. This cleans the contacts of the rotary switch and prolongs the electrical endurance of the DC Disconnect.**

8.3 Troubleshooting

No.	Fault name	Reason of fault	Handling suggestions
1	Inverter NTC Fault	The working environment temperature of the inverter is too high or too low.	1. If the temperature is too high, please lower the ambient temperature as much as possible or try to turn off the inverter for 15 minutes, then restart it; make sure to follow the installation instructions in

			the user manual. 2. If the temperature is too low, please do not try to start, please contact the after-sales service immediately.
2	Grid Frequency Fault	The inverter detects that the grid frequency is outside the normal range required by safety regulations.	1. Make sure the safety country setting of the inverter is correct. 2. If the safety country is set correctly, please check whether the AC frequency (Freq) of the inverter is within the normal range. 3. If Freq faults are rare and resolved quickly, it may be caused by occasional grid frequency instability.
3	Grid Voltage Fault	The inverter detects that the AC voltage is outside the normal range required by safety regulations.	1. Make sure the safety country setting of the inverter is correct. 2. Use a multi meter to check whether the AC voltage between the L line and the N line on the AC wiring side is within the normal range. If the AC voltage is high, make sure that the AC cable is not too long, and the specifications meet the requirements in the user manual. If the AC voltage is low, make sure the AC cable is well wired and the jacket is not pressed into the AC terminal. 3. Make sure the grid voltage in your area is stable and within the normal range.
4	PV Voltage Fault	The inverter has detected that the PV voltage is outside the normal range of the rated requirements.	Turn off the PV switch of the machine and use a multi meter to check whether the open circuit voltage of the panel is less than 600V. If it is greater than the number of panels that need to be reconfigured, reduce the input voltage.
5	DCI High	The inverter has detected a high DC	Try restarting the inverter and check if the fault still exists. If the fault does

		component in the AC output.	not exist, it means that it is only caused by interference. Otherwise, please contact after-sales immediately.
6	Current Leak High	The ground fault may be caused by various reasons such as the AC side N line is not connected properly, or the surrounding humidity is high.	Check with a multi meter for voltage between the inverter and the grounded frame. In general, the voltage should be close to 0V. If there is voltage, it means that the N wire and the ground wire on the AC side are not well connected. It should be normal if this failure occurs in the early morning/dawn/rainy day with high air humidity and recovers quickly.
7	PV Isolation Fault	If the impedance is too low, the grounding of the photovoltaic panel may be poor, the photovoltaic panel may be aged, or the direct current The cable is broken, or the surrounding humidity is high.	1. Use a multi meter to check that the resistance between the inverter and the grounded frame is close to zero. If not, make sure the wiring is good. 2. Isolation failure may occur if humidity is too high. 3.Check the resistance of PV1+/PV2+/PV1-/PV2- to ground. If the resistance is below 50K, check the system wiring. 4. Try restarting the inverter and check if the fault still exists. If the fault does not exist, it means that it is only caused by interference. Otherwise, please contact after-sales immediately.
8	No Utility	The inverter does not detect grid information.	1. Use a multi meter to check whether there is voltage on the AC side and ensure that the grid voltage is normal. 2. Make sure that the AC cable is firmly connected and not loose. 3. If everything is OK, try disconnecting the AC circuit breaker and reconnecting it after 5 minutes.

9	Bus Over Voltage	The internal BUS voltage is out of range.	Try restarting the inverter and check if the fault still exists. If the fault does not exist, it means that it is only caused by interference. Otherwise, please contact after-sales immediately.
10	DSP Communication Fault	Caused by the interference of external strong magnetic field.	Try restarting the inverter and check if the fault still exists. If the fault does not exist, it means that it is only caused by interference. Otherwise, please contact after-sales immediately.
11	Hall Sensor Fault	Abnormal HCT detection in the system.	There is a fault in the leakage current detection circuit inside the machine, please contact the after-sales service for processing.
12	GFCI Fault	Abnormal GFCI detection in the system.	There is a fault in the leakage current detection circuit inside the machine, please contact the after-sales service for processing.
13	Relay Fault	The neutral and ground wires are not properly connected on the AC side or are only accidentally faulty.	When the machine is connected to the grid, use a multi meter to check whether there is a high voltage between the N wire and the ground wire on the AC side. In general, the voltage should be lower than 10V. If the voltage is higher than 10V, it means that the AC side N wire and ground wire are not well connected, or the inverter needs to be restarted. When the machine is disconnected from the grid, check whether the load of the machine connected to the backup exceeds the rated load of the machine, and the inverter needs to be restarted.
14	EEPROM Fault	Caused by the interference of external strong	Try restarting the inverter and check if the fault still exists. If the fault does not exist, it means that it is only

		magnetic field.	caused by interference. Otherwise, please contact after-sales immediately.
15	Consistent Fault	The internal programs of the system do not match each other.	Try restarting the inverter and check if the fault still exists. If the fault does not exist, it means that it is only caused by interference. Otherwise, please contact after-sales immediately.
16	ARM Communication Fault	Caused by the interference of external strong magnetic field.	Try restarting the inverter and check if the fault still exists. If the fault does not exist, it means that it is only caused by interference. Otherwise, please contact after-sales immediately.
17	Back-up Overload Fault	The total backup load power is higher than the backup rated output power.	Reduce off-grid loads to ensure total load power is below off-grid rated output power. If the fault does not exist, it means that it is only caused by interference. Otherwise, please contact after-sales immediately.
18	BMS Comm Fault	The communication between the inverter and the lithium-ion battery is abnormal	Power off to check whether the BMS cable connection is normal. Contact the dealer or after-sales customer service to solve the problem.
19	Bat Volt Low	Lithium battery: battery voltage is less than 43V. Lead acid: Battery voltage less than (LV-cell*1V);	Confirm that the battery connection cable of the current machine is normal. Verify that the battery is switched on and the battery LED is lit, confirm that the battery is not currently over discharged, if it occurs, please set the inverter for strong charging to eliminate the error after the power replenishment is completed. Otherwise, Contact the dealer or after-sales customer service to solve the problem.

20	Bus Unbalance Fault	The positive and negative BUS voltage difference is greater than 70V	Contact the dealer or after-sales customer service to solve the problem.
21	Meter Comm Loss	The inverter communicates abnormally with the meter	Check whether the meter and the inverter are connected normally. Check whether the communication line RX/TX is reversed, and confirm that the uploaded data is normal through the APP. Contact the dealer or after-sales customer service for consultation and solution.
22	Battery Need Charge	The battery voltage is too low to be discharged, and it is necessary to replenish power	Set the inverter through the app to force charging the battery SOC to more than 4% to clear the error.

8.4 Remove Machine

Dismantling The Inverter

(1) Disconnect the inverter as described.

(2) Remove all connection cables from the inverter.

(3) Screw off all projecting cable glands.

(4) Lift the inverter off the bracket and unscrew the bracket screws.

 **Danger**	**Danger of burn injuries due to hot enclosure parts!** **Wait 20 minutes before disassembling until the housing has cooled down.**

8.5 Scrap Machine

When the inverter cannot continue to be used and needs to be scrapped, please dispose of the inverter according to the electrical waste disposal requirements of the country/region where the inverter is located, you can contact the dealer or customer service center for consultation and treatment, and the inverter cannot be disposed of as household waste.

	**The hybrid inverter must not be disposed of with the household waste.**

9 Manufacturer Warranty

This inverter is covered by a 5-years warranty. Completion of the online registration certificate validates a standard factory warranty of 5 years from the date of commission.

10 Technical Data

Technical Specifications	ALPS CUBE HY3.6 Pro	ALPS CUBE HY4.6 Pro	ALPS CUBE HY5.0 Pro	ALPS CUBE HY6.0 Pro
Input Data (PV)				
Max. DC input power	5400W	6900W	7500W	9000W
Max. PV open-circuit voltage	600V			
Start-up voltage	80V			
full load PV voltage	185-480V			
MPPT voltage range	90-550V			
Rated MPPT voltage	360V			
Max. PV input current	17/17A			
Max. PV short-circuit current	23/23A			
MPP tracker/No. of Strings per MPP Tracker	2/1			
Battery				
Battery type	Li-ion or Lead Acid			
Battery voltage range	46.7-57.6V / 40-60V			
Max. charging current	83A	104A	112A	120A
Max. discharging current	83A	104A	112A	120A
Max. battery charging/ discharging power	4000W/4000W	5000W/5000W	5400W/5400W	6000W/6000W
Nominal voltage	51.2V			
Battery communication	RS485/CAN			
Output Data (AC, On-grid)				
Rated/Max. AC output power	3600W/ 3600W	4600W/ 4600W	50000W/ 5000W	6000W/ 6000W
Max. apparent power	3600VA	4600VA	5000VA	6000VA
Nominal grid voltage/range	230Va.c./180-270Va.c.			
Rated/Max. current	16A/16A	20A/20A	21.7A/21.7A	26A/26A
Pass through current（from grid to eps port）	30A			

Nominal frequency/range	50/60Hz; ±5Hz			
Power factor (@full load)	>0.99			
Power factor adjustable range	0.8 lagging - 0.8 leading			
THDi (@rate power)	<3%			
AC output type	Single Phase; L+N+PE			
Output data (AC, backup)				
Nominal EPS output Power	3600W	4600W	5000W	5500W
EPS Peak Power(10s)	2 times of rate power			
AC nominal voltage	230Va.c.			
Rated/Max. output current	16A/16A	20A/20A	21.7A/21.7A	23.9A/23.9A
Nominal frequency	50/60Hz			
Automatic switch time	<10ms			
THDv (Linear load)	<3%			
Equipment Protection				
DC Polarity Reverse Connection Protection	YES			
PV string fault detection	YES			
AC Output Overcurrent Protection	YES			
AC Output Overvoltage Protection	YES			
AC Output Short Circuit Protection	YES			
Thermal Protection	YES			
DC Terminal Insulation Impedance Monitoring	YES			
DC Component Monitoring	YES			
Ground Fault Current Monitoring	YES			
Power Network Monitoring	YES			
Island Protection Monitoring	YES			
Earth Fault Detection	YES			

DC Input Switch	YES
Overvoltage Load Drop Protection	YES
Residual Current (RCD) Detection	YES
Surge Protection Level	YES
Arc fault circuit interrupter (AFCI)	Optional
General data	
Battery Max. charging/discharging efficiency	94%/94%
PV to AC max. efficiency	97.60%
Euro efficiency	97%
PV MPPT efficiency	99.90%
Ingress Protection	IP65
Noise emission (typical)	<30dB
Operating temperature range	-25~+60℃
Full load operation temperature	-25~+45℃
Storage temperature	-25~+60℃
Relative humidity	0-100% RH
Cooling	Natural
Max. altitude	4000m (Derating above 2000m)
Dimensions (W*H*D)	480W*560H*210D(mm)
Weight	30kg
Max. parallel units	2-6 units
Self-consumption	<5W
Protective Class	Class I
Overvoltage category	PV: II, Battery: II, AC: III
Topology	PV to AC: Transformerless; BAT to AC: Isolated

Display	LED+APP
Interface	RS485/CAN/LAN/WiFi/USB/DIDO/DRM
monitoring	LAN/WIFI/4G(Optional)
Certificates	CE, UKCA, G98, G99, EN50549, C10/11, VDE-N4105, NTS2.1, NRS097, AS4777.2
Warranty	5 years

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