USER MANUAL

Solar Hybrid Inverter

HESP4880SH3

HESP48100SH3

HESP48120SH3

CONTENTS

1. Safety

1.1 How to use this manual

This manual contains important information、guidelines、operation and maintenance for the following products： HESP series 4880SH3, 48100SH3, 48120SH3
This manual must be followed during installation, use and maintenance.

1.2 Symbols in this manual

⚠ DANGER	DANGER: Indicates a hazardous situation which, if not avoided, will result in death or serious injury.
⚠ WARING	WARING: 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, may result in minor or moderate injury.
⚠ NOTICE	NOTICE: Provides tips or cues regarding product operation.

1.3 Safety instruction

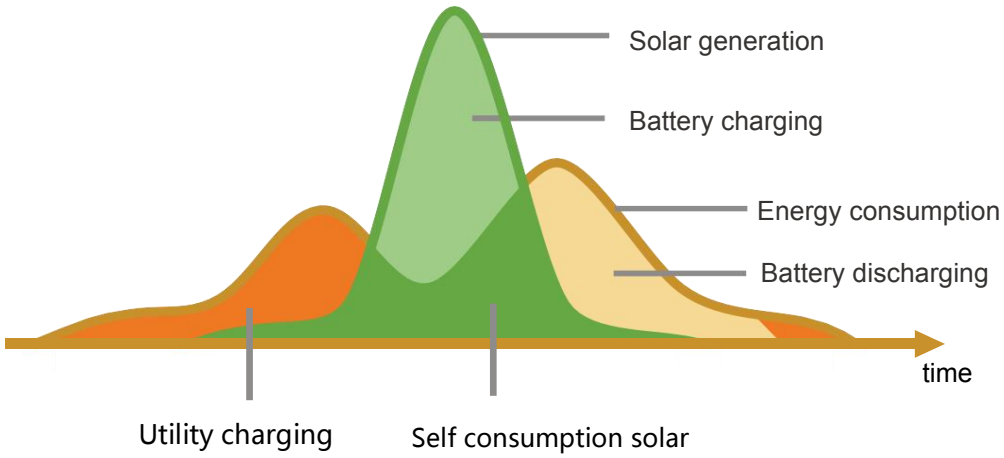
⚠ DANGER

- This chapter contains important safety instructions. Read and keep this manual for future reference.
- Be sure to comply the local requirements and regulation to install this inverter.
- Beware of high voltage. Please turn off the switch of each power sources before and during the installation to avoid electric shock.
- For optimal operation of this inverter, select the appropriate cable size and the necessary protective devices as specified.
- Do not connect or disconnect any connections when the inverter working.
- Do not open the terminal cover when the inverter working.
- Make sure the inverter is well grounding.
- Be careful not to cause short-circuiting of the AC output and DC input.
- Do not disassembly this unit, for all repair and maintenance, please take it to the professional service center.
- Never charge a frozen battery.

2. Production Instructions

2.1 Instructions

HESP SH3 series is a new type of solar energy storage inverter control inverter integrating solar energy storage & utility charging and energy storage, AC sine wave output. It adopts DSP control and features high response speed, reliability, and industrial standard through an advanced control algorithm.



2.2 Features

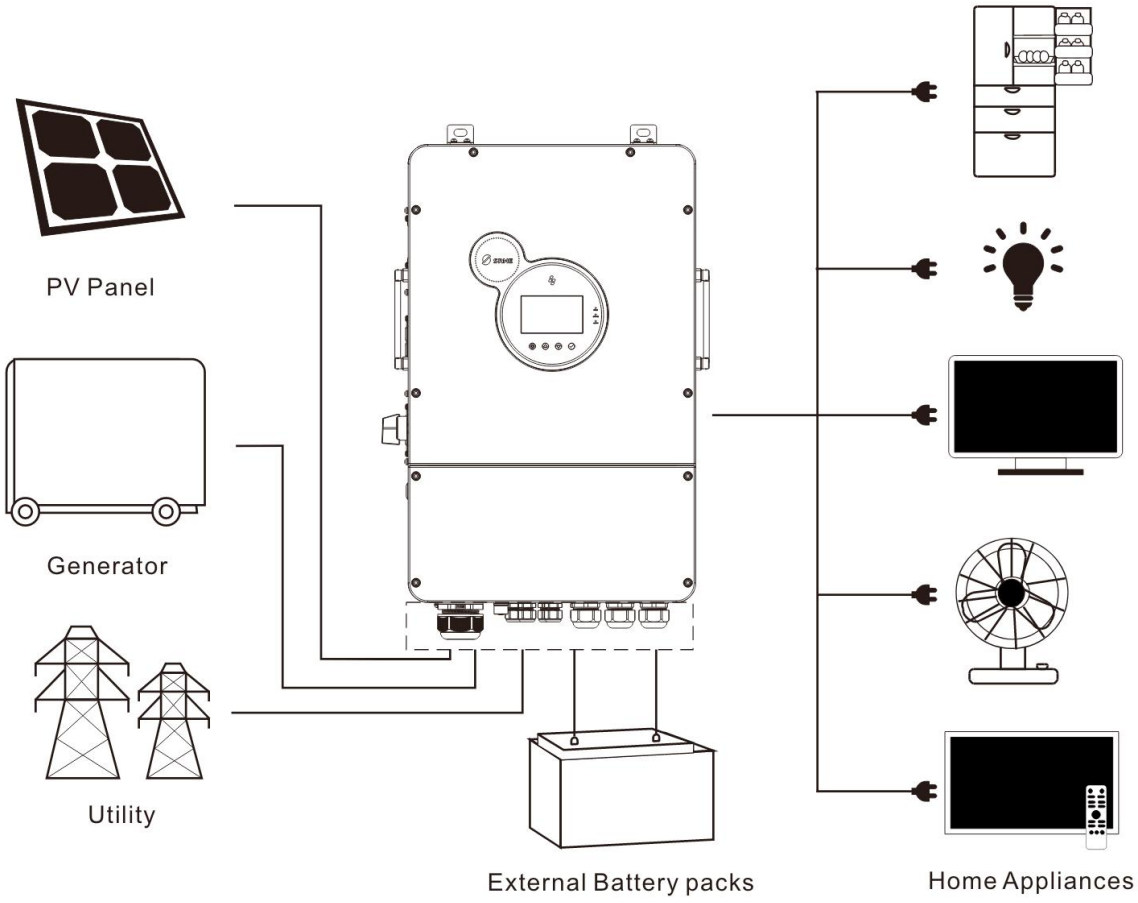
- Supports lead-acid battery and li-ion battery connections.
- Smart load function.
- AC coupling function.
- With a dual activation function when the li-ion battery is dormant; either mains or photovoltaic power supply access can trigger the activation of the li-ion battery.
- Support three-phase pure sine wave output (350~415V).
- Supports phase voltage adjustment in the range of 200, 208, 220, 230, 240Vac.
- Supports two PV inputs, with the function of simultaneously tracking the maximum power charging or carrying capacity of two MPPT.
- Dual MPPT, efficiency up to 99.9%, single maximum current of 22A, perfectly adapted to high-power modules.
- 2 charging modes are available: solar only, grid and PV hybrid charging.
- With time-slot charging and discharging setting function, it helps users to take advantage of peak and valley tariffs and save electricity costs.
- Energy-saving mode function to reduce no-load energy losses.
- With two output modes of utility bypass and inverter output, with uninterrupted power supply function.
- LCD large screen dynamic flow diagram design, easy to understand the system data and operation status.
- 360° protection with complete short-circuit protection, over-current protection, over-voltage protection, under-voltage protection, over-load protection, etc.
- Support CAN, USB, and RS485 communication.

2.3 System connection diagram

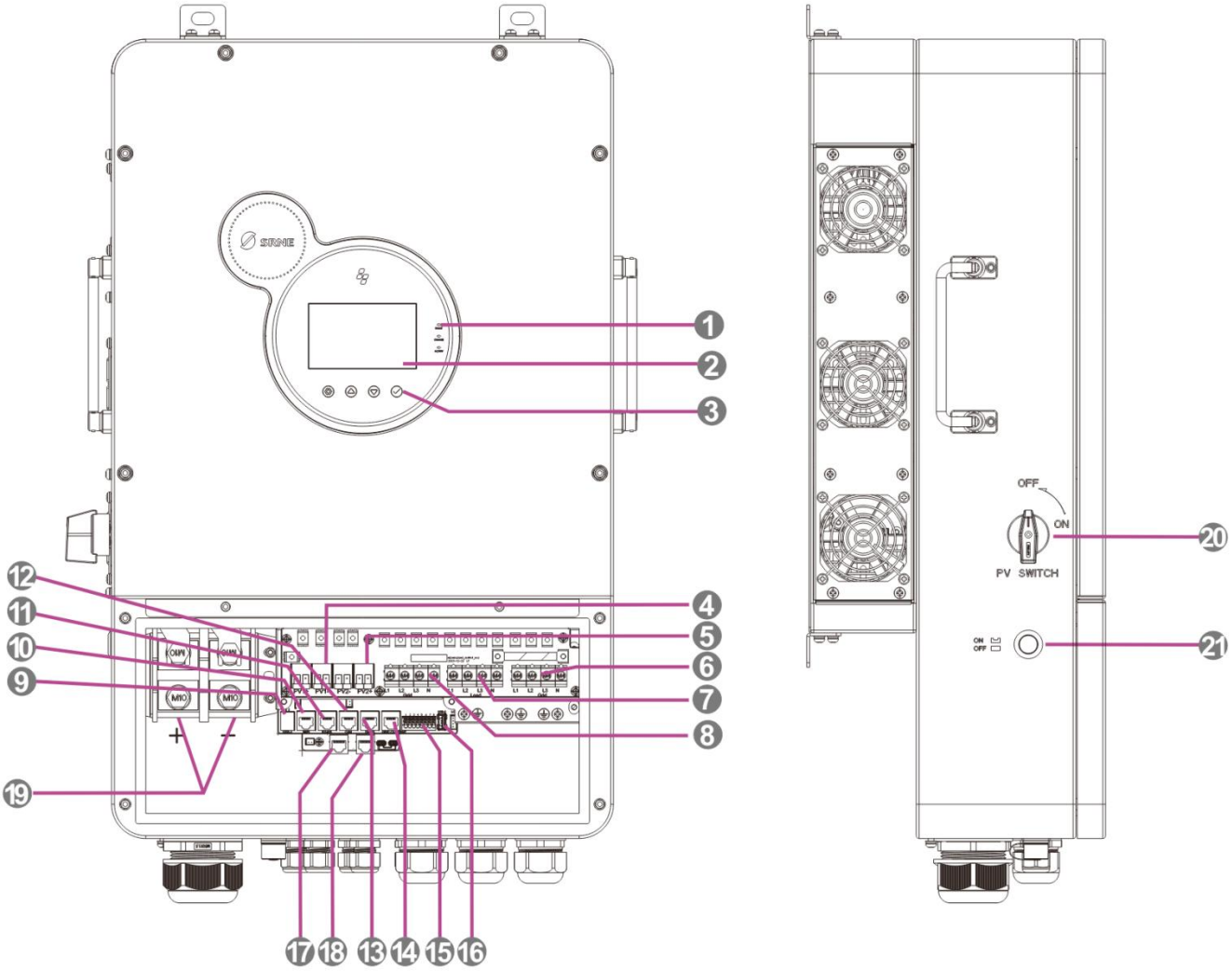
The diagram below shows the system application scenario of this product. A complete system consists of the following components:

- **PV modules:** Converts light energy into DC energy, which can be used to charge the battery via an inverter or directly inverted into AC power to supply the load.
- **Utility grid or generator:** Connected to the AC input, either of the connected utility and generator can charge the battery while supplying the load. When the batteries and photovoltaic modules supply the load, the system can operate without the utility or generator.
- **Battery:** The role of the battery is to ensure the normal power supply of the system loads in case of insufficient photovoltaic and no utility power.
- **Home load:** Connects to a variety of home and office loads including refrigerators, lamps, TVs, fans, air conditioners and other AC loads.
- **Inverter:** it is the energy conversion device of the whole system.

The actual application scenario determines the specific system cabling.

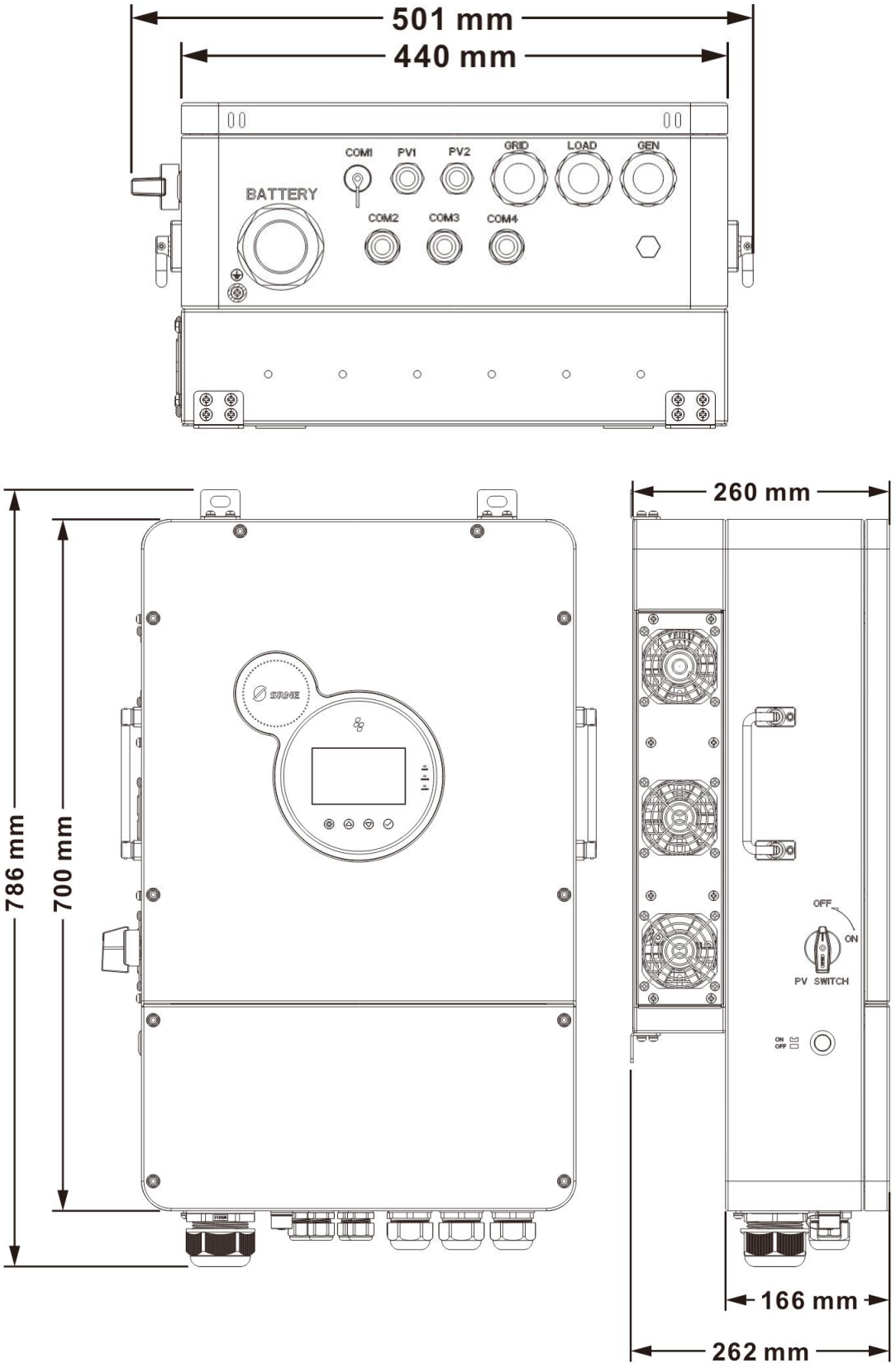


2.4 Production overview



1	LED indicator	2	LCD screen	3	Physical key
4	PV1 terminals	5	PV2 terminals	6	Generator terminals (L1+L2+L3+N)
7	Load terminals (L1+L2+L3+N)	8	Grid terminals (L1+L2+L3+N)	9	USB-1
10	WIFI	11	485 port	12	CAN terminal
13	DRMS	14	Grid current(CT)	15	Dry contact
16	USB-2	17	Parallel communication B	18	Parallel communication A
19	Battery terminals	20	PV circuit breaker	21	ON/OFF switch

2.5 Dimension drawing

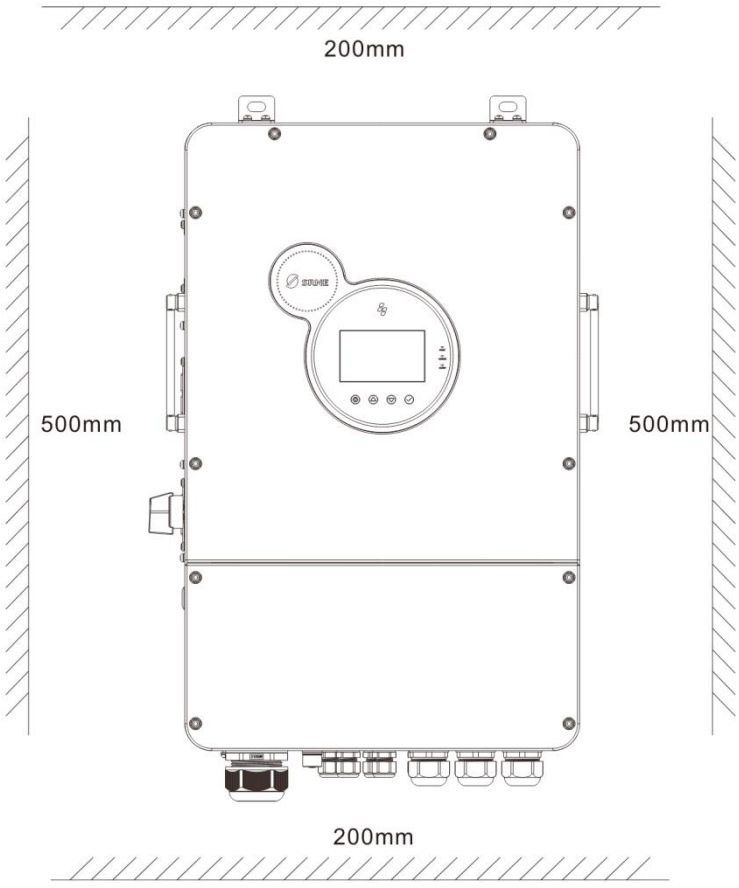


3. Installation

3.1 Select the mount location

HESP series can be used outdoors (protection class IP65). Please consider the followings before selecting the location：

- Choose the solid wall to install the inverter.
- Mount the inverter at eye level.
- Adequate heat dissipation space must be provided for the inverter.
- The ambient temperature should be between-25~60℃（-13~140℉） to ensure optimal operation.



DANGER

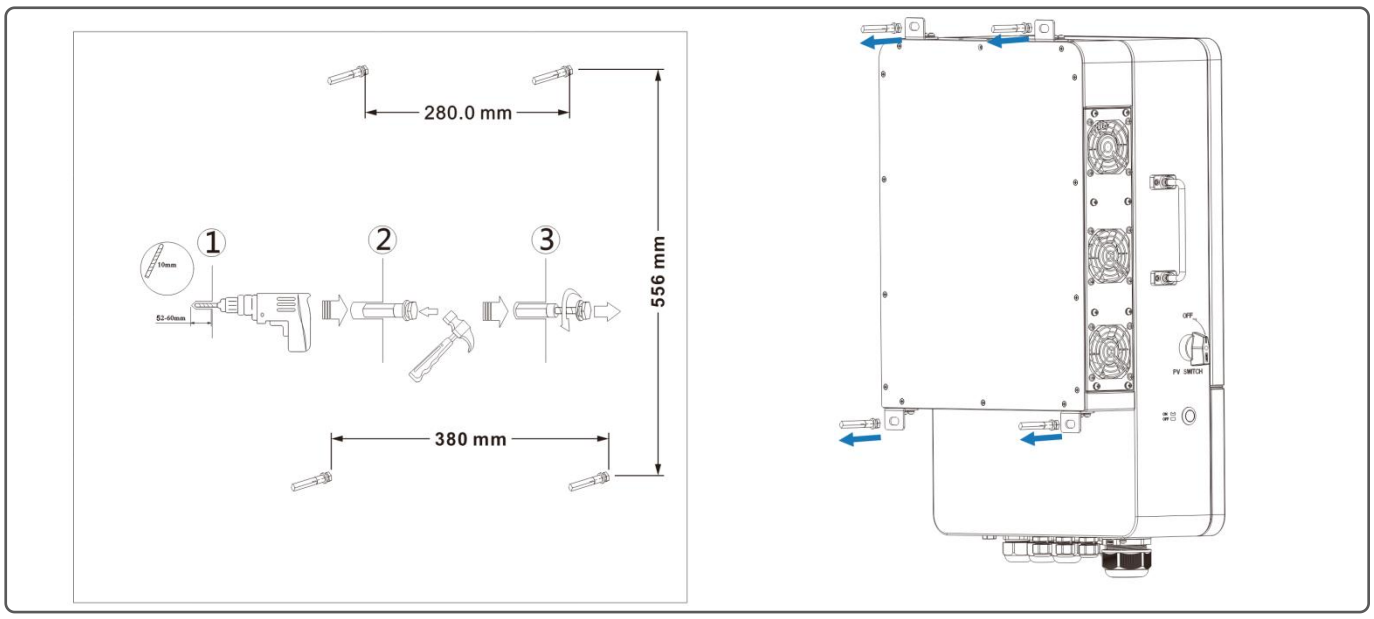
- Do not install the inverter near highly flammable materials.
- Do not install the inverter in a potentially explosive area.
- Do not install the inverter in a confined space with lead-acid batteries.

CAUTION

- Do not install the inverter in direct sunlight.
- Do not install or use the inverter in a humid environment.

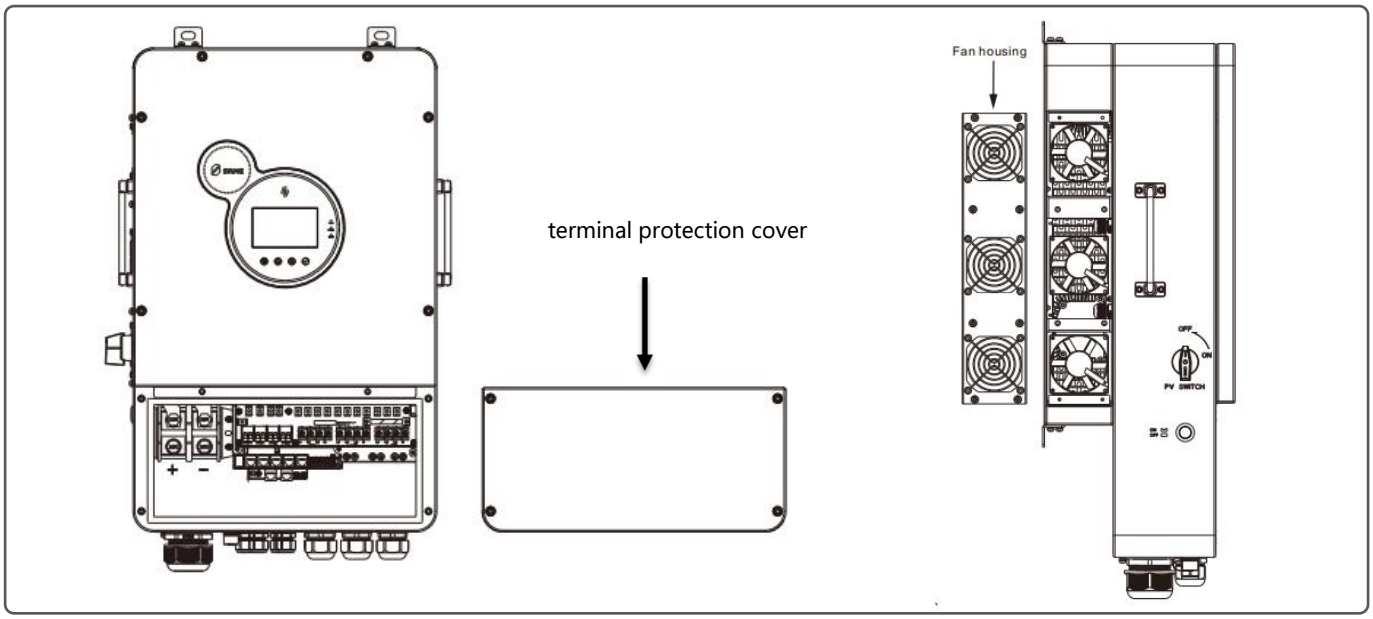
3.2 Mount the inverter

Punch 4 mounting holes in the wall with an electric drill according to the specified size, and insert 4 M8*60 expansion screws above.



3.3 Remove terminal protection cover and dust screen

Using a screwdriver, remove the terminal protection cover and dust screen.

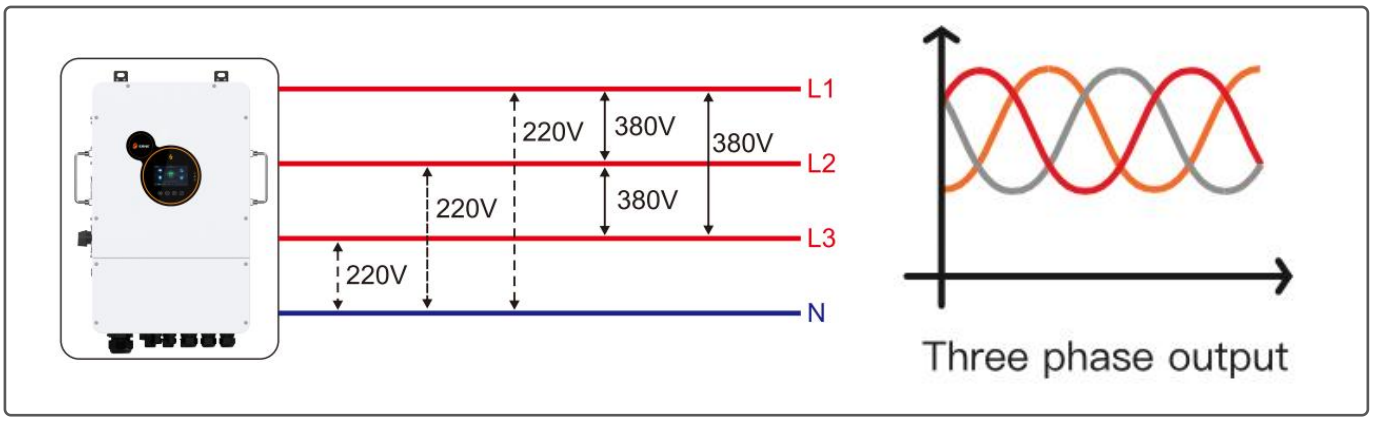


NOTICE

When using the device in areas with poor air quality, the dust screen is easily blocked by air particles. Please disassemble and clean the dust screen periodically to avoid affecting the internal air flow rate of the inverter, which may trigger an over-temperature protection fault (19/20 fault) affecting the use of the power supply and the service life of the inverter.

4. Connection

4.1 Three-phase mode



Items	Description
Applicable models	HESP series SH3 model
AC output phase voltage (L-N)	200~240Vac, 230Vac default

> ⚠ *NOTICE*
>
> The user can change the output phase mode and output voltage through the setup menu, please read chapter 5.2 for details.
> The output voltage corresponds to item [38] of the parameter setting, and the output phase voltage can be set within the range of 200V to 240V.

4.2 Cable & circuit breaker requirement

■ PV input

Models	Cable Diameter	Max. PV Input Current	Circuit Breaker Spec
HESP4880SH3	5mm²/ 10 AWG	22A	2P-25A
HESP48100SH3	5mm²/ 10 AWG	22A	2P-25A
HESP48120SH3	5mm²/ 10 AWG	22A	2P-25A

■ GRID

Models	Output Mode	Max. Phase Current	Cable Diameter	Circuit Breaker Spec
HESP4880SH3	Three-phase	23.2A	6mm²/8 AWG(L1/L2/L3/N)	4P-40A
HESP48100SH3	Three-phase	29A	7mm²/8 AWG(L1/L2/L3/N)	4P-40A
HESP48120SH3	Three-phase	35A	7mm²/8 AWG(L1/L2/L3/N)	4P-40A

■ Generator

Models	Output Mode	Max. Phase Current	Cable Diameter	Circuit Breaker Spec
HESP4880SH3	Three-phase	11.6A	5mm²/10AWG(L1/L2/L3/N)	4P-25A
HESP48100SH3	Three-phase	14.5A	5mm²/10AWG(L1/L2/L3/N)	4P-25A
HESP48120SH3	Three-phase	17.4A	5mm²/10AWG(L1/L2/L3/N)	4P-25A

■ Battery

Models	Cable Diameter	Max. Current	Circuit Breaker Spec
HESP4880SH3	53mm²/ 0 AWG	180A	2P-200A
HESP48100SH3	67mm²/ 00 AWG	220A	2P-250A
HESP48120SH3	67mm²/ 00 AWG	260A	2P-300A

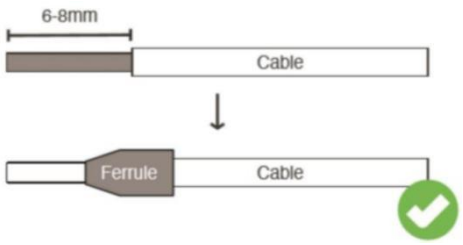
■ LOAD

Models	Output Mode	Max.phase Current	Cable Diameter	Circuit Breaker Spec
HESP4880SH3	Three-phase	11.6A	6mm²/8 AWG(L1/L2/L3/N)	4P-40A
HESP48100SH3	Three-phase	14.5A	7mm²/8 AWG(L1/L2/L3/N)	4P-40A
HESP48120SH3	Three-phase	17.4A	7mm²/8 AWG(L1/L2/L3/N)	4P-40A

⚠ *NOTICE*

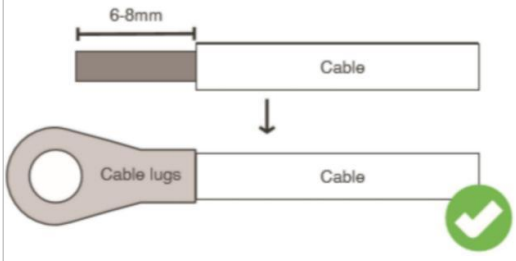
● PV input, AC input, AC output

① Use a stripper to remove the 6~8mm insulation of the cable.
② Fixing a ferrule at the end of the cable (ferrule needs to be prepared by the user).



● Battery

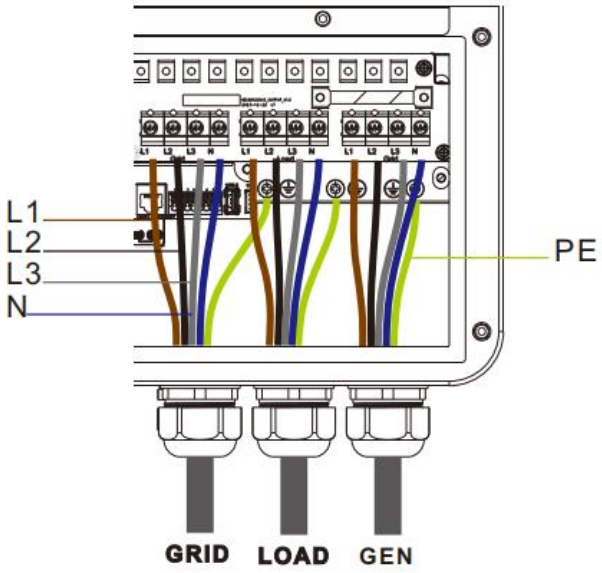
① Use a stripper to remove the 6~8mm insulation of the cable.
② Fixing cable lugs that supply with the box at the end of the cable.



The wire diameter is for reference only. If the distance between the PV array and the inverter or between the inverter and the battery is long, using a thicker wire will reduce the voltage drop and improve the performance of the system.

4.3 AC input & output connection

Connect the live, neutral and ground cables in the position and order of the cables as shown in the diagram below.

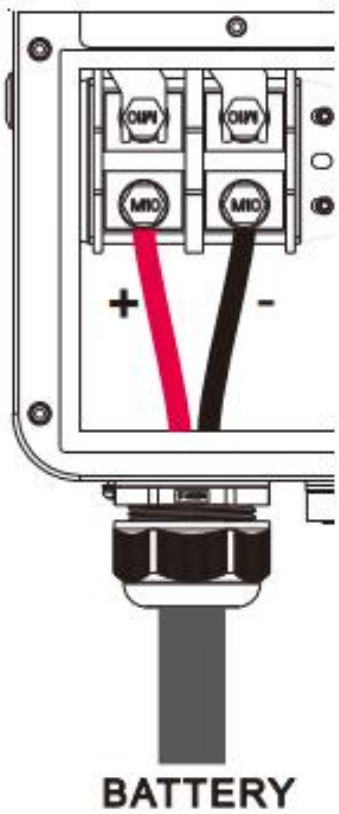


DANGER

- Before connecting the AC input and output, the circuit breaker must be disconnected to avoid the risk of electric shock and must not be operated with electricity.
- Please check that the cable used is sufficient for the requirements, too thin, poor quality cables are a serious safety hazard.

4.4 Battery connection

Connect the positive and negative cable of the battery according to the diagram below.

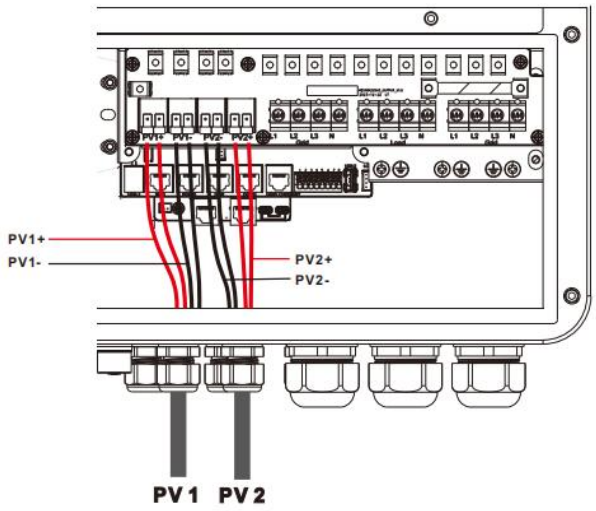


DANGER

- Before connecting the battery, the circuit breaker must be disconnected to avoid the risk of electric shock and must not be operated with electricity.
- Please ensure that the positive and negative terminals of the batteries are correctly connected and not reversed, otherwise the inverter may be damaged.
- Please check that the cable used is sufficient for the requirements, too thin, poor quality cables are a serious safety hazard.

4.5 PV connection

Connect the positive and negative wires of the two strings of PV according to the diagram below.

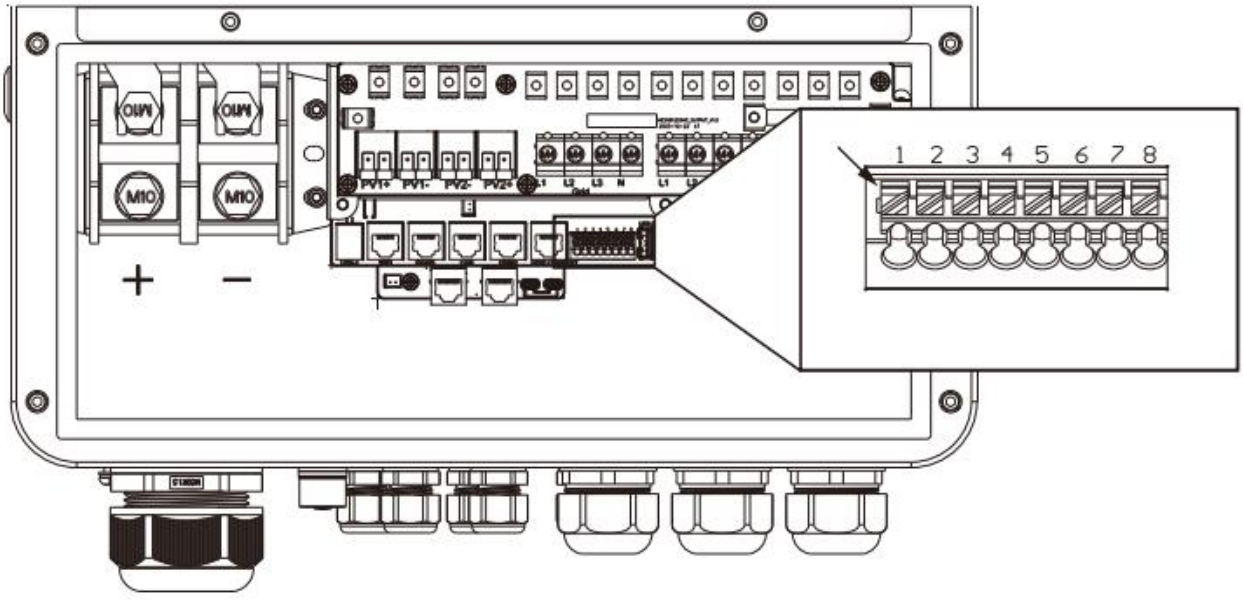


DANGER

- Before connecting the PV, the circuit breaker must be disconnected to avoid the risk of electric shock and must not be operated with electricity.
- Make sure that the open-circuit voltage of the PV modules connected in series does not exceed the maximum open-circuit voltage of the inverter (the value is 800V), otherwise the inverter may be damaged.

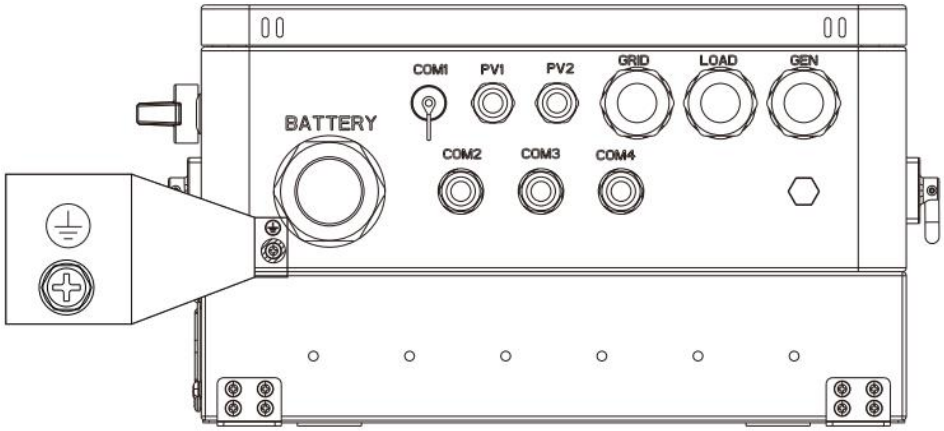
4.6 Dry contact connection

Use a small screwdriver to push back the direction indicated by the arrow, and then insert the communication cable into the dry junction port.
(Communication cable cross section 0.2~1.5mm^2)



4.7 Grounding connection

Make sure that the earth terminal is securely connected to the grounding busbar.



> ⚠ *NOTICE*
>
> Grounding wire shall be not less than 4 mm² in diameter and as close as possible to the earthing point.

4.8 Final assembly

After ensuring that the wiring is reliable and the wire sequence is correct, restore the terminal protection cover to its original position.

Step 1 : Close the circuit breaker of the battery.
Step 2 : Press the ON/OFF switch on the bottom of the inverter, the screen and the indicator light come on to indicate that the inverter is activated.
Step 3 : Sequential close of the circuit breakers for PV, AC input and AC output.
Step 4 : Start the loads one by one in order of power from small to large.

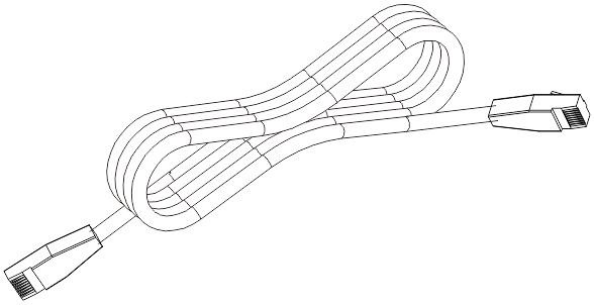
4.9 Parallel wiring

4.9.1 Parallel operation

① The parallel operation supports up to six solar storage inverters.

② When using the parallel function, it is necessary to connect the parallel communication cable in a correct and reliable manner. See the figure blow for the communication cable (packaging accessory):

Parallel communication cable*1



4.9.2 Cautions for parallel connection

Warning:

1. **PV wiring:**
   In parallel connection, the PV array of each inverter must be independent, and the PV array of PV1 and PV2 for one inverter must also be independent.

2. **Battery wiring**
   In single-phase or three-phase parallel connection, all solar storage inverters must be connected to the same battery, with BAT+ connected to BAT+ and BAT- to BAT-, and before power on and start-up, it is necessary to check and ensure correct connection, wiring length, and cable size, so as to avoid the abnormal operation of parallel system output caused by wrong connection.

3. **LOAD wiring:**
   In single-phase parallel connection, all solar storage inverters must be connected in the manner of L-to-L, N-to-N, and PE-to-PE, and before power on and start-up, it is necessary to check and ensure correct connection, wiring length, and cable size, so as to avoid the abnormal operation of parallel system output caused by wrong connection.
   In three-phase parallel connection, all solar storage inverters must be connected in the manner of N-to-N and PE-to-PE. The L lines of all inverters in the same phase shall be connected together, but the AC output L lines of different phases shall not be connected together. Other cautions are the same as those for single-phase parallel connection.

4. **GRID wiring:**
   In single-phase parallel connection, all solar storage inverters must be connected in the manner of L-to-L, N-to-N, and PE-to-PE, and before power on and start-up, it is necessary to check and ensure correct connection, wiring length, and cable size, so as to avoid the abnormal operation of parallel system output caused by wrong connection. Meanwhile, it is not allowed to have multiple different AC source inputs to avoid damage to the external equipment of the inverter. The AC source input shall be consistent and unique.
   In three-phase parallel connection, all solar storage inverters must be connected in the manner of N-to-N and PE-to-PE. The L lines of all inverters in the same phase shall be connected together, but the AC output L lines of different phases shall not be connected together. Other cautions are the same as those for single-phase parallel connection.

5. **Communication wiring:**
   Our parallel communication cable is a shielded 10Pin network connection cable, which can be used for single-phase or three-phase parallel connection. Each machine must be connected with one out and one in. This means that the machine "Parallel_A" is connected to the machine to be parallelized "Parallel_B", and that the machine "Parallel_A" is not

allowed to connect to the "Parallel_B". "Parallel_B" or "Parallel_A" is connected to the machine to be parallelized "Parallel_A". At the same time, the parallel communication cable of each machine should be fastened with 10Pin network connection cable to avoid disconnection or poor contact of the parallel communication cable, which may cause abnormal operation or damage to the system output.

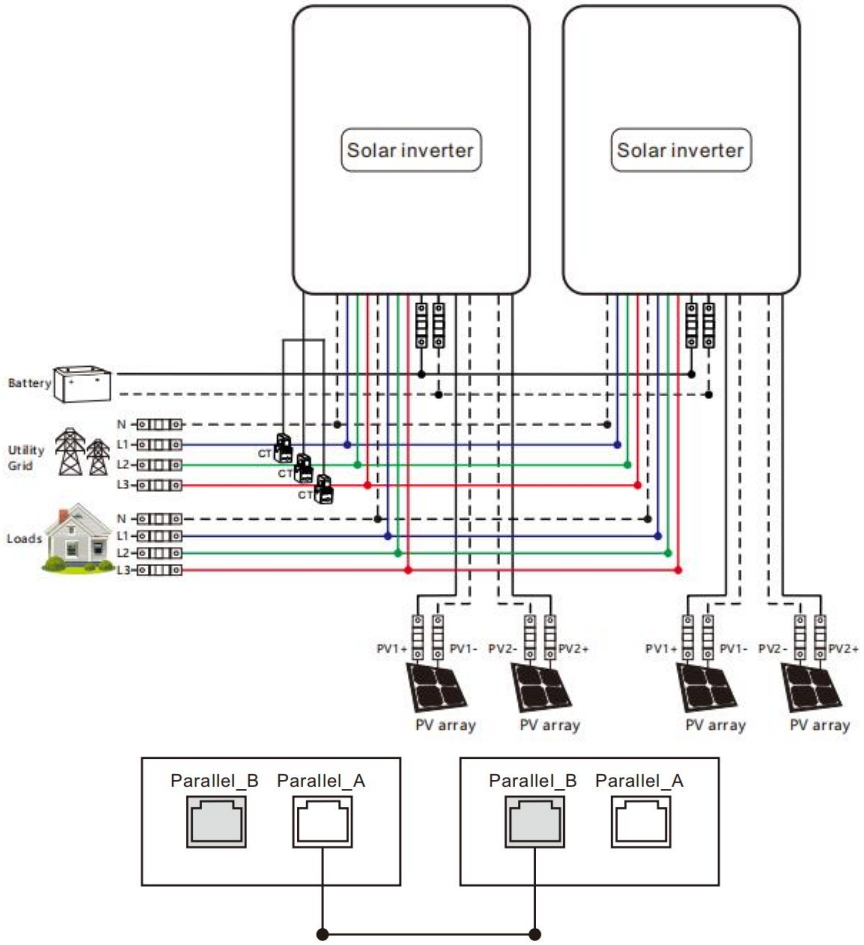
6. Before and after connecting the system, please carefully refer to the following system wiring diagrams to ensure that all wiring is correct and reliable before power on.

7. After the system is correctly wired, powered on, and in normal operation, if a new inverter needs to be connected, make sure to disconnect the battery input, PV input, AC input and AC output, and that all solar storage inverters are powered off before reconnecting into the system.

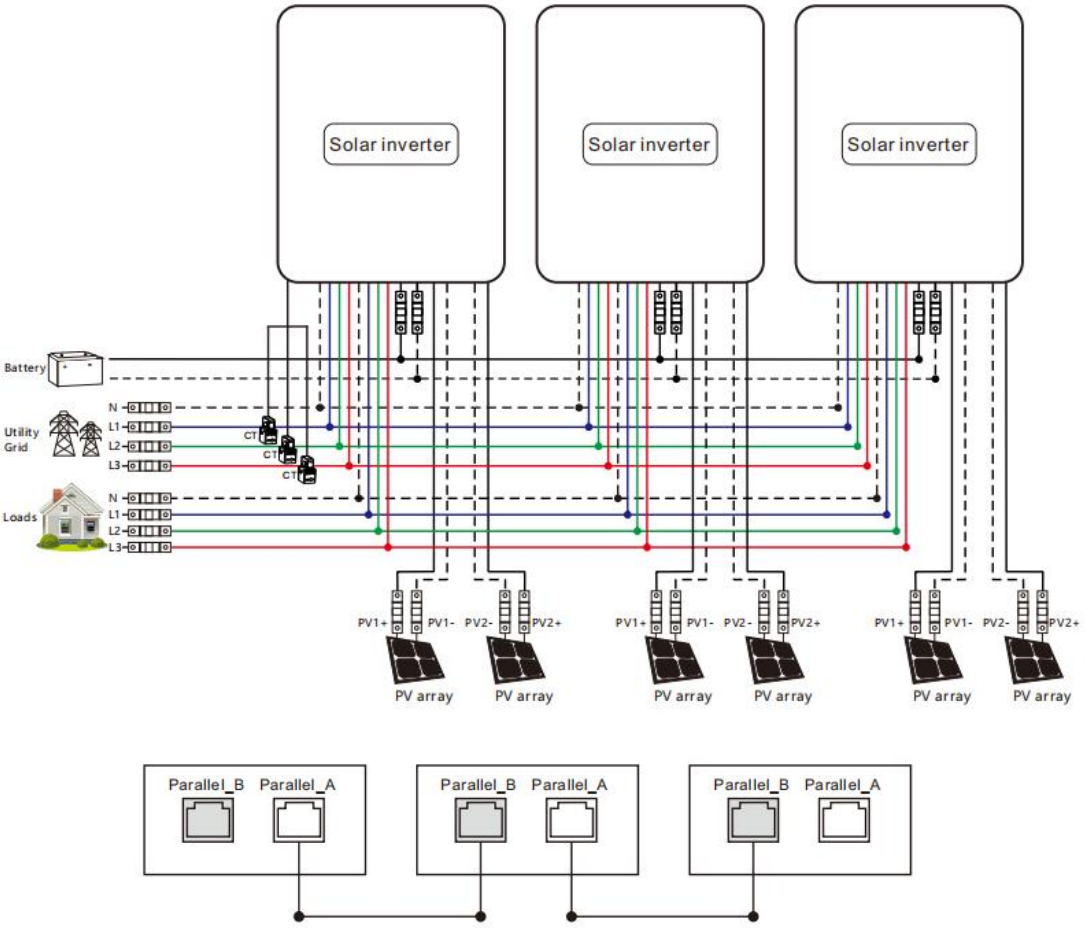
4.9.3 Schematic diagram of parallel connection

The parallel mode need to be set as" parallel" for each inverters

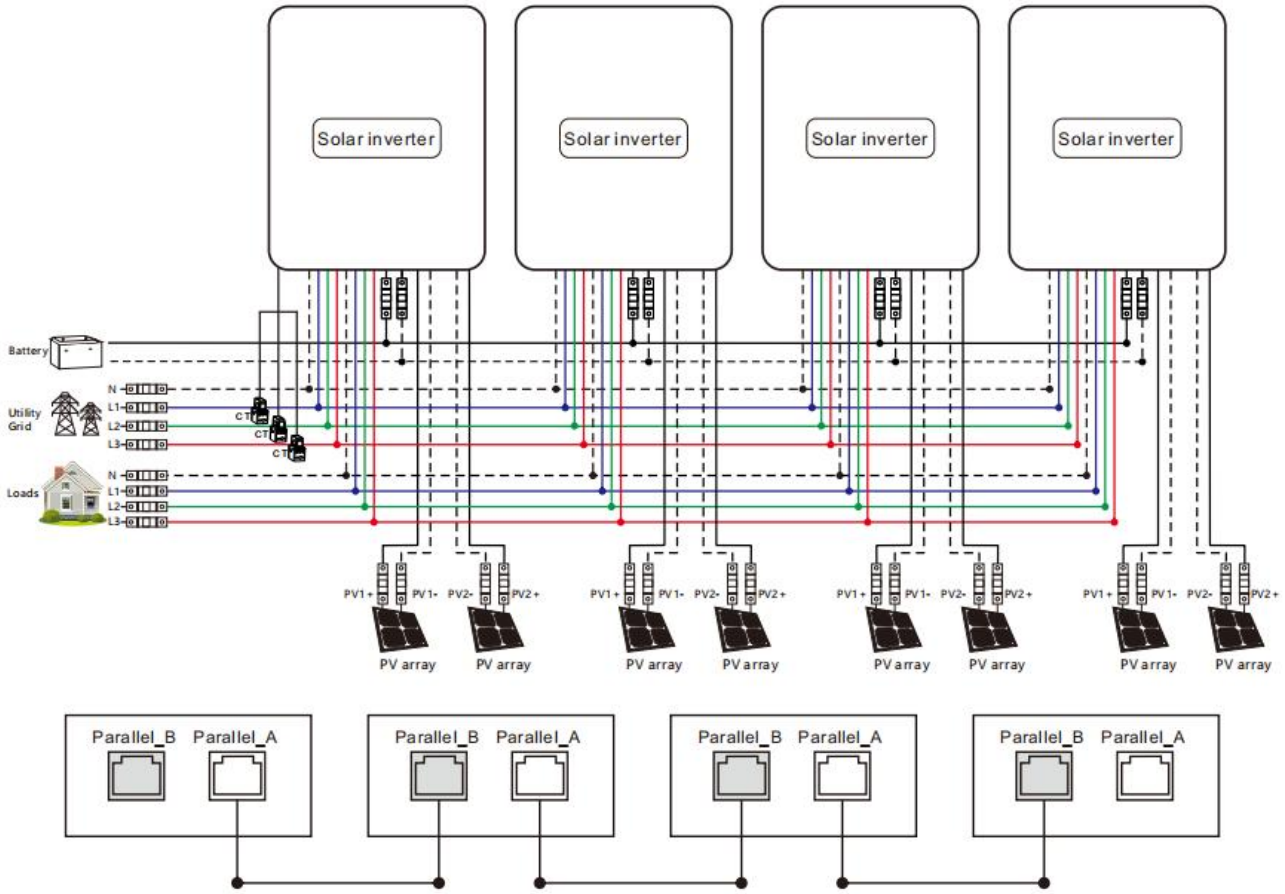
a) Two units connected in parallel:



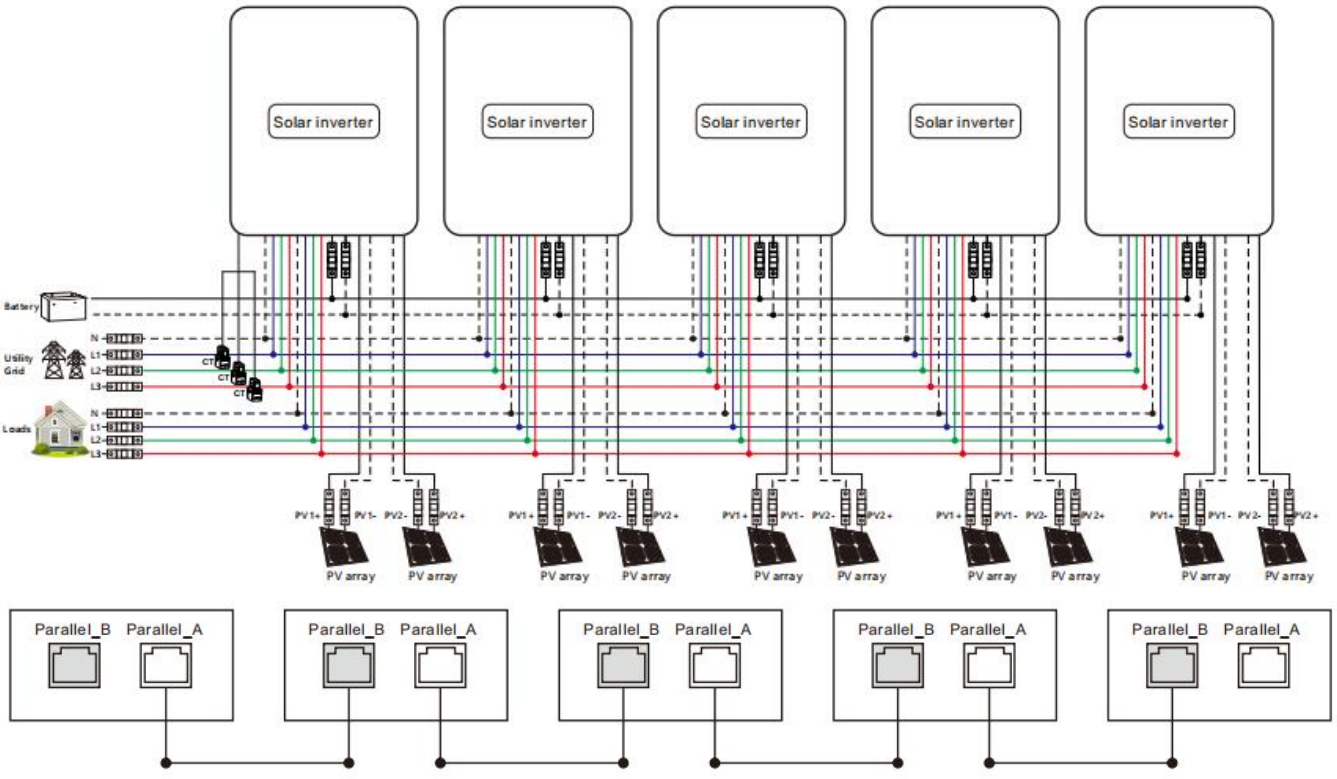
b) Three units connected in parallel:



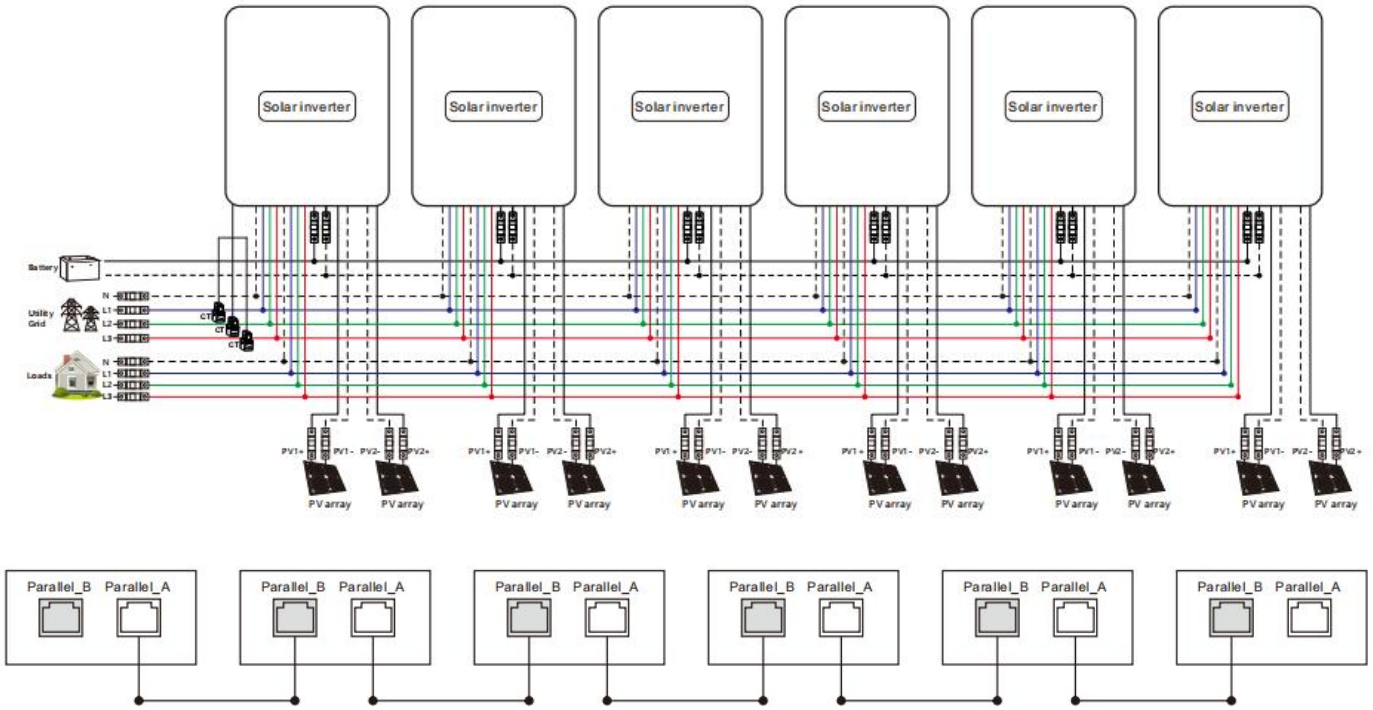
c) Four units connected in parallel:



d) **Five units connected in parallel:**



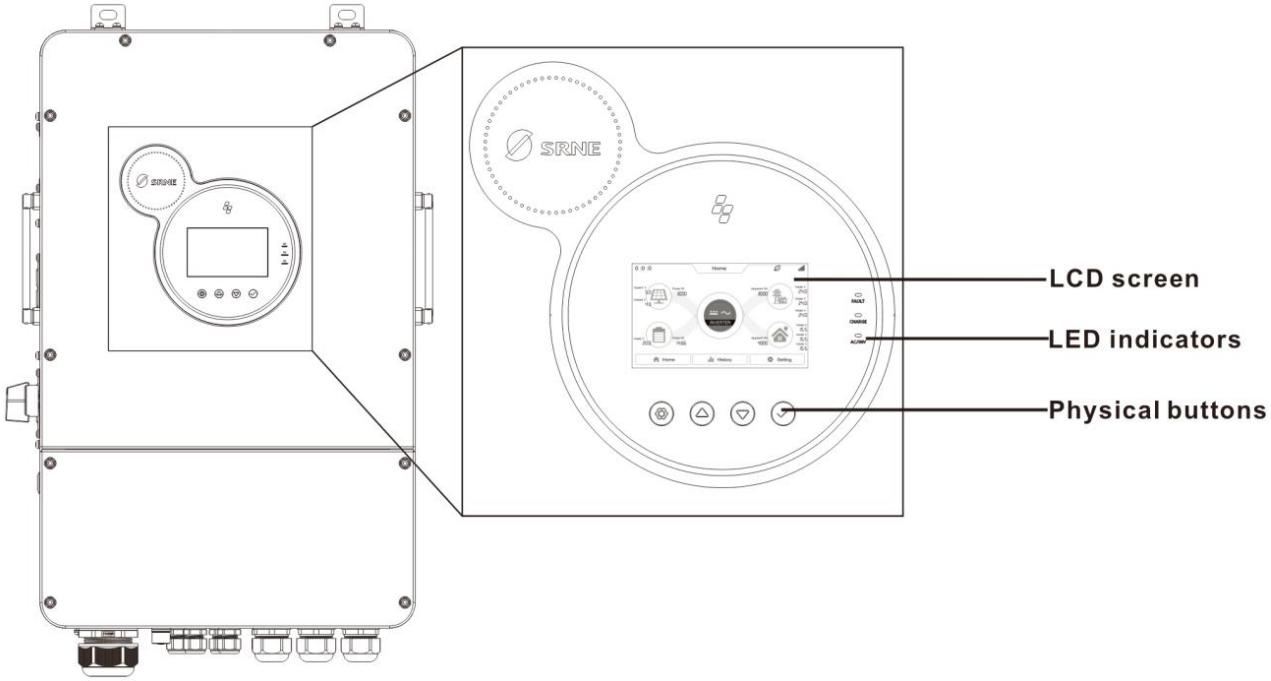
e) **Six units connected in parallel:**



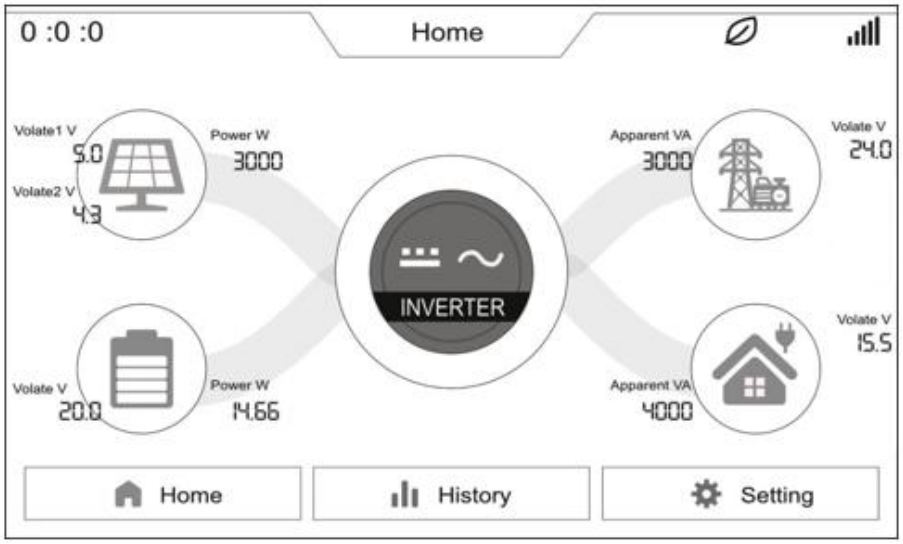
5. Operation

5.1 Operation and display panel

The operation and display panel below includes 1 LCD screen, 3 indicators, 4 touchable keys.



■ Display panel



Icon	Description	Icon	Description
	Solar panel		Load
	Battery		Grid or Generator
Home	Home page		Inverter operating status
History	Historical data	Setting	Setting
0 :0 :0	Local time		Buzzer Off
	BMS communicate status		Power flow direction

■ Keys

Keys	Description
	To enter/exit the setting menu
	To last selection
	To next selection
	To confirm/enter the selection in setting menu

■ LED Indicators

Indicators	Color	Description
FAULT	Red	Flash: error occur
CHARGE	Green	Continued: charging complete
		Flash: charging
AC/INV	Yellow	Continued: utility grid by-pass output
		Flash: inverter output

■ View real-time data

On the LCD home screen, click the inverter icon, battery icon, mains icon, load icon and photovoltaic icon to view the real-time data of the machine.

System data			
No.	**Item**	**No.**	**Item**
1	Machine state	12	SN
2	MCU1 version	13	Min version number
3	LCD version	14	Rated power
4	MCU2 version	15	RS485 Address
5	External Temperature	16	Inverter temperature
6	PV temperature	17	Transformer Temperature
7	L1 Voltage	18	L1 Current
8	L2 Voltage	19	L2 Current
9	L3 Voltage	20	L3 Current
10	Positive busbar voltage	21	Negative busbar voltage
11	Total busbar voltage		
Battery data			
1	SOH	6	Discharge current
2	SOC (Percentage of remaining battery capacity)	7	BMS protocol
3	Battery voltage	8	Battery type
4	Battery current	9	Battery Charge Status
5	Battery power (Battery charging and discharging power)		

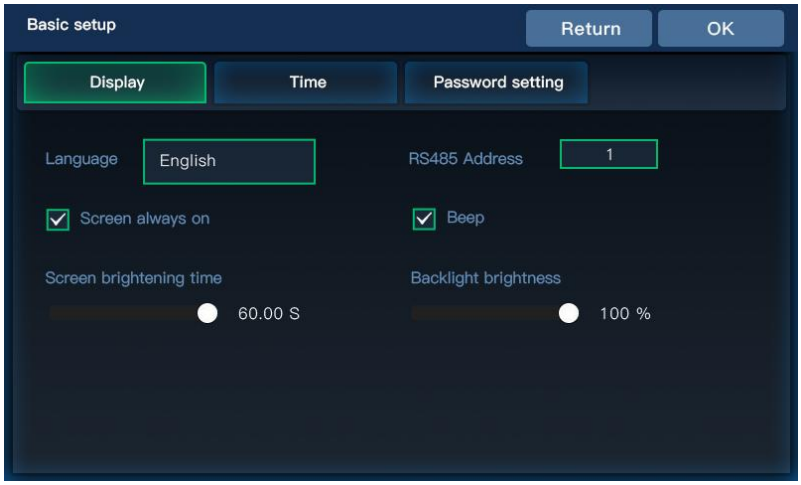
Grid data			
1	L1 Voltage	8	L2 Voltage
2	L1 Current	9	L2 Current
3	L1 Active power	10	L2 Active power
4	L1 Apparent power	11	L2 Apparent power
5	L3 Voltage	12	L3 Active power
6	L3 Current	13	L3 Apparent power
7	Frequency	14	Grid charging Current
Load data			
1	L1 Voltage	11	L2 Voltage
2	L1 Current	12	L2 Current
3	L1 Active power	13	L2 Active power
4	L1 Apparent power	14	L2 Apparent power
5	L1 Home Load Power	15	L2 Home Load Power
6	L1 Secondary Load Apparent Power	16	L2 Secondary Load Apparent Power
7	L3 Voltage	17	L3 Apparent power
8	L3 Current	18	L3 Home Load Power
9	L3 Active power	19	L3 Secondary Load Apparent Power
10	Load Rate	20	Frequency
PV data			
1	PV1 voltage V	5	PV2 current
2	PV1 current A	6	PV2 power
3	PV1 power W	7	PV total Power
4	PV2 voltage V		

5.2 Setting

Operation Instructions: Click "Settings" in the menu bar at the bottom of the screen to enter the settings interface. It includes five categories of settings: Basic Setup, Work Mode Setup, Battery Setup, On grid Setup, and Advance Setup.

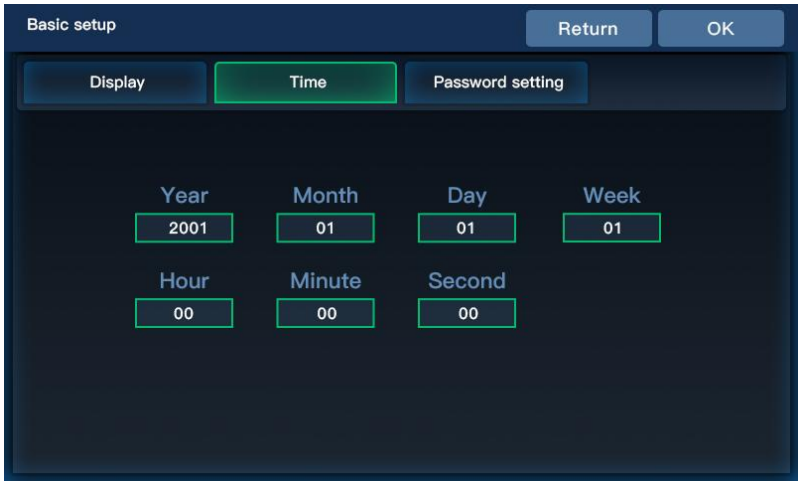
5.2.1 Basic Setup

5.2.1.1 Display Setup

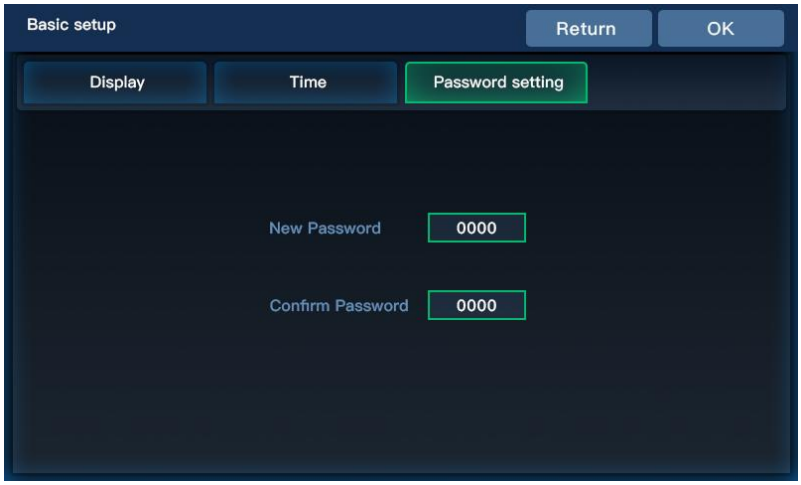


Parameter Meaning	Description
Language	English, Italia, German, Spanish, Chinese,Polski
RS485 Address	This refers to the RS485 address of the inverter. For a single unit, the adjustable range is 1~254, and for parallel units, it is 1~ 6
Screen always on	Selectable whether the screen is always on or not.
Beep	You can choice whether enable the Beep alarm.
Screen brightening time	Setting range 0～60 seconds.
Backlight brightness	0~100%

5.2.1.2 Time Setup



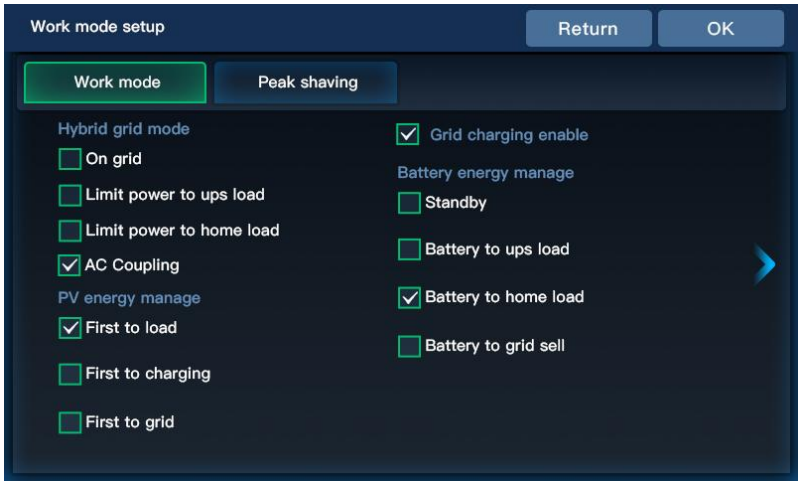
5.2.1.3 Password Setting (Password is required to access the Grid Settings and Advanced Settings)

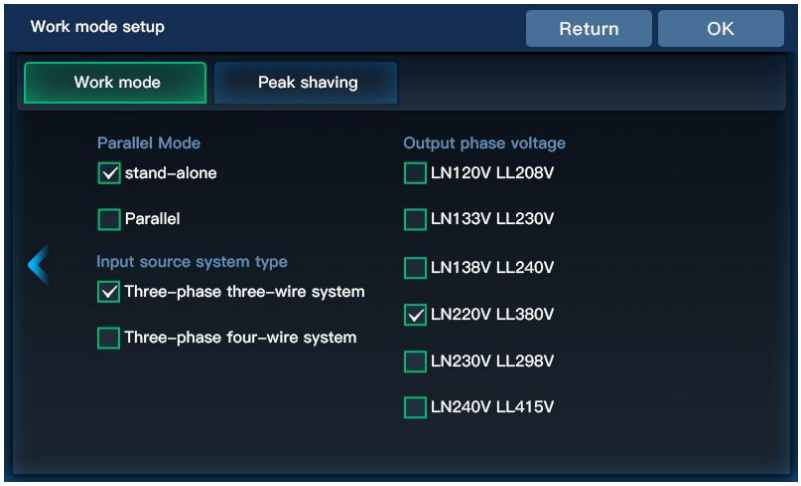


- Default password is "4321".
- Password setting value range: “0～9999”

5.2.2 Work Mode Setup

5.2.2.1 Work Mode

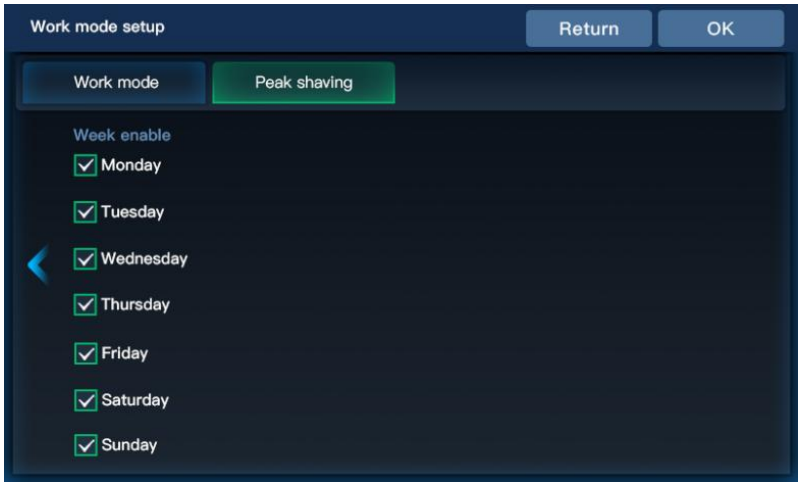




- **Home Load:** connected to the GRID port of the machine, requires external CT for monitoring.
- **UPS Load:** connected to the LOAD port of the machine.

Parameter Meaning	Option	Description
Hybrid grid mode	On grid	Direct grid connection of excess PV energy
	Limit Power to ups load	Ups load backflow prevention, photovoltaic or battery energy is only for the ups load, excess energy will not be connected to the grid.
	Limit Power to home load	Backflow prevention for household loads, with solar or battery energy supplied to UPS loads, smart loads and household loads, with no excess energy connected to the grid.
	AC Coupling	Connect the grid-connected inverter to the grid side of the hybrid inverter, which uses the grid-connected energy from the grid-connected inverter for carrying or charging.
PV energy manage	When mixed grid mode is set to "Limit Power to ups load" or when CT is not connected, the following load refers to the ups load. When mixed grid mode is set to "Limit Power to home load/On grid" and CT is connected, the following load refers to the ups load plus the home load.	
	First to Load	PV power supply logic: load-charge-grid connection.
	First to charging	PV power supply logic: charge-load-grid connection.
	First to grid	PV power supply logic: load-grid connection-charge.
Grid charging enable	Selectable grid participation in battery charging.	
Battery energy manage	Standby	The battery does not discharge, and the battery is discharged only when the working state is off the grid.
	Battery to ups load	When the PV power is less than the UPS load power, the battery discharge is added.
	Battery to home load	The battery can supply the power to UPS load, Smart load and Home load.
	Battery to grid sell	The battery can supply the power to grid.
Parallel mode	Stand-alone	
	Single phase Parallel	
Input source system type	Three-phase three -wire system	
	Three-phase four -wire system	
Output phase voltage	Settable： LN120V LL208V，LN133V LL230V,LN138V LL240V,LN220V LL380V,LN230V LL298V,LN240V LL415V	

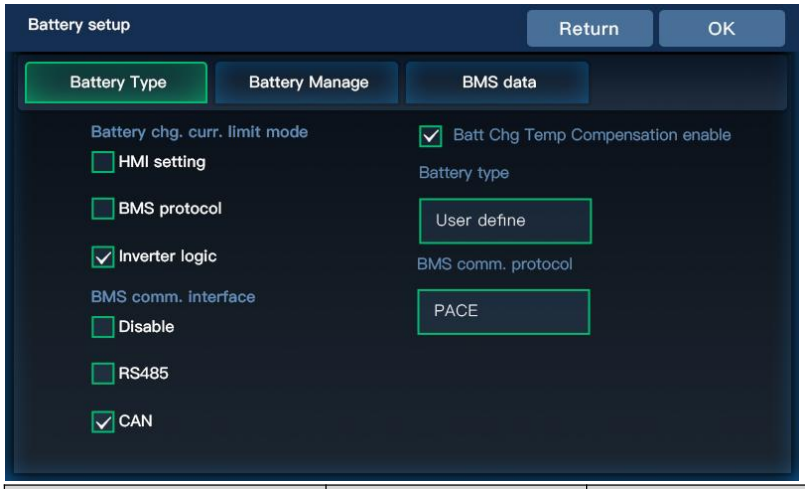
5.2.2.2 Peak Shaving



Parameter Meaning	Description
Time charging/ discharging enable	Select whether to turn on timed charging and discharging.
Max. consumption enable	When this option is enabled, the battery operates according to the battery energy management settings during non-timed charge-discharge periods.
Start/End Time	Setting the time period for timed charging and discharging.
Stop SOC	Setting the battery charging cut-off SOC value and the cut-off SOC value for discharging during the timed charging and discharging time period (during BMS communication).
Stop Volt	Setting the battery charging cut-off voltage value and discharging cut-off voltage value during the timed charging and discharging time period (when the BMS is not communicating).
Max. Power	Setting the battery charging power and discharging power during the timed charging and discharging time period.
Grid	When setting the timed charge, select the grid to charge the battery.
Gen	When setting the timed charge, select the generator to charge the battery.
Week enable	Sets the day of the week for timed charging/discharging (effective only for time-sharing charging/discharging).

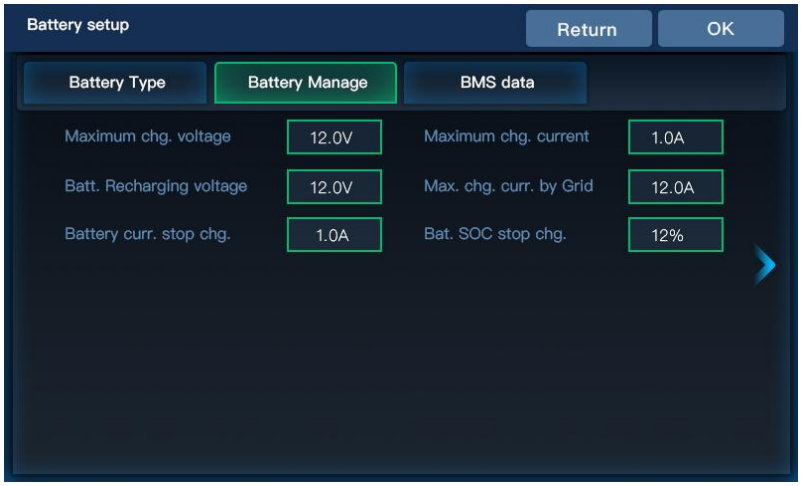
5.2.3 Battery setup

5.2.3.1 Battery type



Parameter Meaning	Option	Description
Battery chg. curr. limit mode (Effective for BMS communication)	HMI setting	Maximum battery charging current is limited according to the inverter battery charging current setting value.
	BMS protocol	Maximum battery charging current is limited by the current limit value of the BMS.
	Inverter logic	Maximum battery charging current is limited by the machine's derating logic.
BMS comm. interface	Disable	BMS does not communication.
	RS485	BMS RS485 communication function
	CAN	BMS CAN communication function
Batt Chg Temp Compensation enable	Select whether to turn on temperature compensation	
Battery Type	USER define	User customizable to set all battery parameters
	SLd	Sealed Lead Acid Battery
	FLd	Open-ended lead-acid batteries
	GEL	gel lead-acid battery
	LFP/14/ 15/ LFP 16	Li-FePO4/14/15/16, corresponding to Li-FePO4 14 string, 15 string, 16 string
	N13/ N14	Ternary lithium batteries, N13/N14, corresponding to ternary lithium batteries 13 string, 14 string
	No battery	Without battery
BMS comm.protocol	When the BMS port selection setting item = 485 or CAN, you need to select the corresponding lithium battery manufacturer brand for communication: 1 : PACE-PACEEX 2 : RUDA-Ritar 3 : AOGUAN-=ALLGRAND BATTERY 4 : OULITE-OLITER 5 : CEF-CHANGFENG TECNOLOGY 6 : XINWANGDA - SUNWODA 7: DAQIN -DAKING 8 : WOW-SRNE 9: PYL-PYLONTECH 10 : MIT-FOXESS 11: XIX-XYE 12: POL-POWERMR 13: GUOX-Gotion 14: SMK-SMK 15: VOL-WEILAN 16:UZE-YUZE	

5.2.3.2 Battery Manage



Parameter Meaning	Description
Maximum chg. voltage	When the battery is charging, the voltage reaches the value to enter thefloat state or stop charging.
Batt. Recharging voltage	When the battery is fully charged, the inverter stops charging and resumes charging when the battery voltage falls below this voltage value.
Battery curr. stop chg.	when the charging current falls below this setting, the battery will stop charge.
Maximum chg. current	Setting the amount of current when charging the battery
Max. chg. curr. by Grid	When using mains charging, set the size of the battery mains charging current (the value is the battery current)
Bat.SOC stop chg.	"Charging will stop when the SOC value reaches this set point (effective when BMS communication is normal)."
Batt volt. stop dischg. in hybrid	The battery will stop discharging when it reaches this setting value in the mixed grid state (when there is grid access).
Batt volt. restart dischg.	When the battery voltage is too low to discharge, the battery voltage needs to reach this setting to discharge again.
Battery under volt. alarm	Battery under-voltage alarm point, when the battery voltage is lower than the judgment point, the under-voltage alarm will be reported and the output will not be turned off.

Batt volt low recovery	When the battery report voltage low fault, the battery voltage reach this setting, the fault will be cleard.
Batt voltage low fault	When in the off-grid state, the inverter will shut down due to the low voltage of the battery; when in the hybrid grid state, the battery will stop outputting due to low voltage.
Battery max. curr. dischg.	Set the max battery discharger current
Batt. SOC stop dischg. in hybrid	In the hybrid grid state, the battery will stop discharging when the State of Charge (SOC) is lower than this set value. In the off-grid state, the battery will continue to discharge when the SOC is lower than this set value.
Batt. SOC restart dischg.	When the battery report SOC low fault, the battery SOC reach this setting, it can restart discharge(valid when BMS communication is normal).

5.2.3.2 BMS date(When the battery communicate with inverter)

Check the data that battery BMS uploade to inverter.

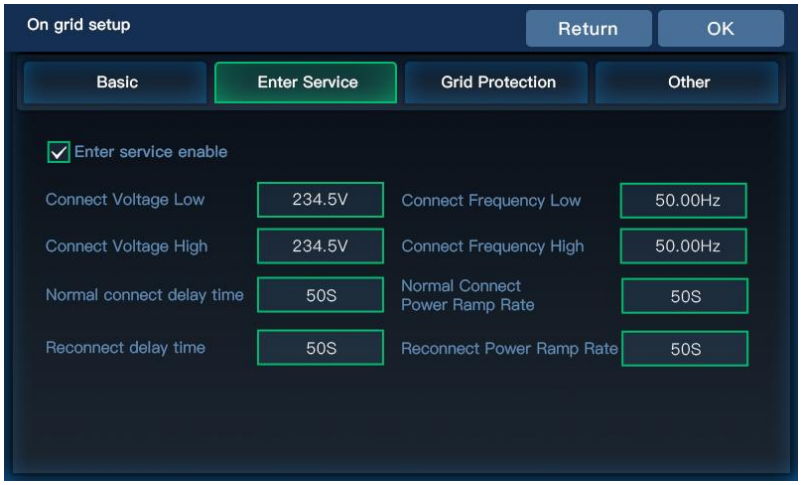
5.2.4 On grid setup

To enter this setting, you need to enter the password set by the user, the default password is "4321".

5.2.4.1 Basic

Parameter Meaning	Description
Grid Standard	Europe: EN 50549-1
	German: VDE-AR-N 4105:2018
	Other area: GNL
	Austria: TE-OVE
	Thailand: PEA-MEA
Grid Frequency	Selection of local grid frequency，50Hz/60Hz
Sell Power Max	Setting the maximum grid-connected power
External CT ratio	When connecting an external CT, enter the ratio on the CT specification.
Buy power Max	Maximum power drawn from the grid. If the grid charging power + load power exceeds this setting, the machine reduces the charging power. (Setting range: 0 to rated power)
Zero-export power	Error calibration power in the case of backflow prevention, recommended setting 20-100W
On-Grid Reactive Power	Setting range 0-100%, % of reactive power
Reactive power over/under excited	Over indicates 0%-100% / Under indicates -100%-0%
On Grid PF	Setting range 0.8-1
Power factor over/under excited	Over indicates 0.8-1 / Under indicates -0.8 ~ -1

5.2.4.2 Enter Service(This setting is not recommended to be changed by the customer, the value depend on the grid standard)



Parameter Meaning	Description
Enter Service enable	Grid-connect enable setting (on by default)
Connect Voltage Low	Grid-connected low voltage protection voltage
Connect Frequency Low	Grid-connected low-frequency protection points
Connect Voltage High	Grid-connected high-voltage protection voltage

Connect Frequency High	Grid-connected high-frequency protection points
Normal connect delay time	Grid normal connection, grid connection delay time
Normal connect Power Ramp Rate	Normal grid connection, rate of rise of grid-connected power
Reconnect delay time	Grid down reconnection, grid connection delay time
Reconnect Power Ramp Rate	Grid disconnection and reconnection, rate of rise of grid-connected power

5.2.4.3 Grid protection (it is not recommended that the user change this setting)

Parameter Meaning	Description
LV1	Class 1 undervoltage protection point
LF1	Class 1 underfrequency protection point
LV2	Class 2 undervoltage protection point
LF2	Class 2 underfrequency protection point
HV1	Class 1 overvoltage protection point
HF1	Class 1 overfrequency protection point
HV2	Class 2 overvoltage protection point
HF2	Class 2 overfrequency protection point
Time	Protection Response Time

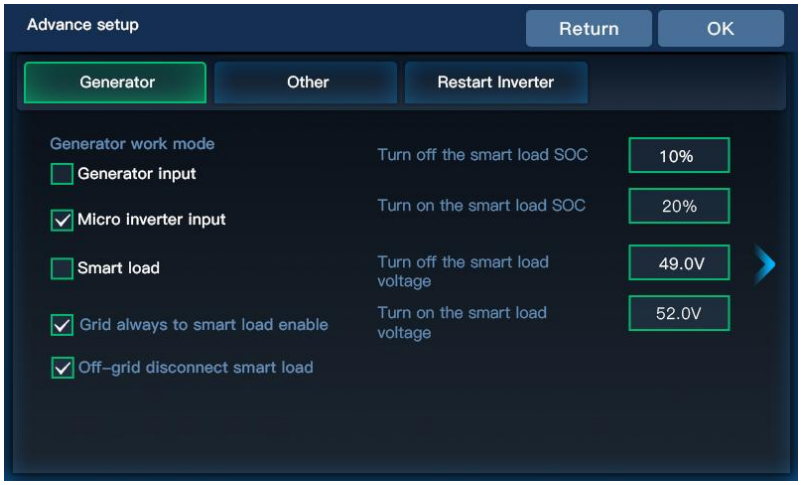
5.2.4.4 Other (it is not recommended that users change this setting)

Parameter Meanin	Description
Frequency Droop (F-P) enable	Adjustment of inverter output power according to grid frequency.
Volt-Watt (V-P) curve enable	Regulates the active power of the inverter according to the set grid voltage.
Volt-Var (V-Q) curve enable	Adjustment of the inverter reactive power according to the set grid voltage.
Watt-Var (P-Q) curve enable	Adjustment of the inverter reactive power according to the set active power.
Watt-PF (P-PF) curve enable	Adjustment of the inverter power factor according to the set active power.
LVRT/HVRT enable	Adjustment of the grid HV ride-through / LV ride-through values.
Reactive power percentage enable	
Discharge PF enable	
Charge PF enable	
DRMS Enable	Australia only

5.2.5 Advance Setup

To enter this setting, you need to enter the password set by the user, the default password is "4321".

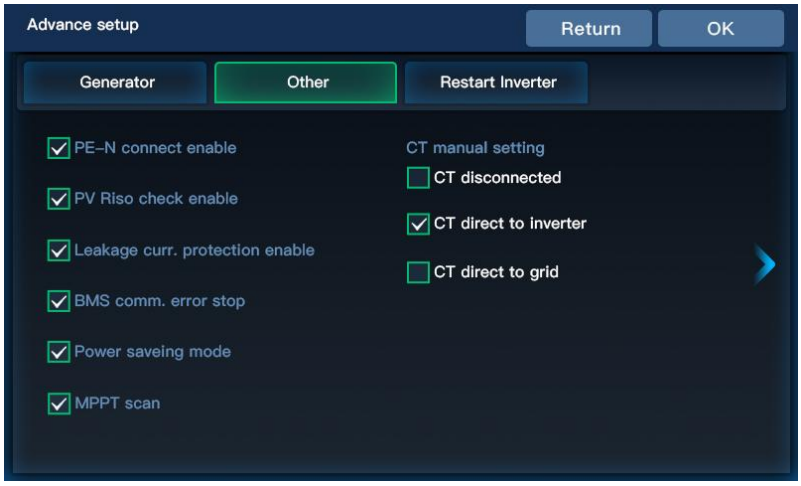
5.2.5.1 Generator



Parameter Meaning	Description	
Generator work mode	Generator Input	When the generator is connected to the “Gen port”, select the generator input.
	Micro inverter input	Grid-tie inverter is connected to the “Gen port” of the hybrid inverter.
	Smart load	When a load is connected to the “Gen port”, select the load output.
Grid always to smart load enable	Whether to enable continuous power supply to the smart load.	
Off-grid disconnect smart load	Immediate Disconnect Smart Load Setting Item in Off-Grid Mode.	
Turn off the smart load SOC Turn on the smart load SOC	Battery current SOC is less than 10% to turn off smart loads, greater than 20% to turn on smart loads.	
Turn off the smart load voltage Turn on the smart load voltage	The current voltage of the battery is less than 49V to turn off the smart load, and more than 52V to turn on the smart load.	
Max charging current by gen.	Maximum battery charging current of the generator.	

Generator rate power	Setting the rated power of the generator.	
Generator charging enable	Set whether the generator is charged or not.	
Dry contact function setting	Generator control	Control Generator Start/Stop
	Energy control	When the PV grid-connected power exceeds the PV energy monitoring threshold, the dry contact activates.
	Grid voltage control	When the grid voltage exceeds the dry contact monitoring grid voltage threshold, the dry contact activates.
Voltage threshold monitoring via dry contact	When the grid voltage exceeds this set value, the dry contact activates. When the voltage is 5V lower than this set value, the dry contact deactivates.	
PV energy monitoring via dry contact	When the PV grid-connected power exceeds this set value, the dry contact activates. When the power is 250W lower than this set value, the dry contact deactivates.	

5.2.5.2 Other



Parameter Meaning	Description
PE-N connect enable	Enable automatic switching of PE-N connections.
PV Riso check enable	Enable PV insulation impedance detection.

Leakage curr. protection enable	Enable leakage current protection.
BMS comm.error stop	When the BMS communication is fault, the inverter stop output.
Power saveing mode	After turning on the energy-saving mode, if the load is empty or less than 25W, the inverter output will be shut down after a delay of 5min; when the load is more than 40W, the inverter will start automatically.
MPPT scan	MPPT Global Scan Enable every 30 minutes.
CT manual setting	According to the CT installation, select the CT direction
Load Type	Select the load type according to the connected load.
Inverter Current Limiting coefficient	Adjust the current coefficient when the inverter is soft-started (this setting is not recommended to be modified by the customer).
Electric meter options	Whether to enable three-phase meter.
Smart meter connect point	Select on-grid inverter side or grid side according to meter installation location.

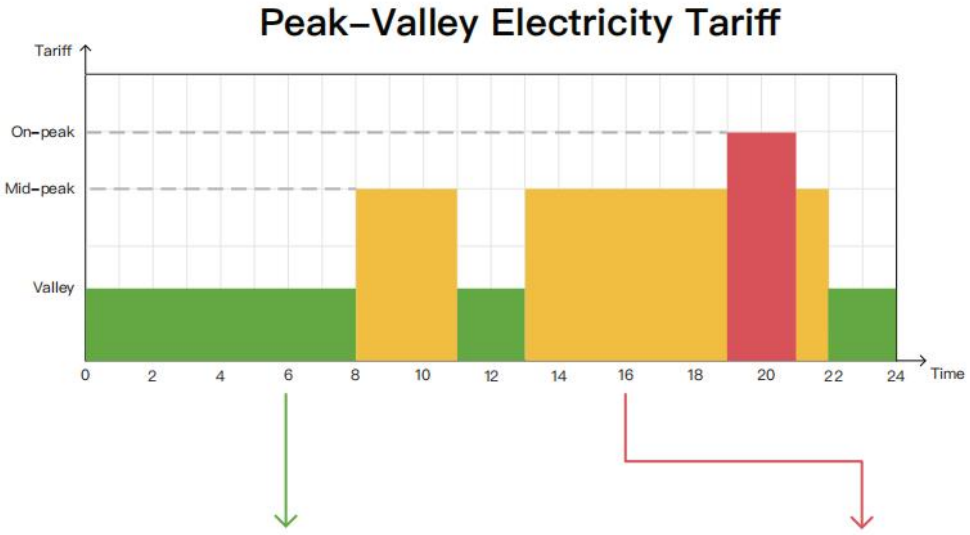
5.2.5.3 Restart

Parameter Meaning	Description
Restore Factory Settings	Reset all inverter settings
Reboot Inverter	Restart the inverter

5.3 Time-slot charging/discharging function

HESP SH3 series is equipped with time-slot charging / discharging function, users can set different charging/discharging time slots according to the local peak and valley electricity price, so as to make efficient use of utility power and PV energy. When the utility price is expensive, the battery inverter can be used to supply power to the loads. When the utility price is cheap, the utility power can be used to supply and charge the loads, which can help users save the electricity bill to the greatest extent. Users can turn on/off the time-sharing charging/discharging function in the setting menu parameters [46] and [53], and set the charging and discharging time periods in parameters [40-45], [47-52] for timed mains charging start/time setting and timed battery discharging start/time setting. Here is a case example to help users understand the function.

Before using this function for the first time, please set the local time in parameter [54], [55], then the user can set the corresponding time slot according to the local peak and valley tariff charges.



Time-slot Utility Charging/Carrying Function

With 3 definable periods, the user can freely set the mains charging/carrying time within the range of 00:00 to 23:59. During the time period set by the user, if PV energy is available, PV energy will be used first, and if PV energy is not available or insufficient, utility energy will be used as a supplement.

Time-slot Battery Disacharging Function

With 3 definable time periods, users can freely set the battery discharge time within the range of 00:00 to 23:59. During the time period set by the user, the inverter will give priority to the battery inverter to carry the load, and if the battery power is insufficient, the inverter will automatically switch to mains power to ensure stable operation of the load.

5.4 Battery parameter

■ Lead-acid battery

Battery type / Parameters	Sealed lead acid battery (SLD)	Gel lead acid battery (GEL)	Flooded lead acid battery (FLD)	User-defined (USE)	Adjustable
Overvoltage disconnection voltage	60V	60V	60V	60V	
Battery fully charged recovery point	52V	52V	52V	52V	√
Boost charge voltage	-	-	-	40～60V	√
Undervoltage alarm voltage([01] fault)	44V	44V	44V	40～60V	√
Undervoltage alarm voltage recovery point([01] fault)	Undervoltage alarm voltage+0.8V				
Low voltage disconnection voltage([04] fault)	42V	42V	42V	40～60V	√
Low voltage disconnection voltage recovery point ([04] fault)(setup item [35])	52V	52V	52V	52V	√
Discharge limit voltage	-	-	-	40～60V	√
Over-discharge delay time	5s	5s	5s	1～30s	√
Boost charge duration	-	-	-	10～900 minutes	√

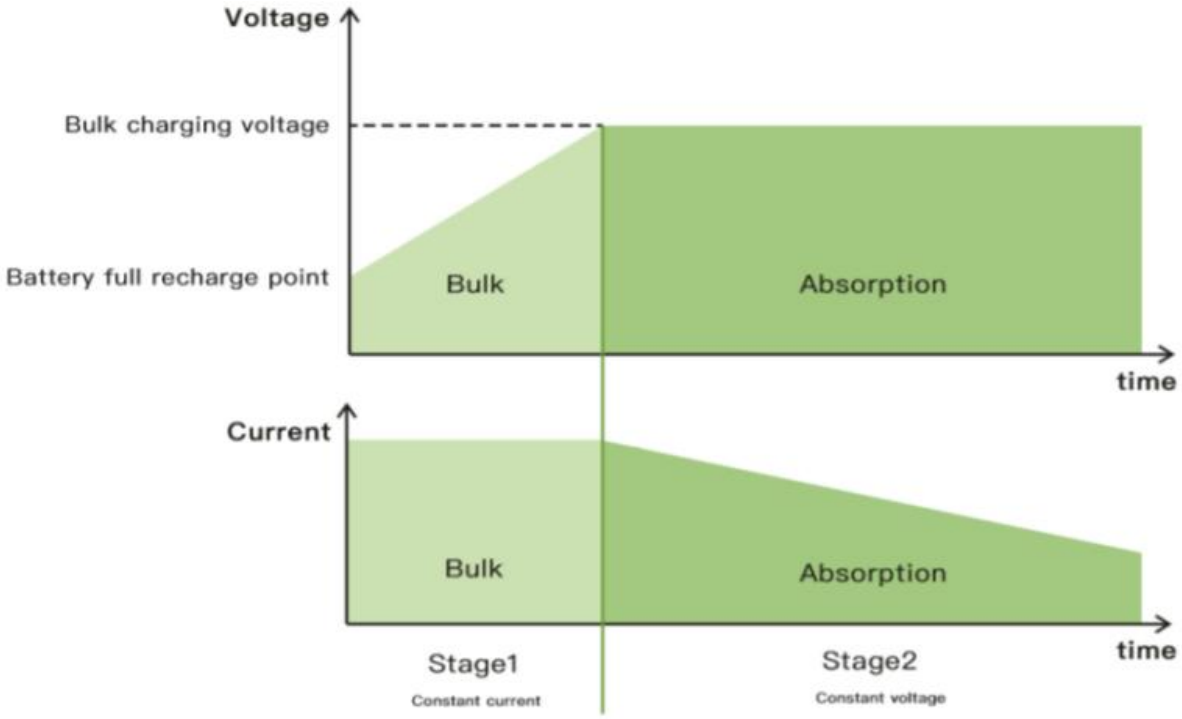
■ Li-ion battery

Battery type / Parameters	Ternary (N13)	Ternary (N14)	LFP (L16)	LFP (L15)	LFP (L14)	Adjustable
Overvoltage disconnection voltage	60V	60V	60V	60V	60V	
Battery fully charged recovery point	50.4V	54.8V	53.6V	50.4V	47.6V	√
Equalizing charge voltage	-	-	-	-	-	√
Boost charge voltage	53.2V	57.6V	56.8V	53.2V	49.2V	√
Undervoltage alarm voltage([01] fault)	43.6V	46.8V	49.6V	46.4V	43.2V	√
Undervoltage alarm voltage recovery point([01] fault)	Undervoltage alarm voltage+0.8V					

Low voltage disconnection voltage([04] fault)	38.8V	42V	48.8V	45.6V	42V	√
Low voltage disconnection voltage recovery point ([04] fault)(setup item [35])	46V	49.6V	52.8V	49.6V	46V	√
Discharge limit voltage	36.4V	39.2V	46.4V	43.6V	40.8V	√
Over-discharge delay time	30s	30s	30s	30s	30s	√
Boost charge duration	120 minutes	120 minutes	120 minutes	120 minutes	120 minutes	√

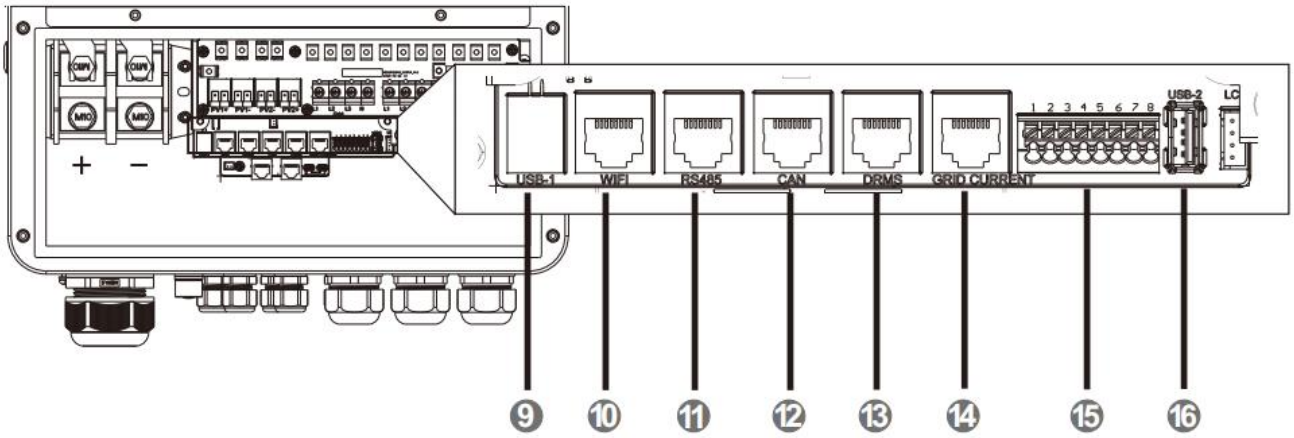
NOTICE

If no BMS is connected, the inverter will charge according to battery voltage with a preset charging curve. When the inverter communicates with the BMS, it will follow the BMS instructions to perform a more complex stage charging process.



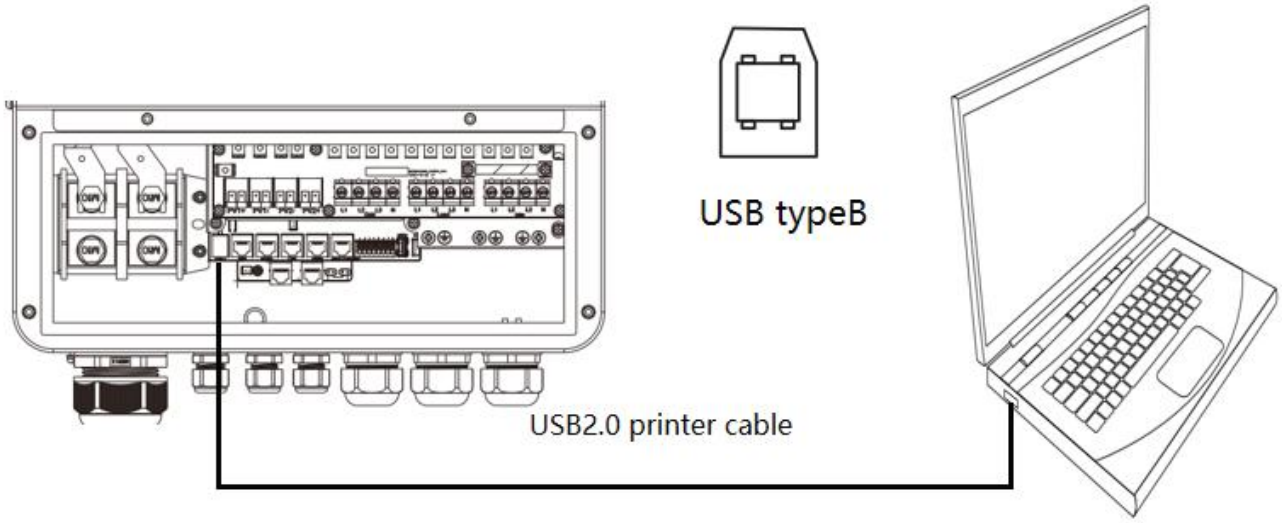
6. Communication

6.1 Overview



9	USB-B port	10	WIFI port
11	RS485 port	12	CAN port
13	DRMS port	14	CT port
15	Dry contact	16	USB-A port

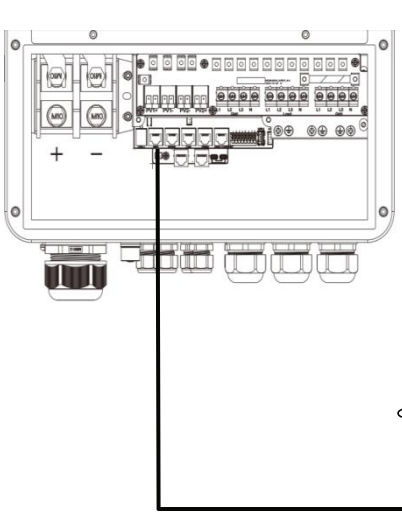
6.2 USB-1 port

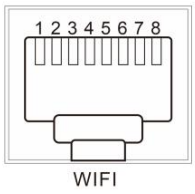


The user can read and modify device parameters through this port by using the host software. Please contact us for the host software installation package if you require one

6.3 WIFI port

The WIFI port is used to connect to the Wi-Fi/GPRS logger module, which allows users to view the operating status and parameters of the inverter via mobile phone APP.

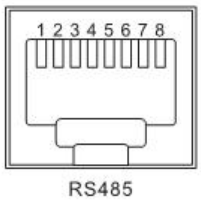




RJ45	Definition
Pin 1	5V
Pin 2	GND
Pin 3	/
Pin 4	/
Pin 5	/
Pin 6	/
Pin 7	RS485-A
Pin 8	RS485-B

6.4 RS485 port

The RS485/CAN port is used to connect to the BMS of Liion battery.



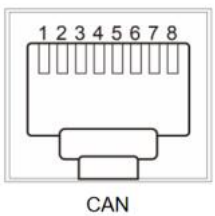
RJ45	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
Definition	RS485-B	RS485-A	/	CANH	CANL	/	RS485-A	RS485-B

⚠ NOTICE

If you need to use the inverter to communicate with the lithium battery BMS, please contact us for the communication protocol or upgrade the inverter to the appropriate software programme.

6.5 CAN port

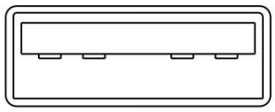
The CAN port is used to connect to the BMS of Liion battery .



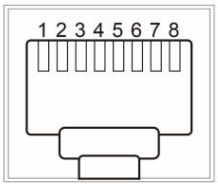
RJ45	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
Definition	/	/	/	CANH	CANL	/	/	/

6.6 USB-2 port

It is used to updated the screen firmware.



6.7 DRMS(Only Australia)

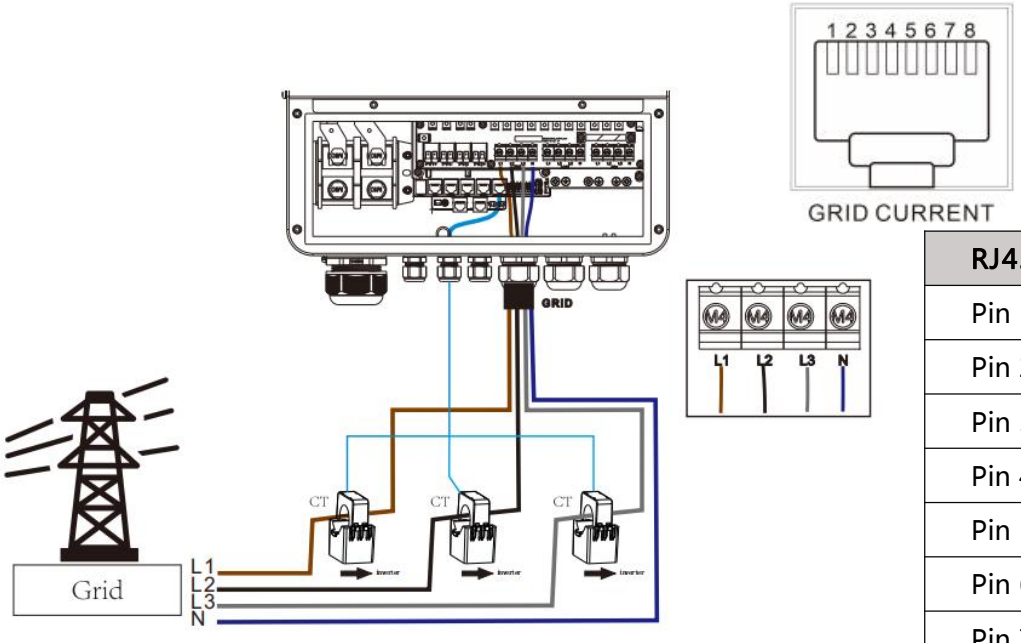


DRMS

RJ45	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
Definition	DRM5	DRM6	DRM7	DRM8	RefGen	COM/ DRM0	V+	V-

MODEL	RJ45 socket asserted by shorting pins		Requirement
DRM0	5	6	Operate the disconnection device.
DRM5	1	5	Do not generate power to grid.
DRM6	2	5	Do not generate at more than 50% of rated power.
DRM7	3	5	Do not generate at more than 75% of rated power AND Sink reactive power if capable.
DRM8	4	5	Increase power generation (subject to constraints from other active DRMs) .

6.8 External CT port

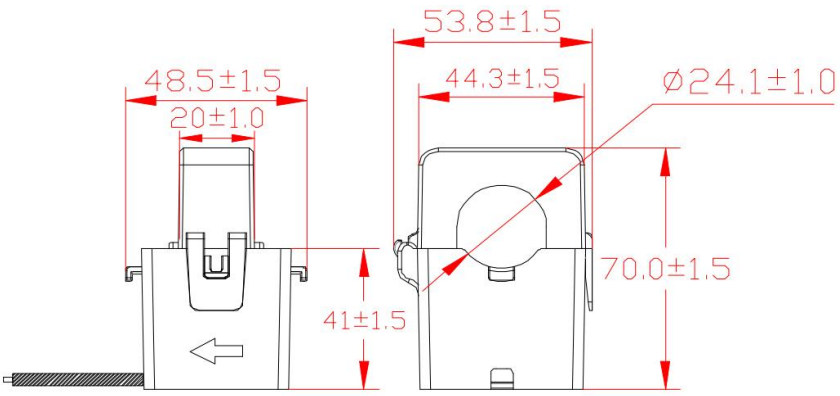


GRID CURRENT

RJ45	Definition
Pin 1	CT1+
Pin 2	CT1-
Pin 3	/
Pin 4	CT2+
Pin 5	CT2-
Pin 6	/
Pin 7	CT3+
Pin 8	CT3-

1. Split Core Current Transformer (CT) dimension: (mm)

2. Secondary output cable length is 4m.



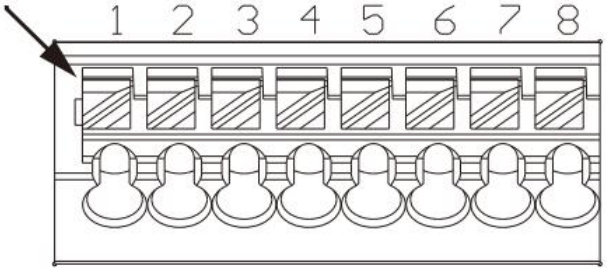
6.9 Dry contact port

Dry contact port with 3 functions:

1. RSD power supply

2. Temperature sampling (reserved)

3. Generator remote start/stop



Function	Description
RSD power supply	PIN 1 is GND，PIN 2 is RSD 12V+
Temperature sampling (reserved)	Pin 1 & Pin 5 can be used for battery temperature sampling compensation.
Generator remote start/stop	6-7：NC 6-8:NO Remote generator shutdown: Pins 6 to 7 are normally closed, and pins 6 to 8 are normally open. (Pin 6/7/8 output 125Vac/1A,230Vac/1A,30Vdc/1A)

⚠ *NOTICE*

If you need to use the remote start/stop function of a dry contact generator, make sure that the generator has an ATS and supports the remote start/stop function.

7. Fault and Remedy

7.1 Fault code

Fault code	Fault name	Whether it affects the output or not	Description
【01】	BatVoltLow	No	Battery undervoltage alarm.
【02】	BatOverCurrSw	Yes	Battery discharge average current overcurrent (software protection).
【03】	BatOpen	Yes	Battery not-connected alarm.
【04】	BatLowEod	Yes	Battery undervoltage stop discharge alarm.
【05】	BatOverCurrHw	Yes	Battery overcurrent (hardware protection).
【06】	BatOverVolt	Yes	Charging overvoltage protection.
【07】	BusOverVoltHw	Yes	Bus overvoltage (hardware protection).
【08】	BusOverVoltSw	Yes	Bus overvoltage (software protection).
【09】	PvVoltHigh	No	PV overvoltage protection.
【10】	PvOCSw	No	Boost overcurrent (software protection).
【11】	PvOCHw	No	Boost overcurrent (hardware protection).
【12】	SpiCommErr	Yes	SPI communication fault of master and slave chips
【13】	OverloadBypass	Yes	Bypass overload protection.
【14】	OverloadInverter	Yes	Inverter overload protection.
【15】	AcOverCurrHw	Yes	Inverter overcurrent (hardware protection).
【16】	AuxDSpReqOffPWM	Yes	Slave chip OFF request fault
【17】	InvShort	Yes	Inverter short-circuit protection.
【18】	Bussoftfailed	Yes	Bus soft-start failure
【19】	OverTemperMppt	No	Buck heat sink over temperature protection.
【20】	OverTemperInv	Yes	Inverter AC output with load or AC charging radiator over-temperature protection.
【21】	FanFail	Yes	Fan blockage or failure fault.
【22】	EEPROM	Yes	Memory failure.
【23】	ModelNumErr	Yes	Model setting error.
【24】	Busdiff	Yes	Positive and negative bus voltage imbalance
【25】	BusShort	Yes	Bus short-circuit
【26】	RlyShort	Yes	Inverted AC Output Backfills to Bypass AC Input.
【27】	LinePhaselose	Yes	Grid input phase lose
【28】	LinePhaseErr	Yes	Grid input phase error

【29】	BusVoltLow	Yes	Internal battery boost circuit failure.
【30】	BatCapacityLow1	No	Alarm given when battery capacity rate is lower than 10% (setting BMS to enable validity).
【31】	BatCapacityLow2	No	Alarm given when battery capacity rate is lower than 5% (setting BMS to enable validity).
【32】	BatCapacityLowStop	Yes	Inverter stops when battery capacity is low (setting BMS to enable validity).
【33】	ControlCanFault	Yes	Control CAN fault in parallel operation.
【34】	CanCommFault	Yes	CAN communication fault in parallel operation.
【35】	ParaAddrErr	Yes	Parallel ID （communication address）setting error.
【36】	Balance currentOC	Yes	Balance bridge arm overcurrent failure
【37】	ParaShareCurrErr	Yes	Parallel current sharing fault .
【38】	ParaBattVoltDiff	Yes	Large battery voltage difference in parallel mode.
【39】	ParaAcSrcDiff	Yes	Inconsistent AC input source in parallel mode.
【40】	ParaHwSynErr	Yes	Hardware synchronization signal error in parallel mode.
【41】	InvDcVoltErr	Yes	Inverter DC voltage error.
【42】	SysFwVersionDiff	Yes	Inconsistent system firmware version in parallel mode.
【43】	ParaLineContErr	Yes	Parallel line connection error in parallel mode.
【44】	Serial number error	Yes	No serial number set at factory.
【45】	Error setting of split-phase mode	Yes	Item “Parallel” setting error.
【49】	Grid over voltage	Yes	selects the local corresponding grid standard.
【50】	Grid under voltage	Yes	
【51】	Grid over frequency	Yes	
【52】	Grid under frequency	Yes	
【53】	Grid loss	Yes	
【54】	Grid DC current over	Yes	
【55】	Grid standard un init	Yes	
【56】	Low insulation resistance fault	No	PV1+, PV2+ and PV- abnormally low impedance to ground.
【57】	Leakage current overload fault	Yes	System leakage current exceeds limit.

【58】	BMS communication error	No	Check whether the communication line is connected correctly and whether [33] is set to the corresponding lithium battery communication protocol.
【60】	BMS battery low temperature alarm	No	BMS alarm battery low temperature.
【61】	BMS battery over temperature alarm	No	BMS alarm battery over temperature.
【62】	BMS battery over current alarm	No	BMS alarm battery over current.
【63】	BMS battery undervoltage alarm	No	BMS alarm low battery.

7.2 Troubleshooting

Fault Code	Meaning	Causes	Remedy
/	No screen display	No power input, or the switch on the bottom of the unit is not switched on.	Check whether the battery air circuit-breaker or PV air circuit-breaker is turned on. Check if the switch is "ON". Press any button on the screen to exit the screen sleep mode.
01	Battery under-voltage	The battery voltage is lower than the value set in parameter [14].	Charge the battery and wait until the battery voltage is higher than the value set in parameter [14].
03	Battery not connected	The battery is not connected, or the BMS is in discharge protection state.	Check that the battery is reliably connected. Check that the battery circuit-breaker is off. Ensure that the BMS is able to communicate properly.
04	Battery over-discharge	The battery voltage is lower than the value set in parameter [12].	Manual reset: Switch off and restart. Automatic reset: Charge the battery so that the battery voltage is higher than the value set in parameter item [35].
06	Battery over-voltage when charging	Battery is in over-voltage condition.	Manually power off and restart. Check to see if the battery voltage exceeds the limit. If it exceeds, the battery needs to be discharged until the voltage is below the battery over-voltage recovery point.

13	Bypass over-load (software detection)	Bypass output power or output current over-load for a period of time.	Reduce the load power and restart the device. Please refer to item 11 of the protection function for more details.
14	Inverter over-load(software detection)	Inverter output power or output current over-load for a period of time.	
19	Heat sink of PV input over-temperature (software detection)	Heat sink of PV input temperature exceeds 90℃ for 3s.	Normal charging and discharging is resumed when the temperature of the heat sink cools below the over-temperature recovery temperature.
20	Heat sink of inverter output over-temperature (software detection)	Heat sink of inverter output temperature exceeds 90℃ for 3s.	
21	Fan failure	Hardware detects fan failure.	Manually toggle the fan after powering off the machine to check for foreign matter blockage.
26	AC input relay short-circuit	Relay for AC input sticking.	Manually turn off and restart the machine, if the fault reappears after restarting, you need to contact the after-sales service to repair the machine.
28	Utility input phase fault	AC input phase does not match AC output phase.	Make sure that the phase of the AC input is the same as the phase of the AC output.

⚠ *NOTICE*

If you encounter product faults that cannot be solved by the methods in the above table, please contact our after-sales service department for technical support and do not disassemble the equipment by yourself.

8. Protection and Maintenance

8.1 Protection function

No.	Protection functions	Description
1	PV input current / power limiting protection	When the charging current or power of the PV array configured exceeds the PV input rated value, the inverter will limit the input power and charge at the rated.
2	PV input over-voltage	If the PV voltage exceeds the maximum value allowed by the hardware, the machine reports a fault and stops PV boosting to output a sinusoidal AC waveform.

3	Anti-reverse charge protection at night	At night, the battery will be prevented from discharging to the PV module because the battery voltage is greater than the PV module voltage.
4	AC input over-voltage protection	When the mains voltage of per phase exceeds 280Vac, the mains charging will be stopped and will switch to inverter output.
5	AC input under-voltage protection	When the mains voltage of per phase falls below 170Vac, the mains charging will be stopped and will switch to inverter output.
6	Battery over-voltage protection	When the battery voltage reaches the over-voltage disconnection voltage point, it will automatically stop the PV and mains charging of the battery to prevent over-charging and damage to the battery.
7	Battery under-voltage protection	When the battery voltage reaches the low-voltage disconnection voltage point, it will automatically stop discharging the battery to prevent the battery from being over-discharged and damaged.
8	Battery over-current protection	When the battery current exceeds the range allowed by hardware, the machine will turn off output and stop discharging the battery.
9	AC output short-circuit protection	When a short-circuit fault occurs at the load, the AC output voltage will be switched off immediately and output again after 1 min. If the output load is still short-circuited after 3 attempts, short-circuit fault of the load must be eliminated first and then manually re-powered in order to restore the normal output.
10	Heat sink over-temperature protection	When the internal temperature of the inverter is too high, the inverter will stop charging and discharging; when the temperature returns to normal, the inverter will resume charging and discharging.
11	Inverter over-load protection	Three phase overload logic: After triggering the overload protection, the inverter will resume output after 3 minutes, 5 consecutive overloads will shut down the output until the inverter is restarted. (102%<load<110%):alarm,output shut down after 5 minutes. (110%<load<125%):alarm, output shut down after 20s. (125%<load<200%):alarm, output shut down after 10s. Single phase overload logic: 1.5*(102%<load<110%) :alarm, output shut down after 5 minutes. 1.5*(load>110%): alarm, output shut down after 10s.
12	AC output reverse	Prevents backfeeding of battery inverter AC to bypass AC inputs.
13	Bypass over-current protection	Built-in AC input overcurrent protection circuit breaker.
14	Bypass phase inconsistency protection	When the phase of the two bypass inputs is different from the phase of the inverter phase split, the machine will prohibit cutting into the bypass to prevent the load from dropping out or short-circuiting when cutting into the bypass.

8.2 Maintenance

To maintain optimum long-lasting working performance, it is recommended that the following items be checked twice a year.

1. Ensure that the airflow around the inverter is not blocked and remove any dirt or debris from the radiator.
2. Check that all exposed conductors are not damaged by sunlight, friction with other surrounding objects, dry rot, insect or rodent damage, etc. The conductors need to be repaired or replaced if necessary.
3. Verify that the indications and displays are consistent with the operation of the equipment, note any faults or incorrect displays and take corrective action if necessary.
4. Check all terminals for signs of corrosion, insulation damage, high temperatures or burning/discolouration and tighten terminal screws.
5. Check for dirt, nesting insects and corrosion, clean as required, clean insect screens regularly.
6. If the lightning arrester has failed, replace the failed arrester in time to prevent lightning damage to the inverter or other equipment of the user.

⚠ *DANGER*

Make sure that the inverter is disconnected from all power sources and that the capacitors are fully discharged before carrying out any checks or operations to avoid the risk of electric shock.

The Company shall not be liable for damage caused by :

1. Damage caused by improper use or use in a wrong location.
2. PV modules with an open-circuit voltage exceeding the maximum permissible voltage.
3. Damage caused by the operating temperature exceeding the restricted operating temperature range.
4. Dismantling and repair of the inverter by unauthorised persons.
5. Damage caused by force majeure: damage during transport or handling of the inverter.

9. Datasheet

MODEL	HESP4880SH3	HESP48100SH3	HESP48120SH3	Settable
Inverter output				
Rated Output Power	8000W	10000W	12000W	
Max. Peak Power	16000VA	20000VA	24000VA	
Rated Output Voltage	230/400Vac (three-phase)			Y
Output Voltage Error	±5%			
Load Motor Capacity	5HP	6HP	6HP	
Rated Frequency	50/60Hz ± 0.3Hz			Y
Waveform	Pure Sine Wave			
Switch Time	10ms (typical)			
Overload	**Three phase overload logic:** After triggering the overload protection, the inverter will resume output after 3 minutes, 5 consecutive overloads will shut down the output until the inverter is restarted. (102%<load<110%): alarm, output shut down after 5 minutes. (110%<load<125%): alarm, output shut down after 20s. (125%<load<200%): alarm, output shut down after 10s. Single phase overload logic: 1.5*(102%<load<110%) : alarm, output shut down after 5 minutes. 1.5*(load>110%): alarm, output shut down after 10s.			
AC output (on-grid)				
Rated Output Power	8000W	10000W	12000W	
Max. Peak Power	8000VA	10000VA	12000VA	
Power Factor	0.8 leading to 0.8 lagging			
Rated Voltage	3L/N/PE 230/400Vac			
Rated AC Frequency	50/60Hz			
Rated AC output phase current	11.6Aac	14.5Aac	17.4Aac	
THD	<3%			
Battery				
Battery Type	Li-ion / Lead-Acid / User Defined			Y
Rated Battery Voltage	48Vdc (minimum start-up voltage 44V)			
Battery Voltage Range	40-60Vdc			
Max. Generator Charging Current	100Adc	120Adc	120Adc	Y

Max. Grid Charging Current	100Adc	120Adc	120Adc	Y
Max. Hybrid Charging Current	180Adc	220Adc	260Adc	Y
PV input				
No. of MPPT Trackers	2			
Max. PV Input Power	6000W/6000W	7500W/7500W	9000W/9000W	
Max. PV Input Current	22/22Adc			
Max. PV Isc	37A/37Adc			
Max. Open Circuit Voltage	800Vdc/800Vdc			
MPPT Operating Voltage Range	200-650Vdc/200-650Vdc			
Grid / Generator input				
Input Voltage Range	phase voltage 170~280V, line voltage 305~485V			
Input Frequency Range	50/60Hz			
Max. AC bypass current	23.2Aac	29Aac	35Aac	
Efficiency				
MPPT Tracking Efficiency	99.9%			
Max. Battery Inverter Efficiency	≥92%			
European Efficiency	97.2%	97.5%	97.5%	
Protection				
PV Input Lightning Protection	Yes			
Anti-islanding Protection	Yes			
PV String Input Reverse Polarity Protection	Yes			
Insulation Resistor Detection	Yes			
Residual Current Monitoring Unit	Yes			
Output Over Current Protection	Yes			
Output Shorted Protection	Yes			
Surge Protection	DC type II/AC type II			
Over Voltage Category	DC type II/AC type III			
Certified specifications				
On-grid standard	EN50549,VDE4105			
Safety	IEC62109-1, IEC62109-2			

EMC	EN61000-6-1, EN61000-6-3, FCC 15 class B	
RoHS	Yes	
Basic data		
Parallel capacity	6	
Operating Temperature Range	-25~60℃,>45℃ derated	
Humidity range	0-100%	
Noise	<60dB	
Protection Degree	IP65	
Cooling Method	Heat sink + intelligent fan cooling	
Self-consumption	<130W	
Dimensions	700*440*260mm	
Weight	39.2kg	
Communication port	RS485 / CAN / USB / Dry contact	Y
External Modules （Optional）	Wi-Fi / GPRS	Y