

# USER MANUAL



## ***Solar Hybrid Inverter***

HY-4K-EU | HY-4.6K-EU | HY-5K-EU  
HY-5.5K-EU | HY-6K-EU

# Enerlution

## Contents

<b>1. Safety</b> .....	<b>4</b>
1.1、 How to use this manual.....	4
1.2、 Symbols in this manual.....	4
1.3、 Safety instructions.....	4
<b>2. Production Instructions</b> .....	<b>5</b>
2.1、 Instructions.....	5
2.2、 Features.....	5
2.3、 System connection diagram.....	6
2.4、 Production Overview.....	7
2.5、 Dimension drawing.....	8
<b>3. Installation</b> .....	<b>9</b>
3.1、 Select the mount location.....	9
3.2、 Mount the inverter.....	10
<b>4. Connection</b> .....	<b>12</b>
4.1、 Single-phase output.....	12
4.2、 Cable & circuit breaker requirement.....	13
4.3、 GRID & LOAD & GEN connection.....	15
4.4、 Battery Connection.....	15
4.5、 PV connection.....	16
4.6、 Grounding connection.....	17
4.7、 Final assembly.....	17
4.8、 Inverter Parallel.....	18
4.8.1 Introduction.....	18
4.8.2 Precautions for connecting the parallel connecting lines.....	18
4.8.3 Schematic diagram of parallel connection in single phase.....	20
4.8.4 Schematic diagram of parallel connection in three phase.....	22
<b>5. Operation</b> .....	<b>27</b>
5.1、 Operation and display panel.....	27
5.2、 Setting.....	30
5.3、 Output priority.....	36
5.4、 Battery charging mode.....	37
5.5、 Time-slot charging/discharging function.....	38
5.6、 Battery parameter.....	39
<b>6. Communication</b> .....	<b>41</b>

# Enerlution





6.1、 Dry contact.....	41
6.2、 RS485/CAN communication port.....	42
6.3、 DIP switch.....	42
6.4、 WIFI port.....	42
6.5、 USB-A port.....	43
6.6、 USB-B port.....	43
6.7、 Parallel port.....	43
6.8 、 External CT port.....	44
<b>7.App Instructions .....</b>	<b>45</b>
7.1、 APP DOWNLOAD.....	45
7.2、 LOGIN.....	45
7.3、 Adding Devices.....	45
<b>8. Fault and Remedy .....</b>	<b>46</b>
8.1、 Fault code.....	46
8.2、 Troubleshooting.....	50
<b>9. Protection and Maintenance .....</b>	<b>52</b>
9.1、 Protection features.....	52
9.2、 Maintenance.....	54
<b>10. Datasheet.....</b>	<b>55</b>

## 1. Safety

### 1.1. How to use this manual

- This manual contains important information, guidelines, operation and maintenance for the following products: HY series
- The manual must be followed during installation and maintenance.

### 1.2. Symbols in this manual

Symbol	Description
	DANGER indicates a hazardous situations which if not avoided will result in death or serious injury.
	WARNING indicates a hazardous situations which if not avoided could result in death or serious injury.
	CAUTION indicates a hazardous situations which if not avoided could result in minor or moderate injury.
	NOTICE provide some tips on operation of products.

### 1.3. Safety instructions

#### **DANGER**

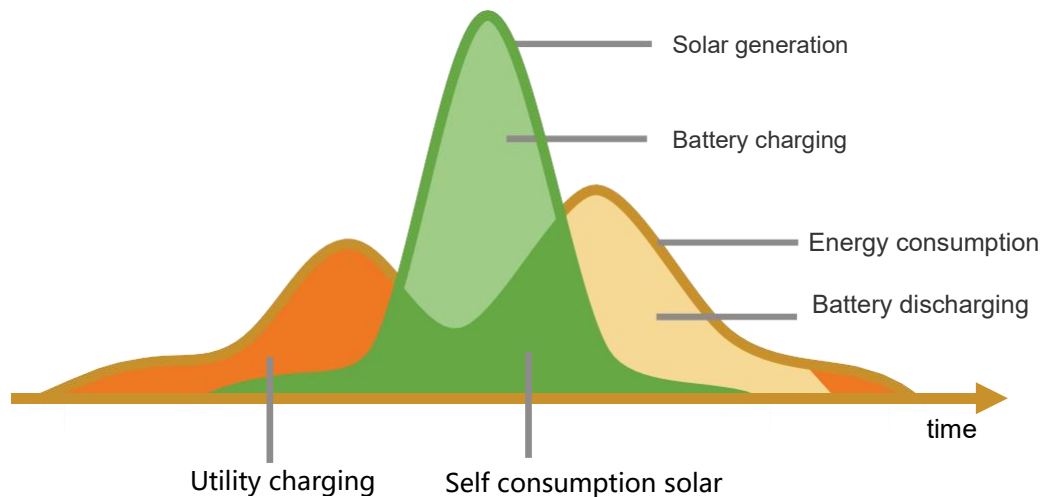
- This chapter contains important safety instructions. Read and keep this manual for future reference.
- Be sure to comply the local requirements and regulation to install this inverter.
- Beware of high voltage. Please turn off the switch of each power sources before and during the installation to avoid electric shock.
- For optimum operation of this inverter, please follow required specification to select appropriate cable size and necessary protective device.
- Do not connect or disconnect any connections when the inverter is working.
- Do not open the terminal cover when the inverter working.
- Make sure the inverter is well grounding.
- Never cause AC output and DC input short circuited.
- Do not disassembly this unit, for all repair and maintenance, please take it to the professional service center.
- Never charge a frozen battery.
- Please keep children away from touching or mishandling the inverter.
- Please make sure that this inverter is the only input power source for the load, do not use it in parallel with other input AC power sources to avoid damage.

# Enerlution

## 2. Production Instructions

### 2.1、 Instructions

HESP 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

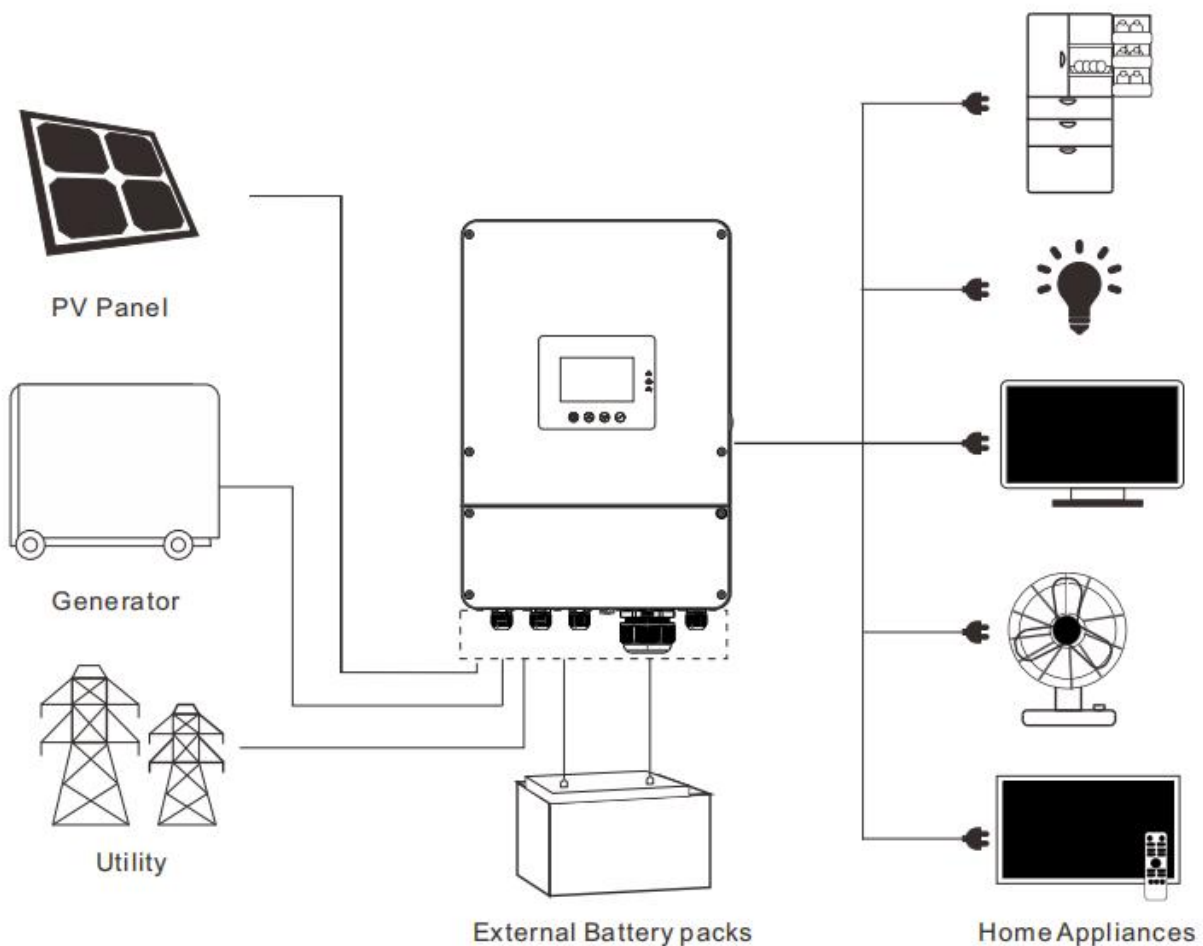
- Supports lead acid battery and li-ion battery connections.
- With a dual activation function when the li-ion battery is dormant; either mains/photovoltaic power supply access can trigger the activation of the li-ion battery.
- Support single-phase pure sine wave output.
- Supports four different voltage levels of 200\208\220\230\240Vac per phase.
- Supports two solar inputs and simultaneous tracking of two solar maximum power charging/carrying capacity functions.
- Dual MPPT with 99.9% efficiency and maximum 16A current in a single circuit, perfectly adapted to high power modules.
- 2 charging modes are available: solar only, mixed mains/PV charging.
- With the time-slot charging and discharging setting function, you can set the time period for cutting in/out of mains charging and switch the time period between battery discharging and mains bypass power supply mode.
- 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 under voltage protection, overload protection, backfill protection, etc.
- Support CAN, USB, and RS485 communication.

## 2.3、 System connection diagram

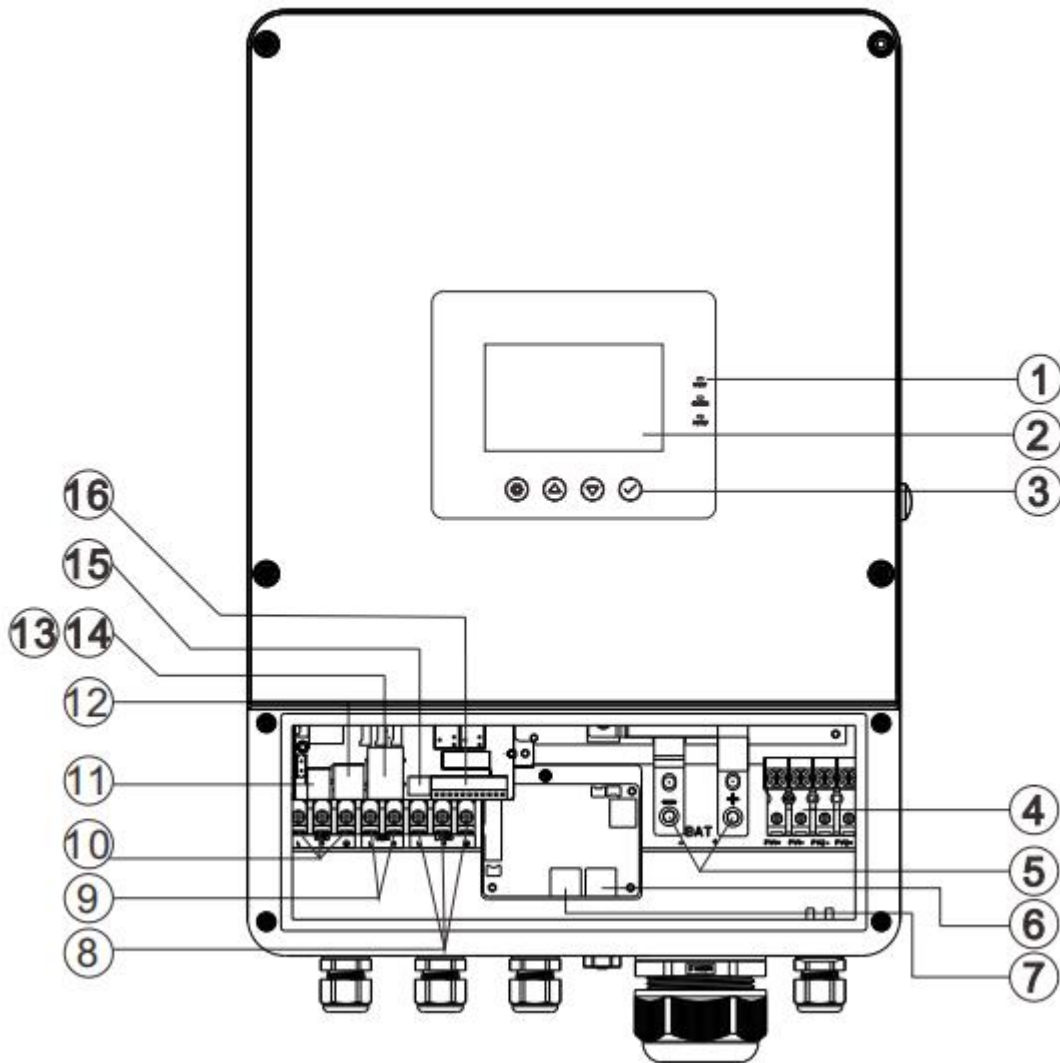
The diagram below shows the system application scenario of this product. A complete system consists of the following components:

- **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, it can supply the load and charge the battery at the same time. The system can also operate generally without the mains or generator when the battery and the PV module power the load.
- **Battery:** The role of the battery is to ensure the regular power supply of the system load when the solar energy is insufficient and there is no mains power.
- **Home load:** Various household and office loads can be connected, including refrigerators, lamps, televisions, fans, air conditioners, and other AC loads.
- **Inverter:** The energy conversion device of the whole system.

The actual application scenario determines the specific system wiring method.

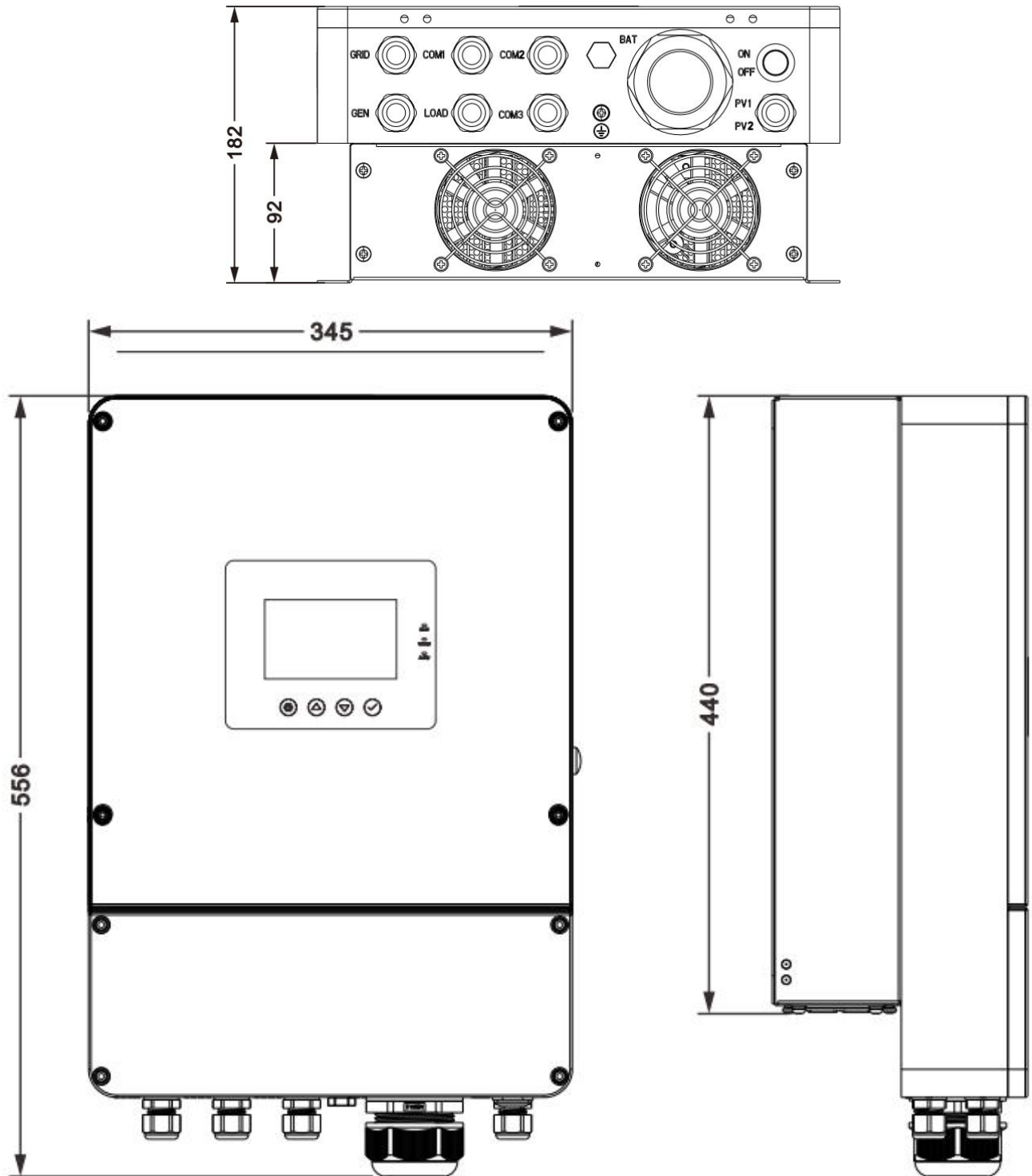


## 2.4、 Production Overview



1	LED Indicators	9	Generator terminals
2	LCD screen	10	Grid terminals
3	keys	11	USB-B port
4	PV1/PV2 terminals	12	RS485/CAN port
5	Battery terminal	13	WIFI port
6	Parallel communication A port	14	USB-A port
7	Parallel communication B port	15	DIP switch
8	LOAD terminals	16	Dry contact

## 2.5、 Dimension drawing



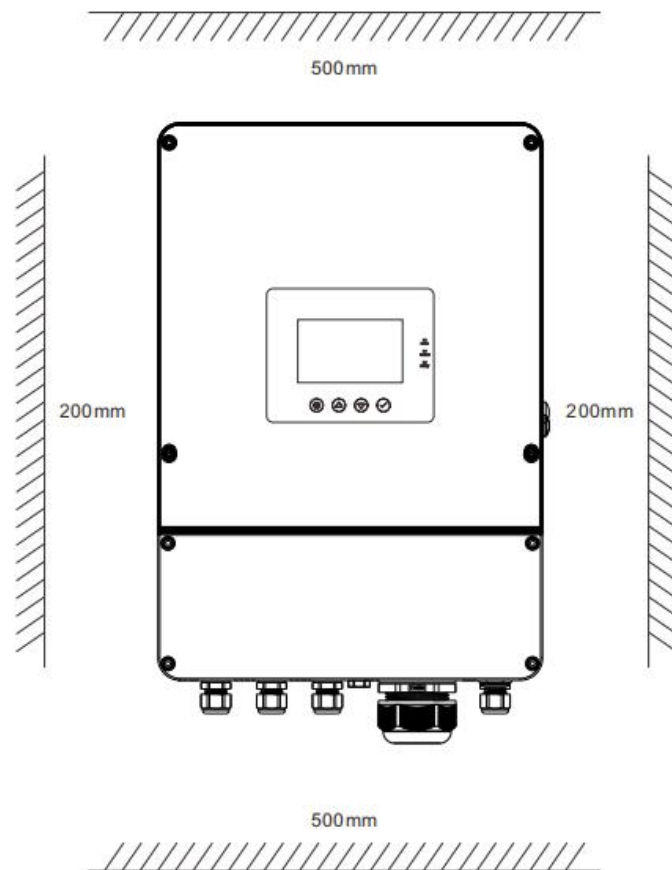


## 3. Installation

### 3.1、 Select the mount location

HY 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  $-25\sim 60^{\circ}\text{C}$  ( $-13\sim 140^{\circ}\text{F}$ ) to ensure optimal operation.



#### **⚠ DANGER**

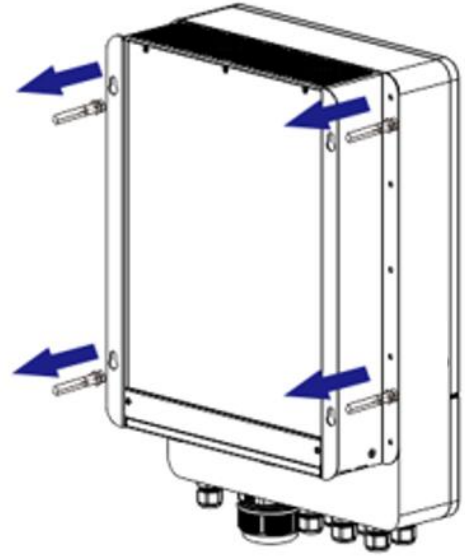
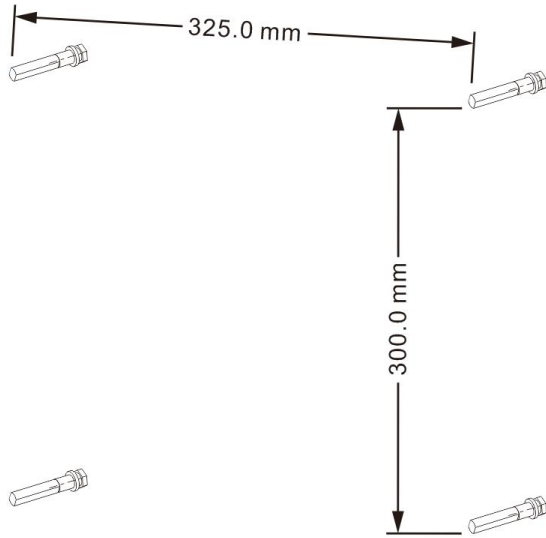
- Do not install the inverter where highly flammable materials are near by.
- Do not install the inverter in potential explosive areas.
- Do not install the inverter with lead-acid batteries in a confined space.

#### **⚠ CAUTION**

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

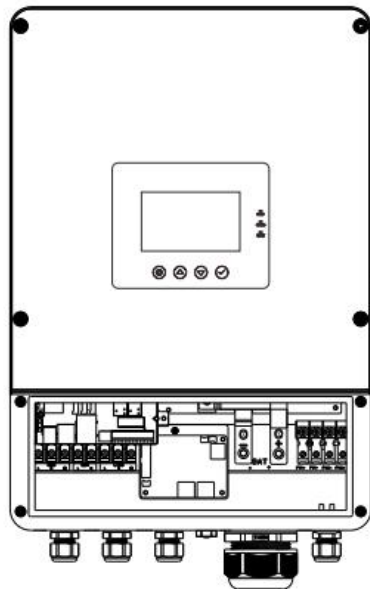
## 3.2、 Mount the inverter

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



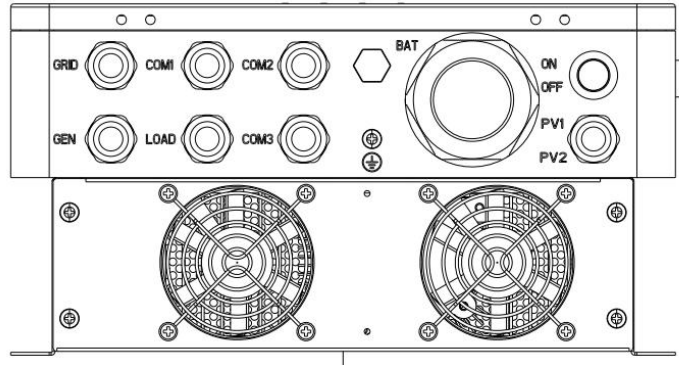
## 3.3、 Remove the terminal cover & wiring

Using a screwdriver, remove the terminal protection cover and anti-insect net.



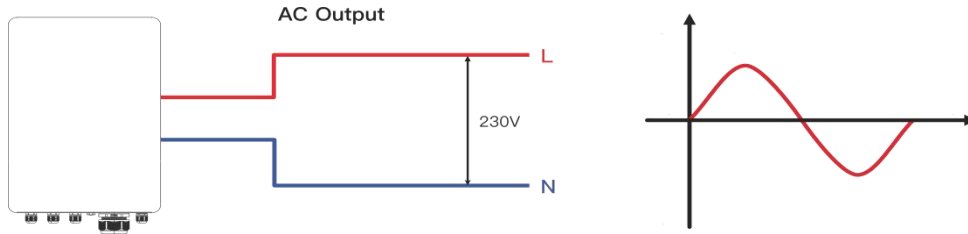
Terminal cover





## 4. Connection

### 4.1、 Single-phase output



Items	Description
Applicable Model	HY series S model
Output Voltage Range (L-N)	200 ~ 240Vac, 230Vac default

#### ⓘ NOTICE

- Users can change the output phase mode and output voltage by setup menu. Please read the chapter 5.2 Setting.
- The output voltage can be set from 200V to 240V.

## 4.2. Cable & circuit breaker requirement

### • PV INPUT

Model	Cable Diameter	Max. PV Input Current	Circuit Breaker Spec
HY-4K-EU	6mm <sup>2</sup> /10AWG	16A/16A	2P—25A
HY-4.6K-EU	6mm <sup>2</sup> /10AWG	16A/16A	2P—25A
HY-5K-EU	6mm <sup>2</sup> /10AWG	16A/16A	2P—25A
HY-5.5K-EU	6mm <sup>2</sup> /10AWG	16A/16A	2P—25A
HY-6K-EU	6mm <sup>2</sup> /10AWG	16A/16A	2P—25A

### • Grid

Model	Cable diameter	Max.input current	Circuit Breaker Spec
HY-4K-EU	10mm <sup>2</sup> /7AWG	40A	2P—40A
HY-4.6K-EU	10mm <sup>2</sup> /7AWG	40A	2P—40A
HY-5K-EU	10mm <sup>2</sup> /7AWG	40A	2P—40A
HY-5.5K-EU	10mm <sup>2</sup> /7AWG	40A	2P—40A
HY-6K-EU	10mm <sup>2</sup> /7AWG	40A	2P—40A

### • Generator

Model	Cable diameter	Max.input current	Circuit Breaker Spec
HY-4K-EU	10mm <sup>2</sup> /7AWG	40A	2P—40A
HY-4.6K-EU	10mm <sup>2</sup> /7AWG	40A	2P—40A
HY-5K-EU	10mm <sup>2</sup> /7AWG	40A	2P—40A
HY-5.5K-EU	10mm <sup>2</sup> /7AWG	40A	2P—40A
HY-6K-EU	10mm <sup>2</sup> /7AWG	40A	2P—40A

# Enerlution

## • Battery

Model	Cable Diameter	Max. Battery discharge Current	Max.battery charge current	Circuit Breaker Spec
HY-4K-EU	30mm <sup>2</sup> /2AWG	100A	100A	2P-160A
HY-4.6K-EU	30mm <sup>2</sup> /2AWG	118A	100A	2P-160A
HY-5K-EU	30mm <sup>2</sup> /2AWG	125A	100A	2P-200A
HY-5.5K-EU	30mm <sup>2</sup> /2AWG	130A	100A	2P-200A
HY-6K-EU	30mm <sup>2</sup> /2AWG	135A	100A	2P-200A

## • LOAD

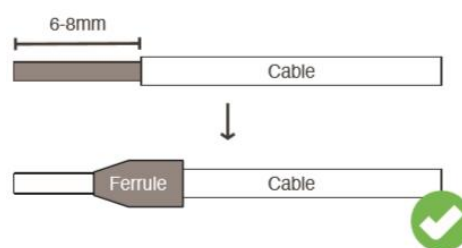
Model	Cable diameter	Output current	Circuit Breaker Spec
HY-4K-EU	10mm <sup>2</sup> /7AWG	17.4A	2P-40A
HY-4.6K-EU	10mm <sup>2</sup> /7AWG	20A	2P-40A
HY-5K-EU	10mm <sup>2</sup> /7AWG	24A	2P-40A
HY-5.5K-EU	10mm <sup>2</sup> /7AWG	24A	2P-40A
HY-6K-EU	10mm <sup>2</sup> /7AWG	26A	2P-40A



### NOTICE

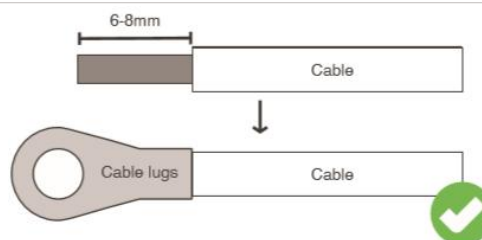
#### • PV INPUT, AC INPUT, AC OUTPUT

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

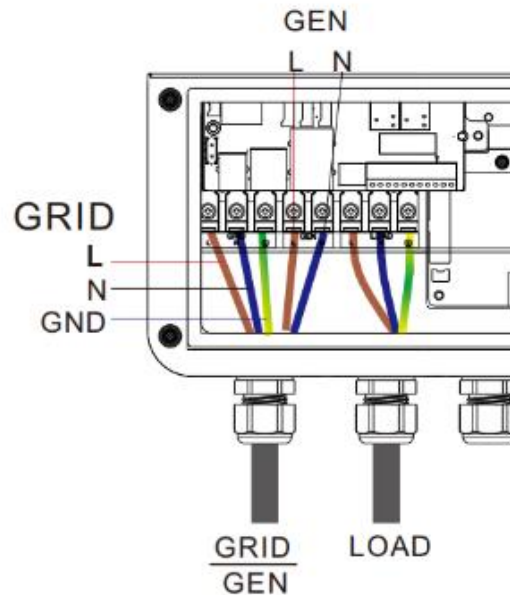
1. Use a stripper to remove the 6~8mm insulation of the cable
2. Fixing cable lugs that supply with the box at the end of the cable.



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. GRID & LOAD & GEN connection

Connect the live, neutral and ground wires according to the cables' position and order shown in the diagram below.

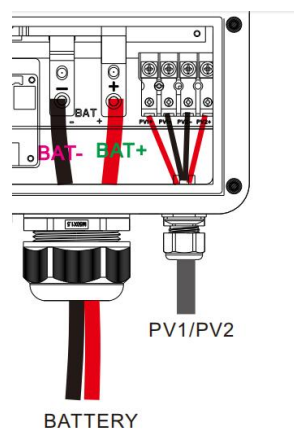


### **⚠ DANGER**

- Before connecting AC inputs and outputs, the circuit breaker must be opened 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.

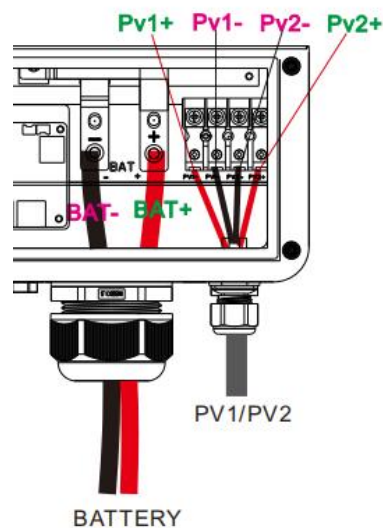


## **DANGER**

- Before connecting battery, the circuit breaker must be opened to avoid the risk of electric shock and must not be operated with electricity.
- Make sure that the positive and negative terminals of the battery are connected correctly 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.



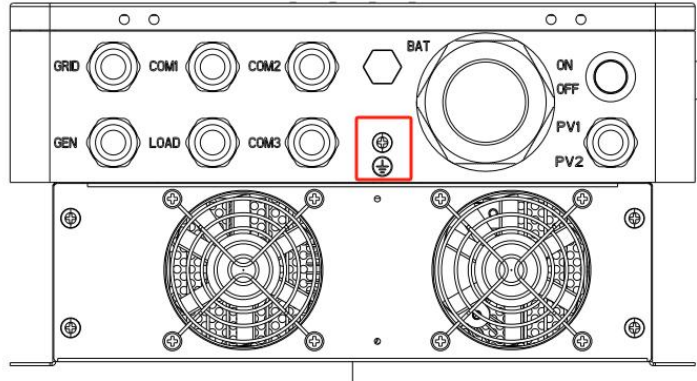
## **DANGER**

- Before connecting PV, the circuit breaker must be opened to avoid the risk of electric shock and must not be operated with electricity.
- Please make sure that the open circuit voltage of the PV modules in series does not exceed the **Max. Open Circuit Voltage** of the inverter (this value is 500V), otherwise the inverter may be damaged.



## 4.6、 Grounding connection

Please make sure the grounding terminal connect to the Grounding Bar.



### NOTICE

- The grounding cable should have a diameter of not less than 4 mm<sup>2</sup> and be as close as possible to the grounding point.

## 4.7、 Final assembly

After ensuring that the wiring is reliable and the wire sequence is correct, install the terminal protection cover in place.

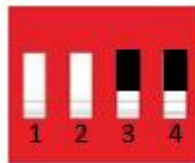
- **Step 1** : Close the circuit breaker of the battery.
- **Step 2** : Press the rocker switch on the bottom of inverter, the screen and indicators light up to indicate that the inverter has been activated.
- **Step 3** : Sequential close of the circuit breakers for PV, AC input and AC output.
- **Step 4** : Start the loads one by one in order of power from small to large

## 4.8、 Inverter Parallel

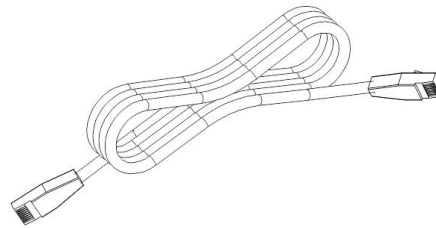
### 4.8.1 Introduction

1. Up to six units connected in parallel.
2. When using the parallel operation function, the following connecting lines (package accessories) shall be firmly and reliably connected:
3. Dip switches 3 and 4 of any two machines must be put down when inverters are in parallel

#### Dip switches



#### Parallel communication line\*1:



### 4.8.2 Precautions for connecting the parallel connecting lines

**Warning:** 

#### 1. PV connection:

When connected in parallel, the PV arrays of each machine must be independent and the PV arrays of PV1 and PV2 of each machine must also be independent.

#### 2. Battery wiring:

Parallel connection in single or three-phase: ensure that all solar storage inverters are connected to the same battery, with BAT + connected to BAT + , BAT - connected to BAT - , and that the connection is correct with the same wiring length and line diameter before power on, so as to avoid the abnormal operation of parallel system output caused by wrong connection.

#### 3. LOAD wiring:

Parallel connection in single phase: ensure L-to-L, N-to-N and PE-to-PE connection for all solar storage inverters, and that the connection is correct with the same wiring length and line diameter before power on,

# Enerlution

so as to avoid the abnormal operation of parallel system output caused by wrong connection. For specific wiring, please refer to Wiring Diagram.

Parallel connection in three-phase: ensure N-to-N and PE-to-PE connection for all solar storage inverters. The L lines of all inverters connected to the same phase need to be connected together. But L lines of different phases cannot be joined together. Other connection precautions are the same as parallel connection in single phase. For specific wiring, please refer to Wiring Diagram.

#### 4. **GRID wiring:**

Parallel connection in single phase: ensure L-to-L, N-to-N and PE-to-PE connection for all solar storage inverters, and that the connection is correct with the same wiring length and line diameter before power on, 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 consistency and uniqueness of AC source input shall be ensured. For specific wiring, please refer to Wiring Diagram.

Parallel connection in three-phase: ensure N-to-N and PE-to-PE connection for all solar storage inverters. The L lines of all inverters connected to the same phase need to be connected together. But L lines of different phases cannot be joined together. Other connection precautions are the same as parallel connection in single phase. For specific wiring, please refer to Wiring Diagram.

#### 5. **Wiring of parallel communication line:**

Our parallel communication cable is a shielded 8Pin 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 8Pin 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.

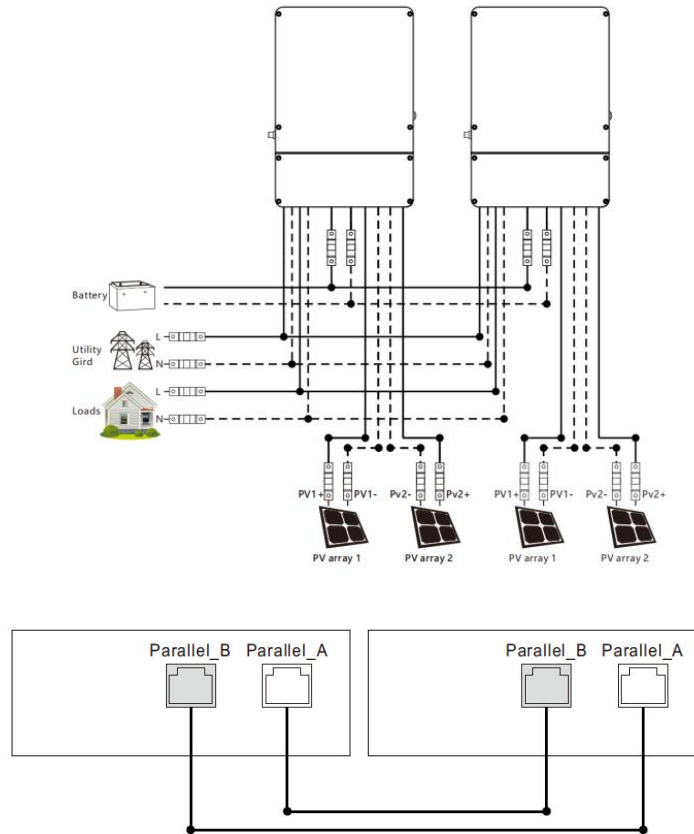
6. Before and after connecting the system, please check the following system wiring diagrams in detail to ensure that all wiring is correct and reliable before powering on.

7. After the system is 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.

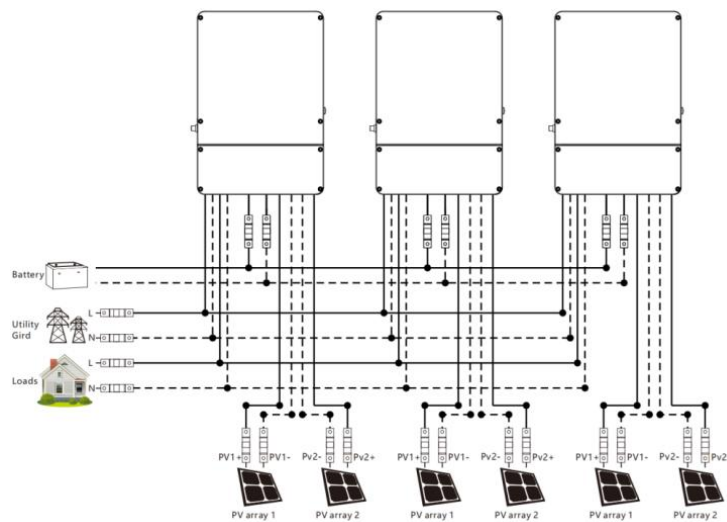
## 4.8.3 Schematic diagram of parallel connection in single phase

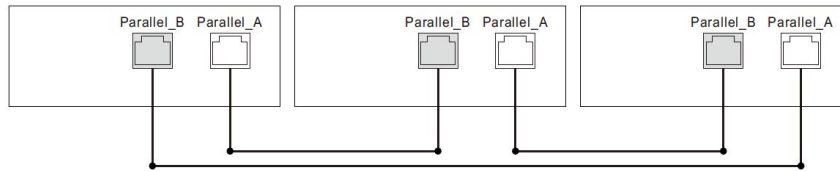
1. The parallel communication line and current sharing detection line of the solar storage inverter need to be locked with screws after connecting.
2. In case of parallel operation with multiple inverters, the schematic diagram of parallel connection is as follows:

### a) Two units connected in parallel:

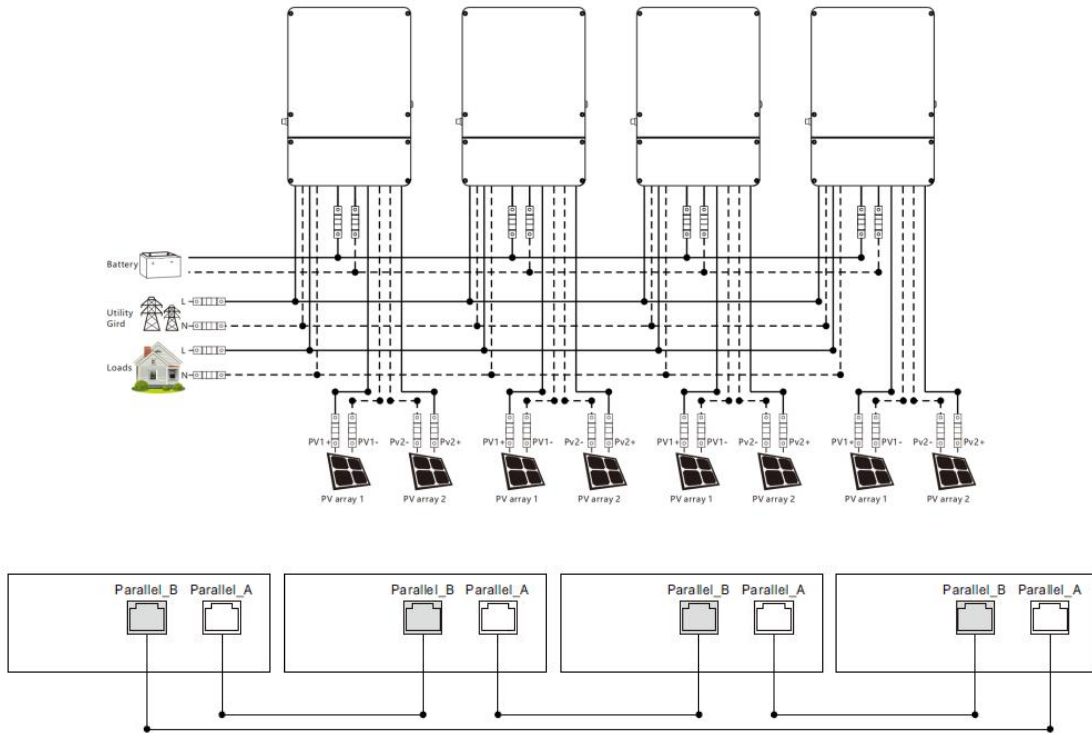


### b) Three units connected in parallel:

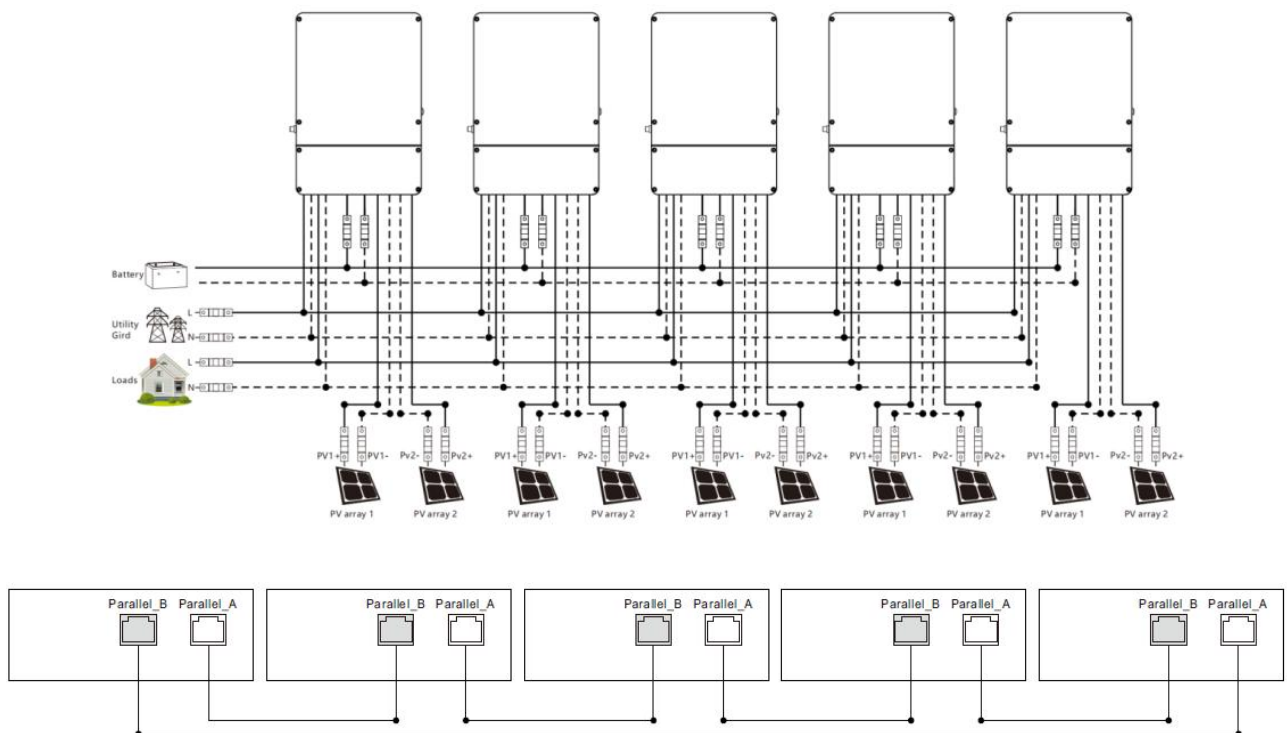




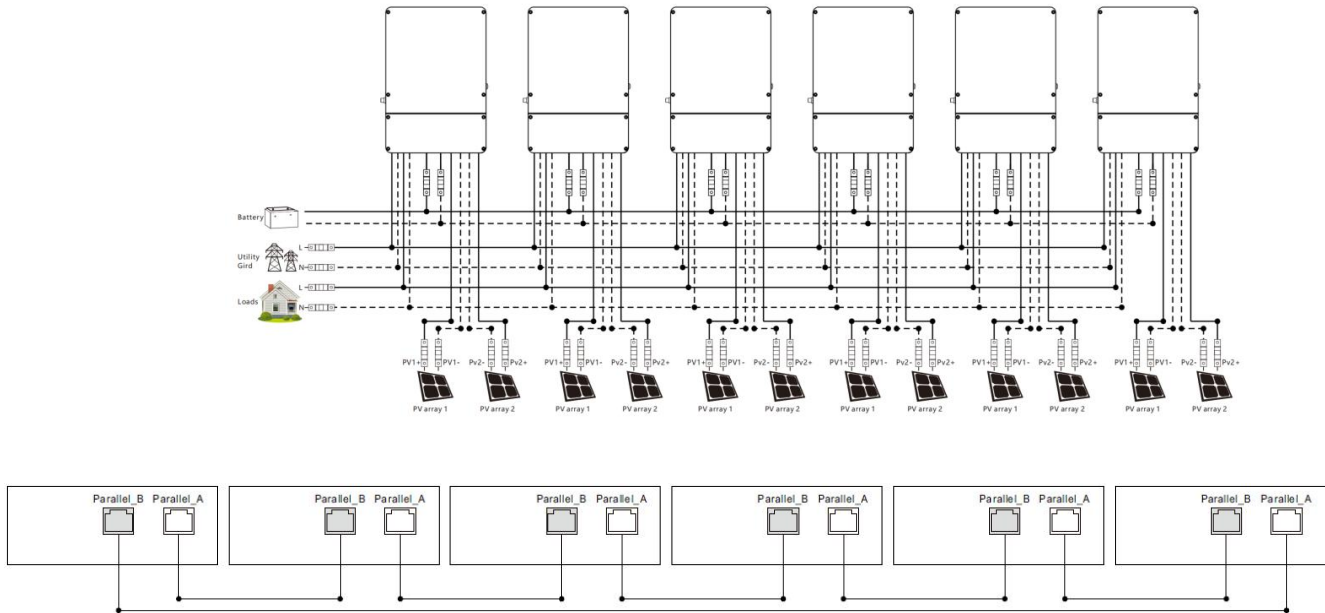
**c) Four units connected in parallel:**



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



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



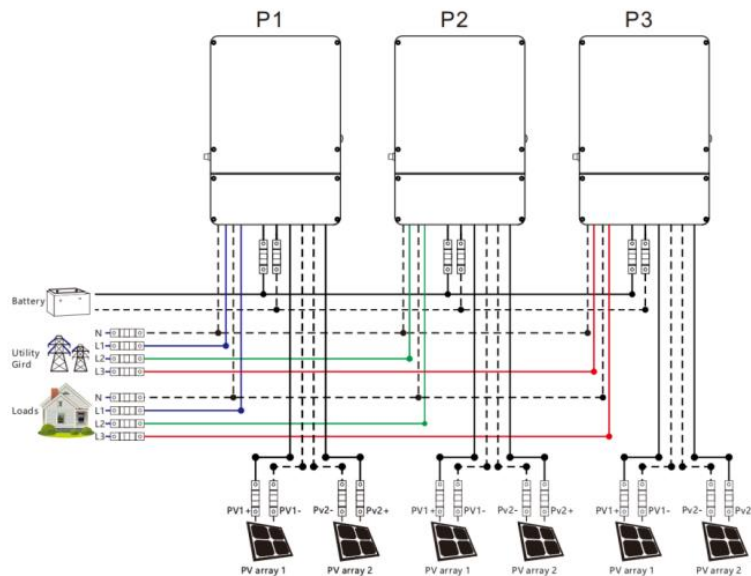
## 4.8.4 Schematic diagram of parallel connection in three phase

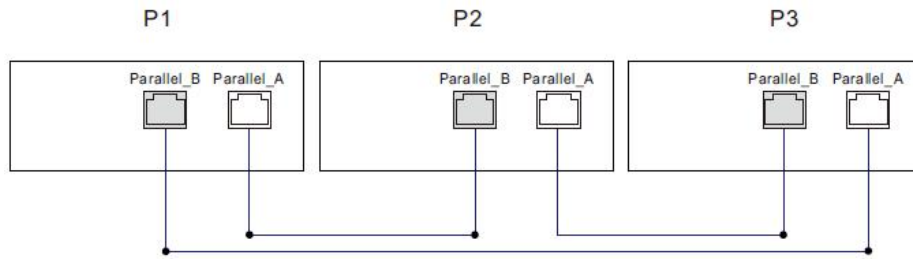
1. The parallel communication line and current sharing detection line of the solar storage inverter need to be locked with screws after connecting.
2. In case of parallel operation with multiple inverters, the schematic diagram of parallel connection is as follows:

### Parallel Operation in three phase :

**a) Three units connected in three phase:**

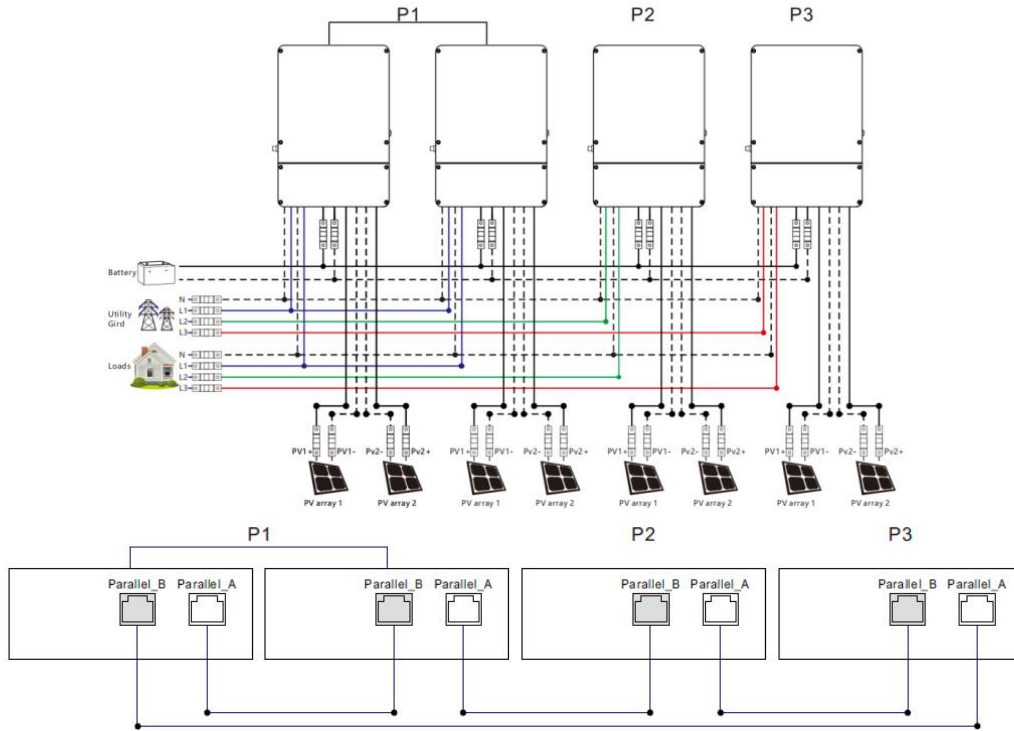
**1+1+1 system:**





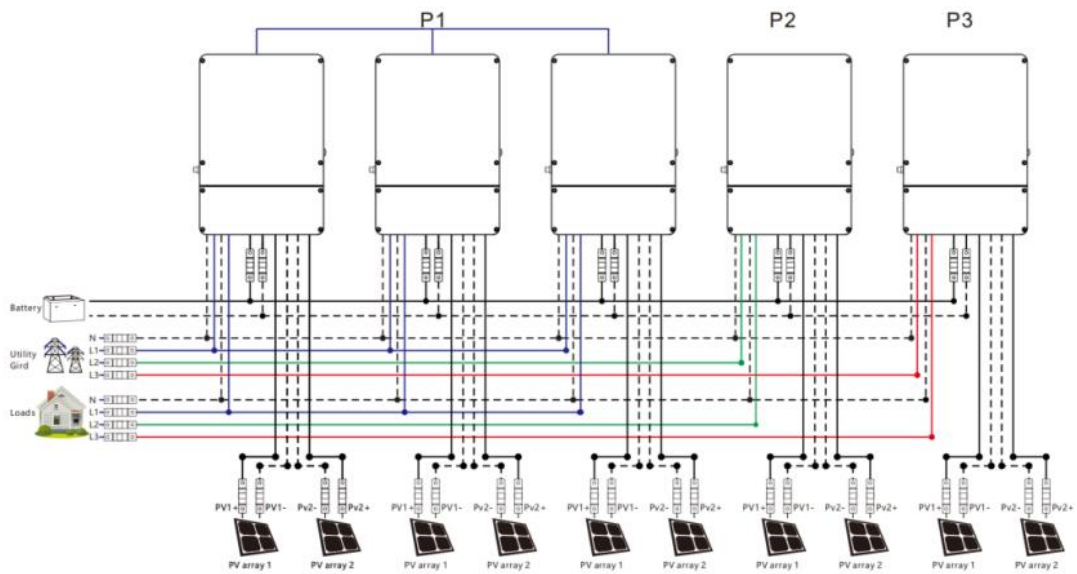
**b) Four units connected in three phase:**

**2+1+1 system:**

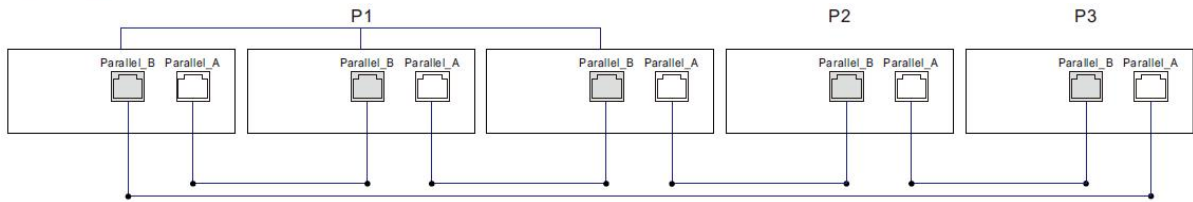


**c) Five units connected in three phase:**

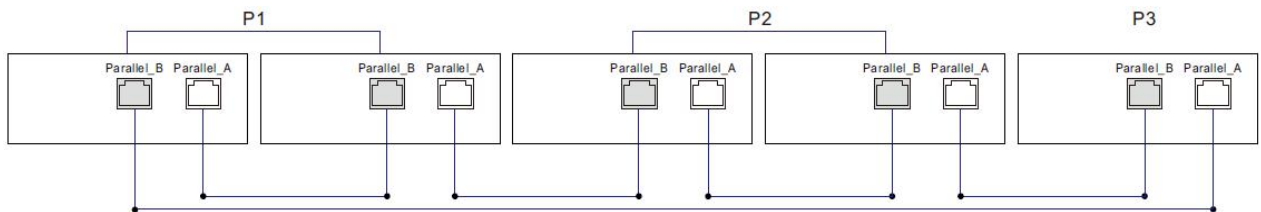
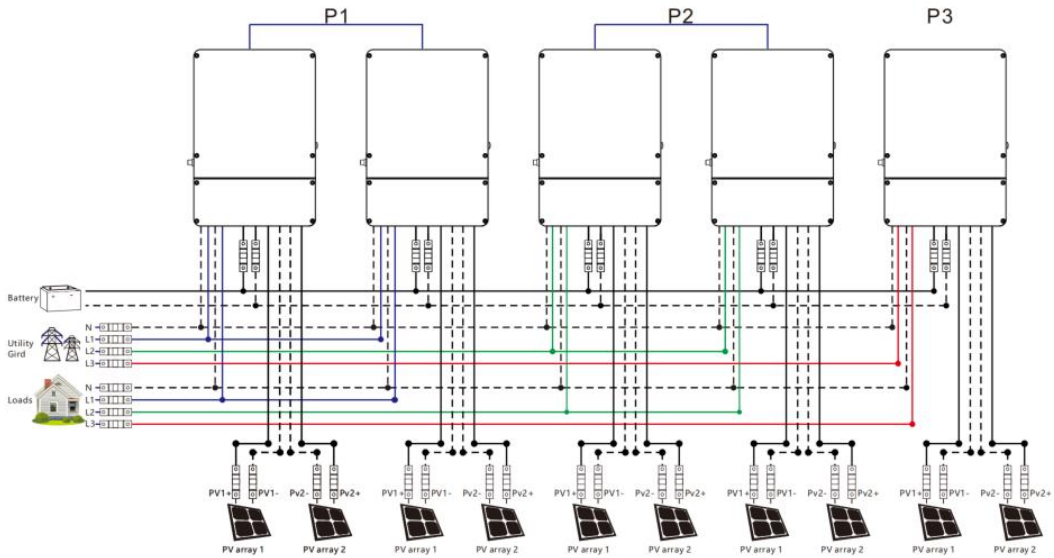
**3+1+1 system:**



# Enerlution

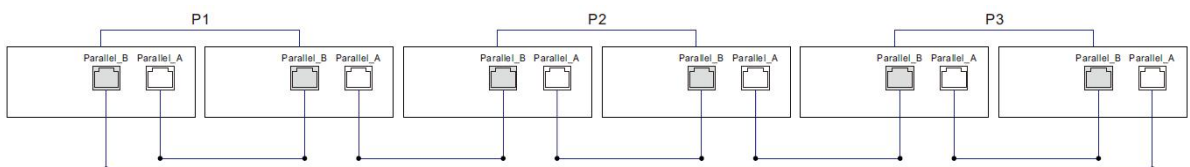
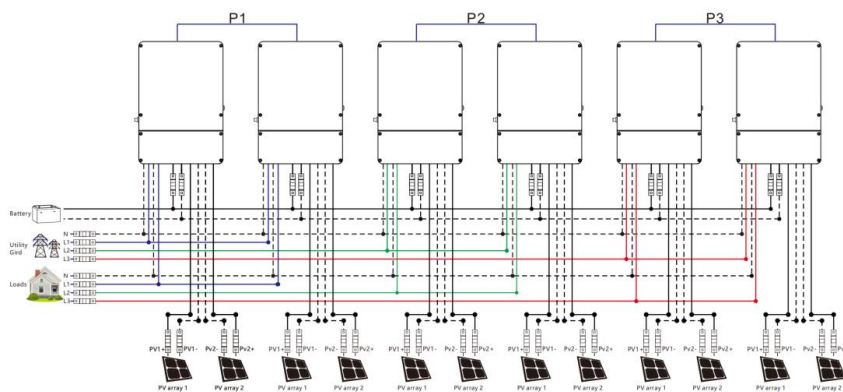


## 2+2+1 system:



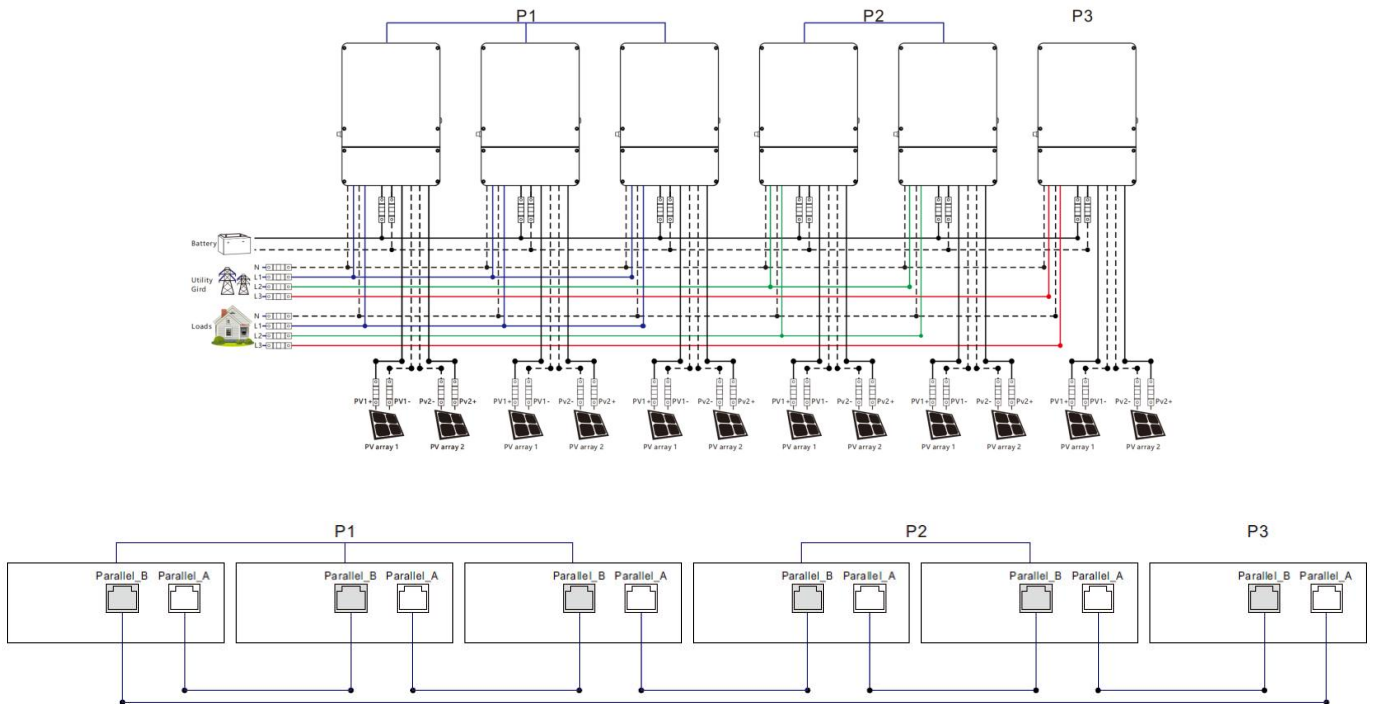
## d) Six units connected in three phase:

### 2+2+2 system:

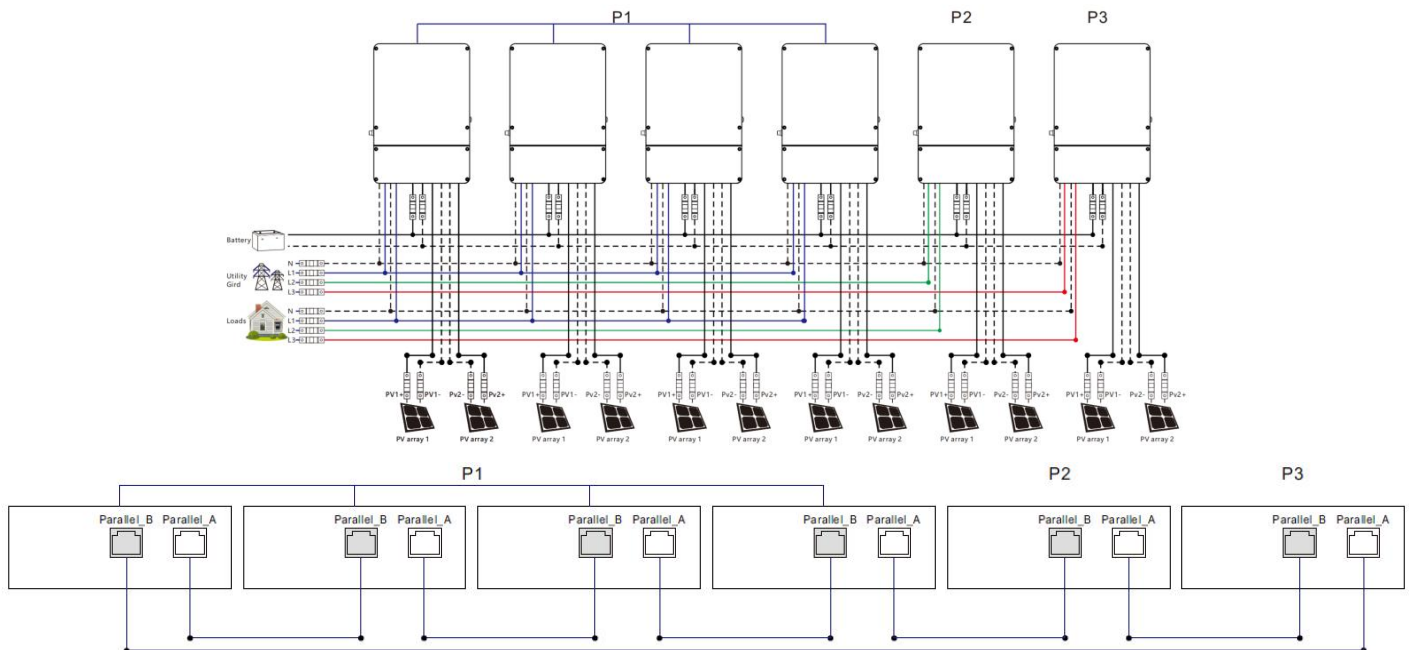




## 3+2+1 system:



## 4+1+1 system:



### Note:

- 1) Before starting up and running, please check whether the connection was correct to avoid any abnormalities in the system.
- 2) All wiring must be fixed and reliable to avoid wire drop during use.
- 3) When the AC output is wired to the load, it shall be properly wired according to the requirements of the

# Enerlution

electrical load equipment to avoid damage to the load equipment.

- 4) Setting item "output voltage setting" needs to be set consistently or only for the master. When paralleling, the voltage set by the master will prevail, and the master will be forced to rewrite the rest of the slaves to be consistent. This option can be set in standby mode only.
- 5) Machine factory default for single machine mode, if you use parallel or three-phase function, you need to set the " Parallel mode " item parameters through the screen. The setting method is: power on one machine at a time, the rest of the machine off, and then set the " Parallel mode " item parameters according to the site system operation mode. After this machine is set successfully, turn off the machine switch and wait for the machine to be powered down, then set the rest of the machines in turn until all machines are set, and then all machines are powered up again at the same time and enter the working state.

The " Parallel mode " setting item :

When in single-phase parallel connection : setting " Parallel mode " should be set as "Single-phase parallel" .

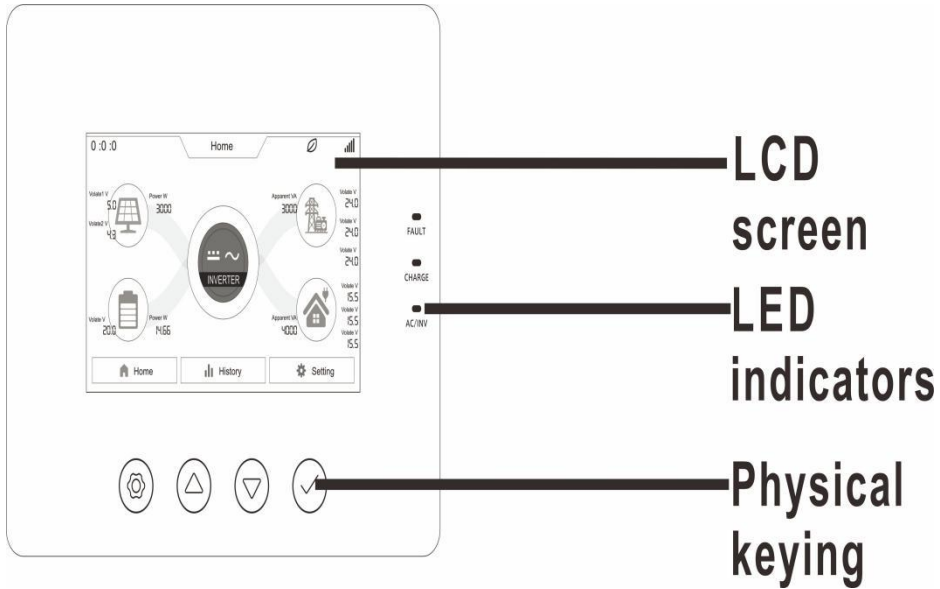
When in three-phase parallel connection, setting " Parallel mode " should be set as follows: all machines in phase 1 must be set as "3PAL1" , all machines in phase 2 must be set as "3PBL2" , all machines in phase 3 must be set as "3PCL3" . At present, the voltage phase difference between P1-P2, P1-P3 and P2-P3 is 120 degrees.

- a. When the output voltage set in the setting output voltage is 230Vac (S model), the line voltage between the live wire L1 in phase 1 and the live wire L2 in phase 2 is  $230 \times 1.732 = 398\text{Vac}$ , and similarly the line voltage between L1-L3, L2-L3 is 398Vac; the single phase voltage between L1-N, L2-N, L3-N is 230Vac.
- 6) After the system runs, the output voltage is measured correctly, and then the load setting is connected.





## 5. Operation

### 5.1、 Operation and display panel

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



#### • Keys

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

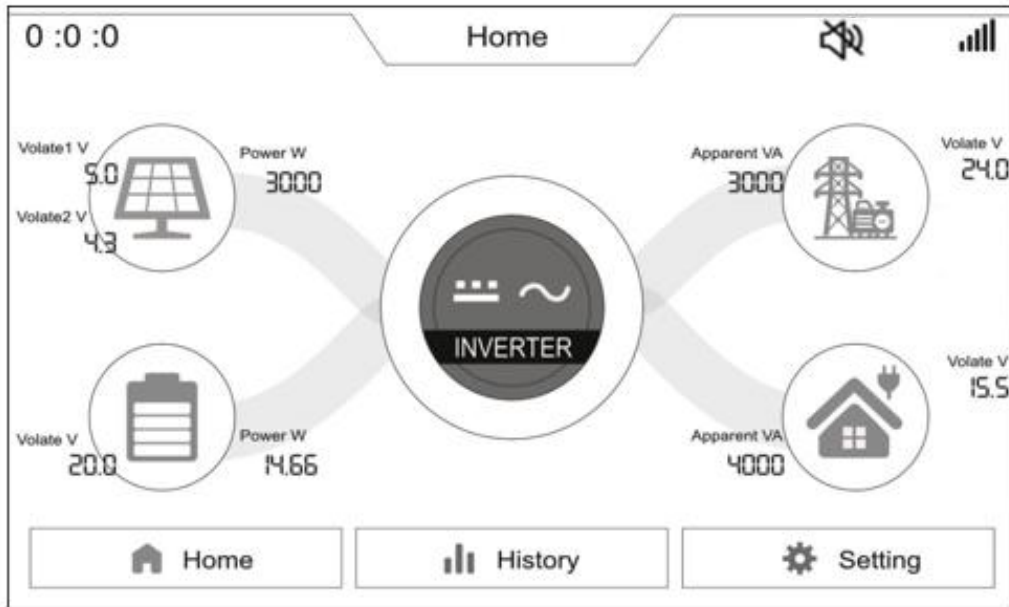
#### • LED Indicators

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

# Enerlution

		Flash: inverter output
--	--	------------------------

## • Display panel



Icon	Description	Icon	Description
	Solar panel		Load
	Battery		Grid or Generator
	Home page		Inverter is Working
	History data		Setting
	Local time		The buzzer is silent
	BMS communicate status		The energy direction

## • 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	MPPT temperature °C	8	Device information
2	Inverter temperature °C	9	SN
3	DC-DC board temperature °C	10	MCU1 version
4	Battery temperature °C	11	MCU2 version
5	AC out voltage	12	LCD version
6	AC out current	13	Alarm code
7	AC out power		
Battery data			
1	Battery voltage	4	Battery BMS communicate flag
2	Battery current	5	BMS protocol
3	Battery power	6	Battery BMS data
7	Battery SOC	8	Battery type
Grid data			
1	Grid voltage V	5	Grid frequency
2	Grid current A	6	Buy energy from grid (kWh)
3	Grid power W	7	Sell energy to grid (kWh)
4	Grid load active power W		
Load data			
1	Backup load voltage V	4	Backup load apparent power
2	Backup Load current A	5	Consume energy today (kWh)
3	Backup load active power	6	Consume energy total (kWh)
PV data			
1	PV1 voltage V	5	PV2 current
2	PV1 current A	6	PV2 power
3	PV1 power W	7	Generate energy today (kWh)
4	PV2 voltage V	8	Generate energy total (kWh)

## 5.2、 Setting

**Operating Instructions:** tap settings in the menu bar at the bottom of the screen to enter the settings interface, including Basic setup, Work mode setup, Battery setup On grid setup and Advance setup.

### Parameter settings:

Parameter Meaning	Options	Description
<b>Basic setup</b>		
System date		This item shows the inverter date, click on it to set the date
System time		This item shows the inverter time, click on it to set the time
Beep		You can choice whether enable the Beep alarm
Password input		Input the inverter password, default password:000000
Password setting		You can set the inverter password
RS485 Address		Displays the current inverter 485 address and jumps to the 34 setting item when clicked.
Display setup		Set the Screen brightness
		Set language
<b>Work Mode</b>		
Off/on grid mode	Off grid	Off grid mode
	On grid	The excess solar energy will feed back into the grid directly
	Anti-feed power to AC in port	Hybrid inverter will only provide power to the backup load connected. The hybrid inverter will neither provide power to the home load nor sell power to grid.
	Anti-feed power to grid entry	Hybrid inverter will not only provide power to the backup load connected but also give power to the home load connected. If PV power and battery power is insufficient, it will take grid energy as supplement. The hybrid inverter will not sell power to grid. In this mode, a CT is needed.
output source priority	AC first	Utility priority: switch to inverter only when utility power is not available.
	Battery first	Inverter priority: switch to mains only when the battery is under-voltage or below the value set in parameter" Turn To Inverter Volt" or " Switching to utility SOC" .

# Enerlution

	Solar first	PV priority: switch to utility power when PV is invalid or when the battery is below the parameter" Turn To Inverter Volt" or " Switching to utility SOC" . setting.
Battery charge priority	Hybrid <b>default</b>	Solar and utility charging the battery at the same time, solar at the first priority, utility power as a supplement when solar power is not sufficient. Notice: Solar and utility charging the battery at the same time only in bypass mode, only solar charging can be used when the invert circuit is in operation
	Only PV	Only solar charging the battery.
Battery power option	Battery power to backupload	The battery preferentially supplies power to the loads connected to the load port of the inverter
	Battery power for selling to grid	Battery energy are preferentially sold to grid
PV power priority	First to load <b>default</b>	PV energy is prioritized to supply the load
	First to charge	PV energy is prioritized to charge the battery before grid connection (only valid when grid connection and hybrid carry function are on)
Parallel mode	Stand alone	Single machine setting
	Single phase parallel	Single-phase parallel connection setting
	3PAL1/3PBL2/3PCL3	Three-phase parallel connection setting All machines in phase 1 must be set as <b>【3PAL1】</b> All machines in phase 2 must be set as <b>【3PBL2】</b> All machines in phase 3 must be set as <b>【3PCL3】</b> When the output voltage is 230Vac (S model) At present the line voltage between the live wire L1 in phase 1 and the live wire L2 in phase 2 is $230 \times 1.732 = 398\text{Vac}$ , and similarly the line voltage
Timed start charging enable	Disable <b>default</b>	Disable this function
	Enable	After the time-slot charging function is enabled, the power supply mode will change to BT1ST, and system will enable the mains power charging only in the set charging period or battery over discharge; If the sectioned discharge function is enabled at the same time, the power supply mode of the system will change to AC 1ST, which only enable the mains charging in the set charging period. If charging and discharging periods overlap, priority is given to charging or switching to the battery inverter supply when the mains power is lost.
1st slot start charging	00:00:00	Setting range: 00:00:00-23:59:00
1st slot end charging	00:00:00	Setting range: 00:00:00-23:59:00

# Enerlution

Stop charging SOC 1	100%	Setting range:0-100%
2nd slot start charging	00:00:00	Setting range: 00:00:00-23:59:00
2nd slot end charging	00:00:00	Setting range: 00:00:00-23:59:00
Stop charging SOC 2	100%	Setting range:0-100%
3rd slot start charging	00:00:00	Setting range: 00:00:00-23:59:00
3rd slot end charging	00:00:00	Setting range: 00:00:00-23:59:00
Stop charging SOC 3	100%	Setting range:0-100%
Timed start discharging enable	Disable <b>default</b>	Disable this function
	Enable	After the time-slot discharge function is enabled, the power supply mode will change to AC 1ST and the system will switch to battery inverter power supply only during the set discharge period or when the mains power is off.
1st slot start discharging	00:00:00	Setting range: 00:00:00-23:59:00
1st slot end discharging	00:00:00	Setting range: 00:00:00-23:59:00
Stop discharging SOC 1	100%	Setting range:0-100%
2nd slot start discharging	00:00:00	Setting range: 00:00:00-23:59:00
2nd slot end discharging	00:00:00	Setting range: 00:00:00-23:59:00
Stop discharging SOC 2	100%	Setting range:0-100%
3rd slot start discharging	00:00:00	Setting range: 00:00:00-23:59:00
3rd slot end discharging	00:00:00	Setting range: 00:00:00-23:59:00
Stop discharging SOC 3	100%	Setting range:0-100%
<b>Battery setup</b>		
Battery type	USER	User-defined, user can set all battery parameter.
	SLd	Sealed lead-acid battery.
	FLd	Flooded lead-acid battery.
	GEL	Gel lead-acid battery.
	LFP14/ 15/ LFP 16 <b>default</b>	LFP li-ion battery, L14\L15\L16 corresponds battery cells number in series.
	N13/ N14	Ternary li-ion battery.
Maximum chg. current	60A <b>default</b>	Current setting range:0~100A.
Maximum chg. voltage	57.6V <b>default</b>	Setting range:48V~58.4V, increment of each click is 0.4V, parameter can be set only when battery type is USER and L14/15/16,N13/14
Stop discharge voltage	42V <b>default</b>	When the battery voltage falls below this voltage point and parameter 'Stop dchg. delay time' value is reached, the inverter output will be switched off. Setting range: 40V~48V,



# Enerlution

		increment of each click is 0.4V, parameter can be set only when battery type is USER and L14/15/16,N13/14
Stop dchg. delay time	5 <b>default</b>	Indicates the duration when battery voltage reached parameter "stop discharge voltage" value in over-voltage procession. Setting range: 5s~50s, increment of each click is 5s, parameter can be set only when battery type is USER and LFP14/15/16,NCM13/14
Battery Under Volt (alarm) Point	44V <b>default</b>	When the battery voltage is lower than this judgment point, the device will under-voltage alarm, the output will not shut down, setting range 40V~52V, step 0.4V
Eod recovery voltage	52V <b>default</b>	Battery recover discharge from under voltage protection when voltage above this value. Setting range: 44V~54V.
Batt. Recharging voltage	52V <b>default</b>	Inverter stops charging when the battery is full. Inverter resumes charging when the battery voltage below this value. Setting range: 44V~54V.
Max. chg. curr. by Grid	60A <b>default</b>	Current setting range:0~60A.
Batt Chg Temp Compensation	Disable <b>default</b>	Disable the battery temp compensation
	Enable	Enable the battery temp compensation
BMS comm. enable	SLA	RS485 port for PC or telecommunication control
	485 <b>default</b>	RS485 port for BMS communication.
	CAN	CAN port for BMS communication.
BMS comm. protocol	When the parameter ' BMS comm. enable' setting item =485, you can choose to match the battery manufacturer's BMS protocol to communicate with BMS for the lithium battery protection.	
	WOW <b>default</b>	PAC=PACE, RDA=Ritar, AOG=ALLGRAND BATTERY, OLT=OLITER, HWD=SUNWODA, DAQ=DAKING, WOW=SRNE, PYL=PYLONTECH, UOL=WEILAN POW=POWMR
BMS chg. curr. limit mode	HMI setting	This mode only takes effect when the inverter communicates successfully with the Li-ion battery BMS (Battery Management System); the following options are available for setting. <b>[HMI setting]</b> When this option is selected, the inverter charging current uses the value set in item ' Max Charge Current' ; at this time, item ' Max Charge Current' can be set to any value from 0 to the maximum charging current.
	BMS protocol <b>default</b>	<b>[BMS protocol]</b> When this option is selected, the charging limit current transmitted by the BMS and the value set in ' Max Charge Current' will be compared, and the smaller value will be used as the current charging current; at this time, the charging current that can be set in ' Max Charge Current' cannot be greater than the charging limits the current value of the BMS.
	Inverter logic	<b>[Inverter logic]</b> When this option is selected, the internal current limit value of the inverter will be compared with the value set in [07], and the smaller value will be taken as the

		<p>current charging current; at this time, the charging current that can be set in [07] cannot be greater than the internal current limit value of the inverter, and the logic for determining the internal current limit value of the inverter is as follows</p> <ol style="list-style-type: none"> <li>1. when the battery SOC&gt;98%, the charging current is reduced to 1/16 of the inverter's rated charging current value</li> <li>2. when the battery SOC is &gt;95%, the charging current is reduced to 1/8 of the inverter's rated charging current</li> <li>3. When the battery SOC&gt;90%, the charging current is reduced to 1/4 of the rated charging current of the inverter</li> <li>4. When battery SOC&gt;85%, the charging current is reduced to 1/2 of the inverter's rated charging current</li> </ol>
Turn To Mains Volt	43.6V <b>default</b>	When output source priority is Solar first or battery first,output source will switch to utility from battery when the battery voltage below the preset value. Setting range:40~60V
Turn To Inverter Volt	56.8V <b>default</b>	When output source priority is Solar first or battery first, output source will switch to battery from utility when the battery voltage above the preset value. Range:40~60V
Battery SOC to line	10%	Switch to utility power when the battery SOC is less than this setting
Battery SOC to inverter	100%	Switches to inverter output mode when SOC is greater than this setting
Battery curr. stop chg.	3 <b>default</b>	Charging stops when the charging current is less than the set value
Batt. SOC low alarm	15%	Triggers an alarm when the battery SOC is less than the set value
Batt. SOC stop dchg.	5%	Stops discharging when the battery SOC is less than the set value
Bat. SOC stop chg.	100%	Stops charging when the battery SOC is touch the set value
<b>On grid setup</b>		
Grid standard	Italy:CEI 021	Select the the local grid standard
	German:VDE-ARN-4105	
	Eu general:EN50549-1	
	Spain:UNE217002	
	UK:G99	
	South Africa:NRS-097	
Grid frequency	50HZ <b>default</b>	Select the inverter output frequency
	60HZ	
On grid max power	When the " off/on grid mode "is "On grid" ,you can set the max on-grid power(less than the inverter rated power)	
On grid reactive power setting	Set range:-100%~100%	

# Enerlution

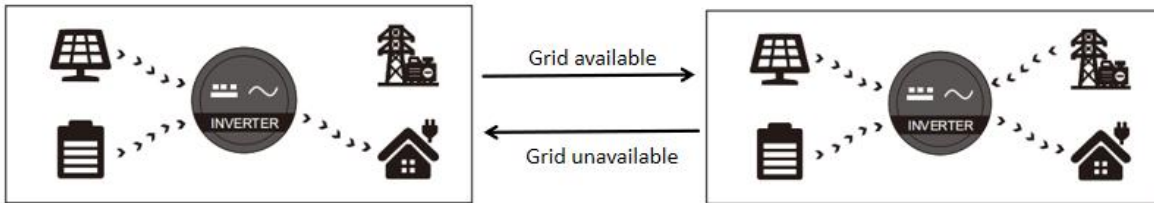
On grid PF setting	Set range:0.9 leading to 0.9 lagging	
Normal connect power ramp rate	Set range: 10s-600s	
Reconnect power ramp rate	Set range: 10s-600s	
Grid power function F-P curve	Disable <b>default</b>	It is able to adjust inverter output power according to grid frequency.
	Enable	
Grid power function V-P curve	Disable <b>default</b>	It is used to adjust the inverter active power according to the set grid voltage.
	Enable	
Grid power function V-Q curve	Disable <b>default</b>	It is used to adjust the inverter reactive power according to the set grid voltage. This function is used to adjust inverter output power (active power and reactive power) when grid voltage changes.
	Enable	
Grid power function P-Q	Disable <b>default</b>	It is used to adjust the inverter reactive power according to the set active power
	Enable	
Grid power function P-PF	Disable <b>default</b>	It is used to adjust the inverter PF according to the set active power. For the detailed setup values, please follow the local grid code.
	Enable	
Grid LVRT/HVRT	Disable <b>default</b>	This function is reserved.It is not recommended.
	Enable	
<b>Advance setup</b>		
CT ratio	1000	Select the CT ratio
	2000	
	4000	
zero-export power	20W <b>default</b>	for zero-export mode, it tells the grid output power. Recommend to set it as 20-100W to ensure the hybrid inverter won' t feed power to grid.
PE-N connect disable	Disable	Disable PE-N Automatic switching
	Enable	Enable PE-N Automatic switching
Output voltage setting	230Vac <b>default</b>	Setting range: 200/208/220/230/240Vac
Generator charging current	40A <b>default</b>	Setting range 0~60A
Oiler generator power setting	3Kw <b>default</b>	Set the input power of the generator to not exceed the rated power of the inverter
PV insulation impedance testing	Disable <b>default</b>	Disable PV insulation impedance testing
	Enable	Enable PV insulation impedance testing (ISO)

# Enerlution

## 5.3. Output priority

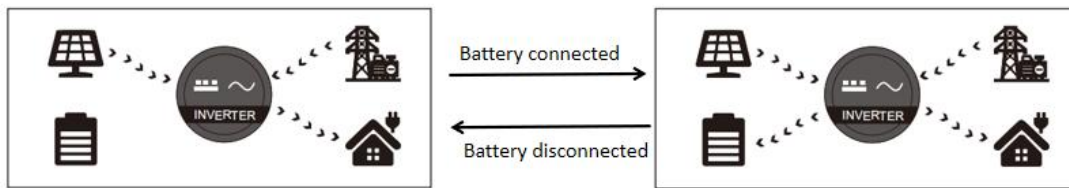
### • AC First Output

Utility at first priority, utility and solar provide power to load at the same time when solar is available, battery will provide power to load only when utility power is not available.(Priority: utility>solar>battery)



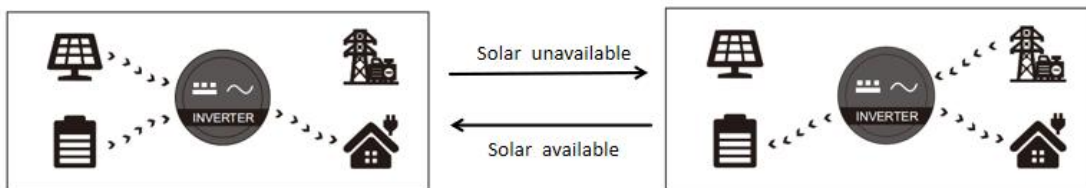
### • Solar and Grid Hybrid Output

In UTI mode, when not connected to the battery or when the battery is full, the solar and the utility supply power to the load at the same time.(Priority: solar>utility>battery)



### • Solar First Output

Solar provides power to the loads as first priority.If solar is not sufficient or not available, the utility will be used as a supplement to provide power to the loads. This mode maximises solar energy while maintaining battery power and is suitable for areas with relatively stable power grids.(Priority: solar>utility>battery)

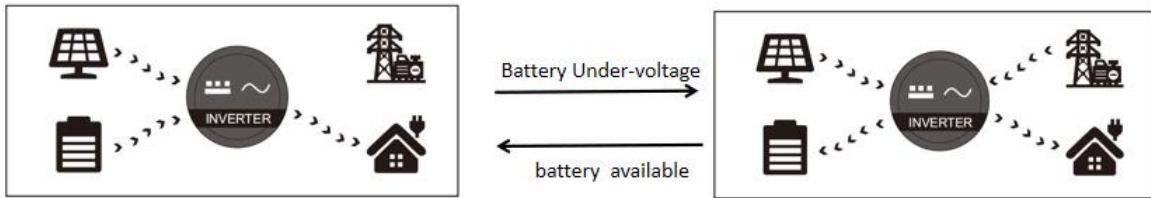


### • Battery first

Solar provides power to the loads as first priority.If solar is not sufficient or not available, the battery will be used as a supplement to provide power to the loads. When the battery voltage reaches the value of parameter (Voltage point of battery switch to utility ) will switch to utility to provide power to the load,

This model makes maximum use of DC energy and is used in areas where the grid is stable. (Priority: solar>battery>utility)

# Enerlution

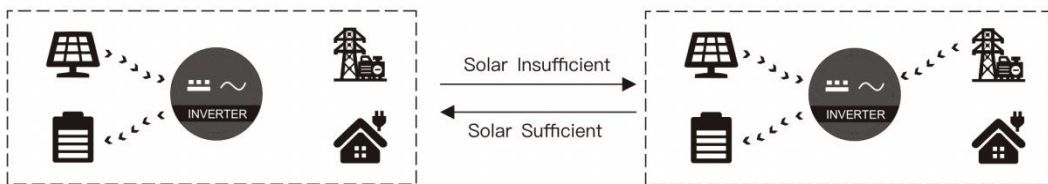


## 5.4. Battery charging mode

The charging mode corresponds to the parameter Battery Charging Mode, allowing the user to set the charging mode manually.

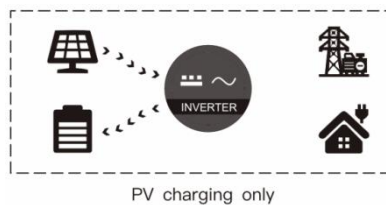
- **Hybrid Charging**

PV and mains charge the battery at the same time, with PV taking priority and mains acting as a supplement when PV is insufficient. This is the fastest charging method and is suitable for areas with insufficient power supply, providing sufficient backup power for users. (Priority: PV > utility)



- **Only Solar Charging**

Only photovoltaic electricity is used to charge the battery, without starting the mains charging. This is the most energy-efficient method, with all battery power coming from solar energy, and is usually used in areas with good radiation conditions.



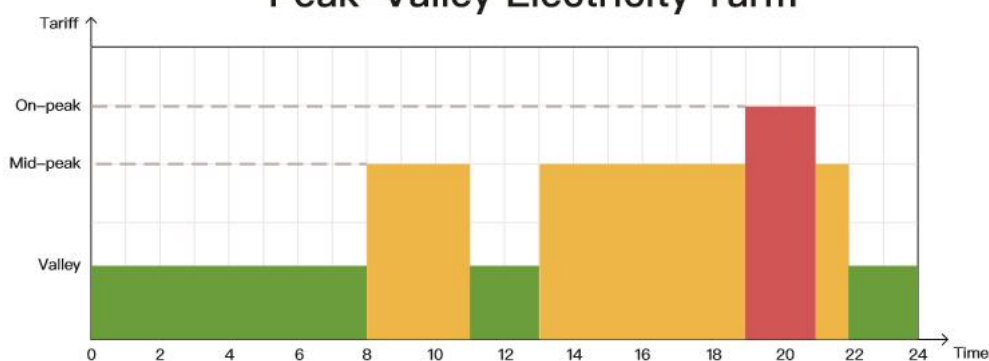
## 5.5、 Time-slot charging/discharging function

The HESP series is equipped with a time-slot charging and discharging function, which allows users to set different charging and discharging periods according to the local peak and valley tariffs, so that the utility power and PV energy can be used rationally.

When mains electricity is expensive, the battery inverter is used to carry the load; when the mains electricity is cheap, the mains electricity is used to carry the load and charge, which can help customers to save electricity costs to the greatest extent.

The user can turn on/off the time-slot charging/discharging function in setup menu parameter 46 and 53. and set charging and discharging slot in parameter . Below are examples for users to understand the function.

### Peak-Valley Electricity Tariff



#### 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 Discharging 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 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

## 5.6、 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	57.6V	56.8V	57.6V	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 ~ 600 minutes	√

## • Li-ion battery

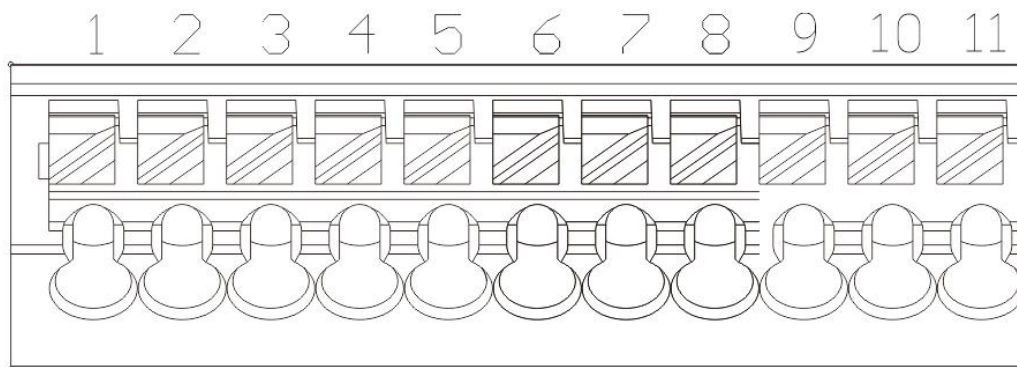
<b>Battery type</b> <b>Parameters</b>	<b>Ternary (N13)</b>	<b>Ternary (N14)</b>	<b>LFP (L16)</b>	<b>LFP (L15)</b>	<b>LFP (L14)</b>	<b>Adjustable</b>
Overvoltage disconnection voltage	60V	60V	60V	60V	60V	
Battery fully charged recovery point	50.4V	54.8V	53.6V	50.4V	47.6V	√
Equalizing charge voltage	-	-	-	-	-	√
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	√



## 6. Communication

### 6.1、 Dry contact

1. RSD power supply
2. Temperature sampling (reserved)
3. Generator remote start/stop
4. CT connection



Function	Description
RSD power supply	PIN 1 is GND, PIN 5 is RSD 12V+
Temperature sampling (reserved)	Pin 1 & Pin 4 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 7 to 8 are normally open. (Pin 6/7/8 output 125Vac/1A,230Vac/1A,30Vdc/1A)
CT connection	PIN 10: CT-, PIN11:CT+

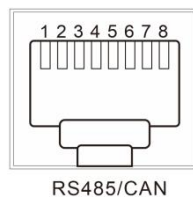


#### NOTICE

If you need to use the remote start/stop function of the generator with dry contact, ensure that the generator has ATS and supports remote start/stop.

## 6.2、RS485/CAN communication port

RS485/CAN communication port for RS485 and CAN communication with lithium battery BMS;



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

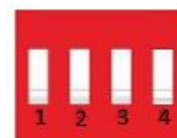
## 6.3、DIP switch

When RS485 port PIN1 and PIN2 are used for BMS 485 communication, put down DIP 1,2,

When RS485 port PIN7 and PIN8 are used for BMS 485 communication, up DIP 1,2

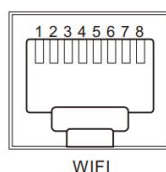
When using a single machine, put down DIP 3,4

When the inverter are in parallel, put down DIP 3,4, of any two inverters



## 6.4、WIFI port

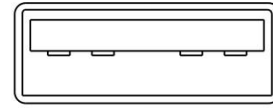
The WIFI port is used to connect to the Wi-Fi/GPRS data acquisition module, which allows the user to view the operating status and parameters of the inverter via the mobile



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

## 6.5、 USB-A port

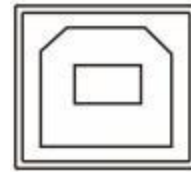
It is used to updated the screen firmware



## 6.6、 USB-B port

This port is a USB communication port, which can be used for USB communication with the selected upper computer software of our company (Need to apply for).

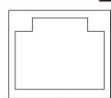
To use this port, the corresponding "USB to serial port chip CH340T driver" should be installed in the computer.



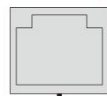
## 6.7、 Parallel port

- a) This port is used for parallel communication, through which the parallel modules can communicate with each other.
- b) Each machine has two 8Pin ports, one for the parallel\_A and one for the parallel\_B.
- c) When connecting, make sure to connect the local Parallel\_A to the parallelized machine Parallel\_B, or the local Parallel\_B should be connected to the parallelized machine Parallel\_A.
- d) Do not connect local parallel\_A to local parallel\_B.

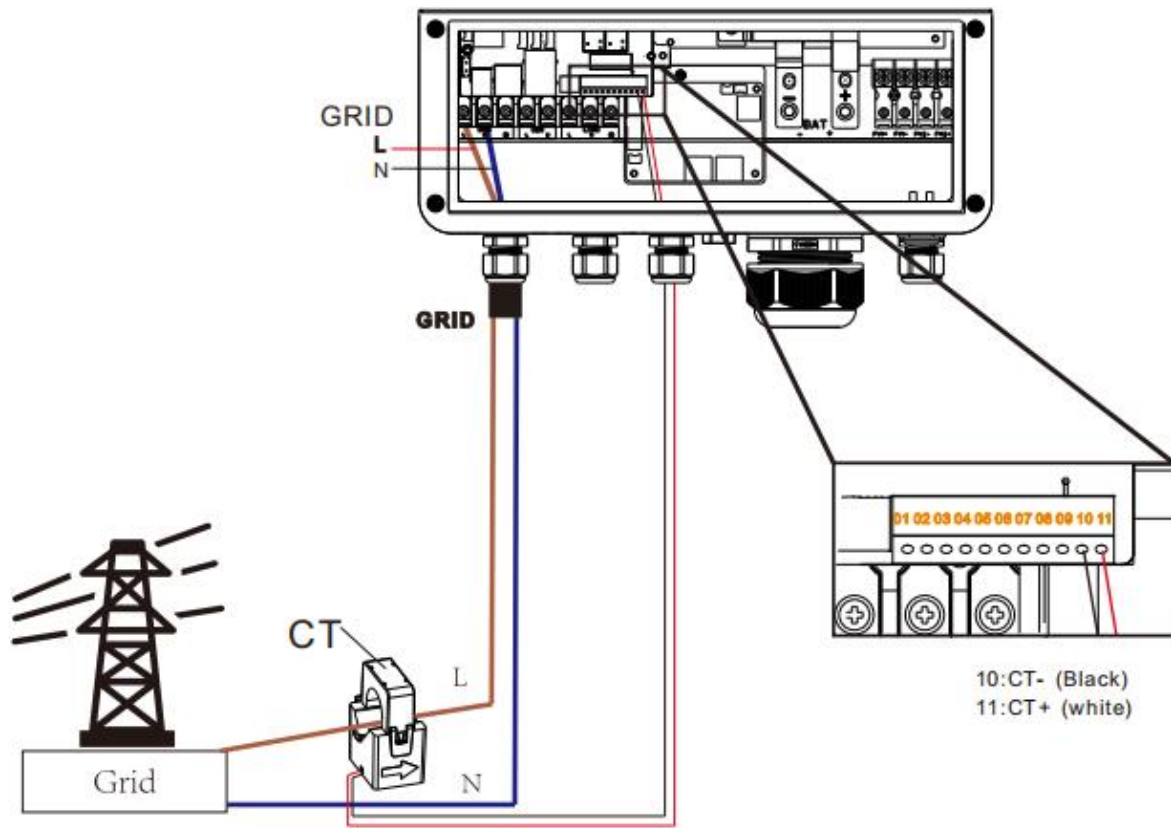
Parallel\_A



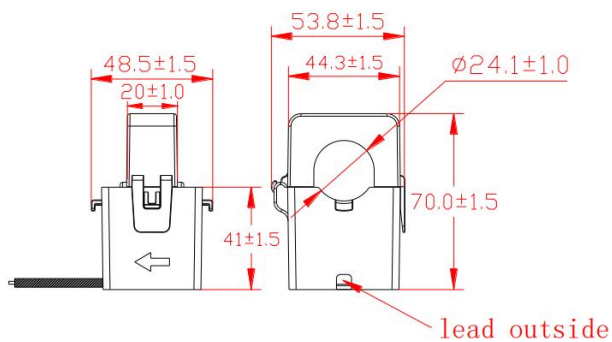
Parallel\_B



## 6.8 、 External CT port



1. Split Core Current Transformer (CT) dimension: (mm)
2. Secondary output cable length is 4m.
3. The CT direction is "to inverter"



## 7.App Instructions

Enerlution app can connect all your devices via Bluetooth and Wi-Fi to track your energy use and production in real time, dynamically display the status data of the device in real time, and control the energy of the device directly from your hands.

### 7.1、 APP DOWNLOAD

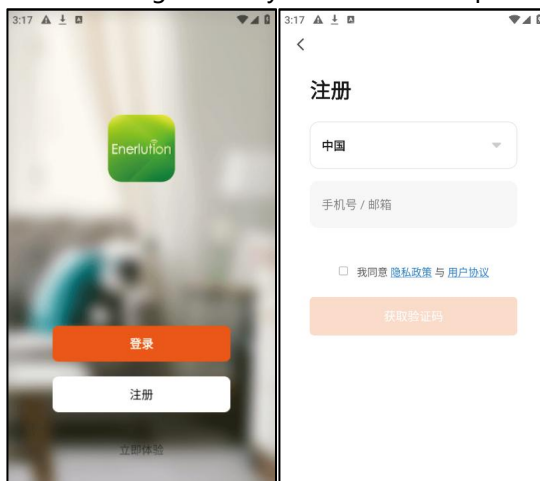
Scan the QR code below for your Android or iPhone to download and install the APP , or in the Google App Store, Apple App Store search for "Enerlution"



Note: This APP is currently only available on Google App Store and Apple App Store,Users in China need to connect to the Internet through VPN.

### 7.2、 LOGIN

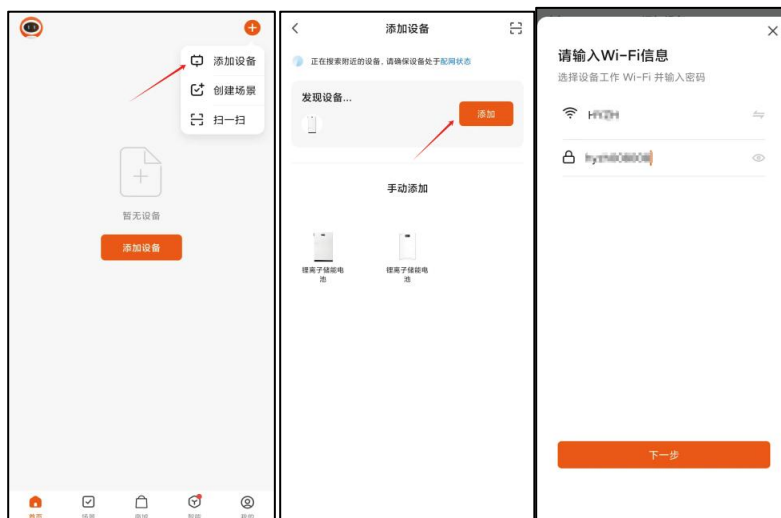
Sign in to the APP. Registered Address Select the country where the battery device resides. Foreign addresses need to be registered by email, and domestic addresses can be registered by email or mobile phone number.



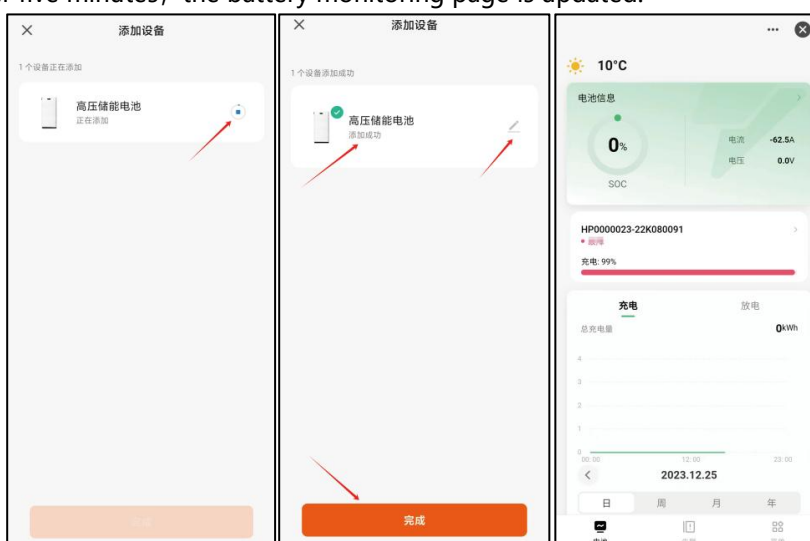
Note: After logging in to the APP, when configuring the network, the mobile phone needs to enable Bluetooth and location rights, and make the mobile phone connect to 2.4G or 2.4G/5G hybrid Wi-Fi network, Bluetooth and GPS can be turned off after completing the network.

### 7.3、 Adding Devices

Open the Enerlution APP, click the upper right corner, select add device. If the APP does not enable the location permission, it will prompt you to open, and you can agree to open it.After entering the Add page, it will automatically search for the current device, click Add, and the WiFi information input window will pop up to confirm that the WiFi name is the same as the WiFi connected to the current phone, And enter the WiFi password, click "Next".



Wait for the device to add a network, After the device is successfully added, the APP interface displays a success message. At this time, click the pen icon to change the battery name and distinguish different batteries. Then click Finish to jump to the battery monitoring page. After five minutes, the battery monitoring page is updated.



## 8. Fault and Remedy

### 8.1、 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

# Enerlution

			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).
【13】	OverloadBypass	Yes	Bypass overload protection.
【14】	OverloadInverter	Yes	Inverter overload protection.
【15】	AcOverCurrHw	Yes	Inverter overcurrent (hardware protection).
【17】	InvShort	Yes	Inverter short-circuit protection.
【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.
【26】	RlyShort	Yes	Inverted AC Output Backfills to Bypass AC Input.
【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).

# Enerlution

【32】	BatCapacityLowStop	Yes	Inverter stops when battery capacity is low (setting BMS to enable validity).
【34】	CanCommFault	Yes	CAN communication fault in parallel operation.
【35】	ParaAddrErr	Yes	Parallel ID (communication address) setting error.
【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.



# Enerlution

【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 BMS 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.

## 8.2、 Troubleshooting

Fault code	Faults	Remedy
<b>Display</b>	No display on the screen	Check if the battery switch or PV switch is closed; whether the switch is in the "ON" state; press any button on the screen to exit the screen sleep mode.
<b>【06】</b>	Battery overvoltage protection	Check that the battery voltage does not exceed the protection value. If it does, discharge the battery until the voltage falls below the battery over-voltage recovery point.
<b>【01】</b> <b>【04】</b>	Battery undervoltage protection	Charge the battery until it returns to the low voltage disconnection recovery voltage.
<b>【21】</b>	Fan failure	Check if the fan is not turning or blocked by foreign object.
<b>【19】</b> <b>【20】</b>	Heat sink over temperature protection	When the temperature of the device is cooled below the recovery temperature, normal charge and discharge control is resumed.
<b>【13】</b> <b>【14】</b>	Bypass overload protection, inverter overload protection	① Reduce the use of power equipment; ② Restart the unit to resume load output.
<b>【17】</b>	Inverter short-circuit protection	① Check the load connection carefully and clear the short-circuit fault points; ② Re-power up to resume load output.
<b>【09】</b>	PV overvoltage	Use a multimeter to check if the PV input voltage exceeds the maximum allowable input voltage rated.
<b>【03】</b>	Battery disconnected alarm	Check if the battery is not connected or if the battery circuit breaker is not closed.
<b>【40】</b> <b>【43】</b>	Parallel connection fault	Check if the parallel line is not connected well, such as loose or wrong connection.
<b>【35】</b>	Parallel ID setting error	Check whether the setting of parallel ID number is repeated.
<b>【37】</b>	Parallel current sharing fault	Check if the parallel current sharing line is not connected well, such as loose or wrong connection.

# Enerlution

<b>【39】</b>	Inconsistent AC input source in parallel mode	Check whether the parallel AC inputs are from the same input interface.
<b>【42】</b>	Inconsistent system firmware version in parallel mode	Check whether the software version of each inverter is consistent.
<b>【44】</b>	Serial number error	Incorrect device serial number setting.
<b>【45】</b>	Parallel mode error	There is a device in the parallel system with the wrong parallel mode setting.
<b>【49】</b>	High grid voltage	Check that the grid voltage is within the normal range, if the grid voltage is abnormal, wait until the grid voltage is restored.
<b>【50】</b>	Low grid voltage	Check that the grid voltage is within the normal range, if the grid voltage is abnormal, wait until the grid voltage is restored.
<b>【51】</b>	High grid frequency	Check that the grid frequency is within the normal range, if the grid frequency is abnormal, wait until the grid frequency is restored.
<b>【52】</b>	Low grid frequency	Check that the grid frequency is within the normal range, if the grid frequency is abnormal, wait until the grid frequency is restored.
<b>【53】</b>	Grid unconnected	Check if the grid is correctly connected, e.g. if the switch is closed and if the grid is disconnected.
<b>【54】</b>	Grid-connected current with DC component over	Power down and restart the device, if it continues to report faults, contact the manufacturer after sales.
<b>【56】</b>	Low insulation resistance fault	Check that the system is well grounded and that the PV modules and cables are not worn.
<b>【57】</b>	Leakage current overload fault	Check that the system is well grounded and that the loads are not operating abnormally.



## **NOTICE**

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

## 9. Protection and Maintenance

### 9.1. Protection features

No	Protection Feature	Instruction
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 will report a fault and stop the PV boost to output a sinusoidal AC wave.
3	PV night reverse current protection	At night, the battery is prevented from discharging through the PV module because the battery voltage is greater than the voltage of PV module.
4	AC input over-voltage protection	When the AC input voltage of each phase exceeds 280V, the mains charging will be stopped and switched to the inverter mode.
5	AC input under-voltage protection	When the AC input voltage of each phase below 170V, the utility charging will be stopped and switched to the inverter mode.
6	Battery over-voltage protection	When the battery voltage reaches the over-voltage cut-off point, the PV and the utility will automatically stop charging to prevent the battery from being overcharged and damaged.
7	Battery under-voltage protection	When the battery voltage reaches the under-voltage cut-off point, the inverter will automatically stop the battery discharge to prevent damage from over-discharging the battery.
8	Battery over-current protection	After a period when the battery current exceeds that allowed by the hardware, the machine will switch off the output and stop discharging the battery.
9	AC output short-circuit protection	When a short-circuit fault occurs at the load output terminal, the AC output is immediately turned off and turned on after 1 second. If the output load terminal is still short-circuited after 3 attempts, the inverter must be manually restarted after first removing the short-circuit fault from the load before the normal output can be restored.
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	After triggering the overload protection the inverter will resume output after 3 minutes, 5 consecutive overloads will switch off the output until the inverter is restarted. (102% < load < 125%) : alarm and output shutdown after 5min; (125% < load < 150%) : alarm and output shutdown after 10s.

# Enerlution

		Load > 150% : alarm reported and output switched off after 5s.
12	AC output reverse	Prevents AC back flow from the battery inverter to the bypass AC input.
13	Bypass over-current protection	Built-in AC input over-current protection circuit breaker.
14	Bypass phase inconsistency protection	When the phase of the bypass input and the phase of the inverter split do not match, the inverter disables switching to the bypass output to prevent the load from dropping out or short-circuiting when switching to the bypass.
15	Charging short-circuit protection	When the external battery port is short-circuited in the PV or AC charging state, the inverter will protect and stop the output current.
16	Parallel connection error protection	In parallel operation, the equipment will be protected when the parallel line is lost.
17	Parallel battery voltage difference protection	In parallel operation, the equipment will be protected when the battery connection is inconsistent and the battery voltage is greatly different from that detected by the host.
18	Parallel AC voltage difference protection	In parallel operation, the equipment will be protected when the AC IN input connection is inconsistent.
19	Synchronization signal fault protection	The equipment will be protected when there is a fault in the guidance signal between parallel buses, causing inconsistent behavior of each inverter.

## 9.2、 Maintenance

**To maintain optimum and long-lasting working performance, we recommend that the following items are 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 the insect screen 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.

A red rectangular warning box containing a white triangle with an exclamation mark and the word "DANGER" in white capital letters.

- 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. Photovoltaic 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.

## 10. Datasheet

MODEL	HY-4K-EU	HY-4.6K-EU	HY-5K-EU HY-5.5K-EU	HY-6K-EU
<b>Inverter output</b>				
Rated Output Power	4000W	4600W	5500W	6000W
Max. Peak Power	8000VA	9200VA	11000VA	12000W
Rated Output Voltage	230Vac (Single phase) (200/208/220/240Vac settable)			
Output voltage error	±5%			
Load Capacity of Motors	3HP	4HP	4HP	4HP
Rated AC Frequency	50/60Hz ± 0.3Hz			
Waveform	Pure Sine Wave			
Switch Time	10ms (typical)			
Overload	<p>After triggering the overload protection the inverter will resume output after 3 minutes, 5 consecutive overloads will switch off the output until the inverter is restarted.</p> <p>(102% &lt; load &lt; 125%): alarm and output shutdown after 5min;                      (125% &lt; load &lt; 150%) : alarm and output shutdown after 10s.                      Load &gt; 150% : alarm reported and output switched off after 5s.</p>			
<b>AC OUT (on-grid)</b>				
Rated Output Power	4000W	4600W	5500W	6000W
Max. Peak Power	8000VA	9200VA	11000VA	12000VA
Power factor	0.8 leading to 0.8 lagging	0.8 leading to 0.8 lagging	0.8 leading to 0.8 lagging	0.8 leading to 0.8 lagging
Rated voltage	220/230Vac	220/230Vac	220/230Vac	220/230Vac
Rated AC Frequency	50/60Hz	50/60Hz	50/60Hz	50/60Hz
Rated AC out current	17.4Aac	20Aac	24Aac	26Aac
THD	<3%	<3%	<3%	<3%
<b>Battery</b>				
Battery Type	Li-ion / Lead-Acid / User Defined			
Rated Battery Voltage	48Vdc ( minimum start-up voltage 44V )			
Voltage Range	40-60Vdc			
Max. Generator Charging Current	60Adc			
Max. Grid Charging Current	60Adc			
Max. Hybrid Charging Current	100Adc			
<b>PV input</b>				
Num. of MPP Trackers	2			
Max. PV array power	3000W+3000W	3500W+3500W	4000W+4000W	4500W+4500W
Max. input current	16/16Adc			
Max.PV Isc	27A/27Adc			
Max. Voltage of Open Circuit	500Vdc			
MPPT Voltage Range	120-450Vdc			

# Enerlution

<b>Grid / Generator input</b>	
Input Voltage Range	90-280Vac
Frequency Range	50/60Hz
Max.AC bypass current	40Aac
<b>Efficiency</b>	
MPPT Tracking Efficiency	99.9%
Max Efficiency	97.5%
European Efficiency	97%
<b>Protection</b>	
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
<b>Certified specifications</b>	
On-grid standard	EN50549-1,G99,NRS-097,CEI 021,VDE-ARN-4105,,UNE217002
Safety	IEC62109-1, IEC62109-2
EMC	EN61000-6-1, EN61000-6-3, FCC 15 class B
RoHS	Yes
<b>Basic data</b>	
Parallel capacity	6
Operating Temperature Range	-25~60°C, >45°C derated
Humidity range	0-100%
Warranty	5 years
Noise	<60dB
Protection Degree	IP65
Cooling Method	Heat sink + intelligent fan cooling
Self-consumption	<100W
Dimensions	556*345*182mm
Weight	20kg
Communication port	RS485 / CAN / USB / Dry contact
External Modules (Optional)	Wi-Fi / GPRS