SG10KHB-48

Hybrid Inverter User Manual

CONTENTS A02

1. Notes on this Manual

1.1 Scope of Validity

This manual is an integral part of Hybrid, it describes the assembly, installation, commissioning, maintenance, and failure type of the product. Please read it carefully before operating.

1.2 Target Group

This manual is for qualified electricians. The tasks described in this manual only can be performed by qualified electricians.

1.3 Symbols Used

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

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, could result in death or serious injury.

Caution!

"Caution" indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

Note!

"Note" provides tips that are valuable for the optimal operation of ours.

2. Safety

2.1 Important Safety Instructions

Danger!

- Danger to life due to high voltages in the inverter!
- All work must be carried out by qualified electrician.
- The appliance is not to be used by children or persons with reduced physical sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction.
- Children should be supervised to ensure that they do not play with the appliance.

Caution!

- Danger of burn injuries due to hot enclosure parts!
- During operation, the upper lid of the enclosure and the enclosure body may become hot.
- Only touch the lower enclosure lid during operation.

Caution!

- Possible damage to health as a result of the effects of radiation!
- Do not stay closer than 20 cm to inverter for any length of time.

Note!

- Grounding the PV generator.
- Comply with the local requirements for grounding the PV modules and the PV generator. It is recommends connecting the generator frame and other electrically conductive surfaces in a manner which ensures continuous conduction and ground these in order to have optimal protection of system and persons.

Warning!

- Ensure input DC voltage ≤Max. DC voltage. Over voltage may cause damage.
- Permanent damage to inverter or other losses, which will not be included in warranty!

Warning!

- Authorized service personnel must disconnect both AC and DC power from inverter before attempting any maintenance or cleaning or working on any circuits connected to inverter.

Warning!

- Do not operate the inverter when the device is running.

Warning!

- Risk of electric shock!

- Please keep the user manual properly. When operating equipment, in addition to following the general precautions in this document, follow the specific safety instructions. We will not be liable for any consequence caused by the violation of the safety operation regulations and design, production, and usage standards.
- Accessories only together with the inverter shipment are recommended here. Other- wise may result in a risk of fire, electric shock, or injury to person.
- Make sure that existing wiring is in good condition and that wire is not undersized. Do not disassemble any parts of inverter which are not mentioned in installation guide. It contains no user-serviceable parts. See Warranty for instructions on obtaining service. Attempting to service the inverter yourself may result in a risk of electric shock or fire and will void your warranty.
- Keep away from flammable, explosive materials to avoid fire disaster.
- The installation place should be away from humid or corrosive substance.
- Authorized service personnel must use insulated tools when installing or working with this equipment.
- Never touch either the positive or negative pole of PV connecting device. Strictly prohibit touching both at the same time.
- The unit contains capacitors that remain charged to a potentially lethal voltage after the MAINS, battery and PV supply has been disconnected.
- Hazardous voltage will present for up to 5 minutes after disconnection from power supply.
- CAUTION-RISK of electric shock from energy stored in capacitor, never operate on the inverter couplers, the MAINS cables, Battery cables, PV cables or the PV generator when power is applied. After switching off the PV, battery, and Mains, always wait for 5minutes to let the intermediate circuit capacitors discharge before unplugging DC, battery in plug and MAINS couplers.

- When accessing the internal circuit of inverter, it is very important to wait 5 minutes before operating the power circuit or demounting the electrolyte capacitors inside the device. Do not open the device beforehand since the capacitors require time sufficiently discharge!
- Surge protection devices (SPDs) for PV installation

WARNING!

- Over-voltage protection with surge arresters should be provided when the PV power system is installed.
- The grid connected inverter is not fitted with SPDs in both PV input side and MAINS side.

- Lightning will cause a damage either from a direct strike or from surges due to a nearby strike.
- Induced surges are the most likely cause of lightning damage in majority or installations, especially in rural areas where electricity is usually provided by long overhead lines. Surge may be included on both the PV array conduction and the AC cables leading to the building.

- Specialists in lightning protection should be consulted during the end use application. Using appropriate external lightning protection, the effect of a direct lightning strike into a building can be mitigated in a controlled way, and the lightning current can be discharged into the ground.

- Installation of SPDs to protect the inverter against mechanical damage and excessive stress include a surge arrester in case of a building with external lightning protection system (LPS) when separation distance is kept.

- To protect the DC system, surge suppression device (SPD type2) should be fitted at the inverter end of the DC cabling and at the array located between the inverter and the PV generator, if the voltage protection level (VP) of the surge arresters is greater than 1100V, an additional SPD type 3 required for surge protection for electrical devices.

- To protect the AC system, surge suppression devices (SPD type2) should be fitted at the main incoming point of AC supply (at the consumers cutout), located between the inverter and the meter/distribution system;
- All DC cables should be installed to provide as short a run as possible, and positive and negative cables of the string or main DC supply should be bundled together. Avoiding the creation of loops in the system.
- Spark gap devices are not suitable to be used in DC circuits once conducting, they won’ t stop conducting until the voltage across their terminals is typically

more than 30 volts.

➢ Anti-Islanding Effect

Islanding effect is a special phenomenon that grid-connected PV system still supply power to the nearby grid when the voltage loss is happened in the power system. It is dangerous for maintenance personnel and the public.

Hybrid series inverter provide Active Frequency Drift (AFD) to prevent islanding effect.

➢ PE Connection and Leakage Current

•The end-use application shall monitor the protective conductor by residual current operated protective device (RCD) with rated fault current Ifn≤240mA which automatically disconnects the device in case of a fault.

The device is intended to connect to a PV generator with a capacitance limit of approx. 700nf.

WARNING!

- High leakage current!
- Earth connection essential before connecting supply.

Incorrect grounding can cause physical injury, death or equipment malfunction and increase electromagnetic.

➢ Battery Safety Instructions

Hybrid Series inverter should be worked with low voltage battery, for the specific parameters such as battery type, nominal voltage and nominal capacity etc., please refer to section 4.1.

As accumulator batteries may contain potential electric shock and short-circuit current danger, to avoid accidents that might be thus resulted, the following warnings should be observed during battery replacement:

1: Do not wear watches, rings or similar metallic items.

2: Use insulated tools.

3: Put on rubber shoes and gloves.

4: Do not place metallic tools and similar metallic parts on the batteries.

5: Switch offload connected to the batteries before dismantling battery connection terminals.

6:Only personal with proper expertise can carry out the maintenance of accumulator batteries.

2.2 Explanation of Symbol

This section gives an explanation of all the symbols shown on the inverter and on the type label.

Symbols on the Type Label

	This symbol indicates that you should wait at least 5mins after disconnecting the inverter from the utility grid and from the PV panel before touching any inner live parts.
	Keep dry! The package/product must be protected from excessive humidity and must be stored under cover.
	Refer to the operating instructions.
	Ragile - The package/product should be handled carefully and never be tipped over or slung.
	Products should not be disposed as household waste.
	No more than six (6) identical packages being stacked on each other
	Components of the product can be recycled.
	Danger of hot surface!
	Danger of high voltage and electric shock!
	Caution! Failure to observe a warning indicated in this manual may result in injury.

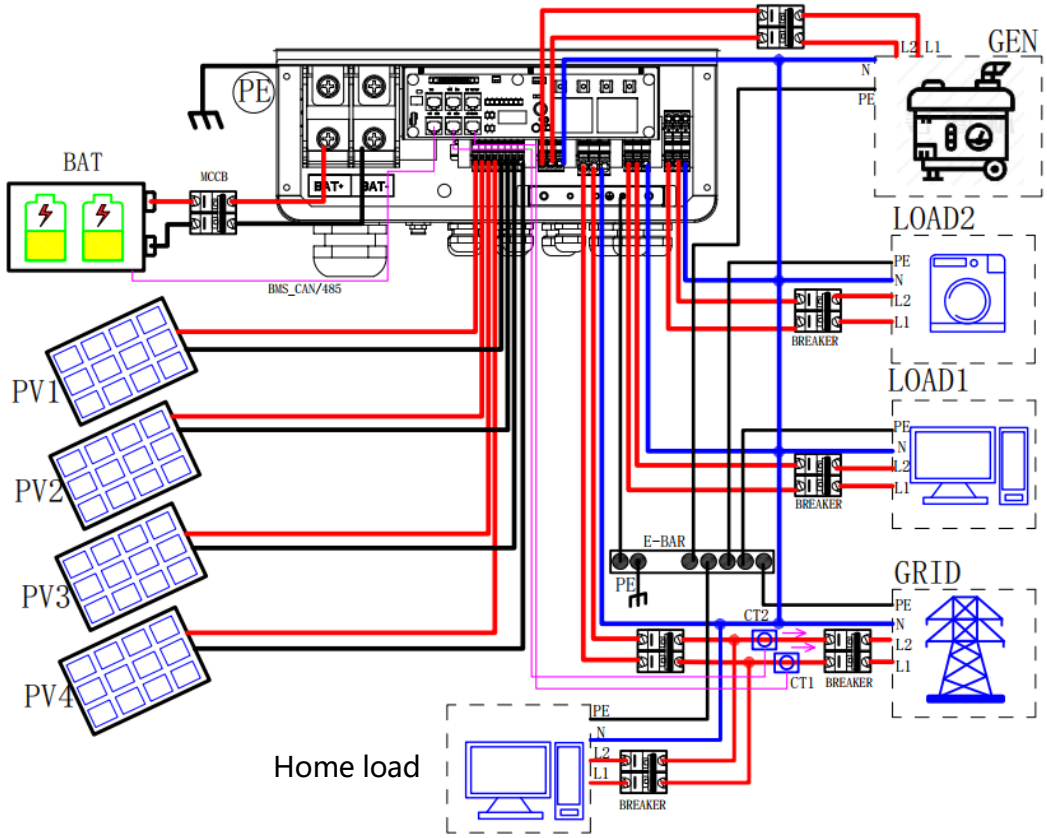
3. Introduction

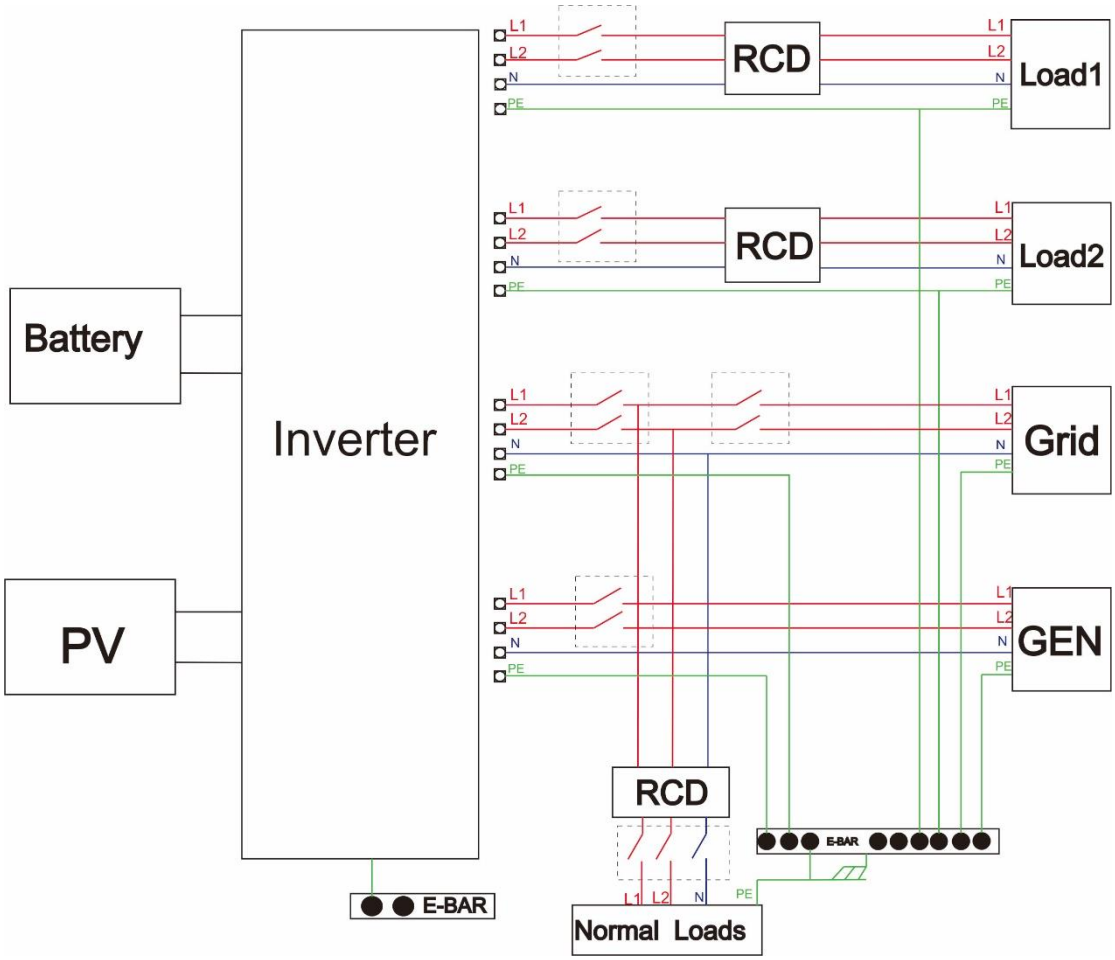
3.1 Basic features

Hybrid Series is a high-quality inverter which can convert solar energy to AC energy and store energy into battery.
The inverter can be used to optimize self-consumption, store in the battery for future use or feed in to public grid. Work mode depends on PV energy and user’ s preference. It can provide power for emergency use during the grid lost by using the energy from battery and inverter (generated from PV).

3.2 System Diagram

Hybrid Series is designed with two BACK-UP versions for customer to choose based on the local rules. The applies to the wiring rules that requires Neutral line of alternative supply must NOT be isolated or switched.

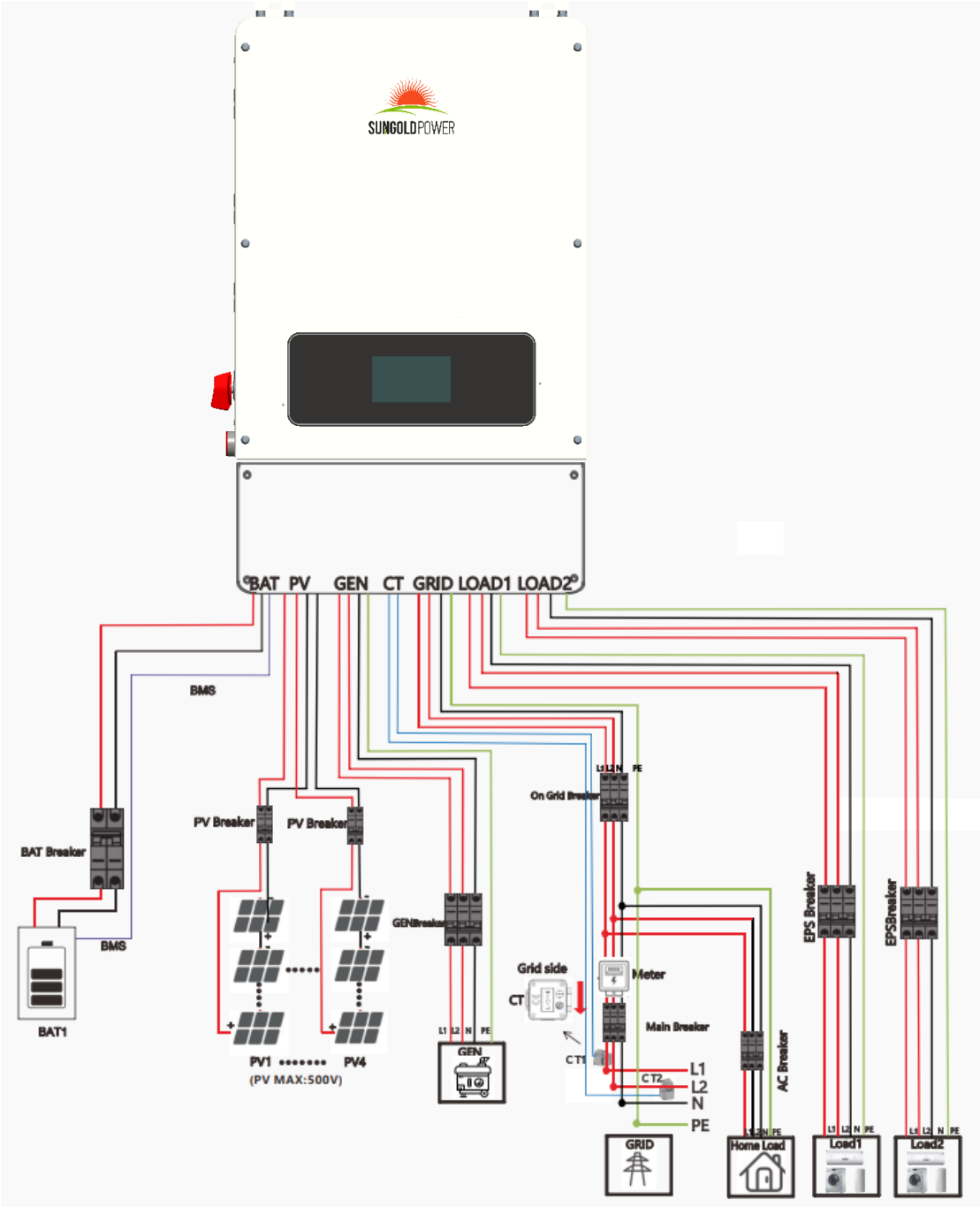




All switches and RCD devices in the figure are for reference only, and the specific installation shall be subject to local regulations.

Note!

- Please control the home loads, and make sure it' s within the "BACK-UP output rating" under BACK-UP mode, otherwise the inverter will shut down with an "overload fault" warning.
- Please confirm with the mains grid operator whether there are any special regulations for grid connection.

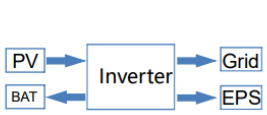


Note!

- The arrow on the CT points to the power grid, as shown.
- If the CT connector is improperly connected, the inverter cannot read the data correctly, so that the relevant working conditions cannot be realized normally.

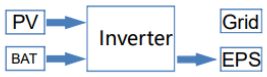
3.3 Work Modes

Inverter provides multiple work modes based on different requirements.

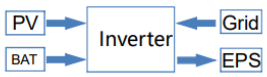


Work modes: Self-use

1.When PV, Grid, Battery is available:
A. Solar energy provides power to the loads as first priority, if solar energy is sufficient to power all connected loads, solar energy excess power will provides to charge battery, and then reduntant power will feed to grid.

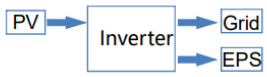


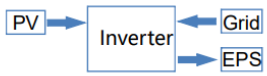
B. Solar energy provides power to the loads as first priority ,if solar energy is not sufficient to power all connected loads, battery energy will supply power to the loads at the same time.



C. Solar energy provides power to the loads as first priority ,if solar energy and battery are not sufficient to power all connected loads, utility energy (Main Grid) will supply power to the loads with solar energy at the same time.

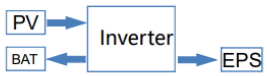
2 .When PV, Grid is available□without battery):
A. Solar energy provides power to the loads as first priority ,if solar energy is sufficient, the excess power will feed to grid.





B. Solar energy provides power to the loads as first priority, if solar energy is not sufficient to power all connected loads, Grid energy will supply power to the loads at the same time.

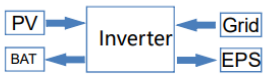
3 .When PV, Battery is available□Grid is disconnected):
A. Solar energy provides power to the loads as first priority ,if solar energy is sufficient to power all connected loads, solar energy will provides to charge battery.



B. Solar energy provides power to the loads as first priority ,if solar energy is not sufficient to power all connected loads, battery energy and solar energy will supply power to the loads at the same time.

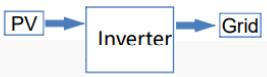
Work modes: Peak shift

1.When PV, Grid, Battery is available:
A. On charge time, solar energy will charge battery as first priority. The excess energy will supply power to the loads.If solar energy is sufficient to supply loads and charge battery,and If there's still some extra energy, then the excess power will feed the power to grid



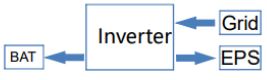
B. On charge time, solar energy will charge battery as first priority.then the excess solar energy will supply power to loads.If solar energy is not sufficient to charge battery and supply loads, grid will supply all the connected loads with solar energy together.

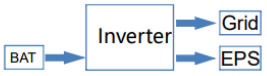
C. On discharge time, solar energy provides power to the loads as first priority, if solar energy is sufficient to supply loads ,and if there's still some extra energy from solar energy ,then the excess power and battery will deliver the power to the grid at the same time.



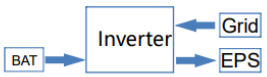
D. In the period of no charge or discharge, the solar power supply loads at first priority , excess energy to the grid.

2. When Grid, Battery is available(PV is disconnected):
A. On charge time, grid will charge battery and supply power to the connected loads at the same time.

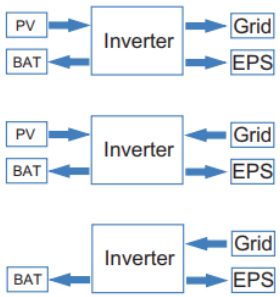




B. On discharge time, if load power is less than battery power, battery will supply power to loads as first priority, the excess power will be feed to grid.



C. On discharge time, if load power is more than battery power, battery and grid will supply power to the loads at the same time.



Work modes: Bat priority

1. When PV, Grid, Battery is available:
A. Solar energy will charge battery as first priority, if solar energy is excess, the excess power will supply load. If there's still some extra energy, then the excess power will feed the power to grid .

B. Solar energy will charge battery as first priority, if solar energy is excess, the excess power will supply load.If solar energy is not sufficient to charge battery and supply loads, grid will supply power to loads.

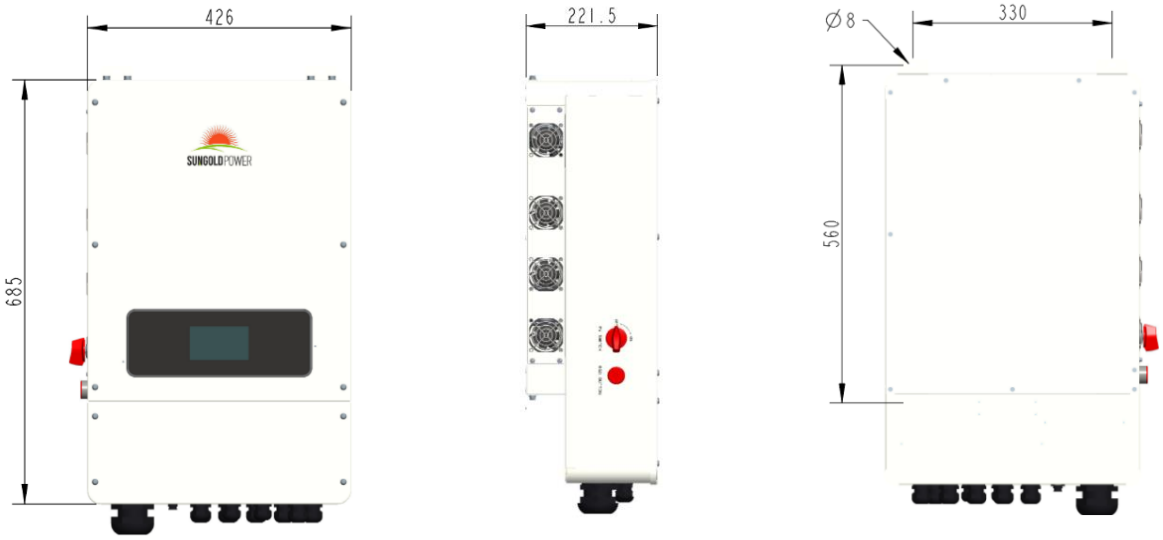
2. When Grid,Battery is available (PV is disconnected):
Grid will supply power to load and charge battery at the same time.

Note!

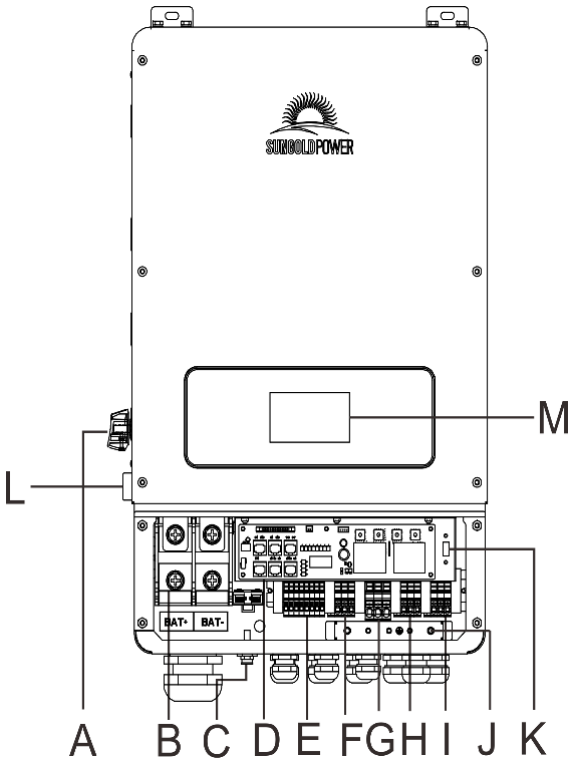
- If set anti-Reverse function allowable, Once on the work mode of Self-use, Peak shift, battery priority, the system will not feed power to grid.

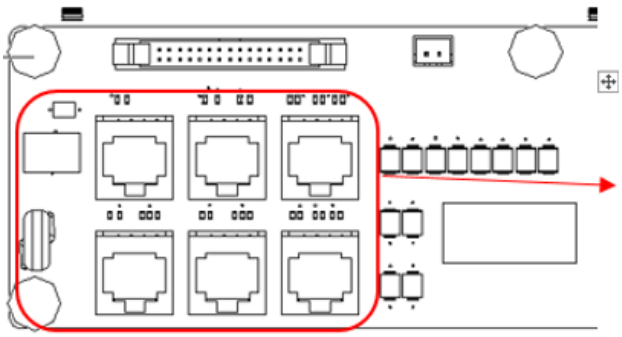
In addition to the above three basic modes, there is also an "Advanced Mode". Please refer to Chapter 11 for details.

3.4 Dimension



3.5 Terminals of PV inverter





TYPE-C UPDATE	CAN1	CAN2	RS485
	BMS-485 BMS-CAN	CT L2	CT L1

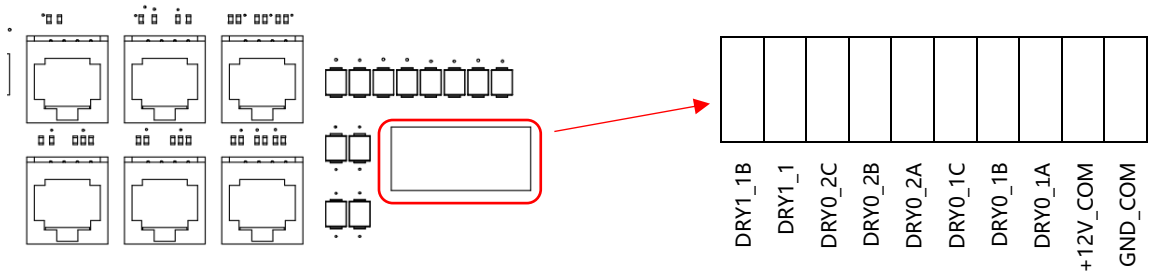
· CAN1/CAN2: Communication interface for connecting inverters.

· RS485: Read the internal data of inverter.

BMS-485/ BMS-CAN: BMS communication for lithium batteries.

CT L1/CT L2: For external grid side CT to detect current size.

TYPE-C UPDATE: Update machine software locally on PC via USB-A port.



DRY1_1B/DRY1_1: Used to start the driver.

DRY0_2A and DRY0_2B (dry contact, normally closed): Reservation.
DRY0_2A and DRY0_2C (dry contact, normally open): Reservation (mutually exclusive with DRY0_2B and DRY0_2A).
DRY0_1A and DRY0_1B (dry contact, normally closed): For generators, dry contact closure, generator start, dry contact disconnection, generator shutdown.
DRY0_1A and DRY0_1C (dry contact, normally open): mutually exclusive with DRY0_1B and DRY0_1A.
+12V_com/GND com: Used to connect RSD.

Object	Description
A	DC switch
B	BAT input
C	Wi-Fi
D	CAN1/CAN2/RS485/BMS485,BMSCAN//CTL1/CTL2/Type-c upgrade
E	PV1~PV4 input
F	Generator
G	Grid
H	BACK-UP1 output
I	BACK-UP2 output
J	PE
K	Screen firmware USB upgrade port
L	RSD/E-stop button
M	LED

WARNING!
Qualified electrician will be required for the installation.

4. Technical Parameters

4.1 Inverter specication

Technical Data	SG10KHB–48
PV Input Data	
MAX.DC Input Power	15kW
NO.MPPT Tracker	4
MPPT Range	120 – 500V
MAX.DC Input Voltage	500V
MAX.Input Current	14A
Battery Input Data	
Nominal voltage (Vdc)	48V
MAX.Charging/Discharging Current	190A/210A
Battery Voltage Range	40–60V
Battery Type	Lithium and Lead Acid Battery
Charging Strategy for Li–Ion Battery	Self–adaption to BMS
AC Output Data (On–Grid)	
Nominal output power Output to Grid	10kVA
MAX. Apparent Power Output to Grid	11kVA
Output Voltage Range	110–120/220–240V split phase, 1Ø, 230 1 phase
Output Frequency	50/60Hz (45 to 54.9Hz / 55 to 65Hz)
Nominal AC Current Output to Grid	41.7A
Max.AC Current Output to Grid	45.8A
Output Power Factor	0.8leading…0.8lagging
Output THDI	< 2%
AC Output Data (Back–Up)	
Nominal. Apparent Power Output	10kVA
MAX. Apparent Power Output	11kVA
Nominal Output Voltage L–N/L1–L2	120/240V
Nominal Output Frequency	60Hz
Output THDU	< 2%
Efficiency	
Europe Efficiency	>=97.8%
MAX. Battery to Load Efficiency	>=97.2%
Protection	
Grounding detection	YES
Arc Fault Protection	YES
Island Protection	YES
Battery reverse Polarity	YES

Insulation Resistor Detection	YES
Residual Current Monitoring Unit	YES
Output Over Current Protection	YES
Back–up Output Short Protection	YES
Output Over Voltage Protection	YES
Output Under Voltage Protection	YES
General Data	
Output Conduit	25.4mm
PV Input Conduit	25.4mm
BAT Input Conduit	34.5mm
Operating Temperature Range	–25 ~ +60˚C(> 45˚C derating)
Relative Humidity	0–95%
Operating Altitude	0~4000m
Ingress Protection	IP65/Type 3R
Weight	41kg
Size (Width*Height*Depth)	460mm x 760mm x 225mm
Cooling	Natural Convection
Noise emission	<38dB
Display	LED
Communication With BMS/Meter/EMS	RS485，CAN
Supported communication interface	RS485, WLAN, 4G (optional)
Self–consumption at night	< 25 W
EMC	FCC Part 15 Class
Grid connection standards	IEEE 1547, IEEE 2030.5, Hawaii Rule 14H, Rule 21 Phase I,II,III

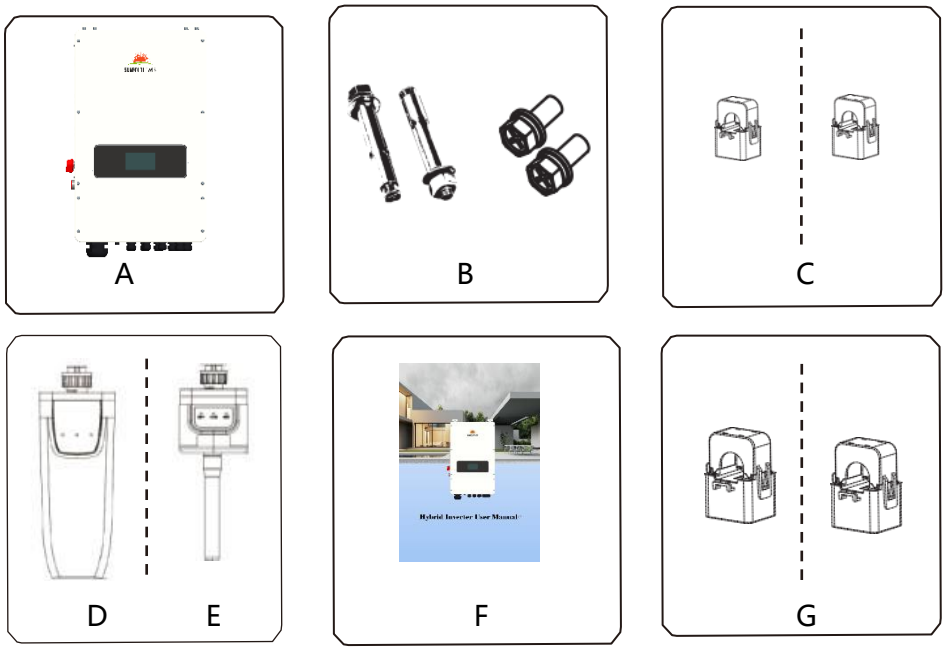
5. Installation

5.1 Check for Physical Damage

Make sure the inverter is intact during transportation. If there is any visible damage, such as cracks, please contact your dealer immediately.

5.2 Packing List

Open the package and take out the product, please check the accessories first. The packing list shown as below.



Object	Description
A	Inverter
B	Expansion screws and pan-head screws
C	CT (inner radius 16mm)
D	GPRS module (optional)
E	WiFi module (optional)
F	User manual
G	CT (inner radius 35mm/optional)

5.3 Mounting

➢ Installation Precaution

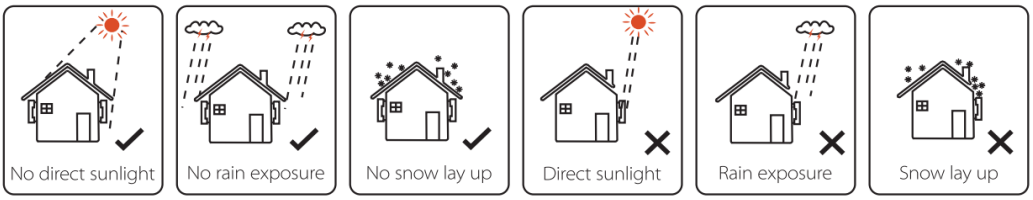
Inverter is designed for outdoor installation (IP65). Make sure the installation site meets the following conditions:

- Not in direct sunlight.
- Not in areas where highly Flammable materials are stored.
- Not in potential explosive areas.
- Not in the cool air directly.
- Not near the television antenna or antenna cable.
- Not higher than altitude of about 2000m above sea level.
- Not in environment of precipitation or humidity (> 95%).
- Under good ventilation condition.
- The ambient temperature in the range of -20℃ to +60℃.
- The slope of the wall should be within ± 5°.
- The wall hanging the inverter should meet conditions below:

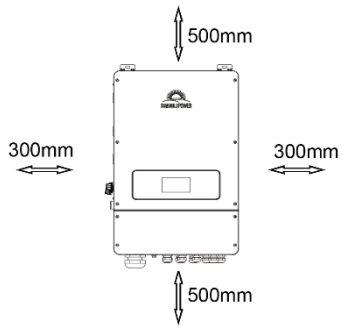
  1.solid brick/concrete, or strength equivalent mounting surface;

  2.Inverter must be supported or strengthened if the wall’ s strength isn’ t enough (such as wooden wall, the wall covered by thick layer of decoration)

  Please AVOIDE direct sunlight, rain exposure, snow laying up during installation and operation.



- **Space Requirement**

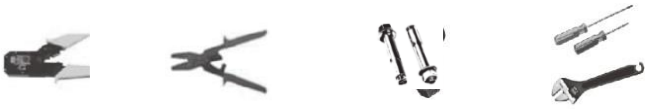


Position	Min. size
Left	300mm
Right	300mm
Top	500mm
Bottom	500mm
Front	1000mm

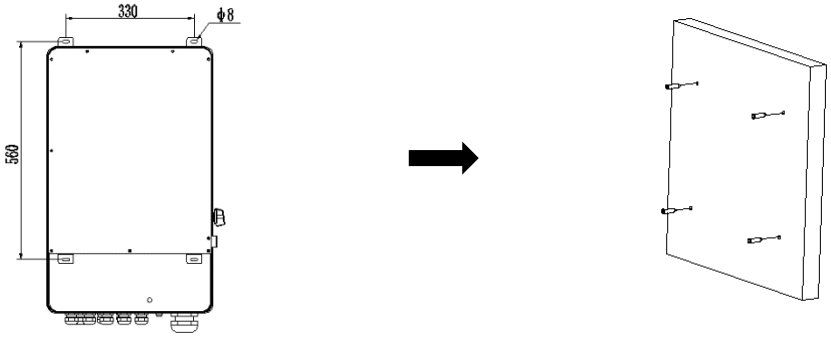
- Mounting

  Tools required for installation.

  Installation tools: crimping pliers for binding post and RJ45, screwdriver, manual wrench etc

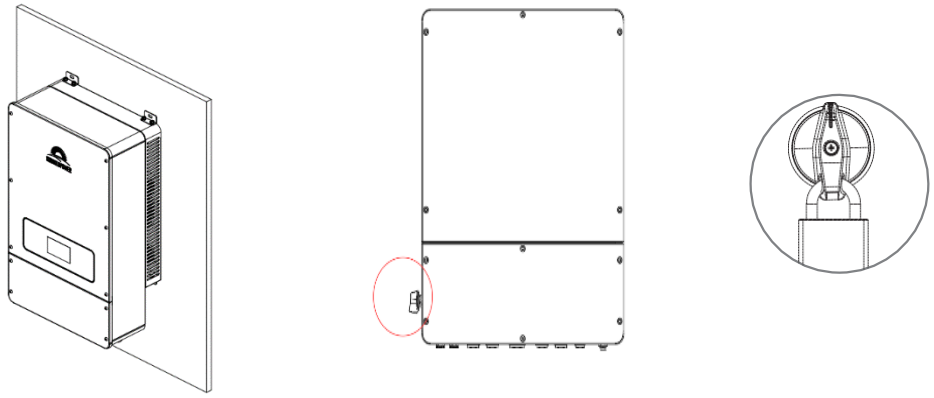


Step 1: Drill 4 holes in the wall according to the following distance dimensions, 50~60mm depth. Then use a proper hammer to fit the expansion bolt into the holes.

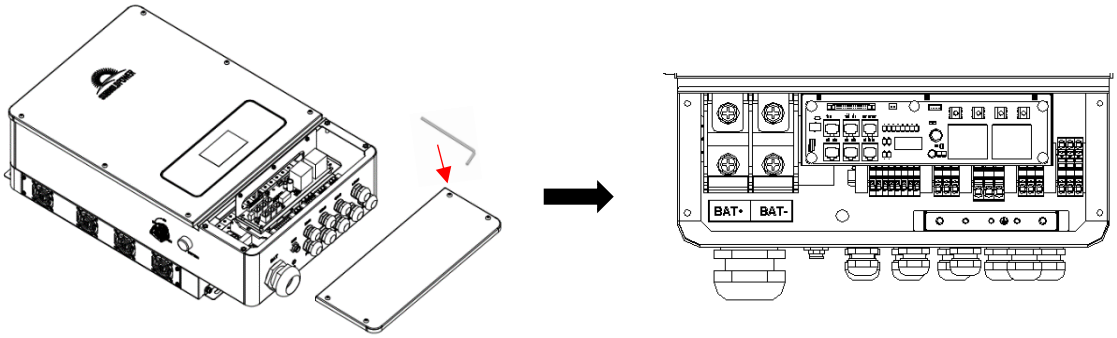


Step 2: Lift up the inverter and align the hole of the inverter with the expansion bolt, Fix the inverter on the wall.

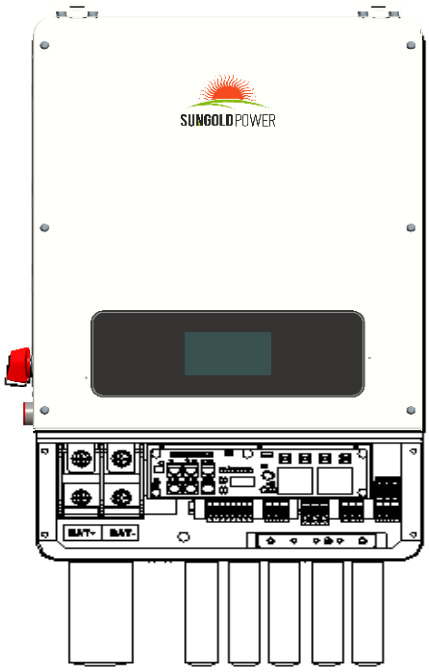
Step 3: Tighten the nut of expansion bolt，and install an anti-theft lock on DC switch of the inverter



Step 4: Remove the cover screws by Allen Wrench and remove the cover. Remove the waterproof cover by a flat blade screwdriver. Wiring box conduit plugs, Conduit plugs are provided for 1inch conduit fittings. If used conduit fitting is not 1 inch, an appropriate conduit adaptor should be used.



Step 5: Pass the corresponding conduit and fasten the joint.



6. Electrical Connection

6.1 PV connection

Hybrid can be connected in series with 4-strings PV modules for 5kW, 6kW, 7.6kW, 8kW，10kW.Select PV modules with excellent function and reliable quality. Open-circuit voltage of module arrays connected in series should be less than Max. DC input voltage; operating voltage should be conformed to MPPT voltage range.

Warning!

- PV module voltage is very high, which already achieve dangerous voltage range, please comply with electric safety rules when connecting.
- Please do not make PV positive or negative ground**!**

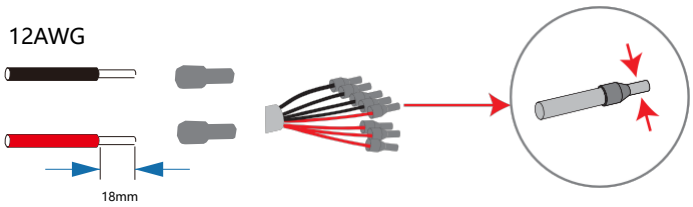
Note!

- The following requirements of PV modules need to be applied for each input area.
- Please do not make PV positive or negative ground!
- In order to save cable and reduce the DC loss, we suggest to install the inverter near PV modules.

Step1. Wiring.

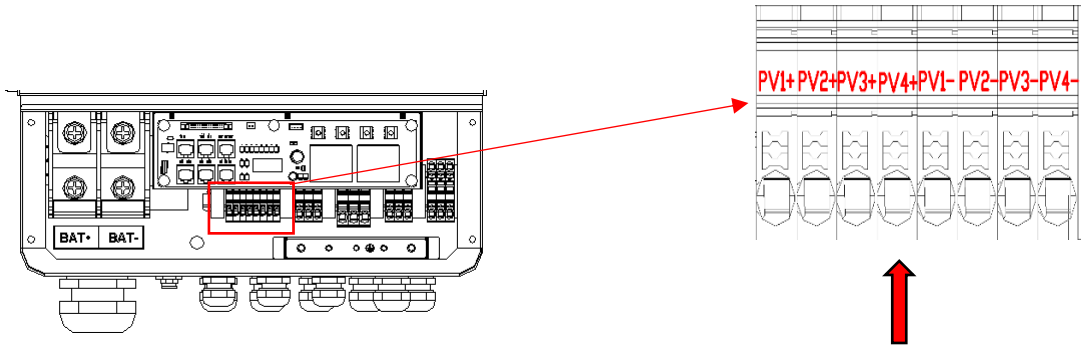
1.1 Choose the 12 AWG wire to connect with the cold-pressed terminal.

1.2 Remove 18mm of insulation from the end of wire.



Step2. Cross the PV cables through the PV port, Connect PV cables to PV terminals.

Connect PV cables to PV terminals.



6.2 Grid Connection (GEN connection)

Step1. Check the grid voltage.

1.1 Check the grid voltage and compare with the permissive voltage range (Please refer to technical data).

1.2 Disconnect the circuit board from all the phases and secure against re-connection.

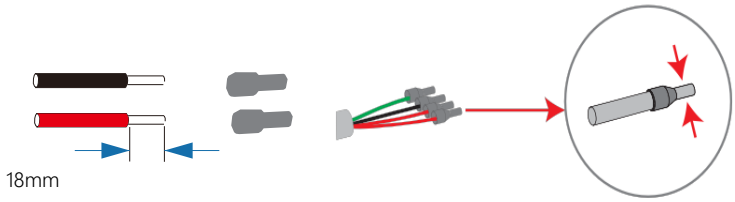
Step2. Grid cables choose

Use the right pin terminal from the accessory box. Press the connectors on cable conductor core tightly.

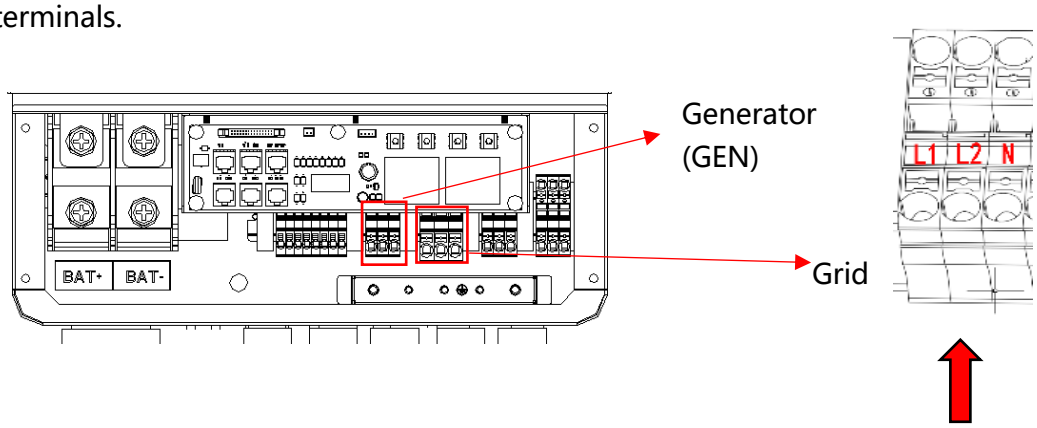
Model	SG10KHB-48
Cable	8AWG

Step3. Choose the wire to connect with the cold-pressed terminal.

(Remove 18mm of insulation from the end of wire.)



Step4. Cross the Grid cables through the grid port, Connect Grid cables to Grid terminals.



6.3 Back-up: Load1 and Load2 Connection

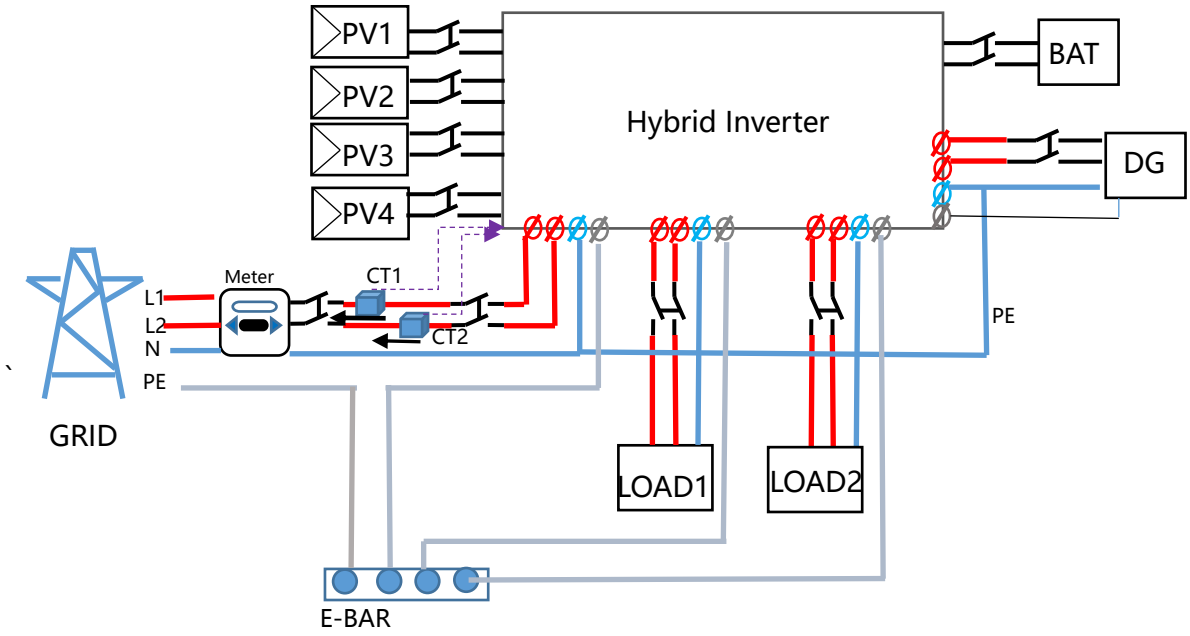
Inverter has On and Off grid function, the inverter will deliver output power through AC port when the grid is on, and it will deliver output power through back-up port when the grid is off.

- Auto & Manual
  The user can manually set the load2 switch SOC on the Aux load SOC, and the machine will automatically connect or disconnect load2 after reaching the SOC.
- Load1 port: important load.
  Load2 port: Set the Aux load SOC option in advanced mode. When the battery SOC falls below the set value, the load relay on the interface will turn off. When the battery SOC is higher than the set value, load 2 is turned on again.

1). For inverter, the standard PV installation typically consists of the connection of the inverter with both panels and batteries. In case of systems not connected to the batteries, the Back-Up function is strongly not advised to use. It shall not cover the standard warranty and be liable for any consequences arising from users not following this instruction.

2). Hybrid inverters are able to supply over load output at its "Back-Up". For details, please refer to the technical parameters of inverter. And the inverter has self-protection dreading at high ambient temperature.

3). For complicated application, or Special load , please contact after-sales team.



Note!

In case of discrepancies between wiring mode of local policy and the operation guide above, especially for the wiring of neutral line, grounding, and RCD, please contact us before any operation!

➢ **Back-Up: Load1 and Load2 Connection:**

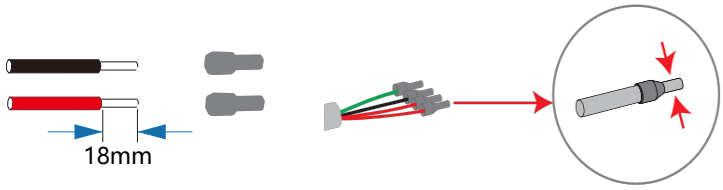
When using the off-grid function, please add off grid AC breaker in off grid output cable to ensure safety.

Model	SG10KHB-48
Micro-breaker	63A

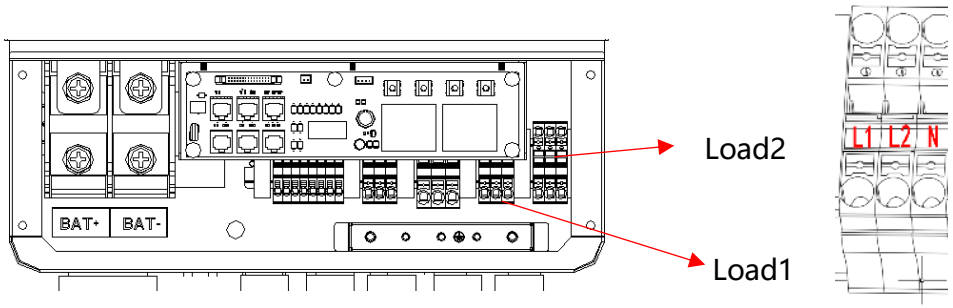
Note: The absence of AC breaker on back-up side will lead to inverter damage if an electrical short circuit happens on back-up side.

Step1.Make BACK-UP wires.

Model	SG10KHB-48
Cable	8AWG



Step2. Connect the cables to the BACK-UP: Load1 and Load2 port of the inverter.



Inside the inverter, load2 is connected to load1 through a relay, and the relay disconnect when the SOC of battery is lower than set value. At that time, the load2 is powered off and load1 is still powered on. (The total power of Load1 plus Load2 should not more than the rated BACK-UP power when GRID is off)

➢ **Requirements for BACK-UP load**

Waring!

- Make sure the BACK-UP load power rating is within BACK-UP output rating, otherwise the inverter will shut down with an "over load" warning.
- When an "over load" is appeared, adjust the load power to make sure it is within the BACK-UP output power range, then turn the inverter back on.
- For the nonlinear load, please make sure the inrush power should be within the BACK- UP output power range.

6.4 Battery Connection

Charging & discharging system of Hybrid series inverter is designed for 48V lithium battery.

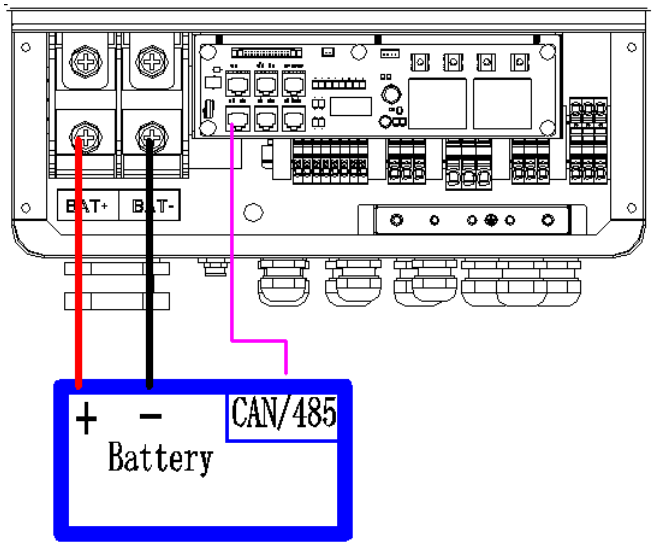
Before choosing battery, please note the maximum voltage of battery cannot exceed 60V and the battery communication should be compatible with Hybrid inverter.

➢ **Battery breaker**

Before connecting to battery, please install a no-polarized DC breaker to make sure inverter can be securely disconnected during maintenance.

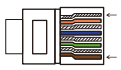
Model	SG10KHB-48
Current[A]	300A

➢ **Battery connection diagram**



➢ BMS PIN Definition

Communication interface between inverter and battery is RS485 or CAN with a RJ45 connector.



	PIN	1	2	3	4	5	6	7	8
CAN	Definition	X	X	X	BMS_CANH	BMS_CANL	X	X	X
RS485	Definition	X	X	X	X	X	GND	BMS_485A	BMS_485B

When using RS485 protocol, please note that PIN2 must be disconnected!

Note!

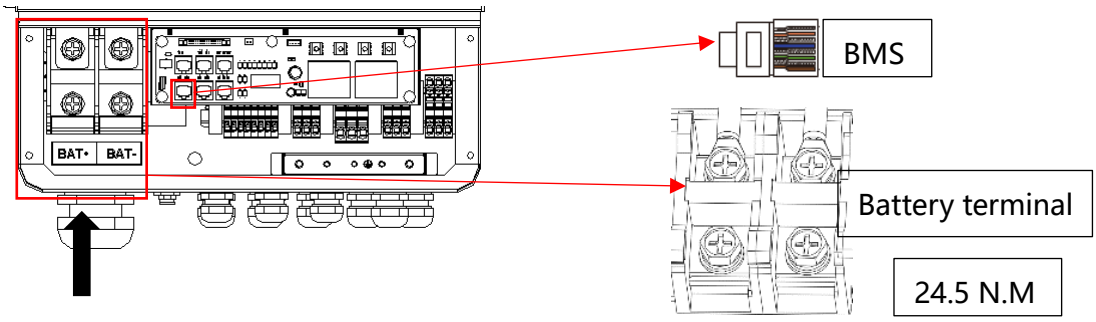
The battery communication can only work when the battery BMS is compatible with the inverter.

➢ Power Connection Battery:

Step1

Choose the 1 AWG wire and strip the cable to 15mm. Select two O-terminals with an aperture of M10. Insert the stripping line into the O-terminal and clamp it with a crimping clamp.

Step2. Cross the battery cable through the battery port. Connect battery cable to battery terminal



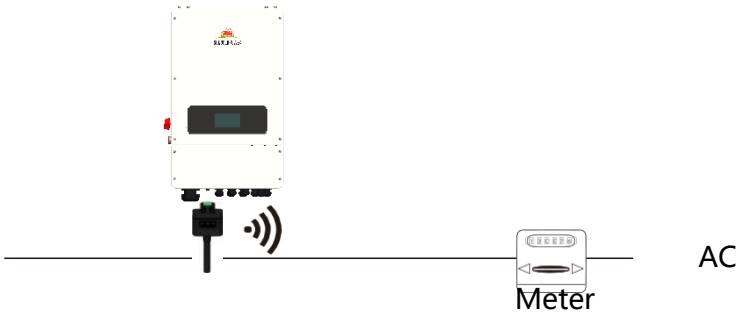
Note!

Positive and negative wires are not allowed to reverse.

6.5 WIFI Connection (optional)

Inverter provides a WIFI port which can collect data from inverter and transmit it to monitoring-website by WIFI. (Purchase the product from supplier if needed)

1) Diagram



2)Wi-Fi Connection:

Step1. Plug Wi-Fi into "Wi-Fi" port at the bottom of the inverter.

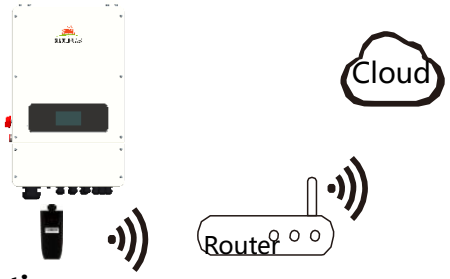
Step2. Build the connection between the inverter and router.

Step3. Create a user account online. (Please check the Wi-Fi user manual for more details).

6.6 GPRS Connection (optional)

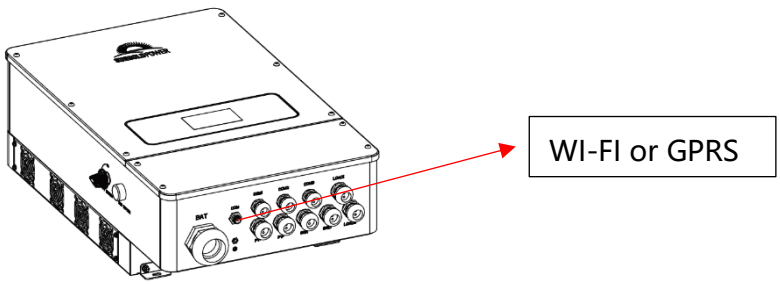
Hybrid inverter provides a GPRS (radio frequency) interface which control the switch time of a designated load via an external Smart Plug (purchase the product from supplier if needed.) so that the load mostly consumes PV energy and incurs the lowest-possible energy costs during operation.

1)Diagram



2)GPRS Connection :

Please refer to the Smart Plug user manual for detailed connection



6.7 CT Installation instructions

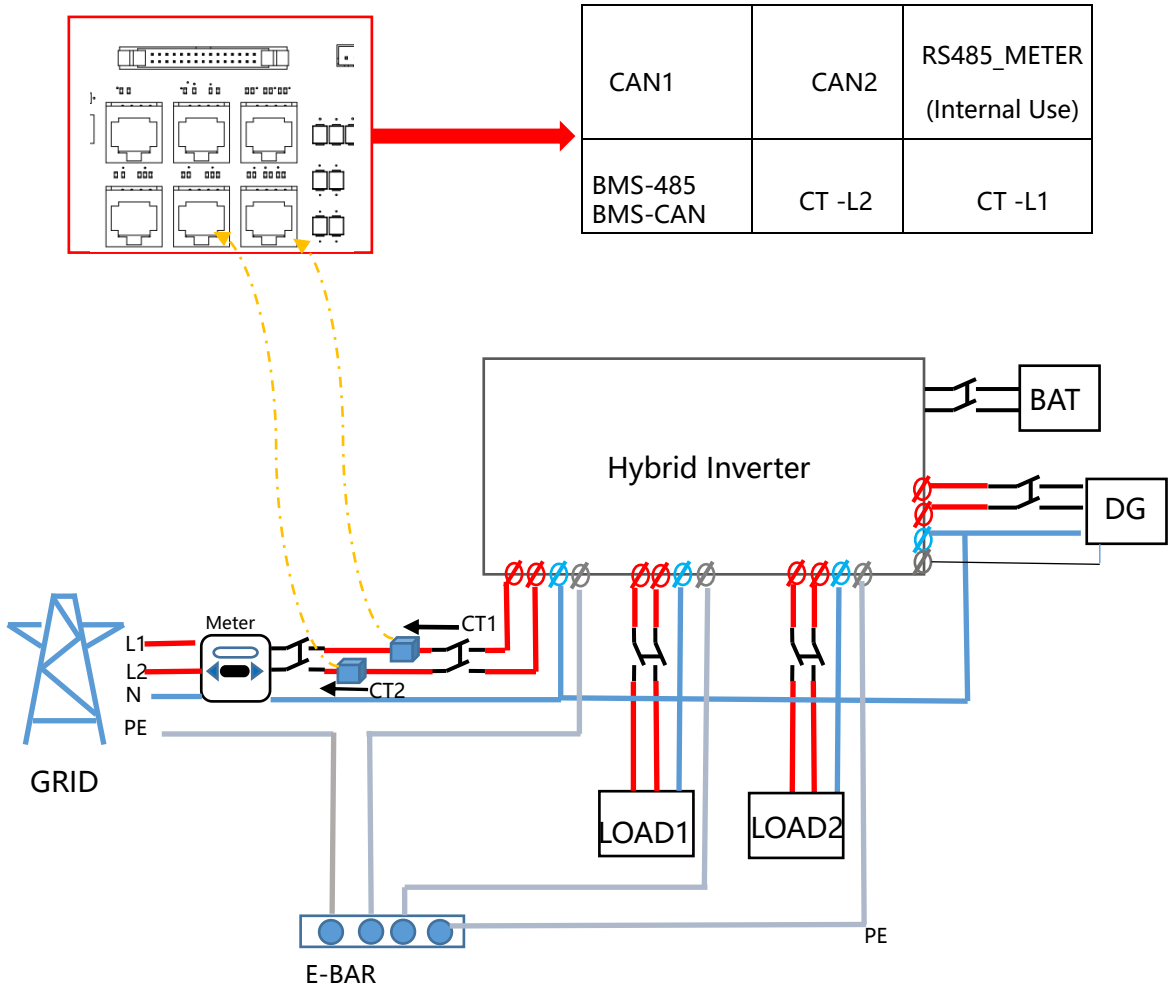
CT is short for “current transform” ,is used to detect Grid current .

Note!

- If CT is not installed or installed reversely, the functions of "Anti-reflux", "Self-use", "Peak-shift "... will not be realized.
- The direction of the arrow on the CT points from this inverter to the GRID!

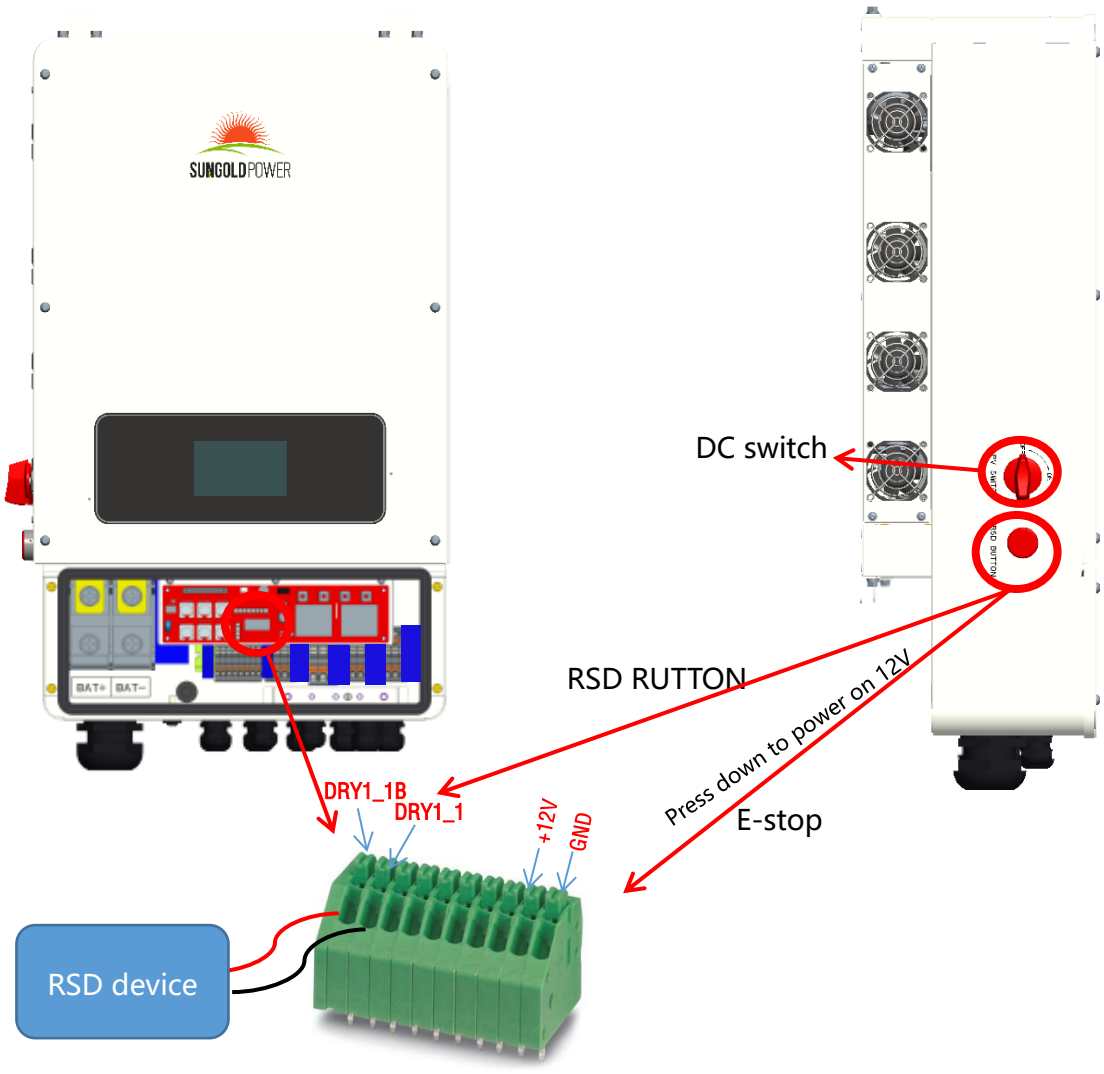
When connected to single-phase power grid (Europe, Africa, Asia, Australia). Only one CT is provided in the accessories. The RJ45 connector of CT is connected to” CT-L1” , and the CT is connected to L phase.

When connected to split phase power grid (North America), the accessories provide two CTS, “CT-L1” network interface is connected to L1 phase, and “CT-L2” network interface is connected to L2 phase.



6.8 RSD/E-Stop Installation

This button combines two functions: RSD and E-stop. The button is a normally closed (NC) contact. When the button is pushed, the state of the e-stop is open.
RSD is used to start or stop the drive of the inverter.
E-stop is used to turn the PV on or off. The voltage of the photovoltaic module is prevented from being transferred to the photovoltaic wire so that the first aid personnel can perform work in or on the building. The premise is that your inverter is equipped with E-stop device.
The connection between the e-stop and the inverter uses two 18-22 AWG wires. The power input of E-stop is provided through the 10pin connector of the inverter communication board, and the two wires are connected to + 12V and GND respectively. Press the button, the communication board outputs 12 V voltage, the E-stop device is turned on, and the PV is connected. On the contrary, the communication board cuts off the 12 V output, turns off the E-stop device, and disconnects the PV.
DC switch: PV DC input manual switch.

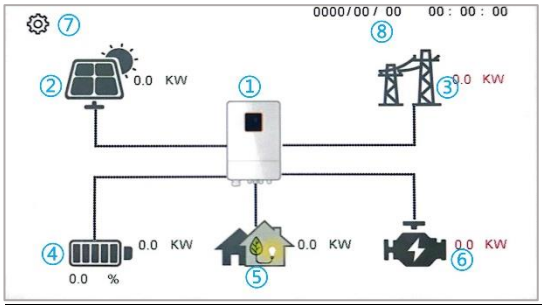


7. LED Operation

LED Operation

1. Energy Storage Inverter
2. PV
3. Grid
4. Battery
5. Load
6. Generator
7. Setting
   1. System Setting
      1. Work Mode
      2. Advanced Mode
      3. Backup Enable
      4. Sell enable
      5. Grid Power Limit
      6. Advanced Settings
      7. PV types
      8. Peak Shift Time
      9. Date and Time settings
   2. Parallel Settings
   3. Battery Settings
   4. Grid Setting
   5. Generator Setting
   6. Inverter Information

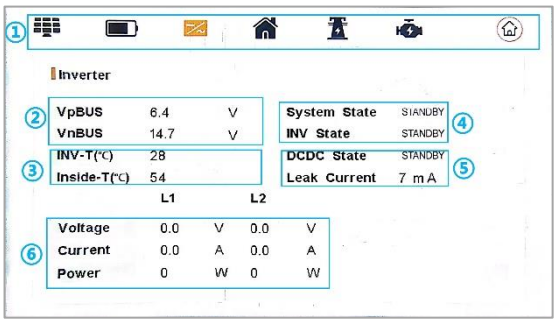
7.1 Control Panel



Code	Name	Explanation
1	Energy Storage Inverter	Click Energy Storage Inverter to enter the working status interface of the energy storage inverter, see section 7.3.1 for details.
2	PV	Display the real-time PV power. Click PV to enter the working status interface of PV, see section 7.3.2 for details.
3	Grid	Display the real-time grid power. Click Grid to enter the working status interface of grid, see section for 7.3.3 details.
4	Battery	Display the real-time battery power and percentage of battery surplus capacity from the BMS. Click Battery to enter the working status interface of battery, see section for 7.3.4 details.
5	Load	Display the real-time load power. Click Load to enter the working status interface of load, see section for 7.3.5 details.
6	Generator	Display the real-time generator power. Click generator to enter the working status interface of generator, see section for 7.3.6 details.
7	Setting	Users can click Setting to enter the settings interface, see section 7.4 for details.
8	Data/Time	Date and time of the inverter.

7.2 Working Status

7.2.1 Energy Storage Inverter



①Users can click on the icon above to switch device status data (PV, Battery, Energy Storage Inverter, Load, Grid, BUS) and return to the Home Page. （not to be repeated later)

② **VPBUS**: Real-time voltage of bus capacitor of the machine.

VnBUS: Real-time voltage of bus capacitor of the machine.

③Temperature

INV-T(℃): INV Temperature

Inside-T(℃):

Internal ambient temperature of the machine.

④

Display status information, including System status, Inverter status, and DCDC status.

System Status: Display complete machine status information, include INIT, STANDBY, PV GRID, BAT GRID, BYP, AC BAT CHG, HYBRID POW etc.

INV: Displays the inverter status information, including: STANDBY, OFF GRID, GRID, OFF GRID PL, INV TO PFC.

GRID: Grid connected state.

OFF-GRID:

Off-GRID working state.

OFF GRID PL:

Working state of off-grid conversion to grid connection.

INV TO PFC: Status of power by public grid turn into on grid working mode.

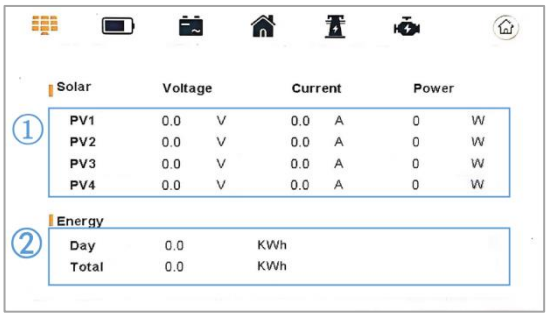
DCDC Status:

Displays charging and discharging status information, include STANDBY, CHARGE, DISCHARGE.

⑤ **Leak current**: Real-time leak current of the machine.

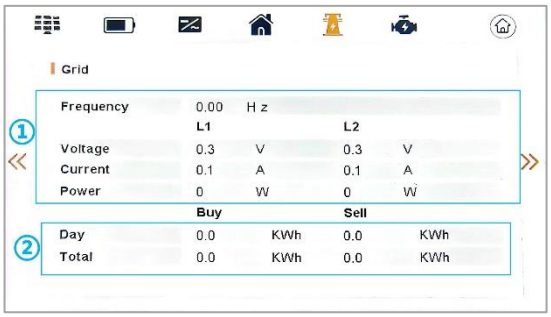
⑥ Display the **real-time voltage**, **current**, and **power** of the device.

7.2.2 PV



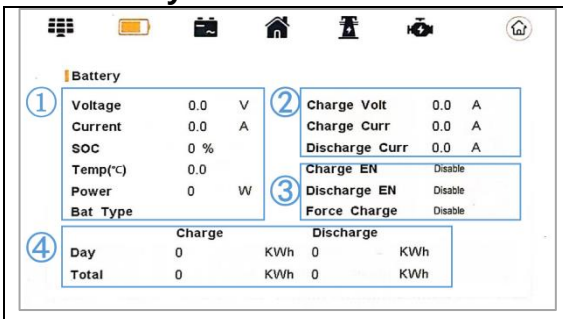
①Display the working parameters of the four channels of PV (**PV1, PV2, PV3, PV4**), including **real-time voltage**, **current**, and **power.** (PV input type can be set in the settings).
② Display the cumulative charging capacity of the PV, including daily and total accumulated energy.

7.2.3 Grid



① Display the working parameters on the grid, including **Frequency**, **real-time voltage**, **real-time current**, and **real-time power**.
② Accumulated energy from the power grid to the equipment(Sell) and accumulated energy from equipment to the power grid(Buy),including daily and total accumulated energy.

7.2.4 Battery

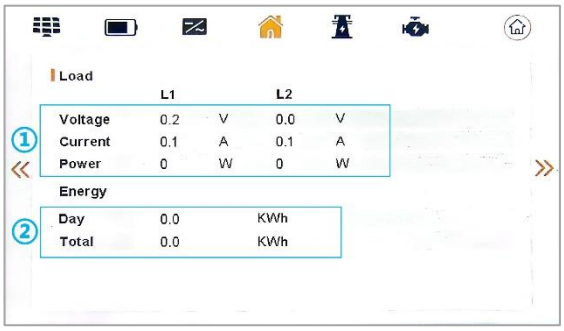


① Display the working parameters of the battery, including **real-time voltage**, **real-time current**, **battery surplus capacity**, **battery temperature**, **battery power**, and **battery type**.
② Display battery **charging voltage**, **charging current**, and **discharge current.**

③ Three working states of batteries (from BMS), including **charging**, **discharging**, and **forced charging**.
Charge EN: Charge Enable
Discharge EN: Discharge Enable.
④ Accumulated discharge and charging capacity of the battery, including daily and total accumulated energy.

7.2.5 Load

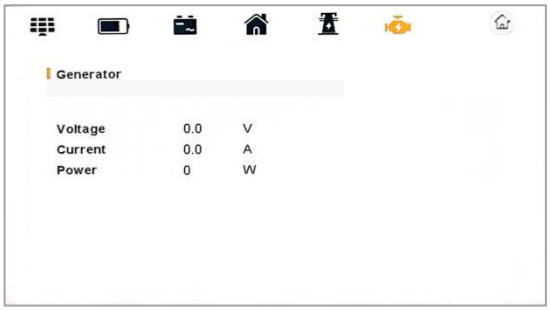
7.2.5.1 Load/Page One

Load	
	①User can click « to return to the previous page, and click » to enter the next page. (not to be repeated later) ②Display the working parameters of the load, including **real-time voltage**, **current**, and **power.** ③ Accumulated usage of load, including daily and total accumulated energy.

7.2.5.2 Load/Page Two

Home Load	
	When set Home load EN to "ENABLE", if you have a load connected to the mains port, you can see its Home load power.

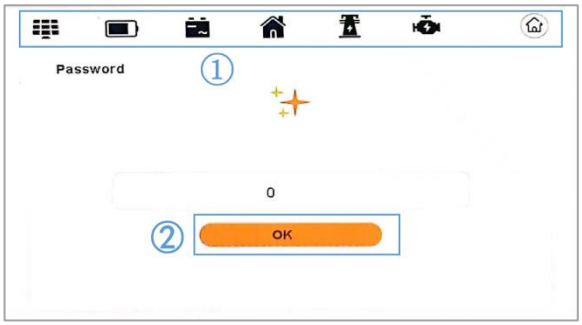
7.2.6 Generator

	Display the working parameters of the generator, including **real-time voltage**, **current**, and **power**.

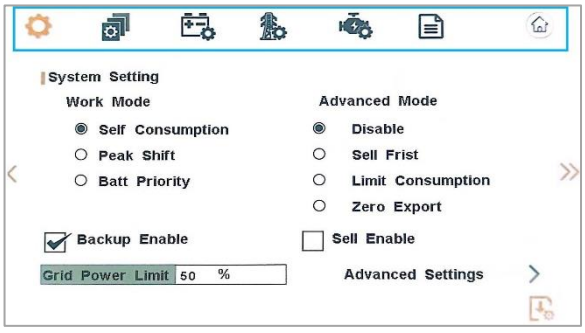
7.3 Setting

7.3.1 Enter Setting

7.3.1.1 Input password

	①Users can click on the icon above to enter device status data (**PV**, **Battery**, **Energy Storage Inverter**, **Load**, **Grid**, **Generator**) and return to the Home Page. ②To enter the settings, a password is required. The default password is 11111. Click OK to enter the settings interface.

7.3.1.2 Enter the settings interface

	Users can click on the icon above to switch between setting options, machine related information, and return to the Home Page.

: System Setting : Parallel Setting : Battery Setting

: Grid Setting : Generator Setting

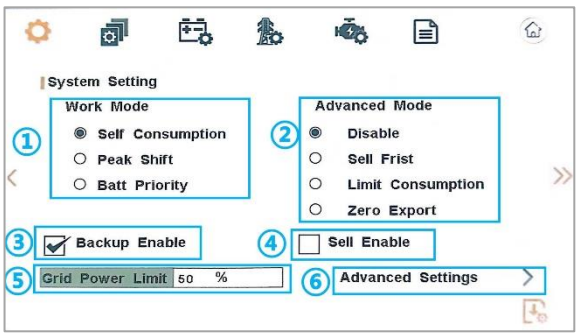
: Machine Information : Return Home Page

: After modifying the parameters, the user needs to click on this icon to confirm the modification.

7.3.2 Setting Option

7.3.2.1 System Setting

System Setting/ Page One:



①**Work Mode:**
Users have three working modes to choose from, **Self Consumption, Peak Shift**, and **Battery Priority**.

②**Advanced mode:**
There are four options here: Disable, Sell First Mode, Limited Consumption Mode and Zero Export Mode.

Disable: Only when users selected "Disable", the three work modes (Self Consumption, Peak Shift, battery priority) take effect. When the user selects the other three options, the three working modes (Sell First, Limit Consumption, Zero Export) are invalid.

Sell First: First consider selling electricity to the grid. In this mode the anti-reflux setting is automatically disabled. The users can use this mode to sell back surplus solar power to grid. If time of use is enabled, the battery power can also be sold to grid（Excess PV and battery power can be sold to the grid）.

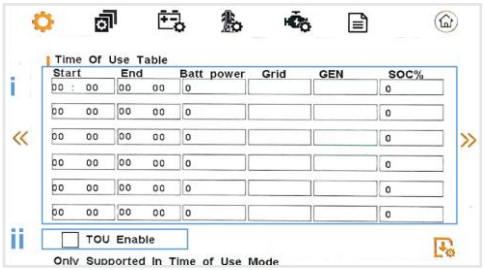
Limit Consumption: In this mode, the CT limiters are used to sense the grid power flow direction. The hybrid inverter can be select to sell power or not sell power to grid. There is a CT Limit Power parameter available in this mode. When the battery is needed to discharge to reduce the load consumption, the grid will cover the parameter set part consumption firstly and the battery discharges energy to makes up the rest part. Other conditions are similar to SELF CONSUME working mode（Excess PV power can be sold to the grid through CT Limit.）.

Zero Export: In this mode, the CT limiters should be installed in the input of the inverter's grid port. The hybrid inverter will not sell power to grid. The user can use Zero export power parameter to ensure the inverter won't feedback power to grid（Neither PV nor battery excess power is sold to the grid）.

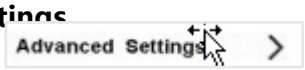
③**Backup Enable**: When the Grid and PV are powered off, Enable the battery to supply power to the load, default option is enabled.

④**Sell Enable**: Whether the inverter is allowed to sell electricity to the grid. The option is checked, which means that the inverter can generate electricity to the grid.

⑤**Grid Power Limit**
Users can click to enter the numerical input interface. (not to be respected)



⑥Advanced Settings

Users can click 

to enter the advanced settings interface.

There are also some attributes of these mode: Global Grid Charge Enable, PV Charge Only, Bat Charge On Priority, Time-of-use Enable and 6 Time-of-use Slots.

Advanced Settings/First Page:

i Time-of-use Enable : There are 6 slots which can be programmed. If grid charge is enabled, the grid is used to power the load and charge the battery to target SOC at specific bat power attribute value. If selling electricity to the grid enable, the battery will discharge to target SOC at specific battery power attribute value.

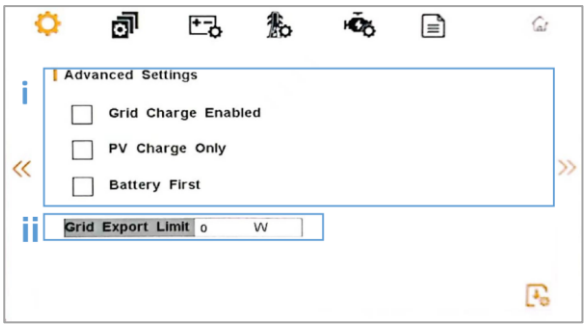
Grid: Grid is ticked, indicating that in the effective interval of the current interface time period, if the set SOC is greater than the actual SOC of the battery, the power grid will charge the battery (if not ticked, the power grid will not charge the battery); if the set SOC is less than the actual SOC of the battery, the battery can be discharged.

GEN: GEN is ticked to indicate charging with GEN.

Batt power: The power that the grid charges and discharges to the battery

ii Only when TOU Enable is selected, the time table in the figure can be effective.

Advanced Settings/Second Page:



i. Users have three advanced settings to choose from, namely Global Grid Charge Enable, PV Charge Only and Battery First.

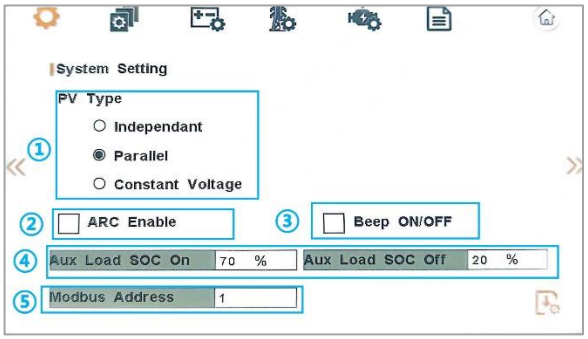
Global Grid Charge Enable: It is a high level control attribute of grid charge enable. If time of use function is disabled, this attribute is used to judge whether or not to charge the

battery by grid. If time of use function is enabled, the battery can be charged by grid only when the time slot grid charge attribute is enabled.

PV Charge Only: If user don't want to use grid to charge the battery in any time, please enable this attribute. The PV energy will be used first for the load, and then the excess energy will be used to charge the battery. If the PV energy is insufficient, the battery will power the load.

Battery First: If there will be a storm or other emergency, user can use this attribute to adjust the power distribution priority. If this attribute is disabled, the solar power will cover the load on priority by default.

7.3.2.2 System Setting/Page Two:



①Users can set PV types, including **Independent**, **Parallel** and **Constant Voltage.**

②Enable or Disable ARC detection function.

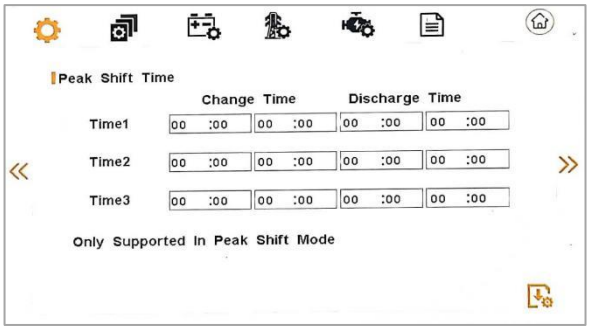
③ Color screen alarm switch. Set enabled, the buzzer will sound when the inverter alarms.

④ load2 Enable or disable the value. If the Battery SOC is less than the set Off value, load2 shuts down. If the Battery SOC is greater than the set On value, load2 is enabled.

⑤Modbus Address:

The default value is 1 and you do not need to change it.

7.3.2.3 System Setting/Page Three:



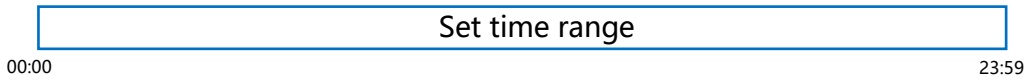
Setting of charging and discharging time for Peak Shift.

When the working mode is Peak Shift, users need to enter this interface to set the charging and discharging time. And Users need to manually input the start charge/discharge time and the end charge/discharge time.

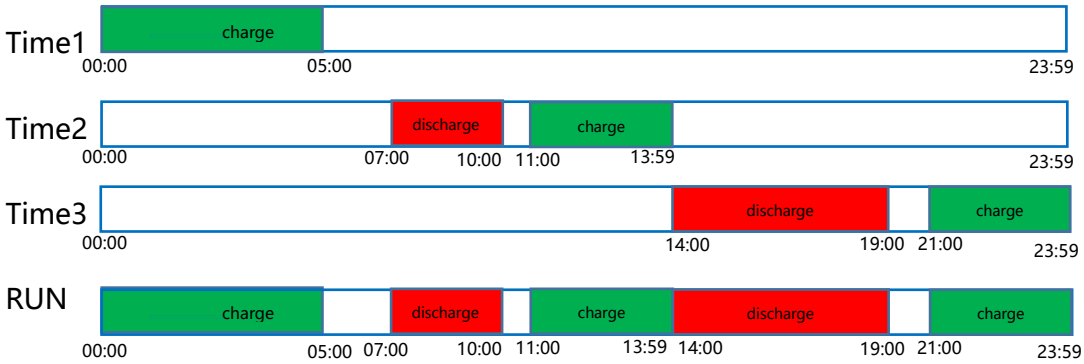
WORKTIME*

1) The maximum allowable setting time is 24 hour (one day), It is allowed to set six different charging and discharging states within 24 hour(time1 twice,time2

twice,time3 twice), The inverter runs repeatedly every day according to the set time.

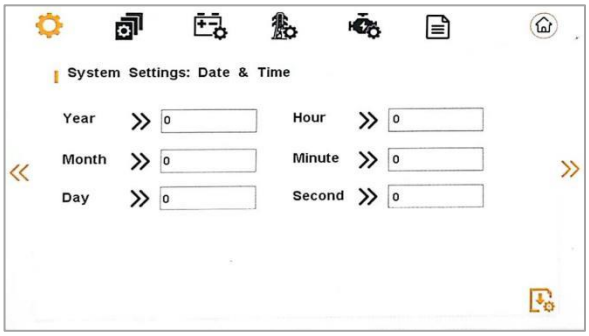


2) The inverter executes according to the settings of time1, time2 and time3 in the order of time. The following figure is an example。Different time periods do not overlap.



3） If you want to set a continuous charging time from the first night to the next morning. For example, you want charge battery form first day 21:00pm to next day 5:00am, divide this time period into two time periods (21:00~23:59, 00:00~05:00), and select two charging time periods from Time1, Time2 and Time3 and set them.

7.3.2.4 System Setting/Page Four:

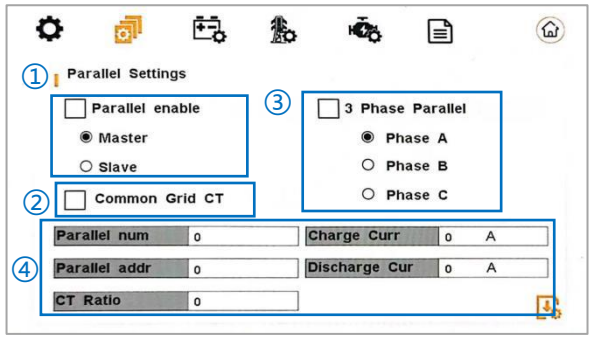


Date and Time settings

Users can manually modify the year, month, day, hour, minute and second.

The year input range should be between 2000 and 2099.

7.3.3 Parallel Settings



① **Parallel enable:** Start or disable the parallel function.

Master/Slave:

This interface is used for parallel, and the inverter is selected as the master or slave.

②**Common Grid CT:** Enable or disable CT sharing.

③**3 Phase Parallel:** Enable or disable group 3 phase enable.

PHASE A/B/C: This interface is used to select the output phase of the device when three phases are used. (Reserved function).

④ **Parallel num:** This operation is used to select the number of parallel machines.

Parallel addr: This interface is used to select the parallel address, the host address is set to 1 by default, there is a slave, and the slave is set to 2; If there are two slaves, the slaves are set to 2 and 3 respectively; the address settings of each inverter cannot be the same.

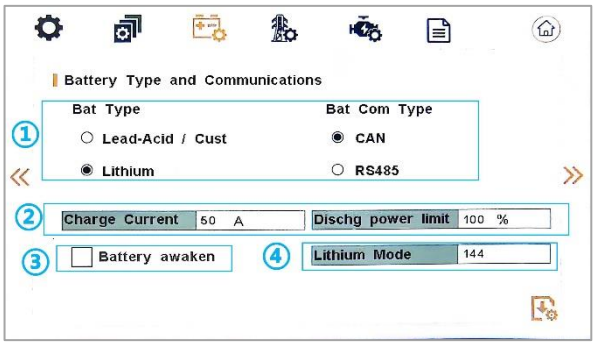
CT Ratio: Set the CT ratio to 1000:1 by default.

Charge Curr: This interface is used to select the parallel charging current.

Discharge Cur: Start or disable the parallel function.

7.3.4 Battery Settings

7.3.4.1 Battery Type and Communications:



① Set Battery Type and Battery Communication method.

Users can choose the **battery type** is lead-acid battery/lithium battery,

and the **battery communication** method is CAN/485. The default option is CAN.

② Users can manually input the value of charging current and discharge power limit.

③**Battery wake-up** :

When the battery is low and the battery relay has been disconnected, the inverter will send instructions to the battery forcibly sucking relay by BMS, and the inverter will charge.

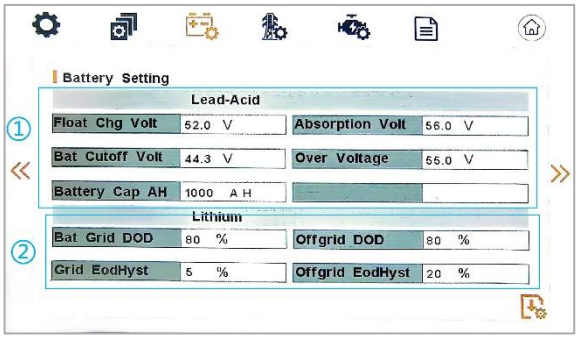
The default option is disabled. (Partial battery support)

If you want to use this feature, please consult the battery brand supported by the dealer. Use it only when the battery is too low.

After the battery wakes up successfully, please turn off the function, otherwise it will affect the normal operation of the machine.

④**Lithium Mode**: The default is 0, and this function is only used for lithium batteries with specific communication protocols. If required, please contact the supplier

7.3.4.2 Battery Setting:



②Settings required when using lithium

Bat Grid DOD/Grid Eod Hyst: When the battery discharge is higher than the set parameter, the inverter generates a battery low voltage alarm.

Off-grid DOD/Off-grid Eod Hyst: When a low-voltage alarm is generated, the alarm is cleared if the battery charge is higher than the specified amount.

① Settings required when using lead-acid batteries

Float Chg Volt: Charge the battery with constant voltage and small current (This interface is used to set the lead acid battery charging voltage. (The input value ranges from 40 to 59.5)Set the floating charge voltage to be less than the constant charge voltage).

Bat Cutoff Volt: Discharge protection voltage (This interface is used to set the lead acid battery discharging voltage. (The input value ranges from 40 to 51) Discharge cut-off voltage, as recommended by the battery manufacturer).

Battery Cap AH: Battery capacity (This interface is used to set the lead acid Battery capacity. It is related to the input power. (The input value ranges from 50 to 1000) The battery capacity setting will affect the maximum charging current, for example, set 100Ah, the maximum charging current is 100A*0.2=20A).

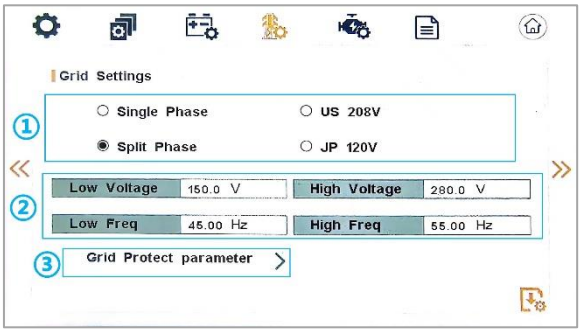
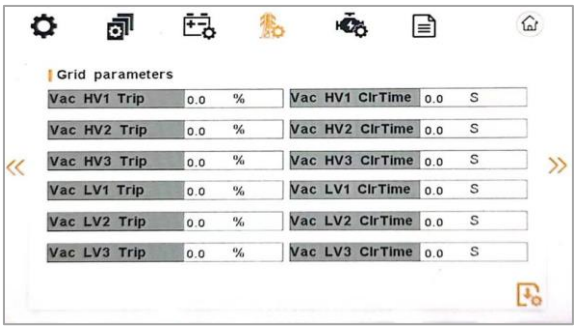
Absorption Volt: Charge the battery with constant current.

Over Voltage: Charging protection voltage (This interface is used to set the lead acid battery Charge protection voltage. (The

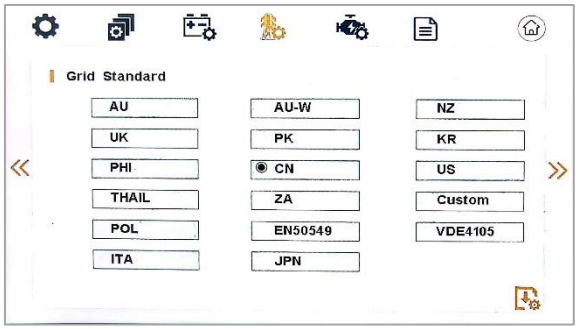
	input value ranges from 50 to 59.5) Charge protection voltage, as recommended by the battery manufacturer).

7.3.5 Grid Setting

7.3.5.1 Grid Setting/Page one

	①Inverter use Split Phase, default option is Split Phase.(JP 120V is the reserved standard) ②**Low Voltage**: The input value of Grid low voltage. It is valid when grid mode selected custom. **High Voltage**: The input value of Grid high voltage. It is valid when grid mode selected custom. **Low Freq**: The input value of Grid low frequency. It is valid when grid mode selected custom. **High Freq**: The input value of Grid high voltage. It is valid when grid mode selected custom.
	HV means high voltage trip protection. LV means low voltage trip protection. Vn stands for the rated voltage of the local grid. In US, Vn stands for 120V for split phase. If the user needs to use over-voltage and under-voltage protection, please contact the supplier.

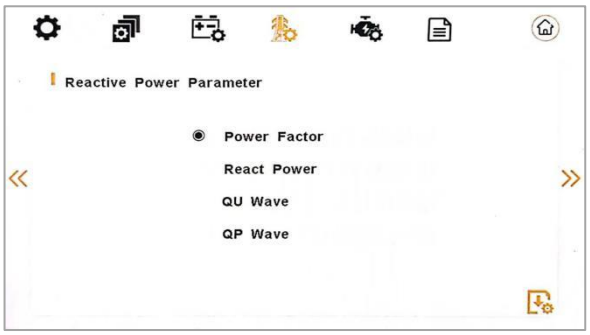
7.3.5.2 Grid Setting/Page Two



This interface is used to select Grid standard. Users can set and switch grid standards according to their needs.

AU: Australia	AU-W: Western Australia	NZ: New Zealand
UK: United Kingdom	PK: PAKISTAN	KR: Korea
PHI: Philippines	CN: China	US: America
TSAIL: THAILAND	ZA: South africa	Custom: User defined
POL: Poland	EN50549	VDE4105
ITA: Italy	JPN: Japan	

7.3.5.3 Grid Setting/Page Three



REACT Power Parameter: REACT Power Parameter , including: **Power Factor**, **React Power**, **QU Wave**, **QP Wave**. (For specific country if required by the local grid.)

Power Factor: The input value should range between L0.80 and L0.99 or C0.8 and C1.00.

React Power: Reactive power control

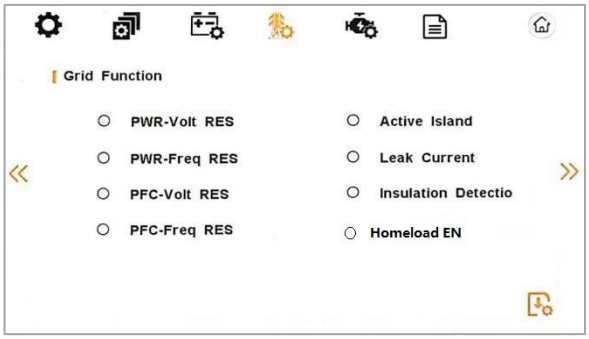
The input value should range between -60% and +60%, which varies with the standard.

QU Wave: Voltage-reactive curve

QP Wave: Active power-reactive power curve

(These two functions are not available on the screen, please contact the distributor if you need to use them.)

7.3.5.4 Grid Setting/Page Four

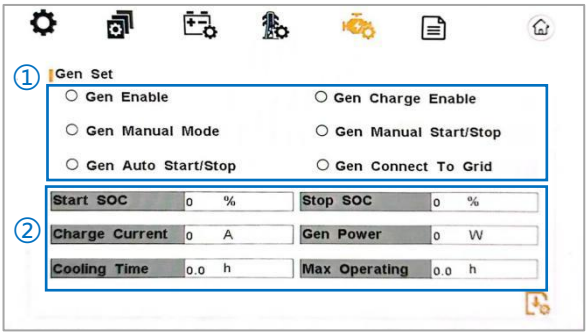


When the grid voltage is abnormal, the charging power will be limited, and the function will be enabled if required by the national grid standards.

PWR-VOLT RES: Generation voltage response.
When the grid voltage is abnormal, the active power is limited, and the function is enabled when required by the national grid standard.
PWR-FREQ RES: Generation frequency response.
When the power grid frequency is abnormal, the active power will be limited, and the function will be enabled if required by the national power grid standard.
PFC-VOLT RES: Charge voltage response
When the grid voltage is abnormal, the charging power will be limited, and the function will be enabled if required by the national grid standards.

PFC-FREQ RES: Charge frequency response.
When the power grid frequency is abnormal, the charging power will be limited, and the function will be enabled if required by the national power grid standard.
Anti-Island: Anti-Island (The default option is enabled)
When the grid goes down, inverter will detect the loss of power and disconnect from the grid within milliseconds. It prevents your solar panels from feeding electricity into a downed power line.
Leak Current: Leak current detect (The default option is enabled.)
Insulation detection: Insulation detect (The default option is enabled).
When the insulation detection function is enabled in the grid connected state, the insulation detection is performed once a day when the photovoltaic energy comes in, and the inverter switches to the By-pass band load. If the inverter is off-grid, the output will be disconnected during insulation detect and the load will stop working.
Home load EN: Enable home load statistics.

7.3.6 Generator Setting



①Diesel generator enable settings:

Gen Enable: Enable control of the Generator function.

Gen Chare Enable: Generator Charge Enable control.

Gen Auto Start/Stop: If the user wants the Generator to be automatically controlled to start and stop through the dry contact, please enable it.

Gen Manual Mode: If the user wants the Generator to be controlled manually, enable it (Manual control enable and automatic control enable are mutually exclusive when set).

Gen Manual Start/Stop:

The on/off command in manual control mode.

Gen Connect to Grid: Connect the diesel Generator to the grid input port.

② Diesel generator parameter setting:

Start SOC: When the SOC of battery is lower than the setpoint, the Generator dry contact is enabled and Generator Manual operation is disabled, the connected Generator will be started.

Stop SOC: When the SOC of battery is higher than the set point, the Generator dry contact is enabled and Generator Manual operation is disabled, the connected Generator will be stopped (START SOC < STOP SOC).

Charge Current: It indicates the maximum current that the inverter charges the battery from Generator.

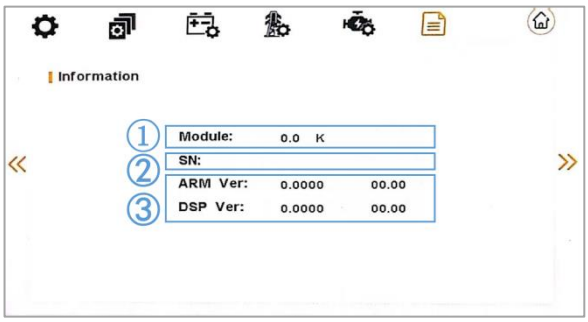
Gen Power: Rated power of Generator.

Cooling Time: It indicates the waiting time of the Generator to restart after it has reached the running time. The unit is 0.1 hour.

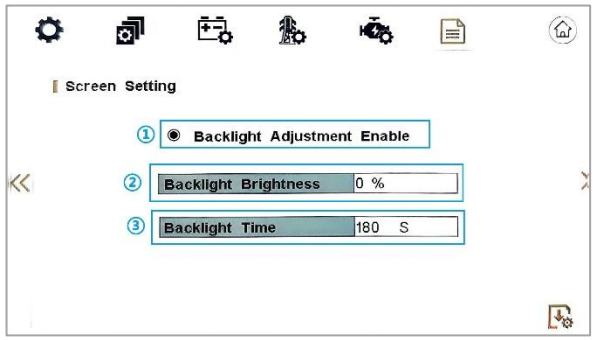
Max Operating: It indicates the longest time Generator can run in one day, when time is up, the Generator will be turned off. The value 240 means 24hours in which state the Generator will not be shut down all the time. The unit is 0.1 hour.

7.3.7 Machine Information

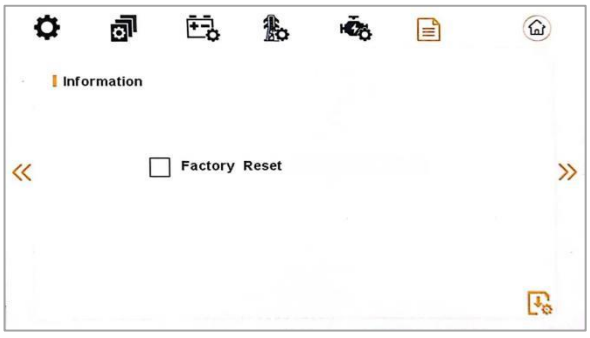
7.3.7.1 Machine Information/Page One

	①Show inverter model. ②Energy storage inverter serial number ③Show Software version

7.3.7.2 Machine Information/Page Two

	① Screen backlight adjustment control, you can use the following options to control the screen backlight. If the option does not enable, the screen will turn off in 3 minutes by default. ② Screen backlight brightness adjustment. The value ranges from 0 to 100%. ③ Set the screen-off time, value ranges from 5 to 250S.

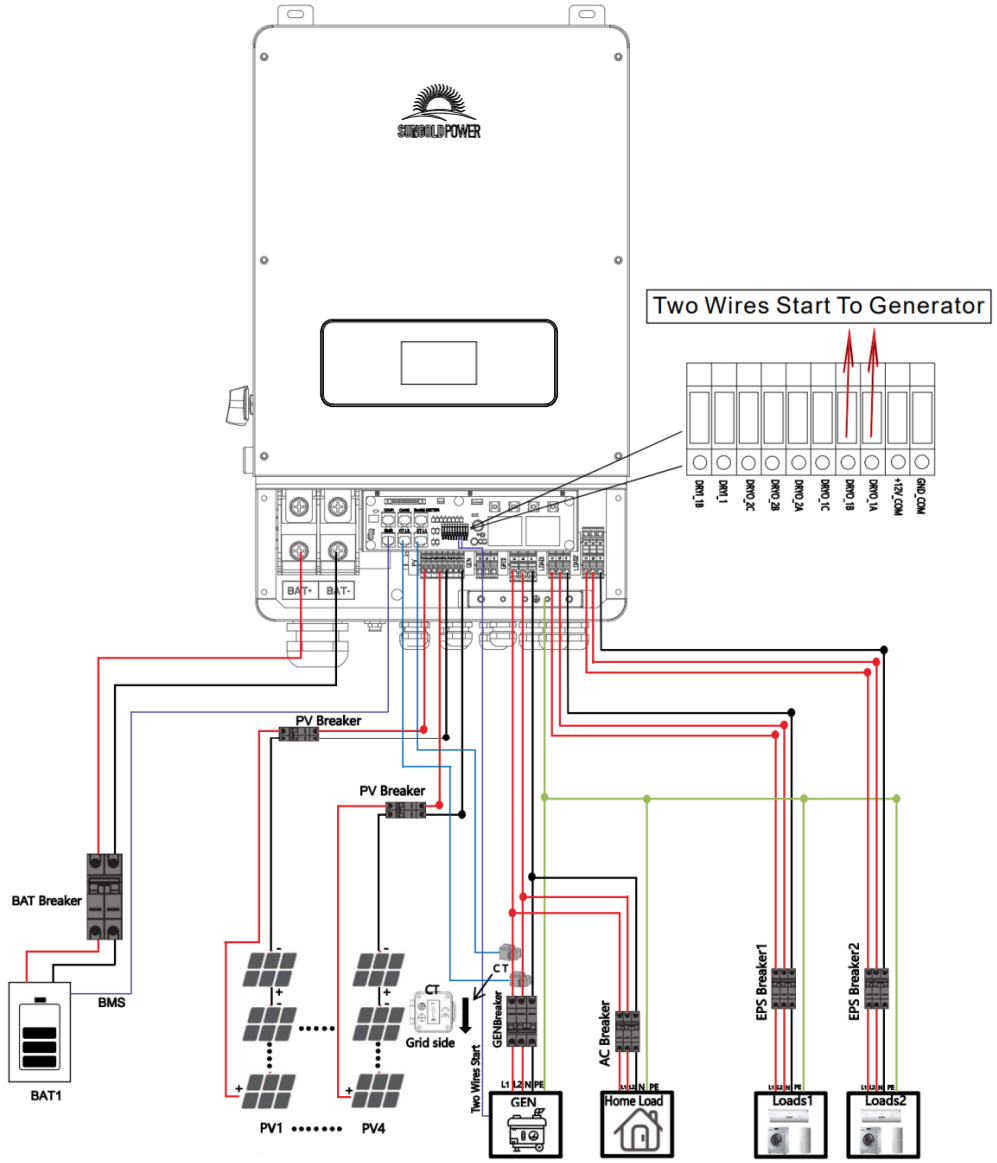
7.3.7.3 Machine Information/Page Three

	This interface is used to reset the inverter.

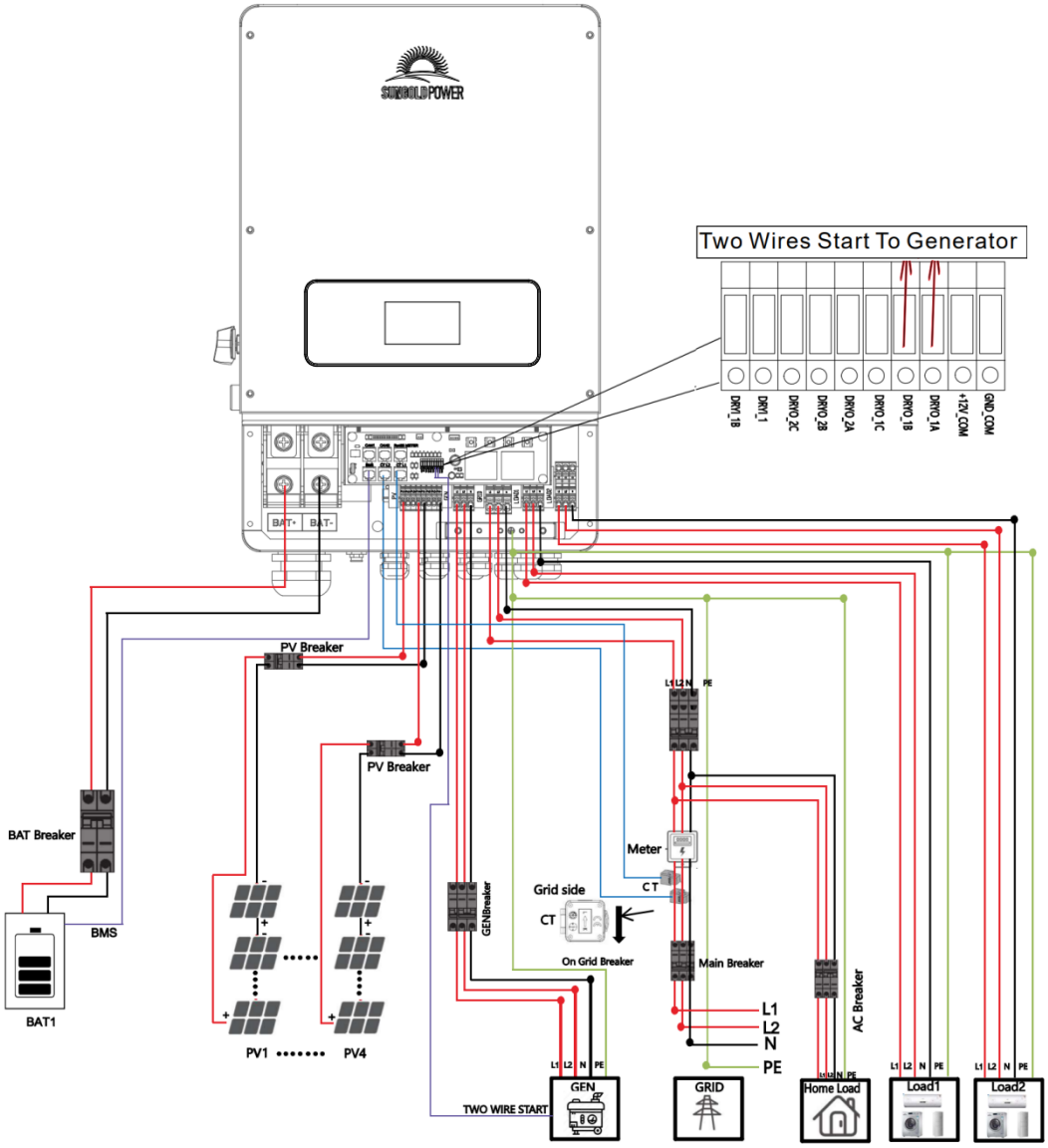
8. Generator Use Operation Guide

8.1 Generator Use Diagram

1）The Generator is connected to the grid port of the inverter. The connecting cable shall be covered with CT. It is used in some off gird situations. The system diagram is as follows.



2）The Generator is normally connected to the Generator port. The connecting cable between the Generator and the inverter does not need to be covered with CT. The connection line of the power grid port should be connected with CT. The system diagram is as follows.


Two Wires Start To Generator
DRY_1B
DRY_1
DRY_2C
DRY_2B
DRY_2A
DRY_1C
DRY_1B
DRY_1A
+12V_COM
GND_COM
BAT+
BAT-
PV Breaker
PV Breaker
BAT Breaker
BMS
BAT1
PV1
PV4
GENBreaker
Grid side
CT
CT
Meter
On Grid Breaker
Main Breaker
AC Breaker
L1
L2
N
PE
L1 L2 N PE
GEN
GRID
Home Load
Load1
Load2
TWO WIRE START

8.2 Generator Operation Notes

1) The two wires start signal **DRYO_1A** and **DRYO_1B** of the Generator is used to automatically control the start and stop of the Generator.

2)Make sure the inverter units software version support Generator function.
Password->**Information**

Information		
ARM Ver:	0.0000	00.00
DSP Ver:	0.0000	00.00

3) When the generator is used in inverter parallel situation, the two wires start signal is only needed to be connected to the master unit. The wiring and the setting of the Generator should be exactly same.

4)Please check the diagram above.

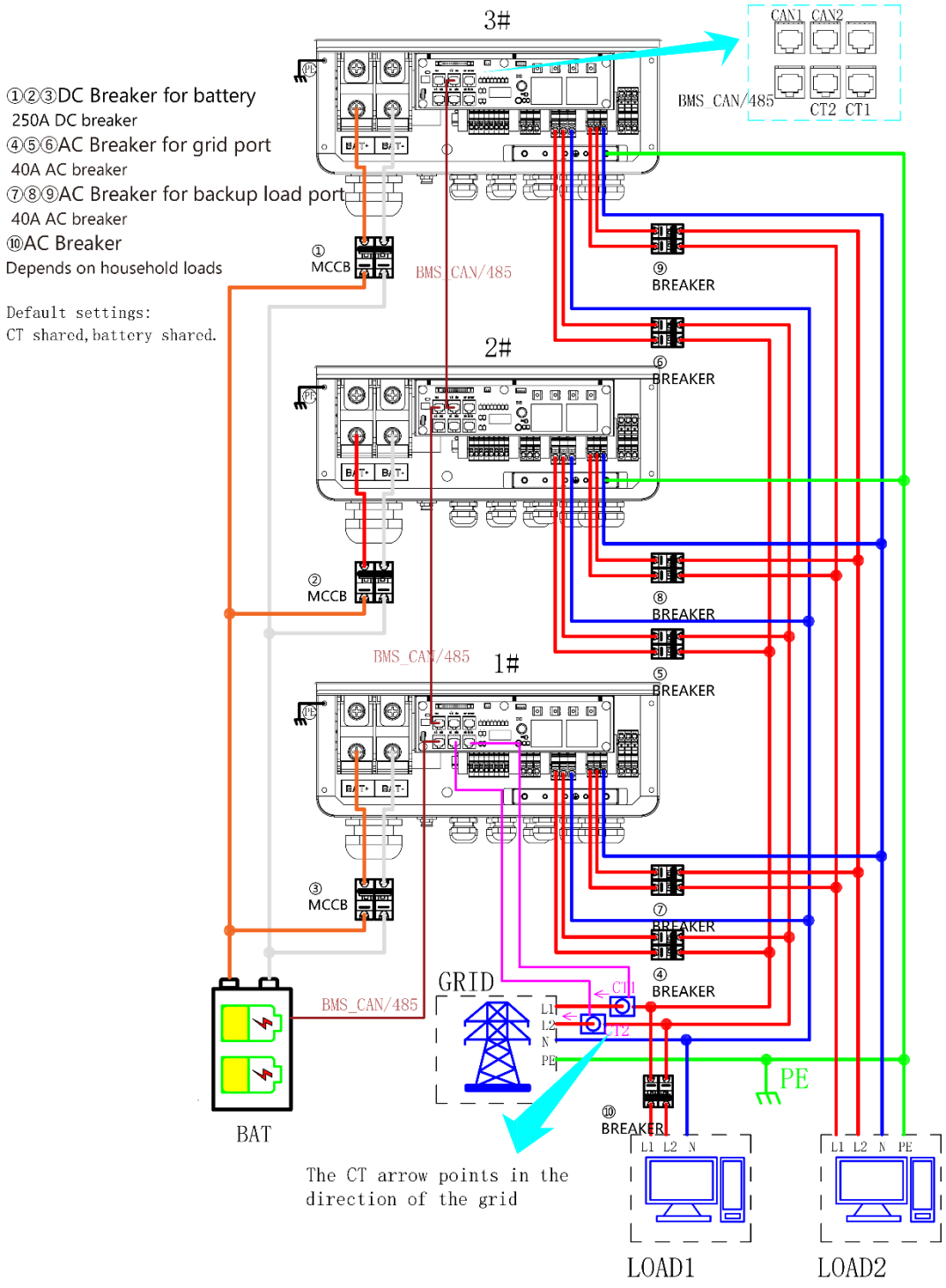
9. Inverter Parallel Guide

9.1 Parallel System Diagram

Multiple inverters can be installed together to deliver more power. When AC loads are present, all units effectively share the load. The system diagram is as follows.

When using the parallel machine, the user can choose to share CT or not share CT (without sharing CT, each inverter should be connected to one CT, CT connection method is the same as the single machine connection method). To use external loads, users must select the COMMON CT wiring method (as shown below) and select COMMON CT ENABLE.

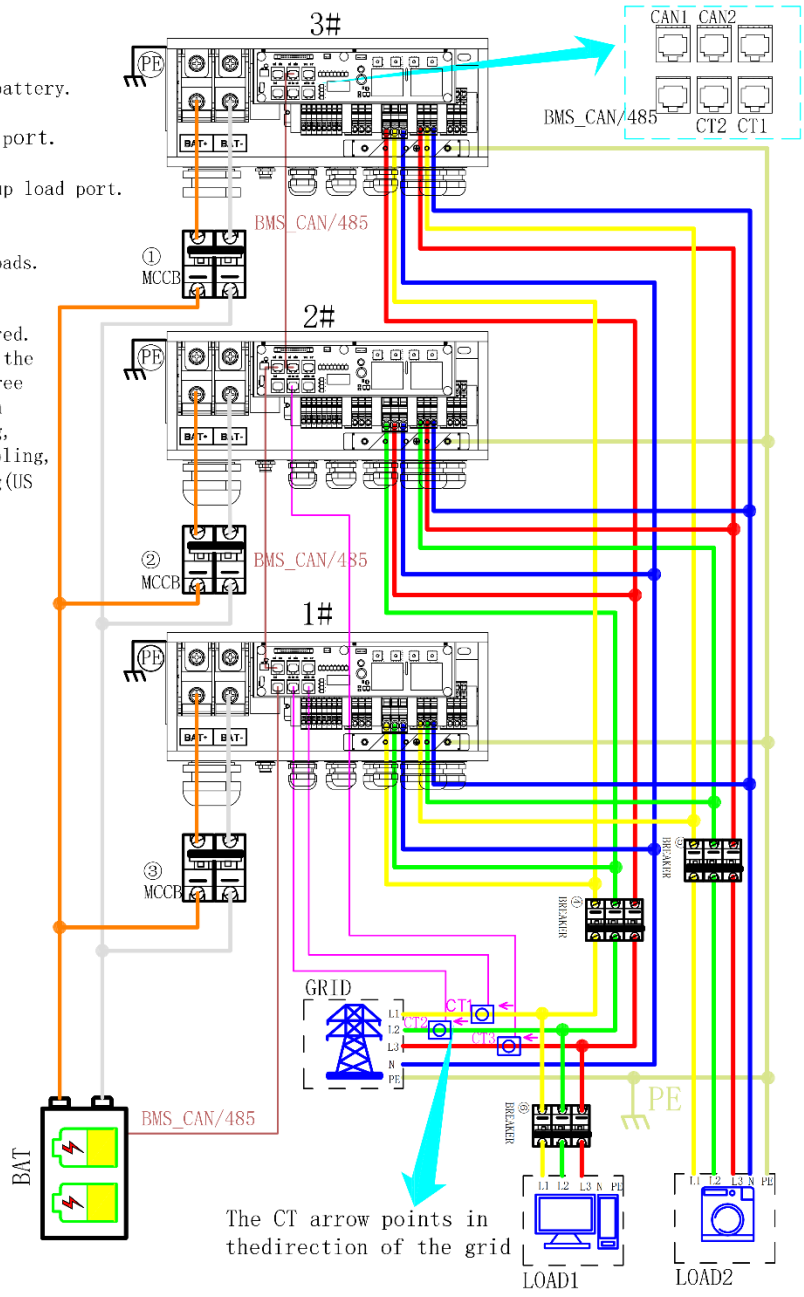
9.1.1 Split phase (120/240Vac) parallel connection diagram



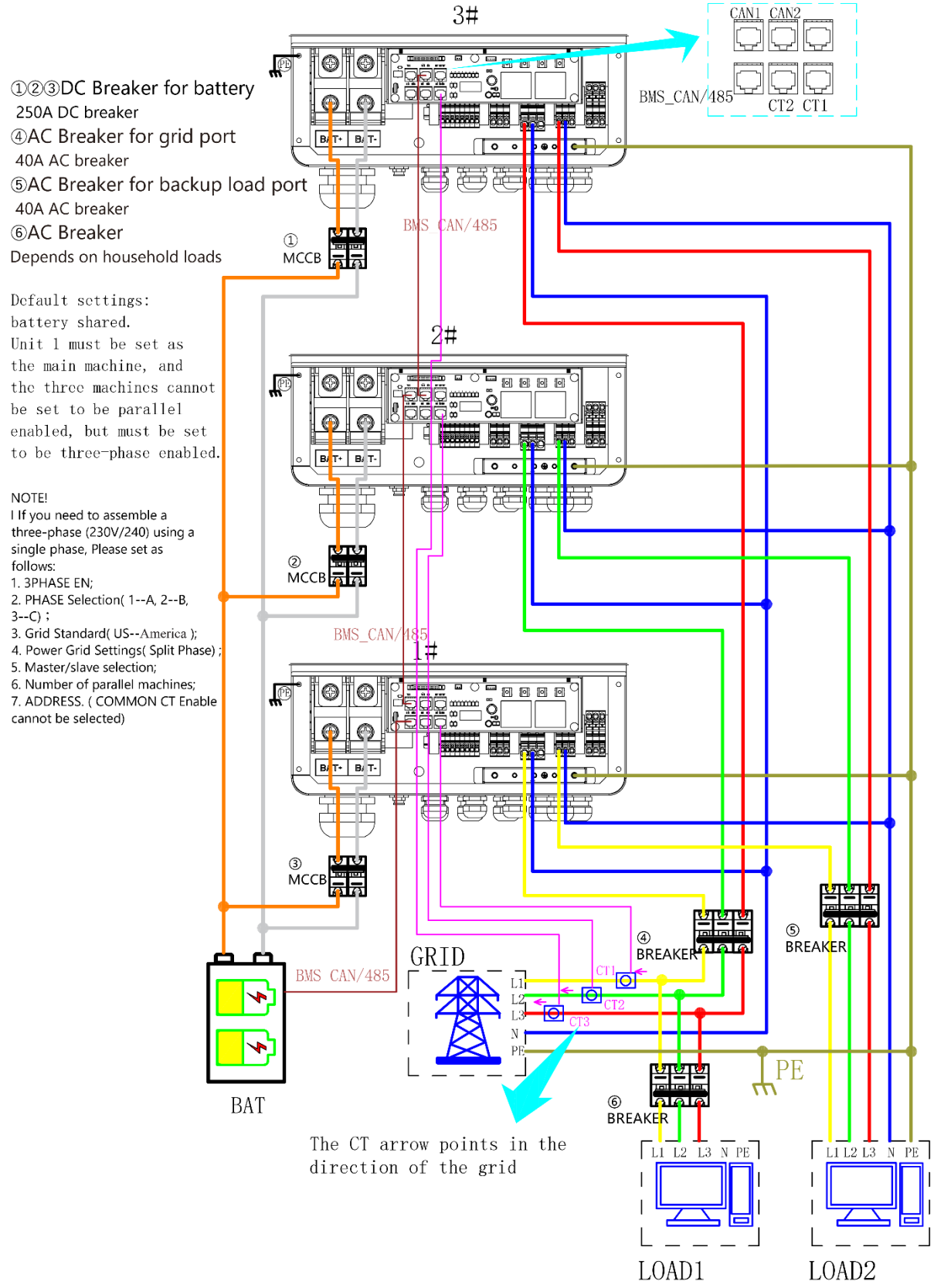
9.1.2 Parallel connection for 120/208 three phase(American Standard)

①②③DC Breaker for battery.
160A DC breaker.
④AC Breaker for grid port.
80A AC breaker.
⑤AC Breaker for backup load port.
80A AC breaker.
⑥AC Breake.
Depends on household loads.

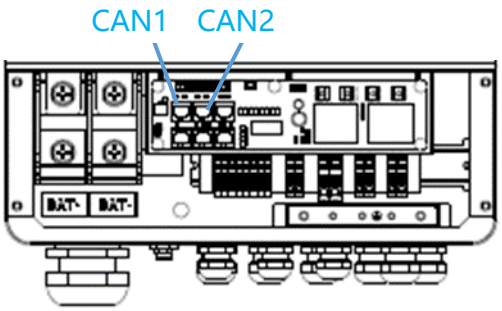
Default settings:
CT shared,battery shared.
Unit 1 must be set as the main unit, and all three units must be set with parallel unit enabling, group three-phase enabling, and Power Grid Setting(US 208V).



9.1.3 Parallel connection for 230/400 three phase(South Africa)



9.2 Parallel Communication Cable Connection



For parallel communication ,CAT 5 cables are needed. The units should be connected hand by hand.

When using common batteries, BMS cable needs to be connected to the master unit. The inverter shares the BMS information by inter-unit parallel communication cable.

9.3 Parallel Operation Notes

1) Make sure all the units in parallel are with the same software version.
Password->**Information**

Information		
ARM Ver:	0.0000	00.00
DSP Ver:	0.0000	00.00

2) Please check the diagram above .The common batteries use is supported on default for maximizing the system efficiency. The BMS cable should be connected to the master inverter.

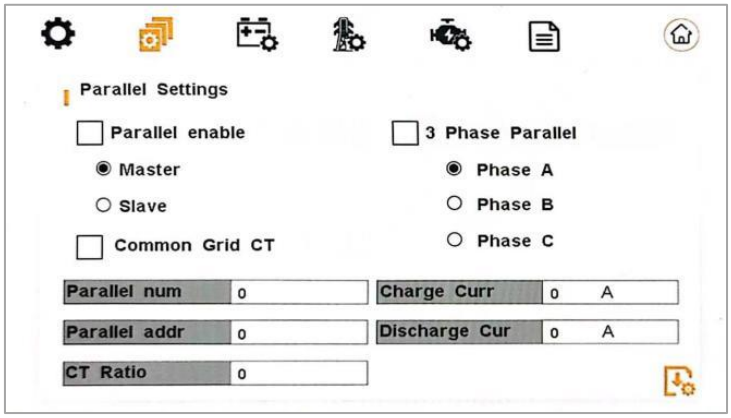
3) Connect the loads of the two inverters together first. It should be noted that **the grid power line and the load line of the two inverters should be roughly the same length.**

4) Make sure the CT Limiter sensor is installed properly. If the load is connected outside the inverter, user need to choose common ct and make sure the CT ratio is right(the default 90A ct ratio is 1:1000, no need to change). The common ct is only needed to be connected to the master inverter. Please install CT on every unit’ s incoming electrical service wires on L1 and L2 when choosing independent ct .
5) Please check the master and slaver’ s setting by screen and make sure all the setting are same.

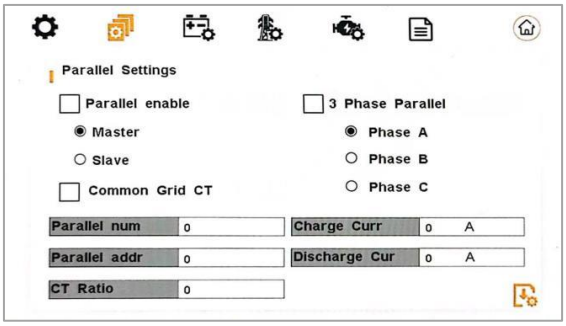
9.4 Parallel System Setting

The parallel setting page can be visited in the following steps in the screen:

Password->**Parallel Settings**



9.4.0 Setting



Common Grid CT: Common CT Enable, must be used when there is an external load.

Parallel num: Total numbers of the inverters.

Parallel addr: Local unit address(1-8), Master must be set to 1.

Charge Cur: Total battery charge current command, only be settable in master unit in parallel mode.

Discharge Cur: Total battery discharge current command, only be settable in master unit in parallel mode.

CT Ratio: The current accuracy of CT is 1000 by default

Parallel enable: Enable/Disable the parallel function.

Master/Slave: The local is the master or slave.

3 phase parallel: Enable or disable group 3 phase enable (It is only used when three-phase group is used, and it is disabled by default when parallel operation is performed.).

PhaseA/B/C: Local phase of unit for three-phase installation.

Note!

- If you need to assemble the split phase into three phases, please make the following settings:

1. 3PHASE EN； 2. PARALLEL EN； 3. PHASE Selection； 4. Grid Standard (United States); 5. Power Grid Settings(US 208V); 6. Master/slave selection; 7. Number of parallel machines; 8. ADDRESS.

- I If you need to assemble a three-phase (230V/240) using a single phase, please make the following settings:

1. 3PHASE EN; 2. PHASE Selection； 3. Grid Standard(South Africa); 4. Power Grid Settings(Split Phase); 5. Master/slave selection; 6. Number of parallel machines; 7. ADDRESS. (Do not PARALLEL Enable and COMMON CT Enable)

10. Advanced Mode Operation Guide

10.1 Advanced Mode Introduction

The hybrid inverter can be programmed to control how and when to use grid power. The Advanced mode allow management of flexible loads and time-of-use billing.

There are three advanced mode available: **Sell First Mode Self-consumption buy and sell Mode** and **Self-consumption sell disabled Mode.**

	Advanced Work mode		
	Selling First	**SFC.BuySell**	**SFC.SellDis**
Grid Sell Disable/Enable	Ignored. Be enabled automatically	For those region with feed-in-tarriff,plz enabled it.	Ignored Be disabled automatically
Mode Descrption	**Features:** Bat storage power can be sold out to power under TOU control. **When TOU is enabled:** When inside time slots:Charge or Discharge to grid at scheduled time and specific power without caring consumption. When outside of the time slots: The grid can not charge the battery, only allow the PV to charge the battery. **When TOU is disabled:** Always charge the battery first whatever from pv or grid. The battery doesn't discharge on grid mode.	**Features:** Use some grid power first,then use battery storage power under TOU control. **When TOU is enabled:** Day time: PV power load and charge battery first , surplux power feedback to grid(grid sell enable) or limit the pv yield(grid sell dis able). **The grid charge can be scheduled.** When outside of the time slots: The grid can not charge the battery, only allow the PV to charge the battery. **When TOU is enabled:** **Night time**: discharge battery to power the load if the battery capacity is available.For those region with tiered electricity price, user can set ct limit power to use some grid power first. The grid charge can be scheduled. When TOU is disabled: Always charge the battery first whatever from pv or grid. The battery doesn't discharge on grid mode.	**Features:** Never sell power to grid forever. **When TOU is enabled:** **Day time:**PV power loadand charge battery first,**surplux power will be limited** automatically. The grid charge can be scheduled. When outside of the time slots: The grid can not charge the battery, only allow the PV to charge the battery. **When TOU is enabled:** Night time: discharge battery to power the load if the battery capacity is available. **The grid charge can be scheduled.** **When TOU is disabled:** Always charge the battery first whatever from pv or grid. The battery doesn't discharge on grid mode.

There are also some attributes of these mode: **Global Grid Charge Enable**, **PV Charge Only**, **Bat Charge On Priority**, **Time-of-use Enable** and **6 Time-of-use Slots.** The time slots parameters are shown in as below:

Start Time	End Time	Bat Power	Grid Charge	Bat SOC
00:00	05:00	8000 W	√	50 %
05:00	08:00	8000 W		50 %
08:00	10:00	8000 W	√	50 %
10:00	16:00	8000 W		50 %
16:00	19:00	8000 W	√	50 %
19:00	23:59	8000 W	√	50 %

Bat Power: This slot is used to set the maximum power provided by the battery to the GRID and EPS.

Grid Charge: Check the box to enable the power grid charging function in this time period. If you don't, you can't use the grid to charge the battery.

Global Grid Charge Enable: It is a high level control attribute of grid charge enable. If time of use function is disabled, this attribute is used to judge whether or not to charge the battery by grid. After the usage time function is enabled, **Grid Charging** can be performed only when slot grid charging is enabled and the actual Bat SOC is smaller than the set Bat SOC（All three modes above operate according to this mode）.

Pv Charge Only: If user don’ t want to use grid to charge the battery in any time ,please enable this attribute （When this option is selected, the Global Grid Charge Enable is automatically disabled）.

Bat Charge On Priority: If there will be a storm or other emergency, user can use this attribute to adjust the power distribution priority. If this attribute is disable, the solar power will cover the load on priority by default.

6 Time-of-use Slots: There are 6 slots which can be programmed. If grid charge is enabled, the grid is used to power the load and charge the battery to target SOC at specific bat power attribute value.

Note!

- If the use time is started and the inverter is operating outside the timeline, it will run in SELF CONSUME mode.
- Advanced mode only makes sense when both the battery and the grid exist.

11. Fault diagnosis and solutions

The inverter is easy to maintain. When you encounter the following problems, please refer to the Solutions below, and contact the local distributor if the problem remains unsolved. The following table lists some of the basic problems that may occur during the actual operation as well as their corresponding basic solutions.

Fault diagnosis table

Content	Codes	Explaination	Solutions
DischgOverCur	01	Battery discharge over current. When the battery is loaded, the load is too large.	(1) Nothing need to do, Wait one minute for the inverter to restart. (2) Check whether the load is in compliance with the specification. (3) Cut off all the power and shut down all the machines; disconnect the load and plug in to restart machines, then check
Over Load	02	The load power is greater than other power. (PV,BAT)	(1) Check whether the load is in compliance with the maximum power of the machine. (2) Cut off all the power and shut down all the machines; disconnect the load and plug in to restart machines, then check whether the load is short circuited if the fault has been eliminated. (3) Contact customer service if error warning continues.
BatDisconnect	03	Battery Disconnect. (Battery voltage not identified)	(1) Check whether the battery is connected. (2) Check if battery wiring port is open circuited. (3) Contact customer service if error warning continues.
Bat Under Vol	04	Battery voltage low that normal range.	(1) Checking System Settings, If so, power off and restart. (2) Check if the grid power down. If so, waitting for the grid power up, the inverter will automatically charge. (3) Contact customer service if error warning continues.
Bat Low capacity	05	Bat Low capacity	(1) Battery Low that setting capacity. (SOC<100%-DOD)
Bat Over Vol	06	The battery voltage is greater than the Inverter maximum voltage.	(1) Checking System Settings, If so, power off and restart. (2) Contact customer service if error warning continues.
Gird low vol	07	Grid voltage is	(1) Check if the grid is abnormal.

Grid over vol	08	abnormal	(2) Restart the inverter and wait until it functions normally. (3) Contact customer service if error warning continues.
Grid low freq	09	Grid Frequency is abnormal.	(1) Check if the grid is abnormal. (2) Restart the inverter and wait until it functions normally. (3) Contact customer service if error warning continues.
Grid overFreq	10		
gfci over	11	Inverter GFCI exceeds standard.	(1) Check PV string for direct or indirect grounding phenomenon. (2) Check peripherals of machine for current leakage. (3) Contact the local inverter customer service if fault remains unremoved.
bus under vol	14	BUS voltage is lower than normal.	(1) Check the input mode setting is correct. (2) Restart the inverter and wait until it functions normally. (3) Contact customer service if error warning continues.
bus over vol	15	BUS voltage is over maximum value.	(1) Check the input mode setting is correct. (2) Restart the inverter and wait until it functions normally.
Inv over cur	16	The inverter current exceeds the normal value.	(1) Restart the inverter and wait until it functions normally.
Chg over cur	17	Battery charge current over than the Inverter maximum voltage.	(1) Restart the inverter and wait until it functions normally.
Meter Comm Fail	18	Meter Comm Fail	(1) Check whether the meter communication line is connected correctly.
Inv under vol	19	INV voltage is abnormal	(1) Check if the INV voltage is abnormal. (2) Restart the inverter and wait until it functions normally. (3) Contact customer service if error warning continues.
Inv over vol	20		
InvFreqAbnor	21	INV frequency is abnormal	(1) Check if the INV frequency is abnormal. (2) Restart the inverter and wait until it functions normally. (3) Contact customer service if error warning continues.

igbt temp high	22	The inverter temperature is higher than the allowed value	(1) Cut off all the power of the machine and wait one hour, then turn on the power of the machine.
bat over temp	23	Battery temperature is higher than the allowed value.	(1) Disconnect the battery and reconnect it after an hour.
bat UnderTemp	25	Battery temperature is low than the allowed value.	(1) Check the ambient temperature near the battery to see if it meets the specifications.
Relay open circuit	26	Grid side relay open circuit detection	(1) Used to detect whether the relay on the power grid side is disconnected due to a fault.
BMS comm.fail	28	Communication between lithium battery and inverter is abnormal.	(1) Check the cable, crystal, Line sequence. (2) Checking the Battery switch.
Fan fail	29	Fan fail	(1) Check whether the Inverter temperature is abnormal. (2) Check whether the fan runs properly. (If you can see it)
Grid Phase err	31	The grid fault phase.	(1) Check power grid wiring
Arc Fault	32	PV Arc Fault	(1) Check Photovoltaic panels, PV wire. (2) Contact customer service if error warning continues.
bus soft fail	33	Hardware may be damaged and need to troubleshoot the cause	(1) Restart the inverter and wait until it functions normally. (2) Contact customer service if error warning continues.
inv soft fail	34		
bus short	35		
inv short	36		
fan fault	37	Fan fault.	(1) Check whether the Inverter temperature is abnormal. (2) Check whether the fan runs properly. (If you can see it)

PV iso low	38	PV iso low	(1) Check if the PE line is connected to the inverter and is connected to the ground. (2) Contact customer service if error warning continues.
Bus Relay Fault	39	The inverter may be damaged	(1) Restart the inverter and wait until it functions normally. (2) Contact customer service if error warning continues.
Grid Relay Fault	40		
EPS rly fault	41		
Gfci fault	42		
Selftest fail	45		
System fault	46		
Current DCover	47		
Voltage DCover	48		

Note: If an error occurs that is not listed in the table, Please Contact customer service.